

System inter- face

Gateway for bus system



Wireless Modbus RTU/Ethernet transceiver for en-
ergy management systems

TMF100



:hager

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1 Overview

1.1 Introduction

These instructions describe the safe and proper installation and commissioning of the product. These instructions are provided as information in addition to the product.

The illustrations and descriptions in this manual are for clarification purposes only and may differ from the actual state of the software due to regular improvements being made.

Symbols used

☑ Requirement. This requirement must have been met before continuing with the next assembly step.

- Single-step instruction or any sequence.

- ① Multi-step instruction. Sequence must be maintained.

- List

- Reference to additional documents/information

	Scope of delivery		Installation by a qualified electrician		For further information on configuring the device, refer to the application manual
	Registered trademarks of Bluetooth SIG, Inc.		Wireless connection in the ISM band 2.4–2.4835 GHz		Connection standard for industrial automated systems
	Direct current		Follow the instructions!		Star topology of an Ethernet network
	Suitable for use throughout Europe and Switzerland		Disposal note		

Table 1: Symbols used

Symbol	Warning word	Consequence of non-observance
	Danger	Leads to serious injuries or death.
	Warning	Can lead to serious injuries or death.
	Caution	Can lead to minor injuries.
	Caution	Can lead to device damage.
	Note	Can lead to physical damage.

Symbol	Description
	Warning against electric shock.
	Warning against damage from mechanical stress.
	Warning against damage from electricity.



Electronic devices may only be assembled, installed and configured by a specialist with electrical training and certification in accordance with the relevant installation standards of the country. The accident prevention regulations valid in the appropriate countries must be complied with.

In addition, these instructions are intended for system administrators and electrically trained specialists.

1.2 Product presentation

The TMF100 operates as a communication gateway at transport level.

The TMF100 provides a dedicated set of internal Modbus registers for device identification, diagnostics, commissioning and configuration functions. These registers are reserved for gateway management purposes only and are independent from the Modbus register maps of connected field devices.

It provides data transmission between Modbus RTU and Modbus TCP networks without modifying the content of data.

The device does not perform data modelling, interpretation or standardisation of Modbus registers.

The structure, meaning and usage of all data points are defined by the connected Modbus devices and must be configured in the controller or Building Management System (BMS).

2 Safety instructions

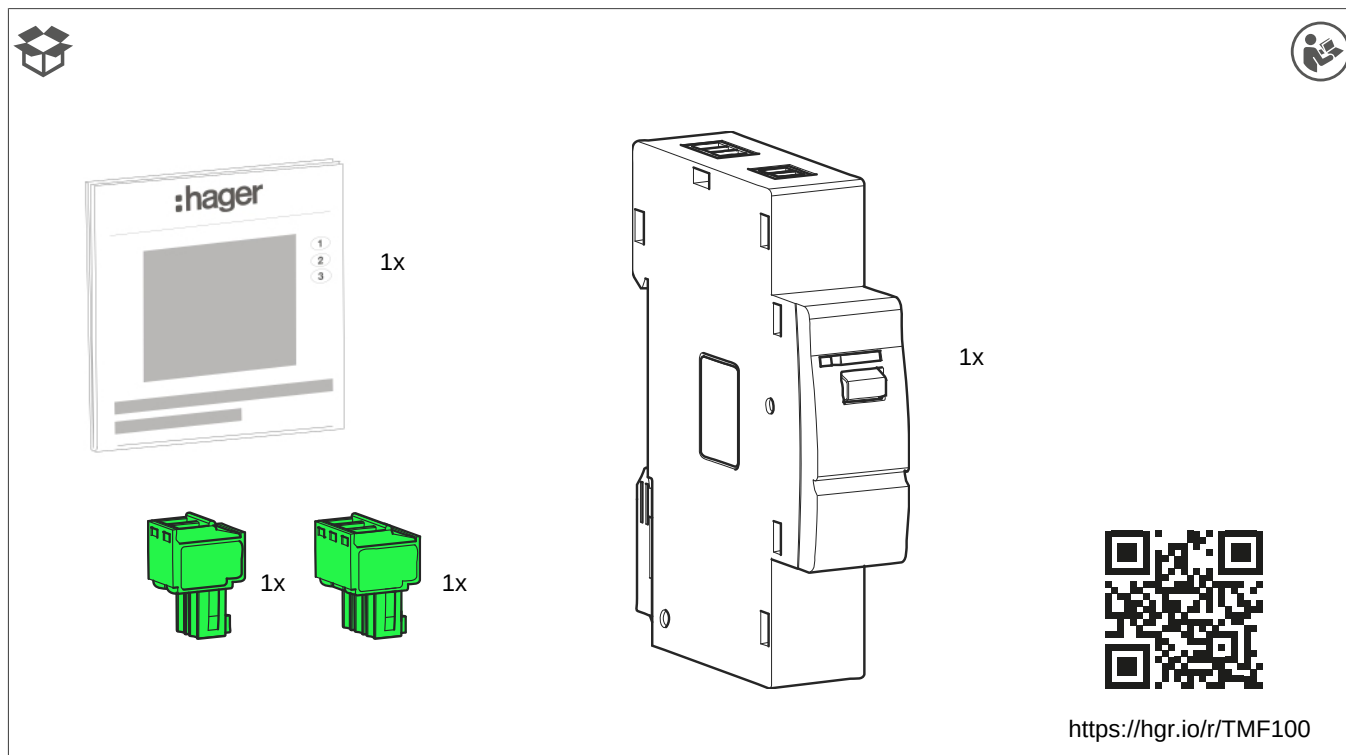
Electrical devices must only be installed and assembled by a qualified electrician in accordance with the relevant installation standards, guidelines, regulations, directives, safety and accident prevention directives of the country.

Failure to comply with these installation instructions may result in damage to the device, fire or other hazards.

