

Technical Information

RIA46

Field meter



Digital field meter with control unit for monitoring and visualizing analog measured values

Application

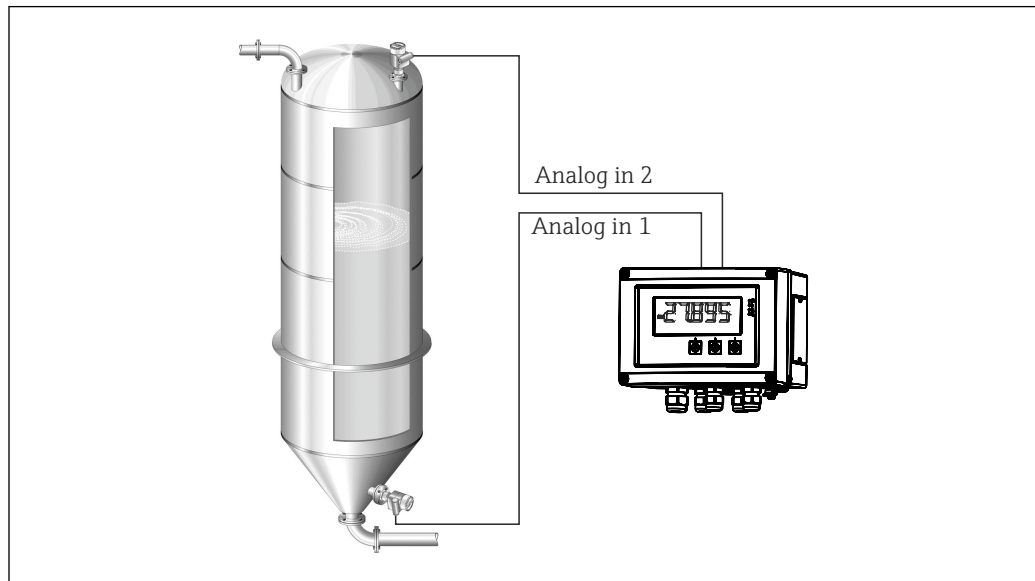
- Process recording and supervision
- Process control
- Signal adjustment and signal conversion
- Optional Ex approval
- WHG compliant limit signal transmitter

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 software
- SIL2 approval (optional)

Function and system design

Application



1 Example for "differential pressure" application

The RIA46 field meter 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, intermediate values and the results of calculations and analysis are transmitted by digital or analog means.

Measuring system

The RIA46 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 RIA46:

- Sum
- Difference
- Multiplication
- Mean
- 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 ranges	<p>Current:</p> <ul style="list-style-type: none"> ■ 0/4 to 20 mA +10% overrange ■ Short-circuit current: max. 150 mA ■ Load: 10 Ω <p>Voltage:</p> <ul style="list-style-type: none"> ■ 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: <ul style="list-style-type: none"> Voltage ≥ 1 V: ± 35 V Voltage < 1 V: ± 12 V ■ Input impedance: $> 1\,000$ kΩ <p>Resistance:</p> <p>30 to 3 000 Ω</p> <p>Resistance thermometer:</p> <ul style="list-style-type: none"> ■ 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 <p>Thermocouple types:</p> <ul style="list-style-type: none"> ■ 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

Output

Output signal	<p>One or two analog outputs, galvanically isolated</p> <p>Current/voltage output</p> <p>Current output:</p> <ul style="list-style-type: none"> ■ 0/4 to 20 mA ■ Overrange up to 22 mA <p>Voltage:</p> <ul style="list-style-type: none"> ■ 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 <p>HART®</p> <p>HART® signals are not affected</p>
Loop power supply	<ul style="list-style-type: none"> ■ Open-circuit voltage: 24 V_{DC} (+15% /-5%) <ul style="list-style-type: none"> Ex version: > 14 V at 22 mA Non-hazardous operation: > 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.

