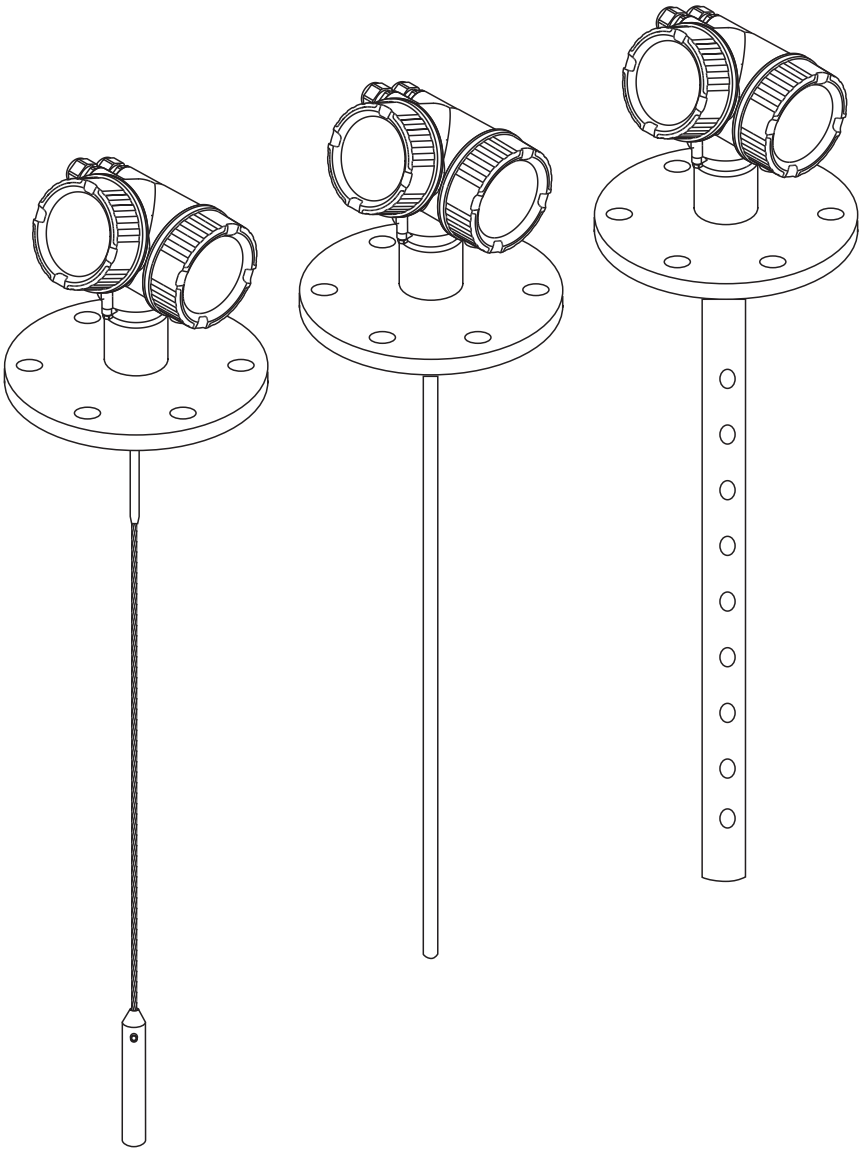
Level Pressure Flow Temperature Liquid Analysis Registration Systems Components Services Solutions

Operating Instructions

Levelflex FMP51, FMP52, FMP54

Guided Level-Radar
Level and interface measurement in liquids

Fieldbus™ Foundation



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Valid as of version
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Endress+Hauser

People for Process Automation

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1 Important document information

1.1 About this document

1.1.1 Document function

These Operating Instructions contain all the information that is required in various phases of the life cycle of the device: from product identification, incoming acceptance and storage, to mounting, connection, operation and commissioning through to troubleshooting, maintenance and disposal.

1.1.2 Additional standard documentation on the device

Document	Purpose and content of the document
Technical Information TI01001F	**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 FMP51/ FMP52/FMP54 PROFIBUS KA01107F	**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.
Description of Device Parameters GP01015F	**Reference for your parameters** The document provides a detailed explanation of each individual parameter in the operating menu. The description is aimed at those who work with the device over the entire life cycle and perform specific configurations.

The document types listed are available:
- On the CD supplied with the device
- In the Download Area of the Endress+Hauser Internet site: www.endress.com → Download

1.1.3 Safety Instructions (XA) for Levelflex FMP51, FMP52, FMP54

Depending on the approval, the following Safety Instructions (XA) are supplied with the instrument. They are an integral part of the Operating Instructions.

51	52	54	Feature 010	Approval	Safety Instructions HART	Safety Instructions PROFIBUS FOUNDATION Fieldbus
x	x	x	BA	ATEX II 1 G Ex ia IIC T6 Ga	XA00496F	XA00516F
x	x	x	BB	ATEX II 1/2 G Ex ia IIC T6 Ga/Gb	XA00496F	XA00516F
x	x	x	BC	ATEX II 1/2 G Ex d[ia] IIC T6 Ga/Gb	XA00499F	XA00519F
x	x	x	BD	ATEX II 1/3 G Ex ic[a] IIC T6 Ga/Gc	XA00497F	XA00517F
		x	BE	ATEX II 1 D Ex t[ia] IIIC Txx°C Da IP6x	XA00501F	XA00521F
		x	BF	ATEX II 1/2 D Ex t[ia] IIIC Txx°C Da/Db IP6x	XA00501F	XA00521F
x	x	x	BG	ATEX II 3 G Ex nA IIC T6 Gc	XA00498F	XA00518F
x	x	x	BH	ATEX II 3 G Ex ic IIC T6 Gc	XA00498F	XA00518F
x	x	x	BL	ATEX II 1/3G Ex nA(ia) IIC T6	XA00497F	XA00517F
x	x	x	B2	ATEX II 1/2 G Ex ia IIC T6, 1/2D Ex ia IIIC IP6x	XA00502F	XA00522F
x	x	x	B3	ATEX II 1/2 G Ex d[ia] IIC T6 Ga/Gb, II 1/2 D Ex t[ia] IIIC Txx°C Da/Db IP6x	XA00503F	XA00523F
x	x	x	B4	ATEX II 1/2 G Ex ia IIC T6 Ga/Gb, Ex d[ia] IIC T6 Ga/Gb	XA00500F	XA00520F

51	52	54	Feature 010	Approval	Safety Instructions HART	Safety Instructions PROFIBUS FOUNDATION Fieldbus
		x	CD	CSA C/US DIP Cl.I,II Div.1 Gr.E-G	XA00529F	XA00570F
x	x	x	C2	CSA C/US IS Cl.I,II,III Div.1 Gr.A-G, NI Cl.1 Div.2, Ex ia	XA00530F	XA00571F
x	x	x	C3	CSA C/US XP Cl.I,II,III Div.1 Gr.A-G, NI Cl.1 Div.2, Ex d	XA00529F	XA00570F
x	x	x	FB	FM IS Cl.I,II,III Div.1 Gr.A-G, AEx ia, NI Cl.1 Div.2	XA00531F	XA00573F
x	x	x	FD	FM XP Cl.I,II,III Div.1 Gr.A-G, AEx d, NI Cl.1 Div.2	XA00532F	XA00572F
		x	FE	FM DIP Cl.II,III Div.1 Gr.E-G	XA00532F	XA00572F
x	x	x	IA	IECEx Zone 0 Ex ia IIC T6 Ga	XA00496F	XA00516F
x	x	x	IB	IECEx Zone 0/1 Ex ia IIC T6 Ga/Gb	XA00496F	XA00516F
x	x	x	IC	IECEx Zone 0/1 Ex d[ia] IIC T6 Ga/Gb	XA00499F	XA00519F
x	x	x	ID	IECEx Zone 0/2 Ex ic[ia] IIC T6 Ga/Gc	XA00497F	XA00517F
		x	IE	IECEx Zone 20 Ex t[ia] IIIC Txx°C Da IP6x	XA00501F	XA00521F
		x	IF	IECEx Zone 20/21 Ex t[ia] IIIC Txx°C Da/Db IP6x	XA00501F	XA00521F
x	x	x	IG	IECEx Zone 2 Ex nA IIC T6 Gc	XA00498F	XA00518F
x	x	x	IH	IECEx Zone 2 Ex ic IIC T6 Gc	XA00498F	XA00518F
x	x	x	IL	IECEx zone 0/2 Ex nA(ia) IIC T6 Ga/Gc	XA00497F	XA00517F
x	x	x	I2	IECEx zone 0/1 Ex ia IIC T6 Ga/Gb, zone 20/21 Ex ia IIIC A20/21 IP6x, Da/Db	XA00502F	XA00522F
x	x	x	I3	IECEx Zone 0/1 Ex d[ia] IIC T6 Ga/Gb, Zone 20/21 Ex t[ia] IIIC Txx°C Da/Db IP6x	XA00503F	XA00523F
x	x	x	NA	NEPSI Zone 0 Ex ia IIC T6 Ga	XA00634F	XA00640F
x	x	x	NB	NEPSI Zone 0/1 Ex ia IIC T6 Ga/Gb	XA00634F	XA00640F
x	x	x	NC	NEPSI Zone 0/1 Ex d(ia) IIC T6 Ga/Gb	XA00636F	XA00642F
		x	NF	NEPSI Zone 20/21 tD IIIC A20/21 IP6x Da/Db	XA00637F	XA00643F
x	x	x	NG	NEPSI Zone 2 Ex nA II T6 Gc	XA00635F	XA00641F
x	x	x	NH	NEPSI Zone 2 Ex ic IIC T6 Gc	XA00635F	XA00641F
x	x	x	N2	NEPSI zone 0/1 Ex ia IIC T6 Ga/Gb, zone 20/21 Ex iaD 20/21 T*	XA00638F	XA00644F
x	x	x	N3	NEPSI zone 0/1 Ex d(ia) IIC T6 Ga/Gb, DIP A20/21 T* IP66	XA00639F	XA00645F
x	x	x	8A	FM/CSA IS+XP Cl.I,II,III Div.1 Gr.A-G	XA00531F XA00532F	XA00572F XA00573F

For certified devices the relevant Safety Instructions (XA) are indicated on the nameplate.

1.2 Document conventions

1.2.1 Safety symbols

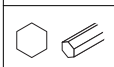
Symbol	Meaning
DANGER A0011189-EN	**DANGER!** This symbol alerts you to a dangerous situation. Failure to avoid this situation will result in serious or fatal injury.
WARNING A0011190-EN	**WARNING!** This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in serious or fatal injury.

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

1.2.2 Electrical symbols

Symbol	Meaning
 A0011197	**Direct current** A terminal to which DC voltage is applied or through which direct current flows.
A0011198	**Alternating current** A terminal to which alternating voltage (sine-wave) is applied or through which alternating current flows.
 A0011200	**Ground connection** A grounded terminal which, as far as the operator is concerned, is grounded via a grounding system.
 A0011199	**Protective ground connection** A terminal which must be connected to ground prior to establishing any other connections.
 A0011201	**Equipotential connection** A connection that has to be connected to the plant grounding system: This may be a potential equalization line or a star grounding system depending on national or company codes of practice.

1.2.3 Tool symbols

Symbol	Meaning
 A0013442	Torx screwdriver
 A0011220	Flat blade screwdriver
 A0011219	Phillips head screwdriver
 A0011221	Allen key
 A0011222	Hexagon wrench

1.2.4 Symbols for certain types of information

Symbol	Meaning
 A0011182	**Allowed** Indicates procedures, processes or actions that are allowed.
 A0011183	**Preferred** Indicates procedures, processes or actions that are preferred.
 A0011184	**Forbidden** Indicates procedures, processes or actions that are forbidden.

Symbol	Meaning
 A0011193	**Tip** Indicates additional information.
 A0011194	**Reference to documentation** Refers to the corresponding device documentation.
 A0011195	**Reference to page** Refers to the corresponding page number.
 A0011196	**Reference to graphic** Refers to the corresponding graphic number and page number.
1. , 2. , 3. …	**Series of steps**
✔	**Result of a sequence of actions**
 A0013562	**Help in the event of a problem**

1.2.5 Symbols in graphics

Symbol	Meaning
1, 2, 3 ...	Item numbers
1. , 2. , 3. …	Series of steps
A, B, C, ...	Views
A-A, B-B, C-C, ...	Sections
 A0011187	**Hazardous area** Indicates a hazardous area.
 A0011188	**Safe area (non-hazardous area)** Indicates a non-hazardous location.

2 Basic safety instructions

2.1 Requirements concerning the staff

The personnel for installation, commissioning, diagnostics and maintenance must fulfill the following requirements:
- ► Trained, qualified specialists: must have a relevant qualification for this specific function and task
- ► Are authorized by the plant owner/operator
- ► Are familiar with federal/national regulations
- ► Before beginning work, the specialist staff must have read and understood the instructions in the Operating Instructions and supplementary documentation as well as in the certificates (depending on the application)
- ► Following instructions and basic conditions

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

2.2 Designated use

Application and measured materials
The measuring device described in these Operating Instructions is intended only for level and interface measurement of liquids. Depending on the version ordered the device can also measure potentially explosive, flammable, poisonous and oxidizing materials.

Observing the limit values specified in the "Technical data" and listed in the Operating Instructions and supplementary documentation, the measuring device may be used for the following measurements only:
- ► Measured process variable: Level and/or interface
- ► Calculated process variable: Volume oder mass in arbitrarily shaped vessels (calculated from the level by the linearization functionality)

To ensure that the measuring device remains in proper condition for the operation time:
- ► Use the measuring device only for measured materials against which the process-wetted materials are adequately resistant.
- ► Observe the limit values in "Technical data".

Incorrect use
The manufacturer is not liable for damage caused by improper or non-designated use.

Verification for borderline cases:
- ► For special measured materials and cleaning agents, Endress+Hauser is glad to provide assistance in verifying the corrosion resistance of wetted materials, but does not accept any warranty or liability.

Residual risk
The electronics housing and its built-in components such as display module, main electronics module and I/O electronics module may heat to 80 °C (176 °F) during operation through heat transfer from the process as well as power dissipation within the electronics. During operation the sensor may assume a temperature near the temperature of the measured material.

Danger of burns due to heated surfaces!
- ► For high process temperatures: Install protection against contact in order to prevent burns.

2.3 Workplace safety

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

2.4 Operational safety

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

Conversions to the device

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

Repair

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

Hazardous area

To eliminate a danger for persons or for the facility when the device is used in the hazardous area (e.g. explosion protection, pressure vessel safety):
- ► Based on the nameplate, check whether the ordered device is permitted for the intended use in the hazardous area.
- ► Observe the specifications in the separate supplementary documentation that is an integral part of these Instructions.

2.5 Product safety

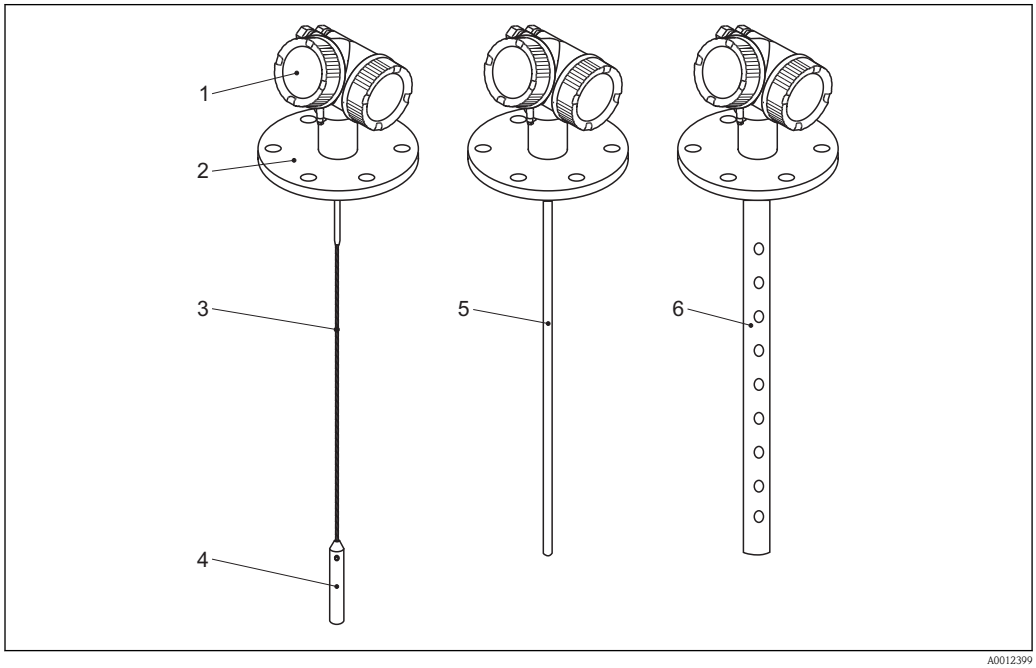
This measuring device is designed in accordance with good engineering practice to meet state-of-the- art safety requirements, has been tested, and left the factory in a condition in which they are safe to operate.

It fulfills general safety requirements and legal requirements. It also conforms to the EC directives listed in the device-specific EC declaration of conformity. Endress+Hauser confirms this fact by applying the CE mark.

3 Product description

3.1 Product design

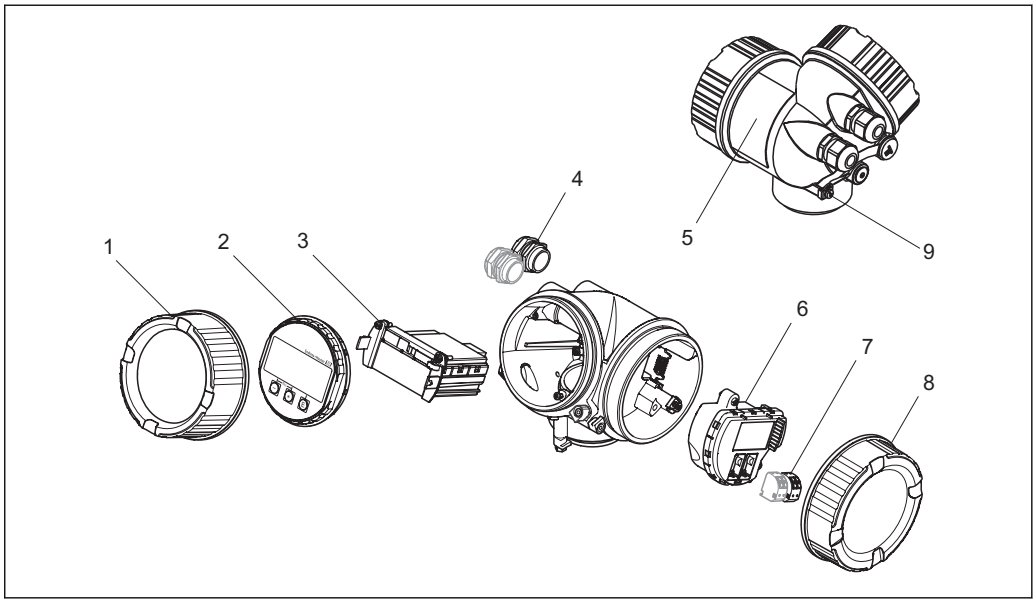
3.1.1 Compact device Levelflex



1 Design of the Levelflex

1 Electronics housing
2 Process connection (here as an example: flange)
3 Rope probe
4 End-of-probe weight
5 Rod probe
6 Coax probe

3.1.2 Electronics housing



2 *Design of the electronics housing*

1 Electronics compartment cover
2 Display module
3 Main electronics module
4 Cable glands (1 or 2, depending on instrument version)
5 Nameplate
6 I/O electronics module
7 Terminals (pluggable spring terminals)
8 Connection compartment cover
9 Grounding terminal

3.2 Registered trademarks

FOUNDATION™ Fieldbus
Registered trademark of the Fieldbus Foundation, Austin, Texas, USA

KALREZ®, VITON®
Registered trademark of DuPont Performance Elastomers L.L.C., Wilmington, USA

TEFLON®
Registered trademark of E.I. DuPont de Nemours & Co., Wilmington, USA

TRI CLAMP®
Registered trademark of Alfa Laval Inc., Kenosha, USA

3.3 Patents

This product may be protected by at least one of the following patents.

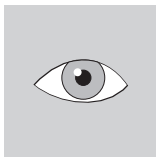
Further patents are pending.

US Patents	EP Patents
5.827.985	—
5.884.231	—
5.973.637	—
6.087.978	955 527
6.140.940	—

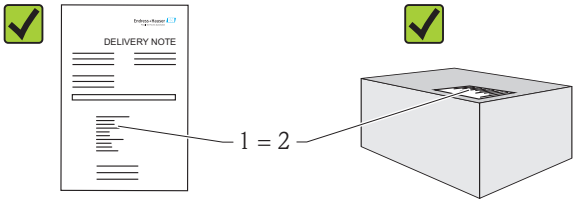
US Patents	EP Patents
6.481.276	—
6.512.358	1 301 914
6.559.657	1 020 735
6.640.628	—
6.691.570	—
6.847.214	—
7.441.454	—
7.477.059	—
—	1 389 337
7.965.087	—

4 Incoming acceptance and product identification

4.1 Incoming acceptance

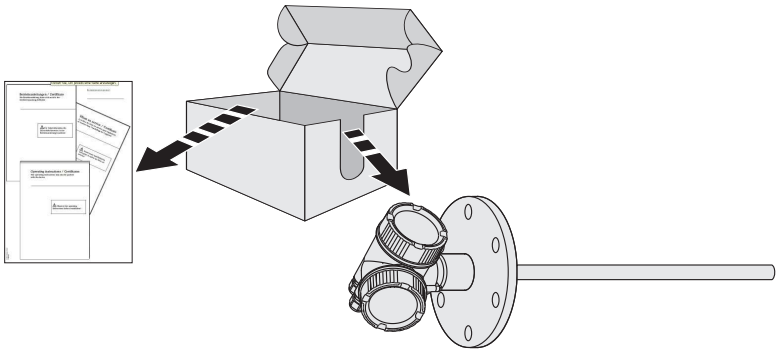


A0013696

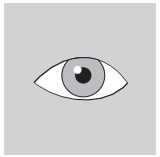


A0016870

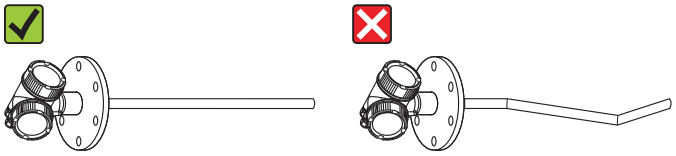
Is the order code on the delivery note (1) identical to the order code on the product sticker (2)?



A0013921

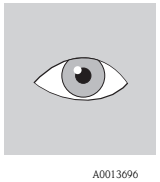


A0013696

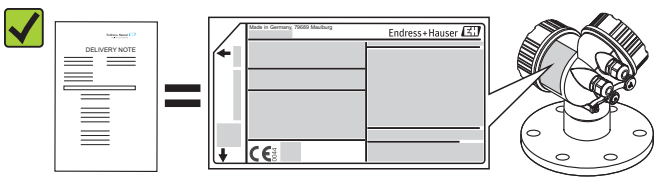


A0013922

Are the goods undamaged?

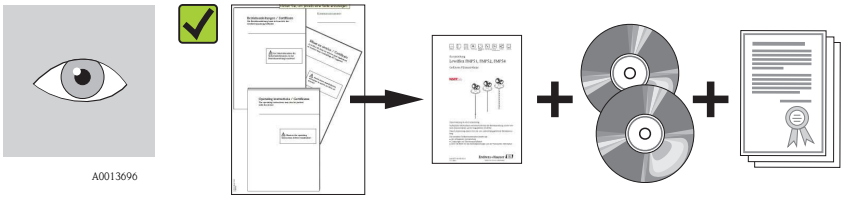


A0013696



A0014038

Do the nameplate data match the ordering information on the delivery note?



A0013696

A0014037

Are the CD-ROMs (product documentation, operating tool) and documentation present?
If required (see nameplate): Are the Safety Instructions (XA) present?

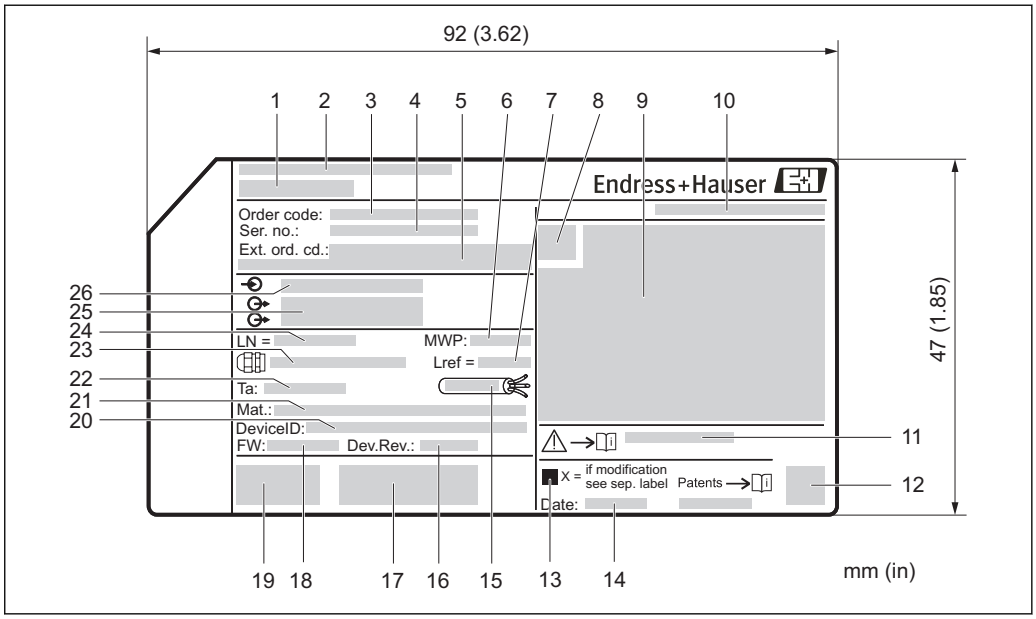
If one of the conditions does not comply, contact your Endress+Hauser distributor.

4.2 Product identification

The following options are available for identification of the measuring device:
- Nameplate specifications
- Order code with breakdown of the device features on the delivery note
- Enter serial numbers from nameplates in *W@M Device Viewer* (www.endress.com/deviceviewer): All information about the measuring device is displayed.

For an overview of the scope of the Technical Documentation provided, refer to the following: enter serial numbers from nameplates in *W@M Device Viewer* (www.endress.com/deviceviewer)

4.2.1 Nameplate



3 *Nameplate of the Levelflex*

1 *Device name*
2 *Address of manufacturer*
3 *Order code*
4 *Serial number (Ser. no.)*
5 *Extended order code (Ext. ord. cd.)*
6 *Process pressure*
7 *Gas phase compensation: reference distance*
8 *Certificate symbol*
9 *Certificate and approval relevant data*
10 *Degree of protection: e.g. IP, NEMA*
11 *Document number of the Safety Instructions: e.g. XA, ZD, ZE*
12 *Data Matrix Code*
13 *Modification mark*
14 *Manufacturing date: year-month*
15 *Permitted temperature range for cable*
16 *Geräterevision (Dev.Rev.)*
17 *Additional information about the device version (certificates, approvals, communication): e.g. SIL, PROFIBUS*
18 *Firmware version (FW)*
19 *CE mark, C-Tick*
20 *DeviceID*
21 *Material in contact with process*
22 *Permitted ambient temperature (T_a)*
23 *Size of the thread of the cable glands*
24 *Length of probe*
25 *Signal outputs*
26 *Operating voltage*

4.2.2 Product structure FMP51, FMP52, FMP54

This overview does not mark options which are mutually exclusive.

