MASTERVOLT

THE POWER TO BE INDEPENDENT

MasterBus Modbus Interface

Interface between Modbus and MasterBus

USER AND INSTALLATION MANUAL

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

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

Mastervolt 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

Mastervolt 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

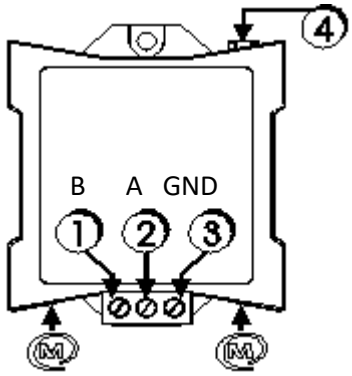
This product is designed and manufactured with high quality materials and components, which can be recycled and reused. Please be informed about the local separate collection system for electrical and electronic products. Please act according to your local rules and do not dispose of your old products 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 MasterBus communication is working.

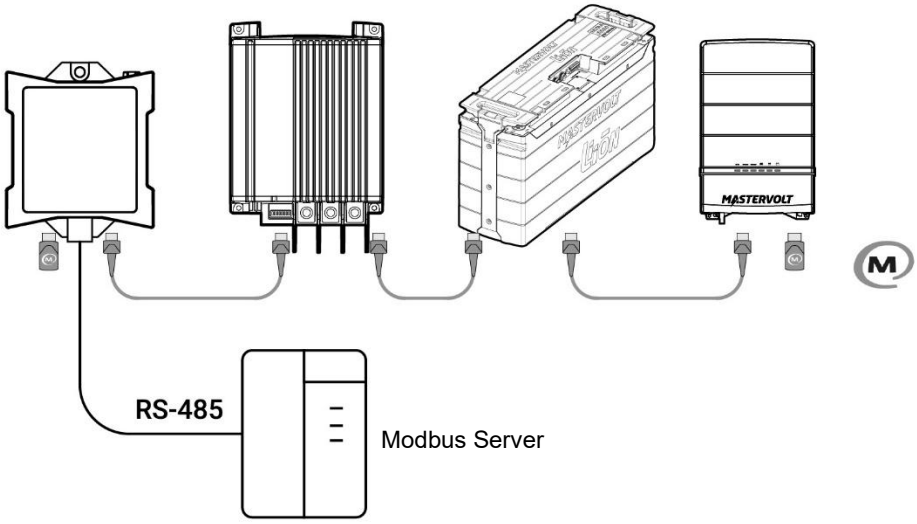
Step 5. Use a Mastervolt USB Interface to connect a Windows PC with MasterAdjust software, to configure the Modbus Interface.

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 menu language	English	English, Nederlands, Deutsch, Français, Castellano, Italiano, Norsk, Svenska, Suomi, Dansk
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
Protocol	Option to re-use the configured device index (Version 1) instead of the default MasterBus BusId (Version 0). See also section 5.6.	Version 0	Version 0, Version 1
Device Numbers	When Protocol Version 1 is selected, up to 25 devices can be selected per Modbus Interface.	-	-

4 TYPICAL SYSTEM OVERVIEW



5 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.

5.1 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).

5.2 MasterBus device address and variable

The Modbus Server can perform read and write actions on each individual variable of a MasterBus device. For this communication, the MasterBus device address and the position of the variable are needed.

5.2.1 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.

