Operating Instructions
RID16

Field indicator
with PROFIBUS® PA protocol

Endress+Hauser [EH]

People for Process Automation
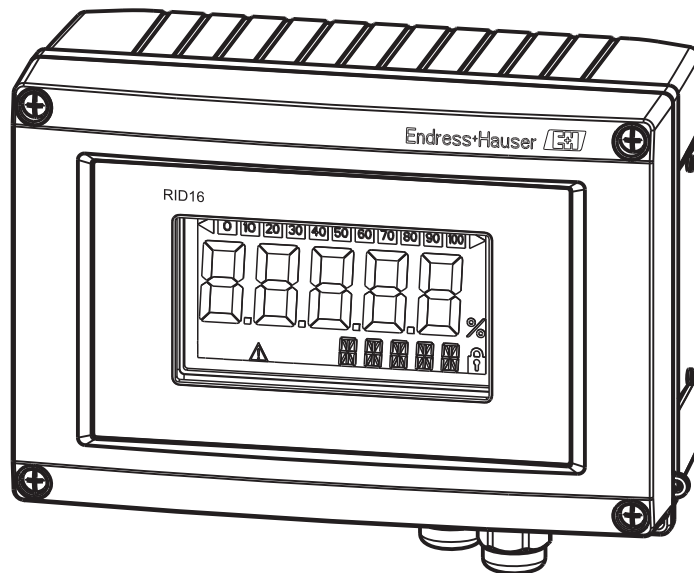
Brief overview

For quick and straightforward commissioning:

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▼

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Information about configuration and operating programs from other manufacturers. Information about setting the HW write protection	

▼

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1   Document information

1.1   Document function

These 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.

1.2   Document conventions

1.2.1   Safety symbols

Symbol	Meaning
⚠ DANGER A0011189-EN	**DANGER!** This symbol alerts you to a dangerous situation. Failure to avoid this situation will result in serious or fatal injury.
⚠ WARNING A0011190-EN	**WARNING!** This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in serious or fatal injury.
⚠ CAUTION A0011191-EN	**CAUTION!** This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in minor or medium injury.
NOTICE A0011192-EN	**NOTE** This symbol contains information on procedures and other facts which do not result in personal injury.

1.2.2   Electrical symbols

Symbol	Meaning
A0011197	**Direct current** A terminal to which DC voltage is applied or through which direct current flows.
A0011198	**Alternating current** A terminal to which alternating voltage is applied or through which alternating current flows.
A0017381	**Direct current and alternating current** • A terminal to which alternating voltage or DC voltage is applied. • A terminal through which alternating current or direct current flows.
A0011200	**Ground connection** A grounded terminal which, as far as the operator is concerned, is grounded via a grounding system.
A0011199	**Protective ground connection** A terminal which must be connected to ground prior to establishing any other connections.
A0011201	**Equipotential connection** A connection that has to be connected to the plant grounding system: This may be a potential equalization line or a star grounding system depending on national or company codes of practice.
A0012751	**ESD - electrostatic discharge** Protect the terminals from electrostatic discharge. Failure to observe this may result in destruction of parts of the electronics.

1.2.3 Symbols for certain types of information

Symbol	Meaning
A0011182	**Permitted** Indicates procedures, processes or actions that are permitted.
A0011183	**Preferred** Indicates procedures, processes or actions that are preferred.
A0011184	**Forbidden** Indicates procedures, processes or actions that are forbidden.
A0011193	**Tip** Indicates additional information.
A0011194	**Reference to documentation** Refers to the corresponding device documentation.
A0011195	**Reference to page** Refers to the corresponding page number.
A0011196	**Reference to graphic** Refers to the corresponding graphic number and page number.
1. , 2. , 3. ... A0015662	**Series of steps**
✔	**Result of a sequence of actions**
A0013562	**Help in the event of a problem**

1.2.4 Symbols in graphics

Symbol	Meaning
1, 2, 3, etc.	Item numbers
1. , 2. , 3. ... A0015662	Series of steps
A, B, C, etc.	Views
A-A, B-B, C-C, etc.	Sections
A0013441	Flow direction
A0011187	**Hazardous area** Indicates a hazardous area.
A0011188	**Safe area (non-hazardous area)** Indicates the non-hazardous area.

2   Safety instructions

2.1   Requirements for the personnel

The personnel for installation, commissioning, diagnostics and maintenance must fulfill the following requirements:
▶ 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 beginning work, the specialist staff must have read and understood the instructions in the Operating Instructions and supplementary documentation as well as in the certificates (depending on the application)
▶ Following instructions and basic conditions

The operating personnel must fulfill the following requirements:
▶ Being instructed and authorized according to the requirements of the task by the facility's owner-operator
▶ Following the instructions in these Operating Instructions

2.2   Designated use

▶ The device is a field indicator designed for connection to a fieldbus.
▶ The device is designed for installation in the field.
▶ The manufacturer accepts no liability for damages resulting from incorrect use or use other than that designated.
▶ Safe operation is only guaranteed if operators comply strictly with the Operating Instructions.
▶ Only operate the device in the designated temperature range.

2.3   Occupational safety

For work on and with the device:
▶ Wear the required personal protective equipment according to federal/national regulations.

2.4   Operational safety

Risk of injury!
▶ Operate the device in proper technical condition and fail-safe condition only.
▶ The operator is responsible for interference-free operation of the device.

Conversions to the device

Unauthorized modifications to the device are not permitted and can lead to unforeseeable dangers.
▶ If, despite this, modifications are required, consult with Endress+Hauser.

Repair

To ensure continued operational safety and reliability,
▶ Carry out repairs on the device only if they are expressly permitted.
▶ Observe federal/national regulations pertaining to repair of an electrical device.
▶ Use original spare parts and accessories from Endress+Hauser only.

Environmental requirements

If a plastic transmitter housing is permanently exposed to certain steam and air mixtures, this can damage the housing.
▶ If you are unsure, please contact your Endress+Hauser Sales Center for clarification.
▶ If used in an approval-related area, observe the information on the nameplate.

Hazardous area

Measuring systems for use in hazardous areas are accompanied by separate "Ex documentation", which is an integral part of these Operating Instructions. Strict compliance with the installation instructions and connection data as stated in this supplementary documentation is mandatory!

2.5 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. Endress+Hauser confirms this by affixing the CE mark to the device.

3   Identification

3.1   Device designation

3.1.1   Nameplate

The right device?
Compare the nameplate on the device with the following diagram:
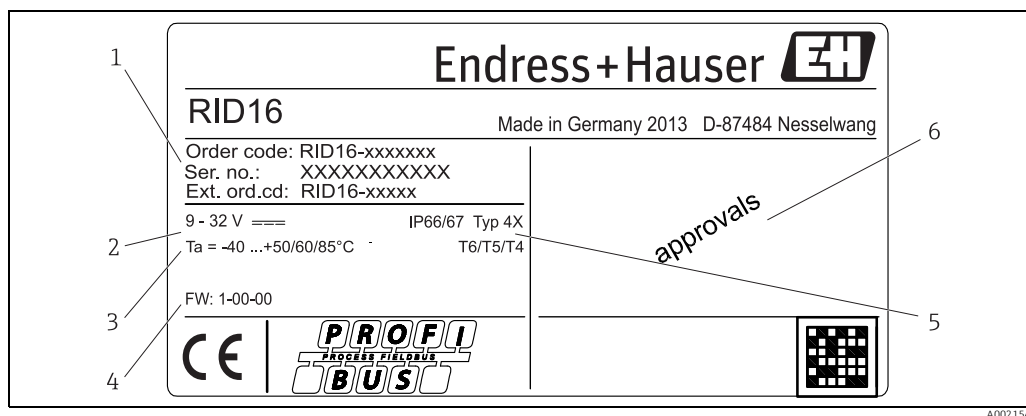
Fig. 1:   Nameplate of the field indicator (example)

1   Order code, serial number and extended order code of the device
2   Power supply
3   Ambient temperature range
4   Firmware version
5   Degree of protection and type of approval
6   Approvals

3.2   Scope of delivery

The scope of delivery of the field indicator comprises:
- Field indicator
- Brief Operating Instructions as hard copy
- Operating Instructions on CD-ROM
- ATEX - safety instructions for using a device approved for hazardous areas, optional
- Optional accessories (e.g. pipe mounting bracket), see 'Accessories' section

3.3   Certificates and approvals

CE mark, Declaration of Conformity

The 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.
The device complies with the standards EN 61 010-1 "Protection Measures for Electrical Equipment for Measurement, Control, Regulation and Laboratory Procedures" and with the EMC requirements of IEC/EN 61326.
The device described in these Operating Instructions therefore complies with the statutory requirements of the EU Directives. The manufacturer confirms that the device has been successfully tested by applying the CE mark.

The field indicator has successfully passed the PROFIBUS PA physical layer test. As a "non-active" bus user it does interfere with Profibus data transfer.
CSA General Purpose.

4   Installation

4.1   Incoming acceptance, transport, storage

Compliance with the permitted environmental and storage conditions is mandatory. Precise specifications are provided in the "Technical data" section .

4.1.1   Incoming acceptance

On receipt of the goods, check the following points:
• Is the packaging or the content damaged?
• Is the delivery complete? Compare the scope of delivery against the information on your order form. See also the "Scope of delivery" section (→ 🖹 8).

4.1.2   Transport and storage

Please note the following:
• Pack the device so that is protected against impact for storage and transport. The original packaging provides optimum protection.
• The permitted storage temperature is -40 to +80 ℃ (-40 to +176 ℉); it is possible to store the device at borderline temperatures for a limited period (48 hours maximum).

4.2   Installation conditions

The indicator is designed for use in the field.
The orientation depends on the readability of the display.
Operating temperature range:
-40 to +80 ℃ (-40 to +176 ℉)

NOTICE
Shorter display operating life at higher temperatures
▶   Where possible do not operate the device in the higher temperature range.

The display can react slowly at temperatures < -20 ℃ (-4 ℉).
The readability of the display is no longer guaranteed at temperatures < -30 ℃ (-22 ℉).
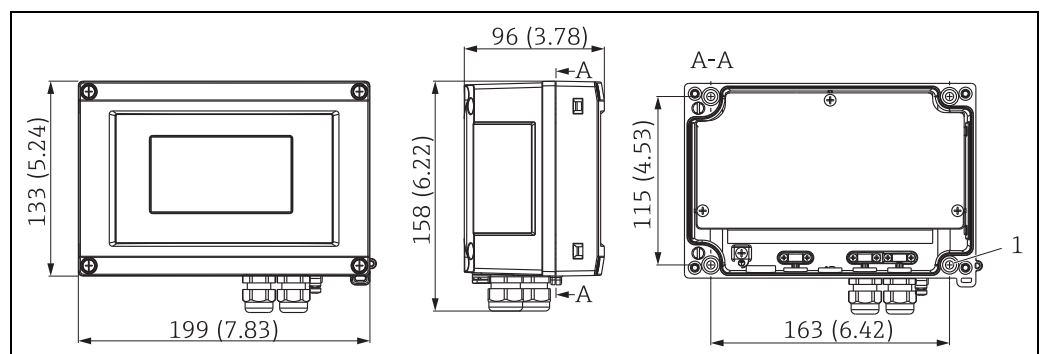
4.2.1   Dimensions

Fig. 2:   Dimensions of the field indicator; dimensions in mm (in)

4.2.2   Mounting location

Information about the conditions (such as the ambient temperature, degree of protection, climate class etc.) that must be present at the installation point so that the device can be mounted correctly, is provided in the "Technical data" section.

