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02.00.xx (device software)

Operating Instructions
RID14

Fieldbus indicator
with FOUNDATION Fieldbus™ protocol

Endress+Hauser
People for Process Automation

Table of contents

1 About this document

1.1 Symbols

1.1.1 Safety symbols

⚠ DANGER
This symbol alerts you to a dangerous situation. Failure to avoid this situation will result in serious or fatal injury.

⚠ WARNING
This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in serious or fatal injury.

⚠ CAUTION
This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in minor or medium injury.

NOTICE
This symbol contains information on procedures and other facts which do not result in personal injury.

1.1.2 Electrical symbols

Symbol	Meaning
	Direct current
	Alternating current
	Direct current and alternating current
	**Ground connection** A grounded terminal which, as far as the operator is concerned, is grounded via a grounding system.
	**Potential equalization connection (PE: protective earth)** Ground terminals that must be connected to ground prior to establishing any other connections. The ground terminals are located on the interior and exterior of the device: ▪ Interior ground terminal: potential equalization is connected to the supply network. ▪ Exterior ground terminal: device is connected to the plant grounding system.

1.1.3 Symbols for certain types of information

Symbol	Meaning
	**Permitted** Procedures, processes or actions that are permitted.
	**Preferred** Procedures, processes or actions that are preferred.
	**Forbidden** Procedures, processes or actions that are forbidden.
	**Tip** Indicates additional information.
	Reference to documentation
	Reference to page

Symbol	Meaning
	Reference to graphic
▶	Notice or individual step to be observed
1., 2., 3...	Series of steps
	Result of a step
	Help in the event of a problem
	Visual inspection

1.1.4 Symbols in graphics

Symbol	Meaning	Symbol	Meaning
1, 2, 3,...	Item numbers	1., 2., 3...	Series of steps
A, B, C, ...	Views	A-A, B-B, C-C, ...	Sections
	Hazardous area		Safe area (non-hazardous area)

1.2 Documentation

For an overview of the scope of the associated Technical Documentation, refer to the following:

- *Device Viewer* (www.endress.com/deviceviewer): Enter the serial number from the nameplate
- *Endress+Hauser Operations app*: Enter serial number from nameplate or scan matrix code on nameplate.

1.2.1 Document function

The following documentation may be available depending on the version ordered:

Document type	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** The Operating Instructions contain all the information that is required in the various phases of the life cycle of the device: from product identification, incoming acceptance and storage, to mounting, connection, operation and commissioning through to troubleshooting, maintenance and disposal.
Description of Device Parameters (GP)	**Reference for your parameters** The document provides a detailed explanation of each individual parameter. The description is aimed at those who work with the device over the entire life cycle and perform specific configurations.

Document type	Purpose and content of the document
Safety Instructions (XA)	Depending on the approval, safety instructions for electrical equipment in hazardous areas are also supplied with the device. The Safety Instructions are an integral part of the Operating Instructions. Information on the Safety Instructions (XA) relevant to the device is provided on the nameplate.
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.

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 starting work, read and understand the instructions in the manual and supplementary documentation as well as the certificates (depending on the application).
- Follow instructions and comply with basic conditions.

The operating personnel must fulfill the following requirements:
- Are instructed and authorized according to the requirements of the task by the facility's owner-operator.
- Follow the instructions in this manual.

2.2 Intended use

- The device is a field indicator for connection to a fieldbus.
- It is designed for mounting in the field.
- The manufacturer accepts no liability for damages resulting from improper or non-intended use.
- Safe operation is only guaranteed if the Operating Instructions are observed.
- Only operate the device in the permitted temperature range.

2.3 Workplace safety

When working on and with the device:
- Wear the required personal protective equipment as per national regulations.

2.4 Operational safety

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

Modifications to the device

Unauthorized modifications to the device are not permitted and can lead to unforeseeable dangers!
- ▶ If modifications are nevertheless required, consult with the manufacturer.

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 the repair of an electrical device.
- ▶ Use only original spare parts and accessories.

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 EU directives listed in the device-specific EU Declaration of Conformity. The manufacturer confirms this by affixing the CE mark to the device.

2.6 IT security

Our warranty is valid only if the product is installed and used as described in the Operating Instructions. The product is equipped with security mechanisms to protect it against any inadvertent changes to the settings.

IT security measures, which provide additional protection for the product and associated data transfer, must be implemented by the operators themselves in line with their security standards.

3 Incoming acceptance and product identification

3.1 Incoming acceptance

Proceed as follows on receipt of the device:

1. Check whether the packaging is intact.
2. If damage is discovered:
   Report all damage immediately to the manufacturer.
3. Do not install damaged components, as the manufacturer cannot otherwise guarantee the material resistance or compliance with the original safety requirements, and can also not be held responsible for the consequences that may result.
4. Compare the scope of delivery against the contents of your order.
5. Remove all the packaging material used for transportation.
6. Do the data on the nameplate match the ordering information on the delivery note?
7. Are the technical documentation and all other necessary documents provided, e.g. certificates?

If one of the conditions is not satisfied, contact your Sales Center.

3.2 Product identification

The following options are available for identification of the device:
- Nameplate specifications
- Enter the serial number from the nameplate in the *Device Viewer* (www.endress.com/deviceviewer): all the information about the device and an overview of the Technical Documentation supplied with the device are displayed.
- Enter the serial number on the nameplate into the *Endress+Hauser Operations App* or scan the 2-D matrix code (QR code) on the nameplate with the *Endress+Hauser Operations App*: all the information about the device and the technical documentation pertaining to the device is displayed.

3.2.1 Nameplate

The right device?

The nameplate provides you with the following information on the device:
- Manufacturer identification, device designation
- Order code
- Extended order code
- Serial number
- Tag name (TAG)
- Technical values: supply voltage, current consumption, ambient temperature, communication-specific data (optional)
- Degree of protection
- Approvals with symbols

▶ Compare the information on the nameplate with the order.

3.2.2 Name and address of manufacturer

Name of manufacturer:	Endress+Hauser Wetzer GmbH + Co. KG
Address of manufacturer:	Obere Wank 1, D-87484 Nesselwang or www.endress.com

3.3 Storage and transport

Storage temperature: −40 to +80 °C (−40 to +176 °F)

Maximum relative humidity: < 95 % as per IEC 60068-2-30

Pack the device for storage and transportation in such a way that it is reliably protected against impact and external influences. The original packaging offers the best protection.

Avoid the following environmental influences during storage:
- Direct sunlight
- Proximity to hot objects
- Mechanical vibration
- Aggressive media

3.4 Certificates and approvals

For certificates and approvals valid for the device: see the data on the nameplate

Approval-related data and documents: www.endress.com/deviceviewer → (enter the serial number)

3.4.1 FOUNDATION Fieldbus™ certification

The field indicator successfully passed all tests and is certified and registered by the Fieldbus Foundation. The measuring system meets all the requirements of the following specifications:

- Certified in accordance with FOUNDATION Fieldbus™ specification
- FOUNDATION Fieldbus™ H1
- Interoperability Test Kit (ITK), revision status 6.1.2 (device certification number available on request): The device can also be operated with certified devices of other manufacturers
- Physical Layer Conformance Test of the Fieldbus FOUNDATION™ (FF-830 FS 2.0)

4 Mounting

4.1 Mounting requirements

The indicator is designed for use in the field.

Its orientation is determined by the readability of the display.

Operating temperature range: −40 to +80 °C (−40 to +176 °F)

NOTICE

Reduced operating life of the display at high temperatures

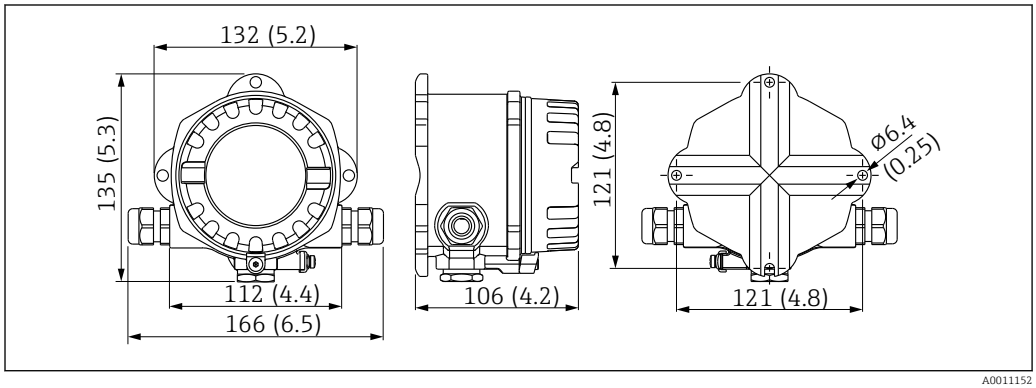
► If possible, do not operate the device in the upper temperature limit range.

The display may react slowly at temperatures < −20 °C (−4 °F).

Readability of the display can no longer be guaranteed at temperatures < −30 °C (−22 °F).

Altitude	Up to 2 000 m (6 561.7 ft) above sea level
Overvoltage category	Overvoltage category II
Pollution degree	Pollution degree 2

4.1.1 Dimensions



1 *Dimensions of the field indicator; dimensions in mm (in)*

4.1.2 Mounting location

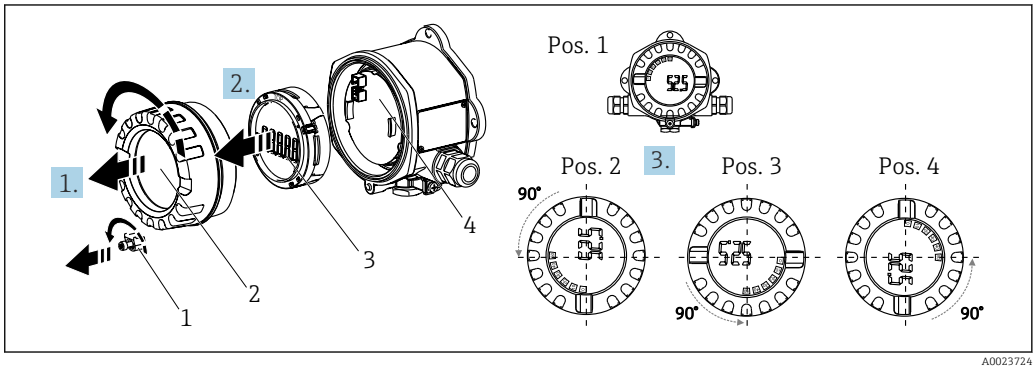
Information about the conditions (such as the ambient temperature, degree of protection, climate class, etc.) that must be present at the installation location so that the device can be mounted correctly is provided in the "Technical data" section.

4.2 Mounting the measuring device

The device can be mounted directly on the wall → 9. A mounting bracket is available for pipe mounting → 3, 10.

The backlit display can be mounted in four different positions → 9.

4.2.1 Turning the display



2 *Field indicator, 4 display positions, can be fitted in 90° steps*

The display can be turned in 90° steps.

1. Remove the cover clamp (1) and the housing cover (2).
2. Remove the display (3) from the electronics unit (4).
3. Turn the display to the desired position and then attach it to the electronics unit.
4. Clean the thread in the housing cover and housing base and lubricate if necessary. (Recommended lubricant: Klüber Syntheso Glep 1)
5. Screw the housing cover (2) and O-ring together and fit the cover clamp (1) back on.

4.2.2 Direct wall mounting

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

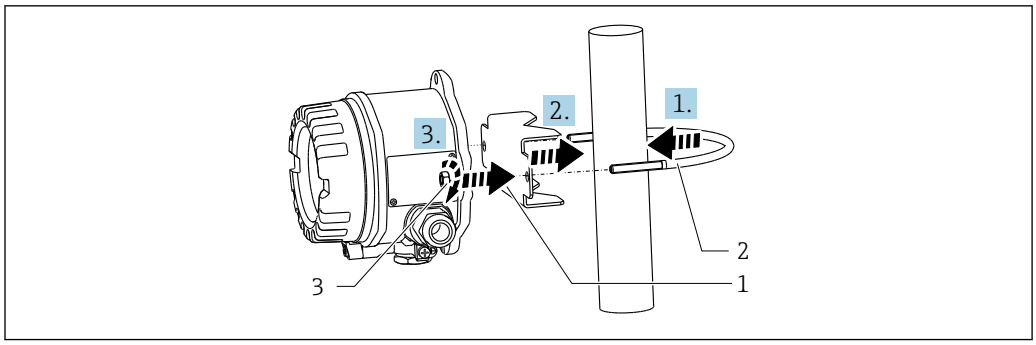
1. Drill 2 holes
2. Fit the device on the wall with 2 screws (Ø 5 mm (0.2 in)).

4.2.3 Pipe mounting

The mounting bracket is suitable for pipes with a diameter between 1.5" and 3.3".

The additional mounting plate must be used for pipes with a diameter between 1.5" and 2.2". The mounting plate is not necessary for pipes with a diameter between 2.2" and 3.3".

Proceed as follows to mount the device on a pipe:



3 Mounting the field indicator on a pipe with a mounting bracket for pipe diameters 1.5" to 2.2"

1 Mounting plate
2 Mounting bracket
3 2 M6 nuts

4.3 Post-mounting check

After installing the device, always perform the following checks:

Device condition and specifications	Notes
Is the measuring device damaged?	Visual inspection
Is the seal undamaged?	Visual inspection
Is the device securely fastened to the wall or the mounting plate?	-
Is the housing cover fixed tightly?	-
Does the device correspond to the measuring point specifications, e.g., ambient temperature etc.?	See 'Technical data' section

5 Electrical connection

5.1 Connecting requirements

For information on the connection data, see the "Technical data" section.

NOTICE

Destruction or malfunction of parts of the electronics

- ESD - Electrostatic discharge. Protect the terminals from electrostatic discharge.

WARNING

Danger of explosion if the device is incorrectly connected in the hazardous area

- When connecting Ex-certified devices, please take special note of the instructions and connection schematics in the Ex-specific supplement to these Operating Instructions.

NOTICE

The electronics can be destroyed if unit is connected incorrectly

- Switch off the power supply before installing or connecting the device. Failure to observe this may result in the 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.

