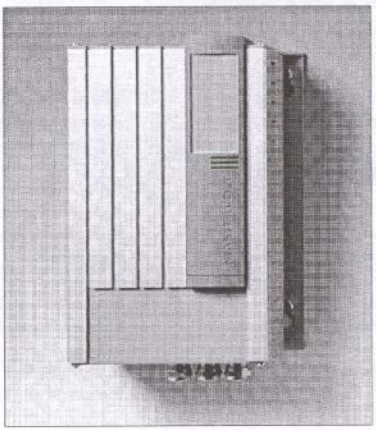
MASTERVOLT
TAILOR MADE ENERGY

GEBRUIKERSHANDLEIDING / USERS MANUAL
BETRIEBSANLEITUNG / MODE D'EMPLOI

MASS 12/60-2; 12/80-2; 24/50-2; 24/75 24/100; 48/25; 48/50

battery charger



CE

MASTERVOLT
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Tel. +31-20-3422100 / Fax +31-20-6971006

V1. September 1999

1 GENERAL INFORMATION

GARANTEE SPECIFICATIONS

Mastervolt quarantees the performance of this MASS charger according to the specifications given in the data sheets, if installed and used as described in this manual. Should work take place, which is not in accordance with the guidelines, instructions and specifications contained in this user's manual and the supplementary installation manual, then damage may occur and/or the unit may not fulfil its specifications. All of these matters may mean that the guarantee may become invalid.
The guarantee period is two years.

QUALITY

During their production and prior to their delivery, all of our units are exhaustively tested and inspected.

LIABILITY

Mastervolt can accept no liability for:

- damage due to use of the battery charger;
- possible errors in the manual and the results thereof.

2 SAFETY GUIDELINES & MEASURES

USE FOR INTENDED PURPOSE

The battery charger is contructed as per the applicable safety-technical guidelines. Use the battery charger only:

- for the charging of lead acid batteries and the supply of users attached to these batteries, in permanent systems;
- connected to a dedicated double pole circuit breaker (MCB);
- with a fuse, protecting the wiring between charger output and battery;
- in a technical correct condition;
- in a closed, well-ventilated room, protected against rain, moist, dust and not condensing circumstances.

⚠ Never use the battery charger at locations where there is danger of gas- or dust explosion!

Use other than as mentioned under 2 is not considered to be consistent with the intended purpose. Mastervolt is not liable for any damage resulting from the above.

SAFETY

1 Use only fuses with the prescribed current level:
   - AC supply fuse not greater than is required for the current consumption;
   - The charger fuse must be large enough for the maximal charger current and small enough to protect the charger's output cables.

2 Check the wiring at least once a year. Defects such as loose connections, burned cables etc. must be corrected immediately.

3 Do not work on the charger or the system if it is still connected to a current source. Only allow changes in your electrical system to be caried out by qualified electricians.

4 Connection and protection must be done in accordance with local standards.

5 Before opening the cabinet of the charger, switch off the mains and remove the charger fuse.

MAINTENANCE & REPAIR

If the battery charger is switched off during maintenance and/or repair activities, it should be secured against unexpected and unintentional switching on:

- switch off the AC circuit breaker;
- disconnect the charger;
- switch off the connection with the batteries or remove the charger fuse;
- be sure that third parties cannot reverse the measures taken.

If such are required, use only original spare parts.

3 TECHNICAL DATA (SHORTFORM)

GENERAL				
Model	**12/60-2**	**12/80-2**	**24/50-2**	**48/25**
Function apparatus	Battery charger/rectifier			
Manufacturer	Mastervolt, Amsterdam			
Input				
Mains voltage	230V, -10% + 15% en 117V, -10% + 15%			
Frequency	50-60 Hz ± 5 Hz			
Current	4A	6A	7A	7A
Power factor (Cos phi)	1	1	1	1
Efficiency	89%	89%	89%	89%
Output				
Nominal voltage	12V DC	12V DC	24V DC	48V DC
Charge current	60A	80A	50A	25A
Outputs	2 (1-60A en 1-3A)	2 (1-80A en 1-3A)	2 (1-50A en 1-3A)	1-25A
Charge characteristic	Three-step, fully automatic			
Kind of batteries	Open- en closed (gel) lead acid			
Charge voltages *)	14,25V-13,25V	14,25V-13,25V	28,5V-26,5V	57V-53V
Voltage ripple	Max. 100mV RMS with resistive load @ full power			
environmental				
Ambient temperature	-20 to 40°C @ 100% output power, derated with 2,5% / °C 40°C			
Cooling	Forced air, by means of a ventilator with variable speed			
Humidity	Maximum 95% RV non condensing			
Enclosure				
Dimensions (h x w x d) mm	333 x 261 x 144	333 x 261 x 144	333 x 261 x 144	333 x 261 x 144
Protection degree	IP22	IP22	IP22	IP22
Weight	5 kg	5 kg	5 kg	5 kg
Safety	IEC 335-2-29			

*) Depending off charge status and battery condition.

3 TECHNICAL DATA (SHORTFORM)

Model	24/75	24/100	48/50
Function apparatus		Battery charger/rectifier	
Manufacturer		Mastervolt, Amsterdam	
Input			
Mains voltage		230V, -10% + 15% en 117V, -10% + 15%	
Frequency		50-60 Hz ± 5 Hz	
Current	12A	16A	16A
Power factor (Cos phi)	1	1	1
Efficiency	89%	89%	89%
Output			
Nominal voltage	24V DC	24V DC	48V DC
Charge current	75A	100A	50A
Outputs	1-75A	1-100A	1-50A
Charge characteristic		Three-step, fully automatic	
Kind of batteries		Open- en closed (gel) lead acid batteries	
Charge voltages *)	28,5V-26,5V	28,5V-26,5V	57V-53V
Voltage ripple		Max. 100mV RMS with resistive load @ full power	
environmental			
Ambient temperature		20 to 40°C @ 100% output power, derated with 2,5% / °C 40°C	
Cooling		Forced air, by means of a ventilator with variable speed	
Humidity		Maximum 95% RV non condensing	
Enclosure			
Dimensions (h x w x d) mm		420 x 318 x 144	
Protection degree	IP22	IP22	IP22
Weight	9 kg	9 kg	9 kg
Safety	IEC 335-2-29		

*) Depending off charge status and battery condition.