4.3 Installation instructions

The device can be mounted directly on the wall or the optional mounting bracket can be used for wall and pipe mounting (→ 🖻 3).

4.3.1 Mounting directly on the wall

Proceed as follows to mount the device directly on the wall:

1. Drill 4 holes

2. Fit the device on the wall with 4 screws (∅5 mm (0.2 in)).

4.3.2 Pipe mounting

The mounting bracket is suitable for pipes with a diameter between 1" - 5". The mounting kit consists of a mounting plate (item 1), 2 clamps (item 2) and 4 screws (item 3).
Proceed as follows to mount the device on a pipe:

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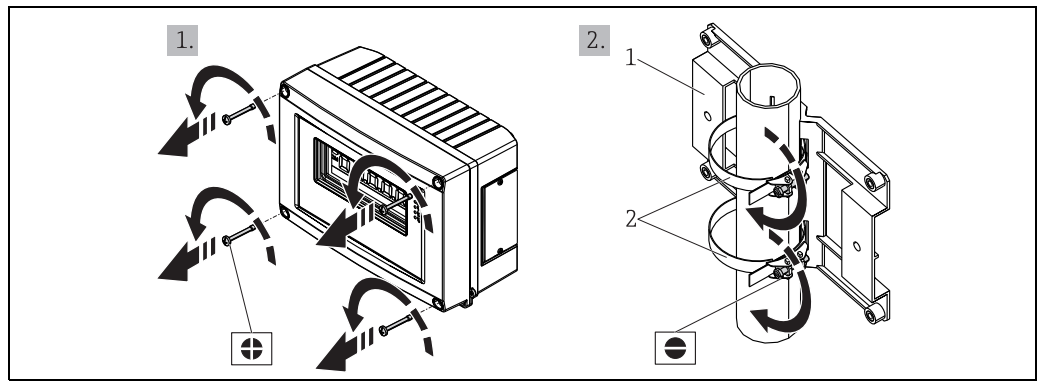
Fig. 3:   Mounting the field indicator on a pipe with mounting kit, steps 1-2

A0011270
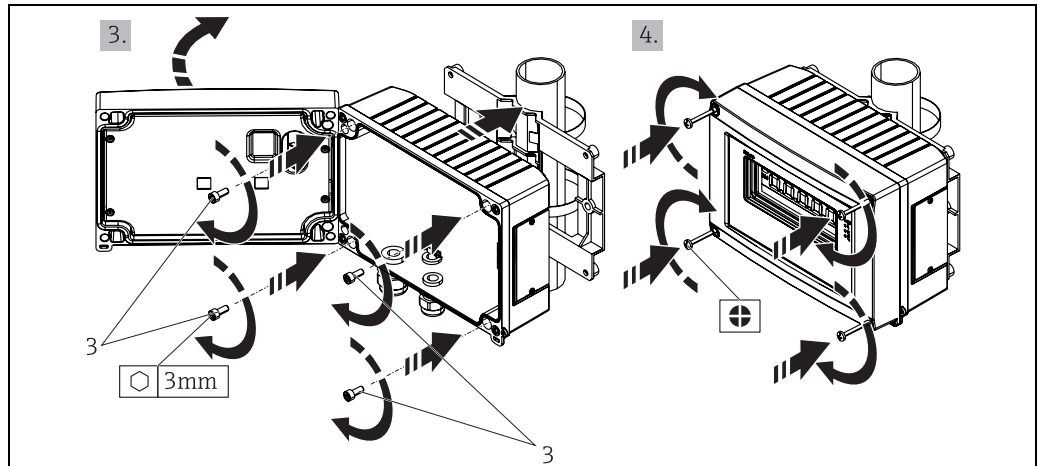
Fig. 4:   Mounting the field indicator on a pipe with mounting kit, steps 3-4

Mounting kit, comprising:
1:   Mounting plate
2:   Mounting bracket
3:   4 screws

4.4 Post-installation check

After installing the device, always run the following final checks:

Device condition and specifications	Notes
Is the device damaged (visual inspection)?	Visual inspection
Is the seal undamaged?	Visual inspection
Is the device securely fastened to the wall or the mounting plate?	-
Is the front of the housing securely closed?	-
Does the device correspond to the measuring point specifications, e.g. ambient temperature range etc.?	See 'Technical data' section,

5   Wiring

⚠ WARNING

Danger of explosion if unit is connected incorrectly in hazardous area

▶ When connecting Ex-approved devices please take special note of the instructions and connection schematics in the Ex-specific supplement to these Operating Instructions. If you have any questions, please do not hesitate to contact your E+H representative.

NOTICE

Electronics can be destroyed if unit is connected incorrectly

▶ Switch off power supply before installing or connecting the device. Failure to observe this may result in destruction of parts of the electronics.

▶ The post connector is only used to connect the display. If other devices are connected, this can result in the destruction of parts of the electronics.

Devices can be connected to the PROFIBUS® PA in two ways:

- Via a conventional cable gland → 🗎 15
- Via a fieldbus connector (optional, available as an accessory) → 🗎 15

5.1   Connecting the cable to the field indicator

5.1.1   Preparing to connect

Mounting the cable gland or fieldbus connector, plastic housing

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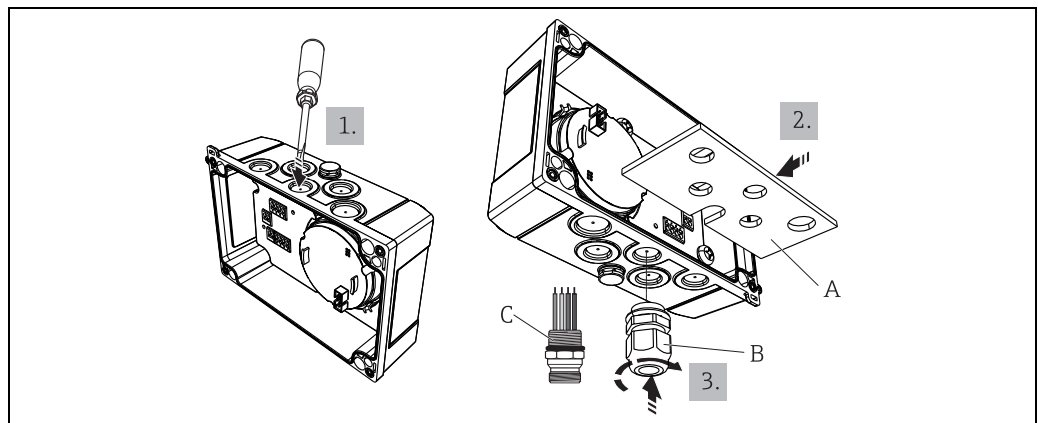
Fig. 5:   Mounting the cable gland or fieldbus connector

A   Mounting plate
B   Cable gland
C   Fieldbus connector

1.   First of all using a suitable tool, such as a screwdriver, open one of the indentations provided on the bottom of the device. Open the indentation at room temperature, as otherwise the housing could be damaged at very low temperatures.

2.   Install the mounting plate for the cable gland and fieldbus connector. The mounting plate is supplied with the field indicator, see the scope of delivery.

3.   Insert the cable gland or the fieldbus connector into the mounting plate. A cable gland is supplied with the field indicator, see the scope of delivery. The fieldbus connector is available as an accessory.

Mounting the cable gland or fieldbus connector, aluminum housing
In the case of the aluminum housing, the cable gland or the fieldbus connector can be screwed into the housing directly. A mounting plate is not required.

Procedure to wire the field indicator
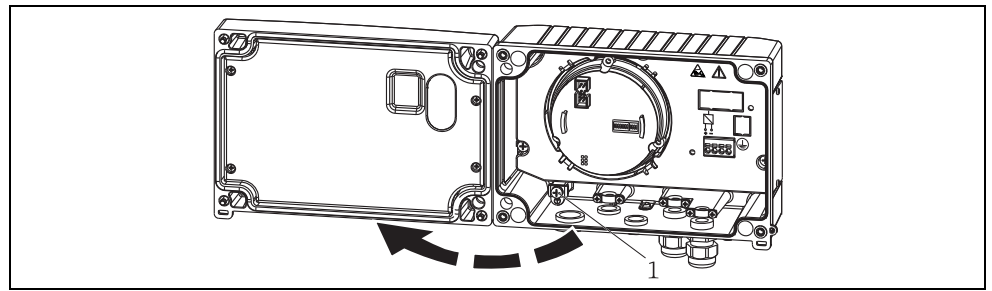
Fig. 6:   Opening the housing of the field indicator

1   Internal ground terminal (only aluminum housing)

1. Open the cable gland and open the housing cover.

2. Guide the cable through the cable gland.

3. Connect the cable as shown in → 🖾 8.

4. Mount the cable shield grounding clamps (only aluminum housing).
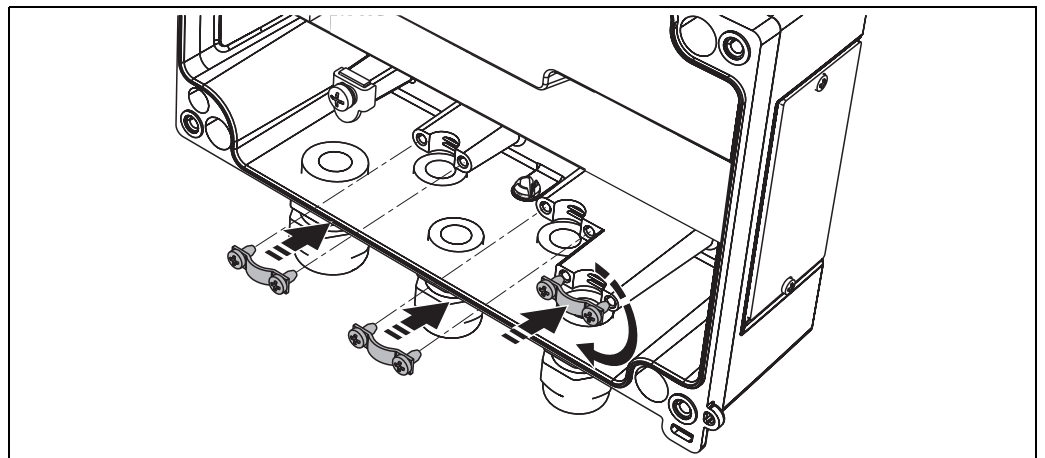
Fig. 7:   Mounting the cable shield grounding clamps (only aluminum housing)

5. Tighten the cable gland again and close the housing cover.

6. To avoid any mistakes when connecting the unit, follow the instructions in the "Post-connection check" section.

5.1.2   Quick wiring guide

Terminal assignment

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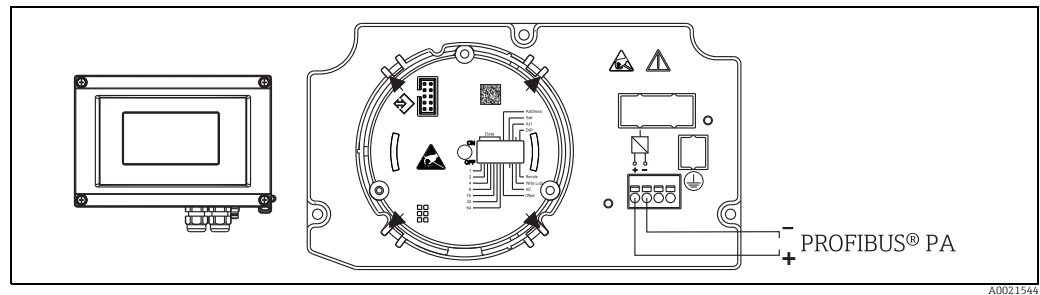
Fig. 8:   Terminal assignment

ESD - electrostatic discharge
Protect the terminals from electrostatic discharge. Failure to observe this may result in destruction or malfunction of parts of the electronics.

