

Brief Operating Instructions RA33

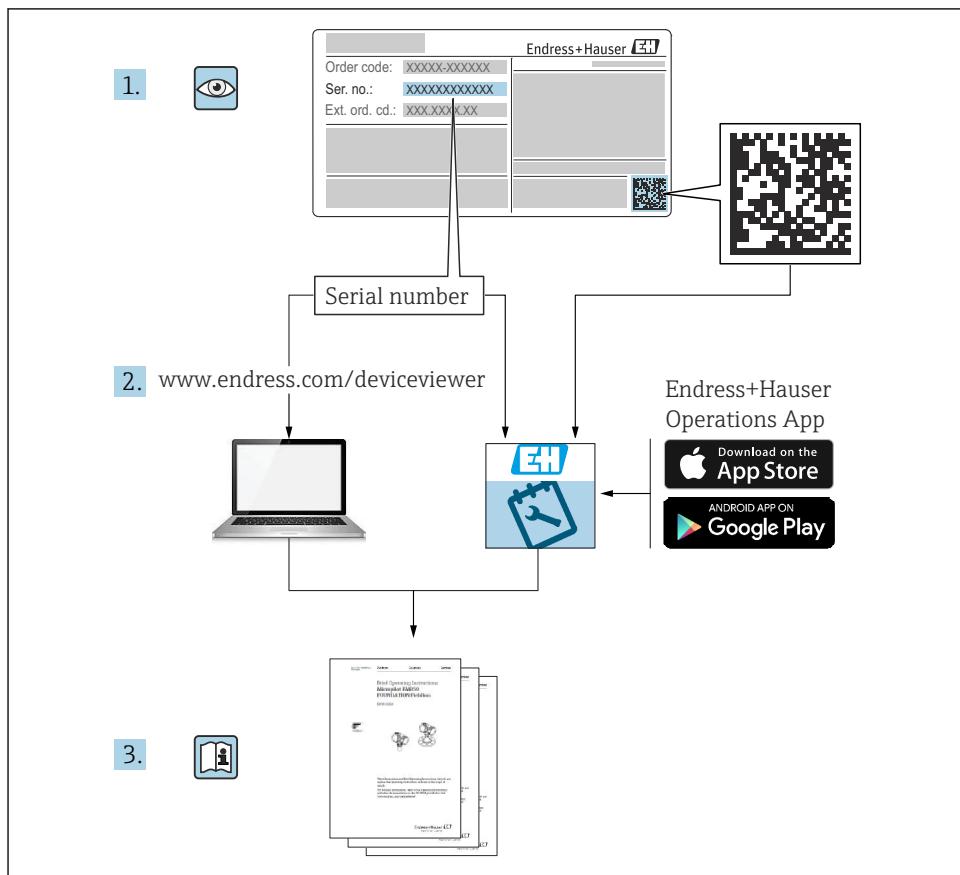
Batch controller with one current/pulse input for flow, one RTD input for temperature and one current input for density



These Brief Operating Instructions are not a substitute for the Operating Instructions pertaining to the device. Detailed information can be found in the Operating Instructions and the additional documentation.

Available for all device versions via:

- Internet: www.endress.com/deviceviewer
- Smartphone/tablet: Endress+Hauser Operations app



A0023555

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1 About this document

1.1 Document function

The Brief Operating Instructions contain all the essential information from incoming acceptance to initial commissioning.

1.2 Symbols

1.2.1 Safety symbols

DANGER

This symbol alerts you to a dangerous situation. Failure to avoid this situation will result in serious or fatal injury.

WARNING

This symbol alerts you to a potentially dangerous situation. Failure to avoid this situation can result in serious or fatal injury.

CAUTION

This symbol alerts you to a potentially dangerous situation. Failure to avoid this situation can result in minor or medium injury.

NOTICE

This symbol alerts you to a potentially harmful situation. Failure to avoid this situation can result in damage to the product or something in its vicinity.

1.2.2 Symbols for certain types of information

Symbol	Meaning	Symbol	Meaning
	Permitted Procedures, processes or actions that are permitted.		Preferred Procedures, processes or actions that are preferred.
	Forbidden Procedures, processes or actions that are forbidden.		Tip Indicates additional information.
	Reference to documentation		Reference to page
	Reference to graphic		Series of steps
	Result of a step		Visual inspection

1.2.3 Electrical symbols

	Direct current		Alternating current
	Direct current and alternating current		Ground connection A grounded terminal which, as far as the operator is concerned, is grounded via a grounding system.

1.2.4 Symbols in graphics

Symbol	Meaning	Symbol	Meaning
1, 2, 3, ...	Item numbers	1, 2, 3, ...	Series of steps
A, B, C, ...	Views	A-A, B-B, C-C, ...	Sections
	Hazardous area		Safe area (non-hazardous area)

2 Basic safety instructions

Safe and reliable operation of the device is only ensured if the Operating Instructions have been read and the safety instructions contained therein are observed.

2.1 Requirements for the personnel

The personnel must fulfill the following requirements for its tasks:

- ▶ Trained, qualified specialists must have a relevant qualification for this specific function and task.
- ▶ Are authorized by the plant owner/operator.
- ▶ Are familiar with federal/national regulations.
- ▶ Before starting work, read and understand the instructions in the manual and supplementary documentation as well as the certificates (depending on the application).
- ▶ Follow instructions and comply with basic conditions.

2.2 Intended use

The Batch Controller is a batching and dosing manager for metering any kind of fluid or mineral oil.

- The manufacturer is not liable for harm caused by improper or unintended use. The device must not be converted or modified in any way.
- The device may only be operated when installed.

2.3 Workplace safety

For work on and with the device:

- Wear the required personal protective equipment according to federal/national regulations.

2.4 Operational safety

Damage to the device!

- Operate the device in proper technical condition and fail-safe condition only.
- The operator is responsible for the interference-free operation of the device.

2.5 Product safety

This product is designed in accordance with good engineering practice to meet state-of-the-art safety requirements and has been tested and left the factory in a condition in which it is safe to operate.

3 Incoming acceptance and product identification

3.1 Incoming acceptance

On receipt of the delivery:

1. Check the packaging for damage.
 - ↳ Report all damage immediately to the manufacturer.
 - Do not install damaged components.
2. Check the scope of delivery using the delivery note.
3. Compare the data on the nameplate with the order specifications on the delivery note.
4. Check the technical documentation and all other necessary documents, e.g. certificates, to ensure they are complete.

 If one of the conditions is not satisfied, contact the manufacturer.

