



SOLVIMUS
METERING SOLUTIONS

MBUS-REP - USER MANUAL

MBUS-REP REPEATER FOR THE M-BUS

Version 1.2
Date: 2019-05-21

Author:

Sven Ladegast
solvimus GmbH
Ratsteichstr. 5
98693 Ilmenau
Germany

This page is left blank intentionally.

Contents

1	General hints and conventions.....	4
1.1	About this document.....	4
1.2	Legal bases	4
1.2.1	Copyright	4
1.2.2	Personnel qualifications	4
1.2.3	Technical condition of specified devices	4
1.3	Symbols.....	4
1.4	Font conventions.....	5
1.5	Number notation	5
1.6	Safety guidelines.....	5
1.7	Scope.....	6
1.8	Abbreviations	6
1.9	Versions	6
2	General Information	7
2.1	Device variants.....	7
2.2	Connectors	8
2.3	State LEDs.....	8
3	Bringing into service.....	9
3.1	Extending an existing M-Bus with a new bus segment	9
3.2	Ripping up an existing M-Bus	9
4	Troubleshooting.....	10
4.1	Hardware error	10
4.1.1	The devices does not respond.....	10
4.1.2	Current consumption is too high (M-Bus slave side).....	10
4.1.3	Current consumption is too high (24 VDC power supply side)	10
5	Technical data	11
5.1	General characteristics	11
5.1.1	Physical dimensions / weight.....	11
5.1.2	Installation / Storage	11
5.2	Electrical characteristics	11
5.2.1	Power Requirements	11
5.2.2	Communication interfaces.....	11

1 General hints and conventions

1.1 About this document

This manual provides guidance and procedures for a fast and efficient installation and start-up of the units described in this manual. It is imperative to read and carefully follow the safety guidelines.

1.2 Legal bases

1.2.1 Copyright

This manual, including all figures and illustrations, is copyright-protected. Any further use of this manual by third parties that violate pertinent copyright provisions is prohibited. Reproduction, translation, electronic and phototechnical filing/archiving (e.g. photocopying) as well as any amendments require the written consent of solvimus GmbH.

Non-observance will involve the right to assert damage claims.

The solvimus GmbH reserves the right to provide for any alterations or modifications that serve to increase the efficiency of technical progress. All rights arising from the granting of patents or from the legal protection of utility patents are owned by the solvimus GmbH. Third-party products are always mentioned without any reference to patent rights. Thus, the existence of such rights cannot be excluded.

1.2.2 Personnel qualifications

The use of the product described in this manual requires special personnel qualifications. All responsible persons have to familiarize themselves with the underlying legal standards to be applied, i.e.:

- Valid standards
- Handling of electronic devices






The solvimus GmbH does not assume any liability whatsoever resulting from improper handling and damage incurred to both, solvimus own and third-party products, by disregarding detailed information in this manual.

1.2.3 Technical condition of specified devices

The supplied components are equipped with hardware and software configurations, which meet the individual application requirements. Changes in hardware, software and firmware are permitted exclusively within the framework of the various alternatives that are documented in the specific manuals. The solvimus GmbH will be exempted from any liability in case of changes in hardware or software as well as to non-compliant usage of components.

Please send your request for modified and new hardware or software configurations directly to the solvimus GmbH.

1.3 Symbols

-  Danger: Always observe this information to protect persons from injury.
-  Warning: Always observe this information to prevent damage to the device.
-  Attention: Marginal conditions that must always be observed to ensure smooth and efficient operation
-  ESD (Electrostatic Discharge): Warning of damage to the components through electrostatic discharge. Observe the precautionary measure for handling components at risk of electrostatic discharge.
-  Note: Make important notes that are to be complied with so that a trouble-free and efficient device operation can be guaranteed.

- ➔ Additional information: References to additional literature, manuals, data sheets and internet pages.

1.4 Font conventions

Names of paths and data files are marked in italic-type. According to the system, Slashes or Backslashes are used.

i.e.: *D:\Data*

Menu items are marked in italic-type, bold letters.

i.e.: ***Save***

Sub-menu items or navigation steps within a web browser are marked by using an arrow between two menu items or tabs.

i.e.: ***File*** → ***New***

Pushbuttons or input fields are marked with bold letters.

i.e.: **Input**

Keys are marked with bold capital letters within angle brackets.

i.e.: <**F5**>

The print font for program codes is Courier.

i.e.: END_VAR

Names of variables, designators and configuration fields are marked in italic-type.

i.e.: *Value*

1.5 Number notation

Numbers are noted according to this table:

Number code	Example	Note
Decimal	100	Normal notation
Hexadecimal	0x64	C Notation
Binary	'100'	in quotation marks
	'0110.0100'	nibbles separated with dot

Table 1: Numbering systems

1.6 Safety guidelines

- ⚠ All power sources to the device must always be switched off before carrying out any installation, repair or maintenance work.



