MASTERVOLT

THE POWER TO BE INDEPENDENT

MasterBus Modbus Interface

Interface between Modbus and MasterBus

USER AND INSTALLATION MANUAL

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www.mastervolt.com

In case of any discrepancy in the interpretation of different language versions, the English version shall prevail.

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1 GENERAL INFORMATION

1.1 Use of this manual

This manual serves as a guideline for the safe and effective operation of the MasterBus Modbus Interface. Keep this manual at a secure place!

1.2 Warranty

Advanced Systems Group (ASG) assures the product warranty of the Modbus Interface during two years after purchase, on the condition that the product is installed and used according to the instructions in this manual.

Installation or use not according to these instructions may result in under performance, damage or failure of the product and may void this warranty. The warranty is limited to the cost of repair and/or replacement of the product. Costs of labour or shipping are not covered by this warranty.

CAUTION!

Never remove the identification label. This will void the warranty.

1.3 Liability

ASG can accept no liability for:

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

1.4 Disclaimer

Our products are subject to continual development and improvement. Therefore, additions or modifications to the products may cause changes to the technical data and functional specifications. No rights can be derived from this document. Please consult our online Terms & Conditions of Sale.

1.5 Correct disposal of this product

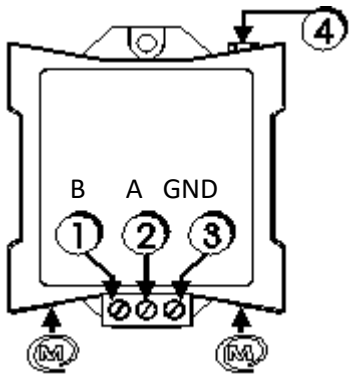
This product is designed and manufactured with high quality materials and components, which can be recycled and reused. Please be informed about the local separate collection system for electrical and electronic products. Please act according to your local rules and do not dispose of your old products with your normal household waste. The correct disposal of your old product will help prevent potential negative consequences to the environment and human health.

2 INSTALLATION

Step 1. Mount the Modbus Interface to any flat surface. The Modbus Interface comes with a DIN rail mount option. Alternatively, use the two mounting holes.

Step 2. Insert the MasterBus cable (included, 1m) to integrate the interface into the MasterBus network. Make sure that the MasterBus network is properly terminated at the two ends with a terminator.

Step 3. Connect the Modbus wires 1, 2 and 3 to the screw terminal.



1. Modbus B line
2. Modbus A line
3. Modbus Ground
4. MasterBus communication LED

Ⓜ MasterBus connector

Step 4. A flashing LED (4) indicates that the MasterBus communication is working.

Step 5. Use a Mastervolt USB Interface to connect a Windows PC (laptop or notebook) with MasterAdjust software, to configure the Modbus Interface.

3 OPERATION

The Modbus communicates via MasterBus. For information about MasterBus, see www.mastervolt.com.

MasterBus functions			
Monitoring	**Description**	**Default**	**Range**
State	Interface can be Communicating (active) or Idle (standby)	Idle	Idle/Communicating
Configuration	**Description**	**Default**	**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
Address	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	Even, Odd, None (1 stopbit), None (2 stopbits),
Speed	Interface communication speed in Baud. Set a lower speed if not all devices support 19200 Baud.	19200	9600, 19200, 115200

4 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.

4.1 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 Windows PC;
- MasterAdjust software, free downloadable from www.mastervolt.com;
- Mastervolt USB Interface (product code 77030100).

4.2 MasterBus device address and variable

The master of the Modbus network can 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.

4.2.1 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.

4.2.2 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:

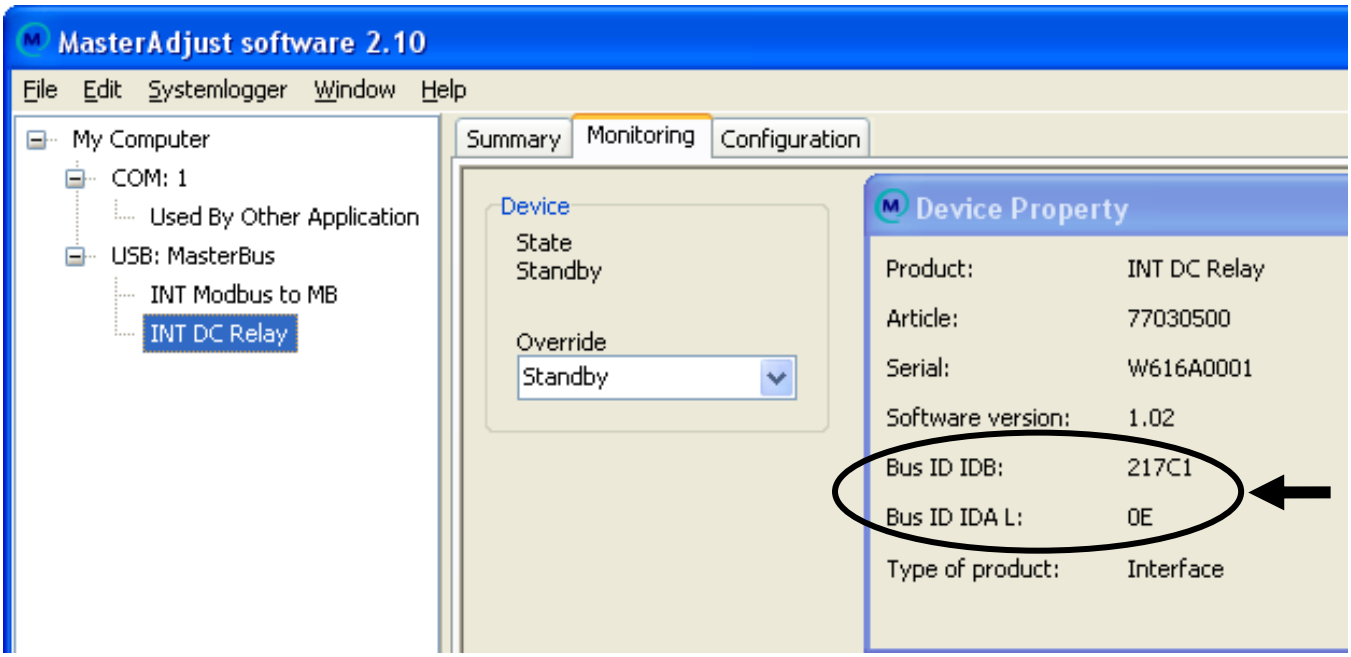
- Monitoring: tab number 0
- Alarm: tab number 1
- History: tab number 2
- Configuration: tab number 3

