Preface

Purpose of the operating instructions

Based on the operating instructions, you will be able to install and connect the SCALANCE device correctly. The instructions are aimed primarily at planning, commissioning, maintenance and service personnel.

The configuration and the integration of the device in a network are not described in these instructions.

Scope of validity

These operating instructions cover the following products:

Product	Description	Article numbers
SCALANCE M874-2	Mobile wireless router for 2G (GPRS/EDGE)	6GK5874-2AA00-2AA2
SCALANCE M874-3	Mobile wireless router for 3G (HSPA+)	6GK5874-3AA00-2AA2
SCALANCE M876-3	Mobile wireless router for 3G (HSPA+) with antenna diversity	6GK5876-3AA02-2BA2 6GK5876-3AA02-2EA2 (ROK)
SCALANCE M876-4	Mobile wireless router for 4G (LTE) with antenna diversity	6GK5876-4AA00-2BA2 (EU) 6GK5876-4AA00-2DA2 (NAM)
	Mobile wireless router for 4G (LTE) optimized for worldwide use	6GK5876-4AA10-2BA2

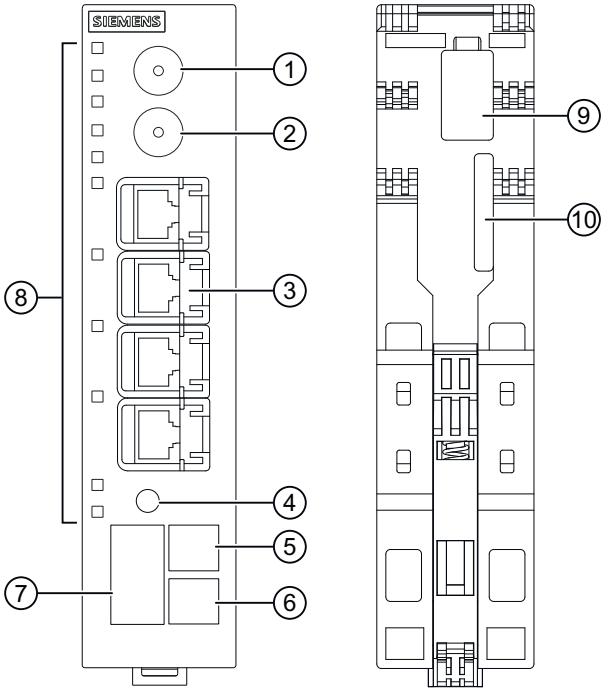
These operating instructions apply to the following firmware version:

- SCALANCE M-800/S615 as of version V8.3

Designations used

Classification	Description	Terms used
Product line	For all devices and variants of all product groups within the SCALANCE M-800 product line, the term **M-800** is used.	M-800
Product group	For all devices and variants of a product group, only the product group is used.	M874 stands for M874-2 and M874-3 M876 stands for M876-3 and M876-4 M87x stands for M874-2, M874-3, M876-3 and M876-4
Device	For a device, only the device name is used.	M874-2 M874-3 M876-3 M876-4

3.2.2 SCALANCE M876



On the device front:

① Antenna connector A2, type SMA female
② Antenna connector A1, type SMA female
③ Ethernet connectors (P1, P2, P3, P4)
④ SET button
⑤ Digital input (DI)
⑥ Digital output (DO)
⑦ Power supply connection
⑧ LED display

On the device rear:

