

# DC Charger

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DC Charger for the °M Warmer System

USER MANUAL


**ENGLISH**



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## 1 INTRODUCTION

This manual provides the user with the information needed to successfully implement and operate the DC Charger for the °M Warmer System.

 Before the DC Charger is used, the user manual for the °M Warmer System (supplied with each Power Pack\*) and the DC Charger (this manual) should be thoroughly read.

Information regarding the DC Charger can be found in:

- The user manual for the DC Charger (this manual)

The DC Charger is suitable for use in Domestic, Residential, Office and Hospital environments, except in special locations where EM Disturbances are known to be high, such as near High Frequency Surgical Equipment or Magnetic Resonance Imaging systems.

When used according to its specification the User can expect the product to fulfil its essential performance, being charging batteries for Medical Electrical Devices.

\* In this manual, the term Power Pack is used to cover both the Power Pack and the Power Pack+

## 2 INDICATIONS FOR USE

The DC Charger is intended to be used for charging the Power Pack / Power Pack+ from a 10-30V DC outlet. The charging must take place outside the patient area, i.e. minimum distance from the patient of 1.5m.

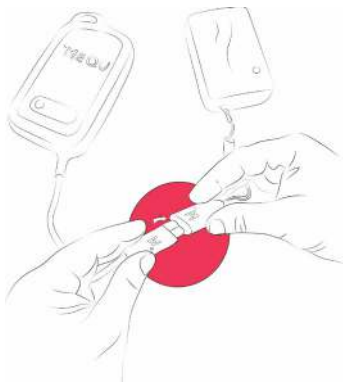
It is designed to be used by healthcare professionals in pre-hospital, hospital, clinical and other environment.

## 3 UNPACKING OF THE DC CHARGER

After receiving the DC Charger you must inspect the shipping box and the content for damage that may have occurred during shipment. If any of the contents are visibly or mechanically damaged, or if the order is not complete, please contact your local supplier immediately.

You can order the latest edition of this manual by sending an e-mail to [support@mequ.dk](mailto:support@mequ.dk) and write DC Charger User Manual in the subject line. Also, please specify which language you want the instructions in. You will then receive the instructions in a PDF version.

## 4 CHARGING OF THE POWER PACK



### THE POWER PACK IS CHARGED AS FOLLOWS:

- Connect the DC Charger to the DC outlet using the plug on the DC Charger. The DC Charger is “switched on” by inserting the plug into the socket and “switched off” by disconnecting the plug from the socket. The time from powering the DC Charger until its full function starts may exceed 15 seconds.

- Connect the Power Pack to the DC Charger

The Power Pack is fully charged and ready for use when all 4 LEDs are on and the green LED on the DC Charger lights up. The Power Pack can now be disconnected from the Charger.

Make sure the LED color behaviour on the DC Charger is as described in the technical manual delivered with the DC Charger, i.e:

- green when connected to a DC outlet but not connected to a Power Pack.
- red/yellow during charging of the Power Pack.
- green when connected to a DC outlet and to a fully charged Power Pack

Ensure that the LED on the DC Charger is on when connected to a DC outlet. If the LED is not on, the DC Charger is faulty.

The charging must take place outside the patient area, i.e. minimum distance from the patient of 1,5m.

The DC Charger may be used for charging the Power Pack under stationary conditions as well as in moving vehicles. It is approved for use in airplanes and helicopters.

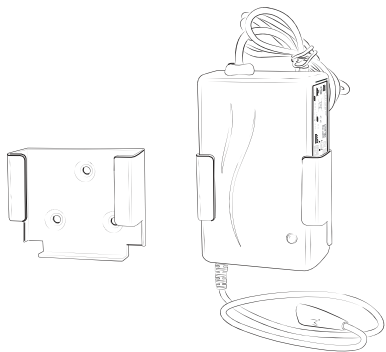
The DC Charger needs to be able to be unplugged if necessary. It therefore shall be easily accessible after installation and during use.

To avoid overheating make sure there is sufficient room for the circulation of air around the DC Charger when in use. Do not cover it up.

The DC Charger is not repairable. The supply cord cannot be replaced. If the cord is damaged the DC Charger should be scrapped. Please contact your supplier for replacement part.

## 5 Mounting of the DC Charger

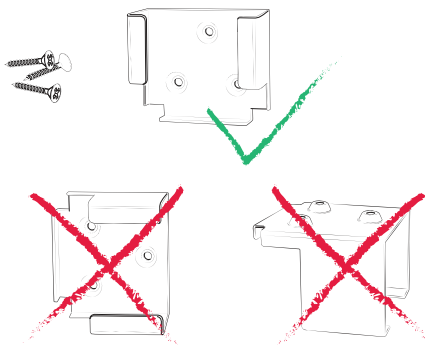
The DC Charger can be securely mounted in the vehicle using the bracket delivered with the DC Charger.