4 TECHNOLOGY

INTRODUCTION

The MASS battery charger is a fully automatic high-efficient battery charger/rectifier,developed and produced by Mastervolt Amsterdam. The MASS series goes with a family of advanced quality battery chargers. Mastervolt distributes these products worldwide. The battery charger posseses an outstanding charging technique in order to charge batteries rapidly, safely and in the same time supply the connected consumers. In addition, the charger is secured against short circuit, overload and high temperatures in an industrial enviroment.

THEORY OF OPERATION

The MASS battery charger has a three-step charge characteristic (see fig. 1).

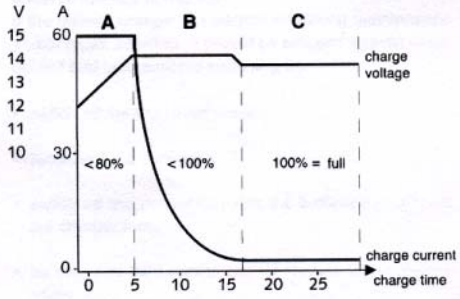


Fig. 1 Example: Charge caracteristic MASS 12/60-2. (For other models V/A according to data sheets).

Phase 1: Main charge ("BULK")
The first step "BULK" starts after switching on the MASS charger. In this phase, the charger supplies the maximum current until the battery reaches the absoption voltage. The battery is now 80% charged. When the battery reaches this limitation area the charge current wil decrease. Bulk duration is maximum 6 hours, depending on the battery's condition and charge rate. The yellow "bulk" LED on the front panel will light up during this phase.

Phase 2: "ABSORPTION"
The second step "ABSORPTION" begins automatically. The current consumption in the absorption mode is depending on the capacity of the batteries and will decrease slowly. The charger remains in this "absorption" phase untill the charge current drops for a periode of 15 minutes below 2.5A. If the charge current will not drop below 2.5A, a clock will switch the "absorption" mode off after 6 hours. During the absorption phase the yellow "ABSORPTION" LED on the front panel will light up.

Phase 3: Trickle charge ("FLOAT")
The third stage, "FLOAT", starts when the "absorption" phase has been completed. In the "float" mode, the charger automatically switches back to a lower output voltage. This voltage is sufficient to maintain the battery at a 100% charge. During this phase, the capacity of the charger can be entirely used for the supply of the users connected to the battery. During this mode the yellow "float" LED will light up. If necessary the charger automatically switches back to the "absorption" mode.

Current consumption from mains or generator
The charger produces no phase shift, because the input current follows the AC voltage waveform so a power factor of 1.0 or "unity" is achieved. The shape of the input current waveform is the same as the input voltage e.g. sinusoïdal. Therefore the input current is very low compared to conventional chargers.

Low ripple on output
The charger has a very low ripple on the output, which prevents interference in the DC circuit. The ripple is less than 100 mV with maximum output current.

Automatic compensation of charge voltage with battery temperature
If the temperature sensor is connected the MASS charger will charge its output voltage -30mV/°C (12V) or -120mV/°C (48V). The temperature sensor should give a good interpretation of the battery temperature.

Compensation of cable losses
The battery charger can compensate cable losses. Thus shortening the charging time. The connections for the sense wires (green connector are situated to the right off the accessories connection. (See fig.3 in the appendix).

DC alarm
The battery charger has been equipped with a built in DC alarm. Tripping the DC settings will activate this function The potential free contact will switch over. The connections from the potential free contact (green connector) are situated to the right off the accessories connection. (see fig.3 in the appendix). The maximum switching current is 1A. For the DC settings see appendix A.

CHARGING TWO OR MORE BATTERIES VIA ONE OUTPUT
If two or more batteries need to be charged at the same time and output, a battery isolator should be used. The battery isolator divides the various battery sets from one other, in order to avoid one set discharging the other. Because there is always a voltage drop across the isolator of 0,7V the output voltage needs to be compensated. This can be done by altering the dip-switches. See the appendix.

CHARGING A CRANKING BATTERY
In certain situations, it may occur that in addition to the main battery(ies) a cranking battery with the same voltage is used. The battery charger can charge a cranking battery at the same time as the main battery, by using the 3A output. Only for 12/60-2, 12/80-2, 24/50-2.


The second output has the same output voltage as the main output, 3 Amps maximal !

THE BATTERY CHARGER AS FLOAT CHARGER
It is possible to use the charger as a "trickle" charger. The charger then supplies a constant output voltage of 13.25V or 53V (26.5V). For this mode you can alter the dip-switch settings. See appendix A.

SELECTION WET OR GEL BATTERIES
The optimal charge voltage for a wet lead acid battery differs from the gel battery. Therefore it is possible to switch over to a higher float voltage (13.8V for 12V and 27.6V for 24V and 55,2V for 48V) necessary for gel batteries. You increase this output voltage bij altering the dip-switch settings. See appendix A.

5 INSTALLATION

Install the MASS battery charger in a dry, well ventilated area, as close as possible to the batteries. Although the battey charger has a high efficiency, some heat will be produced. This heat will be discharged by a fan with variable speed. At installation of the battery charger be sure that:

- the air flow is not obstructed;
- no water and/or dust can enter the cabinet.

