

MASTERVOLT

USERS MANUAL / GEBRUIKERSHANDLEIDING / BETRIEBSANLEITUNG
MANUEL UTILISATEUR / MANUAL DE UTILIZACION / INSTRUZIONI PER L'USO

CHARGEMASTER PLUS

12/75-3, 12/100-3, 24/40-3, 24/60-3

FULLY AUTOMATIC BATTERY CHARGER



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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 and maintenance of the ChargeMaster Plus

It is therefore obligatory that every person who works on or with the ChargeMaster Plus 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 ChargeMaster Plus 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 ChargeMaster Plus delivered by Mastervolt. This manual is only valid for the following models with apparatus version "A" and higher (see section 1.4):

Part number	Model
44310750	ChargeMaster Plus 12/75-3
44311000	ChargeMaster Plus 12/100-3
44320400	ChargeMaster Plus 24/40-3
44320600	ChargeMaster Plus 24/60-3

x = OEM Customer specific number

These models are further mentioned as "ChargeMaster Plus"

1.3 USE OF PICTOGRAMS

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



WARNING

A WARNING refers to possible injury to the user or significant material damage to the charger if the user does not (carefully) follow the procedures.



CAUTION!

Special data, restrictions and rules with regard to preventing damage.



A procedure, circumstance, etc which deserves extra attention.

1.4 IDENTIFICATION LABEL

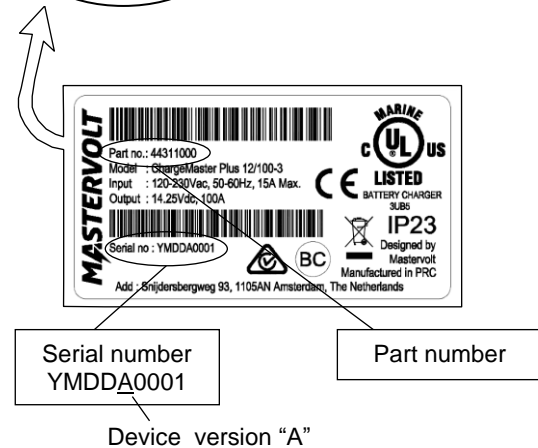
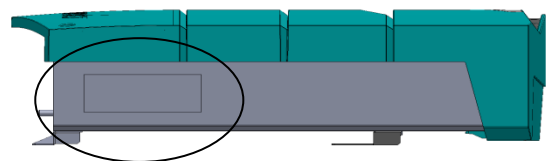


Figure 1: Identification label

The identification label is located at the right-hand side of the ChargeMaster Plus. (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 ChargeMaster Plus;
- possible errors in the manuals and the results thereof.

2 IMPORTANT SAFETY INSTRUCTIONS

READ AND SAVE THESE INSTRUCTIONS



WARNING

This chapter describes important safety and operating instructions for use of a ChargeMaster Plus in residential, recreational vehicle (RV) and marine applications.

2.1 GENERAL

- 1 Before using the ChargeMaster Plus, read all instructions and cautionary markings on the ChargeMaster Plus, the batteries, and all appropriate sections of the manual.
- 2 The appliance is not to be used by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction.
- 3 Children being supervised not to play with the appliance.
- 4 To reduce the risk of electric shock – Do not expose ChargeMaster Plus to rain, snow, spray, moisture, excessive pollution and condensing circumstances. To reduce risk of fire hazard, do not cover or obstruct the ventilation openings. Do not install the ChargeMaster Plus in a non-ventilated room, overheating may result.
- 5 Use of an attachment or spare part not recommended or sold by Mastervolt may result in a risk of fire, electric shock, or injury to persons.
- 6 The ChargeMaster Plus is designed to be permanently connected to an AC and DC electrical system. Installation of, and work on the ChargeMaster Plus, may be carried out only by a qualified, authorised and trained technician or electrician, consistent with the locally applicable standards and regulations.
- 7 Make sure that all wiring is properly installed and in good electrical condition; and that wire size is large enough for AC ampere rating of the ChargeMaster Plus. Check the wiring on a regular base, at least once a year. Do not use the ChargeMaster Plus when the wiring is undersized or damaged.
- 8 Do not operate ChargeMaster Plus if it has received a sharp blow, been dropped, or otherwise damaged in any way; take it to a qualified serviceman.
- 9 Except for the connection compartment, see chapter 4, the ChargeMaster Plus may not be opened or disassembled. There are no serviceable parts inside

the cabinet. Take it to a qualified, authorized and trained serviceman when service or repair is required. Incorrect reassembly may result in a risk of electric shock or fire. Only qualified, electrician installers are authorized to open the connection compartment.

- 10 To reduce risk of electric shock, disconnect the ChargeMaster Plus from both AC and DC electrical system before attempting any maintenance or cleaning. Turning off controls will not reduce this risk.
- 11 The ChargeMaster Plus must be provided with an equipment-grounding conductor to the AC-input ground terminal. Grounding and all other wiring must comply with local codes and ordinances.
- 12 Short circuiting or reversing polarity will lead to serious damage to batteries, ChargeMaster Plus, wiring as well as accessories. Fuses can not prevent damage caused by reversed polarity and the warranty will be void.
- 13 In case of fire, you must use the fire extinguisher which is appropriate for electrical equipment.
- 14 If applied in a marine application in the United States, external connections to the ChargeMaster Plus shall comply with the United States Coast Guard Electrical Regulations (33CFR183, Sub part I).

2.2 EXPLOSIVE GASES

- 1 **WARNING – RISK OF EXPLOSIVE GASES. WORKING IN VICINITY OF A LEAD-ACID BATTERY IS DANGEROUS. BATTERIES GENERATE EXPLOSIVE GASES DURING NORMAL BATTERY OPERATION. FOR THIS REASON, IT IS OF UTMOST IMPORTANCE THAT EACH TIME BEFORE USING THE CHARGEMASTER PLUS, YOU READ THIS MANUAL AND FOLLOW THE INSTRUCTIONS EXACTLY.**
- 2 To reduce risk of battery explosion, follow these instructions and those published by battery manufacturer and manufacturer of any equipment you intend to use in vicinity of the battery. Review cautionary marking on these products and on engine.
- 3 **DANGER:** To reduce the risk of explosion – Never use the ChargeMaster Plus in situations where there is danger of gas or dust explosion or area in which ignition-protected equipment is required.

2.3 PERSONAL PRECAUTIONS

- 1 Consider having someone close enough by to come to your aid when you work near a lead-acid battery.
- 2 Have plenty of fresh water and soap nearby in case battery acid contacts skin, clothing, or eyes.
- 3 Wear complete eye protection and clothing protection. Avoid touching eyes while working near battery.
- 4 If battery acid contacts skin or clothing, wash immediately with soap and water. If acid enters eye, immediately flood eye with running cold water for at least 10 minutes and get medical attention immediately.
- 5 NEVER smoke or allow a spark or flame in vicinity of battery or engine.
- 6 Be extra cautious to reduce risk of dropping a metal tool onto battery. It might spark or short-circuit battery or other electrical part that may cause explosion.
- 7 Remove personal metal items such as rings, bracelets, necklaces, and watches when working with a lead-acid battery. A lead-acid battery can produce a short-circuit current high enough to weld a ring or the like to metal, causing a severe burn.

2.4 WARNINGS REGARDING THE USE OF BATTERIES

- 1 Only use ChargeMaster Plus for charging a LEAD-ACID batteries and the supply of users attached to these batteries, in permanent systems. Do not use ChargeMaster Plus for charging dry-cell batteries that are commonly used with home appliances. These batteries may burst and cause injury to persons and damage to property.
- 2 NEVER charge non-rechargeable batteries.
- 3 NEVER charge a frozen battery.
- 4 Excessive battery discharge and/or high charging voltages can cause serious damage to batteries. Do not exceed the recommended limits of discharge level of your batteries.
- 5 If it is necessary to remove a battery, always remove grounded terminal from battery first. Make sure all accessories are off, so as not to cause an arc.
- 6 Be sure that the area around battery is well ventilated while battery is being charged. Refer to the recommendations of the battery manufacturer.
- 7 Batteries are heavy! It may become a projectile if it is involved in an accident! Ensure adequate and secure mounting and always use suitable handling equipment for transportation.

2.5 CHARGER LOCATION

- 1 Locate charger as far away from battery as dc cables permit.

- 2 Never place charger directly above battery being charged; gases from battery will corrode and damage charger.
- 3 Never allow battery acid to drip on charger when reading electrolyte specific gravity or filling battery.
- 4 Do not operate charger in a closed-in area or restrict ventilation in any way.
- 5 Do not set a battery on top of charger.

2.6 DC CONNECTION PRECAUTIONS

- 1 Connect and disconnect dc output clips only after setting any charger switches to "off" position and removing ac cord from electric outlet. Never allow clips to touch each other.
- 2 Attach clips to battery and chassis as indicated in §2.7 (5), §2.7 (6), and §2.8 (2) through §2.8 (4).

2.7 FOLLOW THESE STEPS WHEN BATTERY IS INSTALLED IN VEHICLE

A SPARK MAY CAUSE BATTERY EXPLOSION. TO REDUCE RISK OF A SPARK NEAR BATTERY:

- 1 Position ac and dc cords to reduce risk of damage by hood, door, or moving engine part.
- 2 Stay clear of fan blades, belts, pulleys, and other parts that can cause injury to persons.
- 3 Check polarity of battery posts. POSITIVE (POS, P, +) battery post usually has larger diameter than NEGATIVE (NEG, N, -) post.
- 4 Determine which post of battery is grounded (connected) to the chassis. If negative post is grounded to chassis (as in most vehicles), see (5). If positive post is grounded to the chassis, see (6).
- 5 For negative-grounded vehicle, connect POSITIVE (RED) clip from battery charger to POSITIVE (POS, P, +) ungrounded post of battery. Connect NEGATIVE (BLACK) clip to vehicle chassis or engine block away from battery. Do not connect clip to carburetor, fuel lines, or sheet-metal body parts. Connect to a heavy gage metal part of the frame or engine block.
- 6 For positive-grounded vehicle, connect NEGATIVE (BLACK) clip from battery charger to NEGATIVE (NEG, N, -) ungrounded post of battery. Connect POSITIVE (RED) clip to vehicle chassis or engine block away from battery. Do not connect clip to carburetor, fuel lines, or sheet-metal body parts. Connect to a heavy gage metal part of the frame or engine block.
- 7 When disconnecting charger, turn switches to off, disconnect AC cord, remove clip from vehicle chassis, and then remove clip from battery terminal.
- 8 See operating instructions for length of charge information.

