

MASTERVOLT

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MANUEL UTILISATEUR / MANUAL DE UTILIZACION / INSTRUZIONI PER L'USO

Solar ChargeMaster 60 MPPT-MB

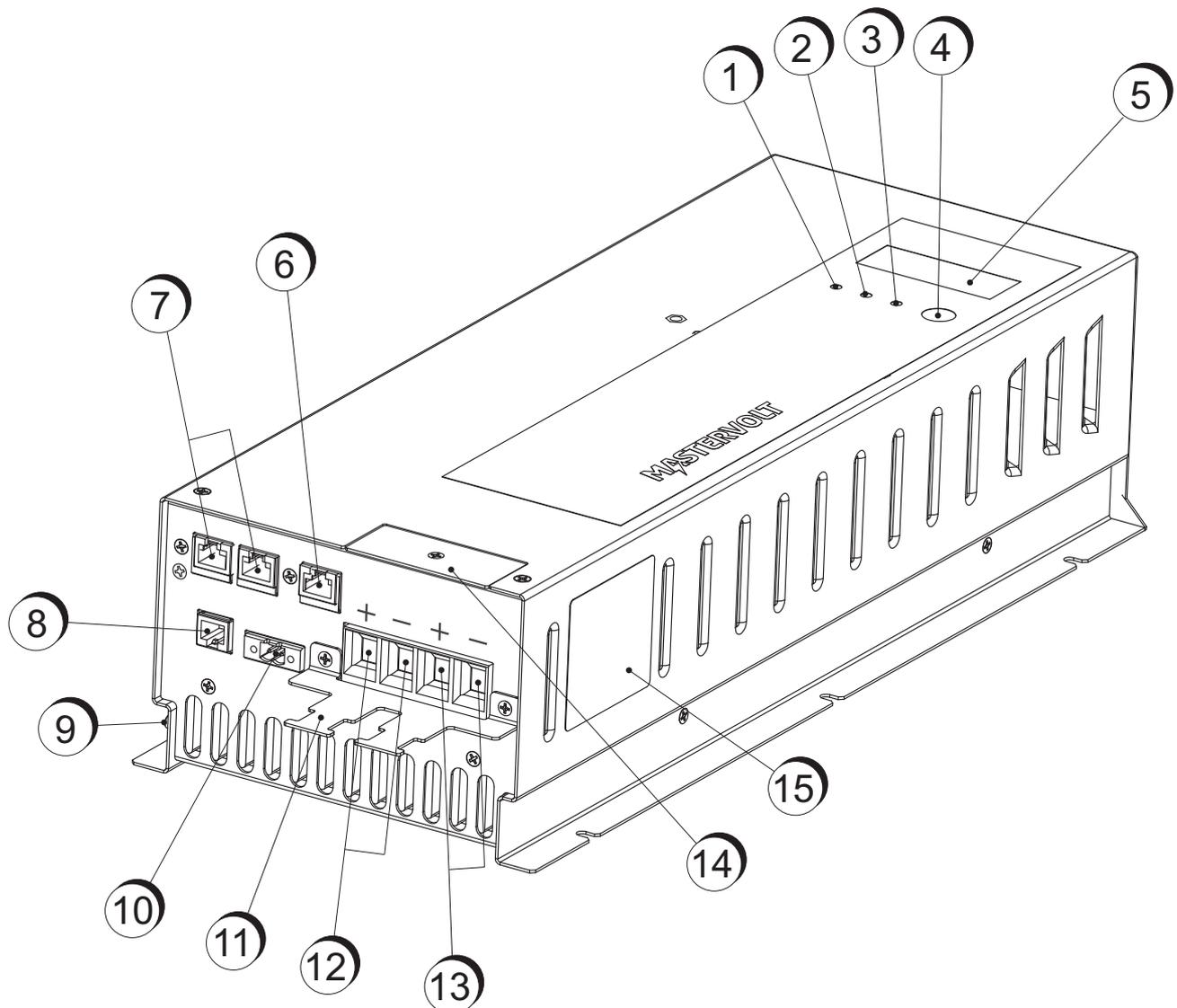
BATTERY SOLAR CHARGE REGULATOR



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2. Fault indicator LED (Section 2.6)
3. Wiring fault indicator LED (Section 2.6)
4. Menu switch (Section 2.5)
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6. Service port (do not use, for factory use only)
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Figure 1: Overview

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1 GENERAL INFORMATION

1.1 USE OF THIS MANUAL

This manual serves as a guideline for the safe and effective operation, maintenance and possible correction of minor malfunctions of the Solar ChargeMaster 60 MPPT-MB.

It is therefore obligatory that every person who works on or with the Solar ChargeMaster must be completely familiar with the contents of this manual and the Important Safety Instructions, and that he/she carefully follows the instructions contained herein.

Installation of, and work on the Solar ChargeMaster 60 MPPT-MB may be carried out only by qualified, authorised and trained personnel, consistent with the locally applicable standards and taking into consideration the Important Safety Instructions.

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1.2 VALIDITY OF THIS MANUAL

All of the specifications, provisions and instructions contained in this manual apply solely to standard versions of the Solar ChargeMaster delivered by Mastervolt.
 This manual is only valid for the following models:

Part number	Model
131906000	Solar ChargeMaster 60 MPPT-MB

These models are mentioned as “Solar ChargeMaster” further in this manual.

1.3 USE OF PICTOGRAMS

Safety instructions and warnings are marked in this manual and on the product by the following pictograms:



A procedure, circumstance, etc which deserves extra attention.



CAUTION!
 Special information, commands and prohibitions in order to prevent damage.



WARNING
 A WARNING refers to possible injury to the user or installer or significant material damage to the Solar ChargeMaster if the installer / user does not (carefully) follow the stated procedures.



Read this manual before installation and use



This product has been declared conform the EC directives and standards.

IP23

Degree of protection: IP23. The product is protected against touch by fingers and water spray < 60 degrees from vertical.

1.4 IDENTIFICATION LABEL

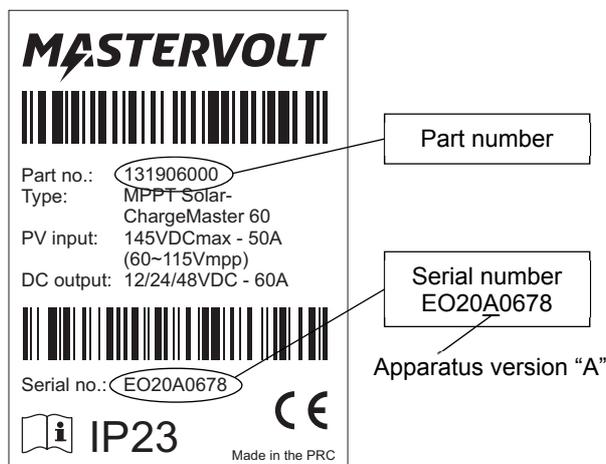


Figure 2: Identification label

The identification label is located at the right-hand side of the Solar ChargeMaster (see Figure 1). Important technical information required for service, maintenance & secondary delivery of parts can be derived from the identification label.



CAUTION!
 Never remove the identification label.

1.5 LIABILITY

Mastervolt can accept no liability for:

- consequential damage due to use of the Solar ChargeMaster;
- possible errors in the manuals and the results thereof.

2 OPERATION

2.1 GENERAL

The Mastervolt Solar ChargeMaster is a fully automatic battery charger which converts power from photovoltaic (PV) array to a regulated battery voltage. The PV array connected to the Solar ChargeMaster is operated at its optimum voltage to obtain an optimal yield (Maximum Power Point tracking). The Solar ChargeMaster will automatically adjust itself to a 12V, 24 or a 48V system. Under normal circumstances the Solar ChargeMaster remains switched on with the PV-array and batteries connected.

If power from the PV array is sufficient, the Solar ChargeMaster will initiate the charging process.



WARNING

The Solar ChargeMaster has no on/off switch. Charging will be initiated as soon as power from the PV-array becomes available.

The Solar ChargeMaster is protected against overload, short circuit, overheating and under and over voltage.



CAUTION!

The Solar ChargeMaster is not protected against:

- Excessive overvoltage on the Solar input
- Surges inducted by lightning.

2.2 MAINTENANCE

No specific maintenance to the Solar ChargeMaster is required. Examine your electrical installation on a regular base, at least once a year. Defects such as loose connections, burnt wiring etc. must be corrected immediately.

If necessary, use a soft clean cloth to clean the casing of the Solar ChargeMaster. Do not use any liquids or corrosive substances, such as solvents, alcohol, petrol or abrasive components.



In the event of decommissioning, refer to section 3.8

2.3 THREE STEP CHARGE ALGORITHM

See Figure 3. Battery charging is accomplished in three automatic stages: BULK, ABSORPTION and FLOAT.