MOUNTING THE MASS CHARGER

The charger can be either horizontal or vertical mounted. We recommend vertical, because the heat convection is from bottom to top.

WIRING AND CONNECTIONS

When connecting any auxiliary equipment and/or a battery isolator, proceed as follows:

- switch off the charger;
- switch off the AC mains or generator supply;
- isolate the DC distribution from the battery.

Battery wires

Keep the cable connection between charger and battery as short as possible. If possible use coloured battery cables. I f this is not possible, mark the plus and the minus cables with coloured insulating tape, e.g. red for plus and blue for minus. Use the following diameters:

charge current	lenght up to 3 meter	lenght above 3 meter
25A	6 mm²	10 mm²
50 -> 60A	25 mm²	35 mm²
75 -> 100A	35 mm²	50 mm²

Connection of main batteries

The minus cable (blue) on the -battery (minus connection) of the battery charger. The plus cable (red) on the + main battery (plus-connection) of the charger. The other side of the cable has to be connected to the battery or the DC distributor. The minus cable (blue) on the min-connection of the battery or DC divider. The plus cable (red) on the plus-connection of the battery or DC divider.

⚠ Reversing the plus and the minus wil blow will severly damage the charger.

⚠ Too thin cables and/or loose connections can cause dangerous overheating of the cables and/ or terminals. Therefore tighten all connections properly, in order to limit as much as possible transition resistance, and use the battery cables with the correct diameter.

Battery isolator

If one or more batteries or battery sets must be charged at the same time via one output, a battery isolator should be used. A battery isolator isolates the different battery sets from one another, in order to prevent one discharging the other. A consequence of the battery isolator is a voltage drop of 0.7 Volt. This voltage drop can be compensated by altering the dip-switch settings. See appendix A.
Choose isolator type:

charge current	2 battery set	3 battery set
25 -> 50A	MV 702 MT	MV 703 MT
60 -> 80A	MV 1202 MT	MV 1203 MT
100A	MV 1602 MT	MV 1603 MT

For proper installation, see the connection diagram included with the battery isolator.
Steps:

1 Check if the charger, the main supply and the DC divider are switched off.
2 Connect the battery isolator(s) using cables with the same diameter as the battery cables.
3 Compensate the voltage drop over these diodes by removing the "diode compensation" jumper on the front of the charger.
4 Switch the charger on.

Connection of cranking battery (3A output)

Only for 12/60-2, 12/80-2 and 24/50-2.The distance between charger and cranking battery de-termines the required, minimal cable diameter. For cable lenghts up to 6 meters 2,5 qmm must be used. When using long thin cables, it will take proportionately longer before a crancking battery is entirely charged. Therefore use, for longer distances, a larger diameter. The maximal charging current for the cranking battery is 3A. The char-ging current for the main battery will in this case be 3A lower.

- Connect the minus of the cranking battery to the minus of the main battery.
- Connect the plus of the cranking battery to the "+3A" plus terminal of the charger. See fig. 3.

AC power supply

Check the voltage of your mains source or generator. This must be between 190 and 250 VAC. Connect the mains cable on one side on the MASS charger and the opposite side to the mains or generator. Connect the brown wire to L1, the blue to N and the green /yellow to PE.

ACCESSORIES

When connecting accessories, first switch the charger „OFF" and disconnect from AC.

Temperature sensor

Mount the sensor at a location that gives a good indication of the battery temperature. Plug the connection cable into one of the two input jacks on the righthand side.

Basic remote panel

Plug the connection cable into the analog input jack.

Standard remote panel

Plug the connection cable into the digital input jack.
The communication protocol is based on quasi RS 232.

Adjustment Interface & advanced remote panel

Plug the connection cable into the digital input jack.
The communication protocol is based on quasi RS 232.

ADJUSTMENTS

To the left off the accessories connection. (see fig.1 in the appendix) are 4 tiny switches (dip-switches). By means off these tiny switches the configuration of the battery charger can be adjusted. The switches can be altered witch a small screwdriver. See the appendix for all possibilities.

6 OPERATION

1 Check if the charger is „OFF".
2 Connect DC output with batteries or place fuse.
3 Switch on AC source.

Switching on:

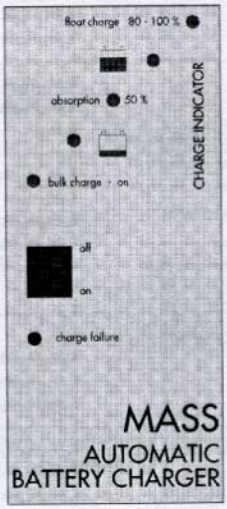
The MASS charger will be switched on by the ON switch. One of the front LEDS will light up now and the charging starts immediately.

INDICATOR LIGHTS

FLOAT:
The battery charger is in a "trickle charge" mode, batteries are 100% charged.

ABSORPTION:
The batteries are still charging, charge level is approx. 80%.

BULK:
The charger supplies the maximal voltage, the battery charge is less than 80%.



Switching off:

The IVO charger will be switched off by the OFF switch.

⚠ The connection between the mains and the bettery charger will not be severd with the switch

7 USING THE CHARGER WITH YOUR BATTERIES

CHARGING EFFICIENCY

For a good performance your batteries should not be discharged below 30-40% of their capacity. Therefore always start charging at this level.
As in marine and mobile systems often a limited charging time is desired, batteries are with generator use charged up to 85-90%. Charging up to 100% would take too long. This means that normally about 50% of the theoretical battery capacity can be used.
In case a mains connection is present, charging time is less important. Then charging up to 100% is advised.

TIPS TO INCREASE THE BATTERY LIFETIME:

- Install the batteries at a cool place. The acid in the batteries will damage the plates in a high temperature environment. A normal life time of 5 year at 20°C, will go down to 2.5 years at 30°C.

