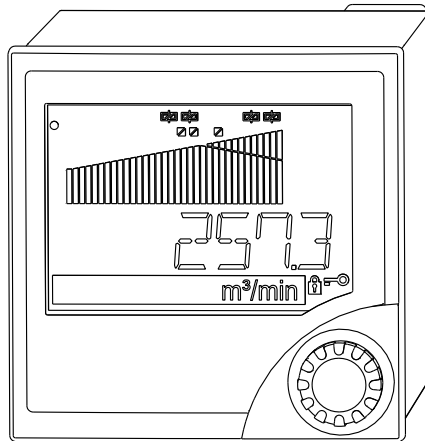


# Brief Operating Instructions

## RIA452

Process indicator  
with pump control



These Instructions are Brief Operating Instructions; they are not a substitute for the Operating Instructions pertaining to the device.

For detailed information, refer to the Operating Instructions and other documentation.

Available for all device versions via:

- Internet: [www.endress.com/deviceviewer](http://www.endress.com/deviceviewer)
- Smart phone/Tablet: Endress+Hauser Operations App



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## 1 About this document

### 1.1 Document conventions

#### 1.1.1 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 dangerous situation. Failure to avoid this situation can result in serious or fatal injury.





**⚠ CAUTION**


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

**NOTICE**











This symbol contains information on procedures and other facts which do not result in personal injury.

**1.1.2 Electrical symbols**




Symbol	Meaning	Symbol	Meaning
	Direct current		Alternating current
	Direct current and alternating current		<b>Ground connection</b> A grounded terminal which, as far as the operator is concerned, is grounded via a grounding system.

Symbol	Meaning
	<b>Protective Earth (PE)</b> A terminal which must be connected to ground prior to establishing any other connections.  The ground terminals are situated inside and outside the device: <ul style="list-style-type: none"> <li>▪ Inner ground terminal: Connects the protective earth to the mains supply.</li> <li>▪ Outer ground terminal: Connects the device to the plant grounding system.</li> </ul>

**1.1.3 Symbols for certain types of information**

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

### 1.1.4 Symbols in graphics

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

### 1.1.5 Registered trademarks

#### HART®

Registered trademark of the HART Communication Foundation, Austin, USA

#### Applicator®, FieldCare®, Field Xpert™, HistoROM®

Registered or registration-pending trademarks of the Endress+Hauser Group

## 2 Safety instructions

### 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 Designated use

The process indicator evaluates analog process variables and displays them on its multicolored screen. Processes can be monitored and controlled with the indicator's outputs and limit relays. The device is equipped with a wide array of software functions for this purpose. Power can be supplied to 2-wire sensors with the integrated transmitter power supply.

- The device is seen as an associated apparatus and may not be installed in hazardous areas.
- The manufacturer accepts no liability for damages resulting from incorrect use or use other than that designated. It is not permitted to convert or modify the device in any way.
- The device is designed for installation in a panel and must only be operated in an installed state.

### 2.3 Operational safety

Risk of injury!

- ▶ Operate the device only if it is in proper technical condition, free from errors and faults.

- The operator is responsible for interference-free operation of the device.

## 2.4 Product safety

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

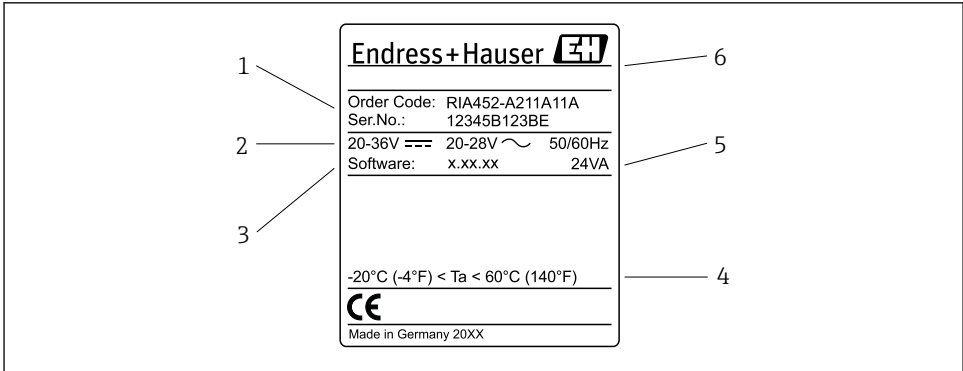
It meets general safety standards and legal requirements. It also complies with the EC directives listed in the device-specific EC Declaration of Conformity. The manufacturer confirms this by affixing the CE mark to the device.