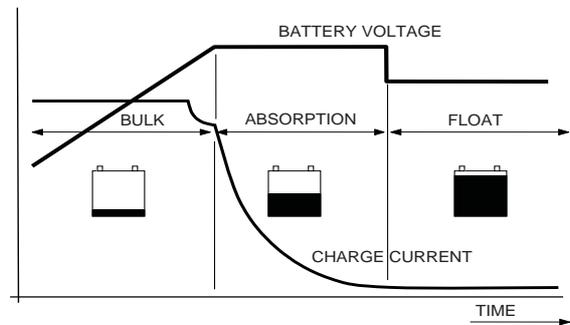


Figure 3: Three step charge system

- BULK: At this stage the charger delivers its maximum current for quick charging from 0 to 80%
- ABSORPTION: The charger has reached its maximum charge voltage and the charge current will slowly decrease until the battery is charged up to 100%.
- FLOAT: This stage begins once the battery is fully charged. The battery remains in fully charged state.

By installing the battery temperature sensor the charge voltages are automatically adapted for deviating temperatures.

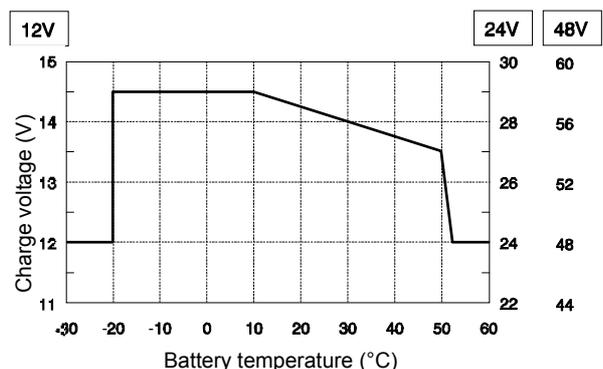


Figure 4: Temperature compensated charging

See Figure 4. When the battery temperature is low, the charge voltage increases. On the other hand, when the battery temperature is high, the charge voltage is decreased. Over charge and gassing are prevented this way. This will extend the life of your batteries.

2.4 OVERVIEW

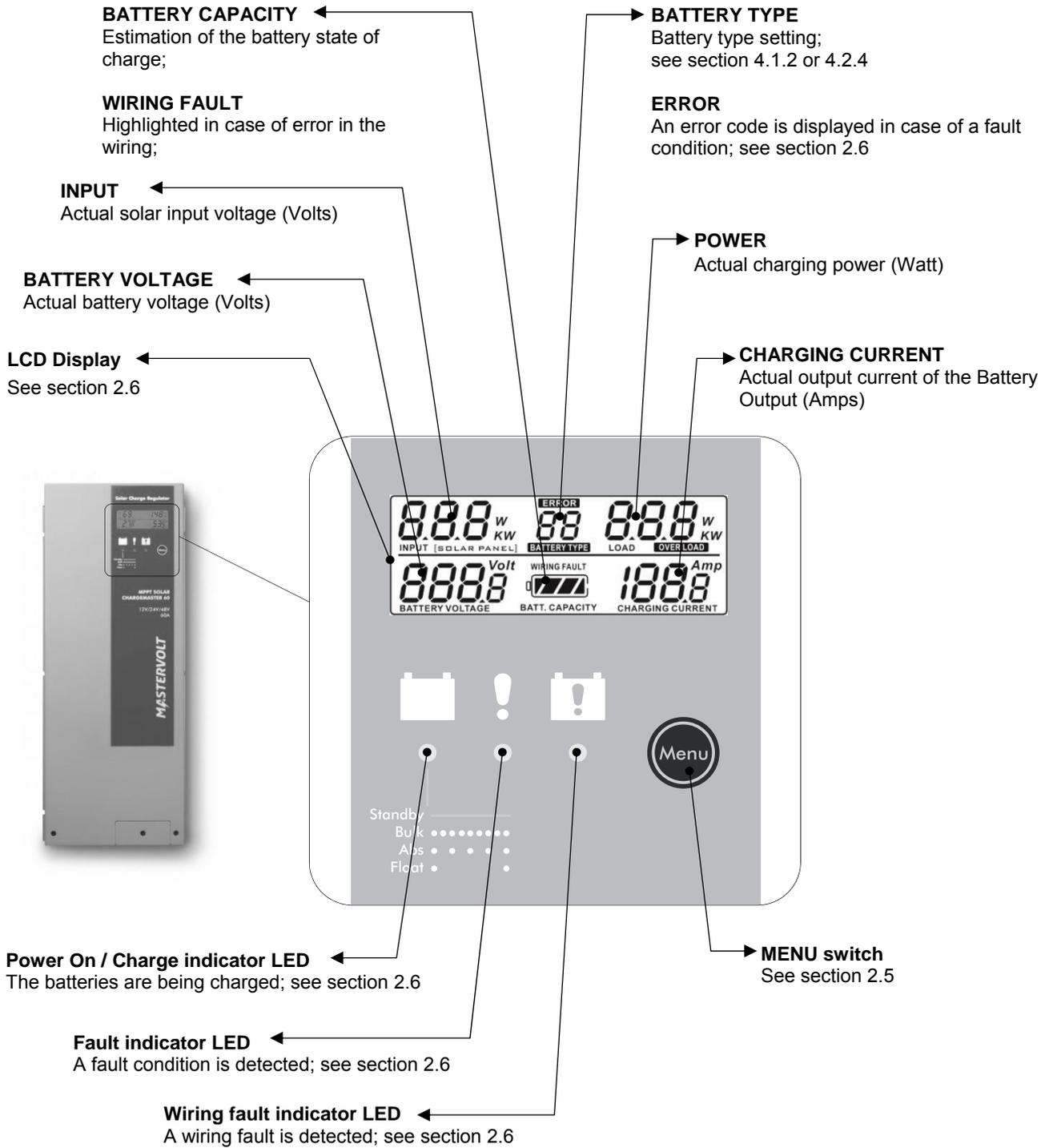


Figure 5: operation of the Solar ChargeMaster

2.5 MENU SWITCH

MENU switch operation	Meaning
Press shortly	Activate LCD-display
1 second	Switch on Solar ChargeMaster again after a fault or error situation
>5 seconds	Configuration menu, see section 4.1

2.6 LED'S AND LCD DISPLAY

LED indication			LCD indication	Meaning
			ERROR 	
Green flashing	(Off)	(Off)	--	Normal operation, batteries are being charged. <ul style="list-style-type: none"> ●●●●●●●● (every 0.5 second): Bulk charge stage ● ● ● ● ● (every second): Absorption charge stage ● ● (every 5 seconds): Float charge stage
Green solid on	(Off)	(Off)	--	The Solar ChargeMaster is in Standby mode. This can be due to a MasterBus controlled command; see section 4.2. If used in combination with Mastervolt MLi battery: <i>Stop charge event</i> was triggered.
(Off)	(Off)	(Off)	--	Irradiation on the PV modules is insufficient (for instance during night time). The Solar ChargeMaster is in sleep mode to reduce power drain from the batteries. The display can be activated temporarily by pressing the MENU switch shortly. The display will be deactivated automatically after 1 minute.
(Off)	(Off)	(Off)	--	No power from the PV-modules. Check wiring to PV-modules if the Solar ChargeMaster is switched off during daytime. Check for loose connections or incorrect polarity.
--	(Off)	--	20	Power on the Solar input is too low, irradiation on the PV modules is insufficient. This is a normal situation during sunrise and sunset.
--	(Off)	--	21	Pre-warning for too high voltage (>130V) on the Solar input.
--	(Off)	--	22	Output power de-rating due to too high internal temperature (>80°C/176°F) of the Solar ChargeMaster. Check cooling. See also section 3.2.
--	(Off)	--	23	Battery temperature low. Check batteries, check battery temperature sensor.
--	Red flashing	--	01 + ERROR	Charge current is too high due to over-current/power situation on the Solar input. Check PV-array.
--	Red flashing	--	02 + ERROR	Internal temperature of the Solar ChargeMaster is too high. Check cooling. See also section 3.2
--	Red flashing	--	03 + ERROR	Battery voltage too low (see section 6.1). Check batteries. Reduce load connected to the batteries and charge batteries.
--	Red flashing	--	04 + ERROR	Battery voltage is too high (> 15V @ 12V / >30V @ 24V / >60V @ 48V). Check batteries, check output voltage of other charging devices.
--	Red flashing	--	05 + ERROR	Voltage from PV-modules is too high (>140V). Check PV-array.
--	Red flashing	--	06 + ERROR	Battery temperature too low (<0°C/32°F). Check batteries, check battery temperature sensor.
--	Red flashing	--	07 + ERROR	Battery temperature too high (>50°C/122°F). Check batteries, check battery temperature sensor.
--	Red flashing	--	08 + ERROR	Battery voltage sense error: Difference between voltage measured at battery output and battery voltage sense function is too high. Check battery voltage sense wiring (section 0)
		Red solid on		Reversed polarity on the Battery connection. Check battery wiring.

