

MASTERVOLT

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

Digital DC 10x10A

MasterBus DC Switching Device



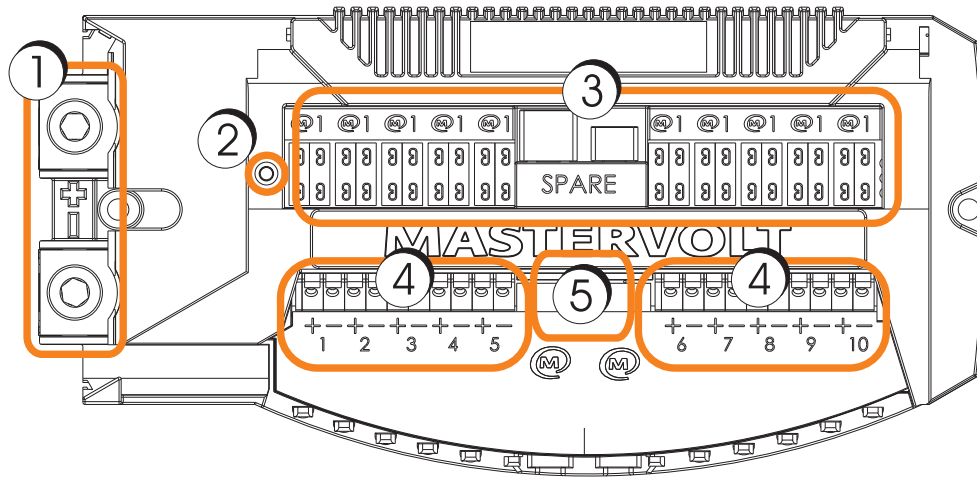
MASTERVOLT
Snijdersbergweg 93,
1105 AN Amsterdam
The Netherlands
Tel.: +31-20-3422100
Fax.: +31-20-6971006
www.Mastervolt.com

ENGLISH:	PAGE 1
NEDERLANDS:	PAGINA 29
DEUTSCH:	SEITE 57
FRANÇAIS:	PAGINA 85
CASTÉLLANO	PÁGINA 113
ITALIANO	PÁGINA 141

QUICK REVIEW

The **Digital DC 10x10A** is a MasterBus based input and output module. It controls maximum 10 fused DC channels with currents up to 10A or maximum 100A when the 10 channels are linked.

It provides the MasterBus network (see chapter 4) with information about the state of the fuses and devices. A MasterBus display enables you to view this information, see section 3.3.



1. DC input
2. Communication LED
3. Functionality determined by fuse positions
4. Channels for DC output or signal input
5. MasterBus connectors

Figure 1: Digital DC 10x10A

Input

MasterBus signal, generated by:

- Digital Input;
- Switch Input 3;
- Switch Input 4;
- MasterView Easy display;
- PC with MasterBus USB interface;
- Any other MasterBus device connected, via MasterBus events.
- Electric signal, generated by an electric On/Off switch connected to the Digital DC directly.

Output

- Electric current up to 10A with software fuse;
- MasterBus output status signal;

MasterBus menus

- Monitoring menu;
- History menu to keep track of data;
- Configuration menu to enter Digital DC 10x10A settings;
- Alarm menu which shows an Overload and No Load situation of a channel and what fuse has possibly blown;
- Event menu

Read out device

For installing and adjusting the Digital DC a read out device is necessary. For example:

- MasterView Easy MkII;
- MasterAdjust PC software (via USB interface)

Communication LED

The LED (figure 1, point 2) has 5 modes, see table.

LED Mode	State	Meaning
Off	-	No power available
One short blink every 10 sec	Disabled	DC available at input
Two short blinks every 10 sec	Disabled	One or more outputs have been set to Always on
One short blink every 1 sec	Enabled	ALARM
On continuously	Enabled	Normal use



The Digital DC 10x10A only functions when MasterBus configured!

CONTENTS:

v 1.6 October 2010

QUICK REVIEW	2
1 GENERAL INFORMATION.....	4
2 SAFETY GUIDELINES AND MEASURES	5
3 OPERATION	6
3.1 Control	6
3.2 Hardware override	6
3.3 MasterBus displays.....	6
4 MASTERBUS	7
4.1 What is MasterBus?.....	7
4.2 Event based commands	7
4.3 How to set up a MasterBus network.....	8
5 MASTERBUS FUNCTIONS.....	9
5.1 MasterBus menus.....	9
5.2 Channel modes.....	10
5.3 Channel mode options.....	12
5.4 Wire check	13
5.5 Event configuration	14
5.6 MasterBus Event data	14
5.7 MasterBus logical blocks	15
5.8 Dimming.....	18
5.9 Event examples Switches.....	18
6 INSTALLATION	19
6.1 Things you need for installation.....	19
6.2 Adjustable fuses	19
6.3 End cap.....	19
6.4 Installation step by step	20
6.5 High powering	20
6.6 Commissioning	21
6.7 MasterConnect	21
7 SYSTEM EXAMPLES	22
7.1 Reading light.....	22
7.2 System example 1: Camper	22
7.3 System example 2: Motor ship	23
8 ORDERING INFORMATION.....	24
9 TROUBLE SHOOTING.....	25
10 SPECIFICATIONS	26
10.1 Technical specifications.....	26
10.2 Dimensions	26
11 EC DECLARATION OF CONFORMITY	27

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 *Digital DC 10x10A*, called Digital DC further in this manual.

This manual is valid for the following model:

Description	Part number
Digital DC 10x10A	77020400

It is therefore obligatory that every person who works on or with the *Digital DC* 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 *Digital DC*, 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!

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 *Digital DC 10x10A* delivered by Mastervolt.

1.5 LIABILITY

Mastervolt can accept no liability for:

- consequential damage due to use of the *Digital DC*;
- 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 DIGITAL DC 10X10A

Changes to the *Digital DC* 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:



CAUTION

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 *Digital DC 10x10A* is constructed as per the applicable safety-technical guidelines.
- 2 Use the *Digital DC 10x10A* 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 Digital DC 10x10A in locations where there is danger of gas or dust explosion or potentially flammable products!

- 3 Use of the *Digital DC 10x10A* 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 *Digital DC 10x10A* 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.






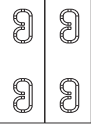
3 OPERATION

3.1 CONTROL

Control of the Digital DC 10x10A is largely MasterBus based. This means you need a display like shown in section 3.3 for controlling this switching device.

3.2 HARDWARE OVERRIDE

For security reasons the channels are equipped with a 15A conventional hardware fuse. The 15A fuses have two positions each. These enable choosing three different configurations manually. The table shows the fuse positions with according meaning.

Position	Mode
 	Normal (MasterBus) position: MasterBus controls up to 10A of the output
 	Manual override: Always On, Hardware fused
 	Manual override: Always Off



WARNING

Manual Override overrides light voltage settings, refer to sections 5.2.2 and 5.2.4. With Manual Override Always On the DC input is connected to the output directly (fused). 12V devices in a 24V system are then supplied with 24 V and can get damaged!

3.3 MASTERBUS DISPLAYS

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



Figure 2: MasterView System panel

Another way of displaying and configuring your MasterBus devices is the MasterView System software, shown for Digital DC application. See figure 3.



Figure 3: MasterView System software

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. This CAN-bus based communication network 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 automatically 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. Three different panels are available, from the MasterView Easy 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 configured to initiate an action at another connected device. This is done by means of event based commands, see chapter 5 for explanation.

An event is a *condition* to be met at which you want *another device* to perform a *task*. In chapter 5 the Events are explained.

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.