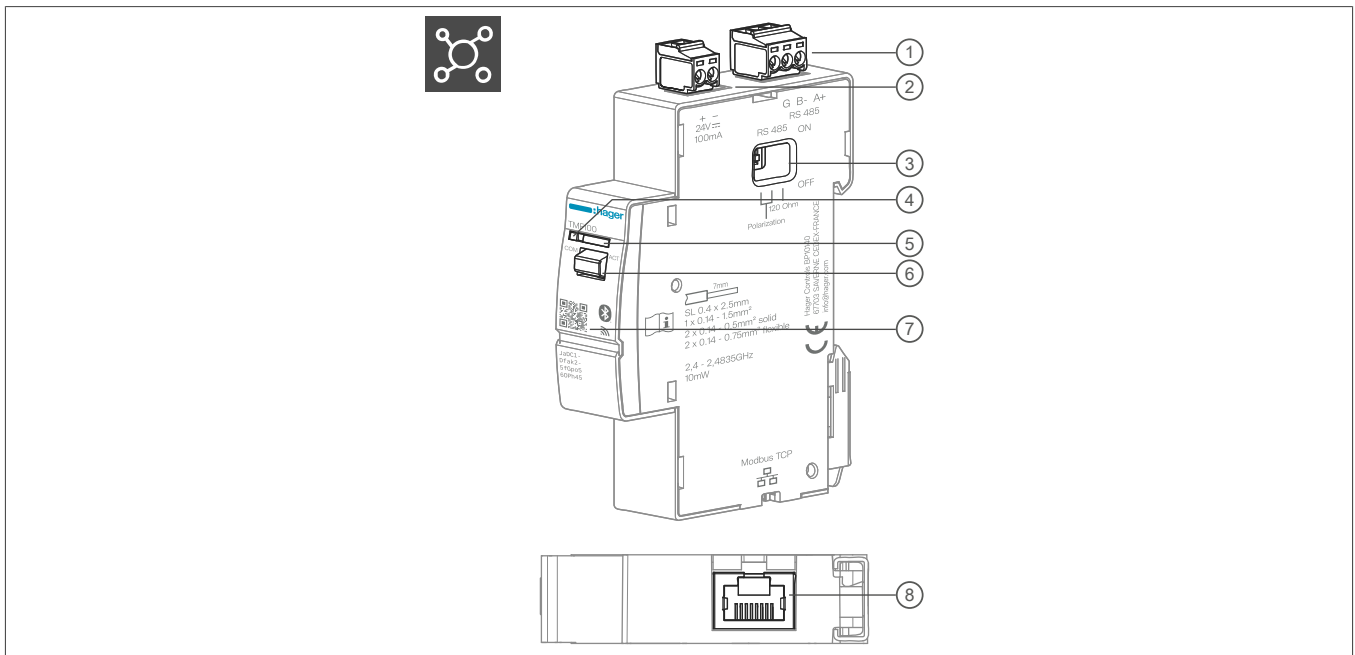
When installing and routing cables, always comply with the applicable regulations and standards for SELV circuits. Use only cables that comply with IEC 603321-2:2004.

Any kind of intervention in the product, including when it no longer works or is defective, may endanger the safety of the user and will release the manufacturer from any liability.

3 Scope of delivery



4 Design and layout of the device



- ① Modbus RTU Terminal Block A/B/G (RS-485)
- ② Connecting terminals for power supply, 24 V $\overline{\text{SELV}}$
- ③ DIP switches for termination and polarisation resistors
- ④ Modbus communication LED (COM)
- ⑤ Status LED (ACT)
- ⑥ Configuration button
- ⑦ Unique product ID (QR code)
- ⑧ Ethernet connection socket (RJ45)

5 Function

5.1 Functional description

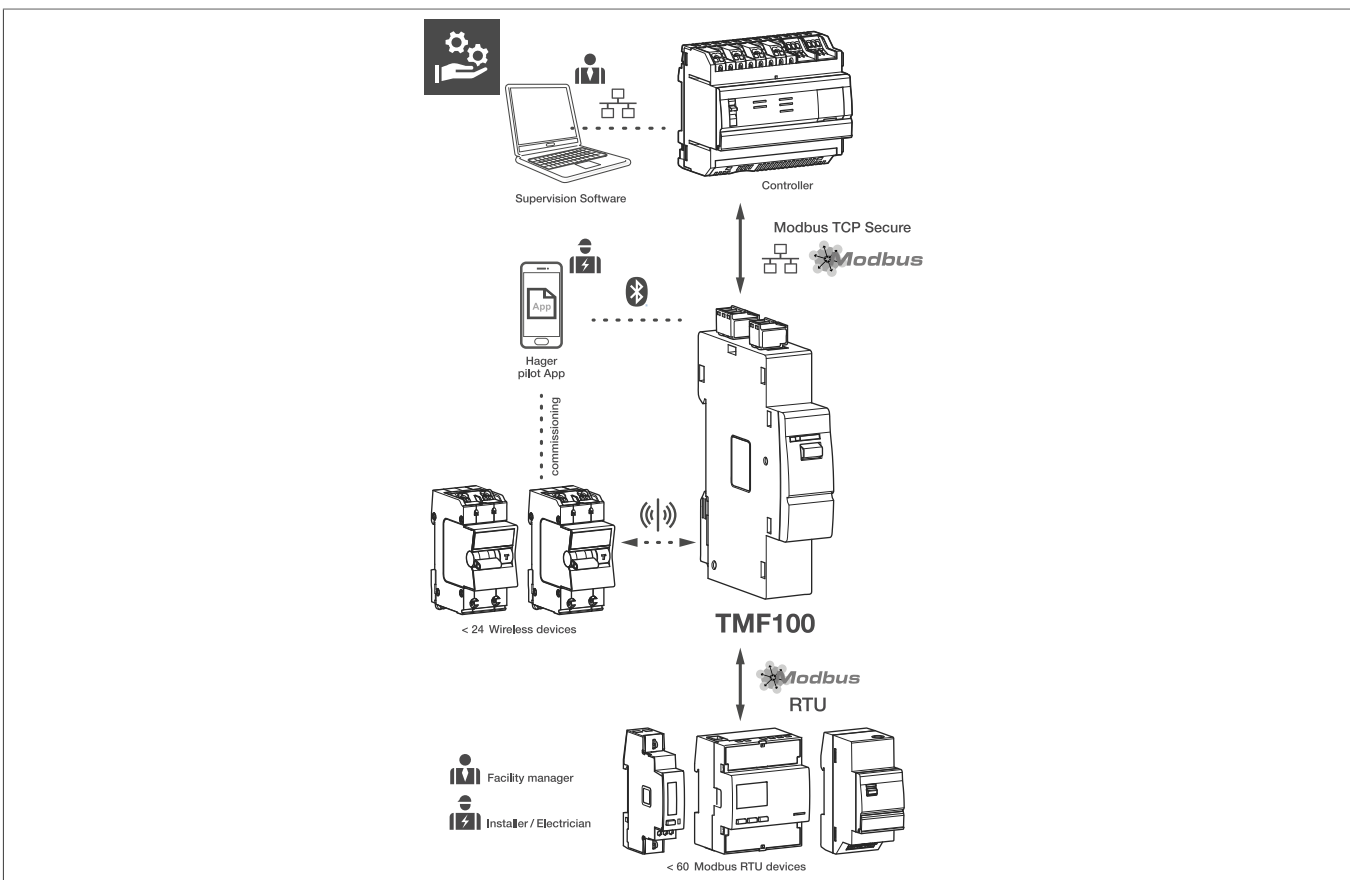
The TMF100 transceiver connects wireless energy management devices and cable-connected Modbus RTU devices to Ethernet networks.