3 INSTALLATION

During installation commissioning and maintenance of the Solar ChargeMaster, the Important Safety Instructions are applicable at all times.

3.1 UNPACKING

The delivery includes the following items:

- Solar ChargeMaster;
- Mounting bracket;
- Strain relief bracket
- Battery temperature sensor;
- MasterBus terminating device;
- This User's manual;
- Important Safety Instructions.
- Battery voltage sense connector (pre-assembled)

After unpacking, check the contents for possible damage. Do not use the product if it is damaged. If in doubt, contact your supplier.

3.2 ENVIRONMENT

Obey the following stipulations during installation:

- The Solar ChargeMaster is designed for indoor use only.
- Ambient operating temperature: -20°C ... 55°C / -4°F ... 131°F (power de-rating above 40°C / 104°F to decrease the internal temperature).
- Humidity: 5-95%, non-condensing.
- The Solar ChargeMaster must be mounted to a vertical, solid and heat-resistant surface, with the connecting cables downwards.
- Do not expose the Solar ChargeMaster to excessive dust, aggressive environments, ammonia or salt.
- Make sure that the hot air that is developed during operation can be discharged. The Solar ChargeMaster must be mounted in such a way that obstruction of the airflow along the heatsink on the backside of the casing will be prevented.
- No objects must be located within a distance of 20 cm / 8 inch to the side and 50 cm / 20 inch above and below the Solar ChargeMaster.
- Do not locate the Solar ChargeMaster in the same compartment as the batteries.
- Do not install the Solar ChargeMaster straight above the batteries because of possible corrosive sulphur fumes.
- Although the Solar ChargeMaster fully complies with all applicable EMC limits, it may still cause harmful interference to radio communication equipment. If such interference appears, it is recommended to increase the separation between the Solar ChargeMaster and the equipment, to relocate the receiving antenna or to

connect the equipment to a circuit different from that to which the Solar ChargeMaster is connected.

3.3 WIRING AND FUSES

3.3.1 Battery output



WARNING

The wire and fuse sizes stated in this manual are given as example only. Prescribed wire and fuse sizes may be different due to local applicable regulations and standards.

Keep in mind that high current will pass through the DC wiring. Keep the cable length as short as possible, this will keep the system efficiency as high as possible. The recommended minimum cross sections of the wiring are:

Connection	Minimum DC Cable cross section	
	<3m / 10ft length	3 - 5m / 10 - 16ft
Battery	25mm ² / AWG4	35mm ² / AWG2

Use boot lace ferrules on the wire ends. These ferrules must be crimped with a proper crimping tool.

Use the following wire colours for DC wiring:

Wire colour	Meaning	Connect to:
Red	Positive	+ (POS)
Black	Negative	- (NEG)

Lay the positive and negative cables next to each other to limit the electromagnetic field around the cables. The negative battery cable should be connected directly to the negative post of the battery bank or the ground side of a current shunt. Do not use the chassis frame as the negative conductor. Tighten securely. The positive battery cable must be fused and connected to the positive post of the battery bank.

The recommended DC fuses are:

Connection	DC fuse
Battery fuse	80A

See section 6.3 for ordering information

3.3.2 Voltage sense

To compensate the charge voltage of the Solar ChargeMaster for losses over the battery cables the voltage sense function can be used. Connect wiring as indicated in Figure 6.

Recommended cable cross section and DC fuse:

Connection	Minimum DC Cable cross section	DC-fuse
Voltage sense	0.75mm ² / AWG18	3A

See section 6.3 for ordering information



NOTE:
Do not connect the voltage sense wiring if the *Shunt device* function is enabled (section 4.2.4)

3.4 PV ARRAY

3.4.1 External DC Switch



WARNING
When the PV array is exposed to light, it supplies a DC voltage to the Solar ChargeMaster which can be dangerous to touch.

For this reason, use of an external DC-switch to disconnect the PV-modules from the Solar ChargeMaster is strongly recommended and can even be mandatory. For example international standard IEC60364-7-712 prescribes a DC switch in solar electric installations in buildings Please acquaint yourself with locally applicable regulations and standards on this aspect. Alternatively, before attempting any maintenance or cleaning the PV-array should be protected from light exposure, e.g. by covering the PV modules.

3.4.2 Specifications of the PV array



CAUTION!
Do not connect Solar ChargeMasters in parallel on the side of the PV array.

The Solar ChargeMaster can be used with any PV array configuration that satisfies the following requirements:

- Maximum open circuit PV voltage: 145 V DC;

- The MPP voltage from the PV array must be 5Volts higher than the battery voltage.

Configuration examples for PV-arrays consisting of monocrystalline or polycrystalline PV-modules:

Battery voltage U _{NOM} = 12V		
Panel type	Number of panels	
	in series	Parallel*
36 cells	1 – 5 or 6**	Max. 900Wp
60 cells	1 – 3	Max. 900Wp
72 cells	1 – 2 or 3**	Max. 900Wp

Battery voltage U _{NOM} = 24V		
Panel type	Number of panels	
	in series	Parallel*
36 cells	2 – 5 or 6**	Max. 1800Wp
60 cells	1 – 3	Max. 1800Wp
72 cells	1 – 2 or 3**	Max. 1800Wp

Battery voltage U _{NOM} = 48V		
Panel type	Number of panels	
	in series	Parallel*
36 cells	3 – 5 or 6**	Max. 3600Wp
60 cells	2 – 3	Max. 3600Wp
72 cells	2 – 3**	Max. 3600Wp

* If more than two PV-strings are connected in parallel, string fuses must be integrated in both the positive and negative legs of the string cabling. Fuse ratings should be chosen 50 % higher than the MPP current of the PV modules used.

** See caution below.



CAUTION!
Never connect voltages higher than specified to the PV-input, as this will cause permanent damage to the Solar ChargeMaster Always verify the maximum open circuit PV voltage at lowest possible temperature in which the PV array will be used!



NOTE:
The Solar ChargeMaster will automatically limit the input current and power to its specified rating (see section 6.1). Excess power will not be converted.