2.8 FOLLOW THESE STEPS WHEN BATTERY IS OUTSIDE VEHICLE

A SPARK NEAR THE BATTERY MAY CAUSE BATTERY EXPLOSION. TO REDUCE RISK OF A SPARK NEAR BATTERY:

- 1 Check polarity of battery posts. POSITIVE (POS, P, +) battery post usually has a larger diameter than NEGATIVE (NEG, N, -) post.
- 2 Attach at least a 24-inch-long 6-gauge (AWG) insulated battery cable to NEGATIVE (NEG, N, -) battery post.
- 3 Connect POSITIVE (RED) charger clip to POSITIVE (POS, P, +) post of battery.
- 4 Position yourself and free end of cable as far away from battery as possible – then connect NEGATIVE (BLACK) charger clip to free end of cable.
- 5 Do not face battery when making final connection.
- 6 When disconnecting charger, always do so in reverse sequence of connecting procedure and break first connection while as far away from battery as practical.
- 7 A marine (boat) battery must be removed and charged on shore. To charge it on board requires equipment specially designed for marine use.

2.9 PREPARING TO CHARGE

- 1 If necessary to remove battery from vehicle to charge, always remove grounded terminal from battery first. Make sure all accessories in the vehicle are off, so as not to cause an arc.
- 2 Be sure area around battery is well ventilated while battery is being charged.
- 3 Clean battery terminals. Be careful to keep corrosion from coming in contact with eyes.
- 4 Add distilled water in each cell until battery acid reaches level specified by battery manufacturer. Do not overfill. For a battery without removable cell caps, such as valve regulated lead acid batteries, carefully follow manufacturer's recharging instructions.
- 5 Study all battery manufacturer's specific precautions while charging and recommended rates of charge.
- 6 Determine voltage of battery by referring to car owner's manual and make sure that output voltage selector switch is set at correct voltage. If charger has adjustable charge rate, charge battery initially at lowest rate. Exception: For a charger not having an output voltage selector switch, determine voltage of battery by referring to car owner's manual and make sure it matches output rating of battery charger.

2.10 GROUNDING INSTRUCTIONS

This battery charger should be connected to a grounded, metal, permanent wiring system; or an equipment-

grounding conductor should be run with circuit conductors and connected to equipment-grounding terminal or lead on battery charger. Connections to battery charger should comply with all local codes and ordinances.

2.11 WARNING REGARDING LIFE SUPPORT APPLICATIONS

The ChargeMaster Plus is not sold for applications in any medical equipment intended for use as a component of any life support system unless a specific written agreement pertaining to such intended use is executed between the manufacturer and Mastervolt. Such agreement will require the equipment manufacturer either to contract additional reliability testing of the ChargeMaster Plus and/or to commit to undertake such testing as a part of the manufacturing process. In addition the manufacturer must agree to indemnify and not hold Mastervolt responsible for any claims arising from the use of the ChargeMaster Plus in the life support equipment.

2.12 GUARANTEE SPECIFICATIONS

Mastervolt guarantees that this unit has been built according to the legally applicable standards and specifications. Should work take place, which is not in accordance with the guidelines, instructions and specifications contained in this user manual, then damage may occur and/or the unit may not fulfil its specifications. All of these matters may mean that the guarantee becomes invalid.

The guarantee is limited to the costs of repair and/or replacement of the product. Costs for installation labor or shipping of the defective parts are not covered by this guarantee.

2.13 CORRECT DISPOSAL OF THIS PRODUCT

(Waste Electrical & Electronic Equipment)



This product is designed and manufactured with high quality materials and components, which can be recycled and reused. When this crossed-out wheeled bin symbol is attached to a product, it means the product is covered by the European Directive 2012/19/EU. Please be informed about the local separate collection system for electrical and electronic products. Please act according to your local rules and do not dispose of your old products with your normal household waste. The correct disposal of your old product will help prevent potential negative consequences to the environment and human health.

3 OPERATING INSTRUCTIONS

3.1 FEATURES

The Mastervolt ChargeMaster Plus is a fully automatic battery charger. This means that under normal circumstances it may stay switched on with the AC power and batteries connected. The ChargeMaster Plus is suitable for charging of Li-ion and lead-acid batteries, which may include maintenance-free, low maintenance, AGM/spiral, gel or deep-cycle batteries.



WARNING

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



Battery's Best Friend

REVIVAL MODE

- Automatically charges flat batteries, see section 3.4.3.

MULTI CHEMISTRY

- When using different battery sizes or chemistries (eg. the starter battery differs from the service bank), the Smart terminal avoids damage/overcharge by limiting the current and/or by selecting a different chemistry

MULTI BATTERY

- Charge 1 to 3 batteries at the same time

MULTI VOLTAGE

- Charge 12V auxiliary battery from a 24V charger

THREE OUTPUTS

- Full charge power available for each battery. The ChargeMaster Plus is capable of delivering full output power on all three outputs. Ensuring on demand power for the battery that needs it most

PRIORITY CHARGE

- Redirects power to the battery with the lowest state of charge
- The ChargeMaster Plus has the ability to individually move each battery from absorption to pre-float stage. See section 3.4.1.

SAFE CHARGE

- Quickly recognizes the State of Charge The ChargeMaster Plus will prevent unnecessary charging (overcharge) of your batteries. The ChargeMaster Plus will detect previous charges and will reduce the Absorption timer so batteries are not overcharged.

3 STEP + ALGORITHM

- Fast charging and extended battery life

- The three-step Plus charging method guarantees that the batteries are always charged to 100%. See section 3.4



Global Charging

GLOBAL AC

- The ChargeMaster Plus has an auto-ranging input facility which makes it feasible to operate on almost any AC power source in the world. It operates smoothly on both 230V as well as on 120V without any compromises for the output current

RUGGED POWER

- Works under extreme conditions; Operating range -25°C ... 80°C / -13°F ... 176°F. See section 4.2



Power On The Move

SMART TERMINAL – OUTPUT 3

- Charge 3 batteries from a single alternator
- When charging from an alternator, the Smart input acts as a voltage sensitive relay. While the battery coupled to the smart input, is being charged, the Smart terminal distributes the current to the other batteries (up to 40A). See section 3.5



Powerful Connections

MASTERSHUNT READY

- Seamless integration with MasterShunt. See section 5.2.3

POWER SUPPLY MODE

- With an external AC source connected, the ChargeMaster Plus charger also serves the functions of an AC to DC converter to supply DC loads with or without batteries connected

CURRENT CONTROL

- Prevent blown shore fuses by adjusting the AC input power



MasterBus Compatible

MASTERBUS INSIDE

- For intelligent power systems and easy monitoring. See section 5.2



System Simplicity

STATUS DISPLAY

- Shows charger- and batteries status at a glance

3.2 LOCAL USER INTERFACE

The status display at the front side of the ChargeMaster Plus enables you to control the charger and monitor the charging process.

3.2.1 Switching on / stand-by

The ChargeMaster Plus is activated by holding the MODE switch (see figure 2) pressed for approx. 3 seconds. The MODE LED will illuminate green. If necessary and if AC power is available, the ChargeMaster Plus will start to charge the batteries.



Once switched on, the ChargeMaster Plus automatically resumes operation after it was disconnected from an AC-source temporarily.

By holding the MODE switch pressed again for approx. 3 seconds, the ChargeMaster Plus will switch back to stand-by: the ChargeMaster Plus stops and the MODE LED illuminates red.



WARNING

Switching the ChargeMaster Plus to “stand-by” does not cut off the connection to the batteries or the AC-source. This means that voltages are still present inside the apparatus.

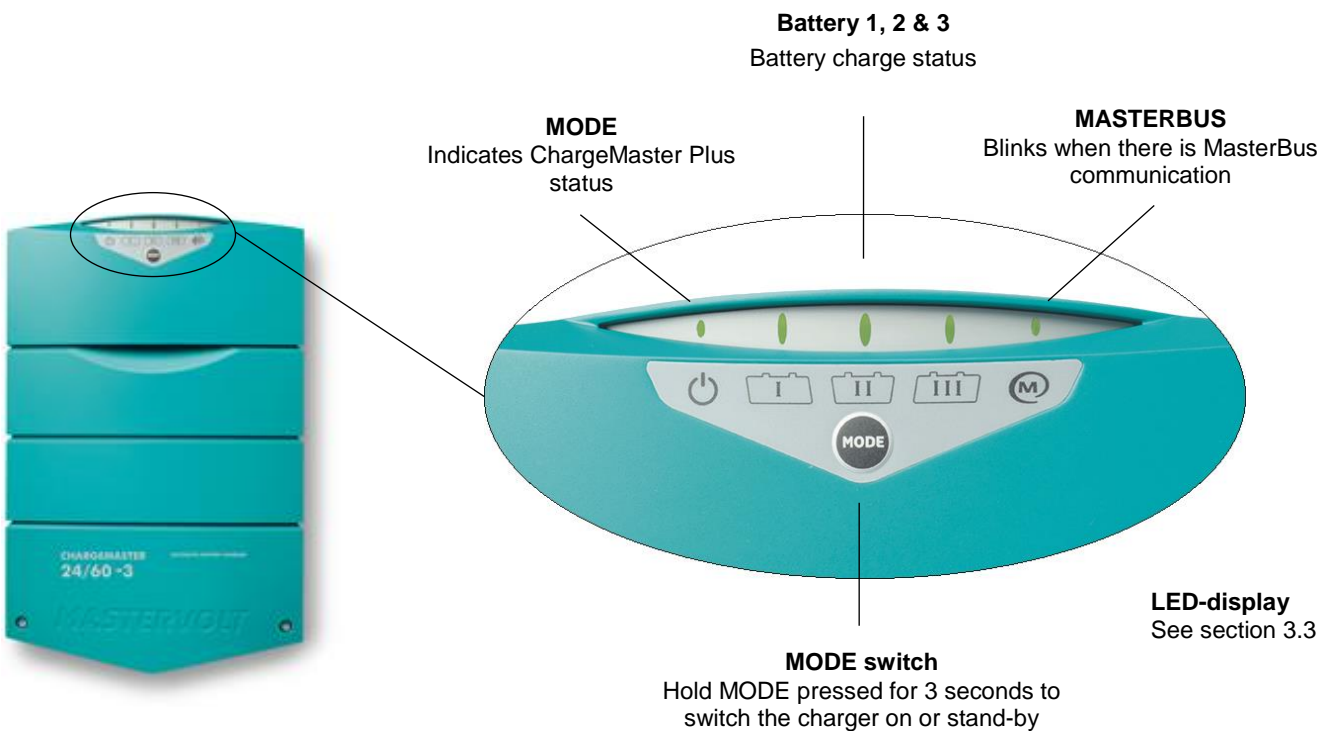


Figure 2: ChargeMaster Plus status display








The ChargeMaster Plus can also be operated and monitored remotely by means of a MasterBus remote control panel. See section 5.2 for details.