3.1.1 Product identification

The device can be identified in the following ways:

- Nameplate specifications
- Enter the serial number from the nameplate into *Device Viewer* (www.endress.com/deviceviewer): all the information about the device and an overview of the Technical Documentation supplied with the device are displayed.
- Enter the serial number from the nameplate into the *Endress+Hauser Operations App* or scan the 2-D matrix code (QR code) on the nameplate with the *Endress+Hauser Operations App*: all the information about the device and the technical documentation pertaining to the device is displayed.

Nameplate

Do you have the correct device?

The nameplate provides you with the following information on the device:

- Manufacturer identification, device designation
- Order code
- Extended order code
- Serial number
- Tag name (TAG) (optional)
- Technical values, e.g. supply voltage, current consumption, ambient temperature, communication-specific data (optional)
- Degree of protection
- Approvals with symbols
- Reference to Safety Instructions (XA) (optional)

- ▶ Compare the information on the nameplate with the order.

Name and address of manufacturer

Name of manufacturer:	Endress+Hauser Wetzer GmbH + Co. KG
Address of manufacturer:	Obere Wank 1, D-87484 Nesselwang or www.endress.com

3.1.2 Storage and transport

Storage temperature: -30 to +70 °C (-22 to +158 °F)

Maximum relative humidity 80 % for temperatures up to 31 °C (87.8 °F), decreasing linearly to 50 % relative humidity at 40 °C (104 °F).

 Pack the device for storage and transportation in such a way that it is reliably protected against impact and external influences. The original packaging provides optimum protection.

Avoid the following environmental influences during storage:

- Direct sunlight
- Proximity to hot objects
- Mechanical vibration
- Aggressive media

4 Installation

4.1 Installation conditions

With the appropriate accessories, the device with field housing is suitable for wall mounting, pipe mounting, panel mounting and DIN rail installation.

The orientation is determined by the readability of the display. Connections and outputs are fed out of the bottom of the device. The cables are connected via coded terminals.

Operating temperature range: -20 to +60 °C (-4 to +140 °F)

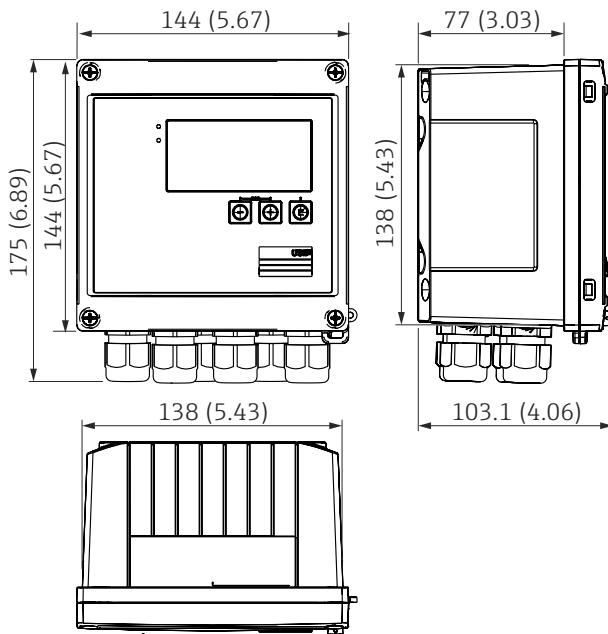
 For further information, see the "Technical data" section of the Operating Instructions.

NOTICE

Overheating of the device due to insufficient cooling

- Always ensure adequate cooling of the device to prevent heat accumulation. Operating the device in the upper temperature limit range decreases the operating life of the display.

4.2 Dimensions



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 1 Dimensions of the device in mm (in)

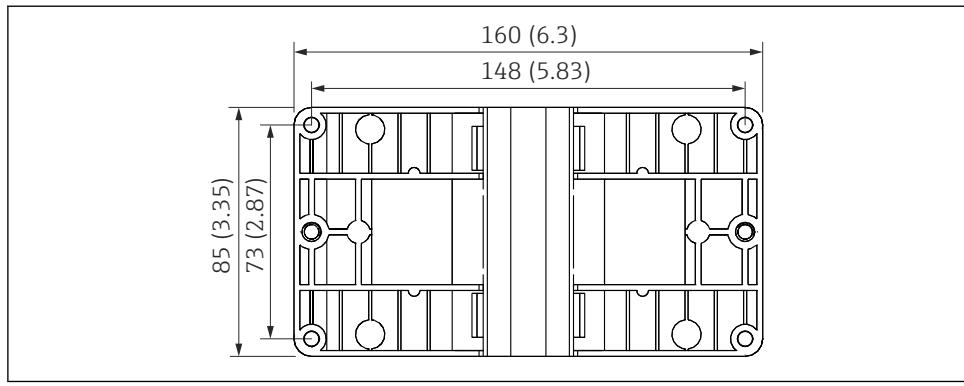


图 2 Dimensions of the mounting plate for wall, pipe and panel mounting in mm (in)

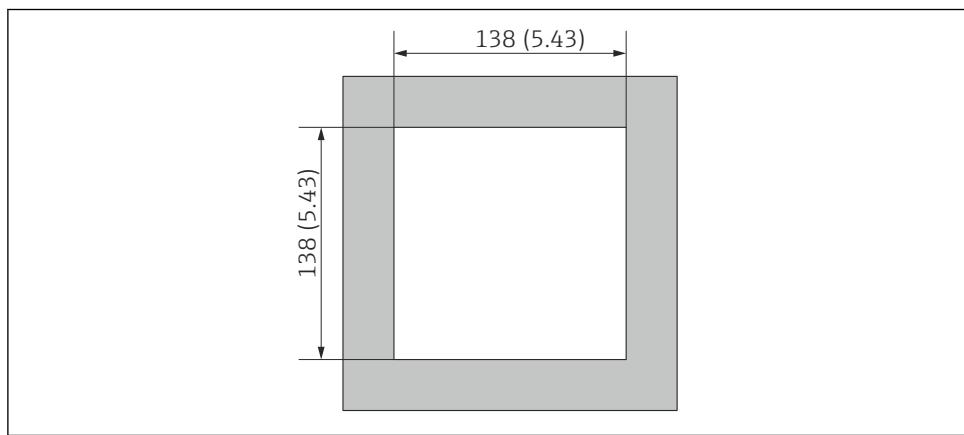
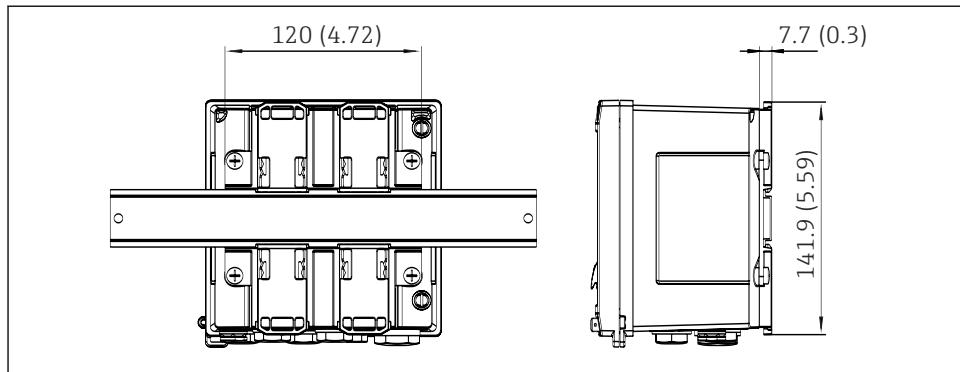