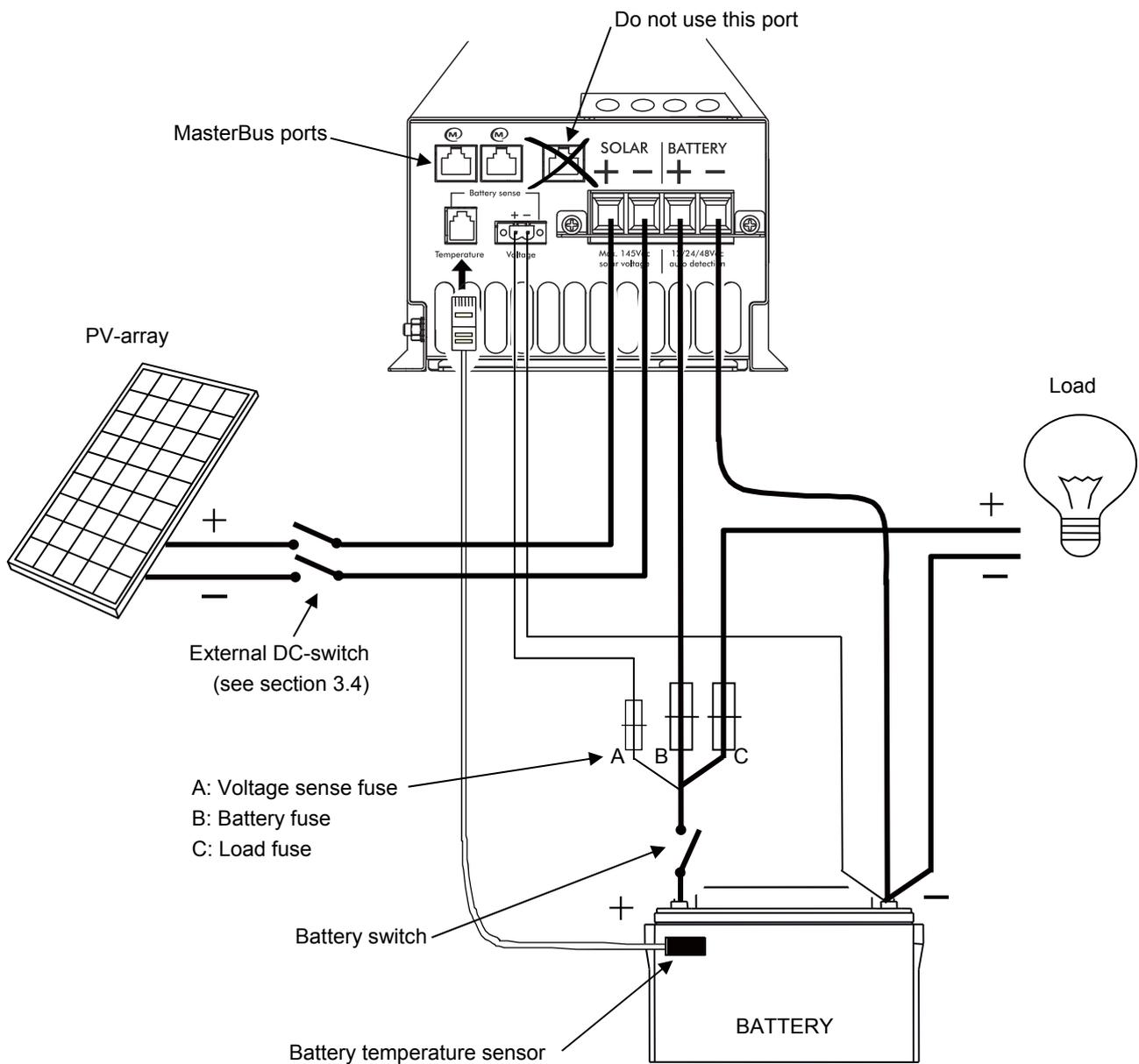


Figure 6: Wiring diagram

Above schematic is to illustrate the general placement of the Solar ChargeMaster in a circuit. It is not meant to provide detailed wiring instructions for any particular electrical installation.

3.5 THINGS YOU NEED

Make sure you have all the parts you need to install the Solar ChargeMaster:

- Solar ChargeMaster (included);
- Battery temperature sensor with cable and plug (included);
- DC cables to connect the Solar ChargeMaster; see section 3.3.1 for specifications;
- DC-fuse holder with a DC-fuse, to be integrated in the positive DC-cable to the battery; see section 3.3.1;
- Option: Wiring, fuse and fuse holder for voltage sense connection; see section 0;
- Screws / bolts (Ø 4mm max.) (with plugs) to mount the Solar ChargeMaster to a surface;
- DC-switch to disconnect the PV-modules from the Solar ChargeMaster, see section 3.4.1
- PV-panels; see section 3.4.2;
- Batteries;
- Battery switch;
- Appropriate and reliable cable terminals, strain reliefs, battery terminals and boot lace ferrules.

We recommend as a minimum tool kit:

- Isolated Phillips screw driver nr.2 or flat blade screw driver 5 mm to fix the DC-cables;
- Tools to fix the screws / bolts with plugs to mount the Solar ChargeMaster to a surface;

3.6 CONNECTION

3.6.1 General



WARNING

Let installation work be done by a licensed electrician.

All electrical systems must be disconnected from any power source during the entire installation!



CAUTION!

- Short circuiting or reversing DC polarity may lead to damage to the Solar ChargeMaster, the cabling and/or the terminal connections.
- Follow all steps of the installation instructions in order of succession as described.



CAUTION!

Too-thin cables and/or loose connections can cause dangerous overheating of the cables and/or terminals. Therefore tighten all connections well, in order to limit transition resistance as far as possible. Use cables of the correct size. Use additional strain reliefs to prevent the transmission of stress to the screw connectors.



CAUTION!

The negative connections of the Solar ChargeMaster are common and therefore have the same electrical potential. If grounding is required, always do this on the negative wires. Use one grounding point only. Minimum wire cross section for grounding: 10mm² / AWG8.

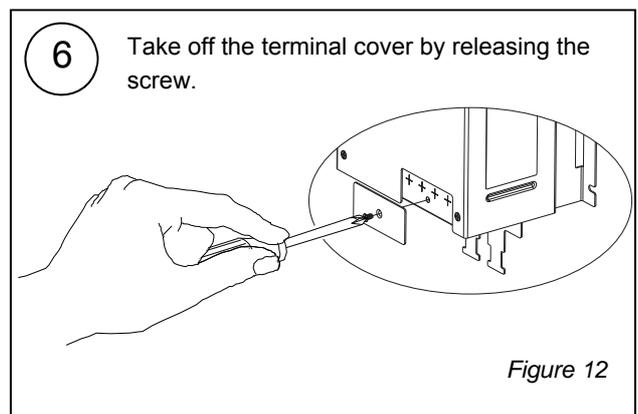
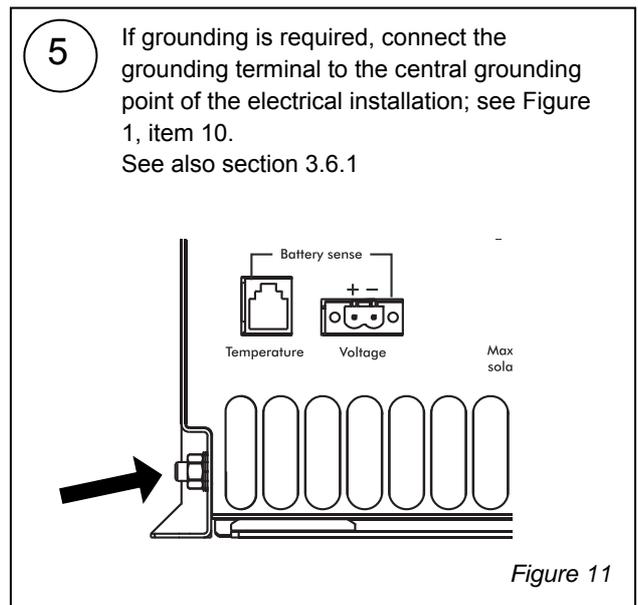
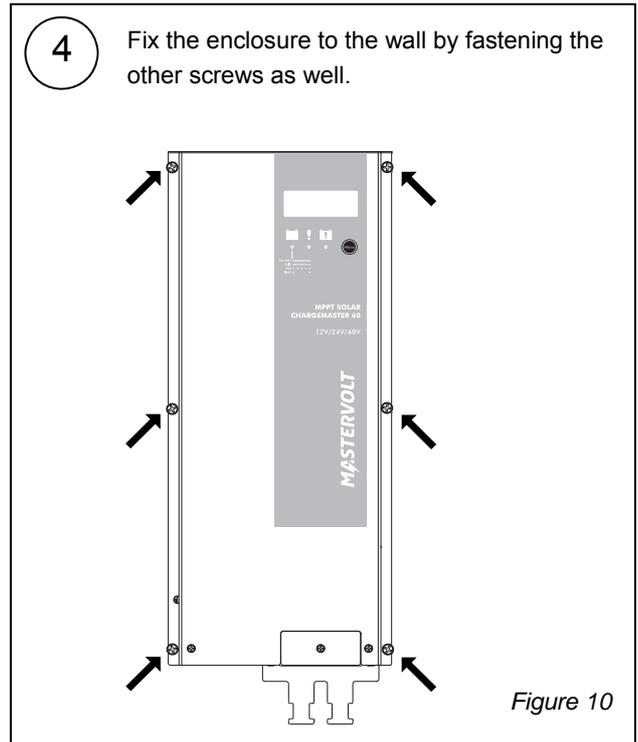
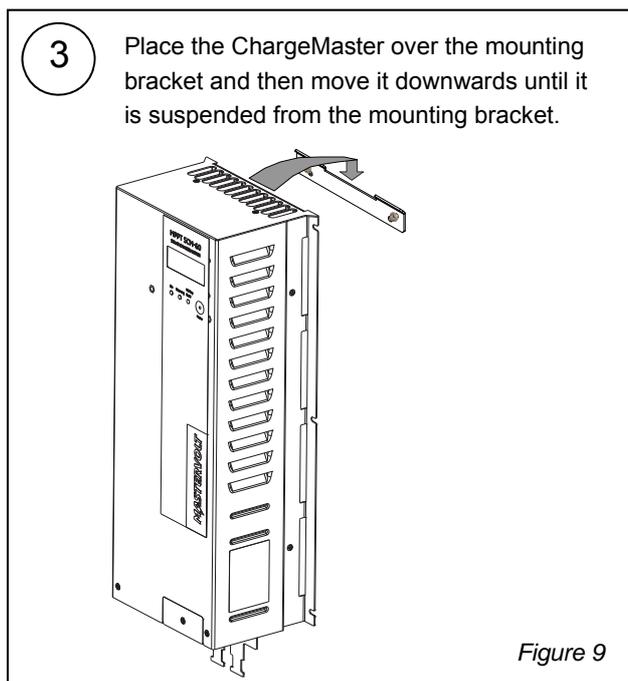
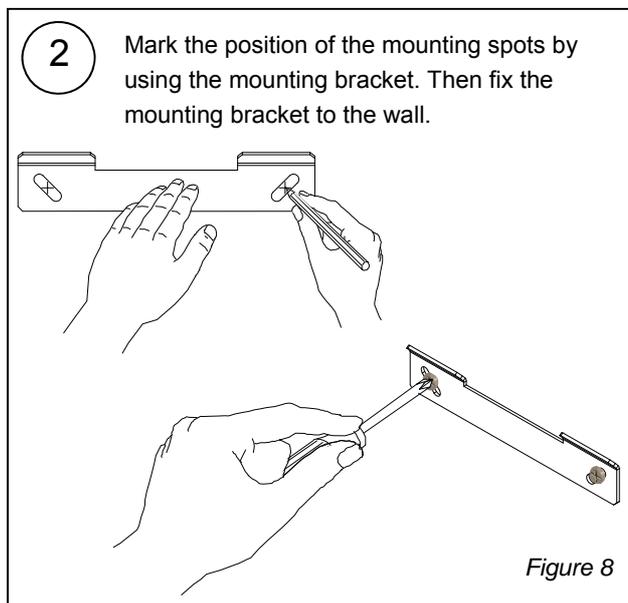
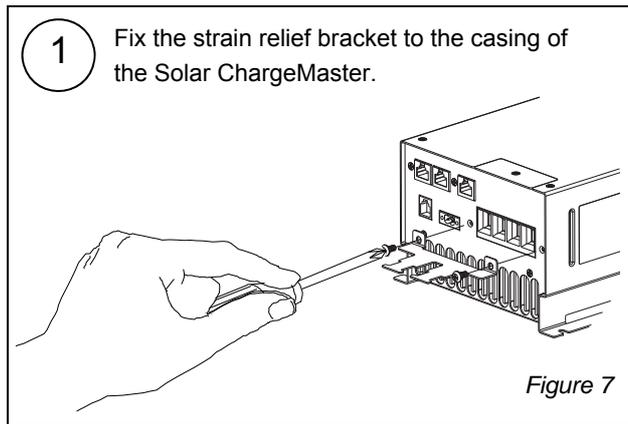


