Base Load Power Hub (BLPH)

FIRE AND GAS FIELD EQUIPMENT

TECHNICAL OPERATING AND MAINTENANCE MANUAL

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Revision / Change Log

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SMOKE DETECTOR

POS.	TAG NUMBER	SERVICE
1	950-SDZ-04201	FZ-04 B-400 HVAC AIR INTAKE
2	950-SDZ-04202	FZ-04 B-400 HVAC AIR INTAKE
3	950-SDZ-04203	FZ-04 B-400 HVAC AIR INTAKE
4	950-SDZ-04207	FZ-04 B-300 HVAC AIR INTAKE
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24	950-SDZ-06206	FZ-06 B-100 AMBIENT

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MR601TEx INTRINSICALLY SAFE ENHANCED OPTICAL SMOKE DETECTOR

PRODUCT APPLICATION AND DESIGN INFORMATION

1. INTRODUCTION

The MR601TEx Intrinsically Safe High Performance Optical Smoke Detector forms part of the M600Ex series of plug in detectors for ceiling mounting. The detector plugs into the 5BEx 5" Universal IS Base and is intended for two-wire operation on the majority of the control equipment currently manufactured by the company. The Intrinsically Safe High Performance Optical detector is available in one sensitivity setting only.

2. INTRINSIC SAFETY

The detectors are for use in potentially explosive gas and dust atmospheres (zone 0 gas, zone 20 dust).

The detectors are designed to comply with EN/IEC 60079-0:2006, EN/IEC 60079-11:2007 and EN/IEC61241-11:2006 for Intrinsically Safe apparatus. They are certified:

ATEX code:	**II 1 GD** CE 1180
Certificate:	**BAS01ATEX1134X**
Gas/Dust code:	**Ex ia IIC T5** **Ex iaD 20 T100°C**
IECEx Certificate:	**IECEx BAS 07.0056X**

These detectors are designed and manufactured to protect against other hazards as defined in paragraph 1.2.7 of Annex II of the ATEX Directive 94/9/EC.

2.1 DETECTOR USE

It is recommended that the detector is used in conjunction with a suitable isolator or shunt diode safety barrier in a certified Intrinsically Safe system, ie, System 620.

2.2 SPECIAL CONDITIONS OF SAFE USE

The apparatus has a plastic enclosure which constitutes a potential electrostatic hazard. The enclosure must be cleaned only with a damp cloth.

3. OPERATING PRINCIPLE

The MR601TEx operates by sensing the optical scatter from smoke particles generated in a fire. While the optical scatter detector can give good detection performance for the majority of fires, some fast burning fires produce little visible smoke and some produce very black smoke, neither of which are easily detected by the optical scatter detector. (Such fires are represented in EN54-7 by Polyurethane and Heptane type fires respectively). These fires do, however, produce high heat outputs with an associated rise in air temperature.

The detector has been designed to offer improved detection of such fires, by detecting the rapid rate-of-rise of air temperature and under these conditions, increasing the smoke detection sensitivity. This gives an earlier detection of such fires and a broader detection capability than a standard detector.

The MR601TEx detector has two sensing systems as follows:

- An optical chamber with associated electronics to measure the presence of smoke by light scatter.
- A thermistor with its associated electronics to detect the presence of hot air draughts or high temperatures.

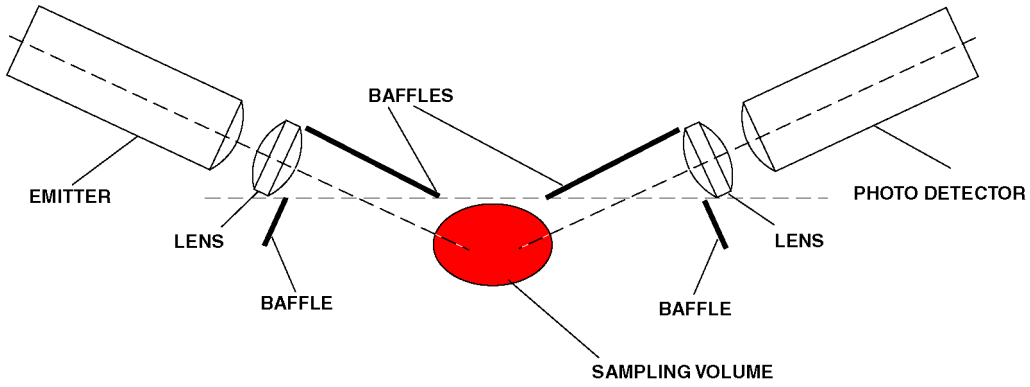


Fig. 1 Optical System Schematic

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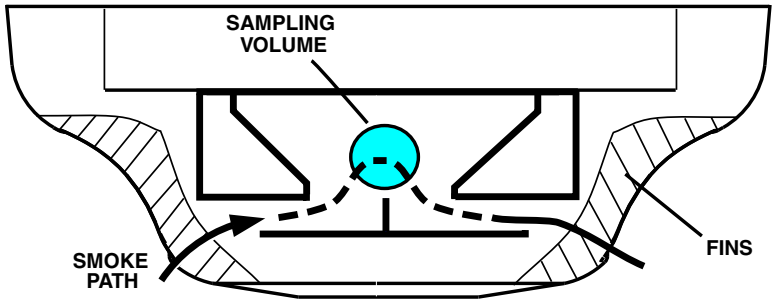


Fig. 2 Measuring Chamber Showing Smoke Flow Path

3.1 OPTICAL SYSTEM

The MR601TEx detects visible particles produced in fires by using the light scattering properties of the particles. The detector uses the optical arrangement shown diagrammatically in Fig. 1.

The optical system consists of an infra-red emitter and receiver, with a lens in front of each, so arranged that their optical axes cross in the sampling volume. The emitter, with its lens, produces a narrow beam of light which is prevented from reaching the receiver by the baffles. When smoke is present in the sampling volume a proportion of the light is scattered, some of which reaches the receiver. For a given type of smoke, the light reaching the photodetector is proportional to the smoke density. The amplified output from the sensor can be used to activate an alarm circuit at a predetermined threshold.

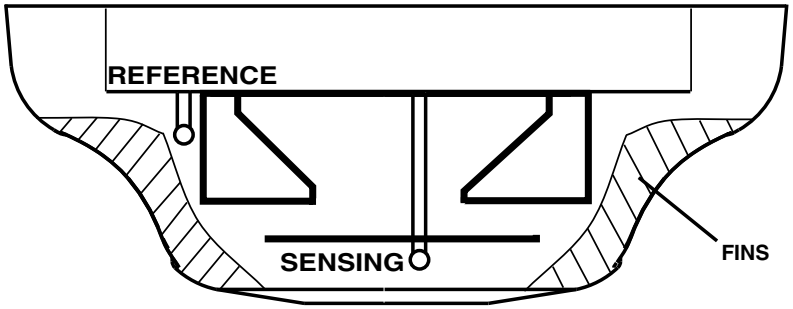


Fig. 3 Thermal Measuring System

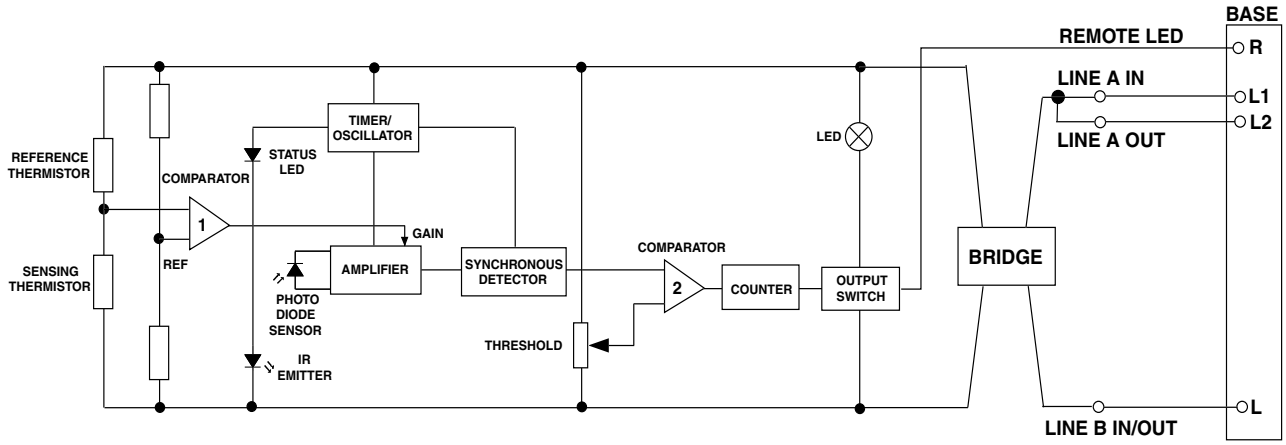


Fig. 4 Block Schematic of Detector

3.2 FEATURES OF MEASURING CHAMBER

The MR601TEx uses vertical chevrons to exclude ambient light.

Smoke incident on the detector is channelled into the detector by the outer cover fins (Fig. 2) and passes through the vertical chevrons. The smoke is deflected into the optical chamber and through the sampling volume before passing out the other side of the detector.

The emitter (Fig. 1) is a GaAlAs solid state type operating in the near infra-red (880nm peak), while the detector is a matched silicon photodiode. These devices, together with their associated lenses, are held in place by the chamber mouldings. The design of the optical system is such that the presence of small insects such as thrips, should not cause false alarms.

3.3 THERMAL MEASURING SYSTEM

Refer to Fig. 3.

This is designed to detect the presence of horizontally moving hot air draughts moving across the ceiling which occur in a fast burning fire.

The measuring system consists of two fast responding negative temperature thermistors. A sensing thermistor is located above the labyrinth under the cover in the airstream and will detect any sudden changes in the air temperature or draughts of hot air moving across the ceiling. The second thermistor is located out of the airflow within the smoke labyrinth and has a longer time constant and is used as a temperature reference to compare the sensing thermistor against. At a given temperature differential between the two thermistors, the comparator will switch and increase the gain of the amplifier, thereby increasing the sensitivity of the sensor. Fins located on the top of the labyrinth are designed to increase air turbulence and the efficiency of the sensing thermistor.

3.4 CIRCUIT OPERATIONS

A simplified block schematic of the detector is given in Fig. 4.

The emitter is subjected to a pulse stream only every 10s in order to reduce the quiescent current. The pulse signal received by the photodiode is fed to a high-gain amplifier. If smoke is present, the pulse signal received varies in proportion to the smoke density.

The amplifier output is fed via an integrator, the output of which is compared to a preset threshold level. Sophisticated synchronous detection techniques are used to reduce the effects of noise and spurious transients.

The gain of the front end amplifier is controlled by the thermistor bridge circuit. When the temperature differential between the two thermistors exceeds a certain value, the amplifier gain increases. Under these conditions the High Performance Optical detector is more sensitive to the presence of smoke and is said to be in 'Enhanced Mode'.

When the detector is in the 'Enhanced Mode', the detector will only alarm if a smoke signal is present. The presence of rising temperature alone cannot cause an alarm.

If the signal amplitude exceeds a threshold level, then the emitter samples the smoke every two seconds. The sample period remains at two seconds if the signal is above the threshold. When the counter has counted three consecutive pulses above the threshold, the output stage is latched into the alarm condition. If however, the amplitude of the second or third pulse is below the threshold, then the pulse period reverts to 10 seconds and the counter resets. The switching of the output stage lights the alarm LED and provides drive for the remote LED indicator.

The critical front end of the circuit is run off a 12V regulator to make it independent of supply voltage.

The detector is polarity conscious.

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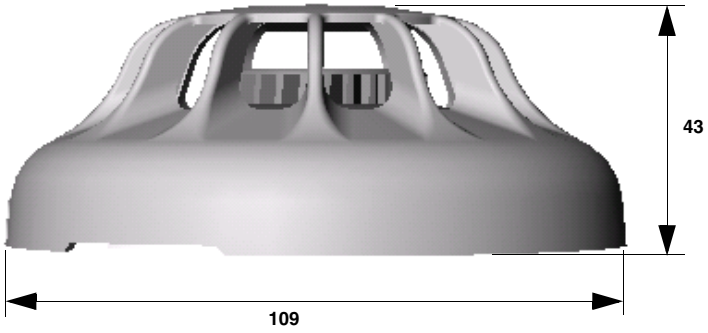


Fig. 5 Overall Dimensions of MR601TEx

3.5 WIRING

Loop cabling is connected to base terminals as follows:

L	-VE
L1	+VE IN
L2	+VE OUT
R	Remote LED Drive

4. MECHANICAL CONSTRUCTION

The major components of the detector are:

- Body Assembly
- Printed Circuit
- Optical Chamber
- Optical Chamber Cover
- Thermistor
- Light Pipe
- Outer Cover

4.1 ASSEMBLY

The body assembly consists of a plastic moulding which has four embedded detector contacts which align with contacts in the 5BEx base. The moulding incorporates securing features to retain the detector in the base.

The PCB is soldered to the body contacts. These contacts act as a mechanical fixture during assembly and provide electrical contact between the contacts and the PCB. The PCB is then potted.

The chamber cover is clipped to the body over the optical chamber ensuring the thermistor protrudes through the cover. The light pipe is slotted into the chamber cover. Finally, the outer cover is clipped to the body.



Fig. 6 MR601TEx Enhanced Optical Smoke Detector with 5BEx 5" Base

4.2 TEST AND FINAL ASSEMBLY

The detectors are fully functionally tested and their sensitivities set in a smoke tunnel to ensure correct calibration. The sealing ring and labels are then fitted to complete detector assembly.

5. TECHNICAL SPECIFICATION

5.1 MECHANICAL

Dimensions

The dimensions of the MR601TEx detector are shown in Fig. 5.

Materials

Body and cover:	FR110 'BAYBLEND' Fire Resistant

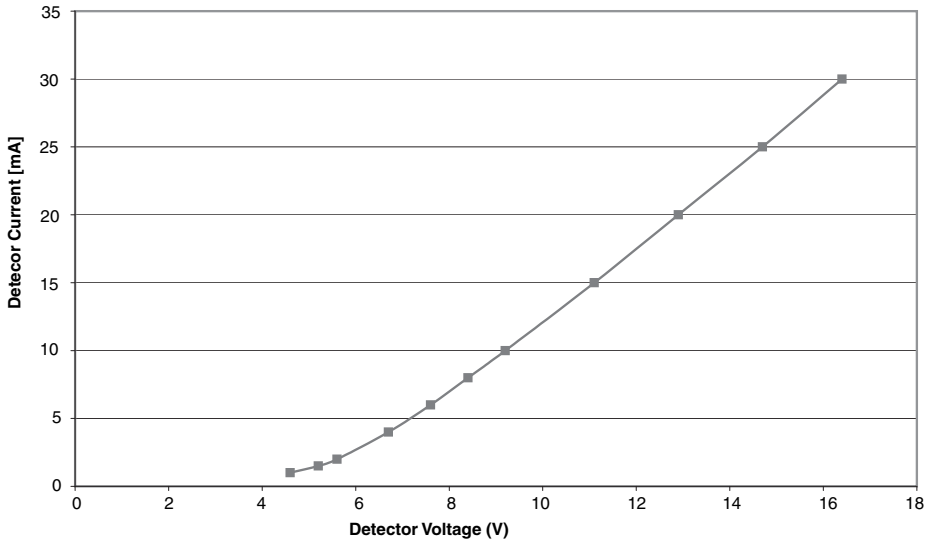


Fig. 7 Alarm Load Presented to the Controller

Weight

Detector:	0.128kg
Detector + base:	0.174kg

5.2 ENVIRONMENTAL

Operating Temperature:	-20°C to +70°C (please see note below).
Storage Temperature:	-25°C to +80°C

Note:

1) ***The operating temperatures quoted exceed the ATEX Certification limits.***
2) *Operation below 0°C is not recommended unless steps are taken to eliminate condensation and hence ice formation on the detector.*

Relative Humidity:	95% non-condensing
Shock:) Vibration:) Impact:) Corrosion:)	To EN54-7

5.3 ELECTROMAGNETIC COMPATIBILITY

The detector complies with the following:

Product family standard EN50130-4 in respect of Conducted Disturbances, Radiated Immunity, Electrostatic Discharge, Fast Transients and Slow High Energy

EN 61000-6-3 for Emissions

5.4 ELECTRICAL CHARACTERISTICS

The alarm load presented to the controller is shown in Fig. 7.

The following characteristics shown in Table 1 are taken at 25°C with a supply voltage of 20V unless otherwise specified.

Characteristics	Min.	Typ.	Max.	Unit
Operating Voltage (d.c.)	16	20	28	V
Average Quiescent Current	90		110	µA
Switch-on-Surge			130	µA
Stabilisation Time			60	sec
Alarm Current	See Fig. 6			mA
Holding Voltage			5	V
Holding Current			1	mA
Reset Time		2	5	sec
Remote LED Drive	Remote LED via 3.4k			

Table. 1 Electrical Characteristics

Intrinsic Safety Rating:

Maximum Voltage for safety (U_i):	28V
Maximum Current for Safety (I_i):	93mA
Maximum Power Input (P_i):	650mW
Equivalent Inductance (L_i):	0
Equivalent Capacitance (C_i):	0

5.5 PERFORMANCE CHARACTERISTICS

The fundamental parameter used to define the sensitivity of an optical smoke detector is the level of smoke which will just produce an alarm under 'ideal' conditions. This parameter, known as the response threshold value, is normally measured in a smoke tunnel and is defined in terms of the obscuration produced by the smoke over a one metre path. The response threshold value is normally given in dB/m, (or % per m).

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Interpretation of response threshold value is somewhat complicated by the fact that the measurement is given in terms of obscuration, whereas the detector works by scattering from the smoke particles. The response threshold (m) value will therefore, depend on the colour of the smoke. Black smokes give less scattering than light smokes for given values of obscuration as shown in Fig. 8.

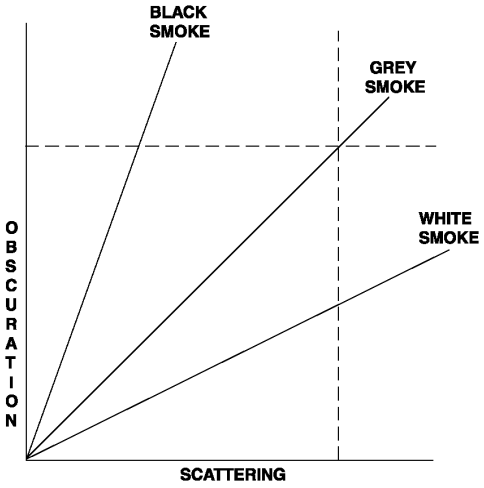


Fig. 8 Response Threshold vs Smoke Colour

Sensitivities are invariably specified for 'grey' smokes as produced by typical smouldering fires. Values for the MR601TEx are given below.

5.5.1 RESPONSE TO RATE OF CHANGE OF TEMPERATURE

The detector will not be enhanced by slow rates of change of temperature, or by cold air draughts moving across the ceiling creating negative rates of change of temperature. The detector is designed to detect sudden horizontal draughts of hot air produced by fast burning fires. The enhancement switching point has been set to allow the detection of TF1 type fires.

Normal response threshold = 0.19 dB/m, 2.7%/m typical.

Enhanced mode threshold = 0.08 dB/m, 1.1%/m typical.

5.6 RESPONSE TO FIRE TESTS

The response of an optical scatter detector to a fire will depend to a large extent on the colour of the smoke produced in the fire. However, other factors such as the detector smoke entry characteristics, the development of the fire and the thermal lift produced by the fire are important. In order to evaluate the response under realistic conditions, detectors are subjected to test fires which cover a range of fire types. These tests are defined in EN54 Pt 7. The MR601TEx passes the following Fire Tests:

TF1	open cellulosic (wood-flaming)
TF2	smouldering pyrolysis
TF3	glowing smouldering (cotton)
TF4	open plastics (polyurethane foam)
TF5	liquid (n-heptane)

Table 2: Response to Fire Tests

Note: TF2 to TF5 are mandatory test fires required to meet EN54 Pt 7.

The MR601TEx is designed to respond to the mandatory tests TF2 to TF5 as required by BS5445 Pt 7. The MR601TEx gives an earlier response to TF5 fires than the MR601 due to its thermal circuit detecting the heat generated by this test of fire and the MR601TEx being 'enhanced'. For the same reason the MR601TEx will detect test fire TF1 (open wood cellulosic flaming fire) which is not normally detected by optical smoke detectors - demonstrating the detectors broader detection capability.

The MR601TEx does not respond to TF6 liquid (methylated spirit) which although having a rapidly rising temperature, does not generate any optical scattering. This shows that the High Performance Optical detector will not respond to hot air draughts without the presence of smoke.

6. INSTALLATION RECOMMENDATIONS

It is not recommended that the MR601TEx be installed in areas where it is likely to be regularly enhanced, since in this condition the detector is extra sensitive and there is a possibility of unwanted alarms from low ambient smoke levels.

The MR601TEx is designed to become enhanced by detecting a rapid temperature rise (>10°C) in air moving horizontally across the ceiling. Siting sensors in positions where air is being blown through the detector should therefore, be particularly avoided, eg, close to ceiling ducts or ceiling mounted industrial heaters; or areas of forced ventilation, such as ducts and under floor voids of computer suites.

Also, not recommended are areas open to the outdoors, such as cargo handling bays, or areas where the detector may become contaminated.

The MR601TEx is not recommended for use in applications where a heater jacket is required.

The MR601TEx is primarily aimed at benign environments.

7. CPD INFORMATION

CE

0832

Tyco Safety Products
Dunhams Lane
Letchworth SG6 1BE
UK

06

0832-CPD-0248

EN 54-7: 2000 + A1: 2002

Conventional Intrinsically Safe high performance photoelectric smoke detector with heat enhancement for use in fire detection and alarm systems in buildings

MR601TEx

Application & Design	01B-04-D12
Installation Instructions	01B-04-I3
Service Instructions	01B-04-S2

8. DETECTOR IDENTIFICATION

The detector is identified by the logo label, as shown in Fig. 9.

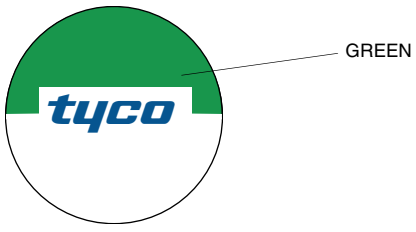


Fig. 9 Detector identification

9. ORDERING INFORMATION

MR601TEx Intrinsically Safe Enhanced Optical Smoke Detector:	516.054.011.Y
5BEx 5" Universal IS Base:	517.050.023

JM/jm

5th May 2010

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HYDROGEN POINT DETECTORS

POS.	TAG NUMBER	SERVICE
1	950-GDZ-02101	H2 GD FZ-02 H2 STORAGE VESSELS AREA
2	950-GDZ-02102	H2 GD FZ-02 H2 STORAGE VESSELS AREA
3	950-GDZ-02103	H2 GD FZ-02 H2 STORAGE VESSELS AREA
4	950-GDZ-02104	H2 GD FZ-02 H2 STORAGE VESSELS AREA
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48	950-GDZ-03105	H2 GD FZ-03 ELECTROLYZER PK AREA
49	950-GDZ-01103	H2 GD FZ-03 ELECTROLYZER PK AREA

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Instructions for use

Dräger Polytron® 8000 Series

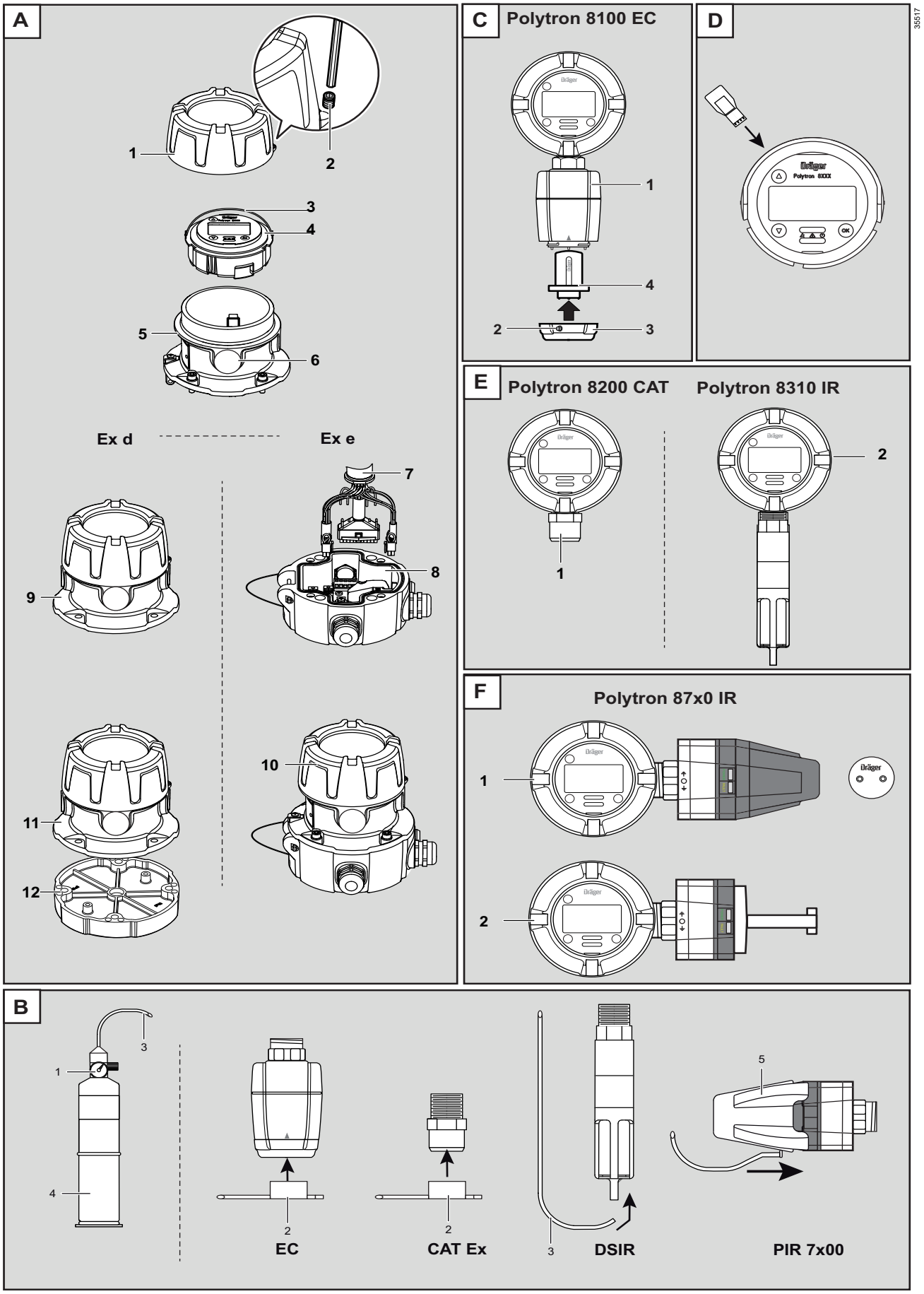


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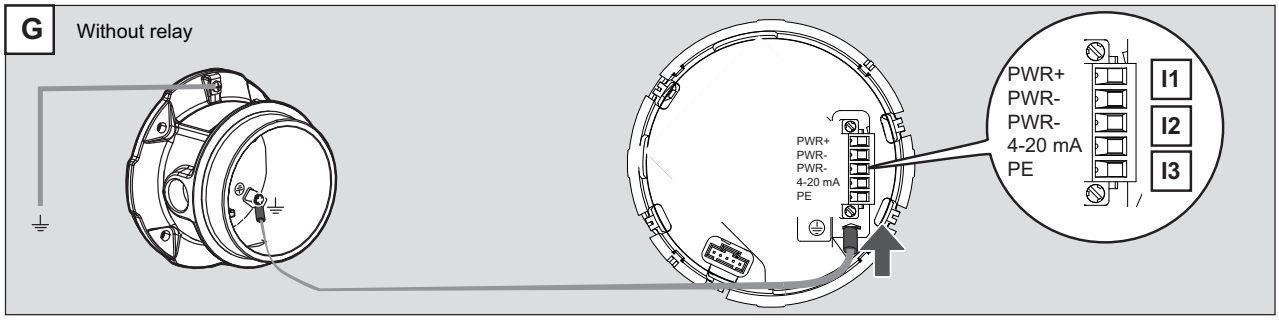
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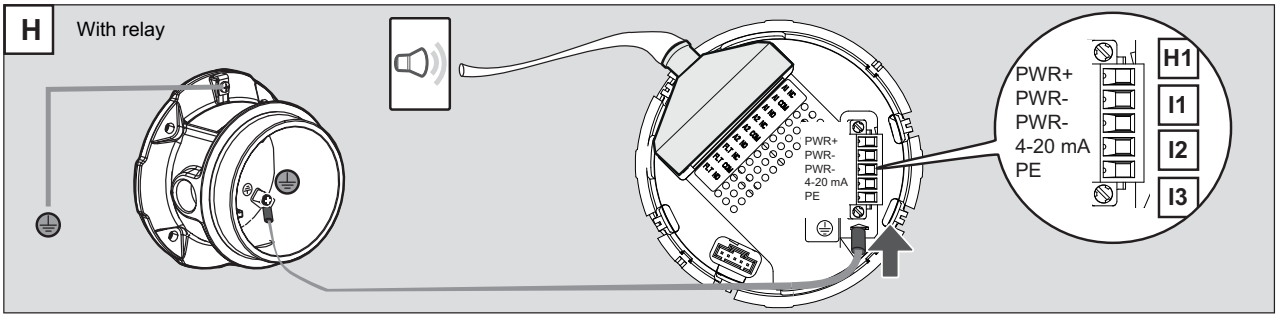
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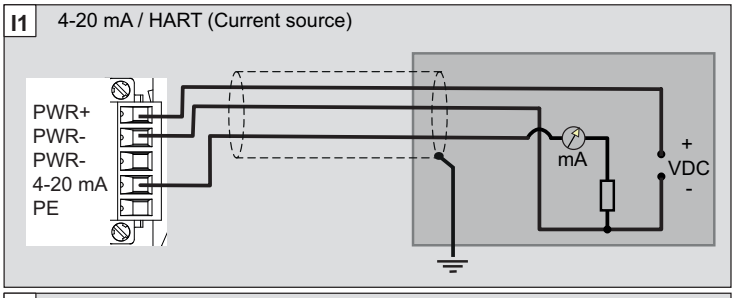
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fr Notice d'utilisation 98
es Instrucciones de uso 145

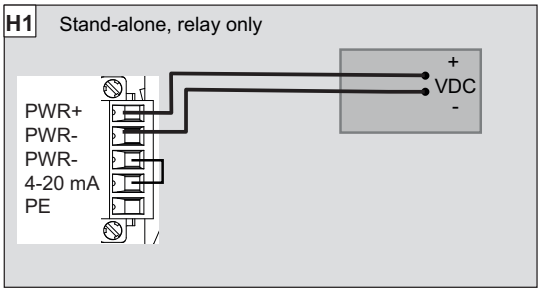

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Polytron 8200 CAT
Polytron 8310 IR
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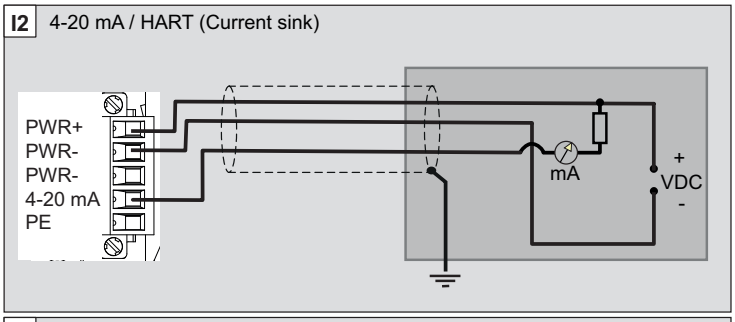
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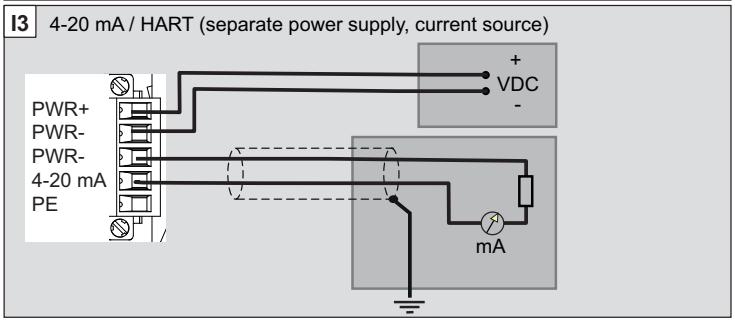






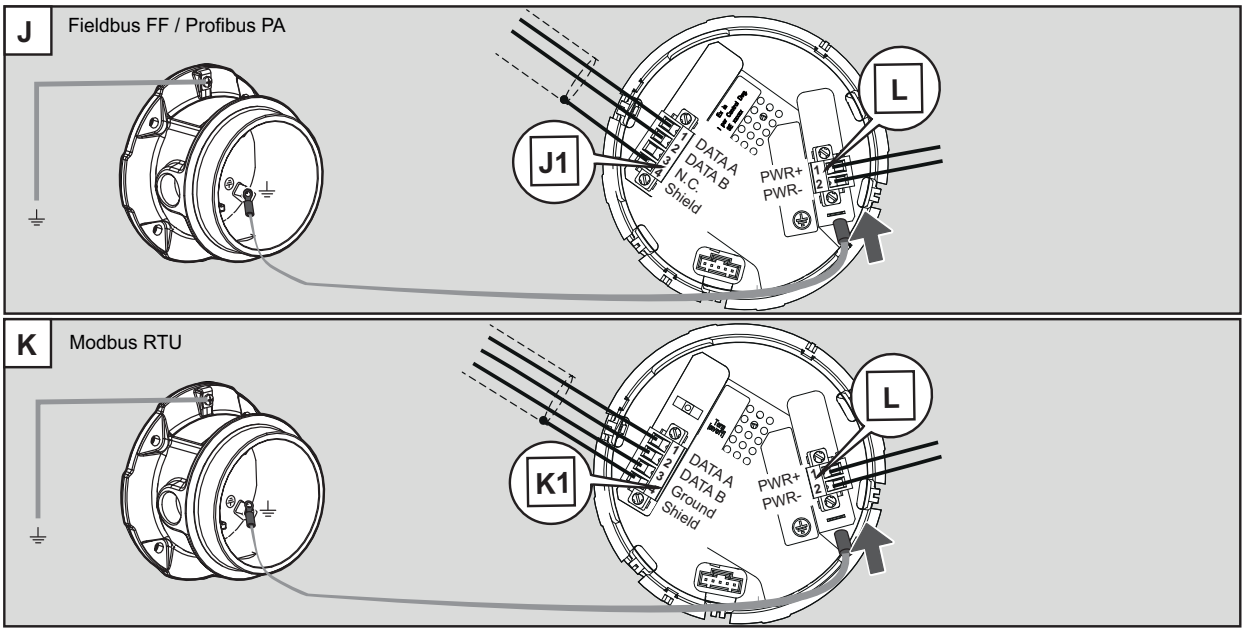


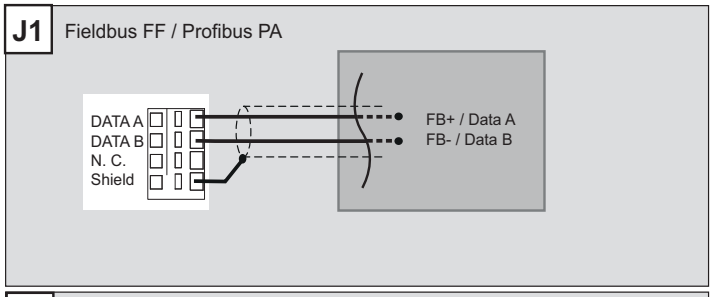


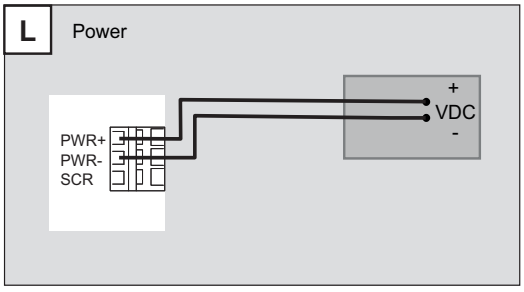


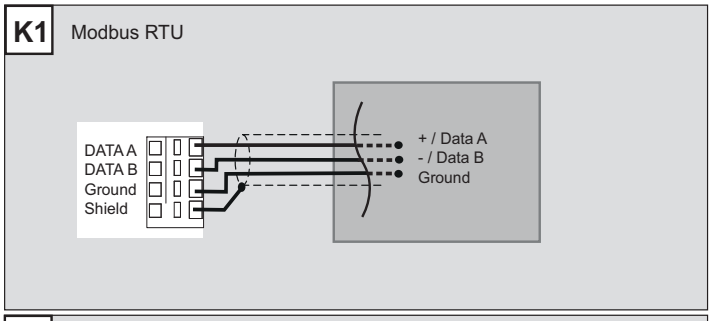
Cable specifications
Power supply and signals: 24 - 12 AWG / 0.2 - 2.5 mm²
Relays: 20 - 12 AWG / 0.5 - 2.5 mm²

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Cable specifications
Power supply and signals: 24 - 12 AWG / 0.2 - 2.5 mm²

M

Dräger **Polytron Xxx0**
XTR 0XXX
Dräger Safety 23560 Lübeck, Germany
CE 0158 Ex II 2G Ex II 2D
Part No: XXXXXXX
Serial No: **XXXX-XXXX**
Data Matrix Code
Gas Detector for Use in Hazardous Locations Subject to Fire, Electrical Shock and Explosion Hazards Only
Class I, Div 1, Groups A,B,C,D | Class II, Div 1, Groups E,F,G
Class I, Zone 1, Group IIC | T6/T4 | Type 4X | C22.2 No. 152
Supply: 10 ...30V ⎓, 0.08 ... Relays: 5A, 30V ⎓ or 230V ~
Ex db IIC T6/T4 Gb | PTB 11 ATEX 1005X
Ex tb IIIC T80 °C ... °C | IECEx PTB 11.0005X | BVS 15 ATEX G 001X
-40°C ≤ Ta ≤ ... °C | IP6X | P ≤ 5W | UL only: -40°C ≤ Ta ≤ +70°C
WARNING: Do not open when energized- risk of Ignition of Harzadous Atmospheres.
AVERTISSEMENT: Lire attentivement le manuel avant utilisation.
WARNING: To reduce the risk of Ignition of Hazardous Atmospheres, the conduit must be sealed within 18" of the enclosure.
WARNING: Read Manual before operating.

SAMPLE

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1 Safety-related information

Both the latest edition and other languages of these instructions for use can be downloaded in the Technical Documentation database (www.draeger.com/ifu). Due to product actualizations, Dräger recommends always using the latest edition of the instructions for use.

1.1 Safety instructions

- Before using this product, carefully read these Instructions for Use and those of the associated products.
- Strictly follow the instruction for use. The user must fully understand and strictly observe the instructions. Use the product only for the purposes and under the conditions specified in this document.
- Do not dispose of the Instructions for Use. Ensure that they are retained and appropriately used by the product user.
- Only trained and competent users are permitted to use this product.
- Notify Dräger in the event of any component fault or failure.
- Comply with all local and national laws, rules, and regulations associated with this product.
- Only trained and competent personnel are permitted to inspect, repair and service the product as detailed in these instructions for use. Further maintenance work that is not detailed in these instructions for use must only be carried out by Dräger or personnel qualified by Dräger.
- Dräger recommends a Dräger service contract for all maintenance activities and that all repairs are carried out by Dräger.
- Use only genuine Dräger spare parts and accessories. Otherwise the proper functioning of the product may be impaired.
- Maintenance must be performed as described, see 10 Maintenance.
- Only operate the product within the framework of a risk-based alarm signaling concept.
- Before connecting this instrument to electrical devices not mentioned in the IFU consult Dräger
- The instruments or components may not be modified in any manner.
- The use of faulty or incomplete parts is forbidden.
- The appropriate regulations must be observed at all times when carrying out repairs on these instruments or components.
- Do not open the instrument during operation.
- The corresponding regulations must be observed when carrying out repairs on these instruments or components.
- Follow the directions of EN 60079-29-2 for the measurement of flammable gases and oxygen.
- Follow the directions of EN 45544-4 for the measurement of toxic gases.

Polytron® 8100 EC-specific:

- **WARNING**: Risk of ignition of flammable or explosive atmospheres! Substitution of components may impair Intrinsic Safety.

1.2 Operating area and conditions

- For SIL applications, observe the Dräger Polytron® 8xx0 safety manual.
- Only applies for Polytron 8200 CAT:
  If the device is exposed to a targeted flow of air that is mixed with gas, the measured values may be elevated. For deviating values, see the instructions for use provided with the corresponding sensor.
- Observe the information and restrictions in the instructions for use for the sensors used.
- **CAUTION** Risk of ignition of flammable or explosive atmospheres! Not tested in oxygen enriched atmospheres (>21% O_2).
- **Using the product in areas subject to explosion hazards:** Instruments or components for use in explosion-hazard areas which have been tested and approved according to national, European or international Explosion Protection Regulations may only be used under the conditions specified in the approval and with consideration of the relevant legal regulations.

Hazardous areas classified by zones:

- The instrument is designed for use in Zone 1 or Zone 2 hazardous areas where gases of explosion groups IIA, IIB or IIC and temperature class T4 or T6 may be present. Temperature classes depend on the maximum ambient temperature. The instrument must not be operated in ambient temperatures outside of the temperature range indicated on the instrument.
- The instrument is designed for use in Zone 21 or Zone 22 hazardous areas where dusts of explosion groups IIIA, IIIB or IIIC and dust temperatures of T80 °C or T130 °C (T135 °C for the Polytron 5100 EC and Polytron 8100 EC) may be present. Dust temperatures depend on the maximum ambient temperature. The instrument must not be operated in ambient temperatures outside of the temperature range indicated on the instrument.

Hazardous areas classified by divisions:

- The instrument is designed for use in Class I, Div. 1 or Div. 2 hazardous areas where gases of groups A, B, C or D and temperature class T4 or T6 may be present. Temperature classes depend on the maximum ambient temperature. The instrument must not be operated in ambient temperatures outside of the temperature range indicated on the instrument.
- The instrument is designed for use in Class II, Div. 1 or Div. 2 hazardous areas where dusts of groups E, F or G may be present. The instrument must not be operated in ambient temperatures outside of the temperature range indicated on the instrument.

2 Conventions in this document

2.1 Meaning of the warnings

The following warnings are used in this document to alert the user to potential dangers. A definition of the meaning of each warning is as follows:

Alert icon	Signal word	Warning classification
⚠	WARNING	Indicates a potentially hazardous situation. If not avoided, it could result in death or serious injury.
⚠	CAUTION	Indicates a potentially hazardous situation. If not avoided, it could result in physical injury. It may also be used to alert against unsafe practices.
	NOTICE	Indicates a potentially hazardous situation. If not avoided, it could result in damage to the product or environment.

2.2 Trademarks

Trademark	Trademark owner
PROFIBUS®	PROFIBUS Nutzerorganisation e. V.
HART®	HART Communication Foundation
Polytron®	Dräger Safety AG & Co. KGaA
DrägerSensor®	Dräger Safety AG & Co. KGaA

The following webpage lists the countries in which Dräger's trademarks are registered: www.draeger.com/trademarks.

3 Description

3.1 Product overview

Refer to the figures on the fold-out page

A 1	Enclosure lid
A 2	Set screw (2 mm Allen screw)
A 3	Handle
A 4	PCB unit (and optional relay)
A 5	Enclosure bottom
A 6	Port for Sensor
A 7	Feed-through cable
A 8	Docking station
A 9	Explosion-proof instrument
A 10	Explosion-proof instrument with docking station for increased safety
A 11	Explosion-proof instrument with mounting spacer (only for Polytron 87x0 IR)
A 12	Mounting spacer (only for Polytron 87x0 IR)
B	Test setup for calibration
C	Polytron 8100 EC
D	Sensor dongle connection (only Polytron 8100 EC)
E 1	Polytron 8200 CAT
E 2	Polytron 8310 IR
F 1	Polytron 8710 IR with splash guard
F 2	Polytron 8710 IR without splash guard

3.2 Feature description

The Polytron 8000 family includes the following instrument versions:

– Polytron 8100 EC, operates with electrochemical sensors (EC sensors)
– Polytron 8200 CAT, operates with catalytic Ex sensors (CatEx sensors/catalytic, DQ or LC DrägerSensors)
– Polytron 8310 IR, operates with infrared Ex sensors (IREx sensors)
– Polytron 8700 IR, operates with infrared sensors (PIR 7000 sensors)
– Polytron 8720 IR, operates with infrared sensors (PIR 7200 sensors)

The following interfaces are possible:

– 4 to 20 mA analog (per NAMUR recommendation NE43)
– Relay board
– Digital HART output signal
– Foundation Fieldbus[1)]
– PROFIBUS PA[1)]
– Modbus RTU[1)]

If the 4 to 20 mA interface is used, the current must be monitored between 0 mA and 3.5 mA. Currents between 0 mA and 3.5 mA can indicate a special state (see "Special states", page 16).

If a relay board is used, local alarm devices can be activated. If no relay board is used and an alarm is pending, only the red LED on the instrument will flash.

Gas concentrations, status messages, and menu choices are displayed on a backlit graphic LC-display and 3 colored LEDs.

Navigation through the menu takes place by tapping the relevant key on the pane of the enclosure lid with a magnetic wand. The instrument can be configured, calibrated and maintained non-intrusively without declassifying the area.

The instruments are supplied with a data logger. The data logger can store up to 35,000 values. At a sampling interval of 1 measurement per minute, the data logger can store the measurement history of approximately 24 days. This time can be significantly increased if the trigger function is activated. The data logger can only be downloaded using the PolySoft

1) No relays are available when the fieldbus interface is used. The fieldbus interface does not conform to BVS 13 ATEX G 001 X. Dräger SensorAlive is not supported.

PC software. The download generates an .ofb file and a .txt file. The .txt file includes the data logger information in readable form.

The instruments can be connected to a Dräger controller or a programmable logic control (PLC) with a sealed conduit or approved cable gland.

The instruments can be operated as a current source or current sink if the power is supplied by the controller. If the instruments are connected to a separate power supply, they can only operate as a current source.

The enclosures of the instruments are made of sturdy stainless steel or aluminum, and are suitable for indoor and outdoor application.

The instruments are designed for stationary installation. They are available in the following designs:

– Explosion-proof instrument (Ex d)
  The flameproof, explosion-proof enclosure provides three ¾ " NPT connections which can be used for field wiring, direct connection of a sensor, or wiring of a remote sensor.
– Instrument for increased safety (Ex e)
  The instrument is supplemented by an increased safety terminal box (docking station) providing up to four 20 mm connections for field wiring or wiring of a remote sensor. If the cable gland from Dräger is used, the permissible cable diameter is 7 mm to 12 mm.

The following dongles are available for the Polytron 8100 EC:

Sensor-test dongle	Activates the sensor self-test (not for hydrazine sensor 6810180)
Diagnostic dongle	Activates the sensor self-test, the display of the sensor vitality and the sensor diagnostic functions (not for hydrazine sensor 6810180)

3.3 Intended use

The instruments in the Polytron 8000 family are intended for continuous monitoring of the ambient air.

With the optionally integrated relay module, the instrument can be operated without a central controller (with additional local alarm signaling).

The instrument can be connected to a Dräger controller or a programmable logic control (PLC) with a sealed conduit or approved cable gland.

If the 4-20 mA interface is used, the current between 0 mA and 3.5 mA must be monitored. Currents between 0 mA and 3.5 mA can indicate a special state.

The instruments are designed for permanent installation and are approved for use in hazardous areas.

– Polytron 8100 EC is a combined intrinsically safe/explosion proof instrument for continuous monitoring of toxic gases or oxygen in the ambient air.
– Polytron 8200 CAT with catalytic DrägerSensor DQ or LC is an explosion-proof instrument for continuous monitoring of combustible gases and vapors containing hydrocarbons and non-hydrocarbons (e.g., hydrogen or ammonia) in ambient air.
– Polytron 8310 IR with infrared DrägerSensor IR is an explosion-proof instrument for continuous monitoring of combustible gases and vapors containing hydrocarbons in ambient air.
– Polytron 8700 IR with PIR 7000 is an explosion proof instrument for the continuous monitoring of combustible gases and vapors containing hydrocarbons in an appropriate atmosphere.
– Polytron 8720 IR with PIR 7200 is an explosion proof instrument for the continuous monitoring of carbon dioxide in ambient air.

3.4 Approvals

3.4.1 ATEX, IECEx, UL, CSA

An example of a name plate is shown on the fold-out page. A print-out of the name plate can also be found on the instrument's shipping box.

3.4.2 Additional information

Declaration of conformity: see supplement 4544300 or www.draeger.com/product-certificates

For additional information on approvals, see supplement 4544300.

4 Transmitter installation

4.1 Explosion proof (Ex d) installation - without Docking Station

4.1.1 Mechanical installation

4.1.1.1 General information on mechanical installation

– Local, state, and national rules and regulations that govern the installation of gas monitoring equipment must be strictly observed.
– The physical properties of the gas or vapor to be detected and the details of the corresponding application (e.g., possible leaks, air movement/drafts, etc.) must be taken into account.
– The future use of accessories and maintenance equipment must be considered.
– The free gas or vapor flow to the sensor must not be obstructed.
– The instrument must not be exposed to radiant heat that will cause the temperature to rise beyond the indicated limit values (16.6 Environmental parameters). The use of a reflective shield is recommended.
– A dust cap may be attached to the cable entry of the instrument. This cap is neither explosion-proof nor watertight and must be removed before connecting the instrument to a sealed conduit or before installation of a flameproof cable gland.

– Unused openings must be closed with blind plugs. For the required tightening torques for cable bushings, cable glands, plugs and sensors, see 16.7 Tightening torques.
– For non-conduit installations, an approved cable gland must be used (e.g., Hawke A501/421/A/¾ " NPT or equivalent).
– **WARNING:** Only for conduit installations: To reduce the risk of ignition of hazardous atmospheres, the conduit must be sealed within 45 cm (18 ") of the enclosure.
– **CAUTION:** If the gas detector is connected to controllers, the total response time may be delayed. The entire measurement path must be taken into account (e.g., latency of the controller). Ensure that the required response time is kept.

Polytron® 8100 EC-specific:

– Recommended sensor orientation: Downwards (see Figure C on the fold-out page).

Polytron® 8200 CAT-specific:

– Preferred sensor orientation: Downwards (see Figure E on the fold-out page). If the sensor inlet is protected against mechanical damage and the ingress of dirt and water, any orientation is permitted.
– For CSA-conform operation only:
The use of the optional splash guard (6812510) is required for CSA approval.

Polytron® 8310 IR-specific:

– Recommended sensor orientation: Downwards (see Figure E on the fold-out page).

Polytron® 87x0 IR-specific:

– The preferred orientation of the Dräger PIR 7x00 sensor must be observed (see Figure F on the fold-out page). Larger deviations and the use of the preassembled splash guard will increase the response time (see PIR 7x00 instructions for use).
– Any other orientation is only permissible if the PIR 7x00 is used without a splash guard, e.g., for use in ducts. If the sensor is installed vertically, there is an increased risk of deposits forming on the optical surfaces.
– The use of the preassembled splash guard is recommended to protect the sensor from water and dust.
– If a splash guard (part number 6811911 or 6811912) is used, the status lights must be arranged in a vertical line and the Dräger logo on the splash guard must be horizontal. A maximum deviation of ±30 degrees from the horizontal position is permissible.
– Liquid and/or deposits on the optical surfaces of the PIR 7x00 may result in a warning or fault.
– For the explosion-proof version, using a spacer (part number 6812617) when the instrument is mounted on a wall or to a level surface is recommended.

Special conditions in accordance with EN/IEC 60079-1

– The threads for the flameproof / explosion-proof enclosure do not conform to the minimum/maximum values indicated in EN/IEC 60079-1. The threads must not be re-worked by the user.

4.1.1.2 Installation

The instrument can be mounted for measuring gases in ambient air or inside of a duct/pipe.

1. Use M6 (1/4'') bolts with hex socket caps to mount the enclosure to one of the following options.

Option	Accessory
Mounting on a flat surface	Drilling template: 4544300 Additionally for Polytron 87x0 IR: Spacer 6812617
Mounting on a pole	Pole mount kit: 4544198
Mounting on a duct/pipe	Duct mount kit: 6812725 For Polytron® 87x0 IR:: 6812300

4.1.2 Electrical installation

4.1.2.1 General information on electrical installation

– For tightening torques, see 16.7, for permissible cable specifications, see 16.3.
– Strict compliance must be given to the electrical codes that govern the routing and connection of electrical power and signal cables to gas monitoring equipment.
– Ferrules must be used.
– The conductors for the power supply must have an adequately low resistance to ensure the correct supply voltage at the instrument.
– Wire insulation must be stripped by 5 to 7mm.
– The secondary circuit supplying power must be electrically isolated from the mains circuit (does not apply for the relay circuit).
– When installed at locations exceeding ambient temperatures of 55 °C, use only appropriate wiring, specified for at least 25 °C above the maximum ambient temperature.
– Only use cable glands that are approved in the country the system is installed in and suitable for the application.
– In accordance with EU Directive 2014/30/EU, this instrument may not be connected to a DC system. Providing the instrument with its own source of supply is recommended.

Analog interface

– To ensure proper operation of the instrument, the resistance of the 4 to 20 mA signal loop must not exceed 500 ohms.
When used in accordance with the metrological suitability test compliant with EN IEC 62990-1, EN IEC 60079-29-1 or EN 50104, the resistance must not exceed 300 ohms. With values above 300 ohms, supply voltage monitoring cannot be ensured.
Depending on the operating voltage and the application (e. g. HART® operation), a specified minimum resistance must be observed (see "Signal transmission to the controller", page 42).

Relay option

– At voltages >30 V AC or >42.4 V DC, the relay cables must be enclosed in protective tubing, or double-insulated cables must be used.
– The wiring for the optional relay module must be selected and fused according to the rated voltages, currents and environmental conditions.
– To ensure that a fault is recognized - without having to look at the instrument - an alarm device must be connected to the fault relay.
– Voltage differences can cause insulation faults. Do not mix electric loads with different voltage types (AC or DC). Using DC loads, ensure that relay contacts only control devices with the same DC voltage rating. Using AC loads, ensure that relay contacts are only connected to devices sharing a common phase.

Special conditions in accordance with IEC 60664-1

– The device variants incorporating a FISCO fieldbus interface as well as gas detection transmitter type ETR 02…5** must operate in circuits that are limited to overvoltage category I/II/III in accordance with IEC 60664-1.

4.1.2.2 Connection diagrams

The fold-out pages show the following connection diagrams:

Figure	Connection diagram for instruments
G	Without relay, enclosure grounding
H	With relay, enclosure grounding
I1	4-20 mA / HART (current source)
I2	4-20 mA / HART (current sink)
I3	4-20 mA / HART (separate power supply, current source)
H1	Standalone, relay only
J	Foundation Fieldbus / PROFIBUS PA, enclosure grounding
K	Modbus RTU, enclosure grounding
J1	Foundation Fieldbus / PROFIBUS PA, field wiring
K1	Modbus RTU, field wiring
L	Power supply digital interfaces

4.1.2.3 Wiring tables

4 to 20 mA/HART interface

Pin	Mark	Function
1	PWR+	V+
2	PWR-	V-
3	PWR-	V- Use if the instrument is connected to a separate power supply (operation as source).
4	4-20 mA	4 to 20 mA signal (Operation as source or sink)
5	PE	Protective earth Optional PE for relay connection. Connecting PE together with the 4-20mA analog output may cause ground loops.

Fieldbus interface

Pin	Mark	Function
1	Data-A	Signal Line A
2	Data-B	Signal Line B
3	GND	Ground
4	SHIELD	Cable Shield

Pin	Mark	Function
1	PWR+	V+
2	PWR-	V-

Relay connectors

All relays (A1, A2, FLT) of the device can be configured as "normally energized" (normally closed relay) or "energized on alarm" (normally open relay). The relays are configured at the factory as normally closed relays ("normally energized"). This ensures fail-safe operation.
Contrary to convention, the NO, COM, NC markings on the instrument are selected to correspond to the normally energized state. When the device is energized, the marking corresponds to the function of the pins.

Pin	Mark		Relay	
1	NO	FLT	Fault	Normally open
2	COM		Fault	Common connection
3	NC		Fault	Normally closed
4	NO	A2	A2	Normally open
5	COM		A2	Common connection
6	NC		A2	Normally closed
7	NO	A1	A1	Normally open
8	COM		A1	Common connection
9	NC		A1	Normally closed

4.1.2.4 Preparing the electrical installation

1. Loosen the set screw (2) and unscrew the enclosure lid from the lower part of the enclosure, see figure A on the fold-out page.
2. Pull out the PCB unit.
3. Proceed with the figure that contains your Polytron® model and signal output, see fold-out page.

4.1.2.5 Connecting the device with relays (stand-alone)

The wires for alarm devices must be connected to the 9-pin relay connector. A piece of wire insulation (heat-shrink tube) and a protective cover are included for extra protection of the relay wires.

1. Remove the 5-pin connector.
2. Connect the cable for the power supply to the corresponding connection terminals, see figure H1 on the fold-out page..
3. Bridge pins 3 and 4 of the 5-pin connector.
4. Remove the 9-pin connector.
5. Cut the heat-shrink tube as needed and slide it over the relay wires before insertion into the 9-pin connector.
6. Position the heat-shrink tube at the edge of the wire insulation and use a heat gun to shrink the tubing securely onto the wire insulation.
7. Slide the protective cover over the wires.
8. Connect the wires for alarm 1 (pre-alarm), alarm 2 (main alarm), and error alert to the relevant terminals as indicated in the following wiring table.
9. Plug the connector back into the socket and tighten the screws.
10. Close the device, see 4.1.2.9 Closing the gas detector.

The following tables display the status of a connected alarm indicator and whether it indicates faults (e.g., power failure for the gas detector).

The behavior of the relay depends on the alarm configuration and the relay contact the alarm indicator is connected to.

Relay configuration: Normally energized

Contact	Alarm indicator status and fault indication by the alarm indicator		
	Alarm triggered	Gas detector-specific fault	Field wiring fault
Normally closed	ON	displayed	not displayed
Normally open	OFF	displayed	displayed

Relay configuration: Energized on alarm

Contact	Alarm indicator status and fault indication by the alarm indicator		
	Alarm triggered	Gas detector-specific fault	Field wiring fault
Normally closed	OFF	not displayed	displayed
Normally open	ON	not displayed	not displayed

4.1.2.6 Connecting the 4-20mA/HART® interface

For connections to a control unit (PLC), refer to the documentation corresponding to the control unit.

1. Pull off the 5-pin connector.
2. Connect the three wires for power and signal to the appropriate terminal as indicated in the wiring table and figure.
3. Plug connector back into socket and tighten screws.
4. Close the instrument, see 4.1.2.9 Closing the gas detector.

4.1.2.7 Grounding

1. Ground the enclosure of the instrument locally at the grounding lug, see figures G and H on the fold-out page..
2. Connect the shield of the wires only to the instrument earth ground of the controller (e g. chassis, ground busbar, etc.).

ℹ Unless special measures are taken (e. g. capacitive earthing), the shield must only be connected at one end.

Information on grounding fieldbus and Modbus connections is provided in the following documents.

Interface	Document
Foundation Fieldbus FF	9033783
Modbus RTU	9033781

4.1.2.8 Connecting the fieldbus interface

1. Pull off the 2-pin and 4-pin connector.
2. Connect the two wires for power and the four wires for signal to the appropriate terminals as indicated in the wiring table and figure.
3. Plug connector back into socket and tighten screws.
4. Close the instrument, see 4.1.2.9 Closing the gas detector.

For further information regarding the fieldbus interface installation consult the corresponding Technical Handbook.

4.1.2.9 Closing the gas detector

1. Ensure that the following connections are correctly established:
   a. The screws for the wiring are tightened with the correct torque.
   b. All cable connections are secured with screws.
   c. The front port of the sensor is inserted.
   d. The grounding cable that leads from the enclosure is connected with the eye on the PCB unit, see figures G and H on the fold-out page.
2. Place the PCB unit in the lower part of the enclosure.
3. Screw the enclosure lid onto the lower part of the enclosure and tighten with the correct torque.
4. Tighten the set screw.

4.2 Increased safety (Ex e) installation - with Docking Station

The installation with enhanced safety (Ex e) is described in the assembly instructions for the docking station (part number 9033242).

5 Installation of sensors or sensing heads

5.1 Installing the EC sensor on the Polytron 8100 EC

See figure C on the fold-out page.

1. Unscrew the locking screw (2) (2 mm hexagon socket screw).
2. Unscrew and remove the bayonet ring (3) and remove the dummy disk.
3. Insert the sensor (4) in the opening and turn until it engages in the gas detector. This does not damage the sensor connector.
4. Secure the sensor with the corresponding bayonet ring (3).

   ℹ For Dräger SensorAlive, a different bayonet ring must be used than for other EC sensors.

5. Tighten the locking screw (2) so that the bayonet ring cannot come loose (required for installations in zone 22).

   ℹ If the Dräger SensorAlive is being installed in an existing system for the first time, the firmware must be updated to version 4.0.0 or higher. Contact Dräger for support.

5.2 Installing the sensing head

Depending on the type of explosion protection, there will be various sensing heads used. Information relating to the installation of the sensing heads can be found in the respective sensing head manual.

For remote applications, the cable shielding must be attached on both the sensor and transmitter side. The cable length should be ≤ 30 m.

Remote versions with "Explosion-proof (Ex d)" explosion protection

Transmitter	Sensing head IFU part numbers
Polytron 8100 EC	Remote EC sensing head (9033247)
Polytron 8200 CAT (for DQ sensors)	DQ NPT aluminum remote sensor, DQ NPT steel remote sensor (4544286)
Polytron 87x0 IR	Remote PIR 7000 (334) with stainless steel or aluminum sensor connection housing (4544286)
Polytron 8200 CAT (for LC sensors) Polytron 8310 IR Polytron 87x0 IR	Stainless steel or aluminum sensor connection housing (4544286)

Remote versions with "Increased safety (Ex e)" explosion protection

Transmitter	Sensing head IFU part numbers
Polytron 8100 EC	Remote EC sensing head (9033247)
Polytron 8200 CAT	Polytron SE Ex sensing heads (9033888)
Polytron 8310 IR	DrägerSensor IR (9023843)
Polytron 87x0 IR	PIR 7x00 (9023885)

6 Commissioning

6.1 General information

– Before connecting the instrument to the power supply, connect the wires for the relay and connect up the sensor.
– Before starting normal operation of the instrument, check whether the configuration and adjustment settings are correct.

In order to guarantee its safe operation according to BVS 13 ATEX G 001 X and PFG 14 G 001 X, the following standard alarm settings for the instrument must remain unchanged.

– The relays must be set to ***Normally energ.*** and the alarm A2 (main alarm) to ***Latching*** and ***Non-acknowledgeable*** or ***Pre-Acknowledgeable***.
– Alarm A1 (pre-alarm) may only be set to ***Acknowledgeable*** if used for activation of an acoustic alarm device.
– Latching in the event of over range (see "Setting the DQ sensor latching", page 37).

When operating in accordance with BVS 13 ATEX G 001 X and PFG 14 G 001 X, consideration must be given to the following special conditions:

– Polytron 8200 CAT:
  – When streaming the DQ or LC sensor with air containing measured gas, measured values may increase by up to 32 %.
    These values may increase by up to 70 % when operating with the DQ remote calibration adapter.
  – The transmitter with LC sensor must be operated in combination with a control unit that indicates over range with a latching signal. Internal transmitter alarm relays are not permitted.
  – The transmitter with LC sensor must be adjusted with its sensor in the standard operating position.
  – False alarms may be triggered during the warm up period of the LC sensor.
– Polytron 8100 EC:
  Minor changes to the concentration may see the setting time t20 of the transmitter with EC sensor exceed the EN 50104 threshold.

6.2 Commissioning the gas detector

1. To prevent false alarms, turn off the alarm activation for the gas detector (see "Turning the alarms on and off", page 30).
2. Switch on the power supply.
   ⇒ The device performs a start-up sequence (LCD/LED test, software version, and initialization).
   ⇒ The display indicates that the sensor will be ready for measurement in hh:mm:ss (countdown). The device transmits the maintenance signal. The fault relay is activated.
   ⇒ The sensor warms up. The maintenance signal on the 4 to 20 mA interface remains until the sensor has warmed up. The length of the warm-up time depends on the type of sensor and the ambient conditions. Maximum warm-up time of a new sensor: See the instructions for use of the sensor.
3. Check the date and time. Settings can be changed during the sensor's warm-up time.
   ⇒ After the sensor's warm-up time, the device switches to normal operation. The display shows the current gas concentration, the unit of measurement, and the selected gas if applicable. The green LED is lit.

If the device is operated with a Dräger SensorAlive, Dräger recommends setting the correct date and time. The sensor's warm-up time is followed by the start-up period of the Dräger SensorAlive. The sensor is ready for measurement during this phase, but the self diagnostics do not yet take place.

4. Adjust the device as necessary.
5. Turn on the alarm activation for the gas detector (see "Turning the alarms on and off", page 30).

7 Operation

7.1 Control panel

The control panel contains

– buttons for navigating in the menu
– a display
– LEDs and associated symbols

The buttons for navigation have different functions depending on the menu that is in use.

The instrument is operated with a magnetic wand. To do so, the enclosure lid must be in place on the instrument. If the enclosure lid is not in place, the magnetic wand may activate two or more buttons at once (cross-talk).

7.2 LEDs and symbols

The following symbols and LEDs can be found on the control panel:

Symbol	LED	Description
	Red	Alarm Triggered
	Yellow	Fault
	Green	Power on

LED status

– If alarm A1 (pre-alarm) has been triggered, the red LED will flash once .
– If alarm A2 (main alarm) has been triggered, the red LED will flash twice .
– If an alarm is acknowledged before the reason for the alarm has been rectified, the red LED will light continuously to indicate that there is a fault.

7.3 Readings on the display

7.3.1 All devices

Symbol	Explanation
	An error message is present. Additional information is available in the ***Information*** menu.
	A warning message is present. Additional information is available in the ***Information*** menu.
	Maintenance signal is transmitted.
	The set full scale deflection is exceeded at the 4-20 mA interface.
	The set threshold limit value is not met at the 4-20 mA interface.
	HART® operation is active. Analog interface is set to a fixed value and is not transmitting any measurement signal.
	Once the capacity of the data logger is reached, the old data are overwritten by new values ("roll" function).
	Once the capacity of the data logger is reached, no more data can be stored ("stack" function).
SIL	SIL operation mode is activated.

7.3.2 Polytron 8100 EC-specific symbols

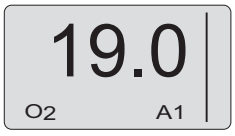
Symbol	Explanation
	The sensor is ready for operation.
	The sensor is ready for operation but is close to the end of its useful life.
	The sensor is still ready for operation but should be changed as soon as possible. The vitality is <25%.
LT	A LifeTest of the Dräger SensorAlive is carried out.

7.3.3 Measuring mode

The following display examples show the Polytron 8100 EC.

Gas names are not predefined for the Polytron 8200 CAT and Polytron 8310 IR. Gas names must be entered via the DrägerPolysoft PC software. After modifying parameters with the DrägerPolysoft PC software or another software, verify all parameters by downloading them from the Polytron® 8xx0 or by checking them directly on the instrument.

The following is displayed in measuring mode:

Display example	Description
	In normal operation, the display shows the measured gas concentration, the selected gas type, and the unit of measurement. **Analog interface:** Corresponding current value **Relays:** All relays are in the normal state
	Exceeding the alarm thresholds. Example shows pre-alarm A1. **Analog interface:** Corresponding current value **Relays:** Relay A1 is in alarm state.

7.3.4 Special states

If the instrument is in a special state, proper measurement or alarm activation can no longer be guaranteed.

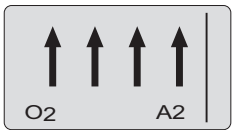
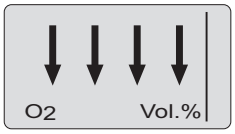
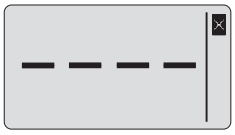
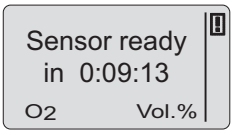
This is the case:

- When the gas concentration exceeds the measuring range.
- When a fault occurs.
- When alarms are deactivated.
- When calibrations are performed.
- When bump tests are performed.
- When a sensor is in the warm-up phase.
- When the system is in maintenance mode.
- When a Dräger SensorAlive is used and the system is configured such that the measured value is not indicated during a LifeTest.

For the current of the analog interface corresponding to the analog signal, see 16.2.

The signals of the digital interfaces are described in the following documents.

Interface	Document
PROFIBUS PA	9033782
Foundation Fieldbus FF	9033783
Modbus RTU	9033781

Display example	Description
	**Value above measuring range** The gas concentration is outside of the measuring range of the sensor[1]. **Analog interface:** Over range **Relays:** A2 relay switch ***Note for the Polytron 8200 and Polytron 8310:*** The message that the measuring range has been exceeded can also be caused by a short circuit or an interruption in the line to a remote sensor.
	**Value below measuring range** The gas concentration is outside of the measuring range of the sensor. **Analog interface:** Drift below zero **Relays:** Fault relay switch
	**Fault display** The ⊠ symbol is displayed on the right side of the display. **Analog interface:** Fault current **Relays:** Fault relay switch
	**Maintenance display** The 🔧 symbol is displayed on the right side of the display. This is displayed when alarms are deactivated, and during adjustment, bump tests, and maintenance work. **Analog interface:** Maintenance current **Relays:** No change
	**Warning display** The ⚠ symbol is displayed on the right side of the display. **Analog interface:** Warning current[2] **Relays:** No change
	**Warm-up phase 1** The ⚠ symbol is displayed on the right side of the display. The remaining time is displayed on the left side. **Analog interface:** Maintenance current **Relays:** Fault relay switch The fault relay behavior can be configured for warm-up phase 1 (see "Setting fault relay warm-up 1", page 30).

Display example	Description
	**Warm-up phase 2** The ! symbol is displayed on the right side of the display. The measured value is displayed on the left side. **Analog interface:** Measured value **Relays:** Behavior as in measuring mode (the fault relay does not indicate warm-up phase 2).

1) When the gas concentration exceeds the full scale deflection of the 4 to 20 mA interface, the display continues to display the measured value plus "Analog interface over range" .
2) Only when warning current is activated. Factory setting: Deactivated.

7.3.5 Ending special states

Error display / warning display

Error displays and warning displays are usually non-latching. As soon as the causes of the errors or warnings have been rectified, no more error or warning is displayed. Exceptions are "SensorAlive fault detection" and "SensorAlive clogging detection".

To eliminate the causes, display the error or warning (see "The Information menu", page 18) and start troubleshooting (see "Troubleshooting", page 25).

Value exceeds/falls below the measuring range

The display indicates that the gas concentration is beyond the measuring range of the sensor. The information on the display disappears as soon as the gas concentration is back within the measuring range. After an over range occurrence, the sensitivity and response time of the sensor may deteriorate.

NOTICE

Sensor malfunction

Gas concentrations outside the sensor's measuring range can cause the sensor to malfunction.

► Recalibrate the sensor if necessary.

Polytron® 8200 CAT with DQ sensor:

An over range has to be acknowledged with [OK] after verifying that the gas concentration is below 100 %LEL (e.g. using a portable instrument).

Latching alarms is the default setting of the instrument.

For instruments without relays, the over range can be set to non-latching. In this case, the over range indication disappears. The control unit must support this function! For further information see: "Setting the DQ sensor latching", page 37.

Polytron® 8200 CAT with LC sensor:

⚠ WARNING

Ambiguous readings for measured values that exceed the measuring range

Latching alarms for over range situations are not supported by LC sensors.

For safe operation in line with BVS 13 ATEX G 001 X, the gas detector must be operated with a controller that can display latching alarms. Do not use internal alarm relays of the gas detector.

► Make sure that over range latching is active at the controller.

After over range measuring values, verify that the gas concentration is below 100 %LEL (e.g. using a portable instrument).

7.4 Info mode and function keys

7.4.1 Opening Info mode

Info mode is used to show relevant device information. This does not interrupt the normal operation of the device.

- Tap and hold ▲ for 3 seconds in measuring mode.

7.4.2 Navigating in Info mode

Button	Function
▲	Switches to the next screen
▼M	Switches to the previous screen
OK	Ends info mode

If no key is tapped within 30 seconds, the instrument will automatically return to normal operation.

7.4.3 Using function key

Using the function key, a pre-set function can be executed. By default the faults are displayed.

- Tap and hold ▲ for 1 seconds in measuring mode.

To configure the function key, see 11.4 Configuring function key.

7.5 Menus

7.5.1 Navigating in a menu

Button	Function
▲	Scrolls upwards. Sets values.
▼M	Scrolls downwards. Sets values.
OK	Confirms entry. Selects menus and functions.

7.5.2 Opening menus

- To open the ***Information*** menu:
  a. Tap and hold ▼ for 1 second in measuring mode.
- To open the ***Calibration*** menu:
  a. Tap and hold ▼ for 3 seconds in measuring mode.
  b. Select ***Enter password***.
  c. Enter the corresponding password and confirm with [OK].
- To access all menus:
  a. Tap and hold ▼ for 3 seconds in measuring mode.
  b. Select ***Enter password***.
  c. Enter the corresponding password and confirm with [OK].

7.5.3 Passwords

Calibration PWD	Permits access to the ***Information*** menu and the ***Calibration*** menu (adjustment settings) Default value: **_ _ _ 1**
Settings PWD	Permits access to all configurations and menus Default value: **_ _ _ 2**

Information on changing the passwords can be found in 11.1.

7.5.4 The *Information* menu

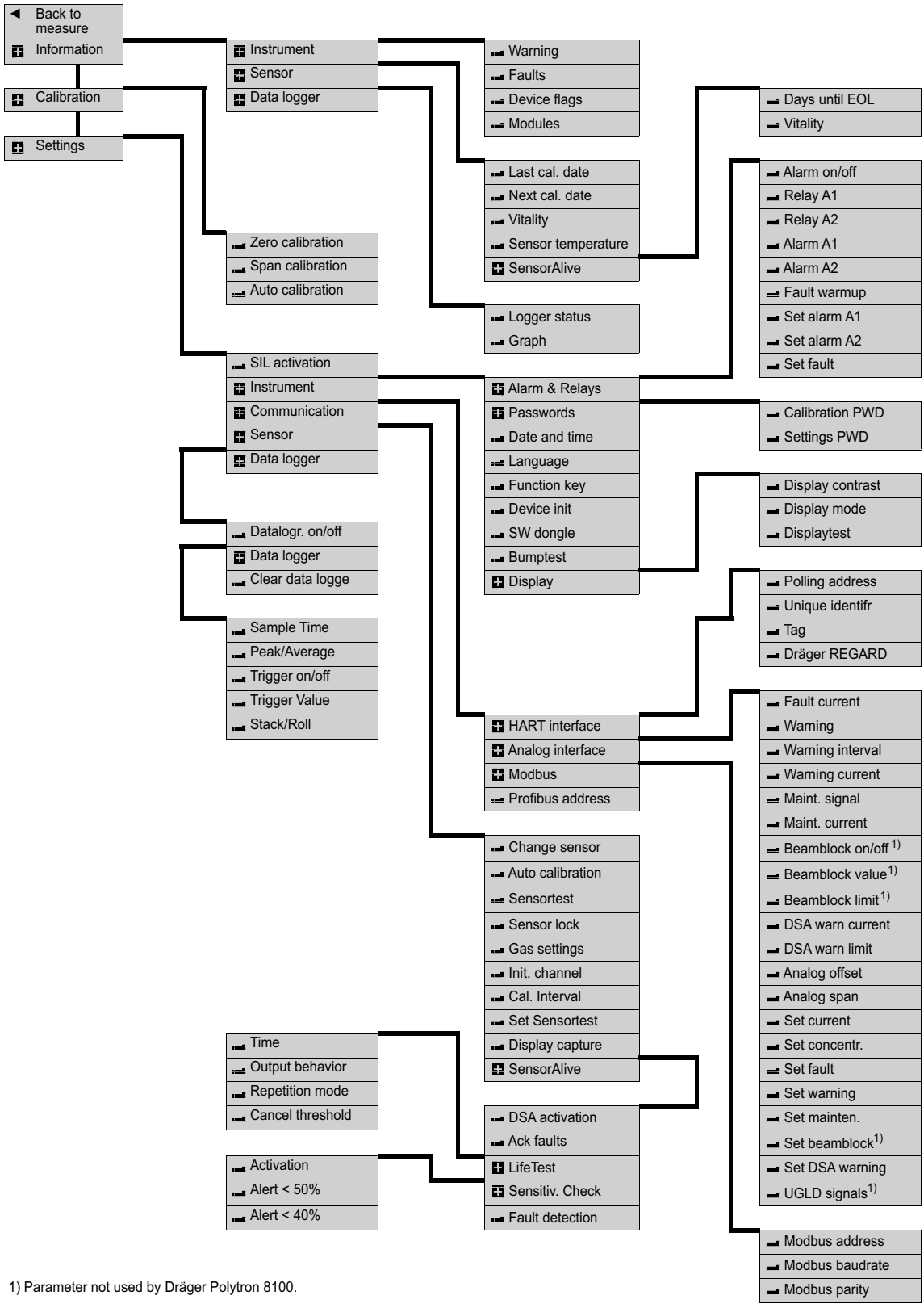
In the ***Information*** menu, the following information can be called up:

Instrument	
Warnings	Warning messages in plain text, including the corresponding number. If there are several warning messages, this will be shown accordingly (e.g. with 1/3 = screen 1 of 3).
Faults	Error messages in plain text, including the corresponding number. If there are several errors, this will be shown accordingly (e.g. with 1/3 = screen 1 of 3).
Device flag	With this function, the warning and error codes are shown in table format. If the value 00 is shown for all codes, then there are no warning or error messages present.
Modules	An overview of the installed hardware modules, as well as the software version of the SIOS-specified EC sensor interface, will be shown. For more detailed information, select the corresponding module. ■ = installed modules □ = modules not installed
Sensor	
Last cal. date	Adjustment date, unit, gas and concentration of the last adjustment are shown.
Next cal. date	Shows the date of the adjustment that is due next.
Vitality[1)]	The sensor vitality is shown in %. Dräger recommends replacing the sensor when vitality is < 25 %.
Sensor temperature[1)]	The current and highest sensor temperature will be shown.
SensorAlive	The sub-menu shows the number of days left for the expected service life and the vitality in %.
Data logger	
Logger status	Data logger status display (active or inactive)
Graph	Display of progress over last 15 minutes in a time/concentration graph.

1) The function is only available with the diagnostic dongle.

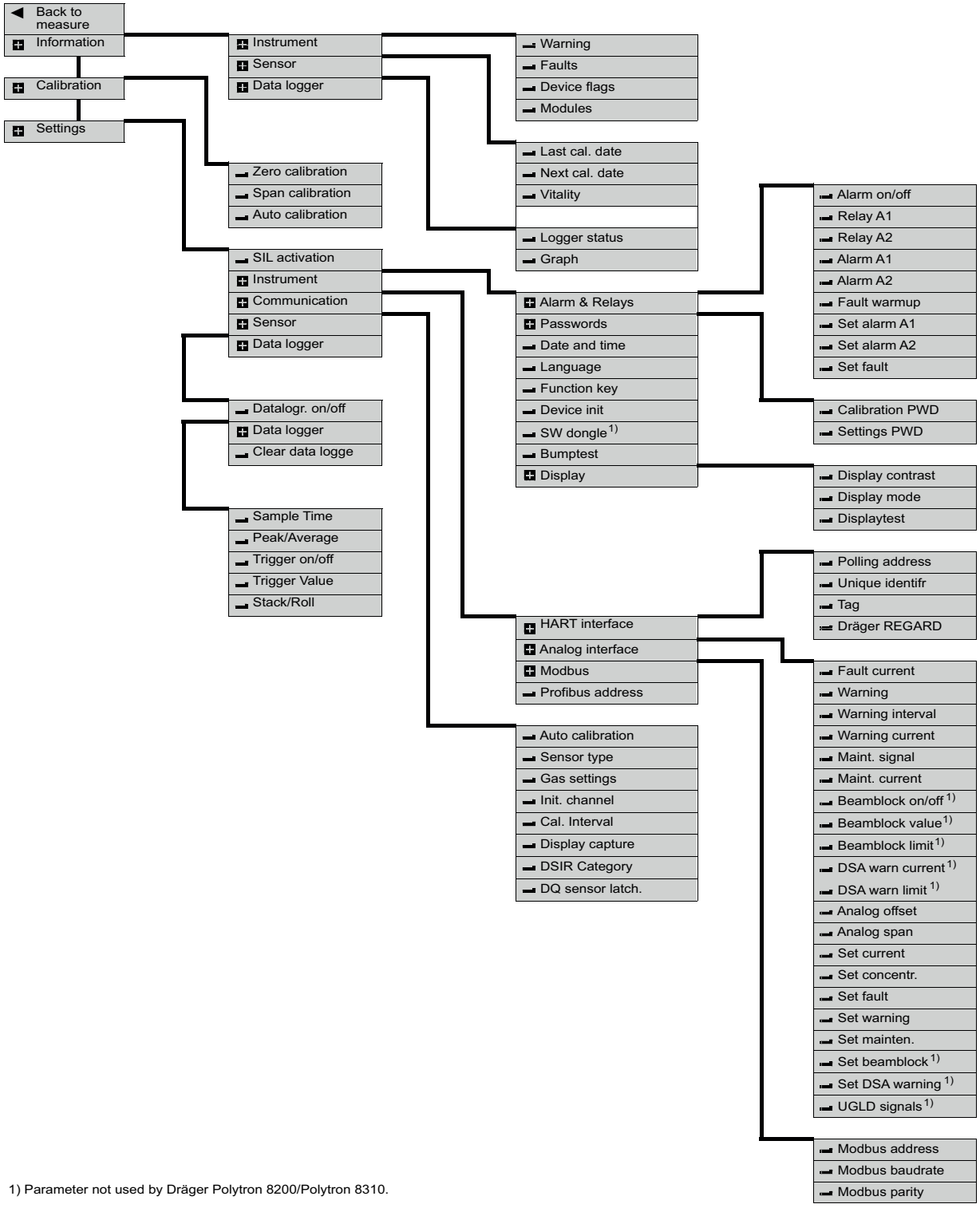
7.5.5 Menu overviews

Polytron 8100



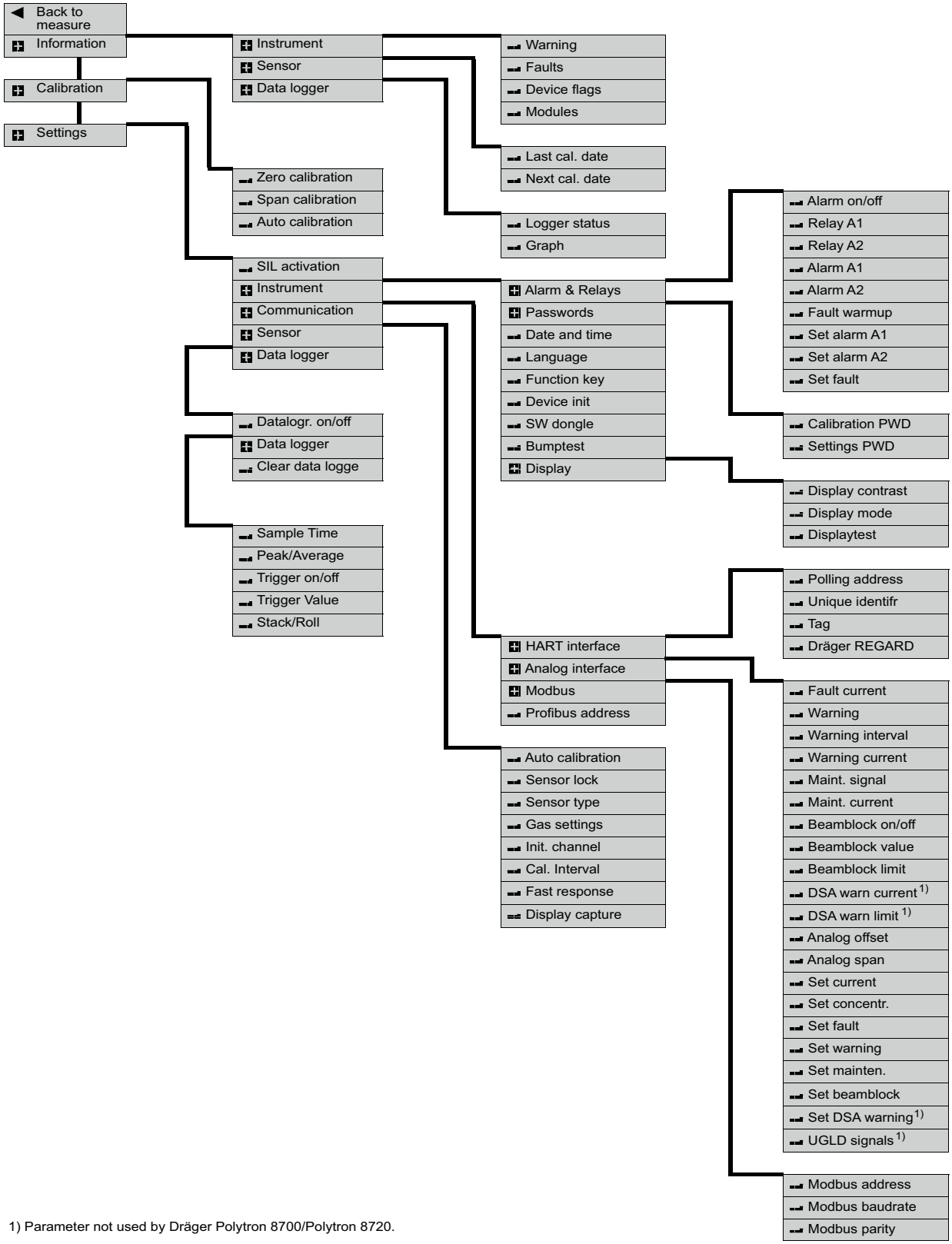
1) Parameter not used by Dräger Polytron 8100.