图 3 Dimensions of the panel cutout in mm (in)



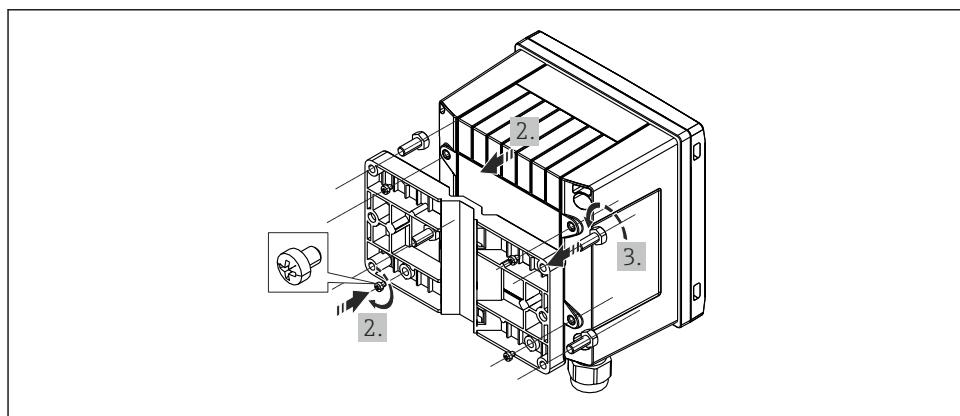
A0014610

4 Dimensions of DIN rail adapter in mm (in)

4.3 Installing the device

4.3.1 Wall mounting

1. Use the mounting plate as the template for drilled holes, dimensions → 2, 9
2. Attach the device to the mounting plate and fasten it in place from the rear using 4 screws.
3. Fasten the mounting plate to the wall using 4 screws.



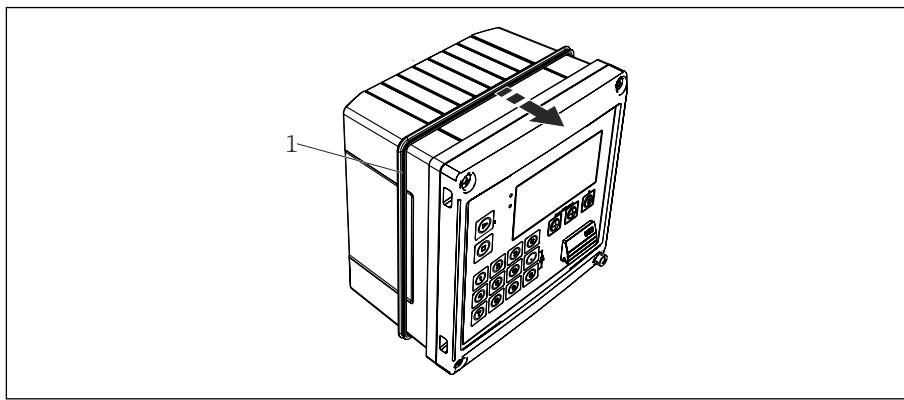
A0014170

5 Wall mounting

4.3.2 Panel mounting

1. Make the panel cutout in the required size, dimensions → 3, 9

2.

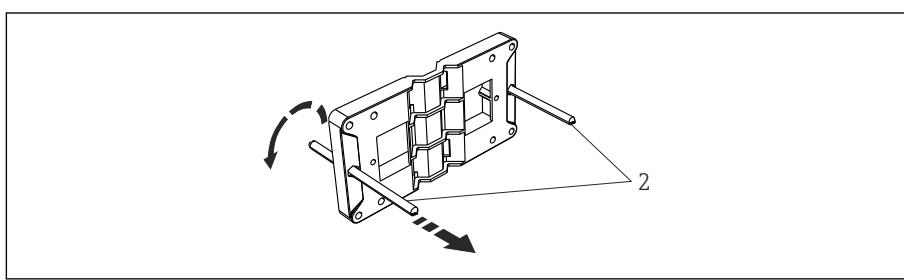


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6 Panel mounting

Attach the seal (item 1) to the housing.

3.



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7 Preparing the mounting plate for panel mounting

Screw the threaded rods (item 2) into the mounting plate (dimensions → **2**, **9**).

4.

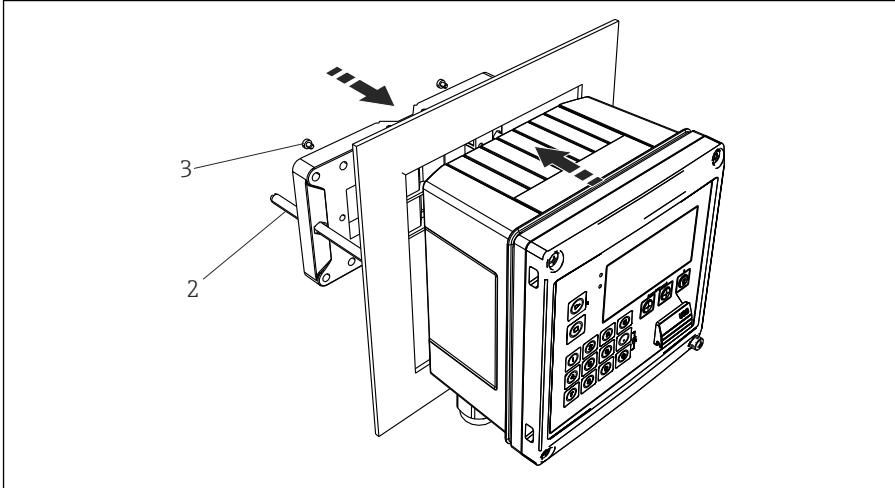


图 8 Panel mounting

Push the device into the panel cutout from the front and attach the mounting plate to the device from the rear using the 4 screws provided (item 3).