3.3 STATUS-DISPLAY



The status display has a 3 level menu. Menu navigation is done by shortly pressing the MODE switch. After each press the next menu level is shown. The MODE LED color indicates the level that is being shown.

Menu	MODE LED color	Meaning
Level 1	Green	Status menu
Level 2	Orange	Output power menu
Level 3	Red	Error menu



3.3.1 Status

Display	LED	State	Meaning
	MODE	Solid green	ChargeMaster Plus on
		Solid red	ChargeMaster Plus stand-by
		Blink fast red	Error, navigate to error menu
	Battery I	Blinking medium fast green	Battery in bulk stage
		Blinking slow green	Battery absorption stage
		Solid green	Battery in float stage
	Battery II	Blinking medium fast green	Battery in bulk stage
		Blinking slow green	Battery absorption stage
		Solid green	Battery in float stage
	Battery III	Blinking medium fast green	Battery in bulk stage
		Blinking slow green	Battery absorption stage
		Solid green	Battery in float stage
	MasterBus	Blinking green	MasterBus communication

3.3.2 Output power

Display	LED	State	Meaning
	MODE	Solid orange	Output power menu
	Battery I	Solid orange	Total output power 0-25%
	Battery II	Solid orange	Total output power 26-50%
	Battery III	Solid orange	Total output power 51-75%
	MasterBus	Solid orange	Total output power 76-100%

3.3.3 Error

Error	LED	State	Meaning	What to do
	MODE	Blink fast red	Error menu	
	Battery I	Blink fast red	Reverse polarity	Check battery connection
	Battery II	Blink fast red	AC error	Check AC voltage/frequency
	Battery III	Blink fast red	DC error	Check battery voltage
	MasterBus	Blink fast red	Temperature sense error	Check temperature sensor

3.4 THREE STEP PLUS CHARGE ALGORITHM

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

The first step of the three step plus charge system is the BULK phase, in which the output current of the charger is 100%, and the greater part of the capacity of the battery is rapidly charged. The current charges the batteries and gradually the voltage rises to the BULK voltage 14.4V (MLi:14.25V) resp. 28.8V (MLi: 28.5V) at 25°C / 77°F.

The duration of this phase depends on the ratio of battery to charger capacity, and the battery state of charge.

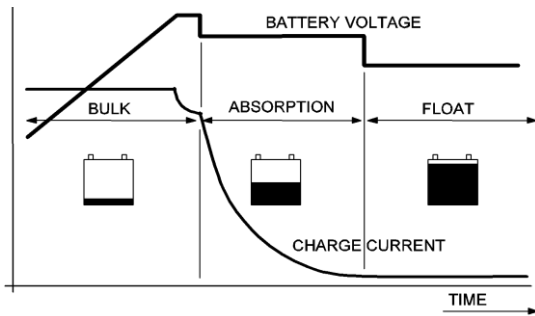


Figure 3: Three step charge algorithm

The bulk phase is followed by the ABSORPTION phase. Absorption charging starts when the voltage on the batteries has reached the BULK voltage, and ends when the battery is completely full. Battery voltage remains constant at 14.25V / 28.5V at 25°C / 77°F throughout this stage, and the charge current depends on the degree to which the battery was initially discharged, the battery type, the ambient temperature, and so on. With a flooded battery this stage lasts approx. 4h, with gel and AGM around 3h. Once the battery is 100% full, the ChargeMaster Plus automatically switches over to the float phase. At FLOAT (for Gel/AGM, flooded batteries) the ChargeMaster Plus switches to a stabilised 13.25V (MLi: 13.5V) or 26.5V (MLi: 27.0V) at 25°C / 77°F.

Connected DC-loads are powered directly by the charger. If the load is higher than charger capacity, the required additional power comes from the battery, which will be progressively discharged until the charger automatically switches back to the bulk phase. Once consumption decreases, the charger goes back to normal operation of the three-step charge system.

As the ChargeMaster Plus is equipped with a three-step plus charge system, the batteries can also remain connected to the ChargeMaster Plus during winter. One hour every 12 days the charger automatically switches to absorption to keep the battery running properly and prolong its life span. The three-step plus charge system is also safe for all the connected equipment.

3.4.1 Pre-float

The ChargeMaster Plus has the ability to individually move each battery from absorption to pre-float stage. In pre-float

stage, the charge voltage is lower than in absorption stage. Pre-float ensures batteries that are nearly full don't receive the higher charge voltage needed in the absorption stage. This prevents over-charging, extending the lifespan of the batteries.

3.4.2 Temperature compensated charging

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

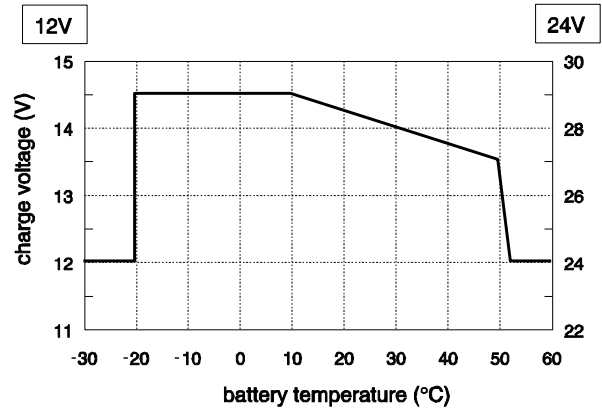


Figure 4: Temperature compensated charging

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.

3.4.3 Flat battery support

The ChargeMaster Plus automatically detects a flat battery, and will initiate the flat battery charge curve described in the table below.

UBat	Voltage	Output power
12V	0.00V - 2.50V	15%-30% of I _{max}
	2.50V – 8.00V	25% of I _{max}
	8.00V – 10.00V	linear from 25% - 100% of I _{max}
	10.00V – 14.25V	100% of I _{max}
	>14.25	Limited by P _{max}
24V	0.00V – 5.00V	15%-30% of I _{max}
	5.00V – 16.00V	25% of I _{max}
	16.00V – 20.00V	linear from 25% - 100% of I _{max}
	20.00V – 28.50V	100% of I _{max}
	>28.50	Limited by P _{max}

3.5 SMART TERMINAL - OUTPUT 3

The Chargemaster is equipped with three full outputs. The total output current is divided over these three outputs. See section 4.6 for connections.

Output 3 is the Smart terminal, which can be current limited and can serve as an output and as an input to charge battery 1 & 2.

The Smart terminal has the following operating modes:

- 10A starter
- Starter
- Starter + alternator
- Follow main
- Follow main + alternator
- 12V constant voltage
- 24V constant voltage
- 12V 3 step+

3.5.1 10A starter

Output 1 & 2 are configured as full outputs, Smart terminal 3 is now current limited to 10A to safely charge a starter battery.

3.5.2 Starter

Output 1 & 2 are configured as full outputs, Smart terminal 3 is now current limited to be able to charge a starter battery. A 24V charger can charge a 24V or 12V starter battery with an own charging profile. Settings are configured via MasterBus, see section 5.2.

3.5.3 Starter + alternator

Output 1 & 2 are configured as full outputs, Smart terminal functions as a VSR (Voltage Sensitive Relay). When there is no AC power available and the alternator is charging the starter battery, the alternator can also be used to charge battery 1 & 2. The threshold voltage which is used to switch over can be configured via MasterBus. See section 5.2

3.5.4 Follow main

Operation mode for 3 batteries, the charger is configured with 3 full outputs. All batteries are charged with the same settings.

3.5.5 Follow main + alternator

Operation mode for 3 batteries, the charger is configured with 3 full outputs. All batteries are charged with the same settings. Smart terminal functions as a VSR (Voltage Sensitive Relay). When there is no AC power available and the alternator is charging the starter battery, the

alternator can also be used to charge battery 1 & 2. The threshold voltage which is used to switch over is configured via MasterBus. See section 5.2

3.5.6 12V constant voltage

Output 1 & 2 are configured as full outputs, Smart terminal is now current limited and set to 12V constant voltage

3.5.7 24V constant voltage (24V model only)

Output 1 & 2 are configured as full outputs, Smart terminal is now current limited and set to 24V constant voltage

3.5.8 12V 3 step+ (24V model only)

Output 1 & 2 are configured as full outputs, Smart terminal is now current limited and set to 3 step+ charge algorithm. In 12V 3 step plus configuration the following battery types can be selected: AGM, GEL, flooded, AGM Spiral.

3.6 MAINTENANCE

No specific maintenance to the ChargeMaster Plus is required. Examine your electrical installation on a regular basis, 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 enclosure of the ChargeMaster Plus. Do not use any liquids or corrosive substances, such as solvents, alcohol, petrol or abrasive components.

