Base Load Power Hub (BLPH)

INSTRUCTION AND OPERATING MAINTENANCE (IOM)-FIREFIGHTING AND SAFETY EQUIPMENT

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Document Class: 3

ROSETTI MARINO

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

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Sign | Date

28/01/25

Rev.	Date	Description	Prepared	Reviewed	Approved
00	19/12/2024	Issue for Information (IFR)	BACH	POTU	ROSC

Dräger

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Revision / Change Log

Rev.	Description
00	Issue for Information (IFI)

General comment: all the safety, operating and maintenance isngtructiontions shall be translated in hollandeese language.
Also provide specific indicaiton for the sold product and not general for different models. The instructions shall be clear for use the product.

HOLDS LIST

No.	Description
1	
2	
3	
4	

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None

1 INTRODUCTION

1.1 PROJECT OVERVIEW

Crosswind, a Shell and Eneco joint venture, was awarded the tender to develop the offshore Hollandse Kust Noord (HKN) wind farm, located 18.5km off the coast of Netherlands near the town of Egmond aan Zee. The consortium plans to have HKN operational in 2023 with an installed capacity of 759MW generating at least 3.3TWh per year. This is sufficient renewable power to supply more than 1 million Dutch households with green electricity.

Offshore wind farms produce intermittent electricity and balancing these dips and peaks and integrating this electricity into the national energy system requires new technologies. For this reason, the offshore wind farm will include several new technologies that could be implemented at full-scale in the future. The new technologies being explored include a floating solar park, a short-duration battery storage as well as long-term storage via green hydrogen produced by water electrolysis and subsequently consumed in a fuel cell. The combination of these individual measures, herein referred to as the Base Load Power Hub (BLPH) will ensure a continuous power supply regardless of the wind situation.

1.1.1 Project Location

The Hollandse Kust Noord (HKN) wind farm is located 18.5km off the coast of the Netherlands near the town of Egmond aan Zee.

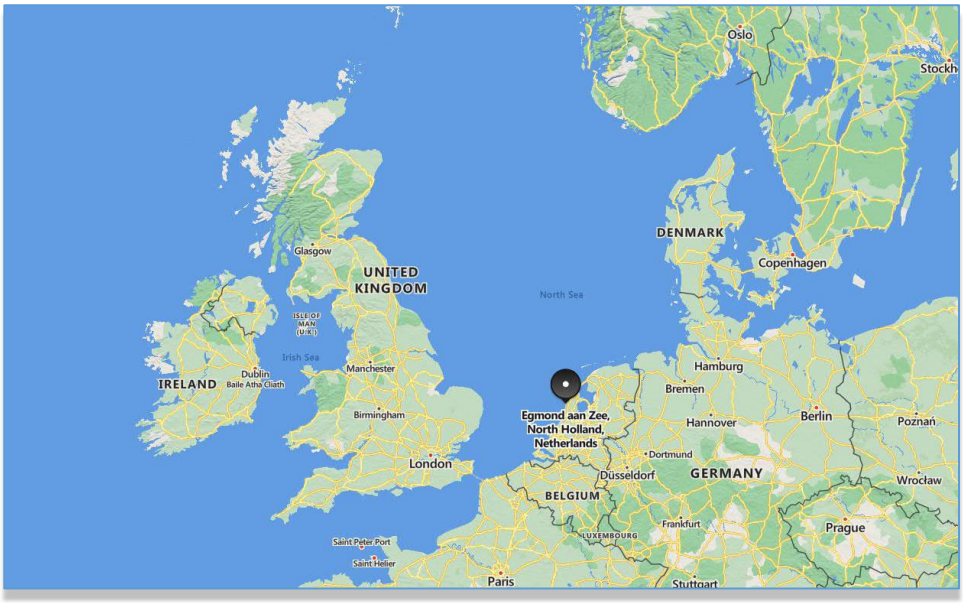


Figure 1 HOLLANDSE KUST NOORD WIND PARK Location Map

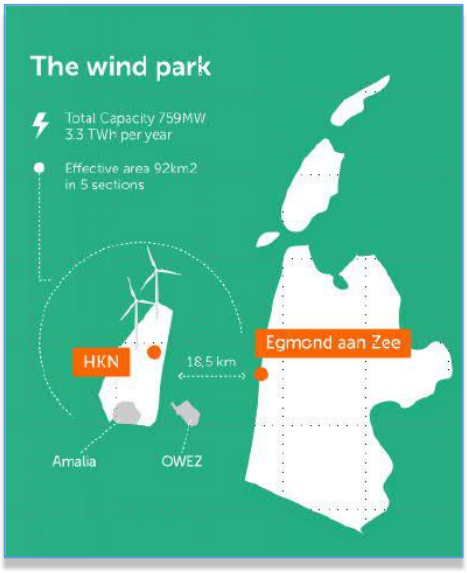


Figure 2 - Wind Park Details

The wind farm will consist of No. 69 x 11.5MW wind turbine generators each to be installed on a dedicated monopile structure. A 70th monopile located on coordinates E 590719.1, N 5841602.3 is reserved for installing the platform accommodating the BLPH. The monopile structure was designed and installed by Van Oord Offshore Wind (VooW) and therefore not part of the BLPH scope.

1.1.2 Project Concept

All components included in the BLPH will be integrated onshore on a topsides and installed in an offshore location within the boundaries of the HKN wind farm. At its simplest, the BLPH will store energy during periods of high electricity generation from renewable sources (a wind turbine generator and the floating solar PV farm) and release it during periods of low generation. In practice. It is expected that the energy stored will supplement generation from renewable sources to ensure that at least 1.0MW of power is exported to the electrical grid regardless of wind/solar availability.

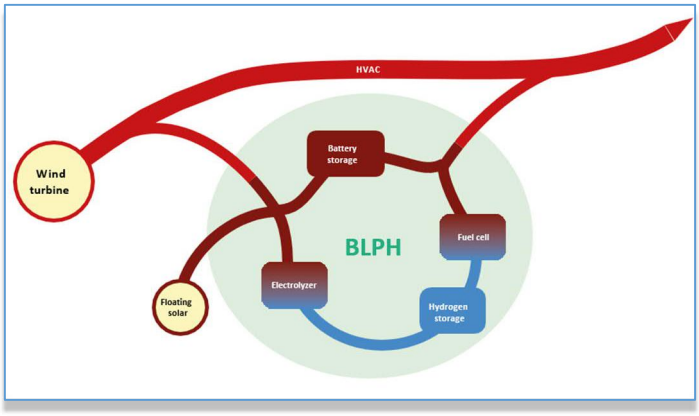


Figure 3 – BLPH Concept

Electricity in the BLPH will be stored in the form of electrons in a battery energy storage system (BESS) as well as converted into green hydrogen via water electrolysis. When the power output from the connecting wind turbine drops to below 1 MWe, the BLPH will return its stored energy to supplement the remaining power output. This will be by discharging the BESS, while stored hydrogen will be converted back into electricity using a fuel cell to extend the discharge duration.

The purpose of the BLPH s to function as a testbed for the integration of energy storage technologies with renewable generation. It is expected that equipment installed on the BLPH will operate as Normally Unmanned Installation for at least two (2) years with no or minimal maintenance and it will have its own independent control room with the ability to communicate with Crosswind's control room.

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2 DOCUMENT SCOPE

Product Datasheets

Instruction and Operating Maintenance

2.1 REFERENCES

Doc. No.	Description

Table 1 - Reference Documents

2.2 DEFINITIONS AND ABBREVIATIONS

COMPANY or Client (CPY):	Crosswind
CONTRACTOR (CTR):	ROSETTI MARINO S.p.A.
PROJECT:	HOLLANDSE KUST NOORD WIND PARK Project

Table 2 - Definitions and Abbreviations

3 LIFERAFT & HYDROSTATIC RELEASE UNIT



Liferafts and containers by

VIKING liferafts are found all over the globe - from the arctic to the tropics

A full range of throw-overboard and davit-launched liferafts

VIKING's liferafts are available in a standard version and a top of the line automatically self-righting version. The proven self-righting liferafts ensure that no matter how the liferaft lands in the water it will always inflate rightside up, ready for boarding.

Liferafts can be equipped with a hydrostatic release unit to ensure that it inflates automatically if it has not been released manually.

Liferafts are subjected to rough sea trials, wind velocity tests at forces of 30 metres per second and deployment at extremely low temperatures. Self-righting liferafts are also tested for automatic self-righting capabilities.

Ready for installation

Liferafts can be delivered with optional galvanized deck cradles and lashings. A full set can be delivered with the liferaft mounted in the cradle including the hydrostatic release unit ready to be installed on the vessel. We also offer assistance with installation tests for davit-launched liferafts. Contact your local VIKING office for more information.

Standard features

- Equipped with emergency packs and liferaft equipment according to SOLAS and flag requirements.
- Provided with two individual buoyancy compartments. Even if one compartment is damaged, the other still has sufficient buoyancy to carry the specified number of passengers.
- Stored in a rigid fibre glass container for durability.
- Installed onboard either on cradles, racks, or stacked column racks

VIKING



Containers by VIKING

Durable and easy to handle VIKING containers are designed with several unique features. The special VIKING shell overlap design gives a secure watertight fit to protect against the elements.

Unlike many other containers, our rim makes a solid easy grip for faster and easier handling - even in wet and slippery conditions. The overlap design is easier to open and re-seal during servicing.

We manufacture our own containers and build them to last. Ongoing reseach and development for 50 years ensures that the containers that we use today are among the best on the market. The ribbed design adds extra stability to the sturdy fibre glass, making our containers approved to withstand a drop of up to 36 metres, some are even approved for heights of 55 metres.

Throw-overboard liferafts, standard

Specify the model that was provided



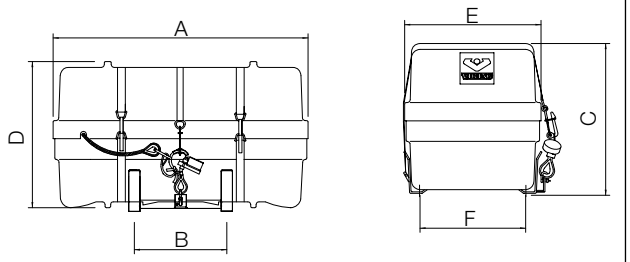
Throw-overboard liferafts are stored in containers on deck and inflate in the water when the painter line is pulled.

Standard SOLAS liferafts are available for:
6, 8, 10, 12, 16, 20, 25 and 35 persons.

Self-righting liferafts are available in the following sizes:
25, 39, 51, 101 and 151 persons.

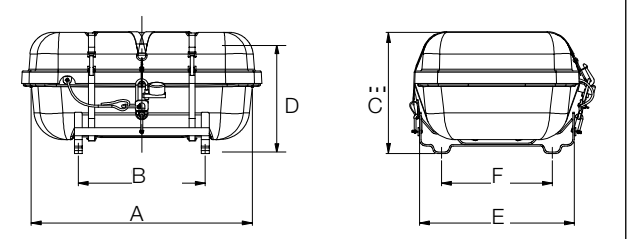
Container

4, 6 DK, Standard liferaft



Approx. size of container in mm							Approx. weight kg ***	
	A	B	C	D	E	F	A Pack	B Pack
4 DK*	910	330	555	510	490	380	66	52
6 DK*	910	330	555	510	490	380	78	60

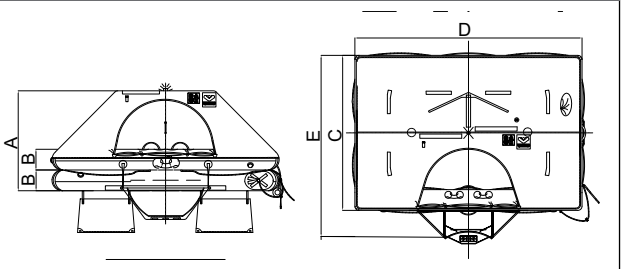
4, 6 DK, Low profile for standard liferaft



Approx. size of container in mm							Approx. weight kg ***	
	A	B	C	D	E	F	A Pack	B Pack
4 DK*	869	409	389	326	625	423	62	48
6 DK*	968	512	488	432	664	447	74	56

Liferaft

4, 6, 8 DK, Standard liferaft



Approx. size of raft in mm						
	A	B	C	D	E	F
4 DK	1150	210	1670	1670	2020	-
6 DK	1190	234	1683	2323	2033	-
8 DK	1190	247	1846	2706	2196	-

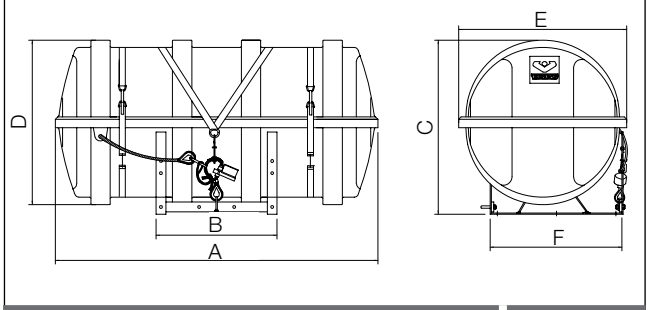
* *Special liferaft for fishing vessels.*

** *Liferafts weighing over 185 kg. can only be placed in a cradle if permitted by the flag state authority.*

*** *Weight of container does not include a cradle*

Container

4, 6, 8, 10, 12, 16, 20, 25, 35 DK



Approx. size of container in mm							Approx. weight kg ***	
	A	B	C	D	E	F	A Pack	B Pack
4 DK*	1155	435	615	561	628	520	75	-
6 DK	1155	435	615	561	628	520	70	65
8 DK	1155	435	615	561	628	520	86	70
10 DK	1355	500	630	565	650	550	98	75
12 DK	1355	500	630	565	650	550	109	85
16 DK	1335	500	720	680	700	550	124	97
20 DK	1335	545	713	685	780	620	150	110
25 DK	1385	545	750	735	790	620	172	-
25 DK	1335	545	713	685	780	620	-	122
35 DK	1550	760	947	890	920	750	282**	-
35 DK	1465	690	843	800	855	620	-	212**

* *Special liferaft for fishing vessels.*

** *Liferafts weighing over 185 kg. can only be placed in a cradle if permitted by the flag state authority.*

*** *Weight does not include a cradle*



VIKING patented Polar Liferafts

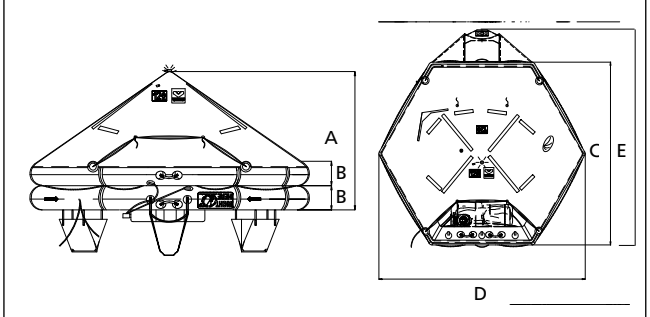
For safe escape and evacuation in Polar regions, VIKING recommends our patented Polar liferafts.

VIKING's Polar liferaft is specially designed and tested to withstand the harsh conditions typical of Polar regions and can function at temperatures as low as -50˚C or more. The float free function has also been tested at Polar temperatures.

VIKING Polar liferafts comply with Russian winterization regulations and are certified by DNV, TC Canada, RMRS and USCG. Patents include: DK Patent No. 17671681, CN Patent No. 101795934B.

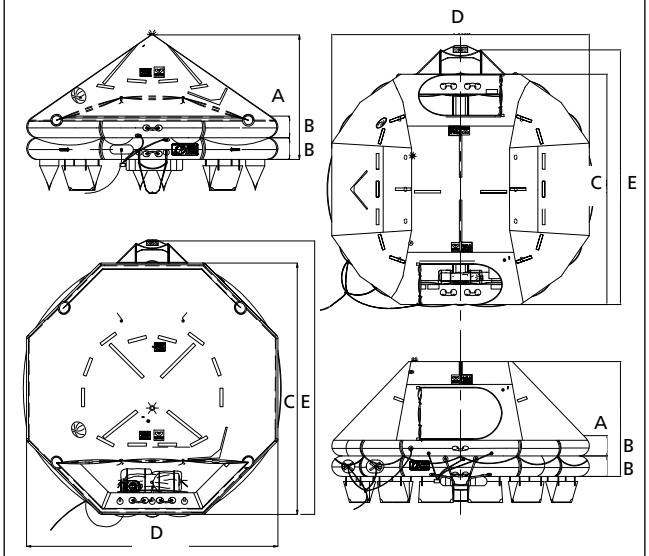
Liferaft

10 and 12 DK, Standard liferaft



Approx. size of raft in mm						
	A	B	C	D	E	F
10 DK	1540	275	2638	3070	2988	-
12 DK	1550	289	2882	3328	3232	-

16, 20, 25, 35 DK, Standard liferaft



Approx. size of raft in mm						
	A	B	C	D	E	F
16 DK	1450	313	3342	3342	3692	-
20 DK	1575	334	3686	3686	4036	-
25 DK	1785	352	4076	4076	4426	-
35 DK	2200	390	4420	4950	5390	-

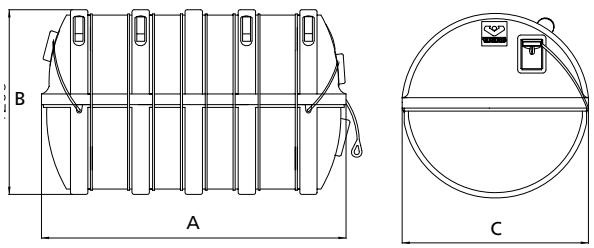
Throw-overboard liferafts, self-righting



Throw-overboard liferafts are stored in containers on deck and inflate in the water when the painter line is pulled.

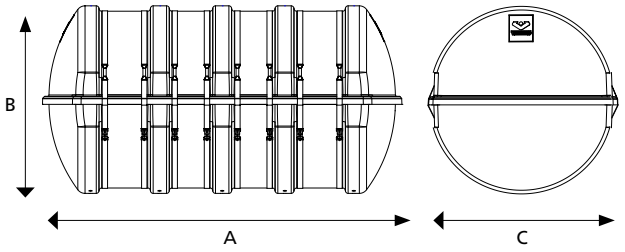
Container

150 DKS, Self-righting liferaft



Approx. size of container in mm					Approx. weight kg	
	A	B	C	D	A Pack	B Pack
150 DKS	1980	1200	1210	-	950	-

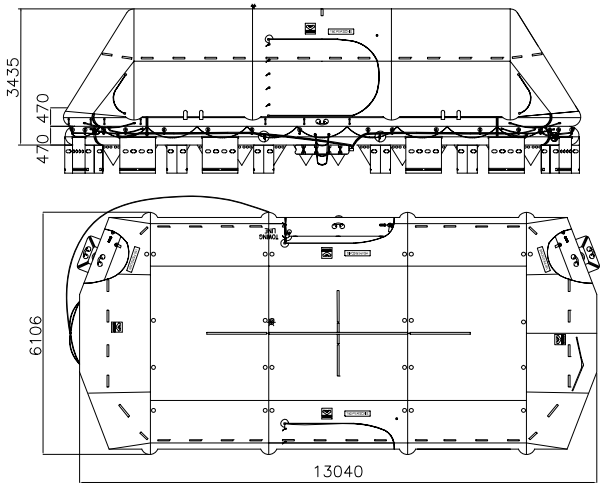
100 DKS, Self-righting liferaft



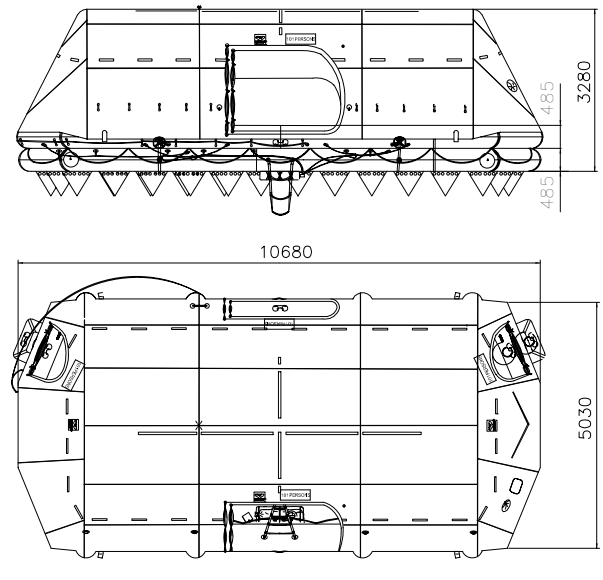
Approx. size of container in mm					Approx. weight kg	
	A	B	C	D	A Pack	B Pack
100 DKS	1980	1200	1210	-	840	-
100 DKS	2006	1047	1055	-	-	540

Liferaft

150 DKS, Self-righting liferaft

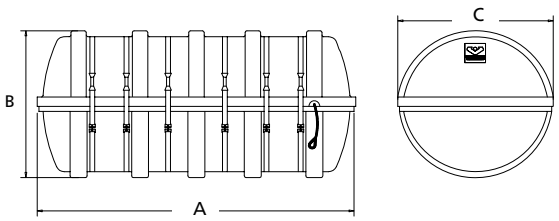


100 DKS, Self-righting liferaft



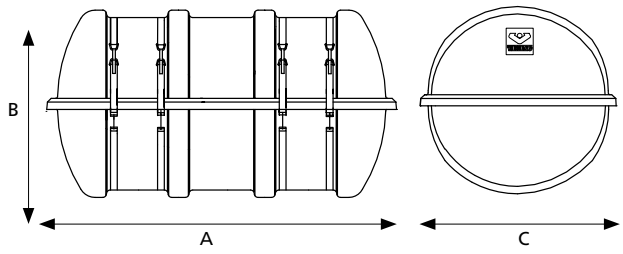
Container

50 DKS, A & B Pack, Self-righting liferaft



Approx. size of container in mm					Approx. weight kg	
A PACK	A	B	C	D	A Pack	B Pack
50 DKS	1865	860	910	-	393	-
B PACK	A	B	C	D	A Pack	B Pack
50 DKS	1550	890	929	-	-	285

25 & 39 DKS, A & B Pack, Self-righting liferaft

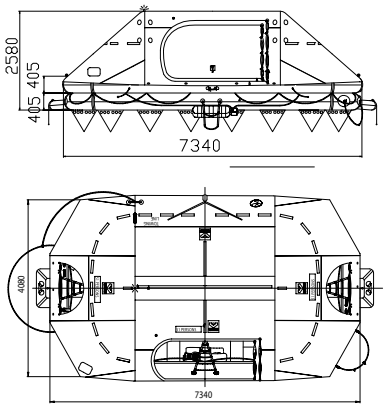


Approx. size of container in mm					Approx. weight kg	
	A	B	C	D	A Pack	B Pack
25 DKS	1420	760	795	-	215	155*
39 DKS	1550	890	920	-	290	-

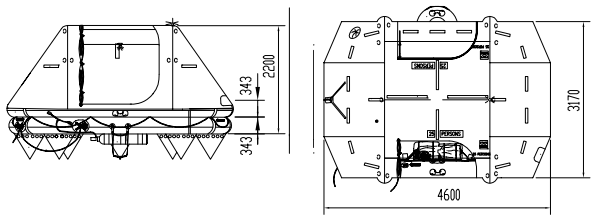
** Can be mounted on a standard deck cradle as the weight is below 185 kg.*

Liferaft

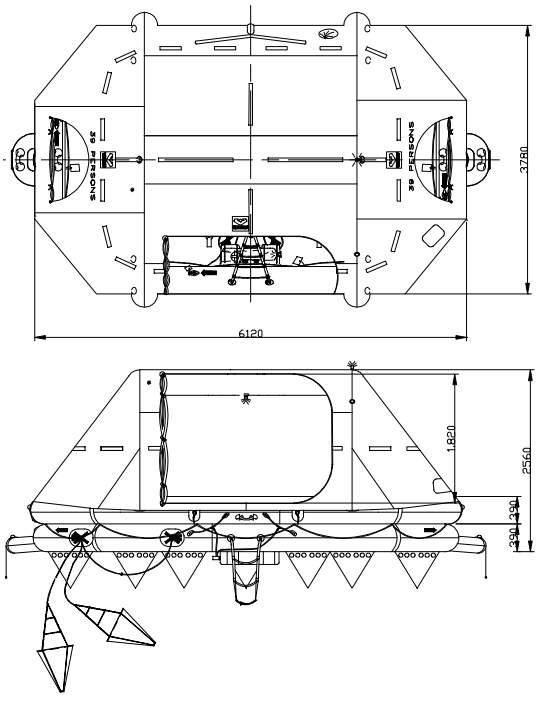
50 DKS, Self-righting liferaft



25 DKS, Self-righting liferaft



39 DKS, Self-righting liferaft



Storage racks



Flexible storage and easy handling with minimal crew

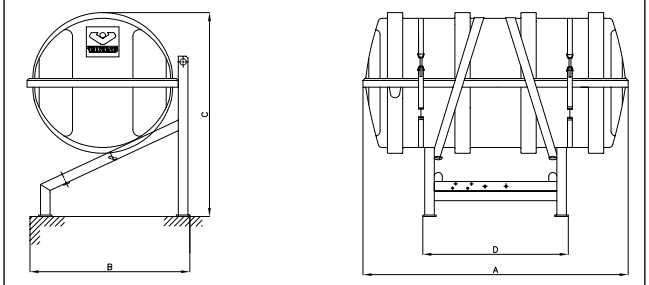
VIKING has developed a range of liferaft racks as a flexible storage alternative to traditional cradles.

Our racks are constructed for flexible integration with modern ship design, increasing the number of possible installation locations. Optional remote release systems also allow liferaft containers to be stored in otherwise inaccessible locations.

Racks can be operated by a single crew member for a faster and more effective launch, as liferafts in racks do not need to be lifted.

Racks are available in galvanised stainless steel or aluminium. Custom-made racks can also be supplied upon request.

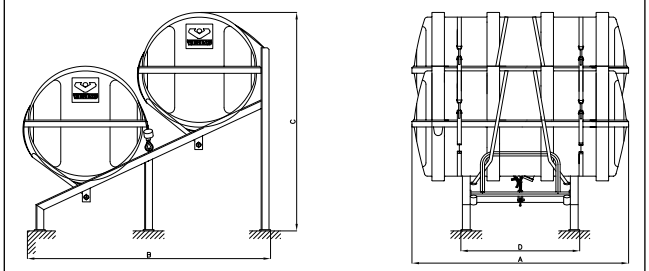
Rack for liferaft containers



Approx. size of rack system

	A	B	C	D	Pack type
10 DK	1355	800	911	760	A+B
12 DK	1355	800	911	760	A+B
16 DK	1335	835	1017	760	A+B
20 DK	1335	835	1017	760	A+B
25 DK	1385	835	1063	760	A
25 DK	1335	835	1017	760	B
35 DK	1550	955	1266	820	A
35 DK	1465	955	1198	820	B
25 DKS	1450	955	1179	820	A+B
50 DKS	1865	955	1225	1050	A
50 DKS	1550	955	1262	820	B
50 DKS	1710	955	1170	1050	B
100 DKS	1980	1365	1722	1090	A
100 DKS	1934	1145	1522	1190	B
150 DKS	1980	1365	1722	1090	B
12 DKR	1155	720	874	520	HSC
20 DKR	1355	800	911	760	HSC
25 DKR	1355	800	911	760	HSC
50 DKR	1385	835	1063	760	HSC
100 DKR	1550	955	1266	820	HSC
150 DKR	1934	1150	1522	1190	HSC

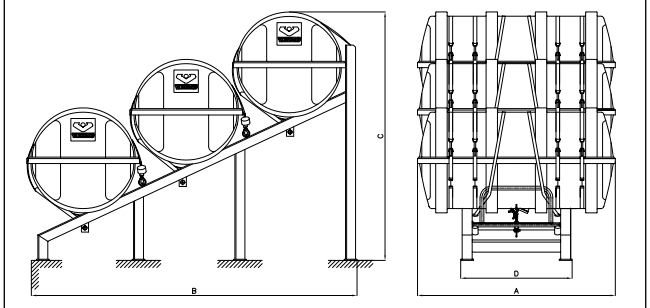
Ramp for liferaft containers



Approx. size of ramp system

	A	B	C	D	Pack type
16 DK	1335	1555	1400	760	A + B
20 DK	1335	1555	1400	760	A + B
25 DK	1385	1555	1400	760	A
25 DK	1335	1555	1400	760	B

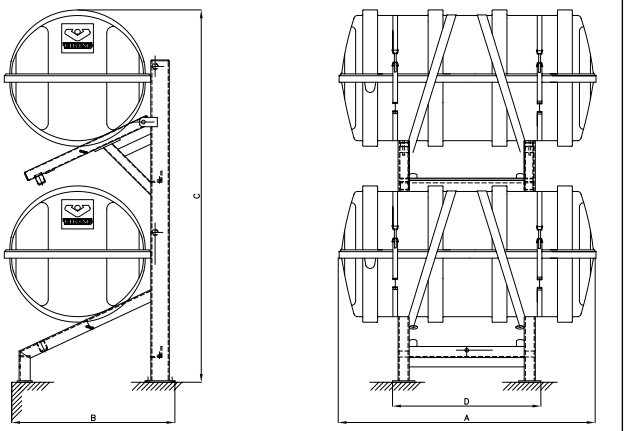
Ramp for liferaft containers



Approx. size of ramp system

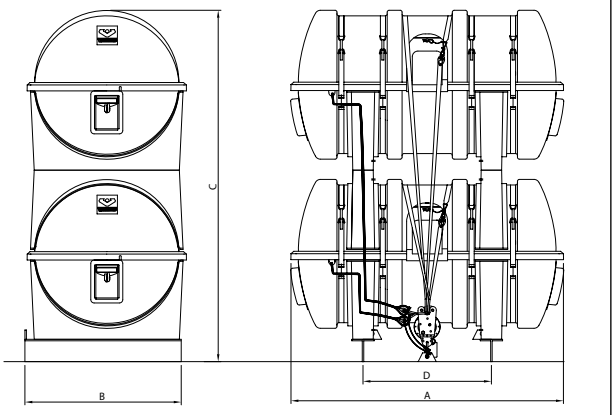
	A	B	C	D	Pack type
16 DK	1335	2280	1740	780	A + B
20 DK	1335	2280	1740	780	A + B
25 DK	1385	2280	1780	780	A
25 DK	1335	2280	1740	780	B

Column rack for liferaft containers



Approx. size of rack system					
	A	B	C	D	Pack type
16 DK	1355	925	1970	800	A + B
20 DK	1355	925	1970	800	A + B
25 DK	1385	925	1970	800	A + B

GRP Rack



Approx. size of rack system					
	A	B	C	D	Pack type
25 DKFS	1464	840	1888	690	A
25 DKFS	1420	840	1774	690	B
35 DKF	1550	940	2000	720	A
35 DKF	1464	840	1888	690	B
39 DKFS	1550	940	2000	720	A
39 DKFS	1464	840	1888	690	B

Liferaft service

The unique VIKING global servicing network of liferaft specialists perform customer convenient liferaft servicing according to strict guidelines.

