TI01043K/09/EN/09.24-00
71681515
2024-09-30

Technical Information
RIA15

Loop-powered Ex ia process indicator as a field device or panel-mounted instrument for 4 to 20 mA signals or HART® protocol



Application

- Display of 4 to 20 mA measured values or optionally up to four of a sensor's HART® process variables in all industries
- Use as primary or secondary HART® master
- Panel-mount housing or field housing as local display
- Scalable display value

Your benefits

- No external power supply required
- Voltage drop ≤1 V (HART® ≤1.9 V)
- 5-digit measured value display with 17 mm (0.67 in) digit height with dimension, bar graph and activatable backlight
- Minimal installation depth
- Easy 3-key operation for configuring the device
- International approvals such as ATEX, IECEx, FM, CSA, NEPSI, JPN Ex, UK-CA, UL C/US, marine approval
- SIL option for use in safety equipment according to IEC 61508 up to SIL 2

Endress+Hauser
People for Process Automation

Function and system design

Measuring principle

The RIA15 process indicator is integrated into the 4 to 20 mA or HART loop and transmits the measuring signal or HART process variables in digital form. The process indicator does not require an external power supply. It is powered directly from the current loop.

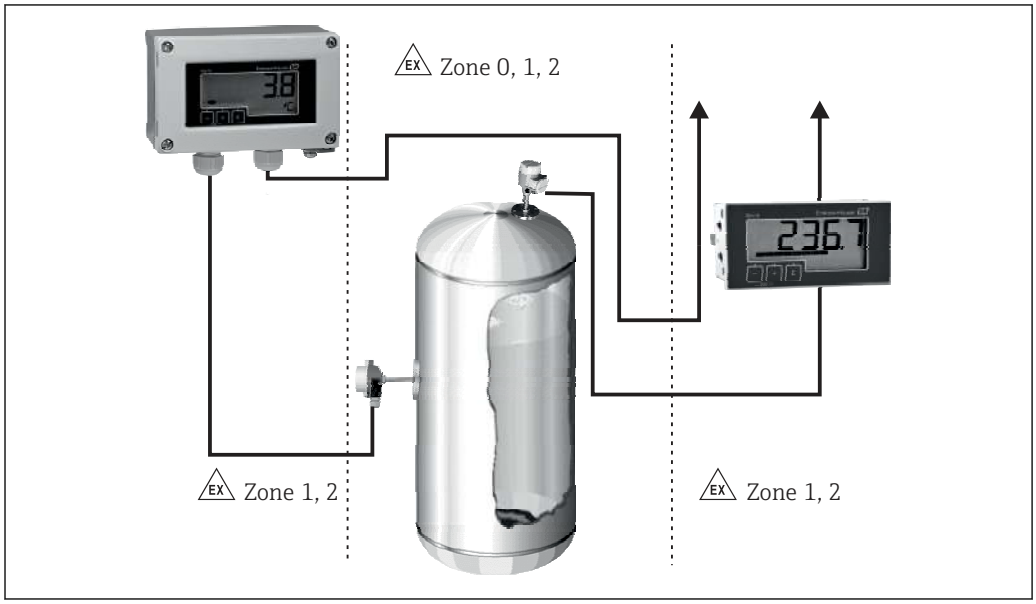
The device meets the requirements of the HART Communication Protocol Specifications and can be used with devices with HART Revision ≥ 5.0 and higher.

The LC display is easy to read even in bright sunlight and enables 5-digit, scalable measured value display. In addition to measured value display, the associated value dimension and a bar graph can be easily configured with simple 3-key operation.

The device can also be operated with backlighting where necessary. In such cases pay attention to the higher voltage drop.

For certain Endress+Hauser sensors/transmitters, the RIA15 can be used to configure the sensors in addition to displaying measured values. For this, the RIA15 must be ordered with the corresponding option "Level" or "Analysis".

Measuring system



1 RIA15 as field and panel display

Input

Voltage drop	
Standard device with 4 to 20 mA communication	≤ 1.0 V
Device with HART communication	≤ 1.9 V
Display lighting	Additional 2.9 V

HART input impedance
Rx = 40 kΩ
Cx = 2.3 nF

Measured variable

The 4 to 20 mA current signal or the HART signal is the input variable.

HART signals are not affected.

