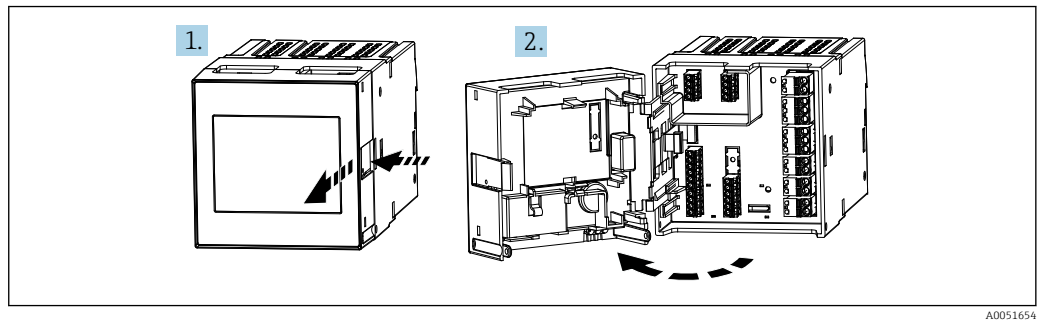


Access to terminals



A0051654

6.2.2 Panel-mounted device

Device version: Order code 040 (housing); option B (panel mounting)

Access to terminals

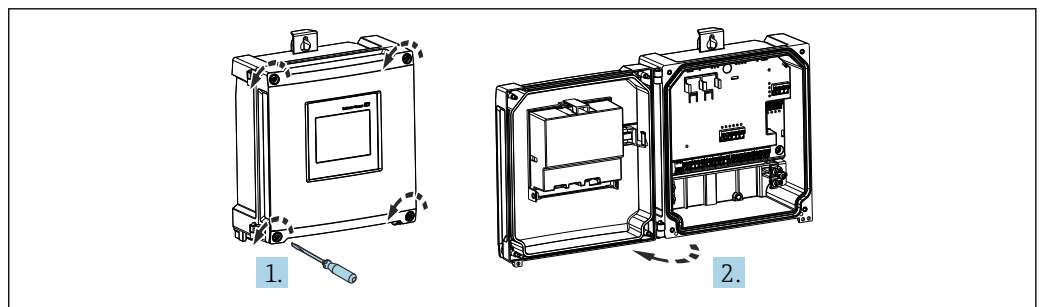
The terminals are freely accessible at the rear of the device.

6.2.3 Terminal compartment of polycarbonate field housing

Device version: Order code 040 (housing); option C (polycarbonate field housing)

Access to terminal compartment

Required tool: Torx T8 or flat-blade screwdriver



A0053259

14 Access to terminal compartment in polycarbonate field housing

Cable entries of polycarbonate field housing

Precut openings on the bottom of the housing for the following cable entries:

- M16x1.5 (4 openings)
- M20x1.5 (2 openings)
- M25x1.5 (2 openings)

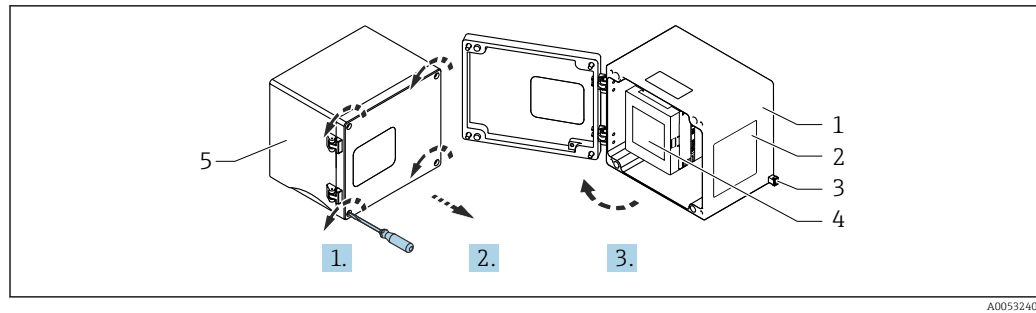
Use a suitable tool to cut out the required openings.

6.2.4 Terminal compartment of aluminum field housing

Device version: Order code 040 (housing); option D (aluminum field housing)

Access to terminal compartment

Required tool: Torx T8 or flat-blade screwdriver



A0053240

15 Access to terminal compartment in aluminum field housing

- 1 Aluminum field housing, open
- 2 Nameplate
- 3 Terminal for protective ground
- 4 FMA90 DIN rail device
- 5 Aluminum field housing, closed

Cable entries for aluminum field housing

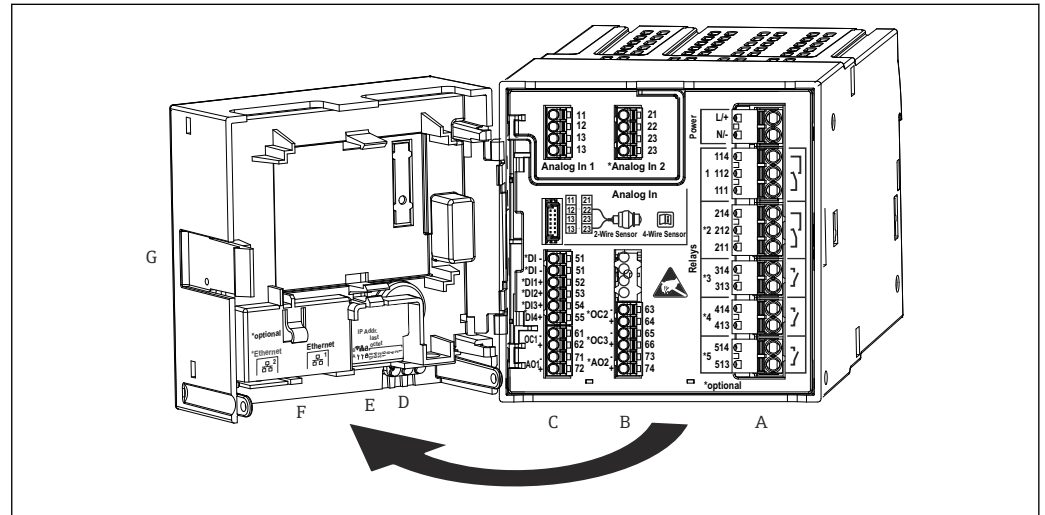
- There are eight M20x1.5 openings with blanking covers for cable glands on the bottom of the field housing.
- To establish the electrical connection: remove the blanking covers and replace them with cable glands. Guide the cables through the cable glands into the housing. The device is then connected in the same way as the DIN rail device.

6.2.5 Terminal areas of DIN rail device

Device version

Order code 040 (housing); option A (DIN rail mounting)

-  The DIN rail device is designed for installation in the optional aluminum field housing.
-  The DIN rail device is available with or without a display unit (optional). The electrical connection is the same.



