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Technical Information
RIA45

Process indicator with control unit

4-wire process indicator with control unit as panel-mounted device with up to two universal sensor inputs and optional SIL approval

Application

- Plant and apparatus engineering and construction
- Control rooms and cabinets
- Laboratories
- Process recording and supervision
- Process control
- Signal adjustment and signal conversion
- WHG compliant limit signal transmitter

Your benefits

- 5-digit, 7-segment backlit LC display
- User-configurable dot matrix display range for bar graph, units and tag name
- 1 or 2 universal inputs
- 2 relays (optional)
- Min./max. value saved
- 1 or 2 calculated values
- One linearization table with 32 points for each calculated value
- 1 or 2 analog outputs
- Digital status output (open collector)
- Operation using 3 keys
- SIL2 approval (optional)

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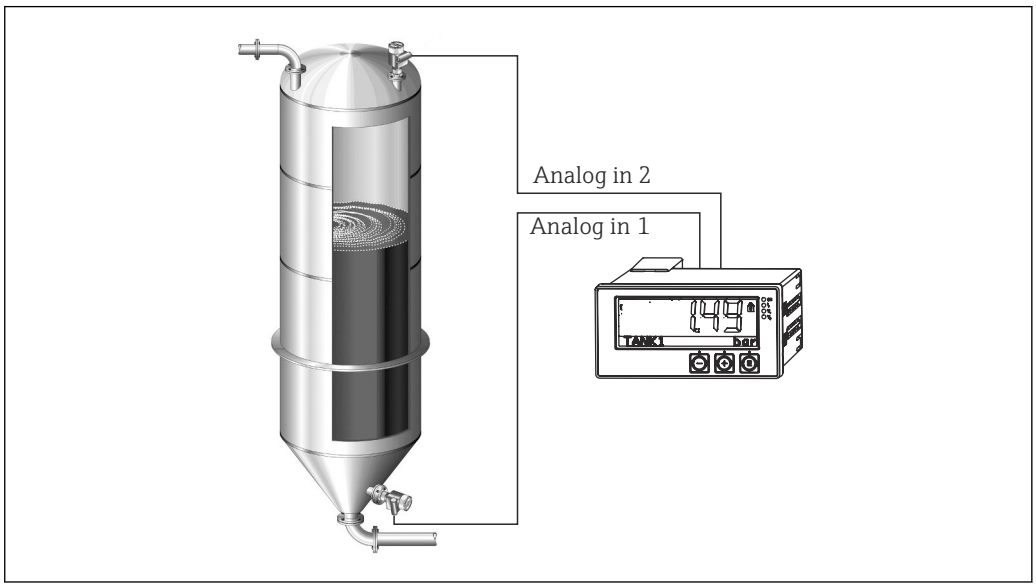
People for Process Automation

Table of contents

Function and system design

Application



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1 *Example of a "differential pressure" application*

The RIA45 process indicator supplies transmitters and processes analog signals from transmitters, primarily from process instrumentation. These signals are monitored, evaluated, calculated, saved, separated, linked, converted and displayed. The signals, intermediate values and the results of calculations and analysis are transmitted by digital or analog means.

Measuring system

The RIA45 is a process transmitter, which is controlled by a microcontroller, and exhibits a display, analog inputs for process and status signals, analog and digital outputs, as well as an interface for configuration.

Connected sensors (e.g. temperature, pressure) can be powered by the integrated transmitter power supply system. The signals to be measured are converted from analog to digital signals, processed digitally in the device, and then converted from digital to analog signals and made available to the various outputs. All measured values, and values calculated in any way, are available as a signal source for the display, all outputs, relays and the interface. It is possible to make multiple use of the signals and results (e.g. a signal source as an analog output signal and limit value for a relay).

Mathematics functions

The following mathematics functions are available in RIA45:
- Sum
- Difference
- Multiplication
- Mean value
- Linearization

Linearization function

Up to 32 user-definable points are available in the device per calculated value to linearize the input, e.g. for tank linearization. In the case of the two-channel device (option), mathematics channel M2 can be used to linearize mathematics channel M1.