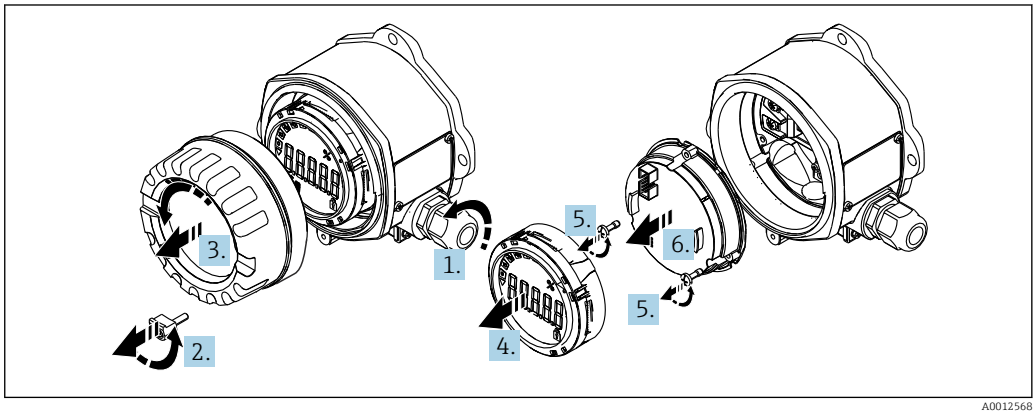
Devices can be connected to the FOUNDATION Fieldbus™ in two ways:

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

5.2 Connecting the measuring device

5.2.1 Connecting the cable to the field indicator

Proceed as follows to wire the field indicator:



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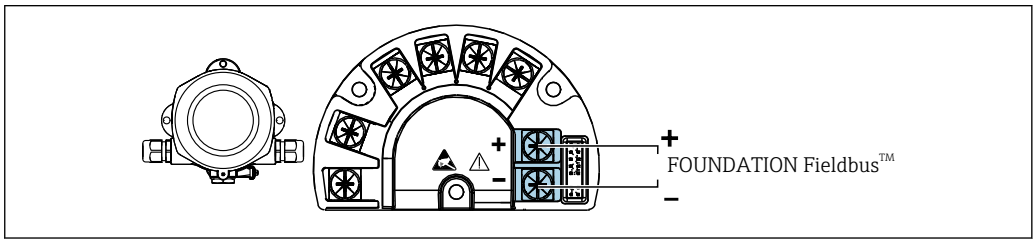
4 *Opening the field indicator housing*

1. Open the cable gland, or remove the cable gland to use a fieldbus connector (optional accessory).
2. Remove the cover clamp.
3. Remove the housing cover.
4. Remove the display.
5. Remove the screws from the electronics unit.
6. Remove the electronics unit.
7. Feed the cable through the cable entry, or screw the fieldbus connector into the housing.
8. Connect the cable → 5, 11.
9. Assembly is in reverse order.

Quick wiring guide



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5 *Terminal assignment*

Terminal	Terminal assignment
+	FOUNDATION Fieldbus™ connection (+)
-	FOUNDATION Fieldbus™ connection (-)

5.2.2 Connecting to the FOUNDATION Fieldbus™

Devices can be connected to the FOUNDATION Fieldbus™ in two ways:
- Via a conventional cable gland → 12
- Via a fieldbus device connector (optional, available as an accessory) → 12

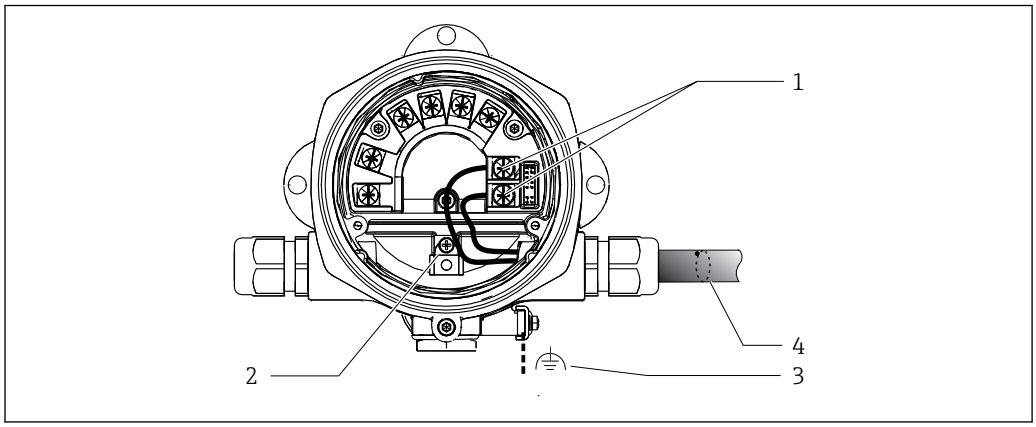
NOTICE

The device and fieldbus cable can be damaged by electrical voltage
- ▶ Switch off the power supply before installing or connecting the device.
- ▶ It is recommended to ground the unit via one of the grounding screws.
- ▶ If the shielding of the fieldbus cable is grounded at more than one point in systems without 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!

We recommend that the fieldbus not be looped using conventional cable glands. If you replace even just one measuring device at a later date, the bus communication will have to be interrupted.

Cable gland or entry

Please also observe the general procedure → 11



6 *Connection to the FOUNDATION Fieldbus™ fieldbus cable*

1 *FF terminals - fieldbus communication and power supply*
2 *Internal ground terminal*
3 *External ground terminal*
4 *Shielded fieldbus cable (FOUNDATION Fieldbus™)*

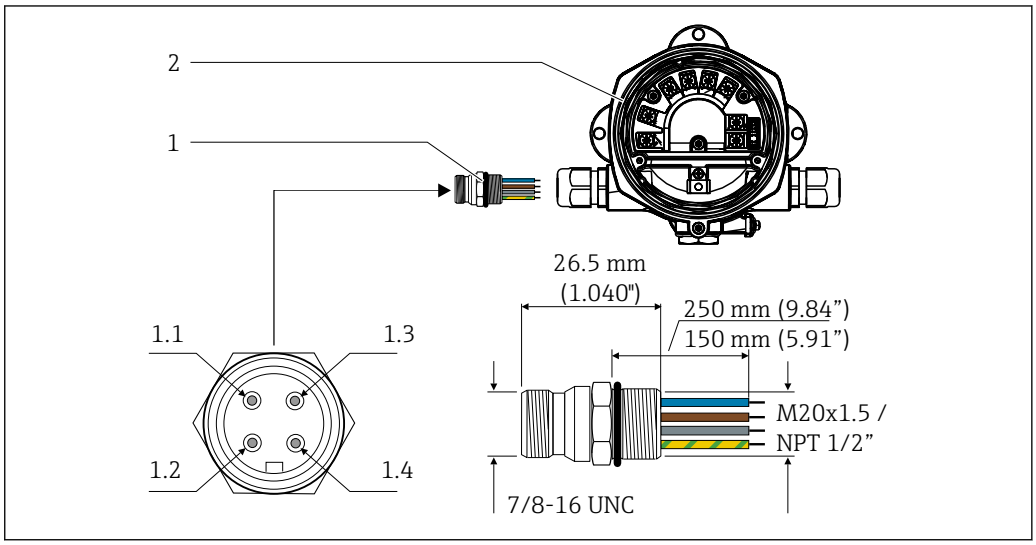
- The terminals for the fieldbus connection (1+ and 2-) are independent of polarity.
- Conductor cross-section: Max. 2.5 mm^2 (14 in^2)
- Always use a shielded cable for the connection.

Fieldbus connector

As an option, a fieldbus connector can be screwed into the field housing instead of a cable gland. Fieldbus connectors can be ordered from Endress+Hauser as an accessory (see 'Accessories' section).

The connection technology of FOUNDATION Fieldbus™ allows devices to be connected to the fieldbus via uniform mechanical connections such as T-boxes, junction boxes etc.

This connection technology using prefabricated distribution modules and plug-in connectors offers substantial advantages over conventional wiring:
- Field devices can be removed, replaced or added at any time during normal operation. Communication is not interrupted.
- Installation and maintenance are significantly easier.
- Existing cable infrastructures can be used and expanded instantly, e.g. when constructing new star distributors using 4-channel or 8-channel distribution modules.



7 *Connectors for connection to the FOUNDATION Fieldbus™*

		Pin assignment/color codes	
1	Fieldbus connector	**1.1**	Blue wire: FF- (terminal 2)
2	Field indicator	**1.2**	Brown wire: FF+ (terminal 1)
		1.3	Gray wire: shield
		1.4	Green/yellow wire: ground

Connector technical data:
- Degree of protection IP 67 (NEMA 4x)
- Ambient temperature: −40 to +105 °C (−40 to +221 °F)

5.2.3 FOUNDATION Fieldbus™ cable specification

Cable type

Twin-core cables are generally advisable for connecting the device to the FOUNDATION Fieldbus H1. Following IEC 61158-2 (MBP), four different 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 generally does not meet the requirements 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, electromagnetic compatibility, etc.

	Type A	Type B
Cable structure	Twisted pair, shielded	One or more twisted pairs, fully shielded
Wire cross-section	0.8 mm^2 (18 in^2)	0.32 mm^2 (22 in^2)
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)	1 900 m (6 233 ft)	1 200 m (3 937 ft)
*) Not specified		

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

Maximum overall cable length

The maximum network expansion depends on the type of protection and the cable specifications. The overall cable length comprises 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 permitted cable length is doubled! A maximum of three repeaters are permitted between user and master.

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)

Number of field devices

In accordance with IEC 61158-2 (MBP), a maximum of 32 field devices can be connected per fieldbus segment. However, this number is restricted under certain conditions (explosion protection, bus power option, field device current consumption). A maximum of four field devices can be connected to a spur.

Shielding and grounding

NOTICE

Equalizing currents 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!

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.

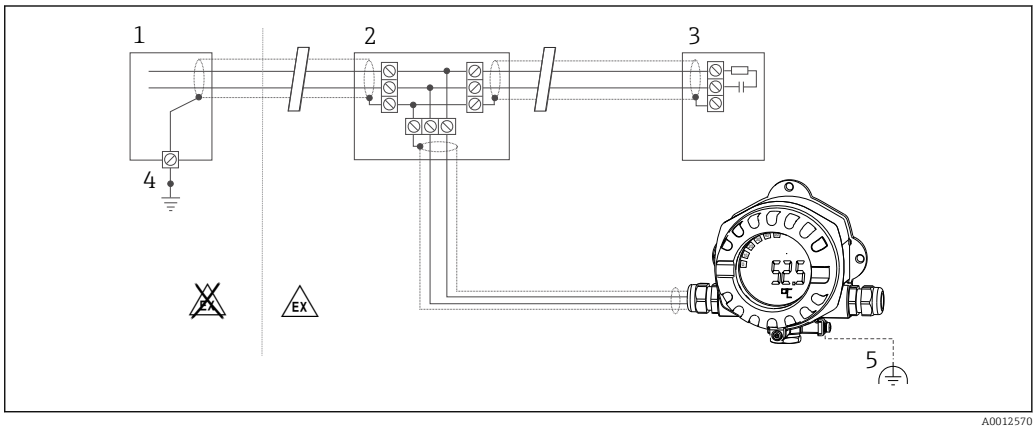
To meet both requirements, the FOUNDATION Fieldbus™ allows three different types of shielding:

- 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.



8 *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*

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.

Further information

General information and further pointers on wiring can be found on www.fieldbus.org, the website of the Fieldbus Foundation.

5.3 Ensuring the degree of protection

The devices fulfill the requirements for the 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 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 (0.2 to 0.39 in)).
- 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.

5.4 Post-connection check

After completing the device's electrical installation, carry out the following checks:

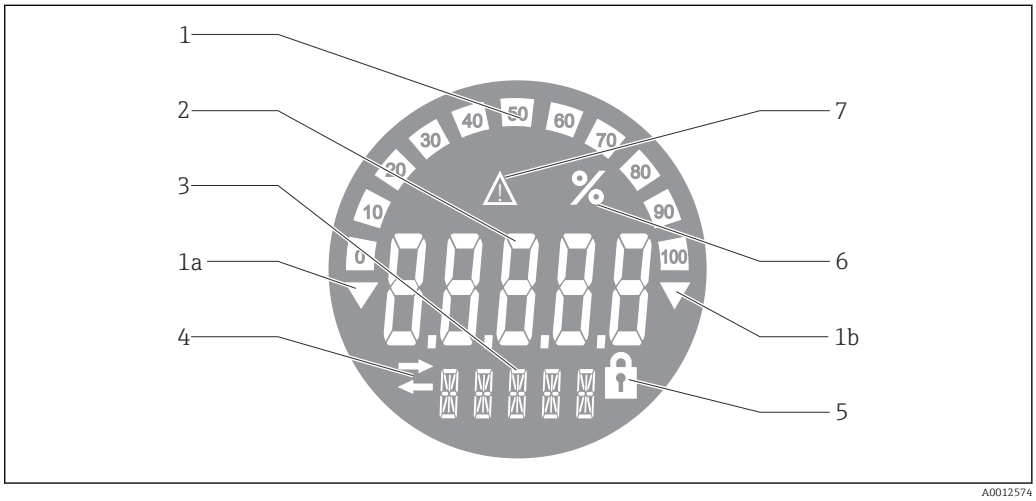
Device condition and specifications	Notes
Are cables or the device damaged (visual inspection)?	-

Electrical connection	Notes
Does the supply voltage match the specifications on the nameplate?	9 to 32 V_{DC}
Do the cables used meet the required specifications?	Fieldbus cable, see specification
Do the cables have adequate strain relief?	-
Are the power supply and signal cables correctly connected?	→ 🖹 11
Are all the screw terminals well tightened and have the connections of the spring terminals been checked?	-
Are all the cable entries installed, tightened and sealed? Cable run with "water trap"?	-
Are all housing covers installed and firmly tightened?	-
Are all the connecting components (T-boxes, junction boxes, connectors, etc.) connected with each other correctly?	-
Has each fieldbus segment been terminated at both ends with a bus terminator?	-
Has the max. length of the fieldbus cable been observed in accordance with the fieldbus specifications?	See cable specifications → 🖹 13
Has the max. length of the spurs been observed in accordance with the fieldbus specifications?	
Is the fieldbus cable fully shielded (90%) and correctly grounded?	

6 Operation options

6.1 Overview of operation options

6.1.1 Display



9 *LC display of the field indicator*

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

The backlit LCD display contains a bar graph (0-100) and arrows to indicate measured values above or below the measuring 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 an alternating time of 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).