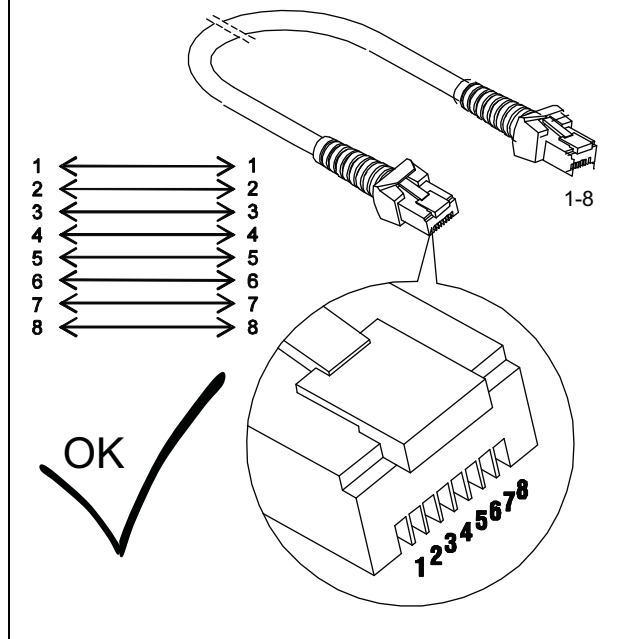


Figure 4: UTP patch cable

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

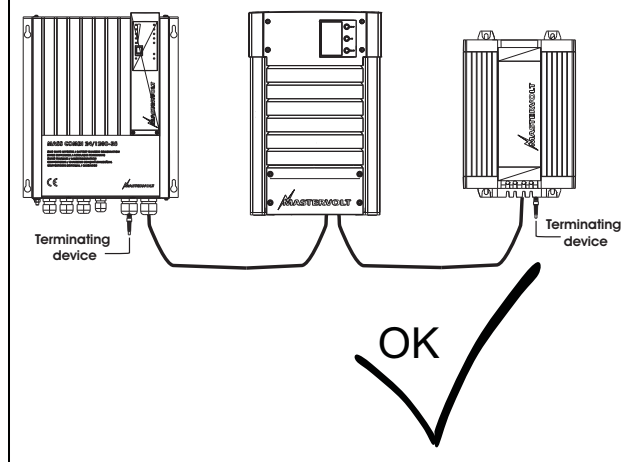


Figure 5: Two Terminators

The electric power for the network is supplied by the connected MasterBus 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 galvanic isolated, multiple powering devices are allowed.

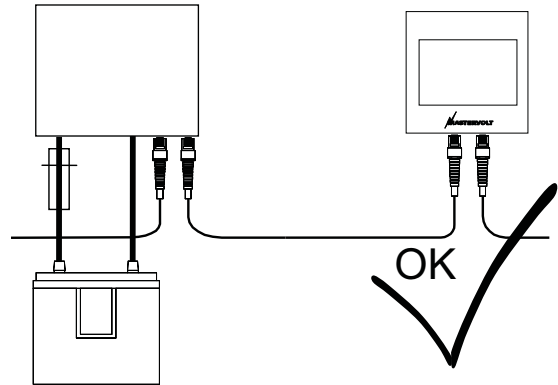


Figure 6: Power supply

Do not make ring networks.

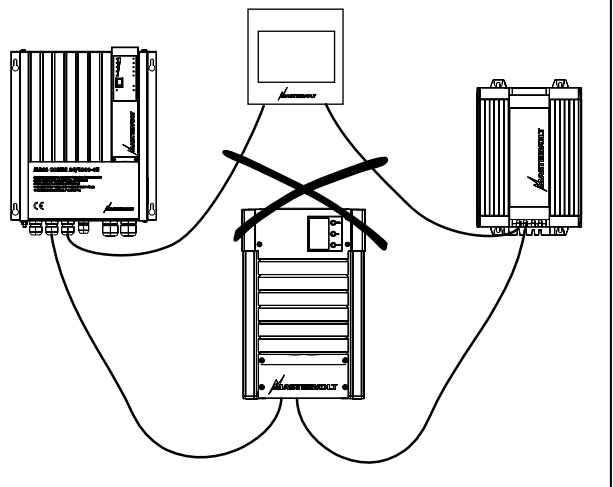


Figure 7: No ring networks

Do not make T-connections in the network.

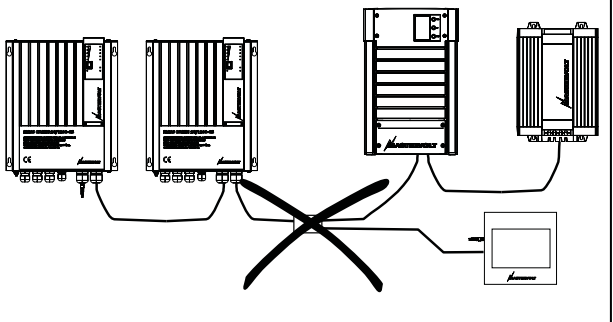


Figure 8: No T-connections

5 MASTERBUS FUNCTIONS

5.1 MASTERBUS MENUS

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

Where mentioned, X ranges from 1 to 10 referring to a specific channel. 10 channels are available.

Menu	Description	Default	Range
Monitoring			
Device state	State of the Digital DC. One state is alarm. See <i>alarms</i> for more information.	On	On, Stand by, Alarm, Disabled
Channels X	Switch On/ Off a specific channel of the unit. Last means the channel will retain its state before the Digital DC was switched Off.	On	On, Off, Last
Reset all alarms	Reset MasterBus alarms in all channels.		
Alarms			
Alarm status X	Alarm state of channel X. <i>Overload</i> means a current is drawn that exceeds the software fuse setting. <i>Hardware fuse</i> : the fuse in channel X has blown or the channel voltage is too low. <i>Minimum current</i> : A current below the minimum current set is detected.	No alarms	No alarms, Overload, Hardware fuse, Minimum current,
System	System temperature alarm state. <i>Temperature high</i> : temperature warning, <i>Temperature critical</i> : Device shut off due to overheating. <i>Battery Low</i> means once the voltage of the supply battery (bank) has dropped below 10V (20V) in a 12V (24V) system for more than 30 seconds, an alarm will be raised. The alarm stops as soon as the battery voltage is higher than 11 (22) V in a 12 (24) V system for more than 30 seconds.	Temperature normal No alarms	Temperature normal, high, critical No alarm, Battery low
Configuration Device			
Language	Language setting of the Digital DC. NOTE: the language of the display may be different from this setting.	English	See Specifications section 10.1.
Name	Name of your Digital DC in the MasterBus system. If you have more than one unit you should change names.	DSD DC Switching	Any name with maximum 12 characters.
Events locked	Check box to disable event configuration on the device. Operable by installer only (log in required).	Unchecked	Unchecked, Checked
Logics locked	Check box to disable logic block configuration on the device. Operable by installer only (log in required).	Unchecked	Unchecked, Checked
Low bat alarm	See <i>Alarms</i> (log in required for alarm adjustments).	Disabled	Disabled, 12V, 24V
Factory settings	Option to reset the Digital DC to factory settings (log in required).		
System			
MasterBus power	Option for setting the Digital DC to power other MasterBus devices.	On	On, Off
Channel X			
Config. locked	Option to lock configuration of this channel.	Unlocked	Unlocked, Locked
Mode	Select the way channel X should act. 8 different modes are available, <i>Disabled</i> being the simplest and <i>Manual</i> the most sophisticated.	Conventional	See section 5.2

5.2 CHANNEL MODES

Eight channel modes are selectable for easy configuration, omitting unwanted options.



WARNING

In a 24V system, modes Light 12V and Switched Light 12V will change to 24V in Manual Override Always On (section 3.2).

5.2.1 Conventional

The conventional mode is used only for switching the channel On/Off. See section 5.3 for channel mode options. In Conventional mode the output voltage equals the input voltage, there is no PWM on this channel.

Application: navigation Electronics, refrigerator.

5.2.2 Light 12V

The Light 12V is convenient for 12V lighting without built in switch. A correction for short voltage dips has been built in. At a voltage supply of 24V, the Light 12V mode is still possible. The light intensity can be adjusted by MasterBus configuration. Fade modes:

- dimming,
- fading out,
- fading in and out.

Manual Override overrides the Light 12 V setting, see section 3.2.

Application: navigation lights and ceiling lights.

5.2.3 Light 24V

See light 12V, now for 24V lighting. At a voltage supply of 12V, the Light 24V mode is not convenient.