⑨ PLUG slot
⑩ Slot for the mini SIM card 2FF

3.3 Scope of delivery

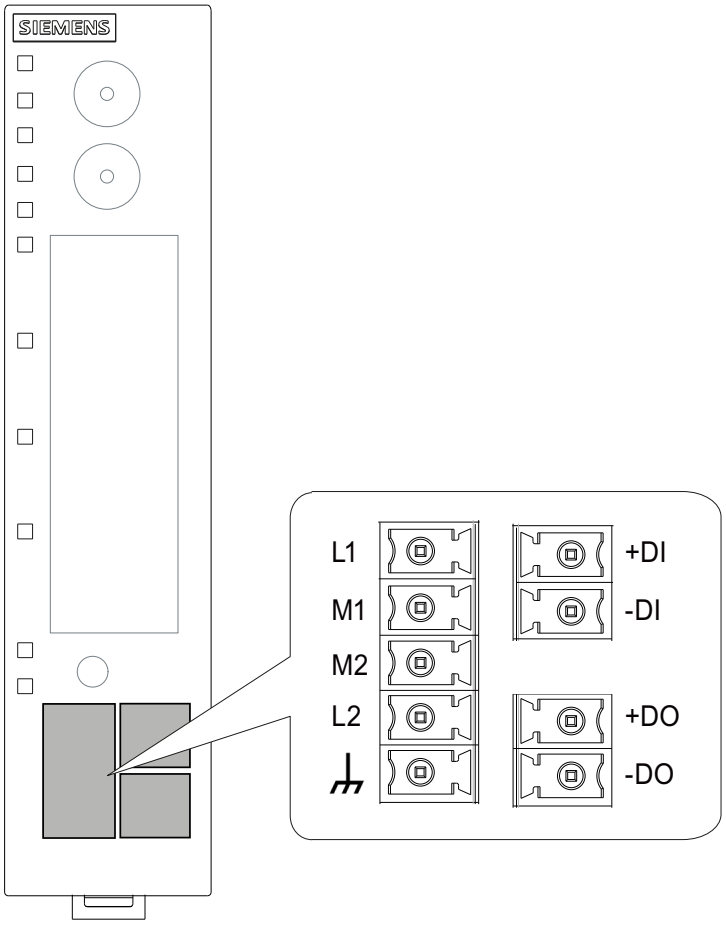
The following components ship with the product:

- One SCALANCE M device
- A 5-pin terminal block for the power supply
- A 2-pin terminal block for the digital output
- A 2-pin terminal block for the digital input
- A product DVD

3.5 Terminals

Position

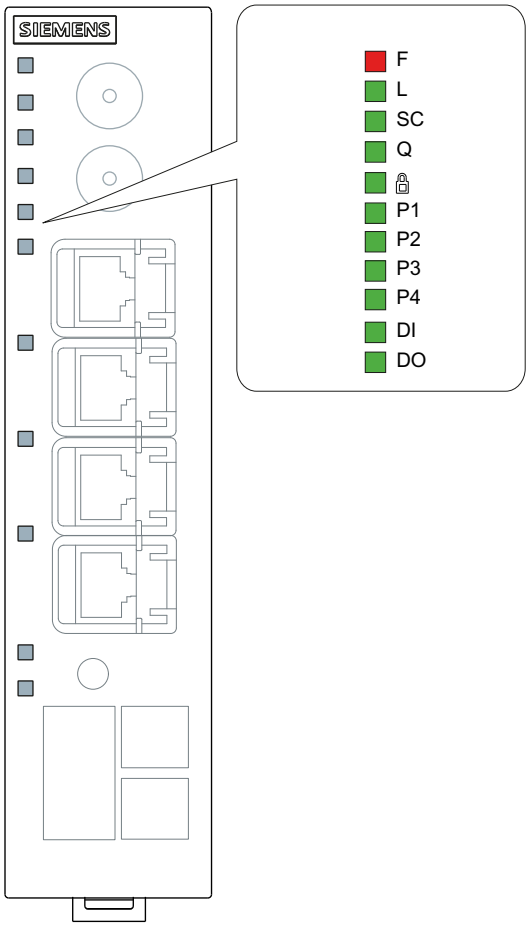
The device has a 5-pin plug-in terminal block for the power supply and two 2-pin plug-in terminal blocks for the digital input and output.



Connectors and terminal markings

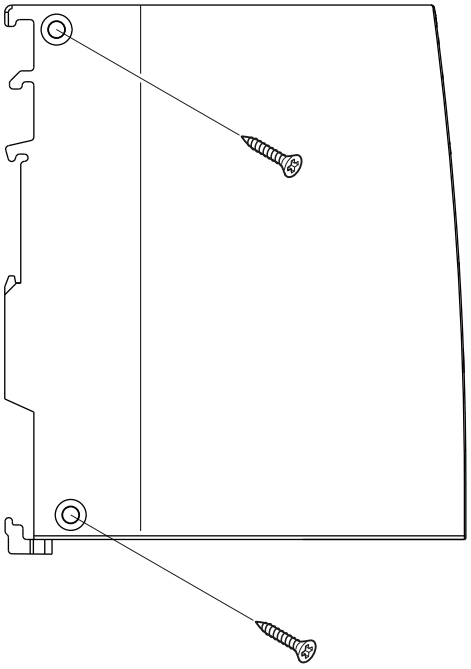
L1, M1, L2, M2	Input for the power supply	Terminal block with five terminal connectors
⏚	Functional grounding	
+DI, -DI	Digital input	Terminal block with two terminal connectors
+DO, -DO	Digital output	Terminal block with two terminal connectors