Measuring range

4 to 20 mA (scalable, reverse polarity protection)

Max. input current 200 mA

Power supply

Terminal assignment

NOTICE

SELV/Class 2 device

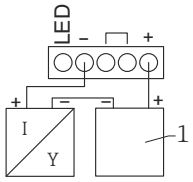
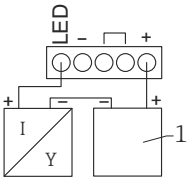
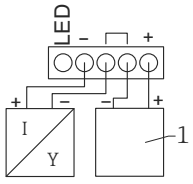
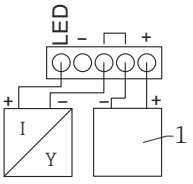
- The device may only be powered by a power unit with an energy-limited circuit in accordance with IEC 61010-1: 'SELV or Class 2 circuit'.

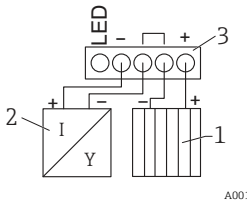
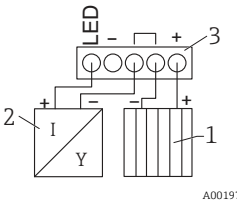
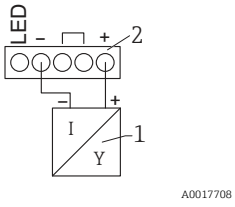
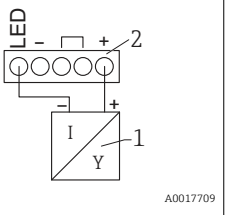
Device destroyed if current too high

- Do not operate the device at a voltage source without a current limiter. Instead, operate the device only in the current loop with a transmitter.

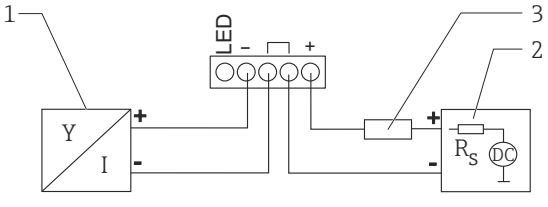
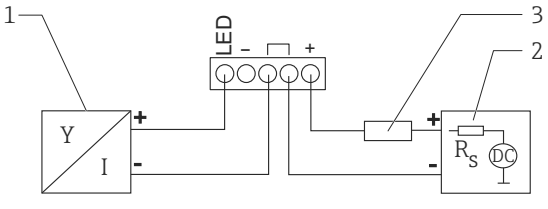
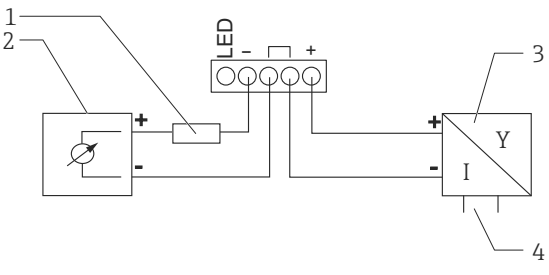
Terminal	Description
+	Positive connection, current measurement
-	Negative connection, current measurement (without backlighting)
LED	Negative connection, current measurement (with backlighting)
⌐¬	Auxiliary terminals (electrically connected internally)
⏚	Functional grounding: ▪ Panel-mounted device: Terminal on the rear of the housing ▪ Field device: Terminal in the housing