# 3 Incoming acceptance and product identification

## 3.1 Product identification

### 3.1.1 Nameplate

Compare the nameplate on the device with the following diagram:



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#### 1 Nameplate of the process indicator (example)

- 1 Order code and serial number of the device
- 2 Power supply
- 3 Software version number
- 4 Ambient temperature
- 5 Power
- 6 Name and address of manufacturer

### 3.1.2 Name and address of manufacturer

<b>Name of manufacturer:</b>	Endress+Hauser Wetzler GmbH + Co. KG
<b>Address of manufacturer:</b>	Obere Wank 1, D-87484 Nesselwang or <a href="http://www.endress.com">www.endress.com</a>

## 3.2 Scope of delivery

The scope of delivery of the process indicator comprises:

- Process indicator for panel mounting
- Multilingual Brief Operating Instructions as hard copy
- CD-ROM with PC configuration software and RS232 interface cable (optional)
- Fastening clips
- Sealing ring



Please note the device accessories in the "Accessories" section of the Operating Instructions.

## 3.3 Storage and transport

### Storage temperature

-30 to +70 °C (-22 to +158 °F)

# 4 Certificates and approvals

## 4.1 CE mark



The product meets the requirements of the harmonized European standards. As such, it complies with the legal specifications of the EC directives. The manufacturer confirms successful testing of the product by affixing to it the CE-mark.

# 5 Installation

## 5.1 Installation conditions

The permitted ambient conditions must be observed during installation and operation (see the "Technical data" section of the Operating Instructions). The device must be protected from exposure to heat.

### 5.1.1 Installation dimensions

Required panel cutout 92 mm (3.62 in)x92 mm (3.62 in). Ensure an installation depth of 150 mm (5.91 in) for the device plus cable. For additional dimensions, see →  2,  8 and the "Technical data" section of the Operating Instructions.

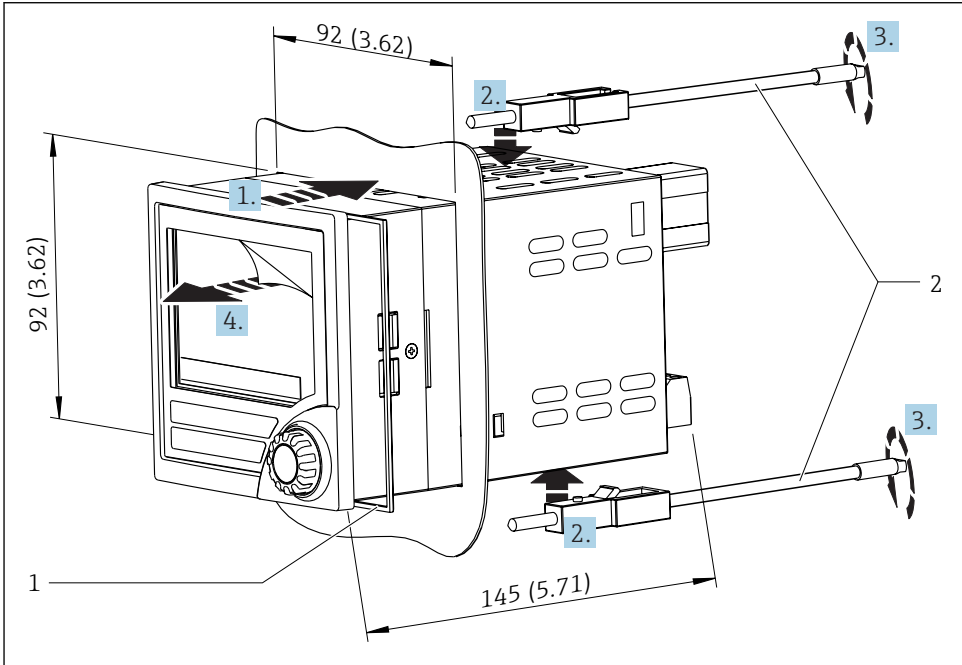
### 5.1.2 Mounting location

Installation in a panel. The mounting location must be free from vibrations. A suitable electrical, fire-proof and mechanical enclosure must be provided.

### 5.1.3 Orientation

Horizontal,  $\pm 45^\circ$  in every direction.