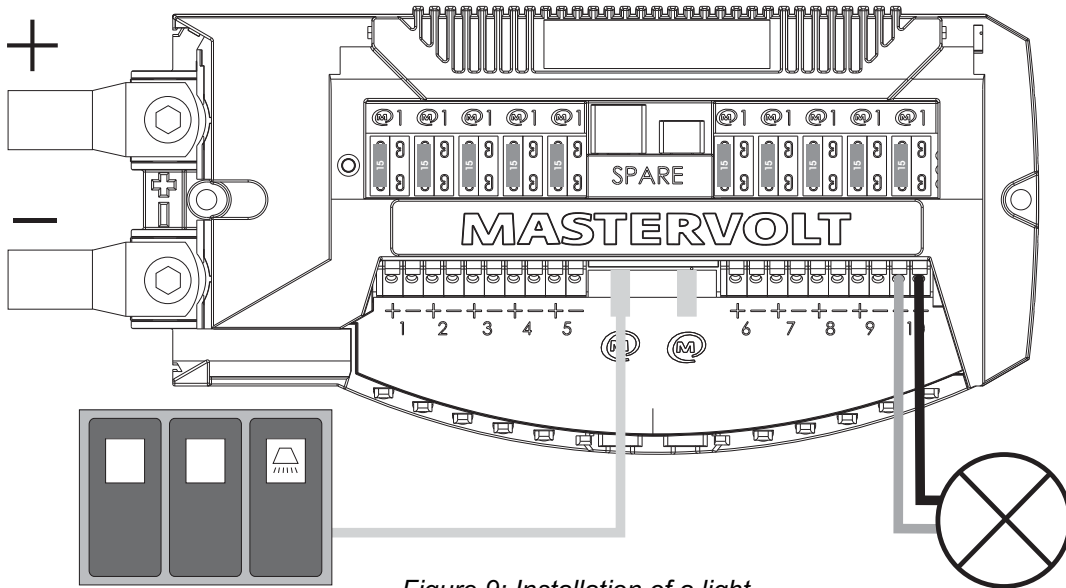
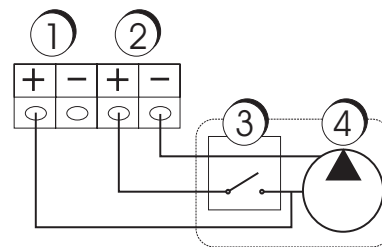


Figure 9: Installation of a light

5.2.4 Switched light 12V

The Switched light 12V is convenient for 12V lighting with a built in switch. The option Minimum Current is omitted to prevent an unwanted alarm at switch off. With a voltage supply of 24V, the Switch light 12V mode is still possible.

Application: reading light with built in switch.



1. Output controlled by push button (no minus necessary)
2. Always On
3. Float switch
4. Pump

Figure 10: Installation of float switch bilge pump

5.2.5 Switched light 24V

See Switched light 12V, now for 24V lighting. At a voltage supply of 12V, the Switched light 24V mode is not convenient.

5.2.6 Motor

This function features an optional 1 second ramping up setting. *Application: cooling fan or toilet pump.*

5.2.7 Bilge pump float

Function for bilge pump with floating switch. The bilge pump includes a float switch enabling the pump when soaked, with option Always On.

5.2.8 Input

Each channel can function as an input for electrical switches. This facilitates the use of a simple switch.

The wiring connects the battery + to the channel +. For short circuit protection a wire size dependent fuse has to be included in the wiring.

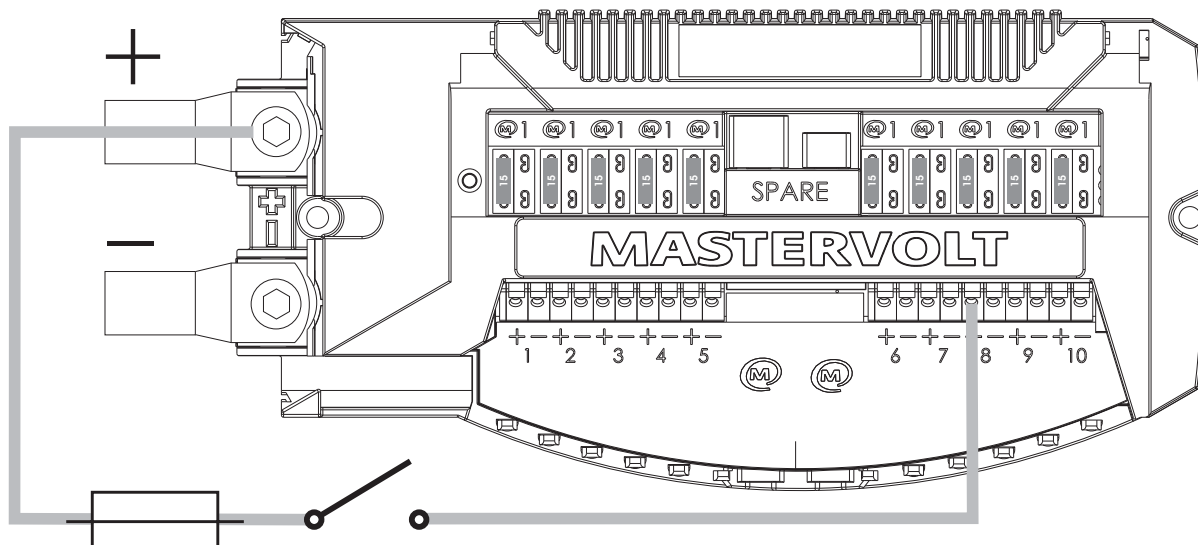




Figure 11: Channel 8 as input

 A channel cannot be used as switch input and output at the same time.

 **WARNING**
In Always On only the hardware fuse (up to 15 A) is functioning!


5.2.9 Manual


The Manual mode enables a custom setting of the channel, offering all settings available. Besides the Switch light settings, the Failure Below value can be set in this mode. See also section 5.3.8.

5.2.11 Linked
The Linked mode is used for paralleling two to ten channels. A channel always links to the previous channel. For example channel 2 always links to channel 1. Channel 1 cannot be linked.

5.2.10 Always On

In Always On the channel does not switch off, provided the hardware fuse current is not exceeded.
Application: radio memory, refrigerator.

 The channel to which the other channel(s) link(s), is visible only. Its configuration mode applies to all channels linked.

 For joining cables correctly, refer to ISO 10133.

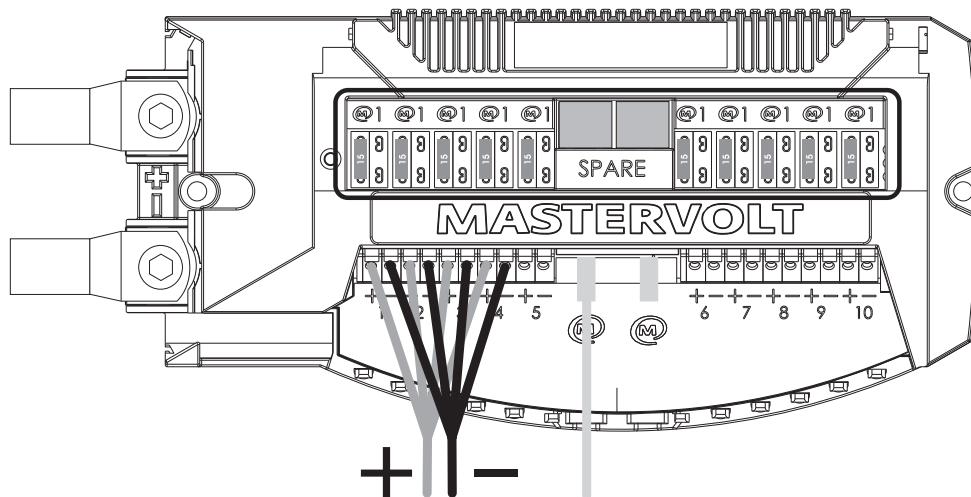


Figure 12: 4 channels linked

5.3 CHANNEL MODE OPTIONS

The tables below show the configuration options for each channel mode and their meaning.

A grey area means the option is available for this mode. Mode *linked* is not available for channel 1.