Option with * = in preparation

010	Approval:	FMP		
		51	52	54
AA	Non-hazardous area	x	x	x
BA	ATEX II 1G Ex ia IIC T6	x	x	x
BB	ATEX II 1/2G Ex ia IIC T6	x	x	x

010	Approval:	FMP		
		51	52	54
BC	ATEX II 1/2G Ex d(ia) IIC T6	x	x	x
BD	ATEX II 1/3G Ex ic(ia) IIC T6	x	x	x
BE	ATEX II 1 D Ex tD IIIC IP6x			x
BF	ATEX II 1/2 D Ex tD IIIC IP6x			x
BG	ATEX II 3G Ex nA IIC T6	x	x	x
BH	ATEX II 3G Ex ic IIC T6	x	x	x
BL	ATEX II 1/3G Ex nA(ia) IIC T6	x	x	x
B2	ATEX II 1/2G Ex ia IIC T6, 1/2D Ex ia IIIC IP6x	x	x	x
B3	ATEX II 1/2G Ex d(ia) IIC T6, 1/2D Ex tD IIIC IP6x	x	x	x
B4	ATEX II 1/2G Ex ia IIC T6, Ex d(ia) IIC T6	x	x	x
CA	CSA General Purpose	x	x	x
CD	CSA C/US DIP Cl.II,III Div.1 Gr.E-G			x
C2	CSA C/US IS Cl.I,II,III Div.1 Gr.A-G, NI Cl.1 Div.2, Ex ia	x	x	x
C3	CSA C/US XP Cl.I,II,III Div.1 Gr.A-G, NI Cl.1 Div.2, Ex d	x	x	x
FB	FM IS Cl.I,II,III Div.1 Gr.A-G, AEx ia, NI Cl.1 Div.2	x	x	x
FD	FM XP Cl.I,II,III Div.1 Gr.A-G, AEx d, NI Cl.1 Div.2	x	x	x
FE	FM DIP Cl.II,III Div.1 Gr.E-G			x
IA	IECEx Zone 0 Ex ia IIC T6 Ga	x	x	x
IB	IECEx Zone 0/1 Ex ia IIC T6 Ga/Gb	x	x	x
IC	IECEx Zone 0/1 Ex d(ia) IIC T6 Ga/Gb	x	x	x
ID	IECEx Zone 0/2 Ex ic(ia) IIC T6 Ga/Gc	x	x	x
IE	IECEx Zone 20 tD IIIC A20 IP6x Da			x
IF	IECEx Zone 20/21 tD IIIC A20/21 IP6x Da/Db			x
IG	IECEx Zone 2 Ex nA IIC T6 Gc	x	x	x
IH	IECEx Zone 2 Ex ic IIC T6 Gc	x	x	x
IL	IECEx zone 0/2 Ex nA(ia) IIC T6 Ga/Gc	x	x	x
I2	IECEx zone 0/1 Ex ia IIC T6 Ga/Gb, zone 20/21 Ex ia IIIC A20/21 IP6x Da/Db	x	x	x
I3	IECEx Zone 0/1 Ex d(ia) IIC T6 Ga/Gb, Zone 20/21 Ex tD IIIC A20/21 IP6x Da/Db	x	x	x
NA	NEPSI zone 0 Ex ia IIC T6 Ga	x	x	x
NB	NEPSI zone 0/1 Ex ia IIC T6 Ga/Gb	x	x	x
NC	NEPSI zone 0/1 Ex d(ia) IIC T6 Ga/Gb	x	x	x
NF	NEPSI zone 20/21 tD IIIC A20/21 IP6x Da/Db			x
NG	NEPSI zone 2 Ex nA II T6 Gc	x	x	x
NH	NEPSI zone 2 Ex ic IIC T6 Gc	x	x	x
N2	NEPSI zone 0/1 Ex ia IIC T6 Ga/Gb, zone 20/21 Ex iaD 20/21 T*	x	x	x
N3	NEPSI zone 0/1 Ex d(ia) IIC T6 Ga/Gb, DIP A20/21 T* IP6x	x	x	x
8A	FM/CSA IS+XP Cl.I,II,III Div.1 Gr.A-G	x	x	x
99	Special version, TSP-no. to be sepc.	x	x	x

020	Power Supply, Output	FMP		
		51	52	54
A	2-wire; 4-20mA HART	x	x	x
C	2-wire; 4-20mA HART, 4-20mA	x	x	x
E	2-wire; FOUNDATION Fieldbus, switch output	x	x	x
G	2-wire. PROFIBUS PA, switch output	x	x	x
K	4-wire 90-253VAC; 4-20mA HART	x	x	x
L	4-wire 10,4-48VDC; 4-20mA HART	x	x	x
Y	Special version, TSP-no. to be sepc.	x	x	x

030	Display, Operation:	FMP		
		51	52	54
A	W/o, via communication	x	x	x
C	SD02 4-line, push buttons + data backup function	x	x	x
Y	Special version, TSP-no. to be sepc.	x	x	x

040	Housing:	51	52	54
A	GT19 dual compartment, Plastics PBT	x	x	x
B	GT18 dual compartment, 316L	x	x	x
C	GT20 dual compartment, Alu coated	x	x	x
Y	Special version, TSP-no. to be sepc.	x	x	x

050	Electrical connection:	FMP		
		51	52	54
A	Gland M20, IP66/68 NEMA4X/6P	x	x	x
B	Thread M20, IP66/68 NEMA4X/6P	x	x	x
C	Thread G1/2, IP66/68 NEMA4X/6P	x	x	x
D	Thread NPT1/2, IP66/68 NEMA4X/6P	x	x	x
I	Plug M12, IP66/68 NEMA4X/6P	x	x	x
M	Plug 7/8", IP66/68 NEMA4X/6P	x	x	x
Y	Special version, TSP-no. to be sepc.	x	x	x

060	Probe:	FMP		
		51	52	54
AA	..... mm, rod 8mm 316L	x		
AB	..... inch, rod 1/3" 316L	x		
AC	..... mm, rod 12mm 316L	x		
AD	..... inch, rod 1/2" 316L	x		
AE	..... mm, rod 16mm 316L			x
AF	..... inch, rod 0.63in 316L			x
AL	..... mm, rod 12mm AlloyC	x		
AM	..... inch, rod 1/2" AlloyC	x		
BA	..... mm, rod 16mm 316L, 500mm divisible	x		x
BB	..... inch, rod 0.63in 316L, 20 inch divisible	x		x
BC	..... mm, rod 16mm 316L, 1000mm divisible	x		x

060	Probe:	FMP		
		51	52	54
BD	..... inch, rod 0.63in 316L, 40 inch divisible	x		x
CA	..... mm, rod 16mm PFA>316L		x	
CB	..... inch, rod 0.63in PFA>316L		x	
LA	..... mm, rope 4mm 316	x		x
LB	..... inch, rope 1/6" 316	x		x
MB	..... mm, rope 4mm 316, max 300mm nozzle height, center rod	x		
MD	..... inch, rope 1/6" 316, max 12inch nozzle height, center rod	x		
OA	..... mm, rope 4mm PFA>316, max 150mm		x	
OB	..... mm, rope 4mm PFA>316, max 300mm		x	
OC	..... inch, rope 1/6" PFA>316, max 6inch		x	
OD	..... inch, rope 1/6" PFA>316, max 12inch		x	
UA	..... mm, coax 316L	x		x
UB	..... inch, coax 316L	x		x
UC	..... mm, coax AlloyC	x		
UD	..... inch, coax AlloyC	x		
YY	Special version, TSP-no. to be sepc.	x	x	x

090	Seal:	FMP		
		51	52	54
A4	Viton, -30...150°C	x		
B3	EPDM, -40...120°C	x		
C3	Kalrez, -20...200°C; saturated steam max. 150°C	x		
D1	Graphite, -196...280°C (XT); saturated steam max. 200°C			x
D2	Graphite, -196...450°C (HT)			x
Y9	Special version, TSP-no. to be sepc.	x	x	x

100	Process connection:	FMP		
		51	52	54
AAJ	2" 300/600lbs RF, 316/316L flange ANSI B16.5 (CRN)			x
ABJ	3" 300/600lbs RF, 316/316L flange ANSI B16.5 (CRN)			x
AEJ	1-1/2" 150lbs RF, 316/316L flange ANSI B16.5 (CRN)	x		
AEK	1-1/2" 150lbs, PTFE>316/316L flange ANSI B16.5 (CRN)		x	
AEM	1-1/2" 150lbs, AlloyC>316/316L flange ANSI B16.5 (CRN)	x		
AFJ	2" 150lbs RF, 316/316L flange ANSI B16.5 (CRN)	x		x
AFK	2" 150lbs, PTFE>316/316L flange ANSI B16.5 (CRN)		x	
AFM	2" 150lbs, AlloyC>316/316L flange ANSI B16.5 (CRN)	x		
AGJ	3" 150lbs RF, 316/316L flange ANSI B16.5 (CRN)	x		x
AGK	3" 150lbs, PTFE>316/316L flange ANSI B16.5 (CRN)		x	
AGM	3" 150lbs, AlloyC>316/316L flange ANSI B16.5 (CRN)	x		
AHJ	4" 150lbs RF, 316/316L flange ANSI B16.5 (CRN)	x		x
AHK	4" 150lbs, PTFE>316/316L flange ANSI B16.5 (CRN)		x	
AJJ	6" 150lbs RF, 316/316L flange ANSI B16.5 (CRN)	x		
AJK	6" 150lbs, PTFE>316/316L flange ANSI B16.5 (CRN)		x	

100	Process connection:	FMP		
		51	52	54
AKJ	8" 150lbs RF, 316/316L flange ANSI B16.5 (CRN)	x		
AOJ	4" 600lbs RF, 316/316L flange ANSI B16.5 (CRN)			x
AQJ	1-1/2" 300lbs RF, 316/316L flange ANSI B16.5 (CRN)	x		
AQK	1-1/2" 300lbs, PTFE>316/316L flange ANSI B16.5		x	
AQM	1-1/2" 300lbs, AlloyC>316/316L flange ANSI B16.5 (CRN)	x		
ARJ	2" 300lbs RF, 316/316L flange ANSI B16.5 (CRN)	x		
ARK	2" 300lbs, PTFE>316/316L flange ANSI B16.5 (CRN)		x	
ARM	2" 300lbs, AlloyC>316/316L flange ANSI B16.5 (CRN)	x		
ASJ	3" 300lbs RF, 316/316L flange ANSI B16.5 (CRN)	x		
ASK	3" 300lbs, PTFE>316/316L flange ANSI B16.5 (CRN)		x	
ASM	3" 300lbs, AlloyC>316/316L flange ANSI B16.5 (CRN)	x		
ATJ	4" 300lbs RF, 316/316L flange ANSI B16.5 (CRN)	x		x
ATK	4" 300lbs, PTFE>316/316L flange ANSI B16.5 (CRN)		x	
AZJ	4" 900lbs RF, 316/316L flange ANSI B16.5 (CRN)			x
A6J	2" 1500lbs RF, 316/316L flange ANSI B16.5 (CRN)			x
A7J	3" 1500lbs RF, 316/316L flange ANSI B16.5 (CRN)			x
A8J	4" 1500lbs RF, 316/316L flange ANSI B16.5 (CRN)			x
CFJ	DN50 PN10/16 B1, 316L flange EN1092-1	x		x
CFK	DN50 PN10/16, PTFE>316L flange EN1092-1		x	
CFM	DN50 PN10/16, AlloyC>316L flange EN1092-1	x		
CGJ	DN80 PN10/16 B1, 316L flange EN1092-1	x		x
CGK	DN80 PN10/16, PTFE>316L flange EN1092-1		x	
CGM	DN80 PN10/16, AlloyC>316L flange EN1092-1	x		
CHJ	DN100 PN10/16 B1, 316L flange EN1092-1	x		x
CHK	DN100 PN10/16, PTFE>316L flange EN1092-1		x	
CHM	DN100 PN10/16, AlloyC>316L flange EN1092-1	x		
CJJ	DN150 PN10/16 B1, 316L flange EN1092-1	x		
CJK	DN150 PN10/16, PTFE>316L flange EN1092-1		x	
CKJ	DN200 PN16 B1, 316L flange EN1092-1	x		
CQJ	DN40 PN10-40 B1, 316L flange EN1092-1	x		
CQK	DN40 PN10-40, PTFE>316L flange EN1092-1		x	
CQM	DN40 PN10-40, AlloyC>316L flange EN1092-1	x		
CRJ	DN50 PN25/40 B1, 316L flange EN1092-1	x		x
CRK	DN50 PN25/40, PTFE>316L flange EN1092-1		x	
CRM	DN50 PN25/40, AlloyC>316L flange EN1092-1	x		
CSJ	DN80 PN25/40 B1, 316L flange EN1092-1	x		x
CSK	DN80 PN25/40, PTFE>316L flange EN1092-1		x	
CSM	DN80 PN25/40, AlloyC>316L flange EN1092-1	x		
CTJ	DN100 PN25/40 B1, 316L flange EN1092-1	x		x
CTK	DN100 PN25/40, PTFE>316L flange EN1092-1		x	
CTM	DN100 PN25/40, AlloyC>316L flange EN1092-1	x		
GDJ	Thread ISO228 G3/4, 316L	x		

100	Process connection:	FMP		
		51	52	54
GGJ	Thread ISO228 G1-1/2, 316L (CRN)	x		
GIJ	Thread ISO228 G1-1/2, 200bar, 316L (CRN)			x
GJJ	Thread ISO228 G1-1/2, 400bar, 316L (CRN)			x
KEJ	10K 40 RF, 316L flange JIS B2220	x		
KEK	10K 40, PTFE>316L flange JIS B2220		x	
KFJ	10K 50 RF, 316L flange JIS B2220	x		x
KFK	10K 50, PTFE>316L flange JIS B2220		x	
KGJ	10K 80 RF, 316L flange JIS B2220	x		x
KGK	10K 80, PTFE>316L flange JIS B2220		x	
KHJ	10K 100 RF, 316L flange JIS B2220	x		x
KHK	10K 100, PTFE>316L flange JIS B2220		x	
K3J	63K 50 RF, 316L flange JIS B2220			x
K4J	63K 80 RF, 316L flange JIS B2220			x
K5J	63K 100 RF, 316L flange JIS B2220			x
LNJ	Fisher 249B/259B cages 600lbs, 316L, torque tube displacer flange			x
LPJ	Fisher 249N cages 900lbs, 316L, torque tube displacer flange			x
LQJ	Masoneilan 7-1/2" 600lbs, 316L torque tube displacer flange			x
MOK	DIN11851 DN50 PN40 cap-nut, PTFE>316L		x	
PDJ	DN50 PN63 B2, 316L flange EN1092-1			x
PEJ	DN80 PN63 B2, 316L flange EN1092-1			x
PFJ	DN100 PN63 B2, 316L flange EN1092-1			x
PNJ	DN50 PN100 B2, 316L flange EN1092-1			x
PPJ	DN80 PN100 B2, 316L flange EN1092-1			x
PQJ	DN100 PN100 B2, 316L flange EN1092-1			x
RAJ	Thread ANSI MNPT1-1/2, 200bar, 316L (CRN)			x
RBJ	Thread ANSI MNPT1-1/2, 400bar, 316L (CRN)			x
RDJ	Thread ANSI MNPT3/4, 316L	x		
RGJ	Thread ANSI MNPT1-1/2, 316L (CRN)	x		
TAK	Tri-Clamp ISO2852 DN40-51 (2"), 3A, PTFE>316L (CRN)		x	
TDK	Tri-Clamp ISO2852 DN40-51 (2"), PTFE>316L (CRN)		x	
TFK	Tri-Clamp ISO2852 DN70-76.1 (3"), PTFE>316L (CRN)		x	
TJK	Tri-Clamp ISO2852 DN38 (1-1/2"), PTFE>316L (CRN)		x	
TLK	Tri-Clamp ISO2852 DN70-76.1 (3"), 3A, PTFE>316L (CRN)		x	
TNK	Tri-Clamp ISO2852 DN38 (1-1/2"), 3A, PTFE>316L (CRN)		x	
WQJ	DN50 PN25/40 E, 316L flange EN1092-1	x		
WRJ	DN80 PN25/40 E, 316L flange EN1092-1	x		
WSJ	DN100 PN25/40 E, 316L flange EN1092-1	x		x
YYY	Special version, TSP-no. to be sepc.	x	x	x

500	Additional Operation Language:	FMP		
		51	52	54
AA	English	x	x	x
AB	German	x	x	x
AC	French	x	x	x
AD	Spanish	x	x	x
AE	Italian	x	x	x
AF	Dutch	x	x	x
AG	Portuguese	x	x	x
AH	Polish	x	x	x
AI	Russian	x	x	x
AK	Chinese simplified	x	x	x
AL	Japanese	x	x	x
AM	Korean	x	x	x
AR	Czech	x	x	x

540	Application Package: *(Multiple options can be selected)*	FMP		
		51	52	54
EB	Interface measurement	x	x	x
EF	Gas Phase Compensation, L_{ref} = 300mm			x
EG	Gas Phase Compensation, L_{ref} = 550mm			x
E9	Special version, TSP-no. to be sepc.	x	x	x

550	Calibration:	FMP		
		51	52	54
F4	5-point linearity protocol	x	x	x
F9	Special version, TSP-no. to be sepc.	x	x	x

570	Service: *(Multiple options can be selected)*	FMP		
		51	52	54
HC	PWIS free, PWIS = paint-wetting impairment substances	x	x	x
IJ	Customized parametrization HART	x	x	x
IK	Customized parametrization PA	x	x	x
IL	Customized parametrization FF	x	x	x
IW	W/o Tooling DVD (FieldCare setup)	x	x	x
I9	Special version, TSP-no. to be sepc.	x	x	x

580	Test, Certificate: *(Multiple options can be selected)*	FMP		
		51	52	54
JA	3.1 Material certificate, wetted metallic parts, EN10204-3.1 inspection certificate	x		x
JB	Conformity to NACE MR0175, wetted metallic parts	x		x
JD	3.1 Material certificate, pressure retaining parts, EN10204-3.1 inspection certificate		x	
JE	Conformity to NACE MR0103, wetted metallic parts	x		x
KD	Helium leak test, internal procedure, inspection certificate	x		x
KE	Pressure test, internal procedure, inspection certificate	x	x	x

580	**Test, Certificate:** *(Multiple options can be selected)*	FMP		
		51	52	54
KG	3.1 Material certificate+PMI test (XRF) internalprocedure, wetted metallic parts, EN10204-3.1 inspection certificate	x		x
KP	Liquid penetrant test AD2000-HP5-3(PT), wetted/pressure retaining metallic parts, inspection certificate	x		x
KQ	Liquid penetrant test ISO23277-1 (PT), wetted/pressure retaining metallic parts, inspection certificate	x		x
KR	Liquid penetrant test ASME VIII-1 (PT), wetted/pressure retaining metallic parts, inspection certificate	x		x
KS	WPQR, WPS to ISO15614/ASME IX/Norsok, wetted/pressure retaining metallic parts	x		x
K9	Special version, TSP-no. to be sepc.	x	x	x

590	**Additional Approval:** *(Multiple options can be selected)*	FMP		
		51	52	54
LA	SIL	x	x	x
LC	*WHG overfill prevention	x	x	x
L9	Special version, TSP-no. to be sepc.	x	x	x

600	**Probe Design:** *(Multiple options can be selected)*	FMP		
		51	52	54
MB	Sensor remote, 3m/9ft cable, detachable+mounting bracket	x	x	x
M9	Special version, TSP-no. to be sepc.	x	x	x

610	**Accessory mounted:** *(Multiple options can be selected)*	FMP		
		51	52	54
NC	Gas-tight feed through	x	x	
OA	Rod center washer d=75mm/2.95", 316L pipe diameter DN80/3" + DN100/4"	x		x
OB	Rod center washer d=45mm/1.77", 316L pipe diameter DN50/2" + DN65/2-1/2"	x		x
OC	Rope center washer d=75mm/2.95", 316L pipe diameter DN80/3" + DN100/4"	x		x
OD	Rod center washer d=48-95mm/1.88-3.74", PEEK, interface measurement, pipe diameter DN50/2" to DN100/4"	x		x
OE	Rod center washer d=37mm/1.45", PFA, interface measurement, pipe diameter DN40/1-1/2" + DN50/2"	x	x	x
O9	Special version, TSP-no. to be sepc.	x	x	x

620	**Accessory enclosed:** *(Multiple options can be selected)*	FMP		
		51	52	54
PB	Weather protection cover	x	x	x
PG	Mounting kit, insulated, rope	x		
R9	Special version, TSP-no. to be sepc.	x	x	x

850	**Firmware Version:**	FMP		
		51	52	54
75	01.01.zz, HART, DevRev02	x	x	x
76	01.00.zz, FF, DevRev01	x	x	x
77	01.00.zz, PROFIBUS PA, DevRev01	x	x	x
78	01.00.zz, HART, DevRev01	x	x	x

895	**Tagging:** *(Multiple options can be selected)*	FMP		
		51	52	54
Z1	Tagging (TAG), see additional spec.	x	x	x
Z2	Bus address, see additional spec.	x	x	x

5 Storage, Transport

5.1 Storage conditions

- Permitted storage temperature: –40 to +80 °C (–40 to +176 °F)
- Use the original packaging.

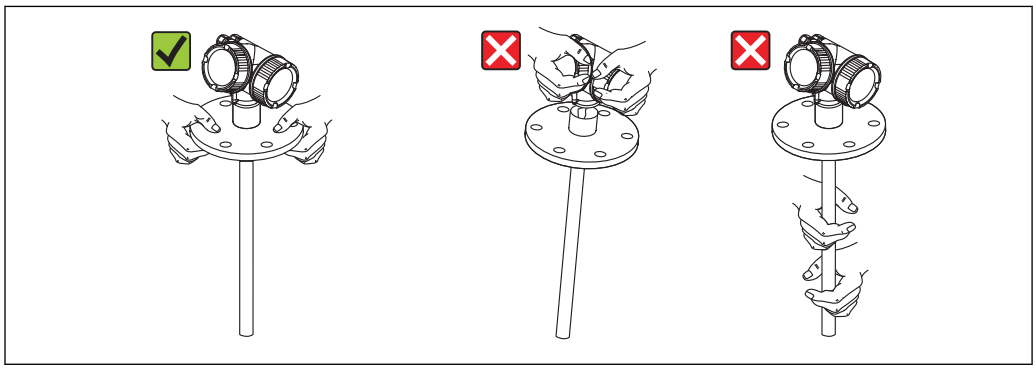
5.2 Transport product to the measuring point

⚠ WARNING

Risk of injury if the hosuing breaks away!

► Transport the measuring device to the measuring point in its original packaging or at the process connection.

► Comply with the safety instructions, transport conditions for devices over 18kg (39.6lbs).



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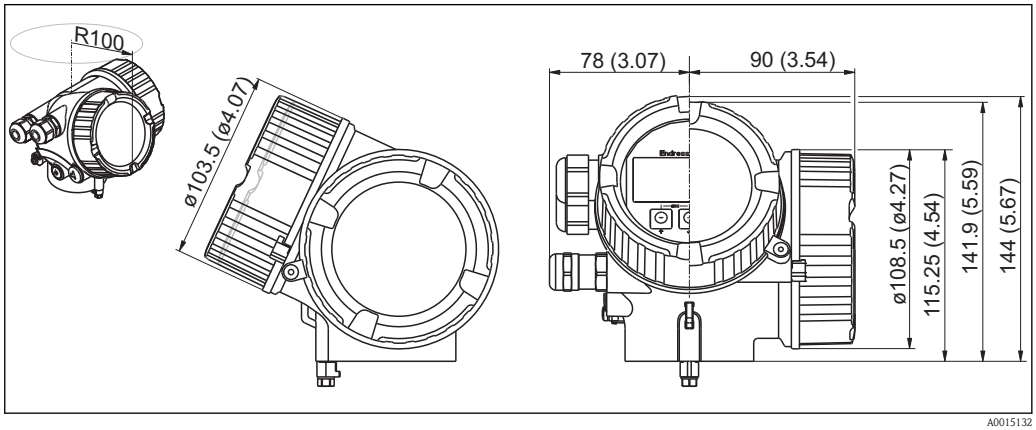
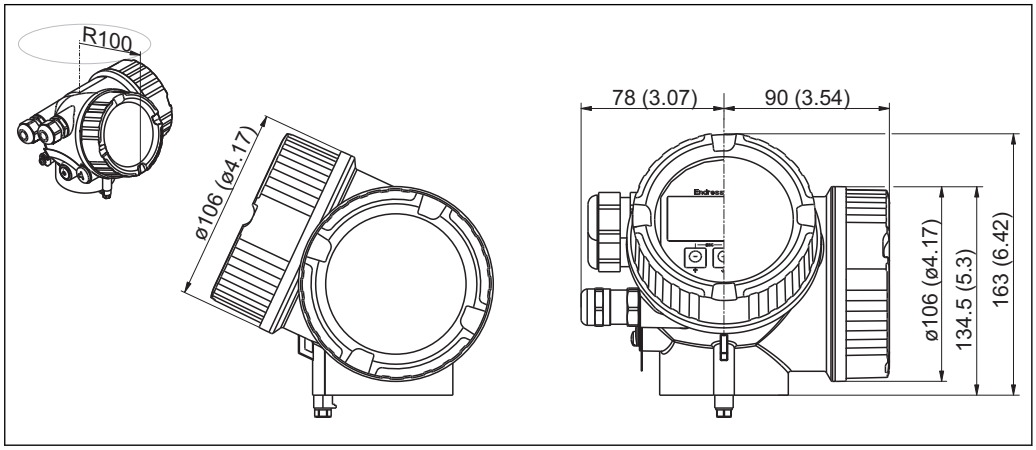
6 Mounting

6.1 Mounting dimensions

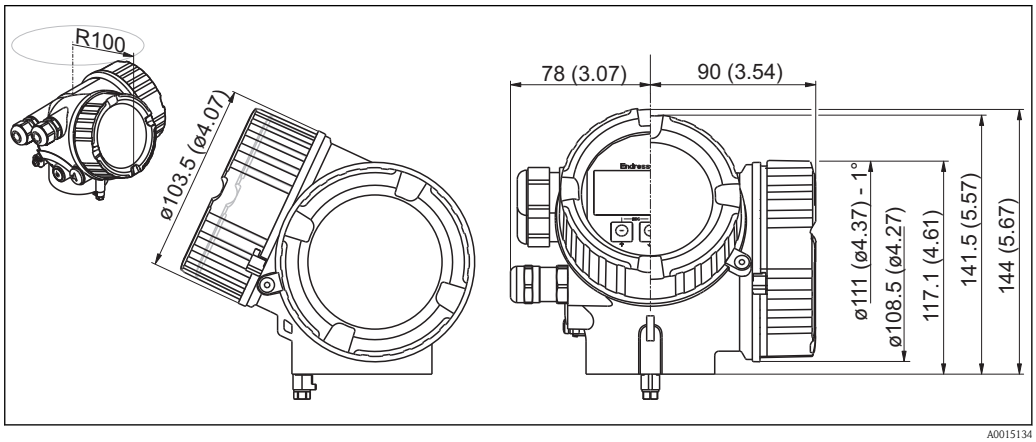
6.1.1 Dimensions of the electronics housing