## 5.2 Mounting the indicator



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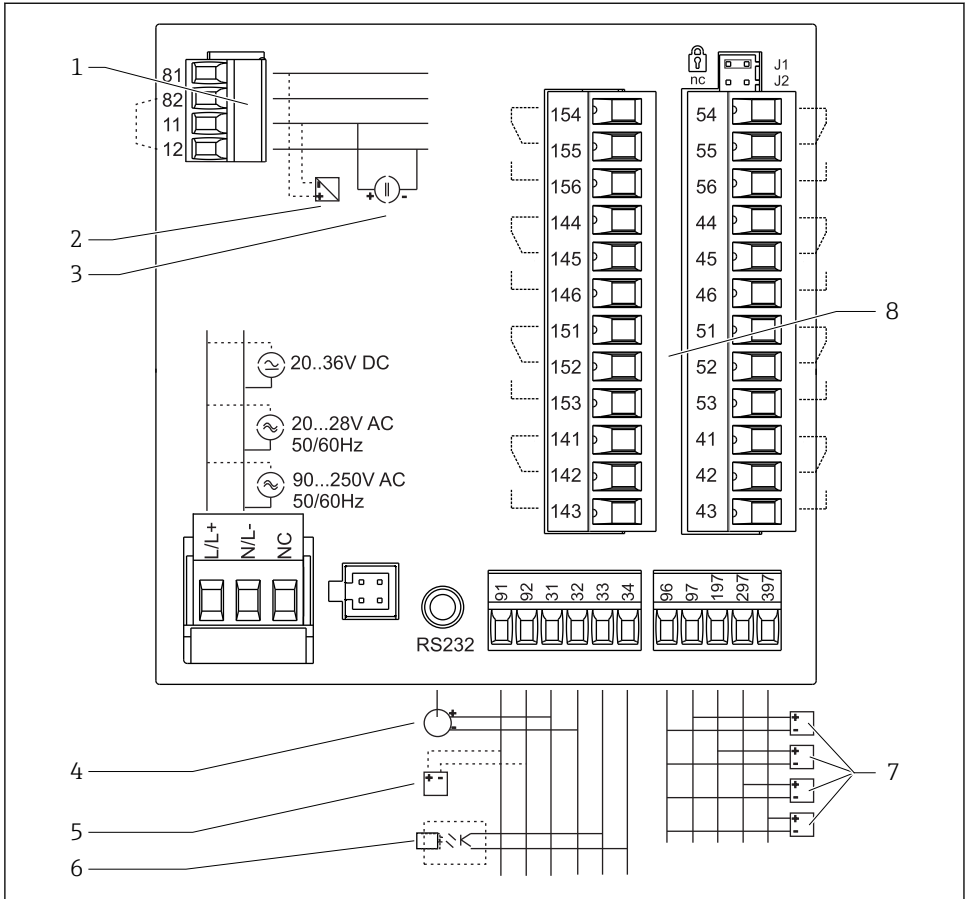
2 Installation in a panel

### Mounting the indicator

1. Push the device with the sealing ring (item 1) through the panel cutout from the front.
2. Hold the device level and clip the fastening clips (item 2) into the openings provided.
3. Tighten the screws of the fastening clips uniformly using a screwdriver.
4. Remove the protective foil from the display.



## 6 Electrical connection



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3 Terminal assignment of process indicator. Internal circuits illustrated as dotted lines.

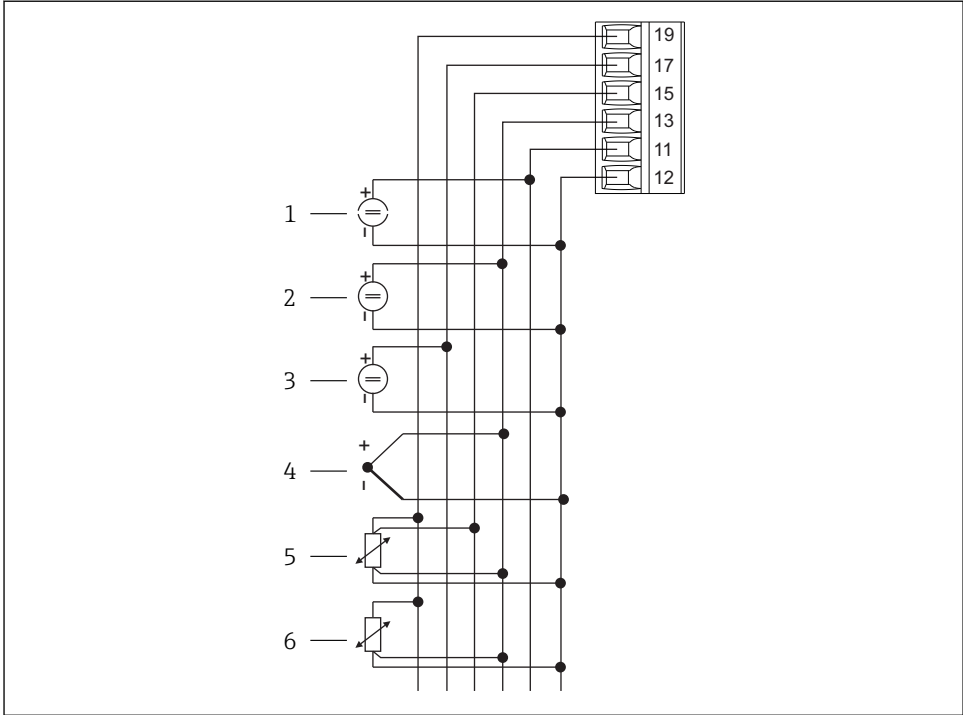
- |   |   |   |  |
|---|---|---|--|
| 1 | Current input, terminals 12 and 82 jumpered internally.         | 6 | Digital output, passive open collector, max. 28 V, 200 mA  |
| 2 | Current loop, transmitter power supply max. 22 mA current input | 7 | Digital inputs according to DIN 19240; voltage level: -3 to 5 V low, 12 to 30 V high, input current typ. 3 mA (with overload and polarity reversal protection), input voltage max. 34.5 V, scanning frequency max. 10 Hz |
| 3 | Current input 0 to 20 mA  | 8 | Relay output: relay 1-8; 250 V <sub>AC</sub> /30 V <sub>DC</sub> , 3 A   |
| 4 | Analog output 0 to 20 mA, 0 to 10 V <sub>DC</sub>               |   |  |
| 5 | Transmitter power supply, 24 V, ≤250 mA.                        |   |  |

