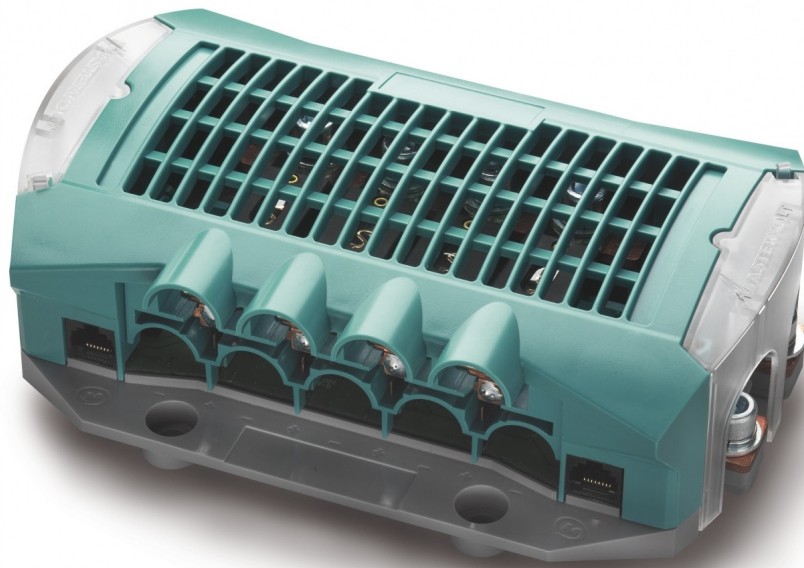




USERS MANUAL

DC Distribution 500

DC Connection Device



QUICK REVIEW

The **DC Distribution** is a connecting device. It enables you to connect up to 4 different DC devices safely. Besides, the internal fuses are being monitored and their state can be accessed via the MasterBus communication platform.

The DC Distribution features three different menus:

- a monitoring menu which shows the state (OK or Alarm in one or more fuses);
- a configuration menu to enter DC Distribution settings;
- an alarm menu which shows what fuse has possibly blown.

A read out device is necessary for showing the information. For example:

- MasterView Classic
- MasterView Easy (as seen below)
- MasterAdjust PC software (via USB interface)



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v 1.3 July 2010

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1 GENERAL INFORMATION

1.1 USE OF THIS MANUAL

Copyright © 2010 Mastervolt. All rights reserved.
Reproduction, transfer, distribution or storage of part or all of the contents in this document in any form without the prior written permission of Mastervolt is prohibited.

This manual serves as a guideline for the safe and effective operation, maintenance and possible correction of minor malfunctions of the *DC Distribution*.

This manual is valid for the following models:

Description	Part number
DC Distribution	77020200

It is therefore obligatory that every person who works on or with the *DC Distribution* is completely familiar with the contents of this manual, and that he/she carefully follows the instructions contained herein.

Installation of, and work on the *DC Distribution*, may be carried out only by qualified, authorised and trained personnel, consistent with the locally applicable standards and taking into consideration the safety guidelines and measures (chapter 2 of this manual).

Keep this manual at a secure place!

The English version includes 20 pages.

1.2 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 users 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.

1.3 QUALITY

During their production and prior to their delivery, all of our units are exhaustively tested and inspected. The standard guarantee period is two years.

1.4 VALIDITY OF THIS MANUAL

All of the specifications, provisions and instructions contained in this manual apply solely to standard versions of the *DC Distribution* delivered by Mastervolt.

1.5 LIABILITY

Mastervolt can accept no liability for:

- consequential damage due to use of the *DC Distribution*;
- possible errors in the manuals and the results thereof.



CAREFUL!

Never remove the type number plate.

Important technical information required for service, maintenance & secondary delivery of parts can be derived from the type number plate.

1.6 CHANGES TO THE DC DISTRIBUTION

Changes to the *DC Distribution* may be carried out only after obtaining the written permission of Mastervolt.

2 SAFETY GUIDELINES AND MEASURES

2.1 WARNINGS AND SYMBOLS

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



CAREFUL!

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



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.



A procedure, circumstance, etc which deserves extra attention.

2.2 USE FOR INTENDED PURPOSE

- 1 The *DC Distribution* is constructed as per the applicable safety-technical guidelines.
- 2 Use the *DC Distribution* only:
 - in a technical correct condition;
 - in a closed, well-ventilated room, protected against rain, moist, dust and condensation;
 - observing the instructions in the users manual.



WARNING

Never use the *DC Distribution* in locations where there is danger of gas or dust explosion or potentially flammable products!

- 3 Use of the *DC Distribution* other than mentioned in point 2 is not considered to be consistent with the intended purpose. Mastervolt is not liable for any damage resulting from the above.

2.3 ORGANIZATIONAL MEASURES

The user must always:

- have access to the user's manual;
- be familiar with the contents of this manual. This applies in particular to this chapter, Safety Guidelines and Measures.

2.4 MAINTENANCE AND REPAIR

- 1 If the electrical installation is switched off during maintenance and/or repair activities, it should be secured against unexpected and unintentional switching on:
 - switch off all charging systems;
 - switch off the connection with the batteries;
 - be sure that third parties cannot reverse the measures taken.
- 2 If maintenance and repairs are required, only use original spare parts.

