Base Load Power Hub (BLPH)

EQUIPMENT TECHNICAL DATA SHEET

Document Number: 1724000775-EL-DS-00004

ROSETTI MARINO

1	NO COMMENTS - APPROVED - WORK MAY PROCEED
2	MINOR COMMENTS - REVISE AND RESUBMIT - WORK MAY PROCEED
3	MAJOR COMMENTS – REJECTED – DO NOT PROCEED
4	APPROVAL NOT REQUIRED

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1 EQUIPMENT DATA SHEETS, MANUALS & SETTINGS

1.1 SICE MARINE /STATUS LIGHT SICE-LXS-YEL-05-1/SICE-LXS-RED-03-1 DATA SHEET



ZONE 1 TYPE SICE-LXS-RED-03-1
SUBSIDIARY MARINE RED SIGNAL LIGHT RANGE >5 NM



SIGNAL LIGHT STATION
SICE-LXS-RED-03-1
INCLUDING PEDESTAL

Subsidiary red lantern, led type, with very high efficiency & long life. It is suitable for marking the fixed obstacles over the sea, in compliance with IALA Recommendations as "Subsidiary Red Signal Light", where a range >3 nautical miles is required. This lantern contains 1 tier of red LED equipped with 48 LEDs and is driven by a "driver & coder circuit", at constant controlled current.

Main advantages:

- ✓ *Long lifetime. Expected 40 years with effective intensity >100cd*
- ✓ *Self-cleaning borosilicate cover glass*
- ✓ *Reduced connection cable size. The Expected constant current of this lantern is 0.07A at 90Vdc approx*
- ✓ *Reduced dimensions*
- ✓ *Easy installation*
- ✓ *Very low maintenance required*
- ✓ *ATEX and IECEx certified for wide temperature range of working*
- ✓ *Very high reliability with very low failure expectancy because:*
  - ➢ *No moving parts are placed inside the lantern. Only the LEDs tiers are installed inside this equipment.*
  - ➢ *No electronic devices are placed inside the lantern. The photocell and coder driver circuits are placed in a dedicated control panel.*

MAIN TECHNICAL DATA:

✓ -Control circuit driver & coder supply voltage	:	Standard 24Vdc (range from 21 to 33Vdc) (available others voltage on request)
✓ -Lantern supply voltage	:	90Vdc (+-15% approx., provided by coder-driver circuit)
✓ -Power consumption	:	<10W peak approx. (19Wh/day for 14 hours activation/day) (*) (**)
✓ -Starting effective intensity	:	>200cd (during dot) (*)
✓ -Vertical divergence	:	8 degrees to 50%; asymmetric (+1.5 / - 6.5)
✓ -Horizontal divergence	:	360 degrees
✓ -Expected life time minimum	:	>30.000 working hours (>40 years approx. with "U" code) (*)
✓ -Lumen maintenance	:	90% at 30.000 hours (40 years approx. with "U" code) (*)
✓ -Working temperature range	:	From -52°C to +60°C
✓ -Coder & driver circuits	:	External in the control panel
✓ -Photocell	:	External in the control panel
✓ -Synchronization	:	Possible through coders circuits
✓ -Mechanical protection	:	IP66
✓ -Marking ATEX	:	Ex de IIC T4 Gb
✓ -Marking IECEx	:	Ex tb IIIC T135°C Db IP66
✓ -ATEX Certificate Number	:	INERIS 01ATEX 0019X
✓ -IECEx Certificate Number	:	INE 15.00031X
✓ -(*) Expected IALA "U" CODE (standard)	:	0.4" on; 0.5" off; 0.4" on; 0.5" off; 1.2" on; 12" off (15" total period)
✓ -(**) Driver & coder efficiency included		

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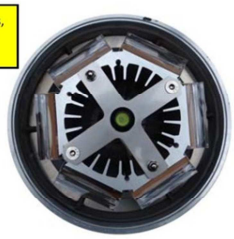


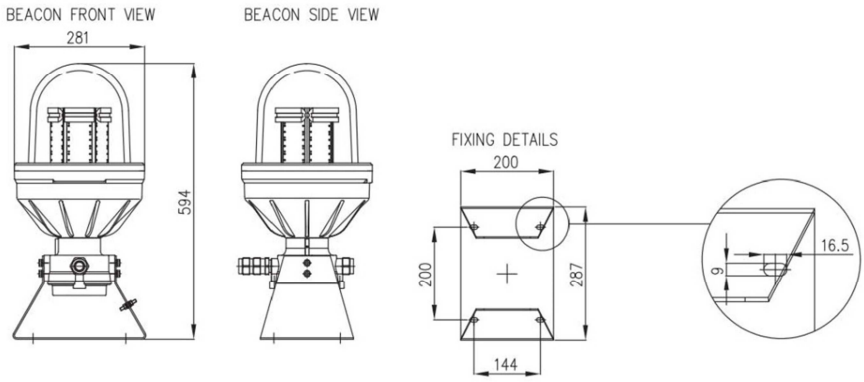
ZONE 1 TYPE SICE-LXS-RED-03-1
SUBSIDIARY MARINE RED SIGNAL LIGHT RANGE >5 NM



Terminal strip junction box placed in the bottom side

Internal layout with LED arrays, LED lenses, heatsink and bubble highlighted





MAIN MECHANICAL DATA:

-Body material	: Marine grade aluminium painted for off-shore use
-Painting color	: RAL 7035
-Pedestal	: AISI 316L Stainless Steel not painted
-Cover	: Borosilicate fused tempered glass, self-cleaning
-LED manufacturer	: CREE
-LED quantity	: 48
-Connection junction box	: Included in the equipment
-Connection terminals	: Suitable for wires from 0.5 to 2.5 mm² (standard)
-Signal light weight	:15kg
-Optional accessory	: Support pole

Document can be subjected to modifications, without prior notice

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1.2 LUXSOLAR MIOL OBSTRUCTION LIGHT L864-LXS-EX-CS2LJS DATA SHEET



According to ICAO - Annex 14 Medium Intensity Obstruction Lights - Type A Ex, B Ex or C Ex - have to be used where the obstacle is particularly large and the height of the surrounding ground is more than 45m in hazardous areas.

Medium Intensity Obstacle Lights Type A Ex and C Ex have to be used alone, whereas Medium Intensity Obstacle Lights, Type B Ex, should be used either alone or in combination with Low Intensity Obstacle Lights, Type B Ex.

The Medium Intensity Obstruction Lights Type A Ex is white flashing.

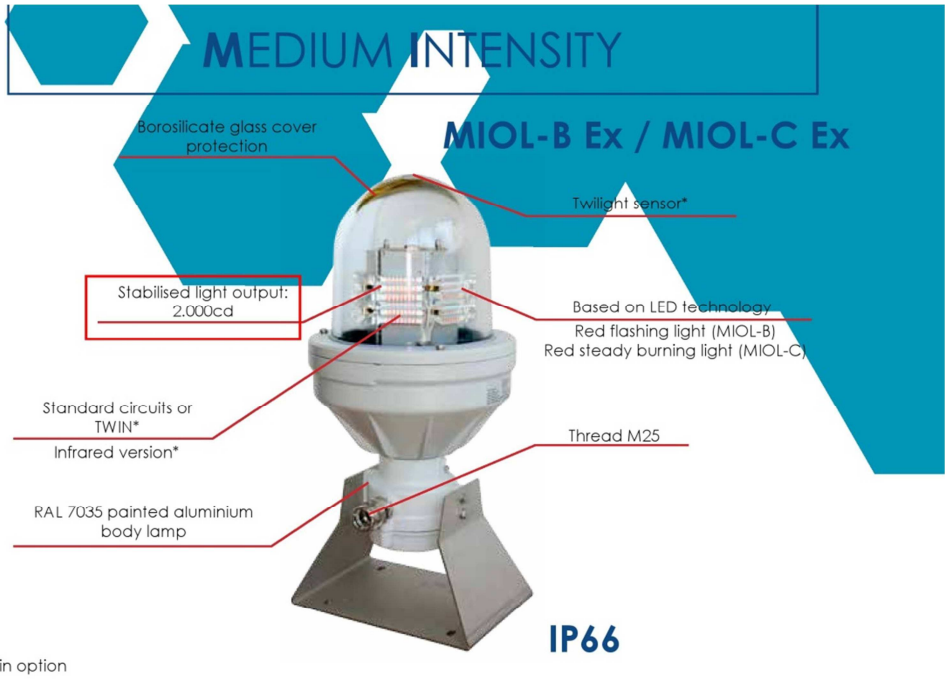
The Medium Intensity Obstruction Lights Type B Ex is red flashing.

The Medium Intensity Obstruction Lights Type C Ex is red steady burning.

This type is equivalent to the Medium Intensity compliant with CAP 168

LXS® LUXSOLAR®

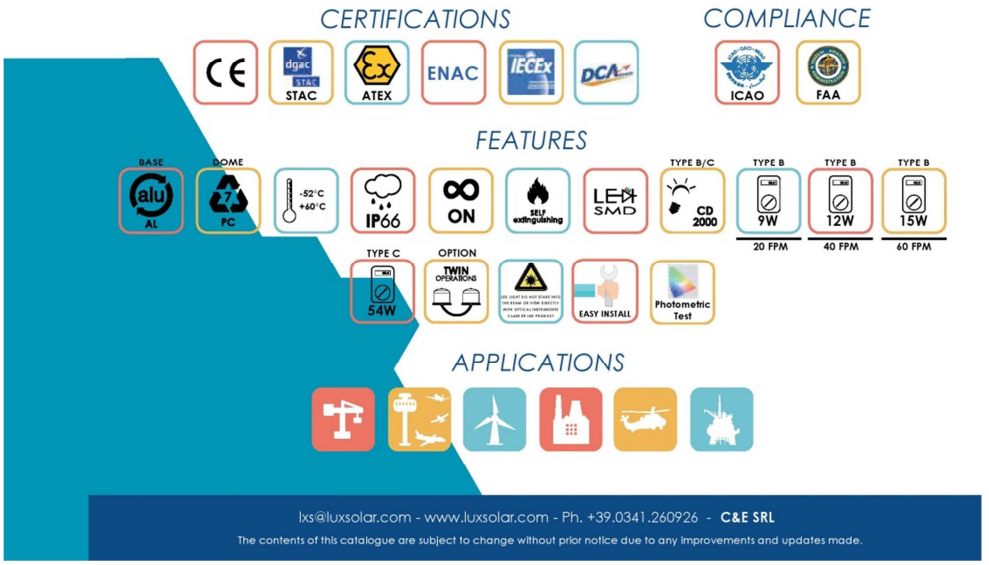
8 C&E SRL - lxs@luxsolar.com - www.luxsolar.com - Ph. +39.0341.260926



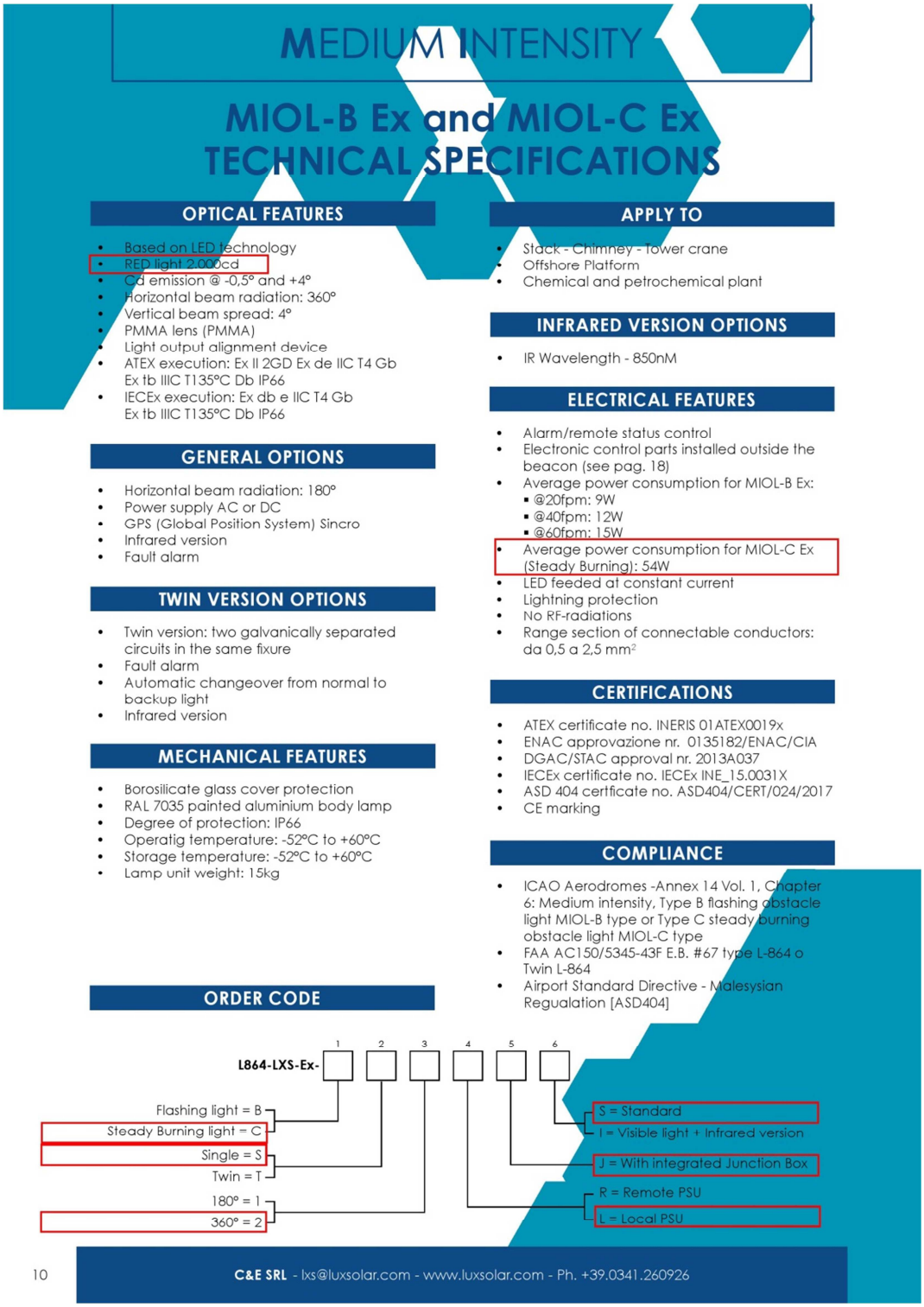
Medium Intensity Obstruction Light is according to ICAO (Medium Intensity – Type B or C), FAA (Type L-864) and ATEX certified.

This beacon is the ideal solution for an **efficient, lightweight** and **compact** obstacle signalling.

MIOL-B Ex is emits a **red flashing light**, while **MIOL-C Ex** emits **red steady burning light**.



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MEDIUM INTENSITY

MIOL-B Ex and MIOL-C Ex TECHNICAL SPECIFICATIONS

OPTICAL FEATURES

- Based on LED technology
- RED light 2.000cd
- Cd emission @ -0,5° and +4°
- Horizontal beam radiation: 360°
- Vertical beam spread: 4°
- PMMA lens (PMMA)
- Light output alignment device
- ATEX execution: Ex II 2GD Ex de IIC T4 Gb Ex tb IIIC T135°C Db IP66
- IECEx execution: Ex db e IIC T4 Gb Ex tb IIIC T135°C Db IP66

GENERAL OPTIONS

- Horizontal beam radiation: 180°
- Power supply AC or DC
- GPS (Global Position System) Sincro
- Infrared version
- Fault alarm

TWIN VERSION OPTIONS

- Twin version: two galvanically separated circuits in the same fixure
- Fault alarm
- Automatic changeover from normal to backup light
- Infrared version

MECHANICAL FEATURES

- Borosilicate glass cover protection
- RAL 7035 painted aluminium body lamp
- Degree of protection: IP66
- Operatig temperature: -52°C to +60°C
- Storage temperature: -52°C to +60°C
- Lamp unit weight: 15kg

APPLY TO

- Stack - Chimney - Tower crane
- Offshore Platform
- Chemical and petrochemical plant

INFRARED VERSION OPTIONS

- IR Wavelength - 850nM

ELECTRICAL FEATURES

- Alarm/remote status control
- Electronic control parts installed outside the beacon (see pag. 18)
- Average power consumption for MIOL-B Ex:
  - @20fpm: 9W
  - @40fpm: 12W
  - @60fpm: 15W
- Average power consumption for MIOL-C Ex (Steady Burning): 54W
- LED feeded at constant current
- Lightning protection
- No RF-radiations
- Range section of connectable conductors: da 0,5 a 2,5 mm²

CERTIFICATIONS

- ATEX certificate no. INERIS 01ATEX0019x
- ENAC approvazione nr. 0135182/ENAC/CIA
- DGAC/STAC approval nr. 2013A037
- IECEx certificate no. IECEx INE_15.0031X
- ASD 404 certficate no. ASD404/CERT/024/2017
- CE marking

COMPLIANCE

- ICAO Aerodromes -Annex 14 Vol. 1, Chapter 6: Medium intensity, Type B flashing obstacle light MIOL-B type or Type C steady burning obstacle light MIOL-C type
- FAA AC150/5345-43F E.B. #67 type L-864 o Twin L-864
- Airport Standard Directive - Malesysian Regualation [ASD404]

ORDER CODE

L864-LXS-Ex- [1] [2] [3] [4] [5] [6]

- [1]: Flashing light = B; Steady Burning light = C
- [2]: Single = S; Twin = T
- [3]: 180° = 1; 360° = 2
- [4]: R = Remote PSU; L = Local PSU
- [5]: J = With integrated Junction Box
- [6]: S = Standard; I = Visible light + Infrared version

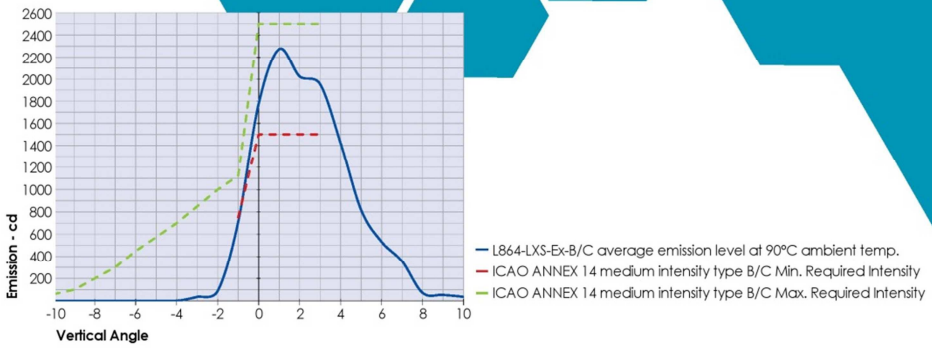
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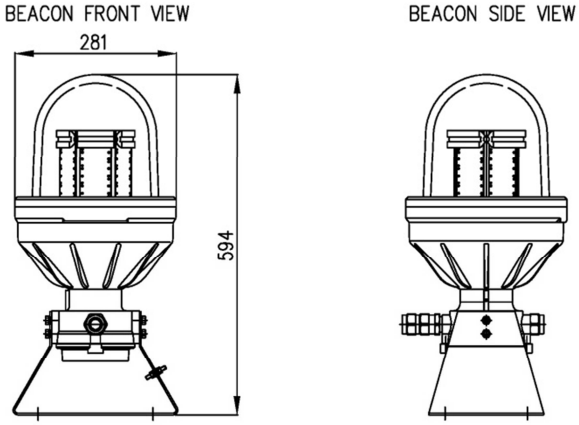
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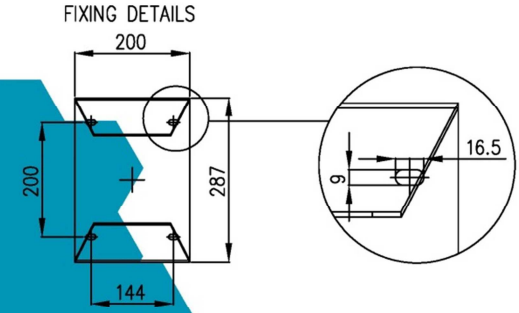
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MEDIUM INTENSITY

MIOL-B Ex and MIOL-C Ex
TECHNICAL SPECIFICATIONS







LUXSOLAR and LXS are trademarks of C&E SRL

11

1.3 TECHNOR SERIES LIGHTING APPARATUS EV/EVDE INSTRUCTIONS

Technor® ITALSMEA
A company of MARECHAL ELECTRIC GROUP

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Phone +39 - 02 - 9500151 Fax +39 - 02 - 95001527
tech@italsmea.com www.italsmea.com

EV.. / EVde.. SERIES LIGHTING APPARATUS - USE AND MAINTENANCE INSTRUCTIONS

IMPORTANT – READ CAREFULLY

a) The apparatus must be installed according to EN / IEC 60079-14 (edit in force) and maintenance operations must be performed according to EN / IEC 60079-17 (edit in force). The user must be aware of electricity risks, chemical and physical characteristics of gas, vapours, dusts present in the plant. Lighting apparatus EV… series are protected by mode of protection "d" – Explosion proof enclosures.
The lighting apparatus EVde.. series have two sections:
- lamp and accessories enclosures with mode of protection "d" – Explosion proof enclosures
- terminals enclosure with mode of protection "e" – Increased safety

To further guarantee good product quality/safety, the Quality System of Technor Italsmea is evaluated and approved by a Notified Body which carries out Quality System surveillance.
Technor Italsmea ensures and guarantees correct manufacturing of its products. Buyer and/or end User are directly responsible of correct product installation and maintenance, according to local and national laws and product installation specifications.
WARNING – All modifications / changing, made by buyer / end user, without Technor Italsmea written acceptance, certification, warranties and any other contractual agreement will be invalidate.

b) TYPE OF PROTECTION

Increased safety "e", Flameproof "d", protection by enclosure "t" according to :
EN 60079-0 - IEC 60079-0
EN 60079-1 - IEC 60079-1
EN 60079-7 - IEC 60079-7
EN 60079-31 - IEC 60079-31

1. In the type of protection "d", the electric equipment is installed in enclosure suitable to withstand the pressure raised during the internal explosion and avoids flame transmission to the external potentially explosive atmosphere.
2. The type of protection "e" is a protection in which additional measures are applied so as to give increased security against the possibility of excessive temperatures and of the occurrence of arcs and sparks inside and on external parts of electrical apparatus which does not produce arcs or sparks in normal service.
3. Type of protection "t" avoids combustible dust penetration into enclosure and ensures surface temperature limitation for use in explosive dust atmospheres.
4. The integrity of the enclosure must not be compromised with not authorized drillings, unused and not closed pipe and/or cable entries.
5. Do not compromise the IP65 protection degree, obtained with the installation of gaskets in material certified for that job.
6. Verify the absence of lighting apparatus causes of stress different from what the lighting apparatus was certified for (i.e. exposure to damaging for collisions, corrosive agents presence, internal short circuits possibility with power dissipation superior than the admitted one).

c) PLACING IN SERVICE

Before making the placing in service of a certified apparatus, user must:
1. Verify the match to the project data and the correct installation.
2. Verify that the certified apparatus is suitable for the dangerous place classification.
3. Verify that the group of the certified apparatus is suitable for gases, vapours and/or dusts presents.
4. Verify that the certified apparatus temperature class is suitable for gases, vapours and/or dusts existing in the installation site.
5. At the certified apparatus must be assigned the service for which was built (ratings, mechanical and thermal stress within project data).
6. Verify the fastening of the electric and mechanical connections.
7. Verify the integrity and the continuity of grounding, protection or equipotential conductors.
8. Verify that were not produced modifications not expressly authorized by Technor Italsmea or that however changes the electrical and/or mechanical structure and functionality of the certified apparatus.
9. Threaded entries must be equipped with suitable cable glands and blanking elements certified according to type of protection Ex d IIC (EV .. series), Ex e IIC (EVde .. series) and /or Ex tb IIIC, suitable to maintain the enclosure protection degree IP65 and suitable for ambient temperature as stated on marking tag.
   Ex d parallel thread accessories must be secured against loosening to the threaded entries with medium strength threadlocker (eg Loctite 243 or equivalent).
10. Pipe entries (EV.. series only) must be equipped with sealing fittings, correctly filled and installed close to the enclosure.
11. Cable entries : M25x1,5 (unless otherwise indicated near the enclosure entry)

d) MAINTENANCE

1. The maintenance is a combination of operations executed at the purpose to keep or to restore a certified apparatus in the conditions in which it is able to meet the requirements of the relevant specification and perform its required functions. These maintenance operations must be made in conformity to the prescriptions of the Rules EN 60079-17 (Edit in force) or IEC 60079-17 (Edit in force).
2. During the time, the initial characteristics of the certified apparatus must be assured by a detailed maintenance program studied and managed by qualified technicians which keeps in debit count the kind of apparatus, their service and the ambient conditions which they work in. In every case one advises not to exceed the limit of two years between inspections.
3. The maintenance is called to guarantee the functionality of the certified apparatus in security terms and since the security is a such juridical obligation it is also the conservation of all the conditions that it depends on.

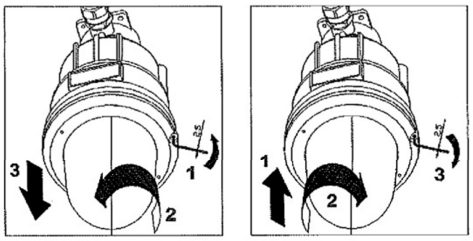
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4. The certified apparatus must be installed and kept so as to prevent the dangers derived from casual contacts with under voltage elements and the risks of fire and burst derived from possible abnormal conditions that happen in their exercise.
5. The maintenance operations must be carried out only by experienced personnel, whose training has included instruction on the characteristics of the apparatus.
6. If the operations are outside the normal maintenance (i.e. do not limited to replacement with original Technor Italsmea spare parts) to assume the character of repairs regarding the mode of protection, must be taken opportune agreements with Technor Italsmea on the procedure to be followed for the execution of the jobs and for mandatory verifications and individual tests prescribed from the rules.
7. All the maintenance operations must be made with the electrical apparatus isolated by all the sources of energy.
8. When reassembling flameproof enclosures, the user must verify that the flameproof joints are not damaged, all joints must be thoroughly cleaned and lightly smeared with a suitable not hardening grease to prevent the corrosion and contribute to protect them against the bad weather. It cannot be too strongly emphasized that extreme care should be exercised in the selection and application of the grease to ensure the retention of not hardening characteristics, to allow subsequent separation of the treated parts.
9. Only not metallic brushes and not corrosive cleaning fluids must be used to clean flameproof joints.
10. If the certified apparatus is submitted to vibrations, verify frequently the fastening of screws, pipe and/or cable entries and each part of the enclosure.
11. Verify the correct installation and the correct clamping of the lamp.

e) DISASSEMBLY AND ASSEMBLY INSTRUCTIONS OF THE GLASS GLOBE



Before re-assembling the glass globe, clean up the threaded joint by using a dry cloth and without using detergent.
Verify that the gasket is in good condition, if not it must be replaced with a genuine Technor Italsmea spare part.
Grease up the threaded joint and the gasket with a silicone grease (like the Dow Corning - "High Vacuum Grease" or "Molykote 111") and then re-assembly the glass globe as above shown.

f) SPECIAL USE CONDITIONS

1. The lighting apparatus must be used within ambient temperature as stated on the marking tag.
2. Check the WARNINGS on the marking tag before opening the enclosure.
3. Check if WARNING - POTENTIAL ELECTROSTATIC CHARGING HAZARD is present. In this case, clean luminaire ONLY WITH DAMP CLOTH.
4. The following precautions must be taken when the apparatus is installed in environments with combustible dust : to avoid dust accumulation on the surfaces, user must proceed with a regular cleaning of the lighting apparatus.
5. The lenght of the flameproof joints is greater than the values stated in the tables of the standard EN 60079-1.

g) MARKING

Technor Italsmea – via Italia 33 – I-20060 Gessate (MI) – Italy
EV(**) or **EVde(**)** **(**)** further digit and /or letters according to certified types (see tag on enclosure).
Serial nr. or lot ……(see tag on enclosure)
Year of construction …….. (see tag on enclosure)
INERIS 01ATEX0019X
CE 0080 Ex **II 2 GD**
Ex d IIC T(see tag on enclosure) **Gb** (EV.. series) or
Ex d e IIC T(see tag on enclosure) **Gb** (EVde ... series) and
Ex tb IIIC T(see tag on enclosure)**°C Db IP65** (EV… and EVde … series)
Tamb (see tag on enclosure)
Tcable (see tag on enclosure)
RATINGS (see tag on enclosure)
WARNINGS (see tag on enclosure)

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APPARECCHI ILLUMINANTI SERIE EV.. / EVde..
ISTRUZIONI DI USO E MANUTENZIONE

IMPORTANTE – LEGGERE ATTENTAMENTE

a) Gli apparecchi illuminanti serie EV.. e EVde.. devono essere installati in accordo alle prescrizioni delle Norme EN / IEC 60079-14 (Edizione in vigore) e le operazioni di manutenzione devono essere effettuate in accordo alle prescrizioni delle Norme EN / IEC 60079-17 (Edizione in vigore). L'utilizzatore deve inoltre essere a conoscenza dei rischi dovuti alla corrente elettrica e alle caratteristiche chimiche e fisiche dei gas e/o vapori e delle polveri presenti nell'impianto.
Gli apparecchi serie EV.. sono protetti mediante tipo di protezione "d" custodia a prova di esplosione. Gli apparecchi serie EVde.. sono costituiti da due compartimenti: il vano lampada e relativi accessori in custodia a prova di esplosione "d" ; il vano morsettiera in custodia a sicurezza aumentata "e" .
Ad ulteriore garanzia della qualità/sicurezza del prodotto, il sistema di gestione della qualità Technor Italsmea è stato valutato ed approvato da un Organismo Notificato che effettua la sorveglianza della qualità e la verifica ad ogni stadio di produzione.
Il proprietario/utilizzatore è direttamente responsabile della corretta installazione e manutenzione del prodotto, in accordo alle leggi locali e nazionali e alle relative specifiche di installazione.
ATTENZIONE: tutte le modifiche o cambiamenti apportati al prodotto da parte del proprietario/utilizzatore, senza il consenso scritto di Technor Italsmea, invalidano la certificazione del prodotto, le relativa garanzia e ogni altro accordo contrattuale pertinente.

b) **TIPI DI PROTEZIONE**

A prova di esplosione "d", protezione mediante custodia "t" secondo le norme :

EN 60079-0	- IEC 60079-0
EN 60079-1	- IEC 60079-1
EN 60079-7	- IEC 60079-7
EN 60079-31	- IEC 60079-31

1. Nel tipo di protezione "d" le apparecchiature elettriche sono installate in custodie idonee a resistere alla pressione sviluppata durante l'eventuale esplosione interna ed impedire la trasmissione della fiamma all'atmosfera esterna potenzialmente esplosiva.
2. Il tipo di protezione "e" è un tipo di protezione che, applicato a costruzioni elettriche non scintillanti in servizio normale, impedisce il verificarsi di archi o scintille e temperature eccessive.
3. Il tipo di protezione "t" impedisce la penetrazione della polvere combustibile nella custodia ed assicura la limitazione della temperatura superficiale per l'utilizzo in atmosfere con polveri esplosive.
4. Non compromettere l'integrità della custodia con forature non autorizzate, fori di ingresso tubi e/o cavi inutilizzati e non chiusi.
5. non compromettere il grado di protezione IP65 ottenuto mediante installazione di guarnizioni in materiale certificato per l'impiego specifico.
6. verificare l'assenza di sollecitazioni diverse da quelle per le quali l'apparecchio è stato certificato (es. esposizione a danni per collisioni, presenza di agenti corrosivi, possibilità di corto circuiti interni con conseguente dissipazione di calore superiore a quella ammessa.

c) **MESSA IN SERVIZIO**

Prima di mettere in servizio un apparecchio certificato l'utilizzatore deve :

1. Verificare la corrispondenza dell'apparecchio ai dati di progetto e la corretta installazione.
2. Verificare che l'apparecchio certificato sia appropriato alla classificazione del luogo pericoloso.
3. Verificare che il gruppo dell'apparecchio certificato sia idoneo per i gas, vapori e/o polveri presenti nel luogo di installazione.
4. Verificare che la classe di temperatura / temperatura superficiale dell'apparecchio certificato sia idonea per i gas, vapori e/o polveri presenti nel luogo di installazione.
5. Verificare che all'apparecchio certificato sia assegnato il servizio per cui è stato costruito (tensione, corrente, sollecitazioni meccaniche e termiche entro i dati di progetto).
6. Verificare il perfetto serraggio delle connessioni elettriche e meccaniche.
7. Verificare l'integrità e la continuità dei conduttori di terra, di protezione o di equipotenzialità.
8. Verificare che non siano state in alcun modo apportate modifiche non espressamente autorizzate da Technor Italsmea o che comunque alterino la struttura e la funzionalità sia elettrica sia meccanica della costruzione elettrica a sicurezza.
9. Le entrate filettate devono essere equipaggiate con idonei pressacavi e tappi certificati per il tipo di protezione Ex d IIC (serie EV..), Ex e IIC (serie Evde..) e/o Ex tb IIIC, idonei a mantenere il grado di protezione IP65 e adatti alla temperatura ambiente indicata sulla "marcatura. Gli accessori Ex d con filettatura cilindrica accoppiati agli imbocchi filettati devono essere assicurati contro l'allentamento mediante frena-filetti a media resistenza (ad es. Loctite 243 o prodotto equivalente).
10. Le entrate di tubo devono essere equipaggiate con giunti di bloccaggio correttamente sigillati ed installati adiacenti alla custodia
11. Entrate di cavo : M25x1,5 (se non diversamente indicato vicino alla entrata).

d) **MANUTENZIONE**

1. La manutenzione è una combinazione di operazioni eseguite al fine di mantenere o ripristinare una costruzione elettrica a sicurezza nelle condizioni in cui sia in grado di soddisfare le prescrizioni delle specifiche pertinenti ed effettuare le funzioni richieste. Queste operazioni di manutenzione devono essere effettuate in accordo alle prescrizioni delle Norme EN 60079-17 (Edizione in vigore) o IEC 60079-17 (Edizione in vigore).
2. Il mantenimento nel tempo delle caratteristiche iniziali delle costruzioni elettriche a sicurezza deve essere assicurato da un preciso programma di manutenzione, messo a punto e gestito da tecnici qualificati, che tenga in debito conto la tipologia delle costruzioni elettriche interessate, il servizio loro richiesto e le condizioni ambientali in cui esse operano. In ogni caso si consiglia di non superare il limite dei due anni tra un'ispezione e l'altra.

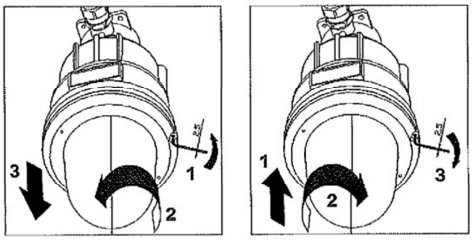
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3. La manutenzione è chiamata a garantire la funzionalità delle costruzioni elettriche in termini di sicurezza, e poiché la sicurezza è un obbligo giuridico tale è anche la conservazione di tutte le condizioni da cui essa dipende.
4. Le costruzioni elettriche a sicurezza, in tutte le loro parti costitutive, devono essere installate e mantenute in modo da prevenire i pericoli derivanti da contatti accidentali con gli elementi sotto tensione ed i rischi di incendio e di scoppio derivanti da eventuali anormalità che si verifichino nel loro esercizio.
5. Le operazioni di manutenzione devono essere affidate a personale debitamente qualificato ed istruito sulle caratteristiche specifiche delle apparecchiature.
6. Qualora gli interventi esulino dalla normale manutenzione (ad es. non siano limitati a sostituzioni di parti con ricambi originali forniti da Technor Italsmea) per assumere il carattere di riparazioni riguardanti il modo di protezione, debbono essere presi opportuni accordi con Technor Italsmea sulla procedura da seguire sia per l'esecuzione dei lavori sia per le successive verifiche e prove individuali obbligatoriamente prescritte dalle Norme.
7. Tutte le operazioni di manutenzione devono essere effettuate con la costruzione elettrica a sicurezza isolata da tutte le sorgenti d'energia.
8. Quando si rimontano parti di custodie di costruzioni elettriche a prova di esplosione, verificare che i giunti di laminazione non siano danneggiati, tutti i giunti devono essere puliti accuratamente e spalmati leggermente con un grasso non indurente adatto per prevenire la corrosione e contribuire a proteggerli contro le intemperie. Si sottolinea la necessità di garantire le caratteristiche di non indurimento, sia nella scelta, sia nell'applicazione, per consentire una successiva separazione delle parti trattate.
9. Per la pulizia dei giunti di laminazione devono essere impiegati spazzole non metalliche e liquidi non corrosivi.
10. Se la costruzione elettrica a sicurezza è soggetta a vibrazioni, verificare attentamente che i mezzi di unione, le entrate di tubo e/o cavo e tutte le parti dell'apparecchio siano ben serrati.
11. Verificare la corretta installazione e serraggio della lampada.

g) ISTRUZIONI DI SMONTAGGIO E RIMONTAGGIO DEL GLOBO DI VETRO



Prima che il globo di vetro venga rimontato, pulire bene il giunto filettato con un panno asciutto senza usare detergenti.
Verificare che la guarnizione O-ring sia in buone condizioni, altrimenti bisogna necessariamente sostituirla con un ricambio originale Technor Italsmea. Ingrassare il giunto filettato con un grasso siliconico (come il Dow Corning - Dow Corning - "High Vacuum Grease" or "Molykote 111") e quindi rimontare il globo in vetro come mostrato sopra.

e) CONDIZIONI SPECIALI DI UTILIZZO

1. Gli apparecchi illuminanti devono essere utilizzati entro la gamma di temperature ambiente indicate nella marcatura.
2. Leggere le avvertenze riportate nella marcatura prima di aprire la custodia.
3. Se fosse presente l'avvertenza POTENZIALE PERICOLO DI CARICHE ELETTROSTATICHE, pulire l'armatura solo con panno umido
4. Precauzioni per l'utilizzo in ambienti con presenza di polvere combustibile: per evitare l'accumulo di polvere sulle superfici, l'utilizzatore deve procedere ad una regolare pulizia degli apparecchi.
5. La lunghezza dei giunti è superiore a quella indicata nelle tabelle della Norma EN 60079-1.

f) MARCATURA

Technor Italsmea – via Italia 33 – I-20060 Gessate (MI) – Italy
EV(**) o EVde(**) (**) cifre o lettere come da tipi certificati (vedi targa).
Serial nr. or lot ……(vedi targa)
Anno di fabbricazione …….. (vedi targa)
INERIS 01ATEX0019X
CE 0080 Ex **II 2 GD**
Ex d IIC T(vedi targa) **Gb** (serie EV..) oppure
Ex d e IIC T(vedi targa) **Gb** (serie EVde ..) e
Ex tb IIIC T(vedi targa)**°C Db IP65** (serie EV… e EVde …)
Tamb (vedi targa)
Tcable (vedi targa)
DATI NOMINALI (vedi targa)
AVVERTENZE (vedi targa)

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EV… EVde… USE AND MAINTENANCE INSTRUCTION

IMPORTANT – READ CAREFULLY

a) The apparatus must be installed according to EN / IEC 60079-14 (edit in force) and maintenance operations must be performed according to EN / IEC 60079-17 (edit in force). The user must be aware of electricity risks, chemical and physical characteristics of gas, vapours, dusts present in the plant. Lighting apparatus EV… series are protected by mode of protection "d" – Explosion proof enclosures. The lighting apparatus EVde.. series have two sections:
- lamp and accessories enclosures with mode of protection "d" – Explosion proof enclosures;
- terminals enclosure with mode of protection "e" – Increased safety.

To further guarantee of the good quality/safety of the product, the Quality System of Technor Italsmea has been evaluated and approved by a Notified Body which makes the surveillance of the quality and the verification at every stage of manufacture.
To further guarantee good product quality/safety, the Quality System of Technor Italsmea is evaluated and approved by a Notified Body which carries out Quality System surveillance. Technor Italsmea ensures and guarantees correct manufacturing of its products.
Buyer and/or end User are directly responsible of correct product installation and maintenance, according to local and national laws and product installation specifications.
WARNING – All modifications / changing, made by buyer / end user, without Technor Italsmea written acceptance, certification, warranties and any other contractual agreement will be invalidate.

b) TYPE OF PROTECTION

Increased safety "e", Flameproof "d", protection by enclosure "t" according to :
- IEC 60079-0 : 2011 edition 6
- IEC 60079-1 : 2014-06 edition 7
- IEC 60079-7 : 2006-07 edition 4
- IEC 60079-31 : 2013 edition 2

1. In the type of protection "d", the electric equipment is installed in enclosure suitable to withstand the pressure raised during the internal explosion and avoids flame transmission to the external potentially explosive atmosphere.
2. The type of protection "e" is a protection in which additional measures are applied so as to give increased security against the possibility of excessive temperatures and of the occurrence of arcs and sparks inside and on external parts of electrical apparatus which does not produce arcs or sparks in normal service.
3. Type of protection "tb" avoids combustible dust penetration into enclosure and ensures surface temperature limitation for use in explosive dust atmospheres.
4. The integrity of the enclosure must not be compromised with not authorized drillings, unused and not closed pipe and/or cable entries.
5. Do not compromise the protection degree, obtained with the installation of gaskets in material certified for the specific job.
6. Verify the absence of causes of stress of the lighting apparatus different from what the lighting apparatus was certified for (i.e. exposure to damaging for collisions, presence of corrosive agents, possibility of internal short circuits with power dissipation superior than the admitted one).

c) PLACING IN SERVICE

Before making the placing in service of a certified apparatus, user must :
1. Verify the match to the project data and the correct installation.
2. Verify that the certified apparatus is suitable for the dangerous place classification.
3. Verify that the group of the certified apparatus is suitable for gases, vapours and/or dusts presents.
4. Verify that the temperature class of the certified apparatus is suitable for gases, vapours and/or dusts existing in the installation site.
5. At the certified apparatus must be assigned the service for which was built (ratings, mechanical and thermal stress within project data).
6. Verify the fastening of the electric and mechanical connections.
7. Verify the integrity and the continuity of grounding, protection or equipotential conductors.
8. Verify that were not produced modifications not expressly authorized by Technor Italsmea or that however changes the electrical and/or mechanical structure and functionality of the certified apparatus.
9. Treaded entries must be equipped with suitable cable glands and blanking elements certified according to type of protection Ex db IIC (EV .. series), Ex e IIC (EVde .. series) and /or Ex tb IIIC, suitable to maintain the enclosure protection degree IP65 and suitable for ambient temperature as stated on marking tag.
10. Pipe entries (EV.. series only) must be equipped with sealing fittings, correctly filled and installed close to the enclosure.
11. Cable entries –EVde series -: Nr. 2 threaded entries M20x1,5 (except otherwise marked on the enclosure entry)
    Cable entries –EVA series -: Nr. 1 threaded entry ¾ NPT (except otherwise marked on the enclosure entry)
    Cable entries –EVCC series -: Nr. 2 threaded entries ¾ NPT (except otherwise marked on the enclosure entry)
12. EV size 1 portable type must be feeded by a cable incorporating an earthing or equipotential bonding conductor connected to the internal earthing terminal, or installed only with wiring systems not requiring an external earth connection, for example, metallic conduit or armoured cable. No external grounding connection required.
13. The lighting apparatus must be used within ambient temperature as stated on the marking tag.

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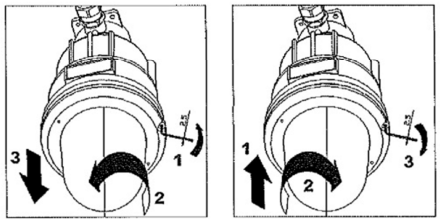
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d) MAINTENANCE

1. The maintenance is a combination of operations executed at the purpose to keep or to restore a certified apparatus in the conditions in which it is able to meet the requirements of the relevant specification and perform its required functions. The maintenance operations must be made according to the standard IEC 60079-17 (Edit in force).
2. During the time, the initial characteristics of the certified apparatus must be assured by a detailed maintenance program studied and managed by qualified technicians and related to the type of apparatus, their service and the ambient conditions which they work in. In every case one advises not to exceed the limit of two years between inspections.
3. The maintenance is called to guarantee the functionality of the certified apparatus in security terms and since the security is a such juridical obligation it is also the conservation of all the conditions that it depends on.
4. The certified apparatus must be installed and kept so as to prevent the dangers derived from casual contacts with under voltage elements and the risks of fire and burst derived from possible abnormal conditions that happen in their exercise.
5. The maintenance operations must be carried out only by experienced personnel, whose training has included instruction on the characteristics of the apparatus.
6. If the operations are outside the normal maintenance (i.e. do not limited to replacement with original Technor Italsmea spare parts) to assume the character of repairs regarding the mode of protection, must be taken opportune agreements with Technor Italsmea on the procedure to be followed for the execution of the jobs and for mandatory verifications and individual tests prescribed from the rules.
7. All the maintenance operations must be made with the electrical apparatus isolated by all the sources of energy.
8. When reassembling flameproof enclosures, the user must verify that the flameproof joints are not damaged, all joints must be thoroughly cleaned and lightly smeared with a suitable not hardening grease to prevent the corrosion and contribute to protect them against the bad weather. It cannot be too strongly emphasized that extreme care should be exercised in the selection and application of the grease to ensure the retention of not hardening characteristics, to allow subsequent separation of the treated parts.
9. Only not metallic brushes and not corrosive cleaning fluids must be used to clean flameproof joints.
10. If the certified apparatus is submitted to vibrations, verify frequently the fastening of screws, pipe and/or cable entries and each part of the enclosure.
11. Verify the correct installation and the correct clamping of the lamp.
12. Check the WARNINGS on the marking tag before opening the enclosure.

e) DISASSEMBLY AND ASSEMBLY INSTRUCTIONS OF THE GLASS GLOBE



Before re-assembling the glass globe, clean up the threaded joint by using a dry cloth and without using detergent.
Verify that the O-ring gasket is in good condition, if not it must be replaced with a genuine Technor Italsmea spare part.
Grease up the threaded joint and the gasket with a silicone grease (like the Dow Corning - "High Vacuum Grease" or "Molykote 111") and then re-assembly the glass globe as above shown.

f) SPECIAL USE CONDITIONS

1. The following precautions must be taken when the apparatus is installed in environment with combustible dust: to avoid dust accumulation on the surfaces, user must proceed with a regular cleaning of the lighting apparatus.
2. The length of the flameproof threaded joints is greater than the values stated in the tables of IEC 60079-1.
3. During the installation, the user will take into consideration that the luminaires type EV*5** underwent only an impact test corresponding to an energy of low risk.

f) MARKING

Technor Italsmea – via Italia 33 – 20060 Gessate (MI) – Italy
EV(**) or EVde(**) (**) further digit and /or letters according to certified types (see tag on enclosure).
Serial nr. ……(see tag on enclosure)
Year of construction …….. (see tag on enclosure)
IECEx INE 15.0031X
Ex db IIC T(see tag on enclosure) **Gb** (EV.. series) or **Ex db e IIC T**(see tag on enclosure) **Gb** (EV... series)
and / or
Ex tb IIIC T(see tag on enclosure)**°C Db IP66** (EV… and EVde … series)
Tamb (see tag on enclosure) **Tcable** (see tag on enclosure)
RATINGS (see tag on enclosure)
WARNINGS (see tag on enclosure)

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1.4 PHAROS MARINE VISIBILITY METER FD-410EX-MINI-OC-M DATA SHEET

Pharos Marine Automatic Power

BROCHURE

FD-410EX MINI

Fog Detector Ex / Visibility Sensor

Zone 1 Hazardous Locations

Compliant to IALA Guideline 1090- Use of Audible Signals



OVERVIEW

The FD-410EX MINI fog detector is the new standard in visibility sensor technology and is the smallest, most compatible and cost-effective unit on the market.

The sensor is sensitive for fog particles in a zone approximately 25cm ahead of the sensor placement to detect limited visibility in the area. These particles are typically the microscopic water particles constituting fog, but may also include snowflakes, raindrops, dust or air pollutants.

The fog detector is programmed to transmit a beam of modulated infrared light every 30 seconds, measuring the amount of light reflected by the atmosphere to the receiver in the instrument and is capable of detecting fog in the range of 20m to 4km.

KEY FEATURES

- Pulsed infrared, backscatter, single-station type
- Microprocessor-based design ensures maximum reliability and minimum maintenance
- LED light source provides extremely long service life
- Automatic self-checking; electronic pilot light system automatically compensates for fouling/fogging of the lens
- Automatic self-test feature
- Remote on/off control terminals
- Extremely low power consumption; ideal for solar power applications
- Remote monitoring of fault and visibility levels

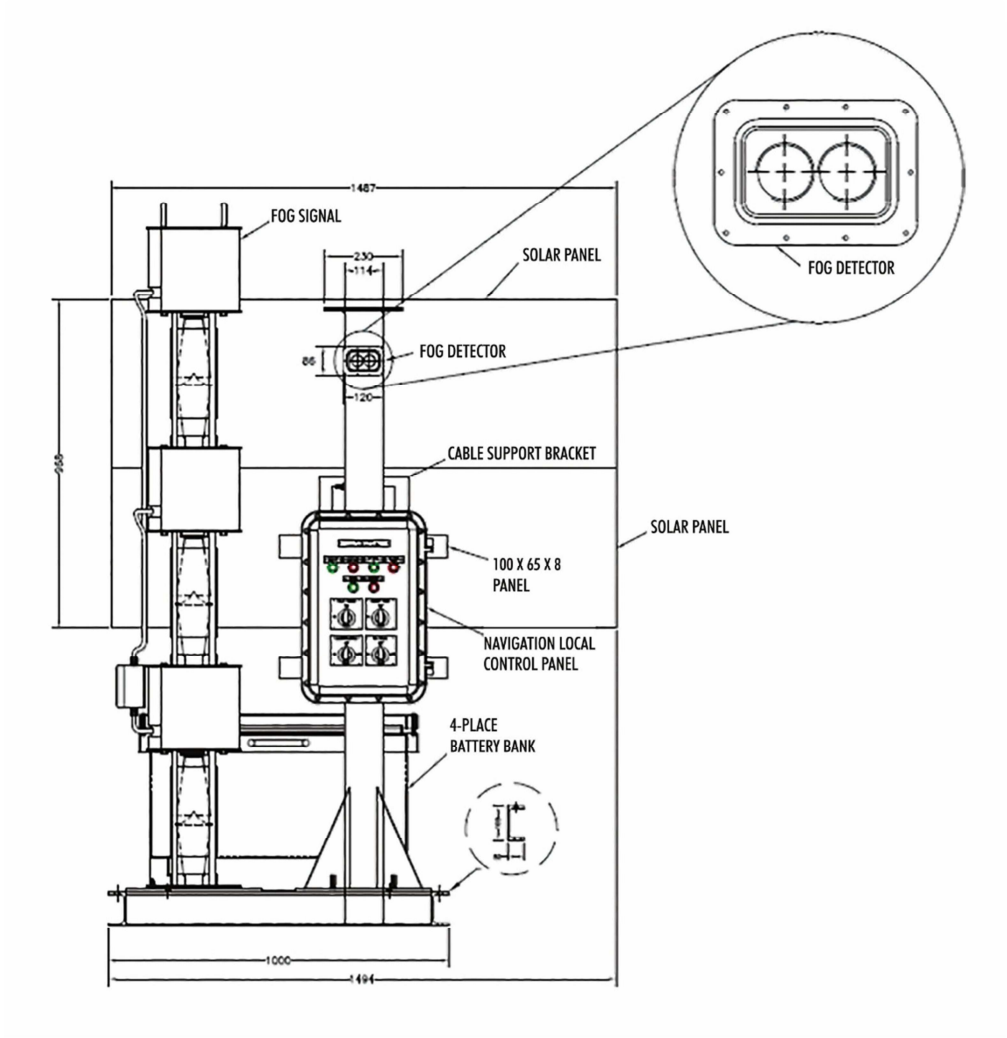
PHYSICAL SPECIFICATIONS	
Dimensions (HxLxW)	86 x 60 x 120 mm 3.35 x 2.37 x 4.72 in
Weight	2.0 kg 4.41 lbs
Housing	Stainless steel, openings sealed with O-rings
Mounting	Top/Bottom Plate
Cable entries	2 x M20 mm
ELECTRICAL SPECIFICATIONS	
Supply voltage	24 VDC (AC Optional)
Power consumption	1.5 Watts (Average)
Current consumption	50mA @ 12 VDC

PERFORMANCE CHARACTERISTICS	
Warmup time	Approximately 1 minute
Update time	30 seconds
Outputs	2x Volt free contacts (fog detection, fault condition) and digital RS232
Optical output power	Roughly 3 mW from and IR LED; Eye safe, laser safetly class 1 M
Wavelength	850nm
Visibility range	From 4km - down to 20 meters
Operating temperature	-40°C to +55°C
Anti-condensation heater	Optional (for negative °C)
Ingress rating	IP-66
STANDARDS/CERTIFICATIONS	
Coding	Ex db IIB T6 Gb Ta -40°C to +55°C IECEx ITS 18.0032X

**All values are subject to change without notice.*

PHAROSMARINE.COM | AUTOMATICPOWER.COM 060719

TYPICAL INSTALLATION



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1.5 PHAROS MARINE VISIBILITY METER FD-410EX-MINI-OC-M MANUAL

Pharos Marine Automatic Power

Manufacturers and Designers
of
SIGNAL AND POWER SYSTEMS

NAVIGATIONAL AIDS

OPERATION MANUAL

FD410Ex-MINI

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Document Number **V-71048/R2** (See last Page for Revision Details)

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1. Introduction

1.1 General

The FD410Ex-MINI is a visibility sensor that can detect fog in the range of 20m to 4Km.

The sensor is sensitive for fog particles in a zone about 25 cm ahead of the location of the sensor which limits the visibility in the air. These particles are normally the microscopic water particles constituting fog, but they may also be snowflakes, raindrops or air pollutants. But the most indications of low visibility are because of fog or snow.

The sensor is heated to a few degrees above ambient temperature in order to keep moisture away from the lenses.

This handbook describes the FD410Ex-MINI, which is suitable for installation in hazardous areas and has the following ATEX/IECEx Classification:
II 2 G Ex db IIB T6 Gb, Temp ambient -40°C to +55°C.

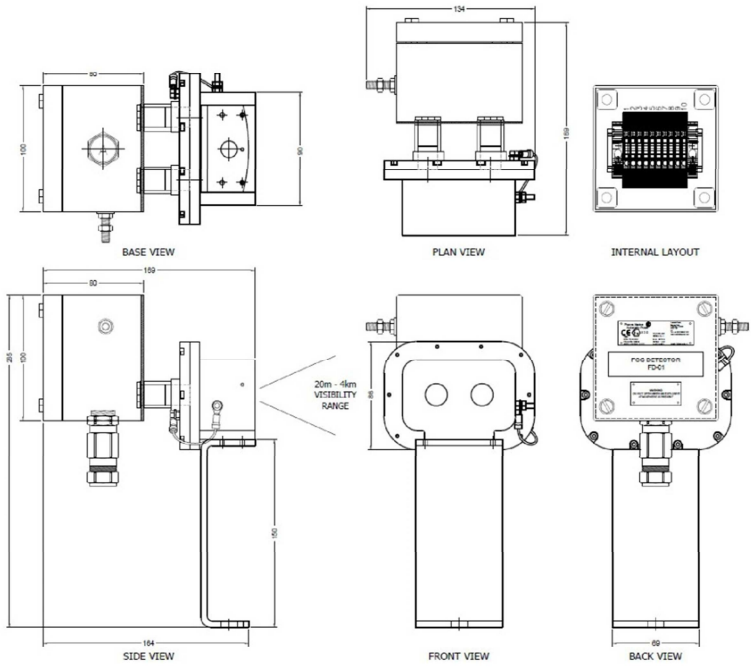


Fig 1 – FD410Ex-MINI General Arrangement

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1.2 Mechanical

The unit is machined from 316 stainless steel with an approximate weight of 4Kg.
The unit is designed to withstand heavy seas to an ingress protection of IP66.
A 316 stainless steel mounting bracket is provided as standard with the fog detector.

1.3 Electrical Overview

The fog detector will operate with a DC input voltage of 24V DC.

The sensor has two digital outputs consisting of semiconductor switches.

The first switch:

- **FD-410EX-MINI**: Terminal J2 1 to 2 switches state from closed to open when the visibility drops below 2 nautical miles (about 3750 m).
- **FD-410EX-MINI-OC**: Terminal J2 1 to 2 switches state from open to closed when the visibility drops below 2 nautical miles (about 3750 m).

The second switch, terminal J2 4to 5 switches state from closed to open when there is a fault.

2. Specification

Dimensions:	265x164x134 (mm)
Weight	4Kg
Warm up time	approx. 1 minute
Input voltage:	24V DC
Outputs:	Two switches
Update time:	30 seconds
Warmup time:	1 minute
Temp. range:	-40 to +55 deg C
Optical output power	about 3mW from an IR LED - eye safe, laser safety class 1 M
Wavelength:	850nm
Housing:	Stainless steel, openings sealed with O-rings.
Visibility range	Visibilities from 4 km – down to 20 meters – digital output
ATEX/IECEx	II 2 G Ex db IIB T6 Gb Temp ambient -40°C to +55°C
IP Rating	IP 66

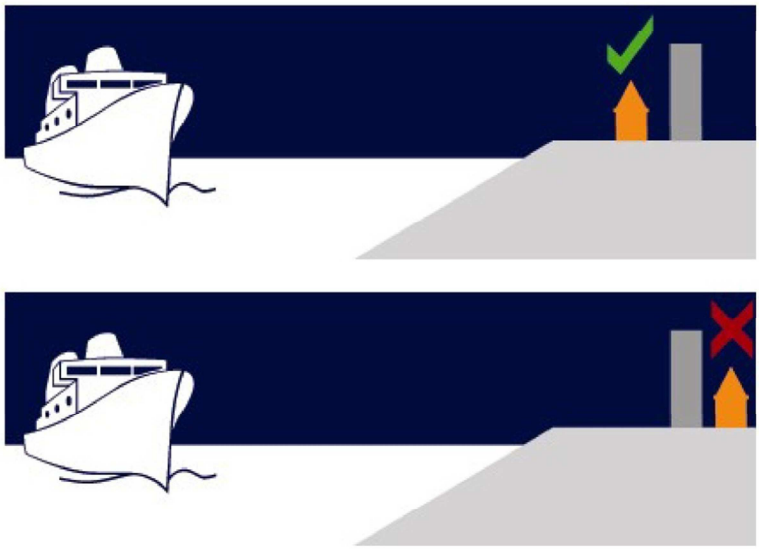
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3. Installation

3.1 General

The fog detector is designed for normal base mounting in a vertical position on a suitably rigid, flat, horizontal surface. Due consideration must be given to the degree of access necessary when carrying out routine servicing and maintenance. Cable gland entry positions should face inboard.

The fog detector requires a clear field of view over the intended operational area, any obstruction will severely restrict operating range.



To prevent the Fog Detector from being blinded by the sun at mornings & evenings, it is recommended that the Fog Detector does not point due East or West.

The Fog Detector should be pointed away from lights, buildings, or any reflective structures.

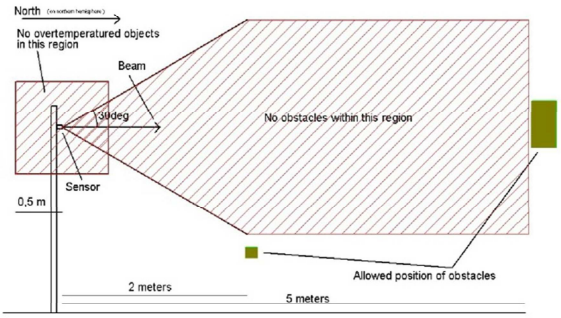
Ensure that any hardware used for mounting the FD-410 Ex is strong enough, and of a material and finish compatible with the stainless-steel enclosure.

The sensor should be mounted so that it "looks" horizontal and roughly north (south on the southern hemisphere) – eliminating direct sunlight into receiver. There must not be anything

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in the sightline closer than 5 meters. Outside a cone of about 30 degrees angle objects can be tolerated at down to 2 about meter. See figure below.

Mounting on a wall or too near to a roof of a building is not recommended. The reason is that the air near a building is a little warmer than some meters away from it. In the warmer air the small "drops" will evaporate resulting in a higher measured visibility reading. So, the recommended min. distance to a single store house is 0.5 meters and 2 meters from larger buildings.



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3.2 Mounting

The Transponder is supplied in custom packaging for safety during transportation. Should the unit need to be relocated at any time it is recommended that it is carried in suitable packaging to avoid the potential for damage.

After the unit has been unpacked it should be inspected for any signs of damage that may have occurred during shipping.

The fog detector support platform must be pre-drilled, according to the fog detector correct orientation, to provide four M3 mm-clearance holes as below.

Stainless steel M2 screws and plain washers are used to secure the fog detector in position, or to provide a degree of levelling if required – grade 316 S16 or grade A4.

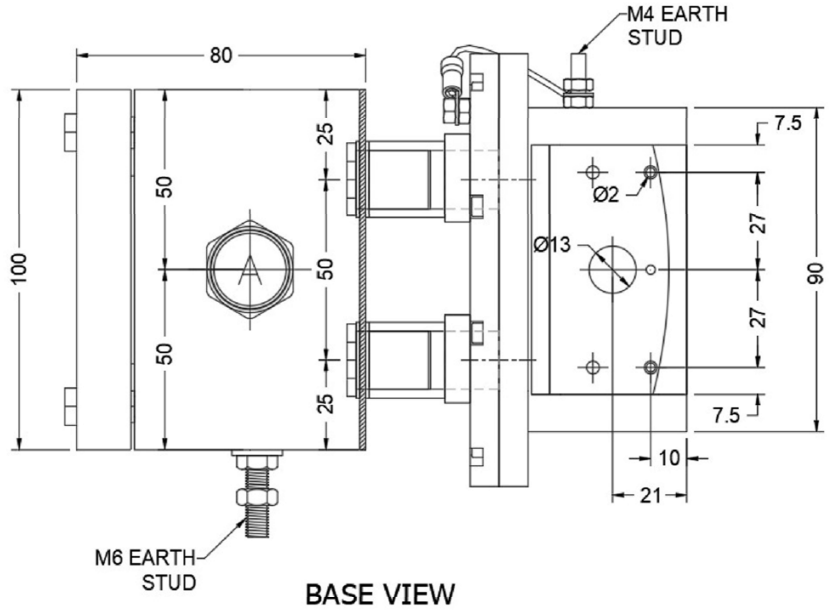


Fig 2 – FD410Ex-MINI Mounting Details – Base View

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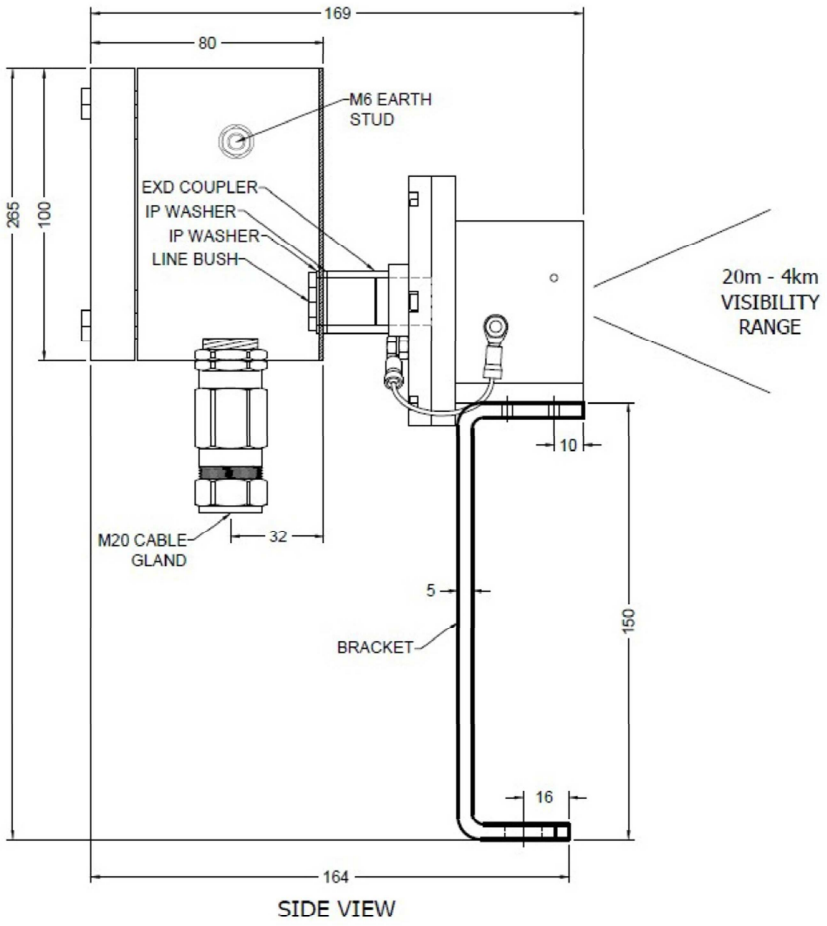


Fig 3 – FD410Ex-MINI Mounting Details – Side View

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3.3 Electrical Connection

3.3.1 Electrical Connections

The FD410Ex-MINI is supplied as standard close coupled to a junction box for customer connection into their control panel.

Customers fitting their own glands should install them in accordance with the requirements of EN/IEC60079-0 'General Requirements' and EN/IEC60079-14 'Electrical Installations in Hazardous areas (other than mines)'.

A suitable overload protection device must be fitted for the device in accordance with the requirements of EN/IEC60079-0 'Electrical Apparatus for Explosive Gas Atmospheres Part 0 General requirements.

The table below details the connection of the unit:

Function	Signal
1- POWER	+ V (24V DC)
2- POWER	- V
3- COMMS	TX232
4- COMMS	RX232
5- COMMS	GND
6- CALIBRATION	Relay - Common
7- RELAY (*)	Fog Detected
8- RELAY COMMON	Fog Detected
9- RELAY N/O	Fault Alarm
10- RELAY COMMON	Fault Alarm

(*) = FD-410EX-MINI: Terminal 7 = Relay N/C – Closed when fog detected.
(*) = FD-410EX-MINI-OC: Terminal 7 = Relay N/O – Open when fog detected.

Note the 24V supply line must be suitably fused.
A fuse rated equal or in excess of 2A but less than 3A fitted in series with the positive voltage connection wire is required to prevent the apparatus from risk of short circuit.

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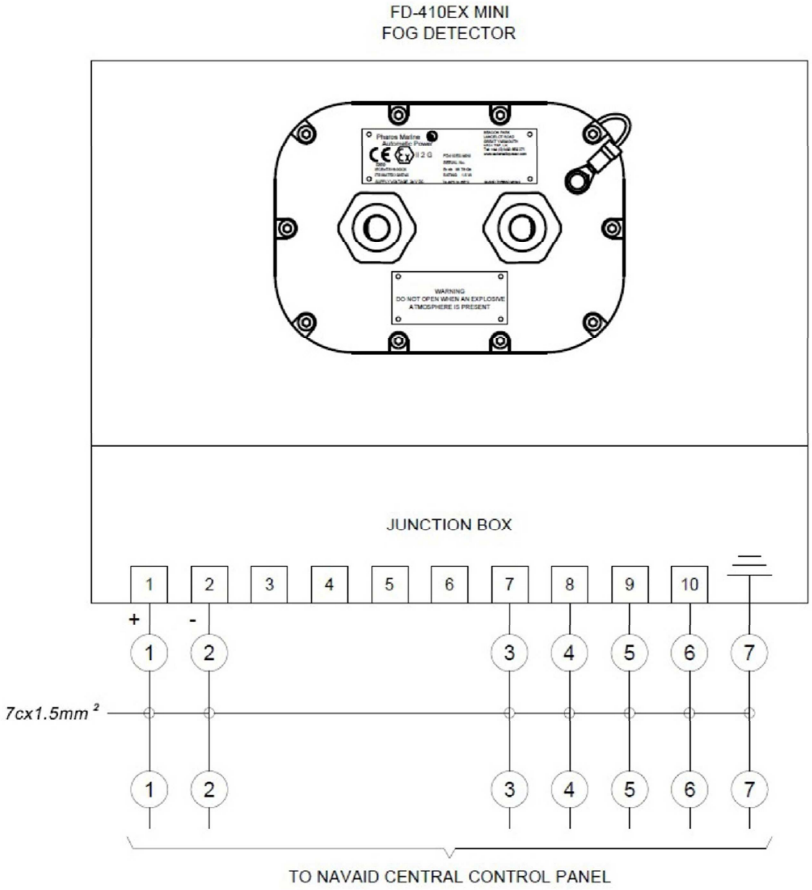


Fig 4 – FD410Ex-MINI Electrical Connections

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3.3.2 Connection process

Digital information is available on the PCB. But it is only used for calibration purposes etc. The calculated data is presented in digital form as an ASCII string on the RS232 output, 1200 baud 8N1, that is transmitted "streaming" every 30 seconds. This string can be received by many loggers with RS232 inputs but also by a PC via the serial port and with a terminal program like Hyper Terminal (part of WINDOWS).

This is an example of an output string:

amb= 100 alfa=0.0012 VIS= 2500

The first figure – the amb parameter is uncalibrated measure of the ambient solar irradiance in W/m2. The sensitivity depends strongly on how the sensor is aimed. It may vary as much as - 50 to +100%. But the repetitivity is much better and the offset error is only ± 2 units. The sensor can, when mounted, be calibrated by comparing it with an irradiance sensor. But a simple method is to take data from a clear day at noon. If the sun is 60 deg or more above the horizon the irradiance is not far from 1000 W/m2. The measurement is not very accurate- but it may be useful for instance for telling if it is day or night.

The second figure is the so-called extinction coefficient often called alfa. The relation between the extinction and visibility is alfa=3/VIS.* the alfa parameter can be used for monitoring trends in visibility when the visibility is larger than 4000 meters. But note that the absolute accuracy in alfa is limited in such cases.

The third figure – the VIS parameter - is the measured visibility in meters

If the optical receiver is saturated by for instance sunlight or reflections from an object in the sensitive zone like an insect or fallen snow covering the front, the visibility displayed visibility value will be 5000 and the output can be:

amb=050 alfa=0.0000 VIS= 5000

More information about extinction etc can be found Annex B.

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4 Maintenance

4.1 General

Other than the cleaning requirements, there are no regular maintenance inspections other than the mandate hazardous area inspection requirements stated below. The FD410Ex-MINI will report any functional fault with the latching of the 'FAULT' relay.

There are no serviceable parts within the Fog detector enclosure – if the unit develops a fault it should be returned to the factory for inspection and repair.

The FD410Ex-MINI should be inspected on a regular interval in accordance with the requirements of EN/IEC60079-17 'Electrical Installations Inspection and Maintenance'.

4.2 Cleaning Recommendations

The windows of the fog detector should be inspected on a routine bases and washed down with fresh water to prevent the build-up of salt and other airborne deposits.

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5 Marking

5.1 ATEX/IECEx Label Details

The details on the label will be completed by Pharos Marine prior to the fog detector being dispatched from the factory



Notified body number for the issuer of the current QAN

* To be completed by Pharos Marine prior to unit dispatch

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6 Revision Status

Manual

Rev	Description	Date	By
1	Issued	12.06.18	OJ
2	Amended sections 1.1, 3.2, 3.3.1, 4.1, 4.2 & 5.3	09.07.19	ES

Annex

Rev	Description	Date	By
A1	Initial Issue	12.06.18	OJ

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Annex A – Mandatory Certification Requirements – Issue A1

A1. Label Details



A2. Cable Connections

The FD410Ex-MINI is supplied as standard close coupled to a junction box for customer connection into their control panel.

Customers fitting their own glands should install them in accordance with the requirements of EN/IEC60079-0 'General Requirements' and EN/IEC60079-14 'Electrical Installations in Hazardous areas (other than mines)'.

A suitable overload protection device must be fitted for the device in accordance with the requirements of EN/IEC60079-0 'Electrical Apparatus for Explosive Gas Atmospheres Part 0 General requirements.

A3. Maintenance

The FD410Ex-MINI should be inspected on a regular interval in accordance with the requirements of EN/IEC60079-17 'Electrical Installations Inspection and Maintenance'.

There are no serviceable parts within the fog detector enclosure – if the unit develops a fault it should be returned to the factory for inspection and repair.

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A4. Certification

IECEx Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION
IEC Certification Scheme for Explosive Atmospheres
for rules and details of the IECEx Scheme visit www.iecex.com

Certificate No.: IECEx ITS 18.0032X — Issue No: 0 — Certificate history: Issue No. 0 (2018-09-04)

Status: Current

Page 1 of 3

Date of Issue: 2018-09-04

Applicant: Pharos Marine Automatic Power Ltd
Lancelot Road
Beacon Business Park
Great Yarmouth
NR31 7BF
United Kingdom

Equipment: FD-410Ex-MINI Fog Detector
Optional accessory:

Type of Protection: Flameproof Ex db

Marking:
Ex db IIB T6 Gb
Ta -40°C to +55°C
IECEx ITS 18.0032X

Approved for issue on behalf of the IECEx Certification Body: P Moss

Position: Certification Officer

Signature: (for printed version) Paul Moss

Date: 2018.09.04 17:42:06 +01'00'

1. This certificate and schedule may only be reproduced in full.
2. This certificate is not transferable and remains the property of the issuing body.
3. The Status and authenticity of this certificate may be verified by visiting the Official IECEx Website.

Certificate issued by:
Intertek Testing & Certification Limited
ITS House, Cleeve Road,
Leatherhead,
Surrey, KT22 7SA
United Kingdom

intertek

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IECEx Certificate of Conformity

Certificate No: IECEx ITS 18.0032X Issue No: 0

Date of Issue: 2018-09-04 Page 2 of 3

Manufacturer: Pharos Marine Automatic Power Ltd
Lancelot Road
Beacon Business Park
Great Yarmouth
NR31 7BF
United Kingdom

Additional Manufacturing location(s):

This certificate is issued as verification that a sample(s), representative of production, was assessed and tested and found to comply with the IEC Standard list below and that the manufacturer's quality system, relating to the Ex products covered by this certificate, was assessed and found to comply with the IECEx Quality system requirements. This certificate is granted subject to the conditions as set out in IECEx Scheme Rules, IECEx 02 and Operational Documents as amended.

STANDARDS:
The apparatus and any acceptable variations to it specified in the schedule of this certificate and the identified documents, was found to comply with the following standards:

IEC 60079-0 : 2017 Explosive atmospheres - Part 0: Equipment - General requirements
Edition:7.0
IEC 60079-1 : 2014-06 Explosive atmospheres - Part 1: Equipment protection by flameproof enclosures "d"
Edition:7.0

*This Certificate **does not** indicate compliance with electrical safety and performance requirements other than those expressly included in the Standards listed above.*

TEST & ASSESSMENT REPORTS:
A sample(s) of the equipment listed has successfully met the examination and test requirements as recorded in

Test Report:
GB/ITS/ExTR18.0015/00

Quality Assessment Report:
GB/EXV/QAR17.0023/00

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IECEx Certificate of Conformity

Certificate No: IECEx ITS 18.0032X Issue No: 0

Date of Issue: 2018-09-04 Page 3 of 3

Schedule

EQUIPMENT:

Equipment and systems covered by this certificate are as follows:

The FD410Ex-MINI is a visibility sensor that can detect fog in the range of 20m to 4Km. The FD410Ex-MINI consist of a stainless steel enclosure that holds the electronic Fog Detector module with approximate dimensions of 120mm x 86mm x 60mm. The enclosure base forms a flanged joint with the cover which is secured with Qty 10 M3x0.5 socket head cap screws. An O-ring is fitted between the cover and base for IP purposes only. In the bottom of the base of the enclosure are fitted two glass lenses, forming a cemented joint with the base. In the cover of the enclosure are two M16 cable entries into which are fitted certified Ex d IIB Gb cable glands.
External earthing connection facility is provided.
Note: The optical radiation output of the apparatus with respect to explosion protection is covered in this certificate based on Exception 3 to the scope of IEC 60079-28:2015 Ed 2.

SPECIFIC CONDITIONS OF USE: YES as shown below:

1. No modification must be made to the flamepaths of the enclosure without prior consultation with the manufacturer.
2. Fasteners used to secure cover of the Fog Detector must be stainless steel grade 70 with a minimum yield stress of 410MPa.
3. The 24V supply line must be suitably fused. A fuse rated equal or in excess of 2A but less than 3A fitted in series with the positive voltage connection wires is required to prevent the apparatus from risk of short circuit.

Annex:

Annex to IECEx ITS 18.0032X Issue 0.pdf

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EU-Type Examination Certificate

Intertek
Value Quality. Delivered.

1. **EU-TYPE EXAMINATION CERTIFICATE**
2. **Equipment or Protective System intended for use in Potentially Explosive Atmospheres Directive 2014/34/EU**
3. **EU-Type Examination Certificate Number: ITS18ATEX103574X Issue 0**
4. **Product:** FD-410Ex-MINI Fog Detector
5. **Manufacturer:** Pharos Marine Automatic Power Ltd
6. **Address:** Lancelot Road, Beacon Business Park, Great Yarmouth, NR31 7BF
7. This product and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.
8. Intertek Testing and Certification Limited, Notified Body number 0359 in accordance with Article 17 of Directive 2014/34/EU of the European Parliament and of the Council dated 26 February 2014, certifies that the product has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of products intended for use in potentially explosive atmospheres given in Annex II to the Directive.

   The examination and test results are recorded in confidential Intertek Report 103406077CHE-001 dated 04 September 2018.
9. Compliance with the Essential Health and Safety Requirements has been assured by compliance with EN 60079-0:2018 & EN 60079-1:2014 except in respect of those requirements referred to at Item 16 of the Schedule.
10. If the sign "X" is placed after the certificate number, it indicates that the product is subject to Specific Conditions of Safe Use specified in the Schedule to this certificate.
11. This EU-Type Examination Certificate relates only to the design and construction of the specified product. Further requirements of the Directive apply to the manufacturing process and supply of this product. These are not covered by this certificate.
12. The marking of the product shall include the following:

    Ex II 2 G Ex db IIB T6 Gb

    T_a -40°C to +55°C

P Moss
Certification Officer
04 September 2018

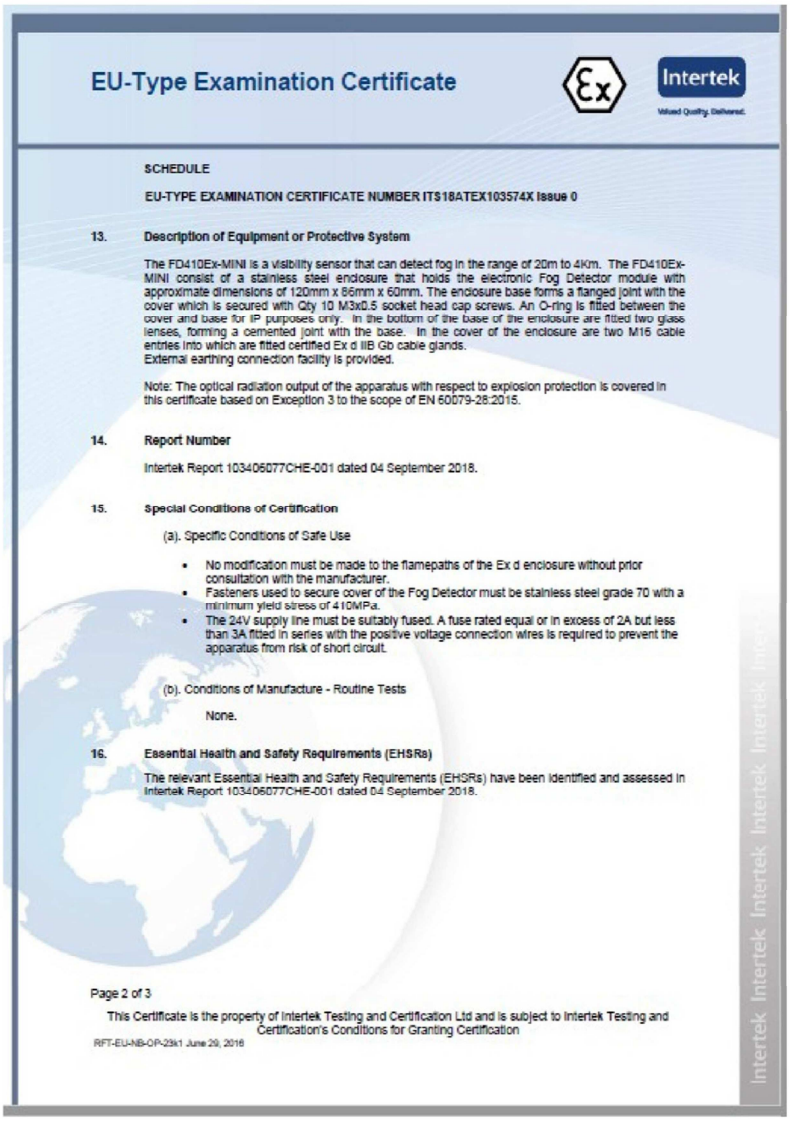
Intertek Testing & Certification Limited
Intertek House, Cleeve Road, Leatherhead, Surrey, KT22 7SA
Tel: +44 (0)1372 370900 Fax: +44 (0)1372 370977
www.intertek.com
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RFT-EU-NB-OP-25k1 June 29, 2016

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EU-Type Examination Certificate

Intertek
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SCHEDULE

EU-TYPE EXAMINATION CERTIFICATE NUMBER ITS18ATEX103574X Issue 0

13. Description of Equipment or Protective System

The FD410Ex-MINI is a visibility sensor that can detect fog in the range of 20m to 4Km. The FD410Ex-MINI consist of a stainless steel enclosure that holds the electronic Fog Detector module with approximate dimensions of 120mm x 86mm x 60mm. The enclosure base forms a flanged joint with the cover which is secured with Qty 10 M3x0.5 socket head cap screws. An O-ring is fitted between the cover and base for IP purposes only. In the bottom of the base of the enclosure are fitted two glass lenses, forming a cemented joint with the base. In the cover of the enclosure are two M16 cable entries into which are fitted certified Ex d IIB Gb cable glands.
External earthing connection facility is provided.

Note: The optical radiation output of the apparatus with respect to explosion protection is covered in this certificate based on Exception 3 to the scope of EN 60079-28:2015.

14. Report Number

Intertek Report 103406077CHE-001 dated 04 September 2018.

15. Special Conditions of Certification

(a). Specific Conditions of Safe Use

- No modification must be made to the flamepaths of the Ex d enclosure without prior consultation with the manufacturer.
- Fasteners used to secure cover of the Fog Detector must be stainless steel grade 70 with a minimum yield stress of 410MPa.
- The 24V supply line must be suitably fused. A fuse rated equal or in excess of 2A but less than 3A fitted in series with the positive voltage connection wires is required to prevent the apparatus from risk of short circuit.

(b). Conditions of Manufacture - Routine Tests

None.

16. Essential Health and Safety Requirements (EHSRs)

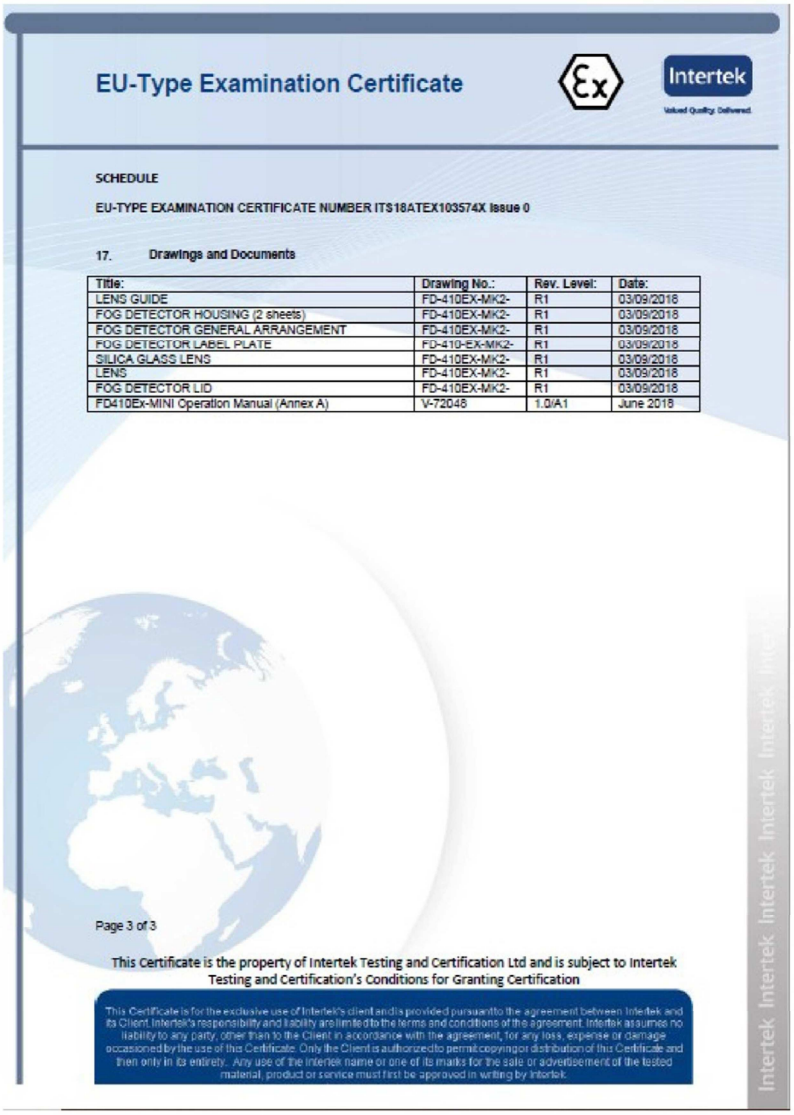
The relevant Essential Health and Safety Requirements (EHSRs) have been identified and assessed in Intertek Report 103406077CHE-001 dated 04 September 2018.

Page 2 of 3

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RFT-EU-NB-OP-23k1 June 29, 2016

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EU-Type Examination Certificate

SCHEDULE

EU-TYPE EXAMINATION CERTIFICATE NUMBER ITS18ATEX103574X Issue 0

17. Drawings and Documents

Title:	Drawing No.:	Rev. Level:	Date:
LENS GUIDE	FD-410EX-MK2-	R1	03/09/2018
FOG DETECTOR HOUSING (2 sheets)	FD-410EX-MK2-	R1	03/09/2018
FOG DETECTOR GENERAL ARRANGEMENT	FD-410EX-MK2-	R1	03/09/2018
FOG DETECTOR LABEL PLATE	FD-410-EX-MK2-	R1	03/09/2018
SILICA GLASS LENS	FD-410EX-MK2-	R1	03/09/2018
LENS	FD-410EX-MK2-	R1	03/09/2018
FOG DETECTOR LID	FD-410EX-MK2-	R1	03/09/2018
FD410Ex-MINI Operation Manual (Annex A)	V-72048	1.0/A1	June 2018

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Total Quality Assured

Test Verification of Conformity

Verification Number: 103406077CHE-001

On the basis of the tests undertaken, the sample<s> of the below product have been found to comply with the requirements of the referenced specification<s>/standard<s> at the time the tests were carried out. This verification is part of the full test report<s> and should be read in conjunction with it <them>.

Applicant Name & Address:	Pharos Marine Automatic Power Ltd Lancelot Road, Beacon Business Park, Great Yarmouth
Product Description:	Fog Detector
Ratings & Principle Characteristics:	24Vdc
Models/Type References:	FD-410Ex-MINI
Specification<s>/Standard<s>:	IP66 – IEC/EN 60529:1992+A2:2013
Verification Issuing Office Name & Address:	Intertek Testing & Certification Ltd Deeside Lane, Chester, CH1 6DD
Test Report Number<s>:	103406077CHE-001

Signature

Name: M Newman
Position: Senior Engineer
Date: 11 September 2018

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Intertek Page 1 of 1 GFT-OP-11a (22-February-2018)

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Annex B – Methods for detecting fog and measuring visibility

What is fog?
Fog is large density of small water droplets that are small enough to "float" in the air. The size of fog particles is typically 5 to 50 µm (0.005 to 0.05 mm). The reason why fog particles float in the air is the following:
The smaller a water drop is the lower is the fall velocity. And for small enough size the time it takes for the droplet to fall to the ground is much longer than its lifetime. In a real atmosphere the air is also constantly moving also vertically which compensates for the motion by gravity for some of the droplets.
So, under conditions for fog build up - like cooling of moist saturated air - there will be a large number of fog particles present in the air.

How do we define visibility?
The most understandable measure on visibility is the Meteorological Optical Range MOR: The simple definition of MOR is how far we can see objects. But exactly how far away we can see an object during foggy conditions in daylight depends on the optical properties of the object such as colour, structure and (of course) if it is a light source or not, and if so the intensity of the light source. At night time we can of course only talk about visibility distance to a light source. Therefore, different standards have been created - in one of them - for daylight conditions - the object is a black and white checkerboard pattern.

Now to a more theoretical definition of MOR:
The attenuation of a light ray that is propagating through a homogenous absorbing or scattering atmosphere can be described using an exponential function as:
I=Io*exp(-x*a)
Where: Io is the intensity at a certain plane
x is the distance from that plane along the ray
a is a constant (unit m-1) that determines the attenuation.

MOR relates to a as MOR= 3.9/a or MOR =2.5/a or something in between like MOR =3/a (this last one is probably the most common).
We can interpret a as the inverse of the penetration depth which is the distance the ray has propagated when the intensity has decreased to Io*e(-1) which is about Io*37%. The penetration depth is simply 1/a. Theoretically about 2% to 8% remains at the distance MOR depending on if the value 3.9, 3 or 2.5 is used. MOR varies between 50 km or even more at very clear weather and 10 meters in heavy fog. (During heavy snowfall or snow combined with wind MOR can be even lower.)

The extinction coefficient and fog density
The constant a is often known as the "extinction coefficient" in the literature. At good visibility the extinction coefficient is near to zero and it increases as the visibility decreases. The extinction coefficient can also be named fog density.

Scattering of light in fog.
We start by considering a light beam that hits a small particle in the air. The light source can for instance be a laser or a LED. The wavelength may be inside or a little outside the

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visible range. The particle is typically a small water drop constituting fog.
A fraction of the laser light propagating from left to right will be scattered in all directions - but with different efficiency - by the particle.

The light that has changed its propagation direction less than 90 degrees is called **forward scattered** light, and the light that has changed its direction more than 90 degrees is called **backscattered light**.
All the scattered light is lost for contributing to an image on the retina in the eye. This is the reason why the perception when looking at objects with our eyes (or with a camera) during fog is changed. We also have another phenomena: The light grey haze covering the whole image comes from scattered light from the fog particles.

How can we measure fog using optical techniques?
We will briefly describe the major optical methods used for detecting fog and for measuring visibility.

Transmission method
One classical method to measure visibility is to measure how much light that is transmitted from a light source to a receiver located a distance- for instance 50 meters away.

In foggy weather less light (compared to during clear weather) will reach the receiver because of the scattering along the ray path. The scattered light will of course not be collected by the receiver. The reduction is used as raw data for strait forward calculation of the visibility.
This method is for instance used on airports. The visibility along runways, a very important safety parameter on airports, is often controlled this way.

Forward scatter and back scatter method
The following figures show two other main concepts for building optical sensors for detecting particles in the air by collecting and measuring the light scattered by the particles in an optical receiver. The most common concept is to collect the forward scattered light.
Backscatter method
The backscatter concept is the most compact way of detecting particles in the air since the transmitter and the receiver can be located close to each other in the same box.
The main disadvantage of the backscatter concept is that the optical power reaching the receiver is lower than that in the forward scatter case. This causes lower signal to noise ratio when using the backscatter method but can be compensated for by using high performance electro optic solutions (low noise optical receivers) making range of 10 km possible.

Detection volume and accuracy of sensor readings
The transmission method measures along a narrow path between receiver and transmitter.
Both the backscatter method and the forward scatter method kind of sensors detect particles in a very small volume. That volume is representative for a limited area near the

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sensor. If we want the readings to represent the weather in a larger region around the sensor, we have to do assumptions and accept errors. These errors are normally the dominating error source when measuring visibility using any method.
Let's explain this with an example: Assume that the visibility reading from one sensor is 4000 meters. But 1000 meters away there is a fog bank and we have another sensor there, which gives the reading 500 meters. So, it is certainly not possible to see 4000 meters (- in that direction from the location of the first sensor). So, what is the visibility? And what do we mean with visibility readings in a case like this?
We can conclude that all optical sensors primarily give a local reading of the density of scattering particles that we can convert to visibility under the assumption that the density is homogenous.
When there is wind (which is very often the case) the local density may still vary, but if the visibility reading is a mean value of samples taken during several minutes the errors are considerably reduced.
If a visibility sensor is used to warn for low visibility the best alternative is to mount it at a location where the fog normally starts and tends to be most dense - for instance near a river or a lake or in a valley.

Measuring visibility during rain- and snowfall
As we all know the visibility is reduced - compared to clear weather - not only during fog but also during rain- and snowfall. A raindrop and a snowflake will of course scatter light and cause reduced visibility. The scattered light is lost for making an image on the retina in the eye in the same way as for a fog particle.
The different optical methods described will however give different results in terms of a or MOR. The reason is that the form of the scattering lobes (also called phase function) is not the same for the different scattering particles involved. The total scattering is the relevant quantity for determining MOR.
The transmission method will give correct results. The reason is as explained above that the relevant quantity - the non-scattered light which can be converted to MOR without approximations - is measured.
It has been shown that forward scatter sensors measure within ±15% accuracy if the scattering angle 42 deg is used - which usually is the case today.
The backscatter method will overestimate the visibility during rain and give roughly correct values during snowfall.

Measuring visibility in polluted air
The visibility can also be reduced because of solid particles like desert dust or soot. The sizes of these particles are normally of the order fog particle or smaller. If the particles are very small the visibility will be slightly underestimated by the forward- and back scatter sensors.

Conclusions
We can now compare the different methods to measure visibility in some respects:
Sensitivity:
The transmission method can measure up to about 50 km visibility.
The forward scatter method is able to measure up to about the same order - or even better - which is in both cases better than backscatter sensors which are able to detect visibilities up to about 10 km.

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Correctness:
We use the term correctness for the ability to measure visibility in all conditions that occur. The most interesting cases besides fog are when the visibility is reduced because of rain or snow.
The "winner" in this discipline is the transmission method since it measures the quantity relevant for visibility namely the transmitted light. Forward scatter sensors are ranked as second. The backscatter method overestimates the visibility during rain giving ranking as 3.
Compactness:
The winner is in this case the backscatter method which is easily understood when looking at the figures. The forward scatter sensors are second in this discipline and the transmission method number three.
Price:
The backscatter sensors are the cheapest. On second ranking is the forward scatter and the transmission system is ranked as number 3.
The conclusion is that transmission and forward scatter sensors have the best and almost equal performance but back scatter visibility sensors is an interesting alternative in applications where:
- A low price is important.
- Visibility reduction because of fog - and to below 5 to 10 km - is the main concern.

This is generally the case in applications where warning for fog because of safety is the main concern "Fog warning systems"
One important example of such applications is Road weather stations.

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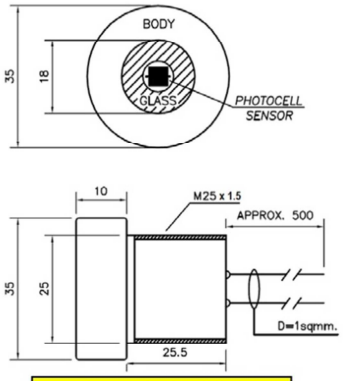
1.6 SICE PHOTOCELL FTC M25 DATASHEET



SICE NAVIGATION AID SYSTEM
Ex PHOTOCELL SYSTEM



SICE FTC M25 COMPLETE DEVICE INCLUDING PHOTOCONDUCTIVE CELL SENSOR, ENCLOSURE, ENCAPSULATION AND CONNECTING CABLE



SICE FTC M25 COMPLETE DEVICE DIMENSIONAL DRAWING

Photoconductive cell (photoresistor), rugged type, installed, connected and encapsulated by SICE inside a special enclosure, M25 threaded, that includes the glass window. The complete device (photoresistor + enclosure + encapsulation + connecting cable) is ATEX and IECEx certified and is suitable for Zone 1 installation. This device can be installed on a dedicated Junction Box (Photocell Junction Box) or inside the same navigation aids control panel, depending on the navigation aids requirements. Main technical characteristics:



VT50N1 (OR EQUIVALENT) PHOTOCONDUCTIVE CELL SENSOR INSTALLED INSIDE ENCLOSURE

Photoconductive cell details:

- ✓ Type : VT50N1 (or equivalent)
- ✓ Resistance range at 10 lux : from 4.0kΩ to 12kΩ
- ✓ Resistance at dark : 200kΩ minimum
- ✓ Working voltage : 200Vpk maximum
- ✓ Power dissipation : 0.5W maximum
- ✓ Operating (and storage) temperature : from -45°C to +75°C

Complete device details:

- ✓ Type : SICE FTC M25
- ✓ Enclosure body material : AISI 316L Stainless Steel
- ✓ Window glass type : tempered
- ✓ Glass thickness : 10mm
- ✓ Rating voltage : 80Vdc/ac maximum
- ✓ Rating current : 0.1A maximum
- ✓ Mechanical protection : IP66
- ✓ Rated service temperature range : from -40°C to +55°C
- ✓ Protection mode (marking) : Ex II 2 G Ex d IIB Gb IP 66
- ✓ ATEX certificate number : INERIS 02ATEX9006U
- ✓ IECEx certificate number : INE 14.0022U

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SICE NAVIGATION AID SYSTEM
Ex PHOTOCELL SYSTEM

REDUNDANT PHOTOCELL SYSTEM TYPE EJB-2 + 3xFTC



PHOTOCELL DEVICE 1
PHOTOCELL DEVICE 2
PHOTOCELL DEVICE 3

EJB-2 + 3 FTC
Ex ENCLOSURE TYPE EJB-2
ASSEMBLED WITH THREE
PHOTOCELL DEVICES TYPE FTC
(TYPICAL)

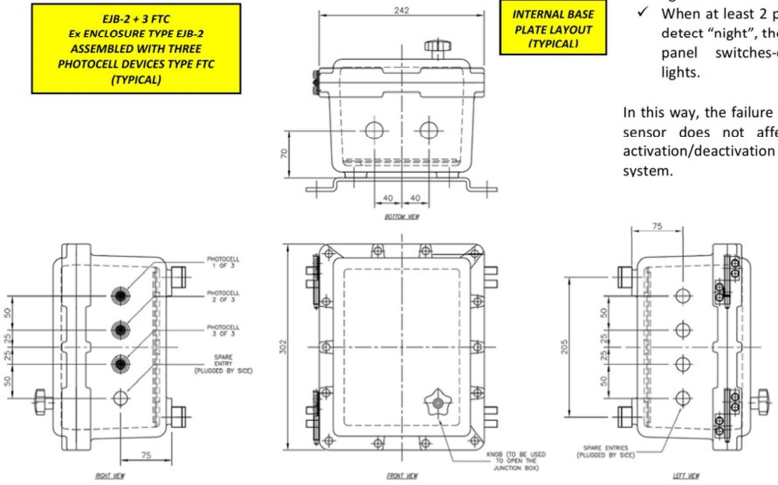


INTERNAL BASE PLATE LAYOUT (TYPICAL)

This redundant photocell system includes Q.ty 3 photocell sensors, ATEX and IECEx certified, type SICE FTC M25, placed in the side of one explosion proof enclosure type EJB-02 (or equivalent enclosure). These sensors are managed by SICE supervisor system placed in the SICE navaids control panel and work as follows:

- ✓ When at least 2 photocell sensors detect "day", the navaids control panel switches-off the signal lights.
- ✓ When at least 2 photocell sensors detect "night", the navaids control panel switches-on the signal lights.

In this way, the failure of one photocell sensor does not affect the correct activation/deactivation of the lights system.



EJB-2 Ex ENCLOSURE
TYPICAL DIMENSIONAL DRAWING

Enclosure details:

- ✓ Type: EJB-2
- ✓ Manufacturer: Technor-Italsmea
- ✓ Material: marine grade aluminium
- ✓ External paint: for off shore use
- ✓ Internal paint: anticondensation
- ✓ Mechanical protection: IP66
- ✓ Execution: Ex d IIB T6 IP66
- ✓ Temp. range: from -40°C to +55°C
- ✓ ATEX certificate: INERIS 00ATEX0021X
- ✓ IECEx certificate: INE 10.0015X
- ✓ Weight: 12kg (approx.)

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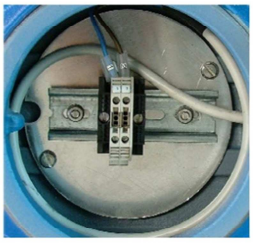


SICE NAVIGATION AID SYSTEM
Ex PHOTOCELL SYSTEM

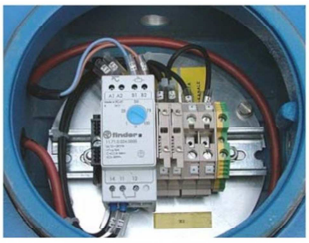
PHOTOCELL SYSTEM TYPE GUB-02 + 1xFTC



GUB-02 + 1xFTC Ex ENCLOSURE TYPE GUB-02 ASSEMBLED WITH ONE PHOTOCELL DEVICE TYPE FTC M25 (TYPICAL)

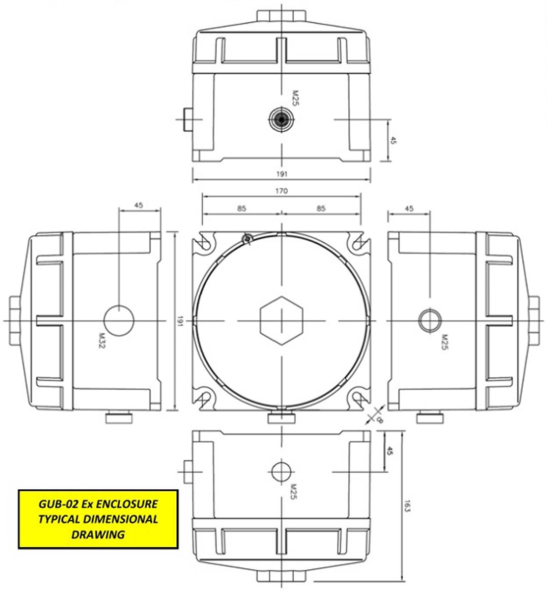


INTERNAL BASE PLATE LAYOUT OF GUB-02 + 1xFTC STANDARD TYPE (TYPICAL)



INTERNAL BASE PLATE LAYOUT OF GUB-02 + 1xFTC COMPLETE TYPE (TYPICAL)

This system includes (usually) Q.ty 1 photocell sensor device, ATEX and IECEx certified, type SICE FTC M25, placed in the side of one explosion proof enclosure, type GUB-02 (or equivalent enclosure). SICE can manufacture this system in compliance with Customer specifications and requirements, as in the following two examples.



GUB-02 Ex ENCLOSURE TYPICAL DIMENSIONAL DRAWING

GUB-02 + 1xFTC standard type:
Inside the enclosure are installed the photocell sensor device and the terminal strip only. The photocell sensor device must be managed by SICE Navaids Panel, where the light dependant relay, that manages the photocell sensor, is installed. This system does not require power supply voltage, it is powered by Navaids Panel directly through the two wires used for the connection.
Main technical details:

- ✓ Working voltage: ≤24Vdc (from SICE Navaid Panel)
- ✓ Power consumption: ≤0.5W

GUB-02 + 1xFTC complete type:
This system is complete also with local light dependant relay and, in this case, it is able to switch ON / OFF the loads directly. So, in this case, the photocell system must be also powered by external voltage.
Main technical details:

- ✓ Working voltage: 24Vdc / 230Vac
- ✓ Power consumption:1.3VA / 0.8W (excluded loads)
- ✓ Relay contacts current: 16A at 250Vac (AC1)

Enclosure details:

- ✓ Type: GUB-02
- ✓ Manufacturer: Technor-Italsmea
- ✓ Material: marine grade aluminium
- ✓ External paint: for off shore use
- ✓ Internal paint: anticondensation
- ✓ Mechanical protection: IP66
- ✓ Execution: Ex db IIC T6 Gb IP66
- ✓ Temp. range: from -40°C to +55°C
- ✓ ATEX certificate: INERIS 00ATEX0033x
- ✓ IECEx certificate: BKI 15.0003
- ✓ Weight: 6kg (approx.)

Document can be subjected to modifications, without prior notice

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1.7 SICE PHOTOCELL FTC M25 INSTRUCTIONS (ATEX)

sice S.R.L.

ISTRUZIONI D'USO E MANUTENZIONE / *INSTRUCTION AND MAINTENANCE*

FOTOCELLULA / *PHOTOCONDUCTIVE CELL* – FTC

IU-001/ATEX

Rev.3 del 22/02/2013

Pag. 1 di 4

CARATTERISTICHE TECNICHE

Modo di protezione:	Ex d IIB Gb
Zona di impiego:	1 - 2
Classificazione ATEX	Gruppo II
Categoria	2 G
Temperatura ambiente:	-40°C + +55°C
Caratteristiche nominali:	Max 80Vac-dc Max 100mA

GRADO DI PROTEZIONE

IP66 standard

CERTIFICATE
02ATEX9006U/03
IECEx INE 14.0022U

AVVERTENZE:

La fotocellula non può essere utilizzata singolarmente in atmosfera esplosiva; la stessa, dovrà essere utilizzata montata su una custodia certificata con uno dei modi di protezione approvato dalla direttiva 94/9/CE.
I cavi della fotocellula dovranno essere collegati in zona sicura oppure in custodie idonee alla zona di installazione, limiti di temperatura e temperatura ambiente.

INSTALLAZIONE:

Questo apparecchio deve essere installato da personale autorizzato ed addestrato in accordo alla EN 60079-14. E' vietata qualsiasi modifica all'apparecchiatura originale. E' compito dell'installatore o utilizzatore di verificare se le caratteristiche meccaniche, dei materiali e il modo di protezione sono compatibili con le condizioni ambientali e la classificazione del luogo di installazione. L'uso improprio annulla la garanzia. Il trasporto e lo stoccaggio devono essere effettuati nell'imballo originale. L'apparecchiatura è provvista di una filettatura standard di NPT ¾" conforme alla norma EN 60079-1. Altri tipi di filettature:
- filettature cilindriche unificate conformi alla norma EN 60079-1 tab 3.

Le filettature cilindriche devono essere assicurate contro l'allentamento meccanicamente oppure mediante idoneo sigillante.

TECHNICAL SPECIFICATIONS

Type of protection:	*Ex d IIB Gb*
Operating zones:	*1 - 2*
ATEX classification	*Group II*
Category	*2 G*
Ambient temperature:	*-40°C + +55°C*
Ratings:	Max 80Vac-dc Max 100mA

PROTECTION DEGREE

IP66 standard

WARNING :

The photoconductive cell cannot singly be used in explosive atmosphere; the same one, must be uses climbed on a certified enclosure with one of the types of protection approved by the directive 94/9/EC.
The cables of the photoconductive cell must have connected in safety zone or in enclosures with suitable type of protection, temperature limits and ambient temperature.

MOUNTING :

This apparatus must be mounted by authorized and specialized personnel in accordance with EN 60079-14. All modifications of original apparatus are forbidden. The installer or the user must verify the compatibility between materials, mechanical characteristics and the environmental conditions / classification of the installation site. All wrong use cancel the warranty. Transportation and storage must be with the original packing.
The apparatus is provided with NPT ¾" thread according to EN 60079-1.
Others threadings types:
- *normalized cylindrical threadings according to EN 60079-1 table 3.*

The cylindrical threads must be mechanically secured against the loosening by a suitable sealant.

INERIS NOTIFIED BODY ATMOSPHERES EXPLOSIVES

INERIS IECEx Certified EXPLOSIVE ATMOSPHERES

SICE S.R.L. Via G. Bartolini ... Tel. ... Fax ... C.Fisc. - P.IVA 02099630412

File: IU001-ATEX Fotocellula FTC rev 3

sice S.R.L.

ISTRUZIONI D'USO E MANUTENZIONE / *INSTRUCTION AND MAINTENANCE*

FOTOCELLULA / *PHOTOCONDUCTIVE CELL* – **FTC**

IU-001/ATEX

Rev.3 del 22/02/2013

Pag. 2 di 4

MANUTENZIONE :

Tutti gli interventi di manutenzione devono essere eseguiti da personale autorizzato ed addestrato in accordo alla EN 60079-17. Gli interventi dovranno essere effettuati sull'apparecchiatura priva di alimentazione. E' vietata qualsiasi modifica all'apparecchiatura originale.

MAINTENANCE :

All actions must be executed by authorized and specialized personnel in accordance with EN 60079-17. All actions must be executed without power supply. All modification of original apparatus are forbidden.

DATI DI TARGA E CONTRASSEGNO

La fotocellula riporta il contrassegno nella parte della testina realizzato in alternativa con uno dei seguenti modi :

- Incisione tramite raggio laser
- Incisione tramite punzone metallico

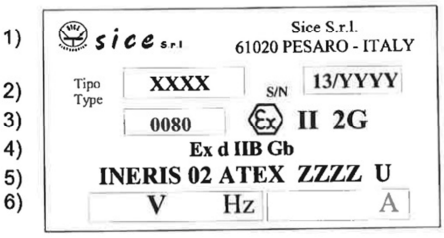
I dati riportati sono i seguenti:

RATINGS AND MARKING

The photoconductive cell reports the mark in the external realized in alternative in one of the following ways :

- *Incision by ray laser*
- *Incision by metallic tampon*

The data appearing on the label are as follows



1) Nome e indirizzo del costruttore / *Manufacturer's brand name and address*
2) **XXXX** = Definizione dell'apparecchiatura / *Description of apparatus*
   13/YYYY = Anno di costruzione e n° di matricola / *Year of construction and serial n.er.*
3) **0080** = Nr. d'identificazione Organismo notificato / *Number of identification Notified Body*
   Ex = Marchio comunitario distintivo delle apparecchiatura Ex / *EC distinctive mark for Ex apparatus*
   II = Gruppo Apparecchiatura (superficie) / *Apparatus class*
   2 = Categoria apparecchiatura / *Apparatus category*
   G = Tipo di atmosfera esplosiva G=GAS / *Type of explosive atmosphere G=GAS*
4) **Ex d IIB Gb** = Modo di protezione in accordo alle Norme EN 60079-0, EN 60079-1 *Type of protection according to EN 60079-0; EN 60079-1 Standards*
5) **INERIS** = Organismo notificato / *Notified body*
   02ATEX = Anno di rilascio dell'attestazione / *Year of issue of the certificate*
   ZZZZ = Nr. del certificato di componente / *Number of the EC type certificate*
   U = Certificato di componente / Component certificate
6) **V - Hz–A** = Dati elettrici / *Electrical data*

File: IU001-ATEX Fotocellula FTC rev 3

Corrispondenze tra zone pericolose, sostanze e categorie, EPL
Hazardous areas, substances and categories relation, EPL

Zona pericolosa *Hazardous area*		Categorie secondo Direttiva 94/9/CE 94/9/EC Directive category	EPL
Gas, vapori o nebbie *Gases, vapours or mists*	Zona 0 Zone 0	1 G	Ga
	Zona 1 Zone 1	1 G oppure / *or* 2 G	Ga oppure / *or* Gb
	Zona 2 Zone 2	1 G, 2 G oppure / *or* 3 G	Ga, Gb oppure / *or* Gc

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Attestazione di conformità
Attestation of conformity

Noi **SICE S.r.l.**
We **Via G.Bartolucci, 16**
61020 Borgo Santa Maria - Pesaro (PU) - Italy

dichiariamo sotto la nostra esclusiva responsabilità che i prodotti
declare under our sole responsibility that the products

Fotocellula serie FTC
FTC photoconductive cell serie

ai quali questa dichiarazione si riferisce sono conformi alle seguenti direttive:
to which this declaration relates complies with the following Directives:

- **ATEX Directive 94/9/EC**

La conformità è stata verificata sulla base dei requisiti delle norme o dei documenti normativi riportati nel seguito:
The conformity are under observance of the following standards or standards documents:

- EN 60079-0:2012
- EN 60079-1:2007
- EN 60529

Modo di protezione / type of protection:

- Ⓔx **II 2 G Ex d IIB Gb IP 66**
- **Operating temperature: -40°C ÷ +55°C**

Certificato CE di tipo :
INERIS 02 ATEX xxxx

Organismo Notificato ATEX/Q:
0080 INERIS

Pesaro, *date xx.xx.xxxx*

Signature S.I.C.E.

File: IU001-ATEX Fotocellula FTC rev 3

1.8 SICE PHOTOCELL FTC M25 INSTRUCTIONS (IECEX)

sice S.R.L.

ISTRUZIONI D'USO E MANUTENZIONE / *INSTRUCTION AND MAINTENANCE*

FOTOCELLULA / *PHOTOCONDUCTIVE CELL* – **FTC**

IU-001/IECEx

Rev.0 del 22/02/2013 — Pag. 1 di 4

CARATTERISTICHE TECNICHE

Modo di protezione:	Ex d IIB Gb
Zona di impiego:	1 - 2
Classificazione IECEx	Gruppo II
Temperatura ambiente:	-40°C ÷ +55°C
Caratteristiche nominali:	Max 80Vac-dc Max 100mA

GRADO DI PROTEZIONE

IP66 standard

AVVERTENZE:

La fotocellula non può essere utilizzata singolarmente in atmosfera esplosiva; la stessa, dovrà essere utilizzata montata su una custodia certificata con uno dei modi di protezione approvato dallo schema IECEx.
I cavi della fotocellula dovranno essere collegati in zona sicura oppure in custodie idonee alla zona di installazione, limiti di temperatura e temperatura ambiente.

INSTALLAZIONE:

Questo apparecchio deve essere installato da personale autorizzato ed addestrato in accordo alla IEC 60079-14. E' vietata qualsiasi modifica all'apparecchiatura originale. E' compito dell'installatore o utilizzatore di verificare se le caratteristiche meccaniche, dei materiali e il modo di protezione sono compatibili con le condizioni ambientali e la classificazione del luogo di installazione. L'uso improprio annulla la garanzia. Il trasporto e lo stoccaggio devono essere effettuati nell'imballo originale. L'apparecchiatura è provvista di una filettatura standard di NPT ¾" conforme alla norma IEC 60079-1. Altri tipi di filettature:

- filettature cilindriche unificate conformi alla norma IEC 60079-1 tab 3.

Le filettature cilindriche devono essere assicurate contro l'allentamento meccanicamente oppure mediante idoneo sigillante.

TECHNICAL SPECIFICATIONS

Type of protection:	*Ex d IIB Gb*
Operating zones:	*1 - 2*
IECEx classification	*Group II*
Ambient temperature:	*-40°C ÷ +55°C*
Ratings:	Max 80Vac-dc Max 100mA

CERTIFICATE 02ATEX9006U/03 IECEx INE 14.0022U INERIS

PROTECTION DEGREE

IP66 standard

WARNING :

The photoconductive cell cannot singly be used in explosive atmosphere; the same one, must be uses climbed on a certified enclosure with one of the types of protection approved by the IECEx scheme.
The cables of the photoconductive cell must have connected in safety zone or in enclosures with suitable type of protection, temperature limits and ambient temperature.

MOUNTING :

This apparatus must be mounted by authorized and specialized personnel in accordance with IEC 60079-14. All modifications of original apparatus are forbidden. The installer or the user must verify the compatibility between materials, mechanical characteristics and the environmental conditions / classification of the installation site. All wrong use cancel the warranty. Transportation and storage must be with the original packing.
The apparatus is provided with NPT ¾" thread according to IEC 60079-1.
Others threadings types:

- *normalized cylindrical threadings according to IEC 60079-1 table 3.*

The cylindrical threads must be mechanically secured against the loosening by a suitable sealant.

ATMOSPHERES EXPLOSIVES ORGANISME NOTIFIE INERIS NOTIFIED BODY EXPLOSIVE ATMOSPHERES

INERIS IECEx Certified EXPLOSIVE ATMOSPHERES

File: IU001-IECEx Fotocellula FTC rev 0

sice S.R.L.

ISTRUZIONI D'USO E MANUTENZIONE / *INSTRUCTION AND MAINTENANCE*

FOTOCELLULA / *PHOTOCONDUCTIVE CELL* – FTC

IU-001/IECEx

Rev.0 del 22/02/2013

Pag. 2 di 4

MANUTENZIONE :

Tutti gli interventi di manutenzione devono essere eseguiti da personale autorizzato ed addestrato in accordo alla IEC 60079-17. Gli interventi dovranno essere effettuati sull'apparecchiatura priva di alimentazione. E' vietata qualsiasi modifica all'apparecchiatura originale.

MAINTENANCE :

All actions must be executed by authorized and specialized personnel in accordance with IEC 60079-17. All actions must be executed without power supply. All modification of original apparatus are forbidden.

DATI DI TARGA E CONTRASSEGNO

La fotocellula riporta il contrassegno nella parte della testina realizzato in alternativa con uno dei seguenti modi :

- Incisione tramite raggio laser
- Incisione tramite punzone metallico

I dati riportati sono i seguenti:

RATINGS AND MARKING

The photoconductive cell reports the mark in the external realized in alternative in one of the following ways :

- *Incision by ray laser*
- *Incision by metallic tampon*

The data appearing on the label are as follows

1) sice s.r.l. — Sice S.r.l. 61020 PESARO - ITALY
2) Tipo / Type: XXXX — S/N: 13/YYYY
3) 0080
4) Ex d IIB Gb
5) IECEx INE 14.ZZZZU
6) V Hz A

1) Nome e indirizzo del costruttore / *Manufacturer's brand name and address*
2) **XXXX** = Definizione dell'apparecchiatura / *Description of apparatus*
   13/YYYY = Anno di costruzione e n° di matricola / *Year of construction and serial n.er.*
3) **0080** = Nr. d'identificazione Organismo notificato / *Number of identification Notified Body*
   Type of explosive atmosphere G=GAS
4) **Ex d IIB Gb** = Modo di protezione in accordo alle Norme IEC 60079-0, IEC 60079-1
   Type of protection according to IEC 60079-0; IEC 60079-1 Standards
5) **IECEx INE 14.ZZZZU** = certificato IECEx (CoC) /
   Number of the IECEx certificate (CoC)
6) **V - Hz–A** = Dati elettrici / *Electrical data*

File: IU001-IECEx Fotocellula FTC rev 0

Corrispondenze tra zone pericolose, sostanze e EPL
Hazardous areas, substances and EPL relation

Zona pericolosa *Hazardous area*		**EPL**
Gas, vapori o nebbie *Gases, vapours or mists*	Zona 0 Zone 0	Ga
	Zona 1 Zone 1	Ga oppure / *or* Gb
	Zona 2 Zone 2	Ga, Gb oppure / *or* Gc

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Attestazione di conformità
Attestation of conformity

Noi **SICE S.r.l.**
We **Via G.Bartolucci, 16**
61020 Borgo Santa Maria - Pesaro (PU) - Italy

dichiariamo sotto la nostra esclusiva responsabilità che i prodotti
declare under our sole responsibility that the products

Fotocellula serie FTC
FTC photoconductive cell serie

ai quali questa dichiarazione si riferisce sono conformi a:
to which this declaration relates complies with the following:

- **IECEx Scheme**

La conformità è stata verificata sulla base dei requisiti delle norme o dei documenti normativi riportati nel seguito:
The conformity are under observance of the following standards or standards documents:

- IEC 60079-0:2011
- IEC 60079-1:2007
- IEC 60529

Modo di protezione / type of protection:

- **Ex d IIB Gb IP 66**
- **Operating temperature: -40°C ÷ +55°C**

Certificato IECEx (CoC) :
IECEx INE 14.XXXXU

Organismo Notificato QAR:
0080 INERIS

Pesaro, *date xx.xx.xxxx*

Signature S.I.C.E.

File: IU001-IECEx Fotocellula FTC rev 0

1.9 TECHNOR EX-PROOF ENCLOSURE GUB/EMH-160 DATA SHEET

GAS GROUP IIC

GUB/EMH.. Series with window - Copper-free aluminium or Stainless Steel AISI 316 L



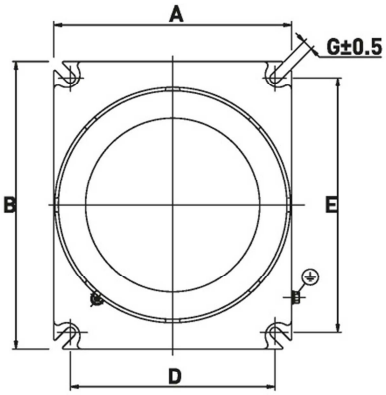
GUB/EMH.. series enclosures offers Ex d IIC mode of protection.
They are suitable for hazardous areas of industrial plants for indoor and outdoor applications.
GUB/EMH version is equipped with window made of tempered glass

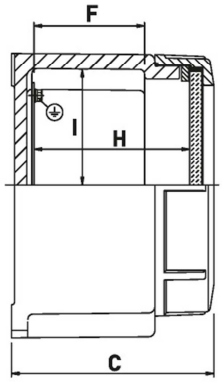
TECHNICAL FEATURES

Material	Copper-free aluminium Stainless steel AISI 316 L (upon request) The sides A,B & C can be increased/decrease of 10%	
IP rating	IP66	
Ambient temperature range	-50°C to +55°C (ATEX) -60°C to +60°C (IECEx)	
Approvals	Full conformity certificate: ATEX: 00ATEX0033X IECEx: BKI 15.0003 EAC: RU C-IT.BH02.B.00588/20	Component certificate: ATEX: IMQ 09 ATEX 018U IECEx: IECEx INE 09.0016U EAC: RU C-IT.BH02.B.00588/20
Marking	II 2 GD Ex d IIC T(*) Gb Ex tb IIIC T(*) Db IP66 * T6/T85°C, T5/T100°C, T4/T135°C	
Surface treatment	Polyurethane painting cycle - Blue colour RAL5014 (other colour available upon request)	
Entries	Metric pitch 1.5, ANSI B1.20.1 NPT	
Standard certificate label	Made by self adhesive UV and corrosion resistant polyester, approved by certified Laboratory.	
Optional accessories	Drain/breather valve Internal anticondensate painting Traffolyte/Stainless steel certificate label	

160 technor.com

Dimensions GUB/EMH..





GUB/EMH.. Series enclosures c/w internal mounting plate - Copper-free aluminium - Standard versions*

TYPE	CODE	DIMENSIONS [mm]							WINDOW DIAMETER	WEIGHT [Kg]
		A	B	C	D	E	F	H		
EMH-160	B016084010003	210	210	160	180	180	78	115	155	6.00
EMH-175	B016084010005	232	281	185	202	251	97	141	170	8.90
EMH-200	B016084010006	257	298	200	227	268	106	150	195	11.90
EMH-230	B016084010009	295	330	236	259	295	140	189	230	15.80

*Standard enclosures are supplied painted - painting cycle: C4 - Colour: Blue RAL5014
For complete junction boxes, ask to the Sales Office.
Note: For installations in either Zone 1 or in the presence of Group IIC gases, barrier glands are required. Please refer to EN-60079-14.

Maximum number of entries on sides A/B under ATEX directive

TYPE	EMH-160	EMH-175	EMH-200	EMH-230
M20/1/2"	5/5	5/7	7/9	7/9
M25/3/4"	5/5	5/7	7/9	7/9
M32/1"	3/3	5/5	5/7	5/7
M50/1" 1/2	2/2	2/3	2/3	3/5
M63/2"	1/1	2/2	2/2	2/3
M75/2" 1/2	-	1/2	1/2	2/2
M80/3"	-	1/1	1/2	1/2

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1.10 TECHNOR EX-PROOF ENCLOSURE GUB/EMH-160 INSTRUCTIONS



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Listed Documents	Any changes should be authorized by ExCB
EU Type Examination Certificate	**INERIS 22ATEX0008X**
IECEx Certificate	**IECEx INE 22.0012X**
Ex Technical Report	**FR/INE/ExTR22.0010/00**

INSTRUCTION NOTE: N° TN2202 Annex A				
0	Emission	AIOLFI	FUMAGALLI	01/03/2022
REV.	DESCRIPTION	ISSUED	APPR.	DATE

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A COMPANY OF MARECHAL ELECTRIC

Technor Italsmea Spa Via Italia, 33 20060 Gessate Milan Italy
Phone +39 - 02 - 9500151 Fax +39 - 02 – 95781462

FLAMEPROOF ENCLOSURES

GUB SERIES

Suitable for installation in Zone: 1, 2, 21, 22



GUB..
Series



GUB../QL
Series



GUB/EMH..
Series

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1. **General information**
   - 1.1 Manufacturer
   - 1.2 About these Instructions
   - 1.3 Conformity with Standards and Regulations
2. **Explanations of Symbols on the device**
3. **Safety**
   - 3.1 General precautions
   - 3.2 Type of protection
   - 3.3 Intended Use
4. **Transport, Storage & Handling**
   - 4.1 Transport & Storage
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5. **Mounting & Installation**
   - 5.1 Preparation of the product: unpacking
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***Table of Contents*:**

5.6 Opening the enclosure
5.7 Electrical connections
6. Maintenance
6.1 General Information
7. Cleaning
8. Repairing
9. Disposal
10. Special conditions of use
11. Warranties
12. Management of non-conformities
13. Marking
14. Annex A – Technical Data
15. Annex B – Enclosure dimensions
16. Annex C – Maximum number of entries

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1. General Information

1.1 Manufacturer

TECHNOR ITALSMEA S.p.A.
Via Italia 33, 20060
Gessate, Milan, Italy
Phone: +39 02 95 00 151
Fax: +39 02 95 00 15 27

1.2 About these Instructions

- INSTRUCTION NOTE: N° TN2202 Annex A, issued on February 2nd, 2022
- Read carefully these Instructions before using the device
- Keep these Instructions throughout the entire service life of the enclosure
- Make these Instructions available to operating and maintenance personnel
- Update these Instructions every time an amendment is delivered from TECHNOR ITALSMEA
- In case of sale of the apparatus, pass these Instructions to subsequent owners

1.3 Conformity with Standards and Regulations

- GUB Series is manufactured in accordance with ATEX and IECEx standards

2. Explanation of symbols on the device

Symbol	Meaning
	Product compliant with European Directive 2014/34/EU (ATEX) for installation in hazardous areas
	Product compliant with IEC standards for installation in hazardous areas
	Product compliant with applicable European Directives

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3. Safety

3.1 General precautions

- The apparatus must be installed according to EN/IEC 60079-14 standard (Edit in force) and maintenance operations must be performed according to EN/IEC 60079-17 standard (Edit in force).
- User must be aware of electric risks, chemical and physical characteristics of gas, vapours, and dusts present in the plant.
- To further guarantee good product quality/safety, the Quality System of Technor Italsmea is evaluated and approved by a Notified Body, which carries out Quality System surveillance.
- Technor Italsmea ensures and guarantees correct manufacturing of its products.
- Buyer and/or End User are directly responsible of correct product installation and maintenance, according to local and national laws and product installation specifications.
- Use the apparatus only in accordance with the operating conditions described in these operating Instructions;
- Use the apparatus only for the intended purpose specified in these operating Instructions;
- All modifications and changing are strictly forbidden.

DANGER: EXPLOSION HAZARD DUE TO IMPROPER USE AND/OR ALTERATIONS TO THE APPARATUS CAN CAUSE SEVERE OR FATAL INJURIES

WARNING: ALL MODIFICATIONS / CHANGING, MADE BY BUYER / END USER, WITHOUT TECHNOR ITALSMEA WRITTEN ACCEPTANCE WILL INVALIDATE CERTIFICATIONS, WARRANTIES AND ANY OTHER CONTRACTUAL AGREEMENT

RESIDUAL RISK: ALTOUGH USED PROPERLY, THE APPARATUS CAN PRESENT RESIDUAL RISKS, WHICH ARE TYPICAL OF ANY APPARATUS CONNECTED TO POWER SUPPLY.

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3.2 Type of protection

Flameproof enclosures GUB** Series – Protection: Ex db, Ex db [i.], Ex ia/ib, Ex tb

Compliant with:

- *IEC 60079-0* & *EN IEC 60079-0*
  Equipment - General requirement
- *IEC 60079-1* & *EN IEC 60079-1*
  Equipment protection by flameproof enclosures 'd'
- *IEC 60079-11* & *EN IEC 60079-11*
  Equipment protection by intrinsic safety 'i'
- *IEC 60079-31* & *EN 60079-31*
  Equipment dust ignition protection by enclosure "t"

Enclosure:

Type of protection Ex db:

Electric equipment is installed in enclosure suitable to withstand the pressure raised during the internal explosion and avoids flame transmission to the external potentially explosive atmosphere.

Type of protection Ex i:

The energy of the circuit which could be capable of igniting a potentially explosive atmosphere is limited so that neither sparking nor heating of the electrical components can ignite the surrounding potentially explosive atmosphere.

Type of protection Ex tb:

It avoids combustible dust (IIIC) penetration into the enclosure and ensures surface temperature limitation for use in explosive dust atmospheres.

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3.3 Intended Use

GUB Series are suitable for:

- Equipment for explosive Gas and Dust atmospheres, having a "high" Level of Protection, which is not a source of ignition in normal operation or during expected malfunctions.
- Applications such as: control units, junction boxes, industrial power distribution switch racks; receptacles; heat tracing and lighting panels.
- Housing electric and/or electronic equipment and / or terminals.
- Housing arcing or sparking components.
- Indoor / Outdoor application.
- Hazardous areas: Zone 1, 2, 21, 22.
- Safe areas.

WARNING: USE THE APPARATUS ONLY FOR ITS INTENDED PURPOSE. AN INCORRECT USE MAY AFFECT NEGATIVELY THE EFFICIENCY OF THE APPARATUS

WARNING: USE THE APPARATUS ONLY IN THE HAZARDOUS AREAS STATED IN THESE INSTRUCTIONS.

DANGER: AN IMPROPER USE OF THE APPARATUS MAY LEAD TO SEVER AND/OR FATAL INJURIES

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4. Transport, Storage & Handling

4.1 Transport & Storage

- Transport and store the device only in its original packaging:
  - Paper/carton boxes; or
  - Wood boxes; or
  - Wood cages
- Store the device in a dry place, protected from sunlight, humidity, rain and vibration-free in the following condition:
  - -20°C ... +40°C

4.2 Handling

For handling, no special measures are required, therefore it is recommended to perform this operation following the common safety standards.

5. Mounting & Installation

5.1 Preparation of the product: unpacking

- Make sure to throw away any packaging component which could result dangerous to people, such as: screws, belts, plastic bags, etc...;
- Make sure that the packaging has not been damanged during transport;
- Put down the right side of the packaging and unpack the apparatus;
- Remove the apparatus from the package in the most appropriate manner according to the weight of the apparatus.

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5.2 Before mounting & installation

Before mounting and installing the device, User must verify that:

- Responsibility for assembly, commissioning, operation, maintenance, and dismounting lies with the plant operator.
- The personnel must be appropriately trained and qualified in order to carry out mounting, installation, commissioning, operation, maintenance, and dismounting of the device. The trained and qualified personnel must have read and understood the instruction manual.
- Do not damage the flame path surfaces between enclosure and enclosure cover during the opening.
- If one of the flame path surfaces is damaged, replace the enclosure.
- Before fixing the enclosure cover to the enclosure, protect the flame path surfaces with a thin layer of suitable protective grease. We recommend using silicone grease type LOCTITE 8104 or similar. It shall be of a type that does not harden, does not contain an evaporating solvent and does not cause corrosion.
- Grounding terminals fastening: the M6 screws and/or nuts of the grounding cables terminals must be screwed tight. Suggested tightening torque 9Nm.
- The enclosure can be supplied c/w transparent tempered glass parts installed by Technor Italsmea.
- If other solid obstacles are present outside the enclosure, the minimum distance between the flame path of the enclosure and these obstacles must not be less than the distance according to EN/IEC 60079-14:
  - Gas group IIC ≥ 40 mm.
- The enclosure is not damaged.

DANGER: EXPLOSION HAZARD DUE TO INCORRECT MOUNTING OF THE DEVICE CAN CAUSE SEVERE OR FATAL INJURIES

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5.3 Before commissioning

Before placing the device into service:

- Correct project data and installation;
- The electrical ratings (voltages, frequency, mechanical and thermal stress within project data);
- The clamping of the electric and mechanical connections;
- The integrity and the continuity of earth, protection or equipotential conductors;
- That no modifications have occurred to the electrical and/or mechanical structure and functionality of the apparatus (e.g. the alteration of the enclosure by the installation of further equipment inside the apparatus);
- Any electrical protection was not excluded nor deregulated;
- Verify the correct fastening of the enclosure parts;
- Verify the absence of any cause of stress (e.g. exposure to collision damages, presence of corrosive agents, possibility of internal short circuits with power dissipation superior than the admitted one).

WARNING: ALL MODIFICATIONS / CHANGING, MADE BY BUYER / END USER, WHICH IMPACT ON THE ELECTRICAL AND/OR MECHANICAL STRUCTURE AND FUNCTIONALITY OF THE APPARATUS WILL INVALIDATE CERTIFICATIONS, WARRANTIES AND ANY OTHER CONTRACTUAL AGREEMENT

Verify THREADED ENTRIES and CABLE GLANDS:

- Type and size of threaded holes are marked on the enclosure;
- Threaded entries must be equipped with suitable cable glands, accessories and blanking elements certified according to type of protection Ex db IIC and / or Ex tb IIIC, suitable to maintain the enclosure protection degree IP66 and suitable for ambient temperature stated on the "marking" label;
- Each entry shall have no more than one thread adapter. DO NOT USE a blanking element with a thread adapter.
- Use certified stopping plugs to close unused entries.

Verify the COVER:

- Cover must be properly closed. For more information, refer to paragraph *5.6 Unscrewing / Screwing the enclosure lid*.

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5.4 Apparatus Composition

5.4.1 Components & accessories

The enclosure can host electric and/or electronic equipment and/or terminals. The cover can be provided by threaded entries for the assembling of following accessories: draining & breathing devices, push buttons, selector switches, potentiometers, signal lamps, rotary handles fuses and/or windows (suitable for visualization of internal apparatus). Refer to below table for the complete list of suitable components:

COMPONENT TYPE:	
Instruments of measure of electric parameters	Time relay
Electronic thermoregulation units	Photocells
Radio communication and telephony units	Capacitors
PLC and multiplexer	Transformers
Devices for the control and the weight measure; pressure; damp; level; temperature and capacity	Anticondensate heatings
Automatic and/or earth leakage circuit breakers	Circumferentor and recorders of physical data
Switches; on load switches; rotary switches	Displays
Fuses / antitrouble filters	Ignitors
Contactors; remote control switches	General purpose drive and UPS
Relay	Fans
Led lamps 3 W max.	Cells and batteries
Electric and electronic of regulation and of starting devices	Terminals
Intrinsically safe devices	

Pushbutton



Pilot lamp



Rotary switch



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5.4.2 Terminals

Refer to below tables for terminals rated current and max. number of terminals which can be installed inside ***GUB**, GUB-QL**, GUB-**/EMH-**** enclosures.

TERMINALS – RATED CURRENT

Terminal cross-sectional area (mm²)	2,5	4	6	10	16	35	50	70	95	120	185	240	300
Rated current (A)	24	32	41	57	76	125	150	192	239	269	353	415	520

Max. number of terminals calculated in worst condition, so according to following parameters:

- T. class = T3;
- Ambient temp. = +40°C

TYPE / SECTION	GUB 0	GUB01	GUB02	GUB03	GUB04	GUB05	GUB06	GUB07
2,5 mmq	12	18	22	25	40	46	58	174
4 mmq)	11	17	21	25	40	46	58	174
6 mmq	9	14	17	19	22	34	42	126
10 mmq	7	11	13	15	17	19	34	102
16 mmq	-	9	10	12	14	16	19	57
35 mmq	-	-	6	8	9	8	12	36
50 mmq	-	-	5	8	8	5	11	33
70 mmq	-	-	-	-	-	4	8	24
95 mmq	-	-	-	-	-	-	6	18
120 mmq	-	-	-	-	-	-	6	18
185 mmq	-	-	-	-	-	-	5	15
240mmq	-	-	-	-	-	-	-	10
300mmq	-	-	-	-	-	-	-	6

5.4.3 Bars

Refer to below tables for bars which can be installed inside **GUB-**, GUB-QL**** and **GUB-**/EMH-**** enclosures.

ELECTRICAL BAR CHARACTERISTICS

GUB-, GUB-QL**** and **GUB-**/EMH-****	Nominal Section sqmm	Nominal current (A)
From GUBX to GUB07	36	72
From GUBX to GUB07	100	200
From GUBX to GUB07	160	250
From GUBX to GUB07	250	400
From GUBX to GUB07	400	625

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5.4.4 Maximum dissipated power

Maximum dissipated power (W / VA) for GUB** and GUB-QL** without windows and without or with IS apparatus when IS apparatus is protected by thermal probes

TYPE OF ENCLOSURE	T6/T85°C for ambient up to					T5/T100°C for ambient up to					
	40°C	50°C	55°C	60°C	70°C (*)	40°C	50°C	55°C	60°C	70°C(*)	80°C (*)
GUB0	34	24	20	15	5	48	39	34	29	20	10
GUB01 GUB-QL01	44	31	25	19	7	62	50	44	37	25	13
GUB02 GUB-QL02	56	40	32	25	9	79	64	56	48	32	16
GUB03 GUB-QL03	71	50	41	31	11	100	80	71	60	41	20
GUB04 GUB-QL04	91	64	52	40	14	127	103	91	77	52	26
GUB05 GUB-QL05	114	81	65	50	17	160	129	114	96	65	33
GUB06 GUB-QL06	151	108	87	67	23	213	172	151	128	87	44
GUB07 GUB-QL07	399	284	230	176	61	561	453	399	338	230	115
T° Cable	N/A		Tcable=75°C		Tcable=80°C	Tcable=80°C		Tcable=85°C		Tcable=95°C	

(*) Ambient temperature +70°C and +80°C are allowed only for enclosure type GUB** except GUB-QL**

TYPE OF ENCLOSURE	T4/T135°C for ambient up to						T3/T200°C for ambient up to					
	40°C	50°C	55°C	60°C	70°C	80°C(*)	40°C	50°C	55°C	60°C	70°C(*)	80°C(*)
GUB0	81	72	67	62	52	43	143	133	129	124	114	105
GUB01 GUB-QL01	105	93	87	81	68	56	185	172	166	161	148	136
GUB02 GUB-QL02	135	118	111	103	87	72	237	221	213	205	189	174
GUB03 GUB-QL03	169	149	139	130	109	90	298	277	268	258	238	218
GUB04 GUB-QL04	216	190	178	166	140	115	381	355	342	330	304	279
GUB05 GUB-QL05	272	239	223	208	175	144	478	445	430	414	381	351
GUB06 GUB-QL06	362	318	298	277	234	193	637	593	573	552	508	467
GUB07 GUB-QL07	953	838	784	730	615	507	1677	1562	1508	1454	1339	1231
T° Cable	Tcable=100°C		Tcable=105°C		Tcable=115°C		Tcable=140°C		Tcable=145°C		Tcable=155°C	

(*) Ambient temperature +70°C and +80°C are allowed only for enclosure type GUB** except GUB-QL**

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Maximum dissipated power (W / VA) for GUB-QL07 and GUB-**/EMH-** with windows, and without or with IS apparatus when IS apparatus is protected by thermal probes.

TYPE OF ENCLOSURE GUB-**	T6/T85°C for ambient up to					T5/T100°C for ambient up to					
	40°C	50°C	55°C	60°C	70°C	40°C	50°C	55°C	60°C	70°C	80°C
03/EMH-160	71	50	41	31	11	100	80	71	60	41	20
04/EMH-175	91	64	52	40	14	127	103	91	77	52	26
05/EMH-200	114	81	65	50	17	160	129	114	96	65	33
06/EMH-230	151	108	87	67	23	213	172	151	128	87	44
QL07	399	284	230	176	-	561	453	399	338	-	-
T° Cable	N/A		Tcable=75°C		Tcable=80°C	Tcable=80°C		Tcable=85°C		Tcable=95°C	

TYPE OF ENCLOSURE GUB-**	T4/T135°C for ambient up to					
	40°C	50°C	55°C	60°C	70°C	80°C
03/EMH-160	133	121	115	109	96	84
04/EMH-175	170	155	147	140	123	107
05/EMH-200	214	195	185	175	154	135
06/EMH-230	285	259	246	234	205	180
QL07	751	683	649	615	-	-
T° Cable	Tcable=95°C		Tcable=100°C		Tcable=80°C	Tcable=95°C

(*) Ambient temperature +70°C and +80°C are allowed only for enclosure type GUB**/EMH*** except GUB-QL07

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5.4.4 Maximum dissipated power

Maximum dissipated power (W / VA) for GUB-**, GUB-QL** and GUB-**/EMH-** with or without windows with IS apparatus without thermal probes protection.

TYPE OF ENCLOSURE	T.AMB OF THE INTRINSIC SAFETY ELEMENT	T6/T85°C FOR AMBIENT UP TO			
		40°C	50°C	55°C	60°C
GUB0	60°C	10	3	N/A	N/A
	70°C	17	10	6	3
	80°C	25	17	13	10
	85°C	28	21	17	13
GUB-01 GUB-QL01	60°C	13	4	N/A	N/A
	70°C	22	13	8	4
	80°C	32	22	17	13
	85°C	36	27	22	17
GUB-02 GUB-QL02	60°C	17	5	N/A	N/A
	70°C	29	17	10	5
	80°C	41	29	22	17
	85°C	46	34	29	22
GUB-03 GUB-QL03	60°C	21	6	N/A	N/A
	70°C	36	21	13	6
	80°C	51	36	28	21
	85°C	58	43	36	28
GUB-04 GUB-QL04	60°C	27	8	N/A	N/A
	70°C	46	27	17	8
	80°C	65	46	36	27
	85°C	74	55	46	36
GUB-05 GUB-QL05	60°C	34	10	N/A	N/A
	70°C	58	34	21	10
	80°C	82	58	45	34
	85°C	93	69	58	45
GUB-06 GUB-QL06	60°C	45	13	N/A	N/A
	70°C	77	45	28	13
	80°C	109	77	60	45
	85°C	124	92	77	60
GUB-07 GUB-QL07	60°C	118	34	N/A	N/A
	70°C	203	118	73	34
	80°C	287	203	158	118
	85°C	327	242	203	158
GUB-03/EMH160	60°C	21	43	N/A	N/A
	70°C	36	36	13	6
	80°C	51	21	28	21
	85°C	58	6	36	28
GUB-04/EMH-175	60°C	27	8	N/A	N/A
	70°C	46	27	17	9
	80°C	65	46	36	27
	85°C	74	55	46	36
GUB-05/EMH-200	60°C	34	10	N/A	N/A
	70°C	58	34	21	10
	80°C	82	58	45	34
	85°C	93	69	58	45
GUB-06/EMH-175	60°C	45	13	N/A	N/A
	70°C	77	45	28	13
	80°C	109	77	60	45
	85°C	124	92	77	60

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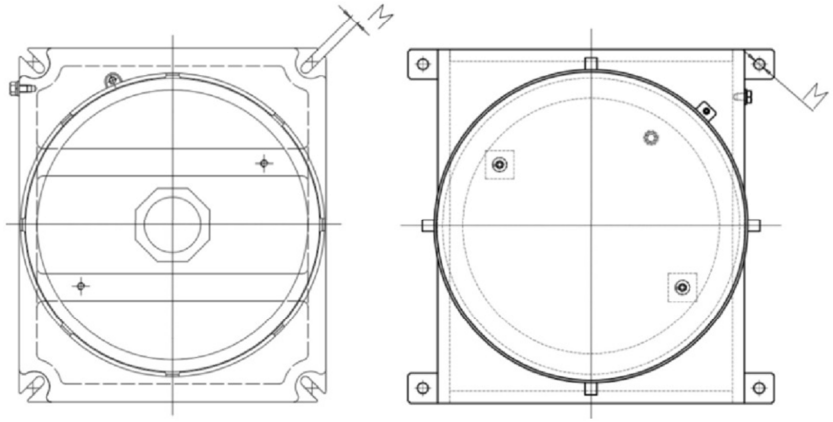
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5.5 Mounting the enclosure

- Mount the enclosure in vertical position by using four screws. Refer to dimensional drawings for mounting holes
- Tighten the mounting screws properly.

Fig. 5.



ENCLOSURE TYPE	SCREW SIZE FOR GUB (AL)	SCREW SIZE FOR GUB (SS)
GUB0	M6	M8
GUB-01	M6	M8
GUB-02	M8	M8
GUB-03	M8	M10
GUB-04	M8	M10
GUB-05	M8	M12
GUB-06	M10	M12
GUB-07	M16	M16

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5.6 Unscrewing / Screwing the eclosure lid

Unscrewing the enclosure LID

1. Loosen the clamping dowel
2. Unscrew the enclosure lid and put it safely.

Screwing down the enclosure LID

1. To prevent corrosion the lid thread must be coated with anti-seize Loctite 8150 or equivalent.
2. Screw lid of enclosure carefully onto base of enclosure. Do not tilt the thread.
3. Screw in threads all the way.
4. Fasten the clamping dowel to lock the lid.

5.7 Electrical connections

The terminals of the equipment must be used with the insert and the connection of the wires of type and section allowed, for voltage and current values not higher than ones indicated from the constructor.

DANGER: EXPLOSION HAZARD DUE TO IMPROPER CONNECTION CAN CAUSE SEVERE OR FATAL INJURIES

WARNING: ALL DAMAGES TO THE DEVICE DUE TO IMPROPER CONNECTION WILL INVALIDATE CERTIFICATIONS, WARRANTIES AND ANY OTHER CONTRACTUAL AGREEMENT

Internal wiring

- Strictly adhere to wire size and length for which heat loss dissipation are taken into account for permissible wattage for a given T Class. In case of non-compliance explosion protection can no longer be guaranteed.
- Strictly adhere to the creepage and clearance required.
- Use only insulated wires of suitable voltage grade.
- Mounting rails or components must be loosened and fastened properly.

External wiring

- The cables must comply with IEC/EN 60079-14 and relevant regulation and must have the required cross section.
- Strictly adhere to cable size and length for which heat loss dissipation are taken into account for permissible wattage for a given T Class and ambient temperature.
- Cable shall be in compliance with the Tcable.
- In case of non-compliance explosion protection can no longer be guaranteed.

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Protective Earth conductor connection

- The device is equipped with one internal and two external protective conductor connection arrangements with knurled SS screw (anti-rotational) and flat washer.
- Use ring type lug of suitable material and size to be affixed between plain washers.
- The PE conductor size shall be as under:

CROSS SECTIONAL AREA OF PHASE CONDUCTOR S mm^2	MINIMUM CROSS SECTIONAL AREA OF THE CORRESPONDING PE CONDUCTOR IN mm^2
$S \leq 16$	S with min of $4mm^2$
$16 < S \leq 35$	16
$S > 35$	0.5 S

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6. Maintenance

6.1 General information

The maintenance is a set of operations performed in order to maintain the safety and functional features of the apparatus during its operating life. The maintenance operations must be performed according to EN/IEC 60079-17 standard (Edit in force).
The apparatus must be submitted to a detailed maintenance program studied and managed by qualified and authorized technicians and related to the type of apparatus, its operating service and environmental conditions.

- Do not exceed the limit of two years between inspections;
- Check the WARNINGS on the marking tag before opening the enclosure;
- All the maintenance operations must be performed with the electrical apparatus isolated from all energy sources;
- The apparatus must be installed and maintained in order to prevent dangers from casual contacts with under voltage elements and the risks of fire and burst derived from possible abnormal working conditions;
- If the apparatus is subjected to vibrations, verify frequently the fastening of screws, pipe and/or cable entries and each part of the enclosure;
- Replace damaged parts by original Technor Italsmea spare parts only;
- The inspections and maintenance on the apparatus must be carried out only from expert staff, whose training has included all the necessary instructions on the installation modalities, on the laws and standards relevant and on the general principles of the classification of the hazardous areas.

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7. Cleaning

Cleaning of flanged joints and cover screws:

- Use only non-metallic brushes and non-corrosive cleaning fluids;
- All joints and screws must be thoroughly cleaned and lightly smeared with a suitable grease to protect and prevent corrosion. NON-HARDENING grease (LOCTITE 8104 or equivalent) must be used in order to prevent corrosion and protect them against bad weather;
- Clean and grease the flanged joints and cover screws before cover reassembling;
- Before reassembling the apparatus, verify that flanged joints and screws have not been damaged.

WARNING: APPLY CAREFULLY THE GREASE TO THE JOINTS TO ENSURE THE RETENTION OF NOT HARDENING CHARACTERISTICS

DANGER: EXPLOSION HAZARD DUE TO DAMAGED JOINTS DURING CLEANING TREATMENTS CAN CAUSE SEVERE OR FATAL INJURIES

When the apparatus is installed in environments with combustible dust:

- Proceed with a regular cleaning of the apparatus to avoid dust accumulation on the surfaces

When the Warning: "POTENTIAL ELECTROSTATIC CHARGING HAZARD – SEE INSTRUCTIONS" is present on the tag:

- Proceed with a regular cleaning using damp cloth or antistatic products only;
- During cleaning process, touch the apparatus with an insulated object.

The following precautions must be taken when the apparatus is installed in environments with combustible dust: TO AVOID DUST ACCUMULATION ON THE SURFACES, USER MUST PROCEED WITH A REGULAR CLEANING OF THE APPARATUS.

WARNING: DO NOT USE AGGRESSIVE DETERGENTS OR ABRASIVE SOLVENTS WHICH CAN AFFECT NEGATIVELY THE FUNCTIONALITY OF THE APPARATUS

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8. Repairing

Flameproof joints whose dimensions are different from the values specified in the tables of EN/IEC 60079-1 standard cannot be repaired.
All repairing impacting the type of protection (except for replacement with original Technor Italsmea spare parts) are admitted only under written authorization of Technor Italsmea.
Written agreements with Technor Italsmea must be taken concerning procedures for mandatory verifications and tests to be performed after repairing.

9. Disposal

Ensuring that you dispose of the product in the appropriate way contributes to avoiding potential negative consequences that might arise from unsuitable disposal of the product.
For further information about recycling of this product, contact your local municipal offices, the local municipal waste disposal service or the point-of-sale where you purchased this product.



The symbol, applied to the product or to the package, indicates that the product should not be considered normal domestic waste, but must be taken to the appropriate collection print for the recycling of electric and electronic devices.

10. Special conditions of use

- The screws used for cover fastening must have a tensile strength higher or equal to 800 N/mm^2.
- The dimensions of flameproof joints are different from the values specified in the tables of the EN/IEC 60079-1 standard. The flameproof joints are not intended to be repaired.

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11. Warranties

For Warranty Terms & Conditions, please refer to our General Terms & Conditions available at https://marechal.com/technor/en/p-general-terms-and-conditions-of-sales-technor.html

12. Management of non-conformities

In case of receiving a Product considered as non-compliant, please contact aftersaleservice@italsmea.com and communicate the following information: Company name, PO number, delivery date, non-compliant Product and the reason(s) why the Product has been considered as non-compliant. TECHNOR ITALSMEA will evaluate the request and the Product will be repaired or replaced, at TECHNOR ITALSMEA sole discretion.