Terminal	Terminal assignment	Description
L/L+	L for AC L+ for DC	Power connection
N/L-	N for AC L- for DC	
NC	Not connected	
J1	Jumper for locking device operation via hardware. If the jumper is set to J1, the setting cannot be modified.	The device can always be configured with the PC software via RS232 even if the jumper is set to J1.
J2	Not connected	
11	+0/4 to 20 mA	Current input
12	Signal ground (current)	
81	24 V sensor power supply 1	Transmitter power supply (intrinsically safe if required)
82	Ground, sensor power supply 1	
41	Normally closed (NC)	Relay 1
42	Common (COM)	
43	Normally open (NO)	
51	Normally closed (NC)	Relay 2
52	Common (COM)	
53	Normally open (NO)	
44	Normally closed (NC)	Relay 3
45	Common (COM)	
46	Normally open (NO)	
54	Normally closed (NC)	Relay 4
55	Common (COM)	
56	Normally open (NO)	
141	Normally closed (NC)	Relay 5
142	Common (COM)	
143	Normally open (NO)	
151	Normally closed (NC)	Relay 6
152	Common (COM)	
153	Normally open (NO)	
144	Normally closed (NC)	Relay 7
145	Common (COM)	
146	Normally open (NO)	

Terminal	Terminal assignment	Description
154	Normally closed (NC)	Relay 8
155	Common (COM)	
156	Normally open (NO)	
96	Ground for digital status inputs	Digital inputs
97	+ digital status input 1	
197	+ digital status input 2	
297	+ digital status input 3	
397	+ digital status input 4	
31	+ analog output	Analog output (optional)
32	Ground, analog output	
33	+ digital output	Digital output (optional)
34	Ground, digital output	
91	24 V sensor power supply 2	Transmitter power supply
92	Ground, sensor power supply 2	

## 6.1 Universal input option

The device can be optionally equipped with a universal input instead of the current input.



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4 Universal input terminal assignment

- |   |                            |   |                      |
|---|----------------------------|---|----------------------|
| 1 | Current input 0/4 to 20 mA | 4 | Thermocouples        |
| 2 | Voltage input $\pm 1$ V    | 5 | RTD assembly, 4-wire |
| 3 | Voltage input $\pm 30$ V   | 6 | RTD assembly, 3-wire |

Terminal	Terminal assignment
11	+0/4 to 20 mA signal
12	Signal ground (current, voltage, temperature)
13	+1 V, + thermocouples, - RTD assembly signal (3/4-wire)
15	+ RTD assembly signal (4-wire)
17	+30 V
19	+ RTD assembly power supply (3/4-wire)

## 6.2 Connecting the process indicator

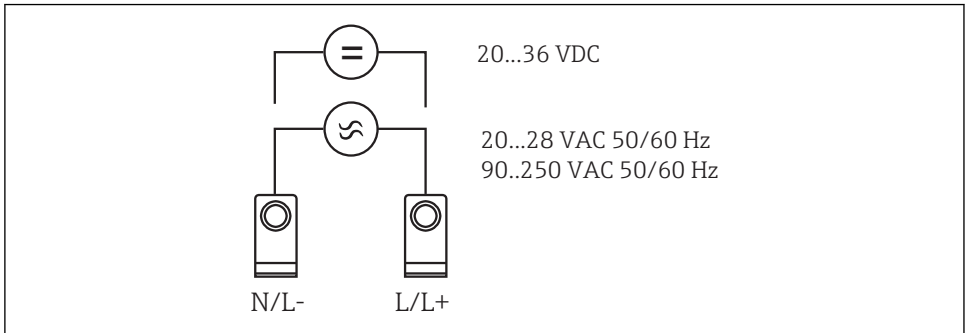
### **⚠ WARNING**

#### **Danger! Electric voltage!**


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

### 6.2.1 Power supply connection

- Before wiring the device, ensure that the supply voltage corresponds to the specification on the nameplate.
- For the 90 to 250 V<sub>AC</sub> version (mains connection), a switch marked as a circuit breaker, as well as an overload protection device (rated power ≤ 10 A) must be fitted in the supply line near the device (easy to reach).
- For version 20 to 35 V<sub>DC</sub> or 20 to 28 V<sub>AC</sub>: The device must be powered only by a power unit that operates using a limited energy circuit in accordance with UL/EN/IEC 61010-1, Section 9.4 and the requirements in Table 18.



