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TI00150R/09/EN/07.22-00
71563924
2022-03-04

Technical Information
RMA42

Process transmitter with control unit



Universal process transmitter for monitoring and displaying analog measured values

Application

- Plant and apparatus engineering
- Control rooms and cabinets
- Process recording and monitoring
- Process control
- Signal adjustment and 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
- Configuration via interface and FieldCare or DeviceCare software

Endress+Hauser
People for Process Automation

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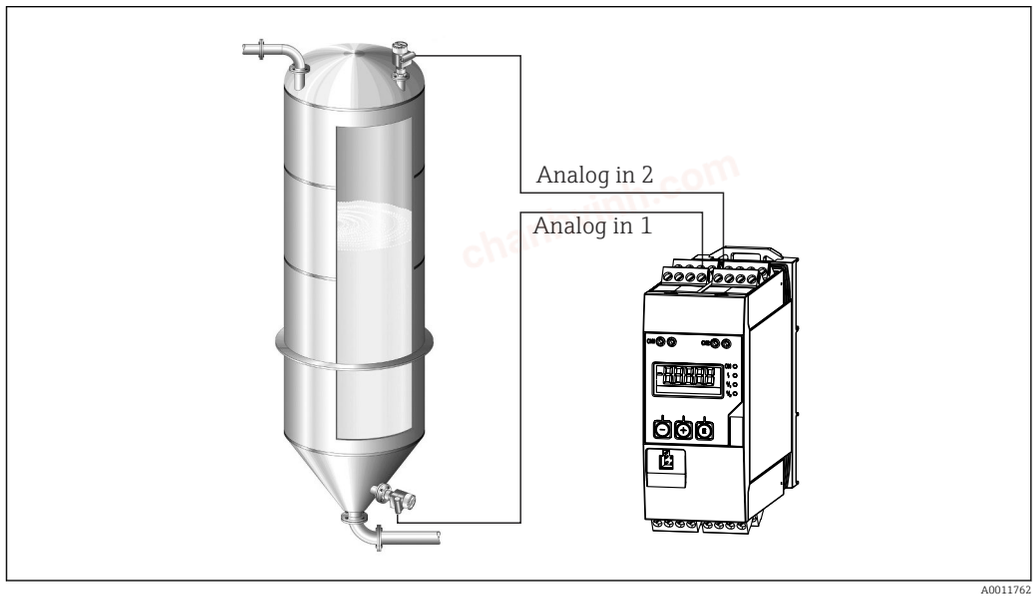
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Function and system design

Measuring principle



1 *Example of a "differential pressure" application*

The RMA42 process transmitter powers the transmitter and processes analog signals from transmitters, particularly from the area of process instrumentation. These signals are monitored, evaluated, calculated, saved, separated, linked, converted and displayed. The signals and results of calculations are communicated by analog means, as a switch output and displayed digitally.

Measuring system

The RMA42 is a process transmitter that is controlled by a microcontroller and features a display, analog inputs for process and status signals, analog and digital outputs, as well as a configuration interface.

Connected sensors (e.g. temperature, pressure) can be powered by the integrated transmitter power supply system. These signals are monitored, evaluated, calculated, saved (min/max values) and provided at 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 is used as an analog output signal and as a limit value for a relay).

Mathematics functions

The following mathematics functions are available in the RMA42:
- Total
- Difference
- Multiplication
- Average
- Linearization

Linearization function

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

Linearization is also provided in the FieldCare configuration software.