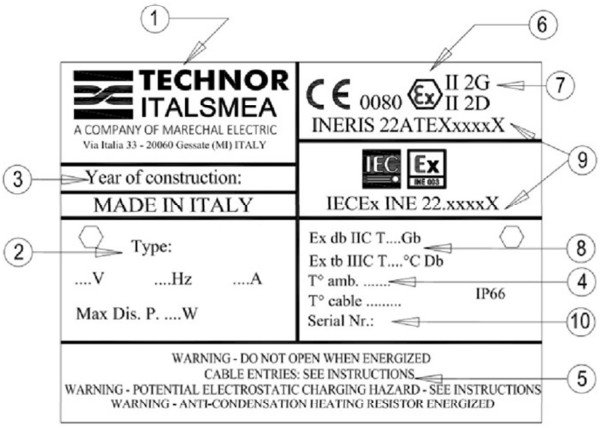
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13. Marking

Find below an example of marking that will be present on flameproof enclosure GUB Series



Legenda:		
(1)	Brand, name and address of the manufacturer	
(2)	Equipment type designation given by manufacturer	
(3)	Year of construction and serial number	
(4)	Ambient temperature range	
(5)	Warning used for all types of luminaires	
(6)	Distinctive community mark specific of explosion protection	
(7)	ATEX Marking	
	II:	Group of apparatus - equipment suitable to be installed in surface places
	2G:	Category – equipment suitable to be installed in places in which, during the normal activities, explosive atmosphere caused by gases, vapours, mists (G) are likely to occur (zone 1); suitable to be installed in zone 1 and in zone 2.
	2D:	Category – equipment suitable to be installed in places in which, during the normal activities, explosive atmosphere caused by mixture of air and combustible dust are likely to occur (zone 21); suitable to be installed in zone 21 and in zone 22.
(8)	IECEx marking – type of protection	
	Ex:	Protection against explosion.
	db	Type of protection "db" – Equipment protection by flameproof enclosures (for EPL Gb)
	IIC	Equipment suitable to be installed in surface places for all types of combustible gas
	Gb:	Equipment for explosive gas atmospheres, having a "enhanced" level of protection, which is not source of igniton in normal operation and which may have some additional protection to ensure that it remains inactive as an ignition source in the case of regular expected occurrences.
	tb:	Protection by enclosures, (for EPL Db).
	IIIC	Group III for use in places with an explosive dust atmosphere other than mines susceptible to firedamp; conductive dust
	Db:	Equipment for explosive dust atmospheres, having an "high" level of protection, which is not a source of ignition in normal operation or during expected malfunctions
(9)	Identification of Notified Body that have issued the ATEX and IECEx certificate and its relative number (see declaration of conformity)	
(10)	Serial Nr	

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14. Annex A – Technical data

14.1 Explosion protection

Global (IECEx)	Ex db IIC T(**) Gb or Ex db ia/ib IIC T(**) Gb and/or Ex tb IIIC T(**) Db Ex tb ia/ib IIIC T(**) Db *** T6/T85°C, T5/T100°C, T4/T135°C, T3/T200°C* Ex db [ia Ga] IIC T6 Gb and/or Ex db [ib] IIC T6 Gb and Ex db ia/ib [ia Ga] IIC T6 Gb and/or Ex db ia/ib [ib] IIC T6 Gb and/or Ex tb [ia Da] IIIC T85°C Db Ex tb [ib] IIIC T85°C Db Ex tb ia/ib [ia Da] IIIC T85°C Db Ex tb ia/ib [ib] IIIC T85°C Db Ex db I Mb Ex db ia/ib I Mb Ex db [ia Ma] I Mb Ex db [ib] I Mb Ex db ia/ib [ia Ma] I Mb Ex db ia/ib [ib] I Mb

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14. Annex A – Technical data

14.2 Explosion protection

Europe (ATEX)

II 2 G Ex db IIC T(**) Gb or
II 2 G Ex db ia/ib IIC T(**) Gb and/or
II 2 D Ex tb IIIC T(**) Db
II 2 D Ex tb ia/ib IIIC T(**) Db
*** T6/T85°C, T5/T100°C, T4/T135°C, T3/T200°C*

II 2(1) G Ex db [ia Ga] IIC T6 Gb and/or
II 2(2) G Ex db [ib] IIC T6 Gb and/or
II 2(1) G Ex db ia/ib [ia Ga] IIC T6 Gb and/or
II 2(2) G Ex db ia/ib [ib] IIC T6 Gb and/or

II 2(1) D Ex tb [ia Da] IIIC T85°C Db
II 2(2) D Ex tb [ib] IIIC T85°C Db
II 2(1) D Ex tb ia/ib [ia Da] IIIC T85°C Db
II 2(2) D Ex tb ia/ib [ib] IIIC T85°C Db

I M2 Ex db I Mb
I M2 Ex db ia/ib I Mb
I M2(M1) Ex db [ia Ma] I Mb
I M2(M2) Ex db [ib] I Mb
I M2(M1) Ex db ia/ib [ia Ma] I Mb
I M2(M2) Ex db ia/ib [ib] I Mb

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14.3 Electrical data

I max.	2000A
V max. DC	20 kV
V max. AC	20 kV
Rated Frequency	0 to 1000Hz
Maximum supply voltage for "IS" elements	500V

14.4 Mechanical data

Degree of protection:	IP66
Ambient temp. range:	FROM -60°C to +80°C for all GUB** SIZES FROM -60°C to +60°C for all GUB-QL** and GUB-**/EMH** SIZES
Body:	Aluminim / Cast iron / Stainless steel / Carbon steel
Window	Tempered glass (GUB-EMH only)
Entries:	Metric pitch 1.5, ANSI B1.20.1 NPT
Coating / Painting:	Polyurethane painting cycle
Enclosure colour:	Blue (RAL5014) - Other colours available upon request
Certification label:	Acrylic laminate – Traffolyte available upon request

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14.5 Optional accessories

ACCESSORIES	FEATURES
DRAIN / BREATHER VALVE	ECR-1 Valve
GUB07	Closing system
OPERATION HEADS	PL.. Series: Push buttons, mechanical operators, signaling lamps PSRC.. Series: Rotating switches
WINDOWS	Standard shape: Rectangular Standard dimensions (mm): 45x70; 100x170; 100x270; 110x290 Customization is available upon request

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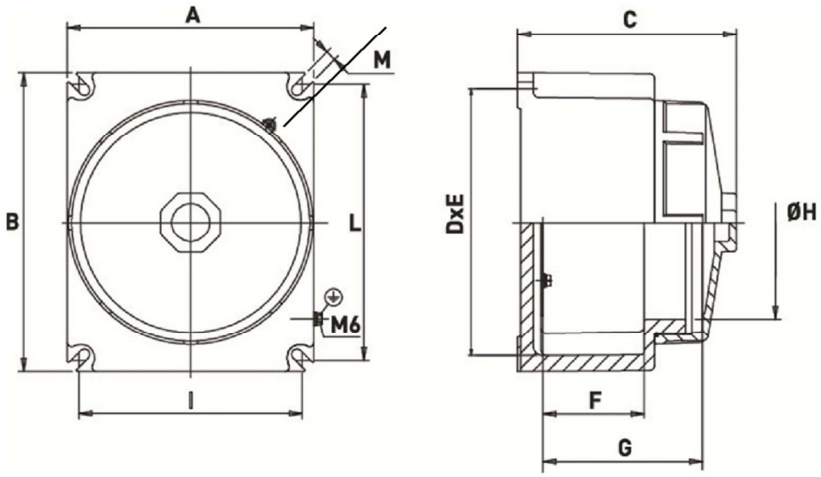
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15. Annex B – Enclosure dimensions

GUB... Series in copper-free aluminium

MOUNTING HOLES



TYPE	DIMENSIONS [mm]											WEIGHT [Kg]
	A	B	C	D	E	F	G	ØH	I	L	ØM	
GUB-0	133	133	142	110	110	62	107	90	113	113	8	2.5
GUB-01	169	169	152	139	139	64	115	126	150	150	8	3.60
GUB-02	190	190	164	160	160	65	125	144	170	170	8	4.70
GUB-03	210	210	179	180	180	80	139	167	179	179	8	6.00
GUB-04	281	232	206	202	291	99	160	183	260	210	10	8.90
GUB-05	298	257	222	227	268	108	178	206	275	235	8	11.90
GUB-06	329	293	248	259	295	141	211	242	270	305	10,5	15.80
GUB-07	545	545	248	490	490	195	229	457	475	475	14,5	81.5

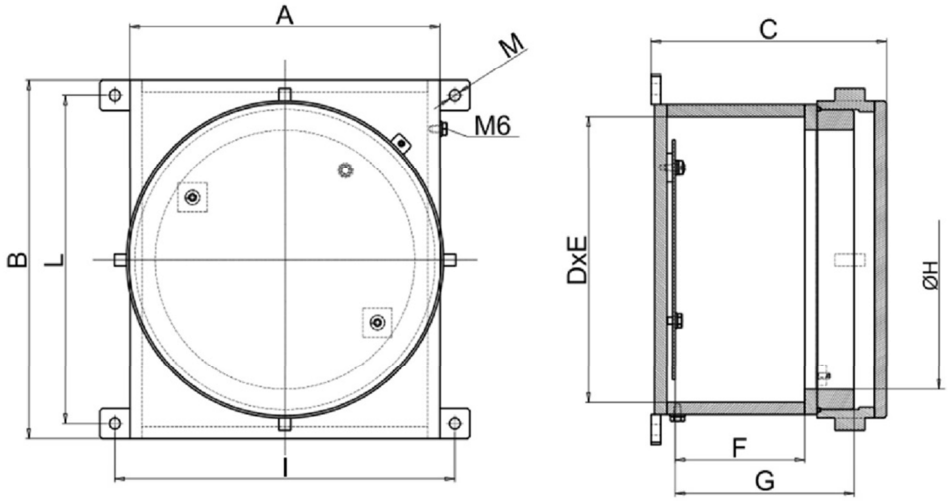
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GUB... Series in stainless steel

MOUNTING HOLES



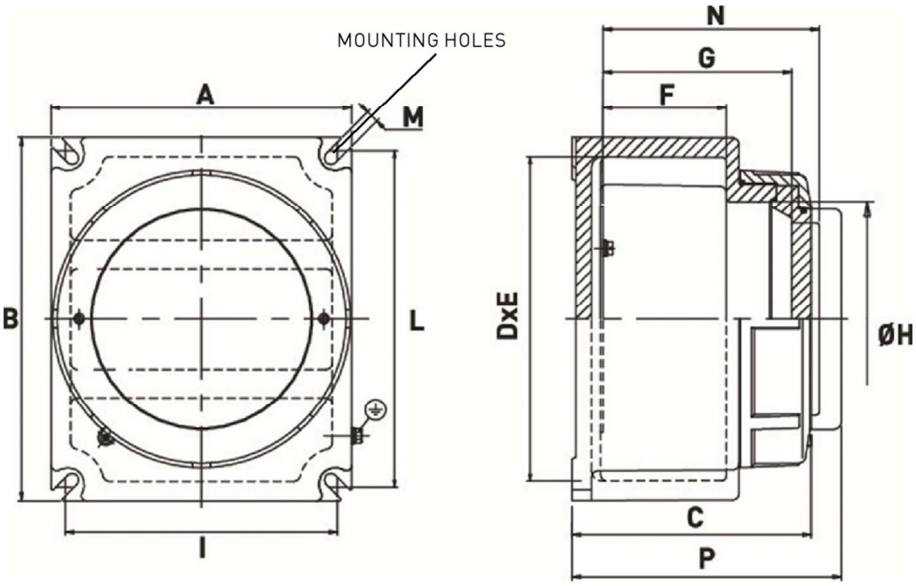
TYPE	DIMENSIONS [mm]											WEIGHT [Kg]
	A	B	C	D	E	F	G	ØH	I	L	ØM	
GUB-01	170	170	135	154	154	68	112	124,5	145	195	9	9.5
GUB-02	191	191	149	70	163	163	120	144	166	216	9	12.5
GUB-03	210	210	157	190	190	80	129	173	185	235	9	16.5
GUB-04	232	281	183	212	262	101	155	18	256	257	9	23.5
GUB-05	258	298	196	238	278	110	166	216	273	283	9	30
GUB-06	295	330	240	310	275	151	210	257	305	320	9	40.5
GUB-07	545	545	341	515	515	205	290	443	595	495	16	169

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GUB../QL Series in copper-free aluminium



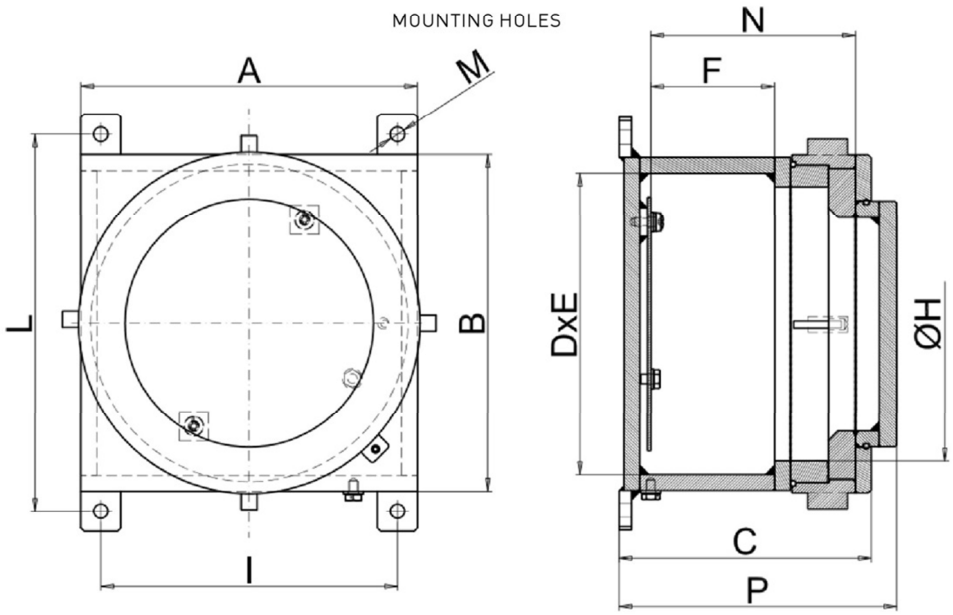
TYPE	DIMENSIONS [mm]													WEIGHT [Kg]
	A	B	C	D	E	F	G	ØH	I	L	ØM	N	P	
GUB-QL 01	169	169	139	139	139	62	103	126	150	150	8	-	-	3.60
GUB-QL 02	190	190	144	160	160	64	114	144	170	170	8	143	179	4.70
GUB-QL 03	210	210	158	180	180	78	129	167	179	179	8	140	174	6.00
GUB-QL 04	281	232	185	202	291	97	148	183	260	210	10	-	-	8.90
GUB-QL 05	298	257	199	227	268	108	161	206	275	235	8	-	-	11.90
GUB-QL 06	330	295	236	259	295	140	195,5	242	270	305	10,5	-	-	15.80
GUB-QL 07	545	545	348	490	490	197	285	457	475	475	14,5	-	-	81.5

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GUB../QL Series in stainless steel



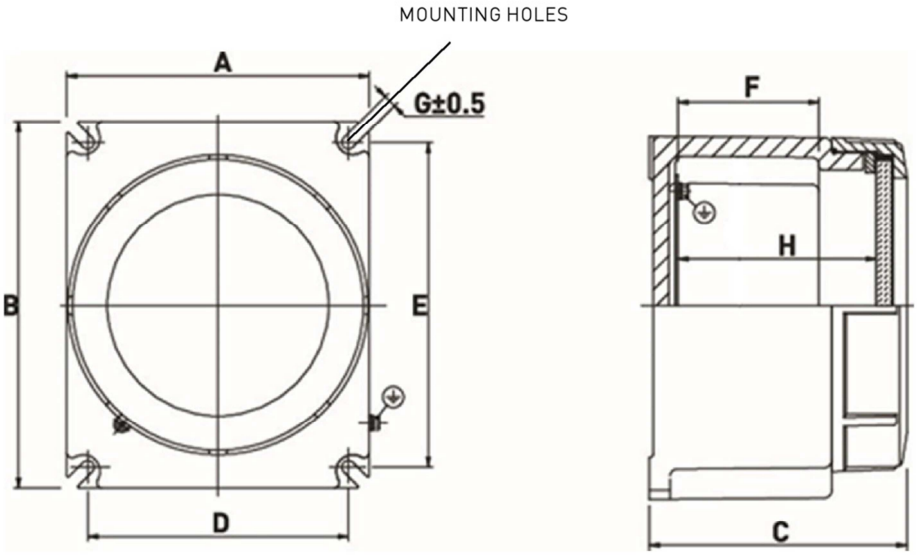
TYPE	DIMENSIONS [mm]													WEIGHT [Kg]
	A	B	C	D	E	F	G	ØH	I	L	ØM	N	P	
GUB-QL 01	170	170	136	154	154	66	109	124,5	145	195	9	-	-	11
GUB-QL 03	210	210	157	190	190	80	129	173	185	235	9	144	175	20
GUB-QL 04	232	281	183	212	262	101	155	18	256	257	9	-	-	26.3
GUB-QL 05	258	298	194	238	278	110	163	216	273	283	9	-	-	32
GUB-QL 06	295	330	238	310	275	151	210	257	305	320	9	-	-	43
GUB-QL 07	545	545	341	515	515	205	290	443	595	495	16	-	-	169

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GUB/EMH.. Series in copper-free aluminium



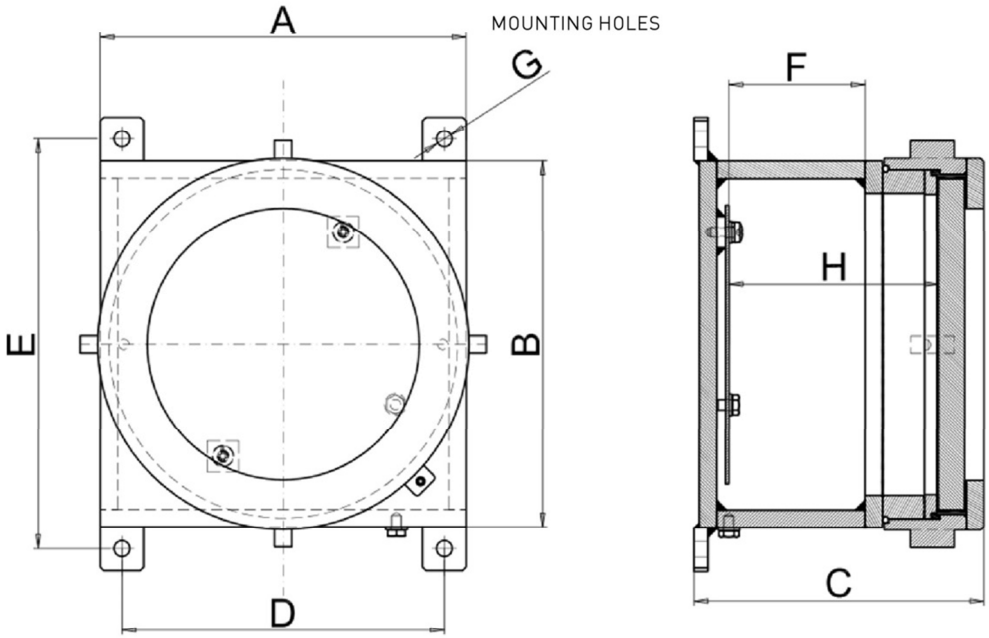
TYPE	DIMENSIONS [mm]								WINDOW Ø [mm]	WEIGHT [Kg]
	A	B	C	D	E	F	ØG	H		
EMH-160	210	210	160	180	180	78	8	115	155	6.00
EMH-175	281	232	185	202	251	97	8	141	170	8.90
EMH-200	298	257	200	227	268	106	8	150	195	11.90
EMH-230	329	293	236	259	295	140	10	189	230	15.80

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GUB/EMH... Series in stainless steel



TYPE	DIMENSIONS [mm]								WINDOW Ø [mm]	WEIGHT [Kg]
	A	B	C	D	E	F	ØG	H		
EMH-160	210	210	166	185	235	80	9	115	156	17.00
EMH-175	232	281	193	256	257	97	9	141	170	24.3
EMH-200	258	298	204	273	283	110	9	157	205	30
EMH-230	295	330	252	305	320	150	9	201	249	41

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16. Annex C – Maximum number of entries

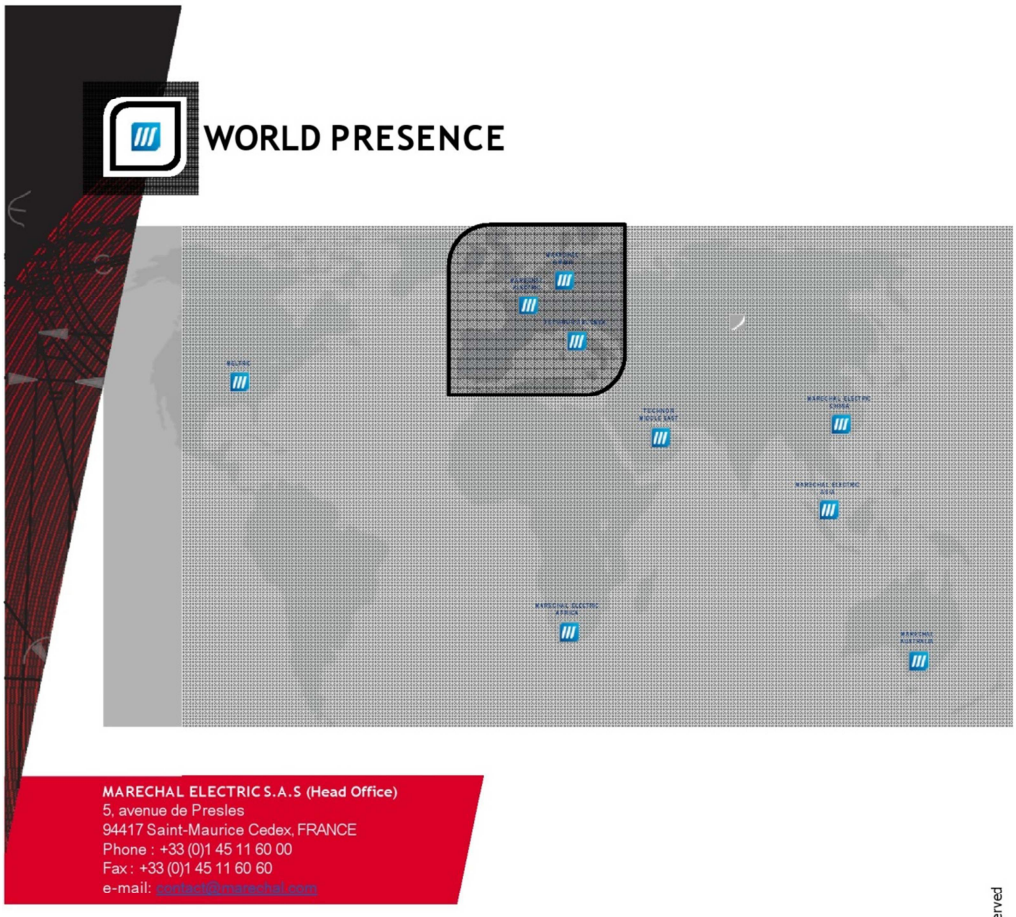
GUB... Series in copper-free aluminium and stainless steel

Maximum number of entries on sides A/B

TYPE	GUB-01	GUB-QL 01	GUB-02	GUB-QL 02	GUB-03	GUB-QL 03	GUB-03/EMH-160	GUB-04	GUB-QL 04	GUB-04/EMH-175	GUB-05	GUB-QL 05	GUB-05/EMH-200	GUB-06	GUB-QL06	GUB-06/EMH-200	GUB-07	GUB-QL 07
M16 / 3/8"	6/6		8/8		10/10			15/18			18/21			32/36			84/84	
M20 / 1/2"	3/3		5/5		5/5			5/7			7/9			7/9			50/50	
M25 / 3/4"	3/3		5/5		5/5			5/7			7/9			7/9			40/40	
M32 / 1"	2/2		3/3		3/3			5/5			5/7			5/7			24/24	
M50 / 1"½	1/1		1/1		2/2			2/3			2/3			3/5			18/18	
M63 / 2"	1/1		1/1		1/1			2/2			2/2			2/3			10/10	
M75 / 2"½	-		-		-			1/2*			1/2*			2/2*			5/5	
M80 / 3"	-		-		-			1/1*			1/2*			1/2*			4/4	
M90 / 3 ½"	-		-		-			-			-			-			4/4	
M100 / 4"	-		-		-			-			-			-			3/3	

* For Aluminium version, an adaptor is necessary

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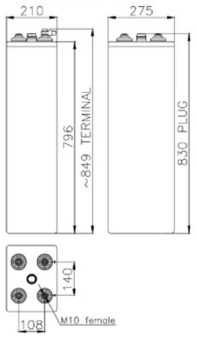
1.11 FIAMM BATTERY CELL SMG1680 DATA SHEET

FIAMM

PRODUCT SHEET SMG 1680

TECHNICAL DATA	
Voltage	2.00 V
Performance	1680Ah C10 1.80Vcell 20°C
Float Voltage	2.25V/cell at 20°C
Connection torque	20 - 25 Nm
Max Charge Current	420.00 A
Weight (Typical)	111,70 kg
Internal Resistance	0.17 mO
Short Circuit Current	11730.00 A

LAYOUT



ELECTRICAL PERFORMANCES - Including Fiamm connection voltage drop

Constant Current Discharge Table [A] at 20°C

V / cell	5 min	10 min	15 min	30 min	45 min	1 h	2 h	3 h	4 h	5 h	6 h	8 h	10 h
1,60	1429	1389	1338	1171	1019	910	626	471	375	310	265	208	169
1,65	1368	1328	1280	1121	979	877	608	460	368	305	262	206	169
1,67	1332	1292	1244	1092	956	857	597	454	364	302	260	205	169
1,70	1307	1267	1221	1072	940	844	590	450	361	300	258	204	168
1,75	1185	1145	1104	973	861	778	555	429	347	291	251	201	168
1,80	941	901	869	776	703	647	484	386	319	271	237	193	168
1,85	688	669	653	597	554	516	411	329	279	243	216	179	153
1,90	522	512	504	473	445	421	350	288	244	212	189	159	136

Constant Power Discharge Table [W/cell] at 25°C

V / cell	5 min	10 min	15 min	30 min	45 min	1 h	2 h	3 h	4 h	5 h	6 h	8 h	10 h
1,60	2343	2294	2205	1928	1720	1536	1078	853	685	582	507	408	333
1,65	2277	2231	2146	1881	1680	1505	1060	839	676	576	502	405	331
1,67	2237	2193	2111	1852	1656	1486	1049	831	670	572	499	403	330
1,70	2211	2167	2088	1833	1640	1473	1042	825	667	569	497	402	330
1,75	2078	2041	1970	1738	1560	1409	1007	798	649	556	486	395	326
1,80	1814	1788	1736	1548	1400	1282	937	744	613	530	464	383	319
1,85	1311	1281	1249	1165	1092	1030	811	665	558	479	424	352	300
1,90	1028	1021	1006	946	891	861	702	591	500	433	383	318	271

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1.12 FIAMM BATTERY CELL SMG1680 MANUAL

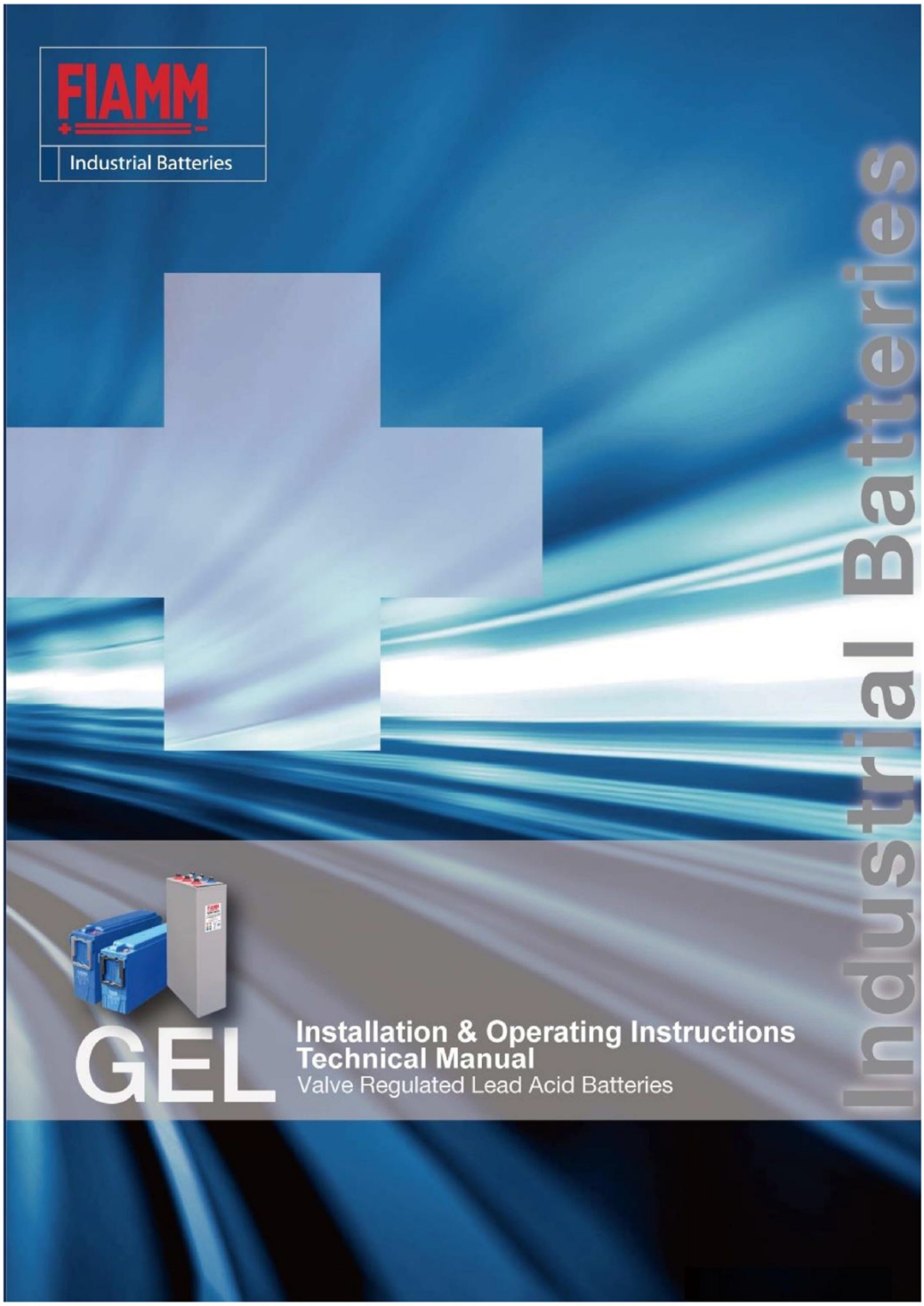


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- Separators
- Electrolyte
- Valves
- Terminal post
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❖ INTRODUCTION

In a high technological environment it is extremely important to have a backup power source whenever possible. In fact mains power failure could cause severe losses and damages anytime.

❖ CONSTRUCTION FEATURES

The main construction features of FIAMM GEL batteries are shortly described in the below section.

♦ Plates

Positive plates can be tubular A or flat; negative plates are flat pasted type B. The active material is made of a paste of lead oxide, water, sulphuric acid and other materials needed to obtain the performances and stability required throughout the battery life. The grids are made of a high quality lead alloy with calcium and tin which assures good resistance against corrosion

♦ Containers C

Battery cases and lids are made of a type of ABS (for some types flame retardant material comply with UL 94, class V-0 and with IEC 707, method FV0 is also available). This material is shock resistant. They are also designed to fully withstand the internal pressure variations during battery operation.

♦ Separators D

The separators are made of microporous PVC material which assures a good ionic exchange in the electrochemical process.

♦ Electrolyte E

The electrolyte consists in a GEL structure .

♦ Valves F

Each cell has a one way valve to permit the release of gases from the cell whenever the internal pressure exceeds the fixed safety value. The valve is rated at 0.15~0.30 atmospheres (15~30 Kpa).

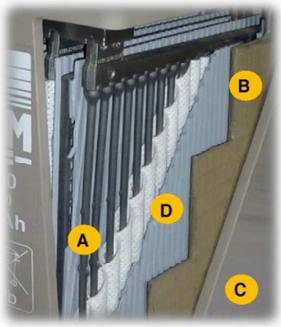
♦ Terminal posts G

Suitable threaded female post design with cable connectors are provided to ensure low ohmic losses. Post to lid seals are designed to prevent leakage over a wide range of internal pressures and conditions of thermal cycling.
Special plastic terminal caps are provided for transportation assuring a protection against short circuit during transportation. H

♦ Connections

Suitable fully insulated cable connectors with holes on the bolt for cell voltage measurement are provided G

Cutaway drawing of FIAMM GEL cell













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❖ OPERATING FEATURES

♦ Capacity

The battery capacity is rated in ampere hours (Ah) and is the quantity of electricity which it can supply during discharge. The capacity depends on the quantity of the active materials contained in the battery (thus on dimensions and weight) as well as the discharge rate, and temperature, and minimum voltage.
The nominal capacity of FIAMM batteries refers to the 10 hrs discharge rate (indicated with C_{10}) with constant current at 20°C to 1.80 volt per cell.

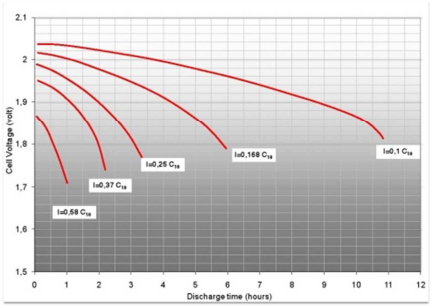


Fig. 1: Typical discharge curves for FIAMM Gel Batteries

♦ Discharge Voltage

Althought the discharge tables show end voltage down to 1.60 volt per cell, the following voltage values versus discharge time are suggested; in fact, there are negligible advantages in discharge time if discharge continues below these voltages.

Discharge Time	End cell Voltage (*)
10 hours	1.80 Volt
8 hours	1.75 Volt
3 hours	1.70 Volt
1 hour	1.60 Volt

(*) values recommended also in EN 60896-21/22 Standard

♦ Capacity in relation to discharge rate

The available capacity of all lead acid batteries depend on discharge rate (discharge current); this is due to internal electrochemical process and type of construction (i.e. type of positive plate).

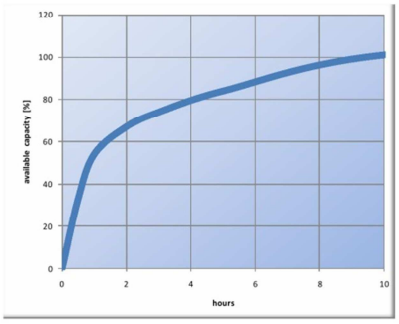


Fig. 2: Average available capacity versus discharge rates for FIAMM Gel batteries

♦ Capacity range of FIAMM Gel Lead Acid Batteries

FIAMM Battery range	Capacity range [Ah]
SMG	from 100 to 3350
XL	from 60 to 200

♦ Capacity in relation to the temperature

The capacity available from a battery, at any particular discharge rate, varies with temperature. Batteries which have to operate at temperatures different from the nominal (20°C) need a higher or lower capacity as per the factor indicated in the following graph (required capacity has to be multiply by the correction factor stated in the graph).

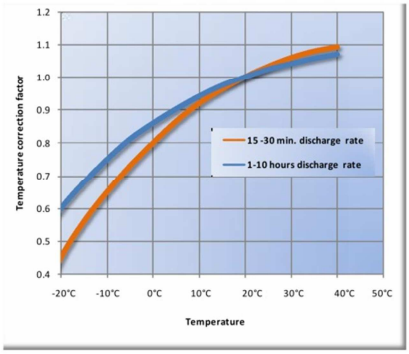


Fig. 3: Capacity Correction factor versus temperature for a 10 hours discharge rate for FIAMM Gel batteries

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Internal impedance and short circuit current

The internal impedance of a lead acid battery is a direct result of the type of internal construction, plate thickness, number of plates, separator material, electrolyte sp. gr., temperature and state of charge. The internal resistance and the short circuit current of FIAMM VRLA batteries at 100% state of charge and 20°C is indicated in the relative Product Sheet. These values are calculated in accordance with IEC 60896 part 21/22.
Different instruments are available to detect the internal resistance or impedance of lead acid batteries. These instruments use a different way to determinate these values. The values obtained from these instruments will be different to the values stated in FIAMM Product Sheet.

Service life

According to the main international standards a battery is considered at the end of its service life whenever delivering less than 80% of its nominal capacity. The recommended operating temperature range is between 10°C to 30°C. FIAMM VRLA batteries can operate over a temperature range of –20 to +50°C and higher; operation at temperature higher than 20°C reduces life expectancy according to the graph in figure 4.

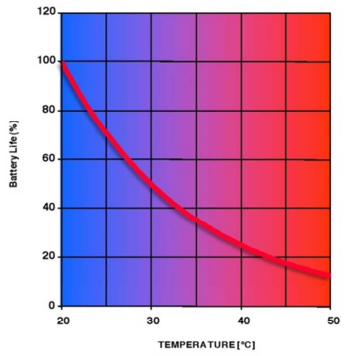


Fig. 4: Expected service life vs working temperature

Gassing

All Lead Acid Batteries emits gases during the charge process. FIAMM VRLA batteries have a high recombination efficiency (>98%) and for cells operated at 20°C under normal operating conditions venting is virtually negligible. Laboratory test measurements show the following gassing rates:

- 2 ml/Ah/cell/month at a float voltage of 2.25 V/cell
- 10 ml/Ah/cell/month at a recharge voltage of 2.40 V/cell.

The quantity of gas given off in the air (it basically consists of 80-90% hydrogen) is very low and thus it is clear that FIAMM VRLA batteries can be installed in rooms containing electric equipment with no explosion danger or corrosion problems under normal conditions. In any case these rooms or cabinets must have a natural or forced ventilation and not be fully sealed. Please refer to "VENTILATION" for information on required air exchange.

Operation of batteries in parallel

When the required capacity exceeds the capacity of a single string of batteries, it is possible to connect more strings in parallel paying attention to the following guidelines:

- in each string only cells or monoblocs of the same type, model, manufacturing date and quantity should be used;
- a symmetrical layout of the batteries should be designed (i.e. length and type of connector) to minimize possible resistance variations;
- the quantity of strings in parallel should be reasonable in terms of layout and application. Usually 4 strings could be connected in parallel. However, depending on strings voltage and cables length, a higher number of strings could be safely connected to reach required total capacity.

Open circuit voltage - State of charge

The measurement of the open circuit voltage (battery has to be disconnect from charger system for at least 24 hours) provides an approximate indication of the state of charge of the cells.

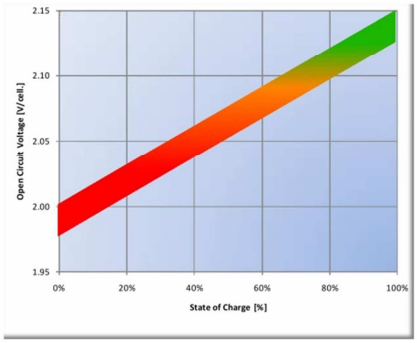


Fig. 5: Approximate state of Charge versus Open circuit cell voltage

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❖ CHARGING

In order to ensure the best protection against power failures in any moment, it is necessary that batteries are kept in the following conditions:

- in float charging throughout all their standby period;
- fully recharged soon after a discharge,
- completely recharged after a discharge. Recharge as soon as possible to ensure maximum protection against subsequent power outages. Early recharge also ensures the maximum battery life.

♦ Floating charge

Floating battery systems are those where the charger, the battery and the load are connected in parallel.
The "float" setting will maintain the battery in a fully charged state with minimal water consumption.
The voltage recommended for float charge is 2.25 V at 20°C. The recommended float voltages to maximise the battery life over the range of temperatures between -20 and +60°C are shown in the figure 6.
The normal float current observed in fully charged FIAMM batteries at 2.25 VPC and a temperature of 20°C is approximately 0.3 mA/Ah. Because of the nature of recombination phenomena, the float current observed in the case of the FIAMM batteries is normally higher than that of vented batteries and is not an indication of the state of charge of batteries

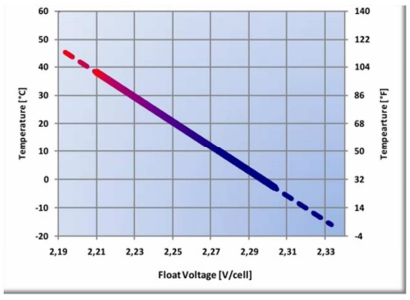


Fig. 6
Recommended Float Voltage at different temperatures

♦ Boost charge (Recharge following a discharge)

Boost charge has to be used to recharge a battery after a discharge; it will restore the battery to a fully charged state within a relatively short period of time. Use a constant voltage 2.4 V/cell at 20°C with a maximum current of 0.25 C10. However this recharge should be limited to no more than once per month to ensure the maximum service life of the battery. We do not recommend frequent boost charging, especially if the power conditions at site is good with very little power failures". Temperature has to remain lower than 35°C.

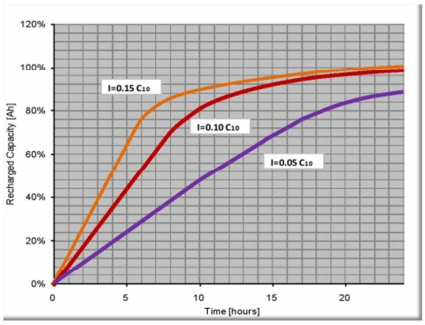


Fig. 7
Recharge curves at 2.4 volt per cell with different limit of current

❖ BATTERY INSTALLATION

All necessary precaution must be taken when working with lead acid batteries as per electrical risk, explosives gasses, heavy components, corrosive liquids. Use insulated tools and wear protective equipment.

♦ Installation

FIAMM valve regulated recombination batteries can be fitted on stands or into cabinets. FIAMM offers a wide selection of stands, from one tier/one row to six tiers/three rows, to suit most applications. Cabinets are available with or without circuit breaker and its relevant compartment.

1. Avoid any impact or shock which could cause breaking or micro fractures to container. Do not lift cells by its terminals.
2. Make sure that all cell jars and covers are thoroughly clean and dry.
3. Synthetic cleaning cloths must not be used. To clean the cell lids and containers, use only antistatic cotton cloths soaked in a solution of mild soap and completely "wrung" out.
4. Do not lift cells by terminals; do not use terminals as point of lifting during handling/installation process.
5. Should the terminal posts have a white film on them, lightly abrade their contact surfaces, using a Scotchbrite pad or fine grit abrasive paper, to remove any surface oxidation.
6. Place the single units at their correct position according to the electrical layout.

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7. In order to allow heat dissipation a minimum distance of 10mm between cells/blocs is recommended.
8. Care must be taken to avoid short circuiting the cells with any of the battery hardware.
9. Start with the lowest shelf to ensure stability. Carefully preserve the sequence: positive, negative, positive, negative throughout the whole battery. Flexible cable connectors for connecting from one shelf to the one below, will be applied once that all the blocs have been connected (we would suggest to connect such inter-shelf or inter-row cable connectors at the final User's premises only).
10. To ensure a good electrical contact between the bottom of each terminal and the connecting strap and, at the same time, to ensure that the threaded terminals are not damaged by excessive torque, use a torque spanner set on the value of:

BATTERY RANGE	TRHEAD TYPE	STANDARD VALUE Nm	STANDARD VALUE Lbs
SMG	M10 Female	20÷25	175÷220

11. Insulate all the connectors by means of the plastic covers being supplied with the battery accessories.
12. Affix the cell number stickers to the cell jars making sure that the surfaces are dry and clean. It is usual to number the cells beginning with #1 at the positive end of the battery, numbering consecutively in the same order as the cells are connected electrically, through to the negative end of the battery.
13. Check the total battery voltage which should comply with the total number of cell connected in series. (Open Circuit Voltage deviation could reach the value of ± 0.050V on a 12 V battery)
14. The cells are usually designed to be installed in vertical or horizontal position.

HORIZONTAL HANDLING



If the cells have to be placed horizontal on a rack, we suggest to use a special straps (Fig. 8).

Fig. 8 Image of strap for horizontal handling.

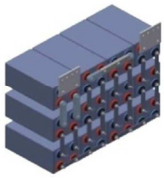
VERTICAL HANDLING



If the cells have to be placed in vertical we suggest to use special straps as per on left image

Fig. 9 Image of strap for horizontal handling

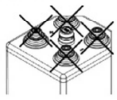
HORIZONTAL INSTALLATION



Due to difficulties in handling / installation we suggest to limit this type of installation to cell up to about 1700 Ah (it refers to SMG range 2 volt cells)

Fig. 10 Image of horizontal installation

HANDLE



Do not handle the cells from the poles

Fig. 11 Dangerous handle the cells from the poles

♦ Batteries installed into cabinet

For safety reasons, we would not recommend to pre-assemble the blocs into the cabinets before shipment to the final Customer. However, if this is normal practice for some system makers, we would strongly recommend to pay special attention to protect the battery system from mechanical stress and vibrations occurring during transport. For this purpose, we would require to properly fasten all the blocs to the relevant cabinet shelves by means of plastic band and/or other adequate methods. Furthermore, the cabinet should be protected, in the outside, with shock-absorbing packaging material, in order to prevent any transmission of vibrations to the internal components such as the battery blocs. Special precautions must be taken to avoid accidental short circuits (do not connect all the batteries, divide the battery circuit low voltage parts).

For any further information please refer to EN50272 Standard or contact FIAMM at:
info.standby@fiamm.com

♦ Ripple

Residual a.c. ripple is usually present in the output voltage of chargers; amplitude and frequency depends on charger design and it can affect negatively the battery life. Ripple could increase water loss, battery temperature and accelerate corrosion with a result to reduce the battery life. It is recommended therefore, that voltage regulation across the system including the load, but without the battery connected, under steady state conditions, shall be better than ± 1% through 5% to 100% load. Transient and other ripple type excursions can be accommodated provided that, with the battery disconnected but the load connected, the system peak to peak voltage, including the regulation

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limits, falls within 2.5% of the recommended float voltage of the battery.
Under no circumstances should the current flowing through the battery when it is operating under float conditions, reverse into the discharge mode.

♦ Battery room requirements

- The battery room should be dry, well ventilated and have its temperature as moderate as the climate will allow, preferably between 10°C and 30°C.
- **DO NOT permit smoking or the use of open flames in the battery room.**
- Adequate ventilation to change the air in the battery room is essential to prevent an accumulation of the gases given off during charge (for further information please refer to "VENTILATION" paragraph).
- The battery will give the best results and life when working in a room temperature of 20°C, but will function satisfactorily when operating in temperatures between -20°C and +60°C. High temperatures increase the performance, but decrease the life of the cells; low temperatures reduce the performance.
- Do not allow direct sunlight to fall on any part of the battery.
- If a rack is not supplied by FIAMM, suitable racks should be provided to support the cells. These should be arranged to provide easy access to each cell for inspection, topping up and general maintenance. Suitable racks may be made of wood or metal with a coating of acid resistant paint. If metal racks are used, they must be fitted with rubber or plastic insulators to prevent the cells coming into contact with the metal.
- To facilitate proper battery operation, maintenance, and care, post a battery data card/ instruction table in a conspicuous place near the battery to provide the attendant with service information and data.

❖ SAFETY

It is recommended that full precautions be taken at all times when working on batteries. The safety standards of the country of installation must be risk, explosives gasses, heavy components,

♦ Protective Equipment

Make sure that the following equipment is available to personnel working with batteries:

- Instructions manual.
- Tools with insulated handles.
- Fire extinguisher.
- PPE (Personal Protective Equipment) must be worn (glasses, gloves, aprons etc ...). To avoid static electricity when handling batteries, material of clothing, safety boots and gloves are required to have a surface resistance $\leq 10^8\ \Omega$, and an insulation resistance $\geq 10^5\ \Omega$
- First aid equipment must be available.

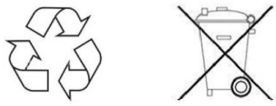
♦ Safety Precautions

Observe the following precautions at all times:

- Batteries are no more dangerous than any other equipment when handled correctly
- Do not allow metal objects to rest on the battery or fall across the terminals (even when disconnected, a battery remain charged!).
- Never wear rings or metal wrist bands when working on batteries.
- Do not smoke or permit open flames near batteries or do anything to cause sparks.
- Do not try to remove the battery cap to add water or acid into the cell(s).
- Never lift or pull up the battery at the terminals.
- Air exchange must be provided to prevent the formation of explosive hydrogen concentration.
- For further information please refer to EN 50272-2 Safety requirements for secondary batteries and battery installations Part 2: Stationary batteries.

♦ Battery Disposal

Lead acid batteries must be disposed according to the country law. It is strongly recommended to send batteries for recycling to a lead smelter. Please refer to the local Standards for any further information. As of the 31st of December 1994, all Valve Regulated Lead Acid (VRLA) battery has to have the following symbols present in conformance to EG-guideline 93/86/EWG



Pb

❖ APPLICABLE STANDARDS

FIAMM Valve Regulated Lead Acid Batteries comply with:

- IEC 60896 –Part 21 Stationary lead-acid battery Valve Regulated Type – Methods of tests;
- IEC 60896 –Part 22 Stationary lead-acid battery Valve Regulated Type - Requirements
- EN 50272-2 Safety requirements for secondary batteries and battery installations Part 2: Stationary batteries.
- BS 6290-1 Lead-acid stationary cells and batteries. Specification for general requirements

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❖ MAINTENANCE

♦ Battery care

GASES GIVEN OFF BY BATTERIES ON CHARGE ARE EXPLOSIVE!
DO NOT SMOKE OR PERMIT OPEN FLAMES OR DO ANYTHING TO CAUSE SPARKS NEAR BATTERIES.

1. Keep the battery and surroundings clean and dry.
2. Make sure that bolted connections are properly tightened (see table before).
3. Should any corrosion of the connections occur because of spilled acid, etc., carefully remove corrosion materials, thoroughly clean and neutralize with diluted ammonia or baking soda.
4. Keep the battery at the recommended charge voltage (see CHARGING section).
5. The room in which the battery is installed should be well ventilated and its temperature as close as possible to 20°C.
6. Do not try to open the cover valve.

♦ Cleaning

When necessary, batteries could be cleaned using a soft dry antistatic cloth or water-moistened soft antistatic cloth paying attention not to cause any ground faults.
No detergent nor solvent-based cleaning agents nor abrasive cleaners should be used as they may cause a permanent damage to the battery plastic container and lid.

♦ Voltage checks

All voltage measurements should be made when the whole battery has stabilized on floating, at least 7 days after battery installation or after a discharge/ charge cycle. To facilitate voltage reading in the correspondence of each block terminal protection covers are designed with a safe and proper hole. Measure and record individual block voltages on float once a year. The blocks/cells should be within -3%....+5% of the average at 20°C. No corrective action is required in this case. Maintaining a correct battery charging voltage is extremely important for the reliability and life of the battery. So it is advisable to carry out a periodical checking of the overall float voltage to verify any possible defect of charger or connections.

♦ Cell Appearance

Any cells showing corrosion, container bulging, high temperature than the other cells, should be regarded as suspect. Such cells should be carefully examined and, expert advice should be obtained immediately from FIAMM.

♦ Pilot Cell

For regular monitoring of the battery condition, select one or more cells of the battery as a "pilot" cell(s); for batteries comprising more than 60 cells, select one pilot cell for every 60 cells.

♦ Periodic Inspections

Written records must be kept of battery maintenance, so that long-term changes in battery condition may be monitored. The following inspection procedures are recommended:

EVERY SIX MONTHS:

- Visual inspection on cells/racks (appearance, cracks or corrosion signs, electrolyte leakage..)
- check and record the overall float voltage at the battery terminals (not at the charger!),
- measure and record the pilot cell(s) voltage.
- measure and record the pilot cell(s) temperature
- room ventilation

YEARLY:

- all the controls indicated at six months
- check and record the voltage of all cells
- measure and record the pilot cell(s) temperature
- make sure all connection are torque according to connection torque table; in case of frequent high discharge current please consider to check
- clean the cells

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❖ BATTERY TEST

Test must be conducted in accordance with EN 60896-21/22.
Before any discharging test, the batteries have to be properly charge with a boost charge (2.40 V per cell for 24 hours at 20°C) to ensure they are in a fully charge condition. In order to take temperature readings of a battery, one pilot cell or block shall be chosen. The surface temperature of the container wall centre of each pilot cell or block shall be measured immediately prior to the discharge test. The individual readings shall be from 15°C to 30°C. The temperature of the selected block shall be considered as representative of the average temperature of the battery. It is desirable that the average cell surface temperature and the ambient temperature be as near as possible to the reference temperature of 20°C or 25°C.
In case of batteries having a capacity lower than 80% of the nominal rating it is advisable to replace them within 12 months
Here below some precaution to be taken:

- Discharge must be stopped at the final discharge voltage.
- Deeper discharges must not be carried out unless specifically agreed with FIAMM.
- Recharge immediately the battery after each (full or partial) discharge test.

♦ Service/Functional test

This is a test of the battery's ability, to satisfy the design requirements of the system. It means to discharge the battery directly to the load (in this case take precautions to ensure that a battery failure does not jeopardise other equipment) or dummy load to simulate a main failure.

1. Record the floating voltage of each cell, as well as the total system voltage
2. Check the actual load (A or W), as well as the minimum admissible voltage of the system
3. On FIAMM discharge tables you can approx. determinate the discharge rate (minutes of discharge) **Please note that battery performances decrease) with battery age.** After switching off the rectifier, discharge the battery for a time of 20% of that calculated discharge rate
4. During the discharge, record at regular intervals, cell/block voltage, battery temperature, discharge current, total battery voltage
5. For safety reason, during the test assure that the total battery voltage remains above the minimum depending on discharging rate in order to avoid any failure to the system (please note that approaching to the final voltage, the voltage curve decreases rapidly)
6. For particular comments on test's data, please refer to FIAMM technical offices

♦ Capacity test

Please carry out this test only when complete information on the quantity of energy inside the battery is requested. Take precautions because after this test battery SHOULD NOT BE ABLE TO SUPPLY ENERGY IN CASE OF MAIN FAILURE.
Dummy load is usually necessary to provide the request discharge current. Test is usually carried out to verify the battery capacity to a specify end voltage and discharge rate (usually 1, 3 or 10 hours).
Test must be conducted in accordance with EN 60896-21/22. Please refer to prescription indicated in the above standard. Record at regular intervals every half an hour at the beginning, every 10 minutes the last half an hour cell/bloc voltage, battery temperature on pilot cell, discharge current, total battery voltage (in any case voltage reading has to be made at least at 25%, 50% and 80% of the discharge time).

According IEC60896-21 the discharge shall be terminated when one of the following values t_{disch}, whichever comes first, has been recorded:

1. t_{disch} = the elapsed time of discharge of the string, with n cells, to a voltage of $n \times U_{final}$ (V)
2. t_{disch} = the elapsed time when the first of the unit in the string reached a voltage of

$$U = \mathrm{U_{final}} - \left(\sqrt{\frac{\text{unit voltage}}{2}}\right) \times 0.2$$

At the end of discharging test, batteries have to be recharged immediately.

The following formula determinates the battery capacity:

$$C = discharge\ current \times t_{disch}$$

(where t_{disch} is indicated in hours)

For temperatures different from the nominal (20°C) and discharge rates between 3 to 10 hours, the battery capacity shall be corrected as follows:

$$C_{20°C} = \frac{C}{1 + \lambda(\theta - 20)}$$

Where:
θ = initial pilot cell temperature (°C)
λ= 0.006 for tests > 1 hour
λ= 0.01 for tests ≤ 1 hour

Trending battery capacity during years will provide information in predicting when the battery will no longer meet design requirements.

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UNPACKING

Inspection

Upon receiving a shipment, of battery cells, it is advisable to open the shipping containers and carefully check the cells and hardware against the packing list. The contents of each consignment are carefully inspected by FIAMM before shipment. Any damage must be reported immediately to the carrier and the damaged items retained for inspection by the carrier's representative.

Handling

Monolite units are shipped fully charged and must be treated with care at all times. The product is capable of supplying high short circuit currents, even if the case or lid are damaged. Always lift the individual unit from underneath, or by the build-in-lifting handles. Never apply force to, or drop anything on, the terminal posts: doing so may damage the threads or the post seals.

STORAGE

Storage prior to installation

VRLA batteries range are delivered activated/filled and charged ready for installation. If they cannot be installed immediately, the following instructions need to be respected.

Storage Conditions

A good storage practice requires as follows:

- Battery storage area has to be clean, cool and dry.
- Surroundings have to be kept clean.
- Elevated temperatures, direct and indirect sunshine have to be avoided.
- Optimum storage temperature range is -10°C to +30°C.
- Avoid storage in ambient with a relative humidity greater than 90%.
- Battery cells must be protected from harsh weather, moisture and flooding.
- Storage on a pallet wrapped in plastic material is permitted, in principle. However, it is not recommended in rooms where temperature fluctuates significantly, or if high relative humidity can cause condensation under the plastic cover.
- With time, this condensation can cause a whitish hydration on the poles and lead to high self-discharge by leakage current.
- Atmospheres with chemical contaminants have to avoid.
- Do not load other merchandise on top of unprotected batteries.
- Battery cells must be protected from dropping objects, from falling down and falling over.
- Battery cells must be protected from short-circuits by metallic parts or conductive contaminations.
- Avoid storing of unpacked battery cells on sharp-edged supports.
- Stacking of pallets is not permitted unless otherwise specified.
- It is recommended to realize the same storage conditions within a batch, pallet or room.

Storage time / Temperature

- VRLA battery ranges have a shelf life of **6 months** at a storage temperature of 20°C.
- The temperature has an impact on the self-discharge rate of battery cells.
- Higher temperatures increase the rate of self discharge and therefore storage life is reduced.
- FIAMM Gel batteries have a self discharge rate of ≤ 2% per month at 20°C and therefore are stored for prolonged periods of time.
- MAXIMUM storage period before refresh at the given average storage ambient temperature is as follows :

6 months at 20°C
4 months at 30°C
2 months at 40°C

Storage / Recharge

- As during storage batteries will lose part of their capacity due to self discharge (≤ 2% per month at 20°C), a refreshing charge must be given :
  1) when MAXIMUM STORAGE TIME is reached
     OR
  2) when the OCV (open circuit voltage) approaches 2,11 Volts/cell

whichever occurs first.

Recharge the cells as directed in FIAMM'S instruction table for Gel battery type. (Usually at 2.4 volt per cell for a period of 24 hours at 20°C).

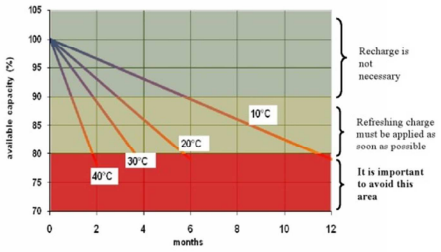


Fig. 12 Storage time versus temperatures.

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VENTILATION (in accordance with EN 50272-2)

During normal operating conditions, lead acid batteries emits low quantity of gases which can reach an explosive mixture when hydrogen concentration is higher than Lower Explosion Limit (LEL) threshold which is 4%vol.
The purpose of ventilating a battery location or enclosure by natural or forced (artificial) ventilation is to maintain the hydrogen concentration below the above stated limit. Battery locations and enclosures are to be considered as safe from explosions, when the concentration of hydrogen is kept below this safe limit.
The minimum air flow rate for ventilation of a battery location or compartment shall be in accordance with European Standard EN 50272 calculated by the following formula:

$$Q = 0{,}05 \times N \times I_{gas} \times C_{rt\,x} \times 10^{-3}$$

where:
Q = ventilation air flow in m^3/h
N = number of cells (each 2 Volt)
C_{rt}= capacity C_{10} [Ah] at 1.80 volt/cell. at 20°C.

The current I_{gas} [mA/Ah] producing gas as indicated in the table of the above mentioned standard con be assumed as:

$I_{gas} = 1$ For batteries on float

$I_{gas} = 5$ For batteries on boost charge

Determination of openings

The amount of ventilation air flow shall preferably be ensured by natural ventilation, otherwise by forced (artificial) ventilation. Battery rooms or enclosures require an air inlet and an air outlet with a minimum free area of opening calculated by the following formula:

$$A = 28 \times Q$$

with Q = ventilation flow rate of fresh air [m^3/h]
A = free area of opening in air inlet and outlet [cm^2]

Note: For the purpose of this calculation the air velocity is assumed to be 0,1 m/s.

The air inlet and outlet shall be located at the best possible location to create best conditions for exchange of air, i.e.

- openings on opposite walls,
- minimum separation distance of 2 m when openings on the same wall.

The following picture gives an indication of the correct opening to assure a complete battery room air exchange

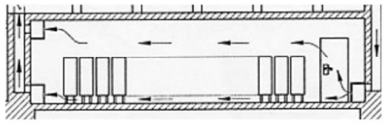


Fig. 13 Opening on opposite walls

Forced ventilation

Where an adequate air flow Q cannot be obtained by natural ventilation and forced ventilation is applied, the charger shall be interlocked with the ventilation system or an alarm shall be actuated to secure the required air flow for the mode of charging selected. The air extracted from the battery room shall be exhausted to the atmosphere outside the building.

Close vicinity to the battery

In the close vicinity of the battery the dilution of explosive gases is not always secured. Therefore a safety distance extending through air must be observed within which sparking or glowing devices (max. surface temperature 300 °C) are prohibited. The dispersion of explosive gas depends on the gas release rate and the ventilation close to the source of release. For calculation of the safety distance d from the source of release the following formula applies assuming a hemispherical dispersal of gas. The safety distance "d" is given from the following formula:

$$d = 28{,}8 \times \sqrt[3]{N} \times \sqrt[3]{I_{gas}} \times \sqrt[3]{C_{rt}}$$

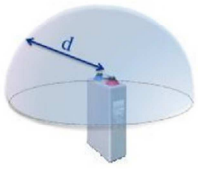


Fig. 14 close vicinity of the battery

where N depends on the number of cells per monoblock battery (N) or vents openings per cell involved (1/N).

For further information please refer to EN50272 Standard or contact FIAMM at:
infostandby@fiamm.com

Note: calculation program is available on request.

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FIAMM
Industrial Batteries

General brochure EMEA 2012-02

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1.13 PHAROS BATTERY BOX BTBX-EXCM GS EX DATA SHEET



Ex BATTERY BOX
SUITABLE FOR ZONE 1 INSTALLATION



Iron sheet box with anti-acid painting and Battery Breaker



AISI 316L stainless steel box with connection junction box

This battery system is composed by a battery box that includes some battery cells that are already assembled and connected. The whole complex, that includes the box, the cells and the interconnections, is manufactured in compliant with ATEX (European) Directive and is certified for use in classified area of Zone 1. Different types of batteries, from more manufacturers, which are selected among the most important and qualified of the market, can be used for the realization of this battery system.

SICE has performed a mainly selection and, usually, uses the following battery types:

VRLA BATTERIES MADE BY FIAMM:
- SMG
- SMG/S (Solar) for photovoltaic system
- SLA

VRLA BATTERIES MADE BY SONNENSCHEIN:
- A400
- A500
- A600
- A600 (Solar) for photovoltaic system
- Solar block "S" and "SB" series

NiCd BATTERIES MADE BY SAFT:
- SBLE
- SUNICA+(Solar) for photovoltaic system
- Uptimax UP1L

Other types of batteries from same and other manufacturers, that are already approved ad included in the ATEX certificate (for example ENERSYS and HOPPECKE), can be used for the construction of this battery system. SICE is open to evaluate all customer requirements.



Battery box made in iron shet with anti-acid painting or in AISI 316 L Stainless Steel not panted. Can be equipped with Battery breaker and/or connection junction box



MAIN TECHNICAL GENERAL DATA

Execution	:	ATEX II 2G Ex-eb IIC T6 Gb IP56
Certificates	:	SEV 15ATEX 0163X - SEV IECEx 15.0022X
Box Manufacturer	:	EXCEN for SICE
Box Material	:	Iron sheet with anti-acid painting
Box mechanical protection	:	IP23 (minimum)
Complex mechanical protection	:	IP56 (protection battery + battery box)
Standard temperature range	:	-20°C to +40°C
Dimensions	:	depending on the battery capacity required
Available capacity	:	12Vdc ÷ 400Vdc max 3000Ah (C5)
Main available options:		
Box material	:	AISI 316L Stainless Steel not painted
Box mechanical protection	:	IP43
Connection mechanical protection	:	IP66 (Complex protection battery + battery box)
Terminal strip junction box material	:	AISI 316L Stainless Steel
Extreme temperature range	:	-60°C to + 60°C (according to the cell manufacturer specifications)
Hinged cover		

SICE Pesaro (ITALY)

Rev. 2018 - Document can be subjected to modifications, without prior notice

1.14 PHAROS BATTERY BOX BTBX-EXCM GS EX BROCHURE

Pharos Marine Automatic Power

BROCHURE

BATTERY BOX

Certified to ATX and IECEx





OVERVIEW

Pharos Marine Automatic Power's explosion proof Zone 1 and 2 Battery Boxes have the versatility to house any type of sealed Nickel Cadmium or Lead Acid battery from all recognised battery manufacturers.

Available in 316L stainless steel and galvanised or painted steel, the battery box is suitable for all environmental locations and is the most flexible and user-friendly unit on the market due to each box being built to customers' bespoke sizing and specifications.

Suitable for:

- Remote Solar PV Powered Systems
- Zone 1 UPS Systems
- Navigation Systems
- Remote Fire & Gas Systems
- Communication Systems
- Remote Site Security Systems

CERTIFICATIONS

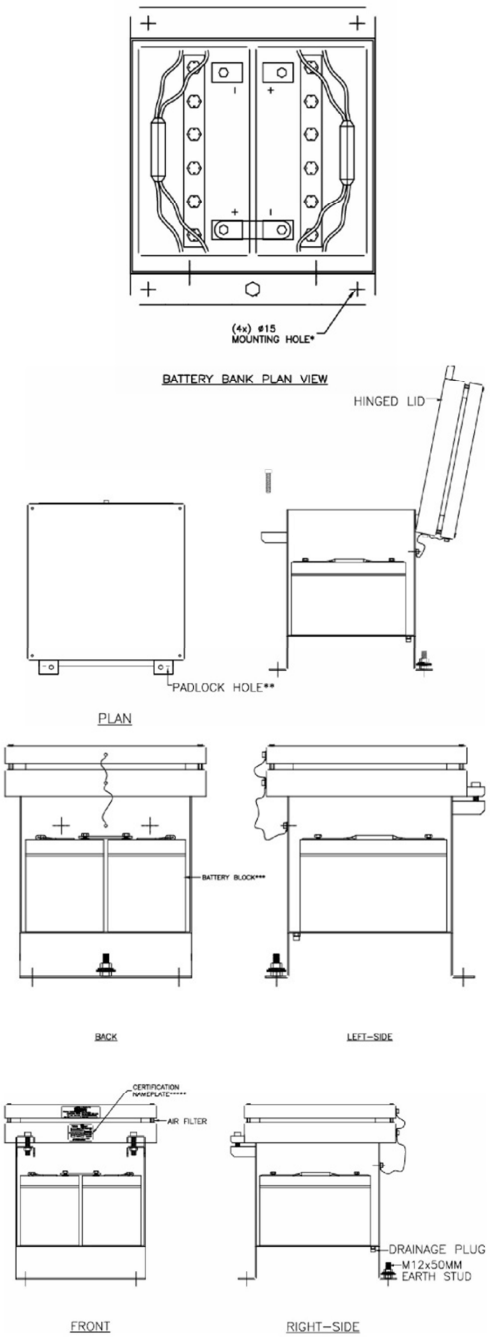
- ATEX Certificate No.: ExVeritas 16ATEX0193X
- IECEx Certificate No.: IECEx EXV 16.0015X
- Coding: II 2 G Ex e II Gb T6 Tamb −40°C to +55°C Gb
- Ingress Protection: IP-56
- MECHANICAL SPECIFICATIONS

KEY FEATURES

- Fully customisable
- ATEX & IECEx certified for use in Zone 1 locations
- Hinged lids available
- Removable front panel available
- Padlockable for security
- Optional trace heating available for low temperature environments
- Optional temperature sensor for compensating battery charging
- Complementary range of Ex 'd' battery chargers available

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MECHANICAL SPECIFICATIONS	
Dimension	Bespoke or standard sizes available
Weight	Dependent on size
Material	Stainless Steel or Galvanized Steel
Cable Entries	As per customers requirements
ELECTRICAL SPECIFICATIONS	
Battery Capacities	Customisable to client/project requirement
Battery Voltages	2-48V DC available



*All values are subject to change without notice.

Pharos Marine Automatic Power, Inc.
Houston, TX - USA
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1.15 PHAROS BATTERY BOX BTBX-EXCM GS EX MANUAL

Pharos Marine Automatic Power

Manufacturers and Designers
of
SIGNAL AND POWER SYSTEMS

NAVIGATIONAL AIDS

INSTALLATION, OPERATION & MAINTENANCE MANUAL

EX BATTERY BOX

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Pharos Marine

If there are any defects as a result of transit or installation damage please contact Pharos Marine/Automatic Power at the address below for further advice.

Document Number **V-71025/06** (See last Page for Revision Details)

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Pharos Marine

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2. Installation 4
3. Certification Requirements 5
4. Maintenance 5
5. Marking 6
6. Recycling 6
7. Certification 7
8. Manual Revision 17

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Pharos Marine

1 Introduction

The Pharos Marine/Automatic Power Ex Battery Box is an extremely versatile battery enclosure that will allow for numerous battery configurations up to a maximum size of 2500Ahr and a maximum voltage of 48V DC.

The certification allows for any Lead Acid or Ni-Cad battery that meets standard industrial constructional requirements to a maximum size of 2300Ahr, with an ingress protection rating of IPX6. Specific models/manufacturers of batteries i.e. Sonnenchien and Hoppecke have been tested that allow an increased size of battery to 2,500Ahr with an ingress protection of IP56.

The boxes as standard are fabricated from 316L stainless steel, although galvanised mild steel boxes are available as an option, with a padlockable lid. All hardware associated with the boxes, i.e. hinges and fixings are made from stainless steel. The boxes can be supplied with or without a hinged lid and depending on the physical size of the box a lid stay may also be fitted.

2. Installation

Cable entry to the battery box is via an ATEX/IEC approved cable gland. Customers fitting their own glands should install them in accordance with the requirements of EN/IEC 60079-0 **'General Requirements and EN/IEC 60079-14 'Electrical Installations in Hazardous Areas (other than mines)'**

The box is supplied with only transit cable gland plugs or covers. Due to the wide variety of battery configurations and boxes available, the order specific wiring details of the battery inside the box are shown in 'Appendix A – Customer Specific Drawings'.

For the larger battery boxes, generally $1m^3$ plus, the battery box can be fitted with an optional removable side panel for ease of battery installation.

NOTE:

- **When the front panel is removed it is important that the external earthing cable is re-connected when the panel is replaced.**
- **Ensure all applicable 'X' conditions on the certificate are complied with. See Section 6**

No items, i.e. terminals are allowed to be fitted other than those approved under the certificate conditions listed below (see 'Section 6 – Certification' for full details):

- External Trace Heating
- Temperature sensor
- External frame for JB's
- Internal racking

Pharos Marine

3. Certification Requirements

The battery box main explosion protection concept is increased safety Ex 'e'. The certification does allow for the installation on other protection concepts e.g. an Ex 'm' or Ex 'i' temperature sensor within the box.

The box is certified against the ATEX and IEC standards 60079-0 and 60079-7 and is marked as follows.

Certified II 2 G Ex e II T6 -40°C to +55°C Gb
Certified II 2 G Ex e II T4 -40°C to +55°C Gb (if fitted with external trace heating)

4. Maintenance

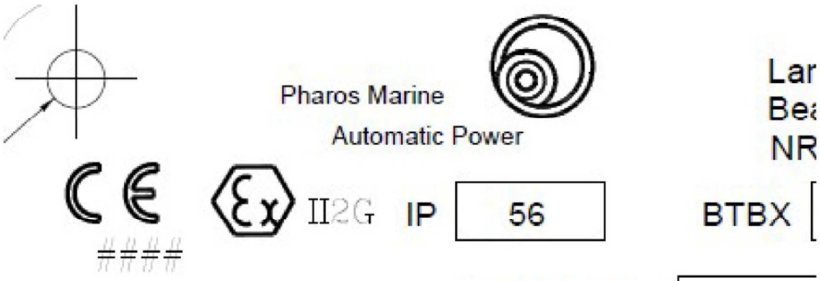
The battery box should be inspected on a regular interval in accordance with the requirements of EN/IEC60079-17 'Electrical Installations Inspection and Maintenance'.

The battery box is designed for continuous service with an absolute minimum of maintenance. However, in order to maintain the full operational efficiency, it is essential that as well as regular battery checks the condition of the dust filters in the box lid are checked and vacuum cleaned on a routine basis.

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5. Marking



- To be completed by Manufacturer

6. Recycling

This product must not be disposed freely into any non-dedicated recycling centre. It must be recycled/disposed to an adequate recycling facility (for further information you may contact your local authority) or returned to Pharos Marine Automatic Power.



Pharos Marine

7. Certification

Certificates to be inserted

ExVeritas®

1 EU - Type Examination Certificate

2 Equipment intended for use in Potentially Explosive Atmospheres Directive 2014/34/EU

3 Certificate Number: ExVeritas 16 ATEX 0193X Issue: 2

4 Equipment: Increased Safety Ex e Battery Box

5 Manufacturer: Pharos Marine Limited

6 Address: Lancelot Road
Beacon Park,
Great Yarmouth,
NR31 7BF. UK

7 This equipment and any acceptable variation thereto are specified in the schedule to this certificate and the documents therein referred to.

8 ExVeritas, Notified Body number 2804 in accordance with Article 17 of the Council Directive 2014/34/EU of 26 February 2014, certifies that this equipment or protective system has been found to comply with the Essential Health and Safety Requirements relating to design and construction of equipment and protective systems for use in potentially explosive atmospheres given in Annex II to the Directive

9 Compliance with the applicable Essential Health and Safety Requirements has been assured by compliance with the following Standards and section 16 of this certificate:

EN 60079-0:2012+A11:2013 EN 60079-7:2015

10 If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.

11 This EU-Type Examination Certificate relates only to the design, construction, examination and tests of the specified equipment or protective system in accordance to the Directive 2014/34/EU. Further requirements of the Directive apply to the manufacturing process and supply of this equipment or protective system. These are not covered by this certificate.

12 The marking of the equipment shall include the following:

Ex II 2 G Ex eb IIC T4/T6 Gb T_{amb} -40°C to +55°C

DANAK
PROD Reg.No. 7044
Member of EA MLA

On behalf of ExVeritas
ExVeritas
OFFICIAL SIGNATORY
Stephen D'Henin
Certification Manager

This certificate may only be reproduced in its entirety and without any change, schedule included.
The certificate is only valid when it carries an original signature.
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Page 1 of 3 FO-CB-DK-37 V1

ExVeritas®

Schedule

13 Description of Equipment or Protective System

The product is a range of increased safety battery boxes. The maximum size box can be populated with 36 cell blocks with capacities up to 1800 Ah or 2500 Ah. The ventilation slots of the battery box can be open or fitted with dust filters, when fitted with the filters the maximum cell capacity is limited to 1800 Ah.

The option to have 12 Cell Blocks of the type Sonnenchien/Hoppecke 16 OPzV 2300 with dust filters fitted is also permitted. The permitted cell types are lead-acid or nickel-cadmium that the construction of which complies with the relevant IEC constructional standard for the cell type. The box has the option for a removable front panel to facilitate the fitting of the cells. The option to fit the battery box with suitably certified T4 rated trace heating (external to the box) and suitably certified temperature sensor is included. When the trace heating is fitted the enclosure shall be marked T4, in all other cases the enclosure is marked T6.

13.1 Details of changes

Issue 2

The following changes are incorporated in issue 2 of the certificate:

- Update of EN 60079-7 to the latest edition as detailed on page 1 of the certificate.
- Update the manufacturing address.
- Update of the GA drawing to remove the paint on the internal surface of the enclosure lid.
- Transfer of the Certificate from ExVeritas Limited, Notified Body number 2585 to ExVeritas ApS.

14 Descriptive Documents

14.1 Associated Report and Certificate History:

Report Number	Cert Issue Date	Issue	Comment
R1051/A/1	20 Sept 2016	1	Initial issue of the Prime Certificate
R2175/A/1	26 Sept 2019	2	Issue of the first variation

14.2 Compliance Drawings:

Issue 1

Number	Date	Issue	Description
BTBEx	14.09.16	02	Battery Box Hazardous Area General Arrangement
Wc50197	15/09/16	01	Battery Box Nameplate
V-71025	09-2016	04	Installation, Operation and Maintenance Manual – Ex Battery Box

Issue 2

Number	Date	Issue	Description
BTBEx	11.07.19	03	Battery Box Hazardous Area General Arrangement
BTBX-EX-00-LAB-01	16.01.2019	R2	Battery Box Nameplate
V-71025/05	09-2019	05	Installation, Operation and Maintenance Manual – Ex Battery Box

Certificate: ExVeritas 16 ATEX 0193X Issue 2

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Schedule

15 Conditions of Certification

15.1 Special Conditions for Safe Use

1. Refer to the battery manufacturer's manual for full details of cell charging conditions.
2. The battery box shall not be exposed to mechanical shock.
3. If the battery is to be disconnected from its associated equipment in the hazardous area then a suitably approved disconnection device shall be used.
4. EN 60079-7 clause 7.2 requires a routine insulation resistance test to be conducted on the batteries in accordance with clause 6.6.2. The test shall be deemed satisfactory if the resistance measured is at least 1 MΩ. The test conditions are as follows:

   a. The measuring voltage of the ohmmeter shall be at least 100V;
   b. All connections between the battery and the external circuits and, where fitted, the battery container shall be disconnected;
   c. The cells shall be filled with electrolyte up to the maximum permissible level

   This test may be completed either by the manufacturer prior to the equipment leaving the factory or on-site during installation under the manufacturer's guidance prior to commissioning. Full details are given in the Installation, operation and maintenance manual.

15.2 Special Conditions for Manufacture

1. The maximum cell block capacity permitted is 2500Ah with open ventilation slots and 1800Ah with ventilation slot dust filters fitted. The option to have 12 Cells of the type Sonnenchien/Hoppecke 16 OPzV 2300 with dust filters fitted to the battery box is also permitted.
2. The permitted cell types are lead-acid or nickel-cadmium that are constructed to comply with the relevant IEC constructional standard for the IEC cell type K.
3. The cells used to form the battery shall only be connected in series.
4. The battery shall be made from cells of the same type and from the same manufacturer.
5. The cells shall be operated within the allowable limits of the cell manufacturer.
6. To prevent faults from the charging devices causing over voltage or over current of the cells voltage regulation and current limitation (fuses) will be provided between the charger and the cells.
7. The optional T4 self-limiting trace heating if fitted shall be suitably ATEX and IECEx approved apparatus and shall be installed to the external surface of the battery box in accordance with the manufacturer's instructions.
8. The optional T4 (min) temperature probe if fitted shall be suitability ATEX and IECEx approved apparatus and the electrical connections shall be internal or external to the battery box.
9. The optional cell monitoring device shall be suitably approved apparatus and shall be installed to the external surface of the enclosure in accordance with the manufacturer's instructions.
10. Ex e glands shall be ATEX and IECEx approved.
11. The cell interconnecting conductor sizing shall be in accordance with IEC 60364-5-52: 2009 Edition 3.0 and EN60079-14: 2013 with reference to the maximum ambient temperature of + 55°C and the conductor not to exceed 70°C or 80°C at the conductor branching point.

16 Essential Health and Safety Requirements

Essential Health and Safety Requirements are addressed by the standards listed in section 9 and where required the report listed in section 14.1

The manufacturer shall inform the Notified Body of any modifications to the design of the product described by this schedule.

Certificate: ExVeritas 16 ATEX 0193X Issue 2

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IECEx Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION
IEC Certification System for Explosive Atmospheres
for rules and details of the IECEx Scheme visit www.iecex.com

Certificate No.: **IECEx EXV 16.0015X** Page 1 of 4 Certificate history:
Issue 0 (2016-09-21)

Status: **Current** Issue No: 1

Date of Issue: 2019-09-26

Applicant: **Pharos Marine Limited**
Lancelot Road
Beacon Park
Great Yarmouth
NR31 7BF
United Kingdom

Equipment: **Increased Safety Ex e Battery Enclosure**

Optional accessory:

Type of Protection: **Increased Safety Ex e**

Marking: Ex eb IIC Gb T6 -40°C ≤ T_{amb} ≤+55°C

Ex eb IIC Gb T4 -40°C ≤ T_{amb} ≤+55°C (When fitted with optional trace heating)

Approved for issue on behalf of the IECEx Certification Body: **Stephen D'Henin**

Position: **Certification Manager**

Signature: (for printed version)

Date:

1. This certificate and schedule may only be reproduced in full.
2. This certificate is not transferable and remains the property of the issuing body.
3. The Status and authenticity of this certificate may be verified by visiting www.iecex.com or use of this QR Code.

Certificate issued by:

ExVeritas Limited
Units 16-18 Abenbury Way
Wrexham Ind. Est.
Wrexham LL 139UZ
United Kingdom

ExVeritas®



IECEx Certificate of Conformity

Certificate No.: **IECEx EXV 16.0015X** Page 2 of 4

Date of issue: 2019-09-26 Issue No: 1

Manufacturer: **Pharos Marine Limited**
Lancelot Road
Beacon Park
Great Yarmouth
NR31 7BF
United Kingdom

Additional manufacturing locations:

This certificate is issued as verification that a sample(s), representative of production, was assessed and tested and found to comply with the IEC Standard list below and that the manufacturer's quality system, relating to the Ex products covered by this certificate, was assessed and found to comply with the IECEx Quality system requirements.This certificate is granted subject to the conditions as set out in IECEx Scheme Rules, IECEx 02 and Operational Documents as amended

STANDARDS :
The equipment and any acceptable variations to it specified in the schedule of this certificate and the identified documents, was found to comply with the following standards

IEC 60079-0:2011 Explosive atmospheres - Part 0: General requirements
Edition:6.0

IEC 60079-7:2015 Explosive atmospheres – Part 7: Equipment protection by increased safety "e"
Edition:5.0

This Certificate **does not** indicate compliance with safety and performance requirements other than those expressly included in the Standards listed above.

TEST & ASSESSMENT REPORTS:
A sample(s) of the equipment listed has successfully met the examination and test requirements as recorded in:

Test Reports:

GB/EXV/ExTR16.0020/00 GB/EXV/ExTR19.0061/00

Quality Assessment Report:

GB/EXV/QAR16.0008/00

IECEx Certificate of Conformity

Certificate No.: **IECEx EXV 16.0015X** Page 3 of 4

Date of issue: 2019-09-26 Issue No: 1

EQUIPMENT:
Equipment and systems covered by this Certificate are as follows:

The product is a range of increased safety battery boxes. The maximum size box can be populated with 36 cell blocks with capacities up to 1800 Ah or 2500 Ah. The ventilation slots of the battery box can be open or fitted with dust filters, when fitted with the filters the maximum cell capacity is limited to 1800 Ah.

The option to have 12 Cell Blocks of the type Sonnenchien/Hoppecke 16 OPzV 2300 with dust filters fitted is also permitted. The permitted cell types are lead-acid or nickel-cadmium that the construction of which complies with the relevant IEC constructional standard for the cell type. The largest size of box has the option for a removable front panel to facilitate the fitting of the cells. The option to fit the battery box with suitably certified T4 rated trace heat (external to the box) and temperature sensor is included. When the trace heating is fitted the enclosure shall be marked T4, in all other cases the enclosure is marked T6.

SPECIFIC CONDITIONS OF USE: YES as shown below:

1. Refer to the battery manufacturer's manual for full details of cell charging conditions.

2. The battery box shall not be exposed to mechanical shock.

3. If the battery is to be disconnected from its associated equipment in the hazardous area then a suitably approved disconnection device shall be used.

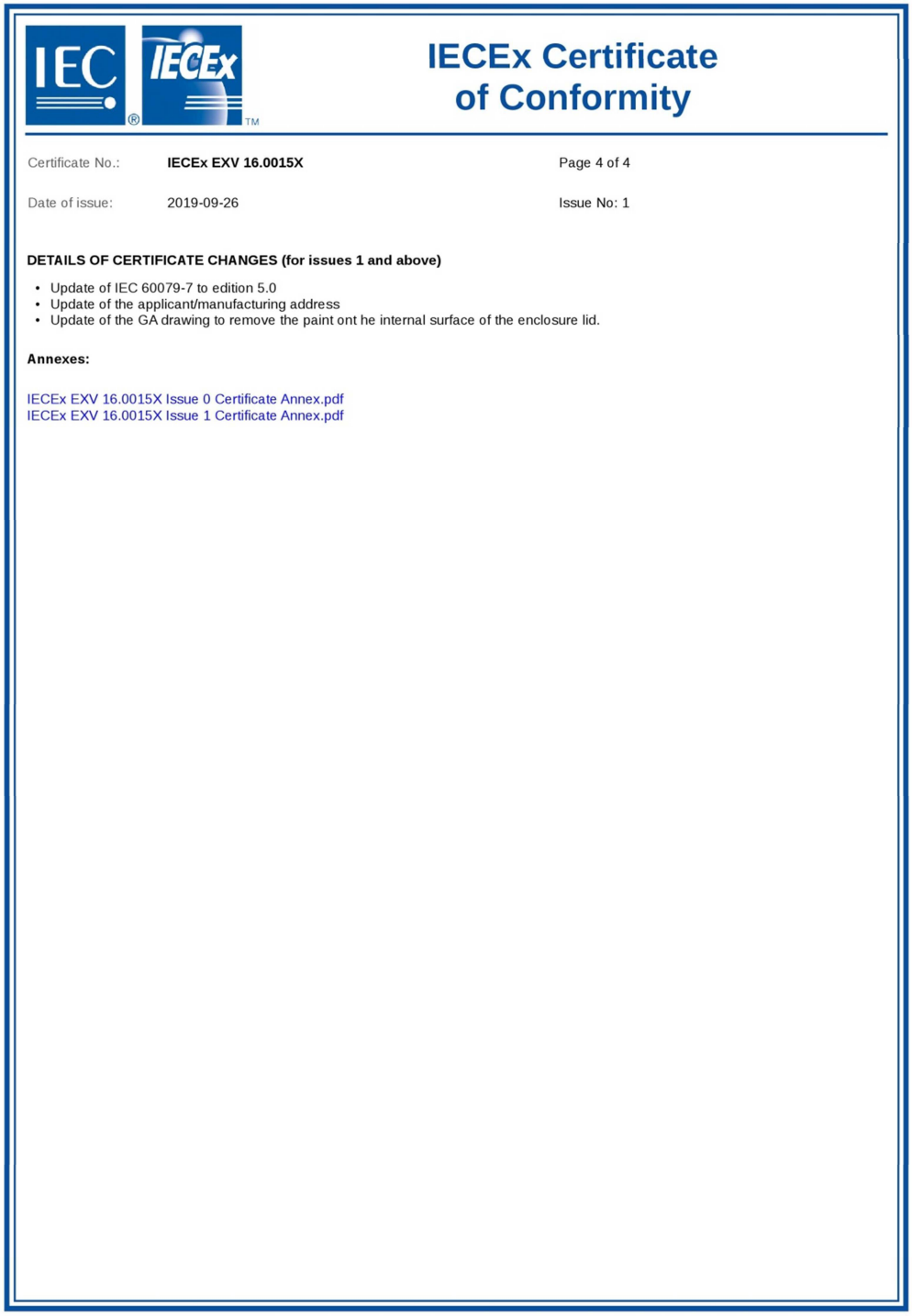
4. EN 60079-7 clause 7.2 requires a routine insulation resistance test to be conducted on the batteries in accordance with clause 6.6.2. The test shall be deemed satisfactory if the resistance measured is at least 1 MΩ. The test conditions are as follows:

a. The measuring voltage of the ohmmeter shall be at least 100V;

b. All connections between the battery and the external circuits and, where fitted, the battery container shall be disconnected;

c. The calls shall be filled with electrolyte up to the maximum permissible level

This test may be completed either by the manufacturer prior to the equipment leaving the factory or on-site during installation under the manufacturers guidance prior to commissioning. Full details are given in the Installation, operation and maintenance manual.



IECEx Certificate of Conformity

Certificate No.: **IECEx EXV 16.0015X** Page 4 of 4

Date of issue: 2019-09-26 Issue No: 1

DETAILS OF CERTIFICATE CHANGES (for issues 1 and above)

- Update of IEC 60079-7 to edition 5.0
- Update of the applicant/manufacturing address
- Update of the GA drawing to remove the paint ont he internal surface of the enclosure lid.

Annexes:

IECEx EXV 16.0015X Issue 0 Certificate Annex.pdf
IECEx EXV 16.0015X Issue 1 Certificate Annex.pdf

Annex to: **IECEx EXV 16.0015X Issue 0**

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Special Conditions for manufacture:
1. The maximum cell block capacity permitted is 2500Ah with open ventilation slots and 1800Ah with ventilation slot dust filters fitted. The option to have 12 Cells of the type Sonnenchien/Hoppecke 16 OPzV 2300 with dust filters fitted to the battery box is also permitted.
2. The permitted cell types are lead-acid or nickel-cadmium that are constructed to comply with the relevant IEC constructional standard for the IEC cell type K.
3. The cells used to form the battery shall only be connected in series.
4. The battery shall be made from cells of the same type and from the same manufacturer.
5. The cells shall be operated within the allowable limits of the cell manufacturer.
6. To prevent faults from the charging devices causing over voltage or over current of the cells voltage regulation and current limitation (fuses) will be provided between the charger and the cells.
7. The optional T4 self-limiting trace heating if fitted shall be suitably ATEX and IECEx approved apparatus and shall be installed to the external surface of the battery box in accordance with the manufacturer's instructions.
8. The optional T4 temperature probe if fitted shall be suitability ATEX and IECEx approved apparatus and the electrical connections shall be internal or external to the battery box.
9. Ex e glands shall be ATEX and IECEx approved.
10. The cell interconnecting conductor sizing shall be in accordance with IEC 60364-5-52: 2009 Edition 3.0 and EN60079-14: 2013 with reference to the maximum ambient temperature of + 55^{0}C and the conductor not to exceed 70^{0}C or 80^{0}C at the conductor branching point.

Manufacturer's documents:				
Title:	Drawing No.:	Rev	Sheets	Date:
Battery Box Hazardous Area General Arrangement	BTBEx	02	1 of 1	14.09.16
Battery Box Nameplate	Wc50197	01	1 of 1	15/09/16
Installation, Operation and Maintenance Manual – Ex Battery Box	V-71025	04	1 to 9	09-2016

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Annex to: **IECEx EXV 16.0015X Issue 1**

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Special Conditions for manufacture:

1. The maximum cell block capacity permitted is 2500Ah with open ventilation slots and 1800Ah with ventilation slot dust filters fitted. The option to have 12 Cells of the type Sonnenchien/Hoppecke 16 OPzV 2300 with dust filters fitted to the battery box is also permitted.
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Manufacturer's documents:

Title:	Drawing No.:	Rev	Sheets	Date:
Battery Box Hazardous Area General Arrangement	BTBEx	03	1 of 1	11.07.19
Battery Box Nameplate	BTBX-EX-00-LAB-01	R2	1 of 1	16.01.2019
Installation, Operation and Maintenance Manual – Ex Battery Box	V-71025/05	05	1 to 9	09-2019

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8. **Manual Revision**

Rev	Description	Date	By
01	Creation on New Manual	06-2012	OJ
02	Appendix B modified	06-2013	OJ
03	Clarifying Statement added to Section 2	04-2014	OJ
03a	Appendix B – Test Form modified – Instrument Number added	12-2014	OJ
04	Certificate re-issue for T6 rating	09-2016	OJ
05	Certificate re-issue – remove lid painting and update address	09-2019	OJ
06	Including WEEE requirements	06-2022	AN

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Tel: +44 (0)1493 659271
sales@pharosmarine.com

1.16 PHAROS BATTERY BOX BTBX-EXCM GS EX LID OPERATION GUIDE

Pharos Marine Automatic Power Limited
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Beacon Park,
Gorleston, Norfolk.
NR31 7BF
Tel: +44 (0)1493 659271
Web: www.automaticpower.com

Contents

1. Overview 2
2. Referenced Documents 2
3. Equipment Supplied 2
4. Resources Required 2
5. Lid Closing Procedure 3

REVISION LOG

Rev No	Date	Revised Pages	Revision Description	Prepared By
1	29/06/2022	FIRST ISSUE	ISSUED FOR USE	C.WILLIS

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Supplier: Pharos Marine Automatic Power	**Document No:** BTBX-J01-0002	**Revision No.:** 1	Pharos Marine Automatic Power
Document Title: Battery Box Lid Operation Guide			

1. Overview

This document outlines the method of closing battery boxes with a lid not reachable and too heavy, including the materials and resources required.

The equipment is to be installed, maintained, and operated in accordance with the manufacturer's documentation.

NOTE:

Modifying the equipment mechanically or electrically without Pharos Marine Automatic Power Ltd permission will void the warranty and certification of the unit.

2. Referenced Documents

	Document No.	Description
1.	BTBX-J01-0001	Battery Box Installation & Operation Manual
2.	BTBX-J01-0002	Battery Box Lid Operation Guide

3. Equipment Supplied for closing operation

	Equipment Description	Part No.	Qty.	Tag Number
1.	Cargo Webbing Sling 3m	N/A	2	N/A

4. Resources Required

	Equipment Description	Part No.	Qty.	Tag Number
1.	Step Ladders	N/A	2	N/A
2.	Engineers / Technicians	N/A	2	N/A

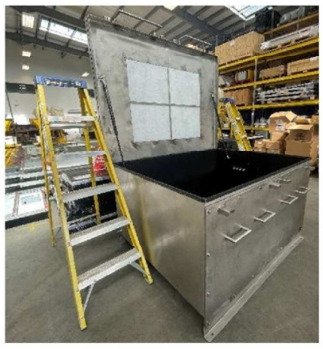
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5. Lid Closing Procedure

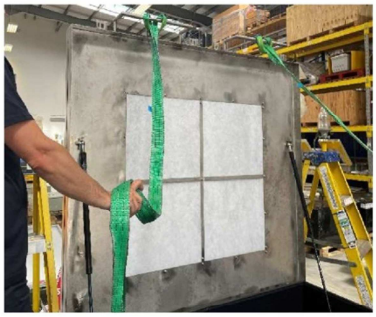
STEP 1- Locate the 2 x Cargo webbing slings that were supplied with the package. Inspect slings for any damage. If any damage is found with the webbing sling DO NOT proceed to the next step and replace sling.



STEP 2- Using access equipment i.e.: Step ladders with the correct procedures/ permits, gain access to the top of the battery box lid to install the 2 x slings.



Using the Choke method on both slings install the slings onto the handles. Ensure the slings are situated in the middle of the handles of the battery box.

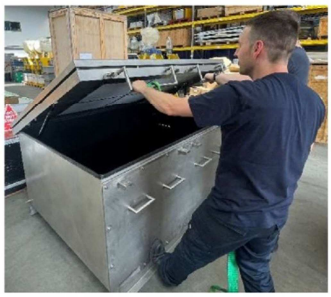


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Supplier: Pharos Marine Automatic Power	**Document No:** BTBX-J01-0002	**Revision No.:** 1	Pharos Marine Automatic Power
Document Title: Battery Box Lid Operation Guide			

STEP 3- With assistance slowly bring the battery box to it closed position.





STEP 4- Remove the slings and store accordingly for future use



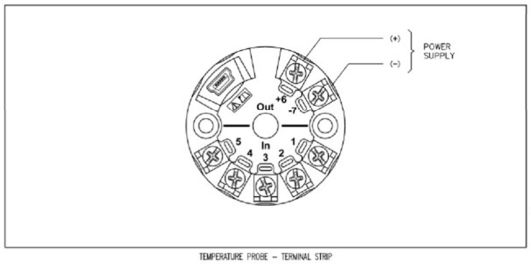
STEP 5- Close battery box using the fixings provided.



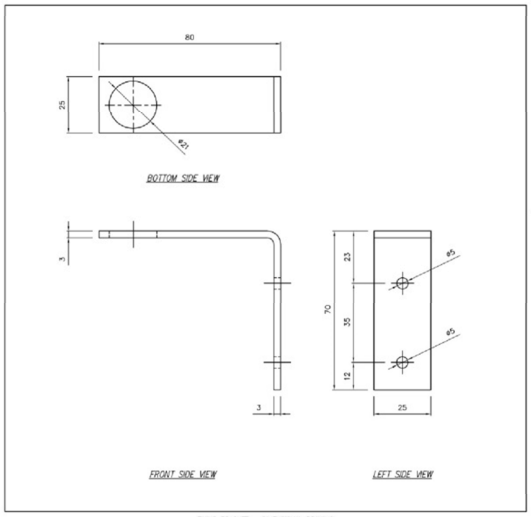
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1.17 TERMICS TEMPERATURE PROBE TS-CTL DATASHEET

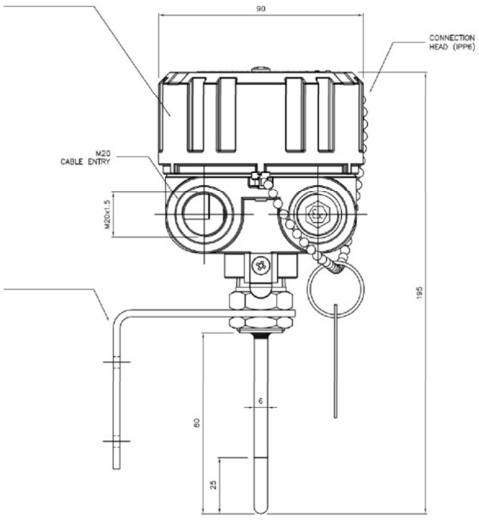
EX TEMPERATURE PROBE (PTC)
SUITABLE FOR ZONE 1 & 2 INSTALLATION



TEMPERATURE PROBE – TERMINAL STRIP



FIXING BRACKET – DIMENSIONAL DRAWING



TECHNICAL DATA		
-TYPE	:	TS-CTL
-TEMPERATURE PROBE TYPE	:	PT100
-MANUFACTURER	:	TERMICS (Italy)
-HOUSING	:	Marine grade aluminium painted RAL 7035
-EXECUTION	:	II 2G Ex d IIC T6 to T1 Gb - IP66
-ATEX CERTIFICATE	:	TUV IT 13 ATEX 069 X Rev.2
-IECEx CERTIFICATE	:	IECEx TPS 15.0007X
-TEMP. SENSOR RESISTANCE	:	100OHM (@ 0°C)
-OPERATING TEMPERATURE	:	-50°C / +70°C
-CALIBRATION RANGE	:	-20°C / +50°C
-4/20mA SIGNAL TYPE	:	LOOP POWERED
-CONNECTIONS	:	TWO WIRES
-WEIGHT	:	1.5kg

Document can be subjected to modifications, without prior notice

SICE Pesaro (ITALY) **Ex TEMPERATURE PROBE (PTC) Technical Data Sheet rev. 1 (2020)** Pag. 1 of 1

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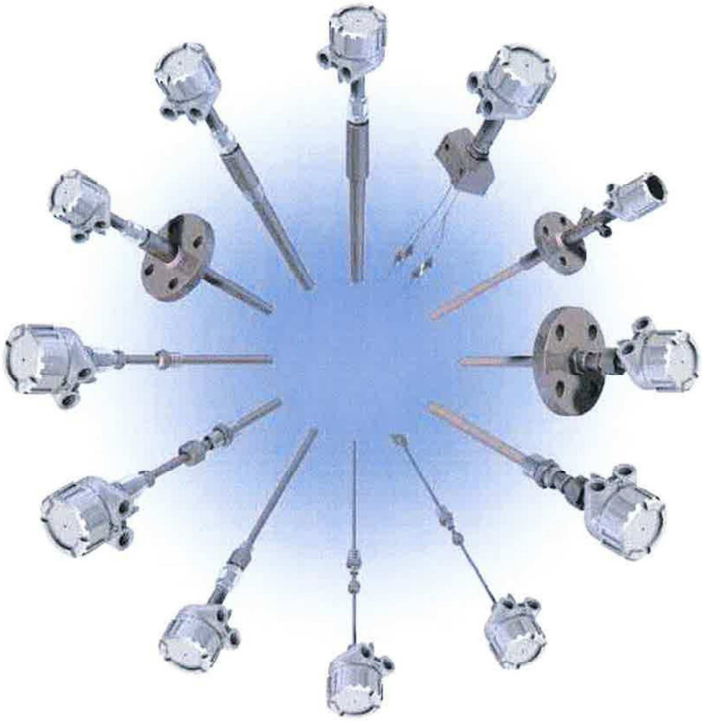
1.18 TERMICS TEMPERATURE PROBE TS-CTL MANUAL

TERMICS S.R.L.

I.S. TS-EXD-...[RTD-TC] REV.04

Thermocouple and thermoresistance thermometric assemblies

Series: TS-CTB; TS-CTF; TS-CTL;TS-TH-CTS; TS-TH-CTT



Termics S.r.l.
Via S. Predengo, 29
Castelverde - CR
(Italy)

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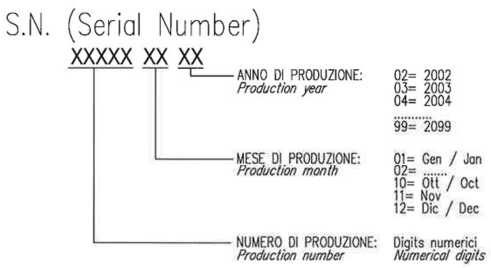
The user shall attain to the following safety instructions.

The equipment for temperature measurement (thermocouple and thermoresistance) of the above mentioned series, is used in thermometry in the most different application fields, for instance in heavy and light industrial processes with presence of vapour, high pressure and high temperatures processed gases or dust, in the following fields: light chemical industry, light energy industry, food industry, environmental engineering and general service industries.
These devices can be used in potentially explosive atmospheres classified as **zone 0, 1, 2** (with the presence of gas) or **zone 0, 21, 22** (with the presence of dust)

Assemblies series **TS-CT-....[TC/ RTD]** marking







The sticker nameplate is fixed to the enclosure of the thermometric assembly.

The installation and the maintenance of the sensors must be carried out following the manufacturer's instructions and the regulation in force (see standard EN 60079-14, EN 60079-26 or other national standards). In particular, the non-compliance with the following instructions shall cause the decay of the conformity to the directive 2014/24/UE of the thermometric assemblies and the manufacturer disclaims all responsibility in case of possible damages to persons or things deriving from a wrong use.

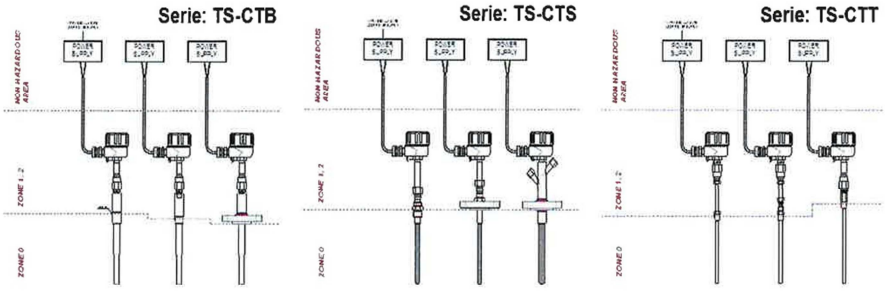
⚠ The assemblies shall be used with cable glands and caps separately Ex certified with "d" and/or "tb" type of protection EPL Gb and/or Db, respecting all the parameters reported on the nameplate.

⚠ Average pressure range: 0.8 a 1.1 bar

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⚠ It is responsibility of the user the choice of the proper installation modalities in order to guarantee the minimum length of the neutral part outside the process area and the consequent respect of the following tables 1, 2, 3, 4. The minimum extension length depends on the variable "working temperature" also called "measuring temperature" and on the maximum certified temperature that the enclosure can stand (see column T_{amb}).

TAB 1 – Measuring insert inside "Zone 0-20"



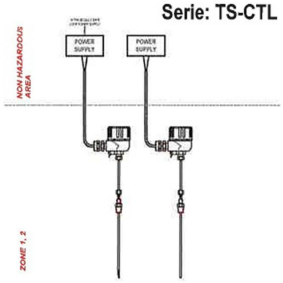
TAB 2 – Temperature range for "Zone 0-20"

Marking	Max Temp at thermowell/ measuring insert	Extension minimum length Mh	Room temperature range T_{amb}
II 1/2 G Ex d IIC T6 Ga/Gb II 1/2 D Ex ta/tb IIIC T85°C Da/Db	-20 °C...45 °C		-50 °C...55 °C
II 1/2 G Ex d IIC T5 Ga/Gb II 1/2 D Ex ta/tb IIIC T100°C Da/Db	-20 °C...58 °C		-50 °C...60 °C
II 1/2 G Ex d IIC T4 Ga/Gb II 1/2 D Ex ta/tb IIIC T135°C Da/Db	-20 °C...86 °C	50 mm	-50 °C...80 °C
II 1/2 G Ex d IIC T3 Ga/Gb II 1/2 D Ex ta/tb IIIC T200°C Da/Db	-20 °C...138 °C	50 mm	-50 °C...80 °C
II 1/2 G Ex d IIC T2 Ga/Gb II 1/2 D Ex ta/tb IIIC T300°C Da/Db	-20 °C...214 °C	100 mm	-50 °C...80 °C
II 1/2 G Ex d IIC T1 Ga/Gb II 1/2 D Ex ta/tb IIIC T450°C Da/Db	-20 °C...334 °C	100 mm	-50 °C...80 °C

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TAB 3 – Measuring insert inside "Zone 1-2-21-22"

Serie: TS-CTL

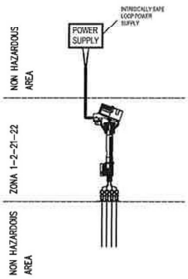


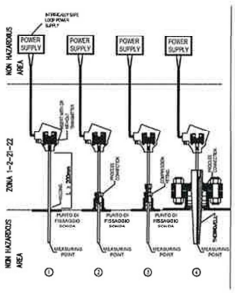
TAB 4 – Temperature Range for "Zone 1-2"

Marking	Max Temp at thermowell/ measuring insert	Extension minimum length Mh	Room temperature range T_{amb}
II 2 G Ex d IIC T6 Gb II 2 D Ex tb IIIC T85°C Db	-50 °C...56 °C		-50°C...55 °C
II 2 G Ex d IIC T5 Gb II 2 D Ex tb IIIC T100°C Db	-50 °C...71 °C		-50°C...70 °C
II 2 G Ex d IIC T4 Gb II 2 D Ex tb IIIC T135°C Db	-50 °C...106 °C	50 mm	-50°C...80 °C
II 2 G Ex d IIC T3 Gb II 2 D Ex tb IIIC T200°C Db	-50 °C...171 °C	50 mm	-50°C...80 °C
II 2 G Ex d IIC T2 Gb II 2 D Ex tb IIIC T300°C Db	-50 °C...266 °C	100 mm	-50°C...80 °C
II 2 G Ex d IIC T1 Gb II 2 D Ex tb IIIC T450°C Db	-50 °C...416 °C	100 mm	-50°C...80 °C

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TAB 5 – Measuring insert inside "NON HAZARDOUS AREA"





TAB 6 – "NON HAZARDOUS AREA" Temperature Range

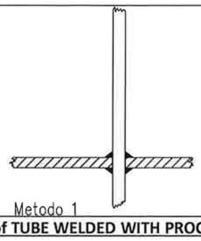
Ex and IIC IP6X TX Temp Class / Surface Temp	Max Temp at thermowell/ measuring insert	Extension minimum length Mh	Room temperature range T_{amb}
II -/2 G Ex d IIC T6 Gb II 2 D Ex tb IIIC T85°C Db	-50°C..400°C		-50°C...80 °C
II -/2 G Ex d IIC T5 Gb II 2 D Ex tb IIIC T100°C Db	-50°C..900°C		-50°C...80 °C
II -/2 G Ex d IIC T4 Gb II 2 D Ex tb IIIC T135°C Db	-50°C..1200 °C	50 mm	-50°C...80 °C
II -/2 G Ex d IIC T3 Gb II 2 D Ex tb IIIC T200°C Db	-50°C..1200 °C	50 mm	-50°C...80 °C
II -/2 G Ex d IIC T2 Gb II 2 D Ex tb IIIC T300°C Db	-50°C..1200 °C	100 mm	-50°C...80 °C
II -/2 G Ex d IIC T1 Gb II 2 D Ex tb IIIC T450°C Db	-50°C..1200 °C	100 mm	-50°C...80 °C

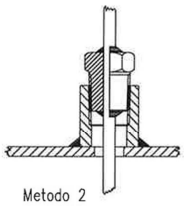
⚠ The choice of the proper installation modalities in order to guarantee the shortest length of the neutral part and the consequent respect of TAB 1, 2, 3, 4, 5, 6 is responsibility of the user.
The maximum length of the free insert manufactured with MgO is 30 mt while the length of the assembly manufactured from tube is 5 mt. It is responsibility of the user to protect mechanically from shock and stress the MI cable (see manual).

⚠ The respect of the installation criteria of the assemblies, from the mechanical point of view, is responsibility of the user, exactly as required in the following points.

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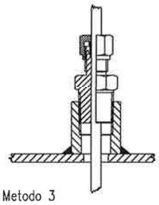
Method 1: it can be installed by means of WELDING.
The welding can be performed using TIG, LASER or equivalent methods; during this operation, attention must be paid not to alter the inner structure of the insert. The welding is done exclusively by the user and must obviously guarantee the protection IP66 and respect the necessary requirements, regarding mechanical connections of delimitation of zone 0 from zone 1, as required at par. 4.2.5 of the standard 60079-26 (see drawing).

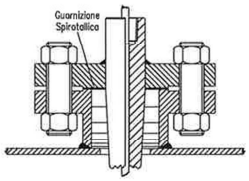




Method 2: it can be installed by means of TUBE WELDED WITH PROCESS CONNECTION.
Also in this case (as seen in the first method), during the welding operation, attention must be paid not to alter the inner structure of the insert and, in addition, standardized thermowells shall be used. The stopper welded to the thermometric assembly is supplied by TERMICS S.r.l.; the welding instead is done exclusively by the user. The protection IP66 and the respect of the necessary requirements, regarding mechanical connections, of delimitation of zone 0 from zone 1, as required at par. 4.2.5 of the standard 60079-26 is ensured, in this case, by the threading (see drawing) performed in compliance with ISO, DIN, ANSI specifications. It is responsibility of the user using a threaded bar also complying to ISO, DIN, ANSI specifications.

Method 3: the insert can be applied by means of A COMPRESSION COUPLING.
The compression coupling to the thermometric assembly is supplied by TERMICS; the welding instead is done exclusively by the user. The protection IP66 and the respect of the necessary requirements, regarding mechanical connections, of delimitation of zone 0 from zone 1, as required at par. 4.2.5 of the standard 60079-26 is ensured, in this case, by the threading (see drawing) performed in compliance with ISO, DIN, ANSI specifications. It is responsibility of the user using a threaded bar also complying to ISO, DIN, ANSI specifications.





Method 4: the insert can be installed INSIDE a THERMOWELL or a FLANGED THERMOWELL
The thermowells must be standardized and can be made out of stainless or ferritic, austenitic, martensitic, duplex (austenitic - ferritic) steel or in alloys and superalloys (Titanium, Inconel, Hastelloy, Monel, Incoloy, Tantalum, etc...).
For stainless steel thermowells the thickness of the walls must be ≥1.2mm and for thermowells manufactured with non-stainless steel the thickness of the walls must be ≥2.5mm and suitable process connection (welding connection, threaded connection, industrial flange, hygienic flange).
The flanged thermowell for the thermometric assembly is supplied by TERMICS; the coupling flange is done exclusively by the user. The protection IP66 and the respect of the necessary requirements, regarding mechanical connections of delimitation of zone 0 from zone 1, as required at par. 4.2.5 of the standard 60079-26 is ensured, in this case, by the flanged coupling (see drawing). It is responsibility of the client the use of a flange complete with gasket also complying with ISO, DIN, ANSI specifications.

⚠ It is responsibility of the user always to guarantee that the welding, the process connections, the compression joints, the thermowells and the enclosures used, stand the possible effects deriving from the environmental conditions such as, for instance, heat, fluid dynamic force, pressure, corrosion, vibrations and shocks due to the process actions.

Special conditions for safe use

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The thermometer has to be operated with a power limitation circuit that limits Pmax at category 1 applications with a two faults safety and at category 2 applications with a one fault safety (e.g. intrinsically safe circuits of ia resp. ib)
The thermometer isn't signed with the permitted liquid temperature. The relation between the temperature code, the permitted ambient temperature (Tamb), the minimal neck length Mh and the max. temperature at the protecting tube/measuring insert is shown in the above table or in the operating manual.
Connection for thermocouple and thermoresistance thermometric assemblies intended for ambient temperatures:
- up to 70 °C shall be provided with cable of thermal stability not less than 90°C and
- up to 80 °C shall be provided with cable of thermal stability not less than 100°C .

In case where temperature sensitive part of thermocouples are grounded, thermometric assembly shall be supplied with isolation amplifier (device with galvanic separation).
The user has to read the safety instructions before using the equipment.

Electrical characteristics

Maximum d.c. current	I_i	≤	380 mA
Maximum voltage	U_i	≤	30 V
Maximum Power	P_i	≤	2 W
Maximum Power at sensor	P_o	≤	500 Mw

⚠ The thermometer must be complete of a cable whose temperature resistance shall be at least compliant to the relative room temperature range allowed.

⚠ The flanged connection between thermowell and flange shall be properly closed according to EN 60079-26 standard Chapter 4.2.5.

⚠ The thermometer is connected to the equipotential circuit of the system.

⚠ For applications requiring category 1/2 devices, an additional thermowell (in anti-corrosive steel, minimum thickness 1 mm) shall separate the thermometer from the process fluid.

⚠ For special applications in which the user needs to apply additional or components different from the ones supplied by the manufacturer such as transmitter, TERMICS S.r.l. must be informed in advance; in case authorization is not given, the device will no longer comply with the directive 2014/24/UE of the product.

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INSTALLATION MODALITIES

The thermocouple and thermoresistance assemblies have been designed for operating in difficult environmental conditions and for a long time. That's why all the sub-components in contact with the process and/or ambient fluid, have been designed in stainless steel or in another stainless metal in order to:

- Prevent that oxidation, corrosion or physical-chemical etching blocks the threaded couplings.
- Prevent that oxidation, corrosion, etc... damage essential components as time goes by, so compromising the life of the whole assembly.

CRITICAL PARTS

The essential parts of a thermocouple for non aeriform fluid are:

- Sensing element (JOINT or RTD)
- Mineral oxide cable
- Connection terminal block or transmitter
- Connection head and thermowell connection parts
- Organic sealing or gaskets
- Thermowell

All these parts shall be considered as passive, with absolutely no moving components. The mechanical, thermo-hydraulic and ambient stress is due to the interaction between component and process system.

The assemblies are designed and manufactured in order to resist to the stress, even if accidental, that can take place during the operation. The sensor of the assembly is intrinsically delicate, therefore it must be handled with attention to the aim not to cause irrecoverable damage.

On thermometer delivery make sure that all the parts, that might have been delivered separately, are taken out from the packaging.

The thermometers that are long must be supported in several points and lifted or carried in a proper manner. On assembling, it is necessary to act cautiously as well. Check the thermometers before assembling, in order to make sure that no damage has occurred during transport.

Thermometric assemblies with thermocouples

Thermometric assemblies with thermocouple can be single, double or triple element. The hot junction is usually insulated, but it can also be grounded through the protection tube.

The connection to the thermocouple is done through a compensation cable. The compensation cables suitable for the thermocouple must be connected respecting the correct polarity. The cables must be laid at a distance not less than 0.5 m from electrical cables, and it would be better they were laid in a proper wire way. Interlaced and protected cables suppress magnetic and electrical leakage.

Thermometric assemblies with RTD

The thermometric assemblies with RTD can be single, dual and, on request, even triple element.

The connection to the sensor is usually done through 2 connectors. For more accurate measurements a 3 wire connection is used and for maximum precision measurements a 4 wire connection is used with constant current and tension.
The connection to the assembly is done through copper cables, having preferably 1.5 mm section. The cables must be laid at a distance not less than 0.5 m from electrical cables, and it would be better they were laid in a proper wire way. Interlaced and protected cables suppress magnetic and electrical leakage.
The suggested measuring current is from 0.1 mA up to 10 mA, in order to avoid self-heating errors.

Thermometric assemblies with transmitter

The above mentioned problems can be solved by mounting a 2 conductors transmitter having an output 4...20 mA inside the connection head. A two-pole copper cable only is necessary in this case.

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In case a transmitter is used, it is compulsory to follow the instruction reported in the installation manual of the transmitter itself.

Assembly and operating

Assembly
The thermocouple and thermoresistance assemblies must be brought into contact with the medium to be measured in the best possible manner.

In order to avoid thermal conduction errors, the immersion depth should be:

- in fluids 6 ... 8 times greater than the diameter of the protection tube,
- in gases 10 ...15 times greater than the diameter of the protection tube.

If only very short insertion lengths are possible, special designs should be applied without additional protection tubes. It is often helpful to install a tube arc; in this case the protection tube should be positioned opposite the flow of the medium.

Power Cables

Pay particular attention that all power cables have a good contact.
Cables insulation must be selected according to surrounding environment (dry, humid, chemically aggressive, hot). The ambient temperature either of cable and connection head shall never exceed, as a rule, 100°C.

When selecting and laying down cables, the related installation standards shall be followed.

All measuring systems should work, if possible, without a grounding connection or grounded at one single point.

In case of thermocouples connected through a protection tube, the latter should be the only grounding connection.

Protection tubes

Thermometric assemblies (TC and RTD) can be installed in any mounting position, preferably hanging vertically, up to temperatures reaching about 500 C°.

Ceramic protection tubes must be sheltered from mechanical stress (knocks, distortions), and from temperature shock, i.e. through direct contact with flame.

If they are placed in hot processes (i.e. when changing the thermocouple), they must be either pre-warmed or inserted very slowly (1 ... 2 cm/min at 1600 °C, 10 ... 20 cm/min at 1200 °C). This also applies when removing hot protection tubes.

Maintenance

The thermometric assemblies and the whole measuring circuit must be checked periodically, especially about:

- wear of the protection tubes or chemical attack
- aging of the measuring elements
- reduction of the insulation resistance because of humidity and dirt
- improper contact of the wire connections
- mechanical or chemical damage of thermometer and cables.

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The circuits wiring of the resistance thermometers is controlled by replacing the measuring element with a known defined resistance thereby simulating a specific temperature.

Thermocouple thermometer circuits can be checked by connecting to the measuring circuit, instead of the thermocouple, a mV tension having a well-known value.

In both cases, it's possible to determine any deviations of the nominal values, and whether the thermometer or the instrumentation is the cause of operation error.

The insulation resistance of the entire ungrounded measuring circuit (power cables and thermometer) against ground should be > 1 MΩ (measured with100 V DC tension)

Failures messages

Quick check

Quick check of thermocouples and resistance thermometers, such as the related measuring circuits, dismantled.

Necessary tools:

millivoltmeter,
ohmmeter or resistance bridge,
insulation tester (megaohm).

At room temperature the throughput and insulation are checked by "knocking" to see if any wire breaks have occurred.

A thermocouple is considered to be in order if R is >0 Ω and R_{isol} is ≥ 100 MΩ (in case of insulated thermocouples).

A RTD is considered to be in order if R is about 100 Ω (Pt 100), R_{isol} is > 100 MΩ

The accuracy of temperature sensors, according to ISO 9000 standard, can only be checked by comparison with a reference element.

In most cases the thermometer has to be dismantled and checked in a test furnace.

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Table about tension values for the insulation tests on RTD

PROBE OUTER Ø	TENSION VALUES Vdc	MEGAOHM MIN. ACCEPTED VALUE
2.00	100	500
3.00	250	500
4.50	250	500
5.00	250	500
6.00	500	500
8.00	500	500

Table about tension values for the insulation tests on thermocouples

PROBE OUTER Ø	TENSION VALUES Vdc	MEGAOHM MIN. ACCEPTED VALUE
0.50	100	100
2.00	250	500
3.00	250	500
4.50	500	1000
6.00	500	1000
8.00	500	1000
F.I.	500	500

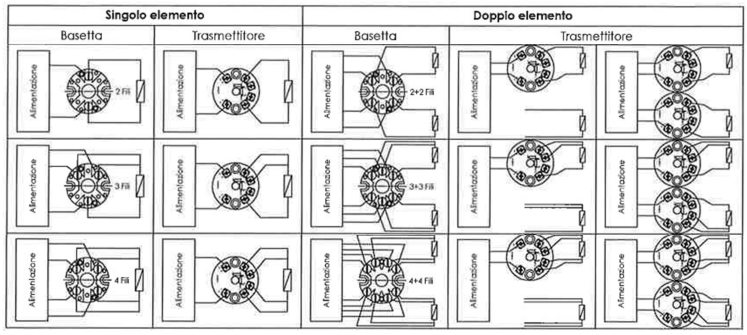
General table about the relation temperature-resistance for platinum resistance according to EN 60751 (IEC 60751) - Variation between 0°C and + 39°C

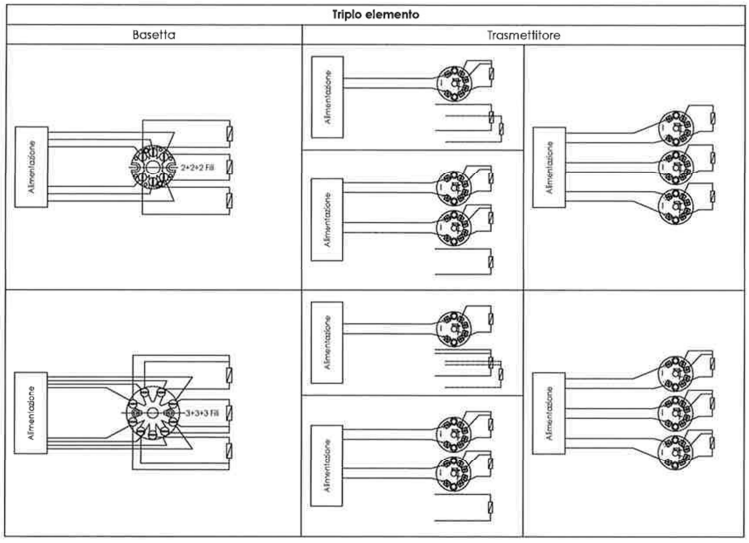
TEMP °C	Ro = 100ohm α (alpha) = 0,00385 [1/°C]									
	0	1	2	3	4	5	6	7	8	9
0	100,00	100,39	100,78	101,17	101,56	101,95	102,24	102,73	103,12	103,51
10	103,90	104,29	104,68	105,07	105,46	105,85	106,24	106,63	107,02	107,40
20	107,79	108,18	108,57	108,96	109,35	109,73	110,12	110,51	110,90	111,28
30	111,67	112,06	112,45	112,83	113,22	113,61	113,99	114,38	114,77	115,15

α (alpha) is the average temperature coefficient between 0 and 100°C

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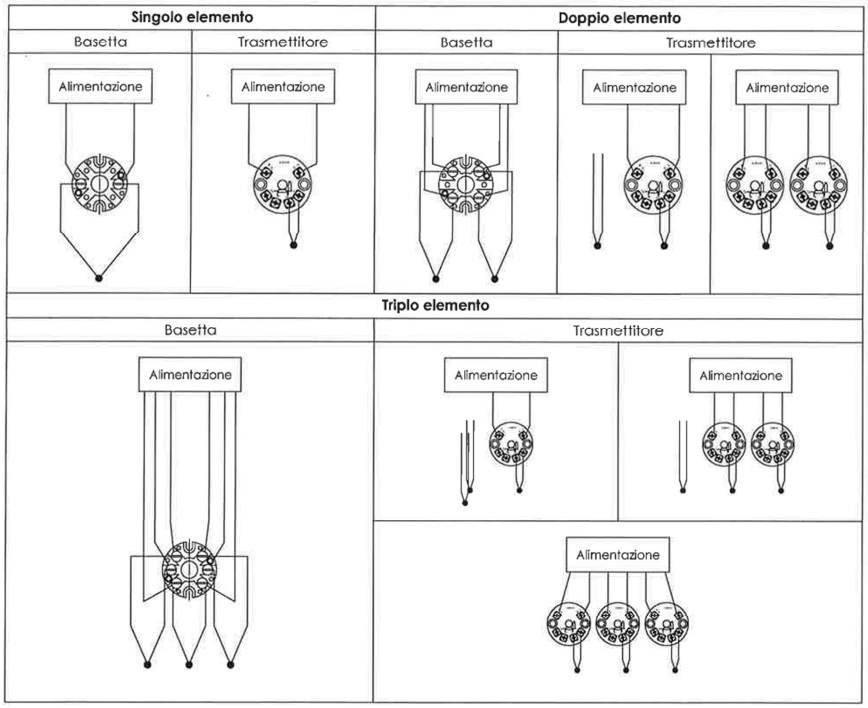
Thermoresistance thermometric assembly connection modalities





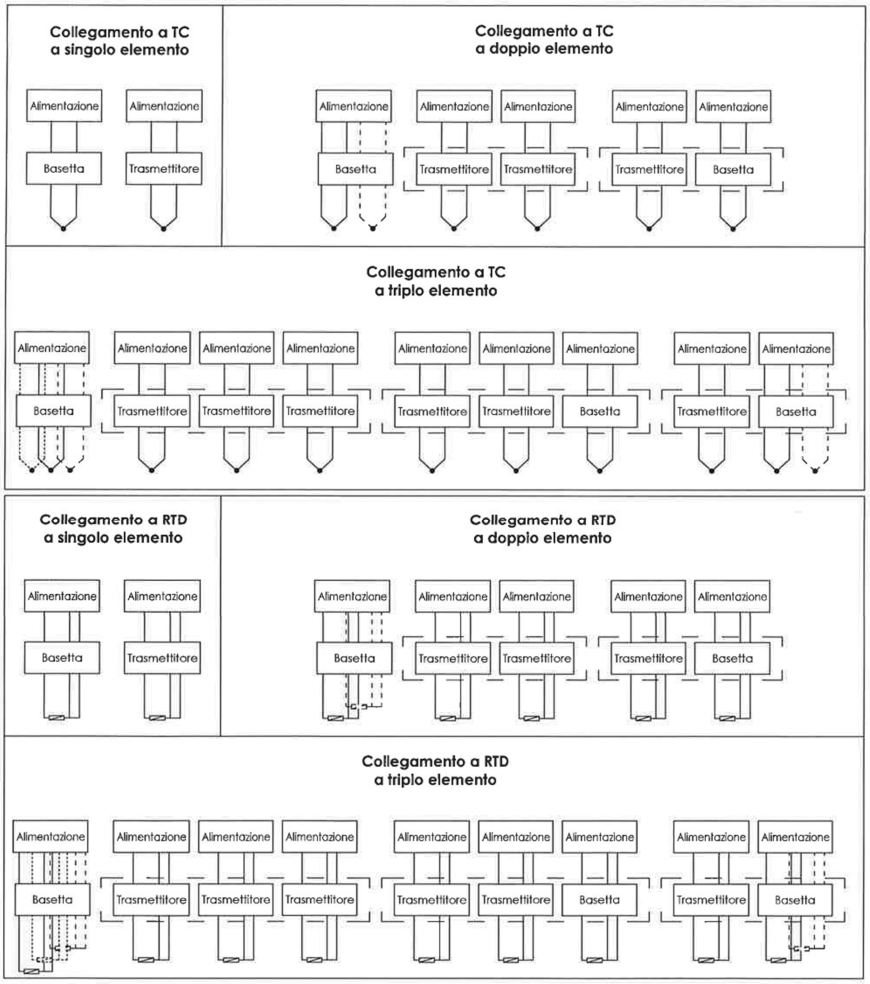
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Thermocouple thermometric assembly connection modalities



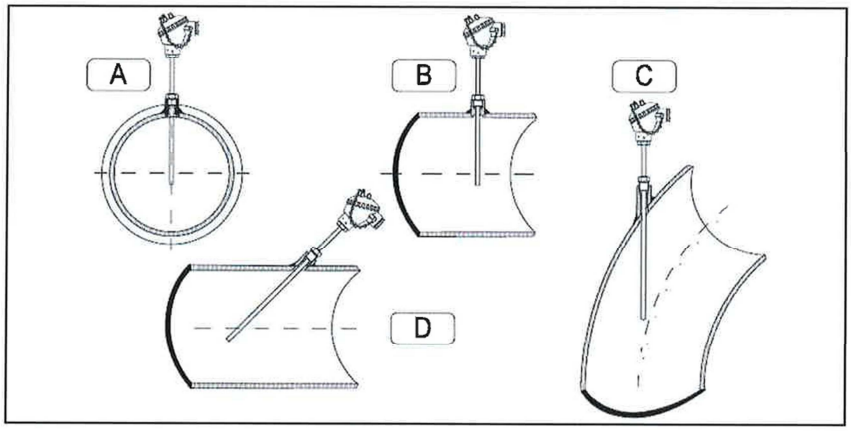
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See the following electrical connection table



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Examples of installation on piping:



A - B: *In pipes having small section the axis line of the duct must be reached and, if possible, slightly exceeded by the tip of the probe*

C - D: *Tilted installation*

Occasional operations

In case anomalies in the operation of an increased safety instrumentation system occur, it will obviously be necessary to be able to perform in the shortest possible time the following operations regarding the determination of the anomaly causes:

- Insulation and location of the anomalous parts of the system
- Replacement, if possible, of the anomalous parts (with spare ones)
- Repair of the faulty parts so that they can work correctly again

Dismantling

If the assembly, still under warranty, proves malfunction, take it to pieces and send it to the supplier for a check. The manufacturer will take care of the repair procedures.
If instead the product does not work and dismantling becomes necessary, the customer shall call the proper waste disposal company and carry out the disposal considering the product as out of order non-dangerous equipment, marking it with European code 160214.

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1.19 TERMICS TEMPERATURE PROBE TS-CTL LOOP POWERED TRANSMITTER MANUAL



OPTITEMP TT 20 Handbook

Analog PC-programmable two-wire transmitters for Pt100

The documentation is only complete when used in combination with the relevant documentation for the sensor.

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1.1 Intended use

The transmitter is an analog two-wire non-isolating PC configured transmitter designed for Pt100 temperature sensors and intended to be used in an industrial environment.

The transmitter is intended for installation in a B connection head or larger according to DIN 43729. It's designed for a three wire sensor connection.

The transmitters are configured from a PC by using the ConSoft program and a transmitter configuration kit (USB connection) ICON without external power supply. Calibration of the transmitter, after the PC configuration is not necessary.

1.2 Certifications

CE marking

CE

The device fulfils all applicable statutory requirements of the following EC directives:

- CE Directive 93/68/EEC
- EMC Directive 2004/108/EC according harmonized standard EN 61326-1:2006 including A1 and A2

The manufacturer certifies successful testing of the product by applying the CE marking.

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1.3 Safety instructions from the manufacturer

1.3.1 Copyright and data protection

The contents of this document have been created with great care. Nevertheless, we provide no guarantee that the contents are correct, complete or up-to-date.

The contents and works in this document are subject to copyright. Contributions from third parties are identified as such. Reproduction, processing, dissemination and any type of use beyond what is permitted under copyright requires written authorisation from the respective author and/or the manufacturer.

The manufacturer tries always to observe the copyrights of others, and to draw on works created in-house or works in the public domain.

The collection of personal data (such as names, street addresses or e-mail addresses) in the manufacturer's documents is always on a voluntary basis whenever possible. Whenever feasible, it is always possible to make use of the offerings and services without providing any personal data.

We draw your attention to the fact that data transmission over the Internet (e.g. when communicating by e-mail) may involve gaps in security. It is not possible to protect such data completely against access by third parties.

We hereby expressly prohibit the use of the contact data published as part of our duty to publish an imprint for the purpose of sending us any advertising or informational materials that we have not expressly requested.

1.3.2 Disclaimer

The manufacturer will not be liable for any damage of any kind by using its product, including, but not limited to direct, indirect or incidental and consequential damages.

This disclaimer does not apply in case the manufacturer has acted on purpose or with gross negligence. In the event any applicable law does not allow such limitations on implied warranties or the exclusion of limitation of certain damages, you may, if such law applies to you, not be subject to some or all of the above disclaimer, exclusions or limitations.

Any product purchased from the manufacturer is warranted in accordance with the relevant product documentation and our Terms and Conditions of Sale.

The manufacturer reserves the right to alter the content of its documents, including this disclaimer in any way, at any time, for any reason, without prior notification, and will not be liable in any way for possible consequences of such changes.

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1.3.3 Product liability and warranty

The operator shall bear responsibility for the suitability of the device for the specific purpose. The manufacturer accepts no liability for the consequences of misuse by the operator. Improper installation and operation of the devices (systems) will cause the warranty to be void. The respective "Standard Terms and Conditions" which form the basis for the sales contract shall also apply.

1.3.4 Information concerning the documentation

To prevent any injury to the user or damage to the device it is essential that you read the information in this document and observe applicable national standards, safety requirements and accident prevention regulations.

If this document is not in your native language and if you have any problems understanding the text, we advise you to contact your local office for assistance. The manufacturer can not accept responsibility for any damage or injury caused by misunderstanding of the information in this document.

This document is provided to help you establish operating conditions, which will permit safe and efficient use of this device. Special considerations and precautions are also described in the document, which appear in the form of underneath icons.

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1.3.5 Warnings and symbols used

Safety warnings are indicated by the following symbols.



DANGER!
This information refers to the immediate danger when working with electricity.



DANGER!
This warning refers to the immediate danger of burns caused by heat or hot surfaces.



DANGER!
This warning refers to the immediate danger when using this device in a hazardous atmosphere.



DANGER!
These warnings must be observed without fail. Even partial disregard of this warning can lead to serious health problems and even death. There is also the risk of seriously damaging the device or parts of the operator's plant.



WARNING!
Disregarding this safety warning, even if only in part, poses the risk of serious health problems. There is also the risk of damaging the device or parts of the operator's plant.



CAUTION!
Disregarding these instructions can result in damage to the device or to parts of the operator's plant.



INFORMATION!
These instructions contain important information for the handling of the device.



LEGAL NOTICE!
This note contains information on statutory directives and standards.



- HANDLING
  This symbol designates all instructions for actions to be carried out by the operator in the specified sequence.

➲ RESULT
This symbol refers to all important consequences of the previous actions.

1.4 Safety instructions for the operator



WARNING!
In general, devices from the manufacturer may only be installed, commissioned, operated and maintained by properly trained and authorized personnel.
This document is provided to help you establish operating conditions, which will permit safe and efficient use of this device.

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2.1 Scope of delivery

INFORMATION!
Inspect the cartons carefully for damages or signs of rough handling. Report damage to the carrier and to the local office of the manufacturer.

INFORMATION!
Do a check of the packing list to make sure that you have all the elements given in the order.

INFORMATION!
Look at the device nameplate to ensure that the device is delivered according to your order.

The scope of delivery always consists of the transmitter and its documentation.

2.2 Device description

The transmitter will indicate sensor break according to selected value high (> 21.0 mA) or low (< 3.6 mA). Short circuit will always be indicated as low output (< 3.6 mA).

The transmitter is designed for installation in a B connection head according to DIN 43729. With an installation kit the transmitter can be installed on a top-hat rail according to DIN EN 50022.

The transmitters are configured from a PC by using the ConSoft program and a transmitter configuration kit ICON. When transmitters are configured from PC no calibration is necessary.

The PC configuration software ConSoft is used for configuration, display and documentation. The current ConSoft version is available for downloading on our website.

You can find configuration instructions in the ConSoft reference manual.

ConSoft is compatible with Windows 2000, Windows XP, Windows Vista and Windows 7.

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2.3 Nameplate

INFORMATION!
Look at the device nameplate to ensure that the device is delivered according to your order.

The transmitter can be identified by the information on the nameplates.

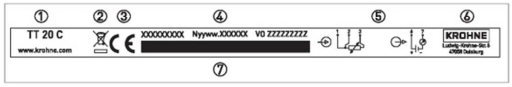


Figure 2-1: Example for round nameplate

① Product name
② Recycling
③ CE marking (EC conformity)
④ Part number, serial number and batch number
⑤ Connections
⑥ Manufacturer and address
⑦ Printable field, sensor configuration

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3.1 Notes on installation

INFORMATION!
Inspect the cartons carefully for damages or signs of rough handling. Report damage to the carrier and to the local office of the manufacturer.

INFORMATION!
Do a check of the packing list to make sure that you have all the elements given in the order.

INFORMATION!
Look at the device nameplate to ensure that the device is delivered according to your order.

3.2 In-head transmitter

The transmitter is intended for installation in DIN B connection heads or larger. The large Ø7 mm / 0.28 inch center hole facilitates the electrical connection of the sensor and the installation. For detailed information refer to *Dimensions* on page 25.

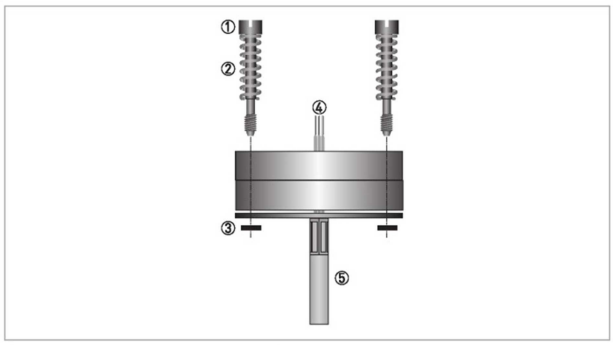


Figure 3-1: Connection head installation kit

① M4 screw
② Spring
③ Lock washer
④ Wires from the measuring inserts
⑤ MI Cable

INFORMATION!
The connection head installation kit does not belong to the standard scope of delivery of the transmitter, you have to order it separately. For more information refer to Accessory parts on page 19.

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WARNING!
The transmitter has been developed for an operating temperature of -40...+85°C/ -40°F...+185°F. To avoid destruction or damage of the device, always assure that the operating temperature or ambient temperature does not exceed the permissible range. The thermowell also transfer the process temperature to the transmitter housing. If the process temperature is close to or exceeds the maximum temperature of the transmitter, then the temperature in the transmitter housing can rise above the maximum permissible temperature. One way to decrease the head transfer via thermowell is to install the transmitter further away from the heat source. Inversely similar measurements can be done if the temperature gets below specified minimum temperature.

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3.3 Rail mounting kit for in-head transmitters

INFORMATION!
The rail mounting kit allows to install the in-head transmitter on a rail according to DIN 50022. The kit does not belong to the standard scope of delivery. You have to order it separately. For more information refer to Accessory parts on page 19.

The screws in the kit is not to be used with this transmitter.

Rail mounting kit for in-head transmitters

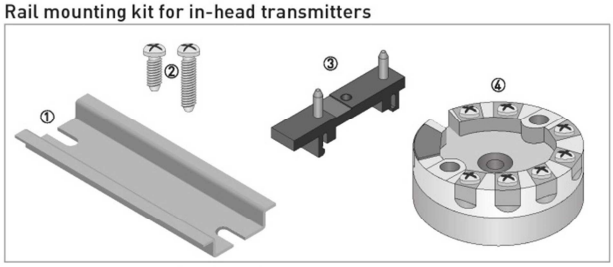
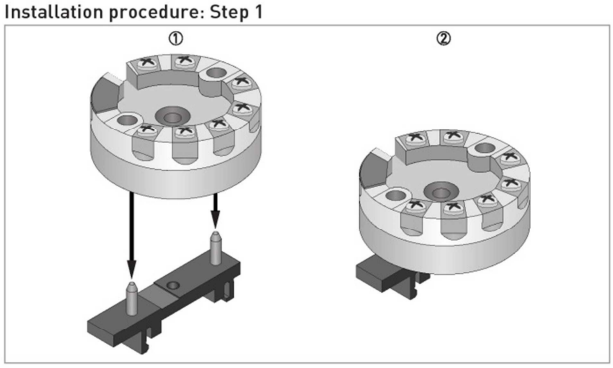


Figure 3-2: Rail mounting kit for in-head transmitters

① Rail (not included in the kit)
② Screws (not needed)
③ Clamp
④ Transmitter

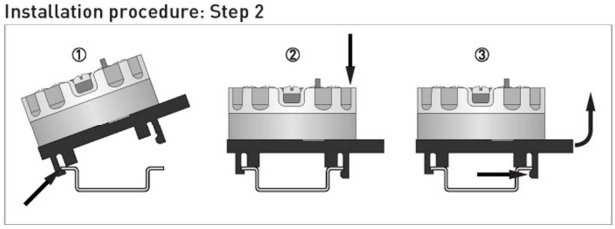
Installation procedure: Step 1



① Place the transmitter on the rail mounting kit as shown above.
② Push the transmitter down until it reaches the plate and is attached.

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Installation procedure: Step 2



① Hook one end of the installation the kit into the rail as shown above.
② Push the other end of the the kit down until it snaps onto the rail.
③ Release by pushing the hook, shown in the picture, and at the same time lift the clip out of the rail.

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4.1 Safety instructions

DANGER!
All work on the electrical connections may only be carried out with the power disconnected.

DANGER!
Observe the corresponding regulations, declarations of conformity, the type test certificate of the device and the relevant instructions of this manual.

CAUTION!
Before you connect and operate a transmitter, always note the following items to avoid an electric shock:

- *For all work on the electrical connections use an electrostatic safe (i.e. grounded) workplace! In this way you minimize the risk of electrostatic discharge (ESD).*

WARNING!
Observe without fail the local occupational health and safety regulations. Any work done on the electrical components of the measuring device may only be carried out by properly trained specialists.

INFORMATION!
Look at the device nameplate to ensure that the device is delivered according to your order.

INFORMATION!
The transmitter is protected against polarity reversal. No damage will occur to the device if the polarity of the supply voltage is switched. The output will then indicate 0 mA.

4.2 Electrical connection diagram

INFORMATION!
To avoid measuring errors, all cables must be connected properly and the screws tightened correctly.

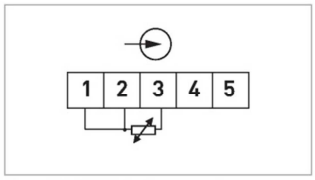


Figure 4-1: Pt100, 3-wire connection

INFORMATION!
The transmitter has a polarity protection, connecting the power supply with wrong polarity will not harm the transmitter.

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4.3 Connection diagram

CAUTION!
Always establish the electrical connections according to the following diagrams. Otherwise it can come to destruction or damage of the transmitter. Note that the maximum output load always depends on the power supply. If the maximum output load is exceeded, then the measured value will become incorrect. For further information refer to the output load diagram in the chapter "Technical data" on page 25.

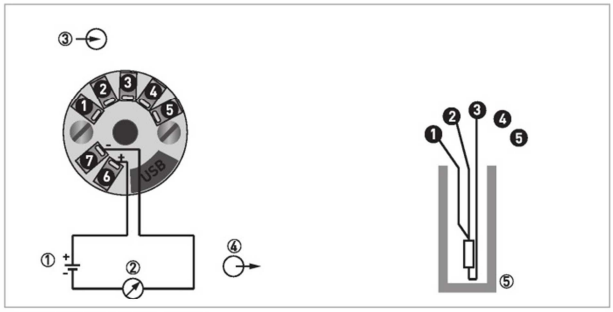


Figure 4-2: Connection diagram

① Voltage supply 8.5...32 VDC (terminals 6,7)
② R_{Load}
③ Input
④ Output signal (4...20mA)
⑤ Pt100 3-wire connection

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5.1 Configuration of transmitter

The transmitters are configured from a PC by using the ConSoft program and a transmitter configuration kit ICON. For more information refer to *Accessory parts* on page 19.

The ConSoft is a PC based graphical user interface for configuration of the transmitters. The PC configuration software ConSoft is used for configuration, display and documentation.

Full functionality of the transmitter is achieved with ConSoft program version 2.0.0.1 or later. Consoft is compatible with Windows 2000 SP3, Windows XP (SP2+), Windows Vista, and Windows 7.The current software versions of ConSoft and the USB interface are available for downloading on our website.

Configuration can be performed with or without connected power supply.

To make a configuration of the transmitter you need to do following:

① Install the PC configuration software ConSoft in your PC.
② Install the driver for the Transmitter configuration kit ICON (included in the Transmitter configuration kit ICON). See User instructions for Transmitter configuration kit ICON. USB interface will indicate correct installation and connection of the transmitter – ICON – PC.
③ Connect the transmitter to your PC via the Transmitter configuration kit ICON.
④ Start the software ConSoft.
⑤ Click on the icon "Read from the transmitter" or File - "Read from the transmitter". The software will identify and connect to the transmitter. A configuration window for the connected transmitter will open.
⑥ Enter one of the following options:
- Temperature sensor - Pt100 type (3 different standards)
- Measuring range - lower range value and upper range value
- Error monitoring - upscale or downscale action at sensor break indication
- Error correction - sensor error lower and upper values - compensation for known sensor errors
- Custom settings - Tag number

⑦ The selected configuration is downloaded to the transmitter by clicking the icon "Transfer to transmitter" or File - "Transfer to transmitter"
⑧ The transmitter begins using the new parameters directly after downloading.

CAUTION!
Only use the manufacturer's configuration kit for PC configuration. Another configuration kit could destroy or damage the transmitter.

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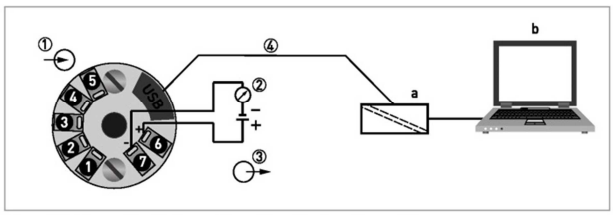


Figure 5-1: Connection during configuration of in-head transmitter

a = PC configuration kit; b = PC software ConSoft

① Input
② R_{Load}
③ Output voltage supply (terminals 6 and 7)
④ Communication with USB interface and a PC software ConSoft

5.2 Factory calibration of transmitter

The transmitters are delivered with a factory configuration Pt100 (α = 0.00385), 3-wire connection 0...+100 °C / +32...+212 °F or configured according to customer's requirements.

Due to the long-term drift of max. ±0.1% of span per year, a re-calibration of the transmitter is normally not needed. Should you for any reason require the re-calibration, the transmitter must be returned to the factory.

5.3 Sensor Break Monotoring (Up/Down scale)

In case the sensor breakes the transmitter will indicate this by either drop the output <3.6 mA or lift it to >21.0 mA. The diffrent indication is set in the transmitter via configurator.

5.4 Sensor Short Circuit (Down Scale)

In case the sensor short circuit the transmitter indicates this by dropping the output <3.6 mA and is default.

5.5 Error Corrections

By setting the measured min and max value for the sensor in given temperature range the transmitter can compensate sensor errors. This is set with help of the configurator.

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6.1 Accessory parts

Accessory part	Order code
Universal rail mounting kit for in-head version	70ADA00027
Configuration kit including modem, software Consoft and cables for USB connection	4001107901
Connection Head installation kit	70ADA00017

6.2 Spare parts availability

The manufacturer adheres to the basic principle that functionally adequate spare parts for each device or each important accessory part will be kept available for a period of 3 years after delivery of the last production run for the device.

This regulation only applies to spare parts which are subject to wear and tear under normal operating conditions.

6.3 Availability of services

The manufacturer offers a range of services to support the customer after expiration of the warranty. These include repair, maintenance, technical support and training.

INFORMATION!
For more precise information, please contact your local representative.

6.4 Returning the device to the manufacturer

6.4.1 General information

This device has been carefully manufactured and tested. If installed and operated in accordance with these operating instructions, it will rarely present any problems.

CAUTION!
Should you nevertheless need to return a device for inspection or repair, please pay strict attention to the following points:

- *Due to statutory regulations on environmental protection and safeguarding the health and safety of our personnel, manufacturer may only handle, test and repair returned devices that have been in contact with products without risk to personnel and environment.*
- *This means that the manufacturer can only service this device if it is accompanied by the following certificate (see next section) confirming that the device is safe to handle.*

CAUTION!
If the device has been operated with toxic, caustic, flammable or water-endangering products, you are kindly requested:

- *to check and ensure, if necessary by rinsing or neutralizing, that all cavities are free from such dangerous substances,*
- *to enclose a certificate with the device confirming that is safe to handle and stating the product used.*

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6.4.2 Form (for copying) to accompany a returned device

Company:		Address:
Department:		Name:
Tel. no.:		Fax no.:
Manufacturer's order no. or serial no.:		
The device has been operated with the following medium:		
This medium is:		water-hazardous
		toxic
		caustic
		flammable
		We checked that all cavities in the device are free from such substances.
		We have flushed out and neutralized all cavities in the device.
We hereby confirm that there is no risk to persons or the environment through any residual media contained in the device when it is returned.		
Date:		Signature:
Stamp:		

6.5 Disposal

CAUTION!
Disposal must be carried out in accordance with legislation applicable in your country.

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7.1 Measuring principles

The kind of the measuring principle depends on the measuring insert that you combine with the transmitter. In matters of the thermometer type the manufacturer offers two different measuring inserts, either with a resistance thermometer or with a thermocouple. This transmitter only supports resistance thermometer.

7.1.1 Resistance thermometer

The measuring insert with a resistance thermometer features a temperature-sensitive sensor made from a platinum RTD, whose value at 0°C / +32°F is 100 Ω. That is where the name "Pt100" comes from.

It is generally valid that the electric resistance of metals increases according to a mathematical function as the temperature rises. This effect is taken advantage of by resistance thermometers to measure temperature. The "Pt100" thermometer features a measuring resistance with defined characteristics, standardised in IEC 60751. The same is true for the tolerances. The average temperature coefficient of a Pt100 is 3.85 x 10^{-3} K^{-1} in the range from 0...+100°C / +32...+212°F.

During operation, a constant current I (≤ 1 mA) flows through the Pt100 RTD, which brings about a voltage drop U. The resistance R is calculated using Ohm's Law (R=U/I). As the voltage drop U at 0°C / +32°F is 100 mV, the resulting resistance of the Pt100 thermometer is 100 Ω (100 mV / 1 mA = 100 Ω).

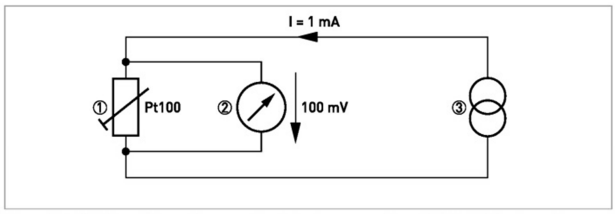


Figure 7-1: Pt100 resistance thermometer in 4-wire connection at 0°C / +32°F, schematic.

① Pt100 RTD
② Voltage meter
③ Current source

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7.2 Technical data

INFORMATION!

- *The following data is provided for general applications. If you require data that is more relevant to your specific application, please contact us or your local representative.*
- *Additional information (certificates, special tools, software,...) and complete product documentation can be downloaded free of charge from the website (Download Center).*

Measuring system

Application range	Temperature measurements of solids, liquids and gases in industrial environment.

Design

Versions	
TT 20	In-head transmitters which are intended for installation in a "B connection head" or larger according to DIN 43729.
Features	
Sensor matching	A matching to a calibrated temperature sensor can easily be performed by entering the sensor deviation in the low and high ends of the measuring ranges.
PC programmable	Input type and measuring ranges are set from PC.
	Full accuracy is provided without any need for calibration.
	Configuration without external power.
	Edit/Read configuration offline, i.e. without power supply, by just connecting to a USB port of a PC.

Measuring accuracy

Accuracy & Stability	Basic accuracy is max. of ±0.1% of span.
Temperature influence	Deviation from +20°C / +68°F Max. of ±0.25°C / 25°C or ±0.25% / 25°C Max. of ±0.5°F / 50°F or ±0.28% / 50°F
Supply voltage influence	Negligible
Long-term drift	±0.1% of span per year

Operating conditions

Temperature	
In-head transmitter	**Operating and storage temperature:** Standard version: -40...+85°C / -40...+185°F
Humidity	0...100% RH (non-condensing)
Protection category	
In-head transmitter	Protection housing: IP65
	Protection terminals: IP10

Installation conditions

Mounting	In-head transmitter: DIN B-head or larger, DIN-rail (with adapter)
	For detailed information refer to *Installation* on page 11.
Weight	In-head transmitter: 32 g / 0.07 lb
Dimensions	For detailed information refer to *Dimensions* on page 25.

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Materials

Housing	PC/ABS + PA
Flammability acc. to UL	In-head transmitter: V0

Electrical connections

Power supply	Standard: 8.5...32 VDC
Isolation	Not galvanically isolated
Connection	Single/stranded wires: max. 1.5 mm^2 / AWG 16
Polarity Protection	Standard

Inputs / Outputs

Input - RTD	
Pt100 (IEC 60751, α=0.00385)	-50... +850°C / -58...+1562°F
Pt100 (JIS C 1604-8, α=0.003916)	
Pt100 (US, α=0,003902	
Sensor current	≤0.5 mA
Maximum sensor wire resistance	20 Ω/wire
Adjustment	Zero adjustment -50, -25, 0, +25, +50°C / -58, -13, +32, +77, +122°F
	Minimum span +20°C / +68°F
	Sensor error compensation ±1% of span
Output	
Output signal	4...20 mA Temperature linear
Permissible load	700 Ω at 24 VDC
NAMUR compliance	Failure currents acc. to NAMUR NE 43 except short circuit detection were downscale is the only option.
Respons time	<50 ms
Monitoring	Sensor break monitoring, selectable, upscale ≥21.0 mA or downscale ≤3.6 mA action Sensor short-circuit, fixed, downscale ≤3.6 mA action
Configuration	
ConSoft	The PC configuration software, ConSoft, is a versatile and user-friendly tool for transmitter configuration.
	Consoft is compatible with Windows 2000 (SP3), Windows XP (SP2+), Windows Vista, and Windows 7.
	ConSoft is part of the complete configuration kit ICON, which also contains a USB Interface and necessary cables.

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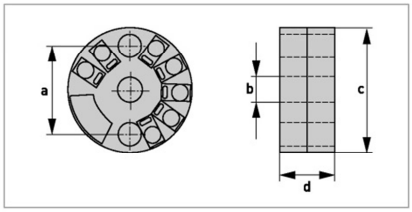
Approvals and certifications

CE	The device fulfils the statutory requirements of the EC directives. The manufacturer certifies that these requirements have been met by applying the CE marking.
Other standards and approvals	
Electromagnetic compatibility	Directive: 2004/108/EC
	Harmonized standards: EN 61326-1:2006
	ESD, Radiated EM-field: Criteria A Surge: ~3% of span Burst, conducted RF: ~1% of span
Vibration resistance	Acc. to IEC 60068-2-6, test Fc, 84...2000 Hz, 10 g
Shock resistance	Acc. to IEC 60068-2-31, test Ec

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7.3 Dimensions

In-head transmitter



	Dimensions	
	[mm]	[inch]
a	33.0	1.30
b	7.0	0.28
c	44.5	1.75
d	18.5	0.72

7.4 Output load diagram

Formula for the maximum permissible output load:

permissible R_{Load} [Ω] = (U-8.5)/0.022

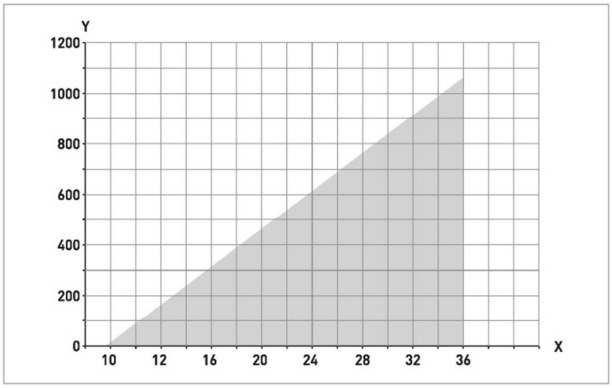


Figure 7-2: Output load diagram

X: Power supply U [VDC]
Y: Total output load R [Ω]

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KROHNE product overview

- Electromagnetic flowmeters
- Variable area flowmeters
- Ultrasonic flowmeters
- Mass flowmeters
- Vortex flowmeters
- Flow controllers
- Level meters
- Temperature meters
- Pressure meters
- Analysis products
- Measuring systems for the oil and gas industry
- Measuring systems for sea-going tankers

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Tel.:+49 (0)203 301 0
Fax:+49 (0)203 301 10389
info@krohne.de

The current list of all KROHNE contacts and addresses can be found at:
www.krohne.com

KROHNE

1.20 TECHNOR EX-PROOF ENCLOSURE EJB DATA SHEET

GAS GROUP IIB + H_2

EJB.. Series - Copper-free aluminium



EJB.. series enclosures offers Ex d IIB or IIB+H2 mode of protection.
They are suitable for hazardous areas of industrial plants for indoor and outdoor applications

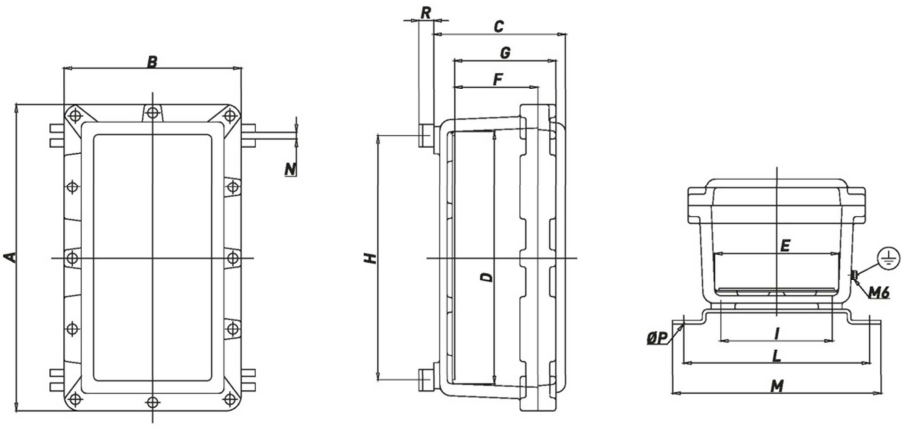
They can be equipped with following components:
- Push buttons and mechanical operators PL.. Series;
- Rotating switches PSRC Series;
- Signalling lamps PL.. Series;
- Potentiometers;
- Rotating handles SRC-1 or SRC-10;
- Measurement instruments;
- Electric and electronic equipment;
- Windows made of tempered glass.

TECHNICAL FEATURES

Material	Copper-free aluminium
IP rating	IP65, IP66
Ambient temp. range	-60 °C up to +60 °C (without window)/-50°C up to +60°C (with window)
Approvals	Full Conformity Certificate: ATEX: INERIS 00ATEX0021X IECEx: INE 10.0015X EAC: RU C-IT.BH02.B.00588/20 Component Certificate: ATEX: INERIS 21 ATEX 9004U IECEx: INE 21.0006U EAC: RU C-IT.BH02.B.00588/20
Marking	Full Conformity Certificate: II 2 G Ex db IIB T(*) Gb or II 2 G Ex db IIB+H2 T(*) Gb or II 2 G Ex db ia/ib IIB T(*) Gb or II 2 G Ex db ia/ib IIB+H2 T(*) Gb and/or II 2 D Ex tb IIIC T(*) Db *T6/T85°C, T5/T100°C, T4/T135°C, T3/T200°C II 2(1) G Ex db [ia Ga] IIB T6 Gb or II 2(1) G Ex db [ia Ga] IIB+H2 T6 Gb and/or II 2(1) D Ex tb [ia Da] IIIC T85°C Db II 2(2) G Ex db [ib] IIB T6 Gb or II 2(2) G Ex db [ib] IIB+H2 T6 Gb and/or II 2(2) D Ex tb [ib] IIIC T85°C Db II 2(1) G Ex db ia/ib [ia Ga] IIB T6 Gb or II 2(1) G Ex db ia/ib [ia Ga] IIB+H2 T6 Gb and/or II 2(1) D Ex tb [ia Da] IIIC T85°C Db II 2(2) G Ex db ia/ib [ib] IIB T6 Gb or II 2(2) G Ex db ia/ib [ib] IIB+H2 T6 Gb and/or II 2(2) D Ex tb [ib] IIIC T85°C Db I M2 Ex db T(**) I Mb I M2(M1) Ex db [ia Ma] T(**) I Mb I M2(M2) Ex db [ib] T(**) I Mb **T150°C or T450°C Component Certificate: II 2G Ex db IIB+H2 Gb or I M2 Ex db I Mb and/or II 2D Ex tb IIIC Db IP65 or 66
Surface treatment	Polyurethane painting cycle - Blue colour RAL5014 (other colour available upon request)
Entries	Metric pitch 1.5, ANSI B1.20.1 NPT
Included accessories	Galvanized steel internal mounting plate, galvanized steel mounting brackets, AISI316 stainless steel external screws, hinges, door handle, acrylic laminate certificate label
Optional accessories	A4-80 sainless steel mounting brackets, AISI316 stainless steel certificate label, Drain/breather valve, internal anticondensate painting.

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Dimensions EJB Aluminium



EJB.. Series - Standard versions are supplied painted and complete with: mounting plate, mounting brackets, hinges, screws and handle.

TYPE	DIMENSIONS [MM]														WEIGHT [KG]	COVER ENTRIES	MOUNTING PLATE(S)
	A	B	C	D	E	F	G	H	I	L	M	N	ØP	R			
EJB-2	298	238	163	230	168	116	135	205	140	250	280	9	M6	20	10.07	12	160 X 220
EJB-3	410	236	167	340	167	115	136	330	150	250	280	9	M8	20	13.40	18	155 X 330
EJB-3A	410	236	191	340	167	115	158	330	150	250	280	9	M8	20	13.50	9	155 X 330
EJB-4	415	300	165	335	220	116	132	300	190	300	320	9	M8	20	17.50	20	210 X 325
EJB-5	477	297	221	392	209	157	182	350	185	300	320	9	M8	20	20.50	22	200 X 385
EJB-6	478	404	226	387	310	160	186	355	280	390	420	9	M8	20	33.00	28	300 X 380
EJB-8	630	361	246	530	262	173,5	204	495	225	340	370	9	M8	20	36.05	36	250 X 520
EJB-9	532	465	252	426	363	177	204	410	340	440	470	12	M10	20	40.00	34	350 X 420
EJB-10	754	366	294	630	250	217	234	580	205	330	360	12	M10	20	48.50	34	240 X 620
EJB-11	592	501	257	483	394	174	204	445	360	480	510	12	M10	20	53.30	44	380 X 470
EJB-12	801	450	300	690	335	206,5	243	640	285	425	450	14	M12	20	73.00	54	325 X 675
EJB-13	830	604	298	723	500	160	236	630	405	580	620	14	M12	20	106.00	76	463 X 683
EJB-13A	830	604	404	723	500	265	322	630	405	580	620	14	M12	20	124.00	76	463 X 683
EJB-14	970	770	478	795 745	595 545	343 378	404 439	765	565	710	770	16	M14	25	245.00	0	795x595 745x545
EJB-14*	970	770	461	795 745	595 545	343 378	367 402	765	565	710	770	16	M14	25	310.00	57	795x595 745x545

**Copper-free aluminium body and galvanized steel cover
Standard painting cycle: C4 - Colour: Blue RAL5014. For a different colour, ask to our Sales Dept.
Hinges are mounted on long left side of the enclosure. For a different configuration, ask to our Sales Dept.
For complete junction boxes, ask to our Sales Dept.

Note: For installations in either Zone 1 or volume up to 2dm^3, barrier glands are required. Please refer to EN-60079-14.

Maximum number of entries on sides A/B

TYPE	EJB-2	EJB-3 EJB-3A	EJB-4	EJB-5	EJB-6	EJB-8	EJB-9	EJB-10	EJB-11	EJB-12	EJB-13	EJB-13A	EJB-14*
M20 - ½"	9/7	14/7	14/9	27/13	24/18	35/16	27/24	57/21	32/27	61/28	48/32	81/54	111/110
M25 - ¾"	9/5	7/3	7/4	14/7	14/10	29/13	24/18	46/18	21/27	40/18	27/18	54/36	71/70
M32 - 1"	4/3	6/3	6/4	12/5	12/9	18/8	12/10	29/10	14/12	32/16	23/16	35/24	43/43
M50 - 1½"	3/2	4/2	4/3	5/2	5/4	7/3	9/9	14/5	6/5	16/7	9/6	18/10	17/17
M63 - 2"	2/1	3/1	3/2	4/2	4/3	6/2	4/4	12/4	5/4	12/5	8/5	14/9	11/11
M75 - 2½"	-	-	-	3/1	3/2	4/2	3/3	5/2	4/3	6/3	6/4	6/4	7/7
M80 - 3"	-	-	-	2/1	2/2	3/1	2/2	4/1	3/2	4/2	5/3	5/3	6/6
M90 - 3½"	-	-	-	2/1	2/2	3/1	2/2	4/1	3/2	4/2	5/3	5/3	6/5
M100 – 4"	-	-	-	2/1	2/2	2/1	2/2	4/1	3/2	4/2	4/3	5/3	5/4

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1.21 TECHNOR EX-PROOF ENCLOSURE EJB INSTRUCTIONS

TECHNOR ITALSMEA
A COMPANY OF MARECHAL ELECTRIC

Technor Italsmea Spa Via Italia, 33 20060 Gessate Milan Italy
Phone +39 - 02 - 9500151 Fax +39 - 02 – 95781462

INSTRUCTION NOTE N° TN1410 Annex A				
2	Instruction Note	MELONI	RONCORONI	03/02/20
REV.	DESCRIPTION	ISSUED	APPR.	DATE

The below text specifies the minimum information contained in "use and maintenance instructions sheet". The below instructions can be increased by further information, drawings, diagrams, etc. Graphic layout and sequence of information is not binding.

IMPORTANT – READ CAREFULLY

a) **The apparatus must be installed according to EN/IEC 60079-14 (Edit in force) and maintenance operations must be performed according to EN/IEC 60079-17 standard (Edit in force).**
The user must be aware of electric risks, chemical and physical characteristics of gas, vapours, dusts present in the plant.
To further guarantee good product quality/safety, the Quality System of TECHNOR ITALSMEA is evaluated and approved by a Notified Body which carries out Quality System surveillance.
TECHNOR ITALSMEA ensures and guarantees correct manufacturing of its products.
Buyer and/or end User are directly responsible of correct product installation and maintenance, according to local and national laws and product installation specifications.
WARNING – All modifications / changing, made by buyer / end user, without TECHNOR ITALSMEA written acceptance, certification, warranties and any other contractual agreement will be invalidate.

b) **TYPE OF PROTECTION**
Type of protection "db" "ia/ib" and/or "tb" according to the standards:
EN/IEC 60079-0 EN/IEC 60079-1 EN/IEC 60079-11 EN/IEC 60079-31

1. **Type of protection "d": the electric equipment is installed in enclosure suitable to withstand the pressure raised during the internal explosion and avoids flame transmission to the external potentially explosive atmosphere.**
2. **Type of protection "i": energy limited in order to avoid ignition of the explosive atmosphere.**
3. **Type of protection "t": avoids combustible dust penetration into enclosure and ensures surface temperature limitation for use in explosive dust atmospheres.**

c) **PLACING INTO SERVICE**
Before placing into service the certified apparatus, user must verify:
1. **- correct project data and installation.**
2. **- that the apparatus is suitable for the dangerous place classification.**
3. **- that the group of the apparatus is suitable for gases, vapours and/or dusts present in the installation site.**
4. **- that the temperature class and surface temperature of the apparatus is suitable for gases, vapours and/or dusts present in the installation site.**
5. **– correct electrical ratings.**
6. **- correct fastening of electric and mechanical connections.**
7. **- integrity and continuity of grounding, protection or equipotential conductors.**
8. **– that entries in the enclosures are equipped with suitable cable entries certified according to the type of protection of the enclosure, suitable to maintain the enclosure protection degree and suitable for ambient temperature stated on the marking tag.**
9. **– that lids are properly closed. Grease and tighten the lid screws according to the table below :**

ENCLOSURE SIZE	EJB2	EJB3	EJB3A	EJB4	EJB5	EJB6	EJB8	EJB9	EJB9	EJB10	EJB11	EJB12	EJB13	EJB13A	EJB14
TORQUE (Nm)	10	15	15	30	15	30	30	30	40	30	40	40	45	45	110
SCREW SIZE	M6	M8	M8	M10	M8	M10	M10	M10	M12	M10	M12	M12	M12	M12	M14

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10.- the absence of causes of stress (i.e. exposure to damaging for collisions, presence of corrosive agents)
11. – CABLE ENTRIES: type and size of threaded holes are marked on the enclosure or specified on the attached document(s).

d) MAINTENANCE

The maintenance is a set of operations performed in order to maintain the safety and functional features of the apparatus during its operating life. The maintenance operations must be performed according to EN/IEC 60079-17 standard (Edit in force).
The apparatus must be submitted to a detailed maintenance program studied and managed by qualified and authorized technicians and related to the type of apparatus, its operating service and environmental conditions.

1 - Do not to exceed the limit of two years between inspections.
2 - Check the WARNINGS on the marking tag before opening the enclosure.
3 - All the maintenance operations must be performed with the electrical apparatus isolated from all energy sources.
4 - Before lid reassembling, clean the flanged joint by mean of non-corrosive cleaners and spread it with grease type LOCTITE 8104 or similar.
Grease and tighten the lid screws according to the table below:

ENCLOSURE SIZE	EJB2	EJB3	EJB3A	EJB4	EJB5	EJB6	EJB8	EJB9	EJB9	EJB10	EJB11	EJB12	EJB13	EJB13A	EJB14
TORQUE (Nm)	10	15	15	30	15	30	30	30	40	30	40	40	45	45	110
SCREW SIZE	M6	M8	M8	M10	M8	M10	M10	M10	M12	M10	M12	M12	M12	M12	M14

5 - If the apparatus is subjected to vibrations, verify frequently the fastening of screws, pipe and/or cable entries and each part of the enclosure.
6 - Replace the lid fastening screws by original TECHNOR ITALSMEA spare parts only.
7 - When the warning "POTENTIAL ELECTROSTATIC CHARGING HAZARD- SEE INSTRUCTIONS" is marked on the tag:
- CLEAN THE APPARATUS BY DAMP CLOTH OR ANTISTATIC PRODUCTS ONLY
- TOUCH THE APPARATUS WITH AN INSULATED OBJECT.
8 - The following precautions must be taken when the apparatus is installed in environments with combustible dust: TO AVOID DUST ACCUMULATION ON THE SURFACES, USER MUST PROCEED WITH A REGULAR CLEANING OF THE APPARATUS.

e) REPAIRING

All repairing impacting the type of protection (except the replacement with original TECHNOR ITALSMEA spare parts) are admitted only under written authorization of TECHNOR ITALSMEA and written agreements with TECHNOR ITALSMEA must be taken concerning procedures for mandatory verifications and tests.

f) SPECIFIC CONDITION OF USE:

The dimensions of flameproof joints are different from the values specified in the tables of the EN/IEC 60079-1 standard. The flameproof joints are not intended to be repaired.

The screws used for the lid fastening must have a tensile strength higher or equal to 800 N/mm².

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g) Marking

TECHNOR ITALSMEA – 20060 GESSATE – ITALY

CE 0080 Ex — **II 2 G** or **II 2 D** or **II 2 GD** or **II 2 (1) G** or **II 2 (1) D** or **II 2 (1) GD** or **II 2 (2) G** or **II 2 (2) D** or **II 2 (2) GD** } ATEX marking only

IEC Ex INE 003 ← IECEx marking only

EJB (*)

Serial nr. or lot. Year of construction

IECEx INE 10.0015X and / or **INERIS 00 ATEX 0021X**

Ex db IIB T(*) Gb or **Ex db IIB+H2 T(*) Gb** or **Ex db [ia Ga] IIB T6 Gb** or **Ex db [ia Ga] IIB+H2 T6 Gb** or **Ex db [ib] IIB T6 Gb** or **Ex db [ib] IIB+H2 T6 Gb** and/or **Ex tb IIIC T(*)°C Db IP65/66** or **Ex tb [ia Da] IIIC T85°C Db IP65/66** or **Ex tb [ib] IIIC T85°C Db IP65/66**

Tamb (operating ambient temperature): (*)

Tcable (operating temperature of the connection cables) : (*)

Ratings: (*)

(*) = see tag on enclosure

WARNINGS:
– DO NOT OPEN IF AN EXPLOSIVE ATMOSPHERE IS PRESENT
– CABLE ENTRIES: SEE INSTRUCTIONS

Additional warning (**) :
– POTENTIAL ELECTROSTATIC CHARGING HAZARD – SEE INSTRUCTIONS

(**) : warning added when required by particular conditions – see tag on enclosure

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1.22 TECHNOR EX-PROOF ENCLOSURE SB DATA SHEET

INCREASED SAFETY

SB Series - AISI 316 L Stainless steel



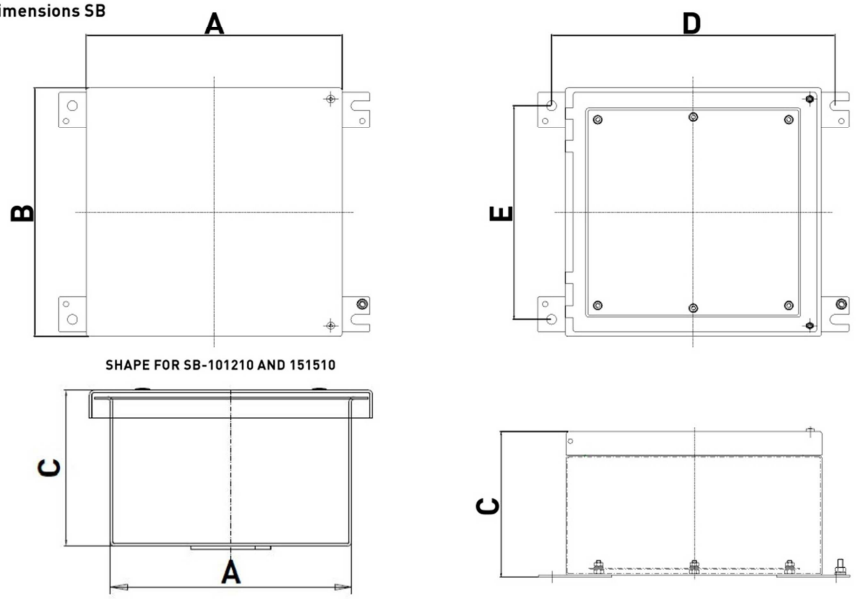
- SB../SBHT.. Series enclosures are suitable for housing Ex e/eb and Ex i terminals and can be provided with internal mounting plate to facilitate terminal board mounting.
- Maximum numbers of terminals varies according to: terminals section and current, enclosure size, operating temperature and required temperature class.
- Suitable for installation in ON/OFF-SHORE plants, in the presence of chemical agents and in any other highly corrosive environment.
- Full customization from 100x120x100 mm to 910x1140x500 mm: our technical department will support you in designing the best solution according to your needs and within the limits of the certificate.
- Full range of off-the-shelf solutions to ensure the best lead time on the market at a competitive pricing.