3.7 FAILURES

The ChargeMaster Plus is protected against overload, short circuit, overheating and under and over voltage. If a fault condition occurs, the MODE button turns red and the Battery 1, 2 & 3 LED indicate an error code. See section 3.3.3 for explanation.



CAUTION!

The ChargeMaster Plus is not protected against serious over voltage (>275VAC) on the AC-input .



As long as there is no error code shown, no failure is detected: the ChargeMaster Plus is operating normally!

3.8 HISTORICAL DATA

Connect the ChargeMaster Plus to MasterBus in order to be able to see the historical data stored in the ChargeMaster Plus.

4 INSTALLATION

During installation and commissioning of the ChargeMaster Plus, the important safety instructions are applicable at all times.

4.1 UNPACKING

In addition to the ChargeMaster Plus the delivery includes:

- Mounting bracket to mount the ChargeMaster Plus to a wall;
- Battery temperature sensor;
- MasterBus terminating device;
- This user's manual

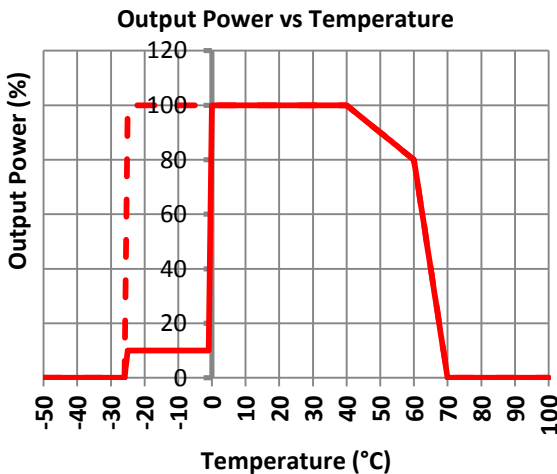
After unpacking, check the contents for possible damage. Do not use the product if it is damaged. If in doubt, contact your supplier

Check from the identification label (see section 1.4) whether the battery voltage is the same as the nominal output voltage of the ChargeMaster Plus (e.g. 24V battery set for a 24V battery charger).

4.2 ENVIRONMENT

Obey the following stipulations during installation:

- The ChargeMaster Plus is designed for indoor use only.
- Ambient temperature: -25°C ... 80°C / -13°F ... 176°F; (power derating above 40°C / 104°F to decrease the internal heat sink temperature).



- Humidity: 0-95% non condensing
- Mount the ChargeMaster Plus vertically, with the connecting cables downwards.
- Do not expose the ChargeMaster Plus to excessive dust, aggressive environments, ammonia or salt.
- Make sure that the hot air that is developed during operation can be discharged. The ChargeMaster Plus must be mounted in such a way that obstruction of the airflow through the ventilation openings will be prevented.

- No objects must be located within a distance of 10 cm / 4 inch around the ChargeMaster Plus.
- Do not locate the ChargeMaster Plus in the same compartment as the batteries.
- Do not install the ChargeMaster Plus straight above the batteries because of possible corrosive sulphur fumes.
- If the ChargeMaster Plus is installed in the immediate vicinity of living areas, take into account that the fan of the ChargeMaster Plus can produce noise when operating.
- Although the ChargeMaster Plus 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 ChargeMaster Plus and the equipment, to relocate the receiving antenna or to connect the equipment to a circuit different from that to which the ChargeMaster Plus is connected.

4.3 WIRING



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.

4.3.1 DC wiring

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 section of the battery cables is:

ChargeMaster Plus model	DC Cable cross section:	
	<3m / 10ft	3-5m / 10-16ft
12/75-3	25mm ² / AWG2	35mm ² / AWG1
12/100-3	35mm ² / AWG1	50mm ² / AWG0
24/40-3	16mm ² / AWG4	25mm ² / AWG2
24/60-3	25mm ² / AWG2	35mm ² / AWG2

Use ring terminals on the ends of the wires. The terminals must be crimped with a proper crimping tool. Use the following wire colours for DC wiring colour or at least different colours to make a clear distinction between the positive and negative wire from the battery:

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 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 for outputs 1, 2 and 3 are:

ChargeMaster Plus model	DC fuse
12/75-3	85A
12/100-3	125A
24/40-3	50A
24/60-3	80A

The fuse with the fuse-holder is available from your local Mastervolt distributor or Customer Service Representative.

4.3.2 AC-wiring



WARNING!

The ground wire offers protection only if the enclosure of the ChargeMaster Plus is connected to the safety ground. Connect the ground terminal (PE / GND) to the hull or the chassis.



CAUTION!

According to local regulations a RCD/Breaker must be placed in the AC input circuit of the ChargeMaster Plus.

For a safe installation the correct wire cross section must be applied. Don't use a cross section that is smaller than indicated. See table below to select the appropriate cross section for the AC wiring (up to 6m / 20ft length):

AC-Current	Minimum cross section:	
	in mm ²	AWG
6-12 Amp	1.5 mm ²	AWG 14
12-20 Amp	2.5 mm ²	AWG 12
20-32 Amp	4.0 mm ²	AWG 10

Connection of AC-wiring and recommended wire colours:

- 230V/50Hz installations:

Wire color	Meaning	Must be connected to:
Brown or black	Phase	L1
Blue	Neutral	N
Green/Yellow	Earth	PE / GND

- 120V/60Hz installations (single phase):

Wire color	Meaning	Must be connected to:
Black	Hot or Line	L1
White	Neutral	N
Green	Ground	PE / GND

4.3.3 AC safety grounding



WARNING!

The ground wire offers protection only if the enclosure of the ChargeMaster Plus is connected to the safety ground. Connect the ground terminal (PE / GND) to the hull or the chassis.



CAUTION!

For safe installation it is necessary to insert a Residual Current Device (earth leakage switch) in the AC input circuit of the ChargeMaster Plus.

4.4 BATTERIES

Always follow the instructions published by battery manufacturer.

ChargeMaster Plus model	Recommended battery capacity		
12/75-3	140Ah	-	800Ah
12/100-3	200Ah	-	1000Ah
24/40-3	80Ah	-	400Ah
24/60-3	120Ah	-	500Ah

4.5 THINGS YOU NEED

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

- ChargeMaster Plus (included)
- Battery temperature sensor with cable and plug (included).
- DC cables to connect the ChargeMaster Plus to the batteries and common negative; see section 4.3.1 for specifications
- DC-fuse holder with a DC-fuse, to be integrated in the positive DC-cable; see section 4.3.1 for specifications
- Screws / bolts (Ø 6mm) (with plugs) to mount the enclosure to a surface. Use mounting materials which are suitable to carry the weight of the ChargeMaster Plus
- AC cable to connect the AC input to an AC power source. See section 4.3.2.
- Batteries; see section 4.4
- Appropriate and reliable cable terminals, cable lugs, battery terminals and cord end terminals

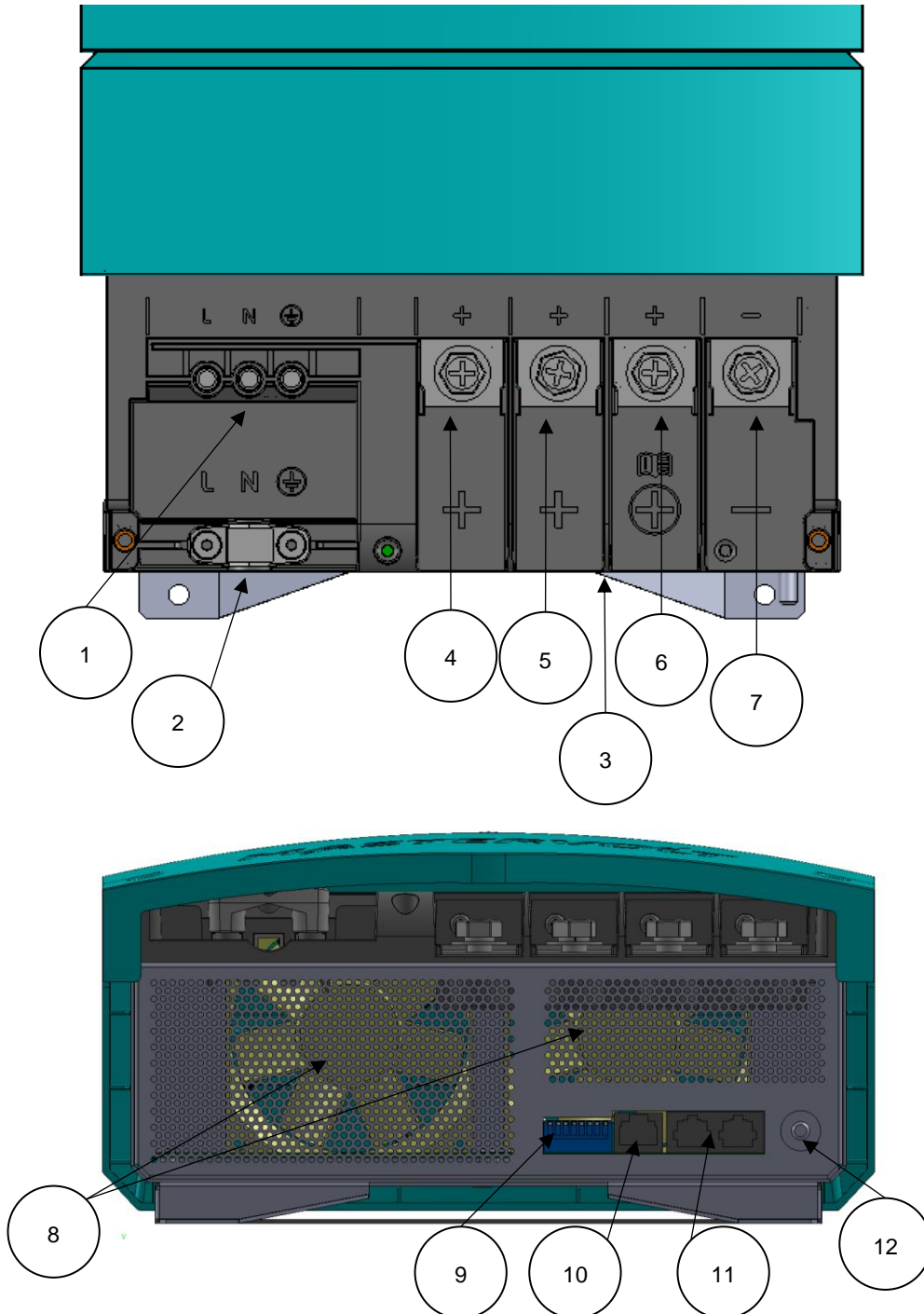
We recommend as a minimum tool kit:

- Socket wrench 13mm to fix the main DC-cables

- Socket wrench 10mm to fix the Safety ground connection
- Flat blade screw driver 1.0 x 4.0 mm to fix the screw terminals of the AC wiring
- Tools to fix the screws / bolts (\varnothing 6mm) with plugs to mount the enclosure to a surface
- Philips screw driver nr. 2 to open the connection compartment

4.6 OVERVIEW CONNECTION COMPARTMENT

Figure 5:
connection
compartment



- | | | | |
|---|---|----|---------------------------------|
| 1 | Screw terminals AC input | 7 | Common negative output terminal |
| 2 | Cable clip for AC-wiring | 8 | Ventilation openings |
| 3 | Isolation walls for DC connections | 9 | DIP-switches |
| 4 | Positive terminal charge output 1 | 10 | Temperature sensor connection |
| 5 | Positive terminal charge output 2 | 11 | MasterBus connection |
| 6 | Positive terminal charge Smart terminal | 12 | Safety ground connection |

4.7 CONNECTION

4.7.1 General



WARNING

Let installation work be done by a licensed electrician.

All electrical systems (AC and DC) must be disconnected from any power source during the entire installation!



CAUTION!

Short circuiting or reversing polarity may lead to serious damage to the batteries, the ChargeMaster Plus, the cabling and/or the terminal connections. Fuses between the batteries and the ChargeMaster Plus cannot prevent damage caused by reversed polarity. The damage as a result of reverse polarity is detectable by the service department and is not covered by the warranty.



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.



NOTE:

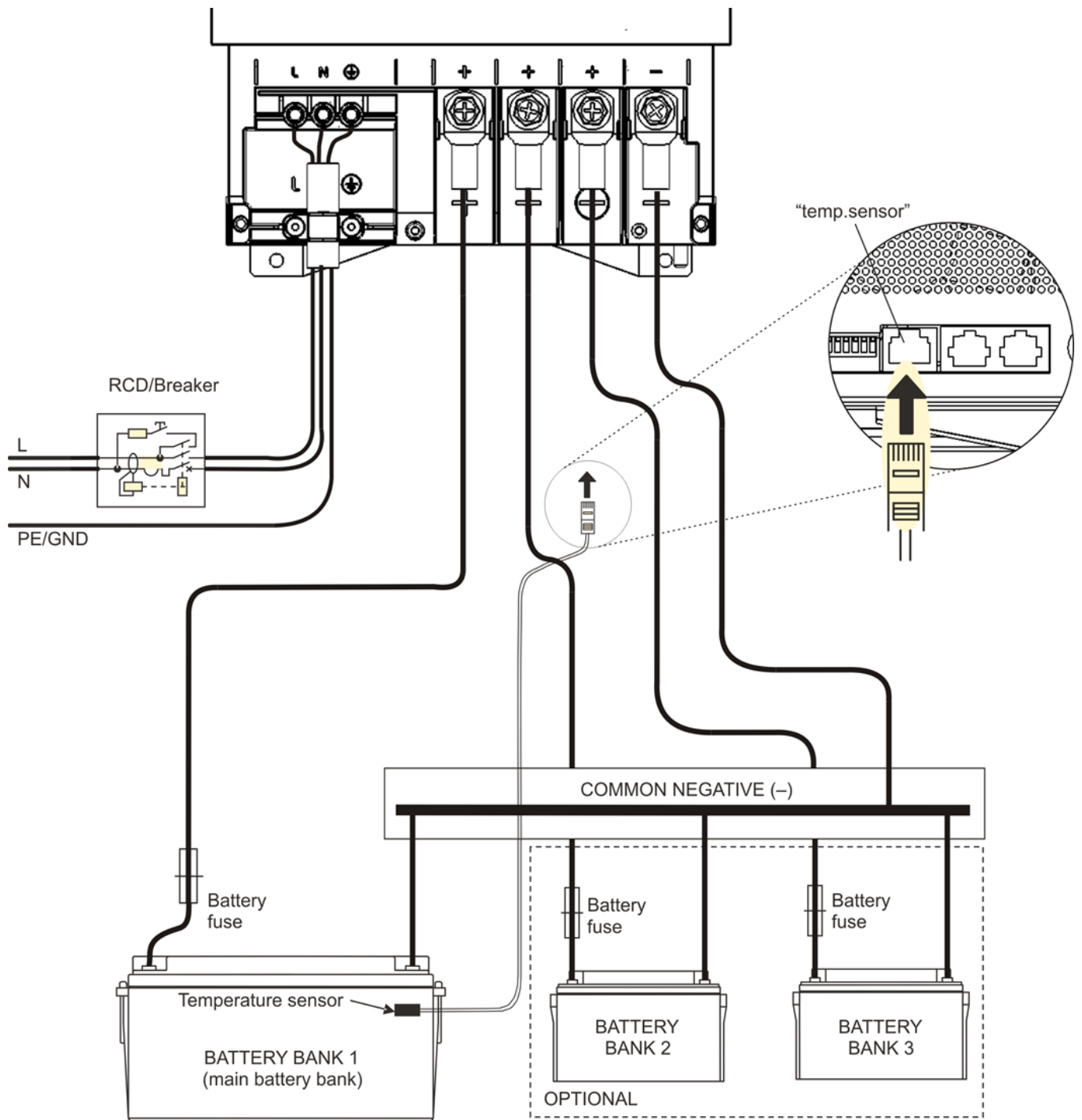
If the battery temperature remains within 15-25°C, connection of the battery temperature sensor is optional.



NOTE:

The ChargeMaster Plus is only feasible for the connection of MasterBus compatible remote control panels.

4.7.2 Connection example

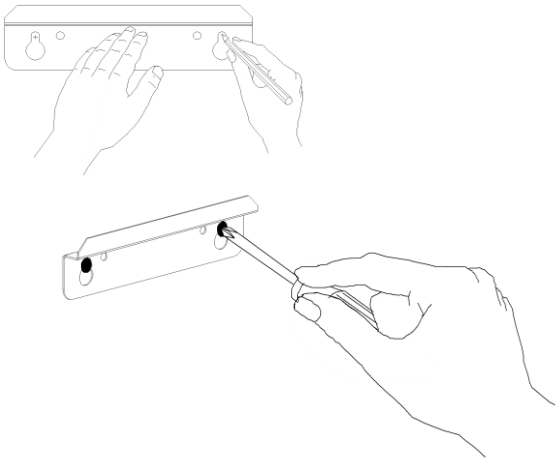


This schematic is to illustrate the general placement of the ChargeMaster Plus in a circuit. It is not meant to provide detailed wiring instructions for any particular electrical installation.

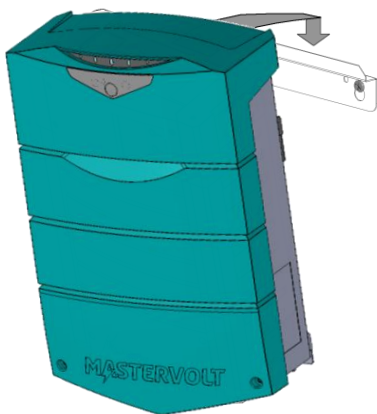
Figure 6: installation drawing of the ChargeMaster Plus

4.8 INSTALLATION STEP-BY-STEP

- 1 Mark the position of the mounting spots by using the mounting bracket. Then Fix the mounting bracket to the wall.



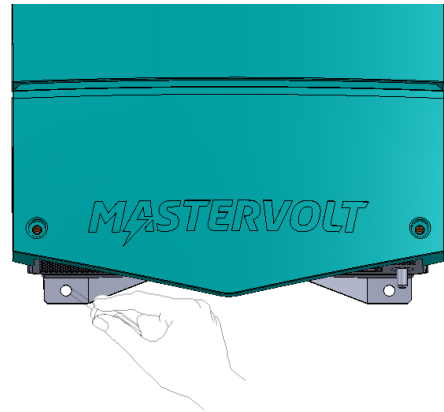
- 2 Place the ChargeMaster over the mounting bracket and then move it downwards until it is suspended from the mounting bracket.



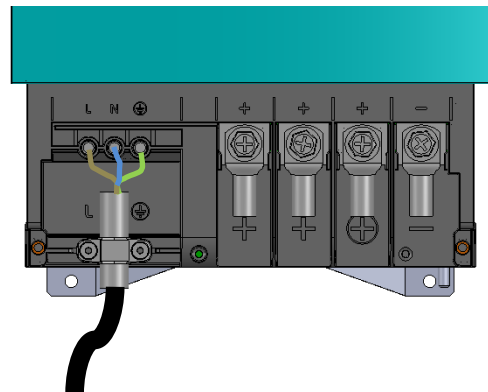
- 3 Open the connection compartment by loosening the two screws.



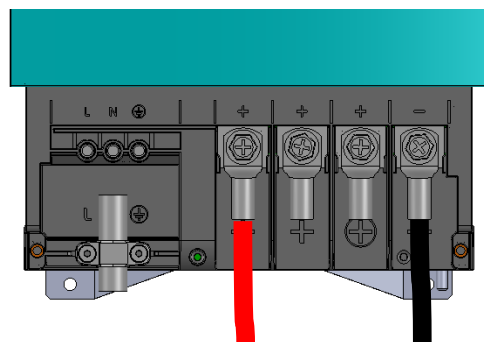
- 4 Fix the enclosure to the wall by fastening two screws at the lower side of the enclosure as well.



- 5 Connect the wiring to the screw terminals. Fasten the cable with the cable clip.