Terminal	Terminal assignment
+	PROFIBUS® PA connection (+)
-	PROFIBUS® PA connection (-)

5.2   Connection to PROFIBUS® PA

Devices can be connected to the PROFIBUS® PA in two ways:

- Via a conventional cable gland → 📄 15
- Via a fieldbus connector (optional, available as an accessory) → 📄 15

NOTICE
The device and fieldbus cable can be damaged by electrical voltage
▶ Switch off power supply before installing or connecting the device.
▶ It is recommended to ground the unit via one of the grounding screws.
▶ If the shield of the fieldbus cable is grounded at more than one point in systems that do not have additional potential equalization, mains frequency equalizing currents can occur that damage the cable or shield. In such cases the shielding of the fieldbus cable is to be grounded on one side only, i.e. it must not be connected to the ground terminal of the housing. The shield that is not connected should be insulated!

It is not advisable to loop the fieldbus via conventional cable glands. If you want to replace just one measuring device at a later date, you will have to interrupt bus communication.

5.2.1   Cable gland or cable entry

ℹ️   Please also observe the general procedure on → 🔖 12.
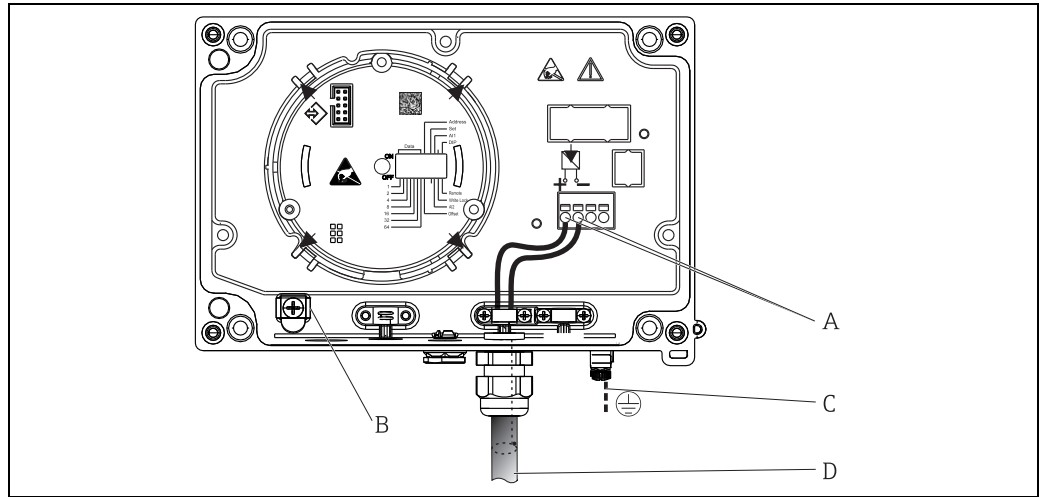
Fig. 9:   Connection to the PROFIBUS® PA fieldbus cable

A   Terminals - fieldbus communication and power supply
B   Internal ground terminal
C   External ground terminal
D   Shielded fieldbus cable

ℹ️   ▶ The terminals for the fieldbus connection (1+ and 2-) are not polarity sensitive.
     ▶ Conductor cross-section:
       – Max. 2.5 mm^2 (14 AWG)
     ▶ Always use a shielded cable for the connection.

5.2.2   Fieldbus connector

Optionally, a fieldbus connector can be installed in the field housing instead of a cable gland. Fieldbus connectors can be ordered as an accessory from Endress+Hauser (see Section 8 "Accessories").

The PROFIBUS® PA connection technology allows measuring devices to be connected to the fieldbus via standardized mechanical connections such as T-boxes, junction box modules etc.

This connection technology using pre-fabricated junction box modules and plug-in connectors offers considerable advantages over conventional wiring systems:
• Field devices can be removed, replaced or added at any time during normal operation. Communication is not interrupted.
• Installation and maintenance are considerably easier.
• Existing cable infrastructures can be used and extended immediately, e.g. when creating new star distributor systems using 4-channel or 8-channel distribution modules.

Shielding the supply line/T-box
Always use cable glands with good EMC properties, where possible with wraround cable shielding (Iris spring). This requires minimum differences in potential, and possibly potential equalization.

• The shielding of the PA cable may not be interrupted.
• The shielding connection must always be kept as short as possible.

Ideally cable glands with Iris springs should be used to connect the shield. The Iris spring, which is located inside the gland, connects the shield to the T-box housing. The shielding braid is located under the Iris spring.

When the armored thread is screwed tight, the Iris spring is pressed against the shield, thereby establishing a conductive connection between the shield and the metal housing. A junction box or a plug-in connection must be considered part of the shielding (Faraday shield). This applies in particular to remote boxes if such boxes are connected to a PROFI-BUS® PA device via a plug-in cable. In such cases, you must use a metal connector where the cable shielding is connected to the connector housing (e.g. pre-terminated cables).
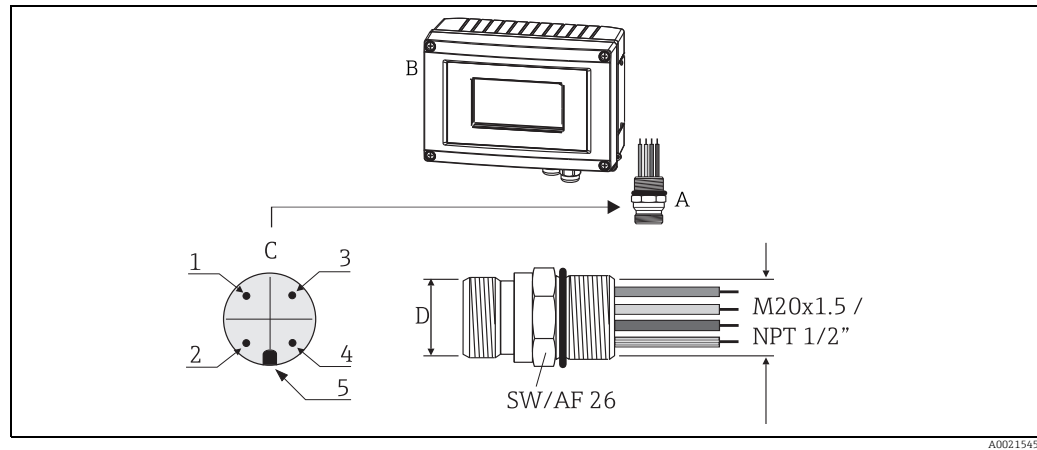
Fig. 10:   Connectors for connection to the PROFIBUS® PA fieldbus

A   Fieldbus connector
B   Field indicator
C   Connector on the housing (male)

	Pin assignment / color codes		
D	**7/8" connector**	**D**	**M12 connector**
1	Brown wire: PA+ (terminal 1)	1	Gray wire: shielding
2	Green-yellow wire: grounding	2	Brown wire: PA+ (terminal 1)
3	Blue wire: PA- (terminal 2)	3	Blue wire: PA- (terminal 2)
4	Gray wire: shielding	4	Green-yellow wire: grounding
5	Positioning key	5	Positioning key

Technical data for connector:
- IP 67 degree of protection (NEMA 4x)
- Ambient temperature range: −40 to +105 ˚C (−40 to +221 ˚F)

5.3   PROFIBUS® PA cable specifications

5.3.1   Cable type

Twin-core cables are generally advisable for connecting the device to the fieldbus. Following IEC 61158-2 (MBP), four cable types (A, B, C, D) can be used for FOUNDATION Fieldbus™, only two of which (cable types A and B) are shielded.

- Cable types A or B are particularly preferable for new installations. Only these types have cable shielding that guarantees adequate protection from electromagnetic interference and thus the most reliable data transfer. In the case of cable type B, several fieldbuses (same degree of protection) may be operated in one cable. No other circuits are permissible in the same cable.
- Practical experience has shown that cable types C and D should not be used due to the lack of shielding, since the freedom from interference frequently does not meet the require-ments described in the standard.

The electrical data of the fieldbus cable have not been specified but determine important characteristics of the design of the fieldbus, such as distances bridged, number of users, elec-tromagnetic compatibility, etc.

Suitable fieldbus cables (type A) from various manufacturers for non-hazardous areas are listed below:
- Siemens: 6XV1 830-5BH10

- Belden: 3076F
- Kerpen: CeL-PE/OSCR/PVC/FRLA FB-02YS(ST)YFL

5.3.2   Maximum overall cable length

The maximum network expansion depends on the type of protection and the cable specifications. The overall cable length combines the length of the main cable and the length of all spurs (>1 m/3.28 ft). Please note the following:

- The maximum permissible overall cable length depends on the cable type used.
- If repeaters are used, the maximum cable length is doubled. A maximum of three repeaters are permitted between the user and master.

	Type A	Type B
Cable structure	Twisted pair of cores, shielded	Individual or multiple pairs of twisted cores, complete shield
Wire cross-section	0.8 mm^2 (AWG 18)	0.32 mm^2 (AWG 22)
Loop resistance (direct current)	44 Ω/km	112 Ω/km
Characteristic impedance at 31.25 kHz	100 Ω ± 20%	100 Ω ± 30%
Attenuation constant at 39 kHz	3 dB/km	5 dB/km
Capacitive asymmetry	2 nF/km	2 nF/km
Envelope delay distortion (7.9 to 39 kHz)	1.7 ms/km	*
Shield coverage	90%	*
Max. cable length (incl. spurs >1 m)	1900 m (6233 ft)	1200 m (3937 ft)
* not specified		

5.3.3   Maximum spur length

The line between the distribution box and field device is described as a spur.
In the case of non-Ex applications, the max. length of a spur depends on the number of spurs (>1 m/3.28 ft):

Number of spurs	1 to 12	13 to 14	15 to 18	19 to 24	25 to 32
Max. length per spur	120 m (393 ft)	90 m (295 ft)	60 m (196 ft)	30 m (98 ft)	1 m (3.28 ft)

5.3.4   Number of field devices

In systems that meet FISCO with Ex ia type of protection, the line length is limited to max. 1000 m (3280 ft). A maximum of 32 users per segment in non-Ex areas or a maximum of 10 users in an Ex-area (Ex ia IIC) is possible. The actual number of users must be determined during the planning stage.

5.3.5 Shielding and grounding

Optimum electromagnetic compatibility (EMC) of the fieldbus system can only be guaranteed if the system components and, in particular, the lines are shielded and the shield forms as complete a cover as possible. A shield coverage of 90% is ideal.

- To ensure an optimum EMC protective effect, connect the shield as often as possible to the reference ground.
- For reasons of explosion protection, you should refrain from grounding however.