 16 Terminals for DIN rail device; terminal design: attachable push-in terminals

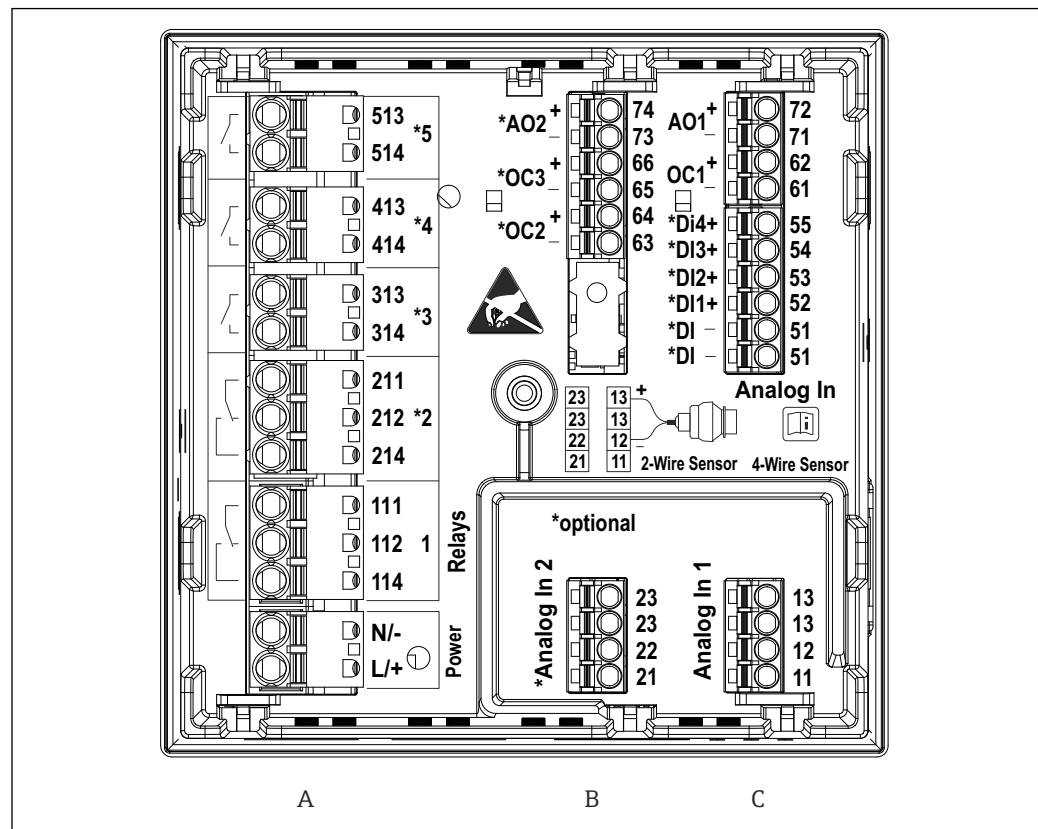
- A Power unit with relay 1 (changeover contact). Optional: Relay 2 to 5
- B I/O option card with analog input 2 (incl. loop power supply), analog output 2, open collector 2, 3
- C Standard I/O card with analog input 1 (incl. loop power supply), analog output 1, open collector 1, optional: digital inputs 1 to 4
- D 3 LEDs (only for version without display): DS (device status), NS (network status), WLAN
- E DIP switch
- F Ethernet connection 1 (standard), Ethernet connection 2 (optional)
- G Unlocking device

-  The switching positions of the relays shown on the terminal area refer to the de-energized (current-free) state.

6.2.6 Terminal areas of panel-mounted device

Device version

Order code 040 (housing); option B (panel mounting)



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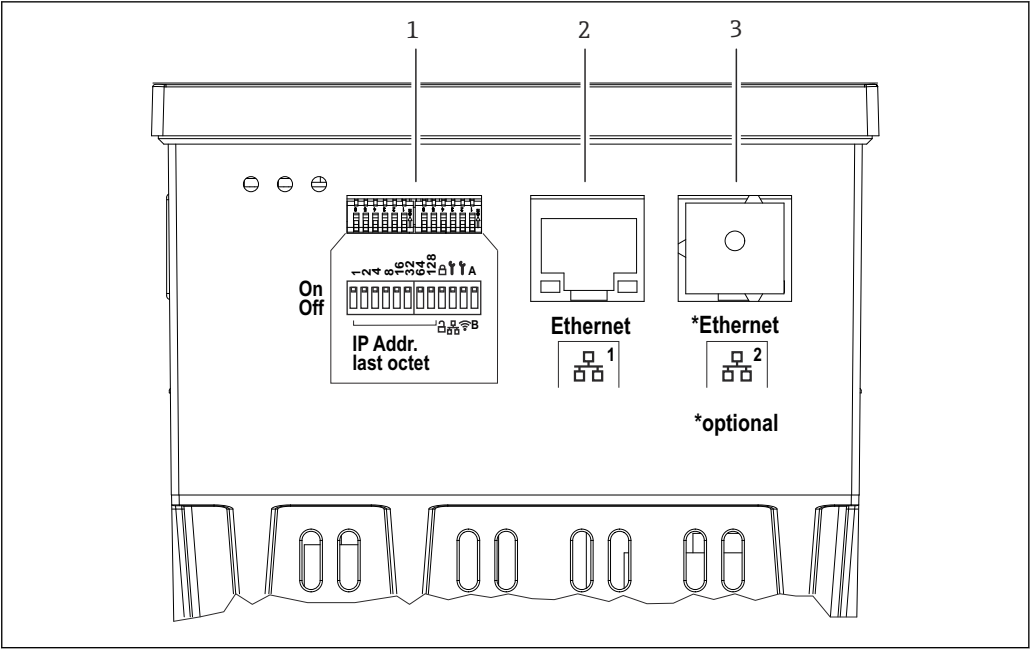
17 Terminals for panel-mounted device (rear of device); terminal design: attachable push-in terminals

A Power unit with relay 1 (changeover contact). Optional: Relay 2 to 5

B I/O option card with analog input 2 (incl. loop power supply), analog output 2, open collector 2, 3

C Standard I/O card with analog input 1 (incl. loop power supply), analog output 1, open collector 1, optional: digital inputs 1 to 4

i The switching positions of the relays shown on the terminal area refer to the de-energized (current-free) state.



