

# MASTERVOLT

USER'S MANUAL

## MasterBus - Modbus Interface

Interface from Modbus to MasterBus



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## 1 GENERAL INFORMATION

### 1.1 Use of this manual

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This manual serves as a guideline for the safe and effective operation of the Modbus.

Keep this manual at a secure place!

### 1.2 Guarantee specifications

Mastervolt guarantees that this product was built according to the legally applicable standards and stipulations. If you fail to act in accordance with the regulations, instructions and stipulations in this user's manual, damage can occur and/or the

product will not fulfil the specifications. This may mean that the guarantee will become null and void.

**IMPORTANT:** Additional warranty agreements, like "Mastervolt system warranty" may contain restrictions which forbid resetting of historical data. The standard guarantee period is two years after date of purchase.

### 1.3 Liability

Mastervolt can accept no liability for:

- consequential damage due to use of the Modbus;
- possible errors in the manuals and the results thereof;
- Use that is inconsistent with the purpose of the product.



**CAUTION!**  
 Never remove the identification label.

## 2 OPERATION

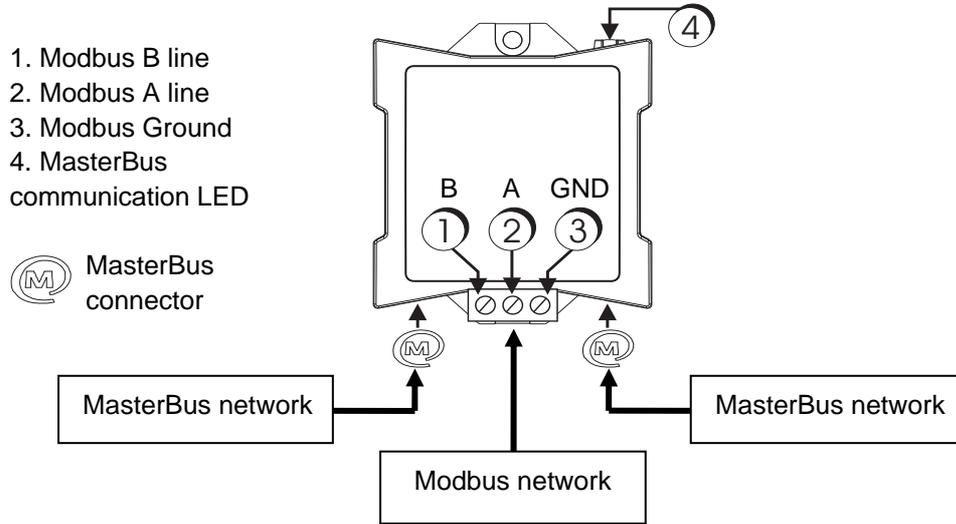
### 2.1 MasterBus functions

The Modbus communicates via MasterBus. For information about MasterBus, see [www.mastervolt.com](http://www.mastervolt.com). The table below shows the interface functions.

Monitoring Function	Description	Factory settings	Range
State	Interface can be Communicating (activate) or Idle (standby)	Idle	Idle/ Communicating
Configuration Function	Description	Factory settings	Range
Language	Set the Modbus menu language	English	See specifications
Device name	Any name you wish with 12 characters max	INT MB Modbus	12 characters max
Device ID	Number to recognize the interface	1	1-247
Parity	The parity check of the interface can be set. None (1 stopbit) means no parity check in a 1 stopbit protocol.	Even	None (1 stopbit), None (2 stopbits), Even, Odd
Speed	Interface communication speed in Baud. Set a lower speed if not all devices support 19200 Baud.	19200	9600, 19200, 115200

## 3 INSTALLATION

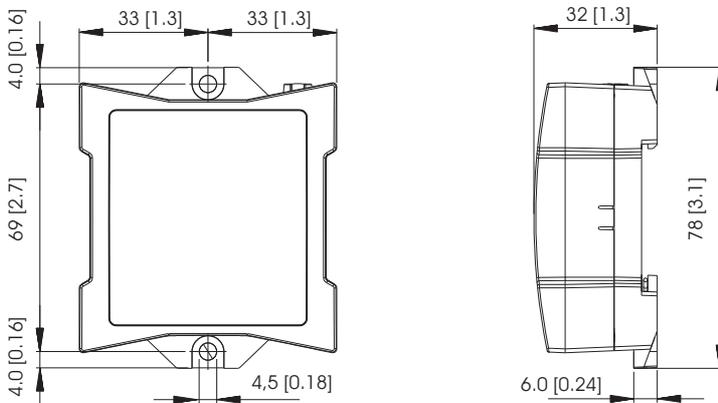
Insert the MasterBus cables first, then connect the Modbus cables to the screw terminal, see figure below.