- Charge the battery immediately after a consistent deep discharge.Especially at high environment temperatures, sulfating occurs very fast. If the state of sulfating is not too bad, the battery will regain a part of its capacity after a number of charge/recharge cycles.

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8 TROUBLE SHOOTING

Malfunction	Possible cause	What to do
No output voltage and/or current	No AC mains or fuse blowes	Check fuse, replace if necessary.
	Mains or generator output too low	Check input voltage, must be between 190 and 260V (nominal 230V).
Output voltage too low but charger supplies max. current	Battery load consumes more than the charger can supply, the battery voltage cannot increase more	Reduce the battery load taken from batteries.
	Batteries not 100% charged	Measure the battery voltage after a while, this will be higher.
Charge current too low	Batteries almost fully charged	Check if the charger is in the absorption mode. In this mode, the charge current will slowly decrease.
	High ambient temperature	If the ambient temperature is more than 40°C, the maximum charge current automatically will be reduced.
	Mains too low	When the mains is lower than 190V, the charger will regulate the current down.
Batteries not fully charged	Charge current too low Current to load too high Charge time too short Battery temperature too low Defective battery (short circuit in cell)	See "charge current too low"; Decrease the battery load; Increase type of charger; Use temperature sensor; Replace the battery;
Battery very fast empty	Battery capacity reduced because: • wastage • sulphating/stagnation	 Replace the batteries; Charge/discharge for several times, this might help, otherwise replace batteries.
Batteries are warm/gassing	Defective batteries (short circuit in cell) Battery temperature too high Charge voltage too high	Replace batteries; Use temperature sensor; Check the dip-switch setting.

If you cannot solve the problem with this fault finding table, contact your Mastervolt Service Centre.
For a detailed distributor list, please contact our main office in Amsterdam, tel. +31-20-3422100.
See also error code tabel in the Appendix.

9 MAINTENANCE

The battery charger requires no specific maintenance.For a reliable and optimal function of the MASS battery charger only the following is required:

- Check at least ones a year the wire and cable connections (loosen joints etc.).
- Keep the MASS charger dry, clean and in a dust-free area, in order to ensure a good heat discharge.

10 EC DECLARATION OF CONFORMITY

CE

Manufacturer:	MASTERVOLT	
Address:	Snijdersbergweg 93 1105 AN AMSTERDAM Z.O. The Netherlands	
Herewith declares that:		
Product:	MASS battery charger	
Model:	MASS 12/60-2	MASS 24/75
	MASS 12/80-2	MASS 24/100
	MASS 24/50-2	MASS 48/25
		MASS 48/50

Is in conformity with the provision of the EC EMC directive 89/336/EEC and amendments 92/31/EEC and 93/68/EEC.

The following harmonized standards have been applied:

Generic emission standard	EN 50081-1:1992
Generic immunity standard	EN 50082-1:1992

Amsterdam,

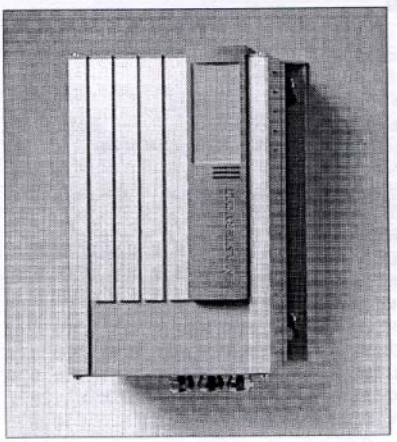
Dr. F.J. ter Heide,
Managing director MASTERVOLT

MASTERVOLT
TAILOR MADE ENERGY

APPENDIX A & B

MASS 12/60-2; 12/80-2; 24/50-2; 24/75 24/100; 48/25; 48/50

battery charger



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V1. September 1999

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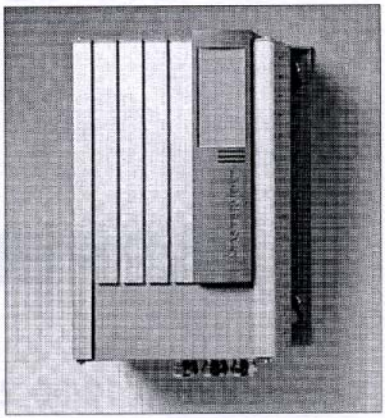
TAILOR MADE ENERGY

11 DATA SHEETS MASS



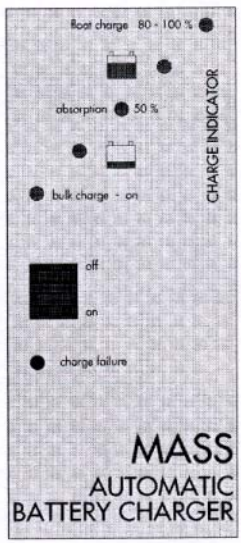
Mass 12/60-2 battery charger/rectifier, art.no 04.00.10600, in new 'high tech' enclosure.