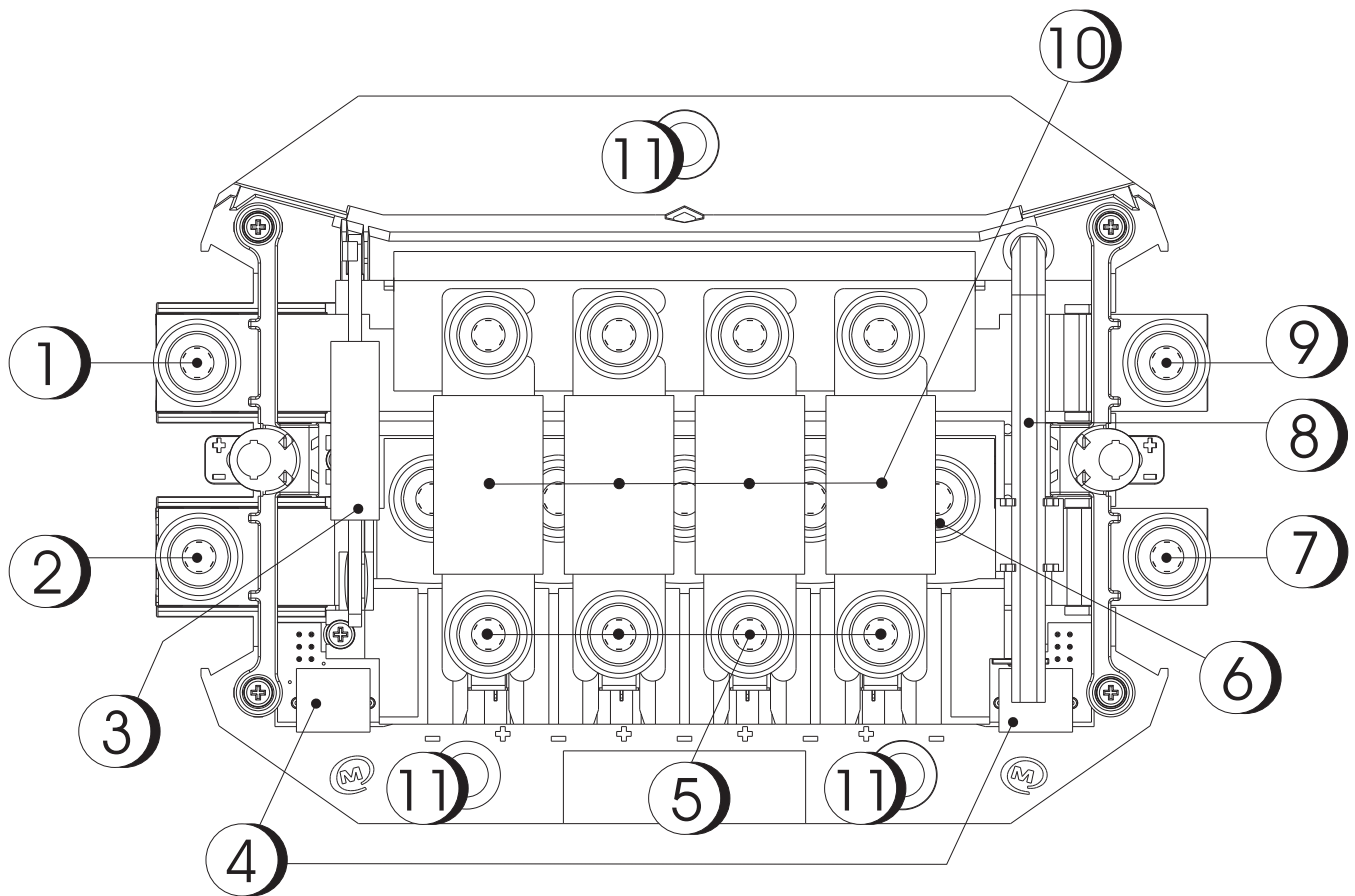
2.5 GENERAL SAFETY AND INSTALLATION PRECAUTIONS

- Connection and protection must be done in accordance with local standards.
- Do not work on the *DC Distribution* or system if it is still connected to a current source. Only allow changes in your electrical system to be carried out by qualified electricians.
- Check the wiring at least once a year. Defects such as loose connections, burned cables etc. must be corrected immediately.

2.6 WARNING REGARDING THE USE OF BATTERIES.

Excessive battery discharge and/or high charging voltages can cause serious damage to batteries. Do not exceed the recommended limits of battery discharge level. Avoid short circuiting batteries, as this may result in explosion and fire hazard. Installation of the batteries and adjustments of the *DC Distribution* should only be undertaken by authorised personnel!

3 OPERATION



1. Positive pole at MasterShunt side
2. Negative pole at MasterShunt side
3. Spare fuse (included)
4. MasterBus connector (2x)
5. Positive pole connections components
6. Negative pole connections components

7. Negative pole at load side
8. Hexagonal socket wrench (included)
9. Positive pole at load side
10. Fuses (included)
11. Mounting holes (3x)

Figure 1: DC Distribution with lid detached

3.1 INTRODUCTION

The Mastervolt *DC Distribution* offers fused DC connections to install up to four different components. Besides it provides the MasterBus network (see chapter 4) with information about the fuse state. To view the MasterBus information you need a MasterBus display.

3.2 CONNECTING YOUR COMPONENTS

Your components are securely connected to the main DC lines with fuses that can be chosen to match the components. If you have two groups installed, i.e. the ingoing group (chargers) and the outgoing group (inverters), the sum of fuse currents may never exceed 500A per group.

Regarding the currents a charger inverter combi should be counted to the two groups.



CAREFUL!

The maximum fuse size may never exceed 300A!

3.3 FEATURES

- Connecting up to 4 components to the main DC line, fused in positive line
- Easy installation
- Possibility to choose four fuses
- Accurate alarm indication for system fuses
- Remote monitoring of fuses
- MasterBus network support (Refer to chapter 4 for more information on how MasterBus works)
- Communication LEDs to show data traffic and alarm situation.
- Solid housing of the fuses with isolation of the DC connections.

3.4 MASTERBUS DISPLAYS

Mastervolt offers several ways of displaying your MasterBus data. Shown is the MasterView Classic panel.