5.2.2 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

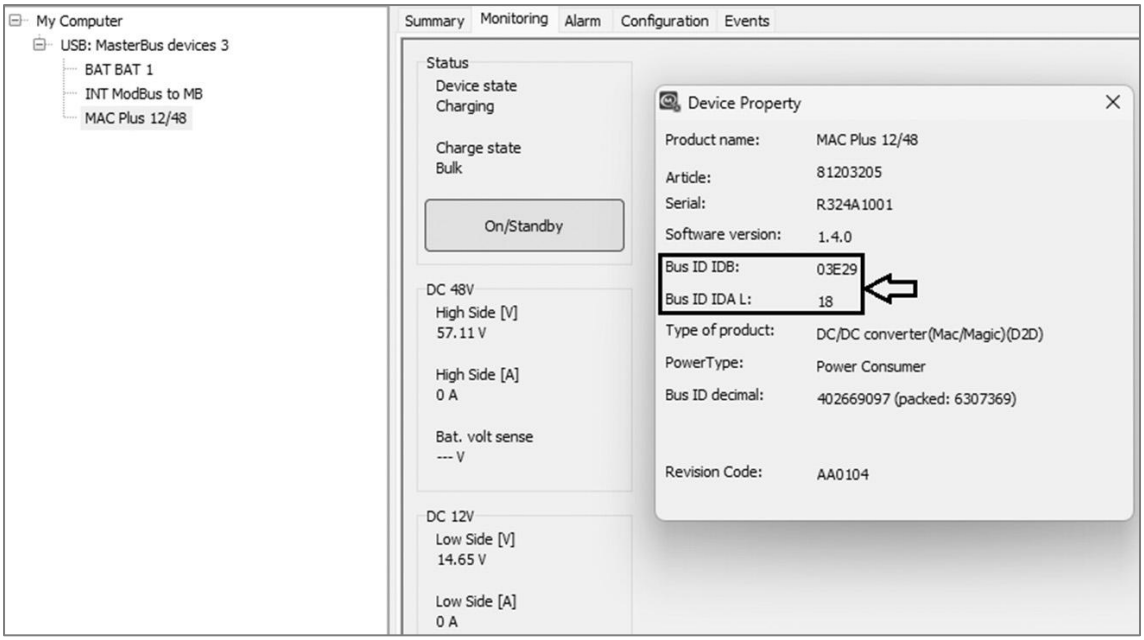
Enter this number into *TabNr* to communicate with correct categories. The Variable number is the index connected to every variable in a category. Enter this number into *Index*. You now defined the position of the MasterBus device variable you want the Modbus to communicate with. See the following section for how to find these variables IDAL, IDB, TabNr and Index using MasterAdjust.

5.3 Finding IDB and IDAL

5.3.1 Protocol Version 0

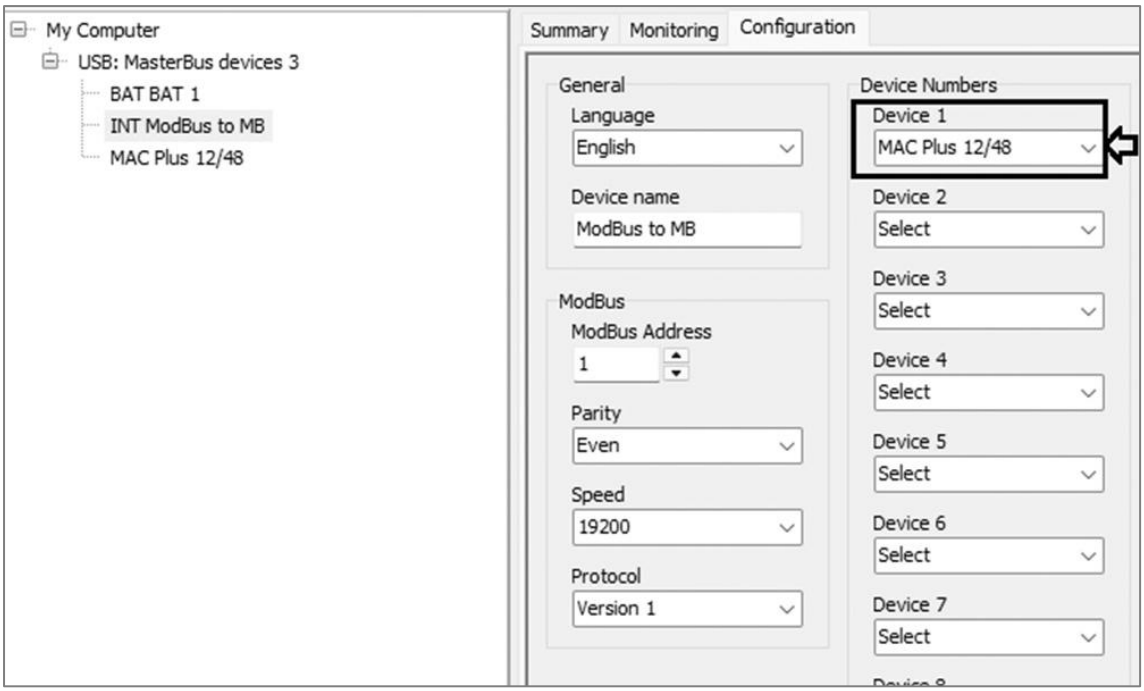
When using Protocol Version 0, you need target device **Bus ID IDB** and **ID IDA L** information in the Modbus protocol.
To get the Bus ID information, right-click (in our example below) **MAC Plus 12/48** and select **Property**. The *Device Property* window will pop up.