NOTE:

If the battery temperature remains within 15-25°C, connection of the battery temperature sensor is optional.

Do not connect the battery temperature sensor to the *Temperature sensor jack* (Figure 1, item 8) if *Battery Type* is set to "MLI" or if the *Shunt device* function is enabled; see section 4.2.4

3.6.2 Installation step by step



- 7** Connect the wiring to the battery. See figure 6. Fix the wires to the strain relief by means of tie-wraps. Integrate a fuse holder in the positive battery wire, but do not place the fuse yet.

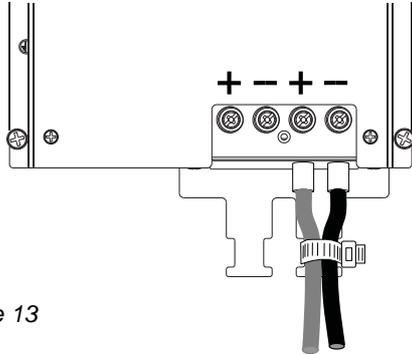


Figure 13

- 8** If required, connect the battery voltage sense wires. Integrate a fuse holder in the positive battery wire, but do not place the fuse yet.

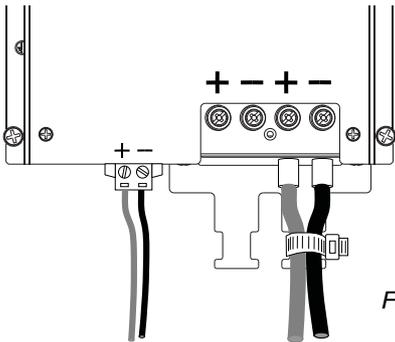


Figure 14

- 9** Attach the battery temperature sensor to the casing of the battery. Plug the temperature sensor cable into the Temperature sensor jack (Figure 1, item 8).

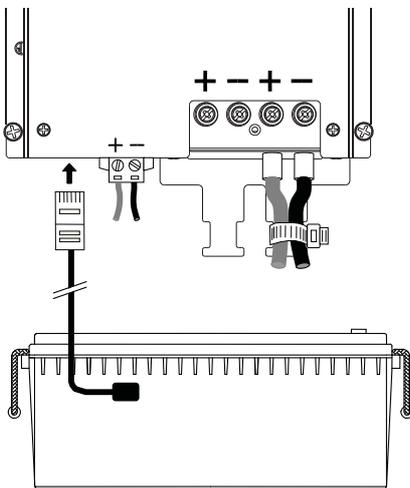


Figure 15



WARNING

Risk of shock! When the PV array is exposed to light, it supplies a dangerous DC voltage. See section 3.4.1.

- 10** Connect the PV-array

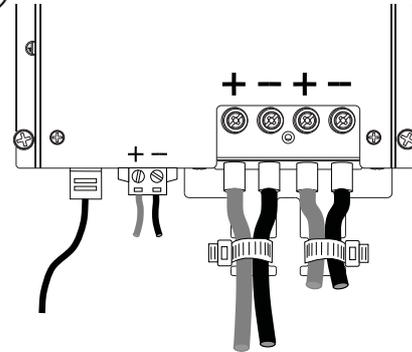


Figure 16

- 11** Close the terminal cover.

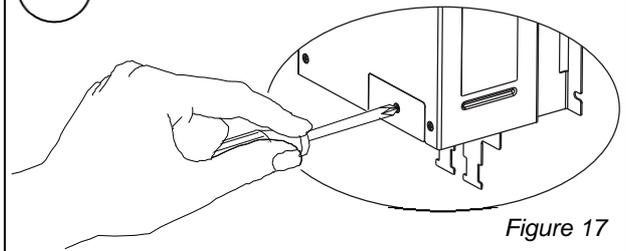


Figure 17

- 12** Option: Connect the Solar ChargeMaster to the MasterBus network.

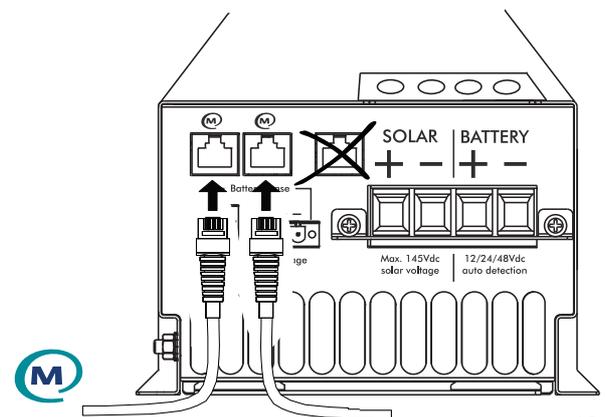


Figure 18

- 13** Check all wiring: positive to +, negative to -. See also Figure 6 for wiring example. If OK, close the terminal cover by fastening the screw. Continue with section 3.7 for commissioning of the Solar ChargeMaster.

3.7 COMMISSIONING AFTER INSTALLATION

3.7.1 Commissioning step-by-step

**CAUTION!**

Check the polarity of all wiring before commissioning: positive connected to positive (red cables), negative connected to negative (black cables).

- 1 If all wiring is OK, place the DC-fuse in the *Battery voltage sense* wiring.
- 2 Place the DC-fuse between the *Battery output* of Solar ChargeMaster and the battery. Move the battery switch in the "ON" position.

**WARNING**

When placing this fuse, a spark can occur, caused by the capacitors used in the Solar ChargeMaster. This is particularly dangerous in places with insufficient ventilation, due to the gassing of the batteries an explosion can occur. Avoid having flammable materials close by.

- 3 The Solar ChargeMaster will initiate the charging process if the voltage from the PV array is 5VDC higher than the battery voltage; see chapter 2.



If the Solar ChargeMaster does not switch on, press the MENU switch for 1 second.

- 4 Continue with chapter 4 for settings.

3.8 DECOMMISSIONING

To put the Solar ChargeMaster out of operation, follow these instructions in order of succession:

- 1 Switch off all loads that are connected to the Solar ChargeMaster;
- 2 Disconnect the PV array by switching off the switch between the PV-array and the Solar ChargeMaster (or protect the PV-array from light exposure, e.g. by covering the PV modules);
- 3 Move the battery switch in the "OFF" position and remove the DC-fuse between the Solar ChargeMaster and the battery;
- 4 Check with a suitable voltage meter whether the Battery connection and the LOAD output of the Solar ChargeMaster are voltage free;
- 5 Disconnect the negative cable to the PV array from the terminal block of the Solar ChargeMaster. Isolate the core of the wire with insulating tape;
- 6 Do the same for the positive cable to the PV array;
- 7 Disconnect all other remaining wiring.