Linearization is also available in the FieldCare configuration software.

Input

Measured variable

Current, voltage, resistance, resistance thermometer, thermocouples

Measuring range

Current:
- 0/4 to 20 mA +10% overrange
- Short-circuit current: max. 150 mA
- Load: 10 Ω

Voltage:
- 0 to 10 V, 2 to 10 V, 0 to 5 V, 0 to 1 V, 1 to 5 V, ±1 V, ±10 V, ±30 V, ±100 mV
- Max. permitted input voltage:
  Voltage ≥ 1 V: ±35 V
  Voltage < 1 V: ±12 V
- Input impedance: > 1 000 kΩ

Resistance:
30 to 3 000 Ω

RTD assembly:
- Pt100 as per IEC60751, GOST, JIS1604
- Pt500 and Pt1000 as per IEC60751
- Cu100, Cu50, Pt50, Pt46, Cu53 as per GOST
- Ni100, Ni1000 as per DIN 43760

Thermocouple types:
- Type J, K, T, N, B, S, R as per IEC60584
- Type U as per DIN 43710
- Type L as per DIN 43710, GOST
- Type C, D as per ASTM E998

Number of inputs

One or two universal inputs

Measuring cycle

200 ms

Galvanic isolation

Towards all other circuits

Output

Output signal

One or two analog outputs, galvanically isolated

Current/voltage output

Current output:
- 0/4 to 20 mA
- Overrange up to 22 mA

Voltage:
- 0 to 10 V, 2 to 10 V, 0 to 5 V, 1 to 5 V
- Overrange: up to 11 V, short-circuit proof, I_{max} < 25 mA

HART®

HART® signals are not affected

Loop power supply

- Open-circuit voltage: 24 V_{DC} (+15% /-5%)
- Hazardous area version: > 14 V at 22 mA
- Non-hazardous area version: > 16 V at 22 mA
- Maximum 30 mA short-circuit-proof and overload-resistant
- Galvanically isolated from system and outputs

Switching output

Open collector for monitoring the device state as well as open circuit and alarm notification. The OC output is closed in the fault-free operating state. In error state, the OC output is opened.