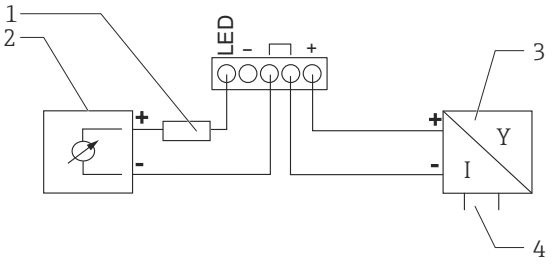
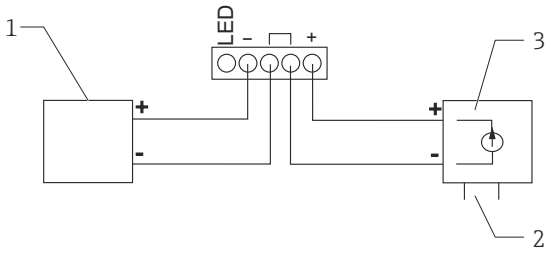
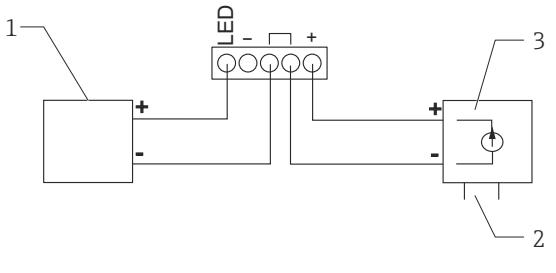
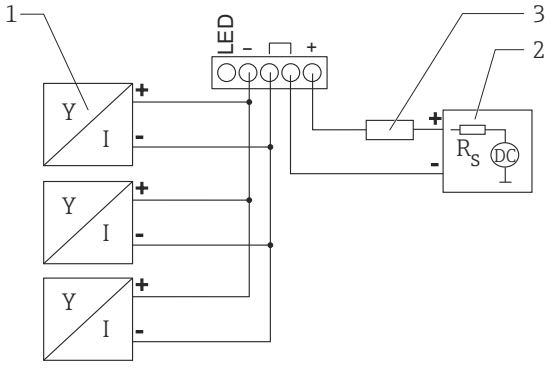
4 to 20 mA connection

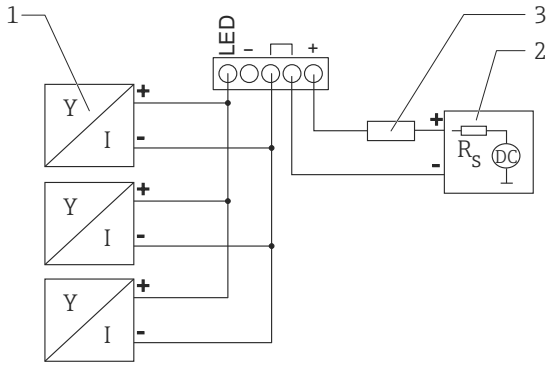
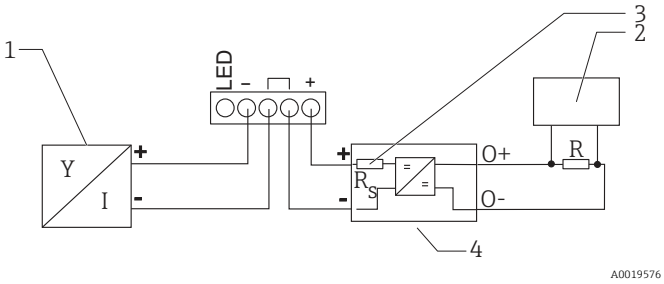
	Connection without backlighting	Connection with backlighting
Connection with transmitter power supply and transmitter	 A0017704 *1 Transmitter power supply*	 A0017705 *1 Transmitter power supply*
Connection with transmitter power supply and transmitter using the auxiliary terminal	 A0017706 *1 Transmitter power supply*	 A0017707 *1 Transmitter power supply*

	Connection without backlighting	Connection with backlighting
Connection with PLC and transmitter	 *1 PLC* *2 Transmitter* *3 RIA15*	 *1 PLC* *2 Transmitter* *3 RIA15*
Connection without transmitter power supply directly in the 4 to 20 mA circuit	 *1 4 to 20 mA power source* *2 RIA15*	 *1 4 to 20 mA power source* *2 RIA15*

HART connection

	Circuit diagram / Description
2-wire sensor with process indicator and transmitter power supply, without backlighting	 *1 Sensor* *2 Power supply* *3 Additional 230 to 600 Ω HART resistor inserted*
2-wire sensor with process indicator and transmitter power supply, with backlighting	 *1 Sensor* *2 Power supply* *3 Additional 230 to 600 Ω HART resistor inserted*
4-wire sensor with process indicator and transmitter power supply, without backlighting	 *1 HART resistor* *2 Current meter* *3 Sensor* *4 Power supply*