Documentation

- Liferaft is received and registered
- Logbook in the liferaft is completed (proof that the liferaft has been opened and tested)
- Inspection is performed using VIKING approved inspection checklist
- Certificate of re-inspection is issued
- Full documentation for service is archived according to regulations
- Detailed invoice is issued

Service

- Container is opened and the inflation system dismounted
- Liferaft is removed from the container
- Container shell is cleaned and fibreglass is repaired if needed
- Container is relabelled
- Liferaft is inspected inside and out
- Emergency pack is checked and items replaced if expired according to regulations
- Liferaft equipment is inspected and replaced if needed
- Cylinder operating head, valve, knife and release wire is inspected
- Inflation systems and high pressure hoses are inspected
- CO_2 cylinder is checked for correct content level
- Liferaft is deflated, repacked in the container and prepared for despatch

Testing

- Liferaft is inflated with compressed air and pressure tested including a 60 min. working pressure test of the lower buoyancy chamber, upper buoyancy chamber and arch chamber
- If the liferaft is equipped with an inflatable floor, this is pressure tested for 60 min.

Liferaft is subjected to specific tests at various intervals according to international regulations.

- Gas inflation stress test (GI) is conducted every 5 years using the liferaft's own CO_2 cylinder to inflate the liferaft
- Necessary additional pressure test (NAP) at double the working pressure rate is conducted at 11 years end then annually thereafter
- Floor seam test (FS) is performed to check the seams of the internal floor and is conducted at 10 years and then annually



Dedicated global production

VIKING products are manufactured using a combination of modern technology and skilled manual labour.

VIKING has an award winning workplace. Our commitment to quality and safety and our loyal and experienced employees mean that our working atmosphere is quite exceptional.

VIKING practices integrated production with joint global planning. Special competences are concentrated at individual production units.

All our production facilities follow uniform guidelines and have identical systems and procedures. VIKING Life-Saving Equipment is certified according to ISO 9001 standards and is regularly evaluated by the Norwegian Veritas for compliance. All of our products and components are subject to prototype testing and quality control procedures.

VIKING is registered in the Achilles Joint Supplier Qualification System.



Global service

An important consideration when investing in marine safety equipment is servicing in the long term.

VIKING is a global all-in-one service provider offering consolidated servicing of safety equipment on board.

- Liferafts and evacuation systems
- Boats, davits and release hooks
- Marine fire safety equipment
- Immersion suits and lifejackets

We offer total concept service packages including competitive global pricing, handling specifications and service certificates.

Our unique network of more than 280 servicing stations follows strict guidelines for servicing VIKING's products.The network is supported by certified educational programmes, spare parts supplies and continually updated online information and manuals.

Certified servicing stations have the appropriate tools and spare parts available as turnaround time is important to our customers. Service can be booked by contacting any of our offices in our global network.

Contact your local office for the nearest VIKING servicing station or visit VIKING-life.com.

Global logistics



Our logistics network acts as one global unit with specialised systems for handling and tracking stock and delivery.

VIKING's logistics specialists have the necessary certifications for optimising handling of products covered by the Dangerous Goods Act, such as lifejackets and liferafts. We are experienced in customising logistics for customers with centralised stock or several delivery points.

VIKING has worldwide stock facilities for selected products that are geared to carry the appropriate stock for each market to ensure that our customers benefit from optimal delivery and pricing at appropriate locations.



VIKING
LIFE-SAVING EQUIPMENT

MOST TRUSTED SUPPLIER
8 OUT OF 10 RECOMMEND VIKING

We're proud to be the safety equipment and servicing industry's Most Trusted Supplier:

98%
renew their Shipowner Agreement upon expiry

9 out of 10
customers rate VIKING as professional and service-minded

70%
expand their agreement during the contract period

8 out of 10
shipowners actively recommend us to others

VIKING LIFE-SAVING EQUIPMENT

- Protecting people and business

VIKING-LIFE.COM

1022544 - 06.19 - Printed in Denmark

Art. no HT-0019/11.03

MARCODE AUTHENTICATION

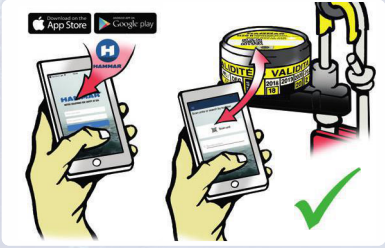
- Download the **Hammar MarCode App** at App Store or Google Play
- Register as a user inside the MarCode App

VALIDATE THE H20

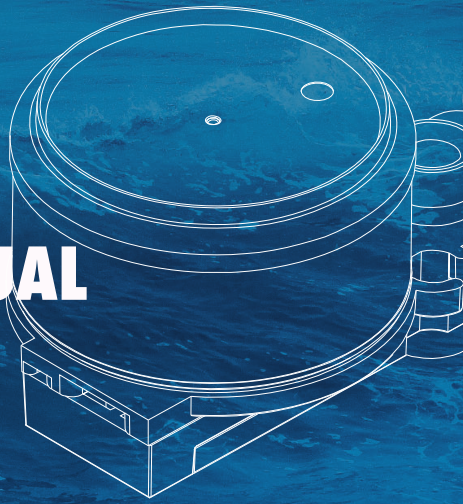
- Select Scan unit in the Hammar MarCode App
- Scan the unique MarCode on the unit's top label

You can also type in the 12 digits manually in the MarCode App for validation.

You will automatically receive a validation confirming that the unit is an original Hammar product.



H20 MANUAL





The Hammar H20 is also available for:

EPIRB'S • NAVY • SPECIAL APPLICATIONS

HAMMAR®

BETTER SOLUTIONS FOR SAFETY AT SEA

ISO 9001
BUREAU VERITAS
Certification

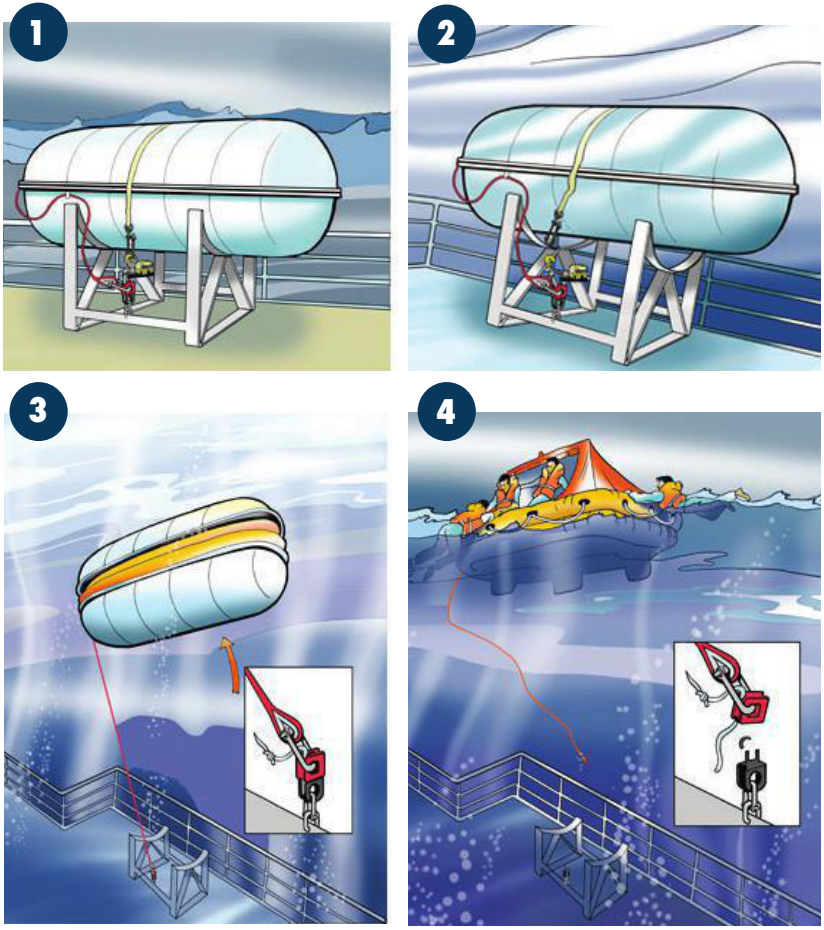
HAMMAR H20
HYDROSTATIC RELEASE UNIT

www.cmhammar.com

CM Hammar AB, August Barks gata 15, SE-421 32 Västra Frölunda (Göteborg), Sweden
Phone: +46 31 709 65 50, info@cmhammar.com

HAMMAR®
BETTER SOLUTIONS FOR SAFETY AT SEA

FLOAT-FREE FUNCTION



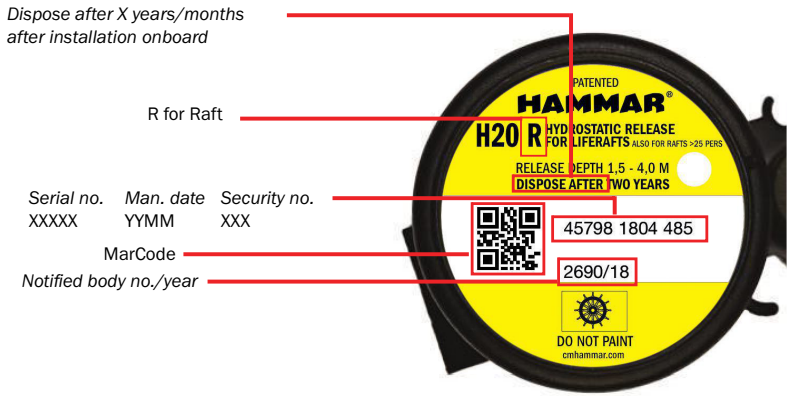
MANUAL RELEASE

In order to launch the liferaft manually, release the sliphook and throw the liferaft overboard. The liferaft is now attached to the vessel by the painter line via the Red Weak Link™ connector. Pull the painter line and inflate the liferaft so the survivors can board.

APPROVALS

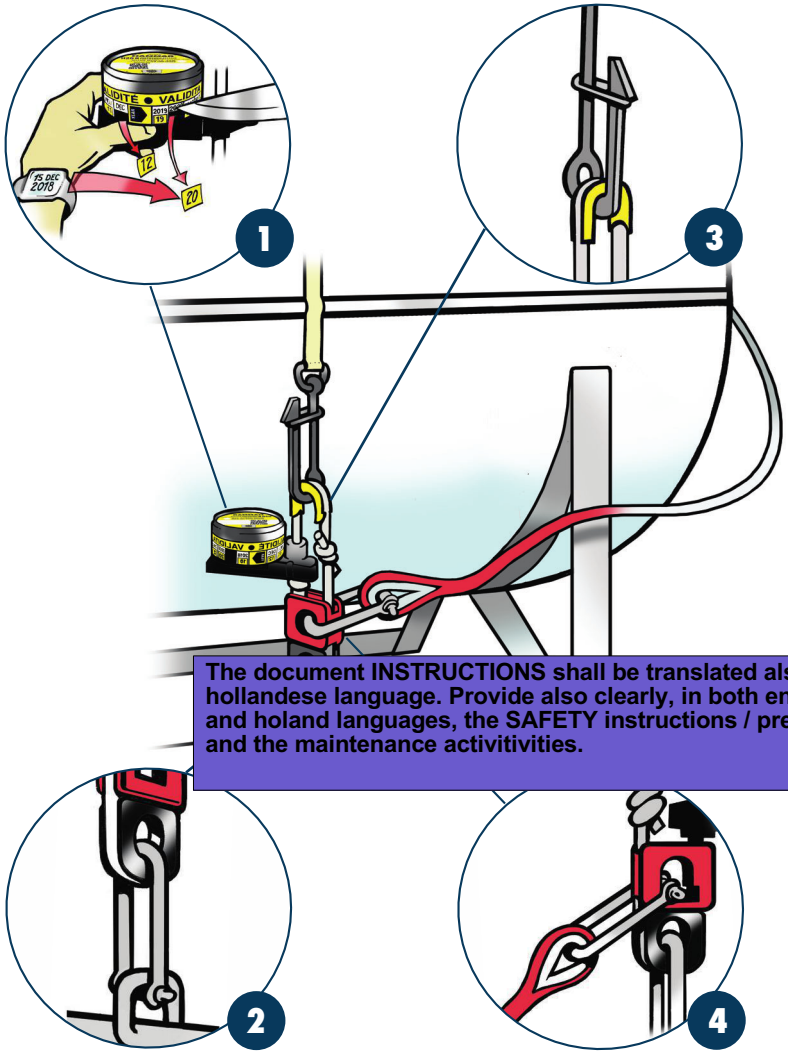
The Hammar H20 hydrostatic release units are approved all over the world, fulfil the requirements of the SOLAS 74 Convention, IMO Res. MSC 97(73)8.1/8.6 (2000 HSC Code) IMO Res. MSC. 48(66), IMO Res. MSC.81(70), IMO MSC/Circ.811, approved to EU Directive 96/98 EC on Marine Equipment and has a Nato stock number. Release depth 1,5 - 4,0 metres according to IMO/SOLAS regulations.

The required certificates can be downloaded from our website: www.cmhammar.com



SPECIFICATONS FOR SOLAS APPROVED UNITS

Breaking strength strong rope: minimum 15 kN
Breaking strength weak link: 2,2 ± 0,4 kN for liferafts from 6 up to 150 persons
Release depth: 1,5 – 4,0 metres
Temperature range: -30 to +65°C



1. Mark the unit. Markings must be done solely by a manufacturer of liferafts or an authorised liferaft service station. The expiry date is 2 years, or otherwise stated on the product, from month of installation onboard. The release unit is labelled with a marking for year and month. Use a knife and carefully scratch away the appropriate square for month and year of expiry.

2. Attach the Hammar H20 with a shackle to a strong point on the deck or on the cradle.

3. Attach the liferaft lashing with a manual release hook to the upper yellow thimble and firmly secure the liferaft.

4. Fit a shackle to the Red Weak Link™ connector and connect the painter line to the shackle.

The document INSTRUCTIONS shall be translated also in hollandese language. Provide also clearly, in both enaglish and holand languages, the SAFETY instructions / precaution and the maintenance activitivities.

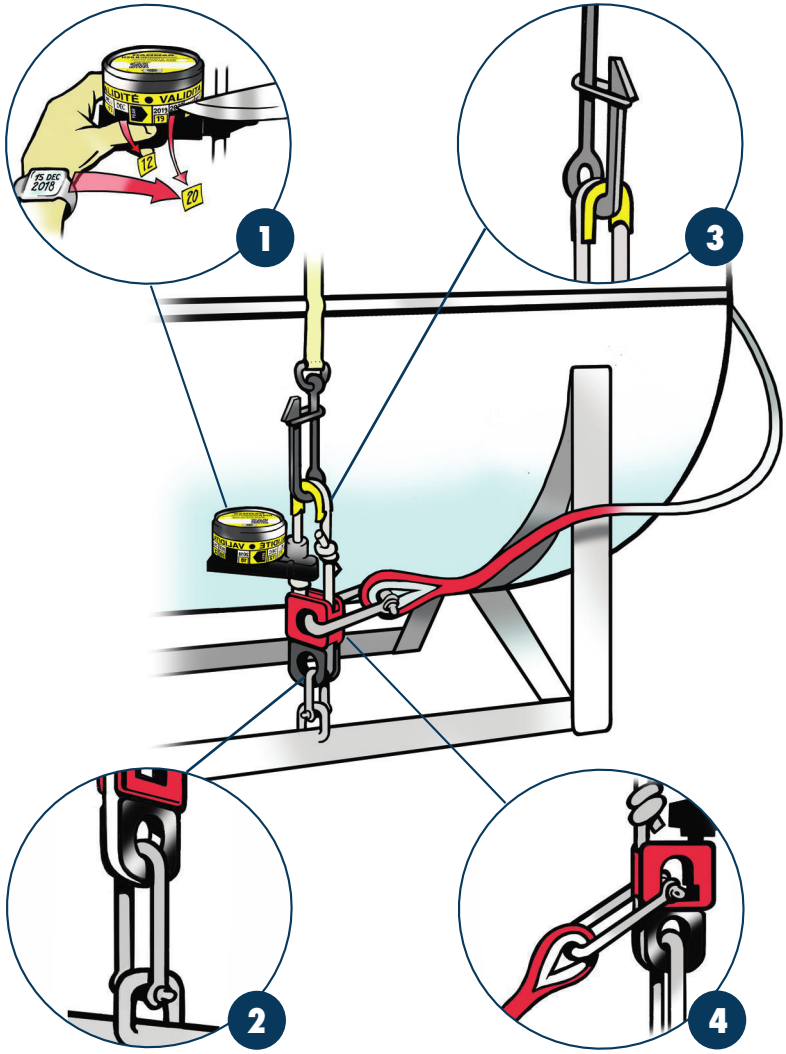
To complete the installation, download the Hammar MarCode app and registrate your installation.

The hydrostatic release unit has to be correctly marked, to be approved by the marine authorities

Do not power wash the hydrostatic release unit

Do not paint the hydrostatic release unit

If an H20 is dropped or exposed to an impact it shall be discarded



1. Le dispositif doit être daté. Le marquage des dates doit être effectué par un fabricant de radeaux, un distributeur ou une station de révision de radeaux habilitée. Sauf indications contraires écrites sur le produit, la date d'expiration est de deux ans à compter du mois d'installation à bord. Le marquage consiste à retirer proprement les étiquettes correspondant au mois et à l'année d'expiration.

2. Fixer le Hammar H20 avec une manille à un point fixe et solide du pont ou au berceau du radeau.

3. Attacher la sangle de saisissage du radeau à la cosse supérieure jaune avec un croc à échappement et fixer solidement le radeau.

4. Attacher une manille à l'anneau cassant rouge (The Red Weak LinkTM) et relier la ligne de déclenchement du radeau à cette manille.

Après la mise en place télécharger le Hammar Marcode et enregistrer votre installation.

L'appareil hydrostatique doit être correctement daté pour être approuvé par les Affaires Maritimes

Ne pas laver à l'eau haute pression

Ne pas peindre l'appareil

Si un appareil H20 tombe ou est exposé à des chocs, il doit être mis au rebut.

4 INSULATING GLOVES & MATS

INSULATING GLOVES
CG-05-*-R to CG-40-*-R





NF EN 60903 2003
CEI 60903 : 2002

(*) Add the size :
A = size 8, B = size 9,
C = size 10, D = size 11

FIELD OF USE

Personal protection against electrical shocks for live working from 500 to 36 000V.
These gloves have to be used with leather overgloves, to ensure a mechanical protection.
The use of thin cotton undergloves is recommended for a better comfort and a good hygiene.

CARACTERISTICS

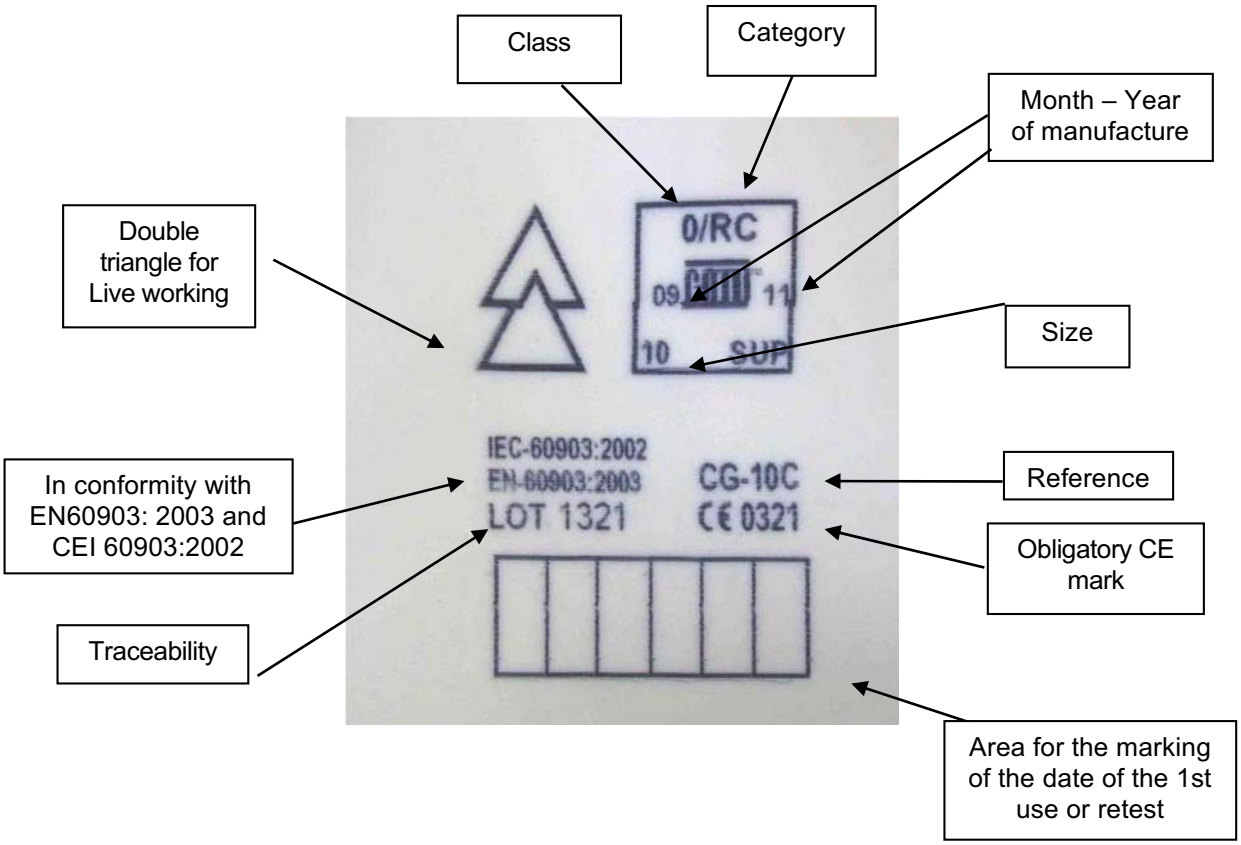
- **Temperature of use : -25°C to +55°C**
- **In conformity with the IEC 60903 : 2002 , EN 60903 : 2003**
- **Insulating gloves from class 00 (500V) to class 4 (36 000V)**
- **Material : natural latex**
- **AZC or RC Category : resistant to acid, ozone and extremely low temperature or acid, oil, ozone and extremely low temperature**
- **Colour : Red for class 00 and 0, Bi-colour for class 1 to 4 (external Red and internal natural)**
- **This shape will ensure good ergonomics and a good sensitivity.**
- **Gloves marking following IEC 60903**
- **With an Instruction for use**
- **Delivered in individual packaging. This packaging provide a UV protection**

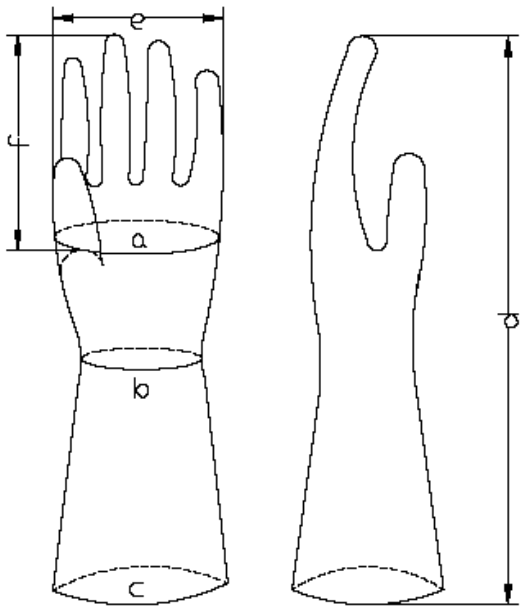
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Phone : (33) 1 42 31 46 00 - FAX : (33) 1 42 31 46 31

RANGE			Voltage max		Weight
Reference	**Class**	**Category**	**AC**	**DC**	**(g)**
CG-05-*-R	**00**	**AZC**	**500**	**750**	**90**
CG-10-*-R	**0**	**AZC**	**1 000**	**1 500**	**200**
CG-15-*-R	**1**	**AZC**	**7 500**	**11 250**	**270**
CG-20-*-R	**2**	**RC**	**17 000**	**25 500**	**450**
CG-30-*-R	**3**	**RC**	**26 500**	**39 750**	**560**
CG-40--R**	**4**	**RC**	**36 000**	**54 000**	**800**

(*) Add the size : A = Size 8, B = Size 9, C = Size 10, D = Size 11
(**) Add the size : B = Size 9, C = Size 10, D = Size 11

MARKING EXPLANATION :





DIMENSIONS (mm)

Reference	Size	a	d	Thickness max
CG-05-A-R	8	210	360	1.10
CG-05-B-R	9	235	360	1.10
CG-05-C-R	10	255	360	1.10
CG-05-D-R	11	280	360	1.10
CG-10-A-R	8	210	360	1.60
CG-10-B-R	9	235	360	1.60
CG-10-C-R	10	255	360	1.60
CG-10-D-R	11	280	360	1.60
CG-15-A-R	8	210	360	2.10
CG-15-B-R	9	235	360	2.10
CG-15-C-R	10	255	360	2.10
CG-15-D-R	11	280	360	2.10
CG-20-A-R	8	210	360	2.90
CG-20-B-R	9	235	360	2.90
CG-20-C-R	10	255	360	2.90
CG-20-D-R	11	280	360	2.90
CG-30-A-R	8	210	360	3.50
CG-30-B-R	9	235	360	3.50
CG-30-C-R	10	255	360	3.50
CG-30-D-R	11	280	360	3.50
CG-40-C-R	10	255	410	4.20
CG-40-D-R	11	280	410	4.20

RECOMMANDATIONS (annex E CEI 60903)

- **Examination before use: Each time before use, both gloves of a pair should be visually inspected and subjected to a manually applied air test, where practicable. If either glove is thought to be unsafe, the pair should not be used and should be returned for testing.**
- **Storage: Gloves should be stored in their container or package. Care should be taken to ensure that gloves are not compressed, folded or stored in proximity to steam pipes, radiators or other sources of artificial heat or exposed to direct sunlight, artificial light or other source of ozone. It is desirable that the ambient temperature be between 10°C and 21°C.**
- **Periodic inspection: For class 00 and O gloves, a check for air leaks and a visual inspection may be consider adequate. However a routine dielectric test may be performed at the owner's request**
- **Class 1, 2, 3 et 4 : no gloves, not even those held in storage, should be used unless they have been tested within a maximum period of six months The tests consist of air inflation to check for air leaks, a visual inspection while pressurized, and then a routine dielectric test, in accordance with IEC60903.**
- **The date of the 1st use, and the controls dates, have to be marked in the area on the gloves.**

ACCESSORIES (Option)



Cotton under-gloves CG-80



Cotton mittens CG-81



Pneumatic gloves tester CG-117



Gloves box CG-35/2



Over-gloves CG-991
For class 1 to 4

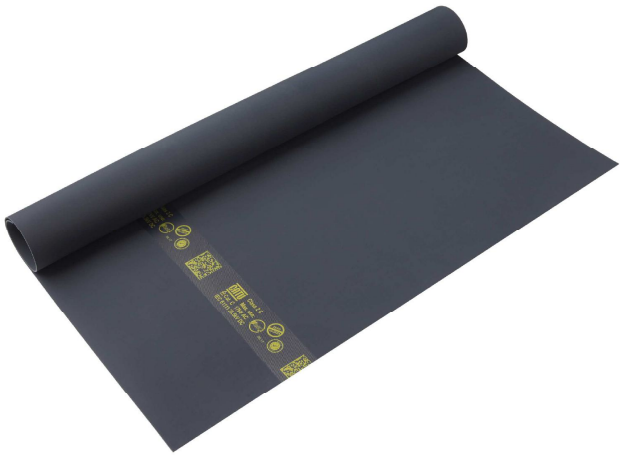


Over-gloves CG-981
for class 00 or 0

IEC 61111 INSULATING MATS

Series MP-11-20-42-60-100-120

Class 0 – 2 – 3 - 4





Detail of marking

Protective equipment against electric shock.
Electrical insulating mat for use as a floor covering for the electrical protection of workers on electrical installations.
Standard conformity: **IEC 61111. Live Working.**

TECHNICAL CHARACTERISTICS

- All references are in accordance with **IEC 61111 standard** and to specific properties of the "C" Category (extremely low temperature folding test at – 40 °C).
  IEC 61111 standard is the only one international standard concerning insulating mats.
- RoHS2 compliant.
- REACH compliant (SVHC free).
- Zero Halogen.
- 2 D bar code (Datamatrix) on marking with direct link to user guide and technical sheet.
- Insulating mats must be chosen according to the maximum service voltage of the installation.
- High dielectric quality.
- Rubber material with non-slip surfaces on both sides.
- Operating temperature : - 40 to + 55 °C
- Storage temperature : + 10 to + 21 °C
- Repetitive marking (2 markings every 1 m minimum).