5. Fasten the device in place by tightening the threaded rods.

4.3.3 Support rail/DIN rail (as per EN 50 022)

1.

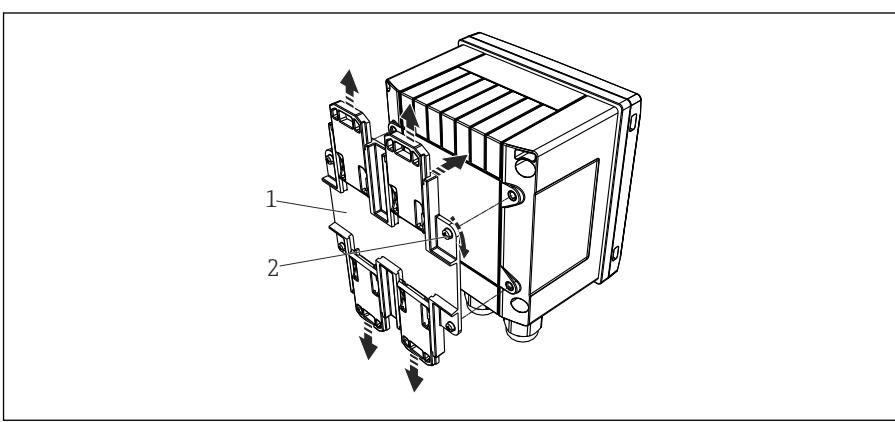
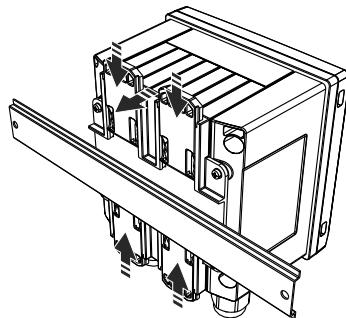


图 9 Preparing for DIN rail mounting

Fasten the DIN rail adapter (item 1) to the device using the screws provided (item 2) and open the DIN rail clips.

2.



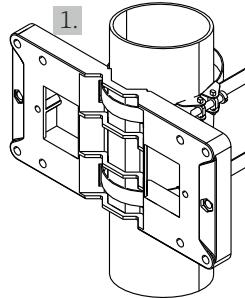
A0014177

 10 *DIN rail mounting*

Attach the device to the DIN rail from the front and close the DIN rail clips.

4.3.4 Pipe mounting

1.

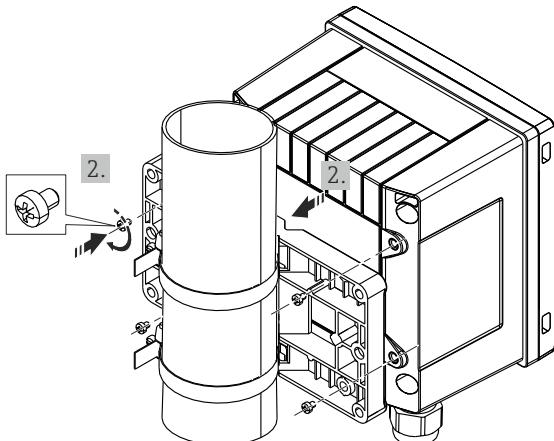


A0014178

 11 *Preparing for pipe mounting*

Pull the steel belts through the mounting plate (dimensions →  2,  9) and fasten them to the pipe.

2.



A0014179

12 Pipe mounting

Attach the device to the mounting plate and fasten it in place using the 4 screws provided.

4.4 Post-installation check

Perform the following checks after installing the device:

Device condition and specifications	Notes
Is the device undamaged?	Visual inspection
Is the seal undamaged?	Visual inspection
Is the device fixed securely to the wall or mounting plate?	-
Is the housing cover firmly mounted?	-
Do the ambient conditions match the device specification (e.g. ambient temperature, measuring range etc.)?	See "Technical data" section.

For installation of the Batch Controller and the associated temperature sensors, observe the general installation instructions according to EN 1434 Part 6.

5 Electrical connection

5.1 Connecting requirements

⚠ WARNING

Danger! Electric voltage

- The entire connection of the device must take place while the device is de-energized.

⚠ CAUTION

Pay attention to additional information provided

- Before commissioning the device, make sure that the supply voltage matches the voltage specifications on the nameplate.
- Provide a suitable switch or circuit breaker in building installation. This switch must be provided close to the device (within easy reach) and marked as a circuit breaker.
- An overcurrent protection element (rated current ≤ 10 A) is required for the power cable.