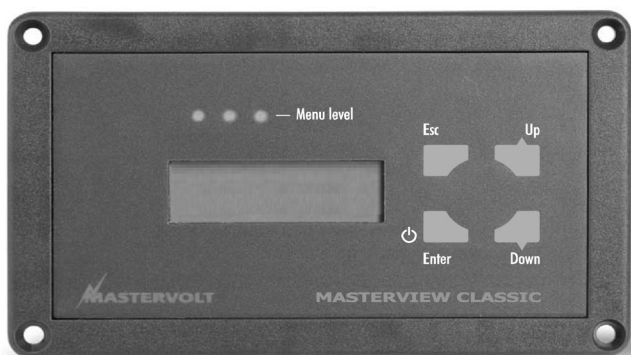


Figure 2: MasterView Classic panel

Another way of displaying and setting values is the MasterAdjust software, shown for DC Distribution application. See figure 3.

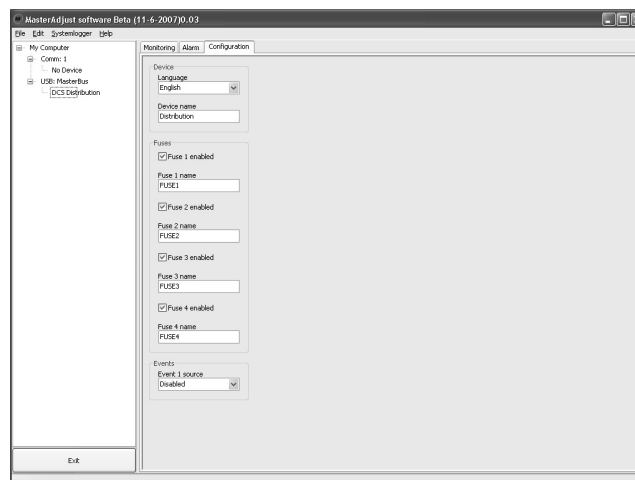


Figure 3: MasterAdjust software

3.5 EVENT BASED PROGRAMMING

An event is a *condition* to be met at which you want *another device* to perform a *task*.

If a fuse has blown, you might want to switch off a component. To trigger this component, a signal is needed that the according fuse has blown. This signal is originated in the event.

DC Distribution has 4 parameters available to serve as an event. These are the 4 fuse states. These can be On (in function) or Off (blown).

3.6 COMMUNICATION LEDs

The DC Distribution features two LEDs, between the DC connectors at the load side and battery side (see also figure 1). These two green LEDs blink together in three modes:

Mode	Blinking	Meaning
1	Simultaneously short, regular intervals	No MasterBus activity
2	Simultaneously, irregular intervals	MasterBus activity
3	Alternately, regular intervals of half a second	Alarm situation

4 MASTERBUS

4.1 WHAT IS MASTERBUS?



All devices that are suitable for MasterBus are marked by the MasterBus symbol.

MasterBus is a fully decentralized data network for communication between the different Mastervolt system devices. It is a CAN-bus based communication network which has proven itself as a reliable bus-system in automotive applications. MasterBus is used as power management system for all connected devices, such as the inverter, battery charger, generator and many more. This gives the possibility for communication between the connected devices, for instance to start the generator when the batteries are low.

MasterBus reduces complexity of electrical systems by using UTP patch cables. All system components are simply chained together. Therefore each device is equipped with two MasterBus data ports. When two or more devices are connected to each other through these data ports, they form a local data network, called the MasterBus. The results are a reduction of material costs as only a few electrical cables are needed and less installation time.

For central monitoring and control of the connected devices Mastervolt offers a wide range of panels which show full status information of your electrical system at a glance and a push of a button. Four different panels are available, from the small Mastervision compatible 120 x 65mm LCD screen up to the full colour MasterView System panel. All monitoring panels can be used for monitoring,

control and configuration of all connected MasterBus equipment.

New devices can be added to the existing network in a very easy way by just extending the network. This gives the MasterBus network a high degree of flexibility for extended system configuration, not only today, but in the future as well!

Mastervolt also offers several interfaces, making even non-MasterBus devices suitable to operate in the MasterBus network. For direct communication between the MasterBus network and a product which is not from Mastervolt, the Modbus interface is recommended.



CAUTION: Never connect a non-MasterBus device to the MasterBus network directly! This will void warranty of all MasterBus devices connected.

4.2 EVENT BASED COMMANDS

With MasterBus each device can be programmed to initiate an action at an other connected device. This is done by means of event based commands.

Example: if the shore power of a boat in the harbour is almost in overload, the onboard generator must be started.

As for instance the shore power is measured by the Mass Systemswitch, this device is considered as the command source. The generator is the device that should initiate an action (start the generator), and is therefore considered to be the target. This means that the Mass Systemswitch must be programmed as follows:

Event source:	Shore pre overload	Select from <i>list of events sources</i> (see manual of the <i>Mass Systemswitch</i>)
Event target:	Generator	Select from the <i>device list</i> (devices connected to the MasterBus)
Event command:	Status	Select event command from the <i>list of event commands</i> of the target (see manual of the of the <i>Generator</i>)
Event data:	On	Select event action from the <i>list of event commands</i> of the target (see manual of the of the <i>Generator</i>)

The *list of events sources* and the *list of event commands* of the DC Distribution are stated in chapter 5 of this manual.

4.3 HOW TO SET UP A MASTERBUS NETWORK

Every device that is suitable for the MasterBus network is equipped with two data ports. When two or more devices are connected to each other through these ports, they form a local data network, called the MasterBus.

Keep the following rules in mind:

Connections between the devices are made by standard straight UTP patch cables. Mastervolt can supply these cables. These cables are also commonly available at computer supply stores.