Edition : 11/2017 - Technical sheet N° : MP-11-20-42-60-100-120_GB

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Phone : (33) 1 42 31 46 00 • Fax : (33) 1 42 31 46 31 • www.catuelec.com

IEC 61111 INSULATING MATS

Class 0 – 2 – 3 - 4

• RoHS2 compliant. Material free of Lead, Mercury, Cadmium, Hexavalent Chomium, Polybrominated biphenyls (PBB), Polybrominated diphenyl ethers (PBDE).	
• REACH compliant. Material free of 163 Substances of Very High Concern (SVHC).	
• Zero Halogen. Material free of Fluoride, Chlorine, Bromine and Iodine. **The absence of halogen is a positive indicator for the safety and health of operators in the event of fire.**	

REFERENCE / DIMENSIONS / WEIGHT / SERVICE VOLTAGE

Reference	IEC 61111	Thickness (mm)	Length x Width (m)	Weight (kg)	Maximum service voltage in kV (1)	
					AC	DC
MP-11/66	**Class 0**	2,2	0,6 x 0,6	1	1	1,5
MP-11/16			0,6 x 1	1,8		
MP-11/26			0,6 x 1,2	2		
MP-11/11			1 x 1	3		
MP-11/21			1 x 1,2	3,4		
MP-11/22			1,2 x 1,2	4		
MP-60/02-5			0,6 x 5	9		
MP-60/02-10			0,6 x 10	18		
MP-100/02-5			1 x 5	15		
MP-100/02-10			1 x 10	30		
MP-120/02-5			1,2 x 5	17		
MP-120/02-10			1,2 x 10	34		
MP-20/66	**Class 2**	2,6	0,6 x 0,6	1,5	17	25,5
MP-20/16			0,6 x 1	2,4		
MP-20/26			0,6 x 1,2	2,8		
MP-20/11			1 x 1	3,9		
MP-20/21			1 x 1,2	4,7		
MP-20/22			1,2 x 1,2	5,6		
MP-60/20-5			0,6 x 5	12		
MP-60/20-10			0,6 x 10	24		
MP-100/20-5			1 x 5	19,5		
MP-100/20-10			1 x 10	39		
MP-120/20-5			1,2 x 5	23,5		
MP-120/20-10			1,2 x 10	47		

(1) On multiphase circuits: the nominal voltage is the phase to phase voltage.
On single phase circuit: the nominal voltage is the phase to ground voltage.

IEC 61111 INSULATING MATS

Class 0 – 2 – 3 - 4

Reference	IEC 61111	Thickness (mm)	Length x Width (m)	Weight (kg)	Maximum service voltage in kV (1)	
					AC	DC
MP-42/66	Class 3	3,2	0,6 x 0,6	1,8	26,5	39,75
MP-42/16			0,6 x 1	2,9		
MP-42/26			0,6 x 1,2	3,5		
MP-42/11			1 x 1	4,5		
MP-120/03-1			1 x 1,2	5,4		
MP-120/03-2			1,2 x 1,2	6,5		
MP-60/03-5			0,6 x 5	14		
MP-60/03-10			0,6 x 10	28		
MP-100/03-5			1 x 5	22,5		
MP-100/03-10			1 x 10	45		
MP-120/03-5			1,2 x 5	27		
MP-120/03-10			1,2 x 10	54		
MP-60/05-1	Class 4	5	0,6 x 1	4,5	36	54
MP-120/05-0			0,6 x 1,2	5,4		
MP-100/05-1			1 x 1	8,9		
MP-120/05-1			1 x 1,2	10,5		
MP-120/05-2			1,2 x 1,2	12,6		
MP-60/05-5			0,6 x 5	22		
MP-60/05-10			0,6 x 10	45		
MP-100/05-5			1 x 5	44,5		
MP-100/05-10			1 x 10	89		
MP-120/05-5			1,2 x 5	52,5		
MP-120/05-10			1,2 x 10	105		

(1) On multiphase circuits: the nominal voltage is the phase to phase voltage.
On single phase circuit: the nominal voltage is the phase to ground voltage.

STANDARD REFERENCES

- “Live working. Electrical insulating matting”: EN 61111, IEC 61111 standard, "C" Category.
- RoHS2: Directive 2011/65/EU Annex II.
- REACH: SVHC list based on the publication by European Chemicals Agency (ECHA) on 2015 and Regulation (EC) N° 1907/2006 concerning the REACH.
- Zero Halogen: Tests based on EN 14582 guidelines.

IEC 61111 INSULATING MATS

Class 0 – 2 – 3 - 4

OPTIONAL ACCESSORIES

Carrying bag for individual mats up to 0.7 m width.
Reference: MP-01



Carrying bag for individual mats up to 1.1 m width.
Reference: MP-02

Strap “Velcro” type for maintaining the mat in rolled position.
Reference: MO-160



Shoulder strap for maintaining and carrying the mat in rolled position.
Reference: MO-161



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5 COMET


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Comet

WESCOM GROUP

Reliability. Performance. Compliance

When you specify lifesaving equipment for your vessel, you need to know – beyond any doubt – that it is the most reliable and cost-effective available. With Comet advanced pyrotechnic marine distress signals, you can be sure you have made the right choice.

The leading light – worldwide

Comet, one of the world's leading brands of pyrotechnics for the commercial and leisure marine markets, has been saving lives around the globe more than half a century.

Our comprehensive range of marine distress signals and safety systems are trusted for their reliability by the world's navies, lifeboat and rescue services, merchant fleets and airlines, as well as by fishing vessels and leisure craft.

The quality, technological superiority and innovative design of our products – combined with worldwide SOLAS approvals, including MED and USCG, and manufacturing to ISO 9001 standard – has placed Comet Marine at the forefront of marine safety.

Through our extensive network of specialist distributors, WesCom Signal and Rescue's range of superior quality distress signals are available, freshly dated, in all major ports around the world.

Full details can be found on the Comet Marine website.

www.comet-marine.com



SOLAS approved Safety of life at Sea (SOLAS)

Marine Equipment Directive (MED)

United States Coast Guard Approved

CE European Conformity Mark

Linethrower 250

Art Nos. Complete unit 9160400 · Body and line 9160500 · Rocket 9162700



A self-contained line-throwing appliance consisting of a weatherproof plastic casing with end cap, twist-grip trigger assembly, rocket and line. To comply with SOLAS requirements, four complete rocket and line assemblies (Art. No. 9160400) should be carried on board. The device has a throwing range of between 230m and 250m. A solid propellant is used which guarantees a highly accurate flight path even in strong sidewinds.

For further information on rocket installation – please see page 15.

Application

The Comet Linethrower 250 is designed for ease of operation in the most extreme weather conditions. It can be used in all situations where a line is required to be passed accurately and quickly, these include:-

- All line-throwing operations at sea between vessels, ship-to-shore, shore-to-ship and shore based rescue services.
- Rescue of swimmers in distress.
- Line carrying across obstacles and rough terrain.

Operation



1. Wear Personal Safety Equipment (gloves, glasses, ear protection, helmet).
2. Remove the front cover and point in the desired flight direction.
3. Pull out safety pin.
4. Aim over the top of target. Be prepared for recoil.
5. Turn grip to left or right to fire.
6. If misfire occurs hold unit in firing position for at least 60 seconds, then dispose of overboard.

Product Life

- Body and line kit: 9 years • Rocket minimum 3 years
- Spare rockets are available to replace consumed or time expired rockets.

Packing & Transport Information

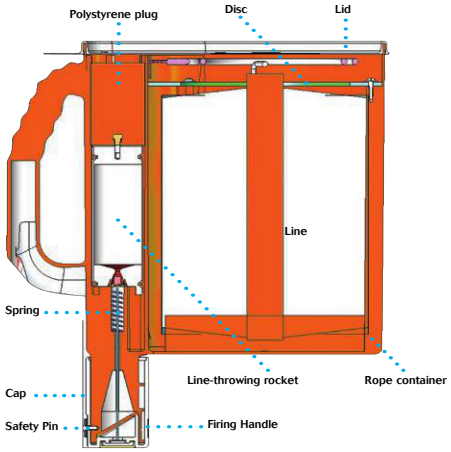
Body and Line, less rocket in packing case,
L 37 cm (14.57 in) x W 27 cm (10.63 in) x H 27 cm (10.63 in)
- Gross weight 4.2 kg (9.26 lb.) • Net weight 3.6 kg (7.94 lb.)
- Other Information: Non-hazardous

20 Spare Rockets in metal tin in a fibreboard box,
L 37 cm (14.57 in) x W 27 cm (10.63 in) x H 27 cm (10.63 in)
- Gross Weight Max: 13 kg (28.66 lb.) • Net Weight Max: 10.70 kg (23.59 lb.)
- Net Explosive Content per box : 2.12 kg (4.67 lb.)
- Hazard class 1.4G • UN 0431 • Proper shipping name: Articles, Pyrotechnic
- Other Information: Cargo Aircraft Only

Specifications

Projects a line to a nominal range of 250m in calm conditions.

- Length: 33 cm (13.0")
- Height: 31.3 cm (12.3")
- Diameter: 20.5 cm (8.1")
- Gross Weight: 4.7kg (10.36 lb.)
- Net Weight: 4.4 kg (9.7 lb.)
- Rocket Weight Max: 535g (18.9 oz.)
- Explosive Content Max.: 106g (3.74 oz.)
- Line breaking strain: >2 kn



Storage

This compact appliance is ideally stored in a water-resistant locker at ambient temperature allowing easy access in an emergency. The set of 4 appliances normally carried onboard can be dispersed in strategic positions throughout the vessel.

Approvals

Conforms to: BAM 0589-P2-0016 (Complete Unit), 0589-P2-0094 (Rocket only), SOLAS 74 as amended, IMO resolutions MSC. 81(70) Part 1, (MED) 96/98/EC, BGV 424. 002, USCG - and other major maritime authorities worldwide.

WARNING

- Ejects rocket projectile - do not point at people or property
- Do not fire in a confined space
- Keep out of reach of children
- For emergency use at sea
- If damaged or dented do not use
- Do not dismantle
- Keep away from source of heat
- Do not use after expiry date

DISPOSAL

- Pyrotechnics must be treated as hazardous items and must be disposed of responsibly in accordance with local regulations. For help and advice, visit our website **www.comet-marine.com**

Comet

WESCOM GROUP



Light and Smoke Signal

Art No. 9181600

The Light and Smoke Lifebuoy Marker produces dense orange smoke for 15 minutes and features two self contained, inversion switched, LED lights which far exceed SOLAS requirements for output and duration. Ships are required to carry 2 markers, one mounted on each bridge wing with the brackets supplied and attached by line to a 4kg Lifebuoy. The signal is used to mark the position of a man overboard by day or night. It can be automatically deployed by releasing the attached lifebuoy, or manually activated.

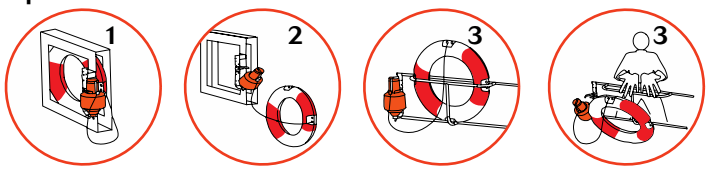
For further information on Light and Smoke Signal installation – please see page 15.

The Comet Smoke Signal Art. No 9181700 is identical, except that it does not feature the lighting system, so is an orange smoke daytime marker only.

Application

- Day and night signal attached to 4kg lifebuoy and used in an emergency to mark the position of man overboard.
- Provides 15 minutes of dense orange smoke.
- Far exceeds SOLAS requirements of 2 hours at 2 candela for light output and duration.
- Safe to use on petrol or oil covered water.
- Lithium batteries sealed for life - no annual replacement.
- Screw fit, inversion switched, LED light units.
- Automatic or manual deployment.
- Universal stainless steel mounting bracket. Usually mounted on a ships bridge wing
- Approved mounting height: 56m - but manufacturer tested to survive 100m drop into water. (SOLAS only requires 30m).
- Ideal for use on ships or rigs with high freeboard.

Operation



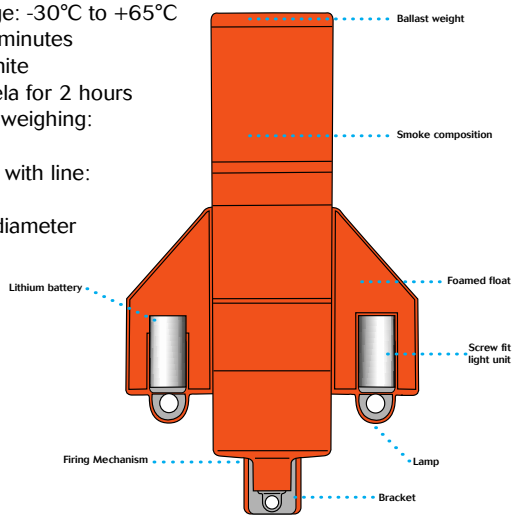
1. Signal and Lifebuoy mounted on bridge wing in ready to fire position.
2. Release locking pin and lifebuoy falls, automatically deploying marker.
3. Alternatively, manually throw lifebuoy overboard.

Packing & Transport Information

- 2 x signals in 1 fibreboard box
- Max. Gross Weight: 9.5 kg (20.94 lb.) per box
- Max. Net Weight: 7.7 kg (17 lb.)
- Measurements of fibreboard box: 36 x 27 x 40 cm (14.2 x 10.6 x 15.8 in)
- Max. Net Explosive Content per box: 2.574kg (5.67 lb.)
- Hazard class 1.4S UN 0507
- Proper shipping name: Signals, Smoke
- Other information: Passenger and cargo aircraft

Specifications

- Height: 375mm (14.76 in)
- Diameter: 183mm (7.20 in)
- Weight: 3.3kg (7.27 lb.)
- Weight – including bracket and angles: 3.85kg (8.5 lb.)
- Net Explosive Content: 1.287kg (2.84 lb.)
- Lamps (bulbs): 2 x 3.6v 2.0A
- Temperature range: -30°C to +65°C
- Burning time: 15 minutes
- Colour of light: white
- Duration: 2 candela for 2 hours
- Use with lifebuoy weighing: 4.0kg (8.82 lb.)
- Attach to lifebuoy with line: 4m (13ft) long, 9.5mm (0.37 in) diameter



Storage

This compact unit is ideally stored in good magazine conditions in an upright position, mounted to its stainless steel bracket in our original packaging. Onboard vessel: Two units are normally required to be carried. Mounted inverted and attached to a Lifebuoy. Usually positioned on each bridge wing and need a clear, uninterrupted drop into the water.

Approvals

Conforms to SOLAS 74 as amended. IMO Resolution MSC 81 (70) part 1.
MED: Light & Smoke Signal - BGV 422012-00,
Smoke Signal - BGV 422011-00, BAM-P1-0596, 0589-P1-0619.

WARNING

- Produces dense orange smoke - do not inhale.
- Do not fire in a confined space
- Keep out of reach of children
- Only for emergency use at sea
- If damaged or dented do not use
- Do not dismantle
- Keep away from source of heat
- Do not use after expiry date

DISPOSAL

- Pyrotechnics must be treated as hazardous items and must be disposed of responsibly in accordance with local regulations. For help and advice, visit our website **www.comet-marine.com**

Comet

WESCOM GROUP



Red Parachute Signal Rocket

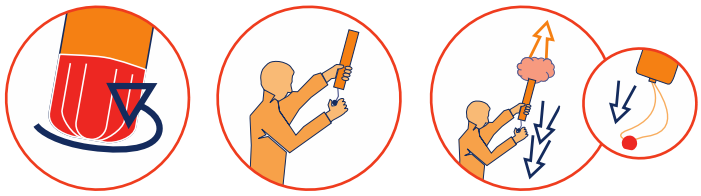
Art No. 9163100

The Comet Red Parachute Signal Rocket conforms to SOLAS 74 as amended. Designed to withstand exceptional environmental exposure and to perform reliably even after immersion in water, the pull wire ignitor and improved grip provides easy handling. Ejecting a red flare suspended on a parachute at 300m (1000ft), burning for 40 seconds at 30,000 candela.

Application

A day or night long-range distress signal. 12 may be carried on ships bridge and there is a requirement for 4 in ships lifeboats and liferafts. Also suitable for use in other commercial and recreational boats.

Operation



1. Hold signal firmly by ribbed handle. Unscrew RED bottom cap. Do not point at people or property.
2. Hold rocket vertically above head pointing away from body.
3. Ensure hands remain clear of top. To fire - pull red ball sharply down.

Packing & Transport Information

- 56 rockets in 2 metal tins in a fibreboard box
- Gross weight 16.3 kg (35.93 lb.)
- Net weight 13.7 kg (30.20 lb.)
- Measurements of fibreboard box: 47 x 27 x 35 cm (18.5 x 10.6 x 13.8 in)
- Net Explosive Content per box Max: 5.152 kg (11.36 lb.)
- Hazard Class 1.4G I UN 0505
- Proper Shipping Name: Signals, Distress, Ship
- Other Information: Cargo Aircraft Only

Storage

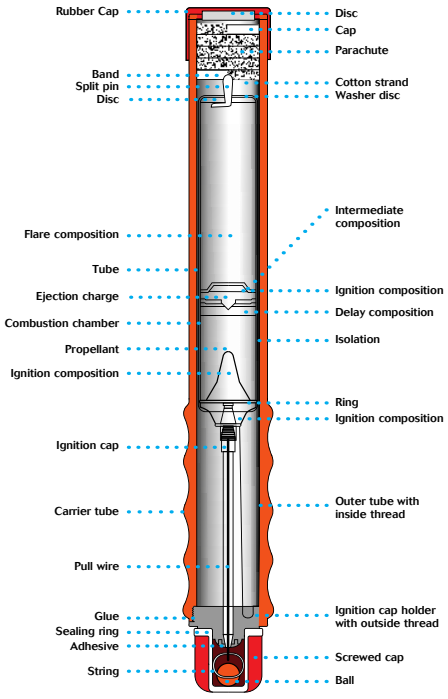
Ideally, should be stored in the robust, specially designed Polybottle, or in a dry, easily accessed location at ambient temperature.

Approvals

Conforms to SOLAS 74 as amended, IMO Resolution 96/98/EC. MED - BGV 425.005, BAM-P2-0059, 0589-P2-0046, USCG and other major maritime authorities world wide.

Specifications

- Length: 287 mm (11.3 in)
- Diameter at handle: 38 mm (1.5 in)
- Diameter: 32 mm (1.25 in)
- Weight Max: 245g (8.23 oz)
- NEC Max: 92g (3.25 oz)
- Light intensity: 30,000 candela
- Burning time: 40 seconds
- Colour of light: red
- Ignition: pull-wire ignitor
- Altitude: 300 m (985 ft)



WARNING

- Ejects rocket projectile - do not point at people
- Do not fire in a confined space
- Keep out of reach of children
- Only for emergency use at sea
- If damaged or dented do not use
- Do not dismantle
- Keep away from source of heat
- Do not use after expiry date

DISPOSAL

- Pyrotechnics must be treated as hazardous items and must be disposed of responsibly in accordance with local regulations. For help and advice, visit our website **www.comet-marine.com**

Smoke Signal Orange

Art No. 9192000



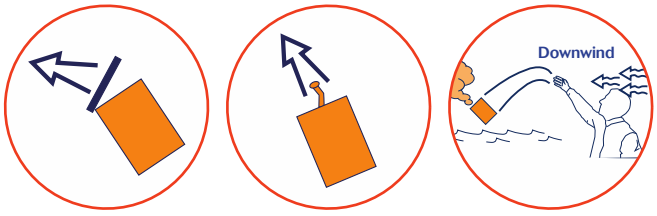
The Smoke Signal Orange is a compact, daylight distress signal designed to be easy and safe to handle. It provides effective position marking during rescue operations and can be used to indicate wind direction, producing dense orange smoke for a minimum of 3 minutes.

Application

The Comet orange smoke signal is a small and compact distress signal for daylight use designed for stowage in liferafts and lifeboats. SOLAS requires 2 smoke signals per raft/boat.

- Signal for position marking during rescue operations
- Indicates wind direction
- Safe use on oil or petrol covered water
- Conforming to SOLAS 74 as amended
- Ideal also for leisure boats

Operation



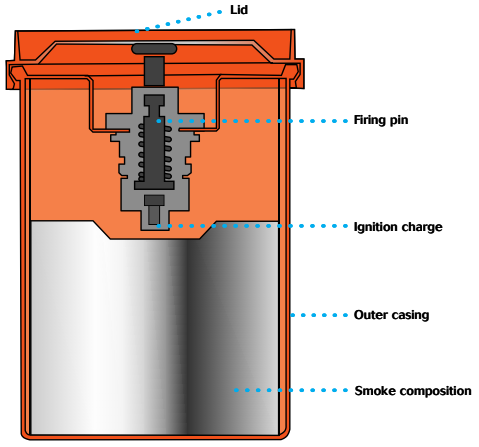
1. Remove plastic cap. Point away from body.
2. Pull tab firmly away from canister. Ensure hand remains clear of HOT END.
3. Throw Lifesmoke overboard immediately. Smoke will be emitted after a 2 second delay.

Packing & Transport Information

- 24 signals in 1 fibreboard box
- Gross weight 9.40 kg (20.72 lb.)
- Net weight 8.90 kg (19.62 lb.)
- Measurements of fibreboard box: 37 x 27 x 27 cm (15 x 11 x 11 in)
- Net Explosive Content per box: 5.736 kg (12.64 lb.)
- Hazard Class 1.4S
- UN 0507
- Proper Shipping Name: Signals, Smoke
- Other Information: Passenger and Cargo Aircraft

Specifications

- Height: 114 mm (4.5 in)
- Diameter: 82 mm (3.2 in)
- Gross Weight Max. 370g (13.05 oz)
- NEC Max. 239g (8.43 oz)
- Burning time: 3 minutes minimum
- Colour of smoke: orange
- Ignition: percussion ignitor with 2 seconds safety delay



Storage

This compact unit is ideally stored in a water-resistant locker at ambient temperature allowing easy access in an emergency or in the robust, specially designed polybottle.

Approvals

Conforms to SOLAS 74 as amended, Res. MSC 81 (70). Approvals: CE 0589, BAM–P1-0191, 0589-P1-0324, BGV MED 423.008, USCG 160.122./21/0, 160.022/21/0, and other major maritime authorities worldwide.

WARNING

- Produces dense orange smoke – do not inhale
- Do not fire in a confined space
- Keep out of reach of children
- Only for emergency use at sea
- If damaged or dented do not use
- Do not dismantle
- Keep away from source of heat
- Do not use after expiry date

DISPOSAL

- Pyrotechnics must be treated as hazardous items and must be disposed of responsibly in accordance with local regulations. For help and advice, visit our website **www.comet-marine.com**

Red Handflare

Art No. 9162800

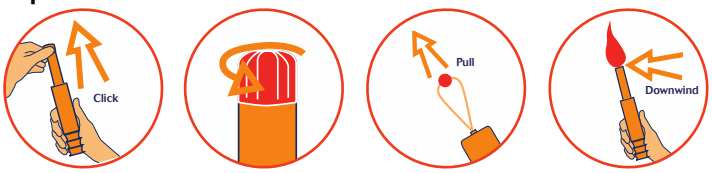


The Handflare MK8 conforms to SOLAS 74 as amended. Designed to withstand exceptional environmental exposure and to perform reliably even after immersion in water. Featuring a telescopic handle with improved grip, making it very compact for stowage. Easily extended for safe handling and operation by pull wire ignitor. Produces hot red flame for 60 seconds at 15000 candela.

Application

For use day or night the Comet Red Handflare is a short-range distress signal used to pinpoint position. May be carried on ships bridge and six are required to be fitted in ships lifeboats and liferafts. The handflare is suitable for use on other commercial and recreational boats.
Also available is the Comet White Collision Warn-off Handflare which is for use day or night when a collision danger exists or for the illumination of small areas outside. (Art No. 9162500)

Operation



1. Pull out red end until telescopic tube is fully extended and engaged.
2. Unscrew red end cap and point away.
3. Pull ball out sharply to fire.
4. Hold at arms length. Point Downwind. End plug ejects after 2 seconds delay.

Packing & Transport Information

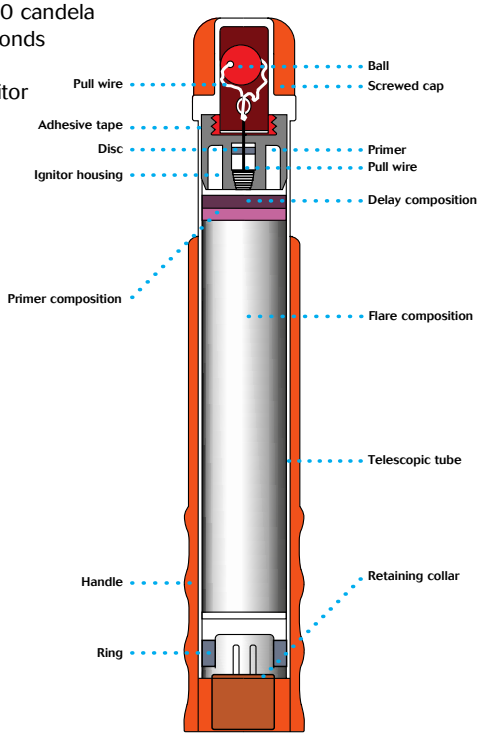
- 100 flares in 1 fibreboard box
- Gross Weight Max: 18.20 kg (40.12 lb.)
- Net Weight Max: 17.6 kg (38.8 lb.)
- Measurements of fibreboard box: 37 x 27 x 27cm (15 x 11 x 11 in)
- Net Explosive Content per box Max: 6.3 kg (13.89 lb.)
- Hazard Class 1.4G I UN 0191
- Proper Shipping Name: Signal Devices, Hand
- Other Information: Cargo Aircraft Only

Storage

Ideally, both products should be stored in the robust, specially designed Polybottle, or in a dry, easily accessed location at ambient temperature.

Specifications

- Length: 175mm (6.9 in)
- Length with handle pulled out: 280mm (11 in)
- Diameter: 28mm (1.1 in)
- Weight Max:176g (6.2 oz)
- Light intensity: 15,000 candela
- Burning time: 60 seconds
- Colour of light: red
- Ignition: pull-wire ignitor
- Net Explosive Content Max.: 63g (2.22 oz)



Approvals

Conforms to: SOLAS 74 as amended, IMO resolution MSC. 81(70) Part 1, (MED) 96/98/EC, BGV 426.004, BAM –P1-0594, 0589-P1-0617, USCG and other major maritime authorities worldwide.

WARNING

- Produces red hot flame - do not point at people
- Do not fire in a confined space
- Keep out of reach of children
- Only for emergency use at sea
- If damaged or dented do not use
- Do not dismantle
- Keep away from source of heat
- Do not use after expiry date

DISPOSAL

- Pyrotechnics must be treated as hazardous items and must be disposed of responsibly in accordance with local regulations. For help and advice, visit our website **www.comet-marine.com**

Day & Night Signal

Art No. 9131500



The compact, handheld Comet Day & Night Signal consists of a red flare at one end and an orange smoke at the other. Housed in a rugged, corrosion-resistant case and protected by end caps with 'O' ring seals.

Application

This handheld signal has been designed for personal distress signalling and is ideal for divers, windsurfers, dinghy sailors and small boats operating inshore as well as outdoor pursuits such as mountaineering, and was originally designed for helicopter/aircrew.

- Incorporates a red flare 15,000 candela at one end, for use at night and day, and a dense orange smoke at the other for daytime use.
- Both ends can be fired independently and can be doused in water after firing, allowing the unused end to be stowed until required.

Operation (identical both ends)



FOR DAY OR NIGHT USE ONLY WHEN RESCUE SERVICES ARE SIGHTED

1. Select the end to be used – smoke by day, flare at night. Due to its high power the flare also has good visibility by day if required. The Signal has differently coloured and ribbed end caps to aid identification at night.
2. Remove end cap.
3. Hold clear of face and point downwind.
4. To activate – pull toggle sharply away from body.

Packing & Transport Information

- 100 signals in fibreboard carton
- Gross weight: 19.3 kg (45.55 lb.)
- Net Weight: 18.7 kg (41.23 lb.)
- Measurements of fibreboard box: 37 x 27 x 27 cm (15 x 11 x 11 in)
- Net Explosive Content per carton: 5.14 kg (11.33 lb.)
- Hazard Class: 1.4G
- UN 0191
- Proper Shipping name: Signal Devices, Hand
- Other Information: Cargo Aircraft Only

Storage

Ideally, should be stored in the robust, specially designed Polybottle, or in a dry, easily accessed location at ambient temperature.

Specifications

- Length: 190mm (7.48 in)
- Diameter: 30mm (1.18 in)
- Burning time: Smoke 18 seconds, Flare 20 seconds
- Light intensity: 15,000 candela
- Colour of smoke: Orange
- Colour of flare: Red
- Weight: 187g (6.603oz)
- NEC: 51.49g (1.8 oz)
- Ignition: Pull wire ignitor

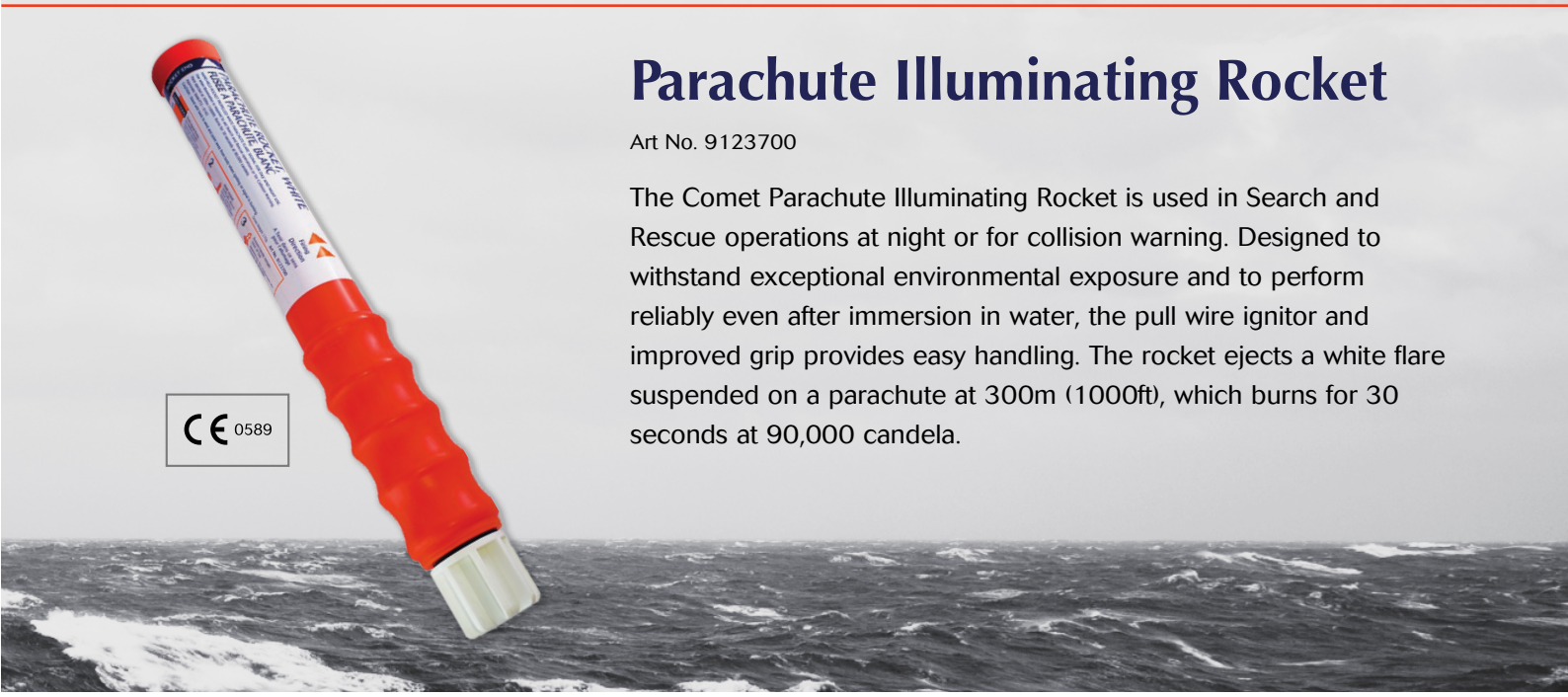


WARNING

- Produces red hot flame - do not point at people
- Produces dense orange smoke - do not inhale
- Do not fire in a confined space
- Keep out of reach of children
- Only for emergency use at sea
- If damaged or dented do not use
- Do not dismantle
- Keep away from source of heat
- Do not use after expiry date

DISPOSAL

- Pyrotechnics must be treated as hazardous items and must be disposed of responsibly in accordance with local regulations. For help and advice, visit our website **www.comet-marine.com**



Parachute Illuminating Rocket

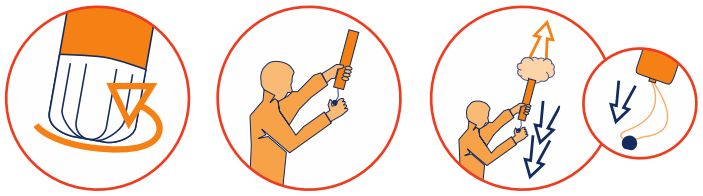
Art No. 9123700

The Comet Parachute Illuminating Rocket is used in Search and Rescue operations at night or for collision warning. Designed to withstand exceptional environmental exposure and to perform reliably even after immersion in water, the pull wire ignitor and improved grip provides easy handling. The rocket ejects a white flare suspended on a parachute at 300m (1000ft), which burns for 30 seconds at 90,000 candela.