To comply with both requirements, the fieldbus system allows three different types of shielding:
- Shielding at both ends
- Shielding at one end on the feed side with capacitance termination at the field device
- Shielding at one end on the feed side

Experience shows that the best results with regard to EMC are achieved in most cases in installations with shielding at one end. Appropriate measures with regard to input wiring must be taken to allow unrestricted operation when EMC interference is present. These measures have been taken into account for this device. Operation in the event of disturbance variables as per NAMUR NE21 is possible with shielding at one end.
Where applicable, national installation regulations and guidelines must be observed during the installation!
Where there are large differences in potential between the individual grounding points, only one point of the shielding is connected directly with the reference ground. In systems without potential equalization, therefore, cable shielding of fieldbus systems should only be grounded on one side, for example at the fieldbus supply unit or at safety barriers, → ☑ 11.

A0011645
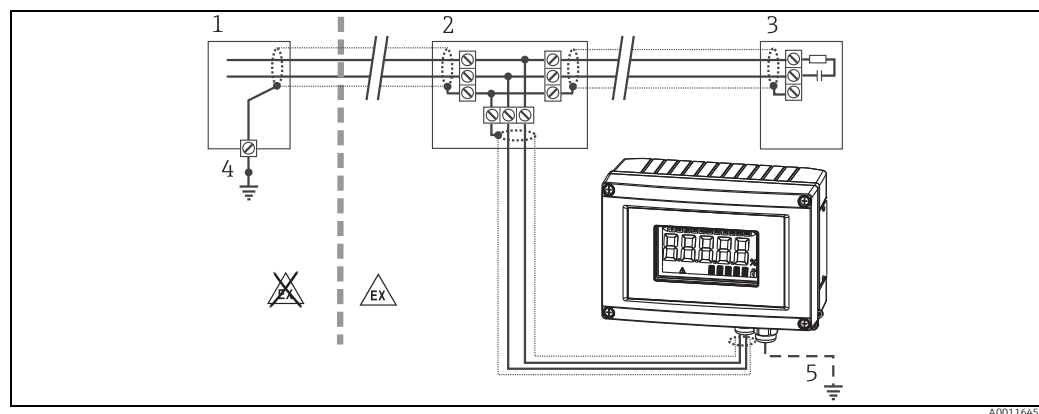
Abb. 11: Shielding and grounding of the fieldbus cable shield at one end

1 Supply unit
2 Distribution box (T-box)
3 Bus terminator
4 Grounding point for fieldbus cable shield
5 Optional grounding of the field device, isolated from cable shielding.

NOTICE

Equalizing current can damage the bus cable or bus shield
▶ If the shielding of the cable is grounded at more than one point in systems without potential matching, mains frequency equalizing currents can occur that damage the bus cable or the bus shield or have a serious effect on signal transmission. In such cases the shielding of the fieldbus cable is to be grounded on one side only, i.e. it must not be connected to the ground terminal of the housing. The shield that is not connected should be insulated!

5.3.6 Bus termination

The start and end of each fieldbus segment must always be terminated by a bus terminator. With various junction boxes (non-Ex), the bus termination can be activated via a switch. If

this is not the case, a separate bus terminator must be installed. Please also note the following:

- In the case of a branched bus segment, the measuring device furthest from the segment coupler represents the end of the bus.
- If the fieldbus is extended with a repeater then the extension must also be terminated at both ends.

5.3.7   Further information

General information and additional wiring instructions are provided in the manual "Guidelines for planning and commissioning, PROFIBUS ® DP/PA, field communication" (BA034S/04), which can also be found on the CD-ROM. (Also available at: → www.endress.de → Download).

5.4   Degree of protection

The devices fulfill the requirements for IP 67 degree of protection. Compliance with the following points is mandatory to ensure IP 67 protection is guaranteed after installation or after service work:

- The housing seal must be clean and undamaged when it is inserted into the groove. The seal should be cleaned, dried or replaced.
- The connecting cables must be of the specified outer diameter (e.g. M16 x 1.5, cable diameter 5 to 10 mm).
- Replace all unused cable entries with dummy plugs.
- The cable entry seal may not be removed from the cable entry.
- The housing cover and cable entry/entries must be closed securely.
- Install the device in such a way that the cable entries point downwards.

5.5   Post-connection check

After the electrical installation of the device, always run the following final checks:

Device condition and specifications	Notes
Are cables or the device damaged (visual inspection)?	-
Electrical connection	**Notes**
Does the supply voltage match the specifications on the nameplate?	9 to 32 V DC
Do the cables used comply with the specifications?	Fieldbus cable, → 🖹 16
Do the cables have adequate strain relief?	-
Are the power supply and signal cables correctly connected?	→ 🖹 14
Are all the screw terminals well tightened and have the connections of the spring terminals been checked?	→ 🖹 16
Are all the cable entries installed, tightened and sealed? Cable run with "water trap"?	
Are all housing covers installed and firmly tightened?	
Electrical connection, fieldbus system	**Notes**
Are all the connection components (T-box, junction boxes, connectors, etc.) correctly connected to one another?	-
Has each fieldbus segment been terminated by a bus terminator at both ends?	-
Has the max. length of the fieldbus cable, as defined in the fieldbus specifications, been observed?	→ 🖹 16
Has the max. length of the spurs, as defined in the fieldbus specifications, been observed?	
Is the fieldbus cable completely shielded (90%) and correctly grounded?	

6   Operating the field indicator

6.1   Quick operation guide

Operators have two options for configuring and commissioning the device:

1. Configuration programs

Device-specific parameters are configured via the E+H Service interface (CDI). A special device driver (DTM) for an FDT operating program (e.g. DeviceCare, FieldCare) is available for this purpose → 🗎 25

2. Miniature switches (DIP switches) for local configuration

You can make the following settings for the PROFIBUS® PA interface using miniature switches (DIP switches) on the rear of the display:

- Setting to specify whether operation is possible via DIP switches or remotely via the DTM
- Setting for the address of the bus users whose values are to be displayed
- Setting for an index (offset)

More information on the hardware settings via DIP switches → 🗎 26.

A0021500
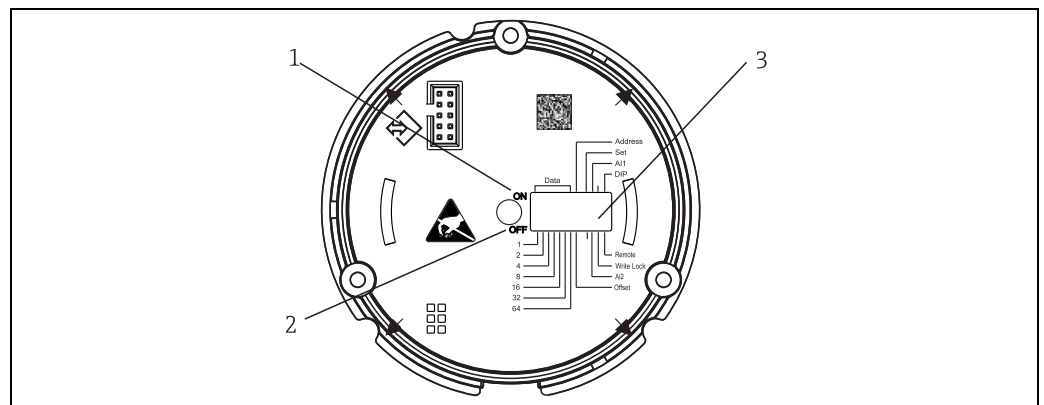
Fig. 12:   Hardware setting via DIP switches

1   ON switch position
2   OFF switch position
3   Write protection

> ℹ️ Only 2 display values are displayed when operating via the DIP switches, even if several display values have been configured via the configuration software.

6.1.1   Listener mode

The field indicator acts solely as a listener, i.e. it does not appear in the bus as an active user with its own specific address and it also does not increase the traffic in the bus.
The field indicator analyzes the devices active on the bus. Via their addresses these devices can be assigned to up to 8 channels if DTM operation is used, or up to 2 channels in the case of operation with DIP switches.

> ℹ️ Operation via the PROFIBUS protocol is not possible given the sole listener function of the indicator!

6.2   Display and operating elements

6.2.1   Display
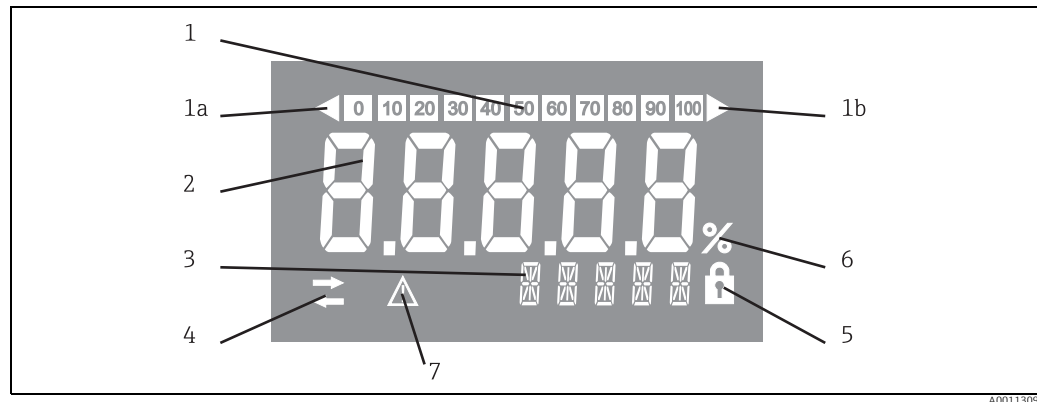
Fig. 13:   LC display of the field indicator

Item 1: Bar graph display in increments of 10% with indicators for underranging (item 1a) and overranging (item 1b)
Item 2: Measured value display, status indication "Bad measured value status"
Item 3: 14-segment display for units and messages
Item 4: 'Communication' symbol
Item 5: Parameters cannot be modified' symbol
Item 6: '%' unit
Item 7: 'Uncertain measured value status' symbol

The backlit LCD display contains a bargraph (0-100) and arrows to indicate measurements above or below the measurement range. Analog process values, digital status and failure codes are displayed in the 7-segment area. Here up to 8 values can be displayed with a alternating time between 2 and 20 seconds. Plain text can be displayed in the 14-segment area (text is limited to 16 characters and is scrolled if needed (marquee text)).
The indicator also displays the quality of the measured value. If the status of the displayed value is 'good' (quality code equal to or above 0x80), no symbol is lit and the indicator remains in the normal operational state. If the status of the displayed value is 'uncertain' (quality code between 0x40 and below 0x80), the 'Uncertain measured value status' symbol is lit. If the status is 'bad' (quality code below 0x40), within the 7-segment area the display will show "BAD-" and the channel number where the bad value is published. The entered text continues to be displayed in the 14-segment area and the bar graph is not shown.

6.3   PROFIBUS® technology

PROFIBUS is the open, digital communication system in factory and process automation that is standardized for all applications. PROFIBUS communication is incorporated into the international standards EN 50170 and IEC 61158. It replaces analog 4 to 20 mA transmission technology on a broad basis.
PROFIBUS has been around for over a decade and has systematically evolved to become the global market leader. With different protocol versions, interfaces and profiles, the modular PROFIBUS communication system can be applied universally and, with PROFIBUS versions geared towards specific industries, covers the wide range of requirements of factory and process automation in equal measure.
Configuration information is available in the manual "Guidelines for planning and commissioning, PROFIBUS® DP/PA, field communication" (BA034S). This manual is available on the CD-ROM supplied or can be downloaded at www.endress.com/download.