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

Galvanic isolation towards all other circuits; test voltage 500 V

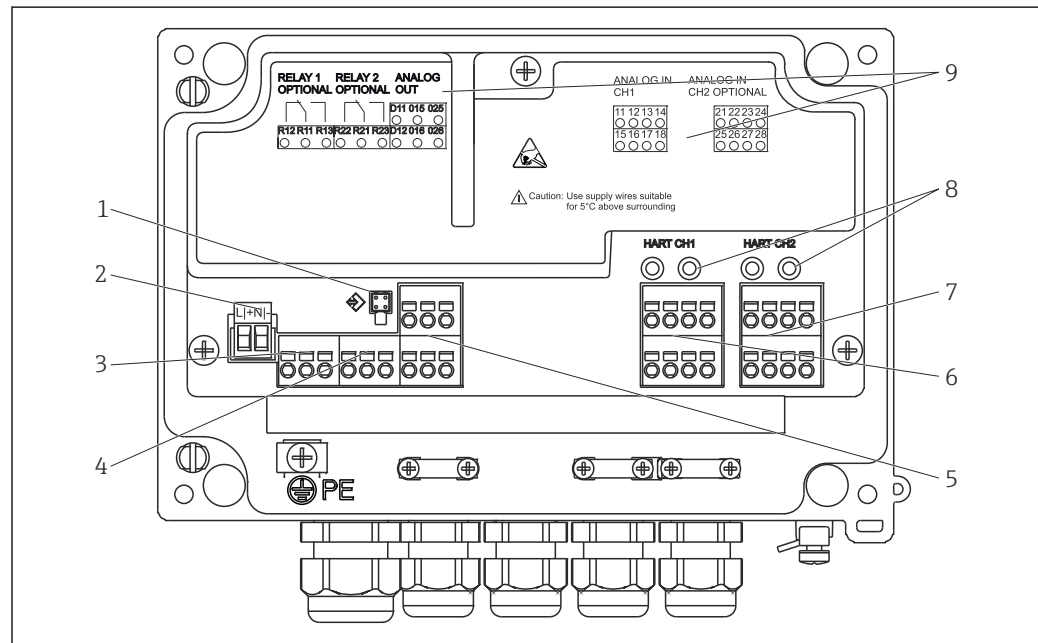
Relay output

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

Power supply

Terminal assignment



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2 Inside view and terminal assignment of the process display

- 1 Connection socket for interface cable
- 2 Connection supply voltage
- 3 Connection relay 1 (optional)
- 4 Connection relay 2 (optional)
- 5 Connection analog and status output
- 6 Connection analog input 1
- 7 Connection analog input 2 (optional)
- 8 HART® connection sockets
- 9 Laser labelling of terminal assignment

Supply voltage

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

Power consumption

Max. 21.5 VA / 6.9 W

Connection data interface

Commubox FXA291 PC USB interface

- Connection: 4-pin connector
- Transmission protocol: FieldCare
- Transmission rate: 38,400 Baud

Interface cable TXU10-AC PC USB interface

- Connection: 4-pin connection
- Transmission protocol: FieldCare
- Delivery scope: Interface cable incl. FieldCare Device Setup DVD with 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 3000 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 1562 °F) (IEC60751, α=0.00385) Pt100, -200 to 850 °C (-328 to 1562 °F) (JIS1604, w=1.391) Pt100, -200 to 649 °C (-328 to 1200 °F) (GOST, α=0.003916) Pt500, -200 to 850 °C (-328 to 1562 °F) (IEC60751, α=0.00385) Pt1000, -200 to 600 °C (-328 to 1112 °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 1100 °C (-328 to 2012 °F) (GOST, w=1.391) Pt46, -200 to 850 °C (-328 to 1562 °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 1200 °C (-346 to 2192 °F) (IEC60584)	± (0.10% oMR + 0.5 K (0.9 °F)) from -100 °C (-148 °F)
			Typ K (NiCr-Ni), -200 to 1372 °C (-328 to 2502 °F) (IEC60584)	± (0.10% oMR + 0.5 K (0.9 °F)) from -130 °C (-202 °F)

Accuracy	Input:	Range:	Maximum measured error of measuring range (oMR):
		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 1300 °C (-454 to 2372 °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 1652 °F) (DIN43710, GOST)	± (0.10% oMR + 0.5 K (0.9 °F)) from -100 °C (-148 °F)
		Typ D (W3Re/W25Re), 0 to 2495 °C (32 to 4523 °F) (ASTME998)	± (0.15% oMR + 1.5 K (2.7 °F)) from 500 °C (932 °F)
		Typ C (W5Re/W26Re), 0 to 2320 °C (32 to 4208 °F) (ASTME998)	± (0.15% oMR + 1.5 K (2.7 °F)) from 500 °C (932 °F)
		Typ B (Pt30Rh-Pt6Rh), 0 to 1820 °C (32 to 3308 °F) (IEC60584)	± (0.15% oMR + 1.5 K (2.7 °F)) from 600 °C (1112 °F)
		Typ S (Pt10Rh-Pt), -50 to 1768 °C (-58 to 3214 °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 1112 °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 1000 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 Field, direct wall mounting and wall or pipe mounting ¹⁾ using the optional mounting plate.