4 *Housing GT18 (316L); Dimensions in mm (in)*

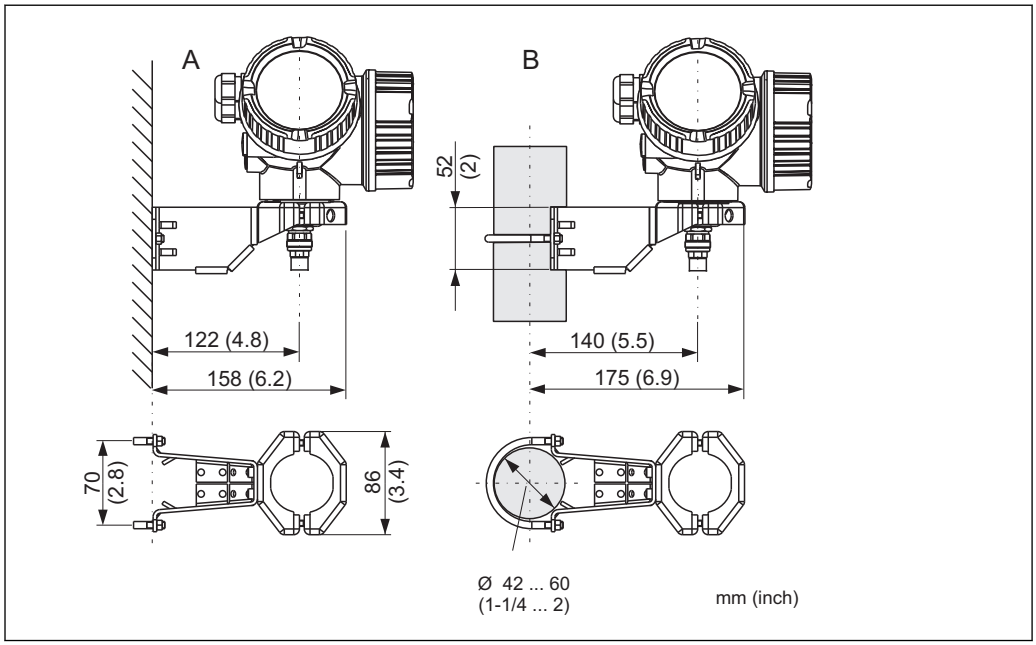


5 *Housing GT19 (Plastics PBT); Dimensions in mm (in)*



6 *Housing GT20 (Alu coated); Dimensions in mm (in)*

6.1.2 Dimensions of the mounting bracket

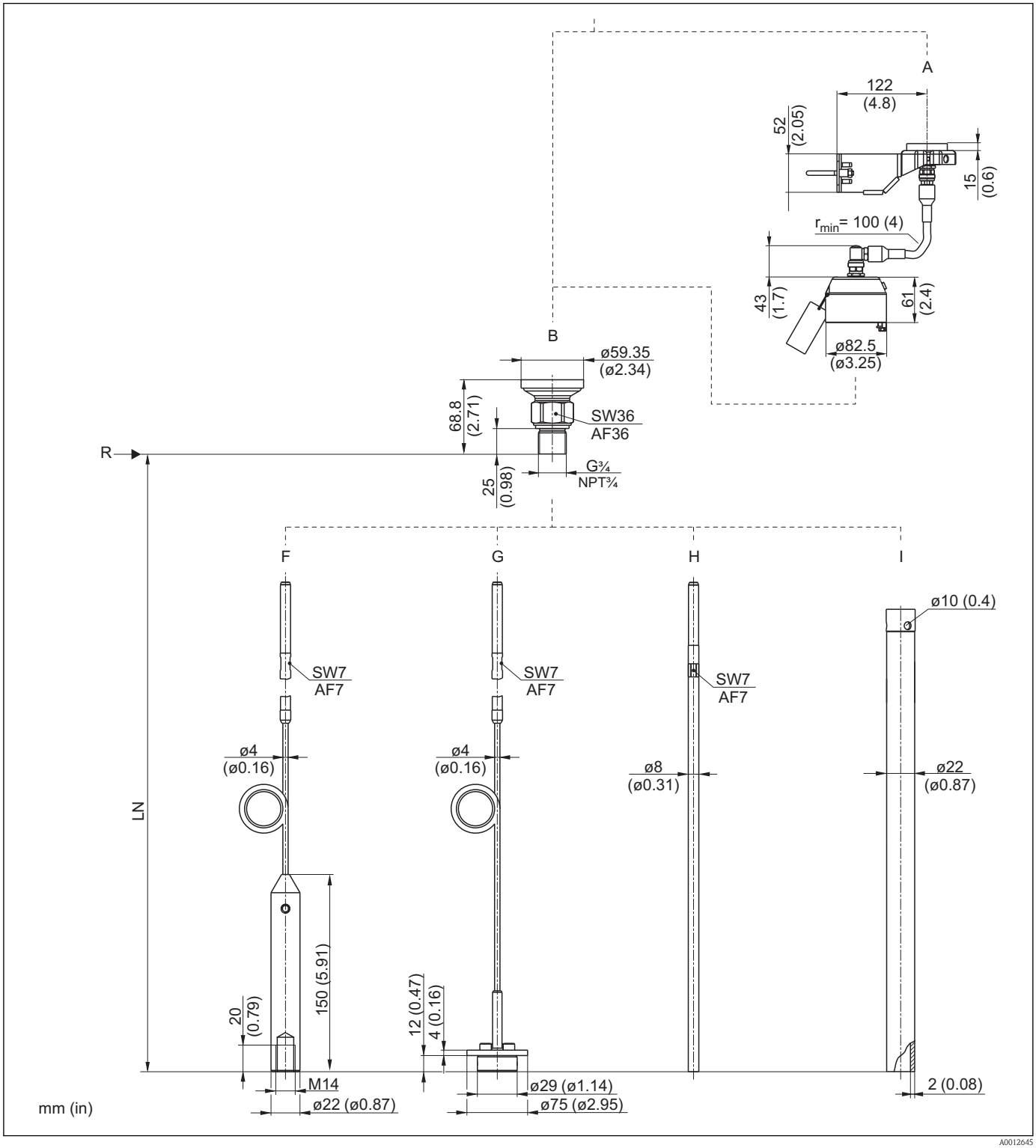


7 *Mounting bracket for the electronics housing*

A Wall mounting
B Pipe mounting

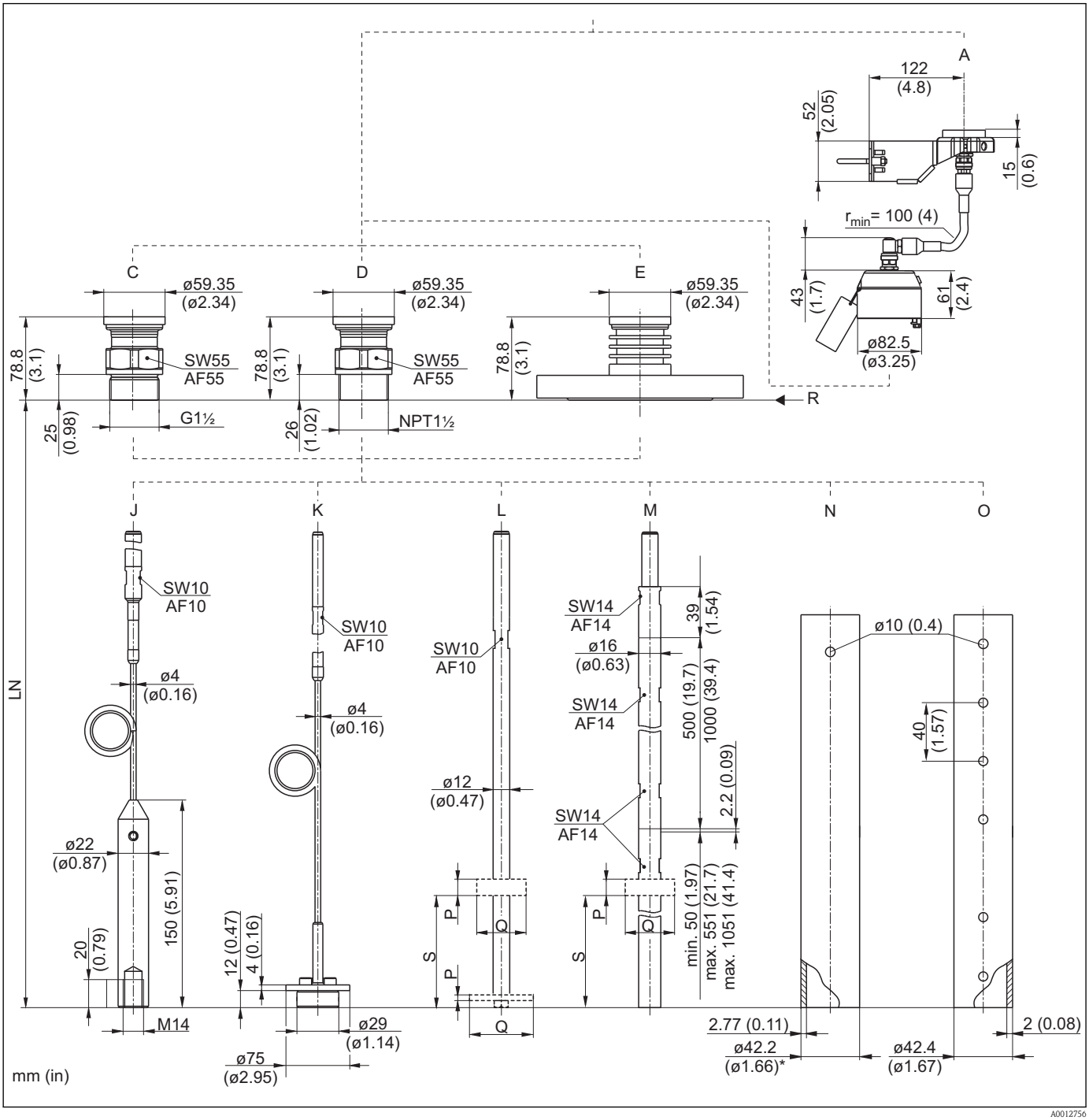
For the "Sensor remote" device version (see feature 060 of the product structure), the mounting bracket is part of the delivery. If required, it can also be ordered as an accessory (order code 71102216).

6.1.3 FMP51: Dimensions of process connection (G¾,NPT¾) and probe



A Mounting bracket for probe design "Sensor remote" (Feature 600)
B Thread ISO G3/4 or ANSI MNPT3/4 (Feature (100)
F Rope probe 4mm or 1/6" (Feature 060)
G Rope probe 4 mm or 1/6"; centering disk optional (Features 060 and 610)
H Rod probe 8mm or 1/3" (Feature 060)
I Coax probe (Feature 060)
LN Length of probe
R Reference point of the measurement

6.1.4 FMP51: Dimensions of process connection (G1½,NPT1½,flange) and probe

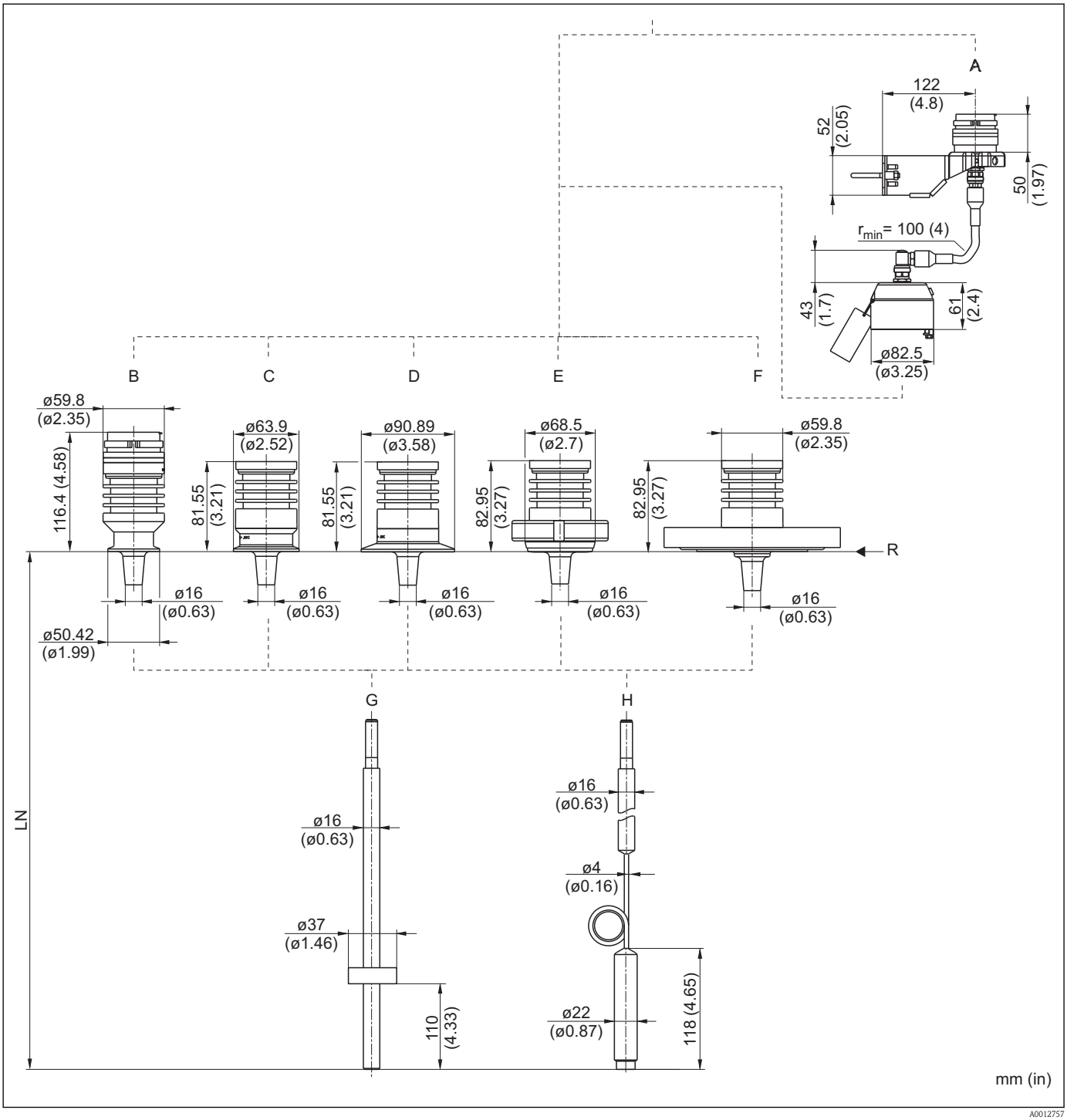


A Mounting bracket for probe design "Sensor remote" (Feature 600)
C Thread ISO228 G1-1/2 (Feature 100)
D Thread ANSI MNPT1-1/2 (Feature 100)
E Flange ANSI B16.5, EN1092-1, JIS B2220 (Feature 100)
J Rope probe 4mm or 1/6" (Feature 060)
K Rope probe 4mm or 1/6"; centering disk optional (Features 060 and 610)
L Rod probe 12mm or 1/2"; centering disk optional, see table below (Features 060 and 610)
M Rod probe 16 mm or 0.63in, 20" or 40" divisible; centering disk optional, see table below (Feature 060 and 610)
N Coax probe; AlloyC (Feature 060)

O Coax probe; 316L (Feature 060)
LN Length of probe
R Reference point of the measurement

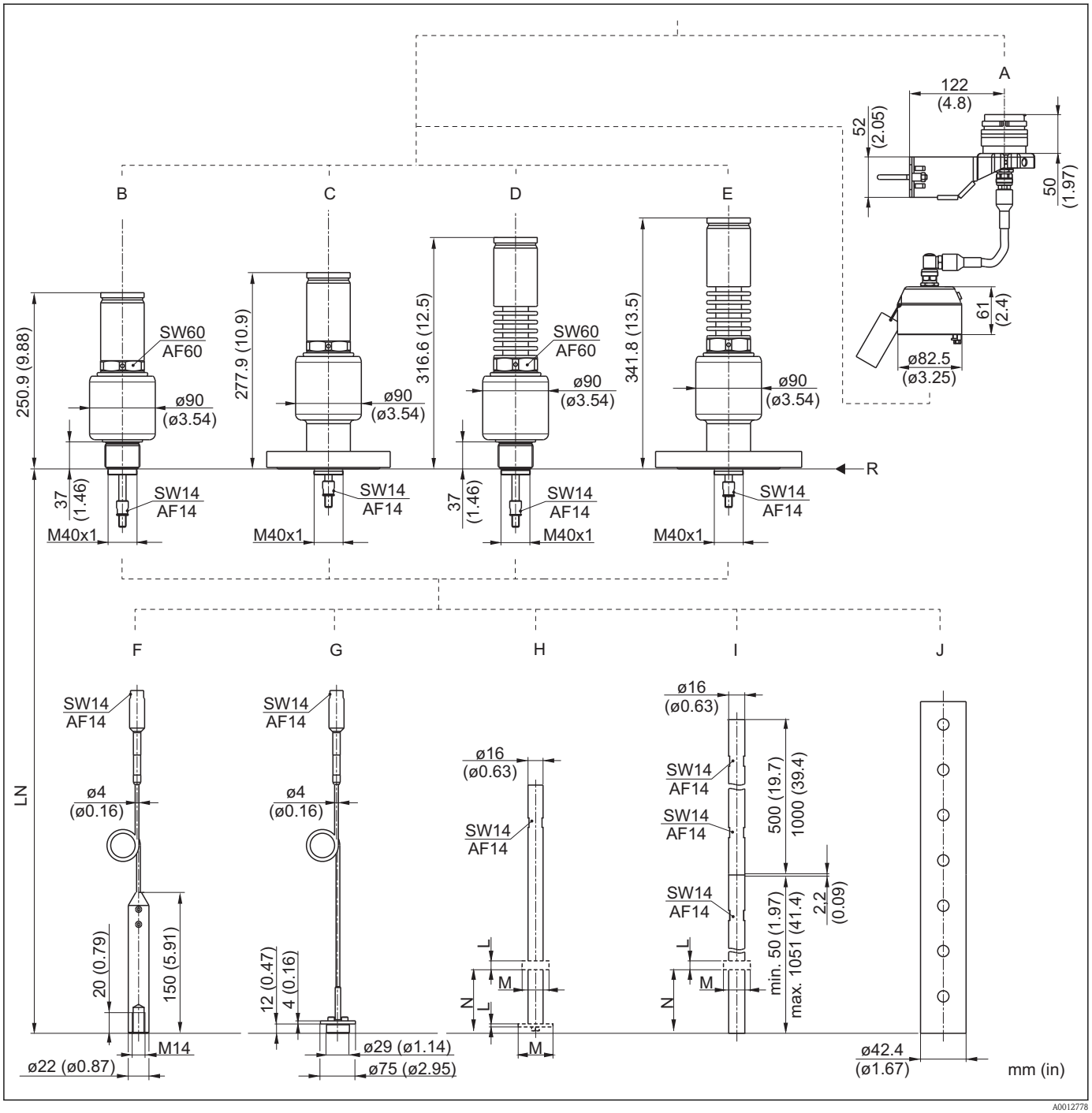
	P	**Q**	**S**
PEEK	7 mm (0.28 in)	∅95 mm (3.74 in)	
PFA	10 mm (0.39 in)	37 mm (1.46 in)	110 mm (4.33 in)
316L	4 mm (0.16 in)	∅45 mm (1.77 in)	
		∅75 mm (2.95 in)	

6.1.5 FMP52: Dimensions of process connection and probe



A Mounting bracket for probe design "Sensor remote" (Feature 600)
B Tri-Clamp 1-1/2" (Feature 100)
C Tri-Clamp 2" (Feature 100)
D Tri-Clamp 3" (Feature 100)
E DIN 11851 (Dairy coupling) DN50 (Feature 100)
F Flange ANSI B16.5, EN1092-1, JIS B2220 (Feature 100)
G Rod probe 16mm or 0.63 in , PFA>316L (Feature 060)
H Rope probe 4mm or1/6", PFA>316 (Feature 060)
LN Length of probe
R Reference point of the measurement

6.1.6 FMP54: Dimensions of process connection and probe



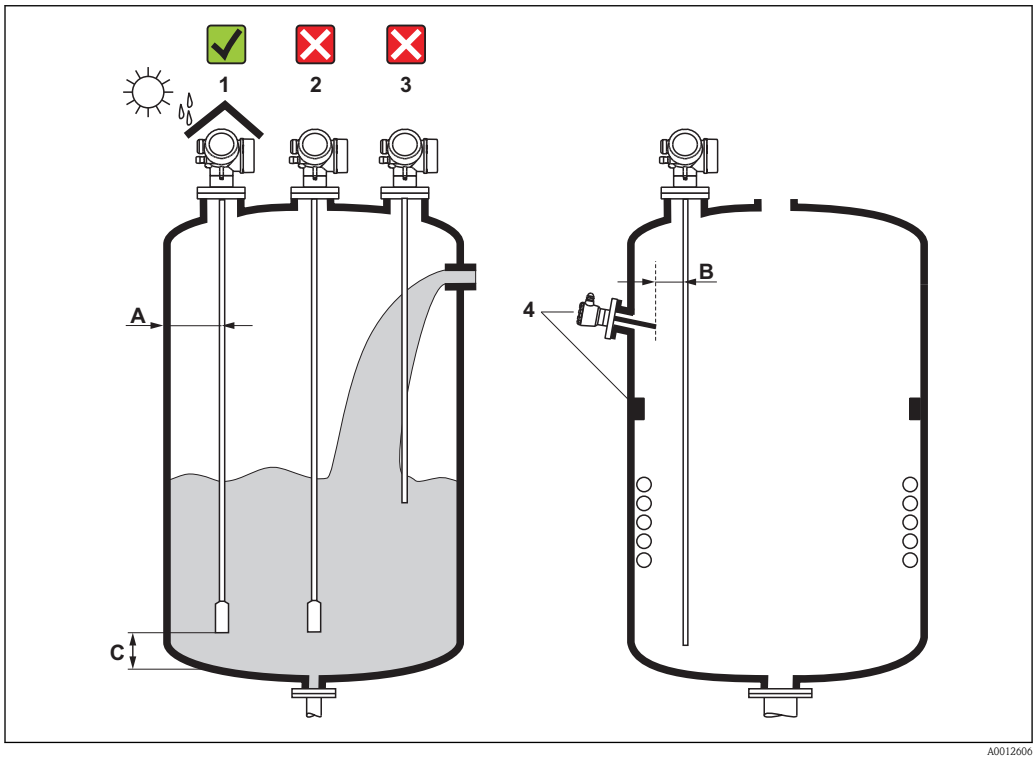
A Mounting bracket for probe design "Sensor remote" (Feature 600)
B Thread ISO228 G1-1/2 or ANSI MNPT1-1/2; XT 280 °C (Features 100 and 090)
C Flange ANSI B16.5, EN1092-1, JIS B2220; XT 280 °C (Features 100 and 090)
D Thread ISO228 G1-1/2 or ANSI MNPT1-1/2; HT 450 °C (Features 100 and 090)
E Flange ANSI B16.5, EN1092-1, JIS B2220; HT 450°C (Features 100 and 090)
F Rope probe 4mm or 1/6" (Feature 060)
G Rope probe 4mm (1/6"), centering disk optional (Features 060 and 610)
H Rod probe 16mm or 0.63in; centering disk optional, see table below (Features 060 and 610)
I Rod probe 16mm or 0.63in ; 20" or 40" divisible; centering disk optional, see table below (Feature 060 and 610)

J Coax probe (Feature 060)
LN Length of probe
R Reference point of the measurement

	L	M	N
PEEK	7 mm (0.28 in)	∅95 mm (3.74 in)	-
PFA	10 mm (3.94 in)	37 mm (1.46 in)	110 mm (4.33 in)
316L	4 mm (0.16 in)	∅45 mm (1.77 in)	
		∅75 mm (2.95 in)	-

6.2 Mounting requirements

6.2.1 Suitable mounting position



Mounting distances

- Distance (A) between wall and rod or rope probe:
  - for smooth metallic walls: > 50 mm (2")
  - for plastic walls: > 300 mm (12") mm to metallic parts outside the vessel
  - for concrete walls: > 500 mm (20") , otherwise the available measuring range may be reduced.
- Distance (B) between rod or rope probe and internal fittings in the vessel: > 300 mm (12")
- Distance (C) from end of probe to bottom of the vessel:
  - Rope probe: > 150 mm (6 in)
  - Rod probe: > 10 mm (0.4 in)
  - Coax probe: > 10 mm (0.4 in)

For coax probes the distance to the wall and to internal fittings is arbitrary.

Additional conditions

- When mounting in the open, a weather protection cover (1) may be installed to protect the device against extreme weather conditions.
- In metallic vessels: Preferably do not mount the probe in the center of the vessel (2), as this would lead to increased interference echoes.
  If a central mounting position can not be avoided, it is crucial to perform an interference echo suppresion(mapping) after the commissioning of the device.
- Do not mount the probe in the filling curtain (3).
- Avoid buckling the rope probe during installation or operation (e.g. through product movement against silo wall) by selecting a suitable mounting location.

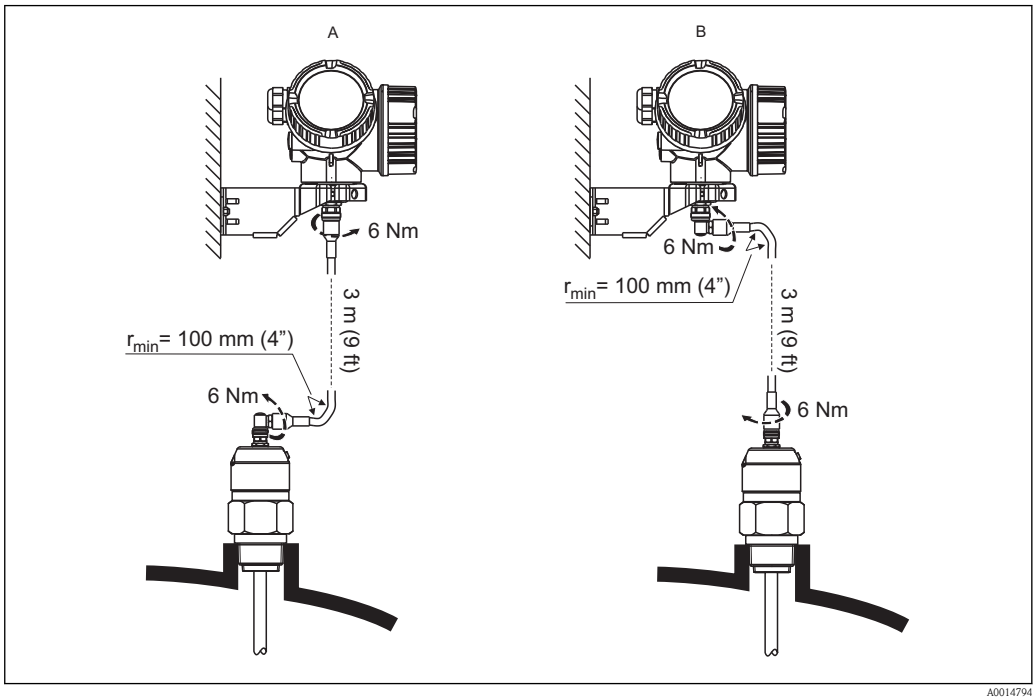
With suspended rope probes (probe end not fixed at the bottom) the distance between the probe rope and internal fittings in the tank must not fall below 300 mm (12") during the entire process. A sporadic contact between the probe weight and the cone of the vessel, however, does not influence the measurement as long as the dielectric constant of the medium is at least DC = 1.8.

When mounting the electronics housing into a recess (e.g. in a concrete ceiling), observe a minimum distance of 100 mm (4 inch) between the cover of the terminal compartment / electronics compartment and the wall. Otherwise the connection compartment / electronics compartment is not accessible after installation.

6.2.2 Applications with restricted mounting space

Mounting with remote sensor

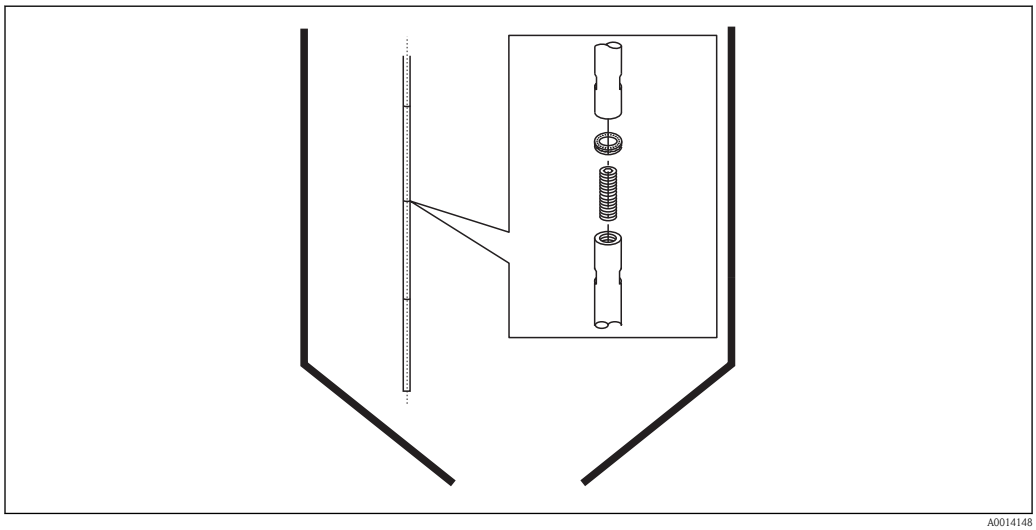
The device version with a remote sensor is suited for applications with restricted mounting space. In this case the electronics housing is mounted at a separate position from which it is easier accessible.



A Angled plug at the probe
B Angled plug at the electronics housing

- Levelflex version (see product structure):
  Feature 600 "Probe Design", Option MB "Sensor remote, 3m/9ft cable, detachable+mounting bracket" (→ 📄 24)
- A connecting cable is supplied with this device version
  – Length: 3 m (9 ft)
  – Minimum bending radius: 100 mm (4 inch)
- A mounting bracket for the electronics housing is supplied with this device version. Mounting options:
  – Wall mounting
  – Pipe mounting; diameter: 42 to 60 mm (1-1/4 to 2 inch)
- The connection cable has got one straight and one angled plug (90°). Depending on the local conditions the angled plug can be connected at the probe or at the electronics housing.

Divisible probes



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If there is little mounting space (distance to the ceiling), it is advisable to use divisible rod probes (∅ 16 mm).