6.3.1   System architecture

The following figure shows an example of a PROFIBUS® network with the associated components.
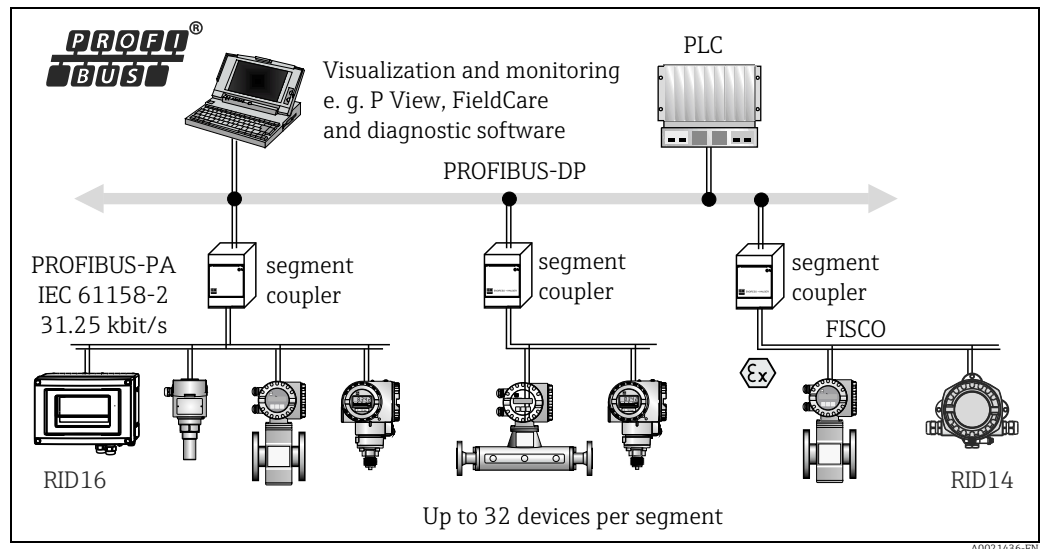

Fig. 14:   System integration with PROFIBUS® PA

PROFIBUS PA is always used in connection with a higher-level PROFIBUS DP control system. Given that PROFIBUS DP and PROFIBUS PA have different transmission media and baud rates, the PROFIBUS® PA segment is integrated into the PROFIBUS DP system via a segment coupler.
A segment coupler consists of a signal coupler and a bus power supply unit. One or more transmission rates are supported on the PROFIBUS DP side, depending on the model. The transmission rate for PROFIBUS PA is fixed at 31.25 kBit/s.

PROFIBUS PA has been specially designed to meet the needs of the process engineering sector. Three features set it apart from a PROFIBUS DP system:
• PROFIBUS PA supports operation in hazardous areas without any special requirements.
• The devices are powered via the bus cable (two-wire devices)
• The data are transmitted via a physical layer according to IEC 61158-2 (MBP), allowing users freedom in selecting the topology. With PROFIBUS PA, a tree structure, a line or a combination of both can be selected for the topology. The fieldbus cable can be looped through individual field devices but it is more advisable to connect the devices via a T-junction with a short spur.

Field devices can be configured on the fly with PROFIBUS PA.
The number of connected fieldbus devices depends on different factors, such as use in a hazardous area, spur length, cable types, current consumption of the field devices, etc.
The start and end of the bus segment must be terminated by a bus terminator.

> No power should be supplied via the bus if configuring the PROFIBUS PA indicator with the DTM via the CDI interface!

6.3.2   Bus access methods and data transmission

PROFIBUS PA uses the central master/slave principle as the bus access method. The PI (process interface, e.g. PLC), a Class 1 master, is located on the PROFIBUS DP system. The field devices are configured via a Class 2 PROFIBUS DP master, such as FieldCare. The field devices on the PROFIBUS PA segment are the slaves.

Segment coupler
From the point of view of the PROFIBUS DP master, segment couplers are transparent and are therefore not configured in the PLC, i.e. they only convert the signals and power the PROFIBUS PA segment.

They do not require any settings and they are not assigned an address.

Each field device on the PA segment is assigned a PROFIBUS DP address and acts like a DP slave. Each slave is only assigned to one Class 1 master. The masters communicate directly with the slaves:

- A Class 1 master, such as a PLC, retrieves the field device data with the cyclic service.
- A Class 2 master, such as FieldCare, sends and retrieves data from the field devices with the acyclic service.

A link is recognized by the master and is a user of the PROFIBUS DP system. It is assigned a DP address and is therefore no longer transparent for cyclic data exchange of the master with the field devices. Instead it retains the device data in a data buffer which can be read cyclically by a Class 1 master. Therefore a link must be configured.

On the PROFIBUS PA side the link behaves like a PA master. It retrieves the data cyclically from the field devices and saves them in a data buffer. Each field device is assigned to a PA address which may only occur once in the individual link. It can be present in another link segment however.

For acyclic data exchange with a Class 2 master the link is virtually transparent.

Once the link address (DP address) and the device address (PA address) have been specified, any field device can be addressed.

> Since the field indicator is only a listener, it does not appear as an active user on the bus and does not require its own bus address. Therefore the indicator can also not be addressed directly by the master. The indicator listens to the cyclic data traffic on the bus and presents the corresponding values on the display.

6.3.3 Device ID, addressing

Users must be addressed correctly for communication on the bus to function correctly. Each device on the PROFIBUS PA segment is given a unique bus address between 0 and 125. Addressing depends on the type of DP/PA interface (segment coupler or link).

> Since the indicator is only a listener and is not an active bus user, it does not require its own bus address. The bus address of the device whose values are to be shown on the indicator must be configured on the field indicator.

6.4   Configuration via interface & PC configuration software "FieldCare Device Setup"

⚠ WARNING

The device is not explosion-protected when the housing is open

▶ The device must be configured outside the hazardous area.

To configure the device via the FieldCare Device Setup software, connect the device to your PC. For this you will require a special interface adapter, the Commubox FXA291 (see 'Accessories' section).
The four-pin plug of the interface cable must be inserted into the corresponding socket in the device. The USB plug must be inserted into a free USB port on the PC.

Establishing a connection
When the device is connected the device DTM is not loaded automatically in FieldCare, i.e. the device must be added manually.

1. First of all add the communication DTM "CDI communication FXA291" to an empty project.

2. In the settings for the Comm DTM, set the baud rate to 2400 baud and set the COM port used.

3. Add the device DTM "RID14/16 / Vx.xx.xx" to the project via the "Add device...." function.

4. Continue the device configuration as described in these Operating Instructions for the device. All the parameters listed in these Operating Instructions can also be found in the FieldCare Device Setup. The DTM operating parameters can be found in the Appendix (→ 🕮 41).

A0021549-EN
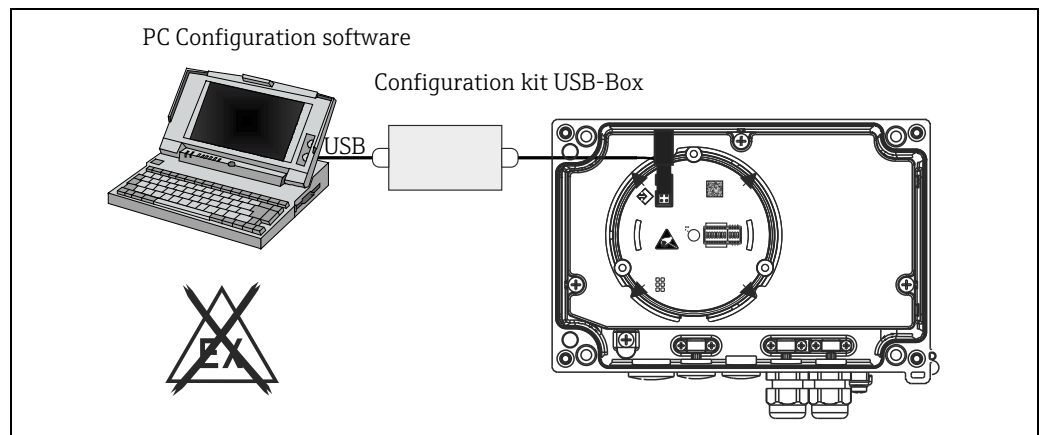
Fig. 15:   Configuration of the field indicator via the interface adapter

ℹ No power should be supplied via the bus if configuring the PROFIBUS® PA indicator with the DTM via the CDI interface!
To ensure a connection to the device can be established, operation must be set to "Remote" at the DIP switches. Furthermore write protection, which can be enabled and disabled via the DIP switches, must be disabled so that the parameters of the field indicator can be modified via the DTM.
The DIP switches are described in the "Operation" section (→ 🕮 21).

6.5 Hardware settings

Hardware write protection can be enabled and disabled via DIP switches inside the field indicator. When write protection is active, parameters cannot be modified. The current write protection status is displayed in the "Locking status" parameter (→ 🖹 44).

ESD - electrostatic discharge
Protect the terminals from electrostatic discharge. Failure to observe this may result in destruction or malfunction of parts of the electronics.

To set the DIP switches, proceed as follows:

1. Open the housing cover.

2. Configure the DIP switches. Switch to ON = function enabled, switch to OFF = function disabled.

3. Close the housing cover and secure it.

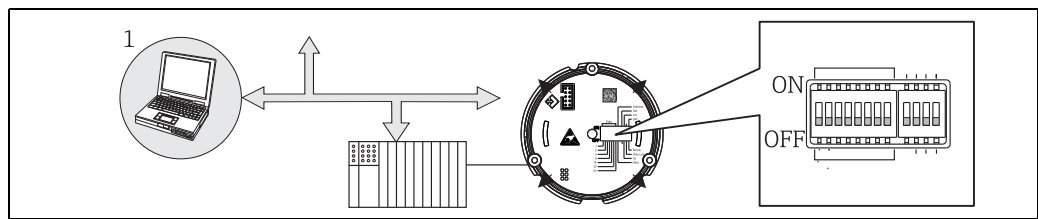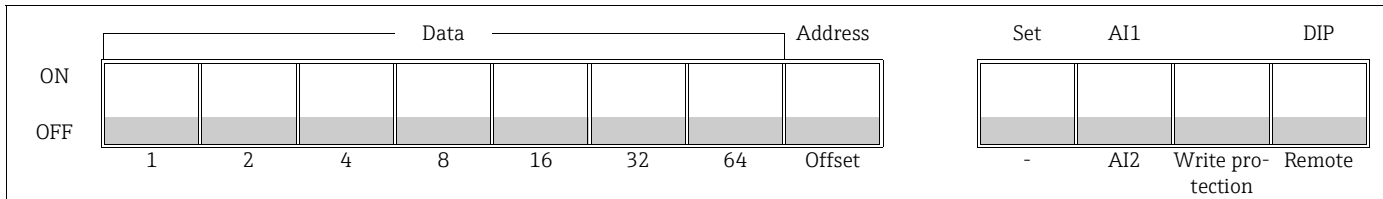*Fig. 16:   Hardware configuration of the field indicator*

A0021499

Assignment of the DIP switches

	Data							Address		Set	AI1		DIP
ON													
OFF													
	1	2	4	8	16	32	64	Offset		-	AI2	Write protection	Remote

6.5.1 Switching write protection on/off

Write protection is switched on and off via the "WRITE LOCK" DIP switch. When write protection is active ("WRITE LOCK" is "ON"), parameters cannot be modified. The current write protection status is displayed in the "Locking status" parameter. When write protection is active ("WRITE LOCK" is "ON"), a padlock symbol is lit on the display.