Overview and functional scheme of the Modbus

## 4 SPECIFICATIONS

Model:	MasterBus - Modbus interface
Article number:	77030800
Delivery also includes:	Screw terminal, MasterBus cable, MasterBus Terminating device, User's manual
Function of instrument:	Modbus to MasterBus interface
Languages available:	English, Nederlands, Deutsch, Français, Castellano, Italiano, Norsk, Svenska, Suomi, Dansk
Power consumption:	350 mW
MasterBus Powering:	No
Din rail mounting:	Yes, Din rail 30 mm [1.2 inch]
Protection degree:	IP 21
Dimensions:	66 x 78 x 32 mm [2.6 x 3.1 x 1.3 inch]; see drawing below
Weight:	Approx. 80 gr [0.18 lb]



Dimensions in mm [inch]



## 5 EC DECLARATION OF CONFORMITY

We, Mastervolt, Snijdersbergweg 93, 1105 AN Amsterdam, The Netherlands, declare under our sole responsibility that

Product: 77030800 - MasterBus - Modbus interface,

is in conformity with the provisions of the following EC directives:

- 2004/108/EC (EMC directive); the following harmonized standards have been applied:
  - EN 61000-6-3: 2007 - Emission for residential, commercial and light-industrial environments
  - EN 61000-6-2: 2007 - Immunity for industrial environments
- 2011/65/EU (RoHS directive)

Amsterdam, 18 September 2014

H.A. Poppelier  
Product Manager marine & mobile

## 6 MODBUS INTERFACE CONFIGURATION

This chapter describes the configuration of the Modbus interface for communication between the MasterBus network and the Modbus network. The communication mode supported is RTU.

### 6.1 What you need

To configure the Modbus interface, you will need besides the Modbus itself:

- a Modbus cable from your Modbus network to the Modbus interface;
- a pc with Windows 2000, XP or higher;
- Masteradjust software, free downloadable from [www.mastervolt.com](http://www.mastervolt.com);
- USB-MasterBus interface.

### 6.2 MasterBus device address and variable

The master of the Modbus network is able to communicate with any individual MasterBus device variable for read or write action.

For this communication the MasterBus device address and the position of the variable are needed.

#### 6.2.1 MasterBus Device Address

The MasterBus Device Address consists of 2 variables:

- IDB (18 bit value) and
- IDAL (5 bit value).

These two variables are read out by MasterAdjust.

#### 6.2.2 Position of the MasterBus device variable

The position of a particular MasterBus variable is expressed in 2 values:

Tab number (column) and Variable number (row).

The Tab number is related to the category concerned. There are 4 different categories as mentioned below.

- Monitoring: tab number 0
- Alarm: tab number 1
- History: tab number 2
- Configuration: tab number 3

Enter this number into *TabNr* to communicate with correct categories.

The Variable number is the index connected to every variable in a category.

Enter this number into *Index*.

You now defined the position of the MasterBus device variable you want the Modbus to communicate with.

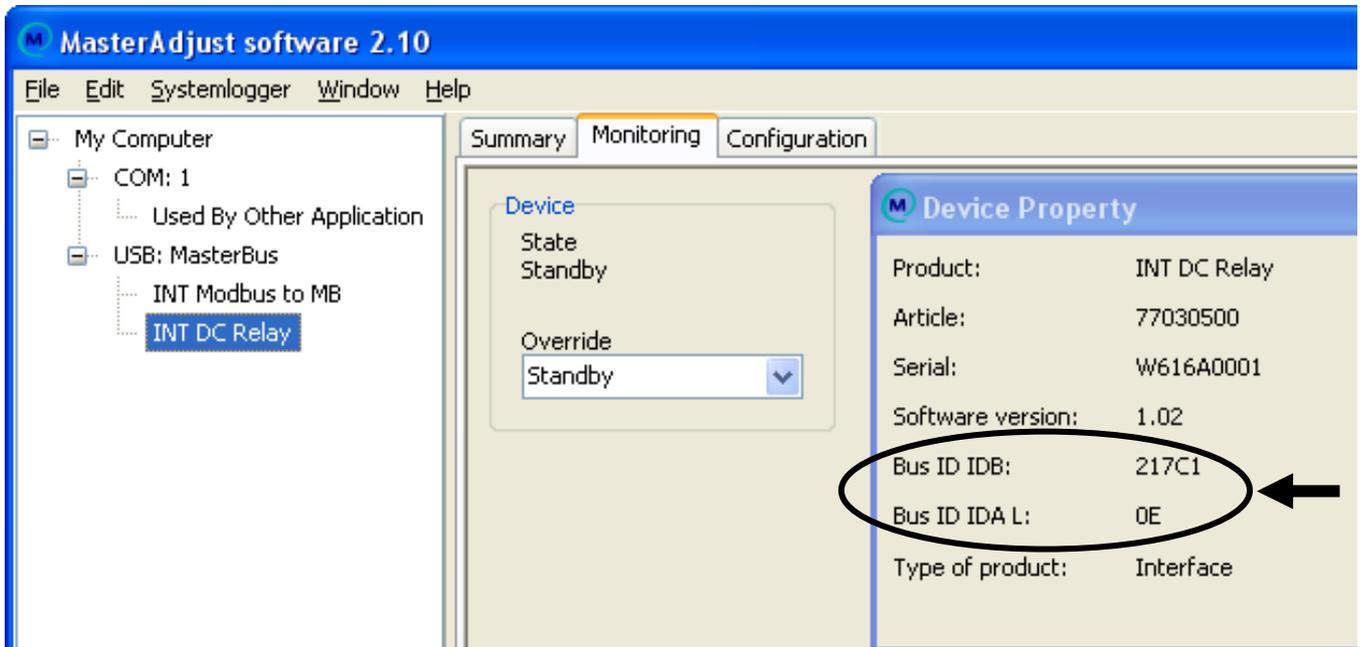
See the example how to find these variables IDAL, IDB, TabNr and Index using MasterAdjust.