- max. probe length 10 m/394 inch
- max. sideways capacity 20 Nm
- probes are separable several times with the lengths:
  – 500 mm/20 inch
  – 1000 mm/ 40 inch
- torque: 15 Nm

6.2.3 Notes on the mechanical load of the probe

Tensile load limit of rope probes

Sensor	Feature 060	Probe	Tensile load limit [kN]
FMP51	LA, LB MB, MD	Rope 4mm (1/6") 316	5
FMP52	OA, OB, OC, OD	Rope 4mm (1/6") PFA>316	2
FMP54	LA, LB	Rope 4mm (1/6") 316	10

Bending strength of rod probes

Sensor	Feature 060	Probe	Bending strength [Nm]
FMP51	AA, AB	Rod 8mm (1/3") 316L	10
	AC, AD	Rod 12mm (1/2") 316L	30
	AL, AM	Rod 12mm (1/2") AlloyC	30
	BA, BB, BC, BD	Rod 16mm (0.63") 316L divisible	30
FMP52	CA, CB	Rod 16mm (0.63") PFA>316L	30
FMP54	AE, AF	Rod 16mm (0.63") 316L	30
	BA, BB, BC, BD	Rod 16mm (0.63") 316L divisible	30

Bending load (torque) through fluid flow

The formula for calculating the bending torque M impacting on the probe:

$M = c_w \cdot \rho/2 \cdot v^2 \cdot d \cdot L \cdot (L_N - 0.5 \cdot L)$

with:

c_w: Friction factor

ρ [kg/m^3]: Density of the medium

v [m/s]: Velocity of the medium perpendicular to the probe rod

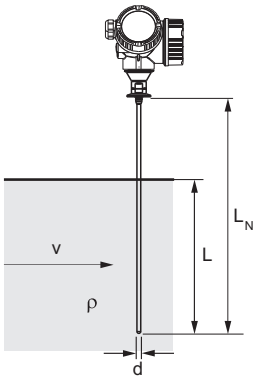
d [m]: Diameter of the probe rod

L [m]: Level

LN [m]: Probe length

Calculation example

Friction factor c_w	0,9 (on the assumption of a turbulent current - high Reynolds number)
Density ρ [kg/m^3]	1000 (e.g. water)
Probe diameter d [m]	0,008
$L = L_N$	(worst case)



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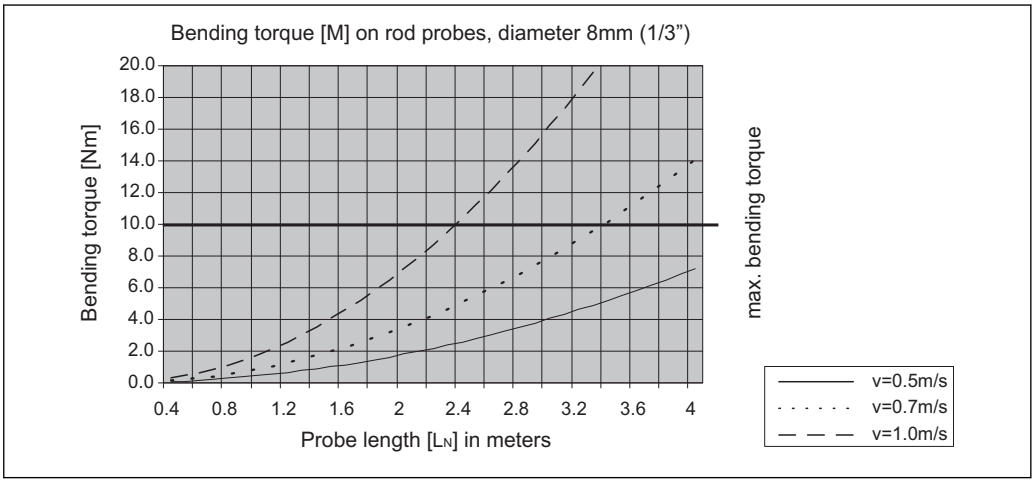

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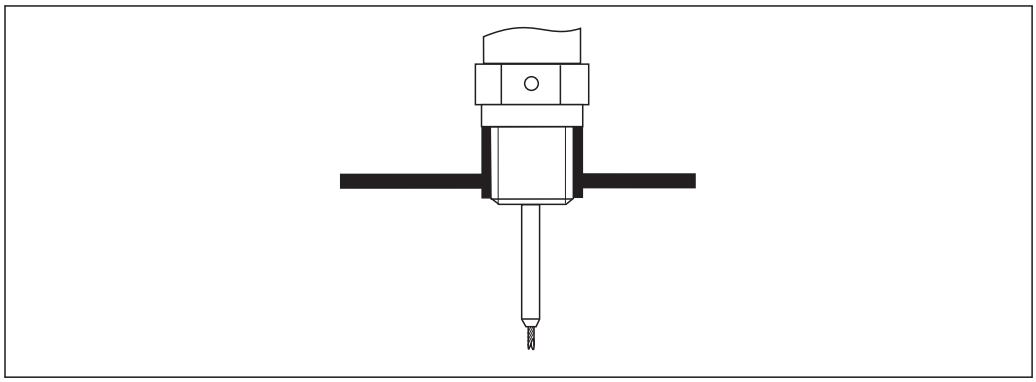
Bending strength of coax probes

Sensor	Feature 060	Process connection	Probe	Bending strength [Nm]
FMP51	UA, UB	Thread G¾ oder NPT¾	Coax 316L, Ø 21,3 mm	60
		▪ Thread G1½ or NPT1½ ▪ Flange	Coax 316L, Ø 42,4 mm	300
	UC, UD	Flange	Coax AlloyC, Ø 42,4 mm	300
FMP54	UA, UB	▪ Thread G1½ or NPT1½ ▪ Flange	Coax 316L, Ø 42,4 mm	300

6.2.4 Notes on the process connection

Probes are mounted to the process connection with threaded connections or flanges. If during this installation there is the danger that the probe end moves so much that it touches the tank floor or cone at times, the probe must, if necessary, be shortened and fixed down (→ 41).

Threaded connection



8 Mounting with threaded connection; flush with the container ceiling

Seal

The thread as well as the type of seal comply to DIN 3852 Part 1, screwed plug form A.

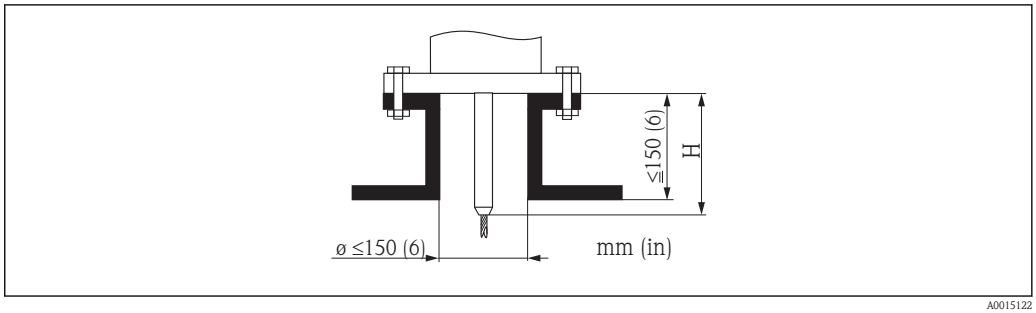
They can be sealed with the following types of sealing rings:

- Thread G3/4": According to DIN 7603 with the dimensions 27 x 32 mm
- Thread G1-1/2": According to DIN 7603 with the dimensions 48 x 55 mm

Please use a sealing ring according to this standard in the form A, C or D and of a material that is resistant to the application.

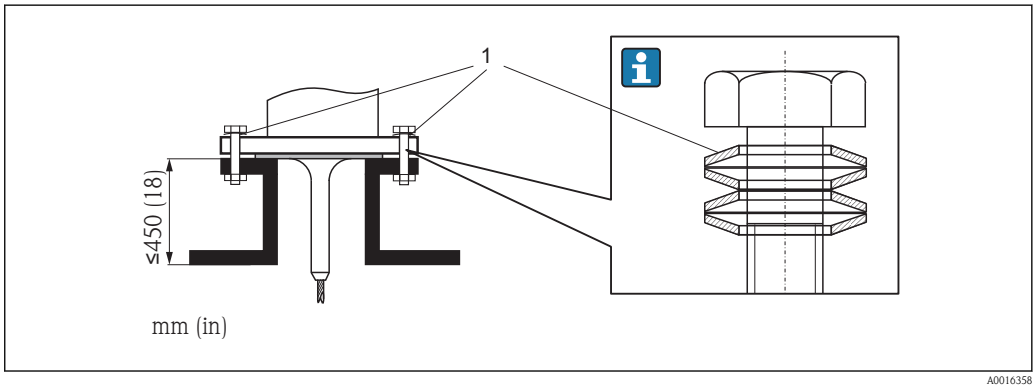
For the length of the screwed plug refer to the dimensional drawing:
- FMP51: (→ 29)
- FMP54: (→ 33)

Nozzle mounting with flange



For FMP52: Use spring washers in order to compensate a possible creep deformation of the PTFE cladding between the tank and the device flange; see figure below.

Alternative: Retighten the flange bolts periodically, depending on process temperature and pressure. Recommended torque: 60 to 100 Nm (44.3 to 73.7 lbf ft).



1 Spring wahsers ensure sufficient preload between the tank and the flange of the FMP52.

Hight and diameter of the nozzle

- Permissible nozzle diameter: ≤ 150 mm (6 in).
  For larger diameters the near range measuring capability may be reduced.
  For nozzles ≥ DN300: (→ 🖹 40).
- Permissible nozzle height [1]: ≤ 150 mm (6 in).
  For a larger height the near range measuring capability may be reduced.
  Larger nozzle heights may be possible in special cases (see sections "Center rod for FMP51 and FMP52" and "Rod extension/centering HMP40 for FMP54").

With thermally insulated vessels the nozzle should also be insulated in order to prevent condensate formation.

Center rod for FMP51 and FMP52

For rope probes it may be necessary to use a version with center rod in order to prevent the probe rod from coming into contact with the nozzle wall. Probes with center rod are available for FMP51 and FMP52.

Probe	Max. nozzle height (= length of the center rod)	Option to be selected in feature 060 ("Probe")
FMP51	150 mm	LA
	6 inch	LB

1) Larger nozzle heights on request

Probe	Max. nozzle height (= length of the center rod)	Option to be selected in feature 060 ("Probe")
	300 mm	MB
	12 inch	MD
FMP52	150 mm	OA
	6 inch	OC
	300 mm	OB
	12 inch	OD

Rod extension/centering HMP40 for FMP54

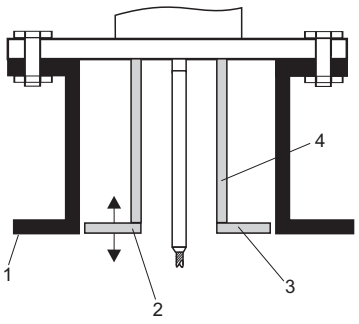
For FMP54 with rope probes the rod extension/centering HMP 40 is available as an accessory (→ 126). It has to be used if otherwise the probe rope comes into contact with the lower edge of the nozzle.

This accessory consists of the extension rod corresponding to the nozzle height, on which a centering disk is also mounted if the nozzles are narrow or when working in bulk solids. This component is delivered separately from the device. Please order the probe length correspondingly shorter.

Centering disks with small diameters (DN40 and DN50) may only be used if there is no significant build-up in the nozzle above the disk. The nozzle must not become clogged by the product.

Installation in nozzles ≥ DN300

If installation in ≥ 300mm/12" nozzles is unavoidable, installation must be carried out in accordance with the sketch on the right.



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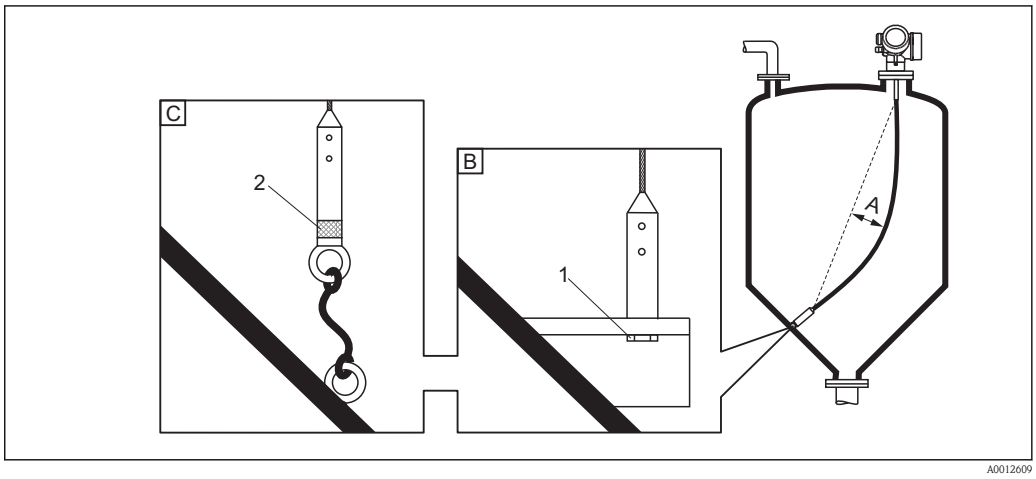
1 Lower edge of the nozzle
2 Approx. flush with the lower edge of the nozzle (± 50 mm/2")
3 Plate
4 Pipe ∅ 150 to 180 mm (6 to 7 inch)

Nozzle diameter	Plate diameter
300 mm (12")	280 mm (11")
≥ 400 mm (16")	≥ 350 mm (14")

6.2.5 Securing the probe

Securing rope probes

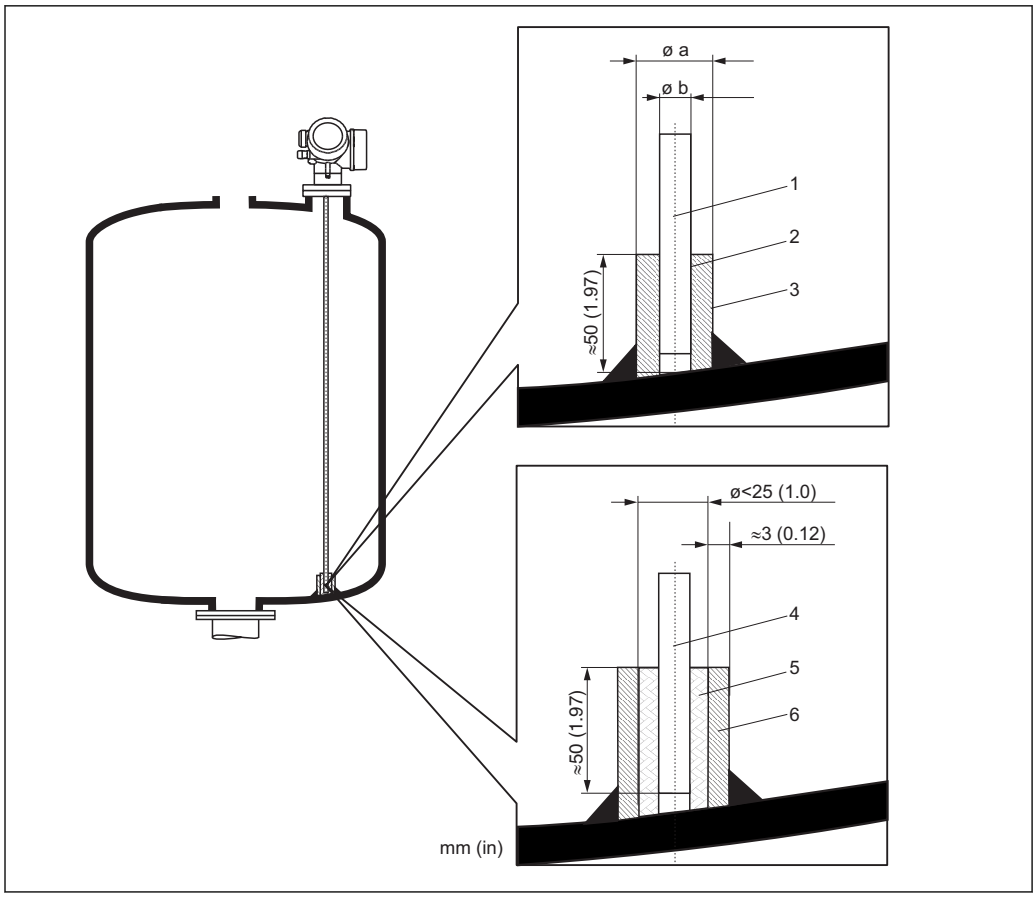


A Sag of the rope: ≥ 1 cm per 1m of the probe length (0.12 inch per 1 ft of the probe length)
B Reliably grounded end of probe
C Reliably isolated end of probe
1: Mounting and contact with a bolt
2 Mounting kit isolated (→ 128)

- The end of the probe needs to be secured under the following conditions:
  if otherwise the probe sporadically comes into contact with the wall of the vessel, the outlet cone, internal fittings or other parts of the installation.
- The end of probe can be secured at its internal thread
  rope 4 mm (1/6"), 316: M 14
- The fixing must be either reliably grounded or reliably insulated. If it is not possible to mount the probe weight with a reliably insulated connection, it can be secured using an isolated eyelet, which is available as an accessory (→ 128).
- In the case of a grounded fixing the **Positive echo** option must be selected in the **Expert → Sensors → EOP evaluation → EOP search mode** parameter. Otherwise the automatic probe length correction will not work.
- In order to prevent an extremely high tensile load (e.g. due to thermal expansion) and the risk of rope crack, the rope has to be slack. Make the rope longer than the required measuring range such that there is a sag in the middle of the rope that is ≥ 1cm/(1 m rope length) [0.12 inch/(1 ft rope length)]. Tensile load limit of rope probes: (→ 36)

Securing rod probes

- For Ex-approvals: For probe lengths ≥ 3 m (10 ft) a support is required.
- In general, rod probes must be supported if there is a horizontal flow (e.g. from an agitator) or in the case of strong vibrations.
- Rod probes may only be supported at the end of the probe.



1 Probe rod, uncoated
2 Sleeve bored tight to ensure electrical contact between the rod and sleeve!
3 Short metal pipe, e.g. welded in place
4 Probe rod, coated
5 Plastic sleeve, e.g. PTFE, PEEK or PPS
6 Short metal pipe, e.g. welded in place

Ø probe	Ø a [mm (inch)]	Ø b [mm (inch)]
8 mm (1/3")	< 14 (0.55)	8.5 (0.34)
12 mm (1/2")	< 20 (0.78)	12.5 (0.52)
16 mm (0.63in)	< 26 (1.02)	16.5 (0.65)

NOTICE

Poor grounding of the end of probe may cause measuring errors.

► Apply a narrow sleeve which has good electrical contact to the probe.

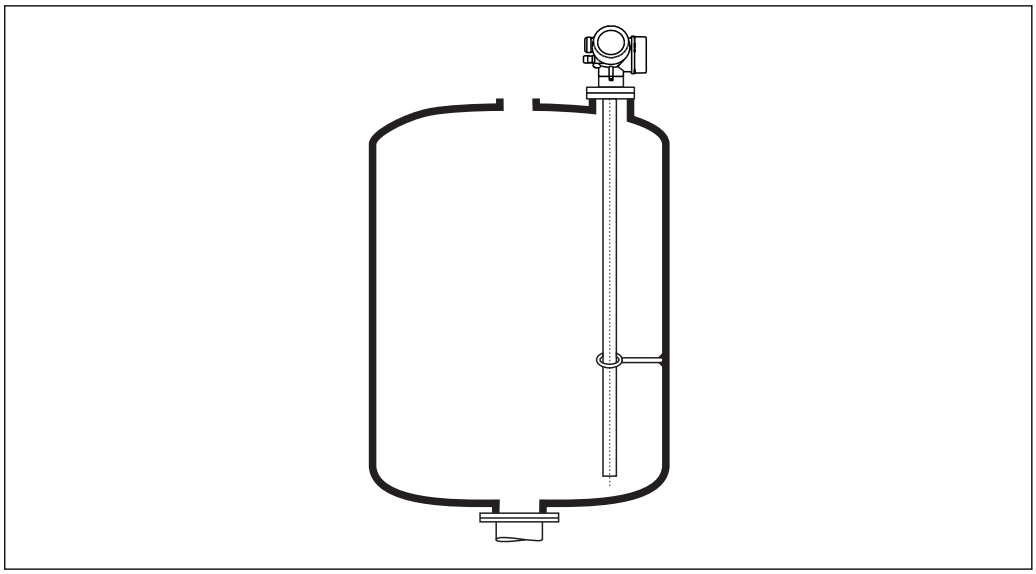
NOTICE

Welding may damage the main electronics module.

► Before welding: Ground the probe and dismount electronics.

Securing coax probes

For Ex-approvals: For probe lengths ≥ 3 m (10 ft) a support is required.



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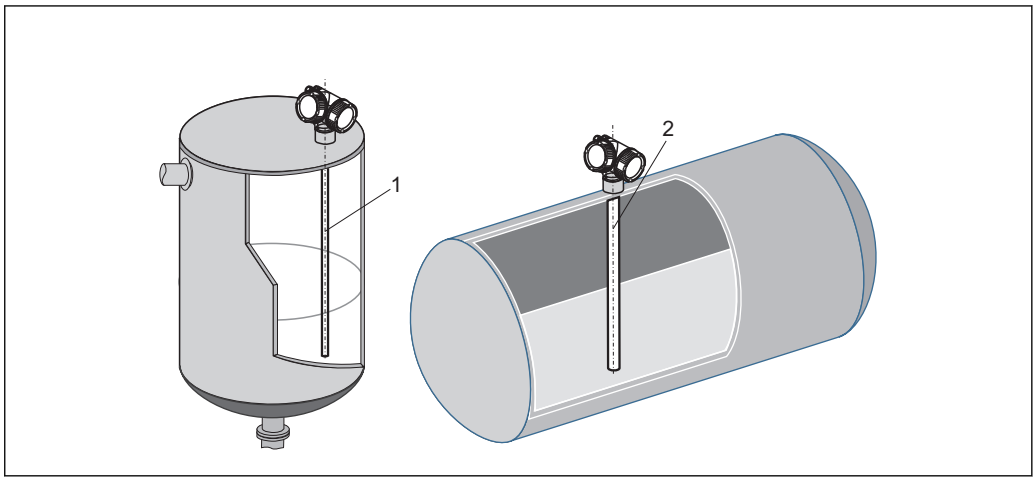
Coax probes can be supported at any point of the outer tube.

6.2.6 Special mounting conditions

Installation in horizontal and upright cylindrical tanks



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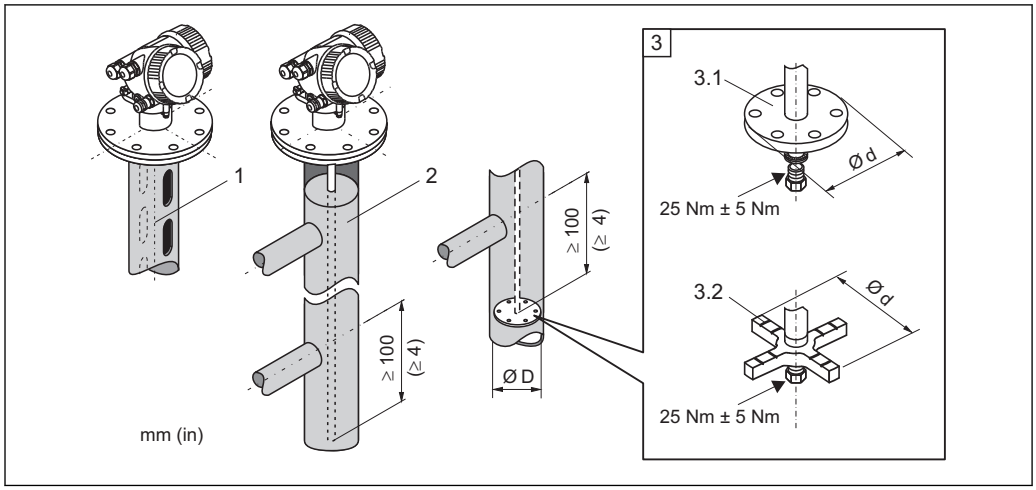
- Any distance from wall, as long as occasional contact is prevented.
- When installing in tanks with a lot of internals or internals situated close to the probe: use a coax probe.

Bypasses and stilling wells



1 Mounting in a stilling well
2 Mounting in a bypass
3 Center washer
3.1 Metallic center washer (316L) for level measurement
3.2 Non-metallic center washer (PEEK, PFA) for interface measurement

For information on bypass solutions from Endress+Hauser please contact your Endress +Hauser sales representative.

Feature 610 - Accessory mounted					
Application	**Option**	**Type of probe**	**Center washer**		**Pipe**
			Ø d [mm (in)]	**Material**	**Ø D [mm (in)]**
Level measurement	OA	Rod probe	75 (2,95)	316L	DN80/3" to DN100/4"
	OB	Rod probe	45 (1,77)	316L	DN50/2" to DN65/2½"
	OC	Rope probe	75 (2,95)	316L	DN80/3" to DN100/4"
Interface measurement	OD	Rod probe	48...95 (1,89...3,74)	PEEK	≥ 50 mm (2")
	OE	Rope probe	37 (1,46)	PFA	≥ 40 mm (1.57")

- Pipe diameter: > 40 mm (1.6") for rod probes
- Rod probe installation can take place up to a diameter size of 100 mm. In the event of larger diameters, a coax probe is recommended.
- Side disposals, holes or slits and welded joints that protrude up to approx. 5 mm (0.2") inwards do not influence the measurement.
- The pipe may not exhibit any steps in diameter.
- The probe must be 100 mm longer than the lower disposal.
- Within the measuring range, the probe must not get into contact with the pipe wall. If necessary, use a center washer (see feature 610 of the product structure).
- If the center washer is mounted at the end of the probe, it enables a reliable recognition of the end-of-probe signal (see feature 610 of the product structure).
  Note: For interface measurements only use the nonmetallic center washers made of PEEK or PFA (feature 610, options OD or OE) (→ 🖹 125).
- Coax probes can always be applied if there is enough mounting space.

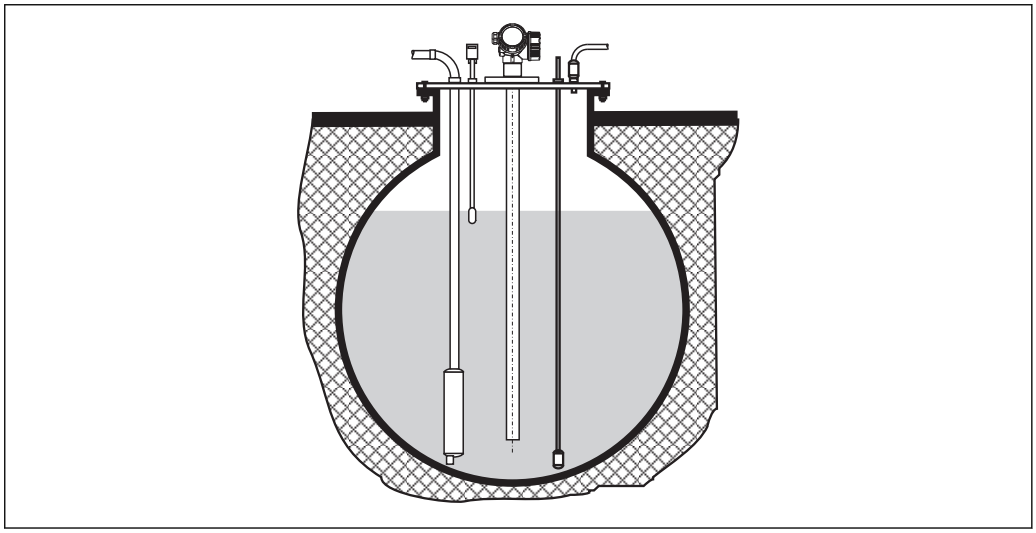
For bypasses with condensate formation (water) and a medium with low dielectric constant (e.g. hydrocarbons):

In the course of time the bypass is filled with condensate up to the lower disposal and for low levels the the level echo is superimposed by the condensate echo. Thus in this range the condensate level is measured instead of the correct level. Only higher levels are measured correctly. To prevent this, position the lower disposal 100 mm (4 in) below the lowest level to be measured and apply a metallic centering disk at the height of the lower edge of the lower disposal.

With heat insulated tanks the bypass should also be insulated in order to prevent condensate formation.

For rope probes with a length exceeding 2 m (6.7 ft) an additional weight or a spring should be mounted in addition to the center a washer (option OC) in order to tighten the rope. The mass of the center wahser is 155 g (5.5 oz).