MAIN INFORMATION TYPE INDEPENDENT

Design	:	by MASTERVOLT
Manufacturer	:	ISO 9001 certified
Product	:	battery charger/rectifier
Colour	:	• RAL 5021, wasserblau • RAL 7037, grey
Type of packing	:	carton recycable
Available	:	230V / 50-60Hz / 117V
Availability	:	normally from stock, from July '99 onwards

TECHNICAL SPECIFICATIONS

Function apparatus	:	charging of lead acid batteries and power simultanously loads
Nominal input voltage	:	230V / 117V AC, 1ph, 3wire, 50/60 Hz
Input voltage range full specs	:	190..250V, 50/60 Hz, ± 5%
Input voltage range no-defects	:	0..250V, 33-80 Hz
Inrush current	:	no inrush current, soft start, according to IEC 1003-3
Power factor	:	1, power factor controlled, IEC 555-2
Efficiency	:	> 88%
Charge characteristic	:	three-step, fully automatic, IUoUo, programmable
Kind of batteries	:	open & sealed lead acid batteries
Return Amps	:	2.5A
Min. Absorption time	:	15 minutes
Max. Bulk/abs. time	:	6 hours
Return new cycle voltage	:	12.8V, delay 30 seconds
Voltage sense	:	yes
DC Alarm	:	yes
Ripple voltage	:	max. 100mV rms, resistive load, full power
Voltage accurancy	:	voltage ± 2%
Current accurancy	:	current ± 3%
DC leakage drain	:	< 10 mA
AC/DC connections	:	internal,
Dipswitch settings	:	see table 1
Remote indication	:	status bulk, absorption, float
Remote connection	:	by telephone plug-in jack - RJ45
Temperature connection	:	by telephone plug-in jack - RJ45
Smart controls	:	QRS232 output by telephone plug - RJ45
Short circuit proctection	:	yes, reduced output
Over heat	:	yes, derating output and shut off by 80°C temperature on heatsink
Storage temperature	:	-25°C to 80°C
Operating ambient temperature	:	-20°C to 40°C, derating with 2.5% / °C > 40°C
Humidity	:	maximum 95%, not condensing
Vibration	:	according IEC 68-2-6
Cooling	:	mix of conventional and forced air cooling
Forced cooling	:	by variable speed maintenance free DC fan
Environmental protection	:	IP21



Standard control on unit.

Reliability/life time	:	• MTBF 30.000 hours • 1/4 life time period, Uin = 207V AC, Uout = 14,25, Iout = 30 Amps at Tamb 40°C • 3/4 life time period, Uin = 207V Ac, Uout = 13,25, Iout = 30 Amps at Tamb 25°C

ELECTRO MAGNETIC COMPATBILITY

Electro Magnetic Emission : better than EN 50081-1 (gen. emmission standard, scope; residiential, commercial & light industry)
Electro Magnetic Immunity : better than EN 50082-1 (gen. emmission standard, scope; residiential, commercial & light industry)
Safety : according to IEC 335-2-29, polarity protected by means of a breaker, short break

WHAT TO DO IN CASE OF A DEFECT?

✔ Consult factory in Amsterdam, tel. +31-20-3422100, or your local Repair Center.

MAIN INFORMATION TYPE DEPENDENT

Model		**12/60-2**	**12/80-2**	**24/50-2**	**48/25**
Article no. 230V AC		04-00-10600	04-00-10800	04-00-20500	04-00-40250
Article no. 117V AC		NA	04-01-10800	04-01-20500	NA
Enclosure		Mass 2	Mass 2	Mass 2	Mass 2
Dimensions		340 x 261 x 130	340 x 261 x 130	340 x 261 x 130	340 x 261 x 130
Weight excl. packing		5 kg	5 kg	5 kg	5 kg
Shipping weight		7 kg	7 kg	7 kg	7 kg
Input					
Input current at 230V	[A]	4	6	7	7
Input power at 230V	[W]	900	1400	1600	1600
Input current at 117V	[A]	NA	12	14	NA
Input power at 117V	[W]	NA	1400	1600	NA
Output					
Nominal voltage		12V DC	12V DC	24V DC	48V DC
Charge voltages *)		14,25V – 13,25V	14,25V – 13,25V	28,5V – 26,5V	57V en 53V
Charge current		60A	80A	50A	25A

Model		**24/75**	**24/100**	**48/50**
Article no. 230V AC		04-00-20750	04-00-21000	04-00-40500
Article no. 117V AC		NA	04-01-21000	04-01-20500
Enclosure		Mass 3	Mass 3	Mass 3
Dimensions		420 x 318 x 130	420 x 318 x 130	420 x 318 x 130
Weight excl. packing		9 kg	9 kg	9 kg
Shipping weight		11 kg	11 kg	11 kg
Input				
Input current at 230V	[A]	12	16	16
Input power at 230V	[W]	2700	3600	3600
Input current at 117V	[A]	NA	32	32
Input power at 117V	[W]	NA	3600	3600
Output				
Nominal voltage		12V DC	12V DC	48V DC
Charge voltages *)		28,5V – 26,5V	28,5V – 26,5V	57V en 53V
Charge current		75A	100A	50A

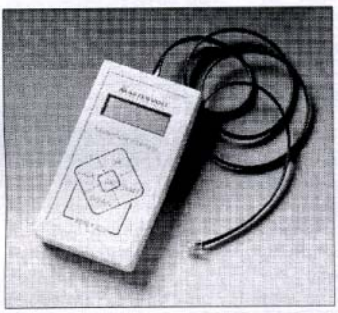
COMPLIANCES

- **CE:**
  Is in conformity with the provision of the EC EMC directive 89/336/EEC and amandments 92/31/EEC, 93/68/EEC.
  The following harmonized standards have been applied:
  - Generic emission standard : EN 50081-1:1992
  - Generic immunity standard : EN 50082-1:1992
- **LLOYDS, DNV, ABS:**
  MASTERVOLT has constructed this product for rugged circumstances in professional or leisure situations.
  This product can be type-approved individually. Price approx. US $ 1500 per certification.
- **MANUFACTURED UNDER ISO 9001.**

*) Depending off charge status and battery condition

ACCESSORIES & REMOTES

Model	Article no	description	
MV 702 MT	08-20-07020		
MV 703 MT	08-20-07030		
MV 1202 MT	08-20-12020		
MV 1203 MT	08-20-12030		
MV 1602 MT	08-20-16020		
MV 1603 MT	08-20-16030		
	04-15-00100	basic remote control LED's	
	--	standaard remote contol	LED's current control
	--	advanced remote control	display with owner's settings
	04-15-00300	MASS 1 temperature sensor	
	--	MASS 1 cable set	
	--	MASS 1 remote cable set	
	00-17-05000	Adjustment Interface	
	--	Smart alarm control box	