A0053119

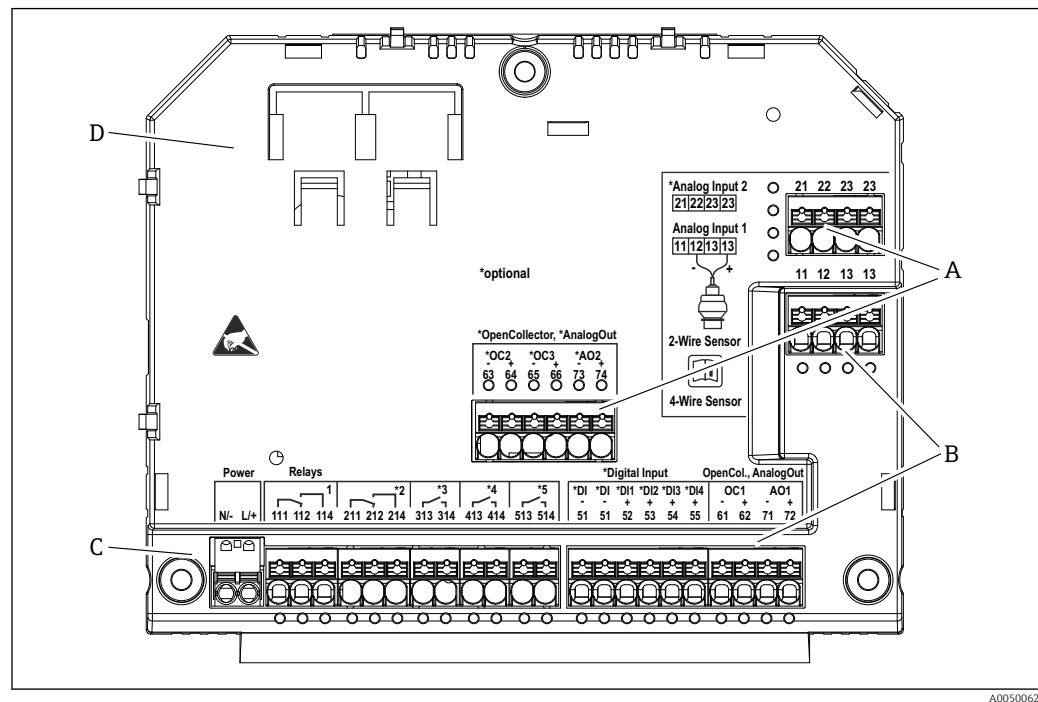
18 Connections for panel-mounted device (underside of devices)

- 1 DIP switch
- 2 Ethernet connection 1 (standard)
- 3 Ethernet connection 2 (optional)

6.2.7 Terminal areas of polycarbonate field housing

Device version

Order code 040 (housing); option C (field mounting, polycarbonate)



19 Terminals in terminal compartment of polycarbonate field housing; terminal design: push-in terminals

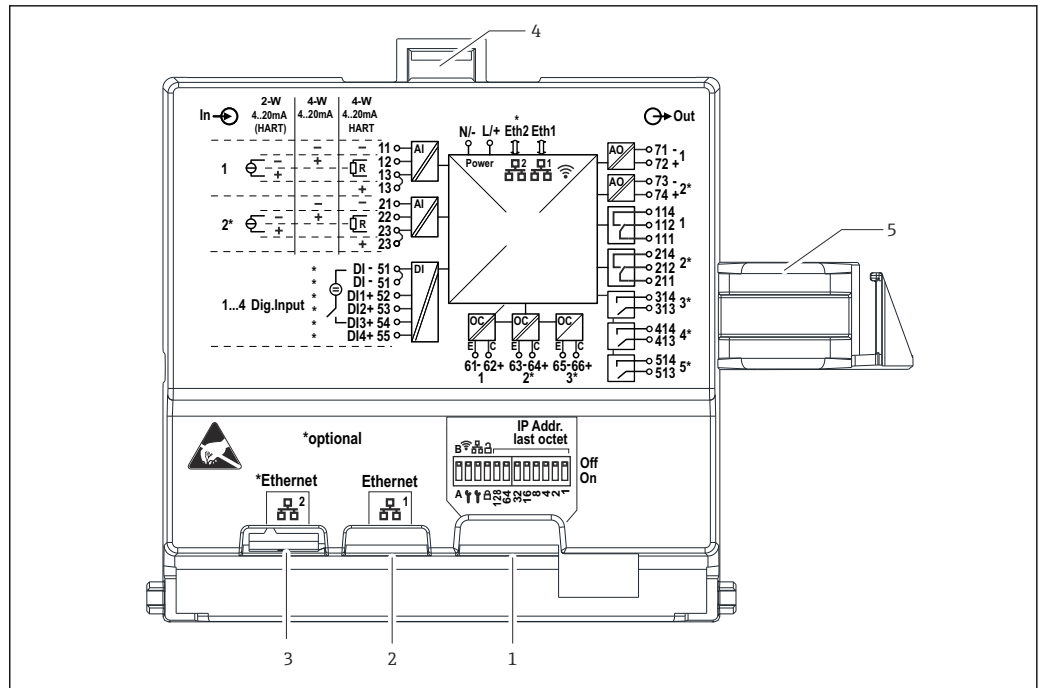
- A Terminal area for analog input 2 (incl. loop power supply), analog output 2, open collector 2, 3
- B Terminal area for analog input 1 (incl. loop power supply), analog output 1, open collector 1, optional: Digital inputs 1 to 4
- C Terminal area for power supply and relay 1 (changeover contact). Optional: Relay 2 to 5
- D Holder for commercially available shunting clamps

i The switching positions of the relays shown on the terminal area refer to the de-energized (current-free) state.

Terminal areas on rear side of display for the polycarbonate field housing

Device version

Order code 040 (housing); option C (field mounting, polycarbonate)



A0052157

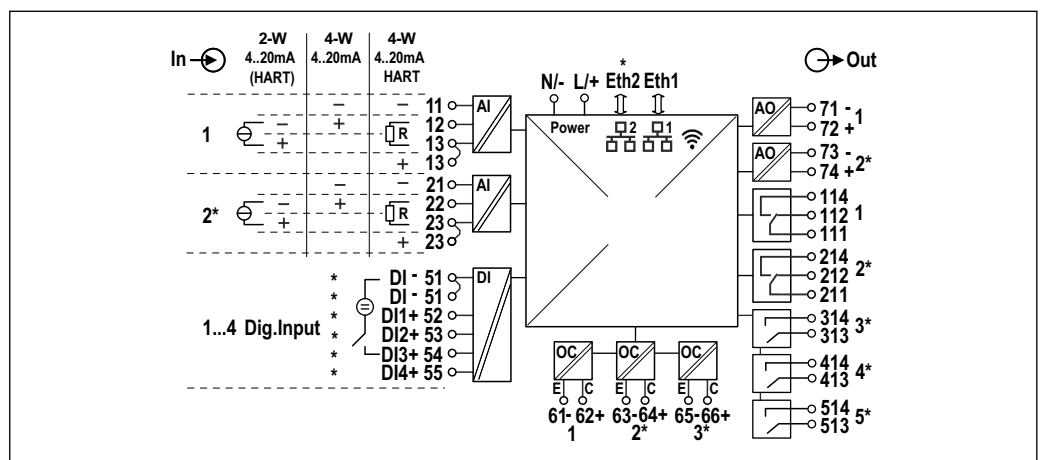
20 Connections on the rear side of display for the polycarbonate field housing

- 1 DIP switch
- 2 Ethernet connection 1 (standard)
- 3 Ethernet connection 2 (optional)
- 4 Locking device
- 5 Connecting cable to the main board

i Adapters for RJ45 to M12 connectors are available as an option for the field housing (see "Accessories" section in Operating Instructions). The adapters connect the RJ45 Ethernet interfaces with the M12 connectors mounted in the cable entries. Therefore the connection to the Ethernet interface can be established via an M12 connector without opening the device.