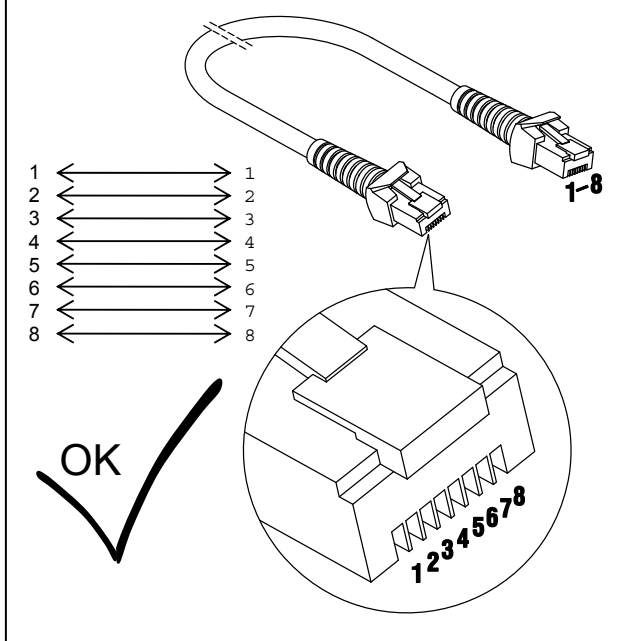


Figure 4: UTP patch cable

As with all high speed data networks, MasterBus needs a terminating device on both ends of the network.

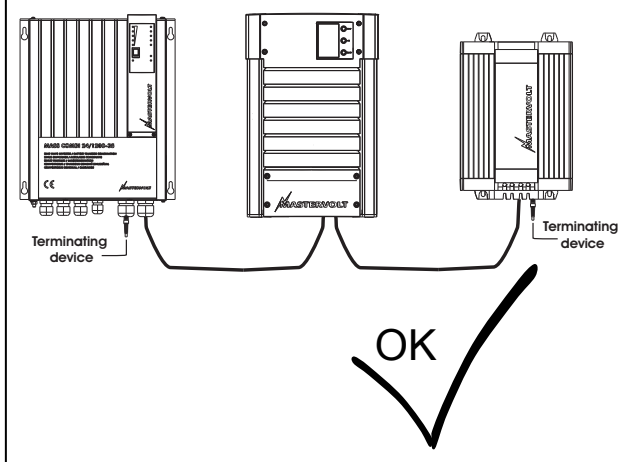


Figure 5: Two terminators

The electric power for the network comes from the connected devices.
 At least one device in the network should have powering capabilities (see specifications).
 One powering device can power up to three non-powering devices.
 As all powering devices are galvanically isolated, multiple powering devices are allowed.

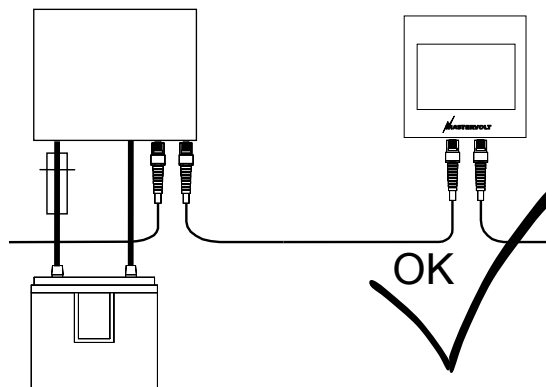


Figure 6: Power supply

Do not make ring networks.

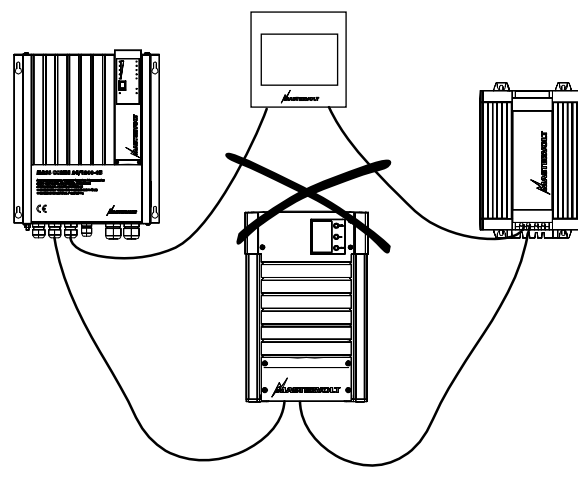


Figure 7: No ring networks

Do not make T-connections in the network.

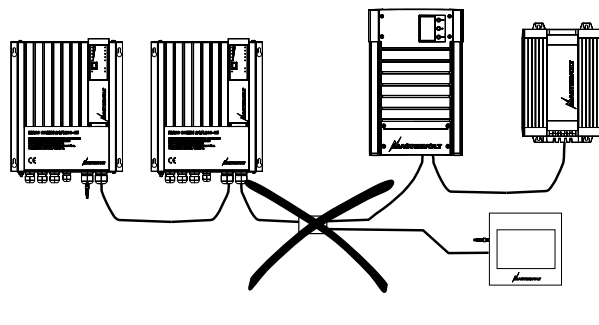


Figure 8: No T-connections

5 MASTERBUS FUNCTIONS

This chapter describes the MasterBus functions available with the DC Distribution.