Mode\Options	Name	Software fuse	Start up state	Intensity	Max voltage	Delayed off	Fade mode	Fade curve	Minimum current
Conventional	X	X	X			X			
Light 12V	X	X	X	X		X	X	X	X
Light 24V	X	X	X	X		X	X	X	X
Switch light 12V	X	X	X	X		X	X	X	
Switch light 24V	X	X	X	X		X	X	X	
Motor	X	X	X						X
Bilge pump float	X	X	X						
Input	X								
Manual	X	X	X	X	X	X	X	X	X
Always On	X								
Disabled									
Linked		X							X

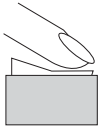
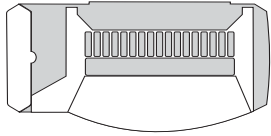
Option	Description	Default	Range
Name	Channel name. Convenient is naming the channel after its application.	Channel x	Any 16 character name.
Software fuse	Fuse current in Amperes.	10 A	2 A, 3 A, 4 A, 5 A, 7.5 A, 10 A, Hardware only.
Start up state	The channel must resume this power mode after powering or enabling the Digital DC. Off: the channel must switch Off, On: the channel must switch On, Last: the channel must resume its last state before the Digital DC was switched Off, Disabled: channel is not enabled power up.	Last	Off, On, Last, Disabled.
Intensity	Voltage as percentage of the maximum output voltage.	100%	0-100%
Maximum voltage	Fixed maximum channel output voltage for 12V or 24V setting. Select option <i>Manual</i> to adjust this value.	11.5 V or 23.5 V	6-29 V
Delayed off	Delay for turning off the channel after the command to switch off has been given.	Immediate	Immediate (no delay), 1 s, 2 s, 3 s, 5 s, 10 s, 20 s, 30 s, 1 min, 2 min, 3 min, 5 min, 10 min, 20 min, 30 min, 1 hr, 2 hrs, 3 hrs, 5 hrs, 12 hrs.
Allow dimming	Check box to allow dimming.	-	Not checked, checked
Fade in	Check box to have the channel fade in.	-	Not checked, checked
Fade out	Check box to have the channel fade out.	-	Not checked, checked
Soft start	Function to let an electric motor start up slowly, avoiding a high current. Only for the modes Motor and Manual. Is not possible in combination with dimming and fading.	-	Not checked, checked
Fade curve	When being dimmed, LED and halogen lights have their own perceptible fading. To correct this, three different fading curves are available.	Linear	Linear, LED and Halogen.
Minimum current	Option to determine a current below which a MasterBus alarm should be sent out.	Not set	Not set, 50 mA, 100 mA, 200 mA, 300 mA, 500 mA, 700 mA, 1 A, 2 A, 3 A, 5 A, 7 A.

5.4 WIRE CHECK

Checking the load and wiring connected is possible in combination with a MasterBus Switch. Convenient are the Switch Input 3 or 4 with LED buttons. The Digital DC is able to illuminate a button LED when

the load is switched On *and* it is working correctly. This is possible only after configuring a Feedback event (see the manual Switch Input 3, 4). After configuring the Minimum Current, a MasterBus alarm will be generated when the wiring is in failure.

5.5 EVENT CONFIGURATION

Event Source	Event Target	Event Command	Event Data
		Channel 1	Toggle

Like mentioned in chapter 4, an event is a *condition* to be met at which you want *another device* to perform a *task*. Shown below is the MasterBus Event configuration.

Events			
<i>Event 1 source</i>	Select an event to serve as Event 1, for instance Switch 1. If you don't select Event 1, it stays Disabled.	Disabled	
<i>Event 1 target</i>	Select a device in your system to perform the task if Event 1 takes place. For instance the Digital DC.	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 Channel 1 if the Digital DC is the target.	Select...	Selectable targets are system dependent.
<i>Event 1 data</i>	Data translates the input into an output. See section 5.6.	Off	Off, On, Copy, Copy Invert, Toggle.
<i>Event 2 to 63</i>	Up to 63 events are configurable on the Digital DC.		

5.6 MASTERBUS EVENT DATA

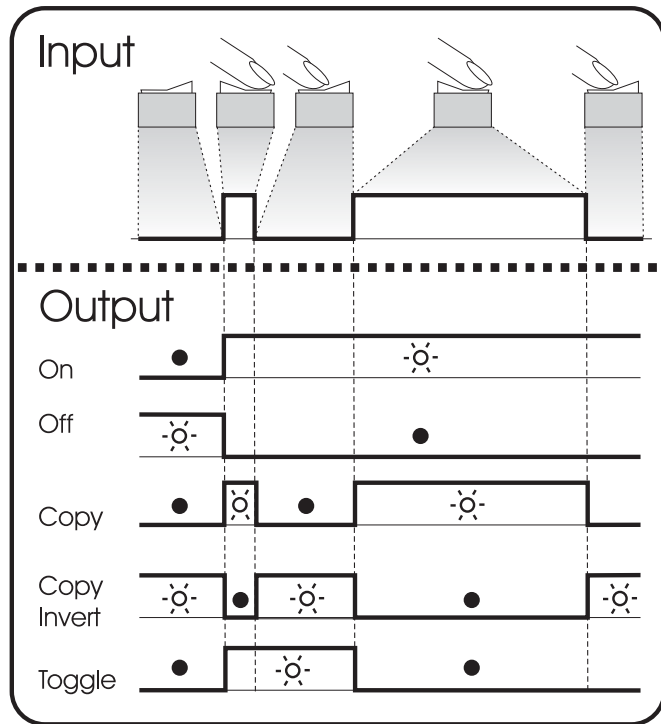


Figure 13: Event data

See figure 13.

Input (pulses)

The **input** can be achieved by operating 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.

5.7 MASTERBUS LOGICAL BLOCKS

The Digital DC features *logical block* configuration to enable installing devices that need logical conditions. In this case the logical blocks are used as source in the MasterBus event configuration. Four logical blocks are available with the Digital DC 10x10A.

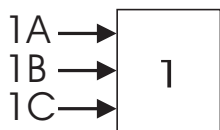


Figure 14: Logical block

See figure 14. A logical block has three sources and one result. The result of the first logical block can be a source for the second block, see figure 15.

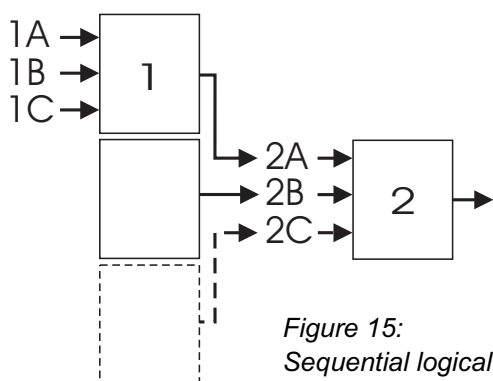


Figure 15: Sequential logical blocks

5.7.1 Logical functions

The table below shows the block input (three sources) and the corresponding output using the functions Disabled, AND, OR, XOR and NAND, NOR, NXOR.

- AND is true when **all** inputs are true;
- OR is true when **at least one** input is true;
- XOR is true when **an odd number** of inputs is true.
- NAND is true when **not all** inputs are true;
- NOR is true when **no** input is true;
- NXOR is true when **an even number** of inputs is true.

The results are True (1) or False (0). The function *Disabled* must be selected when the logical block is not used.

5.7.2 Logical truth table

For each of the three logical block sources, one of next options can be chosen:

- True (1) and False (0) are fixed values in case the source is not in use,
- All channels 1 to 10; switched On =1, Off =0. If the channel is not in use, it says "Do not use",
- Logical Block 1 to 4. This means the logical block can also be chosen as source for itself, which is not without risks.



NOTE

For correct logical functioning, an unused source must be set to True (1) or False (0).

Sources			Function						
A	B	C	Disabled	AND	OR	XOR	NAND	NOR	NXOR
0	0	0	0	0	0	0	1	1	1
0	0	1	0	0	1	1	1	0	0
0	1	0	0	0	1	1	1	0	0
0	1	1	0	0	1	0	1	0	1
1	0	0	0	0	1	1	1	0	0
1	0	1	0	0	1	0	1	0	1
1	1	0	0	0	1	0	1	0	1
1	1	1	0	1	1	1	0	0	0

5.7.3 Configuration explanation

Log. Block	Function	Source 1	Source 2	Source 3	Result description
# 1	AND	Channel 1	Channel 3	True	Only if Channel 1 AND 3 are enabled, Logical Block 1 is TRUE.
# 2	OR	Logical Block 1	Channel 8	False	Only if Logical Block 1 is TRUE OR channel 8 is enabled, Logical Block 2 is TRUE.

5.7.4 Practical example

Explained is a logical block example for a sliding roof control. The roof has two positions: Open and Closed. Only closing the roof is described here.