Application

A day or night collision warning signal, or used at night to illuminate areas for Search and Rescue operations. Suitable for use in commercial vessels, recreational boats and rescue services.

Operation



1. Hold signal firmly by ribbed handle. Unscrew WHITE bottom cap. Do not point at people or property.
2. Hold rocket vertically above head pointing away from body.
3. Ensure hands remain clear of top. To fire – pull red ball sharply down.

Packing & Transport Information

- 56 rockets in 2 metal tins in a fibreboard box
- Gross weight 17.2 kg (37.92 lb.)
- Net weight 14.6 kg (32.18 lb.)
- Measurements of fibreboard box: 47 x 27 x 35 cm (18.5 x 10.6 x 13.8 in)
- Net Explosive Content per box: 5.152 kg (11.36 lb.)
- Hazard Class 1.4G
- UN 0505
- Proper Shipping Name: Signals, Distress, Ship
- Other Information: Cargo Aircraft Only

Storage

Ideally, should be stored in the robust, specially designed Polybottle, or in a dry, easily accessed location at ambient temperature.

Approvals

CE 0589, BAM- P2-0060, BAM 0589-P2-0056

Specifications

- Length: 287 mm (11.3 in)
- Diameter at handle: 38 mm (1.5 in)
- Diameter: 32 mm (1.25 in)
- Nominal weight: 260 g (9.17 oz)
- Net explosive cont: 92 g (3.2 oz)
- Light intensity: 90,000 candela
- Burning time: 30 seconds
- Colour of light: white
- Ignition: pull-wire ignitor
- Altitude: 300 m (985 ft)



WARNING

- Ejects rocket projectile – do not point at people or property
- Do not fire in a confined space
- Keep out of reach of children
- Only for emergency use at sea
- If damaged or dented do not use
- Do not dismantle
- Keep away from source of heat
- Do not use after expiry date

DISPOSAL

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White Handflare

Art No. 9162500

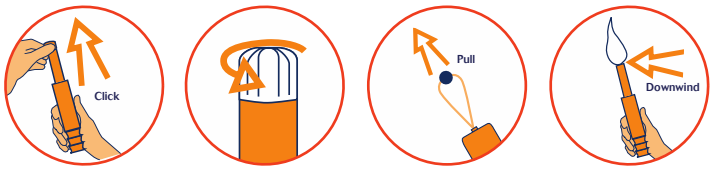


The White Handflare is for use as a collision warning signal or for illumination of small areas. Designed to withstand exceptional environmental exposure and to perform reliably even after immersion in water. Featuring a unique telescopic handle with improved grip, making it very compact for stowage. Easily extended for safe handling and operation by pull wire ignitor. Produces hot white flame for 60 seconds at 2,500 candela.

Application

For use by day or night as a short-range collision warning signal, to pinpoint position and to illuminate small areas at night. These may be carried on the ship's bridge and are recommended for yachts making night passages. Four white handflares are included in our RORC kits. Also available is the similar red handflare (Art No. 9162800), which is used to signal distress.

Operation



1. Pull out white end until telescopic tube is fully extended and engaged.
2. Unscrew white end cap and point away.
3. Pull ball out sharply to fire.
4. Hold at arms length. Point Downwind. End plug ejects after 2 seconds delay.

Packing & Transport Information

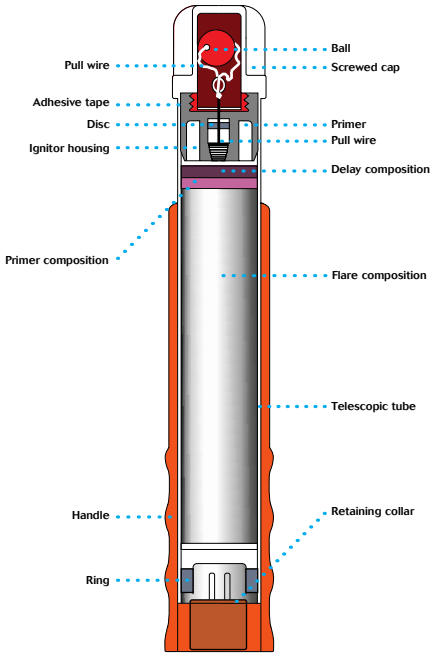
- 100 flares in 1 fibreboard box
- Gross weight 17.6 kg (38.80 lb.)
- Net weight 17 kg (37.48 lb.)
- Measurements of fibreboard box: 37 x 27 x 27cm (15 x 11 x 11 in)
- Net Explosive Content per box: 6 kg (13.23 lb.)
- Hazard Class 1.4G
- UN0191
- Proper Shipping Name: Signal Devices Hand
- Other Information: Cargo Aircraft Only

Storage

The telescopic handle saves stowage space. Ideally, both red and white handflares should be stored in our robust, specially designed polybottles, or in a dry, easily accessed location at ambient temperature. Do not store near sources of heat.

Specifications

- Length: 175mm (6.9 in)
- Length with handle pulled out: 280mm (11 in)
- Diameter: 28mm (1.1 in)
- Weight: 170g (6.003oz)
- Light intensity: 2,500 candela
- Burning time: 60 seconds
- Colour of light: white
- Ignition: pull wire ignitor
- Net explosive content: 60g (2.12oz)





WARNING

- Produces white hot flame – do not point at people
- Do not fire in a confined space
- Keep out of reach of children
- Only for emergency use at sea
- If damaged or dented do not use
- Do not dismantle
- Keep away from source of heat
- Do not use after expiry date

DISPOSAL

- Pyrotechnics must be treated as hazardous items and must be disposed of responsibly in accordance with local regulations. For help and advice, visit our website **www.comet-marine.com**



Orange Handsmoke

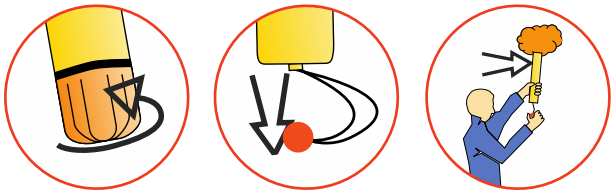
Art No. 9132600

The Orange Handsmoke is a hand-held marine distress signal for daytime use to indicate position and wind direction. Produces dense orange smoke for 60 seconds.

Application

Daytime, short range distress signal, used to pinpoint position and indicate wind direction once potential rescuer is sighted. Ideal for use on yachts, dinghies, RIBs, canoes and is included in our Inshore and Coastal kits.

Operation



1. Unscrew bottom brown end cap and point away from body
2. To ignite - pull toggle down sharply
3. Hold at arms length, downwind and outboard

Packing & Transport Information

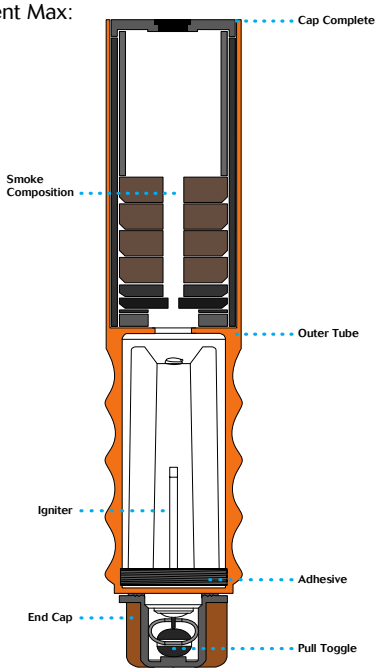
- 50 signals in fibreboard box
- Gross Weight Max per pack: 8.8 kg (19.4 lb.)
- Net Weight Max per pack: 8.3 kg (18.3 lb.)
- Measurements of fibreboard box: 37 x 27 x 27 cm (15 x 11 x 11 in)
- Net Explosive Max Content per box: 2.775kg (6.12 lb.)
- Hazard Class:1.4G
- UN 0197
- Proper Shipping name: Signals, Smoke
- Other information: Cargo Aircraft Only

Storage

Should be stored in either the mini or large Polybottle in a dry, easily accessed location at ambient temperature.

Specifications

- Length: 24.3cm (9.57 in)
- Burning Time: 60 seconds
- Diameter: 3.8cm (1.5 in)
- Colour of Smoke: Orange
- Weight Max: 165g (5.82 oz)
- Ignition: Pull - wire ignitor
- Net Explosive Content Max: 55.5g (1.96 oz)



WARNING

- End plug ejected – do not point at people
- Produces dense orange smoke – do not inhale
- Do not fire in a confined space
- Keep out of reach of children
- Only for emergency use at sea
- If damaged or dented do not use
- Do not dismantle
- Keep away from source of heat
- Do not use after expiry date

DISPOSAL

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CE 0589



Personal Signal Launcher

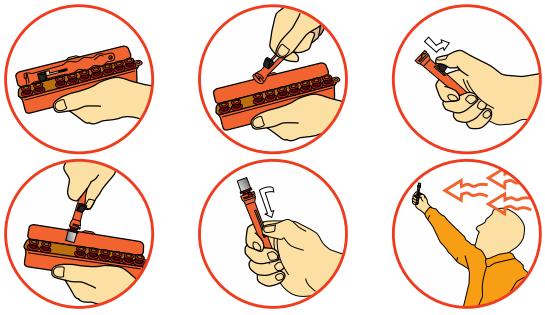
Art No. 9194600

The lightweight, Comet Personal Signal Launcher pack contains 9 red aerial flare cartridges and a penjector firing mechanism, all enclosed in a tough, water-resistant case. The penjector is fitted with a stainless-steel spring and striker pin. It features a slot for easy loading and unloading of the flare cartridge with the trigger in the safety catch position.

Application

Comet Personal Signal Launcher are designed primarily for use on yachts, dinghies, Personal Water Craft, canoes and sailboards, but have many applications as a general-purpose distress signal for aviation, hill-walking, climbing, skiing and other outdoor pursuits. Each cartridge projects its payload to a height of 50 metres, burns for over 5 seconds at a minimum of 10,000 candela and is visible for at least 5 miles in daylight increasing to 10 miles at night, depending on weather conditions. Operating instructions are on the case.

Operation



For day or night-use only when rescue services are sighted

1. Open case.
2. Remove penjector from pack.
3. Place trigger in safety catch position.
4. Load the flare cartridge by sliding into slot on penjector.
5. To fire, hold the penjector firmly at arms length above and away from face and body, pull back penjector trigger and release – fire vertically and be prepared for slight recoil and loud report.

Packing & Transport Information

- 50 kits per fibreboard carton
- Gross weight: 10.1 kg (22.27 lb.)
- Net weight: 9.5 kg (20.94 lb.)
- Hazard Class: 1.4G
- Net Explosive Content per carton: 2.4 kg (2.59 lb.)
- Measurements of carton: 37 x 27 x 27 cm (15 x 11 x 11 in)
- UN 0312
- Proper Shipping Name: Cartridges, Signal
- Other Information: Cargo Aircraft only

Storage

When not carried, the signal should be stored in our robust, specially designed Polybottle, or in a dry location at ambient temperature.

Specifications

- Application: For use in day and night distress signal situations
- Dimensions: 180mm x 58mm x 25mm (7.1 x 2.28 x 1.0 in)
- Height: 50 metres (164')
- Net Explosive Content: Approx 48g per set (1.69 oz)
  5.25g per cartridge (0.19 oz)
- Burning time: over 5 seconds
- Light intensity: 10,000 candela
- Weight: 190g (6.7oz) in display box
  147g (5.19oz) just the magazine filled with nine cartridges and the signal pen

WARNING

- Ejects projectile – do not point at people or property
- Do not fire in a confined space
- Keep out of reach of children
- Only for emergency use
- If damaged or dented do not use
- Do not dismantle
- Keep away from sources of heat
- Do not use after expiry date

DISPOSAL

- Pyrotechnics must be treated as hazardous items and must be disposed of responsibly in accordance with local regulations. For help and advice, visit our website **www.comet-marine.com**

Comet

WESCOM GROUP

CE 0589



Compact Signal Launcher

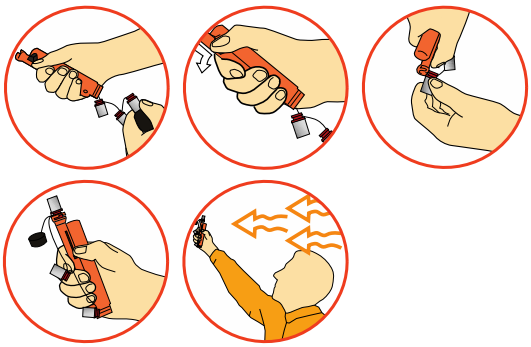
Art No. 9194700

The lightweight, Comet Compact Signal Launcher contains 3 red aerial flare cartridges and a penjector firing mechanism, all enclosed in a tough, water-resistant case. The penjector is fitted with a stainless-steel spring and striker pin. It features a slot for easy loading and unloading of the flare cartridges. These are stored inside the casing on an elastic lanyard to avoid them being lost when the base cap is unscrewed.

Application

Compact Signal Launchers are designed primarily for use on yachts, dinghies, Personal Water Craft, canoes and sailboards, but have many applications as a general-purpose distress signal for aviation, hill-walking, climbing, skiing and other outdoor pursuits. Each cartridge projects its payload to a height of 50 metres, burns for over 5 seconds at a minimum of 10,000 candela and is visible for at least 5 miles in daylight increasing to 10 miles at night, depending on weather conditions. Operating instructions are on the case.

Operation



For day or night-use only when rescue services are sighted

1. Unscrew base cap.
2. Place trigger in safety catch position.
3. Load the flare cartridge attached to lanyard by sliding into slot on penjector.
4. To fire, hold the penjector firmly at arms length above and away from face and body, pull back penjector trigger and release – fire vertically and be prepared for slight recoil and loud report

Packing & Transport Information

- 50 kits per fibreboard carton
- Gross weight: 6.9 kg (15.21 lb.)
- Net weight: 6.3 kg (13.89 lb.)
- Hazard Class: 1.4G
- Net Explosive Content per carton: 0.8 kg (1.76 lb.)
- Measurements of carton: 37 x 27 x 27 cm (15 x 11 x 11 in)
- UN 0312
- Proper Shipping Name: Cartridges, Signal
- Other Information: Cargo Aircraft only

Storage

When not carried, the signal should be stored in our robust, specially designed Polybottle, or in a dry location at ambient temperature.

Specifications

- Application: For use in day and night distress signal situations
- Dimensions: 145mm x 40mm x 25mm (5.7 x 1.6 x 1.0 in)
- Net Explosive Content: Approx 16g per pack (0.56 oz)
  5.25g per cartridge (0.19 oz)
- Burning time: over 5 seconds
- Height: 50 metres (164')
- Light intensity: 10,000 candela
- Weight: 125g (4.41oz) in display box
  80g (2.82) just the signal pen filled with three cartridges

WARNING

- Ejects projectile – do not point at people or property
- Do not fire in a confined space
- Keep out of reach of children
- Only for emergency use
- If damaged or dented do not use
- Do not dismantle
- Keep away from sources of heat
- Do not use after expiry date

DISPOSAL

- Pyrotechnics must be treated as hazardous items and must be disposed of responsibly in accordance with local regulations. For help and advice, visit our website **www.comet-marine.com**



Signal Pistol and Cartridges

Calibre 4/26.5mm. Art Nos. Pistol 9129000

Signal Cartridges Red 9182000 • White 9182100 • Green 9182200 • Maroon 9122500

Signal Pistol Features

Pistols are new, not re-conditioned

• Solid and robust, easy to operate • The body is made of a special polymer which is highly impact, temperature and UV resistant • The barrel is stainless steel which guarantees a lifetime of 2000 shots • Fires range of distress, illuminating, maroon and signalling Very cartridges • Can be used for flare stack lighting

Signal Cartridge Features

• Easy handling • Easy identification
• Coloured caps signify flare colour and notched edges aid identification at night
• Red flare = Full edging and signals distress
• White flare = half edging and signals collision warning and briefly illuminates the foreground
• Green flare = no edging and used as a general signal
• Maroon flare = no edging and produces an acoustic and optical signal (flash and bang)

Signal Pistol

Specifications

• Total length: 199.8mm (7.9 in)
• Length of barrel: 154.8mm (6.1 in)
• Pistol weight: 528g (18.62oz)

Firearm

• The trade in firearms requires an arms trade permit
• Purchase of firearms is only allowed if you possess a valid firearms licence



Pistol shown in plastic briefcase

Cartridges

Specifications

Signal Cartridges

• Length: 80mm (3.15 in)
• Diameter: 26.5mm (1 in) (Cal.4)
• Cartridge case: Plastic
• Height: 100m (328ft) +/-20 m (66ft)
• Burning time: 8 secs
• Art No. 9182000 = Red >30,000 candela
Net Explosive Content: 15g (0.53oz)
Weight: 38g each (0.99oz)
• Art No. 9182100 = White >40,000 candela
Net Explosive Content: 26.5g (0.93oz)
Weight: 45g (1.59oz)
• Art No. 9182200 = Green >10,000 candela
Net Explosive Content: 15g (0.53oz)
Weight: 38g each (1.34oz)
• Art No. 9122500 = Maroon
Net Explosive Content: 13g (0.46oz)
Weight: 62g each (2.19oz)
Cartridge case = Aluminium
Height: 120m (394 ft)
Produces a flash with a cloud of smoke and a loud report of 170 decibels at 3m (10ft) distance and 1m (3.3ft) height

Packing & Transport Information

Signal Cartridges

• 10 Signal cartridges in a inner paper carton
• 250 Cartridges in fibreboard box (25 inner boxes per carton)
• Measurements of carton: 37 x W 27 x H 27 cm (L 14.57 x W 10.63 x H 10.63 in)
• Gross Weight
Red: 11.7 kg (25.79 lb.)
White: 13.5 kg (29.77 lb.)
Green: 11.7 kg (25.79 lb.)
Maroon: 17.7 kg (39.02 lb.)
• Net Weight without inner box
Red: 9.5 kg (20.94 lb.)
White: 11.3 kg (24.91 lb.)
Green: 9.5 kg (20.94 lb.)
Maroon: 15.5 kg (34.17 lb.)
• Net Explosive Content per carton
Red: 3.8 kg (8.38 lb.)
White: 6.6 kg (14.55 lb.)
Green: 3.8 kg (8.38 lb.)
Maroon: 3.3 kg (7.28 lb.)



• Hazard Class 1.4G, Maroon 1.3G
• UN 0312, Maroon UN 0054
• Proper Shipping Name: Cartridges, Signal
• Other Information: Cargo Aircraft Only

Pistol

• Pistol supplied in plastic briefcase
• Total weight (inc. briefcase) approx.:
0.95 kg (2.1 lb)



WARNING

• Ejects projectile - do not point at people or property
• Do not fire in a confined space
• Keep out of reach of children
• If damaged or dented do not use
• Do not dismantle
• Keep away from source of heat
• Do not use after expiry date

DISPOSAL

• Pyrotechnics must be treated as hazardous items and must be disposed of responsibly in accordance with local regulations.
For help and advice, visit our website **www.comet-marine.com**

Polybottles

Rugged, buoyant containers, ideal for storing distress signals. Can be easily picked up in an emergency.



Art no. 9128000
Large Polybottle
(waterproof)
12 litre (2.64gal) capacity

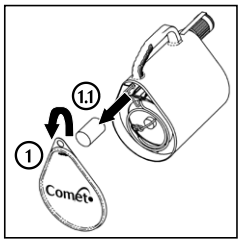


Art no. 9128900
Mini Polybottle
(water resistant)
3 litre (0.8gal) capacity

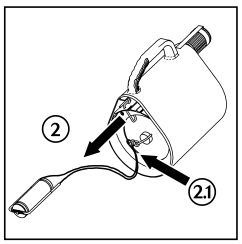
Linethrower 250

Rocket Installation Instruction

1. Inspect the container before changing the rocket for damage and signs of wear. A damaged device must not be used again. Remove the cover of the container and withdraw the white stoppers in the upper part of the container (1.1).
Attention: *In no circumstances are you to remove the stoppers from the middle of the cable coil!*

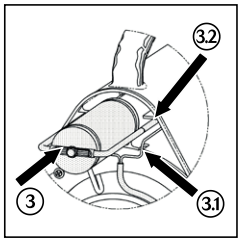


2a. Replace old rocket. Extract the rocket completely from the rocket shaft of the container and separate from the cord (2.1).



2b. Install new rocket.

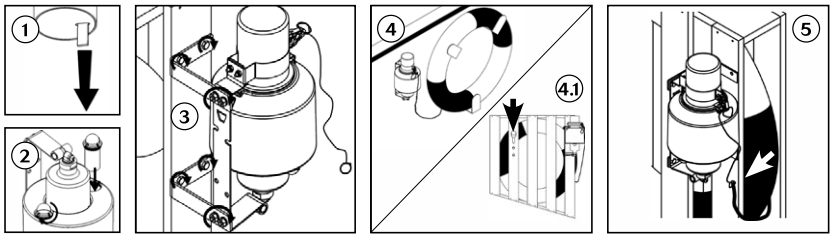
3. Connect the new rocket with the cord (Bowline) and let them slide into the rocket shaft. The bracket must be guided under the tracks (3.1).
Attention: *The rocket should only slide into the rocket shaft through its own dead weight. Pay attention to the correct positon of the pull jack. The steel cables of the pull jack run into the rocket shaft beneath the rocket and are guided through slots on the floor of the shaft (3.2). Ensure that the knotting of the cord end (Slipstek) does not hinder the rockets when firing. Fix the rocket in the bottom of the rocket shaft, place the white polystyrene plug on top and seal the container with the white top cover.*



4. Attach date stickers to the device where the designated place of the product label should be.

Light & Smoke Signal

Mounting, Operating and Test Instructions



MOUNTING INSTRUCTION

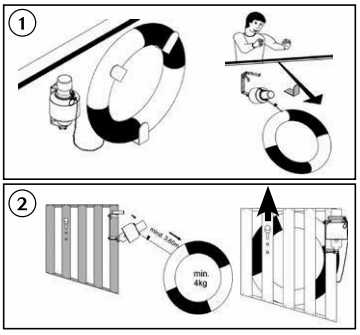
1 Remove transit tag from base of light units. Check lights work by inverting units. Note: Lights only operate when upright and without transit tags.

2 Screw lights firmly into their holders in the float.

3 Fasten mounting bracket on outside of bridge wing bulwarks. Select mounting point to avoid vibration as much as possible. With Lifebuoy shute –fasten the right angled brackets on outboard side of lifebuoy shute. Screw mounting bracket to right angled brackets.

4 Install lifebuoy into bracket (4). Or-install lifebuoy into shute and fix by locking pin.(4.1)

5 Tie the connection line of the lifebuoy to the pull cord of the Light Smoke signal. (Minimum 3.6m of line)
Avoid at any time applying strong tension on the safety clip of the pull cord. Danger of unintended release of signal.



OPERATING INSTRUCTIONS

1 In case of a man overboard, throw lifebuoy overboard and the signal will be released automatically.

2 Attached to Lifebuoy shute: Remove pin and weight of lifebuoy will automatically release the signal.

Signal produces dense orange smoke for 15 minutes and white lights for 2 hours at 2 candela minimum.

TESTING THE LIGHTS

1 The signal is designed to be 'fit and forget' for it's entire service life.

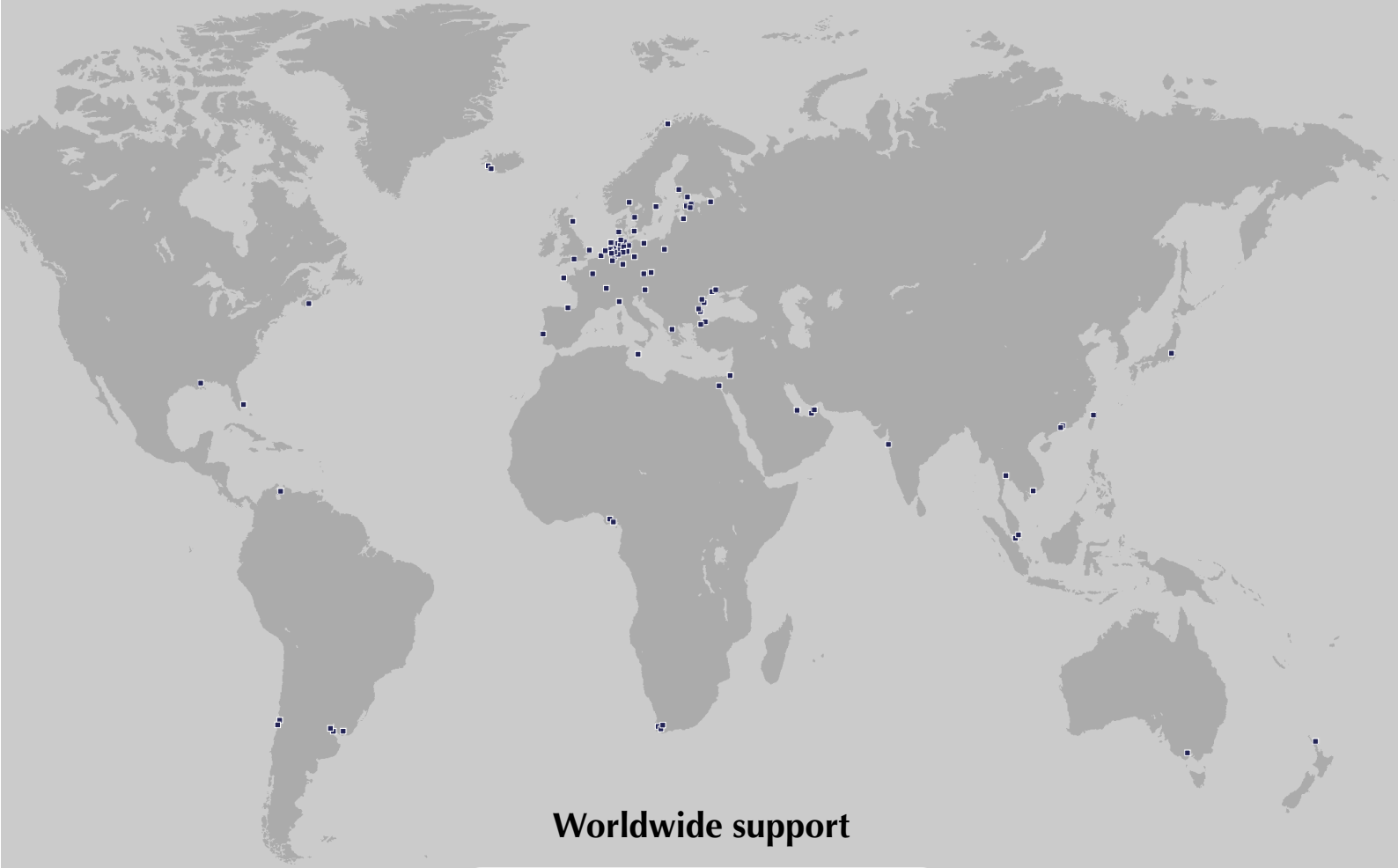
2 Annual testing of lights is not required.

3 The LED lights are operated by a lithium battery and a tilt switch. They will remain 'OFF' until the signal is turned upright.

4 If a light test is required. Each light unit can be carefully unscrewed and removed from the holder in the float.
Hold unit upright to turn the light on. Screw units firmly back into holders. Take care not to drop the lights!