Menu/ read out	Description	Factory setting	Range
Monitoring			
<i>State</i>	State of the fuses. If a fuse has blown, this read out changes from OK to Alarm.	OK	OK, Alarm
Alarms			
<i>Fuse 1</i>	In case of Alarm (On), this read out indicates fuse 1 has blown (see figure 11 for fuse position numbers).	Off	Off, On
<i>Fuse 2</i>	In case of Alarm (On), this read out indicates fuse 2 has blown (see figure 11 for fuse position numbers).	Off	Off, On
<i>Fuse 3</i>	In case of Alarm (On), this read out indicates fuse 3 has blown (see figure 11 for fuse position numbers).	Off	Off, On
<i>Fuse 4</i>	In case of Alarm (On), this read out indicates fuse 4 has blown (see figure 11 for fuse position numbers).	Off	Off, On
Configuration			
General			
<i>Language</i>	Language setting of the DC Distribution. NOTE: the language of the display itself may differ from this setting.	English	10 languages, see section 9.1.
<i>Device name</i>	Name of your DC Distribution in the MasterBus system. If you have more than one DC Distribution you might want to change names.	DC Distri	Any name with maximum 12 characters.
<i>Fuse 1 enabled</i>	If Fuse 1 is enabled, this screen reads "On". Disable a fuse when no component is connected. This will prevent unexpected alarms.	On (Enabled)	On (Enabled), Off (Disabled).
<i>Name Fuse 1</i>	Name of fuse 1 in your DC Distribution in the MasterBus system.	Fuse 1	Any name with maximum 12 characters.
<i>Fuse 2, 3, 4</i>	See Fuse 1.		
Configuration			
Events			
<i>Event 1 source</i>	Select an event to serve as Event 1. The events are only valid if the mentioned fuse (Fuse 1, 2, 3, 4) has been installed. If you don't select Event 1, it stays Disabled.	Disabled	Disabled, Power OK, State OK, Fuse 1 fail, fuse 2 fail, fuse 3 fail, fuse 4 fail.
<i>Event 1 target</i>	Select a device in your system to perform the task if Event 1 takes place. For example a MasterView display could be selected if it is in your power system.	Select...	Selectable targets are system dependent.
<i>Event 1 command</i>	Select a command, depending on the device you chose. The command can be a section of the device to perform a task, for example the command Backlight is one option if MasterView Classic is the Target.	Select...	Selectable targets are system dependent.
<i>Event 1 data</i>	Data is linked to the command. If the event takes place, Copy sets the Command to On whilst Copy Invert sets the Command to Off. Toggle changes the status of a device (On/Off) every time the event takes place. See figure 12.	Off	Off, On, Copy, Copy Invert, Toggle.
<i>Event 2 to 9</i>	Up to 9 events are configurable on the DC Distribution.		

See figure 9.

The fuse positions are numbered from left to right with the DC Distribution oriented that way, the connections and the two mounting holes are pointing towards you.

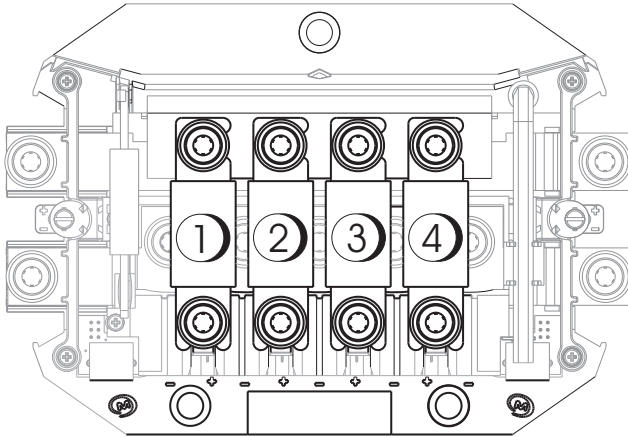


Figure 9: Fuse position numbers

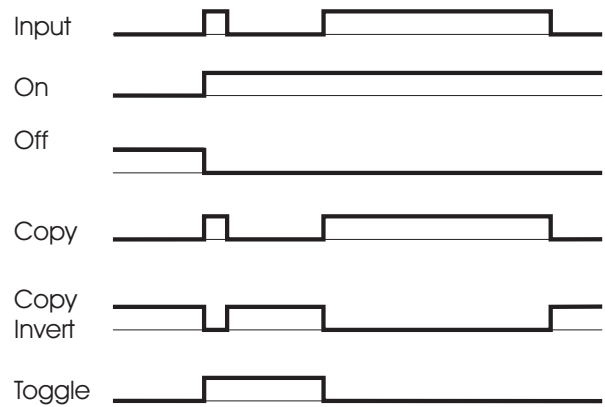


Figure 10: Event data

Figure 10 shows the meaning of the event data.

Input is a pulse followed by a longer signal (1/0).

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.

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

6 INSTALLATION



WARNING

During installation and commissioning of the DC Distribution, the Safety Guidelines and Measures are applicable at all times. See chapter 2 of this manual.



CAREFUL!

Wrong connections may cause damage to the DC Distribution and other equipment as well, which is not covered by warranty!

6.1 THINGS YOU NEED FOR INSTALLATION

Tools:

- Hexagonal socket wrench size 6 mm (included)
- 2 mm flat blade screwdriver.

A complete set of spanners, pliers and wrenches may be helpful during the installation of the *DC Distribution*.



CAREFUL!

Use isolated tools!

Materials:

- DC Distribution
- Up to four fuses, together maximum 500A per group. See section 3.2.
Five fuses included (see figure 1, nr 3 and 10):
 - 160A (1x)
 - 125A (2x)
 - 80A (2x)
- MasterBus cable
- Terminator for MasterBus
- Two translucent end pieces
- Four DC cones
- One translucent mid piece for connection to another MasterConnect device.
- Seventeen M8 hexagonal screws with spring washer and washer to fasten the DC wiring and fuses.
- Heavy duty battery cables shortest possible, finished with cable lugs. Mastervolt advises to use maximum 70 mm² cables for connection components and maximum 95 mm² cables for input and output.