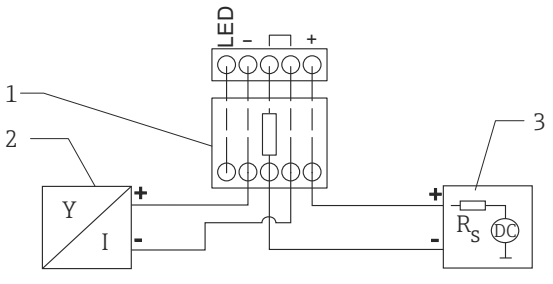
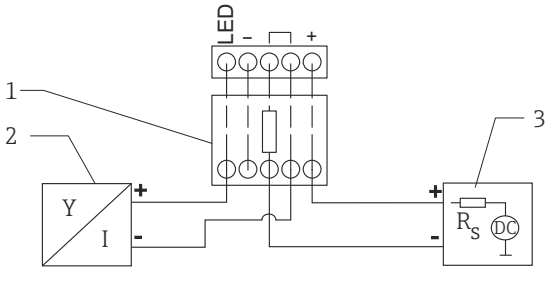
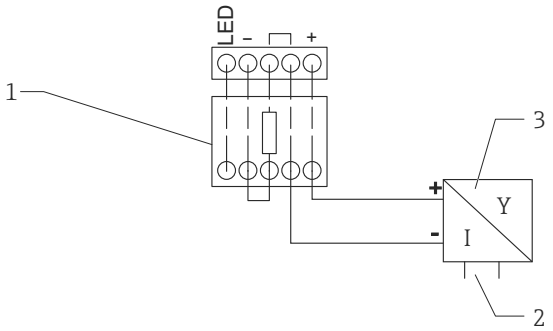
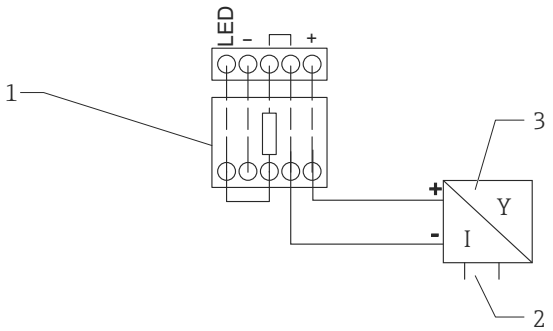
	Circuit diagram / Description
4-wire sensor with process indicator and transmitter power supply, with backlighting	 *1 HART resistor* *2 Current meter* *3 Sensor* *4 Power supply*
Current output with process indicator and actuator (e.g. actuator valve), without backlighting	 *1 Actuator* *2 Power supply* *3 Current output*
Current output with process indicator and actuator (e.g. actuator valve), with backlighting	 *1 Actuator* *2 Power supply* *3 Current output*
Multidrop 2-wire sensors with process indicator and transmitter power supply	 *1 Sensors* *2 Power supply* *3 HART resistor*

	Circuit diagram / Description
Multidrop 2-wire sensors with process indicator and transmitter power supply, with backlighting	 *1 Sensors* *2 Power supply* *3 HART resistor*
2-wire sensor with process indicator and active barrier (e.g. Endress+Hauser RN series) as transmitter power supply	 *1 Sensor* *2 HART primary master* *3 HART resistor* *4 Active barrier*

The 230 Ω HART communication resistor in the signal line is always necessary in the case of a low-impedance power supply. It must be installed between the power supply and the indicator.

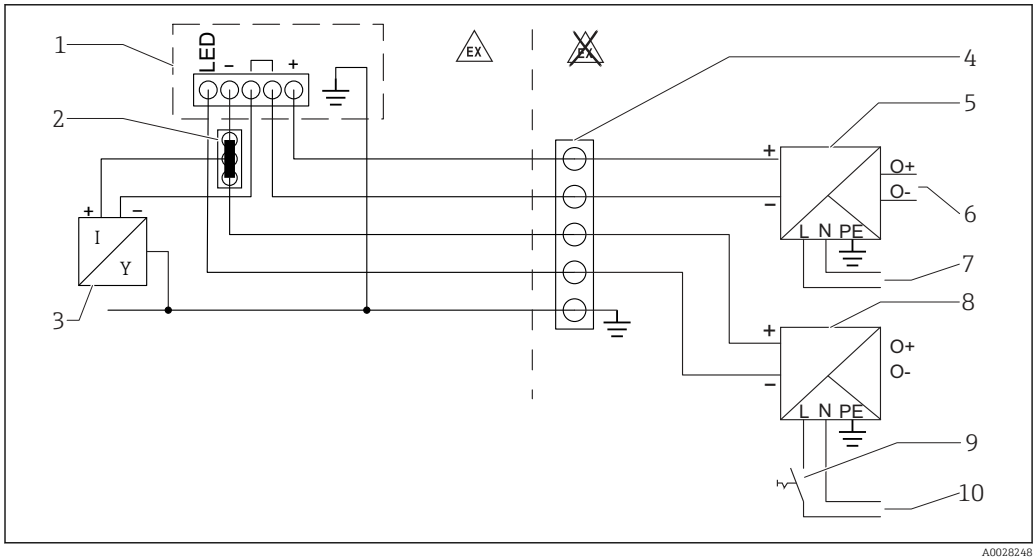
A HART communication resistance module is available as an accessory .