Adjustment Interface, art. no 02-17-05000.
The below mentioned data can be adjusted with this digital instrument:
- *adjustment charge voltage (e.g. traction)*
- *'return' Amps etc.*

For 12V chargers

	Set points register	Setpoint	
1	Min. bulk time	30	sec.
2	Temperature variation	30	mV/C
3	Return to bulk time	30	sec.
4	Return to bulk voltage	12.80	V
5	Max. bulk/abs time	360	min.
6	Min. abs time	15	min.
7	Return Amps	2.5	Amps
8	Max. charge current	I max	
9	Bulk voltage	14.25	V
10	Abs voltage	14.25	V
11	Float voltage	13.25	V
12	Forced to float voltage	13.25	V
13	Gel voltage setting	550	mV
14	Diode compensation setting	600	mV
15	DC high alarm on	16.00	V
16	DC high alarm off	15.00	V
17	DC low alarm on	10.00	V
18	DC low alarm off	11.00	V
19	Alarm delay time	30	sec.

For 24V chargers

	Set points register	Setpoint	
1	Min. bulk time	30	sec.
2	Temperature variation	60	mV/C
3	Return to bulk time	30	sec.
4	Return to bulk voltage	25.6	V
5	Max. bulk/abs time	360	min.
6	Min. abs time	15	min.
7	Return Amps	2.5	Amps
8	Max. charge current	I max	
9	Bulk voltage	28.5	V
10	Abs voltage	28.5	V
11	Float voltage	26.5	V
12	Forced to float voltage	26.5	V
13	Gel voltage setting	1100	mV
14	Diode compensation setting	600	mV
15	DC high alarm on	32	V
16	DC high alarm off	30	V
17	DC low alarm on	20	V
18	DC low alarm off	22	V
19	Alarm delay time	30	sec.

For 48V chargers

	Set points register	Setpoint	
1	Min. bulk time	30	sec.
2	Temperature variation	120	mV/C
3	Return to bulk time	30	sec.
4	Return to bulk voltage	51.2	V
5	Max. bulk/abs time	360	min.
6	Min. abs time	15	min.
7	Return Amps	2.5	Amps
8	Max. charge current	I max	
9	Bulk voltage	57	V
10	Abs voltage	57	V
11	Float voltage	53	V
12	Forced to float voltage	53	V
13	Gel voltage setting	2200	mV
14	Diode compensation setting	600	mV
15	DC high alarm on	64	V
16	DC high alarm off	60	V
17	DC low alarm on	40	V
18	DC low alarm off	44	V
19	Alarm delay time	30	sec.

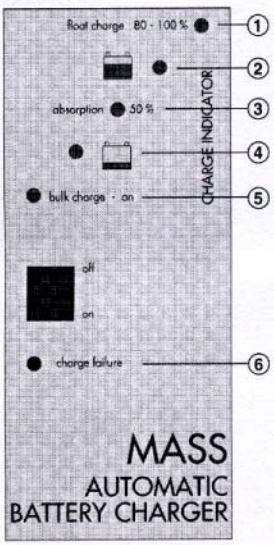
DIP SWITCH SETTINGS

4	3	2	1	dip switches
0	0	0	0 :	Standard
1	0	0	0 :	Diode
0	1	0	0 :	Gel
1	1	0	0 :	Diode + Gel
0	0	1	0 :	Traction
1	0	1	0 :	Traction + Diode
0	1	1	0 :	ContMon + Traction
1	1	1	0 :	ContMon + Traction + Diode
0	0	0	1 :	ForceFloat
1	0	0	1 :	ForceFloat + Diode
0	1	0	1 :	ForceFloat + Gel
1	1	0	1 :	ForceFloat + Diode + Gel
0	0	1	1 :	ContMon
1	0	1	1 :	ContMon + Diode
0	1	1	1 :	ContMon + Gel
1	1	1	1 :	ContMon + Diode + Gel

1 = on; 0 = off

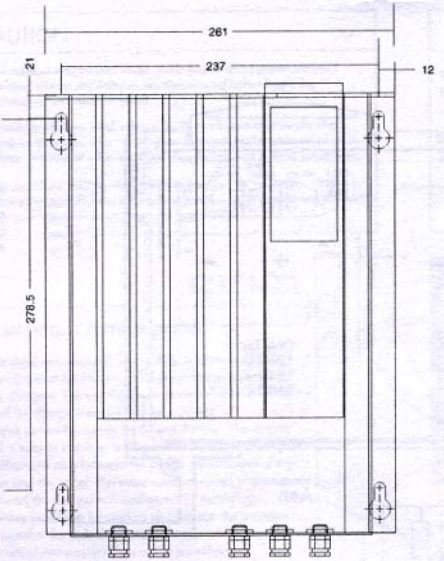
ContMon: Continuous monitor mode. The µP and the RS485/RS232/DCAlarm stays functioning at mains failure. The auxiliary power goes down but the remote's stay functioning if remote has own power source.
Diode: Diode compensation on (+0,6V)
Gel: Gel compensation on (+0,55V during float) or 1,1V/24V or 2,2V/48V
Traction: Traction charging (29,2V during bulk and 28,9 in absorption)