6.2 INSTALLATION STEP BY STEP

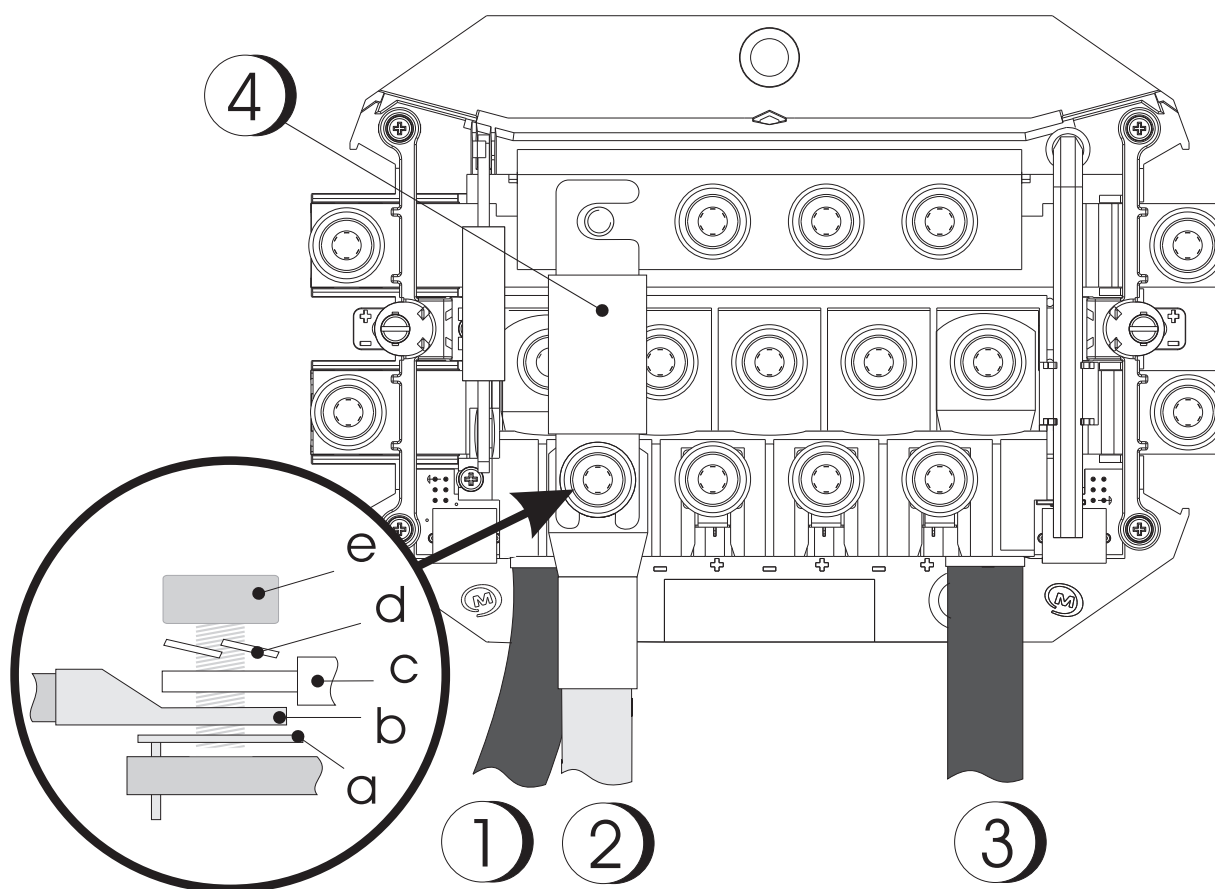
Disconnect the electrical power:

- Switch off all connected components.
- Disconnect the DC poles on both sides, first the positive pole at MasterShunt side.
- Check with a suitable voltmeter whether the entire DC installation is voltage free.
- Mount the DC wiring (see figure 11). Mount the grounding wire (3) first, then the negative wires (1) and finally the positive wires (2).

- Mount the fuse (4) by removing the screw on the positive strip first and fastening it with the fuse installed.
- Fasten the parts in the right order (see figure 11, a - e).



Fasten the M8 hexagonal screws with a 9 – 12 Nm (80 – 105 InLbs) torque. Otherwise the DC Distribution is damaged seriously!



- a Measuring plate
- b Cable lug
- c Fuse plate
- d Washer ring
- e Fastening screw

- 1 Negative DC out 1
- 2 Positive DC out 1
- 3 Grounding cable
- 4 Fuse (to be installed last)

Figure 11: Installation of the DC Distribution

6.3 COMMISSIONING

Check if all wiring is OK. Then:

- (Re)connect the load.
- (Re)connect the DC Distribution



If no fuse is installed at a position, you need to disable the according alarm function.

6.4 MASTERCONNECT

The DC Distribution belongs to the MasterConnect range. These devices link to each other on the DC

connectors directly by pushing them together. See figure 12.

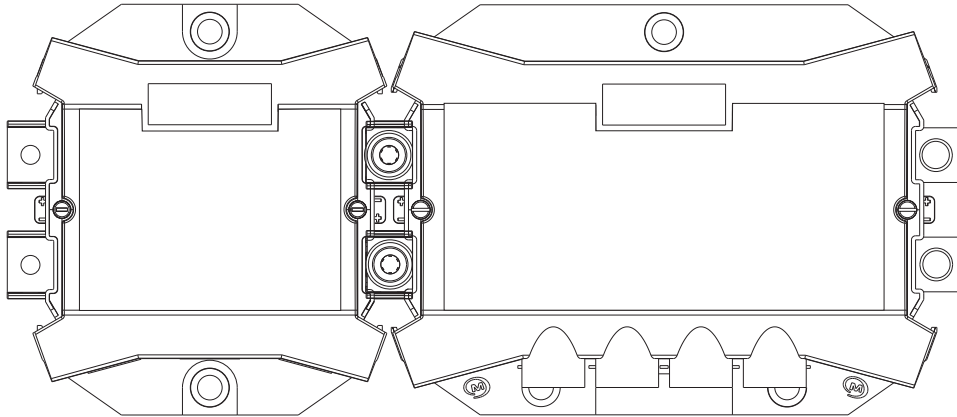


Figure 12: DC Distribution (right) connected with MasterShunt (left)