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 following section for how to find these variables IDAL, IDB, TabNr and Index using MasterAdjust.

4.3 Finding IDB and IDAL

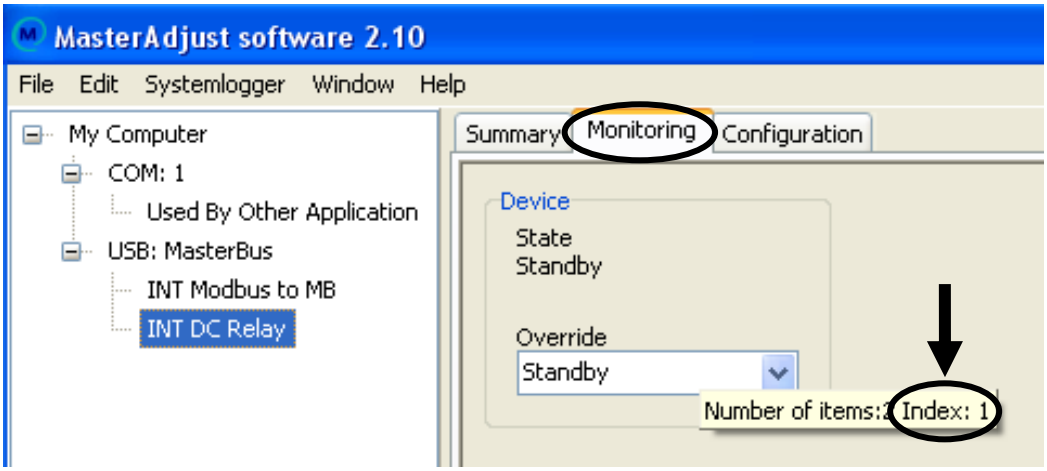
Righ-click **INT DC Relay** and select **Property**. The *Device Property* window will pop up.

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



4.4 Finding TabNr and Index

In this example, the *Override* variable is selected to communicate with. The following picture shows the Monitoring tab (TabNr = 0). The mouse hint (pops up when hovering the mouse pointer over the variable) of this variable shows Index: 1.



The required values are now:

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

4.5 Entering the values into Modbus

After having written down the required values, you must 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”.

4.5.1 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 for more details.

The data frame 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

4.5.2 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]

4.5.3 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 of exactly 25 bytes, incl. 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.

4.5.4 Exception message

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

Exception message

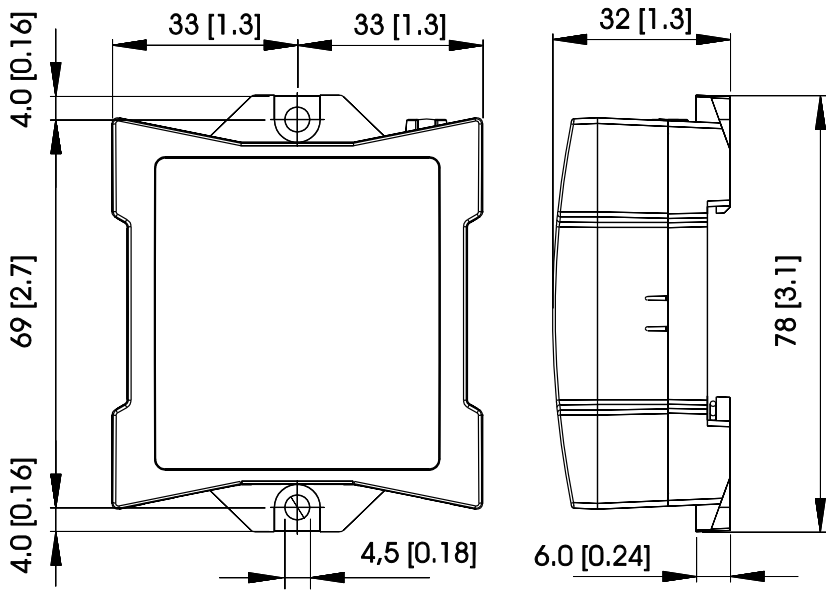
Variable	Size	Value
Bus address	1 Byte	Variable
Function code	1 Byte	0x97 (Fixed)
Exception code	1 Byte	Variable
CRC	2 Byte	Calculated

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]

5 SPECIFICATIONS

Model:	MasterBus Modbus Interface
Product code:	77030800
Delivery also includes:	– Screw terminal (*3 positions, pluggable PCB terminal block, Phoenix Contact part # 1803581*) – MasterBus terminator – MasterBus cable (1m) – User manual
Modbus protocol:	RS485
Modbus function code:	23 (0x17) RTU
Power consumption	350 mW
MasterBus powering	No
Languages available:	English, Nederlands, Deutsch, Français, Castellano, Italiano, Norsk, Svenska, Suomi, Dansk
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 [0.2 lb] including screw terminal



Dimensions in mm [inch]

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