The TMF100 operates as a transparent Modbus RTU to Modbus TCP transceiver. It does not modify, interpret or standardize Modbus data. The Modbus register assignment and data interpretation are defined by the connected Modbus device and must be taken from the device manufacturer's documentation. The slave address, baud rate, parity, stop bits and register assignment must be adapted accordingly.

This enables seamless BMS (Building Management System) integration for intelligent energy management.

Safety instructions for Modbus

- **Modbus TCP Secure** protects the installation from unauthorised access or tampering and is enabled by default in TMF100.
- **Modbus RTU** does not support encrypted communication. Wires should be installed securely to prevent unauthorised access. Correct network segmentation and access control on the Ethernet side shall be considered during installation.

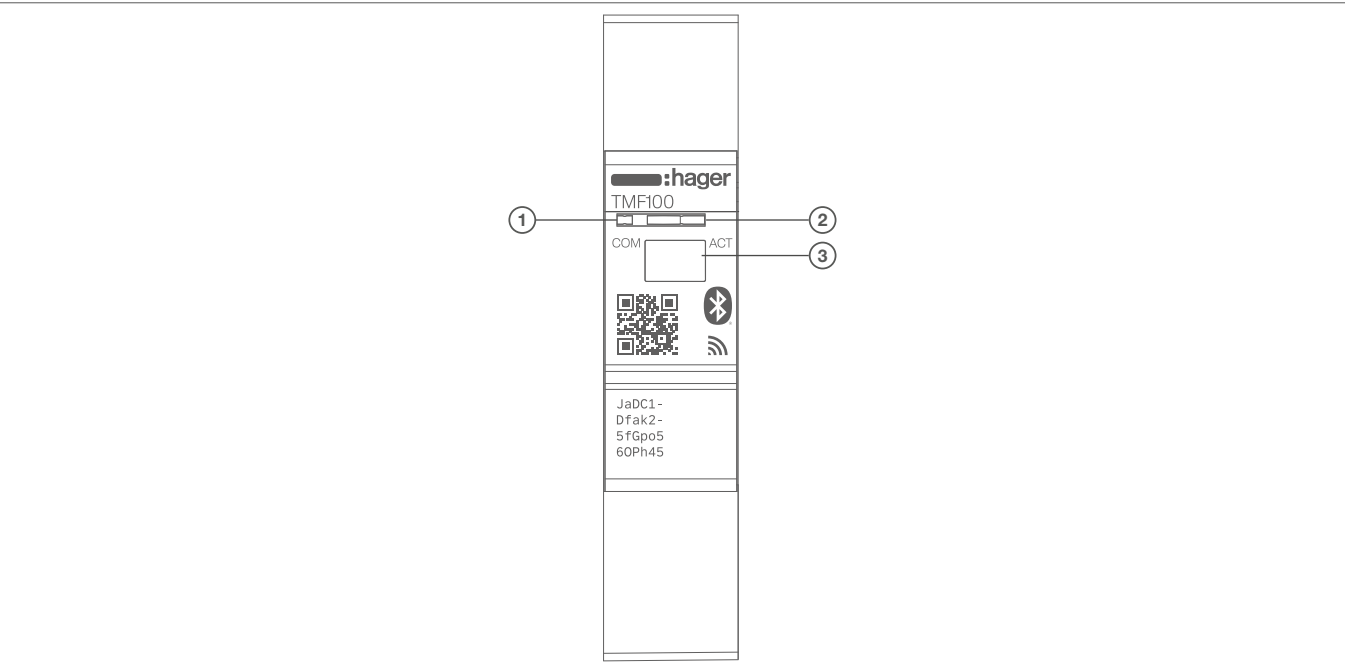


5.2 Intended use

- For the commissioning of compatible Hager wireless devices and for the integration of radio and Modbus RTU devices into Ethernet/Modbus TCP systems.
- For mounting on DIN rail in accordance with EN 60715.
- Use only permitted within the limits described in this manual.

6 LED display

The device has two LEDs.



- ① Communication LED
- ② Status LED
- ③ Configuration button

6.1 Status LED

Status LED (ACT) (2)

The transceiver has an RGB status LED to report errors or show the progress of ongoing operations

LED	Device status
	Switched off
	Startup of the device, firmware update
O/G	
	Normal operation
G	
	Identification
O/G	
	Bluetooth® activation by the user
G	
	Reset to factory setting
R	
O: Orange; G: Green; R: Red	



Note

- To activate the Bluetooth® pairing mode, press the configuration button (6) <5S.
- In standby mode, the brightness of the status LED is set to 30%.

6.2 Communication LED display

Communication LED (COM) (1)

LED

Device status



Modbus TCP communication is in progress

R



Modbus RTU communication is in progress

G

R: Red; G: Green



Note

- During commissioning, use the COM LED to check whether traffic is detected on the Modbus TCP or Modbus RTU side.

7 Information for electricians

7.1 Installation and electrical connection



Danger

Electric shock when live parts are touched!

An electric shock can lead to death!