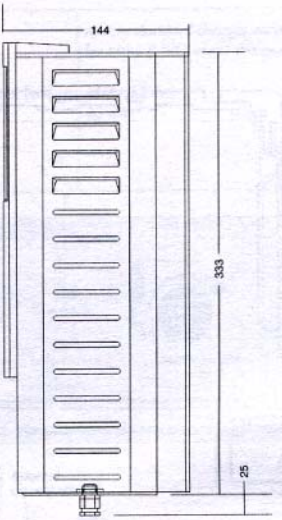
ERROR CODE TABEL



Illuminating LED's	Meaning
① and ⑥	Temperature sense error. the sensor wires are connected short circuited together
② and ⑥	DC error The output voltage is too high or too low.
③ and ⑥	Possible schort circuit on the output The charge current will be reduced to a quarter of the maximum value
④ and ⑥	The charger is too hot because off insufficient ventilation.
⑤ and ⑥	Battery sense error The sense wires are reversibly connected or the charger has reached the maximum compensatble value. The charger compensates the voltage loss on the cable till a maximum of 2.5V

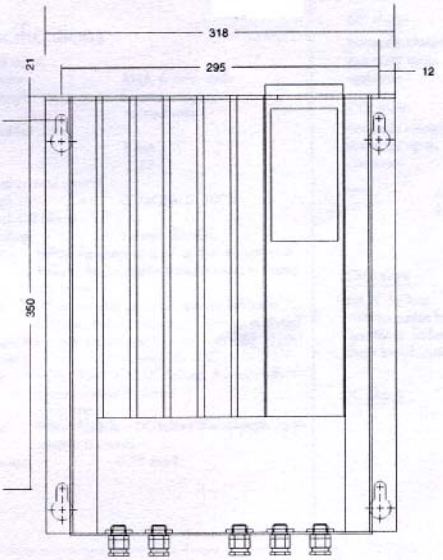
DIMENSIONS FOR 12/60-2, 12/80-2, 24/50-2, 48/25

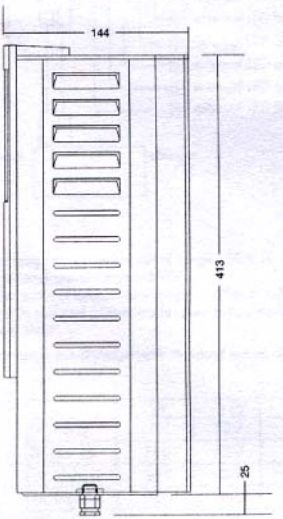




Mass 2 enclosure

DIMENSIONS FOR 24/75, 24/100, 48/50





Mass 3 enclosure

CONNECTIONS

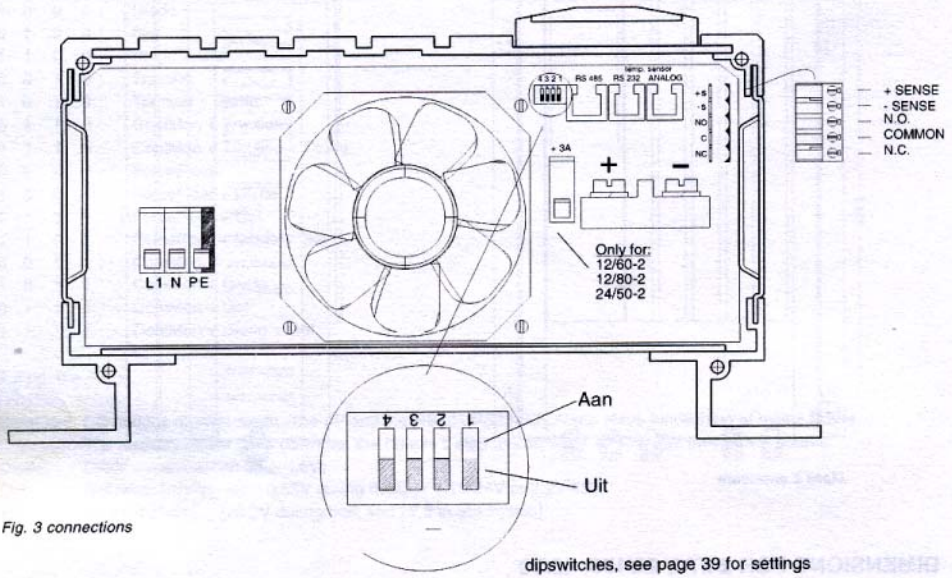


Fig. 3 connections

dipswitches, see page 39 for settings

panel code	C-3-RS
part number	07-04-03040

MASTERVISION MODULAR SWITCHBOARDS

CAUTION

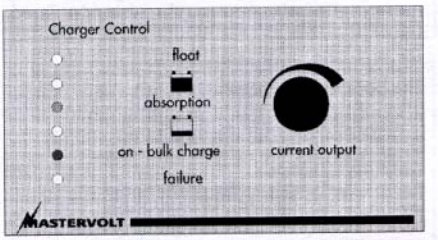
1. Lethal voltages exist on your vessel. Make sure all shore power, onboard generating sources and batteries are disconnected before beginning installation of your electrical panel.
2. AC modules will have lethal voltages on the bus bars and terminals. The coating on these bars is for identification only and should not be relied on as a insulator. Additional safety enclosures may be required in some installations.
3. Make sure all AC modules are bonded to the ships AC ground bus. When grouping modules together to form your panel, a single ground may be used. Use a resistance meter to verify ground to all modules.