Replace any defective or damaged devices/modules (i.e. in the event of deformed contacts), as the functionality of the devices cannot be ensured on a long-term basis.

The components are not resistant against materials having seeping and insulating characteristics. Materials like e.g. aerosols, silicones, triglycerides (found in some hand creams) belong to this group.

If it cannot be ruled out that these materials appear in the component environment, then the components must be installed in an enclosure that is resistant against the above mentioned materials.

Clean tools and materials are generally required to operate the device/module.

- ⚠ Only use a soft, wet cloth for cleaning. Soapy water is allowed. Pay attention to ESD.
- ⚠ Do not use solvents like alcohol, acetone etc. for cleaning.
- ⚠ Do not use contact sprays, which could possibly impair the functioning of the contact area and may cause short circuits.

-  Components, especially OEM modules, are designed for the mounting into electronic housings. Those devices shall not be touched when powered or while in actual operation. The valid standards and guidelines applicable for the installation of switch cabinets shall be adhered to.
-  The devices are equipped with electronic components that may be destroyed by electrostatic discharge when touched. It is necessary to provide good grounding to personnel, working environment and packing. Electroconductive parts and contacts should not be touched.

1.7 Scope

This manual describes the devices mentioned in the title, supplied by solvimus GmbH, Ilmenau.

1.8 Abbreviations

Abbreviation	Description
DIN	Deutsches Institut für Normung, German standardization body
ESD	ElectroStatic Discharge
LED	Light-Emitting Diode
M-Bus	Meter-Bus (EN 13757, part 2 - 3)
OEM	Original Equipment Manufacturer
VDE	Verband der Elektrotechnik Elektronik Informationstechnik e.V., association for electrical, electronic & information technologies
wM-Bus	Wireless Meter-Bus (EN 13757, part 3 - 4)

Table 2: Abbreviations

1.9 Versions

Version	Date	Editor	Changes
1.0	2017-07-18	Sven Ladegast	Initial version.
1.1	2017-08-31	Sven Ladegast	Corrected several paragraphs.
1.2	2018-01-19	Sven Ladegast	Modified layout of this document.
1.2	2019-05-21	Romy Schneider	Added MBUS-REP250 in device variants

Table 3: Versions of this document

2 General Information

The M-Bus (Meter-Bus) is an established and well known interface for automated meter reading. Especially the ease of installation (simple two-wire system with powering by the bus) and the robustness are important features. These are also special attributes that are of interest for use in industrial environments.

The M-Bus is defined in the standard EN 13757. There is an own physical layer as well as an own protocol. For connecting it to other systems a translation is necessary.

The MBUS-Rep acts as an M-Bus master as well as an M-Bus slave. It is fully transparent to the baud rate that is used on the M-Bus and on-the-fly baud rate changes are supported by the device. By the use of the MBUS-REP it is possible to extend an existing M-Bus with further units sharing the same M-Bus installation. The device will supply power for up to 500 UL on the extended M-Bus segment depending on the device variant.

The MBUS-REP comes in a 3 U enclosure (modules) and is intended for DIN rail mounting (standard 35 mm DIN rail).

2.1 Device variants

The MBUS-REP is a modular designed gateway. As different variants are available, it is possible to use the configuration which fits best to the application.

Variant	Order number	M-Bus interface
MBUS-REP125	500414	Max. 125 unit loads
MBUS-REP250	500417	Max. 250 unit loads
MBUS-REP500	500402	Max. 500 unit loads

Table 4: Available variants

2.2 Connectors

The interface and connectors of the MBUS-REP are available on different sides of the device.
The following figure shows the device:

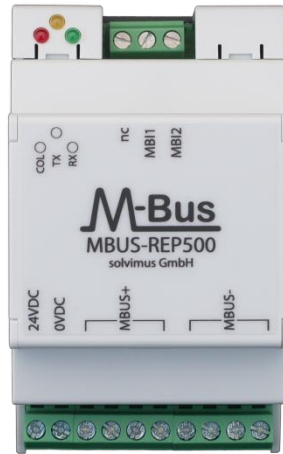


Figure 1: MBUS-REP500

The MBUS-REP is equipped with the following connectors:

Connector	Marking	Pinning	Remark
Power supply	24VDC, 0VDC	24VDC: 12 - 36 VDC 0VDC: Reference ground	Screw clamps Cross sectional area 2,5 mm ²
M-Bus connectors (master side)	MBUS+, MBUS-	MBUS+: M-Bus positive bus line MBUS-: M-Bus negative bus line	Screw clamps Cross sectional area 2,5 mm ² MBUS+ and MBUS- are shorted each
M-Bus connectors (slave side)	MBI1, MBI2, nc	MBI1, MBI2: Bus lines of the M-Bus to extend nc: Not connected	Screw clamps Cross sectional area 2,5 mm ²