Polytron 8200, Polytron 8310



1) Parameter not used by Dräger Polytron 8200/Polytron 8310.

Polytron 8700, Polytron 8720



1) Parameter not used by Dräger Polytron 8700/Polytron 8720.

7.6 Information on operation with a Dräger SensorAlive

– If a menu is accessed on the transmitter or certain errors are set, the Dräger SensorAlive does not perform a LifeTest.
– The Dräger SensorAlive can suppress the instrument calibration for a certain period of time (H_2S sensor: 30 minutes).
– If a high level of accuracy is required for the duration of the LifeTests, the time on the transmitter should be regularly checked and adjusted as necessary.
– The menu entries for the Dräger SensorAlive are only displayed if a Dräger SensorAlive is connected. The dongle functions are also visible in this case, but are not active.

8 Calibration

8.1 General information

– To ensure proper operation, adjust the zero-point first and then the sensitivity. If these procedures are performed in the incorrect order, adjustment cannot be continued due to software settings.
– If the intended operation is at high altitudes, the display value will be lower than that at sea level (reduced partial pressure). New span adjustment is recommended if the altitude or the ambient pressure changes. The factory adjustment is set to sea level.
– Dräger recommends adjusting instruments with the gas to be detected. This method is more accurate than a surrogate gas adjustment. A surrogate gas adjustment may only be performed as an alternative if a measured gas adjustment is not possible.
– Sensors for methane and hydrogen should only be adjusted with measured gas and not with surrogate gas.
– For the Polytron 8310 IR: Also observe the information in the instructions for use for the DrägerSensor IR[1].

During adjustment, the measurement accuracy of the sensor is checked and adjusted with a known test gas concentration. Adjustment must be performed on a regular basis. The length of the adjustment intervals depends on the ambient conditions in which the sensor is operated.

Ambient conditions and aging results in sensor drift. Sensor drift reduces the display accuracy of measured gases. Adjustment restores this display accuracy. Shorter adjustment intervals must be selected depending on the extent of the drift.

To gauge the ambient conditions for new installations, selecting short adjustment intervals and documenting the drift is recommended. The system operator should define the adjustment interval length with the aid of the collected data.

If a Dräger SensorAlive is used, the drift is compensated and can be read out.

Under normal conditions, Dräger recommends the following adjustment intervals[2]:
– Electrochemical sensors (EC): 6–12 months[3]
– Catalytic sensors (CAT): 4 months
– Infrared sensors (IR): 6–24 months[3]

8.2 Test gases

Please refer to the instructions for use provided for the respective sensor for the test gas properties (e.g. relative humidity, concentration). If there is no information provided relating to relative humidity, dry test gas can be used for the adjustment. The humidity of the test gas is not relevant for O_2 sensors.

Depending on the type of adjustment, various types of test gas are used.

Zero gas

The zero gas is a test gas used for adjustment of the zero-point of a sensor. Nitrogen (N_2) is used for O_2 and CO_2 sensors. With other sensors, ambient air can be used once it is free from disruptive contamination and the measured gas.

Adjustment gas

The adjustment gas is a test gas used for adjustment of the sensitivity of a sensor. The adjustment gas is a known concentration of the measured gas, diluted with clean air and nitrogen. Adjustment gas is not required for O_2 sensors, as oxygen from the ambient air is used.

8.3 Gas flow for adjustments

The gas flow varies according to each sensor.

EC sensor, CAT sensor	0.5 L/min ± 10 %
All other sensors	0.5 L/min - 2 L/min

The gas flow should correspond with the ambient conditions during operation (e.g. duct measurement with flow higher than 2 L/min)

8.4 Preparing for adjustment

General information

⚠ WARNING
Health hazard due to test gas
Inhaling test gas may risk health or lead to death.
► Do not inhale test gas.
► Observe risks and security statements related to the test gas (Refer to data sheets and instructions figuring on calibration devices).

1) 9023981 (English), 9033555 (Bulgarian, Romanian), 9023984 (Spanish, Portuguese), 9023986 (Danish, Norwegian), 9033556 (Czech, Croatian), 9033809 (Chinese), 9023985 (Hungarian, Polish), 9023982 (French), 9033557 (Slovak, Slovenian), 9033558 (Greek, Turkish), 9023987 (Italian, Dutch), 9023983 (Finnish, Swedish), 9023843 (German)

2) Observe the instructions for use for the sensor.
3) For applications in accordance with EN 45544-1 and EN IEC 62990-1, the adjustment interval must not exceed 6 months.

⚠ CAUTION
Triggering alerts by test gas
Applied test gas may trigger alerts.
► Make sure that test gas is no longer applied after calibration.

Prerequisites
– The sensor warm-up phase has been completed (see "Commissioning the gas detector", page 15).
– The date and time have been set (see "Setting date and time", page 29).
– If a Dräger SensorAlive is used, the last LifeTest must be sufficiently long ago (see the instructions for use of the sensor).

Special feature of the Polytron 8310
Dräger recommends carrying out an automatic zero calibration on the sensor before adjustment of the zero-point. This resets the zero-point tracking of the DrägerSensor IR, and the full tracking range is available.
1. Turn off the alarm activation for the gas detector (see "Turning the alarms on and off", page 30).
2. Use the calibration adapter to apply nitrogen, synthetic air, or clean air to the sensor and wait until a stable measured value is shown.
3. Set the magnetic wand on the area marked with the ⇩0 symbol (inside of the black border) on the surface of the sensor shell and hold it in place for at least 5 seconds. After 5 seconds, the sensor output signal switches to the display of the calibration signal (display change by approx. –10 %LEL) for as long as the magnetic wand is held in place. At the same time, a zero calibration of the optical measurement system is automatically performed.
4. Remove the magnetic wand. After 30 seconds, the instrument exits the automatic zero calibration routine. To confirm the automatic zero calibration, the output signal switches back to the calibration signal (display change to approx. –10 %LEL). This signal is also displayed for the same length of time as when starting the automatic zero calibration routine.
5. Turn on the alarm activation for the gas detector.

Polytron 8100, Polytron 8200, Polytron 8310
See figure B on the fold-out page.

Adjustment equipment:
– Dräger pressure regulator (1), use a stainless steel pressure regulator for reactive gases
– Dräger calibration adapter (2) (part number 6810536)
– Hose (3)
– Dräger test gas cylinder (4)

Preparing adjustment:
1. Connect the pressure regulator to the test gas cylinder.
2. Mount the calibration adapter on the sensor.
3. Connect the hose to the plug nipple connection.
4. Open the menu (see "Opening menus", page 18).

Polytron 87x0 IR
See figure B on the fold-out page.

Adjustment equipment:
– Dräger pressure regulator (1), use a stainless steel pressure regulator for reactive gases
– Dräger calibration adapter (5) (part number 6811610)
– Hose (3)
– Dräger test gas cylinder (4)

Preparing adjustment:
1. Connect the pressure regulator to the test gas cylinder.
2. Fit the calibration adapter to the splash guard so it snaps into place.
   This does not apply for mounting on ducts or if a process adapter or process cuvette is used (see installation instructions for the corresponding PIR 7x00 accessory).
3. Ensure that the sealing surfaces around the openings of the splash guard are clean. The insect guard does not have to be removed.
4. Connect the hose to the plug nipple connection.
5. Open the menu (see "Opening menus", page 18).

8.5 Zero calibration

8.5.1 General information

Ambient air can be used to calibrate the zero-point of the sensor instead of nitrogen or synthetic air only if the ambient air is known to be free of the target gas and any other gas to which the sensor may be cross-sensitive (as listed on the sensor data sheet). In this case, no cylinder or calibration adapter is needed for the zero calibration.

⚠ WARNING
Calibration fault at zero calibration
Insufficient ambient air flow may cause calibration errors.
► Make sure that the ambient air flow to the sensor is sufficient.

Polytron® 8100 EC-specific:

For Oxygen (O_2) sensors a zero calibration does not change any value in the firmware or sensor. Thus, the zero calibration function can be used to check the correct zero reading when Nitrogen is applied to the sensor. The Polytron 8100 EC will indicate a fault state if a zero check fails with a deviation of more than 0.6 Vol% O_2 from zero. In case of a fault, repeat the zero check or change the sensor if necessary. Use Nitrogen (N_2) for verification.

Polytron® 8200 CAT-specific:

Sensors must not be calibrated with pure nitrogen. Catalytic sensors need oxygen to work properly.

Polytron® 8720 IR-specific:

For Polytron 8720 IR (with PIR 7200 to detect carbon dioxide), only Nitrogen or Synthetic Air without any CO_2 content may be used for a zero calibration.

8.5.2 Performing a zero calibration

ℹ Calibration can be aborted at any time. To abort calibration select ***back***.

Prerequisites:
– Sensor has finished the warm-up phase
– Calibration is prepared.

Calibrate the zero-point as follows:
1. Select ***Calibration*** > ***Zero calibration*** and confirm.
   ⇒ The maintenance signal is transmitted via the analog interface. No alarms or fault relays are activated and the 🔧 symbol is displayed.
   ⇒ The message ***Apply zero gas*** is displayed.
2. Apply Synthetic Air or Nitrogen if ambient air cannot be used.
   a. Set the gas flow corresponding to the sensor used (see "Gas flow for adjustments", page 22)
3. Select ***Next*** and confirm.
   ⇒ The current value is displayed.

ℹ After 15 minutes without confirmation, the instrument reverts to the calibration menu without performing a calibration.

After the test gas has been applied to the sensor for 3 minutes and the displayed value is stable perform calibration.
4. Select ***calibrate*** and confirm.
   ⇒ The message ***please wait...*** is displayed.
   ⇒ The new current value is displayed.
5. Select ***Next*** and confirm.
6. Turn off the gas flow and remove the calibration adapter from the sensor or disconnect the hose.
   If the current value is not within the alarm range:
7. Select ***Next*** and confirm.
   ⇒ The instrument returns to the calibration menu.

8.6 Span calibration

8.6.1 General information

Polytron® 8310 IR-specific:

Due to the design of the DSIR gas sensor, the output signal of the gas sensor is limited to 45 %. . . 55 % of the internal supply voltage. If the gas concentrations increase further after the maximum sensor output signal has been reached, this does not lead to an increase of the values displayed on the instrument response transmitted to the central device. In case of substances with particularly low calibration factors and/or manual configuration of a high span calibration factor at the sensor, this may already happen at concentrations below 100 %LEL. For substitute gas calibrations, correct triggering of the alarm should therefore be checked with a test gas concentration corresponding to the alarm threshold. If necessary, the measuring range that can be displayed can be increased by reducing the sensor output signal as required with subsequent calibration on the instrument (see chapter "Manual span calibration of the output signal" in the instructions for use of the DSIR gas sensor).

8.6.2 Performing a span adjustment

ℹ Calibration can be aborted at any time. To abort calibration select ***back***.

Prerequisites:
– Adjustment is prepared.
– The zero-point has been adjusted.
– Specifically for all Polytron 8xx0 except the Polytron 8100 EC:
  The last valid zero adjustment was no longer than 24 hours ago.

Adjust the sensitivity as follows:
1. Select and confirm ***Calibration*** > ***Span calibration***.
   ⇒ The maintenance signal is transmitted via the analog interface. No alarms or fault relays are triggered and the 🔧 symbol is displayed.
   ⇒ The parameters for the adjustment gas are displayed, e.g.:[1)]
   Gas : H_2S
   Unit: ppm
   Concentr.: 25
2. If the displayed parameters do not match the target gas, adjust the parameters:
   a. Select and confirm ***Gas***.
   b. Select and confirm the adjustment gas from the list.
   c. Select and confirm ***Unit***.
   d. Select and confirm the unit of measurement from the list.
   e. Select and confirm ***Conc.***.
   f. Set the concentration of the adjustment gas.
3. If the settings are correct:
   a. Select and confirm ***Next***.
      ⇒ A message like ***Gas flow ON H_2S*** is displayed.
4. Apply adjustment gas.
   a. Set the gas flow corresponding to the sensor used (see "Gas flow for adjustments", page 22).
5. Select and confirm ***Next***.
   ⇒ The current value is displayed

ℹ After 15 minutes without confirmation, the instrument returns to the adjustment menu without performing an adjustment.

After the test gas has been applied to the sensor for 3 minutes and the displayed value is stable, perform adjustment.[2)]:
6. Select and confirm ***Next***.
   ⇒ The message ***please wait...*** is displayed.
   ⇒ The newly detected (current) value is displayed.

1) Not applicable for all sensors (see "Measuring mode", page 16).
2) For LC sensors, the test gas must be applied for at least 6 minutes.

7. Select and confirm ***Next***.
8. Turn off the gas flow and remove the calibration adapter from the sensor or disconnect the hose.

   If the current value is not within the alarm range:
9. Select and confirm ***Next***.
   ⇒ The instrument returns to the adjustment menu.

8.7 Automatic calibration

8.7.1 General information

Automatic calibration includes the zero calibration and a subsequent span calibration. It is an alternative to manually carrying out the zero and span calibration.

Not all sensors and gases support automatic calibration. If the function is not available, perform the calibration manually.

8.7.2 Perform automatic calibration

i After 24 hours, zero calibration is not up-to-date any more. Thus, automatic calibration cannot be performed unless zero calibration is performed again.

i Calibration can be aborted at any time. To abort calibration select ***back***.

Prerequisites:

– Automatic calibration is enabled.
– Sensor has finished the warm-up phase.
– Calibration is prepared.

Perform the automatic calibration as follows:

1. Apply Synthetic Air or Nitrogen if ambient air cannot be used.
2. Select ***Calibration*** > ***Auto calibration*** and confirm.
   ⇒ The message ***please wait...*** is displayed and the instrument automatically performs the zero calibration.
   ⇒ In the case of an O_2 sensor, ***Fresh air cal.*** is displayed.

   i The Maintenance signal is transmitted by the analog interface, no alarm or fault relays are switched and the symbol is displayed.
3. After a successful zero calibration, the span calibration is started.
   ⇒ The parameters for the gas are displayed, e. g.:[1)]
   Gas : H_2S
   Unit: ppm
   Concentr.:25
4. If the displayed parameters do not match the target gas, adjust the parameters:[2)]
   a. Select ***Gas*** and confirm.
   b. Select the calibration gas from the list and confirm.
   c. Select ***Unit*** and confirm.
   d. Select the unit of measurement from the list and confirm.
   e. Select ***Conc.*** and confirm.
   f. Set the concentration of the calibration gas.
5. If settings are correct:
   a. Select ***Next*** and confirm.
      ⇒ A message like ***Gas flow ON H_2S*** is displayed.
6. Apply calibration gas.
   a. Set the gas flow corresponding to the sensor used (see "Gas flow for adjustments", page 22)
7. Select ***Next*** and confirm.
   ⇒ The current value is displayed

   i After 15 minutes without confirmation, the instrument reverts to the calibration menu without performing a calibration.
8. Once the current value is stable, the instrument automatically performs the span calibration.
9. After a successful calibration, the new current value and the message ***Value OK?*** are displayed.
   - If not, select Redo and confirm to perform the calibration again.
   - If the value corresponds the target value, proceed.
10. Turn off the gas flow and remove the calibration adapter from the sensor or disconnect the hose.
11. Select ***Accept value*** and confirm to finish the calibration. The instrument returns to the calibration menu.

9 Troubleshooting

9.1 Faults

Number	Cause	Remedy
001, 003 - 004, 012 - 014, 020 - 024, 043, 060, 067	Serious instrument fault, various causes.	Have the instrument checked by DrägerService.
002, 025 - 027, 030 - 034, 041, 042, 044, 050, 052, 081, 085	Serious data error in the instrument, various causes.	Reset the instrument to factory settings. If the fault occurs again: Have the instrument checked by DrägerService.
005	Supply voltage is out of range.	Check the power supply.
010	4 to 20 mA interface cable not connected.	Check the 4 to 20 mA interface connection. If operated as a stand-alone instrument without a central controller, wire pin 3 to pin 4.

1) Not applicable for all sensors (see "Measuring mode", page 16).
2) Only possible for certain sensors.

Number	Cause	Remedy
011	Serious instrument fault, various causes.	Have the instrument checked by DrägerService. If the fault occurs again: Check the load or the cables.
045	Instrument does not detect any sensor.	Check the connections. If the fault occurs again: Have the instrument checked by DrägerService.
051, 054	Faulty zero adjustment.	Perform zero adjustment.
055	Faulty span adjustment.	Perform span adjustment.
076, 080 - 084	Instrument fault.	Check the electrical connections. If the fault occurs again: Have the instrument checked by DrägerService.
090	Sensor lock feature is activated. A sensor with a different part number has been connected.	Use a sensor with the same part number or deactivate the sensor lock feature.
105	Instrument fault.	Have the instrument checked by DrägerService.
137, 64, 91	Instrument fault.	Turn the instrument off and back on. If the fault occurs again: Have the instrument checked by DrägerService.

Only for Polytron 8100 EC with Dräger SensorAlive

Number	Cause	Remedy
220	Sensor opening is clogged.	Clean the sensor opening or replace the dust filter. Then confirm the clogged sensor in the menu (see "Dräger SensorAlive settings", page 36).
221	Sensor sensitivity is less than 40 % (calculated value).	Adjust or replace the sensor.
222	Gas value is too high after electrolysis due to a fault.	Replace the sensor or contact DrägerService.
223	Sensor sensitivity is too low.	Adjust or replace the sensor.
224	Conditioning current is not within the permissible range.	Replace the sensor or contact DrägerService.

Only for Polytron 87x0 IR

Number	Cause	Remedy
064, 071	Communication fault.	Check connection to PIR 7x00.
083	PIR 7x00 optics dirty.	Clean PIR 7x00 optics.
086	Supply voltage outside range	Check supply voltage.
087	4 to 20 mA fault at PIR 7x00 sensor.	Check 4 to 20 mA connection to PIR 7x00.
094, 095	Data error in the instrument.	Reset the sensor to factory default settings. If this error occurs again: Have the instrument checked by DrägerService.
096	SIL password does not match with PIR 7x00.	Enter password again.

9.2 Warnings

Number	Cause	Remedy
101	Data logger in Stack mode is 100 % full and is not logging any more data.	Have the instrument checked by DrägerService.
102	Data logger in Stack mode is 90 % full.	Download the data as soon as possible and clear the data logger.
103, 106	Data error in the instrument. Some dongle functions like the data logger, sensor test, etc. may no longer be available.	Reset the instrument to factory settings. If this error occurs again: Have the instrument checked by DrägerService.
104	Date or time setting not valid.	Set the date and time.
105	Instrument fault.	Have the instrument checked by DrägerService.
107	Battery for data memory empty.	Have the instrument checked by DrägerService.
110, 111, 112	The SW dongle has been removed without first being deactivated.	Deactivate the SW dongle.
113	Alarms inhibited.	Activate the alarms.
164, 165	Sensor warm-up phase not yet complete. Increased measurement errors must be expected.	Wait until the sensor warm-up phase has ended. Do not adjust the sensor before it is fully warmed-up.

Number	Cause	Remedy
167, 170	Adjustment interval expired.	Readjust the instrument.

Only for Polytron 8100 EC

Number	Cause	Remedy
163	Low EC sensor vitality	Replace sensor.
171	Negative reading. Value below range minimum.	Recalibrate zero point.

Only for Polytron 8100 EC with Dräger SensorAlive

Number	Cause	Remedy
320	Communication with the sensor failed. Diagnosis and gas generator no longer work.	Remove the sensor, do not use it for approx. 1 day and reinsert it. Check the firmware version and have it updated by DrägerService if necessary. Replace the sensor.
321	Evaluation of the sensor data failed. The sensor cannot perform or evaluate a LifeTest (preconditions are not met).	Change the time of the LifeTest or set the repeat profile to "Flexible" (see "Dräger SensorAlive settings", page 36). If the warning occurs again, contact DrägerService.
322	Sensor data set is faulty.	Replace the sensor.
323	Sensor data set is incompatible.	Contact DrägerService.
324	Sensor sensitivity is less than 50 % (calculated value).	Adjust the sensor and prepare for sensor replacement (e.g., order the spare part).
325	Sensor sensitivity is less than 40 % (calculated value).	Adjust or replace the sensor.
326	Sensor cannot be adjusted during a LifeTest and for a certain period afterwards.	To be able to perform a scheduled adjustment, the LifeTest can be temporarily inhibited in PolySoft via the Inhibit mode.
327, 330, 344, 347	Gas generator is not working.	Adjust or replace the sensor.
331	Gas generation failed.	Adjust the sensor.
332	Sensor is in the safe state. No LifeTests are performed (group warning).	Determine the cause and rectify it.
333	Real time clock of sensor is not working correctly.	Set the clock.
334	Sensor synchronization not complete.	Wait until synchronization is complete. Depending on the condition of the sensor, this state may last for several minutes. Have the firmware updated by DrägerService if necessary.
336	Internal sensor checks return faulty results.	Restart the system.
337	Transmitter firmware must be updated.	Contact DrägerService.
340	Sensor is synchronized after the system is restarted.	Wait until synchronization is complete.
342	Temperature difference between the two temperature measurement points is too great.	Wait and check if the LifeTest is evaluated, or replace the sensor.
347	Configuration failed due to an interruption in the communication between the transmitter and the sensor.	Reconfigure the sensor and check the configuration.
350	Gas generator is in the start-up phase.	Wait until the start-up phase has ended. During the start-up phase, the error detection and clogging detection functions are not active.
352	Sensor self-test failed.	Replace the sensor or contact DrägerService.
353	Sensor is temporarily in Inhibit mode. No LifeTests are performed during this time.	Inhibit mode can be exited manually via PolySoft or is exited automatically.
354	Error during system start.	Perform manual restart.
355	Sensor firmware is incompatible with the hardware.	Have the firmware updated by DrägerService.
356	Hardware data faulty.	Perform a restart or replace the sensor.
357	Sensor was set to the safe state manually, e.g., to perform a firmware update.	To exit the mode, restart the sensor.

Only for Polytron 87x0 IR:

Number	Cause	Remedy
163	Sensor temperature is very high.	
171	Zero drift too high.	Perform zero calibration.
172	PIR 7x00 optics dirty.	Clean PIR 7x00 optics.
173	Zero calibration expired for span calibration	Perform zero calibration.
182	Automatic calibration not possible with PIR 7200.	Perform new zero and span calibration

10 Maintenance

– The maintenance intervals must be established for each individual installation. Depending on safety considerations and application specific conditions the instrument is used in, these might need to be shortened.

Every 6 months:

– Inspection by trained service personnel.
– Check signal transmission to the controller (see "Testing the analog interface", page 33).
– Check LEDs as well as the triggering of the alarm device (see "Testing alarms/relays", page 31).

Regularly:

– Perform calibrations, see 8 Calibration

10.1 Performing a bump test and checking the response time (t90)

A bump test checks the response time without setting off an alarm.

1. Select and confirm ***Settings*** > ***Instrument*** > ***Bump test***.
   ⇒ The Maintenance symbol is displayed.
   ⇒ The analog output is set to the maintenance signal.
2. Apply a known gas concentration to the sensor.
3. Check the response time and compare it with the t90 value indicated in the corresponding sensor data sheet.
4. Press [OK] to return to measurement.

10.2 Sensor replacement

⚠ WARNING
Faulty Calibration
Faulty Calibration may cause inaccurate readings.
► If the sensor is replaced, all settings and parameters must be checked for correctness.
► Check calibration to verify proper operation.

10.2.1 Polytron® 8100 EC

A sensor can be replaced in the hazardous, classified area, without interrupting the power supply.

Sensor lock feature

If a sensor of the same type (same part number) was previously installed, the instrument-specific configuration is retained (gas type, measuring range, test gas, adjustment interval, etc.). Otherwise, the factory default settings of the new sensor are uploaded and will overwrite the instrument-specific configuration. This can be prevented if the sensor lock feature is activated (see "Setting sensor lock", page 35).

Sensor change function

The ***Change Sensor*** menu function lets you replace a sensor during operation without triggering a fault signal at the controller. It also ensures that all sensor data in the microprocessor can be saved in the sensor memory (EEPROM) before disconnecting the sensor.

Replacing a sensor

See figure C on the fold-out page.

A sensor can be replaced at any time.

1. Select ***Settings*** > ***Sensor*** > ***Change Sensor*** and confirm.
   ⇒ The maintenance signal is generated on the 4-20mA interface.
   ⇒ The display shows the following: ***Please remove the sensor***.
   ⇒ The Maintenance symbol is displayed.
2. Replace the old sensor with a new sensor:
   a. Loosen the locking screw (2) (2 mm Allen screw).
   b. Unscrew bayonet ring (3)
   c. Insert the sensor (4) into the opening and turn until it engages in the gas detector. This does not damage the sensor plug.
   d. Secure the sensor with the associated bayonet ring (3).

   ℹ For Dräger SensorAlive, a different bayonet ring needs to be used than for other EC sensors.

   e. Tighten the locking screw (2) so that the bayonet ring cannot come loose (required for installations in zone 22).
      ⇒ The display shows the following: ***Loading data, please wait***
3. If necessary, apply the label included with the sensor to the instrument. This identifies the gas type from a distance, even if the power has failed.
4. When the sensor data are loaded, the display shows: ***Data loaded***.
5. Select ***Back to menu*** and confirm.
   ⇒ The maintenance signal on the 4-20mA interface remains pending until the sensor is warmed-up.

   Maximum warm-up time of a new sensor: see the Instructions for Use for the sensor. For Oxygen: EN 50104 approvals.

6. Check calibration. If necessary, calibrate the instrument (see "Calibration", page 22).
7. Check the installation requirements and instrument for SIL status.
   See sections "Explosion proof (Ex d) installation - without Docking Station" to "Installation of sensors or sensing heads".

10.2.2 Polytron® 8200 CAT, 8310 IR, 87x0 IR

Replacing a sensor

1. If necessary, set the maintenance current for the analog interface.
2. Turn off power to the instrument or declassify the area according to local regulations.
3. Loosen set-screw and unscrew lid from instrument.
4. Pull out the PCB unit.
5. Turn PCB unit over and pull off the sensor connector.
6. Unscrew the sensor.
7. Insert the sensor wires through he threaded port of the enclosure.

⚠ WARNING
Explosion hazard!
The enclosure openings must be sealed to prevent ignition of hazardous atmospheres in case of an ignition inside the enclosure.

► Five threads must be engaged to ensure explosion proof status.

8. Screw in the sensor and tighten with the correct tightening torque (min. 266 in-lbs / min. 30 Nm)
9. Polytron® 8200 CAT-specific:
   Twist the sensor wires together. If necessary, fit a cable tie to keep the wires tight.
10. Plug the sensor connector back into socket.
11. Place PCB unit back into the enclosure.
12. Screw the cover on the instrument until it is correctly engaged (min. ≥44 in-lbs / min. ≥5 Nm) and tighten the locking screw.
13. Apply power to the instrument, if necessary.
    ⇒ The maintenance signal on the 4-20mA interface remains pending until the sensor is warmed-up.

    Maximum warm-up time of a new sensor: see the Instructions for Use for the sensor.
14. Check calibration. If necessary, calibrate the instrument (see "Calibration", page 22).
15. Check the installation requirements and instrument for SIL status.
    See sections "Explosion proof (Ex d) installation - without Docking Station" to "Installation of sensors or sensing heads".

10.3 Performing a display test

1. Select and confirm ***Settings*** > ***Instrument*** > ***Display*** > ***Displaytest***.
2. Select and confirm ***Enable***.
   ⇒ The information on the display is shown inverted. All LEDs are turned on.
   When the menu is exited, the inversion is ended.

11 Instrument settings

11.1 Setting passwords

1. Select ***Settings*** > ***Instrument*** > ***Passwords*** the desired password and confirm.

Calibration PWD	Access to zero and span calibration
Settings PWD	Access to all configuration parameters

2. Select the line for editing the password and confirm.
3. Set the password and confirm.
4. Select ***Confirm*** and confirm with [OK].

11.2 Setting date and time

1. Select ***Settings*** > ***Instrument*** > ***Date and time*** and confirm.
2. Select the line for editing the date or time and confirm.
3. Select ***Confirm*** and confirm with [OK].

11.3 Setting language

1. Select ***Settings*** > ***Instrument*** > ***Language*** and confirm.
2. Select a language from the list and confirm.

11.4 Configuring function key

1. Select ***Settings*** > ***Instrument*** > ***Function key*** and confirm.
2. Select a function and confirm.

Graph	The measurements of the past 15 minutes are displayed as a time/concentration graph.
Faults	Fault messages are displayed in plain text.
Warnings	Warning messages are displayed in plain text.
Bump test	The bump-test allows applying gas to the sensor without generating an alarm. The maintenance signal is transmitted. After 15 minutes or tapping [OK] again ends the bump test and the instrument returns to normal operation.
Sensor vitality[1)]	Shows the remaining sensor vitality.

1) Only with diagnostic dongle

11.5 Resetting to default settings

This function resets the instrument to factory default settings.

1. Select ***Settings*** > ***Instrument*** > ***Device init*** and confirm.
2. Select ***Confirm*** and confirm with [OK].

11.6 Changing the display contrast

1. Select ***Settings*** > ***Instrument*** > ***Display*** > ***Display contrast*** and confirm.
2. Change the contrast and confirm.

11.7 Changing the display mode

1. Select ***Settings*** > ***Instrument*** > ***Display*** > ***Display mode*** and confirm.
2. Select the desired mode and confirm.

Standard	Shows the standard display.
Non-display	Shows the start screen and the applicable symbols.

If an alarm is triggered, the display shows the current gas concentration and the red LED blinks regardless of the selected display mode.

11.8 Relays

11.8.1 Combinations of latching and alarm acknowledgment

The following examples give an overview of relay acknowledgment combinations.

	Latching (Manual relay reset)	**Non-Latching** (Automatic relay reset after alarm condition cleared)
Acknowledgeable	Relay reset possible at any time.	
Non-acknowledgeable	Relay reset not possible before alarm condition cleared.	
Pre-acknowledgeable	Alarm acknowledgment possible before the alarm condition cleared. The relay resets automatically after the alarm condition cleared.	

Latching and non-latching signals are not time-limited. Latching signals stay active until they are acknowledged. Non-latching signals stop as soon as the triggering condition clears.

11.8.2 Configuring relay A1 or A2

This function defines whether the alarm relay is energized during normal operation or energized at an alarm condition.

1. Select ***Settings*** > ***Instrument*** > ***Alarm***> ***Relay A1*** or ***Relay A2*** and confirm.
2. Select the desired option and confirm.

Normally energized	The relay contact is energized during normal operation and changes if an alarm is triggered. At a loss of power this triggers an alarm (fail-safe).
Energ. on alarm	If an alarm is triggered, the relay contact is energized.

11.8.3 Setting fault relay warm-up 1

This function is used to set operation of the fault relay during warm-up 1 to indicate the warm-up 1 state on the relay output.

1. Select ***Settings*** > ***Instrument*** > ***Alarm***> ***Fault warm up*** the desired option and confirm.

static	The fault relay triggers a connected alarm indicator permanently. The orange LED is lit continuously.
dynamic	The fault relay switches state for 9 seconds. *Example:* – A horn is connected to fault relay output Normally Open. – Relays are configured as normally energized. ⇒ The horn and the orange LED of the transmitter are 1 second active and 9 seconds in-active.

11.9 Alarm configuration

11.9.1 Turning the alarms on and off

1. Select ***Settings*** > ***Instrument*** > ***Alarm*** > ***Alarm on/off***.

Enable	Alarm activation is switched on.
Disable	Alarm activation is switched off. LEDs, relays and interfaces do not indicate an alarm condition. The 4-to-20 mA interface transmits the maintenance signal. The value determined and the ! symbol will be shown. The fault relay indicates an error.

2. Select and confirm ***Enable*** or ***Disable***.

11.9.2 Configuring alarms

1. Select and confirm ***Settings*** > ***Instrument*** > ***Alarm*** > ***Alarm A1*** or ***Alarm A2***.
   The current alarm threshold is displayed.
2. Accept the displayed suggestion or change the following settings (confirm the configuration steps one after the other with ***Next***):
   a. Set the value for the alarm threshold.

b. Set the alarm direction.

Rising	The alarm direction is called rising if the gas concentration has to exceed a certain value to activate an alarm.
Falling	The alarm direction is called falling if the gas concentration has to fall below a certain value to activate an alarm.

c. Set the latch mode.

Latching	Once the alarm threshold is reached, the instrument will trigger the alarm. It will remain in the alarm state even if the gas concentration no longer meets the alarm condition. To clear a latching alarm, it must be acknowledged.
Non-latching	The alarm state clears if the gas concentration no longer meets the alarm condition.

d. Set the acknowledgement mode.

Acknowledgeable	The alarm relay and the alarm LED can be reset before the alarm condition clears.
Non-acknowledgeable	The alarm relay and the alarm LED cannot be reset until the alarm condition clears.
Pre-Acknowledgeable	The alarm state can be acknowledged before the alarm condition clears. The alarm relay and the alarm LED stay active until the alarm condition clears, however.

e. Set the hysteresis value.
The hysteresis function defines a range in which a triggered relay will remain in its state until the gas concentration is outside the defined range again. Example: The alarm threshold is set to 40 ppm and hysteresis to 3 ppm. The alarm remains active until the value falls below 37 ppm. This prevents relays from closing and opening in rapid succession at an alarm threshold ("chattering").

ℹ If the direction of an alarm is changed (from falling to rising or vice versa), the hysteresis value must be checked and corrected if necessary.

⇒ A confirmation screen shows all settings.

f. Select ***Confirm*** and confirm with OK.

✓ The new settings are saved.

11.9.3 Testing alarms/relays

These functions change the statuses of a relay and an LED for test purposes (e.g., to check the function of alarm devices connected to the relay). The ℹ symbol is displayed. After exiting this function, the statuses of the relay and the LED will automatically return to their previous statuses.

1. Select and confirm the desired alarm condition via ***Settings*** > ***Instrument*** > ***Alarm***.

Set Alarm A1	Simulates a pre-alarm
Set alarm A2	Simulates a main alarm
Set fault	Simulates a fault signal

2. Select and confirm ***Enable***.
⇒ The fault relay is de-energized and the 4 to 20 mA interface is set to fault current. The yellow LED is lit, the symbol for maintenance is shown.
When the menu is exited, the simulation is ended.

11.10 Data logger settings

11.10.1 Displaying graph

The last 15 minutes as a time/concentration graph can be viewed.

1. Select ***Information*** > ***Data logger*** > ***Graph***

11.10.2 Switching data logger on or off

1. Select ***Settings*** > ***Data logger*** > ***Datalogr. on/off*** and confirm.
2. Select ***Enable*** or ***Disable*** and confirm.

11.10.3 Setting the sampling time

This function defines how often a value is stored.

1. Select ***Settings*** > ***Data logger*** > ***Datalogr. on/off*** > ***Sample time*** and confirm.
2. Select the sample time and confirm.

11.10.4 Setting peak/average

This function determines which value is stored.

1. Select ***Settings*** > ***Data logger*** > ***Data logger*** > ***Peak/Average*** and confirm.
2. Select ***Peak*** or ***Average*** and confirm.

Peak	The maximum value (if monitoring falling concentrations, the minimum value) of the measured concentrations within the selected sampling time is stored.
Average	The average value of all the measured concentrations within the selected sampling time is stored

11.10.5 Switching triggering mode on or off

This function allows storing values from a certain value on.

1. Select ***Settings*** > ***Data logger*** > ***Data logger*** > ***Trigger on/off*** and confirm.
2. Select ***On*** or ***Off*** and confirm.

On	Measurements are stored if they exceed a threshold beyond the trigger value (relative to the last stored value).
Off	Measurements within the sampling time are stored.

11.10.6 Setting trigger value

This function defines the trigger threshold to store a value.The trigger value is defined as a percentage of the full scale deflection.

Example: A trigger value of 2 % at full scale deflection of 500 ppm will only store values if they deviate by 10 ppm (relative to the previously stored value).

1. Select ***Settings*** > ***Data logger*** > ***Datalogr. on/off Trigger value*** and confirm.
2. Set the trigger value and confirm.

11.10.7 Setting stack/roll function

1. Select ***Settings*** > ***Data logger*** > ***Data logger*** > ***Stack/Roll*** and confirm.
2. Select ***Stack*** or ***Roll*** and confirm.

Roll	Once the capacity of the data logger is reached, the old data are overwritten by new values.
Stack	Once the capacity of the data logger is reached, no more data can be stored. The instrument issues a warning.

11.10.8 Clearing data logger

This function deletes the stored data.

1. Select ***Settings*** > ***Data logger*** >***Clear data logger*** and confirm.
2. To clear the data-logger, select ***Confirm*** and confirm with [OK].

12 Interface settings

12.1 4-20mA interface

The current output of the instrument during normal operation is between 4 and 20 mA and is proportional to the detected gas concentration.

Polytron 8xx0 uses different current values to indicate various modes of operation. The factory default settings are user adjustable for application specific requirements. This follows the NAMUR recommendation NE43.

12.1.1 Full scale deflection

Polytron® 8100 EC, 87x0 IR and 8200 CAT LC only

Some sensors offer an adjustable full scale deflection to limit the measuring range for the 4-20 mA interface.

The full scale deflection (FSD) sets an endpoint within the measuring range of the sensor. If the gas concentration reaches this endpoint, the 4-20mA interface transmits 20mA.

Example: Required range 0 to 500 ppm CO (e.g. part number 6809605 default 300 ppm, range min/max = 50/1000 ppm).Select full scale deflection as 500 ppm. The analog output will be linear between 4 mA = 0 ppm and 20 mA = 500 ppm.

12.1.2 Setting fault current

This function defines the current for the fault signal.

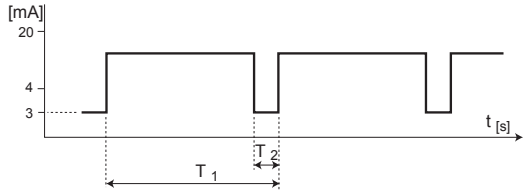
1. Select ***Settings*** > ***Communication*** > ***Analog interface*** >***Fault current*** and confirm.
2. Select the line for editing the current and confirm.
3. Set the current and confirm.
   ⇒ The setting for the ***Fault current*** is displayed.
4. Select ***Confirm*** and confirm with [OK].

12.1.3 Information regarding the warning signal

To transmit a warning signal via the analog interface, it must be switched on.
The warning signal alternates between the warning current and the measurement current.

– Warning current (interval T2)
– Measurement current (interval T1-T2)

Time intervals and the warning current are configurable.



12.1.4 Switching the warning signal on or off

1. Select ***Settings*** > ***Communication*** > ***Analog interface*** > ***Warning*** and confirm.
2. Select ***Enable*** or ***Disable*** and confirm.

12.1.5 Setting warning interval

1. Select ***Settings*** > ***Communication*** > ***Analog interface*** > ***Warning interval*** and confirm.
2. Set times for warning intervals T1 and T2 and confirm.

12.1.6 Setting warning current

1. Select ***Settings*** > ***Communication*** > ***Analog interface*** > ***Warning current*** and confirm.
2. Set the current and confirm with [OK].

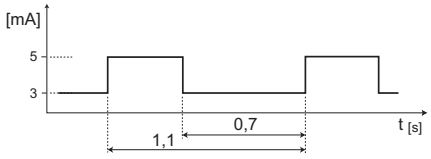
12.1.7 Setting the warnings of the Dräger SensorAlive

This menu can be used to set various parameters of the warning current:

- To set the warning current, select ***Settings*** > ***Communication*** > ***Analog interface*** > ***DSA warn current*** and enter the value.
- To set the threshold value for the warning, select ***Settings*** > ***Communication*** > ***Analog interface*** > ***DSA warn limit*** and enter the value.
- To enable or disable the warning, select ***Settings*** > ***Communication*** > ***Analog interface*** > ***Set DSA warning*** and confirm.
  Select ***Enable*** or ***Disable*** and confirm.

12.1.8 Setting maintenance signal

1. Select ***Settings*** > ***Communication*** > ***Analog interface*** > ***Maint. signal*** and confirm.
2. Set the signal type and confirm.

static	A constant current that can be configured.
dynamic	A square wave signal with the following characteristics: 

12.1.9 Setting the maintenance current

The maintenance current can only be set if the maintenance signal has been set to static.

1. Select ***Settings*** > ***Communication*** > ***Analog interface*** >***Maint. current*** and confirm.
2. Set the current and confirm.

12.1.10 Setting analog offset

This function adds an offset to the analog output at 4 mA. The offset adjusts the current at 4 mA without affecting the 20 mA set point.

1. Select ***Settings*** > ***Communication*** > ***Analog interface*** >***Analog offset*** and confirm.
2. Select the line for editing the offset (range: -0.5 to 0.5 mA, SIL: -0.1 to 0.1) and confirm.
3. Set the current and confirm.
   ⇒ The setting for the ***Analog offset*** is displayed.
4. Select ***Confirm*** and confirm with [OK].

12.1.11 Setting analog span

This function adjusts the analog output at 20 mA without affecting the 4 mA set point.

1. Select ***Settings*** > ***Communication*** > ***Analog interface*** > ***Analog span*** and confirm.
2. Select the line for editing the offset (range: -0.5 to 0.5 mA, SIL: -0.1 to 0.1) and confirm.
3. Set the current and confirm.
   ⇒ The setting for the ***Analog span*** is displayed.
4. Select ***Confirm*** and confirm with [OK].

12.1.12 Testing the analog interface

These functions change the current of the analog interface for test purposes (e.g., to check the programming of the controller). It may be necessary to temporarily inhibit the alarms at the controller to avoid false alarms. After exiting these functions, the currents automatically return to the maintenance signal. During the test, the maintenance symbol is displayed.

- To set the current or concentration:

1. Select the desired option via ***Settings*** > ***Communication*** > ***Analog interface***.

Set Current	This function sets the current to any value between 0 and 22 mA. Offset current and analog span are not used in this function.
Set concentr.	This function sets the current to any measured value between 0 ppm and full scale deflection.

2. Once the alarms at the controller are inhibited, confirm the message ***Inhibit all alarms*** with ***Next***.
3. Select the line for editing and confirm with [OK].
4. Set the desired value.
5. Select and confirm ***Next***.
6. Select the desired option:

Set concentr. out / ***set current out***	This function simulates the preset measured value or test current value. During the test, the maintenance symbol is displayed.
concentration off / ***current off***	This function aborts the transmission of the preset test value.

7. Select and confirm ***Next***.
   ⇒ The function is aborted.
8. Once the alarms at the controller are enabled again, confirm the following message: ***Enable all alarms***.

- To set the test signal:

1. Select the desired test via ***Settings*** > ***Communication*** > ***Analog interface***.

Set fault	This function sets the current to the fault current.
Set warning	This function sets the current to the warning current.
Set mainten.	This function sets the current to the maintenance current.

2. Once the alarms at the controller are inhibited, confirm the message ***Inhibit all alarms***.
3. Select and confirm ***Enable*** or ***Disable***.

12.1.13 Beam block

This function is only available for Polytron 87x0 IR (using the sensor PIR 7000/7200).

The factory default setting for the beam block function is off.

If turned On, the beam block signal will be transmitted on the analog interface if the optics of the PIR 7000/7200 sensor is “dirty”. The optics of the PIR 7000/7200 can become “dirty” if there is a build-up of deposits on the optical surfaces. However, if the gas concentration rises to a level above beam block limit, the instrument returns to normal operation.

If the build-up of deposits on the optical surfaces increases beyond the point where a measurement is possible, the instrument will go into fault.

- To set beam block signals on/off:

1. Select ***Settings*** > ***Communication*** > ***Analog interface*** and the desired option.

Beamblock on/off	This function switches the beam block on or off
Set beamblock	This function sets the current to the beam block warning current

2. Select ***Enable*** or ***Disable*** and confirm.

- To set beam block signals:

1. Select ***Settings*** > ***Communication*** > ***Analog interface*** and the desired option.

Beambl. current	This function defines the current for the beam block signal.
Beamblock limit.	This function defines the maximum limit if the beam block signal will be transmitted on the analog interface.

2. Select the current line for editing the current and confirm.
3. Set the current and confirm.
   ⇒ The setting for the beam block current is displayed.
4. Select ***Confirm*** and confirm with OK.

12.2 HART interface

12.2.1 Setting the polling address

The polling address (query address) configures the gas detector for analog operation or multidrop operation.

HART command: #6 (Write Polling Address)

1. Select ***Settings*** > ***Communication*** > ***Hart interface*** > ***Polling address***.
2. Set the polling address and select ***Confirm***.

0	Activates analog operation.
1 to 15	Activates multidrop operation. The 4 to 20 mA interface is deactivated and set to a constant current of approx. 1 mA.

ℹ Configure all instruments on a line with different polling addresses. It is advised to choose a sequence starting with 1.

12.2.2 Displaying the Unique Identifier

The Unique Identifier (unique HART address) must be known for almost all HART addressing commands.

HART commands:

– #0 (Read Unique Identifier)
– #11 (Read Unique Identifier associated with Tag)

1. Select ***Settings*** > ***Communication*** > ***Hart interface*** > ***Unique identifier***.
2. The Unique Identifier is displayed.

12.2.3 Setting the HART tag

The HART tag (measurement point identification) is used to mark a measurement point.

1. Select ***Settings*** > ***Communication*** > ***Hart interface*** > ***Tag***.
2. Set the HART tag and select ***Confirm***. The HART tag can consist of up to 8 alphanumeric characters.

12.2.4 Setting the Dräger REGARD protocol

This function switches between different HART protocols.

1. Select ***Settings*** > ***Communication*** > ***Hart interface*** > ***Dräger REGARD***.
2. Select the software version corresponding to the REGARD controller.

12.3 Digital interfaces

Information on configuring the other interfaces is provided in the following documents:

Interface	Document
PROFIBUS PA	9033782
Foundation Fieldbus FF	9033783
Modbus RTU	9033781

13 Sensor settings

13.1 Switching automatic calibration on or off

1. Select ***Settings*** > ***Sensor*** > ***Auto calibration*** and confirm.
2. Select ***Enable*** or ***Disable*** confirm with [OK].

13.2 Capture range

The capture range blanks out measurement fluctuations. Measurement fluctuations are minor variations in measured values (such as signal noise, variations in concentration). Those variations do not change the transmitted or displayed value. Measured values within this range will be displayed with the capture value. Measured values outside the capture range will be displayed with the actual measured value.

Capture value (offset)

The capture value is displayed continuously, as long as the measured value ranges between the upper and lower capture value limits.

Upper capture value limit

The upper capture value limit marks the upper limit of the range in which the capture value is displayed.

Lower capture value limit

The lower capture value limit marks the lower limit of the range in which the capture value is displayed.

13.2.1 Setting capture range

1. Select ***Settings*** > ***Sensor*** > ***Display Capture*** and confirm.
2. Set offset in the first window.
3. Set the lowest value of the capture range and confirm with ***Next***.
4. Set the highest value of the capture range and confirm with ***Next***.
5. Check all the values and confirm with ***Next***.

13.2.2 Switching capture range off

1. Select ***Settings*** > ***Sensor*** > ***Display Capture*** and confirm.
2. Set offset in the first window.
3. Set the lowest value of the capture range to 0 and confirm with ***Next***.
4. Set the highest value of the capture range to 0 and confirm with ***Next***.
5. Check all the values and confirm with ***Next***.

13.3 Resetting sensor

This function resets the sensor to factory default settings.

1. Select ***Settings*** > ***Sensor*** > ***Init. channel*** and confirm.
2. Select ***Confirm*** and confirm with [OK].

13.4 Setting calibration interval

After the calibration interval expires, the instrument will issue a warning that the calibration is past due.

1. Select ***Settings*** > ***Sensor*** > ***Cal. interval*** and confirm.
2. Set the calibration interval and confirm with [OK].

13.5 Setting sensor lock

This point is only valid for Polytron 8100 EC and Polytron 87x0 IR.

1. Select ***Settings*** >***Sensor*** > ***Sensor lock*** and confirm.
2. Select ***On*** or ***Off***.

On	The instrument rejects any sensor whose part number does not match the part number of the previously installed sensor.
Off	The instrument accepts any suitable sensor, uploading the default settings of this sensor. However, this overwrites any customized settings with the default settings of the new sensor.

13.6 Software dongles for EC sensors

13.6.1 Installing the dongle

1. Switch off power to the instrument or declassify the area according to the local regulations.
2. Loosen set-screw and unscrew lid from instrument.
3. Insert the dongle with the Dräger logo facing upwards in the slot of the PCB unit, See figure D on the fold-out page..
4. Position the PCB unit back cover and close the instrument (see "Closing the gas detector", page 13).

13.6.2 Deactivating dongles

This function deactivates a dongle to safely remove the dongle or if the dongle is faulty.

A dongle can only be reactivated by cycling the power to the instrument.

1. Select ***Settings*** > ***Instrument*** > ***SW dongle*** > and the dongle to be deactivated, and confirm.
2. Select ***Deactivation func.***. The selected dongle is deactivated.

13.7 Sensor settings Polytron® 8100 EC

13.7.1 Sensor self-test

This function is only active if the sensor-test dongle or diagnostic dongle is installed. If the sensor does not pass the self-test, a warning or error message is issued.

Setting regular sensor self-tests

This feature triggers the sensor self-test at regular intervals. The instrument then routinely checks that the sensor is functioning correctly.

1. Select and confirm ***Settings*** > ***Sensor*** > ***Set Sensortest***.
2. Select and confirm ***Enable*** or ***Disable***.

Starting sensor test manually

This function starts a single sensor self-test.

1. Select ***Settings*** > ***Sensor*** > ***Sensor test*** and confirm.
2. ***Start sensor test*** is displayed.
3. Select ***Confirm***.

✓ The test result is displayed.

13.7.2 Gas settings

This function sets the gas type, measuring range, and units of measurement. Different settings are possible depending on the installed sensor.

1. Select and confirm ***Settings*** > ***Sensor*** > ***Gas settings***.
   ⇒ The current measured gas is displayed.
2. Select and confirm the measured gas from the list.
   ⇒ The current unit of measurement is displayed.
3. Select and confirm the unit of measurement from the list.
   ⇒ The current full scale deflection is displayed.
4. For certain EC sensors only: Set and confirm the full scale deflection.
   ⇒ The new full scale deflection is displayed.
5. Select and confirm ***Next***.
   ⇒ An overview of the new gas settings is displayed.
6. After reviewing it, select ***Back to menu*** or ***Confirm***.

Back to menu	Select Back to menu to exit the function without changes and confirm with [OK].
Confirm	Select Confirm to accept the settings and confirm with [OK].

13.7.3 Dräger SensorAlive settings

This menu lets you select various parameters that define the behavior of the Dräger SensorAlive:

- To activate or deactivate the LifeTest functions of the sensor, select and confirm ***Settings*** > ***Sensor*** > ***SensorAlive*** > ***DSA activation***.
  Select and confirm ***Enable*** or ***Disable***.
- To acknowledge a clogged sensor, select ***Settings*** > ***Sensor*** > ***SensorAlive*** > ***Ack faults***.
- To enable or disable fault detection, select and confirm ***Settings*** > ***Sensor*** > ***SensorAlive*** > ***Fault detection***.
  Select and confirm ***Enable*** or ***Disable***.

The ***SensorAlive*** menu has the following sub-menus:

– LifeTest
– Sensitivity monitoring

The following parameters can be set in the LifeTest sub-menu:

- To define when to start a test run, select ***Time***.
  Enter a time and confirm. The test run is started when this time is reached on the transmitter.

  ℹ Transmitters do not support an automatic daylight savings changeover.

- To define the value to be output via the transmitter during the LifeTest, select ***Output behavior***.
  Select and confirm ***Fixed***, ***Maintenance*** or ***Measurement val.***.
- To define whether retests are to be carried out in a test run if a LifeTest has a negative test result, select ***Repetition mode***.
  Select and confirm ***Flexible***.
  If ***Static*** is selected, no retests are carried out and a new test run is carried out at the indicated time instead.
- To define when to abort a LifeTest, select ***Cancel threshold***.
  Enter a value and confirm.

  ℹ During a LifeTest, test gas is applied to the Dräger SensorAlive. This causes the measured value to rise. To prevent an alarm from being triggered, the measured value is not transmitted for a maximum of 15 minutes by default. The behavior during a LifeTest can be configured in the ***Output behavior*** menu, however. Independent of this, the sensor detects a gas leak if the measured gas concentration is greater than the gas concentration expected as a result of the LifeTest. The difference corresponds to the concentration of the gas leak and is compared with the value entered in ***Cancel threshold***. If this value is exceeded, the LifeTest is immediately aborted. The sensor switches back to measuring mode and the transmitter once again outputs a measured value. If relays are used, these are tripped on the transmitter and, where applicable, an alarm is triggered.

The following parameters can be set in the ***Sensitiv. check*** sub-menu:

- To define whether a warning needs to be issued, select and confirm ***Activation***.
- To define when a warning must be output, select and confirm ***Alert < 50%*** or ***Alert < 40%***.

13.8 Sensor settings Polytron® 8200 CAT / 8310 IR

13.8.1 Sensor type

This function defines the sensor type installed.

1. Select ***Settings*** > ***Sensor*** > ***Sensor type*** and confirm.
2. Select the sensor type and confirm.

13.8.2 Gas settings

This function sets the unit of measurement.

For LC sensors, this function also sets the full scale deflection.

1. Select ***Settings*** > ***Sensor*** > ***Gas settings*** and confirm.
2. Select the unit of measurement from the list and confirm.
   ⇒ For DQ sensors and DSIR:
   An overview of the new gas settings is displayed.
   Continue with step 4.
   ⇒ For LC sensors:
   The current full scale deflection is displayed. Continue with step 3.
3. Set the full scale deflection and confirm (only for LC sensors).
   ⇒ An overview of the new gas settings is displayed.
4. After review, select ***Back to menu*** or ***Confirm***.

Back to menu	Select Back to menu for leaving the function without changes and confirm with [OK].
Confirm	Select Confirm to accept the settings and confirm with [OK].

13.8.3 Setting the DQ sensor latching

This feature is only available if there are no relays installed.
This feature is used to determine whether the DQ sensor must be acknowledged after measuring a concentration higher than 100 %LEL.
This setting does not apply for LC sensors.

1. Select and confirm ***Settings*** > ***Sensor*** > ***DQ Sensor latch.***.
   ⇒ The current setting is displayed.
2. Select and confirm ***Enable*** or ***Disable***.

⚠ WARNING
Explosion Hazard
If sensor latching is disabled and an alarm indicating an explosion hazard is acknowledged, the instrument informs the end user of such hazard by having the red LED on the display being continuously lit.

► Before acknowledging an over range, ensure that the gas concentration has fallen under 100%LEL.

⚠ WARNING
Explosion Hazard possible
Operation is non-compliant with BVS type examination.
If DQ sensor latching is disabled, for safe operation in accordance with BVS 13 ATEX G 001 X, the central controller must support this function.

► Make sure that over range latching is active at the display unit.

13.9 Sensor settings Polytron 8310 IR

13.9.1 Changing the gas category

The DrägerSensor IR can measure gases and vapors that belong to the methane, propane, or ethene (ethylene) gas categories. A gas category must be set for the DrägerSensor IR depending on which target gas is to be measured. For the assignment of gases and vapors to the gas categories, see the DrägerSensor IR documentation.

13.9.2 Changing the gas category

Prerequisites

– The gas detector was turned on less than an hour ago.
– The automatic zero calibration on the sensor was performed less than an hour ago (see "Special feature of the Polytron 8310", page 23).
– The gas concentration measures by the gas detector is below 10 %LEL (apply zero gas to the sensor if necessary).

1. Turn off the alarm activation for the gas detector (see "Turning the alarms on and off", page 30).
2. Select ***Settings*** > ***Sensor*** > ***DSIR Category*** and confirm.
   ⇒ The gas category is displayed on the instrument.

ℹ The next steps are carried out on the sensor.

3. To select the gas category on the sensor, tap the ⇧S or ⇩0 symbol with the magnetic wand.
   ⇒ START is displayed on the gas detector.
4. Remove the magnetic wand.
   ⇒ The sensor switches to an output signal that represents the gas category currently set:
   Output signal 20 %LEL: Methane gas category
   Output signal 40 %LEL: Propane gas category
   Output signal 60 %LEL: Ethene (ethylene) gas category
5. This output signal is maintained for 30 seconds. During this period, the next gas can be selected by placing the magnetic wand on the area marked with the ⇧S symbol.
   ⇒ The sensor's output signal then switches to the value that matches the newly selected gas category. If no further input with the magnetic wand takes place for more than 30 seconds, the setting is saved.
6. Check the span calibration on the gas detector (see "Span calibration", page 24)
7. Turn on the alarm activation for the gas detector (see "Turning the alarms on and off", page 30).

ℹ The setting on the sensor can result in an incorrect gas category being displayed in the ***DSIR Category*** menu item or that a change in gas category is no longer visible.

13.10 Sensor settings Polytron® 87x0 IR

13.10.1 Gas settings

This function sets the gas type, measuring range and units of measurement. Only certain sensors support these settings.

1. Select ***Settings*** > ***Sensor*** > ***Gas settings*** and confirm.
   ⇒ The current measured gas is displayed.
2. Select a measured gas from the list and confirm.
   ⇒ The current unit of measurement is displayed.
3. Select the unit of measurement from the list and confirm.
   ⇒ If the unit of measurement is set to %LEL, %UEG, or %LIE, the category will be displayed. Continue with step 4.
   ⇒ Otherwise the current full scale deflection is displayed. Continue with step 6.
4. Select a category and confirm.
5. Set the LEL value and confirm.
6. Set the full scale deflection and confirm.
   ⇒ The new full scale deflection is displayed.
7. Select ***Next*** and confirm.
   ⇒ An overview of the new gas settings is displayed.
8. After review, select ***Back to menu*** or ***Confirm***.

Back to menu	Select Back to menu for leaving the function without changes and confirm with [OK].
Confirm	Select Confirm to accept the settings and confirm with [OK].

9. Check the alarm settings after changing the category or the LEL value.

14 Factory default settings

14.1 Unchangeable settings for relay, LED, and alarm

	Setting
Fault relay:	Energized / Normally Open
Yellow LED:	Lit if a fault message is available
Red LED:	Single flash if A1 alarm is present. Double flash if A2 alarm is present. If an alarm is configured as acknowledgeable and the alarm is acknowledged, single/double flash changes to continuously lit.
Alarm Hierarchy	A2 overrides A1 on the LED. However, the A1 and A2 relays operate independently. (Example: if A1 is acknowledgeable, A2 is not, and the gas concentration is such that it triggers A1 and A2: acknowledging the alarm will cause the A1 relay to release. But the red LED continues its double flash as long as the state that triggers the A2 alarm persists.

14.2 Settings which can be changed via the menu

Menu	Default setting	Range
Relay active on alarm / No alarm	Active on alarm	On/Off
A1 alarm: direction	Rising (falling for O_2 sensors)	Falling/Rising
A2 alarm: direction	Rising	
A1 latch mode	Non-latching	Latching/Non-latching
A2 latch mode	Latching	
A1 acknowledge mode	Acknowledgeable	Acknowledgeable/Non-acknowledgeable/Pre-acknowledgeable
A2 acknowledge mode	Not acknowledgeable	
Normal operation A1 relay	Energized	Energized/Not energized
Normal operation A2 relay		
Calibration password	_ _ _ 1	
Settings password	_ _ _ 2	
LCD setting	On	On/Off
SIL status	Off	On/Off
Language	EN	DE / EN / FR / ES / RU / ZH
Automatic calibration	Off	On/Off
Function key	Error	Graphic, fault, warning, vitality, bump test

Interface	Default setting	Range
Fault current	1.2 mA	0 to 3.5 mA
Warning	Off	On/Off
Warning current	3.0 mA	0 to 3.5 mA
Warning cycle interval T1	10 s	5 to 60 s

Interface	Default setting	Range
Warning cycle interval T2 (warning current)	1 s	1 to (T1-1) s
Maintenance signal	static	Static/dynamic
Maintenance current	3.4 mA	0 to 3.5 mA
Analog offset	0 mA	-0.5 to 0.5 mA
Sensitivity analog output	0 mA	-0.5 to 0.5 mA
HART® address	0	0 to 15
Modbus address[1)]	126	2-126
Modbus parity[1)]	even (default)	even, odd parity, no parity
Modbus baud rate[1)]	9600 bps	9600 or 19200 bps
PROFIBUS® address[1)]	126	2-126

1) Fieldbus interfaces are not in accordance with the BVS 13 ATEX G001 X. Using the fieldbus interface no relays are available.

14.3 Sensor-specific values

Further specifications are provided in the instructions for use for the relevant sensor.

14.3.1 Polytron 8100 EC

Menu	Default setting	Range
Alarm A1	Depending on sensor	
Alarm A2	Depending on sensor	
Hysteresis for A1 alarm in rising direction	0	0 to A1
Hysteresis for A2 alarm in rising direction	0	0 to A2
Hysteresis for A1 alarm in falling direction	0	0 to full scale deflection -A1
Hysteresis for A2 alarm in falling direction	0	0 to full scale deflection -A2
Calibration interval [days]	Depending on sensor	0 to 720

14.3.2 Polytron 8100 EC with O_2 sensors

Menu	Default setting	Range
Display capture range offset	20.9 Vol% (O_2)	0 to 25 Vol% (O_2 LS) 0 to 100 Vol% (O_2)
Display capture range low	-0.25 Vol% (O_2)	0 to -0.75 Vol%
Display capture range high	0.25 Vol% (O_2)	0 to 0.75 Vol%
Full scale value	25 Vol% (O_2, O_2 LS)	5 to 25 Vol% (O_2 LS) 5 to 100 Vol% (O_2)

14.3.3 Polytron 8100 EC with Dräger SensorAlive

Menu	Default setting	Range
DSA warn current	2.0 mA	0 mA to 3.5 mA
DSA warn limit	Depending on sensor	
DSA activation	On	On / Off
LifeTest		
Time	Depending on sensor	
Output behavior	Fixed	Fixed/maintenance/measured value
Repeat profile	Flexible	Flexible/static
Cancel threshold	Depending on sensor	
Senor monitoring		
Activation	Depending on sensor	
Alarm <50 %	Off	Off/warning
Alarm <40 %	DSA warning	Off/DSA warning/error
Fault detection	On	On / Off

14.3.4 Polytron 8200 CAT DrägerSensor® DQ

Menu	Default setting	Range
Alarm A1	20 %LEL	1 to 100 %LEL
Alarm A2	40 %LEL	
Hysteresis for alarm A1 with increasing direction	1 %LEL	0 to A1
Hysteresis for alarm A2 with increasing direction	1 %LEL	0 to A2
Adjustment interval [days]	180	0 to 360
Display capture range offset	0 %LEL	-5 to 4 %LEL
Display capture range low	-5 %LEL	-5 to 0 %LEL
Display capture range high	2 %LEL	0 to 4 %LEL
Full scale value	100 %LEL	Not possible to set range

14.3.5 Polytron 8200 CAT DrägerSensor® LC

Menu	Default setting	Range
Alarm A1	2.0 %LEL	0.1 to 10 %LEL
Alarm A2	4.0 %LEL	
Hysteresis for alarm A1 with increasing direction	0.1 %LEL	0 to A1
Hysteresis for alarm A2 with increasing direction	0.1 %LEL	0 to A2
Full scale value	10 %LEL	5 to 10[1] % LEL 1 to 10 %LEL
Adjustment interval [days]	180	0 to 360
Display capture range offset	0 %LEL	-0.5 to 0.4 %LEL
Display capture range low	-0.5 %LEL	-0.5 to 0 %LEL
Display capture range high	0.2 %LEL	0 to 0.4 %LEL

1) For firmware versions < 3.0.0

14.3.6 Polytron 8310 IR

Menu	Default setting	Range
Alarm A1	20 %LEL	1 to 100 %LEL
Alarm A2	40 %LEL	
Hysteresis for alarm A1 with increasing direction	1 %LEL	0 to A1
Hysteresis for alarm A2 with increasing direction	1 %LEL	0 to A2
Adjustment interval [days]	180	0 to 360
Display capture range offset	0 %LEL	-3 to 4 %LEL
Display capture range low	-3 %LEL	-3 to 0 %LEL
Display capture range high	2 %LEL	0 to 4 %LEL
Full scale value	100 %LEL	Not possible to set range

14.3.7 Polytron 8700 IR

Type 334

Menu	Default setting	Range
Test gas	Methane	
Test gas units	%LEL	
Test gas concentrations	50 %LEL	
Alarm A1	20 %LEL	0.01 to 100 Vol% with %LEL = 0.3 to 100 %LEL
Alarm A2	40 %LEL	
LEL type	NIOSH	IEC / PTB / NIOSH / configurable
Measured gas	Methane	
Units of measured gas	%LEL	Vol.% / PPM / %LEL / %LIE
Full scale value	100 %LEL	20 to 100 %LEL
Beam block	Off	On/Off
Beam block current	2 mA	0 to 3.5 mA
Beam block limit	7.5 %LEL	0 to max. 15 %LEL[1]
Adjustment interval [days]	360	0 to 720

Menu	Default setting	Range
Response behavior	normal	normal / fast
Display capture range offset	0	The absolute values of the display capture range must be within these limits: -1000 to 2200 ppm (Methane type 334) -850 to 850 ppm (Propane type 334) -1200 to 1150 ppm (Ethylene type 334)
Display capture range low	-750 ppm (Methane) -315 ppm (Propane) -405 ppm (Ethylene)	
Display capture range high	750 ppm (Methane) 315 ppm (Propane) 405 ppm (Ethylene)	

1) The maximum limit of the beam block depends on the type of gas detector and the measured gas selected.

Type 340

Menu	Default setting	Range
Test gas	Propane	
Test gas units	%LEL	
Test gas concentrations	50 %LEL	
Alarm A1	20 %LEL	0.01 to 100 Vol% with %LEL = 0.3 to 100 %LEL
Alarm A"	40 %LEL	
LEL type	NIOSH	IEC / PTB / NIOSH / configurable
Measured gas	Propane	
Units of measured gas	%LEL	Vol% / PPM / %LEL / %LIE
Full scale value	100 %LEL	20 to 100 %LEL
Beam block	Off	On/Off
Beam block current	2 mA	0 to 3.5 mA
Beam block limit	2.5 %LEL	0 to max. 15 %LEL[1)]
Adjustment interval [days]	360	0 to 720
Response behavior	normal	normal / fast
Display capture range offset	0	The absolute values of the display capture range must be within these limits: -850 to 425 ppm (Propane type 340) -1800 to 2200 ppm (Methane type 340)
Display capture range low	-750 ppm (Methane) -85 ppm (Propane)	
Display capture range high	750 ppm (Methane) 85 ppm (Propane)	

1) The maximum limit of the beam block depends on the type of gas detector and the measured gas selected.

14.3.8 Polytron 8720 IR

Menu	Default setting	Range
Test gas	CO_2	
Test gas units	Vol%	
Test gas concentrations	4.0 Vol%	0.2 to 100 Vol%
Alarm A1	1 Vol%	0.01 to 100 Vol%
Alarm A2	2 Vol%	
LEL type	-	
Measured gas	CO_2	
Units of measured gas	Vol%	Vol% / ppm
Full scale value	10 Vol%	0.2 to 100 Vol%
Beam block	Off	On/Off
Beam block current	2 mA	0 to 3.5 mA
Beam block limit	0.1 Vol%	0 to 0.1 Vol%
Adjustment interval [days]	360	0 to 720
Response behavior	normal	normal / fast
Display capture range offset	340 ppm	The absolute values of the display capture range must be within these limits: -1000 to 1000 ppm (carbon dioxide)
Display capture range low	-200 ppm	
Display capture range high	200 ppm	

15 Disposal

This product must not be disposed of as household waste. This is indicated by the adjacent icon.
You can return this product to Dräger free of charge. For information please contact the national marketing organisations and Dräger.

Disposal of electrochemical sensors

⚠ WARNING
Danger of explosions and risk of chemical burns!
Sensor fluids may leak out and can cause acid burns.
► Do not dispose sensors in fire.
► Do not open with force.

16 Technical data

16.1 Measuring ranges

Sensor	Measuring range
Polytron 8100 EC with DrägerSensor® EC	Depending on sensor
Polytron 8200 CAT with DrägerSensor® DQ	0 to 100 %LEL
Polytron 8200 CAT with DrägerSensor®LC	0 to 10 %LEL[1)]
Polytron 8310 IR with DrägerSensor® IR	0 to 100 %LEL
Polytron 8700 IR with PIR 7000 infrared gas sensor	
Type 334 (IDS 01x1)	0 to 10,000 ppm[1)] 0 to 100 %LEL,[1)] 0 to (1.25 x LEL_{max}) Vol%,[1)2)] For CH4 (methane) 0 to 100 Vol%[1)]
Type 340 (IDS 01x2)	0 to 10,000 ppm[1)] 0 to 100 %LEL[1)] 0 to 5 Vol%[1)]
Polytron 8720 IR with PIR 7200 infrared gas sensor (IDS 01x5)	0 to 100 Vol%[1)]

1) For adjustable full scale deflection, see 14.3.
2) Range changes depending on the substance to be measured

16.2 Signal transmission to the controller

The measuring range and performance characteristics depend on the installed sensor (see the instructions for use for the installed sensor).

Frequency of measurement calculation: 1 x per second (update of display, analog interface and relays).

Analog signal	
Normal operation	4 ... 20 mA
Drift below zero	3.8 ... 4 mA
Over range	20 ... 20.5 mA
Instrument fault	≤ 1.2 mA
Fault on analog interface	> 21 mA
Maintenance signal	3.4 mA steady signal or 1 Hz modulation between 3 and 5 mA (selectable)

Resistance of the signal loop

Operating mode	Resistance range of the signal loop	Power supply range
Operation without HART® communication	0 to 230 Ω	at 10 V DC
	Rising linearly with the supply voltage from: 0 to 230 Ω at 10 V to 0 to 500 Ω at 16 V	10 to 18 V DC
	0 to 500 Ω	18 to 30 V DC
Operation with HART® communication	230 to 270 Ω	at 13 V DC
	Rising linearly with the supply voltage from: 230 to 270 Ω at 11 V to 230 to 500 Ω at 16 V	11 to 16 V DC
	230 to 500 Ω	18 to 30 V DC
HART® multidrop operation	230 to 500 Ω	10 to 30 V DC

When used in accordance with the metrological suitability test compliant with EN IEC 62990-1, EN IEC 60079-29-1 or EN 50104, the resistance must not exceed 300 ohms. Further information on installing the fieldbus interface is provided in document 9033783.

16.3 Cable specifications

For non-conduit installations, use shielded cables.

Analog and HART® connection with controller and power supply	
Power supply and signals	3-core shielded cable 24 - 12 AWG / 0.2 - 2.5 mm²
Relays	20 - 12 AWG / 0.5 - 2.5 mm²

Digital connection with controller	
Instruments with fieldbus interfaces and remote sensors must be installed with shielded cables.	
Modbus RTU	2-core or 3-core[1], ≥ 26 AWG
PROFIBUS PA Foundation Fieldbus	2-core, cable type A Wave impedance Rw: 135 - 165 Ω Capacitance / unit length C‘: < 30 pF/m Loop resistance R‘: 110 Ω/km Core diameter d: 0.64 mm Core cross section q: > 0.34 mm² Shield coverage: ≥ 90 %
Power supply	2-core, 24 - 12 AWG / 0.2 - 2.5 mm²

1) If the distance between the controller and the transmitter is very long (>1 km) and the power supplies of the controller and the transmitter are separate, interference or differential differences can occur. In this case, 3-core cabling with ground must be selected. Ground is then connected to the transmitter and looped through to the ground of the controller.

16.4 Power supply and relays

Relay rating[1] SPDT[2]	
230 V ~	0.1 A - 5 A
30 V ⎓, resistive load	0.1 A (minimum) - 5 A

1) For safety-related applications (SIL 2), the maximum contact rating is reduced (see Polytron® 8xx0 Safety Manual).
2) Single pole, double throw, (changeover electrical contacts)

Power supply Polytron 8xx0	
Operating voltage	10[1] to 30 V⎓ at the instrument
Inrush current	2.3 A for 2 ms at 24 V⎓,10 Ω resistor

1) At supply voltages of < 7 V DC the instrument provides a fault signal. The warning signal "undervoltage" depends on the connected load at the 4-20 mA output and the cable resistance. In case of lower load (e.g. 230 Ω), the fault relay drops out and the current output is 0 mA. In case of higher load (e.g. 500 Ω), warning message 011 is indicated.

Operating current	
Polytron® 8100 EC	
without relay, non-remote sensor	80 mA
with relay, remote sensor	100 mA
Polytron® 8200 CAT	
without relay, non-remote sensor	105 mA (DrägerSensor DQ) 130 mA (DrägerSensor LC)
with relay, remote sensor	145 mA (DrägerSensor DQ) 165 mA (DrägerSensor LC)
Polytron® 8310 IR	
without relay, non-remote sensor	145 mA
with relay, remote sensor	185 mA
Polytron® 87x0 IR	
without relay, non-remote sensor	330 mA
with relay, remote sensor	350 mA

16.5 General specifications

Polytron 8xx0 enclosure	
Enclosure material	Copper-free aluminum
Enclosure guard	NEMA 4X[1] IP 65/66/67[2]
Display	Resolution 128 x 64 pixels, backlit[3]

1) Polytron 8100 EC NEMA 4X enclosure guard pending.
2) The IP degrees of protection do not cover the detection of a gas, during or after exposure of the equipment to these conditions. In the event of dust deposits and contact with water through immersion or a jet of water, check the adjustment and functional integrity of the instrument.
3) There is only a limited visibility of the display at high temperatures (>65 °C).

16.6 Environmental parameters

Further sensor specifications and influences can be found in the instructions for use provided for the respective sensor.

The values for accessories and spare parts may deviate from the values given here. The exact values can be found in the corresponding manual.

Polytron 8xx0	
Values in accordance with explosion protection testing	
During operation:	
Pressure	23.6 to 32.5 in. Hg (800 to 1100 hPa)
Humidity	0 to 100 % RH, non-condensing
Temperatures	
Polytron 8100 EC	-40 to +70 °C (-40 to +158 °F)
Polytron 8200 CAT	-40 to +80 °C (-40 to +176 °F)
Polytron 8310 IR	-40 to +65 °C (-40 to +149 °F)
Polytron 87x0 IR	-40 to +80 °C (-40 to +176 °F)
Values according to performance approval	
During operation:	
Pressure	20.7 to 38.4 in. Hg (700 to 1300 hPa)[1)]
Humidity	0 to 95 % RH, non-condensing
Temperatures	
Polytron 8100 EC[2)]	-40 to +65 °C (-40 to +149 °F)
Polytron 8200 CAT	-40 to +80 °C (-40 to +176 °F)
Polytron 8310 IR	-40 to +65 °C (-40 to +149 °F)
Polytron 87x0 IR	-40 to +77 °C (-40 to +170 °F)
During storage:	
Pressure	26.5 to 32.4 in. Hg (900 to 1100 hPa)
Humidity	0 to 100 % RH, non-condensing
Temperature	-20 to +65 °C (-4 to +149 °F)
Recommended storage period	5 years
Values for relay option and installations with UL approval	
During operation:	
Temperatures	
Polytron 8200 CAT	-40 to +70 °C (-40 to +158 °F)
Polytron 87x0 IR	-40 to +70 °C (-40 to +158 °F)

1) Polytron 8200 CAT: 23.6 to 35.44 in. Hg (800 to 1200 hPa)
2) See 18.3, 18.3.2 and the instructions for use provided for the EC sensor for the constraints of the maximum specification.

16.7 Tightening torques

Instrument threads	
Enclosure cover	≥44 in-lbs / ≥5 Nm
Sensor	min. 266 in-lbs / min. 30 Nm
Blind plugs	min. 266 in-lbs / min. 30 Nm
Ports (for conduits or cable glands)	min. 443 in-lbs / min. 50 Nm
Docking Station blind plugs	62 in-lbs / 7 Nm
Docking Station cable glands	70 in-lbs / 8 Nm
Remote EC sensing head	177 in-lbs ±9 in-lbs / 20 Nm ±1 Nm
Field wiring terminals	
Power supply, signals and relays	4.4 - 7.0 in-lbs / 0.5 - 0.8 Nm
Grounding screw	10.6 in-lbs / 1.2 Nm

17 Accessories and spare parts

This chapter provides an overview of the components that are covered by the BVS 13 ATEX G 001 X- and PFG 14 G 001 X-type examination. Further parts are listed in the spare parts list or can be requested from DrägerService.

17.1 Polytron® 8xx0

Description	Part number
IRDA to PC interface	4544197
Magnetic wand with key chain	4544101
Dräger PolySoft, configuration software	8328600 / 8328639
EXd blind plug, stainless steel, 2 pcs.	4544897
Exd blind plug, galvanic steel, 3 pcs.	8344041

17.1.1 Docking station

Description	Part number
Docking Station Power Only Version	8344027
Docking Station Power, Relay (includes 2 cable glands)	8344028
Docking Station Fieldbus	8344029
Cable Gland Docking Station	6812868
Blind plug Docking Station	8344042

17.2 Polytron® 8100 EC

Description	Part number
Polytron 8100 4-20/HART printed circuit board	4544781
Polytron 8100 4-20/HART printed circuit board, relay	4544782
Bayonet ring	4544366
Bayonet ring for Dräger SensorAlive	6800132
Duct adapter for remote EC sensing head[1)]	8317617
Rod attachment for remote EC sensing head	4544213
Sensor-test dongle	8317619
Diagnostic dongle	8317860
Calibration adapter	6810536

1) May influence the measurement, e.g. extend the response time. Not covered by BVS 13 ATEX G 001 X and PFG 14 G 001 X.

17.3 Polytron® 8200 CAT

Description	Part number
Polytron 8200 PCB unit 4-20/HART	4544788
Polytron 8200 PCB unit 4-20/HART relay	4544789
PE calibration adapter, Europe	6806978
DQ remote calibration adapter	6812480
LC remote calibration adapter[1)]	6812482
21.50X14.50 membranes spare part set, 2 pcs.	8326840
Dust filters for DrägerSensor DQ, 10 pcs.	6810537
DQ process adapter	6812470
LC process adapter[1)]	6812465
Splash guard	6812510

1) not covered by performance approval.

17.3.1 CAT sensors

Description	Part number
DrägerSensor DQ NPT	6814150
DrägerSensor DQ NPT S[1)]	3701800
DrägerSensor LC NPT	6810675
Sensing head, Polytron SE Ex PR M1 DQ	6812711
Sensing head, Polytron SE Ex PR M2 DQ	6812710
Sensing head, Polytron SE Ex HT M DQ	6812720
DQ NPT aluminum remote sensor	3706933
DQ NPT steel remote sensor	3706934

1) The DrägerSensor DQ NPT S can also be used instead of the DrägerSensor DQ NPT.

17.4 Polytron® 8310 IR

Description	Part Number
Splash Guard	6810796
Process Adapter	6811330
Protection Labyrinth	6811135
Calibration adapter	6810859
PCB unit Polytron 8310 4-20/HART	4544788
PCB unit Polytron 8310 4-20/HART Relay	4544789

17.4.1 DSIR sensors

Description	Part number
DrägerSensor IR NPT	6811901
Sensing head, DrägerSensor IR complete set e	6811165
Sensing head, DrägerSensor IR complete set e2	6811265

17.5 Polytron® 87x0 IR

Description	Part number
Polytron 87x0 PCB unit 4-20/HART[1)]	4544795
Polytron 87x0 PCB unit 4-20/HART relay[1)]	4544796
PIR 7000 attachment set	6811648
PIR 7000 process cuvette, stainless steel	6811415
PIR 7000 SGR process cuvette	6813219
PIR 7000 / 7200 status indicator	6811625 / 6811920
PIR 7000 / 7200 splash guard	6811911 / 6811912
PIR 7000 / 7200 flowcell	6811490 / 6811910

Description	Part number
PIR 7000 / 7200 remote test adapter	6811630 / 6811930
PIR 7000 insect protection	6811609
PIR 7000 hydrophobic filter	6811890
PIR 7000 calibration adapter	6811610
PIR 7000 / 7200 POM process adapter (polyoxymethylene)	6811915
PIR 7000 assembly set	6811648
Terminal box Ex e	6811989
Terminal box Ex d	4520561
Magnetic wand	4544101

1) Check firmware compatibility of sensor and gas detector. Changing the PCB unit may require a firmware update. Contact Dräger for support.

17.5.1 Sensors

Check firmware compatibility of sensor and gas detector. Changing the sensor may require a firmware update. Contact Dräger for support.

Description	Part number
Dräger PIR 7000 type 334 (NPT)	6811822
Dräger PIR 7000 type 340 (NPT)	6811832
Dräger PIR 7000 334 (M25) complete set	6811825
Dräger PIR 7000 340 (M25) complete set	6811819
Dräger PIR 7200 (NPT)	6811572
Dräger PIR 7200 (M25) HART complete set	6812290

18 Performance Approvals

In combination with certain sensors, Polytron 8xx0 is performance approved based on the following standards:

– EU and Type Examination Certificates in line with EN 60079-29-1, EN 50104, EN 45544 and DIN IEC 62990-1. Issued by DEKRA Testing and Certification GmbH, Handwerkstr. 15, D-70565 Stuttgart.
– FM performance approval in line with ANSI/ISA-92.00.01 FM6340

For further information on sensor specifications and restrictions (e.g., measuring principles, performance, cross-sensitivity), refer to the instructions for use for the relevant sensor.

18.1 EU-TYPE Examination Certificate, BVS 13 ATEX G 001 X

Measurement of flammable gases and vapors mixed with air.

– Polytron 8200 CAT with DrägerSensor DQ
  Special conditions:
  - When streaming with air containing measured gas, measured values may increase by up to 32 %.
  - When operating with the DQ remote calibration adapter, measured values may increase by up to 70 %.
– Polytron 8200 CAT with DrägerSensor LC
  Approved with 10 %LEL full scale deflection.
  A connection to a controller with approved measuring function (e.g., REGARD® 7000) is required. Latching alarms for over range measured values must be activated at the controller.
– Polytron 8310 IR with DrägerSensor IR
– Polytron 8700 IR with PIR 7000 type 334 and 340

Measurement of oxygen (inertization)

– Polytron 8100 EC with DrägerSensor O_2 (6809720) and DrägerSensor O_2 LS (6809630) within a measuring range of 0-5...25 Vol% O_2.

Approved are:

– 4 to 20 mA interface
– Relay module
– Remote sensor
– HART
– Factory default full scale deflections

Not approved are the fieldbus interface and the data logger.

18.2 Type Examination Certificate, PFG 14 G 001 X

Measurement of oxygen (deficiency and excess oxygen)

– Polytron 8100 EC with DrägerSensor O_2 (6809720) and DrägerSensor O_2 LS (6809630) within a measuring range of 0–25 Vol% O_2.

Measurement of hydrogen sulfide

– Polytron 8100 EC with Dräger SensorAlive (6809630) within the following measuring ranges:
  - 0.5 - 100 ppm (Type HM)
  - 0 - 100 ppm (Type SM)

Measurement of carbon dioxide

– Polytron 8720 IR with PIR 7200 within the following measuring ranges:
  - 1 Vol% and 10 Vol% – EN 45544-2
  - 2000 ppm, 1 Vol% and 10 Vol% – EN 45544-3

Approved are:

– 4 to 20 mA interface
– Relay module
– Remote sensor

Not approved are:
– Fieldbus interface
– Data logger
– Only Polytron 8100 EC with Dräger SensorAlive: Self-test functionality when using a gas generator

18.3 DrägerSensor O_2, O_2LS and Dräger SensorAlive certified operating conditions

Cross-sensitivities

There are no known cross-sensitivities against interfering gases with a concentration of up to 100 ppm. Further information can be requested from Dräger.

18.3.1 DrägerSensor O_2 (6809720)

The DrägerSensor O_2 (6809720) is an electrochemical two-electrode sensor for measuring oxygen (O_2) in ambient air.

Environmental parameters	
Pressure	20.7 to 38.4 in. Hg (700 to 1300 hPa)
Humidity	10 to 95 % RH, non-condensing
Temperature	Application of EN 50104 limits the temperature range to 0 °C to +55 °C.

Storage	
Pressure	no influence
Humidity	30 to 70 % RH, non-condensing (only relevant if sensor packaging is open)
Temperature	0 to +40 °C
Time	Storage of sensors is not intended. Sensors should be used immediately. Remaining life span = expected life span - storage time

Influence of environmental parameters	**Zero-point**	**Sensitivity[1)]**
Temperature[2)3)]		
0 to 55 °C	≤ 0.3 Vol% O_2	≤ 0.9 Vol% O_2
Pressure	< ± 0.2 Vol% O_2	Relative deviation from the reading at 1013 hPa: < 10 % of the measured value / 100 hPa
Humidity	No influence	Relative deviation from the reading at 50 % rel. humidity: < 1 % of the measured value

1) Relative deviation of the display reading is caused by atmospheric pressure fluctuations.
2) At temperatures below -5 °C, the measurement deviation is higher than specified in EN 50104.
3) For operating temperatures outside -5 °C to 40 °C, an adjustment at operating temperature must be performed.

Response time[1)]	**$t_{0...20}$**	**$t_{0...90}$**
0-5 Vol% O_2	≤ 15 seconds[2)]	≤ 33 seconds
0-25 Vol% O_2	≤ 10 seconds	≤ 26 seconds

1) At temperatures below -5 °C, the response time may increase.
2) Response time is higher than the permissible limit of EN 50104.

Stabilization time: 5 x $t_{0...90}$

Measuring range

0-5 Vol% O_2 to 0-100 Vol% O_2

Default value: 25 Vol% O_2 Minimum reading: -1.25 Vol% O_2

Sensor warm-up time

Operation: <20 minutes / Adjustment: ≤ 2 hours

18.3.2 DrägerSensor O_2LS (6809630)

The DrägerSensor O_2LS (6809630) is an electrochemical three-electrode sensor for measuring oxygen (O_2) in ambient air.

Environmental parameters	
Pressure	20.7 to 38.4 in. Hg (700 to 1300 hPa)
Humidity	5 to 95 % RH, non-condensing
Temperature	-40 to +60 °C short-term +65 °C

Storage	
Pressure	no influence
Humidity	30 to 70 % RH, non-condensing (only relevant if sensor packaging is open)
Temperature	0 to +40 °C
Time	Storage of sensors is not intended. Sensors should be used immediately. Remaining life span = expected life span - storage time

Influence of environmental parameters	Zero-point	Sensitivity
Temperature		
-20 to 40 °C	≤ 0.1 Vol% O_2	≤ 0.1 Vol% O_2
-40 to 65 °C	≤ 0.2 Vol% O_2	≤ 0.5 Vol% O_2
Pressure	< ± 0.1 Vol% O_2	≤ 0.8 Vol% O_2
Humidity	≤ 0.1 Vol% O_2	≤ 0.9 Vol% O_2

When measuring oxygen in the presence of helium, helium compensation can be used. The option of helium compensation is no certified measuring function according to EN 50104.