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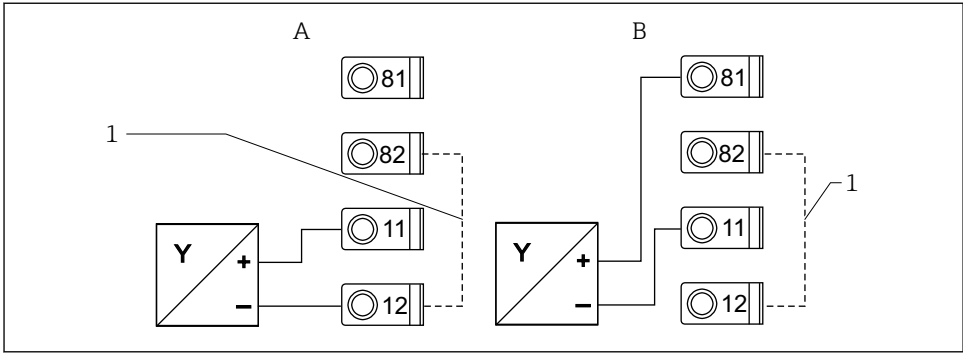
 5 Power supply connection

### 6.2.2 Connecting the external sensors



Active and passive sensors with analog, TC, resistance and RTD sensors can be connected to the device.

### Current input 0/4 to 20 mA

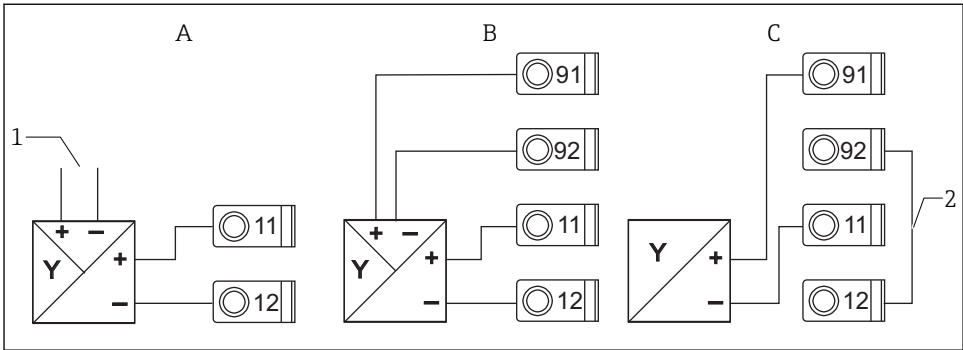


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6 Connection of 2-wire sensor to current input 0/4 to 20 mA

- A Active sensor
- B Passive sensor
- 1 Terminal 12 and 82 jumpered internally

### Universal input



A0031273

7 Connection of 4-wire sensor, transmitter power supply and universal input

- A Active sensor, 4-wire
- 1 Power supply
- B Passive sensor, 4-wire
- C Passive sensor, 2-wire
- 2 Terminal 12 and 92 jumpered externally


## 6.3 Post-connection check

Device condition and specification	Notes
Is the device or cable damaged (visual inspection)?	-

Electrical connection	Notes
Does the supply voltage match the information on the nameplate?	90 to 250 V <sub>AC</sub> (50/60 Hz) 20 to 36 V <sub>DC</sub> 20 to 28 V <sub>AC</sub> (50/60 Hz)
Are all of the terminals firmly engaged in their correct slots? Is the coding on the individual terminals correct?	-
Are the mounted cables strain-relieved?	-
Are the power supply and signal cables connected correctly?	See wiring diagram on the housing
Are all of the screw terminals well-tightened?	-

# 7 Operation options

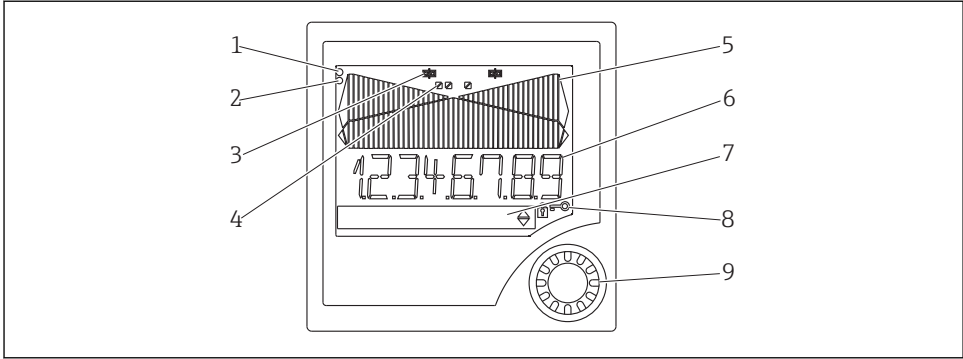
## 7.1 Overview of operation options

For detailed information on the operation and configuration of the device and for notes and a description of the individual functionalities, see the Operating Instructions →  BA00265R. An overview of all the operating parameters is provided in the Operating Instructions.