3.6.2 SCALANCE M876



Installation

1. Insert the SIM card, refer to the section "SIM card (Page 71)".
2. Prepare the drill holes for wall mounting. For the precise dimensions, refer to the section "Dimension drawings (Page 105)".
3. Secure the device to the wall with two screws. When mounting on a wall, use mounting fittings suitable for the type of wall.



1. Connect the power supply, refer to the section "Power supply (Page 63)".
2. Fit the connectors for the digital input and digital output, refer to the section "Digital input/ output (Page 65)".
3. Connect the antenna, refer to the section "Antennas (Page 67)".
4. Connect the device to the local network, refer to the section "Ethernet port (Page 70)".
5. Connect the terminal with as short a cable as possible ≤ 150 mm and a large cross-sectional area ≥ 1.5 mm² to the functional ground of the system, refer to the section "Grounding (Page 64)" and section "Terminals (Page 32)".

4.4 Installation on the DIN rail

Requirement

There is a mini SIM card for the device.

WARNING

WARNING - EXPLOSION HAZARD -

DO NOT DISCONNECT WHILE CIRCUIT IS LIVE UNLESS AREA IS KNOWN TO BE NON-HAZARDOUS.

WARNING

Restricted area of application

This equipment is suitable for use in Class I, Division 2, Groups A, B, C and D or non-hazardous locations only.

WARNING

Restricted area of application

This equipment is suitable for use in Class I, Zone 2, Group IIC or non-hazardous locations only.

Further notes

5.2 Commissioning

WARNING

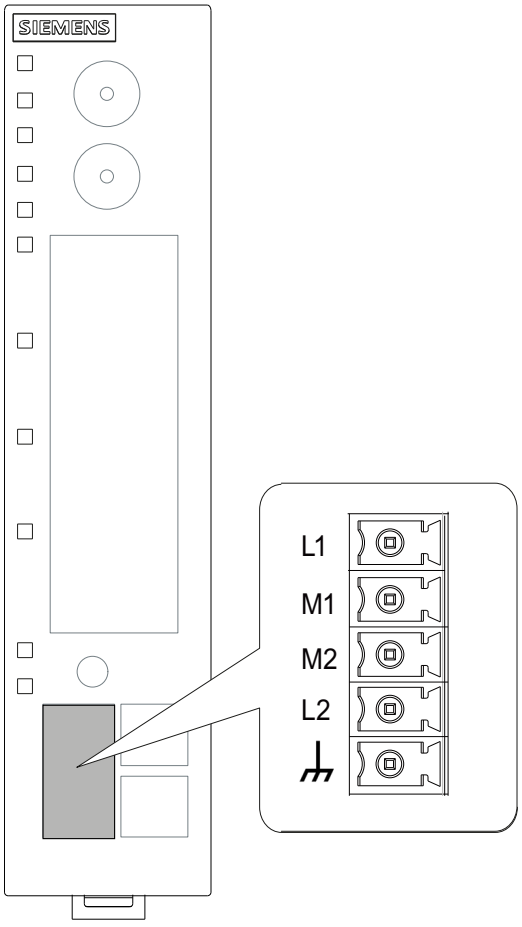
Safety notice for connecting with a LAN ID (Local Area Network)

A LAN or LAN segment with all the interconnected devices should be contained completely in a single low voltage power distribution in a building. The LAN is designed either for “Environment A” according to IEEE802.3 or "Environment 0" according to IEC TR 62102.

Do not connect any electrical connectors directly to the telephone network (telephone network voltage) or a WAN (Wide Area Network).

5.3 Power supply

The power supply is connected using a 5-pin terminal block. The power supply is non-floating.



PIN	Signal	Description
1	L1+	24 VDC
2	M1	Ground
3	M2	Ground
4	L2+	24 VDC
5	⏚	Functional ground, refer to the section "Grounding (Page 64)"

You can find information on wiring in the section "Terminals (Page 32)".