## 6.3 Finding IDB and IDAL

Select 'INT DC Relay' and use right mouse button to select property. A property form like below will pop up.



Write down the values found. You need them later to enter them into the PLC system.

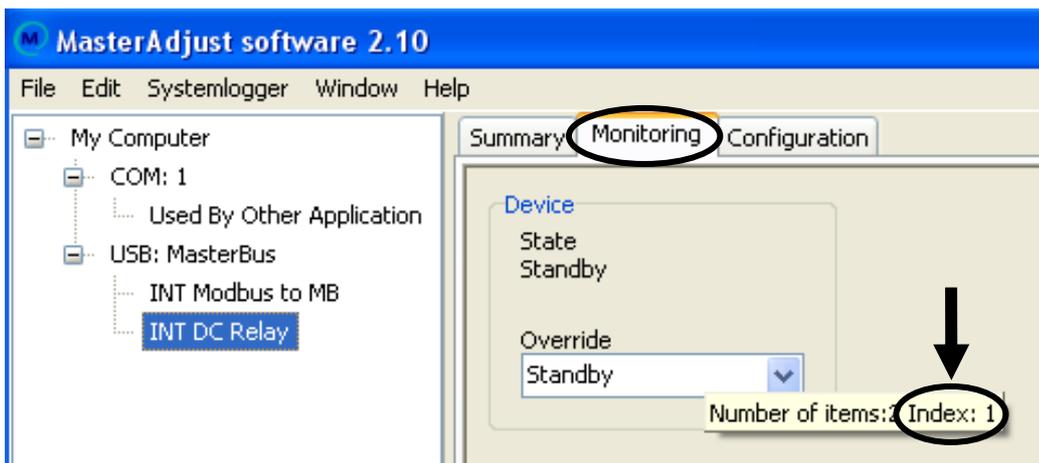


## 6.4 Finding TabNr and Index

In this example the Override variable is selected to communicate with. The picture below shows the Monitoring tab (TabNr = 0). The mouse hint (right mouse button) of this variable shows Index: 1.

The values needed are now:

Variable	Value
IDB	0x217C1 (hexadecimal figure)
IDAL	0x0E (hexadecimal figure)
TabNr	0
Index	1



## 6.5 Entering the values into Modbus

After having written down the values needed, you have to enter these into your Modbus system. The next example shows how to enter the values and how to communicate with the chosen variable "Override" of MasterBus device "INT DC Relay".

### 6.5.1 Modbus function code 23

The Modbus to MasterBus interface uses the Modbus function 23 communication protocol. See the Modbus Application Protocol Specification V1.1b at [www.modbus.org](http://www.modbus.org) for more details. The dataframe tables below describe the variables used in Modbus function 23 (0x17) Read/Write Multiple Registers Protocol.

