User Manual

A1MB

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VERSION	DATE	DESCRIPTION
1.0	25/10/2024	Initial Version
1.1	27/01/2025	Corrected Modbus Default Properties
1.2	07/04/2025	Modbus Registers updated
1.3	22/08/2025	Detached the modbus registers from the Manual and moved it to an Annex

Table of contents

1. Introduction

Thank you for purchasing this A1 converter for industrial purposes. Xemex has a wide product range of devices. We have introduced a variety of meters and converters. For more information on other products visit our website at Home - Xemex | Smart Energy Communicator or contact our sales department on sales@xemex.eu.

The A1MB module is a DIN-sized converter module, converting Smart Meter A1 messages to Modbus over RS485 messages. The module supports A1 ports defined according to E-MUCS specification. The A1MB is connected to the A1 port of the Smart Meter via a **cross** cable with RJ11 connectors on both ends.
The Modbus of the module is acting as slave device to a Modbus master. The unit will be powered via the power present on the A1 port of the Smart Meter.

A1MB can be used in combination with the Xemex Dingate, KWHIQ meter, LEWIZ, and other Modbus masters. These devices log standard information such as import / export energy values. The logging of other information is dependent on the Modbus map implemented. The A1MB is ideal for use in solutions developed for monitoring energy flow in industrial smart meters.

1.1. Scope

This manual is applicable to A1MB, a device which interfaces to the A1 port of a smart meter and transforms the data and make it available on its Modbus slave interface to be read out via a Modbus RTU.
Please read this document carefully before installation and operating.

1.2. Target group

The installation and the operation of this device and any maintenance must be conducted by a qualified person in accordance with specific local standards and safety regulations.

1.3. Intended usage

The A1MB is only to be used for converting a A1 telegram and shall work within the specified values only. This device may only be used for the application cases specified in the user manual and only in connection with devices and components recommended and approved by Xemex NV.

1.4. Used symbols

The following symbols are used in this document and/or are marked on the product:

	Alternating current
	Three-phase alternating current
	Equipment protected throughout by DOUBLE INSULATION or REINFORCED INSULATION
	Caution, possibility hazard of electric shock.
	Caution

1.5. Abbreviations and acronyms

V AC:	AC-voltage
V DC:	DC-voltage
EV:	Electrical Vehicule
E-MUCS:	Extended Multi-Utility Companion Specification
DHCP:	Dynamic Host Configuration Protocol
LED:	Light Emitting Diode
USB:	Universal Serial Bus
UI:	User Interface

1.6. Safety precautions

Always adhere to the following checklist:

1. Only qualified personnel or licensed electricians should install the Xemex A1MB.
2. Follow all applicable local, national electrical and safety codes.
3. Install the A1MB device in an electrical enclosure (panel or junction box) or in a limited access electrical room.
4. Verify that circuit voltages and currents are within the proper range for the meter model.
5. Equipment must be disconnected from the HAZARDOUS LIVE voltages before access.
6. Before applying power, the installer must check that all the wires are securely fixed by tugging on each wire.
7. Do not install the A1MB where the temperatures can be below –25°C or above 75°C, excessive moisture, dust, salt spray, or other contamination. The device requires an environment no worse than pollution degree 2 (normally only non-conductive pollution; an occasionally temporary conductivity caused by condensation must be expected).
8. Do not drill mounting holes in the device. Click the module on a DIN Rail instead.
9. When the A1MB is installed incorrectly, the safety protections may be impaired.

1.7. Certifications

Date	Accreditation Centre	IP Code	Kind
2020-12-18	De Nayer	EN 61326-1:2013 EN 55011 (2016) +am1 EN 61000-4-2 EN 61000-4-3 EN 61000-4-4 EN 61000-4-5 EN 61000-4-6 EN 61000-4-8	Class B