5.2 Connecting the device

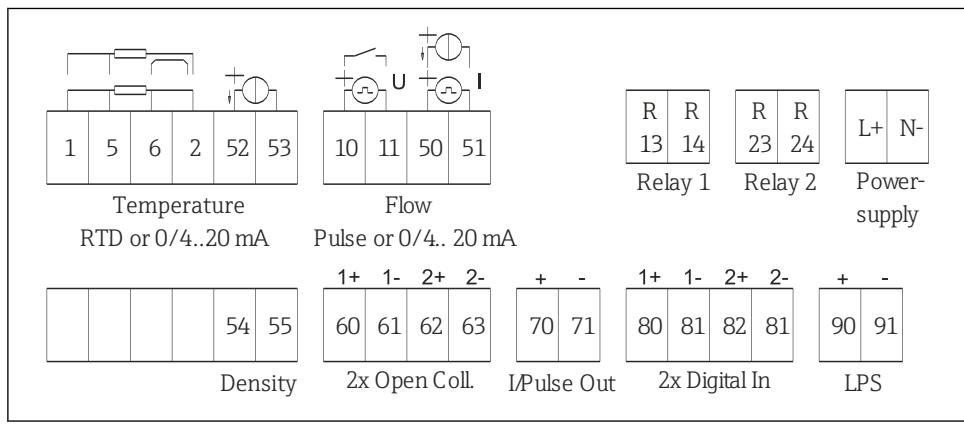


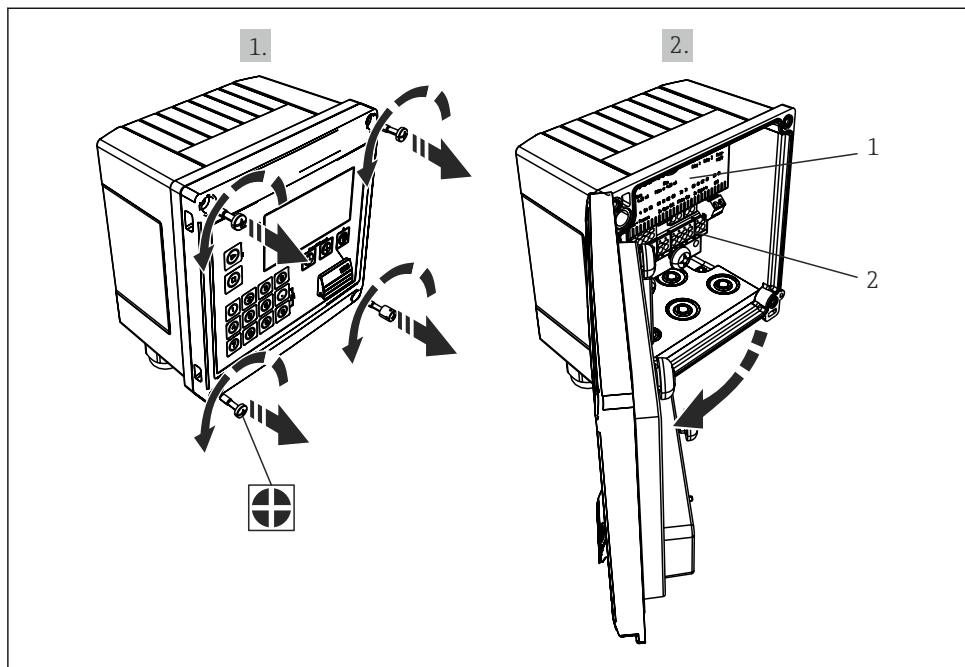
图 13 Connection diagram of the device

Terminal assignment

Terminal	Terminal assignment	Inputs
1	+ RTD power supply	Temperature of steam (Optionally RTD or current input)
2	- RTD power supply	
5	+ RTD sensor	
6	- RTD sensor	
52	+ 0/4 to 20 mA input	

53	Signal ground for 0/4 to 20 mA input	
54	+ 0/4 to 20 mA input	Density (current input)
55	Signal ground for 0/4 to 20 mA input	
10	+ pulse input (voltage or contact)	
11	- pulse input (voltage or contact)	Flow (Optionally pulse or current input)
50	+ 0/4 to 20 mA or current pulse (PFM)	
51	Signal ground for 0/4 to 20 mA input flow	
80	+ digital input 1 (switch input)	<ul style="list-style-type: none"> ■ Time synchronization ■ Start batch ■ Stop batch ■ Reset batch
81	- digital input (terminal 1)	
82	+ digital input 2 (switch input)	
81	- digital input (terminal 2)	
		Outputs
60	+ status/pulse output 1 (open collector)	Batch control: pump/valve, volume counter, signal batch ended, fault
61	- status/pulse output 1 (open collector)	
62	+ status/pulse output 2 (open collector)	
63	- status/pulse output 2 (open collector)	
70	+ 0/4 to 20 mA/pulse output	Current values (e.g. power) or counter values (e.g. energy)
71	- 0/4 to 20 mA/pulse output	
13	Relay 1 normally open (NO)	Batch control: pump/valve, fault
14	Relay 1 normally open (NO)	
23	Relay 2 normally open (NO)	
24	Relay 2 normally open (NO)	
90	24 V Sensor power supply (LPS)	24 V Power supply (e.g. for sensor power supply)
91	Power supply ground	
		Power supply
L/+	L for AC + for DC	
N/-	N for AC - for DC	

5.2.1 Open the housing



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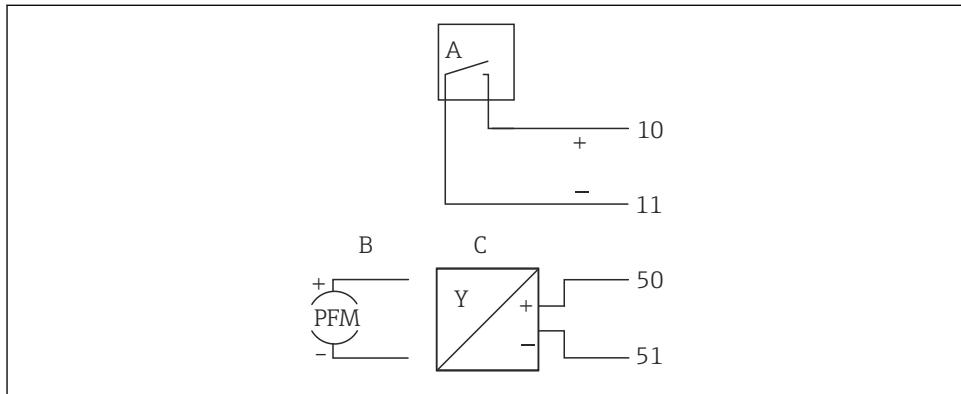
14 Opening the housing of the device

- 1 Terminal assignment labeling
- 2 Terminals

5.3 Connecting the sensors

5.3.1 Flow

Flow sensors with external power supply



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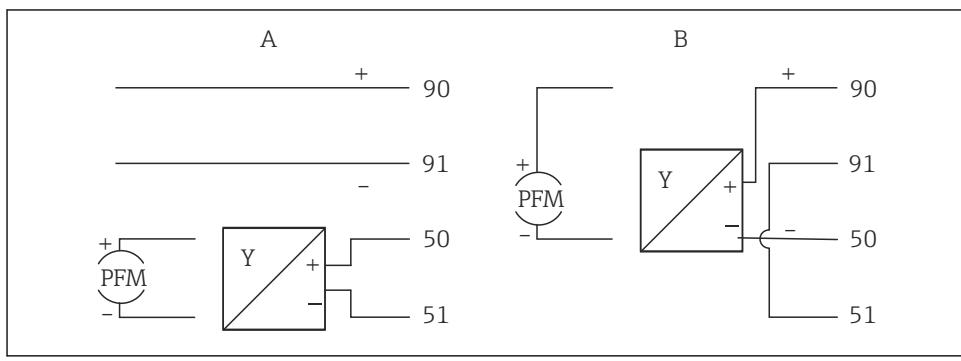
15 Connecting a flow sensor

A Voltage pulses or contact sensors including EN 1434 Type IB, IC, ID, IE

B Current pulses

C 0/4 to 20 mA signal

Flow sensors with power supply via the Batch Controller



A0014180

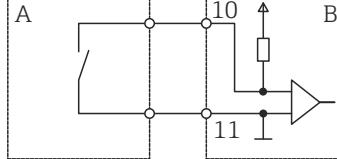
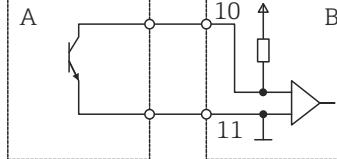
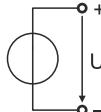
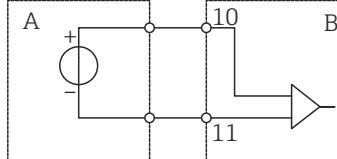
16 Connecting active flow sensors