### 7.1.1 Display and operating elements



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




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**8** *Display and operating elements*

- 1 *Operational indicator, green, is lit when supply voltage is applied*
- 2 *Fault indicator, red, flashes in the event of a sensor or device error*
- 3 *Limit indicator: the symbol is displayed if a relay is energized.*
- 4 *Status of digital inputs: green indicates ready for operation, yellow indicates a signal is pending*
- 5 *Bar graph, yellow, 42-part, with overranging and underranging in orange/red*
- 6 *7-digit, 14-segment display, white for measured values*
- 7 *9x7 dot matrix display, white, for texts, units and menu icons*
- 8 *Key and padlock symbols, indicate whether device operation is locked (see Section 5.3.3)*
- 9 *Jog/shuttle dial for local display operation*

**7.1.2** **Display**

 For troubleshooting information, see the "Troubleshooting" section .



Range	Display	Relay	Analog output	Integration
Input current is below lower error limit	Display	Fault condition	Configured failure mode	No integration
Input current above lower error limit and below lower limit of validity	Display	Normal limit value behavior	Normal behavior with max. 10% overrange. No output < 0 mA/0 V possible	Normal behavior (negative integration not possible)
Input current in valid range	Display scaled measured value	Normal limit value behavior	Normal behavior with max. 10% overrange. No output < 0 mA/0 V possible	Normal behavior (negative integration not possible)
Input current below upper error limit and above upper limit of validity	Display	Normal limit value behavior	Normal behavior with max. 10% overrange. No output < 0 mA/0 V possible	Normal behavior (negative integration not possible)
Input current above upper error limit	Display	Fault condition	Configured failure mode	No integration



## Relay indicator

- Relay not energized: nothing indicated
- Relay energized:  (symbol is lit)

## Status display for digital inputs

- Digital input configured:  (green)
- Signal at digital input:  (yellow)

## 7.2 Structure and function of the operating menu

M1	<b>Analog input</b> INPUT	<b>Signal type</b>	<b>Connection type*</b>	<b>Curve</b>	<b>Signal damping</b>
		Signal type	Connection	Curve	Damp
		<b>Unit</b>	<b>Decimal point</b>	<b>0% value</b>	<b>100% value</b>
		Dimension	Dec. point	0% value	100% value
		<b>Offset</b>	<b>Comparison temp*</b>	<b>Fixed comparison temperature *</b>	<b>Cable open circuit detection</b>
		Offset	Comp. temp.	Const. temp.	Open circ.
M2	<b>Display</b> DISPLAY	<b>Assignment numeric display</b>	<b>Alternating measured value display</b>	<b>Bar graph assignment</b>	<b>Decimal point bar graph</b>
		Ref. num.	Displ. sw.	Ref. bargraph	Dec. point
		<b>Bar graph 0% value</b>	<b>Bar graph 100% value</b>	<b>Bar graph assignment</b>	
		Bar 0%	Bar 100%	Ref. bargraph	
M3	<b>Analog output*</b> ANALOG OUT	<b>Assignment</b>	<b>Damping</b>	<b>Output range</b>	<b>Decimal point</b>
		Ref. num.	Out damp	Out range	Dec. point
		<b>0% value</b>	<b>100% value</b>	<b>Offset</b>	<b>Output in event of error</b>
		Out 0%	Out 100%	Offset	Fail mode
		<b>Failure value</b>	<b>Simulation mA</b>	<b>Simulation volt</b>	
		Fail value	Simu mA	Simu V	
M5	<b>Digital input 1-4</b> DIGITAL INP	<b>Function digital input 1-4</b>	<b>Active level 1-4</b>	<b>Sampling duration pump monitoring</b>	
		Function	Level	Sampl. time	