TECHNICAL FEATURES

Material	AISI316L stainless steel - with thickness 1,5 mm		
IP rating	IP66/IP67 - IP55 (SBHT.. Series - high temperature)		
Shock resistance	IK10		
Ambient temperature range	SB.. Series: From -50°C to +95°C SBHT.. Series: From -60°C to +150°C (-50°C for junction boxes with locking device)		
Approvals	Full conformity Certificate: IMQ 08 ATEX 028X IECEx IMQ 15.0002X UL listed: NEMA TYPE 1, 4, 4X, 12 EAC: RU C-IT.BH02.B.00593/20	Component Certificate: IMQ 16 ATEX 004U IECEx IMQ 15.0010U EAC: RU C-IT. BH02.B.00593/20	SBHT.. Series - high temperature: TUV CY 18 ATEX 0206009 IECEx EXA 18.0001
Marking	SB.. Series: II 1 G Ex ia IIC/IIB T(**) Ga or II 2 G Ex eb(*) IIC/IIB T(**) Gb or II 2(1) G Ex db eb(*) ia/ib mb [ia] IIC/IIB T(**)Gb or II 2 D Ex tb IIIC T(**) Db IP66/67 *or Ex e **Gas: T6/T5/T4 Dust: T85°C/T100°C/T135°C Db	SB.. Series - empty enclosure: II 2 G Ex e IIC Gb II 2D Ex tb IIIC Db	SBHT.. Series - high temperature: II 1 G Ex ia IIC T(***) Ga or II 2 G Ex ib IIC T(***) Gb or Ex eb IIC T(***) Gb or Ex eb ia ib IIC T(***) Gb ***Gas: T6/T5/T4/T3
Compliance	IECEx/Atex: IEC/EN : 60079-0/60079-1/60079-7/60079-11/60079-18/60079-31 UL 508A - CSA C22.2 No. 14-13		
Gaskets	Silicon rubber (suitable for use between -70°C/+200°C)		
Surface treatment	Acid treatment (pickling)		
Standard certificate label	Made by self adhesive UV and corrosion resistant polyester.		
Entries	From M20x1.5mm to M80x1.5mm		
Included accessories	Screws and accessories in stainless steel AISI 316 L		
Optional accessories	Electro-polishing treatment Side gland plate Without hinges Drain/Breather valve Lid-mounted components (SB..Series only) Traffolyte/Stainless steel certificate label Internal mounting plate Locking facility Passing through earth bolt Other material thickness starting from 1,2 mm		

140 technor.com

Dimensions SB



SB Series - AISI 316 L stainless steel

CODE*	TYPE	DIMENSIONS [mm]					CABLE ENTRIES W/O FLANGES		CABLE ENTRIES W. FLANGES		MAX N° TERMINALS [mm²]		WEIGHT [Kg]
		A	B	C	D	E	SIDE A	SIDE B	SIDE A	SIDE B	2,5	4	
B016I00000134	SB-101210**	100	120	100	150	-	7	6	-	-	7	6	1,5
B016I00000136	SB-142013	140	200	130	170	-	6	10	2	4	20	16	5
B016I00000135	SB-151510***	150	150	100	180	-	6	6	-	-	20	20	3
B016I00000137	SB-202016	200	200	160	230	160	14	14	8	8	20	20	6
B016I00000138	SB-202713	200	270	130	230	230	10	14	4	6	36	30	7
B016I00000139	SB-202716	200	270	160	230	230	14	18	8	10	36	30	7
B016I00000140	SB-272713	270	270	130	300	230	14	14	6	6	36	30	4,5
B016C10142526	SB-273513	270	350	130	300	310	14	18	6	8	72	60	9,5
B016I00000141	SB-273516	270	350	160	300	310	17	24	10	14	102	43	11
B016I00000142	SB-282816	280	280	160	310	240	20	20	12	12	76	64	10
B016I00000143	SB-282827	280	280	270	310	240	46	46	33	33	76	64	7,5
B016C12244408	SB-353516	350	350	160	380	310	27	27	16	16	102	86	5,6
B016I00000144	SB-353520	350	350	200	380	310	31	31	21	21	102	43	15
B016I00000145	SB-355016	350	500	160	380	460	27	39	16	24	160	134	13
B016I00000146	SB-355020	350	500	200	380	460	31	46	21	33	240	136	20
B016C10142527	SB-383816	380	380	160	410	340	30	30	18	18	114	96	8,1
B016I00000147	SB-383820	380	380	200	410	340	34	34	24	24	110	96	16
B016I00000148	SB-383827	380	380	270	410	340	67	67	51	51	114	96	10,1
B016I00000149	SB-384516	380	450	160	410	410	30	36	18	20	171	144	10,7
B016I00000150	SB-384520	380	450	200	410	410	34	42	24	30	140	120	20
B016I00000151	SB-385716	380	570	160	410	530	30	45	18	28	228	192	16,4
B016C12244409	SB-505016	500	500	160	530	460	39	39	24	24	240	201	14,5
B016I00000152	SB-505020	500	500	200	530	460	46	46	33	33	240	201	24
B016I00000153	SB-575716	570	570	160	600	530	45	45	28	28	372	312	16,4
B016I00000154	SB-575720	570	570	200	600	530	54	54	39	39	372	312	29
B016I00000155	SB-575730	570	570	300	600	530	116	116	95	95	372	312	21,4
B016I00000156	SB-577620	570	760	200	600	720	54	74	39	51	558	468	36
B016I00000157	SB-769520	760	950	200	790	910	98	125	74	94	990	834	32,9

*Codes refer to empty enclosures
**The enclosure is without hinges and complete with TS35x5 Omega rail welded on a removable mounting plate
***The enclosure is without hinges and complete with TS35x7,5 Omega rail welded on the back

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1.23 TECHNOR EX-PROOF ENCLOSURE SB INSTRUCTIONS

TECHNOR ITALSMEA
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TN1411 Annex A - INSTRUCTION NOTICE				
2	ISSUANCE	MELONI	RONCORONI	12.12.2019
REV.	DESCRIPTION	ISSUED	APPR.	DATE

The below text specifies the minimum information contained in "use and maintenance instructions sheet".
The below instructions can be increased by further information, drawings, diagrams, etc. Graphic layout and sequence of information is not binding.

IMPORTANT – READ CAREFULLY

a) The apparatus must be installed according to EN/IEC 60079-14 (Edit in force) and maintenance operations must be performed according to EN/IEC 60079-17 standard (Edit in force).
The user must be aware of electric risks, chemical and physical characteristics of gas, vapours, dusts present in the plant.
To further guarantee good product quality/safety, the Quality System of TECHNOR ITALSMEA is evaluated and approved by a Notified Body which carries out Quality System surveillance.
TECHNOR ITALSMEA ensures and guarantees correct manufacturing of its products.
Buyer and/or end User are directly responsible of correct product installation and maintenance, according to local and national laws and product installation specifications.
WARNING – All modifications / changing, made by buyer / end user, without TECHNOR ITALSMEA written acceptance, certification, warranties and any other contractual agreement will be invalidate.

b) TYPE OF PROTECTION
Ex ia IIC/IIB T6/T5/T4 Ga(2) or, Ex eb IIC/IIB T6/T5/T4 Gb(1) or, Ex e IIC/IIB T6/T5/T4 Gb(1)
or,
Ex db eb ia/ib mb [ia] IIC/IIB T6/T5/T4 Gb(1) or, Ex db e ia/ib mb [ia] IIC/IIB T6/T5/T4 Gb(1)
and / or,
Ex tb IIIC T85°C/T100°C/T135°C Db

(1) Others types of protection additional to Ex e/eb depending to the components actually mounted.
(2) In case of enclosures containing Ex e/Ex eb terminals and/or Ex ia Ga already certified components (with compatible marking) only.

according to the standards :

IEC 60079–0	**EN IEC 60079-0**
IEC 60079–1	**EN 60079-1**
IEC 60079–7	**EN 60079–7**
IEC 60079–11	**EN 60079-11**
IEC 60079–18	**EN 60079-18**
IEC 60079–31	**EN 60079-31**

The issuance dates of the standards listed above are stated in the certificates :
IECEx IMQ 15.0002X and IMQ 08 ATEX 028 X.

c) PLACING INTO SERVICE
Before placing into service the certified apparatus, user must verify:
1. **- correct project data and installation.**
2. **- that the apparatus is suitable for the dangerous place classification.**
3. **- that the group of the apparatus is suitable for gases, vapours and/or dusts present in the installation site.**
4. **- that the temperature class and surface temperature of the apparatus is suitable for gases, vapours and/or dusts present in the installation site.**
5. **– correct electrical ratings.**
6. **- correct fastening of electric and mechanical connections.**
7. **- integrity and continuity of grounding, protection or equipotential conductors.**
8. **– that entries in the enclosures are equipped with suitable cable entries certified according to the type of protection of the enclosure, suitable to maintain the enclosure protection degree and suitable for ambient temperature stated on the marking tag.**
9. **– that lids are properly closed.**

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10. - the absence of causes of stress (i.e. exposure to damaging for collisions, presence of corrosive agents)
11. GROUNDING TERMINALS FASTENING
    The screws and/or nuts of the grounding cables terminals must be screwed tight.
    Suggested tightening torque as per following table.

M5	M6	M8	M10	M12
8.5Nm	9Nm	20Nm	25Nm	35Nm

12. ENCLOSURE LIDS AND FLANGES FASTENING
    To ensure the IP protection degree, the lid / flanges screws/nuts must be screwed tight.
    Suggested tightening torque as per following table.

POLYESTER ENCLOSURES AQ-AR-EFE	ALUMINIUM ENCLOSURES AQ-AR-EFXE	STAINLESS STEEL ENCLOSURES SB-EFXE
2Nm	2Nm	1.5Nm

13. CABLE GLANDS AND PLUGS FASTENING
    The cable glands and plugs must be installed and tightened to the enclosure according to the manufacturer instructions.

d) MAINTENANCE

The maintenance is a set of operations performed in order to maintain the safety and functional features of the apparatus during its operating life. The maintenance operations must be performed according to EN/IEC 60079-17 standard (Edit in force).
The apparatus must be submitted to a detailed maintenance program studied and managed by qualified and authorized technicians and related to the type of apparatus, its operating service and environmental conditions.

1 - Do not to exceed the limit of two years between inspections.
2 - Check the WARNINGS on the marking tag before opening the enclosure.
3 - All the maintenance operations must be performed with the electrical apparatus isolated from all energy sources.
5 - If the apparatus is subjected to vibrations, verify frequently the fastening of screws, pipe and/or cable entries and each part of the enclosure.
6 - Replace the lid fastening screws by original TECHNOR ITALSMEA spare parts only.
7 - When the warning "POTENTIAL ELECTROSTATIC CHARGING HAZARD- SEE INSTRUCTIONS" is marked on the tag :
    - CLEAN THE APPARATUS BY DAMP CLOTH OR ANTISTATIC PRODUCTS ONLY
    - TOUCH THE APPARATUS WITH AN INSULATED OBJECT.
8 - The following precautions must be taken when the apparatus is installed in environments with combustible dust : TO AVOID DUST ACCUMULATION ON THE SURFACES, USER MUST PROCEED WITH A REGULAR CLEANING OF THE APPARATUS.
9 - When drain / venting valve ECR3 is installed on Ex tb apparatus, the following warning is applied near the device :
    "OPEN THE VALVE ONLY WHEN THE APPARATUS IS DE-ENERGIZED AND WHEN AN EXPLOSIVE DUST ATMOSPHERE IS NOT PRESENT"

e) REPAIRING

All repairing impacting the type of protection (except the replacement with original TECHNOR ITALSMEA spare parts) are admitted only under written authorization of TECHNOR ITALSMEA and written agreements with TECHNOR ITALSMEA must be taken concerning procedures for mandatory verifications and tests.

f) SPECIAL USE CONDITIONS

1. On the intrinsic safety terminals, the user must only connect devices with electric characteristics lower or the same as the suitable ones in the relative certificates.
2. Apparatus equipped with drain / venting valve ECR3 :
   The valve cannot be open when an explosive dust atmosphere is present.
   The valve can be open when an explosive gas atmosphere is present.
   When open, the valve reach the protection degree IP44.
   When the valve is left in open position when it is operating, it should be protected from light exposure.

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g) INSTALLED APPARATUS. USE CONDITIONS / WARNINGS
The user must observe the conditions of use and warnings of the installed apparatus specified in the following table.

REMARK :
the table below is an example.
In the instruction notice will be included the "CONDITIONS / WARNINGS" related to the installed apparatus only.
The table can be included / not included in the instruction notice according to the Clause 5.1 of the technical note TN1411.

APPARATUS TYPE	CERTIFICATE	CONDITIONS / WARNINGS
Digital display BA307E; BA308E; BA327E; BA328E; BA358E	IECEx ITS 11.0015X ITS 11ATEX27254X	WARNING – Potential electrostatic charging hazard – See instructions
Interface module 200250 proTIM-C 200200 pro TIM-R	IECEx CSA17.0007X SIRA 17ATEX2153X	WARNING – Potential electrostatic charging hazard – See instructions
Switch module cz-0201 for panel mounting (rail mounting)	IECEx CML 19.0053U CML 19ATEX1177U	WARNING – Potential electrostatic charging hazard – See instructions
Temp.transm. - 644R Railmount HART	IECEx FMG 12.0022X BAS 00ATEX1033X	WARNING – Potential electrostatic charging hazard – See instructions
Digital display BA307E; BA308E; BA327E; BA328E; BA358E	IECEx ITS 11.0015X ITS 11ATEX27254X	Don't expose to light
Contact type XESW	IECEx INE 11.0010U INERIS 04ATEX9013U	Don't expose to light
Temperature measuring transducer TTHx	IECEx PTB 11.0108X PTB 09ATEX2016X	During installation and maintenance FISCO parameters of installed components shall be respected
Fieldbus Barrier R4D0-FB-IA	IECEx BVS 13.0119X BVS 13ATEX E 121X	During installation and maintenance FISCO parameters of installed components shall be respected
Fieldbus Barrier Module 3GFB-FB2 / 937X-FB2-x	IECEx BAS 14.0057U BASEEFA 14ATEX0111U	During installation and maintenance FISCO parameters of installed components shall be respected
Fieldbus Barrier R4D0-FB-IA	IECEx BVS 13.0119X BVS 13ATEX E 121X	WARNING – Non-intrinsically safe circuits protected by internal IP30 cover
Fieldbus Barrier Module 3GFB-FB2 / 937X-FB2-x	IECEx BAS14.0057U BASEEFA 14ATEX0111U	1. The component shall only be powered from supplies complying with IEC 61158; 2. When a Trunk Surge Module is fitted, the power imput circuit will not withstand a 500 Vac isolation test to earth. This must be taken into account during installation; 3. When one or more Spur Surge Module is fitted, the Spur outputs will not withstand a 500 Vac isolation test to earth. This must be taken into account during installation; 4. The component is intended to meet the requirements for temperature of class T4 when used within its certified temperature range.
Switch module cz-0201 for panel mounting (rail mounting)	IECEx CML 19.0053U CML 19ATEX1177U	Provide effective clamping of the cable to ensure that pulling and twisting is not transmitted to the terminations.
Signal lamp cz-0202 for rail mounting	IECEx CML 19.0052U CML 19ATEX1176U	Power supply must be from an appropriate safety barrier
Temperature transmitter 644R Railmount HART	IECEx FMG 12.0022X BAS 00ATEX1033X	Suitable for low impact energy only (4J)
Potentiometer 8455-4	IECEx PTB 07.0001U PTB 02ATEX2156X	A fuse corresponding to the potentiometer's rated current (max. 3xIB according to IEC 60127-2-1) or motor protection switch with short-circuit and thermal instantaneous tripping (adjusted to rated current) is connected in series to each potentiometer as short-circuit protection. For very low rated potentiometer currents a fuse with the lowest current value according to the mentioned IEC-standard will be sufficient. The fuse is installed in the associated supply unit or it has to be connected in series separately. The fuse's rated voltage shall be the same as or higher than the rated voltage specified for the potentiometer. The breaking capacity of the fuse link is the same as or higher than the prospective maximum short-circuit current at place of installation (usually 1500 A)"
Potentiometer 8455-2	IECEx PTB 07.0002X PTB 02ATEX2156X	
Signal lamp CZ0212	IECEx CML 19.0054U CML 19ATEX1178U	The dimensions of the flameproof joints differ from those of EN/IEC 60079-1 Table 2 and therefore shall not be repaired. For units that use the combined types of protection flameproof and increased safety, they shall be installed into suitably dimensioned and certified enclosures that provide a minimum level of protection IP54. When the units are installed in enclosures of the type of protection increased safety in compliance with standard EN/IEC 60079-7, the clearance and creepage distances according to Section 4.3 and 4.4 and Table 2 shall be complied with. For units that use the type of protection intrinsic safety, the power supply shall be from an appropriately certified and rated safety barrier. The ratings shall comply with the parameters listed in the description. The installation of the unit shall be inside an appropriate housing in such a way that the clearance and creepage distances specified in IEC/EN 60079-11 between intrinsically safe and non-intrinsically safe circuits are be complied with. When units with type of protection intrinsic safety "Ex ia" are installed as part of equipment that has a maximum ambient temperature of +55°C, the temperature class shall be T4.
Circuit breaker CZ0511	IECEx CML 19.0057U CML 19ATEX1181U	The dimensions of the flameproof joints differ from those of EN/IEC 60079-1 Table 2 and therefore shall not be repaired. For units that use the combined types of protection flameproof and increased safety, they shall be installed into suitably dimensioned and certified enclosures that provide a minimum level of protection IP54. When the units are installed in enclosures of the type of protection increased safety in compliance with standard EN/IEC 60079-7, the clearance and creepage distances according to Section 4.3 and 4.4 and Table 2 shall be complied with.

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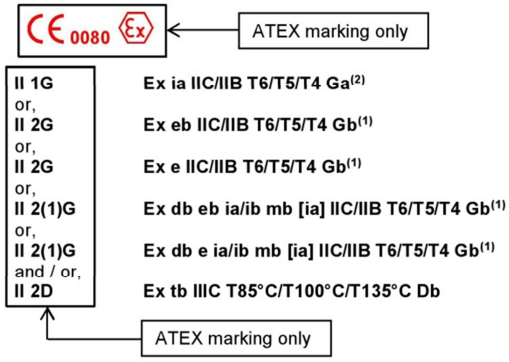
Elec. apparatus module CZ0512	IECEx CML 19.0058U CML 19ATEX1182U	The units shall be installed into suitably dimensioned and certified enclosures that provide a minimum level of protection IP54. When the units are installed in enclosures of the type of protection increased safety in compliance with standard EN/IEC 60079-7, the clearance and creepage distances according to Section 4.3 and 4.4 and Table 2 shall be complied with.
Load isolation switch module CZ0513	IECEx CML 19.0055U CML 19ATEX1179U	Each unit shall be installed into suitably dimensioned and certified enclosures that provide a minimum level of protection IP54. When the units are installed in enclosures of the type of protection increased safety in compliance with standard EN/IEC 60079-7, the clearance and creepage distances according to Section 4.3 and 4.4 and Table 2 shall be complied with.
Electrical box accessories CZ8000	IECEx CML 17.0042U CML 17ATEX3102U	The components shall be installed such that the creepage and clearance distances between the components and other live or earthed parts comply with the requirements of clauses 4.3 and 4.4 and Table 1 of EN/IEC 60079-7.
Anti-condensation heaters HEF	IECEx LCI 07.0004X LCIE 02ATEX6123X	1. The following limiting temperatures for the end seals, splices and power connections shall not be exceeded: +135°C for the S-21 and E-06 +110°C for the GHG 960 923 P... cable gland and CCON 2. The end seals, splices and power connections have the following associated minimum ambient temperatures: -55°C for the E-06, S-21 and CCON -50°C for the E-100, E-100-L, E-150, S-150, C-150, JBS-100, JBU-100 and JBM-100 -40°C for the JBS-100-L, T-100, JBM-100-L and JBU-100-L -55°C for the GHG 960 923 P... cable gland with silicone rubber seals -60°C for the Type E8XF cable gland 3. The end seals, splices and power connections have the following associated ambient temperatures: -50°C to +40°C for the C..-100 -50°C to +150°C for the C-150, S-150 and E-150 -50°C to +56°C for the T-100, JBM-100, JBS-100, JBU-100 and E-100 -40°C to +40°C for the JBM-100-L, JBS-100-L, JBU-100-L and E-100-L 4. The assembly of glands, splices and end terminations shall be carried out in accordance with the manufacturer's instructions. 5. The heating element supply circuit must include an electrical protection device in conformity with Clause 4.4 of IEC 62086-1. 6. The minimum installation temperature is -60°C. The minimum bending radii at specific temperatures for the Type QTVR units are shown in the table in the equipment description. 7. The supply to the heating unit must be terminated in a suitably certified terminal enclosure.
Temperature head transmitter JUMO dTRANS T01 Type (956555)/707015/...	IECEx ZLM 14.0011X ZELM 99 ATEX. 0018X	1. The configuration via the setup circuit is only permitted in non-hazardous locations. In this case, none of the connections may be laid into the hazardous location. 2. The head transmitter is to be installed in a way which guarantees protection IP20 according to IEC 60529 at least for all connectors as well. 3. The head transmitter is to be installed in such a way, that no electrostatic charge is possible. 4. The instruction manual has to be observed, in particular with regard to the consideration of lesser ambient temperatures during the application in accordance with category 1.

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h) MARKING



(1) Others types of protection additional to Ex e/eb depending to the components actually mounted.
(2) In case of enclosures containing Ex e/Ex eb terminals and/or Ex ia Ga already certified components (with compatible marking) only.

TECHNOR ITALSMEA
VIA ITALIA, 33 – 20060 GESSATE – ITALY
Types : AQ-*P / AQ-***AL / AR-***P / AR-***AL / AQ-***P-HT / AQ-***AL-HT / AR-***P-HT**
AR-*AL-HT / SB-*** / EFE-*** / EFXE-*** / EFE-***-HT / EFXE-***AL-HT**
Serial nr. or lot. Year of construction.
IECEx IMQ 15.0002X and / or **IMQ 08 ATEX 028 X**
Tamb (*)
Tcable (*)
Ratings : (*)
(*) See tag on enclosure.

WARNING – DO NOT OPEN WHEN ENERGIZED
(Warning not mandatory for apparatus with protection type Ex ia Ga and Ex ib Gb)

Additional warning :
WARNING – POTENTIAL ELECTROSTATIC CHARGING HAZARD – SEE INSTRUCTIONS
Added when required by special conditions – see tag on enclosure.

Additional warning :
OPEN THE VALVE ONLY WHEN THE APPARATUS IS DE-ENERGIZED AND ONLY WHEN AN EXPLOSIVE DUST ATMOSPHERE IS NOT PRESENT
Only for **Ex tb** apparatus equipped with the drain / venting device ECR3 – see tag on enclosure.
The valve can be open when an explosive GAS atmosphere is present: when open, the equipment reach the protection degree IP44. When the valve is left in open position, it should be protected from light exposure.

Other warnings depending on the component actually mounted, according to manufacturer's documentation.

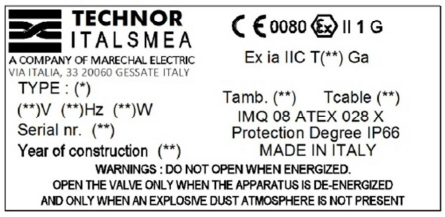
MARKING LABEL EXAMPLE (FAC – SIMILE)
Below examples of marking labels. Graphic layout not bound.

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(*) types of certified equipment - See tag on enclosure.
(**) variable data - See tag on enclosure.

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1.24 SICE CENTRAL PROCESING UNIT SICE255 MANUAL

CENTRAL PROCESSING UNIT (CPU)
- SICE SUPERVISOR SYSTEM -

REFERENCE: DE-255

SICE S.R.L.
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Rev.	Motivo /*Description*	Data/*Date*
0	FOR ISSUE	01/02/06
1	ADDITION OF ENVIRONMENTAL NOTES	05/05/11

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1. SYSTEM DESCRIPTION

The SICE supervisor system has been developed by SICE in order to control and manage its navigation aid and photovoltaic systems. It's based on a central processing unit (SICE255 board) that processes all the data incoming from the monitored digital and analog inputs and, basing on this information and the uploaded control logic, sets the digital outputs accordingly to. The CPU communicates with its peripheral modules (Digital input acquisition modules, Digital output modules, Display modules) via RS485 standard by using a communication protocol developed by SICE. The CPU can be connected also to graphical displays that allow to the users to control, simply by consulting the graphical pages for the application, all the system status (equipment status and alarms) and provide commands to each monitored sub-system. Each CPU (SICE255) is able to manage the following peripheral modules:

- Up to 8 digital input modules (SICE256)
- Up to 8 digital output modules (SICE257): MOS (N-channel) outputs
- Up to 8 digital output modules (SICE258): relay output
- Up to 8 graphic displays (SICE259)

The number of the installed peripheral modules and their type depends on the application and on the total number of I/O to monitor.

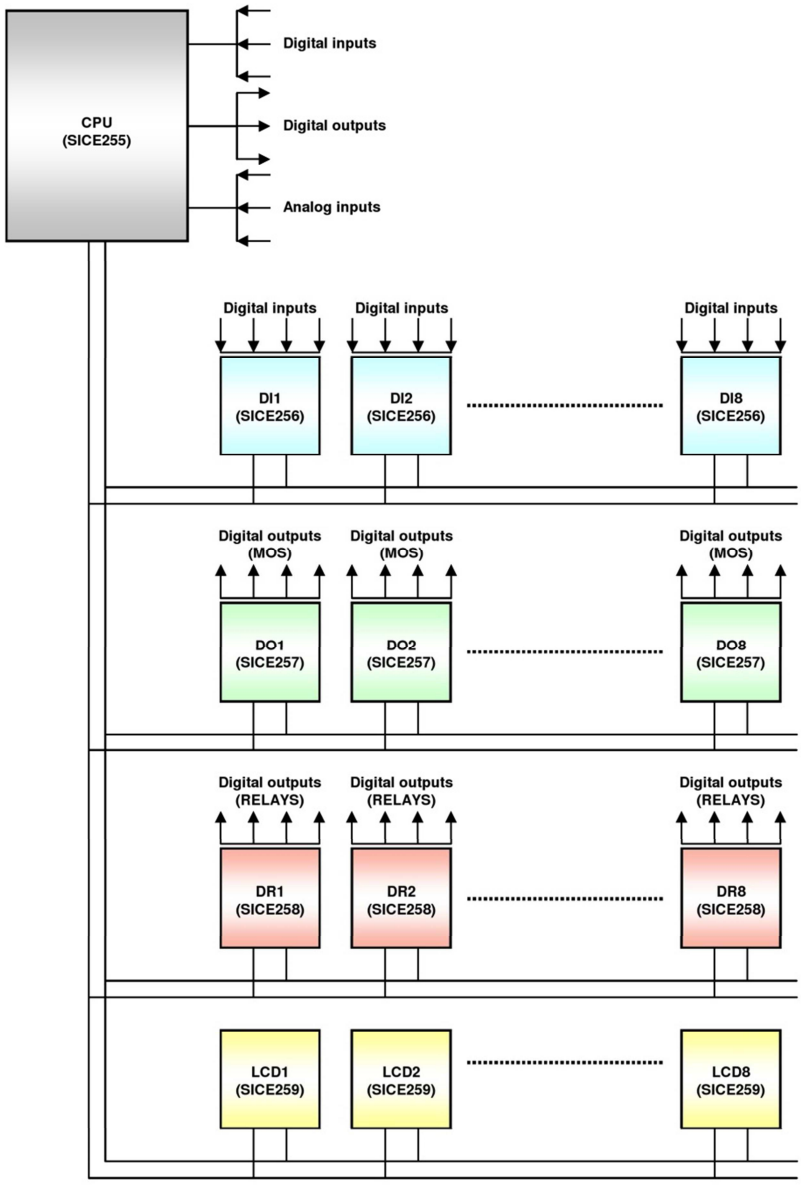
Each Digital Input module (SICE256) is able to acquire up to 15 digital inputs.

Each Digital Output module (SICE257) is able to drive up to 16 digital outputs (MOS outputs).
Each Digital Output module (SICE258) is able to drive up to 12 monostable relays and up to 2 bistable relays.

A possible failure of one peripheral module doesn't affect the correct working of the remaining ones and the CPU will inform the user about the detected problem by opening the free-from-voltage telemetering contact (normally closed). This contact can be configured also to inform the user remotely about an alarm presence in the monitored inputs. The SICE255 can be connected directly to a Liquid Cristal Display (textual display) in order to show all the monitored inputs and to provide directly commands. This latter function is very useful in all applications where the size of the supervisor system and its power consumption have to be as small/low as possible. Usually is preferable to connect to the CPU a dedicated board (SICE259) having a graphic/textual display.
When the process to control is small and it requests few digital inputs/output, the SICE255 board can be used also without peripheral modules since it has the capability of processing up to 8 DIs, up to 4 DOs and up to 4 AIs.

The supervisor system has been designed and developed to be flexible and completely configurable: in this way can be used in several applications and can carry out any process control logic the customer could request. The firmware uploaded on the main MCU (micro controller unit) can be modified and/or updated simply by interconnecting the programmer to the dedicated programming port. In this way the system can be quickly expanded / modified / updated.

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FIG. 1: SICE SUPERVISOR GENERAL BLOCK DIAGRAM

2. TECHNICAL FEATURES

The technical features of the SICE255 board are listed below:

- Circuit protection against:
  - supply voltage inversion
  - input overcurrent
  - input overvoltage
- Redundant power supply section:
  V_{supply} min = 20 Vdc
  V_{supply} max = 32 Vdc
- Digital inputs individually protected against overvoltage and overcurrent
- Digital outputs individually protected against overcurrent and complete with protection diode (suitable to avoid overvoltages that may damage the output MOS)
- Digital outputs configurable to drive monostable relays or bistable relays
- Analog inputs (0 / 4 ÷ 20 mA) individually protected against overcurrent
- EEPROMs to save status and alarms
- On-board temperature sensor
- On-board Real Time Clock complete with back-up battery
- On-board 12-bit multichannel A/D converter
- Quick connection to a local text display (usually not used when a graphical display is available)
- Self-check of board correct working
- Free-from voltage contacts available to be interfaced directly to telemetering system:
  - CPU POWERED contact (open = CPU not powered, close CPU powered)
  - SUPERVISOR SYSTEM FAILURE and/or ALARM PRESENCE (to be configured as per customer spc.)

  The two above mentioned contacts can be connected in series simply by installing a jumper as described in the next sections.
- Quick programming on board of the main MCU
- Secondary MCU that controls constantly the work of the main one
- RS485 communication interface (complete with power supply terminals)
- Configurable on board push-buttons
- Configurable supply voltage of output relay coils used with digital outputs
- Quick connections to peripheral modules through flat cables

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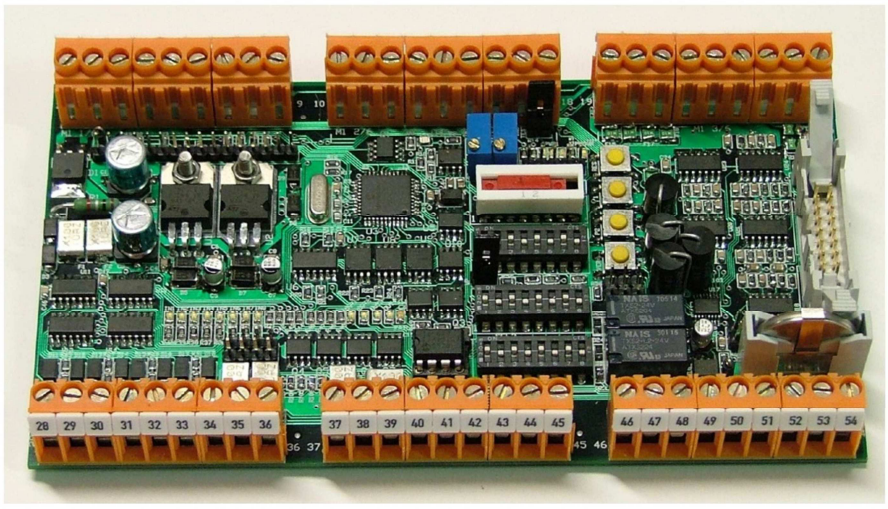


FIG. 2: TOP VIEW OF SICE255 BOARD

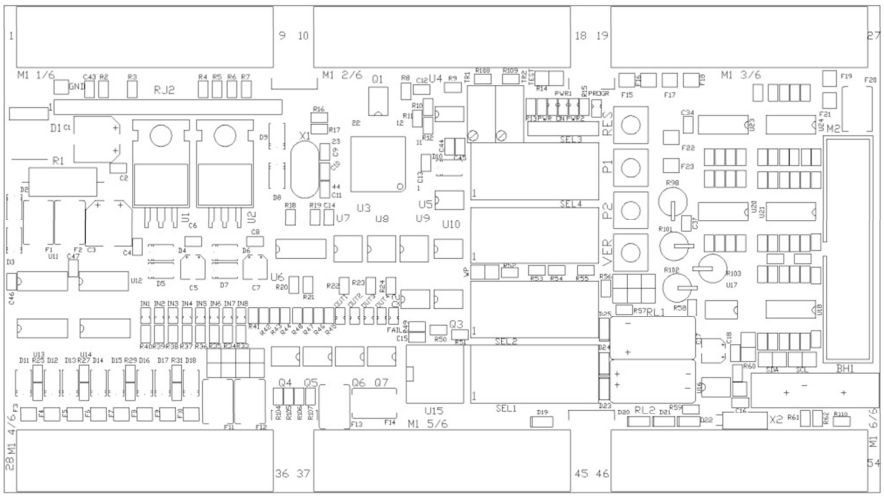


FIG. 3: SICE255 BOARD

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3. BOARD PROGRAMMING

The board can be programmed by simply interconnecting the Programmer to the programming port (figure 4) and selecting the position 2 on the selector named SEL3 as shown in the picture below (figure 5). The orange LED named PROG will be switched on to confirm that the board is waiting for the firmware transferring from the HEX file to the main MCU. After a correct programming of the main MCU, select the position 1 on the selector in order to enable the running mode of the board.

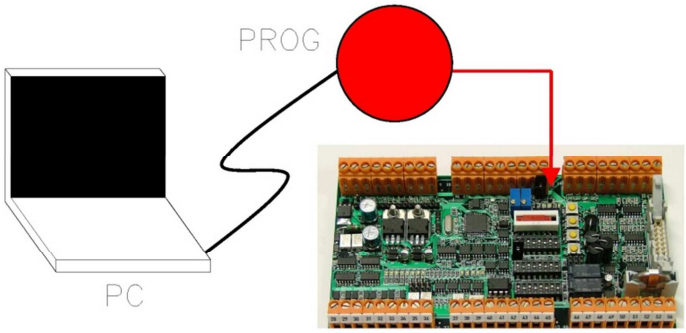


FIG. 4: PROGRAMMING PORT CONNECTION

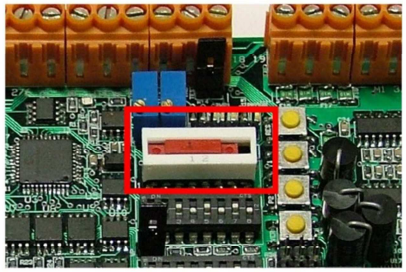


FIG. 5: PROGRAMMING SELECTOR

PROGRAMMING SELECTOR → **POS. 1 = RUNNING mode**
→ **POS. 2 = PROGRAMMING mode**

PROGRAMMING NOTES:

1. The MCU programming has to be carried out with the board powered: it is not possible to program the SICE255 board if it's not powered.
2. The MCU programming has to be carried out only by qualified technicians uploading the original firmware provided by SICE.
3. Mistakes during the programming phase of the main MCU may affect the correct working of the board

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4. BOARD TELEMETERING CONTACTS

SICE255 board features two telemetry relays which provide the telecontrol signals, in particular the following signals are available in the terminal strip:

1. **BOARD POWERED CONTACT** (monostable relay)
   CONTACT CLOSED = BOARD POWERED
   CONTACT OPEN = BOARD NOT POWERED

2. **BOARD FAILURE or GENERAL ALARM CONTACT** (bistable relay) **(*)**
   CONTACT CLOSED = SUPERVISOR SYSTEM OK AND NO ALARMS
   CONTACT OPEN = SUPERVISOR SYSTEM KO AND/OR MONITORED SYSTEM ALARM

(*) THE CONTACT POSITION AND THE EVENT THAT CHANGES OVER THE CONTACT ITSELF CAN BE CONFIGURED AS REQUESTED BY THE CUSTOMER

The two contacts can be connected directly in series just by inserting a jumper on the board (see next sections for further details).

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5. BOARD VISUAL SIGNALS

The board has the following signalling LEDs (Light Emitting Diodes):

1. From **IN1** to **IN8**: they are associated to the status of each digital input on board. If the green LED INx is switched on, it means that the relevant free-from-voltage contact connected to the digital input INx is closed. On the contrary if the LED INx is switched off it means that the relevant contact is open.

2. From **OUT1** to **OUT4**: they are associated to the status of each digital output on board. The LED working depends on the output configuration made for the local digital output. If the digital output couples OUT1 and OUT2 or OUT3 and OUT4 are configured to drive monostable relays then the relevant LED represents the status of each output (1 = coil energized, 0 = coil de-energized). If the output couple is configured to drive a bistable relay then the two relevant LEDs work together and if they are both switched on, it means that the relay is SET, on the contrary, if the LEDs are both switched off, it means that the bistable relay is RESET

3. **PWR ON**: this green LED is switched on if the board is powered, on the contrary is switched off. During the normal working of the board this LED has to be always switched on

4. **PWR ON1** and **PWR ON2**: these two green LEDs represent the output status of each voltage stabilizer that compose the input regulation section. If the LED is switched on it means that the relevant section is working correctly. In order to save electrical energy these two LEDs are not enabled to be switched on in normal working condition: to enable the reading of their status it's necessary to insert a jumper on the board (jumper named TEST)

5. **PROGR**: this orange LED, when switched on, inform the user that the board is stopped and it is waiting for the main MCU programming. In normal condition the LED has to be switched off

6. **FAIL**: this red LED is associated to the BOARD FAILURE or GENERAL ALARM CONTACT. If the contact is closed then the LED is switched off, on the contrary, if the contact is open (failure of the supervisor system and/or general alarm), the LED is switched on.

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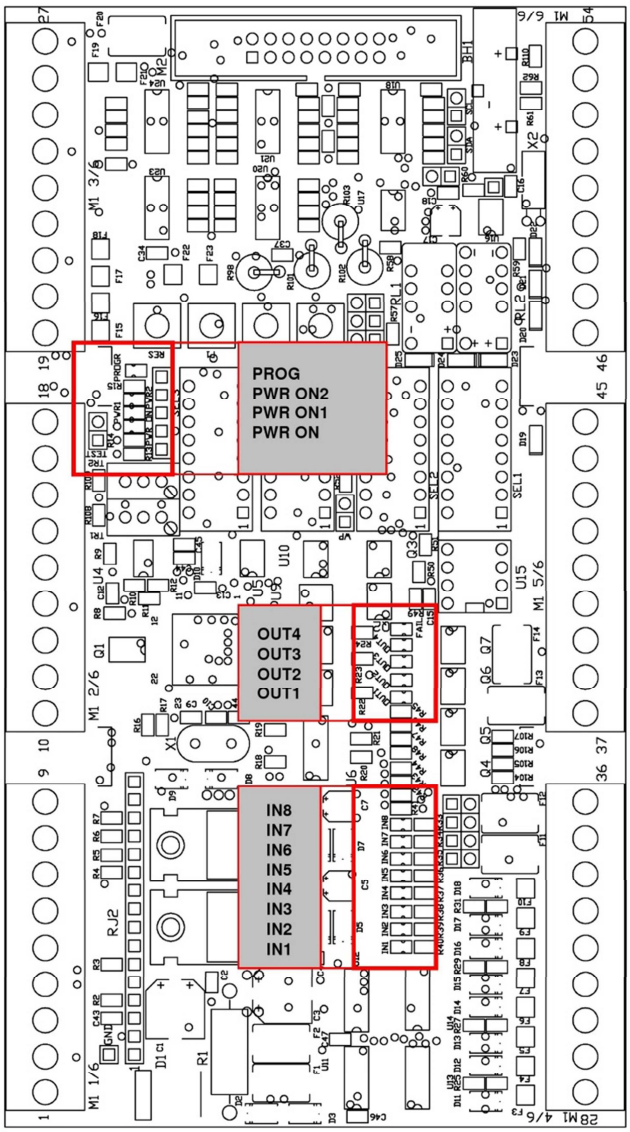


FIG. 6: LED ARRANGEMENT ON THE BOARD

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6. LOCAL PUSH-BUTTONS

The board is equipped with four (4) local push buttons. Usually the users don't have to use them, especially when one or more display panels (SICE259) are available in the same network, but they could be useful in some applications since their functions are completely software-programmable (please refer to system operating manual for the specific functions of these push-buttons).

a) RESET BUTTON

This push button, if pressed, resets the main MCU on the board causing the restart of the firmware execution.

DURING THE NORMAL WORKING OF THE SYSTEM IS NOT NECESSARY TO PRESS THIS BUTTON. PRESS IT ONLY IF THE ACTION IS STRICTLY NECESSARY.

b) VERIFY BUTTON

Usually this push button is configured to activate the LEDs associated to the digital inputs and digital outputs when the application requires low current consumptions. The switching off of the mentioned LEDs is automatically delayed after the last pressing of this button. Anyway it can be configured as per customer request.

c) P1 BUTTON

This push button is completely configurable. Usually is used to change the shown page on the local display or give commands to the local and remote digital outputs.

d) P2 BUTTON

This push button is completely configurable. Usually is used to change the shown page on the local display or give commands to the local and remote digital outputs.

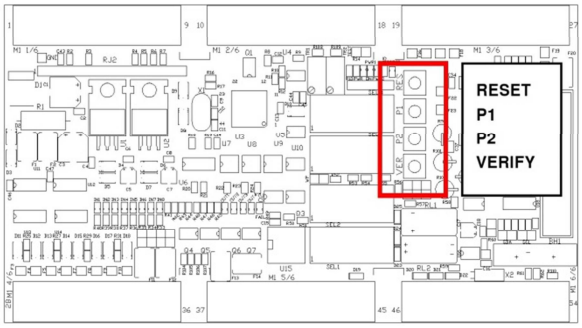


FIG. 7: LOCAL PUSH BUTTON ARRANGEMENT

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7. ELECTRICAL WIRING

Please read and follow carefully the interconnection instructions listed here below in order to avoid mistakes during the board terminals wiring that may seriously damage the board itself.

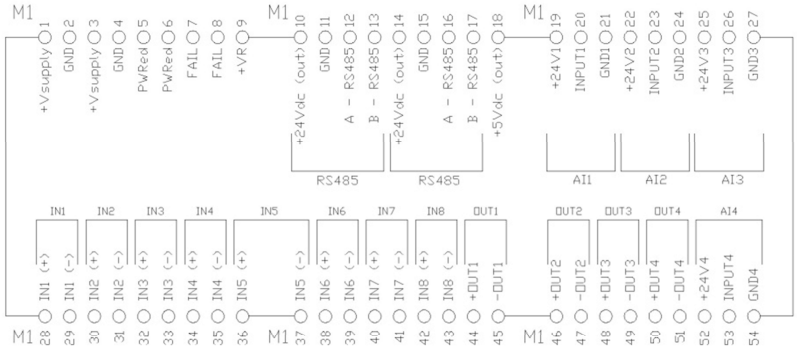


FIG. 8: TERMINAL ARRANGEMENT

7.1 POWER SUPPLY TERMINALS INTERCONNECTION

Connect the power supply positive pole to the terminal named M1 - 1 and the negative to the terminal M1 - 2. Respect the polarities specified above in order to make the power supply interconnections correctly.

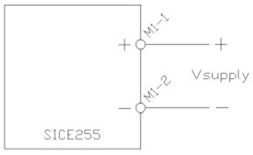


FIG. 9: POWER SUPPLY TERMINALS INTERCONNECTION

The power supply voltage value MUST be in the following range: **20 Vdc < Vsupply < 32 Vdc**

VOLTAGE VALUES APPLIED TO THE BOARD THAT ARE HIGHER THAN THE MAXIMUM ALLOWABLE VOLTAGE VALUE MAY DAMAGE PERMANENTLY THE CIRCUIT ITSELF.

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7.2 DIGITAL INPUT INTERCONNECTIONS

The free-from-voltage contacts monitored by the SICE255 have to be connected as shown in the following figure.

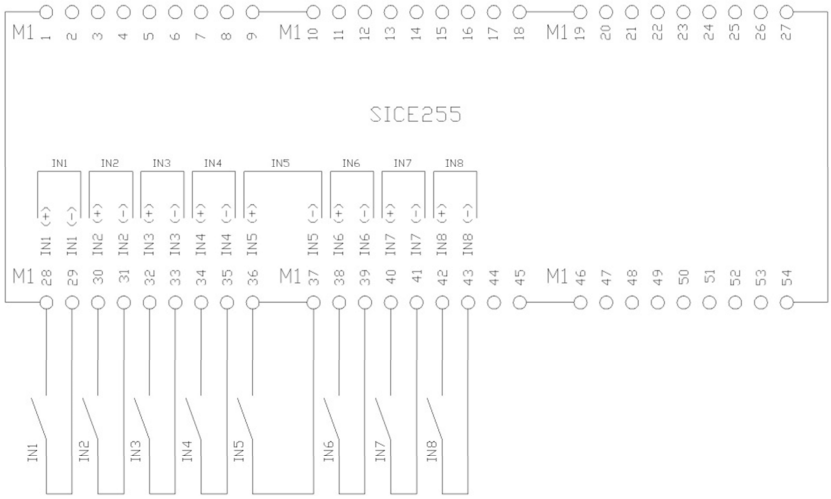


FIG. 10: DIGITAL INPUT INTERCONNECTIONS

7.3 DIGITAL OUTPUT INTERCONNECTIONS

SUPPLY VOLTAGE FOR EXTERNAL RELAY INTERCONNECTION

The terminal named M1 - 9 is used to provide the correct voltage value requested by the external relay coils driven by the digital outputs of the board. Connect to this terminal the correct coil nominal voltage of the external relays.

PLEASE TAKE INTO ACCOUNT THAT, WITHOUT THE ABOVE SPECIFIED INTERCONNECTION, THE RELAY COILS CANNOT BE ENERGIZED BY THE DIGITAL OUTPUTS OF THE BOARD.

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MONOSTABLE RELAY INTERCONNECTIONS

The digital outputs named OUT1, OUT2, OUT3 and OUT4 can be used to drive monostable relays to be connected as shown in the following figures

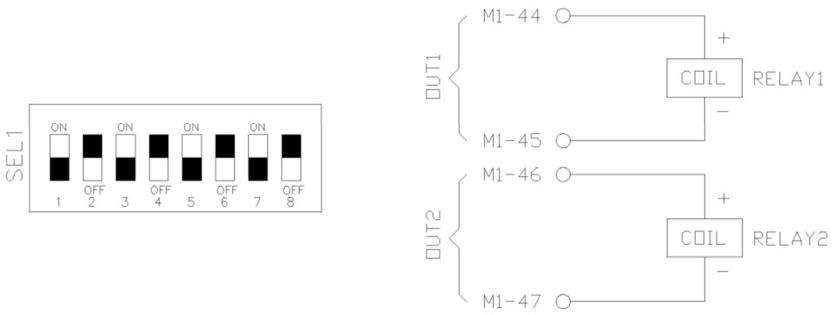


FIG. 11: OUT1 AND OUT2, MONOSTABLE RELAY INTERCONNECTION

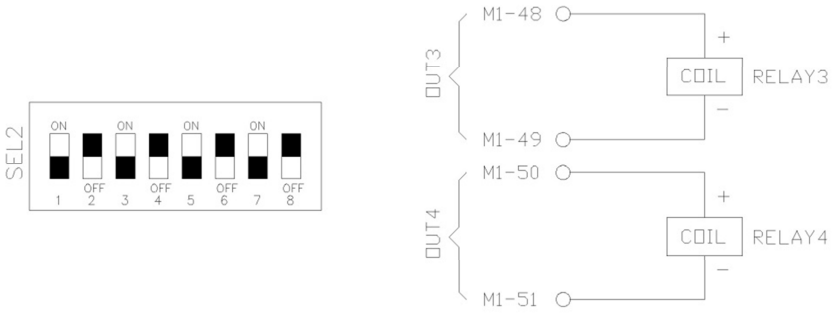


FIG. 12: OUT3 AND OUT4, MONOSTABLE RELAY INTERCONNECTION

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BISTABLE RELAY INTERCONNECTIONS

The digital output named OUT1, OUT2 and OUT3, OUT4 can be used to drive by couples bistable relays to be connected as shown in the following figure

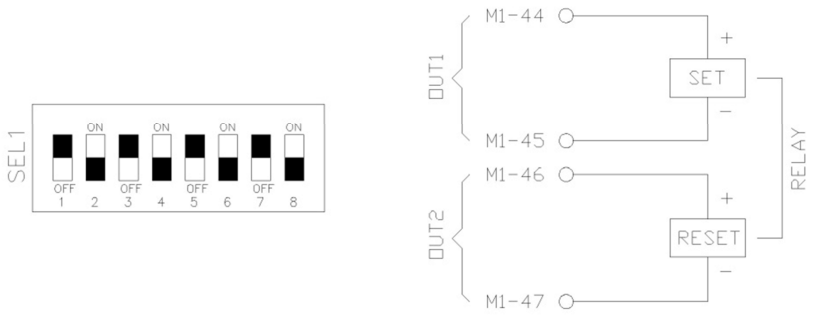


FIG. 13: OUT1 AND OUT2, BISTABLE RELAY INTERCONNECTION

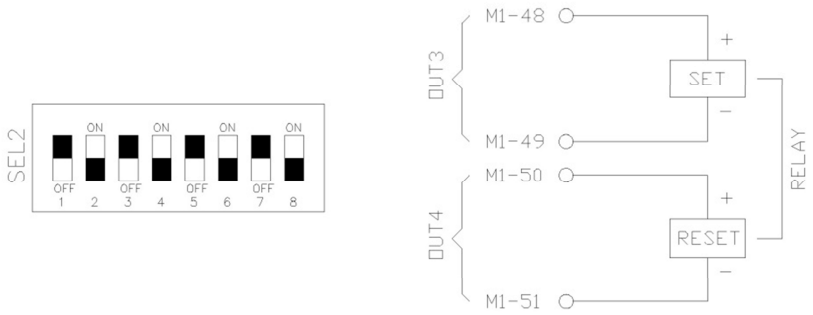


FIG. 14: OUT3 AND OUT4, BISTABLE RELAY INTERCONNECTION

The two digital output couples (OUT1-OUT2 and OUT3-OUT4) are individually configurable to drive independently either monostable relays or bistable relays.

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7.4 ANALOG INPUT INTERCONNECTIONS

4/20mA LOOP POWERED CONFIGURATION

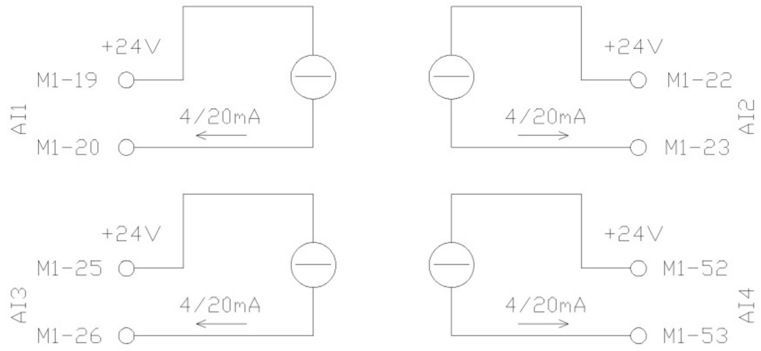


FIG. 15: LOOP POWERED CONFIGURATION

The terminals above shown are all protected against overcurrents by series multifuses.

4/20mA NOT-LOOP POWERED CONFIGURATION

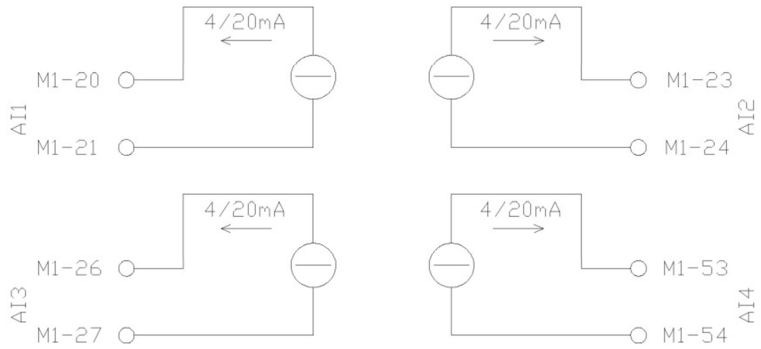


FIG. 16: NOT-LOOP POWERED CONFIGURATION

The terminals M1-20, M1-23, M1-26 and M1-53 are protected against overcurrents through multifuses connected in series on the line in the circuit.

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The analog inputs can be used individually either in loop powered configuration or in not-loop powered configuration.

7.5 RS485 INTERCONNECTIONS

The board has an RS485 interface and its terminals are the following:

RS485 (A) = M1 – 12 / M1 – 16
RS485 (B) = M1 – 13 / M1 – 17
RS485 (+24V) = M1 – 10 / M1 – 14
RS485 (GND) = M1 – 11 / M1 – 15



FOR A CORRECT WORKING OF THE CIRCUIT, THE RS485 INTERFACE TERMINALS HAVE TO BE CONNECTED CORRECTLY WITHOUT EXCHANGING THEM. CHECK AND VERIFY THE INTERCONNECTIONS BEFORE SWITCHING-ON THE BOARD.

7.6 TELEMETERING CONTACT INTERCONNECTIONS

BOARD POWERED CONTACT

As already said in the previous sections, the board makes available one free-from-voltage contact by which a telemetering system, that monitors the correct working of the supervisor system, can detect if the circuit is powered or not. The contact is available at the terminals M1-5 and M1-6 and the user can choice if using it either alone or in series with the other free-from-voltage contact (installing a jumper on the board).

Without the jumper inserted (alone configuration) the meaning of the contact is the following:

OPEN = board not powered, the supervisor system has been switched-off: the relay advices the users to verify the possible causes to this condition

CLOSED = board powered, the supervisor system is switched-on

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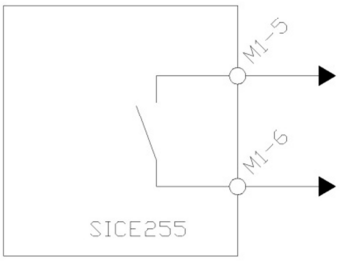


FIG. 17: BOARD POWERED CONTACT

SUPERVISOR SYSTEM ALARM & GENERAL ALARM CONTACT

This contact is completely configurable as per customer requests. Usually it is used to provide information about the supervisor status (OK, failed) and/or the alarm presence in at least one of the monitored systems. In this case its meaning is the following

OPEN = supervisor system in failure condition AND/OR general alarm presence

CLOSED = supervisor system OK AND no alarm presence

Anyway the contact can be configured to be either normally open or normally close and it can be associated to any event detected by the supervisor system.

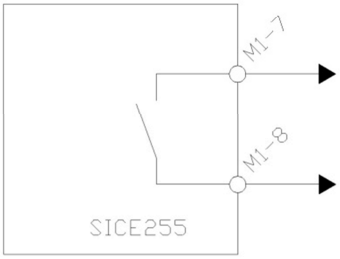


FIG. 18: SUPERVISOR SYSTEM ALARM & GENERAL ALARM CONTACT

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SERIES OF THE ABOVE DESCRIBED CONTACTS

The board includes a very useful option to combine the two contacts in series just by inserting a jumper on the board itself. In this way the external wiring results simplified.

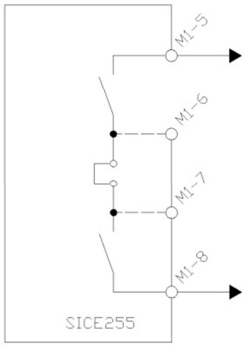


FIG. 19: SERIES OF THE TWO CONTACTS

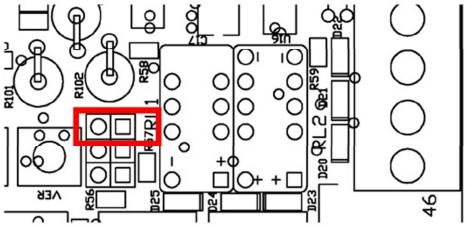


FIG. 20: JUMPER TO INSERT

In this case its meaning is the following

OPEN = supervisor system in failure condition AND/OR supervisor system not powered AND/OR general alarm presence

CLOSED = supervisor system OK AND supervisor system powered AND no alarm presence

IN THIS CONFIGURATION IT IS NOT ALLOWED TO CONNECT WIRES TO THE FREE TERMINALS M1-6 AND M1-7

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8. BACK-UP BATTERY REPLACEMENT

The back-up battery, used to provide an alternative power supply to the on-board real time clock when the circuit has been switched off, has to be replaced about every ten (10) years in order to avoid the reset of the RTC data at the switching off of the board. The back-up battery is a CR2032 3V lithium battery having the following technical specification:

Chemical System	Li / MnO2
Nominal Voltage	3 V
Rated Capacity	235 mAh
Standard Discharge Current	0,4 mA
Max. Cont. Discharge Current	3,0 mA
Average Weight	2,8 g
Temperature Range	-30 / +70 °C
Self Discharge at 23°C	< 1% / year

And having the following dimensions (according to IEC 60086)

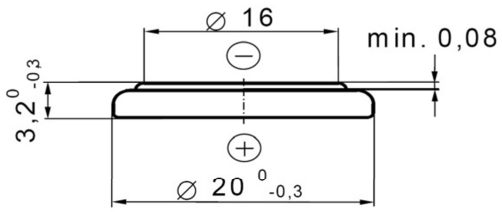


FIG. 21: BACK-UP BATTERY DIMENSIONS

PAY ATTENTION TO RESPECT THE BATTERY POLARITIES DURING ITS REPLACEMENT ON THE BOARD

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9. MECHANICAL INSTALLATION

The board is inserted by SICE in a plastic box (named MODULBOX) ready to be installed on DIN rail. The box has the frontal window made in transparent plastic that allows to the users to see the circuit and its relevant LEDs during the working.

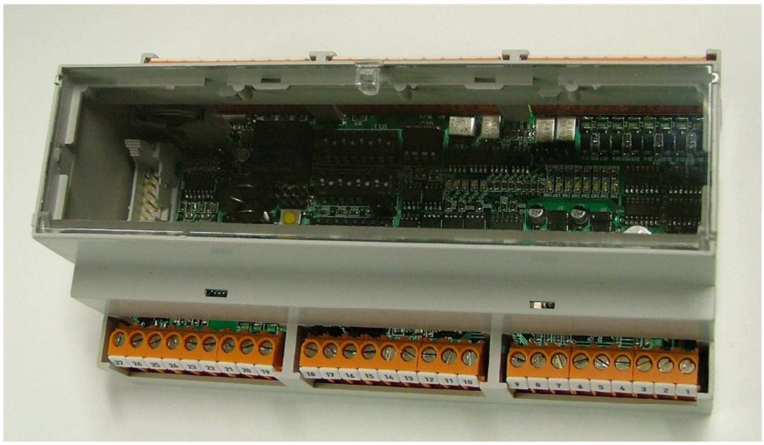


FIG. 22: SICE255 BOARD READY TO BE INSTALLED ON DIN RAIL

The box used by SICE for containing the SICE255 board has the following mechanical dimensions

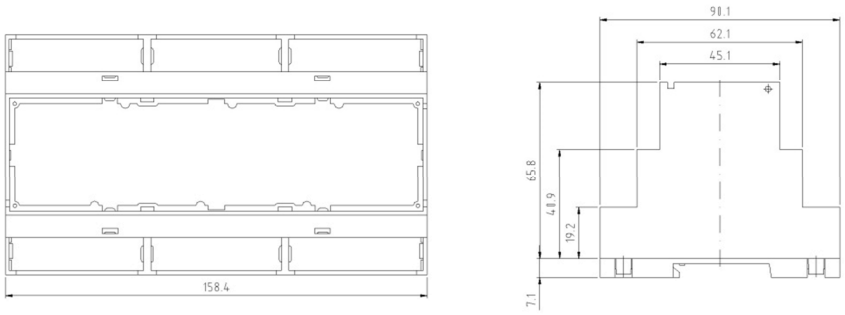


FIG. 23: BOX DIMENSIONS

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File: 1724000775-EL-DS-00004 REV.0

10. PCB COMPONENT LAYOUT

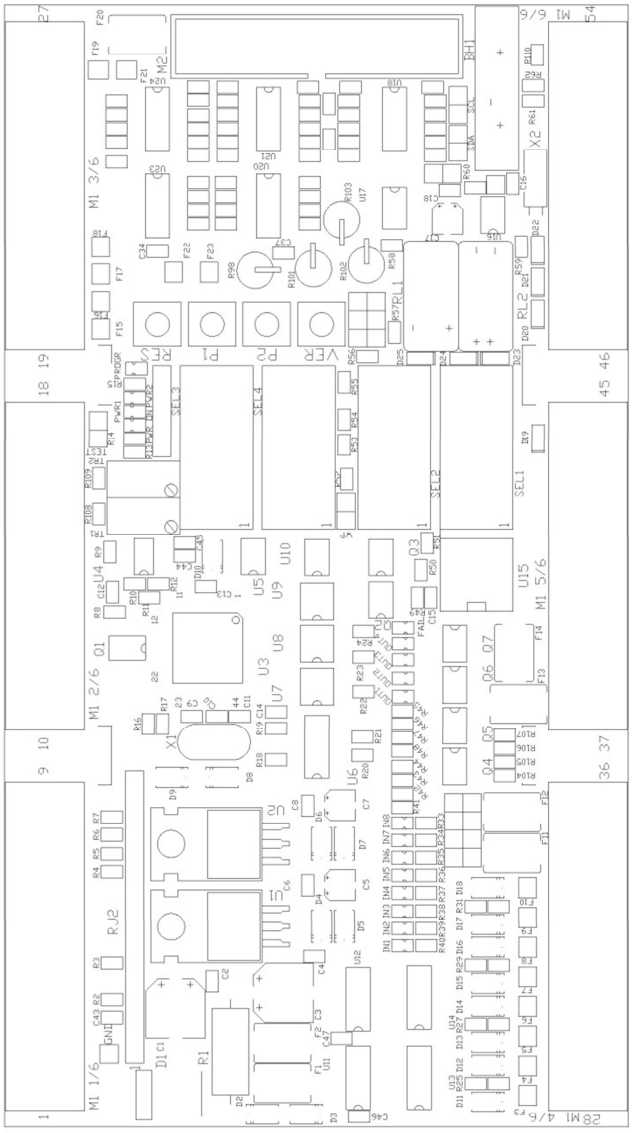


FIG. 24: PCB COMPONENT LAYOUT

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11. COMPONENT LIST

REF. ELECTRIC DIAGRAM *RIF. SCHEMA ELETTRICO*	Q.TY *Q.TÀ*	TYPE *TIPO*	*DESCRIZIONE*	DESCRIPTION
SICE255	1	C.S. 255	CIRCUITO STAMPATO	PRINTED CIRCUIT BOARD
R1	1	0.1Ω 5% 1W	RESISTORE STANDARD	STANDARD RESISTOR
R2	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R3	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R4	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R5	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R6	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R7	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R8	1	100Ω 1% 0805	RESISTORE SMD	SMD RESISTOR
R9	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R10	1	1MΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R11	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R12	1	1MΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R13	1	4.7kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R14	1	4.7kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R15	1	4.7kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R16	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R17	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R18	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R19	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R20	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R21	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R22	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R23	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R24	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R25	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R26	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R27	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R28	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR

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REF. ELECTRIC DIAGRAM *RIF. SCHEMA ELETTRICO*	Q.TY *Q.TÀ*	TYPE *TIPO*	*DESCRIZIONE*	DESCRIPTION
R29	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R30	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R31	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R32	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R33	1	4.7kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R34	1	4.7kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R35	1	4.7kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R36	1	4.7kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R37	1	4.7kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R38	1	4.7kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R39	1	4.7kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R40	1	4.7kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R41	1	100Ω 1% 0805	RESISTORE SMD	SMD RESISTOR
R42	1	100Ω 1% 0805	RESISTORE SMD	SMD RESISTOR
R43	1	100Ω 1% 0805	RESISTORE SMD	SMD RESISTOR
R44	1	100Ω 1% 0805	RESISTORE SMD	SMD RESISTOR
R45	1	4.7kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R46	1	4.7kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R47	1	4.7kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R48	1	4.7kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R49	1	4.7kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R50	1	100Ω 1% 0805	RESISTORE SMD	SMD RESISTOR
R51	1	100Ω 1% 0805	RESISTORE SMD	SMD RESISTOR
R52	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R53	1	120Ω 1% 0805	RESISTORE SMD	SMD RESISTOR
R54	1	4.7kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R55	1	4.7kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R56	1	0Ω 1% 0805	RESISTORE SMD	SMD RESISTOR
R57	1	0Ω 1% 0805	RESISTORE SMD	SMD RESISTOR
R58	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R59	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R60	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R61	1	4.7kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR

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REF. ELECTRIC DIAGRAM *RIF. SCHEMA ELETTRICO*	Q.TY *Q.TÀ*	TYPE *TIPO*	*DESCRIZIONE*	DESCRIPTION
R62	1	4.7kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R63	1	220kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R64	1	82kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R65	1	1MΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R66	1	33kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R67	1	220kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R68	1	470kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R69	1	470kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R70	1	33kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R71	1	220kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R72	1	470kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R73	1	470kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R74	1	33kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R75	1	220kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R76	1	82kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R77	1	1MΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R78	1	33kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R79	1	220kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R80	1	82kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R81	1	1MΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R82	1	33kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R83	1	220kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R84	1	33kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R91	1	220kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R92	1	33kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R95	1	220kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R96	1	33kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R98	1	200Ω 0.1% 1/2w	RESISTORE DI PRECISIONE	PRECISION RESISTOR
R99	1	33kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R100	1	220kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R101	1	200Ω 0.1% 1/2w	RESISTORE DI PRECISIONE	PRECISION RESISTOR
R102	1	200Ω 0.1% 1/2w	RESISTORE DI PRECISIONE	PRECISION RESISTOR
R103	1	200Ω 0.1% 1/2w	RESISTORE DI PRECISIONE	PRECISION RESISTOR

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REF. ELECTRIC DIAGRAM *RIF. SCHEMA ELETTRICO*	Q.TY *Q.TÀ*	TYPE *TIPO*	*DESCRIZIONE*	DESCRIPTION
R104	1	0Ω 1% 0805	RESISTORE SMD	SMD RESISTOR
R105	1	0Ω 1% 0805	RESISTORE SMD	SMD RESISTOR
R106	1	0Ω 1% 0805	RESISTORE SMD	SMD RESISTOR
R107	1	0Ω 1% 0805	RESISTORE SMD	SMD RESISTOR
R108	1	10Ω 1% 0805	RESISTORE SMD	SMD RESISTOR
R109	1	4.7kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R110	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
TR1	1	10kΩ	TRIMMER MULTIGIRO VERT.	VERTICAL TRIMMER
TR2	1	10kΩ	TRIMMER MULTIGIRO VERT.	VERTICAL TRIMMER
C1	1	47uF 50V 8x10.5	CONDENSAT. ELETTROL. SMD	SMD ELECTROL. CAPACITOR
C2	1	100nF 0805	CONDENSAT. CERAMICO SMD	SMD CERAMIC CAPACITOR
C3	1	47uF 50V 8x10.5	CONDENSAT. ELETTROL. SMD	SMD ELECTROL. CAPACITOR
C4	1	100nF 0805	CONDENSAT. CERAMICO SMD	SMD CERAMIC CAPACITOR
C5	1	10uF 16V tipo 4x5.5	CONDENSAT. ELETTROL. SMD	SMD ELECTROL. CAPACITOR
C6	1	100nF 0805	CONDENSAT. CERAMICO SMD	SMD CERAMIC CAPACITOR
C7	1	10uF 16V tipo 4x5.5	CONDENSAT. ELETTROL. SMD	SMD ELECTROL. CAPACITOR
C8	1	100nF 0805	CONDENSAT. CERAMICO SMD	SMD CERAMIC CAPACITOR
C9	1	100nF 0805	CONDENSAT. CERAMICO SMD	SMD CERAMIC CAPACITOR
C10	1	33pF 0805	CONDENSAT. CERAMICO SMD	SMD CERAMIC CAPACITOR
C11	1	33pF 0805	CONDENSAT. CERAMICO SMD	SMD CERAMIC CAPACITOR
C12	1	100nF 0805	CONDENSAT. CERAMICO SMD	SMD CERAMIC CAPACITOR
C13	1	100nF 0805	CONDENSAT. CERAMICO SMD	SMD CERAMIC CAPACITOR
C14	1	100nF 0805	CONDENSAT. CERAMICO SMD	SMD CERAMIC CAPACITOR
C15	1	100nF 0805	CONDENSAT. CERAMICO SMD	SMD CERAMIC CAPACITOR
C16	1	100nF 0805	CONDENSAT. CERAMICO SMD	SMD CERAMIC CAPACITOR
C17	1	4.7uF 35V 4x5.5	CONDENSAT. ELETTROL. SMD	SMD ELECTROL. CAPACITOR
C18	1	100nF 0805	CONDENSAT. CERAMICO SMD	SMD CERAMIC CAPACITOR
C19	1	100nF 0805	CONDENSAT. CERAMICO SMD	SMD CERAMIC CAPACITOR
C20	1	470nF 0805	CONDENSAT. CERAMICO SMD	SMD CERAMIC CAPACITOR

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REF. ELECTRIC DIAGRAM *RIF. SCHEMA ELETTRICO*	Q.TY *Q.TÀ*	TYPE *TIPO*	*DESCRIZIONE*	DESCRIPTION
C21	1	100nF 0805	CONDENSAT. CERAMICO SMD	SMD CERAMIC CAPACITOR
C22	1	470nF 0805	CONDENSAT. CERAMICO SMD	SMD CERAMIC CAPACITOR
C23	1	100nF 0805	CONDENSAT. CERAMICO SMD	SMD CERAMIC CAPACITOR
C24	1	470nF 0805	CONDENSAT. CERAMICO SMD	SMD CERAMIC CAPACITOR
C25	1	100nF 0805	CONDENSAT. CERAMICO SMD	SMD CERAMIC CAPACITOR
C26	1	470nF 0805	CONDENSAT. CERAMICO SMD	SMD CERAMIC CAPACITOR
C27	1	100nF 0805	CONDENSAT. CERAMICO SMD	SMD CERAMIC CAPACITOR
C28	1	470nF 0805	CONDENSAT. CERAMICO SMD	SMD CERAMIC CAPACITOR
C29	1	470nF 0805	CONDENSAT. CERAMICO SMD	SMD CERAMIC CAPACITOR
C30	1	100nF 0805	CONDENSAT. CERAMICO SMD	SMD CERAMIC CAPACITOR
C31	1	100nF 0805	CONDENSAT. CERAMICO SMD	SMD CERAMIC CAPACITOR
C34	1	100nF 0805	CONDENSAT. CERAMICO SMD	SMD CERAMIC CAPACITOR
C35	1	470nF 0805	CONDENSAT. CERAMICO SMD	SMD CERAMIC CAPACITOR
C36	1	100nF 0805	CONDENSAT. CERAMICO SMD	SMD CERAMIC CAPACITOR
C37	1	100nF 0805	CONDENSAT. CERAMICO SMD	SMD CERAMIC CAPACITOR
C38	1	470nF 0805	CONDENSAT. CERAMICO SMD	SMD CERAMIC CAPACITOR
C39	1	100nF 0805	CONDENSAT. CERAMICO SMD	SMD CERAMIC CAPACITOR
C40	1	470nF 0805	CONDENSAT. CERAMICO SMD	SMD CERAMIC CAPACITOR
C41	1	100nF 0805	CONDENSAT. CERAMICO SMD	SMD CERAMIC CAPACITOR
C42A	1	100nF 0805	CONDENSAT. CERAMICO SMD	SMD CERAMIC CAPACITOR
C42B	1	100nF 0805	CONDENSAT. CERAMICO SMD	SMD CERAMIC CAPACITOR
C43	1	100nF 0805	CONDENSAT. CERAMICO SMD	SMD CERAMIC CAPACITOR
C44	1	1nF 0805	CONDENSAT. CERAMICO SMD	SMD CERAMIC CAPACITOR
C45	1	47nF 0805	CONDENSAT. CERAMICO SMD	SMD CERAMIC CAPACITOR
C46	1	100nF 0805	CONDENSAT. CERAMICO SMD	SMD CERAMIC CAPACITOR
C47	1	100nF 0805	CONDENSAT. CERAMICO SMD	SMD CERAMIC CAPACITOR
D1	1	STPR1020CB	DIODO RETTIFICATORE DPAK	DPAK RECTIFIER DIODE
D2	1	SMAJ33CA	DIODO SOPPRESS. TRANSIENTI	TRANSIENT SUPPRESS. DIODE
D3	1	SMAJ33CA	DIODO SOPPRESS. TRANSIENTI	TRANSIENT SUPPRESS. DIODE
D4	1	ES1G	DIODO	DIODE
D5	1	ES1G	DIODO	DIODE

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D6	1	ES1G	DIODO	DIODE
D7	1	ES1G	DIODO	DIODE
D8	1	ES1G	DIODO	DIODE
D9	1	ES1G	DIODO	DIODE
D10	1	SMAJ8.5CA	DIODO SOPPRESS. TRANSIENTI	TRANSIENT SUPPRESS. DIODE
D11	1	SMAJ6.0CA	DIODO SOPPRESS. TRANSIENTI	TRANSIENT SUPPRESS. DIODE
D12	1	SMAJ6.0CA	DIODO SOPPRESS. TRANSIENTI	TRANSIENT SUPPRESS. DIODE
D13	1	SMAJ6.0CA	DIODO SOPPRESS. TRANSIENTI	TRANSIENT SUPPRESS. DIODE
D14	1	SMAJ6.0CA	DIODO SOPPRESS. TRANSIENTI	TRANSIENT SUPPRESS. DIODE
D15	1	SMAJ6.0CA	DIODO SOPPRESS. TRANSIENTI	TRANSIENT SUPPRESS. DIODE
D16	1	SMAJ6.0CA	DIODO SOPPRESS. TRANSIENTI	TRANSIENT SUPPRESS. DIODE
D17	1	SMAJ6.0CA	DIODO SOPPRESS. TRANSIENTI	TRANSIENT SUPPRESS. DIODE
D18	1	SMAJ6.0CA	DIODO SOPPRESS. TRANSIENTI	TRANSIENT SUPPRESS. DIODE
D19	1	BAS216	DIODO DI RICIRCOLO	RECIRCLE DIODE
D20	1	BAS216	DIODO DI RICIRCOLO	RECIRCLE DIODE
D21	1	BAS216	DIODO DI RICIRCOLO	RECIRCLE DIODE
D22	1	BAS216	DIODO DI RICIRCOLO	RECIRCLE DIODE
D23	1	BAS216	DIODO DI RICIRCOLO	RECIRCLE DIODE
D24	1	BAS216	DIODO DI RICIRCOLO	RECIRCLE DIODE
D25	1	BAS216	DIODO DI RICIRCOLO	RECIRCLE DIODE
F1	1	SMD100-2	MULTIFUSE	MULTIFUSE
F2	1	SMD100-2	MULTIFUSE	MULTIFUSE
F3	1	MICROSMD005-02	MULTIFUSE	MULTIFUSE
F4	1	MICROSMD005-02	MULTIFUSE	MULTIFUSE
F5	1	MICROSMD005-02	MULTIFUSE	MULTIFUSE
F6	1	MICROSMD005-02	MULTIFUSE	MULTIFUSE
F7	1	MICROSMD005-02	MULTIFUSE	MULTIFUSE
F8	1	MICROSMD005-02	MULTIFUSE	MULTIFUSE
F9	1	MICROSMD005-02	MULTIFUSE	MULTIFUSE

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REF. ELECTRIC DIAGRAM *RIF. SCHEMA ELETTRICO*	Q.TY *Q.TÀ*	TYPE *TIPO*	*DESCRIZIONE*	DESCRIPTION
F10	1	MICROSMD005-02	MULTIFUSE	MULTIFUSE
F11	1	SMD100-2	MULTIFUSE	MULTIFUSE
F12	1	SMD100-2	MULTIFUSE	MULTIFUSE
F13	1	SMD100-2	MULTIFUSE	MULTIFUSE
F14	1	SMD100-2	MULTIFUSE	MULTIFUSE
F15	1	MICROSMD010-02	MULTIFUSE	MULTIFUSE
F16	1	MICROSMD010-02	MULTIFUSE	MULTIFUSE
F17	1	MICROSMD010-02	MULTIFUSE	MULTIFUSE
F18	1	MICROSMD010-02	MULTIFUSE	MULTIFUSE
F19	1	MICROSMD010-02	MULTIFUSE	MULTIFUSE
F20	1	SMD100-2	MULTIFUSE	MULTIFUSE
F21	1	MICROSMD010-02	MULTIFUSE	MULTIFUSE
F22	1	MICROSMD010-02	MULTIFUSE	MULTIFUSE
F23	1	MICROSMD010-02	MULTIFUSE	MULTIFUSE
Q1	1	STS4NF100	MOSFET SMD (SO-8)	SMD MOSFET (SO-8)
Q2	1	STS4NF100	MOSFET SMD (SO-8)	SMD MOSFET (SO-8)
Q3	1	STS4NF100	MOSFET SMD (SO-8)	SMD MOSFET (SO-8)
Q4	1	STS4NF100	MOSFET SMD (SO-8)	SMD MOSFET (SO-8)
Q5	1	STS4NF100	MOSFET SMD (SO-8)	SMD MOSFET (SO-8)
Q6	1	STS4NF100	MOSFET SMD (SO-8)	SMD MOSFET (SO-8)
Q7	1	STS4NF100	MOSFET SMD (SO-8)	SMD MOSFET (SO-8)
U1	1	7805	STABILIZZATORE TO220	STABILIZER TO220
U2	1	7805	STABILIZZATORE TO220	STABILIZER TO220
U3	1	PIC18F4620-I/PT	MICROCONTROLL. MICROCHIP	MICROCHIP CONTROLLER
U4	1	MAX6301ESA+	SISTEMA SUPERVISIONE	SUPERVISION SYSTEM
U5	1	MAX483ESA+	DIGITAL/RS485 INTERFACE	DIGITAL/RS485 INTERFACE
IN ALTERNATIVA / IN ALTERNATIVE				
U5	1	MAX485ESA+	DIGITAL/RS485 INTERFACE	DIGITAL/RS485 INTERFACE

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REF. ELECTRIC DIAGRAM *RIF. SCHEMA ELETTRICO*	Q.TY *Q.TÀ*	TYPE *TIPO*	*DESCRIZIONE*	DESCRIPTION
U6	1	74HC00D SO-14	NAND GATE	NAND GATE
U7	1	24AA512-I/SM	MEMORIA EEPROM	MEMORY EEPROM
U8	1	24AA512-I/SM	MEMORIA EEPROM	MEMORY EEPROM
U9	1	24AA512-I/SM	MEMORIA EEPROM	MEMORY EEPROM
U10	1	DS75S	SONDA DI TEMPERATURA	TEMPERATURE PROBE
U11	1	74HC14D SO-14	HEX SCHMITT INVERTER	HEX SCHMITT INVERTER
U12	1	74HC05D SO-14	HEX OPEN DRAIN INVERTER	HEX OPEN DRAIN INVERTER
U13	1	74HC14D SO-14	HEX SCHMITT INVERTER	HEX SCHMITT INVERTER
U14	1	74HC05D SO-14	HEX OPEN DRAIN INVERTER	HEX OPEN DRAIN INVERTER
U15	1	PIC12F629-I/P	MICROCONTROLL. MICROCHIP	MICROCHIP CONTROLLER
U16	1	DS1307Z	REAL TIME CLOCK	REAL TIME CLOCK
U17	1	MAX1238EEE	A/D CONVERTER	A/D CONVERTER
U18	1	MCP6024-I/SL	OP AMPS	OP AMPS
U20	1	MCP6024-I/SL	OP AMPS	OP AMPS
U21	1	MCP6024-I/SL	OP AMPS	OP AMPS
U23	1	MCP6024-I/SL	OP AMPS	OP AMPS
U24	1	MCP6024-I/SL	OP AMPS	OP AMPS
LD1/IN1	1	LTST-C170KGKT	LED VERDE SMD LITEON	GREEN LED SMD LITEON
LD2/IN2	1	LTST-C170KGKT	LED VERDE SMD LITEON	GREEN LED SMD LITEON
LD3/IN3	1	LTST-C170KGKT	LED VERDE SMD LITEON	GREEN LED SMD LITEON
LD4/IN4	1	LTST-C170KGKT	LED VERDE SMD LITEON	GREEN LED SMD LITEON
LD5/IN5	1	LTST-C170KGKT	LED VERDE SMD LITEON	GREEN LED SMD LITEON
LD6/IN6	1	LTST-C170KGKT	LED VERDE SMD LITEON	GREEN LED SMD LITEON
LD7/IN7	1	LTST-C170KGKT	LED VERDE SMD LITEON	GREEN LED SMD LITEON
LD8/IN8	1	LTST-C170KGKT	LED VERDE SMD LITEON	GREEN LED SMD LITEON
LD9/OUT1	1	LTST-C170KGKT	LED VERDE SMD LITEON	GREEN LED SMD LITEON
LD10/OUT2	1	LTST-C170KGKT	LED VERDE SMD LITEON	GREEN LED SMD LITEON
LD11/OUT3	1	LTST-C170KGKT	LED VERDE SMD LITEON	GREEN LED SMD LITEON
LD12/OUT4	1	LTST-C170KGKT	LED VERDE SMD LITEON	GREEN LED SMD LITEON

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REF. ELECTRIC DIAGRAM *RIF. SCHEMA ELETTRICO*	Q.TY *Q.TÀ*	TYPE *TIPO*	*DESCRIZIONE*	DESCRIPTION
LD13/PWR-ON	1	LTST-C170KGKT	LED VERDE SMD LITEON	GREEN LED SMD LITEON
LD14/PWR1	1	LTST-C170KGKT	LED VERDE SMD LITEON	GREEN LED SMD LITEON
LD15/PWR2	1	LTST-C170KGKT	LED VERDE SMD LITEON	GREEN LED SMD LITEON
LD16/PROGR.	1	TLYU1002	LED GIALLO SMD TOSHIBA	YELLOW LED SMD TOSHIBA
LD17/FAIL.	1	TLSU1002	LED ROSSO SMD TOSHIBA	RED LED SMD TOSHIBA
PB1/RESET	1	B3S-1002	PULSANTE OMRON IN SMD	SMD OMRON BUTTON
PB2/VERIF	1	B3S-1002	PULSANTE OMRON IN SMD	SMD OMRON BUTTON
PB3/P1	1	B3S-1002	PULSANTE OMRON IN SMD	SMD OMRON BUTTON
PB4/P2	1	B3S-1002	PULSANTE OMRON IN SMD	SMD OMRON BUTTON
RL1	1	TX-S2-24VDC	RELÈ PANASONIC	PANASONIC RELAY
RL2	1	TX-S2-L2-24VDC	RELÈ PANASONIC	PANASONIC RELAY
M1	18	LP5.08/3/90	MORSETT. FISSA WEIDMULLER	WEIDMULLER TERMINAL STRIP
M2	1	636-1624ES	CONNETT. FLAT CABLE PCB 16 POLI	FLAT CABLE CONNECT. PCB 16 POLES
RJ1	1	5 VIE – P. 2,54	PIN STRIP 5 POLI	PIN STRIP 5 POLES
RJ2	1	16 VIE – P. 2,54	PIN STRIP 16 POLI	PIN STRIP 16 POLES
LCD	1	GDM1602K (optional)	DISPLAY LCD 16x2	DISPLAY LCD 16x2
X1	1	HC49-20MHz	QUARZO TRADIZIONALE	TRADITIONAL QUARTZ
X2	1	NTF-3238-E	QUARZO 32768KHz	QUARTZ 32768KHz

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REF. ELECTRIC DIAGRAM *RIF. SCHEMA ELETTRICO*	Q.TY *Q.TÀ*	TYPE *TIPO*	*DESCRIZIONE*	DESCRIPTION
SEL1	1	Dip Switch 8 vie	DIP SWITCH	DIP SWITCH
SEL2	1	Dip Switch 8 vie	DIP SWITCH	DIP SWITCH
SEL3	1	DS16C 4-2	SELETT. TETRAPOLARE 2 VIE	TETRAP. SELECTOR 2 EXITS
SEL4	1	Dip Switch 8 vie	DIP SWITCH	DIP SWITCH
BH1	1	VBH2032-1	PORTABATTERIA CR2032	BATTERY HOLDER CR2032
B1	1	CR2032	BATTERIA CR2032	BATTERY CR2032
U5	1	ZOCCOLO 08 PIN	ZOCCOLO IC	IC SOCKET
-	1	9MDH68	CONTENITORE MODULBOX	MODULBOX CONTAINER
-	1	PANN. 9M	PANNELLO TRASP. APRIBILE	TRANSP. OPENABLE PANEL

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12 – ENVIRONMENTAL NOTES

Environmental aspect explanation

SICE S.R.L., since 2003, has been adopting an Environmental management system integrated with the Quality control one, with the aim of checking and improving in the time the impacts on the environment connected to our activities and products. The system, designed in accordance with UNI EN ISO 14001 rule and, for this standard rule, certified by RINA, consists in planning the activities of designing, manufacturing and testing of our products keeping into account the environmental aspects connected to it. Such aspects regard both the activities which have a direct environmental impact (such as equipment manufacturing in SICE factory) and the ones which have an indirect environmental impact such as the matters relevant to the manufactured product (management of litter at life end, power consumptions during the working phase, etc.) and the activities relevant to the companies which carry out externally some working on the equipment (painting, wiring, etc.).

Environmental aspects

The equipment made by SICE S.R.L. is designed and manufactured in order to minimize its environmental impact in all the phases of its existence, from the manufacturing to the final disposal.

Final disposal of the equipment:
The equipment disposal has to be done respecting fully the applicable rules in the country where the equipment has to be disposed.
From the point of view of reutilization and recycling, the equipment is made mainly with materials easily reclaimable (iron, steel and aluminium) reducing, to the minimum, the presence of dangerous substances for the environment.
The equipment contains some components which, at the moment of the final disposal, have to be removed and started off on the separate treatment because they have some specific disposal problems. Such components are:

- Printed circuits with surface larger than 10 cm^2

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1.25 SICE DIGITAL INPUT MODULE SICE256 MANUAL

DIGITAL INPUT (DI)
- SICE SUPERVISOR SYSTEM -

REFERENCE: DE-256

SICE S.R.L.
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Rev.	Motivo /*Description*	Data/*Date*
0	FOR ISSUE	01/02/06
1	ADDITION OF ENVIRONMENTAL NOTES	05/05/11
2	IMPROVEMENT OF THE REPLACEMENT INSTRUCTIONS	28/07/16

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1. SYSTEM DESCRIPTION

The board named SICE256 is used together with the SICE255 (CPU board) in order to expand the digital input acquisition capability of the supervisor system made by SICE. Each SICE256 board has the possibility to detect up to 15 different contact status connected to its inputs and each SICE supervisor system can have up to eight (8) digital input modules. Each digital input module has its own network address (settable from 0 to 7) that identifies it univocally inside the same SICE network.

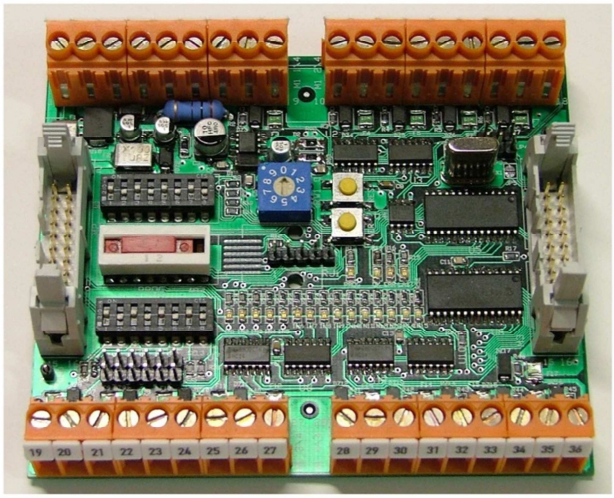


FIG. 1: SICE256 PCB

2. TECHNICAL FEATURES

- On-board microcontroller unit (MCU)
- RS485 interface (complete with power supply terminals for cascade modules)
- On board push buttons
- Self-check of on-board function correct working
- Quick programming on board of the main MCU
- Quick connections to CPU through flat cables
- Digital inputs individually protected against overvoltage and overcurrent
- Circuit protection against:
  - input overcurrent
  - input overvoltage

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3. BOARD PROGRAMMING AND CONFIGURATION

BOARD PROGRAMMING

The board can be programmed simply by interconnecting the Programmer to the programming port (figure 2) and selecting the position 2 on the selector named SEL2 as shown in the picture below (figure 3). The orange LED named PROG will be switched on to confirm that the board is waiting for the firmware transferring from the HEX file to the main MCU. After a correct programming of the main MCU, select the position 1 on the selector in order to enable the running mode of the board.

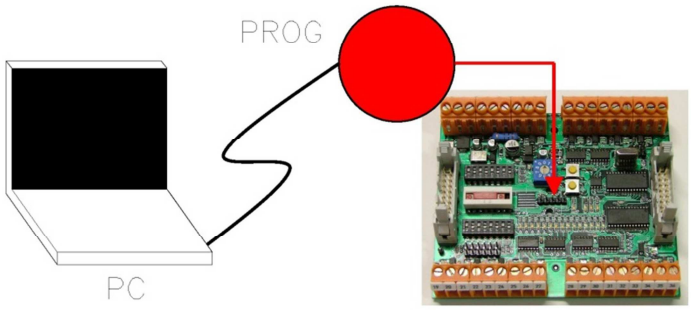


FIG. 2: PROGRAMMING PORT CONNECTION

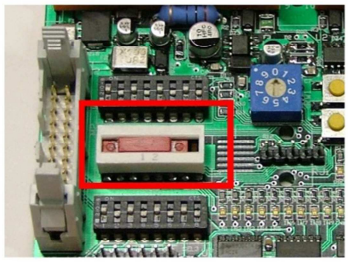


FIG. 3: PROGRAMMING SELECTOR

PROGRAMMING SELECTOR → POS. 1 = RUNNING mode
→ POS. 2 = PROGRAMMING mode

PROGRAMMING NOTES:

1. The MCU programming has to be carried out with the board powered: it is not possible to program the SICE256 board if it's not powered.
2. The MCU programming has to be carried out only by qualified technicians uploading the original firmware provided by SICE.
3. Mistakes during the programming phase of the main MCU may affect the correct working of the board

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BOARD CONFIGURATION

The board configuration has to be done accordingly to the general settings made for the whole SICE supervisor system. The configuration procedure is the following:

1. configure the switches of the DIP switch named SEL1 (**ADDRESSING MODE**)

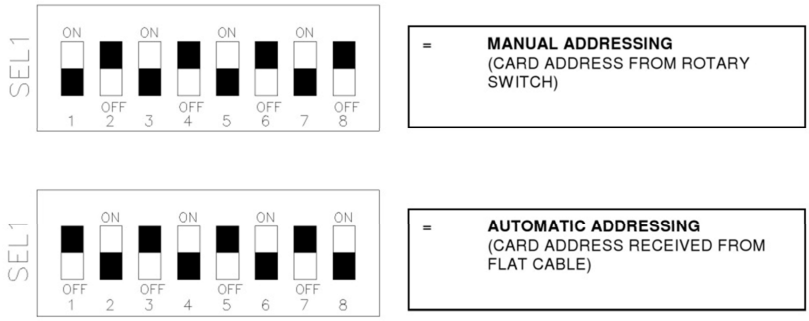


FIG. 4: ADDRESSING MODE SELECTOR

If **MANUAL ADDRESSING** mode is selected, configure the rotary switch with the correct address for the board.

2. configure the switches of the DIP switch named SEL3 (**COMMUNICATION MODE**)

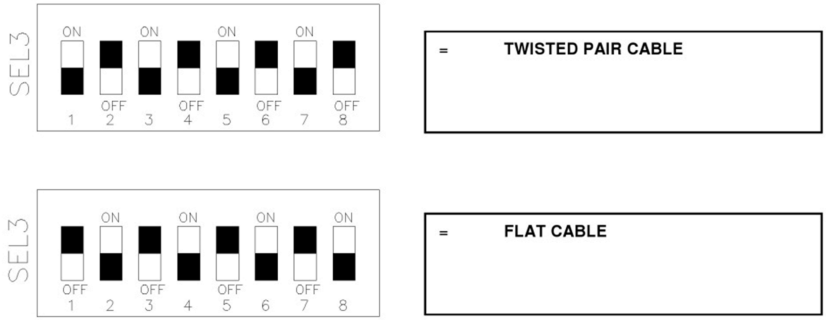


FIG. 5: COMMUNICATION MODE SELECTOR

If **FLAT CABLE** mode is selected, insert the jumpers named JP2 and JP3 on the printed circuit board.

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4. BOARD VISUAL SIGNALS

The board has the following signalling LEDs (Light Emitting Diodes):

1. From **IN1** to **IN15**: they are associated to the status of each digital input on board. If the green LED INx is switched on it means that the relevant free-from-voltage contact connected to the digital input INx is closed. On the contrary if the LED INx is switched off it means that the relevant contact is open.

2. **OK**: this green LED is switched on if the board is powered and correctly working, on the contrary is switched off. During the normal working of the board this LED has to be always switched on

3. **ERROR**: this red LED is switched on when the digital input module doesn't receive correctly the information incoming from the CPU or when the on board MCU detects a failure inside the board itself. During the normal working of the board this LED has to be always switched off

4. **LAST**: this orange LED, when switched on, inform the user that the board is the last of its kind that can be connected to the supervisor system network. If the address has been set manually through the rotary switch, it means that the address for the board, if the previous addresses are already used, is the last allowable address while, if the address is calculated automatically through flat cable, it means that the board is the last and no more boards can be connected in cascade to this one.

5. **PROGR**: this orange LED, when switched on, inform the user that the board is stopped and it is waiting for the main MCU programming. In normal condition the LED has to be switched off

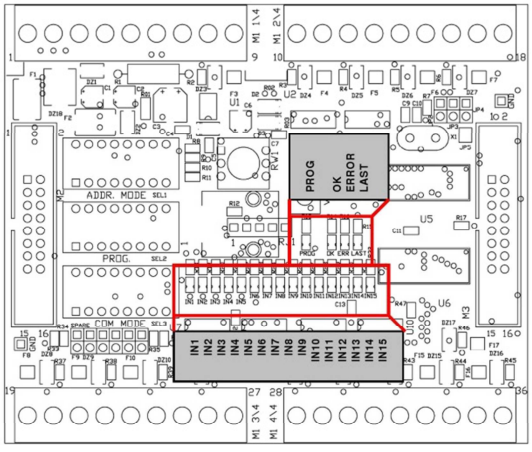


FIG. 6: LED ARRANGEMENT ON SICE256 PCB

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5. LOCAL PUSH-BUTTONS

The board is equipped with two (2) local push buttons. Usually the users don't have to use them, but they could be useful in some applications since their functions are completely software-programmable (please refer to system operating manual for the specific functions of these push-buttons).

a) RESET BUTTON

This push button, if pressed, resets the main MCU on the board causing the restart of the firmware execution.

DURING THE NORMAL WORKING OF THE SYSTEM IS NOT NECESSARY TO PRESS THIS BUTTON. PRESS IT ONLY IF THE ACTION IS STRICTLY NECESSARY.

b) VERIFY BUTTON

Usually this push button is configured to activate the LEDs associated to the digital inputs and digital outputs when the application requires low current consumptions. Anyway it can be configured as per customer request.

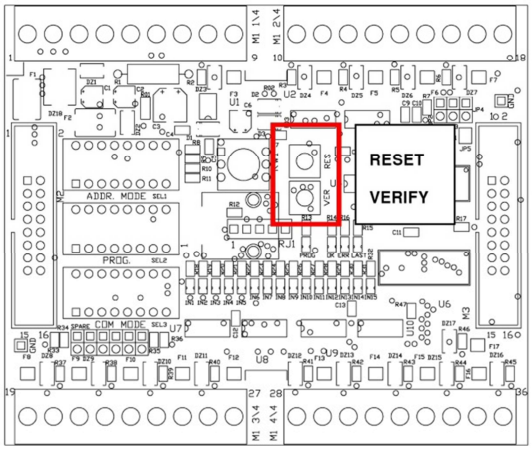


FIG. 7: LOCAL BUTTON ARRANGEMENT

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6. ELECTRICAL WIRING

Please read and follow carefully the interconnection instructions listed here below in order to avoid mistakes during the board terminal wiring that may seriously damage the circuit itself.

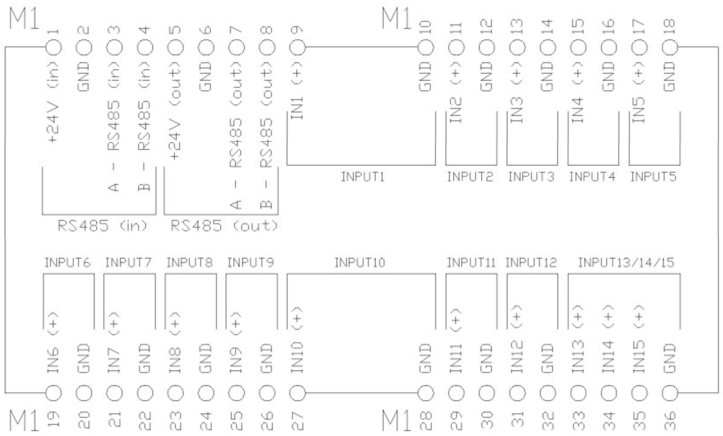


FIG. 8: TERMINAL ARRANGEMENT

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6.1 POWER SUPPLY TERMINALS INTERCONNECTION

Connect the power supply positive pole to the terminal named M1 - 1 and the negative to the terminal M1 - 2. Respect the polarities specified above in order to make the power supply interconnections correctly.

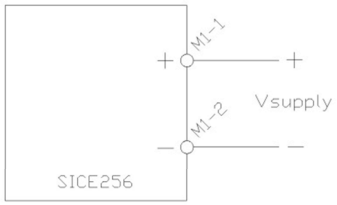


FIG. 9: POWER SUPPLY TERMINALS INTERCONNECTION

The power supply voltage value MUST be in the following range: **20 Vdc < Vsupply < 32 Vdc**

VOLTAGE VALUES APPLIED TO THE CIRCUIT THAT ARE HIGHER THAN THE ABOVE SPECIFIED MAXIMUM VOLTAGE MAY DAMAGE PERMANENTLY THE BOARD ITSELF.

6.2 DIGITAL INPUT INTERCONNECTIONS

The free-from-voltage contacts monitored by the SICE256 have to be connected as shown in the following figure.

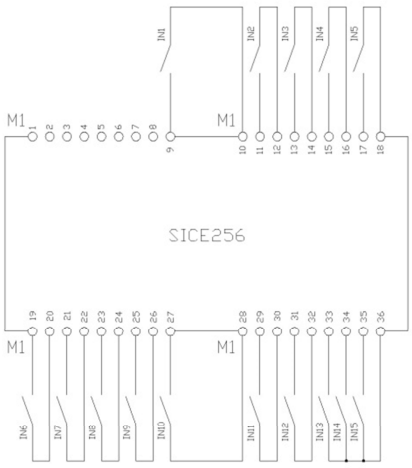


FIG. 10: DIGITAL INPUT INTERCONNECTION

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6.3 RS485 INTERCONNECTIONS

The board has an RS485 interface and its terminals are the following:

RS485 (A) = M1 – 3 / M1 – 7
RS485 (B) = M1 – 4 / M1 – 8
RS485 (+24V) = M1 – 1 / M1 – 5
RS485 (GND) = M1 – 2 / M1 – 6



FOR A CORRECT WORKING, THE RS485 INTERFACE TERMINALS HAVE TO BE CONNECTED CORRECTLY WITHOUT EXCHANGING THEM. CHECK AND VERIFY THE INTERCONNECTIONS BEFORE SWITCHING-ON THE BOARD.

7. BOARD REPLACEMENT

If the red LED named "ERR" is switched on during the working of the board and the CPU signals a failure to its peripheral modules, there is a problem in the supervisor system: if the interconnections between the peripheral module, that is signalling an error with its own ERR LED switched on, and the CPU are correct, try to RESET the circuit by pressing the RESET push button on the board. If the problem persists (LED ERR always switched on), it may be necessary to replace the SICE256 board. The replacement operation has to be carried out following the procedure listed here below:

1. Switch off the whole SICE supervisor system
2. Disconnect the wires connected to the board to replace
3. Remove the board in failure condition from the DIN rail
4. Configure the new board with the same settings of the replaced one (in particular the same setting of the address rotary switch)

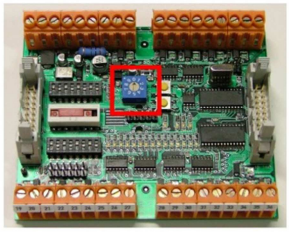


FIG. 11: ADDRESS ROTARY SWITCH

5. Install the new board on the DIN rail
6. Connect all the wires previously disconnected paying attention to carry out this step correctly
7. Switch on the whole SICE supervisor system

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8. MECHANICAL INSTALLATION

The board is inserted by SICE in a plastic box ready to be installed on DIN rail. The box has the frontal window made in transparent plastic that allows to the users to see the circuit and its relevant LEDs.

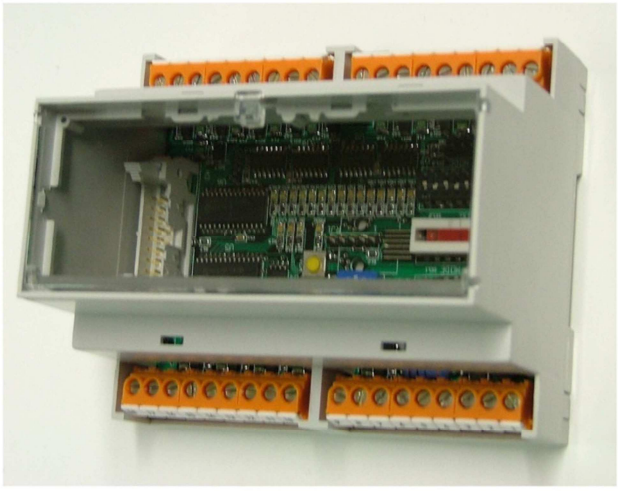


FIG. 12: SICE256 BOARD READY TO BE INSTALLED ON DIN RAIL

The box used by SICE for containing the SICE256 board has the following mechanical dimensions

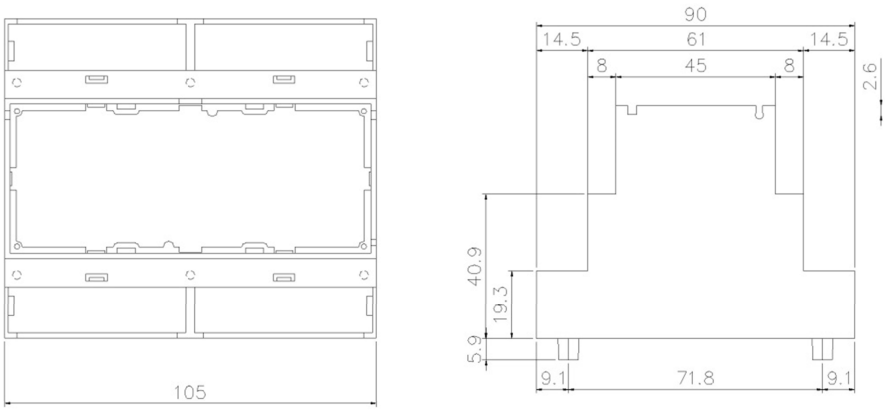


FIG. 13: BOX DIMENSIONS

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9. PCB COMPONENT LAYOUT

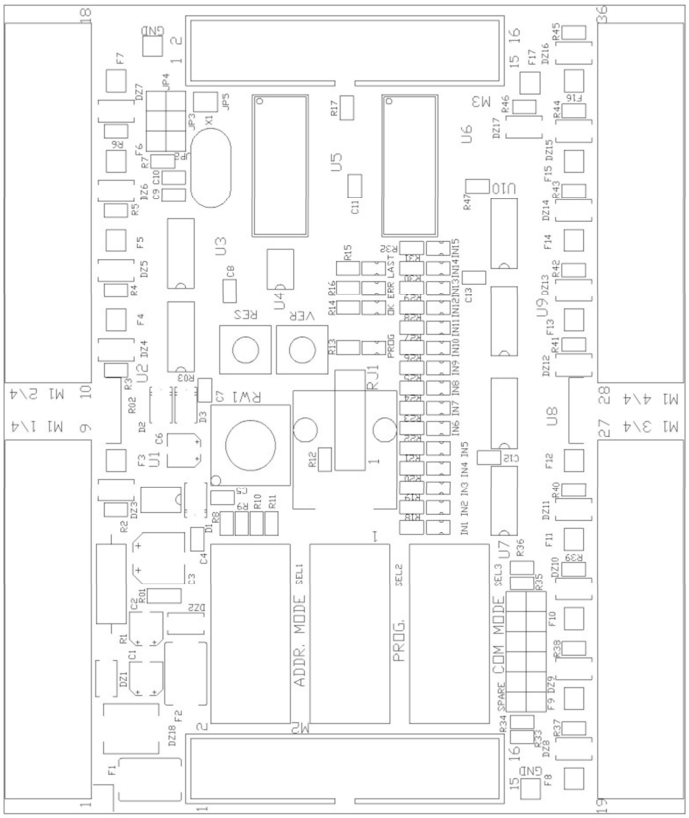


FIG. 14: PCB COMPONENT LAYOUT

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10. COMPONENT LIST

REF. ELECTRIC DIAGRAM *RIF. SCHEMA ELETTRICO*	Q.TY *Q.TÀ*	TYPE *TIPO*	*DESCRIZIONE*	DESCRIPTION
SICE256	1	C.S. 256	CIRCUITO STAMPATO	PRINTED CIRCUIT BOARD
R1	1	10Ω 5% 1W	RESISTORE STANDARD	STANDARD RESISTOR
R2	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R3	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R4	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R5	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R6	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R7	1	120Ω 1% 0805	RESISTORE SMD	SMD RESISTOR
R8	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R9	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R10	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R11	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R12	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R13	1	4.7kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R14	1	4.7kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R15	1	4.7kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R16	1	4.7kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R17	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R18	1	4.7kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R19	1	4.7kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R20	1	4.7kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R21	1	4.7kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R22	1	4.7kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R23	1	4.7kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R24	1	4.7kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R25	1	4.7kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R26	1	4.7kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R27	1	4.7kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R28	1	4.7kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR

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REF. ELECTRIC DIAGRAM *RIF. SCHEMA ELETTRICO*	Q.TY *Q.TÀ*	TYPE *TIPO*	*DESCRIZIONE*	DESCRIPTION
R29	1	4.7kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R30	1	4.7kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R31	1	4.7kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R32	1	4.7kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R33	1	4.7kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R34	1	4.7kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R35	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R36	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R37	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R38	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R39	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R40	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R41	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R42	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R43	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R44	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R45	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R46	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R47	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R01	1	0Ω 1% 1206	RESISTORE SMD	SMD RESISTOR
R02	1	0Ω 1% 1206	RESISTORE SMD	SMD RESISTOR
R03	1	0Ω 1% 1206	RESISTORE SMD	SMD RESISTOR
C1	1	1uF 50V tipo 4x5.5	CONDENS. ELETTR. SMD	SMD ELECTR. CAPACITOR
C2	1	1uF 50V tipo 4x5.5	CONDENS. ELETTR. SMD	SMD ELECTR. CAPACITOR
C3	1	10uF 50V tipo D	CONDENS. ELETTR. SMD	SMD ELECTR. CAPACITOR
C4	1	100nF 0805	CONDENS. CERAMICO SMD	SMD CERAMIC CAPACITOR
C5	1	100nF 0805	CONDENS. CERAMICO SMD	SMD CERAMIC CAPACITOR
C6	1	1uF 50V tipo 4x5.5	CONDENS. ELETTR. SMD	SMD ELECTR. CAPACITOR
C7	1	100nF 0805	CONDENS. CERAMICO SMD	SMD CERAMIC CAPACITOR
C8	1	100nF 0805	CONDENS. CERAMICO SMD	SMD CERAMIC CAPACITOR

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REF. ELECTRIC DIAGRAM *RIF. SCHEMA ELETTRICO*	Q.TY *Q.TÀ*	TYPE *TIPO*	*DESCRIZIONE*	DESCRIPTION
C9	1	33pF 0805	CONDENS. CERAMICO SMD	SMD CERAMIC CAPACITOR
C10	1	33pF 0805	CONDENS. CERAMICO SMD	SMD CERAMIC CAPACITOR
C11	1	100nF 0805	CONDENS. CERAMICO SMD	SMD CERAMIC CAPACITOR
C12	1	100nF 0805	CONDENS. CERAMICO SMD	SMD CERAMIC CAPACITOR
C13	1	100nF 0805	CONDENS. CERAMICO SMD	SMD CERAMIC CAPACITOR
D1	1	S1G	DIODO	DIODE
D2	1	S1G	DIODO	DIODE
D3	1	S1G	DIODO	DIODE
DZ1	1	SMAJ8.5CA	DIODO SOPPRESS. TRANSIENTI	TRANSIENT SUPPRESS. DIODE
DZ2	1	SMAJ6.0CA	DIODO SOPPRESS. TRANSIENTI	TRANSIENT SUPPRESS. DIODE
DZ3	1	SMAJ6.0CA	DIODO SOPPRESS. TRANSIENTI	TRANSIENT SUPPRESS. DIODE
DZ4	1	SMAJ6.0CA	DIODO SOPPRESS. TRANSIENTI	TRANSIENT SUPPRESS. DIODE
DZ5	1	SMAJ6.0CA	DIODO SOPPRESS. TRANSIENTI	TRANSIENT SUPPRESS. DIODE
DZ6	1	SMAJ6.0CA	DIODO SOPPRESS. TRANSIENTI	TRANSIENT SUPPRESS. DIODE
DZ7	1	SMAJ6.0CA	DIODO SOPPRESS. TRANSIENTI	TRANSIENT SUPPRESS. DIODE
DZ8	1	SMAJ6.0CA	DIODO SOPPRESS. TRANSIENTI	TRANSIENT SUPPRESS. DIODE
DZ9	1	SMAJ6.0CA	DIODO SOPPRESS. TRANSIENTI	TRANSIENT SUPPRESS. DIODE
DZ10	1	SMAJ6.0CA	DIODO SOPPRESS. TRANSIENTI	TRANSIENT SUPPRESS. DIODE
DZ11	1	SMAJ6.0CA	DIODO SOPPRESS. TRANSIENTI	TRANSIENT SUPPRESS. DIODE
DZ12	1	SMAJ6.0CA	DIODO SOPPRESS. TRANSIENTI	TRANSIENT SUPPRESS. DIODE
DZ13	1	SMAJ6.0CA	DIODO SOPPRESS. TRANSIENTI	TRANSIENT SUPPRESS. DIODE
DZ14	1	SMAJ6.0CA	DIODO SOPPRESS. TRANSIENTI	TRANSIENT SUPPRESS. DIODE
DZ15	1	SMAJ6.0CA	DIODO SOPPRESS. TRANSIENTI	TRANSIENT SUPPRESS. DIODE
DZ16	1	SMAJ6.0CA	DIODO SOPPRESS. TRANSIENTI	TRANSIENT SUPPRESS. DIODE
DZ17	1	SMAJ6.0CA	DIODO SOPPRESS. TRANSIENTI	TRANSIENT SUPPRESS. DIODE
DZ18	1	SMAJ33CA	DIODO SOPPRESS. TRANSIENTI	TRANSIENT SUPPRESS. DIODE

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REF. ELECTRIC DIAGRAM *RIF. SCHEMA ELETTRICO*	Q.TY *Q.TÀ*	TYPE *TIPO*	*DESCRIZIONE*	DESCRIPTION
F1	1	SMD100-2	MULTIFUSE	MULTIFUSE
F2	1	SMD100-2	MULTIFUSE	MULTIFUSE
F3	1	MICROSMD005-02	MULTIFUSE	MULTIFUSE
F4	1	MICROSMD005-02	MULTIFUSE	MULTIFUSE
F5	1	MICROSMD005-02	MULTIFUSE	MULTIFUSE
F6	1	MICROSMD005-02	MULTIFUSE	MULTIFUSE
F7	1	MICROSMD005-02	MULTIFUSE	MULTIFUSE
F8	1	MICROSMD005-02	MULTIFUSE	MULTIFUSE
F9	1	MICROSMD005-02	MULTIFUSE	MULTIFUSE
F10	1	MICROSMD005-02	MULTIFUSE	MULTIFUSE
F11	1	MICROSMD005-02	MULTIFUSE	MULTIFUSE
F12	1	MICROSMD005-02	MULTIFUSE	MULTIFUSE
F13	1	MICROSMD005-02	MULTIFUSE	MULTIFUSE
F14	1	MICROSMD005-02	MULTIFUSE	MULTIFUSE
F15	1	MICROSMD005-02	MULTIFUSE	MULTIFUSE
F16	1	MICROSMD005-02	MULTIFUSE	MULTIFUSE
F17	1	MICROSMD005-02	MULTIFUSE	MULTIFUSE
U1	1	78L05 SO-8	STABILIZZATORE SO-8	SO-8 STABILIZER
U2	1	74HC14D SO-14	HEX SCHMITT INVERTER	HEX SCHMITT INVERTER
U3	1	74HC05D SO-14	HEX OPEN DRAIN INVERTER	HEX OPEN DRAIN INVERTER
U4	1	MAX483ESA+	DIGITAL/RS485 INTERFACE	DIGITAL/RS485 INTERFACE
IN ALTERNATIVA / IN ALTERNATIVE				
U4	1	MAX485ESA+	DIGITAL/RS485 INTERFACE	DIGITAL/RS485 INTERFACE
U5	1	PIC16F873A-I/SO	MCU MICROCHIP SOIC 300 MIL	MCU MICROCHIP SOIC 300 MIL
U6	1	MCP23017-E/SO	I/O EXPANDER SOIC 300 MIL	I/O EXPANDER SOIC 300 MIL
U7	1	74HC14D SO-14	HEX SCHMITT INVERTER	HEX SCHMITT INVERTER
U8	1	74HC05D SO-14	HEX OPEN DRAIN INVERTER	HEX OPEN DRAIN INVERTER
U9	1	74HC14D SO-14	HEX SCHMITT INVERTER	HEX SCHMITT INVERTER
U10	1	74HC05D SO-14	HEX OPEN DRAIN INVERTER	HEX OPEN DRAIN INVERTER

SICE SRL PESARO

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REF. ELECTRIC DIAGRAM *RIF. SCHEMA ELETTRICO*	Q.TY *Q.TÀ*	TYPE *TIPO*	*DESCRIZIONE*	DESCRIPTION
LD1/IN1	1	LTST-C170KGKT	LED VERDE SMD LITEON	GREEN LED SMD LITEON
LD2/IN2	1	LTST-C170KGKT	LED VERDE SMD LITEON	GREEN LED SMD LITEON
LD3/IN3	1	LTST-C170KGKT	LED VERDE SMD LITEON	GREEN LED SMD LITEON
LD4/IN4	1	LTST-C170KGKT	LED VERDE SMD LITEON	GREEN LED SMD LITEON
LD5/IN5	1	LTST-C170KGKT	LED VERDE SMD LITEON	GREEN LED SMD LITEON
LD6/IN6	1	LTST-C170KGKT	LED VERDE SMD LITEON	GREEN LED SMD LITEON
LD7/IN7	1	LTST-C170KGKT	LED VERDE SMD LITEON	GREEN LED SMD LITEON
LD8/IN8	1	LTST-C170KGKT	LED VERDE SMD LITEON	GREEN LED SMD LITEON
LD9/IN9	1	LTST-C170KGKT	LED VERDE SMD LITEON	GREEN LED SMD LITEON
LD10/IN10	1	LTST-C170KGKT	LED VERDE SMD LITEON	GREEN LED SMD LITEON
LD11/IN11	1	LTST-C170KGKT	LED VERDE SMD LITEON	GREEN LED SMD LITEON
LD12/IN12	1	LTST-C170KGKT	LED VERDE SMD LITEON	GREEN LED SMD LITEON
LD13/IN13	1	LTST-C170KGKT	LED VERDE SMD LITEON	GREEN LED SMD LITEON
LD14/IN14	1	LTST-C170KGKT	LED VERDE SMD LITEON	GREEN LED SMD LITEON
LD15/IN15	1	LTST-C170KGKT	LED VERDE SMD LITEON	GREEN LED SMD LITEON
LD16/OK	1	LTST-C170KGKT	LED VERDE SMD LITEON	GREEN LED SMD LITEON
LD17/ERR	1	TLSU1002	LED ROSSO SMD TOSHIBA	RED LED SMD TOSHIBA
LD18/LAST	1	TLYU1002	LED GIALLO SMD TOSHIBA	YELLOW LED SMD TOSHIBA
LD19/PROG	1	TLYU1002	LED GIALLO SMD TOSHIBA	YELLOW LED SMD TOSHIBA
PB1/RES	1	B3S-1002	PULSANTE OMRON IN SMD	SMD OMRON BUTTON
PB2/VER	1	B3S-1002	PULSANTE OMRON IN SMD	SMD OMRON BUTTON
M1	12	LP5.08/3/90	MORSETT. FISSA WEIDMULLER	WEIDMULLER TERMINAL STRIP
M2	1	636-1624ES	CONNETT. FLAT CABLE 16 POLI	FLAT CABLE CONNEC. 16 POLE
M3	1	636-1624ES	CONNETT. FLAT CABLE 16 POLI	FLAT CABLE CONNEC. 16 POLE

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REF. ELECTRIC DIAGRAM *RIF. SCHEMA ELETTRICO*	Q.TY *Q.TÀ*	TYPE *TIPO*	*DESCRIZIONE*	DESCRIPTION
RJ1	1	Pin-Strip 5 vie	PIN STRIP P. 2,54	PIN STRIP P. 2,54
X1	1	HC-49-4MHz	QUARZO	QUARTZ
SEL1	1	Dip Switch 8 vie	DIP - SWITCH	DIP - SWITCH
SEL2	1	DS16C 4-2	SELETT. TETRAPOLARE 2 VIE	TETRAP. SELECTOR 2 EXITS
SEL3	1	Dip Switch 8 vie	DIP - SWITCH	DIP - SWITCH
RW1	1	ERD 110	ROTARY SWITCH 10 POSIZ.	ROTARY SWITCH
JP2	1	Pin-Strip 2 vie	PIN STRIP P. 2,54	PIN STRIP P. 2,54
JP3	1	Pin-Strip 2 vie	PIN STRIP P. 2,54	PIN STRIP P. 2,54
JP4	1	Pin-Strip 2 vie	PIN STRIP P. 2,54	PIN STRIP P. 2,54
JP5	1	Pin-Strip 2 vie	PIN STRIP P. 2,54	PIN STRIP P. 2,54
JP SPARE	6	Pin-Strip 6 vie	PIN STRIP P. 2,54	PIN STRIP P. 2,54
GND	2	TEST – POINT	TEST - POINT	TEST – POINT
-	1	6MDH 68	CONTENITORE MODULBOX	MODULBOX CONTAINER
-	1	PANN. 6M	PANNELLO TRASP. APRIBILE	TRANSP. OPENABLE PANEL

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11. ENVIRONMENTAL NOTES

Environmental aspect explanation

SICE S.R.L., since 2003, has been adopting an Environmental management system integrated with the Quality control one, with the aim of checking and improving in the time the impacts on the environment connected to our activities and products. The system, designed in accordance with UNI EN ISO 14001 rule and, for this standard rule, certified by RINA, consists in planning the activities of designing, manufacturing and testing of our products keeping into account the environmental aspects connected to it. Such aspects regard both the activities which have a direct environmental impact (such as equipment manufacturing in SICE factory) and the ones which have an indirect environmental impact such as the matters relevant to the manufactured product (management of litter at life end, power consumptions during the working phase, etc.) and the activities relevant to the companies which carry out externally some working on the equipment (painting, wiring, etc.).

Environmental aspects

The equipment made by SICE S.R.L. is designed and manufactured in order to minimize its environmental impact in all the phases of its existence, from the manufacturing to the final disposal.

Final disposal of the equipment:
The equipment disposal has to be done respecting fully the applicable rules in the country where the equipment has to be disposed.
From the point of view of reutilization and recycling, the equipment is made mainly with materials easily reclaimable (iron, steel and aluminium) reducing, to the minimum, the presence of dangerous substances for the environment.
The equipment contains some components which, at the moment of the final disposal, have to be removed and started off on the separate treatment because they have some specific disposal problems. Such components are:

- Printed circuits with surface larger than 10 cm^2

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1.26 SICE FRONTAL DISPLAY PANEL SICE259 MANUAL

DISPLAY PANEL
- SICE SUPERVISOR SYSTEM -

REFERENCE: DE-259

sice S.R.L.

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Web : http://www.sicesrl.com

Rev.	Motivo /*Description*	Data/*Date*
0	FOR ISSUE	01/02/06
1	ADDITION OF ENVIRONMENTAL NOTES	05/05/11
2	IMPROVEMENT OF THE REPLACEMENT INSTRUCTIONS	28/07/16

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1. SYSTEM DESCRIPTION

SICE259 circuit is designed to represent the interface between the SICE supervisor system and the users. From this board is possible to monitor and control continuously the whole system, by checking the status of the connected pieces of equipment and by giving them commands.
The circuit is equipped with the following acoustic / visual equipment:

- Graphical/Textual display having a maximum resolution of 240x128 with backlight and contrast adjustment
- Frontal signalling LEDs. The circuit includes on board twenty (20) LEDs but it can also be quickly connected up to two (2) SICE261 boards through flat cables.
- Acoustic alarm system, in order to signal alarm presence acoustically to the users.

The application pages on the graphical display are developed by SICE accordingly to the customer preferences and they can be always modified/updated when necessary.

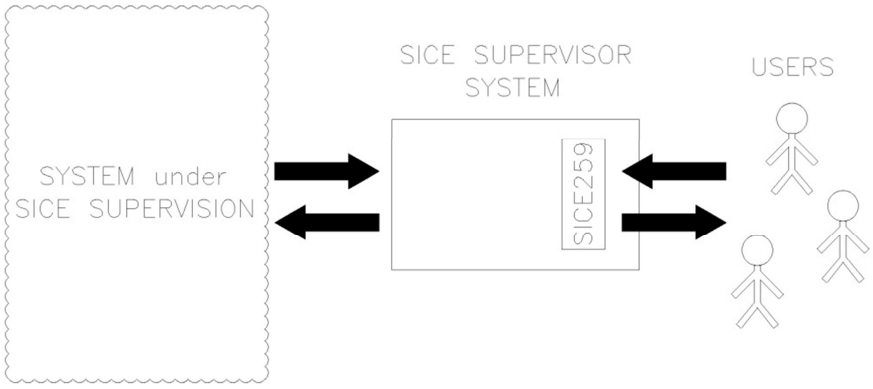


FIG. 1: SYSTEM WORKING DESCRIPTION

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2. TECHNICAL FEATURES

- On-board microcontroller unit (MCU)
- RS485 interface (complete with power supply terminals for cascade modules)
- Configurable on board push-buttons
- Quick connections for external push buttons
- Self-check of on-board function correct working
- Quick on board programming of the main MCU
- Circuit protection against:
  - Supply voltage inversion
  - input overcurrent
  - input overvoltage
- On board EEPROMs
- Up to eight (8) SICE259 boards can be connected to the same SICE network
- Quick connections either to 240x64 LCD display or to 240x128 LCD display
- Quick connection to loudspeaker
- Quick connections to SICE261 boards



FIG. 2: TYPICAL DISPLAY PANEL CONFIGURATION (REAR VIEW)

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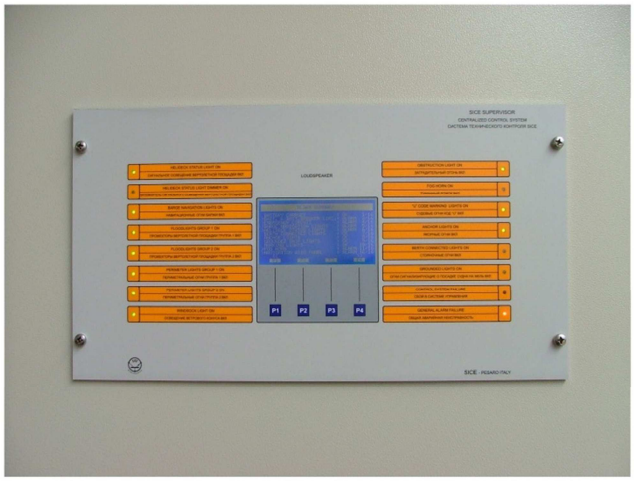


FIG. 3: DISPLAY PANEL EXAMPLE (FRONTAL VIEW)

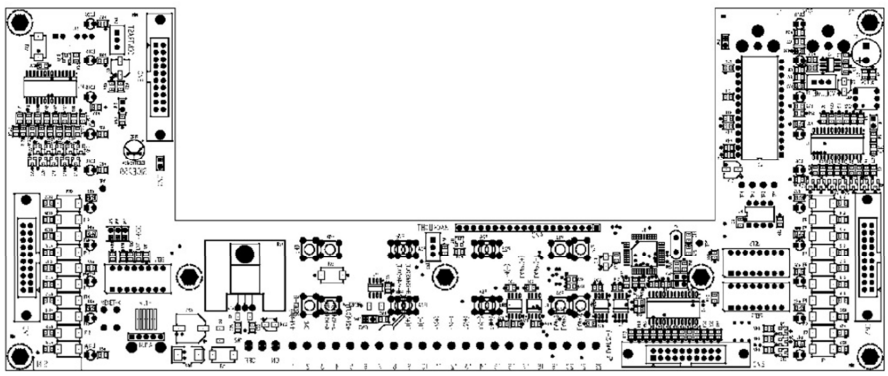


FIG. 4: SICE259 BOARD

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3. BOARD PROGRAMMING AND CONFIGURATION

BOARD PROGRAMMING

The main MCU can be programmed simply by interconnecting the Programmer to the programming port (figure 5) and selecting the position 2 on the selector named SEL1. The orange LED named PROG will be switched on to confirm that the board is waiting for the firmware transferring from the HEX file to the main MCU. After a correct programming of the main MCU, select the position 1 on the selector in order to enable the running mode of the board.

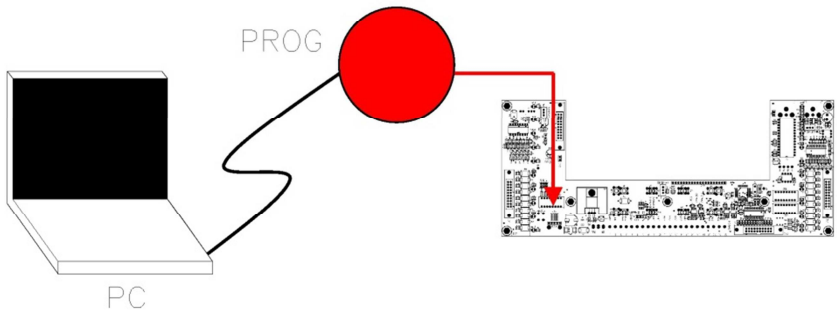


FIG. 5: PROGRAMMING PORT CONNECTION

PROGRAMMING SELECTOR (SEL1) → POS. 1 = RUNNING mode
→ POS. 2 = PROGRAMMING mode

PROGRAMMING NOTES:

1. The MCU programming has to be carried out with the board powered: it is not possible to program the SICE259 board if it's not powered.

2. The MCU programming has to be carried out only by qualified technicians uploading the original firmware provided by SICE.

3. Mistakes during the programming phase of the main MCU may affect the correct working of the board

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BOARD CONFIGURATION

The configuration procedure for SICE259 board has to be carried out without energizing the supervisor system and it is the following:

1. Configure the contacts of DIP switches named SEL2 and SEL3 in order to connect the correct LED named "CONTROL SYSTEM FAILURE" (that signals a possible failure of at least one of the SICE supervisor components) to the self-check section.

2. Configure the correct display panel address through the rotary switch.

3. Switch on the board and adjust the display backlight and contrast by using a suitable screwdriver

4. CIRCUIT ACTIVATION / DEACTIVATION

The board is equipped with on/off switch. The positions for this switch are the following:

ON: the board is powered on and working

OFF: the board is powered off

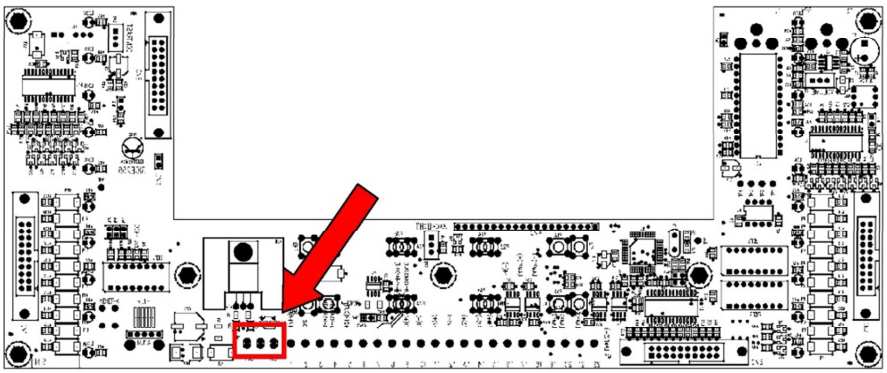


FIG. 6: ON/OFF SWITCH POSITION ON THE CARD

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5. LOCAL PUSH BUTTONS

The board can be equipped with up to eight (8) local push buttons. The number of the available push-buttons mounted on the board depends on the application and on the customer requests.

a) RESET BUTTON

This push button, if pressed, resets the main MCU on the board causing the restart of the firmware execution.



DURING THE NORMAL WORKING OF THE SYSTEM IS NOT NECESSARY TO PRESS THIS BUTTON. PRESS IT ONLY IF THE RELEVANT ACTION IS STRICTLY NECESSARY.

b) P1 BUTTON

This push button is completely configurable. The associated function to this button depends on the page shown by the frontal Liquid Cristal Display.

c) P2 BUTTON

This push button is completely configurable. The associated function to this button depends on the page shown by the frontal Liquid Cristal Display.

d) P3 BUTTON

This push button is completely configurable. The associated function to this button depends on the page shown by the frontal Liquid Cristal Display.

e) P4 BUTTON

This push button is completely configurable. The associated function to this button depends on the page shown by the frontal Liquid Cristal Display.

f) P5 BUTTON

This push button is completely configurable. The associated function to this button depends on the page shown by the frontal Liquid Cristal Display.

g) P6 BUTTON

This push button is completely configurable. The associated function to this button depends on the page shown by the frontal Liquid Cristal Display.

h) P7 BUTTON

This push button is completely configurable. The associated function to this button depends on the page shown by the frontal Liquid Cristal Display.

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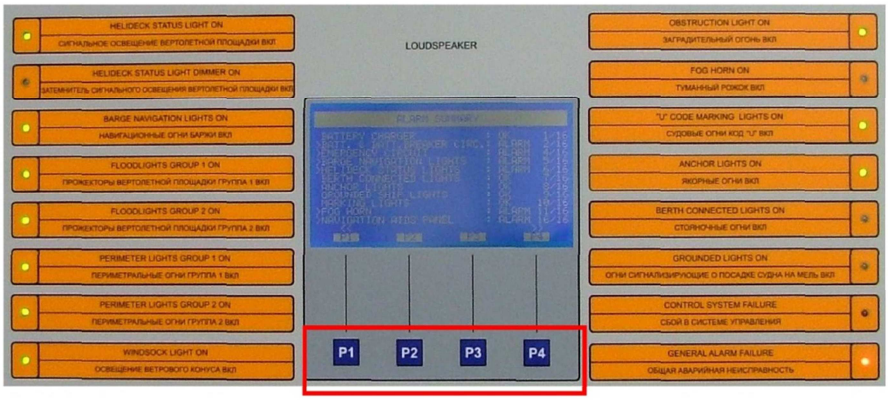


FIG. 7: TYPICAL USE OF P1, P2, P3, P4 BUTTONS

6. ELECTRICAL WIRING

Please read and follow carefully the interconnection instructions listed here below in order to avoid mistakes, during the board terminal wiring, that may seriously damage the circuit itself.

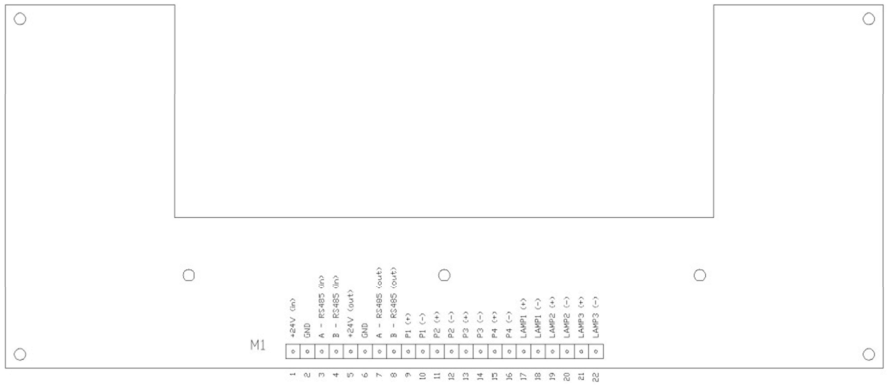


FIG. 8: TERMINAL ARRANGEMENT

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6.1 POWER SUPPLY TERMINALS INTERCONNECTION

Connect the power supply positive pole to the terminal named M1 - 1 and the negative to the terminal M1 - 2. Respect the polarities specified above in order to make the power supply interconnections correctly.

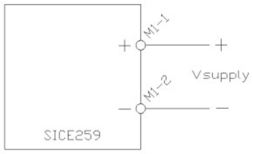


FIG. 9: POWER SUPPLY TERMINALS INTERCONNECTION

The power supply voltage value MUST be in the following range: **20 Vdc < Vsupply < 32 Vdc**

VOLTAGE VALUES APPLIED TO THE CIRCUIT THAT ARE HIGHER THAN THE ABOVE SPECIFIED MAXIMUM VOLTAGE MAY DAMAGE PERMANENTLY THE BOARD ITSELF.

6.2 RS485 INTERCONNECTIONS

The board has an RS485 interface and its terminals are the following:

RS485 (A)	=	M1 – 3 / M1 – 7
RS485 (B)	=	M1 – 4 / M1 – 8
RS485 (+24V)	=	M1 – 1 / M1 – 5
RS485 (GND)	=	M1 – 2 / M1 – 6

FOR A CORRECT WORKING, THE RS485 INTERFACE TERMINALS HAVE TO BE CONNECTED CORRECTLY WITHOUT EXCHANGING THEM. CHECK AND VERIFY THE INTERCONNECTIONS BEFORE SWITCHING-ON THE BOARD.

6.3 EXTERNAL PUSH BUTTON INTERCONNECTIONS

P1 PUSH BUTTON

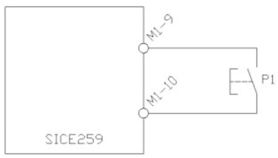


FIG. 10: P1 EXTERNAL PUSH BUTTON INTERCONNECTION

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P2 PUSH BUTTON

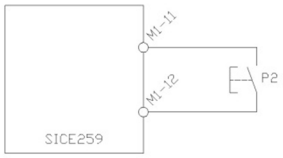


FIG. 11: P2 EXTERNAL PUSH BUTTON INTERCONNECTION

P3 PUSH BUTTON

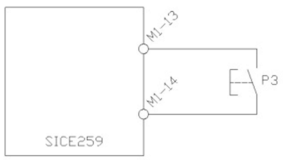


FIG. 12: P3 EXTERNAL PUSH BUTTON INTERCONNECTION

P4 PUSH BUTTON

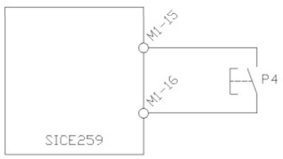


FIG. 13: P4 EXTERNAL PUSH BUTTON INTERCONNECTION

6.4 EXTERNAL SIGNALLING LAMP INTERCONNECTIONS



THE USED EXTERNAL LAMP CURRENT CONSUMPTION HAS TO BE LESS THAN 100 mA. CONSUMPTION HIGHER THAN THE SPECIFIED THRESHOLD CAN DAMAGE PERMANENTLY THE CIRCUIT.

LAMP 1

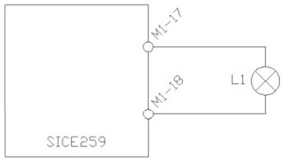


FIG. 14: EXTERNAL LAMP1 INTERCONNECTION

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LAMP 2

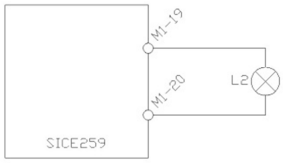


FIG. 15: EXTERNAL LAMP2 INTERCONNECTION

LAMP 3

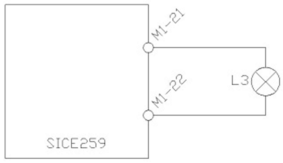


FIG. 16: EXTERNAL LAMP3 INTERCONNECTION

6.5 CONNECTIONS TO LCD DISPLAY

SICE259 circuit has two (2) different on board connectors in order to be quickly connected to a Liquid Cristal Display that can be with a resolution of 240x64 pixels or 240x128 pixels.

240x64 LCD DISPLAY CONNECTION

This kind of LCD has to be connected by using the connectors named CNB and CNC as indicated in the following figure.

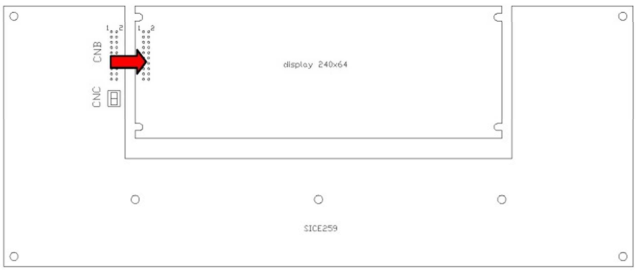


FIG. 17: 240x64 LCD DISPLAY INTERCONNECTION

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The CNB flat cable connector has to be connected to the flat cable connector available on the liquid cristal display board (pin 1 to pin 1 etc etc). The CNC connector has to be connected to the backlight terminals respecting the display LED polarities.

240x128 LCD DISPLAY CONNECTION

This kind of LCD has to be connected by using the connector named CNA as indicated in the following figure.

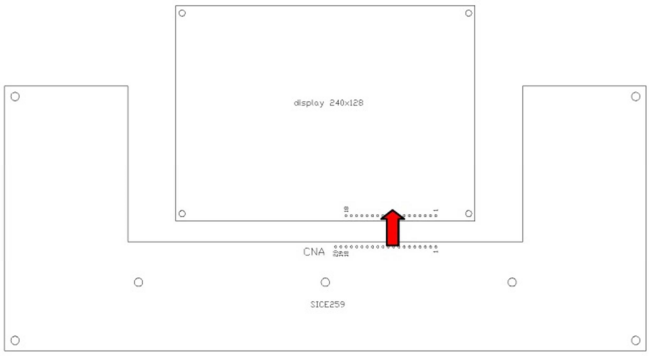


FIG. 18: 240x128 LCD DISPLAY INTERCONNECTION

The CNA connector has to be connected to the connector available on the liquid cristal display board (pin 1 to pin 1 etc etc). The two last terminals (19-20) on the connector has to be connected to the backlight terminals respecting their polarities.

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6.6 CONNECTIONS TO LOUDSPEAKER

Connect the loudspeaker plug to the socket named J2

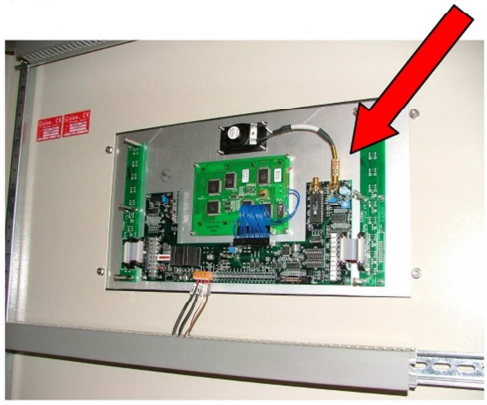


FIG. 19: LOUDSPEAKER INTERCONNECTION

6.7 CONNECTIONS TO SICE261 BOARD

SICE259 board is suitable to be interconnected directly to maximum two (2) SICE261 boards through flat cable connectors named CN1 and CN2.

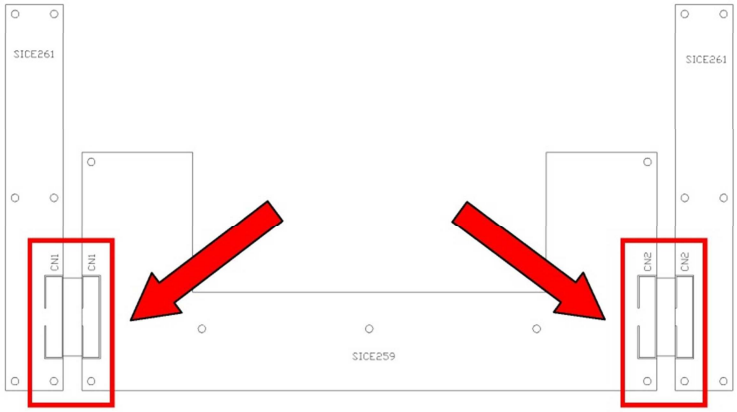


FIG. 20: SICE261 INTERCONNECTION

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7. BOARD REPLACEMENT

The following points show to the user the board replacement procedure step by step.

1. Switch-off the circuit through the switch placed near the M1 terminals
2. Switch off the power source that supplies the circuit
3. Disconnect from the board all the pieces of equipment connected (LCD, loudspeaker, external push-buttons etc etc)
4. Disassembly the board to be replaced from the supporting panel
5. Configure the new board with the same settings previously made for the old one. Be sure to make the same settings on the new board of that is being replaced (in particular the same setting of the address rotary switch and the presence or absence of the jumpers JP1 and JP5).

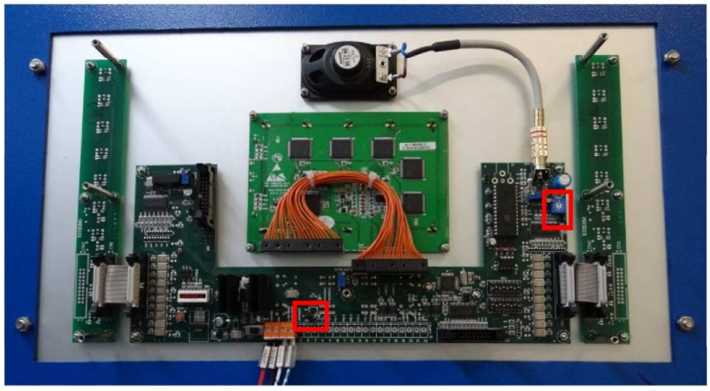


FIG. 21: ADDRESS ROTARY SWITCH AND JUMPERS JP1 AND JP5

6. Assembly the new board on the panel
7. Connect the wires and insert the connectors previously disconnected
8. Switch on the new display panel board and verify its correct working

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8. MECHANICAL INSTALLATION

SICE259 board is suitable to be installed on frontal panel by using seven (7) fixing holes on the board itself.

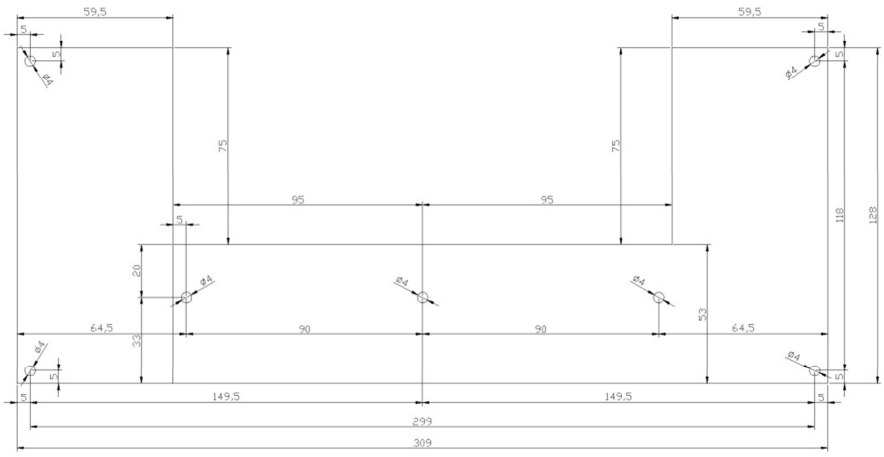


FIG. 22: BOARD DIMENSIONS

DURING THE CARD ASSEMBLY ON THE SUPPORTING PANEL BE SURE THAT NO ELECTRONIC COMPONENT TOUCH THE PANEL ITSELF.

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9. COMPONENT LIST

REF. ELECTRIC DIAGRAM *RIF. SCHEMA ELETTRICO*	Q.TY *Q.TÀ*	TYPE *TIPO*	*DESCRIZIONE*	DESCRIPTION
SICE259	1	C.S. 259	CIRCUITO STAMPATO	PRINTED CIRCUIT BOARD
R1	1	10Ω 1% 0805	RESISTORE SMD	SMD RESISTOR
R2	1	4.7kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R3	1	100Ω 1% 0805	RESISTORE SMD	SMD RESISTOR
R4	1	100Ω 1% 0805	RESISTORE SMD	SMD RESISTOR
R5	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R6	1	100Ω 1% 0805	RESISTORE SMD	SMD RESISTOR
R7	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R8	1	100Ω 1% 0805	RESISTORE SMD	SMD RESISTOR
R9	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R10	1	100Ω 1% 0805	RESISTORE SMD	SMD RESISTOR
R11	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R12	1	100Ω 1% 0805	RESISTORE SMD	SMD RESISTOR
R13	1	0Ω 1% 0805	RESISTORE SMD	SMD RESISTOR
R14	1	0Ω 1% 0805	RESISTORE SMD	SMD RESISTOR
R15	1	0Ω 1% 0805	RESISTORE SMD	SMD RESISTOR
R16	1	0Ω 1% 0805	RESISTORE SMD	SMD RESISTOR
R17	1	0Ω 1% 0805	RESISTORE SMD	SMD RESISTOR
R18	1	0Ω 1% 0805	RESISTORE SMD	SMD RESISTOR
R19	1	0Ω 1% 0805	RESISTORE SMD	SMD RESISTOR
R20	1	0Ω 1% 0805	RESISTORE SMD	SMD RESISTOR
R21	1	0Ω 1% 0805	RESISTORE SMD	SMD RESISTOR
R22	1	0Ω 1% 0805	RESISTORE SMD	SMD RESISTOR
R23	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R24	1	100Ω 1% 0805	RESISTORE SMD	SMD RESISTOR
R25	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R26	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R27	1	1MΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R28	1	1MΩ 1% 0805	RESISTORE SMD	SMD RESISTOR

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REF. ELECTRIC DIAGRAM *RIF. SCHEMA ELETTRICO*	Q.TY *Q.TÀ*	TYPE *TIPO*	*DESCRIZIONE*	DESCRIPTION
R29	1	2x10kΩ 1% 0805	RESISTORE SMD (OPZIONALE)	SMD RESISTOR (OPTIONAL)
R30	1	2x10kΩ 1% 0805	RESISTORE SMD (OPZIONALE)	SMD RESISTOR (OPTIONAL)
R31	1	100kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R32	1	100kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R33	1	2x10kΩ 1% 0805	RESISTORE SMD (OPZIONALE)	SMD RESISTOR(OPTIONAL)
R34	1	100kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R35	1	2x10kΩ 1% 0805	RESISTORE SMD (OPZIONALE)	SMD RESISTOR (OPTIONAL)
R36	1	2x10kΩ 1% 0805	RESISTORE SMD (OPZIONALE)	SMD RESISTOR (OPTIONAL)
R37	1	2x10kΩ 1% 0805	RESISTORE SMD (OPZIONALE)	SMD RESISTOR (OPTIONAL)
R38	1	2x10kΩ 1% 0805	RESISTORE SMD OPZIONALE)	SMD RESISTOR (OPTIONAL)
R39	1	2x10kΩ 1% 0805	RESISTORE SMD (OPZIONALE)	SMD RESISTOR (OPTIONAL)
R40	1	2x10kΩ 1% 0805	RESISTORE SMD (OPZIONALE)	SMD RESISTOR (OPTIONAL)
R41	1	2x10kΩ 1% 0805	RESISTORE SMD (OPZIONALE)	SMD RESISTOR (OPTIONAL)
R42	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R43	1	100Ω 1% 0805	RESISTORE SMD	SMD RESISTOR
R44	1	100Ω 1% 0805	RESISTORE SMD	SMD RESISTOR
R45	1	100Ω 1% 0805	RESISTORE SMD	SMD RESISTOR
R46	1	100kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R47	1	100kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R48	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R49	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R50	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R51	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R52	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R53	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R54	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R55	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R56	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R57	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R58	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R59	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R60	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R61	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR

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R62	1	4.7kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R63	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R64	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R65	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R66	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R67	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R68	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R69	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R70	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R71	1	4.7kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R72	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R73	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R74	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R75	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R76	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R77	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R78	1	100Ω 1% 0805	RESISTORE SMD	SMD RESISTOR
R79	1	10Ω 1% 0805	RESISTORE SMD	SMD RESISTOR
R80	1	120Ω 1% 0805	RESISTORE SMD	SMD RESISTOR
R81	1	4.7kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R82	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R83	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R84	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R85	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R86	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R87	1	2x10kΩ 1% 0805	RESISTORE SMD (OPZIONALE)	SMD RESISTOR (OPTIONAL)
R88	1	2x10kΩ 1% 0805	RESISTORE SMD (OPZIONALE)	SMD RESISTOR (OPTIONAL)
R89	1	2x10kΩ 1% 0805	RESISTORE SMD (OPZIONALE)	SMD RESISTOR (OPTIONAL)
R90	1	2x10kΩ 1% 0805	RESISTORE SMD (OPZIONALE)	SMD RESISTOR (OPTIONAL)
R91	1	2x10kΩ 1% 0805	RESISTORE SMD (OPZIONALE)	SMD RESISTOR (OPTIONAL)
R92	1	2x10kΩ 1% 0805	RESISTORE SMD (OPZIONALE)	SMD RESISTOR (OPTIONAL)
R93	1	2x10kΩ 1% 0805	RESISTORE SMD (OPZIONALE)	SMD RESISTOR (OPTIONAL)
R94	1	2x10kΩ 1% 0805	RESISTORE SMD (OPZIONALE)	SMD RESISTOR (OPTIONAL)

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R95	1	2x10kΩ 1% 0805	RESISTORE SMD (OPZIONALE)	SMD RESISTOR (OPTIONAL)
R96	1	2x10kΩ 1% 0805	RESISTORE SMD (OPZIONALE)	SMD RESISTOR (OPTIONAL)
R97	1	100Ω 1% 0805	RESISTORE SMD	SMD RESISTOR
R98	1	100Ω 1% 0805	RESISTORE SMD	SMD RESISTOR
R99	1	100Ω 1% 0805	RESISTORE SMD	SMD RESISTOR
R100	1	100Ω 1% 0805	RESISTORE SMD	SMD RESISTOR
R101	1	100Ω 1% 0805	RESISTORE SMD	SMD RESISTOR
R102	1	100Ω 1% 0805	RESISTORE SMD	SMD RESISTOR
R103	1	100Ω 1% 0805	RESISTORE SMD	SMD RESISTOR
R104	1	100Ω 1% 0805	RESISTORE SMD	SMD RESISTOR
R105	1	100Ω 1% 0805	RESISTORE SMD	SMD RESISTOR
R106	1	100Ω 1% 0805	RESISTORE SMD	SMD RESISTOR
R107	1	0Ω 1% 0805	RESISTORE SMD	SMD RESISTOR
R108	1	0Ω 1% 0805	RESISTORE SMD	SMD RESISTOR
R109	1	0Ω 1% 0805	RESISTORE SMD	SMD RESISTOR
R110	1	0Ω 1% 0805	RESISTORE SMD	SMD RESISTOR
R111	1	0Ω 1% 0805	RESISTORE SMD	SMD RESISTOR
R112	1	0Ω 1% 0805	RESISTORE SMD	SMD RESISTOR
R113	1	0Ω 1% 0805	RESISTORE SMD	SMD RESISTOR
R114	1	0Ω 1% 0805	RESISTORE SMD	SMD RESISTOR
R115	1	0Ω 1% 0805	RESISTORE SMD	SMD RESISTOR
R116	1	0Ω 1% 0805	RESISTORE SMD	SMD RESISTOR
R117	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R118	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R119	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R120	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R121	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R122	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R123	1	100Ω 1% 0805	RESISTORE SMD	SMD RESISTOR

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REF. ELECTRIC DIAGRAM *RIF. SCHEMA ELETTRICO*	Q.TY *Q.TÀ*	TYPE *TIPO*	*DESCRIZIONE*	DESCRIPTION
TR1	1	10kΩ	TRIMMER MULTIGIRO VERT.	VERTICAL TRIMMER
TR2	1	10kΩ	TRIMMER MULTIGIRO VERT.	VERTICAL TRIMMER
TR3	1	10kΩ	TRIMMER MULTIGIRO VERT.	VERTICAL TRIMMER
C1	1	220uF 50V	CONDENSAT. ELETTROL. STD	STD ELECTROL. CAPACITOR
C2	1	47nF 0805	CONDENSAT. CERAMICO SMD	SMD CERAMIC CAPACITOR
C3	1	100nF 0805	CONDENSAT. CERAMICO SMD	SMD CERAMIC CAPACITOR
C4	1	100nF 0805	CONDENSAT. CERAMICO SMD	SMD CERAMIC CAPACITOR
C5	1	10uF 16V tipo B (4x5,4)	CONDENSAT. ELETTROL. SMD	SMD ELECTROL. CAPACITOR
C6	1	100nF 0805	CONDENSAT. CERAMICO SMD	SMD CERAMIC CAPACITOR
C7	1	100nF 0805	CONDENSAT. CERAMICO SMD	SMD CERAMIC CAPACITOR
C8	1	100nF 0805	CONDENSAT. CERAMICO SMD	SMD CERAMIC CAPACITOR
C9	1	100nF 0805	CONDENSAT. CERAMICO SMD	SMD CERAMIC CAPACITOR
C10	1	100nF 0805	CONDENSAT. CERAMICO SMD	SMD CERAMIC CAPACITOR
C11	1	100nF 0805	CONDENSAT. CERAMICO SMD	SMD CERAMIC CAPACITOR
C12	1	100nF 0805	CONDENSAT. CERAMICO SMD	SMD CERAMIC CAPACITOR
C13	1	22uF 16V tipo C (5x5,4)	CONDENSAT. ELETTROL. SMD	SMD ELECTROL. CAPACITOR
C14	1	33pF 0805	CONDENSAT. CERAMICO SMD	SMD CERAMIC CAPACITOR
C15	1	33pF 0805	CONDENSAT. CERAMICO SMD	SMD CERAMIC CAPACITOR
C16	1	100nF 0805	CONDENSAT. CERAMICO SMD	SMD CERAMIC CAPACITOR
C17	1	100nF 0805	CONDENSAT. CERAMICO SMD	SMD CERAMIC CAPACITOR
C18	1	100nF 0805	CONDENSAT. CERAMICO SMD	SMD CERAMIC CAPACITOR
C19	1	10uF 16V tipo B (4x5,4)	CONDENSAT. ELETTROL. SMD	SMD ELECTROL. CAPACITOR
C20	1	100nF 0805	CONDENSAT. CERAMICO SMD	SMD CERAMIC CAPACITOR
C21	1	100nF 0805	CONDENSAT. CERAMICO SMD	SMD CERAMIC CAPACITOR
C22	1	100nF 0805	CONDENSAT. CERAMICO SMD	SMD CERAMIC CAPACITOR
C23	1	100nF 0805	CONDENSAT. CERAMICO SMD	SMD CERAMIC CAPACITOR
C24	1	10uF 16V tipo B (4x5,4)	CONDENSAT. ELETTROL. SMD	SMD ELECTROL. CAPACITOR

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REF. ELECTRIC DIAGRAM *RIF. SCHEMA ELETTRICO*	Q.TY *Q.TÀ*	TYPE *TIPO*	*DESCRIZIONE*	DESCRIPTION
C25	1	100nF 0805	CONDENSAT. CERAMICO SMD	SMD CERAMIC CAPACITOR
C26	1	100nF 0805	CONDENSAT. CERAMICO SMD	SMD CERAMIC CAPACITOR
C27	1	47uF 63V tipo G (10x10,2)	CONDENSAT. ELETTROL. SMD	SMD ELECTROL. CAPACITOR
C28	1	10uF 50V tipo D (6,3x10,2)	CONDENSAT. ELETTROL. SMD	SMD ELECTROL. CAPACITOR
C29	1	100nF 0805	CONDENSAT. CERAMICO SMD	SMD CERAMIC CAPACITOR
C30	1	100nF 0805	CONDENSAT. CERAMICO SMD	SMD CERAMIC CAPACITOR
D1	1	ES1G	DIODO SMD DO214AC	SMD DIODE DO214AC
D2	1	ES1G	DIODO SMD DO214AC	SMD DIODE DO214AC
DB1	1	SMAJ8.5CA	DIODO SOPPRESS. TRANSIENTI	TRANSIENT SUPPRESS. DIODE
DB2	1	SMAJ33CA	DIODO SOPPRESS. TRANSIENTI	TRANSIENT SUPPRESS. DIODE
F1	1	SMD030	FUSIBILE RIPRIST. SMD	SMD FUSIBLE
F2	1	SMD030	FUSIBILE RIPRIST. SMD	SMD FUSIBLE
F3	1	SMD030	FUSIBILE RIPRIST. SMD	SMD FUSIBLE
F4	1	SMD030	FUSIBILE RIPRIST. SMD	SMD FUSIBLE
F5	1	SMD030	FUSIBILE RIPRIST. SMD	SMD FUSIBLE
F6	1	SMD030	FUSIBILE RIPRIST. SMD	SMD FUSIBLE
F7	1	SMD030	FUSIBILE RIPRIST. SMD	SMD FUSIBLE
F8	1	SMD030	FUSIBILE RIPRIST. SMD	SMD FUSIBLE
F9	1	SMD030	FUSIBILE RIPRIST. SMD	SMD FUSIBLE
F10	1	SMD030	FUSIBILE RIPRIST. SMD	SMD FUSIBLE
F11	1	SMD030	FUSIBILE RIPRIST. SMD	SMD FUSIBLE
F12	1	SMD030	FUSIBILE RIPRIST. SMD	SMD FUSIBLE
F13	1	SMD030	FUSIBILE RIPRIST. SMD	SMD FUSIBLE
F14	1	SMD030	FUSIBILE RIPRIST. SMD	SMD FUSIBLE
F15	1	SMD030	FUSIBILE RIPRIST. SMD	SMD FUSIBLE
F16	1	SMD030	FUSIBILE RIPRIST. SMD	SMD FUSIBLE

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REF. ELECTRIC DIAGRAM *RIF. SCHEMA ELETTRICO*	Q.TY *Q.TÀ*	TYPE *TIPO*	*DESCRIZIONE*	DESCRIPTION
F17	1	SMD030	FUSIBILE RIPRIST. SMD	SMD FUSIBLE
F18	1	SMD030	FUSIBILE RIPRIST. SMD	SMD FUSIBLE
F19	1	SMD030	FUSIBILE RIPRIST. SMD	SMD FUSIBLE
F20	1	SMD030	FUSIBILE RIPRIST. SMD	SMD FUSIBLE
F21	1	SMD100	FUSIBILE RIPRIST. SMD	SMD FUSIBLE
F22	1	SMD030	FUSIBILE RIPRIST. SMD	SMD FUSIBLE
F23	1	SMD030	FUSIBILE RIPRIST. SMD	SMD FUSIBLE
Q1	1	PMBF170	MOS SMD (SOT-23)	SMD MOS (SOT-23)
Q2	1	PMBF170	MOS SMD (SOT-23)	SMD MOS (SOT-23)
Q3	1	PMBF170	MOS SMD (SOT-23)	SMD MOS (SOT-23)
Q4	1	PMBF170	MOS SMD (SOT-23)	SMD MOS (SOT-23)
Q5	1	PMBF170	MOS SMD (SOT-23)	SMD MOS (SOT-23)
Q6	1	PMBF170	MOS SMD (SOT-23)	SMD MOS (SOT-23)
Q7	1	PMBF170	MOS SMD (SOT-23)	SMD MOS (SOT-23)
Q8	1	PMBF170	MOS SMD (SOT-23)	SMD MOS (SOT-23)
Q9	1	PMBF170	MOS SMD (SOT-23)	SMD MOS (SOT-23)
Q10	1	PMBF170	MOS SMD (SOT-23)	SMD MOS (SOT-23)
Q11	1	PMBF170	MOS SMD (SOT-23)	SMD MOS (SOT-23)
Q12	1	PMBF170	MOS SMD (SOT-23)	SMD MOS (SOT-23)
Q13	1	PMBF170	MOS SMD (SOT-23)	SMD MOS (SOT-23)
Q14	1	PMBF170	MOS SMD (SOT-23)	SMD MOS (SOT-23)
Q15	1	PMBF170	MOS SMD (SOT-23)	SMD MOS (SOT-23)
Q16	1	PMBF170	MOS SMD (SOT-23)	SMD MOS (SOT-23)
Q17	1	PMBF170	MOS SMD (SOT-23)	SMD MOS (SOT-23)
Q18	1	PMBF170	MOS SMD (SOT-23)	SMD MOS (SOT-23)
Q19	1	PMBF170	MOS SMD (SOT-23)	SMD MOS (SOT-23)
Q20	1	PMBF170	MOS SMD (SOT-23)	SMD MOS (SOT-23)
Q21	1	PMBF170	MOS SMD (SOT-23)	SMD MOS (SOT-23)
Q22	1	PMBF170	MOS SMD (SOT-23)	SMD MOS (SOT-23)

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REF. ELECTRIC DIAGRAM *RIF. SCHEMA ELETTRICO*	Q.TY *Q.TÀ*	TYPE *TIPO*	*DESCRIZIONE*	DESCRIPTION
P1A	1	B6820	PULSANTE STD	STD BUTTON
P1B	-	-	NON MONTATO	NOT MOUNTED
P2A	1	B6820	PULSANTE STD	STD BUTTON
P2B	-	-	NON MONTATO	NOT MOUNTED
P3A	1	B6820	PULSANTE STD	STD BUTTON
P3B	-	-	NON MONTATO	NOT MOUNTED
P4A	1	B6820	PULSANTE STD	STD BUTTON
P4B	-	-	NON MONTATO	NOT MOUNTED
P5A	-	-	NON MONTATO	NOT MOUNTED
P5B	-	-	NON MONTATO	NOT MOUNTED
P6A	-	-	NON MONTATO	NOT MOUNTED
P6B	-	-	NON MONTATO	NOT MOUNTED
P7A	-	-	NON MONTATO	NOT MOUNTED
P7B	-	-	NON MONTATO	NOT MOUNTED
RESETA	-	-	NON MONTATO	NOT MOUNTED
RESETB	-	-	NON MONTATO	NOT MOUNTED
RESETC	1	B6820	PULSANTE STD	STD BUTTON
U1	1	MCP23017-E/SO	I/O EXPANDER SOIC 300 MIL	I/O EXPANDER SOIC 300 MIL
U2	1	LM386M-1	AUDIO AMPLIFIER	AUDIO AMPLIFIER
U3	1	ISD25120	VOICECORDER IC	VOICECORDER IC
U4	1	PIC12F629-I/P	MICROCONTROLL. MICROCHIP	MICROCHIP MICROCONTROL.
U5	1	MCP23017-E/SO	I/O EXPANDER SOIC 300 MIL	I/O EXPANDER SOIC 300 MIL
U6		PIC18F4620-I/PT	MCU	MCU
U7		24AA512-I/SM	MEMORIA EEPROM	MEMORY EEPROM
U8		24AA512-I/SM	MEMORIA EEPROM	MEMORY EEPROM
U9		24AA512-I/SM	MEMORIA EEPROM	MEMORY EEPROM
U10		24AA512-I/SM	MEMORIA EEPROM	MEMORY EEPROM
U11		MAX483ESA+	DIGITAL/RS485 INTERFACE	DIGITAL/RS485 INTERFACE
		IN ALTERNATIVA /	**IN ALTERNATIVE**	
U11		MAX485ESA+	DIGITAL/RS485 INTERFACE	DIGITAL/RS485 INTERFACE

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REF. ELECTRIC DIAGRAM *RIF. SCHEMA ELETTRICO*	Q.TY *Q.TÀ*	TYPE *TIPO*	*DESCRIZIONE*	DESCRIPTION
U12	1	7805	STABILIZZATORE TO220	TO220 STABILIZER
U13	1	TRACO TMA0515S	DC/DC CONVERTER	DC/DC CONVERTER
U14	1	MCP23017-E/SO	I/O EXPANDER SOIC 300 MIL	I/O EXPANDER SOIC 300 MIL
Con U4	1	ZOCCOLO 08 PIN	ZOCCOLO IC	SOCKET IC
Con U3	1	ZOCCOLO 28 PIN	ZOCCOLO IC	SOCKET IC
LD1	-	-	NON MONTATI (OPZIONALI)	NOT MOUNTED (OPTIONAL)
LD2	-	-	NON MONTATI (OPZIONALI)	NOT MOUNTED (OPTIONAL)
LD3	-	-	NON MONTATI (OPZIONALI)	NOT MOUNTED (OPTIONAL)
LD4	-	-	NON MONTATI (OPZIONALI)	NOT MOUNTED (OPTIONAL)
LD5	-	-	NON MONTATI (OPZIONALI)	NOT MOUNTED (OPTIONAL)
LD6	-	-	NON MONTATI (OPZIONALI)	NOT MOUNTED (OPTIONAL)
LD7	-	-	NON MONTATI (OPZIONALI)	NOT MOUNTED (OPTIONAL)
LD8	-	-	NON MONTATI (OPZIONALI)	NOT MOUNTED (OPTIONAL)
LD9	-	-	NON MONTATI (OPZIONALI)	NOT MOUNTED (OPTIONAL)
LD10	-	-	NON MONTATI (OPZIONALI)	NOT MOUNTED (OPTIONAL)
LD11	-	-	NON MONTATI (OPZIONALI)	NOT MOUNTED (OPTIONAL)
LD12	-	-	NON MONTATI (OPZIONALI)	NOT MOUNTED (OPTIONAL)
LD13	-	-	NON MONTATI (OPZIONALI)	NOT MOUNTED (OPTIONAL)
LD14	-	-	NON MONTATI (OPZIONALI)	NOT MOUNTED (OPTIONAL)
LD15	-	-	NON MONTATI (OPZIONALI)	NOT MOUNTED (OPTIONAL)
LD16	-	-	NON MONTATI (OPZIONALI)	NOT MOUNTED (OPTIONAL)
LD17	-	-	NON MONTATI (OPZIONALI)	NOT MOUNTED (OPTIONAL)
LD18	-	-	NON MONTATI (OPZIONALI)	NOT MOUNTED (OPTIONAL)
LD19	-	-	NON MONTATI (OPZIONALI)	NOT MOUNTED (OPTIONAL)
LD20	-	-	NON MONTATI (OPZIONALI)	NOT MOUNTED (OPTIONAL)
LD21	1	TLYU1002	LED GIALLO SMD TOSHIBA	LED YELLOW SMD TOSHIBA
LD22	1	LTST-C170KGKT	LED VERDE SMD LITEON	LED GREEN SMD LITEON

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REF. ELECTRIC DIAGRAM *RIF. SCHEMA ELETTRICO*	Q.TY *Q.TÀ*	TYPE *TIPO*	*DESCRIZIONE*	DESCRIPTION
M1	-	-	NON MONTATA	NOT MOUNTED
M1	1	LP5.08/4/90	MORSETT. FISSA WEIDMULLER	WEIDMULLER TERMINAL STRIP
RJ1A	1	Pin-strip 5 vie	PIN STRIP P. 2,54	PIN STRIP P. 2,54
X1	1	20MHz	QUARZO TRADIZIONALE	TRADITIONAL QUARTZ
RW1	1	ERD10	ROTARY SWITCH 10 POSIZIONI	ROTARY SWITCH 10 POSITIONS
SEL1	1	DS16C 4-2	SELETT. TETRAPOLARE 2 VIE	TETRAP. SELECTOR 2 EXITS
SEL2	1	Dip Switch 8 vie	DIP SWITCH	DIP SWITCH
SEL3	1	Dip Switch 8 vie	DIP SWITCH	DIP SWITCH
JP1	1	Pin-strip 2 vie	PIN STRIP P. 2,54	PIN STRIP P. 2,54
JP2	1	Pin-strip 2 vie	PIN STRIP P. 2,54	PIN STRIP P. 2,54
JP3	1	Pin-strip 2 vie	PIN STRIP P. 2,54	PIN STRIP P. 2,54
JP4	1	Pin-strip 2 vie	PIN STRIP P. 2,54	PIN STRIP P. 2,54
JP5	1	Pin-strip 2 vie	PIN STRIP P. 2,54	PIN STRIP P. 2,54
JP6	1	Pin-strip 2 vie	PIN STRIP P. 2,54	PIN STRIP P. 2,54
JP7	1	Pin-strip 2 vie	PIN STRIP P. 2,54	PIN STRIP P. 2,54
JP8	1	Pin-strip 2 vie	PIN STRIP P. 2,54	PIN STRIP P. 2,54
JP9	1	Pin-strip 2 vie	PIN STRIP P. 2,54	PIN STRIP P. 2,54

SICE SRL PESARO

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REF. ELECTRIC DIAGRAM *RIF. SCHEMA ELETTRICO*	Q.TY *Q.TÀ*	TYPE *TIPO*	*DESCRIZIONE*	DESCRIPTION
TP1	1	TEST POINT	TEST POINT	TEST POINT
TP2	1	TEST POINT	TEST POINT	TEST POINT
TP3	1	TEST POINT	TEST POINT	TEST POINT
TP4	1	TEST POINT	TEST POINT	TEST POINT
TP5	1	TEST POINT	TEST POINT	TEST POINT
TP6	1	TEST POINT	TEST POINT	TEST POINT
J1-J2	2	SCP604906 BLACK	BOCCOLA TIPO CINCH NERA	BLACK CINCH RING
HS1	1	8028/25	DISSIPATORE TERMICO	THERMAL DISSIPATOR
CN1	1	636-2024ES	CONNETTORE FLAT CABLE	CONNECTOR FLAT CABLE
CN2	1	636-2024ES	CONNETTORE FLAT CABLE	CONNECTOR FLAT CABLE
CN3	1	636-2024ES	CONNETTORE FLAT CABLE	CONNECTOR FLAT CABLE
CNA	1	MPSS100-20-L	CONNETTORE MASCON	CONNECTOR MASCON
CNB	1	636-2024ES	CONNETTORE FLAT CABLE	CONNECTOR FLAT CABLE
CNC	1	Pin-strip 2 vie	PIN STRIP P. 2,54	PIN STRIP P. 2,54
SW1	1	1101-M2-C-Q	MICROSWITCH C&K	MICROSWITCH C&K

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10. ENVIRONMENTAL NOTES

Environmental aspect explanation

SICE S.R.L., since 2003, has been adopting an Environmental management system integrated with the Quality control one, with the aim of checking and improving in the time the impacts on the environment connected to our activities and products. The system, designed in accordance with UNI EN ISO 14001 rule and, for this standard rule, certified by RINA, consists in planning the activities of designing, manufacturing and testing of our products keeping into account the environmental aspects connected to it. Such aspects regard both the activities which have a direct environmental impact (such as equipment manufacturing in SICE factory) and the ones which have an indirect environmental impact such as the matters relevant to the manufactured product (management of litter at life end, power consumptions during the working phase, etc.) and the activities relevant to the companies which carry out externally some working on the equipment (painting, wiring, etc.).