Note: Write down the values shown. You need them later to use in the Modbus protocol.



5.3.2 Protocol Version 1

When using Protocol Version 1, you need to use ***Device Index*** information in the Modbus protocol. You can configure/select the Device in Modbus Interface.

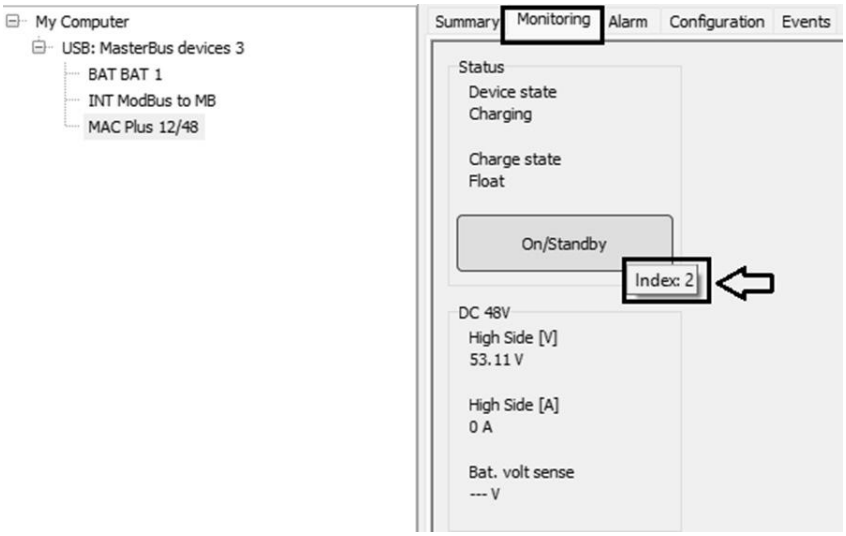


Use 0xFFFFF (fixed) as IDB value.

Use 0x00 as IDAL to communicate with Device ‘1’. Use 0x01 as IDAL to communicate with Device ‘2’. 0x02 with Device ‘3’ and so on. You can select up to 25 MasterBus devices.

5.4 Finding TabNr and Index

In this example, the *Device status* variable is selected to communicate with. The picture shows the Monitoring tab (TabNr: 0). The tooltip (pops up when hovering the mouse pointer over the variable) of this variable shows Index: 2.



The required values are now:

Variable	Value	
	Protocol version 0	**Protocol version 1**
IDB	0x03E29 (hexadecimal)	0xFFFFF
IDAL	0x18 (hexadecimal)	0 (Device 1)
TabNr	0	0
Index	2	2

5.5 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 “Device Status” of MasterBus device “MAC Plus 12/48”.

5.5.1 Modbus function code 23

The Modbus to MasterBus interface uses the Modbus function code 23 in the 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 – Hexadecimal) 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 0xFFFFF	(Protocol Version 0] (Fixed) [Protocol Version 1]
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	(Protocol Version 0)
		0xFFFFF	(Protocol Version 1)
TabNr	2 Bytes	Variable	
Index	2 Bytes	Variable	
Value	4 Bytes	Variable	
CRC	2 Bytes	Calculated	

5.5.2 Example writing request

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

- Monitoring (TabNr = 0);
- Variable index (Index = 2);
- MasterBus device IDAL = 0x18 (Protocol Version 0) or 0x00 (Protocol Version 1)
- MasterBus device IDB = 0x03E29 (Protocol Version 0) or 0xFFFFF (Protocol Version 1).

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		[0...31]
	0x18	(Protocol Version 0)
	0x00	(Protocol Version 1)
IDB Hi		[0...3]
	0x00	(Protocol Version 0)
	0xFF	(Protocol Version 1)
IDB Mi		[0...255]
	0x3E	(Protocol Version 0)
	0xFF	(Protocol Version 1)
IDB Lo		[0...255]
	0x29	(Protocol Version 0)
	0xFF	(Protocol Version 1)
TabNr Hi	0x00	Fixed
TabNr Lo	0x00	[0...3]
Index Hi	0x00	[0...255]
Index Lo	0x02	[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		[0...31]
	0x18	(Protocol Version0)
	0x00	(Protocol Version1)
IDB Hi		[0...3]
	0x00	(Protocol Version0)
	0xFF	(Protocol Version1)
IDB Mi		[0...255]
	0x3E	(Protocol Version0)
	0xFF	(Protocol Version1)
IDB Lo		[0...255]
	0x29	(Protocol Version0)
	0xFF	(Protocol Version1)
TabNr Hi	0x00	Fixed
TabNr Lo	0x00	[0...3]
Index Hi	0x00	[0...255]
Index Lo	0x02	[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]

5.5.3 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.