6.2.8 Block diagram and terminal table

Function diagram



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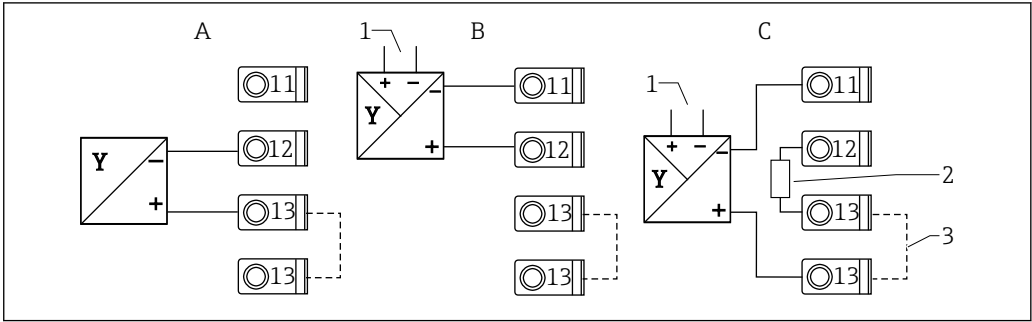
21 Connection diagram (terminals marked with * depend on options)

Terminal table

Terminal	Terminal assignment	Description
L/+	L for AC + for DC	Power supply
N/-	N for AC - for DC	
11	Only for 4-wire: - Current measuring input	Analog input 1
12	For 2-wire: - of sensor For 4-wire: + Current measuring input For 4-wire with HART: Communication resistor	
13	For 2-wire: + of sensor For 4-wire with HART: Communication resistor	
13	Only for 4-wire with HART: + of sensor output (LPS must be disabled)	
21	Only for 4-wire: - Current measuring input	Analog input 2 (optional)
22	For 2-wire: - of sensor For 4-wire: + Current measuring input For 4-wire with HART: Communication resistor	
23	For 2-wire: + of sensor For 4-wire with HART: Communication resistor	
23	Only for 4-wire with HART: + of sensor output (LPS must be disabled)	
51 (2x)	- For digital inputs 1 to 4	Digital inputs/switch inputs (optional)
52	+ Digital input 1 (external switch 1)	
53	+ Digital input 2 (external switch 2)	
54	+ Digital input 3 (external switch 3)	
55	+ Digital input 4 (external switch 4)	
61	-	Open Collector 1
62	+	
63	-	Open collector 2 (optional)
64	+	
65	-	Open collector 3 (optional)
66	+	
71	- (0/4 to 20 mA, HART)	Analog output 1
72	+ 0/4 to 20 mA	
73	- (0/4 to 20 mA)	Analog output 2 (optional)
74	+ 0/4 to 20 mA	
111	Normally closed (NC)	Relay 1
112	Common (COM)	
114	Normally open (NO)	
211	Normally closed (NC)	Relay 2 (optional)
212	Common (COM)	
214	Normally open (NO)	
313	Common (COM)	Relay 3 (optional)
314	Normally open (NO)	
413	Common (COM)	Relay 4 (optional)
414	Normally open (NO)	

Terminal	Terminal assignment	Description
513	Common (COM)	Relay 5 (optional)
514	Normally open (NO)	

6.2.9 Sensor connection

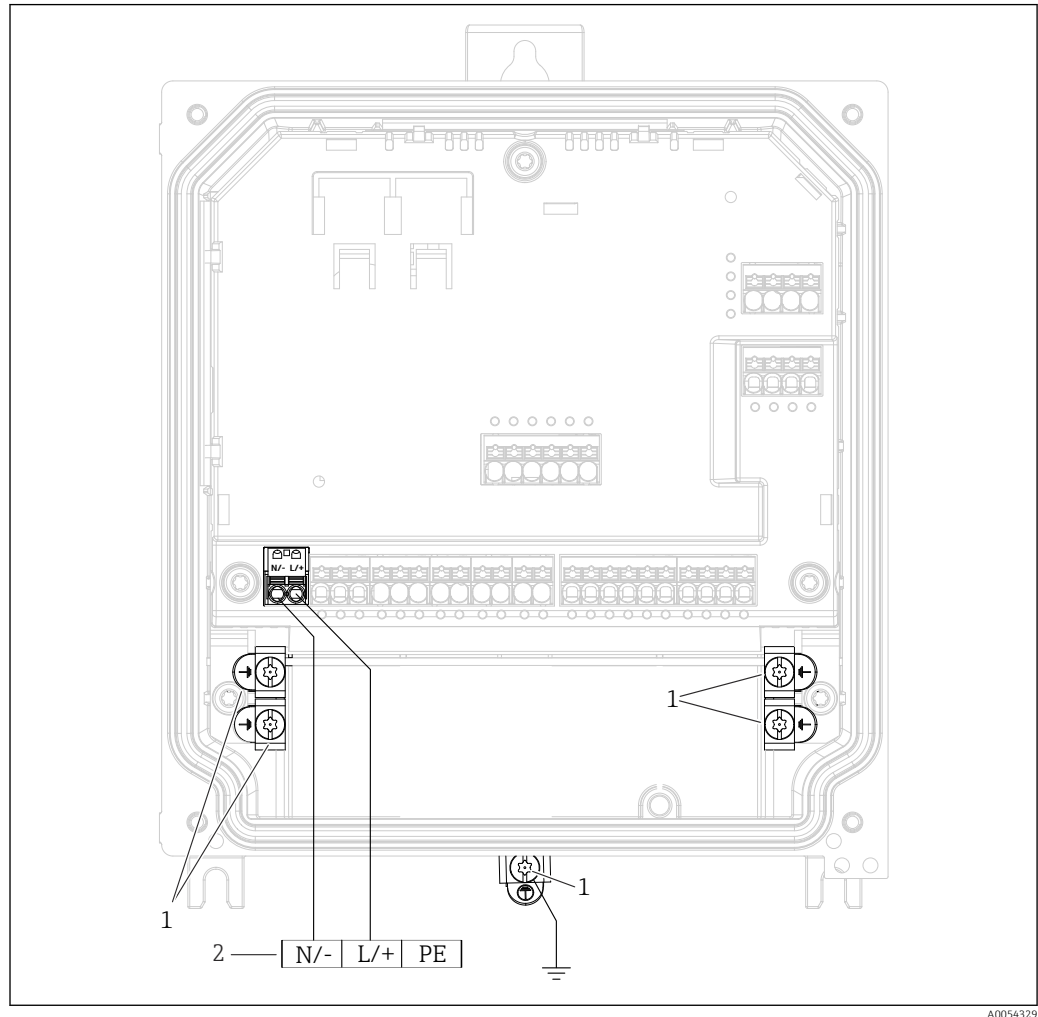


- 22 Connection examples: 2-wire and 4-wire sensor on 4 to 20 mA current input or HART
- A Passive 2-wire sensor (LPS switched on), e.g. FMR10B, FMR20B, FMR30B, FMX11, FMX21
- B Active 4-wire sensor, 4 to 20 mA
- C Active 4-wire sensor, HART (LPS switched off)
- 1 External power supply
- 2 External HART communication resistor
- 3 Terminal 13 and 14 jumpered internally

 Observe the relevant Operating Instructions when connecting a sensor.