⚠ CAUTION

Sensor failure

The exposure of the sensor to higher concentrations of unsaturated hydrocarbons, alcohols, or hydrogen over an extended period of time (dose approx. 100,000 ppm x hours) can cause the instrument to fail.

► Ensure that the sensor is not exposed to such concentrations over an extended period of time.

Response time	$t_{0...20}$	$t_{0...90}$
0-5 Vol% O_2	≤ 14 seconds[1)]	≤ 45 seconds
0-25 Vol% O_2	≤ 10 seconds	≤ 27 seconds

1) Response time is higher than the permissible limit of EN 50104.

Stabilization time: 5 x $t_{0...90}$

Measuring range

0-5...25 Vol% O_2, 0-25 Vol% O_2

Default value: 25 Vol% O_2

Minimum reading: -1.25 Vol% O_2

Sensor warm-up time

Operation: ≤ 20 minutes / Adjustment: ≤ 6 hours

18.3.3 Dräger SensorAlive (6814014)

The Dräger SensorAlive (6814014) is an electrochemical diffusion sensor with an integrated gas generator for measuring hydrogen sulfide (H_2S) in ambient air.

Environmental parameters	
Pressure	20.7 to 35.5 in. Hg (700 to 1200 hPa)
Humidity	5 to 95 % RH, non-condensing
Temperature	-40 to +65 °C
Maximum flow speed of the ambient air	6 m/s

Storage	
Pressure	no influence
Humidity	30 to 70 % RH, non-condensing (only relevant if sensor packaging is open)
Temperature	0 to +40 °C
Time	Storage of sensors is not intended. Sensors should be used immediately. Remaining life span = expected life span - storage time

Influence of environmental parameters	Relative deviation from the reading
Pressure	At 1000 hPa: ≤ 0.15 ppm
Humidity (at +40 °C)	at 0 and 95 %RH: ≤ 0.29 ppm
Temperature	at 20 °C: ≤ 0.44 ppm

Interference gases (e.g., NH_3) can impair the function of the sensor.

Response times in diffusion operation	
t(50)	≤ 20 s
t(90)	≤ 55 s

Decay times in diffusion operation	
t(50)	≤ 20 s
t(10)	≤ 55 s

18.4 FM performance approval for DrägerSensor H_2S and H_2S LC

The DrägerSensor H_2S and H_2S LC are electrochemical diffusion sensors measuring hydrogen sulfide (H_2S) in ambient air.

DrägerSensor H_2S (6810435)	
Examination Type P8100	ETR 0400, 0401, 0500, 0501
Interface[1)]	4-20mA, relay
Environmental parameters	
Humidity	5 to 95%RH, non-condensing
Temperature	-40/+65 °C (-40/149 °F)
Storage temperature	0/+40°C (32/104°F)
Enclosure protection [2)]	IP 65/66/67
Range	0-100 ppm
Accuracy (whichever is greater)	measurement uncertainly (of meas. value) ≤ ±3 % or minimum ≤ ±0.5 ppm
Accessory	
Dust filter	6809595
Adapter kit	6810536
Standard	ANSI/ISA-92.00.01FM6340

1) HART communication must not be used for safety-relevant communication.
2) After submersion and jet water the sensor must be replaced.

DrägerSensor H_2S LC (6809610)	
Examination Type P8100	ETR 0400, 0401, 0500, 0501
Interface[1)]	4-20mA, relay
Environmental parameters	
Humidity	5 to 95%RH, non-condensing
Temperature	-20/+65 °C (-4/149 °F)
Storage temperature	0/+40°C (32/104°F)
Enclosure protection [2)]	IP 65/66/67
Range	0-100 ppm
Accuracy (whichever is greater)	measurement uncertainly (of meas.value) ≤ ±3 % or minimum ≤ ±0.5 ppm in the range >50 ppm, ±10 % or ±3 ppm
Accessory	
Dust filter	6809595
Adapter kit	6810536
Standard	ANSI/ISA-92.00.01FM6340

1) HART communication must not be used for safety-relevant communication.
2) After submersion and jet water the sensor must be replaced.

HYDROGEN ULTRASONIC LEAK DETECTORS

POS.	TAG NUMBER	SERVICE
1	950-GDZ-01101	H2 GD FZ-01 FUEL CELL PK AREA
2	950-GDZ-01102	H2 GD FZ-01 FUEL CELL PK AREA
3	950-GDZ-02117	H2 GD FZ-02 H2 STORAGE VESSELS AREA
4	950-GDZ-02118	H2 GD FZ-02 H2 STORAGE VESSELS AREA
5	950-GKDZ-02119	H2 GD FZ-02 H2 STORAGE VESSELS AREA
6	950-GDZ-02120	H2 GD FZ-02 H2 STORAGE VESSELS AREA
7	950-GDZ-03101	H2 GD FZ-03 ELECTROLYZER PK AREA
8	950-GDZ-03102	H2 GD FZ-03 ELECTROLYZER PK AREA
9	950-GDZ-03103	H2 GD FZ-03 ELECTROLYZER PK AREA

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Dräger Polytron® 8900 UGLD

Firmware version ≥ 4.0.x



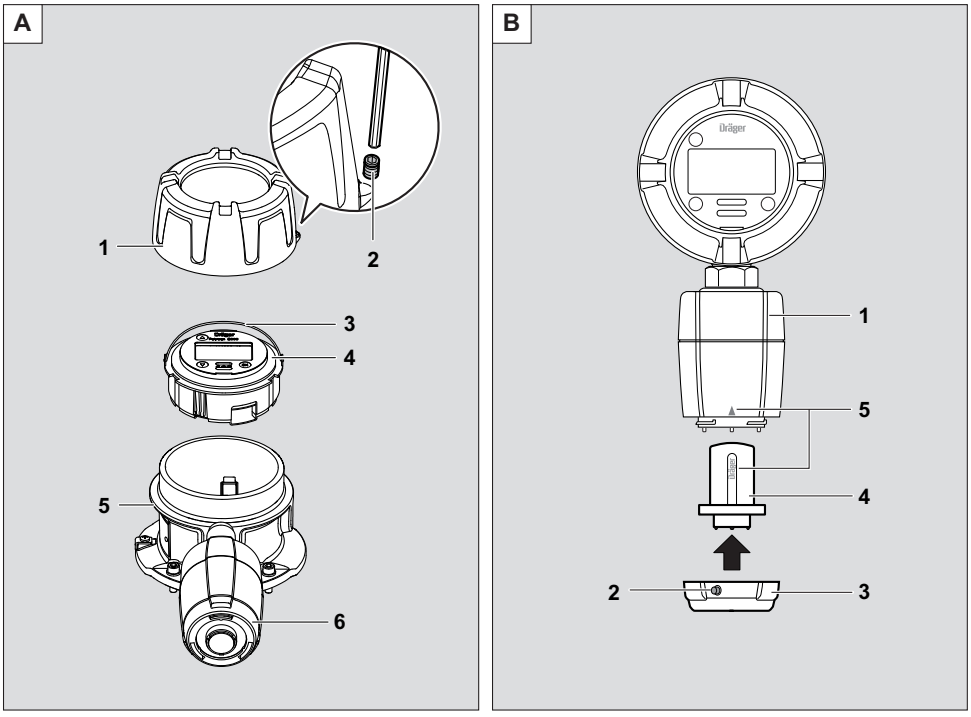
Instructions for use

enUS · de · fr · es · ptBR

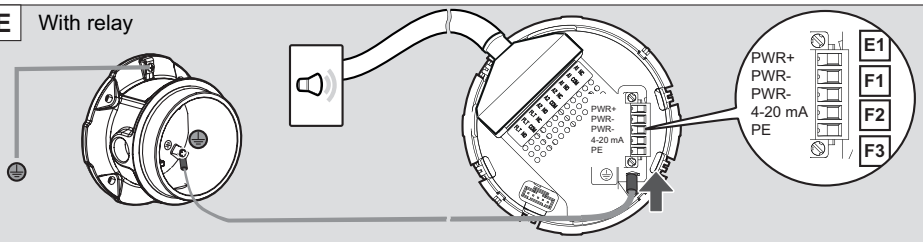
⚠ WARNING
To properly use this product, read and comply with these instructions for use.

Dräger. Technology for Life®

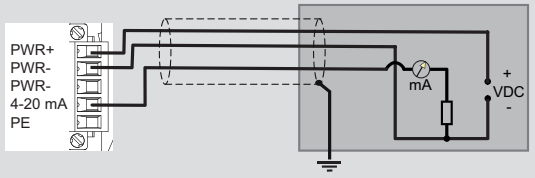
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fr Notice d'utilisation 49
es Instrucciones de uso 72
ptBR Instruções de uso 96


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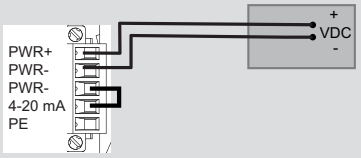
E With relay



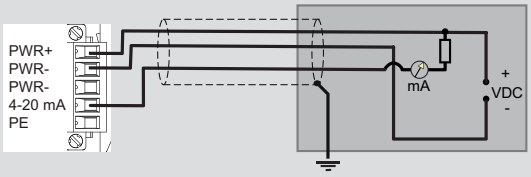
F1 4-20 mA / HART (Current source)



E1 Stand-alone, relay only



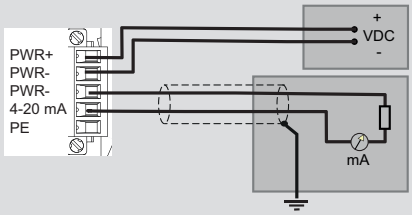
F2 4-20 mA / HART (Current sink)



Cable specifications

Power supply and signals: 24 - 12 AWG / 0.2 - 2.5 mm²
Relays: 20 - 12 AWG / 0.5 - 2.5 mm²

F3 4-20 mA / HART (separate power supply)



G

Dräger **Polytron Xxx0**
XTR 0XXX
Dräger Safety 23560 Lübeck, Germany
CE 0158 Ex II 2G II 2D
Part No: XXXXXXX
Serial No: **XXXX-XXXX**
Data Matrix Code

Gas Detector for Use in Hazardous Locations as to Fire, Electrical Shock and Explosion Hazards only
Class I, Div 1, Groups A,B,C,D | UL only: Class II, Div 1, Groups E,F,G
Class I, Zone 1, Group IIC | T-Code T6/T4 | Type 4X | C22.2 No. 152
Supply: 10 ...30V⎓, 0.08 ...0.15mA Relays: 5A, 30V⎓ or 230V ~
Ex db IIC T6/T4 Gb PTB 11 ATEX 1005X
Ex tb IIIC T80/130°C Db IECEx PTB 11.0005X | BVS 15 ATEX G 001X
-40°C ≤ Ta ≤ +40/+80°C IP6X| P ≤ 5W | UL only: -40°C ≤ Ta ≤ +70°C

WARNING: Do not open when energized- risk of Ignition of Harzadous Atmospheres. AVERTISSEMENT: Lire attentivement le manuel avant utilisation.

WARNING: To reduce the risk of Ignition of Hazardous Atmospheres, the conduit must be sealed within 18" of the enclosure.
WARNING: Read Manual before operating.

DRAFT

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1 Safety-related information

These instructions for use are available in further languages and can be downloaded in electronic form via the database for technical documentation (www.draeger.com/ifu) or a printed version can be ordered free of charge via Dräger.

1.1 Safety statements

- Before using this product, carefully read these Instructions for Use and those of the associated products.
- Strictly follow the instruction for use. The user must fully understand and strictly observe the instructions. Use the product only for the purposes and under the conditions specified in this document.
- Comply with all local and national laws, rules, and regulations associated with this product.
- Only trained and competent personnel are permitted to inspect, repair and service the product as detailed in these instructions for use. Further maintenance work that is not detailed in these instructions for use must only be carried out by Dräger or personnel qualified by Dräger.
- Dräger recommends a Dräger service contract for all maintenance activities and that all repairs are carried out by Dräger.
- Use only genuine Dräger spare parts and accessories. Otherwise the proper functioning of the product may be impaired.
- Do not dispose of the Instructions for Use. Ensure that they are retained and appropriately used by the product user.
- Only trained and competent users are permitted to use this product.
- Maintenance must be performed as described, see 9 Maintenance.
- Only operate the product within the framework of a risk-based alarm signaling concept.
- Before connecting this instrument to electrical devices not mentioned in the IFU consult Dräger
- Notify Dräger in the event of any component fault or failure.
- The instruments or components may not be modified in any manner.
- The use of faulty or incomplete parts is forbidden.
- The appropriate regulations must be observed at all times when carrying out repairs on these instruments or components.
- **WARNING**: Risk of ignition of flammable or explosive atmospheres! Substitution of components may impair Intrinsic Safety.
- The flameproof / explosion proof joints are not in accordance with the relevant minimum or maximum values of EN/IEC 60079-1. The joints are not intended to be re-worked by the user.

1.2 Operating area and conditions

- For SIL applications observe the Polytron® 8xx0 Safety Manual.
- Observe the specifications and restrictions in the Instructions for Use and/ or data sheets for the sensors.
- **CAUTION** Risk of ignition of flammable or explosive atmospheres! Not tested in oxygen enriched atmospheres (>21% O_2).
- **Using the product in areas subject to explosion hazards:** Instruments or components for use in explosion-hazard areas which have been tested and approved according to national, European or international Explosion Protection Regulations may only be used under the conditions specified in the approval and with consideration of the relevant legal regulations.
- **Hazardous areas classified by divisions:** The device is intended to be used in hazardous areas Class I, Div. 1 or Div. 2, where gases of groups A, B, C, D and temperature class T4 may be present. The device must not be operated within ambient temperatures outside the temperature range marked on the device.
- **Hazardous areas classified by zones:**
  The device is intended to be used in hazardous areas classified Zone 1 or Zone 2 where gases of explosion groups IIA, IIB or IIC and temperature class T4 may be present. The device must not be operated within ambient temperatures outside the temperature range marked on the device.

1.3 Mechanical installation

- Strict compliance must be given to the local, state, national codes and regulations that govern the installation of gas monitoring equipment.
- The future use of accessories and maintenance equipment must be kept in mind.
- The instrument must not be exposed to radiant heat that will cause the temperature to rise beyond the limits stated in 15.5 Environmental parameters. The use of a reflecting shield is recommended.
- The instrument may be equipped with a dust plug at the conduit entry. This plug is not explosion proof nor meant to be watertight, and must be removed before connecting the instrument to a sealed conduit or installation of a flameproof cable gland.
- Unused openings must be closed with a plug. For correct tightening torques of conduit hubs, cable glands, plugs and sensor see 15.6 Tightening torque.
- For non-conduit installations, an approved cable gland must be used (e.g. Hawke A501/421/A/¾” NPT or equivalent)
- **WARNING:** Only for conduit installations: To reduce the risk of Ignition of Hazardous Atmospheres, the conduit must be sealed within 45 cm (18") of the enclosure.

1.4 Electrical installation

- Strict compliance must be given to the electrical codes that govern the routing and connection of electrical power and signal cables to gas monitoring equipment.
- The instrument must have between 10 to 30 VDC at the instrument.
- Ferrules must be used.

– The conductors for the power supply must have an adequately low resistance to ensure the correct supply voltage at the instrument.
– Wire insulation must be stripped by 5 to 7mm.
– Secondary circuit intended to be supplied from an isolating source (N/A for relay circuits).
– When installed at locations exceeding ambient temperatures of 55 °C, use only appropriate wiring, specified for at least 25 °C above the maximum ambient temperature.

Analog interface

– To ensure proper operation of the instrument, the impedance of the 4 to 20 mA signal loop must not exceed 300 Ohms. With values above 300 Ohms, monitoring of the supply voltage cannot be guaranteed. Depending on the operating voltage and according to the application (e. g. HART® operation), certain minimum impedances must be observed (see "Signal transmission to control unit", page 24).

1.5 Commissioning

– Ensure wiring for relays and connections for sensor are made before applying power.
– Before leaving the instrument for normal operation, check the configuration and calibration for the proper settings.

1.6 During operation

– After modifying parameters with the PolySoft PC software or another software, verify all parameters by downloading from the instrument or by checking them on the Polytron 8xx0.
– IP ratings do not imply that the equipment detects leaks during and after exposure to those conditions. In case of dust deposits and submersion/jet water, check the calibration and the proper functioning of the device.

Risk of ignition of flammable or explosive atmospheres!

– **CAUTION:** High off scale readings may indicate an explosive concentration.
(Only for instruments measuring combustible atmospheres.)
– **WARNING:** Do not open when energized

1.6.1 Maintenance

– The maintenance intervals must be established for each individual installation. Depending on safety considerations and application specific conditions the instrument is used in, these might need to be shortened.
– Refer to the maintenance section in the transmitter instructions for use.

2 Conventions in this document

2.1 Meaning of the warnings

The following warnings are used in this document to alert the user to potential dangers. A definition of the meaning of each warning is as follows:

Alert icon	Signal word	Warning classification
⚠	WARNING	Indicates a potentially hazardous situation. If not avoided, it could result in death or serious injury.
⚠	CAUTION	Indicates a potentially hazardous situation. If not avoided, it could result in physical injury. It may also be used to alert against unsafe practices.
	NOTICE	Indicates a potentially hazardous situation. If not avoided, it could result in damage to the product or environment.

2.2 Typographical conventions

Text Texts in bold type identifies labels on the device and screen texts.

► This triangle indicates the possibilities for avoiding the hazard in warnings.

> The greater-than sign indicates a navigation path in a menu.

ℹ This symbol indicates information that facilitates the use of the product.

2.3 Trademarks

Trademark	Trademark owner
Polytron®	Dräger
DrägerSensor®	Dräger
HART®	HART Communication Foundation

The following webpage lists the countries in which Dräger's trademarks are registered: www.draeger.com/trademarks.

3 Description

3.1 Product overview

Refer to the figures on the fold-out page

A 1	Enclosure lid
A 2	Set screw (2 mm Allen screw)
A 3	Handle
A 4	PCB unit
A 5	Enclosure bottom
A 6	Port for sensor
B	Sensor replacement
C	Calibration set-up

3.2 Feature description

Polytron 8000 instruments are housed in a rugged stainless steel enclosure for indoor and outdoor applications.

The flameproof / explosion proof enclosure provides three ¾" NPT openings, which can be used for field wiring or direct attachment of a sensor.

Polytron 8900 UGLD consists of an ultrasonic sensor (remote or integrated) and the transmitter. The ultrasonic sensor detects the ultrasonic sound level of the surrounding areas. The detected ultrasound is then indicated as dB (re 20 µPa) or percentage of full scale measuring range on the display and the analog interface.

Level of ultrasound, status messages, and menu choices are displayed on a backlit graphic LC-display and 3 colored LEDs.

Navigation through the menu is done by taping a magnetic wand on the glass at the appropriate indicator. The instrument can be configured, calibrated and maintained non-intrusively without declassifying the area.

The instrument can be operated as current source or sink.

With the optional remote sensing head, the ultrasonic sensor can be mounted at a distance of up to 30 m from the transmitter.

3.3 Intended use

Polytron 8900 UGLD is an explosion proof instrument for continuous ultrasonic gas leak detection (Ultrasonic Gas Leak Detection = UGLD).

Dräger Polytron 8900 UGLD can be used to build large and complex monitoring systems if sufficient power supply and a sufficient number of HART/4-20 mA input channels are available in a suitable Programmable Logic Controller (PLC), e.g. Dräger REGARD 7000.

The instrument can be connected through a sealed conduit or approved cable gland to a Dräger monitoring system or a PLC.

The instrument is designed to be installed in permanent locations and is approved for use in hazardous, classified areas.

A mapping survey of the installation site should be conducted to determine environmental conditions. With the obtained data the instrument is commissioned.

3.4 Ultrasonic gas leak detection (UGLD)

Pressurized gas leaks (minimum pressure 2 bar / 29 psi) generate both acoustic and ultrasound. Airborne ultrasound has a frequency range of approx. 16 kHz to >100 kHz.

Dräger Polytron 8900 UGLD frequency range extends from 16 kHz to >80 kHz.

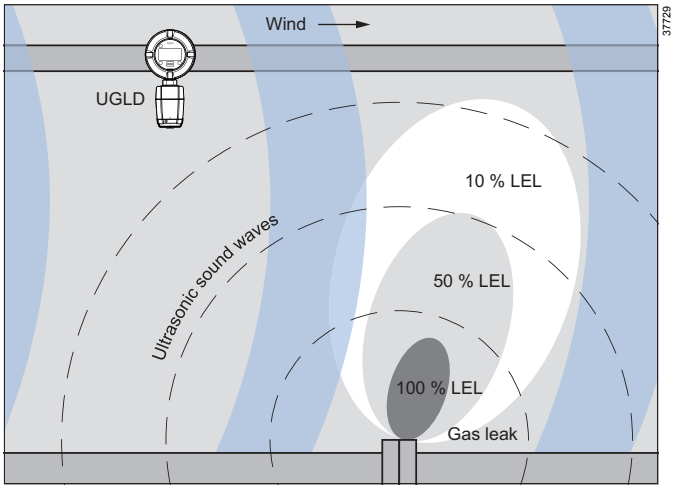
There are three primary factors that influence the intensity of the ultrasound signal:

– Physical size of the leak (mass flow)
– Pressure drop between the pressurized vessel or pipeline and the surrounding atmosphere.
– Properties of leaking gas

  Gases with lower molecular mass (or higher speed of sound) appear louder.

Ultrasound travels at the speed of sound and is only slightly influenced by wind or strong air currents. Thus, the instrument detects pressurized gas leaks that point detectors could miss due to environmental conditions. The position of the gas leak relative to the instrument does not significantly affect the ability of the system to detect leaks.

Size and ultrasound distribution of a leak



3.4.1 Gas leaks

Point detectors detect gas concentrations (e.g. ppm, %LEL). UGLD transmitters indicate a change of sound in a known environment. This is likely to be the onset of a hazard caused by a leak.

Ultrasound emitted by gas leaks is proportional to the leak rate. Leak rate is also called mass flow rate and describes the amount of gas released over time [kg/s].

3.4.2 Background noise

Background noise is recurrent noise from running machinery or other sound sources that emit ultrasound.

To increase the range, look for a location with as little background signal as possible (< 54 dB re 20 µPa).

3.4.3 Alarm settings

The instrument displays the ultrasonic sound level in dB.

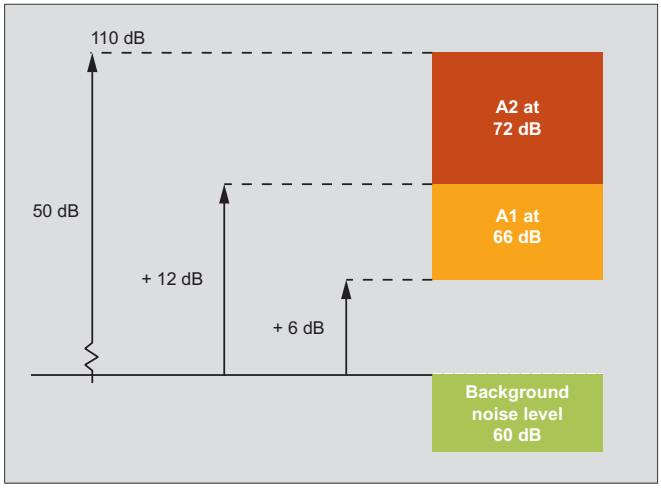
Alarm threshold

Alarm threshold should be based on the max. recurrent background noise level. Short lasting, background noise peaks may conflict with a lower required alarm threshold. For such cases, an alarm delay can be set.

Dräger recommends the following alarm thresholds.

– Alarm A1: 6 dB above max. recurrent background noise.
– Alarm A2 can be set as a second escalation stage.

In the example, A1 is triggered at 66 dB and A2 is triggered at 72 dB.



Alarm delay and analyzed time

If there is a possibility of short background noise peaks, it is reasonable to install an alarm delay. An alarm delay helps to avoid false alarms by ignoring spurious sound peaks not generated by a leak. Ultrasound peaks not created by a leak can arise e.g. by the fizz of detaching compressed air hoses, active pressure release valves, the jingling of tools falling to the ground or similar incidents. These sounds shall not trigger an alarm even if the detected sound levels breaches the alarm thresholds for a short time. Real leaks are characterized by generating a continuous signal. An alarm shall be triggered only if the signal is breaching the alarm threshold for a defined alarm delay time (***Delay***) within a time frame (***Analyzed time***) set to be analyzed.

Concept of the parameter '*Delay*' in the menu

All measurement data points (one per second) within 60 seconds are sorted by value. The parameter ***Delay*** (say e.g. 20 seconds) will provide the 20th largest value measured in this time frame. Here, it does not matter whether the larger data are received in one sequence or at different moments within the 60 seconds.

Concept of the parameter '*Analyzed time*' in the menu

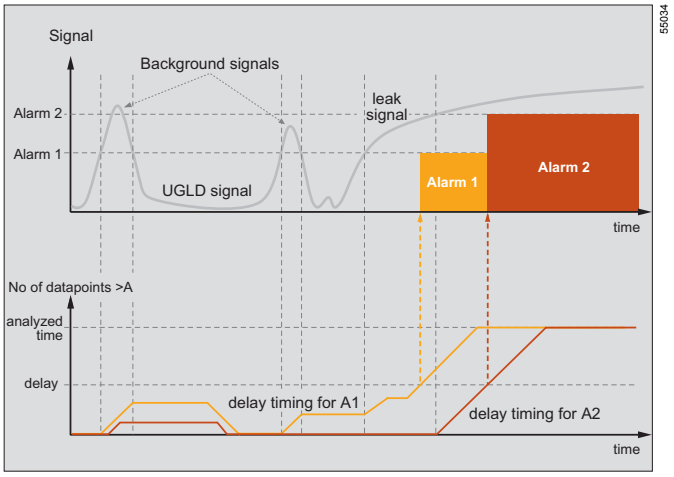
The parameter ***Analyzed time*** defines the number of measurement data points (length in seconds) that are used to determine the measurement value given by the parameter ***Delay***. The default value of the analyzed time is 60 seconds. This parameter can be changed by the DrägerService.

Examples

A If a normal delay is wanted, like: within the delay time the signal shall not drop below the alarm threshold and after the delay time the alarm shall be triggered. Here, the parameters ***Delay*** and ***Analyzed time*** shall be set to the same number.
Possible disadvantage: In usual industrial setups the ultrasonic signal by a leak can vary by e.g. shadowing effects (passing vehicles, changing environments, moving pressure vessels, etc.). Once the signal drops below the alarm threshold, the delay time starts over again. It is recommended to allow a few data points to drop below alarm level without losing too much time in detecting the leak. If a delay of 20 seconds within an analyzed time of 60 seconds is used, the alarm is triggered as soon as 20 measurement data points within 60 seconds are higher than the alarm threshold. If there is no repeated or persistent background signal to be expected, it reacts exactly like a normal delay. This may be a valid setup.

B If there is a recurring background signal (e.g. the UGLD is located near a large metal punch or release valve with regular gas deflation events) that extends repeatedly beyond the alarm level, the delay shall be set to a longer time, preventing to trigger an unwanted alarm by adding up background noise events.
Possible disadvantage: the delay may be too long for a quick detection of a leak and a safe reaction to it. In order to react to a leak quickly, the parameter ***Analyzed time*** shall not be chosen to be much larger than the delay. Thus, the alarm is triggered once the moments between the background signals that are usually below the alarm threshold are filled by the sound of the leak.

These examples show the concept of the parameters ***Delay*** and ***Analyzed time***. The alarm delay and analyzed time, which define the time where no alarm is triggered, should be optimized for each installation. Dräger recommends alarm delays of 10-30 seconds depending on the duration of spurious ultrasound events. Alarm delays of up to 60 seconds can be set by the customer. If longer delays are needed, the DrägerService can install delays of up to 240 seconds.



3.4.4 Placement / detection coverage

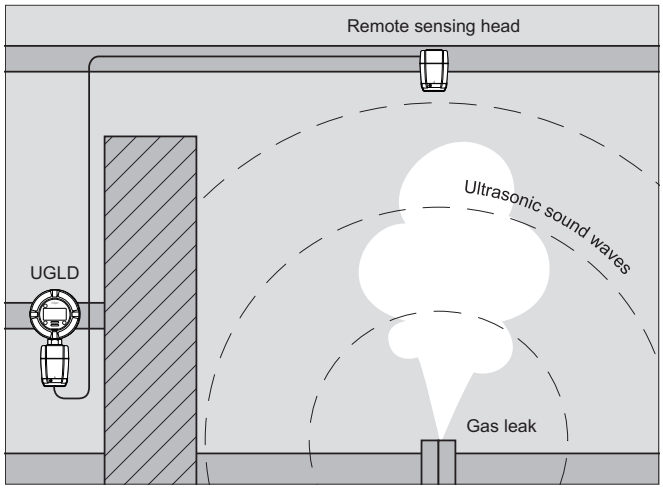
Instruments are normally installed at heights of 3-5 m (approx. 10- 16 ft.) above possible gas leak locations.

The recommendation that the instruments have to be installed above possible gas leaks may result in installations awkward to reach for maintenance and configuration.

The optional remote sensing head that can be installed remotely from the transmitter allows the display to be easily accessible for configuration. Remote sensor cables are available in lengths of 5 m, 15 m, and 30 m (approx. 15 ft., 50 ft. and 100 ft). The remote sensing head can also be used to avoid interferences such as vibrations or precipitation.

Placement of the ultrasonic sensor should not be obstructed by solid objects like walls or pipework. Such obstacles might deflect or absorb the ultrasound on its way to the instrument.

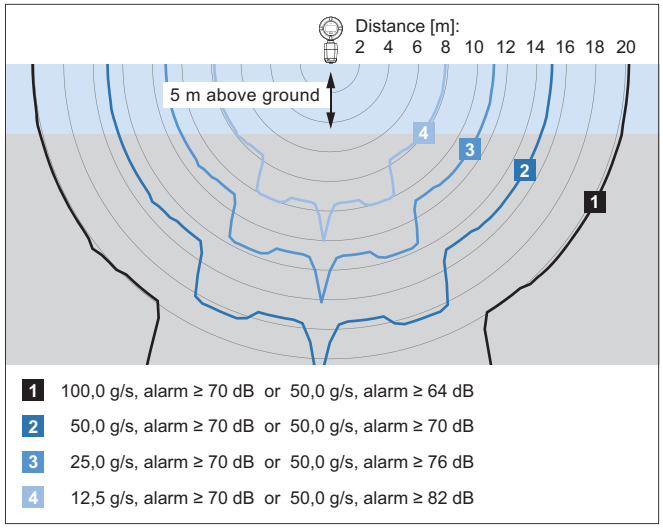
To optimize installation the sensor surface can be pointed at different directions.



Sensor orientation and coverage

The instrument detects ultrasound within a 360° coverage. However, coverage is not spherical since the sensor is more sensitive to the front than off to the side or back. Therefore, coverage range is affected by the sensor's orientation towards possible leaks.

Detection range for different leaks sizes of CH_4 at different alarm thresholds.



Limits to sensor orientation

The sensor surface should be facing potential gas leak sources. In most cases, the orientation of the sensor will be best facing downwards. In any case, objects (e.g. raindrops) falling onto the sensor surface generating a signal due to physical impact should be prevented.

3.4.5 Mapping survey

Mapping surveys should be conducted before an instrument is installed. A mapping survey is conducted by using a field survey device to record background ultrasound noise. Background noise readings serve as the basis for defining alarm set points. A background noise level must be determined for each installation location so that an appropriate alarm threshold can be defined for that location.

A mapping survey can be requested through the DrägerService organization.

The following environmental conditions need to be considered, because they can affect the measurement radius of the sensor.

– Typical temperature and humidity range
  UGLD range is higher with cold, dry air and lower with warm, humid air
– Typical and maximum background noise
  A field survey device may be used to log background noise and suggest suitable delay times.

There are two initial situations for a mapping survey.

– Green field
  The site to be mapped does not yet exist. During the planning stage, possible installation locations are determined based on estimated background levels.
– Brown field
  The site to be secured does already exist and is in operation. Measurements of typical and maximum background levels may be performed on site.

3.5 Interfaces

- 4 to 20 mA analog (per NAMUR recommendation NE43)
- Digital HART® output signal
- Relays with alarm delay functionality[1)]

3.6 Approvals

The approvals and the declaration of conformity can be found in the document "Notes on Approval" (order no. 4544300).

3.6.1 ATEX

See approval label. There is also a printout of the approval label inside the shipping box of the instrument.

3.6.2 Marking

The marking is reproduced on a separate piece of paper shipped with the instrument.

Serial Number key: The third letter of the serial number specifies the manufacturing year: M = 2019, N = 2020, P = 2021, R = 2022, S = 2023, T = 2024, U = 2025, W = 2026, X = 2027, Y = 2028, Z = 2029, etc. (Letters G, I, O, Q are omitted)

Example: Serial Number ARMB-0001: the third letter is M, which means that the unit was manufactured in 2019.

1) Alarm delay functionality will be available in a future firmware release.

4 Installation

Obey the safety statements mentioned in 1 Safety-related information!

4.1 Mechanical installation

The instrument can be mounted for measuring ultrasound in ambient air.

1. Use M6 (1/4") bolts with hex socket caps to mount the enclosure to one of the following options.

Option	
Mounting on a flat surface	Drilling template 4544299
Mounting on a pole	Pole mount kit (part number 4544198)

Mechanical installation impacts

Vibrations might have influence on the ultrasonic sensor measurements. Machinery and conduits might cause vibrations in the ultrasonic frequency range.
Conduits protect cable routing and are screwed into the enclosure. Conduits might transmit high-frequency vibrations into the transmitter enclosure.

To prevent vibrations, order and use the following spare parts.

- Flexible conduit cable glands
- Remote installation-kit

4.2 Electrical installation

For recommended tightening torques and admissible wire specifications see 15.2 Cable specifications.

4.2.1 Wiring tables

4-20mA / HART® interface

Pin	Mark	Function
1	PWR+	V+
2	PWR-	V-
3	PWR-	V- To be used when the instrument is not powered by the control unit (separate power supply), see figures F3 and E1 on the fold-out page.
4	4-20 mA	4 to 20 mA signal (Operation as source or sink)
5	PE	Protective earth Optional PE for relay connection. Connecting PE together with the 4-20 mA analog output may cause ground loops.

4.2.2 Figures on the fold-out page

Figure	Connecting diagram for instruments
E	With relay
F1	4-20 mA / HART (Current source)
F2	4-20 mA / HART (Current sink)
F3	4-20 mA / HART (separate power supply)

4.2.3 Preparing the electrical installation

1. Loosen set-screw (2) and unscrew lid from instrument (Figure A on the fold-out page).
2. Pull-out the PCB unit.
3. Proceed with the figure on the fold-out page corresponding to your Polytron model and signal output.

4.2.4 Connecting the 4-20mA/HART® interface

For connections to a control unit (PLC), refer to the documentation corresponding to the control unit.

1. Pull off the 5-pin connector.
2. Connect the three wires for power and signal to the appropriate terminal as indicated in the wiring table and figure.
3. Plug connector back into socket and tighten screws.
4. Close the instrument, see 4.2.6 Closing the instrument.

4.2.5 Grounding

1. Ground the enclosure of the instrument locally at the grounding lug.
2. Connect the shield of the wires only to the instrument earth ground of the controller (e g. chassis, ground busbar, etc.).

ℹ Unless special measures are taken (e. g. capacitive earthing), the shield must only be connected at one end.

4.2.6 Closing the instrument

1. Ensure the following connections are properly made:
   a. Wiring screws are tightened to the correct torque.
   b. All cable connectors are secured with screws.
   c. The sensor connector is plugged.
   d. The grounding cable coming from the enclosure is connected to the lug on the PCB unit (Figure E on the fold-out page)
2. Place PCB unit back into the enclosure.
3. Screw the lid back on, until it is seated with correct torque, and tighten set-screw.

5 Commissioning

5.1 Commissioning the instrument

1. Switch power supply on.
   ⇒ The fault relay is switched.
   ⇒ The instrument will go through a start-up sequence (LCD / LED test, software version, and initialization) and start the warm-up period.
   The maintenance signal on the 4-20 mA interface remains pending until the sensor is warmed-up.
   ⇒ The display shows that the sensor will be ready for measurement in hh:mm:ss (countdown) and the instrument transmits the maintenance signal.
   ⇒ After the countdown, the instrument goes into normal operation. The display shows the currently detected signal, UGLD (ultrasonic gas leak detection) and the units of measurement. The green LED is lit.
2. Check date and time.
3. Perform bump test.

5.2 Commissioning service

After the system is installed, it is recommended to schedule a system commissioning service through DrägerService.

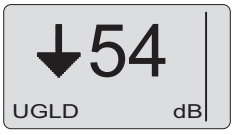
A commissioning service ensures that customer required leak rate at each potential leak location will be detected by the corresponding instrument. The instrument shall not be operated permanently with a background signal above 100 dB. However, permanent high signal above 100 dB does not harm the device.

A commissioning device simulates a real gas leak in a short burst and is proof for proper installation. A calibration of the instrument is not necessary.

6 Operation

6.1 Display

6.1.1 Measuring mode

Display example	Description
	In normal operation, the detected signal of the instrument is displayed[1].

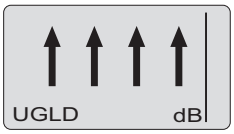
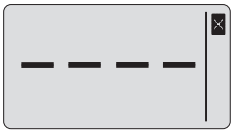
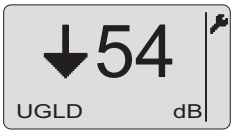
1) The value changes according to the background noise emitted by machinery or personnel. Thus a changing value does not immediately indicate a leak. To prevent misinterpretation from personnel, the display can be switched off.

6.1.2 Special states

If the instrument is in a special state, a proper measurement can no longer be guaranteed.

This is the case:

– When the ultrasonic signal exceeds the measuring range.
– When a fault occurs.
– During calibrations.
– During bump tests.
– During maintenance.

Display example	Description
	Exceeding measuring range
	Fault indication The current output of the analog interface is set to fault current and the fault relay is asserted (if relay option is installed).
	For calibration, bump test and maintenance the symbol is displayed on the right side of the display. On the left side corresponding information is given.

6.1.3 Ending special states

Fault / warning indication

Faults and warnings are non-latching. If the fault or warning condition clears, the message disappears.

To solve warning and fault conditions, display the error code or warning message (see "Displaying Information", page 14) and begin troubleshooting (see "Troubleshooting", page 16).

6.2 LED and symbol indications

Symbol	LED	Description
	Red	Alarm Triggered
	Yellow	Fault
	Green	Power on

6.3 Definitions of indicators in the display

Symbol	Explanation
	Error message available.
	Warning message available.
	Maintenance signal is transmitted.
	Measuring range of analog interface exceeded.
	Measurement value less than range of analog interface.
	HART® operation is active. Analog interface is set to a fixed value and is not transmitting any measurement signal.

Symbol	Explanation
	The data logger is active in Roll mode.
	The data logger is active in stack mode.
SIL	SIL operation mode is activated.

6.4 User interface keys

The instrument is designed for the magnetic wand (part number 4544101: blue body, white logo) to be used with the enclosure lid in place. If the enclosure lid is not in place, the magnetic wand may activate two or more buttons at once (cross-talk).

Button	Function
▲	Upwards / Function key
▼	Downwards / Menu key
OK	Different functions depending on the type of menu

6.5 Info mode and function key

6.5.1 Activating info mode

The Info mode is used to show instrument relevant information. This does not interrupt the normal operation of the instrument.

- Tap and hold ▲ for 3 seconds in measuring mode.

6.5.2 Navigating in Info mode

Button	Function
▲	Switches to the next screen
▼M	Switches to the previous screen
OK	Ends info mode

If no key is tapped within 30 seconds, the instrument will automatically return to normal operation.

6.5.3 Using function key

Using the function key, a pre-set function can be executed. By default the faults are displayed.

- Tap and hold ▲ for 1 seconds in measuring mode.

To configure the function key, see 10.6 Configuring function key.

6.6 Menu

6.6.1 Menu navigation

Button	Function
▲	Scrolls upwards. Sets values.
▼	Scrolls downwards. Sets values.
OK	Confirms entry. Selects menus and functions.

6.6.2 Passwords

Calibration PWD	Access to information (Information menu) and calibration settings (Calibration menu) Default: **_ _ _ 1**
Settings PWD	Access to all configurations and menus Default: **_ _ _ 2**

To change passwords, see 10.3.

6.6.3 Entering the menu

- To directly enter the ***Information*** menu:
  a. Tap and hold ▼ for 1 second in the measuring mode.
- To enter the ***Calibration*** menu:
  a. Tap and hold ▼ for 3 seconds in measuring mode
  b. Select ***Enter password***
  c. Enter ***Calibration PWD***.
- To enter all menus:
  a. Tap and hold ▼ for 3 seconds in measuring mode
  b. Select ***Enter password***
  c. Enter ***Settings PWD***

6.6.4 Displaying Information

Select the appropriate menu item in the ***Information*** menu:

Instrument	
Warnings	Displays warning messages in plain text and the corresponding number. If there are several warning messages available, there is an indicator (e.g. 1/3 = Screen 1 of 3).
Faults	displays fault messages in plain text and the corresponding number If there are several faults, there is an indicator (e.g. 1/3 = Screen 1 of 3).
Device flag	This function displays warning and fault codes as a table. If all codes are 00 there are no warning or fault messages available.
Modules	Displays an overview of the installed hardware modules. To access detailed information select the appropriate module. ■ = installed modules □ = not installed modules
Sensor	
Last cal. date	The calibration date, unit, gas and concentration of the last calibration are displayed.
Next cal. date	Displays the next calibration due date.

Sensor temperature	The current and the highest sensor temperature is displayed.
Data logger	
Logger status	Display the data-logger status (active or non-active)
Graph	Displays the history of the past 15 minutes on a time/concentration graph.

7 Calibration

Obey the safety statements mentioned in 1 Safety-related information!

A bump test (calibration check) and adjustment of the measurement accuracy can be performed with the Dräger Polytron 8900 UGLD Calibration Kit. Only the sensor span should be calibrated if the bump test result is out of spec.

Severe ambient conditions or physical impacts to the sensor may cause sensor drifts. Sensor drifts have a negative impact on the measurement accuracy. Calibrations restore this accuracy.

Dräger ultrasonic sensors are life-time calibrated. Under normal conditions sensor drifts should not occur and a recalibration should not be necessary.

To verify the sensor is providing correct measurement data, the sensor should undergo a regular bump test utilizing the calibration kit.

ℹ In general calibration is not necessary. To check whether a calibration is necessary, first perform a bump test.

7.1 Test gas

The acoustic sound pressure emitted by a leak varies by the type of target gas, the leak size and the distance to the device.

Test gas for ultrasonic sensors is compressed air or nitrogen. The calibration adapter generates the ultrasonic sound pressure at defined flow rate.

Thus, the calibration adapter generates the needed ultrasonic signal to calibrate the system span.

7.2 Performing a bump test

Once installed, the instrument typically does not need regular calibrations. Nevertheless, the calibration can be checked and performed if a deviation outside the acceptable tolerance is detected.

A bump test checks alarm activation and sensor sensitivity without setting off the alarms.

Prerequisites:

– Background noise is < 80 dB.
– Environmental temperatures within 0 °C to 40 °C (+32 °F to +104 °F).

Calibration equipment:

– Dräger Polytron 8900 UGLD Calibration Kit (8328042)

To perform a bump test:

1. Place the calibration adapter onto the sensor up to the stop.
2. Enter the menu, see 6.6.3 Entering the menu.
3. Select ***Settings*** > ***Instrument*** > ***Bump test*** and confirm.
   ⇒ The maintenance symbol is displayed
   ⇒ The analog output is set to the maintenance signal.
4. Open calibration gas cylinder valve.
   ⇒ After a short period of stabilization time (~ 10 s), the displayed value should stabilize at the dB number (or percentage of measurement range) that is indicated on the calibration adapter.
   ⇒ If the value deviates by > 3 dB (or 6 %), perform a span calibration.
5. Press OK to return to measurement.

The calibration adapter must not be soiled. Store the calibration adapter in a clean environment. Dräger recommends storing the calibration adapter in the calibration kit case.

7.3 Preparing a calibration

A calibration needs to be performed in a controlled environment with the following prerequisites:

– Background noise is < 70 dB.
– Environmental temperatures within +15 °C to +35 °C (+59 °F to +95 °F).

Calibration equipment:

– Dräger Polytron 8900 UGLD Calibration Kit (83 28 042)

To prepare a calibration:

1. Remove the sensor from the instrument or the remote sensing head.
2. Take the sensor to a controlled environment.
3. In the controlled environment insert the sensor into a Polytron 8900 UGLD instrument.
4. Calibrate the sensor by using the calibration kit.
   - Performing a zero calibration, see 7.4 Performing a zero calibration.
   - Performing a span calibration, see 7.5 Performing a span calibration.
5. Re-insert the sensor in it‘s previous location.
6. Re-integrate the instrument into the alarming system.

7.4 Performing a zero calibration

NOTICE
Zero calibrations may cause malfunctions
Zero calibrations should not be necessary.
Zero calibrations set the zero point of the measurement range.
The zero point of the measurement is < 54 dB and should only be calibrated if background noise is < 54 dB.
► Do not calibrate the zero point at the installation site with background noise present.

If a zero calibration is still necessary, the ultrasonic sensor can be detached and calibrated with a separate Polytron 8900 UGLD instrument under workshop conditions.

Calibration can be aborted at any time. To abort calibration select ***back***.

Prerequisites:

– Calibration is prepared.

To perform a zero calibration:

1. Attach silencer cap to the sensor up to the stop.
2. Enter the menu, see 6.6.3 Entering the menu.
3. Select ***Calibration*** > ***Zero calibration*** and confirm.
   ⇒ The Maintenance signal is transmitted by the analog interface, no alarm or fault relays are switched and the symbol is displayed.
   ⇒ The message ***Apply zero gas*** is displayed.
4. Ignore the message ***Apply zero gas***, select ***Next*** and confirm.
   ⇒ The current value is displayed.
5. Once the displayed value is 54 dB, perform calibration.
   a. Select ***calibrate*** and confirm.
      ⇒ The message ***please wait...*** is displayed.
      ⇒ The new zero value is displayed.
   b. Select ***Next*** and confirm.
6. Select ***Next*** and confirm.
   ⇒ The instrument returns to the calibration menu.
7. Detach the silencer cap.

The silencer cap must not be soiled. Store the silencer cap in a clean environment. Dräger recommends storing the silencer cap in the calibration kit case.

7.5 Performing a span calibration

Calibration can be aborted at any time. To abort calibration select ***back***.

Prerequisites:

– Calibration is prepared.

Refer to figure C on the fold-out page.

To perform a span calibration:

1. Check the tubing for holes. The tubing must be leak-proof.
2. Attach the pressure regulator to the compressed air (or nitrogen) cylinder.
3. Fit calibration adapter to the sensor up to the stop and orientate the pipe parallel to the mark on the sensing head housing (figure B 5 on fold-out page).
4. Make sure the gas escapes the calibration adapter freely within 25 cm (10 inch) from the calibration adapter.
5. Connect the tubing to the barbed fitting.
6. Enter the menu, see 6.6.3 Entering the menu
7. Select ***Calibration*** > ***Span calibration*** and confirm.
   ⇒ The Maintenance signal is transmitted by the analog interface, no alarm or fault relays are switched and the symbol is displayed.
   ⇒ The parameters for calibration are displayed:
   Gas : UGLD
   Unit: dB (or %)
   Concentr.:50
8. Adjust the number at concentration to the number printed on the calibration adapter.
9. Select ***Next*** and confirm.
   ⇒ The message ***Gas flow ON*** is displayed.
10. Select ***Next*** and confirm.
    ⇒ The current value is displayed
11. Apply the gas flow.

    After the displayed value is stable by +/- 1 dB:

12. Select ***Next*** and confirm.
    ⇒ The message ***please wait...*** is displayed.
    ⇒ The new current value is displayed.
13. Select ***Next*** and confirm.
14. Turn off air flow and remove the calibration adapter from the sensor.

    If the current value is not within the alarm range:

15. Select ***Next*** and confirm.
    ⇒ The instrument returns to the calibration menu.

The calibration adapter must not be soiled. Store the calibration adapter in a clean environment. Dräger recommends storing the calibration adapter in the calibration kit case.

8 Troubleshooting

8.1 Faults

Fault number	Cause	Remedy
001, 003 004 012-014 020-024 043, 060 067	Serious instrument fault, various causes.	Have the instrument checked by DrägerService.
005	Supply voltage outside range.	Check power supply.
002 025-027 030-034 041, 042 044, 050 052, 081 085	Serious data error in the instrument, various causes.	Reset the instrument to factory default settings. If this fault occurs again: Have the instrument checked by DrägerService.

Fault number	Cause	Remedy
010	4 to 20 mA interface cable not connected.	Disconnect the power supply, connect the 4 to 20 mA interface and reconnect the power supply. If operated as a stand-alone instrument without a central controller, wire pin 3 to pin 4.
011	Serious instrument fault, various causes.	Have the instrument checked by DrägerService; in case of repeated occurrence, check the load or cable.
045	Instrument not detecting any sensor.	Check connections. If this fault occurs again: Have the instrument checked by DrägerService.
051, 054	Faulty zero calibration.	Perform zero calibration.
055	Faulty span calibration.	Perform span calibration
076 080-084	Instrument fault.	Check electrical connections. If this fault occurs again: Have the instrument checked by DrägerService.
081	Sensor fault (Self test failure) or Ultrasound noise level > 100 dB for more than 1 h detected.	Mute ultrasound noise or temporarily cover sensor with silencer cap. If error remains longer than 1 h, replace sensor.
090	Sensor lock function is activated. A sensor with a different part number has been connected.	Use a sensor with the same part number or disable the sensor lock function.
105	Instrument fault.	Have the instrument checked by DrägerService.
137	Instrument fault.	Cycle power.If this fault occurs again: Have the instrument checked by DrägerService.
064 071	Communication fault.	Check connection to Polytron 8900 UGLD.
086	Supply voltage outside range.	Check supply voltage.
087	4 to 20 mA fault at UGLD sensor.	Check 4 to 20 mA connection to Polytron 8900 UGLD.
094 095	Data error in the instrument.	Reset the sensor to factory default settings. If this fault occurs again: Have the instrument checked by DrägerService.
096	SIL password does not match.	Enter password again.

8.2 Warnings

Warning number	Cause	Remedy
101	Data-logger in Stack mode is 100 % full and is not logging any more data.	Have the instrument checked by DrägerService.
102	Data-logger in Stack mode is 90 % full.	Download the data as soon as possible and clear the data-logger.
103 106	Data error in the instrument. Some dongle functions like data-logger, sensor test, etc. may no longer be available.	Reset the instrument to factory default settings. If this error occurs again: Have the instrument checked by DrägerService.
104	Date or time setting not valid.	Set date and time
105	Instrument fault.	Have the instrument checked by DrägerService.
107	Battery for data memory empty.	Have the instrument checked by DrägerService.
110 111 112	SW dongle has been removed without being deactivated.	Deactivate SW dongle.
113	Alarms inhibited.	Enable alarms
164 165	Sensor warm-up phase has not ended. Increased measurement error must be expected.	Wait until the sensor has warmed up. Do not calibrate before sensor is fully warmed-up.
167 170	Calibration interval expired.	Recalibrate the instrument.
163	Sensor temperature is very high.	
171	Zero drift too high.	Perform zero calibration
182	Auto calibration not possible.	Perform new zero and span calibration

9 Maintenance

– The maintenance intervals must be established for each individual installation. Depending on safety considerations and application specific conditions the instrument is used in, these might need to be shortened.

Every 12 months

– Inspection by trained service personnel.
– Check signal transmission to the control unit, LEDs and triggering of alarm devices.
– Perform bump test

9.1 Sensor replacement

A sensor can be replaced in the hazardous, classified area, without interrupting the power supply.

Sensor change function

With the menu function ***Change Sensor***, a sensor can be changed during operation without triggering a fault signal at the control unit. It also ensures that all sensor data in the microprocessor can be saved in the sensor memory (EEPROM) before disconnecting the sensor.

Replacing the sensor

Refer to figure B on the fold-out page.

A sensor can be replaced at any time.

1. Select ***Settings*** > ***Sensor*** > ***Change Sensor*** and confirm.
   ⇒ The maintenance signal is generated on the 4-20mA interface. The display shows ***Please remove the sensor***.
   ⇒ The Maintenance symbol is displayed.
2. Replace the old sensor with a new sensor:
   a. Loosen set-screw (2)
   b. Unscrew bayonet ring (3)
   c. Remove old sensor.
   d. Insert sensor (4) into the opening. The Dräger logo on the sensor must point to the mark on the sensing head housing (5).
   e. Lock sensor with bayonet ring (3)
   f. Tighten set-screw (2).
   The display shows: ***Loading data, please wait***
3. When the sensor data are loaded, the display shows: ***Data loaded***.
4. Select ***Back to menu*** and confirm.
   ⇒ The maintenance signal on the 4-20mA interface remains pending until the sensor is warmed-up.
5. Perform bump test to check the instrument for proper operation.
6. Check the installation requirements and instrument for SIL status.

10 Instrument settings

10.1 Alarms and delay

ℹ To avoid false alarms triggered by short ultrasonic peaks, do not use alarm settings of the instrument without alarm delay.

10.1.1 Changing unit

The displayed unit can be changed to the relative unit % of the measuring range.

1. Select ***Settings*** > ***Sensor*** > ***Gas settings*** > ***UGLD*** > ***%*** and confirm with OK.
   ⇒ Range /% 100.00 is displayed.

   ℹ Do not change this range!

2. Select ***Next*** and confirm with ***Confirm***.

✓ The unit is changed.

10.1.2 Switching the alarms on or off

If the alarm is set to Off, an alarm condition will not be shown by the LEDs or asserted relays! Using relays the maintenance signal is transmitted via the 4-20 mA interface and the symbol is displayed.

1. Select ***Settings*** > ***Instrument*** > ***Alarm*** > ***Alarm on/off***.
2. Select ***Enable*** or ***Disable*** and confirm.

10.1.3 Configuring alarms

1. Select ***Settings*** > ***Instrument*** > ***Alarm*** > ***Alarm A1*** or ***Alarm A2*** and confirm.
   The current alarm threshold is displayed.
2. Apply settings and confirm the configuration steps successively with ***Next***.
   a. Set value for alarm threshold.
   b. Set alarm direction.

Rising	The alarm direction is called rising, if the gas concentration has to exceed a certain value to activate an alarm.
Falling	The alarm direction is called falling, if the gas concentration has to fall below a certain value to activate an alarm.

   c. Set latching mode.

Latching	Once the alarm threshold is reached, the instrument will trigger the alarm. It will remain in alarm status even if the gas concentration does not meet the alarm condition any more. To clear a latching alarm it has to be acknowledged.
Non-latching	The alarm status clears if the gas concentration does not meet the alarm condition anymore.

   d. Set acknowledgement mode.

Acknowledgeable	Alarm relay and LED can be reset before alarm condition clears.
Non-acknowledgeable	Alarm relay and LED can not be reset until the alarm condition clears.
Pre-Acknowledgeable	Alarm status is acknowledgeable before the alarm condition clears. However, the alarm relay and LED stay active until the alarm condition clears.

e. Set the hysteresis mode.
The hysteresis function defines an interval where a triggered relay maintains its status until the gas concentration is outside the defined interval. Example: Alarm threshold is set to 75 dB and hysteresis to 3 dB. The alarm stays active until the value falls below 72 dB. This prevents relays from chattering at an alarm threshold.

When the direction of an alarm was changed (from falling to rising or vice versa), the value of the hysteresis must be checked and corrected again if necessary.

⇒ A confirmation screen shows all settings.

f. Select ***Confirm*** and confirm with OK.

✓ The new settings are saved.

10.1.4 Adjusting alarm delay time and analyzed time

The alarm delay time is per default set to 30 seconds and can be adjusted between 1 second and the analyzed time.

The analyzed time is per default set to 60 seconds and can be adjusted by DrägerService only between 1 second and 240 seconds.

1. Select ***Settings*** > ***Sensor*** > ***UGLD delay*** > ***Delay*** and confirm.
2. Enter new alarm delay time in seconds and confirm with OK.
3. Select ***Confirm*** and confirm with OK.

✓ The new alarm delay time is saved.

10.1.5 Activating delay function

The delay function can be individually activated for the display, the alarm relays and the 4-20 mA output signal.

1. Select ***Settings*** > ***Sensor*** > ***UGLD delay*** and confirm.
2. Select desired output and confirm: ***Display***, ***Alarm Relays*** and ***4-20 mA***.
3. Select ***Enable*** or ***Disable*** for each output and confirm with ***Back to menu***.

✓ The delay function is activated for the selected output(s).

10.1.6 Setting analog output signal (4-20 mA) characteristic

1. Select ***Settings*** > ***Communication*** > ***Analog interface*** > ***UGLD signals*** and confirm.
2. Select analog output signal characteristic and confirm:

Alarm normal	The 4-20 mA reacts proportional to the detected ultrasonic signal.
Alarm enhanced	The 4-20 mA reacts proportional to the detected ultrasonic signal until an alarm is reached. The signal then jumps to 16 mA if A1 is triggered and to 20 mA if A2 is triggered.
Alarm only	The analog output signal stays at 4 mA until an alarm is reached. The signal then jumps to 16 mA if A1 is triggered and to 20 mA if A2 is triggered.

3. Select ***Back to menu*** and confirm.

✓ The new settings are saved.

10.2 Testing alarms/relays

These functions change the status of a relay and LED for test purposes (e.g. to check the function of alarm devices connected to the relay) and the symbol is displayed. After exiting this function, the status of the relay and LED will automatically return to their previous status.

1. Select ***Settings*** > ***Instrument*** > ***Alarm*** the desired alarm condition and confirm.

Set Alarm A1	Simulates pre-alarm
Set alarm A2	Simulates main alarm
Set fault	Simulates fault signal

2. Select ***Enable*** or ***Disable*** and confirm.

✓ If the function is activated, the fault relay is de-energized and the 4 to 20 mA interface is set to the fault current. The yellow LED is lit, the symbol for maintenance is shown.

10.3 Setting passwords

1. Select ***Settings*** > ***Instrument*** > ***Passwords*** the desired password and confirm.

Calibration PWD	Access to zero and span calibration
Settings PWD	Access to all configuration parameters

2. Select the line for editing the password and confirm.
3. Set the password and confirm.
4. Select ***Confirm*** and confirm with [OK].

10.4 Setting date and time

1. Select ***Settings*** > ***Instrument*** > ***Date and time*** and confirm.
2. Select the line for editing the date or time and confirm.
3. Select ***Confirm*** and confirm with [OK].

10.5 Setting language

1. Select ***Settings*** > ***Instrument*** > ***Language*** and confirm.
2. Select a language from the list and confirm

10.6 Configuring function key

1. Select ***Settings*** > ***Instrument*** > ***Function key*** and confirm.
2. Select a function and confirm.

Graph	The measurements of the past 15 minutes are displayed as a time/concentration graph.
Faults	Fault messages are displayed in plain text.
Warnings	Warning messages are displayed in plain text.
Bump test	The bump-test allows applying gas to the sensor without generating an alarm. The maintenance signal is transmitted. After 15 minutes or tapping [OK] again ends the bump test and the instrument returns to normal operation.

10.7 Resetting to default settings

This function resets the instrument to factory default settings.

1. Select ***Settings*** > ***Instrument*** > ***Device init*** and confirm.
2. Select ***Confirm*** and confirm with [OK].

10.8 Deactivating dongles

This function deactivates the sensor self-test dongle to safely remove the dongle or if the dongle is faulty. Dräger recommends not to deactivate the dongle.

A dongle can only be reactivated by cycling the power to the instrument.

1. Select ***Settings*** > ***Instrument*** > ***SW dongle*** and confirm.
2. Select ***Deactivation func.***
   ⇒ The selected dongle is deactivated.

11 Interface settings

HART interface and 4-20mA interface are available for Polytron 8900 UGLD.

11.1 HART interface

11.1.1 Polling address

The polling address configures the instrument for analog operation (4 to 20 mA) or multidrop operation. In multidrop operation the analog interface is deactivated and set to a constant current of approximately 1 mA. To allow the central controller to request the Unique Identifier (unique HART address) with HART command #0, all the devices on a line must be configured with different polling addresses. It is advised to choose a sequence starting with 1 and continuous increments. This function corresponds to HART command #6 (Write Polling Address).

1. Select ***Settings*** > ***Communication*** >***HART interface*** > ***Polling address*** and confirm.
2. Select the line for editing the address and confirm.
3. Set the polling address and confirm.

Address	Description
0	Setting the polling address to 0 activates analog operation (4 to 20 mA).
0 - 15	Setting the polling address to 0 activates analog operation (4 to 20 mA).

4. Select ***Confirm*** and confirm with [OK].

11.1.2 Unique Identifier

This function reads the Unique Identifier (unique HART address). It has to be known for almost all HART addressing commands. However, this information is only required for systems which are not able to read back the Unique Identifier using the HART command #0 in Short-Frame Format or HART command #11. The display corresponds to the address for HART command #0 (Read Unique Identifier) or #11 (Read Unique Identifier associated with Tag).

1. Select ***Settings*** > ***Communication*** > ***HART interface*** >***Unique Identifier*** and confirm.
   The Unique Identifier is displayed.

11.1.3 Tag

The tag can be used to identify an instrument. It can contain up to 8 alphanumeric characters. The tag can also be used as an address for reading the unique identifier using HART command #11 (Read Unique Identifier Associated with Tag), even if the polling address is unknown. This requires that a unique tag has been configured for each instrument.

1. Select ***Settings*** > ***Communication*** > ***HART interface*** > ***Tag*** and confirm.
2. Select the line for editing the tag and confirm.
3. Set the tag and confirm.
4. Select ***Confirm*** and confirm with [OK].

11.1.4 Dräger REGARD

This function switches between different HART protocols.

1. Select ***Settings*** > ***Communication*** > ***HART interface*** > **Dräger REGARD** and confirm.
2. Select the desired option and confirm.

REGARD SW 2.0	Default setting
REGARD SW 1.4	For REGARD controllers with SW 1.4

11.2 4-20mA interface

The current output of the instrument during normal operation is between 4 and 20 mA. Between 4.5 and 18 mA the current changes proportionally to the detected ultrasonic sound levels. Whereas 4 mA < 54 dB and 20 mA represents about 110 dB.

Alarms are not transmitted via the analog interface. Alarm thresholds must be set at the control unit.

The instrument uses different current values to indicate various modes of operation. The factory default settings are user adjustable for application specific requirements. This follows the NAMUR recommendation NE43.

11.2.1 Full scale deflection

The ultrasonic sensor full scale deflection represents about 110 dB.

⚠ WARNING
Sensor malfunction
The default full scale deflection must not be changed.
► Do not change the full scale deflection
► If the full scale deflection was changed by accident within the menu sensor settings, reset the instrument to default settings

11.2.2 Settings at the control unit

Alarm thresholds and alarm delays must be set in the control unit. For further information see: "Alarm threshold", page 9.

11.2.3 Setting fault current

This function defines the current for the fault signal.

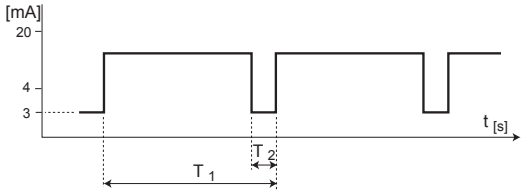
1. Select ***Settings*** > ***Communication*** > ***Analog interface*** >***Fault current*** and confirm.
2. Select the line for editing the current and confirm.
3. Set the current and confirm.
   ⇒ The setting for the ***Fault current*** is displayed.
4. Select ***Confirm*** and confirm with [OK].

11.2.4 Information regarding the warning signal

To transmit a warning signal via the analog interface, the warning signal must be switched on.
The warning signal alternates between the warning current and the measurement current.

– Warning current (interval T2)
– Measurement current (interval T1-T2)

Time intervals and the warning current are configurable.



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11.2.5 Switching the warning signal on or off

1. Select ***Settings*** > ***Communication*** > ***Analog interface*** > ***Warning*** and confirm.
2. Select ***Enable*** or ***Disable*** and confirm.

11.2.6 Setting warning interval

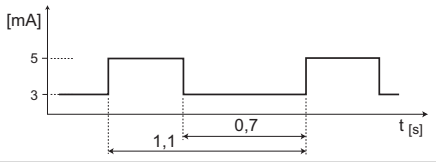
1. Select ***Settings*** > ***Communication*** > ***Analog interface*** > ***Warning interval*** and confirm.
2. Set times for warning intervals T1 and T2 and confirm.

11.2.7 Setting warning current

1. Select ***Settings*** > ***Communication*** > ***Analog interface*** > ***Warning current*** and confirm.
2. Set the current and confirm with [OK].

11.2.8 Setting maintenance signal

1. Select ***Settings*** > ***Communication*** > ***Analog interface*** > ***Maint. signal*** and confirm.
2. Set the signal type and confirm.

static	A constant current that can be configured.
dynamic	A square wave signal with the following characteristics: 

11.2.9 Setting static maintenance current

The maintenance current can only be set if the maintenance signal has been set to static.

1. Select ***Settings*** > ***Communication*** > ***Analog interface*** >***Maint. current*** and confirm.
2. Set the current and confirm.

11.2.10 Setting analog offset

This function adds an offset to the analog output at 4 mA. The offset adjusts the current at 4 mA without affecting the 20 mA set point.

1. Select ***Settings*** > ***Communication*** > ***Analog interface*** >***Analog offset*** and confirm.
2. Select the line for editing the offset (range: -0.5 to 0.5 mA, SIL: -0.1 to 0.1) and confirm.
3. Set the current and confirm.
   ⇒ The setting for the ***Analog offset*** is displayed.
4. Select ***Confirm*** and confirm with [OK].

11.2.11 Setting analog span

This function adjusts the analog output at 20 mA without affecting the 4 mA set point.

1. Select ***Settings*** > ***Communication*** > ***Analog interface*** > ***Analog span*** and confirm.
2. Select the line for editing the offset (range: -0.5 to 0.5 mA, SIL: -0.1 to 0.1) and confirm.
3. Set the current and confirm.
   ⇒ The setting for the ***Analog span*** is displayed.
4. Select ***Confirm*** and confirm with [OK].

11.2.12 Testing the analog interface

These functions change the current of the analog interface for test purposes (e.g. to check the programming of the control unit). It might be necessary to inhibit the alarms at the control

unit to avoid false alarms. After exiting these functions, the currents automatically return to the maintenance signal. During the test, the maintenance symbol is displayed.

- To set current or concentration:

1. Select ***Settings*** > ***Communication*** > ***Analog interface*** and the desired option.

Set Current	This function sets the current to any value between 0 and 22 mA. Analog offset and analog span are not used for this function.
Set concentr.	This function sets the current corresponding to any measurement value between 54 dB and full scale deflection.

2. Once the alarms at the control unit are inhibited, confirm the message ***Inhibit all alarms*** with ***Next***.
3. Select the line for editing and confirm with [OK].
4. Set the desired value.
5. Select ***Next*** and confirm.
6. Select the desired option:

Set concentr. out / ***set current out***	This function sets the preset measurement value or current test value. During the test, the maintenance symbol is displayed.
concentration off / ***current off***	This function aborts the transmission of the preset test value.

7. Select ***Next*** and confirm.
   ⇒ The function is aborted.
8. Once the alarms at the control unit are enabled again, confirm the message ***Enable all alarms***.

- To set a test signal:

1. Select ***Settings*** > ***Communication*** > ***Analog interface*** and the desired test.

Set fault	Sets the current to the fault current.
Set warning	Sets the current to the warning current.
Set mainten.	Sets the current to the maintenance current.

2. Once the alarms at the control unit are inhibited, confirm the message ***Inhibit all alarms***.
3. Select ***Enable*** or ***Disable*** and confirm.

12 Sensor settings

Ultrasonic sensors are not suited for auto calibration because the zero point of the sensor must only be calibrated under workshop conditions.

12.1 Setting capture range

1. Select ***Settings*** > ***Sensor*** > ***Display Capture*** and confirm.
2. Set offset in the first window.
3. Set the lowest value of the capture range and confirm with ***Next***.
4. Set the highest value of the capture range and confirm with ***Next***.
5. Check all the values and confirm with ***Next***.

12.2 Resetting sensor

This function resets the sensor to factory default settings.

1. Select ***Settings*** > ***Sensor*** > ***Init. channel*** and confirm.
2. Select ***Confirm*** and confirm with [OK].

12.3 Setting calibration interval

After the calibration interval expires, the instrument will issue a warning that the calibration is past due.

1. Select ***Settings*** > ***Sensor*** > ***Cal. interval*** and confirm.
2. Set the calibration interval and confirm with [OK].

12.4 Setting sensor lock

1. Select ***Settings*** >***Sensor*** > ***Sensor lock*** and confirm.
2. Select ***On*** or ***Off***.

On	The instrument rejects any sensor whose part number does not match the part number of the previously installed sensor.
Off	The instrument accepts any suitable sensor, uploading the default settings of this sensor. However, this overwrites any customized settings with the default settings of the new sensor.

12.5 Sensor test

This function is only active if the sensor test dongle is installed. If the sensor does not pass the self-test, a warning or fault message is created.

Setting periodic sensor test

This function periodically initiates the sensor self-test. The instrument routinely checks the sensor for proper function.

1. Select ***Settings*** > ***Sensor*** > ***Set sensor test*** and confirm.
2. Select ***Enable*** or ***Disable*** and confirm.

Starting sensor test manually

This function starts a singular sensor test.

1. Select ***Settings*** > ***Sensor*** > ***Sensor test*** and confirm.
2. Select ***Start sensor test*** and confirm.
3. Select ***Confirm***

✓ The test result is displayed.

12.6 Gas settings

Gas settings are not used in Polytron 8900 UGLD.

13 Factory default settings

13.1 Fixed settings for relays, LED and alarm

	Setting
Fault relay	Energized / Normally Open
Yellow Fault LED	Lit if a fault message is available
Red Alarm LED	Single blink if A1 condition is present. Double blink if A2 condition is present. If an alarm is configured as acknowledgeable and the alarm is acknowledged, single/double blink changes into continuously lit.
Alarm Hierarchy	A2 overrides A1 on the LED. However, the A1 and A2 relays operate independently. I.e. if A1 is acknowledgeable and A2 is not, and the gas concentration is such that it triggers A1 and A2: acknowledging will cause the A1 relay to release. However, the red LED will still double blink as long as the A2 condition continues to exist.

13.2 Settings which can be changed via the menu

Menu	Default setting	Range
Relay active on alarm / No alarm	Active on alarm	On / Off
A1 alarm: direction	Rising	Falling / Rising
A2 alarm: direction	Rising	
A1 latch mode	Non-latching	Latching / Non-latching
A2 latch mode	Latching	
A1 acknowledgment mode	Acknowledgeable	Acknowledgeable / Not acknowledgeable / Pre-acknowledgeable
A2 acknowledgment mode	Not acknowledgeable	
Normal operation A1 relay	Energized	Energized / Not energized
Normal operation A2 relay		
UGLD signals	Alarm normal	Alarm normal / Alarm enhanced / Alarm only
Calibration password	_ _ _ 1	
Settings password	_ _ _ 2	
LCD setting	On	On / Off
SIL status	Off	On / Off
Language	EN	DE / EN / FR / ES / RU / ZH
Function key	Faults	Graph, fault, warning, vitality, bump test

Interface	Default setting	Range
Fault current	1.2 mA	0 to 3.5 mA
Warning	Off	On / Off
Warning current	3.0 mA	0 to 3.5 mA
Warning cycle time T1 (measurement current)	9 s	5 to 60 s
Warning cycle time T2 (warning current)	1 s	1 to (T1-1) s
Maintenance signal	static	static / dynamic
Maintenance current	3.4 mA	0 to 3.5 mA
Analog offset	0 mA	-0.5 to 0.5 mA
Analog span	0 mA	-0.5 to 0.5 mA
HART address	0	0 to 15

13.3 Sensor specific values

Menu	Default setting	Range
A1 Alarm	108 dB	55 to 108 dB
A2 Alarm	108 dB	
Hysteresis for A1 alarm at direction rising	0	0 to A1
Hysteresis for A2 alarm at direction rising	0	0 to A2
Delay	30 s	1 to 60 (240) s
UGLD delay: Display	disabled	
UGLD delay: Alarm Relays	disabled	
UGLD delay: 4-20 mA	disabled	
Calibration interval [days]	3650	0 to 5475
Measuring range	< 54 dB to 108.6 dB	not adjustable

Menu	Default setting	Range
Display capture low	-1 dB	-3 to 0 dB
Display capture high	1 dB	0 to 3 dB

14 Disposal



This product must not be disposed of as household waste. This is indicated by the adjacent icon.
You can return this product to Dräger free of charge. For information please contact the national marketing organisations and Dräger.

15 Technical data

15.1 Signal transmission to control unit

Frequency of measurement calculation: 1 x per second (update of display, analog interface and relays).

Analog signal	
Normal operation	4 ... 20 mA
Drift below zero	3,8 ... 4 mA
Measuring range exceeded	20 ... 20,5 mA
Instrument fault	≤ 1.2 mA
Fault on analog interface	> 21 mA
Maintenance signal	3.4 mA steady signal or 1 Hz modulation between 3 and 5 mA (selectable)

Impedance of the signal loop

Operating mode	Impedance range of the signal loop	Supply voltage range
Operation without HART® communication	0 to 230 Ω	at 10 V DC
	Rising linearly with the supply voltage from: 0 to 230 Ω at 10 V to 0 to 500 Ω at 16 V	10 to 18 V DC
	0 to 500 Ω	18 to 30 V DC
Operation with HART® communication	230 to 270 Ω	at 13 V DC
	Rising linearly with the supply voltage from: 230 to 270 Ω at 11 V to 230 to 500 Ω at 16 V	11 to 16 V DC
	230 to 500 Ω	18 to 30 V DC
HART® Multidrop operation	230 to 500 Ω	10 to 30 V DC

15.2 Cable specifications

For non-conduit installations Dräger recommends using shielded cables.

Analog / HART connection with control unit and power supply	
Power supply and signals	3-core shielded cable 24 - 12 AWG / 0.2 - 2.5 mm²
Relays	20 -12 AWG / 0.5 - 2.5 mm²

15.3 Power supply

Power supply	
Maximum power consumption	3000 mW
Operating voltage	10 to 30 V⎓ at the instrument
Inrush current	2.3 A for 2 ms at 24 V⎓,10 Ω resistor
Minimum supply voltage	If the supply voltage is < 9.5 V DC, the instrument issues a fault signal.

Operating current (max.)[1]	
without relay, non-remote sensor	80 mA
with relay, remote sensor	100 mA

1) Values are valid at 24 V DC operating voltage.

15.4 General specifications

Enclosure	
Enclosure material	316L stainless steel
Enclosure protection	IP 66
Display	Resolution 128 x 64 pixel, back-lit

Size (LxWxD, approx.)	
Polytron 8900 UGLD	7.1” x 5.8” x 5.1” 180 x 150 x 130 mm

Weight stainless steel 316 enclosure (approx.)	
Polytron 8900 UGLD	8.8 lbs. 4.0 kg

Service life
10 years

Recommended period of storage
Maximum 5 years

15.5 Environmental parameters

See sensor data sheet for sensor specifications and influences.

Pressure	20.7 to 38.4 in. Hg (700 to 1300 hPa)
Humidity	0 to 100%RH, non-condensing
Storage temperature	-4 to +158 °F -20 to +70 °C
Storage pressure	20.7 to 38.4 in. Hg (700 to 1300 hPa)
Storage humidity	0 to 100%RH, non-condensing
Operating temperature	-40 to +149°F -40 to +65°C

15.6 Tightening torque

Instrument threads	
Enclosure lid	≥44 LB IN. / ≥5 Nm
Sensor	min. 266 LB IN. / min. 30 Nm
Blind plugs	min. 266 LB IN. / min. 30 Nm
Ports (for conduits or cable glands)	min. 443 LB IN. / min. 50 Nm

Field wiring terminals	
Power supply, signals and relays	4.4 - 7.0 LB IN. / 0.5 - 0.8 Nm
Grounding screws	10.6 LB IN. / 1.2 Nm

16 Accessories and spare parts

Description	Part Number
PCB unit Polytron 8900 UGLD 4-20/HART	8328015
Dräger Polytron 8900 UGLD d S 4-20/HART relay	8328030
Dräger PolySoft Configuration Software	8328600
IR Connection Kit (requires PolySoft)	4544197
UGLD Calibration and Bump Test Kit with Carrying Case (no bottle included).	8328042
UGLD Sensor SPPT (Dräger-Service Exclusive)	8328045
Zero Air Gas Cylinder 112L for Calibration and Bump Test Kit	6813239
Magnetic wand (blue body, white logo)	4544101
Hardware kit enclosure	4544167
EC Sensing Head Remote UGLD w/ wall mount kit (requires cable)	8328021
Remote Cable + Plug (5 m)	8323305
Remote Cable + Plug (15 m)	8323315
Remote Cable + Plug (30 m)	8323330
Blind Plug 316L St. Steel ¾” NPT for SS Housing (set of 2)	4544897
Bayonet ring	4544366
Pole mount kit for EC Sensing Head Remote	4544213
EX-D Cable Gland (CG ¾“ NPT BR 9.4 – 14 mm UAC)	AG00570

OXYGEN POINT DETECTORS

POS.	TAG NUMBER	SERVICE
1	950-GDZ-03107	O2 DET. FZ-03 ELECTROLYZER PK AREA
2	950-GDZ-03108	O2 DET. FZ-03 ELECTROLYZER PK AREA
3	950-GDZ-03109	O2 DET. FZ-03 ELECTROLYZER PK AREA

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Instructions for use

Dräger Polytron® 8000 Series

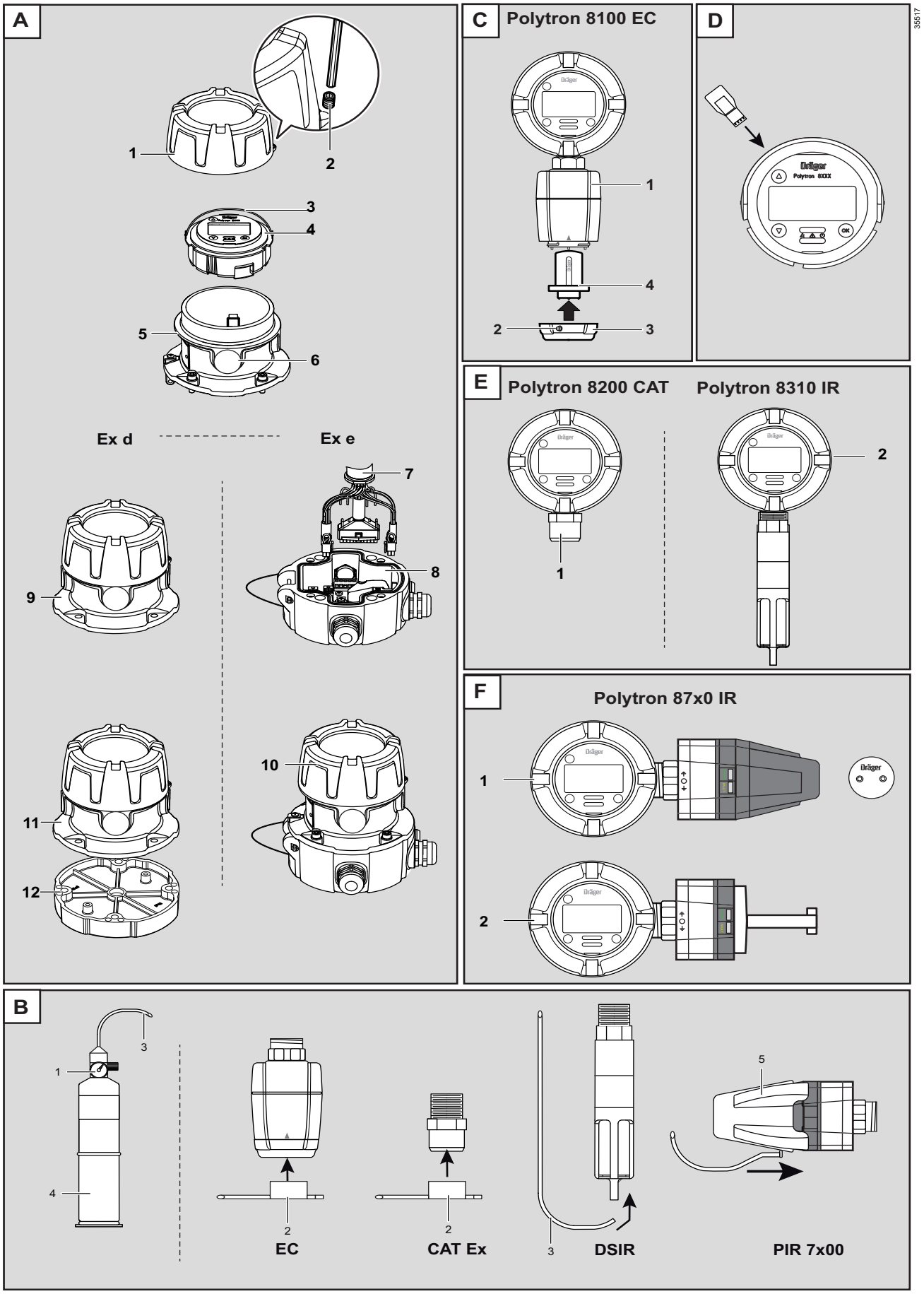


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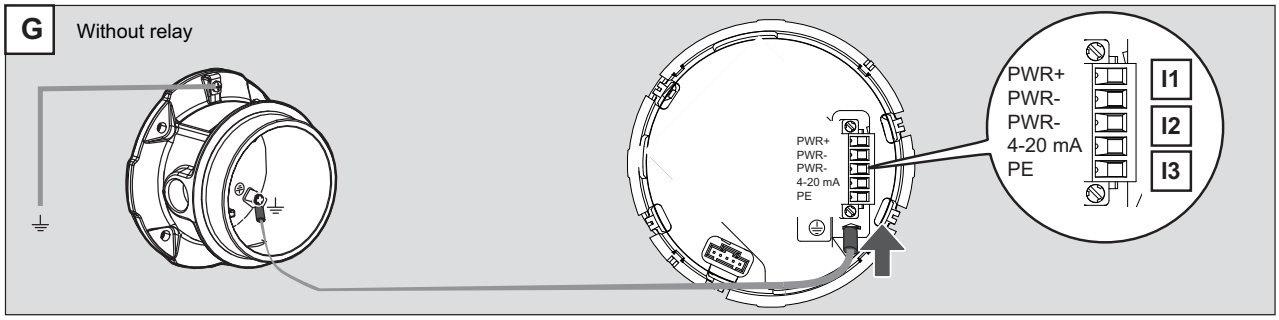
⚠ WARNING
To properly use this product, read and comply with these instructions for use.