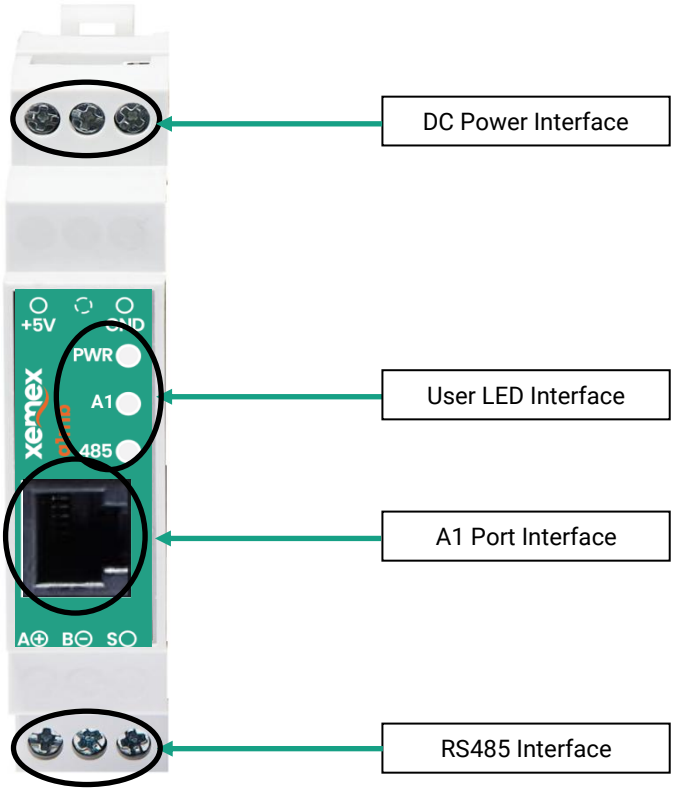
2. Technical description

2.1. General description

The Xemex A1MB is a compact Modbus interface module that connects to the A1 port of a smart meter (compliant with E-MUCS). It reads and converts A1 telegrams into a Modbus RTU memory map that can be accessed via its RS485 interface.

Interfaces:

- 5V DC Power Input
- LED Interface
- A1 Port Interface
- RS485 Interface (Modbus RTU)

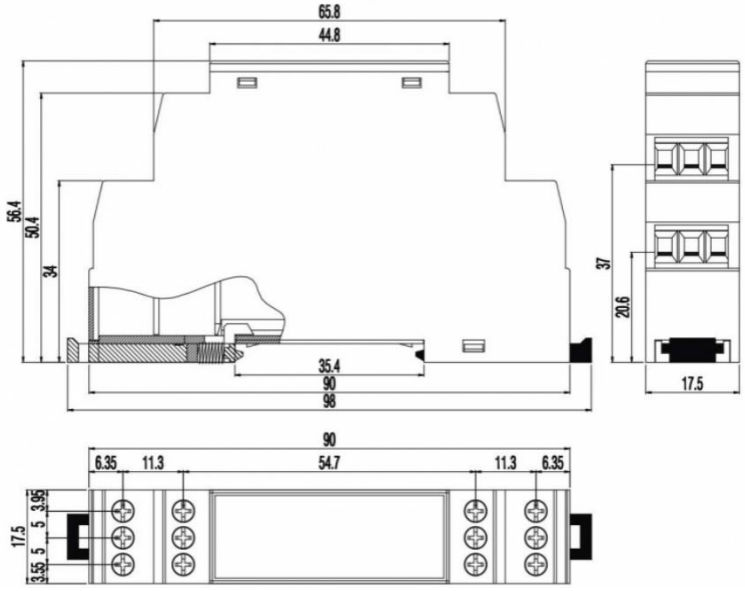


The device is typically powered via the A1 port. If the connected smart meter does not provide power, an optional external +5V DC adapter can be used via the DC input interface.

The A1MB automatically enables the data request line on the smart meter and updates the Modbus register map every second with the latest A1 data. It functions as a Modbus RTU slave and can be queried by a master over the RS485 bus.

2.2. Form factor

Parameter	Value
Housing	DIN 43880 – 1 DIN unit
Dimensions	90 x 17.5 x 56.4 mm (H x W x D)



2.3. Environmental conditions

Parameter	Value
Protection Class	Class II
Operating Temperature	−25 °C to +75 °C
Storage Temperature	−40 °C to +85 °C
Humidity	< 75 % year's average at 21 °C < 95 % less than 30 days/year, at 25 °C
Pollution Degree	2
Altitude	< 2000 m
Application Area	Indoor use only – in a suitable residential meter cabinet

2.4. A1 port Interface

Communication via the A1 interface is unidirectional: the smart meter sends data telegrams containing energy measurements and status information to the A1MB. The A1MB reads these telegrams, processes them, and stores the values in its internal Modbus memory registers.

Parameter	Value
Protocol	A1 protocol conform E-MUCS (BE)
Max Cable Length	3 meters
Connector	RJ12 – 6 pin (female connector)
Polarity Protection	Yes (reverse polarity protected)

The pin definition of the RJ12 port of the A1MB is as follows:

Pin #	Signal name	Description	Remark
1	Power GND	Power ground	
2	Data	Data line	Input. Current source PU.
3	n.c.	Not connected	
4	Data GND	Data ground	
5	Data Request	Data Request	Output for A1MB device
6	+5V	+5V power supply	Power input for A1MB device

No data is delivered to the A1MB if the data request line is held low. When the data request is high, the A1MB receives data at intervals depending on the meter type—every 1 or 10 seconds.