External power supply

Refer to the section Connecting up (Page 57) and the installation instructions and instructions for use of the manufacturer of the power supply, the battery or the accumulator.

With automation components, functional ground also ensures interference-free operation of a controller. Via the functional ground, interference currents coupled in via the connecting cables are discharged to ground.

In terms of the large-area and low impedance implementation, a functional ground set up for this purpose generally also meets the requirements of protective earth. On the other hand, protective earth does not always meet the requirements of functional ground. In general while the connection for protective earth is always low resistance, it is not necessarily low impedance.

The resistance of a connection for protective earth must always be as small as possible to divert fault currents safely to ground. The length of a protective earth cable can therefore be several meters (m) long, without seriously impairing this effect. For a functional ground for diverting HF disturbances, this cable does however have impedance and is therefore not suitable.

5.5 Digital input/output

The digital input and output are connected using a 2-pin plug-in terminal block in each case. Two terminal blocks ship with the device.

NOTICE
Damage due to voltage being too high or too low The voltage at the digital input/output must not exceed 30 VDC and not fall below -30 VDC, otherwise the digital input/output will be destroyed.

Note

Interference pulse

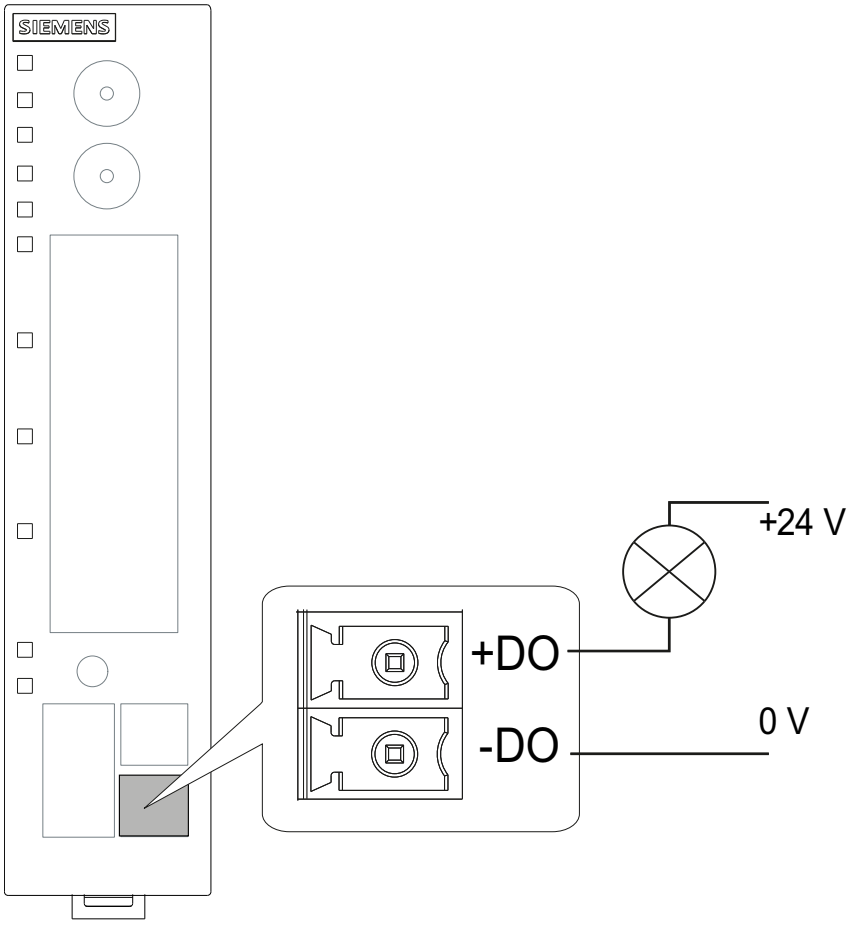
To avoid evaluating an interference pulse, the pulse for the signal 1 (TRUE / HIGH) must be at least 200 ms.

Rules for wiring

- To wire the digital input/output, use a copper cable of category AWG18-16 or a cable with a cross-section of 0.75 to 1.5 mm^2.
- Always wire the digital input/output in pairs.
- The maximum permitted cable length is 30 m.

Digital output

The 2-pin terminal block has the following assignment:



Contact	Assignment
+DO	Switching signal
-DO	Ground

The output is a switch that switches the signal at +DO to -DO.