SPECIFICATIONS

description: type:	remote standard charger control for Mass & IVO smart chargers
dimensions panel (wxh): panel depth:	120 x 65 mm 40 mm

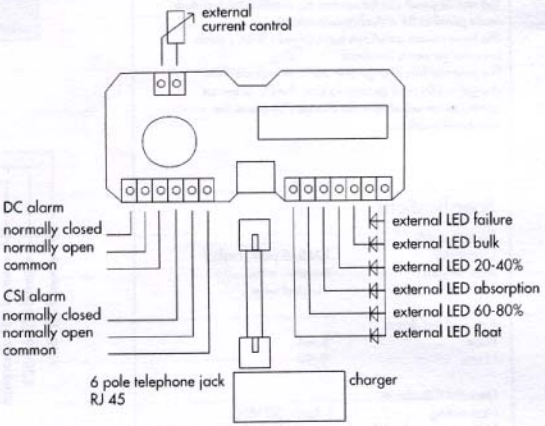
The standard remote panel

The standard remote panel is a useful power device for remote control of the Mass an IVO smart Mastervolt battery chargers. The standard remote control does indicate the status of the charge control by six high power leds and control the output current by setting the potential meter. The remote control is easy to install by a plug-in standard twisted six pole RJ45 telephone plug between the digital rs232 output of the charger and the panel. The serial communication of the remote control and the charger is based on rs232 technology.
The remote panel can be used as an interface for a custom made panel or for a dual remote indicator.
The standard remote panel has a CSI (csi=charger status interface) and a DC high/low alarm.
The two potential free change-over contacts indicate if the charger is ON or in general failure. The DC alarm set points can be adjusted in the charger by use of the adjustment interface.



Specifications

Remote cable:	
Connector	RJ45, 6 pole, male
Max length	6 meter, max
Type	twisted wire
External led drive:	
Imax	5 mA
Umax	2,5V
External current control	
R pot cc	0..1kOhm 0..100%
General CSI alarm	
Max rating	1 Amp, 30 VDC
NC-on	When the charger is off or the charger is in failure, the normally closed contact is closed
C	Common
NO-on	When the charger is on and no-failure is indicated the normally open contact is closed
DC-high/low alarm (combined function with CSI)	
Max rating	1 Amp, 30 VDC
NC-on	When there is no DC failure, the normally closed contact is closed
C	Common
NO-on	When there is a DC failure the normally open contact is closed
Connectors	0,75 mm2



CSI failure

Bat TC failure	Battery temperature sensor out of range <20°C & >60°C
Voltage sense failure	Voltage sense out of range >3 VDC
Sys. temp. failure	Charger is out of temperature range "overload" (>75--85 C)
Short break indicator	Charger in reduced current mode (short break mode) Uout <4..5VDC

DC alarm

Battery range out of range (with standard setting of charger)

	12V	24V	
DC low on	10.0	20.0	VDC
DC low off	11.0	22.0	VDC
DC high on	16.0	32.0	VDC
DC high off	15.0	30.0	VDC
Delay time	30	30	SEC

panel code	C-4-RB
part number	07-04-04100

MASTERVISION MODULAR SWITCHBOARDS

CAUTION

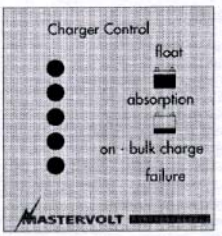
1. Lethal voltages exist on your vessel. Make sure all shore power, onboard generating sources and batteries are disconnected before beginning installation of your electrical panel.
2. AC modules will have lethal voltages on the bus bars and terminals. The coating on these bars is for identification only and should not be relied on as a insulator.
   Additional safety enclosures may be required in some installations.
3. Make sure all AC modules are bonded to the shipis AC ground bus. When grouping modules together to form your panel, a single ground may be used. Use a resistance meter to verify ground to all modules.

SPECIFICATIONS

description: type:	remote basic charger control for Mass & IVO smart chargers
dimensions panel (wxh): panel depth:	60 x 65 mm 40 mm

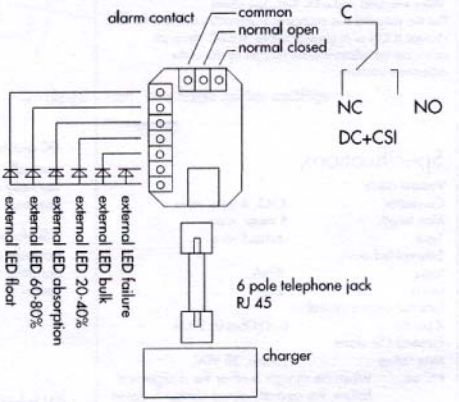
The basic remote panel

The basic remote panel is a useful power device for remote control of the Mass an Ivo smart Mastervolt battery chargers.
The basic remote control does indicate the status of the charge control by six high power leds.
The remote control is easy to install by a plug-in standard twisted six pole RJ45 telephone plug between the analog output of the charger and the panel. The communication of the remote control and charger is based on analog technology.
The remote panel can be used as an interface for a custom made panel or for a dual remote indicator.
The basic remote panel has a combined CSI-DC/alarm (csi=charger status interface).
The potential free change-over contacts indicate if the charger is ON or in general failure. The DC alarm set points can be adjusted in the chargers by use of the adjustment interface.



Specifications

Remote cable:	
Connector	RJ45, 6 pole, male
Max length	6 meter, max
Type	twisted wire
External led drive:	
Imax	5 mA
Umax	2,5V
General CSI alarm	
Max rating	1 Amp, 30 VDC
NC-on	When the charger is off or the charger is in failure, the normally closed contact is closed
C	Common
NO-on	When the charger is on and no-failure is indicated the normally open contact is closed
Connectors	0,75 mm2



Combined CSI failure and DC high/low alarm

Bat TC failure	Battery temperature sensor out of range <20°C & >60°C
Voltage sense failure	Voltage sense out of range >3 VDC
Sys. temp. failure	Charger is out of temperature range ioverloadi (>75··85 C)
Short break indicator	Charger in reduced current mode (short break mode) Uout <4..5VDC
DC alarm	Battery range out of range (with standard setting of charger)

	12V	24V	
DC low on	10.0	20.0	VDC
DC low off	11.0	22.0	VDC
DC high on	16.0	32.0	VDC
DC high off	15.0	30.0	VDC
Delay time	30	30	SEC

These products fully comply to the latest CE norms in force from Januari 1st 1996 and are produced to ISO 9001 standards.

ISO 9001 CE