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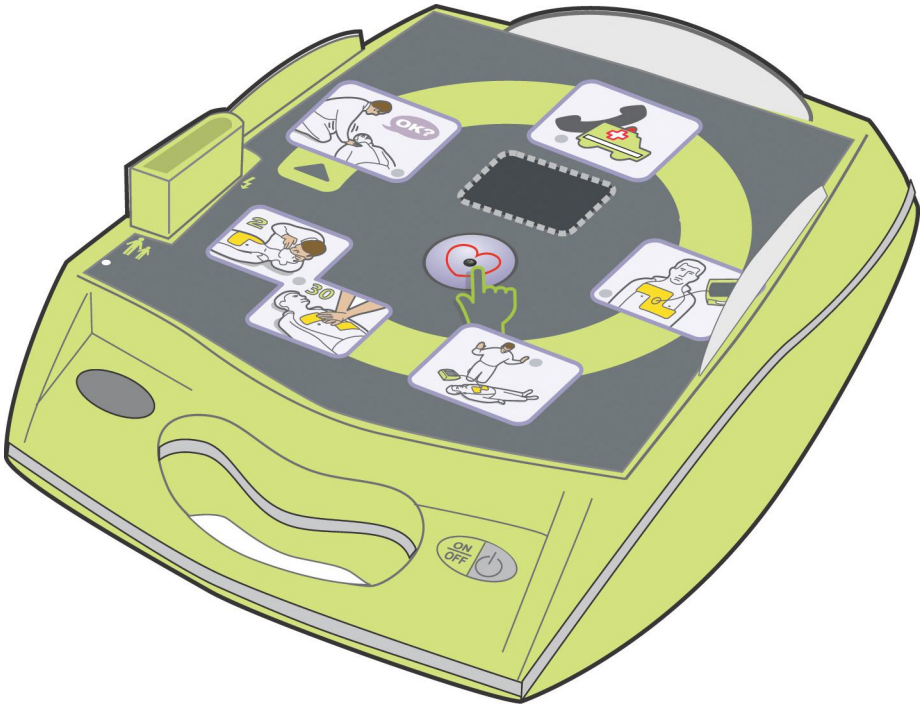
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Compostable
Recyclable
Marine Degradable
Energy Saving
Saving Trees

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AED brands®

AED Plus®
Administrator's Guide



ZOLL®

9650-0301-01 Rev. X

AED brands®

This issue date for the ZOLL **AED Plus Administrator's Guide**, (**REF** 9650-0301-01 Rev X) is **March, 2016**.

If more than 3 years have elapsed since the issue date, contact ZOLL Medical Corporation to determine if additional product information updates are available.

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Preface

AED brands®

The AED Plus® *Administrator's Guide* is to be used by responsible medical authorities in conjunction with the *ZOLL AED Plus Operator's Guide* (**REF** 9650-0300-01).

The AED Plus is to be used by trained rescuers to provide emergency defibrillation. It incorporates a sequence of visual and voice prompts to help rescuers follow established AHA/ERC Guidelines 2010 protocols for use of AEDs. It also incorporates recording/memory capabilities to allow medical control authorities to review rescuer's use of the device. Recording includes ECG rhythms, event data, device identification, and optionally, voice recording of rescuer and ambient sounds. This information is available via an upload capability to a personal computer for event review and archiving.

Both the American Heart Association (AHA) and the European Resuscitation Council (ERC) publish extensive information regarding the use of automated external defibrillators and their relationship to cardiopulmonary resuscitation. The following publications provide supplemental material to be used in conjunction with the *ZOLL AED Plus Administrator's Guide* and *Operator's Guide*:

1. *2010 American Heart Association Guidelines for CPR and ECC*; Supplement to *Circulation*, Volume 192, Issue 18, November 12, 2010.
2. *European Resuscitation Council Guidelines for Resuscitation 2010*; *Resuscitation* (2010) Volume 81, October 2010.

This guide provides information about the operation and care of the AED Plus unit. The administrator, and user should read each section carefully. Make sure to read the Safety Summary section.

This guide is divided into six sections.

Preface - This page.

Safety Summary - Describes General Warnings and Cautions.

Introduction- Provides a general product overview of the AED Plus.

Section 1 - Operation - Describes the functions of all controls and indicator lights of the AED Plus.

Section 2 - Installation, Self Test, Maintenance and Troubleshooting- Describes configuration of the unit, data communications, troubleshooting, maintenance and how to order accessories and supplies.

Appendices - Provides the specifications of the AED Plus, characteristics of the ZOLL Rectilinear Biphasic™ waveform, and information on the ECG Analysis Algorithm Accuracy.

Safety Summary

The following section describes general warnings and safety considerations for administrators, rescuers, and patients.

Warnings

- Use the AED Plus unit only as described in this manual. Improper use of the device can cause death or injury.
- DO NOT use or place the AED Plus unit in service until you have read the AED Plus Operator's and Administrator's Guides.
- DO NOT use or place the AED Plus unit in service if the unit's status indicator window (located on the left side of the handle) displays a red "X".
- DO NOT use or place the AED Plus unit in service if the unit emits a beeping tone.
- Connect the electrode cable to the AED Plus unit after installing batteries.
- Keep the electrode cable connected to the AED Plus unit at all times.
- This device should only be used by properly trained individuals.
- Only use electrodes labeled "Infant/Child" on children less than 8 years old or weighing less than 55 lbs (25 kg). Use CPR-D-padz® if victim is older than 8 years or weighs more than 55 lbs (25 kg).
- Always stand clear of victim when delivering a shock. Defibrillation energy delivered to the victim may be conducted through the victim's body and cause a lethal shock to those touching the victim.
- DO NOT TOUCH the electrode surfaces, the victim, or any conductive material touching the victim during ECG analysis or defibrillation.
- Move victim away from electrically conductive surfaces prior to use of equipment.
- DO NOT use this unit near or within puddles of water.
- Keep the victim as motionless as possible during ECG analysis.
- DO NOT use this unit near flammable agents, such as gasoline, oxygen-rich atmospheres or flammable anesthetics.
- Avoid radio frequency interference from high-power sources that might cause the defibrillator to interpret cardiac rhythms incorrectly by turning off cell phones and 2 way-radios.
- Disconnect non-defibrillation protected electronic devices or equipment from victim before defibrillation.
- Dry victim's chest, if wet, before attaching electrodes.
- Apply freshly opened and undamaged electrodes, within the electrode expiration date, to clean and dry skin to minimize burning.
- DO NOT place the electrodes directly over the victim's implanted pacemaker. Pacemaker stimuli may degrade the accuracy of ECG rhythm analyses or the pacemaker may be damaged by defibrillator discharges.
- Check labeling inside the AED Plus cover before using the cover as a Passive Airway Support System (PASS) device. Ensure it is intended for this use.
- DO NOT use Passive Airway Support System (PASS) if there is a suspected head or neck injury. Place victim on a firm surface before performing cardiopulmonary resuscitation.
- DO NOT recharge, disassemble, or dispose of batteries in fire. Batteries may explode, if mistreated.
- Do not use or stack the AED Plus unit with other equipment. If the unit is used or stacked with other equipment, verify proper operation prior to use.

Cautions

- Do not disassemble the unit. A shock hazard exists. Refer all servicing to qualified personnel.
- Use only commercially available type 123A lithium manganese dioxide batteries. Discard batteries properly after removal from unit. Use only batteries from recommended manufacturers.
- If the device is stored outside the recommended environmental conditions, the electrode pads and/or batteries may be damaged or their useful life reduced.
- Safety and effectiveness data submitted by ZOLL Medical Corporation to the Food and Drug Administration (FDA) under section 510(K) of the Medical Device Act to obtain approval to market are based upon the use of ZOLL accessories such as disposable electrodes. The use of electrodes from sources other than ZOLL is not recommended. ZOLL makes no representations or warranties regarding the performance or effectiveness of its products when used in conjunction with electrodes from other sources. If unit failure is attributable to the use of accessories not manufactured by ZOLL, this may void ZOLL's warranty.
- The CPR-D-padz electrode can be connected to other ZOLL Defibrillators with Multifunction Cables. Defibrillation can be administered when connected to other ZOLL Defibrillators. The CPR function does not operate with any device other than the AED Plus and AED Pro®.

Indications for Use

Use the AED when a suspected cardiac arrest victim has an apparent LACK OF CIRCULATION as indicated by:

- Unconsciousness and
- Absence of normal breathing and
- Absence of a pulse or signs of circulation.

When the victim is less than 8 years of age, or weighs less than 55 lbs (25 kg), the ZOLL AED Plus should be used with the ZOLL AED Plus Pediatric Electrodes. Therapy should not be delayed to determine the victim’s exact age or weight.

Contraindications for Use

Do NOT use the AED Plus when the victim:

- Is conscious; or
- Is breathing; or
- Has a detectable pulse or other signs of circulation.

Intended Users of the Device

The AED Plus external defibrillator is intended to be used by personnel who are qualified by training in the use of the AED Plus device, basic life support, advanced life support, or other physician-authorized emergency medical response to defibrillate victims of cardiac arrest. The Real CPR Help® function provides a metronome designed to encourage rescuers to perform chest compressions at the AHA/ERC recommended rate of 100 compressions per minute. Voice and visual prompts encourage a minimum compression depth of 2 inches for adult victims. The Real CPR Help function is not intended for use on victims under 8 years of age.

Tracking Requirements

U.S Federal Law (21 CFR 821) requires the tracking of defibrillators. As an owner of this device, you have the responsibility under this law to notify ZOLL Medical Corporation if this product has been received, lost, stolen or destroyed or has been donated, resold or otherwise distributed to a different organization.

If any of the events described above occur, please contact ZOLL Medical Corporation in writing with the following information:

1. Originator's organization - Company Name, Address, Contact Name and Contact Phone Number.
2. Part Number/Model Number and Serial Number.
3. Disposition of Device (e.g. received, lost, stolen destroyed, distributed to another organization).
4. New Location and/or Organization (if different from #1 above) - Company Name, Address, Contact Name and Contact Phone number.
5. Date change took effect.

Notification of Adverse Events

As a health care provider, you may have responsibilities under the Safe Medical Devices Act (SMDA) for reporting to ZOLL and possibly to the FDA, the occurrence of certain events. These events, described in 21 CFR Part 803, include device related death and serious injury or illness. In any event, as part of our Quality Assurance Program, ZOLL should be notified of any device failures or malfunction. This information is required to assure that ZOLL provides only the highest quality products.

Unpacking

- Carefully inspect each packing container for damage.
- Examine the unit for any signs of damage that may have occurred during shipping.
- If the contents are incomplete or damaged or if the unit fails to pass its self test as indicated by a Red "X" in the status indicator window after battery installation, contact ZOLL Medical Corporation's Technical Service Department.
- Review the shipping list to insure that all items ordered were received.

Conventions

Throughout this document, voice prompts are indicated by capital italicized letters, such as *CALL FOR HELP.*

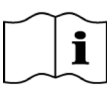
WARNING! Warning statements describe conditions or actions that can result in personal injury or death.

CAUTION! Caution statements describe conditions or actions that can result in damage to the unit.

NOTE Notes contain additional information on using the defibrillator.

Symbols

Symbols used in this manual or on the equipment include the following:

	Class II equipment
	Defibrillation protected Type BF patient connection
	**ATTENTION:** Refer to manual for more information
	**DANGEROUS VOLTAGE**
	Not new battery cells
	New battery cells
	Do Not push button
	Push button
	Do not use this manufacturer
	Ok to use this manufacturer
	Unit equipped to treat adult and pediatric victims
	Manufacturer
	Authorized representative in the European Community
	Serial Number
	Catalogue number
	Consult instructions for use

AED brands®

Introduction

Using the ZOLL AED Plus

The AED Plus is an automated external defibrillator (AED) that uses voice prompts and visual indicators to guide the rescuer through a resuscitation sequence that may include defibrillation and/or cardiopulmonary resuscitation (CPR). The unit incorporates the ZOLL Rectilinear Biphasic Defibrillation waveform, and operates in either adult or pediatric mode.

The AED Plus supports both adult and pediatric defibrillation electrode pads, and automatically adjusts the defibrillation energy based on the type of electrode pads connected to it. Following attachment of electrodes to a victim's chest, the defibrillator monitors the electrocardiographic (ECG) rhythm of the victim's heart, analyzes that rhythm, and determines whether the rhythm is shockable or non-shockable. When needed, defibrillation energy is delivered through these same electrodes. When the unit detects a shockable rhythm, it charges and issues the warning *PRESS FLASHING SHOCK BUTTON*. The rescuer presses the Shock Button to deliver the shock. The rescuer will then be prompted to perform CPR for a period of 2 minutes, after which the unit automatically initiates a new ECG analysis.

Some versions of the AED Plus include a cover that can also be used as a PASS (Passive Airway Support System) to support the victim's neck and shoulders in a position that assists in maintaining an open airway. Some versions also contain disposable accessories (razor, barrier mask, scissors, and a towel). The AED Plus is powered by ten commercially available consumer brand lithium-manganese dioxide batteries.

The AED Plus can:

- Perform periodic self tests to ensure its continual readiness.
- Use a one-piece electrode assembly (***CPR•D****-padz*) that facilitates proper electrode placement and that is easy to apply to the victim.
- Analyze heart rhythm and inform the rescuer if the rhythm is shockable or non-shockable.
- Deliver defibrillation treatment to victims of cardiac arrest who exhibit shockable ECG rhythms.
- Provide voice prompts and graphics to guide the rescuer regarding what to do and when to do it during a cardiac emergency, such as calling for help or giving CPR to the victim.
- Provide audible beeps to encourage rescuers to provide CPR compressions at 100 CPM (requires ***CPR-D•****padz*).
- Monitor the depth of chest compressions during CPR and provide voice prompts, if compression depth is inadequate (requires ***CPR-D•****padz*).
- Provide a unit cover that functions as a Passive Airway Support System (PASS). (Note the PASS feature is standard with some versions of the product and optional with others.)
- Upload data from the defibrillator to a computer to store events or print event reports.
- Use commercially available batteries.

Using Real CPR Help®

The ***CPR-D•padz*** include a sensor that detects the rate and depth of CPR chest compressions. This sensor is placed (as part of the electrodes application) on the victim's chest so that it is located between the rescuer's hands and the victim's lower sternum during chest compressions. When the rescuer performs CPR compressions, the sensor detects their rate and depth and sends the information to the AED Plus unit. When used with ***CPR-D•padz***, the AED Plus monitors the depth and rate of CPR chest compressions. It provides a CPR metronome function designed to encourage rescuers to perform chest compressions at the AHA/ERC recommended rate of 100 compressions per minute (CPM) as well as voice and visual prompts to encourage a minimum compression depth of 2 inches for adult victims.

WARNING! Real CPR Help is intended for use on adult victims only; do not use on victims under 8 years of age.

The adaptive metronome function is disabled during periods when CPR should not be performed (for example, during ECG analyses and defibrillation shock sequences). During periods when CPR may be indicated, the metronome begins issuing audible beeps following detection of the rescuer's first few compressions. The beeps continue automatically (at rates described below) until a few seconds after chest compressions are halted by the rescuer or until the recommended "CPR period" ends (2 minutes for AHA and ERC protocols). If the rescuer ceases chest compressions during the CPR period, metronome beeps stop within a few seconds after compressions are halted. Audible beeps resume during the CPR period following any re-initiation of CPR compressions. If no CPR compressions are detected during "CPR periods", the AED Plus periodically re-issues the *CONTINUE CPR* prompt.

The rate of beeps issued by the AED Plus adaptive metronome function adapts to the rescuer's actual chest compression rate. The metronome will beep at 100 CPM when chest compressions are delivered at greater than 80 compressions per minute (CPM). Should the rescuer fail to deliver compressions at 80 CPM or greater, the metronome will beep at a rate that is approximately 15 CPM higher than the rescuer's actual rate. This increased metronome rate is intended to encourage the rescuer to increase his/her chest compression rate until the recommended 100 CPM rate is achieved. The metronome beeps at a minimum rate of 60 CPM in cases where the rescuer's compression rate is substantially below 60 CPM.

During CPR, the AED Plus may issue one or more audible prompts based on the depth of chest compressions detected. When Real CPR Help determines that compression depth is consistently less than 2 inches, a *PUSH HARDER* prompt will be issued. A *GOOD COMPRESSION* prompt will be issued if the rescuer responds by increasing compression depth to 2 inches or more.

The AED Plus unit can be configured to display the *FULLY RELEASE* text prompt to remind the user to lift the hands off the chest during CPR. By default, this text prompt is not enabled.

Operation

This section describes the following functions:

- Operating Controls and Indicators
- Using the AED Plus Graphical User Interface
- Voice Prompts
- Using the LCD Display
- Using the Passive Airway Support System (PASS)
- Using Electrodes
- Applying CPR-D-padz
- Applying pedi-padz II® (Infant/Child Electrodes)
- Using the CPR Monitoring Function — Real CPR Help
- Using the Audio Recording Option

Operating Controls and Indicators

See *Table 1: Control Functions* for an explanation of each of these controls.

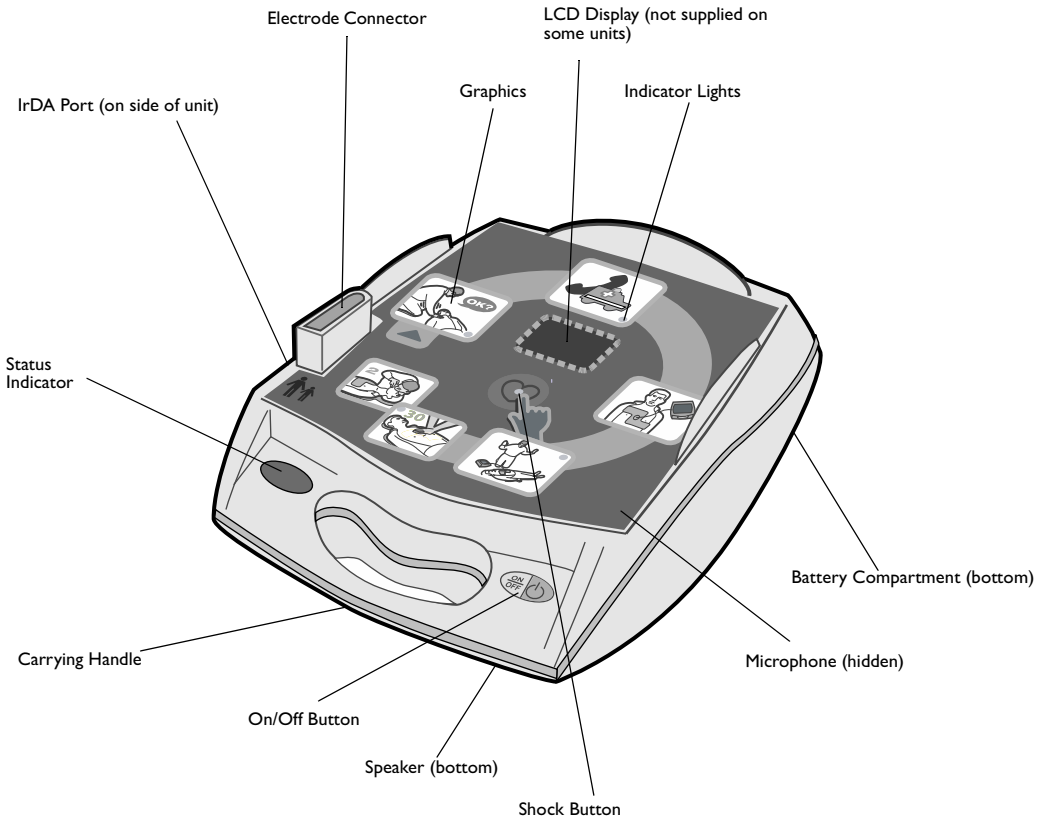


Figure 1: Identifying Operating Controls and Indicators

Table 1: Control Function

Control/Indicator	Description
ON/OFF Button	Turns power ON or OFF. When held depressed for > 5 seconds initiates self test or data communications.
Indicator lights	Illuminates to indicate which step rescuer must take to treat a victim.
Shock Button	Illuminates when the AED Plus is charged and ready to deliver a shock to the victim. When pressed, causes the charged and ready AED Plus to discharge its energy into the victim. When the AED Plus is not charged the lighted button is extinguished. Pressing this button initiates a voice prompt that indicates the number of defibrillator shocks delivered since the unit was powered on.
Pictograms	Icons that explain the series of steps needed for resuscitation and defibrillation.
Status Indicator  	Illuminated check mark indicates the unit passed its last self test and is ready for use. Illuminated “X” indicates unit has failed its self test and is not ready for use
LCD Display	Displays elapsed time, shock count, user prompts, CPR compression depths and ECG waveforms.
IrDA Port	Provides a communications link between the defibrillator and a personal computer or another IrDA™ equipped device.
PASS Cover (optional)	Some AED Plus models include a cover that may be used as a shoulder support to aid victim airway management. The PASS can be ordered separately for other AED Plus models (see “Ordering Accessories” on page 27).
Battery Compartment	Holds 10 123A lithium manganese dioxide batteries used to power the unit.
Electrode Connector	Connector for attaching electrodes to the AED Plus.
Speaker	Provides audio prompts and metronome beeps that direct rescuers on what to do during a rescue; also provides voice prompts to indicate if service is required.
Microphone (optional)	When voice recording option is installed, this microphone picks up and records ambient sounds, including rescuer’s voice.

Using the AED Plus Graphical User Interface

The AED Plus graphical user interface (see Figure 2) is visible on the top of the unit when the cover is removed. The pictograms are reminders of the steps to follow when performing a rescue and reinforce instructions provided through voice prompts and optional display messages.

Each pictogram on the device is associated with an indicator light (LED) and voice prompts. This combination draws attention to the graphics in a sequence defined by current protocols for use of an Automated External Defibrillator (AED) by the AHA and ERC.

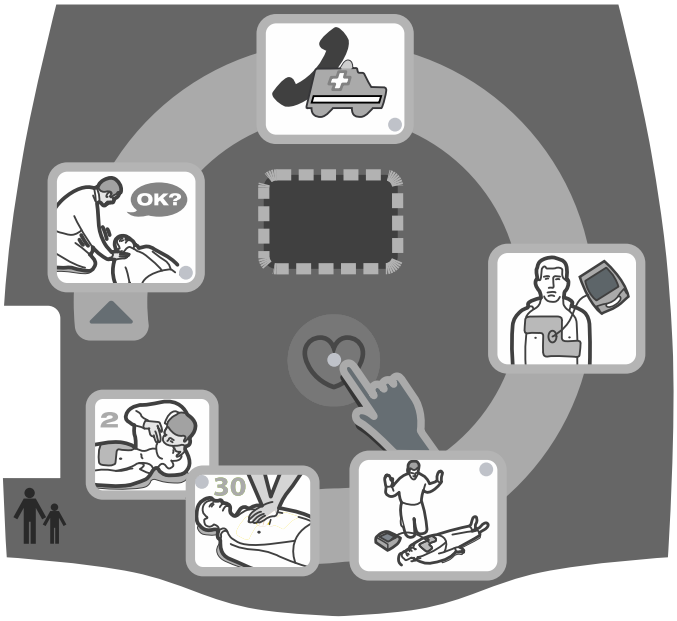


Figure 2: Graphical User Interface

The AED Plus unit contains an LCD display (some special models do not have an LCD) that displays elapsed time, number of shocks delivered, text messages corresponding to the voice prompts, and depth of CPR compressions. The LCD can also be configured to display the acquired ECG signals.

When the AED Plus is turned on, the unit automatically initiates the sequence of voice prompts and graphic illuminations for a rescue event. The sequence continues until the AED Plus is turned off or the electrodes are disconnected from the victim for an extended period of time. As soon as electrodes are attached to the victim and impedance of the connection is verified, the unit stops cycling through the above-mentioned voice and graphic illumination sequence and automatically begins analysis of the ECG rhythm.

Following the results of this ECG analysis, voice prompts tell the rescuer whether a shockable or non-shockable rhythm has been detected. If a shockable ECG rhythm is present, the graphics illuminate and voice prompts guide the rescuer through the defibrillation sequence. When no shock is advised, the AED Plus issues the audio prompts, *NO SHOCK ADVISED* and *START CPR,* and illuminates the CPR-related graphics. A period of 2 minutes (depending upon device configuration) is then allowed for rescuer CPR. Following this “CPR period”, the AED Plus automatically re-initiates a new ECG rhythm analysis.

The AED Plus automatically adjusts defibrillation energy to adult or pediatric levels based on the type of electrodes attached to the unit. In its factory default configuration, the unit delivers the first three shocks at 120J, 150J, and 200J respectively in adult mode, and at 50J, 70J, and 85J in pediatric mode. However, the device can be configured to deliver shocks at other energy levels, as long as the setting for each successive shock is the same or greater than the setting for the preceding shock. Shocks are delivered by depressing the Shock Button (indicated by the heart icon and associated LED) located in the center of the graphical user interface.

Consult the AED Plus *Operator's Guide* for more details on the graphics included in the unit's graphic interface, the audio prompts issued at each step in the treatment protocol and the rescuer action associated with these audio and visual prompts.

Loss of contact between the electrodes and the victim interrupts ECG analysis and/or shock delivery until the electrodes are re-attached and results in a *CHECK ELECTRODE PADS* prompt to the operator.

Voice Prompts

During clinical use of the AED Plus, you may hear the following voice prompts.

Table 2: Clinical Voice Prompts

Voice Prompt	**Definition**
UNIT OK.	AED Plus has successfully passed its power up self tests.
UNIT FAILED.	AED Plus has failed its power up self tests and is not usable for victim care.
CHANGE BATTERIES.	AED Plus self test has detected a low battery condition that is insufficient for the device's use for victim care. Replace batteries immediately.
STAY CALM.	Relax as much as possible and focus on the rescue effort.
CHECK RESPONSIVENESS.	Check victim for responsiveness/consciousness by gently shaking the victim and shouting "Are you all right?".
CALL FOR HELP.	Activate the EMS system or ask a bystander to do it for you.
OPEN AIRWAY.	Place victim in the supine position and perform Head Tilt – Chin Lift or Jaw – Thrust maneuver to open victim's airway. (This prompt is off by default.)
CHECK BREATHING.	Look, listen or feel for the presence of breathing and/or airflow from the victim's lungs. (This prompt is off by default.)
GIVE TWO BREATHS.	If victim is not breathing, give two rescue breaths. (This prompt is off by default.)
PLUG IN CABLE.	Ensure that the electrode cable is properly connected to the AED Plus electrode connector.
ATTACH DEFIB PADS TO PATIENT'S BARE CHEST.	Attach defibrillation pads to the victim's bare chest.
CHECK ELECTRODE PADS.	Previously attached electrodes are not making good contact with the victim's skin or the electrodes are defective.

Voice Prompt	Definition
ADULT PADS.	AED Plus has detected adult electrode pads connected to it and adjusted defibrillation energy settings to adult levels.
PEDIATRIC PADS.	AED Plus has detected pediatric electrode pads connected to it and adjusted defibrillation energy settings to pediatric levels.
DON'T TOUCH PATIENT, ANALYZING.	Do not touch victim, an ECG rhythm analysis is in progress or about to begin.
SHOCK ADVISED.	ECG rhythm analysis has detected the presence of ventricular fibrillation or shockable ventricular tachycardia.
NO SHOCK ADVISED.	ECG rhythm analysis has detected a rhythm that is not treatable by defibrillation.
ANALYSIS HALTED. KEEP PATIENT STILL.	ECG rhythm analysis has been halted due to excessive ECG signal artifact. Stop any ongoing CPR and keep the victim as motionless as possible.
DON'T TOUCH PATIENT. PRESS FLASHING SHOCK BUTTON.	Warn all persons in attendance of the victim to stand clear and stop touching the victim. Press the Shock Button to deliver defibrillation therapy.
RELEASE SHOCK BUTTON.	Shock Button was depressed before the defibrillator was ready to defibrillate. Release the Shock Button and press again after the ready tone sounds.
SHOCK DELIVERED.	A defibrillation shock has just been delivered to the victim.
NO SHOCK DELIVERED.	No shock was delivered to the victim because rescuer failed to press Shock Button or an error condition was detected.
n SHOCKS DELIVERED.	A total of *n* shocks have been delivered since the AED Plus was turned on.
START CPR.	Begin CPR.
CONTINUE CPR.	Continue providing CPR. This prompt may also be issued if Real CPR Help fails to detect chest compressions at least ¾ of an inch deep.
PUSH HARDER.	CPR compressions are consistently less than 2 inches deep.
GOOD COMPRESSIONS.	After prompting to Push Harder, rescuer has succeeded in delivering chest compressions at least 2 inches deep.
STOP CPR.	Stop CPR, the AED Plus is about to begin an ECG rhythm analysis.

Prompts that may be heard during non-clinical use of the AED Plus unit include:

Table 2b Non-Clinical Voice Prompts

Voice Prompt	**Definition**
IF NEW BATTERIES, PRESS BUTTON.	Press the Battery Reset Button located in the battery compartment after replacing ALL batteries in the device with new batteries.
NON-RESCUE MODE.	AED Plus device has entered the diagnostics/data communications mode.
COMMUNICATIONS ESTABLISHED.	IrDA Communications between the AED Plus and a personal computer or modem have been established.

Using the LCD Display

The AED Plus is equipped with a 1.3 x 2.6 inch LCD screen (see Figure 3) that displays the following information:

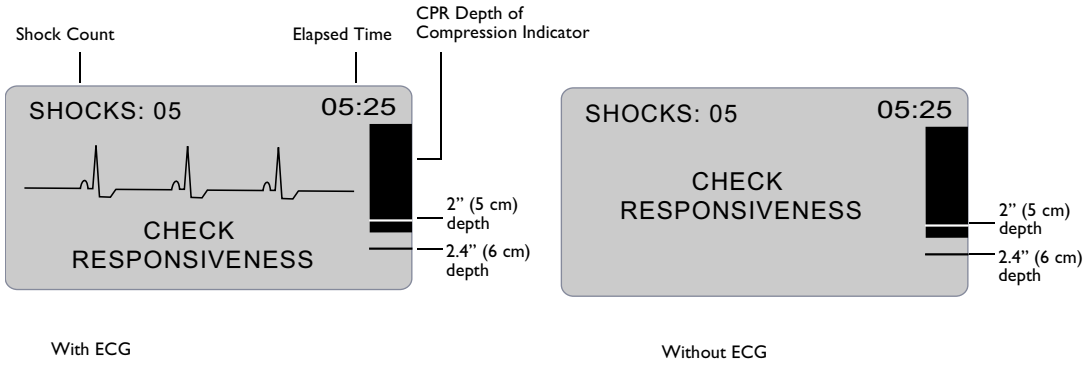


Figure 3: LCD Displays

NOTE Some special AED Plus models do not have an LCD.

Shock Count (Upper left corner of screen): Indicates the total number of defibrillation shocks delivered by the AED Plus since it was last powered on. Shock count is saved through brief power off periods (< 5 seconds). When the AED Plus is turned off for more than 5 seconds, the shock count is reset to 0.