5.6 Antennas

Note

Use the antennas from the accessories program for the M87x device. You will find more detailed information in "Accessories (Page 31)". If you use a different antenna, there is no guarantee that the device will function according to the specification.

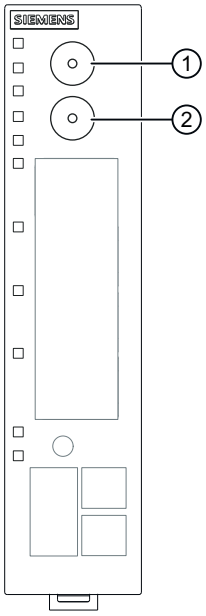
You can either connect an external antenna directly to the device or connect it with a flexible connecting cable.

If the "Q" LED is lit permanently, the signal quality is good. For more detailed information, refer to the section "LED display (Page 33)".

Avoid large metal objects in the immediate vicinity.

Position

The SCALANCE M874 has an SMA antenna connector for a UMTS/GSM antenna and the SCALANCE M876 has two SMA antenna connectors for two LTE/UMTS/GSM antennas for diversification.



① A2 antenna connector, only with SCALANCE M876
② A1 antenna connector

5.7 Ethernet port

Connect the local network with the local applications to the Ethernet port, for example a programmable logic controller, a machine with an Ethernet interface for remote monitoring or a PC.

To set up the device, connect a PC with a Web browser to one of the Ethernet ports.

For the connection, use a path cable with an RJ-45 plug. You will find the properties of the Ethernet interface in the technical specifications.

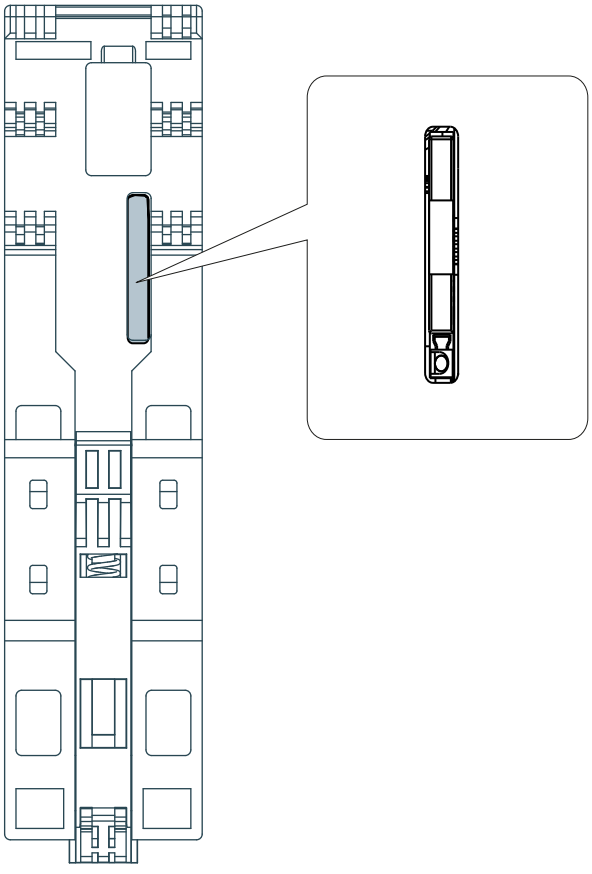
5.8 SIM card

NOTICE
Damage to the SIM card during replacement
Before you insert or remove the SIM card, turn off the power supply of the SCALANCE M-800.
Do not open the SIM card tray during operation. This can damage the SIM card and the device.

The tray for the 2FF mini SIM card is located on the back of the device. There is a small button directly beneath the tray.