Underground tanks



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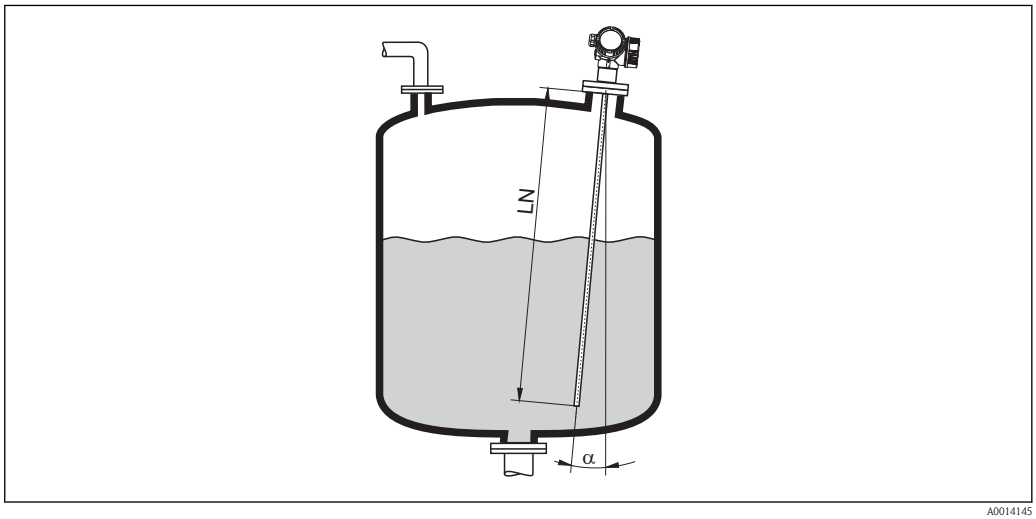
Use a coax probe for nozzles with large diameters in order to avoid reflections at the nozzle wall.

Installation at an angle



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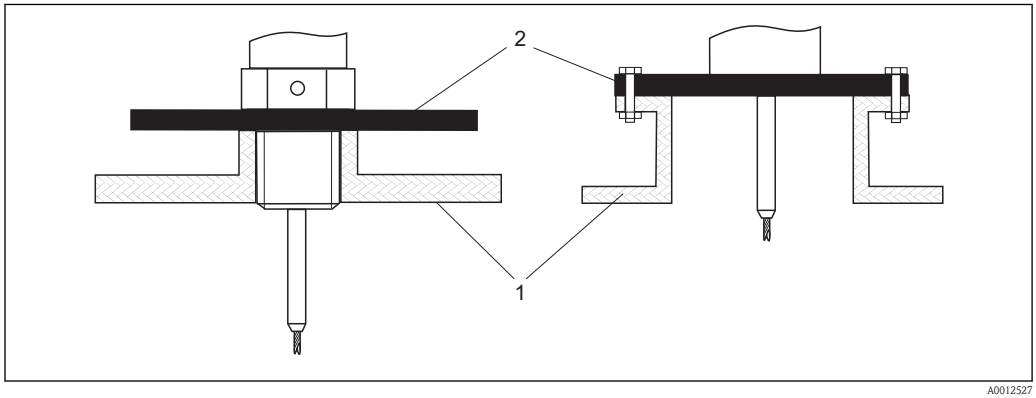
- For mechanical reasons, the probe should be installed as vertically as possible.
- With inclined installations the probe length has to be adjusted in dependence to the installation angle.
  - Up to LN = 1 m (3.3 ft): $\alpha = 30°$
  - Up to LN = 2 m (6.6 ft): $\alpha = 10°$
  - Up to LN = 4 m (13.1 ft): $\alpha = 5°$

Non-metallic vessels



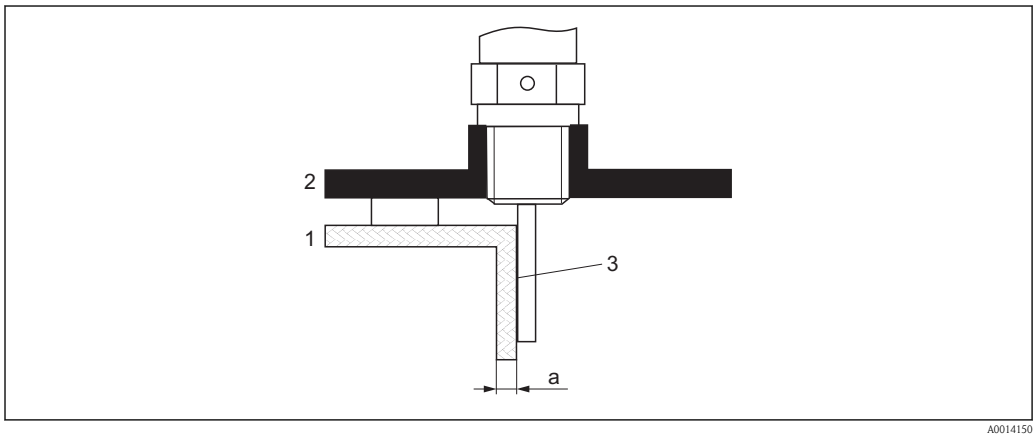
1 Non-metallic vessel
2 Metal sheet or metal flange

To measure, Levelflex with a rod probe needs a metallic surface at the process connection. Therefore:

- Select an instrument version with metal flange (minimum size DN50/2").
- Or: mount a metal sheet with a diameter of at least 200 mm (8") to the probe at the process connection. Its orientation must be perpendicular to the probe.

No additional measures are required for coax probes.

Plastic or glass tanks: Mounting the probe externally at the wall



1 Plastic or glass tank
2 Metall sheet with threaded sleeve
3 No free space between tank wall and probe!

Requirements
- The dielectric constant of the medium must be at least DC > 7.
- The tank wall must be non-conductvie.
- Maximum wall thickness (a):
  – Plastic: < 15 mm (0.6")
  – Glass: < 10 mm (0.4")
- There may be no metallic reinforcements fixed to the tank.

Mounting conditions:
- The probe must be mounted directly to the tank wall (no open space)
- A plastic half pipe with a diameter of approx. 200 mm (8"), or some other protective unit, must be affixed externally to the probe to prevent any influences on the measurement.
- If the tank diameter is less than 300 mm (12"):
  A metallic grounding sheet must be installed at the opposite side of the tank. The sheet must be conductively connected to the process connection and cover about the half of the vessel's circumference.
- If the tank diameter exceeds 300 mm (12"):
  A metal sheet with a diameter of at least 200 mm (8") must be mounted to the probe at the process connection. Its orientation must be perpendicular to the probe (see above).

Calibration for external probe mounting

If the probe is mounted externally at the wall of the tank, the speed of signal propagation will be reduced. There are two possibilities to compensate for this effect.

Compensation with the gas phase compensation factor

The effect of the dielectric wall can be compared to the effect of a dielectric gas phase. Thus it can be compensated for in the same manner. The compensation factor if given by the quotient of the actual probe length LN and the probe length meausred when the tank is empty.

The device looks for the end of probe signal in the subtracted curve. Thus, the value of the measured probe length depends on the mapping. In order to obtain an exact value, it is advisable to determine the probe length manually using the envelope curve display in FieldCare.

Step	Parameter	Action
1	Expert → Sensor → Gas phase compensation → GPC mode	Select **Constant GPC factor** option.
2	Expert → Sensor → Gas phase compensation → Constant GPC factor	Enter quotient: "(Actual probe length)/ (Measured probe length)".

Compensation via the calibration parameters

If an acutal gas phase has to be compensated for, the gas phase compensation functionality is no longer available for a correction of the external mounting. In this case the calibration parameters (**Empty calibration** and **Full calibration**) must be adjusted and a value longer than the actual probe length has to be entered into the **Present probe length** parameter. The correction factor for these three parameters is given by the quotient of the probe length measured when the tank is empty and the acutal probe length LN.

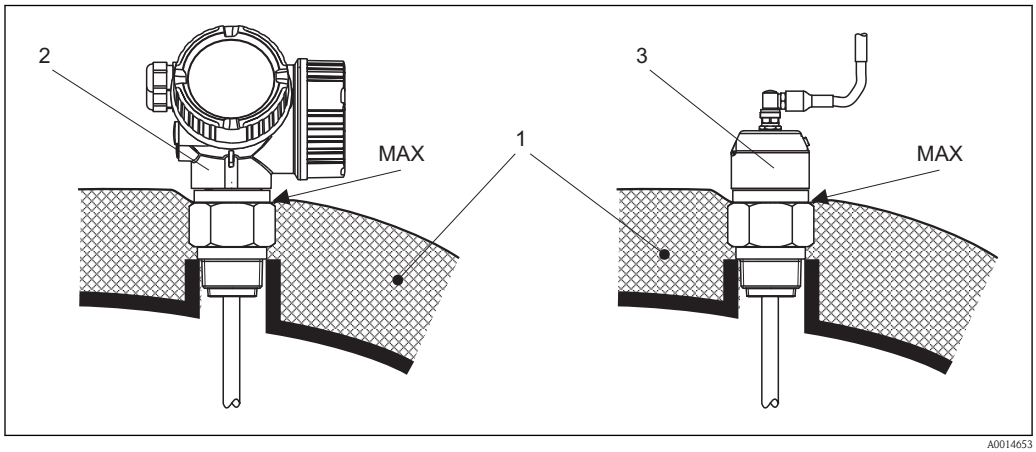
The device looks for the end of probe signal in the subtracted curve. Thus, the value of the measured probe length depends on the mapping. In order to obtain an exact value, it is advisable to determine the probe length manually using the envelope curve display in FieldCare.

Step	Parameter	Action
1	Setup → Empty calibration	Increase parameter value by "(Measured probe length)/(Actual probe length)".
2	Setup → Full calibration	Increase parameter value by "(Measured probe length)/(Actual probe length)".

Step	Parameter	Action
3	Expert → Sensor → Sensor properties → Probe length correction → Confirm probe length	Select **Manual input** option.
4	Expert → Sensor → Sensor properties → Probe length correction → Present probe length	Enter measured probe length.

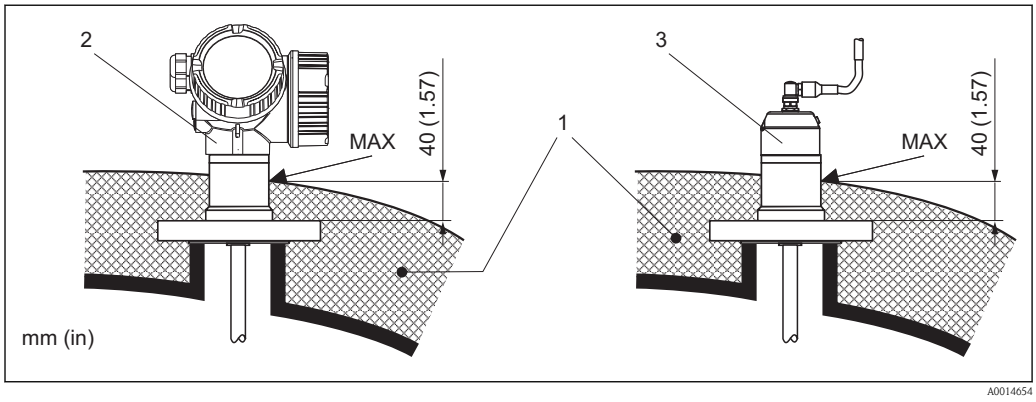
Vessels with heat insulation

If process temperatures are high, the device must be included in normal tank insulation to prevent the electronics heating up as a result of heat radiation or convection. The insulation may not exceed beyond the points labeled "MAX" in the drawings.



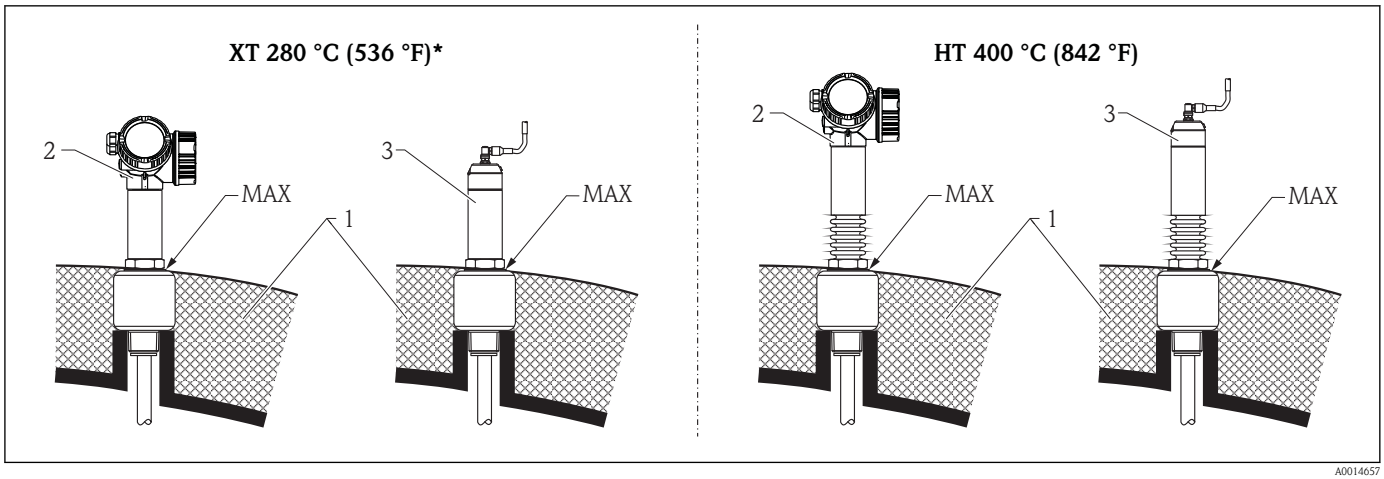
9 *Process connection with thread - FMP51*

1 Tank insulation
2 Compact device
3 Sensor remote (feature 600)



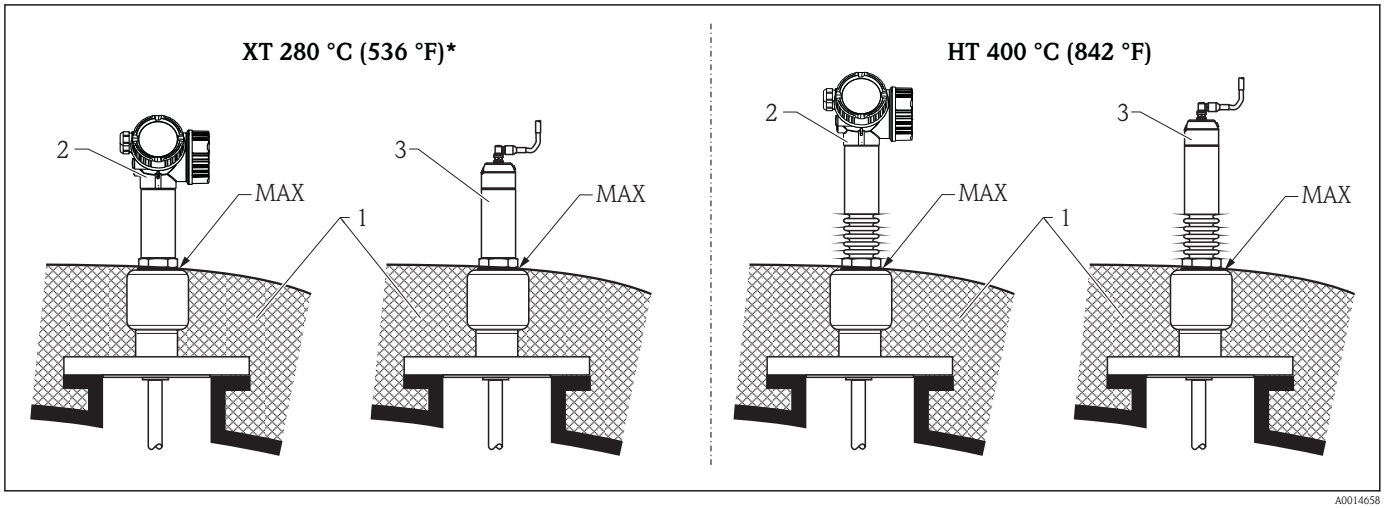
10 *Process connection with flange - FMP51, FMP52*

1 Tank insulation
2 Compact device
3 Sensor remote (feature 600)



11 *Process connection with thread - FMP54, sensor version XT and HT*

1 Tank insulation
2 Compact device
3 Sensor remote (feature 600)
** The XT version is not recommended for saturated steam above 200 °C (392 °F). Use the HT version instead.*



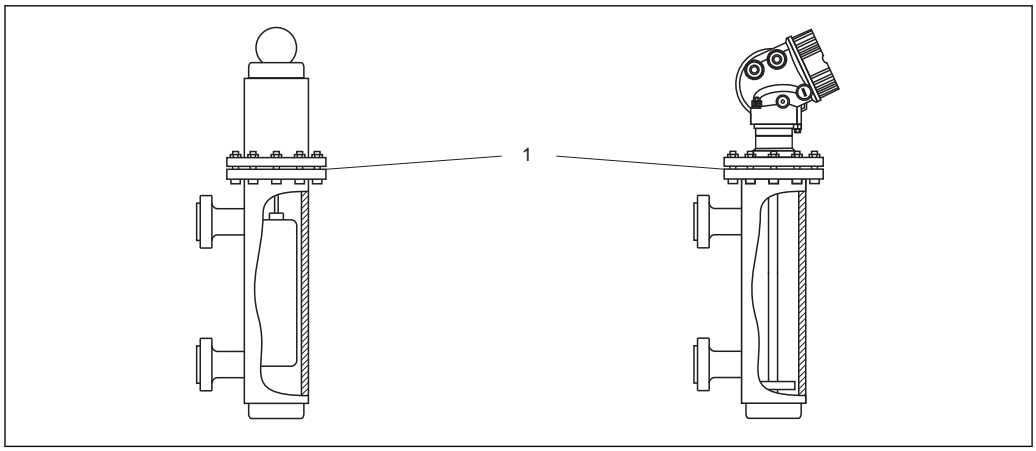
12 *Process connection with flange - FMP54, sensor version XT and HT*

1 Tank insulation
2 Compact device
3 Sensor remote (feature 600)
** The XT version is not recommended for saturated steam above 200 °C (392 °F). Use the HT version instead.*

Replacing a displacer system in an existing displacer chamber

FMP51 and FMP54 are a perfect replacement for a conventional displacer system in an existing displacer chamber. Endress+Hauser offers flanges that suit Fischer and Masoneilan displacer chamber for this purpose (special product for FMP51; feature 100, options LNJ, LPJ, LQJ for FMP54). Thanks to menu-guided local operation, commissioning the Levelflex only takes a few minutes. Replacement is also possible when partially filled, and wet calibration is not required.

Your benefits:
- No moving parts, thus zero-maintenance operation.
- Not sensitive to process influences such as temperature, density, turbulence and vibrations.
- The rod probes can be shortened or replaced easily. In this way, the probe can be easily adjusted on site.



1 Flange of the displacer chamber

Planning instructions:
- In normal cases, use a rod probe. When installing into a metallic displacer chamber up to 150 mm, you have all the advantages of a coax probe.
- It must be ensured that the probe does not come into contact with the side wall. Where necessary, use a center washer at the lower end of the probe (feature 610 of the product structure).
- A center washer must be adapted as accurately as possible to the internal diameter of the displacer chamber to also ensure perfect operation in the area of the probe end.

Additional information on interface measurement
- In the case of oil and water the centering disk should be positioned at the lower edge of the lower disposal (water level).
- The pipe may not exhibit any steps in diameter. Use the coax probe where necessary.
- In the case of rod probes, it must be ensured that the probe does not come into contact with the wall. If necessary, use a center washer at the end of the probe.
- A plastic center washer has to be used for interface measurement (feature 610, options OD and OE).

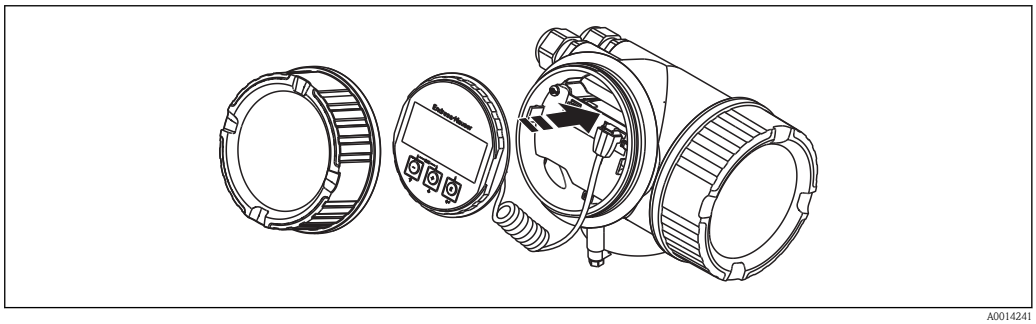
6.3 Mounting the device

6.3.1 Required mounting tools

- For mounting thread 3/4": Hexagonal wrench 36 mm
- For mounting thread 1-1/2": Hexagonal wrench 55 mm
- To shorten rod or coax probes: Saw
- To shorten rope probes:
  - Allen key AF 3 mm (for 4mm ropes) or AF 4 mm (for 6 mm ropes)
  - Saw or bolt cutter
- For flanges and other process connections: appropriate mounting tools
- To turn the housing: Hexagonal wrench 8 mm

6.3.2 Preparing the device for mounting

When shortening the probe: Enter the new length of probe into the Quick Setup which can be found in the electronics housing behind the display module.



A0014241

Shortening rod probes

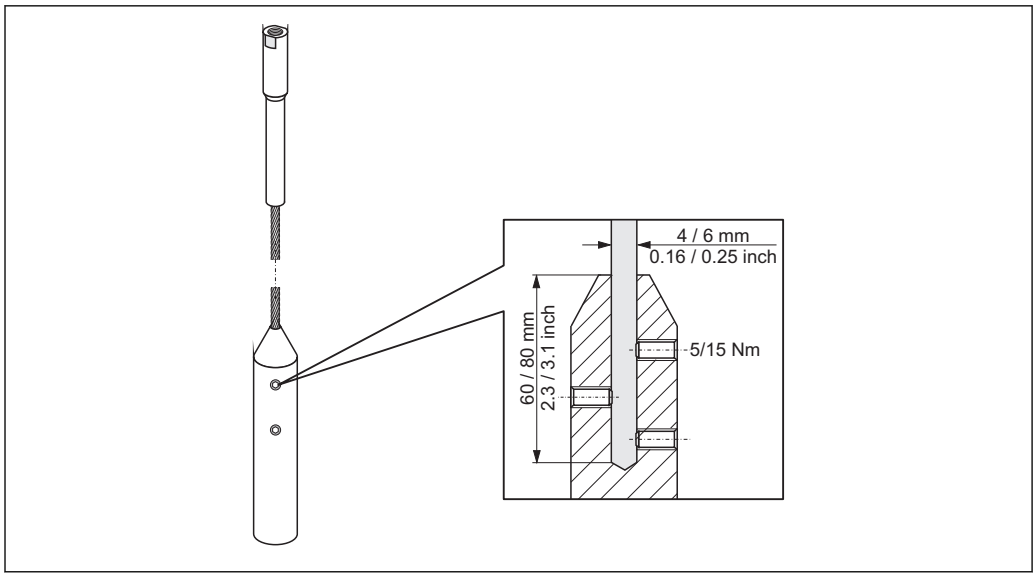
Rod probes must be shortened if the distance to the container floor or outlet cone is less than 10 mm (0.4 in). The rods of a rod probe are shortened by sawing at the bottom end.

Rod probes of FMP52 can **not** be shortened as they are coated.

Shortening rope probes

Rope probes must be shortened if the distance to the container floor or outlet cone is less than 150 mm (6 in).

Rope probes of FMP52 can **not** be shortened as they are coated.



1. Loosen the 3 Allen set screws using an Allen key AF3 (for 4mm ropes) or AF4 (for 6 mm ropes). Note: The set screws have got a clamping coating in order to prevent accidental loosening. Thus an increased torque might be necessary to loosen them.
2. Remove released rope from the weight.
3. Measure off new rope length.
4. Wrap adhesive tape around the rope at the point to be shortened to prevent it from fanning out.
5. Saw off the rope at a right angle or cut it off with a bolt cutter.
6. Insert the rope completely into the weight: rope 4 mm (0.16 in): 60 mm (2.4 in) deep; rope 6 mm (0.24 in): 80 mm (3.2 in) deep.
7. Screw the set screws into place. Due to the clamping coating of the setscrews application of a screw locking fluid is not necessary. Torque: rope 4 mm (0.16 in): 5 Nm (3.7 lbf ft); rope 6 mm (0.24 in): 15 Nm (11 lbf ft).

Shortening coax probes

Coax probes must be shortened if the distance to the container floor or outlet cone is less than 10 mm (0.4 in).

Coax probes can be shortened max. 80 mm (3.2 in) from the end. They have centering units inside, which fix the rod centrally in the pipe. The centerings are held with borders on the rod. Shortening is possible up to approx. 10 mm (0.4 in) below the centering unit.

The coax probe is shortened by sawing the pipe at the bottom end.

6.3.3 FMP54 with gas phase compensation: Mounting the probe rod

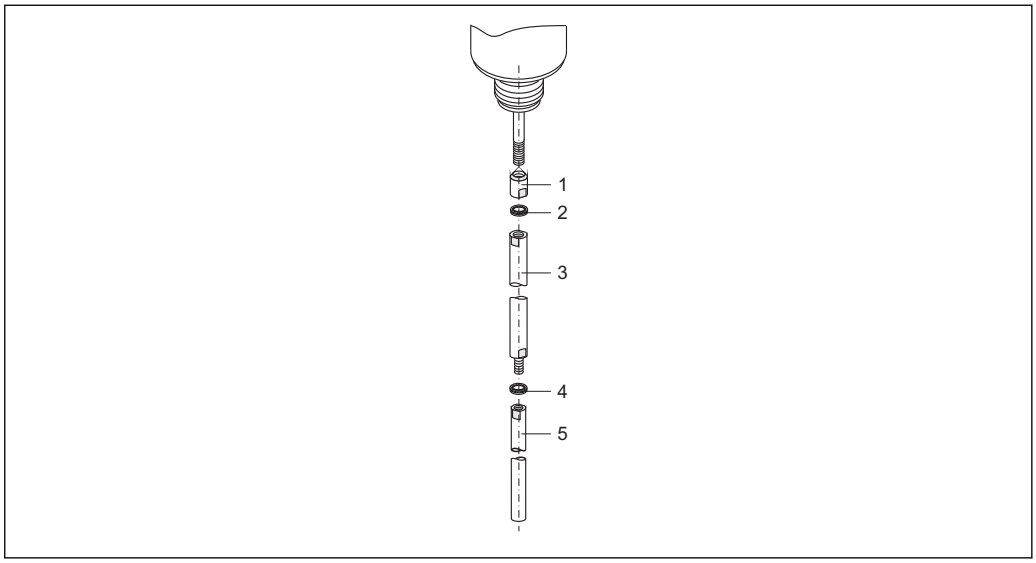
This section is only valid for FMP54 with gas phase compensation (product structure: feature 540 "Application Package", option EF or EG).

Coax probes

Coax probes with reference reflection are completely mounted and adjusted on delivery. After mounting they are ready for use. Additional settings are not necessary.

Rod probes

For rod probes with reference reflection the probe rod is delivered separately and has to be mounted as follows:



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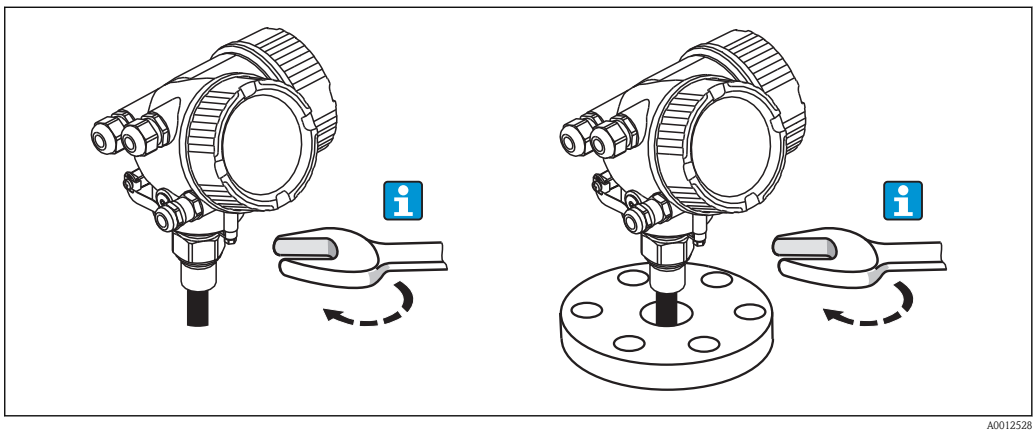
1. Screw the counter nut onto the connection thread (M10x1) of the gland. Take care that the chamfer is oriented to the gland.
2. Place a pair of Nord-Lock washers on the thread.
3. Screw the probe rod with the larger diameter onto the thread and fasten it hand-tight.
4. Place the second pair of Nord-Lock washers on the threaded bolt.
5. Screw the probe rod with the smaller diameter onto the threaded bolt and tighten it with 15 Nm (torque wrench/spanner AF14).