6.5.2 Choosing between operation via DIP switches and remote operation

When the device is operated via the DIP switches only 2 values are displayed even if more display values were configured previously in the configuration software.
The bargraph is not displayed when the device is operated via the DIP switches.

Via the "Remote/DIP" DIP switch users can specify whether configuration is possible onsite via the DIP switches or remotely via the DTM and PC configuration software. If the switch is set to "OFF" (remote), all the switches apart from "WRITE LOCK" are disabled. If the switch is set to "ON", all the DIP switches work and operation via the DTM is not possible.

6.5.3   Setting the bus address

The DIP switches can be used to set the address of the Profibus PA measuring device whose values are to be displayed on the field indicator.

The bus address is set as follows:

1. "AI1/AI2" DIP switch
    This DIP switch is used to select whether the configured address refers to analog input 1 (switch set to "ON") or analog input 2 (switch set to "OFF").

2. "Address/Offset" DIP switch set to "ON"
    If the switch is set to "ON", the bus address of the measuring device whose values are to be displayed can be set using DIP switches 1 to 64.
    Valid address range: 0 to 125

3. "Set" DIP switch set from "OFF" to "ON"
    Switch which is used to accept the offset setting in the device.
    The settings are only accepted if the "Set" switch is changed from "OFF" to "ON". If the "Set" switch is set to "ON", device power-on does not have any effect, nor does a change in the "Set" switch setting from "OFF" to "ON" if the write lock is enabled.

> If all the DIP switches are set for the address, address 127 can be configured. This deletes the settings for the channel. A channel that was previously configured can be disabled again in this way.
> Address 126 is not valid for the necessary Data Exchange Telegram. The device displays a configuration error with this address.

6.5.4   Configuring an offset

Using the DIP switch, it is possible to set the index (offset) of the first byte of the value to be displayed in relation to the set bus address of the data source.
An index (offset) of between 0 and 127 can be set via the DIP switches.

The setting is made as follows:

1. "AI1/AI2" DIP switch
    This DIP switch is used to select whether the configured index (offset) refers to analog input 1 (switch set to "ON") or analog input 2 (switch set to "OFF").

2. "Address/Offset" DIP switch set to "OFF"
    If the switch is in the "OFF" position, an index (offset) can be set for analog input 1 or analog input 2.

3. "Set" DIP switch set from "OFF" to "ON"
    Switch which is used to accept the index (offset) setting in the device.
    The settings are only accepted if the "Set" switch is changed from "OFF" to "ON". If the "Set" switch is set to "ON", device power-on does not have any effect, nor does a change in the "Set" switch setting from "OFF" to "ON" if the write lock is enabled.

7 Commissioning

7.1 Post-installation check

Make sure that all post-connection checks have been carried out before putting your devices into operation:
- Checklist for "post-installation check" → 📄 11
- Checklist for "post-connection check", → 📄 20

ℹ️ The functional data of the PROFIBUS® PA interface according to IEC 61158-2 (MBP) must be observed. A normal multimeter can be used to check that the bus voltage is between 9 and 32 V and that current consumption is approx. 11 mA.

7.2 Switching on the field indicator

Once the final checks have been successfully completed, it is time to switch on the supply voltage. The field indicator performs a number of internal test functions after power-up. As this procedure progresses, the following sequence of messages appears on the display:

Step	Display
1	All segments on
2	All segments off
3	Manufacturer name
4	Device name
5	Firmware version
6	Device revision
7a	A published value
7b	The current status message If the switch-on procedure fails, the appropriate status message is displayed, depending on the cause. A detailed list of the status messages, as well as the measures for troubleshooting, can be found in Section 9, 'Troubleshooting'.

Normal indicating mode commences as soon as the switch-on procedure is completed. Various measured values and/or status values appear on the display.

7.3 Commissioning

Note the following points:

- The files required for commissioning and network configuration can be obtained as described on → 📄 19.
- The field indicator acts solely as a listener. This means that the device listens on the bus for values that should be displayed. The device does not have an address of its own and is not an active bus user.

An address of a sensor connected to the PROFIBUS PA network can be selected for each of the 8 channels of the indicator. The first published value of the selected address is listed in the next step. The selected value is then displayed by the device. The first published value of the selected address is listed in the next step. The selected value is then displayed by the device.
If an address publishes more than one value, additional values can be selected manually. This address generates a configuration error in the indicator once the bus has been reconfigured or a published device has been removed. If only the displayed value of the device is no longer available, the indicator switches automatically to the next value published to this address.
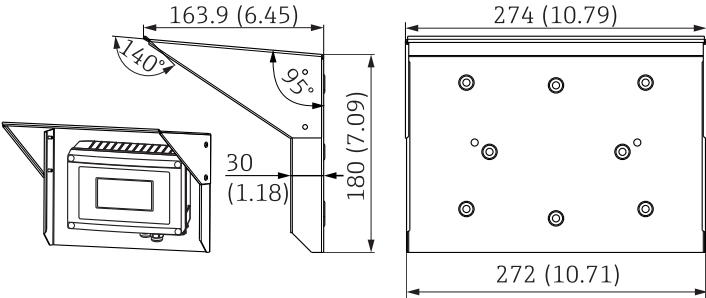
8   Maintenance

The device does not require any special maintenance and servicing work.

9   Accessories

Various accessories are available for the device, and these can be ordered with the device or at a later stage from Endress+Hauser. 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.

9.1   Device-specific accessories

Designation	Description
Pipe mounting kit (for pipes ⌀1-5")	• Plastic housing • Alu housing
Protective cover	 *Fig. 17: Dimensions in mm (in)*

9.2   Communication-specific accessories

Designation	Description
Fieldbus connector	
PROFIBUS® PA:	• NPT ½" → M12 • M20 → M12 • M20 → 7/8"
Interface cable	Commubox FXA291 incl. FieldCare Device Setup + DTM Library

10 Troubleshooting

10.1 Troubleshooting instructions

In the event of a critical error, you might need to return the indicator to the manufacturer for repair. Please follow the instructions for returning devices (→ 📄 34) before you send in the indicator.

Always start troubleshooting with the checklists below if faults occur after start up or during operation. This takes you directly (via various queries) to the cause of the problem and the appropriate remedial measures.

Checking the display	
No display visible - no connection to the fieldbus system	1. For fault elimination, see under "Faulty connection to the fieldbus system" 2. Other possible causes of error: – Defective electronics module » Test with spare module » Order spare part – Defective housing (internal electronics) » Test with spare housing » Order spare part 3. Defective field indicator → Replace field indicator
No display visible - connection to the fieldbus system is established, however	1. Check whether the display module is correctly connected to the electronics module, → 📄 12. 2. Defective display » Test with spare display » Order spare part 3. Defective electronics module » Test with spare module » Order spare part

Faulty connection to the fieldbus system	
A connection cannot be established between the fieldbus system and the indicator. Check the following points:	
Fieldbus connection	Check the data cable
Fieldbus connector (optional)	Pin assignment / check wiring, → 📄 15
Fieldbus voltage	Check whether a minimum bus voltage of 9 V DC is present at the +/- terminals. Permitted range: 9 to 32 V DC
Network structure	Check the permitted fieldbus cable length and number of spurs, → 📄 16
Basic current	Is there a basic current of min. 11 mA?
Terminating resistors	Has the PROFIBUS PA segment been terminated correctly? Each bus segment must always be terminated with a bus terminator at both ends (start and finish). Otherwise there may be interference in data transmission.
Current consumption Permitted feed current	Check the current consumption of the bus segment: The current consumption of the bus segment in question (= total of basic currents of all bus users) must not exceed the max. permissible feed current of the bus power supply unit.
Error messages in the PROFIBUS® PA configuration system	
→ 📄 30	

Other errors (application errors without an error message)	
Another error has occurred.	Possible causes and remedial measures → 📄 30

10.2 Status messages

The device displays warnings or alarms as status messages. If errors occur during commissioning, these errors are displayed immediately. A distinction is made here between the following 4 status categories:

Status category	Description	Error category
F	Fault detected ('Failure')	ALARM
C	Device is in the service mode ('Check')	WARNING
S	Specifications not observed ('Out of speci-fication')	
M	Maintenance required ('Maintenance')	

ALARM error category:
In the event of an error the display alternates between the error message (= letter F plus the defined error number, e.g. "F283") and "BAD" and the channel number every second. The bar-graph and the alarm signals are disabled in this case.
Other channels that are correctly configured continue to be shown alternately with the correct bargraph. As soon as the channel with the error is reached again, Fxxx) is shown alternately with "BAD" and the channel number once more.

WARNING error category:
The display alternates between the displayed values and the error message (= appropriate letter plus the defined error message, e.g. "C501").
If more than one value is displayed the display alternates between the values and the error message as follows:

- e.g. channel 1, channel 2 and channel 3 are configured for value display
- Value of channel 1 => error message => value of channel 2 => error message => value of channel 3 => error message => value of channel 1 => etc.

If no value is to be displayed and an error occurs, the display alternates between "- - - - -" and the error message.

As long as the error message is active the alternating time is set to 2 seconds. Once the error has been rectified the alternating time will return to its normal value which is entered in the "DISP_ALTERNATING_TIME" parameter.

7-segment display	14-segment display	Description	Cause of error / remedy
C501		Device reset	A reset has been performed. This status is then only visible in the last status message and just before the reset, if applicable.
M561	CHAN followed by channel info 1-8	Display overrun	Value too large to be displayed with the number of decimal places currently configured. Measured value is displayed with 5 dashes "-----".
F437	CHAN followed by channel info 1-8	Configuration error	An address has been selected that is currently not on the bus or does not send a value to the bus.
F283		Memory content	Int. RAM, ext. RAM or EEPROM error • Perform reset • Replace electronics
F261		Electronics board defective	Replace electronics

10.3   Spare parts

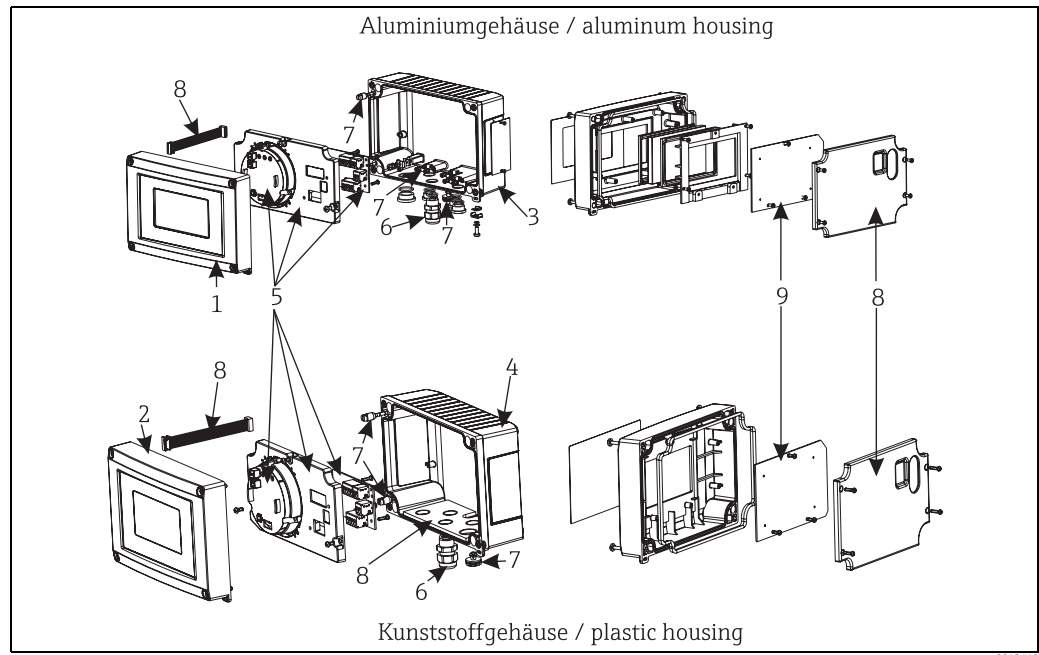When ordering spare parts, please specify the serial number of the device!