6.5 SYSTEM EXAMPLE

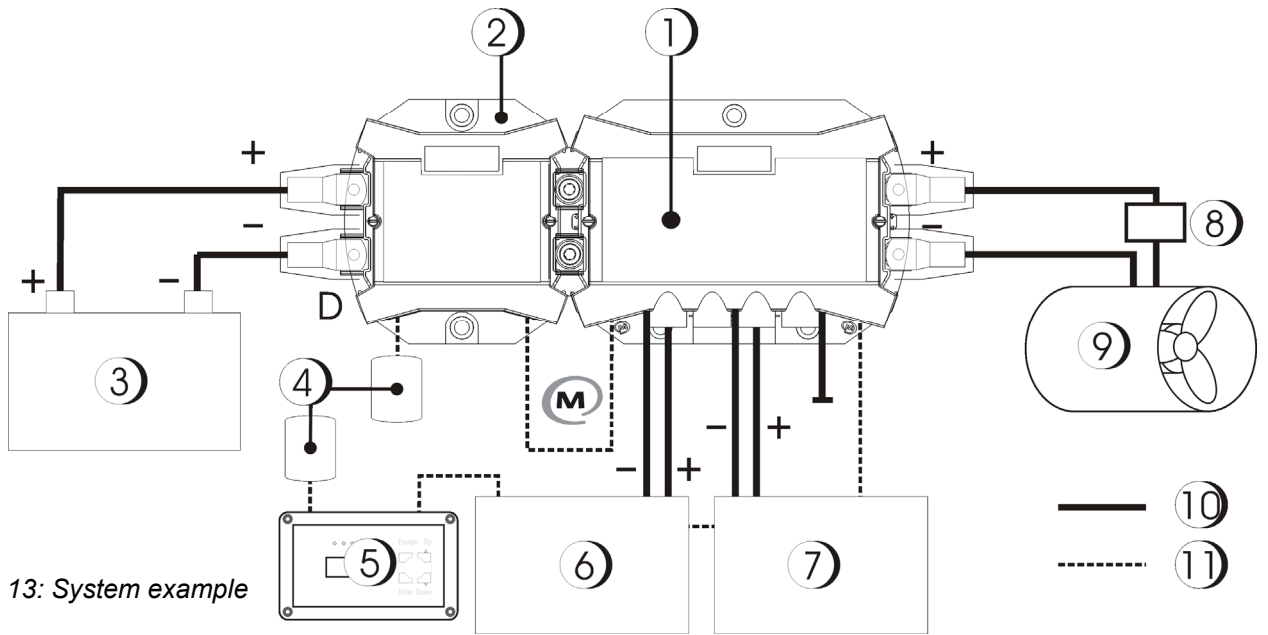


Figure 13: System example

- 1 DC Distribution
- 2 MasterShunt
- 3 Battery
- 4 Terminator for MasterBus

- 5 Display for MasterBus data
- 6 Charger
- 7 Inverter
- 8 Load fuse

- 9 Load
- 10 DC wiring
- 11 MasterBus wiring

Figure 13 shows an example of the DC Distribution in combination with the MasterShunt. Note the serial connection between the MasterBus devices. Connect two or more MasterBus devices with MasterBus cable. Put two MasterBus terminators at the two ends of the network. Refer to section 4.3 to

see further details on how to set up a MasterBus network.

NOTE: Always place two terminators, one at each end of the MasterBus network.

7 ORDERING INFORMATION

Part number	Description
77010100	MasterView Classic
77010300	MasterView Easy
77030100	MasterBus USB interface, required as interface between your PC and the MasterBus network
77040000*	MasterBus terminator for the MasterBus network
77040020	MasterBus connection cable, 0,2m / 0.6ft
77040050*	MasterBus connection cable, 0,5m / 1.6ft
77040100	MasterBus connection cable, 1,0m / 3.3ft
77040300	MasterBus connection cable, 3,0m / 10ft
77040600	MasterBus connection cable, 6,0m / 20ft
77041000	MasterBus connection cable, 10m / 33ft
77041500	MasterBus connection cable, 15m / 49ft
77042500	MasterBus connection cable, 25m / 82ft
77050100	100m / 330ft MasterBus cable
77050200	50 pcs. MasterBus connectors
77050000	Complete set to assemble MasterBus cables. Delivery includes: 100m / 330ft UTP cable, 50 pcs. modular jacks and crimping tool
77049050	ANL-Fuse 50A
77049080**	ANL-Fuse 80A
77049100	ANL-Fuse 100A
77049125**	ANL-Fuse 125A
77049160*	ANL-Fuse 160A
77049200	ANL-Fuse 200A
77049250	ANL-Fuse 250A
77049300	ANL-Fuse 300A

* These parts are standard included within the delivery of the *DC Distribution*

** These parts are standard included twice within the delivery of the *DC Distribution*

Mastervolt offers a wide range of products for your electrical installation, including AGM batteries, GEL batteries, DC distribution kits, battery switches, battery cables, battery terminals and Mastervision switchboards.

8 TROUBLE SHOOTING

Please contact your local Mastervolt Service Centre if you cannot correct a problem with the aid of the malfunction table below.

Failure	Possible cause	What to do
No display function.	Display has switched off.	Turn on display.
	Error in the network wiring.	Check wiring for errors.
	No powering device available on the MasterBus.	The <i>MasterView Easy</i> display must be powered by the network. This means that at least one device in the network should have powering capabilities (Section 4.3). The DC Distribution is no powering device.
No communication.	Error in the 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 installed (See section 4.3).
	MasterBus network is configured as a ring network.	Ring networks are not allowed. Check the connections of the network (Section 4.3).
	T-connections in the MasterBus network.	Check if T-connections are made in the network. T-connections are not allowed (see section 4.3).
MasterView display shows no DC Distribution.	Error in the wiring.	Check the UTP patch cables and terminating devices (Section 4.3).
	Display not set up to show all devices.	Check manual of the display.
No voltage in one group of DC Distribution.	Fuse(s) blown.	Investigate the cause of the blown fuse. Then replace the fuse.
Wrong language is displayed.	Wrong setting of the language at the DC Distribution.	Adjust the language setting. See chapter 5, Configuration General.
	Wrong setting of the language at displaying device.	Each separate connected device can have its own language setting. See user's manual of the connected device.
Alarm messages do not appear (correctly).	One of the fuses has loosened.	Check the fastenings of all fuses.
The communication LEDs blink alternately, indicating an alarm situation.	All fuses can trigger an alarm situation.	Look at your display to find out which fuse has blown. Investigate the cause of the blown fuse. Then replace the fuse.
The alarm situation of a fuse stays "On", after replacing the fuse.	Detection only functions above 5V DC. If you did not yet connect the battery, the alarm situation stays the same.	Connect the battery and watch the alarm situation changing to Off.
The alarm situation of a fuse is "On", while no fuse is installed at that position.	If no fuse is installed, you need to disable the alarm function at that position.	Disable the alarm function to avoid a constant alarm situation with a fuse not installed.