Connection with optional HART communication resistance module

	Circuit diagram / Description
2-wire sensor with process indicator and transmitter power supply, without backlighting	 A0020839 *1 HART communication resistance module* *2 Sensor* *3 Power supply*
2-wire sensor with process indicator and transmitter power supply, with backlighting	 A0020840 *1 HART communication resistance module* *2 Sensor* *3 Power supply*
4-wire sensor with process indicator and transmitter power supply, without backlighting	 A0020837 *1 HART communication resistance module* *2 Power supply 4-wire device* *3 Sensor*
4-wire sensor with process indicator and transmitter power supply, with backlighting	 A0020838 *1 HART communication resistance module* *2 Power supply 4-wire device* *3 Sensor*

Wiring with switchable backlighting

An additional current-limited power source (e.g. active barrier from the Endress+Hauser RN product family) is required to implement switchable backlighting. This power source is used to supply the LED backlighting of up to seven RIA15 process indicators without generating an additional voltage drop in the measuring loop. The backlighting can be switched on and off using an external switch.



1 *RIA15 process indicator*
2 *3-wire connector, e.g. WAGO 221 series*
3 *2-wire sensor*
4 *Terminal block on DIN rail*
5 *Active barrier (e.g. Endress+Hauser RN series)*
6 *4 to 20 mA output to the control unit*
7 *Power supply*
8 *Power source (e.g. Endress+Hauser RN series)*
9 *Switch to activate backlighting*
10 *Power supply*

Supply voltage

NOTICE

SELV/Class 2 device

- The device may be powered only by a power unit with an energy-limited circuit in accordance with UL/EN/IEC 61010-1 Paragraph 9.4 or Class 2 as per UL 1310: 'SELV or Class 2 circuit'.

The process indicator is loop-powered and does not require any external power supply. The voltage drop is ≤1 V in the standard version with 4 to 20 mA communication, ≤1.9 V with HART communication and an additional 2.9 V if display lighting is used.

Performance characteristics

Reference operating conditions

Reference temperature 25 °C ±5 °C (77 °F ±9 °F)

Humidity 20 to 60 % relative humidity

Maximum measured error

Input	Range	Measured error of measuring range
Current	4 to 20 mA Over range up to 22 mA	±0.1 %

Resolution

Signal resolution > 13 bit

Influence of ambient temperature

< 0.02 %/K (0.01 %/°F) of measuring range

Warm-up period	10 minutes

Installation

Mounting location	**Panel housing** The device is designed for use in a panel. Required panel cutout 45x92 mm (1.77x3.62 in) **Field housing** The field housing version is designed for use in the field. The unit is mounted directly on a wall, or on a pipe with a diameter of up to 2 " with the aid of an optional mounting bracket. An optional weather protection cover protects the device from the effects of weather conditions.
Orientation	**Panel housing** The orientation is horizontal. **Field housing** The device must be mounted in such a way that the cable entries point downwards.