After mounting the probe rod in the stilling well or bypass, check and – if necessary – correct the settings in the unpressurized state (→ 90).

6.3.4 Mounting the device

Mounting devices with thread



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Devices with mounting thread are screwed into a welding boss or a flange and are usually also secured with these.

- Tighten with the hexagonal nut only:
  – Thread 3/4": Hexagonal wrench 36 mm
  – Thread 1-1/2": Hexagonal wrench 55 mm
- Maximum permissible torque:
  – Thread 3/4": 45 Nm
  – Thread 1-1/2": 450 Nm
- Recommended torque when using the supplied aramid fibre seal and a process pressure of 40 bar (580 psi):
  – Thread 3/4": 25 Nm
  – Thread 1-1/2": 140 Nm
- When installing in metal containers, take care to ensure good metallic contact between the process connection and container.

Flange mounting

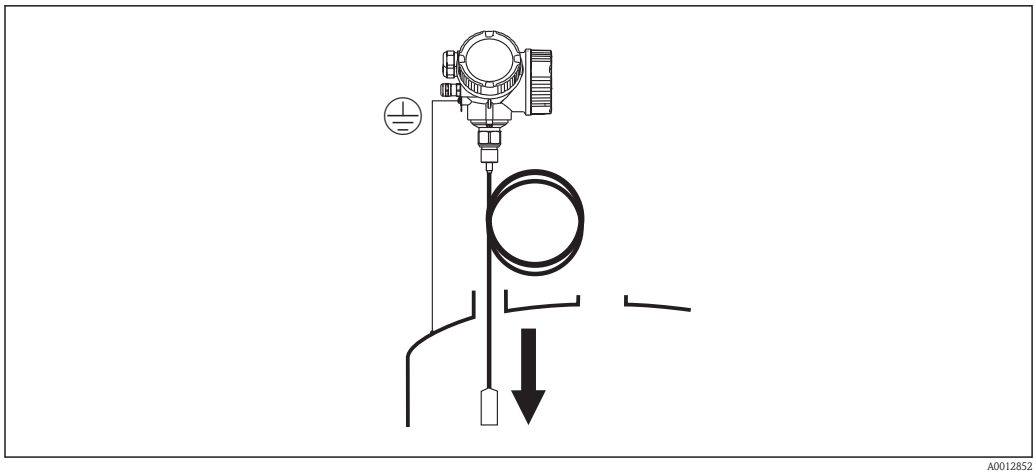
If a seal is used, be sure to use unpainted metal bolts to ensure good electrical contact between probe flange and process flange.

Mounting rope probes

NOTICE

Electrostatic discharges may damage the electronics.

► Earth the housing before lowering the rope into the vessel.



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When lowering the rope probe into the vessel, observe the following:

- Uncoil rope and lower it slowly and carefully into the vessel.
- Do not kink the rope.
- Avoid any backlash, since this might damage the probe or the vessel fittings.

6.3.5 Mounting the "Sensor remote" version

This section is only valid for devices of the version "Probe Design" = "Sensor remote" (feature 600, option MB).

For the version "Probe design" = "Sensor remote" the following is supplied:

- The probe with the process connection
- The electronics housing
- The mounting bracket for wall or pipe mounting of the electronics housing
- The connection cable (3m/9ft). The cable has got one straight and one angled plug (90°). Depending on the local conditions the angled plug can be connected at the probe or at the electronics housing.

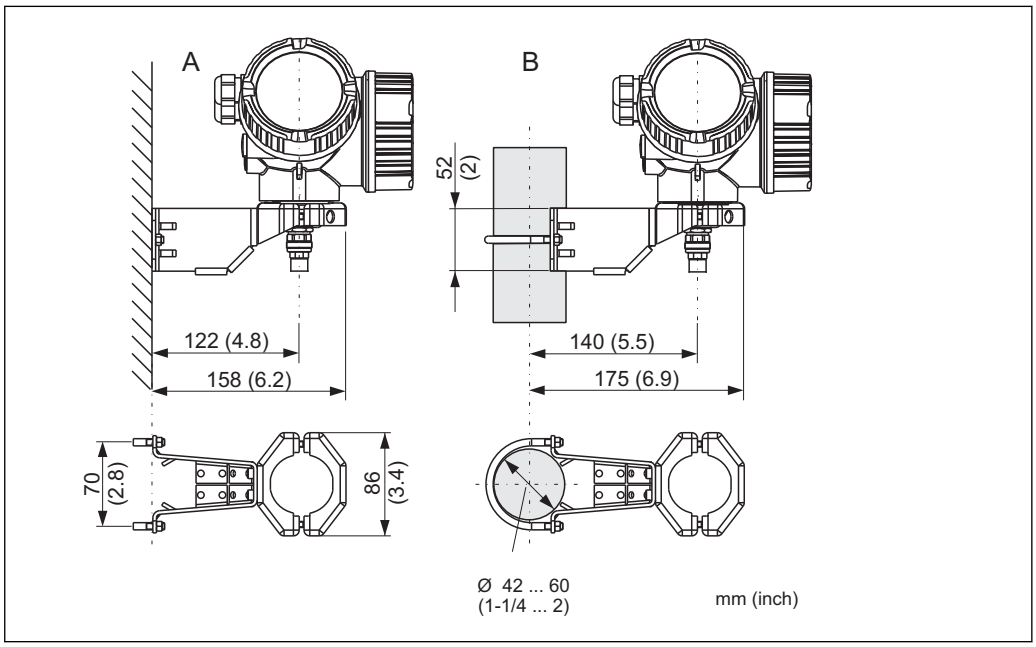
⚠ CAUTION

The plugs of the connection cable may be damaged by mechanical stress.

- ► Mount the probe and the electronics housing tightly before connecting the cable.
- ► Lay the cable such that it is not exposed to mechanical stress. Minimum bending radius: 100 mm (4").
- ► When connecting the cable: Connect the straight plug before the angled one. Torque for both coupling nuts: 6 Nm.

If the meeasuring point is exposed to strong vibrations, an additional locking compound (e.g. Loctite 243) can be applied at the plug connectors.

Mounting the electronics housing

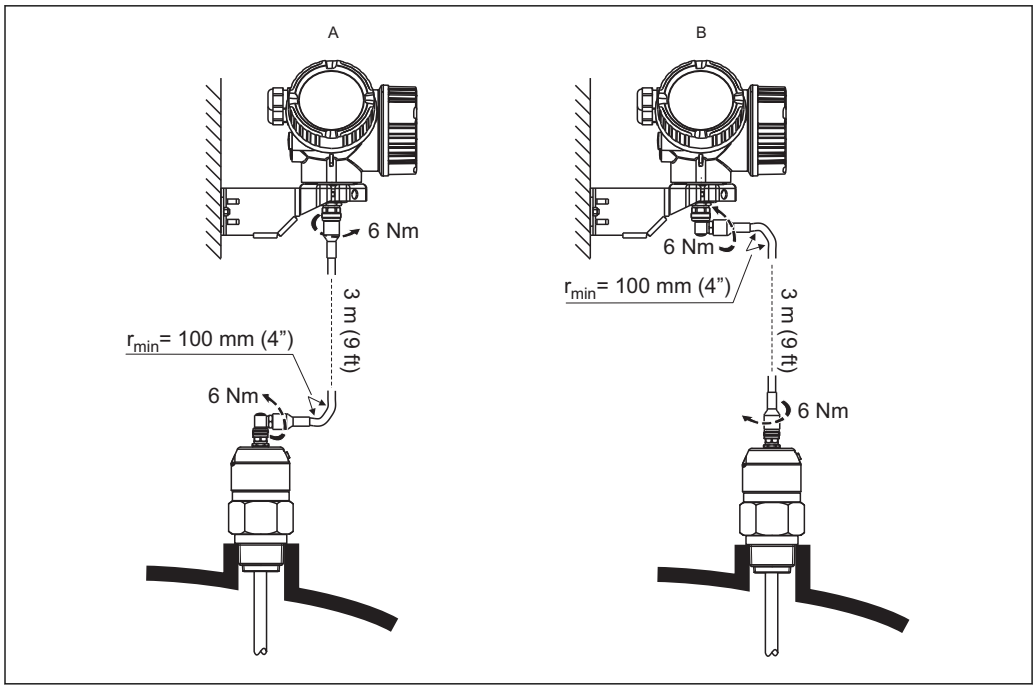


13 *Mounting the electronics housing using the mounting bracket*

A Wall mounting
B Pipe mounting

Connecting the cable

Required tools:
Open-end wrench 18AF

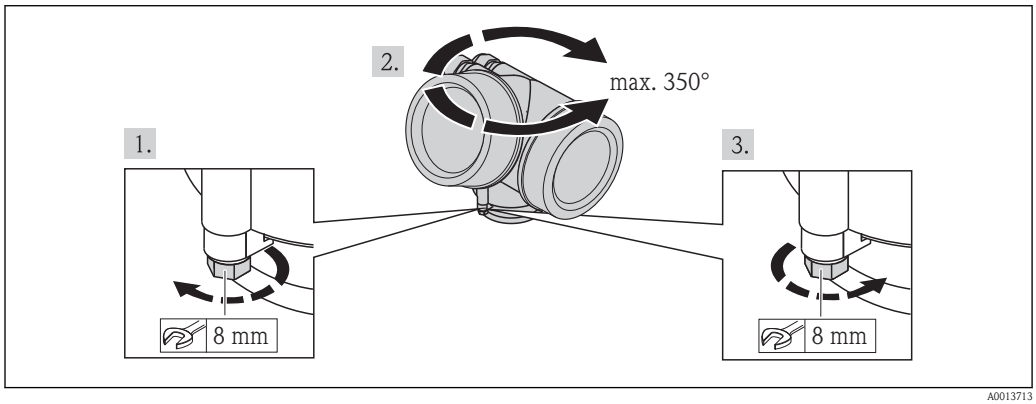


14 Connecting the cable. There are the following possibilities:

A Angled plug at the probe
B Angled plug at the electronics housing

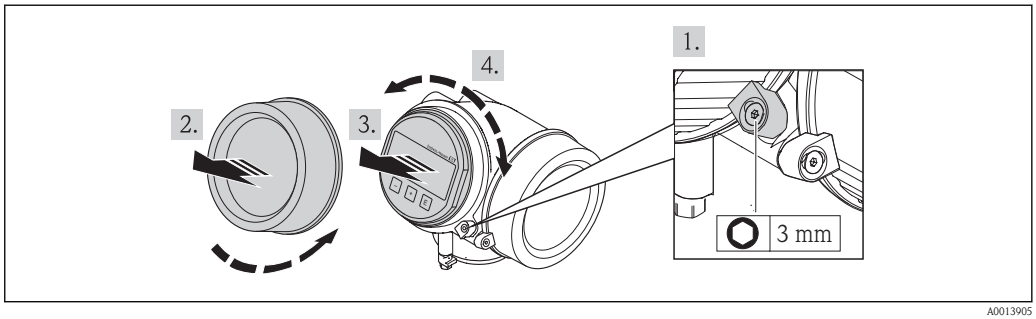
6.3.6 Turning the transmitter housing

To provide easier access to the connection compartment or display module, the transmitter housing can be turned:



1. Unscrew the securing screw using an open-ended wrench.
2. Rotate the housing in the desired direction.
3. Firmly tighten the securing screw. (1,5 Nm for plastics housing; 2,5 Nm for aluminium or stainless steel housing).

6.3.7 Turning the display module



1. If present (i.e. for devices with Dust-Ex/DIP approval): Loosen the securing clamp of the electronics compartment cover using an Allen key.
2. Unscrew cover of the electronics compartment from the transmitter housing.
3. Pull out the display module with a gentle rotation movement.
4. Rotate the display module into the desired position: Max. 8 × 45 ° in each direction.
5. Feed the spiral cable into the gap in the housing above the main electronics module and plug the display module in the desired orientation onto the electronics compartment until it engages.
6. Screw the cover of the electronics compartment firmly back onto the transmitter housing.
7. If present (i.e. for devices with Dust-Ex/DIP approval): Tighten the securing clamp again using the Allen key (Torque: 2.5 Nm).

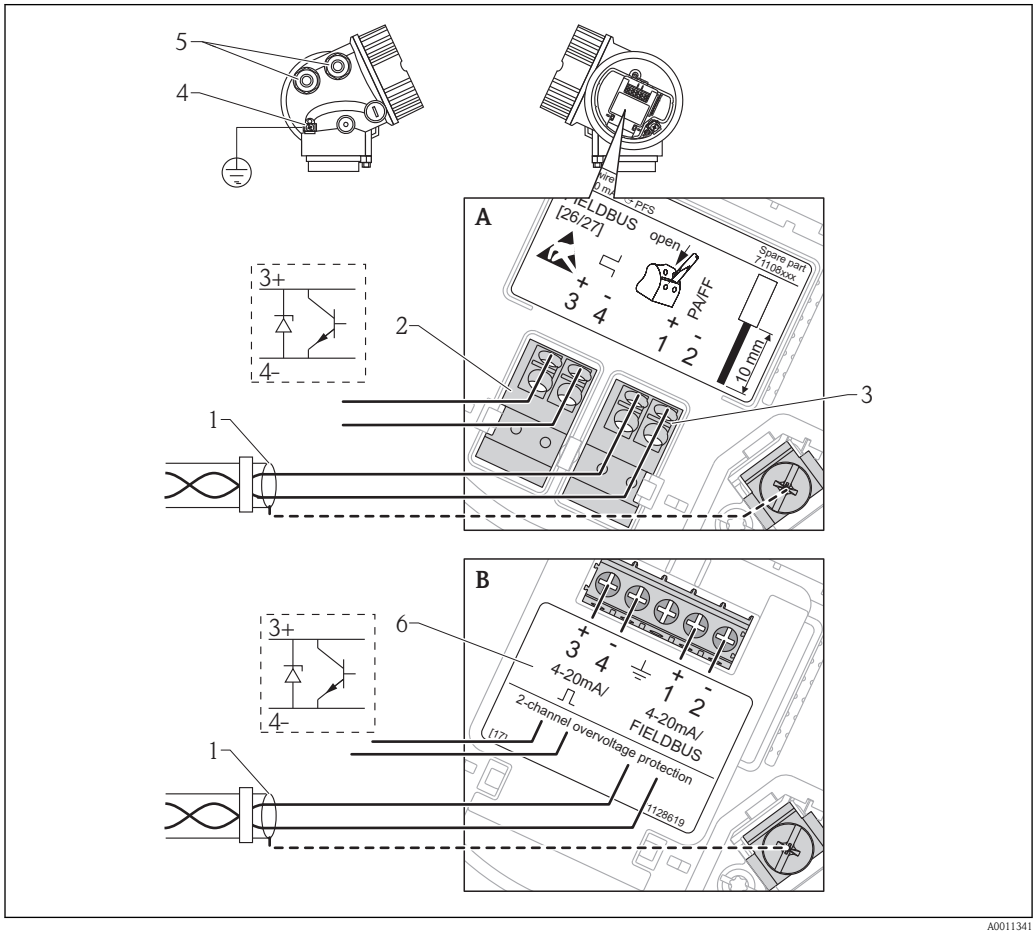
6.4 Post-installation check

❍	Is the device undamaged (visual inspection)?
❍	Does the device conform to the measuring point specifications? For example: ■ Process temperature ■ Process pressure (refer to the chapter on "Material load curves" of the "Technical Information" document) ■ Ambient temperature range ■ Measuring range
❍	Are the measuring point identification and labeling correct (visual inspection)?
❍	Is the device adequately protected from precipitation and direct sunlight?
❍	Are the securing screw and securing clamp tightened securely?

7 Electrical connection

7.1 Connection options

7.1.1 PROFIBUS PA / FOUNDATION Fieldbus



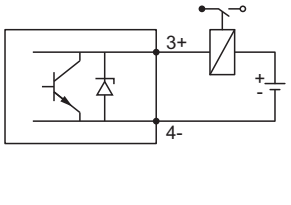
15 *Terminal assignment PROFIBUS PA / FOUNDATION Fieldbus*

A Without integrated overvoltage protection
B With integrated overvoltage protection
1 Cable screen: Observe cable specifications (→ 59)
2 Terminals for switch output (open collector)
3 Terminals PROFIBUS PA / FOUNDATION Fieldbus
4 Terminal for potential equalization line
5 Cable entries
6 Overvoltage protection module

7.1.2 Connection examples for the switch output

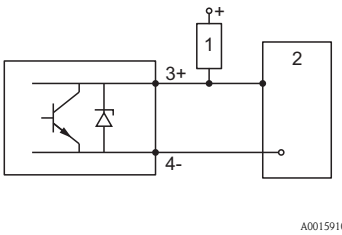
For HART devices, the switch output is available as an option. See product structure, feature 20: "Power Supply, Output", option B: "2-wire; 4-20mA HART, switch output"

Devices with PROFIBUS PA and FOUNDATION Fieldbus always have a switch output.



16 Connection of a relay

Suitable relays (examples):
- Solid-state relay: Phoenix Contact OV-24DC/480AC/5 with mounting rail connector UMK-1 OM-R/AMS
- Electromechanical relay: Phoenix Contact PLC-RSC-12DC/21



17 Connection of a digital input

1 Pull-up resistor
2 Digital input

7.2 Connection options

7.2.1 Cable specification

FOUNDATION Fieldbus

- Endress+Hauser recommends using twisted, shielded two-wire cables.
- Terminals for wire cross-sections: 0.5 to 2.5 mm² (20 to 14 AWG)
- Cable outer diameter: 5 to 9 mm (0.2 to 0.35 in)

For further information on the cable specifications, see Operating Instructions BA00013S "FOUNDATION Fieldbus Overview", FOUNDATION Fieldbus Guideline and IEC 61158-2 (MBP).

7.2.2 Cable diameter and cross-section of the strands

Type of protection	Cable gland	Admissible cable diameter	Admissible cross-section of the strands
■ Standard ■ Ex ia ■ Ex ic	Plastics M20x1,5	5 to 10 mm (0.2 to 0.39 in)	0.5 to 2.5 mm² (20 to 14 AWG)
■ Ex tD ■ Ex nA ■ FM approval ■ CSA approval	Metal M20x1.5	7 to 10 mm (0.28 to 0.39 in)	

7.2.3 Overvoltage protection

If the measuring device is used for level measurement in flammable liquids which requires the use of overvoltage protection according to DIN EN 60079-14, standard for test procedures 60060-1 (10 kA, pulse 8/20 µs), overvoltage protection has to be ensured by an integrated or external overvoltage protection module.

Integrated overvoltage protection

An integrated overvoltage protection module is available for 2-wire HART as well as PROFIBUS PA and FOUNDATION Fieldbus devices.

Product structure: Feature 610 "Accessory mounted", option NA "Overvoltage protection".

Technical data	
Resistance per channel	2 * 0.5 Ω max
Threshold DC voltage	400 to 700 V
Threshold impulse voltage	< 800 V
Capacitance at 1 MHz	< 1.5 pF
Nominal arrest impulse voltage (8/20 µs)	10 kA

External overvoltage protection

HAW562 or HAW569 from Endress+Hauser are suited as external overvoltage protection.

For detailed information please refer to the following documents:

- HAW562: TI01012K
- HAW569: TI01013K

7.3 Connection data

7.3.1 FOUNDATION Fieldbus

"Power supply; Output" [1]	Terminal voltage
E: 2-wire; FOUNDATION Fieldbus, switch output	9 to 32 V_{DC}

1) Feature 020 of the product structure

7.4 Connecting the measuring device

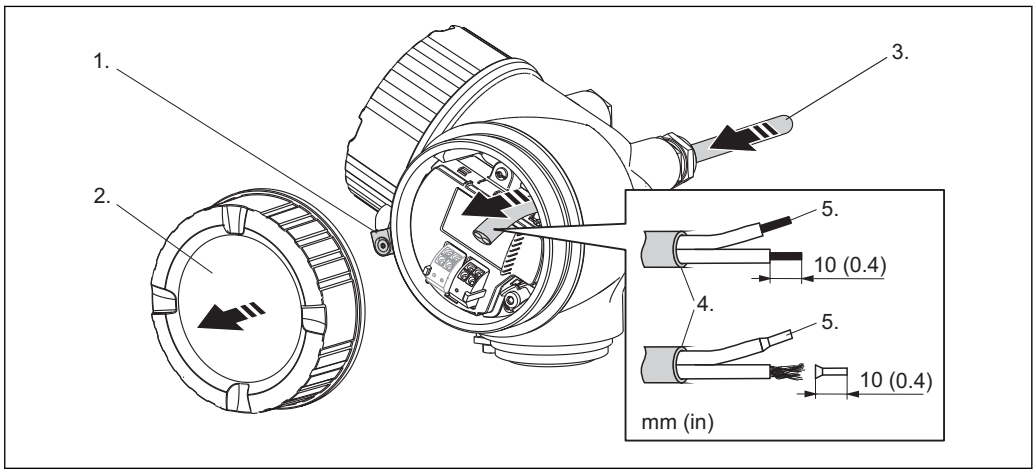
⚠ WARNING

Explosion hazard!

- ► Comply with the relevant national standards.
- ► Observe the specifications in the Safety Instructions (XA).
- ► Only use the specified cable glands.
- ► Check whether the supply voltage matches the specifications on the nameplate.
- ► Before connecting the device: Switch the supply voltage off.
- ► Before switching on the supply voltage: Connect the potential bonding line to the exterior ground terminal.

Required tools and accessories:

- For instruments with safety pin for the lid: AF 3 Allen key
- Wire stripping pliers
- When using stranded wires: Wire end sleeves.



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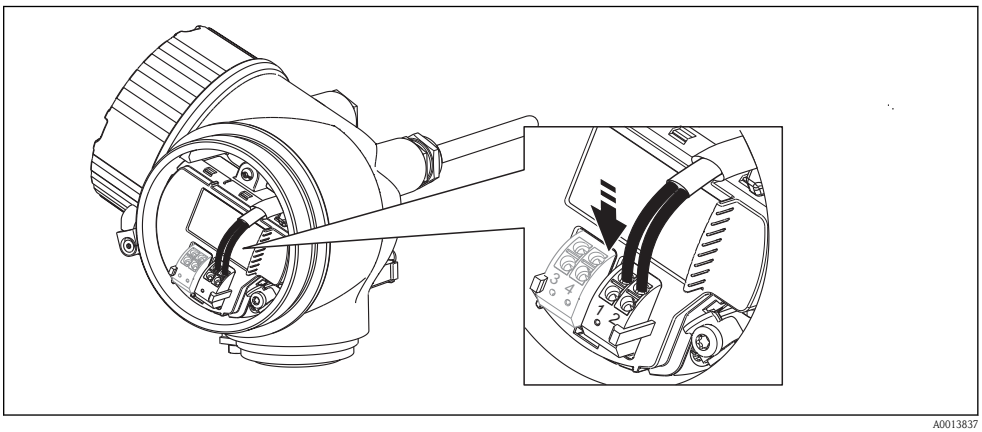
1. Loosen the screw of the securing clamp of the connection compartment cover and turn the clamp 90° counterclockwise.
2. Unscrew the connection compartment cover.
3. Push the cable through the cable entry. To ensure tight sealing, do not remove the sealing ring from the cable entry.
4. Strip the cable.
5. Strip the cable ends 10 mm (0.4 in). For stranded cables, also attach wire end ferrules.
6. Firmly tighten the cable glands.
7. 

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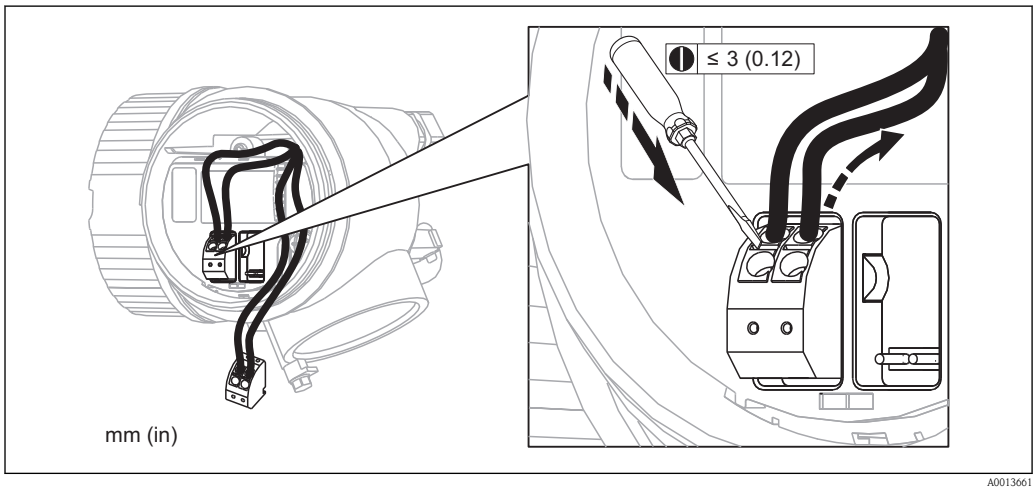
Connect the cable in accordance with the terminal assignment (→ 58).

8. When using screened cable: Connect the cable screen to the ground terminal.
9. Screw the cover onto the connection compartment.
10. For instruments with safety pin for the lid: Adjust the safety pin so that its edge is over the edge of the display lid. Tighten the safety pin.

Pluggable spring-force terminals

Instruments without integrated overvoltage protection have pluggable spring-force terminals. Rigid or flexible conductors with or without cable sleeve can directly be inserted and are contacted automatically.

To remove cables from the terminal: Press on the groove between the terminals using a flat-tip screwdriver ≤ 3 mm (0.12 inch) while pulling the cables out of the terminals.



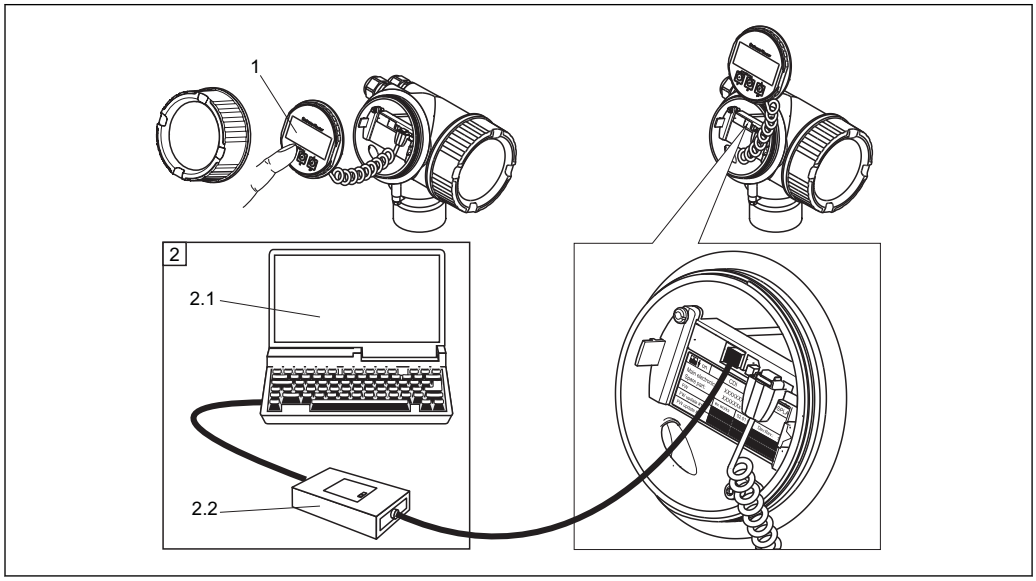
7.5 Post-connection check

❍	Are cables or the device undamaged (visual inspection)?
❍	Do the cables comply with the requirements?
❍	Do the cables have adequate strain relief?
❍	Are all cable glands installed, firmly tightened and correctly sealed?
❍	Does the supply voltage match the specifications on the transmitter nameplate?
❍	Is the terminal assignment correct (→ 🖹 58)?
❍	If required: Is the protective earth connected correctly (→ 🖹 58)?
❍	If supply voltage is present: Is the device ready for operation and do values appear on the display module?
❍	Are all housing covers installed and firmly tightened?
❍	Is the securing clamp tightened correctly?