Now the Solar ChargeMaster can be demounted in a safe way.

3.9 STORAGE AND TRANSPORTATION

When not installed, store the Solar ChargeMaster in the original packing, in a dry and dust free environment.

Always use the original packing for transportation. Contact your local Mastervolt Service Centre for further details if you want to return the apparatus for repair.

3.10 RE-INSTALLATION

To reinstall the Solar ChargeMaster, follow the instructions as described in this chapter (chapter 3).

4 SETTINGS

Adjustment of the settings of the Solar ChargeMaster can be made in two different ways:

- By means of the Configuration menu; see section 4.1;
- Via the MasterBus network; see section 4.2.



WARNING

The MLI charging voltages on this charger fit the Mastervolt Li-Ion (MLi) batteries but do not necessarily fit other Li-ion batteries! See also section 4.3. Always follow the instructions provided by the battery manufacturer!



CAUTION!

Invalid settings of the Solar ChargeMaster can cause serious damage to your batteries and/or the connected load! Adjustments of settings may be undertaken by authorised personnel only.



If your Solar ChargeMaster is not new, you have to take into account that former users may have changed the settings.

4.1 CONFIGURATION MENU

4.1.1 Readout of software version

To check the version of the installed software:

- Hold the MENU switch (Figure 1) pressed until the Battery type indication starts blinking;
- The version of the installed software is shown at the right upper side of the display (Figure 19);
- After 10 seconds the Solar ChargeMaster returns to the normal operation mode.



Software version

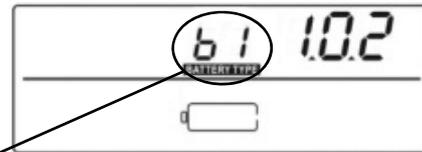
Figure 19: Software version

4.1.2 Battery type and output current

To change the setting for Battery type or maximum output current:

- Hold the MENU switch (Figure 1) pressed until the setting for Battery type (“b1”, “b2”, “b3”, etcetera) is shown;
- Press the MENU switch shortly to toggle between the configuration modes: Battery type (“b”) or Maximum output current (“C”).
- Hold the MENU switch pressed to until the selected configuration mode starts blinking.
- Press the MENU switch shortly to scroll through the settings as shown in below table.
- Hold the MENU switch pressed until the preferred setting stops blinking to confirm the desired setting.

When the MENU switch is not touched during 10 seconds, the Solar ChargeMaster will return to the normal operation mode without changing a setting



Indication	Battery type
b1	Flooded
b2	AGM
b3	Gel
b4	Flooded traction
b5	Mastervolt MLI (see section 4.3)
b6	User defined (see section 4.2.4)

Indication	Maximum output current
C1	10A
C2	20A
C3	30A
C4	40A
C5	50A
C6	60A

Figure 20: Battery type and output current

4.2 MASTERBUS FUNCTIONS

Adjustment of the settings of the ChargeMaster can be made via the MasterBus network (by means of a remote control panel or an interface connected to a PC with MasterAdjust software).



Refer to the user's manual of the MasterBus remote control panel for more information about MasterBus.

4.2.1 Monitoring

Value	Meaning	Default	Adjustable range
General			
Device state	Shows the actual operation mode of the Solar ChargeMaster (Charging / Standby / Alarm/Off)		(read only)
Charge state	Actual state of charge algorithm: Bulk / Absorption / Float / Off		(read only)
Solar voltage	Voltage at the Solar input		(read only)
Charge current	Output current of the Battery output		(read only)
Battery voltage	Voltage measured at the Battery output. If the voltage sense wires are connected: voltage measured at the <i>Battery voltage sense</i> input. If the <i>Shunt device</i> function is enabled for a <i>Mastershunt</i> (MSH) or a <i>MLI-Ultra</i> (BAT) (section 4.2.4): voltage measured by the <i>MasterShunt</i> / <i>MLI-Ultra</i> .		(read only)
Battery temp	Actual battery temperature measured by the Battery temperature sensor. If the <i>Shunt device</i> function is enabled for a <i>Mastershunt</i> (MSH): Battery temperature measured by the <i>MasterShunt</i> . “---“ is shown if no battery temperature sensor is used or when <i>Battery Type</i> is set to “MLI”.		(read only)
Total energy	Total amount of energy (kWh) converted by the Solar ChargeMaster (measured at the Battery output)		(read only)
On/Off	Button to toggle the <i>Device state</i> . NOTE: If the Solar ChargeMaster was switched off by means of this button, it will switch on again the next day (after sunset and sunrise).	On	On/Off
Shunt			
State	Shows whether a current measuring shunt is connected or not. See configuration for settings	Not selected, Connected	(read only)

4.2.2 Alarm

Value	Meaning	Adjustable range
Alarms		
Over current	Load connected to the Battery output is too high	(read only)
Solar volt. high	Input voltage at the Solar input is too high	(read only)
Battery low	Battery voltage is too low (see section 6.1)	(read only)
Battery high	Battery voltage is too high (see section 6.1)	(read only)
Battery temp.	Battery temperature is out of range <0°C/32°F or >50°C/122°F	(read only)
Charger temp.	Internal temperature of the Solar ChargeMaster is too high	(read only)
Temp sense error	Battery temperature sensor is in short circuit	
Shunt mismatch	Setting for nominal voltage (12, 24 or 48V) at the <i>Mastershunt</i> or the nominal voltage of the <i>MLi Ultra</i> battery differs from nominal voltage detected by the Solar ChargeMaster. Check battery voltage and settings of the <i>Mastershunt</i> or voltage of the <i>MLi Ultra</i> battery.	(read only)
Hardware error	Internal hardware error. Contact Mastervolt.	(read only)

4.2.3 History

This menu shows the absolute maximum readings.

Value	Meaning	Adjustable. range
Solar		
Total energy	Total amount of energy (kWh) converted by the Solar ChargeMaster (measured at the Battery output)	(read only)

4.2.4 Configuration

Below parameters can be changed via the MasterBus network by means of a remote control panel or by means of an interface connected to a PC with MasterAdjust software. See applicable user's manuals for details.

Value	Meaning	Factory setting	Adjustable. range
Device			
Language	Language that is displayed on a monitoring device connected to the MasterBus	English	EN, NL, DE, FR, ES, IT, NO, SV, FI, DA
Name	Name of this device. This name will be recognized by all devices connected to the MasterBus	SCM [serial number]*	0-12 chars
Charger			
Max. charge curr.	Setting of the maximum output current	60A	10...60A
Battery type	Selection of pre-set charge algorithm. Individual adjustments of <i>Absorption</i> , <i>Float</i> and <i>Max. absorpt. time</i> are only possible if "User defined" is selected here.	Flooded	Flooded, Gel, AGM, Traction, MLI, User defined
Absorption	Absorption voltage (@ 25°C); see section 2.3	14.25V 28.50V 57.00V	12.00-15.50V 24.00-31.00V 48.00-62.00V
Float	Float voltage (@ 25°C); see section 2.3	13.25V 26.50V 53.00V	12.00-15.50V 24.00-31.00V 48.00-62.00V
Max. absorp. time	Maximum absorption timer	240min	0-1440min
Shunt			
Shunt device	Selection of the shunt device to which the Solar ChargeMaster is connected. This can either be a <i>Mastershunt</i> (MSH) or a <i>MLI-Ultra</i> battery (BAT). Enabling this function allows the ChargeMaster Solar to: <ul style="list-style-type: none"> - Compensate the charge voltage for cable losses (Voltage sense function); - Adjust the actual <i>Charge state</i> based on the state of charge of the battery - Compensate the charge voltage for deviating battery temperatures (<i>Mastershunt</i> only) 	No connection	No connection, MSH+Product Name, BAT+Product Name
Software version			
Charger	Installed software version of the Solar ChargeMaster		
MasterBus	MasterBus software version		

* See section 1.4

4.2.5 Events

Value	Meaning	Factory setting	Adjustable. range
Events			
Event x source	<i>Event-based command</i> Event by the ChargeMaster that should result in an action by another device on the <i>MasterBus</i> network.	Disabled	(See List of event sources, section 4.2.6)
Event x target	<i>Event-based command</i> Selection of device on the <i>MasterBus</i> network that should take action due to an event by the ChargeMaster.		(See Device list)
Event x command	<i>Event-based command</i> Action to be taken by the selected device.		(See <i>List of event commands</i> in the manual of the selected device.)
Event x data	<i>Event-based command</i> Value of the action to be taken by the selected device.		(See <i>List of event commands</i> in the manual of the selected device.)
Event x+1	The next event appears after enabling Event x.	Disabled	See Event x.

4.2.6 List of list of events sources (Solar ChargeMaster as event source)

Below the list of event sources of the *Solar ChargeMaster* is shown. These event sources can be used to initiate an event command and an event action at another device that is connected to the *MasterBus*.