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Input

Measured variable	Current, voltage, resistance, resistance thermometer, thermocouples
Measuring ranges	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 Resistance thermometer: ▪ 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: ▪ Typ J, K, T, N, B, S, R as per IEC60584 ▪ Typ U as per DIN 43710 ▪ Typ L as per DIN 43710, GOST ▪ Typ C, D as per ASTM E998
Number of inputs	One or two universal inputs
Update time	200 ms
Galvanic isolation	Towards all other circuits

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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%)
- Ex version: > 14 V at 22 mA
- Non-Ex version with SIL: > 14 V at 22 mA
- Non-Ex version without SIL: > 16 V at 22 mA
- Maximum 30 mA short-circuit-proof and overload-proof
- Galvanically isolated from system and outputs

Switching output

Open Collector for monitoring of the device state and alarm notification. The OC output is closed in normal 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 towards all other circuits; test voltage 500 V

Relay output

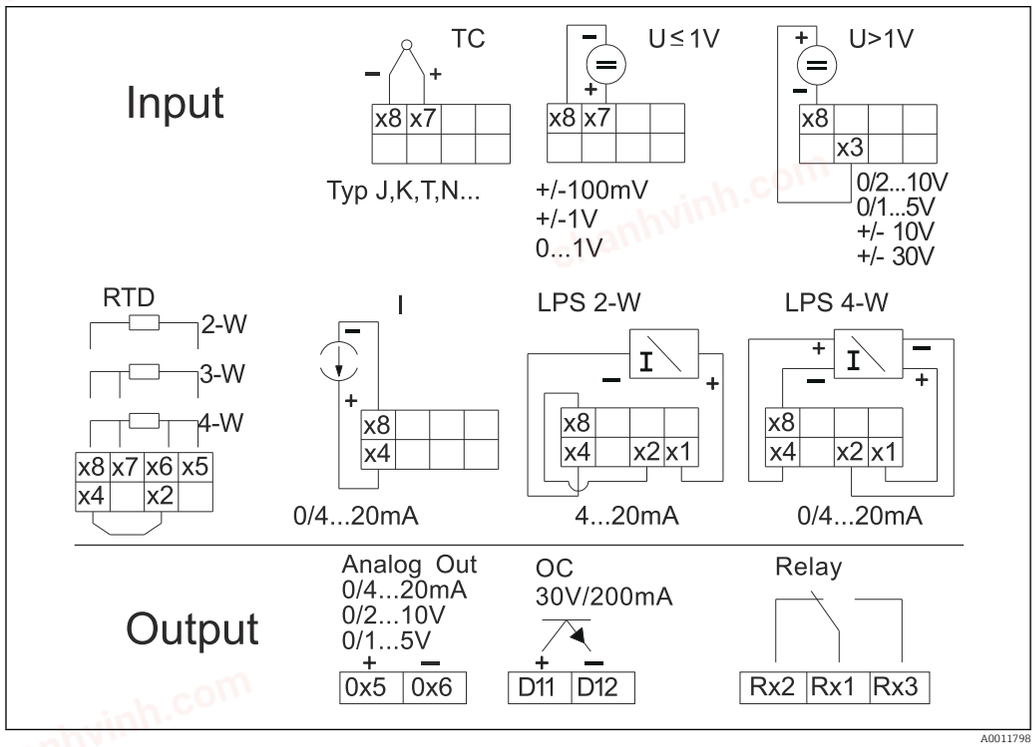
Relay output for limit function

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

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Power supply

Terminal assignment



2 *Terminal assignment of the process transmitter (relay (terminals Rx1-Rx3) and channel 2 (terminals 21-28 and O25/O26) optional). Note: Illustrated contact position of the relays if the limit value is breached or 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

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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)
		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)

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Accuracy	Input:	Range:	Maximum measured error of measuring range (oMR):
		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

Mounting on top-hat rail as per IEC 60715.

Orientation

Vertical or horizontal.

NOTICE

Heat accumulation when installing several devices on a vertically mounted top-hat rail

▶ Keep sufficient gaps between the individual devices.

Environment

Ambient temperature

NOTICE

Operation in the upper temperature range reduces the operating life of the display.