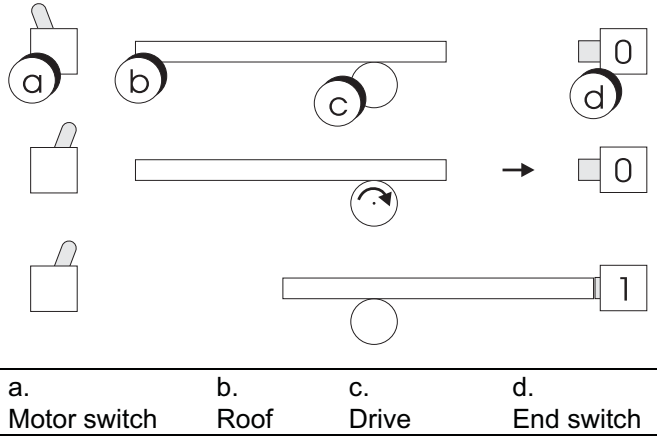


Figure 16: Sliding roof

The motor switch is flipped to the right to close the roof. The end switch indicates when the roof is open. With the motor switch flipped to the right, the roof moves to the right until it reaches the end switch. When the end switch is closed (1), the drive must stop.

Shown are three situations.

- The roof is in open position, the end switch is open (0).
- The roof is being closed, the end switch is open (0).
- The roof is in closed position, the end switch is closed (1).

The motor switch, the drive and the end switch have to be introduced to the Digital DC by means of channel configuration, see below.

Channel 1 is configured as input *Close roof*, channel 2 as input *End switch open*, channel 3 as *Drive*, softstart saves the installation. Channel 4 is *linked* to supply an extra 10 A for the drive. See figure 17.

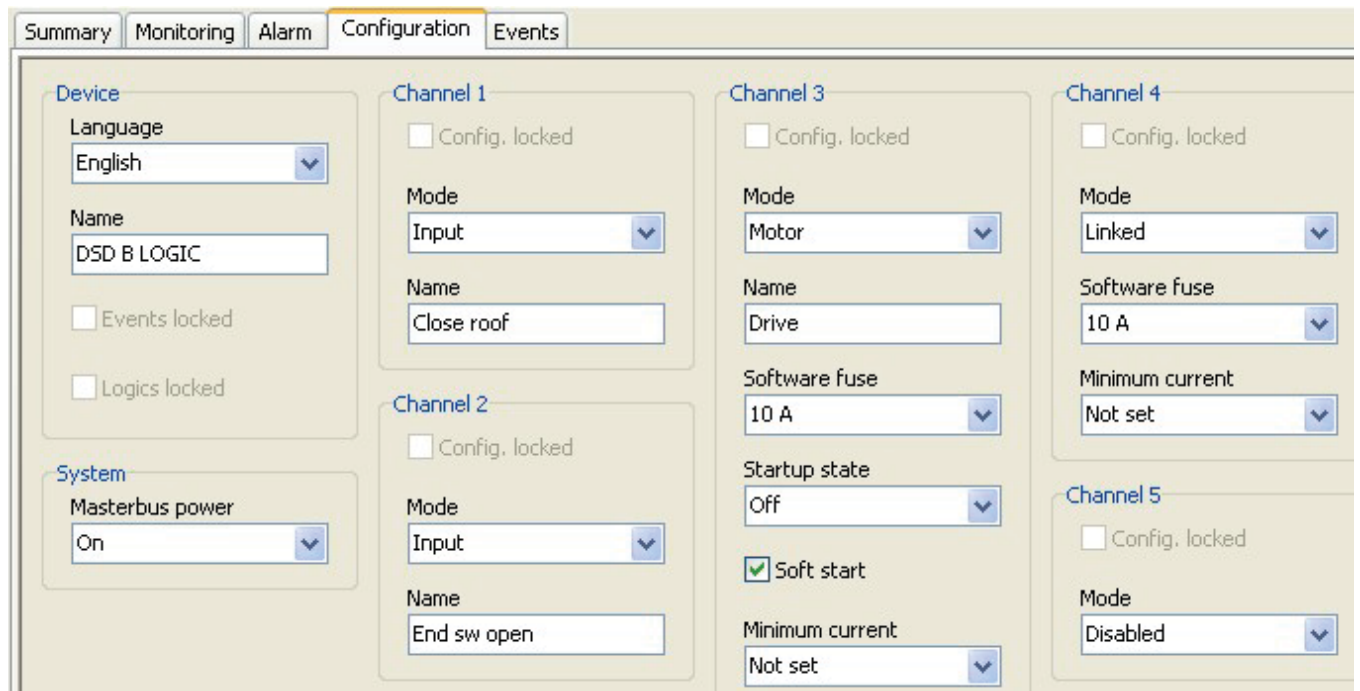


Figure 17: Sliding roof configuration (MasterAdjust software)

To close the roof, the motor switch must be in position Close roof AND the end switch must be open (0). For this configuration example, logical block 1 was renamed *Roof is closed*.

Function	Source 1	Source 2	Source 3	Result description
AND	Close roof	End sw open	True	Only if the motor switch is on Close roof AND the End switch is open, <i>Roof is closed</i> is TRUE.

In the next event, *Roof is closed* is used as source to switch On the roof drive. When the roof has reached the end switch, *Roof is closed* becomes FALSE (0) and the drive is switched Off.

Event	Source	Target	Command	Data
1	Roof is closed	DSD Logic	Drive	Copy

5.8 DIMMING

The Light 12/24V, Switch light 12/24V and Manual channel modes feature a dimming option. Dimming is accomplished by keeping a button pressed for more than 0.5 seconds. This button should be connected to a *pulse switch* combined with the Data function Copy.



NOTES

For dimming a pulse switch is recommended.



If you use one switch to dim more channels, their intensities may be different. To level out the channels, dim to the maximum and click once after that.

5.8.1 Configuration of a pulse switch

A switch is installed to control a dimmable light. It is connected to a pulse switch and the event is adjusted to Copy. Pulses shorter than 0.5 seconds have the light switch On/Off. Pulses longer than 0.5 seconds have the light dim till the button is released. See also table below.

Configuration of a pulse switch for dimming

Event	Source	Target	Command	Data
1	Switch 3	DSD Living	Channel 1	Copy

Functions of a pulse switch

Pulse	Function
< 0.5 sec	Switching On/Off
> 0.5 sec	Dimming till button release

5.9 EVENT EXAMPLES SWITCHES

5.9.1 Event example 1: Main switch

In this example the main system switch (Switch 4) disables two Digital DC 's.

Event configuration example 1

#	Source	Target	Command	Data
1	Switch 4	DSD 1	Disabled	Copy invert
2	Switch 4	DSD 2	Disabled	Copy invert

5.9.2 Event example 2: Navigation lighting

This example explains that using one switch in more events is possible. Figure 18 shows three ship lighting options. The tables below show the according event configuration.

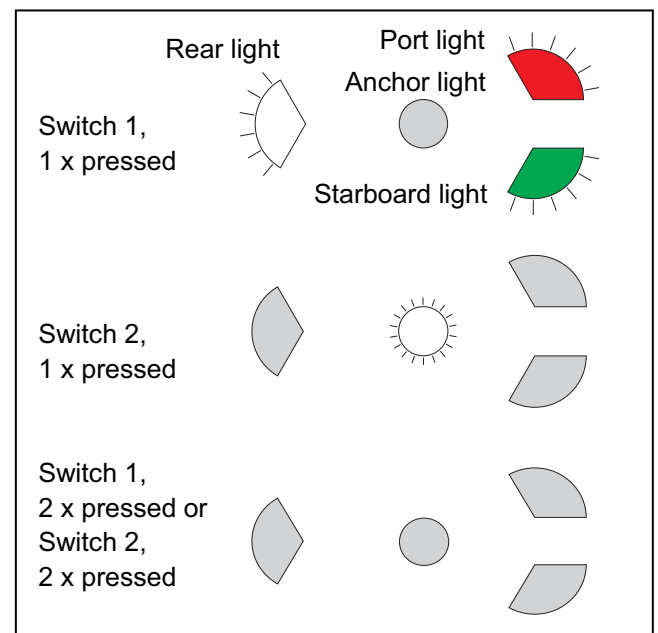


Figure 18: Switching a ship's navigation lights

Event configuration example 2, configuration of Switch 1

Event	Source	Target	Command	Data
1	Switch 1	DSD Saloon	Rear light	Toggle
2	Switch 1	DSD Bedroom	Port light	Toggle
3	Switch 1	DSD Bedroom	Starboard light	Toggle
4	Switch 1	DSD Kitchen	Anchor light	Off

Event configuration example 2, configuration of Switch 2

Event	Source	Target	Command	Data
1	Switch 2	DSD Saloon	Rear light	Off
2	Switch 2	DSD Bedroom	Port light	Off
3	Switch 2	DSD Bedroom	Starboard light	Off
4	Switch 2	DSD Kitchen	Anchor light	Toggle

6 INSTALLATION



WARNING

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



CAREFUL!