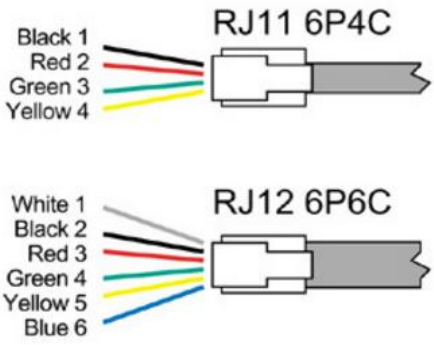
The +5V input is a SELV (Safety Extra-Low Voltage) power supply. This power input is typically provided by the smart meter and is double insulated and fully isolated from other meter ports. If unavailable, external +5V DC power can be used.

The data line is implemented as an open collector input with current limiting to ensure safe and reliable communication without risk of damage.

2.5. A1 Cable Specifications and power considerations

This RJ12 port is the main interface for receiving smart meter data and optionally powering the A1MB. Cable choice (4-wire vs 6-wire) determines whether external power is required:

- 6-wire cable (RJ12): Used when the smart meter provides +5V. This allows the A1MB to be powered directly through the A1 cable.
- 4-wire cable (RJ11): Used when the smart meter does not provide +5V. In this case, you must power the A1MB externally via the DC power interface (see section 2.5).



2.6. DC Power Interface

If the smart meter does not provide power through the A1 port (i.e. a voltage-free port), the A1MB must be supplied with power via the external DC power interface.

WARNING

Only use the external power interface if the A1MB is not powered by the smart meter's A1 port.

Refer to cable specifications in section 2.6.

DANGER

Use SELV-rated (Safety Extra Low Voltage) power supplies only.

Incorrect use may result in severe injury, death, or equipment damage.

Parameter	Value
Connector Type	Screw terminal for 0V and +5V DC
Voltage Range	5V DC (−10% / +10%)
Max Current Draw	50 mA
Max Cable Length	3 meters
Polarity Protection	Yes (reverse polarity protected)

2.7. Modbus Interface (RS485 communication)

The data read from the A1 port is translated by the A1MB into a Modbus register map, which is made available via the RS485 interface (more information about Modbus register maps: see section 5.1).

Parameter	Value
Connector Type	Screw terminal connector for A, B and Shield
Bus termination	120 Ohm, switchable on/off
Communication protocol	Modbus RTU over RS485
Max Cable Length	Up to 30 meters under standard RS485 conditions.
Recommended cabling	Use a shielded twisted pair (STP) or armored twisted pair with a drain wire for optimal signal integrity. Conductor cross-section: 0.20 mm² to 0.50 mm².

NOTE

Ensure correct polarity (A/B) across all devices on the RS485 bus. Only enable termination on devices at the end of the bus.

2.8. User LED Interface

The A1MB is equipped with three LED indicators that provide visual feedback on power status, A1 communication, and Modbus activity. The table below explains the meaning of each LED and its behaviour.

LED	Colour	Status	Description
Power (PWR)	Yellow	On	A1MB is powered (via A1 port or external power supply).
		Off	No power. Check A1 cable or external power source.
A1	Green	On	Valid telegram received from the smart meter via the A1 port.
		Blinking	Invalid telegram received from the smart meter (invalid CRC).
		Off	No communication with the smart meter.
Modbus (485)	Red	On	Modbus request received via RS485 interface.
		Off	No active Modbus communication.