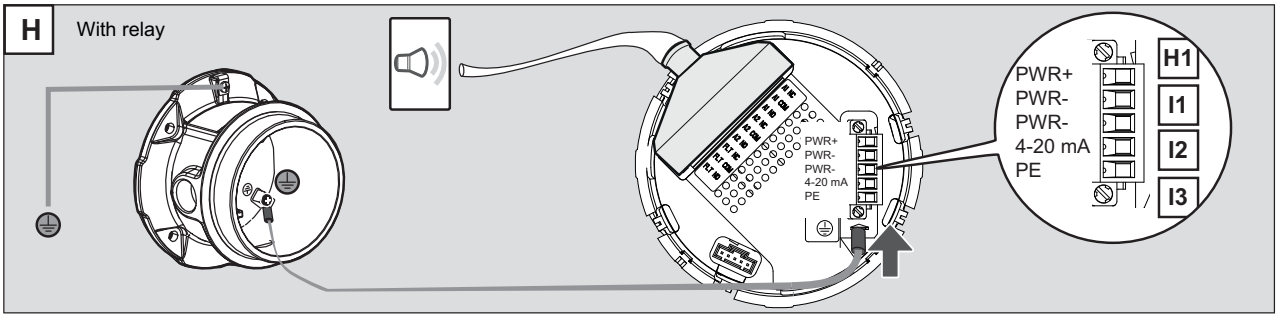
Dräger. Technology for Life®

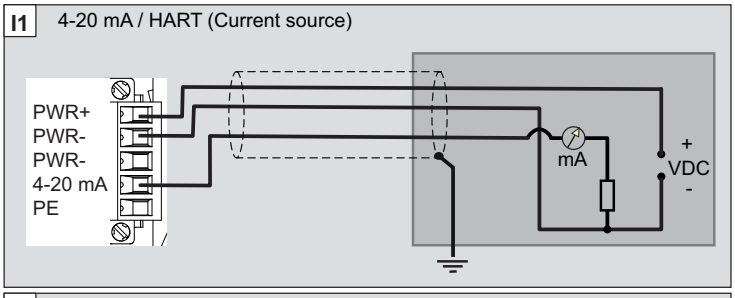
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de Gebrauchsanweisung 50
fr Notice d'utilisation 98
es Instrucciones de uso 145

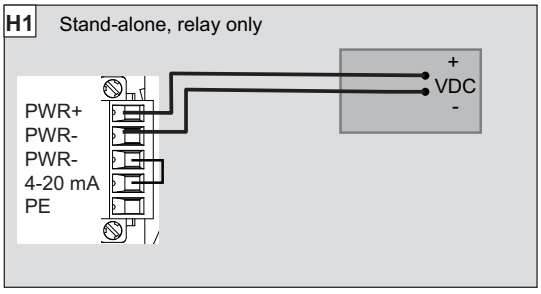

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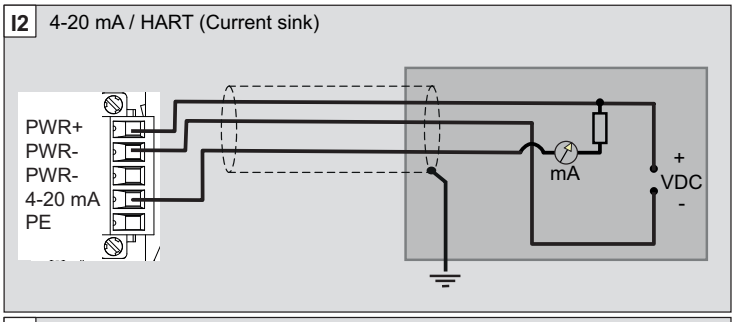
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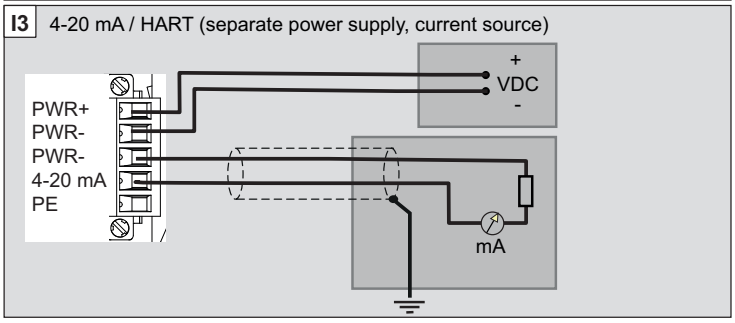






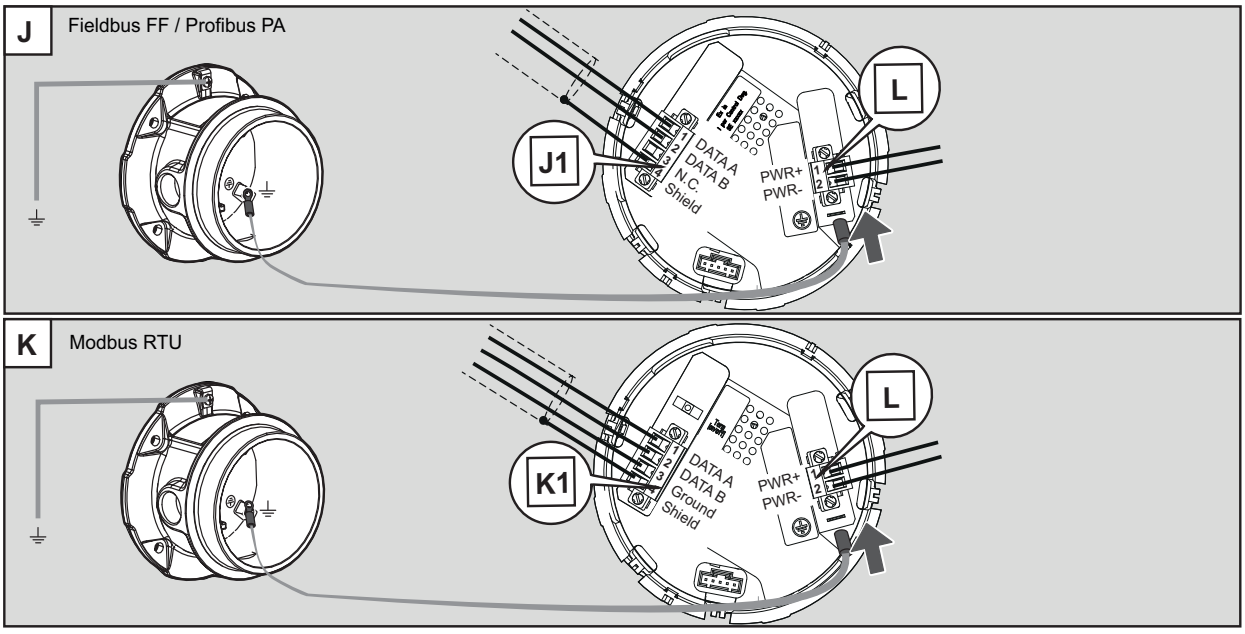


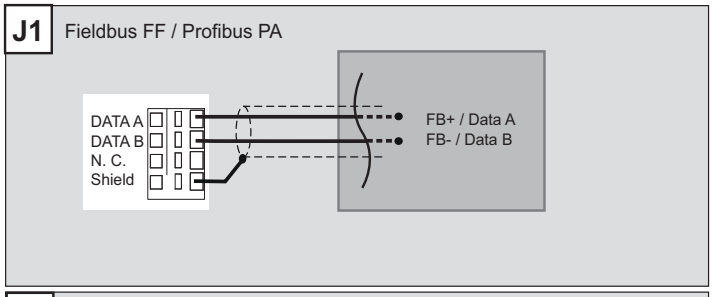


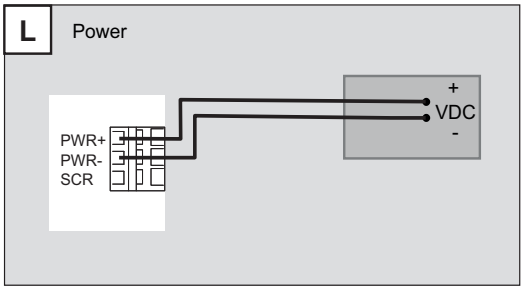


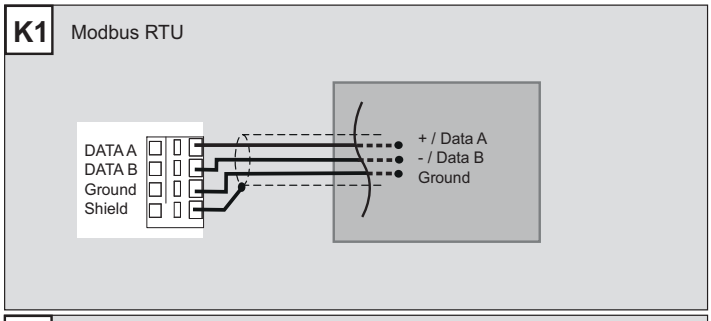
Cable specifications
Power supply and signals: 24 - 12 AWG / 0.2 - 2.5 mm²
Relays: 20 - 12 AWG / 0.5 - 2.5 mm²

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Cable specifications
Power supply and signals: 24 - 12 AWG / 0.2 - 2.5 mm²

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Dräger **Polytron Xxx0**
XTR 0XXX
Dräger Safety 23560 Lübeck, Germany
CE 0158 Ex II 2G Ex II 2D
Part No: XXXXXXX
Serial No: **XXXX-XXXX**
Data Matrix Code
Gas Detector for Use in Hazardous Locations Subject to Fire, Electrical Shock and Explosion Hazards Only
Class I, Div 1, Groups A,B,C,D | Class II, Div 1, Groups E,F,G
Class I, Zone 1, Group IIC | T6/T4 | Type 4X | C22.2 No. 152
Supply: 10 ...30V ⎓, 0.08 ... Relays: 5A, 30V ⎓ or 230V ~
Ex db IIC T6/T4 Gb | PTB 11 ATEX 1005X
Ex tb IIIC T80 °C ... °C | IECEx PTB 11.0005X | BVS 15 ATEX G 001X
-40°C ≤ Ta ≤ ... °C | IP6X | P ≤ 5W | UL only: -40°C ≤ Ta ≤ +70°C
WARNING: Do not open when energized- risk of Ignition of Harzadous Atmospheres.
AVERTISSEMENT: Lire attentivement le manuel avant utilisation.
WARNING: To reduce the risk of Ignition of Hazardous Atmospheres, the conduit must be sealed within 18" of the enclosure.
WARNING: Read Manual before operating.

SAMPLE

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1 Safety-related information

Both the latest edition and other languages of these instructions for use can be downloaded in the Technical Documentation database (www.draeger.com/ifu). Due to product actualizations, Dräger recommends always using the latest edition of the instructions for use.

1.1 Safety instructions

- Before using this product, carefully read these Instructions for Use and those of the associated products.
- Strictly follow the instruction for use. The user must fully understand and strictly observe the instructions. Use the product only for the purposes and under the conditions specified in this document.
- Do not dispose of the Instructions for Use. Ensure that they are retained and appropriately used by the product user.
- Only trained and competent users are permitted to use this product.
- Notify Dräger in the event of any component fault or failure.
- Comply with all local and national laws, rules, and regulations associated with this product.
- Only trained and competent personnel are permitted to inspect, repair and service the product as detailed in these instructions for use. Further maintenance work that is not detailed in these instructions for use must only be carried out by Dräger or personnel qualified by Dräger.
- Dräger recommends a Dräger service contract for all maintenance activities and that all repairs are carried out by Dräger.
- Use only genuine Dräger spare parts and accessories. Otherwise the proper functioning of the product may be impaired.
- Maintenance must be performed as described, see 10 Maintenance.
- Only operate the product within the framework of a risk-based alarm signaling concept.
- Before connecting this instrument to electrical devices not mentioned in the IFU consult Dräger
- The instruments or components may not be modified in any manner.
- The use of faulty or incomplete parts is forbidden.
- The appropriate regulations must be observed at all times when carrying out repairs on these instruments or components.
- Do not open the instrument during operation.
- The corresponding regulations must be observed when carrying out repairs on these instruments or components.
- Follow the directions of EN 60079-29-2 for the measurement of flammable gases and oxygen.
- Follow the directions of EN 45544-4 for the measurement of toxic gases.

Polytron® 8100 EC-specific:

- **WARNING**: Risk of ignition of flammable or explosive atmospheres! Substitution of components may impair Intrinsic Safety.

1.2 Operating area and conditions

- For SIL applications, observe the Dräger Polytron® 8xx0 safety manual.
- Only applies for Polytron 8200 CAT:
  If the device is exposed to a targeted flow of air that is mixed with gas, the measured values may be elevated. For deviating values, see the instructions for use provided with the corresponding sensor.
- Observe the information and restrictions in the instructions for use for the sensors used.
- **CAUTION** Risk of ignition of flammable or explosive atmospheres! Not tested in oxygen enriched atmospheres (>21% O_2).
- **Using the product in areas subject to explosion hazards:** Instruments or components for use in explosion-hazard areas which have been tested and approved according to national, European or international Explosion Protection Regulations may only be used under the conditions specified in the approval and with consideration of the relevant legal regulations.

Hazardous areas classified by zones:

- The instrument is designed for use in Zone 1 or Zone 2 hazardous areas where gases of explosion groups IIA, IIB or IIC and temperature class T4 or T6 may be present. Temperature classes depend on the maximum ambient temperature. The instrument must not be operated in ambient temperatures outside of the temperature range indicated on the instrument.
- The instrument is designed for use in Zone 21 or Zone 22 hazardous areas where dusts of explosion groups IIIA, IIIB or IIIC and dust temperatures of T80 °C or T130 °C (T135 °C for the Polytron 5100 EC and Polytron 8100 EC) may be present. Dust temperatures depend on the maximum ambient temperature. The instrument must not be operated in ambient temperatures outside of the temperature range indicated on the instrument.

Hazardous areas classified by divisions:

- The instrument is designed for use in Class I, Div. 1 or Div. 2 hazardous areas where gases of groups A, B, C or D and temperature class T4 or T6 may be present. Temperature classes depend on the maximum ambient temperature. The instrument must not be operated in ambient temperatures outside of the temperature range indicated on the instrument.
- The instrument is designed for use in Class II, Div. 1 or Div. 2 hazardous areas where dusts of groups E, F or G may be present. The instrument must not be operated in ambient temperatures outside of the temperature range indicated on the instrument.

2 Conventions in this document

2.1 Meaning of the warnings

The following warnings are used in this document to alert the user to potential dangers. A definition of the meaning of each warning is as follows:

Alert icon	Signal word	Warning classification
⚠	WARNING	Indicates a potentially hazardous situation. If not avoided, it could result in death or serious injury.
⚠	CAUTION	Indicates a potentially hazardous situation. If not avoided, it could result in physical injury. It may also be used to alert against unsafe practices.
	NOTICE	Indicates a potentially hazardous situation. If not avoided, it could result in damage to the product or environment.

2.2 Trademarks

Trademark	Trademark owner
PROFIBUS®	PROFIBUS Nutzerorganisation e. V.
HART®	HART Communication Foundation
Polytron®	Dräger Safety AG & Co. KGaA
DrägerSensor®	Dräger Safety AG & Co. KGaA

The following webpage lists the countries in which Dräger's trademarks are registered: www.draeger.com/trademarks.

3 Description

3.1 Product overview

Refer to the figures on the fold-out page

A 1	Enclosure lid
A 2	Set screw (2 mm Allen screw)
A 3	Handle
A 4	PCB unit (and optional relay)
A 5	Enclosure bottom
A 6	Port for Sensor
A 7	Feed-through cable
A 8	Docking station
A 9	Explosion-proof instrument
A 10	Explosion-proof instrument with docking station for increased safety
A 11	Explosion-proof instrument with mounting spacer (only for Polytron 87x0 IR)
A 12	Mounting spacer (only for Polytron 87x0 IR)
B	Test setup for calibration
C	Polytron 8100 EC
D	Sensor dongle connection (only Polytron 8100 EC)
E 1	Polytron 8200 CAT
E 2	Polytron 8310 IR
F 1	Polytron 8710 IR with splash guard
F 2	Polytron 8710 IR without splash guard

3.2 Feature description

The Polytron 8000 family includes the following instrument versions:

– Polytron 8100 EC, operates with electrochemical sensors (EC sensors)
– Polytron 8200 CAT, operates with catalytic Ex sensors (CatEx sensors/catalytic, DQ or LC DrägerSensors)
– Polytron 8310 IR, operates with infrared Ex sensors (IREx sensors)
– Polytron 8700 IR, operates with infrared sensors (PIR 7000 sensors)
– Polytron 8720 IR, operates with infrared sensors (PIR 7200 sensors)

The following interfaces are possible:

– 4 to 20 mA analog (per NAMUR recommendation NE43)
– Relay board
– Digital HART output signal
– Foundation Fieldbus[1)]
– PROFIBUS PA[1)]
– Modbus RTU[1)]

If the 4 to 20 mA interface is used, the current must be monitored between 0 mA and 3.5 mA. Currents between 0 mA and 3.5 mA can indicate a special state (see "Special states", page 16).

If a relay board is used, local alarm devices can be activated. If no relay board is used and an alarm is pending, only the red LED on the instrument will flash.

Gas concentrations, status messages, and menu choices are displayed on a backlit graphic LC-display and 3 colored LEDs.

Navigation through the menu takes place by tapping the relevant key on the pane of the enclosure lid with a magnetic wand. The instrument can be configured, calibrated and maintained non-intrusively without declassifying the area.

The instruments are supplied with a data logger. The data logger can store up to 35,000 values. At a sampling interval of 1 measurement per minute, the data logger can store the measurement history of approximately 24 days. This time can be significantly increased if the trigger function is activated. The data logger can only be downloaded using the PolySoft

1) No relays are available when the fieldbus interface is used. The fieldbus interface does not conform to BVS 13 ATEX G 001 X. Dräger SensorAlive is not supported.

PC software. The download generates an .ofb file and a .txt file. The .txt file includes the data logger information in readable form.

The instruments can be connected to a Dräger controller or a programmable logic control (PLC) with a sealed conduit or approved cable gland.

The instruments can be operated as a current source or current sink if the power is supplied by the controller. If the instruments are connected to a separate power supply, they can only operate as a current source.

The enclosures of the instruments are made of sturdy stainless steel or aluminum, and are suitable for indoor and outdoor application.

The instruments are designed for stationary installation. They are available in the following designs:

– Explosion-proof instrument (Ex d)
  The flameproof, explosion-proof enclosure provides three ¾ " NPT connections which can be used for field wiring, direct connection of a sensor, or wiring of a remote sensor.
– Instrument for increased safety (Ex e)
  The instrument is supplemented by an increased safety terminal box (docking station) providing up to four 20 mm connections for field wiring or wiring of a remote sensor. If the cable gland from Dräger is used, the permissible cable diameter is 7 mm to 12 mm.

The following dongles are available for the Polytron 8100 EC:

Sensor-test dongle	Activates the sensor self-test (not for hydrazine sensor 6810180)
Diagnostic dongle	Activates the sensor self-test, the display of the sensor vitality and the sensor diagnostic functions (not for hydrazine sensor 6810180)

3.3 Intended use

The instruments in the Polytron 8000 family are intended for continuous monitoring of the ambient air.

With the optionally integrated relay module, the instrument can be operated without a central controller (with additional local alarm signaling).

The instrument can be connected to a Dräger controller or a programmable logic control (PLC) with a sealed conduit or approved cable gland.

If the 4-20 mA interface is used, the current between 0 mA and 3.5 mA must be monitored. Currents between 0 mA and 3.5 mA can indicate a special state.

The instruments are designed for permanent installation and are approved for use in hazardous areas.

– Polytron 8100 EC is a combined intrinsically safe/explosion proof instrument for continuous monitoring of toxic gases or oxygen in the ambient air.
– Polytron 8200 CAT with catalytic DrägerSensor DQ or LC is an explosion-proof instrument for continuous monitoring of combustible gases and vapors containing hydrocarbons and non-hydrocarbons (e.g., hydrogen or ammonia) in ambient air.
– Polytron 8310 IR with infrared DrägerSensor IR is an explosion-proof instrument for continuous monitoring of combustible gases and vapors containing hydrocarbons in ambient air.
– Polytron 8700 IR with PIR 7000 is an explosion proof instrument for the continuous monitoring of combustible gases and vapors containing hydrocarbons in an appropriate atmosphere.
– Polytron 8720 IR with PIR 7200 is an explosion proof instrument for the continuous monitoring of carbon dioxide in ambient air.

3.4 Approvals

3.4.1 ATEX, IECEx, UL, CSA

An example of a name plate is shown on the fold-out page. A print-out of the name plate can also be found on the instrument's shipping box.

3.4.2 Additional information

Declaration of conformity: see supplement 4544300 or www.draeger.com/product-certificates

For additional information on approvals, see supplement 4544300.

4 Transmitter installation

4.1 Explosion proof (Ex d) installation - without Docking Station

4.1.1 Mechanical installation

4.1.1.1 General information on mechanical installation

– Local, state, and national rules and regulations that govern the installation of gas monitoring equipment must be strictly observed.
– The physical properties of the gas or vapor to be detected and the details of the corresponding application (e.g., possible leaks, air movement/drafts, etc.) must be taken into account.
– The future use of accessories and maintenance equipment must be considered.
– The free gas or vapor flow to the sensor must not be obstructed.
– The instrument must not be exposed to radiant heat that will cause the temperature to rise beyond the indicated limit values (16.6 Environmental parameters). The use of a reflective shield is recommended.
– A dust cap may be attached to the cable entry of the instrument. This cap is neither explosion-proof nor watertight and must be removed before connecting the instrument to a sealed conduit or before installation of a flameproof cable gland.

– Unused openings must be closed with blind plugs. For the required tightening torques for cable bushings, cable glands, plugs and sensors, see 16.7 Tightening torques.
– For non-conduit installations, an approved cable gland must be used (e.g., Hawke A501/421/A/¾ " NPT or equivalent).
– **WARNING:** Only for conduit installations: To reduce the risk of ignition of hazardous atmospheres, the conduit must be sealed within 45 cm (18 ") of the enclosure.
– **CAUTION:** If the gas detector is connected to controllers, the total response time may be delayed. The entire measurement path must be taken into account (e.g., latency of the controller). Ensure that the required response time is kept.

Polytron® 8100 EC-specific:

– Recommended sensor orientation: Downwards (see Figure C on the fold-out page).

Polytron® 8200 CAT-specific:

– Preferred sensor orientation: Downwards (see Figure E on the fold-out page). If the sensor inlet is protected against mechanical damage and the ingress of dirt and water, any orientation is permitted.
– For CSA-conform operation only:
The use of the optional splash guard (6812510) is required for CSA approval.

Polytron® 8310 IR-specific:

– Recommended sensor orientation: Downwards (see Figure E on the fold-out page).

Polytron® 87x0 IR-specific:

– The preferred orientation of the Dräger PIR 7x00 sensor must be observed (see Figure F on the fold-out page). Larger deviations and the use of the preassembled splash guard will increase the response time (see PIR 7x00 instructions for use).
– Any other orientation is only permissible if the PIR 7x00 is used without a splash guard, e.g., for use in ducts. If the sensor is installed vertically, there is an increased risk of deposits forming on the optical surfaces.
– The use of the preassembled splash guard is recommended to protect the sensor from water and dust.
– If a splash guard (part number 6811911 or 6811912) is used, the status lights must be arranged in a vertical line and the Dräger logo on the splash guard must be horizontal. A maximum deviation of ±30 degrees from the horizontal position is permissible.
– Liquid and/or deposits on the optical surfaces of the PIR 7x00 may result in a warning or fault.
– For the explosion-proof version, using a spacer (part number 6812617) when the instrument is mounted on a wall or to a level surface is recommended.

Special conditions in accordance with EN/IEC 60079-1

– The threads for the flameproof / explosion-proof enclosure do not conform to the minimum/maximum values indicated in EN/IEC 60079-1. The threads must not be re-worked by the user.

4.1.1.2 Installation

The instrument can be mounted for measuring gases in ambient air or inside of a duct/pipe.

1. Use M6 (1/4'') bolts with hex socket caps to mount the enclosure to one of the following options.

Option	Accessory
Mounting on a flat surface	Drilling template: 4544300 Additionally for Polytron 87x0 IR: Spacer 6812617
Mounting on a pole	Pole mount kit: 4544198
Mounting on a duct/pipe	Duct mount kit: 6812725 For Polytron® 87x0 IR:: 6812300

4.1.2 Electrical installation

4.1.2.1 General information on electrical installation

– For tightening torques, see 16.7, for permissible cable specifications, see 16.3.
– Strict compliance must be given to the electrical codes that govern the routing and connection of electrical power and signal cables to gas monitoring equipment.
– Ferrules must be used.
– The conductors for the power supply must have an adequately low resistance to ensure the correct supply voltage at the instrument.
– Wire insulation must be stripped by 5 to 7mm.
– The secondary circuit supplying power must be electrically isolated from the mains circuit (does not apply for the relay circuit).
– When installed at locations exceeding ambient temperatures of 55 °C, use only appropriate wiring, specified for at least 25 °C above the maximum ambient temperature.
– Only use cable glands that are approved in the country the system is installed in and suitable for the application.
– In accordance with EU Directive 2014/30/EU, this instrument may not be connected to a DC system. Providing the instrument with its own source of supply is recommended.

Analog interface

– To ensure proper operation of the instrument, the resistance of the 4 to 20 mA signal loop must not exceed 500 ohms.
When used in accordance with the metrological suitability test compliant with EN IEC 62990-1, EN IEC 60079-29-1 or EN 50104, the resistance must not exceed 300 ohms. With values above 300 ohms, supply voltage monitoring cannot be ensured.
Depending on the operating voltage and the application (e. g. HART® operation), a specified minimum resistance must be observed (see "Signal transmission to the controller", page 42).

Relay option

– At voltages >30 V AC or >42.4 V DC, the relay cables must be enclosed in protective tubing, or double-insulated cables must be used.
– The wiring for the optional relay module must be selected and fused according to the rated voltages, currents and environmental conditions.
– To ensure that a fault is recognized - without having to look at the instrument - an alarm device must be connected to the fault relay.
– Voltage differences can cause insulation faults. Do not mix electric loads with different voltage types (AC or DC). Using DC loads, ensure that relay contacts only control devices with the same DC voltage rating. Using AC loads, ensure that relay contacts are only connected to devices sharing a common phase.

Special conditions in accordance with IEC 60664-1

– The device variants incorporating a FISCO fieldbus interface as well as gas detection transmitter type ETR 02…5** must operate in circuits that are limited to overvoltage category I/II/III in accordance with IEC 60664-1.

4.1.2.2 Connection diagrams

The fold-out pages show the following connection diagrams:

Figure	Connection diagram for instruments
G	Without relay, enclosure grounding
H	With relay, enclosure grounding
I1	4-20 mA / HART (current source)
I2	4-20 mA / HART (current sink)
I3	4-20 mA / HART (separate power supply, current source)
H1	Standalone, relay only
J	Foundation Fieldbus / PROFIBUS PA, enclosure grounding
K	Modbus RTU, enclosure grounding
J1	Foundation Fieldbus / PROFIBUS PA, field wiring
K1	Modbus RTU, field wiring
L	Power supply digital interfaces

4.1.2.3 Wiring tables

4 to 20 mA/HART interface

Pin	Mark	Function
1	PWR+	V+
2	PWR-	V-
3	PWR-	V- Use if the instrument is connected to a separate power supply (operation as source).
4	4-20 mA	4 to 20 mA signal (Operation as source or sink)
5	PE	Protective earth Optional PE for relay connection. Connecting PE together with the 4-20mA analog output may cause ground loops.

Fieldbus interface

Pin	Mark	Function
1	Data-A	Signal Line A
2	Data-B	Signal Line B
3	GND	Ground
4	SHIELD	Cable Shield

Pin	Mark	Function
1	PWR+	V+
2	PWR-	V-

Relay connectors

All relays (A1, A2, FLT) of the device can be configured as "normally energized" (normally closed relay) or "energized on alarm" (normally open relay). The relays are configured at the factory as normally closed relays ("normally energized"). This ensures fail-safe operation.
Contrary to convention, the NO, COM, NC markings on the instrument are selected to correspond to the normally energized state. When the device is energized, the marking corresponds to the function of the pins.

Pin	Mark		Relay	
1	NO	FLT	Fault	Normally open
2	COM		Fault	Common connection
3	NC		Fault	Normally closed
4	NO	A2	A2	Normally open
5	COM		A2	Common connection
6	NC		A2	Normally closed
7	NO	A1	A1	Normally open
8	COM		A1	Common connection
9	NC		A1	Normally closed

4.1.2.4 Preparing the electrical installation

1. Loosen the set screw (2) and unscrew the enclosure lid from the lower part of the enclosure, see figure A on the fold-out page.
2. Pull out the PCB unit.
3. Proceed with the figure that contains your Polytron® model and signal output, see fold-out page.

4.1.2.5 Connecting the device with relays (stand-alone)

The wires for alarm devices must be connected to the 9-pin relay connector. A piece of wire insulation (heat-shrink tube) and a protective cover are included for extra protection of the relay wires.

1. Remove the 5-pin connector.
2. Connect the cable for the power supply to the corresponding connection terminals, see figure H1 on the fold-out page..
3. Bridge pins 3 and 4 of the 5-pin connector.
4. Remove the 9-pin connector.
5. Cut the heat-shrink tube as needed and slide it over the relay wires before insertion into the 9-pin connector.
6. Position the heat-shrink tube at the edge of the wire insulation and use a heat gun to shrink the tubing securely onto the wire insulation.
7. Slide the protective cover over the wires.
8. Connect the wires for alarm 1 (pre-alarm), alarm 2 (main alarm), and error alert to the relevant terminals as indicated in the following wiring table.
9. Plug the connector back into the socket and tighten the screws.
10. Close the device, see 4.1.2.9 Closing the gas detector.

The following tables display the status of a connected alarm indicator and whether it indicates faults (e.g., power failure for the gas detector).

The behavior of the relay depends on the alarm configuration and the relay contact the alarm indicator is connected to.

Relay configuration: Normally energized

Contact	Alarm indicator status and fault indication by the alarm indicator		
	Alarm triggered	Gas detector-specific fault	Field wiring fault
Normally closed	ON	displayed	not displayed
Normally open	OFF	displayed	displayed

Relay configuration: Energized on alarm

Contact	Alarm indicator status and fault indication by the alarm indicator		
	Alarm triggered	Gas detector-specific fault	Field wiring fault
Normally closed	OFF	not displayed	displayed
Normally open	ON	not displayed	not displayed

4.1.2.6 Connecting the 4-20mA/HART® interface

For connections to a control unit (PLC), refer to the documentation corresponding to the control unit.

1. Pull off the 5-pin connector.
2. Connect the three wires for power and signal to the appropriate terminal as indicated in the wiring table and figure.
3. Plug connector back into socket and tighten screws.
4. Close the instrument, see 4.1.2.9 Closing the gas detector.

4.1.2.7 Grounding

1. Ground the enclosure of the instrument locally at the grounding lug, see figures G and H on the fold-out page..
2. Connect the shield of the wires only to the instrument earth ground of the controller (e g. chassis, ground busbar, etc.).

ℹ Unless special measures are taken (e. g. capacitive earthing), the shield must only be connected at one end.

Information on grounding fieldbus and Modbus connections is provided in the following documents.

Interface	Document
Foundation Fieldbus FF	9033783
Modbus RTU	9033781

4.1.2.8 Connecting the fieldbus interface

1. Pull off the 2-pin and 4-pin connector.
2. Connect the two wires for power and the four wires for signal to the appropriate terminals as indicated in the wiring table and figure.
3. Plug connector back into socket and tighten screws.
4. Close the instrument, see 4.1.2.9 Closing the gas detector.

For further information regarding the fieldbus interface installation consult the corresponding Technical Handbook.

4.1.2.9 Closing the gas detector

1. Ensure that the following connections are correctly established:
   a. The screws for the wiring are tightened with the correct torque.
   b. All cable connections are secured with screws.
   c. The front port of the sensor is inserted.
   d. The grounding cable that leads from the enclosure is connected with the eye on the PCB unit, see figures G and H on the fold-out page.
2. Place the PCB unit in the lower part of the enclosure.
3. Screw the enclosure lid onto the lower part of the enclosure and tighten with the correct torque.
4. Tighten the set screw.

4.2 Increased safety (Ex e) installation - with Docking Station

The installation with enhanced safety (Ex e) is described in the assembly instructions for the docking station (part number 9033242).

5 Installation of sensors or sensing heads

5.1 Installing the EC sensor on the Polytron 8100 EC

See figure C on the fold-out page.

1. Unscrew the locking screw (2) (2 mm hexagon socket screw).
2. Unscrew and remove the bayonet ring (3) and remove the dummy disk.
3. Insert the sensor (4) in the opening and turn until it engages in the gas detector. This does not damage the sensor connector.
4. Secure the sensor with the corresponding bayonet ring (3).

   ℹ For Dräger SensorAlive, a different bayonet ring must be used than for other EC sensors.

5. Tighten the locking screw (2) so that the bayonet ring cannot come loose (required for installations in zone 22).

   ℹ If the Dräger SensorAlive is being installed in an existing system for the first time, the firmware must be updated to version 4.0.0 or higher. Contact Dräger for support.

5.2 Installing the sensing head

Depending on the type of explosion protection, there will be various sensing heads used. Information relating to the installation of the sensing heads can be found in the respective sensing head manual.

For remote applications, the cable shielding must be attached on both the sensor and transmitter side. The cable length should be ≤ 30 m.

Remote versions with "Explosion-proof (Ex d)" explosion protection

Transmitter	Sensing head IFU part numbers
Polytron 8100 EC	Remote EC sensing head (9033247)
Polytron 8200 CAT (for DQ sensors)	DQ NPT aluminum remote sensor, DQ NPT steel remote sensor (4544286)
Polytron 87x0 IR	Remote PIR 7000 (334) with stainless steel or aluminum sensor connection housing (4544286)
Polytron 8200 CAT (for LC sensors) Polytron 8310 IR Polytron 87x0 IR	Stainless steel or aluminum sensor connection housing (4544286)

Remote versions with "Increased safety (Ex e)" explosion protection

Transmitter	Sensing head IFU part numbers
Polytron 8100 EC	Remote EC sensing head (9033247)
Polytron 8200 CAT	Polytron SE Ex sensing heads (9033888)
Polytron 8310 IR	DrägerSensor IR (9023843)
Polytron 87x0 IR	PIR 7x00 (9023885)

6 Commissioning

6.1 General information

– Before connecting the instrument to the power supply, connect the wires for the relay and connect up the sensor.
– Before starting normal operation of the instrument, check whether the configuration and adjustment settings are correct.

In order to guarantee its safe operation according to BVS 13 ATEX G 001 X and PFG 14 G 001 X, the following standard alarm settings for the instrument must remain unchanged.

– The relays must be set to ***Normally energ.*** and the alarm A2 (main alarm) to ***Latching*** and ***Non-acknowledgeable*** or ***Pre-Acknowledgeable***.
– Alarm A1 (pre-alarm) may only be set to ***Acknowledgeable*** if used for activation of an acoustic alarm device.
– Latching in the event of over range (see "Setting the DQ sensor latching", page 37).

When operating in accordance with BVS 13 ATEX G 001 X and PFG 14 G 001 X, consideration must be given to the following special conditions:

– Polytron 8200 CAT:
  – When streaming the DQ or LC sensor with air containing measured gas, measured values may increase by up to 32 %.
    These values may increase by up to 70 % when operating with the DQ remote calibration adapter.
  – The transmitter with LC sensor must be operated in combination with a control unit that indicates over range with a latching signal. Internal transmitter alarm relays are not permitted.
  – The transmitter with LC sensor must be adjusted with its sensor in the standard operating position.
  – False alarms may be triggered during the warm up period of the LC sensor.
– Polytron 8100 EC:
  Minor changes to the concentration may see the setting time t20 of the transmitter with EC sensor exceed the EN 50104 threshold.

6.2 Commissioning the gas detector

1. To prevent false alarms, turn off the alarm activation for the gas detector (see "Turning the alarms on and off", page 30).
2. Switch on the power supply.
   ⇒ The device performs a start-up sequence (LCD/LED test, software version, and initialization).
   ⇒ The display indicates that the sensor will be ready for measurement in hh:mm:ss (countdown). The device transmits the maintenance signal. The fault relay is activated.
   ⇒ The sensor warms up. The maintenance signal on the 4 to 20 mA interface remains until the sensor has warmed up. The length of the warm-up time depends on the type of sensor and the ambient conditions. Maximum warm-up time of a new sensor: See the instructions for use of the sensor.
3. Check the date and time. Settings can be changed during the sensor's warm-up time.
   ⇒ After the sensor's warm-up time, the device switches to normal operation. The display shows the current gas concentration, the unit of measurement, and the selected gas if applicable. The green LED is lit.

If the device is operated with a Dräger SensorAlive, Dräger recommends setting the correct date and time. The sensor's warm-up time is followed by the start-up period of the Dräger SensorAlive. The sensor is ready for measurement during this phase, but the self diagnostics do not yet take place.

4. Adjust the device as necessary.
5. Turn on the alarm activation for the gas detector (see "Turning the alarms on and off", page 30).

7 Operation

7.1 Control panel

The control panel contains

– buttons for navigating in the menu
– a display
– LEDs and associated symbols

The buttons for navigation have different functions depending on the menu that is in use.

The instrument is operated with a magnetic wand. To do so, the enclosure lid must be in place on the instrument. If the enclosure lid is not in place, the magnetic wand may activate two or more buttons at once (cross-talk).

7.2 LEDs and symbols

The following symbols and LEDs can be found on the control panel:

Symbol	LED	Description
	Red	Alarm Triggered
	Yellow	Fault
	Green	Power on

LED status

– If alarm A1 (pre-alarm) has been triggered, the red LED will flash once .
– If alarm A2 (main alarm) has been triggered, the red LED will flash twice .
– If an alarm is acknowledged before the reason for the alarm has been rectified, the red LED will light continuously to indicate that there is a fault.

7.3 Readings on the display

7.3.1 All devices

Symbol	Explanation
	An error message is present. Additional information is available in the ***Information*** menu.
	A warning message is present. Additional information is available in the ***Information*** menu.
	Maintenance signal is transmitted.
	The set full scale deflection is exceeded at the 4-20 mA interface.
	The set threshold limit value is not met at the 4-20 mA interface.
	HART® operation is active. Analog interface is set to a fixed value and is not transmitting any measurement signal.
	Once the capacity of the data logger is reached, the old data are overwritten by new values ("roll" function).
	Once the capacity of the data logger is reached, no more data can be stored ("stack" function).
SIL	SIL operation mode is activated.

7.3.2 Polytron 8100 EC-specific symbols

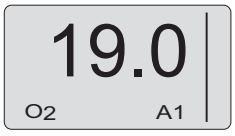
Symbol	Explanation
	The sensor is ready for operation.
	The sensor is ready for operation but is close to the end of its useful life.
	The sensor is still ready for operation but should be changed as soon as possible. The vitality is <25%.
LT	A LifeTest of the Dräger SensorAlive is carried out.

7.3.3 Measuring mode

The following display examples show the Polytron 8100 EC.

Gas names are not predefined for the Polytron 8200 CAT and Polytron 8310 IR. Gas names must be entered via the DrägerPolysoft PC software. After modifying parameters with the DrägerPolysoft PC software or another software, verify all parameters by downloading them from the Polytron® 8xx0 or by checking them directly on the instrument.

The following is displayed in measuring mode:

Display example	Description
	In normal operation, the display shows the measured gas concentration, the selected gas type, and the unit of measurement. **Analog interface:** Corresponding current value **Relays:** All relays are in the normal state
	Exceeding the alarm thresholds. Example shows pre-alarm A1. **Analog interface:** Corresponding current value **Relays:** Relay A1 is in alarm state.

7.3.4 Special states

If the instrument is in a special state, proper measurement or alarm activation can no longer be guaranteed.

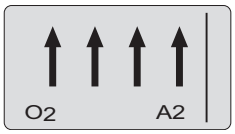
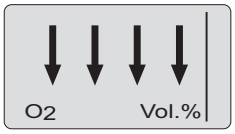
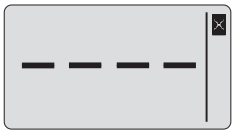
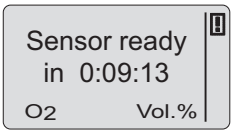
This is the case:

- When the gas concentration exceeds the measuring range.
- When a fault occurs.
- When alarms are deactivated.
- When calibrations are performed.
- When bump tests are performed.
- When a sensor is in the warm-up phase.
- When the system is in maintenance mode.
- When a Dräger SensorAlive is used and the system is configured such that the measured value is not indicated during a LifeTest.

For the current of the analog interface corresponding to the analog signal, see 16.2.

The signals of the digital interfaces are described in the following documents.

Interface	Document
PROFIBUS PA	9033782
Foundation Fieldbus FF	9033783
Modbus RTU	9033781

Display example	Description
	**Value above measuring range** The gas concentration is outside of the measuring range of the sensor[1]. **Analog interface:** Over range **Relays:** A2 relay switch ***Note for the Polytron 8200 and Polytron 8310:*** The message that the measuring range has been exceeded can also be caused by a short circuit or an interruption in the line to a remote sensor.
	**Value below measuring range** The gas concentration is outside of the measuring range of the sensor. **Analog interface:** Drift below zero **Relays:** Fault relay switch
	**Fault display** The ⊠ symbol is displayed on the right side of the display. **Analog interface:** Fault current **Relays:** Fault relay switch
	**Maintenance display** The 🔧 symbol is displayed on the right side of the display. This is displayed when alarms are deactivated, and during adjustment, bump tests, and maintenance work. **Analog interface:** Maintenance current **Relays:** No change
	**Warning display** The ⚠ symbol is displayed on the right side of the display. **Analog interface:** Warning current[2] **Relays:** No change
	**Warm-up phase 1** The ⚠ symbol is displayed on the right side of the display. The remaining time is displayed on the left side. **Analog interface:** Maintenance current **Relays:** Fault relay switch The fault relay behavior can be configured for warm-up phase 1 (see "Setting fault relay warm-up 1", page 30).

Display example	Description
	**Warm-up phase 2** The ! symbol is displayed on the right side of the display. The measured value is displayed on the left side. **Analog interface:** Measured value **Relays:** Behavior as in measuring mode (the fault relay does not indicate warm-up phase 2).

1) When the gas concentration exceeds the full scale deflection of the 4 to 20 mA interface, the display continues to display the measured value plus "Analog interface over range" .
2) Only when warning current is activated. Factory setting: Deactivated.

7.3.5 Ending special states

Error display / warning display

Error displays and warning displays are usually non-latching. As soon as the causes of the errors or warnings have been rectified, no more error or warning is displayed. Exceptions are "SensorAlive fault detection" and "SensorAlive clogging detection".

To eliminate the causes, display the error or warning (see "The Information menu", page 18) and start troubleshooting (see "Troubleshooting", page 25).

Value exceeds/falls below the measuring range

The display indicates that the gas concentration is beyond the measuring range of the sensor. The information on the display disappears as soon as the gas concentration is back within the measuring range. After an over range occurrence, the sensitivity and response time of the sensor may deteriorate.

NOTICE

Sensor malfunction

Gas concentrations outside the sensor's measuring range can cause the sensor to malfunction.

► Recalibrate the sensor if necessary.

Polytron® 8200 CAT with DQ sensor:

An over range has to be acknowledged with [OK] after verifying that the gas concentration is below 100 %LEL (e.g. using a portable instrument).

Latching alarms is the default setting of the instrument.

For instruments without relays, the over range can be set to non-latching. In this case, the over range indication disappears. The control unit must support this function! For further information see: "Setting the DQ sensor latching", page 37.

Polytron® 8200 CAT with LC sensor:

⚠ WARNING

Ambiguous readings for measured values that exceed the measuring range

Latching alarms for over range situations are not supported by LC sensors.

For safe operation in line with BVS 13 ATEX G 001 X, the gas detector must be operated with a controller that can display latching alarms. Do not use internal alarm relays of the gas detector.

► Make sure that over range latching is active at the controller.

After over range measuring values, verify that the gas concentration is below 100 %LEL (e.g. using a portable instrument).

7.4 Info mode and function keys

7.4.1 Opening Info mode

Info mode is used to show relevant device information. This does not interrupt the normal operation of the device.

- Tap and hold ▲ for 3 seconds in measuring mode.

7.4.2 Navigating in Info mode

Button	Function
▲	Switches to the next screen
▼M	Switches to the previous screen
OK	Ends info mode

If no key is tapped within 30 seconds, the instrument will automatically return to normal operation.

7.4.3 Using function key

Using the function key, a pre-set function can be executed. By default the faults are displayed.

- Tap and hold ▲ for 1 seconds in measuring mode.

To configure the function key, see 11.4 Configuring function key.

7.5 Menus

7.5.1 Navigating in a menu

Button	Function
▲	Scrolls upwards. Sets values.
▼M	Scrolls downwards. Sets values.
OK	Confirms entry. Selects menus and functions.

7.5.2 Opening menus

- To open the ***Information*** menu:
  a. Tap and hold ▼ for 1 second in measuring mode.
- To open the ***Calibration*** menu:
  a. Tap and hold ▼ for 3 seconds in measuring mode.
  b. Select ***Enter password***.
  c. Enter the corresponding password and confirm with [OK].
- To access all menus:
  a. Tap and hold ▼ for 3 seconds in measuring mode.
  b. Select ***Enter password***.
  c. Enter the corresponding password and confirm with [OK].

7.5.3 Passwords

Calibration PWD	Permits access to the ***Information*** menu and the ***Calibration*** menu (adjustment settings) Default value: **_ _ _ 1**
Settings PWD	Permits access to all configurations and menus Default value: **_ _ _ 2**

Information on changing the passwords can be found in 11.1.

7.5.4 The *Information* menu

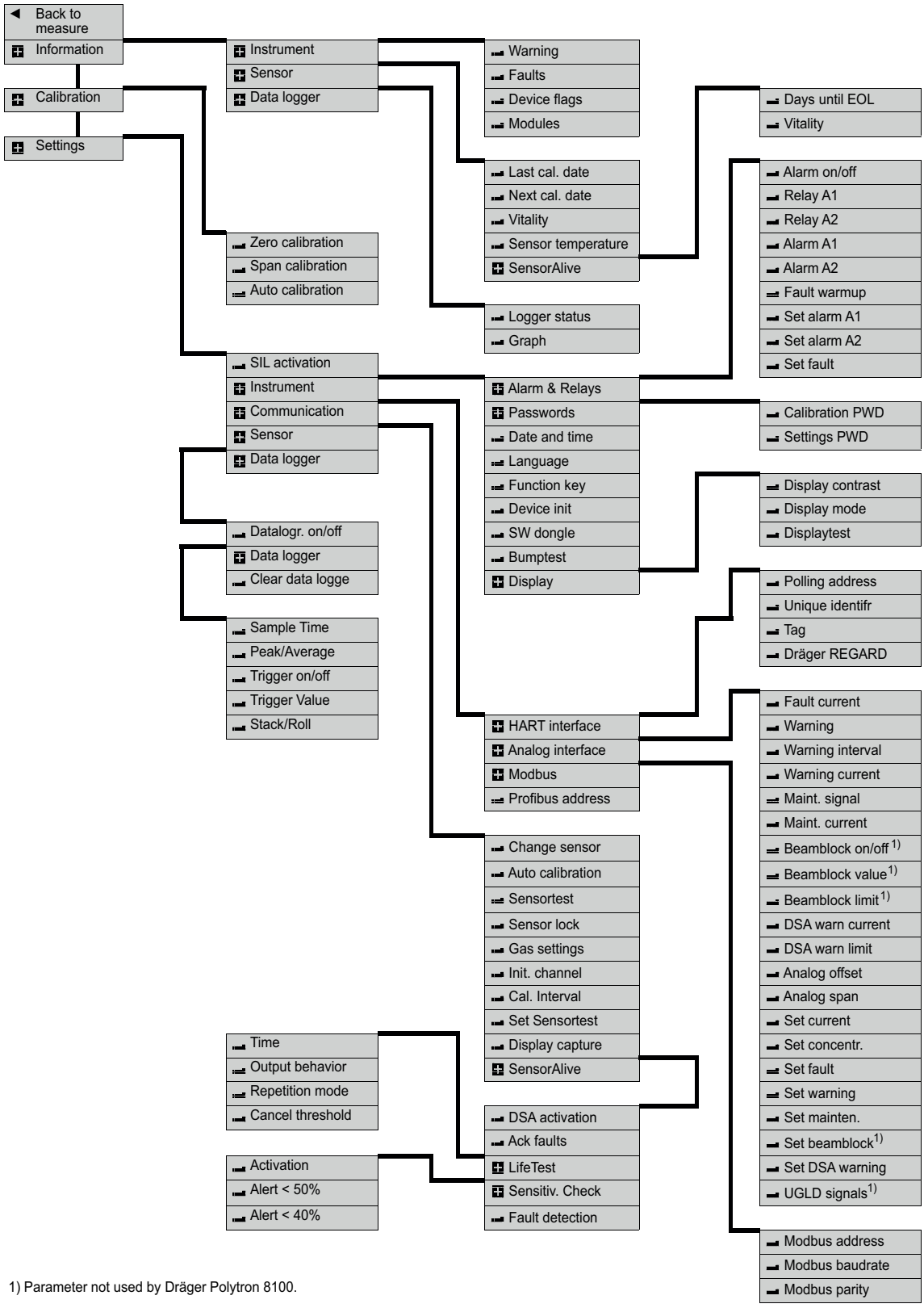
In the ***Information*** menu, the following information can be called up:

Instrument	
Warnings	Warning messages in plain text, including the corresponding number. If there are several warning messages, this will be shown accordingly (e.g. with 1/3 = screen 1 of 3).
Faults	Error messages in plain text, including the corresponding number. If there are several errors, this will be shown accordingly (e.g. with 1/3 = screen 1 of 3).
Device flag	With this function, the warning and error codes are shown in table format. If the value 00 is shown for all codes, then there are no warning or error messages present.
Modules	An overview of the installed hardware modules, as well as the software version of the SIOS-specified EC sensor interface, will be shown. For more detailed information, select the corresponding module. ■ = installed modules □ = modules not installed
Sensor	
Last cal. date	Adjustment date, unit, gas and concentration of the last adjustment are shown.
Next cal. date	Shows the date of the adjustment that is due next.
Vitality[1)]	The sensor vitality is shown in %. Dräger recommends replacing the sensor when vitality is < 25 %.
Sensor temperature[1)]	The current and highest sensor temperature will be shown.
SensorAlive	The sub-menu shows the number of days left for the expected service life and the vitality in %.
Data logger	
Logger status	Data logger status display (active or inactive)
Graph	Display of progress over last 15 minutes in a time/concentration graph.

1) The function is only available with the diagnostic dongle.

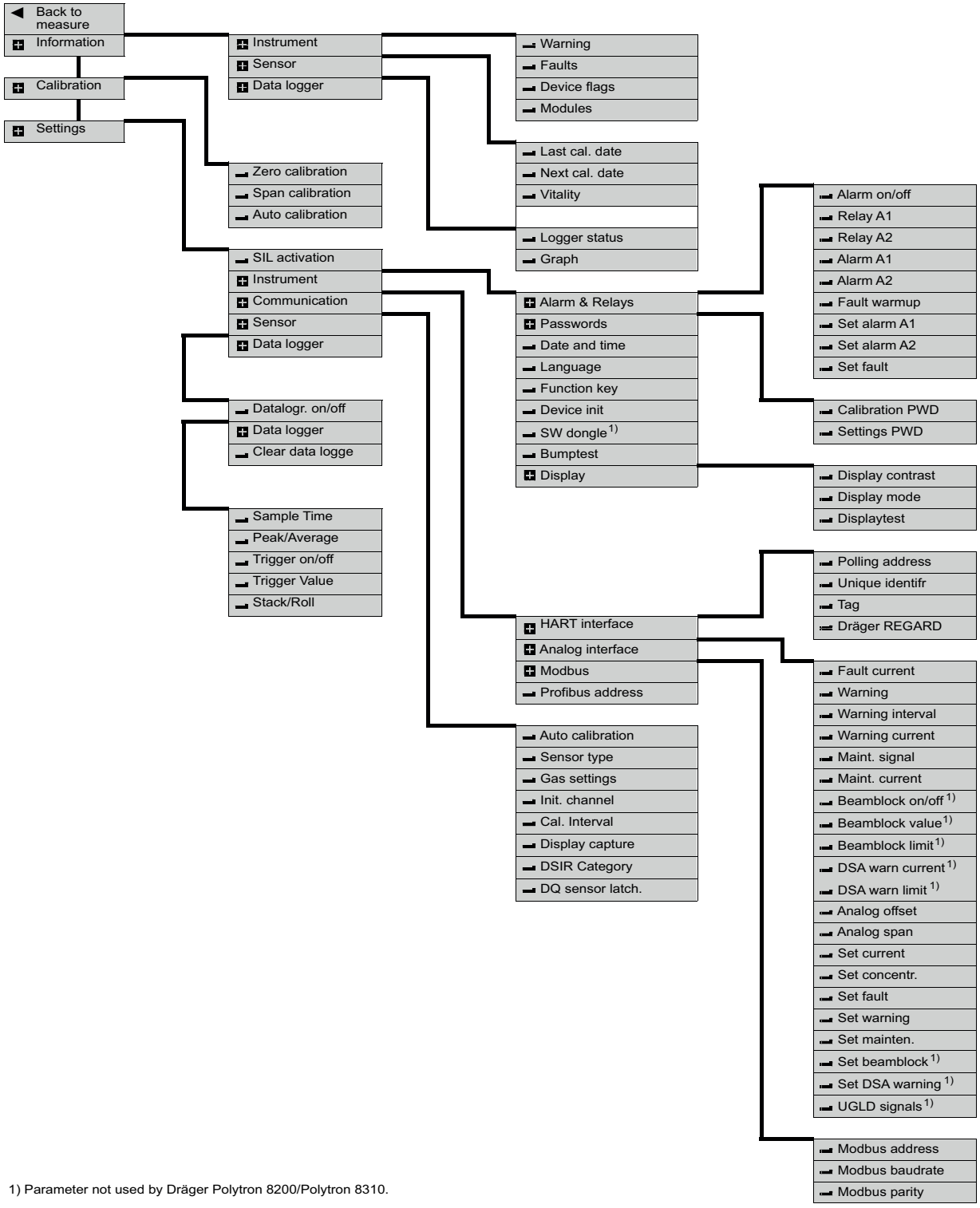
7.5.5 Menu overviews

Polytron 8100



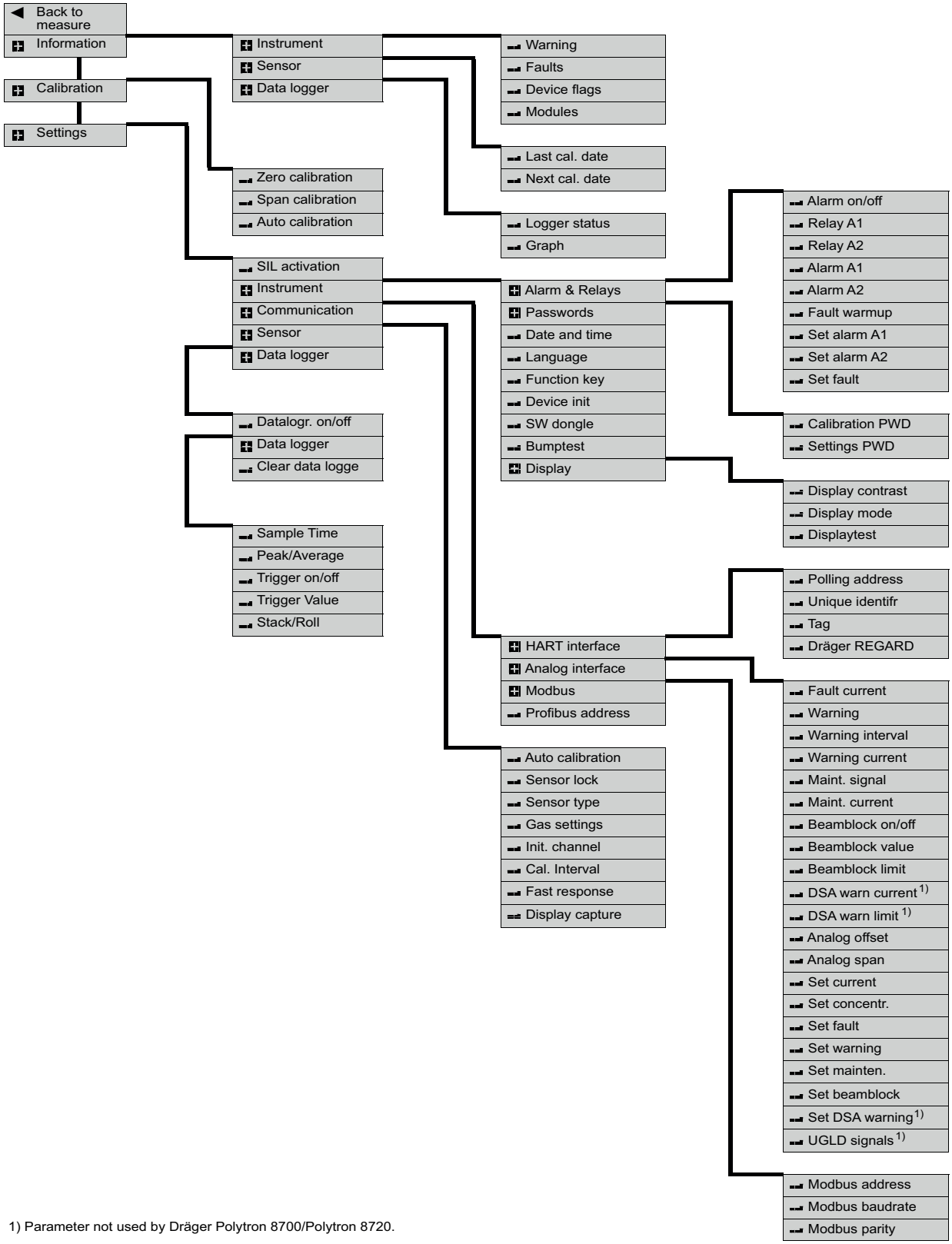
1) Parameter not used by Dräger Polytron 8100.

Polytron 8200, Polytron 8310



1) Parameter not used by Dräger Polytron 8200/Polytron 8310.

Polytron 8700, Polytron 8720



1) Parameter not used by Dräger Polytron 8700/Polytron 8720.

7.6 Information on operation with a Dräger SensorAlive

– If a menu is accessed on the transmitter or certain errors are set, the Dräger SensorAlive does not perform a LifeTest.
– The Dräger SensorAlive can suppress the instrument calibration for a certain period of time (H_2S sensor: 30 minutes).
– If a high level of accuracy is required for the duration of the LifeTests, the time on the transmitter should be regularly checked and adjusted as necessary.
– The menu entries for the Dräger SensorAlive are only displayed if a Dräger SensorAlive is connected. The dongle functions are also visible in this case, but are not active.

8 Calibration

8.1 General information

– To ensure proper operation, adjust the zero-point first and then the sensitivity. If these procedures are performed in the incorrect order, adjustment cannot be continued due to software settings.
– If the intended operation is at high altitudes, the display value will be lower than that at sea level (reduced partial pressure). New span adjustment is recommended if the altitude or the ambient pressure changes. The factory adjustment is set to sea level.
– Dräger recommends adjusting instruments with the gas to be detected. This method is more accurate than a surrogate gas adjustment. A surrogate gas adjustment may only be performed as an alternative if a measured gas adjustment is not possible.
– Sensors for methane and hydrogen should only be adjusted with measured gas and not with surrogate gas.
– For the Polytron 8310 IR: Also observe the information in the instructions for use for the DrägerSensor IR[1].

During adjustment, the measurement accuracy of the sensor is checked and adjusted with a known test gas concentration. Adjustment must be performed on a regular basis. The length of the adjustment intervals depends on the ambient conditions in which the sensor is operated.

Ambient conditions and aging results in sensor drift. Sensor drift reduces the display accuracy of measured gases. Adjustment restores this display accuracy. Shorter adjustment intervals must be selected depending on the extent of the drift.

To gauge the ambient conditions for new installations, selecting short adjustment intervals and documenting the drift is recommended. The system operator should define the adjustment interval length with the aid of the collected data.

If a Dräger SensorAlive is used, the drift is compensated and can be read out.

Under normal conditions, Dräger recommends the following adjustment intervals[2]:
– Electrochemical sensors (EC): 6–12 months[3]
– Catalytic sensors (CAT): 4 months
– Infrared sensors (IR): 6–24 months[3]

8.2 Test gases

Please refer to the instructions for use provided for the respective sensor for the test gas properties (e.g. relative humidity, concentration). If there is no information provided relating to relative humidity, dry test gas can be used for the adjustment. The humidity of the test gas is not relevant for O_2 sensors.

Depending on the type of adjustment, various types of test gas are used.

Zero gas

The zero gas is a test gas used for adjustment of the zero-point of a sensor. Nitrogen (N_2) is used for O_2 and CO_2 sensors. With other sensors, ambient air can be used once it is free from disruptive contamination and the measured gas.

Adjustment gas

The adjustment gas is a test gas used for adjustment of the sensitivity of a sensor. The adjustment gas is a known concentration of the measured gas, diluted with clean air and nitrogen. Adjustment gas is not required for O_2 sensors, as oxygen from the ambient air is used.

8.3 Gas flow for adjustments

The gas flow varies according to each sensor.

EC sensor, CAT sensor	0.5 L/min ± 10 %
All other sensors	0.5 L/min - 2 L/min

The gas flow should correspond with the ambient conditions during operation (e.g. duct measurement with flow higher than 2 L/min)

8.4 Preparing for adjustment

General information

⚠ WARNING
Health hazard due to test gas
Inhaling test gas may risk health or lead to death.
► Do not inhale test gas.
► Observe risks and security statements related to the test gas (Refer to data sheets and instructions figuring on calibration devices).

1) 9023981 (English), 9033555 (Bulgarian, Romanian), 9023984 (Spanish, Portuguese), 9023986 (Danish, Norwegian), 9033556 (Czech, Croatian), 9033809 (Chinese), 9023985 (Hungarian, Polish), 9023982 (French), 9033557 (Slovak, Slovenian), 9033558 (Greek, Turkish), 9023987 (Italian, Dutch), 9023983 (Finnish, Swedish), 9023843 (German)

2) Observe the instructions for use for the sensor.
3) For applications in accordance with EN 45544-1 and EN IEC 62990-1, the adjustment interval must not exceed 6 months.

⚠ CAUTION
Triggering alerts by test gas
Applied test gas may trigger alerts.
► Make sure that test gas is no longer applied after calibration.

Prerequisites
– The sensor warm-up phase has been completed (see "Commissioning the gas detector", page 15).
– The date and time have been set (see "Setting date and time", page 29).
– If a Dräger SensorAlive is used, the last LifeTest must be sufficiently long ago (see the instructions for use of the sensor).

Special feature of the Polytron 8310
Dräger recommends carrying out an automatic zero calibration on the sensor before adjustment of the zero-point. This resets the zero-point tracking of the DrägerSensor IR, and the full tracking range is available.
1. Turn off the alarm activation for the gas detector (see "Turning the alarms on and off", page 30).
2. Use the calibration adapter to apply nitrogen, synthetic air, or clean air to the sensor and wait until a stable measured value is shown.
3. Set the magnetic wand on the area marked with the ⇩0 symbol (inside of the black border) on the surface of the sensor shell and hold it in place for at least 5 seconds. After 5 seconds, the sensor output signal switches to the display of the calibration signal (display change by approx. –10 %LEL) for as long as the magnetic wand is held in place. At the same time, a zero calibration of the optical measurement system is automatically performed.
4. Remove the magnetic wand. After 30 seconds, the instrument exits the automatic zero calibration routine. To confirm the automatic zero calibration, the output signal switches back to the calibration signal (display change to approx. –10 %LEL). This signal is also displayed for the same length of time as when starting the automatic zero calibration routine.
5. Turn on the alarm activation for the gas detector.

Polytron 8100, Polytron 8200, Polytron 8310
See figure B on the fold-out page.

Adjustment equipment:
– Dräger pressure regulator (1), use a stainless steel pressure regulator for reactive gases
– Dräger calibration adapter (2) (part number 6810536)
– Hose (3)
– Dräger test gas cylinder (4)

Preparing adjustment:
1. Connect the pressure regulator to the test gas cylinder.
2. Mount the calibration adapter on the sensor.
3. Connect the hose to the plug nipple connection.
4. Open the menu (see "Opening menus", page 18).

Polytron 87x0 IR
See figure B on the fold-out page.

Adjustment equipment:
– Dräger pressure regulator (1), use a stainless steel pressure regulator for reactive gases
– Dräger calibration adapter (5) (part number 6811610)
– Hose (3)
– Dräger test gas cylinder (4)

Preparing adjustment:
1. Connect the pressure regulator to the test gas cylinder.
2. Fit the calibration adapter to the splash guard so it snaps into place.
   This does not apply for mounting on ducts or if a process adapter or process cuvette is used (see installation instructions for the corresponding PIR 7x00 accessory).
3. Ensure that the sealing surfaces around the openings of the splash guard are clean. The insect guard does not have to be removed.
4. Connect the hose to the plug nipple connection.
5. Open the menu (see "Opening menus", page 18).

8.5 Zero calibration

8.5.1 General information

Ambient air can be used to calibrate the zero-point of the sensor instead of nitrogen or synthetic air only if the ambient air is known to be free of the target gas and any other gas to which the sensor may be cross-sensitive (as listed on the sensor data sheet). In this case, no cylinder or calibration adapter is needed for the zero calibration.

⚠ WARNING
Calibration fault at zero calibration
Insufficient ambient air flow may cause calibration errors.
► Make sure that the ambient air flow to the sensor is sufficient.

Polytron® 8100 EC-specific:

For Oxygen (O_2) sensors a zero calibration does not change any value in the firmware or sensor. Thus, the zero calibration function can be used to check the correct zero reading when Nitrogen is applied to the sensor. The Polytron 8100 EC will indicate a fault state if a zero check fails with a deviation of more than 0.6 Vol% O_2 from zero. In case of a fault, repeat the zero check or change the sensor if necessary. Use Nitrogen (N_2) for verification.

Polytron® 8200 CAT-specific:

Sensors must not be calibrated with pure nitrogen. Catalytic sensors need oxygen to work properly.

Polytron® 8720 IR-specific:

For Polytron 8720 IR (with PIR 7200 to detect carbon dioxide), only Nitrogen or Synthetic Air without any CO_2 content may be used for a zero calibration.

8.5.2 Performing a zero calibration

ℹ Calibration can be aborted at any time. To abort calibration select ***back***.

Prerequisites:
– Sensor has finished the warm-up phase
– Calibration is prepared.

Calibrate the zero-point as follows:
1. Select ***Calibration*** > ***Zero calibration*** and confirm.
   ⇒ The maintenance signal is transmitted via the analog interface. No alarms or fault relays are activated and the 🔧 symbol is displayed.
   ⇒ The message ***Apply zero gas*** is displayed.
2. Apply Synthetic Air or Nitrogen if ambient air cannot be used.
   a. Set the gas flow corresponding to the sensor used (see "Gas flow for adjustments", page 22)
3. Select ***Next*** and confirm.
   ⇒ The current value is displayed.

ℹ After 15 minutes without confirmation, the instrument reverts to the calibration menu without performing a calibration.

After the test gas has been applied to the sensor for 3 minutes and the displayed value is stable perform calibration.
4. Select ***calibrate*** and confirm.
   ⇒ The message ***please wait...*** is displayed.
   ⇒ The new current value is displayed.
5. Select ***Next*** and confirm.
6. Turn off the gas flow and remove the calibration adapter from the sensor or disconnect the hose.
   If the current value is not within the alarm range:
7. Select ***Next*** and confirm.
   ⇒ The instrument returns to the calibration menu.

8.6 Span calibration

8.6.1 General information

Polytron® 8310 IR-specific:

Due to the design of the DSIR gas sensor, the output signal of the gas sensor is limited to 45 %. . . 55 % of the internal supply voltage. If the gas concentrations increase further after the maximum sensor output signal has been reached, this does not lead to an increase of the values displayed on the instrument response transmitted to the central device. In case of substances with particularly low calibration factors and/or manual configuration of a high span calibration factor at the sensor, this may already happen at concentrations below 100 %LEL. For substitute gas calibrations, correct triggering of the alarm should therefore be checked with a test gas concentration corresponding to the alarm threshold. If necessary, the measuring range that can be displayed can be increased by reducing the sensor output signal as required with subsequent calibration on the instrument (see chapter "Manual span calibration of the output signal" in the instructions for use of the DSIR gas sensor).

8.6.2 Performing a span adjustment

ℹ Calibration can be aborted at any time. To abort calibration select ***back***.

Prerequisites:
– Adjustment is prepared.
– The zero-point has been adjusted.
– Specifically for all Polytron 8xx0 except the Polytron 8100 EC:
  The last valid zero adjustment was no longer than 24 hours ago.

Adjust the sensitivity as follows:
1. Select and confirm ***Calibration*** > ***Span calibration***.
   ⇒ The maintenance signal is transmitted via the analog interface. No alarms or fault relays are triggered and the 🔧 symbol is displayed.
   ⇒ The parameters for the adjustment gas are displayed, e.g.:[1)]
   Gas : H_2S
   Unit: ppm
   Concentr.: 25
2. If the displayed parameters do not match the target gas, adjust the parameters:
   a. Select and confirm ***Gas***.
   b. Select and confirm the adjustment gas from the list.
   c. Select and confirm ***Unit***.
   d. Select and confirm the unit of measurement from the list.
   e. Select and confirm ***Conc.***.
   f. Set the concentration of the adjustment gas.
3. If the settings are correct:
   a. Select and confirm ***Next***.
      ⇒ A message like ***Gas flow ON H_2S*** is displayed.
4. Apply adjustment gas.
   a. Set the gas flow corresponding to the sensor used (see "Gas flow for adjustments", page 22).
5. Select and confirm ***Next***.
   ⇒ The current value is displayed

ℹ After 15 minutes without confirmation, the instrument returns to the adjustment menu without performing an adjustment.

After the test gas has been applied to the sensor for 3 minutes and the displayed value is stable, perform adjustment.[2)]:
6. Select and confirm ***Next***.
   ⇒ The message ***please wait...*** is displayed.
   ⇒ The newly detected (current) value is displayed.

1) Not applicable for all sensors (see "Measuring mode", page 16).
2) For LC sensors, the test gas must be applied for at least 6 minutes.

7. Select and confirm ***Next***.
8. Turn off the gas flow and remove the calibration adapter from the sensor or disconnect the hose.

   If the current value is not within the alarm range:
9. Select and confirm ***Next***.
   ⇒ The instrument returns to the adjustment menu.

8.7 Automatic calibration

8.7.1 General information

Automatic calibration includes the zero calibration and a subsequent span calibration. It is an alternative to manually carrying out the zero and span calibration.

Not all sensors and gases support automatic calibration. If the function is not available, perform the calibration manually.

8.7.2 Perform automatic calibration

i After 24 hours, zero calibration is not up-to-date any more. Thus, automatic calibration cannot be performed unless zero calibration is performed again.

i Calibration can be aborted at any time. To abort calibration select ***back***.

Prerequisites:

– Automatic calibration is enabled.
– Sensor has finished the warm-up phase.
– Calibration is prepared.

Perform the automatic calibration as follows:

1. Apply Synthetic Air or Nitrogen if ambient air cannot be used.
2. Select ***Calibration*** > ***Auto calibration*** and confirm.
   ⇒ The message ***please wait...*** is displayed and the instrument automatically performs the zero calibration.
   ⇒ In the case of an O_2 sensor, ***Fresh air cal.*** is displayed.

   i The Maintenance signal is transmitted by the analog interface, no alarm or fault relays are switched and the symbol is displayed.
3. After a successful zero calibration, the span calibration is started.
   ⇒ The parameters for the gas are displayed, e. g.:[1)]
   Gas : H_2S
   Unit: ppm
   Concentr.:25
4. If the displayed parameters do not match the target gas, adjust the parameters:[2)]
   a. Select ***Gas*** and confirm.
   b. Select the calibration gas from the list and confirm.
   c. Select ***Unit*** and confirm.
   d. Select the unit of measurement from the list and confirm.
   e. Select ***Conc.*** and confirm.
   f. Set the concentration of the calibration gas.
5. If settings are correct:
   a. Select ***Next*** and confirm.
      ⇒ A message like ***Gas flow ON H_2S*** is displayed.
6. Apply calibration gas.
   a. Set the gas flow corresponding to the sensor used (see "Gas flow for adjustments", page 22)
7. Select ***Next*** and confirm.
   ⇒ The current value is displayed

   i After 15 minutes without confirmation, the instrument reverts to the calibration menu without performing a calibration.
8. Once the current value is stable, the instrument automatically performs the span calibration.
9. After a successful calibration, the new current value and the message ***Value OK?*** are displayed.
   - If not, select Redo and confirm to perform the calibration again.
   - If the value corresponds the target value, proceed.
10. Turn off the gas flow and remove the calibration adapter from the sensor or disconnect the hose.
11. Select ***Accept value*** and confirm to finish the calibration. The instrument returns to the calibration menu.

9 Troubleshooting

9.1 Faults

Number	Cause	Remedy
001, 003 - 004, 012 - 014, 020 - 024, 043, 060, 067	Serious instrument fault, various causes.	Have the instrument checked by DrägerService.
002, 025 - 027, 030 - 034, 041, 042, 044, 050, 052, 081, 085	Serious data error in the instrument, various causes.	Reset the instrument to factory settings. If the fault occurs again: Have the instrument checked by DrägerService.
005	Supply voltage is out of range.	Check the power supply.
010	4 to 20 mA interface cable not connected.	Check the 4 to 20 mA interface connection. If operated as a stand-alone instrument without a central controller, wire pin 3 to pin 4.

1) Not applicable for all sensors (see "Measuring mode", page 16).
2) Only possible for certain sensors.

Number	Cause	Remedy
011	Serious instrument fault, various causes.	Have the instrument checked by DrägerService. If the fault occurs again: Check the load or the cables.
045	Instrument does not detect any sensor.	Check the connections. If the fault occurs again: Have the instrument checked by DrägerService.
051, 054	Faulty zero adjustment.	Perform zero adjustment.
055	Faulty span adjustment.	Perform span adjustment.
076, 080 - 084	Instrument fault.	Check the electrical connections. If the fault occurs again: Have the instrument checked by DrägerService.
090	Sensor lock feature is activated. A sensor with a different part number has been connected.	Use a sensor with the same part number or deactivate the sensor lock feature.
105	Instrument fault.	Have the instrument checked by DrägerService.
137, 64, 91	Instrument fault.	Turn the instrument off and back on. If the fault occurs again: Have the instrument checked by DrägerService.

Only for Polytron 8100 EC with Dräger SensorAlive

Number	Cause	Remedy
220	Sensor opening is clogged.	Clean the sensor opening or replace the dust filter. Then confirm the clogged sensor in the menu (see "Dräger SensorAlive settings", page 36).
221	Sensor sensitivity is less than 40 % (calculated value).	Adjust or replace the sensor.
222	Gas value is too high after electrolysis due to a fault.	Replace the sensor or contact DrägerService.
223	Sensor sensitivity is too low.	Adjust or replace the sensor.
224	Conditioning current is not within the permissible range.	Replace the sensor or contact DrägerService.

Only for Polytron 87x0 IR

Number	Cause	Remedy
064, 071	Communication fault.	Check connection to PIR 7x00.
083	PIR 7x00 optics dirty.	Clean PIR 7x00 optics.
086	Supply voltage outside range	Check supply voltage.
087	4 to 20 mA fault at PIR 7x00 sensor.	Check 4 to 20 mA connection to PIR 7x00.
094, 095	Data error in the instrument.	Reset the sensor to factory default settings. If this error occurs again: Have the instrument checked by DrägerService.
096	SIL password does not match with PIR 7x00.	Enter password again.

9.2 Warnings

Number	Cause	Remedy
101	Data logger in Stack mode is 100 % full and is not logging any more data.	Have the instrument checked by DrägerService.
102	Data logger in Stack mode is 90 % full.	Download the data as soon as possible and clear the data logger.
103, 106	Data error in the instrument. Some dongle functions like the data logger, sensor test, etc. may no longer be available.	Reset the instrument to factory settings. If this error occurs again: Have the instrument checked by DrägerService.
104	Date or time setting not valid.	Set the date and time.
105	Instrument fault.	Have the instrument checked by DrägerService.
107	Battery for data memory empty.	Have the instrument checked by DrägerService.
110, 111, 112	The SW dongle has been removed without first being deactivated.	Deactivate the SW dongle.
113	Alarms inhibited.	Activate the alarms.
164, 165	Sensor warm-up phase not yet complete. Increased measurement errors must be expected.	Wait until the sensor warm-up phase has ended. Do not adjust the sensor before it is fully warmed-up.

Number	Cause	Remedy
167, 170	Adjustment interval expired.	Readjust the instrument.

Only for Polytron 8100 EC

Number	Cause	Remedy
163	Low EC sensor vitality	Replace sensor.
171	Negative reading. Value below range minimum.	Recalibrate zero point.

Only for Polytron 8100 EC with Dräger SensorAlive

Number	Cause	Remedy
320	Communication with the sensor failed. Diagnosis and gas generator no longer work.	Remove the sensor, do not use it for approx. 1 day and reinsert it. Check the firmware version and have it updated by DrägerService if necessary. Replace the sensor.
321	Evaluation of the sensor data failed. The sensor cannot perform or evaluate a LifeTest (preconditions are not met).	Change the time of the LifeTest or set the repeat profile to "Flexible" (see "Dräger SensorAlive settings", page 36). If the warning occurs again, contact DrägerService.
322	Sensor data set is faulty.	Replace the sensor.
323	Sensor data set is incompatible.	Contact DrägerService.
324	Sensor sensitivity is less than 50 % (calculated value).	Adjust the sensor and prepare for sensor replacement (e.g., order the spare part).
325	Sensor sensitivity is less than 40 % (calculated value).	Adjust or replace the sensor.
326	Sensor cannot be adjusted during a LifeTest and for a certain period afterwards.	To be able to perform a scheduled adjustment, the LifeTest can be temporarily inhibited in PolySoft via the Inhibit mode.
327, 330, 344, 347	Gas generator is not working.	Adjust or replace the sensor.
331	Gas generation failed.	Adjust the sensor.
332	Sensor is in the safe state. No LifeTests are performed (group warning).	Determine the cause and rectify it.
333	Real time clock of sensor is not working correctly.	Set the clock.
334	Sensor synchronization not complete.	Wait until synchronization is complete. Depending on the condition of the sensor, this state may last for several minutes. Have the firmware updated by DrägerService if necessary.
336	Internal sensor checks return faulty results.	Restart the system.
337	Transmitter firmware must be updated.	Contact DrägerService.
340	Sensor is synchronized after the system is restarted.	Wait until synchronization is complete.
342	Temperature difference between the two temperature measurement points is too great.	Wait and check if the LifeTest is evaluated, or replace the sensor.
347	Configuration failed due to an interruption in the communication between the transmitter and the sensor.	Reconfigure the sensor and check the configuration.
350	Gas generator is in the start-up phase.	Wait until the start-up phase has ended. During the start-up phase, the error detection and clogging detection functions are not active.
352	Sensor self-test failed.	Replace the sensor or contact DrägerService.
353	Sensor is temporarily in Inhibit mode. No LifeTests are performed during this time.	Inhibit mode can be exited manually via PolySoft or is exited automatically.
354	Error during system start.	Perform manual restart.
355	Sensor firmware is incompatible with the hardware.	Have the firmware updated by DrägerService.
356	Hardware data faulty.	Perform a restart or replace the sensor.
357	Sensor was set to the safe state manually, e.g., to perform a firmware update.	To exit the mode, restart the sensor.

Only for Polytron 87x0 IR:

Number	Cause	Remedy
163	Sensor temperature is very high.	
171	Zero drift too high.	Perform zero calibration.
172	PIR 7x00 optics dirty.	Clean PIR 7x00 optics.
173	Zero calibration expired for span calibration	Perform zero calibration.
182	Automatic calibration not possible with PIR 7200.	Perform new zero and span calibration

10 Maintenance

– The maintenance intervals must be established for each individual installation. Depending on safety considerations and application specific conditions the instrument is used in, these might need to be shortened.

Every 6 months:

– Inspection by trained service personnel.
– Check signal transmission to the controller (see "Testing the analog interface", page 33).
– Check LEDs as well as the triggering of the alarm device (see "Testing alarms/relays", page 31).

Regularly:

– Perform calibrations, see 8 Calibration

10.1 Performing a bump test and checking the response time (t90)

A bump test checks the response time without setting off an alarm.

1. Select and confirm ***Settings*** > ***Instrument*** > ***Bump test***.
   ⇒ The Maintenance symbol is displayed.
   ⇒ The analog output is set to the maintenance signal.
2. Apply a known gas concentration to the sensor.
3. Check the response time and compare it with the t90 value indicated in the corresponding sensor data sheet.
4. Press [OK] to return to measurement.

10.2 Sensor replacement

⚠ WARNING
Faulty Calibration
Faulty Calibration may cause inaccurate readings.
► If the sensor is replaced, all settings and parameters must be checked for correctness.
► Check calibration to verify proper operation.

10.2.1 Polytron® 8100 EC

A sensor can be replaced in the hazardous, classified area, without interrupting the power supply.

Sensor lock feature

If a sensor of the same type (same part number) was previously installed, the instrument-specific configuration is retained (gas type, measuring range, test gas, adjustment interval, etc.). Otherwise, the factory default settings of the new sensor are uploaded and will overwrite the instrument-specific configuration. This can be prevented if the sensor lock feature is activated (see "Setting sensor lock", page 35).

Sensor change function

The ***Change Sensor*** menu function lets you replace a sensor during operation without triggering a fault signal at the controller. It also ensures that all sensor data in the microprocessor can be saved in the sensor memory (EEPROM) before disconnecting the sensor.

Replacing a sensor

See figure C on the fold-out page.

A sensor can be replaced at any time.

1. Select ***Settings*** > ***Sensor*** > ***Change Sensor*** and confirm.
   ⇒ The maintenance signal is generated on the 4-20mA interface.
   ⇒ The display shows the following: ***Please remove the sensor***.
   ⇒ The Maintenance symbol is displayed.
2. Replace the old sensor with a new sensor:
   a. Loosen the locking screw (2) (2 mm Allen screw).
   b. Unscrew bayonet ring (3)
   c. Insert the sensor (4) into the opening and turn until it engages in the gas detector. This does not damage the sensor plug.
   d. Secure the sensor with the associated bayonet ring (3).

   ℹ For Dräger SensorAlive, a different bayonet ring needs to be used than for other EC sensors.

   e. Tighten the locking screw (2) so that the bayonet ring cannot come loose (required for installations in zone 22).
      ⇒ The display shows the following: ***Loading data, please wait***
3. If necessary, apply the label included with the sensor to the instrument. This identifies the gas type from a distance, even if the power has failed.
4. When the sensor data are loaded, the display shows: ***Data loaded***.
5. Select ***Back to menu*** and confirm.
   ⇒ The maintenance signal on the 4-20mA interface remains pending until the sensor is warmed-up.

   Maximum warm-up time of a new sensor: see the Instructions for Use for the sensor. For Oxygen: EN 50104 approvals.

6. Check calibration. If necessary, calibrate the instrument (see "Calibration", page 22).
7. Check the installation requirements and instrument for SIL status.
   See sections "Explosion proof (Ex d) installation - without Docking Station" to "Installation of sensors or sensing heads".

10.2.2 Polytron® 8200 CAT, 8310 IR, 87x0 IR

Replacing a sensor

1. If necessary, set the maintenance current for the analog interface.
2. Turn off power to the instrument or declassify the area according to local regulations.
3. Loosen set-screw and unscrew lid from instrument.
4. Pull out the PCB unit.
5. Turn PCB unit over and pull off the sensor connector.
6. Unscrew the sensor.
7. Insert the sensor wires through he threaded port of the enclosure.

⚠ WARNING
Explosion hazard!
The enclosure openings must be sealed to prevent ignition of hazardous atmospheres in case of an ignition inside the enclosure.

► Five threads must be engaged to ensure explosion proof status.

8. Screw in the sensor and tighten with the correct tightening torque (min. 266 in-lbs / min. 30 Nm)
9. Polytron® 8200 CAT-specific:
   Twist the sensor wires together. If necessary, fit a cable tie to keep the wires tight.
10. Plug the sensor connector back into socket.
11. Place PCB unit back into the enclosure.
12. Screw the cover on the instrument until it is correctly engaged (min. ≥44 in-lbs / min. ≥5 Nm) and tighten the locking screw.
13. Apply power to the instrument, if necessary.
    ⇒ The maintenance signal on the 4-20mA interface remains pending until the sensor is warmed-up.

    Maximum warm-up time of a new sensor: see the Instructions for Use for the sensor.
14. Check calibration. If necessary, calibrate the instrument (see "Calibration", page 22).
15. Check the installation requirements and instrument for SIL status.
    See sections "Explosion proof (Ex d) installation - without Docking Station" to "Installation of sensors or sensing heads".

10.3 Performing a display test

1. Select and confirm ***Settings*** > ***Instrument*** > ***Display*** > ***Displaytest***.
2. Select and confirm ***Enable***.
   ⇒ The information on the display is shown inverted. All LEDs are turned on.
   When the menu is exited, the inversion is ended.

11 Instrument settings

11.1 Setting passwords

1. Select ***Settings*** > ***Instrument*** > ***Passwords*** the desired password and confirm.

Calibration PWD	Access to zero and span calibration
Settings PWD	Access to all configuration parameters

2. Select the line for editing the password and confirm.
3. Set the password and confirm.
4. Select ***Confirm*** and confirm with [OK].

11.2 Setting date and time

1. Select ***Settings*** > ***Instrument*** > ***Date and time*** and confirm.
2. Select the line for editing the date or time and confirm.
3. Select ***Confirm*** and confirm with [OK].

11.3 Setting language

1. Select ***Settings*** > ***Instrument*** > ***Language*** and confirm.
2. Select a language from the list and confirm.

11.4 Configuring function key

1. Select ***Settings*** > ***Instrument*** > ***Function key*** and confirm.
2. Select a function and confirm.

Graph	The measurements of the past 15 minutes are displayed as a time/concentration graph.
Faults	Fault messages are displayed in plain text.
Warnings	Warning messages are displayed in plain text.
Bump test	The bump-test allows applying gas to the sensor without generating an alarm. The maintenance signal is transmitted. After 15 minutes or tapping [OK] again ends the bump test and the instrument returns to normal operation.
Sensor vitality[1)]	Shows the remaining sensor vitality.

1) Only with diagnostic dongle

11.5 Resetting to default settings

This function resets the instrument to factory default settings.

1. Select ***Settings*** > ***Instrument*** > ***Device init*** and confirm.
2. Select ***Confirm*** and confirm with [OK].

11.6 Changing the display contrast

1. Select ***Settings*** > ***Instrument*** > ***Display*** > ***Display contrast*** and confirm.
2. Change the contrast and confirm.

11.7 Changing the display mode

1. Select ***Settings*** > ***Instrument*** > ***Display*** > ***Display mode*** and confirm.
2. Select the desired mode and confirm.

Standard	Shows the standard display.
Non-display	Shows the start screen and the applicable symbols.

If an alarm is triggered, the display shows the current gas concentration and the red LED blinks regardless of the selected display mode.

11.8 Relays

11.8.1 Combinations of latching and alarm acknowledgment

The following examples give an overview of relay acknowledgment combinations.

	Latching (Manual relay reset)	**Non-Latching** (Automatic relay reset after alarm condition cleared)
Acknowledgeable	Relay reset possible at any time.	
Non-acknowledgeable	Relay reset not possible before alarm condition cleared.	
Pre-acknowledgeable	Alarm acknowledgment possible before the alarm condition cleared. The relay resets automatically after the alarm condition cleared.	

Latching and non-latching signals are not time-limited. Latching signals stay active until they are acknowledged. Non-latching signals stop as soon as the triggering condition clears.

11.8.2 Configuring relay A1 or A2

This function defines whether the alarm relay is energized during normal operation or energized at an alarm condition.

1. Select ***Settings*** > ***Instrument*** > ***Alarm***> ***Relay A1*** or ***Relay A2*** and confirm.
2. Select the desired option and confirm.

Normally energized	The relay contact is energized during normal operation and changes if an alarm is triggered. At a loss of power this triggers an alarm (fail-safe).
Energ. on alarm	If an alarm is triggered, the relay contact is energized.

11.8.3 Setting fault relay warm-up 1

This function is used to set operation of the fault relay during warm-up 1 to indicate the warm-up 1 state on the relay output.

1. Select ***Settings*** > ***Instrument*** > ***Alarm***> ***Fault warm up*** the desired option and confirm.

static	The fault relay triggers a connected alarm indicator permanently. The orange LED is lit continuously.
dynamic	The fault relay switches state for 9 seconds. *Example:* – A horn is connected to fault relay output Normally Open. – Relays are configured as normally energized. ⇒ The horn and the orange LED of the transmitter are 1 second active and 9 seconds in-active.

11.9 Alarm configuration

11.9.1 Turning the alarms on and off

1. Select ***Settings*** > ***Instrument*** > ***Alarm*** > ***Alarm on/off***.

Enable	Alarm activation is switched on.
Disable	Alarm activation is switched off. LEDs, relays and interfaces do not indicate an alarm condition. The 4-to-20 mA interface transmits the maintenance signal. The value determined and the ! symbol will be shown. The fault relay indicates an error.