- Disconnect all connection cables before working on the device and cover any live parts in the area!

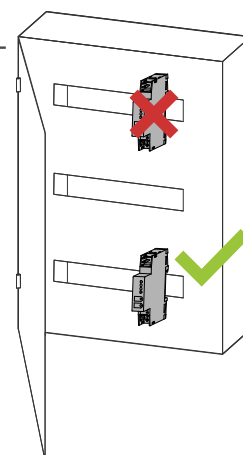
- Install the device on a TH 35 7.5–15 DIN rail in accordance with IEC 60715:2017 / EN 60715:2017.



Note!

Observe temperature range. Provide sufficient cooling.

It is recommended mount the device on the lowest DIN rail on the distribution panel to ensure sufficient space for wiring and connecting the RJ45 network cable.



03

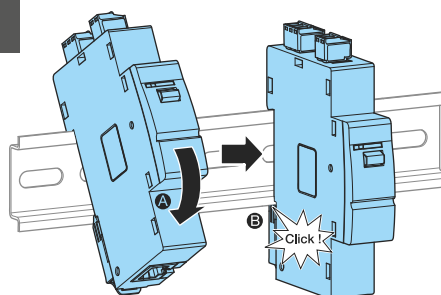


Fig. 1: Installing the device on the DIN rail



Danger

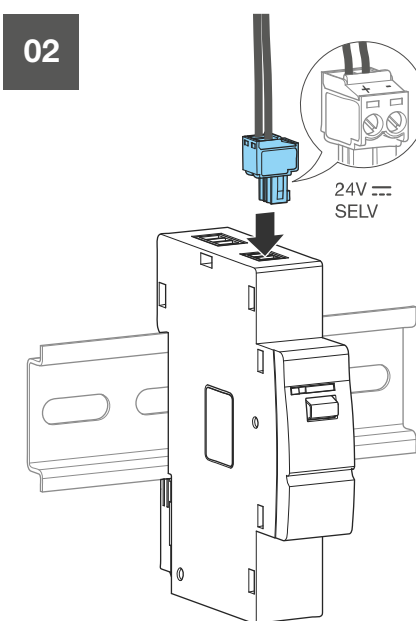
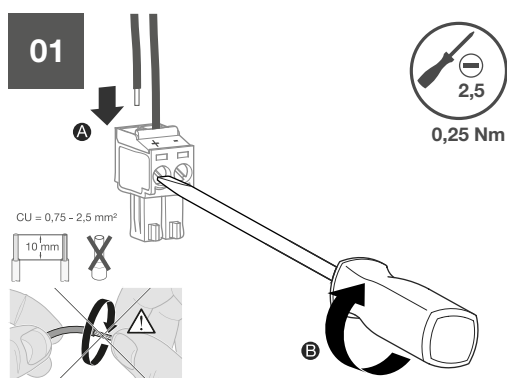
Electric shock when live parts are touched!

An electric shock can lead to death!

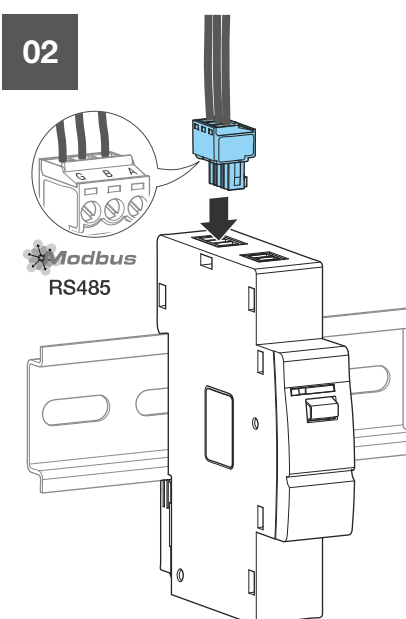
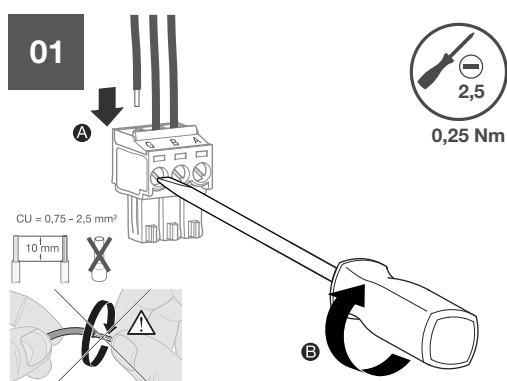
- Disconnect all connection cables before working on the device and cover any live parts in the area!

☑ The device is installed on the DIN rail in accordance with ISO 60715.

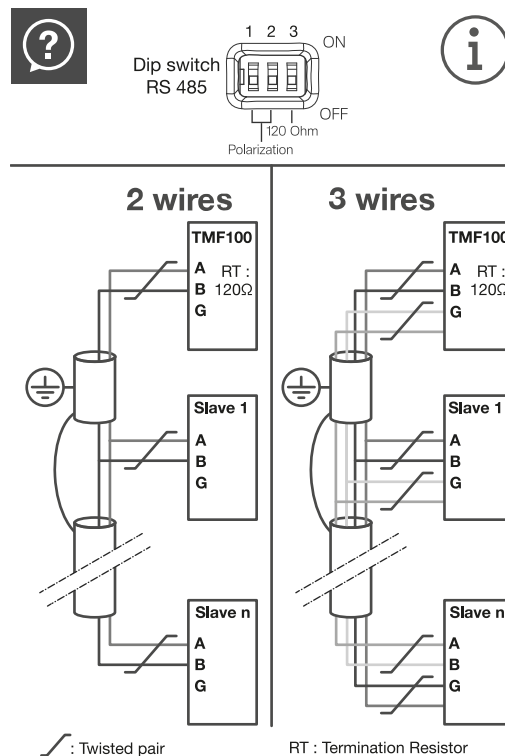
- Connect the connection cables for the power supply.



- Connect the cables to the bus line (RS485-Modbus).