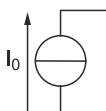
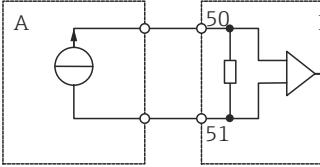
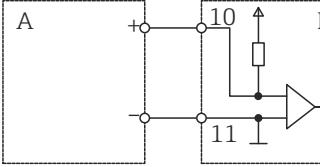
A 4-wire sensor

B 2-wire sensor

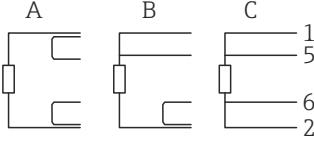
Settings for flow sensors with pulse output

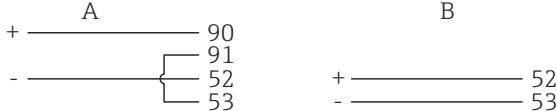
The input for voltage pulses and contact sensors is divided into different types according to EN 1434 and provides a supply for switching contacts.

Pulse output of the flow sensor	Setting at the Rx33	Electrical connection	Comment
Mechanical contact  A0015360	Pulse ID/IE up to 25 Hz	 A Sensor B Rx33 A0015354	As an alternative, it is possible to choose "Pulse IB/IC+U" up to 25 Hz. The current flow via the contact is then lower (approx. 0.05 mA instead of approx. 9 mA). Advantage: lower power consumption, disadvantage: less immunity to interference.
Open collector (NPN)  A0015361	Pulse ID/IE up to 25 Hz or up to 12.5 kHz	 A Sensor B Rx33 A0015355	As an alternative, it is possible to choose "Pulse IB/IC+U". The current flow via the transistor is then lower (approx. 0.05 mA instead of approx. 9 mA). Advantage: lower power consumption, disadvantage: less immunity to interference.
Active voltage  A0015362	Pulse IB/IC+U	 A Sensor B Rx33 A0015356	The switching threshold is between 1 V and 2 V

Pulse output of the flow sensor	Setting at the Rx33	Electrical connection	Comment
Active current  A0015363	Pulse I	 A Sensor B Rx33	The switching threshold is between 8 mA and 13 mA
Namur sensor (as per EN 60947-5-6)	Pulse ID/IE up to 25 Hz or up to 12.5 kHz	 A Sensor B Rx33	No monitoring for short circuit or line break takes place.

5.3.2 Temperature

Connecting the RTD sensors	 A = 2-wire connection B = 3-wire connection C = 4-wire connection Terminals 1, 2, 5, 6: temperature
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Temperature transmitter connection	 <p>A = without external power supply of the transmitter, B = with external power supply of the transmitter Terminals 90, 91: transmitter power supply Terminals 52, 53: temperature input</p> <p style="text-align: right;">A0047822</p>
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i To ensure the highest level of accuracy, we recommend using the RTD 4-wire connection, as this compensates for measurement errors caused by the mounting location of the sensors or the line length of the connecting cables.

5.3.3 Density

Density sensor connection	 <p>A = without external power supply of the density sensor B = with external power supply of the density sensor</p> <p style="text-align: right;">A0015152</p>
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5.4 Outputs

5.4.1 Analog output (active)

This output can be used either as a 0/4 to 20 mA current output or as a voltage pulse output. The output is galvanically isolated. Terminal assignment, →  15.

5.4.2 Pulse output (active)

Voltage level:

- 0 to 2 V corresponds to Low level
- 15 to 20 V corresponds to High level

Maximum output current: 22 mA

5.4.3 Open collector output

The two digital outputs can be used as status or pulse outputs. Make the selection in the following menus **Setup** → **Advanced setup** or **Expert** → **Outputs** → **Open collector**

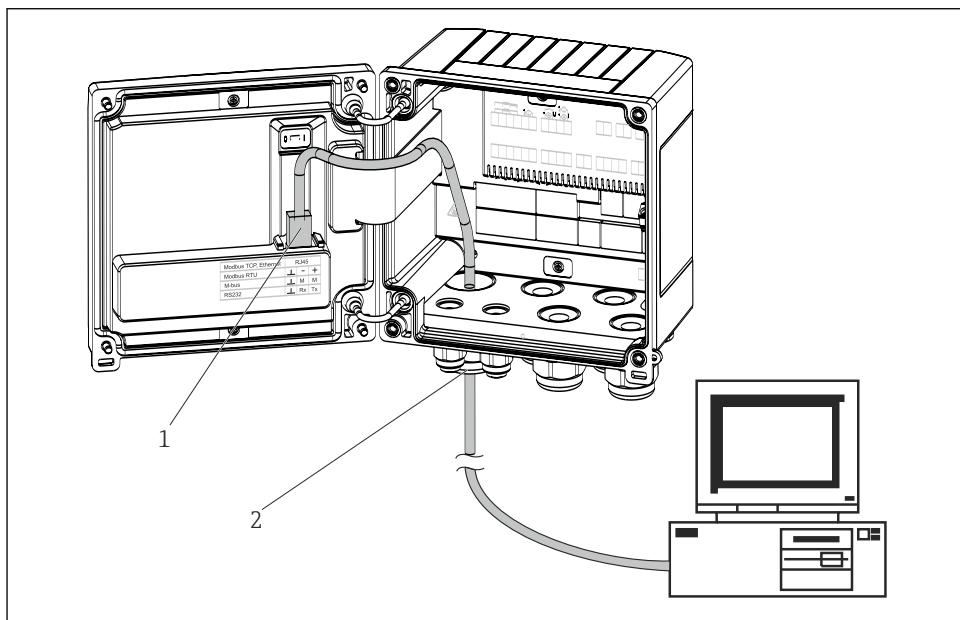
5.5 Communication

i The USB interface is always active and can be used independently of other interfaces. Parallel operation of multiple optional interfaces, e.g. fieldbus and Ethernet, is not possible.

5.5.1 Ethernet TCP/IP (optional)

The Ethernet interface is galvanically isolated (test voltage: 500 V). A standard patch cable (e.g. CAT5E) can be used to connect the Ethernet interface. A special cable gland is available for this purpose which allows users to guide pre-terminated cables through the housing. Via the Ethernet interface, the device can be connected using a hub or a switch or directly to office equipment.