8 Operating options

8.1 Overview

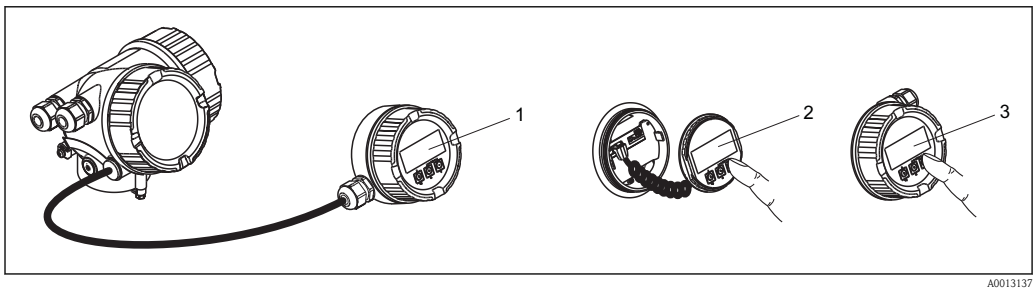
8.1.1 On-site operation



18 *On-site operation options*

1 Display module SD02, push buttons; cover must be open for operation
2 Operating options via CDI interface (= Endress+Hauser Common Data Interface)
2.1 Computer with operating tool (FieldCare)
2.2 Commubox FXA291, connected to the CDI interface of the device

8.1.2 Operation with remote display and operating module FHX50

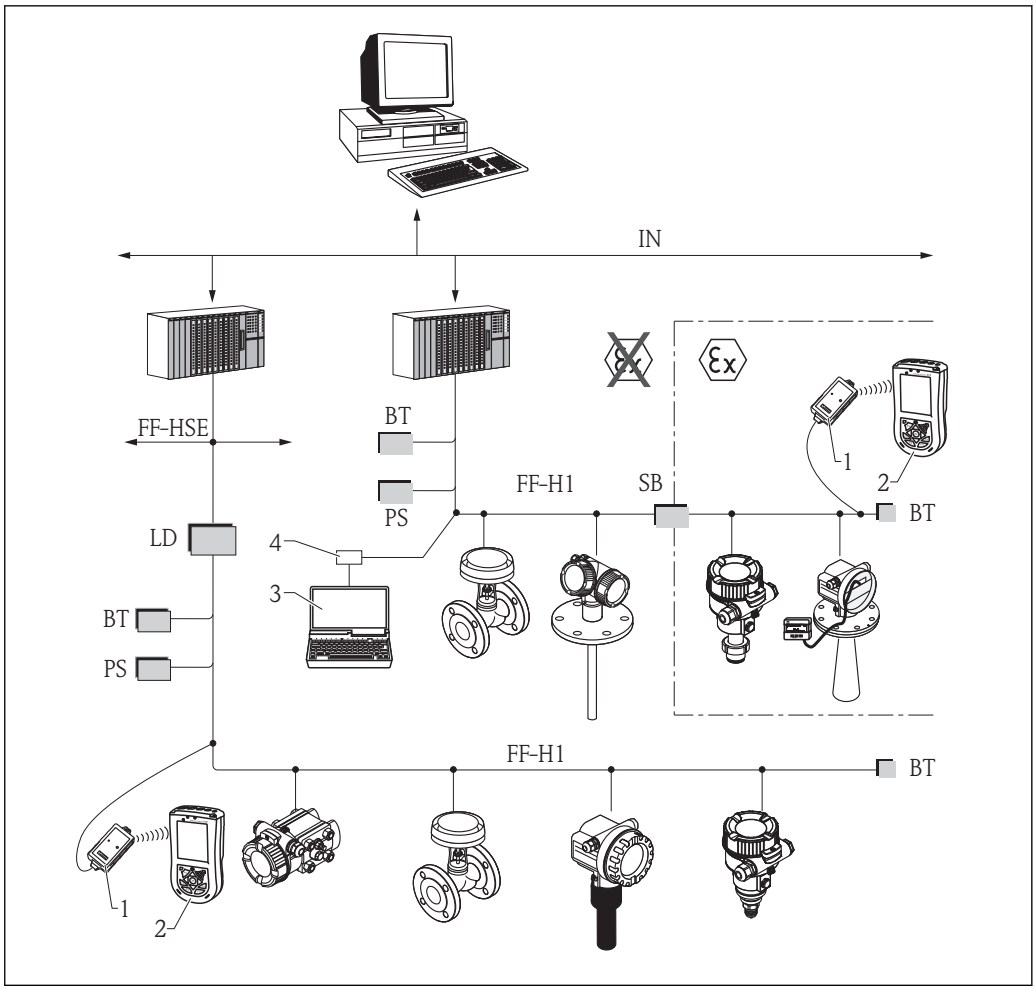


19 *FHX50 operating options*

1 Housing of the remote display and operating module FHX50
2 Display and operating module SD02, push buttons; cover must be removed
3 Display and operating module SD03, optical keys; can be operated through the glass of the cover (in preparation)

8.1.3 System integration via FOUNDATION Fieldbus

The following diagram shows two typical examples of a FOUNDATION Fieldbus network with the associated components.



20 *FOUNDATION Fieldbus system architecture with associated components*

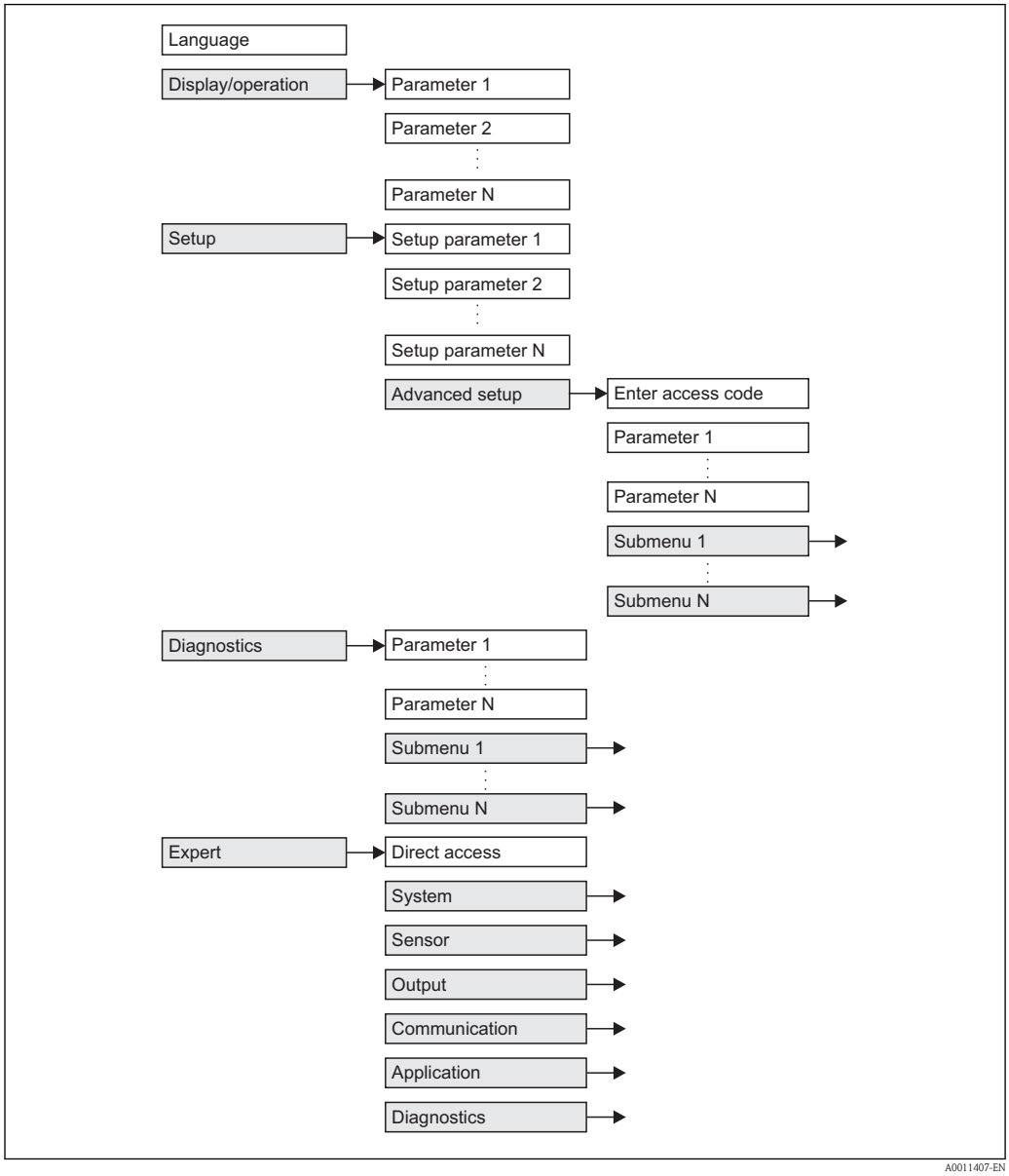
IN Industrial network
FF-HSE High Speed Ethernet
FF-H1 FOUNDATION Fieldbus-H1
LD Linking Device FF-HSE/FF-H1
PS Bus Power Supply
SB Safety Barrier
BT Bus Terminator
1 FFblue Bluetooth modem
2 Field Xpert SFX100
3 FieldCare
4 NI-FF interface card

The system can be connected in the following ways:
- A linking device makes the connection to higher-order fieldbus levels (e.g. High Speed Ethernet (HSE)) possible.
- An FF-H1 connecting card is needed for direct connection to a process control system.

Further information on FOUNDATION Fieldbus can be found in Operating Instructions BA00013S "FOUNDATION Fieldbus Overview, Installation and Commissioning Guidelines", the FOUNDATION Fieldbus Specification or on the Internet at "http://www. fieldbus.org".

8.2 The operating menu

8.2.1 Structure



21 *Basic structure of the operating menu; gray: submenus; white: parameters*

8.2.2 Submenus and user roles

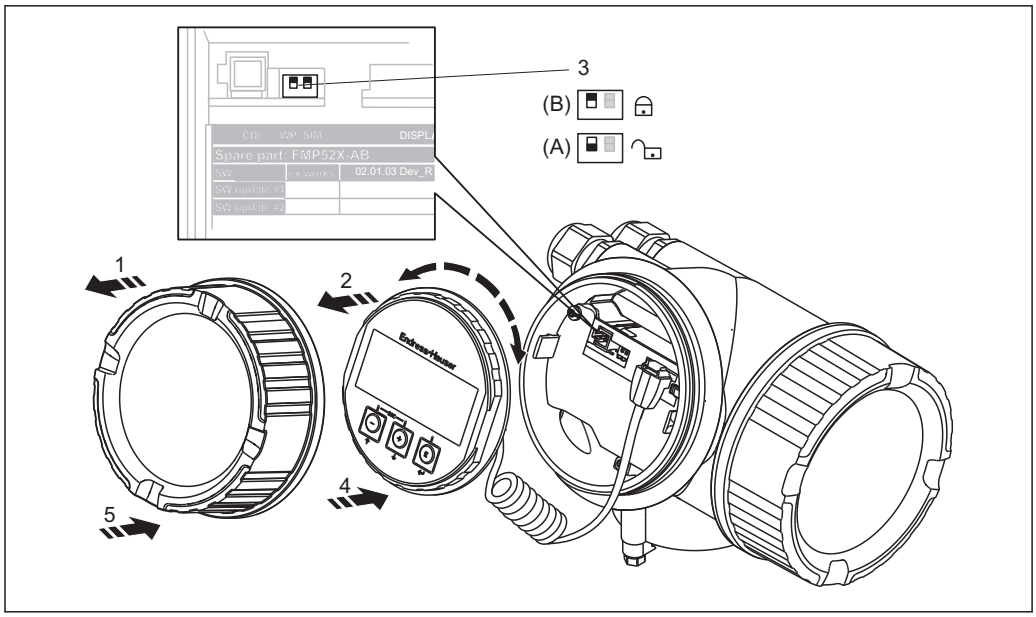
The submenus are designed for different user roles. A user role is defined by typical tasks within the lifecycle of the device.

User role	Typical tasks	Submenu	Content/Meaning
Operator	Tasks in the ongoing process: ■ Configuration of the display. ■ Reading measuring values.	"Language"	Defines the operating language.
		"Display/Operation"	Contains all parameters which are needed during the ongoing process: Configuration of the display (display values, display format, display contrast ...).
Maintenance	Commissioning: ■ Configuration of the measurement. ■ Configuration of the measured value processing (scaling, linearization, limit detection etc.). ■ Configuration of the measured value output (analog and digital communication interface).	"Setup"	Contains all commissioning parameters: ■ **Setup parameters** When all these parameters have been assigned appropriate values, the measured should be completely configured in a standard application. ■ **"Advanced setup" submenu** Contains further submenus and parameters: – to adapt the device to special measuring conditions. – to process the measured value (scaling, linearization). – to configure the signal output.
	Error handling	"Diagnostics"	Contains all parameters needed to detect and analyze operational errors. ■ **Diagnostics list** Contains up to 5 currently active error messages. ■ **Event logbook** Contains the 10 last messages (which are no longer active). ■ **"Device info" submenu** Contains information needed to identify the device. ■ **"Measured values" submenu** Contains all current measured values. ■ **"Simulation" submenu** Used to simulate measured values or output values.
Expert	Tasks which require detailed knowledge about the instrument: ■ Commissioning of measurements under demanding conditions. ■ Optimization of the measurement under demanding conditions. ■ Detailed configuration of the communication interface. ■ Error diagnosis in diffcult cases.	"Expert"	Contains all parameters of the device (including those which are already contained in one of the above submenus). This menu is organized according to the function blocks of the device: ■ **"System" submenu** Contains all general device parameters which do not affect the measurement or the communication interface. ■ **"Sensor" submenu** Contains all parameters needed to configure the measurement. ■ **"Output" submenu** Contains all parameters needed to configure the switch output (PFS) ■ **"Communication" submenu** Contains all parameters needed to configure the digital communication interface. ■ **"Diagnostics" submenu** Contains all parameters needed to detect and analyze operational errors.

8.2.3 Locking the menu

Locking the menu via the locking switch (hardware locking)

The complete operating menu can be locked by the locking switch below the display and operating module. In the locked state most parameter values can be read but not changed.



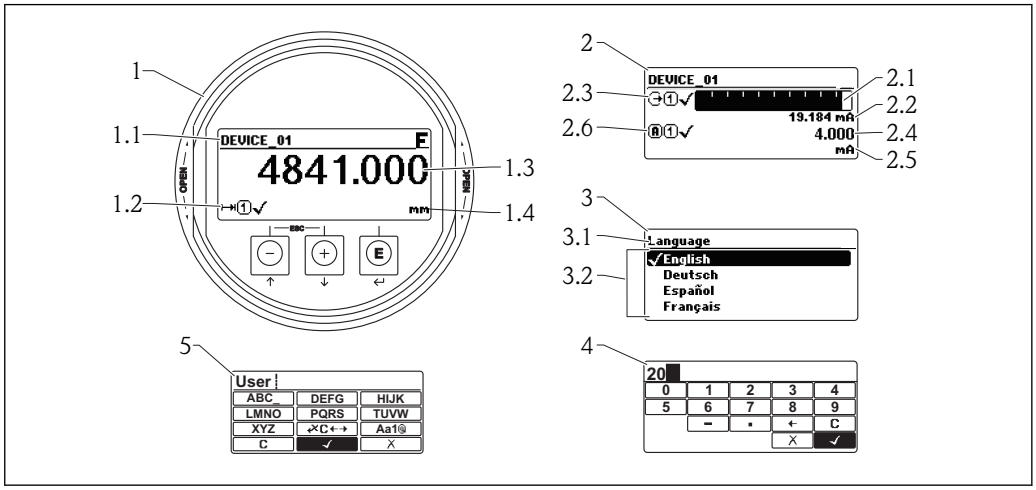
1. Unscrew the lid from the compartment for the display and operating module.
2. Slightly turn the display and operating module to remove it from the compartment.
3. Set the locking switch (WP: Write Protection) into the desired position. (A): unlocked; (B): locked.
4. Attach the display and operating module in the desired orientation until it closes with a snap.
5. Screw the lid onto the compartment.

Locking the menu via parameter settings (software locking)

Step	Parameter	Action	Description
1	Setup → Advanced setup → **Define access code**	**To lock the device:** Enter a user-defined access code.	(→ 154)
2	Setup → Advanced setup → **Enter access code**	**To unlock the device:** Enter the previously defined access code.	(→ 153)
3	Setup → Advanced setup → **Enter access code**	**To lock the device again:** Enter a number other than the previously defined access code.	(→ 153)

8.3 Display and operating module

8.3.1 Display appearance



22 *Appearance of the display and operation module for on-site operation*

1 Measured value display (1 value max. size)
1.1 Header containing tag and error symbol (if an error is active)
1.2 Measured value symbols
1.3 Measured value
1.4 Unit
2 Measured value display (1 bargraph + 1 value)
2.1 Bargraph for measured value 1
2.2 Measured value 1 (including unit)
2.3 Measured value symbols for measured value 1
2.4 Measured value 2
2.5 Unit for measured value 2
2.6 Measured value symbols for measured value 2
3 Representation of a parameter (here: a parameter with selection list)
3.1 Header containing parameter name and error symbol (if an error is active)
3.2 Selection list; ✓ marks the current parameter value.
4 Input matrix for numbers
5 Input matrix for alphanumeric and special characters

Display symbols for the submenus

Symbol	Meaning
 A0011975	**Display/operation** Is displayed: ■ in the main menu next to the selection "Display/operation" ■ in the header, if you are in the "Display/operation" menu
 A0011974	**Setup** Is displayed: ■ in the main menu next to the selection "Setup" ■ in the header, if you are in the "Setup" menu
 A0011976	**Expert** Is displayed: ■ in the main menu next to the selection "Expert" ■ in the header, if you are in the "Expert" menu
 A0011977	**Diagnostics** Is displayed: ■ in the main menu next to the selection "Diagnostics" ■ in the header, if you are in the "Diagnostics" menu

Status signals

F A0013956	**"Failure"** A device error is present. The measured value is no longer valid.
C A0013959	**"Function check"** The device is in service mode (e.g. during a simulation).
S A0013958	**"Out of specification"** The device is operated: ■ Outside of its technical specifications (e.g. during startup or a cleaning) ■ Outside of the configuration carried out by the user (e.g. level outside configured span)
M A0013957	**"Maintenance required"** Maintenance is required. The measured value is still valid.

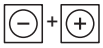
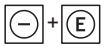
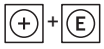
Display symbols for the locking state

Symbol	Meaning
 A0011978	**Display parameter** Marks display-only parameters which can not be edited.
 A0011979	**Device locked** ■ In front of a parameter name: The device is locked via software and/or hardware. ■ In the header of the measured value screen: The device is locked via hardware.

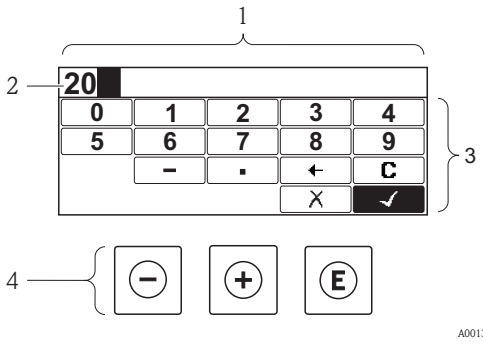
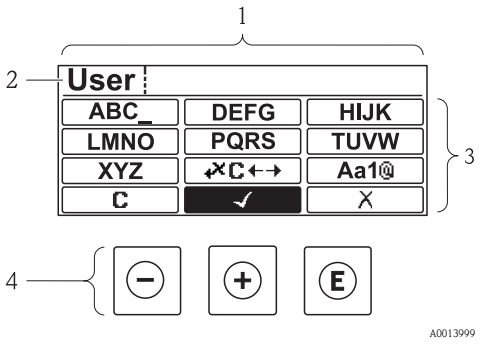
Measured value symbols

Symbol	Meaning
Measured values	
 A0011995	**Level**
 A0011996	**Distance**
 A0011998	**Current output**
 A0011999	**Measured current**
 A0012106	**Terminal voltage**
 A0012104	**Temperature of the electronics or the sensor**
Measuring channels	
 A0012000	**Measuring channel 1**
 A0012107	**Measuring channel 2**
Status of the measured value	
 A0012102	**Status "Alarm"** The measurment is interrupted. The output assumes the defined alarm value. A diagnostic message is generated.
 A0012103	**Status "Warning"** The device continues measuring. A diagnostic message is generated.

8.3.2 Operating elements

Key	Meaning
 A0013969	**Minus key** *For menu, submenu* Moves the selection bar upwards in a picklist. *For text and numeric editor* In the input mask, moves the selection bar to the left (backwards).
 A0013970	**Plus key** *For menu, submenu* Moves the selection bar downwards in a picklist. *For text and numeric editor* In the input mask, moves the selection bar to the right (forwards).
 A0013952	**Enter key** *For measured value display* ■ Pressing the key briefly opens the operating menu. ■ Pressing the key for 2 s opens the context menu. *For menu, submenu* ■ Pressing the key briefly Opens the selected menu, submenu or parameter. ■ Pressing the key for 2 s for parameter: If present, opens the help text for the function of the parameter. *For text and numeric editor* ■ Pressing the key briefly – Opens the selected group. – Carries out the selected action. ■ Pressing the key for 2 s confirms the edited parameter value.
 A0013971	**Escape key combination (press keys simultaneously)** *For menu, submenu* ■ Pressing the key briefly – Exits the current menu level and takes you to the next higher level. – If help text is open, closes the help text of the parameter. ■ Pressing the key for 2 s returns you to the measured value display ("home position"). *For text and numeric editor* Closes the text or numeric editor without applying changes.
 A0013953	**Minus/Enter key combination (press and hold down the keys simultaneously)** Reduces the contrast (brighter setting).
 A0013954	**Plus/Enter key combination (press and hold down the keys simultaneously)** Increases the contrast (darker setting).
 A0013955	**Minus/Plus/Enter key combination (press and hold down the keys simultaneously)** *For measured value display* Enables or disables the keypad lock.

8.3.3 Entering numbers and text

Numeric editor	Text editor
	

1 Editing view
2 Display area of the entered values
3 Input mask
4 Operating elements

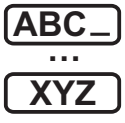
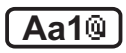
Input mask

The following input symbols are available in the input mask of the numeric and text editor:

Numeric editor symbols

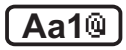
Symbol	Meaning
 A0013998	Selection of numbers from 0 to 9.
 A0016619	Inserts decimal separator at the input position.
 A0016620	Inserts minus sign at the input position.
 A0013985	Confirms selection.
 A0016621	Moves the input position one position to the left.
 A0013986	Exits the input without applying the changes.
 A0014040	Clears all entered characters.

Text editor symbols

Symbol	Meaning
 A0013997	Selection of letters from A to Z
 A0013981	Toggle ■ Between upper-case and lower-case letters ■ For entering numbers ■ For entering special characters

 A0013985	Confirms selection.
 A0013987	Switches to the selection of the correction tools.
 A0013986	Exits the input without applying the changes.
 A0014040	Clears all entered characters.

Operating symbols in the numeric editor		
 A0013985	 A0016621	 A0013986
Confirms selection.	Moves the input position one position to the left.	Exits the input without applying the changes.
 A0016619	 A0016620	 A0014040
Inserts decimal separator at the input position.	Inserts minus sign at the input position.	Clears all entered characters.

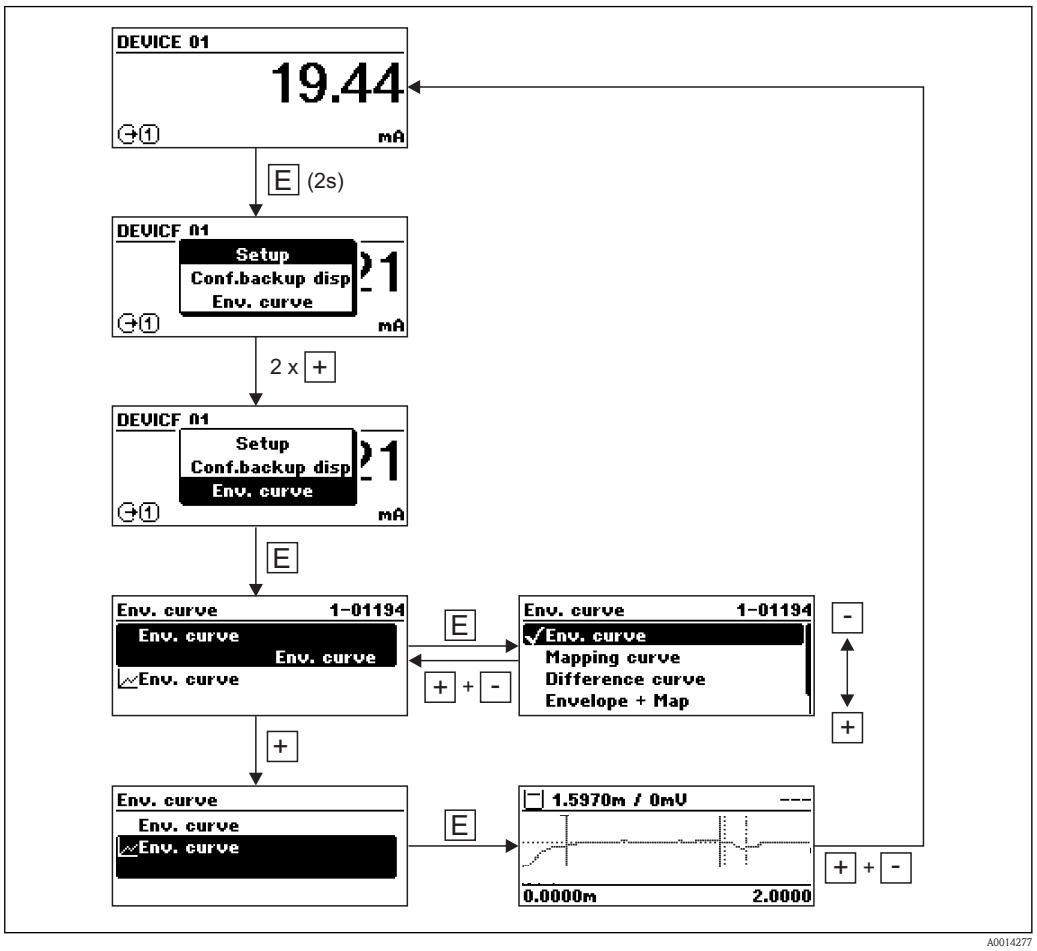
Operating symbols in the text editor		
 A0013985	 A0013987	 A0013986
Confirms selection.	Switches to the selection of the correction tools.	Exits the input without applying the changes.
 A0014040	 A0013981	
Clears all entered characters.	Toggle ■ Between upper-case and lower-case letters ■ For entering numbers ■ For entering special characters	

Correction symbols under	
 A0013989	Clears all entered characters.
 A0013991	Moves the input position one position to the right.
 A0013990	Moves the input position one position to the left.
 A0013988	Deletes one character immediately to the left of the input position.

Correction symbols under			
 A0013989	 A0013990	 A0013991	 A0013988
Clears all entered characters.	Moves the input position one position to the left.	Moves the input position one position to the right.	Deletes one character immediately to the left of the input position.

8.3.4 Envelope curve on the display and operating module

In order to assess the measuring signal, the envelope curve and – if a mapping has been recorded – the mapping curve can be displayed:



9 Integration into a FOUNDATION Fieldbus network

9.1 Device Description (DD)

You require the following to configure a device and integrate it into an FF network:
- An FF configuration program
- The Cff file (Common File Format: *.cff)
- The device description (DD) in one of the following formats
  - Device Description format 4 : *sym, *ffo
  - Device Description format 5 : *sy5, *ff5

Information on the device-specific DD

Manufacturer ID	452B48hex
Device Type	100Fhex
Device Revision	05hex
DD Revision	Information and files at: ■ www.endress.com ■ www.fieldbus.org
CFF Revision	

9.2 Integration into the FOUNDATION Fieldbus network

- For more in-depth information on integrating the device into the FF system, see the description for the configuration software used.
- When integrating the field devices into the FF system, make sure you are using the right files. You can read out the required version by means of the Device Revision/DEV_REV and DD Revision/ DD_REV parameters in the Resource Block.