Connecting Modbus devices



- ☐ **DIP1:** Polarisation resistor
- ☐ **DIP2:** Polarisation resistor
- ☐ **DIP3:** 120 Ω termination resistor

- First, connect the Modbus RTU slave devices to the **A/B/G** terminals on the terminal block (1).
 - **A (+):** Data connection (non-inverting).
 - **B (-):** Data connection (inverting)
 - **G (GND):** Communication ground (do not connect to earth)
- For **A** and **B**, use a twisted cable (e.g. green/yellow) to ensure signal integrity. For three-wire connections, use an additional wire (e.g. brown) for **GND**.
- Connect the cable shield (e.g. of HTG485H) to the earth at the beginning of the Modbus line using a suitable ground terminal.

Before starting communication, ensure that the following parameters are configured correctly for all devices on the bus:

- Unique Modbus slave address for each device (> 25)
- Identical baud rate for all devices (e.g. 9600/19200)
- Same configuration of parity and stop bits
- Consistent A/B polarity across the entire bus
- Common GND reference point for all devices

Incorrect communication parameters prevent Modbus communication.

Use a linear daisy-chain topology. Star or ring topologies are not recommended for RS-485 Modbus networks and may cause communication instability.



Take Care

Ensure that all devices share a common **GND** reference.
Never connect **GND** (G) to protective earth (PE).
The cable must not be routed outside the building.



Note

For reliable performance, we recommend using the Hager HTG485H Modbus cable. It is specifically designed for RS-485 environments.

Termination and polarisation

Due to the high frequencies involved and the transmission distances, particular attention must be paid to transmission line effects. A termination resistor shall be fitted at each end of the cable. It is important that the line is terminated at both ends, as signal transmission is bidirectional.

The value of the termination resistor is adjusted to the characteristic impedance of the cable (120 ohms).

If the termination resistor does not have the same value as the characteristic impedance of the line, reflections occur as the signal propagates along the cable.

Although some reflections are unavoidable due to cable and resistor tolerances, excessive deviations can cause large reflections resulting in data errors.

Each line terminator must be connected between the two conductors of the balanced line.

The transceiver has an integrated termination resistor (120 Ω) between cables **A** and **B**.

This resistor must be activated via the DIP switch (**3**) when the transceiver is installed at the beginning or end of the Modbus cable.

Otherwise, leave deactivated (as upon delivery).



Note

Termination resistor (120 Ω)

- May only be attached to the two ends of the RS-485 line
- Must not be activated on intermediate devices
- Incorrect termination may cause signal reflections and communication errors

Polarisation resistors are activated via the DIP switch (**DIP 1-2**):

- Ensure that the RS-485 bus is in a defined standby status.
- Activate the polarisation resistors when required by connected devices or in environments with high interference. The signal-to-noise ratio (SNR) must be improved.
- Activate the polarisation resistors if no device provides an internal biasing

General rule :

Ensure that only one device provides the biasing unless otherwise specified.

The number of connected devices may affect the stability of a Modbus RTU communication line. If the Modbus RTU bus is heavily loaded and communication errors or transmission losses occur, it may be necessary to disable the polarisation resistors to improve signal integrity.



Note

Always use the same colour codes for wiring to ensure consistency between devices. Terminate both ends of the RS-485 bus with 120-Ω resistors to avoid reflections and data errors.



Note

Use the **HTG485H** reference cable, specifically designed by Hager as an accessory.

The cable must therefore comply with the **IEC 60332-1-2:2004 standard** or have a **flame resistance class UL 2556 VW-1**.

☑ The device is installed and the connection cable for the power supply is connected.

- Connect the network cable to the port of the device.