Environmental aspects

The equipment made by SICE S.R.L. is designed and manufactured in order to minimize its environmental impact in all the phases of its existence, from the manufacturing to the final disposal.

Final disposal of the equipment

The equipment disposal has to be done respecting fully the applicable rules in the country where the equipment has to be disposed.
From the point of view of reutilization and recycling, the equipment is made mainly with materials easily reclaimable (iron, steel and aluminium) reducing, to the minimum, the presence of dangerous substances for the environment.
The equipment contains some components which, at the moment of the final disposal, have to be removed and started off on the separate treatment because they have some specific disposal problems. Such components are:

- Printed circuits with surface larger than 10 cm^2

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1.27 SICE CODER/DRIVER CIRCUIT FOR MARINE/STATUS LIGHT SICE266 MANUAL

L.E.D. SIGNAL LIGHT CODER CIRCUIT SICE266

REFERENCE: DE-266

SICE S.R.L.
via G. Bartolucci, 16
Borgo S. Maria - Pesaro (Italy)

Tel.: (+39) 0721/201301 - 202635
Fax : (+39) 0721/202086
E-mail : tech@sicesrl.com
Web : http://www.sicesrl.com

Rev.	Motivo /*Description*	Data/*Date*
0	FOR ISSUE	22/02/2013
1	HARDWARE UPGRADE	13/05/2015
2	PERFORMANCE IMPROVEMENT	03/08/2015
3	UPDATE COMPONENT LIST (10NM/15NM)	11/04/2018

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1. OVERVIEW

The SICE266 coder circuit is a complete driver for the new generation of the signal lights using the light emitting diodes (l.e.d.) as light source. The device is developed and manufactured by SICE. All the parameters (e.g. current to l.e.d. light, code repeated by the l.e.d. light, alarm thresholds etc) are completely programmable so the same coder circuit can be used to drive all the types of l.e.d. signal lights (within the circuit min-max thresholds) manufactured by SICE. The coder circuit comes already installed inside a suitable plastic box ready to be installed on DIN rail.



FIGURE 1: SICE266 INSTALLED INSIDE BOX SUITABLE FOR DIN RAIL

2. TECHNICAL FEATURES

The main technical features of the SICE266 coder circuit are listed below:

- Output MORSE code programmable as per customer request.
- Frontal signalling l.e.d.'s.
- Quick on-board programming of the main microcontroller unit.
- Ready to be installed on DIN rail (easy installation).
- Microcontroller unit made with FLASH technology (re-programmable).
- Volt-free contacts make available the circuit and the light statuses to remote control system.
- Output code l.e.d. on the box front panel that reproduces the code generated by the signal light.
- Synchronization input/output in order to synchronize together the flashes of two or more SICE266 circuits (with the same output code) as requested by IALA.
- In-circuit self checking circuit.
- Very low power consumption.

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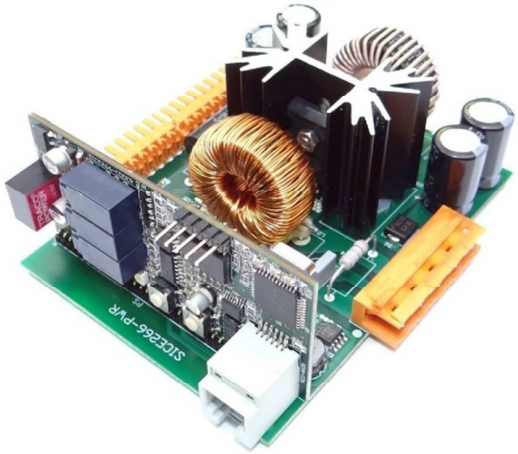


FIGURE 2: SICE266 PCB

3. ON BOARD PROGRAMMING

SICE supplies the SICE266 coder circuit already programmed according to the customer specifications. In case the customer needs to change the programmed code, it is possible to program the board again through the use of a programmer, MICROCHIP ICD3, together with the firmware, to be loaded, provided by SICE.

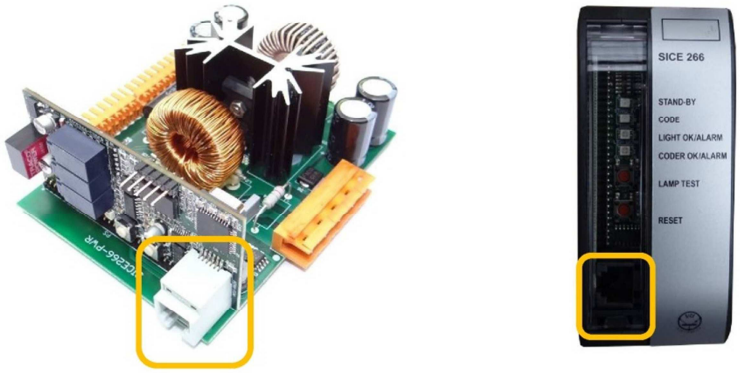


FIGURE 3: SICE266 PROGRAMMING PORT

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In order to be able to program the SICE266 coder circuit, it is necessary to be equipped with:

- ✓ **Laptop (PC), O.S. Windows XP / VISTA / 7 / 8 complete with USB 2.0 port**
- ✓ **ICD3 MICROCHIP programmer**
- ✓ **SICE firmware to be uploaded (.HEX file)**

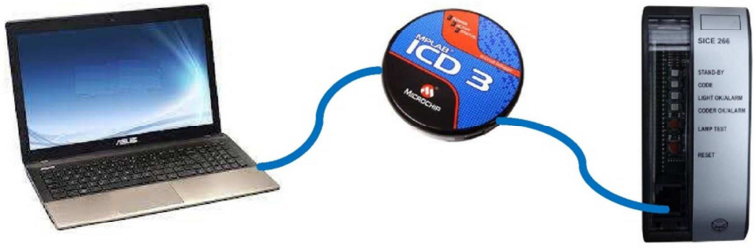


FIGURE 4: SICE266 PROGRAMMING CONNECTIONS

WARNING
The programming procedure has to be carried-out only by qualified technician. Wrong programming may lead the coder circuit to malfunctioning or permanent damage.

4. WORKING DESCRIPTION

The coder circuit (SICE266) has been designed to generate the suitable power supply to drive one l.e.d. signal light whenever the circuit is powered-on and activated. The user is always able to understand which are the statuses of the coder and of the driven l.e.d. light through the local frontal l.e.d.'s and the volt-free contacts.

While the coder circuit is powered-on, independently if the coder is in stand-by or activated, the internal self-diagnostic unit continuously checks if the coder circuit works properly or not: in case of any failure detected on the coder, the corresponding alarm is raised through the red l.e.d., placed on the frontal and named "CODER OK/ALARM", and through the volt-free contact named "CODER OK/ALARM".

During the code generation on the l.e.d. signal light, the user is able to monitor the generated code simply by looking the LED named "CODE" on the frontal of the box.

This coder has been designed to allow the synchronization of several SICE266 circuits together (with the same code uploaded) accordingly to IALA requirement. Please refer to the next sections for further details.

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5. ELECTRICAL CONNECTIONS

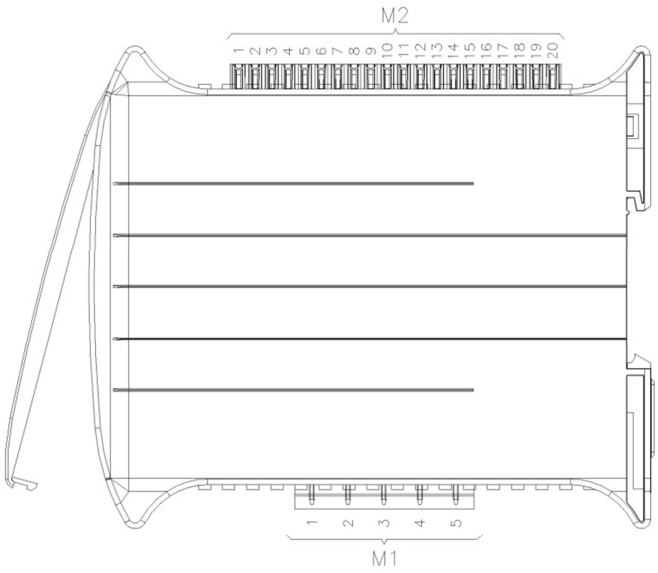


FIGURE 5: SICE266 TERMINAL LAYOUT

In order to properly connect all the terminals of the coder, the installer is recommended to follow the instructions reported here below.

⚠	**WARNING** Wrong electrical connections may lead the coder circuit to malfunctioning or permanent damage.

5.1 POWER SUPPLY (INPUT)

Connect the power source to the power supply inputs (power source range: 21 ÷ 33Vdc):

- **M1 – 4 / 5 = POWER SUPPLY INPUT (+/-)**

⚠	Make sure to connect the power supply at input terminals respecting the polarities (+/-) as indicated above. Reversing the polarities may harm the coder.

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5.2 L.E.D. POWER SUPPLY (OUTPUT)

Connect the l.e.d. signal light in the following way:

- **M1 – 1 / 2 = L.E.D. OUTPUT (+/-)**

⚠	Make sure to connect the power supply of the signal light at input terminals respecting the polarities (+/-) as indicated above. Reversing the polarities may harm the coder and/or the l.e.d. light.

5.3 VOLT-FREE CONTACTS

The SICE266 coder circuit makes available the following volt-free contacts:

- **M2 – 13 / 14 = LIGHT ON/OFF (or PHOTOCELL OK/ALARM)**
- **M2 – 15 / 16 = CODER OK/ALARM**
- **M2 – 17 / 18 = LIGHT OK/ALARM**

5.4 SYNCHRONIZATION BUS

If more than one coder for l.e.d. signal light are installed in the same plant, connect their synchronization terminals in the following way, in order to have all the signal lights flashing synchronized together during the code generation:

- **M2-19 / 20 = SYNCHRONIZATION SIGNAL (+/-)**

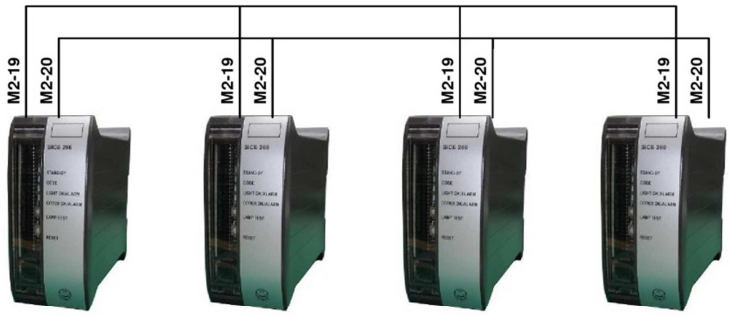


FIGURE 6: SYNCHRONIZATION BUS

⚠	Make sure to connect the synchronization bus respecting the polarities (+/-) as indicated above. Reversing the polarities may harm the coders.
⚠	Only coders having the same programmed flashing code can be synchronized together properly.

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6. FRONT PANEL

On the front panel of SICE266 coder are available some l.e.d.'s, through which is possible to know which are the statuses of the coder and of the connected l.e.d. light, and some push-buttons.



FIGURE 7: FRONT PANEL

STAND-BY (orange):
- **ON:** the coder circuit is in stand-by so the Morse code is not generated, the l.e.d. light is switched-off and the coder power consumption is very low in order to save energy from the power supply
- **OFF:** if no further frontal l.e.d. is switched-on, the coder circuit is not powered otherwise the coder circuit is powered and it's generating the Morse code on the light (flashing).
- **FLASHING:** the photocell connected to the coder circuit (if any) is not changing its state since more than 24 hours.

CODE (orange):
- **ON:** This l.e.d. reproduces the code generated by the coder circuit on the l.e.d. signal light. While this l.e.d. is on, it means that the signal light is switched-on (flashing).
- **OFF:** the l.e.d. signal light is switched-off.

LIGHT OK/ALARM (green/red):
- **ON (green):** the coder circuit is activated and no alarm is detected in the l.e.d. signal light by the coder circuit.
- **ON (red):** the coder circuit is activated and at least one alarm is detected in the l.e.d. signal light by the coder circuit.
- **OFF:** the coder circuit is not activated (stand-by or powered-off)

CODER OK/ALARM (green/red):
- **ON (green):** the coder circuit is activated and no alarm is detected in the coder circuit itself.
- **ON (red):** the coder circuit is powered-on and at least one alarm is detected in the coder circuit itself.
- **OFF:** the coder circuit is not activated (stand-by or powered-off)
- **FLASHING (red):** the coder circuit is detecting a power supply voltage that is lower than the minimum allowed threshold.

LAMP TEST:
This push-button can be used by the user in order to carry-out the lamp test of the l.e.d.'s installed on the front panel of the coder. While this push-button is pressed all the l.e.d.'s must be switched-on.

RESET:
This push-button can be used by the user in order to carry-out the reset of the coder circuit.

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7. COMPONENT LIST

7.1 SICE266-PWR

REF. ELECTRIC DIAGRAM *RIF. SCHEMA ELETTRICO*	Q.TY *Q.TÀ*	TYPE *TIPO*	*DESCRIZIONE*	DESCRIPTION
SICE 266-PWR	1	C.S. SICE 266-PWR	CIRC. STAMP.	PRINTED CIRCUIT BOARD
R1	1	1k 5% 2512	RESISTORE SMD	SMD RESISTOR
R2	1	180k 1% 0805	RESISTORE SMD	SMD RESISTOR
R3	1	100k 1% 0805	RESISTORE SMD	SMD RESISTOR
R4	1	68k 1% 0805	RESISTORE SMD	SMD RESISTOR
R5	1	470k 1% 0805	RESISTORE SMD	SMD RESISTOR
R6	1	56k 1% 0805	RESISTORE SMD	SMD RESISTOR
R7	1	10k 1% 0805	RESISTORE SMD	SMD RESISTOR
R8	1	4,7k 1% 0805	RESISTORE SMD	SMD RESISTOR
R9	1	10k 1% 0805	RESISTORE SMD	SMD RESISTOR
R10	1	10k 1% 0805	RESISTORE SMD	SMD RESISTOR
R11	1	47k 1% 0805	RESISTORE SMD	SMD RESISTOR
R12	1	1M 1% 0805	RESISTORE SMD	SMD RESISTOR
R13	1	2,2k 1% 0805	RESISTORE SMD	SMD RESISTOR
R14	1	47k 1% 0805	RESISTORE SMD	SMD RESISTOR
R15	1	10k 1% 0805	RESISTORE SMD	SMD RESISTOR
R16	1	47k 1% 0805	RESISTORE SMD	SMD RESISTOR
R17	1	47k 1% 0805	RESISTORE SMD	SMD RESISTOR
R18	1	1k 1% 0805	RESISTORE SMD	SMD RESISTOR
R19	1	1k 1% 0805	RESISTORE SMD	SMD RESISTOR
R20	1	10R 1% 0805	RESISTORE SMD	SMD RESISTOR
R21	1	47k 1% 0805	RESISTORE SMD	SMD RESISTOR
R22	1	33R 1% 0805	RESISTORE SMD	SMD RESISTOR
R23	1	10R 1% 0805	RESISTORE SMD	SMD RESISTOR
R24	1	47k 1% 0805	RESISTORE SMD	SMD RESISTOR
R25	1	47k 1% 0805	RESISTORE SMD	SMD RESISTOR
R26	1	2,2k 1% 0805	RESISTORE SMD	SMD RESISTOR
R27	1	100k 1% 0805	RESISTORE SMD	SMD RESISTOR
R28	1	3k 1% 0805	RESISTORE SMD	SMD RESISTOR
R29	1	33R 1% 0805	RESISTORE SMD	SMD RESISTOR
R30	1	47k 1% 0805	RESISTORE SMD	SMD RESISTOR

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REF. ELECTRIC DIAGRAM *RIF. SCHEMA ELETTRICO*	Q.TY *Q.TÀ*	TYPE *TIPO*	*DESCRIZIONE*	DESCRIPTION
R32	1	187k 1% 1206	RESISTORE SMD	SMD RESISTOR
R33	1	1k 1% 0805	RESISTORE SMD	SMD RESISTOR
R34	1	2,2k 5% 2W	RESISTORE CERAM.	CERAMIC RESISTOR
C1	1	10nF 50V 0805	CONDENSATORE CERAMICO SMD	CERAMIC SMD CAPACITOR
C2	1	100nF 50V 0805	CONDENSATORE CERAMICO SMD	CERAMIC SMD CAPACITOR
C3	1	100nF 50V 0805	CONDENSATORE CERAMICO SMD	CERAMIC SMD CAPACITOR
C4	1	47µF 50V (6,3x7,7)	CONDENSAT. ELETTROL. SMD	ELETTROL. SMD CAPACITOR
C5	1	1nF 50V 0805	CONDENSATORE CERAMICO SMD	CERAMIC SMD CAPACITOR
C6	1	1µF 50V 0805	CONDENSATORE CERAMICO SMD	CERAMIC SMD CAPACITOR
C7	1	47µF 50V (6,3x7,7)	CONDENSAT. ELETTROL. SMD	ELETTROL. SMD CAPACITOR
C8	1	100nF 50V 0805	CONDENSATORE CERAMICO SMD	CERAMIC SMD CAPACITOR
C9	1	100nF 50V 0805	CONDENSATORE CERAMICO SMD	CERAMIC SMD CAPACITOR
C10	1	100nF 50V 0805	CONDENSATORE CERAMICO SMD	CERAMIC SMD CAPACITOR
C11	1	100nF 50V 0805	CONDENSATORE CERAMICO SMD	CERAMIC SMD CAPACITOR
C12	1	1nF 50V 0805	CONDENSATORE CERAMICO SMD	CERAMIC SMD CAPACITOR
C13	1	100nF 50V 0805	CONDENSATORE CERAMICO SMD	CERAMIC SMD CAPACITOR
C14	1	100nF 50V 0805	CONDENSATORE CERAMICO SMD	CERAMIC SMD CAPACITOR
C15	1	47µF 50V (6,3x7,7)	CONDENSAT. ELETTROL. SMD	ELETTROL. SMD CAPACITOR
C16	1	100nF 50V 0805	CONDENSATORE CERAMICO SMD	CERAMIC SMD CAPACITOR
C17	1	10nF 50V 0805	CONDENSATORE CERAMICO SMD	CERAMIC SMD CAPACITOR
C18	1	100nF 50V 0805	CONDENSATORE CERAMICO SMD	CERAMIC SMD CAPACITOR
C19	1	47µF 50V (6,3x7,7)	CONDENSAT. ELETTROL. SMD	ELETTROL. SMD CAPACITOR
C20	1	1nF 50V 0805	CONDENSATORE CERAMICO SMD	CERAMIC SMD CAPACITOR
C21	1	100pF 50V 0805	CONDENSATORE CERAMICO SMD	CERAMIC SMD CAPACITOR
C22	1	100nF 50V 0805	CONDENSATORE CERAMICO SMD	CERAMIC SMD CAPACITOR
C23	1	1nF 50V 0805	CONDENSATORE CERAMICO SMD	CERAMIC SMD CAPACITOR
C24	1	4,7nF 250V p.5	CONDENSAT. PACCH. POLIEST.	POLYEST. SMD CAPACITOR
C25	1	470µF 63V (13x25)	CONDENSAT. ELETTROL. VERT.	ELETTROL. SMD CAPACITOR
C26	1	470µF 63V (13x25)	CONDENSAT. ELETTROL. VERT.	ELETTROL. SMD CAPACITOR
C27	1	47µF 250V (13x25)	CONDENSAT. ELETTROL. VERT.	ELETTROL. SMD CAPACITOR

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REF. ELECTRIC DIAGRAM *RIF. SCHEMA ELETTRICO*	Q.TY *Q.TÀ*	TYPE *TIPO*	*DESCRIZIONE*	DESCRIPTION
D1	1	SS16 DO214AC	DIODO SCHOTTKY SMD	SCHOTTKY SMD DIODE
D2	1	BAS21HT1G SOD-323	DIODO DI SEGNALE SMD	SMD DIODE
D3	1	BAS21HT1G SOD-323	DIODO DI SEGNALE SMD	SMD DIODE
D4	1	BAS21HT1G SOD-323	DIODO DI SEGNALE SMD	SMD DIODE
D5	1	ES3G DO214AB	DIODO ULTRAFAST SMD	ULTRAFAST DIODE
D6	1	SMCJ36 DO214AB	DIODO SOPPR. TRANS. SMD	SUPPRESSOR DIODE
D7	1	ES3G DO214AB	DIODO ULTRAFAST SMD	ULTRAFAST DIODE
DZ1	1	BZX384-C27 SOD-323	ZENER SMD	ZENER SMD
DZ2	1	BZX384-C12 SOD-323	ZENER SMD	ZENER SMD
U1	1	LM2671M-5.0 SO-8	STABILIZZ. SMD	SMD STABILIZER
U2	1	LP2951ACM SO-8	STABILIZZ. SMD	SMD STABILIZER
U3	1	LMV331M51 SOT23-5	INTEGRATO SMD	SMD INTEGRATED
U4	1	IRS21091SPBF SO-8	INTEGRATO SMD	SMD INTEGRATED
U5	1	UCC3800 PWM SO-8	INTEGRATO SMD	SMD INTEGRATED
Q1	1	FDN5630 SOT-23	MOSFET SMD	SMD MOSFET
Q2	1	BC847B SOT-23	TRANSISTOR NPN SMD	SMD TRANSISTOR NPN
Q3	1	MMBT92 SOT-23	TRANSISTOR PNP SMD	SMD TRANSISTOR PNP
Q4	1	MMBT92 SOT-23	TRANSISTOR PNP SMD	SMD TRANSISTOR PNP
Q5	1	IRFP4332 TO 247	MOSFET	MOSFET
Q6	1	IRFP4332 TO 247	MOSFET	MOSFET
L1	1	150µH/580mA (8x5)	INDUTT. SMD	SMD INDUCTOR
L2	1	TOROID. 3mH/0,7A	INDUTT. TOROIDALE	TOROIDAL INDUCTOR
L3	1	TOROID. 50µH/10A	INDUTT. TOROID. CAVO (LITZ)	TOROIDAL INDUCTOR (LITZ)
HS1	1	SK129	DISSIPATORE H. 35MM.	HEAT SINK
RV1	1	V250LA4P	SOPPRESS. DI TRANSIENTE	TRANSIENT SUPPRESSOR
M1	1	SL 7.62/05/90 3.2	COMM. MASCHIO 90° WEID.	90° MALE TERMINAL STRIP
M2	1	SL 3.50/20/90 3.2	COMM. MASCHIO 90° WEID.	90° MALE TERMINAL STRIP

SICE SRL PESARO

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REF. ELECTRIC DIAGRAM *RIF. SCHEMA ELETTRICO*	Q.TY *Q.TÀ*	TYPE *TIPO*	*DESCRIZIONE*	DESCRIPTION
CARDS FOR LANTERN WITH RANGE OF 10 NAUTICAL MILES MAX. SCHEDE PER FANALI CON UN RANGE DI MAX 10 MIGLIA NAUTICHE				
R31	1	330k 1% 0805	RESISTORE SMD	SMD RESISTOR
R35	1	0,1Ω 5% 6W	RESISTORE POTENZA	POWER RESISTOR
R (under M1)	/	NOT MOUNTED	RESISTENZA STD	STD RESISTOR
C28	/	NOT MOUNTED	CONDENSAT. ELETTROL. VERT.	ELETTROL. SMD CAPACITOR
CARDS FOR LANTERN WITH RANGE OF 15 NAUTICAL MILES SCHEDE PER FANALI CON UN RANGE DI 15 MIGLIA NAUTICHE				
R31	1	100k 1% 0805	RESISTORE SMD	SMD RESISTOR
R35	1	0,04Ω 5% 5W	RESISTORE POTENZA	POWER RESISTOR
R (under M1)	1	150k 1/4W 1%	RESISTENZA STD	STD RESISTOR
C28	1	47µF 250V (13x25)	CONDENSAT. ELETTROL. VERT.	ELETTROL. SMD CAPACITOR

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7.2 SICE266-CODER

REF. ELECTRIC DIAGRAM *RIF. SCHEMA ELETTRICO*	Q.TY *Q.TÀ*	TYPE *TIPO*	*DESCRIZIONE*	DESCRIPTION
SICE 266-CODER	1	C.S. SICE 266-CODER	CIRCUITO STAMPATO	PRINTED CIRCUIT BOARD
R1	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R2	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R3	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R4	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R5	1	120Ω 1% 0805	RESISTORE SMD	SMD RESISTOR
R6	1	4.7kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R7	1	4.7kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R8	1	330Ω 1% 1206 1/4W	RESISTORE SMD	SMD RESISTOR
R9	1	1kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R10	1	220Ω 1% 1206 1/4W	RESISTORE SMD	SMD RESISTOR
R11	1	0Ω 1% 0805	RESISTORE SMD	SMD RESISTOR
R12	1	0Ω 1% 0805	RESISTORE SMD	SMD RESISTOR
R13	1	0Ω 1% 0805	RESISTORE SMD	SMD RESISTOR
R14	1	0Ω 1% 0805	RESISTORE SMD	SMD RESISTOR
R15	1	0Ω 1% 0805	RESISTORE SMD	SMD RESISTOR
R16	1	220Ω 1% 0805	RESISTORE SMD	SMD RESISTOR
R17	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R18	1	100Ω 1% 0805	RESISTORE SMD	SMD RESISTOR
R19	1	100Ω 1% 0805	RESISTORE SMD	SMD RESISTOR
R20	1	100Ω 1% 0805	RESISTORE SMD	SMD RESISTOR
R21	1	3.3kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R22	1	2.7kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R23	1	33kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R24	1	470kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R25	1	220kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R27	1	33kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R28	1	1MΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R29	1	120kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R30	1	470kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R31	1	220kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R33	1	4.7kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R34	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR

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REF. ELECTRIC DIAGRAM *RIF. SCHEMA ELETTRICO*	Q.TY *Q.TÀ*	TYPE *TIPO*	*DESCRIZIONE*	DESCRIPTION
R35	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R36	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R37	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R38	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R39	1	100Ω 1% 0805	RESISTORE SMD	SMD RESISTOR
R40	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R41	1	100Ω 1% 0805	RESISTORE SMD	SMD RESISTOR
R42	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R43	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R44	1	56kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R45	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R46	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R47	1	220Ω 1% 0805	RESISTORE SMD	SMD RESISTOR
R48	1	22kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R49	1	2.2kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R50	1	1MΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R51	1	1MΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R52	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R53	1	3.3kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R54	1	2.7kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R55	1	2.7kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R56	1	2.7kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R57	1	4.7kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R58	1	4.7kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R59	1	100Ω 1% 0805	RESISTORE SMD	SMD RESISTOR
R60	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R61	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
R62	1	100Ω 1% 0805	RESISTORE SMD	SMD RESISTOR
R63	1	10kΩ 1% 0805	RESISTORE SMD	SMD RESISTOR
C1	1	10uF 35V tipo 5x5	CONDENSAT. ELETTROL. SMD	ELETTROL. SMD CAPACITOR
C2	1	22uF 50V tipo 6.3x5.5	CONDENSAT. ELETTROL. SMD	ELETTROL. SMD CAPACITOR
C3	1	100nF 0805	CONDENSATORE CERAMICO SMD	CERAMIC SMD CAPACITOR
C5	1	470nF 25V 0805	CONDENSATORE CERAMICO SMD	CERAMIC SMD CAPACITOR
C6	1	100nF 0805	CONDENSATORE CERAMICO SMD	CERAMIC SMD CAPACITOR

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REF. ELECTRIC DIAGRAM *RIF. SCHEMA ELETTRICO*	Q.TY *Q.TÀ*	TYPE *TIPO*	*DESCRIZIONE*	DESCRIPTION
C7	1	4.7uF 35V tipo 4x5.5	CONDENSAT. ELETTROL. SMD	ELETTROL. SMD CAPACITOR
C8	1	100nF 0805	CONDENSATORE CERAMICO SMD	CERAMIC SMD CAPACITOR
C9	1	100nF 0805	CONDENSATORE CERAMICO SMD	CERAMIC SMD CAPACITOR
C10	1	33pF 0805	CONDENSATORE CERAMICO SMD	CERAMIC SMD CAPACITOR
C11	1	33pF 0805	CONDENSATORE CERAMICO SMD	CERAMIC SMD CAPACITOR
C12	1	100nF 0805	CONDENSATORE CERAMICO SMD	CERAMIC SMD CAPACITOR
C13	1	100nF 0805	CONDENSATORE CERAMICO SMD	CERAMIC SMD CAPACITOR
C14	1	47nF 0805	CONDENSATORE CERAMICO SMD	CERAMIC SMD CAPACITOR
C15	1	1nF 0805	CONDENSATORE CERAMICO SMD	CERAMIC SMD CAPACITOR
C16	1	100nF 0805	CONDENSATORE CERAMICO SMD	CERAMIC SMD CAPACITOR
C17	1	100nF 0805	CONDENSATORE CERAMICO SMD	CERAMIC SMD CAPACITOR
C18	1	470nF 25V 0805	CONDENSATORE CERAMICO SMD	CERAMIC SMD CAPACITOR
C19	1	100nF 0805	CONDENSATORE CERAMICO SMD	CERAMIC SMD CAPACITOR
C20	1	100nF 0805	CONDENSATORE CERAMICO SMD	CERAMIC SMD CAPACITOR
D1	1	TMMBAT-48	DIODO MINIMELF	MINIMELF DIODE
D2	1	ZMM4.7	DIODO ZENER MINI-MELF	MINIMELF ZENER DIODE
D3	1	BAS216	DIODO DI RICIRCOLO CASE SOD110	SOD110 DIODE
D4	1	BAS216	DIODO DI RICIRCOLO CASE SOD110	SOD110 DIODE
D5	1	BAS216	DIODO DI RICIRCOLO CASE SOD110	SOD110 DIODE
D6	1	BAS216	DIODO DI RICIRCOLO CASE SOD110	SOD110 DIODE
D7	1	BAS216	DIODO DI RICIRCOLO CASE SOD110	SOD110 DIODE
D8	1	SMAJ6.0CA-TR	DIODO SOPPRESS. TRANSIENTI	TRANSIENT SUPP. DIODE
D9	1	SMAJ6.0CA-TR	DIODO SOPPRESS. TRANSIENTI	TRANSIENT SUPP. DIODE
D10	1	SMAJ6.0CA-TR	DIODO SOPPRESS. TRANSIENTI	TRANSIENT SUPP. DIODE
D11	1	SMAJ6.0CA-TR	DIODO SOPPRESS. TRANSIENTI	TRANSIENT SUPP. DIODE
D12	1	SMAJ8.5CA-TR	DIODO SOPPRESS. TRANSIENTI	TRANSIENT SUPP. DIODE
X1	1	20MHz mercury	QUARZO SMD BASSO PROFILO	SMD QUARTZ
F1	1	SMD100F-2	FUSIBILE RIPRISTINABILE	MULTIFUSE
U1	1	ITS 4142N infineon	SWITCH DI POTENZA CASE SOT223	SOT223 POWER SWITCH
U2	1	TSR1-24150 traco power	STABILIZZATORE DI TENSIONE 15V	VOLTAGE STABILIZER
U3	1	MAX483EESA+ maxim	TTL/RS485 INTERFACE CASE 8SO	DIGITAL/RS485 INTERFACE
U4	1	MCP6024-I/SL microchip	QUAD OP AMPS CASE SOIC	QUAD OP AMPS CASE SOIC

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U5	1	PIC16F628A-I/SO	MICROCONTROLLORE SOIC18	MICROCONTROLLER
U6	1	MAX1238EEE maxim	A/D CONVERTER CASE QSOP	A/D CONVERTER CASE QSOP
U7	1	MCP6024-I/SL microchip	QUAD OP AMPS CASE SOIC	QUAD OP AMPS CASE SOIC
U8	1	PIC18F4620-I/PT	MICROCONTROLLORE CASE TQFP	MICROCONTROLLER
U9	1	74HC14D	HEX SCHMITT INVERTER SO-14	HEX SCHMITT INVERTER SO-14
U10	1	IRLL-110	MOSFET CASE SOT223	MOSFET CASE SOT223
U11	1	MAX6301ESA+ maxim	SISTEMA SUPERVISIONE CASE 8SO	SUPERVISION SYSTEM
U12	1	24AA512-I/SM microchip	MEMORIA EEPROM	EEPROM MEMORY
LD1	1	LY T676 osram	DIODO LED GIALLO	SMD LED (YELLOW)
LD2	1	LY T676 osram	DIODO LED GIALLO	SMD LED (YELLOW)
LD3	1	LSG T676 osram	DIODO LED ROSSO/VERDE	SMD LED (RED/GREEN)
LD4	1	LSG T676 osram	DIODO LED ROSSO/VERDE	SMD LED (RED/GREEN)
LD5	1	LTST-C170KGKT	LED VERDE SMD LITEON	GREEN LED SMD LITEON
RL1	1	TXS2-24VDC Panasonic	RELÈ MINIAT. MONOSTABILE	MONOSTABLE MINIAT. RELAY
RL2	1	TXS2-L2-24VDC	RELÈ MINIATURIZZATO BISTABILE	BISTABLE MINIAT. RELAY
RL3	1	TXS2-L2-24VDC	RELÈ MINIATURIZZATO BISTABILE	BISTABLE MINIAT. RELAY
P1	1	B3S-1002 omron	PULSANTE OMRON IN SMD	SMD PUSH-BUTTON
P2	1	B3S-1002 omron	PULSANTE OMRON IN SMD	SMD PUSH-BUTTON
PROG-MAIN (MCU-MAIN)	1	MOLEX 95003	CONNETTORE TELEFONICO SMD	SMD RJ CONNECTOR
PROG-SEC (MCU-SECOND.)	1	Pin strip singola fila 180° 5 poli 2.54mm	PIN STRIP SINGOLA FILA 180° 5 POLI 2.54MM	PIN STRIP 5 POLES
PS	1	Pin strip singola fila 90° 30 poli 2mm	PIN STRIP SINGOLA FILA 90° 30 POLI 2MM	PIN STRIP 30 POLES
DIP1	1	IKH-08 apem	DIP SWITCH (8 VIE) SMD	SMD DIP SWITCH
Q1	1	PMBF170 philips	MOS SMD (SOT-23)	SMD MOSFET (SOT-23)
Q2	1	PMBF170 philips	MOS SMD (SOT-23)	SMD MOSFET (SOT-23)
Q3	1	PMBF170 philips	MOS SMD (SOT-23)	SMD MOSFET (SOT-23)
Q4	1	PMBF170 philips	MOS SMD (SOT-23)	SMD MOSFET (SOT-23)
Q5	1	PMBF170 philips	MOS SMD (SOT-23)	SMD MOSFET (SOT-23)
Q6	1	PMBF170 philips	MOS SMD (SOT-23)	SMD MOSFET (SOT-23)

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8. ENVIRONMENTAL NOTES

ENVIRONMENTAL ASPECT EXPLANATION

SICE S.R.L., since 2003, has been adopting an Environmental management system integrated with the Quality control one, with the aim of checking and improving in the time the impacts on the environment connected to our activities and products. The system, designed in accordance with UNI EN ISO 14001 rule and, for this standard rule, certified by RINA, consists in planning the activities of designing, manufacturing and testing of our products keeping into account the environmental aspects connected to it. Such aspects regard both the activities which have a direct environmental impact (such as equipment manufacturing in SICE factory) and the ones which have an indirect environmental impact such as the matters relevant to the manufactured product (management of litter at life end, power consumptions during the working phase, etc.) and the activities relevant to the companies which carry out externally some working on the equipment (painting, wiring, etc.).

ENVIRONMENTAL ASPECTS

The equipment made by SICE S.R.L. is designed and manufactured in order to minimize its environmental impact in all the phases of its existence, from the manufacturing to the final disposal.

FINAL DISPOSAL OF THE EQUIPMENT

The equipment disposal has to be done respecting fully the applicable rules in the country where the equipment has to be disposed.
From the point of view of reutilization and recycling, the equipment is made mainly with materials easily reclaimable (iron, steel and aluminium) reducing, to the minimum, the presence of dangerous substances for the environment.
The equipment contains some components which, at the moment of the final disposal, have to be removed and started off on the separate treatment because they have some specific disposal problems. Such components are:

- Printed circuits with surface larger than 10 cm^2

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1.28 MEAN WELL BATTERY CHARGER MODULE RPB-1600-24 DATA SHEET

MEAN WELL

1600W Intelligent Single Output Battery Charger **RPB-1600 series**

Dimension

L	*	W	*	H	
300	*	85	*	41 (1U)	mm
11.8	*	3.35	*	1.61(1U)	inch

Front



User's Manual

Back





TAIWAN EXCELLENCE 2017 PMBus

Parallel PFC c UL us UL62368-1 BS EN/EN62368-1 EAC TPTC004 CB IEC62368-1 CE UKCA

Industrial Automate Telecom Network EV Marine

Features

- Charger for lead-acid batteries (Gel, flooded and AGM) and Li-ion batteries (lithium iron and lithium manganese)
- Built-in default 3 stage charging curves and programmable curve
- Built-in I²C interface, PMBus protocol (Optional CANBus protocol)
- Universal AC input / Full range (Withstand 300VAC surge input for 5 seconds)
- Built-in active PFC function
- Forced air cooling by built-in DC fan
- Output voltage and current programmable
- Built-in OR-ing FET
- Active current sharing up to 4800W(2+1)
- Protections: Battery under voltage / Battery no connection / Short circuit / Over voltage / Over temperature
- Optional conformal coating
- 5 years warranty

Applications

- Large scale DC UPS or emergency backup system
- Marine battery charger module
- Electric scooter or vehicle charger station
- Wastewater treatment system
- Electrolysis system

GTIN CODE

MW Search: https://www.meanwell.com/serviceGTIN.aspx

Description

RPB-1600 is a 1.6KW single output AC/DC charger with a high power density up to 25W/inch³. Three embedded charging curves, specifically for the lead-acid batteries, are built into each model. Thanks to the communication protocol, PMBus, and CANBus one spare curve can be further accommodated to fit other types of batteries such as the li-ion batteries. Each model is cooled by the thermostatically controlled fan. Moreover, RPB-1600 provides various protection mechanisms, offering the best safety for diversified types of applications.

Model Encoding

RPB - 1600 - 12 ☐

- ☐ Communication protocol option
- 12 Nominal voltage
- 1600 Output wattage
- RPB Series name

Type	Communication Protocol	Note
Blank	PMBus protocol	In Stock
CAN	CANBus protocol	By request

File Name:RPB-1600-SPEC 2024-02-02

MEAN WELL 1600W Intelligent Single Output Battery Charger **RPB-1600 series**

SPECIFICATION

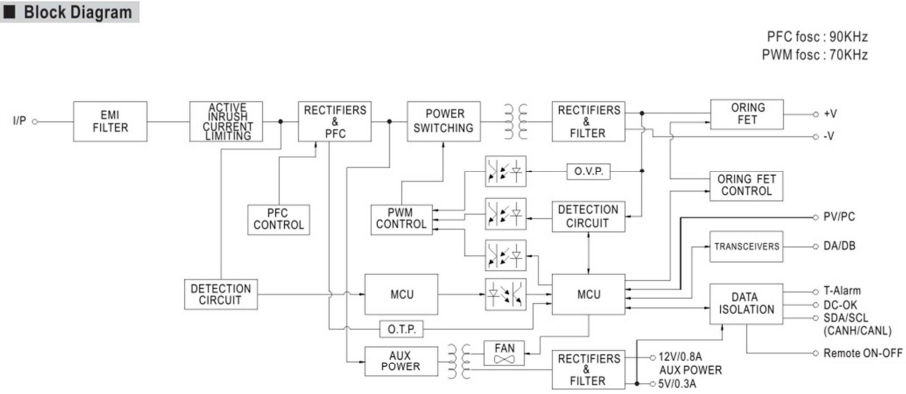
MODEL		RPB-1600-12	RPB-1600-24	RPB-1600-48
OUTPUT	BOOST CHARGE VOLTAGE(Vboost)(default)	14.4V	28.8V	57.6V
	FLOAT CHARGE VOLTAGE(Vfloat)(default)	13.8V	27.6V	55.2V
	CONSTANT CURRENT(CC)(default)	100A	55A	27.5A
	VOLTAGE ADJ. RANGE Note 5	By built-in potentiometer, SVR		
		11.5 ~ 15V	23.5 ~ 30V	47.5 ~ 58.8V
	RECOMMENDED BATTERY CAPACITY(AMP HOURS) Note.3	330 ~ 1000Ah	180 ~ 550Ah	90 ~ 270Ah
	LEAKAGE CURRENT FROM BATTERY (Typ.) Note.8	<45mA		
INPUT	VOLTAGE RANGE Note.4	90 ~ 264VAC 250 ~ 370VDC		
	FREQUENCY RANGE	47 ~ 63Hz		
	POWER FACTOR (Typ.)	0.97/230VAC at full load		
	EFFICIENCY (Typ.)	91%	92.5%	93.5%
	AC CURRENT (Typ.) Note.4	14A/115VAC 8A/230VAC	15A/115VAC 8.5A/230VAC	
	INRUSH CURRENT (Typ.)	COLD START 35A/230VAC		
	LEAKAGE CURRENT	<2mA / 240VAC		
PROTECTION	OVER VOLTAGE	15.75 ~ 18.75V	31.5 ~ 37.5V	63 ~ 75V
		Protection type : Shut down o/p voltage, re-power on to recover		
	OVER TEMPERATURE	Shut down o/p voltage, recovers automatically after temperature goes down		
FUNCTION	AUXILIARY POWER	5V @ 0.3A, 12V @ 0.8A		
	REMOTE ON-OFF CONTROL	By electrical signal or dry contact Power ON:short Power OFF:open. Please refer to Function Manual		
	OUTPUT VOLTAGE PROGRAMMABLE(PV) Note 5	Adjustment of output voltage is allowable to 75 ~ 125% of nominal output voltage Please refer to the Function Manual.		
	OUTPUT CURRENT PROGRAMMABLE(PC) Note 5	Adjustment of output current is allowable to 20 ~ 100% of rated current Please refer to the Function Manual.		
	TEMPERATURE COMPENSATION	-3mV / ℃ / cell / (12V = 6 cells ; 24V = 12 cells ; 48V = 24 cells)		
	ALARM SIGNAL	Isolated signal output for T-alarm and DC OK		
ENVIRONMENT	WORKING TEMP.	-30 ~ +70℃ (Refer to "Derating Curve")		
	WORKING HUMIDITY	20 ~ 90% RH non-condensing		
	STORAGE TEMP., HUMIDITY	-40 ~ +85℃, 10 ~ 95% RH non-condensing		
	TEMP. COEFFICIENT	±0.03%/℃ (0 ~ 50℃)		
	VIBRATION	10 ~ 500Hz, 2G 10min./1cycle, 60min. each along X, Y, Z axes		
SAFETY & EMC (Note 6)	SAFETY STANDARDS	UL62368-1, TUV BS EN/EN62368-1, EAC TP TC 004 approved		
	WITHSTAND VOLTAGE	I/P-O/P:3KVAC I/P-FG:2KVAC O/P-FG:1.5KVAC		
	ISOLATION RESISTANCE	I/P-O/P, I/P-FG, O/P-FG:100M Ohms / 500VDC / 25℃/ 70% RH		
	EMC EMISSION	Compliance to BS EN/EN55032 (CISPR32) Conduction Class B, Radiation Class A ; BS EN/EN61000-3-2,-3, EAC TP TC 020		
	EMC IMMUNITY	Compliance to BS EN/EN61000-4-2,3,4,5,6,8,11, BS EN/EN55035, EAC TP TC 020		
OTHERS	MTBF	457.7K hrs min. Telcordia SR-332 (Bellcore) ; 100.3K hrs min. MIL-HDBK-217F (25℃)		
	DIMENSION	300*85*41mm (L*W*H)		
	PACKING	2.1Kg;6pcs/13.6Kg/1.25CUFT		
NOTE	1. Modification for charger specification may be required for different battery specification. Please contact battery vendor and MEAN WELL for details. 2. All parameters NOT specially mentioned are measured at 230VAC input, rated load and 25℃ of ambient temperature. 3. This is MEAN WELL's suggested range. Please consult your battery manufacturer for their suggestions about maximum charging current limitation. 4. Derating may be needed under low input voltages. Please check the derating curve for more details. 5. PV/PC functions when users are not operating on PMBus/CANBus. SVR functions when users are neither operating on PMBus/CANBus nor using PV/PC. 6. The charger is considered a component which will be installed into a final equipment. All the EMC tests are been executed by mounting the unit on a 720mm*360mm metal plate with 1mm of thickness. The final equipment must be re-confirmed that it still meets EMC directives. For guidance on how to perform these EMC tests, please refer to "EMI testing of component power supplies." (as available on https://www.meanwell.com//Upload/PDF/EMI_statement_en.pdf) 7. The ambient temperature derating of 3.5℃/1000m with fanless models and of 5℃/1000m with fan models for operating altitude higher than 2000m(6500ft). 8. When charging lead acid battery or battery without BMS, use breaker to disconnect charger and battery after fully charged. ※ Product Liability Disclaimer : For detailed information, please refer to https://www.meanwell.com/serviceDisclaimer.aspx		

File Name:RPB-1600-SPEC 2024-02-02

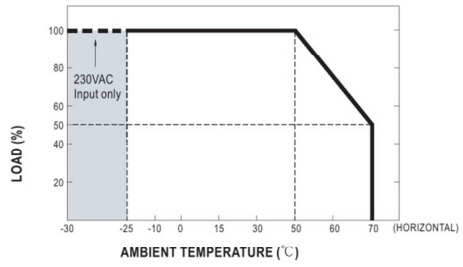
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MEAN WELL 1600W Intelligent Single Output Battery Charger **RPB-1600 series**

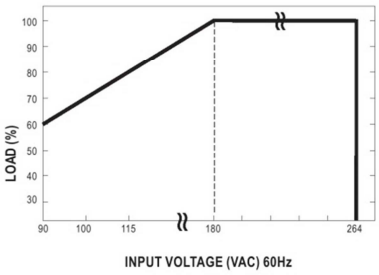
■ Block Diagram



■ Derating Curve



■ Static Characteristics



File Name:RPB-1600-SPEC 2024-02-02

MEAN WELL 1600W Intelligent Single Output Battery Charger **RPB-1600 series**

■ Function Manual

1.PMBus Communication Interface

※ RPB-1600 supports PMBus Rev. 1.1 with maximum 100KHz bus speed, allowing information reading, status monitoring, output trimming, etc. For details, please refer to the Installation Manual.

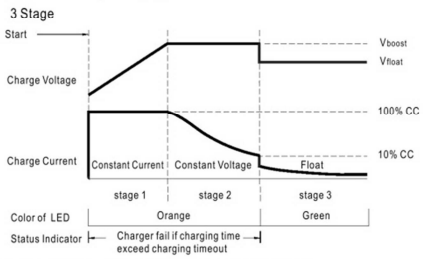
2.Charging Curve

※ By factory default, this charger performs the default curve which can be programmed via PMBus and CANBus. PIN10 and PIN14 on CN1 are thus shorted by default.

※ To disable/ enable the charging curve, change to a 2 stage curve, a different curve frequently used for certain types of batteries in the industry, switch to PMBus, CANBus, PV/PC or SVR control instead and so on, please refer to the Installation Manual.

※ To program the parameters of the charging curve, SBP-001, the smart battery charging programmer designed by MEAN WELL, and a personal computer are needed. Please contact MEAN WELL for details.

◎ Default 3 stage charging curve



◎ Suitable for lead-acid batteries (flooded, Gel and AGM) and Li-ion batteries (lithium iron and lithium manganese).

◎ Embedded 3 stage charging curve

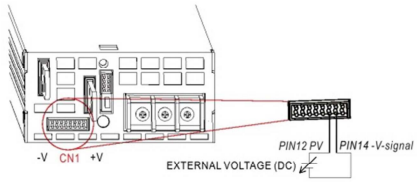
MODEL	Description	Vboost	Vfloat	CC (default)
12V	Default, programmable	14.4	13.8	100A
	Pre-defined, gel battery	14	13.6	
	Pre-defined, flooded battery	14.2	13.4	
	Pre-defined, AGM battery	14.5	13.5	
24V	Default, programmable	28.8	27.6	55A
	Pre-defined, gel battery	28	27.2	
	Pre-defined, flooded battery	28.4	26.8	
	Pre-defined, AGM battery	29	27	
48V	Default, programmable	57.6	55.2	27.5A
	Pre-defined, gel battery	56	54.4	
	Pre-defined, flooded battery	56.8	53.6	
	Pre-defined, AGM battery	58	54	

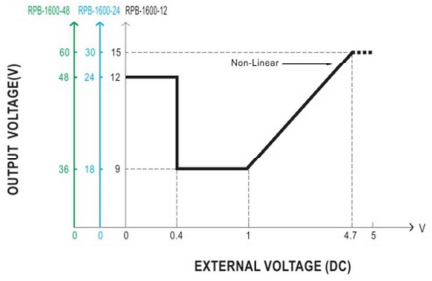
3. Front Panel LED Indicators & Corresponding Signal at Function Pins

LED	Description
Green	Float (stage 3)
Orange	Charging (stage 1 or stage 2)
Red	Abnormal status (OTP, OLP, Fan Fail, Charging timeout.)
Red (Flashing)	The LED will flash with the red light when the internal temperature reaches 60℃; under this condition, the unit still operates normally without entering OTP. (In the meantime, an alarm signal will be sent out through the PMBus interface.)

4. Output Voltage Programming (or, PV / remote voltage programming / remote adjust / margin programming / dynamic voltage trim)

※ In addition to the adjustment via the built-in potentiometer, the output voltage can be trimmed by applying EXTERNAL VOLTAGE.



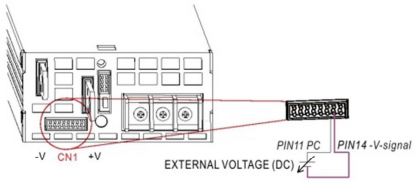


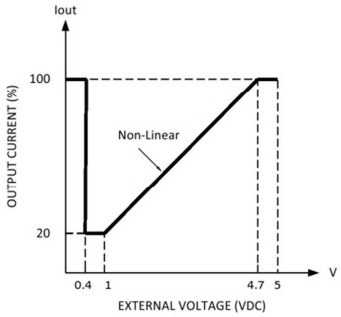
File Name:RPB-1600-SPEC 2024-02-02

MEAN WELL 1600W Intelligent Single Output Battery Charger **RPB-1600 series**

5. Output Current Programming (or, PC / remote current programming / dynamic current trim)

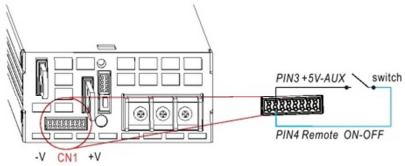
※ The output current can be trimmed to 20~100% of the rated current by applying EXTERNAL VOLTAGE.





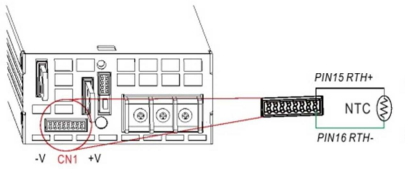
6. Remote ON-OFF Control

The power supply can be turned ON/OFF individually or along with other units in parallel by using the "Remote ON-OFF" function.

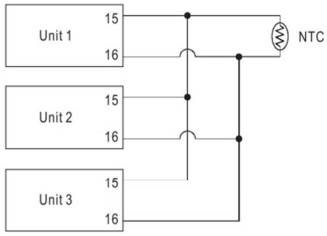


Between Remote ON-OFF and +5V-AUX	Power Supply Status
Switch Short	ON
Switch Open	OFF

7.Temperature Compensation



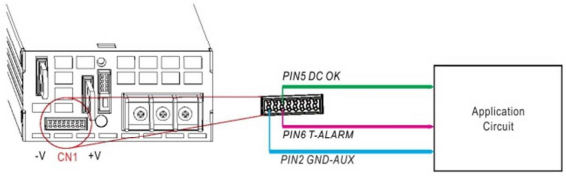
◎ To exploit the temperature compensation function, please attach the temperature sensor, NTC, which is enclosed with the charger, to the battery or the battery's vicinity.
◎ The charger is able to work normally without the NTC.



When multiple chargers are connected in parallel, please configure with the NTC as exhibited in the diagram .
If the temperature compensation is not required, RTH+ (PIN15) and RTH- (PIN16) from each unit still need to be connected.

8. Alarm Signal Output

※ There are 2 alarm signals, DC OK and T-ALARM, in TTL signal form, on CN1. These signals are isolated from output. The maximum sink current is 10mA.



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MEAN WELL 1600W Intelligent Single Output Battery Charger **RPB-1600 series**

9.Current Sharing

RPB-1600 has the built-in active current sharing function and can be connected in parallel, up to 3 units, to provide higher output power as exhibited below :

※ The power supplies should be paralleled using short and large diameter wiring and then connected to the load.

※ Difference of output voltages among parallel units should be less than 0.2V.

※ The total output current must not exceed the value determined by the following equation:
Maximum output current at parallel operation=(Rated current per unit)×(Number of unit)×0.9

※ When the total output current is less than 5% of the total rated current, or say (5% of Rated current per unit)×(Number of unit) the current shared among units may not be balanced.

※ CN500/SW1 Function pin connection

Parallel	PSU1		PSU2		PSU3	
	CN500	SW1	CN500	SW1	CN500	SW1
1 unit	X	ON	—	—	—	—
2 unit	V	ON	V	ON	—	—
3 unit	V	ON	V	OFF	V	ON

(V : CN500 connected ; X : CN500 not connected.)

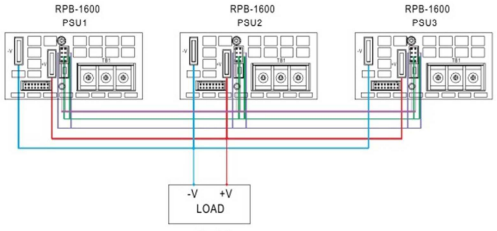
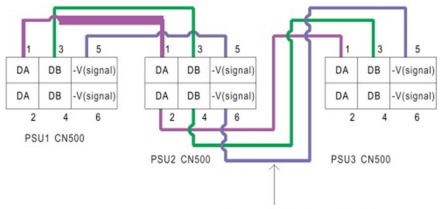


Fig 5.1



If the lines of CN500 are too long, they should be twisted in pairs to avoid the noise.

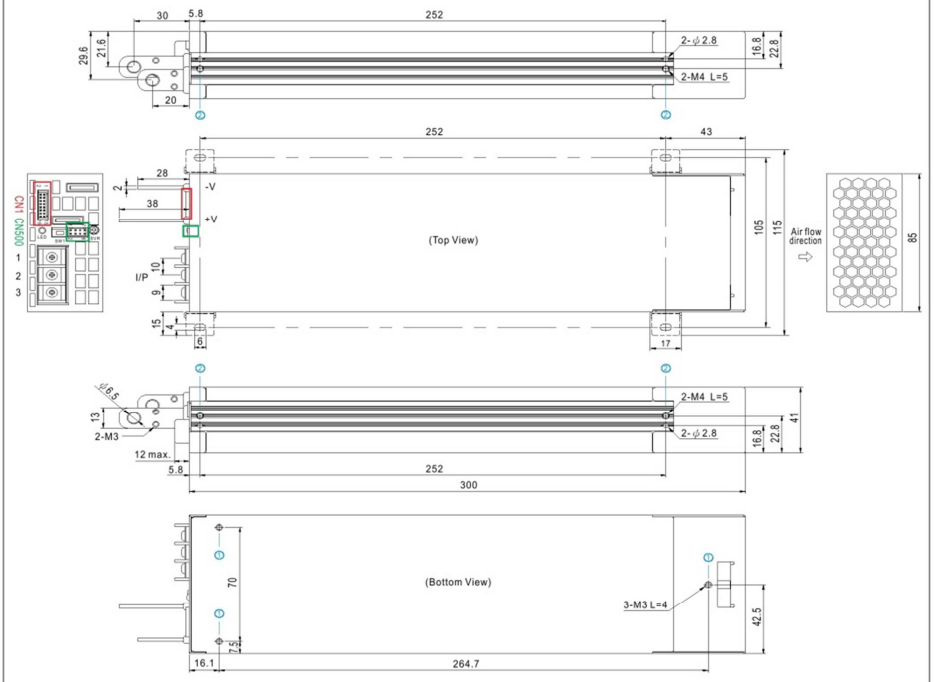
◎ DA,DB and -V(signal) are connected mutually in parallel.

File Name:RPB-1600-SPEC 2024-02-02

MEAN WELL 1600W Intelligent Single Output Battery Charger **RPB-1600 series**

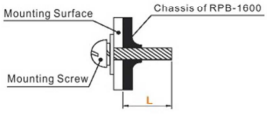
■ Mechanical Specification

Case No.250 Unit:mm



※ Mounting Instruction

Hole No.	Recommended Screw Size	MAX. Penetration Depth L	Recommended mounting torque
①	M3	4mm	6~8Kgf-cm
②	M4	5mm	7~10Kgf-cm



※Control Pin No. Assignment(CN1) : HRS DF11-16DP-2DS or equivalent



Mating Housing	HRS DF11-16DS or equivalent
Terminal	HRS DF11-**SC or equivalent

Pin No.	Function	Description
1	+12V-AUX	Auxiliary voltage output, 10.6~13.2V, referenced to GND-AUX (pin2). The maximum load current is 0.8A. This output has the built-in "Oring diodes" and is not controlled by "Remote ON-OFF".
2	GND-AUX	Auxiliary voltage output GND. The signal return is isolated from the output terminals (+V & -V).
3	+5V-AUX	Auxiliary voltage output, 4.5~5.5V, referenced to GND-AUX (pin2). The maximum load current is 0.3A. This output has the built-in "Oring diodes" and is not controlled by "Remote ON-OFF
4	Remote ON-OFF	The unit can turn the output ON/OFF by electrical signal or dry contact between *Remote ON/OFF* and *+5V-AUX*. (Note.2) Short (4.5 ~ 5.5V) : Power ON ; Open (-0.5 ~ 0.5V) : Power OFF ; The maximum input voltage is 5.5V.
5	$\overline{\text{DC-OK}}$	High (3.5 ~ 5.5V) : When the Vout ≦8V/16V/32V ±1V. Low (-0.5 ~ 0.5V) : When Vout ≧8V/16V/32V ±1V. The maximum sourcing current is 10mA and only for output. (Note.2) *DC OK* is associated with battery low protection.
6	T-ALARM	High (3.5 ~ 5.5V) : When the internal temperature exceeds the limit of temperature alarm, or when Fan fails. Low (-0.5 ~ 0.5V) : When the internal temperature is normal, and when Fan normally works. The maximum sourcing current is 10mA and only for output(Note.2)
7,8,9	A0,A1,A2	PMBus / CANBus interface address lines. (Note.1)
10	D0	Charging mechanism control. This pin determines, for charging operation, whether charging curve is used, or control over PMBus, PV/PC or SVR is used. Please refer to the installation Manual. (Note.1)
11	PC	Connection for output current programming. (Note.1)
12	PV	Connection for output voltage programming. (Note.1)
13	+V (Signal)	Positive output voltage signal. It cannot be connected directly to the load.
14	-V (Signal)	Negative output voltage signal. It is for certain function reference; it cannot be connected directly to the load.
15	RTH+	Temperature sensor(NTC, 5KOhm) comes along with the charger can be connected to the unit to allow temperature compensation of the charging voltage.
16	RTH-	

Note1: Non-isolated signal, referenced to the [-V(signal)].
Note2: Isolated signal, referenced to GND-AUX.

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MEAN WELL 1600W Intelligent Single Output Battery Charger **RPB-1600 series**

※AC Input Terminal Pin No. Assignment

Pin No.	Assignment	Diagram	Maximum mounting torque
1	FG ⏚		8Kgf-cm
2	AC/N		
3	AC/L		

※Control Pin No. Assignment(CN500) : HRS DF11-8DP-2DS or equivalent



Mating Housing	HRS DF11-8DS or equivalent
Terminal	HRS DF11-**SC or equivalent

Pin No.	Function	Description
1,2	DA	Differential digital signal for parallel control. (Note.1)
3,4	DB	Differential digital signal for parallel control. (Note.1)
5,6	-V (Signal)	Negative output voltage signal. It is for certain function reference; it cannot be connected directly to the load.
7	SDA	For PMBus model: Serial Data used in the PMBus interface. (Note.2)
	CANH	For CANBus model: Data line used in CANBus interface. (Note.2)
8	SCL	For PMBus model: Serial Clock used in the PMBus interface. (Note.2)
	CANL	For CANBus model: Data line used in CANBus interface. (Note.2)

Note1: Non-isolated signal, referenced to [-V(signal)].
Note2: Isolated signal, referenced to GND-AUX.

※Control Pin No. Assignment(SW1)

Pin No.	Function	Description
1,2	Terminal resistance	SW1 is the selector of terminal resistor that is designed for DA/DB signals and parallel control function.

File Name:RPB-1600-SPEC 2024-02-02

1.29 MEAN WELL BATTERY CHARGER MODULE RPB-1600-24 MANUAL



RPB-1600
Instruction Manual

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RPB-1600 Instruction Manual

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Nov. 2023 Version 5

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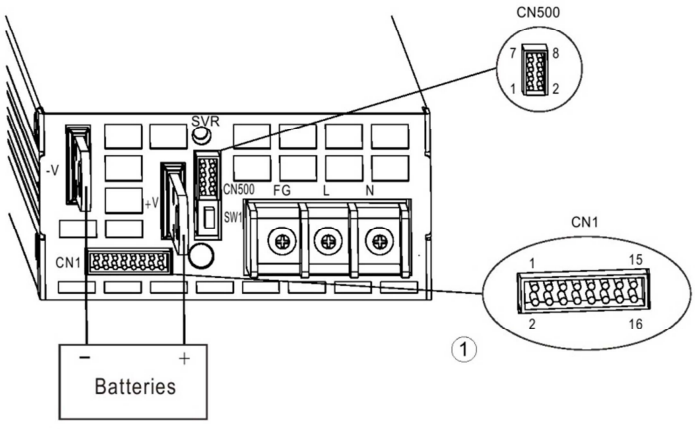
0.Product Description

RPB-1600 is MEAN WELL's new generation intelligent battery charger with high power density. Different battery brands and types (lead acid batteries, such as flooded, Gel, AGM, and so on, or lithium-ion batteries, such as lithium iron, lithium manganese, and so on) may require different charging curves and protection mechanisms for batteries. RPB-1600 is able to be accommodated through the communication interface; parameters, such as charge voltage, charge current and taper current, can be adjusted and the protection mechanisms for batteries can also be cancelled.

1.Notes on Operation

◎ The charger must be installed in a dry and well ventilated area. It should not be exposed to rain or snow.
◎ The cables between charger and battery should be kept as short as possible to prevent excessive voltage drop. Too much voltage drop will lead to longer charging period.
◎ Please make sure charging voltage and current meet battery specification.
◎ While charging batteries in series, do not mix old and new batteries in the same connection.
◎ When connecting or disconnecting wires, please ensure the charger is OFF.
◎ Under normal operating conditions, a 5 years warranty is offered for RPB-1600. If failure results from improper operation, the warranty will not apply to the defective units.

2.Mechanical Design and Installation Procedure



Warning: Before connecting a battery, please make sure the polarity is correct to avoid damaging the charger

Figure2.1 Front panel

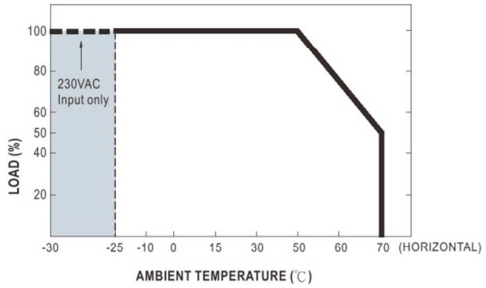
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Installation Procedure:

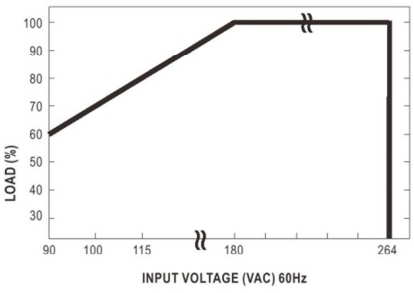
Please make sure the charger is OFF before connecting the battery to the output terminal. Choose a cable with suitable wire gauge according to the charging current to connect between the charger and the battery. Battery polarity must be connected correctly:Terminal(+) to Battery(+); Terminal(-) to Battery(-), and take notice that the positive and negative ends are not shorted.

3.Derating Curve

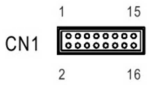
3.1 Charging current vs Temperature



3.2 Charging current vs Input Voltage



4.Pin Assignment



Pin No.	Function	Description
1	+12V-AUX	Auxiliary voltage output, 10.6~13.2V, referenced to GND-AUX (pin2). The maximum load current is 0.8A. This output has the built-in "Oring diodes" and is not controlled by "Remote ON-OFF".
2	GND-AUX	Auxiliary voltage output GND. The signal return is isolated from the output terminals (+V & -V).
3	+5V-AUX	Auxiliary voltage output, 4.5~5.5V, referenced to GND-AUX (pin2). The maximum load current is 0.3A. This output has the built-in "Oring diodes" and is not controlled by "Remote ON-OFF
4	Remote ON-OFF	The unit can turn the output ON/OFF by electrical signal or dry contact between *Remote ON/OFF* and *+5V-AUX*. (Note.2) Short (4.5 ~ 5.5V) : Power ON ; Open (-0.5 ~ 0.5V) : Power OFF ; The maximum input voltage is 5.5V.
5	$\overline{\text{DC-OK}}$	High (3.5 ~ 5.5V) : When the Vout ≦8V/16V/32V ±1V. Low (-0.5 ~ 0.5V) : When Vout ≧8V/16V/32V ±1V. The maximum sourcing current is 10mA and only for output. (Note.2) *DC OK* is associated with battery low protection.
6	T-ALARM	High (3.5 ~ 5.5V) : When the internal temperature exceeds the limit of temperature alarm, or when Fan fails. Low (-0.5 ~ 0.5V) : When the internal temperature is normal, and when Fan normally works. The maximum sourcing current is 10mA and only for output(Note.2)
7,8,9	A0,A1,A2	PMBus interface address lines. (Note.1)
10	D0	DIP-switch interface lines for charging curve selection. (Note.1)
11	PC	Connection for output current programming. (Note.1)
12	PV	Connection for output voltage programming. (Note.1)
13	+V (Signal)	Positive output voltage signal. It cannot be connected directly to the load.
14	-V (Signal)	Negative output voltage signal. It is for certain function reference; it cannot be connected directly to the load.
15	RTH+	Temperature sensor(NTC, 5KOhm) comes along with the charger can be connected to the unit to allow temperature compensation of the charging voltage.
16	RTH-	

Note1: Non-isolated signal, referenced to the [-V(signal)].

Note2: Isolated signal, referenced to GND-AUX.

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CN500 

Pin No.	Function	Description
1,2	DA	Differential digital signal for parallel control.
3,4	DB	Differential digital signal for parallel control.
5,6	-V (Signal)	Negative output voltage signal. cannot be connected directly to the load.
7	SDA	Serial clock used in the PMBus interface.
8	SCL	Serial clock used in the PMBus interface.

SW1

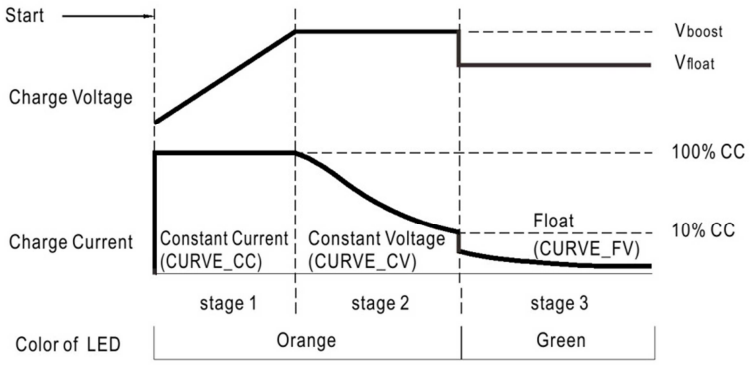
Pin No.	Function	Description
1,2	Terminal resistance	SW1 is the selector of terminal resistor that is designed for DA/DB signals and parallel control function.

5.LED Indicators

LED	Description
Green	Float (stage 3)
Orange	Charging (stage 1 or stage 2)
Red	Abnormal status (OTP, OLP, Fan Fail, Charging timeout)
Red(Flashing)	The LED will flash with the red light when the internal temperature reaches 60℃; under this condition, the unit still operates normally without entering OTP. (In the meantime, an alarm signal will be sent out through the PMBus interface.)

6.Explanation of Operation Logic : (3 stage charge)

At the beginning stage of operation, the charger provides the largest current to charge the batteries, the LED indicator will lighten in orange. After a period of time (probably a couple of hours, based on the capacity of the batteries), the charging current will decrease gradually. When the output current reduces to 10% of its maximum value, the charger will go into "float" mode, the LED indicator will turn to green. The relationship between charging current and charging voltage for each operation stage is shown in the curves below:



STATUS	RPB-1600-12	RPB-1600-24	RPB-1600-48
CONSTANT CURRENT	100A	55A	27.5A
BOOST CHARGE VOLTAGE	14.4V	28.8V	57.6V
FLOAT CHARGE VOLTAGE	13.8V	27.6V	55.2V

Figure 6.1 Charge Curve

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Explanation for 3 stage charge curve

(0) Initial stage (battery analysis) : Check battery voltage level to see whether there is a battery connected.

(1) Stage 1 (constant current) : A constant current is provided so that the battery can be quickly charged to 2.4V per cell.

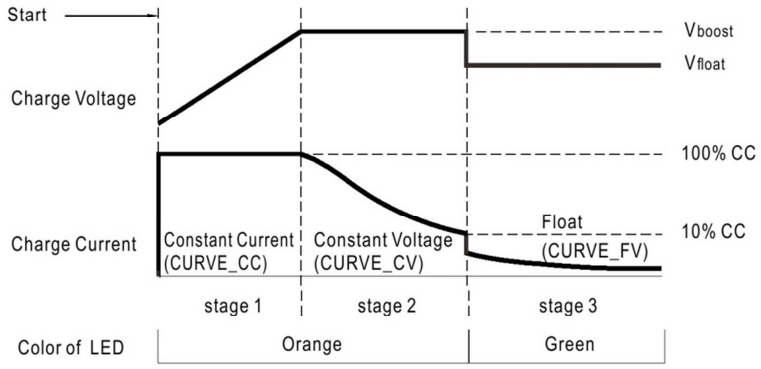
(2) Stage 2 (constant voltage) : A constant voltage of 2.4V per cell is provided until the charging current gradually reduces to 10%.

(3) Stage 3 (float) : The output voltage switches to the float voltage, making it 2.3V per cell to keep the battery fully charged.

7.Charge Cureve

The factory setting is "default", which can be programmed via PMBus.

◎ Default 3 stage charging curve



Note: By factory default, PIN10 and PIN14 on CN1 are connected.

◎ Embedded 3 stage charging curve

MODEL	Description	Vboost	Vfloat	CC (default)
12V	Default, programmable	14.4	13.8	100A
	Pre-defined, gel battery	14	13.6	
	Pre-defined, flooded battery	14.2	13.4	
	Pre-defined, AGM battery	14.5	13.5	
24V	Default, programmable	28.8	27.6	55A
	Pre-defined, gel battery	28	27.2	
	Pre-defined, flooded battery	28.4	26.8	
	Pre-defined, AGM battery	29	27	
48V	Default, programmable	57.6	55.2	27.5A
	Pre-defined, gel battery	56	54.4	
	Pre-defined, flooded battery	56.8	53.6	
	Pre-defined, AGM battery	58	54	

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8.Communication Protocol

Users can use three different methods to control outputs of RPB-1600. The control priority between the methods is as follows: Communication (PMBus or CAN bus) > PV/PC > SVR. These three control methods can be used interchangeably. When using communication control, it is essential to communicate with the device within 4 seconds. Otherwise, the program will reset the control priority and set the communication parameters back to the factory default values(NOTE 1). However, the following condition will bypass this control logic: setting RPB-1600 to charger mode. In charger mode, PV/PC and SVR controls will become inactive and charging-related settings can only be changed via communication.

NOTE: 1.When D0 is set at "1" and communication function is used, some of the parameters will return to the factory default values if any of the conditions happens, AC recycling and communication timeout. Take RPB-1600-12 as an example, command OPERATION becomes ON, Vo and Io change to 12V and 100A.

2.In charger mode, Remote ON/OFF or OPERATION ON/OFF can be used to activate new curve procedures and import parameters and settings for a new curve profile. Additionally, it can also release protections caused by CURVE_CC_TIMEOUT, CURVE_CV_TIMEOUT, or CURVE_TP_TIMEOUT due to timeouts.

8.1 PMbus Addressing and CAN ID setting

◎Each RPB-1600 unit should have their unique and own device address to communicate over the bus.

*PMbus 7-bit addressing definition :

MSB						LSB
1	0	0	0	A2	A1	A0

*CAN message ID definition :

Message ID	Description
0xC00XX	RPB-1600 to Controller Message ID
0xC01XX	Controller to RPB-1600 Message ID
0xC01FF	Controller broadcasts to RPB-1600

XX means the CAN ID of RPB-1600

A0-A2 allows users to designate an address or ID for the RPB-1600 unit; these three bits are defined through PIN7 (A0), PIN8 (A1) and PIN9 (A2) on CN1. There are up to 8 different addresses are available to be assigned. When connecting one of these pins, for example, PIN8 with PIN14 (-V(Signal)), the corresponding bit, A1, is set to logic "0"; when it is kept opened, for example, PIN7, the corresponding bit, A0, is set to logic "1". Please refer to Table 8-1(left) for detailed setup.

◎Charge mode can be activated by settings over D0 (PIN10) on CN1. When D0 is logic "0", connecting PIN10 to PIN14(-V(Signal)), RPB-1600 follows a built-in charging curve to charge the batteries; when D0 is logic "1", PIN10 kept opened, operation of the unit is completely defined by the control over PMBus, PV/PC or SVR. Please refer to Table 8-1(right).

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Module No.	Device address		
	A0	A1	A2
0	0	0	0
1	1	0	0
2	0	1	0
3	1	1	0
4	0	0	1
5	1	0	1
6	0	1	1
7	1	1	1

D0	Function describe
0	Charging curve
1	PMBus or PV/PC or SVR control

Table 8-1

Charging Curve

When it is opted for charging curve, D0 set to 0, charging curve function is enabled with additional PMBus or CAN bus commands. There are 4 built-in charging curves, "default" curve, one pre-defined curve for "gel battery", one pre-defined curve for "flooded battery" and one pre-defined curve for "AGM battery". Each curve can be selected by Command CURVE_CONFIG (PM: B4h; CAN: 0x00B4). In addition, users are able to customize their own charge curves, which will be stored to "default" after modification._ CV can be set by Command CURVE_CV (PM:B1h; CAN: 0x00B1);_ FV can be set by Command CURVE_FV (PM:B2h; CAN: 0x00B2) ;Charge current level of stage1 can be set by Command CURVE_CC(PM:B0h; CAN: 0x00B0);Taper current level from stage2 to stage3 can be set by Command CURVE_TC(PM:B3h; CAN: 0x00B3)). Please refer to the command list for PMBus or CAN bus for detailed information on commands and parameters.

NOTE:

1. The updated charging parameters is saved into EEPROM. The updated charging curve takes effect after RPB-1600 is restarted, remoted on/off or operation on/off.
2. When charging curve is enabled, the following commands will be invalid while other commands are effective:, Command VOUT_TRIM(22h)/ VOUT_SET(0x0020) (regarding Output voltage programming function) and Command IOUT_OC_FAULT_LIMIT(46h)/ IOUT_SET(0x0030) (regarding Output current programming function).

8.2 PMBus Communication Interface

◎RPB-1600 is compliant with PMBus Rev.1.1, the maximum communication speed is 100KHz and the maximum number of assignable addresses is up to 8 units on a bus.

◎PMBus communication interface is able to provide the current operating status and information as follows:

1.Output voltage, current and internal temperature.
2.Alarm and status.
3.Manufacturer's and model data.
4.Read/write of charge curve settings.

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◎PMBus commands: The command list of the RPB 1600 is shown in Table 8-2. It is compliant with the standard protocol of PMBus Rev. 1.1. For more detailed information, please refer to PMBus official website (http://pmbus.org/specs.html)

Table 8-2

Command Code	Command Name	Transaction Type	# of data Bytes	Description
01h	OPERATION	R/W Byte	1	Remote ON/OFF control
02h	ON_OFF_CONFIG	Read Byte	1	ON/OFF function configuration
19h	CAPABILITY	Read Byte	1	Capabilities of a PMBus device
20h	VOUT_MODE	R Byte	1	Define data format for output voltage (format: Linear 16, N= -9)
21h	VOUT_COMMAND	R Word	2	Output voltage setting value (format: Linear 16, N= -9)
22h	VOUT_TRIM	R/W Word	2	Output voltage trimmed value (format: Linear 16, N= -9)
46h	IOUT_OC_FAULT_LIMIT	R/W Word	2	Output overcurrent setting value (format: Linear 11, N= -2)
47h	IOUT_OC_FAULT_RESPONSE	R Byte	1	Define protection and response when an output overcurrent fault occurred
79h	STATUS_WORD	R Word	2	Summary status reporting
7Ah	STATUS_VOUT	R Byte	1	Output voltage status reporting
7Bh	STATUS_IOUT	R Byte	1	Output current status reporting
7Ch	STATUS_INPUT	R Byte	1	AC inpit voltage statusreporting
7Dh	STATUS_TEMPERATURE	R Byte	1	Temperature status reporting
7Eh	STATUS_CML	R Byte	1	Communication, logic, Memory status reporting
80h	STATUS_MFR_SPECIFIC	R Byte	1	Manufacture specific status reporting
81h	STATUS_FANS_1_2	R Byte	1	Fan1 and 2 status reporting
88h	READ_VIN	R Word	2	AC input voltage reading value (format: Linear 11, N=-1)
8Bh	READ_VOUT	R Word	2	Output voltage reading value (format: Linear 16, N= -9)
8Ch	READ_IOUT	R Word	2	Output current reading value (format: Linear 11, N= -2)
90h	READ_FAN_SPEED_1	R Word	2	Fan speed 1 reading value (format: Linear 11, N= 5)
91h	READ_FAN_SPEED_2	R Word	2	Fan speed 2 reading value (format: Linear 11, N= 5)
98h	PMBUS_REVISION	R Byte	1	The compliant revision of the PMBus (default: 11h for Rev. 1.1)
99h	MFR_ID	Block Read	12	Manufacturer's name
9Ah	MFR_MODEL	Block Read	12	Manufacturer's model name
9Bh	MFR_REVISION	Block Read	6	Firmware revision
9Ch	MFR_LOCATION	Block R/W	3	Manufacturer's factory location
9Dh	MFR_DATE	Block R/W	6	Manufacture date. (format: YYMMDD)
9Eh	MFR_SERIAL	Block R/W	12	Product serial number

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Valid when charging according to charge curve (D0=0)

Command Code	Command Name	Transaction Type	# of data Bytes	Description
B0h	CURVE_CC	R/W Word	2	Constant current setting value of charging curve (format: Linear, N=-2)
B1h	CURVE_CV	R/W Word	2	Constant voltage setting value of charging curve (format: Linear, N=-9)
B2h	CURVE_FV	R/W Word	2	Constant voltage setting value of charging curve (format: Linear, N=-9)
B3h	CURVE_TC	R/W Word	2	Taper current setting value of charging curve (format: Linear, N=-2)
B4h	CURVE_CONFIG	R/W Word	2	Configuration setting of charging curve
B5h	CURVE_CC_TIMEOUT	R/W Word	2	CC stage timeout setting value of charging curve (format: Linear, N=0)
B6h	CURVE_CV_TIMEOUT	R/W Word	2	CV stage timeout setting value of charging curve (format: Linear, N=0)
B7h	CURVE_FLOAT_TIMEOUT	R/W Word	2	Floating timeout setting value of charging curve (format: Linear, N=0)
B8h	CHG_STATUS	READ Word	2	Charger's status reporting

Note：

◎Definition of Command B4h CURVE_CONFIG：

	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
High byte	-	-	-	-	-	FVTOE	CVTOE	CCTOE
Low byte	-	STGS	-	-	TCS		CUVS	

Low byte

Bit 1-0 CUVS ：Charge Curve selecting

00＝Customized Charge Curve (default)

01＝Gel Battery

10＝Flooded Battery

11＝AGM Battery

Bit 3-2 TCS：Temperature Compensation setting

00＝ disable

01＝ -3 mV/℃/cell (default)

10＝ -4 mV/℃/cell

11＝ -5 mV/℃/cell

Bit 6 STGS：2/3 stage charge setting

0＝ 3 stage charge (default, Curve_VBST and CURVE_V FLOAT)

1＝ 2 stage charge (only CURVE_VBST)

High byte

Bit 0 CCTOE：Constant Current Stage timeout indication enable

0＝ disabled (default)

1＝ enabled

Bit 1 CVTOE：Constant Voltage Stage timeout indication enable

0＝ disabled (default)

1＝ enabled

Bit 2 FTTOE：Float Stage timeout indication enable

0＝ disabled (default)

1＝ enabled

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◎ Definition of Command B8h CHG_STATUS：

	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
High byte	FVTOF	CVTOF	CCTOF	-	BTNC	NTCER	-	EEPER
Low byte	-	-	-	-	FVM	CVM	CCM	FULLM

Low byte
Bit 0 FULLM：Fully Charged
0＝NOT fully charged
1＝fully charged

Bit 1 CCM：Constant Current Mode Status
0＝the charger NOT in constant current mode
1＝the charger in constant current mode

Bit 2 CVM：Constant Voltage Mode Status
0＝the charger NOT in constant voltage mode
1＝the charger in constant voltage mode

Bit 3 FVM：Float Mode Status
0＝the charger NOT in float mode
1＝the charger in float mode

High byte
Bit 0 EEPER: EEPROM Charge Parameter Error
0＝data of charge parameter correct
1＝data of charge parameter error

Bit 2 NTCER: Temperature Compensation Status
0＝NO short-circuit in the circuitry of temperature compensation
1＝the circuitry of temperature compensation has short-circuited

Bit 3 BTNC: Battery Detection
0＝battery detected
1＝NO battery detected

Bit 5 CCTOF：Time-out Flag of Constant Current Mode
0＝NO time-out in constant current mode
1＝constant current mode timed out

Bit 6 CVTOF：Time-out Flag of Constant Voltage Mode
0＝NO time-out in constant voltage mode
1＝constant voltage mode timed out

Bit 7 FTTOF：Time-out Flag of Float Mode
0＝NO time-out in float mode
1＝float mode timed out

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Note:

EEPER：When EEPROM Charge Parameter Error occurs, the charger stops charging the battery and the LED indicator turns red. The charger needs to re-power on to re-start charging the battery.

NTCER：When Temperature Compensation Short occurs, the charger output will shut down and the LED indicator will turn red. The charger will automatically restart after the Temperature Compensation Short condition is removed.

BTNC：When there is no battery detected, the charger stops charging the battery and the LED indicator turns red. The charger needs to re-power on to re-start charging the battery.

CCTOF：When timeout arises in the Constant Current stage, the charger stops charging the battery and the LED indicator turns red. The charger needs to re-power on to re-start charging the battery.

CVTOF：When timeout arises in the Constant Voltage stage, the charger stops charging the battery and the LED indicator turns red. The charger needs to re-power on to re-start charging the battery.

FVTOF：When timeout arises in the Float stage, the charger stops charging the battery and the LED indicator turns green. This charging flow is finished; the charger needs to re-power on to start charging a different battery.

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PMBus Data Range and Tolerance

◎ Display parameters

PMBus command	Model	Range	Tolerance
READ_VIN	ALL	80 ~ 264V	±10V
READ_VOUT	12V	0 ~ 15V	±0.18V
	24V	0 ~ 30V	±0.36V
	48V	0 ~ 60V	±0.48V
READ_IOUT (Note. 1)	12V	0 ~ 150A	±2.5A
	24V	0 ~ 80A	±1.34A
	48V	0 ~ 40A	±0.67A
READ_FAN_SPEED_1	ALL	0 ~ 26500RPM	±2000RPM
READ_FAN_SPEED_2	ALL	0 ~ 26500RPM	±2000RPM

Table 8-3

◎ Control parameter

PMBus command	Model	Adjustable range	Tolerance	Default
OPERATION	ALL	00h(OFF) / 80h(ON)	N/A	80h(ON)
VOUT_COMMAND (Note. 2)	12V	12V	N/A	12V
	24V	24V	N/A	24V
	48V	48V	N/A	48V
VOUT_TRIM (Note. 2)	12V	-3 ~ 3V	±0.18V	0V
	24V	-6 ~ 6V	±0.36V	0V
	48V	-12 ~ 12V	±0.48V	0V
CURVE_CV (Note. 3)	12V	9 ~ 15V	±0.18V	14.4V
	24V	18 ~ 30V	±0.36V	28.8V
	48V	36 ~ 60V	±0.48V	57.6V
CURVE_FV (Note. 3)	12V	9 ~ VBST	±0.18V	13.8V
	24V	18 ~ VBST	±0.36V	27.6V
	48V	36 ~ VBST	±0.48V	55.2V
IOUT_OC_FAULT_LIMIT CURVE_CC	12V	20 ~ 100A	±2.5A	100A
	24V	11 ~ 55A	±1.34A	55A
	48V	5.5 ~ 27.5A	±0.67A	27.5A
CURVE_TC	12V	5 ~ 30A	±2.5A	10A
	24V	2.75 ~ 16.5A	±1.34A	5.5A
	48V	1.5 ~ 8.3A	±0.67A	2.8A
CURVE_CC_TIMEOUT CURVE_CV_TIMEOUT CURVE_FLOAT_TIMEOUT	ALL	60 ~ 64800 Minute	±5 Minute	600 Minute

Table 8-4

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Note:

1. READ_IOUT will display ZERO amp when output current is less than values in the table below:

Model	Minimum readable current
12V	5A±1A
24V	2.7A±1A
48V	1.3A±1A

2. When using PMBus to adjust output voltage, VOUT_COMMAND only can be used to display the rated voltage of the unit and cannot be written. It is VOUT_TRIM that sets up the amount of trimmed voltage. Taking RPB-1600-12 as an example, to get a 9V output, please set value of VOUT_TRIM to -3V. Adjustable voltage range for each model is shown as below:

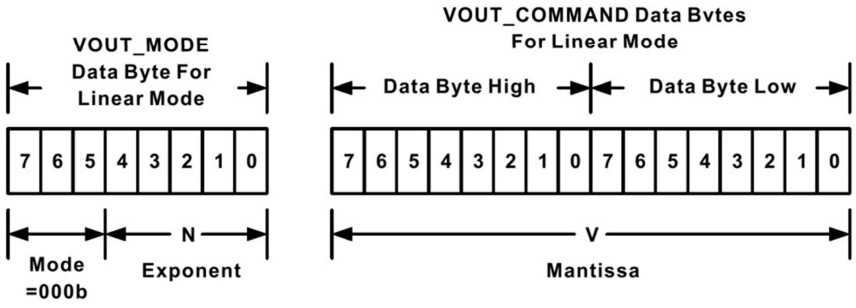
Model	Adjustable voltage range
12V	9 ~ 15V
24V	18 ~ 30V
48V	36 ~ 60V

3. The value of CURVE_FV should be set less or equal to CURVE_CV,If CURVE_FV is greater than CURVE_CV, it will be saved as CURVE_FV = CURVE_CV in EEPROM.

Notes on PMBus

1. Insert a at least 50msec delay between commands
2. Examples for Format Conversion :

(1) LINEAR16 format：VOUT_COMMAND、VOUT_TRIM、READ_VOUT、CURVE_CV、CURVE_FV.
Actual voltage = communication reading V × 2^N. There are two definitions in the VOUT_MODE command that refer to N requirements.



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Linear Format Data Bytes

The Mode bits are set to 000b.

The Voltage, in volts, is calculated from the equation:

$Voltage = V \cdot 2^N$

Where:

Voltage is the parameter of interest in volts;

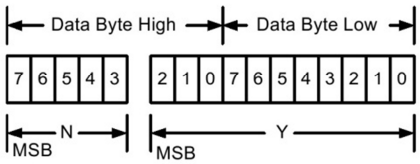
V is a 16 bit unsigned binary integer; and

N is a 5 bit two's complement binary integer.

EX: Vo_real (actual output voltage) = V x 2^N , V is from READ_VOUT. N If VOUT_MODE = 0x17, meaning N is -9. READ_VOUT is 0x3000 12288, then Vo_real =12288 × 2^{-9}=24.0V.

(2)LINEAR11 format：IOUT_OC_FAULT_LIMIT、READ_VIN、READ_IIN、READ_IOUT、READ_TEMPERATURE_1、READ_FAN_SPEED_1、READ_FAN_SPEED_2、CURVE_CC、CURVE_TC、CURVE_CC_TIMEOUT 、CURVE_CV_TIMEOUT 、CURVE_FV_TIMEOUT。

Actual value X = communication read value Y x 2^N. Among them, the definition of the description column for each aircraft type is referred to



Linear Data Format Data Bytes Y, N and the "real world" value is:

The relation between

$X = Y \cdot 2^N$

Where, as described above:

X is the "real world" value;

Y is an 11 bit, two's complement integer; and

N is a 5 bit, two's complement integer.

Devices that use the Linear format must accept and be able to process any value of N.

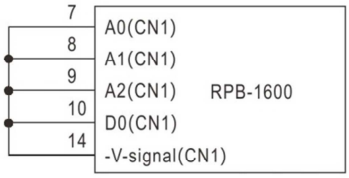
EX: Io_real (actual output current) = Y× 2^N , Y is from READ_IOUT. N If READ_IOUT is 0xF188h, meaning N is -2 and Y is 0x0188. Y is 0x0188 → 392, then Io_real = 392 × 2^{-2} = 98.0A.

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Communication Example - Practical Operation of Charger Mode

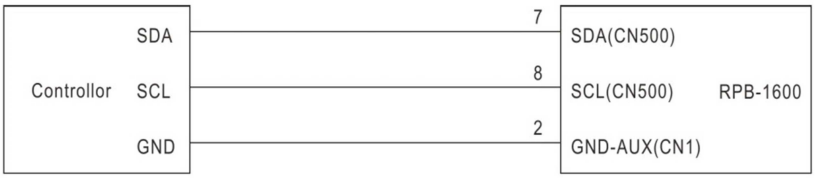
The following steps will describe how to set the RPB-1600-48 to charger mode and adjust its curve for a 2-stage charging process, with a constant current (CC) of 20A and a constant voltage (CV) of 56V.

1.Set the address of the charger to "0" and set it to charge mode.



2.Connect the SDA, SCL and GND pins of the master to the corresponding SDA (PIN7) and SCL (PIN8) of CN500 and GND-AUX (PIN2) of CN1 on the charger.

◎Set speed: 100KHz



3.Communication function can be accessed immediately after RPB-1600 is connected to AC. Frist set the charger to 2-stage charging mode.

Address(7 bit)	Operation	Command Code	Data
0x40	Write	0xB4	0x44, 0x00

Command code: 0xB4(CURVE_CONFIG)

Data: 44(Lo) + 00(Hi). Please refer to definition of CURVE_CONFIG for detailed information.

4.Set the constant current (CC) point to 20A.

Address(7 bit)	Operation	Command Code	Data
0x40	Write	0xB0	0x50, 0xF0

Command code: 0xB0(CHURVE_ICHG)

Data: 20A → 0x50(Lo) + 0xF0(Hi)

NOTE: CURVE_ICHG is LINEAR11 format

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5. Set the constant voltage (CV) point to 56V.

Address(7 bit)	Operation	Command Code	Data
0x40	Write	0xB1	0x00, 0x70

Command code: 0xB1(CHURVE_VBST)

Data: 56V → 0x00(Lo) + 0x70(Hi)

NOTE: CHURVE_VBST is LINEAR16 forma

6.Before connecting to the batteries, it is recommended to review all of the settings and parameters using the appropriate commands. In the event that they do not meet your requirements, you may rewrite them as needed. EX: Read CHURVE_VBST to check whether CV level or Vboost was set to a proper level.

Read CURVE_VBST

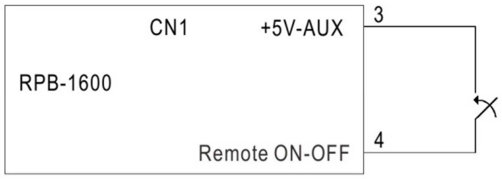
Address(7 bit)	Operation	Command Code
0x40	Read	0xB1

The unit returns data below

Address(7 bit)	Data
0x40	0x00, 0x70

Data: 0x00(Lo) + 0x70(Hi) → 0x7000 → $28672 \times 2^{-9} = 56V$ 。

7.Finally, short circuit Remote ON-OFF (PIN4) and +5-AUX (PIN3) pins of the CN1 connector on the charger to remote on it to charge the batteries.



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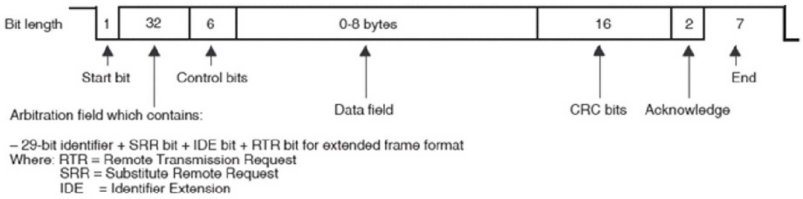
8.3 CANBus Communication Interface

◎Physical layer specification

This protocol follows CAN ISO-11898 with Baud rate of 250Kbps.

◎Data Frame

This protocol uses Extended CAN 29-bit identifier frame format or CAN 2.0B.

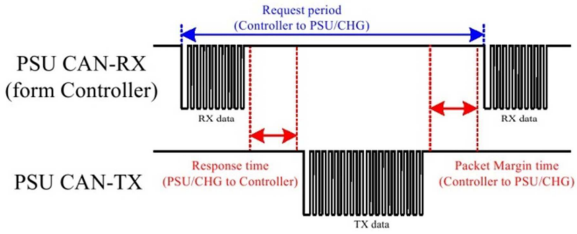


◎Communication Timing

Min. request period (Controller to RPB-1600): 50mSec。

Max. response time (RPB-1600 to Controller): 12.5mSec。

Min. packet margin time (Controller to RPB-1600): 12.5mSec。



◎Data Field Format

Controller to RPB-1600

Write:

Data filed bytes

0	1	2	3
COMD. low byte	COMD. high byte	Data low byte	Data high byte

Read:

Data filed bytes

0	1
COMD. low byte	COMD. high byte

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RPB-1600 to Controller

Response:

Data filed bytes

0	1	2	.....	7
COMD. low byte	COMD. high byte	Data low 1	.....	Data high 6

NOTE: RPB-1600 will not send data back when writing parameters, such as VOUT_SET

8.3.1 CANBus Command list

Command Code	Command Name	Transaction Type	# of data Bytes	Description
0x0000	OPERATION	R/W	1	ON/OFF control ON: 01h OFF: 00h
0x0020	VOUT_SET	R/W	2	Output voltage set (format: value, F=0.1)
0x0030	IOUT_SET	R/W	2	Output current set (format: value, F=0.1)
0x0040	FAULT_STATUS	R	2	Abnormal status
0x0050	READ_VIN	R	2	Input voltage read value (format: value, F=1)
0x0060	READ_VOUT	R	2	Output voltage read value (format: value, F=0.1)
0x0061	READ_IOUT	R	2	Output current read value (format: value, F=0.1)
0x0062	READ_ TEMPERATURE_1	R	2	Internal ambient temperature (format: value, F=0.1)
0x0070	READ_FAN_SPEED_1	R	2	Fan speed 1 reading value (Format: value, F=1, unit: RPM)
0x0071	READ_FAN_SPEED_2	R	2	Fan speed 2 reading value (Format: value, F=1, unit: RPM)
0x0080	MFR_ID_B0B5	R	6	Manufacture's name
0x0081	MFR_ID_B6B11	R	6	Manufacture's name
0x0082	MFR_MODEL_B0B5	R	6	Manufacture model name
0x0083	MFR_MODEL_B6B11	R	6	Manufacture model name
0x0084	MFR_REVISION_B0B5	R	6	Firmware version
0x0085	MFR_LOCATION_B0B2	R	3	Manufacture place
0x0086	MFR_DATE_B0B5	R	6	Manufacture date

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Valid when charging according to charge curve(D0=ON)

Command Code	Command Name	Transaction Type	# of data Bytes	Description
0x0087	MFR_SERIAL_B0B5	R	6	Manufacture serial number
0x0088	MFR_SERIAL_B6B11	R	6	Manufacture serial number
0x00B0	CURVE_CC	R/RW	2	Constant current setting of charge curve (format: value, F=0.1)
0x00B1	CURVE_CV	R/RW	2	Constant voltage setting of charge curve (format: value, F=0.1)
0x00B2	CURVE_FV	R/RW	2	Floating voltage setting of charge curve (format: value, F=0.1)
0x00B3	CURVE_TC	R/RW	2	Taper current setting of charge curve (format: value, F=0.1)
0x00B4	CURVE_CONFIG	R/RW	2	Configuration setting of charge curve
0x00B5	CURVE_CC_TIMEOUT	R/RW	2	CC charge timeout setting of charging curve (format: value, F=1)
0x00B6	CURVE_CV_TIMEOUT	R/RW	2	CV charge timeout setting of charging curve (format: value, F=1)
0x00B7	CURVE_FV_TIMEOUT	R/RW	2	FV charge timeout setting of charging curve (format: value, F=1)
0x00B8	CHG_STATUS	R	2	Charging status reporting

Table 8-8

8.3.2 Definition and contents of CANBus Command list

◎Definition of Command FAULT_STATUS(0x0040) :

	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Low byte	HI_TEMP	OP_OFF	AC_FAIL	SHORT	OLP	OVP	OTP	FAN_FAIL

Bit 0 FAN_FAIL : Fan locked flag
0 = Working normally
1 = Fan locked

Bit 1 OTP : Over temperature protection
0 = Internal temperature normal
1 = Internal temperature abnormal

Bit 2 OVP : DC over voltage protection
0 = DC voltage normal
1 = DC over voltage protected

Bit 3 OLP : DC over current protection
0 = DC current normal
1 = DC over current protected

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Bit 4 SHORT : Short circuit protection
0 = Shorted circuit do not exist
1 = Shorted circuit protected

Bit 5 AC_FAIL : AC abnormal flag
0 = AC input range normal
1 = AC input range abnormal

Bit 6 OP_OFF : DC status
0 = DC output turned on
1 = DC output turned off

Bit 7 HI_TEMP : Internal high temperature protection
0 = Internal temperature normal
1 = Internal temperature abnormal

Note: Unsupported settings displays with "0"

◎MFR_ID_B0B5 (0x0080) is the first 6 codes of the manufacturer's name (ASCII); MFR_ID_B6B11 (0x0081) is the last 6 codes of the manufacturer's name (ASCII)

EX: Manufacturer's name is MEANWELL MFR_ID_B0B5 is MEANWE ; MFR_ID_B6B11 is LL

MFR_ID_B0B5					
Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5
0x4D	0x45	0x41	0x4E	0x57	0x45

MFR_ID_B6B11					
Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5
0x4C	0x4C	0x20	0x20	0x20	0x20

◎MFR_MODEL_B0B5 (0x0082) is the first 6 codes of the manufacturer's model name (ASCII); MFR_MODEL_B6B11 (0x0083) is the last 6 codes of the manufacturer's model name (ASCII)

EX: Model names is RPB-1600-48 → MFR_MODEL_B0B5 is RPB-16 ; MFR_MODEL_B6B11 is 00-48

MFR_MODEL_B0B5					
Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5
0x52	0x50	0x42	0x2D	0x31	0x36

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MFR_ID_B6B11					
Byte 6	Byte 7	Byte 8	Byte 9	Byte 10	Byte 11
0x30	0x30	0x2D	0x34	0x38	0x20

◎MFR_REVISION_B0B5 (0x0084) is the firmware revision (hexadecimal).
A range of 0x00 (R00.0)~0xFE (R25.4) represents the firmware version of an MCU; 0xFF represents no MCU existed.
EX: The supply has two MCUs, the firmware version of the MCU number 1 is version R25.4 (0xFE), the MCU number 2 is version R10.5 (0x69)

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5
0xFE	0x69	0xFF	0xFF	0xFF	0xFF

◎MFR_DATE_B0B5 (0x0086) is manufacture date (ASCII)
EX: MFR_DATE_B0B5 is 180101, meaning 2018/01/01

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5
0x31	0x38	0x30	0x31	0x30	0x31

◎MFR_SERIAL_B0B5 (0x0087) and MFR_SERIAL_B6B11 (0x0088) are defined as manufacture date and manufacture serial number (ASCII)
EX: The first unit manufactured on 2018/01/01→MFR_SERIAL_B0B5: 180101 ; MFR_SERIAL_B6B11: 000001

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5
0x31	0x38	0x30	0x31	0x30	0x31

Byte 6	Byte 7	Byte 8	Byte 9	Byte 10	Byte 11
0x30	0x30	0x30	0x30	0x30	0x31

◎CURVE_CONFIG(0x00B4, only for charger mode) :

	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
High byte	-	-	-	-	-	FVTOE	CVTOE	CCTOE
Low byte	-	STGS	-	-	TCS		CUVS	

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Low byte

Bit 0:1 CUVS : Charge Curve Selection
00 = Customized charge Curve(default)
01 = Gel Battery
10 = Flooded Battery
11 = AGM Battery

Bit 3-2 TCS : Temperature Compensation Setting
00 = disable
01 = -3 mV/℃/cell (default)
10 = -4 mV/℃/cell
11 = -5 mV/℃/cell

Bit 6 STGS : 2/3 Stage Charge Setting
0 = 3 stage charge (default)
1 = 2 stage charge

High byte:

Bit 0 CCTOE : Constant Current Stage Timeout Indication Enable
0 = disable (default)
1 = enabled

Bit 1 CVTOE : Constant Voltage Stage Timeout Indication Enable
0 = disable (default)
1 = enabled

Bit 2 FTTOE : Float Voltage Stage Timeout Indication Enable
0 = disable (default)
1 = enabled

Note: Unsupported settings displays with "0"

◎CHG_STATUS(0x00B8, only for charger mode) :

	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
High byte	FVTOF	CVTOF	CCTOF	-	BTNC	NTCER	-	EEPER
Low byte	-	-	-	-	FVM	CVM	CCM	FULLM

Low byte

Bit 0 FULLM : Fully Charged Mode Status
0 = NOT fully charged
1 = fully charged

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Bit 1 CCM : Constant Current Mode Status
0 = the charger NOT in constant current mode
1 = the charger in constant current mode

Bit 2 CVM : Constant Voltage Mode Status
0 = the charger NOT in constant voltage mode
1 = the charger in constant voltage mode

Bit 3 FVM : Float Mode Status
0 = the charger NOT in float mode
1 = the charger in float mode

High byte:

Bit 0 EEPER: EEPROM charging parameter error
0 = charging parameter is correct
1 = charging parameter has error

Bit 2 NTCER: temperature compensation error
0 = There is no short circuit in the temperature compensation circuitry
1 = There is a short circuit in the temperature compensation circuitry

Bit 3 BTNC : Battery Detection
0 = battery detected
1 = No battery detected

Bit 5 CCTOF : Time Out Flag of Constant Current Mode
0 = NO time out in constant current mode
1 = constant current mode timed out

Bit 6 CVTOF : Time Out Flag of Constant Voltage Mode
0 = NO time out in constant voltage mode
1 = constant voltage mode timed out

Bit 7 FTTOF : Time Out Flag of Float Mod
0 = NO time out in float mode
1 = float mode timed out

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8.3.3 CANBus Value Range and Tolerance

(1)Display parameters

CANBus command	Model	Display value range	Tolerance
READ_VIN	ALL	80~264V	±10V
READ_VOUT	12V	0~15V	±0.18V
	24V	0~30V	±0.36V
	48V	0~60V	±0.48V
READ_IOUT	12V	0~150A	±2.5A
	24V	0~80A	±1.34A
	48V	0~40A	±0.67A
READ_ TEMPERATURE_1	ALL	-40~100℃	±5℃
READ_FAN_SPEED_1	ALL	0~26500 RPM	±2000RPM
READ_FAN_SPEED_2	ALL	0~26500 RPM	±2000RPM

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(2)Control parameters

CANBus command	Model	Display value range	Tolerance	Default
OPERATION	ALL	00h(OFF)/01h(ON)	N/A	ON
VOUT_SET	12V	9~15V	±0.18V	12V
	24V	18~30V	±0.36V	24V
	48V	36~60V	±0.48V	48V
IOUT_SET	12V	20~100A	±2.5A	100A
	24V	11~55A	±1.34A	55A
	48V	5.5~27.5A	±0.67A	27.5A
CURVE_CV	12V	9~15V	±0.18V	28.8A
	24V	18~30V	±0.36V	57.6A
	48V	36~60V	±0.48V	13.8A
CURVE_FV	12V	9~VBST	±0.18V	13.8A
	24V	18~VBST	±0.36V	27.6A
	48V	36~VBST	±0.48V	55.2A
CURVE_TC	12V	5~30V	±2.5A	10A
	24V	2.75~16.5V	±1.34A	5.5A
	48V	1.5~8.25V	±0.67A	2.8A
CURVE_CC_TIMEOUT CURVE_CV_TIMEOUT CURVE_FV_TIMEOUT	ALL	60~64800 Minute	±5 Minute	600 Minute

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Note:

1.READ_IOUT will display ZERO amp when output current is less than values in the table below.

Model	Minimum readable current
12V	5A±1A
24V	2.7A±1A
48V	1.3A±1A

2. The setting of CURVE_FV must be less than or equal to CURVE_CV. If CURVE_FV is greater than CURVE_CV, it will be CURVE_VF=CURVE_CV stored in EEPROM.

8.3.4 Communication example

8.3.4.1 Sending comman

The master adjusts output voltage of the unit with address "01" to 30V

CAN ID	DLC (data length)	Command code	Parameters
0xC0101	0x4	0x2000	0x2C01

Command code: 0x0020 (VOUT_SET) → 0x20(Lo) + 0x00(Hi)

Parameters: 30V → 300 → 0x012C → 0x2C(Lo) + 0x01(Hi)

NOTE: Conversion factor for VOUT_SET is 0.1, so $\frac{30V}{F=0.1}$ =300

8.3.4.2 Reading data or status

The master reads operation setting from the unit with address "00".

CAN ID	DLC (data length)	Command code
0xC0100	0x2	0x0000

The unit with address "00" returns data below

CAN ID	DLC (data length)	Command code	Parameters
0xC0000	0x3	0x0000	0x01

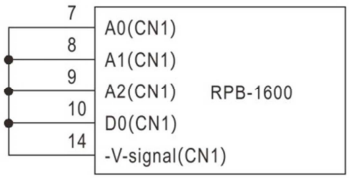
The unit with address "00" returns data below

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Practical Operation of Charger Mode

The following steps will describe how to set the RPB-1600-48 to charger mode and adjust its curve for a 2-stage charging process, with a constant current (CC) of 20A and a constant voltage (CV) of 56V

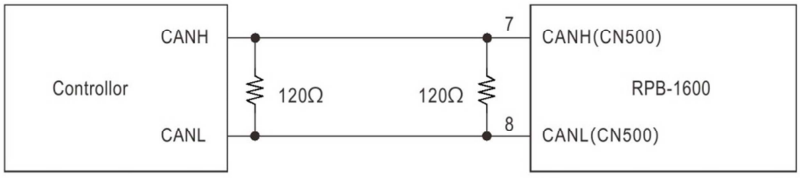
1.Set the address of the charger to "0" and set it to charge mode.



2. Connect the CANH/CANL pins of the master to the corresponding CANH(PIN7) and CANL(PIN8)pins of the CN500 connector on the charger. It is recommended to establish a common ground for the communication system to increases its communication reliability by using GND-AUX (PIN2) of CN1.

◎Set baud rate: 250kbps, type: extended

◎Adding a 120Ω terminal resistor to both the controller and rack shelf ends can increase communication stability



3.Communication function can be accessed immediately after RPB-1600 is connected to AC. Frist set the charger to 2-stage charging mode.

CANID	DLC(data length)	Command Code	Parameters
0xC0100	0x04	0xB400	0x4400

Command code: 0x00B4(CURVE_CONFIG)

Data: 44(Lo) + 00(Hi). Please refer to definition of CURVE_CONFIG for detailed information.

4.Set the constant current (CC) point to 20A

CANID	DLC(data length)	Command Code	Parameters
0xC0100	0x04	0xB000	0xC800

Command code: 0x00B0(CHURVE_CC)

Data: 20A → 200 → 0x00C8 → 0xC8(Lo) + 0x00(Hi)

NOTE: Conversion factor for CURVE_CC is 0.1，so $\frac{20A}{F=0.1}$ =200

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5.Set the constant voltage (CV) point to 56V.

CANID	DLC(data length)	Command Code	Parameters
0xC0100	0x04	0xB100	0x3002

Command code: 0x00B1(CHURVE_CV)

Data: 56V → 560 → 0x0230 → 0x30(Lo) + 0x02(Hi)

NOTE: Conversion factor for CURVE_CV is 0.1, so $\frac{56V}{F=0.1}$ =560

6.Before connecting to the batteries, it is recommended to review all of the settings and parameters using the appropriate commands. In the event that they do not meet your requirements, you may rewrite them as needed.

EX: Read CURVE_CV to check whether CV level or Vboost was set to a proper level.

Read CURVE_CV

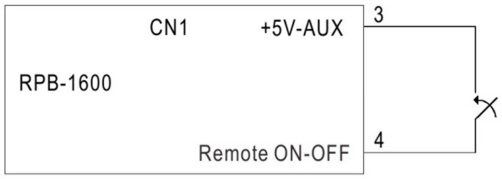
CANID	DLC(data length)	Command Code
0xC0100	0x04	0xB100

The unit returns data below

CANID	DLC(data length)	Command Code	Parameters
0xC0100	0x04	0xB100	0x3002

Data: 0x02(Lo) + 0x30(Hi) → 0x0230 → 560 = 56V。

7.Finally, short circuit remote ON-OFF (PIN4) and +5-AUX (PIN3) pins of the CN1 connector on the charger to remote on it to charge the batteries.



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9.Function description

9.1 Input voltage

◎The input voltage range is AC90~264Vor DC127~370V.

◎The provided input voltage must fall within the specified range; otherwise, the unit may be non-functional. Also the active PFC circuit may fail or get damaged.

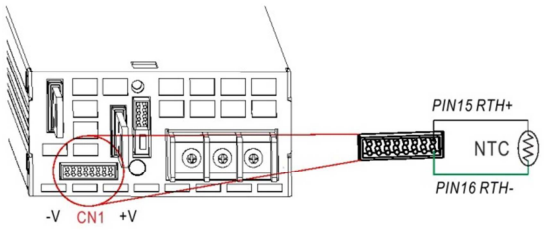
◎The efficiency will be lower and the output current should be reduced according to the Derating Curve when the unit is applied with an input voltage below AC180V.

9.2 Power factor correction (PFC)

◎Built-in active PFC circuit: PF>0.95 when input voltage is between 90-230Vac with full load at the output. On the other hand, if the input voltage is > 230V or output is not at full load, the PF will drop below 0.95

9.3 Temperature Compensation

Temperature sensor which comes with the charger can be connected to the unit to allow temperature compensation of the charging voltage. If the temperature sensor is not used, the charger can still work normally.



10.Wiring for battery

Select suitable wire guage based on rated charging current. Refer to the following table for minimum wire gauge. It is highly recommend using RED wire for (+) connection and BLACK wire for (-) connection

AWG	Cross section(mm^2)	Maximum current(A)
[redacted]		

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11.Suggested Battery Capacity

Model	Battery capacity
RPB-1600-12	330-1000AH
RPB-1600-24	180-550AH
RPB-1600-48	90-270AH

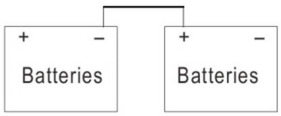
Note:1.Using battery capacity larger than the suggested value will not lead to damage of the battery. The main drawback is it may take longer to fully charge the battery.

2.If you're unsure about max allowable charging current of your battery, please refer to the battery's technical specification or consult its manufacturer.

12.Series and Parallel Connection of Batteries

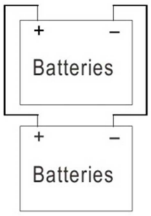
1.Batteries in series

Voltage can be doubled when 2 batteries are connected in series. However, the capacity (Ah) will remain the same. For example, 2/12V 100Ah batteries connected in series = 24V 100A.



2.Batteries in parallel

When 2 batteries are connected in parallel, voltage remains the same and the capacity (Ah) doubles. For example, 2 x 12V 100Ah batteries connected in parallel = 12V 200Ah.



13.Troubleshooting

Failure State	Possible Cause	Suggested Solutions
Unable to charge the battery	Input voltage too low	Make sure input source is between 90~264VAC
LED indicator does not turn Green after a long charging period	Battery is over lifetime or damaged	Replace with a new battery
	Output cables are too thin	Replace with suitable wire gauge

If you are unable to clarify the problem you are facing, please contact MEAN WELL or any of our distributors for repair service.

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明緯企業股份有限公司
MEAN WELL ENTERPRISES CO., LTD.
248 新北市五股區五權三路28號
No.28, Wuquan 3rd Rd., Wugu Dist., New Taipei City 248, Taiwan
Tel:886-2-2299-6100 Fax:886-2-2299-6200
http://www.meanwell.com E-mail:info@meanwell.com

Your Reliable Power Partner

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1.30 VICTRON ENERGY POWER INVERTER MODULE PHOENIX 24/250 DATA SHEET

victron energy
BLUE POWER

Phoenix Inverters

250VA – 1200VA 230V and 120V, 50Hz or 60Hz

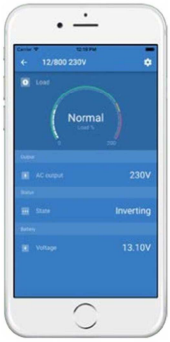
www.victronenergy.com



Phoenix 12/375 VE.Direct



Phoenix 12/375 VE.Direct





VE.Direct communication port

The VE.Direct port can be connected to:

- A computer (VE.Direct to USB interface cable needed)
- Apple and Android smartphones, tablets, MacBook's and other devices (VE.Direct Bluetooth Smart dongle needed)

Fully configurable:

- Low battery voltage alarm trip and reset levels
- Low battery voltage cut-off and restart levels
- Dynamic cut-off: load dependent cut-off level
- Output voltage 210 - 245V
- Frequency 50 Hz or 60 Hz
- ECO mode on/off and ECO mode sense level

Monitoring:

- In- and output voltage, % load and alarms

Proven reliability

The full bridge plus toroidal transformer topology has proven its reliability over many years.
The inverters are short circuit proof and protected against overheating, whether due to overload or high ambient temperature.

High start-up power

Needed to start loads such as power converters for LED lamps, halogen lamps or electric tools.

ECO mode

When in ECO mode, the inverter will switch to standby when the load decreases below a preset value (min load: 15W). Once in standby the inverter will switch on for a short period (adjustable, default: every 2,5 seconds). If the load exceeds a preset level, the inverter will remain on.

Remote on/off

A remote on/off switch can be connected to a two pole connector, or between battery plus and the left hand contact of the two pole connector.

LED diagnosis

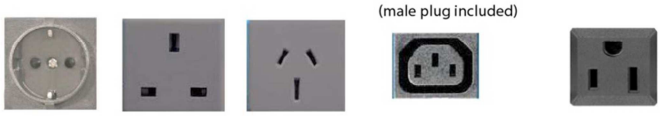
Please see manual for a description.

To transfer the load to another AC source: the automatic transfer switch

For our low power inverters we recommend our Filax Automatic Transfer Switch. The Filax features a very short switchover time (less than 20 milliseconds) so that computers and other electronic equipment will continue to operate without disruption.

Available with different output sockets

Schuko UK AU/NZ IEC-320 (male plug included) Nema 5-15R



DC connection with screw terminals

No special tools needed for installation

Phoenix Inverter 12 Volt / 24 Volt / 48 Volt	12/250 24/250 48/250	12/375 24/375 48/375	12/500 24/500 48/500	12/800 24/800 48/800	12/1200 24/1200 48/1200
Cont. power at 25°C (1)	250VA	375VA	500VA	800VA	1200VA
Cont. power at 25°C / 40°C	200 / 175W	300 / 260W	400 / 350W	650 / 560W	1000 / 850W
Peak power	400W	700W	900W	1500W	2200W
Output AC voltage / frequency (adjustable)	230VAC or 120VAC +/- 3% 50Hz or 60Hz +/- 0,1%				
Input voltage range	9,2 - 17 / 18,4 - 34,0 / 36,8 - 62,0V				
DC low shut down (adjustable)	9,3 / 18,6 / 37,2V				
Dynamic (load dependent) DC low shut down (fully configurable)	Dynamic cut-off, see https://www.victronenergy.com/live/ve.direct:phoenix-inverters-dynamic-cutoff				
DC low restart and alarm (adjustable)	10,9 / 21,8 / 43,6V				
Battery charged detect (adjustable)	14,0 / 28,0 / 56,0V				
Max. efficiency	87 / 88 / 88%	89 / 89 / 90%	90 / 90 / 91%	90 / 90 / 91%	91 / 91 / 92%
Zero-load power	4,2 / 5,2 / 7,9W	5,6 / 6,1 / 8,5W	6 / 6,5 / 9W	6,5 / 7 / 9,5W	7 / 8 / 10W
Default zero-load power in ECO mode (default retry interval: 2,5 s, adjustable)	0,8 / 1,3 / 2,5W	0,9 / 1,4 / 2,6W	1 / 1,5 / 3,0	1 / 1,5 / 3,0	1 / 1,5 / 3,0
ECO mode stop and start power setting	Adjustable				
Protection (2)	a - f				
Operating temperature range	-40 to +65°C (fan assisted cooling) Derate 1,25% per °C above 40°C				
Humidity (non-condensing)	max 95%				
ENCLOSURE					
Material & Colour	Steel chassis and plastic cover (blue Ral 5012)				
Battery-connection	Screw terminals				
Maximum cable cross-section	10 mm² / AWG8	10 mm² / AWG8	10 mm² / AWG8	25/10/10mm² / AWG4/8/8	35/25/25 mm² / AWG 2/4/4
Standard AC outlets	230V: Schuko (CEE 7/4), IEC-320 (male plug included) UK (BS 1363), AU/NZ (AS/NZS 3112) 120V: Nema 5-15R				
Protection category	IP 21				
Weight	2,4kg / 5,3lbs	3,0kg / 6,6lbs	3,9kg / 8.5lbs	5,5kg / 12lbs	7,4kg / 16,3lbs
Dimensions (hxwxd, mm) (hxwxd, inch)	86 x 165 x 260 3.4 x 6.5 x 10.2	86 x 165 x 260 3.4 x 6.5 x 10.2	86 x 172 x 275 3,4 x 6,8 x 10,8	105 x 216 x 305 4.1 x 8.5 x 12.1 (12V model: 105 x 230 x 325)	117 x 232 x 327 4.6 x 9.1 x 12.9 (12V model: 117 x 232 x 362)
ACCESSORIES					
Remote on-off	Yes				
Automatic transfer switch	Filax				
STANDARDS					
Safety	EN-IEC 60335-1 / EN-IEC 62109-1				
EMC	EN 55014-1 / EN 55014-2 / IEC 61000-6-1 / IEC 61000-6-2 / IEC 61000-6-3				
Automotive Directive	ECE R10-4				

1) Nonlinear load, crest factor 3:1
2) Protection key:
   a) output short circuit
   b) overload
   c) battery voltage too high
   d) battery voltage too low
   e) temperature too high
   f) DC ripple too high



Battery Alarm
An excessively high or low battery voltage is indicated by an audible and visual alarm, and a relay for remote signalling.



BMV Battery Monitor
The BMV Battery Monitor features an advanced microprocessor control system combined with high resolution measuring systems for battery voltage and charge/discharge current. Besides this, the software includes complex calculation algorithms to exactly determine the state of charge of the battery. The BMV selectively displays battery voltage, current, consumed Ah or time to go. The monitor also stores a host of data regarding performance and use of the battery.



VE.Direct Bluetooth Smart dongle
(must be ordered separately)

Victron Energy B.V. | De Paal 35 | 1351 JG Almere | The Netherlands
General phone: +31 (0)36 535 97 00 | Fax: +31 (0)36 535 97 40
E-mail: sales@victronenergy.com | **www.victronenergy.com**

victron energy
BLUE POWER

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1.31 VICTRON ENERGY POWER INVERTER MODULE PHOENIX 24/250 MANUAL

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BLUE POWER

Manual EN
Handleiding NL
Manuel FR
Anleitung DE
Manual ES
Manuale IT

Phoenix Inverter VE.Direct

12 | 250	12 | 375	12 | 500	12 | 800	12 | 1200
24 | 250	24 | 375	24 | 500	24 | 800	24 | 1200
48 | 250	48 | 375	48 | 500	48 | 800	48 | 1200

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EN NL FR DE ES IT

1. Safety instructions

WARNING: ELECTRIC SHOCK HAZARD
The product is used in conjunction with a permanent energy source (battery). Input and/or output terminals may still be dangerously energized, even when the equipment is switched off. Always disconnect the battery before carrying out maintenance or servicing the product.

The product has no internal user-serviceable components. Do not remove the front plate or operate the product if any panels have been removed. All servicing must be undertaken by qualified personnel.

Please read the installation instructions in the installation manual before installing the equipment.

This is a Safety Class I product (supplied with a protective grounding terminal). The chassis must be grounded. A grounding point is located on the outside of the product. Whenever it is likely that the grounding protection has been damaged, the product must be turned off and secured against unintended operation; please contact qualified service staff.

The AC output is isolated from the DC input and the chassis. Local regulations may require a true neutral. In this case one of the AC output wires must be connected to the chassis, **and the chassis must be connected to a reliable ground**. Please note that a true neutral is needed to ensure correct operation of an earth leakage circuit breaker.

Ensure that the equipment is used under the correct ambient conditions.
Never operate the product in a wet or dusty environment.
Never use the product where there is a risk of gas or dust explosions.

Ensure there is adequate free space (10 cm) for ventilation around the product and check that the ventilation vents are not blocked.

This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.

Children should be supervised to ensure that they do not play with the appliance.

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2. Description

VE.Direct communication port
The VE.Direct port can be connected to:
- A computer (VE.Direct to USB interface cable needed)
- Apple and Android smartphones, tablets and other devices (VE.Direct to Bluetooth Smart dongle needed)

Fully configurable
- Low battery voltage alarm trip and reset levels
- Low battery voltage cut-off and restart levels, or Dynamic Cut-off
- Output voltage 210 - 245V
- Frequency 50 Hz or 60 Hz
- ECO mode on/off and ECO mode sense level

Monitoring
Battery voltage, AC Output voltage, load indicator, alarms

Proven reliability
The full bridge with toroidal transformer topology has proven its reliability over many years.
The inverters are short circuit proof and protected against overheating, whether due to overload or high ambient temperature.

High start-up power
Needed to start loads such as power converters for LED lamps, filament lamps or electric tools.

ECO mode
When in ECO mode, the inverter will switch to standby when the load decreases below a preset value. It will switch on and check every few seconds, adjustable, if the load has increased again.

Remote on/off connector
A remote on/off switch can be connected to a two pole connector or between battery plus and the left hand contact of the two pole connector.

LED diagnosis
A red and a green LED indicate inverter operation and status of the different protections.

To transfer the load to another AC source: the automatic transfer switch
For our low power inverters we recommend our Filax Automatic Transfer Switch. The Filax features a very short switchover time (less than 20 milliseconds) so that computers and other electronic equipment will continue to operate without disruption.

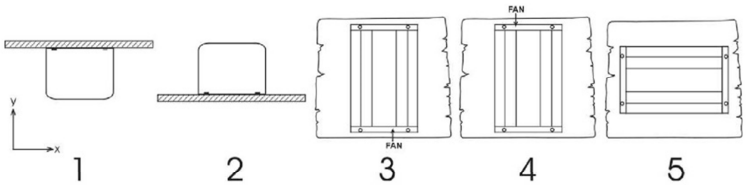
Available with different output sockets
Schuko, UK (BS-1363), AU/NZ (3112) or IEC-320 (male plug included)

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3. Installation

3.1 Location of the inverter



1	Ceiling mounting (inverted).	*Not recommended*
2.	Base mounting.	**OK**
3	Vertical wall mounting, fan at bottom.	**OK** (beware of small objects falling through the ventilation openings on top).
4	Vertical wall mounting, fan on top.	*Not recommended*
5	Horizontal wall mounting.	**OK**

For best operating results, the inverter should be placed on a flat surface. To ensure a trouble free operation of the inverter, it must be used in locations that meet the following requirements:

a) Avoid any contact with water. Do not expose the inverter to rain or moisture.

b) Do not place the unit in direct sunlight. Ambient air temperature should be between -20°C and 40 °C (humidity < 95% non condensing). Note that in extreme situations the inverter's case temperature can exceed 70 °C.

c) Do not obstruct the airflow around the inverter. Leave at least 10 centimetres clearance
around the inverter. When the inverter is running too hot, it will shut down. When the inverter has reached a safe temperature level the unit will automatically restart again.

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3.2 Connection to the battery

In order to utilize the full capacity of the product, batteries with sufficient capacity and battery cables with sufficient cross section should be used. See table:

	12/250	24/250	48/250		12/375	24/375	48/375
Minimum battery cap.	30 Ah	20 Ah	10 Ah		40 Ah	30 Ah	15 Ah
Internal DC fuse	2 x 30A	30A	25A		2 x 40A	40A	25A
Fuse type (Mfr.: Littelfuse)	ATOF 32V	ATOF 32V	FKS 80V		ATOF 32V	ATOF 32V	FKS 80V
Fuse replaceble	no	no	no		no	no	no
Recommended DC cable cross-section (mm^2)							
0 – 1,5 m	4 mm^2	2,5 mm^2	1,5 mm^2		6 mm^2	4 mm^2	2,5 mm^2
1,5 – 3 m	6 mm^2	4 mm^2	2,5 mm^2		10 mm^2	6 mm^2	4 mm^2

	12/500	24/500	48/500		12/800	24/800	48/800
Minimum battery cap.	60 Ah	40Ah	20 Ah		100 Ah	50 Ah	30 Ah
Internal DC fuse	3 x 35A	2 x 25A	30A		125A	2 x 40A	2 x 20A
Fuse type (Mfr.: Littelfuse)	ATOF 32V	ATOF 32V	FKS 80V		MIDI 32V	ATOF 32V	FKS 80V
Fuse replaceble	no	no	no		yes	no	no
Recommended DC cable cross-section (mm^2)							
0 – 1,5 m	6 mm^2	6 mm^2	4 mm^2		16 mm^2	6 mm^2	4 mm^2
1,5 -3 m	10 mm^2	10 mm^2	6 mm^2		25 mm^2	10 mm^2	6 mm^2

	12/1200	24/1200	48/1200
Minimum battery cap.	150 Ah	60Ah	30 Ah
Internal DC fuse	200A	100A	50A
Fuse type (Mfr.: Littelfuse)	MIDI 32V	MIDI 32V	MIDI 58V
Fuse replaceble	yes	yes	yes
0 – 1,5 m	25 mm^2	10 mm^2	6 mm^2
1,5 -3 m	35 mm^2	16 mm^2	10 mm^2

The inverters are fitted with an internal DC fuse (see table above for rating). If the DC cable length is increased to more than 1,5m, an additional fuse or DC circuit breaker must be inserted close to the battery.

Reverse polarity connection of the battery wires will blow the internal fuse and can damage the inverter. The internal fuse is not always replaceble (see table above).

3.3 Wire size for connecting the inverter chassis to ground

The earth conductor from the earth lug on the chassis to ground should have at least half the cross-section of the conductors used for the battery connection: see Appendix B.

3.4 Connection to the load

Never connect the output of the inverter to another AC source, such as a household AC wall outlet or a generator.

3.5 Connecting the inverter neutral output to the chassis/ground

The AC output is isolated from the DC input and the chassis. Local regulations may require a true neutral. In this case one of the AC output wires must be connected to the chassis, and the chassis must be connected to a reliable ground: see appendix A.

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3.6 Remote on/off connector

A remote on/off switch can be connected to the two pole connector. Alternatively, the left hand contact of the connector can be switched to battery positive: useful in automotive applications, wire it to the ignition contact.

Note that also the front switch needs to set to either On or ECO for the inverter to start.

3.7 Configuration

The inverter is ready for use with the factory settings (see specifications), and can be configured with a computer (VE.Direct to USB interface cable needed), Apple and Android smartphones, tablets and other devices (VE.Direct to Bluetooth Smart dongle needed).

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4. Operation

4.1 LED definitions

Green LED	Status	Trouble shooting
●●●●●●●● Solid on	Inverter on	**Red LED Off** status OK **Red LED On or blinking:** The Inverter is still on, but will shut down when the condition gets worse. See red LED table for warning reason
●●------ Slow single pulse	ECO mode	If the inverter keeps switching on and off while there is a load connected, the load may be too small compared to the actual ECO mode settings. Increase the load or change ECO mode settings. (minimum ECO mode setting: 15W)
●-●----- Fast double pulse	Off and waiting	Inverter did shut down because of a protection. The inverter will restart automatically as soon as all alarm conditions are cleared. See red LED state for the shutdown reason.
-------- Off	Inverter off	**Red LED Off** Check the On/Off/ECO switch: it should be in On position or in ECO position. Check Remote on/off connector. Check DC cable connections and fuses. Inverter fuse blown: the inverter has to be returned for service. **Red LED On or blinking** The inverter did shut down because of a protection. It will no longer automatically restart. The red LED indicates the reason for shutdown. Remove the cause and then restart the inverter by switching it Off, and then back On.

Red LED	Definition	Trouble shooting
●●●●●●●● Solid on	Overload	Reduce load
●●●●---- Slow blink	Low batt.	Recharge or replace battery Check DC cable connections Check cable cross section as it may be insufficient. See section 4.3 Protections and automatic restarts for manual and automatic restart behavior.
●-●-●-●- Fast blink	High batt.	Reduce DC input voltage, check for faulty charger
●-●----- Double pulse	High temp.	Reduce load and/or move inverter to better ventilated area
●---●--- Fast single pulse	High DC ripple	Check DC cable connections and cable cross section.

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4.2 ECO Mode

Set the front switch to ECO mode to reduce the power consumption in no-load operation. The inverter will automatically switch off as soon as it detects that there is no load connected. It then switches on, briefly, every 2,5 seconds to detect a load. If the output power exceeds the set level, the inverter will continue to operate.

The default ECO mode wake-up minimum power is 15 Watt.
The default ECO mode search interval is 2.5 seconds

Note that the required ECO mode settings are heavily dependent on the type of load: inductive, capacitive, non-linear. Adjustment may be needed.

4.3 Protections and automatic restarts

Overload

Some loads like motors or pumps draw large inrush currents in a start-up situation. In such circumstances, it is possible that the start-up current exceeds the over current trip level of the inverter. In this case the output voltage will quickly decrease to limit the output current of the inverter. If the over current trip level is continuously exceeded, the inverter will shut down: wait 30 seconds and then restart.

After three restarts followed by another overload within 30 seconds of restarting, the inverter will shutdown and remain off. The LEDs will signal shutdown due to overload. To restart the inverter, switch it Off, then On.

Low battery voltage (adjustable)

The inverter will shut down when the DC input voltage drops below the low battery shutdown level. After a minimum delay of 30 seconds, the inverter will restart if the voltages rise above the low battery restart level.

After three restarts followed by a low battery shutdown within 30 seconds of restarting, the inverter will shutdown and stop retrying. The LEDs will signal low battery shutdown. To restart the inverter, switch it Off, and then On, or recharge the battery: as soon as the battery has risen and then stays above the Charge detect level for 30 seconds, it will switch on.

See the Technical Data table for default low battery shutdown and restart levels. They can be changed with VictronConnect (computer or app).

Alternatively Dynamic Cut-off can be implemented, see
https://www.victronenergy.com/live/ve.direct:phoenix-inverters-dynamic-cutoff

High battery voltage

Reduce DC input voltage and/or check for a faulty battery- or solar-charger in the system. After shutting down due to a high battery voltage, the inverter will first wait 30 seconds and then retry operation as soon as the battery voltage has dropped to acceptable level. The inverter will not stay off after multiple retries.

High temperature

A high ambient temperature or enduring high load may result in shut down to over temperature. The inverter will restart after 30 seconds. The inverter will not stay off after multiple retries. Reduce load and/or move inverter to better ventilated area.

High DC ripple

High DC ripple is usually caused by loose DC cable connections and/or too thin DC wiring. After the inverter has switched off due to high DC ripple voltage, it waits 30 seconds and then restarts.

After three restarts followed by a shutdown due to high DC ripple within 30 seconds of restarting, the inverter will shutdown and stops retrying. To restart the inverter, switch it Off and then On.

Continuous high DC ripple reduces life expectancy of the inverter.

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5. Technical data

Phoenix Inverter 12 Volt / 24 Volt / 48 Volt	12/250 24/250 48/250	12/375 24/375 48/375	12/500 24/500 48/500	12/800 24/800 48/800
Cont. power at 25°C (1)	250 VA	375 VA	500 VA	800 VA
Cont. power at 25°C / 40°C	200 / 175 W	300 / 260 W	400 / 350 W	650 / 560 W
Peak power	400 W	700 W	900 W	1500 W
Output AC voltage / frequency (adjustable)	230 VAC or 120 VAC +/- 3% 50Hz or 60Hz +/- 0,1%			
Input voltage range	9,2 - 17 / 18,4 - 34,0 / 36,8 - 62,0 VDC			
Low battery shut down (adjustable)	9,3 / 18,6 / 37,2 VDC			
Low battery restart & alarm (adjustable)	10,9 / 21,8 / 43,6 VDC			
Battery charged detect (adjustable)	14,0 / 28,0 / 56,0 VDC			
Max. efficiency	87/88/88 %	89/89/90 %	90/90/91 %	90/90/91 %
Zero-load power	4,2/5,2/7,9 W	5,6/6,1/8,5 W	6/6,5/9 W	6,5/7/9,5 W
Default zero-load power in ECO mode (default search interval: 2,5 s, adjustable)	0,8/1,3/2,5 W	0,9/1,4/2,6 W	1 / 1,5 / 3 W	1 / 1,5 / 3 W
ECO mode stop and start power setting	Adjustable			
Protection (2)	a – f			
Operating temperature range	-40 to +60°C (fan assisted cooling) (derate 1,25% per °C above 40°C)			
Humidity (non-condensing)	max 95%			
ENCLOSURE				
Material & Colour	Steel chassis and plastic cover (blue Ral 5012)			
Battery-connection	Screw terminals			
Maximum cable cross-section	10 mm² / AWG8			25/10/10mm² / AWG4/8/8
Standard AC outlets	230V: Schuko (CEE 7/4), IEC-320 (male plug included) UK (BS 1363), AU/NZ (AS/NZS 3112) 120V: Nema5-15R			
Protection category	IP 21			
Weight	2,4 kg/5,3 lbs	3,0 kg/6,6 lbs	3,9 kg/8,5 lbs	5,5 kg/12 lbs
Dimensions (hxwxd, mm) (hxwxd, inch)	86x165x260 3,4x6,5x10,2	86x165x260 3,4x6,5x10,2	86x172x275 3,4x6,8x10,8	105x216x305 4,1x8,5x12,1 (12V model: 105x230x325)
ACCESSORIES				
Remote on-off	Yes			
Automatic transfer switch	Filax or Multi			
STANDARDS				
Safety	EN/IEC 60335-1 / EN/IEC 62109-1			
EMC	EN 55014-1 / EN 55014-2 IEC 61000-6-1 / IEC 61000-6-3			
Automotive Directive	ECE R10-4 EN 50498			

1) Nonlinear load, crest factor 3:1
2) Protection key:
   a) output short circuit
   b) overload
   c) battery voltage too high
   d) battery voltage too low
   e) temperature too high
   f) DC ripple too high

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5. Technical data, continued

Phoenix Inverter 12 Volt / 24 Volt / 48 Volt	12/1200 / 24/1200 / 48/1200
Cont. power at 25°C (1)	1200 VA
Cont. power at 25°C / 40°C	1000 / 900 W
Peak power	2400 W
Output AC voltage / frequency (adjustable)	230 VAC or 120 VAC +/- 3% 50Hz or 60Hz +/- 0,1%
Input voltage range	9,2 - 17 / 18,4 - 34,0 / 36,8 - 62,0 VDC
Low battery shut down (adjustable)	9,3 / 18,6 / 37,2 VDC
Low battery restart & alarm (adjustable)	10,9 / 21,8 / 43,6 VDC
Battery charged detect (adjustable)	14,0 / 28,0 / 56,0 VDC
Max. efficiency	92 / 94 / 94 %
Zero-load power	8 / 9,5 / 10 W
Default zero-load power in ECO mode (default search interval: 2,5 s, adjustable)	1 / 1,7 / 2,7 W
ECO mode stop and start power setting	Adjustable
Protection (2)	a – f
Operating temperature range	-40 to +60°C (fan assisted cooling) (derate 1,25% per °C above 40°C)
Humidity (non-condensing)	max 95%
ENCLOSURE	
Material & Colour	Steel chassis and plastic cover (blue Ral 5012)
Battery-connection	Screw terminals
Maximum cable cross-section	35/25/25mm² / AWG2/4/4
Standard AC outlets	230V: Schuko (CEE 7/4), IEC-320 (male plug included) UK (BS 1363), AU/NZ (AS/NZS 3112) 120V: Nema5-15R
Protection category	IP 21
Weight	7,7 kg/17 lbs
Dimensions (hxwxd, mm) (hxwxd, inch)	117x232x327 4,6x9,1x12,9 (12V model: 117x232x367)
ACCESSORIES	
Remote on-off	Yes
Automatic transfer switch	Filax or Multi
STANDARDS	
Safety	EN/IEC 60335-1 / EN/IEC 62109-1
EMC	EN 55014-1 / EN 55014-2 IEC 61000-6-1 / IEC 61000-6-3
Automotive Directive	ECE R10-4 EN 50498

1) Nonlinear load, crest factor 3:1
2) Protection key:
   a) output short circuit
   b) overload
   c) battery voltage too high
   d) battery voltage too low
   e) temperature too high
   f) DC ripple too high

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Fig 1: Front and rear view



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Mounting instructions

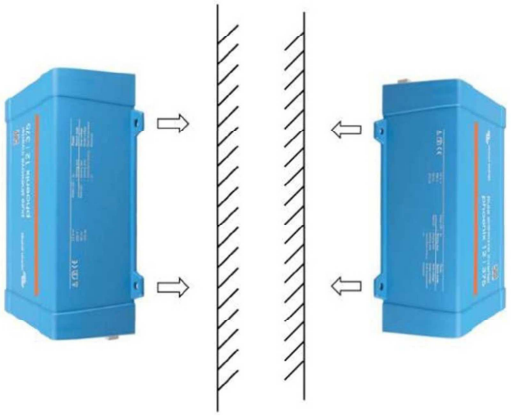


Figure 1





Figure 2

Mount the inverter with four screws vertically up- or downwards or horizontally up- or downwards (as indicated in Figure 1) against a sturdy wall or horizontally on a suitable ground surface (as indicated in Figure 2). Keep at least 4 inches (10 cm) clearance with respect to other apparatus/objects. Beware that IP21 only applies to the lower mounting method depicted in Figure 2; otherwise IP20 is applies. **Do not mount the inverter upside down to a surface.**

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Appendix A
Connecting the inverter neutral output to the chassis/ground

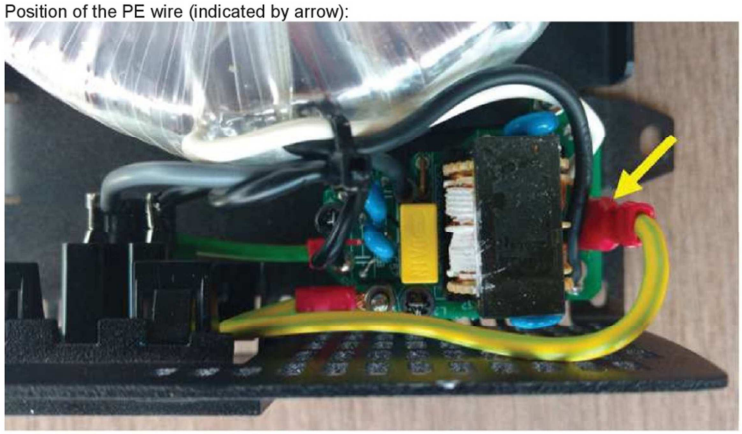
The AC output is isolated from the DC input and the chassis. Local regulations may require a true neutral. In this case one of the AC output wires must be connected to the chassis, and the chassis must be connected to a reliable ground. Inside the inverter a provision has been made to be able to connect the neural and the chassis; the way to do this is explained below.

Please be sure to disconnect the battery when connecting the neutral to protective earth (PE).

An internal PE wire, which is used to connect the neutral and the chassis, is accessible after removing the plastic cover. A Torx T10 screwdriver is needed to loosen the four screws which hold the plastic cover.
In the pictures below the two possible connections of the PE wire are shown:

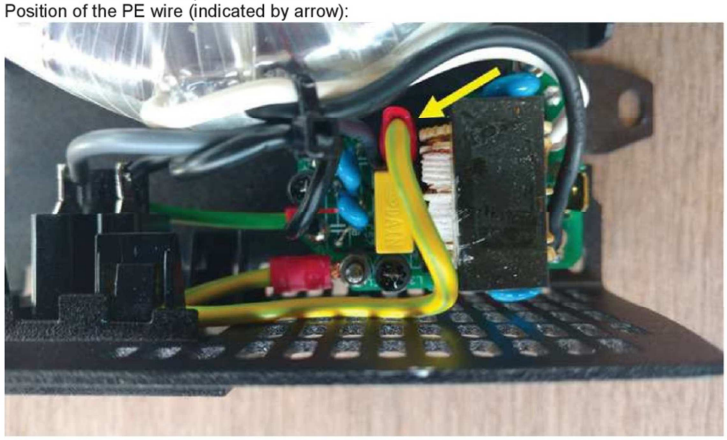
For the 250VA, 375VA and 500VA inverters:
1. Neutral floating

Position of the PE wire (indicated by arrow):



2. Neutral connected to protective earth

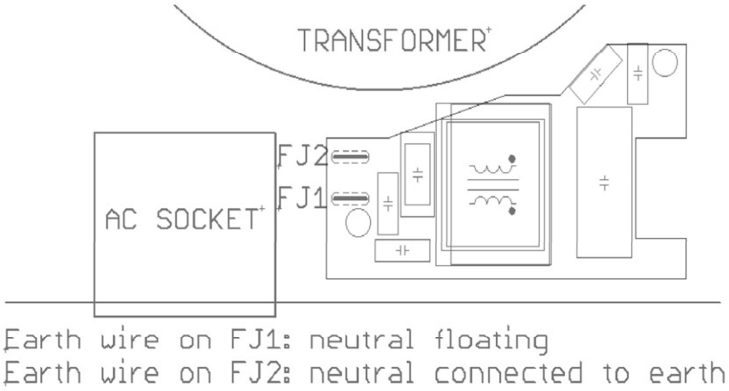
Position of the PE wire (indicated by arrow):



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For the 800VA and 1200VA inverters:
For these inverters the earth wire from the chassis can be either connected to FJ1 (neutral floating) or to FJ2 (neutral connected to earth/chassis). The labels FJ1 and FJ2 are printed on the circuit board. The default position is FJ1, i.e. neutral is floating.



Appendix B
Wire size for connecting the inverter chassis to ground

The earth conductor from the earth lug on the chassis to ground should have at least half the cross-section of the conductors used for the battery connection. The maximum conductor size that fits the earth lug is 25 mm². Use the table below to find the correct cross-section for the earth conductor.

Cable cross-section	
to battery	to protective earth
1.5 mm²	≥ 0.75 mm²
2.5 mm²	≥ 1.5 mm²
4 mm²	≥ 2.5 mm²
6 mm²	≥ 4 mm²
10 mm²	≥ 6 mm²
16 mm²	≥ 10 mm²
25 mm²	≥ 16 mm²
35 mm²	25 mm²

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1. Consignes de sécurité

ATTENTION : RISQUE D'ÉLECTROCUTION
L'appareil est utilisé conjointement avec une source d'énergie permanente (batterie). Même lorsque l'appareil est hors tension, une tension dangereuse peut être présente sur les bornes d'entrée et de sortie. La batterie doit toujours être déconnectée avant de réaliser des activités de maintenances ou de réparation.

L'appareil ne contient aucun élément interne pouvant être réparé par l'utilisateur. Ne jamais retirer le panneau frontal et ne jamais mettre l'appareil en service si tous les panneaux ne sont pas montés. Tout entretien doit être effectué par du personnel qualifié.

Veuillez lire attentivement les consignes d'installation avant de mettre l'appareil en service.

Cet appareil est un produit de classe de sécurité I (livré avec une borne de mise à la terre de protection). Le châssis doit être mis à la masse. Un point de mise à la terre est situé à l'extérieur du boîtier de l'appareil Si vous suspectez la protection par prise de terre d'être endommagée, l'appareil doit être mis hors tension et protégé contre toute mise en service involontaire ; faire appel à du personnel qualifié.

La sortie CA est isolée par rapport à l'entrée CC et le châssis. L'utilisation d'une vraie phase neutre peut être rendue obligatoire par les réglementations locales. Dans ce cas, l'un des fils de la sortie CA doit être branché au châssis, **et celui-ci doit être raccordé à un point de mise à la terre fiable**. Notez qu'un vrai neutre est nécessaire pour garantir le fonctionnement correct d'un disjoncteur de fuite à la terre.

Assurez-vous que l'appareil est utilisé dans des conditions d'exploitation appropriées.
Ne jamais l'utiliser dans un environnement humide ou poussiéreux.
Ne pas utiliser l'appareil dans un endroit présentant un risque d'explosion de gaz ou de poussière.

Conservez toujours suffisamment d'espace libre autour de l'appareil (10 cm) pour la ventilation et assurez-vous que les orifices de ventilation ne sont pas obstrués.

Cet appareil n'est pas prévu pour être utilisé par des personnes (dont des enfants) présentant un handicap physique, sensoriel ou mental, ou ayant un manque de connaissances et d'expérience, sauf si elles sont surveillées, ou si elles ont reçues des instructions concernant l'utilisation de cet appareil par une personne responsable de leur sécurité.

Les enfants doivent être surveillés afin de s'assurer qu'ils ne jouent pas avec l'appareil.

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2. Description

Port de communication VE.Direct
Le port VE.Direct peut être raccordé à :
- Un ordinateur (Câble d'interface VE.Direct-USB nécessaire).
- Smartphones Apple et Android, tablettes et autres dispositifs (une clé électronique Bluetooth Smart communicant avec VE.Direct est nécessaire).

Entièrement configurable
- Niveaux de réinitialisation et déclenchement de l'alarme en cas de tension de batterie faible
- Niveaux de redémarrage et coupure en cas de tension de batterie faible, ou Coupure dynamique
- Tension de sortie 210 - 245V
- Fréquence de sortie 50 Hz ou 60 Hz
- Niveau de détection du mode ECO et Allumage/arrêt du mode ECO

Surveillance
Tension de batterie, tension de sortie CA, indicateur de charge, alarmes

Fiabilité reconnue
La topologie de pont complet avec un transformateur toroïdal a démontré sa fiabilité depuis des années.
Les convertisseurs sont protégés contre les courts-circuits et la surchauffe, que ce soit en cas de surcharge ou de température ambiante élevée.

Forte puissance de démarrage
Nécessaire pour démarrer des charges telles que des convertisseurs de puissance pour des ampoules LED, des ampoules à filament ou des outils électriques.

Mode ECO
En mode ECO, le convertisseur commutera sur pause si la charge chute en dessous d'une valeur prédéterminée. Il s'allumera et vérifiera toutes les X secondes (réglable), si la charge a de nouveau augmenté.

Interrupteur On/Off à distance
Un interrupteur à distance d'allumage/arrêt peut être connecté à un connecteur à deux pôles ou entre le pôle positif de la batterie et le contact gauche du connecteur à deux pôles.

LED de diagnostic
Un voyant LED rouge et un vert indiquent le fonctionnement du convertisseur et l'état des différentes protections.

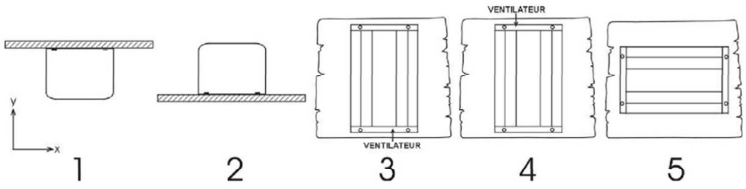
Pour transférer la charge vers une autre source CA : le commutateur de transfert automatique
Pour nos convertisseurs de faible puissance, nous recommandons l'utilisation de notre commutateur de transfert automatique Filax. Le Filax bénéficie d'un temps de transfert très rapide (inférieur à 20 millisecondes) afin que les ordinateurs et les autres équipements électroniques puissent continuer de fonctionner sans interruption.

Disponible avec différentes prises de sortie
Schuko, UK (BS-1363), AU/NZ (3112) ou IEC-320 (prise mâle incluse)

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3. Installation

3.1 Installation du convertisseur



1	Montage au plafond	*Déconseillé*
2	Montage au sol	**OK**
3	Montage vertical sur une cloison avec ventilateur vers le bas	**OK** (attention aux petits objets qui pourraient tomber dans les ouvertures de ventilation)
4	Montage vertical sur une cloison avec ventilateur vers le haut	*Déconseillé*
5	Montage horizontal sur une cloison	**OK**

Pour garantir le fonctionnement correct du convertisseur, son emplacement doit répondre aux exigences suivantes :

a) Évitez tout contact avec l'eau. N'exposez pas le convertisseur à la pluie ou au brouillard ;

b) Ne placez pas le convertisseur dans un endroit exposé directement au soleil; la température ambiante doit être de -20 °C à 40 °C (humidité de l'air <95% sans ruissellement); dans des situations extrêmes, le boîtier du convertisseur peut atteindre une température de plus de 70 °C ;

c) Évitez toute obstruction de la circulation de l'air autour du convertisseur; laissez au moins 10 cm d'espace libre autour du convertisseur; lorsque le convertisseur atteint une température trop élevée, il s'éteint automatiquement; lorsque la température du convertisseur devient à nouveau acceptable, il redémarre automatiquement.