3. Installation instructions

3.1. Guidelines for safety and installation

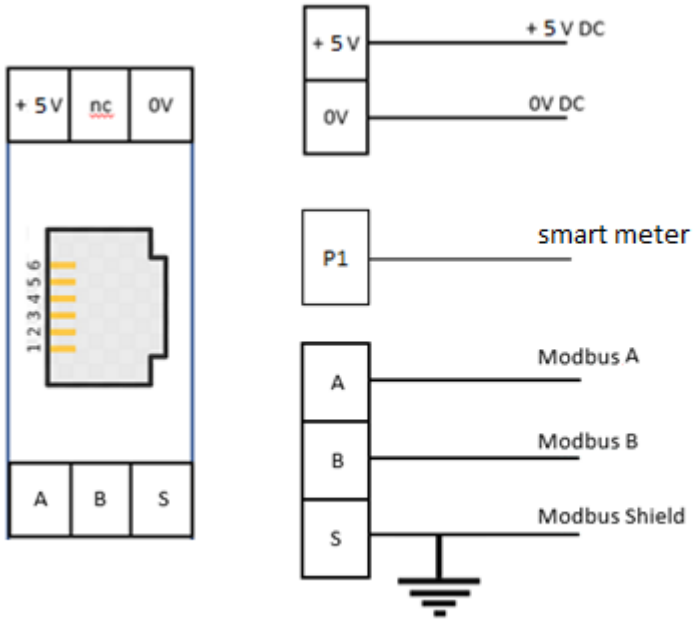
This installation guide must be consulted in all cases when manipulating parts which are marked with the Caution symbol.
The installation and the operation of this device and any maintenance must be carried out by a qualified person in accordance with specific local standards and safety regulations.

Failing to obey the ”Guidelines for safety and installation”, the guarantee no longer applies.

3.2. Mounting

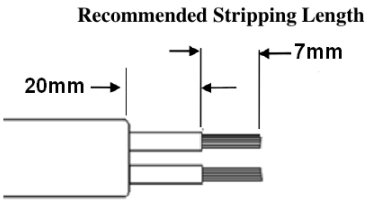
Mount the device in a DIN rail cabinet.

3.3. Electrical wiring



3.4. Wire stripping

Each wire should be stripped bare from one end over the length of 7mm. The secondary insulation (individual insulation over each individual wire may be visible up to 20mm from the end. After those 20mm, the second insulation (around all wires) should be present at all times.



3.5. Notes

The Modbus Shield must only be connected to the Modbus master side. The Modbus Shield connection is a

4. Maintenance

There are no serviceable parts inside. Clean the unit with a dry cloth.

5. Software

5.1. Modbus mapping

The Modbus register map defines which data elements from the A1 interface of the industrial meter are mapped to which Modbus registers. The specific mapping depends on the variant of the A1MB in use. Each variant emulates a particular energy meter model, and the register layout is designed to match that meter's structure.

The following A1MB variants are available (To be expanded later)

- Eastron SDM630

Detailed register maps for each variant can be found in **Annex I** of this manual.

When using an A1MB, make sure to select the variant that matches the meter type expected by the Modbus, master (e.g., the charging station). Using the correct variant ensures full compatibility with the master's register expectations.

Note:

The Modbus register map of the A1MB is predefined at the time of purchase and cannot be changed afterwards. This means the selected variant (and its corresponding register structure) is permanently configured for that specific device.

5.2. Modbus properties

The A1MB supports the following Modbus function codes:

Function Codes
03 – Read Holding Registers
06 – Write Single Register

Note:

- Every modbus register map only contains data read from the A1 port of the smart meter. Only values from available A1 objects are stored in the Modbus map. Registers that are not defined in the selected map will return the value 0x0000 (0) rather than a Modbus error.
- Registers for which A1 data is not available (yet) will also return 0x0000 (0).
- Some register values are fixed (shown in brackets in the register table in Annex I).

- Changes made via Modbus become active only after rebooting the device. This can be done by writing to the Reboot register.

5.2.1. Physical layers properties

Parameter	Options	Default
Baud rate	1200 … 115200	9600
Line setting	8 Data bits, no parity, 1 stop bit = 8N1, 8 Data bits, even parity, 1 stop bit = 8E1	8N1
Line termination resistor	On/off	Off

The physical layer properties can be modified using a specific cable and the A1MB Configuration Tool. Both are available for purchase by contacting our sales department at sales@xemex.eu.

5.2.2. Data link layer properties

Parameter	Options	Default
Modbus device address	1 … 247	2

The data link layer properties can be modified using a specific cable and the A1MB Configuration Tool. Both are available for purchase by contacting our sales department at sales@xemex.eu.

5.3. Configuration

Special tooling is needed to change the physical layer parameters. This is done during the production of the device, or afterwards by using the A1MB configuration tool.

1. **Connect the device to your PC**
   Connect the device to your PC with the cable that matches the communication port of the device and your PC. Make sure the connection is secure. Kindly note that the cable is not included in the price and must be purchased separately.

2. **Open the Xemex A1MB configurator on your PC**
   Open the Xemex A1MB configuration application on your PC. If the input fields are gray and therefore not editable, go to step 3. If the input fields are white and therefore editable, continue to step 5.