Procedure

1. To open the drawer, press the button with a sharp object, for example a pencil.



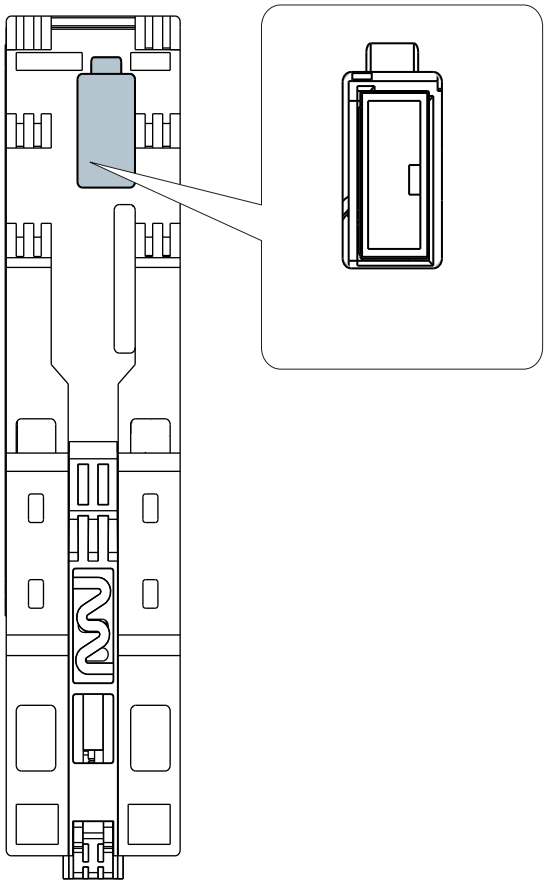
2. Place the SIM card in the tray so that the card audibly locks in place and so that its gold-plated contacts remain visible.
3. Then push the tray with the SIM card completely back into the housing.

5.9 Replacing the PLUG

NOTICE
Do not remove or insert a C-PLUG / KEY-PLUG during operation! A PLUG may only be removed or inserted when the device is turned off. The device checks whether or not a PLUG is present at one second intervals. If it is detected that the PLUG was removed, there is a restart. If a valid KEY-PLUG was inserted in the device, the device changes to a defined error state following the restart. With SCALANCE M, the wireless interface is deactivated in this case.

Inserting the PLUG

1. Turn off the power to the device.
2. The housing of the PLUG has a protruding ridge on the long side. The slot has a groove at this position.
   Insert the PLUG correctly oriented into the slot.



Troubleshooting 7

7.1 Downloading new firmware using TFTP without WBM and CLI

Firmware

The firmware is signed and encrypted. This ensures that only firmware created by Siemens can be downloaded to the device.

Procedure with Microsoft Windows

You can download new firmware to the device using TFTP. To do this, the device does not need to be reachable either using Web Based Management (WBM) or using the Command Line Interface (CLI). This can be the case if there was a power failure during a firmware update.

When pressing the button, make sure you adhere to the instructions in the section "SET button (Page 39)".

To load a new firmware via TFTP, follow these steps:

1. Turn off the power to the device.
2. Press and hold the SET button and reconnect the device to the power supply while holding down the button.
3. Hold down the button until the red fault LED "F" starts to flash after approximately 2 seconds (500ms on/500ms off).
4. Release the button as long as the red error LED is still flashing.
   This time only lasts a few seconds.
   The bootloader waits in this state for a new firmware file that you can download using TFTP.
5. Connect a PC to the device over the Ethernet interface.
6. Assign an IP address to the device using DHCP or the SINEC PNI.
7. In a Windows command prompt, go to the directory where the file with the new firmware is located and use the following command:
   `tftp -i <IP address> put <firmware file>.`

Note

You can enable TFTP in Microsoft Windows as follows:

"Control Panel > Programs and Features > Turn Windows features on or off > TFTP Client".

Once the firmware has been transferred completely to the device and validated, the device restarts. This process can take several minutes.

7.2 Restoring the factory settings

NOTICE
If you reset, all the settings you have made will be overwritten by factory defaults.

NOTICE
Inadvertent reset An inadvertent reset can cause disturbances and failures in a configured network with further consequences.

With the SET button

When pressing the button, make sure you adhere to the instructions in the section "SET button (Page 39)".

To reset the device to the factory defaults during the startup phase, follow the steps below:

1. Turn off the power to the device.
2. Press the SET button and reconnect the device to the power supply while holding down the button.
3. Hold down the button until the red error LED "F" stops flashing after approximately 10 seconds and is permanently lit.
4. Release the button and wait until the fault LED "F" goes off.
   The device starts automatically with the factory settings.

With SINEC PNI

Follow the steps below to reset the device parameters to the factory settings with the SINEC PNI:

1. Select the device whose parameters you want to reset.
2. Click the "Reset device" button.
3. Select the "Reset to factory settings" option in the following dialog.