- Standard: 10/100 Base T/TX (IEEE 802.3)
- Socket: RJ-45
- Max. cable length: 100 m



17 Connection of Ethernet TCP/IP, Modbus TCP

1 Ethernet, RJ45

2 Cable entry for Ethernet cable

5.5.2 Modbus TCP (optional)

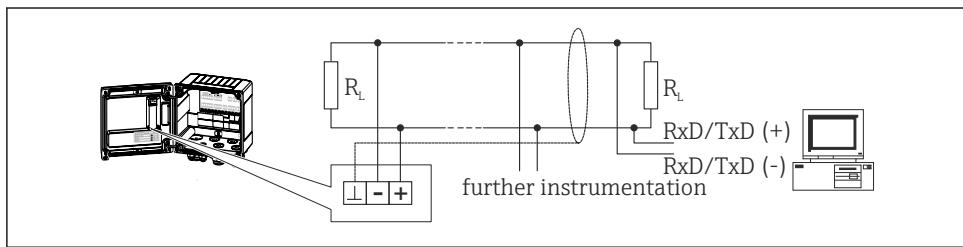
The Modbus TCP interface is used to connect the device to higher-order systems to transmit all measured values and process values. The Modbus TCP interface is physically identical to the Ethernet interface → 17, 22

 The device can only be read by a Modbus master.

 Detailed information for Modbus register assignment: www.endress.com

5.5.3 Modbus RTU (optional)

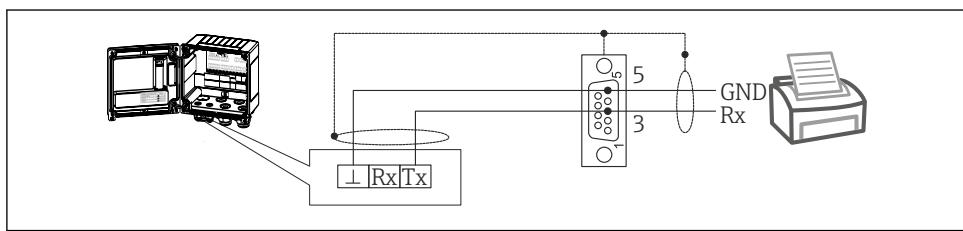
The Modbus RTU (RS-485) interface is galvanically isolated (test voltage: 500 V) and used to connect the device to higher-level systems to transmit all measured values and process values. The connection is made via a 3-pole pluggable terminal in the housing cover.



■ 18 Connection of Modbus RTU

5.5.4 Printer interface/RS232 (optional)

The printer/RS232 interface is galvanically isolated (test voltage: 500 V) and is used to connect a printer. The connection is made via a 3-pole pluggable terminal in the housing cover.



■ 19 Printer connection via RS232

The following printers have been tested with the Batch Controller:

GeBE MULDE Mini thermal printer

5.6 Post-connection check

Perform the following checks after completing electrical installation of the device:

Device conditions and specifications	Notes
Is the device or cable damaged (visual inspection)?	-
Electrical connection	Notes

Does the supply voltage match the information on the nameplate?	100 to 230 V AC/DC ($\pm 10\%$) (50/60 Hz) 24 V DC (-50% / $+75\%$) 24 V AC ($\pm 50\%$) 50/60 Hz
Are the mounted cables strain-relieved?	-
Are the power supply and signal cables connected correctly?	See wiring diagram on the housing

6 Operation options

6.1 Overview of operation options

The device can be configured using operating keys or with the help of the "FieldCare" operating software.

The operating software, including interface cable, is available as an order option.

Parameter configuration is locked if the device is locked by the write protection switch
→  27 or the user code.

 For details, see "Access protection" in the "Commissioning" section of the Operating Instructions.

6.2 Structure and function of the operating menu

A complete overview of the operating matrix, incl. all of the configurable parameters, can be found in the appendix of the Operating Instructions.

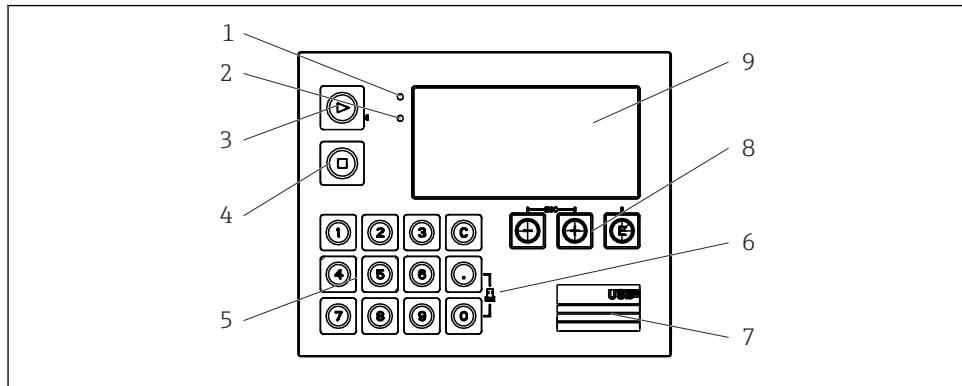
Language	Picklist with all available operating languages. Select the language of the device.
Display/operation menu	<ul style="list-style-type: none"> ▪ Select the group for display (alternate automatically or fixed display group) ▪ Configure brightness and contrast of display ▪ Display saved analyses and batch reports ▪ Enter a value for the preset counter ▪ Recipe selection
Setup menu	The parameters for quick commissioning of the device can be configured in this setup. The advanced setup contains all of the essential parameters for configuring the device function.

	<ul style="list-style-type: none">■ Units■ Signal type■ Pulse value, value (for pulse signal type) or■ Start of measuring range (for current signal type)■ End of measuring range (for current signal type)■ Unit■ Counter unit■ Date and time <p>Advanced setup (settings that are not essential for basic operation of the device)</p> <p>Special settings can also be configured via the "Expert" menu.</p>	Parameters for quick commissioning
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Diagnostics menu	Device information and service functions for a quick device check <ul style="list-style-type: none">■ Diagnostic messages and list■ Event logbook■ Device information■ Simulation■ Measured values, outputs
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Expert menu	<p>The Expert menu provides access to all of the operating positions of the device, including fine-tuning and service functions.</p> <ul style="list-style-type: none">■ Skip directly to the parameter via Direct Access (on device only)■ Service code to display service parameters (via PC operating software only)■ System (settings)■ Inputs■ Outputs■ Application■ Diagnostic
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6.3 Display and operating elements



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20 Display and operating elements of the device

- 1 Green LED, "Operation"
- 2 Red LED, "Fault message"
- 3 Start (function key)
- 4 Stop (function key)
- 5 Numeric keyboard (function key)
- 6 Start printout (function key)
- 7 USB connection for configuration (interface)
- 8 -, +, E (operating keys)
- 9 160x80 dot-matrix display

i Green LED if voltage present, red LED in the event of an alarm/error. Green LED is always lit once the device is supplied with power.