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.

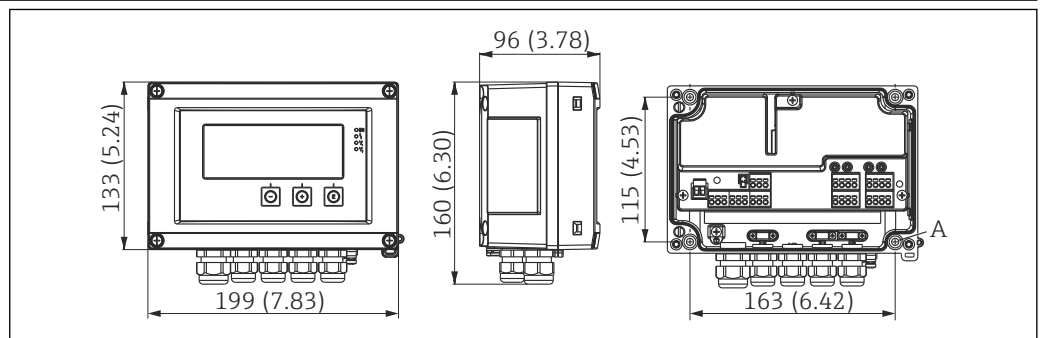
1) According to UL approval panel or surface mounting only.

Environment

Ambient temperature range	NOTICE
	<p>The life-time of the display is shortened when operated in the upper temperature range.</p> <p>► To avoid heat accumulation, always make sure the device is sufficiently cooled.</p> <p>Non-Ex/Ex devices: -40 to 60 °C (-40 to 140 °F)</p> <p>UL devices: -40 to 50 °C (-40 to 122 °F)</p> <p>i At temperatures below -30 °C (-22 °F) the readability of the display can no longer be guaranteed.</p>
Storage temperature	-40 to 85 °C (-40 to 185 °F)
Operating height	< 2 000 m (6 560 ft) above MSL
Climate class	As per IEC 60654-1, Class B2
Degree of protection	Front IP 67 / NEMA 4x (not evaluated by UL)
Shock and vibration	3g at 2...150 Hz as per IEC 60068-2-6
Electrical safety	Protection class I, overvoltage category II, pollution degree 2 for aluminum housing Protection class II, overvoltage category II, pollution degree 2 for plastic housing
Condensation	Permitted
Electromagnetic compatibility (EMC)	<p>CE compliance</p> <p>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.</p> <p>Interference immunity as per IEC/EN 61326 series, industrial requirements.</p> <p>Interference emission as per IEC/EN 61326 series, Class B equipment.</p>

Mechanical construction

Design, dimensions



3 Dimensions of the field meter in mm (in)

A Drill-hole for direct wall mounting or on optional mounting plate with 4 screws $\phi 5$ mm (2 in)

Weight

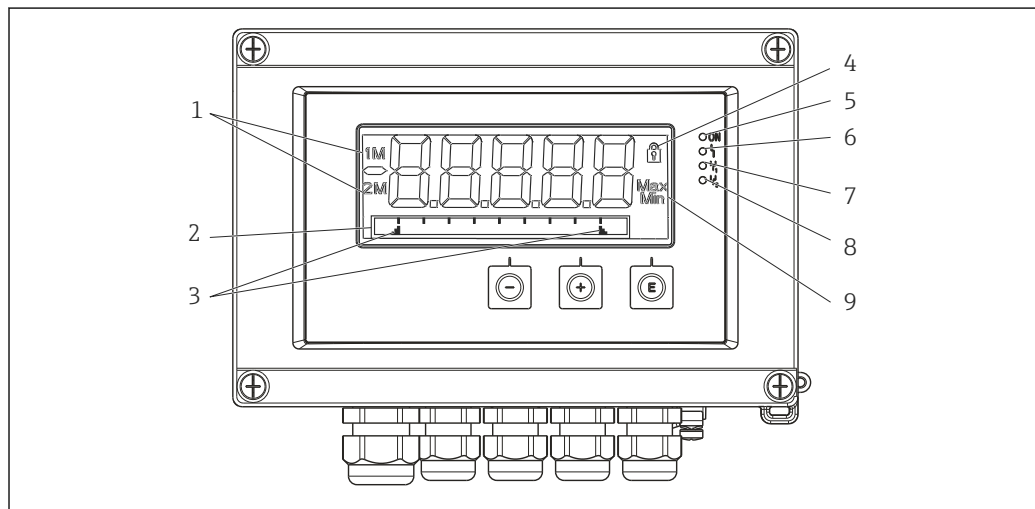
- Plastic housing: approx. 600 g (1.32 lb)
- Aluminum housing: approx. 1 700 g (3.75 lb)