5.5.4 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

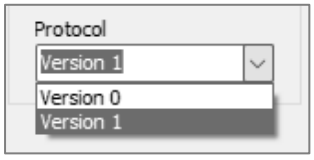
Exception message example

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]

5.6 Updating or duplication of MasterBus devices

When replacing MasterBus devices or duplicating a complete configuration, use **Protocol Version 1**. This allows you to select the device(s) in MasterAdjust, to avoid changes to the Modbus Protocol. The new device(s) must be the same type so that index numbers still correspond. For example, if Device 1 is a battery of type *xyz*, where index 1 represents the State of Charge (SOC), then the new Device 1 must also be a battery of type *xyz*.

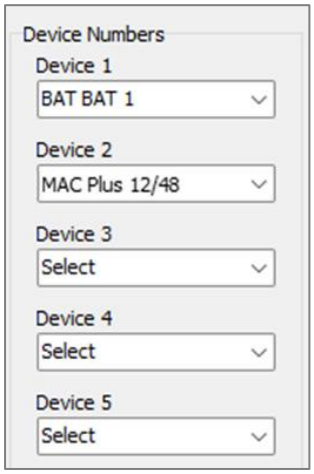
1. Open MasterAdjust.
2. Select the Modbus Interface.
3. Go to the **Configuration** tab.
4. From the **Protocol** drop-down list, select **Version 1**.



With Version 0, you need to find, and write down, the IDB & IDA of the MasterBus device and use it in the Modbus protocol.

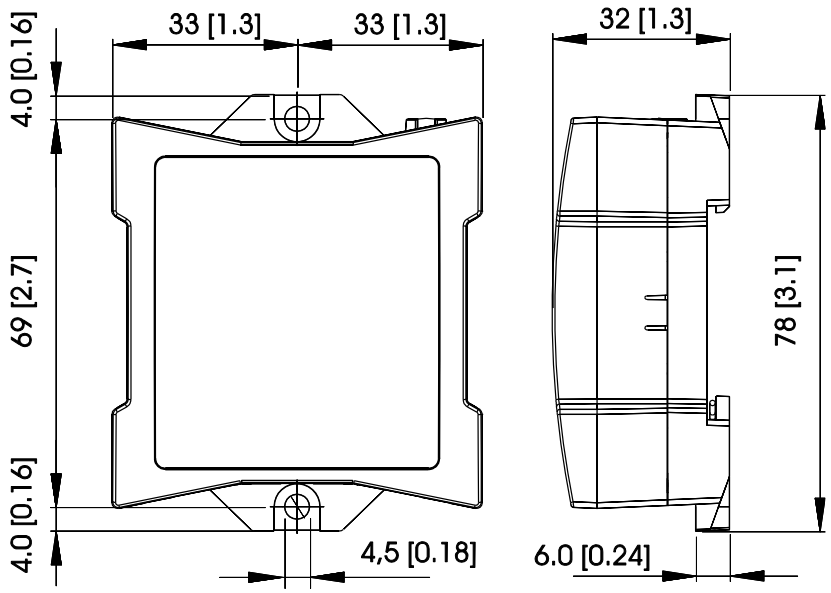
With Version 1, the Modbus protocol stays the same. The MasterBus device will have the same product code, but a different serial number.

5. Select the individual devices from the **Device Numbers** drop-down lists.



6 SPECIFICATIONS

Model:	MasterBus Modbus Interface
Product code:	77030800
Delivery also includes:	– Screw terminal (*3 positions, pluggable PCB terminal block, Phoenix Contact part # 1757022*) – MasterBus terminator – MasterBus cable (1m) – User manual
Modbus protocol:	RS485
Modbus function code:	23 (0x17) RTU
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 [0.2 lb] including screw terminal



Dimensions in mm [inch]

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