6.3 Special connection instructions

6.3.1 Connection of the power supply in the polycarbonate field housing



23 Connection of the power supply in the polycarbonate field housing

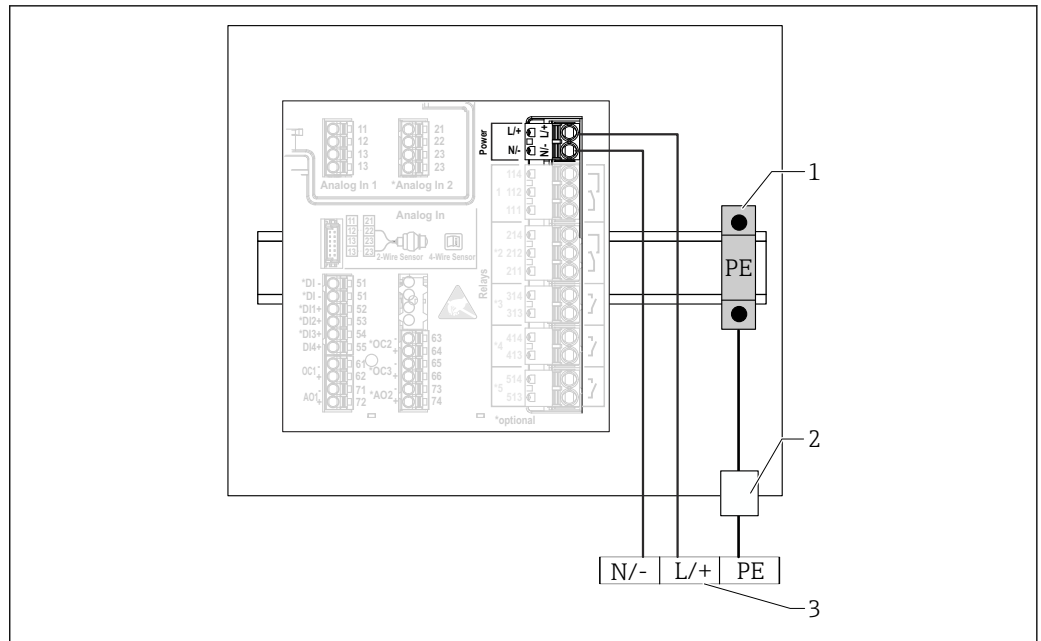
- 1 Connection options for functional ground and shielding of signal lines
- 2 Connection of the power supply (see nameplate)

6.3.2 Connection of the power supply in the aluminum field housing

⚠ WARNING

Shock hazard and explosion hazard

- Connect the aluminum field housing to the potential earth (PE) and/or the local ground potential (PML) via the protective ground terminal.

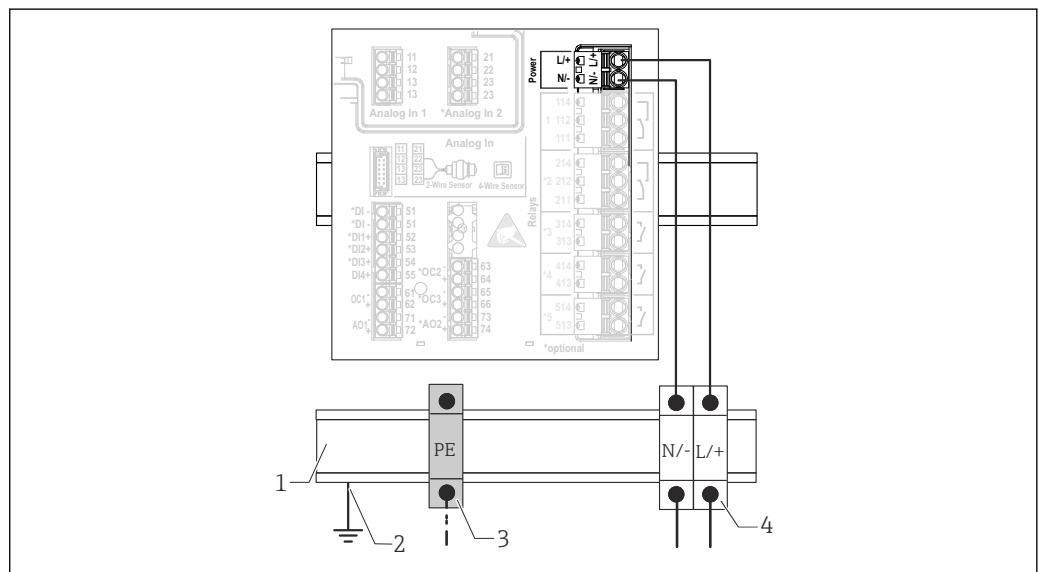


A0054325

24 Connection of the power supply in the aluminum field housing

- 1 Protective ground terminal strip (with contact to DIN rail)
- 2 Protective ground terminal on the outside of the field housing
- 3 Connection of the power supply (see nameplate)

6.3.3 Connection of the power supply on the DIN rail device

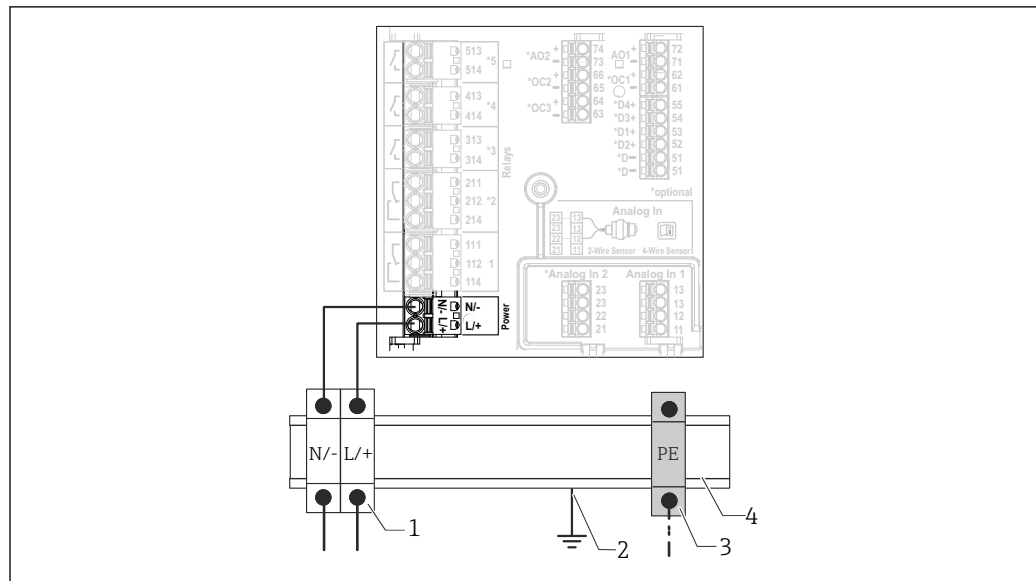


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25 Connection of the power supply on the DIN rail device