Elapsed Time (Upper right corner of screen): Indicates the total time in minutes and seconds that has elapsed since the AED Plus was last powered on. Elapsed time continues to be counted through brief power off periods (< 5 seconds). When the AED Plus is turned off for more than 5 seconds, elapsed time is reset to 00:00. When elapsed time exceeds 99 minutes and 59 seconds, the timer wraps around to 00:00 and continues counting.

CPR Depth of Compression Indicator (Right side of screen): A bar graph is displayed that shows the depth of chest compressions measured during the delivery of CPR. Indicator lines are displayed in the bar graph area at 2 and 2.4 inches of compression depth to provide reference points for rescuers performing CPR.

Visual User Prompts (Lower 1/3 of screen): Whenever the AED Plus issues a voice prompt, the text of the voice prompt is simultaneously displayed on the LCD display.

ECG Waveform (Center portion of screen): Although AED Plus units do not display ECG waveforms in their factory default configuration, the device can be specifically set up to continuously display ECG signals as they are acquired.

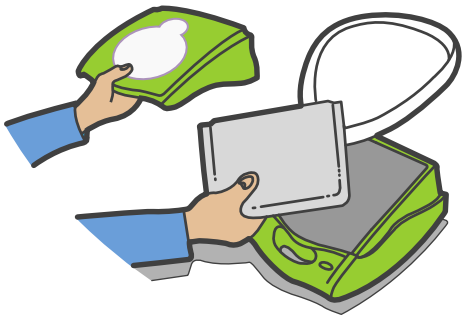
Using the Passive Airway Support System (PASS)

If there is no evidence of head or neck trauma, the head tilt chin lift method is the recommended maneuver for opening the airway. The PASS may be placed under the victim's shoulders to help maintain head tilt.

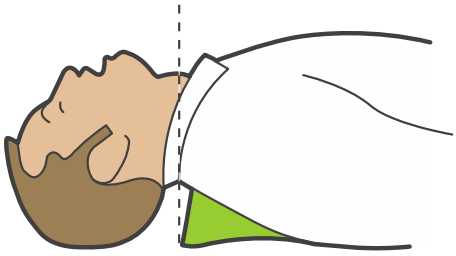
WARNING! DO NOT use PASS if suspected head or neck injury. Place victim on a firm surface before performing CPR.

If the victim requires airway support and there is no evidence of head or neck trauma**,** roll the victim on his/her side and then roll him/her back over so that the PASS is under the victim's shoulders causing the head to tilt backwards.

For PASS COVERS only: The shape of the PASS, when placed under the shoulders of the victim, can be used to help maintain an open airway (see Figure 4).



The unit cover also functions as the Passive Airway Support System (PASS).



Place the PASS under the victim to lift his/her shoulders. Do not use the PASS if there is a suspected head or neck injury.

Figure 4: Using the PASS Cover

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Using Electrodes

WARNING! DO NOT reuse electrodes.

The AED Plus supports both adult and pediatric electrode pads. The device automatically adjusts defibrillation energy to adult or pediatric levels depending on the type of electrodes connected to it. Make sure that the electrode pads used are appropriate for the victim.

WARNING! DO NOT use adult electrode pads or *CPR-D•padz* on victims under 8 years of age.

The AED Plus uses electrode packs that are connected to the unit by a cable. The package contains electrodes that you attach to the victim.

- Make sure to install a new package of electrodes and connect the electrode cable to the unit after each use, to prepare for future emergencies.
- Check the electrode expiration date regularly to ensure that electrodes are fresh and ready to use in an emergency situation.
- Replace electrodes, if expired
- After the AED Plus is powered on and completes its self-test, the unit will issue an “Adult Pads” voice prompt or a “Pediatric Pads” voice prompt to indicate the type of electrodes connected to the unit. Verify that the connected electrode pads are appropriate for the victim being treated. Connect alternate electrode pads if necessary.

If the electrodes are not attached properly, the unit issues the *CHECK ELECTRODE PADS* or the *ATTACH ELECTRODE PADS* voice prompt during operation. If the electrode cable is not properly attached to the unit, the unit issues the *PLUG IN CABLE* prompt. Make certain to connect the electrode cable to the AED Plus unit and attach the electrodes to the victim properly.

WARNING! Electrodes must be pre-attached to the device. Keep the electrode cable connected to the AED Plus unit at all times.

The electrode package may include:

- Scissors to cut clothing or chest hair.
- Razor to remove excessive hair at the electrode application site, if necessary.
- Small towel to make sure that the victim’s skin is dry.
- Gloves.
- Barrier Mask.

NOTE Electrodes contain no hazardous materials and may be disposed of in general trash unless contaminated with pathogens. If contaminated, appropriate precautions should be used in their disposal.

Applying *CPR-D-padz*

Prepare the victim before attaching the electrodes.

WARNING! ***CPR-D-padz* are intended for use on adult victims only; do not use on victims under 8 years of age.**

To prepare the victim:

1. Remove all clothing covering the victim's chest.
2. Ensure the victim's chest is dry.
3. If the victim has excessive chest hair, clip or shave the hair to help ensure proper adhesion of the electrodes.

To apply the electrodes:

1. Tear open the electrode package and unfold the electrodes. Place the electrodes on the victim according to the graphics on the package (see Figure 5).
2. Hold the CPR sensor and place the sensor between the nipples and on the middle of the victim's breastbone, using the sensor's cross hairs to guide you.
3. Press the CPR sensor with your right hand and pull the number 2 tab to peel the protective backing from the electrode. Press the electrode from the center out to make sure it adheres properly to the victim's skin.
4. Press the CPR sensor with your left hand and pull the number 3 tab to peel the protective backing from the electrode. Press the electrode from the center out to make sure it adheres properly to the victim's skin.

NOTE If the victim is large or there is a need to place the electrode under a breast, you may need to tear away the lower pad at the perforated line (see Figure 5) and extend the pad. Place the pad slightly to the victim's left and below the victim's left breast.

NOTE If the victim has an implanted pacemaker or defibrillator in the upper right chest, angle the electrodes slightly to avoid placing the electrodes over either device. Make certain that the CPR sensor maintains a position over the lower half of the breastbone.

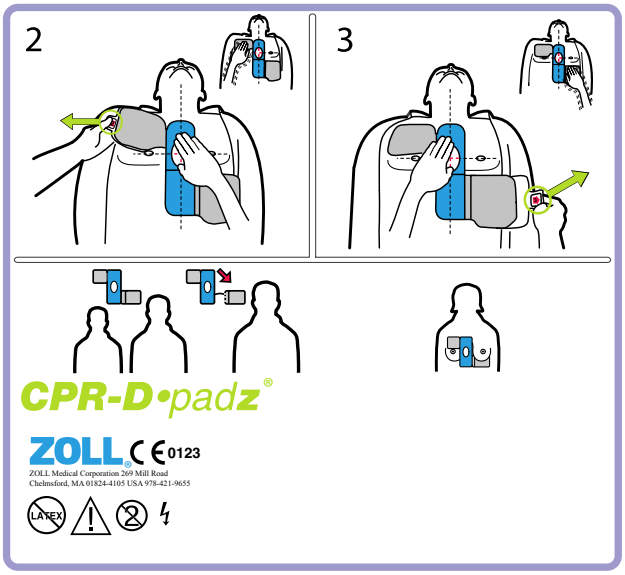


Figure 5: Placement of CPR-D-padz

Applying *pedi•padz II* (Infant/Child Electrodes)

Prepare the victim before attaching the electrodes.

Important! This symbol indicates that an AED Plus unit is equipped for treating adult and pediatric victims. An AED Plus unit without this symbol is not equipped to treat pediatric victims and will NOT work with the pedi-padz II pediatric electrodes. To upgrade an AED Plus unit for use with ZOLL pedi-padz II pediatric electrodes, contact ZOLL Medical Corporation or an authorized ZOLL distributor for information on the ZOLL AED Plus Pediatric Upgrade Kit.

To prepare the victim:

1. Remove all clothing covering the victim's chest.
2. Ensure the victim's chest is dry.

To apply the electrodes:

1. Tear open the electrode package and unfold the inner package to expose the electrodes. Place the electrodes on the victim according to the graphics on the package (see Figure 6).
2. Remove the round electrode from its backing material and place it on the victim's chest (as shown in Figure 6).
3. Place your hand on the electrode edge and, using the other hand, gently roll the electrode onto the victim's chest, pushing any air out from beneath the electrode as you go.
4. Roll the victim onto his/her chest, remove the square electrode from its backing and place it on the victim's back (as shown in Figure 6).
5. Place your hand on the electrode's edge and, using your other hand, roll the electrode onto the victim's skin, pushing any air out from beneath the electrode as you go.
6. Roll the victim onto his/her back and follow the AED Plus prompts.

NOTE The pedi-padz II (infant/child electrodes) can also be used with ZOLL pacemaker products for up to one hour of pacing (see the *M Series Operator's Guide* for information about pacing).

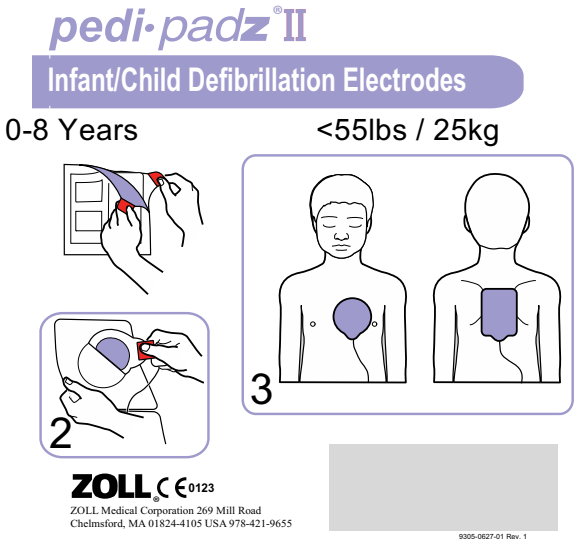


Figure 6: Placement of pedi-padz II

Using the CPR Monitoring Function — Real CPR Help

When used with ZOLL CPR-D-padz, the AED Plus monitors the rate and depth of CPR chest compressions. The AED Plus provides a CPR adaptive metronome function designed to encourage rescuers to perform chest compressions at the AHA/ERC recommended rate of 100 compressions per minute. Voice and visual prompts encourage a minimum compression depth of 2 inches for adult victims. Real CPR Help operates only when CPR-D-padz are used, and is intended for use on adult victims only.

To use Real CPR Help you must do the following:

1. Connect CPR-D-padz to the AED Plus unit.
2. Apply the CPR-D-padz to the victim as described in the previous section
   Ensure that the CPR sensor is centered on the lower half of the victim's sternum.
3. If no signs of circulation are present when the AED Plus issues the *START CPR* prompt, place your hands on top of the CPR sensor and push on the sensor to deliver chest compressions to the victim. After your first few compressions, the AED Plus adaptive metronome will begin issuing timing beeps. Try to maintain synchronization between these beeps and your chest compressions. Shortly after you stop chest compressions to deliver rescue breaths the metronome will stop beeping.

NOTE If the AED Plus prompts you to *PUSH HARDER*, your compressions are less than 2 inches deep. Increase your compression depth to improve CPR performance.

4. Deliver the appropriate number of rescue breaths then resume chest compressions. The metronome will begin to beep again after your first few compressions have been delivered.

Using the Audio Recording Option

If installed and configured, the AED Plus contains an audio recording option that records and stores 20 minutes of continuous audio and clinical event data during a rescue. (The unit records and stores at least 7 hours of clinical event data if the audio recording option is disabled.) The recorded audio data is synchronized to the clinical event data. The audio recording starts when the AED Plus issues the *STAY CALM* prompt.

NOTE The AED Plus allows for up to 3 minutes of audio recording prior to electrode attachment. When you turn the unit off, the first indicator light (LED) on the graphical user interface illuminates and the second indicator light (LED) flashes intermittently while the unit stores the data in memory.

Whenever the device detects a clinical event in rescue mode, the AED Plus deletes previously stored data (ECG, Audio and Event) from memory before data for the current rescue is recorded. Overwriting of old ECG, audio and event data begins 10 seconds after the electrodes are properly connected to the victim. However, if the AED Plus is started in Non-rescue Mode, the recorded data of the last rescue is retained and may be uploaded to a data storage or archiving system.

Installation and Self Test

This section describes the following functions to prepare the AED Plus for use:

- Inspecting the Unit
- Preparing the AED Plus for Use
- Using the Self Test Feature
- Installing or Replacing Batteries
- Identifying Battery Condition

Inspecting the Unit

Once unpacked, inspect the device for any signs of damage due to shipping. Check for accessories and any other parts ordered.

Preparing the AED Plus for Use

To ensure that the AED Plus is functioning properly and is ready for use in an emergency situation, the following set-up and checkout procedures should be performed before placing the device into service and after each clinical use.

1. Inspect all external surfaces of the unit to ensure that they are clean and free of structural damage such as cracks, broken or missing parts.
2. Inspect the electrode connector to ensure that there are no broken or missing connector pins.
3. Verify that new CPR-D-padz, stat-padz® II or pedi-padz II to be used with the AED Plus are well within their expiration date.
4. Follow instructions provided with the new electrodes to pre-connect them to the electrode connector on the device and pack them within the AED Plus cover.

NOTE If the electrodes are not connected to the AED Plus unit, the device will fail the self test and display a red “X” in the status indicator window.

5. If the status indicator displays a red X, install new batteries. (See “Installing or Replacing Batteries” on page 18.)
6. Close the top cover of the AED Plus unit and initiate a self test by pressing the Power Button. Verify that the unit issues the *UNIT OK* voice prompt. This prompt indicates that the new batteries and electrodes are properly installed and that the unit is ready for service.
7. Verify that the AED Plus unit issues the appropriate “Adult Pads” or “Pediatric Pads” voice prompt.
8. Turn the AED Plus unit off.
9. Wait 2 minutes. Verify that the green check symbol (✓) appears in the status indicator window and that the unit does not emit a beeping tone.
10. Place the AED Plus unit in service.
11. Check the AED Plus unit periodically to ensure that the green check symbol (✓) appears in the status indicator window.

NOTE If the status indicator displays a red X following completion of the above test, the AED Plus is not ready for use and may be defective. Remove the AED Plus from service and consult the Troubleshooting section on page 23 of this guide to help determine the problem.

Using the Self Test Feature

The AED Plus performs the following self tests to verify unit integrity and its readiness for emergency use:

- Battery Installation Self Test
- Power On Self Test
- Manual Self Test
- Automatic Self Test
- Automatic Monthly Test (software version 5.32 or higher only)

Following successful completion of all self tests, the AED Plus's status indicator displays a green check (✓) to show that all tests passed and that the unit is ready to use.

If the status indicator displays a red X following completion of any self test, the AED Plus is not ready for use and may be defective. Remove the AED Plus from service and consult the Troubleshooting section of this guide to help determine the problem.

Battery Installation Self Test

The AED Plus performs a self test whenever batteries are installed and verifies the following functions:

1. Defibrillation Electrodes Connection: Verifies that the defibrillation electrodes are properly pre-connected to the device.
2. ECG Circuitry: Verifies that the ECG signal acquisition and processing electronics are functional.
3. Defibrillator Charge and Discharge Circuitry: Verifies that the device's defibrillator electronics are functional and can charge and discharge at 200 joules.
4. Microprocessor Hardware/Software: Verifies proper function of the AED Plus microprocessor electronics and the integrity of its software.
5. CPR Circuitry and Sensor: Verifies that CPR monitoring and compression depth detection are functional.
6. Audio Circuitry: Verifies that voice prompts are functional.

At the end of this self test, the AED Plus prompts the user to press the Battery Reset Button, located inside the battery compartment. Pressing this button resets the unit's battery usage indicator to full charge.

CAUTION! DO NOT press the Battery Reset Button unless all batteries are new. Pressing the Battery Reset Button when used batteries are installed may result in a false high reading of battery capacity. See the "Installing or Replacing Batteries" on page 18 for more information.

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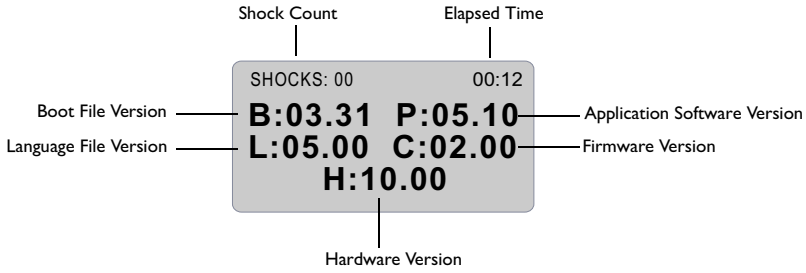
Power On Self Test

The AED Plus performs a self test whenever the unit is turned on and verifies the following functions:

1. Battery Capacity: Verifies that the battery usage indicator shows adequate battery capacity remaining.
2. Defibrillation Electrodes Connection: Verifies that the defibrillation electrodes are properly pre-connected to the device.
3. ECG Circuitry: Verifies that the ECG signal acquisition and processing electronics are functional.
4. Defibrillator Charge and Discharge Circuitry: Verifies that the device's defibrillator electronics are functional and can charge and discharge at 2 joules.
5. Microprocessor Hardware/Software: Verifies proper function of the AED Plus microprocessor electronics and the integrity of its software.
6. CPR Circuitry and Sensor: Verifies that CPR monitoring and compression depth detection are functional.
7. Audio Circuitry: Verifies that voice prompts are functional.

Manual Self Test

You can initiate a manual self test on the AED Plus by pressing and holding the unit's On/Off button for 5 seconds. The AED Plus illuminates all graphic indicators and issues voice and LCD display messages to allow user verification of the device's visual and auditory output functionality. In addition, the LCD shows the application software version currently running on the unit.



This self test verifies the following AED Plus functions:

1. Battery Capacity: Verifies that the battery usage indicator shows adequate battery capacity remaining.

NOTE For units with software below version 5.32, batteries must be replaced every 3 years regardless of test results.

2. Defibrillation Electrodes Connection: Verifies that the defibrillation electrodes are properly pre-connected to the device.
3. ECG Circuitry: Verifies that the ECG signal acquisition and processing electronics are functional.
4. Defibrillator Charge and Discharge Circuitry: Verifies that the device's defibrillator electronics are functional and can charge and discharge at 200 joules.
5. Microprocessor Hardware/Software: Verifies proper function of the AED Plus microprocessor electronics and the integrity of its software.
6. CPR Circuitry and Sensor: Verifies that CPR monitoring and compression depth detection are functional.
7. Audio Circuitry: Verifies that voice prompts are functional.
8. Display: Verifies that visual indicators are functional.

Automatic Self Test

By default, the AED Plus unit performs an automatic self test once every 7 days (this interval can be configured to 1, 2, 3, 4, 5, 6, or 7 days) when the unit is stored with batteries installed. This self test verifies the following AED Plus functions:

1. Battery Capacity: Verifies that the battery usage indicator shows adequate battery capacity remaining.

NOTE For units with softeware below version 5.32, batteries must be replaced every 3 years regardless of test results.

2. Defibrillation Electrodes Connection: Verifies that the defibrillation electrodes are properly pre-connected to the device.
3. ECG Circuitry: Verifies that the ECG signal acquisition and processing electronics are functional.
4. Defibrillator Charge and Discharge Circuitry: Verifies that the device's defibrillator electronics are functional and can charge and discharge at 2 joules.
5. Microprocessor Hardware/Software: Verifies proper function of the AED Plus microprocessor electronics and the integrity of its software.
6. CPR Circuitry and Sensor: Verifies that CPR monitoring and compression depth detection are functional.

Automatic Monthly Test (software version 5.32 or higher only)

By default, the AED Plus unit performs an automatic self test once per month when the unit is stored with batteries installed. This self test verifies the following AED Plus functions:

1. Battery Capacity: Verifies that the battery usage indicator shows adequate battery capacity remaining.
2. Defibrillation Electrodes Connection: Verifies that the defibrillation electrodes are properly pre-connected to the device.
3. ECG Circuitry: Verifies that the ECG signal acquisition and processing electronics are functional.
4. Defibrillator Charge and Discharge Circuitry: Verifies that the device's defibrillator electronics are functional and can charge and discharge at 200 joules.
5. Microprocessor Hardware/Software: Verifies proper function of the AED Plus microprocessor electronics and the integrity of its software.
6. CPR Circuitry and Sensor: Verifies that CPR monitoring and compression depth detection are functional.

Installing or Replacing Batteries

To power the AED Plus, use 10 consumer type 123A Photo Flash lithium manganese dioxide batteries. You can purchase these batteries at many department, camera or electronics stores.

For AED Plus units running software version 5.32 or higher, replace batteries every 5 years or if unit prompts. For earlier software versions, replace batteries every 3 years. A dated AED Plus battery replacement reminder label can be placed next to the On/Off button (available from ZOLL Customer Service).

CAUTION! Use Duracell or **power** one batteries only. **Do not use Panasonic, Rayovac, or Varta batteries.** Use of Panasonic, Rayovac, or Varta batteries may result in significantly longer defibrillator charging times than those required during emergency situations.

These batteries:

- Should be used well before their labeled expiration date.
- Should be checked periodically for the expiration date.

Batteries produced by all recommended manufacturers have a 10 year from date of manufacture shelf life when not installed in an AED Plus unit.

The following examples demonstrate how to read date codes on Duracell and **power** one batteries.

Duracell:

The cell date of manufacture is located on each cell label. Format is YYYY/MM, where YYYY = Year and MM = Month. (Example 2009/08 = August 2009)

power one:

The cell date of manufacture is located on each cell label. Format is MMYY, where MM = Month and YY = Year. (Example 0809 = August 2009)

To install the batteries:

1. Ensure that the AED Plus is turned off. Open the battery compartment by removing the battery cover from the back of the unit.

   To remove the battery cover, insert a small tool (e.g., flat blade screw driver) into the two slots on the rear of the unit to depress the latches, then insert the tool into the groove on the bottom to lift the cover (see Figure 7).



Figure 7: Removing the Battery Compartment Door

2. Remove all batteries at once and dispose of batteries properly. Place new batteries into the battery bank, observing battery polarity markings and making sure that all batteries are securely seated and properly oriented. After placing the first 5 to 9 batteries in the battery well, the *INSTALL BATTERIES* audio prompt reminds you to install the remaining batteries in the battery compartment.

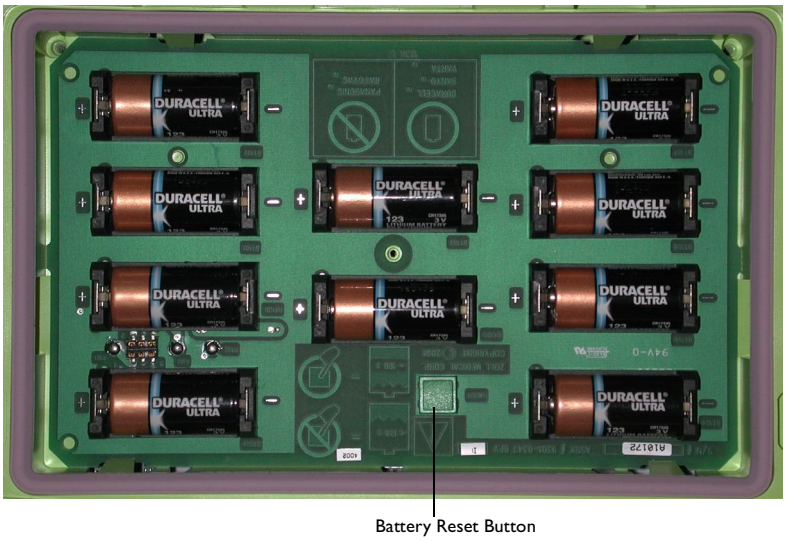


Figure 8: Battery Compartment

3. After installing new batteries, press the Battery Reset Button inside the battery compartment when prompted (see Figure 8). Pressing the button resets the battery usage indicator to full charge.

CAUTION! You MUST replace all 10 batteries at once. Do not replace individual batteries. The AED Plus cannot detect whether all batteries or only a few batteries have been replaced. Do not place used batteries into the AED Plus. **Using less than fully charged batteries can affect the unit when performing a rescue**. DO NOT press the Battery Reset Button if all the batteries are not new. The AED Plus then assumes that they are the same batteries that were just removed.

NOTE If you do not press the Battery Reset Button in the battery well within 15 seconds after installing all batteries, the AED Plus assumes that the batteries installed in the device were temporarily removed, and are **not fully** charged.

NOTE Because Lithium Manganese Dioxide battery cells do not contain toxic materials, they may be disposed of in general trash after discharge or when properly protected against shorting between terminals.

Identifying Battery Condition

Battery capacity depletes during standby operation of the unit, while the unit is operating, and as a result of each defibrillation. Battery capacity also gradually diminishes over a shelf life of years without use. The AED Plus monitors energy remaining in the installed batteries. When battery capacity is low or depleted, the AED Plus will not function to specification. When a low battery condition occurs, the AED Plus:

- emits an audible alarm or “beep” once every minute, if the AED Plus is off
- issues the *CHANGE BATTERIES* audio prompt, if the AED Plus is on

- displays a red “X” in the status indicator window, indicating that the batteries are at low capacity or that the AED Plus has failed other self tests.

Table 3: Battery Condition

Battery Condition	**Indications**	**Correction**
Low Battery with AED Plus off.	Audible beep from AED Plus once every minute.	Replace batteries.
Low Battery during power up self test.	*CHANGE BATTERIES* prompt (when AED Plus is powered on)	Replace batteries.
Low Battery or other self test failure with AED Plus powered off or during self test.	Status Indicator has red “X” indicating failure to operate (when off).	Replace batteries. Check or replace electrodes. If red “X” remains, return to ZOLL Technical Support for service.
Low Battery with AED Plus powered on.	*CHANGE BATTERIES* prompt (unit powered on).	Replace batteries as soon as possible.
Dead Battery	Status Indicator has red “X” indicating failure to operate (when off).	Replace batteries. If red “X” remains, return to ZOLL Technical Support for service.

Maintenance and Troubleshooting

This section describes the following functions to maintain the AED Plus:

- Maintaining the AED Plus
- Cleaning the AED Plus
- Optional Maintenance for Technical Professionals
- Troubleshooting

Maintaining the AED Plus

- Inspect frequently, as necessary.
- Check for the green check (✓) showing that the AED Plus is ready to use.
- Verify that electrodes are within their expiration date.
- Verify that batteries are within their expiration date.
- Verify that electrodes are pre-connected to the input connector.
- Verify that supplies are available for use (razor, mask, gloves, extra batteries.)

Maintenance Checklist

Use the following maintenance checklist when you periodically check your AED Plus.

Table 4: Maintenance Checklist

Check the following	Pass	Fail
Is the unit clean, undamaged, free of excessive wear?	☐	☐
Are there any cracks or loose parts in the housing?	☐	☐
Verify electrodes are connected to the AED Plus and sealed in their package. Replace if expired.	☐	☐
Are all cables free of cracks, cuts and exposed or broken wires?	☐	☐
Turn the AED Plus on and off and verify the green check indicates ready for use.	☐	☐
Batteries within expiration date. Replace if expired.	☐	☐
Check for adequate supplies.	☐	☐

Cleaning the AED Plus

- After each use, clean and disinfect the AED Plus with a soft, damp cloth using 90% isopropyl alcohol, or soap and water, or chlorine bleach and water mixture (30 ml/liter water).
- Do not immerse any part of the AED Plus in water.
- Do not use ketones (MEK, acetone, etc.) to clean the AED Plus.
- Avoid using abrasives (e.g., paper towel) on the display window or IrDa port.
- Do not sterilize the AED Plus.

Optional Maintenance for Technical Professionals

The AED Plus automatically performs maintenance testing during periodic self tests. However, if a qualified technical professional wishes to test the AED Plus further, the following checkout procedure can be followed:

1. Connect an AED Plus Simulator/Tester (or equivalent) to the AED Plus electrode connector.
2. Power on the simulator and AED Plus. Verify that all of the following occur:
   - The status indicator (located on the left side of the handle) initially displays a red "X" which changes to a green check (✓) within 4 to 5 seconds after the AED Plus is turned on.
   - All top panel user interface lights (LEDs) illuminate sequentially.
   - The AED Plus issues the *UNIT OK* voice prompt within 5 seconds after power-up (and displays the message if equipped with an LCD).
   - If the AED Plus has an LCD, the message "SHOCKS: 0" appears in the upper left corner and the elapsed time (since power-up) appears in the upper right corner of the screen.
3. Using the simulator, input a VF rhythm to the AED Plus. Verify that after the AED Plus proceeds through its sequence of victim assessment prompts, it:
   - analyzes the ECG rhythm
   - issues the *SHOCK ADVISED* voice prompt
   - charges the defibrillator
   - issues the *DON'T TOUCH PATIENT, PRESS FLASHING SHOCK BUTTON* voice prompt
4. Verify that the charge ready tone is heard and that the Shock Button illuminates.
5. Press the Shock Button and verify that the simulator shows that a shock was delivered. Verify that the message "Shocks: 1" displays on LCD screen.

   NOTE This test checks the device's ability to defibrillate. It does not, however, verify that the correct defibrillation energy was delivered. A defibrillator analyzer should be used in place of the AED Plus simulator/tester to verify the accuracy of the delivered energy.
6. Following shock delivery, verify that the AED Plus issues the *START CPR* messages.
7. Activate the simulator's CPR function. Verify that the adaptive metronome begins to beep and that the following voice prompts/messages are issued within 60 seconds: *PUSH HARDER* followed by *GOOD COMPRESSIONS.*
8. After approximately two minutes of CPR, verify that the *STOP CPR* prompt is issued. Set the simulator to Normal Sinus Rhythm (NSR) and verify that a new ECG analysis begins.
9. Verify that a *NO SHOCK ADVISED* prompt is issued.
10. Turn the AED Plus and Simulator off.

See "Preparing the AED Plus for Use" on page 15 for instructions on placing the AED Plus back into service.

Troubleshooting

The following table summarizes common error indications on the AED Plus, and their associated corrective action. Return the AED Plus to ZOLL's Technical Service Department if the AED Plus is not working properly.