Wrong connections may cause damage to the Digital DC 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
- 2 mm flat blade screwdriver for opening the DC output terminals.
- Pair of cuttings pliers for cutting the end cap.

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



CAREFUL!

Use isolated tools!

Materials:

- Digital DC 10x10A
- Up to ten fuses, together maximum 100A per Digital DC. See section 3.2
- 10+2 fuses 15A included (see figure 1)
- MasterBus cable
- Terminator for MasterBus
- One translucent end/ mid piece

The DC input cabling must have a cross section large enough to supply the total output current.

6.2 ADJUSTABLE FUSES

Your components are securely connected to the DC lines by means of software fuses. These fuses are adjustable to protect thin cables as well. For 12 and 24 V DC we recommend using fuse values of 3 to 4 amperes per mm².



CAREFUL!

The maximum load current per channel may never exceed 10A!

6.3 END CAP

The end cap has two cut out options.

It can be used in three ways: uncut, section 1 cut out and both sections cut out, see figure 19. Use a pair of cutting pliers like shown for the vertical cuts.

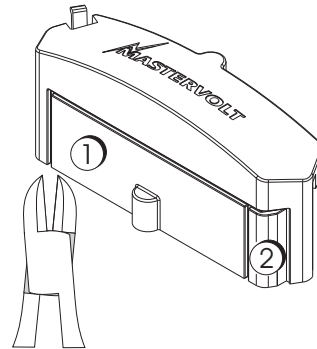


Figure 19: End cap

6.4 INSTALLATION STEP BY STEP

Disconnect the electrical power:

- Switch off all connected components.
- Disconnect the battery DC poles, the positive pole first.

- Check with a suitable voltmeter whether the entire DC installation is voltage free.
- Mount the DC output wiring. Mount the negative wires first and then the positive wires.
- Cut the end cap if necessary, see figure 19.

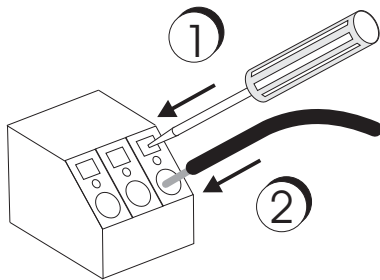
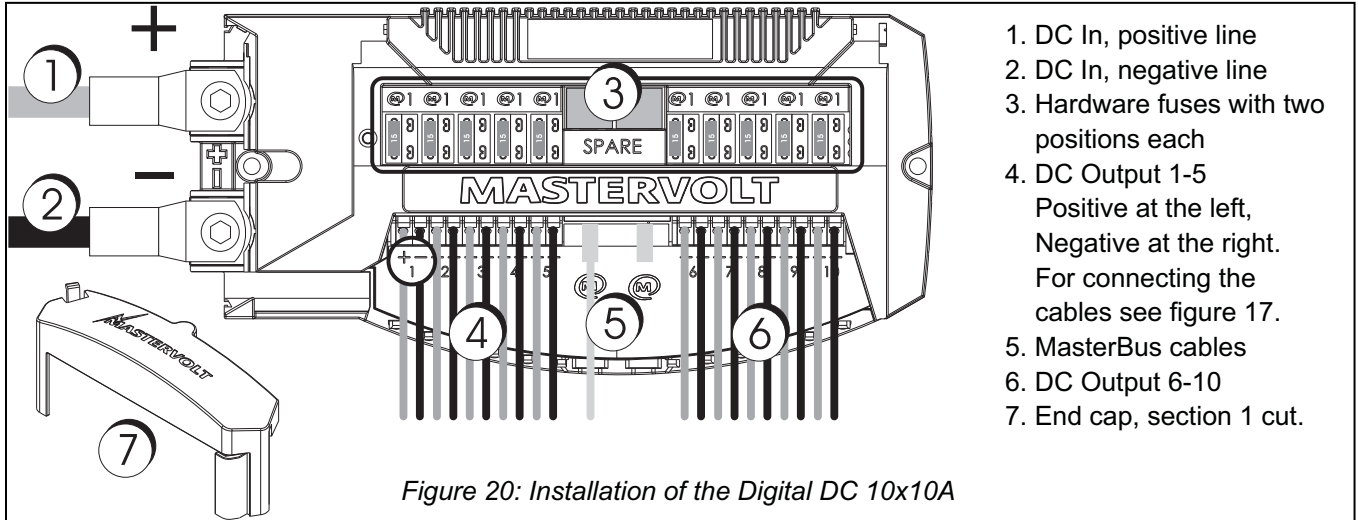


Figure 21: Use of the spring cage terminal block

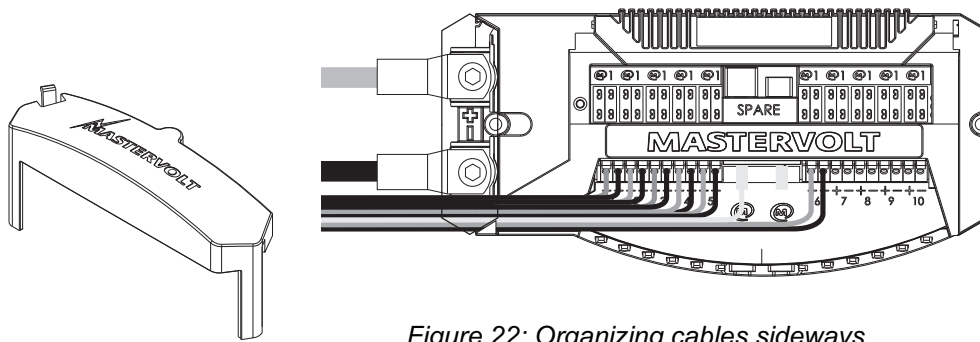


Figure 22: Organizing cables sideways

Another way to organize the cables is shown in figure 22. This way is applicable only when no MasterConnect devices are connected to the Digital DC 10x10A directly and the DC cables are not too thick. The end cap has sections 1 and 2 cut out.

6.5 HIGH POWERING

The Digital DC 10x10A is a high powering MasterBus device. This type of device gets priority from low powering MasterBus devices when MasterBus power is needed.

6.6 COMMISSIONING

Check if all wiring is OK. Then:
(Re)connect the Digital DC input.

6.7 MASTERCONNECT

The Digital DC 10x10A belongs to the MasterConnect range. These devices link to each other on the DC connectors directly by pushing them together and bolt them. See figure 23.

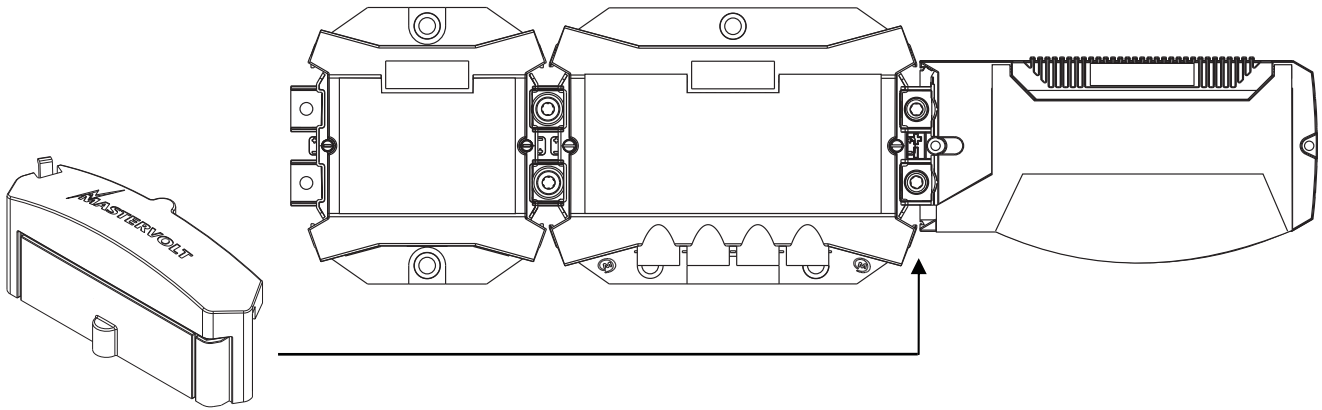


Figure 23: Digital DC 10x10A (right) connected with DC Distribution and MasterShunt. The end cap stays uncut.

7 SYSTEM EXAMPLES

In this chapter a small system illustrates the control of components and a larger system illustrates the control of component groups.