Event source	Description
Disabled	(no event programmed)
Device state	A change in the <i>Device state</i> occurs
Bulk	State of charge is Bulk
Absorption	State of charge is Absorption
Float	State of charge is Float
Battery low	Battery voltage is too low (see section 6.1)
Solar low	Input voltage at the Solar input is too low (see section 6.1)
Any alarm	Any of the Alarms is triggered (see section 4.2.2)

4.2.7 List of list of event commands (Solar ChargeMaster as event target)

Below is shown the list of event commands and event data of the *Solar ChargeMaster*. Other devices connected to the *MasterBus* can be programmed to initiate these commands and actions at the *Solar ChargeMaster*.

Event command	Description
On/Off	Command to switch on/off the Solar ChargeMaster. NOTE: If the Solar ChargeMaster was switched off by means of this event command, it will switch on again the next day (after sunset and sunrise).
Bulk	Command to start the Bulk state of charge
Abs	Command to start the Absorption state of charge
Float	Command to start the Float state of charge

4.3 USE IN COMBINATION WITH MASTERVOLT MLI BATTERY

If the Solar ChargeMaster is used in combination with a Mastervolt MLI Ultra type Li-ion battery, charging shall be terminated if the MLI Ultra battery generates the *Stop charge event*. The Solar ChargeMaster is able to process such *Stop Charge event*.

Follow next additional steps to install the Solar ChargeMaster in combination with a Mastervolt MLI type Li-ion battery (see Figure 21):

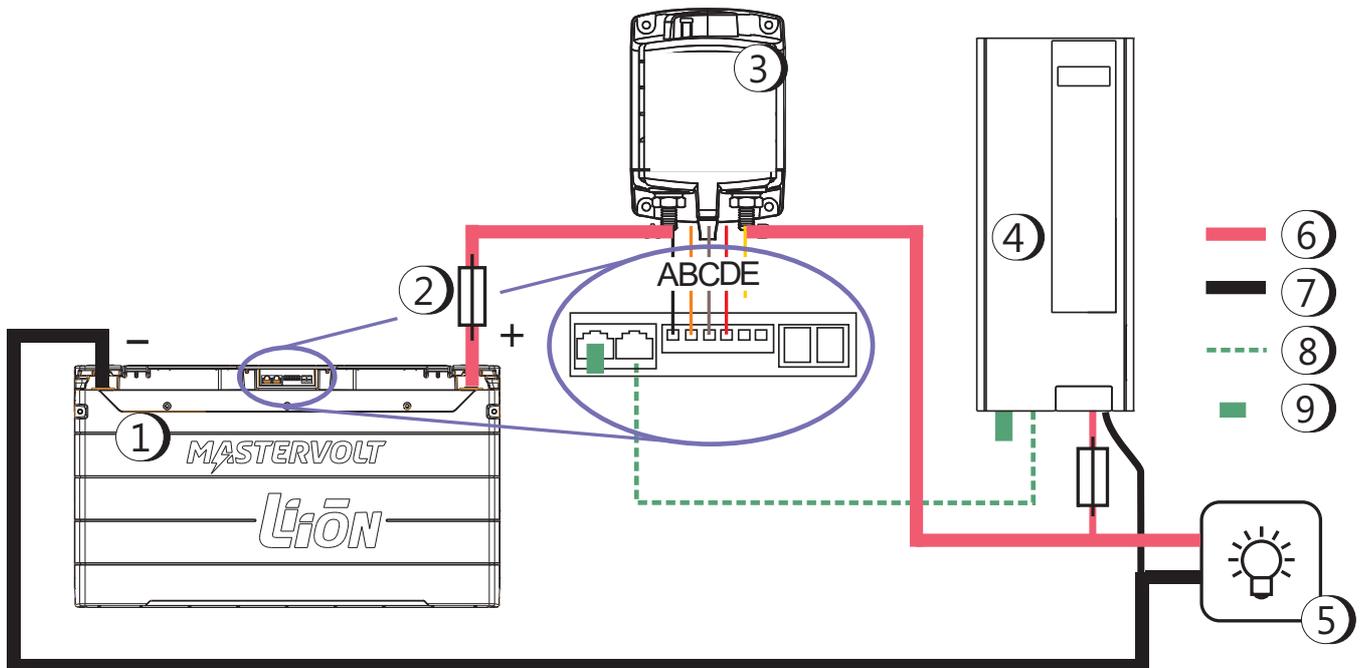
- 1 Connect the DC main wiring and other components as indicated.
- 2 Connect the MasterBus cabling between the devices as indicated. Do not install the battery temperature sensor!
- 3 Add a MasterBus control panel to the MasterBus network;

- 4 Configure the following *Stop Charge event* at the Li-ion battery:

Configuration	Event 1 (obligatory)
Event source	Stop Charge
Event target	SCM [serial number]*
Event command	On/Off
Event data	Copy invert

* See section 1.4

- 5 Adjust setting for Battery type to Mastervolt MLI (see section 4.1.2 or 4.2.4);
- 6 Option: enable the *Shunt device* function of the Solar ChargeMaster by selecting the *MLI-Ultra* battery (BAT) as shunt device (see section 4.2.4);
- 7 Continue with the "Commissioning" section in the manual of the MLI Ultra battery.



- | | |
|---|-------------------------|
| 1. Li-ion battery | 5. Loads |
| 2. Battery fuse in positive battery line | 6. DC positive cable |
| 3. Safety relay | 7. DC negative cable |
| 4. Mastervolt Solar ChargeMaster 60 MPPT-MB | 8. MasterBus cable |
| | 9. MasterBus terminator |

Figure 21: Use of the Solar ChargeMaster in combination with a Mastervolt MLI Ultra battery

5 TROUBLE SHOOTING

If you cannot solve a problem with the aid of this chapter, contact your local Mastervolt Service Centre. See www.mastervolt.com/technical-support. Make sure you have the following information present if you have to contact your local Mastervolt Service Center to solve a problem:

- Article and serial number; see section 1.4
- Software version; see section 4.1.1

Malfunction	Possible cause	What to do
No output voltage and/or current	Solar ChargeMaster was switched off due to a previous fault situation	Investigate the cause of the fault situation (section 2.6) and correct the problem. Press MENU-switch for one second to switch on the Solar ChargeMaster again.
Display shows ERROR or an error code	Check section 2.6 for an overview of fault indications of the LED's and the LCD display	
A red LED is on or blinking	Check section 2.6 for an overview of fault indications of the LED's and the LCD display	
No display	The Solar ChargeMaster is in Standby mode	Press the MENU switch shortly to activate the display
Output voltage too low, charger supplies maximum current	Load that is connected to the batteries is larger than charger can supply.	Reduce load taken from the batteries.
	Batteries not 100% charged	Measure battery voltage. After some time this will be higher.
	Wrong battery type setting	Check settings (see section 4.1.2 or 4.2.4).
Charge current too low	Batteries almost fully charged	Nothing, this is normal when the battery is almost fully charged.
	High ambient temperature	Nothing; if ambient temperature is above 40°C / 104°F the charge current is automatically reduced.
	Low irradiation on the PV-array.	Check PV-array, check for shading.
	Output current is limited	Check settings (see section 4.1.2 or 4.2.4).
Battery not fully charged	Current to load is too high	Reduce load taken from the batteries.
	Charge time too short	Use an additional battery charger
	Battery temperature too low	Use the battery temperature sensor.
	Defective or worn-out battery	Check battery and replace if necessary.
Battery is discharged too fast	Wrong battery type setting	Check settings (see section 4.1.2 or 4.2.4).
	Battery capacity reduced due to sulphation or due to plate corrosion	Charge and recharge a few times, this might help. Check battery and replace if necessary.
Batteries are too warm, gassing	Defective battery (short circuit in cell)	Check battery and replace if necessary.
	Battery temperature too high	Use the battery temperature sensor.
	Wrong battery type setting	Check settings (see section 4.1.2 or 4.2.4).