- I_{max} = 200 mA
- U_{max} = 28 V
- $U_{on/max}$ = 2 V at 200 mA

Galvanic isolation to all circuits, test voltage 500 V

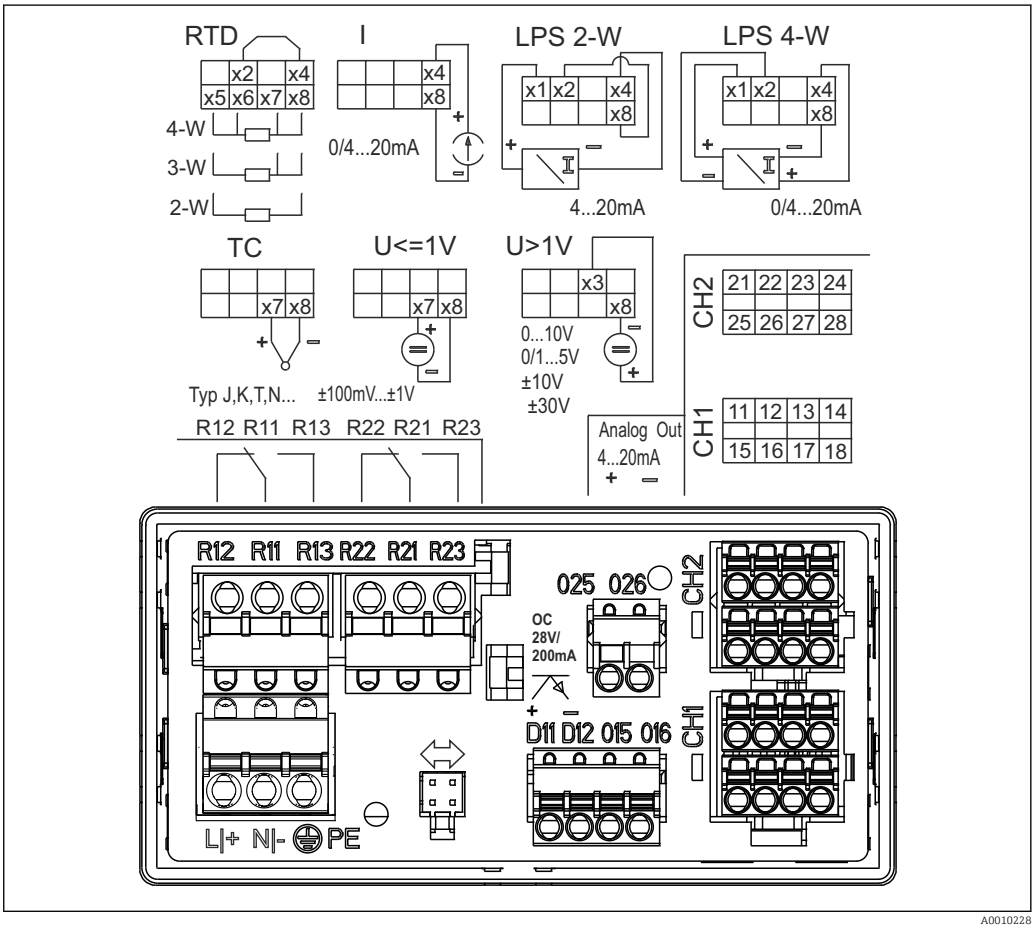
Relay output

Relay output for limit monitoring

Relay contact	Change-over contact
Maximum contact load DC	30 V / 3 A (permanent state, without destruction of the input)
Maximum contact load AC	250 V / 3 A (permanent state, without destruction of the input)
Minimum contact load	500 mW (12 V/10 mA)
Galv. isolation towards all other circuits	Test voltage 1 500 V_{AC}
Switching cycles	> 1 million

Power supply

Terminal assignment



2 *Terminal assignment of the process indicator (relay (terminals Rx1-Rx3) and channel 2 (terminals 21-28 and O25/O26) optional). Note: Illustrated contact position of the relays if the power supply fails.*

Supply voltage

Wide range power supply 24 to 230 V AC/DC (-20 % / +10 %) 50/60 Hz

Power consumption

Max. 21.5 VA / 6.9 W

Interface connection data

Commubox FXA291 PC USB interface

- Connection: 4-pin socket
- Transmission protocol: FieldCare
- Transmission rate: 38,400 baud

Interface cable TXU10-AC PC USB interface

- Connection: 4-pin socket
- Transmission protocol: FieldCare
- Order configuration: interface cable with FieldCare Device Setup DVD incl. all Comm DTMs and Device DTMs

Performance characteristics

Reference operating conditions

Power supply: 230 V_{AC}, 50/60 Hz

Ambient temperature: 25 °C (77 °F) ± 5 °C (9 °F)

Humidity: 20 %...60 % rel. humidity

Maximum measured error

Universal input:

Accuracy	Input:	Range:	Maximum measured error of measuring range (oMR):
	Current	0 to 20 mA, 0 to 5 mA, 4 to 20 mA; Overrange: up to 22 mA	±0.05%
	Voltage ≥ 1 V	0 to 10 V, 2 to 10 V, 0 to 5 V, 1 to 5 V, 0 to 1 V, ±1 V, ±10 V, ±30 V	±0.1%
	Voltage < 1 V	±100 mV	±0.05%
	Resistance measurement	30 to 3 000 Ω	4-wire: ± (0.10% oMR + 0.8 Ω) 3-wire: ± (0.10% oMR + 1.6 Ω) 2-wire: ± (0.10% oMR + 3 Ω)
	RTD	Pt100, −200 to 850 °C (−328 to 1 562 °F) (IEC60751, α=0.00385) Pt100, −200 to 850 °C (−328 to 1 562 °F) (JIS1604, w=1.391) Pt100, −200 to 649 °C (−328 to 1 200 °F) (GOST, α=0.003916) Pt500, −200 to 850 °C (−328 to 1 562 °F) (IEC60751, α=0.00385) Pt1000, −200 to 600 °C (−328 to 1 112 °F) (IEC60751, α=0.00385)	4-wire: ± (0.10% oMR + 0.3 K (0.54 °F)) 3-wire: ± (0.10% oMR + 0.8 K (1.44 °F)) 2-wire: ± (0.10% oMR + 1.5 K (2.7 °F))
		Cu100, −200 to 200 °C (−328 to 392 °F) (GOST, w=1.428) Cu50, −200 to 200 °C (−328 to 392 °F) (GOST, w=1.428) Pt50, −200 to 1 100 °C (−328 to 2 012 °F) (GOST, w=1.391) Pt46, −200 to 850 °C (−328 to 1 562 °F) (GOST, w=1.391) Ni100, −60 to 250 °C (−76 to 482 °F) (DIN43760, α=0.00617) Ni1000, −60 to 250 °C (−76 to 482 °F) (DIN43760, α=0.00617)	4-wire: ± (0.10% oMR + 0.3 K (0.54 °F)) 3-wire: ± (0.10% oMR + 0.8 K (1.44 °F)) 2-wire: ± (0.10% oMR + 1.5 K (2.7 °F))
		Cu53, −50 to 200 °C (−58 to 392 °F) (GOST, w=1.426)	4-wire: ± (0.10% oMR + 0.3 K (0.54 °F)) 3-wire: ± (0.10% oMR + 0.8 K (1.44 °F)) 2-wire: ± (0.10% oMR + 1.5 K (2.7 °F))
	Thermocouples	Typ J (Fe-CuNi), −210 to 1 200 °C (−346 to 2 192 °F) (IEC60584)	± (0.10% oMR +0.5 K (0.9 °F)) from −100 °C (−148 °F)

Accuracy	Input:	Range:	Maximum measured error of measuring range (oMR):
		Typ K (NiCr-Ni), −200 to 1 372 °C (−328 to 2 502 °F) (IEC60584)	± (0.10% oMR +0.5 K (0.9 °F)) from −130 °C (−202 °F)
		Typ T (Cu-CuNi), −270 to 400 °C (−454 to 752 °F) (IEC60584)	± (0.10% oMR +0.5 K (0.9 °F)) from −200 °C (−328 °F)
		Typ N (NiCrSi-NiSi), −270 to 1 300 °C (−454 to 2 372 °F) (IEC60584)	± (0.10% oMR +0.5 K (0.9 °F)) from −100 °C (−148 °F)
		Typ L (Fe-CuNi), −200 to 900 °C (−328 to 1 652 °F) (DIN43710, GOST)	± (0.10% oMR +0.5 K (0.9 °F)) from −100 °C (−148 °F)
		Typ D (W3Re/W25Re), 0 to 2 495 °C (32 to 4 523 °F)(ASTME998)	± (0.15% oMR +1.5 K (2.7 °F)) from 500 °C (932 °F)
		Typ C (W5Re/W26Re), 0 to 2 320 °C (32 to 4 208 °F) (ASTME998)	± (0.15% oMR +1.5 K (2.7 °F)) from 500 °C (932 °F)
		Typ B (Pt30Rh-Pt6Rh), 0 to 1 820 °C (32 to 3 308 °F) (IEC60584)	± (0.15% oMR +1.5 K (2.7 °F)) from 600 °C (1 112 °F)
		Typ S (Pt10Rh-Pt), −50 to 1 768 °C (−58 to 3 214 °F) (IEC60584)	± (0.15% oMR +3.5 K (6.3 °F)) for −50 to 100 °C (−58 to 212 °F) ± (0.15% oMR +1.5 K (2.7 °F)) from 100 °C (212 °F)
		Typ U (Cu-CuNi), −200 to 600 °C (−328 to 1 112 °F) (DIN 43710)	± (0.15% oMR +1.5 K (2.7 °F)) from 100 °C (212 °F)
AD converter resolution		16 bit	
Temperature drift		Temperature drift: ≤ 0.01%/K (0.1%/18 °F) oMR ≤ 0.02%/ K (0.2%/18 °F) oMR for Cu100, Cu50, Cu53, Pt50 and Pt46	

Analog output:

Current	0/4 to 20 mA, overrange up to 22 mA	±0.05% of measuring range
	Max. load	500 Ω
	Max. inductivity	10 mH
	Max. capacity	10 µF
	Max. ripple	10 mVpp at 500 Ω, frequency < 50 kHz
Voltage	0 to 10 V, 2 to 10 V 0 to 5 V, 1 to 5 V Overrange: up to 11 V, shortcircuit proof, I_{max} < 25 mA	±0.05% of measuring range ±0.1 % of measuring range
	Max. ripple	10 mVpp at 1 000 Ω, frequency < 50 kHz
Resolution	13 bit	
Temperature drift	≤ 0.01%/K (0.1%/18 °F) of measuring range	
Galvanic isolation	Testing voltage of 500 V towards all other circuits	

Installation

Mounting location

Panel, cutout 92 x 45 mm (3.62 x 1.77 in) (see 'Mechanical construction').

Max. panel thickness 26 mm (1 in).

Orientation

No restrictions.

The orientation is determined by the readability of the display.

Max. viewing angle range +/- 45° from the central display axis in every direction.

Environment

Ambient temperature range

NOTICE

The life-time of the display is shortened when operated in the upper temperature range.

► To avoid heat accumulation, always make sure the device is sufficiently cooled.

Non-Ex/Ex devices: −20 to 60 °C (−4 to 140 °F)

UL devices: −20 to 50 °C (−4 to 122 °F)

Storage temperature

−40 to 85 °C (−40 to 185 °F)

Altitude

< 2 000 m (6 560 ft) above MSL

Climate class

As per IEC 60654-1, Class B2

Degree of protection

Front IP 65 / NEMA 4 (not evaluated by UL)

Device casing/rear IP 20

Electrical safety

Protection class I, overvoltage category II, pollution degree 2

Condensation

Front: permitted

Device casing: not permitted

Electromagnetic compatibility (EMC)

CE compliance

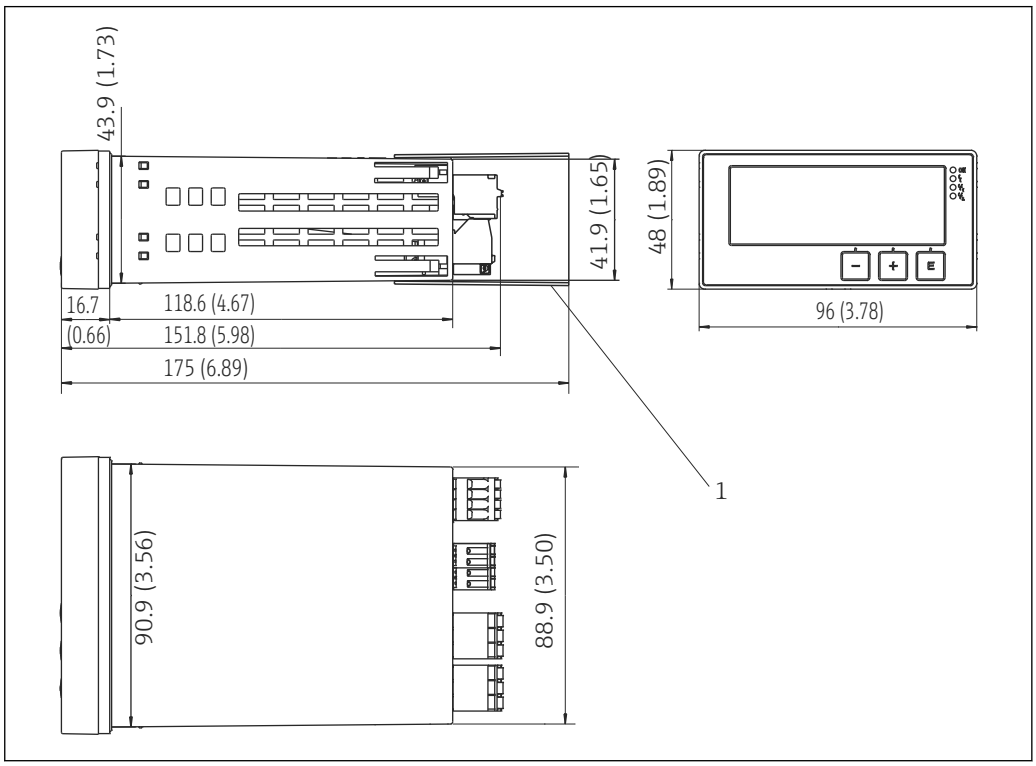
Electromagnetic compatibility in accordance with all the relevant requirements of the IEC/EN 61326 series and NAMUR Recommendation EMC (NE21). For details refer to the EU Declaration of Conformity.