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3.2 Raccordement à la batterie

Pour bénéficier de la puissance maximale de l'appareil, il est nécessaire d'utiliser des batteries de capacité suffisante et des câbles de section suffisante. Voir le tableau :

	12/250	24/250	48/250	12/375	24/375	48/375
Capacité min. de batterie	30 Ah	20 Ah	10 Ah	40 Ah	30 Ah	15 Ah
Fusible CC interne	2 x 30 A	30 A	25 A	2 x 40 A	40 A	25 A
Type de fusible (Mfr. : Littelfuse)	ATOF 32 V	ATOF 32 V	FKS 80 V	ATOF 32 V	ATOF 32 V	FKS 80 V
Fusible remplaçable	non	non	non	non	non	non
Section efficace de câble CC recommandée (mm^2)						
0 – 1,5 m	4 mm^2	2,5 mm^2	1,5 mm^2	6 mm^2	4 mm^2	2,5 mm^2
1,5 – 3 m	6 mm^2	4 mm^2	2,5 mm^2	10 mm^2	6 mm^2	4 mm^2

	12/500	24/500	48/500	12/800	24/800	48/800
Capacité min. de batterie	60 Ah	40 Ah	20 Ah	100 Ah	50 Ah	30 Ah
Fusible CC interne	3 x 35 A	2 x 25 A	30 A	125 A	2 x 40 A	2 x 20 A
Type de fusible (Mfr. : Littelfuse)	ATOF 32 V	ATOF 32 V	FKS 80 V	MIDI 32 V	ATOF 3 2 V	FKS 80 V
Fusible remplaçable	non	non	non	oui	non	non
Section efficace de câble CC recommandée (mm^2)						
0 – 1,5 m	6 mm^2	6 mm^2	4 mm^2	16 mm^2	6 mm^2	4 mm^2
1,5 -3 m	10 mm^2	10 mm^2	6 mm^2	25 mm^2	10 mm^2	6 mm^2

	12/1200	24/1200	48/1200
Capacité min. de batterie	150 Ah	60 Ah	30 Ah
Fusible CC interne	200 A	100 A	50 A
Type de fusible (Mfr. : Littelfuse)	MIDI 32 V	MIDI 32 V	MIDI 58 V
Fusible remplaçable	oui	oui	oui
0 – 1,5 m	25 mm^2	10 mm^2	6 mm^2
1,5 -3 m	35 mm^2	16 mm^2	10 mm^2

Les convertisseurs disposent d'un fusible CC interne (voir le tableau technique ci-dessus indiquant les valeurs nominales). Si la longueur de câble CC est augmentée de plus de 1,5 m, un fusible supplémentaire ou un disjoncteur CC devra être inséré près de la batterie.

Inverser la polarité des câbles de la batterie fera sauter le fusible interne et pourrait endommager le convertisseur. Le fusible interne n'est pas toujours remplaçable (voir le tableau ci-dessus).

3.3 Taille des fils pour raccorder le châssis du convertisseur à la terre

Le fil de terre provenant de la cosse de la terre sur le châssis vers le sol devra présenter une section équivalente à au moins la moitié de celle des conducteurs utilisés pour le raccordement de la batterie : consultez l'annexe B.

3.4 Raccordement à la charge

Ne jamais connecter la sortie du convertisseur à une autre source CA, telle qu'une prise de courant murale CA d'un appareil électroménager ou d'un générateur.

3.5 Raccordement de la sortie neutre du convertisseur au châssis/terre

La sortie CA est isolée par rapport à l'entrée CC et le châssis. L'utilisation d'une vraie phase neutre peut être rendue obligatoire par les réglementations locales. Dans ce cas, l'un des fils de la sortie CA doit être branché au châssis, et le châssis doit être mis à la terre. Consultez l'annexe A.

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3.6 Interrupteur on/off à distance

Un interrupteur d'allumage/arrêt à distance peut être connecté à un connecteur à deux pôles. Sinon, le contact de gauche du connecteur peut être commuté sur le pôle positif de la batterie : il s'agit d'une fonction très utile pour des applications automobiles, car vous pouvez le brancher au contact de démarrage.

Notez également que l'interrupteur frontal doit être mis sur ON ou sur ECO pour que le convertisseur démarre.

3.7. Configuration

Le convertisseur est prêt à l'emploi avec les paramètres d'usine (voir spécifications). Il peut être configuré à l'aide d'un ordinateur (avec le câble d'interface VE.Direct-USB), de Smartphones Apple et Android, de tablettes et d'autres dispositifs (en utilisant une clé électronique Bluetooth Smart communicant avec VE.Direct).

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4. Fonctionnement

4.1 Définitions des voyants LED

LED Verte	État	Résolutions des problèmes
●●●●●●●● Allumée Fixe	Convertisseur allumé	**LED rouge éteinte** état OK **LED rouge allumée ou clignotante :** Le convertisseur est encore allumé, mais il s'arrêtera si les conditions empirent. Voir le tableau des LED rouges pour les causes d'avertissement
●●------- Clignotement simple lent	Mode ECO	Si le convertisseur continue de s'allumer et de s'éteindre, alors qu'une charge est connectée, la charge peut être trop petite par rapport aux paramètres réels du mode ECO. Augmentez la charge ou modifiez les paramètres du Mode ECO. (le minimum paramétres de mode ECO : 15 W)
●-●----- Clignotement double rapide	Éteint et en attente	Le convertisseur s'est éteint suite à l'activation d'une protection. Le convertisseur redémarrera automatiquement dès que toutes les conditions d'alarme auront été supprimées. Voir le tableau de l'état des LED rouges pour les causes d'avertissement.
-------- Off	Convertisseur éteint	**LED rouge éteinte** Vérifiez l'interrupteur On/Off/ECO : il devrait être en position ON ou ECO. Vérifiez l'interrupteur on/off à distance. Vérifiez les fusibles et les connexions du câble CC. Le fusible du convertisseur a grillé : le convertisseur doit être envoyé à réparer. **LED rouge allumée ou clignotante** Le convertisseur s'est éteint suite à l'activation d'une protection. Il ne redémarrera plus automatiquement. La LED rouge indique la raison de l'arrêt. Supprimez la cause et redémarrez ensuite le convertisseur en l'éteignant puis en le rallumant.

LED rouge	Définition	Résolutions des problèmes
●●●●●●●● Allumé Fixe	Surcharge	Réduisez la charge
●●●●---- Clignotement lent	Niveau de batterie bas	Rechargez ou remplacez la batterie Vérifiez les connexions du câble CC Vérifiez la section efficace de câble car elle peut être insuffisante. Voir la section 4.3 Protections et redémarrages automatiques.
●-●-●-●- Clignotement rapide	Niveau de batterie élevé	Réduisez la tension d'entrée CC. Contrôlez le chargeur défaillant.
●-●------ Clignotement double	Temp.élevée	Réduisez la charge et/ou déplacez le convertisseur vers une zone mieux aérée
●---●--- Clignotement unique rapide	Ondulation CC élevée	Vérifiez les connexions du câble CC et la section de câble.

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4.2 Mode ECO

Mettre l'interrupteur sur le mode ECO afin de réduire la consommation d'énergie en cas de fonctionnement sans charge. Le convertisseur s'éteindra automatiquement dès qu'il détectera qu'aucune charge n'est connectée. Il s'allumera brièvement toutes les 2,5 secondes pour détecter la présence d'une charge. Si la puissance de sortie dépasse le niveau défini, le convertisseur continuera à fonctionner.

Par défaut, la puissance minimale de déclenchement du mode ECO est de 15 W.
Par défaut, l'intervalle de recherche du mode ECO est de 2,5 secondes.

Notez que les paramètres du mode ECO requis dépendent fortement du type de charge : inductive, capacitive, non linéaire. Des réglages peuvent être nécessaires.

4.3 Protections et redémarrages automatiques

Surcharge

Certaines charges, telles que des moteurs ou des pompes, font appel à de grandes quantités de courants lors des démarrages. Dans de telles circonstances, il est possible que le courant de démarrage dépasse le niveau de déclenchement de surintensité du convertisseur. Dans ce cas, la tension de sortie baissera rapidement pour limiter le courant de sortie du convertisseur. Si le niveau de déclenchement de surintensité est dépassé continuellement, le convertisseur s'éteindra, attendra 30 secondes et il redémarrera.

Après trois redémarrages suivis d'une autre surcharge dans les 30 secondes suivant le redémarrage, le convertisseur s'arrêtera et il restera éteint. Les LED indiqueront un arrêt dû à une surcharge. Pour redémarrer le convertisseur, éteignez-le, et ensuite allumez-le.

Tension de batterie faible (réglable)

Le convertisseur s'éteindra, puis la tension d'entrée CC descendra en dessous du niveau d'arrêt en cas de batterie basse. Après un délai minimal de 30 secondes, le convertisseur redémarrera si la tension dépasse le niveau de redémarrage en cas de batterie basse.

Après trois redémarrages suivis d'un arrêt dû à un niveau de batterie bas dans les 30 secondes suivant le redémarrage, le convertisseur s'arrêtera et il restera éteint. Les LED signaleront un arrêt dû à un niveau de batterie bas. Pour redémarrer le convertisseur, éteignez-le puis rallumez-le. Sinon, rechargez la batterie : dès que le niveau de la batterie montera et qu'il restera au-dessus du niveau de détection de charge pendant 30 secondes, le convertisseur s'allumera.

Consultez le tableau des spécifications techniques pour les seuils par défaut d'arrêt et de redémarrage en cas de niveau de batterie bas. Ils peuvent être modifiés à l'aide de VictronConnect (à l'aide d'un ordinateur ou depuis l'application).

Sinon, une fonction de coupure dynamique (Dynamic Cut-Off) peut être mise en place, voir https://www.victronenergy.com/live/ve.direct:phoenix-inverters-dynamic-cutoff

Tension de batterie élevée

Réduisez la tension d'entrée CC et/ou recherchez la batterie ou le chargeur solaire défaillant dans le système. Après un arrêt dû à une tension élevée, le convertisseur attendra d'abord 30 secondes, et il essayera à nouveau de démarrer dès que la tension de batterie descendra à un niveau acceptable. Le convertisseur ne restera pas éteint après plusieurs tentatives.

Température élevée

Une température ambiante élevée ou une charge élevée durable peut entraîner un arrêt dû à une surchauffe. Le convertisseur redémarrera au bout de 30 secondes. Le convertisseur ne restera pas éteint après plusieurs tentatives. Réduisez la charge et/ou déplacez le convertisseur vers une zone mieux aérée.

Ondulation CC élevée

Une ondulation CC élevée est généralement causée par des pertes sur les connexions du câble CC et/ou des fils CC trop fins. Si le convertisseur s'est éteint à cause d'une tension d'ondulation CC élevée, il attendra 30 secondes, et il redémarrera.

Après trois redémarrages suivis d'un arrêt dû à une ondulation CC élevée dans les 30 secondes suivant le redémarrage, le convertisseur s'arrêtera et il arrêtera d'essayer. Pour redémarrer le convertisseur, éteignez-le, et ensuite allumez-le.

Une ondulation CC élevée constante réduit la durée de vie du convertisseur.

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5. Caractéristiques techniques

Convertisseur Phoenix 12 Volts / 24 Volts / 48 Volts	12/250 24/250 48/250	12/375 24/375 48/375	12/500 24/500 48/500	12/800 24/800 48/800
Puissance continue à 25 °C (1)	250 VA	375 VA	500 VA	800 VA
Puissance continue à 25 °C / 40 °C	200 / 175 W	300 / 260 W	400 / 350 W	650 / 560 W
Puissance de crête	400 W	700 W	900 W	1500 W
Fréquence / Tension de sortie CA (réglable)	230 VCA ou 120 VAC +/- 3 % 50 Hz ou 60 Hz +/- 0,1 %			
Plage de tension d'alimentation	9,2 - 17 / 18,4 - 34,0 / 36,8 - 62,0 VCC			
Arrêt batterie basse (réglable)	9,3 / 18,6 / 37,2 VCC			
Alarme et redémarrage batterie basse (réglable)	10,9 / 21,8 / 43,6 VCC			
Dètection de batterie chargée (réglable)	14,0 / 28,0 / 56,0 VCC			
Efficience maximale	87/88/88 %	89/89/90 %	90/90/91 %	90/90/91 %
Consommation à vide	4,2/5,2/7,9 W	5,6/6,1/8,5 W	6/6,5/9 W	6,5/7/9,5 W
Consommation à vide par défaut en mode ECO (Intervalle de recherche par défaut : 2,5 s, réglable)	0,8/1,3/2,5 W	0,9/1,4/2,6 W	1/1,5/3 W	1/1,5/3 W
Paramètre de puissance de démarrage et arrêt en mode ECO	Réglable			
Protection (2)	a – f			
Plage de température d'exploitation	-40 à +60°C (refroidissement par ventilateur) (Réduction de 1,25 % par °C au-dessus de 40°C)			
Humidité (sans condensation)	maxi 95%			
BOÎTIER				
Matériau et couleur	Châssis en acier et couverture en plastique (Bleu RAL 5012)			
Raccordement batterie	Bornes à vis			
Section de câble maximale	10 mm² / AWG8			25 / 10 / 10 mm² / AWG4 / 8 / 8
Prises CA standard	230V: Schuko (CEE 7/4), IEC-320 (prise mâle incluse) UK (BS 1363), AU/NZ (AS/NZS 3112) 120V : Nema5-15R			
Degré de protection	IP 21			
Poids	2,4 kg/5,3 lb	3,0 kg/6,6 lb	3,9kg/8,5lbs	5,5kg/12lbs
Dimensions (HxLxP en mm) (h x w x d, pouce)	86x165x260 3,4x6,5x10,2	86x165x260 3,4x6,5x10,2	86x172x275 3,4x6,8x10,8	105x216x305 4,1x8,5x12,1 (12V modèle: 105x230x325)
ACCESSOIRES				
Interrupteur on/off à distance	Oui			
Commutateur de transfert automatique	Filax ou Multi			
NORMES				
Sécurité	EN/IEC 60335-1 / EN/IEC 62109-1			
EMC	EN 55014-1 / EN 55014-2 IEC 61000-6-1 / IEC 61000-6-3			
Directive sur l'automobile	ECE R10-4 EN 50498			

1) Charge non linéaire, facteur de crête 3:1
2) Touche de protection :
   a) court-circuit en sortie
   b) surcharge
   c) tension de batterie trop élevée
   d) tension de batterie trop faible
   e) température trop élevée
   f) ondulation CC trop élevée

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Caractéristiques techniques, a continué

Convertisseur Phoenix 12 Volt 24 Volt 48 Volt	12/1200 24/1200 48/1200
Puissance continue à 25 °C (1)	1200 VA
Puissance continue à 25 °C / 40 °C	1000 / 900 W
Puissance de crête	2400 W
Fréquence / Tension de sortie CA (réglable)	230 VAC ou 120 VAC +/- 3% 50Hz ou 60Hz +/- 0,1%
Plage de tension d'alimentation	9,2 - 17 / 18,4 - 34,0 / 36,8 - 62,0 VDC
Arrêt batterie basse (réglable)	9,3 / 18,6 / 37,2 VDC
Alarme et redémarrage batterie basse (réglable)	10,9 / 21,8 / 43,6 VDC
Dètection de batterie chargée (réglable)	14,0 / 28,0 / 56,0 VDC
Efficience maximale	92 / 94 / 94 %
Consommation à vide	8 / 9,5 / 10 W
Consommation à vide par défaut en mode ECO (intervalle de recherche par défaut : 2,5 s, réglable)	1 / 1,7 / 2,7 W
Paramètre de puissance de démarrage et arrêt en mode ECO	Réglable
Protection (2)	a – f
Plage de température d'exploitation	-40 à +60°C (refroidissement par ventilateur) (Réduction de 1,25 % par °C au-dessus de 40°C)
Humidité (sans condensation)	max 95%
BOÎTIER	
Matériau et couleur	Châssis en acier et couverture en plastique (Bleu RAL 5012)
Raccordement batterie	Bornes à vis
Section de câble maximale	35/25/25 mm² / AWG2/4/4
Prises CA standard	230V : Schuko (CEE 7/4), IEC-320 (prise mâle incluse) UK (BS 1363), AU/NZ (AS/NZS 3112) 120V : Nema5-15R
Degré de protection	IP 21
Poids	7,7 kg/17 lbs
Dimensions (HxLxP en mm) (h x w x d, pouce)	117x232x327 4,6x9,1x12,9 (12V modèle : 117x232x367)
ACCESSOIRES	
Interrupteur on/off à distance	Oui
Commutateur de transfert automatique	Filax ou Multi
NORMES	
Sécurité	EN/IEC 60335-1 / EN/IEC 62109-1
EMC	EN 55014-1 / EN 55014-2 IEC 61000-6-1 / IEC 61000-6-3
Directive sur l'automobile	ECE R10-4 EN 50498

1) Charge non linéaire, facteur de crête 3:1
2) Touche de protection :
   a) court-circuit en sortie
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   e) température trop élevée
   f) ondulation CC trop élevée

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Illustration 1 : Vue avant et arrière





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Consignes de montage

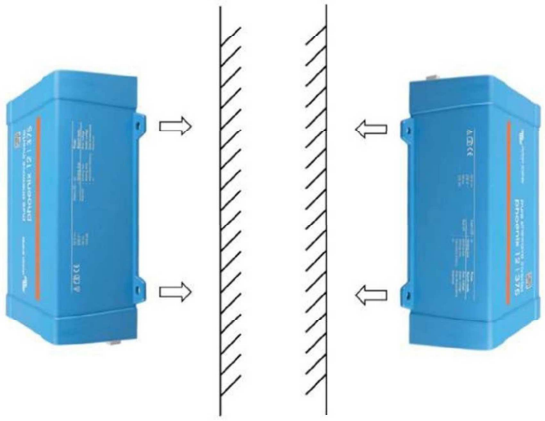


Illustration 1





Illustration 2

Montez le convertisseur avec quatre vis verticalement – vers le haut ou vers le bas – ou horizontalement –vers le haut ou vers le bas – (comme le montre l'Illustration 1) contre un mur robuste ; ou horizontalement sur une surface au sol adaptée (comme le montre l'Illustration 2). Laissez un espace d'au moins 10 cm entre le convertisseur et les autres appareils/objets. Attention : la protection IP21 ne s'applique qu'à la méthode de montage la plus basse indiquée sur l'Illustration 2. Sinon, la protection IP20 s'applique. **Ne montez pas le convertisseur à l'envers sur une surface.**

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Annexe A
Raccordement de la sortie Neutre du convertisseur au châssis/terre

La sortie CA est isolée par rapport à l'entrée CC et le châssis. L'utilisation d'une vraie phase neutre peut être rendue obligatoire par les réglementations locales. Dans ce cas, l'un des fils de la sortie CA doit être branché au châssis, et le châssis doit être mis à la terre. À l'intérieur du convertisseur, un emplacement a été prévu afin de pouvoir raccorder le Neutre et le châssis. La manière de le faire est expliquée ci-dessous.

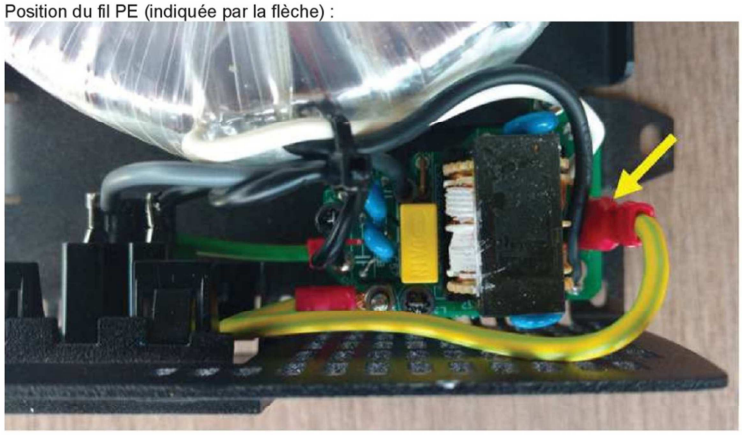
Assurez-vous de débrancher la batterie lorsque vous connectez le Neutre au fil de terre de protection (PE).

Vous pouvez trouver un câble PE interne, utilisé pour raccorder le Neutre et le châssis, après avoir retiré le cache en plastique. Un tournevis Torx T10 est nécessaire pour desserrer les quatre vis qui fixent le cache en plastique.
Les illustrations ci-dessous montrent les deux connexions possibles du fil PE :

Pour les convertisseurs de 250 VA, 375 VA et 500 VA :

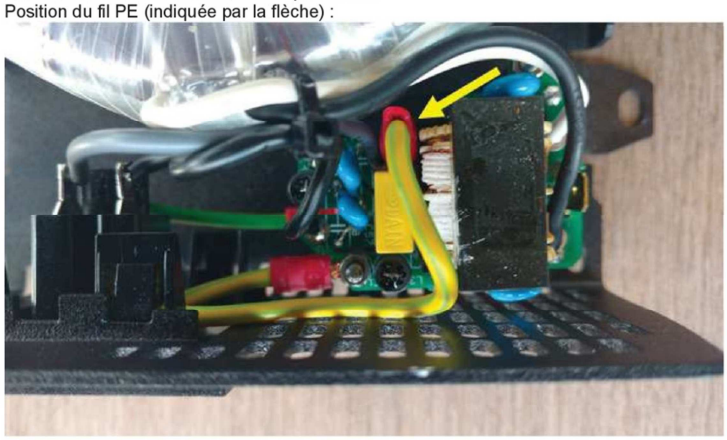
3. Neutre flottant

Position du fil PE (indiquée par la flèche) :



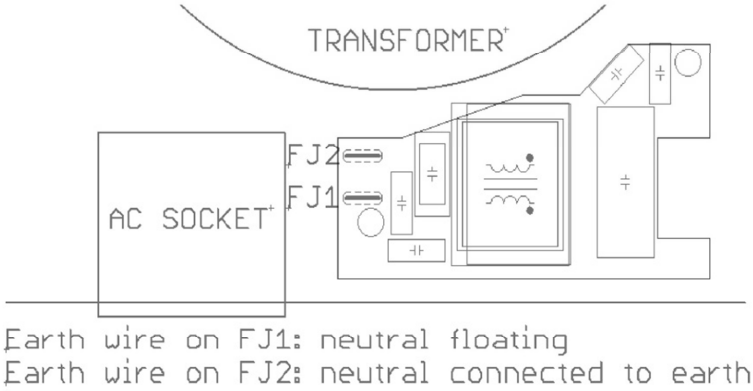
2. Neutre connecté au fil de terre de protection.

Position du fil PE (indiquée par la flèche) :



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Pour des convertisseurs de 800 VA et 1200 VA :
Pour ces convertisseurs, le fil de terre provenant du châssis peut être raccordé aussi bien au FJ1 (neutre flottant) qu'au FJ2 (neutre connecté à la terre/châssis). Les étiquettes FJ1 et FJ2 sont imprimées sur la carte du circuit imprimé. La position par défaut est FJ1, c'est à dire avec le neutre flottant.



Annexe B
Taille des fils pour raccorder le châssis du convertisseur à la terre

Le fil de terre provenant de la cosse de la terre sur le châssis vers le sol devra présenter une section équivalente à au moins la moitié de celle des conducteurs utilisés pour le raccordement de la batterie. La taille maximale du conducteur qui s'ajuste à la cosse de la terre est de 25 mm^2. Utilisez le tableau ci-dessous pour trouver la section correcte correspondant au conducteur de terre.

Section de câble	
à la batterie	à la masse
1.5 mm^2	≥ 0.75 mm^2
2.5 mm^2	≥ 1.5 mm^2
4 mm^2	≥ 2.5 mm^2
6 mm^2	≥ 4 mm^2
10 mm^2	≥ 6 mm^2
16 mm^2	≥ 10 mm^2
25 mm^2	≥ 16 mm^2
35 mm^2	25 mm^2

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Victron Energy Blue Power

Distributor:

Serial number:

Version : 03
Date : July 4th, 2019

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PO Box 50016 | 1305 AA Almere | The Netherlands

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E-mail : sales@victronenergy.com

www.victronenergy.com

1.32 CONTREL NETWORK ANALYZER EMT-1C/50 / EMT-1C/300 LV DATA SHEET

EMT-1C/50 | 1C/300

DIGITAL MEASURING INSTRUMENTS
MODULAR MEASUREMENT TRANSDUCER

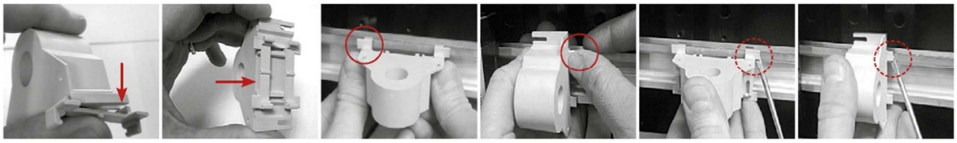




TECHNICAL CHARACTERISTICS		EMT-1C/50	EMT-1C/50 LV	EMT-1C/300	EMT-1C/300 LV
AUXILIARY SUPPLY					
Nominal voltage Us		9...30 VDC		9...30 VDC	
Operating voltage range		-		-	
Power consumption		< 1,3W		< 1,3W	
Frequency		50 - 60 Hz		50 - 60 Hz	
VOLTAGE INPUTS					
Measurement range		Up to 800 VAC or 1000 VDC	Up to 80 VAC or 100 VDC	Up to 800 VAC or 1000 VDC	Up to 80 VAC or 100 VDC
Method of measuring		True RMS value		True RMS value	
CURRENT INPUTS					
Measurement range		Fino a 50A AC/DC		Fino a 300A AC o 400A DC	
Method of measuring		True RMS value		True RMS value	
ACCURACY					
Measures	Voltage	0,5%		0,5%	
	Current	0,5%		0,5%	
	Power	0,5%		0,5%	
	Frequency	± 0,1		± 0,1	
	Active energy	Class 1		Class 1	
RS485 SERIAL INTERFACE					
Baud-rate		Programmable 1200 - 115200 bps		Programmable 1200 - 115200 bps	
Protocol		Modbus RTU		Modbus RTU	
INSULATION					
Insulation voltage		3 kV on bare wire for current measure 4 kV for Voltage measure		3 kV on bare wire for current measure 4 kV for Voltage measure	
AMBIENT CONDITION					
Operating temperature		-15...+65°C		-15...+65°C	
Storage temperature		-40...+85°C		-40...+85°C	
HOUSING					
Version		DIN rail clips for vertical/horizontal mounting		DIN rail clips for vertical/horizontal mounting	
Filling		Epoxy resin		Epoxy resin	
Degree of protection		IP20		IP20	
Weight		80g		370g	
CERTIFICATIONS AND COMPLIANCE					
Reference standards		EN61000-6-4/2006 + A1 2011; EN64000-6-2/2005 ; EN61010-1/2010		EN61000-6-4/2006 + A1 2011; EN64000-6-2/2005 ; EN61010-1/2010	

MOUNTING

The EMT-1C can be mounted in any position (see photo below), horizontal or vertical mounting, horizontal or vertical through the two hooks for DIN rail included in the box.



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EMT-1C/50 | 1C/300

DIGITAL MEASURING INSTRUMENTS

MODULAR MEASUREMENT TRANSDUCER

EMT-1C/50

The EMT-1C/50 is a Single-phase Power meter able to measure TRMS Current AC/DC, and Voltage.
On the RS485 Modbus are available : Irms, Vrms, Watt, Var, Va, Vpk, Ipk, Frequency, Cosϕ, Energy bidirectional and THD.
The device is fully configurable by RS485.

CHARACTERISTICS:
- TRMS Measure, THD available
- 0,5 % Accuracy
- RS485 Modbus integrated
- Bidirectional Energy metering
- Din rail mounting in both side
- Fully configurable by interface software
- Bootloader for updating firmware

EMT-1C/50 LV

The EMT-1C/50-LV is the LOW VOLTAGE version of the Single-phase Power meter EMT-1C/50, able to measure the RMS AC or DC Current and Voltage.
On the RS485 Modbus are available:
Irms, Vrms, Watt, Var, Va, Vpk, Ipk, Frequency, Cosϕ, Energy bidirectional and THD.
The device is fully configurable by RS485.

CHARACTERISTICS:
- LOW VOLTAGE VERSION
- TRMS Measure, THD available
- 0,5% Accuracy;
- RS485 Modbus integrated;
- Bidirectional Energy metering
- Din-rail mounting in both side
- Fully configurable by interfacesoftware
- Available measure register: MSW first, LSW first or hundredts

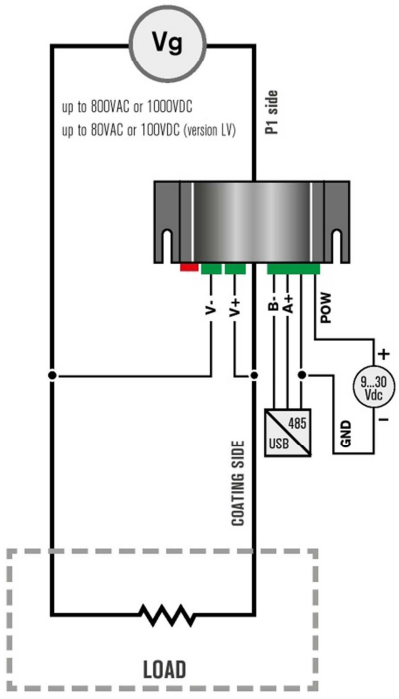
EMT-1C/300

The EMT-1C/300 is an Energy / Power Meter capable of measuring single-phase current and voltage AC RMS/ DC.
RS485 Modbus with over 200 registers.
Measure available: Irms, Vrms, Watt, Var, Va, Vpk, Ipk, Frequenza, Cosϕ, Import/Export energy, THD, min/MAX of RMS measurement.
Suitable for measurements with varying frequencies (Wind, Hydro, Shipbuilding Industries, Aviation). Telecommunication applications, Refrigeration, Motors.
Suitable for direct measurements between inverter and motor.

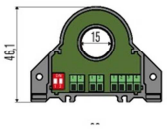
EMT-1C/300 LV

The EMT-1C/300-LV is the LOW VOLTAGE version of the Energy / Power Meter EMT-1C/300, capable of measuring single-phase current and voltage AC/DC TRMS.
RS485 Modbus with over 200 registers.
Measure available: Measure available: Irms, Vrms, Watt, Var, Va, Vpk, Ipk, Frequenza, Cosϕ, Import/Export energy, THD, min/MAX of RMS measurement.

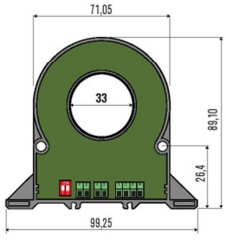
WIRING DIAGRAMS **EMT-1C/50 E EMT-1C/300**



MECHANICAL DIMENSIONS **EMT-1C/50**



MECHANICAL DIMENSIONS **EMT-1C/300**



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1.33 CONTREL NETWORK ANALYZER EMT-1C/50 / EMT-1C/300 LV MANUAL

MANUALE ISTRUZIONI / INSTRUCTION MANUAL
IM412-IU v0.1

SERIE EMT-1C

Analizzatore di rete monofase

ATTENZIONE!!!
- Leggere attentamente il manuale prima dell'utilizzo e l'installazione.
- Questi strumenti devono essere installati da personale qualificato, nel rispetto delle vigenti normative impiantistiche, allo scopo di evitare danni a persone o cose.
- Prima di qualsiasi intervento sullo strumento, togliere tensione dagli ingressi di alimentazione e dalle uscite relè dove presenti.
- Il costruttore non si assume responsabilità in merito alla sicurezza elettrica in caso di utilizzo improprio del dispositivo.
- I prodotti descritti in questo documento sono suscettibili in qualsiasi momento di evoluzioni o di modifiche.

Introduzione
L'EMT-1C è un analizzatore di rete monofase in grado di misurare la corrente e la tensione CA/CC TRMS. L'isolamento di ingresso è di 4 kV. Tramite l'uscita RS485 Modbus sono disponibili le seguenti misurazioni: Tensione, Corrente, Potenza Attiva, Potenza Reattiva, Potenza Apparente, CosPhi, Frequenza, THD, Energia bidirezionale.
Il dispositivo è configurabile tramite la porta RS485. Predisposto per il montaggio su barra DIN.

Descrizione
- Esecuzione modulare per guida DIN
- Misure in vero valore efficace (TRMS)
- Analizzatore di rete monofase per tensioni e correnti in CA/CC
- Range di misura fino a 800VAC o 1000VAC e 50A o 400A
- Classe di precisione 0,5%
- Misure di energia bidirezionale
- Interfaccia di comunicazione RS485 integrata (Modbus RTU)
- LED per lo stato della comunicazione
- Facilmente configurabile tramite RS485
- Bootloader per aggiornamento firmware

Funzione dip-switch

SW1	SW2	DESCRIZIONE
OFF	OFF	Configurazione da EEPROM
ON	OFF	Indirizzo seriale nodo = 1 – Baudrate 9600
ON	ON	Indirizzo seriale nodo = 1 – Baudrate 38400

Nota: Per rendere attive le modifiche via dip-switch bisogna togliere l'alimentazione al dispositivo.

Programmazione e configurazione
Attraverso un dispositivo seriale è possibile collegarsi all'EMT-1C tramite il programma di configurazione.
Per la configurazione del dispositivo tramite software, impostare entrambi i dipswitch a OFF (basso). Per la configurazione via RS485, alzare il SW1 e scegliere la velocità di comunicazione con il SW2.
Una volta configurato, potete riportare il modulo nella configurazione di default in modo tale che prenda le configurazioni memorizzate in EEPROM.

EMT-1C SERIES

Single-phase network analyzer

WARNING!
- Carefully read the manual before the installation or use.
- This device is to be installed by qualified personnel, complying to current standards, to avoid damages.
- Before any maintenance operation on the device, remove supply inputs.
- The manufacturer cannot be held responsible for electrical safety in case of improper use of the equipment.
- Products illustrated herein are subject to alteration and changes without prior notice.

Introduction
The EMT-1C is a single phase power meter able to measure TRMS current AC/DC and voltage.
On the RS485 Modbus are available: Voltage, Current, Active Power, Reactive Power, Apparent Power, CosPhi, Frequency, THD, Bidirectional Energy.
The device is fully configurable by RS485, DIN rail mounting, 4 kV galvanic isolation for voltage input.

Description
- Modular DIN-rail housing
- True RMS measurement
- AC/DC single phase network analyzers
- Measurement range up to 800VAC or 1000VAC and 50A or 400A
- 0,5% accuracy
- Bidirectional energy metering
- Built-in RS485 interface (Modbus RTU protocol)
- Communication status LED
- Fully configurable by RS485
- Bootloader for updating firmware

Dip-switch function

SW1	SW2	DESCRIPTION
OFF	OFF	All setting from EEPROM
OFF	OFF	Serial node address = 1 – Baudrate 9600
ON	ON	Serial node address = 1 – Baudrate 38400

Note: Any changes made by dip-switch, required to switch off the power supply.

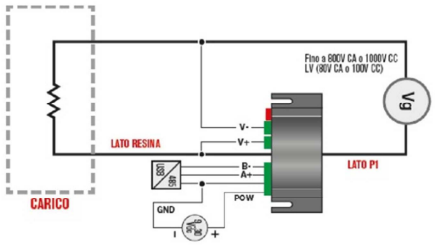
Programming and configuration
Using a serial link RS485 you can connect the EMT-1C with the configuration software.
If you want to set the device using the software, set both dipswitch in OFF. If you want to set by RS495 directly, set the SW1 to ON (up) then use the SW2 for baudrate setting (0=9600 1=38400).
After the setting, please save the configuration by the COMMAND register, then switch off the power supply, before to switch on the power supply set both dipswitch to OFF.

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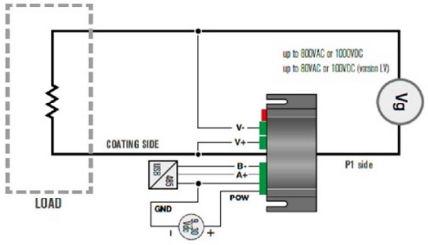
Montaggio
L'EMT-1C può essere montato in qualsiasi posizione, orizzontale o verticale con viti, orizzontale o verticale attraverso i due gancetti per barra DIN inclusi nella scatola.

Mounting
The power meter EMT-1C can be mounted in any position, horizontal or vertical mounting, horizontal or vertical through the two hooks for DIN rail included in the box.

Schemi di connessione

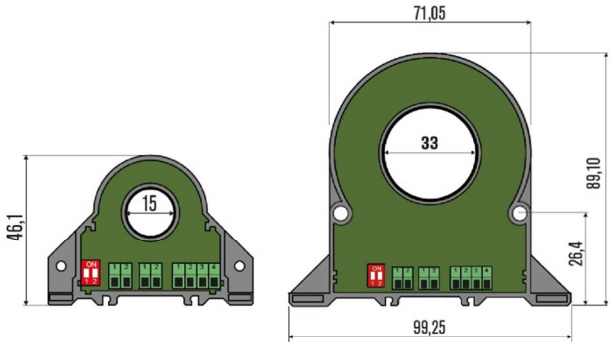


Wiring diagrams



Dimensioni meccaniche (mm)

Mechanical dimensions (mm)



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Caratteristiche tecniche

Alimentazione ausiliaria	
Tensione nominale alimentazione	9 ... 30 VCC
Frequenza	50/60 Hz
Potenza assorbita	1,3W
Misure	
Campo di misura	50A o 25A (EMT-1C /50) 300A o 150A (EMT-1C /300)
Tipo di misura	Valore efficace (TRMS)
Frequenza di lavoro	CC o 30...1000Hz
Accuratezza	
Tensione e Corrente	0.5% f.s.
Interfaccia seriale RS485	
Velocità seriale	1200...115200bps
Formato dati	8 - 7 bit, no parità-dispari-pari
Bit di stop	1-2
Protocollo	Modbus RTU
Condizioni ambientali e di funzionamento	
Installazione	Solo per uso interno
Temperatura d'impiego	-15...+65 °C
Temperatura di stoccaggio	-40...+85 °C
Massima umidità d'impiego	90%
Contenitore	
Esecuzione	Aggancio verticale/orizzontale per barra DIN
Riempimento	Resina epossidica
Peso	72 g
Grado di protezione	IP20
Omologazioni e conformità	
Conformità a norme	EN 61000-6-4/2007-01 EN 64000-6-2 EN 61010-1/2001

Technical characteristics

Auxiliary supply	
Rated voltage	9 ... 30 VDC
Frequency	50/60 Hz
Power consumption	1,3W
Current	
Measurement range	50A or 25A (EMT-1C /50) 300A or 150A (EMT-1C /300)
Method of measuring	True RMS value
Band width	DC or 30...1000Hz
Accuracy	
Voltage and Current	0.5% f.s.
RS485 serial interface	
Baud-rate	1200...115200bps
Data format	8 - 7 bit, no parity-odd-even
Stop bits	1-2
Protocol	Modbus RTU
Ambient operating conditions	
Mounting	Indoor use only
Operating temperature	-15...+65 °C
Storage temperature	-40...+85 °C
Relative humidity	90%
Housing	
Version	DIN rail clips for vertical/horizontal mounting
Filling	Epoxy resin
Weight	72 g
Degree of protection	IP20
Certifications and compliance	
Reference standards	EN 61000-6-4/2007-01 EN 64000-6-2 EN 61010-1/2001

Codice ordinazione	
EMT-1C /50	Tensione fino a 800V CA o 1000V CC Corrente fino a 50A CA/CC
EMT-1C /50 LV	Tensione fino a 80V CA o 100V CC Corrente fino a 50A CA/CC
EMT-1C /300	Tensione fino a 800V CA o 1000V CC Corrente fino a 400A CA/CC
EMT-1C /300 LV	Tensione fino a 80V CA o 100V CC Corrente fino a 400A CA/CC

Order code	
EMT-1C /50	Voltage up to 800V AC or 1000V DC Current up to 50A AC/DC
EMT-1C /50 LV	Voltage up to 80V AC o 100V DC Current up to 50A AC / DC
EMT-1C /300	Voltage up to 800V AC o 1000V DC Current up to 400A AC / DC
EMT-1C /300 LV	Voltage fino a 80V AC o 100V DC Current up to 400A AC / DC

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1.34 CONTREL NETWORK ANALYZER EMT-1C/50 / EMT-1C/300 LV MODBUS PROTOCOL



SERIE EMT-1C

Analizzatore di rete monofase

PROTOCOLLO DI COMUNICAZIONE MODBUS

EMT-1C SERIES

Single-phase network analyzer

MODBUS COMMUNICATION PROTOCOL

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PROTOCOLLO MODBUS

L'analizzatore di rete monofase EMT-1C supporta il protocollo di comunicazione Modbus RTU sulla porta seriale RS-485. Quando si utilizza il protocollo Modbus RTU, la struttura del messaggio di comunicazione è così costituita:

Start frame	Indirizzo (8 bit)	Funzione (8 bit)	Dati (N x 8 bit)	CRC (16bit)	End frame

- Il campo Indirizzo contiene l'indirizzo dello strumento slave cui il messaggio viene inviato.
- Il campo Funzione contiene il codice della funzione che deve essere eseguita dallo slave.
- Il campo Dati contiene i dati inviati allo slave o quelli inviati dallo slave come risposta ad una domanda.
- Il campo CRC consente sia al master che allo slave di verificare se ci sono errori di trasmissione.

FUNZIONI MODBUS

Le funzioni disponibili sono:

03H = Read input register	Consente la lettura delle misure disponibili nell'EMT-1C
06H = Preset single register	Permette la scrittura dei parametri

Tempo di risposta EMT-1C:

- Caso tipico: 30ms

PROTOCOLLO MODBUS

The EMT-1C network analyzer supports the communication protocol Modbus RTU on the RS485 serial interface.
If one use Modbus RTU protocol, the structure communication message has the following structure:

Start frame	Address (8 bit)	Function (8 bit)	Data (N x 8 bit)	CRC (16bit)	End frame

- The Address field holds the serial address of the slave destination device.
- The Function field holds the code of the function that must be executed by the slave.
- The Data field contains data sent to the salve or data received from the slave in response to a query.
- The CRC field allows the master and slave devices to check the message integrity.

MODBUS FUNCTION

The available functions are:

03H = Read input register	Allows to read the EMT-1C measures
06H = Preset single register	Allows writing parameters

EMT-1C response time:

- Typical case: 30ms

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FUNZIONE 03H: READ INPUT REGISTER

La funzione 03 permette di leggere una o più grandezze consecutive in memoria. L'indirizzo di ciascuna grandezza è indicato nelle tabelle riportate nelle utlime pagine del presente manuale.

Richiesta Master:

Indirizzo slave	01h
Funzione	03h
MSB indirizzo registro	00h
LSB indirizzo registro	58h
MSB numero registri	00h
LSB numero registri	02h
MSB CRC	45h
LSB CRC	D8h

Nell'esempio vengono richiesti, allo slave numero 1, 2 registri consecutivi a partire dall'indirizzo 24h. Quindi vengono letti i registri 24h e 25h. Il commando termina sempre con il valore checksum CRC.

Risposta Slave:

Indirizzo slave	01h
Funzione	03h
Numero di byte	04h
MSB dato 58h	95h
LSB dato 58h	D7h
MSB dato 59h	3Fh
LSB dato 59h	F0h
MSB CRC	76h
LSB CRC	73h

La risposta è composta sempre dall'indirizzo dello slave, dalla funzione richiesta dal Master e dai dati dei registri richiesti. La risposta termina sempre con il valore di checksum CRC.

FUNCTION 03H: READ INPUT REGISTER

The Modbus function 03 allows to read one or more consecutive registers from the slave. The address of each measures is given in the tables on the final page of this manual.

Master query:

Slave address	01h
Function	03h
MSB register address	00h
LSB register address	58h
MSB register number	00h
LSB register number	02h
MSB CRC	45h
LSB CRC	D8h

In the above example, slave 1 is requested for 2 consecutive registers beginning with address 24h. Thus, registers from 24h to 25h will be returned. As usual, the message ends with CRC checksum.

Slave response:

Slave address	01h
Function	03h
Numero di byte	04h
MSB dato 58h	95h
LSB dato 58h	D7h
MSB dato 59h	3Fh
LSB dato 59h	F0h
MSB CRC	76h
LSB CRC	73h

The response is always composed of the slave address, the function code requested by the master and the contents of the requested registers. The answer ends with the CRC.

FUNZIONE 06H: PRESET SINGLE REGISTER

Questa funzione permette di scrivere nei registri. E' possibile ad esempio impostare i parametri del setup. L'indirizzo ed il range valido per i vari parametri può essere trovato nelle tabelle sottostanti.

Richiesta Master:

Indirizzo slave	01h
Funzione	06h
MSB indirizzo registro	00h
LSB indirizzo registro	08h
MSB numero registri	00h
LSB numero registri	0Ah
MSB CRC	88h
LSB CRC	0Fh

Risposta Slave:
La risposta è un eco della domanda, cioè viene inviato al master l'indirizzo del dato da modificare e il nuovo valore del parametro.

FUNCTION 06H: PRESET SINGLE REGISTER

This function allows to write in the registers. It's possible, for example, to set the setup parameters. The address and value range are indicated on tables below.

Master query:

Slave address	01h
Function	06h
MSB register address	00h
LSB register address	08h
MSB register number	00h
LSB register number	0Ah
MSB CRC	88h
LSB CRC	0Fh

Slave response:
The slave response is an echo to the query. The slave sends back to the master the address and the new value of the parameter.

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MISURE FORNITE DAL PROTOCOLLO DI COM. (Utilizzabili con funzione 03H e 06H)

MEASURES SUPPLIED BY COMMUNICATION PROTOCOL (To be used with function 03H and e 06H)

INDIRIZZO ADDRESS	WORDS	MISURA	MEASURE	UNITA' UNIT	FORMATO FORMAT
		MISURE ISTANTANEE	**ISTANTANEOUS MEASURE**		
40073	2	Tensione	Voltage	V	Float (LSW first)
40075	2	Corrente	Current	mA	Float (LSW first)
40077	2	Potenza Attiva	Active Power	W	Float (LSW first)
40079	2	Potenza Reattiva	Reactive Power	VAr	Float (LSW first)
40081	2	Potenza Apparente	Apparent Power	VA	Float (LSW first)
40083	2	CosPhi	CosPhi	-	Float (LSW first)
40085	2	Frequenza	Frequency	Hz	Float (LSW first)
40087	2	THD	THD	%	Float (LSW first)
40089	2	Energia Attiva totale	Total Active Energy	kWh	Float (LSW first)
40091	2	Energia Attiva importata	Imported Active Energy	kWh	Float (LSW first)
40093	2	Energia Attiva esportata	Exported Active Energy	kWh	Float (LSW first)
		MISURE DI PICCO (R/W)	**PEAK MEASURES (R/W)**		
40095	2	Tensione	Voltage	V	Float (LSW first)
40097	2	Corrente	Current	mA	Float (LSW first)
		MISURE MASSIME (R/W)	**MAXIMUM MEASURES (R/W)**		
40099	2	Tensione	Voltage	V	Float (LSW first)
40103	2	Corrente	Current	mA	Float (LSW first)
40107	2	Potenza Attiva	Active Power	W	Float (LSW first)
40111	2	Potenza Reattiva	Reactive Power	VAr	Float (LSW first)
40115	2	Potenza Apparente	Apparent Power	VA	Float (LSW first)
40119	2	CosPhi	CosPhi	-	Float (LSW first)
40123	2	Frequenza	Frequency	Hz	Float (LSW first)
40127	2	THD	THD	%	Float (LSW first)
		MISURE MINIME (R/W)	**MINIMUM MEASURES (R/W)**		
40101	2	Tensione	Voltage	V	Float (LSW first)
40105	2	Corrente	Current	mA	Float (LSW first)
40109	2	Potenza Attiva	Active Power	W	Float (LSW first)
40113	2	Potenza Reattiva	Reactive Power	VAr	Float (LSW first)
40117	2	Potenza Apparente	Apparent Power	VA	Float (LSW first)
40121	2	CosPhi	CosPhi	-	Float (LSW first)
40125	2	Frequenza	Frequency	Hz	Float (LSW first)
40129	2	THD	THD	%	Float (LSW first)
		MISURE ISTANTANEE	**ISTANTANEOUS MEASURE**		
40133	2	Tensione (swapped)	Voltage (swapped)	V	Float (MSW first)
40135	2	Corrente (swapped)	Current (swapped)	mA	Float (MSW first)
40137	2	Potenza Attiva (swapped)	Active Power (swapped)	W	Float (MSW first)
40139	2	Potenza Reattiva (swapped)	Reactive Power (swapped)	VAr	Float (MSW first)
40141	2	Potenza Apparente (swapped)	Apparent Power (swapped)	VA	Float (MSW first)
40143	2	CosPhi (swapped)	CosPhi (swapped)	-	Float (MSW first)
40145	2	Frequenza (swapped)	Frequency (swapped)	Hz	Float (MSW first)
40147	2	THD (swapped)	THD (swapped)	%	Float (MSW first)
40149	2	Energia Attiva totale (swapped)	Total Active Energy (swapped)	kWh	Float (MSW first)
40151	2	Energia Attiva importata (swapped)	Imported Active Energy (swapped)	kWh	Float (MSW first)
40153	2	Energia Attiva esportata (swapped)	Exported Active Energy (swapped)	kWh	Float (MSW first)
		MISURE DI PICCO (R/W)	**PEAK MEASURES (R/W)**		
40155	2	Tensione (swapped)	Voltage (swapped)	V	Float (MSW first)
40157	2	Corrente (swapped)	Current (swapped)	mA	Float (MSW first)
		MISURE MASSIME (R/W)	**MAXIMUM MEASURES (R/W)**		
40159	2	Tensione (swapped)	Voltage (swapped)	V	Float (MSW first)
40163	2	Corrente (swapped)	Current (swapped)	mA	Float (MSW first)
40167	2	Potenza Attiva (swapped)	Active Power (swapped)	W	Float (MSW first)
40171	2	Potenza Reattiva (swapped)	Reactive Power (swapped)	VAr	Float (MSW first)
40175	2	Potenza Apparente (swapped)	Apparent Power (swapped)	VA	Float (MSW first)
40179	2	CosPhi (swapped)	CosPhi (swapped)	-	Float (MSW first)
40183	2	Frequenza (swapped)	Frequency (swapped)	Hz	Float (MSW first)
40187	2	THD (swapped)	THD (swapped)	%	Float (MSW first)

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INDIRIZZO ADDRESS	WORDS	MISURA	MEASURE	UNITA' UNIT	FORMATO FORMAT
		MISURE MINIME (R/W)	**MINIMUM MEASURES (R/W)**		
40161	2	Tensione (swapped)	Voltage (swapped)	V	Float (MSW first)
40165	2	Corrente (swapped)	Current (swapped)	mA	Float (MSW first)
40169	2	Potenza Attiva (swapped)	Active Power (swapped)	W	Float (MSW first)
40173	2	Potenza Reattiva (swapped)	Reactive Power (swapped)	VAr	Float (MSW first)
40177	2	Potenza Apparente (swapped)	Apparent Power (swapped)	VA	Float (MSW first)
40181	2	CosPhi (swapped)	CosPhi (swapped)	-	Float (MSW first)
40185	2	Frequenza (swapped)	Frequency (swapped)	Hz	Float (MSW first)
40189	2	THD (swapped)	THD (swapped)	%	Float (MSW first)
		MISURE ISTANTANEE	**ISTANTANEOUS MEASURE**		
40193	2	Tensione (centinaia)	Voltage (hundredths)	V/100	Signed long
40195	2	Corrente (centinaia)	Current (hundredths)	mA/100	Signed long
40197	2	Potenza Attiva (centinaia)	Active Power (hundredths)	W/100	Signed long
40199	2	Potenza Reattiva (centinaia)	Reactive Power (hundredths)	VAr/100	Signed long
40201	2	Potenza Apparente (centinaia)	Apparent Power (hundredths)	VA/100	Signed long
40203	2	CosPhi (centinaia)	CosPhi (hundredths)	-	Signed long
40205	2	Frequenza (centinaia)	Frequency (hundredths)	Hz/100	Signed long
40207	2	THD (centinaia)	THD (hundredths)	%/100	Signed long
40209	2	Energia Attiva totale (centinaia)	Total Active Energy (hundredths)	kWh/100	Signed long
40211	2	Energia Attiva importata (centinaia)	Imported Active Energy (hundredths)	kWh/100	Signed long
40213	2	Energia Attiva esportata (centinaia)	Exported Active Energy (hundredths)	kWh/100	Signed long
		MISURE DI PICCO (R/W)	**PEAK MEASURES (R/W)**		
40215	2	Tensione (centinaia)	Voltage (hundredths)	V/100	Signed long
40217	2	Corrente (centinaia)	Current (hundredths)	mA/100	Signed long
		MISURE MASSIME (R/W)	**MAXIMUM MEASURES (R/W)**		
40219	2	Tensione (centinaia)	Voltage (hundredths)	V/100	Signed long
40223	2	Corrente (centinaia)	Current (hundredths)	mA/100	Signed long
40227	2	Potenza Attiva (centinaia)	Active Power (hundredths)	W/100	Signed long
40231	2	Potenza Reattiva (centinaia)	Reactive Power (hundredths)	VAr/100	Signed long
40235	2	Potenza Apparente (centinaia)	Apparent Power (hundredths)	VA/100	Signed long
40239	2	CosPhi (centinaia)	CosPhi (hundredths)	-	Signed long
40243	2	Frequenza (centinaia)	Frequency (hundredths)	Hz/100	Signed long
40247	2	THD (centinaia)	THD (hundredths)	%/100	Signed long
		MISURE MINIME (R/W)	**MINIMUM MEASURES (R/W)**		
40221	2	Tensione (centinaia)	Voltage (hundredths)	V/100	Signed long
40225	2	Corrente (centinaia)	Current (hundredths)	mA/100	Signed long
40229	2	Potenza Attiva (centinaia)	Active Power (hundredths)	W/100	Signed long
40233	2	Potenza Reattiva (centinaia)	Reactive Power (hundredths)	VAr/100	Signed long
40237	2	Potenza Apparente (centinaia)	Apparent Power (hundredths)	VA/100	Signed long
40241	2	CosPhi (centinaia)	CosPhi (hundredths)	-	Signed long
40245	2	Frequenza (centinaia)	Frequency (hundredths)	Hz/100	Signed long
40249	2	THD (centinaia)	THD (hundredths)	%/100	Signed long

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PARAMETRI SETUP
(Utilizzabili con funzioni 03H e 06H)

SETUP PARAMETERS
(To be used with functions 03H and 06H)

INDIRIZZO ADDRESS	WORDS	MENU	MENU	MIN	MAX	DEF
		COMUNICAZIONE	**COMMUNICATION**			
40003	1	Indirizzo seriale nodo	Serial node address	1	250	1
40004	1	Ritardo (cicli macchina)	Delay (machine cycles)	1	1000	1
40005	1	Velocità seriale ❶	Serial speed ❶	0	7	1
40006	1	Formato dati ❷	Data format ❷	0	2	0
		GENERALE	**GENERAL**			
40007	1	Numero in decimi di secondo (1/10) per tutti il calcolo RMS in CC	Number of tenths of second (1/10) for all RMS calculation in DC	1	65535	10
40008	1	Impostazioni misure ❸	Flag measurement ❸	-	-	0x10
40009	2	Rapporto di trasformazione tensione	Voltage transformer ratio	1	65535	1
40011	2	Rapporto di trasformazione corrente	Current transformer ratio	1	65535	1
40014	1	Numero di ZX per AC_Meas_Number del ciclo di linea "zero crossing" per la misurazione AC RMS	Number of ZX for AC Meas Number of line cycle Zero Crossings for AC measurement RMS	1	65535	50

❶ Velocità seriale
0 = 1200 bps 4 = 19200 bps
1 = 2400 bps 5 = 38400 bps
2 = 4800 bps 6 = 57600 bps
3 = 9600 bps 7 = 115200 bps

❷ Formato dati
0 = 8 bit, no parità, 1 bit di stop
1 = 8 bit, dispari, 1 bit di stop
2 = 8 bit, pari, 1 bit di stop

❸ Impostazioni misure
Bit 0: 0 = valori TRMS (senza segno)
1 = misura CC (con segno)
Bit 1: 0 = memorizzazione energia disabilitata
1 = memorizzazione energia abilitata
Bit 2: 0 = rilevamento frequenza dall'ingresso di tensione
1 = rilevamento frequenza dall'ingresso di corrente

❶ Serial speed
0 = 1200 bps 4 = 19200 bps
1 = 2400 bps 5 = 38400 bps
2 = 4800 bps 6 = 57600 bps
3 = 9600 bps 7 = 115200 bps

❷ Data format
0 = 8 bit, no parity, 1 stop bit
1 = 8 bit, odd, 1 stop bit
2 = 8 bit, even, 1 stop bit

❸ Flag measurement
Bit 0: 0 = valori TRMS (senza segno)
1 = misura CC (con segno)
Bit 1: 0 = memorizzazione energia disabilitata
1 = memorizzazione energia abilitata
Bit 2: 0 = rilevamento frequenza dall'ingresso di tensione
1 = rilevamento frequenza dall'ingresso di corrente

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COMANDI
(Utilizzabili con funzioni 06H)

COMMANDS
(To be used with functions 06H)

INDIRIZZO ADDRESS	WORDS	COMANDO	COMMAND	FORMATO FORMAT
40252	1	Registro comandi ❶	Command register ❶	Unsigned short
40253	2	Registro ausiliario per impostazioni contatori di energia (vedi registro comandi)	Auxiliary register for Energy Command (see command register)	Float (LSW first)

❶ Registro comandi
0xC1C0 = memorizzazione parametri in flash
0xC1A0 = comando di reset del dispositivo
0xBABA = comando per il caricamento del valore di energia totale (impostare il valore nel registro ausiliario)
0xBABB = comando per il caricamento del valore di energia importata (impostare il valore nel registro ausiliario)
0xBABC = comando per il caricamento del valore di energia esportata (impostare il valore nel registro ausiliario)

❶ Command register
0xC1C0 = flash settings save command
0xC1A0 = reset command
0xBABA = load energy command (total energy to load must be written in Auxiliary register)
0xBABB = load energy command (import energy to load must be written in Auxiliary register)
0xBABC = load energy command (export energy to load must be written in Auxiliary register)

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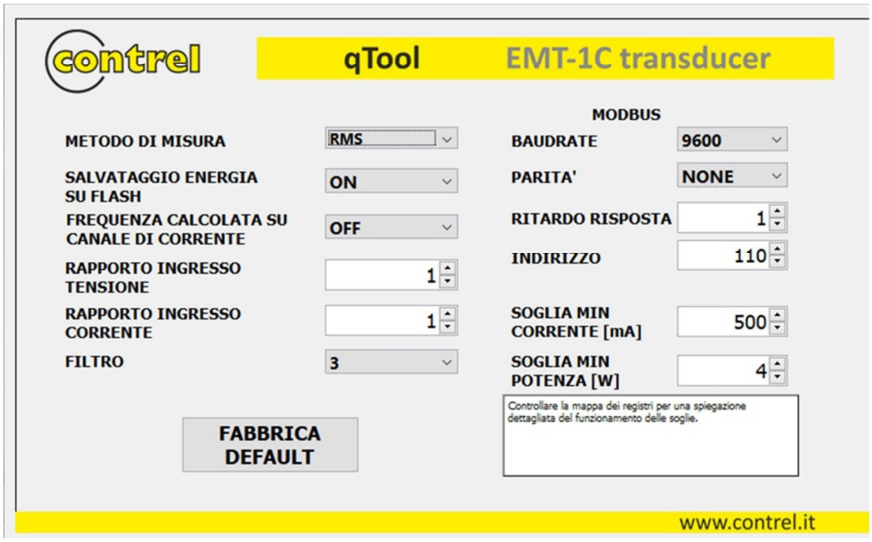
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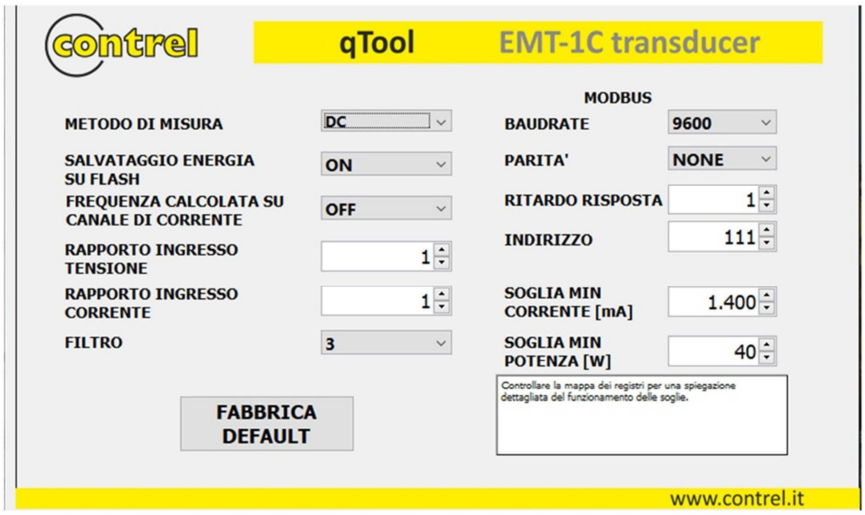
1.35 CONTREL NETWORK ANALYZER EMT-1C/50 SETTING

CONFIGURAZIONE NA1



1.36 CONTREL NETWORK ANALYZER EMT-1C/300 LV SETTING

CONFIGURAZIONE NA2



1.37 FINDER DIGITAL ASTRONOMICAL TIME SWITCH 12.A2.0.024.0000 DATA SHEET

finder
SWITCH TO THE FUTURE

Time switches 16 A



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12 SERIES
Time switches 16 A

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12 SERIES

Mechanical time switches
- **Daily time setting***
- **Weekly time setting****

Type 12.01
- Daily
- 1 CO 16 A
- 35.8 mm wide
- 35 mm rail mount

Type 12.11
- Daily
- 1 NO 16 A
- 17.5 mm wide
- 35 mm rail mount

Type 12.31-0000
- Daily
- 1 CO 16 A
- 72 x 72 mm
- Front panel mount

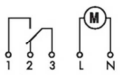
Type 12.31-0007
- Weekly
- 1 CO 16 A
- 72 x 72 mm
- Front panel mount

• Minimum time interval setting:
1 h (12.31-0007)
30 min (12.01)
15 min (12.11 - 12.31-0000)

* Same program every day

** Different program possible for each of the 7 days of the week

For outline drawing see page 13

	12.01	12.11	12.31	
				
	• Mechanical daily time switch • 1 CO 16 A • 35 mm rail (EN 60715) mount	• Mechanical daily time switch • 1 NO 16 A • 35 mm rail (EN 60715) mount	• Mechanical daily or weekly • 1 CO 16 A • Front panel mounting	
				
Contact specification				
Contact configuration	1 CO (SPDT)	1 NO (SPST-NO)	1 CO (SPDT)	
Rated current/Maximum peak current A	16/—	16/30	16/—	
Rated voltage/ Maximum switching voltage V AC	250/—	250/—	250/—	
Rated load AC1 VA	4000	4000	4000	
Rated load AC15 (230 V AC) VA	750	420	420	
Nominal lamp rating:				
incandescent (230 V) W	2000 (NO contact)	2000	2000	
compensated fluorescent (230 V) W	750 (NO contact)	750	750	
uncompensated fluorescent (230 V) W	1000 (NO contact)	1000	1000	
halogen (230 V) W	2000 (NO contact)	2000	2000	
Minimum switching load mW (V/mA)	1000 (10/10)	1000 (10/10)	1000 (10/10)	
Standard contact material	$AgSnO_2$	$AgSnO_2$	AgCdO	
Supply specification				
Nominal voltage (U_N) V AC (50/60 Hz)	230	230	120 - 230	
V DC	—	—	—	
Rated power AC/DC VA (50 Hz)/W	2/—	2/—	2/—	
Operating range AC (50 Hz)	(0.85…1.1)U_N	(0.85…1.1)U_N	(0.85…1.1)U_N	
DC	—	—	—	
Technical data				
Electrical life at rated load in AC1 cycles	$50 \cdot 10^3$	$50 \cdot 10^3$	$50 \cdot 10^3$	
Type of time switch	daily	daily	daily	weekly
Switching intervals /day	48	96	96	24 (168/week)
Minimum switching interval min	30	15	15	60
Accuracy s/day	1.5	1.5	1.5	
Ambient temperature range °C	–5…+50	–5…+50	–10…+50	
Protection category	IP 20	IP 20	IP 20	
Approvals (according to type)	CE EAC			

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12 SERIES

12 SERIES
Time/Astro-Switch 16 A

finder

Type 12.51
Digital (analogue-style) time switch, daily/weekly programming
- **Can be programmed in "Classic" mode via the joystick, or "Smart" mode via smartphones with NFC communication**
- Minimum time interval setting - 30 minutes
- Easily configurable for daily or weekly programming

Type 12.81
Digital Astro-switch
- **Can be programmed in "Classic" mode via the joystick, or "Smart" mode via smartphones with NFC communication**
- Astro program: calculation of sunrise and sunset times through date, time and location coordinates
- Option for Astro ON period override, by timeswitch
- Location coordinates easily settable for most European countries through post codes
- Offset function: allows programming of switching times offset from the astronomic time (by up to 90 min, in 10 min steps)

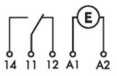
- Summer/Winter European, Australian, Brazilian time
- 1 CO 16 A output contact
- LCD status indication, set-up and programming
- Lock with a 4-digit PIN
- Back-light display
- Internal battery for set-up and programming without supply, easily replaceable from the front
- Protective separation between supply and contacts
- 35 mm wide
- 35 mm rail (EN 60715) mount
- Cadmium free contact material

For outline drawing see page 13

NEW 12.51



- Digital time switch
- 1 CO 16 A

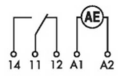


NEW 12.81

EUROPEAN PATENT GUARANTEE



- Digital Astro-switch
- 1 CO 16 A



Contact specification			
Contact configuration		1 CO (SPDT)	1 CO (SPDT)
Rated current/Maximum peak current	A	16/30 (120 A - 5 ms)	16/30 (120 A - 5 ms)
Rated voltage/ Maximum switching voltage	V AC	250/400	250/400
Rated load AC1	VA	4000	4000
Rated load AC15 (230 V AC)	VA	750	750
Nominal lamp rating:			
230 V incandescent/halogen	W	2000	2000
fluorescent tubes with electronic ballast	W	1000	1000
fluorescent tubes with electromechanical ballast	W	750	750
CFL	W	400	400
230 V LED	W	400	400
LV halogen or LED with electronic ballast	W	400	400
LV halogen or LED with electromechanical ballast	W	800	800
Minimum switching load	mW (V/mA)	1000 (10/10)	1000 (10/10)
Standard contact material		$AgSnO_2$	$AgSnO_2$
Supply specification			
Nominal voltage (U_N)	V AC (50/60 Hz)	110…230	110…230
	V DC	110…230	110…230
Rated power AC/DC	VA (50 Hz)/W	2.8/0.9	2.8/0.9
Operating range	V AC (50 Hz)	88…264	88…264
	V DC	88…264	88…264
Technical data			
Electrical life at rated load in AC1	cycles	$100 \cdot 10^3$	$100 \cdot 10^3$
Switching intervals		48	—
Minimum switching interval	min	30	—
Accuracy	s/day	1	1
Ambient temperature range	°C	–20…+50 (see page 9, diagram L12)	–20…+50 (see page 9, diagram L12)
Protection category		IP 20	IP 20
Approvals (according to type)		CE EAC	

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12 SERIES
Time switches 16 A

finder

12 SERIES

Digital time switch, weekly programming
- **Can be programmed in "Classic" mode via the joystick, or "Smart" mode via smartphones with NFC communication**

Type 12.61
- 1 CO 16 A

Type 12.62
- 2 CO 16 A

- Functions:
  Switch ON, Switch OFF
  Pulse: 1s…59 min
- Minimum time interval setting - 1 minute
- Summer/Winter European, Australian, Brazilian time
- LCD status indication, set-up and programming
- Lock with a 4-digit PIN
- Back-light display
- Internal battery for set-up and programming without supply, easily replaceable from the front
- Protective separation between supply and contacts
- 35 mm wide
- 35 mm rail (EN 60715) mount
- Cadmium free contact material

NEW 12.61



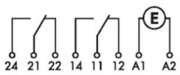
- Weekly programming
- 1 CO 16 A
- Switch ON, Switch OFF, Pulse



NEW 12.62



- Weekly programming
- 2 CO 16 A
- Switch ON, Switch OFF, Pulse



For outline drawing see page 14

Contact specification				
Contact configuration		1 CO (SPDT)		2 CO (DPDT)
Rated current/Maximum peak current	A	16/30 (120 A - 5 ms)		16/30 (120 A - 5 ms)
Rated voltage/ Maximum switching voltage	V AC	250/400		250/400
Rated load AC1	VA	4000		4000
Rated load AC15 (230 V AC)	VA	750		750
Nominal lamp rating:				
230 V incandescent/halogen	W	2000		2000
fluorescent tubes with electronic ballast	W	1000		1000
fluorescent tubes with electromechanical ballast	W	750		750
CFL	W	400		400
230 V LED	W	400		400
LV halogen or LED with electronic ballast	W	400		400
LV halogen or LED with electromechanical ballast	W	800		800
Minimum switching load	mW (V/mA)	1000 (10/10)		1000 (10/10)
Standard contact material		$AgSnO_2$		$AgSnO_2$
Supply specification				
Nominal voltage (U_N)	V AC (50/60 Hz)	12…24	110…230	110…230
	V DC	12…24	110…230	110…230
Rated power AC/DC	VA (50 Hz)/W	2.8/0.9		2.8/0.9
Operating range	V AC (50 Hz)	10…30	88…253	88…253
	V DC	10…30	88…253	88…253
Technical data				
Electrical life at rated load in AC1	cycles	$100 \cdot 10^3$		$100 \cdot 10^3$
Type of time switch		Weekly		Weekly
Memory locations for switching times		50		50
Minimum internal setting	min	1		1
Accuracy	s/day	1		1
Ambient temperature range	°C	–20…+50 (see page 9, diagram L12)		–20…+50 (see page 9, diagram L12)
Protection category		IP 20		IP 20
Approvals (according to type)		CE EAC		

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5

12 SERIES

12 SERIES
Time/Astro-Switch 16 A

finder

Weekly Astro time switch
- **Can be programmed in "Classic" mode via the joystick, or "Smart" mode via smartphones with NFC communication**
- **"Astro" program: calculation of sunrise and sunset times through date, time and location coordinates**

Type 12.A1
- 1 CO 16 A

Type 12.A2
- 2 CO 16 A

- Functions: "Astro" ON, "Astro" OFF Switch ON, Switch OFF Pulse: 1s…59 min
- Location coordinates easily settable for most European countries through Post codes
- Offest function: allows programming of switching times offset from the astronomic time (by up to 90 min, in 1 min step)
- Minimum time interval setting - 1 minute
- Summer/Winter European, Australian, Brazilian time
- LCD status indication, set-up and programming
- Lock with a 4-digit PIN
- Back-light display
- Internal battery for set-up and programming without supply, easily replaceable from the front
- Protective separation between supply and contacts
- 35 mm wide
- 35 mm rail (EN 60715) mount
- Cadmium free contact material

NEW 12.A1



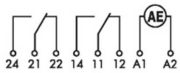
- Weekly programming
- 1 CO 16 A
- Switch ON, Switch OFF, Pulse



NEW 12.A2



- Weekly programming
- 2 CO 16 A
- Switch ON, Switch OFF, Pulse



For outline drawing see page 14

Contact specification				
Contact configuration		1 CO (SPDT)	2 CO (DPDT)	
Rated current/Maximum peak current	A	16/30 (120 A - 5 ms)	16/30 (120 A - 5 ms)	
Rated voltage/ Maximum switching voltage	V AC	250/400	250/400	
Rated load AC1	VA	4000	4000	
Rated load AC15 (230 V AC)	VA	750	750	
Nominal lamp rating:				
230 V incandescent/halogen	W	2000	2000	
fluorescent tubes with electronic ballast	W	1000	1000	
fluorescent tubes with electromechanical ballast	W	750	750	
CFL	W	400	400	
230 V LED	W	400	400	
LV halogen or LED with electronic ballast	W	400	400	
LV halogen or LED with electromechanical ballast	W	800	800	
Minimum switching load	mW (V/mA)	1000 (10/10)	1000 (10/10)	
Standard contact material		$AgSnO_2$	$AgSnO_2$	
Supply specification				
Nominal voltage (U_N)	V AC (50/60 Hz)	110…230	12…24	110…230
	V DC	110…230	12…24	110…230
Rated power AC/DC	VA (50 Hz)/W	2.8/0.9	2.8/0.9	
Operating range	V AC (50 Hz)	88…253	10…30	88…253
	V DC	88…253	10…30	88…253
Technical data				
Electrical life at rated load in AC1	cycles	$100 \cdot 10^3$	$100 \cdot 10^3$	
Type of time switch		Weekly	Weekly	
Memory locations for switching times		50	50	
Minimum internal setting	min	1	1	
Accuracy	s/day	1	1	
Ambient temperature range	°C	–20…+50 (see page 9, diagram L12)	–20…+50 (see page 9, diagram L12)	
Protection category		IP 20	IP 20	
Approvals (according to type)		CE EAC		

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12 SERIES
Time switches 16 A

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12 SERIES

Electronic digital time switches
- **1 Weekly time setting**

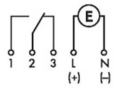
Type 12.71
- 1 CO 16 A
- 17.8 mm wide

- Minimum time interval setting - 1 minute
- Internal battery for set-up without supply
- Pulse output function: 1 s… 59:59(mm:ss)
- Automatic adjustment for daylight saving
- 35 mm rail (EN 60715) mount

12.71



- Digital weekly time switch
- 1 CO 16 A
- 17.8 mm wide



For outline drawing see page 13

Contact specification			
Contact configuration		1 CO (SPDT)	
Rated current/Maximum peak current	A	16/30	
Rated voltage/ Maximum switching voltage	V AC	250/—	
Rated load AC1	VA	4000	
Rated load AC15 (230 V AC)	VA	420	
Nominal lamp rating:			
230 V incandescent/halogen	W	400	
fluorescent tubes with electronic ballast	W	100	
fluorescent tubes with electromechanical ballast	W	100	
CFL	W	50	
230 V LED	W	50	
LV halogen or LED with electronic ballast	W	50	
LV halogen or LED with electromechanical ballast	W	100	
Minimum switching load	mW (V/mA)	1000 (10/10)	
Standard contact material		AgNi	
Supply specification			
Nominal voltage (U_N)	V AC (50/60 Hz)	—	230
	V AC/DC	24	—
Rated power AC/DC	VA (50 Hz)/W	1.4/1.4	2/—
Operating range	AC (50 Hz)	(0.9…1.1)U_N	(0.85…1.1)U_N
	DC	(0.9…1.1)U_N	—
Technical data			
Electrical life at rated load in AC1	cycles	$50 \cdot 10^3$	
Type of time switch		weekly	
Memory locations for switching times*		30	
Minimum switching interval	min	1	
Accuracy	s/day	0.5	
Ambient temperature range	°C	–30…+55	
Protection category		IP 20	
Approvals (according to type)		CE EAC	

* Switching times in memory may be used more than once i.e. when selected for different days.

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12 SERIES
Time switches 16 A

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Ordering information

Example: 12 series digital (analogue style) time switch, 1 CO 16 A contact, (110…230)V AC/DC supply

1 2	.	5	1	.	8	.	2 3 0	.	0	0	0	0

Series

Type
0 = Daily, 35.8 mm wide
1 = Daily, 17.5 mm wide
3 = Daily or Weekly, 72 x 72 mm
5 = Digital (analogue style), NFC programming, 35 mm wide
6 = Weekly, NFC programming, 35 mm wide
7 = Weekly, 17.5 mm wide
8 = Astro-switch, NFC programming, 35 mm wide
A = Weekly "Astro", NFC programming, 35 mm wide

No. of poles
1 = 1 CO (SPDT), 16 A
1 = 1 NO (SPST), 16 A
2 = 2 CO (DPDT), 16 A

Supply version
0 = AC (50/60 Hz)/DC (types 12.61.0.024, 12.A2.0.024, 12.71.0.024)
8 = AC (50/60 Hz)
8 = AC (50/60 Hz)/DC (types 12.51, 12.81, 12.61, 12.62, 12.A1, 12.A2)

Supply voltage
024 = 24 V AC/DC (type 12.71)
024 = 12…24 V AC/DC (types 12.61, 12.A2)
120 = 120 V AC
230 = 230 V AC
230 = (110…230)V AC/DC (types 12.51, 12.61, 12.62, 12.81, 12.A1, 12.A2)

Option
0 = With power back-up
1 = Without power back-up (type 12.11)

Special version
0 = Standard

Option
0 = Standard
0 = Daily only for 12.31
7 = Weekly only for 12.31

Codes
12.01.8.230.0000
12.11.8.230.0000
12.11.8.230.1000
12.31.8.230.0000
12.31.8.230.0007
12.51.8.230.0000
12.71.0.024.0000
12.71.8.230.0000
12.81.8.230.0000
12.61.0.024.0000
12.61.8.230.0000
12.62.8.230.0000
12.A1.8.230.0000
12.A2.0.024.0000
12.A2.8.230.0000

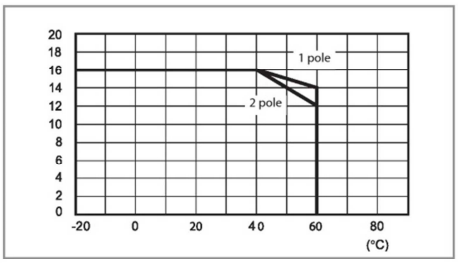
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Technical data

Insulation			12.51, 12.61, 12.62, 12.81, 12.A1, 12.A2		12.01, 12.11, 12.31, 12.71	
Dielectric strength between supply and contacts		V AC	4000		4000	
Dielectric strength between open contacts		V AC	1000		1000	
Rated impulse voltage (between supply and contacts)		kV/(1.2/50)µs	6		6	
Rated impulse voltage (between open contacts)		kV/(1.2/50)µs	1.5		1.5	
EMC specifications						
Type of test		**Reference standard**				
Electrostatic discharge	contact discharge	EN 61000-4-2	4 kV		6 kV	
	air discharge	EN 61000-4-2	8 kV		8 kV	
Radiated electromagnetic field (80…1000 MHz)		EN 61000-4-3	10 V/m		10 V/m	
Fast transients (burst 5/50 ns, 5 and 100 kHz)		EN 61000-4-4	4 kV		4 kV	
Voltage pulses on supply terminals (surge 1.2/50 µs)	common mode	EN 61000-4-5	4 kV		2 kV	
	differential mode	EN 61000-4-5	4 kV		2 kV	
Radiofrequency common mode voltage (0.15…80 MHz)		EN 61000-4-6	10 V		10 V	
Voltage dips	70% U_N , 40% U_N	EN 61000-4-11	10 cycles		10 cycles	
Short interruptions		EN 61000-4-11	10 cycles		10 cycles	
Radio frequency conducted emissions	0.15…30 MHz	EN 55014	class B		class B	
Radiated emissions	30…1000 MHz	EN 55014	class B		class B	
Terminals						
⊕ Screw torque		Nm	0.8		1.2	
Max. wire size			mm²	AWG	mm²	AWG
		solid cable	1 x 6 / 2 x 4	1 x 10 / 2 x 12	1 x 6 / 2 x 4	1 x 10 / 2 x 12
		stranded cable	1 x 4 / 2 x 2.5	1 x 12 / 2 x 14	1 x 6 / 2 x 2.5	1 x 10 / 2 x 14
Wire strip length		mm	9			
Other data						
Power back-up (Battery life)			6 years (12.51, 12.61, 12.62, 12.81, 12.A1, 12.A2, 12.71)			
Battery type			CR 2032, 3 V, 230 mAh (12.51, 12.61, 12.62, 12.81, 12.A1, 12.A2)			
Power back-up			100 h (12.01, 12.11, 12.31 - following 80 h continuous energisation)			
Power lost to the environment			**12.51, 12.61, 12.81, 12.A1**	**12.62, 12.A2**	**12.01, 12.11, 12.31**	**12.71**
		in stand-by W	0.2	0.2	—	—
		without contact current W	0.9	0.9	1.5	2
		with rated current W	1.5	2.1	2.5	3 (for 1 pole)

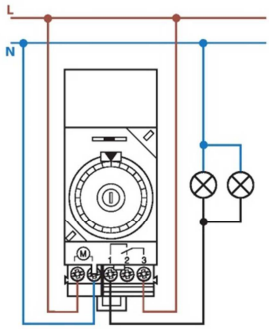
L 12 - Rated current v ambient temperature



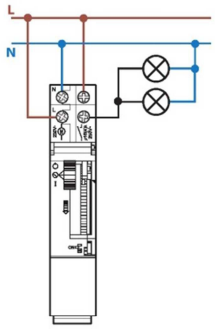
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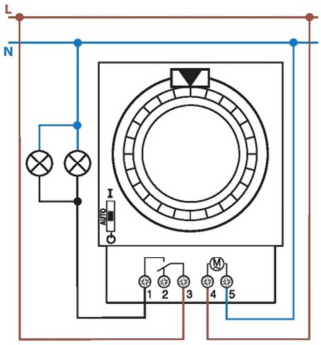
Wiring diagrams



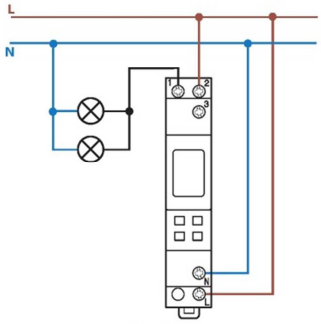
Type 12.01
Selector switch:
⏻ = Permanently OFF
AUTO = Automatic
I = Permanently ON



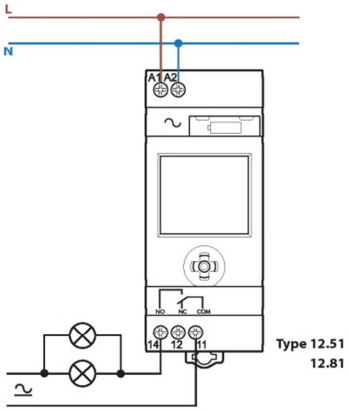
Type 12.11
Selector switch:
⏻ = Permanently OFF
⟲ = Automatic
I = Permanently ON



Type 12.31



Type 12.71

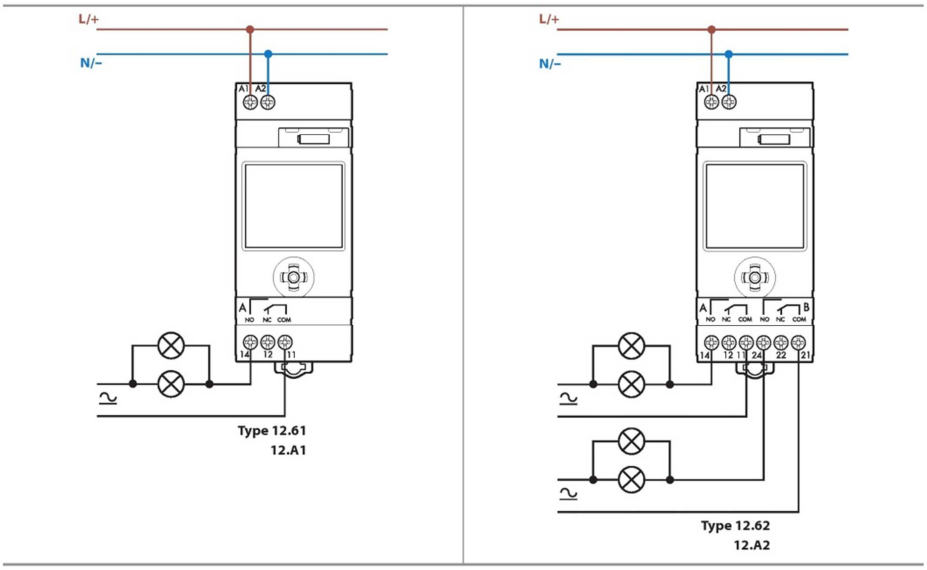


Type 12.51
12.81

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Wiring diagrams



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12 SERIES

12 SERIES
Time switches 16 A

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Two programming modes for type 12.51, 12.61, 12.62, 12.81, 12.A1, 12.A2



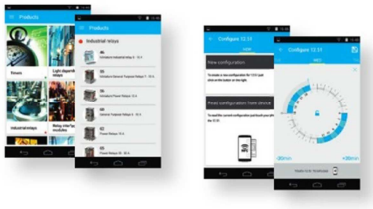
"Smart"

Mode via smartphones with NFC communication using Finder toolbox Android App.

"Classic"

Mode via the joystick

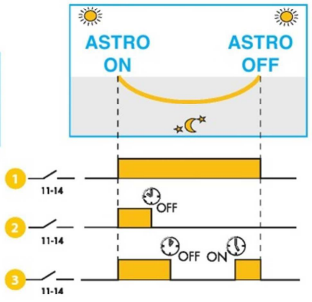




Finder Toolbox for programming
Once the App FINDER Toolbox is downloaded and installed, you can read an existing program, or program your device with maximum flexibility, changing the smallest details and saving your program directly to your smartphone.
At this point you simply touch the time switch with the smartphone to transfer the data.

Finder Toolbox for reference
Finder Toolbox provides all technical data sheets and news from Finder.

Functions type 12.81



The Override feature permits the 12.81 three different ways of functioning:

1. Classic function where the **AstroON** and **AstroOFF** times are determined by the geographic coordinates. These times vary every day.
2. Functions such that the output turns on according to the **AstroON** time and turns off according to the clock off-time $\overset{OFF}{}$. Application example: shop window lighting on by **AstroON** at sunset and off $\overset{OFF}{}$ at 00:30 .
3. Functions such that the output turns on according to the **AstroON** time and turns off a ccording to the clock off-time $\overset{OFF}{}$, and then turns back on at the clock on-time $\overset{ON}{}$ (for the remainder of the ASTRO time period). Application example: company car park lighting, on by **AstroON** at sunset, off end of the evening shift at 23:00 $\overset{OFF}{}$.
   On again at the beginning of the morning shift at 5:00 $\overset{ON}{}$ and off automatically by **AstroOFF***.

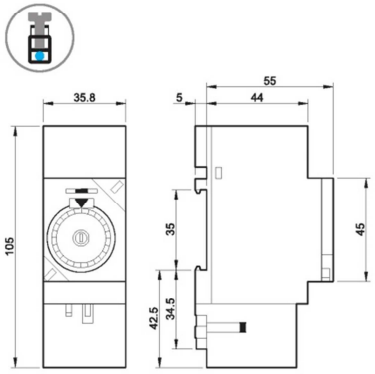
* Depending on the time of year (summer specifically) it may be that the override ON time will fall after the AstroOFF time. In this case, the output switches off at the AstroOFF time and the override ON time is ignored.

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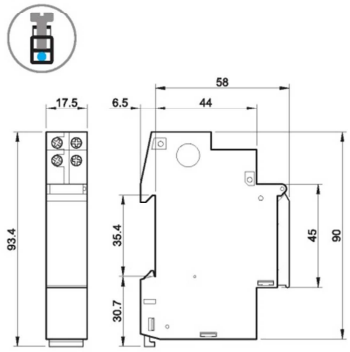
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Outline drawings

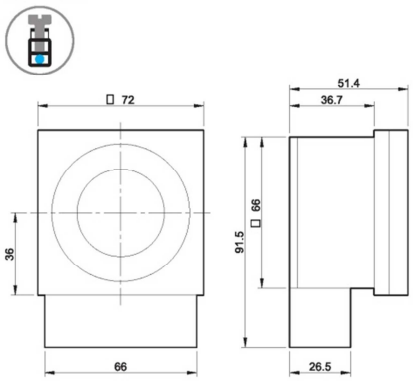
12.01
Screw terminal



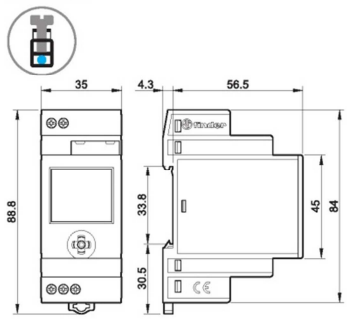
12.11
Screw terminal



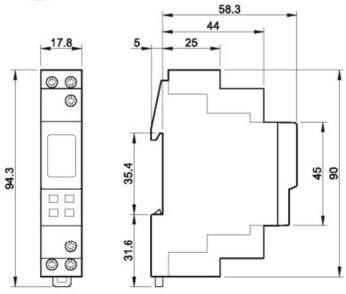
12.31
Screw terminal



12.51/12.81
Screw terminal



12.71
Screw terminal



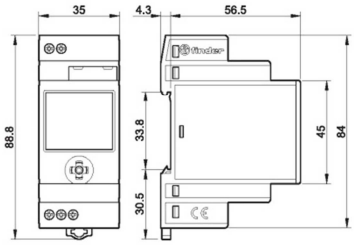
XI-2017, www.findernet.com

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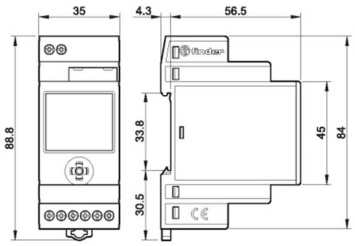
12 SERIES
Time switches 16 A

Outline drawings

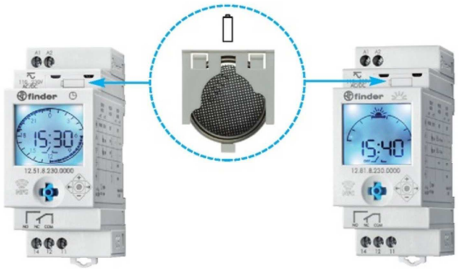
12.61 / 12.A1
Screw terminal



12.62 / 12.A2
Screw terminal



Battery replacement type 12.51, 12.61, 12.62, 12.81, 12.A1, 12.A2



Power-save mode

If the 230 V AC supply is not connected, the time switch enters power-save mode: only the clock is maintained active whilst the display turns off so as to guarantee a long life for the built-in back-up battery.
With a press to the joystick it is possible to "awake" the device and enter Display mode (with the "plug" symbol displayed). A further press to ◎ will enter the program or set-up mode as explained in the Display mode section above.
After about 1 minute of inactivity the power-save mode will start again. During program or set-up the current absorption is higher than in power-save mode, thus influencing the battery life.
In this mode the display back-light is not active. It is activated following a press to the joystick only with the 230 V AC supply connected, but after about 1 minute of inactivity the display back-light will turn off, and to activate it again it is necessary to press the joystick again.
Note: the output relay only functions if the power supply is connected.

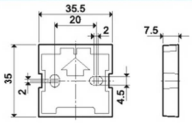


Accessories type 12.51, 12.61, 12.62, 12.81, 12.A1, 12.A2



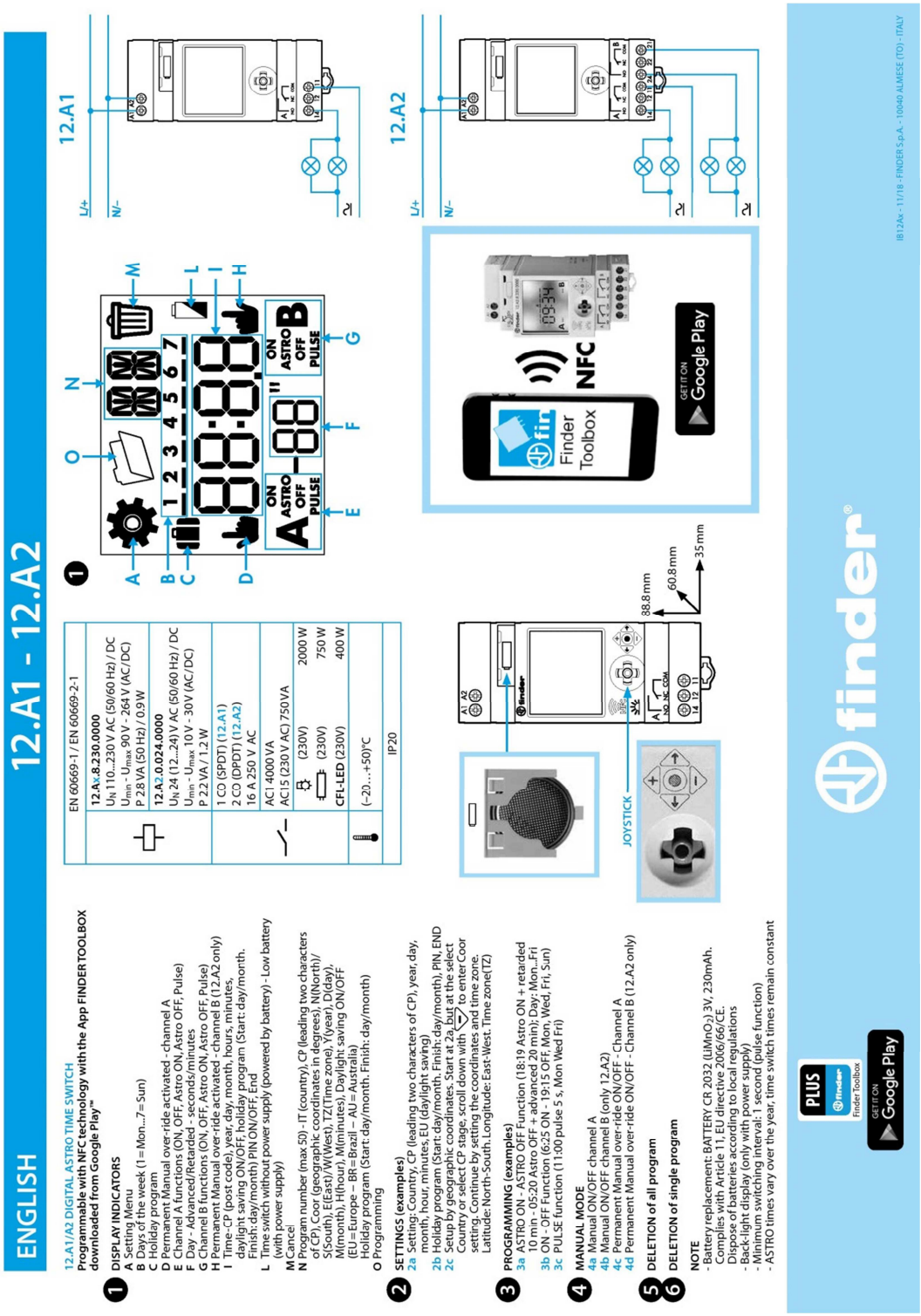
011.01

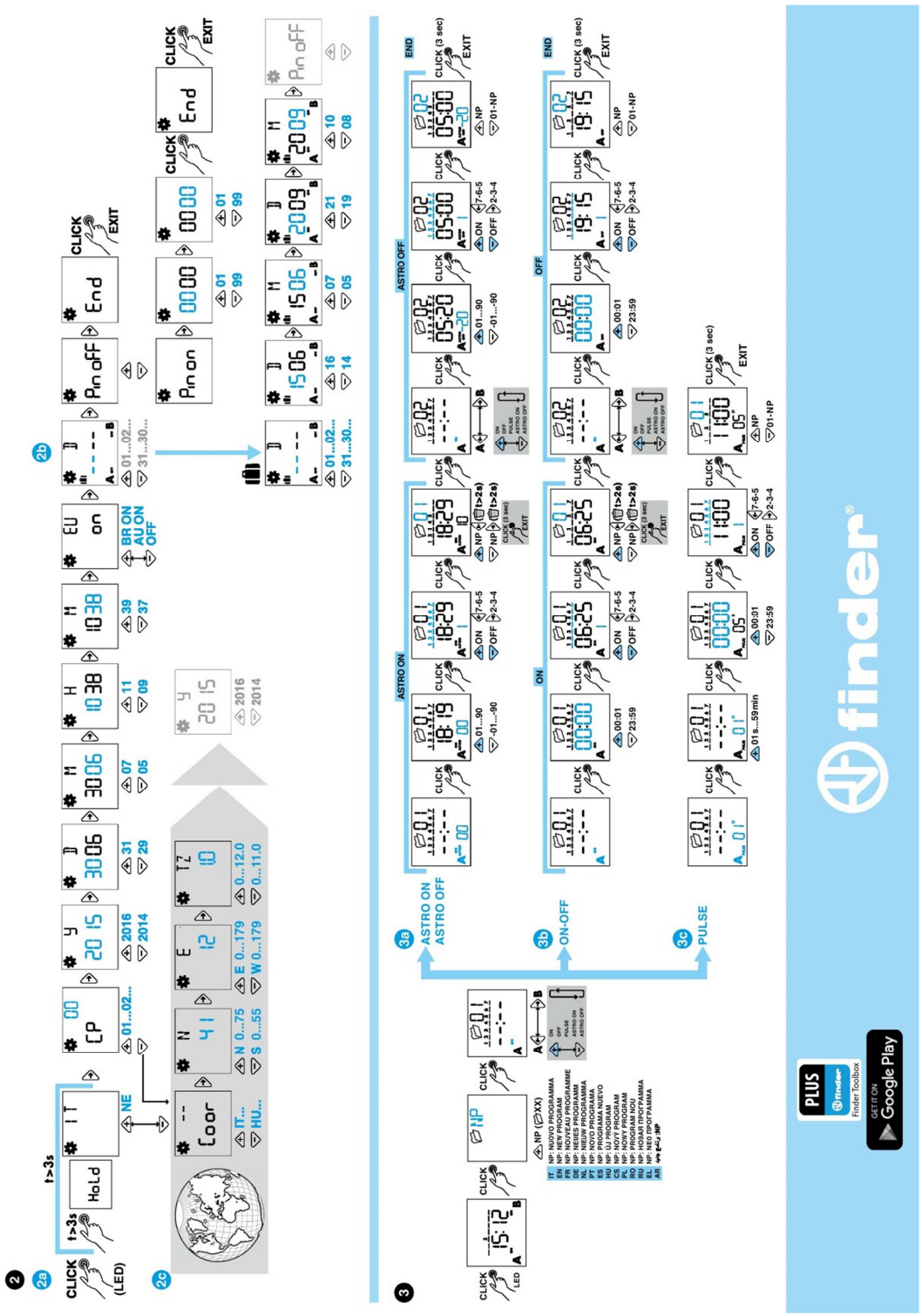
Adaptor for panel mounting, 35 mm wide	011.01

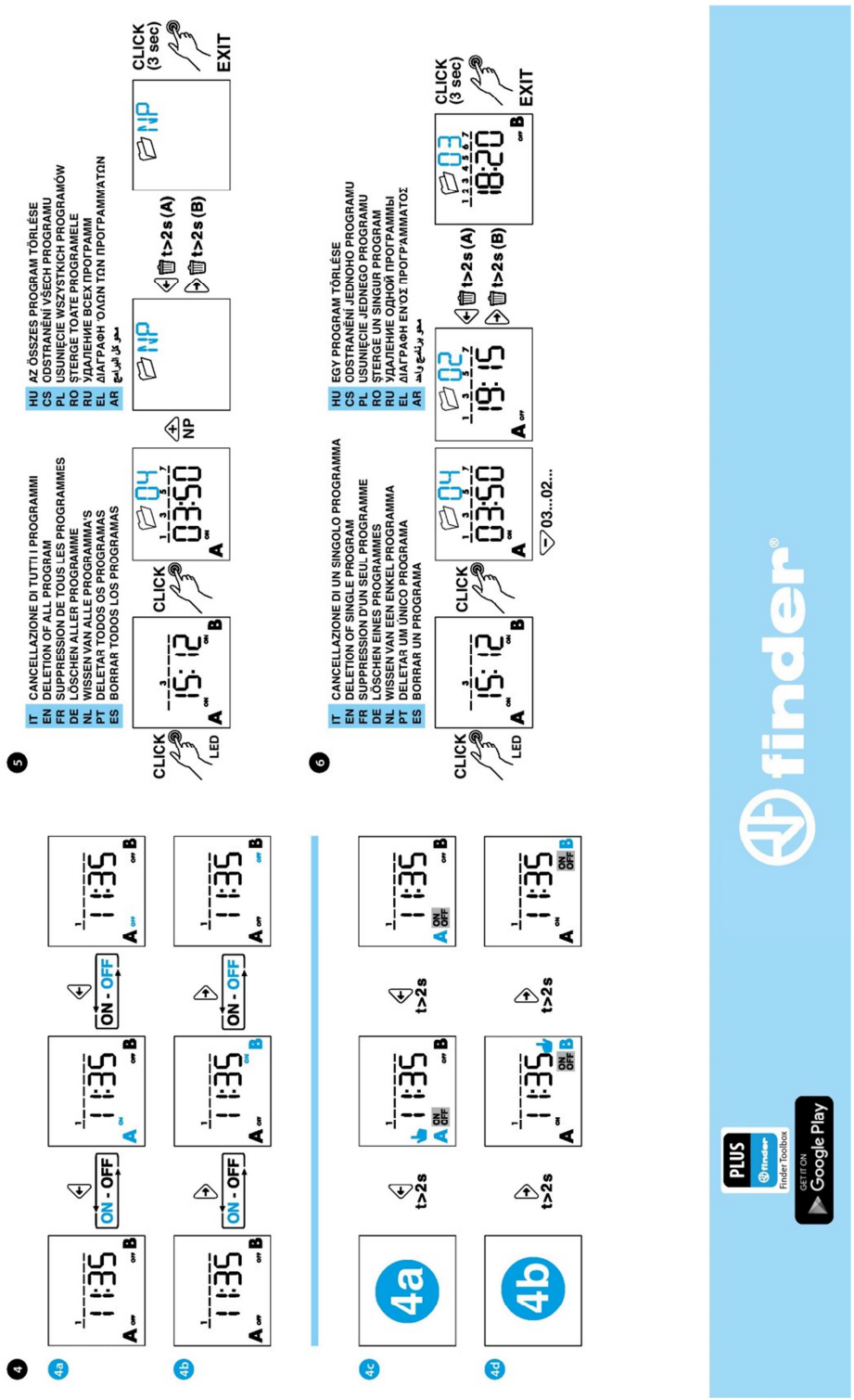


XI-2017, www.findernet.com

1.38 FINDER DIGITAL ASTRONOMICAL TIME SWITCH 12.A2.0.024.0000 MANUAL




finder
PLUS
Finder Toolbox
GET IT ON Google Play
ASTRO ON
ASTRO OFF
ON-OFF
PULSE
CLICK
EXIT
END


5
IT CANCELLAZIONE DI TUTTI I PROGRAMMI
EN DELETION OF ALL PROGRAM
FR SUPPRESSION DE TOUS LES PROGRAMMES
DE LÖSCHEN ALLER PROGRAMME
NL WISSEN VAN ALLE PROGRAMMA'S
PT DELETAR TODOS OS PROGRAMAS
ES BORRAR TODOS LOS PROGRAMAS
HU AZ ÖSSZES PROGRAM TÖRLÉSE
CS ODSTRANĚNÍ VŠECH PROGRAMU
PL USUNIĘCIE WSZYSTKICH PROGRAMÓW
RO ȘTERGE TOATE PROGRAMELE
RU УДАЛЕНИЕ ВСЕХ ПРОГРАММ
EL ΔΙΑΓΡΑΦΗ ΟΛΩΝ ΤΩΝ ΠΡΟΓΡΑΜΜΑΤΩΝ
AR حذف كل البرامج
CLICK
LED
CLICK
NP
t>2s (A)
t>2s (B)
CLICK (3 sec)
EXIT
6
IT CANCELLAZIONE DI UN SINGOLO PROGRAMMA
EN DELETION OF SINGLE PROGRAM
FR SUPPRESSION D'UN SEUL PROGRAMME
DE LÖSCHEN EINES PROGRAMMES
NL WISSEN VAN EEN ENKEL PROGRAMMA
PT DELETAR UM ÚNICO PROGRAMA
ES BORRAR UN PROGRAMA
HU EGY PROGRAM TÖRLÉSE
CS ODSTRANĚNÍ JEDNOHO PROGRAMU
PL USUNIĘCIE JEDNEGO PROGRAMU
RO ȘTERGE UN SINGUR PROGRAM
RU УДАЛЕНИЕ ОДНОЙ ПРОГРАММЫ
EL ΔΙΑΓΡΑΦΗ ΕΝΟΣ ΠΡΟΓΡΑΜΜΑΤΟΣ
AR حذف برنامج واحد
CLICK
LED
CLICK
03...02...
t>2s (A)
t>2s (B)
CLICK (3 sec)
EXIT
4
4a
4b
ON - OFF
4c
4d
4a
4b
t>2s
t>2s
finder
PLUS
Finder Toolbox
GET IT ON Google Play

1.39 CONTREL INSULATION MONITORING RELAY RI-R22 DATA SHEET



RI-F22 series
RI-R22 series
RI-R38 series
INSULATION MONITORING
VERSIONS FOR NETWORKS ac MAX 400 V

GENERALITA'

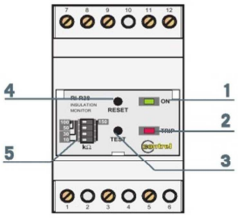


These devices allow insulation monitoring on earth of electric networks in alternating 230 V and isolated 400 V (IT systems).
Insulation resistance monitoring is carried out applying a measure's signalling in direct-current between isolated network and earth.
Surveying electric leakage set up on earth it's possible to measure insulation level.
Versions with fixed trip threshold are available and they are very cheap.
There are also versions with possibility of adjustable calibration of trip threshold.
On frontal panel, devices have signal for activity ON, for TRIP (low insulation), a test button, a reset button (only for versions with adjustable threshold) and a potentiometer for setting the threshold of tripping (model RI-R22) or micro switches (model RI-R38).

MODELS

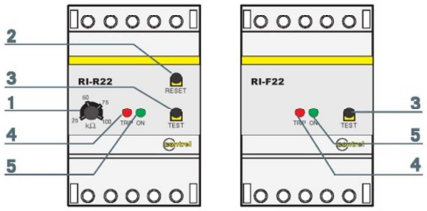
RI-F22 fixed threshold	Vaux: 230 V 50-60 Hz (standard version)
RI-F22 fixed threshold	Vaux: 110 V 50-60 Hz (optional version)
RI-R22 adjustable threshold	Vaux: 230 V 50-60 Hz (standard version)
RI-R22 adjustable threshold	Vaux: 110 V 50-60 Hz (optional version)
RI-R38 adjustable threshold	Vaux: 230 V 50-60 Hz (standard version)
RI-R38 adjustable threshold	Vaux: 110 V 50-60 Hz (optional version)

FUNCTIONS AND OPERATORS - LEGENDA



RI-R38

1. LED ON green active device's indication
2. LED TRIP red signal of trip for low insulation
3. TEST button device functioning testing
4. RESET button trip signalling reset (manual reset functions)
5. micro switches for trip threshold adjusting



RI-F22 / RI-R22

1. Potentiometer for adjusting insulation's resistance (only for model RI-R22)
2. Manual resetting button (only for model RI-R22)
3. Test button
4. Signalling lamp of auxiliary supply (green LED)
5. Signalling lamp for relay tripped (red LED)

9

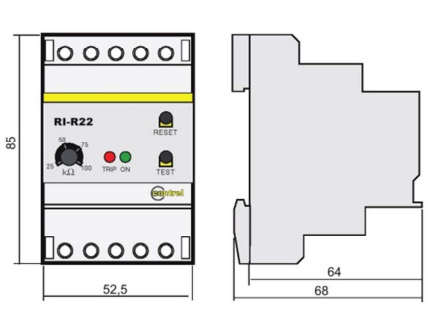


RI-F22 series
RI-R22 series
RI-R38 series
INSULATION MONITORING
VERSIONS FOR NETWORKS ac MAX 400 V

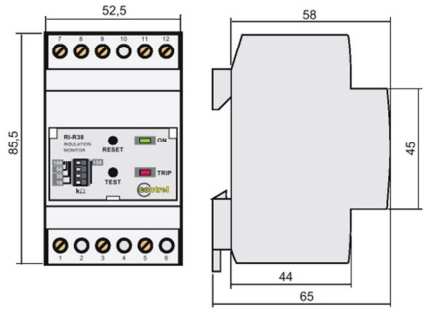
ELECTRIC CHARACTERISTICS

Auxiliary supply voltage	230 V 50-60 Hz ±20 % standard 110 V 50-60 Hz ±20 % optional
Self-consumption	3 VA MAX
Network voltage	RI-F22 / RI-R22 24 ÷ 230 Vac +10 % (400 V on 3 phase network with neutral) RI-R38 24 ÷ 440 Vac +10 % (760 V on 3 phase network with neutral)
Measure's voltage	RI-F22 / RI-R22 12 V MAX RI-R38 24 V MAX
Measure's current	RI-F22 / RI-R22 0.1 mA MAX RI-R38 0.5 mA MAX
Internal impedance	RI-F22 / RI-R22 100 kohm RI-R38 250 kohm
Tripping threshold setting	RI-F22 fixed 100 kohm RI-R22 adjustable 25 ÷ 100 kohm (by potentiometer) RI-R38 adjustable 10 ÷ 150 kohm (4 levels by micro switches)
Tripping late	about 1 second
Signals and operators	led ON - led TRIP buttons TEST and RESET (RESET is not available for RI-F22)
Output	relay switch contact NO-C-NC MAX 5 A 250 Vac
Working temperature	- 10 ...+ 60 °C
Storing temperature	- 20 ...+ 70 °C
Relative humidity	< 90 %
Insulation test	3 kV 60 sec / 4 kV set 1.2 / 50 µs
Assembling position	indifferent
Connection type	by screw terminals - wire section MAX 4 mm²
Protection's degree	IP 40 frontal with cap - IP 20 case
Mounting according with DIN 50022	easy connection snap on DIN rail 35 mm / 3 modules of 17.5 mm
Weight	approximately 300 g
Standard reference	CEI-EN 61010-1 / CEI-EN 61557-8 / VDE 0413 part.8 / CEI-EN 61326-1

DIMENSIONS



RI-F22 I RI-R22



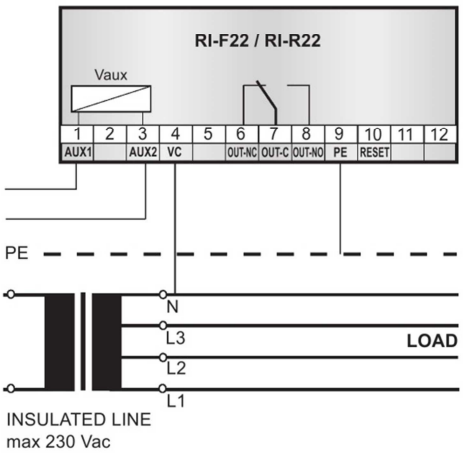
RI-R38

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RI-F22 series
RI-R22 series
RI-R38 series
INSULATION MONITORING
VERSIONS FOR NETWORKS ac MAX 400 V

WIRING DIAGRAMS - LEGENDA



RI-F22 / RI-R22

AUXILIARY SUPPLY - terminals 1-3
auxiliary supply available from under-control network

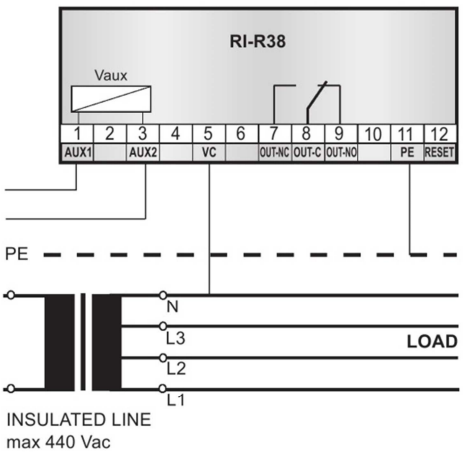
INSULATION MONITORING - terminals 4-9
the two terminals have to be connected between under-control network and measure's referring earth (max. applicable voltage between these terminals is 230 V, so it's possible apply insulation monitoring on single phase networks till 230 V, three phase networks three-wires without neutral till 230 V and three phase networks with neutral till 400 V)

RELAYS' OUTPUT CONNECTIONS - terminals 6-7-8

CONNECTIONS FOR REMOTE SIGNALLING
by relays in switch voltage-free max 5 A 250 V on resistive load

EVENTUAL CONNECTION FOR AUTOMATIC OR REMOTE RESET
(only for RI-R22) it is required to connect a NC button between terminal 10 and earth's conductor PE and to link with a bond terminals 9 and 10 themselves

EVENTUAL CONNECTION FOR REMOTE TEST
(only for version RI-R22) it is required to connect a NO button between terminal 5 and earth's conductor PE



RI-R38

AUXILIARY SUPPLY - terminals 1-3
auxiliary supply available from under-control network

INSULATION MONITORING - terminals 5-11
the two terminals have to be connected between under-control network and measure's referring earth. Terminal 5 has to be connected between under-control network single phase or three phase and neutral conductor. If three phase network is three-wire, the terminal has to be connected to a phase. max. applicable voltage between these terminals is 230 V, so it's possible apply insulation monitoring on single phase networks up to 440 V, three phase networks three-wire without neutral up to 440 V and three phase networks with neutral up to 760 V

RELAYS' OUTPUT CONNECTIONS - terminals 7-8-9

CONNECTIONS FOR REMOTE SIGNALLING
by relays in switch voltage-free max 5 A 250 V on resistive load

CONNECTION FOR AUTOMATIC OR REMOTE RESET - terminal 12

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1.40 CONTREL INSULATION MONITORING RELAY RI-R48 DATA SHEET

RI-F48 | RI-R48 | RI-R48N

IT NETWORKS INSULATION CONTROL **24-48 VAC/DC**

General Characteristics



These devices allows the insulation monitoring to earth of electric networks in alternate and direct current 24-48 VAC/DC isolated (IT systems). These devices measure the potential variation of two polarity on earth reference, to signal when the insulation decreasing under a fixed value. Auxiliary supply is taken from under-control network. On the frontal panel there is the signaling of device ON, a TEST and a RESET (versions RI-R48 and RI-R48N) pushbuttons and LEDs to the signaling of tripping (TRIP) and to indicate the polarity (version RI-R48N) of the line under control that has low insulation. The TRIP threshold is regulated by micro-switches (versions RI-R48 and RI-R48N). It's available a changeover contact relay to use the low insulation signaling in a remote panel.

Features

- INSULATION MONITORING OF IT SYSTEMS 24-48 VAC/DC
- TRIP MANUAL RESET (VERSIONS RI-R48 AND RI-R48N)
- LOW INSULATION LED
- DAMAGED POLE LED (VERSION RI-R48N)
- TEST PUSHBUTTON
- TRIP THRESHOLD SETTING (VERSIONS RI-R48 AND RI-R48N)

Technical characteristics

Controlled network voltage	24-48 VAC/DC	**Max relay contact capacity**	250V - 5A
Power consumption	3 VA	**Operating temperature**	-10 ÷ 60 °C
ALARM threshold setting	-	**Storage temperature**	-20 ÷ 80 °C
TRIP threshold setting	10÷60 kΩ (version RI-R48 and version RI-R48N) 100kΩ (version RI-F48)	**Relative humidity**	≤95%
Tripping delay	< 5 sec	**Max terminal section**	4 mm²
Max measuring current	0.5 mA	**Protection degree**	IP40 front | IP20 housing
Max measuring voltage	-	**Insulation test**	2.5 kV 60 sec. / 4 kV imp 1.2/50 µs
Internal impedance	50 kΩ	**Modules**	3
TRIP Relay number NO-C-NC	1	**Weight**	200 g
ALARM Relay number NO-C-NC	-	**Standards**	EN 61010-1, EN 61557-8, EN 61326-1

ORDER CODE	VERSION	Vaux	DESCRIPTION	CONTROLLED NETWORK VOLTAGE	MODULES
RI-F48	TRIP threshold fixed 100kΩ	24-48 VAC/DC	IT networks insulation control 24-48 VAC/DC	24-48 VAC/DC	3
RI-R48	TRIP threshold adjustment	24-48 VAC/DC	IT networks insulation control 24-48 VAC/DC	24-48 VAC/DC	3
RI-R48N	TRIP threshold adjustment Damaged pole LED	24-48 VAC/DC	IT networks insulation control 24-48 VAC/DC	24-48 VAC/DC	3

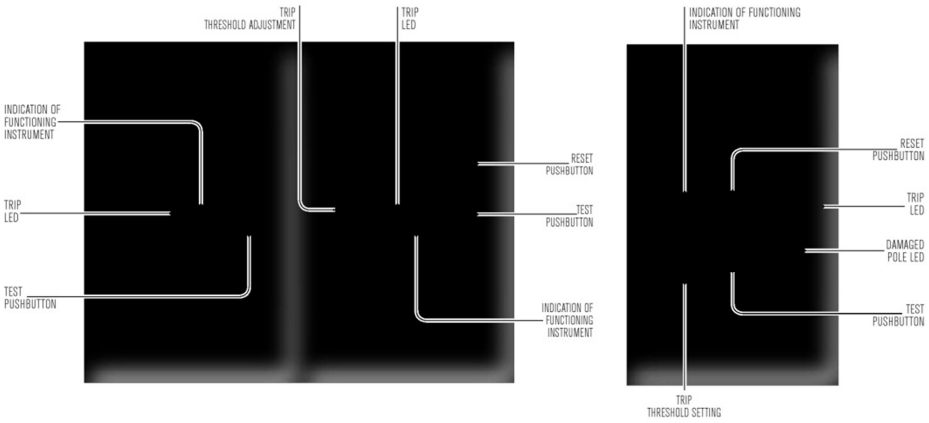
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RI-F48 | RI-R48 | RI-R48N

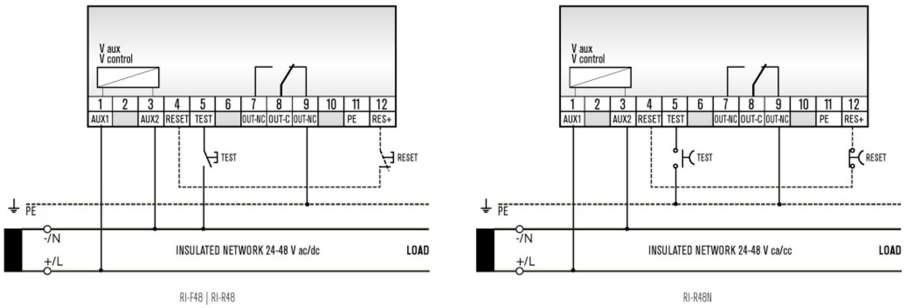
IT NETWORKS INSULATION CONTROL **24-48 VAC/DC**



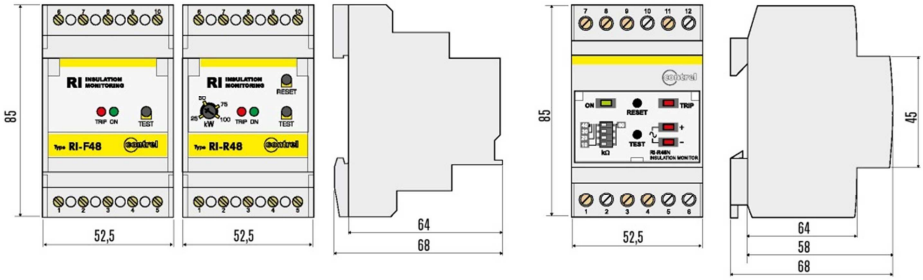
Operators



Wiring diagrams



Mechanical dimensions (mm)



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1.41 OMRON UNDERCURRENT MONITORING RELAY K8AK-AS1 DATA SHEET

New Product

OMRON

Single-phase Current Relay

K8AK-AS

Ideal for Current Monitoring for Industrial Facilities and Equipment.

- Monitor for overcurrents or undercurrents.
- Use commercially available CTs (CT current on secondary side: 0 to 1 A or 0 to 5 A).
- Manual resetting and automatically resetting supported by one Relay.
- Startup lock and operating time can be set separately.
- One SPDT output relay, 5 A at 250 VAC (resistive load).
- Output relay can be switched between normally open and normally closed.
- Output status can be monitored using LED indicator.
- Inputs are isolated from the power supply.

⚠ Refer to *Safety Precautions* on page 9.
Refer to page 8 for commonly asked questions.



For the most recent information on models that have been certified for safety standards, refer to your OMRON website.

Ordering Information

List of Models

Setting range	Power supply voltage	Model
2 to 20 mA AC/DC, 10 to 100 mA AC/DC, 50 to 500 mA AC/DC	24 VAC/DC	**K8AK-AS1 24 VAC/DC**
	100 to 240 VAC	**K8AK-AS1 100-240 VAC**
0.1 to 1 A AC/DC, 0.5 to 5 A AC/DC, 0.8 to 8 A AC/DC	24 VAC/DC	**K8AK-AS2 24 VAC/DC**
	100 to 240 VAC	**K8AK-AS2 100-240 VAC**
10 to 100 A AC*1, 20 to 200 A AC*1	24 VAC/DC	**K8AK-AS3 24 VAC/DC**
	100 to 240 VAC	**K8AK-AS3 100-240 VAC**

*1 The K8AK-AS3 is designed to be used in combination with an OMRON K8AC-CT200L Current Transformer (CT). (Direct input is not possible.)

Accessory (Order Separately)

●OMRON CT

Appearance	Input range	Applicable Relay	Model
	10 to 100 A AC, 20 to 200 A AC	K8AK-AS3	**K8AC-CT200L**

●Commercially Available CTs*

Appearance	CT current on secondary side	Applicable Relay
	0 to 1 A AC, 0 to 5 A AC	K8AK-AS2

* If you use a commercially available CT, do not exceed the overload capacity of the K8AK-AS2.

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K8AK-AS

Ratings and Specifications

Input Range

Model	Range*1	Connection terminal	Setting range	Input impedance	Input type	Overload capacity
K8AK-AS1	0 to 20 mA AC/DC	I1-COM	2 to 20 mA AC/DC, 10 to 100 mA AC/DC, 50 to 500 mA AC/DC	Approx. 5 Ω	Direct input	Continuous input at 120% of maximum input 1 s at 150%
	0 to 100 mA AC/DC	I2-COM		Approx. 1 Ω	Direct input	
	0 to 500 mA AC/DC	I3-COM		Approx. 0.2 Ω	Direct input	
K8AK-AS2	0 to 1 A AC/DC	I1-COM	0.1 to 1 A AC/DC, 0.5 to 5 A AC/DC, 0.8 to 8 A AC/DC	Approx. 0.12 Ω	Direct input or commercially available CT	
	0 to 5 A AC/DC	I2-COM		Approx. 0.02 Ω		
	0 to 8 A AC/DC	I3-COM		Approx. 0.02 Ω	Direct input	
K8AK-AS3	0 to 100 A AC	I2-COM	10 to 100 A AC*2, 20 to 200 A AC*2	---	OMRON CT	Continuous input at 120% with an OMRON CT (K8AC-CT200L). 30 s at 200% 1 s at 600% * CT capacity on primary side.
	0 to 200 A AC	I3-COM		---	OMRON CT	

*1 The range is selected using connected terminals.
*2 The K8AK-AS3 is designed to be used in combination with an OMRON K8AC-CT200L Current Transformer (CT). (Direct input is not possible.)

Ratings

Power supply voltage **Isolated power supply**	24 VAC/DC 100 to 240 VAC
Power consumption	24 VAC/DC: 2.0 VA/1.1 W max. 100 to 240 VAC: 4.6 VA max.
Operating value setting range (SV)	10% to 100% of the maximum value of the setting range K8AK-AS1: 2 to 20 mA AC/DC 10 to 100 mA AC/DC 50 to 500 mA AC/DC K8AK-AS2: 0.1 to 1 A AC/DC (Compatible with commercially available CTs.) 0.5 to 5 A AC/DC (Compatible with commercially available CTs.) 0.8 to 8 A AC/DC K8AK-AS3: When used with the OMRON CT (K8AC-CT200L). 10 to 100 A AC 20 to 200 A AC
Operating value	100% operation at set value
Reset value setting range (HYS.)	5% to 50% of operating value
Reset method	Manual reset/automatic reset (switchable) **Note:** Manual reset: Turn OFF power supply for 1 s or longer.
Operating time setting range (T)	0.1 to 30 s
Startup lock time setting range (LOCK) **Note:** Enabled only for overcurrent operation.	0 to 30 s (The startup lock timer starts when the input has reached approximately 30% or more of the set value.) **Note:** Enabled only for overcurrent operation.
Indicators	Power (PWR): Green, Relay output (RY): Yellow, Alarm outputs (ALM): Red
Input impedance	Refer to *Input Range* on this page.
Output relays	One SPDT relay (NO/NC switched using DIP switch.)
Output relay ratings	Rated load Resistive load 5 A at 250 VAC 5 A at 30 VDC Maximum switching capacity: 1,250 VA, 150 W Minimum load: 5 VDC, 10 mA (reference values) Mechanical life: 10 million operations min. Electrical life: 5 A at 250 VAC or 30 VDC: 50,000 operations 3 A at 250 VAC/30 VDC:100,000 operations
Ambient operating temperature	–20 to 60°C (with no condensation or icing)
Storage temperature	–25 to 65°C (with no condensation or icing)
Ambient operating humidity	25% to 85% (with no condensation)
Storage humidity	25% to 85% (with no condensation)
Altitude	2,000 m max.
Terminal screw tightening torque	0.49 to 0.59 N·m
Terminal wiring method	Recommended wire Solid wire: 2.5 mm² Twisted wires: AWG16, AWG18 **Note:** 1. Ferrules with insulating sleeves must be used with twisted wires. 2. Two wires can be twisted together. Recommended ferrules AI 1,5-8BK (for AWG16) manufactured by Phoenix Contact AI 1-8RD (for AWG18) manufactured by Phoenix Contact AI 0,75-8GY (for AWG18) manufactured by Phoenix Contact
Case color	N1.5
Case material	PC and ABS, UL 94 V-0

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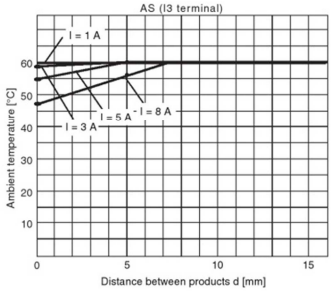
Weight	Approx. 150 g
Mounting	Mounts to DIN Track
Dimensions	22.5 × 90 × 100 mm (W×H×D)

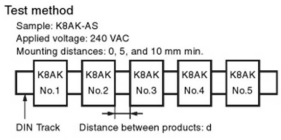
Specifications

Allowable operating voltage range		85% to 110% of power supply voltage
Allowable operating frequency range		50/60 Hz ±5 Hz
Input frequency range		K8AK-AS1 and K8AK-AS2: DC input or AC input (45 to 65 Hz) K8AK-AS3: AC input (45 to 65 Hz)
Overload capacity		K8AK-AS1 and K8AK-AS2: Continuous input at 120% of maximum input, 1 s at 150% K8AK-AS3: Continuous input at 120%, 30 s at 200%, and 1 s at 600% with an OMRON CT (K8AC-CT200L) **Note:** Overload capacity of primary side of CT.
Repeat error	**Operating value**	±0.5% full scale (at 25°C and 65% humidity, rated power supply voltage, DC or 50/60 Hz sine wave input)
	Operating time	±50 ms (at 25°C and 65% humidity, rated power supply voltage)
Applicable standards	**Conforming standards**	EN 60947-5-1 Installation environment (pollution level 2, installation category III)
	EMC	EN 60947-5-1
	Safety standards	UL 508 (Recognition), Korean Radio Waves Act (Act 10564), CSA: C22.2 No.14, CCC: GB14048.5
Insulation resistance		20 MΩ min. Between external terminals and case Between power supply terminals and input terminals Between power supply terminals and output terminals Between input terminals and output terminals
Dielectric strength		2,000 VAC for one minute Between external terminals and case Between power supply terminals and input terminals Between power supply terminals and output terminals Between input terminals and output terminals
Noise immunity		1,500 V power supply terminal common/normal mode Square-wave noise of ±1 μs/100 ns pulse width with 1-ns rise time
Vibration resistance		Frequency 10 to 55 Hz, 0.35-mm single amplitude 10 sweeps of 5 min each in X, Y, and Z directions
Shock resistance		100 m/s², 3 times each in 6 directions along 3 axes
Degree of protection		Terminals: IP20

●Relationship of Mounting Distance between K8AK-AS Relays and Input Current (Reference Values)

The following diagram shows the relationship between the mounting distances and the input current. If the relay is used with an input current that exceeds these values, the temperature of the K8AK may rise and shorten the life of the internal components.



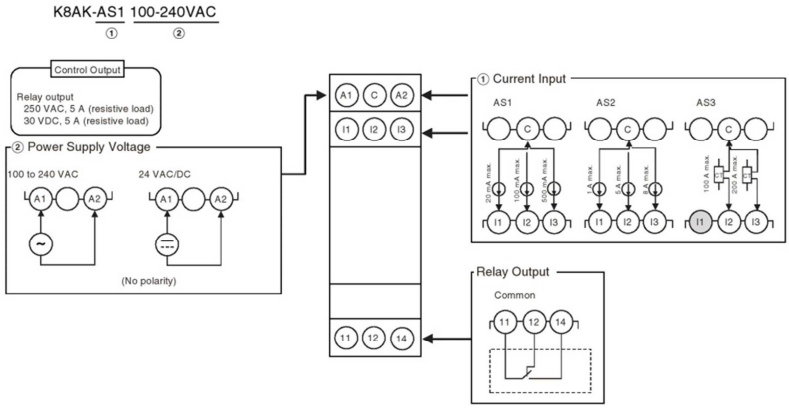


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K8AK-AS

Connections

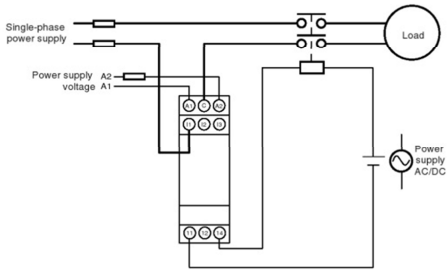
Terminal Diagram



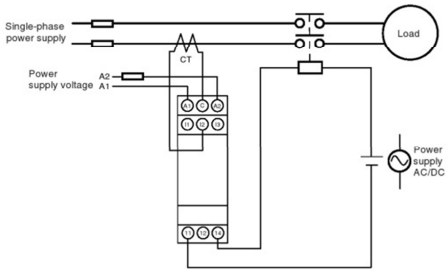
Note: 1. Do not connect anything to terminals that are shaded in gray.
2. There is no polarity for the DC power supply input.
3. For the current input, you can input only from the C terminal and one other terminal.
4. Refer to *Setting Ranges and Wiring Connections* on the I1, I2, and I3 current input terminals.
5. Use the recommended ferrules if you use twisted wires.
6. The K8AK-AS3 is designed to be used in combination with the OMRON K8AC-CT200L Current Transformer (CT).

Wiring Example

Directly Inputting a Current



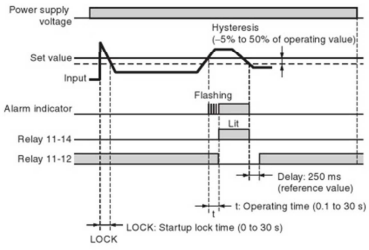
Using a CT



Timing Charts

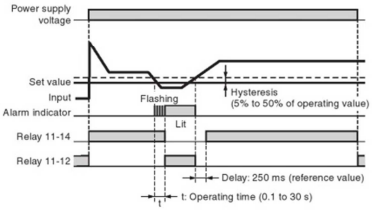
●Overcurrent Operation Diagram (Output Relay Drive Method: Normally Open)

DIP switch setting: SW3 OFF, SW4 OFF



●Undercurrent Operation Diagram (Output Relay Drive Method: Normally Closed)

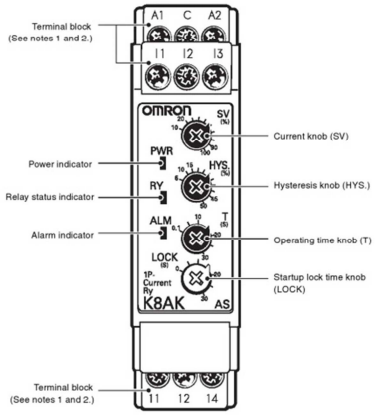
DIP switch setting: SW3 ON, SW4 ON



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Nomenclature

Front



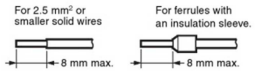
●Indicators

Item	Meaning
Power indicator (PWR: Green)	Lit when power is being supplied.
Relay status indicator (RY: Yellow)	Lit when relay is operating.
Alarm indicator (ALM: Red)	Lit when there is an overcurrent or undercurrent. The indicator flashes to indicate the error status after the input has exceeded the set value while the operating time is being clocked.

●Setting Knobs

Item	Usage
Current knob (SV)	Used to set the current to 10% to 100% of maximum setting range.
Hysteresis knob (HYS.)	Used to set the rest value to 5% to 50% of the operating value.
Operating time knob (T)	Used to set the operating time to 0.1 to 30 s.
Startup lock time knob (LOCK)	Used to set the startup lock time to 0 to 30 s.

Note: 1. Use either a solid wire of 2.5 mm² maximum or a ferrule with insulating sleeve for the terminal connection.
The length of the exposed current-carrying part inserted into the terminal must be 8 mm or less to maintain dielectric strength after connection.



Recommended ferrules
Phoenix Contact
- AI 1,5-8BK (for AWG16)
- AI 1-8RD (for AWG18)
- AI 0,75-8GY (for AWG18)

2. Tightening torque: 0.49 to 0.59 N·m

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K8AK-AS

Operation Methods

Setting Ranges and Wiring Connections

Model	Setting range	Input type	Wiring connections
K8AK-AS1	2 to 20 mA AC/DC	Direct input	I1-COM
	10 to 100 mA AC/DC	Direct input	I2-COM
	50 to 500 mA AC/DC	Direct input	I3-COM
K8AK-AS2	0.1 to 1 A AC/DC	Direct input or commercially available CT	I1-COM
	0.5 to 5 A AC/DC		I2-COM
	0.8 to 8 A AC/DC	Direct input	I3-COM
K8AK-AS3	10 to 100 A AC*	OMRON CT	I2-COM
	20 to 200 A AC*	OMRON CT	I3-COM

Note: The DC input terminals have no polarity.
* The K8AK-AS3 is designed to be used in combination with the OMRON K8AC-CT200L Current Transformer (CT). (Direct input is not possible.)

Connections

●Input

Connect the input between the I1-COM, I2-COM, or I3-COM terminals, according to the input current. Malfunctions may occur if the input is connected to unused terminals and the Unit will not operate correctly.
Terminal I1 is not used by the K8AK-AS3.
If using the OMRON K8AC-CT200L CT, connect to terminals k and l on the K8AC-CT200L. (Terminals kt and lt are not used.)

●Power Supply

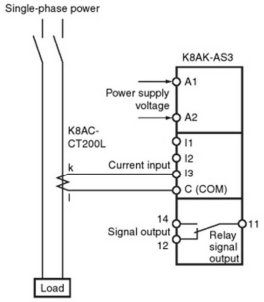
Connect the power supply to terminals A1 and A2.

●Outputs

Terminals 11, 12, and 14 are the output terminals (SPDT) for overvoltage.

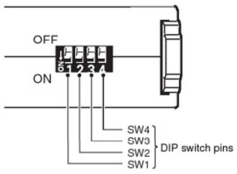
Note: Use the recommended ferrules if using twisted wires.

<For K8AK-AS3>



DIP Switch Settings

The resetting method, relay drive method, and operating mode are set using the DIP switch located on the bottom of the Unit.
K8AK-AS□ does not use SW1.



●DIP Switch Functions

Pin		OFF ● ↑ ON ○ ↓	1 (OFF / ON)	2	3	4
Resetting method	Manual reset		Not used.	●	---	---
	Automatic reset			○	---	---
Relay drive method	Normally open			---	●	---
	Normally closed			---	○	---
Operating mode	Overcurrent			---	---	●
	Undercurrent			---	---	○

Note: All pins are set to OFF by default.

Setting Method

●Setting Current

The current knob (SV) is used to set the current.
The current can be set to 10% to 100% of the maximum setting range.
Turn the knob while there is an input to the input terminals until the alarm indicator flashes (when the set value and the input have reached the same level.)
Use this as a guide to set the current.
The maximum setting range will differ depending on the model and the input terminal.
Example: K8AK-AS3 Using Input Terminals I3-COM
The maximum setting range will be 200 A AC and the setting range will be 20 to 200 A.

●Hysteresis

Hysteresis is set using the hysteresis knob (HYS.)
The setting range is 5 to 50% of the operating value.
Turn the knob while there is an input to the input terminals until the alarm indicator flashes (when the set value and the input have reached the same level.)
Use this as a guide to set the hysteresis.
Example: Maximum of 200 A AC, Current Set Value (SV) of 50%, and Overcurrent Operation
Operation will be at 100 A and resetting at 90 A when the hysteresis (HYS.) is set to 10%.

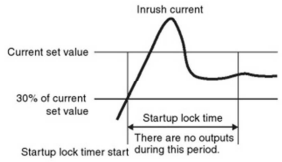
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●Operating Time

The operating time is set using the operating time knob (T).
The operating time can be set to between 0.1 and 30 s.
Turn the knob while there is an input to the input terminals until the alarm indicator flashes (when the set value and the input have reached the same level.)
Use this as a guide to set the operating time.
If the input current exceeds (drops lower than) the set value, the alarm indicator will start flashing for the set period and then stay lit.

●Startup Lock Time

The startup lock time is set using the startup lock time knob (LOCK).
The startup lock time can be set to between 0 and 30 s.
Turn the knob while there is an input to the input terminals until the alarm indicator flashes (when the set value and the input have reached the same level.)
Use this as a guide to set the startup lock time.
The startup lock time will start when the input current reaches 30% or more of the set value.
Use startup lock time to prevent unwanted operation, e.g., as a result of inrush current.



Dimensions

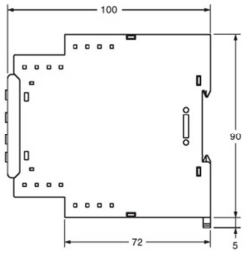
(Unit: mm)

Single-phase Current Relays

K8AK-AS1
K8AK-AS2
K8AK-AS3



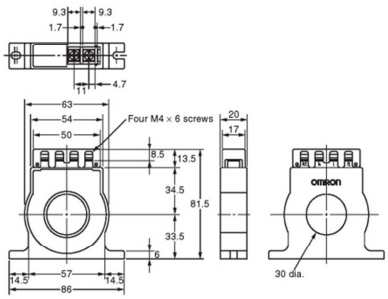


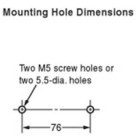


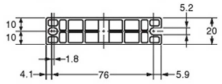
OMRON CT

K8AC-CT200L





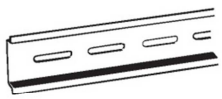


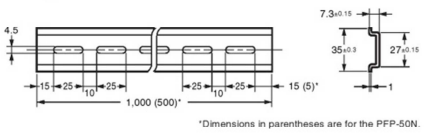


Note: The OMRON Current Transformer (CT) is designed to be used with the K8AK-AS3. Use terminals k and l for connections. (Terminals kt and lt are not used.)

Optional Parts for DIN Track Mounting

●DIN Tracks
PFP-100N
PFP-50N





*Dimensions in parentheses are for the PFP-50N.

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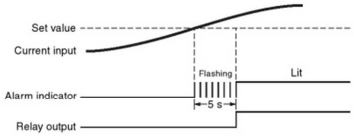
K8AK-AS

Questions and Answers

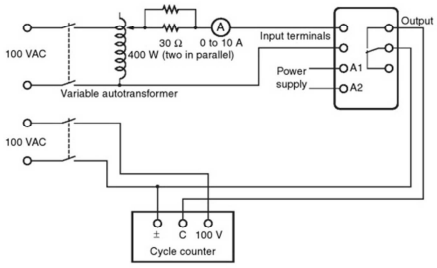
Q **Checking Operation**

A Overcurrents
Gradually increase the input from 80% of the set value. The input will equal the operating value when the input exceeds the set value and the alarm indicator starts flashing. Operation can be checked by the relay outputs that will start after the operating time has passed.
Undercurrent
Gradually decrease the input from 120% of the setting and check the operation using the same method as for overcurrent.

Example: Overcurrent Operating Mode, Normally Open Relay Drive, and an Operating Time of 5 s



Connection Diagram



Q **How to Measure the Operating Time**

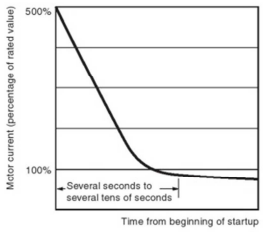
A Overcurrent
Change the input suddenly from 0% to 120% of the set value and measure the time until the Unit operates.
Undercurrent
Change the input suddenly from 120% to 0% of the set value and measure the time until the Unit operates.

Q **Monitoring Switch-mode Power Supplies**

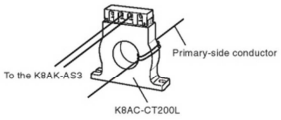
A Switch-mode Power Supplies cannot be monitored. In circuits with a capacitor input, including switch-mode power supplies, the input capacitor recharge current flows in pulse form as the load current. The K8AK-AS□ has a built-in filter as a countermeasure against high frequencies and cannot be used to remove pulse current.

Q **Can a motor with a rated current of 5 A be monitored using the K8AK? Are there any application precautions?**

A The K8AK-AS1 and K8AK-AS2 cannot be used with motor loads. Use the K8AK-AS3 in combination with the K8AC-CT200L Current Transformer (CT). With motor loads, the startup current and stall current will cause a current of many times the rated current to flow. Refer to the following figure for information on the motor startup current.



For a motor with a rating of 5 A, the startup current will be approximately 30 A. The startup current will exceed the overload capacity (rating: 150% for 1 s) of the K8AK-AS1 and K8AK-AS2 and result in failure of the Relay.
To monitor the motor load, use the K8AK-AS3. (Overload capacity: 120% of rating for continuous load, 200% of rating for 30 s, and 600% of rating for 1 s).
The K8AK-AS3 has a large input range. Pass the conductors multiple times through the special CT.



Concept behind Passing Conductor through the CT When Using the K8AK-AS3

Example: Monitoring Overload of a Motor with a Rated Current of 5 A

K8AK set value:
Overcurrent detection, operating value setting: 25%, operating time: 0.1 s
Startup lock timer: 0.1 to 30 s (Set the timer according to the duration of the startup current.)

The setting range for the K8AK-AS3 is 10% to 100% of the rated current (i.e., 10 to 100 A). Pass the conductors through the CT five times so that at least 10 A of current flows. The input current to the K8AK will be 25 A (i.e., 5 A x 5 loops).
If a startup current of six times the rated current is generated, it will be 150 A (i.e., 25 A x 6). The overload capacity for the K8AK-AS3 is 200% of the rating for 30 s. The Relay will not fail even if the startup current continues for 30 s, and it is possible to perform overload detection.

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Safety Precautions

Be sure to read the precautions for all models in the website at the following URL: http://www.ia.omron.com/.

Warning Indications

⚠ CAUTION	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury or in property damage.
Precautions for Safe Use	Supplementary comments on what to do or avoid doing, to use the product safely.
Precautions for Correct Use	Supplementary comments on what to do or avoid doing, to prevent failure to operate, malfunction, or undesirable effects on product performance.

Meaning of Product Safety Symbols

	Used to warn of the risk of electric shock under specific conditions.
	Used for general prohibitions for which there is no specific symbol.
	Used to indicate prohibition when there is a risk of minor injury from electrical shock or other source if the product is disassembled.
	Used for general mandatory action precautions for which there is no specified symbol.

⚠ CAUTION

Electrical shock may cause minor injury.
Do not touch terminals while electricity is being supplied. 

There is a risk of minor electrical shock, fire, or device failure.
Do not allow any pieces of metal, conductors, or cutting chips that occur during the installation process to enter the product. 

Explosions may cause minor injuries. Do not use the product in locations with inflammable or explosive gases.

There is a risk of minor electrical shock, fire, or device failure.
Do not disassemble, modify, repair, or touch the inside of the product. 

Loose screws may cause fires. Tighten terminal screws to the specified torque of 0.49 to 0.59 N·m. 

Use of excessive torque may damage the terminal screws.
Tighten terminal screws to the specified torque of 0.49 to 0.59 N·m. 

Use of the product beyond its life may result in contact welding or burning. Make sure to consider the actual operating conditions and use the product within its rated load and electrical life count. The life of the output relay varies significantly with the switching capacity and switching conditions. 

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Precautions for Safe Use

1. Do not use or store the product in the following locations.
   - Locations subject to water or oil
   - Outdoor locations or under direct sunlight
   - Locations subject to dust or corrosive gases (particularly sulfurizing gases, ammonia, etc.)
   - Locations subject to rapid temperature changes
   - Locations prone to icing and dew condensation
   - Locations subject to excessive vibration or shock
   - Locations subject to wind and rain
   - Locations subject to static electricity and noise
   - Habitats of insects or small animals
2. Use and store the product in a location where the ambient temperature and humidity are within the specified ranges. If applicable, provide forced cooling.
3. Mount the product in the correct direction.
4. Check terminal polarity when wiring and wire all connections correctly. The power supply terminals do not have polarity.
5. Do not wire the input and output terminals incorrectly.
6. Make sure the power supply voltage and loads are within the specifications and ratings for the product.
7. Make sure the crimp terminals for wiring are of the specified size.
8. Do not connect anything to terminals that are not being used.
9. Use a power supply that will reach the rated voltage within 1 second after the power is turned ON.
10. Keep wiring separate from high voltages and power lines that draw large currents.
    Do not place product wiring in parallel with or in the same path as high-voltage or high-current lines.
11. Do not install the product near equipment that generates high frequencies or surges.
12. The product may cause incoming radio wave interference. Do not use the product near radio wave receivers.
13. Install an external switch or circuit breaker and label it clearly so that the operator can quickly turn OFF the power supply.
14. Make sure the indicators operate correctly. Depending on the application environment, the indicators may deteriorate prematurely and become difficult to see.
15. Do not use the product if it is accidentally dropped. The internal components may be damaged.
16. Be sure you understand the contents of this catalog and handle the product according to the instructions provided.
17. Do not install the product in any way that would place a load on it.
18. When discarding the product, properly dispose of it as industrial waste.
19. When using the product, remember that the power supply terminals carry a high voltage.
20. The product must be handled only by trained electrician.
21. Prior to operation, check the wiring before you supply power to the product.
22. Do not install the product immediately next to heat sources.
23. Perform periodic maintenance.

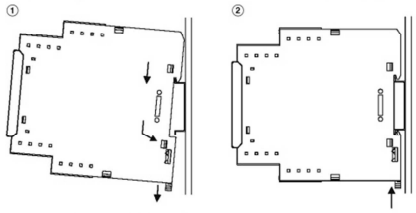
Precautions for Correct Use

Observe the following operating methods to prevent failure and malfunction.

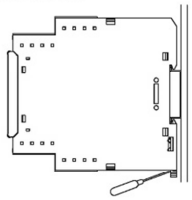
1. Use the power supply voltage, input power, and other power supplies and converters with suitable capacities and rated outputs.
2. Use a precision screwdriver or similar tool to adjust the setting knobs.
3. The distortion in the input waveform must be 30% max. If the input waveform is distorted beyond this level, it may cause unnecessary operation.
4. Error will be large if the product is used for thyristor or inverter control.
5. To reduce the error in the setting knob, always turn the setting knob from the minimum setting toward the maximum setting.
6. When cleaning the product, do not use thinners or solvents. Use commercial alcohol.

Correct Mounting Direction, Mounting, and Removing

- Mounting to DIN Track
  1. Attach the product to the DIN Track with the tab at the top and the hooks at the bottom.
  2. Push the product onto the Track until the hooks lock into place.



- Removing from the DIN Track
  Pull down on the bottom hook with a flat-blade screwdriver and lift up on the product.



Applicable DIN Tracks:
PFP-100N (100 cm)
PFP-50N (50 cm)

Adjusting the Setting Knobs

- Use a screwdriver to adjust the setting knobs. The knobs have a stopper that prevents them from turning beyond the full right or left position. Do not force a knob beyond these points.



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Terms and Conditions Agreement

Read and understand this catalog.

Please read and understand this catalog before purchasing the products. Please consult your OMRON representative if you have any questions or comments.

Warranties.

(a) Exclusive Warranty. Omron's exclusive warranty is that the Products will be free from defects in materials and workmanship for a period of twelve months from the date of sale by Omron (or such other period expressed in writing by Omron). Omron disclaims all other warranties, express or implied.

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Limitation on Liability; Etc.

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Further, in no event shall liability of Omron Companies exceed the individual price of the Product on which liability is asserted.

Suitability of Use.

Omron Companies shall not be responsible for conformity with any standards, codes or regulations which apply to the combination of the Product in the Buyer's application or use of the Product. At Buyer's request, Omron will provide applicable third party certification documents identifying ratings and limitations of use which apply to the Product. This information by itself is not sufficient for a complete determination of the suitability of the Product in combination with the end product, machine, system, or other application or use. Buyer shall be solely responsible for determining appropriateness of the particular Product with respect to Buyer's application, product or system. Buyer shall take application responsibility in all cases.

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Omron Companies shall not be responsible for the user's programming of a programmable Product, or any consequence thereof.

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Data presented in Omron Company websites, catalogs and other materials is provided as a guide for the user in determining suitability and does not constitute a warranty. It may represent the result of Omron's test conditions, and the user must correlate it to actual application requirements. Actual performance is subject to the Omron's Warranty and Limitations of Liability.

Change in Specifications.

Product specifications and accessories may be changed at any time based on improvements and other reasons. It is our practice to change part numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the Product may be changed without any notice. When in doubt, special part numbers may be assigned to fix or establish key specifications for your application. Please consult with your Omron's representative at any time to confirm actual specifications of purchased Product.

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CSM_4_2_0317
Cat. No. N179-E1-01 0314 (0314)

1.42 WEIDMULLER INTERFACE RELAY TRS230VAC RC 1CO DATA SHEET

Data sheet

Weidmüller

TRS 230VAC RC 1CO

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Product image





- 1 CO contact
- Contact material: AgNi
- Unique multi-voltage input from 24 to 230 V UC
- Input voltages from 5 V DC to 230 V UC with coloured marking: AC: red, DC: blue, UC: white

General ordering data

Version	TERMSERIES, Relay module, Number of contacts: 1, CO contact AgNi, Rated control voltage: 230 V AC ±10 %, Continuous current: 6 A, Screw connection, Test button available: No
Order No.	1122840000
Type	TRS 230VAC RC 1CO
GTIN (EAN)	4032248905034
Qty.	10 pc(s).

Creation date October 21, 2024 5:21:26 PM CEST

Catalogue status 12.10.2024 / We reserve the right to make technical changes. 1

Data sheet

Weidmüller

TRS 230VAC RC 1CO

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Technical data

Dimensions and weights

Depth	87.8 mm	Depth (inches)	3.457 inch
Height	89.6 mm	Height (inches)	3.528 inch
Width	6.4 mm	Width (inches)	0.252 inch
Net weight	34 g		

Temperatures

Storage temperature	-40 °C...85 °C	Operating temperature	-40 °C...60 °C
Humidity	5-95% relative humidity, T_u = 40°C, without condensation		

Rated data UL

Ambient temperature (operational), max.	60 °C	Connection cross-section AWG, min.	AWG 26
Connection cross-section AWG, max.	AWG 14	Type of conductor	rigid copper conductor, flexible copper conductor
Tightening torque, max.	0.4 Nm	Pollution severity level	2

Control side

Rated control voltage	230 V AC ±10 %	Rated current AC	8.5 mA
Power rating	2 VA	Status indicator	Green LED
Protective circuit	Rectifier, RC element	RC filter	94 Ω / 100 nF
Coil voltage of the replacement relay deviating from the rated control voltage	Yes	Coil voltage of the replacement relay	60 V DC

Load side

Rated switching voltage	250 V AC	Continuous current	6 A
Max. switching frequency at rated load	0.1 Hz	Max. switching voltage, AC	250 V
Max. switching voltage, DC	250 V	Inrush current	20 A / 20 ms
AC switching capacity (resistive), max.	1500 VA	DC switching capacity (resistive), max.	144 W @ 24 V
Switch-on delay	≤ 10 ms	Switch-off delay	≤ 12 ms
Contact type	1 CO contact (AgNi)	Mechanical service life	5 x 10^6 switching cycles
Min. switching power	1 mA @ 24 V, 10 mA @ 12 V, 100 mA @ 5 V		

General data

Operating altitude	≤ 2000 m, above sea level	
Rail	TS 35	
Test button available	No	
Mechanical switch position indicator	No	
Colour	black	
UL94 flammability rating component	Component	Housing
	UL94 flammability rating	V-0
	Component	Retaining clip
	UL94 flammability rating	V-0

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Data sheet

Weidmüller

TRS 230VAC RC 1CO

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Technical data

Insulation coordination

Rated voltage	300 V	Pollution severity	2
Surge voltage category	III	Clearance and creepage distances for control side - load side	≥ 6 mm
Dielectric strength for control side - load side	4 kV_{eff} / 1 Min.	Type of isolation at input and output	reinforced insulation
Dielectric strength of open contact	1 kV_{eff} / 1 min	Dielectric strength to mounting rail	4 kV_{eff} / 1 Min.
Impulse withstand voltage	6 kV (1.2/50 µs)	Protection degree	IP20

Further details of approvals / standards

Certificate No. (DNV)	TAA00001E5	Certificate no. (cULus)	E141197

Connection data

Wire connection method	Screw connection	Stripping length, rated connection	8 mm
Tightening torque, max.	0.4 Nm	Clamping range, rated connection	1.5 mm²
Clamping range, min.	0.14 mm²	Clamping range, max.	2.5 mm²
Wire connection cross section AWG, min.	AWG 26	Wire connection cross section AWG, max.	AWG 14
Wire cross-section, solid, min.	0.14 mm²	Wire cross-section, solid, max.	2.5 mm²
Wire cross-section, solid, min. (AWG)	AWG 26	Wire cross-section, solid, max. (AWG)	AWG 14
Wire connection cross section, finely stranded, min.	0.14 mm²	Wire connection cross section, finely stranded, max.	2.5 mm²
Wire cross-section, finely stranded, min. (AWG)	AWG 26	Wire cross-section, finely stranded, max. (AWG)	AWG 16
Wire connection cross-section, finely stranded with wire-end ferrules DIN 46228/4, min.	0.25 mm²	Wire connection cross-section, finely stranded with wire-end ferrules DIN 46228/4, max.	2.5 mm²
Conductor cross-section, flexible, AEH (DIN 46228-1), min.	0.25 mm²	Conductor cross-section, flexible, AEH (DIN 46228-1), max.	1.5 mm²
Wire connection cross section, finely stranded, two clampable wires, min.	0.5 mm²	Wire cross-section, finely stranded, two clampable wires, max.	1 mm²
Blade size	SD 0.6 x 3.5		

Classifications

ETIM 6.0	EC001437	ETIM 7.0	EC001437
ETIM 8.0	EC001437	ETIM 9.0	EC001437
ECLASS 9.0	27-37-16-01	ECLASS 9.1	27-37-16-01
ECLASS 10.0	27-37-16-01	ECLASS 11.0	27-37-16-01
ECLASS 12.0	27-37-16-01	ECLASS 13.0	27-37-16-01
ECLASS 14.0	27-37-16-01		

Environmental Product Compliance

RoHS Compliance Status	Compliant with exemption
RoHS Exemption (if applicable/known)	7a, 7cI
REACH SVHC	Lead 7439-92-1
SCIP	9e2cbc49-76d9-4611-b8ec-5b4f549a0aa9

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Weidmüller

TRS 230VAC RC 1CO

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Technical data

Approvals

Approvals	
ROHS	Conform
UL File Number Search	UL Website
Certificate no. (cULus)	E141197

Downloads

Approval/Certificate/Document of Conformity	EU Konformitätserklärung / EU Declaration of Conformity
Engineering Data	CAD data – STEP
User Documentation	Beipackzettel / Package Insert – multilingual FL_TERMSERIES_RSS1COAgNi_LOAD_GUIDE
Catalogues	Catalogues in PDF-format
Brochures	

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Weidmüller

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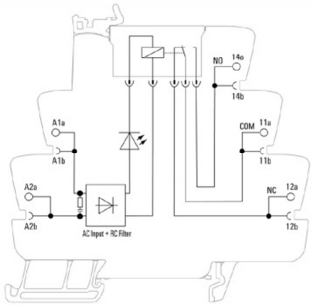
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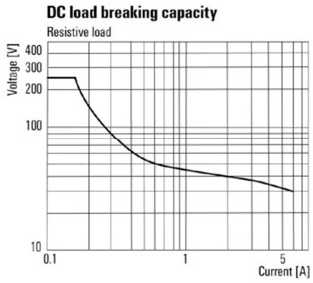
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Drawings

Wiring diagram

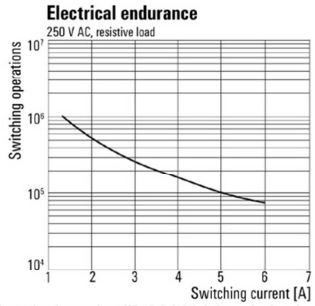


Graph



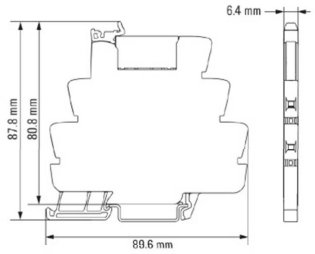
DC load limit curve
Resistive load

Graph



Electrical service life230 V AC resistive load
230 V AC resistive load

Dimensional drawing



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Data sheet

TRS 230VAC RC 1CO

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Accessories

Slotted screwdriver



Slotted screwdriver with rounded blade SD DIN 5265, ISO 2380/2, output to DIN 5264, ISO 2380/1. ChromTop tip, SoftFinish grip

General ordering data

Type	SDS 0.6X3.5X100	Version
Order No.	2749340000	Screwdriver, Blade width (B): 3.5 mm, Blade length: 100 mm, Blade
GTIN (EAN)	4050118895568	thickness (A): 0.6 mm
Qty.	1 pc(s).	

WS 12/6



WS/ DEK
MultiMark terminal markers use an innovative composite material made from two components. The hard base contour of the marker snaps securely into the connector. The elastic surface finish makes the marker easy to mount. This specially punched material enables the strips to be stretched to accommodate the slight variations in spacing that tend to add up, especially with long terminal blocks. Another advantage: the excellent printability of the surface material guarantees durable and wear-resistant labelling. A print resolution of 300 dpi also produces a very legible script.

Your benefits with MultiMark

- Firm hold and durable printing
- Continuous strips save installation time
- Easy mounting thanks to an innovative composite material
- Large label field for optimal legibility
- High flexibility thanks to manufacturer independence

General ordering data

Type	WS 12/6 MM WS	Version
Order No.	2007200000	WS, Terminal marker, 12 x 6 mm, Weidmueller, white
GTIN (EAN)	4050118391886	
Qty.	600 pc(s).	

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Weidmüller

TRS 230VAC RC 1CO

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Accessories

Slotted screwdriver



VDE insulated screwdriver sets, for working on live parts up to 1000 V AC and 1500 V DC, DIN EN 60900. IEC 900. Each piece is "GS" safety tested. Blade made from fully hardened, high-alloy chromium-vanadium-molybdenum steel, gun-metal finish.

General ordering data

Type	SDIS SLIM 0.6X3.5X100	Version
Order No.	2749610000	Mounting tool, Blade width (B): 3.5 mm, Blade length: 100 mm, Blade
GTIN (EAN)	4050118896350	thickness (A): 0.6 mm
Qty.	1 pc(s).	

Cross-connections



Adjustable cross-connections
Increase the flexibility of your cross-connections. The TERMSERIES CROSS-CONNECTION (TCC) enables individually adjustable cross-connections with up to 51 poles. The maximum number of pluggable poles has been increased to 32 poles. The strip material can be shortened to the required length very easily. The cross-connectors convince thanks to their easy handling and visibility as well as their universal connection possibilities. An additional web prevents the spring from deforming during assembly.

- Individually adjustable cross-connection with 51 poles
- Additional bar to avoid deformation of the spring
- Increased cross-connection – up to 32 poles possible
- Vibration resistance

General ordering data

Type	TCC 6.4/51 OR	Version
Order No.	2556370000	TERMSERIES, Cross-connector
GTIN (EAN)	4050118566680	
Qty.	10 pc(s).	
Type	TCC 6.4/2 BL	Version
Order No.	2556430000	TERMSERIES, Cross-connector
GTIN (EAN)	4050118566949	
Qty.	10 pc(s).	
Type	TCC 6.4/2 RD	Version
Order No.	2556390000	TERMSERIES, Cross-connector
GTIN (EAN)	4050118566901	
Qty.	10 pc(s).	
Type	TCC 6.4/2 OR	Version
Order No.	2556350000	TERMSERIES, Cross-connector
GTIN (EAN)	4050118566826	
Qty.	10 pc(s).	

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TRS 230VAC RC 1CO

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Accessories

Type	TCC 6.4/51 BK	Version
Order No.	2556490000	TERMSERIES, Cross-connector
GTIN (EAN)	4050118567007	
Qty.	10 pc(s).	
Type	TCC 6.4/51 BL	Version
Order No.	2556450000	TERMSERIES, Cross-connector
GTIN (EAN)	4050118566963	
Qty.	10 pc(s).	
Type	TCC 12.8/26 RD	Version
Order No.	2556420000	TERMSERIES, Cross-connector
GTIN (EAN)	4050118566932	
Qty.	10 pc(s).	
Type	TCC 12.8/26 BK	Version
Order No.	2556500000	TERMSERIES, Cross-connector
GTIN (EAN)	4050118567014	
Qty.	10 pc(s).	
Type	TCC 6.4/10 BK	Version
Order No.	2556480000	TERMSERIES, Cross-connector
GTIN (EAN)	4050118566994	
Qty.	10 pc(s).	
Type	TCC 6.4/2 BK	Version
Order No.	2556470000	TERMSERIES, Cross-connector
GTIN (EAN)	4050118566987	
Qty.	10 pc(s).	
Type	TCC 6.4/10 RD	Version
Order No.	2556400000	TERMSERIES, Cross-connector
GTIN (EAN)	4050118566918	
Qty.	10 pc(s).	
Type	TCC 6.4/10 OR	Version
Order No.	2556360000	TERMSERIES, Cross-connector
GTIN (EAN)	4050118566673	
Qty.	10 pc(s).	
Type	TCC 12.8/26 OR	Version
Order No.	2556380000	TERMSERIES, Cross-connector
GTIN (EAN)	4050118566697	
Qty.	10 pc(s).	
Type	TCC 12.8/26 BL	Version
Order No.	2556460000	TERMSERIES, Cross-connector
GTIN (EAN)	4050118566970	
Qty.	10 pc(s).	
Type	TCC 6.4/51 RD	Version
Order No.	2556410000	TERMSERIES, Cross-connector
GTIN (EAN)	4050118566925	
Qty.	10 pc(s).	
Type	TCC 6.4/10 BL	Version
Order No.	2556440000	TERMSERIES, Cross-connector
GTIN (EAN)	4050118566956	
Qty.	10 pc(s).	