- 1 Metal DIN rail in cabinet
- 2 Grounding via DIN rail
- 3 Protective ground terminal strip (with contact to DIN rail)
- 4 Terminal blocks (no contact with DIN rail); connection of power supply (see nameplate)

6.3.4 Connection of the power supply on the panel-mounted device

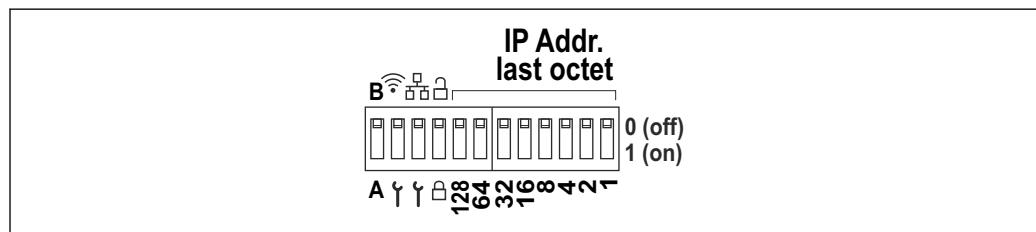


A0054326

26 Connection of the power supply on the panel-mounted device

- 1 Terminal blocks (no contact with DIN rail); connection of power supply (see nameplate)
- 2 Grounding via DIN rail
- 3 Protective ground terminal strip (with contact to DIN rail)
- 4 Metal DIN rail in cabinet

6.4 Hardware settings



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27 DIP switch (drawing shows the delivery settings)

The following settings are made at the DIP switch (from left to right):

- A/B: Reserve (currently no function)
- Activate/deactivate the WLAN service IP address (192.168.2.212)
- Activate/deactivate the LAN service IP address (192.168.1.212)
- Write protection switch: locks the device to prevent modifications to the configuration
- 128 to 1: last octet of IP address (192.168.1.xxx) or hardware address for PROFINET



The LAN and WLAN must not be in the same subnet.

6.5 Ensuring the degree of protection

Only the mechanical and electrical connections which are described in these instructions, and which are necessary for the required intended use, may be established on the device delivered.

6.5.1 DIN rail device

The device meets all the requirements of IP20 protection.

6.5.2 Panel-mounted device

The device fulfills all the requirements for the IP65/NEMA type 4 (front) and IP20 (rear) degree of protection.

Carry out the following steps after electrical connection to ensure the degree of protection:

1. Check that the housing seal to the panel is clean and fitted correctly. Dry, clean or replace the seal if necessary.
2. Tighten all the fastening clips.

6.5.3 Field housing

The field housing fulfills all the requirements for the IP65/NEMA type 4X degree of protection.

Carry out the following steps after electrical connection to ensure the degree of protection:

1. Aluminum field housing: The device must be mounted and connected on a DIN rail in the field housing as described in this manual.
2. Polycarbonate field housing: Check that the housing seal is not damaged. Dry, clean or replace the seal if necessary.
3. Tighten all housing screws and screw covers. (Tightening torque: 1.3 Nm (1 lbf ft))
4. Firmly tighten the cable glands.
5. To ensure that moisture does not enter the cable entry, route the cable so that it loops down before the cable entry ("water trap").

6.6 Post-connection check

Device condition and specifications	Notes
Are the device and cable undamaged (visual inspection)?	-
Electrical connection	Notes
Does the supply voltage match the specifications on the nameplate?	-
Are the power supply and signal cables connected correctly?	-
Are the mounted cables strain-relieved?	-
Are all the connections of the terminals, ground terminals, etc. checked?	-
For field housing: Are the cable glands tightened correctly? Are the cover screws on the connection compartment cover firmly tightened? (Visual inspection)	-

7 Operation options

7.1 Structure and function of the operating menu

7.1.1 Structure of the operating menu

Menu	Typical tasks	Contents/Submenu ¹⁾
Guidance	Main functions for use: From fast and reliable commissioning to guided support during operation.	■ Commissioning ("Maintenance" only) This wizard guides through the commissioning of the device. ■ Certificate management Import of certificates for the web server or other services, as well as the creation of certificates for reliable communication. ■ Import/Export Option for file import and export via web server
Diagnostics	Troubleshooting and preventive maintenance: Device behavior settings for process and device events and help and measures for diagnostic purposes.	Contains all parameters for detecting and analyzing errors: ■ Active diagnostics Shows the current diagnostic message with the highest priority, the last diagnostic message and the operating time of the device ■ Diagnostic list Shows the current diagnostic events pending ■ Event logbook Shows all event messages in chronological order ■ Minimum/maximum values Shows the lowest and highest electronics temperature measured to date, the minimum/maximum level values linearized to date and the minimum/maximum volume flow rate with the respective timestamps. The values can be reset. ■ Simulation Simulation of a process variable, a pulse output or a diagnostic event ■ Diagnostic settings Contains all parameters for configuring error events ■ HART master Diagnostic information for checking the quality of the HART signal and HART communication

Menu	Typical tasks	Contents/Submenu ¹⁾
Application	Targeted optimization for the specific application: Comprehensive device settings from sensor technology to system integration for optimum application adjustment.	Contains all parameters for commissioning an application: ■ Measured values Displays the current measured values and status of the applications ■ Operating mode Use this function to select the operating mode (normal operating mode or configuration mode), as well as the logging interval and the application ■ Units Contains all parameters for configuring the engineering units ■ Sensors Contains all parameters for configuring the sensors ■ Level Contains all parameters for level configuration ■ Pump control Contains all the parameters for configuring pump control ■ Flow Contains all parameters for flow configuration ■ Backwater detection Contains all parameters for configuring backwater detection ■ Calculations Enables average calculations and totalizers for level and flow ■ Totalizer Enables a reset of the totalizer ■ Rake control Contains all parameters for configuring rake control ■ Digital inputs Contains all parameters for configuring the digital inputs ■ Limit values Contains all parameters for configuring the limit values ■ Current output Contains all parameters for configuring the current outputs ■ HART output (optional) Contains all parameters for configuring the HART outputs ■ Relay Contains all parameters for configuring the relays ■ Open collector Contains all parameters for configuring the open collector outputs
System	Comprehensive device management and security settings: Management of system settings and adjustment to the operating requirements.	Contains all higher-level device parameters that are assigned to system, device and user management. ■ Device management Contains all parameters for general device management ■ Security Contains all parameters for device security and user administration ■ Connectivity Contains the parameters for configuring the communication interfaces ■ Web server Contains all parameters for the web server ■ Display Configuration of the on-site display ■ Date/time Configuration and display of date/time ■ Geolocation Configuration of GPS coordinates for the device ■ Information Contains all parameters for unique identification of the device ■ Hardware configuration Overview of the hardware configuration ■ Software configuration Updates, activation and overview of the software
Visualization	Tasks during operation: Create and display groups for the visualization of measured values.	Group 1 to 6 Configuration, display and visualization of the current measured values in groups
Help	Additional information on the device	Displays QR codes with external links (product page, training videos, etc.)

1) The visibility of the submenus depends on the device configuration and the selected ordering options.