The bracket is mounted using three screws appropriate for the type of material, the bracket is to be mounted on. The bracket is not designed for rail mounting.

The screws are not included with the bracket, and it is the users own responsibility to select appropriate screws and ensure, that the bracket is securely mounted.

The bracket must always be mounted vertically with the opening facing upwards in order to ensure, that the DC Charger does not fall out of the bracket.



## 6 DISPOSAL





The DC Charger is electrical and electronic equipment (as per EU directive 2012/19/EU on Waste Electrical and Electronic Equipment) and should therefore not be disposed with regular household waste.

Take the product to the nearest recycling collection facility.




## 7 SAFETY INFORMATION

For Cautions regarding the DC Charger – see the separate technical manual for the DC Charger.

-  Before the DC Charger is used, the user manuals for the °M Warmer System (supplied with the each Power Pack and the DC Charger should be thoroughly read.
-  Use of this equipment adjacent to or stacked with other equipment should be avoided because it could result in improper operation. If such use is necessary, this equipment and the other equipment should be observed to verify that they operating normally
-  Use of accessories, transducers and cables other than those specified or provided by the manufacturer of this equipment could result in increased electromagnetic emissions or decreased electromagnetic immunity of this equipment and result in improper operation
-  Portable RF communications equipment (including peripherals such as antenna cables and external antennas) should be used no

closer than 30cm (12 inches) to any part of the ME equipment, including cables specified by the manufacturer. Otherwise, degradation of the performance of this equipment could result.

 Connect only items that have been specified as part of ME SYSTEM or specified as being compatible with ME SYSTEM.

 Do not use if DC Charger shows sign of damage.

Any serious incident that has occurred in relation to the device should be reported to the manufacturer and the competent authority of the Member State in which the user and/or patient is established.

## 8 SYMBOLS

All information regarding symbols for the °M Warmer System, including the DC Charger, can be found in the °M Warmer System User Manual supplied with each Power Pack.



MR Unsafe, items should not enter the MRI scanner room. Patients with MR Unsafe devices should not be scanned

## 9 ELECTROMAGNETIC COMPATIBILITY

The DC Charger is intended for use in the electromagnetic environment specified below.  
The customer or user should ensure that it is used in such an environment.

TEST / STANDARD	COMPLIANCE LEVEL	GUIDANCE
Emission:		
RF emissions, CISPR 11	Group 1, Class B	Suitable for use in all establishments, including domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes. RF emissions not likely to cause any interference in nearby electronic equipment. However, a separation distance of 30 cm shall be maintained.
Harmonic emissions, IEC 61000-3-2	-	
Voltage fluctuations / flicker emissions, IEC 61000-3-3	-	

TEST / STANDARD	COMPLIANCE LEVEL	GUIDANCE
Immunity:		
Electrostatic discharge (ESD), IEC 61000-4-2	± 8 kV contact ± 15 kV air	Temporary loss of function may be experienced while the product is subject to the phenomena. The product is expected to recover to its normal operation.
Electrostatic fast transient / burst, IEC 61000-4-4	± 2 kV for AC-power lines ± 1 kV for output lines	
Surge, IEC 61000-4-5	± 1 kV line to line ± 2 kV line to earth (if applicable).	
Voltage dips, short interruptions and voltage variations on power supply lines, IEC 61000-4-11	<5% UT (0.5 cycle) 40% UT (5 cycles) 70% UT (25 cycles) <5% UT for 5 s $U_T = \text{AC Input Voltage}$ prior to test.	
Power frequency magnetic field IEC 61000-4-8	3 A/m (50/60 Hz)	Not applicable for non-magnetic field sensitive devices.

Conducted RF, IEC 61000-4-6	3 Vrms 150 kHz to 80 MHz	Temporary loss of function may be experienced while the product is subject to the phenomena. The product is expected to recover to its normal operation.
Radiated RF, IEC 61000-4-3	3V/m for Professional healthcare environment. 10 V/m for Home Healthcare environment. 80 MHz to 2.7 GHz	
<p>These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people and field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcasts and TV broadcasts cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters an EM site survey may be considered. If the measured field strength in the location exceeds the applicable RF compliance level above, the Mascot product should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as re-orienting or relocating the product.</p>		

## 10 CLEANING

Cleaning instructions for the DC Charger is described in the °M Warmer System User Manual supplied with each Power Pack.

## 11 TECHNICAL SPECIFICATIONS

DIMENSIONS	
Size	7.5cm (W); 11.7cm (L); 4.4cm (H); cable length (from DC Charger to plug for connecting to DC outlet) 138cm, cable length (from DC Charger to plug connecting to Power Pack) 53cm.
Weight	250g
POWER	
Standard DC Charger input	10-30V DC, 4A
ENVIRONMENTAL*	
Operating Temperature	10°C - +40°C
Relative Humidity RH	15 - 95%
Pressure	70 - 106kPa
Storage Temperature	-20 - +50°C

\* If the DC Charger has recently been stored or transported at conditions outside the operating temperature, relative humidity and/or pressure, please wait for 30 minutes before operating the DC Charger.