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Weidmüller

TRS 230VAC RC 1CO

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Accessories

Blank



WS markers are the perfect match for the W-series connectors. Thanks to their system compatibility, the WS tags can also be used with the I-series and the Z-series. The large marking surfaces do not only permit long character strings but also multi-line text.
WS markers are ideal for labels with long, customised character strings. Thanks to the proven MultiCard format, printing with PrintJet CONNECT oder/or Plotter is possible.
- Can be fitted in strips or individually
- Markers in proven MultiCard format

For custom printing: Please send us a file of our labeling software M-Print PRO or M-Print PRO Online (without installation) for your labeling specifications.

General ordering data

Type	WS 10/6 M MC NE WS	Version
Order No.	1818400000	WS, Terminal marker, 10 x 6 mm, Pitch in mm (P): 6.00 Weidmueller,
GTIN (EAN)	4032248310876	Allen-Bradley, white
Qty.	600 pc(s).	

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Weidmüller

TRS 230VAC RC 1CO

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Accessories

Partition plate



Versatile separation plates
Separation plates can be used to group together signals visually, to electrically
isolate modules and to insert markings for a better overview. This makes
them a particularly versatile accessory. Separation plates increase the
clearance and creepage distances between two modules, thus increasing
the rated insulation voltage between two modules to up to 600 V. Double
separation plates can be marked with WAD5 or WS10/5 markers and
enable continuous cross-connections. Installation is made easier with the
perforations to individually break out the cross-connection channels.

- Partition plates visually separates groups from each other
- Indentations for individual breaking out the crosscconnection channels
- Partition plates isolates between two modules by increasing the clearance and creepage distances of up to 600 V

General ordering data

Type	TW TXS/TXZ R3.2	Version
Order No.	1240800000	TERMSERIES, Partition plate
GTIN (EAN)	4050118028188	
Qty.	10 pc(s).	

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Weidmüller

TRS 230VAC RC 1CO

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Accessories

Supply module



Space-saving supply modules
Our supply terminals enable potentials to be fed at the input – e.g.
neutral or minus potentials – or switched potentials to be fed at the output. In
conjunction with precisely fitting cross-connections from the TEMRSERIES,
the connections for the cables on the relay module remain free for actuators
or sensors. No additional feed-through terminal blocks are required, resulting
in huge space savings in the panel. At the same time, the wiring is simplified
as no double wire-end ferrules are required for the potential feed.

General ordering data

Type	TXZ SUPPLY	Version
Order No.	1240790000	TERMSERIES, Supply module, Number of contacts: 5, , Continuous
GTIN (EAN)	4050118028164	current: 10 A, Tension-clamp connection
Qty.	10 pc(s).	
Type	TXP SUPPLY	Version
Order No.	2618940000	TERMSERIES, Supply module, Number of contacts: 5, , Continuous
GTIN (EAN)	4050118667592	current: 10 A, PUSH IN
Qty.	10 pc(s).	
Type	TXS SUPPLY	Version
Order No.	1240780000	TERMSERIES, Supply module, Number of contacts: 5, , Continuous
GTIN (EAN)	4050118028140	current: 10 A, Screw connection
Qty.	10 pc(s).	

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TRS 230VAC RC 1CO

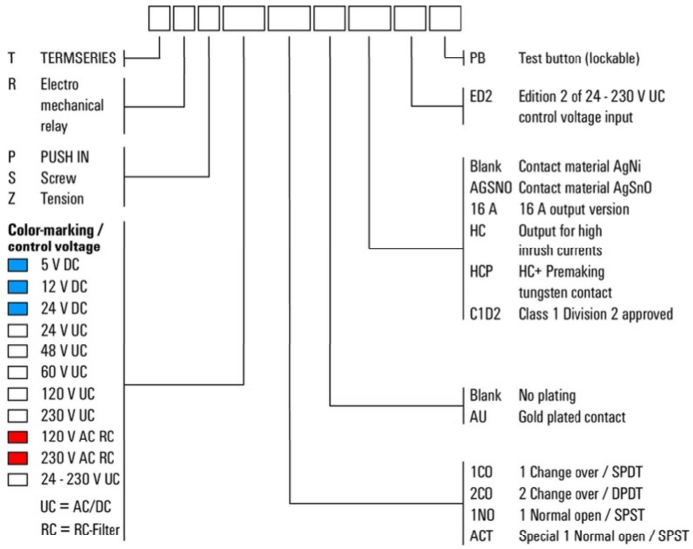
Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Drawings

Miscellaneous

Type code TERMSERIES electromechanical relay versions



Type codes

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1.43 WEIDMULLER INTERFACE RELAY TRS 24VDC 1CO DATA SHEET

Data sheet

Weidmüller

TRS 24VDC 1CO

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Product image





- 1 CO contact
- Contact material: AgNi
- Unique multi-voltage input from 24 to 230 V UC
- Input voltages from 5 V DC to 230 V UC with coloured marking: AC: red, DC: blue, UC: white

General ordering data

Version	TERMSERIES, Relay module, Number of contacts: 1, CO contact AgNi, Rated control voltage: 24 V DC ±20 %, Continuous current: 6 A, Screw connection, Test button available: No
Order No.	1122770000
Type	TRS 24VDC 1CO
GTIN (EAN)	4032248904808
Qty.	10 pc(s).

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Weidmüller

TRS 24VDC 1CO

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Technical data

Dimensions and weights

Depth	87.8 mm	Depth (inches)	3.457 inch
Height	89.6 mm	Height (inches)	3.528 inch
Width	6.4 mm	Width (inches)	0.252 inch
Net weight	33 g		

Temperatures

Storage temperature	-40 °C...85 °C	Operating temperature	-40 °C...60 °C
Humidity	5-95% relative humidity, T_u = 40°C, without condensation		

Rated data UL

Ambient temperature (operational), max.	60 °C	Connection cross-section AWG, min.	AWG 26
Connection cross-section AWG, max.	AWG 14	Type of conductor	rigid copper conductor, flexible copper conductor
Tightening torque, max.	0.4 Nm	Pollution severity level	2

Control side

Rated control voltage	24 V DC ±20 %	Rated current DC	11.5 mA
Power rating	280 mW	Status indicator	Green LED
Protective circuit	Free-wheeling diode, Reverse polarity protection	Coil voltage of the replacement relay deviating from the rated control voltage	No
Coil voltage of the replacement relay	24 V DC		

Load side

Rated switching voltage	250 V AC	Continuous current	6 A
Max. switching frequency at rated load	0.1 Hz	Max. switching voltage, AC	250 V
Max. switching voltage, DC	250 V	Inrush current	20 A / 20 ms
AC switching capacity (resistive), max.	1500 VA	DC switching capacity (resistive), max.	144 W @ 24 V
Switch-on delay	≤ 6 ms	Switch-off delay	≤ 16 ms
Contact type	1 CO contact (AgNi)	Mechanical service life	5 x 10^6 switching cycles
Min. switching power	1 mA @ 24 V, 10 mA @ 12 V, 100 mA @ 5 V		

General data

Operating altitude	≤ 2000 m, above sea level	
Rail	TS 35	
Test button available	No	
Mechanical switch position indicator	No	
Colour	black	
UL94 flammability rating component	Component	Housing
	UL94 flammability rating	V-0
	Component	Retaining clip
	UL94 flammability rating	V-0

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Weidmüller

Data sheet

TRS 24VDC 1CO

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Technical data

Insulation coordination

Rated voltage	300 V	Pollution severity	2
Surge voltage category	III	Clearance and creepage distances for control side - load side	≥ 6 mm
Dielectric strength for control side - load side	4 kV_{eff} / 1 Min.	Type of isolation at input and output	reinforced insulation
Dielectric strength of open contact	1 kV_{eff} / 1 min	Dielectric strength to mounting rail	4 kV_{eff} / 1 Min.
Impulse withstand voltage	6 kV (1.2/50 µs)	Protection degree	IP20

Further details of approvals / standards

Certificate No. (DNV)	TAA00001E5	Certificate no. (cULus)	E141197

Connection data

Wire connection method	Screw connection	Stripping length, rated connection	8 mm
Tightening torque, max.	0.4 Nm	Clamping range, rated connection	1.5 mm²
Clamping range, min.	0.14 mm²	Clamping range, max.	2.5 mm²
Wire connection cross section AWG, min.	AWG 26	Wire connection cross section AWG, max.	AWG 14
Wire cross-section, solid, min.	0.14 mm²	Wire cross-section, solid, max.	2.5 mm²
Wire cross-section, solid, min. (AWG)	AWG 26	Wire cross-section, solid, max. (AWG)	AWG 14
Wire connection cross section, finely stranded, min.	0.14 mm²	Wire connection cross section, finely stranded, max.	2.5 mm²
Wire cross-section, finely stranded, min. (AWG)	AWG 26	Wire cross-section, finely stranded, max. (AWG)	AWG 16
Wire connection cross-section, finely stranded with wire-end ferrules DIN 46228/4, min.	0.25 mm²	Wire connection cross-section, finely stranded with wire-end ferrules DIN 46228/4, max.	2.5 mm²
Conductor cross-section, flexible, AEH (DIN 46228-1), min.	0.25 mm²	Conductor cross-section, flexible, AEH (DIN 46228-1), max.	1.5 mm²
Wire connection cross section, finely stranded, two clampable wires, min.	0.5 mm²	Wire cross-section, finely stranded, two clampable wires, max.	1 mm²
Blade size	SD 0.6 x 3.5		

Classifications

ETIM 6.0	EC001437	ETIM 7.0	EC001437
ETIM 8.0	EC001437	ETIM 9.0	EC001437
ECLASS 9.0	27-37-16-01	ECLASS 9.1	27-37-16-01
ECLASS 10.0	27-37-16-01	ECLASS 11.0	27-37-16-01
ECLASS 12.0	27-37-16-01	ECLASS 13.0	27-37-16-01
ECLASS 14.0	27-37-16-01		

Environmental Product Compliance

RoHS Compliance Status	Compliant with exemption
RoHS Exemption (if applicable/known)	7a, 7cI
REACH SVHC	Lead 7439-92-1
SCIP	9e2cbc49-76d9-4611-b8ec-5b4f549a0aa9

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Data sheet

Weidmüller

TRS 24VDC 1CO

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Technical data

Approvals

Approvals	
ROHS	Conform
UL File Number Search	UL Website
Certificate no. (cULus)	E141197

Downloads

Approval/Certificate/Document of Conformity	EU Konformitätserklärung / EU Declaration of Conformity
Engineering Data	CAD data – STEP
User Documentation	Beipackzettel / Package Insert – multilingual FL_TERMSERIES_RSS1COAgNi_LOAD_GUIDE
Catalogues	Catalogues in PDF-format
Brochures	

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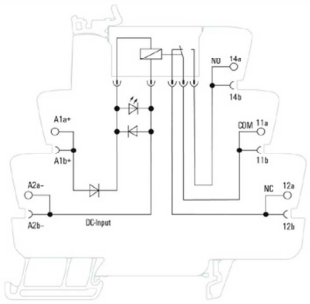
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Klingenbergstraße 26
D-32758 Detmold
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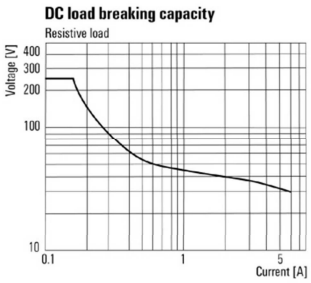
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Drawings

Wiring diagram

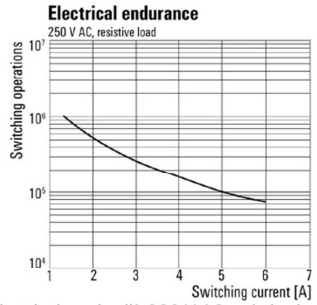


Graph



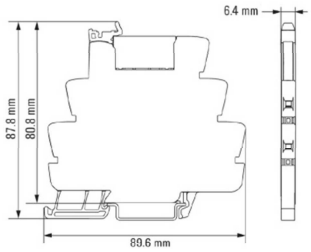
DC load limit curve
Resistive load

Graph



Electrical service life230 V AC resistive load
230 V AC resistive load

Dimensional drawing



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TRS 24VDC 1CO

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Accessories

Slotted screwdriver



Slotted screwdriver with rounded blade SD DIN 5265, ISO 2380/2, output to DIN 5264, ISO 2380/1. ChromTop tip, SoftFinish grip

General ordering data

Type	SDS 0.6X3.5X100	Version
Order No.	2749340000	Screwdriver, Blade width (B): 3.5 mm, Blade length: 100 mm, Blade thickness (A): 0.6 mm
GTIN (EAN)	4050118895568	
Qty.	1 pc(s).	

WS 12/6



WS/ DEK
MultiMark terminal markers use an innovative composite material made from two components. The hard base contour of the marker snaps securely into the connector. The elastic surface finish makes the marker easy to mount. This specially punched material enables the strips to be stretched to accommodate the slight variations in spacing that tend to add up, especially with long terminal blocks. Another advantage: the excellent printability of the surface material guarantees durable and wear-resistant labelling. A print resolution of 300 dpi also produces a very legible script.
Your benefits with MultiMark

- Firm hold and durable printing
- Continuous strips save installation time
- Easy mounting thanks to an innovative composite material
- Large label field for optimal legibility
- High flexibility thanks to manufacturer independence

General ordering data

Type	WS 12/6 MM WS	Version
Order No.	2007200000	WS, Terminal marker, 12 x 6 mm, Weidmueller, white
GTIN (EAN)	4050118391886	
Qty.	600 pc(s).	

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TRS 24VDC 1CO

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
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Germany

www.weidmueller.com

Accessories

Slotted screwdriver



VDE insulated screwdriver sets, for working on live parts up to 1000 V AC and 1500 V DC, DIN EN 60900. IEC 900. Each piece is "GS" safety tested. Blade made from fully hardened, high-alloy chromium-vanadium-molybdenum steel, gun-metal finish.

General ordering data

Type	SDIS SLIM 0.6X3.5X100	Version
Order No.	2749610000	Mounting tool, Blade width (B): 3.5 mm, Blade length: 100 mm, Blade
GTIN (EAN)	4050118896350	thickness (A): 0.6 mm
Qty.	1 pc(s).	

Cross-connections



Adjustable cross-connections
Increase the flexibility of your cross-connections. The TERMSERIES CROSS-CONNECTION (TCC) enables individually adjustable cross-connections with up to 51 poles. The maximum number of pluggable poles has been increased to 32 poles. The strip material can be shortened to the required length very easily. The cross-connectors convince thanks to their easy handling and visibility as well as their universal connection possibilities. An additional web prevents the spring from deforming during assembly.

- Individually adjustable cross-connection with 51 poles
- Additional bar to avoid deformation of the spring
- Increased cross-connection – up to 32 poles possible
- Vibration resistance

General ordering data

Type	TCC 6.4/51 OR	Version
Order No.	2556370000	TERMSERIES, Cross-connector
GTIN (EAN)	4050118566680	
Qty.	10 pc(s).	
Type	TCC 6.4/2 BL	Version
Order No.	2556430000	TERMSERIES, Cross-connector
GTIN (EAN)	4050118566949	
Qty.	10 pc(s).	
Type	TCC 6.4/2 RD	Version
Order No.	2556390000	TERMSERIES, Cross-connector
GTIN (EAN)	4050118566901	
Qty.	10 pc(s).	
Type	TCC 6.4/2 OR	Version
Order No.	2556350000	TERMSERIES, Cross-connector
GTIN (EAN)	4050118566826	
Qty.	10 pc(s).	

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TRS 24VDC 1CO

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Accessories

Type	TCC 6.4/51 BK	Version
Order No.	2556490000	TERMSERIES, Cross-connector
GTIN (EAN)	4050118567007	
Qty.	10 pc(s).	
Type	TCC 6.4/51 BL	Version
Order No.	2556450000	TERMSERIES, Cross-connector
GTIN (EAN)	4050118566963	
Qty.	10 pc(s).	
Type	TCC 12.8/26 RD	Version
Order No.	2556420000	TERMSERIES, Cross-connector
GTIN (EAN)	4050118566932	
Qty.	10 pc(s).	
Type	TCC 12.8/26 BK	Version
Order No.	2556500000	TERMSERIES, Cross-connector
GTIN (EAN)	4050118567014	
Qty.	10 pc(s).	
Type	TCC 6.4/10 BK	Version
Order No.	2556480000	TERMSERIES, Cross-connector
GTIN (EAN)	4050118566994	
Qty.	10 pc(s).	
Type	TCC 6.4/2 BK	Version
Order No.	2556470000	TERMSERIES, Cross-connector
GTIN (EAN)	4050118566987	
Qty.	10 pc(s).	
Type	TCC 6.4/10 RD	Version
Order No.	2556400000	TERMSERIES, Cross-connector
GTIN (EAN)	4050118566918	
Qty.	10 pc(s).	
Type	TCC 6.4/10 OR	Version
Order No.	2556360000	TERMSERIES, Cross-connector
GTIN (EAN)	4050118566673	
Qty.	10 pc(s).	
Type	TCC 12.8/26 OR	Version
Order No.	2556380000	TERMSERIES, Cross-connector
GTIN (EAN)	4050118566697	
Qty.	10 pc(s).	
Type	TCC 12.8/26 BL	Version
Order No.	2556460000	TERMSERIES, Cross-connector
GTIN (EAN)	4050118566970	
Qty.	10 pc(s).	
Type	TCC 6.4/51 RD	Version
Order No.	2556410000	TERMSERIES, Cross-connector
GTIN (EAN)	4050118566925	
Qty.	10 pc(s).	
Type	TCC 6.4/10 BL	Version
Order No.	2556440000	TERMSERIES, Cross-connector
GTIN (EAN)	4050118566956	
Qty.	10 pc(s).	

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Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Accessories

TERMSERIES interface adapter



Faster signal wiring with less space
To reduce wiring times, pre-assembled cables are used between the control system and the interface level and are simply connected to the TERMSERIES adapter. This enables throughput times in electrical cabinet building to be significantly reduced. The adapter has a universal fit and offers a genuine space advantage in interaction with the TERMSERIES products with identical contours.

- Reduced wiring time due to plug-and-play concept with pre-assembled cables
- Can be applied to the input and output sides of the TERMSERIES
- Ready for plus and minus switching logic
- High space-saving due to universal fit to other TERMSERIES products

General ordering data

Type	TIAL F20	Version
Order No.	1463550000	TERMSERIES, Adapter, 20-pole plug according to DIN EN 60603-13,
GTIN (EAN)	4050118331783	long locking lever, Number of signal paths: 16, Rated voltage DC : 24
Qty.	1 pc(s).	V, Rated current (per signal path): 60 mA
Type	TIA F10	Version
Order No.	1463520000	TERMSERIES, Adapter, 10-pole plug according to DIN EN 60603-13,
GTIN (EAN)	4050118323535	long locking lever, Number of signal paths: 8, Rated voltage DC : 24 V,
Qty.	1 pc(s).	Rated current (per signal path): 125 mA
Type	TIA SUBD 15S	Version
Order No.	1463530000	TERMSERIES, Adapter, Sub-D, 15-pole, DIN 41652 / IEC 60807,
GTIN (EAN)	4050118323542	Number of signal paths: 8, Rated voltage DC : 24 V, Rated current (per
Qty.	1 pc(s).	signal path): 125 mA

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Weidmüller

TRS 24VDC 1CO

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Accessories

Blank



WS markers are the perfect match for the W-series connectors. Thanks to their system compatibility, the WS tags can also be used with the I-series and the Z-series. The large marking surfaces do not only permit long character strings but also multi-line text.
WS markers are ideal for labels with long, customised character strings. Thanks to the proven MultiCard format, printing with PrintJet CONNECT oder/or Plotter is possible.

- Can be fitted in strips or individually
- Markers in proven MultiCard format

For custom printing: Please send us a file of our labeling software M-Print PRO or M-Print PRO Online (without installation) for your labeling specifications.

General ordering data

Type	WS 10/6 M MC NE WS	Version
Order No.	1818400000	WS, Terminal marker, 10 x 6 mm, Pitch in mm (P): 6.00 Weidmueller,
GTIN (EAN)	4032248310876	Allen-Bradley, white
Qty.	600 pc(s).	

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Weidmüller

TRS 24VDC 1CO

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Klingenbergstraße 26
D-32758 Detmold
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www.weidmueller.com

Accessories

Partition plate



Versatile separation plates
Separation plates can be used to group together signals visually, to electrically
isolate modules and to insert markings for a better overview. This makes
them a particularly versatile accessory. Separation plates increase the
clearance and creepage distances between two modules, thus increasing
the rated insulation voltage between two modules to up to 600 V. Double
separation plates can be marked with WAD5 or WS10/5 markers and
enable continuous cross-connections. Installation is made easier with the
perforations to individually break out the cross-connection channels.

- Partition plates visually separates groups from each other
- Indentations for individual breaking out the crosscconnection channels
- Partition plates isolates between two modules by increasing the clearance and creepage distances of up to 600 V

General ordering data

Type	TW TXS/TXZ R3.2	Version
Order No.	1240800000	TERMSERIES, Partition plate
GTIN (EAN)	4050118028188	
Qty.	10 pc(s).	

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D-32758 Detmold
Germany

www.weidmueller.com

Accessories

Supply module



Space-saving supply modules
Our supply terminals enable potentials to be fed at the input – e.g.
neutral or minus potentials – or switched potentials to be fed at the output. In
conjunction with precisely fitting cross-connections from the TEMRSERIES,
the connections for the cables on the relay module remain free for actuators
or sensors. No additional feed-through terminal blocks are required, resulting
in huge space savings in the panel. At the same time, the wiring is simplified
as no double wire-end ferrules are required for the potential feed.

General ordering data

Type	TXZ SUPPLY	Version
Order No.	1240790000	TERMSERIES, Supply module, Number of contacts: 5, , Continuous
GTIN (EAN)	4050118028164	current: 10 A, Tension-clamp connection
Qty.	10 pc(s).	
Type	TXP SUPPLY	Version
Order No.	2618940000	TERMSERIES, Supply module, Number of contacts: 5, , Continuous
GTIN (EAN)	4050118667592	current: 10 A, PUSH IN
Qty.	10 pc(s).	
Type	TXS SUPPLY	Version
Order No.	1240780000	TERMSERIES, Supply module, Number of contacts: 5, , Continuous
GTIN (EAN)	4050118028140	current: 10 A, Screw connection
Qty.	10 pc(s).	

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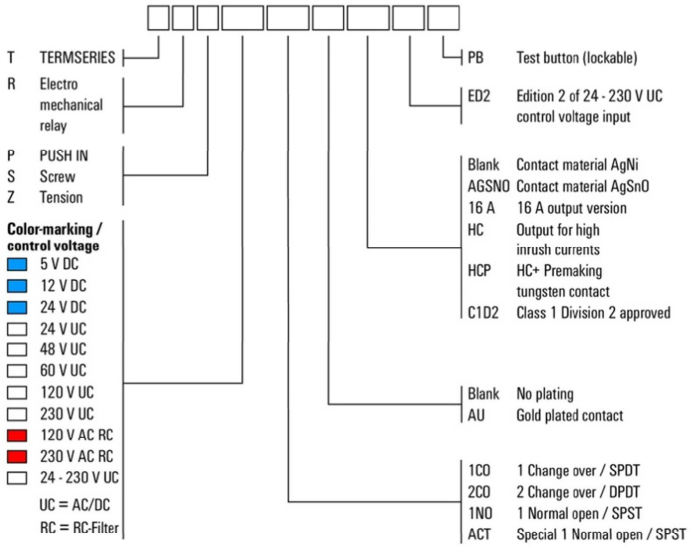
Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Drawings

Miscellaneous

Type code TERMSERIES electromechanical relay versions



Type codes

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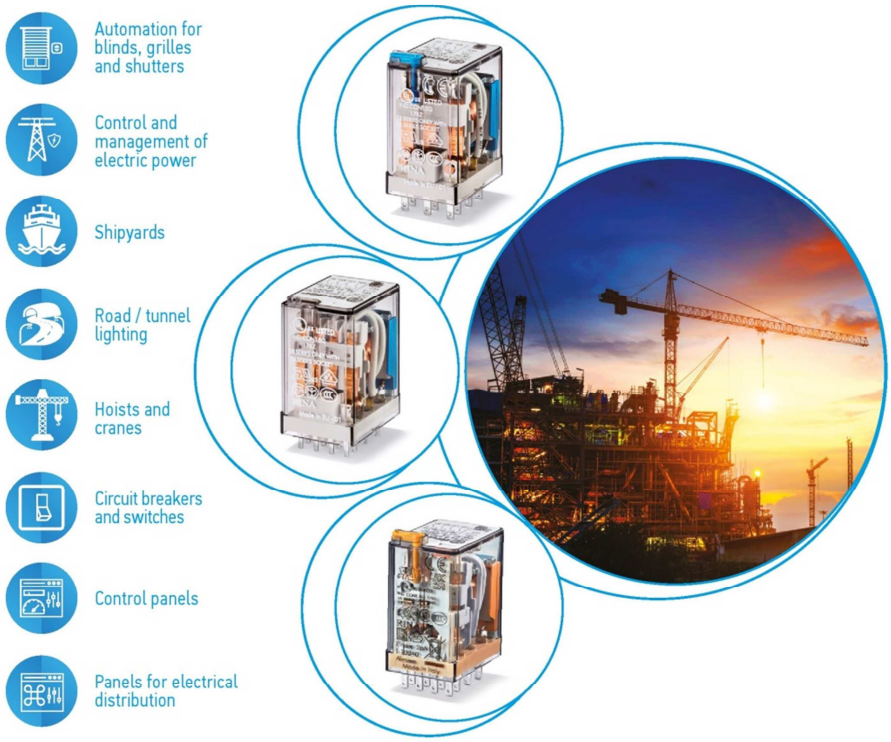
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1.44 FINDER POWER RELAY 55 DATA SHEET

finder
SWITCH TO THE FUTURE

55
SERIES

General purpose relays
7 - 10 A



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55 SERIES
General purpose relays 7 to 10 A

finder

55 SERIES

A

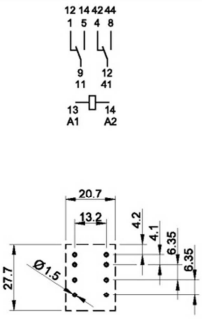
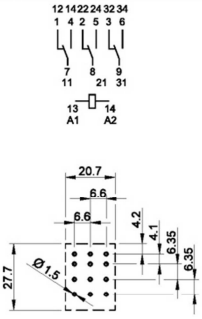
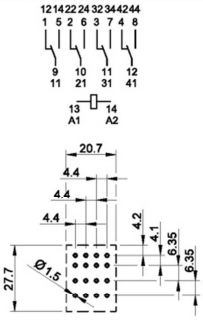
General purpose relays
For printed circuit mounting

Type 55.12
- 2 CO 10 A

Type 55.13
- 3 CO 10 A

Type 55.14
- 4 CO 7 A

- AC & DC coils
- Cadmium Free contacts
- Contact material options
- RT III (wash tight) option available

	55.12	55.13	55.14
			
	• 2 CO 10 A • PCB mount	• 3 CO 10 A • PCB mount	• 4 CO 7 A • PCB mount
			
FOR UL RATINGS SEE: "General technical information" page V			
For outline drawing see page 7	Copper side view	Copper side view	Copper side view
Contact specification			
Contact configuration	2 CO (DPDT)	3 CO (3PDT)	4 CO (4PDT)
Rated current/Maximum peak current A	10/20	10/20	7/15
Rated voltage/ Maximum switching voltage V AC	250/400	250/400	250/250
Rated load AC1 VA	2500	2500	1750
Rated load AC15 (230 V AC) VA	500	500	350
Single phase motor rating (230 V AC) kW	0.55	0.55	0.24
Breaking capacity DC1: 24/110/220 V A	10/0.5/0.25	10/0.5/0.25	7/0.5/0.25
Minimum switching load mW (V/mA)	300 (5/5)	300 (5/5)	300 (5/5)
Standard contact material	AgNi	AgNi	AgNi
Coil specification			
Nominal voltage (U_N) V AC (50/60 Hz)	6 - 12 - 24 - 48 - 60 - 110 - 120 - 230 - 240		
V DC	6 - 12 - 24 - 48 - 60 - 110 -125 - 220		
Rated power AC/DC VA (50 Hz)/W	1.5/1	1.5/1	1.5/1
Operating range AC	$(0.8...1.1)U_N$	$(0.8...1.1)U_N$	$(0.8...1.1)U_N$
DC	$(0.8...1.1)U_N$	$(0.8...1.1)U_N$	$(0.8...1.1)U_N$
Holding voltage AC/DC	$0.8\ U_N / 0.5\ U_N$	$0.8\ U_N / 0.5\ U_N$	$0.8\ U_N / 0.5\ U_N$
Must drop-out voltage AC/DC	$0.2\ U_N / 0.1\ U_N$	$0.2\ U_N / 0.1\ U_N$	$0.2\ U_N / 0.1\ U_N$
Technical data			
Mechanical life AC/DC cycles	$20 \cdot 10^6 / 50 \cdot 10^6$	$20 \cdot 10^6 / 50 \cdot 10^6$	$20 \cdot 10^6 / 50 \cdot 10^6$
Electrical life at rated load AC1 cycles	$200 \cdot 10^3$	$200 \cdot 10^3$	$150 \cdot 10^3$
Operate/release time ms	10/5	9/5	9/5
Insulation between coil and contacts (1.2/50 µs) kV	4	4	4
Dielectric strength between open contacts V AC	1000	1000	1000
Ambient temperature range °C	–40...+85	–40...+85	–40...+85
Environmental protection	RT I	RT I	RT I
Approvals (according to type)			

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55 SERIES

55 SERIES
General purpose relays 7 to 10 A

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General purpose relays
For socket mounting

Type 55.32
- 2 CO 10 A

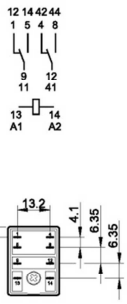
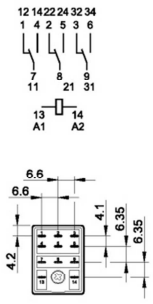
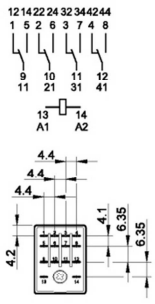
Type 55.33
- 3 CO 10 A

Type 55.34
- 4 CO 7 A

- AC & DC coils
- Lockable test button and mechanical flag indicator as standard on 2 & 4 pole types
- Integral LED and coil suppression options
- 94 series sockets for PCB or 35 mm rail mounting (EN 60715) with Screw, Screwless or Push-in terminals
- Coil Indication and EMC suppression modules 99 series and Timer module 86.30 options
- Optional alternative mounting adaptors
- UL Listing (certain relay/socket combinations)
- Cadmium Free contacts
- Contact material options
- European Patent

For UL ratings see: "General technical information" page V

For outline drawing see page 7

		55.32	55.33	55.34
				
		• 2 CO 10 A • Plug-in 94 series sockets	• 3 CO 10 A • Plug-in 94 series sockets	• 4 CO 7 A • Plug-in 94 series sockets
				
Contact specification				
Contact configuration		2 CO (DPDT)	3 CO (3PDT)	4 CO (4PDT)
Rated current/Maximum peak current	A	10/20	10/20	7/15
Rated voltage/ Maximum switching voltage	V AC	250/400	250/400	250/250
Rated load AC1	VA	2500	2500	1750
Rated load AC15 (230 V AC)	VA	500	500	350
Single phase motor rating (230 V AC)	kW	0.55	0.55	0.24
Breaking capacity DC1: 24/110/220 V	A	10/0.5/0.25	10/0.5/0.25	7/0.5/0.25
Minimum switching load	mW (V/mA)	300 (5/5)	300 (5/5)	300 (5/5)
Standard contact material		AgNi	AgNi	AgNi
Coil specification				
Nominal voltage (U_N)	V AC (50/60 Hz)	6 - 12 - 24 - 48 - 60 - 110 - 120 - 230 - 240		
	V DC	6 - 12 - 24 - 48 - 60 - 110 -125 - 220		
Rated power AC/DC	VA (50 Hz)/W	1.5/1	1.5/1	1.5/1
Operating range	AC	$(0.8…1.1)U_N$	$(0.8…1.1)U_N$	$(0.8…1.1)U_N$
	DC	$(0.8…1.1)U_N$	$(0.8…1.1)U_N$	$(0.8…1.1)U_N$
Holding voltage	AC/DC	$0.8\ U_N$ / $0.5\ U_N$	$0.8\ U_N$ / $0.5\ U_N$	$0.8\ U_N$ / $0.5\ U_N$
Must drop-out voltage	AC/DC	$0.2\ U_N$ / $0.1\ U_N$	$0.2\ U_N$ / $0.1\ U_N$	$0.2\ U_N$ / $0.1\ U_N$
Technical data				
Mechanical life AC/DC	cycles	$20 \cdot 10^6$ / $50 \cdot 10^6$	$20 \cdot 10^6$ / $50 \cdot 10^6$	$20 \cdot 10^6$ / $50 \cdot 10^6$
Electrical life at rated load AC1	cycles	$200 \cdot 10^3$	$200 \cdot 10^3$	$150 \cdot 10^3$
Operate/release time	ms	10/5	9/5	9/5
Insulation between coil and contacts (1.2/50 µs)	kV	4	4	4
Dielectric strength between open contacts	V AC	1000	1000	1000
Ambient temperature range	°C	–40…+85	–40…+85	–40…+85
Environmental protection		RT I	RT I	RT I
Approvals (according to type)				

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55 SERIES
General purpose relays 7 to 10 A

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55 SERIES

A

Ordering information

Example: 55 series plug-in relay, 4 CO, 12 V DC coil, lockable test button and mechanical indicator.

								A	B	C	D
5	5	.	3	4	.	9	.	0 1 2	.	0	4	0

Series

Type
1 = PCB
3 = Plug-in

No. of poles
2 = 2 pole, 10 A
3 = 3 pole, 10 A
4 = 4 pole, 7 A

Coil version
8 = AC (50/60 Hz)
9 = DC

Coil voltage
See coil specifications

A: Contact material
0 = Standard AgNi
5 = AgNi + Au

B: Contact circuit
0 = CO (nPDT)

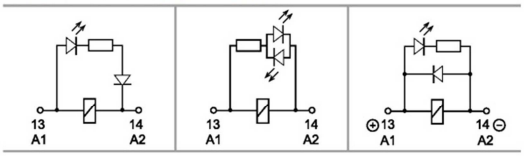
D: Special versions
0 = Standard
1 = Wash tight (RT III) for 55.12, 55.13 and 55.14 only

C: Options
0 = None
1 = Lockable test button
2 = Mechanical indicator
3 = LED (AC)
4 = Lockable test button + mechanical indicator
5 = Lockable test button + LED (AC)
54 = Lockable test button + LED (AC) + mechanical indicator
6* = Double LED (DC non-polarized)
7* = Lockable test button + double LED (DC non-polarized)
74* = Lockable test button + double LED (DC non-polarized) + mechanical indicator
8* = LED + diode (DC, polarity positive to pin A1/13)
9* = Lockable test button + LED + diode (DC, polarity positive to pin A1/13)
94* = Lockable test button + LED + diode (DC, polarity positive to pin A1/13) + mechanical indicator
* Options not available for 220 V DC versions.

Selecting features and options: only combinations in the same row are possible.
Preferred selections for best availability are shown in **bold**.

Type	Coil version	A	B	C	D
55.32/34	AC - DC	0 - 5	0	0	0
	AC	**0** - 5	**0**	2 - 3 - **4** - 5	**0**
	AC	0 - 5	0	54	/
	DC	**0** - 5	**0**	2 - **4** - 6 - 7 - 8 - 9	**0**
	DC	0 - 5	0	74 - 94	/
55.33	AC - DC	**0** - 5	**0**	**0**	**0**
	AC	0 - 5	0	1 - 3 - 5	0
	DC	0 - 5	0	1 - 6 - 7 - 8 - 9	0
55.12/13/14	AC - DC	**0** - 5	**0**	**0**	**0** - 1

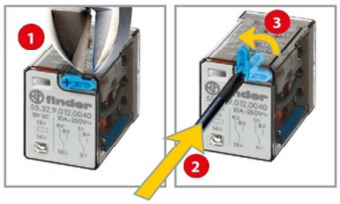
Descriptions: options and special versions



C: Option 3, 5, 54
LED (AC)

C: Option 6, 7, 74
Double LED
(DC non-polarized)

C: Option 8, 9, 94
LED + diode (DC, polarity positive to pin A1/13)



Lockable test button and mechanical flag indicator (0010, 0040, 0050, 0054, 0070, 0074, 0090, 0094)

The dual-purpose Finder test button can be used in two ways:
Case 1) The plastic pip (located directly above the test button) remains intact. In this case, when the test button is pushed, the contacts operate. When the test button is released the contacts return to their former state.
Case 2) The plastic pip is broken-off (using an appropriate cutting tool). In this case, (in addition to the above function), when the test button is pushed and rotated, the contacts are latched in the operating state, and remain so until the test button is rotated back to its former position.
In both cases ensure that the test button actuation is swift and decisive.

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55 SERIES

55 SERIES
General purpose relays 7 to 10 A

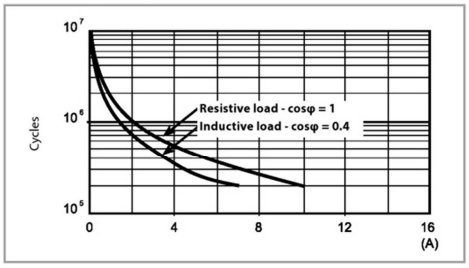
finder

Technical data

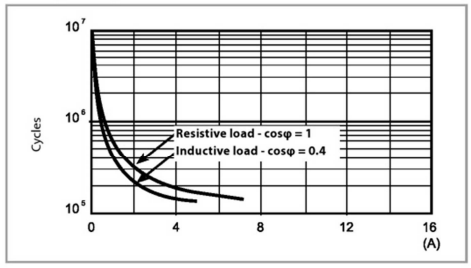
A	**Insulation according to EN 61810-1**			**2 pole - 3 pole**	**4 pole**
	Nominal voltage of supply system		V AC	230/400	230
	Rated insulation voltage		V AC	400	250
	Pollution degree			2	2
	Insulation between coil and contact set				
	Type of Insulation			Basic	Basic
	Overvoltage category			III	III
	Rated impulse voltage		kV (1.2/50 µs)	4	4
	Dielectric strength		V AC	2000	2000
	Insulation between adjacent contacts				
	Type of insulation			Basic	Basic
	Overvoltage category			III	II
	Rated impulse voltage		kV (1.2/50 µs)	4	2.5
	Dielectric strength		V AC	2000	2000
	Insulation between open contacts				
	Type of disconnection			Micro-disconnection	Micro-disconnection
	Dielectric strength		V AC/kV (1.2/50 µs)	1000/1.5	1000/1.5
	Insulation between coil terminals				
	Rated impulse voltage (surge) differential mode (according to EN 61000-4-5)		kV (1.2/50 µs)	4	
	Other data				
	Bounce time: NO/NC		ms	1/4 (2 pole), 1/6 (3 pole), 2/4 (4 pole)	
	Vibration resistance (5…55)Hz: NO/NC		g	15/15	
	Shock resistance		g	16	
	Power lost to the environment	without contact current	W	1	
		with rated current	W	3 (2 pole)	4 (3 pole) / 3 (4 pole)
	Recommended distance between relays mounted on PCB		mm	≥ 5	

Contact specification

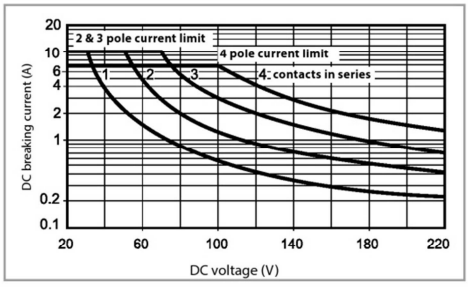
F 55 - Electrical life (AC) v contact current
2 and 3 pole relays



F 55 - Electrical life (AC) v contact current
4 pole relays



H 55 - Maximum DC1 breaking capacity



- When switching a resistive load (DC1) having voltage and current values under the curve, an electrical life of ≥ 100 · 10³ can be expected.
- In the case of DC13 loads, the connection of a diode in parallel with the load will permit a similar electrical life as for a DC1 load.
  Note: the release time of the load will be increased.

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55 SERIES
General purpose relays 7 to 10 A

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55 SERIES

A

Coil specifications

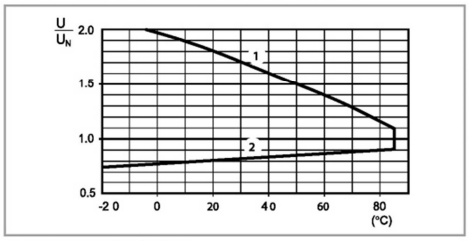
DC coil data

Nominal voltage U_N	Coil code	Operating range U_{min}	Operating range U_{max}	Resistance R	Rated coil consumption I at U_N
V		V	V	Ω	mA
6	**9**.006	4.8	6.6	40	150
12	**9**.012	9.6	13.2	140	86
24	**9**.024	19.2	26.4	600	40
48	**9**.048	38.4	52.8	2400	20
60	**9**.060	48	66	4000	15
110	**9**.110	88	121	12500	8.8
125	**9**.125	100	138	17300	7.2
220	**9**.220	176	242	54000	4

AC coil data

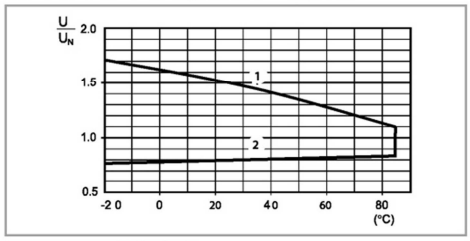
Nominal voltage U_N	Coil code	Operating range U_{min}	Operating range U_{max}	Resistance R	Rated coil consumption I at U_N
V		V	V	Ω	mA
6	**8**.006	4.8	6.6	12	200
12	**8**.012	9.6	13.2	50	97
24	**8**.024	19.2	26.4	190	53
48	**8**.048	38.4	52.8	770	25
60	**8**.060	48	66	1200	21
110	**8**.110	88	121	3940	12.5
120	**8**.120	96	132	4700	12
230	**8**.230	184	253	17000	6
240	**8**.240	192	264	19100	5.3

R 55 - DC coil operating range v ambient temperature



1 - Max. permitted coil voltage.
2 - Min. pick-up voltage with coil at ambient temperature.

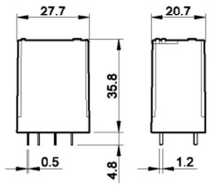
R 55 - AC coil operating range v ambient temperature



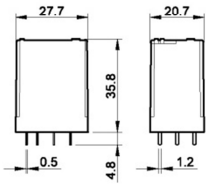
1 - Max. permitted coil voltage.
2 - Min. pick-up voltage with coil at ambient temperature.

Outline drawings

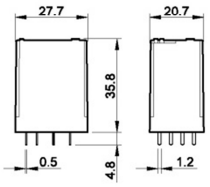
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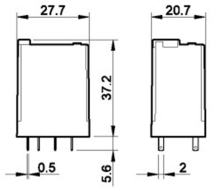
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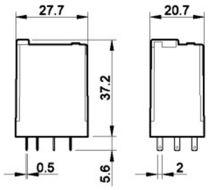
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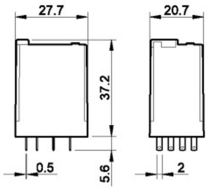
Type 55.32



Type 55.33



Type 55.34



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55 SERIES
General purpose relays 7 to 10 A

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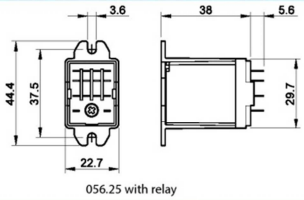
Accessories

A

Top flange mount adaptor for 55.32, 55.33, 55.34 — 056.25



056.25 056.25 with relay

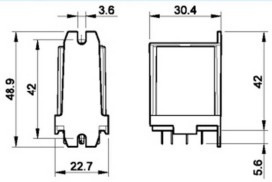


056.25 with relay

Rear flange mount adaptor for 55.32, 55.33, 55.34 — 056.26



056.26 056.26 with relay

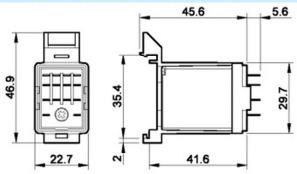


056.26 with relay

Top 35 mm rail (EN 60715) adaptor for 55.32, 55.33, 55.34 — 056.27



056.27 056.27 with relay



056.27 with relay

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94 SERIES
Socket overview for 55 series relays

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55 SERIES

A



94.P4
See page 10

Module	Socket	Relay	Description	Mounting	Accessories
99.02	94.P3	55.33	**Push-in terminal socket** - For fast cable connections - Top terminals - Contacts - Bottom terminals - Coil	Panel or 35 mm rail (EN 60715) mount	- Coil indication and EMC suppression modules - Jumper link - Timer modules - Plastic retaining and release clip
	94.P4	55.32 55.34			



94.04
See page 12

Module	Socket	Relay	Description	Mounting	Accessories
99.02	94.02	55.32	**Screw terminal (Box clamp) socket** - Top terminals - Contacts - Bottom terminals - Coil	Panel or 35 mm rail (EN 60715) mount	- Coil indication and EMC suppression modules - Jumper link - Timer modules - Plastic retaining and release clip
	94.03	55.33			
	94.04	55.32 55.34			



94.54
See page 13

Module	Socket	Relay	Description	Mounting	Accessories
99.02	94.54	55.32 55.34	**Screwless terminal socket** - Top terminals - Contacts - Bottom terminals - Coil	Panel or 35 mm rail (EN 60715) mount	- Coil indication and EMC suppression modules - Jumper link - Timer modules - Plastic retaining and release clip



94.84.2
See page 14

Module	Socket	Relay	Description	Mounting	Accessories
99.80	94.84.2	55.32 55.34	**Screw terminal (Box clamp) socket**	Panel or 35 mm rail (EN 60715) mount	- Coil indication and EMC suppression modules - Jumper link - Plastic retaining and release clip



94.94.3
See page 15

Module	Socket	Relay	Description	Mounting	Accessories
99.80	94.92.3	55.32	**Screw terminal (Box clamp) socket** - Top terminals - Contacts - Bottom terminals - Coil	Panel or 35 mm rail (EN 60715) mount	- Coil indication and EMC suppression modules - Jumper link - Plastic retaining and release clip
	94.94.3	55.32 55.34			



94.74
See page 16

Module	Socket	Relay	Description	Mounting	Accessories
99.01	94.72	55.32	**Screw terminal (Plate clamp) socket** For 94.82: - 23 mm wide for space saving	Panel or 35 mm rail (EN 60715) mount	- Coil indication and EMC suppression modules - Plastic retaining and release clip
	94.73	55.33			
	94.74	55.32 55.34			
	94.82	55.32			



94.14
See page 17

Module	Socket	Relay	Description	Mounting	Accessories
—	94.12	55.32	**PCB socket**	PCB mounting	- Metal retaining clip
—	94.13	55.33			
—	94.14	55.32 55.34			

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55 SERIES

94 SERIES
Sockets and accessories for 55 series relays

finder

A



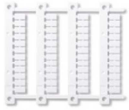
94.P4

Approvals (according to type):

Certain relay/socket combinations

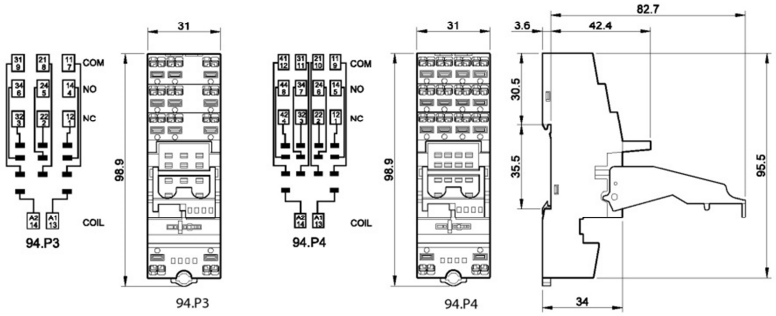


094.91.3



060.48

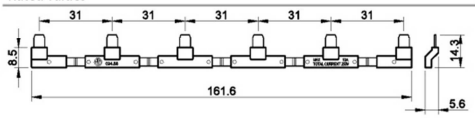
Push-in terminal socket panel or 35 mm (EN 60715) rail mount		**94.P3** **Blue**	**94.P4** **Blue**
For relay type		55.33	55.32, 55.34
Accessories			
Metal retaining clip		094.71	
Plastic retaining and release clip (supplied with socket - packaging code SPA)		094.91.3	
6-way jumper link		094.56	
Identification tag		095.00.4	
2-way jumper link		094.52.1	
2-way jumper link		097.52	
Marker tag holder		097.00	
Modules (see table below)		99.02	
Timer modules (see table below)		86.30	
Sheet of marker tags for plastic retaining and release clip 094.91.3 and for marker tag holder 097.00 , 48 tags, 6 x 12 mm for CEMBRE thermal transfer printers		060.48	
Technical data			
Rated values		10 A - 250 V	
Dielectric strength		2 kV AC	
Protection category		IP 20	
Ambient temperature	°C	–40…+70	
Wire strip length	mm	10	
Min. wire size for 94.P3 and 94.P4 sockets		solid wire	stranded wire
	mm²	0.5	0.5
	AWG	21	21
Max. wire size for 94.P3 and 94.P4 sockets		solid wire	stranded wire
	mm²	2 x 1.5 / 1 x 2.5	2 x 1.5 / 1 x 2.5
	AWG	2 x 16 / 1 x 14	2 x 16 / 1 x 14





094.56

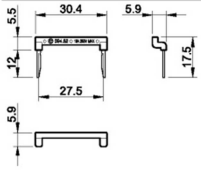
6-way jumper link for 94.P3 and 94.P4 sockets	094.56 (blue)
Rated values	10 A - 250 V





094.52.1

2-way jumper link for 94.P3 and 94.P4 sockets	094.52.1
Rated values	10 A - 250 V



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94 SERIES
Sockets and accessories for 55 series relays

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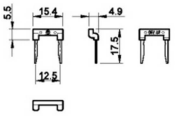
55 SERIES

A



097.52

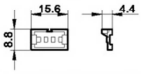
2-way jumper link for 94.P3 and 94.P4 sockets	097.52
Rated values	10 A - 250 V





097.00

Marker tag holder for 94.P3 and 94.P4 sockets	097.00





86.30

86 series timer modules	
(12…24)V AC/DC; Bi-function: AI, DI; (0.05 s…100 h)	86.30.0.024.0000
(110…125)V AC; Bi-function: AI, DI; (0.05 s…100 h)	86.30.8.120.0000
(230…240)V AC; Bi-function: AI, DI; (0.05 s…100 h)	86.30.8.240.0000

Approvals (according to type):



99.02

Approvals (according to type):

DC Modules with non-standard polarity (+A2) on request.

99.02 coil indication and EMC suppression modules for 94.P3 and 94.P4 sockets		
Diode (+A1, standard polarity)	(6…220)V DC	99.02.3.000.00
LED	(6…24)V DC/AC	99.02.0.024.59
LED	(28…60)V DC/AC	99.02.0.060.59
LED	(110…240)V DC/AC	99.02.0.230.59
LED + Diode (+A1, standard polarity)	(6…24)V DC	99.02.9.024.99
LED + Diode (+A1, standard polarity)	(28…60)V DC	99.02.9.060.99
LED + Diode (+A1, standard polarity)	(110…220)V DC	99.02.9.220.99
LED + Varistor	(6…24)V DC/AC	99.02.0.024.98
LED + Varistor	(28…60)V DC/AC	99.02.0.060.98
LED + Varistor	(110…240)V DC/AC	99.02.0.230.98
RC circuit	(6…24)V DC/AC	99.02.0.024.09
RC circuit	(28…60)V DC/AC	99.02.0.060.09
RC circuit	(110…240)V DC/AC	99.02.0.230.09
Residual current by-pass*	(110…240)V AC	99.02.8.230.07

*Additional 0.9 W power dissipation

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55 SERIES

94 SERIES
Sockets and accessories for 55 series relays

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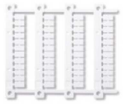
94.04

Approvals (according to type):

Certain relay/socket combinations

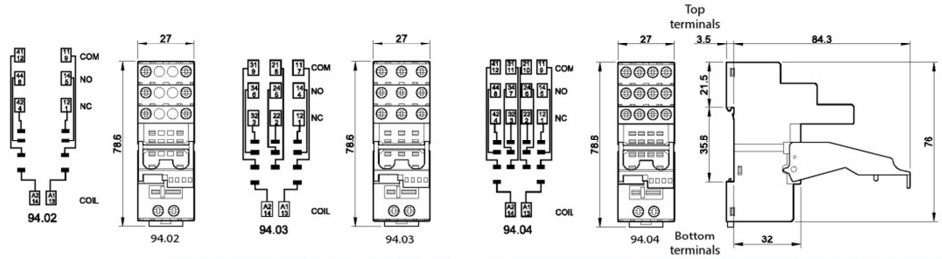


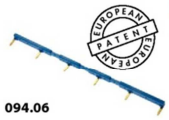
094.91.3



060.48

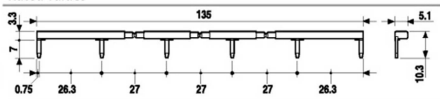
Screw terminal (Box clamp) socket panel or 35 mm (EN 60715) rail mount		**94.02 Blue**	**94.02.0 Black**	**94.03 Blue**	**94.03.0 Black**	**94.04 Blue**	**94.04.0 Black**
For relay type		55.32		55.33		55.32, 55.34	
Accessories							
Metal retaining clip		094.71					
Plastic retaining and release clip (supplied with socket - packaging code SPA)		094.91.3	094.91.30	094.91.3	094.91.30	094.91.3	094.91.30
6-way jumper link		094.06	094.06.0	094.06	094.06.0	094.06	094.06.0
Identification tag		094.00.4					
Marker tag holder		097.00					
Modules (see table below)		99.02					
Timer modules (see table below)		86.30					
Sheet of marker tags for plastic retaining and release clip 094.91.3 and for marker tag holder 097.00 , 48 tags, 6 x 12 mm for CEMBRE thermal transfer printers		060.48					
Technical data							
Rated values		10 A - 250 V					
Dielectric strength		2 kV AC					
Protection category		IP 20					
Ambient temperature	°C	–40…+70					
Screw torque	Nm	0.5					
Wire strip length	mm	8					
Max. wire size for 94.02/03/04 sockets		solid wire			stranded wire		
	mm²	1 x 6 / 2 x 2.5			1 x 4 / 2 x 2.5		
	AWG	1 x 10 / 2 x 14			1 x 12 / 2 x 14		





094.06

6-way jumper link for 94.02, 94.03 and 94.04 sockets	094.06 (blue)	094.06.0 (black)
Rated values	10 A - 250 V	





86.30

86 series timer modules	
(12…24)V AC/DC; Bi-function: AI, DI; (0.05 s…100 h)	86.30.0.024.0000
(110…125)V AC; Bi-function: AI, DI; (0.05 s…100 h)	86.30.8.120.0000
(230…240)V AC; Bi-function: AI, DI; (0.05 s…100 h)	86.30.8.240.0000

Approvals (according to type):



99.02

Approvals (according to type):

DC Modules with non-standard polarity (+A2) on request.

99.02 coil indication and EMC suppression modules for 94.02, 94.03 and 94.04 sockets		
Diode (+A1, standard polarity)	(6…220)V DC	99.02.3.000.00
LED	(6…24)V DC/AC	99.02.0.024.59
LED	(28…60)V DC/AC	99.02.0.060.59
LED	(110…240)V DC/AC	99.02.0.230.59
LED + Diode (+A1, standard polarity)	(6…24)V DC	99.02.9.024.99
LED + Diode (+A1, standard polarity)	(28…60)V DC	99.02.9.060.99
LED + Diode (+A1, standard polarity)	(110…220)V DC	99.02.9.220.99
LED + Varistor	(6…24)V DC/AC	99.02.0.024.98
LED + Varistor	(28…60)V DC/AC	99.02.0.060.98
LED + Varistor	(110…240)V DC/AC	99.02.0.230.98
RC circuit	(6…24)V DC/AC	99.02.0.024.09
RC circuit	(28…60)V DC/AC	99.02.0.060.09
RC circuit	(110…240)V DC/AC	99.02.0.230.09
Residual current by-pass*	(110…240)V AC	99.02.8.230.07

*Additional 0.9 W power dissipation

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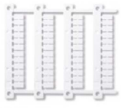


94.54

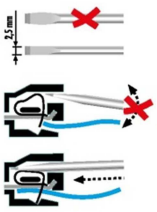
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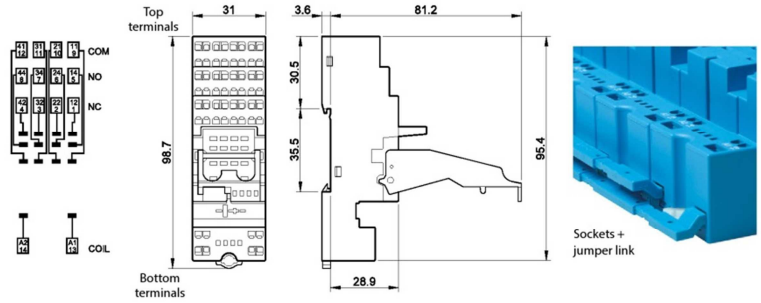
094.91.3

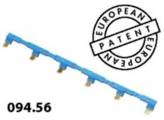


060.48



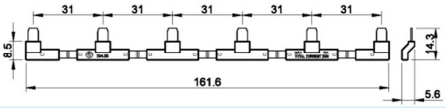
Screwless terminal socket 35 mm rail (EN 60715) mount		**94.54 (blue)**	
For relay type		55.32, 55.34	
Accessories			
Metal retaining clip		094.71	
Plastic retaining and release clip		094.91.3	
6-way jumper link		094.56	
Modules (see table below)		99.02, 86.30	
Sheet of marker tags for retaining and release clip 094.91.3, plastic, 48 tags, 6 x 12 mm for CEMBRE thermal transfer printers		060.48	
Technical data			
Rated values		10 A - 250 V	
Dielectric strength		2 kV AC	
Protection category		IP 20	
Ambient temperature	°C	–25…+70	
Wire strip length	mm	10	
Max. wire size for 94.54 sockets		solid wire	stranded wire
	mm²	2 x (0.5…1.5)	2 x (0.5…1.5)
	AWG	2 x (21…14)	2 x (21…14)





094.56

6-way jumper link	094.56 (blue)
Rated values	10 A - 250 V





86.30

86 series timer modules	
(12…24)V AC/DC; Bi-function: AI, DI; (0.05 s…100 h)	86.30.0.024.0000
(110…125)V AC; Bi-function: AI, DI; (0.05 s…100 h)	86.30.8.120.0000
(230…240)V AC; Bi-function: AI, DI; (0.05 s…100 h)	86.30.8.240.0000

Approvals (according to type):



99.02

Approvals (according to type):

DC Modules with non-standard polarity (+A2) on request.

99.02 coil indication and EMC suppression modules for 94.54 sockets		
Diode (+A1, standard polarity)	(6…220)V DC	99.02.3.000.00
LED	(6…24)V DC/AC	99.02.0.024.59
LED	(28…60)V DC/AC	99.02.0.060.59
LED	(110…240)V DC/AC	99.02.0.230.59
LED + Diode (+A1, standard polarity)	(6…24)V DC	99.02.9.024.99
LED + Diode (+A1, standard polarity)	(28…60)V DC	99.02.9.060.99
LED + Diode (+A1, standard polarity)	(110…220)V DC	99.02.9.220.99
LED + Varistor	(6…24)V DC/AC	99.02.0.024.98
LED + Varistor	(28…60)V DC/AC	99.02.0.060.98
LED + Varistor	(110…240)V DC/AC	99.02.0.230.98
RC circuit	(6…24)V DC/AC	99.02.0.024.09
RC circuit	(28…60)V DC/AC	99.02.0.060.09
RC circuit	(110…240)V DC/AC	99.02.0.230.09
Residual current by-pass*	(110…240)V AC	99.02.8.230.07

*Additional 0.9 W power dissipation

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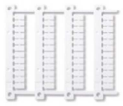


94.84.2

Approvals (according to type):

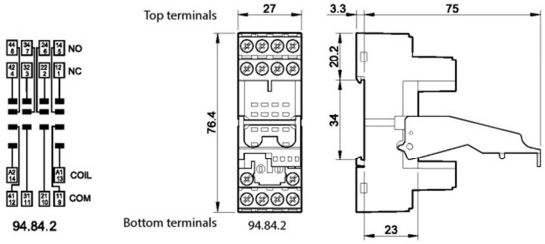


094.91.3



060.48

Screw terminal (Box clamp) socket panel or 35 mm (EN 60715) rail mount		**94.84.2 Blue**	**94.84.20 Black**
For relay type		55.32, 55.34	
Accessories			
Metal retaining clip (supplied with socket - packaging code SMA)		094.71	
Plastic retaining and release clip		094.91.3	094.91.30
6-way jumper link		094.06	094.06.0
Identification tag		094.80.3	
Modules (see table below)		99.80	
Sheet of marker tags for retaining and release clip 094.91.3, plastic, 48 tags, 6 x 12 mm for CEMBRE thermal transfer printers		060.48	
Technical data			
Rated values		10 A - 250 V	
Dielectric strength		2 kV AC	
Protection category		IP 20	
Ambient temperature	°C	–40…+70	
Screw torque	Nm	0.5	
Wire strip length	mm	7	
Max. wire size for 94.84.2 socket		solid wire	stranded wire
	mm²	1 x 6 / 2 x 2.5	1 x 4 / 2 x 2.5
	AWG	1 x 10 / 2 x 14	1 x 12 / 2 x 14

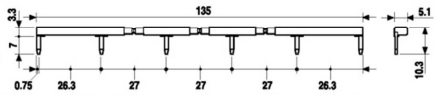


94.84.2



094.06

6-way jumper link for 94.84.2 socket	094.06 (blue)	094.06.0 (black)
Rated values	10 A - 250 V	





99.80

Approvals (according to type):

99.80 coil indication and EMC suppression modules for 94.84.2 socket		**Blue***
Diode (+A1, standard polarity)	(6…220)V DC	99.80.3.000.00
LED	(6…24)V DC/AC	99.80.0.024.59
LED	(28…60)V DC/AC	99.80.0.060.59
LED	(110…240)V DC/AC	99.80.0.230.59
LED + Diode (+A1, standard polarity)	(6…24)V DC	99.80.9.024.99
LED + Diode (+A1, standard polarity)	(28…60)V DC	99.80.9.060.99
LED + Diode (+A1, standard polarity)	(110…220)V DC	99.80.9.220.99
LED + Varistor	(6…24)V DC/AC	99.80.0.024.98
LED + Varistor	(28…60)V DC/AC	99.80.0.060.98
LED + Varistor	(110…240)V DC/AC	99.80.0.230.98
RC circuit	(6…24)V DC/AC	99.80.0.024.09
RC circuit	(28…60)V DC/AC	99.80.0.060.09
RC circuit	(110…240)V DC/AC	99.80.0.230.09
Residual current by-pass*	(110…240)V AC	99.80.8.230.07

*Additional 0.9 W power dissipation

* Modules in Black housing are available on request.

Green LED is standard. Red LED available on request.

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94 SERIES
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55 SERIES

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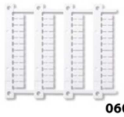


94.94.3

Approvals (according to type):

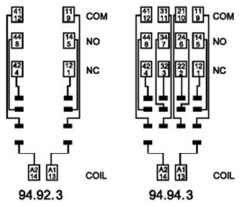


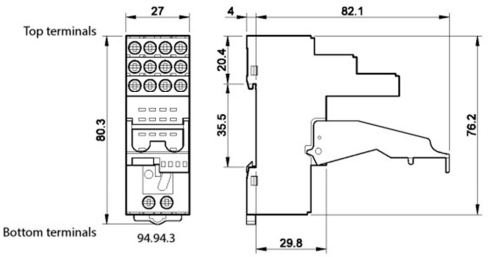
094.91.3



060.48

Screw terminal (Box clamp) socket panel or 35 mm rail mount		**94.92.3 (blue)**	**94.92.30 (black)**	**94.94.3 (blue)**	**94.94.30 (black)**
For relay type		55.32		55.32, 55.34	
Accessories					
Metal retaining clip		094.71			
Plastic retaining and release clip		094.91.3	094.91.30	094.91.3	094.91.30
6-way jumper link		094.06	094.06.0	094.06	094.06.0
Identification tag		094.80.3			
Modules (see table below)		99.80			
Sheet of marker tags for retaining and release clip 094.91.3, plastic, 48 tags, 6 x 12 mm for CEMBRE thermal transfer printers		060.48			
Technical data					
Rated values		10 A - 250 V			
Dielectric strength		2 kV AC			
Protection category		IP 20			
Ambient temperature	°C	–25…+70			
Screw torque	Nm	0.5			
Wire strip length	mm	8			
Max. wire size for 94.92.3 and 94.94.3 sockets		solid wire		stranded wire	
	mm²	1 x 6 / 2 x 2.5		1 x 4 / 2 x 2.5	
	AWG	1 x 10 / 2 x 14		1 x 12 / 2 x 14	

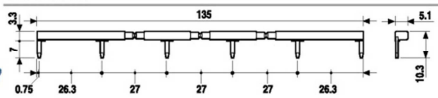






094.06

6-way jumper link for 94.92.3 and 94.94.3 sockets	094.06 (blue)	094.06.0 (black)
Rated values	10 A - 250 V	





99.80

Approvals (according to type):

* Modules in Black housing are available on request.

Green LED is standard. Red LED available on request.

99.80 coil indication and EMC suppression modules for 94.92.3 and 94.94.3 sockets		**Blue***
Diode (+A1, standard polarity)	(6…220)V DC	99.80.3.000.00
LED	(6…24)V DC/AC	99.80.0.024.59
LED	(28…60)V DC/AC	99.80.0.060.59
LED	(110…240)V DC/AC	99.80.0.230.59
LED + Diode (+A1, standard polarity)	(6…24)V DC	99.80.9.024.99
LED + Diode (+A1, standard polarity)	(28…60)V DC	99.80.9.060.99
LED + Diode (+A1, standard polarity)	(110…220)V DC	99.80.9.220.99
LED + Varistor	(6…24)V DC/AC	99.80.0.024.98
LED + Varistor	(28…60)V DC/AC	99.80.0.060.98
LED + Varistor	(110…240)V DC/AC	99.80.0.230.98
RC circuit	(6…24)V DC/AC	99.80.0.024.09
RC circuit	(28…60)V DC/AC	99.80.0.060.09
RC circuit	(110…240)V DC/AC	99.80.0.230.09
Residual current by-pass*	(110…240)V AC	99.80.8.230.07

*Additional 0.9 W power dissipation

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55 SERIES

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94.74

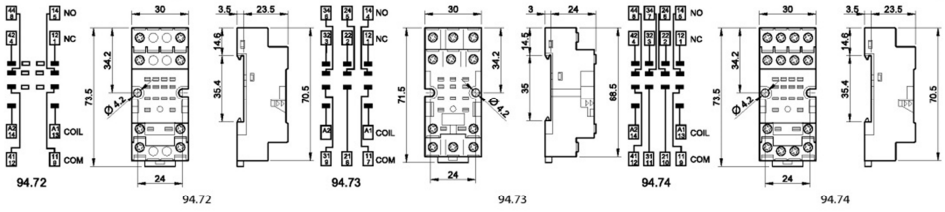
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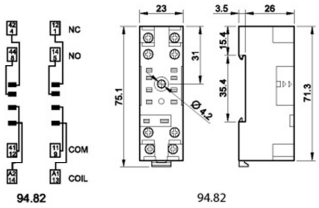
94.82

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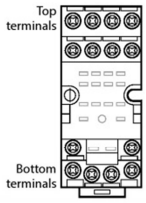
Screw terminal (Plate clamp) socket panel or 35 mm (EN 60715) rail mount		**94.72 Blue**	**94.72.0 Black**	**94.73 Blue**	**94.73.0 Black**	**94.74 Blue**	**94.74.0 Black**
For relay type		55.32		55.33		55.32, 55.34	
Accessories							
Metal retaining clip (supplied with socket - packaging code SMA)		094.71					
Modules (see table below)		99.01					
Screw terminal (Plate clamp) socket: panel or 35 mm rail mount		**94.82 (blue)**			**94.82.0 (black)**		
For relay type		55.32			55.32		
Accessories							
Metal retaining clip (supplied with socket - packaging code SMA)		094.71					
Modules (see table below)		99.01					
Technical data							
Rated values		10 A - 250 V					
Dielectric strength		2 kV AC					
Protection category		IP 20					
Ambient temperature	°C	–40…+70					
Screw torque	Nm	0.5					
Wire strip length	mm	8 (94.72/73/74)			9 (94.82)		
Max. wire size for 94.72/73/74 and 94.82 sockets		solid wire			stranded wire		
	mm²	1 x 2.5 / 2 x 1.5			1 x 2.5 / 2 x 1.5		
	AWG	1 x 14 / 2 x 16			1 x 14 / 2 x 16		



94.72 94.73 94.74



94.82





99.01

Approvals (according to type):

99.01 coil indication and EMC suppression modules for 94.72, 94.73, 94.74 and 94.82 sockets		
		Blue*
Diode (+A1, standard polarity)	(6…220)V DC	99.01.3.000.00
Diode (+A2, non standard polarity)	(6…220)V DC	99.01.3.000.00
LED	(6…24)V DC/AC	99.01.0.024.59
LED	(28…60)V DC/AC	99.01.0.060.59
LED	(110…240)V DC/AC	99.01.0.230.59
LED + Diode (+A1, standard polarity)	(6…24)V DC	99.01.9.024.99
LED + Diode (+A1, standard polarity)	(28…60)V DC	99.01.9.060.99
LED + Diode (+A1, standard polarity)	(110…220)V DC	99.01.9.220.99
LED + Diode (+A2, non standard polarity)	(6…24)V DC	99.01.9.024.79
LED + Diode (+A2, non standard polarity)	(28…60)V DC	99.01.9.060.79
LED + Diode (+A2, non standard polarity)	(110…220)V DC	99.01.9.220.79
LED + Varistor	(6…24)V DC/AC	99.01.0.024.98
LED + Varistor	(28…60)V DC/AC	99.01.0.060.98
LED + Varistor	(110…240)V DC/AC	99.01.0.230.98
RC circuit	(6…24)V DC/AC	99.01.0.024.09
RC circuit	(28…60)V DC/AC	99.01.0.060.09
RC circuit	(110…240)V DC/AC	99.01.0.230.09
Residual current by-pass*	(110…240)V AC	99.01.8.230.07

*Additional 0.9 W power dissipation

Approvals (according to type):

* Modules in Black housing are available on request.

Green LED is standard. Red LED available on request.

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94 SERIES
Sockets and accessories for 55 series relays

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55 SERIES

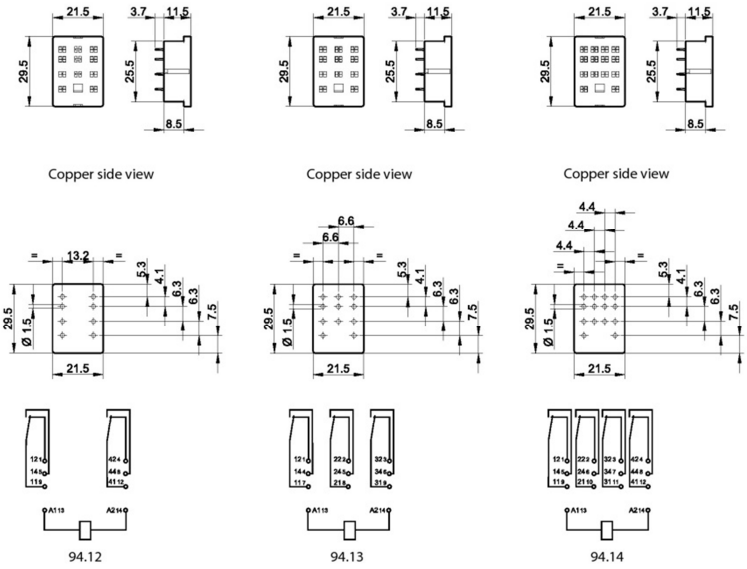


94.14

Approvals (according to type):

PCB socket	94.12 Blue	94.12.0 Black	94.13 Blue	94.13.0 Black	94.14 Blue	94.14.0 Black
For relay type	55.32		55.33		55.32, 55.34	
Accessories						
Metal retaining clip (supplied with socket - packaging code SMA)	094.51					
Technical data						
Rated values	10 A - 250 V					
Dielectric strength	2 kV AC					
Ambient temperature °C	–40…+70					

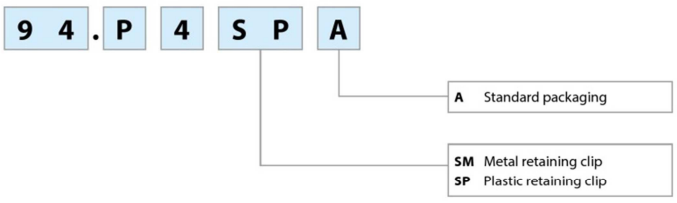
A



Packaging codes

How to code and identify retaining clip and packaging options for sockets.

Example:



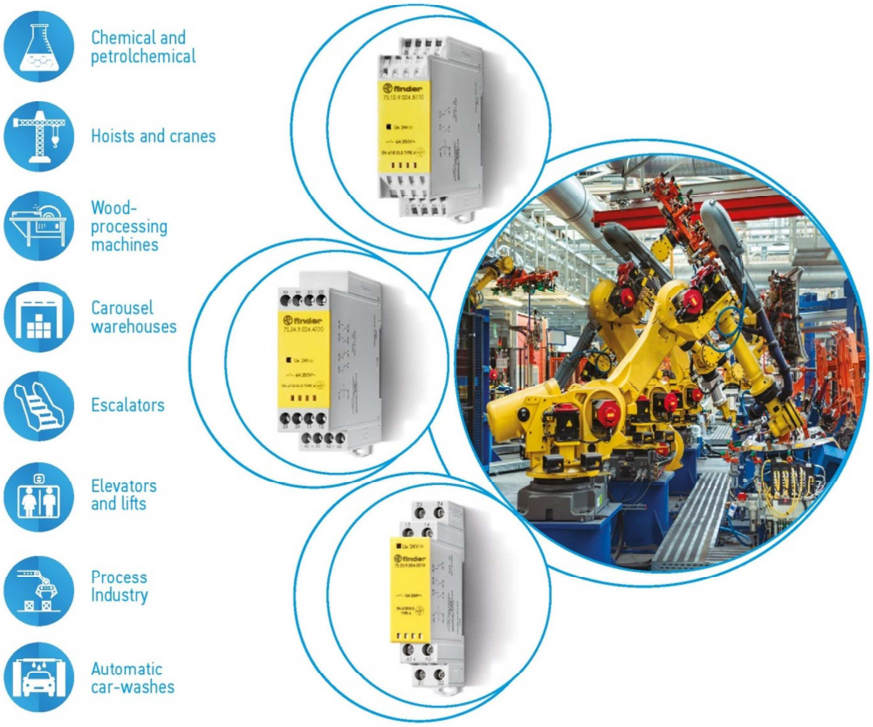
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1.45 FINDER INTERFACE RELAY FOR SAFETY APPLICATIONS 7S.23.9.024.0210 DATA SHEET

finder
SWITCH TO THE FUTURE

7S
SERIES

Modular relays with forcibly guided contacts 6 - 10 A



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In case of discrepancies between the printed and online versions, the latter prevails.

7S SERIES
Modular relays with forcibly guided contacts 6 A

finder

7S SERIES

Modular relays with forcibly guided contacts

Type 7S.12/32
- 2 pole 6 A (1 NO + 1 NC)

Type 7S.14/34
- 4 pole 6 A (2 NO + 2 NC and 3 NO + 1 NC)

Type 7S.16/36
- 6 pole 6 A (4 NO + 2 NC and 5 NO + 1 NC)

- For safety applications, with class A forcibly guided contact relays EN 61810-3 (previously EN 50205)
- SIL2 evaluated according to EN 61508, for use in functional safety application according to EN 62061 up to SIL2 and according to IEC 13849-1 up to PL d (instead of For functional reliability in machinery and plant engineering according to EN 13849-1)
- For functional reliability in machinery and plant engineering according to EN 13849-1
- Railways application versions available
- DC and AC supply versions
- Coil status visual indication with LED
- 35 mm rail (EN 60715) mount

7S.12/7S.14/7S.16 Screwless terminal



7S.32/7S.34/7S.36 Box clamp



	7S.12/32...5110	7S.14/34...4xx0	7S.16/36...5xx0
			
	• 2 pole (1 NO + 1 NC)	• 4 pole : (2 NO + 2 NC) type 7S.xx.x.xxx.4220 (3 NO + 1 NC) type 7S.xx.x.xxx.4310	• 6 pole: (4 NO + 2 NC) type 7S.xx.x.xxx.5420 (5 NO + 1 NC) type 7S.xx.x.xxx.5510
For outline drawing see page 12			
Contact specification			
Contact configuration	1 NO + 1 NC	2 NO + 2 NC, 3 NO + 1 NC	4 NO + 2 NC, 5 NO + 1 NC
Rated current/Max. peak current A	6/15	6/15	6/15
Rated switching voltage V AC (50/60 Hz)	250	250	250
Rated load AC1 VA	1500	1500	1500
Rated current AC15 (230 V AC) A	5	5	5
Rated current AC15 (400 V AC) A	2	—	—
Breaking capacity DC1: 24/110/220 V A	6/0.6/0.2	6/0.9/0.3	6/0.9/0.3
Breaking capacity DC13: 24 V A	1	3	3
Minimum switching load mW (V/mA)	60 (5/5)	60 (5/10)	60 (5/10)
Standard contact material	AgNi + Au	$AgSnO_2$	$AgSnO_2$+Au
Coil specification			
Nominal voltage (U_N) V AC (50/60 Hz)	110...125 - 230...240	110...125 - 230...240	110...125 - 230...240
V DC	12 - 24	12 - 24 - 110	12 - 24 - 110
Rated power VA (50 Hz)/W	2.3/1	2.3/1	2.3/1
Operating range AC	(0.85...1.1)U_N	(0.85...1.1)U_N	(0.85...1.1)U_N
DC	(0.8...1.2)U_N	(0.8...1.2)U_N	(0.8...1.2)U_N
DC (24 and 110 V only)	(0.7...1.25)U_N	(0.7...1.25)U_N	(0.7...1.25)U_N
Holding voltage AC/DC	0.45 U_N / 0.45 U_N	0.55 U_N / 0.55 U_N	0.55 U_N / 0.55 U_N
Must drop-out voltage AC/DC	0.1 U_N / 0.1 U_N	0.1 U_N / 0.1 U_N	0.1 U_N / 0.1 U_N
Technical data			
Mechanical life cycles	$10 \cdot 10^6$	$10 \cdot 10^6$	$10 \cdot 10^6$
Electrical life at rated load AC1 cycles	$100 \cdot 10^3$	$100 \cdot 10^3$	$100 \cdot 10^3$
Operate/release time ms	7/11	12/10	12/10
Insulation between coil and contacts (1.2/50 µs) kV	6	6	6
Dielectric strength between open contacts V AC	1500	1500	1500
Ambient temperature °C	–40...+70	–40...+70	–40...+70
Protection category	IP 20	IP 20	IP 20
Approvals (according to type)	CE UK CA EAC SIL2 cULus		

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3

7S SERIES

7S SERIES
Modular relays with forcibly guided contacts 10 A

finder

C

Modular relays with forcibly guided contacts

Type 7S.23
- 3 pole (2 NO + 1 NC)

- For safety applications, with class A forcibly guided contact relays EN 61810-3 (previously EN 50205)
- SIL2 evaluated according to EN 61508, for use in functional safety application according to EN 62061 up to SIL2 and according to IEC 13849-1 up to PL d (instead of For functional reliability in machinery and plant engineering according to EN 13849-1)
- For functional reliability in machinery and plant engineering according to EN 13849-1
- DC coil
- Cadmium free contacts
- 17.5 mm wide
- Coil status visual indication with LED
- 35 mm rail (EN 60715) mount

7S.23
Box clamp



7S.23



- 3 pole (2 NO + 1 NC)

For outline drawing see page 12

Contact specification		
Contact configuration		2 NO + 1 NC
Rated current/Max. peak current	A	10/20
Rated switching voltage	V AC (50/60 Hz)	250
Rated load AC1	VA	2500
Rated current AC15 (230 V AC)	A	5
Breaking capacity DC1: 24/110/220 V	A	10/0.6/0.3
Breaking capacity DC13: 24 V	A	5
Minimum switching load	mW (V/mA)	60 (5/5)
Standard contact material		AgNi + Au
Coil specification		
Nominal voltage (U_N)	V DC	12 - 24 - 48 -110
Rated power	W	1
Operating range	DC	(0.8…1.2)U_N
Holding voltage	DC	0.45 U_N
Must drop-out voltage	DC	0.1 U_N
Technical data		
Mechanical life	cycles	$10 \cdot 10^6$
Electrical life at rated load AC1	cycles	$100 \cdot 10^3$
Operate/release time	ms	7/11
Insulation between coil and contacts (1.2/50 µs)	kV	6
Dielectric strength between open contacts	V AC	1500
Ambient temperature	°C	–40…+70
Protection category		IP 20
Approvals (according to type)		CE UK CA EAC SIL2 cULus

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7S SERIES
Modular relays with forcibly guided contacts 6 A

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7S SERIES

Modular relays with forcibly guided contacts for SIL3 safety applications

Type 7S.43/63
- 2 NO safety contacts
- 1 NC feedback contact
- 1 auxiliary signalling contact

- For safety application, with class A forcibly guided contact relays EN 61810-3 (previously EN 50205) for safety application up to SIL 3
- SIL 3 evaluated according to EN 61508, for use in functional safety application according to EN 62061 up to SIL 3 and according to IEC 13849-1 up to PL e
- Double channel architecture (1oo2) with 2 NO contact, 1 feedback contact and 1 auxiliary contact
- From 12 up to 110 V DC version with operating range (0.85…1.1)U_N
- DC coil
- Coil status visual indication with LED
- 35 mm rail (EN 60715) mount

7S.43 Screwless terminal

7S.63 Box clamp

7S.43/63...0211



- 3 pole (2 NO + 1 NC)
- 1 auxliary contact

C

For outline drawing see page 12

Contact specification		
Contact configuration		2 NO + 1 NC + 1 AUX
Rated current/Max. peak current	A	6/15
Rated switching voltage	V AC (50/60 Hz)	250
Rated load AC1	VA	1500
Rated current AC15 (230 V AC)	A	5
Breaking capacity DC1: 24/110/220 V	A	6/0.6/0.2
Breaking capacity DC13: 24 V	A	3
Minimum switching load	mW (V/mA)	60 (5/10)
Standard contact material		$AgSnO_2$ & AgNi+Au
Coil specification		
Nominal voltage (U_N)	V DC	12 - 24 - 48 -110
Rated power	W	1.7
Operating range	DC	(0.85…1.1)U_N
Holding voltage	DC	0.55 U_N
Must drop-out voltage	DC	0.1 U_N
Technical data		
Mechanical life	cycles	$10 \cdot 10^6$
Electrical life at rated load AC1	cycles	$100 \cdot 10^3$
Operate/release time of NO contacts	ms	10/7
Operate/release time of NC contacts	ms	5/30
Insulation between coil and contacts (1.2/50 µs)	kV	6
Dielectric strength between open contacts	V AC	1500
Ambient temperature	°C	–40…+70
Protection category		IP 20
Approvals (according to type)		CE UKCA EAC SIL3 cULus

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7S SERIES
Modular relays with forcibly guided contacts 6 - 10 A

finder

Ordering information

Example: 7S series Modular relay with forcibly guided contacts, 6 contact (4 NO + 2 NC) 6 A, supply voltage 24 V DC.

7 S . 1 6 . 9 . 0 2 4 . 5 4 2 0 [ ]

Series

Type
1 = 22.5 mm wide, screwless terminals
2 = 17.5 mm wide, Box clamp
3 = 22.5 mm wide, Box clamp
4 = 22.5 mm wide, screwless terminals
6 = 22.5 mm wide, Box clamp

C

Output
2 = 2 contacts
3 = 3 contacts
4 = 4 contacts
6 = 6 contacts

Supply version
8 = AC (50 /60 Hz)
9 = DC

Supply voltage
See page 10

Contact material
0 = AgNi +Au (7S.23) only
0 = $AgSnO_2$ & AgNi + Au (7S.43/63) only
4 = $AgSnO_2$ (7S.14/34) only
5 = AgNi +Au (7S.12/32) only
5 = $AgSnO_2$ + Au (7S.16/36) only

NO and NC contatcs
11 = 1 NO + 1 NC (SPST-NO + SPST-NC)
21 = 2 NO + 1 NC (DPST-NO+SPST-NC)
22 = 2 NO + 2 NC (DPST-NO + DPST-NC)
31 = 3 NO + 1 NC (3PST-NO + SPST-NC)
42 = 4 NO + 2 NC (4PST-NO + DPST-NC)
51 = 5 NO + 1 NC (4PST-NO + SPST-NC)

Special versions
0 = Standard
1 = NO auxliary contact

T= Railways application version

Codes, Preferred selections for best availability are shown in **bold.**

7S.12.9.012.5110	7S.14.9.012.4220	7S.16.9.012.5420
7S.12.9.024.5110	7S.14.9.012.4310	**7S.16.9.024.5420**
7S.12.8.120.5110	**7S.14.9.024.4220**	**7S.16.9.024.5510**
7S.12.8.230.5110	**7S.14.9.024.4310**	7S.16.9.110.5420
	7S.14.9.110.4220	7S.16.8.120.5420
7S.32.9.012.5110	7S.14.9.110.4310	7S.16.8.230.5420
7S.32.9.024.5110	7S.14.8.120.4220	
7S.32.8.120.5110	7S.14.8.120.4310	7S.36.9.012.5420
7S.32.8.230.5110	7S.14.8.230.4220	**7S.36.9.024.5420**
	7S.14.8.230.4310	**7S.36.9.024.5510**
7S.43.9.012.0211		7S.36.9.110.5420
7S.43.9.024.0211	7S.34.9.012.4220	7S.36.8.120.5420
7S.43.9.048.0211	7S.34.9.012.4310	7S.36.8.230.5420
7S.43.9.110.0211	**7S.34.9.024.4220**	
	7S.34.9.024.4310	7S.23.9.012.0210
7S.63.9.012.0211	7S.34.9.110.4220	**7S.23.9.024.0210**
7S.63.9.024.0211	7S.34.9.110.4310	7S.23.9.048.0210
7S.63.9.048.0211	7S.34.8.120.4220	7S.23.9.110.0210
7S.63.9.110.0211	7S.34.8.120.4310	
	7S.34.8.230.4220	
	7S.34.8.230.4310	

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7S SERIES
Modular relays with forcibly guided contacts 6 - 10 A

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7S SERIES

Technical data

Insulation according to EN 61810-1						
Nominal voltage of supply system		V AC	230/400			
Rated insulation voltage		V AC	250			
Pollution degree			2			
Insulation between coil and contact set						
Type of Insulation			Reinforced			
Overvoltage category			III			
Rated impulse voltage		kV (1.2/50 µs)	6			
Dielectric strength		V AC	4000			
Insulation between adjacent contacts						
Type of Insulation			Basic			
Overvoltage category			III			
Rated impulse voltage		kV (1.2/50 µs)	4			
Dielectric strength		V AC	2500			
Insulation between open contacts						
Type of disconnection			Micro-disconnection			
Dielectric strength		V AC/kV (1.2/50 µs)	1500/2.5			

Insulation between coil terminals						
Rated impulse voltage (surge) differential mode (according to EN 61000-4-5)		kV (1.2/50 µs)	1.5			
Terminals			**Box clamp**		**Screwless Terminal**	
Min. wire size			solid cable	stranded cable	solid cable	stranded cable
		mm²	0.5	0.5	0.5	0.5
		AWG	21	21	21	21
			Box clamp		**Screwless Terminal**	
Max. wire size			solid cable	stranded cable	solid cable	stranded cable
		mm²	1 x 6 / 2 x 2.5	1 x 4 / 2 x 2.5	1 x 1.5	1 x 1.5
		AWG	1 x 10 / 2 x 14	1 x 12 / 2 x 14	1 x 14	1 x 16
Wire strip length		mm	9			

Other data			**7S.12/32**	**7S.14/34**	**7S.16/36**	**7S.23**	**7S.43/63**
Bounce time: NO/NC		ms	2/8	2/10	2/10	2/15	1/8
Vibration resistance (10…200)Hz: NO/NC		g	10/5	20/6	20/6	10/2	10/2
Shock resistance: NO/NC		g	20/6	20/5	20/5	20/6	20/5
Power lost to the environment	without contact current	W	0.8	0.8	0.8	0.8	1.7
	with rated current	W	1.4	2.3	2.8	1.4	3.8

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7S SERIES
Modular relays with forcibly guided contacts 6 - 10 A

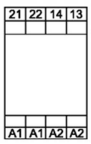
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Contact specifications

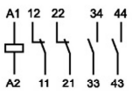
Contact diagrams

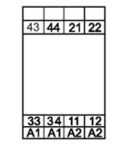
7S.12/7S.32



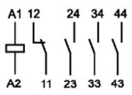


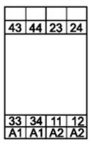
7S.14/34...4220



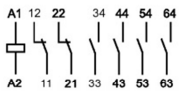


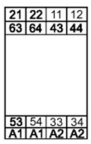
7S.14...4310



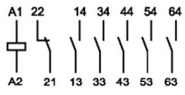


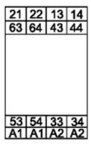
7S.16/36...5420



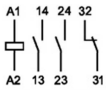


7S.16/36...5510



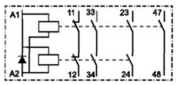


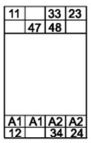
7S.23



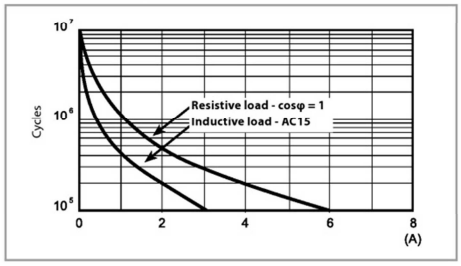


7S.43/7S.63

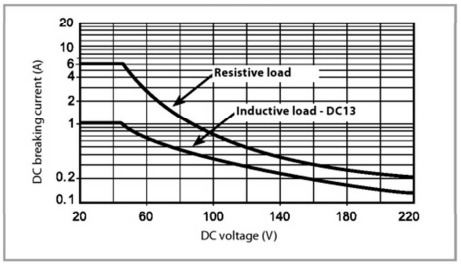




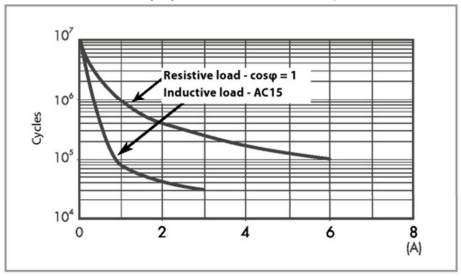
F 7S12 - Electrical life (AC) v contact current - 7S.12



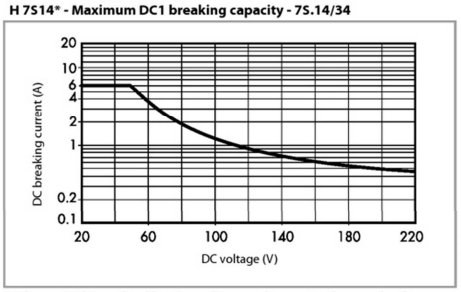
H 7S12* - Maximum DC breaking capacity - 7S.12



F 7S14 - Electrical life (AC) v contact current - 7S.14/34



H 7S14* - Maximum DC1 breaking capacity - 7S.14/34



* When switching a load having voltage and current values under the curve, an electrical life of ≥ 100 · 10³ can be expected.

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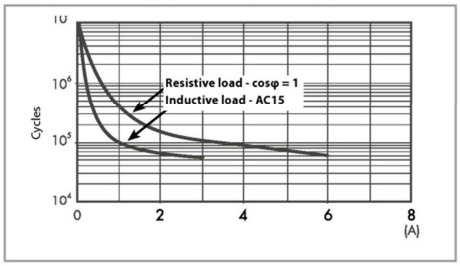
7S SERIES
Modular relays with forcibly guided contacts 6 - 10 A

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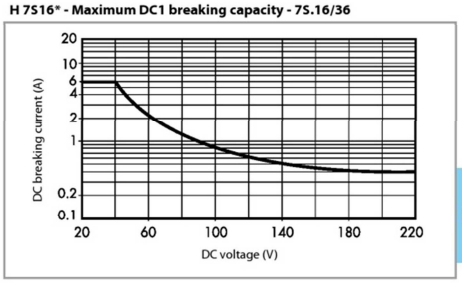
7S SERIES

Contact specifications

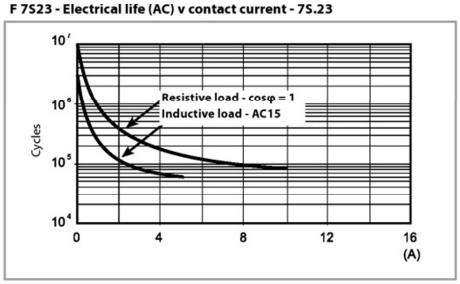
F 7S16 - Electrical life (AC) v contact current - 7S.16/36



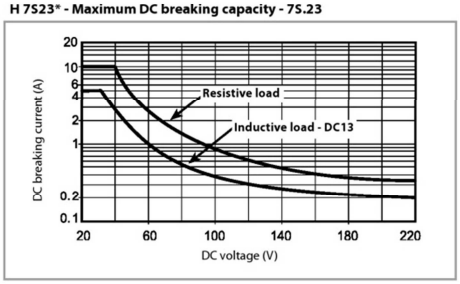
H 7S16* - Maximum DC1 breaking capacity - 7S.16/36



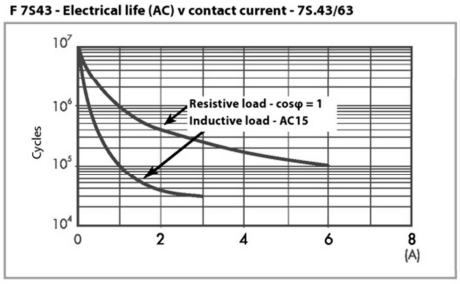
F 7S23 - Electrical life (AC) v contact current - 7S.23



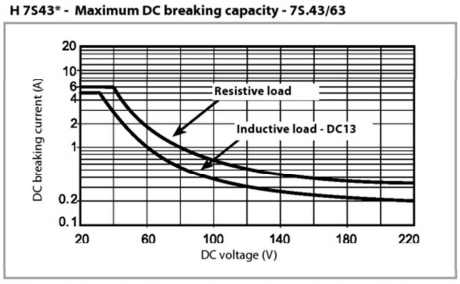
H 7S23* - Maximum DC breaking capacity - 7S.23



F 7S43 - Electrical life (AC) v contact current - 7S.43/63

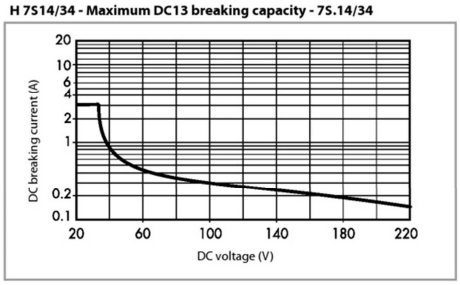


H 7S43* - Maximum DC breaking capacity - 7S.43/63

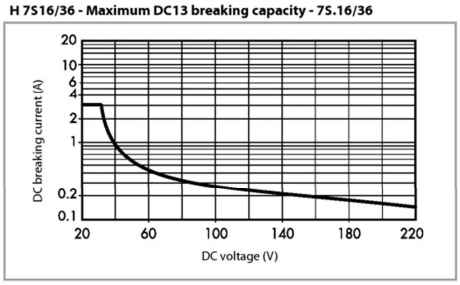


* When switching a load having voltage and current values under the curve, an electrical life of ≥ $100 \cdot 10^3$ can be expected.

H 7S14/34 - Maximum DC13 breaking capacity - 7S.14/34



H 7S16/36 - Maximum DC13 breaking capacity - 7S.16/36



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7S SERIES
7S SERIES
Modular relays with forcibly guided contacts 6 - 10 A
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C

Coil specifications

DC coil data - type 7S.12/32

Nominal voltage U_N	Coil code	Operating range U_{min}	Operating range U_{max}	Rated input current at U_N I_N	Rated power at U_N
V		V	V	mA	W
12	**9**.012	9.6	14.4	55	0.7
24	**9**.024	16.8	30	38.2	0.9

AC coil data - type 7S.12/32

Nominal voltage U_N	Coil code	Operating range U_{min}	Operating range U_{max}	Rated input current at U_N I_N	Rated power at U_N
V		V	V	mA	VA/W
110…125	**8**.120	93	138	9.8	1.2/1.1
230…240	**8**.230	195	264	11.8	2.8/1.2

DC coil data - type 7S.14/34 / 7S.16/36

Nominal voltage U_N	Coil code	Operating range U_{min}	Operating range U_{max}	Rated input current at U_N I_N	Rated power at U_N
V		V	V	mA	W
12	**9**.012	9.6	14.4	64.7	0.8
24	**9**.024	16.8	30	42.2	1
110	**9**.110	77	138	11.6	1.4

AC coil data - type 7S.14/34 / 7S.16/36

Nominal voltage U_N	Coil code	Operating range U_{min}	Operating range U_{max}	Rated input current at U_N I_N	Rated power at U_N
V		V	V	mA	VA/W
110…125	**8**.120	93	138	10.2	1.3/1.1
230…240	**8**.230	195	264	11.8	2.9/1.2

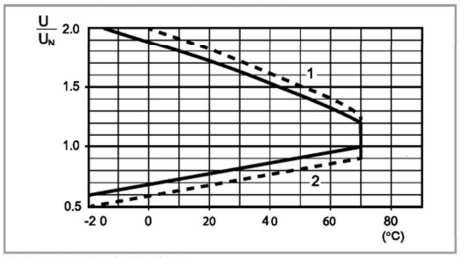
DC coil data - type 7S.23

Nominal voltage U_N	Coil code	Operating range U_{min}	Operating range U_{max}	Rated input current at U_N I_N	Rated power at U_N
V		V	V	mA	W
12	**9**.012	9.6	14.4	47.1	0.6
24	**9**.024	19.2	28.8	26.6	0.6
48	**9**.048	38.4	57.6	16.2	0.8
110	**9**.110	88	132	8.8	1

DC coil data - type 7S.43/63

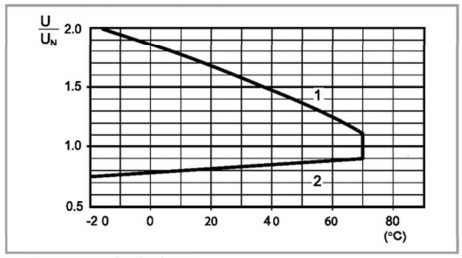
Nominal voltage U_N	Coil code	Operating range U_{min}	Operating range U_{max}	Rated input current at U_N I_N	Rated power at U_N
V		V	V	mA	W
12	**9**.012	10.2	13.2	105	1.3
24	**9**.024	20.4	26.4	60	1.45
48	**9**.048	40.8	52.8	36	1.6
110	**9**.110	93.5	121	20	1.7

R 7S - DC coil operating range v ambient temperature - 7S.12/32 / 7S.23 / 7S.14/34 / 7S.16/36



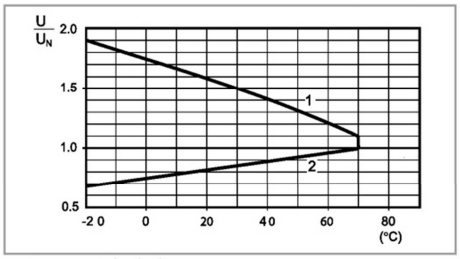
1 - Max. permitted coil voltage.
2 - Min. pick-up voltage with coil at ambient temperature.
----- 24 and 110 V DC coils only excluding 7S.23

R 7S - AC coil operating range v ambient temperature - 7S.12/32 / 7S.14/34 / 7S.16/36



1 - Max. permitted coil voltage.
2 - Min. pick-up voltage with coil at ambient temperature.

R 7S - DC coil operating range v ambient temperature - 7S.43/63



1 - Max. permitted coil voltage.
2 - Min. pick-up voltage with coil at ambient temperature.

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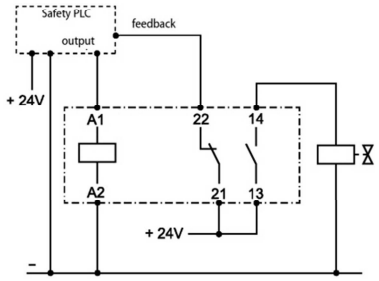
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7S SERIES

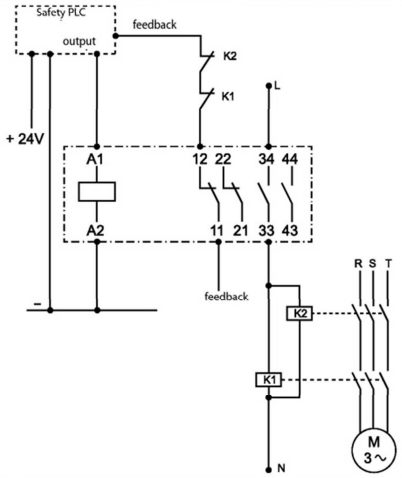
C

Example wiring diagrams

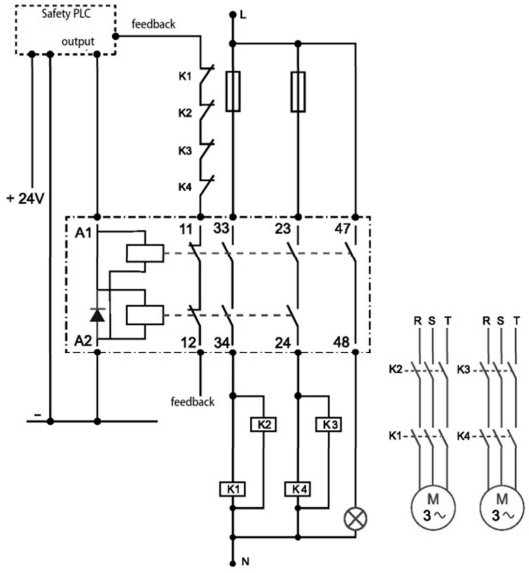
Type 7S.x2



Type 7S.x4...4220



Type 7S.43/63



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7S SERIES

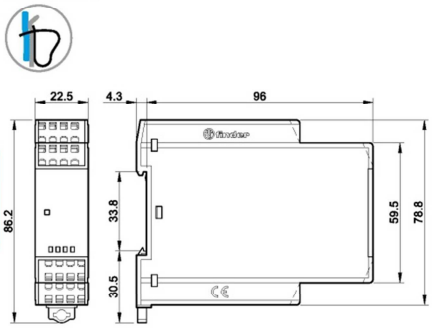
7S SERIES
Modular relays with forcibly guided contacts 6 - 10 A

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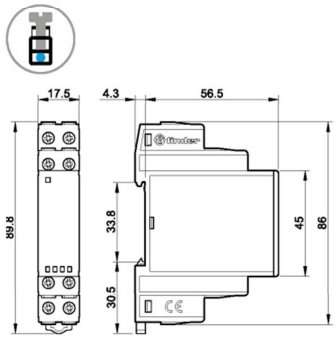
C

Outline drawings

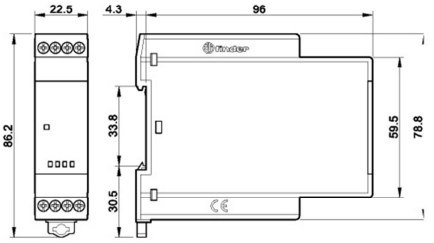
Types 7S.12/14/16/43
Screwless terminal



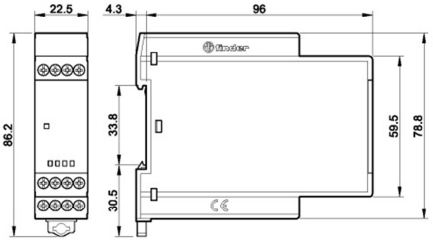
Type 7S.23
Box clamp



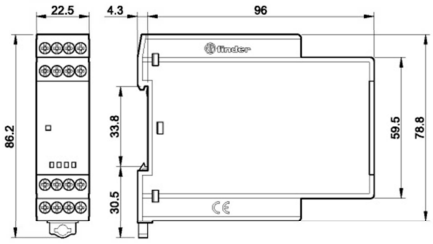
Type 7S.32
Box clamp



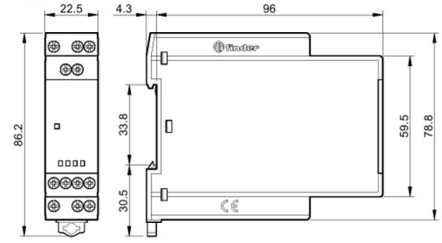
Type 7S.34
Box clamp



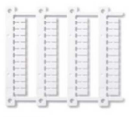
Type 7S.36
Box clamp



Type 7S.63
Box clamp



Accessories



060.48

Sheet of marker tags, plastic, 48 tags, 6 x 12 mm, for CEMBRE thermal transfer printers	060.48

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1.46 FINDER SURGE PROTECTION DEVICE 7P DATA SHEET

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SWITCH TO THE FUTURE

Surge Protection Devices (SPD)

7P
SERIES



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7P SERIES
Surface Protection Devices (SPD)

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7P SERIES

E

SPD Type 1+2 Surge arrester range high discharge capability with no following current - single/three phase systems

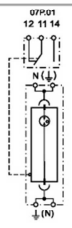
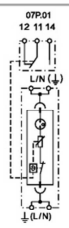
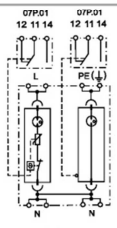
- Surge arresters, suitable for low-voltage applications, to protect equipment against overvoltage by direct lightning strike, induced overvoltage and switching overvoltage
- To be installed at the boundary of LPZ 0 - LPZ 1 zones or higher
- Versions with combination of varistor and high-performance spark gap (GDT) ensures:
  - high discarge current
  - high insulation resistance that eliminates leakage current
  - no following current
- Very low residual voltage
- Replaceable modules
- Upside down mounting possible (thanks to dual terminal markings and new restraint system for the replaceable module that permits its inversion)
- Visual fault signalling: Healthy/Replace
- Double screw terminal
- Remote status signalling contact: Healthy/Replace/Presence. Connector 07P.01 included
- According to EN 61 643-11
- 35 mm rail EN 60715 mounting, 36 mm each pole

7P.09.1.255.0100 SPD Type 1, GDT protection for N-PE application only, for 3+1 configuration

7P.01.8.260.1025 SPD Type 1+2, varistor + GDT unipolar protection suitable to realize single phase or three phase systems (230/400 V) with the GDT protection module (7P.09)

7P.02.8.260.1025 SPD Type 1+2 for single phase TT and TN-S system. Varistor + GDT protection L-N + GDT protection N-PE

For outline drawing see page 20

	7P.09.1.255.0100	**7P.01.8.260.1025**	**7P.02.8.260.1025**
			
	• SPD Type 1 • Spark gap module for N-PE application in three phase system, 3+1 configuration • Remote contact signalling of GDT presence • Upside down mounting possible • Replaceable modules	• SPD Type 1+2 • Combination of varistor and encapsulated spark gap (for single or three phase systems) • Visual fault and remote contact fault signalling varistor/GDT status • Upside down mounting possible • Replaceable modules	• SPD Type 1+2 • Combination of varistor and encapsulated spark gap (for single phase systems) • Visual fault and remote contact fault signalling varistor/GDT status, N-PE GDT presence • Upside down mounting possible • Replaceable modules
			

SPD specification		**N-PE**		**L-N**	**N-PE**
Nominal voltage (U_N)	V AC	—	230	230	—
Maximum operating voltage (U_C)	V AC	255	260	260	255
Lightning impulse current (10/350 µs) (I_{imp})	kA	100	25	25	50
Nominal discharge current (8/20 µs) (I_n)	kA	100	30	30	50
Maximum discharge current (8/20 µs) (I_{max})	kA	100	60	60	100
Total discharge current (10/350 µs) (I_{total})	kA	100	25	50	50
Voltage protection level (U_p)	kV	1.5	1.5	1.5	1.5
Ability to independently switch off the following current (I_{fi})	A	100	No following current	No following current	100
I_{PE}	µA	< 4	< 4	< 4	
TOV 120 min L-N	V AC	—	440	440	—
TOV 5 s L-N	V AC	—	335	335	—
TOV 200 ms N-PE	V AC	1200	—	—	1200
Response time (t_a)	ns	100	100	100	100
Short-circuit proof at maximum overcurrent protection - I_{SSCR}	kA_{rms}	—	50	50	—
Maximum overcurrent protection (fuse rating gL/gG)	A	—	250	250	—
Maximum overcurrent protection for serial connection, gL/gG	A	—	125	125	—
Replacement module code		7P.00.1.000.0100	7P.00.8.260.0025	7P.00.8.260.0025	7P.00.1.000.0050
Other technical data					
Ambient temperature range	°C	–40…+80			
Protection degree		IP 20			
Wire size		solid cable		stranded cable	
	mm^2	1 x 2.5…1 x 50		1 x 2.5…1 x 35	
	AWG	1 x 13…1 x 1		1 x 13…1 x 2	
Wire strip length	mm	11			
Screw torque	Nm	4			
Remote status signalling contact specification					
Contact configuration		1 CO (SPDT)		1 CO (SPDT)	
Rated current	A AC/DC	0.5/0.1		0.5/0.1	
Rated voltage	V AC/DC	250/30		250/30	
Wire size (07P.01)		solid cable / stranded cable	solid cable / stranded cable	solid cable / stranded cable	
	mm^2	1.5 / 1.5	1.5 / 1.5	1.5 / 1.5	
	AWG	16 / 16	16 / 16	16 / 16	
Approvals (according to type)		CE UK CA EAC SM	CE UK CA EAC SM		

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7P SERIES

7P SERIES
Surge Protection Devices (SPD)

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E

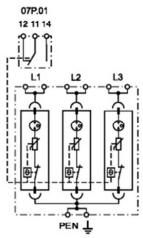
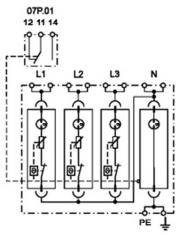
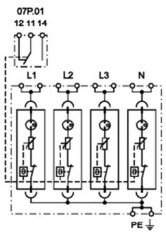
SPD Type 1+2 Surge arrester range - three phase high discharge capability with no following current - system (230/400 V)

- Surge arresters, suitable for low-voltage applications, to protect equipment against overvoltage by direct lightning strike, induced overvoltage and switching overvoltage
- To be installed at the boundary of LPZ 0 - LPZ 1 zones or higher
- Combined high energy varistor block and high-performance spark gap (GDT) ensures:
  - high discarge current
  - high insulation resistance that eliminates leakage current
  - no following current
- Very low residual voltage
- Replaceable modules
- Upside down mounting possible (thanks to dual terminal markings and new restraint system for the replaceable module that permits its inversion)
- Visual fault signalling: Healthy/Replace
- Double screw terminal
- Remote status signalling contact: Healthy/Replace/Presence. Connector 07P.01 included
- According to EN 61 643-11
- 35 mm rail EN 60715 mounting, 36 mm each pole

7P.03.8.260.1025 SPD Type 1+2 for three phase TN-C system without Neutral (PEN conductor). Varistor + GDT protection L1, L2, L3-PEN

7P.04.8.260.1025 SPD Type 1+2 for three phase TT and TN-S system with Neutral. Varistor + GDT protection L1, L2, L3-N + spark gap protection N-PE

7P.05.8.260.1025 SPD Type 1+2 for three phase TN-S system with Neutral. Varistor + GDT protection L1, L2, L3-N + varistor + GDT protection N-PE

	7P.03.8.260.1025	7P.04.8.260.1025	7P.05.8.260.1025
			
	• SPD Type 1+2 • 3 x combined varistor and encapsulated spark gap • Visual fault and remote contact fault signalling varistor/GDT status • Upside down mounting position • Replaceable modules	• SPD Type 1+2 • 3 x combined varistor and encapsulated spark gap + 1 encapsulated spark gap • Visual fault and remote contact fault signalling varistor/GDT status, N-PE GDT presence • Upside down mounting position • Replaceable modules	• SPD Type 1+2 • 4 x combined varistor and encapsulated spark gap • Visual fault and remote contact fault signalling varistor/GDT status • Upside down mounting position • Replaceable modules
			

For outline drawing see page 20, 22

SPD specification		L-PEN	L-N	N-PE	L, N-PE
Nominal voltage (U_N)	V AC	230	230	—	230
Maximum operating voltage (U_C)	V AC	260	260	255	260
Lightning impulse current (10/350 µs) (I_{imp})	kA	25	25	100	25
Nominal discharge current (8/20 µs) (I_n)	kA	30	30	100	30
Maximum discharge current (8/20 µs) (I_{max})	kA	60	60	100	60
Total discharge current (10/350 µs) (I_{total})	kA	75	100	100	100
Voltage protection level (U_P)	kV	1.5	1.5	1.5	1.5
Ability to independently switch off the following current (I_{fi})	A	No following current	No following current	100	No following current
I_{PE}	µA	< 4	< 4		< 4
TOV 120 min L-N	V AC	440	440	—	440
TOV 5 s L-N	V AC	335	335	—	335
TOV 200 ms N-PE	V AC	—	—	1200	—
Response time (t_a)	ns	100	100	100	100
Short-circuit proof at maximum overcurrent protection - I_{SSCR}	kA_{rms}	50	50	—	50
Maximum overcurrent protection (fuse rating gL/gG)	A	250	250	—	250
Maximum overcurrent protection for serial connectiong, gL/gG	A	125	125	—	125
Replacement module code		7P.00.8.260.0025	7P.00.8.260.0025	7P.00.1.000.0100	7P.00.8.260.0025
Other technical data					
Ambient temperature range	°C	-40…+80			
Protection degree		IP 20			
Wire size		solid cable		stranded cable	
	mm^2	1 x 2.5…1 x 50		1 x 2.5…1 x 35	
	AWG	1 x 13…1 x 1		1 x 13…1 x 2	
Wire strip length	mm	11			
Screw torque	Nm	4			
Remote status signalling contact specification					
Contact configuration		1 CO (SPDT)	1 CO (SPDT)		1 CO (SPDT)
Rated current	A AC/DC	0.5/0.1	0.5/0.1		0.5/0.1
Rated voltage	V AC/DC	250/30	250/30		250/30
Wire size (07P.01)		solid cable / stranded cable	solid cable / stranded cable		solid cable / stranded cable
	mm^2	1.5 / 1.5	1.5 / 1.5		1.5 / 1.5
	AWG	16 / 16	16 / 16		16 / 16
Approvals (according to type)		CE UKCA EAC			

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7P SERIES
Surface Protection Devices (SPD)

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7P SERIES

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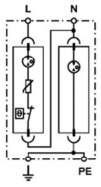
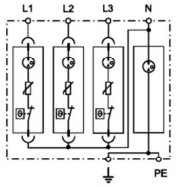
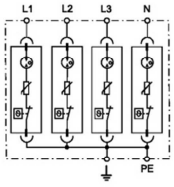
SPD Type 1+2 Compact Surge arrester range with no leakage current for single and three phase systems (230/400 V)

- Surge arresters, suitable for low-voltage applications, to protect equipment against overvoltage by direct lightning strike, induced overvoltage and switching overvoltage
- To be installed at the boundary of LPZ 0 - LPZ 1 zones or higher
- Combined high energy varistor block and high-performance spark gap (GDT) ensures:
  - no leakage current
  - galvanic insulation between phases
  - no following current
- Very low residual voltage
- Replaceable modules with retaining system
- Visual fault signalling: Healthy/Replace
- Double screw terminal
- Remote status signalling contact option available: Healthy/Replace/Presence
- According to EN 61643-11+A1:2018 , IEC 61643-11 Ed.2011
- 35 mm rail EN 60715 mounting, 36 mm each pole

7P.02.8.275.1012 SPD Type 1+2 for single phase TT (TN-S) system with Neutral. Varistor + GDT protection L-N + GDT protection N-PE

7P.04.8.275.1012 SPD Type 1+2 for three phase TT (TN-S) system with Neutral. Varistor + GDT protection L1, L2, L3-N + spark gap protection N-PE

7P.05.8.275.1012 SPD Type 1+2 for three phase TN system. Varistor + GDT protection L1, L2, L3-PE and N-PE

7P.02.8.275.1012	**7P.04.8.275.1012**	**7P.05.8.275.1012**
		
• SPD Type 1+2 • Combination of varistor and encapsulated spark gap (for single phase systems) • Visual fault and remote contact fault signalling varistor/GDT status, N-PE GDT presence • Replaceable modules	• SPD Type 1+2 • 3 x combined varistor and encapsulated spark gap + 1 encapsulated spark gap • Visual fault and remote contact fault signalling varistor/GDT status • Replaceable modules	• SPD Type 1+2 • 4 x combined varistor and encapsulated spark gap • Visual fault and remote contact fault signalling varistor/GDT status • Replaceable modules
		

For outline drawing see page 21

SPD specification		**L-N**	**N-PE**	**L-N**	**N-PE**	**L-PE, N-PE**	
Nominal voltage (U_N)	V AC	230	—	230	—	230	
Maximum operating voltage (U_C)	V AC	275	255	275	255	275	
Lightning impulse current (10/350 µs) (I_{imp})	kA	12.5	25	12.5	50	12.5	
Nominal discharge current (8/20 µs) (I_n)	kA	30	30	30	50	30	
Maximum discharge current (8/20 µs) (I_{max})	kA	60	60	60	100	60	
Total discharge current (10/350 µs) (I_{total})	kA	50		50	50	50	
Voltage protection level (U_P)	kV	1.5	1.5	1.5	1.5	1.5	
Ability to independently switch off the following current (I_{fi})	A	No following current	100	No following current	100	No following current	
I_{PE}	µA	< 2	< 2	< 2	< 2	< 2	
TOV 120 min L-N (whitstand)	V AC	440	—	440	—	440	
TOV 5 s L-N (whitstand)	V AC	335	—	335	—	335	
Response time (t_a)	ns	100	100	100	100	100	
Short-circuit proof at maximum overcurrent protection - I_{SSCR}	kA_{rms}	50	—	50	—	50	
Maximum overcurrent protection (fuse rating gL/gG)	A	160	—	160	—	160	
Replacement module code		7P.00.8.275.0012	7P.00.1.255.0025	7P.00.8.275.0012	—	7P.00.8.275.0012	
Other technical data							
Ambient temperature range	°C	–40…+80					
Protection degree alone / installed		IP 20					
Wire size		solid cable			stranded cable		
	mm^2	1 x 1…1 x 35			1 x 1…1 x 25		
	AWG	1 x 17…1 x 2			1 x 17…1 x 4		
Wire strip length	mm	12					
Screw torque	Nm	3					
Remote status signalling contact specification							
Contact configuration		1 CO (SPDT)		1 CO (SPDT)		1 CO (SPDT)	
Rated current	A AC/DC	0.5/0.1		0.5/0.1		0.5/0.1	
Rated voltage	V AC/DC	250/30		250/30		250/30	
Wire size (07P.01)		solid cable	stranded cable	solid cable	stranded cable	solid cable	stranded cable
	mm^2	1.5	1.5	1.5	1.5	1.5	1.5
	AWG	16	16	16	16	16	16
Approvals (according to type)		CE UK CA EAC					

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7P SERIES

7P SERIES
Surge Protection Devices (SPD)

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SPD Type 1+2 Surge arrester range with high performance "Low U_p" - Single phase/three phase system

- Surge arrester suitable for 230/400 V system applications to prevent overvoltage effects caused by direct or indirect lightning strikes
- To be installed at the boundary of LPZ 0 and LPZ 1 zones
- Very Low U_p level to protect senstive equipment
- Visual indication of varistor status - Healthy/Replace
- Contact for remote signalling of varistor status. Connector 07P.01 included
- Replaceable spark gap and modules
- Complies with EN 61 643-11
- 17.5 mm rail EN 60715 mounting for each module

7P.12.8.275.1012 SPD Type 1+2 for single phase TT and TN-S system with Neutral.

- Varistor protection L-N + spark gap protection N-PE for single phase systems
- Replaceble spark gap and varistor modules

7P.13.8.275.1012 SPD Type 1+2 for three phase TN-C system without Neutral (PEN conductor).

- Varistor protection L1, L2, L3-PEN for three phase systems
- Replaceable varistor modules

7P.12 / 7P.13
Screw terminals



For outline drawing see page 22

E

7P.12.8.275.1012

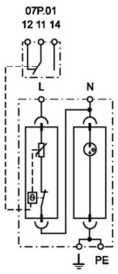


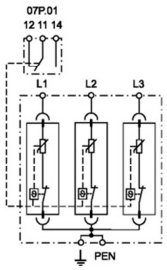
- SPD Type 1+2
- Replaceble spark gap and varistor modules (for single phase systems)
- Visual and remote signalling of varistor status

7P.13.8.275.1012



- SPD Type 1+2
- Replaceable varistor modules (for three phase systems)
- Visual and remote signalling of varistor status





SPD specification		**L-N**		**N-PE**	**L-PEN**	
Nominal voltage (U_N)	V AC	230		—	230	
Maximum operating voltage (U_C)	V AC/DC	275/—		255/—	275/—	
Lightning impulse current (10/350 µs) (I_{imp})	kA	12.5		25	12.5	
Nominal discharge current (8/20 µs) (I_n)	kA	30		40	30	
Maximum discharge current (8/20 µs) (I_{max})	kA	60		60	60	
Total discharge current (10/350 µs) (I_{total})	kA	25		25	37.5	
Voltage protection level (U_p)	kV	1.5		1.5	1.5	
Ability to independently switch off the following current (I_{fi})	A	No following current		100	No following current	
I_{PE}	µA	< 1			< 2100	
TOV 120 min L-N	V AC	440		—	440	
TOV 5 s L-N (Withstand)	V AC	335		—	335	
TOV 200 ms N-PE (Withstand)	V AC	—		1200	—	
Response time (t_a)	ns	25		100	25	
Short-circuit proof at maximum overcurrent protection - I_{SSCR}	kA_{rms}	50		—	50	
Maximum overcurrent protection (fuse rating gL/gG)	A	160		—	160	
Replacement module code		7P.10.8.275.0012		7P.10.1.000.0025	7P.10.8.275.0012	
Other technical data						
Ambient temperature range	°C	-40…+80				
Protection degree		IP 20				
Wire size		solid cable			stranded cable	
	mm^2	1 x 1…1 x 35			1 x 1…1 x 25	
	AWG	1 x 17…1 x 2			1 x 17…1 x 4	
Wire strip length	mm	12				
Screw torque	Nm	3				
Remote status signalling contact specification						
Contact configuration		1 CO (SPDT)		—	1 CO (SPDT)	
Rated current	A AC/DC	0.5/0.1		—	0.5/0.1	
Rated voltage	V AC/DC	250/30		—	250/30	
Wire size (07P.01)		solid cable	stranded cable		solid cable	stranded cable
	mm^2	1.5	1.5	—	1.5	1.5
	AWG	16	16	—	16	16
Approvals (according to type)		CE UKCA EAC				

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7P SERIES
Surface Protection Devices (SPD)

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7P SERIES

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SPD Type 1+2 Surge arrester range with high performance "Low U_p" - three phase system

- Surge arrester suitable for 230/400 V system applications to prevent overvoltage effects caused by direct or indirect lightning strikes
- To be installed at the boundary of LPZ 0 and LPZ 1 zones
- Very Low U_p level to protect senstive equipment
- Visual indication of varistor status - Healthy/Replace
- Contact for remote signalling of varistor status. Connector 07P.01 included
- Replaceable varistor modules
- Complies with EN 61 643-11
- 17.5 mm rail EN 60715 mounting for each module

7P.14.8.275.1012 SPD Type 1+2 for three phase TT and TN-S system with Neutral.

- Varistor protection L1, L2, L3-N + spark gap protection N-PE
- Replaceable varistor modules
- Non replaceable high discharge current spark gap

7P.15.8.275.1012 SPD Type 1+2 for three phase TN-S system with Neutral.

- Varistor protection L1, L2, L3,N-PE
- Replaceable varistor modules

7P.14 / 7P.15
Screw terminals

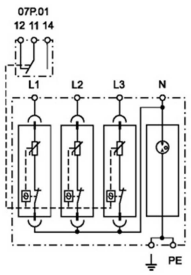


For outline drawing see page 22

7P.14.8.275.1012



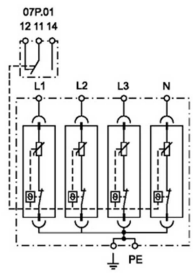
- SPD Type 1+2
- Replaceable varistor module
- Visual and remote signalling of varistor status



7P.15.8.275.1012



- SPD Type 1+2
- Replaceable varistor module
- Visual and remote signalling of varistor status



SPD specification		**L-N**		**N-PE**	**L, N-PE**	
Nominal voltage (U_N)	V AC	230		—	230	
Maximum operating voltage (U_C)	V AC/DC	275/—		255/—	275/—	
Lightning impulse current (10/350 µs) (I_{imp})	kA	12.5		50	12.5	
Nominal discharge current (8/20 µs) (I_n)	kA	30		50	30	
Maximum discharge current (8/20 µs) (I_{max})	kA	60		100	60	
Total discharge current (10/350 µs) (I_{total})	kA	50		50	50	
Voltage protection level (U_p)	kV	1.5		1.5	1.5	
Ability to independently switch off the following current (I_fi)	A	No following current		100	No following current	
I_{PE}	µA	< 2			< 2800	
TOV 120 min L-N	V AC	440		—	440	
TOV 5 s L-N (Withstand)	V AC	335		—	335	
TOV 200 ms N-PE (Withstand)	V AC	—		1200	—	
Response time (t_a)	ns	25		100	25	
Short-circuit proof at maximum overcurrent protection - I_{SSCR}	kA_{rms}	50		—	50	
Maximum overcurrent protection (fuse rating gL/gG)	A	160		—	160	
Replacement module code		7P.10.8.275.0012		—	7P.10.8.275.0012	
Other technical data						
Ambient temperature range	°C	–40…+80				
Protection degree		IP 20				
Wire size		solid cable			stranded cable	
	mm^2	1 x 1…1 x 35			1 x 1…1 x 25	
	AWG	1 x 17…1 x 2			1 x 17…1 x 4	
Wire strip length	mm	12				
Screw torque	Nm	3				
Remote status signalling contact specification						
Contact configuration		1 CO (SPDT)		—	1 CO (SPDT)	
Rated current	A AC/DC	0.5/0.1		—	0.5/0.1	
Rated voltage	V AC/DC	250/30		—	250/30	
Wire size (07P.01)		solid cable	stranded cable		solid cable	stranded cable
	mm^2	1.5	1.5	—	1.5	1.5
	AWG	16	16	—	16	16
Approvals (according to type)		CE UK CA EAC				

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7P SERIES

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Surge Protection Devices (SPD)

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SPD Type 2 Surge arrester range for single/ three phase AC systems and for DC systems

- Surge arrester suitable for AC and DC systems to protect equipment against induced overvoltage or switching transients
- To be installed at the boundary of LPZ 1 - LPZ 2 zones or higher
- Visual indication of varistor status - Healthy/Replace
- Contact for remote signalling of varistor status. Connector (07P.01) included (depending on the version)
- Replaceable varistor and spark gap modules
- Complies with EN 61643-11:2012
- 17.5 mm rail EN 60715 mounting for each module

7P.21.8.075.1015 SPD Type 2, unipolar protection suitable for DC applications or low voltage AC single phase systems
- Varistor protection +/– or L/N (GND); –/+ or GND (L/N)
- Replaceable module

7P.21.8.130.1015 SPD Type 2, unipolar protection suitable for DC application or low voltage AC single phase systems
- Varistor protection +/– or L/N (GND); –/+ or GND (L/N)
- Replaceable module

7P.21.8.275.x020 SPD Type 2, unipolar protection suitable to realize single phase or three phase systems (230/400 V)
- Varistor protection L/N(GND)-GND/(L/N)
- Replaceable module

7P.21.8.440.x020 SPD Type 2, unipolar protection suitable for three phase systems (400 V AC)
- Varistor protection L/N(GND)-GND/(L/N)
- Replaceable module

7P.22.8.275.x020 SPD Type 2 for single phase TT and TN-S system with Neutral
- Varistor protection L-N + spark gap protection N-PE
- Replaceable varistor and spark gap modules

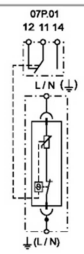
7P.27.8.275.x020
7P.27.8.150.x015: SPD Type 2 for single phase TN system with Neutral
- Varistor protection L, N-PE
- Replaceable varistor modules

For outline drawing see page 22

7P.21.8.xxx.x0xx



- SPD Type 2 (1 varistor)
- Replaceable varistor module
- Visual and optional remote connector for signalling of the varistor status

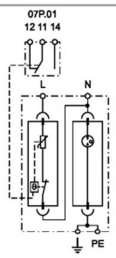


* 7P.20.8.075.0015
** 7P.20.8.130.0015
*** 7P.20.8.150.0015
**** 7P.20.8.275.0020
***** 7P.20.8.440.0020

7P.22.8.275.x020



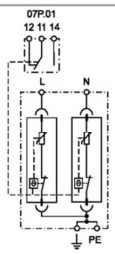
- SPD Type 2 (1 varistor + 1 spark-gap)
- Combination of replaceable varistor and encapsulated spark gap modules
- Visual and optional remote connector for signalling of the varistor status



7P.27.8.xxx.x0xx



- SPD Type 2 (2 varistors)
- Replaceable varistor modules
- Visual and optional remote connector for signalling of the varistor status



SPD specification		075.1015	130.1015	150.x015	275.1020	440.1020	L-N	N-PE	L, N-PE 275.x020	L,N-PE 150.x015
Nominal voltage (U_N)	V AC/DC	60/60	110/125	120/—	230/—	400/—	230/—	—	230/—	120/—
Maximum operating voltage (U_C)	V AC/DC	75/100	130/170	150/—	275/350	440/585	275/—	255/—	275/—	150/—
Nominal discharge current (8/20 µs) (I_n)	kA	15	15	15	20	20	20	20	20	15
Maximum discharge current (8/20 µs) (I_{max})	kA	40	40	40	40	40	40	40	40	40
Voltage protection level at 5 kA (U_{PS})	kV	0.3	0.45	0.6	0.9	1.5	0.9	—	0.9	0.6
Voltage protection level at I_n (U_p)	kV	0.4	0.7	0.74	1.35	1.9	1.35	1.5	1.35	0.74
I_{PE}	µA	< 350	< 350	—	< 200	< 350	< 4		< 400	—
TOV 120 min L-N	V AC	115	225	—	440	—	440	—	440	—
TOV 5 s L-N	V AC	90	175	—	335	580	335	—	335	—
TOV 200 ms N-PE	V AC	—	—	—	—	—	—	1200	—	—
Response time (t_a)	ns	25					25	100	25	25
Short-circuit proof at maximum overcurrent protection - I_{SSCR}	kA_{rms}	50				25	50	—	50	50
Maximum overcurrent protection (fuse rating gL/gG)	A	160				125	160	—	160	160
Replacement module code		*	**	***	****	*****	7P.20.8.275.0020	7P.20.1.000.0020	7P.20.8.275.0020	7P.20.8.150.0015
Other technical data										
Ambient temperature range	°C	–40…+80								
Protection degree		IP 20								
Wire size		solid cable						stranded cable		
	mm^2	1 x 1…1 x 35						1 x 1…1 x 25		
	AWG	1 x 17…1 x 2						1 x 17…1 x 4		
Wire strip length	mm	12								
Screw torque	Nm	3								
Remote status signalling contact specification										
Contact configuration		1 CO (SPDT)						1 CO (SPDT)		
Rated current	A AC/DC	0.5/0.1						0.5/0.1		
Rated voltage	V AC/DC	250/30						250/30		
Wire size (07P.01)		solid cable				stranded cable		solid cable		stranded cable
	mm^2	1.5				1.5		1.5		1.5
	AWG	16				16		16		16
Approvals (according to type)		CE UK CA EAC SM								

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7P SERIES
Surface Protection Devices (SPD)

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SPD Type 2 Surge arrester range - three phase systems

- Surge arrester suitable for 230/400 V system applications to protect equipments against induced overvoltage or switching transients
- To be installed at the boundary of LPZ 1 - LPZ 2 zones or higher
- Visual indication of varistor status - Healthy/Replace
- Contact for remote signalling of varistor status. Connector (07P.01) included (depending on the version)
- Replaceable varistor and spark gap modules
- Complies with EN 61643-11:2012
- 35 mm rail (EN 60715) mounting

7P.23.8.275.x020
7P.23.8.150.x015: SPD Type 2 for three phase TN-C system without Neutral (PEN conductor).
- Varistor protection L1, L2, L3-PEN
- Replaceable varistor module

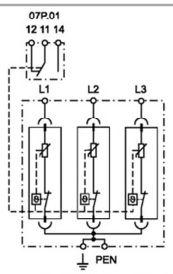
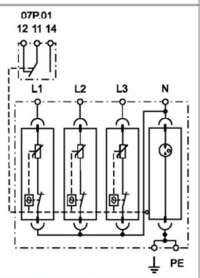
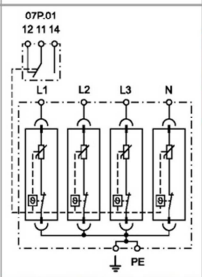
7P.24.8.275.x020 SPD Type 2 for three phase TT and TN-S system with Neutral.
- Varistor protection L1, L2, L3 + spark gap protection N-PE
- Replaceable varistor and spark gap modules

7P.25.8.275.x020
7P.25.8.150.x015: SPD Type 2 for three phase TN-S system with Neutral.
- Varistor protection L1, L2, L3, N-PE
- Replaceable varistor module

7P.23.8 / 7P.24 / 7P.25
Screw terminals



For outline drawing see page 23

	7P.23.8.xxx.x0xx	**7P.24.8.275.x020**	**7P.25.8.xxx.x0xx**
			
	• SPD Type 2 (3 varistors) • Replaceable varistor module, 3 pole • Visual and remote signalling of varistor status	• SPD Type 2 (3 varistors + 1 spark-gap) • Combination of replaceable varistor and encapsulated spark gap modules • Visual and optional remote connector for signalling of the varistor status	• SPD Type 2 (4 varistors) • Replaceable varistor module, 4 pole • Visual and optional remote connector for signalling of the varistor status
			

SPD specification		**L - PEN 275.x020**	**L - PEN 150.x015**	**L-N**	**N-PE**	**L, N-PE 275.x020**	**L, N-PE 150.x015**
Nominal voltage (U_N)	V AC	230	120/—	230	—	230	120/—
Maximum operating voltage (U_C)	V AC/DC	275/350	150/—	275/—	255/—	275/350	150/—
Nominal discharge current (8/20 µs) (I_n)	kA	20	15	20	20	20	15
Maximum discharge current (8/20 µs) (I_{max})	kA	40	40	40	40	40	40
Voltage protection level at 5 kA (U_{PS})	kV	0.9	0.6	0.9	—	0.9	0.6
Voltage protection level at I_n(U_p)	kV	1.35	0.74	1.35	1.5	1.35	0.74
I_{PE}	µA	< 600	—	< 4		< 800	—
TOV 120 min L-N	V AC	440	—	440	—	440	—
TOV 5 s L-N	V AC	335	—	335	—	—	—
TOV 200 ms N-PE	V AC	—	—	—	1200	—	—
Response time (t_a)	ns	25	25	25	100	25	25
Short-circuit proof at maximum overcurrent protection - I_{SSCR}	kA_{rms}	50	50	50	—	50	50
Maximum overcurrent protection (fuse rating gL/gG)	A	160	160	160	—	160	160
Replacement module code		7P.20.8.275.0020	7P.20.8.150.0015	7P.20.8.275.0020	7P.20.1.000.0020	7P.20.8.275.0020	7P.20.8.150.0015
Other technical data							
Ambient temperature range	°C	–40…+80					
Protection degree		IP 20					
Wire size		solid cable			stranded cable		
	mm^2	1 x 1…1 x 35			1 x 1…1 x 25		
	AWG	1 x 17…1 x 2			1 x 17…1 x 4		
Wire strip length	mm	12					
Screw torque	Nm	3					
Remote status signalling contact specification							
Contact configuration		1 CO (SPDT)		1 CO (SPDT)		1 CO (SPDT)	
Rated current	A AC/DC	0.5/0.1		0.5/0.1		0.5/0.1	
Rated voltage	V AC/DC	250/30		250/30		250/30	
Wire size (07P.01)		solid cable	stranded cable	solid cable	stranded cable	solid cable	stranded cable
	mm^2	1.5	1.5	1.5	1.5	1.5	1.5
	AWG	16	16	16	16	16	16
Approvals (according to type)		CE UK CA EAC					

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7P SERIES

7P SERIES
Surge Protection Devices (SPD)

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SPD Type 2 Surge arrester range for single/three phase AC systems without leakage current

- Surge arrester suitable for AC systems to protect equipment against induced overvoltage or switching transients
- To be installed at the boundary of LPZ 1 - LPZ 2 zones or higher
- Versions with combination of varistor and high-performance spark gap (GDT) ensures:
  - high discarge current
  - high insulation resistance that eliminates leakage current
  - no following current
- Very low residual voltage
- Visual fault signalling: Healthy/Replace
- Remote status signalling contact: Healthy/Replace
- Connector 07P.01 included
- Replaceable modules
- Complies with EN 61643-11:2012
- 17.5 mm rail EN 60715 mounting for each module

7P.42.8.275.1020 SPD Type 2 for single phase TT and TN-S system. Varistor + GDT protection L-N + GDT protection N-PE

7P.43.8.275.1020 SPD Type for three phase TN-C system without Neutral (PEN conductor). Varistor + GDT protection L1, L2, L3-PEN

7P42/7P43
Screw terminals

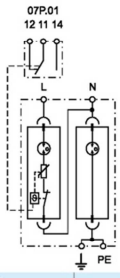


For outline drawing see page 22, 23

7P.42.8.275.1020



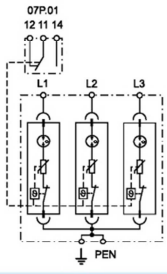
- SPD Type 2
- Combination of varistor and encapsulated spark gap (for single phase systems)
- Replaceable modules
- Visual fault and remote contact fault signalling varistor/GDT status



7P.43.8.275.1020



- SPD Type 2
- 3 x combined varistor and encapsulated spark gap
- Replaceable modules
- Visual fault and remote contact fault signalling varistor/GDT status



SPD specification		**L-N**		**N-PE**	**L-PEN**	
Nominal voltage (U_N)	V AC	230		—	230	
Maximum operating voltage (U_C)	V AC	275		255	275	
Nominal discharge current (8/20 µs) (I_n)	kA	20		20	20	
Maximum discharge current (8/20 µs) (I_{max})	kA	25		40	25	
Voltage protection level (U_p)	kV	1.2		1.5	1.2	
Ability to independently switch off the following current (I_{fi})	A	No following current		100	No following current	
I_{PE}	µA	< 4			< 4	
TOV 120 min L-N	V AC	440		—	440	
TOV 5 s L-N	V AC	335		—	335	
TOV 200 ms N-PE	V AC	—		1200	—	
Response time (t_a)	ns	100		100	100	
Short-circuit proof at maximum overcurrent protection - I_{SSCR}	kA_{rms}	35		—	35	
Maximum overcurrent protection (fuse rating gL/gG)	A	125		—	125	
Replacement module code		7P.40.8.275.0020		7P.40.1.000.0020	7P.40.8.275.0020	
Other technical data						
Ambient temperature range	°C	–40…+80				
Protection degree		IP 20				
Wire size		solid cable			stranded cable	
	mm^2	1 x 1…1 x 35			1 x 1…1 x 25	
	AWG	1 x 17…1 x 2			1 x 17…1 x 4	
Wire strip length	mm	12				
Screw torque	Nm	3				
Remote status signalling contact specification						
Contact configuration		1 CO (SPDT)		—	1 CO (SPDT)	
Rated current	A AC/DC	0.5/0.1		—	0.5/0.1	
Rated voltage	V AC/DC	250/30		—	250/30	
Wire size (07P.01)		solid cable	stranded cable		solid cable	stranded cable
	mm^2	1.5	1.5	—	1.5	1.5
	AWG	16	16	—	16	16
Approvals (according to type)		CE UKCA EAC SIM				

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7P SERIES
Surface Protection Devices (SPD)

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7P SERIES

E

SPD Type 2 Surge arrester range for three phase AC systems (230/400 V) without leakage current

- Surge arrester suitable for AC systems to protect equipment against induced overvoltage or switching transients
- To be installed at the boundary of LPZ 1 - LPZ 2 zones or higher
- Versions with combination of varistor and high-performance spark gap (GDT) ensures:
  - high discarge current
  - high insulation resistance that eliminates leakage current
  - no following current
- Very low residual voltage
- Visual fault signalling: Healthy/Replace
- Remote status signalling contact: Healthy/Replace. Connector 07P.01 included
- Replaceable modules
- Complies with EN 61643-11:2012
- 17.5 mm rail EN 60715 mounting for each module

7P.44.8.275.1020 SPD Type 2 for three phase TT and TN-S system with Neutral. Varistor + GDT protection L1, L2, L3-N + spark gap protection N-PE

7P.45.8.275.1020 SPD Type 2 for three phase TN-S system with Neutral. Varistor + GDT protection L1, L2, L3-N + varistor + GDT protection N-PE

7P.44/7P.45
Screw terminals



For outline drawing see page 23

7P.44.8.275.1020

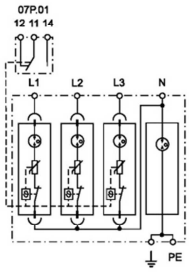


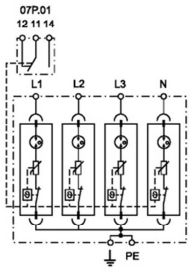
- SPD Type 2
- 3 x combined varistor and encapsulated spark gap + 1 encapsulated spark gap
- Visual fault and remote contact fault signalling varistor/GDT status
- Replaceable modules

7P.45.8.275.1020



- SPD Type 2
- 4 x combined varistor and encapsulated spark gap
- Visual fault and remote contact fault signalling varistor/GDT status
- Replaceable modules





SPD specification		**L-N**		**N-PE**	**L, N-PE**	
Nominal voltage (U_N)	V AC	230		—	230	
Maximum operating voltage (U_C)	V AC	275		255	275	
Nominal discharge current (8/20 µs) (I_n)	kA	20		20	20	
Maximum discharge current (8/20 µs) (I_{max})	kA	25		40	25	
Voltage protection level (U_p)	kV	1.2		1.5	1.2	
Ability to independently switch off the following current (I_{fi})	A	No following current		100	No following current	
I_{PE}	µA	< 4			< 4	
TOV 120 min L-N	V AC	440		—	440	
TOV 5 s L-N	V AC	335		—	335	
TOV 200 ms N-PE	V AC	—		1200	—	
Response time (t_a)	ns	100		100	100	
Short-circuit proof at maximum overcurrent protection - I_{SSCR}	kA_{rms}	35		—	35	
Maximum overcurrent protection (fuse rating gL/gG)	A	125 A		—	125 A	
Replacement module code		7P.40.8.275.0020		7P.40.1.000.0020	7P.40.8.275.0020	
Altri dati tecnici						
Ambient temperature range	°C	–40…+80				
Protection degree		IP 20				
Wire size		solid cable			stranded cable	
	mm^2	1 x 1…1 x 35			1 x 1…1 x 25	
	AWG	1 x 17…1 x 2			1 x 17…1 x 4	
Wire strip length	mm	12				
Screw torque	Nm	3				
Remote status signalling contact specification						
Contact configuration		1 CO (SPDT)		—	1 CO (SPDT)	
Rated current	A AC/DC	0.5/0.1		—	0.5/0.1	
Rated voltage	V AC/DC	250/30		—	250/30	
Wire size (07P.01)		solid cable	stranded cable		solid cable	stranded cable
	mm^2	1.5	1.5	—	1.15	1.5
	AWG	16	16	—	16	16
Approvals (according to type)		CE UK CA EAC				

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7P SERIES

7P SERIES
Surge Protection Devices (SPD)

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SPD Type 2 Surge arrester range for photovoltaic applications

- Surge arrester Type 2 for protection of DC side with U_{CPV} from 750 V up to 1500 V DC
- Protects equipment against induced overvoltage caused by lightning strikes or switching transients

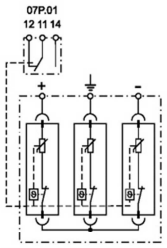
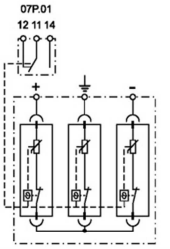
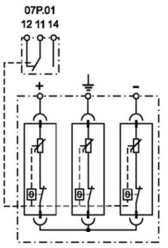
  7P.23.9.750.x020, U_{CPV} = 750 V DC
  7P.23.9.000.x015, U_{CPV} = 1020 V DC
  7P.23.9.500.x015, U_{CPV} = 1500 V DC
- Visual indication of varistor status - Healthy/Replace
- Contact for remote signalling of varistor status. Connector (07P.01) included (depending on the verision)
- Replaceable modules
- Complies with EN 61643-31, IEC 61643-31
- 35 mm rail (EN 60715) mounting

7P.23.9
Screw terminals

E



For outline drawing see page 23

	7P.23.9.750.x020	7P.23.9.000.x015	7P.23.9.500.x015
			
	• SPD Type 2 (3 Y varistors) for photovoltaic systems with U_{CPV} of 750 V DC • Replaceable varistor modules • Visual and optional remote connector for signalling of the varistor status	• SPD Type 2 (3 Y varistors) for photovoltaic systems with U_{CPV} of 1020 V DC • Replaceable varistor modules • Visual and optional remote connector for signalling of the varistor status	• SPD Type 2 (3 Y varistors) for photovoltaic systems with U_{CPV} of 1500 V DC • Replaceable varistor modules • Visual and remote signalling of varistor status
			

SPD specification		**Varistor module**	**Varistor module**	**Varistor module**
Maximum operating voltage mode +/PE and -/PE (U_{CPV})	V DC	750	1020	1500
Maximum operating voltage/per module (U_{CPV})	V DC	375	510	750
Nominal discharge current/ per module (8/20 µs) (I_n)	kA	20	15	15
Maximum discharge current/ per module (8/20 µs) (I_{max})	kA	40	40	40
Total discharge current (8/20 µs) (I_{Total})	kA	40	40	40
Voltage protection level/per module (U_p)	kV	1.8	2	3.2
Voltage protection level of the system U_p (+ → –)/(+/– → PE)	kV	3.6/3.6	4/4	6.4/6.4
Residual current (+ → –)/(+/– → PE)	µA DC	< 5	< 5	< 5
Residual current (+ → –)/(+/– → PE)	µA AC	250	250	250
Response time (t_a)	ns	25	25	25
Short circuit current withstand I_{SCPV}	A	10 000	10 000	10 000
Replacement module code		7P.20.9.375.0020	7P.20.9.500.0015	7P.20.9.750.0015
Other technical data				
Fault indication		Mechanical indicator and optional remote connector		
Ambient temperature range	°C	–40…+80		
Protection degree		IP 20		
Wire size		solid cable	stranded cable	
	mm²	1 x 1…1 x 35	1 x 1…1 x 25	
	AWG	1 x 17…1 x 2	1 x 17…1 x 4	
Wire strip length	mm	14		
Screw torque	Nm	3		
Remote status signalling contact specification				
Contact configuration		1 CO (SPDT)	1 CO (SPDT)	1 CO (SPDT)
Rated current	A AC/DC	0.5/0.1	0.5/0.1	0.5/0.1
Rated voltage	V AC/DC	250/30	250/30	250/30
Wire size (07P.01)		solid cable / stranded cable	solid cable / stranded cable	solid cable / stranded cable
	mm²	1.5 / 1.5	1.5 / 1.5	1.5 / 1.5
	AWG	16 / 16	16 / 16	16 / 16
Approvals (according to type)		CE UKCA EAC		

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7P SERIES
Surface Protection Devices (SPD)

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7P SERIES

SPD Type 1+2 Surge Arrester range for photovoltaic applications

- Surge arrester for protection of PV systems with U_{CPV} up to 1500 V DC
- Protects equipment against overvoltage caused by direct lightning strikes and induced overvoltages
- Suitable for non-isolated LPS systems

  7P.13.9.000.x006, U_{CPV} = 1050 V DC
  7P.13.9.500.x006, U_{CPV} = 1500 V DC
- Visual indication of varistor status - Healthy/Replace
- Contact for remote signalling of varistor status. Connector (07P.01) included
- Compact design. Can be mounted inversely
- Complies with EN 61643-31, IEC 61643-31
- 35 mm rail (EN 60715) mounting

NEW **7P.13.9.000.x006**



- SPD Type 1+2 (3 Y varistors) for PV system with U_{CPV} 1050 V DC
- Compact design. Can be mounted inversely
- Visual and optional remote connector for signalling of the varistor status

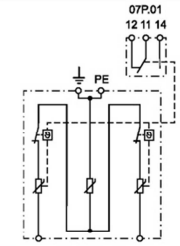
NEW **7P.13.9.500.x006**

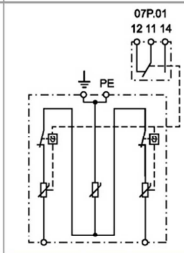


- SPD Type 1+2 (3 Y varistors) for PV system with U_{CPV} 1500 V DC
- Compact design. Can be mounted inversely
- Visual and optional remote connector for signalling of the varistor status

7P.13
Screw terminals







For outline drawing see page 23

SPD specification		PV T1+T2	PV T1+T2
Maximum operating voltage mode +/PE, -/PE (U_{CPV})	V DC	1050	1500
Lightning impulse current (10/350 µs)/ per module (I_{imp})	kA	6.25	6.25
Nominal discharge current/ per module (8/20 µs) (I_n)	kA	20	20
Maximum discharge current/ per module (8/20 µs) (I_{max})	kA	40	40
Total discharge current (10/350 µs) (I_{Total})	kA	12.5	12.5
Total discharge current (8/20 µs) (I_{Total})	kA	80	80
Voltage protection level module +/- (U_p)	kV	3.8	5.4
Voltage protection level module (+PE)/(–PE) (U_p)	kV	3.8	5.4
Response time (t_a)	ns	25	25
Short circuit current rating I_{SCPV}	kA	20	20
Residual current mode +/PE, -/PE (I_{PE})	µA AC	500	500
Residual current mode +/PE, -/PE (I_{PE})	µA DC	10	10
Other technical data			
Fault indication		Red indication flag and remote contact	
Ambient temperature range	°C	–40…+80	
Protection degree		IP 20	
Wire size		stranded cable	solid cable
	mm²	1 x 2.5…1 x 25	1 x 4…1 x 35
	AWG	1 x 13…1 x 4	1 x 11…1 x 2
Wire strip length	mm	14	
Screw torque	Nm	3	
Remote status signalling contact specification			
Contact configuration		1 CO (SPDT)	1 CO (SPDT)
Rated current	A AC/DC	0.5/0.1	0.5/0.1
Rated voltage	V AC/DC	250/30	250/30
Wire size (07P.01)		solid cable / stranded cable	solid cable / stranded cable
	mm²	1.5 / 1.5	1.5 / 1.5
	AWG	16 / 16	16 / 16
Approvals (according to type)		CE UK CA EAC	

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7P SERIES

7P SERIES
Surge Protection Devices (SPD)

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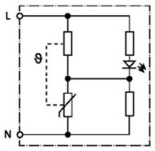
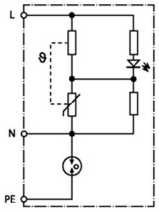
E

SPD Type 3, Surge arrester for TT and TN-S system (with Neutral)
Single phase applications within socket outlets and 35 mm rail mounting

- Protects electrical and electronic equipment sensitive to impulse overvoltage
- Varistor and spark gap (GDT) combination avoiding earth leakage current
- Conforms to EN 61643-11:2012

7P.31.8.275.0005
- Unipolar protection (L/N)
- IP 65 SPD
- LED indication of need to replace the SPD
- 2 wires, 150 mm long, for ease of connection

7P.32.8.275.0005
- "1+1" configuration: varistor + spark gap with very low U_p level
- IP 65 SPD
- LED indication of need to replace the SPD
- 3 wires, 150 mm long, for ease of connection

	7P.31.8.275.0005	**7P.32.8.275.0005**
		
	• SPD Type 3 • Unipolar protection suitable also for LED lamp protection • IP 65	• SPD Type 3 • "1+1" configuration suitable also for LED lamp protection • IP 65
		

* see diagram L7P page 29
For outline drawing see page 24

SPD specification			
Nominal voltage (U_N)	V AC	230	230
Maximum operating voltage (U_C)	V AC	275	275
Nominal discharge current (8/20 µs) L-N, L(N)-PE (I_n)	kA	5/—	5/5
Maximum discharge current (8/20 us) L-N, N-PE (I_{max})	kA	10/—	10/10
Test voltage of the combined generator L-N, L(N)-PE (U_{OC})	kV	10/—	10/10
Voltage protection level L-N, L(N)-PE (U_p)	kV	1.6/—	1.65/1.5
Response time L-N, L(N)-PE (t_a)	ns	25/—	25/100
Short-circuit proof at maximum overcurrent protection - I_{SSCR}	kA_{rms}	1.5	1.5
Maximum overcurrent protection		16 A gL/gG, B16 A, C10 A	16 A gL/gG, B16 A, C10 A
Other technical data			
Ambient temperature range	°C	–25…+80	–25…+80
Protection degree		IP 65	IP 65
Approvals (according to type)		CE UK CA EAC SIM	CE UK CA SIM

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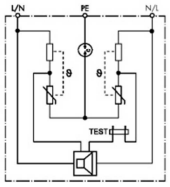
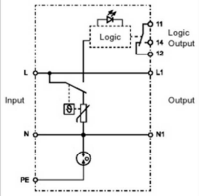
14

7P SERIES
Surface Protection Devices (SPD)

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7P SERIES

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	7P.36.8.275.2003	7P.37.8.275.1003
SPD Type 3, Surge arrester for TT and TN-S system (with Neutral) **Single phase applications within socket outlets and 35 mm rail mounting** • Protects electrical and electronic equipment sensitive to impulse overvoltage • Varistor and spark gap (GDT) combination avoiding earth leakage current • Conforms to EN 61643-11:2012 **7P.36.8.275.2003** • Provides easy additional surge protection for 230 V sockets • "Y" configuration: varistor + spark gap with very low U_p level • Audible indication of need to replace varistor and jumper test point for SPD status • 3-wires, 150 mm long, for connection to socket terminals **7P.37.8.275.1003** • "1+1" configuration: varistor + spark gap with very low U_p level • Permits serial connection for optimized load protection up to 16 A • Integral CO contact for remote signalling of varistor status - contact gold plated for reliable low level switching • 17.5 mm L-N/N-PE protection • Mounting on 35 mm DIN rail (EN 60715)	 • SPD Type 3 • "Y" configuration • Audible (buzzing) signalling of varistor fault	 • SPD Type 3 • "1+1" configuration • Series connection for protection of loads up to 16 A • Remote signalling of varistor status by integral change-over relay contact
		
* see diagram L7P page 29 For outline drawing see page 23, 24		

SPD specification			
Nominal voltage (U_N)	V AC	230	230
Maximum operating voltage L-N/N-PE (U_C)	V AC	275	275/255
Rated load current (I_L)	A	—	16
Nominal discharge current (8/20 µs) L-N, L(N)-PE (I_n)	kA	3/3	3/3
Test voltage of the combined generator L-N, L(N)-PE (U_{OC})	kV	6/6	6/6
Voltage protection level L-N, L(N)-PE (U_p)	kV	1.65/1.5	1/1.5
Response time L-N, L(N)-PE (t_a)	ns	25/100	25/100
Short-circuit proof at maximum overcurrent protection - I_{SSCR}	kA_{rms}	1.5	5
Maximum overcurrent protection		16 A gL/gG, B16 A, C10 A	C16 A, 16 A gG
Other technical data			
Ambient temperature range	°C	–20…+70	–20…+70*
Protection degree		IP 20	IP 20
Wire size		—	solid cable / stranded cable
	mm^2	—	0.5…4 / 0.5…4
	AWG	—	20…11 / 20…12
Wire strip length	mm	—	9
Screw torque	Nm	—	0.8
Remote status signalling contact specification			
Contact configuration		—	1 CO (SPDT)
Rated current	A AC	—	0.5
Rated voltage	V AC	—	230
Breaking capacity DC1: 24/110	A	—	2/0.3
Minimum switching load	mW (V/mA)	—	10 (5/5)
Contact material		—	AgNi + Au
Approvals (according to type)		CE UKCA EAC	

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7P SERIES
Surge Protection Devices (SPD)

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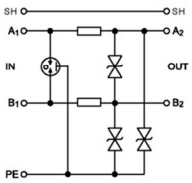
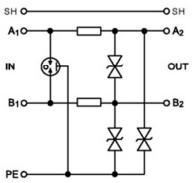
SPD Type 2+3 with combination of coarse and fine suppression for 2 wires data lines and signalling network

- Suitable for the protection of 2 wires data lines and telecommunication interface allowing continuity of the shield
- Permits serial connection optimizing the fine protection of longitudinal overvoltage (core-PG) and lateral overvoltage (core-core)
- Conform to EN 61643-21+A1,A2:2013, EN IEC61643-21+A1,A2:2012 C2,C3
- DIN rail mounting

7P.62.9.009.0485
- Suitable for the protection of RS485 data lines of inverter, PLC, energy meters or other interfaces

7P.62.9.036.0005
- Suitable for the protection of fire detection systems, telecommunications interfaces and 2-wire data lines

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	7P.62.9.009.0485	**7P.62.9.036.0005**
		
	• SPD Type 2+3 • Protection of RS485 data lines, telecommunication and other Bus lines	• SPD Type 2+3 • Protection of fire detection systems, telecommunication and other data/Bus lines
		

For outline drawing see page 24

SPD specification					
Nominal voltage (U_N)	V DC	6		24	
Maximum operating voltage (U_C)	V DC	8.5		36	
Nominal load current (I_L)	A	0.5		0.5	
C2 nominal discharge current (8/20 µs) core-core (I_n)	kA	5		5	
C2 total discharge current (8/20 µs) cores-PE (C)	kA	10		10	
C2 voltage protection level mode core-core @ I_n (U_p)	V	18		50	
C2 voltage protection level mode core-PE @ I_n (U_p)	V	30		65	
C3 voltage protection level mode core-core @ 1 kV/µs (U_p)	V	12		45	
C3 voltage protection level mode core-PE @ 1 kV/µs (U_p)	V	15		45	
Response time core-core/core-PE (ta)	ns	1/1		1	
Serial resistance per core (R)	Ω	1.6		1.6	
Treshold frequency core-core (f)	MHz	1		4	
Other technical data					
Range of operating temperature	°C	–40…+70		–40…+70	
Degree of protection		IP 20		IP 20	
Wire size		solid cable	stranded cable	solid cable	stranded cable
	mm²	4	2.5	4	2.5
	AWG	12	14	12	14
Approvals (according to type)		CE UKCA			

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7P SERIES
Surface Protection Devices (SPD)

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7P SERIES

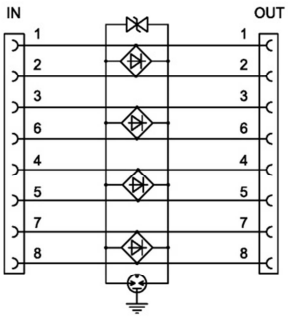
Data line SPD for Ethernet Cat. 6

- Suitable for Ethernet, POE (Power over Ethernet) and dataline transmission system up to 250 MHz
- Protection of all pairs of conductors with minimum attenuation
- Aluminum chassis and RJ45 in metal screens
- Included accessories for simple installation near the equipment to be protected, LPZ boundary 2-3 (Type 3)
- Complies to EN 61643-21
- Mounting on 35 mm DIN rail

7P.68.9.060.0600



- Ethernet Cat 6 - 60 V
- Shielded RJ45 connectors



E

For outline drawing see page 24

SPD specification		
Nominal voltage of system (U_N)	V DC	48
Maximum operating voltage (U_C)	V DC	60
Nominal current (I_L)	mA	500
C2 total nominal discharge current (8/20 µs) line - PG (I_n)	kA	1.6
C2 nominal discharge current (8/20 µs) line-line (I_n)	A	200
Voltage protection level line-line @ I_n (C2) - (U_p)	V	130
Voltage protection level line-PG @ I_n (C2) - (U_p)	V	350
Voltage protection level line-line @ 1 kV/µs (C3) - (U_p)	V	130
Insertion attenuation @ 250 MHz	dB	< 2
Response time	ns	1
Other technical data		
Ambient temperature range	°C	–40…+80
Degree of protection		IP 20
Input-Output connection		RJ45/RJ45 shielded
Approvals (according to type)		CE UKCA

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7P SERIES

7P SERIES
Surge Protection Devices (SPD)

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Ordering information

Example: 7P series, surge protection device, Type 2, three-phase (U_C = 275 V), 1 varistor + 1 encapsulated spark gap, with remote status signalling contact, I_n = 20 kA