Table 1: Connectors



2.3 State LEDs

The MBUS-REP is equipped with 3 state LEDs. These LEDs visualize the operational state of the device:

LED	Color	Description
COL	red	Lights up when a collision has been detected on the M-Bus
TX	yellow	Lights up when the M-Bus master is transmitting to the M-Bus
RX	green	Lights up when data is received from M-Bus slaves

Table 2: State LEDs

3 Bringing into service

-  De-energize the M-Bus or whose master respectively before connecting the device.
-  Please connect the slave connectors (MBI1 and MBI2, see section 2.2) of the MBUS-REP exclusively to the bus segment of the M-Bus that is powered by the original M-Bus master. Not doing so will damage the device.

The MBUS-REP is completely transparent to the data communication on the M-Bus. In this manner the device is not visible as an M-Bus slave and baud rate changes of the M-Bus master do not need any user interaction.

3.1 Extending an existing M-Bus with a new bus segment

Connect the bus lines of the existing M-Bus to the terminals MBI1 and MBI2.

The new M-Bus segment shall be connected to the terminals MBUS+ and MBUS- (see section 2.2). The MBUS-REP is able to supply this new bus segment with 125 or 500 UL respectively by only drawing 2 UL from the M-Bus on its slave connectors (MBI1 & MBI2).

Connect the power supply terminals 24VDC and 0VDC with a suitable DC power supply.

3.2 Ripping up an existing M-Bus

Do rip up the M-Bus at an appropriate position. Please make sure to distribute the devices and unit loads according to the drive power of the M-Bus master(s).

Connect the bus lines that are connected to the original M-Bus master to the terminals MBI1 and MBI2 (see section 2.2).

The second M-Bus segment is now powered by the MBUS-REP and goes to the terminals MBUS+ and MBUS- (see section 2.2). The MBUS-REP is able to supply this new bus segment with 125 or 500 UL respectively by only drawing 2 UL from the M-Bus on its slave connectors (MBI1 & MBI2).

Connect the power supply terminals 24VDC and 0VDC with a suitable DC power supply.

4 Troubleshooting

In case the MBUS-REP works not as described in this document, it is useful to locate the malfunction in order to resolve the issue and to recover the full functionality again.

4.1 Hardware error

4.1.1 The devices does not respond

After powering the device it does not operate. Current consumption is about 0 mA.

Please check the following things:

- Is there a voltage of about 24 VDC between the terminals 24VDC and 0VDC?
- Is there a voltage of about 40 VDC present between the terminals MBUS+ and MBUS-?
- Is there a voltage of about 20 - 40 VDC between the terminals MBI1 and MBI2?

If errors could not be resolved, please contact our customer support:
email: support@solvimus.de

4.1.2 Current consumption is too high (M-Bus slave side)

Communication stalls after connecting the MBUS-REP to the M-Bus. When supplying a voltage between 24 and 40 VDC to the terminals MBI1 and MBI2 the current draw exceeds 100 mA.

If errors could not be resolved, please contact our customer support:
email: support@solvimus.de

4.1.3 Current consumption is too high (24 VDC power supply side)

Communication to the extended M-Bus segment stalls after connecting a suitable power supply to the MBUS-REP. The current draw from the power supply exceeds 1.8 A.

If errors could not be resolved, please contact our customer support:
email: support@solvimus.de

5 Technical data

5.1 General characteristics

5.1.1 Physical dimensions / weight

The housing has the following dimensions:

- Width: 53 mm (3U)
- Height: 89 mm
- Depth: 61 mm
- Weight: approx. 160 g

5.1.2 Installation / Storage

The device is intended for installation in a switch cabinet:

- Storage temperature: -20 – 70 °C
- Operating temperature: 0 – 55 °C
- Humidity: 10 – 95 % relH
- Protection class: IP20
- DIN rail mounting (35 mm DIN rail)

5.2 Electrical characteristics

5.2.1 Power Requirements

The device is powered by an external power supply (see pin assignment at section 2.2):

- Input voltage: 12 - 36 VDC, Screw terminals ($\leq 2,5 \text{ mm}^2$)
- Power consumption 24 VDC: max. 40 W
- Power consumption M-Bus: typ. 72 mW, equates to 2 UL (M-Bus)
- Safety: Bipolar M-Bus slave terminals, Reverse voltage protection, over-voltage protection (transient)

5.2.2 Communication interfaces

The MBUS-REP comes with an M-Bus slave interface and an M-Bus master interface (see pin assignment at section 2.2)

- Conform to EN 13757-2/-3
- Baud rate: 300-9600 Baud