Via the configuration

You will find detailed information on resetting the device parameters using the WBM and CLI in the configuration manuals:

- Web Based Management, section "Restart"
- Command Line Interface, section "SET and Defaults"

		M876-4
Monitoring / diagnostics / maintenance		• LEDs Display of operating statuses via the LED display. You will find additional information on this in the operating instructions of the device. • Logging Events can be logged for monitoring. • SNMPv1/v2/v3 For monitoring and controlling network components such as routers or switches from a central station.
Other functions		• Time-of-day synchronization – NTP client and NTP server – Secure NTP server – SIMATIC time client – SNTP client • DHCP – DHCP server (local network) Virtual networks (VLAN) To structure Industrial Ethernet networks with a fast growing number of devices, a physical network can be divided into several virtual subnets • Digital input/digital output • Dynamic DNS client • DNS client and DNS proxy • SMTP client

8.5 SCALANCE M876-4 (NAM)

		M876-4 (NAM)
Article number		6GK5876-4AA00-2DA2
Ethernet interface		
Connection to Industrial Ethernet	Quantity	4
	Design	RJ-45 jack Characteristics: • 10/100BASE-T • Ethernet IEEE 802.3 • 10/100 Mbps
Wireless interface		

		M876-4 (NAM)
Antenna connector	Quantity	2 A1: Main antenna A2: UMTS: RX diversity LTE: RX MIMO
	Design	SMA socket (straight)
	Impedance	50 Ω nominal
Frequency bands	LTE	700 MHz, 850 MHz, AWS-1 (1700/2100) MHz, 1900 MHz
	UMTS with HSPA+	850 MHz, AWS-1 (1700/2100) MHz, 1900 MHz
	GSM	850 MHz, 900 MHz, 1800 MHz, 1900 MHz
LTE	Transmission speed	• Downlink: up to 100 Mbps • Uplink: up to 50 Mbps
UMTS with HSPA+	Transmission speed	• HSDPA (downlink): up to 14.4 Mbps • HSUPA (uplink): up to 5.76 Mbps
EGPRS	Properties	Multislot class 12, end device class B • Coding scheme downlink: CS 1 ... 4, MCS 1 ... 9 • Coding scheme uplink: CS 1 ... 4, MCS 1 ... 9
	Transmission speed	• Downlink: up to 237 kbps: • Uplink: up to 237 kbps:
GPRS	Properties	Multislot class 12, end device class B, coding scheme 1 ... 4
	Transmission speed	• Downlink: up to 85.6 kbps. • Uplink: up to 85.6 kbps.
GSM (CSD dial-in)	Properties	Radio Link Protocol (RLP) V.110, non-transparent
	Transmission speed	up to 14.4 kbps
SMS (TX)	Properties	Text mode, SMSoverIP
Electrical data		
Power supply	Quantity	1
	Design	Terminal block, 5-pin
	Properties	Input voltage: • 12 to 24 VDC • min. 10.8 VDC, max. 28.8 VDC Maximum power consumption 8 W Maximum cable length < 3 m

		M876-4 (NAM)
Digital input	Quantity	1
	Design	Terminal block, 2-pin
	Properties	Rated voltage 24 VDC Safety Extra Low Voltage (SELV)
		For state "1": 10 to 30 VDC
		For state "0": -30 to 3 VDC
		Maximum input current 8 mA
		Cables should be routed in pairs
		Maximum cable length < 30 m
		Inputs isolated from electronics.
Digital output	Quantity	1
	Design	Terminal block, 2-pin
	Properties	Rated voltage 24 VDC Safety Extra Low Voltage (SELV)
		Relay, internally not current limited
		Maximum current carrying capacity 1 A
		Cables should be routed in pairs
		Maximum cable length < 30 m
		Output isolated from electronics
Permitted ambient conditions		
Ambient temperature	During operation	Vertical mounting position • Without air flow and with lateral clearance of 5 cm to the neighboring device: -20 °C ... +60 °C • Without clearance at the side and an air flow of 0.5 m/s (only with the "LTE only" mode) -20 °C to +70 °C Horizontal mounting position: • -20 °C ... +50 °C
	During storage	-40 °C to +70 °C
	During transportation	-40 °C to +70 °C
Relative humidity	During operation	≤ 95% at 25 °C, no condensation
Design, dimensions and weight		
Module format		Compact module S7-1500
Degree of protection		IP20
Weight		290 g
Dimensions (W x H x D)		34.8 x 147 x 134.7 mm
Installation options		• Mounting on a DIN rail • Installation on S7-300 mounting rail • Installation on S7-1500 mounting rail • Wall mounting • Mounting on a pedestal

9.2 SCALANCE M876

Dimensions are specified in mm.