- Maximum measured error < 1% of measuring range
- Interference immunity as per IEC/EN 61326 series, industrial requirements
- Interference emission as per IEC/EN 61326 series (CISPR 11) Group 1 Class A

This unit is not intended for use in residential environments and cannot guarantee adequate protection of the radio reception in such environments.

Mechanical construction

Design, dimensions



3 Dimensions of the process indicator in mm (in)

1 Spacer for terminals (option Ex)

Weight

Approximately 300 g (10.6 oz)

Material

Housing: plastic PC-GF10

Terminals

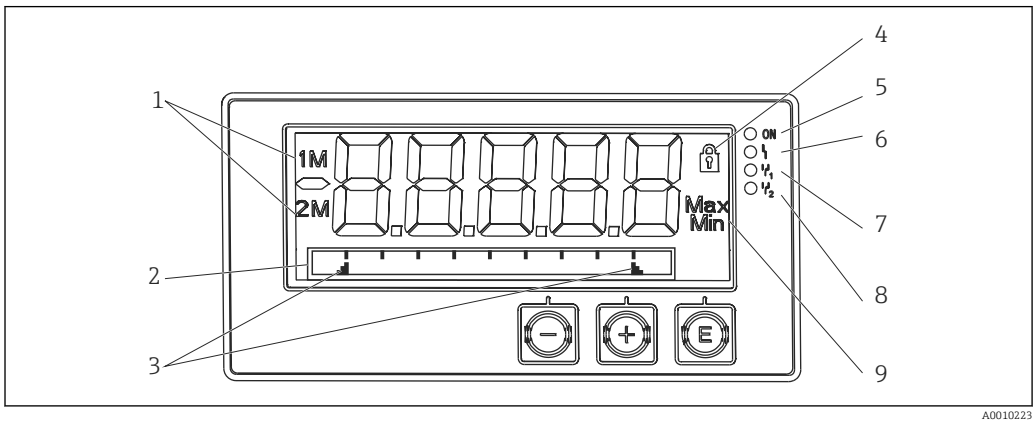
Spring terminals	
Relay / auxiliary voltage terminals	0.2 to 2.5 mm² (24 to 12 AWG)
Input / output terminals	0.2 to 1.5 mm² (24 to 16 AWG)

Panel thickness

Max. 26 mm (1 in)

Operability

On-site operation



4 *Display of the process indicator*

1 *Channel indicator: 1: analog input 1; 2: analog input 2; 1M: calculated value 1; 2M: calculated value 2*
2 *Dot matrix display for TAG, bar graph, unit*
3 *Limit value indicators in the bar graph*
4 *"Operation locked" indicator*
5 *Green LED; device operational*
6 *Red LED; fault/alarm*
7 *Yellow LED; status of relay 1*
8 *Yellow LED; status of relay 2*
9 *Minimum/maximum value indicator*

Local display

- Display
  5-digit, 7-segment backlit LC display
  Dot matrix for text/bar graph
- Display area
  -99999 to +99999 for measured values
- Signaling
  - Setup security locking (lock)
  - Measuring range overshoot/undershoot
  - 2 x status relay (only if the relay option was selected)

Operating elements

3 keys: -, +, E

Remote operation

Configuration

The device can be configured with the FieldCare PC software. FieldCare Device Setup is included in the Commubox FXA291 and TXU10-AC scope of delivery (see ‘Accessories’) or can be downloaded free of charge at www.endress.com.

Interface

4-pin socket for the connection with a PC via Commubox FXA291 and TXU10-AC interface cable (see 'Accessories').