The indicator also displays the quality of the measured value. If the status of the displayed value is 'good' (value 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' (value between 0x40 and 0x7F), the 'Uncertain measured value status' symbol is lit. If the status is 'bad' (value below 0x40), within the 7-segment area the display will show "BAD" and the channel number where the bad value is published. The channel number is also displayed in the 14-segment area.

6.1.2 Operation options

Two options are available to the operator for configuring and commissioning the device:

1. Configuration programs

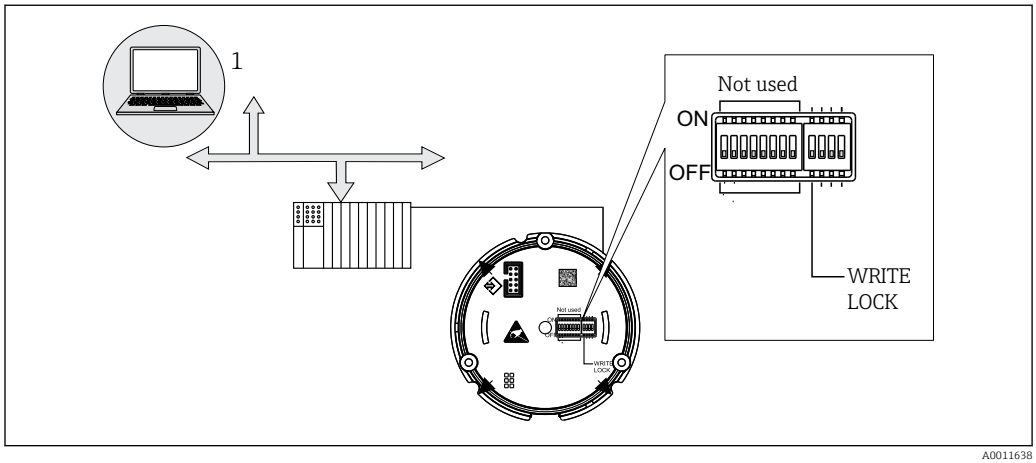
The FF functions and device-specific parameters are configured via the fieldbus interface. Special configuration and operating programs are available from various manufacturers for this purpose → 18.

Device Description Files are available for download: www.endress.com/download → Select device driver → Type → Select product root.

2. Miniature switches (DIP switches) for various hardware settings

You can make the following hardware settings for the fieldbus interface using miniature switches (DIP switches) on the electronics module → 19:

Switching the hardware write protection on/off



10 *Hardware configuration of the field indicator*

Listener mode

The field indicator analyzes the devices active on the bus. These devices are listed and they can be assigned to up to 8 channels via their address. The published values are displayed for the devices and the value to be shown on the display can be selected.

Function block interconnection

A published value, which is assigned to a function block in the field indicator, can be displayed in function block interconnection mode. This can be IN and OUT parameters in the function blocks.

6.2 Access to the operating menu via the operating tool

NOTICE

Loss of explosion protection when housing is open

► The device must be configured outside the hazardous area.

The FF communication system will only function properly if correctly configured. You can obtain special configuration and operating programs from various manufacturers for the configuration.

Process control systems	Asset management systems
Emerson DeltaV	Endress+Hauser FieldCare/DeviceCare
Rockwell Control Logix/FFLD	National Instruments NI-Configurator (≥ 3.1.1)
Honeywell EPKS	Emerson AMS and Handheld FC375
Yokogawa Centum CS3000	Yokogawa PRM EDD/DTM
ABB Freelance System/800xA	Honeywell FDM
Invensys IA Series	PACTware

These can be used for configuring both the FF functions and all of the device-specific parameters. The predefined function blocks allow uniform access to all the network and fieldbus device data.

6.2.1 System files

The following files are required for commissioning and configuring the network:
- Commissioning → Device description (DD :*. Sym ,*. Ffo)
- Network configuration → CFF file (Common File Format)

These files can be acquired as follows:
- Free of charge via the Internet: www.endress.com/download → Device driver → Select type → Select product root.
- Via the Fieldbus Foundation organization: www.fieldbus.org

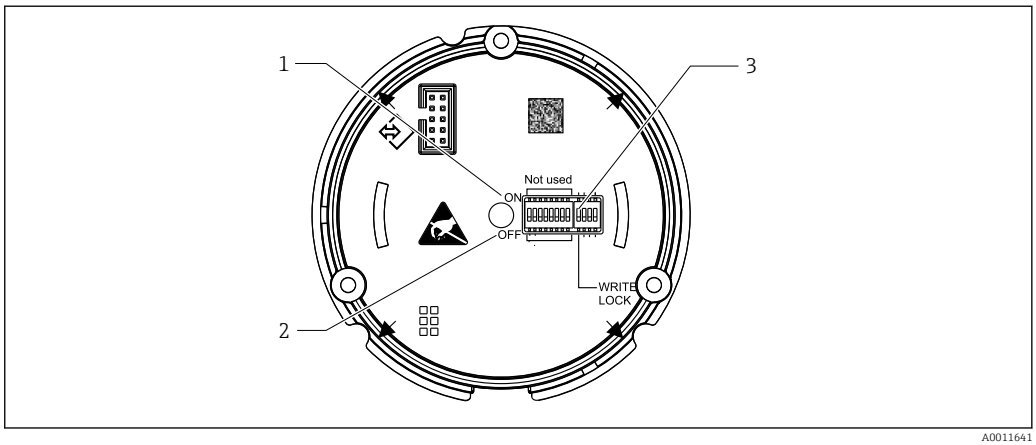
6.3 Hardware settings

Hardware write protection can be switched on and off via DIP switches inside the field indicator. If write protection is enabled, no parameters can be changed.

The current write protection status is displayed in the WRITE_LOCK parameter (Resource Block → 38).

Proceed as follows to set the DIP switch:

1. Remove the housing cover and remove the display → 4, 11
2. Configure the DIP switch as required. Switch on ON = function switched on, switch on OFF = function switched off.
3. Attach the display to the electronics.
4. Close the housing cover and secure it.



11 *Hardware configuration via DIP switches*

1 *ON switch position*
2 *OFF switch position*
3 *Write protection*

7 System integration

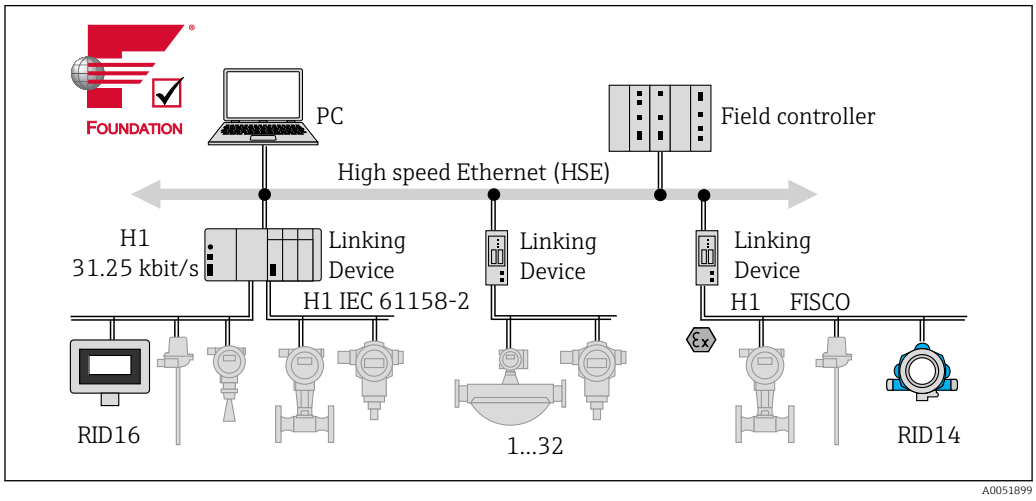
7.1 FOUNDATION Fieldbus™ technology

The FOUNDATION Fieldbus™ (FF) is a purely digital, serial communication system that connects fieldbus devices (sensors, actuators), automation and process control systems with each other. As a local communications network (LAN) for field devices, the FF was primarily designed for the requirements of process engineering. The FF is therefore the basic network in the overall hierarchy of a communication system.

For fieldbus configuration information, please refer to Operating Instructions BA00013S “FOUNDATION Fieldbus Overview: Installation and Commissioning Guidelines”.

7.1.1 System architecture

The following diagram shows an example of a FOUNDATION Fieldbus™ network with associated components.



12 System integration with FOUNDATION Fieldbus™

PC Visualization and monitoring, e.g. P View, FieldCare and diagnostic software
HSE High Speed Ethernet (100 Mbit/s)
H1 FOUNDATION Fieldbus H1
1-32 Up to 32 devices per segment

The system can be connected in the following ways:
- A linking device can be used to connect to superior fieldbus protocols (e.g. to the High Speed Ethernet - HSE).
- A H1 connecting card is required for direct connection to a process control system.
- System inputs are directly available for H1 (HSE).

The system architecture of the FOUNDATION Fieldbus™ can be divided into two subnetworks:

H1 bus system:

In the field, fieldbus devices are connected only via the slower H1 bus system that is specified following IEC 61158-2. The H1 bus system enables simultaneous power supply to the field devices and data transfer on the two-wire cable.

The following points describe some important characteristics of the H1 bus system:
- All fieldbus devices are powered via the H1 bus. Like the fieldbus devices, the power supply unit is connected in parallel to the bus line. Devices requiring external power must use a separate power supply.
- The line structure is one of the most common network structures. Star, tree or mixed network structures are also possible using connecting components (junction boxes).
- The bus connection to the individual fieldbus devices is achieved by means of a T-connector or via a spur. This has the advantage that individual fieldbus devices can be connected or disconnected without interrupting the bus or the bus communication.
- The number of connected fieldbus devices depends on various factors, such as use in hazardous areas, the length of the spur, cable types, current consumption of the field devices, etc. (see the "Cable specifications" section in the Operating Instructions).
- When fieldbus devices are used in a hazardous area, the H1 bus must be equipped with an intrinsically safe barrier before the transition to the hazardous area.
- A bus terminator is required at each end of the bus segment.

High Speed Ethernet (HSE):

The superior bus system is implemented via the High Speed Ethernet (HSE) with a transmission rate of max. 100 MBit/s. This serves as the 'backbone' (basic network) between various local sub-networks and/or where there is a large number of network users.

7.1.2 Link Active Scheduler (LAS)

The FOUNDATION Fieldbus™ works according to the 'producer-consumer' relationship. This offers many advantages.

Data can be directly exchanged between field devices, e.g. a sensor and an actuating valve. Each bus user “publishes” its data on the bus and all the bus users configured accordingly obtain these data. The publication of these data is controlled by a “bus administrator”, known as the “Link Active Scheduler”, which centrally controls the time sequence of the bus communication process. The LAS organizes all the bus activities and sends corresponding commands to the individual field devices.

Other tasks of the LAS include:
- Recognizing and reporting newly connected devices.
- Logging out devices that are no longer communicating with the fieldbus.
- Maintaining the “Live List”. This list contains a record of all the fieldbus users and is checked regularly by the LAS. If devices are logged on or logged off, the "Live List" is updated and sent immediately to all the devices.
- Requesting process data from the field devices according to a fixed schedule.
- Allocating send rights (tokens) to devices between unscheduled data transfer.

The LAS can run redundantly, i.e. it exists both in the process control system and in the field device. If one LAS fails, the other LAS can accurately take over communication. Thanks to the precise timing of bus communication via the LAS, the FF can run exact processes at regular, equidistant intervals.

Fieldbus devices, such as this field indicator, which can take over the LAS function if the primary master fails, are called “Link Masters”. This contrasts with simple "Basic Devices", which can only receive signals and send them to the central control system. The LAS functionality is deactivated in this field indicator when the unit is delivered.

7.1.3 Data transmission

A distinction is made between two types of data transfer:
- **Scheduled data transfer (cyclic):** All time-critical data, i.e. continuous measurement or actuating signals, are transmitted and processed according to a fixed schedule.
- **Unscheduled data transfer (acyclic):** Device parameters and diagnostic information that are not time-critical for the process are only transmitted over the fieldbus when required. Data transmission only takes place in the intervals between cyclic (scheduled) communication.

7.1.4 Device ID, addressing

Each fieldbus device in the FF network is identified by a unique device ID (DEVICE_ID).

The fieldbus host system (LAS) automatically gives the network address to the field device. The network address is the address that the fieldbus currently uses.

The FOUNDATION Fieldbus™ uses addresses between 0 and 255:
- **0 to 15** are reserved.
- **16 to 247** are available for permanent devices. Some host systems may further divide this range. It is usually limited for reasons of efficiency.
- **248 to 251** are available for devices without a permanent address, e.g. new devices or devices that have been taken out of operation.
- **252 to 255** are available for temporary devices such as handheld terminals.

The field device tag name (PD_TAG) is assigned for the device in question during commissioning (see Operating Instructions). It remains stored in the device even if the supply voltage is interrupted.

7.1.5 Function blocks

The FOUNDATION Fieldbus™ uses predefined function blocks to describe the functions of a device and to specify uniform data access. The function blocks implemented in each fieldbus device provide information on the tasks that a device can perform in the overall automation strategy.

In the case of sensors, these are typically the following blocks:
- "Analog Input" or
- "Discrete Input" (digital input)

Actuating valves normally have the following function blocks:
- 'Analog Output' or
- "Discrete Output" (digital output)

The following blocks are available for control tasks:
- PD controller or
- PID controller

Additional information is provided in the Appendix → 38.

The following function blocks are available in the field indicator:
- Input selector
- PID
- Integrator
- Arithmetic

7.1.6 Fieldbus-based process control

With FOUNDATION Fieldbus™, field devices can perform simple process control functions themselves and thereby reduce the workload on the superior process control system. Here, the Link Active Scheduler (LAS) coordinates data exchange between the sensor and controller and ensures that two field devices cannot access the bus simultaneously. For this purpose, configuration software, e.g. NI-FBUS Configurator from National Instruments, is used to connect the various function blocks to the desired control strategy, generally graphically (see Operating Instructions).

7.1.7 Device description

For commissioning, diagnostics and parameter configuration, it is important to ensure that process control systems or superior configuration systems can access all measuring device data and have a uniform operating structure.

The device-specific information required for this is stored as so-called device description data in special files (the 'Device Description'- DD). This makes it possible to interpret the device data and display the data via the configuration program. The DD is therefore a kind of “device driver”.

On the other hand, a CFF file (CFF = Common File Format) is required for network configuration in offline mode.