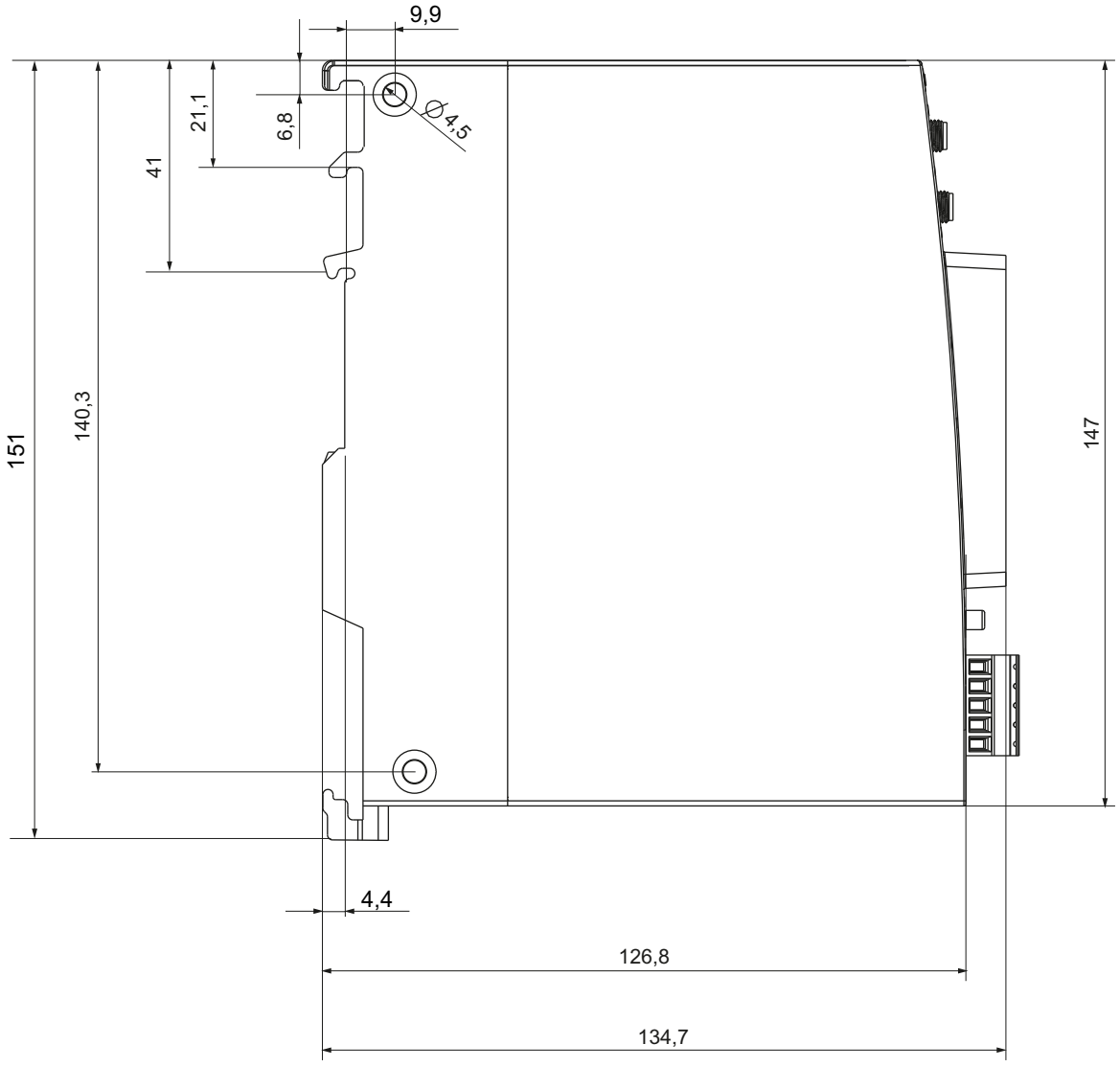


Figure 9-3 M876-3 and M876-4 side view