#### Request data frame

Address field	Function code (Function 23)	Data (Read Starting Address, etc.)	CRC (Error check)
1 Byte	1 Byte	21 Bytes	2 Bytes

#### Request

Variable	Size	Value
Bus address	1 Byte	Variable
Function code	1 Byte	0x17 (Fixed)
Read Starting Address	2 Bytes	0 (Fixed)
Quantity to Read	2 Bytes	6 (Fixed)
Write Starting Address	2 Bytes	0 = read / 1 = write
Quantity to Write	2 Bytes	6 (Fixed)
Write Byte Count	1 Byte	12 (Fixed)
IDAL 5 bit value	1 Byte	Variable
IDB	3 Bytes	Variable
TabNr	2 Bytes	Variable
Index	2 Bytes	Variable
Value	4 Bytes	Variable
CRC	2 Bytes	Calculated

#### Response data frame

Address field	Function code (Function 23)	Data (Read Starting Address, etc.)	CRC (Error check)
1 Byte	1 Byte	13 Bytes	2 Bytes

#### Response

Variable	Size	Value
Bus address	1 Byte	Variable
Function code	1 Byte	0x17 (Fixed)
Byte Count	1 Byte	0x0C (Fixed)
IDAL 5 bit value	1 Byte	Variable
IDB	3 Bytes	Variable
TabNr	2 Bytes	Variable
Index	2 Bytes	Variable
Value	4 Bytes	Variable
CRC	2 Bytes	Calculated

## 6.5.2 Example writing request

This is an example of a request to WRITE to the variable with :

- Monitoring (TabNr = 0);
- Variable index (Index = 1);
- MasterBus device IDAL = 0x0E ID;
- MasterBus device IDB = 0x0217C1.

### Request example

Variable	Value	Range
Bus address	0x01	[1..247]
Function code	0x17	Fixed
Read Starting Address Hi	0x00	Fixed
Read Starting Address Lo	0x00	Fixed
Quantity to Read Hi	0x00	Fixed
Quantity to Read Lo	0x06	Fixed
Write Starting Address Hi	0	Fixed
Write Starting Address Lo	1	0 = read / 1 = write
Quantity to Write Hi	0x00	Fixed
Quantity to Write Lo	0x06	Fixed
Write Byte Count (Fixed)	0x0C	Fixed
IDAL	0x0E	[0..31]
IDB Hi	0x02	[0..3]
IDB Mi	0x17	[0..255]
IDB Lo	0xC1	[0..255]
TabNr Hi	0x00	Fixed
TabNr Lo	0x00	[0..3]
Index Hi	0x00	[0..255]
Index Lo	0x01	[0..255]
Value Lo (Float IEEE 754)	0x00	[0..255]
Value Mi	0x00	[0..255]
Value Hi	0x80	[0..255]
Value Exponent	0x3F	[0..255]
CRC Lo	0x85	[0..255]
CRC Hi	0xFA	[0..255]

### Response example

Variable	Value	Range
Bus address	0x01	[1..247]
Function code	0x17	Fixed
Byte Count(Fixed)	0x0C	Fixed
IDAL	0x0E	[0..31]
IDB Hi	0x02	[0..3]
IDB Mi	0x17	[0..255]
IDB Lo	0xC1	[0..255]
TabNr Hi	0x00	Fixed
TabNr Lo	0x00	[0..3]
Index Hi	0x00	[0..255]
Index Lo	0x01	[0..255]
Value Lo (Float IEEE 754)	0x00	[0..255]
Value Mi	0x00	[0..255]
Value Hi	0x80	[0..255]
Value Exponent	0x3F	[0..255]
CRC Lo	0x94	[0..255]
CRC Hi	0xC1	[0..255]

### 6.5.3 Exception codes

The Modbus function 23 communication protocol implements five default Modbus Exception Codes for incorrectly entered values.

The table below describes the corresponding errors and proposes their solutions.

Code	Error	Solution
01	The function code is wrong	Enter the Function 23 code: 0x17
02	Wrong Read starting address.	Enter Read Starting Address: 0
	Wrong Write starting address.	Enter Write Starting Address: 0 or 1
03	Wrong Quantity to Read.	Enter Quantity to Read: 6
	Wrong Quantity to Write.	Enter Quantity to Write: 6
04	Packet size is too large or too small.	Enter a Packet sized exactly 25 bytes, including Modbus ID + CRC.
	IDAL value is too high	Enter a maximum 5 bit value.
	IDB value is too high	Enter a maximum 18 bit value.
05	The time out error occurs when there is no response from MasterBus for three seconds.	Check if the MasterBus powering device is working and/or check the MasterBus wiring.

### 6.5.4 Exception message

Below, the exception message is described and an example is shown.

#### *Exception message*

Variable	Size	Value
Bus address	1 Byte	Variable
Function code	1 Byte	0x97 (Fixed)
Exception code	1 Byte	Variable
CRC	2 Byte	Calculated

#### *Exception message example*

Variable	Value	Range
Bus address	0x01	[1..247]
Function code	0x97	Fixed
Exception code	0x05	[1..5]
CRC Lo	0x8E	[0..255]
CRC Hi	0x33	[0..255]



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