For a detailed overview of all operating parameters, see the associated description of device parameters (GP)

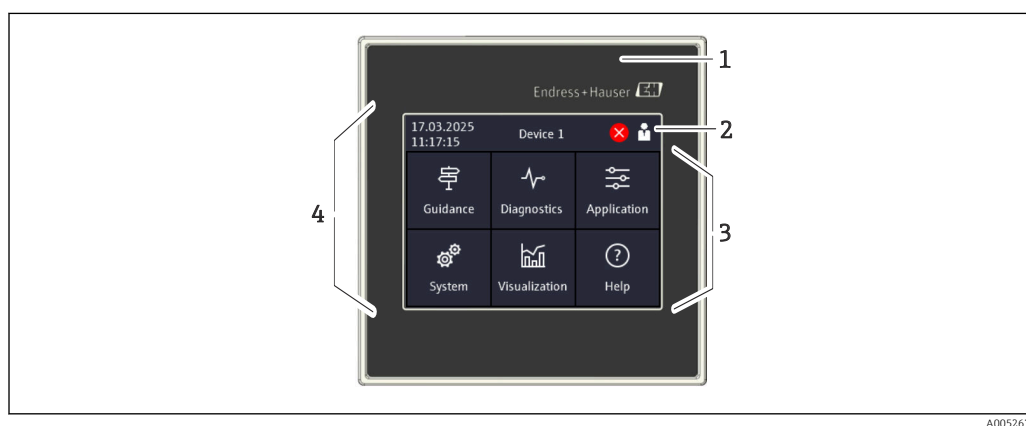
7.2 Access to the operating menu via the local display

The device can be operated intuitively via the 3.5" TFT touch display (order option). Once switched on, the device responds by displaying the start screen. The device is operated using buttons, drop-down lists and input fields. A screen keyboard is available for alphanumeric entries. Drop-down lists and visualization menus (measured value displays) can be operated by swiping vertically/horizontally.

7.2.1 Elements on front of device with touch display



The device version without display features 3 LEDs: DS (device status), NS (network status) and WLAN status at the bottom left instead of the display



A0052679

- 1 Front of device
- 2 Header: date/time, tag name, diagnostic information, quick access menu (logging in/log out, language)
- 3 Function tiles for display and touch operation
- 4 Touch display

7.2.2 Light emitting diodes (LEDs)



The LEDs are only visible with the DIN rail version without touch display.

DS (device status): LED for operating status

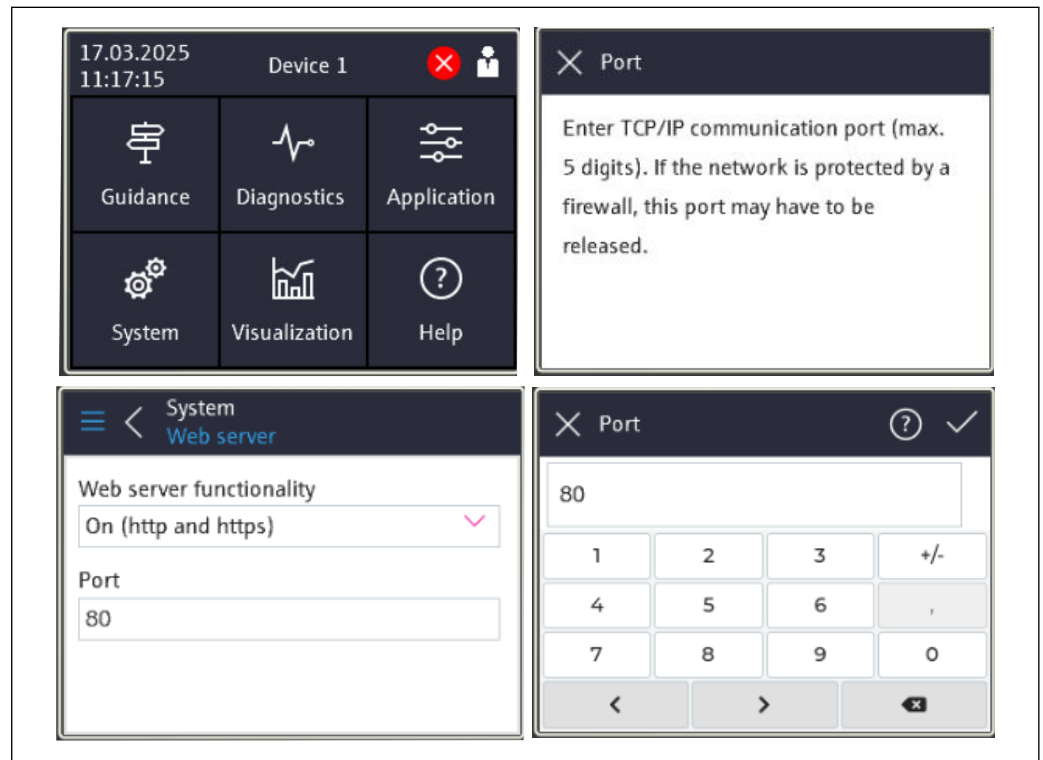
- **Lit green**
Normal operation; no faults detected.
- **Flashes red**
Warning is pending. Details are saved in the diagnostic list.
- **Lit red**
Alarm is pending. Details are saved in the diagnostic list.
- **Off**
No supply voltage.

NS (network status): LED for PROFINET or Ethernet/IP

- **Lit red**
Communication active
- **Lit green**
Connection established, no active communication
- **Off**
No connection

WLAN: LED for communication

- **Flashing blue**
Searching for WLAN access point
- **Lit blue**
Connection established
- **Off**
No connection

7.2.3 Operation via touch display

28 Operating menu on the touch display: Start screen, submenu with input fields, screen keyboard, online help

- i** The ✓ symbol with the "OK" or "Confirm entry" function appears in the top right of each dialog box.

The value is accepted and the dialog box closes by clicking ✓.

- i** The ✕ symbol with the "Back" or "Cancel" function appears in the top left of each dialog box.

Pressing ✕ closes the dialog box without accepting the value entered.

- i** Help: The ? symbol appears in the top right of each dialog box and can be used to call up the integrated help function.

Pressing ✕ closes help.