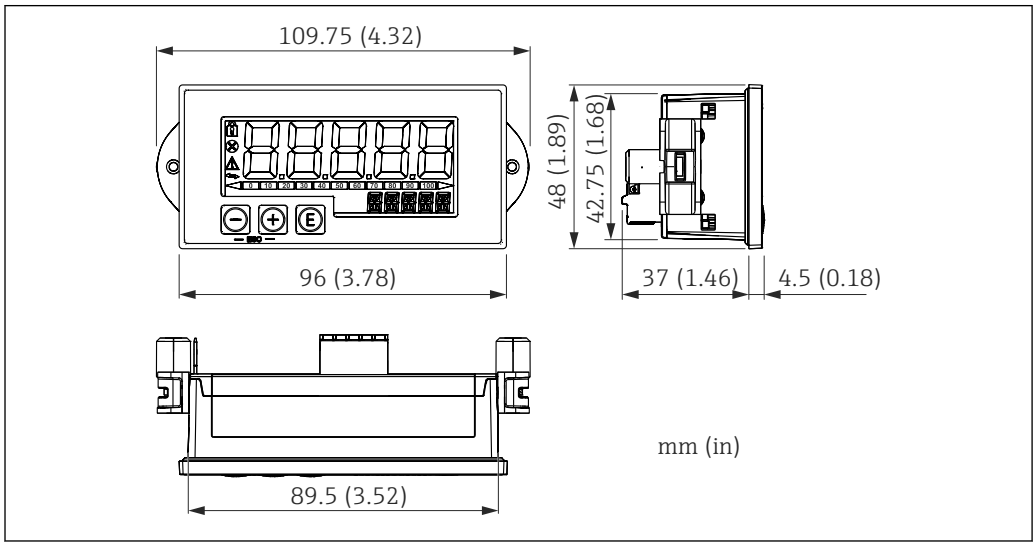
Environment

Ambient temperature range	−40 to 60 °C (−40 to 140 °F) At temperatures below −25 °C (−13 °F) the readability of the display can no longer be guaranteed.
Storage temperature	−40 to 85 °C (−40 to 185 °F)
Climate class	IEC 60654-1, Class B2
Operating altitude	Up to 5 000 m (16 400 ft) above MSL in accordance with IEC61010-1
Degree of protection	**Panel housing** IP65 at front, IP20 at rear **Field housing** Aluminum housing: degree of protection IP66/67, NEMA 4x Plastic housing: degree of protection IP66/67
Electromagnetic compatibility	▪ Interference immunity: As per IEC61326 (Industrial Environments) / NAMUR NE 21 Maximum measured error < 1 % o. MR ▪ Interference emission: As per IEC61326, Class B
Electrical safety	Class III, overvoltage protection category II, pollution degree 2

Mechanical construction

Design, dimensions

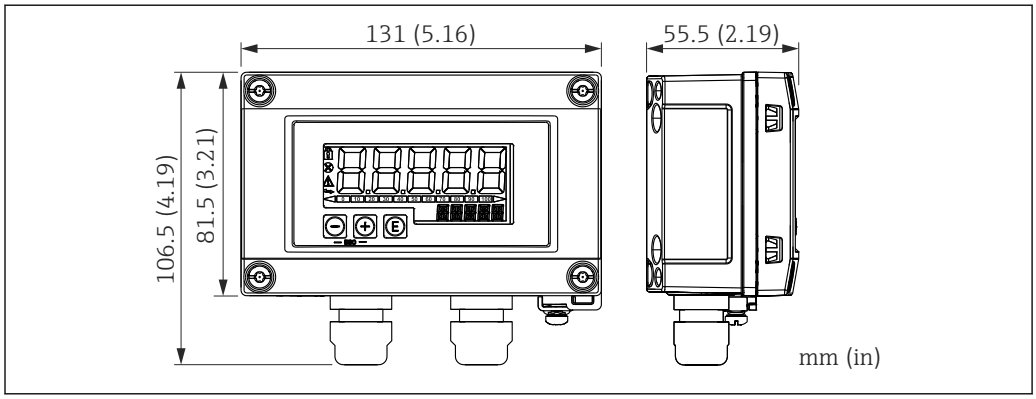
Panel-mount housing



2 Dimensions of the panel housing

Required panel cutout 45x92 mm (1.77x3.62 in), max. panel thickness 13 mm (0.51 in).

Field housing



3 Dimensions of the field housing incl. cable entries (M16)

Weight

Panel-mount housing

115 g (0.25 lb.)