7.1 READING LIGHT

The example of a reading light illustrates the use of events for configuration of a small system component.

Event example: Reading light

Event configuration	
Event source	Switch 1
Event target	DSD Front
Event command	Read light
Event data	Toggle

This reading light uses a pulse switch which is only in the On position when the button is pressed.

The reading light can now be switched On and Off by pressing the button shortly. If configured, long button presses let the light grow and dim alternately.

7.2 SYSTEM EXAMPLE 1: CAMPER

Figure 24 shows an example of the Digital DC 10x10A on a recreational vehicle. Note the serial connection with MasterBus cables. Refer to section 4.3 for more details on setting up a MasterBus network.



NOTE:

Always place two Terminators, one at each end of the MasterBus network.

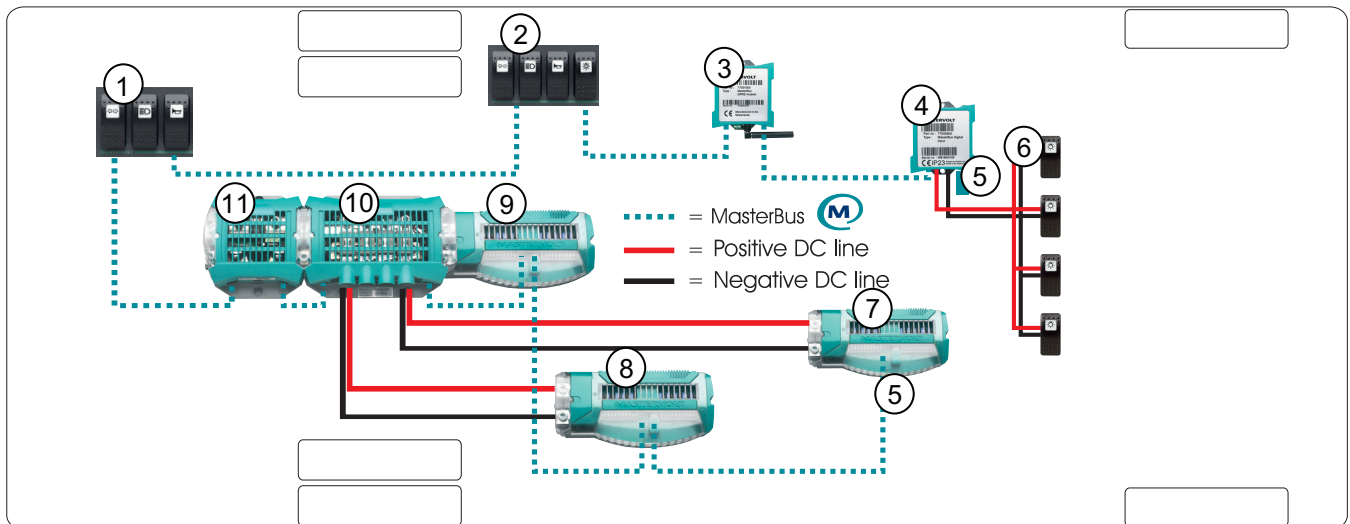


Figure 24: System example 1: Camper

1 Switch input 3
2 Switch input 4
3 GPRS module
4 Digital Input

5 MasterBus Terminator
6 Electrical switches
7 Digital DC 10x10A (Front)
8 Digital DC10x10A (Kitchen)

9 Digital DC10x10A (Salon)
10 DC Distribution
11 MasterShunt

7.3 SYSTEM EXAMPLE 2: MOTOR SHIP

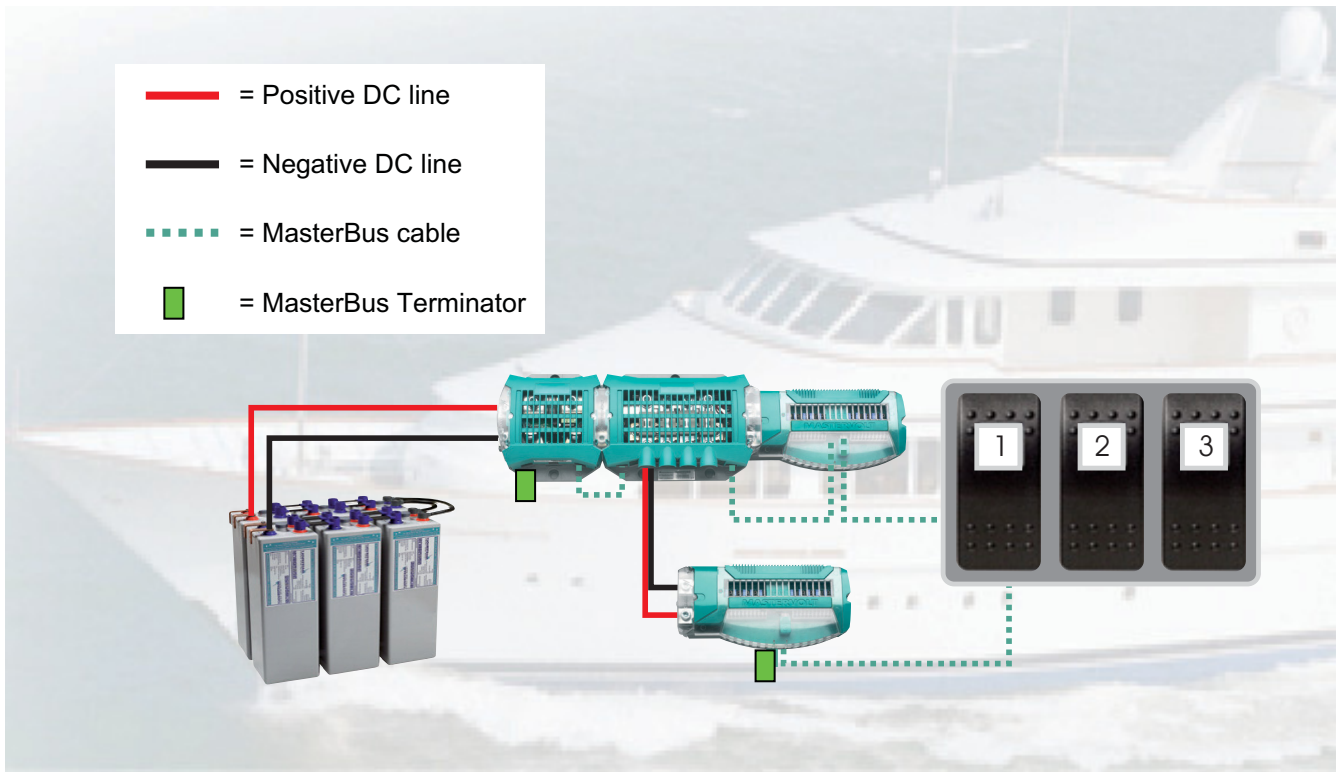


Figure 25: System example 2

Shown is a subsystem in a motor ship. Switch 1 has been configured to switch enable/ disable two Digital DC's. Note that the switch has two targets.

The command is Disable for a total Digital DC now instead of a single channel. Switching Off means the channels' outputs are disabled, except for the Always On outputs. These outputs (see also section 3.2) will stay active even when the Digital DC is disabled, useful for a radio memory or refrigerator. In

the table below the event configuration of Switch 1 is displayed.

Event configuration Switch 1		
Source	Switch 1	Switch 1
Target	DSD Crew 1	DSD Crew 2
Command	Disable	Disable
Data	Copy invert	Copy invert

8 ORDERING INFORMATION

Part number	Description
77010305	MasterView Easy MkII
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
77050000	Complete set to assemble MasterBus cables. Delivery includes: 100m / 330ft UTP cable, 50 pcs. modular jacks and crimping tool
77050100	100m / 330ft MasterBus cable
77050200	50 pcs. MasterBus connectors
77030900	Digital Input
77031300	Switch 3
77031400	Switch 4
77030800	Modbus interface
77031000	GPRS Module
77030500	Multipurpose Contact Output
77049815**	Mini Blade fuses 15 A, 5 pcs. per package

* These parts are standard included within the delivery of the *Digital DC 10x10A*

** 12 Mini Blade fuses 15 A are standard included within the delivery of the *Digital DC 10x10A*

Mastervolt offers a wide range of products for your electrical installation, including AGM batteries, GEL batteries, Digital DC 10x10A kits, battery switches, battery cables, battery terminals and Mastervision switchboards. See our website www.mastervolt.com for an extensive overview of all our products and free to download software for remote monitoring.