Table 5: Troubleshooting

Technical Problem	**Recommended Action**
Self test failed.	Initiate manual self test by pressing and holding the ON/OFF Button for more than 5 seconds. Attempt to repair the device by replacing the batteries or electrodes. If the AED Plus fails test again, remove the AED Plus from service and contact ZOLL Technical Service.
CHANGE BATTERIES prompt.	Replace all batteries with new batteries at the same time. Press the Battery Reset Button when prompted.
Red "X" in status indicator window.	Initiate manual self test by pressing and holding the ON/OFF Button for more than 5 seconds. Check to see if cable is attached properly to the AED Plus or replace the electrodes. Cycle power on the AED Plus by turning the unit off, then on again. Replace all batteries at the same time with new batteries that are less than 1 year old. Press the Battery Reset Button when prompted. If the AED Plus still does not operate correctly, remove unit from service and contact ZOLL Technical Service.
Beeping noise when AED Plus is off.	Remove AED Plus from service and replace batteries. Replace all batteries at the same time with new batteries. Press the Battery Reset Button when prompted. If beeping continues, contact ZOLL Technical Service.
PLUG IN CABLE prompt.	Check cable connection between electrodes and the AED Plus.
ANALYSIS HALTED. KEEP VICTIM STILL prompt.	Excessive artifact detected during ECG analysis. Victim must be motionless during ECG analysis. Do not touch the victim during analysis. Keep the victim still. If the rescuer is using the AED Plus in an emergency vehicle, bring the vehicle to a halt before performing ECG analysis.
RELEASE SHOCK BUTTON prompt.	Release Shock Button, then press and hold Shock Button until discharge occurs. If voice prompt continues, contact ZOLL Technical Service.

Contacting Technical Service

If a ZOLL product requires service, contact the ZOLL Technical Service Department:

Telephone: 1-978-421-9655
Toll free: 1-800-348-9011
Fax: 1-978-421-0010

Have the following information available for the Technical Service representative:

- Unit serial number.
- Description of the problem.
- Purchase Order or credit card number to allow tracking of loan equipment.
- Purchase Order or credit card number for a unit with an expired warranty.

If you need to send the AED Plus to ZOLL Medical Corporation, obtain a service order request number from the Technical Service representative. AED Plus units are available on loan at an additional cost while your AED Plus is being repaired.

Remove all batteries from the AED Plus and return the unit and batteries in its original container (or equivalent packaging) with the service order request number on it to the following address:

ZOLL Medical Corporation
269 Mill Road
Chelmsford, MA 01824-4105

Attn: Technical Service Department

International Customers

Customers outside of the United States should remove all batteries from the unit and return the unit and batteries in its original container (or equivalent packaging) to the nearest authorized ZOLL Medical Corporation Service Center. To locate an authorized service center, contact the nearest ZOLL Sales office or authorized distributor.

ZOLL Administration Software

ZOLL Administration Software (ZAS) helps you perform software maintenance tasks when your defibrillator is connected to your personal computer (PC). ZAS lets you upload data from a defibrillator to a PC, then transmit that data to your main network, or print the data locally from your PC to your printer.

See the online Help for instructions on how to use ZAS.

Installing ZOLL Administration Software

To install ZAS, insert the ZAS CD into the CD-ROM drive on your PC. The installation program starts automatically.

If the installation program does not start automatically:

- Select RUN from the Start menu.
- In the Open field, enter *X*:Setup.exe, where *X* is the correct letter of your CD-ROM drive.
- Click OK.
- Follow the instructions that appear on the screen to complete the installation.

RescueNet Code Review Software

RescueNet® Code Review software allows you to analyze resuscitation incident information uploaded from the AED Plus to a PC. Using RescueNet Code Review software, you can:

- access and review victim event information
- add or modify victim information
- view animated versions of ECG traces
- annotate ECG traces
- print ECG stripcharts and case reports

See the *RescueNet Code Review User's Guide* for more information.

Setting Up Data Communications

You can exchange data between a AED Plus unit and a personal computer without any cable connection by transferring data using two IrDA (infrared interface standard) ports. One IrDA™ port is located on the side of the AED Plus. The second IrDA port may be on your personal computer. In some cases, you will be sending data from the IrDA port on your AED Plus to an IrDA port on a modem which then transmits the data to a remote computer.

For best transmission results, IrDA ports must be facing each other and the path between the two devices must be clear of obstacles. Beaming distances between devices may vary but should be at least 10 inches and not more than 18 inches. Power up the PC and have the ZAS and/or RescueNet Code Review software running. Press and hold the ON/OFF Button on the AED Plus for at least 5 seconds to establish contact with the computer or modem. Once connected properly, you hear the *COMMUNICATIONS ESTABLISHED* audio prompt and see a message on your computer screen that the connection was successful.

Ordering Accessories

You can order the following accessories from the ZOLL Customer Service Department.

Table 6: Ordering Accessories

Item	REF
CPR-D-padz electrode including accessory kit	8900-0800-01
Adult stat-padz II electrode (single)	8900-0801-01
Adult stat-padz II electrode (case)	8900-0802-01
pedi-padz II electrode (single)	8900-0810-01
Set of 10 Batteries (Type 123L Lithium Batteries)	8000-0807-01
Administrator's Guide	9650-0301-01
Operator's Guide	9650-0300-01
Simulator/Tester	8000-0800-01
AED Cover (PASS)	8000-0812-01
Graphical Cover (PASS)	8000-0808-01
Low Profile Cover	8000-0803-01
Soft Case	8000-0802-01
Battery expiration labels	9305-0395-01
Upgrade Kit, Battery Replacement W/Label & Addendum	7771-0100-01
Universal Adapter Cable	8000-0804-01
Administration Guide with ZOLL Administration Software CD	9659-0302-01
Mounting Bracket	8000-0809-01
Flush Mount Wall Box	8000-0811
Recess Mount Wall Box	8000-0814
Surface Mount Wall Box	8000-0817
Standard Metal Wall Cabinet	8000-0855
Clear AED Plus Wall Cabinet	8000-0856
Brushed Stainless Steel Wall Cabinet	8000-0855-02
USB IrDA PC Adapter	8000-0815
RS-232 IrDA PC Adapter	8000-0816
RescueNet Code Review Software	8000-0813-01
AED Plus Trainer	8008-0104-01
AED Plus Trainer2	8008-0050-01
Replacement Trainer	1008-0115-01
Replacement Trainer Control	1008-0113-01

Item	REF
Trainer AC Adapter	
US	9355-0802
EURO	9355-0803
UK	9355-0804
Switzerland	9355-0805
Australia	9355-0806
Trainer Cord	9355-0801

Appendix A: Specifications

Table 7: General Specifications

DEVICE	
Size (H x W x D)	5.25" x 9.50" x 11.50"; 13.3 cm x 24. 1 cm x 29.2 cm
Weight	6.7 lbs.; 3.1 kg
Power	User Replaceable Batteries. 10 Type 123A Photo Flash lithium manganese dioxide batteries
Device Classification	Class II and internally powered per EN60601-1
Design Standards	Meets applicable requirements of UL 60601-1, AAMI DF-39, IEC 601-2-4, EN 60601-1, IEC 60601-1-2
ENVIRONMENT	
Operating Temperature	PS Model: 32° to 122° F; 0° to 50° C
Storage Temperature	PS Model: -22° to 158° F; -30° to 70° C
Humidity	10 to 95% relative humidity, non-condensing
Vibration	MIL Std. 810F, Min Helicopter Test
Shock	PS Model: IEC 68-2-27; 100G
Altitude	PS Model: -300 to 15,000 ft.; -91m to 4573m
Aircraft	Method RTCA/DO-160D: 1997 Section 21, Category M – all operating modes.
Particle and Water Ingress	IP-55
DEFIBRILLATOR	
Waveform	Rectilinear Biphasic™
Defibrillator Charge Hold Time	30 seconds
Energy Selection	Automatic pre-programmed selection (Adult mode: 120J, 150J, 200J; Pediatric mode: 50J, 70J, 85J)
Patient Safety	All patient connections are electrically isolated.
Charge Time	Less than 10 seconds with new batteries.
Maximum time from first rhythm analysis to unit charged and ready to shock	With new batteries: 12 seconds With batteries depleted by 15 200J discharges: 13 seconds

DEFIBRILLATOR (cont'd)	
Maximum time from power on to unit charged and ready to shock at 200J	22.6 seconds
Electrodes	ZOLL stat-padz II, CPR-D-padz or pedi-padz II
Built in Defibrillator Self Test	Included
CPR	*Metronome Rate: Variable 60 to 100 CPM Depth: ¾" to 3"; 1.9 to 7.6 cm
Defibrillation Advisory	Evaluates electrode connection and patient ECG to determine if defibrillation is required. Shockable Rhythms: Ventricular fibrillation with average amplitude>100 microvolts and wide complex ventricular tachycardia with rates greater than 150 BPM (adult mode) and 200 BPM (pediatric mode). Refer to ECG Analysis Algorithm Accuracy Section for sensitivity and specificity performance.
Electrode Patient Impedance Measurement Range	0 to 300 ohms
Defibrillator Electrode ECG Circuitry	Protected
ECG Bandwidth	2-30Hz
Display Format	Optional LCD with Moving Bar Size: 2.6" x 1.3"; 6.6 cm x 3.3 cm Viewing Time: 2.6 seconds
Display Sweep Speed	25 mm/sec
Battery Capacity	Typical new battery at +20° C (68° F): • 5 year stand-by life with batteries installed (weekly self-test), or • 225 ±5 continuous defibrillator discharges at maximum energy (200 joules); or • 13 hours of continuous monitoring (with 2-minute CPR periods). End of life designated by Red X (typical remaining shocks = 9).

*Testing reports validating performance and accuracy of CPR depth measurement capability, adaptive metronome feature function and rescuer performance, and the PASS (Passive Airway Support System) cover function are on file with ZOLL Medical Corporation and are available for review. Contact ZOLL Technical Support to request a copy of the following report(s) if desired:

- Using the AED Plus Cover to Aid in Airway Patency
- Depth and Compression Rate Response of Real CPR Help
- AED Plus Real CPR Help Test Results.

DEFIBRILLATOR (cont'd)	
PC Minimum Requirements	Windows® 98, Windows® 2000 Windows®NT, Windows® XP IBM-compatible PII with 16550 UART (or higher) computer 64MB RAM. VGA monitor or better CD-ROM drive IrDA™ port 20MB disk space

Guidance and Manufacturer's Declaration - Electromagnetic Emissions

Table 8: EMC Specifications

The AED Plus is intended for use in the electromagnetic environment specified below. The customer or the user of the AED Plus should assure that it is used in such an environment.		
Emissions test	**Compliance**	**Electromagnetic environment - guidance**
RF emissions CISPR11	Group 1	The AED Plus uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR 11	Class B	
Harmonic Emission IEC 61000 3-2	Not applicable	
Voltage Fluctuations/Flicker Emission IEC 61000 3-3	Not applicable	
Medical Electrical Equipment needs special precautions regarding EMC and needs to be installed and put into service according to EMC information provided in this document.		

The AED Plus is intended for use in the electromagnetic environment specified below. The customer or the user of the AED Plus should assure that it is used in such an environment.			
Immunity test	**IEC 60601 test level**	**Compliance level**	**Electromagnetic environment - guidance**
Electrostatic discharge (ESD) IEC 61000-4-2	± 6 kV contact ± 8 kV air	± 6 kV contact ± 8 kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Electrical fast transient/burst IEC 61000-4-4	± 2 kV for power supply lines ± 1 kV for input/ output lines	Not applicable ± 1 kV I/O	
Surge IEC 61000-4-5	± 1 kV differential mode +/- 2 kV common mode	Not applicable Not applicable	

Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment - guidance
Voltage dips, short interruptions and voltage variations on power supply input lines. IEC 61000-4-11	<5% *U*t (>95% dip in *U*t) for 0.5 cycle 40% *U*t (60% dip in *U*t) for 5 cycles 70% Ut (30% dip in *U*t) for 25 cycles <5% *U*t (>95%dip in *U*t) for 5 sec	Not applicable Not applicable Not applicable Not applicable	
Power frequency (50/60 Hz) magnetic field IEC 61000-4-8	3 A/m	3 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment
NOTE *U*t is the a.c. mains voltage prior to application of the test level.			

The AED Plus is intended for use in the electromagnetic environment specified below. The customer or the user of the AED Plus should assure that it is used in such an environment.			
Immunity test	**IEC 60601 test level**	**Compliance level**	**Electromagnetic environment - guidance**
			Portable and mobile RF communications equipment should be used no closer to any part of the AED Plus, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter.
			Recommended separation distance
Conducted RF IEC 61000-4-6	3 Vrms 150 kHz to 80 MHz outside ISM bands[a] 10 Vrms 150 kHz to 80 MHz in ISM bands[a]	3 Vrms 10 Vrms	d = 1.17 $\sqrt{P}$ d = 1.20 $\sqrt{P}$

Immunity test (cont'd)	IEC 60601 test level (cont'd)	Compliance level (cont'd)	Electromagnetic environment - guidance (cont'd)
			Recommended separation distance
Radiated RF IEC 61000-4-3	10 V/m 80 MHz to 2.5 GHz	10 V/m	$d = 1.20 \sqrt{P}$ 80 MHz to 800 MHz $d = 2.30 \sqrt{P}$ 800 MHz to 2.5 GHz where *P* is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and *d* is the recommended separation distance in metres (m).[b] Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey,[c] should be less than the compliance level in each frequency range.[d] Interference may occur in the vicinity of equipment marked with the following symbol: 

NOTE 1 At 80 MHz, the higher frequency range applies.
NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

[a] The ISM (industrial, scientific and medical) bands between 150 KHz and 80 MHz are 6.765 MHz to 6.795 MHz; 13.553 MHz to 13.567 MHz; 26.957 MHz to 27.283 MHz; and 40.66 MHz to 40.70 MHz.

[b] The compliance levels in the ISM frequency bands between 150 kHz and 80 MHz and in the frequency range 80 MHz to 2.5 GHz are intended to decrease the likelihood that mobile/portable communications equipment could cause interference if it is inadvertently brought into patient areas. For this reason, an additional factor of 10/3 is used in calculating the recommended separation distance for transmitters in these frequency ranges.

[c] Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the AED Plus is used exceeds the applicable RF compliance level above, the AED Plus should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the AED Plus.

[d] Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 10 V/m.

Recommended separation distances between portable and mobile RF communications equipment and the AED Plus

The AED Plus is intended for use in an environment in which radiated RF disturbances are controlled. The customer or the user of the AED Plus can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the AED Plus as recommended below, according to the maximum output power of the communications equipment.

	Separation distance according to frequency of transmitter m			
Rated maximum output power of transmitter W	150 kHz to 80 MHz outside ISM bands $d = [\frac{3.5}{3}] \sqrt{P}$	150 kHz to 80 MHz in ISM bands $d = [\frac{12}{10}] \sqrt{P}$	80 MHz to 800 MHz $d = [\frac{12}{10}] \sqrt{P}$	800MHz to 2.5 GHz $d = [\frac{23}{10}] \sqrt{P}$
0.01	0.17	0.12	0.12	0.23
0.1	0.37	0.38	0.38	0.73
1	1.17	1.20	1.20	2.3
10	3.69	3.79	3.79	7.27
100	11.70	12.00	12.00	23.00

For transmitters rated at a maximum output power not listed above, the recommended separation distance d in metres (m) can be determined using the equation applicable to the frequency of the transmitter, where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.

NOTE 1 At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.

NOTE 2 The ISM (industrial, scientific and medical) bands between 150 kHz and 80 MHz are 6.765 MHz to 6.795 MHz; 13.553 MHz to 13.567 MHz; 26.957 MHz to 27.283 MHz; and 40.66 MHz to 40.70 MHz.

NOTE 3 An additional factor of 10/3 is used in calculating the recommended separation distance for transmitters in the ISM frequency bands between 150 kHz and 80 MHz and in the frequency range 80 MHz to 2.5 GHz to decrease the likelihood that mobile/portable communications equipment could cause interference if it is inadvertently brought into patient areas.

NOTE 4 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

Rectilinear Biphasic Waveform Characteristics

The following table shows the Rectilinear Biphasic waveform's characteristics when discharged into 25 ohm, 50 ohm, 100 ohm, and 125 ohm loads at a maximum energy setting of 200 joules.

Table 9: Biphasic Waveform

	Discharged into 25 ohm load	**Discharged into 50 ohm load**	**Discharged into 100 ohm load**	**Discharged into 125 ohm load**
First Phase Maximum Initial Current	32 A	26 A	21 A	17 A
First Phase Average Current	28 A	22A	16 A	13 A
First Phase Duration	6 ms	6 ms	6 ms	6 ms
Interphase duration between first and second phases	150 µsec	150 µsec	150 µsec	150 µsec
Second Phase Maximum Initial Current	33 A	19 A	12 A	11 A
Second Phase Average Current	21 A	14 A	11 A	10 A
Second Phase Duration	4 ms	4 ms	4 ms	4 ms

Table 10: Delivered Energy at Each Defibrillator Setting into a Range of Loads

	Selected Energy					
Load	**50 J**	**70 J**	**85 J**	**120 J**	**150 J**	**200 J**
25Ω	40 J	61 J	66 J	95 J	111 J	146 J
50Ω	51 J	80 J	85 J	124 J	144 J	183 J
75Ω	64 J	89 J	111 J	148 J	172 J	204 J
100Ω	62 J	86 J	108 J	147 J	171 J	201 J
125Ω	63 J	89 J	110 J	137 J	160 J	184 J
150Ω	67 J	93 J	116 J	127 J	148 J	168 J
175Ω	61 J	86 J	107 J	119 J	138 J	155 J
Accuracy	±15%	±15%	±15%	±15%	±15%	±15%

The efficacy of ZOLL's Rectilinear Biphasic Waveform has been clinically verified during a Ventricular Fibrillation (VF) and Ventricular Tachycardia (VT) defibrillation study. This study (which was conducted using ZOLL M Series defibrillators) and the findings are described below. Since the AED Plus's Rectilinear Biphasic Waveform employs the same first and second phase timing, similar first and second phase currents/voltages and essentially the same mechanisms for controlling defibrillation waveshape, the M Series® and AED Plus defibrillation waveforms are considered substantially equivalent.

Figures 9 through 14 show the Rectilinear Biphasic waveforms that the AED Plus defibrillator produces when it discharges into loads of 25, 50, 75, 100, 125, 150, and 175 ohms at each energy setting (200, 150, 120, 85, 70, and 50 joules).

The vertical axis shows the current in amperes (A); the horizontal axis shows the duration in milliseconds (ms).

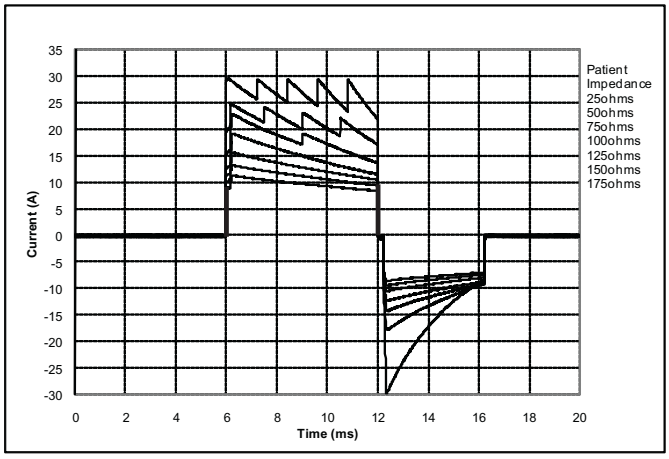


Figure 9: Rectilinear Biphasic Waveforms at 200 joules

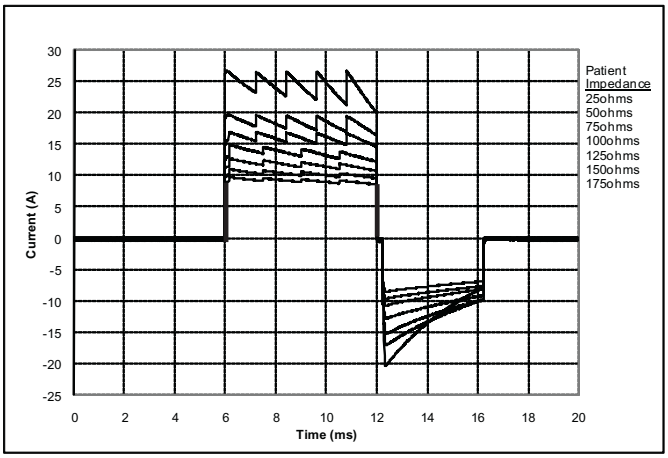


Figure 10: Rectilinear Biphasic Waveforms at 150 joules

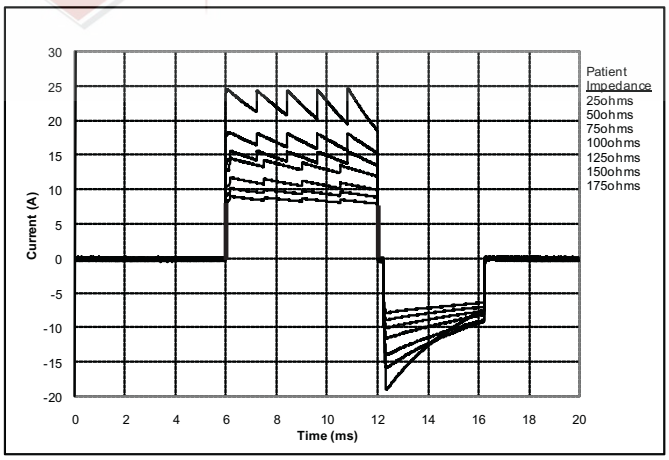


Figure 11: Rectilinear Biphasic Waveforms at 120 joules

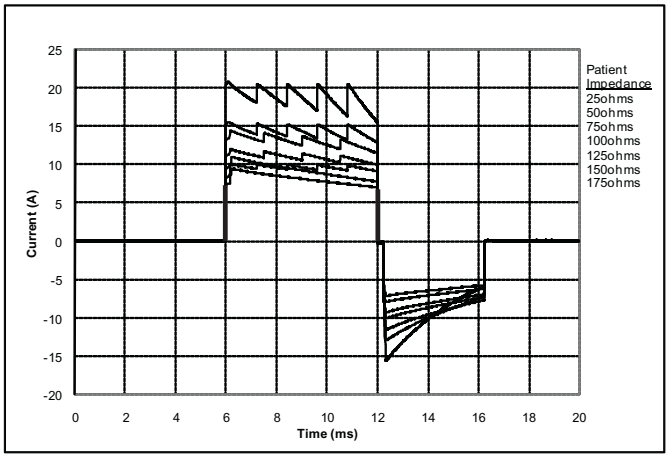


Figure 12: Rectilinear Biphasic Waveforms at 85 joules

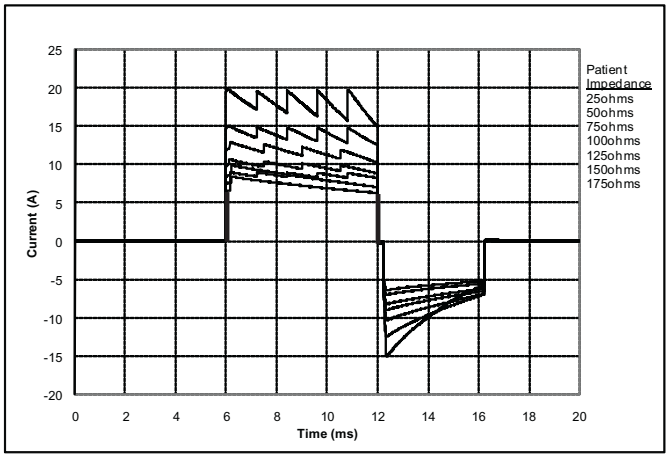


Figure 13: Rectilinear Biphasic Waveforms at 70 joules

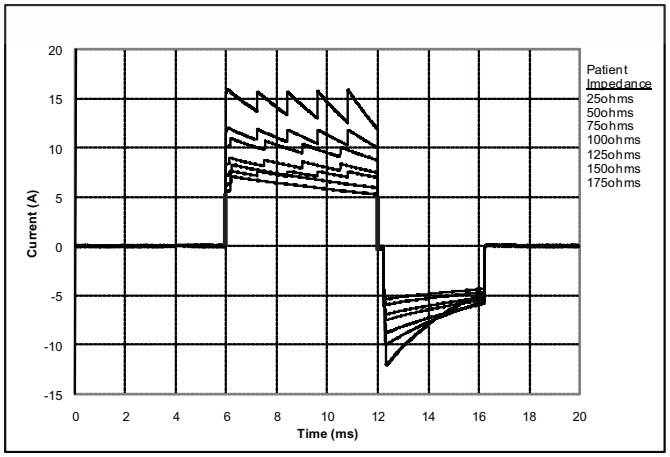


Figure 14: Rectilinear Biphasic Waveforms at 50 joules

Clinical Trial Results for the M Series Biphasic Waveform

The efficacy of ZOLL's Rectilinear Biphasic Waveform has been clinically verified during a study of defibrillation of Ventricular Fibrillation (VF)/Ventricular Tachycardia (VT). A feasibility study was performed initially for defibrillation of VF/VT (n=20) on two separate groups of patients to ensure waveform safety and energy selection. Subsequently a separate, multi-center, randomized clinical trial was performed to verify the waveform's efficacy. A description of this study is provided below. The study was performed using ZOLL defibrillation systems consisting of ZOLL defibrillators, the ZOLL Rectilinear Biphasic Waveform and ZOLL Multi-Function Pads.

Randomized Multi-Center Clinical Trial for Defibrillation of Ventricular Fibrillation (VF) and Ventricular Tachycardia (VT)

Overview: The defibrillation efficacy of ZOLL's Rectilinear Biphasic Waveform was compared to a monophasic damped sine waveform in a prospective, randomized, multi-center study of patients undergoing ventricular defibrillation for VF/VT during electro-physiological studies, ICD implants and test. A total of 194 patients were enrolled in the study. 10 patients who did not satisfy all protocol criteria were excluded from the analysis.

Objectives: The primary goal of this study was to compare the first shock efficacy of the 120J Rectilinear Biphasic Waveform with a 200J monophasic waveform. The secondary goal was to compare all shock (three consecutive 120, 150, 170J) efficacy of the Rectilinear Biphasic Waveform with that of a monophasic waveform (three consecutive 200, 300, 360J). A significance level of p=0.05 or less was considered statistically significant using Fischer's Exact test. Also, differences between the two waveforms were considered statistically significant when the customary 95% or AHA recommended 90%* confidence interval between the two waveforms was greater than 0%.

Results: The study population of 184 patients had a mean age of 63 ±14 years. 143 patients were males. 98 patients were in the biphasic group (ventricular fibrillation/flutter, n=80, ventricular tachycardia, n=18) and 86 patients were in the monophasic group (ventricular fibrillation/flutter, n=76, ventricular tachycardia, n=10). There were no adverse events or injuries related to the study.

The first shock, first induction efficacy of biphasic shocks at 120J was 99% versus 93% for monophasic shocks at 200J (p=0.0517, 95% confidence interval of the difference of -2.7% to 16.5% and 90% confidence interval of the difference of -1.01% to 15.3%).

	Monophasic	**Biphasic**
1st Shock Efficacy	93%	99%
p-value	0.0517	
95% Confidence Interval	-2.7% to 16.5%	
90% Confidence Interval	-1.01% to 15.3%	

Successful defibrillation with rectilinear biphasic shocks was achieved with 58% less delivered current than with monophasic shocks (14 ±1 vs. 33 ±7 A, p=0.0001).

The difference in efficacy between the rectilinear biphasic and the monophasic shocks was greater in patients with high transthoracic impedance (greater than 90 ohms). The first shock, first induction efficacy of biphasic shocks was 100% versus 63% for monophasic shocks for patients with high impedance (p=0.02, 95% confidence interval of the difference of -0.021% to 0.759% and 90% confidence interval of the difference of 0.037% to 0.706%).

	Monophasic	**Biphasic**
1st Shock Efficacy (High Impedance Patients)	63%	100%
p-value	0.02	
95% Confidence Interval	-0.021% to 0.759%	
90% Confidence Interval	0.037% to 0.706%	

A single patient required a second biphasic shock at 150J to achieve 100% efficacy versus six patients for whom monophasic shocks of up to 360J were required for 100% total defibrillation efficacy.

Conclusion: The data demonstrate the equivalent efficacy of low energy rectilinear biphasic shocks compared to standard high energy monophasic shocks for transthoracic defibrillation for all patients at the 95% confidence level. The data also demonstrate the superior efficacy of low energy rectilinear biphasic shocks compared to standard high energy monophasic shocks in patients with high transthoracic impedance at the 90% confidence level. There were no unsafe outcomes or adverse events due to the use of the rectilinear biphasic waveform.

* Kerber, R., et. al., AHA Scientific Statement, Circulation, 1997; 95: 1677-1682:

"... the task force suggests that to demonstrate superiority of an alternative waveform over standard waveforms, the upper boundary of the 90% confidence interval of the difference between standard and alternative waveforms must be < 0% (i.e., alternative is greater than standard)."

ECG Analysis Algorithm Accuracy

Sensitivity and specificity are expressions of ECG analysis algorithm performance when compared to ECG interpretation by a clinician or expert. Sensitivity refers to the algorithm's ability to correctly identify shockable rhythms (as a percentage of the total number of shockable rhythms); specificity refers to the algorithm's ability to correctly identify non-shockable rhythms (as a percentage of the total number of non-shockable rhythms). The data in Table 11 and Table 12 summarizes the accuracy of the ECG analysis algorithm as tested against ZOLL's ECG Rhythm Database.

The algorithm sequence takes approximately 9 seconds and proceeds as follows:

- Divides the ECG rhythm into three-second segments.
- Filters and measures noise, artifact, and baseline wander.
- Measures baseline content ("waviness" at the correct frequencies — frequency domain analysis) of signal.
- Measures QRS rate, width, and variability.
- Measures amplitude and temporal regularity ("auto-correlation") of peaks and troughs.
- Determines if multiple 3 second segments are shockable then prompts the user to treat patient.
- Stops analyzing the ECG after detecting a shockable rhythm and theAED Plus unit is charged and ready to deliver a shock.