Field housing

- Aluminum: 520 g (1.15 lb)
- Plastic: 300 g (0.66 lb)

Materials

Panel-mount housing

Front: aluminum

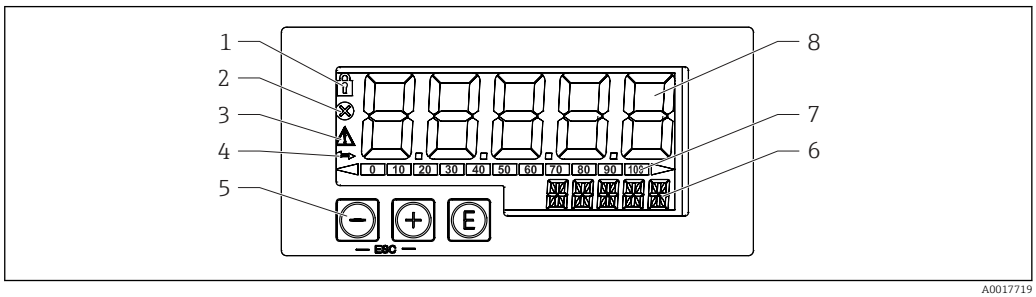
Rear panel: polycarbonate PC

Field housing

Aluminum or plastic (PBT with steel fibers, antistatic)

Operability

On-site operation



4 *Display and operating elements of the process indicator*

1 *Symbol: operating menu disabled*
2 *Symbol: error*
3 *Symbol: warning*
4 *Symbol: communication active (only for HART option)*
5 *Operating keys "-", "+", "E"*
6 *14-segment display for unit/TAG*
7 *Bar graph with indicators for under range and over range*
8 *5-digit 7-segment display for measured value, digit height 17 mm (0.67 in), display range -19999 to 99999*

The device is operated with the 3 operating keys on the front of the housing. The device setup can be disabled with a 4-digit user code. If the setup is disabled, a padlock symbol appears on the display when an operating parameter is selected.

 A0017716	Enter key; for calling up the operating menu, confirming the selection/configuration of parameters in the operating menu
 A0017714	Selecting and setting values in the operating menu; pressing the - and + keys simultaneously takes the user back up a menu level. The configured value is not saved (ESC)
 A0017715	

RIA15 in conjunction with the Micropilot FMR20/ FMR20B/FMR30B

The RIA15 can be used for the basic commissioning of the Micropilot.

The following settings can be made for the Micropilot via the 3 operating keys on the front of the RIA15:
- Units
- Empty and full calibration
- Mapping

The following order options are available to be able to use this function:
- FMR20 product structure, feature 620 "Accessory enclosed":
  Option R4: "Remote display RIA15, non-hazardous"
  Option R5: "Remote display RIA15, hazardous"
- Product structure, FMR20B and FMR30B, feature 620 "Accessory enclosed":
  Option R1: "Remote display RIA15, non-hazardous"
  Option R2: "Remote display RIA15, hazardous"
- RIA15 product structure, feature 030 "Input":
  Option 3: "4 to 20 mA current signal + HART + level"

RIA15 in conjunction with the Waterpilot FMX21

The RIA15 can be used for the basic commissioning of the Waterpilot FMX21 hydrostatic level sensor.

The following settings can be made for the FMX21 via the 3 operating keys on the front of the RIA15:
- Pressure unit
- Level unit
- Temperature unit
- Zero adjustment (only for gauge pressure measuring cells)

- Empty and full pressure adjustment
- Empty and full level calibration
- Reset to factory defaults

The following order options are available to be able to use this function:
- FMX21 product structure, feature 620 "Accessory enclosed":
  Option R4: "Remote display RIA15, non-hazardous"
  Option R5: "Remote display RIA15, hazardous"
- RIA15 product structure, feature 030 "Input":
  Option 3: "4 to 20 mA current signal + HART + level"
- RIA15 product structure, feature 620 "Accessory enclosed":
  Option PF: "1 x cable gland M16 with pressure compensation membrane for FMX21"

RIA15 in conjunction with the Gammapilot FMG50

The RIA15 can be used for the basic commissioning of the Gammapilot FMG50 transmitter.

The following settings can be made for the FMG50 via the 3 operating keys on the front of the RIA15:
- Basic configuration of the "Level" operating mode (continuous level measurement)
- Basic configuration of the "Point Level" operating mode (point level measurement)
- Basic configuration of the "Density" operating mode (density measurement)

The following order options are available to be able to use this function:
- Product structure FMG50, feature 620 "Accessory enclosed":
  Option PE: "Remote display RIA15, non-hazardous"
  Option PF: "Remote display RIA15, hazardous"
- RIA15 product structure, feature 030 "Input":
  Option 3: "4 to 20 mA current signal + HART + level ... FMG50"

RIA15 in conjunction with the Proservo NMS8x servo tank gauging device

The RIA15 can be used for the basic commissioning of the Proservo NMS80, NMS81 and NMS83 servo tank gauging devices.