7 P . 2 4 . 8 . 2 7 5 . 1 0 2 0

Series

Type
0 = Combined type 1 + 2 arresters MOV+GDT, leakage free
1 = Type 1+2 high performance MOV
2 = Type 2 surge arresters
3 = Type 3 surge arresters
4 = Type 2 surge arrester without leakage current
6 = Data line SPD

Circuit
1 = Single phase (1 varistor)
2 = Single phase (1 varistor + 1 spark-gap), protected poles (data line SPD)
2 = Protected poles (Data line SPD)
3 = Three-phase (3 varistors)
4 = Three-phase (3 varistors + 1 spark-gap)
5 = Three-phase (4 varistors)
6 = 1 varistors + 1 spark-gap(7P.36)
7 = Single phase (2 varistors) Type 2 (7P.27)
7 = Single phase (1 varistor + 1 spark gap) Type 3, DIN rail mounting (7P.37)
8 = Protected poles (Data line SPD)
9 = N-PE spark-gap for three phase system
0 = Spare module

Supply version
1 = N+PE connection (only for single spark gap replaceable module and 7P.09)
8 = AC (50/60 Hz)
9 = DC (PV application and Data line SPD)

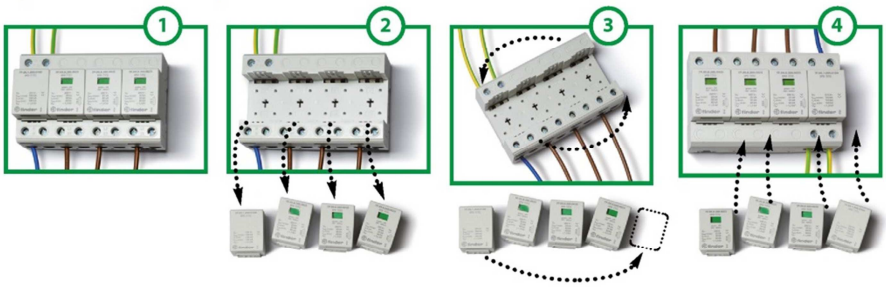
Supply voltage
000 = N+PE connection for spark gap modules
009 = 8.5 V DC Max (U_C) SPD Data line SPD
036 = 36 V DC Max (U_C) SPD Data line SPD
060 = 60 V DC Max (U_C), Data line SPD
075 = 75 V AC Max
130 = 130 V AC Max
150 = 150 V AC Max (only T2)
440 = 440 V Max (U_C) for SPD Type 2 (for U_N = 400 V AC)
275 = 275 V Max for SPD Type 1+2 "Low U_p", Type 2 (U_C) (for U_N = 230-240 V AC) and Type 3
260 = 260 V Max (U_C) for SPD Type 1+ 2 (for U_N = 230-240 V AC)
255 = 255 V Max (U_C) for SPD Type 1, N+PE (7P.09)

Supply voltage PV SPD
U_{CPV} >= 1.2 Uoc STC
000 = 1050 V DC U_{CPV} SPD T1+2 (7P.13.9), 1020 V DC U_{CPV} PV SPD T2 (7P.23.9)
500 = 1500 V DC U_{CPV}
750 = 750 V DC U_{CPV}

Nominal discharge current
100 = 100 kA (I_{imp} Type 1) only for 7P.09, N-PE GDT for 7P.04
050 = 50 kA (I_{imp} Type 1 N-PE GDT for 7P.02)
025 = 25 kA (I_{imp} Type 1+2)
020 = 20 kA (I_n Type 2)
015 = 15 kA (I_n Type 2)
012 = 12.5 kA (I_{imp} Type 1+2)
003 = 3 kA (I_n @ U_{oc} only for 7P.36 and 7P.37)
005 = 5 kA (I_n @ U_{oc} for 7P.31, 7P.32 and 7P.62)
006 = 6.25 kA (I_{imp} Type 1+2)
007 = 7.5 kA (I_{imp} Type 1+2)
107 = 7.5 kA (I_{imp} Type 1+2) with remote status signalling contact
012 = 12.5 kA (I_{imp} Type 1+2)
112 = 12.5 kA (I_{imp} Type 1+2) with remote status signalling contact
485 = RS485 Modbus protocol (Data line SPD)
600 = Ethernet Cat 6 (Data line SPD)

Remote status signalling contact
0 = Without remote status signalling contact (only some Type 2 SPD and Data line)
1 = Built-in remote status signalling contact
2 = Acoustic fault signalling (only for 7P.36)

Upside down mounting



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Replaceable modules



Replacement varistor and modules		7P.00.8.260.0025	7P.00.9.500.0012	7P.00.1.000.0050	7P.00.1.000.0100
		Varistor + GDT	Varistor + GDT	Spark-Gap	Spark-Gap
Maximum operating voltage (U_C/U_{CPV})	V AC/DC	260/—	—/500	255/—	255/—
Lightning Impulse current (10/350 µs) (I_{imp})	kA	25	12.5	50	100
Nominal discharge current (8/20 µs) (I_n)	kA	30	30	50	100
Maximum discharge current (8/20 µs) (I_{max})	kA	60	60	100	100
Voltage protection level (U_p)	kV	1.5	1.8	1.5	1.5
Leakage current (@ 253 V AC) & I_{pe} current	µA	< 4	< 4	< 4	< 4
Response time (t_a)	ns	100	25	100	100
Maximum overcurrent protection		250 A gL/gG	—	—	—



Replacement varistor and modules		7P.00.8.275.0012	7P.00.1.255.0025	7P.10.8.275.0012	7P.10.1.000.0025
		Varistor + GDT	Spark-Gap	Varistor	Spark-Gap
Maximum operating voltage (U_C)	V AC/DC	275/—	255/—	275/—	255/—
Lightning Impulse current (10/350 µs) (I_{imp})	kA	12.5	25	12.5	25
Nominal discharge current (8/20 µs) (I_n)	kA	30	30	30	40
Maximum discharge current (8/20 µs) (I_{max})	kA	60	60	60	60
Voltage protection level (U_p)	kV	1.5	1.5	1.5	1.5
Response time (t_a)	ns	100	100	25	100
Maximum overcurrent protection		160	160	160 A gL/gG	—

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Replacement varistor modules		7P.20.8.075.0015	7P.20.8.130.0015	7P.20.8.150.0015	7P.20.8.275.0020	7P.20.8.440.0020	7P.40.8.275.0020
		Varistor	Varistor	Varistor	Varistor	Varistor	Varistor + GDT
Maximum operating voltage (U_C)	V AC/DC	75/100	130/170	150/—	275/350	440/585	275/—
Nominal discharge current (8/20 µs) (I_n)	kA	15	15	15	20	20	20
Maximum discharge current (8/20 µs) (I_{max})	kA	40	40	40	40	40	25
Voltage protection level (U_p)	kV	0.4	0.7	0.74	1.35	1.9	1.2
Response time (t_a)	ns	25	25	25	25	25	100
Maximum overcurrent protection		160 A gL/gG	160 A gL/gG	160 A gL/gG	160 A gL/gG	125 A gL/gG	125 A gL/gG



Replacement varistor modules		7P.20.9.375.0020	7P.20.9.500.0015	7P.20.9.750.0015
		Varistor	Varistor	Varistor
Maximum operating voltage (U_C/U_{CPV})	V AC/DC	—/375	—/510	—/750
Nominal discharge current (8/20 µs) (I_n)	kA	20	15	15
Maximum discharge current (8/20 µs) (I_{max})	kA	40	40	40
Voltage protection level (U_p)	kV	1.8	2	3.2
Response time (t_a)	ns	25	25	25
Maximum overcurrent protection		—	—	—

Replacement modules		7P.20.1.000.0020	7P.40.1.000.0020
		Spark-Gap	Spark-Gap
Maximum operating voltage (U_C/U_{CPV})	V AC/DC	255/—	255/—
Nominal discharge current (8/20 µs) (I_n)	kA	20	20
Maximum discharge current (8/20 µs) (I_{max})	kA	40	40
Voltage protection level (U_p)	kV	1.5	1.5
Response time (t_a)	ns	100	100
Maximum overcurrent protection		—	—

Temporary Overvoltage (TOV)		7P.32, 7P.36, 7P.37
Transient OverVoltage 5 s L-N (U_{TOV})	V	335
Transient OverVoltage 5 s L-PE (U_{TOV})	V	400
Transient OverVoltage 200 ms L-PE (U_{TOV})	V	1430

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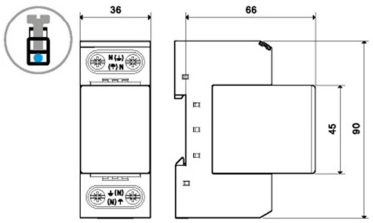
7P SERIES

7P SERIES
Surge Protection Devices (SPD) - Dimensional data

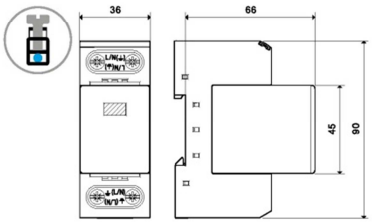
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Outline drawings

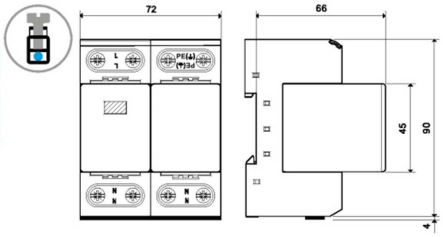
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Screw terminal



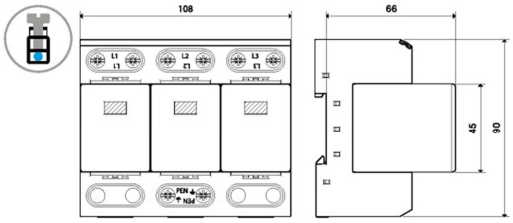
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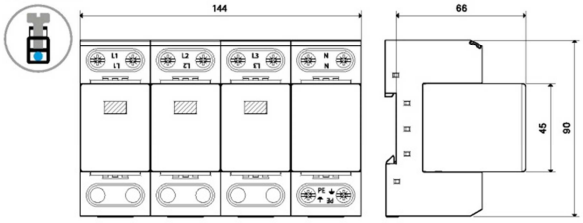
Type 7P.02
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Type 7P.03
Screw terminal



Type 7P.04
Screw terminal



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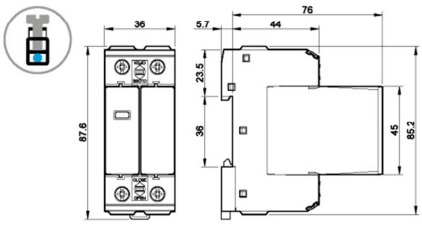
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Surface Protection Devices (SPD) - Dimensional data

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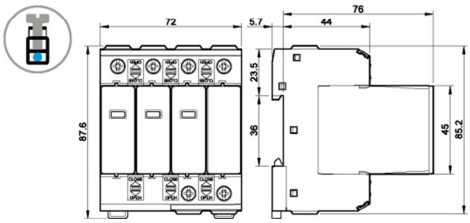
7P SERIES

Outline drawings

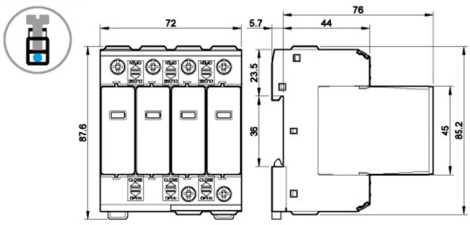
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Screw terminal



Type 7P.04.8.275.1012
Screw terminal



Type 7P.05.8.275.1012
Screw terminal



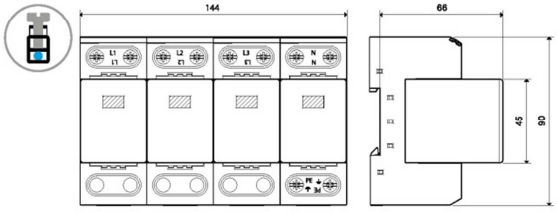
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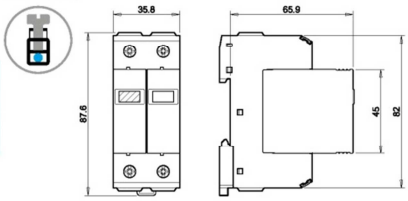
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Outline drawings

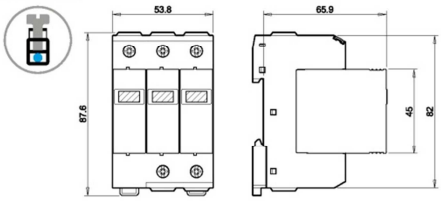
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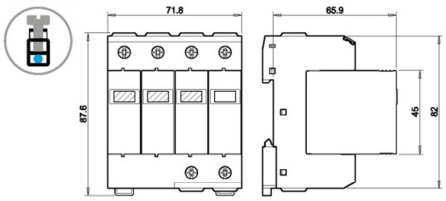
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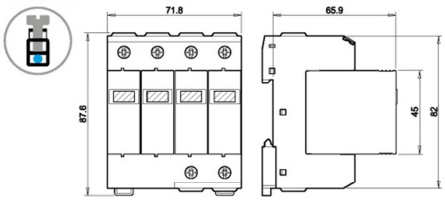
Type 7P.13
Screw terminal



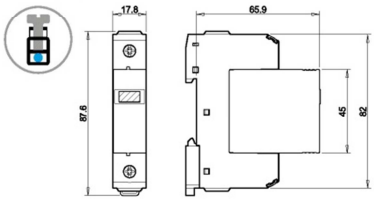
Type 7P.14
Screw terminal



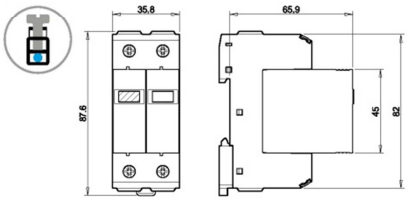
Type 7P.15
Screw terminal



Type 7P.21
Screw terminal



Types 7P.22 / 7P.27 / 7P.42
Screw terminal



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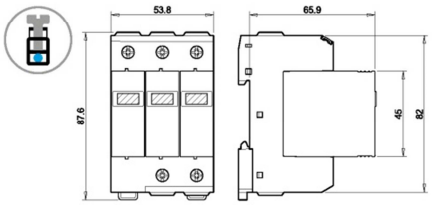
7P SERIES
Surface Protection Devices (SPD) - Dimensional data

finder

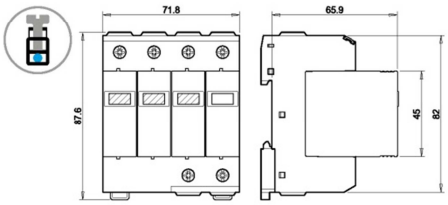
7P SERIES

Outline drawings

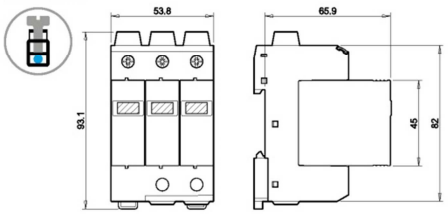
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Screw terminal



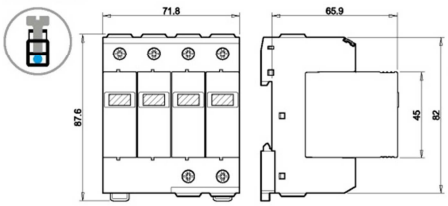
Types 7P.24 / 7P.44
Screw terminal



Type 7P.23.9
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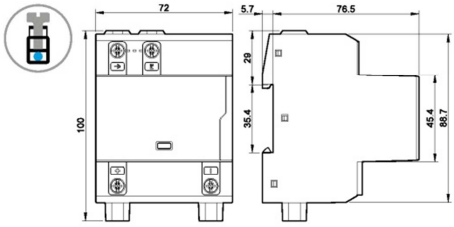


Types 7P.25 / 7P.45
Screw terminal

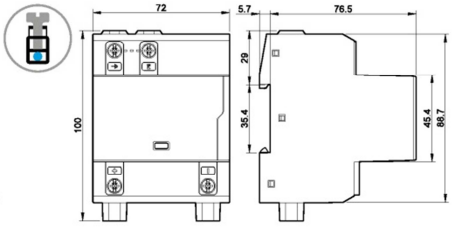


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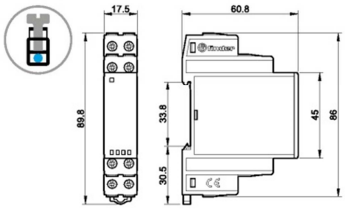
Type 7P.13.9.000.x006
Screw terminal



Type 7P.13.9.500.x006
Screw terminal



Type 7P.37.8.275.1003
Screw terminal



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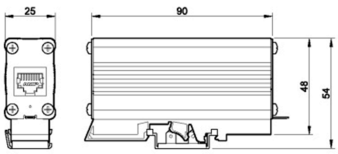
7P SERIES

7P SERIES
Surge Protection Devices (SPD) - Dimensional data

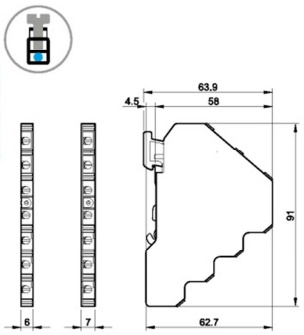
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Outline drawings

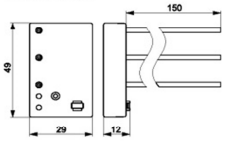
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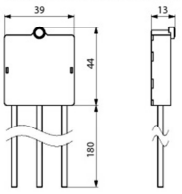
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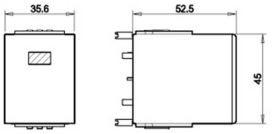
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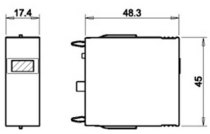
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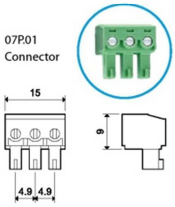
Type 7P.00
Replaceable module



Type 7P.10/20/40
Replaceable module



07P.01
Connector

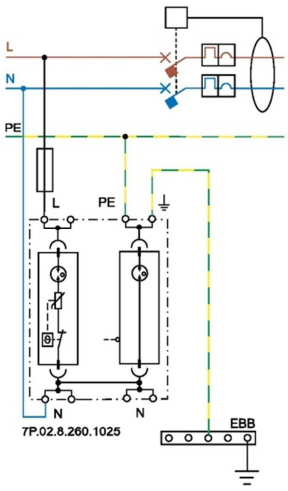


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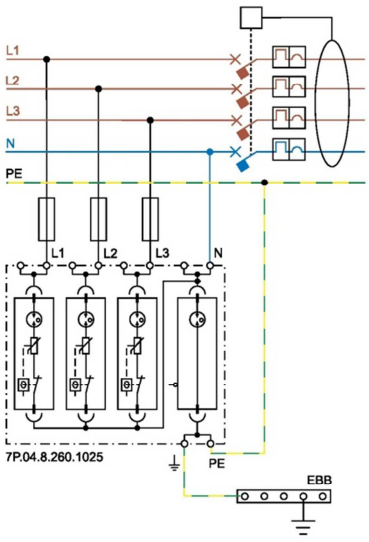
Installation example - SPD Type 1 + 2

TT-SINGLE PHASE SYSTEM - SPD UP-STREAM OF RCD

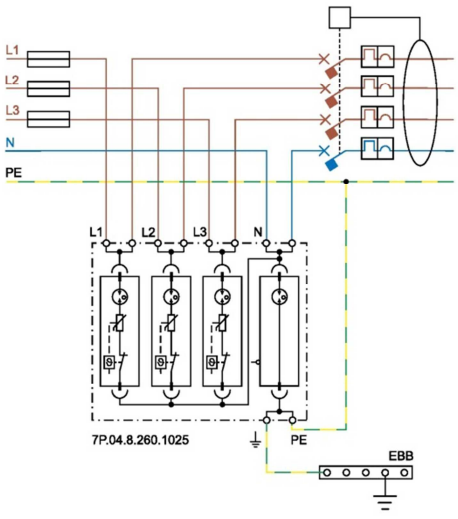


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TT-THREE PHASE SYSTEM - SPD UP-STREAM OF RCD



Wiring diagrams "V-shape" (fuse max = 125 A)



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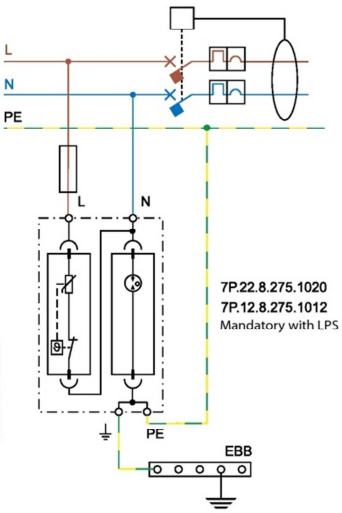
7P SERIES

7P SERIES
Surge Protection Devices (SPD)

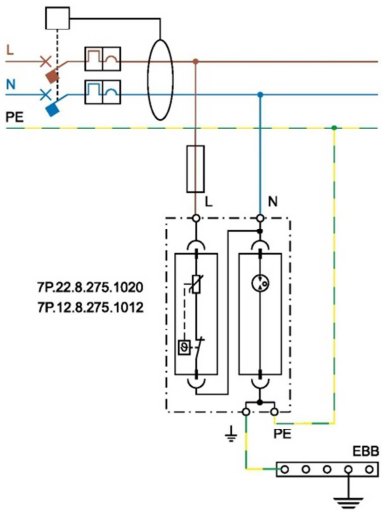
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Installation example for SPD Type 1 + 2 and Type 2 - Single phase

TT-SINGLE PHASE SYSTEM - SPD UP-STREAM OF RCD

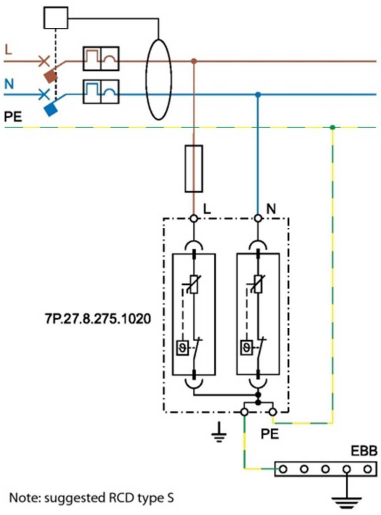


TT or TN-S SINGLE PHASE SYSTEM - SPD DOWN-STREAM OF RCD



E

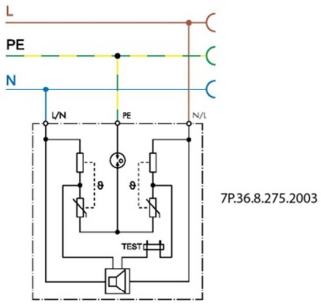
TN-S SINGLE PHASE SYSTEM - SPD DOWN-STREAM OF RCD



Note: suggested RCD type S

Installation example for SPD Type 3

TT or TN-S SINGLE PHASE SYSTEM - INCORPORATED IN SOCKET OUTLET



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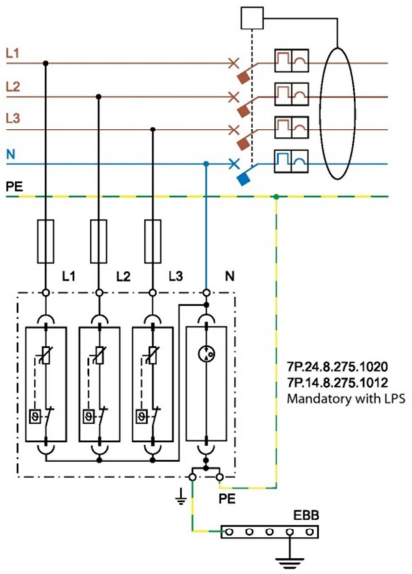
7P SERIES
Surface Protection Devices (SPD)

finder

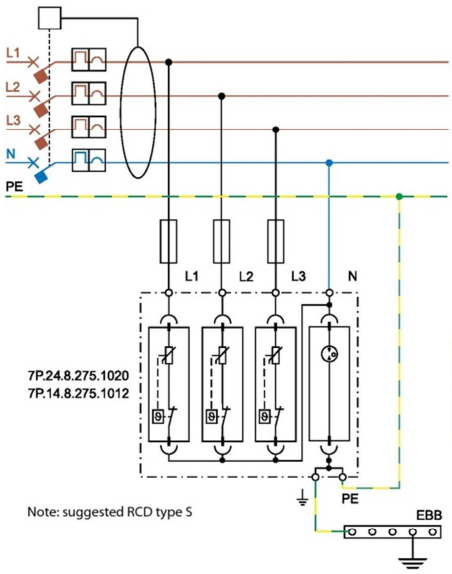
7P SERIES

Installation example for SPD Type 1 + 2 and Type 2 - Three phase

TT-THREE PHASE SYSTEM - SPD UP-STREAM OF RCD

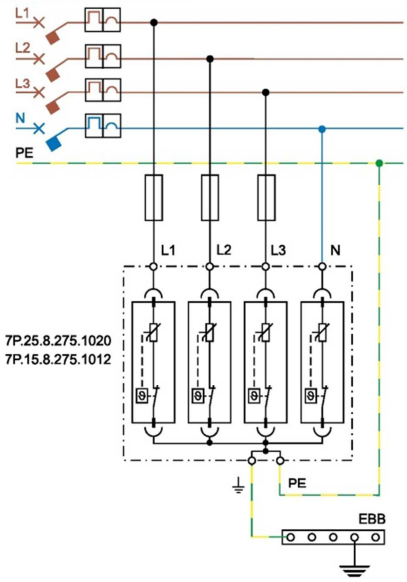


TT or TN-S THREE PHASE SYSTEM - SPD DOWN-STREAM OF RCD

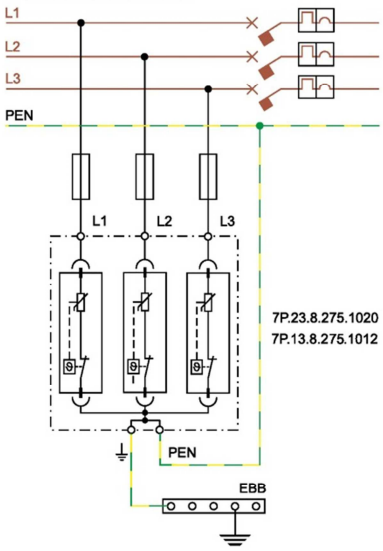


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TN-S THREE PHASE SYSTEM - SPD DOWN-STREAM
OF OVERCURRENT PROTECTION



TN-C THREE PHASE SYSTEM - SPD UP-STREAM
OF OVERCURRENT PROTECTION



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7P SERIES

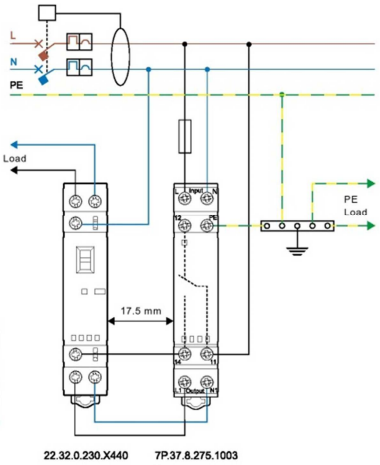
7P SERIES
Surge Protection Devices (SPD)

finder

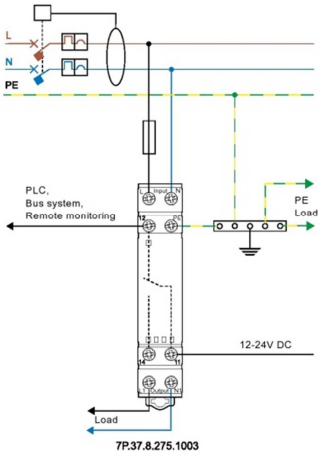
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Installation example for SPD Type 3 - Single phase

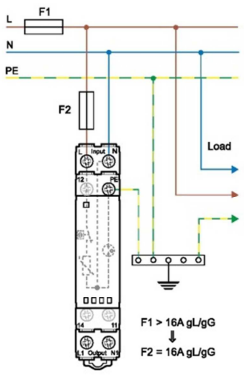
TT or TN-S SINGLE PHASE SYSTEM - SPD DOWN-STREAM OF RCD
Serial connection



TT or TN-S SINGLE PHASE SYSTEM - SPD DOWN-STREAM OF RCD
Serial connection + BUS line

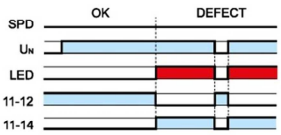


TT, TN-S SINGLE PHASE: parallel connection



Function

Visual local LED signalling and remote signalling of varistor status



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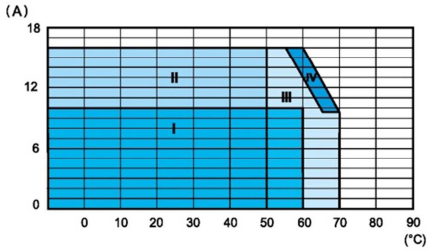
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7P SERIES
Surface Protection Devices (SPD)

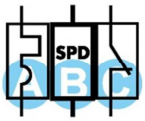
finder

7P SERIES

L7P Temperature/Current diagram for model 7P.37



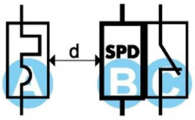
Zone I: SPD and other devices installed as a group (without gap)



A MCB = B10A, C10A
B 7P.37.8.275.1003
C 22.32.0.xxx.x4x0

E

Zone II: SPD spaced, at least from one side, from components that generate heat during their operation (17.5 mm gap)



A MCB = B16A, C16A
B 7P.37.8.275.1003
C 22.32.0.xxx.x4x0
d 17.5 mm

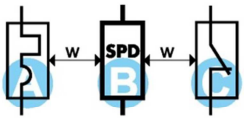


A MCB = B16A, C16A
B 7P.37.8.275.1003



B 7P.37.8.275.1003
D 22.32.0.xxx.x3x0
22.32.0.xxx.x4x0

Zone III: SPD spaced, on both side, from components that generate heat during their operation (20 mm gap)



A MCB = B16A, C16A
B 7P.37.8.275.1003
C 22.32.0.xxx.x4x0
w 20 mm

Zone IV: SPD installed individually in free air (without significant influence from nearby components)



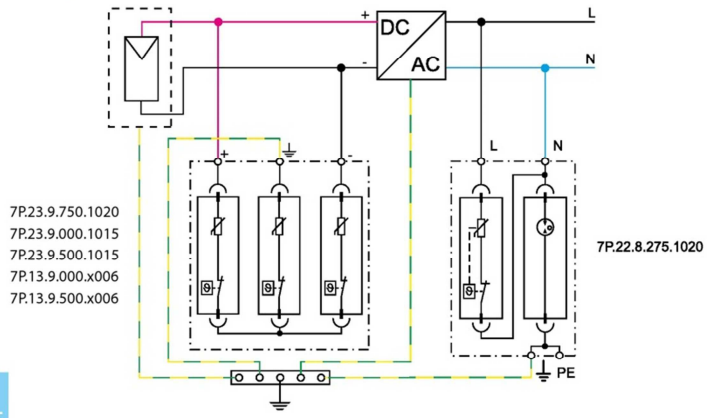
B 7P.37.8.275.1003

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7P SERIES
7P SERIES
Surge Protection Devices (SPD)
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Installation examples - photovoltaic



7P.23.9.750.1020
7P.23.9.000.1015
7P.23.9.500.1015
7P.13.9.000.x006
7P.13.9.500.x006

7P.22.8.275.1020

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SURGE VOLTAGE PROTECTORS

Surge voltage protectors (such as Finder's Surge Protection Devices, SPD) are intended to be installed in electrical systems, to protect people and machines from surge voltages that can occur on the electrical supply line and which would otherwise have disastrous consequences. These surge voltages can be atmospheric (lightning) or can originate on the electrical system due to, for example: the opening and closing of large loads, short circuits, or the switching of large power factor correction capacitors. The SPD can be described as a switch that is in parallel with the electrical system's supply line - which it is protecting. At the nominal network voltage (e.g. 230 V) the SPD appears as an open switch, having a very high impedance (almost infinite). But, under an overvoltage condition its impedance rapidly falls to near 0 Ω. This effectively applies a short circuit across the supply lines and immediately "drains" the overvoltage to earth. In this way the supply line is protected wherever an SPD is installed. When the overvoltage has passed, the SPD impedance rises rapidly and resumes the state of an open switch again.

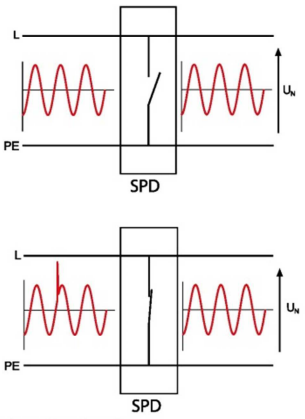


Figure 1: Ideal operation of an SPD

SPD technologies

Finder surge voltage protectors use either varistors or spark gaps.

Varistor: This can be considered as a variable resistance that at nominal voltage has a very high ohmic value. But the resistance rapidly falls to near zero as the voltage surges. In this way the varistor applies a near short circuit which clamps the surge voltage. The varistor is however subject to progressive degradation due to the small leakage current that occurs at the nominal voltage, and with the number of interventions. With every overvoltage that occurs the leakage current rises and accelerates the end of life for the device - which is ultimately indicated by the change from green to red in the signal-window.

Spark gap: This comprises two electrodes separated by air, or a gas. When a surge voltage occurs an electrical arc bridges the gap and a surge current flows to limit the surge voltage to a low and constant level. The arc extinguishes only when the surge current falls below about 10 ampere. The gas guarantees a constant level of breakdown voltage since the arc is struck in a protected environment; not exposed to pressure or humidity variations or impurities as would happen if it had occurred in air. There is however, a delay before the device arcs and the surge current is diverted, and this is dependent on the magnitude of the original voltage surge and on its rate of rise. Therefore, the voltage protection level can vary, although it is guaranteed to be less than U_p.

Component	Symbol	Leakage current	Energy dissipated	Response time	Voltage/Current characteristic
Ideal		0	High	Fast	
Spark gap		0	High	Medium	
Varistor		Very Low	Medium	Fast	

Figure 2: SPD component characteristics.

Installation (Overvoltage) categories

Choosing the SPD requires matching the Rated Impulse Voltage of the SPD with that of the equipment to be protected. This in turn relates to the Installation category (Overvoltage category). Installation categories are described within IEC 60664-1, which for a 230/400 V installation prescribes as follows:

- **Installation category I:** 1.5 kV for "particularly sensitive" equipment (e.g. electronic devices like PC or TV set);
- **Installation category II:** 2.5 kV for "user" equipment subject to "normal" impulse voltages (e.g. household electrical appliances, mobile items);
- **Installation category III:** 4 kV for equipment that are part of a fixed installation (e.g. switchboards, switches)
- **Installation category IV:** 6 kV for equipment installed at or near the origin of main incoming supply mains (e.g. energy meters).

Lightning Protection Zones and installation considerations

International standards refer to the various Lightning Protection Zones by the letters LPZ followed by an appropriate number.

LPZ 0A: An external area, where a direct lightning strike is possible and where there is total exposure to the electromagnetic field induced by the lightning.

LPZ 0B: An external area, but below a lightning conductor providing direct lightening strike protection. There remains total exposure to the electromagnetic field.

LPZ 1: Area within a building – therefore protected from direct lightning strike. The electromagnetic field will be attenuated, depending on the degree of shielding. This zone has to be protected by SPD type 1 device(s) at its boundary with the LPZ 0A or 0B zone.

LPZ 2: An area, typically a room, where the lightning current has been limited by preceding surge protectors. This zone has to be protected by SPD type 2 device(s) at its boundary with the LPZ 1 zone.

LPZ 3: An area within a room where the lightning current has been limited by preceding surge protectors (typically the wiring after a socket or an area within a metal enclosure).

This zone has to be protected by SPD type 3 device(s) at its boundary with the LPZ 2 zone. On the following picture (Figure 3, representation is not binding) it is shown that the transition from a protection zone to the next is through the installtion of SPD. SPD Type 1 must be connected upstream the system, at the point of delivery connection. As an alternative it is possible to use SPD Type 1+2. The grounding conductor must have a minimum section of 6 mm² for SPD Type 1, of 4 mm² for SPD Type 2, and 1.5 mm² for SPD Type 3 (If the building has an LPS, reference should be made to CEI 81-10/4 for the correct dimension of the cable).

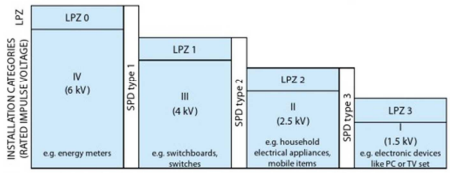


Figure 3: Typical relationship between Lightning Protection Zones, Installation Categories and SPD types

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7P SERIES

7P SERIES
Surge Protection Devices (SPD)

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Rated values and marking common to all SPD

[U_C] Maximum operating voltage: Under this voltage the SPD is guaranteed to appear as an "open switch". This voltage is normally at least equal to the nominal supply voltage (U_N) +10%. For the Finder SPD, U_C is specified as 275 V.

[U_p] Voltage protection level: This is the highest voltage level seen across the SPD during its intervention. For example, for Finder SPD Type 2, this means that a 4 kV overvoltage would be limited by the SPD to a maximum 1.2 kV. Consequently, electronic devices such as PC, TV, stereo, etc. are protected - as their own internal protection will handle overvoltages U_p to 1.5 kV.
To better understand this concept; imagine that the SPD is a switch in series a low resistance. In the case of an overvoltage the switch closes and all the current goes through the resistance. According to Ohm's law the voltage developed across the resistance will be this resistance x the current (V = R x I), and will be limited to < U_p.

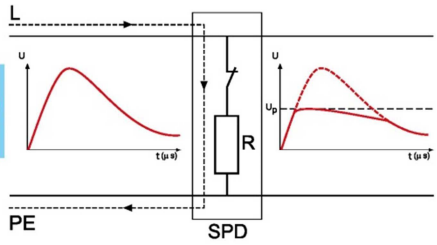


Figure 4: Overvoltage limiting

Short circuit proof: A further characteristic, not normally marked on the product but important for its correct installation, is the Short circuit proof at maximum overcurrent protection. This is the maximum short-circuit current that the SPD is able to withstand when it is installed with additional maximum overcurrent protection - such as a fuse rated in accordance with the value stated under the SPD specification. Consequentely the maximum prospective short-circuit current of the system at the point of installation of the SPD must not exceed this value.

Rated vaules and marking of SPD Type 1

SPD Type 1 must be connected upstream the system, at the point of delivery of power energy. SPD protects building and people from the risk of direct lightning (fire and death) and are characterized by:

[I_{imp} 10/350] Impulse current: I_{imp} corresponds to the peak value of a 10/350 µs current impulse waveform. This waveform represents a direct lightning strike and is used in tests to prove the performance of SPD type 1 devices.

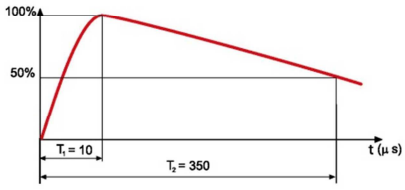


Figure 5: 10/350 µs current waveform

Comparison of the waveforms in figures 5 and 6 shows the much higher energy content controlled by the type 1 SPD.

[I_n 8/20] Nominal discharge current: The peak current (and waveform shape) through the SPD under conditions prescribed by EN 62305 to represent the surge current as a consequence of a lightning strike to the electric supply line.

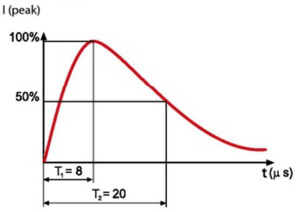


Figure 6: 8/20 µs current waveform

Rated values and marking of SPD Type 2

SPD Type 2 devices are designed to remove all the overvoltage from supply circuits that are not likely to be directly hit by lightning. SPD Type 2 are connected downstream SPD Type 1 or SPD Type 1+2, (minimum distance 1 m) and they protect machine and tools connected to the ground and reduce the risk of economic loss.
SPD Type 2 are characterized by:

[I_n 8/20] Nominal discharge current: The peak current (and waveform shape) through the SPD under conditions prescribed by EN 62305 to represent the surge current as a consequence of a lightning strike to the electric supply line.

[I_{max} 8/20] Maximum discharge current: Peak value of the highest current of a 8/20 µs waveform that an SPD can discharge at least once without breaking.

Rated values and marking of SPD Type 3

SPD type 3 devices are used to protect the end user from overvoltage.
They may be installed in supply networks where SDP types 1 and/or 2 already exist. They can be installed in fixed or mobile sockets and have the following characteristic parameters.

U_{oc}: test voltage. This is the peak value of the no load voltage of the combined test-generator; this has a waveform of 1.2/50 µs (figure 7) and can supply at the same time current with waveform 8/20 µs (figure 6).

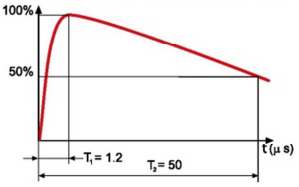
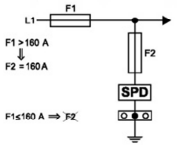


Figure 7: 1.2/50 µs voltage waveform

Suggestion for the connection

The correct connection of SPD requires a shortest as possible connection to the local equipotential bar, to which are connected PE cables of the equipment to be protected. From the local equipotential bar there is a connection to the EBB. The phase wiring remains appropriate to the load.



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Short-circuit protection for the SPD is provided by the overcurrent protective devices (fuses type gL/gG) recomended.

In AC applications if the overcurrent protective devices F1 (which are part of the installation) have a rating smaller than or equal to the maximum recommended rating for the overcurrent protective devices for the SPD, then F2 (back up fuse), can be omitted.

7P.0X:

If F1 > 250 A, then F2 = 250 A

If F1 <= 250 A, F2 can be omitted

7P.1X, 7P.2X:

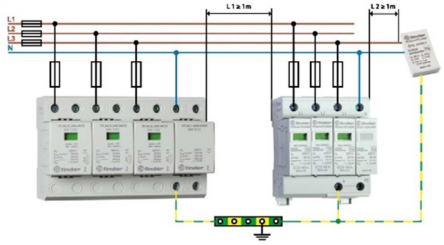
If F1 > 160 A, then F2 = 160 A

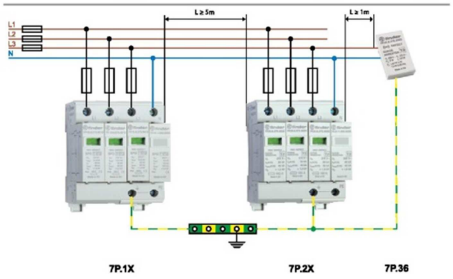
If F1 <= 160 A, F2 can be omitted

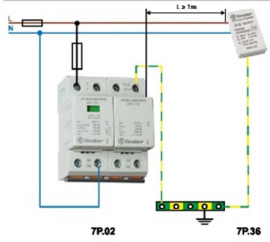
For DC applications the back up fuse must be always used.

Coordination of SPD

Optimal protection from surges requires cascaded coordinated SPDs. Coordination has the purpose of splitting the energy associated with voltage across the SPDs and it is achieved by introducing an impedance between the SPDs, or alternatively, by connecting them using wires having the minimum length indicated in the figures below, in order to use the cable's own impedance.

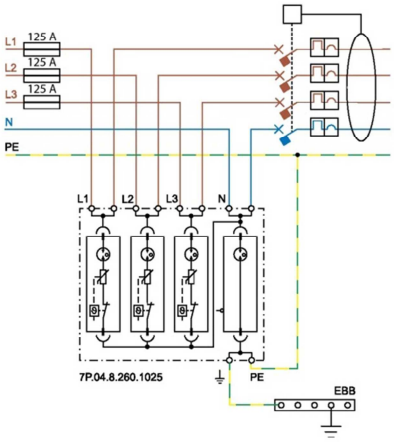






V-shape connection

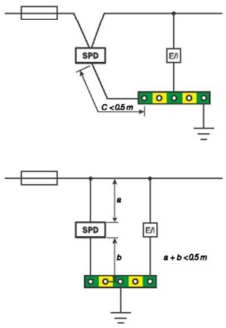
Using a V-shaped connection eliminates transferring downstream the inductive voltage generated by the surge current in the connecting wire to the SPD. This increases the protection to the system and equipment downstream. A limitation of this connection is that the nominal current for the downstream system is limited to 125 A, which is the maximum current permitted through the double SPD terminals.



For systems where the rated current is greater than 125 A, it is necessary to connect the SPD in parallel with the equipment (E/I).

Connecting cable

Depending on the type of connection, serial (V-shape) or parallel (T-shape), ensure that both the maximum cable lengths and minimum cross section of the connecting wires are respected in accordance with the information below (IEC 60634-5-534):



The section of the connecting wires (copper) must not be less than:
SPD Type 1: 16 mm² if it is subject to discharge a significant lightning current, 6 mm² otherwise
SPD Type 2: 6 mm²
SPD Type 3: 1.5 mm²

E

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PROTECTING PHOTOVOLTAIC (PV) SYSTEMS AGAINST LIGHTNING

Installation characteristics

[U_{OCSTC}] PV voltage: Open circuit voltage, measured under standardized test conditions, of the PV module, panel, array, or the DC side of the photovoltaic inverter. prEN 50539-12.

[I_{SCSTC}]: Short-circuit current: Short-circuit current, measured under standardized test conditions, of the PV module, panel, array, or photovoltaic inverter. prEN 50539-12.

[U_{CPV}] SPD Maximum operating voltage: Must be equal or greater than to 1.2 times U_{OCSTC} in all conditions of radiation and temperature. prEN 50539-11, prEN 50539-12.

[I_{SCPV}]: Maximum prospective short-circuit current from the power system for which the SPD, in conjunction with the disconnectors specified, is rated. EN 50539-11.

System installation

Photovoltaic systems are generally located external to a building and can be subjected to the direct or indirect effects of lightning.
Whilst the installation of photovoltaic panels on the roof does not, in itself, increase the risk of direct lightning, the only practical way to protect against the effects of a direct lightning strike would be the use of a lightning protection system (LPS).
The indirect effects of lightning can however, be mitigated by the appropriate use of Surge Protection Devices (SPD). These indirect effects occur when lightning strikes in proximity to the structure and where magnetic induction creates an overvoltage in the conductors – a danger to both people and equipment. In particular, the DC cables of a PV system would be exposed to the high conducted and radiated disturbances caused as a result of the lightning currents. In addition, overvoltages in PV systems are not only of atmospheric origin. It is also necessary to consider overvoltages due to switching on electrical networks connected to them. These overvoltages can also damage both the inverter and the PV panels, and this explains the need to protect the inverter on both DC and AC sides.

Photovoltaic system on a building without a lightning protection system (LPS)

As an example, Figure 10 represents a simplified photovoltaic system placed on a building without lightning rod. In such a system, the protection against lightning must be considered at the following points of installation:

- DC input of the inverter
- AC output of the inverter
- Low voltage supply network

At the DC input to the inverter SPDs specific for photovoltaic systems must be installed, according to the PV system voltage. At the inverter AC output, type 2 surge arresters must be installed suitable for the type of system. At the point of connection to the LV supply network, install type 2 surge arresters suitable to the type of system (TT, TN). In more complex systems, it might be necessary to introduce additional SPDs. DC side: if the distance between the inverter and PV modules exceeds 10 m, it is necessary to replicate and install the SPD as close as possible to the PV modules.

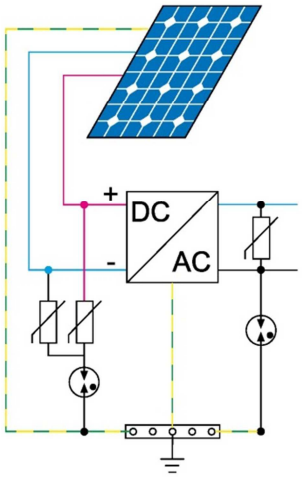


Figure 10: Example of a photovoltaic system located on a building without LPS, protected on the DC side by an SPD with U_{OCSTC} = 420 V, and on the AC side by a 7P.22, specific for TT systems.

Photovoltaic system on a building with a lightning protection system (LPS)

Where an LPS exists it is good practice to install the photovoltaic panels in the area protected by the lightning rod.
In addition it is necessary to realize a good equipotential bonding system, which must be positioned as close as possible to the entry point of LV supply into the structure. The LPS, the SPD and all metal parts have to be connected to this equipotential system.
SPD protection on the DC depends on the safety distance (referred in EN 50539-12:12-2012).
Note that under EN 62305 installation of a Type 1 SPD is mandatory at the point of delivery of the AC electricity supply, whether or not the building has LPS (with or without solar panels).

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7P SERIES
Surge Protection Devices (SPD)

finder

7P SERIES

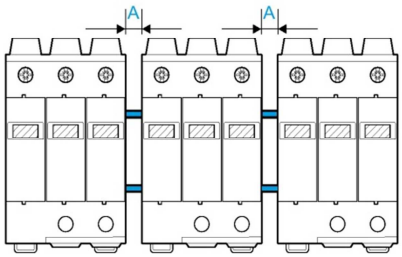
E

SPD fuse protection

Conforming to prEN 50539-11:2010, Finder SPDs are equipped with a thermal disconnector able to safely disconnect a worn or damaged varistor up to a value of short-circuit current equal to the short-circuit current withstand value (I_{scpv}), as specified in the technical data.
Ensure that the PV short circuit current $I_{sc} < I_{scpv}$.
Ensure that the PV short circuit current $I_{sc} < I_{scpv}$ or increase the number of the strings.

Insulation distances and wiring

To conform with prEN 50539-11 insulation distances and minimum wiring cross section must be respected.



Insulation distances		Minimum Wiring [mm²]	
U_{CPV}(SPD) ≥ 1.2 x U_{OCSTC}	A [mm]	+/– Poles	Ground
750 V DC	5	4	6
1000 V DC	5	4	6
1500 V DC	10	4	6

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1.47 LOVATO POWER CONTACTOR 1BG1201A230 DATA SHEET

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ENERGY AND AUTOMATION

11BG1201A230
THREE-POLE CONTACTOR, IEC OPERATING CURRENT IE (AC3) = 12A, AC COIL 50/60HZ, 230VAC, 1NC AUXILIARY CONTACT



Product designation			Power contactor
Product type designation			BG12
Contact characteristics			
Number of poles		Nr.	3
Rated insulation voltage Ui IEC/EN		V	690
Rated impulse withstand voltage Uimp		kV	6
Operational frequency			
	min	Hz	25
	max	Hz	400
IEC Conventional free air thermal current Ith		A	20
Operational current Ie			
	AC-1 (≤40°C)	A	20
	AC-1 (≤55°C)	A	18
	AC-1 (≤70°C)	A	15
	AC-3 (≤440V ≤55°C)	A	12
	AC-4 (400V)	A	4.8
Rated operational power AC-3 (T≤55°C)			
	230V	kW	3.2
	400V	kW	5.7
	415V	kW	6.2
	440V	kW	5.5
	500V	kW	5
	690V	kW	5
Rated operational power AC-1 (T≤40°C)			
	230V	kW	8
	400V	kW	14
	500V	kW	16
	690V	kW	22
IEC max current Ie in DC1 with L/R ≤ 1ms with 1 poles in series			
	≤24V	A	12
	48V	A	10
	75V	A	4
	110V	A	3
	220V	A	–
IEC max current Ie in DC1 with L/R ≤ 1ms with 2 poles in series			
	≤24V	A	15
	48V	A	14
	75V	A	9
	110V	A	8
	220V	A	–
IEC max current Ie in DC1 with L/R ≤ 1ms with 3 poles in series			
	≤24V	A	16
	48V	A	16
	75V	A	10
	110V	A	10

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	220V	A	2
IEC max current Ie in DC1 with L/R ≤ 1ms with 4 poles in series			
	≤24V	A	–
	48V	A	–
	75V	A	–
	110V	A	–
	220V	A	–
IEC max current Ie in DC3-DC5 with L/R ≤ 15ms with 1 poles in series			
	≤24V	A	7
	48V	A	6
	75V	A	2
	110V	A	1
	220V	A	–
IEC max current Ie in DC3-DC5 with L/R ≤ 15ms with 2 poles in series			
	≤24V	A	8
	48V	A	8
	75V	A	5
	110V	A	4
	220V	A	–
IEC max current Ie in DC3-DC5 with L/R ≤ 15ms with 3 poles in series			
	≤24V	A	10
	48V	A	10
	75V	A	6
	110V	A	5
	220V	A	0,8
IEC max current Ie in DC3-DC5 with L/R ≤ 15ms with 4 poles in series			
	≤24V	A	–
	48V	A	–
	75V	A	–
	110V	A	–
	220V	A	–
Short-time allowable current for 10s (IEC/EN60947-1)		A	96
Protection fuse			
	gG (IEC)	A	20
	aM (IEC)	A	16
Making capacity (RMS value)		A	120
Breaking capacity at voltage			
	440V	A	96
	500V	A	72
	690V	A	72
Resistance per pole (average value)		mΩ	10
Power dissipation per pole (average value)			
	Ith	W	4
	AC-3	W	1.44
Tightening torque for terminals			
	min	Nm	0.8
	max	Nm	1
	min	lbin	9
	max	lbin	9
Tightening torque for coil terminal			
	min	Nm	0.8
	max	Nm	1
	min	lbin	9

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		max	Ibin	9
Max number of wires simultaneously connectable			Nr.	2
Conductor section				
	AWG/Kcmil			
		max		12
	Flexible w/o lug conductor section			
		min	mm²	0.75
		max	mm²	2.5
	Flexible c/w lug conductor section			
		min	mm²	1.5
		max	mm²	2.5
	Flexible with insulated spade lug conductor section			
		min	mm²	1.5
		max	mm²	2.5
Power terminal protection according to IEC/EN 60529				IP20 when properly wired
Mechanical features				
Operating position				
		normal allowable		Vertical plan ±30°
Fixing				Screw / DIN rail 35mm
Weight			g	183
Auxiliary contact characteristics				
Thermal current Ith			A	10
IEC/EN 60947-5-1 designation				A600 - Q600
Operating current AC15				
		230V	A	3
		400V	A	1.9
		500V	A	1.4
Operating current DC12				
		110V	A	2.9
Operating current DC13				
		24V	A	2.9
		48V	A	1.4
		60V	A	1.2
		110V	A	0.6
		125V	A	0.55
		220V	A	0.3
		600V	A	0.1
Operations				
Mechanical life			cycles	20000000
Electrical life			cycles	500000
Safety related data				
Performance level B10d according to EN/ISO 13489-1				
		rated load	cycles	500000
		mechanical load	cycles	20000000
Mirror contats according to IEC/EN 609474-4-1				Yes
EMC compatibility				yes
AC coil operating				
Rated AC voltage at 50/60Hz			V	230
AC operating voltage				
	of 50/60Hz coil powered at 50Hz			

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		pick-up		
			min %Us	75
			max %Us	115
		drop-out		
			min %Us	20
			max %Us	55
	of 50/60Hz coil powered at 60Hz			
		pick-up		
			min %Us	80
			max %Us	115
		drop-out		
			min %Us	20
			max %Us	55
AC average coil consumption at 20°C				
	of 50/60Hz coil powered at 50Hz			
			in-rush VA	30
			holding VA	4
	of 50/60Hz coil powered at 60Hz			
			in-rush VA	25
			holding VA	3
	of 60Hz coil powered at 60Hz			
			in-rush VA	30
			holding VA	4
Dissipation at holding ≤20°C 50Hz			W	0.95
Max cycles frequency				
Mechanical operation			cycles/h	3600
Operating times				
Average time for Us control				
	in AC			
		Closing NO		
			min ms	12
			max ms	21
		Opening NO		
			min ms	9
			max ms	18
		Closing NC		
			min ms	17
			max ms	26
		Opening NC		
			min ms	7
			max ms	17
	in DC			
		Closing NO		
			min ms	18
			max ms	25
		Opening NO		
			min ms	2
			max ms	3
		Closing NC		
			min ms	3
			max ms	5
		Opening NC		
			min ms	11
			max ms	17

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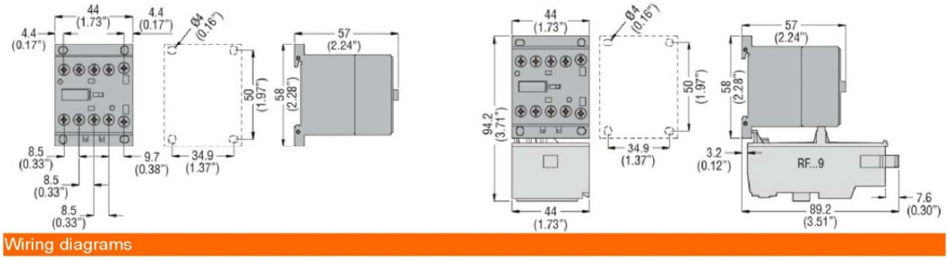
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UL technical data				
Full-load current (FLA) for three-phase AC motor				
		at 480V	A	11
		at 600V	A	11
Yielded mechanical performance				
	for single-phase AC motor			
		110/120V	HP	0.5
		230V	HP	1.5
	for three-phase AC motor			
		200/208V	HP	3
		220/230V	HP	3
		460/480V	HP	7.5
		575/600V	HP	10
General USE				
	Contactor			
		AC current	A	20
Short-circuit protection fuse, 600V				
	High fault			
		Short circuit current	kA	100
		Fuse rating	A	30
		Fuse class		J
	Standard fault			
		Short circuit current	kA	5
		Fuse rating	A	30
		Fuse class		RK5
Contact rating of auxiliary contacts according to UL				A600 - Q600
Ambient conditions				
Temperature				
	Operating temperature			
		min	°C	-50
		max	°C	+70
	Storage temperature			
		min	°C	-60
		max	°C	+80
Max altitude			m	3000
Resistance & Protection				
Pollution degree				3

Dimensions



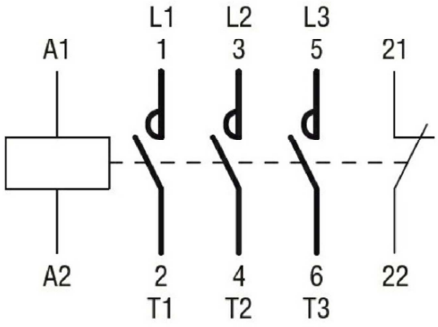
Wiring diagrams

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Certifications and compliance

Compliance

CSA C22.2 n° 60947-1
CSA C22.2 n° 60947-4-1
IEC/EN 60947-1
IEC/EN 60947-4-1
UL 60947-1
UL 60947-4-1

Certificates

CCC
cULus
EAC

ETIM classification

ETIM 8.0	EC000066 - Power contactor, AC switching

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1.48 LOVATO AUXILIARY CONTACT FOR POWER CONTACTOR 11BGX1011 DATA SHEET

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ENERGY AND AUTOMATION

11BGX1011
AUXILIARY CONTACT, SCREW TERMINALS, FOR BG... SERIES MINI-CONTACTORS, 1NO+1NC



Product designation			Auxiliary contact
Product type designation			11BGX10
Contact characteristics			
Number of poles		Nr.	2
Rated insulation voltage Ui IEC/EN		V	690
Rated impulse withstand voltage Uimp		kV	6
IEC Conventional free air thermal current Ith		A	10
Tightening torque for terminals			
	min	Nm	0.8
	max	Nm	1
	min	lbin	9
	max	lbin	9
Tightening torque for coil terminal			
	min	lbin	9
	max	lbin	9
Max number of wires simultaneously connectable		Nr.	2
Conductor section			
AWG/Kcmil			
	max		12
Flexible w/o lug conductor section			
	min	mm²	0.75
	max	mm²	2.5
Flexible c/w lug conductor section			
	min	mm²	0.75
	max	mm²	2.5
Flexible with insulated spade lug conductor section			
	min	mm²	0.75
	max	mm²	2.5
Mechanical features			
Operating position			
	normal		On vertical plane
	allowable		Any
Fixing			Front centre mounting
Weight		g	21
Terminals screw			Screw
Auxiliary contact characteristics			
Type of contact			1NO+1NC
Thermal current Ith		A	10
IEC/EN 60947-5-1 designation			A600 - Q600
Operating current AC15			
	230V	A	3
	400V	A	1.9
	500V	A	1.4
Operating current DC13			

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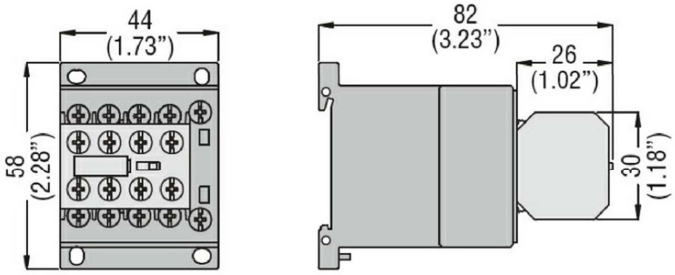
Lovato electric
ENERGY AND AUTOMATION

11BGX1011

AUXILIARY CONTACT, SCREW TERMINALS, FOR BG... SERIES MINI-CONTACTORS, 1NO+1NC

	24V	A	3
	48V	A	1.5
	60V	A	1.2
	110V	A	0.6
	125V	A	0.55
	220V	A	0.27
	600V	A	0.1
Electrical characteristics			
Conductivity			5V 10 mA
UL/CSA and IEC/EN 60947-5-1 designation			A600 Q600
Operating current AC15			
	120V	A	6
	240V	A	3
	480V	A	1.5
	600V	A	1.2
Operating current DC13			
	12V	A	10
	250V	A	0.27
	440V	A	0.15
	500V	A	0.13
Ambient conditions			
Temperature			
Operating temperature			
	min	°C	-50
	max	°C	+70
Storage temperature			
	min	°C	-60
	max	°C	+80
Max altitude		m	3000

Dimensions

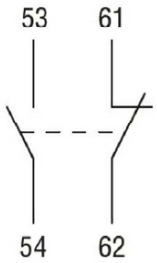


Wiring diagrams

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AUXILIARY CONTACT, SCREW TERMINALS, FOR BG... SERIES MINI-CONTACTORS, 1NO+1NC



Certifications and compliance

Compliance

CSA C22.2 n° 60947-1
CSA C22.2 n° 60947-5-1
IEC/EN 60947-1
IEC/EN 60947-5-1
UL 60947-1
UL 60947-5-1

Certificates

CCC
cULus
EAC

ETIM classification

ETIM 8.0	EC000041 - Auxiliary contact block

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1.49 SCHAFFNER EMI FILTER FN2060-16/06 DATA SHEET

DATASHEET | Two-Stage Filters FN 2060

schaffner
shaping electrical power

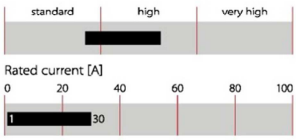
Multi-stage General Purpose AC/DC EMI Filter



- Rated currents from 1 to 30 A
- High differential and common-mode attenuation
- Optional medical versions (B type)
- Optional safety versions (A type)

Performance indicators

Attenuation performance



Rated current [A]

Approvals

RoHS

CE

Technical specifications

Rated voltage*	250 VAC, 50/60 Hz; 250 VDC
Operating frequency	DC to 400 Hz
Rated currents	1 to 30 A @ 40°C max.
High potential test voltage	P –> PE 2000 VAC for 2 sec P –> PE 2500 VAC for 2 sec (B types) P –> N 1100 VDC for 2 sec
Temperature range (operation and storage)	-25°C to +100°C (25/100/21)
Certified to	UL 1283, CSA 22.2 No. 8 1986, IEC/EN 60939 (applies to AC and DC applications)
Flammability corresponding to	UL 94 V-2 or better
Design corresponding to	UL 1283, CSA 22.2 No. 8 1986, IEC/EN 60939
MTBF @ 40°C/230 V (Mil-HB-217F)	1,650,000 hours (B types) 950,000 hours

*maximum RMS operating voltage at rated frequency or the maximum DC operating voltage

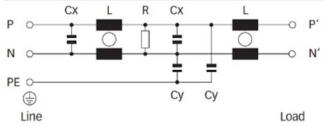
Features and benefits

- FN 2060 two-stage filters are designed for easy and fast chassis mounting
- FN 2060 filters are also available as B versions without Y-capacitors for medical applications as well as A version with low capacitance for safety critical applications with necessity for low leakage currents
- All filters provide a high conducted attenuation performance, based on chokes with high saturation resistance and excellent thermal behavior
- FN 2060 two-stage filters are designed for noisy applications requiering good differential and common-mode attenuation
- FN 2060 filters are also available as single-stage filters (FN 2010 series)
- Various terminal options allow you to select the desired connection style

Typical applications

- Electrical and electronic equipment
- Consumer goods
- Household equipment
- Building automation
- Industrial applications
- Machinery
- Medical equipment
- Electronic data processing equipment
- Office automation and datacom equipment
- Various noisy applications requiering good filter performance

Typical electrical schematic



Filter selection table

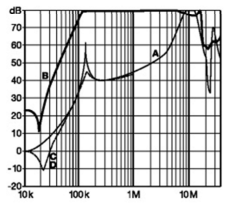
Filter*	Rated current @ 40°C (25°C)	Leakage current** @ 250 VAC/50 Hz (@ 120 VAC/60 Hz)	Inductance L	Capacitance Cx	Capacitance Cy	Resistance R	Input/Output connections			Weight
	[A]	[mA]	[mH]	[µF]	[nF]	[kΩ]				[g]
FN 2060-1-..	1 (1.2)	0.66 (0.38)	12	0.22	4.7	1000	-06	-07		120
FN 2060-3-..	3 (3.5)	0.66 (0.38)	2.5	0.22	4.7	1000	-06	-07		120
FN 2060-6-..	6 (6.9)	0.66 (0.38)	0.97	0.22	4.7	1000	-06	-07		120
FN 2060-10-..	10 (11.5)	0.66 (0.38)	0.8	0.47	4.7	470	-06	-07		190
FN 2060-12-..	12 (13.8)	0.66 (0.38)	0.58	0.47	4.7	470	-06	-07		190
FN 2060-16-..	16 (18.4)	0.66 (0.38)	0.65	0.33	4.7	1000	-06	-07	-08	260
FN 2060-20-..	20 (23)	0.66 (0.38)	0.6	1	4.7	220	-06		-08	480
FN 2060-30-08	30 (34.5)	0.79 (0.45)	0.6	1	10	220			-08	950
FN 2060A-1-..	1 (1.2)	0.07 (0.04)	12	0.22	0.47	1000	-06	-07		120
FN 2060A-3-..	3 (3.5)	0.07 (0.04)	2.5	0.22	0.47	1000	-06	-07		120
FN 2060A-6-..	6 (6.9)	0.07 (0.04)	0.97	0.22	0.47	1000	-06	-07		120
FN 2060A-10-..	10 (11.5)	0.07 (0.04)	0.8	0.47	0.47	470	-06	-07		190
FN 2060A-12-..	12 (13.8)	0.07 (0.04)	0.58	0.47	0.47	470	-06	-07		190
FN 2060A-16-..	16 (18.4)	0.07 (0.04)	0.65	0.33	0.47	1000	-06	-07	-08	260
FN 2060A-20-..	20 (23)	0.07 (0.04)	0.6	1	0.47	220	-06		-08	480
FN 2060A-30-08	30 (34.5)	0.07 (0.04)	0.6	1	0.47	220			-08	950
FN 2060B-1-..	1 (1.2)	0.00	12	0.22		1000	-06	-07		120
FN 2060B-3-..	3 (3.5)	0.00	2.5	0.22		1000	-06	-07		120
FN 2060B-6-..	6 (6.9)	0.00	0.97	0.22		1000	-06	-07		120
FN 2060B-10-..	10 (11.5)	0.00	0.8	0.47		470	-06	-07		190
FN 2060B-12-..	12 (13.8)	0.00	0.58	0.47		470	-06	-07		190
FN 2060B-16-..	16 (18.4)	0.00	0.65	0.33		1000	-06	-07	-08	260
FN 2060B-20-..	20 (23)	0.00	0.6	1		220	-06		-08	480
FN 2060B-30-08	30 (34.5)	0.00	0.6	1		220			-08	950

* To compile a complete part number, please replace the -.. with the required I/O connection style (e.g. FN 2060-30-08, FN 2060B-10-06).
** Maximum leakage under usual AC operating conditions (acc. IEC 60939-3). Note: if the neutral line is interrupted, worst case leakage could reach twice this level. Leakage current for DC application is 0 mA;

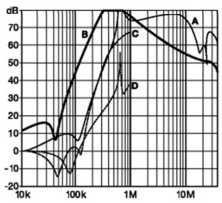
Typical filter attenuation

dPer CISPR 17; A=50 Ω/50 Ω sym; B=50 Ω/50 Ω asym; C=0.1 Ω/100 Ω sym; D=100 Ω/0.1 Ω sym

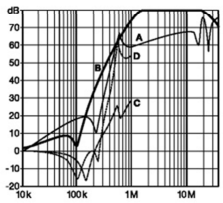
1 A types



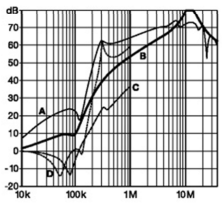
3 to 12 A types



16 A types

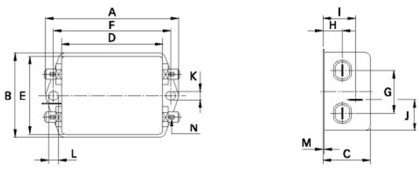


20 and 30 A types

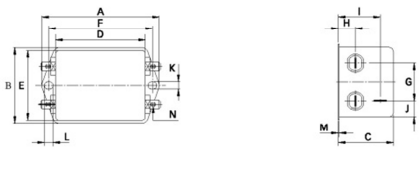


Mechanical data

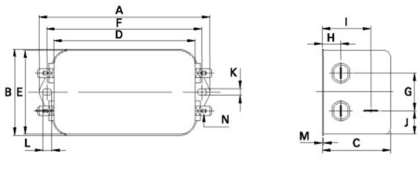
Connection style -06, 1 to 12 A types



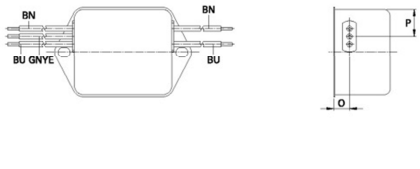
Connection style -06, 16 A types



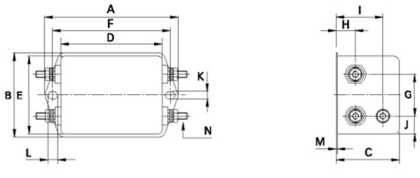
Connection style -06, 20 A types



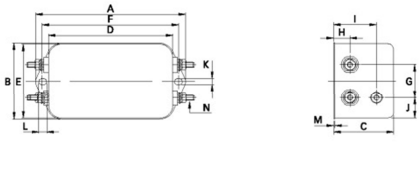
Connection style -07, 1 to 16 A types (same dimensions as style -06)



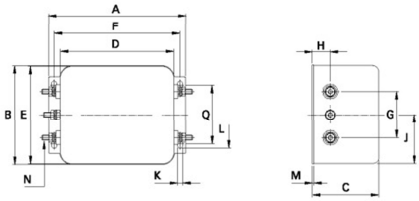
Connection style -08, 16 A types



Connection style -08, 20 A types



Connection style -08, 30 A types



	1 A	3 A	6 A	10 A	12 A	16 A	20 A	30 A	Tolerances
A	71	71	71	85	85	85	113.5 ±1	119 ±1	±0.5
B	46.6	46.6	46.6	54	54	54	57.5 ±1	85.5 ±1	±0.5
C	29.3	29.3	29.3	30.3	30.3	40.3	45.4 ±1	57.6 ±1	±0.5
D	50.5	50.5	50.5	64.8	64.8	64.8	94 ±1	98.5 ±1	±0.5
E	44.5	44.5	44.5	49.8	49.8	49.8	56	84.5	±0.5
F	61	61	61	75	75	75	103	109	±0.3
G	21	21	21	27	27	27	25	40	±0.2
H	10.8	10.8	10.8	12.3	12.3	12.3	12.4	15.6	±0.5
I	19.3	19.3	19.3	20.8	20.8	29.8	32.4		±0.5
J	20.1	20.1	20.1	19.9	19.9	11.4	15.5	42.25	±0.5
K	5.3	5.3	5.3	5.3	5.3	5.3	4.4	4.4	
L	6.3	6.3	6.3	6.3	6.3	6.3	6	7.4	
M	0.7	0.7	0.7	0.7	0.7	0.7	1	1.2	±0.3
Connection style -06									
N	6.3 x 0.8	6.3 x 0.8	6.3 x 0.8	6.3 x 0.8	6.3 x 0.8	6.3 x 0.8	6.3 x 0.8	6.3 x 0.8	
Connection style -07									
O	8.3	8.3	8.3	8.3	8.3	8.3			±0.5
P	14	14	14	14.9	14.9	14.9			
AWG type wire	AWG 20	AWG 20	AWG 18	AWG 18	AWG 16	AWG 16			
Wire length	140	140	140	140	140	140			+5
Connection style -08									
N						M4	M4	M4	
Q								51	±0.2
Recommended torque (Nm)						1.2 - 1.3	1.2 - 1.3	1.2 - 1.3	
Earth terminal						1.5 - 1.7	1.5 - 1.7	1.5 - 1.7	

All dimensions in mm; 1 inch = 25.4 mm
Tolerances according: ISO 2768-m/EN 22768-m

Please visit www.schaffner.com to find more details on filter connections.

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1.50 WEIDMULLER TERMINAL BLOCK RSF-16 DATA SHEET

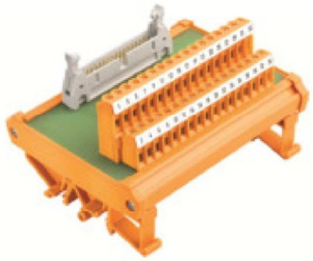
Data sheet

Weidmüller

RS F16 LP2N 5/16

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com



Similar to illustration

Passive interfaces for signal transmission on a flat-cable connector equipped with a clamping-yoke connection in accordance with IEC 603-1 / DIN 41651.
The main features include:

- Group with 10- to 64-pole connectors
- One-to-one electrical connection between controller and field connections.
- Very compact modules can be attached to conventional TS35 or TS32 mounting rails.
- Longer attachment hooks

General ordering data

Version	Interface, RSF, Plug-in connector in acc. with IEC60603-13 / DIN41651, 16-pole, Screw connection
Order No.	0225161001
Type	RS F16 LP2N 5/16
GTIN (EAN)	4032248047079
Qty.	1 pc(s).

Creation date October 21, 2024 5:59:58 PM CEST

Catalogue status 12.10.2024 / We reserve the right to make technical changes. 1

Weidmüller

Data sheet

RS F16 LP2N 5/16

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Technical data

Dimensions and weights

Depth	70 mm	Depth (inches)	2.756 inch
Height	87 mm	Height (inches)	3.425 inch
Width	55 mm	Width (inches)	2.165 inch
Net weight	80.25 g		

Temperatures

Storage temperature	-40…60 °C	Operating temperature	0…55 °C

Rated data UL

Operating temperature UL, max.	25 °C	Operating temperature UL, min.	0 °C
Rated current I_N	1 A	Rated current I_{max}	1 A
Rated voltage U_N	≤ 60 V AC / 75 V DC		

Connection Data

Connection (field side)	LL2N 5.08 mm	Connection on control side	Plug-in connector in acc. with IEC60603-13 / DIN41651
Earthing	No	Number of poles (control side)	16-pole

Rating data

Rated voltage	60 V AC / 75 V DC	Rated current per connection	1 A

Insulation coordination (EN50178)

According to	DIN EN 50178	Rated insulation voltage	100 V
Surge voltage category	II	Pollution severity level	2
Pulse voltage test (1,2/50µs)	0.8 kV		

Connection field

Clamping range, max.	6 mm²	Clamping range, min.	0.5 mm²
Flexible with sleeve, max.	2.5 mm²	Flexible with sleeve, min.	0.5 mm²
Flexible, max. H05(07) V-K	4 mm²	Flexible, min. H05(07) V-K	0.5 mm²
Max. wire cross-section, AWG	AWG 12	Min. wire cross-section, AWG	AWG 26
Sleeve with plastic collar, max.	2.5 mm²	Solid, max. H05(07) V-U	6 mm²
Solid, min. H05(07) V-U	0.5 mm²	Stripping length	6 mm
Tightening torque, max.	0.6 Nm	Tightening torque, min.	0.5 Nm
Type of connection	Screw connection		

Classifications

ETIM 6.0	EC002780	ETIM 7.0	EC002780
ETIM 8.0	EC002780	ETIM 9.0	EC002780
ECLASS 9.0	27-14-11-52	ECLASS 9.1	27-14-11-52
ECLASS 10.0	27-14-11-52	ECLASS 11.0	27-14-11-52
ECLASS 12.0	27-14-11-52	ECLASS 13.0	27-14-11-52
ECLASS 14.0	27-14-11-52		

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Weidmüller

Data sheet

RS F16 LP2N 5/16

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Technical data

Environmental Product Compliance

RoHS Compliance Status	Compliant without exemption
REACH SVHC	/

Approvals

Approvals	
ROHS	Conform
UL File Number Search	UL Website
Certificate No. (UR)	E141197

Downloads

Approval/Certificate/Document of Conformity	Declaration of Conformity
Product Change Notification	20200716-PCN-PL35-A-EN-External
Catalogues	Catalogues in PDF-format
Brochures	

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Data sheet

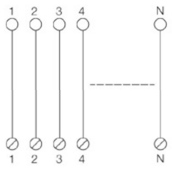
Weidmüller

RS F16 LP2N 5/16

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Drawings



N: Number of poles

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Data sheet

Weidmüller

RS F16 LP2N 5/16

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Accessories

Steel



Steel DIN rails are the most widespread on the market. Among metal DIN rails, they have the lowest shortcircuit protection, similar to stainless steel.

General ordering data

Type	TS 32X15 2M/ST/ZN	Version
Order No.	0122800000	Terminal rail, Accessories, Steel, galvanic zinc plated and passivated,
GTIN (EAN)	4008190066307	Width: 2000 mm, Height: 33 mm, Depth: 15 mm
Qty.	2 m	
Type	TS 32X15/LL 2M/ST/ZN	Version
Order No.	0514400000	Terminal rail, Accessories, Steel, galvanic zinc plated and passivated,
GTIN (EAN)	4008190086152	Width: 2000 mm, Height: 33 mm, Depth: 15 mm, Slit width: 5.20
Qty.	2 m	mm, Slit length: 25.00 mm

Aluminum



Aluminum has the second best electrical conductivity after copper. One advantage is low weight, anMiscellaneous is outstanding corrosion protection.

General ordering data

Type	TS 35X7.5 2M/AL/BK	Version
Order No.	0330800000	Terminal rail, Accessories, Aluminium, untreated, Width: 2000 mm,
GTIN (EAN)	4008190100650	Height: 35 mm, Depth: 7.5 mm
Qty.	2 m	

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Weidmüller

Data sheet

RS F16 LP2N 5/16

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
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Germany

www.weidmueller.com

Accessories

W-Series



Weidmüller's range of products includes end brackets that guarantee a permanent, reliable mounting on the terminal rail and prevent sliding. Versions with and without screws are available. The end brackets include marking options, also for group markers, and also a test plug holder.

General ordering data

Type	WEW 35/1	Version
Order No.	1059000000	End bracket, dark beige, TS 35, V-2, Wemid, Width: 12 mm, 100 °C
GTIN (EAN)	4008190172282	
Qty.	50 pc(s).	
Type	WEW 35/2	Version
Order No.	1061200000	End bracket, dark beige, TS 35, HB, Wemid, Width: 8 mm, 100 °C
GTIN (EAN)	4008190030230	
Qty.	50 pc(s).	

TS 32



Weidmüller's range of products includes end brackets that guarantee a permanent, reliable mounting on the terminal rail and prevent sliding. Versions with and without screws are available. The end brackets include marking options, also for group markers, and also a test plug holder.

General ordering data

Type	EWK 2	Version
Order No.	0199360000	End bracket, beige, TS 32, V-0, Wemid, Width: 15 mm, 100 °C
GTIN (EAN)	4008190023546	
Qty.	50 pc(s).	

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Weidmüller

Data sheet

RS F16 LP2N 5/16

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Accessories

Stainless steel



Stainless steel is a collective term for all types of steel (alloys) with a high degree of purity and corrosion resistance.

General ordering data

Type	TS 32X15 2M/CRN	Version
Order No.	0293220000	Terminal rail, Accessories, Stainless steel, rust-proof, untreated, Width:
GTIN (EAN)	4032248014026	2000 mm, Height: 33 mm, Depth: 15 mm
Qty.	2 m	

Plastic



Plastic DIN rails have insulating properties and are very light. They can be used where clearance and creepage distances to the support bracket cannot be achieved with standard DIN rails.

General ordering data

Type	TSK 35X15 2M PVC/GR	Version
Order No.	0514300000	Terminal rail, Accessories, PVC, untreated, Width: 2000 mm, Height:
GTIN (EAN)	4008190052263	35 mm, Depth: 15 mm
Qty.	2 m	

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Weidmüller

RS F16 LP2N 5/16

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Accessories

Steel



Steel DIN rails are the most widespread on the market. Among metal DIN rails, they have the lowest shortcircuit protection, similar to stainless steel.

General ordering data

Type	TS 35X7.5/LL 2M/ST/SZ	Version
Order No.	7915060000	Terminal rail, Accessories, Steel, galvanic zinc plated and passivated,
GTIN (EAN)	4032248296279	Width: 2000 mm, Height: 35 mm, Depth: 7.5 mm, Slit width: 5.20
Qty.	2 m	mm, Slit length: 25.00 mm
Type	TS 35X7.5 2M/ST/SZ	Version
Order No.	9300090000	Terminal rail, Accessories, Steel, galvanic zinc plated and passivated,
GTIN (EAN)	4032248387564	Width: 2000 mm, Height: 35 mm, Depth: 7.5 mm
Qty.	2 m	
Type	TS 35X15/LL 2M/ST/SZ	Version
Order No.	7907490000	Terminal rail, Accessories, Steel, galvanic zinc plated and passivated,
GTIN (EAN)	4032248296262	Width: 2000 mm, Height: 35 mm, Depth: 15 mm, Slit width: 5.20
Qty.	2 m	mm, Slit length: 25.00 mm
Type	TS 35X15/2.3 2M/ST/ZN	Version
Order No.	0498000000	Terminal rail, Accessories, Steel, galvanic zinc plated and passivated,
GTIN (EAN)	4008190042493	Width: 2000 mm, Height: 35 mm, Depth: 15 mm
Qty.	2 m	
Type	TS 35X15 2M/ST/ZN	Version
Order No.	0236400000	Terminal rail, Accessories, Steel, galvanic zinc plated and passivated,
GTIN (EAN)	4008190114558	Width: 2000 mm, Height: 35 mm, Depth: 15 mm
Qty.	2 m	
Type	TS 35X7.5 2M/ST/ZN	Version
Order No.	0383400000	Terminal rail, Accessories, Steel, galvanic zinc plated and passivated,
GTIN (EAN)	4008190088026	Width: 2000 mm, Height: 35 mm, Depth: 7.5 mm
Qty.	2 m	
Type	TS 35X15/LL 2M/ST/ZN	Version
Order No.	0236500000	Terminal rail, Accessories, Steel, galvanic zinc plated and passivated,
GTIN (EAN)	4008190183967	Width: 2000 mm, Height: 35 mm, Depth: 15 mm, Slit width: 5.20
Qty.	2 m	mm, Slit length: 25.00 mm
Type	TS 35X15/LL 1M/ST/ZN	Version
Order No.	0236510000	Terminal rail, Accessories, Steel, galvanic zinc plated and passivated,
GTIN (EAN)	4008190017699	Width: 1000 mm, Height: 35 mm, Depth: 15 mm, Slit width: 5.20
Qty.	1 m	mm, Slit length: 25.00 mm
Type	TS 35X7.5/LL 1M/ST/ZN	Version
Order No.	0514510000	Terminal rail, Accessories, Steel, galvanic zinc plated and passivated,
GTIN (EAN)	4008190116620	Width: 1000 mm, Height: 35 mm, Depth: 7.5 mm, Slit width: 5.20
Qty.	1 m	mm, Slit length: 25.00 mm
Type	TS 35X7.5 1M/ST/ZN	Version
Order No.	0383410000	Terminal rail, Accessories, Steel, galvanized, chromium-plated, Width:
GTIN (EAN)	4008190115623	1000 mm, Height: 35 mm, Depth: 7.5 mm
Qty.	1 m	

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Weidmüller

Data sheet

RS F16 LP2N 5/16

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Accessories

Type	TS 35X7.5/LL 2M/ST/ZN	Version
Order No.	0514500000	Terminal rail, Accessories, Steel, galvanic zinc plated and passivated,
GTIN (EAN)	4008190046019	Width: 2000 mm, Height: 35 mm, Depth: 7.5 mm, Slit width: 5.20
Qty.	2 m	mm, Slit length: 25.00 mm

Stainless steel



Stainless steel is a collective term for all types of steel (alloys) with a high degree of purity and corrosion resistance.

General ordering data

Type	TS 35X7.5 2M/CRN	Version
Order No.	1747350000	Terminal rail, Accessories, Stainless steel 1.4301, untreated, Width:
GTIN (EAN)	4032248003372	2000 mm, Height: 35 mm, Depth: 7.5 mm
Qty.	2 m	

Aluminum



Aluminum has the second best electrical conductivity after copper. One advantage is low weight, anMiscellaneous is outstanding corrosion protection.

General ordering data

Type	TS 32X15 2M/AL/BK	Version
Order No.	0169300000	Terminal rail, Accessories, Aluminium, untreated, Width: 2000 mm,
GTIN (EAN)	4008190105167	Height: 33 mm, Depth: 15 mm
Qty.	2 m	

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Data sheet

Weidmüller

RS F16 LP2N 5/16

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Accessories

SAK-Series



Weidmüller's range of products includes end brackets that guarantee a permanent, reliable mounting on the terminal rail and prevent sliding. Versions with and without screws are available. The end brackets include marking options, also for group markers, and also a test plug holder.

General ordering data

Type	EW 35 GR 7032	Version
Order No.	0383530000	End bracket, grey, TS 35, V-0, Wemid, Width: 9 mm, 120 °C
GTIN (EAN)	4008190027322	
Qty.	50 pc(s).	
Type	EW 35	Version
Order No.	0383560000	End bracket, beige, TS 35, V-2, Wemid, Width: 8.5 mm, 100 °C
GTIN (EAN)	4008190181314	
Qty.	50 pc(s).	
Type	EW 35/SCHA/M3	Version
Order No.	0258660000	End bracket, beige, TS 35, V-2, Wemid, Width: 16.5 mm, 100 °C
GTIN (EAN)	4008190033477	
Qty.	20 pc(s).	

Z-Series



Weidmüller's range of products includes end brackets that guarantee a permanent, reliable mounting on the terminal rail and prevent sliding. Versions with and without screws are available. The end brackets include marking options, also for group markers, and also a test plug holder.

General ordering data

Type	ZEW 35	Version
Order No.	9540000000	End bracket, dark beige, TS 35, V-2, Wemid, Width: 6 mm, 100 °C
GTIN (EAN)	4008190956264	
Qty.	20 pc(s).	
Type	ZEW 35/2	Version
Order No.	8630740000	End bracket, dark beige, TS 35, V-2, Wemid, Width: 8 mm, 100 °C
GTIN (EAN)	4032248348916	
Qty.	20 pc(s).	

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1.51 WEIDMULLER 95sqmm TERMINAL WDU95N/120N DATA SHEET

Data sheet

Weidmüller

WDU 95N/120N

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Product image



To feed through power, signal, and data is the classical requirement in electrical engineering and panel building. The insulating material, the connection system and the design of the terminal blocks are the differentiating features. A feed-through terminal block is suitable for joining and/or connecting one or more conductors. They could have one or more connection levels that are on the same potential or insulated against one another.

General ordering data

Version	Feed-through terminal block, Screw connection, dark beige, 120 mm², 269 A, 1000 V, Number of connections: 2, Number of levels: 1, TS 35, V-0, Wemid, 130 °C
Order No.	1820550000
Type	WDU 95N/120N
GTIN (EAN)	4032248369300
Qty.	5 pc(s).

Creation date October 22, 2024 12:00:15 PM CEST

Catalogue status 12.10.2024 / We reserve the right to make technical changes. 1

Data sheet

Weidmüller

WDU 95N/120N

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Technical data

Dimensions and weights

Depth	90 mm	Depth (inches)	3.543 inch
Depth including DIN rail	91 mm	Height	91 mm
Height (inches)	3.583 inch	Width	27 mm
Width (inches)	1.063 inch	Net weight	261.8 g

Temperatures

Storage temperature	-25 °C...55 °C	Operating temperature range	For operating temperature range see EC Design Test Certificate / IEC Ex-Certificate of Conformity
Continuous operating temp., min.	-60 °C	Continuous operating temp., max.	130 °C

Material data

Material	Wemid	Colour	dark beige
UL 94 flammability rating	V-0		

Rating data IECEx/ATEX

Certificate No. (ATEX)	DEMKO14ATEX1338U	Certificate No. (IECEX)	IECEXULD14.0005U
Max. voltage (ATEX)	880 V	Current (ATEX)	221 A
Wire cross section max. (ATEX)	120 mm²	Max. voltage (IECEX)	880 V
Current (IECEX)	221 A	Wire cross section max. (IECEX)	120 mm²
Operating temperature range	For operating temperature range see EC Design Test Certificate / IEC Ex-Certificate of Conformity	Marking EN 60079-7	Ex eb II C Gb
Ex 2014/34/EU label	II 2 G D		

System specifications

Version	Screw connection, for screwable cross-connection, in closed state	End cover plate required	No
Number of potentials	1	Number of levels	1
Number of clamping points per level	2	Number of potentials per tier	1
Levels cross-connected internally	No	PE connection	No
Rail	TS 35	N-function	No
PE function	No	PEN function	Yes

2 clampable conductors (H05V/H07V) with equal cross-section (rated connection)

Cross-section for connected wire, solid, two clampable wires, max.	10 mm²	Cross-section for connected wire, solid, two clampable wires, min.	35 mm²
Cross-section for connected wire, stranded, two clampable wires, max.	35 mm²	Cross-section for connected wire, stranded, two clampable wires, min.	10 mm²
Wire connection cross section, finely stranded with wire-end ferrules DIN 46228/1, 2 clampable wires, max.	35 mm²	Wire connection cross section, finely stranded with wire-end ferrules DIN 46228/1, 2 clampable wires, min.	10 mm²
Wire connection cross section, finely stranded, two clampable wires, min.	16 mm²	Wire cross-section, finely stranded, two clampable wires, max.	35 mm²

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Data sheet

Weidmüller

WDU 95N/120N

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Technical data

Additional technical data

Explosion-tested version	Yes	Installation advice	Direct mounting
Number of similar terminals	1	Open sides	closed
Type of mounting	Snap-on		

CSA rating data

Certificate No. (CSA)	200039-1057876	Current size C (CSA)	220 A
Voltage size C (CSA)	1000 V	Wire cross section max. (CSA)	0000 AWG
Wire cross section min. (CSA)	4 AWG		

Conductors for clamping (additional connection)

Connection type, additional connection	Screw connection

Conductors for clamping (rated connection)

Blade size	S6 (DIN 6911)	Clamping range, max.	150 mm²
Clamping range, min.	16 mm²	Clamping screw	M 10
Connection cross-section, stranded, max.	150 mm²	Connection cross-section, stranded, min.	16 mm²
Connection direction	on side	Gauge to IEC 60947-1	B13
Number of connections	2	Stripping length	27 mm
Tightening torque, max.	20 Nm	Tightening torque, min.	12 Nm
Type of connection	Screw connection	Wire connection cross section AWG, max.	kcmil 250
Wire connection cross section AWG, min.	AWG 4	Wire connection cross section, finely stranded, max.	120 mm²
Wire connection cross section, finely stranded, min.	16 mm²	Wire connection cross-section, finely stranded with wire-end ferrules DIN 46228/1, max.	95 mm²
Wire connection cross-section, finely stranded with wire-end ferrules DIN 46228/1, min.	16 mm²	Wire connection cross-section, solid core, max.	16 mm²
Wire connection cross-section, solid core, min.	16 mm²		

Dimensions

TS 32 offset	64.5 mm

General

Installation advice	Direct mounting	Rail	TS 35
Standards	IEC 60947-7-1	Wire connection cross section AWG, max.	kcmil 250
Wire connection cross section AWG, min.	AWG 4		

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Weidmüller

Data sheet

WDU 95N/120N

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Technical data

Rating data

Rated cross-section	120 mm²	Rated voltage	1,000 V
Rated DC voltage	1,000 V	Rated current	269 A
Current at maximum wires	290 A	Standards	IEC 60947-7-1
Volume resistance according to IEC 60947-7-x	0.12 mΩ	Rated impulse withstand voltage	8 kV
Power loss in accordance with IEC 60947-7-x	8.61 W	Pollution severity	3

UL rating data

Certificate No. (UR)	E60693	Conductor size Factory wiring max. (UR)	250 kcmil
Conductor size Factory wiring min. (UR)	4 AWG	Conductor size Field wiring max. (UR)	250 kcmil
Conductor size Field wiring min. (UR)	4 AWG	Current size C (UR)	228 A
Voltage size C (UR)	1000 V	Wire cross section max. (UR)	250 kcmil
Wire cross section min. (UR)	4 AWG		

Classifications

ETIM 6.0	EC000897	ETIM 7.0	EC000897
ETIM 8.0	EC000897	ETIM 9.0	EC000897
ECLASS 9.0	27-14-11-20	ECLASS 9.1	27-14-11-20
ECLASS 10.0	27-14-11-20	ECLASS 11.0	27-14-11-20
ECLASS 12.0	27-14-11-20	ECLASS 13.0	27-25-01-01
ECLASS 14.0	27-25-01-01		

Environmental Product Compliance

RoHS Compliance Status	Compliant without exemption
REACH SVHC	/

Approvals

Approvals

ROHS	Conform
UL File Number Search	UL Website
Certificate No. (UR)	E60693

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Data sheet

Weidmüller

WDU 95N/120N

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Technical data

Downloads

Approval/Certificate/Document of Conformity	Attestation of Conformity IECEx Certificate UKCA Ex Attestation of Conformity UKCA Ex Certificate CCC Ex Certificate CE Declaration of Conformity ATEX Certificate UKCA declaration of conformity Confirmation of Standards EN 45545-2_2020-10
Engineering Data	CAD data – STEP
User Documentation	NTI WDU/WPE 95N/120 StorageConditionsTerminalBlocks Instruction Instruction User documentation WZAD
Catalogues	Catalogues in PDF-format
Brochures	

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WDU 95N/120N

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Data sheet

Weidmüller

WDU 95N/120N

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Accessories

W-Series



Warning covers with a flash symbol provide more safety for man and machine. They are used where external voltage must be indicated within the application.

General ordering data

Type	WAD 20 GE WSD	Version
Order No.	9512260000	Terminal marking, yellow, Pitch in mm (P): 18.00, Printed characters:
GTIN (EAN)	4008190403942	Symbols, horizontal, Width: 18 mm, Height: 48.5 mm
Qty.	10 pc(s).	

DEK 5/8



WS/ DEK
MultiMark terminal markers use an innovative composite material made from two components. The hard base contour of the marker snaps securely into the connector. The elastic surface finish makes the marker easy to mount. This specially punched material enables the strips to be stretched to accommodate the slight variations in spacing that tend to add up, especially with long terminal blocks. Another advantage: the excellent printability of the surface material guarantees durable and wear-resistant labelling. A print resolution of 300 dpi also produces a very legible script.

Your benefits with MultiMark

- Firm hold and durable printing
- Continuous strips save installation time
- Easy mounting thanks to an innovative composite material
- Large label field for optimal legibility
- High flexibility thanks to manufacturer independence

General ordering data

Type	DEK 5/8 MM WS	Version
Order No.	2007130000	Dekafix, Terminal marker, 5 x 8 mm, Weidmueller, white
GTIN (EAN)	4050118392012	
Qty.	500 pc(s).	

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Accessories

W-Series



Weidmüller's range of products includes end brackets that guarantee a permanent, reliable mounting on the terminal rail and prevent sliding. Versions with and without screws are available. The end brackets include marking options, also for group markers, and also a test plug holder.

General ordering data

Type	WEW 35/1	Version
Order No.	1059000000	End bracket, dark beige, TS 35, V-2, Wemid, Width: 12 mm, 100 °C
GTIN (EAN)	4008190172282	
Qty.	50 pc(s).	

Marker holder



The marker holder offer the possibility of additional mounting of standard markers with a pitch of 5 or 5.1 mm. The angled holders can be optionally snaped together and could be mounted in all standard marking channels of the Klippon® Connect modular terminal blocks. Fitting marker types could be found under the respective accessories of the designation marking holder.

General ordering data

Type	BZT 1 ZA WS 10/5	Version
Order No.	1805520000	Accessories, Marker holder
GTIN (EAN)	4032248270248	
Qty.	100 pc(s).	
Type	BZT 1 WS 10/5	Version
Order No.	1805490000	Accessories, Marker holder
GTIN (EAN)	4032248270231	
Qty.	100 pc(s).	

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Data sheet

Weidmüller

WDU 95N/120N

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Accessories

95/120 mm²



Power feed-in
Our wide range of W-Series terminal blocks with our WPD main line branch terminals, which are optimised to guarantee both convenience and space gains, ensures a secure and convenient connection at the power feed-in.

General ordering data

Type	WQV 95N/120N/4	Version
Order No.	1826910000	Cross-connector (terminal), when screwed in, Silver grey, 269 A,
GTIN (EAN)	4032248329960	Number of poles: 4, Pitch in mm (P): 27.00, Insulated: No, Width: 9.5
Qty.	5 pc(s).	mm
Type	WQV 95N/120N/3	Version
Order No.	1826900000	Cross-connector (terminal), when screwed in, Silver grey, 269 A,
GTIN (EAN)	4032248329953	Number of poles: 3, Pitch in mm (P): 27.00, Insulated: No, Width: 9.5
Qty.	5 pc(s).	mm
Type	WQV 95N/120N/2	Version
Order No.	1826890000	Cross-connector (terminal), when screwed in, Silver grey, 269 A,
GTIN (EAN)	4032248329946	Number of poles: 2, Pitch in mm (P): 27.00, Insulated: No, Width: 9.5
Qty.	5 pc(s).	mm

WZAD



General ordering data

Type	WZAD 95N/120N	Version
Order No.	1859580000	Auxiliary connection (terminal), 6 mm², Number of connections: 1
GTIN (EAN)	4032248718429	
Qty.	5 pc(s).	

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Data sheet

Weidmüller

WDU 95N/120N

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Accessories

Blank



The Dekafix (DEK) marker is the universal marker for all conductor and plug-in connectors as well as for electronic sub-assemblies. The system is ideal for short number sequences and covers a wide range of ready-printed markers.
Strips for fast installation in only one work step. The printing is easy to read, rich in contrast and available in various widths.

- Large range of ready-to-use markers
- Strips for fast installation
- Terminal markers, suitable for all Weidmüller cable connectors
- Available as blank MultiCard or with standard printing

For custom printing: Please send us a file of our labeling software M-Print PRO or M-Print PRO Online (without installation) for your labeling specifications.

General ordering data

Type	DEK 5/8 MC NE WS	Version
Order No.	1856740000	Dekafix, Terminal marker, 5 x 8 mm, Pitch in mm (P): 8.00
GTIN (EAN)	4032248400850	Weidmueller, white
Qty.	800 pc(s).	

Blank



WS markers are the perfect match for the W-series connectors. Thanks to their system compatibility, the WS tags can also be used with the I-series and the Z-series. The large marking surfaces do not only permit long character strings but also multi-line text.
WS markers are ideal for labels with long, customised character strings. Thanks to the proven MultiCard format, printing with PrintJet CONNECT oder/or Plotter is possible.

- Can be fitted in strips or individually
- Markers in proven MultiCard format

For custom printing: Please send us a file of our labeling software M-Print PRO or M-Print PRO Online (without installation) for your labeling specifications.

General ordering data

Type	WS 15/5 MC NE WS	Version
Order No.	1609880000	WS, Terminal marker, 15 x 5 mm, Pitch in mm (P): 5.00 Weidmueller,
GTIN (EAN)	4008190203504	Allen-Bradley, white
Qty.	480 pc(s).	

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Data sheet

Weidmüller

WDU 95N/120N

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Accessories

Socket wrench sets

Allen key made from fully hardened, high-alloy chromium-vanadium- steel, acc. to DIN ISO 2936 L (DIN 911), high-quality refined surface.



General ordering data

Type	SKS 2,0-8,0 MR	Version
Order No.	9008870000	socket wrenches
GTIN (EAN)	4032248266623	
Qty.	1 pc(s).	

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1.52 WEIDMULLER 35sqmm TERMINAL WDU35 DATA SHEET

Data sheet

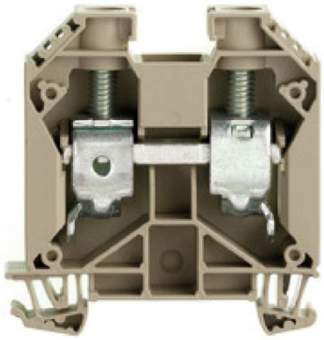
Weidmüller

WDU 35

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Product image



To feed through power, signal, and data is the classical requirement in electrical engineering and panel building. The insulating material, the connection system and the design of the terminal blocks are the differentiating features. A feed-through terminal block is suitable for joining and/or connecting one or more conductors. They could have one or more connection levels that are on the same potential or insulated against one another.

General ordering data

Version	Feed-through terminal block, Screw connection, dark beige, 35 mm², 125 A, 1000 V, Number of connections: 2, Number of levels: 1, TS 35, V-0, Wemid, 130 °C
Order No.	1020500000
Type	WDU 35
GTIN (EAN)	4008190077013
Qty.	40 pc(s).

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Data sheet

Weidmüller

WDU 35

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Technical data

Dimensions and weights

Depth	62.5 mm	Depth (inches)	2.461 inch
Depth including DIN rail	63 mm	Height	60 mm
Height (inches)	2.362 inch	Width	16 mm
Width (inches)	0.63 inch	Net weight	51.38 g

Temperatures

Storage temperature	-25 °C...55 °C	Operating temperature range	For operating temperature range see EC Design Test Certificate / IEC Ex-Certificate of Conformity
Continuous operating temp., min.	-60 °C	Continuous operating temp., max.	130 °C

Material data

Material	Wemid	Colour	dark beige
UL 94 flammability rating	V-0		

Rating data IECEx/ATEX

Certificate No. (ATEX)	DEMKO14ATEX1338U	Certificate No. (IECEX)	IECEXULD14.0005U
Max. voltage (ATEX)	690 V	Current (ATEX)	115 A
Wire cross section max. (ATEX)	35 mm²	Max. voltage (IECEX)	690 V
Current (IECEX)	115 A	Wire cross section max. (IECEX)	35 mm²
Operating temperature range	For operating temperature range see EC Design Test Certificate / IEC Ex-Certificate of Conformity	Marking EN 60079-7	Ex eb II C Gb
Ex 2014/34/EU label	II 2 G D		

System specifications

Version	Screw connection, for screwable cross-connection, One end without connector	End cover plate required	Yes
Number of potentials	1	Number of levels	1
Number of clamping points per level	2	Number of potentials per tier	1
Levels cross-connected internally	No	PE connection	No
Rail	TS 35	N-function	No
PE function	No	PEN function	Yes

2 clampable conductors (H05V/H07V) with equal cross-section (rated connection)

Cross-section for connected wire, stranded, two clampable wires, max.	16 mm²	Cross-section for connected wire, stranded, two clampable wires, min.	16 mm²
Wire connection cross section, finely stranded with wire-end ferrules DIN 46228/1, 2 clampable wires, max.	16 mm²	Wire connection cross section, finely stranded with wire-end ferrules DIN 46228/1, 2 clampable wires, min.	2.5 mm²
Wire connection cross section, finely stranded, two clampable wires, min.	2.5 mm²	Wire cross-section, finely stranded, two clampable wires, max.	16 mm²

Additional technical data

Explosion-tested version	Yes	Number of similar terminals	1
Open sides	right	Type of mounting	Snap-on

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Weidmüller

WDU 35

Weidmüller Interface GmbH & Co. KG
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Germany

www.weidmueller.com

Technical data

CSA rating data

Certificate No. (CSA)	200039-1057876	Current size C (CSA)	150 A
Voltage size C (CSA)	600 V	Wire cross section min. (CSA)	12 AWG

Conductors for clamping (additional connection)

Connection type, additional connection	Screw / solder connection

Conductors for clamping (rated connection)

Blade size	6.5 x 1.2 mm			
Clampable conductor	Connection specification	Screw connection		
	Cross-section for conductor connection	Type	solid, H05(07) V-U	
		min.	2.5 mm²	
		max.	16 mm²	
		nominal	35 mm²	
	wire end ferrule	Stripping length	min.	18 mm
			max.	18 mm
			nominal	18 mm
		Tightening torque	min.	4 Nm
			max.	5 Nm
		Recommended wire-end ferrule		
	Connection specification	Screw connection		
	Cross-section for conductor connection	Type	stranded, H07V-R	
		min.	2.5 mm²	
		max.	50 mm²	
		nominal	35 mm²	
	wire end ferrule	Stripping length	min.	18 mm
			max.	18 mm
			nominal	18 mm
		Tightening torque	min.	4 Nm
			max.	5 Nm
		Recommended wire-end ferrule		
	Connection specification	Screw connection		
	Cross-section for conductor connection	Type	flexible, H05(07) V-K	
		min.	2.5 mm²	
		max.	35 mm²	
		nominal	35 mm²	
	wire end ferrule	Stripping length	min.	18 mm
			max.	18 mm
			nominal	18 mm
		Tightening torque	min.	4 Nm
			max.	5 Nm
		Recommended wire-end ferrule		
Clamping range, max.	50 mm²			
Clamping range, min.	2.5 mm²			
Clamping screw	M 6			
Connection cross-section, stranded, max.	50 mm²			
Connection cross-section, stranded, min.	2.5 mm²			
Connection direction	on side			
Gauge to IEC 60947-1	B9			
Number of connections	2			

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WDU 35

Weidmüller Interface GmbH & Co. KG
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Technical data

Stripping length	18 mm
Tightening torque, max.	5 Nm
Tightening torque, min.	4 Nm
Twin wire-end ferrules, max.	16 mm²
Twin wire-end ferrules, min.	1.5 mm²
Type of connection	Screw connection
Wire connection cross section AWG, max.	AWG 2
Wire connection cross section AWG, min.	AWG 12
Wire connection cross section, finely stranded, max.	35 mm²
Wire connection cross section, finely stranded, min.	2.5 mm²
Wire connection cross-section, finely stranded with wire-end ferrules DIN 46228/1, max.	35 mm²
Wire connection cross-section, finely stranded with wire-end ferrules DIN 46228/1, min.	2.5 mm²
Wire connection cross-section, finely stranded with wire-end ferrules DIN 46228/4, max.	35 mm²
Wire connection cross-section, finely stranded with wire-end ferrules DIN 46228/4, min.	2.5 mm²
Wire connection cross-section, solid core, max.	16 mm²
Wire connection cross-section, solid core, min.	2.5 mm²

General

Rail	TS 35	Standards	IEC 60947-7-1
Wire connection cross section AWG, max.	AWG 2	Wire connection cross section AWG, min.	AWG 12

Rating data

Rated cross-section	35 mm²	Rated voltage	1,000 V
Rated DC voltage	1,000 V	Rated current	125 A
Current at maximum wires	150 A	Standards	IEC 60947-7-1
Volume resistance according to IEC 60947-7-x	0.26 mΩ	Rated impulse withstand voltage	8 kV
Power loss in accordance with IEC 60947-7-x	4 W	Pollution severity	3
Surge voltage category	III		

UL rating data

Certificate No. (UR)	E60693	Conductor size Factory wiring max. (UR)	0 AWG
Conductor size Factory wiring min. (UR)	12 AWG	Conductor size Field wiring max. (UR)	0 AWG
Conductor size Field wiring min. (UR)	12 AWG	Current size C (UR)	150 A
Voltage size C (UR)	1000 V		

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WDU 35

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Technical data

Classifications

ETIM 6.0	EC000897	ETIM 7.0	EC000897
ETIM 8.0	EC000897	ETIM 9.0	EC000897
ECLASS 9.0	27-14-11-20	ECLASS 9.1	27-14-11-20
ECLASS 10.0	27-14-11-20	ECLASS 11.0	27-14-11-20
ECLASS 12.0	27-14-11-20	ECLASS 13.0	27-25-01-01
ECLASS 14.0	27-25-01-01		

Environmental Product Compliance

RoHS Compliance Status	Compliant without exemption
REACH SVHC	/

Approvals

Approvals

CSAEX CURUSEX ATEX IECEx INMETRO KEMA KEUR KOSHAEX UKCA-EX UK CA

ROHS	Conform
UL File Number Search	UL Website
Certificate No. (UR)	E60693
Certificate No. (cURusEX)	E184763

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Data sheet

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WDU 35

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Technical data

Downloads

Approval/Certificate/Document of Conformity	Attestation of Conformity IECEx Certificate UKCA Ex Attestation of Conformity CB Testreport CB Certificate NEMKO certificate Lloyds Register Certificate POLSKIREJ certificate UKCA Ex Certificate 16-AV4BO-0265U. DNV Certificate CCC Ex Certificate CE Declaration of Conformity ATEX Certificate UKCA declaration of conformity Confirmation of Standards EN 45545-2_2020-10
Engineering Data	CAD data – STEP
User Documentation	NTI WDU/WPE 35.pdf StorageConditionsTerminalBlocks
Catalogues	Catalogues in PDF-format
Brochures	

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Data sheet

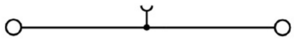
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www.weidmueller.com

Drawings



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Data sheet

Weidmüller

WDU 35

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Accessories

2.5-10 mm²



End plates are fitted to the open side of the last modular terminal before the end bracket. The use of an end plate ensures the function of the modular terminal and the specified rated voltage. It guarantees protection against contact with live parts and makes the final terminal finger-proof.

General ordering data

Type	WAP 16+35 WTW 2.5-10	Version
Order No.	1050100000	End and partition plate for terminals, dark beige, Height: 56 mm,
GTIN (EAN)	4008190079901	Width: 1.5 mm, V-0, Wemid
Qty.	20 pc(s).	
Type	WAP 16+35 WTW 2.5-10 BL	Version
Order No.	1050180000	End and partition plate for terminals, blue, Height: 56 mm, Width: 1.5
GTIN (EAN)	4008190013899	mm, V-0, Wemid
Qty.	20 pc(s).	

Blank



The WAD connector marker is suitable for W-series terminals and for the WEW 35/2 and ZEW 35/2 end brackets. The markers are available as blank markers, with custom printing or standard print with lightning symbol. The WAD MultiCard markers are suitable for labelling with PrintJet CONNECT printers.

For custom printing: Please send us a file of our labeling software M-Print PRO or M-Print PRO Online (without installation) for your labeling specifications.

General ordering data

Type	WAD 12 MC NE GE	Version
Order No.	2445080000	Group markers, Cover, 36.2 x 11.9 mm, WDU 16, WDU 35, yellow
GTIN (EAN)	4050118458213	
Qty.	32 pc(s).	
Type	WAD 12 MC NE WS	Version
Order No.	2445070000	Group markers, Cover, 36.2 x 11.9 mm, WDU 16, WDU 35, white
GTIN (EAN)	4050118458220	
Qty.	32 pc(s).	

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Data sheet

Weidmüller

WDU 35

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Accessories

ZGB pivotable group tag holder



The ZGB 15 is a hinged group tag carrier. The tag carrier can hold the dekafix 5, WS 12/5 terminal markers or the inlay tag ESO 15.
The ZGB 30 is a hinged group tag carrier. The tag carrier can hold the dekafix 5, WS 12/5 terminal markers or the inlay tag ESO 7.
Inlay tags and protective strips can be found under "Accessories".

General ordering data

Type	ZGB 15	Version
Order No.	1636530000	Terminal markers, Terminal marker, 15 x 7 mm, Pitch in mm (P): 5.00
GTIN (EAN)	4008190297053	Weidmueller, white
Qty.	20 pc(s).	
Type	ZGB 30	Version
Order No.	1611930000	Terminal markers, Terminal marker, 32 x 7 mm, Pitch in mm (P): 5.00
GTIN (EAN)	4008190002251	Weidmueller, white
Qty.	20 pc(s).	

Step-down bridges

General ordering data

Type	WQV 35-2.5	Version
Order No.	1064100000	Cross-connector (terminal), when screwed in, yellow, 41 A, Number of
GTIN (EAN)	4008190142285	poles: 3, Pitch in mm (P): 16.00, Insulated: Yes, Width: 13 mm
Qty.	10 pc(s).	
Type	WQV 35-10/6/4	Version
Order No.	1068000000	Cross-connector (terminal), when screwed in, yellow, 57 A, Number of
GTIN (EAN)	4008190141011	poles: 2, Pitch in mm (P): 16.00, Insulated: Yes, Width: 13 mm
Qty.	10 pc(s).	

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Data sheet

Weidmüller

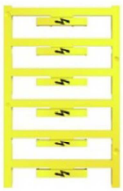
WDU 35

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Accessories

With lightning flash



The WAD connector marker is suitable for W-series terminals and for the WEW 35/2 and ZEW 35/2 end brackets. The markers are available as blank markers, with custom printing or standard print with lightning symbol. The WAD MultiCard markers are suitable for labelling with PrintJet CONNECT printers.

For custom printing: Please send us a file of our labeling software M-Print PRO or M-Print PRO Online (without installation) for your labeling specifications.

General ordering data

Type	WAD 12 MC B GE/SW	Version
Order No.	2445090000	Group markers, Cover, 36.2 x 11.9 mm, WDU 16, WDU 35, yellow
GTIN (EAN)	4050118457896	
Qty.	32 pc(s).	

WS 12/5



WS/ DEK
MultiMark terminal markers use an innovative composite material made from two components. The hard base contour of the marker snaps securely into the connector. The elastic surface finish makes the marker easy to mount. This specially punched material enables the strips to be stretched to accommodate the slight variations in spacing that tend to add up, especially with long terminal blocks. Another advantage: the excellent printability of the surface material guarantees durable and wear-resistant labelling. A print resolution of 300 dpi also produces a very legible script.
Your benefits with MultiMark

- Firm hold and durable printing
- Continuous strips save installation time
- Easy mounting thanks to an innovative composite material
- Large label field for optimal legibility
- High flexibility thanks to manufacturer independence

General ordering data

Type	WS 12/5 MM WS	Version
Order No.	2007190000	WS, Terminal marker, 12 x 5 mm, Weidmueller, white
GTIN (EAN)	4050118392036	
Qty.	800 pc(s).	

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Data sheet

Weidmüller

WDU 35

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Accessories

W-Series



Weidmüller's range of products includes end brackets that guarantee a permanent, reliable mounting on the terminal rail and prevent sliding. Versions with and without screws are available. The end brackets include marking options, also for group markers, and also a test plug holder.

General ordering data

Type	WEW 35/1	Version
Order No.	1059000000	End bracket, dark beige, TS 35, V-2, Wemid, Width: 12 mm, 100 °C
GTIN (EAN)	4008190172282	
Qty.	50 pc(s).	

Blank



WS markers are the perfect match for the W-series connectors. Thanks to their system compatibility, the WS tags can also be used with the I-series and the Z-series. The large marking surfaces do not only permit long character strings but also multi-line text.
WS markers are ideal for labels with long, customised character strings. Thanks to the proven MultiCard format, printing with PrintJet CONNECT oder/or Plotter is possible.

- Can be fitted in strips or individually
- Markers in proven MultiCard format

For custom printing: Please send us a file of our labeling software M-Print PRO or M-Print PRO Online (without installation) for your labeling specifications.

General ordering data

Type	WS 12/5 MC NE WS	Version
Order No.	1609860000	WS, Terminal marker, 12 x 5 mm, Pitch in mm (P): 5.00 Weidmueller,
GTIN (EAN)	4008190203481	Allen-Bradley, white
Qty.	720 pc(s).	

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Data sheet

Weidmüller

WDU 35

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Accessories

Marker holder



The marker holder offer the possibility of additional mounting of standard markers with a pitch of 5 or 5.1 mm. The angled holders can be optionally snaped together and could be mounted in all standard marking channels of the Klippon® Connect modular terminal blocks. Fitting marker types could be found under the respective accessories of the designation marking holder.

General ordering data

Type	BZT 1 ZA WS 10/5	Version
Order No.	1805520000	Accessories, Marker holder
GTIN (EAN)	4032248270248	
Qty.	100 pc(s).	
Type	BZT 1 WS 10/5	Version
Order No.	1805490000	Accessories, Marker holder
GTIN (EAN)	4032248270231	
Qty.	100 pc(s).	

35 mm²



Power feed-in
Our wide range of W-Series terminal blocks with our WPD main line branch terminals, which are optimised to guarantee both convenience and space gains, ensures a secure and convenient connection at the power feed-in.

General ordering data

Type	WQV 35/4	Version
Order No.	1055460000	Cross-connector (terminal), when screwed in, yellow, 112 A, Number
GTIN (EAN)	4008190130275	of poles: 4, Pitch in mm (P): 16.00, Insulated: Yes, Width: 9.85 mm
Qty.	50 pc(s).	
Type	WQV 35/2	Version
Order No.	1053060000	Cross-connector (terminal), when screwed in, yellow, 138 A, Number
GTIN (EAN)	4008190097349	of poles: 2, Pitch in mm (P): 16.00, Insulated: Yes, Width: 9.85 mm
Qty.	50 pc(s).	
Type	WQV 35/10	Version
Order No.	1053160000	Cross-connector (terminal), when screwed in, yellow, 112 A, Number
GTIN (EAN)	4008190026028	of poles: 10, Pitch in mm (P): 16.00, Insulated: Yes, Width: 9.85 mm
Qty.	10 pc(s).	
Type	WQV 35/3	Version
Order No.	1055360000	Cross-connector (terminal), when screwed in, yellow, 112 A, Number
GTIN (EAN)	4008190007249	of poles: 3, Pitch in mm (P): 16.00, Insulated: Yes, Width: 9.85 mm
Qty.	50 pc(s).	

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Data sheet

Weidmüller

WDU 35

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Accessories

Blank



The Dekafix (DEK) marker is the universal marker for all conductor and plug-in connectors as well as for electronic sub-assemblies. The system is ideal for short number sequences and covers a wide range of ready-printed markers.
Strips for fast installation in only one work step. The printing is easy to read, rich in contrast and available in various widths.

- Large range of ready-to-use markers
- Strips for fast installation
- Terminal markers, suitable for all Weidmüller cable connectors
- Available as blank MultiCard or with standard printing

For custom printing: Please send us a file of our labeling software M-Print PRO or M-Print PRO Online (without installation) for your labeling specifications.

General ordering data

Type	DEK 5/5 MC NE WS	Version
Order No.	1609801044	Dekafix, Terminal marker, 5 x 5 mm, Pitch in mm (P): 5.00
GTIN (EAN)	4008190397111	Weidmueller, white
Qty.	1,000 pc(s).	

W-Series



A partition plate is used for the optical separation of circuits or used for electrical isolation from neighbouring cross-connectors. In contrast to the end plate, the contour can be larger than the adjacent terminal blocks. However, it should not be smaller, as otherwise the required clearance and creepage distances within the application can no longer be maintained.

General ordering data

Type	WTW EN	Version
Order No.	1058800000	Partition plate (terminal), dark beige, Height: 86 mm, Width: 3 mm,
GTIN (EAN)	4008190140175	V-0, Wemid
Qty.	20 pc(s).	

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Data sheet

Weidmüller

WDU 35

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Accessories

Testsockets



Test adapters and test plugs are used for the electrical connection between terminal blocks and the test equipment. In this way, an electrical contact can be established in the wired state and measurements can be done easily.

General ordering data

Type	STB 14/D6/4/M3 SAK10	Version
Order No.	0169900000	Accessories, Socket
GTIN (EAN)	4008190076665	
Qty.	50 pc(s).	
Type	STB 16/D7/4/M4 SAK35	Version
Order No.	0140200000	SAK Series, Socket
GTIN (EAN)	4008190134884	
Qty.	50 pc(s).	

PEN bridges



Power feed-in
Our wide range of W-Series terminal blocks with our WPD main line branch terminals, which are optimised to guarantee both convenience and space gains, ensures a secure and convenient connection at the power feed-in.

General ordering data

Type	WQB-PEN 35	Version
Order No.	1060100000	Cross-connector (terminal), when screwed in, Silver grey, 135 A,
GTIN (EAN)	4008190089870	Number of poles: 2, Pitch in mm (P): 16.00, Insulated: No, Width: 24.6
Qty.	10 pc(s).	mm

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Weidmüller

WDU 35

Weidmüller Interface GmbH & Co. KG
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D-32758 Detmold
Germany

www.weidmueller.com

Accessories

SchT group marker carrier



The SchT 5 S group tag carriers are clipped directly onto the TS 32 mounting rail (G-rail) or the TS 35 mounting rail (top-hat rail). It is therefore possible to label the terminal strip irrespective of the terminal and the type of terminal. SchT 5 and SchT 5 S are fitted with ESO 5, STR 5 protective strips.
The SchT 7 is a hinged group tag carrier for inlay tags which enables easy access to the clamping screw.
The SchT 7 is fitted with ESO 7, STR 7 protective strips or DEK 5.
Inlay tags and protective strips can be found under "Accessories".

General ordering data

Type	SCHT 7	Version
Order No.	0517960000	SCHT, Terminal marker, 39.3 x 8 mm, Pitch in mm (P): 7.00
GTIN (EAN)	4008190001742	Weidmueller, white
Qty.	20 pc(s).	

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1.53 WEIDMULLER 16sqmm TERMINAL WDU16 DATA SHEET

Data sheet

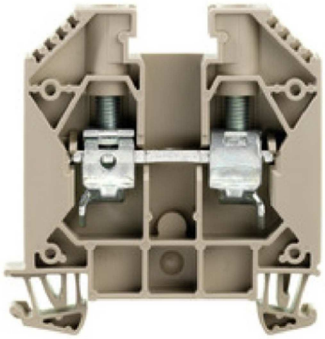
Weidmüller

WDU 16

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Product image



To feed through power, signal, and data is the classical requirement in electrical engineering and panel building. The insulating material, the connection system and the design of the terminal blocks are the differentiating features. A feed-through terminal block is suitable for joining and/or connecting one or more conductors. They could have one or more connection levels that are on the same potential or insulated against one another.

General ordering data

Version	Feed-through terminal block, Screw connection, dark beige, 16 mm², 76 A, 1000 V, Number of connections: 2, Number of levels: 1, TS 35, V-0, Wemid, 130 °C
Order No.	1020400000
Type	WDU 16
GTIN (EAN)	4008190127794
Qty.	50 pc(s).

Creation date October 22, 2024 12:00:57 PM CEST

Catalogue status 12.10.2024 / We reserve the right to make technical changes. 1

Data sheet

Weidmüller

WDU 16

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Technical data

Dimensions and weights

Depth	62.5 mm	Depth (inches)	2.461 inch
Depth including DIN rail	63 mm	Height	60 mm
Height (inches)	2.362 inch	Width	11.9 mm
Width (inches)	0.469 inch	Net weight	29.46 g

Temperatures

Storage temperature	-25 °C...55 °C	Operating temperature range	For operating temperature range see EC Design Test Certificate / IEC Ex-Certificate of Conformity
Continuous operating temp., min.	-60 °C	Continuous operating temp., max.	130 °C

Material data

Material	Wemid	Colour	dark beige
UL 94 flammability rating	V-0		

Rating data IECEx/ATEX

Certificate No. (ATEX)	DEMKO14ATEX1338U	Certificate No. (IECEX)	IECEXULD14.0005U
Max. voltage (ATEX)	690 V	Current (ATEX)	76 A
Wire cross section max. (ATEX)	16 mm²	Max. voltage (IECEX)	690 V
Current (IECEX)	76 A	Wire cross section max. (IECEX)	16 mm²
Operating temperature range	For operating temperature range see EC Design Test Certificate / IEC Ex-Certificate of Conformity	Marking EN 60079-7	Ex eb II C Gb
Ex 2014/34/EU label	II 2 G D		

System specifications

Version	Screw connection, for screwable cross-connection, One end without connector	End cover plate required	Yes
Number of potentials	1	Number of levels	1
Number of clamping points per level	2	Number of potentials per tier	1
Levels cross-connected internally	No	PE connection	No
Rail	TS 35	N-function	No
PE function	No	PEN function	Yes

2 clampable conductors (H05V/H07V) with equal cross-section (rated connection)

Cross-section for connected wire, solid, two clampable wires, max.	6 mm²	Cross-section for connected wire, solid, two clampable wires, min.	1.5 mm²
Cross-section for connected wire, stranded, two clampable wires, max.	6 mm²	Cross-section for connected wire, stranded, two clampable wires, min.	1.5 mm²
Wire connection cross section, finely stranded with wire-end ferrules DIN 46228/1, 2 clampable wires, max.	6 mm²	Wire connection cross section, finely stranded with wire-end ferrules DIN 46228/1, 2 clampable wires, min.	1.5 mm²
Wire connection cross section, finely stranded, two clampable wires, min.	1.5 mm²	Wire cross-section, finely stranded, two clampable wires, max.	6 mm²

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Technical data

Additional technical data

Explosion-tested version	Yes	Number of similar terminals	1
Open sides	right	Type of mounting	Snap-on

CSA rating data

Certificate No. (CSA)	200039-1057876	Current size C (CSA)	85 A
Voltage size C (CSA)	600 V	Wire cross section max. (CSA)	6 AWG
Wire cross section min. (CSA)	18 AWG		

Conductors for clamping (additional connection)

Connection type, additional connection	Screw connection

Conductors for clamping (rated connection)

Blade size	1.0 x 5.5 mm			
Clampable conductor	Connection specification	Screw connection		
	Cross-section for conductor connection	Type	solid, H05(07) V-U	
		min.	1.5 mm²	
		max.	16 mm²	
		nominal	16 mm²	
	wire end ferrule	Stripping length	min.	16 mm
			max.	16 mm
			nominal	16 mm
		Tightening torque	min.	3 Nm
			max.	4 Nm
		Recommended wire-end ferrule		
	Connection specification	Screw connection		
	Cross-section for conductor connection	Type	stranded, H07V-R	
		min.	1.5 mm²	
		max.	25 mm²	
		nominal	16 mm²	
	wire end ferrule	Stripping length	min.	16 mm
			max.	16 mm
			nominal	16 mm
		Tightening torque	min.	3 Nm
			max.	4 Nm
		Recommended wire-end ferrule		
	Connection specification	Screw connection		
	Cross-section for conductor connection	Type	flexible, H05(07) V-K	
		min.	1.5 mm²	
		max.	25 mm²	
		nominal	16 mm²	
	wire end ferrule	Stripping length	min.	16 mm
			max.	16 mm
			nominal	16 mm
		Tightening torque	min.	3 Nm
			max.	4 Nm
		Recommended wire-end ferrule		
Clamping range, max.	25 mm²			
Clamping range, min.	0.82 mm²			
Clamping screw	M 5			

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Technical data

Connection cross-section, stranded, max.	25 mm²
Connection cross-section, stranded, min.	1.5 mm²
Connection direction	on side
Gauge to IEC 60947-1	B7
Number of connections	2
Stripping length	16 mm
Tightening torque, max.	4 Nm
Tightening torque, min.	3 Nm
Twin wire-end ferrules, max.	10 mm²
Twin wire-end ferrules, min.	1.5 mm²
Type of connection	Screw connection
Wire connection cross section AWG, max.	AWG 4
Wire connection cross section AWG, min.	AWG 18
Wire connection cross section, finely stranded, max.	25 mm²
Wire connection cross section, finely stranded, min.	1.5 mm²
Wire connection cross-section, finely stranded with wire-end ferrules DIN 46228/1, max.	16 mm²
Wire connection cross-section, finely stranded with wire-end ferrules DIN 46228/1, min.	1.5 mm²
Wire connection cross-section, finely stranded with wire-end ferrules DIN 46228/4, max.	16 mm²
Wire connection cross-section, finely stranded with wire-end ferrules DIN 46228/4, min.	1.5 mm²
Wire connection cross-section, solid core, max.	16 mm²
Wire connection cross-section, solid core, min.	1.5 mm²

General

Rail	TS 35	Standards	IEC 60947-7-1
Wire connection cross section AWG, max.	AWG 4	Wire connection cross section AWG, min.	AWG 18

Rating data

Rated cross-section	16 mm²	Rated voltage	1,000 V
Rated DC voltage	1,000 V	Rated current	76 A
Current at maximum wires	101 A	Standards	IEC 60947-7-1
Volume resistance according to IEC 60947-7-x	0.42 mΩ	Rated impulse withstand voltage	8 kV
Power loss in accordance with IEC 60947-7-x	2.43 W	Pollution severity	3

UL rating data

Certificate No. (UR)	E60693	Conductor size Factory wiring max. (UR)	4 AWG
Conductor size Factory wiring min. (UR)	18 AWG	Conductor size Field wiring max. (UR)	4 AWG
Conductor size Field wiring min. (UR)	18 AWG	Current size C (UR)	85 A
Voltage size C (UR)	600 V		

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Weidmüller

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Technical data

Classifications

ETIM 6.0	EC000897	ETIM 7.0	EC000897
ETIM 8.0	EC000897	ETIM 9.0	EC000897
ECLASS 9.0	27-14-11-20	ECLASS 9.1	27-14-11-20
ECLASS 10.0	27-14-11-20	ECLASS 11.0	27-14-11-20
ECLASS 12.0	27-14-11-20	ECLASS 13.0	27-25-01-01
ECLASS 14.0	27-25-01-01		

Environmental Product Compliance

RoHS Compliance Status	Compliant without exemption
REACH SVHC	/

Approvals

Approvals

CSAEX CURUSEX ATEX IECEx INMETRO KEMA KEUR KOSHAEX UKCA-EX UK CA

ROHS	Conform
UL File Number Search	UL Website
Certificate No. (UR)	E60693
Certificate No. (cURusEX)	E184763

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Technical data

Downloads

Approval/Certificate/Document of Conformity	Attestation of Conformity IECEx Certificate UKCA Ex Attestation of Conformity CB Testreport CB Certificate NEMKO certificate Lloyds Register Certificate POLSKIREJ certificate UKCA Ex Certificate 16-AV4BO-0265U. DNV Certificate CCC Ex Certificate CE Declaration of Conformity ATEX Certificate UKCA declaration of conformity Confirmation of Standards EN 45545-2 2020-10
Engineering Data	CAD data – STEP
User Documentation	NTI WDU/WPE 16.pdf StorageConditionsTerminalBlocks
Catalogues	Catalogues in PDF-format
Brochures	

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Data sheet

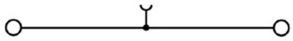
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Drawings



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Data sheet

Weidmüller

WDU 16

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

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Accessories

2.5-10 mm²



End plates are fitted to the open side of the last modular terminal before the end bracket. The use of an end plate ensures the function of the modular terminal and the specified rated voltage. It guarantees protection against contact with live parts and makes the final terminal finger-proof.

General ordering data

Type	WAP 16+35 WTW 2.5-10	Version
Order No.	1050100000	End and partition plate for terminals, dark beige, Height: 56 mm,
GTIN (EAN)	4008190079901	Width: 1.5 mm, V-0, Wemid
Qty.	20 pc(s).	
Type	WAP 16+35 WTW 2.5-10 BL	Version
Order No.	1050180000	End and partition plate for terminals, blue, Height: 56 mm, Width: 1.5
GTIN (EAN)	4008190013899	mm, V-0, Wemid
Qty.	20 pc(s).	

Blank



The WAD connector marker is suitable for W-series terminals and for the WEW 35/2 and ZEW 35/2 end brackets. The markers are available as blank markers, with custom printing or standard print with lightning symbol. The WAD MultiCard markers are suitable for labelling with PrintJet CONNECT printers.

For custom printing: Please send us a file of our labeling software M-Print PRO or M-Print PRO Online (without installation) for your labeling specifications.

General ordering data

Type	WAD 12 MC NE GE	Version
Order No.	2445080000	Group markers, Cover, 36.2 x 11.9 mm, WDU 16, WDU 35, yellow
GTIN (EAN)	4050118458213	
Qty.	32 pc(s).	
Type	WAD 12 MC NE WS	Version
Order No.	2445070000	Group markers, Cover, 36.2 x 11.9 mm, WDU 16, WDU 35, white
GTIN (EAN)	4050118458220	
Qty.	32 pc(s).	

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Data sheet

Weidmüller

WDU 16

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Accessories

Step-down bridges



Reducing cross-connectors enable simple and fast connection of terminal blocks with different rated cross-sections.

General ordering data

Type	WQV 16-2.5	Version
Order No.	1063900000	Cross-connector (terminal), when screwed in, yellow, 76 A, Number of
GTIN (EAN)	4008190112158	poles: 2, Pitch in mm (P): 11.90, Insulated: Yes, Width: 13 mm
Qty.	10 pc(s).	

ZGB pivotable group tag holder



The ZGB 15 is a hinged group tag carrier. The tag carrier can hold the dekafix 5, WS 12/5 terminal markers or the inlay tag ESO 15.
The ZGB 30 is a hinged group tag carrier. The tag carrier can hold the dekafix 5, WS 12/5 terminal markers or the inlay tag ESO 7.
Inlay tags and protective strips can be found under "Accessories".

General ordering data

Type	ZGB 15	Version
Order No.	1636530000	Terminal markers, Terminal marker, 15 x 7 mm, Pitch in mm (P): 5.00
GTIN (EAN)	4008190297053	Weidmueller, white
Qty.	20 pc(s).	
Type	ZGB 30	Version
Order No.	1611930000	Terminal markers, Terminal marker, 32 x 7 mm, Pitch in mm (P): 5.00
GTIN (EAN)	4008190002251	Weidmueller, white
Qty.	20 pc(s).	

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Accessories

PEN bridges



A PEN bridge joins separate PE and N conductors into one PEN conductor.

General ordering data

Type	WQB-PEN 16	Version
Order No.	1060200000	Cross-connector (terminal), when screwed in, Silver grey, 76 A,
GTIN (EAN)	4008190112653	Number of poles: 2, Pitch in mm (P): 12.00, Insulated: No, Width: 17.6
Qty.	10 pc(s).	mm

WS 12/5



WS/ DEK
MultiMark terminal markers use an innovative composite material made from two components. The hard base contour of the marker snaps securely into the connector. The elastic surface finish makes the marker easy to mount. This specially punched material enables the strips to be stretched to accommodate the slight variations in spacing that tend to add up, especially with long terminal blocks. Another advantage: the excellent printability of the surface material guarantees durable and wear-resistant labelling. A print resolution of 300 dpi also produces a very legible script.
Your benefits with MultiMark

- Firm hold and durable printing
- Continuous strips save installation time
- Easy mounting thanks to an innovative composite material
- Large label field for optimal legibility
- High flexibility thanks to manufacturer independence

General ordering data

Type	WS 12/5 MM WS	Version
Order No.	2007190000	WS, Terminal marker, 12 x 5 mm, Weidmueller, white
GTIN (EAN)	4050118392036	
Qty.	800 pc(s).	

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Data sheet

Weidmüller

WDU 16

Weidmüller Interface GmbH & Co. KG
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D-32758 Detmold
Germany

www.weidmueller.com

Accessories

With lightning flash



The WAD connector marker is suitable for W-series terminals and for the WEW 35/2 and ZEW 35/2 end brackets. The markers are available as blank markers, with custom printing or standard print with lightning symbol. The WAD MultiCard markers are suitable for labelling with PrintJet CONNECT printers.

For custom printing: Please send us a file of our labeling software M-Print PRO or M-Print PRO Online (without installation) for your labeling specifications.

General ordering data

Type	WAD 12 MC B GE/SW	Version
Order No.	2445090000	Group markers, Cover, 36.2 x 11.9 mm, WDU 16, WDU 35, yellow
GTIN (EAN)	4050118457896	
Qty.	32 pc(s).	

W-Series



Weidmüller's range of products includes end brackets that guarantee a permanent, reliable mounting on the terminal rail and prevent sliding. Versions with and without screws are available. The end brackets include marking options, also for group markers, and also a test plug holder.

General ordering data

Type	WEW 35/1	Version
Order No.	1059000000	End bracket, dark beige, TS 35, V-2, Wemid, Width: 12 mm, 100 °C
GTIN (EAN)	4008190172282	
Qty.	50 pc(s).	

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Weidmüller

Data sheet

WDU 16

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Accessories

Blank



WS markers are the perfect match for the W-series connectors. Thanks to their system compatibility, the WS tags can also be used with the I-series and the Z-series. The large marking surfaces do not only permit long character strings but also multi-line text.
WS markers are ideal for labels with long, customised character strings. Thanks to the proven MultiCard format, printing with PrintJet CONNECT oder/or Plotter is possible.
- Can be fitted in strips or individually
- Markers in proven MultiCard format

For custom printing: Please send us a file of our labeling software M-Print PRO or M-Print PRO Online (without installation) for your labeling specifications.

General ordering data

Type	WS 12/5 MC NE WS	Version
Order No.	1609860000	WS, Terminal marker, 12 x 5 mm, Pitch in mm (P): 5.00 Weidmueller,
GTIN (EAN)	4008190203481	Allen-Bradley, white
Qty.	720 pc(s).	

Marker holder



The marker holder offer the possibility of additional mounting of standard markers with a pitch of 5 or 5.1 mm. The angled holders can be optionally snaped together and could be mounted in all standard marking channels of the Klippon® Connect modular terminal blocks. Fitting marker types could be found under the respective accessories of the designation marking holder.

General ordering data

Type	BZT 1 ZA WS 10/5	Version
Order No.	1805520000	Accessories, Marker holder
GTIN (EAN)	4032248270248	
Qty.	100 pc(s).	
Type	BZT 1 WS 10/5	Version
Order No.	1805490000	Accessories, Marker holder
GTIN (EAN)	4032248270231	
Qty.	100 pc(s).	

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Data sheet

Weidmüller

WDU 16

Weidmüller Interface GmbH & Co. KG
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D-32758 Detmold
Germany

www.weidmueller.com

Accessories

16 mm²



Screwable cross-connections are easy to mount and de mount. Thanks to the big contact surface, even high currents can be transmitted with maximum contact reliability.

General ordering data

Type	WQV 16/3	Version
Order No.	1055160000	Cross-connector (terminal), when screwed in, yellow, 101 A, Number
GTIN (EAN)	4008190149888	of poles: 3, Pitch in mm (P): 11.90, Insulated: Yes, Width: 10.4 mm
Qty.	50 pc(s).	
Type	WQV 16/2	Version
Order No.	1053260000	Cross-connector (terminal), when screwed in, yellow, 101 A, Number
GTIN (EAN)	4008190036553	of poles: 2, Pitch in mm (P): 11.90, Insulated: Yes, Width: 10.4 mm
Qty.	50 pc(s).	
Type	WQV 16/4	Version
Order No.	1055260000	Cross-connector (terminal), when screwed in, yellow, 101 A, Number
GTIN (EAN)	4008190037000	of poles: 4, Pitch in mm (P): 11.90, Insulated: Yes, Width: 10.4 mm
Qty.	50 pc(s).	
Type	WQV 16/10	Version
Order No.	1053360000	Cross-connector (terminal), when screwed in, yellow, 101 A, Number
GTIN (EAN)	4008190010836	of poles: 10, Pitch in mm (P): 11.90, Insulated: Yes, Width: 10.4 mm
Qty.	10 pc(s).	

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Accessories

Blank



The Dekafix (DEK) marker is the universal marker for all conductor and plug-in connectors as well as for electronic sub-assemblies. The system is ideal for short number sequences and covers a wide range of ready-printed markers.
Strips for fast installation in only one work step. The printing is easy to read, rich in contrast and available in various widths.

- Large range of ready-to-use markers
- Strips for fast installation
- Terminal markers, suitable for all Weidmüller cable connectors
- Available as blank MultiCard or with standard printing

For custom printing: Please send us a file of our labeling software M-Print PRO or M-Print PRO Online (without installation) for your labeling specifications.

General ordering data

Type	DEK 5/5 MC NE WS	Version
Order No.	1609801044	Dekafix, Terminal marker, 5 x 5 mm, Pitch in mm (P): 5.00
GTIN (EAN)	4008190397111	Weidmueller, white
Qty.	1,000 pc(s).	

W-Series



A partition plate is used for the optical separation of circuits or used for electrical isolation from neighbouring cross-connectors. In contrast to the end plate, the contour can be larger than the adjacent terminal blocks. However, it should not be smaller, as otherwise the required clearance and creepage distances within the application can no longer be maintained.

General ordering data

Type	WTW EN	Version
Order No.	1058800000	Partition plate (terminal), dark beige, Height: 86 mm, Width: 3 mm,
GTIN (EAN)	4008190140175	V-0, Wemid
Qty.	20 pc(s).	

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Data sheet

Weidmüller

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www.weidmueller.com

Accessories

Testsockets



Test adapters and test plugs are used for the electrical connection between terminal blocks and the test equipment. In this way, an electrical contact can be established in the wired state and measurements can be done easily.

General ordering data

Type	STB 16/D7/4/M4 SAK35	Version
Order No.	0140200000	SAK Series, Socket
GTIN (EAN)	4008190134884	
Qty.	50 pc(s).	

SchT group marker carrier



The SchT 5 S group tag carriers are clipped directly onto the TS 32 mounting rail (G-rail) or the TS 35 mounting rail (top-hat rail). It is therefore possible to label the terminal strip irrespective of the terminal and the type of terminal. SchT 5 and SchT 5 S are fitted with ESO 5, STR 5 protective strips.
The SchT 7 is a hinged group tag carrier for inlay tags which enables easy access to the clamping screw. The SchT 7 is fitted with ESO 7, STR 7 protective strips or DEK 5.
Inlay tags and protective strips can be found under "Accessories".

General ordering data

Type	SCHT 7	Version
Order No.	0517960000	SCHT, Terminal marker, 39.3 x 8 mm, Pitch in mm (P): 7.00
GTIN (EAN)	4008190001742	Weidmueller, white
Qty.	20 pc(s).	

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1.54 WEIDMULLER 6sqmm TERMINAL WDU6 DATA SHEET

Data sheet

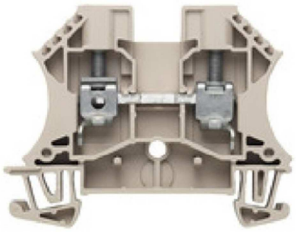
Weidmüller

WDU 6

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Product image



To feed through power, signal, and data is the classical requirement in electrical engineering and panel building. The insulating material, the connection system and the design of the terminal blocks are the differentiating features. A feed-through terminal block is suitable for joining and/or connecting one or more conductors. They could have one or more connection levels that are on the same potential or insulated against one another.

General ordering data

Version	Feed-through terminal block, Screw connection, dark beige, 6 mm², 41 A, 800 V, Number of connections: 2, Number of levels: 1, TS 35, V-0, Wemid, 130 °C
Order No.	1020200000
Type	WDU 6
GTIN (EAN)	4008190163440
Qty.	100 pc(s).

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WDU 6

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

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Technical data

Dimensions and weights

Depth	46.5 mm	Depth (inches)	1.831 inch
Depth including DIN rail	47 mm	Height	60 mm
Height (inches)	2.362 inch	Width	7.9 mm
Width (inches)	0.311 inch	Net weight	12.75 g

Temperatures

Storage temperature	-25 °C...55 °C	Operating temperature range	For operating temperature range see EC Design Test Certificate / IEC Ex-Certificate of Conformity
Continuous operating temp., min.	-60 °C	Continuous operating temp., max.	130 °C

Material data

Material	Wemid	Colour	dark beige
UL 94 flammability rating	V-0		

Rating data IECEx/ATEX

Certificate No. (ATEX)	DEMKO14ATEX1338U	Certificate No. (IECEX)	IECEXULD14.0005U
Max. voltage (ATEX)	690 V	Current (ATEX)	41 A
Wire cross section max. (ATEX)	10 mm²	Max. voltage (IECEX)	690 V
Current (IECEX)	41 A	Wire cross section max. (IECEX)	10 mm²
Operating temperature range	For operating temperature range see EC Design Test Certificate / IEC Ex-Certificate of Conformity	Marking EN 60079-7	Ex eb II C Gb
Ex 2014/34/EU label	II 2 G D		

System specifications

Version	Screw connection, for screwable cross-connection, One end without connector	End cover plate required	Yes
Number of potentials	1	Number of levels	1
Number of clamping points per level	2	Number of potentials per tier	1
Levels cross-connected internally	No	PE connection	No
Rail	TS 35	N-function	No
PE function	No	PEN function	No

2 clampable conductors (H05V/H07V) with equal cross-section (rated connection)

Cross-section for connected wire, solid, two clampable wires, max.	2.5 mm²	Cross-section for connected wire, solid, two clampable wires, min.	0.5 mm²
Wire connection cross section, finely stranded with wire-end ferrules DIN 46228/1, 2 clampable wires, max.	2.5 mm²	Wire connection cross section, finely stranded with wire-end ferrules DIN 46228/1, 2 clampable wires, min.	0.5 mm²
Wire connection cross section, finely stranded, two clampable wires, min.	0.5 mm²	Wire cross-section, finely stranded, two clampable wires, max.	2.5 mm²

Additional technical data

Explosion-tested version	Yes	Number of similar terminals	1
Open sides	right	Type of mounting	Snap-on

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Technical data

CSA rating data

Certificate No. (CSA)	200039-1057876	Current size C (CSA)	50 A
Voltage size C (CSA)	600 V	Wire cross section max. (CSA)	8 AWG
Wire cross section min. (CSA)	22 AWG		

Conductors for clamping (additional connection)

Connection type, additional connection	Screw connection

Conductors for clamping (rated connection)

Blade size	0.8 x 4.0 mm			
Clampable conductor	Connection specification	Screw connection		
	Cross-section for conductor connection	Type	solid, H05(07) V-U	
		min.	0.5 mm²	
		max.	10 mm²	
		nominal	6 mm²	
	wire end ferrule	Stripping length	min.	12 mm
			max.	12 mm
			nominal	12 mm
		Tightening torque	min.	0.8 Nm
			max.	1.6 Nm
		Recommended wire-end ferrule		
	Connection specification	Screw connection		
	Cross-section for conductor connection	Type	stranded, H07V-R	
		min.	1.5 mm²	
		max.	10 mm²	
		nominal	6 mm²	
	wire end ferrule	Stripping length	min.	12 mm
			max.	12 mm
			nominal	12 mm
		Tightening torque	min.	0.8 Nm
			max.	1.6 Nm
		Recommended wire-end ferrule		
	Connection specification	Screw connection		
	Cross-section for conductor connection	Type	flexible, H05(07) V-K	
		min.	0.5 mm²	
		max.	10 mm²	
		nominal	6 mm²	
	wire end ferrule	Stripping length	min.	12 mm
			max.	12 mm
			nominal	12 mm
		Tightening torque	min.	0.8 Nm
			max.	1.6 Nm
		Recommended wire-end ferrule		
Clamping range, max.	10 mm²			
Clamping range, min.	0.22 mm²			
Clamping screw	M 3.5			
Connection cross-section, stranded, max.	10 mm²			
Connection cross-section, stranded, min.	1.5 mm²			
Connection direction	on side			
Gauge to IEC 60947-1	A5			

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Technical data

Number of connections	2
Stripping length	12 mm
Tightening torque, max.	1.6 Nm
Tightening torque, min.	0.8 Nm
Torque level with DMS electric screw-driver	3
Twin wire-end ferrules, max.	4 mm²
Twin wire-end ferrules, min.	0.5 mm²
Type of connection	Screw connection
Wire connection cross section AWG, max.	AWG 8
Wire connection cross section AWG, min.	AWG 26
Wire connection cross section, finely stranded, max.	10 mm²
Wire connection cross section, finely stranded, min.	0.5 mm²
Wire connection cross-section, finely stranded with wire-end ferrules DIN 46228/1, max.	6 mm²
Wire connection cross-section, finely stranded with wire-end ferrules DIN 46228/1, min.	0.5 mm²
Wire connection cross-section, finely stranded with wire-end ferrules DIN 46228/4, max.	6 mm²
Wire connection cross-section, finely stranded with wire-end ferrules DIN 46228/4, min.	0.5 mm²
Wire connection cross-section, solid core, max.	10 mm²
Wire connection cross-section, solid core, min.	0.5 mm²

General

Rail	TS 35	Standards	IEC 60947-7-1
Wire connection cross section AWG, max.	AWG 8	Wire connection cross section AWG, min.	AWG 26

Rating data

Rated cross-section	6 mm²	Rated voltage	800 V
Rated DC voltage	800 V	Rated current	41 A
Current at maximum wires	57 A	Standards	IEC 60947-7-1
Volume resistance according to IEC 60947-7-x	0.78 mΩ	Rated impulse withstand voltage	8 kV
Power loss in accordance with IEC 60947-7-x	1.31 W	Pollution severity	3

UL rating data

Certificate No. (UR)	E60693	Conductor size Factory wiring max. (UR)	8 AWG
Conductor size Factory wiring min. (UR)	22 AWG	Conductor size Field wiring max. (UR)	8 AWG
Conductor size Field wiring min. (UR)	22 AWG	Current size C (UR)	50 A
Voltage size C (UR)	600 V		

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Technical data

Classifications

ETIM 6.0	EC000897	ETIM 7.0	EC000897
ETIM 8.0	EC000897	ETIM 9.0	EC000897
ECLASS 9.0	27-14-11-20	ECLASS 9.1	27-14-11-20
ECLASS 10.0	27-14-11-20	ECLASS 11.0	27-14-11-20
ECLASS 12.0	27-14-11-20	ECLASS 13.0	27-25-01-01
ECLASS 14.0	27-25-01-01		

Environmental Product Compliance

RoHS Compliance Status	Compliant without exemption
REACH SVHC	/

Approvals

Approvals

CSAEX CURUSEX ATEX IECEx INMETRO KEMA KOSHAEX UKCA-EX

ROHS	Conform
UL File Number Search	UL Website
Certificate No. (UR)	E60693
Certificate No. (cURusEX)	E184763

Downloads

Approval/Certificate/Document of Conformity	Attestation of Conformity IECEx Certificate UKCA Ex Attestation of Conformity CB Testreport CB Certificate NEMKO certificate Lloyds Register Certificate POLSKIREJ certificate UKCA Ex Certificate 16-AV4BO-0265U. DNV Certificate CCC Ex Certificate CE Declaration of Conformity ATEX Certificate UKCA declaration of conformity Confirmation of Standards EN 45545-2_2020-10
Engineering Data	CAD data – STEP
User Documentation	NTI WDU/WPE 6 StorageConditionsTerminalBlocks
Catalogues	Catalogues in PDF-format
Brochures	

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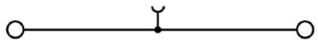
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Drawings



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Accessories

2.5-10 mm²



End plates are fitted to the open side of the last modular terminal before the end bracket. The use of an end plate ensures the function of the modular terminal and the specified rated voltage. It guarantees protection against contact with live parts and makes the final terminal finger-proof.

General ordering data

Type	WAP 2.5-10 BL	Version
Order No.	1050080000	End plate (terminals), blue, Height: 56 mm, Width: 1.5 mm, V-0,
GTIN (EAN)	4008190136611	Wemid
Qty.	50 pc(s).	
Type	WAP 16+35 WTW 2.5-10	Version
Order No.	1050100000	End and partition plate for terminals, dark beige, Height: 56 mm,
GTIN (EAN)	4008190079901	Width: 1.5 mm, V-0, Wemid
Qty.	20 pc(s).	
Type	WAP 2.5-10	Version
Order No.	1050000000	End plate (terminals), dark beige, Height: 56 mm, Width: 1.5 mm, V-0,
GTIN (EAN)	4008190103149	Wemid
Qty.	50 pc(s).	
Type	WAP 2.5-10/0.5MM	Version
Order No.	1966380000	End plate (terminals), dark beige, Height: 54.5 mm, Width: 0.35 mm,
GTIN (EAN)	4032248688616	V-0, Wemid
Qty.	50 pc(s).	
Type	WAP 16+35 WTW 2.5-10 BL	Version
Order No.	1050180000	End and partition plate for terminals, blue, Height: 56 mm, Width: 1.5
GTIN (EAN)	4008190013899	mm, V-0, Wemid
Qty.	20 pc(s).	

ZGB pivotable group tag holder



The ZGB 15 is a hinged group tag carrier. The tag carrier can hold the dekafix 5, WS 12/5 terminal markers or the inlay tag ESO 15.
The ZGB 30 is a hinged group tag carrier. The tag carrier can hold the dekafix 5, WS 12/5 terminal markers or the inlay tag ESO 7.
Inlay tags and protective strips can be found under "Accessories".

General ordering data

Type	ZGB 15	Version
Order No.	1636530000	Terminal markers, Terminal marker, 15 x 7 mm, Pitch in mm (P): 5.00
GTIN (EAN)	4008190297053	Weidmueller, white
Qty.	20 pc(s).	

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Accessories

Type	ZGB 30	Version
Order No.	1611930000	Terminal markers, Terminal marker, 32 x 7 mm, Pitch in mm (P): 5.00
GTIN (EAN)	4008190002251	Weidmueller, white
Qty.	20 pc(s).	

6 mm²



Screwable cross-connections are easy to mount and de mount. Thanks to the big contact surface, even high currents can be transmitted with maximum contact reliability.

General ordering data

Type	WQV 6/10	Version
Order No.	1052260000	Cross-connector (terminal), when screwed in, yellow, 57 A, Number of
GTIN (EAN)	4008190153977	poles: 10, Pitch in mm (P): 8.00, Insulated: Yes, Width: 7.6 mm
Qty.	20 pc(s).	
Type	WQV 6/5	Version
Order No.	1062660000	Cross-connector (terminal), when screwed in, yellow, 57 A, Number of
GTIN (EAN)	4008190176914	poles: 5, Pitch in mm (P): 8.00, Insulated: Yes, Width: 7.6 mm
Qty.	50 pc(s).	
Type	WQV 6/12	Version
Order No.	1062720000	Cross-connector (terminal), when screwed in, yellow, 57 A, Number of
GTIN (EAN)	4050118259391	poles: 12, Pitch in mm (P): 8.00, Insulated: Yes, Width: 7.6 mm
Qty.	50 pc(s).	
Type	WQV 6/3	Version
Order No.	1054760000	Cross-connector (terminal), when screwed in, yellow, 57 A, Number of
GTIN (EAN)	4008190174163	poles: 3, Pitch in mm (P): 8.00, Insulated: Yes, Width: 7.6 mm
Qty.	50 pc(s).	
Type	WQV 6/7	Version
Order No.	1062680000	Cross-connector (terminal), when screwed in, yellow, 57 A, Number of
GTIN (EAN)	4008190261788	poles: 7, Pitch in mm (P): 8.00, Insulated: Yes, Width: 7.6 mm
Qty.	50 pc(s).	
Type	WQV 6/2	Version
Order No.	1052360000	Cross-connector (terminal), when screwed in, yellow, 57 A, Number of
GTIN (EAN)	4008190075866	poles: 2, Pitch in mm (P): 8.00, Insulated: Yes, Width: 7.6 mm
Qty.	50 pc(s).	
Type	WQV 6/4	Version
Order No.	1054860000	Cross-connector (terminal), when screwed in, yellow, 57 A, Number of
GTIN (EAN)	4008190180799	poles: 4, Pitch in mm (P): 8.00, Insulated: Yes, Width: 7.6 mm
Qty.	50 pc(s).	
Type	WQV 6/6	Version
Order No.	1062670000	Cross-connector (terminal), when screwed in, yellow, 57 A, Number of
GTIN (EAN)	4008190261771	poles: 6, Pitch in mm (P): 8.00, Insulated: Yes, Width: 7.6 mm
Qty.	50 pc(s).	

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Accessories

Shielding connection



With the LS 2.8 WDU2.5-10, many feed-through modular terminal blocks from the W series can be converted very easily. Inserting the LS 2.8 WDU2.5-10 allows the cable shielding braid to be looped through directly at the terminal block by soldering or using a suitable flat cable lug.

General ordering data

Type	LS 2.8 WDU2.5-10	Version
Order No.	1056400000	W-Series, Shield bus
GTIN (EAN)	4008190036454	
Qty.	100 pc(s).	

DEK 5/8



WS/ DEK
MultiMark terminal markers use an innovative composite material made from two components. The hard base contour of the marker snaps securely into the connector. The elastic surface finish makes the marker easy to mount. This specially punched material enables the strips to be stretched to accommodate the slight variations in spacing that tend to add up, especially with long terminal blocks. Another advantage: the excellent printability of the surface material guarantees durable and wear-resistant labelling. A print resolution of 300 dpi also produces a very legible script.
Your benefits with MultiMark

- Firm hold and durable printing
- Continuous strips save installation time
- Easy mounting thanks to an innovative composite material
- Large label field for optimal legibility
- High flexibility thanks to manufacturer independence

General ordering data

Type	DEK 5/8 MM WS	Version
Order No.	2007130000	Dekafix, Terminal marker, 5 x 8 mm, Weidmueller, white
GTIN (EAN)	4050118392012	
Qty.	500 pc(s).	

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Accessories

W-Series



Weidmüller's range of products includes end brackets that guarantee a permanent, reliable mounting on the terminal rail and prevent sliding. Versions with and without screws are available. The end brackets include marking options, also for group markers, and also a test plug holder.

General ordering data

Type	WEW 35/2	Version
Order No.	1061200000	End bracket, dark beige, TS 35, HB, Wemid, Width: 8 mm, 100 °C
GTIN (EAN)	4008190030230	
Qty.	50 pc(s).	

Marker holder



The marker holder offer the possibility of additional mounting of standard markers with a pitch of 5 or 5.1 mm. The angled holders can be optionally snaped together and could be mounted in all standard marking channels of the Klippon® Connect modular terminal blocks. Fitting marker types could be found under the respective accessories of the designation marking holder.

General ordering data

Type	BZT 1 ZA WS 10/5	Version
Order No.	1805520000	Accessories, Marker holder
GTIN (EAN)	4032248270248	
Qty.	100 pc(s).	
Type	BZT 1 WS 10/5	Version
Order No.	1805490000	Accessories, Marker holder
GTIN (EAN)	4032248270231	
Qty.	100 pc(s).	

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Accessories

W-Series



Test adapters and test plugs are used for the electrical connection between terminal blocks and the test equipment. In this way, an electrical contact can be established in the wired state and measurements can be done easily.

General ordering data

Type	WTA 3 WDU4	Version
Order No.	1632350000	Test adapter (terminal), 1.5 mm², 250 V, 6 A
GTIN (EAN)	4008190209711	
Qty.	25 pc(s).	

W-Series



A partition plate is used for the optical separation of circuits or used for electrical isolation from neighbouring cross-connectors. In contrast to the end plate, the contour can be larger than the adjacent terminal blocks. However, it should not be smaller, as otherwise the required clearance and creepage distances within the application can no longer be maintained.

General ordering data

Type	WTW EN	Version
Order No.	1058800000	Partition plate (terminal), dark beige, Height: 86 mm, Width: 3 mm,
GTIN (EAN)	4008190140175	V-0, Wemid
Qty.	20 pc(s).	

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Accessories

Blank



The WAD connector marker is suitable for W-series terminals and for the WEW 35/2 and ZEW 35/2 end brackets. The markers are available as blank markers, with custom printing or standard print with lightning symbol. The WAD MultiCard markers are suitable for labelling with PrintJet CONNECT printers.

For custom printing: Please send us a file of our labeling software M-Print PRO or M-Print PRO Online (without installation) for your labeling specifications.

General ordering data

Type	WAD 8 MC NE WS	Version
Order No.	1112940000	Group markers, Cover, 33.3 x 8 mm, Pitch in mm (P): 8.00 WDU 4,
GTIN (EAN)	4032248891825	WEW 35/2, ZEW 35/2, white
Qty.	48 pc(s).	
Type	WAD 8 MC NE GE	Version
Order No.	1112950000	Group markers, Cover, 33.3 x 8 mm, Pitch in mm (P): 8.00 WDU 4,
GTIN (EAN)	4032248891696	WEW 35/2, ZEW 35/2, yellow
Qty.	48 pc(s).	

Testsockets



Test adapters and test plugs are used for the electrical connection between terminal blocks and the test equipment. In this way, an electrical contact can be established in the wired state and measurements can be done easily.

General ordering data

Type	STB 8.5/5/2.3/M3 SAK2.5	Version
Order No.	0280600000	Accessories, Socket
GTIN (EAN)	4008190023188	
Qty.	50 pc(s).	

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Accessories

Blank



WS markers are the perfect match for the W-series connectors. Thanks to their system compatibility, the WS tags can also be used with the I-series and the Z-series. The large marking surfaces do not only permit long character strings but also multi-line text.
WS markers are ideal for labels with long, customised character strings. Thanks to the proven MultiCard format, printing with PrintJet CONNECT oder/or Plotter is possible.
- Can be fitted in strips or individually
- Markers in proven MultiCard format

For custom printing: Please send us a file of our labeling software M-Print PRO or M-Print PRO Online (without installation) for your labeling specifications.

General ordering data

Type	WS 12/8 PLUS MC NE WS	Version
Order No.	1906000000	WS, Terminal marker, 12 x 8 mm, Pitch in mm (P): 8.00 Weidmueller,
GTIN (EAN)	4032248528158	white
Qty.	420 pc(s).	

Test sockets



The test socket is used to connect test devices with a standard 4.0 plug. Depending on the potential within the application, different colors of the test sockets can be selected for quick and easy maintenance work.

General ordering data

Type	STB 21.6/IH/RT WTL6/3	Version
Order No.	1778990000	Socket (terminal), Plug-in depth: 11.1 mm, Depth: 26.6 mm
GTIN (EAN)	4032248169665	
Qty.	50 pc(s).	
Type	STB 21.6/IH/BL WTL6/3	Version
Order No.	1071080000	Socket (terminal), Plug-in depth: 11.1 mm, Depth: 26.6 mm
GTIN (EAN)	4008190043957	
Qty.	50 pc(s).	
Type	STB 21.6/IH/DB WTL6/3	Version
Order No.	1071000000	Socket (terminal), Plug-in depth: 11.1 mm, Depth: 26.6 mm
GTIN (EAN)	4008190259204	
Qty.	50 pc(s).	
Type	STB 21.6/IH/GE WTL6/3	Version
Order No.	1071010000	Socket (terminal), Plug-in depth: 11.1 mm, Depth: 26.6 mm
GTIN (EAN)	4008190259211	
Qty.	50 pc(s).	