Table 11: Clinical Performance Results (Adult Patients)

Rhythms	**Sample Size**	**Performance Goals**	**Observed Performance**	**90% One-sided Lower Confidence Limit**
Shockable (250 Total min.)	**618**			
Coarse VF	535	>90% sensitivity	97.38%	95.65%
Rapid VT	83	>75% sensitivity	91.57%	83.39%
Non-shockable (300 Total min.)	**3039**			
NSR	2205	>99% specificity	99.86%	99.60%
AF, SB, SVT, Heart block, idioventricular, PVCs	770	>95% specificity	100%	99.52%
Asystole	64	>95% specificity	100%	99.40%
Intermediate	**88**			
Fine VF	64	Report only	93.75% sensitivity	84.76%
Other VT	24	Report only	91.67% sensitivity	73.00%

Table 12: Clinical Performance Results (Pediatric Patients)

Rhythms	Sample Size (9 second records)	Performance Goals	Observed Performance	90% One-sided Lower Confidence Limit
Shockable (23 Patients)				
Coarse VF (1)	42	>90% sensitivity	100% (42/42)	93.1%
Rapid VT (2)	51	>75% sensitivity	92.2% (47/51)	82.9%
Non-shockable (121 Patients)				
NSR (3)	229	>99% specificity	100% (229/229)	98.7%
AF, SB, SVT*, Heart block, idioventricular, PVCs (4)	415	>95% specificity	100% (415/415)	99.3%
Asystole (5)	14	>95% specificity	100% (14/14)	80.7%
Intermediate (15 Patients)				
Fine VF (6)	0	Report only	NA	---
Other VT (7)	22	Report only	77.3% (17/22)	58.0%

*155 of the 415 abnormal rhythm records were SVT (39 patients).

1. Arrhythmia Performance is reported according to the article, RE Kerber, LB Becker, JD Bourland, RO Cummins, AP Hallstrom, MB Michos, G Nichol, JP Ornato, WH Thies, RD White, BD Zuckerman, “Automated External Defibrillators for Public Access Defibrillation: Recommendations for Specifying and Reporting Arrhythmia Analysis Algorithm Performance, Incorporation New Waveforms, and Enhancing Safety”, Circulation 1997, Vol 95, No 6, 1677-1681

References:

Young KD, Lewis RJ: “What is confidence? Part 2: Detailed definition and determination of confidence intervals”. Annals of Emergency Medicine, September 1997; 30; 311-218

“CRC Standard Mathematical Tables 28th Edition”, William H. Beyer, Ph.D., CRC Press, Inc, Boca Raton, FL., 1981, Percentage Points, F-Distribution Table, pg 573.

7 ESCAPE MASK

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Donning Poster
Dräger PARAT® Soft Pack



1



D-92771-2013

Dräger PARAT Soft Pack

2



D-92666-2013 & D-84466-2013

Break the security seal.

3



D-92678-2013

Pull the yellow flap downwards.

4



D-92687-2013

Open the Soft Pack **completely**. The front filter sealing plug should be automatically removed.

5



D-84486-2013

Remove the hood from the Soft Pack. Pull the hood against the hook and loop fastener holder, it will automatically open. The second filter sealing plug will automatically be detached when the hood is removed.

6



D-84506-2013

Widen the neck seal and pull the hood over your head. The inner head harness automatically adjusts to your head. Ensure that nose and chin sit comfortably in the half mask and that all hair is tucked into the hood.

7



D-92706-2013

Check the fit of the half mask by closing the front filtering opening with the palm of your hand. If negative pressure is not generated readjust the half mask to ensure a close fit over nose and mouth.

8



D-84531-2013

Ready for use.

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8 IMMERSION SUIT

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VIKING
PPE

Protective Suits

YouSafe™ Wave | SOLAS/MED

MARCH 2024



MODEL
VIKING YouSafe™ Wave

VIKING YouSafe™ Wave

The VIKING YouSafe™ Wave is one of our top-sellers and provides good thermal protection combined with high visibility fabric to increase your chance of survival in an emergency.

- Basic model to be worn with an approved lifejacket
- Durable flame retardant Neoprene with good elasticity for a perfect fit and easy donning
- Detachable gloves for easy donning and handling of emergency equipment

VIKING YouSafe™ Wave, immersion suit, SOLAS, MSMER
Product number: PS2014

VIKING
PPE

Protective Suits

YouSafe™ Wave | SOLAS/MED

MARCH 2024



Specifications

Approvals
- SOLAS/MED - 6-hour insulation
- MSMER

Outer material
- Neoprene, 5 mm

Colour options
- High visibility yellow

Design features
- Strap-attached gloves for easy donning
- Fully integrated boots with adjustment strap
- Waterproof and extended zipper for easy donning
- High visibility in dark water

Typical applications
- Commercial vessels
- Fishing vessels
- Passenger vessels

Sizes
- 54/Universal: Height from 140 cm to 200 cm, weight from 50 kg to 100 kg
- 58/Oversize: Height from 170 cm to 210 cm, weight from 80 kg to 160 kg

Special instructions
- Must be worn with an approved lifejacket

Options
- Airtight packing
- Print

Exchange Concept
- Yes

Service interval
- 3 years (after 10 years - more frequently)

Related items

VIKING YouSafe™ Wave+, immersion suit, SOLAS (PS2004)

VIKING YouSafe™ Essence, lifejacket, SOLAS (PV9530)

VIKING YouSafe™ Multi, lifejacket, SOLAS/TC/USCG (PV9521)

VIKING YouSafe™ Ergo, lifejacket, SOLAS (PV9522)

VIKING YouSafe™ One, inflatable lifejacket, SOLAS (PV9342)

9 LIFEJACKET

VIKING
PPE

Lifejackets

YouSafe™ Essence | SOLAS/MED

MARCH 2024



MODEL
VIKING YouSafe™ Essence

VIKING YouSafe™ Essence

Designed to minimize storage dimensions, while still allowing for easy repacking for crew. Featuring a compact design and proven in-water performance, VIKING YouSafe™ Essence is a great basic lifejacket for commercial cargo and passenger vessels.

- Good in-water performance with a torso and head-support buoyancy panel
- Intuitive donning and protection in case of emergency
- Easy repacking and storage when not in use

VIKING YouSafe™ Essence, lifejacket, SOLAS/MED, MSMER
Product number: PV9530

VIKING
PPE

Lifejackets

YouSafe™ Essence | SOLAS/MED

MARCH 2024

Specifications





Approvals
- SOLAS/MED
- MSMER

Cover fabric
- Coated polyester

Colour options
- Orange
- High visibility yellow

Design features
- Whistle, buddy line, lifting strap
- Single front buckle and crotch strap ensures an easy intuitive donning
- Minimal storage space required
- Body and head-support buoyancy panel

Typical applications
- Cargo vessels
- Passenger vessels
- Offshore applications

Sizes
- Universal size

Options
- SOLAS approved light
- Print

Service interval
- No service required (light must be serviced every 5 years)

Spare parts

- Light, W4-A, alkaline	1061461
- Clips for light	1070497
- Whistle	1058946

Related items

VIKING YouSafe Wave, immersion suit, SOLAS (PS2014)

VIKING YouSafe Breeze, immersion suit, SOLAS (PS5006)

VIKING YouSafe™ Ergo, lifejacket (PV9522)

10 DESCENT DEVISE

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Arco Professional Safety Services Ltd.

Product Technical Data.					
Short Description:	40m Offshore S-Cape™ MkVI Personal Emergency Evacuation Unit.				
Product ID:	15800	**Model Ref:**	9306040	**System Length:**	40m.



Offshore S-Cape™ MkVI Personal Emergency Evacuation System.
Designed specifically as a Tertiary Personal Emergency Self-Rescue / Evacuation System from offshore oil & gas installations. The Offshore S-Cape™ life-saving appliances (personal abseiling rescue devices) are in current use in many regions around of the world.
The Offshore S-Cape™ evacuations units are liferaft compatible & can also be used to lower off an injured or unconscious person.
This model also has an inner vacuum sealed foil bag for additional protection. The system is pre-reeved & ready to use by trained personnel.
Each unit is supplied with, as standard, an operational certificate and system instructions. The Declaration of Conformity is issued separately.
This product requires training before use.

Recertification period:	9Years	**Capacity:**	One Person (40 - 150kg.)
Net weight:	6.8kg.	**Dimensions:**	46cm. x 15cm. x 26.5cm.

Rate of Descent:			
Conscious person:	Variable 0>	**Unconscious person:**	Auto-stop.

Principal Materials: Aluminium top connector, Polyamide rope, aluminium / steel descender, harness is 25% PAD, 70% PVC, 5% Steel, stainless steel intermediate connector & quick release unit, stainless steel handrail strop assembly, Polyester painter line strop with stainless steel connectors, PVC outer bag with stainless steel connector, LDPE / OPA / Aluminium foil / polyester film inner bag, polythene grip seal bag, activated clay desiccant in a Tyvek bag.

Manufacturer:	Arco Professional Safety Services Ltd.
Export Commodity Tariff Code:	8479 89 97
Country of origin:	EC – United Kingdom
Rope CE Marked via:	EN1891:1998
Descender CE Marked via:	EN12841:2006 Type C.
Harness CE Marked & tested to:	EN1497:2007, EN1498:2006 Class B. MBL 15kN.
Liferaft Compatible:	Yes.
Ability to lower a unconscious / injured casualty.	Yes.
Other lengths available for this application:	Yes.
Training to User Level available:	Yes.
Training to Instructor Level available:	Yes.
Other Rescue kit models available for other applications:	Yes.

Additional notes:
In order to be liferaft compatible the system length of the Offshore S-Cape™ system needs to be of a length that is at least the deployment height above the LAT (Lowest Astronomical Tide) plus 12metres.

S-Cape™ Systems: Are rescue systems designed and manufactured by Arco Professional Safety Services Ltd. These are available in a wide variety of models to suit specific applications for the rescue of either the user as in a self-rescue / evacuation, or a casualty.
Please note that instructions are currently only in English with some pictorial content, if other languages are required, then please ask for further detail.
Please contact Arco Professional Safety Services Ltd. or your local Arco representative for more help about a specific rescue application.
Total Access is also a trading name of Arco Professional Safety Services Ltd.

2nd December 2019 Rev: 3

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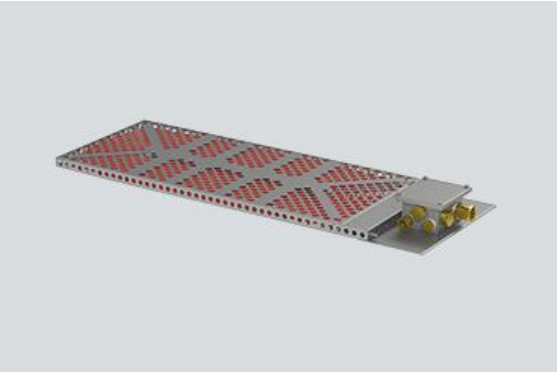
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11 POWDER FIRE EXTINGUISHER CABINET HEATER

TRANBERG Solutions
Enclosure heater With junction box

TEF92071001 Art. No. 220182



- Low profile, easy to fit inside cabinets
- Self-regulating heating element. Prevents overheating
- Rugged AISI 316L, acid steel construction
- Low maintenance
- For use inside equipment enclosures and cabinets to prevent condensation and provide climatic control
- Frost protection

MY R. STAHL **T9207B**

Globally approved Ex e, self regulating enclosure heater. AISI 316L acid resistant steel enclosure and junction box. Junction box for electrical connections. Delivered with power output from 100 W up to 600 W at 0 °C.

Technical Data

Explosion Protection	
Application range (zones)	1, 2
IECEx gas certificate	IECEx NEM 11.0005X
IECEx gas explosion protection	Ex e IIC T3 Gb
ATEX gas certificate	NEMKO 11ATEX1098X
ATEX gas explosion protection	II 2 G Ex e IIC T3 Gb
Electrical Data	
Power	100 W
Frequency range	50 – 60 Hz
Ambient Conditions	
Ambient temperature	-50 °C ... +50 °C (live)
Storage temperature	-50 °C ... +80 °C
Mechanical Data	
Degree of protection (IP)	IP66
Enclosure material	Stainless steel 1.4404
Max. connection cross section, solid	4 mm²
Max. connection cross-section, finely stranded	2,5 mm²
Cable length	0 m
Dimension A	200 mm
Dimension B	430 mm
Dimension C	30 mm
Dimension D	80 mm
Dimension E	190 mm
Dimension F	160 mm
Weight	6.44 lb
Components	
Drilled holes	4 x M25
Cable glands and entries	1 x M25 x 1.5

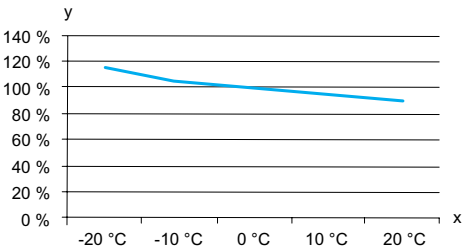
TRANBERG Solutions
Enclosure heater With junction box

TEF92071001 Art. No. 220182

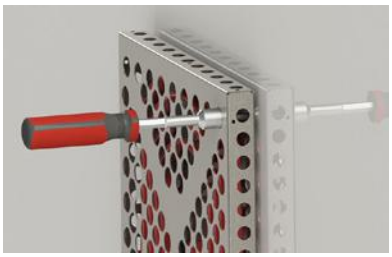
Components

Stopping plugs	3 x M25 x 1.5

Technical Drawings – Subject to Alterations



Estimated power output of heater in respect to ambient temperature
y = Effect %, x = Ambient temperature °C



Use a tool to tighten the screws firmly to secure the heater.

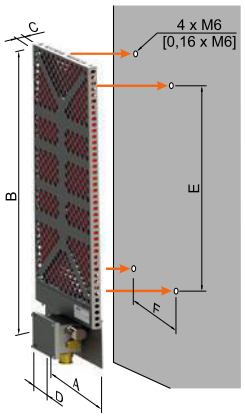


Sandwich design
Insert 4 x M6 screws and washers in the mounting brackets as shown. Use a wrench for tightening the screws firmly.

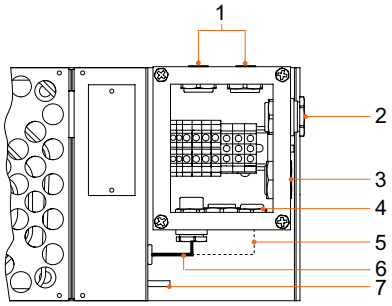


4 x Ø 6 mm mounting holes on the rear side of the heater

Dimensional Drawings (All Dimensions in mm [inches]) – Subject to Alterations



Note! Never install the heater with junction box facing upwards.



1	Stopping plug M25
2	Power in M25
3	Breather M25
4	Stopping plug M25
5	*) 2x cold lead only (for sandwich design)
6	*) Cold lead
7	Earth bolt M6 x 10

*) internal cables from heater plate (installed at TRANBERG Factory)

Nominal output *)	Overall dimensions				Mounting dimensions		Weight
	A	B	C	D	E	F	
100 W	200	430	30	80	190	160	2.92 kg
200 W	240	684	30	80	440	200	4.74 kg
300 W	280	834	30	80	590	240	6.72 kg
400 W	303	684	80	80	440	276	6.44 kg
500 W	360	1004	30	80	760	320	9.32 kg
600 W	343	834	80	80	590	316	11.76 kg
1000 W	424	1004	80	80	760	397	18.50 kg

*) **Note: Nominal output at still air at 0 °C**

TRANBERG®

ENCLOSURE HEATER

TEF 9207 Ex e

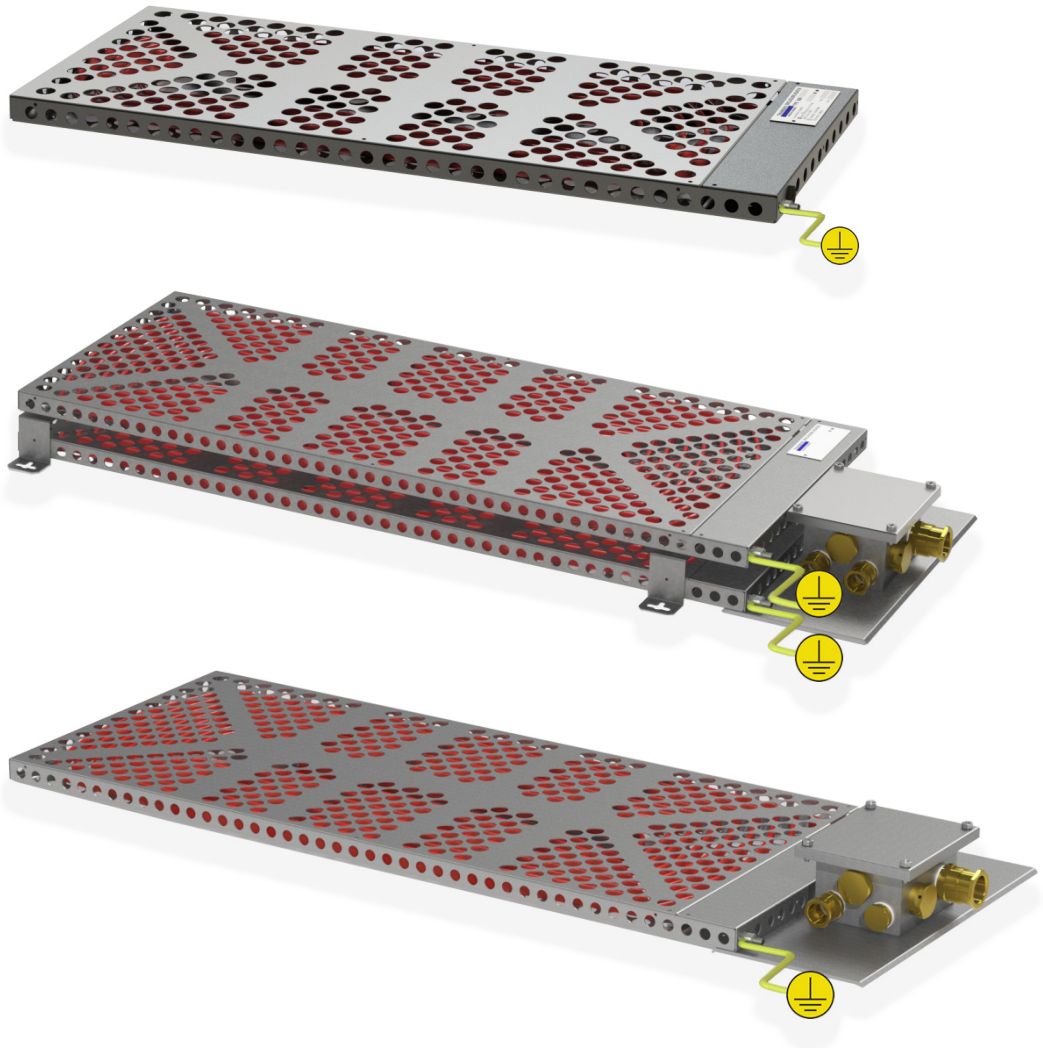
ZONE 1 , ZONE 2 & SAFE AREA

USER MANUAL

Subject to change without prior notice TUM3083 REV. K 20.07.2017

IMPORTANT

Read this instruction carefully before installing the product



STAHL TRANBERG

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TEF 9207 Ex ENCLOSURE HEATER USER MANUAL

INTRODUCTION

Thank you for purchasing this product!
For installation, maintenance and assurance of a long life of this product, please follow this manual.

CONTENT IN BOX

The product is fully assembled, and ready for installation.

SAFETY PRECAUTIONS

Tranberg series 9201 Enclosure Heaters are not suitable for use in Zone 0 hazardous areas. Changes made to the product not confirming to the approvals of this equipment, is a safety violation. The manufacturer is under no circumstances responsible for personal injuries, death or any other damage caused by such activities. For replacement and repairs of the enclosure heater only Tranberg AS spare parts shall be used. Repairs effecting the explosion protection of the equipment, shall only be carried out by Tranberg AS, or qualified electricians in compliance with the respective national regulations.

APPROVALS

Approvals:

Explosion category, without thermostat:	Ex II 2 G Ex e IIC T3 AEx e II/Ex e II Class I, Division 2, Group A/B/C/D
Explosion category, with thermostat:	Ex II 2 G Ex e mb IIC T3 AEx e mb II/Ex e mb II Class I, Division 2, Group A/B/C/D
Marking, without thermostat:	CE 0470 (Ex symbol) II 2 G Ex e IIC T3 Gb AEx e II / Ex e II Class I, Div. 2, Group A, B, C, D -50°C ≤ ta ≤ +50°C
Marking, with thermostat:	CE 0470 (Ex symbol) II 2 G Ex e mb IIC T3 Gb AEx e mb II / Ex e mb II Class I, Div. 2, Group A, B, C, D -50°C ≤ ta ≤ +50°C
Certificate No.:	IECEx NEM 11.0005X Nemko 11ATEX1098X

CSA Certificate: 1370701

CSA Master Contract: 216432

Additional to the marking

Read the installation manual and the safety instruction before installing this product

SPECIAL CONDITION FOR SAFE USE

Warning:

Do not disconnect the enclosure heater without disconnecting power supply. Only qualified personnel are allowed to perform installation and maintenance tasks to this product

1. The equipment must be protected with earth leakage protective device or insulation monitoring device, dependent on the type of system earth, according to IEC 364-3, Chapter 31, CENELEC EN 50019:2000, Annex D., and Canadian Electrical Code, Section 62, Rule 62-300 (either as pt. 1 or pt. 2 below):

1. A A residual current protective device with a rated residual operating current not exceeding 300 mA should be used. Preference should be given to protective devices with a rated residual operating current of 30 mA. The protective device should have a maximum break time not exceeding 5 s at the rated residual operating current and not exceeding 0,15 s at 5 times the rated residual operating current.

2. An insulation monitoring device should be used to disconnect the supply whenever the insulation resistance is lower than 50 **Ω**/ V of rated voltage.

2. A The heating unit must be terminated in a suitable certified terminal enclosure or in safe area.

2. B The heater unit with permanently connected unterminated cable need an appropriate protection of the free end of the cable.

The enclosure heater must not be tested with or terminated to (1000+2Un) V r. m. s. (e. g. 1500 VAC), where Un is the rated voltage. Only DC (direct current) of max. 2550 VDC is acceptable for testing of electrical insulation resistance between lead wires and braid.

INSTALLATION INSTRUCTION

Only qualified personnel are allowed to perform installation and maintenance tasks to this product.

The enclosure heater may be equipped according to customer specification, list of component and product data sheet, and is then ready for installation when leaving the production facilities of Tranberg AS. If the content has any defects or is not complete, file a claim to the manufacturer immediately.

Mounting:
The 9207 Enclosure Heater must be mounted and fastened through mounting holes at rear side of heater by means of M6 screws/bolts. All screws must be firmly tightened to secure the heater. **All measures for mounting are shown in product data/catalogue sheet.**

INSTALLATION INSTRUCTION

Junction box:
Install blind plugs in all non-used hole in junction box. Breather / drain plug must only be installed in the longest horizontal side of junction box.

Electrical connection:
For heater w/ junction box the heating cable is already terminated to terminals inside junction box. The power cable should be connected directly to the terminal blocks inside junction box.
For electrical protection and special conditions related to the electrical connection, see Technical specification on page 2.
In order to maintain the mode of protection, the conductors must be connected with special care. The isolation must reach up to the terminal and the conductor must not be damaged. All screws of terminals, also those remaining vacant, must be tightened.
Only DC (direct current) of max. 2550 VDC is acceptable for testing of electrical insulation resistance between lead wires and braid.

Reliability:
Because of the intrinsic self-regulating properties of the heater, the heater can be used without a thermostat. This provides, in a single component, a heater that is not vulnerable to thermostat failure.
Further, the rugged polymer construction of the heater element ensures highly reliable performance in harsh and corrosive environments due to the acid resistance stainless steel housing.

Design flexibility:
Due to the relatively low surface temperature and self-regulating nature of the heater, components and wires may be located close to the heater without fear of damage caused by overheating. The relatively low profile of the heater makes it ideal for installation into a range of control and monitoring panels as well as instrumentation and monitoring cabinets located on-site.

Operation:
The Tranberg 9207 Enclosure Heater contains no moving parts. It may be left without fear of failure through overheating. The heater may be installed anywhere in the enclosure, although, for best result, the heater should be mounted towards the base of the enclosure in a horizontal position.

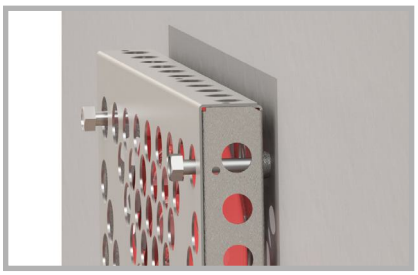
Self-regulating performance:
The enclosure heater contains an element consisting of a semi-conductive polymer core extruded between two parallel copper conductors. At low temperatures, electrical current flows between the conductors thus generating heat. As the temperature rises the electrical resistance of the core material increases thus reducing current flow and heat output. **Power consumption in respect to the ambient temperature is shown in product data/catalogue sheet.**

Maintenance/Repairs/Modification:
Before disconnecting the heater, make sure that the power is disconnected.
If the enclosure heater failed and is defect, it should be replaced by a new heater.
Modification of the enclosure heater or change of design is not allowed.

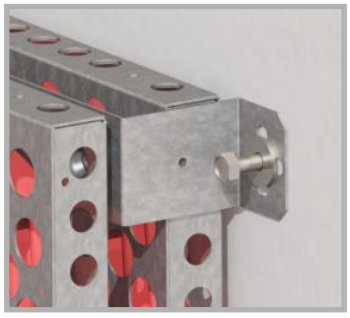
Note! Never install the heater with junction box facing upwards. Please se datasheet for mounting details.



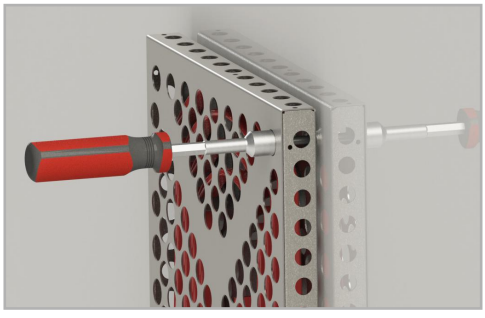
4xM6 mounting holes on the backside of the heater.



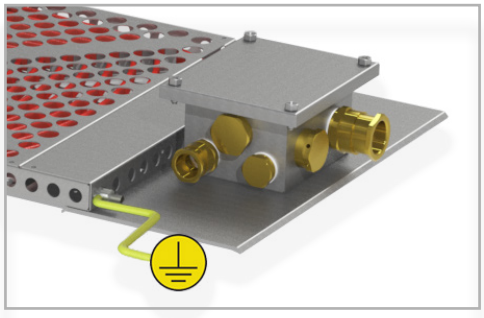
Hold the heater close to the installation surface, and insert the M6 screws in each of the 4 mounting holes.



For the “sandwich” model, insert the M6 screws and a washer in the mounting brackets as shown. Use a wrench for tightening the screws firmly.

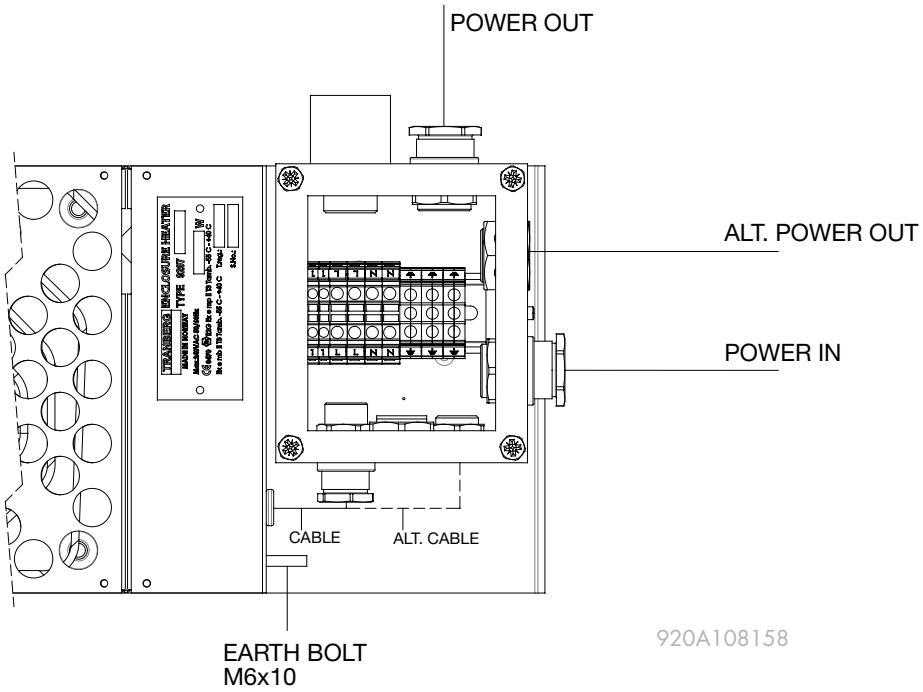


Use a socket wrench to tighten the screws firmly and securing the heater.



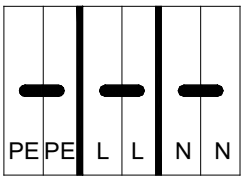
Bonding to earth.

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920A108158

Electrical connection



Conductor cross-section

L/N: 0,2mm² - 6mm² AWG 24-10

PE: 0,5mm² - 10mm² AWG 20-8

920A106068

TECHNICAL DATA

Housing Material:	Acid proof stainless steel
Heater cable overjacket material:	Fluoropolymer
T-rating:	T3 (Max. 200°C)
T_{amb}:	-50°C - +50°C
Maximum withstand temperature	
Power off:	+80°C
Degree of protection:	IP66
Electrical protection:	Use max. size of 16A circuit breaker
For use in zone:	Zone 1, Zone 2 and safe area

Compliance with: EN 60079-0:2009 / IEC 60079-0:2007, EN 60079-7:2007 / IEC 60079-7:2006
EN 60079-18:2009 / IEC 60079-18:2009, EN 60079-30-1:2007 / IEC 60079-30-1:2007

CAN/CSA C22.2 60079-0:07 , CAN/CSA C22.2 60079-7:03 , CAN/CSA Standard C22.2 No. 0-M91
CAN/CSA Standard C22.2 No. 14-10 , CAN/CSA Standard C22.2 No. 130-03
CAN/CSA Standard C22.2 No. 213 - M1987(R2008)

ANSI/IEC 60079-7:03 , ANSI/IEC 60079-30-1:07 , ANSI/IEC 60079-0:07
ANSI/IEC 62086-1 (1st Edition) Part 1

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IEC 60079-30-1:07
ISA/ANSI 12.12.01-2011 UL 1693:11

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