Certificates and approvals

Current certificates and approvals for the product are available at www.endress.com on the relevant product page:

1. Select the product using the filters and search field.
2. Open the product page.
3. Select **Downloads**.

Ordering information

Detailed ordering information is available from your nearest sales organization www.addresses.endress.com or in the Product Configurator at www.endress.com:

1. Select the product using the filters and search field.
2. Open the product page.
3. Select **Configuration**.

Product Configurator - the tool for individual product configuration
- Up-to-the-minute configuration data
- Depending on the device: direct input of information specific to the measuring point, such as the measuring range or operating language
- Automatic verification of exclusion criteria
- Automatic creation of the order code and its breakdown in PDF or Excel output format
- Ability to order directly in the Endress+Hauser Online Shop

Accessories

The accessories currently available for the product can be selected at www.endress.com:

1. Select the product using the filters and search field.
2. Open the product page.
3. Select **Spare parts & Accessories**.

Service-specific accessories

Configurator
Product Configurator - the tool for individual product configuration
- Up-to-the-minute configuration data
- Depending on the device: direct input of information specific to the measuring point, such as the measuring range or operating language
- Automatic verification of exclusion criteria
- Automatic creation of the order code and its breakdown in PDF or Excel output format
- Ability to order directly in the Endress+Hauser Online Shop

The Configurator is available at www.endress.com on the relevant product page:

1. Select the product using the filters and search field.
2. Open the product page.
3. Select **Configuration**.

FieldCare SFE500
FieldCare is a configuration tool for Endress+Hauser and third-party field devices based on DTM technology.
The following communication protocols are supported: HART, WirelessHART, PROFIBUS, FOUNDATION Fieldbus, Modbus, IO-Link, EtherNet/IP, PROFINET and PROFINET APL.

Technical Information TI00028S
www.endress.com/sfe500

Device-specific accessories

Other

Retrofitting of relays

	Order no.
Relay card incl. terminals	RIA45X-RA

Upgrade to two-channel device

	Order no.
Multifunction input card for channel 2, incl. terminals, non-Ex	RIA45X-IA
Multifunction input card for channel 2, incl. terminals, Ex version	RIA45X-IB

Communication-specific accessories

Commubox FXA291

Connects Endress+Hauser field devices with a CDI interface (= Endress+Hauser Common Data Interface) and the USB port of a computer or laptop.

For more information, please refer to: www.endress.com

Configuration kit TXU10

Configuration kit for PC-programmable transmitter - FDT/DTM-based plant asset management tool, FieldCare/DeviceCare, and interface cable (4-pin connector) for PC with USB port.

For more information, please refer to: www.endress.com

Online tools

Product information over the entire life cycle of the device: www.endress.com/onlinetools

Documentation

The following types of documentation are available on the product pages and in the Download Area of the Endress+Hauser website (www.endress.com/downloads) (depending on the selected device version):

Document	Purpose and content of the document
Technical Information (TI)	**Planning aid for your device** The document contains all the technical data on the device and provides an overview of the accessories and other products that can be ordered for the device.
Brief Operating Instructions (KA)	**Guide that takes you quickly to the 1st measured value** The Brief Operating Instructions contain all the essential information from incoming acceptance to initial commissioning.
Operating Instructions (BA)	**Your reference document** These Operating Instructions contain all the information that is required in the various life cycle phases of the device: from product identification, incoming acceptance and storage, to mounting, connection, operation and commissioning, through to troubleshooting, maintenance and disposal.
Description of Device Parameters (GP)	**Reference for your parameters** The document provides a detailed explanation of each individual parameter. The description is aimed at those who work with the device over the entire life cycle and perform specific configurations.

Document	Purpose and content of the document
Safety Instructions (XA)	Safety Instructions (XA) are supplied with the device, depending on the approval. These are an integral part of the Operating Instructions. The nameplate indicates which Safety Instructions (XA) apply to the device.
Supplementary device-dependent documentation (SD/FY)	Always comply strictly with the instructions in the relevant supplementary documentation. The supplementary documentation is an integral part of the device documentation.

www.addresses.endress.com

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