2. Select and confirm ***Enable*** or ***Disable***.

11.9.2 Configuring alarms

1. Select and confirm ***Settings*** > ***Instrument*** > ***Alarm*** > ***Alarm A1*** or ***Alarm A2***.
   The current alarm threshold is displayed.
2. Accept the displayed suggestion or change the following settings (confirm the configuration steps one after the other with ***Next***):
   a. Set the value for the alarm threshold.

b. Set the alarm direction.

Rising	The alarm direction is called rising if the gas concentration has to exceed a certain value to activate an alarm.
Falling	The alarm direction is called falling if the gas concentration has to fall below a certain value to activate an alarm.

c. Set the latch mode.

Latching	Once the alarm threshold is reached, the instrument will trigger the alarm. It will remain in the alarm state even if the gas concentration no longer meets the alarm condition. To clear a latching alarm, it must be acknowledged.
Non-latching	The alarm state clears if the gas concentration no longer meets the alarm condition.

d. Set the acknowledgement mode.

Acknowledgeable	The alarm relay and the alarm LED can be reset before the alarm condition clears.
Non-acknowledgeable	The alarm relay and the alarm LED cannot be reset until the alarm condition clears.
Pre-Acknowledgeable	The alarm state can be acknowledged before the alarm condition clears. The alarm relay and the alarm LED stay active until the alarm condition clears, however.

e. Set the hysteresis value.
The hysteresis function defines a range in which a triggered relay will remain in its state until the gas concentration is outside the defined range again. Example: The alarm threshold is set to 40 ppm and hysteresis to 3 ppm. The alarm remains active until the value falls below 37 ppm. This prevents relays from closing and opening in rapid succession at an alarm threshold ("chattering").

ℹ If the direction of an alarm is changed (from falling to rising or vice versa), the hysteresis value must be checked and corrected if necessary.

⇒ A confirmation screen shows all settings.

f. Select ***Confirm*** and confirm with OK.

✓ The new settings are saved.

11.9.3 Testing alarms/relays

These functions change the statuses of a relay and an LED for test purposes (e.g., to check the function of alarm devices connected to the relay). The ℹ symbol is displayed. After exiting this function, the statuses of the relay and the LED will automatically return to their previous statuses.

1. Select and confirm the desired alarm condition via ***Settings*** > ***Instrument*** > ***Alarm***.

Set Alarm A1	Simulates a pre-alarm
Set alarm A2	Simulates a main alarm
Set fault	Simulates a fault signal

2. Select and confirm ***Enable***.
⇒ The fault relay is de-energized and the 4 to 20 mA interface is set to fault current. The yellow LED is lit, the symbol for maintenance is shown.
When the menu is exited, the simulation is ended.

11.10 Data logger settings

11.10.1 Displaying graph

The last 15 minutes as a time/concentration graph can be viewed.

1. Select ***Information*** > ***Data logger*** > ***Graph***

11.10.2 Switching data logger on or off

1. Select ***Settings*** > ***Data logger*** > ***Datalogr. on/off*** and confirm.
2. Select ***Enable*** or ***Disable*** and confirm.

11.10.3 Setting the sampling time

This function defines how often a value is stored.

1. Select ***Settings*** > ***Data logger*** > ***Datalogr. on/off*** > ***Sample time*** and confirm.
2. Select the sample time and confirm.

11.10.4 Setting peak/average

This function determines which value is stored.

1. Select ***Settings*** > ***Data logger*** > ***Data logger*** > ***Peak/Average*** and confirm.
2. Select ***Peak*** or ***Average*** and confirm.

Peak	The maximum value (if monitoring falling concentrations, the minimum value) of the measured concentrations within the selected sampling time is stored.
Average	The average value of all the measured concentrations within the selected sampling time is stored

11.10.5 Switching triggering mode on or off

This function allows storing values from a certain value on.

1. Select ***Settings*** > ***Data logger*** > ***Data logger*** > ***Trigger on/off*** and confirm.
2. Select ***On*** or ***Off*** and confirm.

On	Measurements are stored if they exceed a threshold beyond the trigger value (relative to the last stored value).
Off	Measurements within the sampling time are stored.

11.10.6 Setting trigger value

This function defines the trigger threshold to store a value.The trigger value is defined as a percentage of the full scale deflection.

Example: A trigger value of 2 % at full scale deflection of 500 ppm will only store values if they deviate by 10 ppm (relative to the previously stored value).

1. Select ***Settings*** > ***Data logger*** > ***Datalogr. on/off Trigger value*** and confirm.
2. Set the trigger value and confirm.

11.10.7 Setting stack/roll function

1. Select ***Settings*** > ***Data logger*** > ***Data logger*** > ***Stack/Roll*** and confirm.
2. Select ***Stack*** or ***Roll*** and confirm.

Roll	Once the capacity of the data logger is reached, the old data are overwritten by new values.
Stack	Once the capacity of the data logger is reached, no more data can be stored. The instrument issues a warning.

11.10.8 Clearing data logger

This function deletes the stored data.

1. Select ***Settings*** > ***Data logger*** >***Clear data logger*** and confirm.
2. To clear the data-logger, select ***Confirm*** and confirm with [OK].

12 Interface settings

12.1 4-20mA interface

The current output of the instrument during normal operation is between 4 and 20 mA and is proportional to the detected gas concentration.

Polytron 8xx0 uses different current values to indicate various modes of operation. The factory default settings are user adjustable for application specific requirements. This follows the NAMUR recommendation NE43.

12.1.1 Full scale deflection

Polytron® 8100 EC, 87x0 IR and 8200 CAT LC only

Some sensors offer an adjustable full scale deflection to limit the measuring range for the 4-20 mA interface.

The full scale deflection (FSD) sets an endpoint within the measuring range of the sensor. If the gas concentration reaches this endpoint, the 4-20mA interface transmits 20mA.

Example: Required range 0 to 500 ppm CO (e.g. part number 6809605 default 300 ppm, range min/max = 50/1000 ppm).Select full scale deflection as 500 ppm. The analog output will be linear between 4 mA = 0 ppm and 20 mA = 500 ppm.

12.1.2 Setting fault current

This function defines the current for the fault signal.

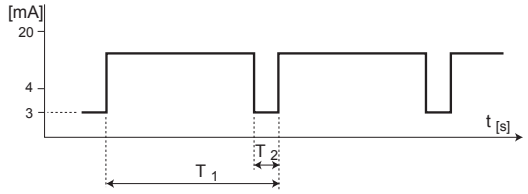
1. Select ***Settings*** > ***Communication*** > ***Analog interface*** >***Fault current*** and confirm.
2. Select the line for editing the current and confirm.
3. Set the current and confirm.
   ⇒ The setting for the ***Fault current*** is displayed.
4. Select ***Confirm*** and confirm with [OK].

12.1.3 Information regarding the warning signal

To transmit a warning signal via the analog interface, it must be switched on.
The warning signal alternates between the warning current and the measurement current.

– Warning current (interval T2)
– Measurement current (interval T1-T2)

Time intervals and the warning current are configurable.



12.1.4 Switching the warning signal on or off

1. Select ***Settings*** > ***Communication*** > ***Analog interface*** > ***Warning*** and confirm.
2. Select ***Enable*** or ***Disable*** and confirm.

12.1.5 Setting warning interval

1. Select ***Settings*** > ***Communication*** > ***Analog interface*** > ***Warning interval*** and confirm.
2. Set times for warning intervals T1 and T2 and confirm.

12.1.6 Setting warning current

1. Select ***Settings*** > ***Communication*** > ***Analog interface*** > ***Warning current*** and confirm.
2. Set the current and confirm with [OK].

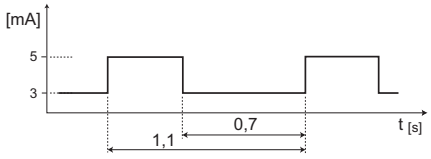
12.1.7 Setting the warnings of the Dräger SensorAlive

This menu can be used to set various parameters of the warning current:

- To set the warning current, select ***Settings*** > ***Communication*** > ***Analog interface*** > ***DSA warn current*** and enter the value.
- To set the threshold value for the warning, select ***Settings*** > ***Communication*** > ***Analog interface*** > ***DSA warn limit*** and enter the value.
- To enable or disable the warning, select ***Settings*** > ***Communication*** > ***Analog interface*** > ***Set DSA warning*** and confirm.
  Select ***Enable*** or ***Disable*** and confirm.

12.1.8 Setting maintenance signal

1. Select ***Settings*** > ***Communication*** > ***Analog interface*** > ***Maint. signal*** and confirm.
2. Set the signal type and confirm.

static	A constant current that can be configured.
dynamic	A square wave signal with the following characteristics: 

12.1.9 Setting the maintenance current

The maintenance current can only be set if the maintenance signal has been set to static.

1. Select ***Settings*** > ***Communication*** > ***Analog interface*** >***Maint. current*** and confirm.
2. Set the current and confirm.

12.1.10 Setting analog offset

This function adds an offset to the analog output at 4 mA. The offset adjusts the current at 4 mA without affecting the 20 mA set point.

1. Select ***Settings*** > ***Communication*** > ***Analog interface*** >***Analog offset*** and confirm.
2. Select the line for editing the offset (range: -0.5 to 0.5 mA, SIL: -0.1 to 0.1) and confirm.
3. Set the current and confirm.
   ⇒ The setting for the ***Analog offset*** is displayed.
4. Select ***Confirm*** and confirm with [OK].

12.1.11 Setting analog span

This function adjusts the analog output at 20 mA without affecting the 4 mA set point.

1. Select ***Settings*** > ***Communication*** > ***Analog interface*** > ***Analog span*** and confirm.
2. Select the line for editing the offset (range: -0.5 to 0.5 mA, SIL: -0.1 to 0.1) and confirm.
3. Set the current and confirm.
   ⇒ The setting for the ***Analog span*** is displayed.
4. Select ***Confirm*** and confirm with [OK].

12.1.12 Testing the analog interface

These functions change the current of the analog interface for test purposes (e.g., to check the programming of the controller). It may be necessary to temporarily inhibit the alarms at the controller to avoid false alarms. After exiting these functions, the currents automatically return to the maintenance signal. During the test, the maintenance symbol is displayed.

- To set the current or concentration:

1. Select the desired option via ***Settings*** > ***Communication*** > ***Analog interface***.

Set Current	This function sets the current to any value between 0 and 22 mA. Offset current and analog span are not used in this function.
Set concentr.	This function sets the current to any measured value between 0 ppm and full scale deflection.

2. Once the alarms at the controller are inhibited, confirm the message ***Inhibit all alarms*** with ***Next***.
3. Select the line for editing and confirm with [OK].
4. Set the desired value.
5. Select and confirm ***Next***.
6. Select the desired option:

Set concentr. out / ***set current out***	This function simulates the preset measured value or test current value. During the test, the maintenance symbol is displayed.
concentration off / ***current off***	This function aborts the transmission of the preset test value.

7. Select and confirm ***Next***.
   ⇒ The function is aborted.
8. Once the alarms at the controller are enabled again, confirm the following message: ***Enable all alarms***.

- To set the test signal:

1. Select the desired test via ***Settings*** > ***Communication*** > ***Analog interface***.

Set fault	This function sets the current to the fault current.
Set warning	This function sets the current to the warning current.
Set mainten.	This function sets the current to the maintenance current.

2. Once the alarms at the controller are inhibited, confirm the message ***Inhibit all alarms***.
3. Select and confirm ***Enable*** or ***Disable***.

12.1.13 Beam block

This function is only available for Polytron 87x0 IR (using the sensor PIR 7000/7200).

The factory default setting for the beam block function is off.

If turned On, the beam block signal will be transmitted on the analog interface if the optics of the PIR 7000/7200 sensor is “dirty”. The optics of the PIR 7000/7200 can become “dirty” if there is a build-up of deposits on the optical surfaces. However, if the gas concentration rises to a level above beam block limit, the instrument returns to normal operation.

If the build-up of deposits on the optical surfaces increases beyond the point where a measurement is possible, the instrument will go into fault.

- To set beam block signals on/off:

1. Select ***Settings*** > ***Communication*** > ***Analog interface*** and the desired option.

Beamblock on/off	This function switches the beam block on or off
Set beamblock	This function sets the current to the beam block warning current

2. Select ***Enable*** or ***Disable*** and confirm.

- To set beam block signals:

1. Select ***Settings*** > ***Communication*** > ***Analog interface*** and the desired option.

Beambl. current	This function defines the current for the beam block signal.
Beamblock limit.	This function defines the maximum limit if the beam block signal will be transmitted on the analog interface.

2. Select the current line for editing the current and confirm.
3. Set the current and confirm.
   ⇒ The setting for the beam block current is displayed.
4. Select ***Confirm*** and confirm with OK.

12.2 HART interface

12.2.1 Setting the polling address

The polling address (query address) configures the gas detector for analog operation or multidrop operation.

HART command: #6 (Write Polling Address)

1. Select ***Settings*** > ***Communication*** > ***Hart interface*** > ***Polling address***.
2. Set the polling address and select ***Confirm***.

0	Activates analog operation.
1 to 15	Activates multidrop operation. The 4 to 20 mA interface is deactivated and set to a constant current of approx. 1 mA.

ℹ Configure all instruments on a line with different polling addresses. It is advised to choose a sequence starting with 1.

12.2.2 Displaying the Unique Identifier

The Unique Identifier (unique HART address) must be known for almost all HART addressing commands.

HART commands:

– #0 (Read Unique Identifier)
– #11 (Read Unique Identifier associated with Tag)

1. Select ***Settings*** > ***Communication*** > ***Hart interface*** > ***Unique identifier***.
2. The Unique Identifier is displayed.

12.2.3 Setting the HART tag

The HART tag (measurement point identification) is used to mark a measurement point.

1. Select ***Settings*** > ***Communication*** > ***Hart interface*** > ***Tag***.
2. Set the HART tag and select ***Confirm***. The HART tag can consist of up to 8 alphanumeric characters.

12.2.4 Setting the Dräger REGARD protocol

This function switches between different HART protocols.

1. Select ***Settings*** > ***Communication*** > ***Hart interface*** > ***Dräger REGARD***.
2. Select the software version corresponding to the REGARD controller.

12.3 Digital interfaces

Information on configuring the other interfaces is provided in the following documents:

Interface	Document
PROFIBUS PA	9033782
Foundation Fieldbus FF	9033783
Modbus RTU	9033781

13 Sensor settings

13.1 Switching automatic calibration on or off

1. Select ***Settings*** > ***Sensor*** > ***Auto calibration*** and confirm.
2. Select ***Enable*** or ***Disable*** confirm with [OK].

13.2 Capture range

The capture range blanks out measurement fluctuations. Measurement fluctuations are minor variations in measured values (such as signal noise, variations in concentration). Those variations do not change the transmitted or displayed value. Measured values within this range will be displayed with the capture value. Measured values outside the capture range will be displayed with the actual measured value.

Capture value (offset)

The capture value is displayed continuously, as long as the measured value ranges between the upper and lower capture value limits.

Upper capture value limit

The upper capture value limit marks the upper limit of the range in which the capture value is displayed.

Lower capture value limit

The lower capture value limit marks the lower limit of the range in which the capture value is displayed.

13.2.1 Setting capture range

1. Select ***Settings*** > ***Sensor*** > ***Display Capture*** and confirm.
2. Set offset in the first window.
3. Set the lowest value of the capture range and confirm with ***Next***.
4. Set the highest value of the capture range and confirm with ***Next***.
5. Check all the values and confirm with ***Next***.

13.2.2 Switching capture range off

1. Select ***Settings*** > ***Sensor*** > ***Display Capture*** and confirm.
2. Set offset in the first window.
3. Set the lowest value of the capture range to 0 and confirm with ***Next***.
4. Set the highest value of the capture range to 0 and confirm with ***Next***.
5. Check all the values and confirm with ***Next***.

13.3 Resetting sensor

This function resets the sensor to factory default settings.

1. Select ***Settings*** > ***Sensor*** > ***Init. channel*** and confirm.
2. Select ***Confirm*** and confirm with [OK].

13.4 Setting calibration interval

After the calibration interval expires, the instrument will issue a warning that the calibration is past due.

1. Select ***Settings*** > ***Sensor*** > ***Cal. interval*** and confirm.
2. Set the calibration interval and confirm with [OK].

13.5 Setting sensor lock

This point is only valid for Polytron 8100 EC and Polytron 87x0 IR.

1. Select ***Settings*** >***Sensor*** > ***Sensor lock*** and confirm.
2. Select ***On*** or ***Off***.

On	The instrument rejects any sensor whose part number does not match the part number of the previously installed sensor.
Off	The instrument accepts any suitable sensor, uploading the default settings of this sensor. However, this overwrites any customized settings with the default settings of the new sensor.

13.6 Software dongles for EC sensors

13.6.1 Installing the dongle

1. Switch off power to the instrument or declassify the area according to the local regulations.
2. Loosen set-screw and unscrew lid from instrument.
3. Insert the dongle with the Dräger logo facing upwards in the slot of the PCB unit, See figure D on the fold-out page..
4. Position the PCB unit back cover and close the instrument (see "Closing the gas detector", page 13).

13.6.2 Deactivating dongles

This function deactivates a dongle to safely remove the dongle or if the dongle is faulty.

A dongle can only be reactivated by cycling the power to the instrument.

1. Select ***Settings*** > ***Instrument*** > ***SW dongle*** > and the dongle to be deactivated, and confirm.
2. Select ***Deactivation func.***. The selected dongle is deactivated.

13.7 Sensor settings Polytron® 8100 EC

13.7.1 Sensor self-test

This function is only active if the sensor-test dongle or diagnostic dongle is installed. If the sensor does not pass the self-test, a warning or error message is issued.

Setting regular sensor self-tests

This feature triggers the sensor self-test at regular intervals. The instrument then routinely checks that the sensor is functioning correctly.

1. Select and confirm ***Settings*** > ***Sensor*** > ***Set Sensortest***.
2. Select and confirm ***Enable*** or ***Disable***.

Starting sensor test manually

This function starts a single sensor self-test.

1. Select ***Settings*** > ***Sensor*** > ***Sensor test*** and confirm.
2. ***Start sensor test*** is displayed.
3. Select ***Confirm***.

✓ The test result is displayed.

13.7.2 Gas settings

This function sets the gas type, measuring range, and units of measurement. Different settings are possible depending on the installed sensor.

1. Select and confirm ***Settings*** > ***Sensor*** > ***Gas settings***.
   ⇒ The current measured gas is displayed.
2. Select and confirm the measured gas from the list.
   ⇒ The current unit of measurement is displayed.
3. Select and confirm the unit of measurement from the list.
   ⇒ The current full scale deflection is displayed.
4. For certain EC sensors only: Set and confirm the full scale deflection.
   ⇒ The new full scale deflection is displayed.
5. Select and confirm ***Next***.
   ⇒ An overview of the new gas settings is displayed.
6. After reviewing it, select ***Back to menu*** or ***Confirm***.

Back to menu	Select Back to menu to exit the function without changes and confirm with [OK].
Confirm	Select Confirm to accept the settings and confirm with [OK].

13.7.3 Dräger SensorAlive settings

This menu lets you select various parameters that define the behavior of the Dräger SensorAlive:

- To activate or deactivate the LifeTest functions of the sensor, select and confirm ***Settings*** > ***Sensor*** > ***SensorAlive*** > ***DSA activation***.
  Select and confirm ***Enable*** or ***Disable***.
- To acknowledge a clogged sensor, select ***Settings*** > ***Sensor*** > ***SensorAlive*** > ***Ack faults***.
- To enable or disable fault detection, select and confirm ***Settings*** > ***Sensor*** > ***SensorAlive*** > ***Fault detection***.
  Select and confirm ***Enable*** or ***Disable***.

The ***SensorAlive*** menu has the following sub-menus:

– LifeTest
– Sensitivity monitoring

The following parameters can be set in the LifeTest sub-menu:

- To define when to start a test run, select ***Time***.
  Enter a time and confirm. The test run is started when this time is reached on the transmitter.

  ℹ Transmitters do not support an automatic daylight savings changeover.

- To define the value to be output via the transmitter during the LifeTest, select ***Output behavior***.
  Select and confirm ***Fixed***, ***Maintenance*** or ***Measurement val.***.
- To define whether retests are to be carried out in a test run if a LifeTest has a negative test result, select ***Repetition mode***.
  Select and confirm ***Flexible***.
  If ***Static*** is selected, no retests are carried out and a new test run is carried out at the indicated time instead.
- To define when to abort a LifeTest, select ***Cancel threshold***.
  Enter a value and confirm.

  ℹ During a LifeTest, test gas is applied to the Dräger SensorAlive. This causes the measured value to rise. To prevent an alarm from being triggered, the measured value is not transmitted for a maximum of 15 minutes by default. The behavior during a LifeTest can be configured in the ***Output behavior*** menu, however. Independent of this, the sensor detects a gas leak if the measured gas concentration is greater than the gas concentration expected as a result of the LifeTest. The difference corresponds to the concentration of the gas leak and is compared with the value entered in ***Cancel threshold***. If this value is exceeded, the LifeTest is immediately aborted. The sensor switches back to measuring mode and the transmitter once again outputs a measured value. If relays are used, these are tripped on the transmitter and, where applicable, an alarm is triggered.

The following parameters can be set in the ***Sensitiv. check*** sub-menu:

- To define whether a warning needs to be issued, select and confirm ***Activation***.
- To define when a warning must be output, select and confirm ***Alert < 50%*** or ***Alert < 40%***.

13.8 Sensor settings Polytron® 8200 CAT / 8310 IR

13.8.1 Sensor type

This function defines the sensor type installed.

1. Select ***Settings*** > ***Sensor*** > ***Sensor type*** and confirm.
2. Select the sensor type and confirm.

13.8.2 Gas settings

This function sets the unit of measurement.

For LC sensors, this function also sets the full scale deflection.

1. Select ***Settings*** > ***Sensor*** > ***Gas settings*** and confirm.
2. Select the unit of measurement from the list and confirm.
   ⇒ For DQ sensors and DSIR:
   An overview of the new gas settings is displayed.
   Continue with step 4.
   ⇒ For LC sensors:
   The current full scale deflection is displayed. Continue with step 3.
3. Set the full scale deflection and confirm (only for LC sensors).
   ⇒ An overview of the new gas settings is displayed.
4. After review, select ***Back to menu*** or ***Confirm***.

Back to menu	Select Back to menu for leaving the function without changes and confirm with [OK].
Confirm	Select Confirm to accept the settings and confirm with [OK].

13.8.3 Setting the DQ sensor latching

This feature is only available if there are no relays installed.
This feature is used to determine whether the DQ sensor must be acknowledged after measuring a concentration higher than 100 %LEL.
This setting does not apply for LC sensors.

1. Select and confirm ***Settings*** > ***Sensor*** > ***DQ Sensor latch.***.
   ⇒ The current setting is displayed.
2. Select and confirm ***Enable*** or ***Disable***.

⚠ WARNING
Explosion Hazard
If sensor latching is disabled and an alarm indicating an explosion hazard is acknowledged, the instrument informs the end user of such hazard by having the red LED on the display being continuously lit.

► Before acknowledging an over range, ensure that the gas concentration has fallen under 100%LEL.

⚠ WARNING
Explosion Hazard possible
Operation is non-compliant with BVS type examination.
If DQ sensor latching is disabled, for safe operation in accordance with BVS 13 ATEX G 001 X, the central controller must support this function.

► Make sure that over range latching is active at the display unit.

13.9 Sensor settings Polytron 8310 IR

13.9.1 Changing the gas category

The DrägerSensor IR can measure gases and vapors that belong to the methane, propane, or ethene (ethylene) gas categories. A gas category must be set for the DrägerSensor IR depending on which target gas is to be measured. For the assignment of gases and vapors to the gas categories, see the DrägerSensor IR documentation.

13.9.2 Changing the gas category

Prerequisites

– The gas detector was turned on less than an hour ago.
– The automatic zero calibration on the sensor was performed less than an hour ago (see "Special feature of the Polytron 8310", page 23).
– The gas concentration measures by the gas detector is below 10 %LEL (apply zero gas to the sensor if necessary).

1. Turn off the alarm activation for the gas detector (see "Turning the alarms on and off", page 30).
2. Select ***Settings*** > ***Sensor*** > ***DSIR Category*** and confirm.
   ⇒ The gas category is displayed on the instrument.

ℹ The next steps are carried out on the sensor.

3. To select the gas category on the sensor, tap the ⇧S or ⇩0 symbol with the magnetic wand.
   ⇒ START is displayed on the gas detector.
4. Remove the magnetic wand.
   ⇒ The sensor switches to an output signal that represents the gas category currently set:
   Output signal 20 %LEL: Methane gas category
   Output signal 40 %LEL: Propane gas category
   Output signal 60 %LEL: Ethene (ethylene) gas category
5. This output signal is maintained for 30 seconds. During this period, the next gas can be selected by placing the magnetic wand on the area marked with the ⇧S symbol.
   ⇒ The sensor's output signal then switches to the value that matches the newly selected gas category. If no further input with the magnetic wand takes place for more than 30 seconds, the setting is saved.
6. Check the span calibration on the gas detector (see "Span calibration", page 24)
7. Turn on the alarm activation for the gas detector (see "Turning the alarms on and off", page 30).

ℹ The setting on the sensor can result in an incorrect gas category being displayed in the ***DSIR Category*** menu item or that a change in gas category is no longer visible.

13.10 Sensor settings Polytron® 87x0 IR

13.10.1 Gas settings

This function sets the gas type, measuring range and units of measurement. Only certain sensors support these settings.

1. Select ***Settings*** > ***Sensor*** > ***Gas settings*** and confirm.
   ⇒ The current measured gas is displayed.
2. Select a measured gas from the list and confirm.
   ⇒ The current unit of measurement is displayed.
3. Select the unit of measurement from the list and confirm.
   ⇒ If the unit of measurement is set to %LEL, %UEG, or %LIE, the category will be displayed. Continue with step 4.
   ⇒ Otherwise the current full scale deflection is displayed. Continue with step 6.
4. Select a category and confirm.
5. Set the LEL value and confirm.
6. Set the full scale deflection and confirm.
   ⇒ The new full scale deflection is displayed.
7. Select ***Next*** and confirm.
   ⇒ An overview of the new gas settings is displayed.
8. After review, select ***Back to menu*** or ***Confirm***.

Back to menu	Select Back to menu for leaving the function without changes and confirm with [OK].
Confirm	Select Confirm to accept the settings and confirm with [OK].

9. Check the alarm settings after changing the category or the LEL value.

14 Factory default settings

14.1 Unchangeable settings for relay, LED, and alarm

	Setting
Fault relay:	Energized / Normally Open
Yellow LED:	Lit if a fault message is available
Red LED:	Single flash if A1 alarm is present. Double flash if A2 alarm is present. If an alarm is configured as acknowledgeable and the alarm is acknowledged, single/double flash changes to continuously lit.
Alarm Hierarchy	A2 overrides A1 on the LED. However, the A1 and A2 relays operate independently. (Example: if A1 is acknowledgeable, A2 is not, and the gas concentration is such that it triggers A1 and A2: acknowledging the alarm will cause the A1 relay to release. But the red LED continues its double flash as long as the state that triggers the A2 alarm persists.

14.2 Settings which can be changed via the menu

Menu	Default setting	Range
Relay active on alarm / No alarm	Active on alarm	On/Off
A1 alarm: direction	Rising (falling for O_2 sensors)	Falling/Rising
A2 alarm: direction	Rising	
A1 latch mode	Non-latching	Latching/Non-latching
A2 latch mode	Latching	
A1 acknowledge mode	Acknowledgeable	Acknowledgeable/Non-acknowledgeable/Pre-acknowledgeable
A2 acknowledge mode	Not acknowledgeable	
Normal operation A1 relay	Energized	Energized/Not energized
Normal operation A2 relay		
Calibration password	_ _ _ 1	
Settings password	_ _ _ 2	
LCD setting	On	On/Off
SIL status	Off	On/Off
Language	EN	DE / EN / FR / ES / RU / ZH
Automatic calibration	Off	On/Off
Function key	Error	Graphic, fault, warning, vitality, bump test

Interface	Default setting	Range
Fault current	1.2 mA	0 to 3.5 mA
Warning	Off	On/Off
Warning current	3.0 mA	0 to 3.5 mA
Warning cycle interval T1	10 s	5 to 60 s

Interface	Default setting	Range
Warning cycle interval T2 (warning current)	1 s	1 to (T1-1) s
Maintenance signal	static	Static/dynamic
Maintenance current	3.4 mA	0 to 3.5 mA
Analog offset	0 mA	-0.5 to 0.5 mA
Sensitivity analog output	0 mA	-0.5 to 0.5 mA
HART® address	0	0 to 15
Modbus address[1)]	126	2-126
Modbus parity[1)]	even (default)	even, odd parity, no parity
Modbus baud rate[1)]	9600 bps	9600 or 19200 bps
PROFIBUS® address[1)]	126	2-126

1) Fieldbus interfaces are not in accordance with the BVS 13 ATEX G001 X. Using the fieldbus interface no relays are available.

14.3 Sensor-specific values

Further specifications are provided in the instructions for use for the relevant sensor.

14.3.1 Polytron 8100 EC

Menu	Default setting	Range
Alarm A1	Depending on sensor	
Alarm A2	Depending on sensor	
Hysteresis for A1 alarm in rising direction	0	0 to A1
Hysteresis for A2 alarm in rising direction	0	0 to A2
Hysteresis for A1 alarm in falling direction	0	0 to full scale deflection -A1
Hysteresis for A2 alarm in falling direction	0	0 to full scale deflection -A2
Calibration interval [days]	Depending on sensor	0 to 720

14.3.2 Polytron 8100 EC with O_2 sensors

Menu	Default setting	Range
Display capture range offset	20.9 Vol% (O_2)	0 to 25 Vol% (O_2 LS) 0 to 100 Vol% (O_2)
Display capture range low	-0.25 Vol% (O_2)	0 to -0.75 Vol%
Display capture range high	0.25 Vol% (O_2)	0 to 0.75 Vol%
Full scale value	25 Vol% (O_2, O_2 LS)	5 to 25 Vol% (O_2 LS) 5 to 100 Vol% (O_2)

14.3.3 Polytron 8100 EC with Dräger SensorAlive

Menu	Default setting	Range
DSA warn current	2.0 mA	0 mA to 3.5 mA
DSA warn limit	Depending on sensor	
DSA activation	On	On / Off
LifeTest		
Time	Depending on sensor	
Output behavior	Fixed	Fixed/maintenance/measured value
Repeat profile	Flexible	Flexible/static
Cancel threshold	Depending on sensor	
Senor monitoring		
Activation	Depending on sensor	
Alarm <50 %	Off	Off/warning
Alarm <40 %	DSA warning	Off/DSA warning/error
Fault detection	On	On / Off

14.3.4 Polytron 8200 CAT DrägerSensor® DQ

Menu	Default setting	Range
Alarm A1	20 %LEL	1 to 100 %LEL
Alarm A2	40 %LEL	
Hysteresis for alarm A1 with increasing direction	1 %LEL	0 to A1
Hysteresis for alarm A2 with increasing direction	1 %LEL	0 to A2
Adjustment interval [days]	180	0 to 360
Display capture range offset	0 %LEL	-5 to 4 %LEL
Display capture range low	-5 %LEL	-5 to 0 %LEL
Display capture range high	2 %LEL	0 to 4 %LEL
Full scale value	100 %LEL	Not possible to set range

14.3.5 Polytron 8200 CAT DrägerSensor® LC

Menu	Default setting	Range
Alarm A1	2.0 %LEL	0.1 to 10 %LEL
Alarm A2	4.0 %LEL	
Hysteresis for alarm A1 with increasing direction	0.1 %LEL	0 to A1
Hysteresis for alarm A2 with increasing direction	0.1 %LEL	0 to A2
Full scale value	10 %LEL	5 to 10[1] % LEL 1 to 10 %LEL
Adjustment interval [days]	180	0 to 360
Display capture range offset	0 %LEL	-0.5 to 0.4 %LEL
Display capture range low	-0.5 %LEL	-0.5 to 0 %LEL
Display capture range high	0.2 %LEL	0 to 0.4 %LEL

1) For firmware versions < 3.0.0

14.3.6 Polytron 8310 IR

Menu	Default setting	Range
Alarm A1	20 %LEL	1 to 100 %LEL
Alarm A2	40 %LEL	
Hysteresis for alarm A1 with increasing direction	1 %LEL	0 to A1
Hysteresis for alarm A2 with increasing direction	1 %LEL	0 to A2
Adjustment interval [days]	180	0 to 360
Display capture range offset	0 %LEL	-3 to 4 %LEL
Display capture range low	-3 %LEL	-3 to 0 %LEL
Display capture range high	2 %LEL	0 to 4 %LEL
Full scale value	100 %LEL	Not possible to set range

14.3.7 Polytron 8700 IR

Type 334

Menu	Default setting	Range
Test gas	Methane	
Test gas units	%LEL	
Test gas concentrations	50 %LEL	
Alarm A1	20 %LEL	0.01 to 100 Vol% with %LEL = 0.3 to 100 %LEL
Alarm A2	40 %LEL	
LEL type	NIOSH	IEC / PTB / NIOSH / configurable
Measured gas	Methane	
Units of measured gas	%LEL	Vol.% / PPM / %LEL / %LIE
Full scale value	100 %LEL	20 to 100 %LEL
Beam block	Off	On/Off
Beam block current	2 mA	0 to 3.5 mA
Beam block limit	7.5 %LEL	0 to max. 15 %LEL[1]
Adjustment interval [days]	360	0 to 720

Menu	Default setting	Range
Response behavior	normal	normal / fast
Display capture range offset	0	The absolute values of the display capture range must be within these limits: -1000 to 2200 ppm (Methane type 334) -850 to 850 ppm (Propane type 334) -1200 to 1150 ppm (Ethylene type 334)
Display capture range low	-750 ppm (Methane) -315 ppm (Propane) -405 ppm (Ethylene)	
Display capture range high	750 ppm (Methane) 315 ppm (Propane) 405 ppm (Ethylene)	

1) The maximum limit of the beam block depends on the type of gas detector and the measured gas selected.

Type 340

Menu	Default setting	Range
Test gas	Propane	
Test gas units	%LEL	
Test gas concentrations	50 %LEL	
Alarm A1	20 %LEL	0.01 to 100 Vol% with %LEL = 0.3 to 100 %LEL
Alarm A"	40 %LEL	
LEL type	NIOSH	IEC / PTB / NIOSH / configurable
Measured gas	Propane	
Units of measured gas	%LEL	Vol% / PPM / %LEL / %LIE
Full scale value	100 %LEL	20 to 100 %LEL
Beam block	Off	On/Off
Beam block current	2 mA	0 to 3.5 mA
Beam block limit	2.5 %LEL	0 to max. 15 %LEL[1)]
Adjustment interval [days]	360	0 to 720
Response behavior	normal	normal / fast
Display capture range offset	0	The absolute values of the display capture range must be within these limits: -850 to 425 ppm (Propane type 340) -1800 to 2200 ppm (Methane type 340)
Display capture range low	-750 ppm (Methane) -85 ppm (Propane)	
Display capture range high	750 ppm (Methane) 85 ppm (Propane)	

1) The maximum limit of the beam block depends on the type of gas detector and the measured gas selected.

14.3.8 Polytron 8720 IR

Menu	Default setting	Range
Test gas	CO_2	
Test gas units	Vol%	
Test gas concentrations	4.0 Vol%	0.2 to 100 Vol%
Alarm A1	1 Vol%	0.01 to 100 Vol%
Alarm A2	2 Vol%	
LEL type	-	
Measured gas	CO_2	
Units of measured gas	Vol%	Vol% / ppm
Full scale value	10 Vol%	0.2 to 100 Vol%
Beam block	Off	On/Off
Beam block current	2 mA	0 to 3.5 mA
Beam block limit	0.1 Vol%	0 to 0.1 Vol%
Adjustment interval [days]	360	0 to 720
Response behavior	normal	normal / fast
Display capture range offset	340 ppm	The absolute values of the display capture range must be within these limits: -1000 to 1000 ppm (carbon dioxide)
Display capture range low	-200 ppm	
Display capture range high	200 ppm	

15 Disposal

This product must not be disposed of as household waste. This is indicated by the adjacent icon.
You can return this product to Dräger free of charge. For information please contact the national marketing organisations and Dräger.

Disposal of electrochemical sensors

⚠ WARNING
Danger of explosions and risk of chemical burns!
Sensor fluids may leak out and can cause acid burns.
► Do not dispose sensors in fire.
► Do not open with force.

16 Technical data

16.1 Measuring ranges

Sensor	Measuring range
Polytron 8100 EC with DrägerSensor® EC	Depending on sensor
Polytron 8200 CAT with DrägerSensor® DQ	0 to 100 %LEL
Polytron 8200 CAT with DrägerSensor®LC	0 to 10 %LEL[1)]
Polytron 8310 IR with DrägerSensor® IR	0 to 100 %LEL
Polytron 8700 IR with PIR 7000 infrared gas sensor	
Type 334 (IDS 01x1)	0 to 10,000 ppm[1)] 0 to 100 %LEL,[1)] 0 to (1.25 x LEL_{max}) Vol%,[1)2)] For CH4 (methane) 0 to 100 Vol%[1)]
Type 340 (IDS 01x2)	0 to 10,000 ppm[1)] 0 to 100 %LEL[1)] 0 to 5 Vol%[1)]
Polytron 8720 IR with PIR 7200 infrared gas sensor (IDS 01x5)	0 to 100 Vol%[1)]

1) For adjustable full scale deflection, see 14.3.
2) Range changes depending on the substance to be measured

16.2 Signal transmission to the controller

The measuring range and performance characteristics depend on the installed sensor (see the instructions for use for the installed sensor).

Frequency of measurement calculation: 1 x per second (update of display, analog interface and relays).

Analog signal	
Normal operation	4 ... 20 mA
Drift below zero	3.8 ... 4 mA
Over range	20 ... 20.5 mA
Instrument fault	≤ 1.2 mA
Fault on analog interface	> 21 mA
Maintenance signal	3.4 mA steady signal or 1 Hz modulation between 3 and 5 mA (selectable)

Resistance of the signal loop

Operating mode	Resistance range of the signal loop	Power supply range
Operation without HART® communication	0 to 230 Ω	at 10 V DC
	Rising linearly with the supply voltage from: 0 to 230 Ω at 10 V to 0 to 500 Ω at 16 V	10 to 18 V DC
	0 to 500 Ω	18 to 30 V DC
Operation with HART® communication	230 to 270 Ω	at 13 V DC
	Rising linearly with the supply voltage from: 230 to 270 Ω at 11 V to 230 to 500 Ω at 16 V	11 to 16 V DC
	230 to 500 Ω	18 to 30 V DC
HART® multidrop operation	230 to 500 Ω	10 to 30 V DC

When used in accordance with the metrological suitability test compliant with EN IEC 62990-1, EN IEC 60079-29-1 or EN 50104, the resistance must not exceed 300 ohms. Further information on installing the fieldbus interface is provided in document 9033783.

16.3 Cable specifications

For non-conduit installations, use shielded cables.

Analog and HART® connection with controller and power supply	
Power supply and signals	3-core shielded cable 24 - 12 AWG / 0.2 - 2.5 mm²
Relays	20 - 12 AWG / 0.5 - 2.5 mm²

Digital connection with controller	
Instruments with fieldbus interfaces and remote sensors must be installed with shielded cables.	
Modbus RTU	2-core or 3-core[1], ≥ 26 AWG
PROFIBUS PA Foundation Fieldbus	2-core, cable type A Wave impedance Rw: 135 - 165 Ω Capacitance / unit length C‘: < 30 pF/m Loop resistance R‘: 110 Ω/km Core diameter d: 0.64 mm Core cross section q: > 0.34 mm² Shield coverage: ≥ 90 %
Power supply	2-core, 24 - 12 AWG / 0.2 - 2.5 mm²

1) If the distance between the controller and the transmitter is very long (>1 km) and the power supplies of the controller and the transmitter are separate, interference or differential differences can occur. In this case, 3-core cabling with ground must be selected. Ground is then connected to the transmitter and looped through to the ground of the controller.

16.4 Power supply and relays

Relay rating[1] SPDT[2]	
230 V ~	0.1 A - 5 A
30 V ⎓, resistive load	0.1 A (minimum) - 5 A

1) For safety-related applications (SIL 2), the maximum contact rating is reduced (see Polytron® 8xx0 Safety Manual).
2) Single pole, double throw, (changeover electrical contacts)

Power supply Polytron 8xx0	
Operating voltage	10[1] to 30 V⎓ at the instrument
Inrush current	2.3 A for 2 ms at 24 V⎓,10 Ω resistor

1) At supply voltages of < 7 V DC the instrument provides a fault signal. The warning signal "undervoltage" depends on the connected load at the 4-20 mA output and the cable resistance. In case of lower load (e.g. 230 Ω), the fault relay drops out and the current output is 0 mA. In case of higher load (e.g. 500 Ω), warning message 011 is indicated.

Operating current	
Polytron® 8100 EC	
without relay, non-remote sensor	80 mA
with relay, remote sensor	100 mA
Polytron® 8200 CAT	
without relay, non-remote sensor	105 mA (DrägerSensor DQ) 130 mA (DrägerSensor LC)
with relay, remote sensor	145 mA (DrägerSensor DQ) 165 mA (DrägerSensor LC)
Polytron® 8310 IR	
without relay, non-remote sensor	145 mA
with relay, remote sensor	185 mA
Polytron® 87x0 IR	
without relay, non-remote sensor	330 mA
with relay, remote sensor	350 mA

16.5 General specifications

Polytron 8xx0 enclosure	
Enclosure material	Copper-free aluminum
Enclosure guard	NEMA 4X[1] IP 65/66/67[2]
Display	Resolution 128 x 64 pixels, backlit[3]

1) Polytron 8100 EC NEMA 4X enclosure guard pending.
2) The IP degrees of protection do not cover the detection of a gas, during or after exposure of the equipment to these conditions. In the event of dust deposits and contact with water through immersion or a jet of water, check the adjustment and functional integrity of the instrument.
3) There is only a limited visibility of the display at high temperatures (>65 °C).

16.6 Environmental parameters

Further sensor specifications and influences can be found in the instructions for use provided for the respective sensor.

The values for accessories and spare parts may deviate from the values given here. The exact values can be found in the corresponding manual.

Polytron 8xx0	
Values in accordance with explosion protection testing	
During operation:	
Pressure	23.6 to 32.5 in. Hg (800 to 1100 hPa)
Humidity	0 to 100 % RH, non-condensing
Temperatures	
Polytron 8100 EC	-40 to +70 °C (-40 to +158 °F)
Polytron 8200 CAT	-40 to +80 °C (-40 to +176 °F)
Polytron 8310 IR	-40 to +65 °C (-40 to +149 °F)
Polytron 87x0 IR	-40 to +80 °C (-40 to +176 °F)
Values according to performance approval	
During operation:	
Pressure	20.7 to 38.4 in. Hg (700 to 1300 hPa)[1)]
Humidity	0 to 95 % RH, non-condensing
Temperatures	
Polytron 8100 EC[2)]	-40 to +65 °C (-40 to +149 °F)
Polytron 8200 CAT	-40 to +80 °C (-40 to +176 °F)
Polytron 8310 IR	-40 to +65 °C (-40 to +149 °F)
Polytron 87x0 IR	-40 to +77 °C (-40 to +170 °F)
During storage:	
Pressure	26.5 to 32.4 in. Hg (900 to 1100 hPa)
Humidity	0 to 100 % RH, non-condensing
Temperature	-20 to +65 °C (-4 to +149 °F)
Recommended storage period	5 years
Values for relay option and installations with UL approval	
During operation:	
Temperatures	
Polytron 8200 CAT	-40 to +70 °C (-40 to +158 °F)
Polytron 87x0 IR	-40 to +70 °C (-40 to +158 °F)

1) Polytron 8200 CAT: 23.6 to 35.44 in. Hg (800 to 1200 hPa)
2) See 18.3, 18.3.2 and the instructions for use provided for the EC sensor for the constraints of the maximum specification.

16.7 Tightening torques

Instrument threads	
Enclosure cover	≥44 in-lbs / ≥5 Nm
Sensor	min. 266 in-lbs / min. 30 Nm
Blind plugs	min. 266 in-lbs / min. 30 Nm
Ports (for conduits or cable glands)	min. 443 in-lbs / min. 50 Nm
Docking Station blind plugs	62 in-lbs / 7 Nm
Docking Station cable glands	70 in-lbs / 8 Nm
Remote EC sensing head	177 in-lbs ±9 in-lbs / 20 Nm ±1 Nm
Field wiring terminals	
Power supply, signals and relays	4.4 - 7.0 in-lbs / 0.5 - 0.8 Nm
Grounding screw	10.6 in-lbs / 1.2 Nm

17 Accessories and spare parts

This chapter provides an overview of the components that are covered by the BVS 13 ATEX G 001 X- and PFG 14 G 001 X-type examination. Further parts are listed in the spare parts list or can be requested from DrägerService.

17.1 Polytron® 8xx0

Description	Part number
IRDA to PC interface	4544197
Magnetic wand with key chain	4544101
Dräger PolySoft, configuration software	8328600 / 8328639
EXd blind plug, stainless steel, 2 pcs.	4544897
Exd blind plug, galvanic steel, 3 pcs.	8344041

17.1.1 Docking station

Description	Part number
Docking Station Power Only Version	8344027
Docking Station Power, Relay (includes 2 cable glands)	8344028
Docking Station Fieldbus	8344029
Cable Gland Docking Station	6812868
Blind plug Docking Station	8344042

17.2 Polytron® 8100 EC

Description	Part number
Polytron 8100 4-20/HART printed circuit board	4544781
Polytron 8100 4-20/HART printed circuit board, relay	4544782
Bayonet ring	4544366
Bayonet ring for Dräger SensorAlive	6800132
Duct adapter for remote EC sensing head[1)]	8317617
Rod attachment for remote EC sensing head	4544213
Sensor-test dongle	8317619
Diagnostic dongle	8317860
Calibration adapter	6810536

1) May influence the measurement, e.g. extend the response time. Not covered by BVS 13 ATEX G 001 X and PFG 14 G 001 X.

17.3 Polytron® 8200 CAT

Description	Part number
Polytron 8200 PCB unit 4-20/HART	4544788
Polytron 8200 PCB unit 4-20/HART relay	4544789
PE calibration adapter, Europe	6806978
DQ remote calibration adapter	6812480
LC remote calibration adapter[1)]	6812482
21.50X14.50 membranes spare part set, 2 pcs.	8326840
Dust filters for DrägerSensor DQ, 10 pcs.	6810537
DQ process adapter	6812470
LC process adapter[1)]	6812465
Splash guard	6812510

1) not covered by performance approval.

17.3.1 CAT sensors

Description	Part number
DrägerSensor DQ NPT	6814150
DrägerSensor DQ NPT S[1)]	3701800
DrägerSensor LC NPT	6810675
Sensing head, Polytron SE Ex PR M1 DQ	6812711
Sensing head, Polytron SE Ex PR M2 DQ	6812710
Sensing head, Polytron SE Ex HT M DQ	6812720
DQ NPT aluminum remote sensor	3706933
DQ NPT steel remote sensor	3706934

1) The DrägerSensor DQ NPT S can also be used instead of the DrägerSensor DQ NPT.

17.4 Polytron® 8310 IR

Description	Part Number
Splash Guard	6810796
Process Adapter	6811330
Protection Labyrinth	6811135
Calibration adapter	6810859
PCB unit Polytron 8310 4-20/HART	4544788
PCB unit Polytron 8310 4-20/HART Relay	4544789

17.4.1 DSIR sensors

Description	Part number
DrägerSensor IR NPT	6811901
Sensing head, DrägerSensor IR complete set e	6811165
Sensing head, DrägerSensor IR complete set e2	6811265

17.5 Polytron® 87x0 IR

Description	Part number
Polytron 87x0 PCB unit 4-20/HART[1)]	4544795
Polytron 87x0 PCB unit 4-20/HART relay[1)]	4544796
PIR 7000 attachment set	6811648
PIR 7000 process cuvette, stainless steel	6811415
PIR 7000 SGR process cuvette	6813219
PIR 7000 / 7200 status indicator	6811625 / 6811920
PIR 7000 / 7200 splash guard	6811911 / 6811912
PIR 7000 / 7200 flowcell	6811490 / 6811910

Description	Part number
PIR 7000 / 7200 remote test adapter	6811630 / 6811930
PIR 7000 insect protection	6811609
PIR 7000 hydrophobic filter	6811890
PIR 7000 calibration adapter	6811610
PIR 7000 / 7200 POM process adapter (polyoxymethylene)	6811915
PIR 7000 assembly set	6811648
Terminal box Ex e	6811989
Terminal box Ex d	4520561
Magnetic wand	4544101

1) Check firmware compatibility of sensor and gas detector. Changing the PCB unit may require a firmware update. Contact Dräger for support.

17.5.1 Sensors

Check firmware compatibility of sensor and gas detector. Changing the sensor may require a firmware update. Contact Dräger for support.

Description	Part number
Dräger PIR 7000 type 334 (NPT)	6811822
Dräger PIR 7000 type 340 (NPT)	6811832
Dräger PIR 7000 334 (M25) complete set	6811825
Dräger PIR 7000 340 (M25) complete set	6811819
Dräger PIR 7200 (NPT)	6811572
Dräger PIR 7200 (M25) HART complete set	6812290

18 Performance Approvals

In combination with certain sensors, Polytron 8xx0 is performance approved based on the following standards:

– EU and Type Examination Certificates in line with EN 60079-29-1, EN 50104, EN 45544 and DIN IEC 62990-1. Issued by DEKRA Testing and Certification GmbH, Handwerkstr. 15, D-70565 Stuttgart.
– FM performance approval in line with ANSI/ISA-92.00.01 FM6340

For further information on sensor specifications and restrictions (e.g., measuring principles, performance, cross-sensitivity), refer to the instructions for use for the relevant sensor.

18.1 EU-TYPE Examination Certificate, BVS 13 ATEX G 001 X

Measurement of flammable gases and vapors mixed with air.

– Polytron 8200 CAT with DrägerSensor DQ
  Special conditions:
  - When streaming with air containing measured gas, measured values may increase by up to 32 %.
  - When operating with the DQ remote calibration adapter, measured values may increase by up to 70 %.
– Polytron 8200 CAT with DrägerSensor LC
  Approved with 10 %LEL full scale deflection.
  A connection to a controller with approved measuring function (e.g., REGARD® 7000) is required. Latching alarms for over range measured values must be activated at the controller.
– Polytron 8310 IR with DrägerSensor IR
– Polytron 8700 IR with PIR 7000 type 334 and 340

Measurement of oxygen (inertization)

– Polytron 8100 EC with DrägerSensor O_2 (6809720) and DrägerSensor O_2 LS (6809630) within a measuring range of 0-5...25 Vol% O_2.

Approved are:

– 4 to 20 mA interface
– Relay module
– Remote sensor
– HART
– Factory default full scale deflections

Not approved are the fieldbus interface and the data logger.

18.2 Type Examination Certificate, PFG 14 G 001 X

Measurement of oxygen (deficiency and excess oxygen)

– Polytron 8100 EC with DrägerSensor O_2 (6809720) and DrägerSensor O_2 LS (6809630) within a measuring range of 0–25 Vol% O_2.

Measurement of hydrogen sulfide

– Polytron 8100 EC with Dräger SensorAlive (6809630) within the following measuring ranges:
  - 0.5 - 100 ppm (Type HM)
  - 0 - 100 ppm (Type SM)

Measurement of carbon dioxide

– Polytron 8720 IR with PIR 7200 within the following measuring ranges:
  - 1 Vol% and 10 Vol% – EN 45544-2
  - 2000 ppm, 1 Vol% and 10 Vol% – EN 45544-3

Approved are:

– 4 to 20 mA interface
– Relay module
– Remote sensor

Not approved are:
– Fieldbus interface
– Data logger
– Only Polytron 8100 EC with Dräger SensorAlive: Self-test functionality when using a gas generator

18.3 DrägerSensor O_2, O_2LS and Dräger SensorAlive certified operating conditions

Cross-sensitivities

There are no known cross-sensitivities against interfering gases with a concentration of up to 100 ppm. Further information can be requested from Dräger.

18.3.1 DrägerSensor O_2 (6809720)

The DrägerSensor O_2 (6809720) is an electrochemical two-electrode sensor for measuring oxygen (O_2) in ambient air.

Environmental parameters	
Pressure	20.7 to 38.4 in. Hg (700 to 1300 hPa)
Humidity	10 to 95 % RH, non-condensing
Temperature	Application of EN 50104 limits the temperature range to 0 °C to +55 °C.

Storage	
Pressure	no influence
Humidity	30 to 70 % RH, non-condensing (only relevant if sensor packaging is open)
Temperature	0 to +40 °C
Time	Storage of sensors is not intended. Sensors should be used immediately. Remaining life span = expected life span - storage time

Influence of environmental parameters	**Zero-point**	**Sensitivity[1)]**
Temperature[2)3)]		
0 to 55 °C	≤ 0.3 Vol% O_2	≤ 0.9 Vol% O_2
Pressure	< ± 0.2 Vol% O_2	Relative deviation from the reading at 1013 hPa: < 10 % of the measured value / 100 hPa
Humidity	No influence	Relative deviation from the reading at 50 % rel. humidity: < 1 % of the measured value

1) Relative deviation of the display reading is caused by atmospheric pressure fluctuations.
2) At temperatures below -5 °C, the measurement deviation is higher than specified in EN 50104.
3) For operating temperatures outside -5 °C to 40 °C, an adjustment at operating temperature must be performed.

Response time[1)]	**$t_{0...20}$**	**$t_{0...90}$**
0-5 Vol% O_2	≤ 15 seconds[2)]	≤ 33 seconds
0-25 Vol% O_2	≤ 10 seconds	≤ 26 seconds

1) At temperatures below -5 °C, the response time may increase.
2) Response time is higher than the permissible limit of EN 50104.

Stabilization time: 5 x $t_{0...90}$

Measuring range

0-5 Vol% O_2 to 0-100 Vol% O_2

Default value: 25 Vol% O_2 Minimum reading: -1.25 Vol% O_2

Sensor warm-up time

Operation: <20 minutes / Adjustment: ≤ 2 hours

18.3.2 DrägerSensor O_2LS (6809630)

The DrägerSensor O_2LS (6809630) is an electrochemical three-electrode sensor for measuring oxygen (O_2) in ambient air.

Environmental parameters	
Pressure	20.7 to 38.4 in. Hg (700 to 1300 hPa)
Humidity	5 to 95 % RH, non-condensing
Temperature	-40 to +60 °C short-term +65 °C

Storage	
Pressure	no influence
Humidity	30 to 70 % RH, non-condensing (only relevant if sensor packaging is open)
Temperature	0 to +40 °C
Time	Storage of sensors is not intended. Sensors should be used immediately. Remaining life span = expected life span - storage time

Influence of environmental parameters	Zero-point	Sensitivity
Temperature		
-20 to 40 °C	≤ 0.1 Vol% O_2	≤ 0.1 Vol% O_2
-40 to 65 °C	≤ 0.2 Vol% O_2	≤ 0.5 Vol% O_2
Pressure	< ± 0.1 Vol% O_2	≤ 0.8 Vol% O_2
Humidity	≤ 0.1 Vol% O_2	≤ 0.9 Vol% O_2

When measuring oxygen in the presence of helium, helium compensation can be used. The option of helium compensation is no certified measuring function according to EN 50104.

⚠ CAUTION

Sensor failure

The exposure of the sensor to higher concentrations of unsaturated hydrocarbons, alcohols, or hydrogen over an extended period of time (dose approx. 100,000 ppm x hours) can cause the instrument to fail.

► Ensure that the sensor is not exposed to such concentrations over an extended period of time.

Response time	$t_{0...20}$	$t_{0...90}$
0-5 Vol% O_2	≤ 14 seconds[1)]	≤ 45 seconds
0-25 Vol% O_2	≤ 10 seconds	≤ 27 seconds

1) Response time is higher than the permissible limit of EN 50104.

Stabilization time: 5 x $t_{0...90}$

Measuring range

0-5...25 Vol% O_2, 0-25 Vol% O_2

Default value: 25 Vol% O_2

Minimum reading: -1.25 Vol% O_2

Sensor warm-up time

Operation: ≤ 20 minutes / Adjustment: ≤ 6 hours

18.3.3 Dräger SensorAlive (6814014)

The Dräger SensorAlive (6814014) is an electrochemical diffusion sensor with an integrated gas generator for measuring hydrogen sulfide (H_2S) in ambient air.

Environmental parameters	
Pressure	20.7 to 35.5 in. Hg (700 to 1200 hPa)
Humidity	5 to 95 % RH, non-condensing
Temperature	-40 to +65 °C
Maximum flow speed of the ambient air	6 m/s

Storage	
Pressure	no influence
Humidity	30 to 70 % RH, non-condensing (only relevant if sensor packaging is open)
Temperature	0 to +40 °C
Time	Storage of sensors is not intended. Sensors should be used immediately. Remaining life span = expected life span - storage time

Influence of environmental parameters	Relative deviation from the reading
Pressure	At 1000 hPa: ≤ 0.15 ppm
Humidity (at +40 °C)	at 0 and 95 %RH: ≤ 0.29 ppm
Temperature	at 20 °C: ≤ 0.44 ppm

Interference gases (e.g., NH_3) can impair the function of the sensor.

Response times in diffusion operation	
t(50)	≤ 20 s
t(90)	≤ 55 s

Decay times in diffusion operation	
t(50)	≤ 20 s
t(10)	≤ 55 s

18.4 FM performance approval for DrägerSensor H_2S and H_2S LC

The DrägerSensor H_2S and H_2S LC are electrochemical diffusion sensors measuring hydrogen sulfide (H_2S) in ambient air.

DrägerSensor H_2S (6810435)	
Examination Type P8100	ETR 0400, 0401, 0500, 0501
Interface[1)]	4-20mA, relay
Environmental parameters	
Humidity	5 to 95%RH, non-condensing
Temperature	-40/+65 °C (-40/149 °F)
Storage temperature	0/+40°C (32/104°F)
Enclosure protection [2)]	IP 65/66/67
Range	0-100 ppm
Accuracy (whichever is greater)	measurement uncertainly (of meas. value) ≤ ±3 % or minimum ≤ ±0.5 ppm
Accessory	
Dust filter	6809595
Adapter kit	6810536
Standard	ANSI/ISA-92.00.01FM6340

1) HART communication must not be used for safety-relevant communication.
2) After submersion and jet water the sensor must be replaced.

DrägerSensor H_2S LC (6809610)	
Examination Type P8100	ETR 0400, 0401, 0500, 0501
Interface[1)]	4-20mA, relay
Environmental parameters	
Humidity	5 to 95%RH, non-condensing
Temperature	-20/+65 °C (-4/149 °F)
Storage temperature	0/+40°C (32/104°F)
Enclosure protection [2)]	IP 65/66/67
Range	0-100 ppm
Accuracy (whichever is greater)	measurement uncertainly (of meas.value) ≤ ±3 % or minimum ≤ ±0.5 ppm in the range >50 ppm, ±10 % or ±3 ppm
Accessory	
Dust filter	6809595
Adapter kit	6810536
Standard	ANSI/ISA-92.00.01FM6340

1) HART communication must not be used for safety-relevant communication.
2) After submersion and jet water the sensor must be replaced.

FLAME DETECTOR

POS.	TAG NUMBER	SERVICE
1	950-FDZ-01101	FZ-01 FUEL CELL PK AREA
2	950-FDZ-01102	FZ-01 FUEL CELL PK AREA
3	950-FDZ-01103	FZ-01 FUEL CELL PK AREA
4	950-FDZ-01104	FZ-01 FUEL CELL PK AREA
5	950-FDZ-02101	FZ-02 H2 STORAGE VESSELS AREA
6	950-FDZ-02102	FZ-02 H2 STORAGE VESSELS AREA
7	950-FDZ-02103	FZ-02 H2 STORAGE VESSELS AREA
8	950-FDZ-02104	FZ-02 H2 STORAGE VESSELS AREA
9	950-FDZ-03101	FZ-03 ELECTROLYZER PK AREA
10	950-FDZ-03102	FZ-03 ELECTROLYZER PK AREA
11	950-FDZ-03103	FZ-03 ELECTROLYZER PK AREA
12	950-FDZ-03104	FZ-03 ELECTROLYZER PK AREA
13	950-FDZ-04101	FZ-04 B-400/B-300/B-200 AREA
14	950-FDZ-04102	FZ-04 B-400/B-300/B-200 AREA
15	950-FDZ-04103	FZ-04 B-400/B-300/B-200 AREA
16	950-FDZ-04104	FZ-04 B-400/B-300/B-200 AREA
17	950-FDZ-05101	FZ-05 BESS AREA
18	950-FDZ-05102	FZ-05 BESS AREA
19	950-FDZ-05103	FZ-05 BESS AREA
20	950-FDZ-05104	FZ-05 BESS AREA
21	950-FDZ-06101	FZ-06 B-100 AREA
22	950-FDZ-06102	FZ-06 B-100 AREA

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FIRE & GAS DETECTION TECHNOLOGIES INC.

User Manual



FlameSpec **UV-IR**

FlameSpec **UV-IR-F**

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FlameSpec-UV-IR (F) UV/IR Flame Detector User Guide, October 2022

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1. Introduction

The **FlameSpec-UV-IR** flame detector provides ultra-fast response, high performance and reliable detection of a large variety of fires including hydrocarbon fires (visible and non-visible), as well as hydrogen fires (FLS-UV-IR only).

The detector is certified for use in hazardous area locations; it may also be used in other areas not classified as hazardous. The two cable/conduit entries either side of the lower part of the detector housing are for connecting power and outputs to associated signaling equipment.

The detector addresses slow growing fires as well as fast eruptions of fire using improved UV-IR technology.

The detector operates in all weather and light conditions. It will automatically record a fire event (1 min pre/post alarm) using the internal data logger.

During normal operation, the flame detector performs self-tests of its optics, electronics and software. These include a periodic BIT (Built-In-Test) in which the sensors and window cleanliness are tested.

This manual covers two UV/IR detector models:

- **FLS-UV-IR:** Hydrogen and hydrocarbons flame detection. UV radiation 0.18-0.26 micron range. Spectrum response of IR radiation in the 2.5 - 3.5 micron range.
- **FLS-UV-IR-F:** Hydrocarbon flame detection. Spectrum response of IR radiation in the 4.0-5.0 micron range.

1.1 Key Features

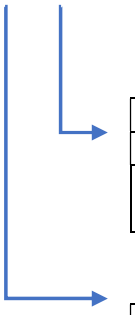
- **High immunity**: To false alarm
- **Ultra-fast detection mode:** Within 5 milliseconds for fireballs or explosions
- **Extreme sensitivity**: Up to 100 ft. (30m) for a 1ft2 (0.1m2) n-heptane pan fire
- **Built-in-Test (BIT)** - Automatic and manual self-test of window cleanliness and the overall operation of the detector.
- **Improved speed of response option** - (0.5s) for automotive applications in compliance with NFPA 33
- **Window heater -** to avoid condensation and icing.
- **Tilt mounting bracket -** for accurate detector positioning.
- **UV and IR warning levels - 0-20mA** - current output warning when elevated UV or IR radiation is detected.

1.2 Model Number Description

The model numbers are defined as follows:

FLS-UV-IR-F - A S X X

FLS-UV-IR - A S X X



0	Standard, no Hart and not SIL certified.
1	Standard
5	Design for, but not limited to, automotive spray paint applications where compliance with 0.5 s response (per NFPA 33) is needed

1	M25
2	¾" NPT

1.2.1 Enhanced performance option

Option 5: Design for, but not limited to, automotive spray paint applications where compliance with 0.5 s response (per NFPA 33) is needed

1.3 Internal tests

During normal operation, the flame detector performs self-tests of its optics, electronics, and software. These include a periodic BIT (Built-In-Test) in which the sensors and window cleanliness are tested. Any detected fault is indicated as shown in table 4 (in section 4.1). During "Dirty Window" fault the detection sensitivity is significantly reduced, while "Fault" refers to critical faults which totally prevent flame detection.

1.4 Product Overview



FIGURE 1 - FRONT VIEW OF THE FLS-UV-IR (F)



FIGURE 2 - REAR VIEW OF THE FLS-UV-IR (F)

1.5 Accessories

1.5.1 Mounting Bracket

The detector should be mounted using the stainless-steel tilt mount part number FLS-TMO-S01. This allows the detector to be securely attached to a wall, pole or other solid surface using appropriate fixings. See section2.5 and 2.6 for further details.



FIGURE 3 - TILT MOUNT

1.5.2 Weather Cover

The weather cover P/N FLS-WCO-S01 protects the detector from extreme weather conditions such heat, rain and snow



FIGURE 4 - WEATHER COVER

1.5.3 Pole mount

The pole mount enables the detectors to be installed with its tilt mount brackets. The pole mount kit we supply are suitable for 2-inch or 3-inch poles. Part number FLS-PMA-S23.



FIGURE 5 - POLE MOUNT

1.5.4 Air shield

The air shield P/N FLS-ASD-S01 allows installation of flame detectors in harsh weather conditions where they may be exposed to dust, sand, and other particulate matter. The connection point can be mounted in the 3, 9 or 12 o'clock locations.

- Air pressure source: Clean, dry, and oil-free air
- Pressure: 2-3 bar /30-45 psi
- Fitting: 7/16"—20UNF-2A
- Operation temperature: -55°C to +85°C / -67°F to +185°F

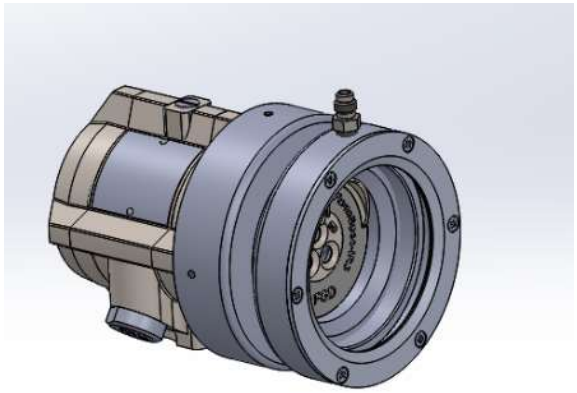


FIGURE 6 - AIR SHIELD

1.5.5 Flame Simulator

The FLS-UV-IR (F) may be tested using the FLS-FSIM-UV-IR-KIT. The FlameSpec flame simulator family provides a fast and convenient means of periodically testing the detector and control system end-to-end. Maintenance costs can be reduced as the detectors can be tested in situ without needing a hot work permit.

FlameSpec Flame Simulators emit UV and IR radiation which simulates a fire to the detectors. The simulators are lightweight, easy to use, with testing distances of up to 21.3 ft. (6.5m) and capable of more than 100 activations between battery charging. FlameSpec Flame Simulators are ATEX approved for use in hazardous Zone 1, Zone 2, Zone 11, Zone 22 areas.
Each simulator kit contains a carrying case, simulator, carrying strap, battery charger, user manual, Allen key and a tool for removing the simulator rear cover.



FIGURE 7 - FLAME SIMULATOR KIT



FIGURE 8 - FLS-FSIM-UV-IR FLAME SIMULATOR FRONT VIEW

1.5.6 Duct Mounts

Duct Mount DMX-S01

The FLS-DMX-S01 allows a standard (non-HD) detector to be mounted remotely from a potential fire source by allowing the device to look through cut hole in the side of a duct. This duct mount must be use with air shield FLS-ADS-S01

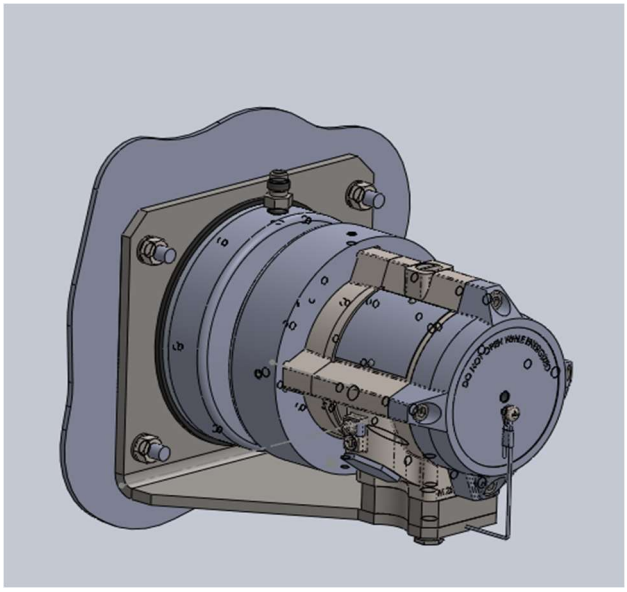


FIGURE 9 - DUCT MOUNT DMX-S01

Duct Mount DMW-S01

The FLS-DMW-S01 allows a standard detector to be mounted remotely from a potential fire source by allowing the device to look through a special sapphire window. It must be acknowledged that the detector cannot tell if this window becomes dirty and so a maintenance routine must be established to check the optical contamination of this window. Please note, the frequency of cleaning needed will vary from installation to installation. It is highly recommended therefore that a means of access be designed into the installation, as close as practicable to the assembly, for inspection and cleaning purposes.

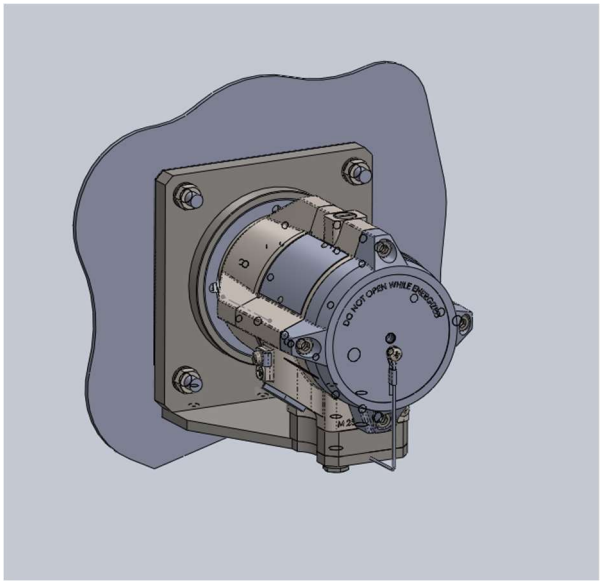


FIGURE 10 - DUCT MOUNT DMW-S01

2 Installation

This chapter does not attempt to cover all of the standard practices and codes of installation. Rather, it emphasizes specific points of consideration and provides some general rules for qualified personnel. You must always observe special safety precautions.

2.1 General Considerations

⚠ This section includes important information.

- To help obtain optimal performance, the detector should be aimed toward the center of the hazard or area to be monitored and protected ("detection zone") and have, to the extent that is required, an unobstructed view of the protected area. Whenever possible, the detector face should be tilted (aimed) down at an angle to prevent the accumulation of dust and dirt.
- Do not start an installation until the performance target, system configuration, installation location and coverage considerations have been defined by the responsible person.

To ensure optimal performance the following guidelines should be addressed:

Sensitivity

To determine the sensitivity level, the following points should be considered:

- The size of the fire to be detected at the determined distance.
- The type of flammable fuel.

Spacing and Location

Consider the following factors when determining the number of detectors and their locations in the protected area:

- The size and shape of the protected area
- The nature of the hazards, including materials stored or used and the protected objects
- The sensitivity of the detectors
- If there are any obstructed lines of sight
- The field of view of the detectors (See Figure 11 and Figure 12)

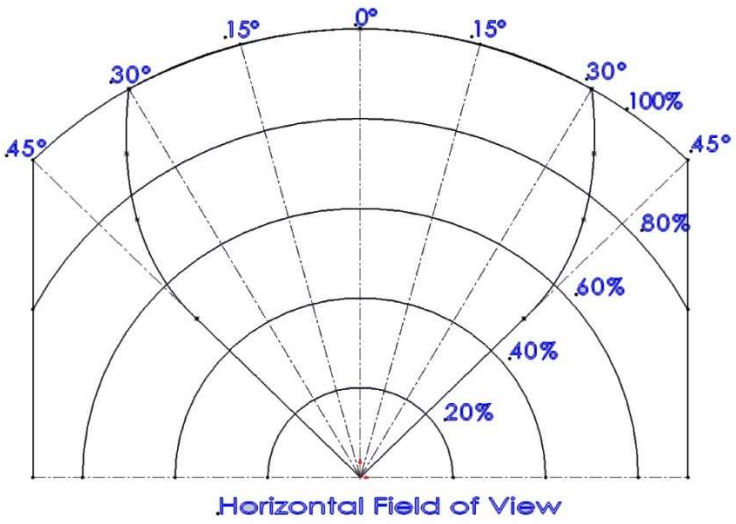


FIGURE 11 - HORIZONTAL FIELD OF VIEW

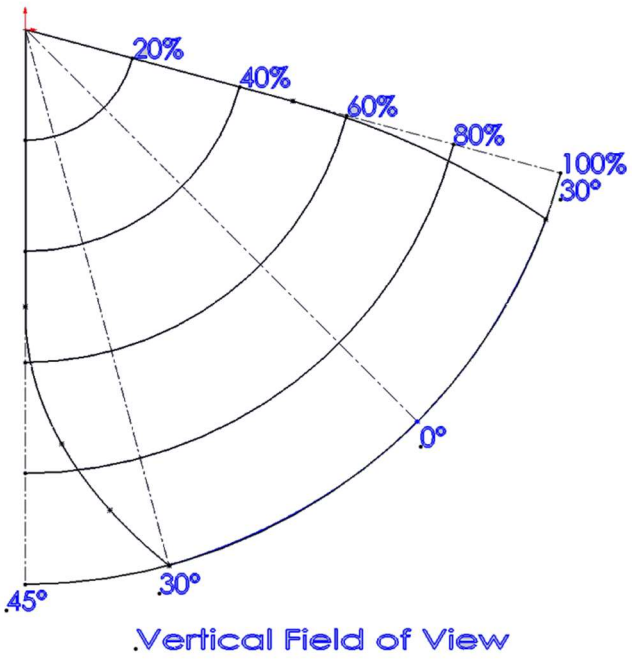


FIGURE 12 - VERTICAL FIELD OF VIEW

Environment

- Environmental conditions including but not limited to dust, snow or rain can reduce the detectors sensitivity and require additional consideration.

Hot Work

- Arc welding should not be performed within 15 ft. (5m) of the detector. It is recommended that the system be inhibited during welding operations in situations where the possibility of a false alarm cannot be tolerated.
- Gas welding requires a system inhibit, since the gas torch is an actual fire.
- Arc welding rods can contain organic binder materials in the flux that burn during the welding operation and are detectable by the device.
- Welding rods with clay binders do not burn and should not be detected. However, a system inhibit is always recommended, since the material being welded may be contaminated with organic substances (paint, oil, etc.) that will burn and may be of the size that should be detected.

2.2 Preparations for Installation

The installation must comply with national and local regulations and standards applicable to flame detectors (e.g., NFPA 72) and all local and common engineering practices. It is recommended to consult with the authority having jurisdiction.

Prior to installation:

- Make sure that you have all the components and tools required to complete the detector installation readily available before beginning installation. In cases where you cannot complete the installation in a single session, secure and seal the detectors and conduits before leaving site.
- Use color-coded conductors or suitable wire markings or labels for the wiring. You may use 14 to 17AWG (2.5 to 1mm^2) multi-strand wires for the site wiring. The selection of wire gauge should be based on the number of detectors used on the same line and the distance from the control unit, in compliance with specifications.
- Individually screen twisted pair cable is recommended for RS485 terminals.
- Use suitably rating wire for the application certification and temperatures.

2.3 Required Tools

The detector can be installed using the following tools:

Tool	Function
Hex. KEY 6 mm	Vertical alignment
Hex. KEY 10 mm	Horizontal alignment
Wrench 13 mm	Mounting the detector
Flat Screwdriver 6 mm	Ground screw connection
Flat screwdriver 3.5mm	Terminal connection

2.4 Certification Instructions

⚠ Warnings

- Do not open the detector, even when isolated, when flammable atmosphere present.
- The equipment may be used in hazardous areas with flammable gasses and vapors with apparatus groups IIC, IIB and IIA and with temperature classes T1, T2, T3, T4 and T5. See details of the explosion proof approvals in section 9.7.
- The equipment is certified for use in ambient temperatures in the range of -67°F to +167°F (-55°C to +75°C) or -67°F to +185°F (-55°C to +85°C) and should not be used in temperatures outside this range.
- Installation shall be carried out in accordance with the applicable code of practice by suitably trained personnel.

- Inspection and maintenance of this equipment shall be carried out by suitably trained personnel in accordance with the applicable code of practice.
- If the equipment is likely to come into contact with corrosive and/or other harsh substances, consult with the relevant technical persons to take suitable precautions to prevent the detector from being adversely affected, thus ensuring that the type of protection is not compromised.

  Harsh substances: For example, acidic liquids, gases, or solvents that may attack the windows, metals, seals, or polymeric materials.

  Suitable precautions: For example, regular checks as part of routine inspections or establishing from the material's data sheet that it is resistant to specific chemicals.

⚠ Specific conditions for use

- The equipment is not intended to be repaired by the user. Repair of this equipment shall be carried out by the manufacturer in accordance with the applicable code of practice.
- The flame paths are not intended for repair. Contact the manufacturer if the flame paths are damaged.
- Consult the manufacturer for genuine replacement cover and housing to connection box fasteners. M6x1x18 Hexagonal Socket head fasteners with a minimum of ISO 4762 Grade A4 Class 80 are acceptable alternatives.
- One suitably certified stopping plug is supplied with the detector.
- The external earthing connection consists of cable lug with M5x10 stainless steel screw, the terminals is suitable for connection of a wire of maximum 2.5mm^2 / 14AWG.
- The internal terminals are suitable for connection of a wire equal to or greater than the power input wiring and at a minimum of 1mm^2 / 17AWG conductor.

2.5 Mounting the Tilt Mount

The tilt mount enables the detector to be rotated up to 45 degrees (horizontal/vertical) in all directions. The following installation instructions show how to use it to support the detector from below (the preferred method).

To install the tilt mount:

a) Mount the tilt mount base (Figure 13) to a solid structure using four suitable fixings through the four 7mm (0.28") diameter holes. Four captive screws with spring washers are provided in the tilt mount.

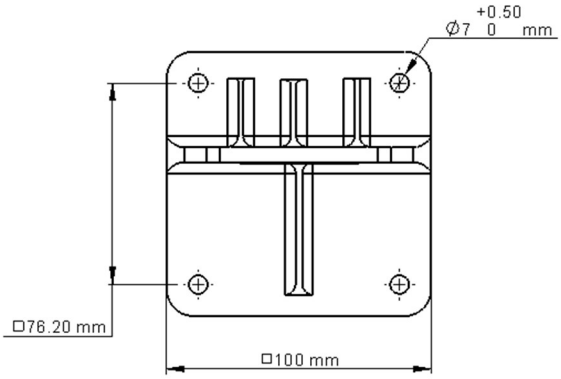


Figure 13: Tilt Mount Base - Plate View

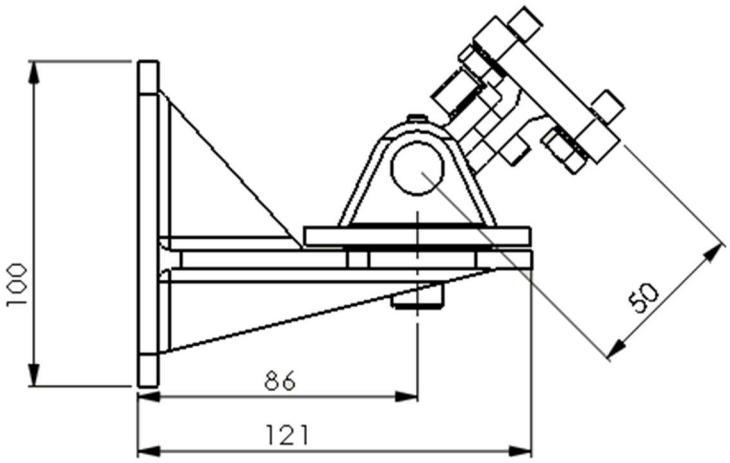


Figure 14: Tilt mount base – Side View

2.6 Mounting the detector

Referring to Figure 13, use the following steps to connect the detector to the tilt mount:

a) Place the detector, with its cable/conduit entries pointing down, on the holding plate of the tilt mount (item 2).

b) Secure the detector to the plate using the two hex screws and spring lock washers (items 3 and 4).

c) Loosen the locking screws (Items 5 and 6) in such a way that enables you to rotate the detector.

d) Point the detector towards the detection area and make certain that the view of the area is unobstructed.

e) Secure the detector in that position by tightening the locking screws (Items 5 and 6) on the tilt mount. (Make sure the detector is pointing in the correct direction).

The detector is now correctly mounted, aligned, and ready for electrical connection. Please refer to section 2.7 for wiring instructions, and section 3 for a description of the detector's configuration settings.

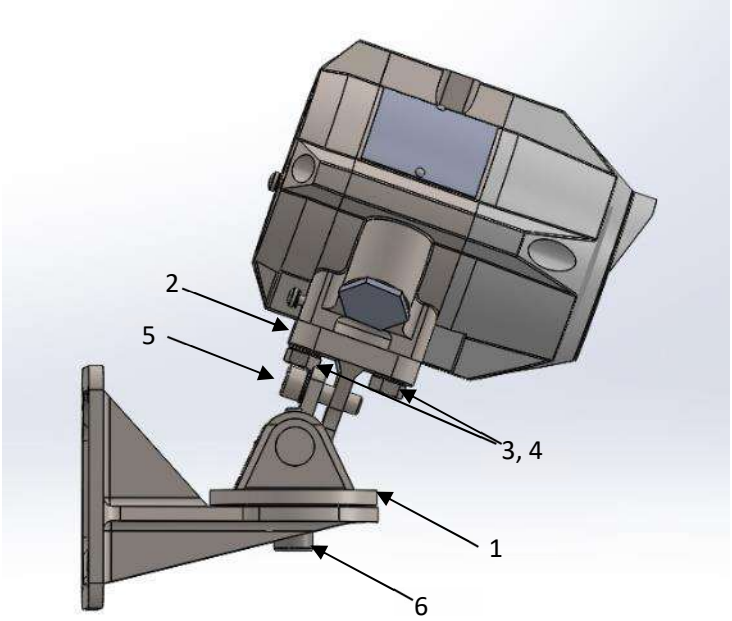


FIGURE 15 - DETECTOR ON TILT MOUNT – SIDE VIEW

ITEM NO.	ITEM NAME
1	TILT MOUNT ASSEMBLY
2	HOLDING PLATE
3,4	MOUNTING HEX SCREWS M8 AND LOCK WASHERS
5	HEX SOCKET LOCKING SCREW M8
6	HEX SOCKET LOCKING SCREW M12

2.7 Electrical Wiring

⚠ Warning

- The sensor module in the front half of the detector contains no serviceable components and should never be opened. Opening will invalidate the warranty of the detector. The terminal compartment at the back is the only part of the housing that should be opened by the user.
- The detector has 16 screw terminals as shown in the following figure and table:

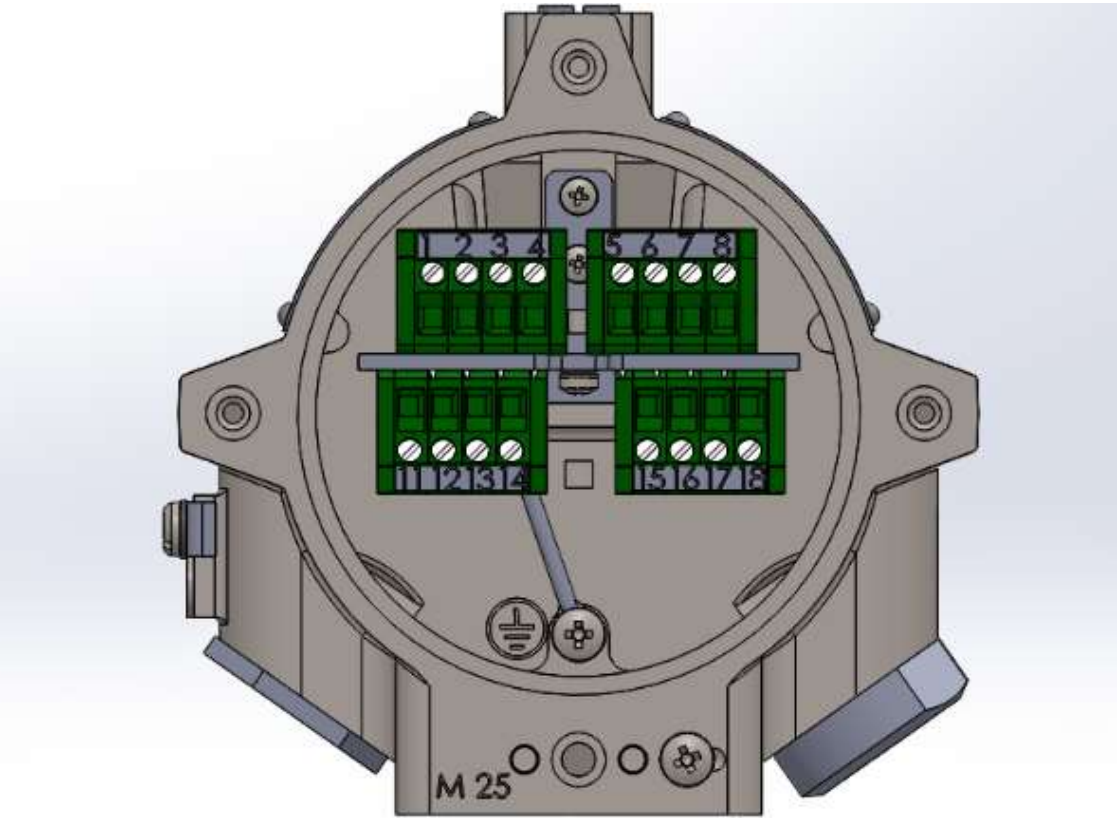


FIGURE 16 – TERMINAL VIEW

TABLE 1: TERMINAL CONNECTIONS

Pin #	Function	Description
Ground	Ground (earth)	Connected to a screw on the housing exterior.
1	24 VDC (+)	Power supply (18-32 VDC)
2	24 VDC (-)	Power supply return (0V)
3	0-20mA+ (In)	This output is used for analog 0-20 mA current output
4	0-20mA- (out)	
5	Fault Relay	A normally open SPST contact relay, that is energized (closed) when the detector is in normal operation and opens under fault condition.
6	Fault Relay COM	
7	Alarm Relay (NO)	A normally open SPST contact relay, that is open in normal operation, and closed when fire is detected. This relay can be configured to latch as described in section (3.4).
8	Alarm Relay COM	
11	24 VDC (+)	Power supply (18-32 VDC)
12	24 VDC (-)	Power supply return (0V)
13	Manual BIT activation	The manual BIT (built-in test) can be initiated by momentarily connecting this terminal and one of the "24 VDC (-)" terminals (2 or 12). See 3.10 Manual BIT – Alarm Output Test for more details.
14	Shield	This terminal should be left connected to the housing internal ground screw.
15	RS-485 (+)	RS-485 Modbus communication (also used by the "FGD Communicator" software)
16	RS-485 (-)	
17	Auxiliary Relay NO	A normally open SPST contact relay, that is open in normal operation, and closed according to the configuration used.
18	Auxiliary Relay COM	

2.8 Current Output (0-20mA) Wiring

The detector's 0-20mA current output can act as both a source or a sink transmitter and can be 3-wire or 4-wire connected.