These files can be acquired as follows:
- Free of charge via the Internet: www.endress.com/download → Device driver → Select type → Select product root.
- Via the Fieldbus Foundation organization: www.fieldbus.org

8 Commissioning

8.1 Post-installation check

Make sure that all final checks have been carried out before putting your devices into operation:
- Checklist for "Post-mounting check"→ 10
- Checklist for "Post-connection check" → 16

Compliance with the function-specific data of the FOUNDATION Fieldbus interface according to IEC 61158-2 (MBP) is mandatory.

A normal multimeter can be used to check that the bus voltage is between 9 to 32 V and that current consumption is approx. 11 mA on the device.

8.2 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 status messages and the corresponding troubleshooting instructions can be found in the "Troubleshooting" section → 26.

The device is ready for operation after approx. 8 seconds!

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

8.3 Commissioning

Note the following points:
- The files required for commissioning and network configuration can be obtained via download → 19.
- For FOUNDATION Fieldbus™, the device is identified in the host or configuration system by means of the device ID (DEVICE_ID). The DEVICE_ID is a combination of the manufacturer ID, device type and device serial number. It is unique and can never be assigned twice. The structure of the DEVICE_ID can be broken down as follows:
  DEVICE_ID = 452B4810CF-XXXXXXXXXXX
  452B48 = Endress+Hauser
  10CF = RID1x
  XXXXXXXXXXX = Device serial number (11-digit)

8.3.1 Initial commissioning

The indicator has two operating modes - listener mode or function block interconnection.

Listener mode	Function block interconnection
Fast commissioning - function block interconnection not required	Flexible integration
Display function alone	Universal use as all function blocks can be used
Lower bus load	

Listener mode

In listener mode, the device listens to values on the bus which should be displayed. The device nevertheless has its own device address and communicates normally via the FOUNDATION Fieldbus™. However, function block interconnection is not required in the device. To this end, the data are evaluated cyclically on the bus and all publishing bus addresses in the range from 0x10 to 0x2F are displayed in a parameter field. A corresponding address can be selected for each of the 8 channels. 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, further values can be selected manually. This address generates a configuration error in the indicator following a reconfiguration of the bus or the removal of a publishing device. If only the displayed value of the device is no longer available, the indicator automatically switches to the next value published at this address.

The device's listener mode is activated in the Display Transducer Block (display value settings for each channel). Listener mode is enabled for channel 1 by default. The indicator automatically displays the first value of the publishing device with the lowest address.

If the indicator itself publishes values, these values are not available in listener mode. Use function block interconnection to display these values.

Function block interconnection

The following description is a step-by-step guide through commissioning of the device and all the necessary settings for the FOUNDATION Fieldbus™.

1. Open the configuration program.
2. Load the device description files or the CFF file into the host system or the configuration program. Make sure you are using the right system files.
3. Note the DEVICE_ID from the device nameplate for identification in the control system.
4. Switch on the device.
   ↳ The first time you establish a connection, the device responds as follows in the configuration program:
   EH_RID14-xxxxxxxxxxx (Tag name PD TAG for RID14, xxx... = serial number)
   452B4810CF-xxxxxxxxxxx (DEVICE_ID) for RID1x
   Block structure → 📄 24
5. Identify the field device using the listed DEVICE_ID and assign the required tag name to the fieldbus device (PD_TAG).

Block description	Permanent	Block category
Resource	YES	Extended
Display Transducer	YES	Manufacturer-specific
Advanced Diagnostic	YES	Manufacturer-specific

Block description	Permanent	Block category
PID	NO	Standard
Input Selector 1	NO	Standard
Input Selector 2	NO	Standard
Arithmetic	NO	Standard
Integrator	NO	Standard

The device is delivered from the factory with the bus address "247" and is therefore in the address range reserved for changing the address of field devices. A lower bus address should be assigned to the device for commissioning.

Configuration of the "Resource Blocks" (base index 400)

1. Open the Resource Block.
2. Check the status of the hardware write protection via the WRITE_LOCK parameter. When the device is delivered, the hardware write protection is disabled so the write parameters can be accessed via the FF. Disable write protection if necessary.
   ↳ Write protection enabled = LOCKED
   Write protection not enabled = NOT LOCKED
3. Enter the desired block name (optional). Factory setting: RS_xxxxxxxxxxx
4. Set the operating mode in the MODE_BLK parameter group (TARGET parameter) to AUTO.

Configuring the "Transducer Blocks"

The individual Transducer Blocks comprise various parameter groups arranged by device-specific functions:
- Local display functions → Transducer Block “TB_DISP_xxxxxxxxxxx”
- Advanced diagnostics → Transducer Block “TB_ADVDIAG_xxxxxxxxxx”

1. Enter the desired block name (optional). See above for factory setting.
2. Set the operating mode in the MODE_BLK parameter group (TARGET parameter) to AUTO.
3. Set active LAS.
4. Upload all data and parameters to the field device.
5. Set the operating mode in the MODE_BLK parameter group (TARGET parameter) to AUTO. Requirements: The function blocks are correctly interconnected. The Resource Blocks are in AUTO operating mode.

System configuration/connecting function blocks

A final "overall system configuration" is mandatory so that the operating mode of the Input Selector, PID, Arithmetic and Integrator function blocks can be set to AUTO and the field device is integrated into the system application.

For this purpose, configuration software, e.g. NI-FBUS Configurator from National Instruments, is used to connect the function blocks to the desired control strategy (generally graphically) and then the time for processing the individual process control functions is specified.

9 Diagnostics and troubleshooting

9.1 Troubleshooting instructions

In the event of a critical error, it might be necessary to return the indicator to the manufacturer for repair. Follow the instructions in → 30 before returning the indicator.

Always start troubleshooting with the checklists below if faults occur after commissioning or during operation. The checklists take 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 host system	▪ For fault elimination, see below "Faulty connection to the fieldbus host system"
	▪ Other possible sources of error:
	  ▪ Electronics module defective → Test with spare module → Order spare part
	  ▪ Housing (internal electronics) defective → Test with spare housing → Order spare part
	▪ Field indicator defective → Replace field indicator

No display visible - however, connection established to the fieldbus system	▪ Check whether the display module is correctly connected to the electronics module ▪ Display defective → Test with spare display → Order spare part ▪ Electronics module defective → Test with spare module → Order spare part

↓

Faulty connection to the fieldbus host 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)	Check pin assignment/wiring → 12
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 → 14
Basic current	Is there a minimum basic current of 11 mA?
Terminating resistors	Has the FOUNDATION Fieldbus H1 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. permitted feed current of the bus power supply unit.

Error messages in the FF configuration system
See "Status messages" section → 27

↓

Problems when configuring function blocks	
Transducer Blocks: The operating mode cannot be set to AUTO.	Check whether the operating mode of the Resource Block is set to AUTO → MODE_BLK parameter group/TARGET parameter.
Transducer Blocks: The manufacturer-specific parameters are not visible..	The device description file (Device Description, DD) has not yet been loaded to the host system or the configuration program? → Download the file to the configuration system. For sources of DD → 🖹 19 Make sure you are using the correct system files for integrating field devices into the host system. Relevant version information can be queried for the field indicator via the following functions/parameters: FF interface: Resource Block → DD_REV parameter **Example:** ▪ Display in the DEV_REV parameter → 02 ▪ Display in the DD_REV parameter → 02 (the lowest possible DD revision) ▪ Device description file (DD) required → 0201.sym/0201.ffo Always use the latest DD revision.

Other errors (application errors without messages)	
Some other error has occurred.	For possible causes and remedial measures see the "Status messages" section → 🖹 27

9.2 Status messages

The device displays warnings or alarms as status messages. If errors occur during commissioning, these errors are displayed immediately. Errors are displayed in the configuration program via the parameter in the Adv. Diagnostic Block or on the connected mounted display. 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 specification')	
M	Maintenance required ('Maintenance')	

WARNING or ALARM error category:

The display alternates between the displayed values and the error message (= relevant letter plus the defined error number, e.g. "F283").

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 => ...
- If no value should be displayed and an error occurs, the display switches 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 returns to the normal value entered in the "DISP_ALTERNATING_TIME" parameter.

If ALARM "F437" has occurred in a channel, the value of this channel is replaced by "- - - - -".

Category	No.	Status message ▪ CURRENT_STATUS_ NUMBER in the 'Advanced Diagnostics' Transducer Block ▪ Display	Display symbol	Cause of error/remedy
F-	261	Device status message (FF): Electronics board F-261.	No bar graph displayed	**Cause of error:** Error in the electronics. **Remedy:** Device defective, replace
F-	283	Device status message (FF): Memory error F-283	No bar graph displayed	**Cause of error:** Error in memory. **Remedy:** Device defective, replace
C-	561	Device status message (FF): Display overflow C-561	No bar graph displayed; value is displayed as "- - - - -"	**Cause of error:** Value is too long to be displayed **Remedy:** Change "DISPLAY_VALUE_X_FORMAT" X = Channel number
F-	437	Device status message (FF): Configuration error F-437	No bar graph displayed	**Cause of error:** Example: Incorrect configuration; a non-existent address was entered in Listener Mode; a value has been chosen to be displayed but the associated block has not been instantiated **Remedy:** Check the configuration of the block; the ACTUAL_STATUS_CHANNEL parameter indicates which block is causing the error
C-	501	Device error message (FF): Device preset C-501	No bar graph displayed, no symbol	**Cause of error:** A device reset is being performed. **Remedy:** The message is only displayed during a reset.

9.3 Firmware history

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 modification	Documentation
12/2009	1.00.zz	Original software	BA282R/09/en/12.09
			BA282R/09/en/02.10
			BA00282R/09/EN/13.14
			BA00282R/09/EN/14.15
09/2016	2.00.zz	Device Revision 2, ITK 6.1.2	BA00282R/09/EN/15.16
01/2023	2.00.zz	-	BA00282R/09/EN/16.23

10 Maintenance

No special maintenance work is required for the device.

10.1 Cleaning

A clean, dry cloth can be used to clean the device.

11 Repair

11.1 General information

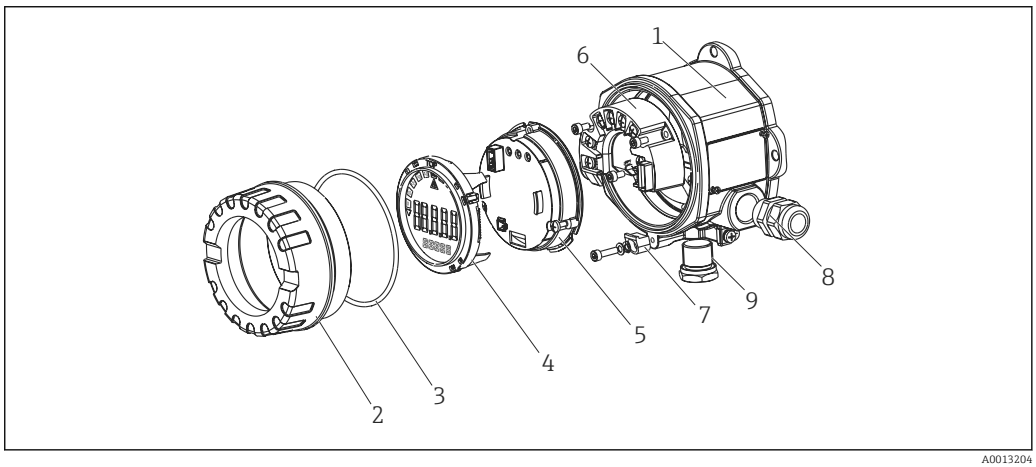
In accordance with the Endress+Hauser repair principle, the devices have a modular design and repairs can be carried out by the customer. For more information on service and spare parts, please contact your supplier.

11.1.1 Repairs to Ex-approved devices

- Only specialist personnel or the manufacturer may undertake repairs on Ex-approved devices.
- Comply with the prevailing standards, national Ex-area regulations, Safety Instructions (XA) and certificates.
- Only use original spare parts from the manufacturer.
- When ordering spare parts, check the device designation on the nameplate. Parts may only be replaced by identical parts.
- Carry out repairs according to the instructions. On completion of the repair, carry out the routine test specified for the device.
- A certified device may only be converted to another certified device version by the manufacturer only.
- Document all repairs and modifications.

11.2 Spare parts

Spare parts currently available for the device can be found online at: http://www.products.endress.com/spareparts_consumables. Always quote the serial number of the device when ordering spare parts!



13 *Spare parts for field indicator*

Item No.						
1	RID14 housing					
		Certificates:				
		A	Non-hazardous area + Ex nA			
		B	Ex d			
			Material:			
			A	Aluminum		
			B	Stainless steel 316L		
				Cable entry:		
				1	3x thread NPT 1/2, w/o terminal block	
				2	3x M20x1.5, w/o terminal block	
				3	3x thread G1/2, w/o terminal block	
					Version:	
					A	Standard
	RIA141G-					← complete order code for RID14 housing

Item No.	Type	Order number
2	Housing cover cpl. display, aluminum Ex d + seal	RIA141X-HK
	Housing cover cpl. display, aluminum + seal	RIA141X-HL
	Housing cover cpl. display, 316L, Ex d, FM XP, CSA XP, with seal	TMT142X-HC
	Housing cover cpl. display, 316L with seal	TMT142X-HD
4	Field housing display fitting kit	51004454
	Display + fitting kit + twist protection	RIA141X-DA
	Display fitting kit + twist protection	RIA141X-DC
5	Electronics	RID14X-EA
6	Terminal strip	RID14X-KA
7	Cover clamp spare part set for field housing: screw, disk, spring washer	51004948
8	Cable gland M20x1.5	51004949
9	Plug (dummy) M20x1.5 EEx-d/XP	51004489
	Plug (dummy) NPT 1/2" ALU	51004490
	Plug (dummy) G1/2" EEx-d/XP	51004916
	Plug (dummy) NPT 1/2" V4A	51006888
None	Mounting bracket for pipe 1.5-3" stainless steel 316L	51007995

11.3 Return

The requirements for safe device return can vary depending on the device type and national legislation.

1. Refer to the web page for information:
   http://www.endress.com/support/return-material
   ↳ Select the region.

2. Return the device if repairs or a factory calibration are required, or if the wrong device was ordered or delivered.

11.4 Disposal

If required by the Directive 2012/19/EU on waste electrical and electronic equipment (WEEE), the product is marked with the depicted symbol in order to minimize the disposal of WEEE as unsorted municipal waste. Do not dispose of products bearing this marking as unsorted municipal waste. Instead, return them to the manufacturer for disposal under the applicable conditions.