Red LED flashing slowly (approx. 0.5 Hz): The device has been set to the bootloader mode.

Red LED flashing quickly (approx. 2 Hz): In normal operation: maintenance required. During firmware update: data transmission in progress.

Red LED remains lit: Device error.

6.3.1 Operating elements

3 operating keys, "-", "+", "E"

Esc/Back function: Press "-" and "+" simultaneously.

Enter/Confirm entry function: Press "E"

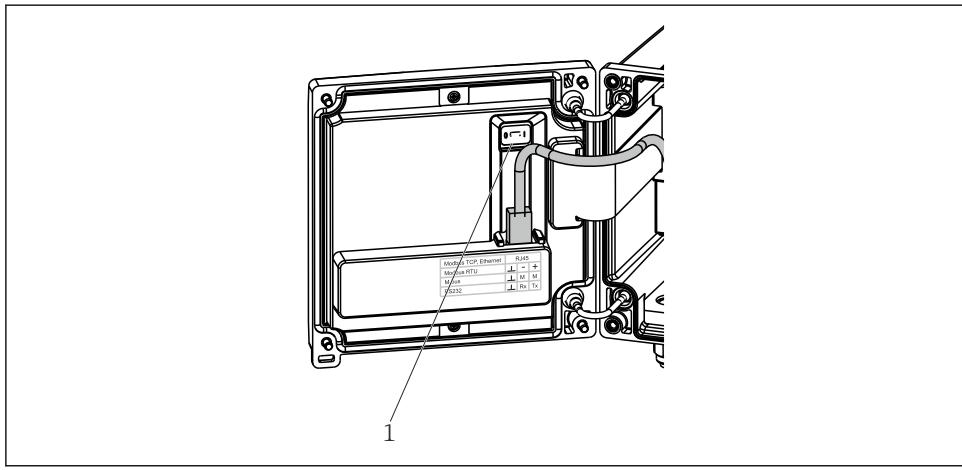
14 function keys

Start / stop function: Press "Start" to start a batching process. Press "Stop" to pause the batch that is currently running. Press "Stop" again to cancel the batch, press "Start" again to resume the batch run.

Function C: Press "C" when a batch is stopped to reset the counters on the display to their initial values.

Print function: Press "0" and "." simultaneously to initiate a printout for the last batch run. To avail of this functionality, the "RS232 printer interface" option must be purchased.

Write protection switch



A0015168

21 Write protection switch

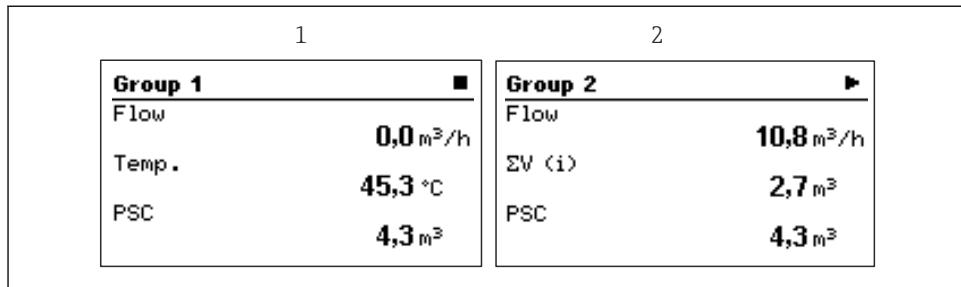
1 Write protection switch on rear of housing cover

6.3.2 Preset counter entry function

A value for the preset counter can be entered any time. This value can be entered either in the **Display** menu or by pressing one of the keys 0-9 or period. It does not matter whether a batching process is currently active when you enter the value. The new preset counter value is used when the next batching process is started.

i If the preset counter is part of a display group, the preset counter value which is valid for the current batch is always displayed. If the value is changed when the batching process is stopped, the new value appears immediately on the display. However, if the value is changed during an active batching operation, the old value of the preset counter, which still applies for the current batch run, is displayed until this batching operation is finished. The new value, which is valid for the next batching operation, is displayed directly afterwards.

6.3.3 Display



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22 Display of the Batch Controller (example)

- 1 Display group 1, no batch active. Flow, temperature, preset counter
- 2 Display group 2, batch active. Flow, volume counter, preset counter

6.4 Access to the operating menu via "FieldCare Device Setup"

To configure the device using the FieldCare Device Setup software, connect the device to your PC via the USB interface.

Establishing the connection

1. Start FieldCare.
2. Connect the device to the PC via USB.
3. Create project in File/New menu.
4. Select Communication DTM (CDI Communication USB).
5. Add device EngyCal RA33.
6. Click Connect.
7. Start parameter configuration.

Continue with device configuration in accordance with the Operating Instructions for the device. The complete Setup menu, i.e. all of the parameters listed in these Operating Instructions, can also be found in the FieldCare Device Setup.

NOTICE

Undefined switching of outputs and relays

► During configuration with FieldCare, the device may assume undefined statuses! This may result in the undefined switching of outputs and relays.

7 Commissioning

7.1 Post-installation check

Perform the following checks prior to commissioning the device:

- See "Post-installation check" section, → [14](#).
- Post-connection check using the checklist in the "Post-connection check" section, → [23](#).

7.2 Switching on the device

After the operating voltage is applied, the display and the green LED are illuminated. The device is now operational and can be configured via the keys or the "FieldCare" parameterization software.



Remove the protective film from the device as this would otherwise affect the readability of the display.

7.3 Quick commissioning

For quick commissioning of the "standard" Batch Controller application, only a few operating parameters must be entered in the **Setup** menu.

Prerequisites for quick commissioning:

RTD temperature sensor, 4-wire direct connection

Menu/setup

- **Units:** Select unit type (SI/US)
- **Signal type:** Select the signal type for the flow (pulse or current)
- **Unit:** Select the flow unit
- **Unit counter:** Define the unit for the flow counter, e.g. m³, kg
- **Pulse value, value:** Enter the unit and value of the pulse value for the flow transmitter (for the pulse signal type)
- **Start of measuring range** and **end of measuring range** (for the current signal type)
- **Date/time:** Set the date and time

The device is now operational and ready to control batches.

The device functions – such as data logging, tariff function, bus integration, and scaling of current inputs for flow or temperature are configured in the **Advanced setup** or **Expert** menu.



For further details on commissioning, see the Operating Instructions.

8 Maintenance

No special maintenance work is required for the device.

8.1 Cleaning

A clean, dry cloth can be used to clean the device.



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