M10- M17	<b>Limit 1-4 (8)*</b> LIMIT	<b>Assignment</b>	<b>Function 1-4 (8)</b>	<b>Decimal point</b>	<b>Switch point A</b>	<b>Switch point B</b>
		Ref. num	Function	Dec. point	Setpoint A	Setpoint B
		<b>Hysteresis or switch-back gradient</b>	<b>Switching delay 1-4 (8) in seconds</b>	<b>Alternating function 1-4</b>	<b>1st power-up after 24 h delayed by</b>	<b>1st power-up after 24 h switch-on duration</b>
		Hysteresis	Delay	Alternate	Sw. delay	Sw. period
		<b>Display the run time 1-8</b>	<b>Display the switching frequency 1-8</b>	<b>Reset the switching frequency and run time</b>	<b>Relay simulation</b>	
		Runtime	Count	Reset	Simu relay	
M18	<b>Integration*</b> Integration	<b>Signal source for integration</b>	<b>Preset counter</b>	<b>Integration base</b>	<b>Decimal point factor</b>	<b>Conversion factor</b>
		Ref. Integr.	Pre-counter	Integr. base	Dec. factor	Factor
		<b>Dimension totalizer</b>	<b>Decimal point totalizer</b>	<b>Set preset counter</b>	<b>Set preliminary alarm</b>	<b>Display totalizer</b>
		Dimension	Dec. point T	Set count A	Set count B	Totalizer
		<b>Reset totalizer</b>	<b>Flow calculation</b>	<b>Dimension input signal</b>	<b>Dimension of linearized value</b>	<b>Decimal point for formula</b>
		Reset total	Calc flow	Dim. Input	Dim. flow	Dec. flow
		<b>Decimal point for display</b>	<b>Alpha value</b>	<b>Beta value</b>	<b>Gamma value</b>	<b>C value</b>
		Dec. point	Alpha	Beta	Gamma	C
		<b>Khafagi-Venturi flumes</b>	<b>Iso-Venturi flumes</b>	<b>Venturi flumes as per British Standard</b>	<b>Parshall flumes</b>	<b>Parshall-Bowlus flumes</b>
		Kha Venturi	Iso-Venturi	BST-Venturi	Parshall	Parshall-Bow
<b>Rectangular weirs</b>	<b>Rectangular weirs with constriction</b>	<b>Rectangular weirs as per NFX</b>	<b>Rectangular weirs as per NFX with constriction</b>	<b>Trapezoidal weirs</b>		
Rect. WTO	Rect. WThr	NFX Rect. WTO	NFX Rect. WThr	Trap. WTO		
<b>Triangular weirs</b>	<b>Triangular weirs as per British Standard</b>	<b>Triangular weirs as per NFX</b>	<b>Width</b>			

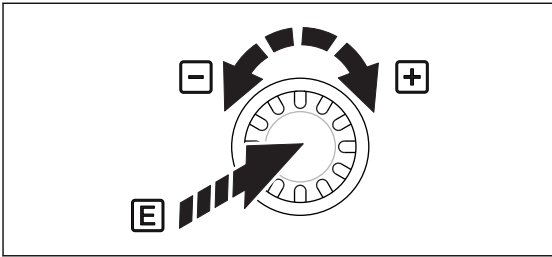
		V. weir	BST V. weir	NFX V. weir	width	
M19	<b>Pulse output*</b> PULSE OUT	<b>Decimal point pulse value</b> Dec value	<b>Pulse value</b> Unit value	<b>Pulse width</b> Pulse width	<b>Pulse output simulation</b> Sim pulseout	
M20	<b>Min/Max memory</b> MIN/MAX	<b>Signal source for Min/ Max</b> Ref. Min/Max	<b>Decimal point</b> Dec. point	<b>Display minimum value</b> Min. value		
		<b>Display maximum value</b> Max. value	<b>Reset minimum value</b> Reset min	<b>Reset maximum value</b> Reset max		
M21	<b>Linearization table</b> LIN-TABLE	<b>Number of points</b> Counts	<b>Dimension of linearized value</b> Dimension	<b>Decimal point Y-axis</b> Dec. Y value	<b>Delete all linearization points</b> Del points	<b>Show all linearization points</b> Show points
M23- Mxx	<b>Lin. points</b> NO 01 NO 32	<b>X-axis</b> X value	<b>Y-axis</b> Y value			
M55	<b>Operating parameters</b> PARAMETERS	<b>Operator code</b> User code	<b>Limit value locking</b> Limit lock	<b>Program name</b> Prog. name	<b>Program version</b> Version	<b>Function pump rotation</b> Func. alt.
		<b>Relay lock time</b> Lock time	<b>Relay failure mode</b> Rel. mode	<b>Time for gradient evaluation</b> Grad. time	<b>Failure mode at 4-20 mA input</b> Namur	<b>Error limit 1</b> Range 1
		<b>Error limit 2</b> Range 2	<b>Error limit 3</b> Range 3	<b>Error limit 4</b> Range 4	<b>Display contrast</b> Contrast	
M56	SERVICE	Only for Service staff. The Service code must be entered.				
M57	EXIT	Exit the menu. If you have changed parameters, a message appears asking you whether the changes should be saved.				
M58	SAVE	Changes are saved and the menu is exited.				
*) Only available if the corresponding option is installed in the device						

### 7.3 Access to the operating menu via the local display

The operating menu is activated by pressing the jog/shuttle dial for at least 3 seconds.

### 7.3.1 Operation via the jog/shuttle dial

#### A) 3-key function

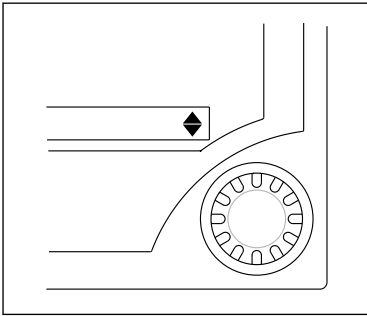


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- Press = "Enter"
- Turn clockwise = "+"
- Turn counterclockwise = "-"