<b>RECHARGE TIME</b>	
Standard Recharge time	Power Pack: 2.5 hours Power Pack+: 3 hours
<b>USE LIFE</b>	
DC Charger use life	2 years
<b>CLASSIFICATION</b>	
Degree of protection against harmful ingress of subjects/water:	IP67: IP6x = Dust tight. IPx7: Protection against the effects of temporary immersion in water ingress of water in quantities causing harmful effects shall not be possible when the enclosure is temporarily immersed in water under standardized conditions of pressure and time)
<b>CONNECTOR SPECIFIKATION</b>	
MWS302	DC Charger with MIL STD D38999/26ZB98AN connector
MWS303	DC Charger with VG95234F-10SL-4PN connector

## Charging method

### STEP 1 - CONSTANT CURRENT CHARGE

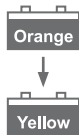
To start a charge cycle, connect the DC Charger to the DC outlet.

The DC Charger is in constant current mode, charging with the maximum current indicated on the DC Charger, the LED-indication on the DC Charger is ORANGE. This step allows rapid charging of your Power Pack until the Power Pack voltage has increased to a certain set level.



### STEP 2 - CONSTANT VOLTAGE CHARGE

When the Power Pack voltage has increased to a certain set level the DC Charger enters constant voltage mode, charging with a decreasing current until the current is below the DC Chargers charge termination level (indicated on the DC Charger). The LED-indication on the DC Charger is ORANGE. When the Power Pack has reached typically 90 - 95% of its full capacity the charge current has dropped below a set level and the LED-indication on the DC Charger changes to YELLOW to indicate that the Power Pack is almost fully charged and may be ready for use. The constant voltage charge continues and the Power Pack reaches its full capacity at the end of this step.



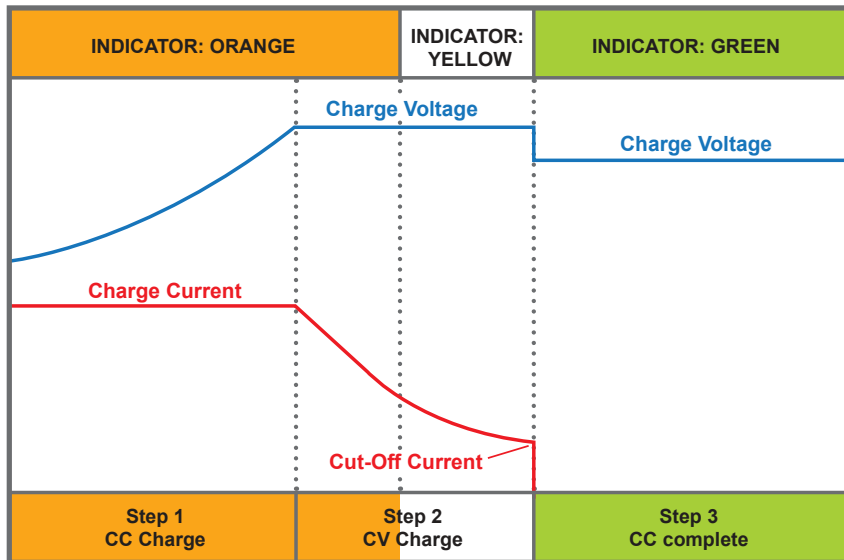
### STEP 3 - CHARGE COMPLETE

The LED-indication on the DC Charger is GREEN and the Power Pack is fully charged.

For Li-Ion batteries the charge current is zero and the Power Pack has been charged to its full capacity. After end of charge Power Pack voltage will remain at "Step 2" level even if output voltage of the DC Charger is indicated as lower in the diagram. The DC Charger will return to Step 1 if the Power Pack is used. A load larger than the cut-off current will initiate a new charge cycle.



## Diagram



## 12 ORDERING INFORMATION

The DC Charger is tested according to the following standards:

- EN 60601-1:2006 + AC 2013, CORR. 1 (2008) + CORR. 2 (2008) + AM1:2013 + AMD2:2021
- RTCA/DO-160G, Section 21
- EN 60601-1-2:2015 + A1:2021
- EN 60601-1-12:2015 + A1:2020
- ASTM F2172-02
- EN 13718-1:2014 + A1:2020
- EN 1789:2020 + A1:2023

Order number / Description

- *MWS302*  
DC Charger with MIL STD D38999/26ZB98AN male connector
- *MWS303*  
DC Charger with VG95234F-10SL-4PN male connector (2 pin bayonet connector, fits in female VG95234B1-10SL-4SN connector)



Designed and developed in Denmark

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MQ1-C028-3.0  
2025-04-01