The following drawing shows how to wire the detector to act as a current source isolated transmitter (4-wire connection):

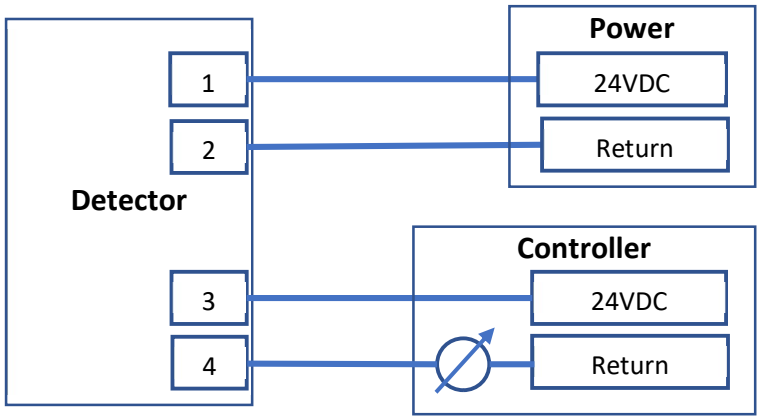


FIGURE 17 – SOURCE 4-WIRE SCHEME

The following drawing shows how to wire the detector to act as a current sink isolated transmitter (4-wire connection):

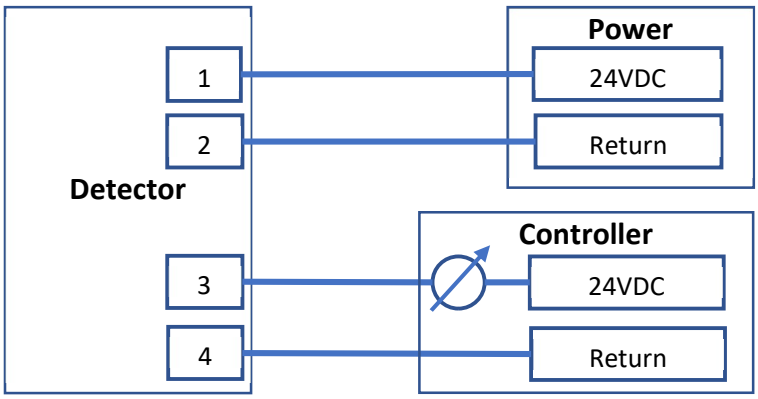


FIGURE 18 – SINK 4-WIRE SCHEME

The following drawing shows how to wire the detector to act as a current source non-isolated transmitter (3-wire connection):

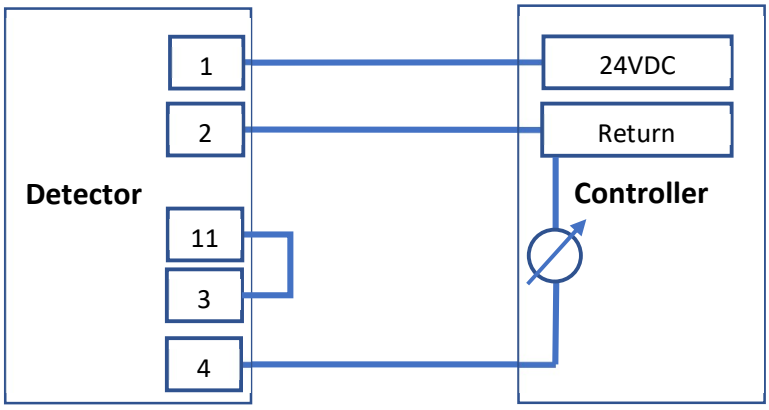


FIGURE 19 – SOURCE 3-WIRE SCHEME

Note: Link between 3 and 11 to be wired on site

The following drawing shows how to wire the detector to act as a current sink non-isolated transmitter (3-wire connection):

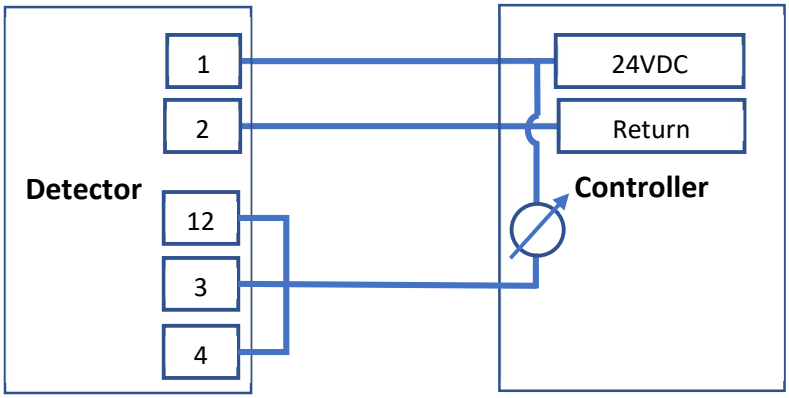


FIGURE 20 – SINK 3-WIRE SCHEME

Note: Link between 4 and 12 to be wired on site

2.9 4 Wire Relay Connection

This wiring option uses the fault and alarm relay and are connected to fire alarm panels. This connection allows to connect several detectors on 4 wires in a single loop. On the last detector there is a connected EOL resistor in the connection box. The value of the resistor depends on the control panel specification.

The number of detectors in a single loop depends on the control panels power supply capacity and length on wire width.

In fault condition, the fault relay will open the contact. The control panel will see an open loop and will report a fault.

In alarm condition, the alarm relay will close the contact and short the loop. With this configuration, the panel does not know which detector in the loop caused the alarm or fault. See figure below.

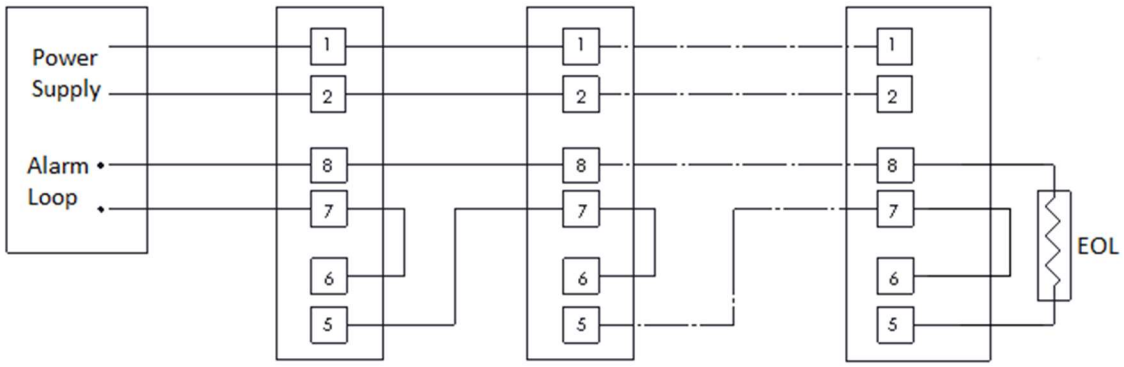


FIGURE 21 - 4 WIRE RELAY CONNECTION

2.10 RS-485 Communication Network

Using the RS-485 network capability of the detector and communicator software, it is possible to connect up to 32 detectors in an addressable system with only 4 wires (2 for power and 2 for communication). Using repeaters, the number of detectors can be much larger (32 detectors for each repeater) up to 247 on the same 4 wires. Using the RS-485 network, it is possible to read each detector's status (fault, alarm) and to initiate a BIT to each detector individually.

The detector communicates via RS-485 with a Modbus RTU compatible protocol. For more details on the communication protocol, please see manual F100P0013

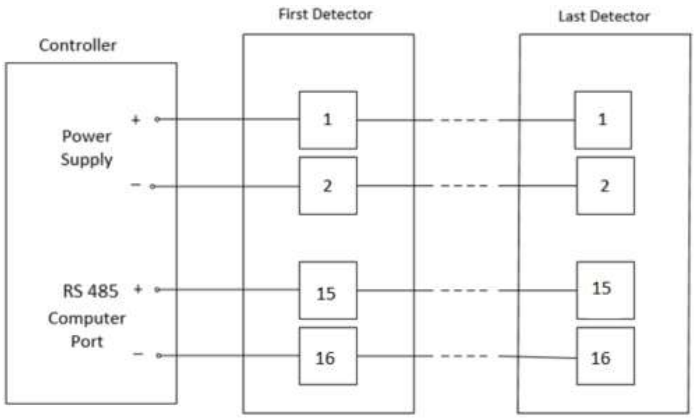


Figure 22: RS-485 Networking

2.11 Cabling Recommendations

The cable used should be appropriate for the hazardous area classification and meet local, national and company regulations.

In order to comply to EMC regulations, the cable must be shielded, and the detector grounded.

The use of industrial grade, suitably armored field cable is recommended). When using HART® communications, there are some additional considerations. In particular, low capacitance cable should be used. Further detailed information can be found at the HART® Communication Foundation's website www.hartcomm.org.

2.12 Earth/Ground Regime

Any earthing regime employed must avoid earth loops. The following information is provided to assist with proper earthing of the detector

- There is an earthing point on the outside of the detector enclosure for connection to Electrical ground

2.12.1 General recommendations

- In general, correctly engineered star earthing arrangements minimize earth current crosstalk and noise, improving the reliability and performance of instrumentation.
- The use of a single, screened / shielded cable for each field device ensures good screening / shielding and reduces crosstalk.

2.12.2 Field Cabling

- The entire length of the field cabling connected to a unit should be screened / shielded. The screen / shield should be connected to a low noise instrument earth at one end.
- The screens / shields of field cabling must not be connected in a manner that creates earth loops or that will result in the screens / shields carrying large currents from heavy plant or equipment.

2.12.3 Interference and noise

- Electrical equipment connected to the system should comply with applicable national or international EMC standards.
- Ideally, the 24 V supply reaching units should be free from large transients, fluctuations, or high frequency noise.
- In order to reduce the likelihood of radio frequency interference affecting the operation of units it is recommended that neither units nor their cabling are installed in close proximity to the antennae of high-powered radio, radar or satellite communication equipment.

3 Configuration options

Some functions of the detector can be configured using an RS-485 modem connected to a computer with the "FGD communicator" software. For details of how to download the software please contact technical support on: (+1) 714-671-8500 or via email at support@fg-detection.com

These configuration options are listed in the following table along with their factory default values.

TABLE 2: DETECTOR CONFIGURATION OPTIONS

Function	Options	Default Setting
Sensitivity	Low, Medium, High, Extreme	Medium
Ultra-fast detection	Disabled, Enabled	Disabled
Alarm Delay	0, 5, 10, 20 or 30 seconds	0 seconds (no delay)
Alarm Latch	Disabled, Enabled	Disabled
Enable Pre-Alarm 0-20mA	Disabled, Enabled	Disabled
Enable dirty window warning 0-20mA	Disabled, Enabled	Disabled
Aux. Relay	Alarm Pre-Alarm UV Detected IR Detected Dirty Window Warning	Alarm
Window Heater	Disabled, Enabled	Enabled
Modbus address	1 – 247	1
Manual BIT – Alarm Output Test	Disabled, Enabled	Disabled

- Note: Medium sensitivity setting allows detection of a 1x1ft^2 (0.1m^2) N-heptane pan fire at a distance of 50ft (15m).

3.1 Sensitivity

The detector can be configured to one of four sensitivity levels: low, medium, high, and extreme. The following table lists for each sensitivity setting the maximum distance, in which a standard fire[1] would be reliably detected.

TABLE 3: SENSITIVITY LEVELS

Sensitivity level	Detection distance in feet (meters)
Low	16 (5)
Medium	49 (15)
High	75 (23)
Extreme	98 (30)

Further details about the response characteristics of the detector at the different sensitivity settings and fuel types can be found in 10

3.2 Ultra-Fast Detection

The ultra-fast detection feature allows detection of fireballs and explosions at 5 milliseconds. If enabled, this feature is independent of other detection algorithms and alarm delays.

3.3 Alarm Delay

When a flame is detected, the flame detector delays the execution of the alarm outputs up to the configured time period. After this time delay, the detector re-evaluates the situation. If a flame is still detected the alarm outputs are activated.

3.4 Alarm Latch

If alarm latch is enabled, the detector outputs will remain active even after a flame is no longer detected. To reset the detector outputs the detector must be power cycled or a manual BIT initiated.

3.5 Enable Pre-Alarm 0-20mA

If the Pre-Alarm is enabled and Alarm Delay is greater than 0, the detector 0-20mA output will be 16mA and the red LED will blink in case of a pre-alarm fire condition.

[1] A standard fire is defined as a 1x1 ft^2 (0.1 m^2) N-heptane pan fire, with maximum wind speed of 6.5 ft/s (2 m/s).

3.6 Enable dirty window warning 0-20mA

If enabled, this feature assists predictive maintenance by indicating an alert when the BIT signal is reduced by 75% of the value needed to trigger a BIT fault failure. When activated, the milliampere output will drop to 3mA and the LED will remain steady green, it should be noted that a fire signal will override the dirty window warning. A process variable of optical contamination (BIT signal level) is accessible via HART and / or MODBUS. The value of the field ranges from 0 (clean) to 100% (BIT fault).

3.7 Auxiliary Relay

The Aux relay can be set to operate in parallel to the alarm relay, at pre-alarm level, when high IR or high UV energy is present or on “dirty window warning.

3.8 Window Heater

The detector is equipped with a heater to prevent condensation and icing on the window. If enabled, the heater is operated automatically depending on temperature.

3.9 Modbus Address

The detector can communicate with the “FGD communicator” software using a Modbus RTU compatible protocol on RS-485. This protocol allows for a network of detectors to be connected, each with a unique Modbus address. The address of the detector can be set to any value in the range 1–247.

3.10 Manual BIT – Alarm Output Test (Full loop test)

When enabled, the alarm outputs are activated when a **Manual** BIT is initiated. See section 4.2 – “Testing” for details.



WARNING

Make sure to disable all fire extinguishing actions or alarms connected to the detector when the manual BIT is initiated and the “Manual BIT – Alarm Output Test” is enabled as the Manual BIT will set the 0-20mA terminal to 20mA and close the alarm relay and auxiliary relay if configured.

4 Operation

On power up, the LED on the front of the detector flashes Yellow indicating the startup routine has begun. After approximately 30 seconds, if the startup is successful, the LED turns green, the 0-20mA output goes to 4mA and the fault relay is closed.

Detector configuration settings can be changed as described in section 2.7.

To restart the detector, turn off and then turn on the power.

4.1 Output Signals

The detector has the following output signals:

- Current output (0–20mA) with HART® 7
- Relays (Fault, Auxiliary and Alarm)
- RS-485
- Tri-color LED

TABLE 4: OUTPUT SIGNALS

	State					
State	Output	0 – 20mA	Fault Relay (NC)	Alarm Relay NO	Aux Relay (NO	LED
	Startup	1mA	Open	Open	Open	Flashing Yellow
	Fault	1mA	Open	Open	Open	Flashing Yellow
	BIT Fault	2mA	Open	Open	Open	Yellow
	Dirty Window Warning	3mA (1)	Closed	Open	Closed (2)	Green
	Normal	4mA	Closed	Open	Open	Green
	IR Radiation detected	8mA	Closed	Open	Closed (3)	Green
	UV Radiation detected	12mA	Closed	Open	Closed (4)	Green
	Pre Alarm	16mA (5)	Closed	Open	Closed (6)	Flashing red
	Fire Alarm	20mA	Closed	Closed	Closed	Red

1 – 3mA when “Enable dirty window warning 0-20mA” enabled. 4mA when “Enable dirty window warning 0-20mA” disabled.

2– Closed when “Aux Relay” set to “Dirty Window Warning”.

3– Closed when “Aux Relay” set to “IR Detected”.

4– Closed when “Aux Relay” set to “UV Detected”.

5 – 16mA when “Enable Pre-Alarm 0-20mA” enabled. 4mA when “Enable Pre-Alarm 0-20mA” disabled.

6– Closed when “Aux Relay” set to “pre-alarm”.

4.2 Testing

The detector has a Built-In-Test (BIT) capability to ensure proper operation and to indicate when the windows are dirty. The BIT process runs automatically at startup and periodically during the operation of the detector. The BIT can also be initiated manually by short circuiting the "Manual BIT" terminal and the "24 VDC (-) "terminal for one second (table 1) or by using the FGD communicator software (connected through RS-485).

In case of "Dirty Window" fault the detector may still detect flames but at a lower sensitivity.

When "Manual BIT – Alarm Output Test" feature is enabled (see section 3.10), a successful Manual BIT will activate the following alarm outputs for a few seconds:

1. The LED in the front of the detector will turn red.
2. The 0-20mA current output will be set to 20mA.
3. The alarm relay will close.



WARNING

Make sure to disable all fire extinguishing actions or alarms connected to the detector, when the manual BIT is initiated and the "Manual BIT – Alarm Output Test" is enabled, as the manual BIT will set the 0-20mA terminal to 20mA and close the alarm relay.

4.3 Flame Simulator

Flame simulators are often used by industry to perform detector testing during installation and periodic end to end testing of a flame detector alarm system. Refer to the FlameSpec Flame simulator manual F300V0020 for full instructions.

5 Maintenance

After powering up, the detector should work maintenance free. Regular checks should be in the form of a physical inspection and to periodically ensure the optical surfaces are clean (windows and reflective mirror). It is also recommended to perform a function test annually or in line with local requirements, whichever is the sooner.



WARNING

The sensor module in the front half of the detector contains no serviceable components and should never be opened. The terminal compartment at the back is the only part of the housing that should be opened by the user. Any violation of these instructions will invalidate the warranty.

5.1 Cleaning Procedure

To clean the detector:

a) Disconnect the power to the unit and disable/inhibit any extinguishing equipment that is connected to the unit.

b) Use water and detergent to clean the detector windows and underside of the reflector. Rinse with a soft cloth, cotton swab, or tissue.

c) Where dust, dirt or moisture accumulates on the window, first clean the window with a soft optical cloth and detergent, and then rinse with a clean soft cloth, cotton swab, or tissue. If contamination continues to be an issue consider using the air shield.

6 Troubleshooting

Use the table below to help troubleshoot any detector operational issues.

Detector Status	Possible Cause	Corrective Action
LEDs Off Fault Relay is open Current output at 0mA	No power to the unit	Check that the power is connected to the detector. Check power polarity. Check wiring in the detector.
Yellow LED constantly on Fault Relay is open Current output at 0mA – 1mA	Power problems	Check the voltage between the “24VDC (+)” and “24VDC (-)” terminals to verify that it is in the allowed range (see section 9.2)
Yellow LED constantly on Fault Relay is open 0−20mA at 2mA	BIT Fault	Clean detector window. Restart the detector (by turning the power off and then back on).
Green LED constantly on Fault Relay is closed 0−20mA at 3mA	Dirty Window Warning	Clean detector window. Restart the detector (by turning the power off and then back on).
Red LED constantly on Alarm Relay closed and current output is at 20mA	Detector is in alarm latch mode	Restart the detector (by turning the power off and then back on) or perform a manual BIT.
Alarm Relay closed and current output is at 20mA	Detector is exposed to a flame	Check cause of alarm. If caused by “friendly fire”, re-position the detector so that it is not affected by it.

7 Servicing

The detector contains no user serviceable parts. In the event the detector has been damaged or is deemed to not be working properly, it should be returned to the manufacturer for repair. For technical assistance and to request a returns authorization number contact technical support on: (+1) 714-671-8500 or via email at support@fg-detection.com. Refer to the detector warranty statement in section 12.

8 FGD Communicator Software

The FGD Communicator software can be used to configure and monitor the FlameSpec-UV-IR flame detector. The software communicates using Modbus over an RS-485 port to the detector. Modbus commands enable the user to configure parameters and monitor the status of the detector. For details of how to download the software and be sent a copy of the manual please contact technical support on: (+1) 714-671-8500 or via email at support@fg-detection.com.

9 Specifications

9.1 Fire Detection

- Detection time and distance:
- FLS-UV-IR:
  - 5ms - for fast fire burst or explosion
  - 1s - for 1ft^2 (0.1m^2) N-heptane pan fire at 0-50 ft (0-15m)
  - <2s - for 1ft^2 (0.1m^2) N-heptane pan fire at 50-100 ft (15-30m)
- FLS-UV-IR-F
  - 5ms - for fast fire burst or explosion
  - 1.5s - for 1ft^2 (0.1m^2) N-heptane pan fire at 0-50 ft (0-15m)
  - <3s - for 1ft^2 (0.1m^2) N-heptane pan fire at 50-100 ft (15-30m)
- Field of view: 90° Horizontal, 80° Vertical
- Time Delay: 0-30 seconds (adjustable)
- Built-in test: Automatic and Manual

9.2 Electrical Specifications

- Operating Voltage: 24 VDC nominal (18-32 VDC)
- Current Consumption:
  - Standby 120mA
  - Maximum 180mA all systems in operation (including window heater)
- Cable Entries: 2x conduit entries 3/4” 14NPT or M25x1.5; with one entry plugged with a certified stopper.
- Wiring: 14-17AWG (2.5-1.0mm^2)

9.3 Outputs

- Relays: Volt-free contacts rated 2A at 30 VDC
  - Alarm: Normally open
  - Auxiliary: Normally open
  - Fault[2]: Normally closed energized
- 0-20mA (stepped) current output: 3 wire and 4 (isolated) wire configurations (sink and source)

The 0-20 mA output at different detectors status are define at the below table.
The max load for the 0-20 mA is 500 ohm at 18-32 VDC. The 0-20 mA is sink isolated and can be configured as source.

Detector status	Output
Fault	0 mA or 1 mA ±0.1mA
BIT Fault	2 mA ±0.2mA
Dirty window warning	3 mA ±0.2mA
Normal	4 mA ±0.2mA
IR Detected	8 mA ±0.3mA
UV Detected	12 mA ±0.3mA
Pre-alarm	16 mA ±0.3mA
Alarm	20 mA ±0.3mA

- Tri-colour LED indication
- Modbus RTU compatible protocol on RS-485

9.4 Mechanical Specifications

- Size: 5.51 x 3.54× 3.54" (140×90×90mm)
- Weight:
  - Detector (Stainless Steel 316): 6.6 lbs. (3 kg)
  - Tilt mount (Stainless steel 316): 3.3 lbs. (1.5 kg)

9.5 Environmental Specifications

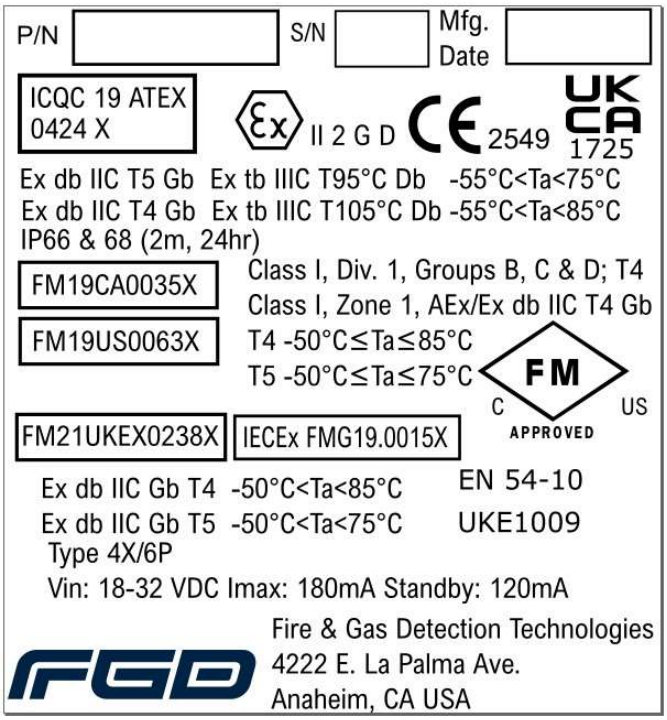
- Temperature Range:
  - Operating and storage -67°F to + 185°F (-55°C to +85°C)
- Humidity: up to 99%, non-condensing

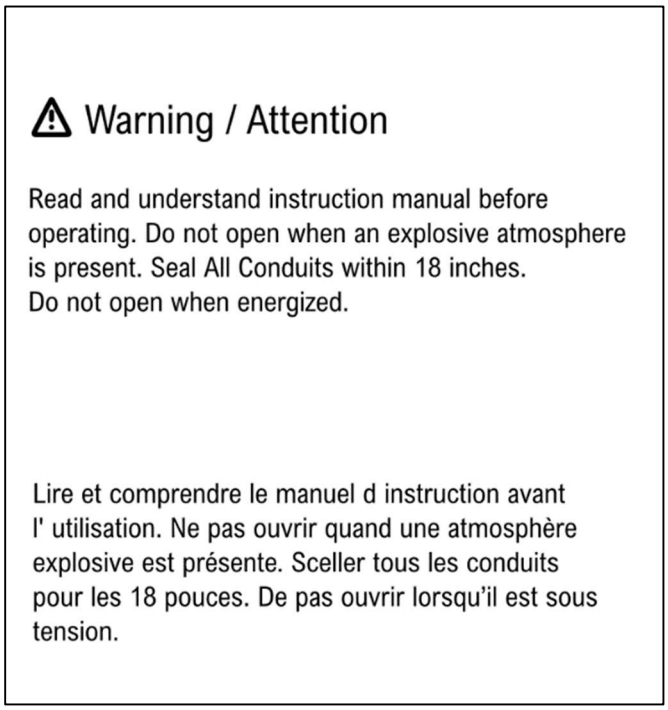
[2] The FAULT relay will normally be energized and the contact will be closed during normal operation of the detector. The contact will be open at fault condition or low voltage.

- Ingress Protection: IP66 & IP 68 (2m, 24hr); NEMA 4X & 6P

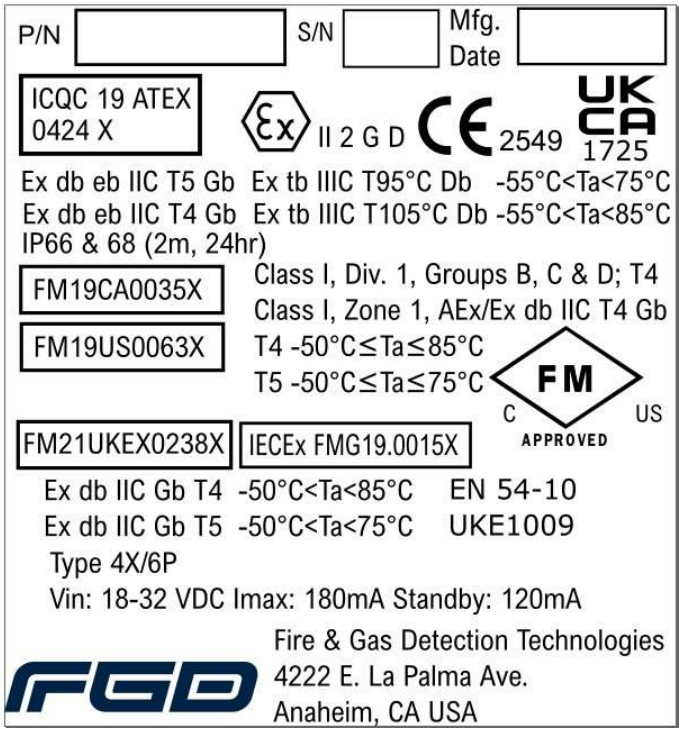
9.6 Product Labeling

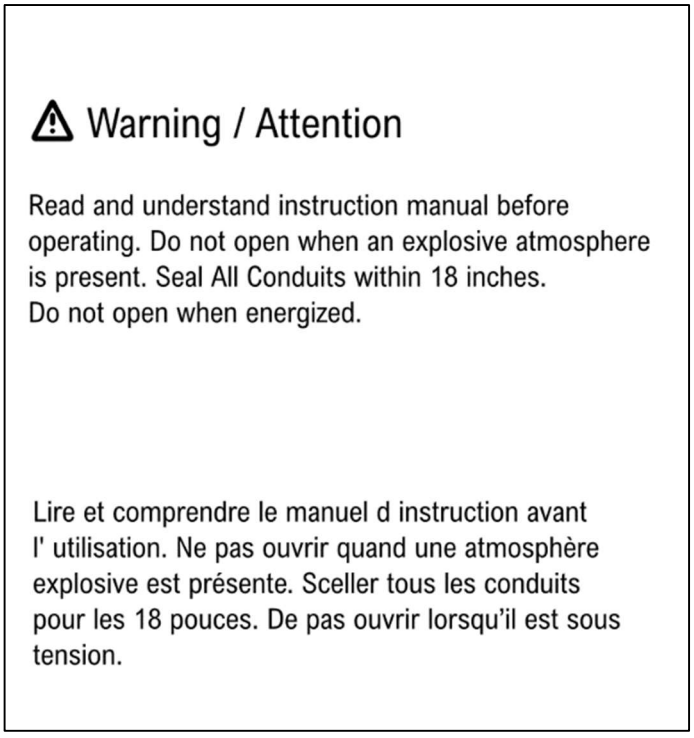
9.6.1 Ex db





9.6.2 Ex db eb


P/N
S/N
Mfg. Date
ICQC 19 ATEX 0424 X
II 2 G D
2549
UK CA 1725
Ex db eb IIC T5 Gb Ex tb IIIC T95°C Db -55°C<Ta<75°C
Ex db eb IIC T4 Gb Ex tb IIIC T105°C Db -55°C<Ta<85°C
IP66 & 68 (2m, 24hr)
FM19CA0035X
FM19US0063X
Class I, Div. 1, Groups B, C & D; T4
Class I, Zone 1, AEx/Ex db IIC T4 Gb
T4 -50°C≤Ta≤85°C
T5 -50°C≤Ta≤75°C
FM
C US
APPROVED
FM21UKEX0238X
IECEx FMG19.0015X
Ex db IIC Gb T4 -50°C<Ta<85°C EN 54-10
Ex db IIC Gb T5 -50°C<Ta<75°C UKE1009
Type 4X/6P
Vin: 18-32 VDC Imax: 180mA Standby: 120mA
Fire & Gas Detection Technologies
4222 E. La Palma Ave.
Anaheim, CA USA


⚠ Warning / Attention
Read and understand instruction manual before operating. Do not open when an explosive atmosphere is present. Seal All Conduits within 18 inches.
Do not open when energized.
Lire et comprendre le manuel d instruction avant l' utilisation. Ne pas ouvrir quand une atmosphère explosive est présente. Sceller tous les conduits pour les 18 pouces. De pas ouvrir lorsqu'il est sous tension.

9.7 Approvals

Note: All items are designed and tested to meet the relevant requirements.

- Explosion proof:
  - ATEX: II 2 G D
    Ex db IIC T5 Gb or Ex db eb IIC T5 Gb and Ex tb IIIC T95°C Db -55°C<Ta<75°C
    Ex db IIC T4 Gb or Ex db eb IIC T4 Gb and Ex tb IIIC T105°C Db -55°C<Ta<85°C
  - UKCA:
    Ex db IIC T5 Gb -50°C≤Ta≤75°C
    Ex db IIC T4 Gb -50°C≤Ta≤85°C
  - IECEx, PESO, InMetro:
    Ex db IIC T5 Gb -50°C≤Ta≤75°C
    Ex db IIC T4 Gb -50°C≤Ta≤85°C
  - FM & FMC:
    Class I, Div. 1, Groups B, C & D; T4
    Class I, Zone 1, AEx/Ex db IIC T4 Gb
    T4 -50°C≤Ta≤85°C
    T5 -50°C≤Ta≤75°C
- Performance:
  - ANSI FM 3260
  - EN 54-10
- Functional safety: Certified as SIL2 capable per IEC 61508:2010
- California Fire Marshall
- EAC CU TR

9.8 Electromagnetic Compatibility

The detector fully complies with EMC directive 2014/30/EU and protected against interference caused by RFI and EMI. The cables to the detector must be shielded and the detector must be grounded in order to comply to the EMC directive.

10 Performance FLS-UV-IR

The following tables show test results of detection distances and times for different fire scenarios. Each table lists results for a different sensitivity setting. For liquid fires the size of fire refers to the size of the pan, filled with the fuel. For gas fires the length of the plume is listed.

10.1 FLS-UV-IR-ASX1 (Standard mode)

Extreme Sensitivity

Fuel	Size	Distance Feet (m)	Average Response Time (Seconds)
N-Heptane	1 x 1 ft	98 (30)	2.0
Gasoline	2 x 2 ft	197(60)	3.3
Gasoline	1 x 1 ft	98 (30)	1.8
Methane	32-in Plume	59 (18)	1.4
LPG	32-in Plume	75 (23)	1.2
Diesel	1 x 1 ft	75 (23)	2.6
JP5	1 x 1 ft	75 (23)	3.3
Kerosene	1 x 1 ft	75 (23)	1.8
Methanol	1 x 1 ft	52 (16)	0.8
Ethanol	1 x 1 ft	62 (19)	4.1
Isopropanol	1 x 1 ft	75 (23)	2.2
Polypropylene	1 x 1 ft	49 (15)	1.4
Paper	1 x 1 ft	33 (10)	1.2
Hydrogen	32-in Plume	66 (20)	6.4
Syngas*	32-in Plume	59 (18)	3.2

High Sensitivity

Fuel	Size	Distance Feet (m)	Average Response Time (Seconds)
N-Heptane	1 x 1 ft	75 (23)	1.7
LPG	32-in Plume	56 (17)	1.6
JP5	1 x 1 ft	56 (17)	1.8
Methanol	1 x 1 ft	43 (13)	3.2

Medium Sensitivity

Fuel	Size	Distance Feet (m)	Average Response Time (Seconds)
N-Heptane	1 x 1 ft	49 (15)	1.0
Gasoline	1 x 1 ft	49 (15)	1.3
Methane	32-in Plume	30 (9)	0.9
LPG	32-in Plume	33 (10)	1.2

Diesel	1 x 1 ft	36 (11)	1.2
JP5	1 x 1 ft	36 (11)	1.2
Kerosene	1 x 1 ft	36 (11)	0.9
Methanol	1 x 1 ft	30 (9)	1.3
Ethanol	1 x 1 ft	31 (9.5)	2.9
Isopropanol	1 x 1 ft	36 (11)	0.8
Polypropylene	1 x 1 ft	23 (7)	0.9
Paper	1 x 1 ft	23 (7)	1.0
Hydrogen	32-in Plume	33 (10)	1.0
Syngas*	32-in Plume	33 (10)	1.2

*Syngas mixture: 30% volume methane (CH_4), 70% volume hydrogen (H_2)

Low Sensitivity

Fuel	Size	Distance Feet (m)	Average Response Time (Seconds)
N-Heptane	1 x 1 ft	16 (5)	1.0
LPG	32-in Plume	13 (4)	1.2
JP5	1 x 1 ft	16 (5)	1.2
Methanol	1 x 1 ft	10 (3)	2.7

10.2 False Alarm Immunity

The following table shows test results of false alarm immunity for detectors configured to “Extreme” sensitivity. For each radiation source a distance is listed. This is the minimum tested distance, from which the detectors did not alarm when exposed to the radiation source (either modulated or non-modulated).

False Stimuli only at Extreme Sensitivity

False Alarm Source	Maximum Distance in ft (m)
Sunlight, Direct, Reflected	No response at any distance
Incandescent frosted glass light, 300W	2 (0.5)
Fluorescent, 70W (3x23.3W)	2 (0.5)
Electric arc	2 (0.5)
Arc welding	10 (3)
Radiation heater, 1850W	2 (0.5)
Quartz lamp (1000W) shielded	2 (0.5)
Quartz lamp (500W) non-shielded	7 (2)
Mercury vapor lamp 160Wx3	2 (0.5)
Car Exhausts	2 (0.5)
Projector led	2 (0.5)
Solenoid bell	2 (0.5)
Soldering iron	2 (0.5)
Electric Drill	2 (0.5)

11 Performance FLS-UV-IR-F

The following tables show test results of detection distances and times for different fire scenarios. Each table lists results for a different sensitivity setting. For liquid fires the size of fire refers to the size of the pan, filled with the fuel. For gas fires the length of the plume is listed.

11.1 FLS-UV-IR-F-ASX1 (Standard mode)

Extreme Sensitivity

Fuel	Size	Distance Feet (m)	Average Response Time (Seconds)
N-Heptane	1 x 1 ft	98 (30)	3.2
Gasoline	2 x 2 ft	197(60)	5.3
Gasoline	1 x 1 ft	98 (30)	3.4
Methane	32-in Plume	59 (18)	1.6
LPG	32-in Plume	75 (23)	1.2
Diesel	1 x 1 ft	75 (23)	4.3
JP5	1 x 1 ft	75 (23)	7.0
Kerosene	1 x 1 ft	75 (23)	2.9
Methanol	1 x 1 ft	59 (18)	3.6
Ethanol	1 x 1 ft	72 (22)	4.5
Isopropanol	1 x 1 ft	75 (23)	2.8
Polypropylene	1 x 1 ft	49 (15)	1.8
Paper	1 x 1 ft	33 (10)	2.6
Syngas*	32-in Plume	66 (20)	1.0

High Sensitivity

Fuel	Size	Distance Feet (m)	Average Response Time (Seconds)
N-Heptane	1 x 1 ft	75 (23)	1.6
LPG	32-in Plume	56 (17)	1.6
JP5	1 x 1 ft	56 (17)	2.3
Methanol	1 x 1 ft	43 (13)	1.2

Medium Sensitivity

Fuel	Size	Distance Feet (m)	Average Response Time (Seconds)
N-Heptane	1 x 1 ft	49 (15)	1.4
Gasoline	1 x 1 ft	49 (15)	2.7
Methane	32-in Plume	30 (9)	0.9
LPG	32-in Plume	33 (10)	1.3
Diesel	1 x 1 ft	36 (11)	1.6
JP5	1 x 1 ft	36 (11)	1.5
Kerosene	1 x 1 ft	36 (11)	1.4
Methanol	1 x 1 ft	30 (9)	1.3
Ethanol	1 x 1 ft	31 (9.5)	1.2
Isopropanol	1 x 1 ft	36 (11)	1.4
Polypropylene	1 x 1 ft	23 (7)	1.7
Paper	1 x 1 ft	23 (7)	2.0
Syngas*	32-in Plume	33 (10)	1.2

*Syngas mixture: 30% volume methane (CH_4), 70% volume hydrogen (H_2)

Low Sensitivity

Fuel	Size	Distance Feet (m)	Average Response Time (Seconds)
N-Heptane	1 x 1 ft	16 (5)	0.9
LPG	32-in Plume	13 (4)	1.0
JP5	1 x 1 ft	16 (5)	2.6
Methanol	1 x 1 ft	10 (3)	1.1

11.2 False Alarm Immunity

The following table shows test results of false alarm immunity for detectors configured to “Extreme” sensitivity. For each radiation source a distance is listed. This is the minimum tested distance, from which the detectors did not alarm when exposed to the radiation source (either modulated or non-modulated).

False Stimuli only at Extreme Sensitivity

False Alarm Source	Maximum Distance in ft (m)
Sunlight, Direct, Reflected	No response at any distance
Incandescent frosted glass light, 300W	2 (0.5)
Fluorescent, 70W (3x23.3W)	2 (0.5)
Electric arc	2 (0.5)
Arc welding	10 (3)
Radiation heater, 1850W	2 (0.5)
Quartz lamp (1000W) shielded	2 (0.5)
Quartz lamp (500W) non-shielded	7 (2)
Mercury vapor lamp 160Wx3	2 (0.5)
Car Exhausts	2 (0.5)
Projector led	2 (0.5)
Solenoid bell	2 (0.5)
Soldering iron	2 (0.5)
Electric Drill	2 (0.5)

12 Ordering Information

Part Number	Description
Flame Detector	
FLS-UV-IR-AS11	FlameSpec UV-IR, ATEX, FMus, FMc and IECEx certified, 316 SS, M25 Entries
FLS-UV-IR -AS21	FlameSpec UV-IR, ATEX, FMus, FMc and IECEx certified, 316 SS, 3/4” NPT Entries
FLS-UV-IR -AS15	As FLS-UV-IR-AS11 but with enhanced speed of response option – NFPA33
FLS-UV-IR -AS25	As FLS-UV-IR-AS21 but with enhanced speed of response option – NFPA33
FLS-UV-IR-F-AS11	FlameSpec UV-IR-F, ATEX, FMus, FMc and IECEx certified, 316SS, M25 Entries
FLS-UV-IR-F-AS21	FlameSpec UV-IR-F, ATEX, FMus, FMc and IECEx certified, 316 SS, 3/4” NPT Entries
FLS-UV-IR-F-AS15	As FLS-UV-IR-F-AS11 but with enhanced speed of response option – NFPA33
FLS-UV-IR-F-AS25	As FLS-UV-IR-F-AS21 but with enhanced speed of response option – NFPA33
Detector Tilt Mount	
FLS-TMO-S01	FlameSpec Stainless Steel Tilt Mount
Flame Simulator Kit	
FLS-FSIM-UV-IR-KIT	UV-IR FlameSpec Flame Simulator Kit Including Carry Case, Simulator, Carrying Strap, Charger and Manual
Flame Simulator Spare Parts	
FLS-FSIM-CASE	Carrying Case
FLS-FSIM-STRAP	Carrying Strap
FLS-FSIM-TOOL	Cover Removal Tool
FLS-FSIM-ALLEN	Allen Key
FLS-FSIM-CHRGR	Power Supply and Charger
FLS-FSIM-BATT	Replacement Battery
Flame Detector Accessories	
FLS-WCO-S01	Weather Cover, Stainless Steel
FLS-PMA-S23	Pole Mounting Adaptor, Stainless Steel, for 2- and 3-inch pipes
FLS-ADS-S01	Air Shield
FLS-DMW-SO1	Duct Mount Assembly, with sapphire window.
FLS-DMX-SO1	Duct Mount Assembly, without window, use with FLS-ASD-SO1 (sold separately)
Communications	
USB/RS485	RS485 to USB Converter (for connection of detector RS485 output to PC/Laptop for use with FGD Communicator Software)

13 Warranty

FIRE & GAS DETECTION TECHNOLOGIES INC. agrees to extend to Purchaser/Distributor a warranty on the FIRE & GAS DETECTION TECHNOLOGIES INC. supplied components of the FlameSpec products. FIRE & GAS DETECTION TECHNOLOGIES INC. warrants to Purchaser/Distributor that the products are free from defects in materials and workmanship for a period of five (5) years, commencing with the date of delivery to Purchaser/Distributor. FIRE & GAS DETECTION TECHNOLOGIES INC. expressly excludes damage incurred in transit from the factory or other damage due to abuse, misuse, improper installation, lack of maintenance or "Act of God" which are above and beyond its control. FIRE & GAS DETECTION TECHNOLOGIES INC. will, upon receipt of any defective product, transportation prepaid, repair or replace it at its sole discretion if found to have been defective when shipped. Said repair or replacement is FIRE & GAS DETECTION TECHNOLOGIES INC. sole liability under this warranty and FIRE & GAS DETECTION TECHNOLOGIES INC. liability shall be limited to repair or replacement of the component found defective and shall not include any liability for consequential or other damages. The customer is responsible for all freight charges and taxes due on shipments both ways. This warranty is exclusive of all other warranties express or implied.

Appendix A

HART 7 Communications

Highway Addressable Remote Transducer (HART®) establishes digital data communication over 4-20mA Current Loop cables. The HART protocol uses FSK modulation signals superimpose at low level on top of the 4-20mA current.

The HART implementation on the FlameSpec IR3/UV-IR Flame Detector allows the Control Unit to monitor the status of the detector, settings of User Configuration and initiate field diagnostics.

The HART protocol implemented in this flame detector is corresponds to HART rev. 7.0.

It supports HART Universal commands including Common Practice and Device Specific

Commands. For more detail information see manual F110V0050

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FIRE & GAS DETECTION TECHNOLOGIES INC.

User Manual



FlameSpec Flame Simulator Family

Safety

⚠ Warnings:

- **Do not try to open, modify or repair the Flame Simulator.**
- **Inspection and maintenance of this equipment should be performed by suitable trained personnel, in accordance with the applicable code of practice, e.g. EN 60079-17.**
- **Repair of this equipment should be performed by suitable trained personnel, in accordance with the applicable code of practice, e.g. EN 60079-19. Operation must be in accordance with recognized standards of the appropriate authority in the country concerned.**
- **Certification of this equipment relies upon use of the following materials in its construction:**
  Enclosure: Aluminum 6061T6
  Window: Sapphire glass
  Seals: EPDM
- **If the equipment is likely to come into contact with aggressive substances (described below), then it is the responsibility of the user to take suitable precautions (described below) to prevent the equipment from being adversely affected. This ensures that the type of protection provided by the equipment is not compromised.**
- **Examples of aggressive substances: acidic liquids or gases that may attack metals or solvents or may affect polymeric materials. Examples of suitable precautions: routine inspections, establishing resistance to specific chemicals from the material's data sheets.**

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FlameSpec Flame Simulator Family User Manual, Dec 2023

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1 Introduction

This manual describes the FlameSpec Flame Simulator Family. The family is comprised by three different models of simulator are available for testing each type of FlameSpec Detector (IR3, IR3-H2 and UV-IR). FlameSpec Flame Simulators provide fast and convenient means for periodic flame detector and end-to-end system verification in the field without removing the detector from the location or hazardous area. Maintenance costs are therefore reduced.
FlameSpec Flame Simulators emit either IR or UV - IR radiation (according to the model) in a special electromagnetic radiation pattern which simulates a fire to the detectors. The simulators are lightweight, easy to use, with testing distances of up to 30 ft (9m), for the IR3 variants and over 42 ft (13m) for the UV-IR. The IR3 version is capable of more than 1000 activations between battery charging.
FlameSpec Flame Simulators are ATEX approved for use in hazardous Zone 1, Zone 2, Zone 21, Zone 22 areas.

Each simulator kit contains a carrying case, simulator, carrying strap, battery charger, user manual, Allen key and a tool for removing the simulator rear cover.



FIGURE 1 - FLAME SIMULATOR KIT LAYOUT

1. Strap Range Tool
2. Flame simulator
3. Carrying Strap
4. Battery Charger
5. Adaptors
6. Carrying Case

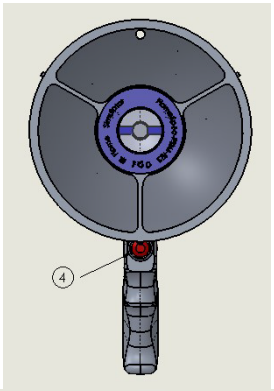
2 Operation

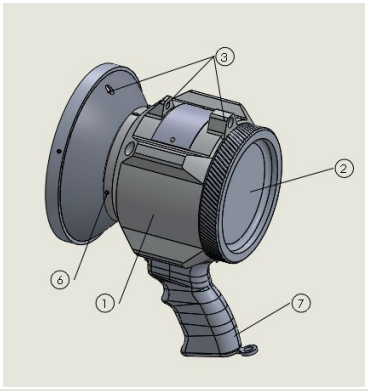
2.1 Flame simulator activation

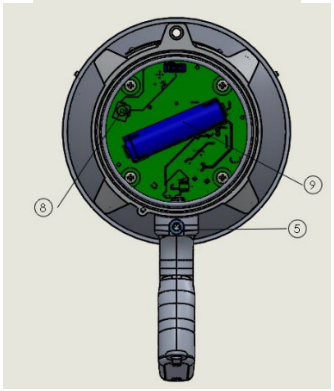
⚠ Warnings:

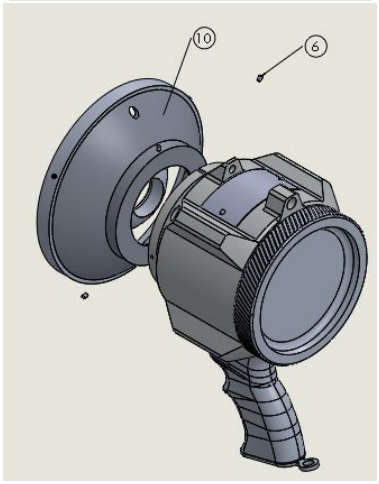
- ***Testing using a flame simulator to simulate a fire to the detector may activate alarms or extinguishing systems in the area unless disabled/inhibited/bypassed.***
- ***All tests should be coordinated, and if needed, disconnect/disable the alarm and/or the extinguishing systems before the test, and reconnect after the test.***

Flame Simulator Key Components









1. Electronic Chamber
2. Battery Cover
3. Aiming Sights
4. Push Button
5. LED Status Indicator
6. Reflector screw
7. Handle
8. Charger Input
9. Battery
10. Reflector

1. Remove simulator from the case and verify the simulator battery is charged.
2. Ensure use of the correct flame simulator model according to the detector type.
3. Make sure you are testing within the specified distance, according to the detector sensitivity. See Table 1 below.
4. Point the flame simulator at center of detector by aligning the front and back aiming sights located on the top of the simulator (3).
5. The simulator should be aimed within +/- 30^{o} from the horizontal and vertical center line axis of the detector.
6. Press the push button (4) to activate, notice the flashing green LED. Wait for the flame detector to alarm (typically 10 seconds). Go to the next detector and repeat the test.

Note: the IR3 and IR3-H2 flame simulators DO NOT emit visible light.

Note: factory default settings for Detectors sensitivity are Medium.

Simulator Kit		**FLS-FSIM-IR3-KIT**	**FLS-FSIM-IR3-H2-KIT**	**FLS-FSIM-UV-IR-KIT**
Use with Detector Model		FLS-IR3-HD	FLS-IR3-H2-HD	FLS-UV-IR-HD
		FLS-IR3	FLS-IR3-H2	FLS-UV-IR
		ft. (m)	**ft. (m)**	**ft. (m)**
Detector Sensitivity Setting	**Extreme**	30.0 (9.0)	30.0 (9.0)	42.5 (13.0)
	High	20.0 (6.0)	20.0 (6.0)	26.0 (8.0)
	Medium	10.0 (3.0)	10.0 (3.0)	20.0 (6.0)
	Low	3.3 (1.0)[1]	3.3 (1.0)[1]	6.6 (2.0)

Note [1] Remove reflector.

3. LED Status, Faults & Warnings

The flame simulator has a tri-colour LED which indicates the operational status of the simulator as described in the table below.

LED Status	Indication	Action
Flashing green	Normal operation	Ready for use
Flashing orange	Battery at medium capacity	Charge battery for 3 hours
Solid orange	Unit is in fail mode	Return for repair
Solid red	No power	Recharge/replace the battery
Off	No power	Recharge/replace the battery
Flashing green LED but simulator fails to activate detector alarm	Detector is unable to read the signal from the Simulator	1. Check you are within the specified distance from the detector according to the detector's sensitivity setting. 2. Check detector is powered and operational. 3. Check simulator window is clean. 4. Check detector window is clean, and not in fault or indicating 2mA output to the panel indicating a dirty window. **Note: Any alarm delay set in the detector will require the simulator to be aimed at the detector for that period plus up to 10 more seconds.**

3 Servicing/Maintenance

⚠ Warnings:

- ***Do not try to open, modify or repair the Flame Simulator.***
- ***Repair, inspection or maintenance of this equipment should be performed by suitable trained personnel, in accordance with the applicable code of practice, e.g., EN 60079-19. Operation must be in accordance with recognized standards of the appropriate authority in the country concerned.***
- ***Charge battery in a safe area– Battery chamber should only be opened in a non-hazardous location.***

1. Periodically, the flame simulators front window should be cleaned using a soft cloth, water and a mild detergent. Clean and dry window.
2. Always make sure the flame simulator battery is fully charged prior to use.
3. To maintain the battery life, it should be fully charged at least once in a 3-month period.
4. Replace battery only with part number FLS-FSIM-BATT.

3.1 Simulator charging

⚠ Charge battery in a safe area – Battery chamber should only be opened in a non-hazardous location.

1. Release the locking screw using the Allen key.
2. Using strap wrench tool to remove the back-battery cover (2) of simulator by unscrewing
3. Connect supplied charger to charging jack (8) and connect charger to power supply, 110-220VAC.
4. Allow to charge for at least 3 hours until the green LED on the charger is seen.
5. Disconnect charger, close back-battery cover (2) and tighten using the removal tool.
6. Close the locking screw using the Allen key.

3.2 Battery replacement

⚠ **Battery replacement in a safe area– Battery chamber should only be opened in a non-hazardous location.**

1. Release the locking screw using the Allen key.
2. Using strap wrench tool to remove the back-battery cover (2) of simulator by unscrewing.
3. Disconnect the battery connector from the PCB.
4. Remove the Battery by pulling it out from the holder.
5. Put a new Battery in place and connect the connector.
6. Connect supplied charger to charging jack (8) and connect charger to power supply, 110-220VAC.
7. Allow to charge for at least 3 hours.
8. Disconnect charger, close back-battery cover (2) and tighten using the removal tool.
9. Close the locking screw using the Allen key.

4 Specifications

4.1 Mechanical

Size	3.9 x 3.9 x 7.8 inch (100 x 100 x 200mm)
Weight	3.96lbs. (1.8Kg)
Enclosure	Painted Aluminum LM25
Ingress protection	IP65 (NEMA 4X)

4.2 Electrical

Power	Li-ion 3.7V
Maximum current	0.5A (IR models) / 0.7A (UV-IR model)
Battery capacity	> 3000mAh
Charging time	3 Hours

4.3 Environmental

Temperature	
Storage:	-4°F (-20°C) to +122°F (+50°C)
Operation:	-4°F (-20°C) to +122°F (+50°C)
Humidity:	up to 99%, non-condensing

4.4 Approvals

ATEX:
Ex II 2 G D
Ex db ib op is IIC T6 Gb
Ex tb ib op is IIIC T85°C Db
-20°C to +50°C / -4°F to +122°F

4.5 Physical Dimensions.

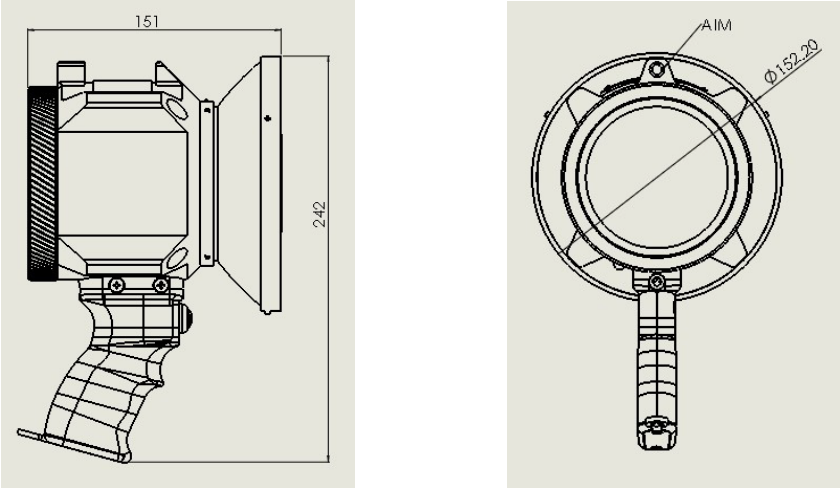


FIGURE 2 - DIMENSIONS (IN MM)

5 Ordering Information

Part Number	Description
Simulator Kits	
FLS-FSIM-IR3-KIT	FLS Flame Simulator Kit for IR3 Hydrocarbon Flame Detector. Includes Simulator in Durable Carry Case, with Carry Strap, Battery Charger, Wrench, and Allen Key.
FLS-FSIM-UV-IR-KIT	FLS Flame Simulator Kit for UV-IR Hydrocarbon/Non-Hydrocarbon Flame Detector. Includes Simulator in Durable Carry Case, with Carry Strap, Battery Charger, Wrench, and Allen Key.
FLS-FSIM-IR3-H2-KIT	FLS Flame Simulator Kit for IR3-H2 Flame Detector. Includes Simulator in Durable Carry Case, with Carry Strap, Battery Charger, Wrench, and Allen Key.
Accessories & Spares	
FLS-FSIM-CASE	FLS Durable Carry Case inc Foam Inserts
FLS-FSIM-STRAP	FLS Flame Simulator Carry Strap
FLS-FSIM-TOOL	FLS Tool / Wrench for Locking Flame Simulator Back Cover
FLS-FSIM-CHRGR	FLS Flame Simulator Battery Charger
FLS-FSIM-BATT	Replacement Battery

6 Warranty

FIRE & GAS DETECTION TECHNOLOGIES INC. agrees to extend to Purchaser/Distributor a warranty on the FIRE & GAS DETECTION TECHNOLOGIES INC. supplied components of the FlameSpec products. FIRE & GAS DETECTION TECHNOLOGIES INC. warrants to Purchaser/Distributor that the products are free from defects in materials and workmanship for a period of three (3) years, commencing with the date of delivery to Purchaser/Distributor. FIRE & GAS DETECTION TECHNOLOGIES INC. expressly excludes damage incurred in transit from the factory or other damage due to abuse, misuse, improper installation, lack of maintenance or "Act of God" which are above and beyond its control. FIRE & GAS DETECTION TECHNOLOGIES INC. will, upon receipt of any defective product, transportation prepaid, repair or replace it at its sole discretion if found to have been defective when shipped. Said repair or replacement is FIRE & GAS DETECTION TECHNOLOGIES INC. sole liability under this warranty and FIRE & GAS DETECTION TECHNOLOGIES INC. liability shall be limited to repair or replacement of the component found defective and shall not include any liability for consequential or other damages. The customer is responsible for all freight charges and taxes due on shipments both ways. This warranty is exclusive of all other warranties express or implied.

MANUAL FIRE ALARM

POS.	TAG NUMBER	SERVICE	DUTY LABEL
1	950-MFA-01101	FZ-01 MFA ACTIVATION	MANUAL FIRE ALARM ACTIVATION
2	950-MFA-01102	FZ-01 MFA ACTIVATION	MANUAL FIRE ALARM ACTIVATION
3	950-MFA-01103	FZ-01 MFA ACTIVATION	MANUAL FIRE ALARM ACTIVATION
4	950-MFA-02101	FZ-02 MFA ACTIVATION	MANUAL FIRE ALARM ACTIVATION
5	950-MFA-03101	FZ-03 MFA ACTIVATION	MANUAL FIRE ALARM ACTIVATION
6	950-MFA-03102	FZ-03 MFA ACTIVATION	MANUAL FIRE ALARM ACTIVATION
7	950-MFA-03103	FZ-03 MFA ACTIVATION	MANUAL FIRE ALARM ACTIVATION
8	950-MFA-03104	FZ-03 MFA ACTIVATION	MANUAL FIRE ALARM ACTIVATION
9	950-MFA-04101	FZ-04 MFA ACTIVATION	MANUAL FIRE ALARM ACTIVATION
10	950-MFA-04102	FZ-04 MFA ACTIVATION	MANUAL FIRE ALARM ACTIVATION
11	950-MFA-04201	FZ-04 MFA ACTIVATION - B-400 INDOOR	MANUAL FIRE ALARM ACTIVATION
12	950-MFA-04202	FZ-04 MFA ACTIVATION - B-300 INDOOR	MANUAL FIRE ALARM ACTIVATION
13	950-MFA-04203	FZ-04 MFA ACTIVATION - B-200 INDOOR	MANUAL FIRE ALARM ACTIVATION
14	950-MFA-05101	FZ-05 MFA ACTIVATION	MANUAL FIRE ALARM ACTIVATION
15	950-MFA-05102	FZ-05 MFA ACTIVATION	MANUAL FIRE ALARM ACTIVATION
16	950-MFA-05103	FZ-05 MFA ACTIVATION	MANUAL FIRE ALARM ACTIVATION
17	950-MFA-05104	FZ-05 MFA ACTIVATION	MANUAL FIRE ALARM ACTIVATION
18	950-MFA-06101	FZ-06 MFA ACTIVATION	MANUAL FIRE ALARM ACTIVATION
19	950-MFA-06102	FZ-06 MFA ACTIVATION	MANUAL FIRE ALARM ACTIVATION
20	950-MFA-06201	FZ-06 MFA ACTIVATION - B-100 INDOOR	MANUAL FIRE ALARM ACTIVATION
21	950-MFA-07101	FZ-07 MFA ACTIVATION	MANUAL FIRE ALARM ACTIVATION

PUSH BUTTON TO SIS

POS.	TAG NUMBER	SERVICE	DUTY LABEL
1	950-ASD-01101	FZ-01 ABANDON SHUTDOWN ACTIVATION	ABANDON ACTIVATION
2	950-ASD-03101	FZ-03 ABANDON SHUTDOWN ACTIVATION	ABANDON ACTIVATION
3	950-ASD-04101	FZ-04 ABANDON SHUTDOWN ACTIVATION	ABANDON ACTIVATION
4	950-ASD-06101	FZ-06 ABANDON SHUTDOWN ACTIVATION	ABANDON ACTIVATION
5	950-ASD-07101	FZ-07 ABANDON SHUTDOWN ACTIVATION	ABANDON ACTIVATION
6	950-MOB-01101	FZ-01 MAN OVER BOARD ACTIVATION	MAN OVER BOARD ACTIVATION
7	950-MOB-03101	FZ-03 MAN OVER BOARD ACTIVATION	MAN OVER BOARD ACTIVATION
8	950-MOB-04101	FZ-04 MAN OVER BOARD ACTIVATION	MAN OVER BOARD ACTIVATION
9	950-MOB-06101	FZ-06 MAN OVER BOARD ACTIVATION	MAN OVER BOARD ACTIVATION
10	950-MOB-07101	FZ-07 MAN OVER BOARD ACTIVATION	MAN OVER BOARD ACTIVATION
11	950-ESD-01101	FZ-01 ESD-1 PUSH BUTTON ACTIVATION	EMERGENCY SHUTDOWN ACTIVATION
12	950-ESD-03101	FZ-03 ESD-1 PUSH BUTTON ACTIVATION	EMERGENCY SHUTDOWN ACTIVATION
13	950-ESD-04101	FZ-04 ESD-1 PUSH BUTTON ACTIVATION	EMERGENCY SHUTDOWN ACTIVATION
14	950-ESD-06101	FZ-06 ESD-1 PUSH BUTTON ACTIVATION	EMERGENCY SHUTDOWN ACTIVATION
15	950-ESD-07101	FZ-07 ESD-1 PUSH BUTTON ACTIVATION	EMERGENCY SHUTDOWN ACTIVATION
16	950-ESDD-01101	FZ-01 ESD-1D PUSH BUTTON ACTIVATION	EMERGENCY SHUTDOWN DEPRESSURIZATION ACTIVATION
17	950-ESDD-03101	FZ-03 ESD-1D PUSH BUTTON ACTIVATION	EMERGENCY SHUTDOWN DEPRESSURIZATION ACTIVATION
18	950-ESDD-04101	FZ-04 ESD-1D PUSH BUTTON ACTIVATION	EMERGENCY SHUTDOWN DEPRESSURIZATION ACTIVATION
19	950-ESDD-06101	FZ-06 ESD-1D PUSH BUTTON ACTIVATION	EMERGENCY SHUTDOWN DEPRESSURIZATION ACTIVATION
20	950-ESDD-07101	FZ-07 ESD-1D PUSH BUTTON ACTIVATION	EMERGENCY SHUTDOWN DEPRESSURIZATION ACTIVATION

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Technical manual

Fire alarm call point - SM87 PBL

Powering Business Worldwide

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1.0 Introduction

These fire alarm call point units have been designed for use in harsh environmental conditions.

2.0 Installation

General

A red high intensity LED can be fitted for alarm indication when ordered from MEDC.

As standard the LED is not provided with over current protection. The forward current (If) should be limited to 20mA

When installing and operating explosion-protected electrical equipment, requirements for selection, installation and operation should be referred to eg. IEC 60079-14 worldwide and the 'National Electrical Code' in North America. Additional national and/or local requirements may apply.

Ensure that all nuts, bolts and fixings are secure.

Ensure that only the correct UL listed stopping plugs are used to blank off unused gland entry points and that the NEMA/IP rating of the unit is maintained.

The SM87PBL is mounted via 4 x Ø 0.354" (9mm) fixing holes in the base.

The fixing holes have been designed to accept an M8 caphead screw or bolt. MEDC recommend the use of stainless steel screws.

A red high intensity LED can be fitted for alarm indication when ordered from MEDC.

As standard the LED is not provided with over current protection. The forward current (If) should be limited to 20mA

Cable termination

Unscrew and remove the 4 off screws holding the cover assembly to the base. Keep in a safe, accessible location.

Twist the cover assembly gently clockwise and anti-clockwise, whilst pulling it away from the base. Remove to gain access to the interior of the base.

Cable termination should be in accordance with specifications applying to the application. MEDC recommend that all cables and cores should be fully identified.

Ensure that only correct UL Listed cable glands are used and that the assembly is shrouded and correctly earthed.

All cable glands should be of an equivalent NEMA/IP rating to that of the call point and integrated with the unit such that this rating is maintained.

The internal earth terminal (where fitted), must be used for the equipment grounding connection and the external terminal is for a supplementary bonding connection where local codes or authorities permit or require such a connection.

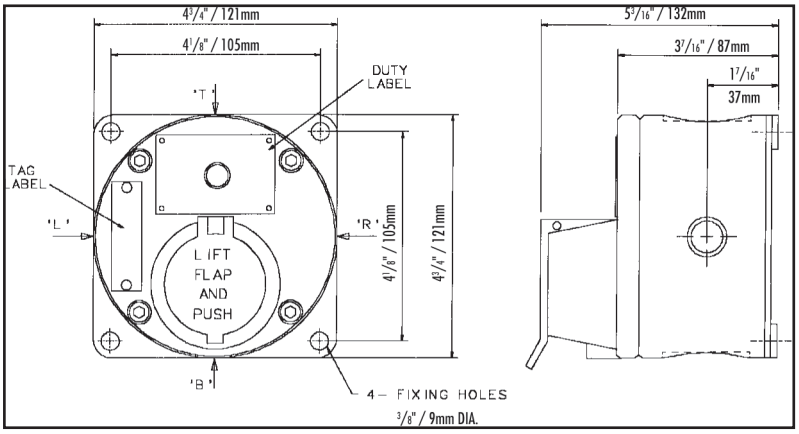
Once termination is complete, carefully push the cover assembly back onto the base, avoiding damage to the mating surfaces. Replace the 4 off screws into the holes in the cover assembly and tighten evenly, to ensure maintenance of the required gap between the cover & base.

3.0 Operation

The call point is operated by lifting the flap on the front of the unit, then depressing the stainless steel actuator underneath. The actuator remains latched in an operated position. To reset the call point, the key (provided with the unit) is inserted into the slot provided in the actuator front face and pulled back to the initial position. The key is then removed and the flap lowered.

General arrangement

All dimensions in inches and millimeters



4.0 Maintenance

During the working life of the call point, little or no maintenance is required. However, if abnormal or unusual environmental conditions occur due to plant damage or accident etc., then visual inspection is recommended.

If a fault should occur, it is recommended that the unit be returned to MEDC for repair. All parts are replaceable.

If you have acquired a significant quantity of units, it is recommended that spares are also made available. Please discuss your requirements with the Technical Sales Engineers at MEDC.

5.0 Warning statements

I. To reduce the risk of ignition of hazardous atmospheres, disconnect the equipment from the supply circuit before opening. Keep assembly tightly closed when in operation

II. To reduce the risk of ignition of hazardous atmospheres, conduit runs must have a sealing fitting connection within 18 inches of the enclosure

Avertissements

I. Afin de réduire le risque d'allumage et d'incendie dans des atmosphères dangereuses, déconnectez l'équipement du circuit d'alimentation avant de procéder à son ouverture. Maintenez l'appareil fermé hermétiquement lors de son utilisation

II. Afin de réduire le risque d'allumage et d'incendie dans des atmosphères dangereuses, les courses de conduits doivent être dotées d'un raccord d'étanchéité situé à 18 pouces ou moins du boîtier

6.0 Certification/approvals

Please refer to marking on the unit for specific approval details

- UL listed for use in USA (USL) — Class 1, Division 1, Groups C & D; Class 1, Zone 1, Groups IIA & IIB
- UL Standards — UL1203 & UL864
- Suitable for hazardous location fire-alarm applications

7.0 Certified temperature

-55°C to +55°C

-67°F to +131°F

8.0 Functional safety

Introduction

The SM87PB Call Point has been designed for use in potentially explosive atmospheres and harsh environmental conditions. The marine grade alloy or stainless enclosures are for use offshore or onshore, where light weight combined with corrosion resistance and strength is required.

The function of the call point is to raise an alarm manually once verification of a fire or emergency condition exists, by pushing the button.

The safety function of the SM87PB Call Point is to raise the alarm when the Button is pressed.

Under No fault (Normal) Operating conditions the SM87PB Push Button Unit will raise the alarm upon operating the switch via pushing the button.

Under fault conditions the failure mode of the Push Buttons is a failure to raise the alarm. For the failure rate associated with this failure mode please refer to the table below.

Assessment of functional safety

The SM87PB Call Point is intended for use in a safety system conforming to the requirements of IEC61508.

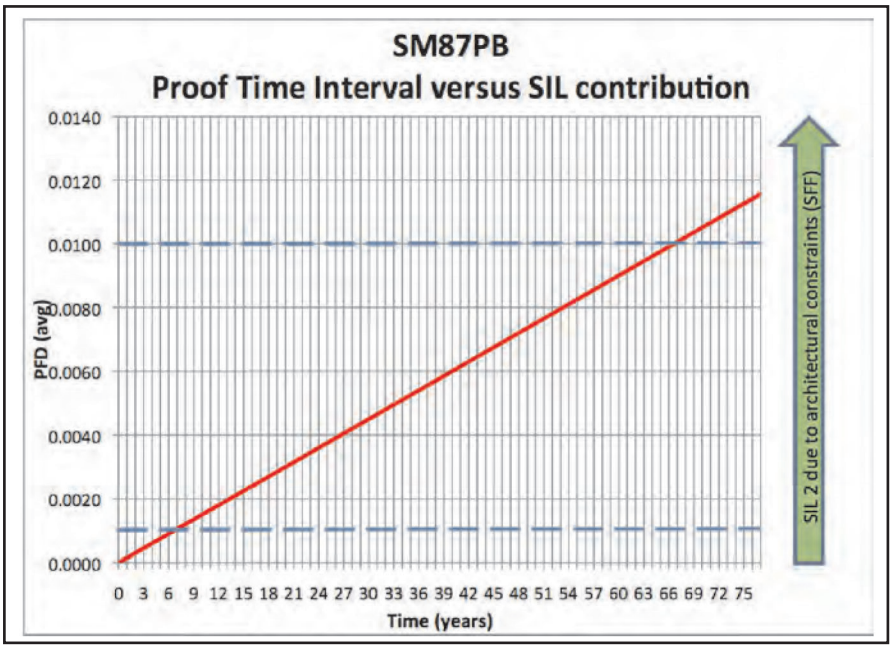
UL has conducted a Failure Modes Effect and Diagnostic Analysis (FMEDA) of the SM87PB Push Button unit against the requirements of IEC61508-2 using a proof test interval of 8760hrs.

The results are shown on the next page and are based on Route 1_H.

The Call Point is classed as a Type A device.

SM87PB Pushbutton

Safety Function of SM87PB Push Button: *'To raise the alarm upon pushing the button'*			
Architectural constraints:	Type A HFT=0 SFF= 79.7%	Proof Test Interval =8760Hrs MTTR = 8 Hrs	SIL2
Random hardware failures:	λ_{DD} = 0 λ_{DU} = 3.43E-08	λ_{SD} = 0 λ_{SU} = 1.34E-07	
Probability of failure on demand:	PFD_{AVG}=1.50E-04 (Low Demand Mode)	SIL3	
Probability of Dangerous failure on safety function:	PFH = 3.43E-08 (High Demand Mode)	SIL3	
Hardware safety integrity compliance[1]	Route 1_H		
Systematic safety integrity compliance	Route 1_S		
Systematic Capability	SC2		
Overall SIL-capability achieved	SIL 2 (Low Demand)* SIL 2 (High Demand)* *Limited to SIL 2 due to SFF value		



Conditions of safe use

The following conditions apply to the installation, operation and maintenance of the assessed equipment. Failure to observe these may compromise the safety integrity of the assessed equipment:

1. The user shall comply with the requirements given in the manufacturer's user documentation (This Safety Manual and Technical manual) in regard to all relevant functional safety aspects such as application of use, installation, operation, maintenance, proof tests, maximum ratings, environmental conditions, repair, etc;
2. Selection of this equipment for use in safety functions and the installation, configuration, overall validation, maintenance and repair shall only be carried out by competent personnel, observing all the manufacturer's conditions and recommendations in the user documentation.
3. **All information associated with any field failures of this product should be collected under a dependability management process (e.g., IEC 60300-3-2) and reported to the manufacturer.**
4. The unit should be tested at regular intervals to identify any malfunctions; in accordance with this safety manual.

GAS FLASH BEACON (AMBER)

POS.	TAG NUMBER	SERVICE	DUTY LABEL
1	950-XL-01101	FZ-01 GAS BEACON ACTIVATION	FLAMMABLE GAS ALARM
2	950-XL-02101	FZ-02 GAS BEACON ACTIVATION	FLAMMABLE GAS ALARM
3	950-XL-03101	FZ-03 GAS BEACON ACTIVATION	FLAMMABLE GAS ALARM
4	950-XL-03103	FZ-03 GAS BEACON ACTIVATION	FLAMMABLE GAS ALARM
5	950-XL-04101	FZ-04 GAS BEACON ACTIVATION	FLAMMABLE GAS ALARM
6	950-XL-04103	FZ-04 GAS BEACON ACTIVATION	FLAMMABLE GAS ALARM
7	950-XL-04201	FZ-04 GAS BEACON ACT. - B-400 INDOOR	FLAMMABLE GAS ALARM
8	950-XL-04203	FZ-04 GAS BEACON ACT. - B-300 INDOOR	FLAMMABLE GAS ALARM
9	950-XL-04205	FZ-04 GAS BEACON ACT. - B-200 INDOOR	FLAMMABLE GAS ALARM
10	950-XL-06101	FZ-06 GAS BEACON ACTIVATION	FLAMMABLE GAS ALARM
11	950-XL-06103	FZ-06 GAS BEACON ACTIVATION	FLAMMABLE GAS ALARM
12	950-XL-06201	FZ-06 GAS BEACON ACT. - B-100 INDOOR	FLAMMABLE GAS ALARM
13	950-XL-07101	FZ-07 GAS BEACON ACTIVATION	FLAMMABLE GAS ALARM

FIRE FLASH BEACON (RED)

POS.	TAG NUMBER	SERVICE	DUTY LABEL
1	950-XL-01102	FZ-01 FIRE BEACON ACTIVATION	FIRE ALARM
2	950-XL-02102	FZ-02 FIRE BEACON ACTIVATION	FIRE ALARM
3	950-XL-03102	FZ-03 FIRE BEACON ACTIVATION	FIRE ALARM
4	950-XL-03104	FZ-03 FIRE BEACON ACTIVATION	FIRE ALARM
5	950-XL-04102	FZ-04 FIRE BEACON ACTIVATION	FIRE ALARM
6	950-XL-04104	FZ-04 FIRE BEACON ACTIVATION	FIRE ALARM
7	950-XL-04202	FZ-04 FIRE BEACON ACT. - B-400 INDOOR	FIRE ALARM
8	950-XL-04204	FZ-04 FIRE BEACON ACT. - B-300 INDOOR	FIRE ALARM
9	950-XL-04206	FZ-04 FIRE BEACON ACT. - B-200 INDOOR	FIRE ALARM
10	950-XL-06102	FZ-06 FIRE BEACON ACTIVATION	FIRE ALARM
11	950-XL-06104	FZ-06 FIRE BEACON ACTIVATION	FIRE ALARM
12	950-XL-06202	FZ-06 FIRE BEACON ACT. - B-100 INDOOR	FIRE ALARM
13	950-XL-07102	FZ-07 FIRE BEACON ACTIVATION	FIRE ALARM

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Technical manual

Steady beacon - SM87LED

Powering Business Worldwide

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1.0 Introduction

These steady beacons have been designed for use in flammable atmospheres and harsh environmental conditions. The marine grade alloy or stainless steel enclosures are suitable for use offshore or onshore, where light weight combined with corrosion resistance and strength is required.

2.0 Installation

General

When installing and operating explosion-protected equipment, requirements for selection, installation and operation should be referred to e.g. IEE Wiring Regulations and the 'National Electrical Code' in North America. Additional national and/or local requirements may apply.

Ensure that all nuts, bolts and fixings are secure.

Ensure that only the correct listed or certified stopping plugs are used to blank off unused gland entry points and that the NEMA/IP rating of the unit is maintained.

The beacon is mounted via the 4 off Ø9mm fixing holes in the base of the unit. The fixing holes have been designed to accept an M8 screw or bolt.

MEDC recommend the use of stainless steel screws.

The unit has been designed and certified to operate at any attitude

Cable termination

CAUTION: Before removing the cover assembly, ensure that the power to the unit is isolated and gas and/or dust atmospheres are not present.

Unscrew the 4 off screws (5mm A/F hexagon key) holding the cover assembly to the base. Keep screws in a safe accessible place as they are not retained in the cover.

Gently twist the cover clockwise and anti-clockwise whilst pulling it away from the base of the enclosure to gain access to the interior.

Cable termination should be in accordance with specifications applying to the required application. MEDC recommends that all cables and cores should be correctly identified. Please refer to the wiring diagram provided with the product.

Ensure that only the correct listed or certified cable glands are used and that the assembly is shrouded and correctly earthed.

All cable glands should be of an equivalent NEMA/IP rating to that of the beacon and integrated with the unit such that this rating is maintained.

The internal earth terminal, where fitted, must be used for the equipment grounding connection and the external terminal is for a supplementary bonding connection where local codes or authorities permit or require such a connection.

Once termination is complete, carefully lower the cover assembly back onto the base, avoiding damage to the mating surfaces. Ensure the o-ring is correctly seated in its groove during re-assembly. Replace and evenly tighten the 4 off cover screws. Ensure the required gap (0.15mm max.) is maintained between the cover and the base.

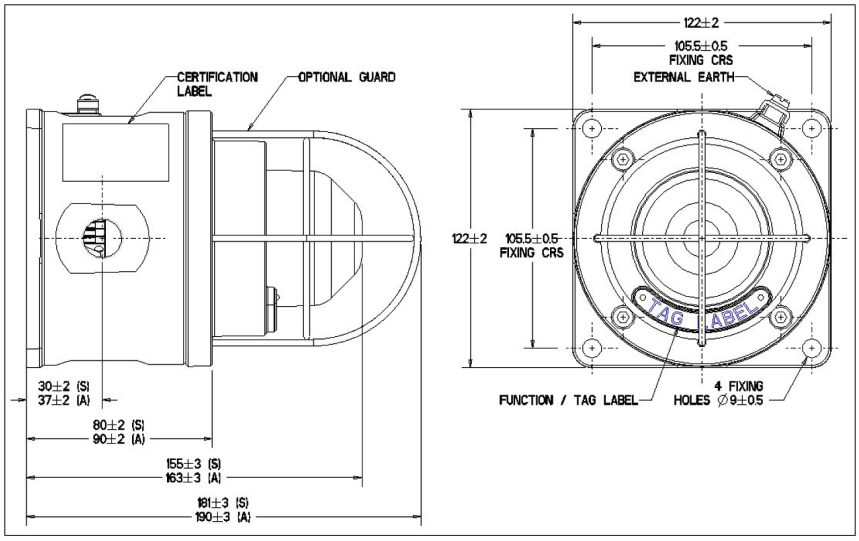
The purchaser/customer should make Eaton aware of any external effects or aggressive substances to which the equipment may be exposed.

Ensure equipment is protected from direct dust laden airflow which may cause charge transfer.

3.0 Operation

The operating voltage of the unit is stated on the certification label. The beacon can be initiated either directly or remotely depending on the type ordered. Please see the wiring documentation supplied with the unit for further information.

General arrangement



4.0 Maintenance

During the working life of the unit, it should require little or no maintenance. However, if abnormal or unusual environmental conditions occur due to plant damage or accident etc., then visual inspection is recommended.

If the unit requires cleaning, then only clean exterior with a damp cloth to avoid electro-static charge build up.

If a unit fault should occur, then the unit can be repaired by MEDC. All parts of the unit are replaceable.

If you acquired a significant quantity of units, then it is recommended that spares are also made available. Please discuss your requirements with the Technical Sales Engineers at MEDC.

Description	Part number
Cover assembly (Without lens guard fitted)	Contact MEDC
Cover assembly (With lens guard fitted)	Contact MEDC
O-ring (Alloy units)	PX99900312
O-ring (Stainless Steel units)	PX99900233
24Vdc Main PCB (Red/Amber)	PX99901003
24Vdc Main PCB (Green/Blue/Clear)	PX99901002
24Vdc Red LED Cluster	PX99900325
24Vdc Amber LED Cluster	PX99900413
24Vdc Green LED Cluster	PX99900138
24Vdc Blue LED Cluster	Contact MEDC
24Vdc Clear LED Cluster	Contact MEDC
48Vdc Main PCB	Contact MEDC
48Vdc LED Clusters	Contact MEDC
Cover screw for st. steel unit (4 off required)	PX99900584
Cover screw for alloy unit (4 off required)	PX99900818

5.0 Certification/approvals

IECEx units

Certified to IEC 60079-0, IEC 60079-1 and IEC 60079-31

Ex d unit (IEC certification No. IECEx BAS 09.0059)

Ex d IIC T55°C (-55°C to +40°C) Gb
Ex tb IIIC T55°C (-55°C to +40°C) Db IP66/IP67

or

Ex d IIC T70°C (-55°C to +55°C) Gb

Ex tb IIIC T70°C (-55°C to +55°C) Db IP66/IP67

The IECEx certificate and product label carry the IECEx equipment protection level marking

Gb
Db

Where Gb signifies suitability for use in a Zone 1 surface industries area in the presence of gas.

Where Db signifies suitability for use in a Zone 21 surface industries area in the presence of dust.

ATEX units

Certified to EN60079-0, EN60079-1 and EN60079-31

Ex d unit (ATEX certification No. Baseefa03ATEX0222)

Ex d IIC T55°C (-55°C to +40°C) Gb
Ex tb IIIC T55°C (-55°C to +40°C) Db IP66/IP67
or
Ex d IIC T70°C (-55°C to +55°C) Gb
Ex tb IIIC T70°C (-55°C to +55°C) Db IP66/IP67

The ATEX certificate and product label carry the ATEX group and category marking:

Ex II 2 GD

Where:

Ex Signifies compliance with ATEX
II Signifies suitability for use in surface industries
2 Signifies suitability for use in a zone 1 area
G Signifies suitability for use in the presence of gases
D Signifies suitability for use in the presence of dust

The ATEX certificate and product label also carry the following mark:

CE 1180

This signifies unit compliance to the relevant European directives, in this case 94/9/EC, along with the number of the notified body issuing the EC type examination certificate.

6.0 Functional safety

Introduction

The SM87LED Beacon has been designed for use in potentially explosive atmospheres and harsh environmental conditions. The marine grade alloy or stainless steel enclosures are suitable for use offshore or onshore, where light weight combined with corrosion resistance and strength is required.

The safety function of the Beacon is to provide an intermittent spherical visual warning light when the correct voltage is applied to the unit. The Beacon is designed to operate on a supply voltage tolerance of +/- 20.

The telephone initiate versions of the Beacon are not included in this safety manual.

Under No fault (Normal) Operating conditions the SM87LED Beacon will provide a spherical visual warning light when required by the system.

Under fault conditions the failure mode of the Beacon is a failure to provide a spherical visual warning light. For the failure rate associated with this failure mode please refer to the table below.

Assessment of functional safety

The SM87LED Call Point is intended for use in a safety system conforming to the requirements of IEC61508.

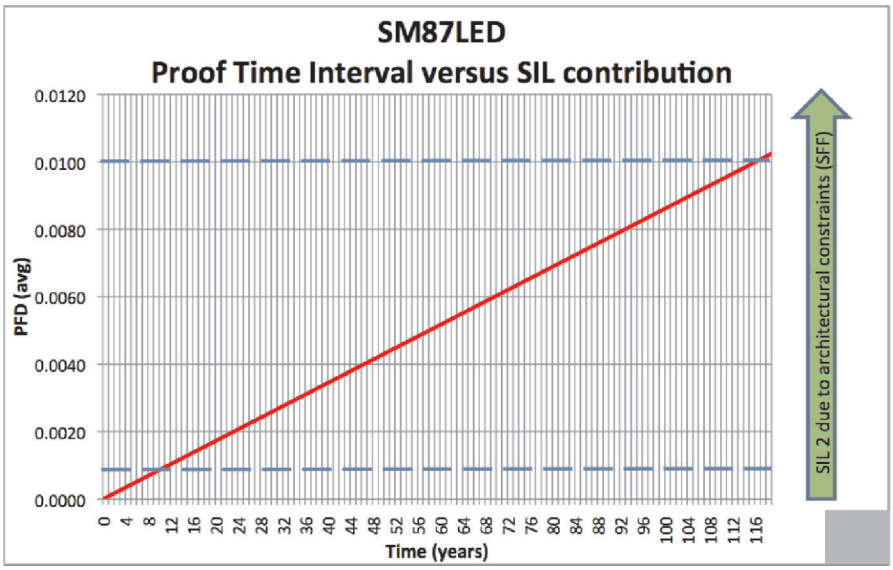
UL has conducted a Failure Modes Effect and Diagnostic Analysis (FMEDA) of the SM87LED Beacon against the requirements of IEC61508-2 using a proof test interval of 8760hrs.