7.3 Access to operating menu via web browser

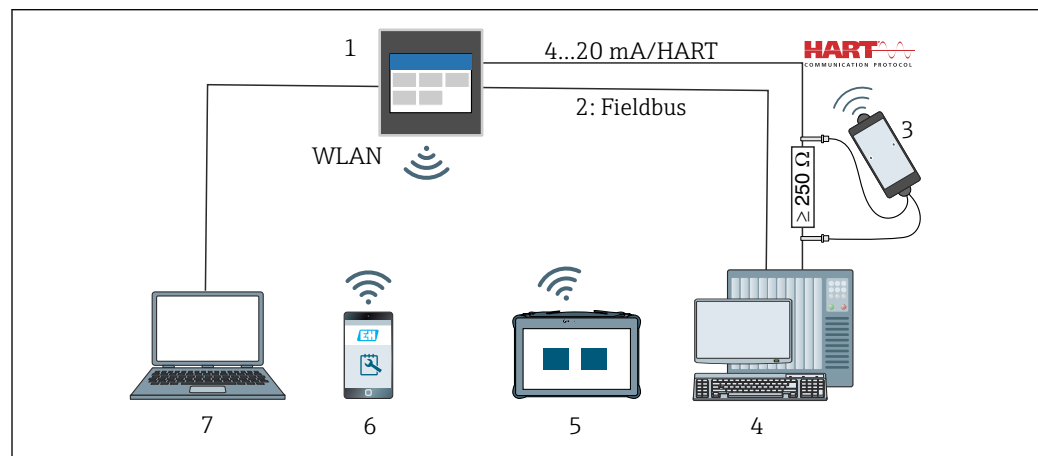
The device can be operated and configured via a web browser with the integrated web server. The web server is enabled when the device is delivered, but can be disabled via an appropriate parameter. Access to the web server always requires entering a PIN. For device versions with Industrial Ethernet communication types, the connection can be established at the signal transmission port via the network.

Function range

Thanks to the integrated web server, the device can be operated and configured using a web browser via the LAN or WLAN interface. The structure of the operating menu is the same as for the local display. In addition to the measured values, status information on the device is displayed which can be used to monitor device health. Furthermore the device data can be managed and the network parameters can be configured.

 A device which has a WLAN interface (optional) is required for the WLAN connection.

8 System integration



 29 System integration

- 1 FlexView FMA90
- 2 Fieldbus: PROFINET, Modbus TCP, EtherNet/IP to PLC (optional)
- 3 HART modem with connection cable, e.g. Commubox FXA195 or VIATOR Bluetooth (restricted operation)
- 4 PLC via HART protocol (FDI package, restricted operation)
- 5 Field Xpert SMT70 via WLAN and web server
- 6 Operation and configuration via WLAN and web server
- 7 Operation and configuration via Ethernet and web server

8.1 Overview of device description files

- Manufacturer ID: 17 (0x0011)
- Device type ID: 0x11DD
- HART specification: 7.9
- DD files, information and files can be found at:
www.endress.com
www.fieldcommgroup.org

8.2 Measured variables via HART protocol (slave)

 It is possible to change the assignment of device variables to process variables in the **Application → HART output → Process variables** menu.

 Detailed overview of all device variables: see the corresponding description of Device Parameters (GP)

8.3 Supported HART commands (slave)

The integrated HART slave of the device supports the following commands:

Command No.	Description
Universal commands	
0, Cmd0	Read unique identifier
1, Cmd001	Read primary variable
2, Cmd002	Read loop current and percent of range
3, Cmd003	Read dynamic variables and loop current
6, Cmd006	Write polling address
7, Cmd007	Read loop configuration
8, Cmd008	Read dynamic variable classifications
9, Cmd009	Read device variables with status
11, Cmd011	Read unique identifier associated with TAG
12, Cmd012	Read message
13, Cmd013	Read TAG, descriptor, date
14, Cmd014	Read primary variable transducer information
15, Cmd015	Read device information
16, Cmd016	Read final assembly number
17, Cmd017	Write message
18, Cmd018	Write TAG, descriptor, date
19, Cmd019	Write final assembly number
20, Cmd020	Read long TAG (32-byte TAG)
21, Cmd021	Read unique identifier associated with long TAG
22, Cmd022	Write long TAG (32-byte TAG)
38, Cmd038	Reset configuration changed flag
48, Cmd048	Read additional device status
Common practice commands	
33, Cmd033	Read device variables
35, Cmd035	Write primary variable range values
40, Cmd040	Enter/Exit fixed current mode
44, Cmd044	Write primary variable units
45, Cmd045	Trim loop current zero
46, Cmd046	Trim loop current gain
50, Cmd050	Read dynamic variable assignments
51, Cmd051	Write dynamic variable assignments
54, Cmd054	Read device variable information
59, Cmd059	Write number of response preambles
60, Cmd060	Read analog channel and percent of range
63, Cmd063	Read analog channel information
72, Cmd072	Squawk
95, Cmd095	Read Device Communication Statistics
100, Cmd100	Write Primary Variable Alarm Code

Command No.	Description
226, Cmd226	Firmware version string
227, Cmd227	Serial number string
228, Cmd228	Extended order code string
231, Cmd231	Device status
233, Cmd233	Order code string
234, Cmd234	ENP version string
236, Cmd236	Start-up time
516, Cmd516	Read Device Location
517, Cmd517	Write Device Location
518, Cmd518	Read Location Description
519, Cmd519	Write Location Description
520, Cmd520	Read Process Unit Tag
521, Cmd521	Write Process Unit Tag
523, Cmd523	Read Condensed Status Mapping Array
524, Cmd524	Write Condensed Status Mapping Array
525, Cmd525	Reset Condensed Status Mapping Array
526, Cmd526	Write Simulation Mode
527, Cmd527	Simulate Status Bit
Device Specific Commands	
194, Cmd194	Read Parameter via HART Index
195, Cmd195	Write Parameter via HART Index
226, Cmd226	Firmware version string
227, Cmd227	Serial number string
228, Cmd228	Extended order code string
231, Cmd231	Device status
233, Cmd233	Order code string
234, Cmd234	ENP version string
236, Cmd236	Start-up time

9 Commissioning

9.1 Post-installation check

Make sure that all installation and connection checks have been carried out before putting the device into operation.

NOTICE

- Before commissioning the device, make sure that the supply voltage matches the voltage specifications on the nameplate. Failure to perform these checks may result in damage to the device caused by the incorrect supply voltage.

9.2 Switching on the device

Once the supply voltage has been applied, the display or the status LED indicates that the device is ready for operation.

If you are commissioning the device for the first time, program the setup as described in the following sections.

If you are commissioning a device that is already configured or preset, the device starts measuring immediately as defined in the settings. The values of the channels currently activated are shown on the touch display.

 Remove the protective film from the touch display as this will otherwise affect the readability of the display.

9.3 Configuring the operating language at the device

Factory setting: English or local language ordered

(Only relevant for version with touch display)

You can change the language under "Language" using the quick access menu at the top right in the header.

1. Select the required language from the "Language" drop-down list
2. Confirm selection by pressing "✓" in the top right

The operating language has been changed.

9.4 User management and permissions

The access control concept consists of several hierarchical levels for different users. User management reflects the various requirements with specific read and write rights.

Settings are configured in the **System → Security** menu.

- **Operator** (logged-out status)

An **operator** can only change settings that have no effect on the application. The operator is able to read most of the parameters, however.

- **Maintenance (factory setting)**

A **Maintenance** role is assigned to the device configuration. It is possible to change the most important parameters.

- **Service** (exclusively for the manufacturer's service technicians)

The **Service** role is primarily intended for diagnostics and troubleshooting. It allows configuration and modification of the relevant parameters.

- **Production**

Internal account for service cases and repair Deactivated in delivery state, can only be activated by the customer's maintenance technician.

- **Developer**

Internal account for service cases and repair Deactivated in delivery state, can only be activated by the customer's maintenance technician.