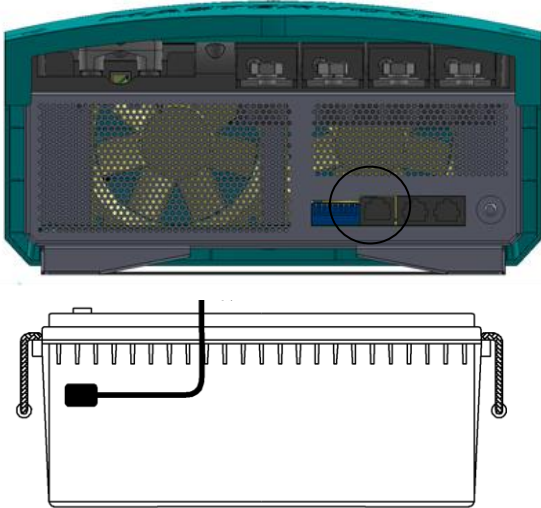


- 6 Fit crimp-on ring terminals to the DC-cables. Connect the DC-cabling of battery bank 1, positive to +, negative to -.

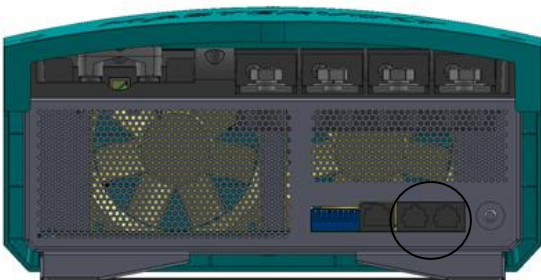


If needed repeat steps for output 2 and 3.

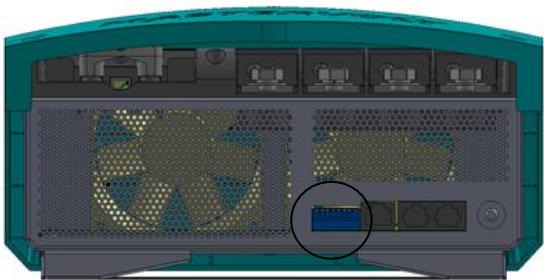
- 9 Attach the battery temperature sensor to the casing of battery bank 1. Plug the temperature sensor cable into the "temp.sensor" jack.



- 10 Option: Connect the ChargeMaster to the MasterBus network.



- 11 If required, change DIP-settings. See section 5.1 for adjustment. Use a small screw driver for adjustment of



- 12 Check all wiring; see also figure 6 for wiring details.

- 13 Close the connection compartment by fixing the four screws.



- 14 Continue with section 4.9 for commissioning of the ChargeMaster.

4.9 COMMISSIONING AFTER INSTALLATION

4.9.1 General



When your ChargeMaster Plus is not new, you have to take into account that former users may have changed the settings. Reset the ChargeMaster Plus back to factory settings when there is any doubt (see section 5.2).

The factory settings of the ChargeMaster Plus are optimal for most installations. With some applications however, it is desirable to change these settings. Therefore several adjustments can be made. See chapter 5



NOTE:
The DIP-switches must be adjusted *prior* to commissioning; all other settings can only be made *after* commissioning.

4.9.2 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(s) to connect the batteries to the ChargeMaster Plus.

**WARNING**

When placing this fuse, a spark can occur, caused by the capacitors used in the ChargeMaster Plus. 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.

- 2 Switch on the AC power supply
- 3 Hold the MODE button (Figure 2) pressed for 3 seconds to switch on the charger

Now the ChargeMaster Plus will initiate the charging process.

4.9.3 MasterBus (optional)

During first commissioning the ChargeMaster Plus will be recognized by the MasterBus network automatically.

Some settings can only be changed via the MasterBus interface. See section 5.2 for an overview of all available MasterBus settings. Refer to the user's manual of the remote control panel to change these settings.

4.10 DECOMMISSIONING

If it is necessary to put the ChargeMaster Plus out of operation, follow the instructions in order of succession as described below:

- 1 Switch the ChargeMaster Plus to stand-by (see chapter 3).
- 2 Remove the DC-fuse(s) and disconnect the batteries.
- 3 Remove the AC-fuse(s) of the AC-input and/or disconnect the AC-mains.
- 4 Open the connection compartment of the ChargeMaster Plus.
- 5 Check with a suitable voltage meter whether the inputs and the outputs of the ChargeMaster Plus are voltage free.
- 6 Disconnect all the wiring.

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

4.11 STORAGE AND TRANSPORTATION

When not installed, store the ChargeMaster Plus 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.

4.12 RE-INSTALLATION

To reinstall the ChargeMaster Plus, follow the instructions as described in this chapter (chapter 4).

5 SETTINGS

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

- By means of DIP-switches; see section 5.1;
- Via the MasterBus network; see section 5.2.



CAUTION!

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

5.1 DIP SWITCH SETTINGS

If all dipswitches are in the '0' position, changes can only be made by via the MasterBus network.

After dipswitch settings have been made, the ChargeMaster Plus needs to be switched off and on, in order for the settings to take effect.

**ChargeMaster Plus
DIP-switch settings**

	DIP Switches							
	1	2	3	4	5	6	7	8
CM+	MasterBus leading	■	■	■	■	■	■	■
Main output 1 & 2	Constant voltage	■	■	■	■	■	■	■
	AGM	■	■	■	■	■	■	■
	GEL	■	■	■	■	■	■	■
	Flooded	■	■	■	■	■	■	■
	AGM spiral	■	■	■	■	■	■	■
	Flooded traction	■	■	■	■	■	■	■
	Flooded calcium	■	■	■	■	■	■	■
	Smart output 3	10 starter	■	■	■	■	■	■
Starter		■	■	■	■	■	■	■
Starter + alternator		■	■	■	■	■	■	■
Follow main		■	■	■	■	■	■	■
Follow main + alternator		■	■	■	■	■	■	■
12V constant voltage		■	■	■	■	■	■	■
24V constant voltage		■	■	■	■	■	■	■
12V 3 step+ AGM		■	■	■	■	■	■	■
12V 3 step+ GEL		■	■	■	■	■	■	■
12V 3 step+ flooded		■	■	■	■	■	■	■
12V 3 step+ AGM spiral	■	■	■	■	■	■	■	

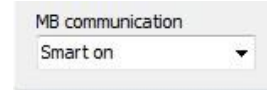
Example as shown above (24V ChargeMaster Plus):
 Main output 1 & 2 => Charging GEL batteries
 Smart output3 => Is set to 12V 3 step+
 Smart output3 => Charging 12V AGM battery

5.2 MASTERBUS FUNCTIONS

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

5.2.1 MasterBus Communication

MasterBus communication can be set to Smart on or Always on. The table below explains the difference between these settings.

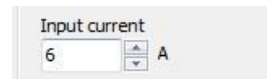


AC available	ChargeMaster Plus mode	MasterBus communication		MasterBus powering
		Smart on	Always on	
No	Standby	No	Yes	No
No	On	Yes	Yes	No
Yes	Standby	Yes	Yes	Yes
Yes	On	Yes	Yes	Yes

As can be seen above, the ChargeMaster Plus is a MasterBus powering device only if AC is available.

5.2.2 Current Control

If the available power at the AC-input is limited. The ChargeMaster can be configured to reduce input current. The Current Control level should be set equal or lower than the value of the external circuit breaker, which protects the incoming AC power. For example, when the external AC power is limited by a 6A fuse, the Current Control level should be set to ≤6 A. The AC input current of the ChargeMaster Plus will be reduced to 6A. The Current Control level can be adjusted by means of MasterAdjust software or the use of an optional remote control, like the EasyView 5.



5.2.3 MasterShunt

A MasterShunt can be coupled with output 1 of the ChargeMaster Plus. The actual measurement data of the MasterShunt will be used to charge the batteries. Refer to the manual of the MasterShunt how to configure your system.



Figure 7: ChargeMaster Plus DIP-switch settings

5.2.4 Li-ion Battery MLi Ultra

The ChargeMaster Plus is compatible to be used with a Li-ion battery MLi Ultra. Refer to the manual of the Li-ion battery MLi Ultra how to configure your system.



WARNING!

Before using the Li-ion battery, it must be installed and commissioned in accordance with the instruction provided in the MLi Ultra manual!

5.2.5 In use

If not all outputs of the ChargeMaster Plus are used, the unused outputs can be excluded from sending alarm messages. This is done by unchecking the in use checkbox for the output that is not used. Factory setting is all outputs in use.

5.2.6 Monitoring

Value	Meaning	Default	Adjustable range
General			
Device state	Shows charger state (Charging / Stand-by / Alarm)		(read only)
Charger state	Actual state of charge algorithm: Off/bulk/absorption/float/suspended		(read only)
Charger	Function to toggle the charger state		On / Stand-by
Input current	Option to set the maximum AC input current level to prevent a generator or shore fuse from overload	20	0-20A
Battery temp.	Actual temperature of the main battery bank (in °C)		(read only)
Output 1			
Output 1	Output state (Off/pre-float/on)		(read only)
Output 1	Voltage of charge output 1		(read only)
Output 1	Output current of charge output 1		(read only)
Shunt device	A connected MasterShunt can be chosen for feedback on the charged battery.	Not connected	(read only)
Output 2			
Output 2	Output state (Off/pre-float/on)		(read only)
Output 2	Voltage of charge output 2		(read only)
Output 2	Output current of charge output 2		(read only)
Smart Terminal			
Output 3	Output state (Off/pre-float/on/smart terminal)		(read only)
Output 3	Voltage of charge output 3		(read only)
Output 3	Output current of charge output 3		(read only)

5.2.7 Alarm

Value	Meaning	Adjustable range
Alarm status		
Bat. Temp. high	Battery temperature too high	(read only)
TS error	Temperature sensor error	(read only)
Mains high volt.	AC Input voltage too high	(read only)
Mains low volt.	AC Input voltage too low	(read only)
Mains high freq.	AC Input frequency too high	(read only)
Mains low freq.	AC Input frequency too low	(read only)
Output 1		
Battery high	DC output voltage is too high	(read only)
Battery low	DC output voltage is too low	(read only)
Shunt mismatch		(read only)
Reverse polarity	DC + and DC - are connected in reverse (this will damage the charger)	(read only)

Value	Meaning	Adjustable range
Output 2		
Battery high	DC output voltage is too high	(read only)
Battery low	DC output voltage is too low	(read only)
Reverse polarity	DC + and DC –are connected in reverse (this will damage the charger)	(read only)
Smart terminal		
Battery high	DC output voltage is too high	(read only)
Battery low	DC output voltage is too low	(read only)
Reverse polarity	DC + and DC –are connected in reverse (this will damage the charger)	(read only)

5.2.8 History

This menu shows the absolute maximum readings.