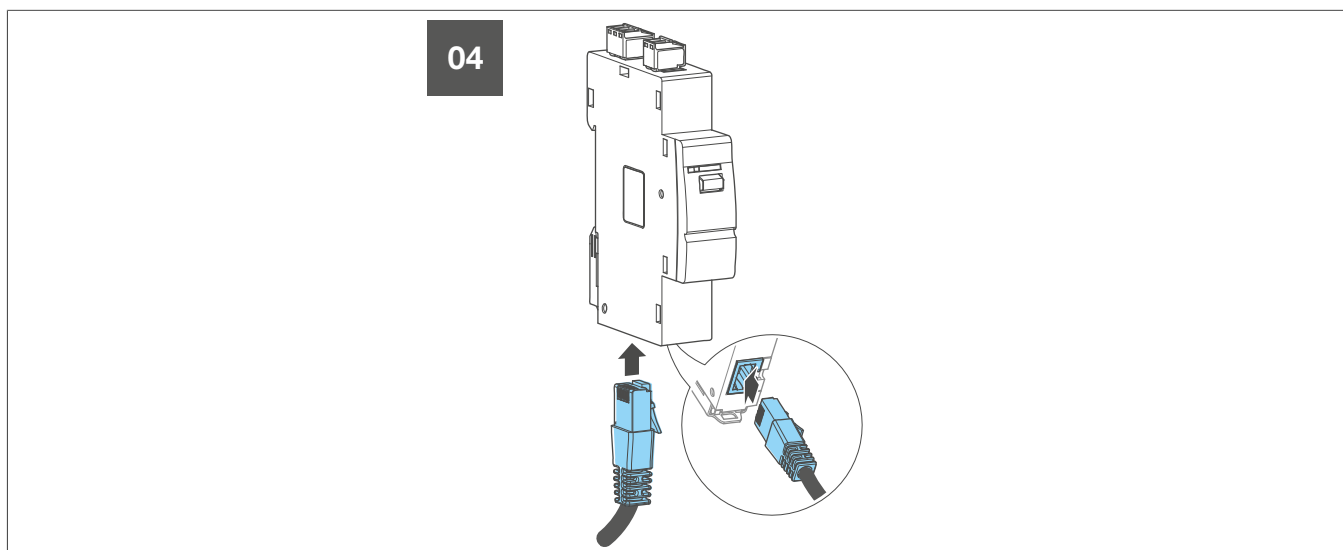


Fig. 2: Connecting the network cable

7.2 Commissioning

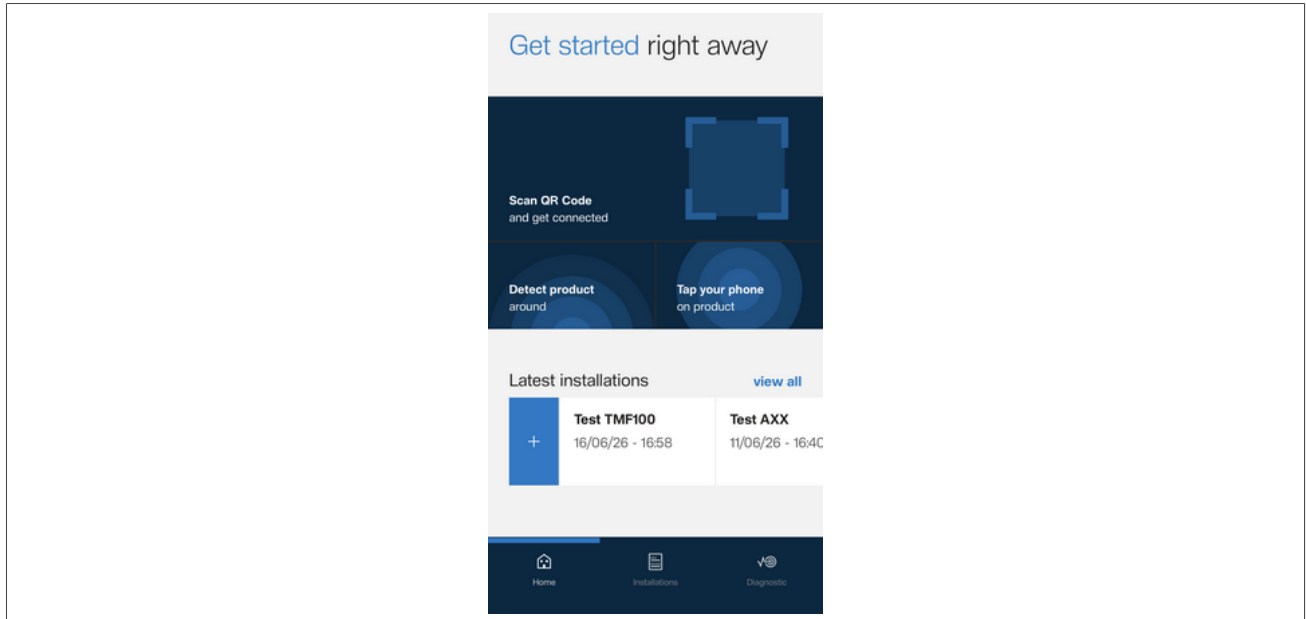


Hager pilot

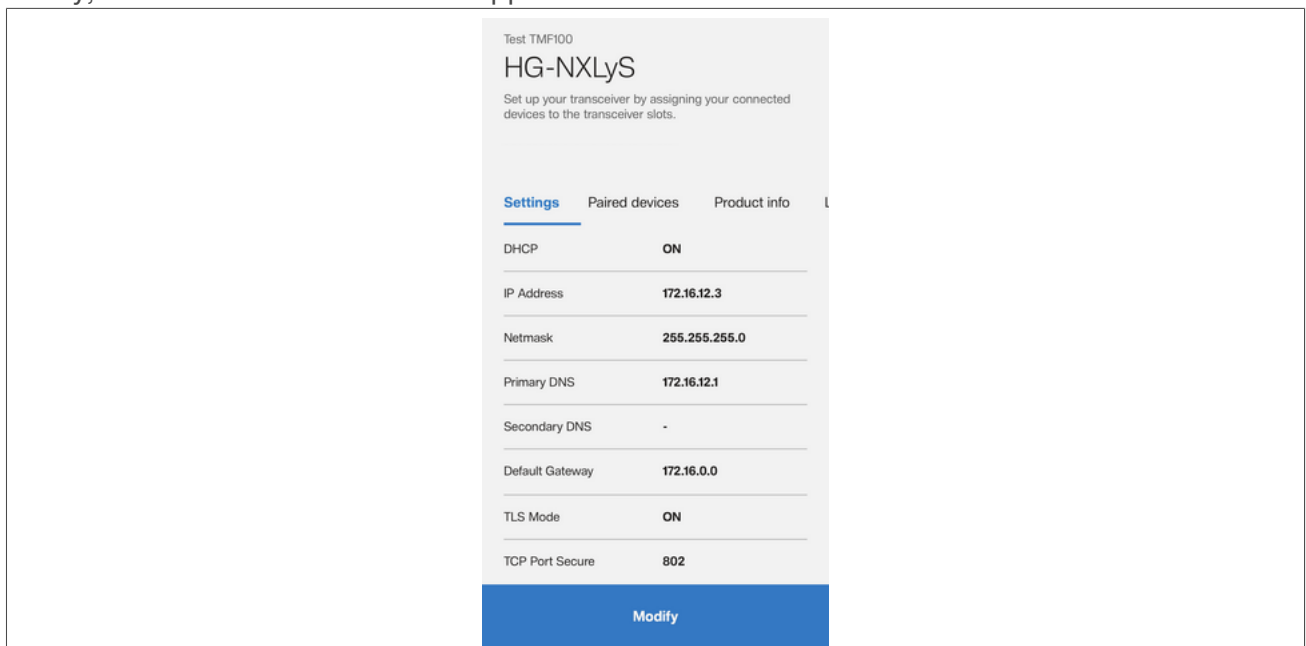


☑ All devices are connected.

- 1 Download the Hager Pilot app.
- 2 Activate the Bluetooth® function on your mobile device and make sure that you are connected.
- 3 Establish access through your installer account
- 4 Create the installation.



- 5 Turn on the transceiver and press the configuration button (< 5 s).
- 6 Scan the unique product ID QR code (7) using the app.
- 7 Finally, follow the instructions in the app.



- 8 Network configuration
 - Obtain an IP address via DHCP (recommended) or configure a static IP address.
 - Check the network connection between the PC or controller used for commissioning and the TMF100.
 - Note the assigned IP address for integration into the controller or BMS.
- 9 Commissioning of Modbus TCP
 - Configure the control system or BMS so that it can communicate with the TMF100 via its IP address.
 - Configure the required Modbus TCP connection parameters (TCP port and security settings).
 - If used, configure the Modbus TCP Secure (TLS) settings.