Fig. 18:   *Spare parts of the FOUNDATION Fieldbus™ indicator*

Item No.	Description	Order No.
1	Front aluminum, incl. film + glass	RID16X-GB
2	Front, plastic incl. film	RID16X-GA
3	Metal base (metric thread)	RIA16X-GD
	Metal base (NPT1/2 thread)	RIA16X-GE
4	Plastic base	RID16X-GC
5	Electronics cpl. (Ex + non Ex)	RID16X-EB
6	Cable gland M16x1.5 PA RAL7035	51004048
7	Set of small parts: Goretex filter, 2x hinged pins, shielding clamp (metal set = 5 brackets + screws / disks)	RIA16X-GG
8	Spare parts set, cover parts + connecting parts (contains cover plate for front, screw plate (plastic housing) + connecting cable for mainboard -> display board)	RIA16X-GF
9	LC display incl. display board	RIA16X-DA
-	Cable gland NPT 1/2 D4-8.5, IP68	51006845
-	Adapter M16x1.5 NPT1/2	71085029
-	Wall+pipe mounting kit (W08)	71089844

10.4 Software history and overview of compatibility

Revision history

The version number on the nameplate and in the Operating Instructions indicates the device release: XX.YY.ZZ (example 01.02.01).

XX	Change to main version. No longer compatible. The device and Operating Instructions change.
YY	Change to functions and operation. Compatible. The Operating Instructions change.
ZZ	Fixes and internal changes. No changes to the Operating Instructions.

Date	Software version	Software change	Documentation
10/2013	1.00.zz	Original software	BA01268K/09/EN/01.13 71232742

11 Return

The measuring device must be returned if repairs or a factory calibration are required, or if the wrong measuring device has been ordered or delivered. According to legal regulations Endress+Hauser, as an ISO-certified company, is required to follow certain procedures when handling returned products that are in contact with the medium.
To ensure the safe, quick and professional return of your device,
visit the Endress+Hauser website (www.services.endress.com/return-material) for information on the procedure to be followed and basic conditions.

12 Disposal

The device contains electronic components and must therefore be disposed of as electronic waste. Comply with local disposal regulations.

13   Technical data

13.0.1   Communication and data processing

Breakdown information
- Status message as per the fieldbus specification.

Switch-on delay
- 8 s

PROFIBUS® PA

- PROFIBUS® PA in accordance with EN 50170 Volume 2, IEC 61158-2 (MBP)
- FDE (Fault Disconnection Electronic) = 0 mA
- Data transmission rate: supported baud rate = 31.25 kBit/s
- Signal coding = Manchester II
- Connection data in accordance with IEC 60079-11 FISCO, Entity

Protocol-specific data

PROFIBUS® PA	
Basic data	
Indicator for PROFIBUS PA, can be used in conjunction with PROFILE 2 and PROFILE 3 (3.0, 3.01 and 3.02) devices	
Device master files (GSD)	How to acquire device master files (GSD) and device drivers: • FieldCare/DTM: www.endress.com → Select country → Solutions → Field Network Engineering → Fieldbus device integration → PROFIBUS → PROFIBUS® GSD files and certificates
Write protection	Write protection enabled by hardware setting (DIP switch)

13.0.2   Power supply

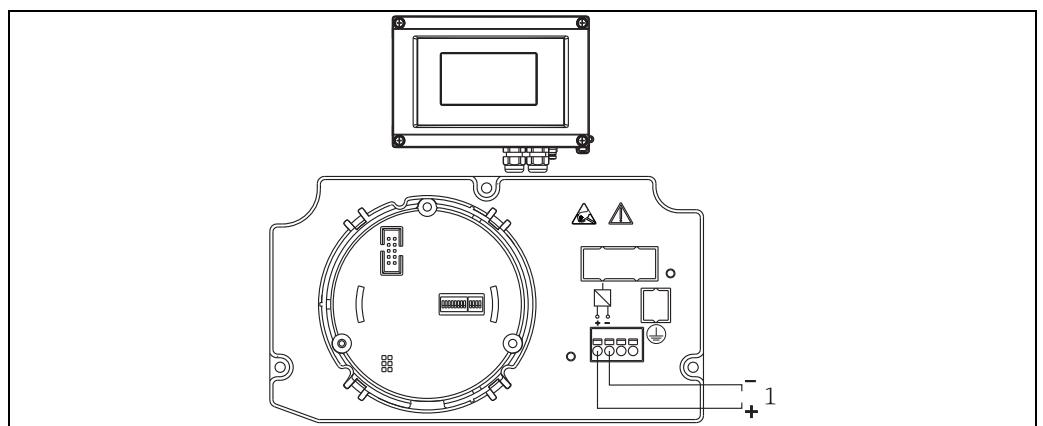### Electrical connection

Fig. 19:   Terminal assignment of the field indicator

1   PROFIBUS® PA

Supply voltage

Voltage is supplied via the fieldbus.
U = 9 to 32 V DC, polarity-independent (max. voltage U_b = 35 V).

Mains voltage filter

50/60 Hz

Current consumption

≤ 11 mA

Cable entry

The following cable entries are available:

▶ Thread NPT1/2
▶ Thread M20
▶ Thread G1/2
▶ 2x gland NPT1/2 + 1x dummy plug
▶ 2x gland M20 + 1 x dummy plug

13.0.3 Installation

Installation instructions

Mounting location
Wall or pipe mounting (see 'Accessories')
Orientation
No restrictions, the orientation depends on the readability of the display.

13.0.4 Environment

Ambient temperature limits

-40 to +80 °C (-40 to 176 °F)
The display can react slowly at temperatures < -20 °C (-4 °F).
The readability of the display is no longer guaranteed at temperatures < -30 °C (-22 °F).

Storage temperature

-40 to +80 °C (-40 to 176 °F)

Altitude

Up to 4000 m (13100 ft.) above mean sea level in accordance with IEC 61010-1, CSA 1010.1-92

Climate class

According to IEC 60654-1, Class C

Humidity

• Condensation permitted as per IEC 60 068-2-33
• Max. rel. humidity: 95% as per IEC 60068-2-30

Degree of protection

IP67. NEMA 4X.

Shock and vibration resistance

10 to 2000 Hz for 5g as per IEC 60 068-2-6

Electromagnetic compatibility (EMC)

CE EMC conformity
The device complies with all the requirements of IEC 61326-1:2006 and NAMUR NE21:2007.

This recommendation is a consistent determination as to whether the devices used in laboratories and in distributed control systems are immune to interference, thus increasing their functional safety.

ESD (electrostatic discharge)	IEC 61000-4-2	6 kV cont., 8 kV air	
Electromagnetic fields	IEC 61000-4-3	0.08 to 4 GHz	10 V/m
Burst (fast transients)	IEC 61000-4-4	1 kV	
Surge	IEC 61000-4-5	1 kV asym.	
Conducted RF	IEC 61000-4-6	0.01 to 80 MHz	10 V

Measuring category

Measuring category II as per IEC 61010-1. The measuring category is provided for measuring on power circuits that are directly connected electrically with the low-voltage network.

Degree of contamination

Pollution degree 2 as per IEC 61010-1.

13.0.5   Mechanical construction

Design, dimensions

Die-cast aluminum housing for general applications, or optional stainless steel housing
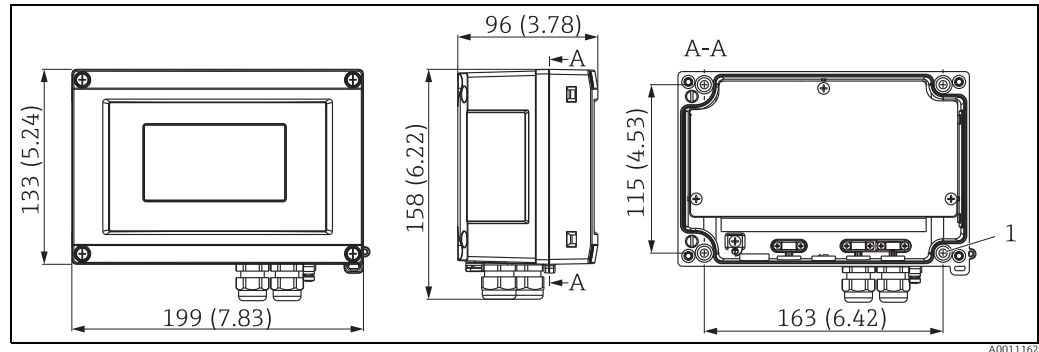
Fig. 20:   Dimensions of the field indicator; dimensions in mm (in)

1:   Bore for mounting directly on the wall or on optional mounting plate with 4 screws ⌀5 mm (0.2")

Weight

- Plastic housing: approx. 500 g (1.1 lb)
- Aluminum housing: approx. 1.7 kg (3.75 lb)

Material

Housing	Nameplate
Fiber-glass reinforced plastic PBT-GF30	Laser inscription
Aluminum AlSi12 (optional)	Laser-writable film, polyester

Terminals

Screw terminals for cables up to max. 2.5 mm^2 (14 AWG) plus ferrule

13.0.6 Human interface

Display elements
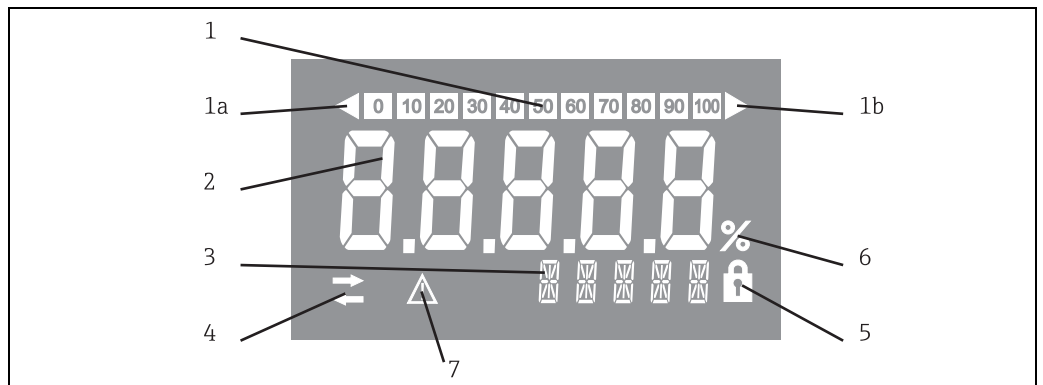
Fig. 21:   LC display of the field indicator

Item 1: Bar graph display in increments of 10% with indicators for underranging (item 1a) and overranging (item 1b)
Item 2: Measured value display, digit height 26 mm (1.02"), status indication "Bad measured value status"
Item 3: 14-segment display for units and messages
Item 4: 'Communication' symbol
Item 5: 'Parameters cannot be modified' symbol
Item 6: '%' unit
Item 7: 'Uncertain measured value status' symbol

- Display range
  -9999 to +99999

Configuration

PROFIBUS® PA
The parameters can either be configured remotely via the DTM and configuration software or locally via DIP switches.