9 SPECIFICATIONS

9.1 TECHNICAL SPECIFICATIONS

Model	DC Distribution
Article number	77020200
Function of instrument	Connecting and fusing components
Manufacturer	Mastervolt Amsterdam the Netherlands
Readout:	By means of external display or PC screen
Available languages:	English, Nederlands, Deutsch, Francais, Castellano, Italiano, Norsk, Svenska, Suomi, Dansk
Maximum fuse current	300 A
Maximum current ingoing group (chargers)	500 A
Maximum current outgoing group (inverters)	500 A
Supply voltage	8-60 V DC
Ipsc (maximum prospective short circuit fault current)	20000A
Power consumption, normal operation	9mA(@12V) / 9mA(@24V)
Power consumption, when no display requires information	<2mA(@12V) / <2mA(@24V)
Dimensions	See section 9.2
Weight without fuses	1,5 kg (3.3 lbs)

9.2 DIMENSIONS

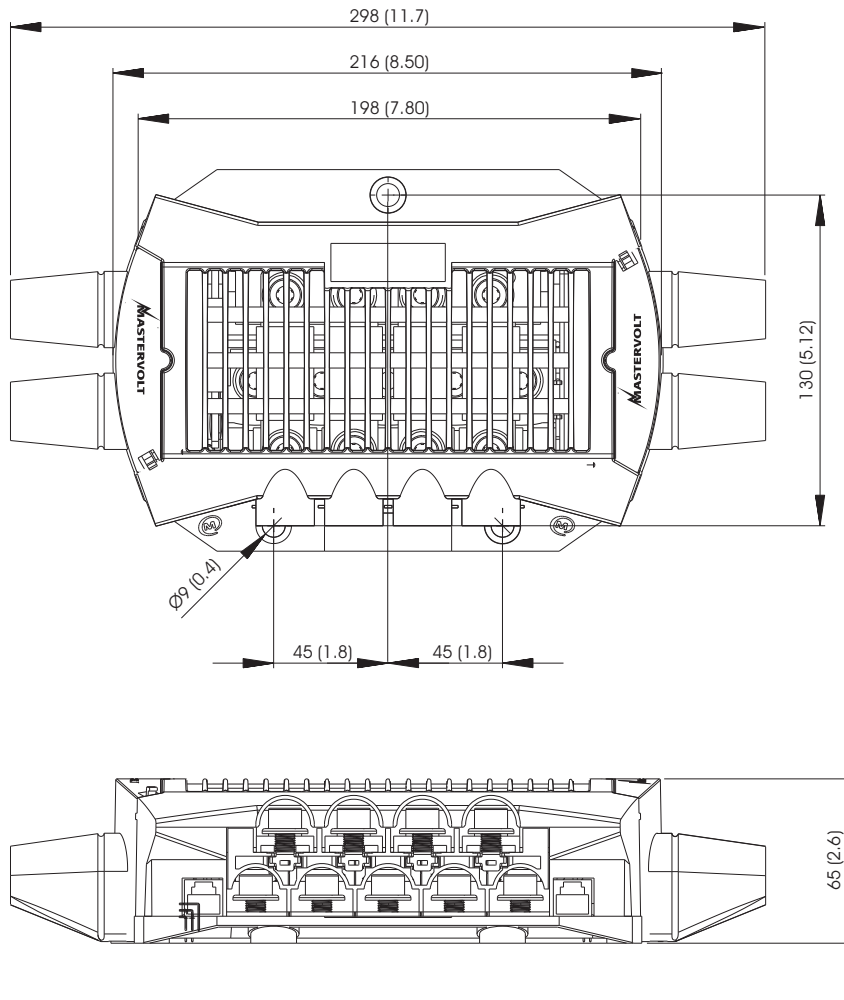


Figure 14: Dimensions in mm (inches)



NOTE: At the bottom of the DC Distribution casing the centre to centre distances of the mounting holes and the DC fastening threads are displayed. If you combine the DC Distribution with other MasterConnect devices, especially dimension 200 mm (7.87 inch) might be of interest to you.

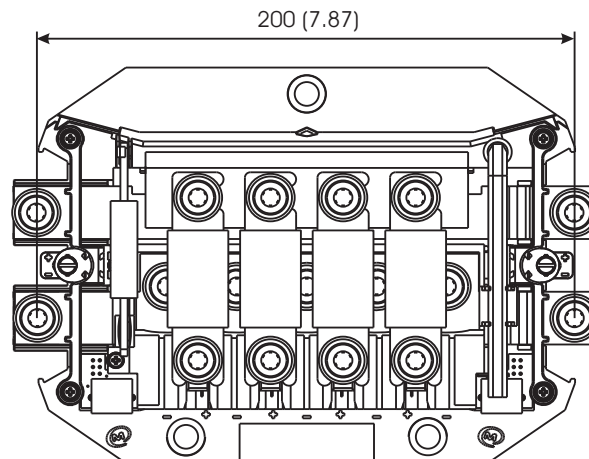


Figure 15: Length connection in mm (inches)

10 EC DECLARATION OF CONFORMITY

Manufacturer Mastervolt



Herewith declares that:

Product:

77020200 DCDistribution 500 (12/24/48V)

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

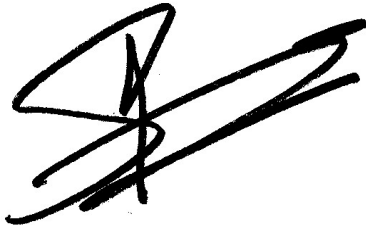
The following harmonised standards have been applied:

Generic emission standard: EN 50081-1:1992

Generic Immunity standard: EN 50082-1:1997

Low voltage directive: 2006/95/EC

Amsterdam,



P.F. Kenninck,
General Manager MASTERVOLT