12 Accessories

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

12.1 Device-specific accessories

12.1.1 Cable glands and adapters

Cable gland

2x cable gland M20	RK01-AB

Plug (dummy)

1/2"NPT 1.0718	51004490
M20x1.5 EEx-d/XP	51004489
G1/2" EEx-d/XP	51004916
1/2"NPT V4A	51006888

12.1.2 Housing

Pipe mounting set

Mounting bracket, pipe 2", 316L	RK01-AI

12.2 Communication-specific accessories

Fieldbus connector

Connector, fieldbus FF M20;7/8" L150	71005804
Connector, fieldbus FF 1/2NPT;7/8" L150	71005803

13 Technical data

13.1 Communication

13.1.1 Failure information

Status message as per the fieldbus specification.

13.1.2 Switch-on delay

8 s

13.1.3 FOUNDATION Fieldbus™

- FOUNDATION Fieldbus™ H1, IEC 61158-2
- FDE (Fault Disconnection Electronic) = 0 mA
- Data transmission rate, supported baudrate: 31.25 kBit/s
- Signal encoding = Manchester II
- LAS (Link Active Scheduler), LM (Link Master) function is supported: Therefore, the indicator can assume the function of a Link Active Scheduler (LAS) if the current Link Master (LM) is no longer available. The device is supplied as a BASIC device. To use the device as an LAS, this must be defined in the distributed control system and activated by downloading the configuration to the device.
- According to IEC 60079-27, FISCO/FNICO

13.1.4 Protocol-specific data

FOUNDATION Fieldbus™

Basic data

Device type	10CF (hex)
Device revision	02 (hex)
Node address	Default: 247
ITK Version	6.1.2
ITK Certification Driver No.	IT108100
Link Master (LAS) capable	Yes
Choice of Link Master / Basic Device	Yes; factory setting: Basic Device
Number of VCRs	44
Number of link objects in VFD	50

Virtual communication relationships (VCRs)

Permanent entries	1
Client VCRs	0
Server VCRs	10
Source VCRs	43
Sink VCRs	0
Subscriber VCRs	43
Publisher VCRs	43

Link settings

Slot time	4
Min. Inter PDU delay	10
Max. response delay	28

Blocks

Block description	Block index	Permanent	Block execution time	Block category
Resource	400	YES		Extended
Display Transducer	500	YES		Manufacturer-specific
Advanced Diagnostic	600	YES		Manufacturer-specific
PID	1100	NO	30 ms	Standard
Input Selector 1	1200	NO	30 ms	Standard
Input Selector 2	1300	NO	30 ms	Standard
Arithmetic	1500	NO	30 ms	Standard
Integrator	1400	NO	30 ms	Standard

Brief block description

Resource Block:

The Resource Block contains all the data that clearly identify and characterize the device. It is an electronic version of a nameplate on the device. In addition to parameters required to operate the device on the fieldbus, the Resource Block makes information available such as the order code, device ID, software revision, order ID etc.

Display Transducer:

The parameters of the "Display" Transducer Block enable the configuration of the display.

Advanced Diagnostic:

All the parameters for self-monitoring and diagnostics are grouped in this Transducer Block.

PID:

This function block contains input channel processing, proportional integral-differential control (PID) and analog output channel processing. The following can be realized: Basic controls, feedforward control, cascade control and cascade control with limiting.

Input Selector (ISEL):

The Input Selector Block enables the selection of up to four inputs and generates an output based on the configured action.

Integrator (INT):

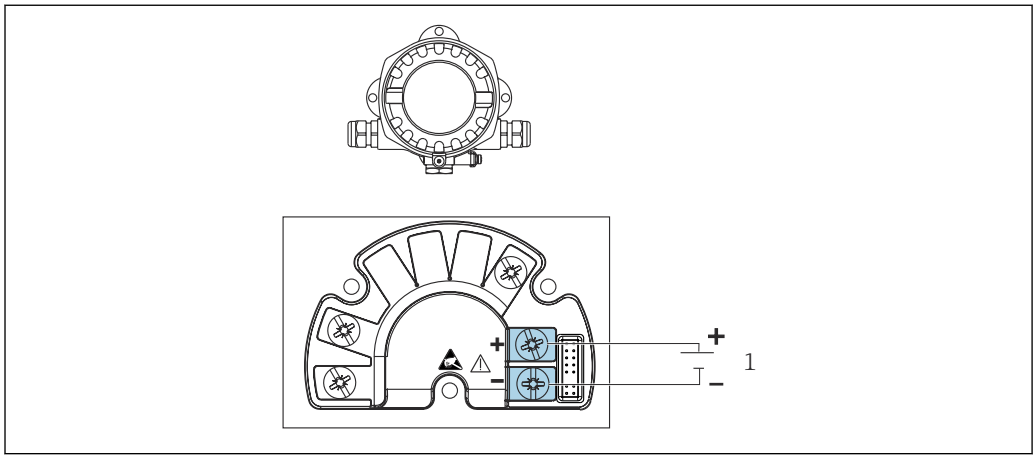
The Integrator Block integrates one or two variables over time. The Block compares the integrated or totalized value to limit values and generates a discrete output signal if the limit value is reached. It can be selected from six integration types.

Arithmetic (ARITH):

The Arithmetic function block permits standard computing operations and compensations. It supports the addition, subtraction, multiplication and division of values. In addition, mean values are calculated and flow values are compensated for (linear, quadratic compensation) in this block.

13.2 Power supply

13.2.1 Terminal assignment



14 Terminal assignment of the field indicator

1 Fieldbus connection

13.2.2 Supply voltage

The power is supplied via the fieldbus.

U = 9 to 32 V_{DC}, polarity-independent (max. voltage U_b = 35 V).

13.2.3 Mains voltage filter

50/60 Hz

13.2.4 Current consumption

≤ 11 mA

13.2.5 Cable entry

The following cable entries are available:
- NPT1/2 thread
- M20 thread
- G1/2 thread

13.3 Installation

13.3.1 Orientation

No restrictions, the orientation depends on the readability of the display.

13.3.2 Mounting location

Wall or pipe mounting (see "Accessories")

13.4 Environment

13.4.1 Ambient temperature range

−40 to +80 °C (−40 to +176 °F)

The display may react slowly at temperatures < −20 °C (−4 °F).

At temperatures < −30 °C (−22 °F) the readability of the display can no longer be guaranteed.

13.4.2 Storage temperature

−40 to +80 °C (−40 to +176 °F)

13.4.3 Altitude

Up to 2 000 m (6 561.7 ft) above sea level

13.4.4 Climate class

As per IEC 60654-1, Class C

13.4.5 Humidity

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

13.4.6 Degree of protection

IP67. NEMA 4X.

13.4.7 Shock and vibration resistance

10 to 2 000 Hz at 5g as per IEC 60 068-2-6

13.4.8 Electromagnetic compatibility (EMC)

CE conformity

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

Interference immunity as per IEC/EN 61326 series, industrial requirements.

Interference emission as per IEC/EN 61326 series, Class B equipment.

13.4.9 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.

13.4.10 Overvoltage category

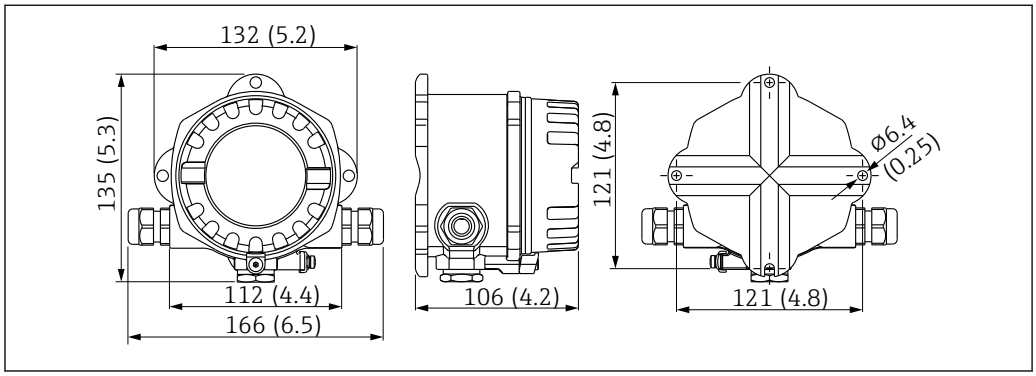
Overvoltage category II

13.4.11 Pollution degree

Pollution degree 2

13.5 Mechanical construction

13.5.1 Design, dimensions



15 Dimensions of the field indicator in mm (in)

- Die-cast aluminum housing for general applications, or optional stainless steel housing
- Electronics compartment and connection compartment in single-chamber housing
- Display attachable in 90° stages

13.5.2 Weight

- Aluminum housing
  Approx. 1.6 kg (3.5 lb)
- Stainless steel housing
  Approx. 4.2 kg (9.3 lb)

13.5.3 Materials

Housing	Nameplate
Die-cast aluminum AlSi10Mg/AlSi12Mg with powder coating on polyester base	Aluminum AlMgl, anodized in black
Stainless steel CF3M (316L)	Stainless steel 1.4404 (AiSi 316L)

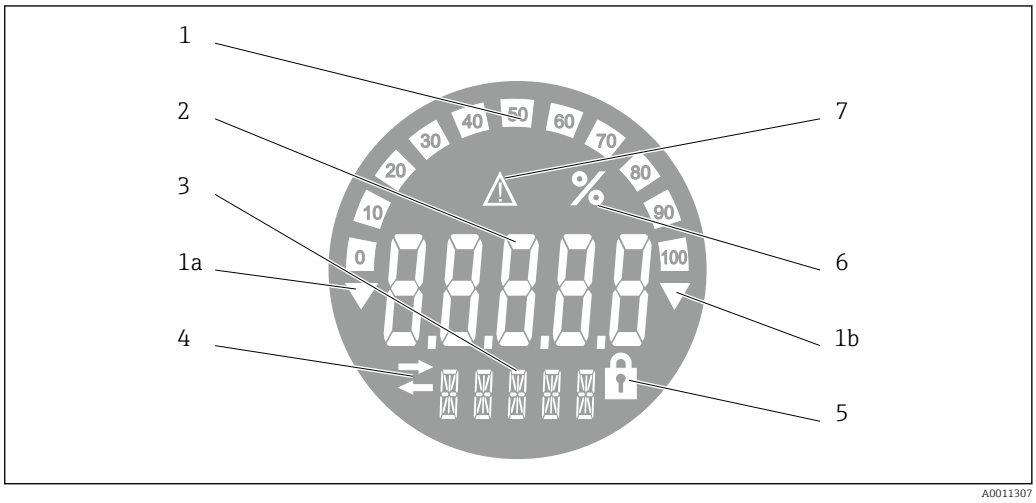
13.5.4 Terminals

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

13.6 Operability

13.6.1 Local operation

Display elements



16 *LC display of the field indicator (backlit, can be plugged in 90° stages)*

1 *Bar graph display in increments of 10% with indicators for underranging (item 1a) and overranging (item 1b)*
2 *Measured value display, digit height 20.5 mm (0.8 in), status indication "Bad measured value status"*
3 *14-segment display for units and messages*
4 *'Communication' symbol*
5 *"Configuration locked" symbol*
6 *Unit "%"*
7 *"Uncertain measured value status" symbol*

Display range
-9999 to +99999

DIP switch

FOUNDATION Fieldbus™: Configuration of the hardware write protection

13.6.2 Remote operation

FOUNDATION Fieldbus™

FOUNDATION Fieldbus™ functions and device-specific parameters are configured via fieldbus communication. Special configuration systems from different manufacturers are available for this purpose.

Process control systems	Asset management systems
Emerson DeltaV	Endress+Hauser FieldCare/DeviceCare
Rockwell Control Logix/FFLD	National Instruments NI-Configurator (≥ 3.1.1)
Honeywell EPKS	Emerson AMS and Handheld FC375
Yokogawa Centum CS3000	Yokogawa PRM EDD/DTM
ABB Freelance System/800xA	Honeywell FDM
Invensys IA Series	PACTware

13.7 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**.

13.7.1

For certificates and approvals valid for the device: see the data on the nameplate

Approval-related data and documents: www.endress.com/deviceviewer → (enter the serial number)

13.8 Supplementary 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** The Operating Instructions contain all the information that is required in various phases of the life cycle of the device: from product identification, incoming acceptance and storage, to mounting, connection, operation and commissioning through to troubleshooting, maintenance and disposal.
Description of Device Parameters (GP)	**Reference for your parameters** The document provides a detailed explanation of each individual parameter. The description is aimed at those who work with the device over the entire life cycle and perform specific configurations.
Safety Instructions (XA)	Depending on the approval, Safety Instructions (XA) are supplied with the device. The Safety Instructions are an integral part of the Operating Instructions. Information on the Safety Instructions (XA) that are relevant for the device is provided on the nameplate.
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.

14 Appendix

14.1 Block model

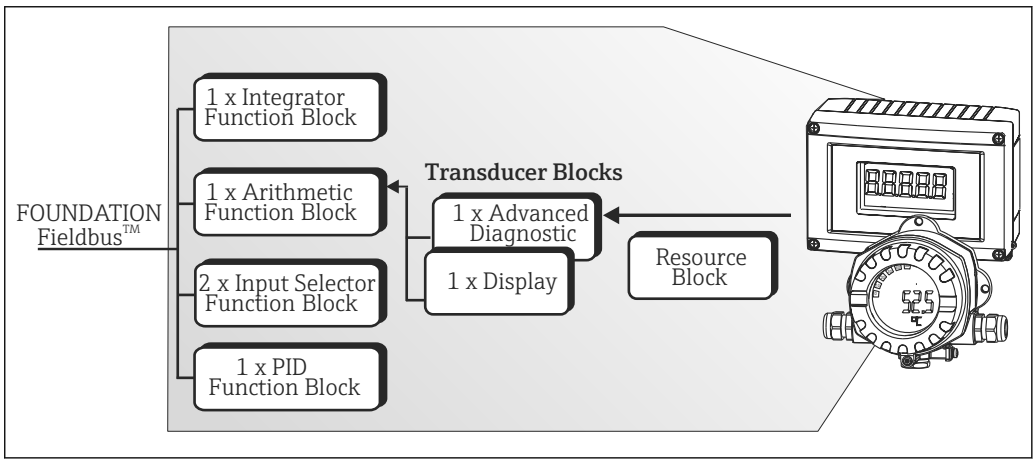
In the FOUNDATION™ Fieldbus all the device parameters are categorized according to their functional properties and task and are generally assigned to three different blocks. A

block may be regarded as a container in which parameters and the associated functionalities are contained. A FOUNDATION™ Fieldbus device has the following block types:

- A Resource Block (device block):
  The Resource Block contains all the device-specific features of the unit.
- One or more Transducer Blocks:
  The Transducer Blocks contain the measuring and device-specific parameters of the device.
- One or more function blocks:
  The function blocks contain the device's automation functions. We distinguish between different function blocks, e.g. Integrator function block, Arithmetic function block. Each of these function blocks is used to execute different application functions.