13.0.7   Certificates and approvals

CE mark

The device meets the legal requirements of the EC directives. Endress+Hauser confirms that the device has been successfully tested by applying the CE 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.

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
- IEC 61326 series:
  Electromagnetic compatibility (EMC requirements)
- NAMUR:
  International user association of automation technology in process industries
  (www.namur.de)

CSA GP

CSA General Purpose

13.0.8   Documentation

▶ Overview brochure: System Components and Data Managers - Solutions for a Complete
   Measuring Point: FA00016K/09
▶ ATEX Safety instructions:
   – ATEX II2G Ex ia IIC: XA00099R/09

14   Appendix

14.1   DTM operating parameters

14.1.1   Operation menu

Display duration

Navigation	▣ Operation ▸ Alternating time
Description	Use this function to set the length of time the measured values are displayed if the values alternate on the display. The display only alternates automatically between values if more than one measured value is defined. Info: ▪ The Value 1 display - Value 8 display parameters are used to specify which measured values are shown on the local display. ▪ The display format of the displayed measured values is specified using the Format display parameter.
Visible offline	Yes
Writable offline	Yes
User entry	Time in seconds [2-20]
Factory setting	5

"Display value X" submenu

Navigation	▣ Operation ▸ Display value X
Description	Settings to display the measured values received via PROFIBUS.

Source address

Navigation	▣ Operation ▸ Display value X ▸ Source address
Description	Allows users to select the bus address of the device whose values are to be displayed.
Visible offline	Yes
Writable offline	Yes
User entry	Bus address [0-125]
Factory setting	0

Offset source

Navigation	▣ Operation ▸ Display value X ▸ Offset source
Description	Indicates the index (offset) of the first byte of the value to be displayed from the payload data received.
Visible offline **Writable offline**	Yes Yes
User entry	Offset [0-244]
Factory setting	0

Description

Navigation	▣ Operation ▸ Display value X ▸ Description
Description	Possibility to enter a user-defined text with a maximum of 16 characters. This text is shown below the value on the display. If the text is longer than 5 characters, it is displayed as marquee text.
Visible offline **Writable offline**	Yes Yes
User entry	Free text
Factory setting	

Enable % symbol

Navigation	▣ Operation ▸ Display value X ▸ Enable % symbol
Description	Switches on the %-symbol of the display.
Visible offline **Writable offline**	Yes Yes
Options	On, off
Factory setting	Off

Bargraph 0%

Navigation	▣ Operation ▸ Display value X ▸ Bargraph 0%
Description	Enter the minimum value (0%) for the bargraph. Only visible if data type = analog and bar graph on/off = on (Expert menu).
Visible offline **Writable offline**	Yes Yes
User entry	Numerical value
Factory setting	0

Bargraph 100%

Navigation	▣ Operation ▸ Display value X ▸ Bargraph 100%
Description	Enter the maximum value (100%) for the bargraph. Only visible if data type = analog and bar graph on/off = on (Expert menu).
Visible offline	Yes
Writable offline	Yes
User entry	Numerical value
Factory setting	100

Decimal places

Navigation	▣ Operation ▸ Display value X ▸ Decimal places
Description	Use this function to select the number of decimal places for the display value. This setting does not affect the accuracy of the device when measuring or calculating. Only visible if data type = analog.
Visible offline	Yes
Writable offline	Yes
Options	Automatic, xxxxx, xxxx.x, xxx.xx, xx.xxx, x.xxxx
Factory setting	Automatic

14.1.2   Diagnostics menu

Current diagnostics

Navigation	▣ Diagnostics ▸ Current diagnostics
Description	The current diagnostic message appears on the display. If two or more messages occur simultaneously, the message with the highest priority is shown on the display. This parameter is the input parameter for the NE107 module. The category and the channel are encoded in the value.
Visible offline	No
Writable offline	No
Options	GOOD, Display overflow ch x, Preset, Electronic, Memory, Configuration ch x

Last diagnostics

Navigation	▣ Diagnostics ▸ Last diagnostics
Description	The last diagnostic message with the highest priority appears on the display.
Visible offline	Yes
Writable offline	No

Actual diagnostics count

Navigation	▣ Diagnostics ▸ Actual diagnostics count
Description	Displays the number of diagnostic messages currently pending in the device.
Visible offline	No
Writable offline	No

Locking status

Navigation	▣ Diagnostics ▸ Locking status
Description	Displays the device locking status. The DIP switch for hardware locking is provided on the display module. Write access to the parameters is locked if write protection is enabled.
Visible offline	No
Writable offline	No
Only read access	Not locked, Hardware locked
Factory setting	Not locked

"Device information" submenu

Navigation	▣ Diagnostics ▸ Device information
Description	Displays general device information.

Device name

Navigation	▣ Diagnostics ▸ Device information ▸ Device name
Description	Displays the device name. Only read access.
Visible offline	Yes
Writable offline	No
Factory setting	RID16

Device tag

Navigation	▣ Diagnostics ▸ Device information ▸ Device tag
Description	Text for the tag name
Visible offline	Yes
Writable offline	Yes
User entry	Free text
Factory setting	Serial number of the device

Serial number

Navigation	▣ Diagnostics ▸ Device information ▸ Serial number
Description	Serial number of the device, text, max. 11 characters
Visible offline	Yes
Writable offline	No

Order code

Navigation	▣ Diagnostics ▸ Device information ▸ Order code
Description	Displays the order code of the device. It can also be found on the nameplate. The code is generated by reversibly transforming the extended order code which indicates the attribute of all the device features in the product structure. In contrast to the extended order code, the device features cannot be read directly from the order code. Uses of the order code • To order an identical spare device. • To identify the device quickly and easily, e.g. when contacting the manufacturer.
Visible offline	Yes
Writable offline	No

"Device reset" submenu

Navigation	▣ Diagnostics ▸ Device information ▸ Device reset
Description	Contains functions to reset the device.

Device reset

Navigation	▣ Diagnostics ▸ Device information ▸ Device reset ▸ Device reset
Description	Use this function to reset the device configuration - either entirely or in part - to a defined state.
Visible offline	No
Writable offline	No
Options	Not active, To factory defaults INFO: If this parameter is set to "To factory defaults" the device reboots.
Factory setting	Not active

14.1.3 Expert menu

The Expert menu contains all the parameters in the Operation and Diagnostics menus as well as the parameters listed below.

Enter access code

Navigation	▣ Expert ▸ Enter access code
Description	Disable the parameter write protection with the user-specific access code.
Visible offline	Yes
Writable offline	No
User entry	4-digit number
Factory setting	0

Access status tooling

Navigation	▣ Expert ▸ Access status tooling
Description	Displays access rights to the parameters
Visible offline	Yes
Writable offline	No
Options	Operator, Service, Production
Factory setting	Operator

"System" submenu

Navigation	▣ Expert ▸ System
Description	This submenu contains system settings.

Locking status

Navigation	▣ Expert ▸ System ▸ Locking status
Description	Displays the device locking status. The DIP switch for hardware locking is provided on the display module. Write access to the parameters is locked if write protection is enabled.
Visible offline	No
Writable offline	No
Only read access	Not locked, Hardware locked
Factory setting	Not locked

"Display" submenu

Navigation	⊟ Expert ▸ Display
Description	This submenu contains display settings.

Display duration

See the Operation menu (→ 🖺 41).

"Display value X" submenu

Navigation	⊟ Expert ▸ Display ▸ Display value X
Description	Settings to display the measured values received via PROFIBUS.

This submenu contains the following parameters in addition to those described in the Operation ▸ Display value X menu (→ 🖺 41).

Data type

Navigation	⊟ Expert ▸ Display ▸ Display value X ▸ Data type
Description	For selecting the data type (analog/digital) whose values are to be displayed.
Visible offline **Writable offline**	Yes Yes
Options	Analog, Digital
Factory setting	Analog

Data direction

Navigation	⊟ Expert ▸ Display ▸ Display value X ▸ Data direction
Description	For selecting the direction of the data that are to be displayed. It is possible to display data that are sent from the device (slave) to the master or from the master to the field device.
Visible offline **Writable offline**	Yes Yes
Options	From device, To device
Factory setting	From device

Factor value

Navigation	▣ Expert ▸ Display ▸ Display value X ▸ Factor value
Description	Use this function to enter a factor by which the measured value should be multiplied. Only visible if data type = analog
Visible offline **Writable offline**	Yes Yes
Options	1E-06, 1E-05, 1E-04, 1E-03, 1E-02, 1E-01, 1E-00, 1E+01, 1E+02, 1E+03, 1E+04, 1E+05, 1E+06
Factory setting	1E-00

Offset value

Navigation	▣ Expert ▸ Display ▸ Display value X ▸ Offset value
Description	Sets the offset for the measured value. The value indicated is added to the measured value. Only visible if data type = analog
Visible offline **Writable offline**	Yes Yes
User entry	Numerical value [-99999 to 99999]
Factory setting	0

Digital representation

Navigation	▣ Expert ▸ Display ▸ Display value X ▸ Digital representation
Description	Select how the digital values are represented. Only visible if data type = digital.
Visible offline **Writable offline**	Yes Yes
Options	1 = On; 0 = Off, 0 = On; 1 = Off, 1 = Open; 0 = Close, 0 = Open; 1 = Close, Display as decimal value
Factory setting	1 = Open; 0 = Close

"Diagnostics" submenu

Navigation	▣ Expert ▸ Diagnostics
Description	Settings to display the measured values received via PROFIBUS.

This submenu contains the following parameters in addition to those described in the Diagnostics menu (→ 🗎 43).

"Device information" submenu

Navigation	▣ Expert ▸ Diagnostics ▸ Device information
Description	Displays general device information.

Extended order code

Navigation	▣ Expert ▸ Diagnostics ▸ Device information ▸ Extended order code
Description	Displays the extended order code. The extended order code indicates the attribute of all the features of the product structure for the device.
Visible offline	Yes
Writable offline	No

Device revision

Navigation	▣ Expert ▸ Diagnostics ▸ Device information ▸ Device revision
Description	Displays the device revision.
Visible offline	Yes
Writable offline	No

Hardware version

Navigation	▣ Expert ▸ Diagnostics ▸ Device information▸ Hardware version
Description	Displays the hardware version and is used to identify the device. Only read access.
Visible offline	Yes
Writable offline	No

Manufacturer name

Navigation	▣ Expert ▸ Diagnostics ▸ Device information ▸ Manufacturer name
Description	Displays the manufacturer name.
Visible offline	Yes
Writable offline	No
Factory setting	Endress+Hauser

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