▶ To avoid heat buildup, always ensure that 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

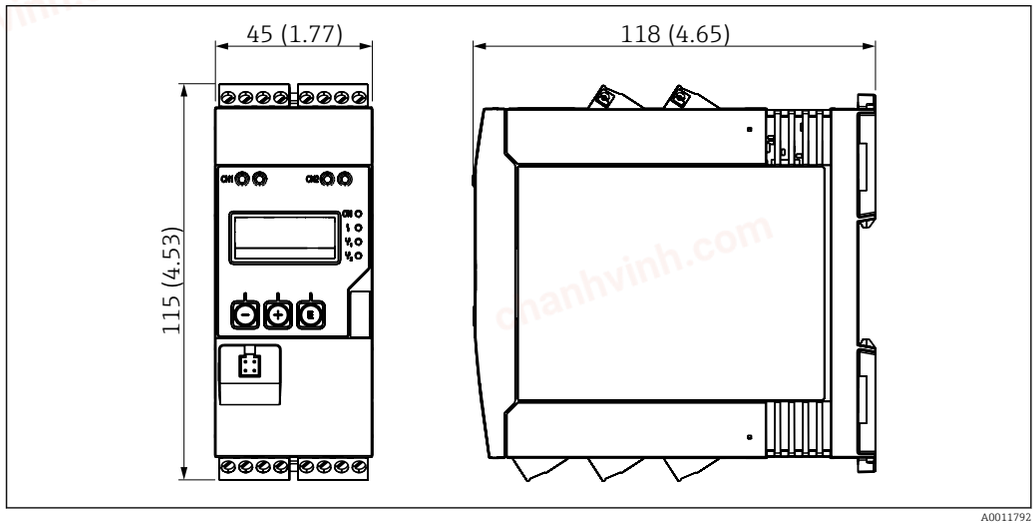
−40 to 85 °C (−40 to 185 °F)

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Operating altitude	< 2 000 m (6 560 ft) above MSL
Climate class	To IEC 60654-1, Class B2
Degree of protection	DIN rail housing IP 20
Electrical safety	Class II equipment, overvoltage category II, pollution degree 2
Condensation	Not permitted
Electromagnetic compatibility (EMC)	**CE conformity** Electromagnetic compatibility in accordance with all the relevant requirements of the IEC/EN 61326 series. For details refer to the EU Declaration of Conformity. ▪ Maximum measured error < 1% of measuring range ▪ Interference immunity according to IEC/EN 61326 series, requirement industrial area ▪ Interference emission according to 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



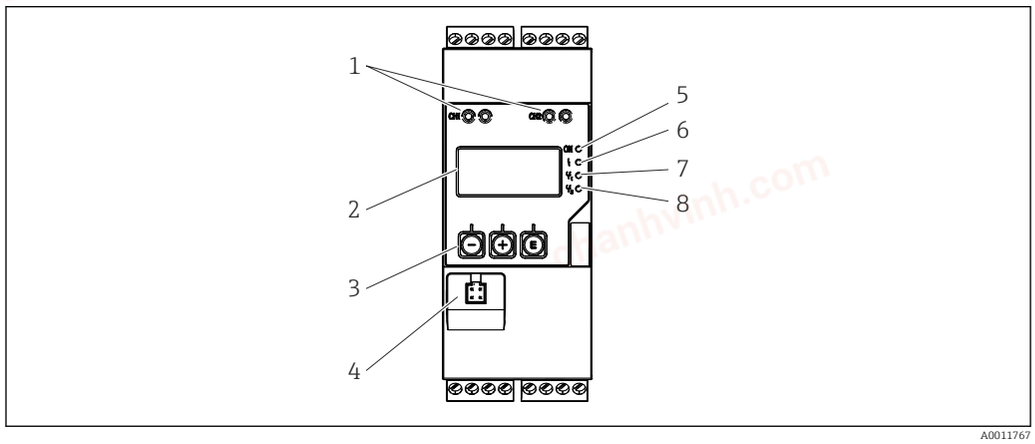
3 *Dimensions of the process transmitter in mm (in)*