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Accessories

Type	STB 2.1.6/IH/VI WTL6/3	Version
Order No.	1071030000	Socket (terminal), Plug-in depth: 11.1 mm, Depth: 26.6 mm
GTIN (EAN)	4008190259235	
Qty.	50 pc(s).	
Type	STB 2.1.6/IH/GN WTL6/3	Version
Order No.	1071020000	Socket (terminal), Plug-in depth: 11.1 mm, Depth: 26.6 mm
GTIN (EAN)	4008190259228	
Qty.	50 pc(s).	
Type	STB 2.1.6/IH/SW WTL6/3	Version
Order No.	1071040000	Socket (terminal), Plug-in depth: 11.1 mm, Depth: 26.6 mm
GTIN (EAN)	4008190859985	
Qty.	50 pc(s).	
Type	STB 2.1.6/IH/WS WTL6/3	Version
Order No.	1312520000	Socket (terminal), Plug-in depth: 11.1 mm
GTIN (EAN)	4050118121704	
Qty.	50 pc(s).	

Blank



The Dekafix (DEK) marker is the universal marker for all conductor and plug-in connectors as well as for electronic sub-assemblies. The system is ideal for short number sequences and covers a wide range of ready-printed markers.
Strips for fast installation in only one work step. The printing is easy to read, rich in contrast and available in various widths.

- Large range of ready-to-use markers
- Strips for fast installation
- Terminal markers, suitable for all Weidmüller cable connectors
- Available as blank MultiCard or with standard printing

For custom printing: Please send us a file of our labeling software M-Print PRO or M-Print PRO Online (without installation) for your labeling specifications.

General ordering data

Type	DEK 5/8 MC NE WS	Version
Order No.	1856740000	Dekafix, Terminal marker, 5 x 8 mm, Pitch in mm (P): 8.00
GTIN (EAN)	4032248400850	Weidmueller, white
Qty.	800 pc(s).	

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Weidmüller

WDU 6

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
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Accessories

SchT group marker carrier



The SchT 5 S group tag carriers are clipped directly onto the TS 32 mounting rail (G-rail) or the TS 35 mounting rail (top-hat rail). It is therefore possible to label the terminal strip irrespective of the terminal and the type of terminal. SchT 5 and SchT 5 S are fitted with ESO 5, STR 5 protective strips.
The SchT 7 is a hinged group tag carrier for inlay tags which enables easy access to the clamping screw. The SchT 7 is fitted with ESO 7, STR 7 protective strips or DEK 5.
Inlay tags and protective strips can be found under "Accessories".

General ordering data

Type	SCHT 7	Version
Order No.	0517960000	SCHT, Terminal marker, 39.3 x 8 mm, Pitch in mm (P): 7.00
GTIN (EAN)	4008190001742	Weidmueller, white
Qty.	20 pc(s).	

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1.55 WEIDMULLER 4sqmm TERMINAL WDU4 DATA SHEET

Data sheet

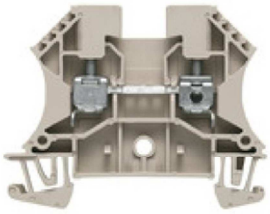
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WDU 4

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Product image



To feed through power, signal, and data is the classical requirement in electrical engineering and panel building. The insulating material, the connection system and the design of the terminal blocks are the differentiating features. A feed-through terminal block is suitable for joining and/or connecting one or more conductors. They could have one or more connection levels that are on the same potential or insulated against one another.

General ordering data

Version	Feed-through terminal block, Screw connection, dark beige, 4 mm², 32 A, 800 V, Number of connections: 2, Number of levels: 1, TS 35, V-0, Wemid, 130 °C
Order No.	1020100000
Type	WDU 4
GTIN (EAN)	4008190150617
Qty.	100 pc(s).

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Technical data

Dimensions and weights

Depth	46.5 mm	Depth (inches)	1.831 inch
Depth including DIN rail	47 mm	Height	60 mm
Height (inches)	2.362 inch	Width	6.1 mm
Width (inches)	0.24 inch	Net weight	9.57 g

Temperatures

Storage temperature	-25 °C...55 °C	Operating temperature range	For operating temperature range see EC Design Test Certificate / IEC Ex-Certificate of Conformity
Continuous operating temp., min.	-60 °C	Continuous operating temp., max.	130 °C

Material data

Material	Wemid	Colour	dark beige
UL 94 flammability rating	V-0		

Rating data IECEx/ATEX

Certificate No. (ATEX)	DEMKO14ATEX1338U	Certificate No. (IECEX)	IECEXULD14.0005U
Max. voltage (ATEX)	690 V	Current (ATEX)	32 A
Wire cross section max. (ATEX)	4 mm²	Max. voltage (IECEX)	690 V
Current (IECEX)	32 A	Wire cross section max. (IECEX)	4 mm²
Operating temperature range	For operating temperature range see EC Design Test Certificate / IEC Ex-Certificate of Conformity	Marking EN 60079-7	Ex eb II C Gb
Ex 2014/34/EU label	II 2 G D		

System specifications

Version	Screw connection, for plug-in cross-connector, for screwable cross-connection, One end without connector	End cover plate required	Yes
Number of potentials	1	Number of levels	1
Number of clamping points per level	2	Number of potentials per tier	1
Levels cross-connected internally	No	PE connection	No
Rail	TS 35	N-function	No
PE function	No	PEN function	No

2 clampable conductors (H05V/H07V) with equal cross-section (rated connection)

Cross-section for connected wire, solid, two clampable wires, max.	2.5 mm²	Cross-section for connected wire, solid, two clampable wires, min.	0.5 mm²
Wire connection cross section, finely stranded with wire-end ferrules DIN 46228/1, 2 clampable wires, max.	1.5 mm²	Wire connection cross section, finely stranded with wire-end ferrules DIN 46228/1, 2 clampable wires, min.	0.5 mm²
Wire connection cross section, finely stranded, two clampable wires, min.	0.5 mm²	Wire cross-section, finely stranded, two clampable wires, max.	1.5 mm²

Additional technical data

Explosion-tested version	Yes	Number of similar terminals	1
Open sides	right	Type of mounting	Snap-on

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Technical data

CSA rating data

Certificate No. (CSA)	200039-1057876	Current size B (CSA)	35 A
Current size C (CSA)	35 A	Voltage size C (CSA)	600 V
Wire cross section max. (CSA)	10 AWG	Wire cross section min. (CSA)	26 AWG

Conductors for clamping (additional connection)

Connection type, additional connection	Screw connection

Conductors for clamping (rated connection)

Blade size	0.6 x 3.5 mm			
Clampable conductor	Connection specification	Screw connection		
	Cross-section for conductor connection	Type	solid, H05(07) V-U	
		min.	0.5 mm²	
		max.	6 mm²	
		nominal	4 mm²	
	wire end ferrule	Stripping length	min.	10 mm
			max.	10 mm
			nominal	10 mm
		Tightening torque	min.	0.5 Nm
			max.	1 Nm
		Recommended wire-end ferrule		
	Connection specification	Screw connection		
	Cross-section for conductor connection	Type	stranded, H07V-R	
		min.	1.5 mm²	
		max.	6 mm²	
		nominal	4 mm²	
	wire end ferrule	Stripping length	min.	10 mm
			max.	10 mm
			nominal	10 mm
		Tightening torque	min.	0.5 Nm
			max.	1 Nm
		Recommended wire-end ferrule		
	Connection specification	Screw connection		
	Cross-section for conductor connection	Type	flexible, H05(07) V-K	
		min.	0.5 mm²	
		max.	6 mm²	
		nominal	4 mm²	
	wire end ferrule	Stripping length	min.	10 mm
			max.	10 mm
			nominal	10 mm
		Tightening torque	min.	0.5 Nm
			max.	1 Nm
		Recommended wire-end ferrule		
Clamping range, max.	6 mm²			
Clamping range, min.	0.13 mm²			
Clamping screw	M 3			
Connection cross-section, stranded, max.	6 mm²			
Connection cross-section, stranded, min.	1.5 mm²			
Connection direction	on side			
Gauge to IEC 60947-1	A4			

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Technical data

Number of connections	2
Stripping length	10 mm
Tightening torque, max.	1 Nm
Tightening torque, min.	0.5 Nm
Torque level with DMS electric screw-driver	2
Twin wire-end ferrules, max.	2.5 mm²
Twin wire-end ferrules, min.	0.5 mm²
Type of connection	Screw connection
Wire connection cross section AWG, max.	AWG 10
Wire connection cross section AWG, min.	AWG 26
Wire connection cross section, finely stranded, max.	6 mm²
Wire connection cross section, finely stranded, min.	0.5 mm²
Wire connection cross-section, finely stranded with wire-end ferrules DIN 46228/1, max.	4 mm²
Wire connection cross-section, finely stranded with wire-end ferrules DIN 46228/1, min.	0.5 mm²
Wire connection cross-section, finely stranded with wire-end ferrules DIN 46228/4, max.	4 mm²
Wire connection cross-section, finely stranded with wire-end ferrules DIN 46228/4, min.	0.5 mm²
Wire connection cross-section, solid core, max.	6 mm²
Wire connection cross-section, solid core, min.	0.5 mm²

General

Rail	TS 35	Standards	IEC 60947-7-1
Wire connection cross section AWG, max.	AWG 10	Wire connection cross section AWG, min.	AWG 26

Rating data

Rated cross-section	4 mm²	Rated voltage	800 V
Rated DC voltage	800 V	Rated current	32 A
Current at maximum wires	41 A	Standards	IEC 60947-7-1
Volume resistance according to IEC 60947-7-x	1 mΩ	Rated impulse withstand voltage	8 kV
Power loss in accordance with IEC 60947-7-x	1.02 W	Pollution severity	3

UL rating data

Certificate No. (UR)	E60693	Conductor size Factory wiring max. (UR)	10 AWG
Conductor size Factory wiring min. (UR)	26 AWG	Conductor size Field wiring max. (UR)	10 AWG
Conductor size Field wiring min. (UR)	22 AWG	Current size C (UR)	35 A
Voltage size C (UR)	600 V		

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Technical data

Classifications

ETIM 6.0	EC000897	ETIM 7.0	EC000897
ETIM 8.0	EC000897	ETIM 9.0	EC000897
ECLASS 9.0	27-14-11-20	ECLASS 9.1	27-14-11-20
ECLASS 10.0	27-14-11-20	ECLASS 11.0	27-14-11-20
ECLASS 12.0	27-14-11-20	ECLASS 13.0	27-25-01-01
ECLASS 14.0	27-25-01-01		

Environmental Product Compliance

RoHS Compliance Status	Compliant without exemption
REACH SVHC	/

Approvals

Approvals	CSAEX CURUSEX ATEX IECEx INMETRO KEMA KEUR KOSHAEX UKCA-EX
ROHS	Conform
UL File Number Search	UL Website
Certificate No. (UR)	E60693
Certificate No. (cURusEX)	E184763

Downloads

Approval/Certificate/Document of Conformity	Attestation of Conformity IECEx Certificate UKCA Ex Attestation of Conformity CB Testreport CB Certificate NEMKO certificate Lloyds Register Certificate POLSKIREJ certificate UKCA Ex Certificate 16-AV4BO-0265U CCC Ex Certificate CE Declaration of Conformity ATEX Certificate UKCA declaration of conformity Confirmation of Standards EN 45545-2_2020-10
Engineering Data	CAD data – STEP
User Documentation	NTI WDU/WPE 4 StorageConditionsTerminalBlocks
Catalogues	Catalogues in PDF-format
Brochures	

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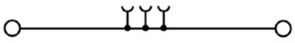
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Drawings



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Accessories

2.5-10 mm²

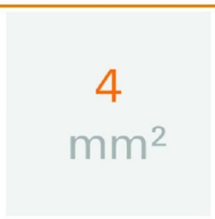


End plates are fitted to the open side of the last modular terminal before the end bracket. The use of an end plate ensures the function of the modular terminal and the specified rated voltage. It guarantees protection against contact with live parts and makes the final terminal finger-proof.

General ordering data

Type	WAP 2.5-10 BL	Version
Order No.	1050080000	End plate (terminals), blue, Height: 56 mm, Width: 1.5 mm, V-0,
GTIN (EAN)	4008190136611	Wemid
Qty.	50 pc(s).	
Type	WAP 16+35 WTW 2.5-10	Version
Order No.	1050100000	End and partition plate for terminals, dark beige, Height: 56 mm,
GTIN (EAN)	4008190079901	Width: 1.5 mm, V-0, Wemid
Qty.	20 pc(s).	
Type	WAP 2.5-10	Version
Order No.	1050000000	End plate (terminals), dark beige, Height: 56 mm, Width: 1.5 mm, V-0,
GTIN (EAN)	4008190103149	Wemid
Qty.	50 pc(s).	
Type	WAP 2.5-10/0.5MM	Version
Order No.	1966380000	End plate (terminals), dark beige, Height: 54.5 mm, Width: 0.35 mm,
GTIN (EAN)	4032248688616	V-0, Wemid
Qty.	50 pc(s).	
Type	WAP 16+35 WTW 2.5-10 BL	Version
Order No.	1050180000	End and partition plate for terminals, blue, Height: 56 mm, Width: 1.5
GTIN (EAN)	4008190013899	mm, V-0, Wemid
Qty.	20 pc(s).	

4 mm²



The plug-in cross-connections feature easy handling and quick installation. This saves a great deal of time during installation in comparison with screwed solutions.

General ordering data

Type	ZQV 4N/4	Version
Order No.	1527970000	Cross-connector (terminal), Plugged, orange, 32 A, Number of poles:
GTIN (EAN)	4050118332889	4, Pitch in mm (P): 6.10, Insulated: Yes, Width: 22.1 mm
Qty.	60 pc(s).	

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Accessories

Type	ZQV 4N/50	Version
Order No.	1528130000	Cross-connector (terminal), Plugged, orange, 32 A, Number of poles:
GTIN (EAN)	4050118332902	50, Pitch in mm (P): 6.10, Insulated: Yes, Width: 303.7 mm
Qty.	5 pc(s).	
Type	ZQV 4N/9 RD	Version
Order No.	2460750000	Cross-connector (terminal), Plugged, red, 32 A, Number of poles: 9,
GTIN (EAN)	4050118476170	Pitch in mm (P): 6.10, Insulated: Yes, Width: 52.6 mm
Qty.	20 pc(s).	
Type	ZQV 4N/8	Version
Order No.	1528030000	Cross-connector (terminal), Plugged, orange, 32 A, Number of poles:
GTIN (EAN)	4050118332841	8, Pitch in mm (P): 6.10, Insulated: Yes, Width: 46.5 mm
Qty.	20 pc(s).	
Type	ZQV 4N/10 RD	Version
Order No.	2460740000	Cross-connector (terminal), Plugged, red, 32 A, Number of poles: 10,
GTIN (EAN)	4050118476163	Pitch in mm (P): 6.10, Insulated: Yes, Width: 58.7 mm
Qty.	20 pc(s).	
Type	ZQV 4N/5 BL	Version
Order No.	1528140000	Cross-connector (terminal), Plugged, blue, 32 A, Number of poles: 5,
GTIN (EAN)	4050118333015	Pitch in mm (P): 6.10, Insulated: Yes, Width: 28.2 mm
Qty.	60 pc(s).	
Type	ZQV 4N/50 RD	Version
Order No.	2460730000	Cross-connector (terminal), Plugged, red, 32 A, Number of poles: 50,
GTIN (EAN)	4050118476156	Pitch in mm (P): 6.10, Insulated: Yes, Width: 303.7 mm
Qty.	5 pc(s).	
Type	ZQV 4N/30 RD	Version
Order No.	2561600000	Cross-connector (terminal), Plugged, red, 32 A, Number of poles: 30,
GTIN (EAN)	4050118569964	Pitch in mm (P): 6.10, Insulated: Yes, Width: 181.7 mm
Qty.	5 pc(s).	
Type	ZQV 4N/6 BL	Version
Order No.	1528170000	Cross-connector (terminal), Plugged, blue, 32 A, Number of poles: 6,
GTIN (EAN)	4050118332926	Pitch in mm (P): 6.10, Insulated: Yes, Width: 34.3 mm
Qty.	20 pc(s).	
Type	ZQV 4N/10 BL	Version
Order No.	1528230000	Cross-connector (terminal), Plugged, blue, 32 A, Number of poles: 10,
GTIN (EAN)	4050118333138	Pitch in mm (P): 6.10, Insulated: Yes, Width: 58.7 mm
Qty.	20 pc(s).	
Type	ZQV 4N/5	Version
Order No.	1527980000	Cross-connector (terminal), Plugged, orange, 32 A, Number of poles:
GTIN (EAN)	4050118332759	5, Pitch in mm (P): 6.10, Insulated: Yes, Width: 28.2 mm
Qty.	60 pc(s).	
Type	ZQV 4N/9	Version
Order No.	1528070000	Cross-connector (terminal), Plugged, orange, 32 A, Number of poles:
GTIN (EAN)	4050118332797	9, Pitch in mm (P): 6.10, Insulated: Yes, Width: 52.6 mm
Qty.	20 pc(s).	
Type	ZQV 4N/7 RD	Version
Order No.	2460770000	Cross-connector (terminal), Plugged, red, 32 A, Number of poles: 7,
GTIN (EAN)	4050118476194	Pitch in mm (P): 6.10, Insulated: Yes, Width: 40.4 mm
Qty.	20 pc(s).	
Type	ZQV 4N/3	Version
Order No.	1527940000	Cross-connector (terminal), Plugged, orange, 32 A, Number of poles:
GTIN (EAN)	4050118332865	3, Pitch in mm (P): 6.10, Insulated: Yes, Width: 16 mm
Qty.	60 pc(s).	

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Accessories

Type	ZQV 4N/4 BL	Version
Order No.	1528120000	Cross-connector (terminal), Plugged, blue, 32 A, Number of poles: 4,
GTIN (EAN)	4050118332872	Pitch in mm (P): 6.10, Insulated: Yes, Width: 22.1 mm
Qty.	60 pc(s).	
Type	ZQV 4N/3 RD	Version
Order No.	2460810000	Cross-connector (terminal), Plugged, red, 32 A, Number of poles: 3,
GTIN (EAN)	4050118476231	Pitch in mm (P): 6.10, Insulated: Yes, Width: 16 mm
Qty.	60 pc(s).	
Type	ZQV 4N/2 BL	Version
Order No.	1528040000	Cross-connector (terminal), Plugged, blue, 32 A, Number of poles: 2,
GTIN (EAN)	4050118332773	Pitch in mm (P): 6.10, Insulated: Yes, Width: 9.9 mm
Qty.	60 pc(s).	
Type	ZQV 4N/30 BL	Version
Order No.	2561610000	Cross-connector (terminal), Plugged, blue, 32 A, Number of poles: 30,
GTIN (EAN)	4050118569971	Pitch in mm (P): 6.10, Insulated: Yes, Width: 181.7 mm
Qty.	5 pc(s).	
Type	ZQV 4N/8 RD	Version
Order No.	2460760000	Cross-connector (terminal), Plugged, red, 32 A, Number of poles: 8,
GTIN (EAN)	4050118476187	Pitch in mm (P): 6.10, Insulated: Yes, Width: 46.5 mm
Qty.	20 pc(s).	
Type	ZQV 4N/9 BL	Version
Order No.	1528220000	Cross-connector (terminal), Plugged, blue, 32 A, Number of poles: 9,
GTIN (EAN)	4050118333107	Pitch in mm (P): 6.10, Insulated: Yes, Width: 52.6 mm
Qty.	20 pc(s).	
Type	ZQV 4N/5 RD	Version
Order No.	2460790000	Cross-connector (terminal), Plugged, red, 32 A, Number of poles: 5,
GTIN (EAN)	4050118476217	Pitch in mm (P): 6.10, Insulated: Yes, Width: 28.2 mm
Qty.	60 pc(s).	
Type	ZQV 4N/2	Version
Order No.	1527930000	Cross-connector (terminal), Plugged, orange, 32 A, Number of poles:
GTIN (EAN)	4050118332766	2, Pitch in mm (P): 6.10, Insulated: Yes, Width: 9.9 mm
Qty.	60 pc(s).	
Type	ZQV 4N/50 BL	Version
Order No.	1528240000	Cross-connector (terminal), Plugged, blue, 32 A, Number of poles: 50,
GTIN (EAN)	4050118333121	Pitch in mm (P): 6.10, Insulated: Yes, Width: 303.7 mm
Qty.	5 pc(s).	
Type	ZQV 4N/2 RD	Version
Order No.	2460450000	Cross-connector (terminal), Plugged, red, 32 A, Number of poles: 2,
GTIN (EAN)	4050118476149	Pitch in mm (P): 6.10, Insulated: Yes, Width: 9.9 mm
Qty.	60 pc(s).	
Type	ZQV 4N/7 BL	Version
Order No.	1528180000	Cross-connector (terminal), Plugged, blue, 32 A, Number of poles: 7,
GTIN (EAN)	4050118333114	Pitch in mm (P): 6.10, Insulated: Yes, Width: 40.4 mm
Qty.	20 pc(s).	
Type	ZQV 4N/6 RD	Version
Order No.	2460780000	Cross-connector (terminal), Plugged, red, 32 A, Number of poles: 6,
GTIN (EAN)	4050118476200	Pitch in mm (P): 6.10, Insulated: Yes, Width: 34.3 mm
Qty.	20 pc(s).	
Type	ZQV 4N/8 BL	Version
Order No.	1528190000	Cross-connector (terminal), Plugged, blue, 32 A, Number of poles: 8,
GTIN (EAN)	4050118332858	Pitch in mm (P): 6.10, Insulated: Yes, Width: 46.5 mm
Qty.	20 pc(s).	

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Accessories

Type	ZQV 4N/7	Version
Order No.	1528020000	Cross-connector (terminal), Plugged, orange, 32 A, Number of poles:
GTIN (EAN)	4050118332780	7, Pitch in mm (P): 6.10, Insulated: Yes, Width: 40.4 mm
Qty.	20 pc(s).	
Type	ZQV 4N/10	Version
Order No.	1528090000	Cross-connector (terminal), Plugged, orange, 32 A, Number of poles:
GTIN (EAN)	4050118332896	10, Pitch in mm (P): 6.10, Insulated: Yes, Width: 58.7 mm
Qty.	20 pc(s).	
Type	ZQV 4N/3 BL	Version
Order No.	1528080000	Cross-connector (terminal), Plugged, blue, 32 A, Number of poles: 3,
GTIN (EAN)	4050118333008	Pitch in mm (P): 6.10, Insulated: Yes, Width: 16 mm
Qty.	60 pc(s).	
Type	ZQV 4N/30	Version
Order No.	2561580000	Cross-connector (terminal), Plugged, orange, 32 A, Number of poles:
GTIN (EAN)	4050118570113	30, Pitch in mm (P): 6.10, Insulated: Yes, Width: 181.7 mm
Qty.	5 pc(s).	
Type	ZQV 4N/4 RD	Version
Order No.	2460800000	Cross-connector (terminal), Plugged, red, 32 A, Number of poles: 4,
GTIN (EAN)	4050118476224	Pitch in mm (P): 6.10, Insulated: Yes, Width: 22.1 mm
Qty.	60 pc(s).	
Type	ZQV 4N/6	Version
Order No.	1527990000	Cross-connector (terminal), Plugged, orange, 32 A, Number of poles:
GTIN (EAN)	4050118332919	6, Pitch in mm (P): 6.10, Insulated: Yes, Width: 34.3 mm
Qty.	20 pc(s).	

Blank



The Dekafix (DEK) marker is the universal marker for all conductor and plug-in connectors as well as for electronic sub-assemblies. The system is ideal for short number sequences and covers a wide range of ready-printed markers.
Strips for fast installation in only one work step. The printing is easy to read, rich in contrast and available in various widths.

- Large range of ready-to-use markers
- Strips for fast installation
- Terminal markers, suitable for all Weidmüller cable connectors
- Available as blank MultiCard or with standard printing

For custom printing: Please send us a file of our labeling software M-Print PRO or M-Print PRO Online (without installation) for your labeling specifications.

General ordering data

Type	DEK 5/6 MC NE WS	Version
Order No.	1609820000	Dekafix, Terminal marker, 5 x 6 mm, Pitch in mm (P): 6.00
GTIN (EAN)	4008190203436	Weidmueller, white
Qty.	1,000 pc(s).	

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Data sheet

Weidmüller

WDU 4

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Accessories

WS 12/6



WS/ DEK
MultiMark terminal markers use an innovative composite material made from two components. The hard base contour of the marker snaps securely into the connector. The elastic surface finish makes the marker easy to mount. This specially punched material enables the strips to be stretched to accommodate the slight variations in spacing that tend to add up, especially with long terminal blocks. Another advantage: the excellent printability of the surface material guarantees durable and wear-resistant labelling. A print resolution of 300 dpi also produces a very legible script.
Your benefits with MultiMark

- Firm hold and durable printing
- Continuous strips save installation time
- Easy mounting thanks to an innovative composite material
- Large label field for optimal legibility
- High flexibility thanks to manufacturer independence

General ordering data

Type	WS 12/6 MM WS	Version
Order No.	2007200000	WS, Terminal marker, 12 x 6 mm, Weidmueller, white
GTIN (EAN)	4050118391886	
Qty.	600 pc(s).	

Blank



The WAD connector marker is suitable for W-series terminals and for the WEW 35/2 and ZEW 35/2 end brackets. The markers are available as blank markers, with custom printing or standard print with lightning symbol. The WAD MultiCard markers are suitable for labelling with PrintJet CONNECT printers.

For custom printing: Please send us a file of our labeling software M-Print PRO or M-Print PRO Online (without installation) for your labeling specifications.

General ordering data

Type	WAD 5 MC NE WS	Version
Order No.	1112910000	Group markers, Cover, 33.3 x 5 mm, Pitch in mm (P): 5.00 WDU 2.5,
GTIN (EAN)	4032248891689	WEW 35/2, ZEW 35/2, white
Qty.	48 pc(s).	
Type	WAD 5 MC NE GE	Version
Order No.	1112920000	Group markers, Cover, 33.3 x 5 mm, Pitch in mm (P): 5.00 WDU 2.5,
GTIN (EAN)	4032248891771	WEW 35/2, ZEW 35/2, yellow
Qty.	48 pc(s).	

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Accessories

ZGB pivotable group tag holder



The ZGB 15 is a hinged group tag carrier. The tag carrier can hold the dekafix 5, WS 12/5 terminal markers or the inlay tag ESO 15.
The ZGB 30 is a hinged group tag carrier. The tag carrier can hold the dekafix 5, WS 12/5 terminal markers or the inlay tag ESO 7.
Inlay tags and protective strips can be found under "Accessories".

General ordering data

Type	ZGB 15	Version
Order No.	1636530000	Terminal markers, Terminal marker, 15 x 7 mm, Pitch in mm (P): 5.00
GTIN (EAN)	4008190297053	Weidmueller, white
Qty.	20 pc(s).	
Type	ZGB 30	Version
Order No.	1611930000	Terminal markers, Terminal marker, 32 x 7 mm, Pitch in mm (P): 5.00
GTIN (EAN)	4008190002251	Weidmueller, white
Qty.	20 pc(s).	

Blank



WS markers are the perfect match for the W-series connectors. Thanks to their system compatibility, the WS tags can also be used with the I-series and the Z-series. The large marking surfaces do not only permit long character strings but also multi-line text.
WS markers are ideal for labels with long, customised character strings. Thanks to the proven MultiCard format, printing with PrintJet CONNECT oder/or Plotter is possible.
- Can be fitted in strips or individually
- Markers in proven MultiCard format

For custom printing: Please send us a file of our labeling software M-Print PRO or M-Print PRO Online (without installation) for your labeling specifications.

General ordering data

Type	WS 12/6 MC NE WS	Version
Order No.	1609900000	WS, Terminal marker, 12 x 6 mm, Pitch in mm (P): 6.00 Weidmueller,
GTIN (EAN)	4008190203467	Allen-Bradley, white
Qty.	600 pc(s).	

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Accessories

Shielding connection

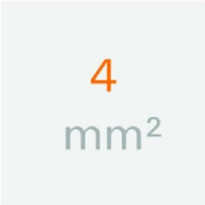


With the LS 2.8 WDU2.5-10, many feed-through modular terminal blocks from the W series can be converted very easily. Inserting the LS 2.8 WDU2.5-10 allows the cable shielding braid to be looped through directly at the terminal block by soldering or using a suitable flat cable lug.

General ordering data

Type	LS 2.8 WDU2.5-10	Version
Order No.	1056400000	W-Series, Shield bus
GTIN (EAN)	4008190036454	
Qty.	100 pc(s).	

4 mm²



Screwable cross-connections are easy to mount and de mount. Thanks to the big contact surface, even high currents can be transmitted with maximum contact reliability.

General ordering data

Type	WQV 4/10	Version
Order No.	1052060000	Cross-connector (terminal), when screwed in, yellow, 41 A, Number of
GTIN (EAN)	4008190054687	poles: 10, Pitch in mm (P): 6.10, Insulated: Yes, Width: 7.6 mm
Qty.	20 pc(s).	
Type	WQV 4/4	Version
Order No.	1054660000	Cross-connector (terminal), when screwed in, yellow, 41 A, Number of
GTIN (EAN)	4008190095758	poles: 4, Pitch in mm (P): 6.10, Insulated: Yes, Width: 7.6 mm
Qty.	50 pc(s).	
Type	WQV 4/3	Version
Order No.	1054560000	Cross-connector (terminal), when screwed in, yellow, 41 A, Number of
GTIN (EAN)	4008190168971	poles: 3, Pitch in mm (P): 6.10, Insulated: Yes, Width: 7.6 mm
Qty.	50 pc(s).	
Type	WQV 4/2	Version
Order No.	1051960000	Cross-connector (terminal), when screwed in, yellow, 41 A, Number of
GTIN (EAN)	4008190026486	poles: 2, Pitch in mm (P): 6.10, Insulated: Yes, Width: 10.6 mm
Qty.	50 pc(s).	

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Accessories

W-Series



Weidmüller's range of products includes end brackets that guarantee a permanent, reliable mounting on the terminal rail and prevent sliding. Versions with and without screws are available. The end brackets include marking options, also for group markers, and also a test plug holder.

General ordering data

Type	WEW 35/2	Version
Order No.	1061200000	End bracket, dark beige, TS 35, HB, Wemid, Width: 8 mm, 100 °C
GTIN (EAN)	4008190030230	
Qty.	50 pc(s).	

Marker holder



The marker holder offer the possibility of additional mounting of standard markers with a pitch of 5 or 5.1 mm. The angled holders can be optionally snaped together and could be mounted in all standard marking channels of the Klippon® Connect modular terminal blocks. Fitting marker types could be found under the respective accessories of the designation marking holder.

General ordering data

Type	BZT 1 ZA WS 10/5	Version
Order No.	1805520000	Accessories, Marker holder
GTIN (EAN)	4032248270248	
Qty.	100 pc(s).	
Type	BZT 1 WS 10/5	Version
Order No.	1805490000	Accessories, Marker holder
GTIN (EAN)	4032248270231	
Qty.	100 pc(s).	

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Accessories

W-Series



Test adapters and test plugs are used for the electrical connection between terminal blocks and the test equipment. In this way, an electrical contact can be established in the wired state and measurements can be done easily.

General ordering data

Type	WTA 3 WDU4	Version
Order No.	1632350000	Test adapter (terminal), 1.5 mm², 250 V, 6 A
GTIN (EAN)	4008190209711	
Qty.	25 pc(s).	
Type	WTA 3/ZA WDU4	Version
Order No.	1632360000	Test adapter (terminal), 1.5 mm², 250 V, 6 A
GTIN (EAN)	4008190209704	
Qty.	25 pc(s).	

W-Series



A partition plate is used for the optical separation of circuits or used for electrical isolation from neighbouring cross-connectors. In contrast to the end plate, the contour can be larger than the adjacent terminal blocks. However, it should not be smaller, as otherwise the required clearance and creepage distances within the application can no longer be maintained.

General ordering data

Type	WTW EN	Version
Order No.	1058800000	Partition plate (terminal), dark beige, Height: 86 mm, Width: 3 mm,
GTIN (EAN)	4008190140175	V-0, Wemid
Qty.	20 pc(s).	

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Accessories

Testsockets



Test adapters and test plugs are used for the electrical connection between terminal blocks and the test equipment. In this way, an electrical contact can be established in the wired state and measurements can be done easily.

General ordering data

Type	STB 8.5/5/2.3/M3 SAK2.5	Version
Order No.	0280600000	Accessories, Socket
GTIN (EAN)	4008190023188	
Qty.	50 pc(s).	

Test sockets



The test socket is used to connect test devices with a standard 4.0 plug. Depending on the potential within the application, different colors of the test sockets can be selected for quick and easy maintenance work.

General ordering data

Type	STB 21.6/IH/RT WTL6/3	Version
Order No.	1778990000	Socket (terminal), Plug-in depth: 11.1 mm, Depth: 26.6 mm
GTIN (EAN)	4032248169665	
Qty.	50 pc(s).	
Type	STB 21.6/IH/BL WTL6/3	Version
Order No.	1071080000	Socket (terminal), Plug-in depth: 11.1 mm, Depth: 26.6 mm
GTIN (EAN)	4008190043957	
Qty.	50 pc(s).	
Type	STB 21.6/IH/DB WTL6/3	Version
Order No.	1071000000	Socket (terminal), Plug-in depth: 11.1 mm, Depth: 26.6 mm
GTIN (EAN)	4008190259204	
Qty.	50 pc(s).	
Type	STB 21.6/IH/GE WTL6/3	Version
Order No.	1071010000	Socket (terminal), Plug-in depth: 11.1 mm, Depth: 26.6 mm
GTIN (EAN)	4008190259211	
Qty.	50 pc(s).	
Type	STB 21.6/IH/VI WTL6/3	Version
Order No.	1071030000	Socket (terminal), Plug-in depth: 11.1 mm, Depth: 26.6 mm
GTIN (EAN)	4008190259235	
Qty.	50 pc(s).	

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Accessories

Type	STB 21.6/IH/GN WTL6/3	Version
Order No.	1071020000	Socket (terminal), Plug-in depth: 11.1 mm, Depth: 26.6 mm
GTIN (EAN)	4008190259228	
Qty.	50 pc(s).	
Type	STB 21.6/IH/SW WTL6/3	Version
Order No.	1071040000	Socket (terminal), Plug-in depth: 11.1 mm, Depth: 26.6 mm
GTIN (EAN)	4008190859985	
Qty.	50 pc(s).	
Type	STB 21.6/IH/WS WTL6/3	Version
Order No.	1312520000	Socket (terminal), Plug-in depth: 11.1 mm
GTIN (EAN)	4050118121704	
Qty.	50 pc(s).	

DEK 5/6



WS/ DEK
MultiMark terminal markers use an innovative composite material made from two components. The hard base contour of the marker snaps securely into the connector. The elastic surface finish makes the marker easy to mount. This specially punched material enables the strips to be stretched to accommodate the slight variations in spacing that tend to add up, especially with long terminal blocks. Another advantage: the excellent printability of the surface material guarantees durable and wear-resistant labelling. A print resolution of 300 dpi also produces a very legible script.
Your benefits with MultiMark

- Firm hold and durable printing
- Continuous strips save installation time
- Easy mounting thanks to an innovative composite material
- Large label field for optimal legibility
- High flexibility thanks to manufacturer independence

General ordering data

Type	DEK 5/6 MM WS	Version
Order No.	2007120000	Dekafix, Terminal marker, 5 x 6 mm, Weidmueller, white
GTIN (EAN)	4050118392104	
Qty.	600 pc(s).	

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Weidmüller Interface GmbH & Co. KG
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Accessories

SchT group marker carrier



The SchT 5 S group tag carriers are clipped directly onto the TS 32 mounting rail (G-rail) or the TS 35 mounting rail (top-hat rail). It is therefore possible to label the terminal strip irrespective of the terminal and the type of terminal. SchT 5 and SchT 5 S are fitted with ESO 5, STR 5 protective strips.
The SchT 7 is a hinged group tag carrier for inlay tags which enables easy access to the clamping screw.
The SchT 7 is fitted with ESO 7, STR 7 protective strips or DEK 5.
Inlay tags and protective strips can be found under "Accessories".

General ordering data

Type	SCHT 7	Version
Order No.	0517960000	SCHT, Terminal marker, 39.3 x 8 mm, Pitch in mm (P): 7.00
GTIN (EAN)	4008190001742	Weidmueller, white
Qty.	20 pc(s).	

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1.56 WEIDMULLER 2.5sqmm TERMINAL WDU2.5 DATA SHEET

Data sheet

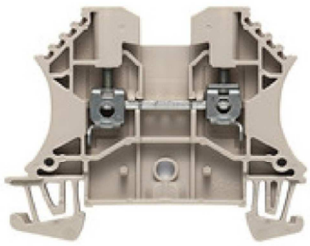
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WDU 2.5

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
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Germany

www.weidmueller.com

Product image



To feed through power, signal, and data is the classical requirement in electrical engineering and panel building. The insulating material, the connection system and the design of the terminal blocks are the differentiating features. A feed-through terminal block is suitable for joining and/or connecting one or more conductors. They could have one or more connection levels that are on the same potential or insulated against one another.

General ordering data

Version	Feed-through terminal block, Screw connection, dark beige, 2.5 mm², 24 A, 800 V, Number of connections: 2, Number of levels: 1, TS 35, V-0, Wemid, 130 °C
Order No.	1020000000
Type	WDU 2.5
GTIN (EAN)	4008190099633
Qty.	100 pc(s).

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WDU 2.5

Weidmüller Interface GmbH & Co. KG
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Technical data

Dimensions and weights

Depth	46.5 mm	Depth (inches)	1.831 inch
Height	60 mm	Height (inches)	2.362 inch
Width	5.1 mm	Width (inches)	0.201 inch
Net weight	7.59 g		

Temperatures

Storage temperature	-25 °C...55 °C	Operating temperature range	For operating temperature range see EC Design Test Certificate / IEC Ex-Certificate of Conformity
Continuous operating temp., min.	-60 °C	Continuous operating temp., max.	130 °C

Material data

Material	Wemid	Colour	dark beige
UL 94 flammability rating	V-0		

Rating data IECEx/ATEX

Certificate No. (ATEX)	DEMKO14ATEX1338U	Certificate No. (IECEX)	IECEXULD14.0005U
Max. voltage (ATEX)	690 V	Current (ATEX)	24 A
Wire cross section max. (ATEX)	2.5 mm²	Max. voltage (IECEX)	690 V
Current (IECEX)	24 A	Wire cross section max. (IECEX)	2.5 mm²
Operating temperature range	For operating temperature range see EC Design Test Certificate / IEC Ex-Certificate of Conformity	Marking EN 60079-7	Ex eb II C Gb
Ex 2014/34/EU label	II 2 G D		

System specifications

Version	Screw connection, for plug-in cross-connector, for screwable cross-connection, One end without connector	End cover plate required	Yes
Number of potentials	1	Number of levels	1
Number of clamping points per level	2	Number of potentials per tier	1
Levels cross-connected internally	No	PE connection	No
Rail	TS 35	N-function	No
PE function	No	PEN function	No

2 clampable conductors (H05V/H07V) with equal cross-section (rated connection)

Cross-section for connected wire, solid, two clampable wires, max.	1.5 mm²	Cross-section for connected wire, solid, two clampable wires, min.	0.5 mm²
Wire connection cross section, finely stranded with wire-end ferrules DIN 46228/1, 2 clampable wires, max.	1.5 mm²	Wire connection cross section, finely stranded with wire-end ferrules DIN 46228/1, 2 clampable wires, min.	0.5 mm²
Wire connection cross section, finely stranded, two clampable wires, min.	0.5 mm²	Wire cross-section, finely stranded, two clampable wires, max.	1.5 mm²

Additional technical data

Explosion-tested version	Yes	Number of similar terminals	1
Open sides	right	Type of mounting	Snap-on

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Technical data

CSA rating data

Certificate No. (CSA)	200039-1057876	Current size C (CSA)	20 A
Voltage size C (CSA)	600 V	Wire cross section max. (CSA)	12 AWG
Wire cross section min. (CSA)	26 AWG		

Conductors for clamping (additional connection)

Connection type, additional connection	Screw connection

Conductors for clamping (rated connection)

Blade size	0.6 x 3.5 mm			
Clampable conductor	Connection specification	Screw connection		
	Cross-section for conductor connection	Type	solid, H05(07) V-U	
		min.	0.5 mm²	
		max.	4 mm²	
		nominal	2.5 mm²	
	wire end ferrule	Stripping length	min.	10 mm
			max.	10 mm
			nominal	10 mm
		Tightening torque	min.	0.4 Nm
			max.	0.8 Nm
		Recommended wire-end ferrule		
	Connection specification	Screw connection		
	Cross-section for conductor connection	Type	stranded, H07V-R	
		min.	1.5 mm²	
		max.	4 mm²	
		nominal	2.5 mm²	
	wire end ferrule	Stripping length	min.	10 mm
			max.	10 mm
			nominal	10 mm
		Tightening torque	min.	0.4 Nm
			max.	0.8 Nm
		Recommended wire-end ferrule		
	Connection specification	Screw connection		
	Cross-section for conductor connection	Type	flexible, H05(07) V-K	
		min.	0.5 mm²	
		max.	2.5 mm²	
		nominal	2.5 mm²	
	wire end ferrule	Stripping length	min.	10 mm
			max.	10 mm
			nominal	10 mm
		Tightening torque	min.	0.4 Nm
			max.	0.8 Nm
		Recommended wire-end ferrule		
Clamping range, max.	4 mm²			
Clamping range, min.	0.05 mm²			
Clamping screw	M 2.5			
Connection cross-section, stranded, max.	4 mm²			
Connection cross-section, stranded, min.	0.5 mm²			
Connection direction	on side			
Gauge to IEC 60947-1	A3			

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Technical data

Number of connections	2
Stripping length	10 mm
Tightening torque, max.	0.8 Nm
Tightening torque, min.	0.4 Nm
Torque level with DMS electric screw-driver	1
Twin wire-end ferrules, max.	1.5 mm²
Twin wire-end ferrules, min.	0.5 mm²
Type of connection	Screw connection
Wire connection cross section AWG, max.	AWG 12
Wire connection cross section AWG, min.	AWG 30
Wire connection cross section, finely stranded, max.	4 mm²
Wire connection cross section, finely stranded, min.	0.5 mm²
Wire connection cross-section, finely stranded with wire-end ferrules DIN 46228/1, max.	2.5 mm²
Wire connection cross-section, finely stranded with wire-end ferrules DIN 46228/1, min.	0.5 mm²
Wire connection cross-section, finely stranded with wire-end ferrules DIN 46228/4, max.	2.5 mm²
Wire connection cross-section, finely stranded with wire-end ferrules DIN 46228/4, min.	0.5 mm²
Wire connection cross-section, solid core, max.	4 mm²
Wire connection cross-section, solid core, min.	0.5 mm²

General

Rail	TS 35	Standards	IEC 60947-7-1
Wire connection cross section AWG, max.	AWG 12	Wire connection cross section AWG, min.	AWG 30

Rating data

Rated cross-section	2.5 mm²	Rated voltage	800 V
Rated DC voltage	800 V	Rated current	24 A
Current at maximum wires	32 A	Standards	IEC 60947-7-1
Volume resistance according to IEC 60947-7-x	1.33 mΩ	Rated impulse withstand voltage	8 kV
Power loss in accordance with IEC 60947-7-x	0.77 W	Pollution severity	3

UL rating data

Certificate No. (UR)	E60693	Conductor size Factory wiring max. (UR)	12 AWG
Conductor size Factory wiring min. (UR)	30 AWG	Conductor size Field wiring max. (UR)	12 AWG
Conductor size Field wiring min. (UR)	28 AWG	Current size B (UR)	25 A
Current size C (UR)	25 A	Voltage size B (UR)	600 V
Voltage size C (UR)	600 V		

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Technical data

Classifications

ETIM 6.0	EC000897	ETIM 7.0	EC000897
ETIM 8.0	EC000897	ETIM 9.0	EC000897
ECLASS 9.0	27-14-11-20	ECLASS 9.1	27-14-11-20
ECLASS 10.0	27-14-11-20	ECLASS 11.0	27-14-11-20
ECLASS 12.0	27-14-11-20	ECLASS 13.0	27-25-01-01
ECLASS 14.0	27-25-01-01		

Environmental Product Compliance

RoHS Compliance Status	Compliant without exemption
REACH SVHC	/

Approvals

Approvals

CSAEX CURUSEX ATEX IECEx INMETRO KEMA KOSHAEX UKCA-EX

ROHS	Conform
UL File Number Search	UL Website
Certificate No. (UR)	E60693
Certificate No. (cURusEX)	E184763

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Approval/Certificate/Document of Conformity	Attestation of Conformity IECEx Certificate UKCA Ex Attestation of Conformity CB Testreport CB Certificate NEMKO certificate Lloyds Register Certificate POLSKIREJ certificate UKCA Ex Certificate 16-AV4B0-0265U. DNV Certificate CCC Ex Certificate CE Declaration of Conformity ATEX Certificate UKCA declaration of conformity Confirmation of Standards EN 45545-2_2020-10
Engineering Data	CAD data – STEP
User Documentation	NTI WDU/WPE 2.5.pdf StorageConditionsTerminalBlocks
Catalogues	Catalogues in PDF-format
Brochures	

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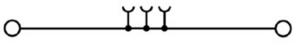
Weidmüller

WDU 2.5

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Drawings



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Accessories

2.5-10 mm²



End plates are fitted to the open side of the last modular terminal before the end bracket. The use of an end plate ensures the function of the modular terminal and the specified rated voltage. It guarantees protection against contact with live parts and makes the final terminal finger-proof.

General ordering data

Type	WAP 2.5-10 BL	Version
Order No.	1050080000	End plate (terminals), blue, Height: 56 mm, Width: 1.5 mm, V-0,
GTIN (EAN)	4008190136611	Wemid
Qty.	50 pc(s).	
Type	WAP 16+35 WTW 2.5-10	Version
Order No.	1050100000	End and partition plate for terminals, dark beige, Height: 56 mm,
GTIN (EAN)	4008190079901	Width: 1.5 mm, V-0, Wemid
Qty.	20 pc(s).	
Type	WAP 2.5-10	Version
Order No.	1050000000	End plate (terminals), dark beige, Height: 56 mm, Width: 1.5 mm, V-0,
GTIN (EAN)	4008190103149	Wemid
Qty.	50 pc(s).	
Type	WAP 2.5-10/0.5MM	Version
Order No.	1966380000	End plate (terminals), dark beige, Height: 54.5 mm, Width: 0.35 mm,
GTIN (EAN)	4032248688616	V-0, Wemid
Qty.	50 pc(s).	
Type	WAP 16+35 WTW 2.5-10 BL	Version
Order No.	1050180000	End and partition plate for terminals, blue, Height: 56 mm, Width: 1.5
GTIN (EAN)	4008190013899	mm, V-0, Wemid
Qty.	20 pc(s).	

Step-down bridges



Reducing cross-connectors enable simple and fast connection of terminal blocks with different rated cross-sections.

General ordering data

Type	WQV 16-2.5	Version
Order No.	1063900000	Cross-connector (terminal), when screwed in, yellow, 76 A, Number of
GTIN (EAN)	4008190112158	poles: 2, Pitch in mm (P): 11.90, Insulated: Yes, Width: 13 mm
Qty.	10 pc(s).	

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Accessories

Blank



The WAD connector marker is suitable for W-series terminals and for the WEW 35/2 and ZEW 35/2 end brackets. The markers are available as blank markers, with custom printing or standard print with lightning symbol. The WAD MultiCard markers are suitable for labelling with PrintJet CONNECT printers.

For custom printing: Please send us a file of our labeling software M-Print PRO or M-Print PRO Online (without installation) for your labeling specifications.

General ordering data

Type	WAD 5 MC NE WS	Version
Order No.	1112910000	Group markers, Cover, 33.3 x 5 mm, Pitch in mm (P): 5.00 WDU 2.5,
GTIN (EAN)	4032248891689	WEW 35/2, ZEW 35/2, white
Qty.	48 pc(s).	
Type	WAD 5 MC NE GE	Version
Order No.	1112920000	Group markers, Cover, 33.3 x 5 mm, Pitch in mm (P): 5.00 WDU 2.5,
GTIN (EAN)	4032248891771	WEW 35/2, ZEW 35/2, yellow
Qty.	48 pc(s).	

ZGB pivotable group tag holder



The ZGB 15 is a hinged group tag carrier. The tag carrier can hold the dekafix 5, WS 12/5 terminal markers or the inlay tag ESO 15.
The ZGB 30 is a hinged group tag carrier. The tag carrier can hold the dekafix 5, WS 12/5 terminal markers or the inlay tag ESO 7.
Inlay tags and protective strips can be found under "Accessories".

General ordering data

Type	ZGB 15	Version
Order No.	1636530000	Terminal markers, Terminal marker, 15 x 7 mm, Pitch in mm (P): 5.00
GTIN (EAN)	4008190297053	Weidmueller, white
Qty.	20 pc(s).	
Type	ZGB 30	Version
Order No.	1611930000	Terminal markers, Terminal marker, 32 x 7 mm, Pitch in mm (P): 5.00
GTIN (EAN)	4008190002251	Weidmueller, white
Qty.	20 pc(s).	

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Accessories

2.5 mm²



Screwable cross-connections are easy to mount and de mount. Thanks to the big contact surface, even high currents can be transmitted with maximum contact reliability.

General ordering data

Type	WQV 2.5/3	Version
Order No.	1053760000	Cross-connector (terminal), when screwed in, yellow, 32 A, Number of
GTIN (EAN)	4008190058999	poles: 3, Pitch in mm (P): 5.10, Insulated: Yes, Width: 7 mm
Qty.	50 pc(s).	
Type	WQV 2.5/4	Version
Order No.	1053860000	Cross-connector (terminal), when screwed in, yellow, 32 A, Number of
GTIN (EAN)	4008190049706	poles: 4, Pitch in mm (P): 5.10, Insulated: Yes, Width: 7 mm
Qty.	50 pc(s).	
Type	WQV 2.5/10	Version
Order No.	1054460000	Cross-connector (terminal), when screwed in, yellow, 32 A, Number of
GTIN (EAN)	4008190135089	poles: 10, Pitch in mm (P): 5.10, Insulated: Yes, Width: 7 mm
Qty.	20 pc(s).	
Type	WQV 2.5/2	Version
Order No.	1053660000	Cross-connector (terminal), when screwed in, yellow, 32 A, Number of
GTIN (EAN)	4008190031121	poles: 2, Pitch in mm (P): 5.10, Insulated: Yes, Width: 7 mm
Qty.	50 pc(s).	

Shielding connection



With the LS 2.8 WDU2.5-10, many feed-through modular terminal blocks from the W series can be converted very easily. Inserting the LS 2.8 WDU2.5-10 allows the cable shielding braid to be looped through directly at the terminal block by soldering or using a suitable flat cable lug.

General ordering data

Type	LS 2.8 WDU2.5-10	Version
Order No.	1056400000	W-Series, Shield bus
GTIN (EAN)	4008190036454	
Qty.	100 pc(s).	

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Accessories

DEK 5/5



WS/ DEK
MultiMark terminal markers use an innovative composite material made from two components. The hard base contour of the marker snaps securely into the connector. The elastic surface finish makes the marker easy to mount. This specially punched material enables the strips to be stretched to accommodate the slight variations in spacing that tend to add up, especially with long terminal blocks. Another advantage: the excellent printability of the surface material guarantees durable and wear-resistant labelling. A print resolution of 300 dpi also produces a very legible script.

Your benefits with MultiMark

- Firm hold and durable printing
- Continuous strips save installation time
- Easy mounting thanks to an innovative composite material
- Large label field for optimal legibility
- High flexibility thanks to manufacturer independence

General ordering data

Type	DEK 5/5 MM WS	Version
Order No.	2007110000	Dekafix, Terminal marker, 5 x 5 mm, Weidmueller, white
GTIN (EAN)	4050118391862	
Qty.	800 pc(s).	

2.5 mm²



The plug-in cross-connections feature easy handling and quick installation. This saves a great deal of time during installation in comparison with screwed solutions.

General ordering data

Type	ZQV 2.5N/10	Version
Order No.	1527690000	Cross-connector (terminal), Plugged, orange, 24 A, Number of poles:
GTIN (EAN)	4050118447989	10, Pitch in mm (P): 5.10, Insulated: Yes, Width: 48.7 mm
Qty.	20 pc(s).	
Type	ZQV 2.5N/9 RD	Version
Order No.	2108900000	Cross-connector (terminal), Plugged, red, 24 A, Number of poles: 9,
GTIN (EAN)	4050118448474	Pitch in mm (P): 5.10, Insulated: Yes, Width: 43.6 mm
Qty.	20 pc(s).	

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Accessories

Type	ZQV 2.5N/10 BL	Version
Order No.	1527880000	Cross-connector (terminal), Plugged, blue, 24 A, Number of poles: 10,
GTIN (EAN)	4050118448573	Pitch in mm (P): 5.10, Insulated: Yes, Width: 48.7 mm
Qty.	20 pc(s).	
Type	ZQV 2.5N/4 BL	Version
Order No.	1527780000	Cross-connector (terminal), Plugged, blue, 24 A, Number of poles: 4,
GTIN (EAN)	4050118448634	Pitch in mm (P): 5.10, Insulated: Yes, Width: 18.1 mm
Qty.	60 pc(s).	
Type	ZQV 2.5N/10 RD	Version
Order No.	2108910000	Cross-connector (terminal), Plugged, red, 24 A, Number of poles: 10,
GTIN (EAN)	4050118486018	Pitch in mm (P): 5.10, Insulated: Yes, Width: 48.7 mm
Qty.	20 pc(s).	
Type	ZQV 2.5N/4 RD	Version
Order No.	2108700000	Cross-connector (terminal), Plugged, red, 24 A, Number of poles: 4,
GTIN (EAN)	4050118448528	Pitch in mm (P): 5.10, Insulated: Yes, Width: 18.1 mm
Qty.	60 pc(s).	
Type	ZQV 2.5N/20	Version
Order No.	1527720000	Cross-connector (terminal), Plugged, orange, 24 A, Number of poles:
GTIN (EAN)	4050118447972	20, Pitch in mm (P): 5.10, Insulated: Yes, Width: 102 mm
Qty.	20 pc(s).	
Type	ZQV 2.5N/6 RD	Version
Order No.	2108720000	Cross-connector (terminal), Plugged, red, 24 A, Number of poles: 6,
GTIN (EAN)	4050118448504	Pitch in mm (P): 5.10, Insulated: Yes, Width: 28.3 mm
Qty.	20 pc(s).	
Type	ZQV 2.5N/9	Version
Order No.	1527680000	Cross-connector (terminal), Plugged, orange, 24 A, Number of poles:
GTIN (EAN)	4050118447996	9, Pitch in mm (P): 5.10, Insulated: Yes, Width: 43.6 mm
Qty.	20 pc(s).	
Type	ZQV 2.5N/7	Version
Order No.	1527640000	Cross-connector (terminal), Plugged, orange, 24 A, Number of poles:
GTIN (EAN)	4050118448412	7, Pitch in mm (P): 5.10, Insulated: Yes, Width: 33.4 mm
Qty.	20 pc(s).	
Type	ZQV 2.5N/3 RD	Version
Order No.	2108690000	Cross-connector (terminal), Plugged, red, 24 A, Number of poles: 3,
GTIN (EAN)	4050118448535	Pitch in mm (P): 5.10, Insulated: Yes, Width: 13 mm
Qty.	60 pc(s).	
Type	ZQV 2.5N/3 BL	Version
Order No.	1527770000	Cross-connector (terminal), Plugged, blue, 24 A, Number of poles: 3,
GTIN (EAN)	4050118448641	Pitch in mm (P): 5.10, Insulated: Yes, Width: 13 mm
Qty.	60 pc(s).	
Type	ZQV 2.5N/5 BL	Version
Order No.	1527790000	Cross-connector (terminal), Plugged, blue, 24 A, Number of poles: 5,
GTIN (EAN)	4050118448627	Pitch in mm (P): 5.10, Insulated: Yes, Width: 23.2 mm
Qty.	20 pc(s).	
Type	ZQV 2.5N/50 BL	Version
Order No.	1527920000	Cross-connector (terminal), Plugged, blue, 24 A, Number of poles: 50,
GTIN (EAN)	4050118448559	Pitch in mm (P): 5.10, Insulated: Yes, Width: 255 mm
Qty.	5 pc(s).	
Type	ZQV 2.5N/3	Version
Order No.	1527570000	Cross-connector (terminal), Plugged, orange, 24 A, Number of poles:
GTIN (EAN)	4050118448450	3, Pitch in mm (P): 5.10, Insulated: Yes, Width: 13 mm
Qty.	60 pc(s).	

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Accessories

Type	ZQV 2.5N/8 BL	Version
Order No.	1527840000	Cross-connector (terminal), Plugged, blue, 24 A, Number of poles: 8,
GTIN (EAN)	4050118448597	Pitch in mm (P): 5.10, Insulated: Yes, Width: 38.5 mm
Qty.	20 pc(s).	
Type	ZQV 2.5N/2 BL	Version
Order No.	1527740000	Cross-connector (terminal), Plugged, blue, 24 A, Number of poles: 2,
GTIN (EAN)	4050118448658	Pitch in mm (P): 5.10, Insulated: Yes, Width: 7.9 mm
Qty.	60 pc(s).	
Type	ZQV 2.5N/20 BL	Version
Order No.	1527890000	Cross-connector (terminal), Plugged, blue, 24 A, Number of poles: 20,
GTIN (EAN)	4050118448566	Pitch in mm (P): 5.10, Insulated: Yes, Width: 102 mm
Qty.	20 pc(s).	
Type	ZQV 2.5N/50 RD	Version
Order No.	2109000000	Cross-connector (terminal), Plugged, red, 24 A, Number of poles: 50,
GTIN (EAN)	4050118486001	Pitch in mm (P): 5.10, Insulated: Yes, Width: 255 mm
Qty.	5 pc(s).	
Type	ZQV 2.5N/6	Version
Order No.	1527630000	Cross-connector (terminal), Plugged, orange, 24 A, Number of poles:
GTIN (EAN)	4050118448429	6, Pitch in mm (P): 5.10, Insulated: Yes, Width: 28.3 mm
Qty.	20 pc(s).	
Type	ZQV 2.5N/9 BL	Version
Order No.	1527870000	Cross-connector (terminal), Plugged, blue, 24 A, Number of poles: 9,
GTIN (EAN)	4050118448580	Pitch in mm (P): 5.10, Insulated: Yes, Width: 43.6 mm
Qty.	20 pc(s).	
Type	ZQV 2.5N/20 RD	Version
Order No.	2108920000	Cross-connector (terminal), Plugged, red, 24 A, Number of poles: 20,
GTIN (EAN)	4050118485899	Pitch in mm (P): 5.10, Insulated: Yes, Width: 102 mm
Qty.	20 pc(s).	
Type	ZQV 2.5N/7 RD	Version
Order No.	2108810000	Cross-connector (terminal), Plugged, red, 24 A, Number of poles: 7,
GTIN (EAN)	4050118448498	Pitch in mm (P): 5.10, Insulated: Yes, Width: 33.4 mm
Qty.	20 pc(s).	
Type	ZQV 2.5N/2 RD	Version
Order No.	2108470000	Cross-connector (terminal), Plugged, red, 24 A, Number of poles: 2,
GTIN (EAN)	4050118448542	Pitch in mm (P): 5.10, Insulated: Yes, Width: 7.9 mm
Qty.	60 pc(s).	
Type	ZQV 2.5N/6 BL	Version
Order No.	1527820000	Cross-connector (terminal), Plugged, blue, 24 A, Number of poles: 6,
GTIN (EAN)	4050118448610	Pitch in mm (P): 5.10, Insulated: Yes, Width: 28.3 mm
Qty.	20 pc(s).	
Type	ZQV 2.5N/8	Version
Order No.	1527670000	Cross-connector (terminal), Plugged, orange, 24 A, Number of poles:
GTIN (EAN)	4050118448405	8, Pitch in mm (P): 5.10, Insulated: Yes, Width: 38.5 mm
Qty.	20 pc(s).	
Type	ZQV 2.5N/5 RD	Version
Order No.	2108710000	Cross-connector (terminal), Plugged, red, 24 A, Number of poles: 5,
GTIN (EAN)	4050118448511	Pitch in mm (P): 5.10, Insulated: Yes, Width: 23.2 mm
Qty.	20 pc(s).	
Type	ZQV 2.5N/8 RD	Version
Order No.	2108870000	Cross-connector (terminal), Plugged, red, 24 A, Number of poles: 8,
GTIN (EAN)	4050118448481	Pitch in mm (P): 5.10, Insulated: Yes, Width: 38.5 mm
Qty.	20 pc(s).	

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Accessories

Type	ZQV 2.5N/2	Version
Order No.	1527540000	Cross-connector (terminal), Plugged, orange, 24 A, Number of poles:
GTIN (EAN)	4050118448467	2, Pitch in mm (P): 5.10, Insulated: Yes, Width: 7.9 mm
Qty.	60 pc(s).	
Type	ZQV 2.5N/50	Version
Order No.	1527730000	Cross-connector (terminal), Plugged, orange, 24 A, Number of poles:
GTIN (EAN)	4050118411362	50, Pitch in mm (P): 5.10, Insulated: Yes, Width: 255 mm
Qty.	5 pc(s).	
Type	ZQV 2.5N/4	Version
Order No.	1527590000	Cross-connector (terminal), Plugged, orange, 24 A, Number of poles:
GTIN (EAN)	4050118448443	4, Pitch in mm (P): 5.10, Insulated: Yes, Width: 18.1 mm
Qty.	60 pc(s).	
Type	ZQV 2.5N/5	Version
Order No.	1527620000	Cross-connector (terminal), Plugged, orange, 24 A, Number of poles:
GTIN (EAN)	4050118448436	5, Pitch in mm (P): 5.10, Insulated: Yes, Width: 23.2 mm
Qty.	20 pc(s).	
Type	ZQV 2.5N/7 BL	Version
Order No.	1527830000	Cross-connector (terminal), Plugged, blue, 24 A, Number of poles: 7,
GTIN (EAN)	4050118448603	Pitch in mm (P): 5.10, Insulated: Yes, Width: 33.4 mm
Qty.	20 pc(s).	

WS 12/5



WS/ DEK
MultiMark terminal markers use an innovative composite material made from two components. The hard base contour of the marker snaps securely into the connector. The elastic surface finish makes the marker easy to mount. This specially punched material enables the strips to be stretched to accommodate the slight variations in spacing that tend to add up, especially with long terminal blocks. Another advantage: the excellent printability of the surface material guarantees durable and wear-resistant labelling. A print resolution of 300 dpi also produces a very legible script.

Your benefits with MultiMark

- Firm hold and durable printing
- Continuous strips save installation time
- Easy mounting thanks to an innovative composite material
- Large label field for optimal legibility
- High flexibility thanks to manufacturer independence

General ordering data

Type	WS 12/5 MM BP WS	Version
Order No.	2619850000	WS, Terminal marker, 12 x 5 mm, Weidmueller, white
GTIN (EAN)	4050118626230	
Qty.	5,500 pc(s).	

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Accessories

Type	WS 12/5 MM WS	Version
Order No.	2007190000	WS, Terminal marker, 12 x 5 mm, Weidmueller, white
GTIN (EAN)	4050118392036	
Qty.	800 pc(s).	

W-Series



Weidmüller's range of products includes end brackets that guarantee a permanent, reliable mounting on the terminal rail and prevent sliding. Versions with and without screws are available. The end brackets include marking options, also for group markers, and also a test plug holder.

General ordering data

Type	WEW 35/2	Version
Order No.	1061200000	End bracket, dark beige, TS 35, HB, Wemid, Width: 8 mm, 100 °C
GTIN (EAN)	4008190030230	
Qty.	50 pc(s).	

Blank



WS markers are the perfect match for the W-series connectors. Thanks to their system compatibility, the WS tags can also be used with the I-series and the Z-series. The large marking surfaces do not only permit long character strings but also multi-line text.
WS markers are ideal for labels with long, customised character strings. Thanks to the proven MultiCard format, printing with PrintJet CONNECT oder/or Plotter is possible.

- Can be fitted in strips or individually
- Markers in proven MultiCard format

For custom printing: Please send us a file of our labeling software M-Print PRO or M-Print PRO Online (without installation) for your labeling specifications.

General ordering data

Type	WS 12/5 MC NE WS	Version
Order No.	1609860000	WS, Terminal marker, 12 x 5 mm, Pitch in mm (P): 5.00 Weidmueller,
GTIN (EAN)	4008190203481	Allen-Bradley, white
Qty.	720 pc(s).	

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Accessories

Marker holder



The marker holder offer the possibility of additional mounting of standard markers with a pitch of 5 or 5.1 mm. The angled holders can be optionally snaped together and could be mounted in all standard marking channels of the Klippon® Connect modular terminal blocks. Fitting marker types could be found under the respective accessories of the designation marking holder.

General ordering data

Type	BZT 1 ZA WS 10/5	Version
Order No.	1805520000	Accessories, Marker holder
GTIN (EAN)	4032248270248	
Qty.	100 pc(s).	
Type	BZT 1 WS 10/5	Version
Order No.	1805490000	Accessories, Marker holder
GTIN (EAN)	4032248270231	
Qty.	100 pc(s).	

WQB

General ordering data

Type	WQB B/2	Version
Order No.	1579010000	Cross-connector (terminal), when screwed in, black, 24 A, Number of
GTIN (EAN)	4008190021696	poles: 2, Pitch in mm (P): 5.10, Insulated: Yes, Width: 10.14 mm
Qty.	50 pc(s).	
Type	WQB B/6	Version
Order No.	1579040000	Cross-connector (terminal), when screwed in, black, 24 A, Number of
GTIN (EAN)	4008190081041	poles: 6, Pitch in mm (P): 5.10, Insulated: Yes, Width: 30.7 mm
Qty.	20 pc(s).	
Type	WQB B/4	Version
Order No.	1579030000	Cross-connector (terminal), when screwed in, black, 24 A, Number of
GTIN (EAN)	4008190185046	poles: 4, Pitch in mm (P): 5.10, Insulated: Yes, Width: 20.42 mm
Qty.	50 pc(s).	
Type	WQB B/3	Version
Order No.	1579020000	Cross-connector (terminal), when screwed in, black, 24 A, Number of
GTIN (EAN)	4008190062392	poles: 3, Pitch in mm (P): 5.10, Insulated: Yes, Width: 15.28 mm
Qty.	50 pc(s).	

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Accessories

Type	WQB B/24	Version
Order No.	1579060000	Cross-connector (terminal), when screwed in, black, 24 A, Number of
GTIN (EAN)	4008190188597	poles: 24, Pitch in mm (P): 5.10, Insulated: Yes, Width: 123.22 mm
Qty.	20 pc(s).	
Type	WQB B/10	Version
Order No.	1579050000	Cross-connector (terminal), when screwed in, black, 24 A, Number of
GTIN (EAN)	4008190094508	poles: 10, Pitch in mm (P): 5.10, Insulated: Yes, Width: 48.26 mm
Qty.	20 pc(s).	

W-Series



Test adapters and test plugs are used for the electrical connection between terminal blocks and the test equipment. In this way, an electrical contact can be established in the wired state and measurements can be done easily.

General ordering data

Type	WTA 2/ZA WDU2.5-10	Version
Order No.	1632330000	Test adapter (terminal), 1.5 mm², 250 V, 6 A
GTIN (EAN)	4008190257330	
Qty.	25 pc(s).	
Type	WTA 2 WDU2.5-10	Version
Order No.	1632320000	Test adapter (terminal), 1.5 mm², 250 V, 6 A
GTIN (EAN)	4008190257347	
Qty.	25 pc(s).	

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Data sheet

Weidmüller

WDU 2.5

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Accessories

Blank



The Dekafix (DEK) marker is the universal marker for all conductor and plug-in connectors as well as for electronic sub-assemblies. The system is ideal for short number sequences and covers a wide range of ready-printed markers.
Strips for fast installation in only one work step. The printing is easy to read, rich in contrast and available in various widths.

- Large range of ready-to-use markers
- Strips for fast installation
- Terminal markers, suitable for all Weidmüller cable connectors
- Available as blank MultiCard or with standard printing

For custom printing: Please send us a file of our labeling software M-Print PRO or M-Print PRO Online (without installation) for your labeling specifications.

General ordering data

Type	DEK 5/5 MC NE WS	Version
Order No.	1609801044	Dekafix, Terminal marker, 5 x 5 mm, Pitch in mm (P): 5.00
GTIN (EAN)	4008190397111	Weidmueller, white
Qty.	1,000 pc(s).	

W-Series



A partition plate is used for the optical separation of circuits or used for electrical isolation from neighbouring cross-connectors. In contrast to the end plate, the contour can be larger than the adjacent terminal blocks. However, it should not be smaller, as otherwise the required clearance and creepage distances within the application can no longer be maintained.

General ordering data

Type	WTW EN	Version
Order No.	1058800000	Partition plate (terminal), dark beige, Height: 86 mm, Width: 3 mm,
GTIN (EAN)	4008190140175	V-0, Wemid
Qty.	20 pc(s).	

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Data sheet

Weidmüller

WDU 2.5

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Accessories

Testsockets

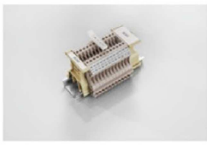


Test adapters and test plugs are used for the electrical connection between terminal blocks and the test equipment. In this way, an electrical contact can be established in the wired state and measurements can be done easily.

General ordering data

Type	STB 8.5/D4/2.3/M2.5 AKZ	Version
Order No.	0215700000	Accessories, Socket
GTIN (EAN)	4008190184872	
Qty.	50 pc(s).	

SchT group marker carrier



The SchT 5 S group tag carriers are clipped directly onto the TS 32 mounting rail (G-rail) or the TS 35 mounting rail (top-hat rail). It is therefore possible to label the terminal strip irrespective of the terminal and the type of terminal. SchT 5 and SchT 5 S are fitted with ESO 5, STR 5 protective strips.
The SchT 7 is a hinged group tag carrier for inlay tags which enables easy access to the clamping screw. The SchT 7 is fitted with ESO 7, STR 7 protective strips or DEK 5.
Inlay tags and protective strips can be found under "Accessories".

General ordering data

Type	SCHT 7	Version
Order No.	0517960000	SCHT, Terminal marker, 39.3 x 8 mm, Pitch in mm (P): 7.00
GTIN (EAN)	4008190001742	Weidmueller, white
Qty.	20 pc(s).	

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1.57 WEIDMULLER 6sqmm TERMINAL WITH FUSE HOLDER WSI6 DATA SHEET

Data sheet

Weidmüller

WSI 6

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Product image



In some applications it is useful to protect the feed through connection with a separate fuse. Fuse terminal blocks are made up of one terminal block bottom section with a fuse insertion carrier. The fuses vary from pivoting fuse levers and pluggable fuse holders to screwable closures and flat plug-in fuses.

General ordering data

Version	Fuse terminal, Screw connection, dark beige, 6 mm², 6.3 A, 500 V, Number of connections: 2, Number of levels: 1, TS 35, V-0, Wemid, G-Si, 5 x 20
Order No.	1011000000
Type	WSI 6
GTIN (EAN)	4008190105624
Qty.	50 pc(s).

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Data sheet

Weidmüller

WSI 6

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Technical data

Dimensions and weights

Depth	61 mm	Depth (inches)	2.402 inch
Depth including DIN rail	62 mm	Height	60 mm
Height (inches)	2.362 inch	Width	7.9 mm
Width (inches)	0.311 inch	Net weight	18.36 g

Temperatures

Storage temperature	-25 °C...55 °C	Continuous operating temp., min.	-50 °C
Continuous operating temp., max.	120 °C		

Material data

Material	Wemid	Colour	dark beige
UL 94 flammability rating	V-0		

System specifications

Version	Screw connection, Fuse isolator, for screwable cross-connection, One end without connector	End cover plate required	Yes
Number of potentials	1	Number of levels	1
Number of clamping points per level	2	Number of potentials per tier	1
Levels cross-connected internally	No	PE connection	No
Rail	TS 35	N-function	No
PE function	No	PEN function	No

2 clampable conductors (H05V/H07V) with equal cross-section (rated connection)

Wire connection cross section, finely stranded with wire-end ferrules DIN 46228/1, 2 clampable wires, max.	2.5 mm²	Wire connection cross section, finely stranded with wire-end ferrules DIN 46228/1, 2 clampable wires, min.	0.5 mm²
Wire connection cross section, finely stranded, two clampable wires, min.	0.5 mm²	Wire cross-section, finely stranded, two clampable wires, max.	2.5 mm²

Additional technical data

Explosion-tested version	No	Number of similar terminals	1
Open sides	right	Type of mounting	Snap-on

CSA rating data

Certificate No. (CSA)	200039-1057876	Current size C (CSA)	10 A
Voltage size C (CSA)	600 V	Wire cross section max. (CSA)	8 AWG
Wire cross section min. (CSA)	20 AWG		

Conductors for clamping (additional connection)

Conductor cross-section, flexible plus plastic collar DIN 46228/1, further connection, max.	6 mm²	Connection type, additional connection	Screw connection

Conductors for clamping (rated connection)

Blade size	0.8 x 4.0 mm

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Weidmüller

WSI 6

Weidmüller Interface GmbH & Co. KG
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D-32758 Detmold
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Technical data

Clampable conductor	Connection specification	Screw connection		
	Cross-section for conductor connection	Type	solid, H05(07) V-U	
		min.	0.5 mm²	
		max.	10 mm²	
		nominal	6 mm²	
	wire end ferrule	Stripping length	min.	12 mm
			max.	12 mm
			nominal	12 mm
		Tightening torque	min.	0.8 Nm
			max.	1.6 Nm
		Recommended wire-end ferrule		
	Connection specification	Screw connection		
	Cross-section for conductor connection	Type	stranded, H07V-R	
		min.	1.5 mm²	
		max.	10 mm²	
		nominal	6 mm²	
	wire end ferrule	Stripping length	min.	12 mm
			max.	12 mm
			nominal	12 mm
		Tightening torque	min.	0.8 Nm
			max.	1.6 Nm
		Recommended wire-end ferrule		
	Connection specification	Screw connection		
	Cross-section for conductor connection	Type	flexible, H05(07) V-K	
		min.	0.5 mm²	
		max.	10 mm²	
		nominal	6 mm²	
	wire end ferrule	Stripping length	min.	12 mm
			max.	12 mm
			nominal	12 mm
		Tightening torque	min.	0.8 Nm
			max.	1.6 Nm
		Recommended wire-end ferrule		

Clamping range, max.	10 mm²
Clamping range, min.	0.5 mm²
Clamping screw	M 3.5
Connection cross-section, stranded, max.	10 mm²
Connection cross-section, stranded, min.	1.5 mm²
Connection direction	on side
Gauge to IEC 60947-1	A5
Number of connections	2
Stripping length	12 mm
Tightening torque, max.	1.6 Nm
Tightening torque, min.	0.8 Nm
Torque level with DMS electric screw-driver	3
Type of connection	Screw connection
Type of connection 2	Screw connection
Wire connection cross section AWG, max.	AWG 8
Wire connection cross section AWG, min.	AWG 20
Wire connection cross section, finely stranded, max.	10 mm²

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Weidmüller Interface GmbH & Co. KG
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D-32758 Detmold
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Technical data

Wire connection cross section, finely stranded, min.	0.5 mm²
Wire connection cross-section, finely stranded with wire-end ferrules DIN 46228/1, max.	6 mm²
Wire connection cross-section, finely stranded with wire-end ferrules DIN 46228/1, min.	0.5 mm²
Wire connection cross-section, finely stranded with wire-end ferrules DIN 46228/4, max.	6 mm²
Wire connection cross-section, finely stranded with wire-end ferrules DIN 46228/4, min.	0.5 mm²
Wire connection cross-section, solid core, max.	10 mm²
Wire connection cross-section, solid core, min.	0.5 mm²

Display element

Type of voltage for indicator	AC/DC

Fuse terminals

Cartridge fuse	G-Si. 5 x 20	Display	Without LED
Fuse holder (cartridge holder)	Pivoting	Operating voltage, max.	250 V
Type of voltage for indicator	AC/DC		

General

Rail	TS 35	Standards	IEC 60947-7-3, IEC 60947-7-1
Wire connection cross section AWG, max.	AWG 8	Wire connection cross section AWG, min.	AWG 20

Rating data

Rated cross-section	6 mm²	Rated voltage	500 V
Rated voltage to adjoining terminal	500 V	Rated DC voltage	500 V
Rated current	6.3 A	Current at maximum wires	6.3 A
Standards	IEC 60947-7-3, IEC 60947-7-1	Volume resistance according to IEC 60947-7-x	0.78 mΩ
Rated impulse withstand voltage	6 kV	Power loss in accordance with IEC 60947-7-x	1.31 W
Pollution severity	3		

UL rating data

Certificate No. (UR)	E60693	Conductor size Factory wiring max. (UR)	8 AWG
Conductor size Factory wiring min. (UR)	22 AWG	Conductor size Field wiring max. (UR)	8 AWG
Conductor size Field wiring min. (UR)	22 AWG	Current size C (UR)	9.5 A
Voltage size C (UR)	600 V		

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Data sheet

Weidmüller

WSI 6

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Technical data

Classifications

ETIM 6.0	EC000899	ETIM 7.0	EC000899
ETIM 8.0	EC000899	ETIM 9.0	EC000899
ECLASS 9.0	27-14-11-16	ECLASS 9.1	27-14-11-16
ECLASS 10.0	27-14-11-16	ECLASS 11.0	27-14-11-16
ECLASS 12.0	27-14-11-16	ECLASS 13.0	27-25-01-13
ECLASS 14.0	27-25-01-13		

Environmental Product Compliance

RoHS Compliance Status	Compliant without exemption
REACH SVHC	/

Important note

Product information	The voltage depends on the selected fuse element or the selected indicator light

Approvals

Approvals

ROHS	Conform
UL File Number Search	UL Website
Certificate No. (UR)	E60693

Downloads

Approval/Certificate/Document of Conformity	CB Testreport CB Certificate CB Test certificate Lloyds Register Certificate POLSKIREJ certificate DNV Certificate CE Declaration of Conformity UKCA declaration of conformity Confirmation of Standards EN 45545-2_2020-10
Engineering Data	CAD data – STEP
User Documentation	StorageConditionsTerminalBlocks Marking options on WSI 6 terminal blocks
Catalogues	Catalogues in PDF-format
Brochures	

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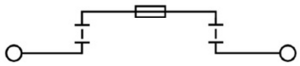
Weidmüller

WSI 6

Weidmüller Interface GmbH & Co. KG
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Drawings



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Weidmüller

WSI 6

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Accessories

2.5-10 mm²



End plates are fitted to the open side of the last modular terminal before the end bracket. The use of an end plate ensures the function of the modular terminal and the specified rated voltage. It guarantees protection against contact with live parts and makes the final terminal finger-proof.

General ordering data

Type	WAP 16+35 WTW 2.5-10	Version
Order No.	1050100000	End and partition plate for terminals, dark beige, Height: 56 mm,
GTIN (EAN)	4008190079901	Width: 1.5 mm, V-0, Wemid
Qty.	20 pc(s).	

Type	WAP 2.5-10	Version
Order No.	1050000000	End plate (terminals), dark beige, Height: 56 mm, Width: 1.5 mm, V-0,
GTIN (EAN)	4008190103149	Wemid
Qty.	50 pc(s).	

Slotted screwdriver



Slotted screwdriver with rounded blade SD DIN 5265, ISO 2380/2, output to DIN 5264, ISO 2380/1. ChromTop tip, SoftFinish grip

General ordering data

Type	SDS 0.8X4.0X100	Version
Order No.	9008340000	Screwdriver, Screwdriver
GTIN (EAN)	4032248056293	
Qty.	1 pc(s).	

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Data sheet

Weidmüller

WSI 6

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Accessories

ZGB pivotable group tag holder



The ZGB 15 is a hinged group tag carrier. The tag carrier can hold the dekafix 5, WS 12/5 terminal markers or the inlay tag ESO 15.
The ZGB 30 is a hinged group tag carrier. The tag carrier can hold the dekafix 5, WS 12/5 terminal markers or the inlay tag ESO 7.
Inlay tags and protective strips can be found under "Accessories".

General ordering data

Type	ZGB 15	Version
Order No.	1636530000	Terminal markers, Terminal marker, 15 x 7 mm, Pitch in mm (P): 5.00
GTIN (EAN)	4008190297053	Weidmueller, white
Qty.	20 pc(s).	
Type	ZGB 30	Version
Order No.	1611930000	Terminal markers, Terminal marker, 32 x 7 mm, Pitch in mm (P): 5.00
GTIN (EAN)	4008190002251	Weidmueller, white
Qty.	20 pc(s).	

Z-Series



Weidmüller's range of products includes end brackets that guarantee a permanent, reliable mounting on the terminal rail and prevent sliding. Versions with and without screws are available. The end brackets include marking options, also for group markers, and also a test plug holder.

General ordering data

Type	ZST 1	Version
Order No.	1269070000	Accessories, Accessories holder
GTIN (EAN)	4050118094091	
Qty.	25 pc(s).	

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Data sheet

Weidmüller

WSI 6

Weidmüller Interface GmbH & Co. KG
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D-32758 Detmold
Germany

www.weidmueller.com

Accessories

Shielding connection



With the LS 2.8 WDU2.5-10, many feed-through modular terminal blocks from the W series can be converted very easily. Inserting the LS 2.8 WDU2.5-10 allows the cable shielding braid to be looped through directly at the terminal block by soldering or using a suitable flat cable lug.

General ordering data

Type	LS 2.8 WDU2.5-10	Version
Order No.	1056400000	W-Series, Shield bus
GTIN (EAN)	4008190036454	
Qty.	100 pc(s).	

QB



Screwable cross-connections are easy to mount and de mount. Thanks to the big contact surface, even high currents can be transmitted with maximum contact reliability.

General ordering data

Type	QB 58/8/9/WI	Version
Order No.	0545300000	Cross-connector (terminal), when screwed in, grey, 27 A, Number of
GTIN (EAN)	4008190125080	poles: 58, Pitch in mm (P): 8.00, Insulated: No, Width: 0.8 mm
Qty.	10 pc(s).	
Type	QB 58/8/15	Version
Order No.	0545400000	Cross-connector (terminal), when screwed in, grey, 27 A, Number of
GTIN (EAN)	4008190028794	poles: 58, Pitch in mm (P): 8.00, Insulated: No, Width: 0.8 mm
Qty.	10 pc(s).	

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Data sheet

Weidmüller

WSI 6

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Accessories

WS 12/5



WS/ DEK
MultiMark terminal markers use an innovative composite material made from two components. The hard base contour of the marker snaps securely into the connector. The elastic surface finish makes the marker easy to mount. This specially punched material enables the strips to be stretched to accommodate the slight variations in spacing that tend to add up, especially with long terminal blocks. Another advantage: the excellent printability of the surface material guarantees durable and wear-resistant labelling. A print resolution of 300 dpi also produces a very legible script.
Your benefits with MultiMark

- Firm hold and durable printing
- Continuous strips save installation time
- Easy mounting thanks to an innovative composite material
- Large label field for optimal legibility
- High flexibility thanks to manufacturer independence

General ordering data

Type	WS 12/5 MM WS	Version
Order No.	2007190000	WS, Terminal marker, 12 x 5 mm, Weidmueller, white
GTIN (EAN)	4050118392036	
Qty.	800 pc(s).	

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Data sheet

Weidmüller

WSI 6

Weidmüller Interface GmbH & Co. KG
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D-32758 Detmold
Germany

www.weidmueller.com

Accessories

DEK 5/8



WS/ DEK
MultiMark terminal markers use an innovative composite material made from two components. The hard base contour of the marker snaps securely into the connector. The elastic surface finish makes the marker easy to mount. This specially punched material enables the strips to be stretched to accommodate the slight variations in spacing that tend to add up, especially with long terminal blocks. Another advantage: the excellent printability of the surface material guarantees durable and wear-resistant labelling. A print resolution of 300 dpi also produces a very legible script.
Your benefits with MultiMark

- Firm hold and durable printing
- Continuous strips save installation time
- Easy mounting thanks to an innovative composite material
- Large label field for optimal legibility
- High flexibility thanks to manufacturer independence

General ordering data

Type	DEK 5/8 MM WS	Version
Order No.	2007130000	Dekafix, Terminal marker, 5 x 8 mm, Weidmueller, white
GTIN (EAN)	4050118392012	
Qty.	500 pc(s).	

W-Series



Weidmüller's range of products includes end brackets that guarantee a permanent, reliable mounting on the terminal rail and prevent sliding. Versions with and without screws are available. The end brackets include marking options, also for group markers, and also a test plug holder.

General ordering data

Type	WEW 35/2	Version
Order No.	1061200000	End bracket, dark beige, TS 35, HB, Wemid, Width: 8 mm, 100 °C
GTIN (EAN)	4008190030230	
Qty.	50 pc(s).	

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Data sheet

Weidmüller

WSI 6

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Accessories

Marker holder



The marker holder offer the possibility of additional mounting of standard markers with a pitch of 5 or 5.1 mm. The angled holders can be optionally snaped together and could be mounted in all standard marking channels of the Klippon® Connect modular terminal blocks. Fitting marker types could be found under the respective accessories of the designation marking holder.

General ordering data

Type	BZT 1 ZA WS 10/5	Version
Order No.	1805520000	Accessories, Marker holder
GTIN (EAN)	4032248270248	
Qty.	100 pc(s).	

Type	BZT 1 WS 10/5	Version
Order No.	1805490000	Accessories, Marker holder
GTIN (EAN)	4032248270231	
Qty.	100 pc(s).	

Blank



WS markers are the perfect match for the W-series connectors. Thanks to their system compatibility, the WS tags can also be used with the I-series and the Z-series. The large marking surfaces do not only permit long character strings but also multi-line text.
WS markers are ideal for labels with long, customised character strings. Thanks to the proven MultiCard format, printing with PrintJet CONNECT oder/or Plotter is possible.

- Can be fitted in strips or individually
- Markers in proven MultiCard format

For custom printing: Please send us a file of our labeling software M-Print PRO or M-Print PRO Online (without installation) for your labeling specifications.

General ordering data

Type	WS 12/5 MC NE WS	Version
Order No.	1609860000	WS, Terminal marker, 12 x 5 mm, Pitch in mm (P): 5.00 Weidmueller,
GTIN (EAN)	4008190203481	Allen-Bradley, white
Qty.	720 pc(s).	

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Weidmüller

Data sheet

WSI 6

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D-32758 Detmold
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Accessories

W-Series



Test adapters and test plugs are used for the electrical connection between terminal blocks and the test equipment. In this way, an electrical contact can be established in the wired state and measurements can be done easily.

General ordering data

Type	WTA 7 WSI6	Version
Order No.	1650210000	Test adapter (terminal), 1.5 mm², 250 V, 6 A
GTIN (EAN)	4008190296872	
Qty.	25 pc(s).	

WS 12/6.5



WS/ DEK
MultiMark terminal markers use an innovative composite material made from two components. The hard base contour of the marker snaps securely into the connector. The elastic surface finish makes the marker easy to mount. This specially punched material enables the strips to be stretched to accommodate the slight variations in spacing that tend to add up, especially with long terminal blocks. Another advantage: the excellent printability of the surface material guarantees durable and wear-resistant labelling. A print resolution of 300 dpi also produces a very legible script.
Your benefits with MultiMark

- Firm hold and durable printing
- Continuous strips save installation time
- Easy mounting thanks to an innovative composite material
- Large label field for optimal legibility
- High flexibility thanks to manufacturer independence

General ordering data

Type	WS 12/6.5 MM WS	Version
Order No.	2619930000	WS, Terminal marker, 12 x 6.5 mm, Weidmueller, white
GTIN (EAN)	4050118626155	
Qty.	600 pc(s).	

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Data sheet

Weidmüller

WSI 6

Weidmüller Interface GmbH & Co. KG
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Accessories

Blank



The Dekafix (DEK) marker is the universal marker for all conductor and plug-in connectors as well as for electronic sub-assemblies. The system is ideal for short number sequences and covers a wide range of ready-printed markers.
Strips for fast installation in only one work step. The printing is easy to read, rich in contrast and available in various widths.
- Large range of ready-to-use markers
- Strips for fast installation
- Terminal markers, suitable for all Weidmüller cable connectors
- Available as blank MultiCard or with standard printing

For custom printing: Please send us a file of our labeling software M-Print PRO or M-Print PRO Online (without installation) for your labeling specifications.

General ordering data

Type	DEK 5/8 MC NE WS	Version
Order No.	1856740000	Dekafix, Terminal marker, 5 x 8 mm, Pitch in mm (P): 8.00
GTIN (EAN)	4032248400850	Weidmueller, white
Qty.	800 pc(s).	

Blank



WS markers are the perfect match for the W-series connectors. Thanks to their system compatibility, the WS tags can also be used with the I-series and the Z-series. The large marking surfaces do not only permit long character strings but also multi-line text.
WS markers are ideal for labels with long, customised character strings. Thanks to the proven MultiCard format, printing with PrintJet CONNECT oder/or Plotter is possible.
- Can be fitted in strips or individually
- Markers in proven MultiCard format

For custom printing: Please send us a file of our labeling software M-Print PRO or M-Print PRO Online (without installation) for your labeling specifications.

General ordering data

Type	WS 12/6.5 MC NE WS	Version
Order No.	1609920000	WS, Terminal marker, 12 x 6.5 mm, Pitch in mm (P): 6.50
GTIN (EAN)	4008190203511	Weidmueller, Allen-Bradley, white
Qty.	540 pc(s).	

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Data sheet

Weidmüller

WSI 6

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Accessories

5x20



For protection against overcurrent, we offer cartridge fuse with dimensions 5x20 mm in sizes from 100 mA to 6.3 A.

General ordering data

Type	G 20/2.00A/F	Version
Order No.	0430900000	Miniature fuse, quick-acting, 2 A, G-Si. 5 x 20
GTIN (EAN)	4008190123567	
Qty.	10 pc(s).	
Type	G 20/0.50A/F	Version
Order No.	0430600000	Miniature fuse, quick-acting, 0.5 A, G-Si. 5 x 20
GTIN (EAN)	4008190046835	
Qty.	10 pc(s).	
Type	G 20/1.00A/F	Version
Order No.	0430700000	Miniature fuse, quick-acting, 1 A, G-Si. 5 x 20
GTIN (EAN)	4008190093877	
Qty.	10 pc(s).	
Type	G 20/0.25A/F	Version
Order No.	0430500000	Miniature fuse, quick-acting, 0.25 A, G-Si. 5 x 20
GTIN (EAN)	4008190153991	
Qty.	10 pc(s).	

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1.58 WEIDMULLER 35sqmm EARTH TERMINAL WPE35 DATA SHEET

Data sheet

Weidmüller

WPE 35

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Product image



A protective feed through terminal block is an electrical conductor for the purpose of safety and is used in many applications. To establish the electrical and mechanical connection between copper conductors and the mounting support plate, PE terminal blocks are used. They have one or more contact points for connection with and/or bifurcation of protective earth conductors.

General ordering data

Version	PE terminal, Screw connection, Green/yellow, 35 mm², 800 V, Number of connections: 2, Number of levels: 1, TS 35, V-0, Wemid
Order No.	1010500000
Type	WPE 35
GTIN (EAN)	4008190112806
Qty.	25 pc(s).

Creation date October 22, 2024 12:02:24 PM CEST

Catalogue status 12.10.2024 / We reserve the right to make technical changes. 1

Data sheet

Weidmüller

WPE 35

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Technical data

Dimensions and weights

Depth	62.5 mm	Depth (inches)	2.461 inch
Depth including DIN rail	63 mm	Height	56 mm
Height (inches)	2.205 inch	Width	16 mm
Width (inches)	0.63 inch	Net weight	77.2 g

Temperatures

Storage temperature	-25 °C...55 °C	Operating temperature range	For operating temperature range see EC Design Test Certificate / IEC Ex-Certificate of Conformity
Continuous operating temp., min.	-60 °C	Continuous operating temp., max.	130 °C

Material data

Material	Wemid	Colour	Green/yellow
UL 94 flammability rating	V-0		

Rating data IECEx/ATEX

Certificate No. (ATEX)	DEMKO14ATEX1338U	Certificate No. (IECEX)	IECEXULD14.0005U
Wire cross section max. (ATEX)	35 mm²	Wire cross section max. (IECEX)	35 mm²
Operating temperature range	For operating temperature range see EC Design Test Certificate / IEC Ex-Certificate of Conformity	Marking EN 60079-7	Ex eb II C Gb
Ex 2014/34/EU label	II 2 G D		

System specifications

Version	Screw connection, With PE connection, in closed state	End cover plate required	No
Number of potentials	1	Number of levels	1
Number of clamping points per level	2	Number of potentials per tier	1
Levels cross-connected internally	No	PE connection	Yes
Rail	TS 35	N-function	No
PE function	Yes	PEN function	Yes

Additional technical data

Explosion-tested version	Yes	Installation advice	when screwed in
Interlock	for screw fixing	Number of similar terminals	1
Open sides	closed	Type of mounting	when screwed in

CSA rating data

Certificate No. (CSA)	200039-1057876	Wire cross section max. (CSA)	2 AWG
Wire cross section min. (CSA)	12 AWG		

Conductors for clamping (additional connection)

Connection type, additional connection	Screw connection

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Data sheet

Weidmüller

WPE 35

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Technical data

Conductors for clamping (rated connection)

Blade size	6.5 x 1.2 mm	Clamping range, max.	35 mm²
Clamping range, min.	2.5 mm²	Clamping screw	M 6
Connection cross-section, stranded, max.	50 mm²	Connection cross-section, stranded, min.	2.5 mm²
Connection direction	on side	Gauge to IEC 60947-1	B8
Number of connections	2	Stripping length	18 mm
Tightening torque, max.	5 Nm	Tightening torque, min.	4 Nm
Type of connection	Screw connection	Wire connection cross section AWG, max.	AWG 2
Wire connection cross section AWG, min.	AWG 12	Wire connection cross section, finely stranded, max.	35 mm²
Wire connection cross section, finely stranded, min.	2.5 mm²	Wire connection cross-section, finely stranded with wire-end ferrules DIN 46228/1, max.	35 mm²
Wire connection cross-section, finely stranded with wire-end ferrules DIN 46228/1, min.	2.5 mm²	Wire connection cross-section, finely stranded with wire-end ferrules DIN 46228/4, max.	35 mm²
Wire connection cross-section, finely stranded with wire-end ferrules DIN 46228/4, min.	2.5 mm²	Wire connection cross-section, solid core, max.	50 mm²
Wire connection cross-section, solid core, min.	2.5 mm²		

Dimensions

TS 35 offset	32 mm

General

Installation advice	when screwed in	Rail	TS 35
Standards	IEC 60947-7-2	Wire connection cross section AWG, max.	AWG 2
Wire connection cross section AWG, min.	AWG 12		

PE rating data

Rated short-time current	4200 A (35 mm²)	Centre screw on PE terminals	M 4
Tightening torque range for fixing screw	1.2...2.4 Nm	PEN function	Yes

Rating data

Rated cross-section	35 mm²	Rated voltage to adjoining terminal	800 V
Rated DC voltage	800 V	Standards	IEC 60947-7-2
Volume resistance according to IEC 60947-7-x	0.26 mΩ	Rated impulse withstand voltage to adjacent terminal	8 kV
Power loss in accordance with IEC 60947-7-x	4 W	Pollution severity	3

UL rating data

Certificate No. (UR)	E60693	Conductor size Factory wiring max. (UR)	2 AWG
Conductor size Factory wiring min. (UR)	12 AWG	Conductor size Field wiring max. (UR)	2 AWG
Conductor size Field wiring min. (UR)	12 AWG		

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Data sheet

Weidmüller

WPE 35

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Technical data

Classifications

ETIM 6.0	EC000901	ETIM 7.0	EC000901
ETIM 8.0	EC000901	ETIM 9.0	EC000901
ECLASS 9.0	27-14-11-41	ECLASS 9.1	27-14-11-41
ECLASS 10.0	27-14-11-41	ECLASS 11.0	27-14-11-41
ECLASS 12.0	27-14-11-41	ECLASS 13.0	27-25-01-03
ECLASS 14.0	27-25-01-03		

Environmental Product Compliance

RoHS Compliance Status	Compliant without exemption
REACH SVHC	/

Approvals

Approvals	CSAEX CURUSEX ATEX IECEx INMETRO KEMA KEUR KOSHAEX UKCA-EX
ROHS	Conform
UL File Number Search	UL Website
Certificate No. (UR)	E60693
Certificate No. (cURusEX)	E184763

Downloads

Approval/Certificate/Document of Conformity	Attestation of Conformity IECEx Certificate UKCA Ex Attestation of Conformity CB Test Certificate CB Certificate Lloyds Register Certificate POLSKIREJ certificate UKCA Ex Certificate 16-AV4BO-0265U. DNV Certificate CCC Ex Certificate CE Declaration of Conformity ATEX Certificate UKCA declaration of conformity Confirmation of Standards EN 45545-2_2020-10
Engineering Data	CAD data – STEP
User Documentation	NTI WDU/WPE 35.pdf StorageConditionsTerminalBlocks
Catalogues	Catalogues in PDF-format
Brochures	

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Data sheet

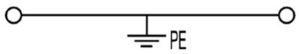
Weidmüller

WPE 35

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Drawings



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Data sheet

Weidmüller

WPE 35

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Accessories

Blank



The WAD connector marker is suitable for W-series terminals and for the WEW 35/2 and ZEW 35/2 end brackets. The markers are available as blank markers, with custom printing or standard print with lightning symbol. The WAD MultiCard markers are suitable for labelling with PrintJet CONNECT printers.

For custom printing: Please send us a file of our labeling software M-Print PRO or M-Print PRO Online (without installation) for your labeling specifications.

General ordering data

Type	WAD 12 MC NE GE	Version
Order No.	2445080000	Group markers, Cover, 36.2 x 11.9 mm, WDU 16, WDU 35, yellow
GTIN (EAN)	4050118458213	
Qty.	32 pc(s).	
Type	WAD 12 MC NE WS	Version
Order No.	2445070000	Group markers, Cover, 36.2 x 11.9 mm, WDU 16, WDU 35, white
GTIN (EAN)	4050118458220	
Qty.	32 pc(s).	

Slotted screwdriver



Slotted screwdriver with rounded blade SD DIN 5265, ISO 2380/2, output to DIN 5264, ISO 2380/1. ChromTop tip, SoftFinish grip

General ordering data

Type	SDS 1.2X6.5X150	Version
Order No.	9009010000	Screwdriver, Screwdriver
GTIN (EAN)	4032248266869	
Qty.	1 pc(s).	

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Data sheet

Weidmüller

WPE 35

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Accessories

ZGB pivotable group tag holder



The ZGB 15 is a hinged group tag carrier. The tag carrier can hold the dekafix 5, WS 12/5 terminal markers or the inlay tag ESO 15.
The ZGB 30 is a hinged group tag carrier. The tag carrier can hold the dekafix 5, WS 12/5 terminal markers or the inlay tag ESO 7.
Inlay tags and protective strips can be found under "Accessories".

General ordering data

Type	ZGB 15	Version
Order No.	1636530000	Terminal markers, Terminal marker, 15 x 7 mm, Pitch in mm (P): 5.00
GTIN (EAN)	4008190297053	Weidmueller, white
Qty.	20 pc(s).	
Type	ZGB 30	Version
Order No.	1611930000	Terminal markers, Terminal marker, 32 x 7 mm, Pitch in mm (P): 5.00
GTIN (EAN)	4008190002251	Weidmueller, white
Qty.	20 pc(s).	

With lightning flash



The WAD connector marker is suitable for W-series terminals and for the WEW 35/2 and ZEW 35/2 end brackets. The markers are available as blank markers, with custom printing or standard print with lightning symbol. The WAD MultiCard markers are suitable for labelling with PrintJet CONNECT printers.

For custom printing: Please send us a file of our labeling software M-Print PRO or M-Print PRO Online (without installation) for your labeling specifications.

General ordering data

Type	WAD 12 MC B GE/SW	Version
Order No.	2445090000	Group markers, Cover, 36.2 x 11.9 mm, WDU 16, WDU 35, yellow
GTIN (EAN)	4050118457896	
Qty.	32 pc(s).	

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Data sheet

Weidmüller

WPE 35

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Accessories

WS 12/5



WS/ DEK
MultiMark terminal markers use an innovative composite material made from two components. The hard base contour of the marker snaps securely into the connector. The elastic surface finish makes the marker easy to mount. This specially punched material enables the strips to be stretched to accommodate the slight variations in spacing that tend to add up, especially with long terminal blocks. Another advantage: the excellent printability of the surface material guarantees durable and wear-resistant labelling. A print resolution of 300 dpi also produces a very legible script.
Your benefits with MultiMark

- Firm hold and durable printing
- Continuous strips save installation time
- Easy mounting thanks to an innovative composite material
- Large label field for optimal legibility
- High flexibility thanks to manufacturer independence

General ordering data

Type	WS 12/5 MM WS	Version
Order No.	2007190000	WS, Terminal marker, 12 x 5 mm, Weidmueller, white
GTIN (EAN)	4050118392036	
Qty.	800 pc(s).	

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Data sheet

Weidmüller

WPE 35

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Accessories

DEK 5/8



WS/ DEK
MultiMark terminal markers use an innovative composite material made from two components. The hard base contour of the marker snaps securely into the connector. The elastic surface finish makes the marker easy to mount. This specially punched material enables the strips to be stretched to accommodate the slight variations in spacing that tend to add up, especially with long terminal blocks. Another advantage: the excellent printability of the surface material guarantees durable and wear-resistant labelling. A print resolution of 300 dpi also produces a very legible script.
Your benefits with MultiMark

- Firm hold and durable printing
- Continuous strips save installation time
- Easy mounting thanks to an innovative composite material
- Large label field for optimal legibility
- High flexibility thanks to manufacturer independence

General ordering data

Type	DEK 5/8 MM WS	Version
Order No.	2007130000	Dekafix, Terminal marker, 5 x 8 mm, Weidmueller, white
GTIN (EAN)	4050118392012	
Qty.	500 pc(s).	

W-Series



Weidmüller's range of products includes end brackets that guarantee a permanent, reliable mounting on the terminal rail and prevent sliding. Versions with and without screws are available. The end brackets include marking options, also for group markers, and also a test plug holder.

General ordering data

Type	WEW 35/1	Version
Order No.	1059000000	End bracket, dark beige, TS 35, V-2, Wemid, Width: 12 mm, 100 °C
GTIN (EAN)	4008190172282	
Qty.	50 pc(s).	

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Data sheet

Weidmüller

WPE 35

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Accessories

Blank



WS markers are the perfect match for the W-series connectors. Thanks to their system compatibility, the WS tags can also be used with the I-series and the Z-series. The large marking surfaces do not only permit long character strings but also multi-line text.
WS markers are ideal for labels with long, customised character strings. Thanks to the proven MultiCard format, printing with PrintJet CONNECT oder/or Plotter is possible.
- Can be fitted in strips or individually
- Markers in proven MultiCard format

For custom printing: Please send us a file of our labeling software M-Print PRO or M-Print PRO Online (without installation) for your labeling specifications.

General ordering data

Type	WS 12/5 MC NE WS	Version
Order No.	1609860000	WS, Terminal marker, 12 x 5 mm, Pitch in mm (P): 5.00 Weidmueller,
GTIN (EAN)	4008190203481	Allen-Bradley, white
Qty.	720 pc(s).	

Marker holder



The marker holder offer the possibility of additional mounting of standard markers with a pitch of 5 or 5.1 mm. The angled holders can be optionally snaped together and could be mounted in all standard marking channels of the Klippon® Connect modular terminal blocks. Fitting marker types could be found under the respective accessories of the designation marking holder.

General ordering data

Type	BZT 1 ZA WS 10/5	Version
Order No.	1805520000	Accessories, Marker holder
GTIN (EAN)	4032248270248	
Qty.	100 pc(s).	
Type	BZT 1 WS 10/5	Version
Order No.	1805490000	Accessories, Marker holder
GTIN (EAN)	4032248270231	
Qty.	100 pc(s).	

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Data sheet

Weidmüller

WPE 35

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Accessories

Blank



The Dekafix (DEK) marker is the universal marker for all conductor and plug-in connectors as well as for electronic sub-assemblies. The system is ideal for short number sequences and covers a wide range of ready-printed markers.
Strips for fast installation in only one work step. The printing is easy to read, rich in contrast and available in various widths.

- Large range of ready-to-use markers
- Strips for fast installation
- Terminal markers, suitable for all Weidmüller cable connectors
- Available as blank MultiCard or with standard printing

For custom printing: Please send us a file of our labeling software M-Print PRO or M-Print PRO Online (without installation) for your labeling specifications.

General ordering data

Type	DEK 5/5 MC NE WS	Version
Order No.	1609801044	Dekafix, Terminal marker, 5 x 5 mm, Pitch in mm (P): 5.00
GTIN (EAN)	4008190397111	Weidmueller, white
Qty.	1,000 pc(s).	

W-Series



A partition plate is used for the optical separation of circuits or used for electrical isolation from neighbouring cross-connectors. In contrast to the end plate, the contour can be larger than the adjacent terminal blocks. However, it should not be smaller, as otherwise the required clearance and creepage distances within the application can no longer be maintained.

General ordering data

Type	WTW EN	Version
Order No.	1058800000	Partition plate (terminal), dark beige, Height: 86 mm, Width: 3 mm,
GTIN (EAN)	4008190140175	V-0, Wemid
Qty.	20 pc(s).	

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Weidmüller

Data sheet

WPE 35

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Accessories

PEN bridges



Power feed-in
Our wide range of W-Series terminal blocks with our WPD main line branch terminals, which are optimised to guarantee both convenience and space gains, ensures a secure and convenient connection at the power feed-in.

General ordering data

Type	WQB-PEN 35	Version
Order No.	1060100000	Cross-connector (terminal), when screwed in, Silver grey, 135 A,
GTIN (EAN)	4008190089870	Number of poles: 2, Pitch in mm (P): 16.00, Insulated: No, Width: 24.6
Qty.	10 pc(s).	mm

SchT group marker carrier



The SchT 5 S group tag carriers are clipped directly onto the TS 32 mounting rail (G-rail) or the TS 35 mounting rail (top-hat rail). It is therefore possible to label the terminal strip irrespective of the terminal and the type of terminal. SchT 5 and SchT 5 S are fitted with ESO 5, STR 5 protective strips.
The SchT 7 is a hinged group tag carrier for inlay tags which enables easy access to the clamping screw. The SchT 7 is fitted with ESO 7, STR 7 protective strips or DEK 5.
Inlay tags and protective strips can be found under "Accessories".

General ordering data

Type	SCHT 7	Version
Order No.	0517960000	SCHT, Terminal marker, 39.3 x 8 mm, Pitch in mm (P): 7.00
GTIN (EAN)	4008190001742	Weidmueller, white
Qty.	20 pc(s).	

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1.59 WEIDMULLER 16sqmm EARTH TERMINAL WPE16 DATA SHEET

Data sheet

Weidmüller

WPE 16

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Product image



A protective feed through terminal block is an electrical conductor for the purpose of safety and is used in many applications. To establish the electrical and mechanical connection between copper conductors and the mounting support plate, PE terminal blocks are used. They have one or more contact points for connection with and/or bifurcation of protective earth conductors.

General ordering data

Version	PE terminal, Screw connection, Green/yellow, 16 mm², 1000 V, Number of connections: 2, Number of levels: 1, TS 35, V-0, Wemid
Order No.	1010400000
Type	WPE 16
GTIN (EAN)	4008190126674
Qty.	50 pc(s).

Creation date October 22, 2024 12:02:59 PM CEST

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Data sheet

Weidmüller

WPE 16

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Technical data

Dimensions and weights

Depth	62.5 mm	Depth (inches)	2.461 inch
Depth including DIN rail	63 mm	Height	56 mm
Height (inches)	2.205 inch	Width	11.9 mm
Width (inches)	0.469 inch	Net weight	56.68 g

Temperatures

Storage temperature	-25 °C...55 °C	Operating temperature range	For operating temperature range see EC Design Test Certificate / IEC Ex-Certificate of Conformity
Continuous operating temp., min.	-60 °C	Continuous operating temp., max.	130 °C

Material data

Material	Wemid	Colour	Green/yellow
UL 94 flammability rating	V-0		

Rating data IECEx/ATEX

Certificate No. (ATEX)	DEMKO14ATEX1338U	Certificate No. (IECEX)	IECEXULD14.0005U
Wire cross section max. (ATEX)	16 mm²	Wire cross section max. (IECEX)	16 mm²
Operating temperature range	For operating temperature range see EC Design Test Certificate / IEC Ex-Certificate of Conformity	Marking EN 60079-7	Ex eb II C Gb
Ex 2014/34/EU label	II 2 G D		

System specifications

Version	Screw connection, With PE connection, in closed state	End cover plate required	No
Number of potentials	1	Number of levels	1
Number of clamping points per level	2	Number of potentials per tier	1
Levels cross-connected internally	No	PE connection	Yes
Rail	TS 35	N-function	No
PE function	Yes	PEN function	Yes

Additional technical data

Explosion-tested version	Yes	Installation advice	when screwed in
Interlock	for screw fixing	Number of similar terminals	1
Open sides	closed	Type of mounting	when screwed in

CSA rating data

Certificate No. (CSA)	200039-1888378	Wire cross section max. (CSA)	6 AWG
Wire cross section min. (CSA)	14 AWG		

Conductors for clamping (additional connection)

Connection type, additional connection	Screw connection

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Data sheet

Weidmüller

WPE 16

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Technical data

Conductors for clamping (rated connection)

Blade size	1.0 x 5.5 mm	Clamping range, max.	25 mm²
Clamping range, min.	1.5 mm²	Clamping screw	M 5
Connection cross-section, stranded, max.	25 mm²	Connection cross-section, stranded, min.	1.5 mm²
Connection direction	on side	Gauge to IEC 60947-1	B /
Number of connections	2	Stripping length	16 mm
Tightening torque, max.	3.6 Nm	Tightening torque, min.	2 Nm
Type of connection	Screw connection	Wire connection cross section, finely stranded, max.	25 mm²
Wire connection cross section, finely stranded, min.	1.5 mm²	Wire connection cross-section, finely stranded with wire-end ferrules DIN 46228/1, max.	16 mm²
Wire connection cross-section, finely stranded with wire-end ferrules DIN 46228/1, min.	1.5 mm²	Wire connection cross-section, finely stranded with wire-end ferrules DIN 46228/4, max.	16 mm²
Wire connection cross-section, finely stranded with wire-end ferrules DIN 46228/4, min.	1.5 mm²	Wire connection cross-section, solid core, max.	16 mm²
Wire connection cross-section, solid core, min.	1.5 mm²		

Dimensions

TS 35 offset	32 mm

General

Installation advice	when screwed in	Rail	TS 35
Standards	IEC 60947-7-2		

PE rating data

Rated short-time current	1920 A (16 mm²)	Centre screw on PE terminals	M 4
Tightening torque range for fixing screw	1.2…2.4 Nm	PEN function	Yes

Rating data

Rated cross-section	16 mm²	Rated voltage to adjoining terminal	1,000 V
Rated DC voltage	1,000 V	Standards	IEC 60947-7-2
Volume resistance according to IEC 60947-7-x	0.42 mΩ	Rated impulse withstand voltage to adjacent terminal	8 kV
Power loss in accordance with IEC 60947-7-x	2.43 W	Pollution severity	3

UL rating data

Certificate No. (UR)	E60693	Conductor size Factory wiring max. (UR)	4 AWG
Conductor size Factory wiring min. (UR)	14 AWG	Conductor size Field wiring max. (UR)	4 AWG
Conductor size Field wiring min. (UR)	14 AWG		

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Data sheet

Weidmüller

WPE 16

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Technical data

Classifications

ETIM 6.0	EC000901	ETIM 7.0	EC000901
ETIM 8.0	EC000901	ETIM 9.0	EC000901
ECLASS 9.0	27-14-11-41	ECLASS 9.1	27-14-11-41
ECLASS 10.0	27-14-11-41	ECLASS 11.0	27-14-11-41
ECLASS 12.0	27-14-11-41	ECLASS 13.0	27-25-01-03
ECLASS 14.0	27-25-01-03		

Environmental Product Compliance

RoHS Compliance Status	Compliant without exemption
REACH SVHC	/

Approvals

Approvals

CSAEX CURUSEX ATEX IECEx INMETRO KEMA KEUR KOSHAEX UKCA-EX

ROHS	Conform
UL File Number Search	UL Website
Certificate No. (UR)	E60693
Certificate No. (cURusEX)	E184763

Downloads

Approval/Certificate/Document of Conformity	Attestation of Conformity IECEx Certificate UKCA Ex Attestation of Conformity CB Test Certificate CB Certificate Lloyds Register Certificate POLSKIREJ certificate UKCA Ex Certificate 16-AV4BO-0265U. DNV Certificate CCC Ex Certificate CE Declaration of Conformity ATEX Certificate UKCA declaration of conformity Confirmation of Standards EN 45545-2_2020-10
Engineering Data	CAD data – STEP
User Documentation	NTI WDU/WPE 16.pdf StorageConditionsTerminalBlocks
Catalogues	Catalogues in PDF-format
Brochures	

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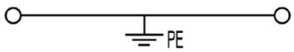
Weidmüller

WPE 16

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Drawings



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Data sheet

Weidmüller

WPE 16

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
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Germany

www.weidmueller.com

Accessories

WS 12/5



WS/ DEK
MultiMark terminal markers use an innovative composite material made from two components. The hard base contour of the marker snaps securely into the connector. The elastic surface finish makes the marker easy to mount. This specially punched material enables the strips to be stretched to accommodate the slight variations in spacing that tend to add up, especially with long terminal blocks. Another advantage: the excellent printability of the surface material guarantees durable and wear-resistant labelling. A print resolution of 300 dpi also produces a very legible script.
Your benefits with MultiMark

- Firm hold and durable printing
- Continuous strips save installation time
- Easy mounting thanks to an innovative composite material
- Large label field for optimal legibility
- High flexibility thanks to manufacturer independence

General ordering data

Type	WS 12/5 MM WS	Version
Order No.	2007190000	WS, Terminal marker, 12 x 5 mm, Weidmueller, white
GTIN (EAN)	4050118392036	
Qty.	800 pc(s).	

Slotted screwdriver



Slotted screwdriver with rounded blade SD DIN 5265, ISO 2380/2, output to DIN 5264, ISO 2380/1. ChromTop tip, SoftFinish grip

General ordering data

Type	SDS 1.0X5.5X150	Version
Order No.	9008350000	Screwdriver, Screwdriver
GTIN (EAN)	4032248056316	
Qty.	1 pc(s).	

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Weidmüller

WPE 16

Weidmüller Interface GmbH & Co. KG
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D-32758 Detmold
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www.weidmueller.com

Accessories

DEK 5/8



WS/ DEK
MultiMark terminal markers use an innovative composite material made from two components. The hard base contour of the marker snaps securely into the connector. The elastic surface finish makes the marker easy to mount. This specially punched material enables the strips to be stretched to accommodate the slight variations in spacing that tend to add up, especially with long terminal blocks. Another advantage: the excellent printability of the surface material guarantees durable and wear-resistant labelling. A print resolution of 300 dpi also produces a very legible script.
Your benefits with MultiMark

- Firm hold and durable printing
- Continuous strips save installation time
- Easy mounting thanks to an innovative composite material
- Large label field for optimal legibility
- High flexibility thanks to manufacturer independence

General ordering data

Type	DEK 5/8 MM WS	Version
Order No.	2007130000	Dekafix, Terminal marker, 5 x 8 mm, Weidmueller, white
GTIN (EAN)	4050118392012	
Qty.	500 pc(s).	

W-Series



Weidmüller's range of products includes end brackets that guarantee a permanent, reliable mounting on the terminal rail and prevent sliding. Versions with and without screws are available. The end brackets include marking options, also for group markers, and also a test plug holder.

General ordering data

Type	WEW 35/1	Version
Order No.	1059000000	End bracket, dark beige, TS 35, V-2, Wemid, Width: 12 mm, 100 °C
GTIN (EAN)	4008190172282	
Qty.	50 pc(s).	

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Data sheet

WPE 16

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Accessories

Blank



WS markers are the perfect match for the W-series connectors. Thanks to their system compatibility, the WS tags can also be used with the I-series and the Z-series. The large marking surfaces do not only permit long character strings but also multi-line text.
WS markers are ideal for labels with long, customised character strings. Thanks to the proven MultiCard format, printing with PrintJet CONNECT oder/or Plotter is possible.
- Can be fitted in strips or individually
- Markers in proven MultiCard format

For custom printing: Please send us a file of our labeling software M-Print PRO or M-Print PRO Online (without installation) for your labeling specifications.

General ordering data

Type	WS 12/5 MC NE WS	Version
Order No.	1609860000	WS. Terminal marker. 12 x 5 mm. Pitch in mm (P): 5.00 Weidmueller.
GTIN (EAN)	4008190203481	Allen-Bradley, white
Qty.	720 pc(s).	

Marker holder



The marker holder offer the possibility of additional mounting of standard markers with a pitch of 5 or 5.1 mm. The angled holders can be optionally snaped together and could be mounted in all standard marking channels of the Klippon® Connect modular terminal blocks. Fitting marker types could be found under the respective accessories of the designation marking holder.

General ordering data

Type	BZT 1 ZA WS 10/5	Version
Order No.	1805520000	Accessories, Marker holder
GTIN (EAN)	4032248270248	
Qty.	100 pc(s).	
Type	BZT 1 WS 10/5	Version
Order No.	1805490000	Accessories, Marker holder
GTIN (EAN)	4032248270231	
Qty.	100 pc(s).	

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Data sheet

Weidmüller

WPE 16

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Accessories

Blank



The Dekafix (DEK) marker is the universal marker for all conductor and plug-in connectors as well as for electronic sub-assemblies. The system is ideal for short number sequences and covers a wide range of ready-printed markers.
Strips for fast installation in only one work step. The printing is easy to read, rich in contrast and available in various widths.

- Large range of ready-to-use markers
- Strips for fast installation
- Terminal markers, suitable for all Weidmüller cable connectors
- Available as blank MultiCard or with standard printing

For custom printing: Please send us a file of our labeling software M-Print PRO or M-Print PRO Online (without installation) for your labeling specifications.

General ordering data

Type	DEK 5/5 MC NE WS	Version
Order No.	1609801044	Dekafix, Terminal marker, 5 x 5 mm, Pitch in mm (P): 5.00
GTIN (EAN)	4008190397111	Weidmueller, white
Qty.	1,000 pc(s).	

ZGB pivotable group tag holder



The ZGB 15 is a hinged group tag carrier. The tag carrier can hold the dekafix 5, WS 12/5 terminal markers or the inlay tag ESO 15.
The ZGB 30 is a hinged group tag carrier. The tag carrier can hold the dekafix 5, WS 12/5 terminal markers or the inlay tag ESO 7.
Inlay tags and protective strips can be found under "Accessories".

General ordering data

Type	ZGB 15	Version
Order No.	1636530000	Terminal markers, Terminal marker, 15 x 7 mm, Pitch in mm (P): 5.00
GTIN (EAN)	4008190297053	Weidmueller, white
Qty.	20 pc(s).	
Type	ZGB 30	Version
Order No.	1611930000	Terminal markers, Terminal marker, 32 x 7 mm, Pitch in mm (P): 5.00
GTIN (EAN)	4008190002251	Weidmueller, white
Qty.	20 pc(s).	

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Weidmüller

WPE 16

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
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www.weidmueller.com

Accessories

W-Series



A partition plate is used for the optical separation of circuits or used for electrical isolation from neighbouring cross-connectors. In contrast to the end plate, the contour can be larger than the adjacent terminal blocks. However, it should not be smaller, as otherwise the required clearance and creepage distances within the application can no longer be maintained.

General ordering data

Type	WTW EN	Version
Order No.	1058800000	Partition plate (terminal), dark beige, Height: 86 mm, Width: 3 mm,
GTIN (EAN)	4008190140175	V-0, Wemid
Qty.	20 pc(s).	

PEN bridges



A PEN bridge joins separate PE and N conductors into one PEN conductor.

General ordering data

Type	WQB-PEN 16	Version
Order No.	1060200000	Cross-connector (terminal), when screwed in, Silver grey, 76 A,
GTIN (EAN)	4008190112653	Number of poles: 2, Pitch in mm (P): 12.00, Insulated: No, Width: 17.6
Qty.	10 pc(s).	mm

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WPE 16

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Accessories

SchT group marker carrier



The SchT 5 S group tag carriers are clipped directly onto the TS 32 mounting rail (G-rail) or the TS 35 mounting rail (top-hat rail). It is therefore possible to label the terminal strip irrespective of the terminal and the type of terminal. SchT 5 and SchT 5 S are fitted with ESO 5, STR 5 protective strips.
The SchT 7 is a hinged group tag carrier for inlay tags which enables easy access to the clamping screw.
The SchT 7 is fitted with ESO 7, STR 7 protective strips or DEK 5.
Inlay tags and protective strips can be found under "Accessories".

General ordering data

Type	SCHT 7	Version
Order No.	0517960000	SCHT, Terminal marker, 39.3 x 8 mm, Pitch in mm (P): 7.00
GTIN (EAN)	4008190001742	Weidmueller, white
Qty.	20 pc(s).	

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1.60 WEIDMULLER 4sqmm EARTH TERMINAL WPE4 DATA SHEET

Data sheet

Weidmüller

WPE 4

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
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Germany

www.weidmueller.com

Product image



A protective feed through terminal block is an electrical conductor for the purpose of safety and is used in many applications. To establish the electrical and mechanical connection between copper conductors and the mounting support plate, PE terminal blocks are used. They have one or more contact points for connection with and/or bifurcation of protective earth conductors.

General ordering data

Version	PE terminal, Screw connection, Green/yellow, 4 mm², 800 V, Number of connections: 2, Number of levels: 1, TS 35, V-0, Wemid
Order No.	1010100000
Type	WPE 4
GTIN (EAN)	4008190039820
Qty.	100 pc(s).

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Data sheet

Weidmüller

WPE 4

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Technical data

Dimensions and weights

Depth	46.5 mm	Depth (inches)	1.831 inch
Depth including DIN rail	47.5 mm	Height	56 mm
Height (inches)	2.205 inch	Width	6.1 mm
Width (inches)	0.24 inch	Net weight	18.5 g

Temperatures

Storage temperature	-25 °C...55 °C	Operating temperature range	For operating temperature range see EC Design Test Certificate / IEC Ex-Certificate of Conformity
Continuous operating temp., min.	-60 °C	Continuous operating temp., max.	130 °C

Material data

Material	Wemid	Colour	Green/yellow
UL 94 flammability rating	V-0		

Rating data IECEx/ATEX

Certificate No. (ATEX)	DEMKO14ATEX1338U	Certificate No. (IECEX)	IECEXULD14.0005U
Wire cross section max. (ATEX)	4 mm²	Wire cross section max. (IECEX)	4 mm²
Operating temperature range	For operating temperature range see EC Design Test Certificate / IEC Ex-Certificate of Conformity	Marking EN 60079-7	Ex eb II C Gb
Ex 2014/34/EU label	II 2 G D		

System specifications

Version	Screw connection, With PE connection, in closed state	End cover plate required	No
Number of potentials	1	Number of levels	1
Number of clamping points per level	2	Number of potentials per tier	1
Levels cross-connected internally	No	PE connection	Yes
Rail	TS 35	N-function	No
PE function	Yes	PEN function	No

Additional technical data

Explosion-tested version	Yes	Installation advice	when screwed in
Interlock	for screw fixing	Number of similar terminals	1
Open sides	closed	Type of mounting	when screwed in

CSA rating data

Certificate No. (CSA)	200039-1888378	Wire cross section max. (CSA)	10 AWG
Wire cross section min. (CSA)	26 AWG		

Conductors for clamping (additional connection)

Connection type, additional connection	Screw connection

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Weidmüller

Data sheet

WPE 4

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

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Technical data

Conductors for clamping (rated connection)

Blade size	0.6 x 3.5 mm	Clamping range, max.	6 mm²
Clamping range, min.	0.13 mm²	Clamping screw	M 3
Connection cross-section, stranded, max.	6 mm²	Connection cross-section, stranded, min.	0.5 mm²
Connection direction	on side	Gauge to IEC 60947-1	A4
Number of connections	2	Stripping length	10 mm
Tightening torque, max.	1 Nm	Tightening torque, min.	0.5 Nm
Torque level with DMS electric screwdriver	2	Type of connection	Screw connection
Wire connection cross section, finely stranded, max.	6 mm²	Wire connection cross section, finely stranded, min.	0.5 mm²
Wire connection cross-section, finely stranded with wire-end ferrules DIN 46228/1, max.	4 mm²	Wire connection cross-section, finely stranded with wire-end ferrules DIN 46228/1, min.	0.5 mm²
Wire connection cross-section, finely stranded with wire-end ferrules DIN 46228/4, max.	4 mm²	Wire connection cross-section, finely stranded with wire-end ferrules DIN 46228/4, min.	0.5 mm²
Wire connection cross-section, solid core, max.	6 mm²	Wire connection cross-section, solid core, min.	0.5 mm²

Dimensions

TS 35 offset	28 mm

General

Installation advice	when screwed in	Rail	TS 35
Standards	IEC 60947-7-2		

PE rating data

Rated short-time current	480 A (4 mm²)	Centre screw on PE terminals	M 2.5
Tightening torque range for fixing screw	0.4...0.8 Nm	PEN function	No

Rating data

Rated cross-section	4 mm²	Rated voltage to adjoining terminal	800 V
Rated DC voltage	800 V	Standards	IEC 60947-7-2
Volume resistance according to IEC 60947-7-x	1 mΩ	Rated impulse withstand voltage to adjacent terminal	8 kV
Power loss in accordance with IEC 60947-7-x	1.02 W	Pollution severity	3

UL rating data

Certificate No. (UR)	E60693	Conductor size Factory wiring max. (UR)	10 AWG
Conductor size Factory wiring min. (UR)	26 AWG	Conductor size Field wiring max. (UR)	10 AWG
Conductor size Field wiring min. (UR)	22 AWG		

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Klingenbergstraße 26
D-32758 Detmold
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Technical data

Classifications

ETIM 6.0	EC000901	ETIM 7.0	EC000901
ETIM 8.0	EC000901	ETIM 9.0	EC000901
ECLASS 9.0	27-14-11-41	ECLASS 9.1	27-14-11-41
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ECLASS 12.0	27-14-11-41	ECLASS 13.0	27-25-01-03
ECLASS 14.0	27-25-01-03		

Environmental Product Compliance

RoHS Compliance Status	Compliant without exemption
REACH SVHC	/

Approvals

Approvals	CSAEX CURUSEX ATEX Exi IECEx INMETRO KEMA KEUR KOSHAEX UKCA-EX
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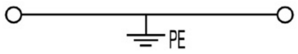
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Data sheet

Weidmüller

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Accessories

2.5-10 mm²



End plates are fitted to the open side of the last modular terminal before the end bracket. The use of an end plate ensures the function of the modular terminal and the specified rated voltage. It guarantees protection against contact with live parts and makes the final terminal finger-proof.

General ordering data

Type	WAP 2.5-10/0.5MM	Version
Order No.	1966380000	End plate (terminals), dark beige, Height: 54.5 mm, Width: 0.35 mm,
GTIN (EAN)	4032248688616	V-0, Wemid
Qty.	50 pc(s).	

Slotted screwdriver



Slotted screwdriver with rounded blade SD DIN 5265, ISO 2380/2, output to DIN 5264, ISO 2380/1. ChromTop tip, SoftFinish grip

General ordering data

Type	SDS 0.6X3.5X100	Version
Order No.	9008330000	Screwdriver, Screwdriver
GTIN (EAN)	4032248056286	
Qty.	1 pc(s).	

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Weidmüller

Data sheet

WPE 4

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Accessories

Blank



The Dekafix (DEK) marker is the universal marker for all conductor and plug-in connectors as well as for electronic sub-assemblies. The system is ideal for short number sequences and covers a wide range of ready-printed markers.
Strips for fast installation in only one work step. The printing is easy to read, rich in contrast and available in various widths.

- Large range of ready-to-use markers
- Strips for fast installation
- Terminal markers, suitable for all Weidmüller cable connectors
- Available as blank MultiCard or with standard printing

For custom printing: Please send us a file of our labeling software M-Print PRO or M-Print PRO Online (without installation) for your labeling specifications.

General ordering data

Type	DEK 5/6 MC NE WS	Version
Order No.	1609820000	Dekafix, Terminal marker, 5 x 6 mm, Pitch in mm (P): 6.00
GTIN (EAN)	4008190203436	Weidmueller, white
Qty.	1,000 pc(s).	

W-Series



Weidmüller's range of products includes end brackets that guarantee a permanent, reliable mounting on the terminal rail and prevent sliding. Versions with and without screws are available. The end brackets include marking options, also for group markers, and also a test plug holder.

General ordering data

Type	WEW 35/2	Version
Order No.	1061200000	End bracket, dark beige, TS 35, HB, Wemid, Width: 8 mm, 100 °C
GTIN (EAN)	4008190030230	
Qty.	50 pc(s).	

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Data sheet

Weidmüller

WPE 4

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Klingenbergstraße 26
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Accessories

Marker holder



The marker holder offer the possibility of additional mounting of standard markers with a pitch of 5 or 5.1 mm. The angled holders can be optionally snaped together and could be mounted in all standard marking channels of the Klippon® Connect modular terminal blocks. Fitting marker types could be found under the respective accessories of the designation marking holder.

General ordering data

Type	BZT 1 ZA WS 10/5	Version
Order No.	1805520000	Accessories, Marker holder
GTIN (EAN)	4032248270248	
Qty.	100 pc(s).	
Type	BZT 1 WS 10/5	Version
Order No.	1805490000	Accessories, Marker holder
GTIN (EAN)	4032248270231	
Qty.	100 pc(s).	

WS 12/6



WS/ DEK
MultiMark terminal markers use an innovative composite material made from two components. The hard base contour of the marker snaps securely into the connector. The elastic surface finish makes the marker easy to mount. This specially punched material enables the strips to be stretched to accommodate the slight variations in spacing that tend to add up, especially with long terminal blocks. Another advantage: the excellent printability of the surface material guarantees durable and wear-resistant labelling. A print resolution of 300 dpi also produces a very legible script.
Your benefits with MultiMark

- Firm hold and durable printing
- Continuous strips save installation time
- Easy mounting thanks to an innovative composite material
- Large label field for optimal legibility
- High flexibility thanks to manufacturer independence

General ordering data

Type	WS 12/6 MM WS	Version
Order No.	2007200000	WS, Terminal marker, 12 x 6 mm, Weidmueller, white
GTIN (EAN)	4050118391886	
Qty.	600 pc(s).	

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Data sheet

Weidmüller

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www.weidmueller.com

Accessories

ZGB pivotable group tag holder



The ZGB 15 is a hinged group tag carrier. The tag carrier can hold the dekafix 5, WS 12/5 terminal markers or the inlay tag ESO 15.
The ZGB 30 is a hinged group tag carrier. The tag carrier can hold the dekafix 5, WS 12/5 terminal markers or the inlay tag ESO 7.
Inlay tags and protective strips can be found under "Accessories".

General ordering data

Type	ZGB 15	Version
Order No.	1636530000	Terminal markers, Terminal marker, 15 x 7 mm, Pitch in mm (P): 5.00
GTIN (EAN)	4008190297053	Weidmueller, white
Qty.	20 pc(s).	
Type	ZGB 30	Version
Order No.	1611930000	Terminal markers, Terminal marker, 32 x 7 mm, Pitch in mm (P): 5.00
GTIN (EAN)	4008190002251	Weidmueller, white
Qty.	20 pc(s).	

W-Series



A partition plate is used for the optical separation of circuits or used for electrical isolation from neighbouring cross-connectors. In contrast to the end plate, the contour can be larger than the adjacent terminal blocks. However, it should not be smaller, as otherwise the required clearance and creepage distances within the application can no longer be maintained.

General ordering data

Type	WTW EN	Version
Order No.	1058800000	Partition plate (terminal), dark beige, Height: 86 mm, Width: 3 mm,
GTIN (EAN)	4008190140175	V-0, Wemid
Qty.	20 pc(s).	

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Accessories

Blank



WS markers are the perfect match for the W-series connectors. Thanks to their system compatibility, the WS tags can also be used with the I-series and the Z-series. The large marking surfaces do not only permit long character strings but also multi-line text.
WS markers are ideal for labels with long, customised character strings. Thanks to the proven MultiCard format, printing with PrintJet CONNECT oder/or Plotter is possible.
- Can be fitted in strips or individually
- Markers in proven MultiCard format

For custom printing: Please send us a file of our labeling software M-Print PRO or M-Print PRO Online (without installation) for your labeling specifications.

General ordering data

Type	WS 12/6 MC NE WS	Version
Order No.	1609900000	WS, Terminal marker, 12 x 6 mm, Pitch in mm (P): 6.00 Weidmueller,
GTIN (EAN)	4008190203467	Allen-Bradley, white
Qty.	600 pc(s).	

DEK 5/6



WS/ DEK
MultiMark terminal markers use an innovative composite material made from two components. The hard base contour of the marker snaps securely into the connector. The elastic surface finish makes the marker easy to mount. This specially punched material enables the strips to be stretched to accommodate the slight variations in spacing that tend to add up, especially with long terminal blocks. Another advantage: the excellent printability of the surface material guarantees durable and wear-resistant labelling. A print resolution of 300 dpi also produces a very legible script.
Your benefits with MultiMark

- Firm hold and durable printing
- Continuous strips save installation time
- Easy mounting thanks to an innovative composite material
- Large label field for optimal legibility
- High flexibility thanks to manufacturer independence

General ordering data

Type	DEK 5/6 MM WS	Version
Order No.	2007120000	Dekafix, Terminal marker, 5 x 6 mm, Weidmueller, white
GTIN (EAN)	4050118392104	
Qty.	600 pc(s).	

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Data sheet

Weidmüller

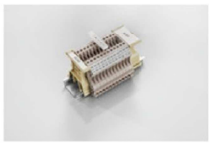
WPE 4

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Accessories

SchT group marker carrier



The SchT 5 S group tag carriers are clipped directly onto the TS 32 mounting rail (G-rail) or the TS 35 mounting rail (top-hat rail). It is therefore possible to label the terminal strip irrespective of the terminal and the type of terminal. SchT 5 and SchT 5 S are fitted with ESO 5, STR 5 protective strips.
The SchT 7 is a hinged group tag carrier for inlay tags which enables easy access to the clamping screw. The SchT 7 is fitted with ESO 7, STR 7 protective strips or DEK 5.
Inlay tags and protective strips can be found under "Accessories".

General ordering data

Type	SCHT 7	Version
Order No.	0517960000	SCHT, Terminal marker, 39.3 x 8 mm, Pitch in mm (P): 7.00
GTIN (EAN)	4008190001742	Weidmueller, white
Qty.	20 pc(s).	

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1.61 WEIDMULLER 2.5sqmm EARTH TERMINAL WPE2.5 DATA SHEET

Data sheet

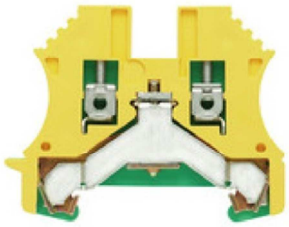
Weidmüller

WPE 2.5

Weidmüller Interface GmbH & Co. KG
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Germany

www.weidmueller.com

Product image



A protective feed through terminal block is an electrical conductor for the purpose of safety and is used in many applications. To establish the electrical and mechanical connection between copper conductors and the mounting support plate, PE terminal blocks are used. They have one or more contact points for connection with and/or bifurcation of protective earth conductors.

General ordering data

Version	PE terminal, Screw connection, Green/yellow, 2.5 mm², 800 V, Number of connections: 2, Number of levels: 1, TS 35, V-0, Wemid
Order No.	1010000000
Type	WPE 2.5
GTIN (EAN)	4008190143640
Qty.	100 pc(s).

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Data sheet

Weidmüller

WPE 2.5

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Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Technical data

Dimensions and weights

Depth	46.5 mm	Depth (inches)	1.831 inch
Depth including DIN rail	47 mm	Height	60 mm
Height (inches)	2.362 inch	Width	5.1 mm
Width (inches)	0.201 inch	Net weight	16.22 g

Temperatures

Storage temperature	-25 °C...55 °C	Operating temperature range	For operating temperature range see EC Design Test Certificate / IEC Ex-Certificate of Conformity
Continuous operating temp., min.	-60 °C	Continuous operating temp., max.	130 °C

Material data

Material	Wemid	Colour	Green/yellow
UL 94 flammability rating	V-0		

Rating data IECEx/ATEX

Certificate No. (ATEX)	DEMKO14ATEX1338U	Certificate No. (IECEX)	IECEXULD14.0005U
Wire cross section max. (ATEX)	2.5 mm²	Wire cross section max. (IECEX)	2.5 mm²
Operating temperature range	For operating temperature range see EC Design Test Certificate / IEC Ex-Certificate of Conformity	Marking EN 60079-7	Ex eb II C Gb
Ex 2014/34/EU label	II 2 G D		

System specifications

Version	Screw connection, With PE connection, One end without connector	End cover plate required	Yes
Number of potentials	1	Number of levels	1
Number of clamping points per level	2	Number of potentials per tier	1
Levels cross-connected internally	No	PE connection	Yes
Rail	TS 35	N-function	No
PE function	Yes	PEN function	No

Additional technical data

Explosion-tested version	Yes	Installation advice	when screwed in
Interlock	for screw fixing	Number of similar terminals	1
Open sides	right	Type of mounting	when screwed in

CSA rating data

Certificate No. (CSA)	200039-1888378	Wire cross section max. (CSA)	12 AWG
Wire cross section min. (CSA)	26 AWG		

Conductors for clamping (additional connection)

Connection type, additional connection	Screw / solder connection

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Data sheet

Weidmüller

WPE 2.5

Weidmüller Interface GmbH & Co. KG
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Germany

www.weidmueller.com

Technical data

Conductors for clamping (rated connection)

Blade size	0.6 x 3.5 mm	Clamping range, max.	4 mm²
Clamping range, min.	0.05 mm²	Clamping screw	M 2.5
Connection cross-section, stranded, max.	4 mm²	Connection cross-section, stranded, min.	0.5 mm²
Connection direction	top	Gauge to IEC 60947-1	A3
Number of connections	2	Stripping length	10 mm
Tightening torque, max.	0.6 Nm	Tightening torque, min.	0.4 Nm
Torque level with DMS electric screwdriver	1	Type of connection	Screw connection
Wire connection cross section AWG, max.	AWG 12	Wire connection cross section AWG, min.	AWG 30
Wire connection cross section, finely stranded, max.	4 mm²	Wire connection cross section, finely stranded, min.	0.5 mm²
Wire connection cross-section, finely stranded with wire-end ferrules DIN 46228/1, max.	2.5 mm²	Wire connection cross-section, finely stranded with wire-end ferrules DIN 46228/1, min.	0.5 mm²
Wire connection cross-section, finely stranded with wire-end ferrules DIN 46228/4, max.	2.5 mm²	Wire connection cross-section, finely stranded with wire-end ferrules DIN 46228/4, min.	0.5 mm²
Wire connection cross-section, solid core, max.	4 mm²	Wire connection cross-section, solid core, min.	0.5 mm²

Dimensions

TS 35 offset	32 mm

General

Installation advice	when screwed in	Rail	TS 35
Standards	IEC 60947-7-2	Wire connection cross section AWG, max.	AWG 12
Wire connection cross section AWG, min.	AWG 30		

PE rating data

Rated short-time current	300 A (2.5 mm²)	Centre screw on PE terminals	M 2.5
Tightening torque range for fixing screw	0.4...0.8 Nm	PEN function	No

Rating data

Rated cross-section	2.5 mm²	Rated voltage to adjoining terminal	800 V
Rated DC voltage	800 V	Standards	IEC 60947-7-2
Volume resistance according to IEC 60947-7-x	1.33 mΩ	Rated impulse withstand voltage to adjacent terminal	8 kV
Power loss in accordance with IEC 60947-7-x	0.77 W	Pollution severity	3

UL rating data

Certificate No. (UR)	E60693	Conductor size Factory wiring max. (UR)	12 AWG
Conductor size Factory wiring min. (UR)	26 AWG	Conductor size Field wiring max. (UR)	12 AWG
Conductor size Field wiring min. (UR)	22 AWG		

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Data sheet

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Technical data

Classifications

ETIM 6.0	EC000901	ETIM 7.0	EC000901
ETIM 8.0	EC000901	ETIM 9.0	EC000901
ECLASS 9.0	27-14-11-41	ECLASS 9.1	27-14-11-41
ECLASS 10.0	27-14-11-41	ECLASS 11.0	27-14-11-41
ECLASS 12.0	27-14-11-41	ECLASS 13.0	27-25-01-03
ECLASS 14.0	27-25-01-03		

Environmental Product Compliance

RoHS Compliance Status	Compliant without exemption
REACH SVHC	/

Approvals

Approvals

CSAEX CURUSEX ATEX DNV Exi IECEx INMETRO KEMA KEUR KOSHAEX APPROVED UKCA-EX

ROHS	Conform
UL File Number Search	UL Website
Certificate No. (UR)	E60693
Certificate No. (cURusEX)	E184763

Downloads

Approval/Certificate/Document of Conformity	Attestation of Conformity IECEx Certificate UKCA Ex Attestation of Conformity CB Test Certificate CB Certificate Lloyds Register Certificate POLSKIREJ certificate UKCA Ex Certificate 16-AV4BO-0265U DNV Certificate CCC Ex Certificate CE Declaration of Conformity ATEX Certificate UKCA declaration of conformity Confirmation of Standards EN 45545-2_2020-10
Engineering Data	CAD data – STEP
User Documentation	NTI WDU/WPE 2.5.pdf Beipackzettel_WPE_2.5.pdf StorageConditionsTerminalBlocks
Catalogues	Catalogues in PDF-format
Brochures	

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Data sheet

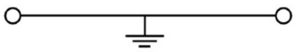
Weidmüller

WPE 2.5

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Drawings



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Data sheet

Weidmüller

WPE 2.5

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www.weidmueller.com

Accessories

2.5-10 mm²



End plates are fitted to the open side of the last modular terminal before the end bracket. The use of an end plate ensures the function of the modular terminal and the specified rated voltage. It guarantees protection against contact with live parts and makes the final terminal finger-proof.

General ordering data

Type	WAP 2.5-10	Version
Order No.	1050000000	End plate (terminals), dark beige, Height: 56 mm, Width: 1.5 mm, V-0,
GTIN (EAN)	4008190103149	Wemid
Qty.	50 pc(s).	
Type	WAP 2.5-10/0.5MM	Version
Order No.	1966380000	End plate (terminals), dark beige, Height: 54.5 mm, Width: 0.35 mm,
GTIN (EAN)	4032248688616	V-0, Wemid
Qty.	50 pc(s).	

WS 12/5



WS/ DEK
MultiMark terminal markers use an innovative composite material made from two components. The hard base contour of the marker snaps securely into the connector. The elastic surface finish makes the marker easy to mount. This specially punched material enables the strips to be stretched to accommodate the slight variations in spacing that tend to add up, especially with long terminal blocks. Another advantage: the excellent printability of the surface material guarantees durable and wear-resistant labelling. A print resolution of 300 dpi also produces a very legible script.

Your benefits with MultiMark

- Firm hold and durable printing
- Continuous strips save installation time
- Easy mounting thanks to an innovative composite material
- Large label field for optimal legibility
- High flexibility thanks to manufacturer independence

General ordering data

Type	WS 12/5 MM WS	Version
Order No.	2007190000	WS, Terminal marker, 12 x 5 mm, Weidmueller, white
GTIN (EAN)	4050118392036	
Qty.	800 pc(s).	

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Data sheet

Weidmüller

WPE 2.5

Weidmüller Interface GmbH & Co. KG
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Germany

www.weidmueller.com

Accessories

Slotted screwdriver



Slotted screwdriver with rounded blade SD DIN 5265, ISO 2380/2, output to DIN 5264, ISO 2380/1. ChromTop tip, SoftFinish grip

General ordering data

Type	SDS 0.6X3.5X100	Version
Order No.	9008330000	Screwdriver, Screwdriver
GTIN (EAN)	4032248056286	
Qty.	1 pc(s).	

DEK 5/8



WS/ DEK
MultiMark terminal markers use an innovative composite material made from two components. The hard base contour of the marker snaps securely into the connector. The elastic surface finish makes the marker easy to mount. This specially punched material enables the strips to be stretched to accommodate the slight variations in spacing that tend to add up, especially with long terminal blocks. Another advantage: the excellent printability of the surface material guarantees durable and wear-resistant labelling. A print resolution of 300 dpi also produces a very legible script.

Your benefits with MultiMark

- Firm hold and durable printing
- Continuous strips save installation time
- Easy mounting thanks to an innovative composite material
- Large label field for optimal legibility
- High flexibility thanks to manufacturer independence

General ordering data

Type	DEK 5/8 MM WS	Version
Order No.	2007130000	Dekafix, Terminal marker, 5 x 8 mm, Weidmueller, white
GTIN (EAN)	4050118392012	
Qty.	500 pc(s).	

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Data sheet

Weidmüller

WPE 2.5

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Accessories

W-Series



Weidmüller's range of products includes end brackets that guarantee a permanent, reliable mounting on the terminal rail and prevent sliding. Versions with and without screws are available. The end brackets include marking options, also for group markers, and also a test plug holder.

General ordering data

Type	WEW 35/2	Version
Order No.	1061200000	End bracket, dark beige, TS 35, HB, Wemid, Width: 8 mm, 100 °C
GTIN (EAN)	4008190030230	
Qty.	50 pc(s).	

Blank



WS markers are the perfect match for the W-series connectors. Thanks to their system compatibility, the WS tags can also be used with the I-series and the Z-series. The large marking surfaces do not only permit long character strings but also multi-line text.
WS markers are ideal for labels with long, customised character strings. Thanks to the proven MultiCard format, printing with PrintJet CONNECT oder/or Plotter is possible.

- Can be fitted in strips or individually
- Markers in proven MultiCard format

For custom printing: Please send us a file of our labeling software M-Print PRO or M-Print PRO Online (without installation) for your labeling specifications.

General ordering data

Type	WS 12/5 MC NE WS	Version
Order No.	1609860000	WS, Terminal marker, 12 x 5 mm, Pitch in mm (P): 5.00 Weidmueller,
GTIN (EAN)	4008190203481	Allen-Bradley, white
Qty.	720 pc(s).	

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Weidmüller

Data sheet

WPE 2.5

Weidmüller Interface GmbH & Co. KG
Klingenbergstraße 26
D-32758 Detmold
Germany

www.weidmueller.com

Accessories

Marker holder



The marker holder offer the possibility of additional mounting of standard markers with a pitch of 5 or 5.1 mm. The angled holders can be optionally snaped together and could be mounted in all standard marking channels of the Klippon® Connect modular terminal blocks. Fitting marker types could be found under the respective accessories of the designation marking holder.

General ordering data

Type	BZT 1 ZA WS 10/5	Version
Order No.	1805520000	Accessories, Marker holder
GTIN (EAN)	4032248270248	
Qty.	100 pc(s).	

Type	BZT 1 WS 10/5	Version
Order No.	1805490000	Accessories, Marker holder
GTIN (EAN)	4032248270231	
Qty.	100 pc(s).	

Blank



The Dekafix (DEK) marker is the universal marker for all conductor and plug-in connectors as well as for electronic sub-assemblies. The system is ideal for short number sequences and covers a wide range of ready-printed markers.
Strips for fast installation in only one work step. The printing is easy to read, rich in contrast and available in various widths.

- Large range of ready-to-use markers
- Strips for fast installation
- Terminal markers, suitable for all Weidmüller cable connectors
- Available as blank MultiCard or with standard printing

For custom printing: Please send us a file of our labeling software M-Print PRO or M-Print PRO Online (without installation) for your labeling specifications.

General ordering data

Type	DEK 5/5 MC NE WS	Version
Order No.	1609801044	Dekafix, Terminal marker, 5 x 5 mm, Pitch in mm (P): 5.00
GTIN (EAN)	4008190397111	Weidmueller, white
Qty.	1,000 pc(s).	

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Data sheet

Weidmüller

WPE 2.5

Weidmüller Interface GmbH & Co. KG
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D-32758 Detmold
Germany

www.weidmueller.com

Accessories

ZGB pivotable group tag holder



The ZGB 15 is a hinged group tag carrier. The tag carrier can hold the dekafix 5, WS 12/5 terminal markers or the inlay tag ESO 15.
The ZGB 30 is a hinged group tag carrier. The tag carrier can hold the dekafix 5, WS 12/5 terminal markers or the inlay tag ESO 7.
Inlay tags and protective strips can be found under "Accessories".

General ordering data

Type	ZGB 15	Version
Order No.	1636530000	Terminal markers, Terminal marker, 15 x 7 mm, Pitch in mm (P): 5.00
GTIN (EAN)	4008190297053	Weidmueller, white
Qty.	20 pc(s).	
Type	ZGB 30	Version
Order No.	1611930000	Terminal markers, Terminal marker, 32 x 7 mm, Pitch in mm (P): 5.00
GTIN (EAN)	4008190002251	Weidmueller, white
Qty.	20 pc(s).	

W-Series



A partition plate is used for the optical separation of circuits or used for electrical isolation from neighbouring cross-connectors. In contrast to the end plate, the contour can be larger than the adjacent terminal blocks. However, it should not be smaller, as otherwise the required clearance and creepage distances within the application can no longer be maintained.

General ordering data

Type	WTW EN	Version
Order No.	1058800000	Partition plate (terminal), dark beige, Height: 86 mm, Width: 3 mm,
GTIN (EAN)	4008190140175	V-0, Wemid
Qty.	20 pc(s).	

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Data sheet

Weidmüller

WPE 2.5

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www.weidmueller.com

Accessories

SchT group marker carrier



The SchT 5 S group tag carriers are clipped directly onto the TS 32 mounting rail (G-rail) or the TS 35 mounting rail (top-hat rail). It is therefore possible to label the terminal strip irrespective of the terminal and the type of terminal. SchT 5 and SchT 5 S are fitted with ESO 5, STR 5 protective strips.
The SchT 7 is a hinged group tag carrier for inlay tags which enables easy access to the clamping screw.
The SchT 7 is fitted with ESO 7, STR 7 protective strips or DEK 5.
Inlay tags and protective strips can be found under "Accessories".

General ordering data

Type	SCHT 7	Version
Order No.	0517960000	SCHT, Terminal marker, 39.3 x 8 mm, Pitch in mm (P): 7.00
GTIN (EAN)	4008190001742	Weidmueller, white
Qty.	20 pc(s).	

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1.62 TECHNOR EX-d COMPONENTS DATA SHEET

FLAMEPROOF

Ex d components are available in a wide range of operators/pilot lights PL series and selectors PSRC series; allow numerous combinations with our CP../CPS.. EFDCN/EFSRC series.

PL.. series includes standard push buttons, emergency push buttons, key selector switches, pilot lights; mechanical operators allow the assembling of a maximum of four contacts.

PSRC.. series includes on-load switches, change over switches, step switches and selector customized upon request on the base of customer specification.

SPARES & ACCESSORIES

IP rating	IP66/IP67
Ambient temperature range	-50°C to +60°C
Approvals	IMQ 09ATEX0019U
Marking	II 2 GD Ex d IIC Ex tD A21 IP66/IP67
Barrel thread	Metric M32x1,5
Option	Version with AISI 316 L external hexagonal ring



PL.. Series momentary push buttons

CODE SPARE PART	CODE COMPONENT CERTIFICATE	TYPE	COLOUR	WEIGHT (Kg)
B130210100021	B131210100020	PLA-10 PUSH BUTTON	BLACK	0.15
B130210200021	B131210B00020	PLA-20 PUSH BUTTON	RED	0.15
B130210300021	B131210300020	PLA-30 PUSH BUTTON	GREEN	0.15
B130210400021	B131210400020	PLA-40 PUSH BUTTON	BLUE	0.15
B130210500021	B131210500020	PLA-50 PUSH BUTTON	YELLOW	0.15
B130210600021	B131210600020	PLA-60 PUSH BUTTON	WHITE	0.15

Contacts are not included



PL.. Series lockable momentary push buttons

CODE SPARE PART	CODE COMPONENT CERTIFICATE	TYPE	COLOUR	WEIGHT (Kg)
B130220100021	B131220100020	PLB-10 PIN-LOCKABLE PUSH BUTTON	BLACK	0.18
B130220200021	B131220200020	PLB-20 PIN-LOCKABLE PUSH BUTTON	RED	0.18
B130220300021	B131220300020	PLB-30 PIN-LOCKABLE PUSH BUTTON	GREEN	0.18

Contacts are not included

104 technor.com





PL.. Series Mushroom push buttons

CODE SPARE PART	CODE COMPONENT CERTIFICATE	TYPE	COLOUR	WEIGHT (Kg)
B130230200021	B131230200020	PLC-S NC/NO MUSHROOM PUSH BUTTON TWIST TO RELEASE	RED	0.21
B130231200021	B131231200020	PLC-S NO/NO MUSHROOM PUSH BUTTON TWIST TO RELEASE	RED	0.21
B130232200021	B131232200020	PLC-S NC/NC MUSHROOM PUSH BUTTON TWIST TO RELEASE	RED	0.21
B130240200021	B131240200020	PLC-S-F NC/NO MUSHROOM PUSH BUTTON WITH KEY	RED	0.15
B130241200021	B131241200020	PLC-S-F NC/NC MUSHROOM PUSH BUTTON WITH KEY	RED	0.15
B130242200021	B131242200020	PLC-S-F NO/NO MUSHROOM PUSH BUTTON WITH KEY	RED	0.15
B130250200021	B131250200020	PLC-I MOMENTARY MUSHROOM PUSH BUTTON	RED	0.15

Contacts are not included



PL.. Series Key selector switches

CODE SPARE PART	CODE COMPONENT CERTIFICATE	TYPE	KEY WITHDRAWAL	WEIGHT (Kg)
B130270100021	B131270100020	PLF-10 NO/NC - KEY SELECTOR SWITCH	0	0.20
B130271100021	B131271100020	PLF-10 NO/NO - KEY SELECTOR SWITCH	0	0.20
B130272100021	B131272100020	PLF-10 NC/NC - KEY SELECTOR SWITCH	0	0.20
B130270200021	B131270200020	PLF-10 NO/NC - KEY SELECTOR SWITCH	0-1	0.20
B130271200021	B131271200020	PLF-10 NO/NO - KEY SELECTOR SWITCH	0-1	0.20
B130272200021	B131272200020	PLF-10 NC/NC - KEY SELECTOR SWITCH	0-1	0.20

Contacts are not included





PL.. Series mechanical operators

CODE SPARE PART	CODE COMPONENT CERTIFICATE	TYPE	COLOUR	WEIGHT (Kg)
B130280210021	B131280210020	PLC-RIP - RESTORE PB M32X1,5	BLACK	0.10
B130280220021	B131280220020	PLC-RIP - RESTORE PB M32X1,5	RED	0.10
B130280230021	B131280230020	PLC-RIP - RESTORE PB M32X1,5	GREEN	0.10
B130280100021	B131280100020	PLC-R - RESET PB M12X1,75	-	0.10

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PL.. Series Contacts

CODE	TYPE	WEIGHT (Kg)
B130700099000	NC CONTACT - PL.. SERIES	0.006
B130700100000	NO CONTACT - PL.. SERIES	0.006



Rated insulated voltage: 660 V AC/DC
Rated thermal current (ith): 6 A
Rated output power:

CAT AC15											CAT DC13						
Tension Ue	V	24	48	60	110	220	380	400	500	600	Tension Ue	V	24	48	60	110	220
Current Ie	A	10	8	6	6	3	2	1,5	1,5	1,2	Current Ie	A	2,5	1,4	1	0,6	0,3



PL.. Series Pilot lights

CODE SPARE PART	CODE COMPONENT CERTIFICATE	TYPE	COLOUR
B130260100021	B131260A00020	PLD-10 PILOT LIGHT	WHITE
B130260200021	B131260200020	PLD-20 PILOT LIGHT	RED
B130260300021	B131260300020	PLD-30 PILOT LIGHT	GREEN
B130260400021	B131260400020	PLD-40 PILOT LIGHT	YELLOW
B130260500021	B131260500020	PLD-50 PILOT LIGHT	BLUE

Suitable for LED lamp 3W max. or incandescent lamp 5W max., Vmax.DC 220V, Vmax.AC 380V

PL.. series Lamps



CODE	TYPE	VOLTAGE	COLOUR
B130700025000	LED LAMP 12V-R	12V	RED
B130700026000	LED LAMP 12V-V		GREEN
B130700027000	LED LAMP 12V-G		YELLOW
B130700028000	LED LAMP 12V-B		WHITE
B130700030000	LED LAMP 24V-R	24V	RED
B130700029000	LED LAMP 24V-V		GREEN
B130700031000	LED LAMP 24V-G		YELLOW
B130700032000	LED LAMP 24V-B		WHITE
B130700291000	LED LAMP 24V-BL		BLUE
B130700043000	LED LAMP 48V-R	48V	RED
B130700042000	LED LAMP 48V-V		GREEN
B130700044000	LED LAMP 48V-G		YELLOW
B130700041000	LED LAMP 48V-B		WHITE
B130700033000	LED LAMP 110V-R	110V	RED
B130700034000	LED LAMP 110V-V		GREEN
B130700035000	LED LAMP 110V-G		YELLOW
B130700036000	LED LAMP 110V-B		WHITE
B130700045000	LED LAMP 110V-BL		BLUE
B130700037000	LED LAMP 220V-R	220V	RED
B130700038000	LED LAMP 220V-V		GREEN
B130700039000	LED LAMP 220V-G		YELLOW
B130700040000	LED LAMP 220V-B		WHITE
B130700333000	LED LAMP 220V-BL		BLUE
B130700359000	LED LAMP 400V-R	400V	RED
B130700358000	LED LAMP 400V-V		GREEN
B130700360000	LED LAMP 400V-G		YELLOW
B130700350000	LED LAMP 400V-B		WHITE
B130700361000	LED LAMP 400V-BL		BLUE

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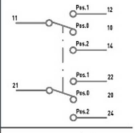
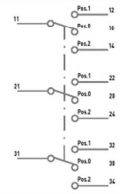
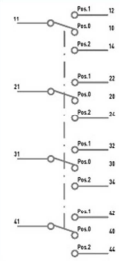


PSRC.. Series On-load switches

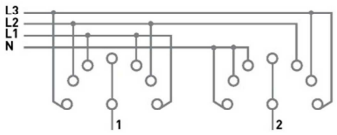
CODE SPARE PART	CODE COMPONENT CERTIFICATE	TYPE	N° OF POLES	AMPERE A	WEIGHT (Kg)	DIAGRAM
B130311200001	B131311200001	PSRC-120 - ON LOAD SWITCH	1	20	0.13	
B130312200001	B131312200001	PSRC-220 - ON LOAD SWITCH	2	20	0.16	
B130313200001	B131313200001	PSRC-320 - ON LOAD SWITCH	3	20	0.20	
B130314200001	B131314200001	PSRC-420 - ON LOAD SWITCH	4	20	0.20	
B130311320001	B131311320001	PSRC-132 - ON LOAD SWITCH	1	32	0.20	
B130312320001	B131312320001	PSRC-232 - ON LOAD SWITCH	2	32	0.20	
B130313320001	B131313320001	PSRC-332 - ON LOAD SWITCH	3	32	0.25	
B130314320001	B131314320001	PSRC-432 - ON LOAD SWITCH	4	32	0.25	

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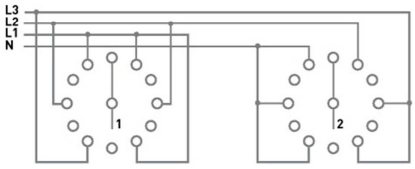
PSRC.. Series Step switch

CODE SPARE PART	CODE COMPONENT CERTIFICATE	TYPE	N° OF POLES	AMPERE A	WEIGHT (Kg)	DIAGRAM
B130321200001	B131321200001	PSRC-C 120 - STEP SWITCH	1	20	0.13	
B130322200001	B131322200001	PSRC-C 220 - STEP SWITCH	2	20	0.20	
B130323200001	B131323200001	PSRC-C 320 - STEP SWITCH	3	20	0.25	
B130324200001	B131324200001	PSRC-C 420 - STEP SWITCH	4	20	0.30	
B13035B000001	B13135B000001	PSRC-C VOLTMETER 7 POS.	-	-		SEE BELOW
B13035C000001	B13135C000001	PSRC-C VOLTMETER 12 POS.	-	-		SEE BELOW
B13034A000001	B13134A000001	PSRC-C AMPERMETER 4 POS.	-	-		SEE BELOW

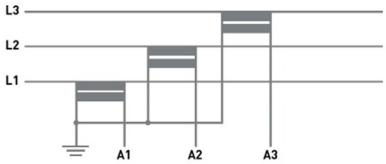
Voltmeter selector switch 7 pos.

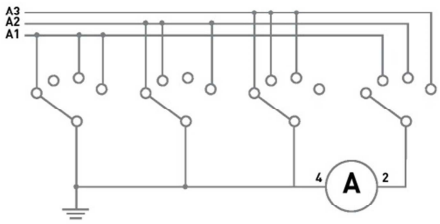


Voltmeter selector switch 12 pos.



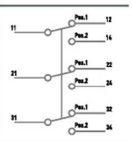
Ammeter selector switch 4 pos.





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PSRC.. Series Change-over switch

CODE SPARE PART	CODE COMPONENT CERTIFICATE	TYPE	N° OF POLES	AMPERE A	WEIGHT (Kg)	DIAGRAM
B130331200001	B131331200001	PSRC-D 120 - CHANGE OVER SWITCH	1	20	0.13	
B130332200001	B131332200001	PSRC-D 220 - CHANGE OVER SWITCH	2	20	0.20	
B130333200001	B131333200001	PSRC-D 320 - CHANGE OVER SWITCH	3	20	0.25	

PSRC Series Rated operational characteristic

AMPERE A	AC-1 IE MAX. (A)	AC-3 Ie MAX. (A)	AC-11 Ie MAX. (A)	Ui max. (V)
20	25	12	9	690
32	36	22	16	690

Special versions can be manufactured upon request. For further information contact our Sales Office.

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