The following settings can be made for the NMS8x via the 3 operating keys on the front of the RIA15:
- Measurement command
- Measurement status
- Balance status

The following order options are available to be able to use this function:
- Product structure NMS8x, feature 620 "Accessory enclosed":
  Option R5 "RIA15, aluminum, no cable"
- RIA15 product structure, feature 030 "Input":
  Option 5: "4 to 20 mA current signal + HART + level ... NMS8x"

RIA15 in conjunction with the Liquiline CM82

The RIA15 can be used for the basic commissioning of the Liquiline CM82 transmitter.

The following settings can be made for the CM82 via the 3 operating keys on the front of the RIA15:
- Units for the connected sensor
- Current output range
- Diagnostic information

The following order options are available to be able to use this function:
- CM82 product structure, feature 620 "Accessory enclosed":
  Option R4: "Remote display RIA15, non-hazardous"
  Option R5: "Remote display RIA15, hazardous"
- RIA15 product structure, feature 030 "Input":
  Option 4: "4 to 20 mA current signal + HART + analysis"

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

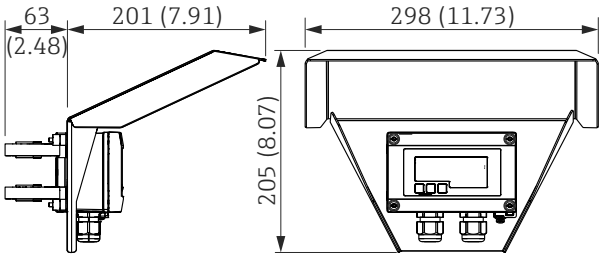
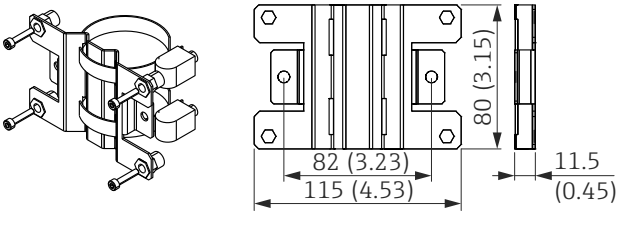
- Up-to-the-minute configuration data
- Depending on the device: Direct input of measuring point-specific information such as measuring range or operating language
- Automatic verification of exclusion criteria
- Automatic creation of the order code and its breakdown in PDF or Excel output format
- Ability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

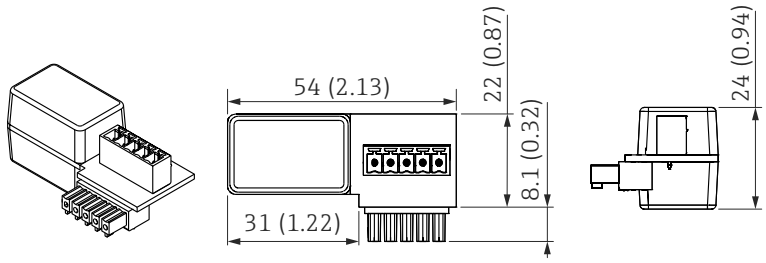
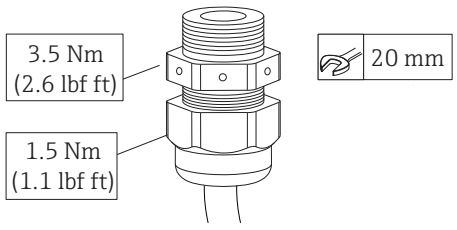
Accessories

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**.

Device-specific accessories

Weather protection cover	 *5 Dimensions of protective cover, engineering unit mm (in)*
Mounting kit for wall/ pipe mounting Material: SS 316L	 *6 Dimensions of mounting bracket, engineering unit mm (in)*

HART® communication resistance module	 7 *Dimensions of communication resistance module, engineering unit mm (in)*
M16 cable gland with integrated pressure compensation membrane	

Online tools

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

System components

RN series active barrier

Single- or two-channel active barrier for safe separation of 0/4 to 20 mA standard signal circuits with bidirectional HART transmission. In the signal duplicator option, the input signal is transmitted to two galvanically isolated outputs. The device has one active and one passive current input; the outputs can be operated actively or passively.

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

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

Endress+Hauser

People for Process Automation