The results are shown below and are based on Route 1_H

The Beacon is classed as a Type A device.

SM87LED Beacon

Safety Function of SM87LED Beacon: *'To provide a spherical visual warning light when energised'*			
Architectural constraints:	Type A HFT=0 SFF= 66%	Proof Test Interval =8760Hrs MTTR = 8 Hrs	SIL2
Random hardware failures:	λ_{DD} = 0 λ_{DU} = 1.96E-08	λ_{SD} = 0 λ_{SU} = 3.92E-08	
Probability of failure on demand:	PFD_{AVG}=8.62E-05 (Low Demand Mode)	SIL4	
Probability of Dangerous failure on safety function:	PFH = 1.96E-08 (High Demand Mode)	SIL3	
Hardware safety integrity compliance[1]	Route 1_H		
Systematic safety integrity compliance	Route 1_S		
Systematic Capability	SC2		
Overall SIL-capability achieved	SIL 2 (Low Demand)* SIL 2 (High Demand)* *Limited to SIL 2 due to SFF value		



Conditions of safe use

The following conditions apply to the installation, operation and maintenance of the assessed equipment. Failure to observe these may compromise the safety integrity of the assessed equipment:

1. The user shall comply with the requirements given in the manufacturer's user documentation (This Safety Manual and Technical manual) in regard to all relevant functional safety aspects such as application of use, installation, operation, maintenance, proof tests, maximum ratings, environmental conditions, repair, etc;
2. Selection of this equipment for use in safety functions and the installation, configuration, overall validation, maintenance and repair shall only be carried out by competent personnel, observing all the manufacturer's conditions and recommendations in the user documentation.
3. **All information associated with any field failures of this product should be collected under a dependability management process (e.g., IEC 60300-3-2) and reported to the manufacturer.**
4. The unit should be tested at regular intervals to identify any malfunctions; in accordance with this safety manual.

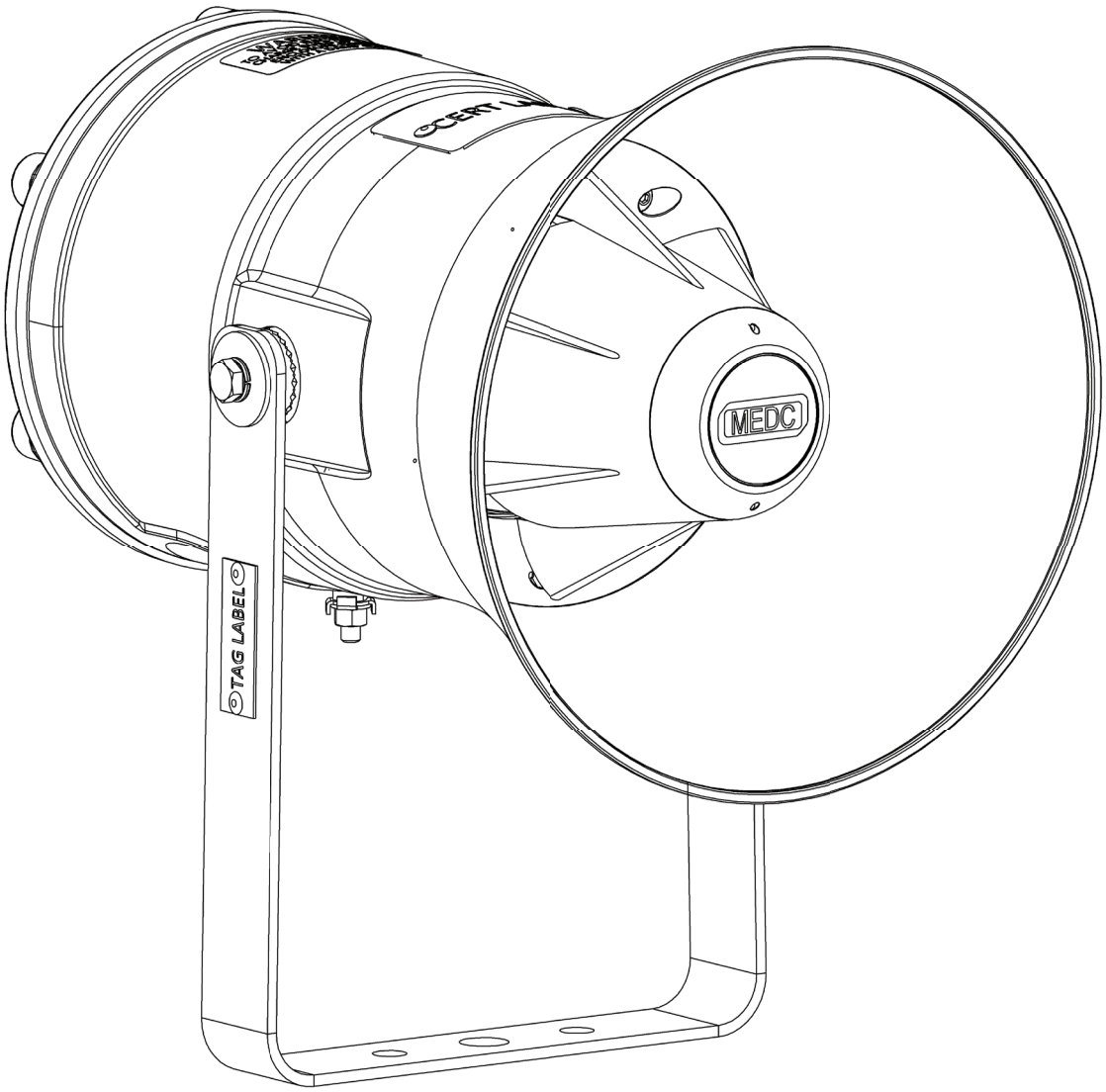
SOUNDER

POS.	TAG NUMBER	SERVICE	DUTY LABEL
1	950-XZ-01101	FZ-01 SOUNDER ACTIVATION	EMERGENCY SHUTDOWN ALARM
2	950-XZ-01102	FZ-01 SOUNDER ACTIVATION	EMERGENCY SHUTDOWN ALARM
3	950-XZ-02101	FZ-02 SOUNDER ACTIVATION	EMERGENCY SHUTDOWN ALARM
4	950-XZ-03101	FZ-03 SOUNDER ACTIVATION	EMERGENCY SHUTDOWN ALARM
5	950-XZ-03102	FZ-03 SOUNDER ACTIVATION	EMERGENCY SHUTDOWN ALARM
6	950-XZ-04101	FZ-04 SOUNDER ACTIVATION	EMERGENCY SHUTDOWN ALARM
7	950-XZ-04102	FZ-04 SOUNDER ACTIVATION	EMERGENCY SHUTDOWN ALARM
8	950-XZ-04201	FZ-04 SOUNDER ACT. - B-400 INDOOR	EMERGENCY SHUTDOWN ALARM
9	950-XZ-04202	FZ-04 SOUNDER ACT. - B-300 INDOOR	EMERGENCY SHUTDOWN ALARM
10	950-XZ-04203	FZ-04 SOUNDER ACT. - B-200 INDOOR	EMERGENCY SHUTDOWN ALARM
11	950-XZ-05101	FZ-05 SOUNDER ACTIVATION	EMERGENCY SHUTDOWN ALARM
12	950-XZ-05102	FZ-05 SOUNDER ACTIVATION	EMERGENCY SHUTDOWN ALARM
13	950-XZ-05103	FZ-05 SOUNDER ACTIVATION	EMERGENCY SHUTDOWN ALARM
14	950-XZ-05104	FZ-05 SOUNDER ACTIVATION	EMERGENCY SHUTDOWN ALARM
15	950-XZ-06101	FZ-06 SOUNDER ACTIVATION	EMERGENCY SHUTDOWN ALARM
16	950-XZ-06201	FZ-06 SOUNDER ACT. - B-100 INDOOR	EMERGENCY SHUTDOWN ALARM
17	950-XZ-07101	FZ-07 SOUNDER ACTIVATION	EMERGENCY SHUTDOWN ALARM

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Eaton MEDC technical manual

Sounder – DB3BM



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INTRODUCTION

This range of sounders, intended for use in potentially explosive gas and dust atmospheres is manufactured from either stainless steel or marine grade alloy with a rugged thermoplastic flare.

Stainless steel mounting bracket, cover screws and fixings are incorporated throughout thus ensuring a corrosion free product.

An uncertified version is available for use in non-explosive atmospheres.

GENERAL SAFETY MESSAGES AND WARNINGS

All instructions and safety messages in this manual must be followed to allow safe installation of the device. The device must only be installed and maintained by correctly trained site personnel/installers.

i. To reduce the risk of ignition of hazardous atmospheres and shock, do not apply power to the device until installation has been completed and the device is fully sealed and secured.

ii. To reduce the risk of ignition of hazardous atmospheres and shock, keep device tightly closed when the circuit is energised.

iii. Before removing the cover for installation or maintenance, ensure that the power to the device is isolated.

iv. Following installation, test the device to ensure correct operation.

v. Following installation ensure a copy of this manual is made available to all operating personnel

vi. When installing the device, requirements for selection, installation and operation should be referred to e.g. IEE Wiring Regulations and the 'National Electrical Code' in North America. Additional national and/or local requirements may also apply.

vii. Cable termination should be in accordance with the specification applying to the required application. MEDC recommends that all cables and cores should be correctly identified. Please refer to the wiring diagram in this manual (or separate diagram provided with the unit).

viii. Ensure that only the correct listed or certified cable glands are used and that the assembly is shrouded and correctly earthed.

ix. Ensure that only the correct listed or certified stopping plugs are used to blank off unused gland entry points in accordance with EN/IEC60079-14 clauses 16.3, 16.4 & 16.5 and that the NEMA/IP rating of the unit is maintained.

x. Maintain the IP rating of the unit by sealing glands in accordance with gland certification / manufacturer's instructions (i.e. use of a sealing washer or specific compound.)

xi. The internal grounding terminal shall be used for the grounding connection and the external terminal, if available, is for a supplementary bonding connection where local codes or authorities permit or require such a connection.

xii. When installing the device, MEDC recommends the use of stainless steel fasteners. Ensure that all nuts, bolts and fixings are secure.

xiii. The unit should be positioned such that debris, dust or water cannot settle in the re-entrant horn.

xiv. The unit should be positioned such that any solid object, not part of the equipment, is a minimum of 40mm from the Ex d flamepath joint.

xv. The front driver cover of the unit, situated underneath the thermoplastic main flare, which encloses the loudspeaker driver shall not be opened as it is not for field installation or maintenance use.

xvi. When the unit is used in dust atmospheres, the cable entries or blanking plugs used shall be sealed to maintain the IP6X rating, in accordance with the applicable installation codes

xvii. **WARNING** – Do not open when an explosive atmosphere is present

xviii. Cable temperature rise 30K

xix. Potential Electrostatic Charging Hazard, protect from direct airflow from exhaust ducts and the like that may cause a charge transfer. If the unit requires cleaning, only clean exterior with a damp cloth to avoid electrostatic charge build-up. Ensure the equipment is correctly earthed.

INSTALLATION

The unit is mounted via 2 off Ø9mm fixing holes in the U-shaped stirrup/mounting bracket. If required, the unit can be initially placed via the Ø13mm central hole in the stirrup. The unit can then be rotated to the required position and fixed via the other holes. If ordered with the unit, a swivel mounting bracket option is available to allow further rotational adjustment to the unit.The fixing holes have been designed to accept an M8 screw or bolt.

⚠ WARNING

The drilling of field wiring threaded entries is not permitted.

Access to Terminals

The cover is secured with 6 off M5 cover screws (4.0mm A/F hexagon key). Once the cover fixings are unscrewed, the cover can be lifted away from the enclosure to gain access to the interior. The cover fixings are captive and will remain in the cover. It is intended that the conductors used for supply and earth connections of the unit shall be 2.5mm² (14AWG) Max. For supply connections be aware that cable temperature rise may be up to 30K.

Once termination is complete, carefully replace the cover assembly back onto the body, avoiding damage to the mating surfaces. For aluminium alloy units, the enclosure/cover joints must be cleaned before replacing the cover. Tighten the cover screws evenly. Ensure the O-ring is seated correctly on the cover during re-assembly. Ensure the required maximum gap of 0.025mm is maintained between the cover and the base once assembled. To maintain the IP rating of the unit, the recommended torque on the cover screws is 3.0Nm.

Wiring details

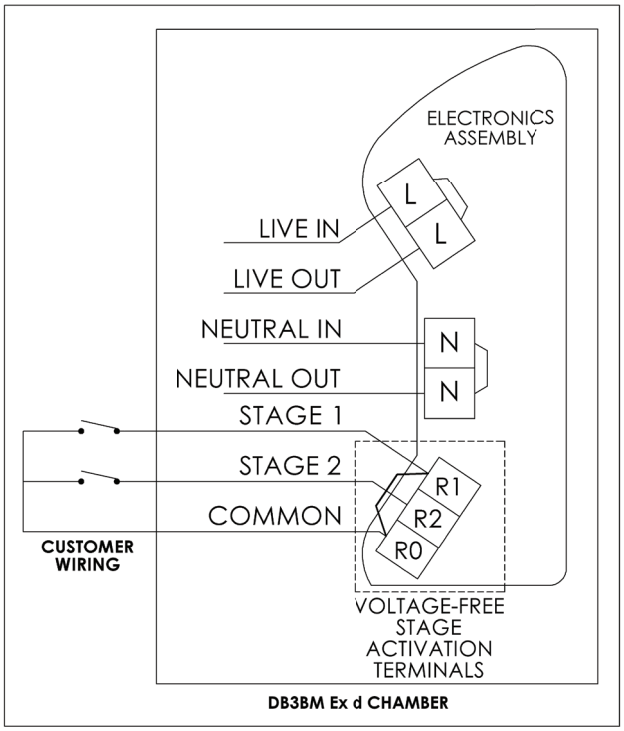
The unit is available in a number of basic configurations:

1. AC input, single stage.
2. AC input, dual stage with voltage-free stage selection.
3. DC input, up to 3 user selectable stages without monitoring.
4. DC input, up to 2 user selectable stages with EOL / monitoring (standard configuration).
5. DC input, up to 3 user selectable stages with optional EOL / monitoring (alternative configuration).
6. DC input, 5 user selectable stages with voltage free stage selection with or without monitoring.

AC input wiring details (Types 1 & 2)

- **Type 1:** Connect the live and neutral supply wires to the terminals as detailed in the wiring diagram. The unit will be supplied with the link between R1 and R0 fitted to the terminals. When power is applied to the unit, the stage 1 tone will be produced as selected on the 5- way DIP switch.
- **Type 2:** Connect the live and Neutral supply wires to the terminals as detailed in the wiring diagram. The unit will be supplied with no link fitted between R1 and R0. Connect wires and remote switches to terminals R0, R1 and R2 as shown. When power is initially applied to the unit, no tone will be produced. When the switch connected to R1 is closed, the stage 1 tone will be produced as selected by the 5-way DIP switch on the electronics assembly. When the switch connected to R2 is closed, the pre-selected tone for stage 2 is produced. See tone table 2 for details of pre-selected tones.

Note: Closing both switches will produce no tone.



DC input, 3 stage without monitoring wiring details (Type 3)

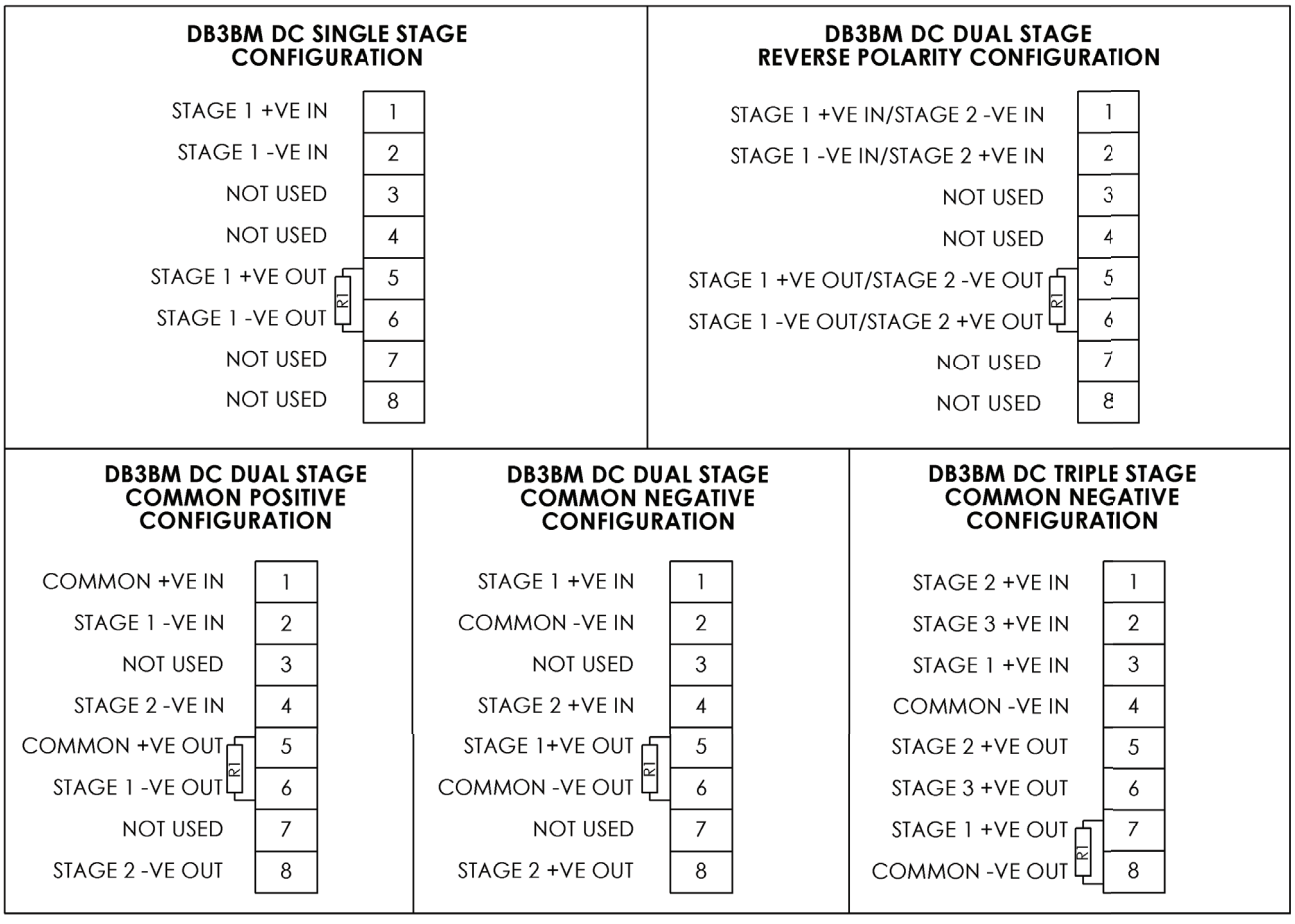
This type can be configured in a number of different ways depending on requirements. Independent tone selection for all 3 stages is via the 3 off 5-way DIP switches fitted to the electronics assembly:

- **2-wire system (Single stage):** Connect the positive and negative supply wires to the terminals as detailed in the wiring diagram.
- **2-wire system (Dual stage, reverse polarity):** Connect the positive and negative supply wires to the terminals as detailed in the wiring diagram. The second stage is produced by reversing the polarity of the supply to the unit.
- **3-wire system (Dual stage, common +ve):** Connect 3 supply wires to the terminals as detailed in the wiring diagram (1 common +ve wire and 2 -ve wires). Stage 1 is produced when power is applied across the common +ve and stage 1 -ve terminals. Stage 2 is produced when power is applied across the common +ve and stage 2 -ve terminals.
- **3-wire system (Dual stage, common -ve):** Connect 3 supply wires to the terminals as detailed in the wiring diagram (2 +ve wires and 1 common -ve wire). Stage 1 is produced when power is applied across the stage 1 +ve and common -ve terminals. Stage 2 is produced when power is applied across the stage 2 +ve and common -ve terminals.
- **4-wire system (Triple stage, Common -ve):** Connect 4 supply wires to the terminals as detailed in the wiring diagram (3 +ve wires and 1 common -ve wire). Stage 1 is produced when power is applied across the stage 1 +ve and common -ve terminals. Stage 2 is produced when power is applied across the stage 2 +ve and common -ve terminals. Stage 3 is produced when power is applied across the stage 3 +ve and common -ve terminals.

All versions are supplied with terminals to allow loop-in loop-out connection of the supply wires

Note: If an EOL resistor is specified on a DC unit, it will be fitted as standard across terminals 5 & 6 in the Exd chamber (see below. Re-position EOL as required for other configurations.

When positioning the EOL, ensure there is a minimum of 14mm free space between the resistor body and terminal block and ensure the resistor is not in contact with the PCB or housing.

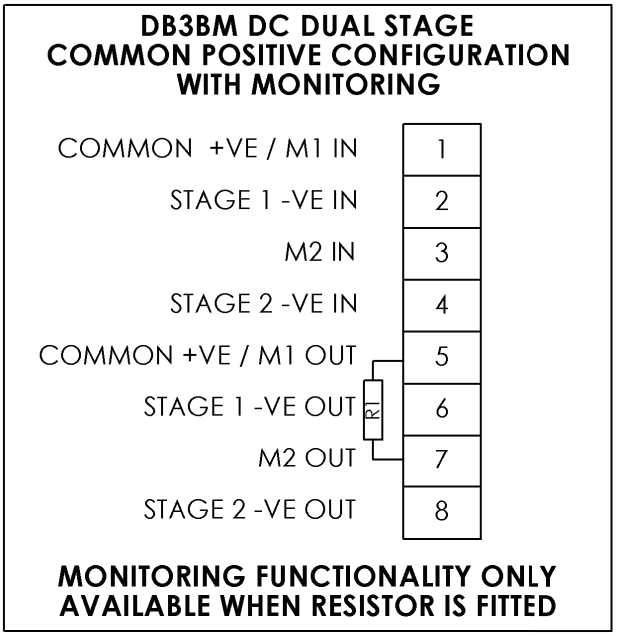


DC input, dual stage common +ve with monitoring (standard configuration) wiring details (Type 4)

Connect up to 4 supply wires to the terminals as detailed in the wiring diagram. Stage 1 is produced when power is applied across the common +ve and stage 1 -ve terminals. Stage 2 is produced when power is applied across the common +ve and stage 2 -ve terminals.

Monitoring functionality is obtained when the supply is connected across M1 & M2 terminals.

Note: monitored terminals are not polarity dependent



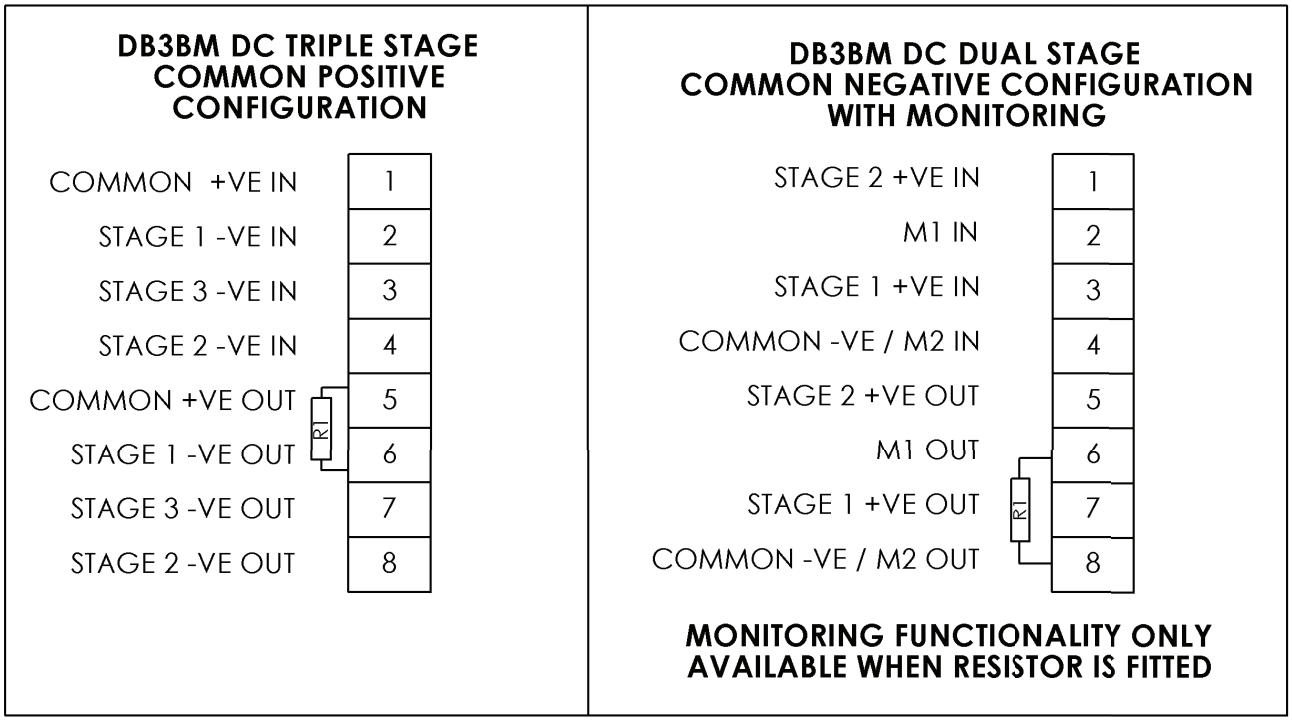
DC input, up to 3 stage with or without monitoring (alternative configuration) wiring details (Type 5)

Note: This alternative configuration must be specified when ordering the unit.

This type can be connected either as a three stage common –ve configuration, or if an optional EOL is specified if can be configured as a dual stage common –ve system with monitoring.

- 4-wire system (Triple stage, Common +ve): Connect 4 supply wires to the terminals as detailed in the wiring diagram (1 common +ve wire and 3 -ve wires). Stage 1 is produced when power is applied across the common +ve and stage 1 -ve terminals. Stage 2 is produced when power is applied across the common +ve and stage 2 -ve terminals. Stage 3 is produced when power is applied across the common +ve and stage 3 -ve terminals.
- 4-wire system (Dual stage, common –ve with monitoring): Connect up to 4 supply wires to the terminals as detailed in the wiring diagram. Stage 1 is produced when power is applied across the common -ve and stage 1 +ve terminals. Stage 2 is produced when power is applied across the common -ve and stage 2 +ve terminals.
  Monitoring functionality is obtained when the supply is connected across M1 & M2 terminals.

Note: monitored terminals are not polarity dependent

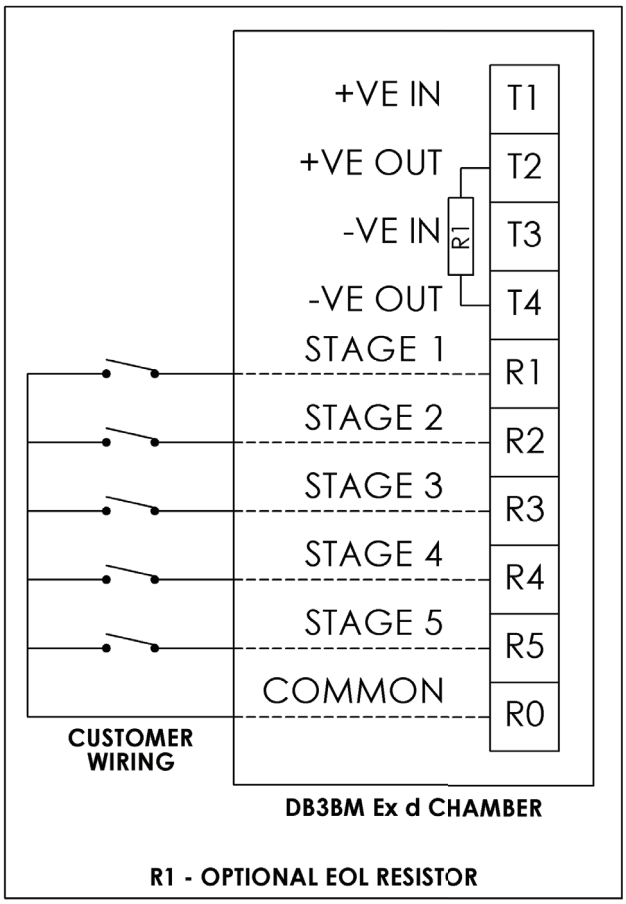


DC input with voltage free stage activation wiring details (Type 6)

Connect the positive (+ve) and negative (-ve) supply wires to the terminals as detailed in the wiring diagram. When power is applied to the unit, no tone will be produced initially. Connect wires and remote switches to terminals R0 to R5 as shown. When the switch connected to R1 is closed, the stage 1 tone will be produced as selected by the 5-way DIP switch on the electronics assembly. When any of the other switches connected to R2 to R5 is closed, the pre-selected tone for stages 2 to 5 are produced. See tone table 2 for details of pre-selected tones.

Note: Closing more than one switch at a time will result in no tone being produced.

If a resistor (R1) is fitted, monitoring functionality is obtained when the supply polarity is reversed.



OPERATION

The sounder is available in various AC input voltage versions and a single DC input voltage version.

For AC versions, the nominal operating voltage is stated on the unit label and the supply voltage tolerance is ±10%.

For DC versions, the absolute input voltage range is 11.0Vdc to 57.6Vdc.

If using End of line resistors the power dissipation must limited to a maximum of 3 Watts

The unit is fitted with a volume control which is positioned on the top face of the electronics assembly PCB. Maximum volume is obtained when this control is turned fully clockwise. When turned fully anti-clockwise the unit will emit no sound.

⚠ WARNING

Do not attempt to turn the volume control past its limits of movement as this may cause damage to the unit.

⚠ WARNING

The unit has a certified upper operating temperature limit of +85°C, however continuous operation is not recommended in ambient temperatures above +70°C.

Stages:

For all versions, a 5-way DIP switch selects the stage required for each stage. The settings for the standard stages are shown in the table below:

Tone table 1:

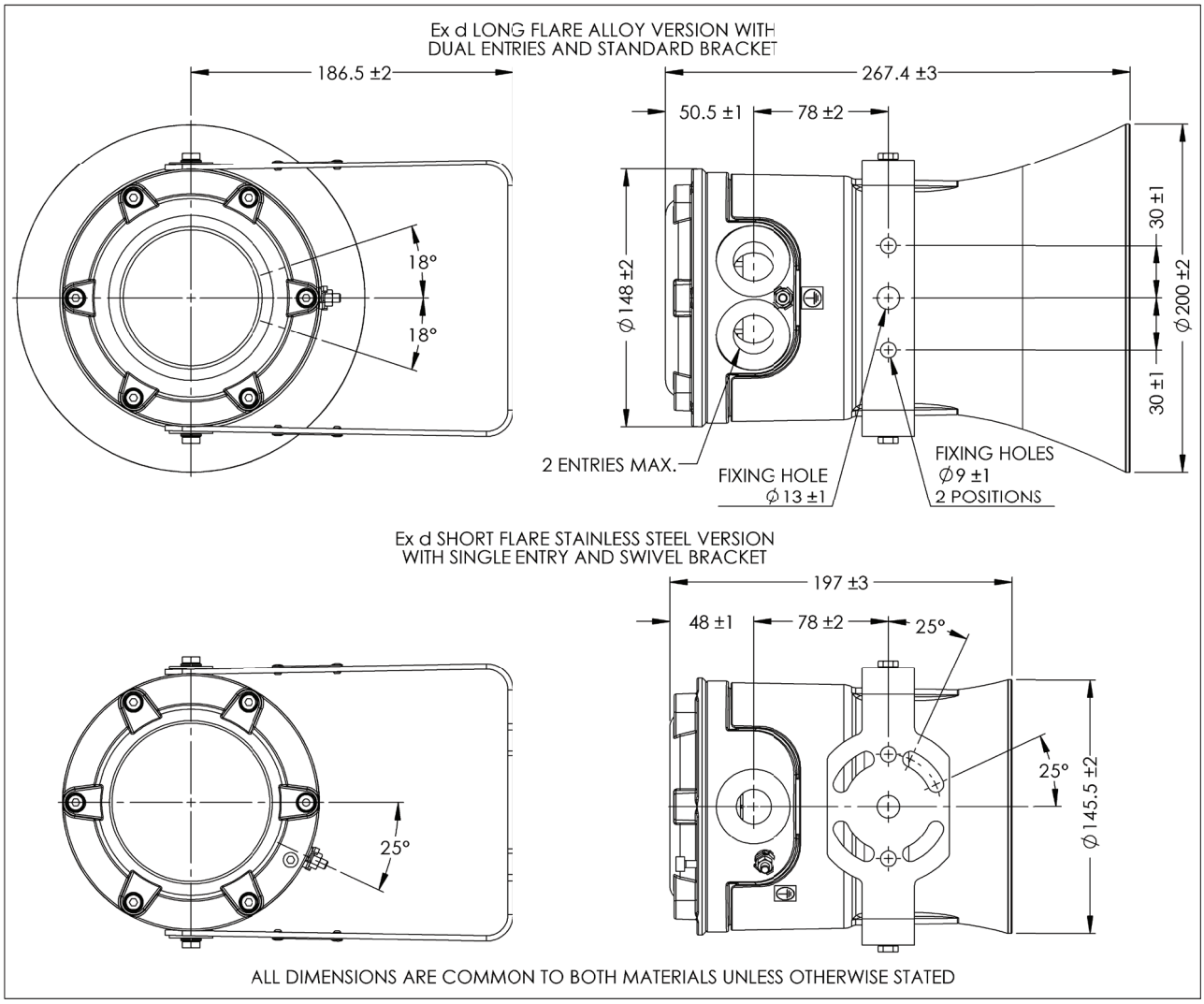
Tone No.	Tone Frequency / Description	Switch Setting 12345	Tone Description	Nominal Spl (Db(A) @ 1m)
1	Alt Stages 800/970 Hz at 1/4 sec	11111		110
2	Sweeping 800/970 Hz at 7 Hz	11110	Fast Sweep (LF)	108
3	Sweeping 800/970 Hz at 1 Hz	11101	Medium Sweep (LF)	110
4	Continuous at 2850 Hz	11100		104
5	Sweeping 2400-2850 Hz at 7 Hz	11011	Fast Sweep	107
6	Sweeping 2400-2850 Hz at 1 Hz	11010		109
7	Slow Whoop	11001	Slow Whoop	110
8	Sweep 1200-500 Hz at 1 Hz	11000	Din Stage	110
9	Alt Stages 2400/2850 Hz at 2 Hz	10111		107
10	Int Stage of 970 Hz at 1 Hz	10110	Back-up Alarm (LF)	111
11	Alt Stages 800/970 Hz at 7/8 Hz	10101		109
12	Int Stage at 2850 Hz at 1Hz	10100	Back-up Alarm (HF)	105
13	970 Hz at 1/4 sec on 1 sec off	10011		110
14	Continuous at 970 Hz	10010		110
15	554 Hz for 0.1S/440 Hz for 0.4S	10001	French Fire Sound	104
16	Int 660 Hz 150 mS on 150 mS off	10000	Swedish Fire Alarm	104
17	Int 660 Hz 1.8 sec on 1.8 sec off	01111	Swedish Fire Alarm	104
18	Int 660 Hz 6.5 sec on 13 sec off	01110	Swedish Fire Alarm	104
19	Continuous 660 Hz	01101	Swedish Fire Alarm	105
20	Alt 554/440 Hz at 1 Hz	01100	Swedish Fire Alarm	104
21	Int 660 Hz at 7/8 Hz	01011	Swedish Fire Alarm	105
22	Int 2850 Hz 150 mS on 100 mS off	01010	Pelican Crossing	104
23	Sweep 800-970 Hz at 50 Hz	01001	Low Freq. Buzz	108
24	Sweep 2400 -2850 Hz at 50 Hz	01000	High Freq. Buzz	108
25	3x970 Hz pulses 0.5 off, 1.5 off	00111		111
26	3x2850 Hz pulses 0.5on/0.5off, 1.5 off	00110		105
27	Int 3100 Hz 0.32s on/0.68s off	00101		104
28	Continuous 1400 Hz	00100		113
29	Spare / Custom tone	00011		
30	Spare / Custom tone	00010		
31	Spare / Custom tone	00001		
32	Spare / Custom tone	00000		

Note: If special tones were requested at the time of ordering, please see the separate tones list supplied with the unit for details of these special tones and their respective switch settings.

Tone table 2:

Tone No.	Tone Frequency / Description	Switch Setting 12345	Voltage free stage selection tone No.				
			DC				AC
Stage 1			Stage 2	Stage 3	Stage 4	Stage 5	Stage 2
1	Alt Tones 800/970Hz at 1/4 sec	11111	T14	T10	T11	T8	T14
2	Sweeping 800/970Hz at 7 Hz	11110	T14	T10	T1	T8	T14
3	Sweeping 800/970Hz at 1 Hz	11101	T14	T10	T1	T8	T14
4	Continuous at 2850Hz	11100	T14	T10	T1	T8	T14
5	Sweeping 2400-2850Hz at 7Hz	11011	T14	T10	T1	T8	T14
6	Sweeping 2400-2850Hz at 1Hz	11010	T14	T10	T1	T8	T14
7	Slow Whoop	11001	T14	T10	T1	T8	T14
8	Sweep 1200-500Hz at 1Hz	11000	T14	T10	T1	T6	T14
9	Alt Tones 2400/2850Hz at 2Hz	10111	T14	T10	T1	T8	T14
10	Int Tone of 970Hz at 1Hz	10110	T14	T12	T1	T8	T14
11	Alt Tones 800/970Hz at 7/8Hz	10101	T14	T10	T1	T8	T14
12	Int Tone at 2850Hz at 1Hz	10100	T14	T10	T1	T8	T14
13	970Hz at 1/4 sec on 1 sec off	10011	T14	T10	T1	T8	T14
14	Continuous at 970Hz	10010	T28	T10	T1	T8	T28
15	554Hz for 0.1S/440Hz for 0.4S	10001	T14	T10	T1	T8	T14
16	Int 660Hz 150 mS on 150 mS off	10000	T14	T10	T1	T8	T14
17	Int 660Hz 1.8 sec on 1.8 sec off	01111	T14	T10	T1	T8	T14
18	Int 660Hz 6.5 sec on 13 sec off	01110	T14	T10	T1	T8	T14
19	Continuous 660Hz	01101	T14	T10	T1	T8	T14
20	Alt 554/440Hz at 1Hz	01100	T14	T10	T1	T8	T14
21	Int 660Hz at 7/8Hz	01011	T14	T10	T1	T8	T14
22	Int 2850Hz 150 mS on 100 mS off	01010	T14	T10	T1	T8	T14
23	Sweep 800-970Hz at 50Hz	01001	T14	T10	T1	T8	T14
24	Sweep 2400-2850Hz at 50Hz	01000	T14	T10	T1	T8	T14
25	3x970Hz pulses 0.5 off, 1.5 off	00111	T14	T10	T1	T8	T14
26	3x2850Hz pulses 0.5on/0.5off, 1.5 off	00110	T14	T10	T1	T8	T14
27	Int 3100Hz 0.32s on/0.68s off	00101	T14	T10	T1	T8	T14
28	Continuous 1400Hz	00100	T14	T10	T1	T8	T14
29	Spare / Custom tone	00011					
30	Spare / Custom tone	00010					
31	Spare / Custom tone	00001					
32	Spare / Custom tone	00000					

GENERAL ARRANGEMENT



MAINTENANCE

During the working life of the unit, it should require little maintenance however; if abnormal or unusual environmental conditions occur due to plant damage or accident etc., then visual inspection is recommended.

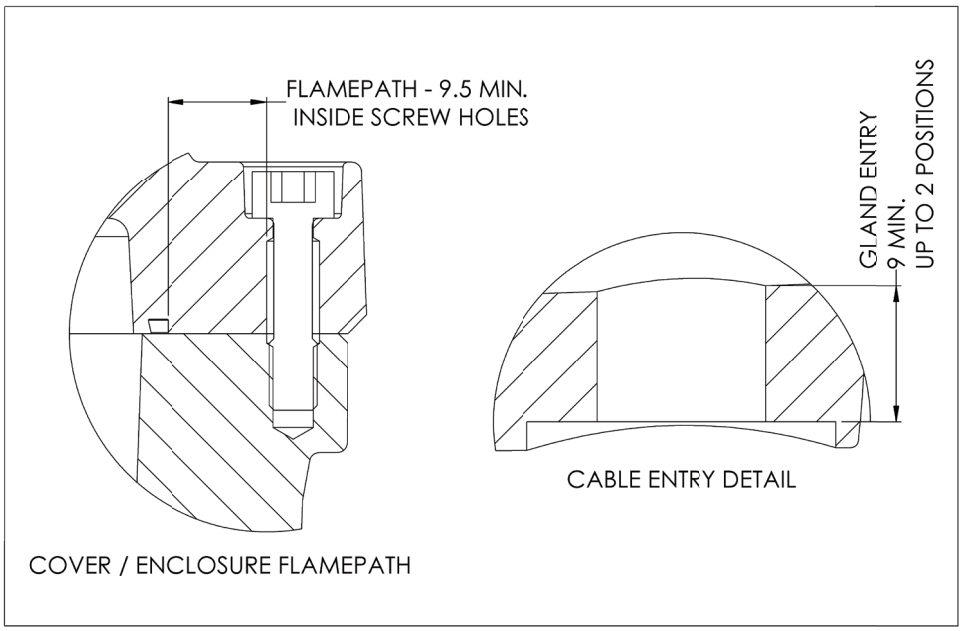
⚠ WARNING

The front driver cover of the unit, situated underneath the thermoplastic main flare, which encloses the loudspeaker driver shall not be opened as it is not for field installation or maintenance use.

See below diagram for details of the flameproof joints found in the unit.

⚠ WARNING

The flameproof joints details below are not intended to be repaired.



Corrosion inhibiting grease, such as petrolatum or soap-thickened mineral oils, may be applied to flameproof joint surfaces before assembly. The grease, if applied, shall be of a type that does not harden because of ageing, does not contain an evaporating solvent, and does not cause corrosion of the joint surfaces. Verification of suitability shall be in accordance with the grease manufacturer's specifications.

If the unit requires cleaning, then only clean exterior with a damp cloth to avoid electro-static charge build up.

If a unit fault should occur, then the unit can be repaired by MEDC

If you acquired a significant quantity of units, then it is recommended that spares are also made available. Please discuss your requirements with the Technical Sales Engineers at MEDC.

CERTIFICATION / APPROVALS

IECEx units

Ex d unit (IECEx certification No. IECEx ULD 21.0017X)
Ex db IIC T* ($T_{amb.}$) Gb
Ex tb IIIC T*°C ($T_{amb.}$) Db IP6X

See table below for ambient temperature ranges and T-ratings
The IECEx certificate and product carry the IECEx equipment protection level markings:

Gb and Db
Where: Gb signifies suitability for use in a Zone 1 surface industries area in the presence of gas.

Db signifies suitability for use in a Zone 21 surface industries area in the presence of dust.

ATEX / UKEX units

Ex d unit (ATEX certification No. UI 21 ATEX 2559X) (UKEX certification No UL21UKEX2209X)
Ex db IIC T* ($T_{amb.}$) Gb
Ex tb IIIC T*°C ($T_{amb.}$) Db IP6X

See table below for ambient temperature ranges and T-ratings

The ATEX / UKEX certificate and product carry the ATEX / UKEX group and category marking: ⟨Ex⟩ II 2 G D

⟨Ex⟩ Signifies compliance with ATEX / UKEX
II Signifies suitability for use in surface industries
2 Signifies suitability for use in a Zone 1 area
G Signifies suitability for use in the presence of gasses
D Signifies suitability for use in the presence of dust

T-Ratings:

Max. Power rating	$T_{amb.}$	T_G	T_D
15W	-60°C to +85°C -60°C to +55°C -60°C to +40°C	T4 T5 T6	T135°C T100°C T85°C

These units also have the following approvals:

Ingress protection: Long Flare units IP66. Short Flare units IP65 Exd terminal chamber IP67 to IEC60529

SPECIAL CONDITIONS FOR SAFE USE

- For replacement purposes M5 x 0.8 x 20 mm long cover bolts shall be used and shall have a property class of A2-70 or stronger. Reduced shank fasteners must be used with covers employing threaded holes. Fully threaded fasteners must be used with covers employing plain clearance holes.
- The flameproof joints are not intended to be repaired.
- Potential Electrostatic Charging Hazard. If the unit requires cleaning, only clean exterior with a damp cloth to avoid electrostatic charge build-up. See instructions for further guidance
- If a metal certification label is attached to the horn it is known to be capable of retaining a 3.33 pF charge.

PUSH BUTTON DPDT CONTACT

POS.	TAG NUMBER	SERVICE
1	77-HS-001A	B-100 Fire Damper AHU1 Inlet Air
2	77-HS-001B	B-100 Fire Damper AHU1 Inlet Air
3	77-HS-002A	B-100 Fire Damper AHU2 Inlet Air
4	77-HS-002B	B-100 Fire Damper AHU2 Inlet Air
5	77-HS-003A	B-100 Fire Damper Exhaust Air
6	77-HS-003B	B-100 Fire Damper Exhaust Air
7	77-HS-004A	B-200 Fire Damper AHU3 Inlet Air
8	77-HS-004B	B-200 Fire Damper AHU3 Inlet Air
9	77-HS-005A	B-200 Fire Damper AHU4 Inlet Air
10	77-HS-005B	B-200 Fire Damper AHU4 Inlet Air
11	77-HS-006A	B-200 Fire Damper Exhaust Air
12	77-HS-006B	B-200 Fire Damper Exhaust Air
13	77-HS-007A	B-300 Fire Damper AHU5 Inlet Air
14	77-HS-007B	B-300 Fire Damper AHU5 Inlet Air
15	77-HS-008A	B-300 Fire Damper AHU5 Return Air
16	77-HS-008B	B-300 Fire Damper AHU5 Return Air
17	77-HS-009A	B-300 Fire Damper AHU6 Inlet Air
18	77-HS-009B	B-300 Fire Damper AHU6 Inlet Air
19	77-HS-010A	B-300 Fire Damper AHU6 Return Air
20	77-HS-010B	B-300 Fire Damper AHU6 Return Air
21	77-HS-011A	B-300 Fire Damper Exhaust Air
22	77-HS-011B	B-300 Fire Damper Exhaust Air
23	77-HS-012A	B-400 Fire Damper AHU7 Inlet Air
24	77-HS-012B	B-400 Fire Damper AHU7 Inlet Air
25	77-HS-013A	B-400 Fire Damper AHU7 Return Air
26	77-HS-013B	B-400 Fire Damper AHU7 Return Air
27	77-HS-014A	B-400 Fire Damper AHU8 Inlet Air
28	77-HS-014B	B-400 Fire Damper AHU8 Inlet Air
29	77-HS-015A	B-400 Fire Damper AHU8 Return Air
30	77-HS-015B	B-400 Fire Damper AHU8 Return Air
31	77-HS-016A	B-400 Fire Damper Exhaust Air
32	77-HS-016B	B-400 Fire Damper Exhaust Air

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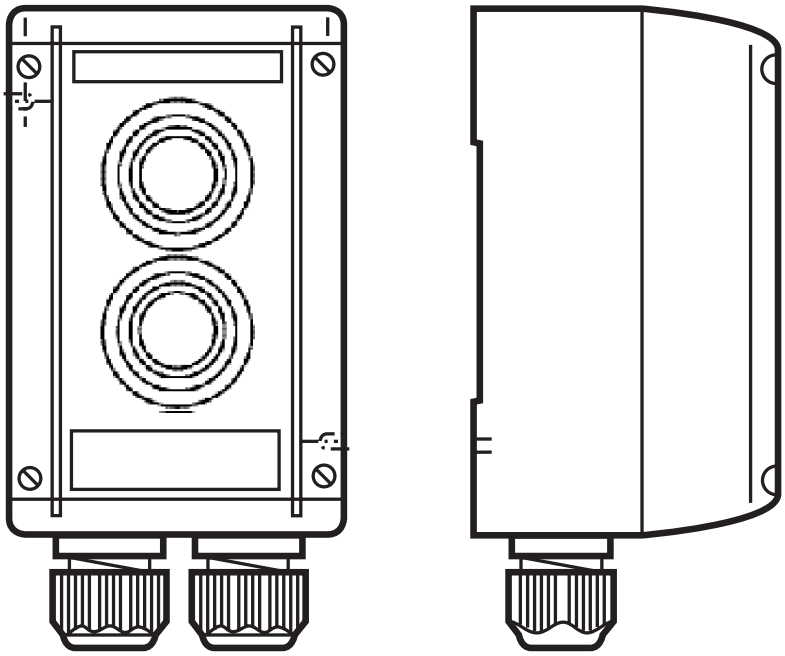
Betriebsanleitung
Operating instructions
Mode d'emploi

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GHG 432 und GHG 434

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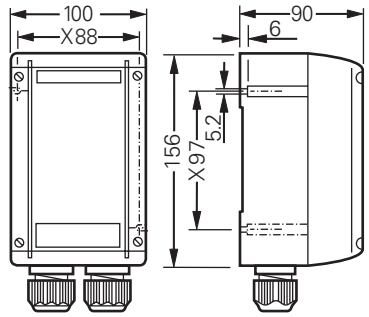
Declaration of conformity, enclosed separately.

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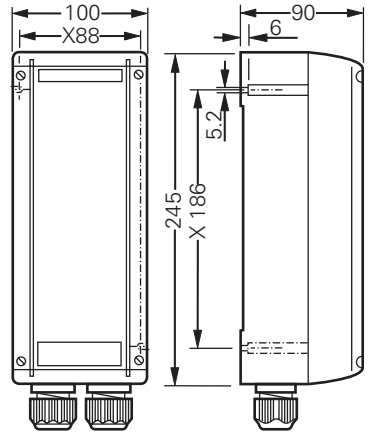
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Maßbilder in mm



GHG 432



GHG 434

X = Befestigungsmaße

1 Technische Angaben

1.1 Komplette Steuergeräte

ATEX EU-Baumusterprüfbescheinigung:		BVS 22 ATEX E 032 X
Gerätekennzeichnung nach 2014/34/EU und Norm:		
	EN 60079-0	Ⓔx II 2 G Ex eb * IIC / IIB+H_2 / IIB T6/T5 Gb
		Ⓔx II 2 D Ex tb IIIC T80 °C Db
IECEx Konformitätsbescheinigung:		IECEx BVS 22.0029X
Gerätekennzeichnung:		
	IEC60079-0	Ex eb * IIC / IIB+H_2 / IIB T6/T5 Gb Ex tb IIIC T80 °C Db

* = die Kennzeichnung wird ergänzt, bzw. erweitert in Abhängigkeit der verwendeten Ex-Komponenten oder des verwendeten Gehäuse Zubehör (z.B. db, mb, ia, ib, ...).

Bemessungsspannung:	bis max. 690 V
Bemessungsstrom:	max. 16 A
Umgebungstemperaturbereich und zul. Lagertemperatur in Originalverpackung:	-20 °C ... +40 °C (Listenausführung)
Geprüfter Umgebungstemperaturberich: (Abweichende Temperaturen sind bei Sonderversionen möglich.)	-40 °C ... +55 °C

Nennstrom / Temperatur

Nennstrom	Querschnitt	Staubschutz	$T_{amb} \leq$ +40 °C	+40 °C $\leq T_{amb} \leq$ +55 °C
6 A			T6	T6
10 A	1,5 mm²	T80°C	T6	T5 (T6 bis T_{amb}=+54°C)
16 A			n/a	n/a
6 A			T6	T6
10 A	2,5 mm²	T80°C	T6	T6
16 A			T6	T6/T5*[1]
6 A			T6	T6
10 A	4 mm²	T80°C	T6	T6
16 A			T6	T6

*[1] nur mit geeigneten KLE und Leitungen mit erweitertem Betriebstemperaturbereich (service temp. range)

Schutzart nach EN/IEC 60529:	IP 66 (Listenausführung)
Schutzklasse nach EN/IEC 61140:	I- mit interner Erdungsplatte
	II – wird von den Kunststoffsteuergeräten erfüllt
PE-Anschlussklemmen:	2 x 4 mm²
Anschlussklemmen:	siehe Einbaukomponenten
Leitungseinführung (Listenausführung):	2 x M25 (1 x M25; 1 x mit Verschluss-Stopfen)

geeignete Leitungen und Prüfdrehmomente der Druckschraube

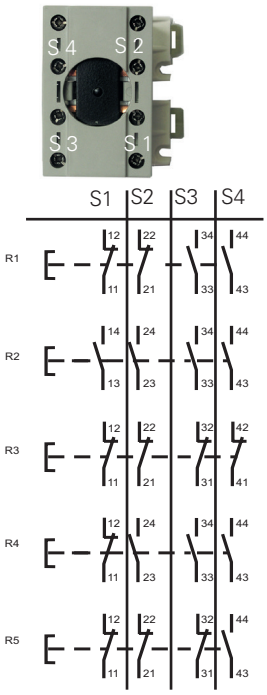
Kabel- und Leitungseinführung (KLE)		M12	M16	M20	M25	M32
Dichtung 1+2+3 (Ø mm / Nm)	min.				8,0 / 1,5	
	max. (1)				10,0 / 2,0	
Dichtung 1+2 (Ø mm / Nm)	min.		5,5 / 1,0	7,0 / 1,5	10,0 / 2,3	14,0 / 3,0
	max. (1)		7,0 / 1,0	9,0 / 1,4	13,0 / 2,6	17,0 / 4,0
Dichtung 1 (Ø mm / Nm)	min.	5,0 / 0,8	7,0 / 1,0	9,5 / 1,0	13,5 / 1,3	17,5 / 1,5
	max. (1)	7,0 / 1,0	10,0 / 1,4	13,0 / 1,7	17,5 / 2,3	21,0 / 1,3
Prüfdrehmomente Einschraubgewinde (Nm)		1,2	3,3	2,7	3,0	5,0

(1) Die Prüfungen der Klemmbereiche und Prüfdrehmomente wurden mit Metalldornen durchgeführt. Bei der Verwendung von Leitungen mit unterschiedlichen Fertigungstoleranzen und Materialeigenschaften kann der Klemmbereich variieren. Bitte verwenden Sie im Zwischenbereich eine geeignete Kombination aus Dichtungen, so dass bei zukünftigen Wartungsarbeiten an der KLE die Hutmutter nachgezogen werden kann.

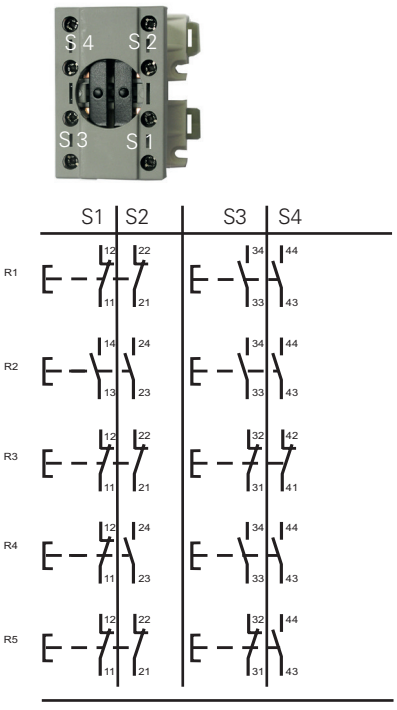
Leergewicht:	
Steuergerät GHG 432	ca. 0,47 kg
Steuergerät GHG 434	ca. 0,70 kg
Prüfdrehmomente:	
Deckelschrauben / Anschlussklemmen	2,00 Nm

⚠ Gehäusematerial:	
Kennbuchstaben "Mat.: A"	schlagfestes Polyamid < 10^9 Ω
Kennbuchstaben "Mat.: B" und " Mat.: C"	schlagfestes Polyamid > 10^9 Ω

Drucktastersockel GHG41.11..R....; 1 x 4 polig



Drucktastersockel GHG41.11..R....; 2 x 2 polig



1.2 Drucktaster-, Schalter- und Potentiometersockel allgemein

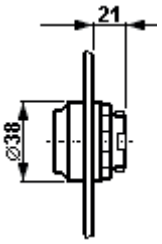
EU-Baumusterprüfbescheinigung:		IBExU14ATEX1030U	
Gerätekennzeichnung nach 2014/34/EU			
und der Normenreihe EN 60079:		Ⓔx II 2 G Ex db eb IIC/IIB/IIB+H2 Gb	
		Ⓔx I M 2 Ex db eb I Mb	
IECEx Konformitätsbescheinigung:		IECEx IBE 14.0005U	
Gerätekennzeichnung			
der Normenreihe IEC 60079:		Ex db eb IIC/IIB/IIB+H2 Gb	
		Ex db eb I Mb	
Umgebungstemperaturbereich			
	Ⓔx II 2 G ... IIC	-55 °C ...	+55 °C
	Ⓔx II 2 G ... IIB	-60 °C ...	+55 °C
	Ⓔx II 2 G ... IIB+H2	-55 °C ...	+55 °C
Betriebstemperaturbereich:			
	Ⓔx II 2 G ... IIC	-55 °C ...	+80 °C
	Ⓔx II 2 G ... IIB	-60 °C ...	+80 °C
	Ⓔx II 2 G ... IIB+H2	-55 °C ...	+80 °C
Schutzart nach EN/IEC 60529			
Drucktaster DRT:		IP 66	(im eingebauten Zustand)
Doppeldrucktaster DDT:		IP 66	(im eingebauten Zustand)
Schlüsseltaster SLT:		IP 66	(im eingebauten Zustand)
Schlüsselschalter SLS:		IP 66	(im eingebauten Zustand)
Schlagtaster SGTE, SGT:		IP 66	(im eingebauten Zustand)
Steuerschalter SCT:		IP 66	(im eingebauten Zustand)

1.2.1 Drucktastersockel GHG41.11..R....; 2 polig für Drucktaster, Schlagtaster, Schalter und Schlüsseltaster

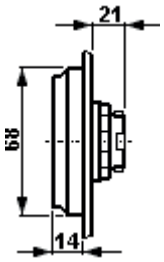
1.2.2 Drucktastersockel GHG41.11..R....; 4 polig für Drucktaster, Schlagtaster, Schalter und Schlüsseltaster

Bemessungsspannung:		bis max. 500 V				
Bemessungsstrom maximal	Bemessungsanschlusssquerschnitt	Umgebungstemperatur maximal				
14 A	2,5 mm²	40 °C				
16 A	4,0 mm² starr	40 °C				
12 A	2,5 mm²	50 °C				
15 A	4,0 mm² starr	50 °C				
Schaltvermögen AC 15	(EN 60947-5-1):	250 V /	6 A	500 V /	4,0 A	
Schaltvermögen DC 13	(EN 60947-5-1):	24 V /	6 A	60 V /	0,8 A	110 V / 0,5 A
mit Goldspitzkontakten:		max. 400 mA				
Anschlussklemmen:		1x / 2x 0,5- 2,5 mm²;				
		1x 4,0 mm² starr				
Prüfdrehmoment Anschlussklemmen:		2,5 Nm				
Gewicht:	2 polig	ca. 0,15 kg				
	4 polig	ca. 0,35 kg				

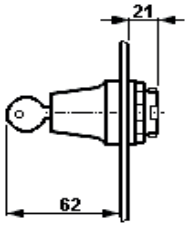
Maßbilder Bedien- und Anzeigeelemente



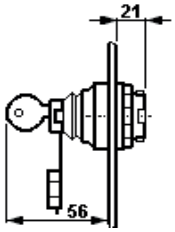
Drucktaster-
vorsatz



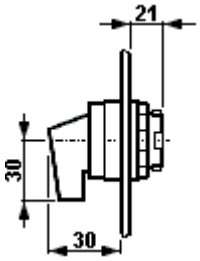
Doppeldrucktaster-
vorsatz



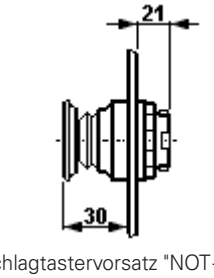
Schlüsselschaltervorsatz



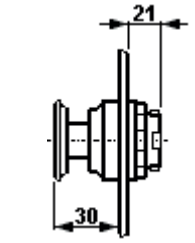
Schlüsseltastervorsatz



Schaltervorsatz Ex 41



Schlagtastervorsatz "NOT- AUS"



Schlagtastervorsatz
X = Befestigungsmaße

Maßangaben in mm

Anschlussbilder (Beispiele nicht vollständig)



2 Ö



2 S



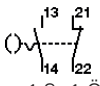
1 S+1 Ö



2 Ö

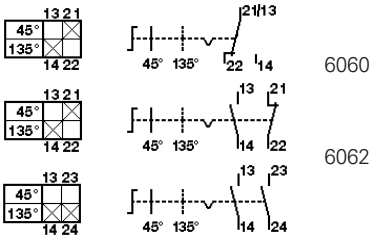


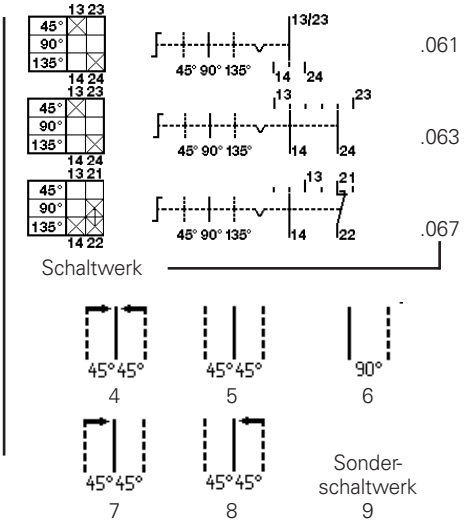
2 S



1 S+1 Ö

Schaltung







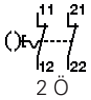
2 Ö



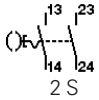
2 S



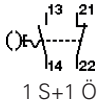
1 S+1 Ö



2 Ö



2 S

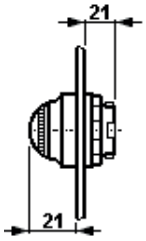


1 S+1 Ö

1.2.3 Potentiometer GHG41.16..R...;

Bemessungsspannung:	bis 250 V
Leistung:	1 W
Drehbereich:	270°
Skalierung:	0- 100%
Anschlussklemme/Prüfdrehmoment:	2 x 1,0- 2,5 mm²
	1 x 4,0 mm² starr
Prüfdrehmoment Anschlussklemmen	2,5 Nm
Gewicht:	ca. 0,15 kg

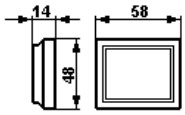
1.3 Signallampe GHG417 1805 R...;



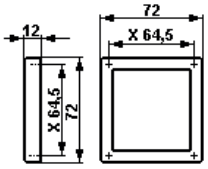
Signalvorsatz

EG-Baumusterprüfbescheinigung:		IBExU 12ATEX 1047 U			
Gerätekennzeichnung nach 2014/34/EU					
und der Normenreihe EN 60079:		Ⓔx II 2 G Ex db eb IIC Gb			
		Ⓔx II 2 G Ex db ia IIC Gb			
IECEx Konformitätsbescheinigung:		IECEx IBE 13.0031U			
Gerätekennzeichnung der Normenreihe IEC 60079:		Ex db eb IIC Gb Ex db ia IIC Gb			
Einsatztemperaturbereich:		-55 °C ... +80 °C			
Max. Betriebstemperaturbereich:		+80 °C			
(Abweichende Temperaturen sind bei Sonderversionen möglich)					
Bemessungsspannung/Bemessungsstrom:					
	"e" erhöhte Sicherheit (Ex db eb)	20 V	...	254 V AC/DC	4 ... 15 mA
	"e" erhöhte Sicherheit (Ex db eb)	12 V	...	24 V AC/DC	max. 24 mA
	"i" eigensichere Ausführung (Ex db ia)	10 V	...	30 V DC	max. 38,7 mA
Ex-i Daten:	U i	30 V			
	I i	100 mA			
	Ci	0			
	Li	0			
	Pi	750 mW			
Anschlussklemmen:		1x / 2x 0,5- 2,5 mm²; 1 x 4,0 mm² starr			
Prüfdrehmoment Anschlussklemmen		2,5 Nm			
Gewicht:		ca. 0,15 kg			

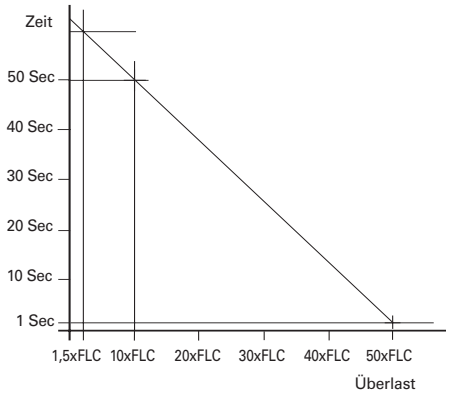
Maßbilder Bedienelemente



Messinstrumentenvorsatz AM 45



Messinstrumentenvorsatz AM 72



Überlast / Zeit

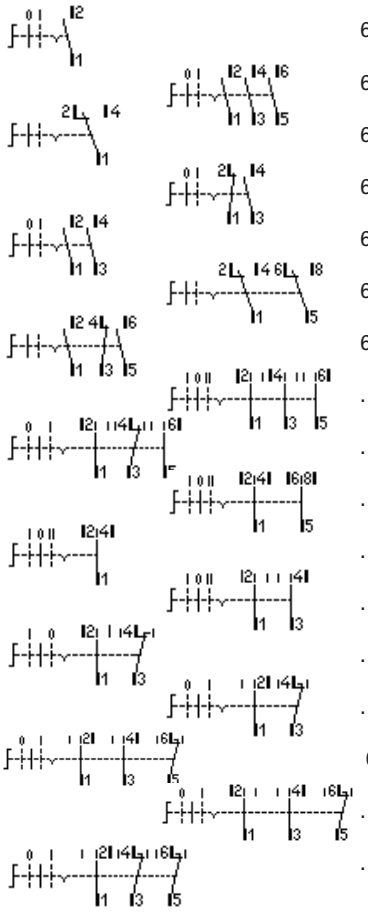
X = Befestigungsmaße

1.4 Messinstrument AM45 /AM72 GHG410 98 .. [1] R....

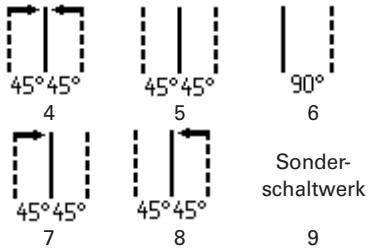
EU-Baumusterprüfbescheinigung:		BVS 14 ATEX E 125U	
Gerätekennzeichnung nach 2014/34/EU und der Normenreihe EN 60079:			
[1] Dreheisen	01 = VM 45 08 = VM 72	Ⓔx II 2 G	Ex eb mb IIC Gb
	02 = AM 45 09 = AM 72	Ⓔx II 2 G	Ex eb IIC Gb / Ex eb mb IIC Gb
(1) Drehspule	20 = AM 45 21 = AM 72	Ⓔx II 2 G	Ex ib IIC Gb
IECEx Konformitätsbescheinigung:		IECEx BVS 14.0082U	
Gerätekennzeichnung nach der Normenreihe IEC 60079:			
(1) Dreheisen	01 = VM 45 08 = VM 72	Ex eb mb IIC Gb	
	02 = AM 45 09 = AM 72	Ex eb IIC Gb / Ex eb mb IIC Gb	
(1) Drehspule	20 = AM 45 21 = AM 72	Ex ib IIC Gb	
Betriebstemperaturbereich:		-55 °C ... +80 °C	
Schutzart nach EN/IEC 60529:		IP 66 (im eingebauten Zustand)	
Bemessungsspannung:		bis max. 500 V	
		Dreheisen	Drehspule
Genauigkeit:		Klasse 2,5	Klasse 1,5
Überlastbereich:		10- fach - 25 sec.	10- fach -5 sek.
		25- fach - 4 sec.	
		50- fach - 1 sec.	
		anzeigend 1:1,5	
Bei Wandler-Geräten sind Sonderausführungen mit 1:2; 1:5; 1:6 und 1:8 möglich			
Messbereiche:	AM:	n / 1A; 5 A; 10 A	0 - 20 mA
		0 - 16 A / 25 A direkt	4 - 24 mA
	VM45:	6- 250 V	
	VM72:	6- 500 V	
Leistungsaufnahme:			
	VM45:	0,91- 1,76 VA	
	VM72:	0,91- 2,65 VA	
Spule:			26,5 Windungen
Innenwiderstand:			2,5 Ohm +- 30%
Li:			max. 0,1 mH
Ci:			max. 0,1 nF
Ui:			max. 30 V
I i :			max. 150 mA
Anschlussklemmen:		1x / 2x 0,5- 2,5 mm²	fein- / mehrdrähtig
		1 x 4,0 mm²	eindrähtig
Prüfdrehmoment Anschlussklemme:		2,5 Nm	
Gewicht	AM/VM 45:	ca. 0,35 Kg	
	AM/VM 72:	ca. 0,40 Kg	

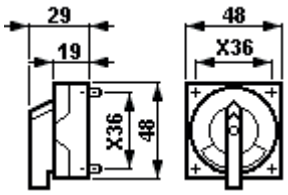
Anschlussbilder Schaltung

Steuerschalter Ex 23



Schaltwerk





Schaltervorsatz Ex 23

X = Befestigungsmaße

1.5 Steuerschalter Ex 23; GHG238 ....R....

EU-Baumusterprüfbescheinigung:		BVS 13 ATEX E 107U			
Gerätekennzeichnung nach 2014/34/EU und der Normenreihe EN 60079:		Ⓔx II 2 G Ex db eb IIB Gb Ⓔx II 2 G Ex db eb IIC Gb Ⓔx II 2 G Ex db ia/ib IIB Gb Ⓔx II 2 G Ex db ia/ib IIC Gb Ⓔx II 2 G Ex db eb I Mb			
IECEx Konformitätsbescheinigung:		IECEx BVS 13.0108U			
Gerätekennzeichnung der Normenreihe IEC 60079:		Ex db eb IIB Gb Ex db eb IIC Gb Ex db ia/ib IIB Gb Ex db ia/ib IIC Gb Ex db eb I Mb			
Betriebstemperaturbereich:	(IIB)	-60 °C	...	+80 °C	
	(IIC)	-55 °C	...	+80 °C	
Geprüfter Umgebungstemperaturbereich:	(IIB)	-60 °C	...	+55 °C	
	(IIC)	-55 °C	...	+55 °C	
Schutzart nach EN/IEC 60529:		IP 66 (im eingebauten Zustand)			
Bemessungsspannung:		bis max.500 V			
Bemessungsstrom:		10 A			
Schaltvermögen AC 15	(EN 60947-5-1):	230 V / 6,0 A		400 V / 6,0 A	
Schaltvermögen DC 13	(EN 60947-5-1):	24 V / 6,0 A		230 V / 0,4 A	
Zul. Kurzschlussvorsicherung:		16 A/gG bei 500 V			
Ausführung mit Goldspitzkontakten:		max. 400 mA			
Anschlussklemmen:		1x / 2x 0,5- 2,5 mm²;			
Prüfdrehmoment Anschlussklemme:		2,0 Nm			
Gewicht:		1 Etage		2 Etagen	
		ca. 0,20 Kg		ca. 0,35 Kg	

1.6 Klemmenblock

ATEX Konformitätsbescheinigung:		SEV 13 ATEX 0178 U
Gerätekennzeichnung nach 2014/34/EU und Norm:		
	EN 60079-0	Ⓔx II 2 G Ex eb IIC
IECEx Zertifikat		IECEx SEV 13.0012 U
Gerätekennzeichnung:	IEC60079-0	Ex eb IIC
Klemmentyp:		6 x MUT 4
Bemessungsspannung:		bis 352 V
Anschlussquerschnitt:		2 x 0,2- 4,0 mm²
Prüfdrehmoment Anschlussklemmen:		0,6- 0,8 Nm
Gewicht:		ca. 0,08 kg

1.7 Eigensichere Stromkreise

Sicherheitstechnische Maximalspannung U_m:	690 V_{eff}
	Galvanisch sicher getrennt von allen anderen Stromkreisen und von Erde

2 Legende

⚠ ***Achtung***

Dieses Symbol warnt vor einem möglichen Ausfall. Wird diese Warnung nicht beobachtet kann der Gesamtausfall der Vorrichtung oder des Systems oder des Betriebes erfolgen, an die es angeschlossen wird.

Besondere Bedingungen
Dieses Symbol weißt auf Hinweise zum sicheren Betrieb gemäß EU-Baumusterprüfbescheinigung / IECEx-Konformitätsbescheinigung hin.

2.1 Sicherheitshinweise

Zielgruppe:
Elektrofachkräfte und geeignet qualifizierte, unterwiesene Personen gemäß den nationalen Rechtsvorschriften, einschließlich der einschlägigen Normen für elektrische Geräte in explosionsgefährdeten Bereichen (EN/IEC 60079-14).

Die Steuergeräte GHG 432 und GHG 434 sind nicht für Zone 0 und Zone 20 geeignet.

Die Anforderungen der EN/IEC 60079-31 u.a. in Bezug auf übermäßige Staubablagerungen und Temperatur, sind vom Anwender zu beachten.

Die auf den Steuergeräten angegebene Temperaturklasse und Explosionsgruppe ist zu beachten.

Umbauten oder Veränderungen an den Steuergeräten sind nicht gestattet.

Sie sind bestimmungsgemäß in unbeschädigtem und einwandfreiem Zustand zu betreiben.

Vor Inbetriebnahme müssen die Steuergeräte entsprechend der im Abschnitt 6 genannten Anweisung geprüft werden.

Beachten Sie die nationalen Sicherheits- und Unfallverhütungsvorschriften und die nachfolgenden Sicherheitshinweise in dieser Betriebsanleitung, die wie dieser Text in Kursivschrift gefasst sind!

3 Normenkonformität

Das Betriebsmittel entspricht den aufgeführten Normen, in der separat beigelegten Konformitätserklärung.

Verweise auf Normen und Richtlinien in dieser Betriebsanleitung beziehen sich immer auf die aktuelle Version. Zusätzliche Ergänzungen (z.B. Jahreszahlangaben) sind zu beachten.

Bild 1 Messinstrumenten AM/VM72 und AM/VM45 für Wandleranschluss n/1A

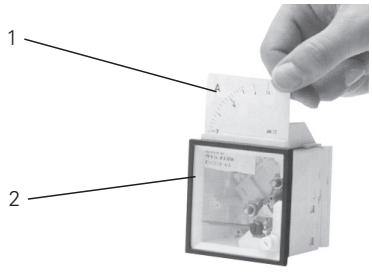
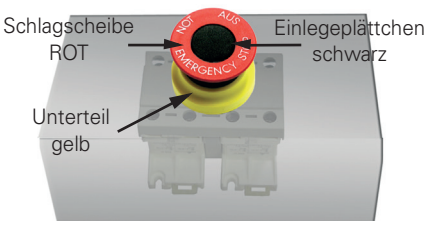


Bild 2 Schlagtaster mit verstärkter Verrastung GHG 410 1437R....



4 Verwendungsbereich

Die Steuergeräte mit den Einbaukomponenten (siehe „Technische Daten"), sind zum Einsatz in explosionsgefährdeten Bereichen der Zonen 1, 2 und 21, 22 gemäß
EN/IEC 60079-10-1 und EN/IEC 60079-10-2 geeignet!

Die eingesetzten Gehäusematerialien einschließlich der außenliegenden Metallteile bestehen aus hochwertigen Werkstoffen, die einen anwendungsgerechten Korrosionsschutz und Chemikalienresistenz in „normaler Industrieatmosphäre" gewährleisten:

– schlagfestes Polyamid

Bei einem Einsatz in extrem aggressiver Atmosphäre, können Sie zusätzliche Informationen über die Chemikalienbeständigkeit der eingesetzten Kunststoffe, bei Ihrer zuständigen Cooper Crouse-Hinds Niederlassung erfragen.

5 Verwendung / Eigenschaften

Die Steuergeräte GHG 432 und GHG 434 dienen zur Vor-Ort-Steuerung elektrischer Anlagen in explosionsgefährdeten Bereichen. Diese Geräte sind, abhängig vom Einzelfall, je nach Bedarf mit den verschiedenen Einbaukomponenten ausgerüstet.

Speziell gekennzeichnete Sonderausführungen der Steuergeräte können in „eigensicheren Stromkreisen" eingesetzt werden.

Die Sockel sind je nach Bedarf auch mit 0,6 W Widerständen, Feinsicherungen und Dioden bestückt (max. Verlustleistung 1 W).

Die für die „Eigensicherheit" maßgebenden elektrischen Grenzwerte sind zu beachten.

Die Ausführung mit Goldspitzkontakten ist für die Schaltung von Kleinspannungsstromkreisen geeignet. Maximale Strombelastung beachten („Technische Daten").
Die Ausführung mit Goldkontakten ist mit „G" auf den Sockeln oder farblich gekennzeichnet .

Um eine sichere Trennung der Taster- und Schalterkontakte zu gewährleisten, sind die Öffnerkontakte als Zwangsöffner ausgeführt.

Die Kleinsteuerschalter können durch Ausschneiden des Schaltkragens an der jeweiligen Abschließposition über ein Vorhängeschloss abgeschlossen werden (Ø Schlossbügel bis 5 mm).

Steuerschaltervorsätze Ex23 sind am Schaltkragen an der entsprechenden Abschließposition mit einer Bohrung Ø 5,5mm zu versehen und somit über oben genanntes Vorhängeschloss abschließbar.

Bild 1:
Die Messinstrumente AM 72 und AM 45 dienen zur Vor-Ort-Anzeige von elektrischen Größen. (Ausführung des Messwerkes, der Genauigkeit sowie Anschlussversion – siehe „Technische Daten").

Bei Messinstrumenten für Wandleranschluss n/1A (Bild 1, Pos 2) können über eine oben am Messinstrument angebrachte Klappe die Wechselskalen (Bild 1, Pos 1; Technische Daten) ausgetauscht werden.

Bild 2:
Der 4 polige Drucktastersockel kann mit den Standard CCH Bedienvorsätzen betrieben werden.

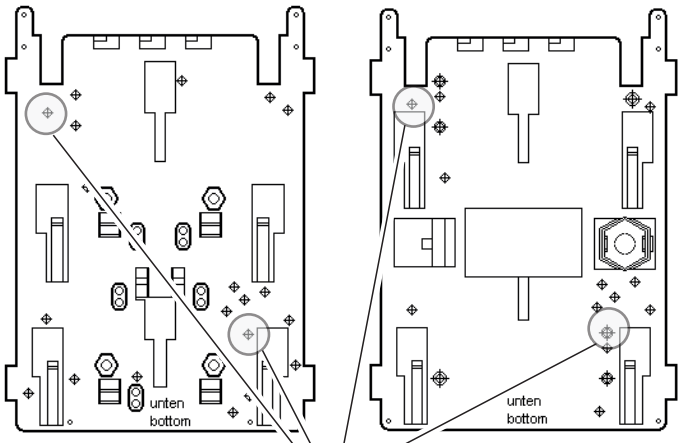
Soll der 4 polige Drucktastersockel mit einem Schlagtaster Not-AUS Vorsatz mit Verrastung betrieben werden, so muss dieser Vorsatz mit einer verstärkten Verrastung ausgestattet sein. Dieser Vorsatz ist an der roten Schlagscheibe
mit schwarzen Einlegeplättchen erkennbar und z. B. unter der CCH Artikelnummer GHG 410 1437R.... erhältlich.

Bild 3 Gerätehalter

Befestigungslöcher auf Gerätehalter Größe 2

Gerätehalter für Gitterrinnen- und Wandbefestigung

Gerätehalter für Rohrbefestigung

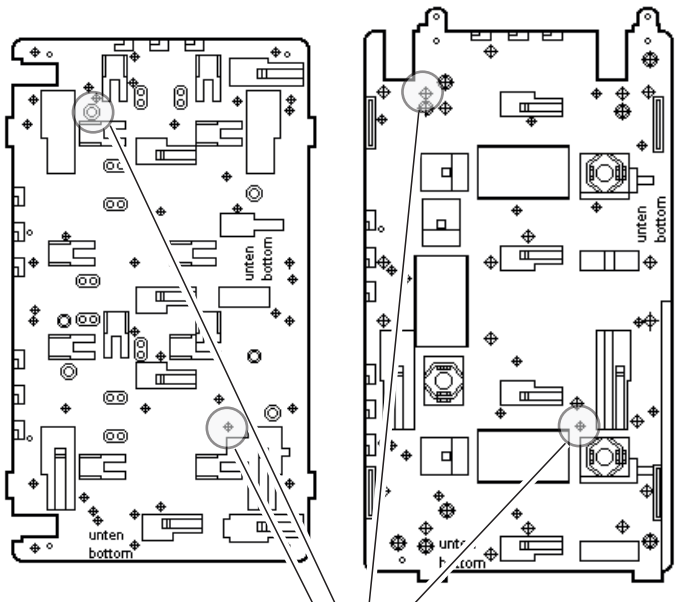


Befestigungs-löcher für Steuergerät GHG 432

Befestigungslöcher auf Gerätehalter Größe 3

Gerätehalter für Gitterrinnen- und Wandbefestigung

Gerätehalter für Rohrbefestigung



Befestigungs-löcher für Steuergerät GHG 434

Angaben aus Punkt 3 und 4 sind bei der Verwendung zu berücksichtigen.

Andere als die beschriebenen Anwendungen sind ohne schriftliche Erklärung der Fa. Cooper Crouse-Hinds / EATON nicht zulässig.

Beim Betrieb sind die in der Betriebsanleitung unter Punkt 7 genannten Anweisungen zu beachten.

Die Verantwortung hinsichtlich bestimmungsgemäßer Verwendung dieser Steuergeräte unter Bezugnahme der in dieser Anleitung vorhandenen Rahmenbedingungen (siehe „Technische Daten") liegt allein beim Betreiber.

6 Installation

Für das Errichten / Betreiben sind die relevanten nationalen Vorschriften (z.B. Betr.Si.V, in Deutschland) sowie die allgemein anerkannten Regeln der Technik maßgebend
(EN/IEC 60079-14).

Unsachgemäße Installation der Steuergeräte können zum Verlust der Garantie führen.

6.1 Montage / Demontage

Die Montage der Steuergeräte GHG 43. kann ohne Öffnen der Gehäuse erfolgen.

Die Steuergeräte dürfen bei der Direktmontage an der Wand nur an den vorgesehenen Befestigungspunkten eben aufliegen.

Die gewählte Schraube muss der Befestigungsöffnung angepasst sein (siehe Maßbilder).

Sie dürfen die Öffnung nicht beschädigen
(z.B. Verwendung einer Unterlegscheibe).

Bei übermäßigem Anziehen der Befestigungsschrauben kann das Betriebsmittel beschädigt werden.

Bild 3:
Die Steuergeräte GHG 432 und GHG 434 sind zur Befestigung auf den Cooper Crouse-Hinds / EATON - Gerätehaltern mittels Form- oder selbstschneidenden Schrauben geeignet.

Die betreffende Montageanleitung ist zu beachten.

6.2 Öffnen des Gerätes/ Elektrischer Anschluss

Vor Öffnen der Geräte ist die Spannungsfreiheit sicherzustellen bzw. sind geeignete Schutzmaßnahmen zu ergreifen.

Der elektrische Anschluss des Betriebsmittels darf nur durch Elektrofachpersonal in Anlehnung an EN/IEC 60079-14 erfolgen.

Die ordnungsgemäß abisolierten Anschlussleitungen der Kabel sind unter Berücksichtigung einschlägiger Vorschriften anzuschließen.

Zur Aufrechterhaltung der Zündschutzart ist der Leiteranschluss mit besonderer Sorgfalt durchzuführen.

Die Isolation der Anschlussleitungen muss bis an die Klemme heranreichen. Der Leiter selbst darf nicht beschädigt sein.

Bei Mischbestückungen Ex-e / Ex-i sind die erforderlichen Mindestabstände einzuhalten (siehe z.B. EN/IEC 60079-11).

Bei geöffneten Geräten ist sicherzustellen (Spannungsfreiheit herstellen), dass keine Spannungsverschleppung auf die angeschlossenen eigensicheren Stromkreise übergreift.

Die minimal und maximal anschließbaren Leiterquerschnitte sind zu beachten (siehe technische Daten).

Alle Schrauben und / oder Muttern der Anschlussklemmen, auch die der nicht benutzten, sind fest anzuziehen.

Die Standardklemmen sind zum Direktanschluss von Leitern mit Kupferadern ausgelegt.

Das Schaltbild der Einbaukomponenten ist auf den Komponenten angegeben, dem Schaltgerät beigelegt oder aus der Betriebsanleitung zu entnehmen.

Bei verdrahteten Steuergeräten ist der dem Gerät beigelegte Anschlussplan zu beachten.

Werden die Einbaukomponenten (Messinstrument AM 72 und AM 45, Drucktastersockel, Signalleuchtensockel, Steuerschaltersockel, Potentiometersockel usw.) zur leichteren Verdrahtung aus der Profilschiene im Gehäuseboden der Steuergeräte ausgeschnappt, sind die Komponenten hiernach wieder vorschriftsmäßig in die entsprechende Einrastposition auf der Profilschiene einzusetzen.

Zum Entriegeln der Komponenten (u.a. auch die Messinstrumente AM72 + AM45), werden die Rasthaken nach außen gezogen.

Ein Schalten an der Achse des Steuerschaltersockels Ex 23 bei geöffnetem Gehäuse ist nicht zulässig (um die Gehäuse wieder korrekt schließen zu können).

Achtung: Die Einrastpositionen der Einbaukomponenten müssen mit den Einkerbungen der Profilschiene übereinstimmen !

Die Errichtungshinweise für eigensichere elektrische Betriebsmittel sind zu beachten.

Es ist sicherzustellen, dass die für den speziellen, eigensicheren Stromkreis zulässige äußere Kapazität und Induktivität nicht überschritten wird.

! Wird das Betriebsmittel in der Ausführung „Schutzisoliert" ausgeführt, kann das entsprechende Klebeschild (▣) GHG 905 1002 P0005 beim Hersteller angefordert werden.

! Wird die eingebaute Klemmentragschiene nicht komplett mit Reihenklemmen bestückt, muss die Klemmentragschiene in den Potentialausgleich mit einbezogen werden.

6.3 Kabel-und Leitungseinführungen (KLE); Verschlussstopfen

Es dürfen generell nur bescheinigte KLEs und Verschlussstopfen verwendet werden. Für bewegliche Leitungen sind Trompetenverschraubungen oder andere geeignete Einführungen mit zusätzlicher Zugentlastung zu verwenden.