6 TECHNICAL DATA

6.1 SPECIFICATIONS

Model	Solar ChargeMaster 60 MPPT-MB		
Article no.	131906000		
Nominal battery voltage (U _{NOM})	12V, 24V and 48V (Auto detection)		
PV-INPUT	@ U_{NOM} = 12V	@ U_{NOM} = 24V	@ U_{NOM} = 48V
Maximum connected PV power	900Wp	1800Wp	3600Wp
Maximum input PV power*	800W	1600W	3200W
Full power voltage MPPT range	15 V ~ 115 V	30 V ~ 115 V	60 V ~ 115 V
Absolute maximum PV Voltage	145V _{DC}	145V _{DC}	145V _{DC}
MPP tracking	Yes, integrated MPP tracker		
Start-up voltage:	Battery voltage + 3V _{DC}		
Maximum PV input current	50A _{DC}		
EU efficiency	>97%		
Peak static power conversion efficiency	>98%		
Static MPPT efficiency	>99%		
BATTERY OUTPUT	@ U_{NOM} = 12V	@ U_{NOM} = 24V	@ U_{NOM} = 48V
Maximum charge current (I _{MAX})	60 A	60 A	60 A
Charge voltage, Absorption:	14.25V (Traction: 14.45V)	28.5V (Traction: 28.9V)	57.0V (Traction: 57.8V)
Charge voltage, Float:	13.25V (AGM, gel: 13.8V, MLI: 13.5V)	26.5V (AGM, gel: 27.6V, MLi: 27.0V)	53.0V (AGM, gel: 55.2V, MLi: 54.0V)
Low voltage disconnect / reconnect	8.5V / 8.0V	17.0V / 18.0V	34.0V / 36.0V
High voltage disconnect / reconnect	15.0V / 14.5V	30.0V / 29.0V	60.0V / 58.0V
Battery temperature compensation	-30 mV/°C	-60 mV/°C	-120 mV/°C
DC consumption (at night):	<1mA	<1mA	<1mA
DC consumption (on, no charging):	<130mA	<130mA	<130mA
Charge algorithm:	Three step (Bulk, Absorption, Float)		
Battery types**:	Flooded, AGM, Gel, Traction, Mastervolt MLI.		
GENERAL			
Galvanic isolation between PV and battery	No, common negative conductor		
Dimensions in mm [inch] (h x w x d):	168 x 398 x 107 mm [6.6 x 15.7 x 4.2 inch]; see also section 6.2		
Weight:	5.5 kg [12.1Lbs]		
Operating Temperature Range	-20°C ≤ T _{AMB} ≤ +55°C [-4°F ≤ T _{AMB} ≤ 131°F]		
Full Power Temperature range	-20°C ≤ T _{AMB} ≤ +40°C [-4°F ≤ T _{AMB} ≤ 104°F] (no power de-rating)		
Non-operating Temperature range	-40°C ≤ T _{AMB} ≤ +75°C [-4°F ≤ T _{AMB} ≤ 167°F] (storage temperature)		
Relative Humidity	5% to 95% non-condensing		
Protection degree	IP23		
MasterBus connectivity	Yes		
Terminals:	Screw terminals, max. wire size 35mm ²		

* Automatic limitation of input power; excessive power will not be converted

** Refer to section 4.1.2 or 4.2.4 for battery type settings.

Specifications are subject to change without prior notice.

6.2 DIMENSIONS

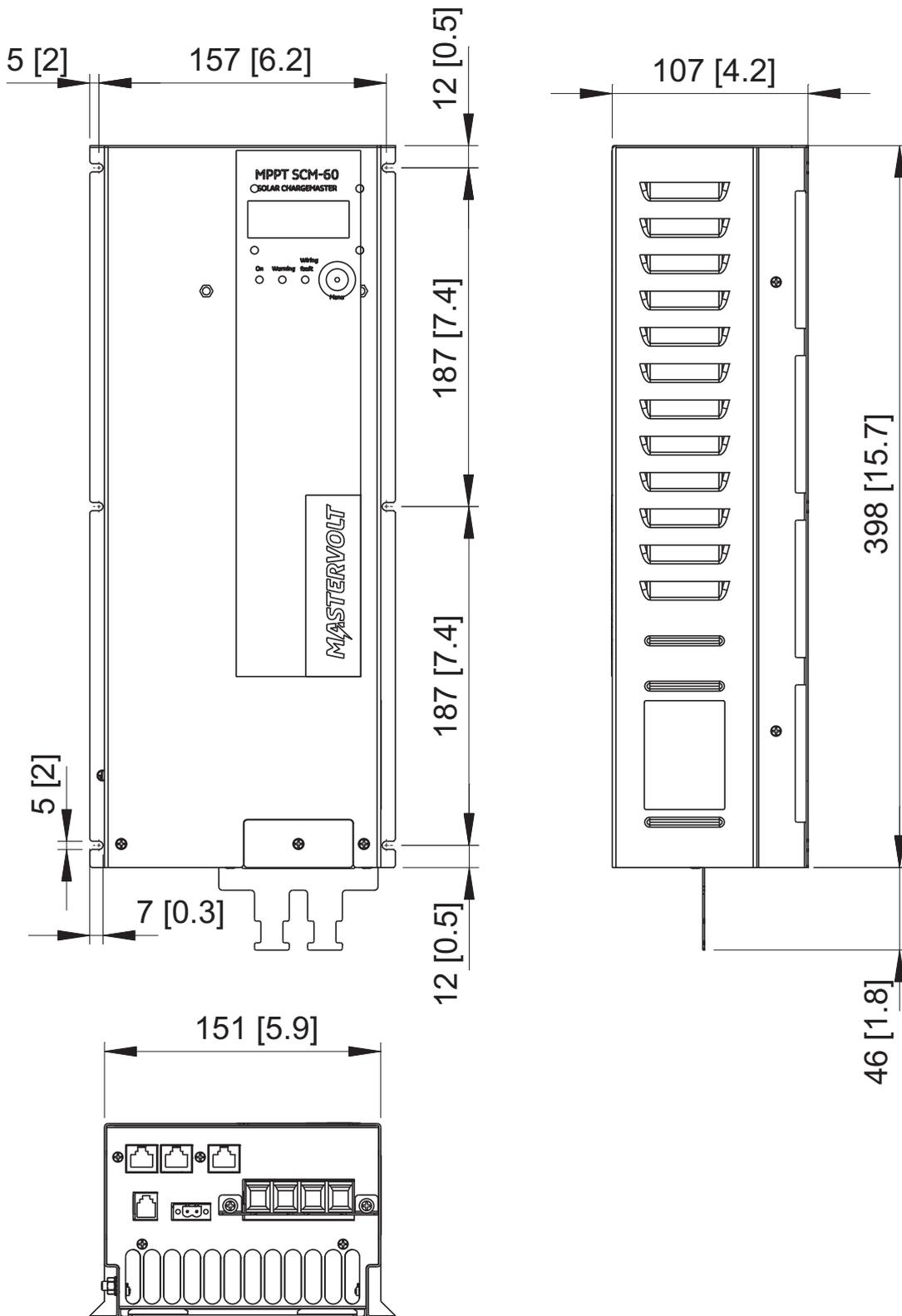


Figure 22: Dimensions of the Solar ChargeMaster in mm [inches]

6.3 ORDERING INFORMATION

Part number	Description
77049080	ANL Fuse 80A
607006	ANL Fuse base
701	Battery switch 275A
604003	ATC Fuse 3A (2 pcs)
607017	In line ATC Fuse holder
41500500*	Battery temperature sensor, incl. 6 meter / 19 ft. cable
41500800	Battery temperature sensor, incl. 15 meter / 49 ft. cable
77040000*	MasterBus terminating device
77040020	MasterBus connection cable (UTP patch cable), 0,2m / 0.6ft.
77040050	MasterBus connection cable (UTP patch cable), 0,5m / 1.6ft.
77040100	MasterBus connection cable (UTP patch cable), 1,0m / 3.3ft.
77040300	MasterBus connection cable (UTP patch cable), 3,0m / 10ft.
77040600	MasterBus connection cable (UTP patch cable), 6,0m / 20ft.
77041000	MasterBus connection cable (UTP patch cable), 10m / 33ft.
77041500	MasterBus connection cable (UTP patch cable), 15m / 49ft.
77042500	MasterBus connection cable (UTP patch cable), 25m / 82ft.
77045000	100m / 330ft MasterBus cable (UTP cable)
77040010	MasterBus RJ45 conn 8-pole 25 pcs
77040015	Cover for RJ45 connector -set of 25 pcs
77050000	Complete set to assemble UTP patch cables: 100m / 330ft UTP cable, 50 pcs. modular jacks and crimping tool
77030100	MasterBus – USB interface, required when using MasterAdjust or MasterView System software.
77010305	MasterView Easy, Touch screen to control and monitor all MasterBus products
77010400	MasterView System, Full-colour touch screen to control and monitor all MasterBus products
77020100	MasterShunt 500, DC-distribution module for exact readout of battery voltage, charge / discharge current, and state of charge. Continuous rating: 250A, peak current: 500A
77020200	DC-Distribution 500. The Mastervolt DC Distribution offers fused DC connections to install up to four different devices

* standard included with the delivery of the Solar ChargeMaster

Mastervolt can offer a wide range of products for your electrical installation, including battery chargers, DC to AC Sine wave inverters, AGM, gel and Li-ion batteries, DC distribution kits and many more.

See our website www.mastervolt.com for an extensive overview of all our products.

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