- Check whether the controller or the BMS can read data from connected Modbus devices via the TMF100.
- Compare the values read with the Modbus register documentation of the connected device.

10 Commissioning of Modbus RTU

- Configure RTU parameters (baud rate, parity, retry attempts, timeout)
- Check communication via the COM LED (green = RTU activity)
- Check the response of the connected RTU devices

Modbus advanced configuration and diagnostics can also be performed via Modbus TCP using engineering tools, depending on the system architecture.

11 Check Modbus TCP communication

- Check the connection from the controller or from the BMS
- Check the response of the RTU devices via Modbus TCP

12 Validate data

- Validate register values using the Modbus table of the connected device



Note

The TMF100 does not provide standardised register mapping for Modbus devices from other manufacturers. The Modbus register assignment is defined by the connected device and must be configured in the controller or in the BMS. The configuration parameters must be set uniformly for all devices on the RS-485 bus.



Network Configuration (Modbus TCP)

The TMF100 supports automatic IP address assignment via DHCP (recommended). If a DHCP server is not available, it can be accessed from the default IP address of the device for manual configuration.

If there is no DHCP server, the transceiver is assigned the IP address **192.168.0.20** by default.

Ensure that the commissioning device is configured in the same IP subnet to allow access

7.3 Factory settings

The TMF100 has a reset function that allows the device to be restored to factory settings. This function is particularly useful in the event of incorrect configurations or when recommissioning the device. When the device is reset, all settings are deleted and replaced with the default values.

- 1 Press and hold the button (>5 s) until the LED flashes red.
- 2 Release the push button.
- 3 Press and hold the button again (>5 s) until the LED stops flashing red.
- 4 Release the push button.

The reset is successful when the LED flashes green/orange.

7.4 Dismantling



Danger

Electric shock when live parts are touched!

An electric shock can lead to death!

- Disconnect all connection cables before working on the device and cover any live parts in the area!

☑ All the cables delivering voltage to the device are switched off.

- 1 Disconnecting the connection cables on the device.

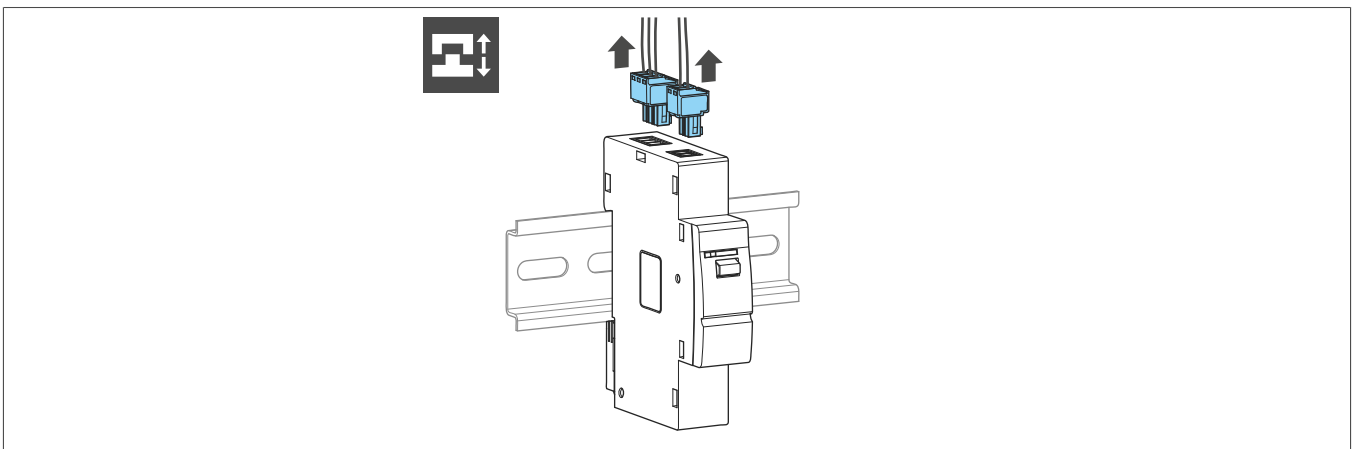


Fig. 3: Disconnecting the connection cables

☑ The bus connection cable and the load cables have been disconnected.

- Disconnect the connected network cable from the device.

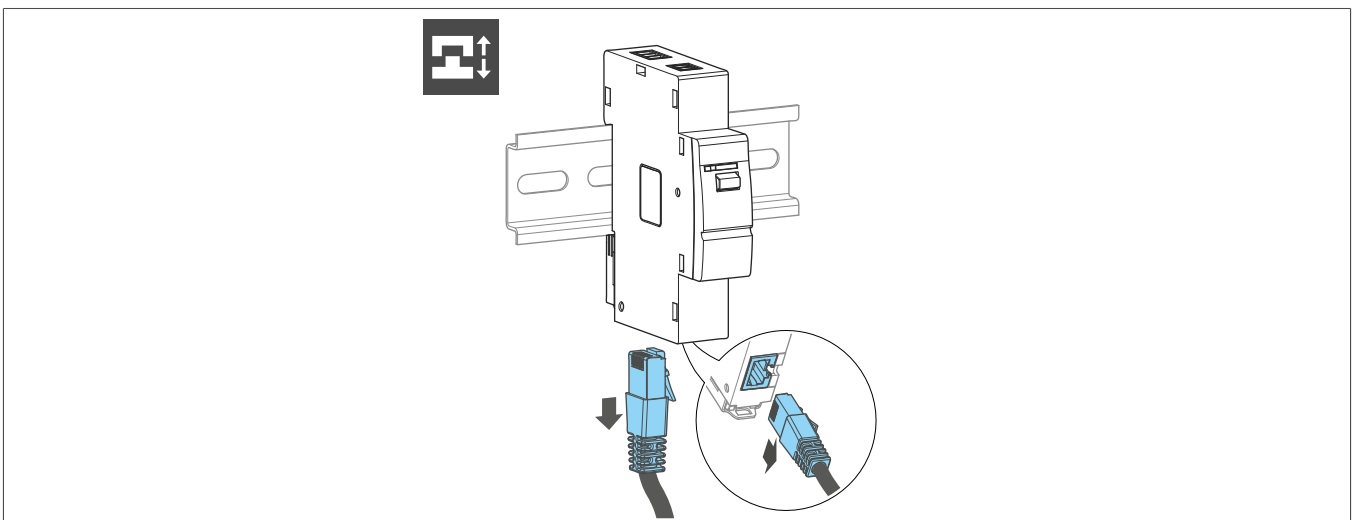


Fig. 4: Disconnecting the network cable



Danger

Electric shock when live parts are touched!