Beim Einsatz von KLE mit einer niedrigeren als der für das Gerät zutreffenden IP-Schutzart (siehe Technische Daten) wird die IP-Schutzart des gesamten Gerätes reduziert.

Die für die eingesetzten KLE maßgebenden Montagerichtlinien sind zu beachten.

Eigensichere Stromkreise sind über die farblich (hellblau) gekennzeichneten KLE einzuführen.

Nicht benutzte Einführungsöffnungen sind mit einem bescheinigten Verschlussstopfen zu verschließen, um die Mindestschutzart herzustellen.

Es ist darauf zu achten, dass bei der Installation der KLE´s die für den Leitungsdurchmesser geeigneten Dichtungseinsätze verwendet werden.

Bei ausschneidbaren Dichtungseinsätzen ist sicherzustellen, dass der Einsatz ordnungsgemäß dem Leitungsdurchmesser angepasst wird.

Zur Sicherstellung der erforderlichen Mindestschutzart sind die KLEs fest anzuziehen.

Bei übermäßigem Anziehen kann die Schutzart beeinträchtigt werden.

Achtung: Beim Anziehen der Hutmutter der Metall - KLE (z.B. Typ ADE/ADL) ist die Verschraubung mit einem geeigneten Werkzeug gegen Verdrehen zu sichern.

Alle nicht benutzten metrischen Cooper Crouse-Hinds / EATON KLE sind mit dem bescheinigten Verschluss für metrische KLE zu verschließen.

6.4 Flansche und Metallplatten*

Müssen Flanschplatten demontiert werden
(z.B. zum Bohren von Einführungsöffnungen),
ist bei der Montage zur Aufrechterhaltung der Mindestschutzart auf den korrekten Sitz der Flanschplatte zu achten.

Von außen herangeführte PE-Leitungen sind auf die dafür vorgesehene PE-Klemme am Flansch anzuschließen. Der maximale Anschlussquerschnitt beträgt 6 mm²

Achtung: Metallflansche, Metallplatten und Metallverschraubungen müssen in den Potentialausgleich miteinbezogen werden.

* z.Zt. nicht bescheinigt für Kategorie II D

6.5 Schließen des Gerätes / Deckelverschluss

Beim Aufsetzen der Gehäusedeckel ist darauf zu achten, dass die Vorsätze korrekt mit den Einbaukomponenten übereinstimmen und der zum Gehäuseunterteil gehörige Deckel verwendet wird.

Alle Fremdkörper sind aus dem Gerät zu entfernen.

Zur Sicherstellung der erforderlichen Mindestschutzart sind die Deckelschrauben fest anzuziehen.

Bei übermäßigem Anziehen kann die Schutzart beeinträchtigt werden.

6.6 Inbetriebnahme

Vor Inbetriebnahme des Betriebsmittels sind die in den einzelnen nationalen Bestimmungen genannten Prüfungen durchzuführen.

Außerdem ist vor der Inbetriebnahme die korrekte Funktion und Installation des Betriebsmittels und der Einbaukomponenten (Messinstrument, Signalleuchte, Taster usw.) in Übereinstimmung mit dieser Betriebsanleitung und anderen anwendbaren Bestimmungen zu überprüfen.

Die Nullpunkteinstellung des Messinstrumentezeigers ist vor der Inbetriebnahme zu überprüfen. Gegebenenfalls mit der Justierschraube den Messgerätezeiger auf den Nullpunkt einjustieren.

Die Gasgruppe (II B bzw. II C) des eigensicheren Stromkreises ist zur Bewertung der Gasgruppe der Einbaukomponenten zu berücksichtigen.

Unsachgemäßer Betrieb der Steuergeräte kann zum Verlust der Garantie führen.

7 Instandhaltung / Wartung

Die für die Wartung / Instandhaltung von elektrischen Betriebsmitteln in explosionsgefährdeten Bereichen geltenden nationalen Bestimmungen sind einzuhalten (EN/IEC 60079-17).

Vor Öffnen des Gehäuses Spannungsfreiheit sicherstellen bzw. geeignete Schutzmaßnahmen ergreifen.

Bei eigensicheren Stromkreisen ist das Arbeiten unter Spannung zulässig.

Die erforderlichen Wartungsintervalle sind anwendungsspezifisch und daher in Abhängigkeit von den Einsatzbedingungen vom Betreiber festzulegen.

Im Rahmen der Wartung sind vor allem die Teile, von denen die Zündschutzart und Funktion abhängt, zu prüfen (z.B. Unversehrtheit und Dichtheit des Gehäuses, Unversehrtheit der Dichtungen und der Kabel- und Leitungseinführungen, Schaltwerksfunktion, sowie fester Sitz aller Schrauben.

Sollte bei einer Wartung festgestellt werden, dass Instandsetzungsarbeiten erforderlich sind, ist Abschnitt 8 dieser Betriebsanleitung zu beachten.

Reinigung:

Betriebsmittel mit der Kennzeichnung auf dem Typenschild "Mat.: B" oder "Mat.: C", sind wie folgt zu reinigen:

Wegen der Gefahr der elektrostatischen Aufladung darf das Betriebsmittel nur mit einem feuchten, nicht fasernden Tuch oder Schwamm gereinigt werden!

8 Reparatur / Instandsetzung /Änderung

Instandsetzungsarbeiten / Reparaturen dürfen nur mit Cooper Crouse-Hinds / EATON Originalersatzteilen vorgenommen werden.

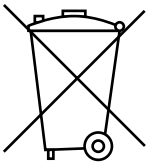
Bei Schäden an der druckfesten Kapselung ist nur ein Austausch zulässig. Im Zweifelsfalle ist das betroffene Betriebsmittel an Cooper Crouse-Hinds / EATON zur Reparatur zurückzugeben.

Reparaturen, die den Explosionsschutz betreffen, dürfen nur von Cooper Crouse-Hinds / EATON oder einer qualifizierten Elektrofachkraft in Übereinstimmung mit national geltenden Regeln durchgeführt werden. (EN/IEC 60079-19)

Umbauten oder Änderungen am Betriebsmittel sind nicht gestattet; ausgenommen ist das Anbringen von zusätzlichen KLEs im Rahmen der Zulassung des Betriebsmittels oder nach Angaben des Herstellers.

Bei Austausch einzelner Einbaukomponenten (Messinstrument, Taster usw.) ist Pkt. 6.2 „Öffnen des Gerätes /Elektrischer Anschluss“ zu beachten.

9 Entsorgung /Wiederverwertung

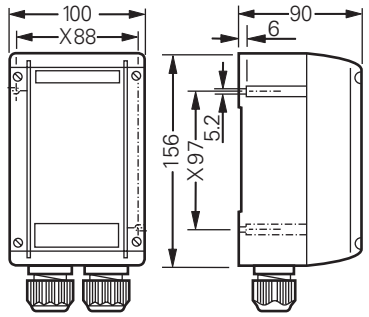


Bei der Entsorgung des Betriebsmittels sind die jeweils geltenden nationalen Abfallbeseitigungsvorschriften zu beachten.

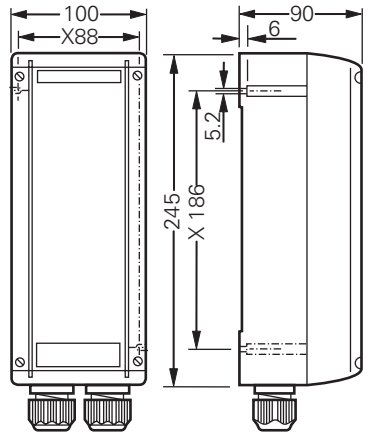
Zusätzliche Informationen zur Entsorgung des Produktes können Sie bei Ihrer zuständigen Cooper Crouse-Hinds / EATON Niederlassung erfragen.

Programmänderungen und-ergänzungen sind vorbehalten.

Dimensions in mm



GHG 432



GHG 434

X = fixing dimensions

1 Technical data

1.1 Control unit assemblies

EU-Type Examination Certificate:		BVS 22 ATEX E 032 X
Marking acc. to 2014/34/EU and standard:		
	EN 60079-0	Ⓔx II 2 G Ex eb * IIC / IIB+H_2 / IIB T6/T5 Gb
		Ⓔx II 2 D Ex tb IIIC T80 °C Db
IECEx type examination certificate:		IECEx BVS 22.0029X
Category of application:		
	IEC60079-0	Ex eb * IIC / IIB+H_2 / IIB T6/T5 Gb Ex tb IIIC T80 °C Db

* = The marking is supplemented or expanded depending on the Ex components used or the housing accessories used (e.g. db, mb, ia, ib, ...)

Rated voltage:	up to max. 690 V
Rated current:	max. 16 A
Ambient temperature range and perm.storage temperature in original packing::	-20 °C ... +40 °C (catalogue version)
Approved ambient temperature range: (Deviating temperatures possible with special versions.)	-40 °C ... +55 °C

Rated Current / temperature

Rated current	Cross section	Dust protection	$T_{amb} \leq$ +40 °C	+40 °C $\leq T_{amb} \leq$ +55 °C
6 A			T6	T6
10 A	1.5 mm²	T80°C	T6	T5 (T6 bis T_{amb}=+54°C)
16 A			n/a	n/a
6 A			T6	T6
10 A	2.5 mm²	T80°C	T6	T6
16 A			T6	T6/T5*[1]
6 A			T6	T6
10 A	4 mm²	T80°C	T6	T6
16 A			T6	T6

*[1] only with suitable KLE and cables with an extended service temperature range

Degree of protection to EN/IEC 60529:	IP 66 (standard version)
Insulation class acc. to EN/IEC 61140:	I – with internal earthing plate
	II – plastic terminal boxes fulfil this requirement
PE- terminal:	2 x 4 mm²
Terminals:	see built-in components
Cable entries (catalogue version):	2 x M25 (1 x M25, 1 x with blanking plug)

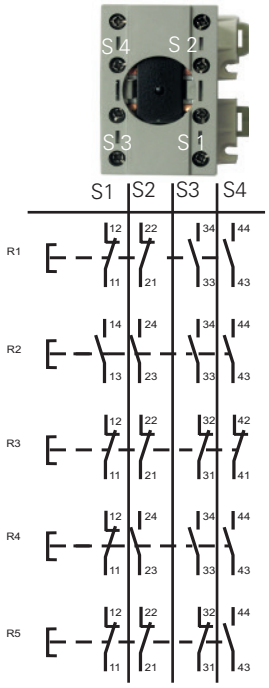
suitable cables and test torques of the pressure screw

Cabel entry:		M12	M16	M20	M25	M32
seal 1+2+3 (Ø mm / Nm)	min.				8.0 / 1.5	
	max. (1)				10.0 / 2.0	
seal 1+2 (Ø mm / Nm)	min.		5.5 / 1.0	7.0 / 1.5	10.0 / 2.3	14.0 / 3.0
	max. (1)		7.0 / 1.0	9.0 / 1.4	13.0 / 2.6	17.0 / 4.0
seal 1 (Ø mm / Nm)	min.	5.0 / 0.8	7.0 / 1.0	9.5 / 1.0	13.5 / 1.3	17.5 / 1.5
	max. (1)	7.0 / 1.0	10.0 / 1.4	13.0 / 1.7	17.5 / 2.3	21.0 / 1.3
Test torque for screw in thread cable entry (Nm)		1.2	3.3	2.7	3.0	5.0

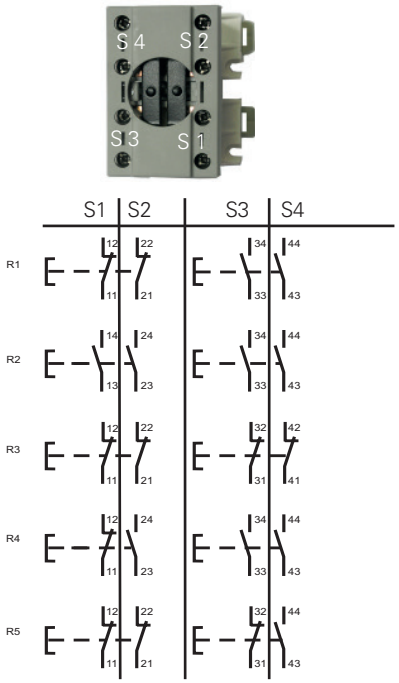
(1) The tests of clamping ranges and torque values were performed with metal mandrel. The clamping range can vary by using cables with different manufacturing tolerances and material properties. Please use a suitable combination of seals in the intermediate area, so that the cap nut can be tightened in future maintenance work on the cable entry.

Empty weight:	
Control unit GHG 432	approx. 0.47 kg
Control unit GHG 434	approx. 0.70 kg
Test torques:	
Cover screws	2.00 Nm
⚠ Enclosure material:	
Identification letter "Mat.: A"	impact resistant polyamide < 10^9 Ω
Identification letter "Mat.: B" and "Mat.: C"	impact resistant polyamide > 10^9 Ω

Contact arrangement
Actuator GHG41.11..R....; 1 x 4 pole



Actuator GHG41.11..R....; 2 x 2 pole



1.2 Actuator, switch and potentiometer general

EU-Type Examination Certificate:	IBExU14ATEX1030U		
Marking acc. to 2014/34/EU			
and standard of series EN 60079:	Ⓔx II 2 G Ex db eb IIC/IIB/IIB+H2 Gb		
	Ⓔx I M 2 Ex db eb I Mb		
IECEx type examination certificate:	IECEx IBE 14.0005U		
Category of application			
standard of series IEC 60079:	Ex db eb IIC/IIB/IIB+H2 Gb		
	Ex db eb I Mb		
Ambient temperature range:			
Ⓔx II 2 G ... IIC	-55 °C	...	+55 °C
Ⓔx II 2 G ... IIB	-60 °C	...	+55 °C
Ⓔx II 2 G ... IIB+H2	-55 °C	...	+55 °C
Operating temperature:			
Ⓔx II 2 G ... IIC	-55 °C	...	+80 °C
Ⓔx II 2 G ... IIB	-60 °C	...	+80 °C
Ⓔx II 2 G ... IIB+H2	-55 °C	...	+80 °C
Degree of protection to EN/IEC 60529			
pushbutton DRT:	IP 66		(installed condition)
double pushbutton DDT:	IP 66		(installed condition)
key-operated pushbutton SLT:	IP 66		(installed condition)
operated switch SLS	IP 66		(installed condition)
mushroom-head pushbutton SGTE, SGT	IP 66		(installed condition)
Mini-control switch SCT	IP 66		(installed condition)

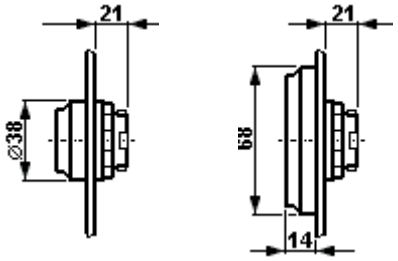
1.2.1 Actuator GHG41.11..R....; 2 pole for push button, Mushroom head p.b., switch and Key-operated pushbutton

1.2.2 Actuator GHG41.11..R....; 4 pole for push button, Mushroom head p.b., switch and Key-operated pushbutton

Rated voltage:		up to 500 V				
Rated current	Rated supply terminal	Permissible ambient temperature max.				
14 A	2.5 mm²	40 °C				
16 A	4.0 mm² single wire	40 °C				
12 A	2.5 mm²	50 °C				
15 A	4.0 mm² single wire	50 °C				
Switching capacity acc. to AC 15	(EN 60947-5-1):	250 V /	6 A	500 V /	4,0 A	
Switching capacity acc. to DC 13	(EN 60947-5-1):	24 V /	6 A	60 V /	0,8 A	110 V / 0,5 A
with gold-tipped contacts:		max. 400 mA				
Supply terminal:		1x / 2x 0.5- 2.5 mm²;				
		1 x 4.0 mm² single wire				
Test torques:		2.5 Nm				
Weight:	2 pole	approx. 0.15 kg				
	4 pole	approx. 0.35 kg				

Dimensions drawings actuator and indicator elements

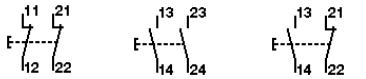
Dimensions in mm



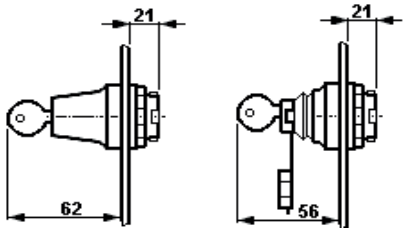
Puschbutton actuator

Double pushbutton actuator

Contact arrangements

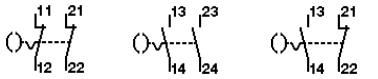


2 NC 2 NO 1 NO + 1NC

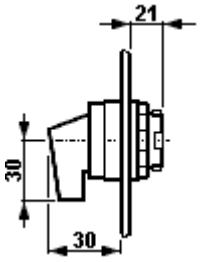


Key-operated switch actuator

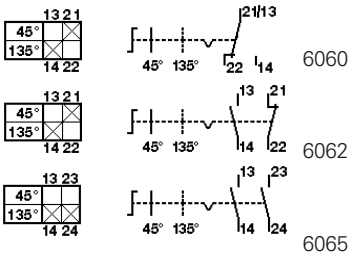
Key-operated pushbutton actuator

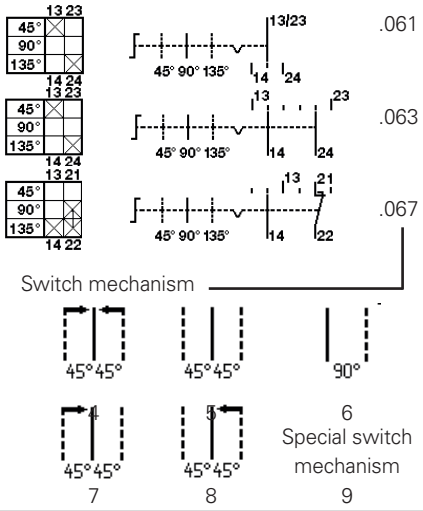


2 NC 2 NO 1 NO + 1NC



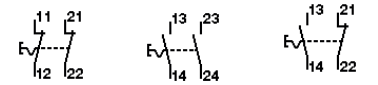
Circuity Code



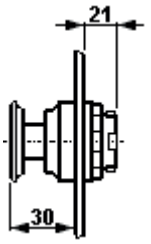




Mushroom-head pushbutton actuator "EMERGENCY STOP"

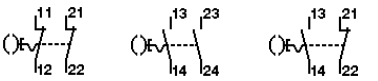


2 NC 2 NO 1 NO + 1 NC



Mushroom-head pushbutton actuator

X = fixing dimensions

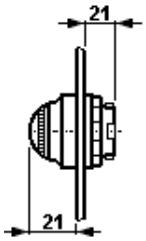


2 NC 2 NO 1 NO + 1 NC

Dimensions in mm

1.2.3 Potentiometer GHG41.16..R...;

Rated voltage:	up to 250 V	
Rating:	1 W	
Turning range:	270°	
Scale:	0- 100%	
Supply terminal/Test torques:	2 x 1.0- 2.5 mm²	2.5 Nm
Weight:	approx. 0.15 kg	

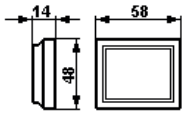


Front element of signal lamp

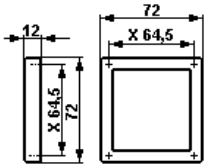
1.3 Signallamp GHG417 1805 R...;

EC-Type Examination Certificate:		IBExU 12ATEX 1047 U			
Marking acc. to 2014/34/EU and standard of series EN 60079:		Ⓔx II 2 G Ex db eb IIC Gb Ⓔx II 2 G Ex db ia IIC Gb			
IECEx type examination certificate:		IECEx IBE 13.0031U			
Category of application standard of series IEC 60079:		Ex db eb IIC Gb Ex db ia IIC Gb			
Permissible operating temperature range:		-55 °C ... +80 °C			
Max. service temperature		+80 °C			
(Other temperatures possible with special versions)					
Rated voltage /Rated current:					
	"e" increased safety (Ex db eb)	20 V	... 254 V	AC/DC	4 ... 15 mA
	"e" increased safety (Ex db eb)	12 V	... 24 V	AC/DC	max. 24 mA
	"i" intrinsically safe version (Ex db ia)	10 V	... 30 V	DC	max. 38.7 mA
Ex-i Datas:	U i	30 V			
	I i	100 mA			
	Ci	0			
	Li	0			
	Pi	750 mW			
Supply terminal:		1x / 2x 0.5- 2.5 mm²; 1 x 4.0 mm² solid			
Test torques:		2.5 Nm			
Weight:		approx. 0.15 kg			

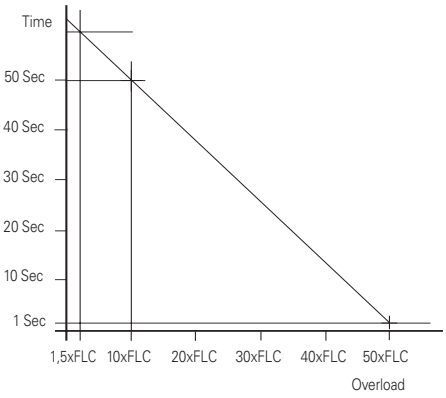
Dimensions of actuator elements



Glass for measuring instrument AM 45



Glass for measuring instrument AM 72



X = fixing dimensions

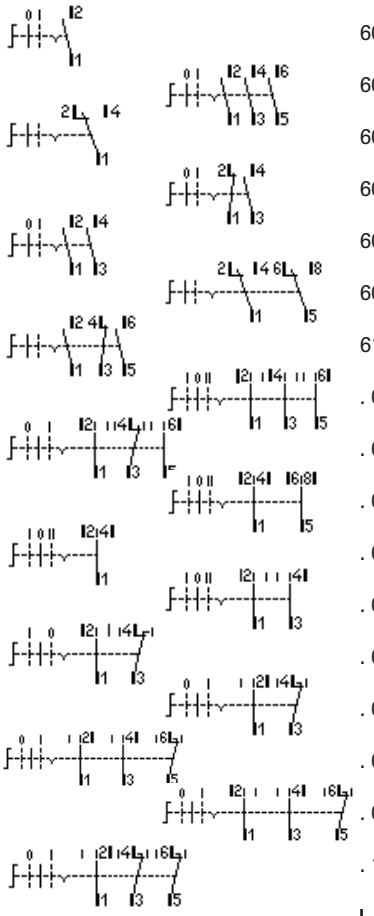
Dimensions in mm

1.4 AM45 / AM72 measuring instrument GHG410 98.. (1) R....

EU-Type Examination Certificate:		BVS 14 ATEX E 125U		
Marking acc. to 2014/34/EU and standard of series EN 60079:				
(1) Moving iron	01 = VM 45 08 = VM 72	⟨Ex⟩ II 2 G	Ex eb mb IIC Gb	
	02 = AM 45 09 = AM 72	⟨Ex⟩ II 2 G	Ex eb IIC Gb / Ex eb mb IIC Gb	
(1) Moving coil	20 = AM 45 21 = AM 72	⟨Ex⟩ II 2 G	Ex ib IIC Gb	
IECEx type examination certificate:		IECEx BVS 14.0082U		
Category of application to standard of series IEC 60079:				
(1) Moving iron	01 = VM 45 08 = VM 72	Ex eb mb IIC Gb		
	02 = AM 45 09 = AM 72	Ex eb IIC Gb / Ex eb mb IIC Gb		
(1) Moving coil	20 = AM 45 21 = AM 72	Ex ib IIC Gb		
Operating temperature:		-55 °C ... +80 °C		
Perm. ambient temperature packing:		-55 °C ... +80 °C		
Degree of protection to EN/IEC 60529:		IP 66 (installed condition)		
Rated voltage:		to max. 500 V		
		Moving iron	Moving coil	
Measuring accuracy:		class 2.5	class 1.5	
Overload range:		10- fold - 25 sec.	10- fold -5 sec.	
		25- fold - 4 sec.		
		50- fold - 1 sec.		
		telltale 1:1.5		
Special versions with 1:2; 1:5; 1:6 and 1:8 are possible for c.t.-versions				
Measuring range:	AM:	n / 1A; 5 A; 10 A	0 - 20 mA	
		0 - 16 A / 25 A direct	4 - 24 mA	
	VM45:	6- 250 V		
	VM72:	6- 500 V		
Power consumption:				
	VM45:	0.91 - 1.76 VA		
	VM72:	0.91 - 2.65 VA		
Coil:			26.5 turns	
Internal resistance:			2.5 Ohm +- 30%	
Li:			max. 0.1 mH	
Ci:			max. 0.1 nF	
Ui:			max. 30 V	
I i :			max. 150 mA	
Supply terminals:		1x / 2 x 1.5- 2.5 mm²	fine- / multi wire	
		1 x 4.0 mm²	solid wire	
Test torques:		2.5 Nm		
Weight:	AM/VM 45:	appox. 0.35 Kg		
	AM/VM 72:	approx. 0.40 Kg		

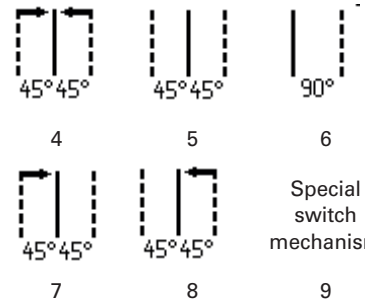
Contact arrangement Code

Ex 23 control switch



6011
6019
6060
6062
6065
6033
6170
. 021
. 023
. 024
. 061
. 063
. 066
. 067
. 049
. 037
. 191

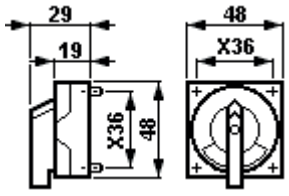
Switch mechanism



4 5 6

Special switch mechanism

7 8 9



Switch actuator Ex 23

1.5 Ex 23 control switch; GHG238 ....R....

EU-Type Examination Certificate:		BVS 13 ATEX E 107U	
Marking acc. to 2014/34/EU			
and standard of series EN 60079:		⟨Ex⟩ II 2 G	Ex db eb IIB Gb
		⟨Ex⟩ II 2 G	Ex db eb IIC Gb
		⟨Ex⟩ II 2 G	Ex db ia/ib IIB Gb
		⟨Ex⟩ II 2 G	Ex db ia/ib IIC Gb
		⟨Ex⟩ II 2 G	Ex db eb I Mb
IECEx type examination certificate:		IECEx BVS 13.0108U	
Category of application			
standard of series IEC 60079:		Ex db eb IIB Gb	
		Ex db eb IIC Gb	
		Ex db ia/ib IIB Gb	
		Ex db ia/ib IIC Gb	
		Ex db eb I Mb	
Operating temperature:	(IIB)	-60 °C ...	+80 °C
	(IIC)	-55 °C ...	+80 °C
Tested ambient temperature range:	(IIB)	-60 °C ...	+55 °C
	(IIC)	-55 °C ...	+55 °C
Degree of protection to EN/IEC 60529:		IP 66	(installed condition)
Rated voltage:		to max.500 V	
Rated current:		10 A	
Switching capacity acc. to AC 15	(EN 60947-5-1):	230 V / 6.0 A	400 V / 6,0 A
Switching capacity acc. to DC 13	(EN 60947-5-1):	24 V / 6.0 A	230 V / 0,4 A
Perm. short-circuit back-up fuse:		16 A/gG to 500 V	
Design with gold-tipped contacts:		to max. 400 mA	
Supply terminals:		1x / 2x 0.5- 2.5 mm²;	
Test torques supply terminals:		2.0 Nm	
Weight:		1 level	2 levels
		approx. 0.20 kg	approx. 0.35 kg

1.6 Terminal block

ATEX certificate:		SEV 13 ATEX 0178 U
Marking acc. to 2014/34/EU and standard:		
	EN 60079-0	⟨Ex⟩ II 2 G Ex eb IIC
IECEx certificate:		IECEx SEV 13.0012 U
Category of application:	IEC60079-0	Ex eb IIC
Type of terminal:		6 x MUT 4
Rated voltage:		up to 352 V
Conductor cross-section:		2 x 0.2- 4.0 mm²
Test torques:		0.6- 0.8 Nm
Weight:		approx. 0.08 kg

1.7 Intrinsically safe circuits:

Intrinsically safe circuits: Max. safe voltage U_m:	690 V_{eff}
	Safe galvanic isolation from all other circuits and earth

X = fixing dimensions

2 Safety instructions

Target group:
For skilled electricians and suitable qualified, instructed personnel in accordance with national legislation, including the relevant standards and, where applicable, in acc. with IEC/EN 60079-14 on electrical apparatus for explosive atmospheres.

The control units GHG 432 and GHG 434. are not suited for use in Zone0 and Zone 20.

The requirements of the IEC/EN 60079-31 regarding excessive dust deposits and temperature to be considered from the user.

The temperature class and type of protection stated on the apparatus shall be observed.

Modifications or changes to the control units are not permitted.

They shall be used for their intended purpose and shall be in a perfect and clean state.

Prior to being put into operation, the control units shall be checked in accordance with the instructions as per section 6.

The national safety rules and regulations for the prevention of accidents, as well as the safety instructions included in these operating instructions, that, like this text, are set in italics, shall be observed!

3 Conformity with standards

The control units are conform to the standards specified in the Declaration of conformity, enclosed separately.

References to standards and directives in these operating instructions always relate to the latest version. Other additions (e.g. details relating to the year) shall be observed.

Fig. 1 Measuring instruments AM/VM72 and AM/VM45 for c.t. connection n/1A

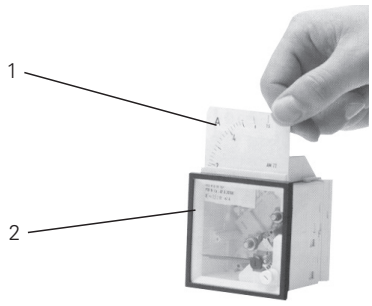
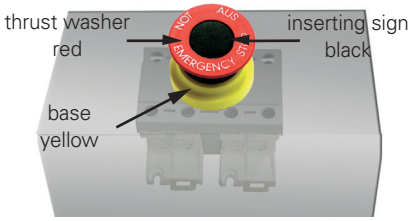


Fig. 2 Mushroom-head pushbutton actuator "EMERGENCY STOP" GHG 410 1437R....



4 Field of application

The control units are intended for use in potentially explosive atmospheres in zones 1, 2 and zones 21, 22 in accordance with IEC/EN 60079-10-1 and IEC/EN 60079-10-2.

The enclosure materials used, including any external metal parts, are high quality materials that ensure a corrosion resistance and resistance to chemical substances according to the requirements for use in a "normal industrial atmosphere"

– impact resistant polyamide
– special steel AISI 316 L.

In case of use in an extremely aggressive atmosphere, please refer to manufacturer.

5 Application / Properties

The control units GHG 432 and 434 are intended for the local control of electrical installations in potentially explosive atmospheres. The units are fitted with built-in components according to the respective application.

Specially marked special versions of the control units can be used in "intrinsically safe circuits".

Where required, the bases are fitted with 0.6 W resistors, fine-wire fuses and diodes (max. power dissipation 1 W).

The electrical limiting values that are decisive for the intrinsic safety shall be observed.

The version with gold-tipped contacts is suited for switching extra-low voltage circuits. Special attention shall be paid to the maximum current load (see "Technical data", pages 12 and 13). The contact chamber of the gold-tipped version is marked with the letter "G" or colour-coded.

To ensure a safe and reliable disconnection, the normally closed contacts are designed as compulsory opening contacts.

When the switch collar of small control switches is cut out at the respective locking position, they can be padlocked (padlock shackle Ø up to 5 mm).

Ex 23 control switch actuator elements shall be provided with a drilled hole, Ø 5.5 mm, at the respective position on the switch collar and can then be padlocked as described above.

Fig. 1:
The measuring instruments AM 72 and AM 45 are used for the local indication of electrical values. See "Technical data" for details of measuring mechanism, accuracy and connection.

With measuring instruments for c.t. connection n/1A (Fig. 1, item 2) the interchangeable scales can be exchanged via a flap on the upper part of the measuring instrument (Fig. 1, item 1).

Fig. 2:
The 4 pole pushbutton contact can be added with the standard CCH actuators.

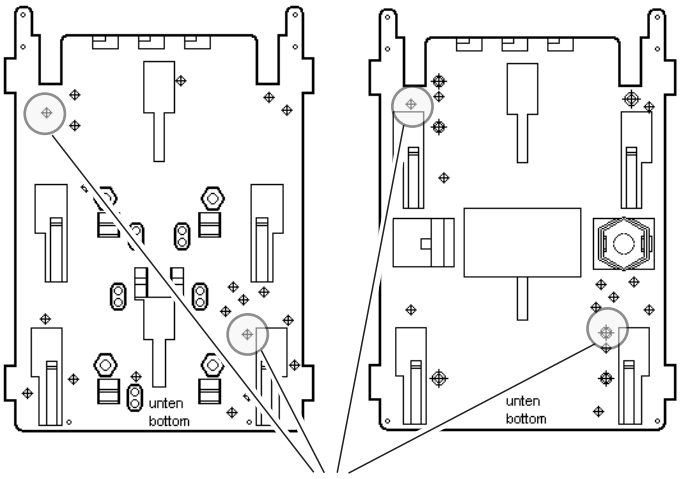
If the 4 pole pushbutton contact is added with an Emergency STOP Mushroom-head pushbutton actuator, then you have to use the actuators with CCH order number GHG 410 1437R.
This actuators can be recognize by the red thrust washer and black inserting sign.

Fig. 3 Mounting plates size

Fastening holes of apparatus mounting plates size 2

Apparatus mounting plate
for trellis and wall mounting

Apparatus mounting plate
for pipe mounting

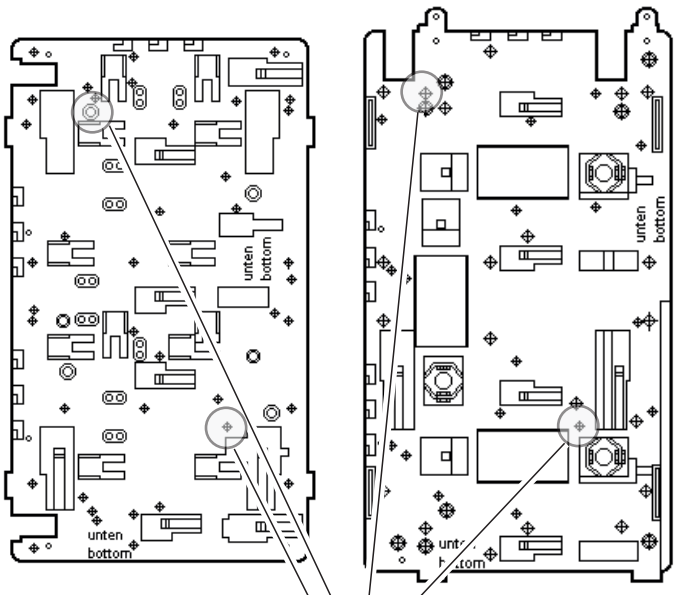


Fastening
holes for
control unit
GHG 432

Befestigungslöcher auf Gerätehalter Größe 3

Apparatus mounting plate
for trellis and wall mounting

Apparatus mounting plate
for pipe mounting



Fastening
holes for
control unit
GHG 434

The data according to sections 3 and 4 shall be taken into account during use.

Applications other than those described are not permissible without a written declaration of consent from Messrs. Cooper Crouse-Hinds / EATON .

During operation the instructions stated in section 7 of the operating instructions shall be observed.

The sole responsibility with respect to the suitability and proper use of the control switches with regard to the basic requirements of these instructions (see "Technical data") lies with the operator.

6 Installation

The relevant national regulations(e.g. Betr.Si.V, the equipment safety law for Germany) and the generally recognized rules of engineering apply for the installation and operation
(IEC/EN 60079-14).

The improper installation and operation of control units may result in the invalidation of the guarantee.

6.1 Mounting

The control units GHG 43. can be mounted without opening the enclosure.

When the control units are mounted directly onto the wall, they shall rest evenly only on the fastening points provided for this purpose.

The screw chosen shall fit the fixing hole (see dimensional drawings) and shall not damage the hole (e.g. use of a washer).

The apparatus shall be fixed diagonally with a minimum of 2 screws.

If the screws are overtightened, the apparatus may be damaged.

Fig. 3:
The control units GHG 432 and GHG 434 are suited for mounting on Cooper Crouse-Hinds / EATON apparatus holders by means of self-cutting screws.

See the respective mounting instructions.

6.2 Opening apparatus/ Electrical connection

Before opening the apparatus, it is necessary to ensure that there is no voltage or to take suitable protective measures.

The electrical connection of the may only be carried out by specialists (IEC/EN 60079-14).

The properly bared conductors of cables shall be connected with due regard to the respective regulations.

To maintain the explosion protection, conductors shall be connected with special care.

The insulation shall reach up to the terminal. The conductor itself shall not be damaged.

In the case of mixed Ex-e / Ex-i installations, the required minimum clearances shall be maintained (see, for example, IEC/EN 60079-11).

When apparatus is open, it is necessary to ensure (disconnect voltage supply) that no voltage is carried over into the connected intrinsically safe circuits.

The minimum and maximum conductor cross sections that can be connected shall be observed (see technical data).

All screws and/or nuts of connection terminals, including those not in use, shall be tightened down securely.

The standard terminals are designed for the direct connection of conductors with copper wires.

The circuit diagram of the built-in components is shown on the components or attached to them, or it is shown in the operating instructions.

If, to facilitate wiring, the built-in components
(AM 72 and AM 45 measuring instruments, pushbutton contact block, signal lamp bases, control switch contact blocks, potentiometer bases, etc.) are snapped off the rail on the bottom of the enclosure, the components shall be snapped back properly into the same notch on the rail.

To snap off components (including the measuring instruments AM 72 and AM 45), pull the hooks outwards to release them.

Switching at the switch shaft of the switch contact block Ex 23 when the enclosure is open is not permitted. (to ensure that the switch can be closed again correctly).

Warning: the engaging positions of the built-in components shall matches the notches on the rail!

The installation instructions for intrinsically safe electrical apparatus shall be observed.

It is necessary to ensure that the permissible external capacitance and inductance of the special intrinsically safe circuits are not exceeded.

! In the case of building up the electrical equipment in the "protective insulation" version, appropriate sticker
(▢) GHG 905 1002 P0005 can be requested by the manufacturer.

! If the inserted terminal rail is not equipped completely with line-up terminals, the terminal rail must be included in the equipotential earth connection also.

6.3 Cable entries (KLE); blanking plugs

Generally only certified cable entries and blanking plugs may be used.

Flexible cables shall be used with trumpet-shaped cable glands or other suitable entries with additional pull relief.

When using cable entries with a degree of protection that is lower than the IP protection of the apparatus, the degree of IP protection for the complete unit is reduced (see Technical Data).

The relevant mounting directives for cables entries being used shall be observed.

Intrinsically safe circuits shall be fed through cable entries that are colour-coded (light blue).

In order to ensure the minimum degree of protection, any unused entry holes shall be sealed with certified blanking plugs.

When fitting cable entries, care has to be taken that the sealing inserts are suitable for the cable diameter.

In the case of sealing inserts that are cut out, it is necessary to ensure that the insert is properly adapted to the cable diameter.

In order to ensure the required minimum degree of protection, the cable entries shall be tightened down securely.

Overtightening can impair the degree of protection.

Warning: When tightening the cap nut of the metal cable entry (e.g. type ADE; ADL), a suitable tool shall be used to safeguard the gland against twisting.

Any unused metric Cooper Crouse-Hinds / EATON cable entries shall be sealed with the blanking plug certified for these metric cable entries.

6.4 Flange and metal plates*

If flange plates have to be dismantled, (e.g. to drill entry holes), when replacing the plates, in order to maintain the minimum degree of protection, it is necessary to ensure that the flange plate and the fixing clamp fit correctly.

PE conductors fed from outside shall be connected to the PE terminal provided on the flange. the maximum terminal cross section is 6 mm².

Warning: Metal flanges, metal plates and metal glands shall be incorporated in the potential equalization.

* not yet certified for category II D

6.5 Closing apparatus / Cover closure

When fitting the enclosure cover onto the base, it is necessary to ensure that the actuator elements correspond correctly with the built-in components and that the enclosure cover for the respective base is being used.

Any foreign matter shall be removed from the apparatus.

To ensure the required minimum degree of protection, the cover screws shall be tightened down.

Overtightening may impair the degree of protection.

6.6 Putting into operation

Before putting the apparatus into operation, the tests specified in the individual national regulations shall be performed.

In addition to this, before being put into ope-ration, the correct functioning of the apparatus and of the built-in components (measuring instruments, signal lamps, pushbuttons, etc.) shall be checked in accordance with these operating instructions and other applicable regulations.

The zero setting of the measuring instrument needle shall be checked before putting it into operation. If necessary, the measuring instrument needle shall be set to zero using the adjustment screw.

The gas group (IIB or IIC) of the intrinsically safe circuit shall be taken into consideration for the evaluation of the gas group of the built-in components.

The improper operation of control units may result in the invalidation of the guarantee.

7 Maintenance / Servicing

The valid national regulations for the servicing / maintenance of electrical apparatus for use in potentially explosive atmospheres shall be observed (IEC/EN 60079-17).

Prior to opening the enclosure, it is necessary to ensure that the voltage supply has been isolated or to take suitable protective measures.

Working with live circuits is permissible for intrinsically safe circuits.

The necessary intervals between servicing depend upon the specific application and shall be stipulated by the operator according to the respective operating conditions.

During servicing, above all, the parts on which the explosion protection depend and function, (e.g. intactness of the flameproof components, the enclosure, the seals and cable entries), the switch mechanism function of the control switch, efficacyof the gaskets and the cable entries and tight fit of all screws shall be checked.

If, in the course of servicing, it is ascertained, that repairs are necessary, section 8 of these operating instructions shall be observed.

Cleaning:

Apparatus marked "Mat.: B" or "Mat.: C" on the type lable have to be cleaned as follows:

Because of the risk of an electrostatic charge, the junction boxes shall only be cleaned with a damp, non fibrous cloth or sponge!

8 Repairs / Overhaul / Modification

Only original Cooper Crouse-Hinds / EATON parts shall be used for carrying out repairs.

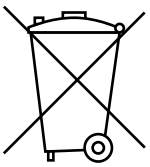
In the event of damage to the flameproof encapsulation, replacement of these components is mandatory. In case of doubt, the respective apparatus shall be sent to Cooper Crouse-Hinds / EATON for repair.

Repairs that affect the explosion protection may only be carried out by Cooper Crouse-Hinds / EATON or by a qualified electrician in compliance with the respective national regulations (IEC/EN 60079-19).

Apparatus modifications or design changes are not permitted; excepted from this is the fitting of additional cable entries within the scope of the apparatus approvals or acc. to the instructions given by the manufacturer.

When replacing individual built-in components (pushbuttons, etc.) section 6.2 "Opening apparatus / Electrical connection" shall be observed.

9 Disposal / Recycling

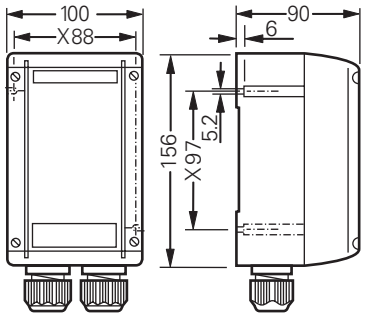


When the apparatus is disposed of, the respective national regulations on waste disposal will have to be observed.

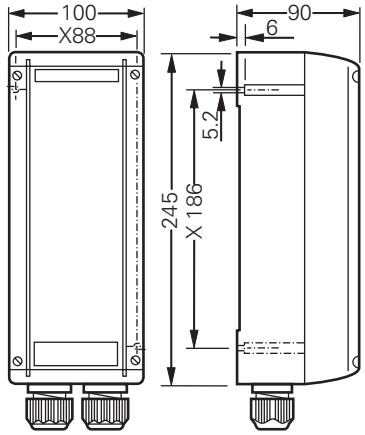
In case of disposal you can obtain additional information from your Cooper Crouse-Hinds /EATON branch.

Subject to modifications or supplement of the product range.

Dimensions en mm



GHG 432



GHG 434

X = dimensions de fixation

1 Caractéristiques techniques

1.1 Boites de commande complete

Attestation d'examen UE de type:		BVS 22 ATEX E 032 X
Marquage selon 2014/34/UE et directive:		
	EN 60079-0	Ⓔx II 2 G Ex eb * IIC / IIB+H_2 / IIB T6/T5 Gb
		Ⓔx II 2 D Ex tb IIIC T80 °C Db
IECEx Certificat de Conformité:		IECEx BVS 22.0029X
Marquage selon:		
	IEC60079-0	Ex eb * IIC / IIB+H_2 / IIB T6/T5 Gb Ex tb IIIC T80 °C Db

* = le marquage est complété ou élargi en fonction des composants Ex utilisés ou des accessoires de logement utilisés (par exemple. db, mb, ia, ib, ...).

Tension nominale:	jusqu'à 690 V
Courant nominal:	16 A au maxi
Température ambiante admissible et Temp. de stockage dans l'emballage original:	-20 °C ... +40 °C (modèles de liste)
Température ambiante approuvée: (D'autres températures possibles avec des modèles spéciaux.)	-40 °C ... +55 °C

Courant nominal / température

courant nominal	Borne de raccordement:	housse de protection	Tamb ≤ +40 °C	+40 °C ≤ Tamb ≤ +55 °C
6 A			T6	T6
10 A	1,5 mm²	1,5 mm²	T6	T5 (T6 bis T_{amb}=+54°C)
16 A			n/a	n/a
6 A			T6	T6
10 A	2,5 mm²	2,5 mm²	T6	T6
16 A			T6	T6/T5*[1]
6 A			T6	T6
10 A	4 mm²	4 mm²	T6	T6
16 A			T6	T5

*[1] uniquement avec KLE adapté et câbles avec une plage de température de service étendue

Indice de protection selon EN/IEC 60529:	IP 66 (standard catalogue)
Classe d'isolation selon EN/IEC 61140:	I – avec plaque métalique
	II – est remplie par les boites de bornes d'éclairage
Borne PE:	2 x 4 mm²
Bornes de connexion:	voir Composants
Entrées de câble (standard catalogue):	2 x M25 (1 x M25; 1 x avec bouchon de fermeture)

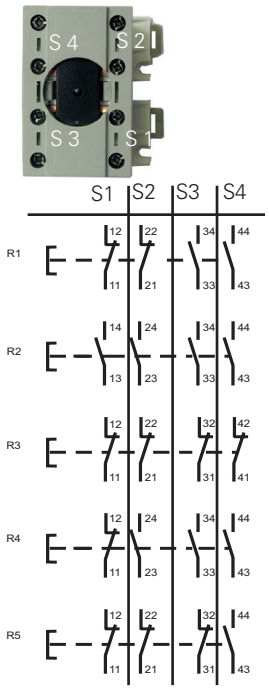
câbles appropriés et couples d'essai de la vis de pression

Entrée de câble			M12	M16	M20	M25	M32
Garniture 1+2+3 (Ø mm / Nm)	1 2 3	min.				8,0 / 1,5	
		max. (1)				10,0 / 2,0	
Garniture 1+2 (Ø mm / Nm)	1 2	min.		5,5 / 1,0	7,0 / 1,5	10,0 / 2,3	14,0 / 3,0
		max. (1)		7,0 / 1,0	9,0 / 1,4	13,0 / 2,6	17,0 / 4,0
Garniture 1 (Ø mm / Nm)	1	min.	5,0 / 0,8	7,0 / 1,0	9,5 / 1,0	13,5 / 1,3	17,5 / 1,5
		max. (1)	7,0 / 1,0	10,0 / 1,4	13,0 / 1,7	17,5 / 2,3	21,0 / 1,3
Couple d' essai pour l'entrée de câble (Nm)			1,2	3,3	2,7	3,0	5,0

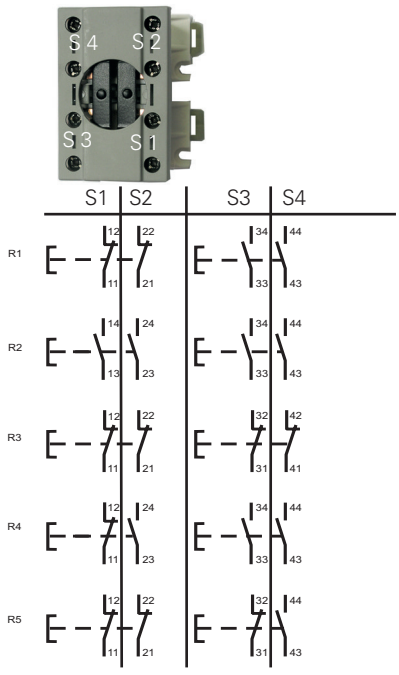
(1) Les tests des plages de serrage et les valeurs de couple de serrage ont été réalisés avec un mandrin métallique. La plage de serrage peut varier légèrement selon le type de câble et les propriétés des matériaux utilisés. Pour les plages de serrage intermédiaires, veuillez utiliser des garnitures d'étanchéité qui laisseront la possibilité de resserrer le chapeau du presse étoupe lors de futures opérations de maintenance.

Boite de commande GHG 432	env. 0,47 kg
Boite de commande GHG 434	env. 0,70 kg
Couples de serrage testés:	
Vis du couvercle	2,00 Nm
⚠ Matériau du boîtier:	
Lettre d'identification "Mat.: A"	polyamide anti-choc < 10^9 Ω
Lettre d'identification "Mat.: B" et "Mat.: C"	polyamide anti-choc > 10^9 Ω

Schémas de connexion GHG41.11..R....;
1 x 4 pole



Schémas de connexion GHG41.11..R.... ;
2 x 2 pole



1.2 Modules général bouton-poussoir, interrupteur, potentiomètre

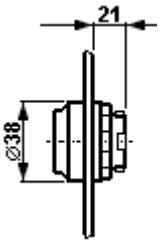
Attestation d'examen CE de type:		IBExU14ATEX1030U		
Marquage selon 2014/34/UE et directive:				
	EN 60079-0	Ⓔx II 2 G	Ex db eb IIC/IIB/IIB+H2 Gb	
		Ⓔx I M 2	Ex db eb I Mb	
IECEx Certificat de Conformité:		IECEx IBE 14.0005U		
Marquage selon:				
	IEC 60079-0	Ex db eb IIC/IIB/IIB+H2 Gb		
		Ex db eb I Mb		
Plage de température ambiante				
	Ⓔx II 2 G ... IIC	-55 °C	...	+55 °C
	Ⓔx II 2 G ... IIB	-60 °C	...	+55 °C
	Ⓔx II 2 G ... IIB+H2	-55 °C	...	+55 °C
Température de fonctionnement:				
	Ⓔx II 2 G ... IIC	-55 °C	...	+80 °C
	Ⓔx II 2 G ... IIB	-60 °C	...	+80 °C
	Ⓔx II 2 G ... IIB+H2	-55 °C	...	+80 °C
Indice de protection selon EN/CEI 60529				
bouton-poussoi DRT:		IP 66		(état installé)
double bouton-poussie DDT:		IP 66		(état installé)
key-operated pushbutton SLT:		IP 66		(état installé)
key-operated pushbutton SLT:		IP 66		(état installé)
operated switch SLS		IP 66		(état installé)
mushroom-head pushbutton SGTE, SGT		IP 66		(état installé)
Mini-control switch SCT		IP 66		(état installé)

1.2.1 Bouton-poussoir GHG41.11. (état installé).R....; 2 pole et interrupteurer
1.2.2 Bouton-poussoir GHG41.11..R....; 4 pole et interrupteur

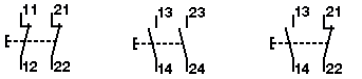
Tension nominale:		jusqu'à 500 V				
Courant nominal maxi	Borne de connexion	Température ambiante admissible maxi				
14 A	2,5 mm²	40 °C				
16 A	4,0 mm² rigide	40 °C				
12 A	2,5 mm²	50 °C				
15 A	4,0 mm² rigide	50 °C				
Puissance de coupure AC15	(EN 60947-5-1):	250 V / 6 A		500 V / 4,0 A		
Puissance de coupure DC13	(EN 60947-5-1):	24 V / 6 A		60 V / 0,8 A		110 V / 0,5 A
Modèle à pointes de contact d'or:		400 mA au maxi				
Borne de raccordement:		1x / 2x 0,5- 2,5 mm²;;				
		1 x 4,0 mm² rigide				
Couples de serrage testés bornes de connexion:		2,5 Nm				
Poids:	2 pole	env. 0,15 kg				
	4 pole	env. 0,35 kg				

Dimensions des éléments de comman de et d'affichage

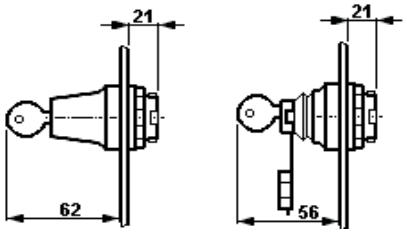
Schémas de connexion

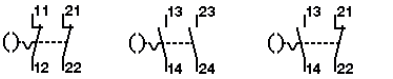


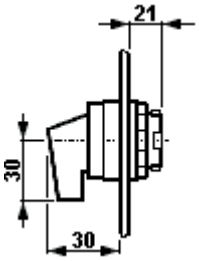
Face avant de-
bouton-poussoi

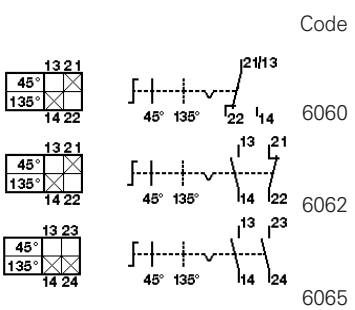


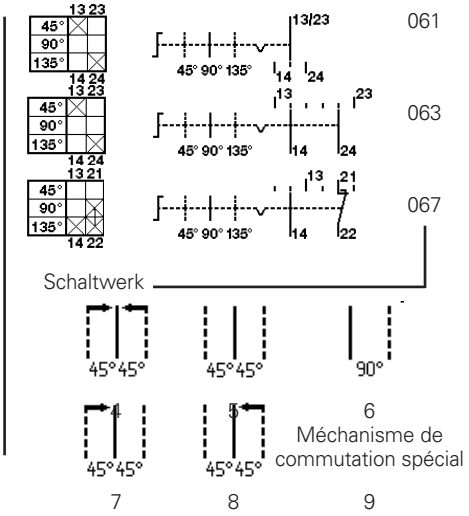
double bouton-poussier



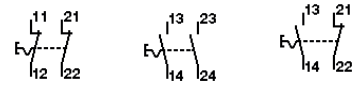


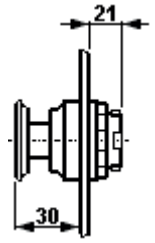


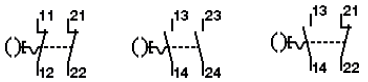










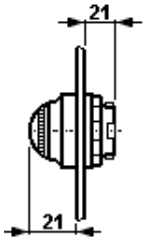


Valeurs en mm

1.2.3 Potentiomètre GHG41.16..R...;

Tension nominale:	jusqu'à 250 V
Puissance:	1 W
Indice de protection selon EN/CEI 60529:	IP 66 (état installé)
Domaine de rotation:	270°
Echelle:	0- 100%
Borne de raccordement:	1x / 2x 0,5- 2,5 mm²;
Couples de serrage testés bornes de connexion:	2,5 Nm
Poids:	env. 0,15 kg

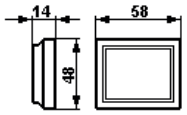
1.3 Lampe de signalisation GHG417 1805 R...



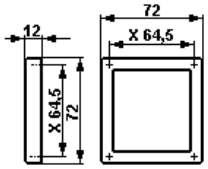
Lampe de signalisation

Attestation d'examen CE de type:		IBExU 12ATEX 1047 U			
Marquage selon 2014/34/UE et normes de la série EN 60079:		⟨Ex⟩ II 2 G Ex db eb IIC Gb ⟨Ex⟩ II 2 G Ex db ia IIC Gb			
IECEx Certificat de Conformité:		IECEx IBE 13.0031U			
Marquage selon normes de la série IEC 60079:		Ex db eb IIC Gb Ex db ia IIC Gb			
Température ambiante admissible en fonctionnement:		-55 °C ...	+80 °C		
Max. température de service:		+80 °C			
(d'autres valeurs sont possibles avec des modèles spéciaux.)					
Tension nominale / courant nominal:					
	"e" une sécurité accrue (Ex db eb)	20 V ...	254 V	AC/DC	4 ... 15 mA
	"e" une sécurité accrue (Ex db eb)	12 V ...	24 V	AC/DC	max. 24 mA
	"i" version à sécurité intrinsèque (Ex db ia)	10 V ...	30 V	DC	max. 38,7mA
Données de Ex-i:	U i	30 V			
	I i	100 mA			
	Ci	0			
	Li	0			
	Pi	750 mW			
Borne de connexion:		1x / 2x 0,5- 2,5 mm²; 1 x 4,0 mm² rigide			
Couples de serrage testés bornes de connexion:		2,5 Nm			
Poids:		env. 0,15 kg			

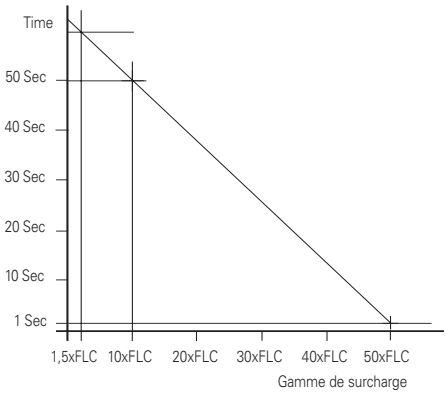
Dimensions des éléments de commande



Tête d'instrument de mesure AM 45



Tête d'instrument de mesure AM 72

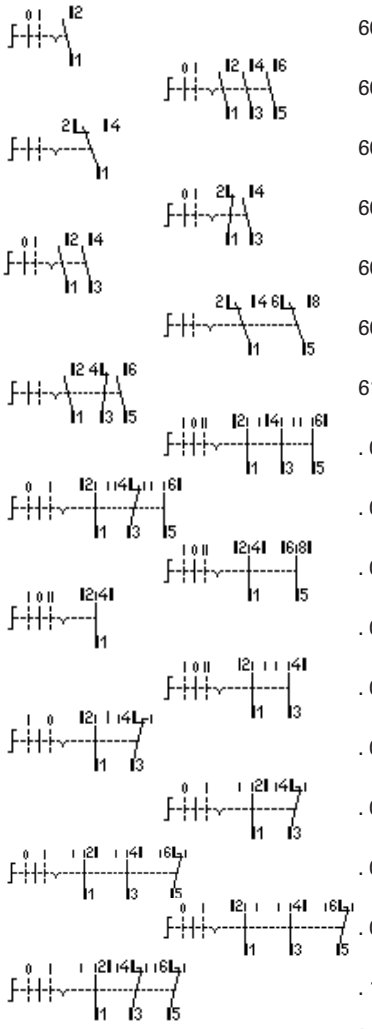


X = dimensions de fixation

1.4 Instrument de mesure AM45 / AM72 GHG410 98.. (1) R....

Attestation d'examen CE de type:		BVS 14 ATEX E 125U	
Marquage selon 2014/34/UE et normes de la série EN 60079:			
(1) ferromagnétique	01 = VM 45 08 = VM 72	Ⓔx II 2 G	Ex eb mb IIC Gb
	02 = AM 45 09 = AM 72	Ⓔx II 2 G	Ex eb IIC Gb / Ex eb mb IIC Gb
(1) magnéto-électrique	20 = AM 45 21 = AM 72	Ⓔx II 2 G	Ex ib IIC Gb
IECEx Certificat de Conformité:		IECEx BVS 14.0082U	
Marquage selon normes de la série IEC 60079:			
(1) ferromagnétique	01 = VM 45 08 = VM 72	Ex eb mb IIC Gb	
	02 = AM 45 09 = AM 72	Ex eb IIC Gb / Ex eb mb IIC Gb	
(1) magnéto-électrique	20 = AM 45 21 = AM 72	Ex ib IIC Gb	
Température de fonctionnement:		-55 °C ... +80 °C	
Température de stockage dans l'emballage d'orgine:		-55 °C ... +80 °C	
Indice de protection selon EN/CEI 60529:		IP 66 (état installé)	
Tension nominale:		500 V au maxi	
		ferromagnétique	magnéto-électrique
Justesse:		Classe 2,5	Classe 1,5
Gamme de surcharge:		10- fois à - 25 sec.	10- fois à -5 sec.
		25- fois à - 4 sec.	
		50- fois à - 1 sec.	
		telltale 1:1,5	
Des versions spéciales avec 1:2 ; 1:5 ; 1:6 et 1:8 sont possibles pour les unités de transformateur d'intensité			
Etendue de mesure:	AM:	n / 1A; 5 A; 10 A	0 - 20 mA
		0 - 16 A / 25 A direct	4 - 24 mA
	VM45:	6- 250 V	
	VM72:	6- 500 V	
Consommaton d'énergie:			
	VM45:	0,91- 1,76 VA	
	VM72:	0,91- 2,65 VA	
Coil:			26,5 tours
Résistance interne:			2,5 Ohm +- 30%
Li:			max. 0,1 mH
Ci:			max. 0,1 nF
Ui:			max. 30 V
I i :			max. 150 mA
Borne de raccordement:		1x / 2x 0,5- 2,5 mm²	fine- / brin
		1 x 4,0 mm²	solide
Couples de serrage testés bornes de connexion:		2,5 Nm	
Poids	AM/VM 45:	appox. 0,35 Kg	
	AM/VM 72:	approx. 0,40 Kg	

Schémas des connexions
Commutateur decommande
Ex 23/ Couplage



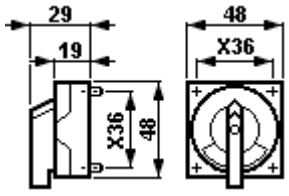
Mécanisme de commutation





Mécanisme de commutation spécial

9



Commutateur de commande
Ex 23; GHG238 ....R....

1.5 Commutateur de commande Ex 23; GHG238 ....R....

Attestation d'examen CE de type:	BVS 13 ATEX E 107U				
Marquage selon 2014/34/UE					
et normes de la série EN 60079:	⟨Ex⟩ II 2 G Ex db eb IIB Gb				
	⟨Ex⟩ II 2 G Ex db eb IIC Gb				
	⟨Ex⟩ II 2 G Ex db ia/ib IIB Gb				
	⟨Ex⟩ II 2 G Ex db ia/ib IIC Gb				
	⟨Ex⟩ II 2 G Ex db eb I Mb				
IECEx Certificat de Conformité:	IECEx BVS 13.0108U				
Marquage selon					
normes de la série IEC 60079:	Ex db eb IIB Gb				
	Ex db eb IIC Gb				
	Ex db ia/ib IIB Gb				
	Ex db ia/ib IIC Gb				
	Ex db eb I Mb				
Température de fonctionnement: (IIB)	-60 °C	...	+80 °C		
(IIC)	-55 °C	...	+80 °C		
Plage de température ambiante testée: (IIB)	-60 °C	...	+55 °C		
(IIC)	-55 °C	...	+55 °C		
Température de stockage dans l'emballage d'orgine	-60 °C	...	+80 °C		
Indice de protection selon EN/CEI 60529:	IP 66	(état installé)			
Tension nominale:	au max.500 V				
Courant nominal maximum:	10 A				
Puissance de coupure AC 15 (EN 60947-5-1):	230 V /	6,0 A	400 V	/	6,0 A
Puissance de coupure DC 13 (EN 60947-5-1):	24 V /	6,0 A	230 V	/	0,4 A
Fusible de court-circuit adm. placé en amont:	16 A/gG to500 V				
Modèle à pointes de contact d'or:	au. max. 400 mA				
Borne de raccordement:	1x / 2x 0,5- 2,5 mm²;				
Couples de serrage testés bornes de connexion:	2,0 Nm				
Poids:	1 étage	2 étages			
	env. 0,20 Kg	env. 0,35 Kg			

1.6 Bornier

ATEX Certificat:		SEV 13 ATEX 0178 U
Marquage selon 2014/34/UE et directive:		
	EN 60079-0	⟨Ex⟩ II 2 G Ex eb IIC
IECEx Certificat:		IECEx SEV 13.0012 U
Marquage selon:	IEC60079-0	Ex eb IIC
Type de borne:		6 x MUT 4
Tension nominale:		jusqu'à 352 V
Section transversale du conducteur:		2 x 0,2- 4,0 mm²
Couples de serrage testés bornes de connexion:		0,6- 0,8 Nm
Poids:		env. 0,08 kg

1.7 Circuit à sécurité intrinsèque

Tension maximale pour sécurité technique U_m:	690 V_{eff}
	isolation galvanique de tous les autres circuits à sécurité intrinsèque et de la terre

2 Consignes de sécurité

Groupe cible:
Pour les électriciens qualifiés et les personnels ayant reçu les formations adéquates, conformément à la législation nationale en vigueur et, si applicable, à la norme CEI/EN 60079-14 sur les installations électriques pour les atmosphères explosives.

Les boites de commande GHG 432 et GHG 434 ne conviennent pas à un emploi en zone 0.

Les exigences des CEI/EN 60079-31 en ce qui concerne des dépôts de poussière démesurés et une température doivent être considérées par l'utilisateur.

Il n'est pas permis de transformer ou de modifier les boites de commande.

Seuls des boites de commande intactes et parfaites devront être employées pour la fonction qui leur est dévolue.

Des réparations qui portent sur la protection contre l'explosion, ne devront être exécutées que par Cooper Crouse-Hinds / EATON ou par un électricien qualifié en conformité avec la règlementation nationale en vigueur.

Avant la mise en service, les boites de commande doivent être vérifiées selon l'instruction donnée dans la section 6.

Respectez les prescriptions nationales de sécurité et de prévoyance contre les accidents ainsi que les consignes de sécurité figurant en italique dans ce mode d'emploi.

3 Conformité avec les normes

Les Appareils sont conformes aux normes reprises dans la déclaration de conformité, jointe séparément.

Les références aux normes et directives dans cette notice se réfèrent toujours à la dernière version. Les suppléments éventuels doivent également être respectés.

Fig. 1 Instruments de mesure pour connexion au transformateur d'intensité n/1A; AM/VM72 et AM/VM45

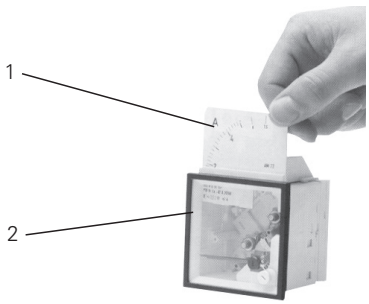
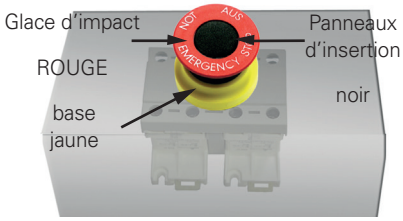


Fig. 2 Têtede bouton-poussoir à frapper GHG 410 1437R....



4 Domaine d'utilisation

Ces boites de commande comportant les composants décrits dans le chapitre Caractéristiques techniques répondent aux exigences d'une utilisation en atmosphère explosible, zones 1, 2 et 21, 22 selon la norme CEI/EN 60079-10-1 et CEI/EN 60079-10-2.

Pour l'enveloppe, et les pièces métalliques extérieures, des matières de qualité supérieure (polyamide anti-choc) qui assurent une protection appropriée contre la corrosion et une résistance aux agents chimiques en "atmosphère normale" ont été employées:

– polyamide anti-choc
– acier spécial AISI 316 L

En cas d'utilisation en atmosphère extrèmement corrosive, vous pouvez obtenir des informations complémentaires sur la résistance chimique des plastiques utilisés chez la succursale Cooper Crouse-Hinds de votre région.

5 Utilisation / Propriétés

Les boites de commande GHG 432 et GHG 434 servent à la commande sur place d'installations électriques en atmosphère explosive.
Selon de l'emploi spécifique et suivant le cas, les appareils seront dotés des composants encastrés appropriés.

Des modèles spéciaux de boites de commande conçus sur demande peuvent être employés dans des circuits à sécurité intrinsèque.

Suivant le cas, les socles sont aussi dotés de résistances de 0,6 W, de fusibles pour faible intensité et de diodes
(puissance dissipée de 1 W maxi).

Dans ce cas, les valeurs électriques limites de la sécurité intrinsèque sont à respecter.

Le modèle à pointes de contact or est employé pour la coupure de valeurs de tension peu élevées. La tension maximale admise doit être observée (voir Caractéristiques techniques). Ce modèle est reconnaissable au marquage "G" sur le socle.

Afin d'obtenir une déconnexion fiable, des contacts de rupture forcée ont été montés comme contacts normaux.

Si le collet de commutation des poignées est découpé à la position de verrouillage respective, il est possible de les cadenasser dans cette position (Ø de l'étrier jusqu'à 5 mm).

Les têtes du commutateur de commande Ex23 doivent être munies d'un perçage de 5,5 mm Ø sur leur collet de commutation et peuvent ainsi être bloquées avec un cadenas comme cité ci-dessus.

Fig. 1:
L'instrument de mesure AM 72 et AM 45 sert à l'indication sur place des grandeurs électriques. Le type du mécanisme de mesure, la justesse et le type de raccordement sont indiqués dans les caractéristiques techniques.

En cas d'instruments de mesure pour connexion au transformateur d'intensité n/1A (fig. 1, pos. 2), un volet disposé sur la partie supérieure de l'instrument de mesure permet d'échanger les echelles (fig. 1, pos. 1)

Fig. 2:
On peut actionner 4 bases de traceur de pression polige avec le type d'état CCH résolutions de contrôle.

Si 4 bases de traceur de pression polige avec un traceur d'impact la résolution doit être actionnée avec des mécanisme de verrouillage, cette résolution doit être équipée avec un mécanisme de verrouillage renforcée.

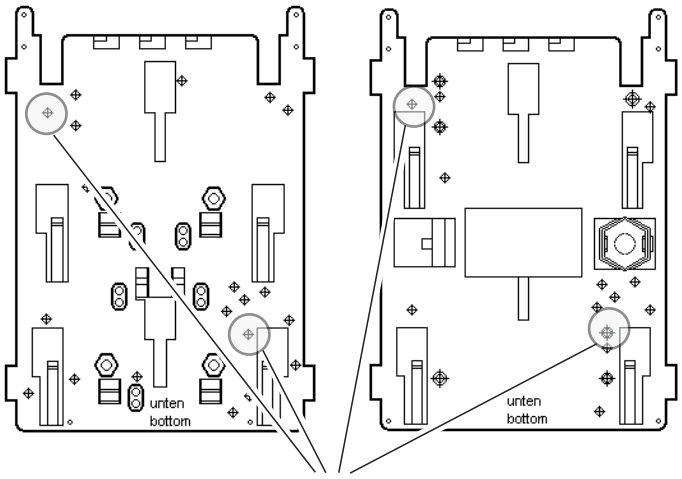
Cette résolution est à la glace d'impact rouge avec des panneaux d'insertion noirs de manière perceptible et p. ex. sous le CCH un numéro d'article GHG 410 1437R….

Fig. 3 Mounting plates size

Trous de fixation sur porte-appareils taille 2

Porte-appareil pour fixation au mur et au conduit de grille

Porte-appareil pour fixation aux tubes

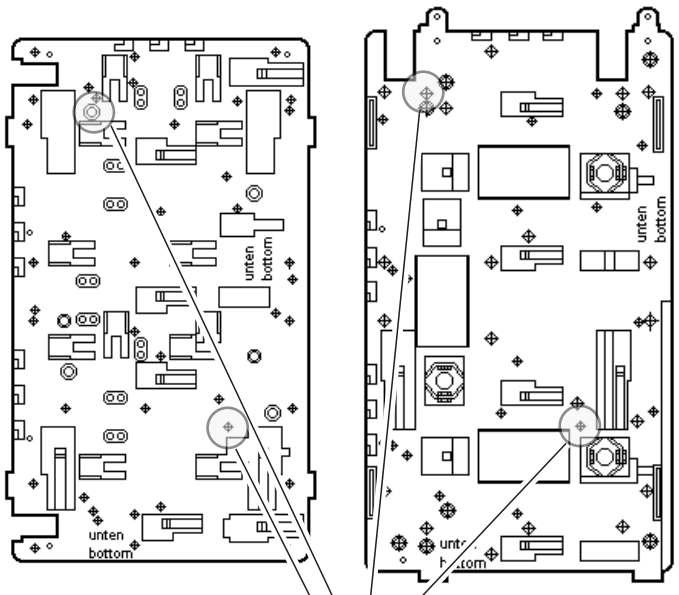


Trous de fixation pour boite de commande GHG 432

Trous de fixation sur porte-appareils taille 3

Porte-appareil pour fixation au mur et au conduit de grille

Porte-appareil pour fixation aux tubes



Trous de fixation pour boite de commande GHG 434

Pour l'emploi, les consignes des sections 3 et 4 devront être respectées.

Des emplois autres que ceux décrits ne sont admis qu'avec le consentement par écrit de la part de Cooper Crouse-Hinds / EATON .

Lors de l'exploitation, les instructions selon point 7 de ce mode d'emploi doivent être respectées.

Seul l'utilisateur est responsable de l'emploi comme prévu de cette boites de commande, en tenant compte des conditions générales existant dans l'établissement (voir Caractéristiques techniques).

6 Installation

Pour l'installation et l'exploitation de ces appareils, la règlementation nationale en vigueur (en Allemagne par ex. Betri.Si.V, loi de sécurité des appareils) ainsi que les règles de la technique généralement reconnues devront être respectées. (CEI/EN 60079-14)

L'installation incorrecte de ces boites à commande peut annuler la garantie.

6.1 Montage

Le montage des boites de commande GHG 43. peut se faire sans ouvrir l'enveloppe.

En cas de montage directement au mur, les boites de commande ne doivent reposer au niveau du mur que sur les points de fixation prévus.

La vis choisie doit être en rapport avec le pas de fixation (voir plan coté).

Elle ne doit pas avarier lepas devis (par ex. emploi d'une rondelle).

Si les vis sont forcées, l'appareil peut être endommagé.

Les boites de commande GHG 432 et GHG 434 peuvent être montées sur des porte-appareils Cooper Crouse-Hinds / EATON au moyen de vis autotaraudeuses.

Les instructions respectives pour le montage devront être respectées.

6.2 Ouverture de l'appareil /Raccordement électrique

Avant ouverture des boîtiers, on s'assurera de la mise hors tension et de la prise de mesures de sécurité.

Le raccordement électrique de l'appareil ne doit se faire que par un personnel qualifié CEI/EN 60079-14).

En tenant compte des règlements respectifs, les conducteurs dûment dénudés des câbles sont raccordés.

Afin de maintenir le mode de protection, la connexion des conducteurs doit se faire très soigneusement.

L'isolation doit couvrir le conducteur jusqu'à la borne. Le conducteur lui-même ne doit pas être endommagé.

Si l'appareil comporte des composants Ex-i et Ex-e, les distances minimales requises sont à respecter (voir par ex. CEI/EN 60079-11).

On s'assurera qu'il n'y a aucun reste de tension dans les circuits à sécurité intrinsèque lorsque l'appareil est ouvert.

Les sections minimales et maximales admissibles des conducteurs doivent être respectées (voir caractéristiques techniques).

Toutes les vis et/ou écrous des bornes de connexion, aussi celles des bornes non utilisées, doivent être serrées à fond.

La borne standard installée au choix est prévue pour raccordement direct des conducteurs en cuivre.

Le schéma des connexions des composants encastrés est soit indiqué sur ceux-ci, soit joint à l'appareil. Il peut encore être exposé dans la notice d'utilisation.

En cas de boîtes de commande câblées, le schéma des connexions joint à l'appareil doit être respecté.

Si, pour faciliter le câblage, les composants encastrés (instrument de mesure AM 72 et AM 45, socle de bouton-poussoir, socle de lampe de signalisation, socle de commutateur de commande, socle de potentiomètre etc.) sont déchiquetés du profilé sur le cadre d'encastrement monté dans les boites de commande, les composants devront être correctement remis dans la position d'encliquetage correspondante sur le profilé du cadre d'encastrement.

Afin de faire décliqueter les composants (instruments de mesure AM72 et AM 45), les crochets à crans sont tirés vers l'extérieur pour les déverrouiller.

Il n'est pas permis de faire une opération de commutation sur l'axe du socle d'interrupteurs Ex 23 lorsque l'enveloppe est ouverte (afin de pouvoir refermer le commutateur correctement).

Attention: Les positions d'encliquetage des composants encastrés doivent correspondre aux encoches du profilé.

Les instructions pour le montage du matériel électrique à sécurité intrinsèque doivent être respectées.

Il faut assurer que la capacitance et l'inductance extérieures admissibles pour le circuit spécifique à sécurité intrinsèque ne soient pas dépassées.

! Si le moyen opérationnel est exporté dans la mise en oeuvre "protection d'isolation", l'autocollant correspondant (▢) GHG 905 1002 P0005 peut être demandé pour le fabricant.

! Si le rail terminal inséré n'est pas équipé complètement avec des bornes de ligne, le rail terminal doit être inclus dans le raccordement équipotentiel de la terre également.

6.3 Entrées de câble / Bouchons de fermeture

Généralement, seuls des bouchons de fermeture et des entrées de câble certifiés doivent être utilisés. Pour des câbles flexibles il faudra utiliser des presse-étoupes en forme de trompette ou d'autres entrées appropriées avec décharge de traction supplémentaire.

Lorsque des entrées de câble avec un indice de protection IP inférieur à celui de la boîte à bornes sont employées, l'indice de protection IP de l'ensemble sera réduit.

Les directives pour le montage qui s'appliquent aux entrées de câble utilisées, doivent être respectées.

Pour les circuits à sécurité intrinsèque, seules les entrées de câble EX-i (reconnaissables à leur couleur bleu clair) devront être utilisées.

Des ouvertures d'entrée non utilisées doivent être fermées avec un bouchon de fermeture certifié pour établir l'indice de protection minimum.

Lors du montage des entrées de câble il faudra veiller à ce que des garnitures d'étanchéité correspondant au diamètre du câble soient utilisées.

En cas de garnitures qui doivent être coupées sur mesure, il faudra faire attention à ce que la garniture soit adaptée au diamètre du câble.

Les entrées de câble doivent être serrées à fond pour maintenir l'indice de protection minimum.

Au cas où elles seraient forcées, cela pourrait être nuisible à l'indice de protection.

Attention : Lors du serrage de l'écrou borgne de l'entrée de câble métallique (par ex. type ADE; ADL), on veillera à éviter toute distorsion en utilisant un outil approprié.

Toutes les entrées de câble métriques Cooper Crouse-Hinds / EATON non utilisées doivent être fermées avec un bouchon de fermeture certifié pour des entrées de câble métriques.

6.4 Plaques à brides*

Si les plaques à brides doivent être démontées (pour perçage d'entrées de câble, par exemple) il faudra veiller lors du montage au maintien de l'indice de protection en replaçant correctement la plaque ainsi que les brides de serrage.

Des conducteurs PE amenés de l'extérieur doivent être connectés à la borne PE prévue à cet effet sur la bride. La section maximale est de 6 mm²

Attention: les brides métalliques, les plaques de fond métalliques et les presse-étoupe métal-liques doivent être reliés au même potentiel.

* pour le moment, pas encore certifié Catégorie II D

6.5 Fermeture de l'appareil / Fermeture à couvercle

Lorsque le couvercle est posé sur l'enveloppe, il faut veiller à ce que les têtes de commande soient en concordance exacte avec les composants encastrés et que seul le couvercle appartenant à la partie inférieure de l'enveloppe soit utilisé.

Tout corps étranger doit être ôté de l'appareil.

Les vis de couvercle doivent être serrées à fond afin de maintenir l'indice de protection minimum.

Si les vis sont forcées, cela peut être nuisible à l'indice de protection.

6.6 Mise en service

Avant la mise en service de l'appareil, les vérifications spécifiées dans les règlements nationaux individuels devront être exécutées.

De plus, on vérifiera que son fonctionnement et son installation sont correcte de telle sorte à respecter les instructions de ce mode d'emploi et des autres règlements applicables

Avant la mise en service, le positionnement à zéro de l'aiguille devra être vérifié. Le cas échéant, on utilisera la vis de réglage.

La classification du gaz (II B ou II C) du circuit à sécurité intrinsèque est à prendre en compte pour le classement des composants encastrés.

L'utilisation incorrecte de ces boites à bornes peut annuler la garantie.

7 Maintien/Entretien

La règlementation nationale en vigueur pour le maintien et l'entretien du matériel électrique pour atmosphère explosive doit être respectée (CEI/EN 60079-17).

Avant d'ouvrir l'enveloppe, débrancher l'appareil ou prendre des mesures préventives appropriées.

En cas de circuits à sécurité intrinsèque, des travaux sont permis sous tension.

Les intervalles de service requis dépendent de l'emploi spécifique et devront donc être fixés par l'utilisateur en tenant compte des conditions d'utilisation.

Lors de l'entretien des commutateurs, surtout les composants qui sont essentiels à leur mode de protection contre l'explosion et function, doivent être vérifiés (par ex. intégrité des composants antidéflagrants et du boitier, efficacité des joints de couvercle et resserrement des entrées de câble, ajustement serré de toutes les vis) ainsi que le fonctionnement du mécanisme de commutation.

Si, lors d'un entretien, on constate que des travaux d'entretien sont nécessaires, il faudra suivre le point 8 de ce mode d'emploi.

Nettoyage:

Les appareils marqués "Mat. : B" ou "Mat. : C" sur la plaque signalétique doivent être nettoyés comme suit :

Vu le risque d' une charge électrostatique, le Boites de dérivation ne doit être nettoyé qu'avec un chiffon humide et non fibreux ou qu'avec une éponge!

8 Réparations/Remise en état

Des réparations ne doivent être exécutées qu'à l'aide des pièces de rechange d'origine Cooper Crouse-Hinds / EATON .

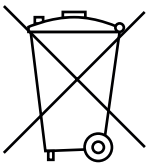
En cas de défauts sur l'enveloppe antidéfla-grante, seul un remplacement est admissible. Dans le doute, l'appareil défectueux devra être renvoyé à Cooper Crouse-Hinds / EATON pour réparation.

Des réparations qui portent sur la protection contre l'explosion, ne devront être exécutées que par COOPER CROUSE-HINDS / Cooper Crouse-Hinds / EATON ou par un électricien qualifié en conformité avec la règlementation nationale en vigueur (CEI/EN 60079-19).

Il n'est pas permis de transformer ou de modifier ces appareils, sauf pour le montage des entrées de câble supplémentaires en conformité avec leur homologation.

Pour remplacer des composants encastrés individuels (instrument de mesure, bouton-poussoir etc.), l'alinéa 6.2 "Ouverture de l'appareil/ Raccordement électrique" devra être respecté.

9 Évacuation des déchets/Recyclage



Lors de l'évacuation de ce matériel électrique, la règlementation nationale respective en vigueur devra être respectée.

En cas d'élimination, vous pouvez obtenir des informations supplémentaires auprès de votre branche Cooper Crouse-Hinds / EATON.

Sous réserve de modification ou de supplément de cette série de produits.

CZ: "Tento návod k použití si můžete vyžádat ve svém mateřském jazyce u příslušného zastoupení společnosti Cooper Crouse-Hinds/CEAG ve vaší zemi."

DK: "Montagevejledningen kan oversættes til andre EU-sprog og rekvireres hos Deres Cooper Crouse-Hinds/CEAG leverandør"

E: "En caso necesario podrá solicitar de su representante Cooper Crouse-Hinds/CEAG estas instrucciones de servicio en otro idioma de la Union Europea"

EST: "Seda kasutusjuhendit oma riigikeeles võite küsida oma riigis asuvast asjaomasest Cooper Crouse-Hindsi/CEAG esindusest."

FIN: "Tarvittaessa tämän käyttöohjeen käännös on saatavissa toisella EU:n kielellä Teidän Cooper Crouse-Hinds/CEAG - edustajaltanne"

GR: *Εαν χρειασθει, μεταφραση των οδηγιων χρησε ως σε αλλη γλωσσα της* EE, *μπορει να ζητηθει απο τον Αντιπροσωπο της* Cooper Crouse-Hinds/CEAG"

H: "A kezelési útmutatót az adott ország nyelvén a Cooper Crouse-Hinds/CEAG cég helyi képviseletén igényelheti meg."

I: "Se desiderate la traduzione del manuale operativo in un´altra lingua della Comunit à Europea potete richiederla al vostro rappresentante Cooper Crouse-Hinds/CEAG"

LT: Šios naudojimo instrukcijos, išverstos į Jūsu gimtąją kalbą, galite pareikalauti atsakingoje "Cooper Crouse-Hinds/CEAG" atstovybėje savo šalyje.

LV: "Šo ekspluatācijas instrukciju valsts valodā varat pieprasīt jūsu valsts atbildīgajā Cooper Crouse-Hinds/CEAG pārstāvniecībā."

M: Jistgħu jitolbu dan il-manwal fil-lingwa nazzjonali tagħhom mingħand ir-rappreżentant ta' Cooper Crouse Hinds/CEAG f'pajjiżhom.

NL: "Indien noodzakelijk kan de vertaling van deze gebruiksinstructie in een andere EU-taal worden opgevraagd bij Uw Cooper Crouse-Hinds/CEAG - vertegenwoordiging"

P: "Se for necessária a tradução destas instruções de operação para outro idioma da União Europeia, pode solicita-la junto do seu representante Cooper Crouse-Hinds/CEAG"

PL: Niniejszą instrukcję obsługi w odpowiedniej wersji językowej można zamówić w przedstawicielstwie firmy Cooper-Crouse-Hinds/CEAG na dany kraj.

S: "En översättning av denna montage- och skötselinstruktion till annat EU - språk kan vid behov beställas från Er Cooper Crouse-Hinds/CEAG- representant"

SK: "Tento návod na obsluhu Vám vo Vašom rodnom jazyku poskytne zastúpenie spoločnosti Cooper Crouse-Hinds/CEAG vo Vašej krajine."

SLO: "Navodila za uporabo v Vašem jeziku lahko zahtevate pri pristojnem zastopništvu podjetja Cooper Crouse-Hinds/CEAG v Vaši državi."

RUS: "При необходимости, вы можете запрашивать перевод данного руководства на другом языке ЕС или на русском от вашего Cooper Crouse-Хиндс / CEAG - представителей."

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