3. **Identify the port number**

The USB serial port adapter you connected is assigned a serial port number by your PC. Go to *Device Manager* on your PC to identify this serial port number.

Note: If the assigned COM port is COM10 or higher, it must be changed to a lower number.

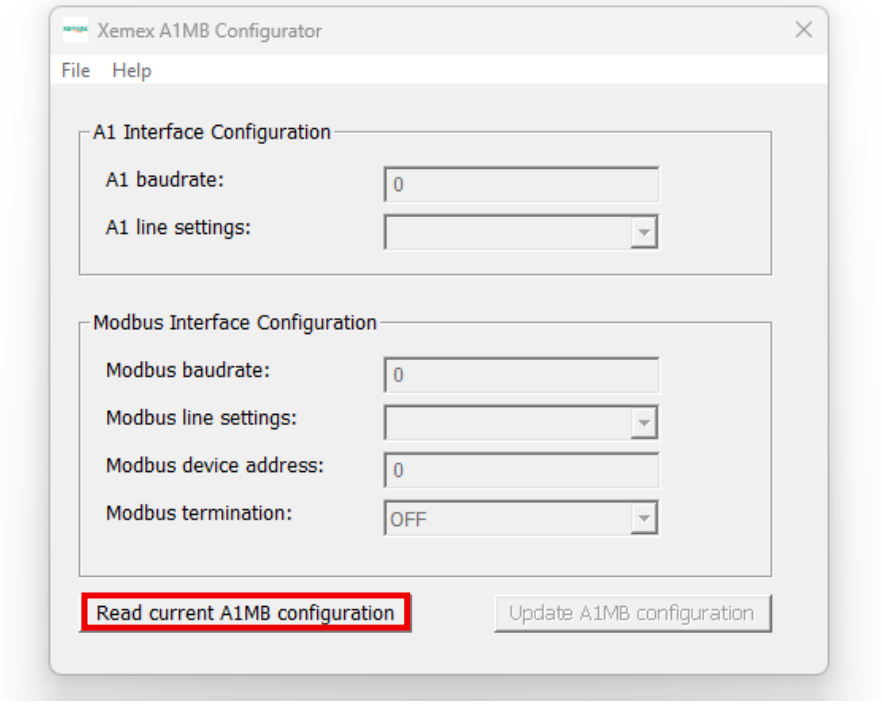
To do this:

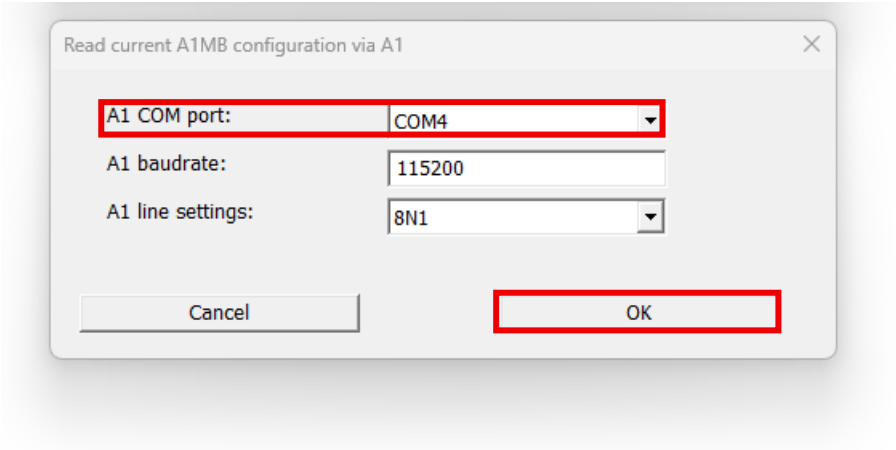
a. Open Device Manager.
b. Locate the assigned COM port under Ports (COM & LPT).
c. Right-click on the port and select Properties.
d. Go to the Port Settings tab.
e. Click on the Advanced button.
f. In the COM Port Number dropdown, select a port number lower than COM10 (e.g., COM3)
g. Click OK to confirm.

Your COM port is now reassigned to a lower number and ready for use.

4. **Configure the communication settings of the device with those of your PC**

Click '*Read current A1MB configuration*'. In the pop-up window '*Read current A1MB configuration via A1*', at '*A1 COM port*', read the communication port that the device communicates with. It should be the same as the port number identified in step 3 in *Device Manager*. If not, change the communication port in this pop-up window. Click OK to save your changes.