An electric shock can lead to death!

- Disconnect all connection cables before working on the device and cover any live parts in the area!

- ☑ The load cables have been disconnected.
- ☑ The bus connection cable has been disconnected.
- ☑ The network cables have been disconnected.

- Removing the device from the DIN rail.

02

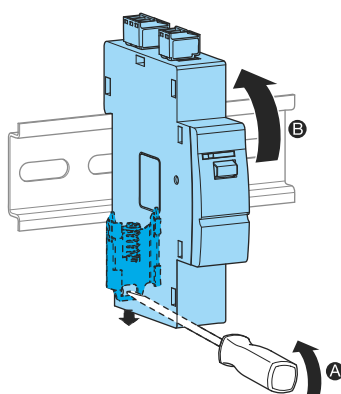


Fig. 5: Removing the device from the DIN rail



Dispose of the device in line with the corresponding guidelines of the respective country ([see Disposal](#)) or, if you have a warranty claim, contact the point of sale ([see Warranty](#)).

8 Appendix

8.1 Technical data

Power supply	24 V $\overline{\text{=}}$ SELV +/-10%.
Maximum power	100 W (with short circuit protection)
Maximum length of the supply cable	10 m
Overvoltage class	III
Degree of contamination	2
Electricity consumption	max. 100 mA
Network connection	TCP/IP — RJ45 100BASE-TX / IEEE 802.3
Number of devices on the RTU bus	max. 5 UL (Unit Load)
Number of Modbus RTU devices*	max. 60
Number of wireless devices	max. 24
Maximum length of the Modbus RTU cable	1000 m (9600 bps max.)
Cable type	Shielded Ethernet cable (S/xTP, F/xTP or SF/xTP), CAT5 or higher
Maximum length of the Modbus TCP/IP cable	100m per segment, longer with suitable cable
Bluetooth version	5.2
Modbus RTU connection	RS-485 via terminal block
Modbus TCP connection	RJ45 Ethernet, CAT5 or higher
Final resistance	120 Ω
Polarisation resistor	470 Ω
Transmission frequency	2.4 ... 2.4835 GHz
Maximum transmission power	10 mW
Radio transmitter range (free field)	100 m
Maximum transient value (EN 62368)	1500 V
Operating temperature	-25 ... +50°C
Storage temperature	-40...+85°C
Relative humidity	max. 90% at 40°C
Degree of protection	IP20
Operating height	Max. 2000 m
Dimensions	60.2 x 85.4 x 17.8 mm

* The number of possible devices depends on the cable length, baud rate, load per device, topology, and electromagnetic environment.

Simplified EU declaration of conformity:

Hager Controls hereby declares that the radio equipment type transceiver TMF100 complies with Directive 2014/53/EU. The full text of the EU declaration of conformity is available at the following Internet address: hager.com

8.2 Accessories

Additional software

Hager Pilot app

8.3 Troubleshooting

Modbus Wireless commissioning issues (Hager Pilot)

TMF100 is not recognised by Hager Pilot

- Ensure that Bluetooth is enabled on the mobile device.
- Check that the Hager Pilot app has been granted Bluetooth permission. Make sure that the mobile device is within range of the TMF100.
- Verify that the TMF100 is powered and that the status LEDs indicate normal operation.
- Close and restart the Hager Pilot app.

- Disable and re-enable Bluetooth on the mobile device.
- Restart the mobile device if necessary.
- Press the button on the TMF100 as described in the commissioning instructions and retry device discovery.
- Make sure that no other mobile device is already connected to the TMF100.

Connection established, but commissioning failed

- Check that the firmware of the Hager Pilot app and the TMF100 are compatible.
- Make sure that the quality of wireless communication is adequate.
- Repeat commissioning.
- Restart the TMF100 if necessary.

Problems with Modbus RTU communication

- Check the A/B polarity
- Check the unique slave address
- Check the baud rate, parity, and stop bits
- Check the termination (at both ends of the line only)
- Ensure that there is a common GND reference
- Check the daisy chain topology (not star or ring topology)
- Check the cable length and possible electromagnetic interference

Problems with Modbus TCP communication

- Check the IP address and subnet
- Check the Ethernet cable and the connection status
- Check the TCP port configuration
- Check the settings of the controller or the BMS
- Check TLS (Modbus TCP Secure) configuration if enabled

No data / incorrect values

- Check the Modbus register mapping of the connected device
- Check scaling, data type, and register addressing
- Ensure that the polling frequency and timeout values are set correctly

Interrupted communication / unstable bus

- Check the termination and polarisation settings
- Decrease the baud rate for long cable lengths
- Reduce the polling frequency or bus load
- Check the grounding and shielding

If a connection is established but no valid data is received, the problem is usually related to the register mapping or the controller configuration.



Note

If the TMF100 is not displayed in Hager Pilot, press the push button to restart the commissioning mode and perform a new device scan.

**Note**

For more information, contact your Hager representative or Hager local technical support (contact details on the Hager website for your country).

8.4 Disposal



Correct disposal of this product (electrical waste).

(Applicable in the European Union and other European countries with separate collection systems)

This marking shown on the product or its documentation indicates that it should not be disposed of with other household waste at the end of its working life. To prevent possible harm to the environment or human health from uncontrolled waste disposal, please separate this device from other types of waste. Recycle the device responsibly to promote the sustainable reuse of material resources.

Household users should contact either the dealer where they purchased this product, or their local government office, for details of where and how they can take this device for environmentally safe disposal.

Commercial users should contact their supplier and check the terms and conditions of the purchase contract. This product should not be mixed with other commercial waste for disposal.

8.5 Warranty

We reserve the right to implement technical and formal changes to the product in the interest of technical progress.

Our products are under guarantee within the scope of the statutory provisions.

If you have a warranty claim, please contact the point of sale.



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