Value	Meaning	Adjustable. Range
Charger		
Days running	Total run time in charger mode	(read only)
Output 1		
Highest voltage	Highest detected DC voltage output 1	(read only)
Lowest voltage	Lowest detected DC voltage output 1	(read only)
Total Ah's	Total charged Ah's	(read only)
Output 2		
Highest voltage	Highest detected DC voltage output 1	(read only)
Lowest voltage	Lowest detected DC voltage output 1	(read only)
Total Ah's	Total charged Ah's	(read only)
Smart terminal		
Highest voltage	Highest detected DC voltage output 1	(read only)
Lowest voltage	Lowest detected DC voltage output 1	(read only)
Total Ah's	Total charged Ah's	(read only)
Total Ah's in	Total charged Ah's using the smart terminal as input	(read only)

5.2.9 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	Menu language of this device	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	CHG ChargeMaster	0-12 chars
MB communication	Select if MasterBus communication is available when only DC power is available.	Smart on	Smart on, Always on
Charger			
Method	Charge method	3-Step +	3-Step+, constant voltage
Maximum current	Maximum DC output current	Depending on model, 100%	Depending on model 20-100%
Battery type	Type of battery	Flooded	User defined, AGM, GEL, Flooded, AGM Spiral, Flooded traction, Flooded calcium, Mli

Value	Meaning	Factory setting	Adjustable. Range
Temp. compensate	Temperature depended charge voltage compensation	-0,030V/°C/ -0,060V/°C	-1,000/+1,000V/°C
Smart terminal	Smart terminal operation mode	10A Starter	Starter, Starter + alternator, Follow main, Follow main + alternator, 12V constant voltage, 24V constant voltage*, 12V 3-step +*
Maximum current	Smart terminal maximum DC input/output current	40/20A	5-40/20A
Bulk			
Voltage	Bulk voltage (@ 25°C); see section 3.4	14.40/28.80V	0-15.50/0-31.00V
Minimum time	Minimum time of the Bulk phase since <i>Start bulk timer</i>	120sec	0-240sec
Start time at	Battery voltage trigger point to start the bulk timer	13.25/26.50V	(read only)
Maximum time	Maximum time of the Bulk phase since <i>Start bulk timer</i>	480 min	0-1440min
Absorption			
Voltage	Absorption voltage (@ 25°C); see section 3.4	14.25/28.50V	0-15.50/0-31.00V
Maximum time	Maximum absorption timer	240min	0-1440min
Return Amps	Return amps. If the charge current drops below this level, the charger switches from the Absorption to the Float stage (% of I _{max})	6%	0-50%
Minimum time	Minimum absorption timer	15min	0-240min
Float			
Voltage	Float voltage (@ 25°C); see section 3.4	13.25/26.50V	0-15.50/0-31.00V
Return to bulk	Return to bulk voltage; If the battery voltage stays below this level for at least the <i>Return to bulk delay time</i> , the charger will start the Bulk stage	13.25/26.50V	0-15.50/0-31.00V
Return to bulk	Return to bulk delay time, see <i>Return to bulk voltage</i>	30sec	0-240sec
Alarm levels			
High alarm on	Upper threshold level to trigger the Battery high alarm	15,25/30.50V	0-16.00/0-32.00V
High alarm off	Lower threshold level to stop the Battery high alarm	14,75/29,50V	0-16.00/0-32.00V
Low alarm off	Upper threshold level to stop the Battery low alarm	11.00/22.00V	0-16.00/0-32.00V
Low alarm on	Lower threshold level to trigger the Battery low alarm	10.00/20.00V	0-16.00/0-32.00V
Alarm delay	Delay time before the alarm is triggered	30sec	5-60sec
Output 1			
In use	Select if the output is used	Selected	Selected/Not selected
Name	Name of this output	Output 1	0-16 chars
Shunt device	Selection of the Mastershunt to which output 1 of the ChargeMaster Plus is connected	No connection	No connection, MSH + Product Name
Output 2			
In use	Select if the output is used	Selected	Selected/Not selected
Name	Name of this output	Output 2	0-16 chars
Smart terminal			
In use	Select if the output is used	Selected	Selected/Not selected
Name	Name of this output	Output 3	0-16 chars

*24V models only

5.2.10 Events

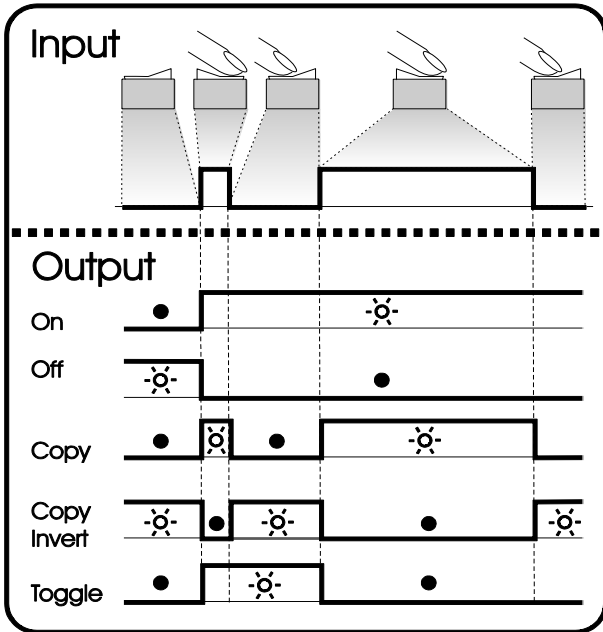


Figure 8: Meaning of the event data.

Input (pulses)

The input is represented by an on/off switch.

Output (data)

On changes the status to On at the first signal.

Off changes the status to Off at the first signal.

Copy lets the status follow the input.

Copy Invert lets the status follow the opposite of the input

Copy is used for dimming too by holding the pulse switch pressed for a longer time.

Toggle changes the status at the first signal and back at the second signal. It is used in combination with a pulse switch.

Value	Meaning	Factory setting	Adjustable. Range
Events			
Event x source	<i>Event-based command</i> Event by the ChargeMaster Plus that should result in an action by another device on the <i>MasterBus</i> network.	Disabled	(See List of event sources, section 5.2.11)
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 Plus.		(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.

5.2.11 Events source

The *ChargeMaster Plus* can be configured as an *event source*; an event source can be used to initiate an *event command* and an *event action by another device* that is connected to the *MasterBus*.

Event sources	Description
Device state	State of the ChargeMaster Plus serves as a event source
Bulk	Bulk state of charge serves as an event source
Abs	Absorption state of charge serves as an event source
Float	Float state of charge serves as an event source

5.2.12 Event target

The *ChargeMaster Plus* can be configured as an *event target by other devices* on the MasterBus network. When the *ChargeMaster Plus* is configured as an *event target* by another device, this device can initiate an *event command* and an *event action* to be performed by the *ChargeMaster Plus*.

Event command	Description
State	Command to switch on the ChargeMaster Plus
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
Suspend charging	When using a Li-ion battery MLi Ultra, programming this event is obligatory. Refer to the manual of the Li-ion battery MLi Ultra.

6 TROUBLE SHOOTING

If you cannot solve a problem with the aid of this chapter, contact your local Mastervolt Service Centre. See www.mastervolt.com. 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;

Malfunction	Possible cause	What to do
No output voltage and/or current	No AC-input	Check AC wiring, check remote control panel.
	AC-input voltage too low (< 75VAC)	Check input voltage, check generator.
	AC input frequency out of range	Check input voltage, check generator.
Output voltage too low, charger supplies maximum current	Load 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 setting of the charge voltage	Check settings (see chapter 5).
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 more than the setting limit, the charge current is automatically reduced.
	Low AC input voltage. At lower AC input voltages the charge current is reduced.	Check AC-input voltage.
Batteries not fully charged	Charge current too low	See "Charge current too low" in this table.
	Current to load is too high	Reduce load taken from the batteries.
	Charge time too short	Use a battery charger with higher capacity.
	Battery temperature too low	Use the battery temperature sensor.
	Defective or old battery	Check battery and replace if necessary.
Batteries are discharged too fast	Wrong setting of the charge voltage	Check settings (see chapter 5).
	Battery capacity reduced due to wastage or sulphation, stagnation	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.
	Charge voltage too high	Check settings (see chapter 5).
No EasyView 5 display function.	Display is switched off.	Switch on display, refer to display manual.
	Error in the wiring.	Check the MasterBus cables.
Slow or no MasterBus communication.	Error in the MasterBus wiring.	Check the MasterBus cables.
	No terminating device placed at the ends of the network.	MasterBus needs a terminating device on both ends of the network. Check if connected.
	MasterBus network is configured as a ring network.	Ring networks are not allowed. Check the connections of the network.