5. **Enter the desired parameters**

   You can now enter the desired parameters in the fields. Do not change the parameters '*A1 baud rate*' and '*A1 line settings*'. Changing these parameters will prevent the operation of the A1MB.

Modbus baud rate

Enter the desired baud rate (range: 1200 ... 115200). All devices connected to the bus must use the same baud rate. The protocol does not specify a specific baud rate. The default value is 9600 baud.

Modbus line settings

Options:

- 8N1 = 8 data bits, no parity, 1 stop bit (default)
- 8E1 = 8 data bits, even parity, 1 stop bit

Modbus device address

Configure the modbus address in this input box. The range is 1 to 247. The default value is 2.

Modbus termination

The A1MB is equipped with a line terminator resistor. The Modbus termination is not activated by default.

After modifying the desired parameters, be sure to click '*Update A1MB Configuration*' to save and apply the changes.

6. Accessories

6.1. A1MB Configurator Cable Connection (optional)

A A1MB Configurator cable is optional.

This cable supports a USB type A connection on one side and a P1 RJ12 connection on the other. It is mainly used to change the default settings of the communication parameters.

Technical Parameters

Connection Type	USB Type A
Cable length	1.85m
Working Voltage	5V

7. Troubleshoot

Issue/fault	Possible Cause	Solution
PWR LED is off (Yellow)	A1MB is not powered	If powered via A1: - Ensure a 6-wire cable is used with power on pin 1 (+5V) and pin 6 (GND). - If the A1 cable is longer than 3 meters, use a 4-wire cable and connect a 5V DC power adapter. If powered via external adapter: - Make sure a 4-wire RJ11 cable is used without power on the A1 port. Avoid dual power sources!
A1 LED is off (Green)	No A1 message received or invalid CRC	- Check RJ12 cable between A1MB and smart meter - Ensure smart meter is powered and actively sending A1 telegrams - Verify the meter supports E-MUCS - Try using a shorter or verified working cable
MB LED is off (Red)	No Modbus requests received	- Ensure Modbus master is polling the correct slave address (default: 2). - Check RS485 wiring (A ↔ A, B ↔ B). - Verify that baud rate and Modbus settings match (default: 9600, 8N1).
MB LED blinking	Data received, but no valid Modbus request	- Verify that the Modbus master requests only supported registers, based on the register map of your specific A1MB variant. - Ensure all devices on the RS485 bus are connected in a daisy-chain topology to avoid signal reflections or bus collisions. - Ensure all line settings are correct.
Modbus reading 0x0000 for some registers	A1 data not available for these registers	This is normal for unsupported registers; check register map for supported ones (Annex I)

8. Disposal & decommisioning

This section explains the disconnection of the A1MB from the system and its correct disposal.

8.1. Decommissioning

The decommissioning must be carried out by a qualified person in accordance with specific local standards and safety regulations.

Remove the A1MB as follows:

1. Switch of the voltage of the A1MB by disconnecting the A1 port cable on the A1 interface and, if installed, disconnecting the external adapter connected to the DC power interface. The yellow Power status LED (PWR) turns off.
2. Remove the connecting wires of the Modbus RTU master connected to the RS485 interface.
3. Use a flat-tip screwdriver (≤ 6.5 mm / 0.25 in) to lower the locking mechanism and release the meter from the DINrail.

8.2. Disposal

For disposal of the A1MB, observe the local disposal and environmental protection regulations in effect without fail.

Components	Disposal
Circuit boards	Electronical waste: disposal according to local regulations
Metal parts	Sorted and taken to collective materials disposal point
Plastic components	Sorted and taken to recycling (regranulation) plant

9. Technical Assistance

For any technical issues or inquiries, our dedicated support team is available to assist you. Please use the following contact methods to reach out for assistance:

9.1. Email Support

For general inquiries, troubleshooting, or technical assistance, please email our support team at: support@xemex.eu Please provide a detailed description of the issue, serial number, along with any relevant screenshots or error messages to expedite the resolution process.

9.2. Phone Support

If you prefer to speak directly with a technician, you can reach us at:
+32 32 01 95 95
Our phone support is available Monday to Friday within regular business hours. If your request falls outside of business hours, please leave a ticket throughout our support portal.

9.3. Support Portal

For access to FAQs, troubleshooting guides, and ticket submission, visit our dedicated support portal at: https://xemex-support.freshdesk.com/nl/support/home

9.4. Social Media

For any non technical related information visit us via our official social media channels:
Website: www.xemex.eu
Linkedin: https://www.linkedin.com/company/xemex/posts/?feedView=all