Weight	Approximately 300 g (10.6 oz)
Material	Housing: plastic PC-GF10
Terminals	Screw terminals, plug-in, 2.5 mm^2 (14 AWG), 0.1 to 4 mm^2 (30 to 12 AWG), torque 0.5 to 0.6 Nm (0.37 to 0.44 lbf ft)

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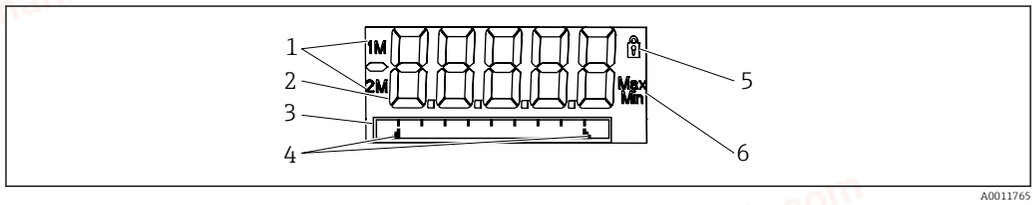
Operability

Local operation



4 *Display and operating elements of the process transmitter*

1 *HART® connection sockets*
2 *Display*
3 *Operating keys*
4 *PC interface connection port*
5 *Green LED; on = supply voltage applied*
6 *Red LED; on = error/alarm*
7 *Yellow LED; on = relay 1 energized*
8 *Yellow LED; on = relay 2 energized*



5 *Display of the process transmitter*

1 *Channel display: 1: analog input 1; 2: analog input 2; 1M: calculated value 1; 2M: calculated value 2*
2 *Measured value display*
3 *Dot matrix display for TAG, bar graph and unit*
4 *Limit value indicators in the bar graph*
5 *"Operation locked" indicator*
6 *Minimum/maximum value indicator*

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

Operating elements

3 keys: -, +, E

Remote operation

Configuration

The device can be configured with the PC software or on site using the operating keys. FieldCare Device Setup is delivered together with the Commubox FXA291 or TXU10-AC (see 'Accessories') or can be downloaded free of charge from www.endress.com.

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Interface

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

Certificates and approvals

Current certificates and approvals that are available for the product can be selected via 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**.

Other standards and guidelines

- IEC 60529:
  Degrees of protection provided by enclosures (IP code)
- IEC 61010-1:
  Safety requirements for electrical equipment for measurement, control and laboratory use
- EN 60079-11:
  Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "I" (optional)

Ordering information

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

1. Click Corporate
2. Select the country
3. Click Products
4. Select the product using the filters and search field
5. Open the product page

The Configuration button to the right of the product image opens the Product Configurator.

Product Configurator - the tool for individual product configuration

- Up-to-the-minute configuration data
- Depending on the device: Direct input of measuring point-specific information such as 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

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Accessories

Various accessories are available for the device, and can be ordered with the device or at a later stage from Endress+Hauser. Detailed information on the specific order code is available from your local Endress+Hauser sales organization or on the product page of the Endress+Hauser website: www.endress.com.

Communication-specific accessories

Designation
Interface cable
Commubox TXU10 incl. FieldCare Device Setup and DTM Library
Commubox FXA291 incl. FieldCare Device Setup and DTM Library

Documentation

The following document types are available on the product pages and in the download area of the Endress+Hauser website (www.endress.com/downloads):

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 comprehensive reference** The Operating Instructions contain all the information that is required in various phases of the life cycle 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.
Safety Instructions (XA)	Depending on the approval, the following Safety Instructions (XA) are supplied with the device. They are an integral part of the Operating Instructions. The nameplate indicates the Safety Instructions (XA) that are relevant to the device.
Supplementary device-dependent documentation	Additional documents are supplied depending on the device version ordered: Always comply strictly with the instructions in the supplementary documentation. The supplementary documentation is an integral part of the device documentation.

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