9 TROUBLE SHOOTING

Please contact your local Mastervolt Service Centre if you cannot correct a problem with the aid of the malfunction table below. See www.Mastervolt.com for an extended list of Mastervolt Service Centres.

Failure	Possible cause	What to do
No display function.	Display must be powered by MasterBus. Only with MasterBus Power On, the Digital DC powers.	Make sure the balance between consuming devices and powering devices is OK.
	No DC input	Provide DC input
No communication.	Error in the wiring.	Check the MasterBus cables.
	No terminating device placed at the ends of the network.	Check if two terminating devices have been installed (See section 4.3).
	MasterBus network is configured as a ring network.	Ring networks are not allowed. Check the network connections (Section 4.3).
LED blinks every 2 seconds	T-connections in the MasterBus network.	Make sure that no T-connections have been made in the network.
	The boot loader is active.	Nothing. This is a normal procedure.
LED blinks every 8 seconds	The device has entered the sleep mode.	Nothing. At bus activity the Digital DC leaves the sleep mode automatically.
LED blinks twice every 8 seconds	The device is in sleep mode with one or more channels Always On.	Nothing. At bus activity the Digital DC leaves the sleep mode automatically.
MasterView display shows no Digital DC.	Error in the wiring.	Check the MasterBus cables and terminating devices (Section 4.3).
	Display not set up to show all devices.	Check manual of the display.
No output voltage in one channel of Digital DC.	(Digital) fuse has blown.	Investigate the cause of the blown fuse. Then replace fuse and reset the alarms.
	Channel has been switched Off (state disabled)	Enable the channel by configuration.
Wrong output voltage measured in one channel of Digital DC.	In manual override the 12V light voltage will change to the system voltage, this can be 24V.	Make appropriate settings and change fuse position to Normal Position.
	Some measuring instruments do not measure the RMS value.	Use an RMS volt meter.
The wrong language is displayed.	Wrong setting of the language at the Digital DC.	Adjust the language setting. See chapter 5, Configuration General.
	Wrong setting of the language at displaying device.	Every connected device has its own language setting. See user's manuals.
Your MasterBus display shows the warning "Temperature high".	The device temperature is too high.	Switching off one or more channels to lower the temperature is recommended.
Your display shows "Temperature critical", all channels are disabled.	The device temperature has reached the upper limit.	Let the device cool down. Then switch off one or more channels to prevent overheating next time.
Alarm messages do not appear (correctly).	One of the fuses has loosened.	Check the fastenings of all fuses.
A channel is in alarm, yet another alarm appears.	More than one alarm can occur at the same time.	Find and take away the alarm cause, see section 5.1.
The alarm situation of a fuse stays "On", after replacing the fuse.	Fuse is detected only above 20% nominal voltage.	Raise the voltage.
Event configuration is not possible, the menus are still readable but grey.	The installer has locked the events to prevent unwanted configuration changes.	If desirable, ask the installer to unlock the event configuration.
Logical block configuration is not possible, the menus are still readable but grey.	The installer has locked <i>logics</i> to prevent unwanted configuration changes.	If desirable, ask the installer to unlock the event configuration.
Channel configuration is not possible, the menus are still readable but grey.	The installer has locked Configuration to prevent unwanted configuration changes.	If desirable, ask the installer to unlock the event configuration.

10 SPECIFICATIONS

10.1 TECHNICAL SPECIFICATIONS

Model	Digital DC 10x10A
Article number	77020400
Function of instrument	Switching, controlling, connecting and fusing components
Manufacturer	Mastervolt Amsterdam the Netherlands
Configuration and monitoring	By means of external display or PC screen
Available languages	English, Nederlands, Deutsch, Francais, Castellano, Italiano, Norsk, Svenska, Suomi, Dansk
Number of configurable events	63
Number of products that can control the Digital DC 10x10A	Unlimited
MasterBus powering capacity	Yes, high powering
Power consumption, off board situation	<2 mA @ 12V / <2 mA @ 24V
Communication isolation	Galvanic
Software layer	MasterBus proprietary protocol
Hardware layer	CAN bus technology
Weight	750 g (0.17 lbs)
<i>DC output</i>	
Maximum hardware fuse current	15 A per channel
Maximum software fuse current	10 A per channel
Maximum rating total output	100 A, derating 5%/°C (3%/°F) above 40°C (104°F)
Connections	max 4 mm ² cable, cable cuff not allowed
<i>DC input</i>	
Maximum current	100 A
Supply voltage	8-30V DC
Connections	MasterConnect or cable lug maximum 95 mm ²

10.2 DIMENSIONS

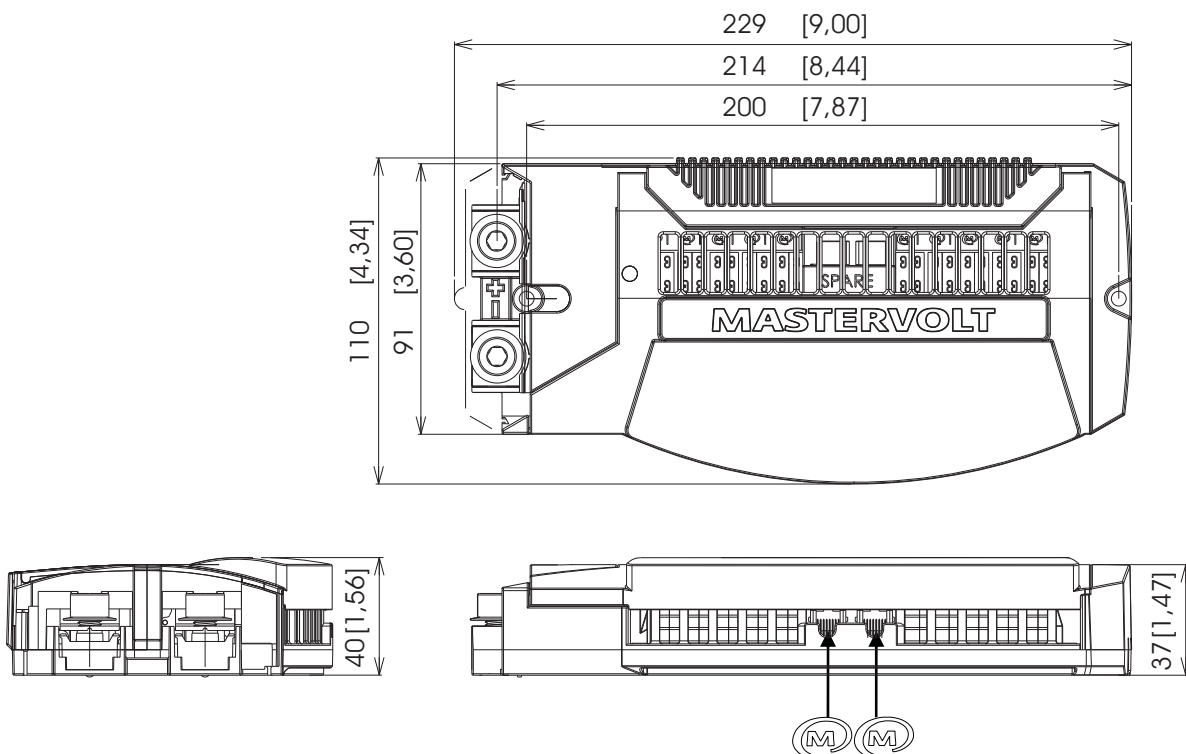


Figure 26: Dimensions in mm (inches) and MasterBus connections

11 EC DECLARATION OF CONFORMITY

Manufacturer Mastervolt
Address Snijdersbergweg 93
1105 AN Amsterdam
The Netherlands



Herewith declares that:

Product:

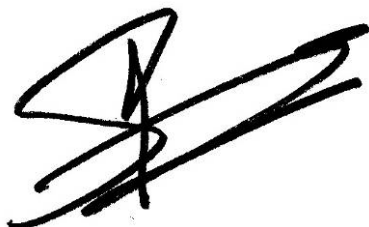
77020400 Digital DC 10x10A

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, with standard:
Low voltage standard: EN 60950: 2000

Amsterdam,



P.F. Kenninck,
General Manager MASTERVOLT



Snijdersbergweg 93, 1105 AN Amsterdam, The Netherlands

Tel : + 31-20-3422100

Fax : + 31-20-6971006

Email : info@Mastervolt.com