7 TECHNICAL DATA

7.1 SPECIFICATIONS 12V MODELS

Model	12/75-3	12/100-3
Article no.	44310750	44311000
GENERAL		
Nominal input voltage*:	120/230V	120/230V
Nominal input frequency:	50/60Hz	50/60Hz
Full load consumption:	1300VA	1700VA
Max. AC input current (@ 230VAC)	7A	9A
Max. AC input current (@ 120VAC)	14A	18A
Nominal output voltage:	12V	12V
Total charge current*:	75A at 14.4V	100A at 14.4V
Number of battery outlets:	3	3
Max. current Smart terminal	75A/40A	100A/40A
Max. input voltage Smart terminal	16V	16V
Charge characteristic*:	IUoUo, automatic, three step plus	
Charge voltage Bulk*:	14.4V	14.4V
Charge voltage Absorption*:	14.25V	14.25V
Charge voltage Float*;	13.25V	13.25V
Max. absorption and max. bulk timer*:	8 hours (start max. bulk timer at 13.25V)	
Minimum absorption time*:	15 min.	15 min.
Maximum ripple voltage on DC	120mV pp	120mV pp
Battery type settings*:	User defined/AGM/GEL/Flooded/AGM Spiral/Flooded traction/Flooded calcium/MLi	
Dimensions (mm):	383x250x126	383x250x126
Dimensions (inch):	15.0x9.8x5.0	15.0x9.8x5.0
Weight:	<7kg (<16Lbs)	<7kg (<16Lbs)
Recommended battery capacity:	140-800Ah	200-1000Ah
Power factor regulations	≥ 0,98	≥ 0,98
Temperature compensation	Battery temperature sensor and cable included.	
Voltage compensation	Yes, by means of automatic compensation or MasterShunt	
DC consumption	<5mA	<5mA
Temperature range	-25°C (-13°F) to 80°C (176°F) Derating of 90% below 0°C (32°F) Derating 1%/°C (0,5%/°F) from 40°C (104°F) to 60°C (140°F) ; Derating 8%/°C (4,4%/°F) from 60°C (140°F) to 70°C (158°F) ; Communication available, 0% output power from 70°C (158°F) to 80°C (176°F)	
Cooling	Vario fan and natural cooling to ensure optimized cooling	
Sound level	<52dBA / 1m	
Protection degree	IP23	IP23
MasterBus connectivity	Yes	Yes
Powering capabilities for MasterBus	Yes, when the charger is switched on, it can power up to three non-powering devices.	

* Adjustable, see chapter 5 for settings.

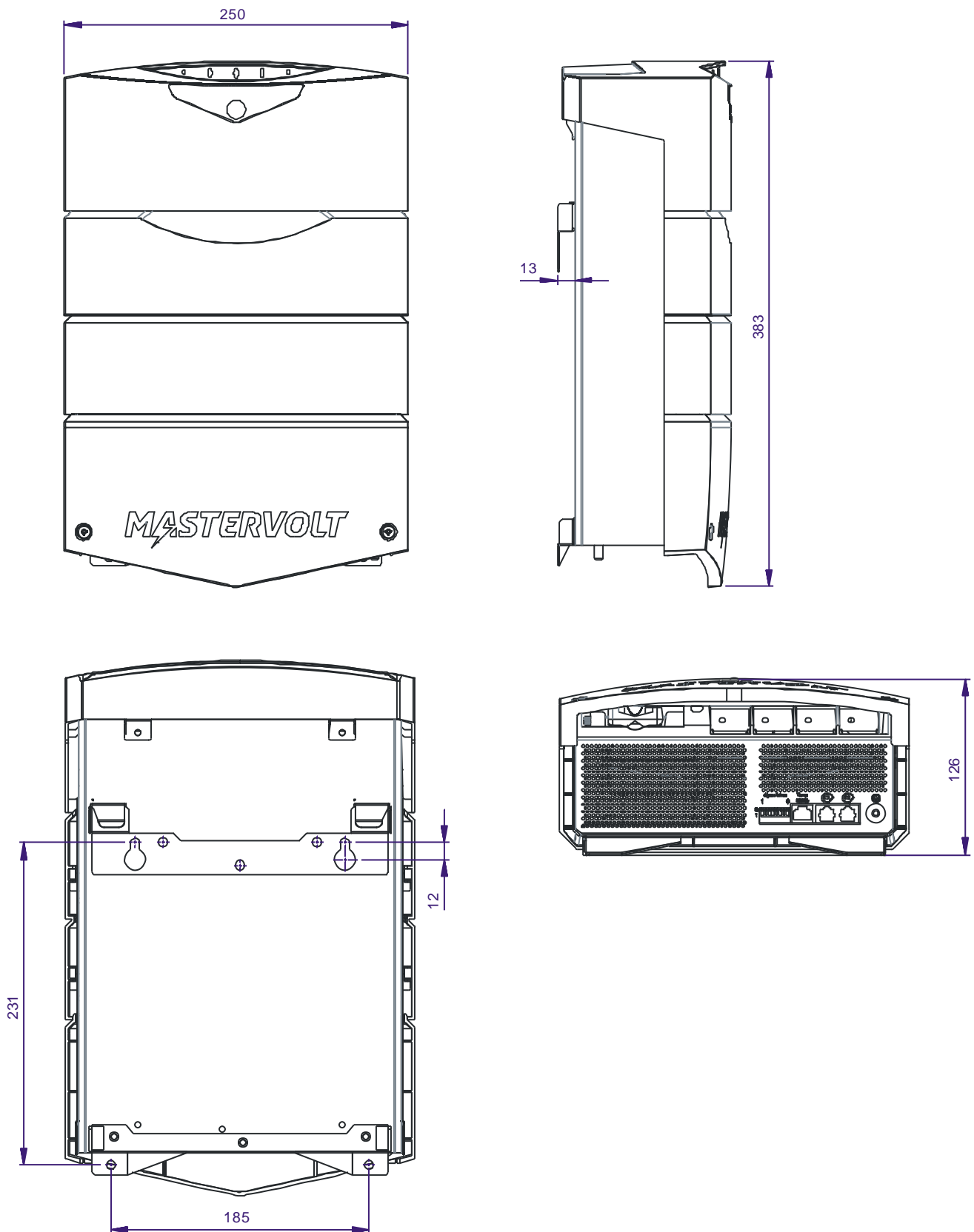
Specifications are subject to change without prior notice.

7.2 SPECIFICATIONS 24V MODELS

Model	24/40-3	24/60-3
Article no.	44320400	44320600
GENERAL		
Nominal input voltage*:	120/230V	120/230V
Nominal input frequency:	50/60Hz	50/60Hz
Full load consumption	1400VA	2000VA
Max. AC input current (@ 230VAC)	8A	10A
Max. AC input current (@ 120VAC)	16A	20A
Nominal output voltage:	24V	24V
Total charge current*:	40A at 28.8V	60A at 28.8V
Number of battery outlets:	3	3
Max. current Smart terminal:	40A/20A/10A(12V)	60A/20A/10A(12V)
Max. input voltage Smart terminal	32V	32V
Charge characteristic*:	IUoUo, automatic, three step plus	
Charge voltage Bulk*:	28.8V	28.8V
Charge voltage Absorption*:	28.5V	28.5V
Charge voltage Float*:	26.5V	26.5V
Max. absorption and max. bulk timer*:	8 hours (start max. bulk timer at 26.5V)	
Minimum absorption time*:	15 min.	15 min.
Maximum ripple voltage on DC	240mV pp	240mV pp
Battery type settings*:	User defined/AGM/GEL/Flooded/AGM Spiral/Flooded traction/Flooded calcium/MLi	
Dimensions (mm):	383x250x126	383x250x126
Dimensions (inch):	15.0x9.8x5.0	15.0x9.8x5.0
Weight:	<7kg (<16Lbs)	<7kg (<16Lbs)
Recommended battery capacity:	160-400Ah	200-500Ah
Power factor regulations	≥0,98	≥ 0,98
Temperature compensation	Battery temperature sensor and cable included.	
Voltage compensation	Yes, by means of automatic compensation or MasterShunt	
DC consumption	<10mA	<10mA
Temperature range	-25°C (-13°F) to 80°C (176°F) Derating of 90% below 0°C (32°F) Derating 1%/°C (0,5%/°F) from 40°C (104°F) to 60°C (140°F) ; Derating 8%/°C (4,4%/°F) from 60°C (140°F) to 70°C (158°F) ; Communication available, 0% output power from 70°C (158°F) to 80°C (176°F)	
Cooling	Vario fan and natural cooling to ensure optimized cooling	
Sound level	<52dBA / 1m	
Protection degree	IP23	IP23
MasterBus connectivity	Yes	Yes
Powering capabilities for MasterBus	Yes, when the charger is switched on, it can power up to three non-powering devices.	

* Adjustable, see chapter 5 for settings

Specifications are subject to change without prior notice.

7.3 DIMENSIONS

Dimensions in mm ChargeMaster Plus models 12/75-3, 12/100-3, 24/40-3 and 24/60-3

8 ORDERING INFORMATION

8.1 MASTERBUS INSTALLATION COMPONENTS

Part number	Description
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
77050100	100m / 330ft MasterBus cable (UTP cable)
77050200	50 pcs. modular jacks
77050000	Complete set to assemble UTP patch cables. Delivery includes: 100m / 330ft UTP cable, 50 pcs. modular jacks and crimping tool
77030100	MasterConnect USB interface, required as interface between your PC and the MasterBus when using MasterAdjust software.
77010310	EasyView 5, Touch screen to control and monitor all MasterBus products
77020110	MasterShunt 500, DC-distribution module for exact readout of battery voltage, charge / discharge current, and state of charge on the display of the ChargeMaster Plus. continuous rating: 250A, peak current: 500A

8.2 MISCELLANEOUS

Part number	Description
604015	ATC Fuse 15A (2 pcs)
77049050	ANL Fuse 50A
77049080	ANL Fuse 80A
77049100	ANL Fuse 100A
77049125	ANL Fuse 125A
607006	ANL Fuse base
701	Battery switch 275A with knob
6387000600	Double pole automatic circuit breaker DPN 6A-B, 1P+N
6387001000	Double pole automatic circuit breaker DPN 10A-B, 1P+N
6387001600	Double pole automatic circuit breaker DPN 16A-B, 1P+N
6385401610	Double pole automatic circuit breaker and earth leakage switch DPN VIGI 16A / B / 16mA, 1P + N
41500500*	Battery temperature sensor, incl. 6 meter / 19 ft cable

* standard included with the delivery of the ChargeMaster Plus

Mastervolt can offer a wide range of products for your electrical installation, including an extended program of components for your MasterBus network, both AGM and gel batteries, shore power connections, DC distribution kits and many more. See our website www.mastervolt.com for an extensive overview of all our products



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