Depending on how the individual function blocks are arranged and connected, various automation tasks can be realized. In addition to these blocks, a field device may have other blocks, e.g. several Input Selector function blocks if more than one process variable is available from the field device.

RID1x has the following blocks:



17 *Block model RID1x*

14.2 Resource Block

The Resource Block contains all the data that clearly identify and characterize the field device. It is like an electronic version of the field device nameplate. In addition to parameters that are needed to operate the device on the fieldbus, the Resource Block makes information available, such as the order code, device ID, hardware revision, software revision, device release etc.

Another task of the Resource Block is to manage general parameters and functions that have an influence on the execution of the remaining function blocks in the field device. The Resource Block is therefore a central unit that also checks the device status and in doing so influences and controls the operability of the other function blocks and therefore of the device. The Resource Block does not have any block input and block output data and therefore cannot be linked to other blocks. The primary functions and parameters of the Resource Block are listed below.

14.2.1 Selecting the operating mode

The operating mode is set via the MODE_BLK parameter group. The Resource Block supports the following operating modes:
- AUTO (automatic mode)
- OOS (out of service)

The 'Out Of Service' (OOS) mode is also shown via the BLOCK_ERR parameter. In the OOS operating mode, you can access all the write parameters without restriction if write protection is not enabled.

14.2.2 Block status

The current operating status of the Resource Block is shown in the RS_STATE parameter. The Resource Block can assume the following states:
- STANDBY
  The Resource Block is in the OOS operating mode. It is not possible to execute the remaining function blocks.
- ONLINE LINKING
  The configured connections between the function blocks are not yet established.
- ONLINE
  Normal operating mode, the Resource Block is in the AUTO (automatic) operating mode. The configured connections between the function blocks have been established.

14.2.3 Write protection

Device parameter write protection can be enabled or disabled via DIP switches in the housing.

The WRITE_LOCK parameter shows the status of the hardware write protection. The following statuses are possible:
- LOCKED =
  Device data cannot be changed via the FOUNDATION Fieldbus interface.
- NOT LOCKED =
  Device data can be changed via the FOUNDATION Fieldbus interface.

14.2.4 Alarm detection and processing

Process alarms provide information about certain block statuses and block events. The status of the process alarms is communicated to the fieldbus host system via the BLOCK_ALM parameter. The ACK_OPTION parameter specifies whether an alarm must be acknowledged via the fieldbus host system. The following process alarms are generated by the Resource Block:

Block process alarms

The following block process alarms of the Resource Block are shown via the BLOCK_ALM parameter:
OUT OF SERVICE

Write protect process alarm

If write protection is disabled, the alarm priority specified in the WRITE_PRI parameter is checked prior to communicating the change of status to the fieldbus host system. The alarm priority specifies the action taken when the write protection alarm WRITE_ALM is active.

If the option of a process alarm has not been activated in the ACK_OPTION parameter, this process alarm only has to be acknowledged in the BLOCK_ALM parameter.

14.2.5 Resource Block FF parameters

The following table shows all the FOUNDATION™ Fieldbus-specific parameters of the Resource Block.

Resource Block			
Parameter Index	**Parameters**	**Write access with operating mode (MODE_BLK)**	**Description**
1	Static Revision (ST_REV)	Read only	Displays the revision status of the static data. The revision status is incremented each time the static data change.
2	Tag Description (TAG_DESC)	AUTO - OOS	Use this function to enter a user-specific text for the clear identification and assignment of the block.
3	Strategy (STRATEGY)	AUTO - OOS	Parameter for grouping the blocks, thereby enabling faster evaluation. Grouping is performed by entering the same numerical value in the STRATEGY parameter of each individual block. Factory setting: 0 These data are neither checked nor processed by the Resource Block.
4	Alert Key (ALERT_KEY)	AUTO - OOS	Use this function to enter the identification number of the plant unit. This information can be used by the fieldbus host system to sort alarms and events. User entry: 1 to 125 Factory setting: 0
5	Block Mode (MODE_BLK)	AUTO - OOS	Displays the actual and target operating mode of the Resource Block, the permitted modes which the Resource Block supports and the normal operating mode. Display: AUTO - OOS The Resource Block supports the following operating modes: AUTO (Automatic mode): The execution of the remaining blocks (ISEL, AI and PID function block) is permitted in this operating mode. OOS (Out of Service): The block is in the “Out of Service” mode. The execution of the remaining blocks (ISEL, AI and PID function block) is stopped in this operating mode. These blocks cannot be set to the AUTO mode. The current operating status of the Resource Block is also shown via the RS_STATE parameter.
6	Block Error (BLOCK_ERR)	Read only	Displays the active block errors. Display: OUT OF SERVICE The block is in the “Out of Service” mode.
7	Resource State (RS_STATE)	Read only	Displays the current operating status of the Resource Block. Display: ▪ STANDBY The Resource Block is in the OOS operating mode. It is not possible to execute the remaining blocks. ▪ ONLINE LINKING The configured connections between the function blocks are not yet established. ▪ ONLINE Normal operating mode, the Resource Block is in the AUTO operating mode. The configured connections between the function blocks have been established.
8	Test Read Write (TEST_RW)	AUTO - OOS	This parameter is required only for interoperability tests and has no significance in normal operation.
9	DD Resource (DD_RESOURCE)	Read only	Displays the source for the device description in the device. Display: (BLANK SPACE)
10	Manufacturer ID (MANUFAC_ID)	Read only	Displays the manufacturer's ID number. Display: 0 x 452B48 = Endress+Hauser

Resource Block			
Parameter Index	**Parameters**	**Write access with operating mode (MODE_BLK)**	**Description**
11	Device type (DEV_TYPE)	Read only	Displays the device ID number in hexadecimal format. Display: 0 x 10CF hex for RID1x
12	Device Revision (DEV_REV)	Read only	Use this function to view the device revision number.
13	DD Revision (DD_REV)	Read only	Displays the revision number of the ITK-tested device description.
14	Grant Deny (GRANT_DENY)	AUTO - OOS	Grant or deny a fieldbus host system access authorization to the field device.
15	Hard Types (HARD_TYPES)	Read only	Displays the input signal type for the Analog Input function block.
16	Restart (RESTART)	AUTO - OOS	The device can be reset in a variety of ways via this parameter. Options: ▪ Restart UNINITIALIZED ▪ RUN ▪ Restart RESOURCE (restart the Resource block) ▪ Restart with DEFAULTS (restart with the defined default values according to FF-Spec. (only FF bus parameters)) ▪ Restart PROCESSOR (restart the processor) ▪ Restart Order Configuration (all the parameters are reset to the order configuration) ▪ Restart PRODUCT DEFAULTS (reset all the device parameters to the default values)
17	Features (FEATURES)	Read only	Displays the additional functions supported by the device. Display: REPORTS FAULTSTATE SOFT W LOCK
18	Feature Selection (FEATURES_SEL)	AUTO - OOS	Use this function to select the additional functions supported by the device.
19	Cycle Type (CYCLE_TYPE)	Read only	Displays the block execution methods supported by the device. Display: ▪ SCHEDULED Cyclical block execution method ▪ BLOCK EXECUTION Sequential block execution method ▪ MANUF SPECIFIC Manufacturer-specific
20	Cycle Selection (CYCLE_SEL)	AUTO - OOS	Displays the block execution method used by the fieldbus host system. The block execution method is selected by the fieldbus host system.
21	Minimum Cycle Time (MIN_CYCLE_T)	Read only	Displays the min. execution time.
22	Memory Size (MEMORY_SIZE)	Read only	Displays the available configuration memory in kilobytes. This parameter is not supported.
23	Nonvolatile Cycle Time (NV_CYCLE_T)	Read only	Displays the time interval in which the dynamic device parameters are stored in the nonvolatile memory. The time interval displayed refers to the storage of the following dynamic device parameters: ▪ OUT ▪ PV ▪ FIELD_VAL This parameter always displays the value 0 because the device does not store the dynamic device parameters in the non-volatile memory.
24	Free Space (FREE_SPACE)	Read only	Displays the free space available (as a percentage) for the execution of additional function blocks. This parameter always displays the value 0 because the function blocks of the device are preconfigured.

Resource Block			
Parameter Index	**Parameters**	**Write access with operating mode (MODE_BLK)**	**Description**
25	Free Time (FREE_TIME)	Read only	Displays the free system time available (as a percentage) for the execution of additional function blocks. This parameter always displays the value 0 because the function blocks of the device are preconfigured.
26	Shed Remote Cascade (SHED_RCAS)	AUTO - OOS	Specify the monitoring time for checking the connection between the fieldbus host system and a function block in the RCAS operating mode. Once the monitoring time elapses, the function block switches from the RCAS operating mode to the operating mode selected in the SHED_OPT parameter. Factory setting: 640000 1/32 ms
27	Shed Remote Out (SHED_ROUT)	AUTO - OOS	Specify the monitoring time for checking the connection between the fieldbus host system and the PID function block in the ROUT operating mode. Once the monitoring time elapses, the PID function block switches from the ROUT operating mode to the operating mode selected in the SHED_OPT parameter, (see Guideline FOUNDATION Fieldbus Function Blocks (www.endress.com/download → Product code: SFC162)). Factory setting: 640000 1/32 ms
28	Fault State (FAULT_STATE)	Read only	Current status display of the fault state of the Analog Output and Discrete Output function blocks.
29	Set Fault State (SET_FSTATE)	AUTO - OOS	The fault state can be activated manually via this parameter.
30	Clear Fault State (CLR_FSTATE)	AUTO - OOS	The fault state of the Analog Output and Discrete Output function blocks can be manually disabled via this parameter.
31	Max Notify (MAX_NOTIFY)	Read only	Displays the maximum number of event reports supported by the device that can simultaneously exist as unconfirmed reports. Display: 4
32	Limit Notify (LIM_NOTIFY)	AUTO - OOS	Use this parameter to specify the number of event reports that can simultaneously exist as unconfirmed reports. Options: 0 to 4 Factory setting: 4
33	Confirm Time (CONFIRM_TIME)	AUTO - OOS	Specify the confirmation time for the event report. If the device does not receive confirmation within this time, the event report is sent to the fieldbus host system again. Factory setting: 640000 1/32 ms
34	Write Lock (WRITE_LOCK)		Write protection enabled/disabled Display: ▪ LOCKED Not possible to write to the device ▪ NOT LOCKED Device data can be modified ▪ UNINITIALIZED
35	Update Event (UPDATE_EVT)	Read only	Indicates whether static block data have been modified, including the date and time.
36	Block Alarm (BLOCK_ALM)	AUTO - OOS	Displays the current block condition with information on pending configuration, hardware or system errors, including information on the date and time when the error occurred. The block alarm is triggered by the following block errors: OUT OF SERVICE If the alarm option is not activated in the ACK_OPTION parameter, the alarm can only be acknowledged via this parameter.
37	Alarm Summary (ALARM_SUM)	AUTO - OOS	Displays the current status of the process alarms in the Resource Block. The process alarms can also be disabled in this parameter group.

Resource Block			
Parameter Index	**Parameters**	**Write access with operating mode (MODE_BLK)**	**Description**
38	Acknowledge Option (ACK_OPTION)	AUTO - OOS	This parameter is used to specify whether a process alarm must be acknowledged by the fieldbus host system when the alarm is detected. If the option is activated, the process alarm is acknowledged automatically. Factory setting: The option is not activated for any alarm. The alarms must be acknowledged.
39	Write Priority (WRITE_PRI)	AUTO - OOS	Specify the behavior in the event of a write protection alarm ("WRITE_ALM" parameter). User entry: ▪ 0 = The write protection alarm is not evaluated. ▪ 1 = The fieldbus host system is not notified in the event of a write protection alarm. ▪ 2 = Reserved for block alarms. ▪ 3-7 = The write protection alarm is output with the appropriate priority (3 = low priority, 7 = high priority) to the fieldbus host system as a user notice. ▪ 8-15 = The write protection alarm is output with the appropriate priority (8 = low priority, 15 = high priority) to the fieldbus host system as a critical alarm. Factory setting: 0
40	Write Alarm (WRITE_ALM)	AUTO - OOS	Displays the status of the write protection alarm. The alarm is triggered when the write protection is disabled.
41	ITK Version (ITK_VER)	Read only	Displays the version number of the supported ITK test.
42	Capability Level (CAPABILITY_LEVEL)	Read only	Indicates the capability level which the device supports.
43	Compatibility Revision (COMPATIBILITY_REV)	Read only	Indicates the previous device revision with which the device is compatible.
44	Electronic Name Plate Version (ENP_VERSION)	Read only	Version of the ENP (electronic name plate).
45	Device Tag (DEVICE_TAG)	Read only	Tag name/device TAG.
46	Serial Number (SERIAL_NUMBER)	Read only	Displays the device serial number.
47	Extended order code (ORDER_CODE_EXT)	Read only	Displays the extended order code for the device.
48	Extended order code part2 (ORDER_CODE_EXT_PAR T2)	Read only	Displays the second part of the extended order code. This is always empty in the case of this device, which is why this parameter does not appear in some host systems.
49	Order Code / Identification (ORDER_CODE)	Read only	Displays the order code for the device.
50	Firmware Version (FIRMWARE_ VERSION)	Read only	Displays the device software version.
51	Access code (RS_ACCESS_CODE)	AUTO - OOS	Use this function to enter the access code. The service parameters for the operating tool are enabled with this function. Use this function to enable the service parameters (serial number, device TAG, order code and extended order code) via the operating tool. The access code is write-only. Read access to this parameter always results in 0. The service parameters should only be modified by the service organization.
52	Access level (RS_ACCESS_LEVEL)	Read only	Use this function to show access authorization to the parameters. Options: ▪ Operator ▪ Service