Material	Housing	Nameplate
	Fiber-glass reinforced plastic PBT-GF30	Laser marking
	Optional: Aluminum (AlSi12, AC-44100 or AlSi10Mg(Fe), AC-43400)	Laser-writable foil, polyester

Terminals Spring terminals, 2.5 mm² (14 AWG); auxiliary voltage with plug-in screw terminals 0.1 to 4 mm² (30 to 12 AWG), torque 0.5 to 0.6 Nm (0.37 to 0.44 lbf ft).

Operability

Local operation



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4 Display of the field meter

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

Interface

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

Certificates and approvals

CE mark	The measuring system meets the legal requirements of the applicable EC guidelines. These are listed in the corresponding EC Declaration of Conformity together with the standards applied. Endress+Hauser confirms successful testing of the device by affixing to it the CE mark.
EAC mark	The product meets the legal requirements of the EEU guidelines. The manufacturer confirms the successful testing of the product by affixing the EAC mark.
Ex approval	Information about currently available Ex versions (ATEX, FM, CSA, etc.) can be supplied by your E+H Sales Center on request. All explosion protection data are given in a separate documentation which is available upon request.
Overfill prevention	WHG-compliant limit signal transmitter (optional)
Functional safety	SIL2 (optional)
UL	UL recognized component (see www.ul.com/database , search by keyword "E225237")
Other standards and guidelines	<ul style="list-style-type: none"> ■ 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 from the following sources:

- In the Product Configurator on the Endress+Hauser website: www.endress.com -> Click "Corporate" -> Select your country -> Click "Products" -> Select the product using the filters and search field -> Open product page -> The "Configure" button to the right of the product image opens the Product Configurator.
- From your Endress+Hauser Sales Center: www.addresses.endress.com



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

Accessories

Various accessories, which can be ordered with the device or subsequently from Endress+Hauser, are available for the device. Detailed information on the order code in question is available from your local Endress+Hauser sales center or on the product page of the Endress+Hauser website: www.endress.com.

Device-specific accessories

Cable glands and adapters

Adapter set NPT

1x M20x1.5 (outer) - NPT1/2" (inner) 4x M16x1.5 (outer) - NPT1/2" (inner)	RIA46X-GI
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Cable gland set plastic

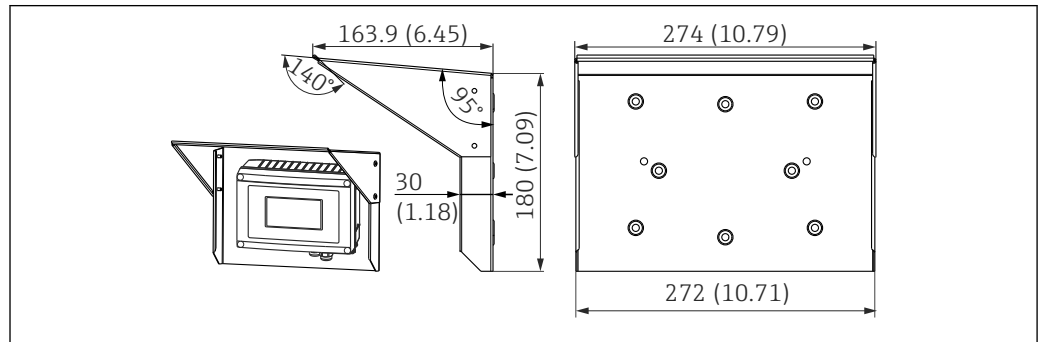
4x M16x1.5 + 1x M20x1.5	RIA46X-GH
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Housing

Weather protection cover

Ordering:

- as an additional option in the product structure for RIA46
- separately via order code: RK01-AR



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5 Dimensions in mm (in)

Mounting kit for wall/pipe mounting

Ordering:

- as an additional option in the product structure for RIA46
- separately via order code: RK01-AH

Pipe mounting set

Install. kit stainl. steel housing W08	71091611
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Communication-specific accessories

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

Supplementary documentation

- System components and data manager - solutions to complete your measuring point: FA00016K/09
- Operating Instructions for process display unit RIA46: BA00274R/09
- Ex-related additional documentation: ATEX II(1) GD [Ex ia] IIC: XA00079R/09
- SIL Safety Manual: SD00023R/09

www.addresses.endress.com