9 Operation via jog/shuttle dial

#### B) List selection

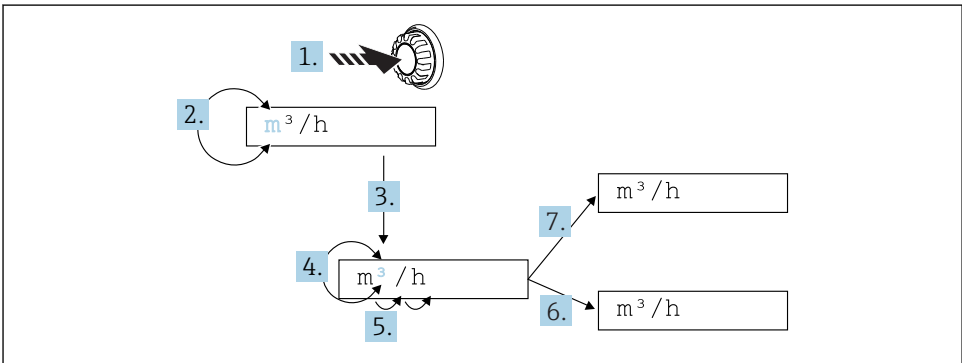


A0031353

- ▼ Arrow points down:  
Selection is at the start of the picklist. Turning the jog/shuttle dial to the right displays additional entries.
- ▲ Both arrows are visible:  
▼ User is in the middle of the picklist.
- ▲ Arrow points up:  
End of picklist has been reached. By turning the jog/shuttle dial to the left, the user starts moving to the top of the list.

10 List selection via jog/shuttle dial

### 7.3.2 Entering text



A0031359

11 Entering text at the process indicator

1. Press and hold the jog/shuttle dial for at least 3 s.
  - ↳ The first character starts flashing.
2. To change the character, turn the dial to the left or right.
3. Press the jog/shuttle dial briefly.
  - ↳ Characters are accepted and the next character flashes.
4. To change the character, turn the dial to the left or right. Select the "<" character to return to the previous character.
5. Press the jog/shuttle dial briefly.
  - ↳ Characters are accepted and the next character flashes.
6. Set/change all the characters in this way. Once you have set the last character, press the jog/shuttle dial briefly.
  - ↳ The entry is accepted.
7. Alternatively, press and hold the jog/shuttle dial at any point for longer than 1 s and then release.
  - ↳ The entry is rejected.

### Possible characters

Text can be entered using the following characters:

Space

+ABCDEFGHIJKLMNPOQRSTUVWXYZabcdefghijklmnopqrstuvwxyz0123456789/!%  
 \*23+-,:;\*( )< (return symbol)



### 7.3.3 Locking the configuration

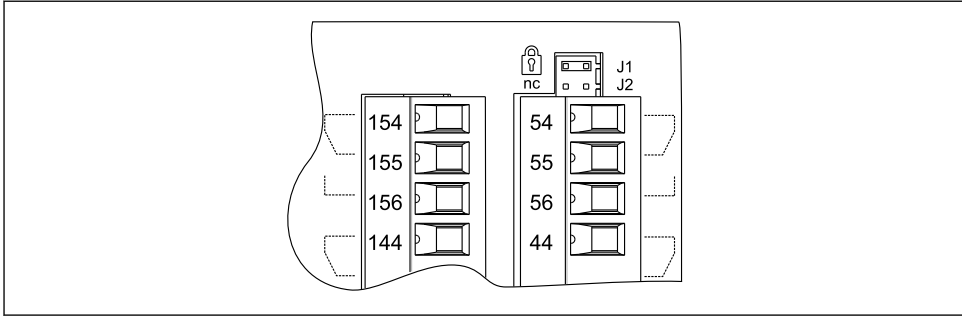
#### User code

The configuration can be locked against unauthorized access by entering a four-digit code. This code is defined in item 55 "Parameter/User Code". All the operating parameters remain visible but can only be modified by first entering the user code. The "Key" symbol appears on the display.

If the limit values are also to be locked, set the "Limit Code" to "On" in menu item 55. Limit values can then only be changed after entering the user code. If the limit code is set to "Off", limit values can be changed without entering the user code. All other parameters are locked, however.


#### Hardware locking

Configuration can also be locked using a plug on the back of the device (→  12,  22). This locking is indicated by a "padlock" symbol on the display. For hardware device locking, set the jumper in the top right-hand corner on the back to position J1.



A0031364

 12 Position of the jumper on the back of the device

 Hardware locking does not affect the PC operating software.

## 8 Commissioning

### 8.1 Function check

Make sure that all post-connection checks have been carried out before you commission your device:

Checklist connection check →  15


 Remove the protective strip from the display as this restricts display legibility otherwise.

### 8.2 Switching on the measuring device

Once the operating voltage is applied, the green LED indicates that the device is operational.

- When the unit is delivered, the device parameters are used as per the factory settings.
- When commissioning a device already configured or preset, measuring is immediately started as per the settings. The limit values only switch once the first measured value has been determined.
- The limit values are only activated as per their configuration once a valid measured value is present.

### 8.3 Configuring the measuring device

Detailed information on the device configuration is provided in the Operating Instructions →  BA00265R.





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