Resource Block			
Parameter Index	**Parameters**	**Write access with operating mode (MODE_BLK)**	**Description**
			Factory setting: Operator
53	Field device diagnostic version (FD_VER)	Read only	The main version of the FF field diagnostic specification which was used for development purposes for this device.
54	Fail Active (FD_FAIL_ACTIVE)	Read only	Indicates whether a diagnostic event of the defined category is currently pending.
55	Offspec Active (FD_OFFSPEC_ ACTIVE)		Indicates whether a diagnostic event of the defined category is currently pending.
56	Maintenance Active (FD_MAINT_ACTIVE)	Read only	Indicates whether a diagnostic event of the defined category is currently pending.
57	Check Active (FD_CHECK_ACTIVE)	Read only	Indicates whether a diagnostic event of the defined category is currently pending.
58	Fail Map (FD_FAIL_MAP)	AUTO - OOS	Enable or disable diagnostic events or groups for the relevant category.
59	Offspec Map (FD_OFFSPEC_ MAP)	AUTO - OOS	Enable or disable diagnostic events or groups for the relevant category.
60	Maintenance Map (FD_MAINT_MAP)	AUTO - OOS	Enable or disable diagnostic events or groups for the relevant category.
61	Check Map (FD_CHECK_MAP)	AUTO - OOS	Enable or disable diagnostic events or groups for the relevant category.
62	Fail Mask (FD_FAIL_MASK)	AUTO - OOS	Disables the transmission of device messages to the fieldbus.
63	Offspec Mask (FD_OFFSPEC_ MASK)	AUTO - OOS	Disables the transmission of device messages to the fieldbus.
64	Maintenance Mask (FD_MAINT_MASK)	AUTO - OOS	Disables the transmission of device messages to the fieldbus.
65	Check Mask (FD_CHECK_MASK)	AUTO - OOS	Disables the transmission of device messages to the fieldbus.
66	Fail Diagnostic Alarm (FD_FAIL_ALM)	AUTO - OOS	Alarms that are actively transmitted by the device to the fieldbus.
67	Offspec Alarm (FD_OFFSPEC_ ALM)	AUTO - OOS	Alarms that are actively transmitted by the device to the fieldbus.
68	Maintenance Alarm (FD_MAINT_ALM)	AUTO - OOS	Alarms that are actively transmitted by the device to the fieldbus.
69	Check Alarm (FD_CHECK_ALM)	AUTO - OOS	Alarms that are actively transmitted by the device to the fieldbus.
70	Fail Priority (FD_FAIL_PRI)	AUTO - OOS	Indicates the alarm priority of the alarm transmitted to the Fieldbus.
71	Offspec Priority (FD_OFFSPEC_ PRI)	AUTO - OOS	Indicates the alarm priority of the alarm transmitted to the Fieldbus.
72	Maintenance Priority (FD_MAINT_PRI)	AUTO - OOS	Indicates the alarm priority of the alarm transmitted to the Fieldbus.
73	Check Priority (FD_CHECK_PRI)	AUTO - OOS	Indicates the alarm priority of the alarm transmitted to the Fieldbus.
74	Field Diagnostic Simulate (FD_SIMULATE)	AUTO - OOS	Makes it possible to simulate the field diagnostic parameters when the simulation switch is enabled.
75	Recommended Action (FD_RECOMMEN_ACT)	Read only	Displays the cause of the highest-priority diagnostic event in plain text along with remedial action.
76	Hardware Version (HARDWARE_ VERSION)	Read only	Displays the device hardware version.
77	FF communication software version (FF_COMM_VERSION)	Read only	Displays the version of the FF communication software (stack).

Resource Block			
Parameter Index	**Parameters**	**Write access with operating mode (MODE_BLK)**	**Description**
78	Block Error Description 1 (BLOCK_ERR_DESC_1)	Read only	Displays additional information to troubleshoot a block error. ▪ Simulation permitted: simulation is permitted with the activated simulation switch ▪ Failsafe active: failsafe is active in an AI Block
79	Resource Directory (RES_DIRECTORY)	Read only	Displays the Resource Directory for the electronic name plate (ENP).

14.3 Transducer Blocks

The Transducer Blocks of the RID1x contain all the device-specific parameters. All the settings directly connected with the display are made here.

14.3.1 Selecting the operating mode

The operating mode is set via the MODE_BLK parameter group → 40.

The Transducer Block supports the following operating modes:
- AUTO (automatic mode)
- OOS (out of service)

The OOS block status is also shown via the BLOCK_ERR parameter.

14.3.2 Accessing the device-specific parameters

To access the manufacturer-specific parameters, the hardware write protection must be disabled → 19.

14.3.3 FF parameters of the Transducer Blocks

The following table provides a description of all the FOUNDATION Fieldbus-specific parameters of the Transducer Blocks.

Transducer Block			
Parameter Index	**Parameters**	**Write access with operating mode (MODE_BLK)**	**Description**
1	Static Revision (ST_REV)	Read only	Displays the revision status of the static data. The revision status parameter is incremented each time the static data change. When a factory reset is performed, this parameter is reset to 0 in all the blocks.
2	Tag description (TAG_DESC)	AUTO - OOS	Use this function to enter a user-specific text (max. 32 characters) for the clear identification and assignment of the block. Factory setting: (_____) no text
3	Strategy (STRATEGY)	AUTO - OOS	Parameter for grouping the blocks, thereby enabling faster evaluation. Grouping is performed by entering the same numerical value in the STRATEGY parameter of each individual block. Factory setting: 0 These data are neither checked nor processed by the Transducer Blocks.
4	Alert key (ALERT_KEY)	AUTO - OOS	Use this function to enter the identification number of the plant unit. This information can be used by the fieldbus host system to sort alarms and events. User entry: 1 to 255 Factory setting: 0

Transducer Block			
Parameter Index	**Parameters**	**Write access with operating mode (MODE_BLK)**	**Description**
5	Block Mode (MODE_BLK)	AUTO - OOS	Displays the actual and target operating mode of the corresponding Transducer Block, the permitted modes which the Resource Block supports and the normal operating mode. Display: ▪ AUTO ▪ OOS The Transducer Block supports the following operating modes: ▪ AUTO (automatic mode): The block is executed. ▪ OOS (Out of Service): The block is in the “Out of Service” mode. The process variable is updated but the process variable status changes to BAD.
6	Block Error (BLOCK_ERR)	Read only	Displays the active block errors. Display: OUT OF SERVICE The block is in the “Out of Service” mode. The following block errors are only displayed in the Sensor Transducer Blocks: ▪ MAINTENANCE NEEDED The device must be checked because an active device error is pending. The detailed cause of the error can be called up in the "Advanced Diagnostic" Transducer Block via the "CURRENT_STATUS_CATEGORY" and "CURRENT_STATUS_NUMBER" parameters. ▪ LOST STATIC DATA / LOST_NV_DATA The memory is inconsistent. ▪ POWER-UP: Status message during the startup procedure. ▪ BLOCK CONFIGURATION ERROR: The block has been configured incorrectly. ▪ 0x0000: No active block error present. An exact error description as well as information on rectifying errors can be found in the "Status messages" section → 27.
7	Update Event (UPDATE_EVT)	AUTO - OOS	Indicates whether static block data have been modified, including the date and time.
8	Block Alarm (BLOCK_ALM)	AUTO - OOS	Displays the current block condition with information on pending configuration, hardware or system errors, including information on the date and time when the error occurred. ▪ In addition, the active block alarm can be acknowledged in this parameter group. ▪ The device does not use this parameter to display a process alarm since this is generated in the BLOCK_ALM parameter of the Analog Input function block.
10	Transducer Type (TRANSDUCER_TYPE)	Read only	Displays the Transducer Block type. Display: ▪ Display Transducer Block: Custom Display Transducer ▪ Advanced Diagnostic Block: Custom Adv. Diag. Transducer
11	Transducer Type Version(TRANSDUCER_TYPE_VER)	Read only	Displays the version of the Transducer Block type.
12	Transducer Error (XD_ERROR)	Read only	Displays the active device error.

Transducer Block			
Parameter Index	**Parameters**	**Write access with operating mode (MODE_BLK)**	**Description**
			Possible display: ▪ No Error (normal state) ▪ Electronics Failure ▪ Data Integrity Error ▪ Mechanical Failure ▪ Configuration Error ▪ Calibration Error ▪ General Error The summarized device status/condition and more precise information on the pending error(s) are available via the manufacturer-specific error display. This can be read via the Transducer Block “Advanced Diagnostic” in the “CURRENT_STATUS_CATEGORY” and "CURRENT_STATUS_NUMBER" parameters. An exact error description as well as information on rectifying errors can be found in the "Status messages" section → 27.
13	Collection Directory (COLLECTION_DIR)	Read only	Displays the "Collection Directory" parameter, always 0.

14.3.4 Transducer Block “Display”

The Display Transducer Block contains all the parameters required to configure the display functions.

The Listener Mode is also activated via this Transducer Block!

Transducer Block			
Parameter Index	**Parameters**	**Write access with operating mode (MODE_BLK)**	**Description**
14	DISP_ALTERNATING_ TIME	AUTO - OOS	Time interval in seconds for switching the display between different measured values.
15	DISP_AVAILABLE_ PUBLISHER	Read only	List of all devices publishing values in the segment. Only publishing devices in the address range 0x10 to 0x2F are displayed in this parameter. If a device in the high address range is publishing, it is not shown here. However, its value can also be made available by entering the device's address in the DISP_VALUE_x_LISTENER_DEVICE parameter.
16 19 22 25 28 31 34 37	DISP_VALUE_1_ANALOG DISP_VALUE_2_ANALOG DISP_VALUE_3_ANALOG DISP_VALUE_4_ANALOG DISP_VALUE_5_ANALOG DISP_VALUE_6_ANALOG DISP_VALUE_7_ANALOG DISP_VALUE_8_ANALOG	Read only	This block shows the current analog value. This block supports: ▪ DISP_VALUE_1[...8]_STATUS: Status of the current analog display value. The source of this value is selected in the "Source analog" parameter, or via the "Listener device" and "Listener value select" parameters if the "Listener mode" is activated. ▪ DISP_VALUE_1[...8]_VALUE: The current analog value. This value is selected by the "Source analog" parameter, or via the "Listener device" and "Listener value select" parameters if the "Listener mode" is activated.
17 20 23 26 29 32 35 38	DISP_VALUE_1_DIGITAL DISP_VALUE_2_DIGITAL DISP_VALUE_3_DIGITAL DISP_VALUE_4_DIGITAL DISP_VALUE_5_DIGITAL DISP_VALUE_6_DIGITAL DISP_VALUE_7_DIGITAL DISP_VALUE_8_DIGITAL	Read only	This block shows the current digital display value. This block supports: ▪ DISP_VALUE_1[...8]_STATUS: Status of the current discrete display value. This value is selected by the "Source digital" parameter, or via the "Listener device" and "Listener value select" parameters if the "Listener mode" is activated. ▪ DISP_VALUE_1[...8]_VALUE: The current discrete value. This value is selected by the "Source digital" parameter, or via the "Listener device" and "Listener value select" parameters if the "Listener mode" is activated.

Transducer Block			
Parameter Index	**Parameters**	**Write access with operating mode (MODE_BLK)**	**Description**
18 21 24 27 30 33 36 39	DISP_VALUE_1_SETTINGS DISP_VALUE_2_SETTINGS DISP_VALUE_3_SETTINGS DISP_VALUE_4_SETTINGS DISP_VALUE_5_SETTINGS DISP_VALUE_6_SETTINGS DISP_VALUE_7_SETTINGS DISP_VALUE_8_SETTINGS	AUTO - OOS	This parameter defines all the values for the setup of the indicator. The following parameters are included: ▪ DISP_VALUE_1|...8|_LISTENER_MODE: Activates the "Listener mode". In this mode the device can show values published on the bus by other devices. The device acts as a passive bus user and listens to other devices. A list of all device addresses of available publishers is provided in the "Available publishers" parameters. The device is selected in "Listener device" and the value in "Listener device value select". ▪ DISP_VALUE_1|...8|_LISTENER_DEVICE: When the "Listener mode" is active, select a publisher's address whose value is to be shown on the display. ▪ DISP_VALUE_1|...8|_LISTENER_VALUE_SELECT: Once the publisher's address has been selected in the "Listener device" parameter, the device shows the first published value on the display. You can select the next published value by choosing "Next value". When an address is written, the "LISTENER_VALUE" parameter is always set to 1. The next values can be selected with "LISTENER_VALUE_SELECT". ▪ DISP_VALUE_1|...8|_LISTENER_VALUE: The currently selected value of a publishing device. The address of the device is selected in "Listener device" and the value is selected in "Listener value select", starting with 1. ▪ DISP_VALUE_1|...8|_SOURCE_ANALOG: Use this function to select an analog signal of a function block whose value is to be shown on the display. Available parameters: ▪ Off ▪ ISEL1.IN_1 ▪ ISEL1.IN_2 ▪ ISEL1.IN_3 ▪ ISEL1.IN_4 ▪ ISEL1.OUT ▪ ISEL2.IN_1 ▪ ISEL2.IN_2 ▪ ISEL2.IN_3 ▪ ISEL2.IN_4 ▪ ISEL2.OUT ▪ PID.IN ▪ PID.OUT ▪ PID.SP ▪ INTG.IN_1 ▪ INTG.IN_2 ▪ INTG.OUT ▪ AR.IN ▪ AR.IN_1 ▪ AR.IN_2 ▪ AR.IN_3 ▪ AR.OUT ▪ DISP_VALUE_1|...8|_SOURCE_DIGITAL: Use this function to select a digital signal of a function block that is to be shown on the display. Available parameters: ▪ Off ▪ ISEL1.DISABLE_1 ▪ ISEL1.DISABLE_2 ▪ ISEL1.DISABLE_3 ▪ ISEL1.DISABLE_4 ▪ ISEL2.DISABLE_1 ▪ ISEL2.DISABLE_2 ▪ ISEL2.DISABLE_3 ▪ ISEL2.DISABLE_4

Transducer Block			
Parameter Index	**Parameters**	**Write access with operating mode (MODE_BLK)**	**Description**
			▪ DISP_VALUE_1[...8]_DESC: Use this function to enter customized text, max. 16 characters. This text is shown beneath the value. The text will scroll if it is longer than 5 characters. ▪ DISP_VALUE_1[...8]_FORMAT: Number of decimal places for the display. Available parameters: ▪ Auto (the device automatically sets the position of the decimal point to fill all 5 digits of the display) ▪ XXXXX ▪ XXXX.X ▪ XXX.XX ▪ XX.XXX ▪ X.XXXX ▪ DISP_VALUE_1[...8]_BGMIN: Use this function to enter the minimum value (0%) for the bar graph display. ▪ DISP_VALUE_1[...8]_BGMAX: Use this function to enter the maximum (100%) for the bar graph display. ▪ DISP_VALUE_1[...8]_PERCENT: Switch the percent sign on/off. The displayed value is not recalculated. ▪ DISP_VALUE_1[...8]_SETUP_DIGITAL: Visualization of digital values. This setting is only valid if a source has been selected for the digital value. Available parameters: ▪ 1 = On; 0 = Off ▪ 0 = On; 1 = Off ▪ 1 = Open; 0 = Close ▪ 0 = Open; 1 = Close ▪ Display as decimal value
40	Block Error Description 1 (BLOCK_ERR_DESC_1)	Read only	Displays additional information to troubleshoot a block error. 0x00000001 Resource Block out of service 0x00010000 IS1 not instantiated but used as the source 0x00020000 IS2 not instantiated but used as the source 0x00040000 PID not instantiated but used as the source 0x00080000 AR Block not instantiated but used as the source 0x00100000 INTG Block not instantiated but used as the source 0x01000000 Channel 1: several inputs or device address not available for Listener Mode 0x02000000 Channel 2: several inputs or device address not available for Listener Mode 0x04000000 Channel 3: several inputs or device address not available for Listener Mode 0x08000000 Channel 4: several inputs or device address not available for Listener Mode 0x10000000 Channel 5: several inputs or device address not available for Listener Mode 0x20000000 Channel 6: several inputs or device address not available for Listener Mode 0x40000000 Channel 7: several inputs or device address not available for Listener Mode 0x80000000 Channel 8: several inputs or device address not available for Listener Mode

14.3.5 Transducer Block "Advanced Diagnostic"

The Advanced Diagnostic Block provides information about the current and last device status. In addition, it also indicates the channel in which the current diagnostic event occurred. It contains minimum and maximum values for every analog channel.

Transducer Block			
Parameter Index	**Parameters**	**Write access with operating mode (MODE_BLK)**	**Description**
14	ACTUAL_STATUS_ NUMBER	Read only	Displays the current diagnostic number.
15	ACTUAL_STATUS_DESC	Read only	Displays a description of the diagnostic message.
16	ACTUAL_STATUS_CATEGORY	Read only	Current status category ▪ Good: no error detected ▪ F: Failure: error detected ▪ C: Function check: device is in the service mode ▪ S: Out of Spec.: device is being operated outside the specifications ▪ M: Maintenance required ▪ No category: No NAMUR category has been selected for the current diagnostic event
17	ACTUAL_STATUS_ CHANNEL	Read only	This parameter displays the channel where the 'Current diagnostics' message occurred.
18	ACTUAL_STATUS_ COUNT	Read only	This parameter displays the current number of status messages that are not "good".
19	LAST_STATUS_NUMBER	AUTO - OOS	Displays the last diagnostic number.
20	LAST_STATUS_DESC	AUTO - OOS	Displays a description of the last diagnostic message.
21	LAST_STATUS_CATEGORY	AUTO - OOS	Last status category ▪ Good: no error detected ▪ F: Failure: error detected ▪ C: Function check: device is in the service mode ▪ S: Out of Spec.: device is being operated outside the specifications ▪ M: Maintenance required ▪ No category: No NAMUR category has been selected for the current diagnostic event
22	LAST_STATUS_CHANNEL	AUTO - OOS	This parameter displays the channel where the 'Last diagnostics' message occurred.
23 25 27 29 31 33 35 37	CH1_MIN_INDICATOR CH2_MIN_INDICATOR CH3_MIN_INDICATOR CH4_MIN_INDICATOR CH5_MIN_INDICATOR CH6_MIN_INDICATOR CH7_MIN_INDICATOR CH8_MIN_INDICATOR	AUTO - OOS	Displays the minimum value of channel 1[...8] (value 1 to 8). This value is written to the non-volatile memory every 10 minutes.
24 26 28 30 32 34 36 38	CH1_MAX_INDICATOR CH2_MAX_INDICATOR CH3_MAX_INDICATOR CH4_MAX_INDICATOR CH5_MAX_INDICATOR CH6_MAX_INDICATOR CH7_MAX_INDICATOR CH8_MAX_INDICATOR	AUTO - OOS	Displays the maximum value of channel 1[...8] (value 1 to 8). This value is written to the non-volatile memory every 10 minutes.
39	RESET_ALL_INDICATORS	AUTO - OOS	Resets all the minimum and maximum values to "0".
40	ADVDIAG_DIAGSIM_ENABLE	OOS	Enable/disable simulation of a diagnostic event.
41	DIAGSIM_NUMBER	AUTO - OOS	Use this function to select the diagnostic event to be simulated.

Transducer Block			
Parameter Index	**Parameters**	**Write access with operating mode (MODE_BLK)**	**Description**
42	STATUS_SIGNAL	Read only	Copy of "ACTUAL_STATUS_CATEGORY" but with the "Status signal" label
43	Block Error Description 1 (BLOCK_ERR_DESC_1)	Read only	Displays additional information to troubleshoot a block error. ▪ 0x00000000 ▪ 0x00000001 Resource Block Out Of Service ▪ 0x00010000 diagnostic simulation active

14.4 PID function block (PID controller)

A PID function block contains the input channel processing, the proportional integraldifferential control (PID) and the analog output channel processing. The configuration of the PID function block depends on the automation task. The following can be realized: Basic controls, feed forward control, cascade control, cascade control with limiting.

The possibilities available for processing measured values within the PID function block include: signal scaling and limiting, operating mode control, actuating, limiting control, limit detection and signal status propagation.

A detailed description of the PID function block can be found in the Guideline FOUNDATION Fieldbus Function Blocks (www.endress.com/download → Product code: SFC162).

14.5 Input Selector function block

The block for selecting a signal (Input Selector Block - ISEL) allows the user to choose up to four inputs and generates an output based on the configured action. A detailed description of the Input Selector function block can be found in the Guideline FOUNDATION Fieldbus Function Blocks (www.endress.com/download → Product code: SFC162).

14.6 Arithmetic function block

The Arithmetic function block provides the ability to configure a range extension function for a primary input and applies the nine different arithmetic types as compensation to or augmentation of the range extended input. All operations are selected by parameter and input connection. The ten arithmetic functions are Flow Compensation Linear, Flow Compensation Square Root, Flow Compensation Approximate, Btu Flow, Traditional Multiply and Divide, Average, Summer, Fourth Order Polynomial, and Simple HTG Compensate Level. This Arithmetic function block supports mode control (Auto, Man, OOS). There is no standard alarm detection in this block.

A detailed description of the Arithmetic function block can be found in the Guideline FOUNDATION Fieldbus Function Blocks (www.endress.com/download → Product code: SFC162).

14.7 Integrator function block

The Integrator (INT) function block integrates one variable or the sum or difference between two variables over time. The block compares the integrated or accumulated value to pre-trip and trip limits and generates discrete output signals when the limits are reached. This function block can also be used as a totalizer. You choose one of seven integrator types that determine whether the integrated value increases from 0 or decreases from the setpoint (SP). The block has two inputs and can integrate positive,

negative, or net flow. This capability is useful to calculate volume or mass variation in vessels or as an optimization tool for flow ratio control.

The Integrator function block supports mode control, demand reset, a reset counter, and signal status calculation. There are no standard alarms in this function block. Custom alarms are supported.

A detailed description of the Integrator function block can be found in the Guideline FOUNDATION Fieldbus Function Blocks (www.endress.com/download → Product code: SFC162).

14.8 Configuration of the device behavior when events occur in accordance with FOUNDATION Fieldbus™ field diagnostics

The device supports the configuration of FOUNDATION Fieldbus field diagnostics. This means the following:

- The diagnostic category as per NAMUR Recommendation NE107 is transmitted over the fieldbus in a format that is independent of the manufacturer:
  - F: Failure
  - C: Function check
  - S: Out of specification
  - M: Maintenance required
- The user can adapt the diagnostic category of the predefined event groups to the requirements of the individual application.

Additional information and troubleshooting measures are transmitted over the fieldbus together with the event message.

It is important to ensure that the "Multi-bit Alarm Support" option is enabled in the FEATURE_SEL parameter of the Resource Block.

14.8.1 Event groups

The diagnostic events are divided into 16 standard groups based on the source and the importance of the event. A standard event category is assigned to every group at the factory. One bit of the assignment parameter belongs to every event group. The standard assignment of event messages to event groups is defined in the following table.

Event weighting	Standard event category	Event source	Bit	Events in this group
Highest severity	Failure (F)	Sensor	31	Not used with this device
		Electronics	30	▪ F261: Device electronics ▪ F283: Memory error
		Configuration	29	F437: Configuration error
		Process	28	Not used with this device

Event weighting	Standard event category	Event source	Bit	Events in this group
High severity	Function check (C)	Sensor	27	Not used with this device
		Electronics	26	Not used with this device
		Configuration	25	▪ C501: Device reset ▪ C561: Display overflow
		Process	24	Not used with this device

No events are assigned to the "Low severity" and "Lowest severity" weighting.

14.8.2 Assignment parameters

Event categories are assigned to event groups via four assignment parameters.

They can be found in the RESOURCE Block (RB2):
- FD_FAIL_MAP: for the "Failure (F)" event category
- FD_CHECK_MAP: for the "Function check (C)" event category
- FD_OFFSPEC_MAP: for the "Out of specification (S)" event category
- FD_MAINT_MAP: for the "Maintenance required (M)" event category

Each of these parameters consists of 32 bits with the following meaning:
- Bit 0: reserved for Fieldbus Foundation ("Check Bit")
- Bits 1-15: configurable range; this range is not used by this device.
- Bits 16-31: standard range; these bits are permanently assigned to the event groups. If the bit is set to 1, this event group is assigned to the corresponding event category.

The following table lists the standard settings for the assignment parameters. In the standard setting, there is a clear assignment between the event weighting and the event category (i.e. the assignment parameters).

	Standard range																Configurable range
Event weighting	Highest weighting				High weighting				Low severity				Lowest severity				
Event source [1]	S	E	C	P	S	E	C	P	S	E	C	P	S	E	C	P	
Bit	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15...1
FD_FAIL_MAP	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
FD_CHECK_MAP	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0
FD_OFFSPEC_MAP	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0
FD_MAINT_MAP	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0

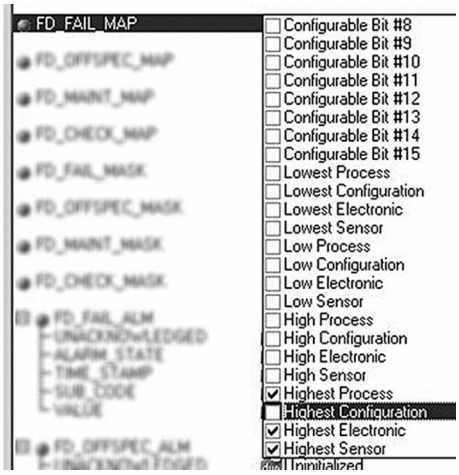
1) S: Sensor; E: Electronics; C: Configuration; P:Process

Proceed as follows to change the diagnostic behavior:

1. Open the assignment parameter which the group is currently assigned to.
2. Change the event group bit from 1 to 0. In configuration systems, this is done by deselecting the corresponding check box.
3. Open the assignment parameter which the group should be assigned to.
4. Change the event group bit from 0 to 1. In configuration systems, this is done by ticking the corresponding check box.

Example: The "Highest severity/Configuration error" group contains event 437: "Configuration error". This event should now be assigned to the "Function check (C)" category, and no longer to the "Failure (F)" category.

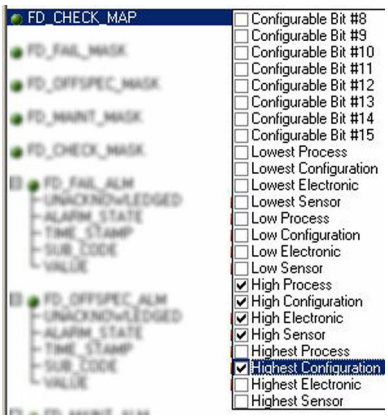
1.



A0019661

In the FD_FAIL_MAP parameter of the Resource Block, deselect the corresponding check box for the "Highest Configuration" group.

2.



A0019663

In the FD_CHECK_MAP parameter of the Resource Block, tick the corresponding check box for the "Highest Configuration" group.

The corresponding bit must be set in at least one of the assignment parameters for every event group. Otherwise no category information is transmitted with the event over the bus, with the result that the process control system would generally ignore the occurrence of the event.

The recognition of diagnostic events is configured with the MAP parameters (F, C, S, M) but the transmission of messages to the bus is not. MASK parameters are used for message transmission. The Resource Block must be set to the Auto mode for the status information to be transmitted to the bus.

14.8.3 Reasons for a diagnostic event and corrective action

The FD_RECOMMEN_ACT parameter in the Resource Block shows a description of the highest priority diagnostic event that is currently active.

The description has the following structure:

Diagnostic number: Diagnostic text with channel (ch x): recommendations for troubleshooting, separated by dashes

437:Configuration error ch01:Check configuration of the transmitter settings - Contact service organization

The value transmitted over the bus has the following structure: XXYYY

X = Channel number

YYY = Diagnostic number

The value in the example above is 1437

14.9 Transmission of event messages to the bus

The process control system used must support the transmission of event messages.

14.9.1 Event priority

Event messages are only transmitted to the bus if their priority is between 2 and 15. Priority 1-events are displayed but are not transmitted to the bus. Priority 0-events are ignored. At the factory, all events have the priority 0. This priority can be changed individually for the four assignment parameters. Four PRI parameters (F, C, S, M) of the Resource Block are used for this purpose.

14.9.2 Suppressing certain events

The transmission of events to the bus can be suppressed via a mask. In such cases, the events are displayed but are not transmitted to the bus. This mask can be found in the MASK parameters (F, C, S, M). The mask is a negative selection mask, i.e. if a field is selected the associated events are not transmitted to the bus.

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