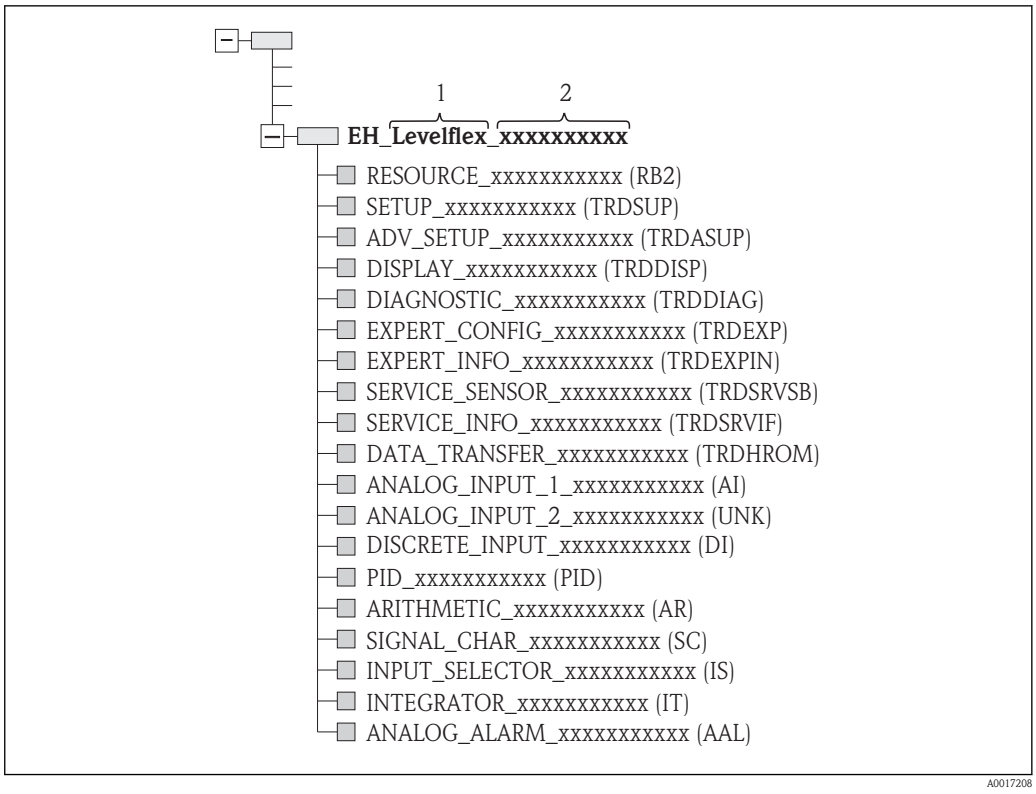
The device is integrated into the FF network as follows:

1. Start the FF configuration program.
2. Download the Cff and device description files (*.ffo, *.sym (for format 4) *ff5, *sy5 (for format 5) to the system.
3. Configure the interface.
4. Configure the device for the measuring task and for the FF system.

9.3 Device identification and addressing

FOUNDATION Fieldbus identifies the device using its ID code (Device ID) and automatically assigns it a suitable field address. The identity code cannot be changed. The device appears in the network display once you have started the FF configuration program and integrated the device into the network. The blocks available are displayed under the device name.

If the device description has not yet been loaded, the blocks report "Unknown" or "(UNK)".



23 Typical display in a configuration program after the connection has been established

1 Device name
2 Serial number

9.4 Block model

9.4.1 Blocks of the device software

The device has the following blocks:
- Resource Block (device block)
- Transducer Blocks
  - Setup Transducer Block (TRDSUP)
  - Advanced Setup Transducer Block (TRDASUP)
  - Display Transducer Block (TRDDISP)
  - Diagnostic Transducer Block (TRDDIAG)
  - Expert Configuration Transducer Block (TRDEXP)
  - Expert Information Transducer Block (TRDEXPIN)
  - Service Sensor Transducer Block (TRDSRVSB)
  - Service Information Transducer Block (TRDSRVIF)
  - Data Transfer Transducer Block (TRDHROM)
- Function Blocks
  - 2 Analog Input Blocks (AI)
  - 1 Discrete Input Block (DI)
  - 1 PID Block (PID)
  - 1 Arithmetic Block (AR)
  - 1 Signal Characterizer Block (SC)
  - 1 Input Selector Block (IS)
  - 1 Integrator Block (IT)
  - 1 Analog Alarm Block (AAL)

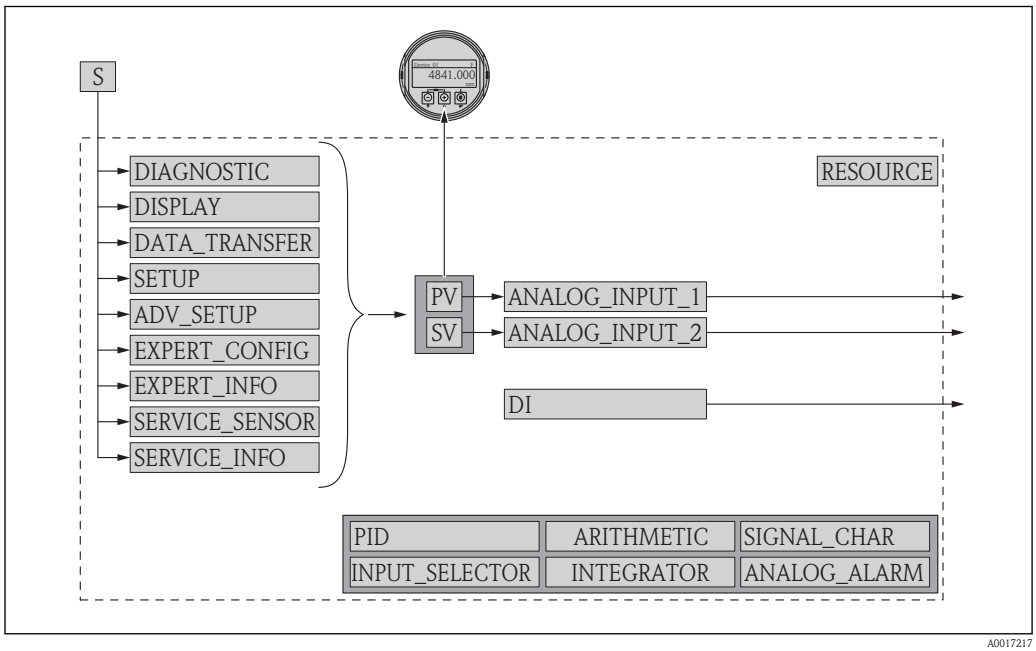
In addition to the pre-instantiated blocks already mentioned, the following blocks can also be instantiated:
- 5 Analog Input Blocks (AI)
- 2 Discrete Input Blocks (DI)
- 3 PID Blocks (PID)
- 3 Arithemetic Blocks (AR)
- 2 Signal Characterizer Blocks (SC)
- 5 Input Selector Blocks (IS)
- 3 Integrator Blocks (IT)
- 2 Analog Alarm Blocks (AAL)

Up to 20 blocks can be instantiated in the device altogether, including the blocks already instantiated. For instantiating blocks, see the appropriate Operating Instructions of the configuration program used.

Endress+Hauser Guideline BA00062S.

The guideline provides an overview of the standard function blocks that are described in FOUNDATION Fieldbus Specifications FF 890 – 894. It is designed to help operators use the blocks implemented in the Endress+Hauser field devices.

9.4.2 Block configuration when device is delivered



24 Block configuration when device is delivered

S Sensor
PV Primary value: Level linearized
SV Secondary value: Distance

9.5 Assignment of the measured values (CHANNEL) in an AI Block

The input value of an Analog Input Block is defined by the **CHANNEL** parameter.

Channel	Measured value
0	Uninitialized
89	Measured capacitance
144	EOP shift

Channel	Measured value
145	Interface distance
172	Calculated DC value
211	Terminal voltage
212	Sensor debug
32785	Absolute EOP amplitude
32786	Absolute echo amplitude
32787	Absolute interface amplitude
32856	Distance
32885	Elektronic temperature
32938	Interface linearized
32949	Level linearized
33044	Relative echo amplitude
33045	Relative interface amplitude
33070	Noise of signal
33107	Upper interface thickness

9.6 Index tables of Endress+Hauser parameters

The following tables list the manufacturer-specific device parameters for the Resource Blocks. For the FOUNDATION Fieldbus parameters, see the document BA062S "Guidline - FOUNDATION Fieldbus Function Blocks", which can be downloaded from www.endress.com.

9.6.1 Setup Transducer Block

Name	Label	Index	Data type	Size (Bytes)	Storage Class	Write access	MODE_BLK	Description
bin_type	Bin type	54	ENUM16	2	Static	x	OOS	
confirm_distance	Confirm distance	82	ENUM16	2	Static	x	OOS	(→ 152)
filtered_dist_val	Distance	76	FLOAT	4	Dynamic			(→ 149)
interface_distance	Interface distance	79	FLOAT	4	Dynamic			(→ 150)
map_end_x	Present mapping	84	FLOAT	4	Dynamic			(→ 153)
mapping_end_point	Mapping end point	83	FLOAT	4	Static	x	AUTO	(→ 152)
record_map	Record map	86	ENUM16	2	Static	x	OOS	(→ 153)
operating_mode	Operating mode	50	ENUM16	2	Static	x	OOS	(→ 144)
signal_quality	Signal quality	81	ENUM16	2	Dynamic			(→ 150)
medium_group	Medium group	55	ENUM16	2	Static	x	OOS	(→ 147)
tank_level	Tank level	66	ENUM16	2	Static	x	OOS	(→ 145)
tank_type	Tank type	52	ENUM16	2	Static	x	OOS	(→ 145)
tube_diameter	Tube diameter	53	FLOAT	4	Static	x	OOS	(→ 145)
dc_value	DC value	68	ENUM16	2	Static	x	OOS	(→ 147)
distance_to_upper_connection	Distance to upper connection	67	FLOAT	4	Static	x	OOS	(→ 146)
empty_calibration	Empty calibration	56	FLOAT	4	Static	x	OOS	(→ 147)
full_calibration	Full calibration	57	FLOAT	4	Static	x	OOS	(→ 148)

Name	Label	Index	Data type	Size (Bytes)	Storage Class	Write access	MODE_BLK	Description
distance_unit	Distance unit	51	ENUM16	2	Static	x	OOS	(→ 144)
interface	Interface	70	FLOAT	4	Dynamic			(→ 149)
level_unit	Level unit	58	ENUM16	2	Static	x	OOS	(→ 158)
output_unit_after_linearization	Unit after linearization	62	ENUM16	2	Static			(→ 165)
level_linearized	Level linearized	64	FLOAT	4	Dynamic			(→ 168)
present_probe_length	Present probe length	87	FLOAT	4	Dynamic	x	AUTO	(→ 173)
level	Level	60	FLOAT	4	Dynamic			(→ 148)
interface_linearized	Interface linearized	73	FLOAT	4	Dynamic			(→ 149)
decimal_places_menu_ro	Decimal places menu	93	ENUM16	2	Static	x	AUTO	(→ 185)
locking_status	Locking status	96	BIT_ENUM16	2	Dynamic			(→ 153)
medium_type_ro	Medium type	92	ENUM16	2	Static	x	OOS	(→ 156)

9.6.2 Advanced Setup Transducer Block

Name	Label	Index	Data type	Size (Bytes)	Storage Class	Write access	MODE_BLK	Description
calculated_dc_value	Calculated DC value	61	FLOAT	4	Dynamic			(→ 163)
blocking_distance	Blocking distance	55	FLOAT	4	Static	x	OOS	(→ 158)
interface_property	Interface property	57	ENUM16	2	Static	x	OOS	
dc_value_lower_medium	DC value lower medium	58	FLOAT	4	Static	x	OOS	(→ 160)
medium_type	Medium type	50	ENUM16	2	Static	x	OOS	(→ 156)
present_probe_length_ro	Present probe length	80	FLOAT	4	Dynamic	x	AUTO	(→ 173)
confirm_probe_length	Confirm probe length	79	ENUM16	2	Static	x	OOS	(→ 172)
process_property	Process property	52	ENUM16	2	Static	x	OOS	(→ 156)
advanced_process_conditions	Advanced process conditions	53	ENUM16	2	Static	x	OOS	(→ 157)
meas_upper_iface_thickness	Measured upper interface thickness	60	FLOAT	4	Dynamic			(→ 195)
manual_interface_thickness	Manual interface thickness	59	FLOAT	4	Static	x	OOS	(→ 163)
medium_property	Medium property	51	ENUM16	2	Static	x	OOS	(→ 156)
use_calculated_dc_value	Use calculated DC value	62	ENUM16	2	Static	x	OOS	(→ 164)
linearization_type	Linearization type	71	ENUM16	2	Static	x	OOS	(→ 165)
activate_table	Activate table	70	ENUM16	2	Static	x	OOS	(→ 169)
table_mode	Table mode	69	ENUM16	2	Static	x	OOS	(→ 167)
custom_table_sel_level	Level	73	FLOAT	4	Static	x	OOS	(→ 168)
custom_table_sel_value	Customer value	74	FLOAT	4	Static	x	OOS	(→ 169)
unit_after_linearization	Unit after linearization	63	ENUM16	2	Static	x	OOS	(→ 165)
free_text	Free text	64	STRING		Static	x	AUTO	(→ 166)
diameter	Diameter	66	FLOAT	4	Static	x	OOS	(→ 167)
output_echo_lost	Output echo lost	76	ENUM16	2	Static	x	OOS	(→ 170)
intermediate_height	Intermediate height	67	FLOAT	4	Static	x	AUTO	(→ 167)

Name	Label	Index	Data type	Size (Bytes)	Storage Class	Write access	MODE_BLK	Description
level_correction	Level correction	56	FLOAT	4	Static	x	OOS	(→ 159)
level_unit_ro	Level unit	54	ENUM16	2	Static	x	OOS	(→ 158)
assign_limit	Assign limit	82	ENUM16	2	Static	x	AUTO	(→ 174)
maximum_value	Maximum value	65	FLOAT	4	Static	x	OOS	(→ 166)
assign_diag_behavior	Assign diagnostic behavior	83	ENUM16	2	Static	x	AUTO	(→ 174)
value_echo_lost	Value echo lost	77	FLOAT	4	Static	x	OOS	(→ 170)
ramp_at_echo_lost	Ramp at echo lost	78	FLOAT	4	Static	x	OOS	(→ 170)
switch_output_failure_mode	Switch output failure mode	88	ENUM16	2	Static	x	AUTO	(→ 177)
switch_output_function	Switch output function	81	ENUM16	2	Static	x	AUTO	(→ 173)
switch_status	Switch status	89	ENUM16	2	Dynamic			(→ 177)
switch_off_delay	Switch-off delay	87	FLOAT	4	Static	x	AUTO	(→ 177)
switch_off_value	Switch-off value	86	FLOAT	4	Static	x	AUTO	(→ 175)
switch_on_delay	Switch-on delay	85	FLOAT	4	Static	x	AUTO	(→ 176)
switch_on_value	Switch-on value	84	FLOAT	4	Static	x	AUTO	(→ 175)
operating_mode_ro	Operating mode	95	ENUM16	2	Static	x	OOS	(→ 144)
table_number	Table number	68	UINT8	1	Static	x	OOS	(→ 168)
level_semiautomatic	Level	75	FLOAT	4	Dynamic			(→ 168)
assign_status	Assign status	91	ENUM16	2	Static	x	AUTO	(→ 173)
locking_status	Locking status	99	BIT_ENUM 16	2	Dynamic			(→ 153)
decimal_places_menu	Decimal places menu	93	ENUM16	2	Static	x	AUTO	(→ 185)
distance_unit_ro	Distance unit	92	ENUM16	2	Static	x	OOS	(→ 144)

9.6.3 Display Transducer Block

Name	Label	Index	Data type	Size (Bytes)	Storage Class	Write access	MODE_BLK	Description
access_status_display	Access status display	51	ENUM16	2	Static			(→ 141)
display_damping	Display damping	65	FLOAT	4	Static	x	AUTO	(→ 183)
display_interval	Display interval	64	FLOAT	4	Static	x	AUTO	(→ 183)
header	Header	66	ENUM16	2	Static	x	AUTO	(→ 183)
format_display	Format display	55	ENUM16	2	Static	x	AUTO	(→ 179)
number_format	Number format	69	ENUM16	2	Static	x	AUTO	(→ 184)
display_separator	Separator	68	ENUM16	2	Static	x	AUTO	(→ 184)
language	Language	54	ENUM16	2	Static	x	AUTO	(→ 140)
contrast_display	Contrast display	71	FLOAT	4	Static	x	AUTO	(→ 143)
header_text	Header text	67	STRING		Static	x	AUTO	(→ 184)
access_code_for_display	Enter access code	52	UINT16	2	Static	x	AUTO	(→ 153)
configuration_management	Configuration management	75	ENUM16	2	Static	x	AUTO	(→ 186)
decimal_places_1	Decimal places 1	57	ENUM16	2	Static	x	AUTO	(→ 179)
decimal_places_2	Decimal places 2	59	ENUM16	2	Static	x	AUTO	(→ 180)

Name	Label	Index	Data type	Size (Bytes)	Storage Class	Write access	MODE_BLK	Description
decimal_places_3	Decimal places 3	61	ENUM16	2	Static	x	AUTO	(→ 181)
decimal_places_4	Decimal places 4	63	ENUM16	2	Static	x	AUTO	(→ 182)
last_backup	Last backup	74	STRING		Static	x	AUTO	(→ 186)
value_1_display	Value 1 display	56	ENUM16	2	Static	x	AUTO	(→ 179)
value_2_display	Value 2 display	58	ENUM16	2	Static	x	AUTO	(→ 180)
value_3_display	Value 3 display	60	ENUM16	2	Static	x	AUTO	(→ 181)
value_4_display	Value 4 display	62	ENUM16	2	Static	x	AUTO	(→ 182)
locking_status_display	Locking status	50	ENUM16	2	Static			(→ 141)
define_access_code	Define access code	53	UINT16	2	Static	x	AUTO	(→ 154)
comparison_result	Comparison result	76	ENUM16	2	Static	x	AUTO	(→ 187)
decimal_places_menu	Decimal places menu	70	ENUM16	2	Static	x	AUTO	(→ 185)
operating_time	Operating time	73	STRING		Dynamic			(→ 186)
operating_mode_ro	Operating mode	83	ENUM16	2	Static	x	OOS	(→ 144)
locking_status	Locking status	85	BIT_ENUM16	2	Dynamic			(→ 141)

9.6.4 Diagnostic Transducer Block

Name	Label	Index	Data type	Size (Bytes)	Storage Class	Write access	MODE_BLK	Description
operating_time	Operating time	55	STRING		Dynamic			(→ 189)
diagnostics_1	Diagnostics 1	56	UINT32	4	Static			(→ 190)
diagnostics_2	Diagnostics 2	58	UINT32	4	Static			(→ 190)
diagnostics_3	Diagnostics 3	60	UINT32	4	Static			(→ 190)
diagnostics_4	Diagnostics 4	62	UINT32	4	Static			(→ 190)
diagnostics_5	Diagnostics 5	64	UINT32	4	Static			(→ 190)
operating_time_from_restart	Operating time from restart	54	STRING		Dynamic			(→ 188)
launch_signal	Launch signal	81	ENUM16	2	Dynamic			(→ 204)
start_device_check	Start device check	77	ENUM16	2	Static	x	AUTO	(→ 203)
interface_signal	Interface signal	82	ENUM16	2	Dynamic			(→ 204)
level_signal	Level signal	80	ENUM16	2	Dynamic			(→ 203)
simulation_device_alarm	Simulation device alarm	75	ENUM16	2	Static	x	OOS	(→ 202)
filter_options	Filter options	66	ENUM8	1	Static	x	AUTO	(→ 191)
previous_diagnostics	Previous diagnostics	52	UINT32	4	Static			(→ 188)
actual_diagnostics	Actual diagnostics	50	UINT32	4	Static			(→ 188)
assign_sim_meas	Assign measurement variable	71	ENUM16	2	Static	x	OOS	(→ 201)
sim_value_process_variable	Value process variable	72	FLOAT	4	Static	x	OOS	(→ 201)
switch_output_simulation	Switch output simulation	73	ENUM16	2	Static	x	OOS	(→ 201)
sim_switch_status	Switch status	74	ENUM16	2	Static	x	OOS	(→ 202)
result_device_check	Result device check	78	ENUM16	2	Dynamic			(→ 203)
last_check_time	Last check time	79	STRING		Dynamic			(→ 203)

Name	Label	Index	Data type	Size (Bytes)	Storage Class	Write access	MODE_BLK	Description
linearization_type	Linearization type	84	ENUM16	2	Static	x	OOS	(→ 165)
unit_after_linearization_ro	Free text	85	STRING		Static	x	AUTO	(→ 166)
decimal_places_menu	Decimal places menu	88	ENUM16	2	Static	x	AUTO	(→ 185)
level_unit_ro	Level unit	90	ENUM16	2	Static	x	OOS	(→ 158)
operating_mode_ro	Operating mode	91	ENUM16	2	Static	x	OOS	(→ 144)
assign_channel_1	Assign channel 1	92	ENUM16	2	Static	x	AUTO	(→ 198)
assign_channel_2	Assign channel 2	93	ENUM16	2	Static	x	AUTO	(→ 198)
assign_channel_3	Assign channel 3	94	ENUM16	2	Static	x	AUTO	(→ 198)
assign_channel_4	Assign channel 4	95	ENUM16	2	Static	x	AUTO	(→ 198)
clear_logging_data	Clear logging data	97	ENUM16	2	Static	x	AUTO	(→ 199)
logging_interval	Logging interval	96	FLOAT	4	Static	x	AUTO	(→ 198)
display_filter_options	Filter options	99	ENUM8	1	Static	x	AUTO	(→ 191)
locking_status	Locking status	108	BIT_ENUM16	2	Dynamic			(→ 153)
distance_unit_ro	Distance unit	89	ENUM16	2	Static	x	OOS	(→ 144)

9.6.5 Expert Configuration Transducer Block

The parameters of the **Expert Configuration Transducer Block** are described in GP01015F: "Levelflex FMP5x – Description of Device Parameters – FOUNDATION Fieldbus"

Name	Label	Index	Data type	Size (Bytes)	Storage Class	Write access	MODE_BLK
acknowledge_alarm	Acknowledge alarm	81	ENUM16	2	Static	x	AUTO
integration_time	Integration time	67	FLOAT	4	Static	x	OOS
result_self_check	Result self check	77	ENUM16	2	Dynamic		
start_self_check	Start self check	76	ENUM16	2	Static	x	AUTO
broken_probe_detection	Broken probe detection	75	ENUM16	2	Static	x	AUTO
gpc_mode	GPC mode	68	ENUM16	2	Static	x	OOS
reference_echo_threshold	Reference echo threshold	73	FLOAT	4	Static	x	OOS
const_gpc_factor	Const. GPC factor	74	FLOAT	4	Static	x	OOS
build_up_ratio	Build-up ratio	90	FLOAT	4	Dynamic		
build_up_threshold	Build-up thres.	91	FLOAT	4	Static	x	AUTO
delay_time_echo_lost	Delay time echo lost	78	FLOAT	4	Static	x	AUTO
empty_capacity	Empty capacity	92	FLOAT	4	Static	x	AUTO
external_pressure_selector	External pressure selector	69	ENUM16	2	Static	x	OOS
measured_capacity	Measured capacitance	89	FLOAT	4	Dynamic		
gas_phase_compens_factor	Gas phase compensation factor	70	FLOT	4	Static	x	OOS
in_safety_distance	In safety distance	80	ENUM16	2	Static	x	OOS
ratio_amplitude_interface_level	Ratio amplitude interface/level	86	FLOAT	4	Static	x	OOS
interface_criterion	Interface criterion	87	FLOAT	4	Dynamic		
control_measurement	Measurement	106	ENUM16	2	Static	x	AUTO
control_measurement	Control measurement	105	ENUM16	2	Static	x	AUTO
filter_dead_time	Dead time	66	FLOAT	4	Static	x	OOS

Name	Label	Index	Data type	Size (Bytes)	Storage Class	Write access	MODE_BLK
present_reference_distance	Present reference distance	72	FLOAT	4	Dynamic		
history_reset	History reset	83	ENUM16	2	Static	x	OOS
safety_distance	Safety distance	79	FLOAT	4	Static	x	OOS
history_learning_control	History learning	85	ENUM16	2	Static	x	AUTO
history_learning_control	History learning control	84	ENUM16	2	Static	x	AUTO
sensor_module	Sensor module	107	ENUM16	2	Static		
evaluation_mode	Evaluation mode	82	ENUM16	2	Static	x	OOS
thin_interface	Thin interface	88	ENUM16	2	Static	x	OOS
calculated_dc_value	Calculated DC value	59	FLOAT	4	Dynamic	x	AUTO
dc_value_expert	DC value	55	FLOAT	4	Static	x	OOS
distance_offset	Distance offset	60	FLOAT	4	Static	x	OOS
level_limit_mode	Level limit mode	62	ENUM16	2	Static	x	OOS
level_high_limit	High limit	63	FLOAT	4	Static	x	OOS
level_low_limit	Low limit	64	FLOAT	4	Static	x	OOS
output_mode	Output mode	65	ENUM16	2	Static	x	OOS
level_external_input_1	Level external input 1	93	ENUM16	2	Static	x	AUTO
level_external_input_2	Level external input 2	96	ENUM16	2	Static	x	AUTO
function_input_1_level	Function Input 1 Level	94	ENUM16	2	Static	x	AUTO
function_input_2_level	Function Input 2 Level	97	ENUM16	2	Static	x	AUTO
fixed_value_inp_1	Fixed value inp.1	95	FLOAT	4	Static	x	AUTO
fixed_value_inp_2	Fixed value inp.2	98	FLOAT	4	Static	x	AUTO
interface_external_input_1	Interface external input 1	99	ENUM16	2	Static	x	OOS
interface_external_input_2	Interface external input 2	102	ENUM16	2	Static	x	OOS
function_input_1_interface	Function input 1 interface	100	ENUM16	2	Static	x	OOS
function_input_2_interface	Function input 2 interface	103	ENUM16	2	Static	x	OOS
fixed_value_input_1_interface	Fixed value input 1 interface	101	FLOAT	4	Static	x	OOS
fixed_value_input_2_interface	Fixed value input 2 interface	104	FLOAT	4	Static	x	OOS
distance_unit_ro	Distance unit	53	ENUM16	2	Static	x	OOS
level_unit_ro	Level unit	61	ENUM16	2	Static	x	OOS
operating_mode_ro	Operating mode	54	ENUM16	2	Static	x	OOS
enter_access_code	Enter access code	52	UINT16	2	Static	x	AUTO
locking_status	Locking status	50	BIT_ENUM16	2	Dynamic		
access_status_tooling	Access status tooling	51	ENUM16	2	Static		
reference_distance	Reference distance	71	FLOAT	4	Static	x	OOS
sw_option_active_overview	SW option active overview	110	BIT_ENUM32	4	Static		
decimal_places_menu	Decimal places menu	109	ENUM16	2	Static	x	AUTO
fieldbus_type	Fieldbus Type	111	ENUM8	1	Static		
interface_property_ro	Interface property	108	ENUM16	2	Static	x	OOS
medium_type_ro	Medium type	112	ENUM16	2	Static	x	OOS
eop_level_evaluation_ro	EOP level evaluation	113	ENUM16	2	Static	x	OOS
sensor_type_ro	Sensor type	114	ENUM16	2	Static	x	OOS
calculated_dc_status_en	Status	58	ENUM8	1	Dynamic		

9.6.6 Expert Information Transducer Block

The parameters of the **Expert Information Transducer Block** are described in GP01015F: "Levelflex FMP5x – Description of Device Parameters – FOUNDATION Fieldbus"

Name	Label	Index	Data type	Size (Bytes)	Storage Class	Write access	MODE_BLK
abs_echo_amp_val	Absolute echo amplitude	51	FLOAT	4	Dynamic		
abs_eop_amp_val	Absolute EOP amplitude	55	FLOAT	4	Dynamic		
absolute_interface_amplitude	Absolute interface amplitude	58	FLOAT	4	Dynamic		
application_parameter	Application parameter	74	ENUM16	2	Dynamic		
electronic_temp_value	Electronic temperature	66	FLOAT	4	Dynamic		
eop_shift_value	EOP shift	69	FLOAT	4	Dynamic		
found_echoes	Found echoes	71	ENUM16	2	Dynamic		
max_electr_temp	Max. electronics temperature	73	FLOAT	4	Dynamic	x	AUTO
time_max_electr_temp	Time max. electronics temperature	75	STRING		Dynamic		
measurement_frequency	Measurement frequency	76	FLOAT	4	Dynamic		
min_electr_temp	Min. electronics temperature	77	FLOAT	4	Dynamic	x	AUTO
time_min_electr_temp	Time min. electronics temperature	78	STRING		Dynamic		
rel_echo_amp_val	Relative echo amplitude	53	FLOAT	4	Dynamic		
relative_interface_amplitude	Relative interface amplitude	60	FLOAT	4	Dynamic		
reset_min_max_temp	Reset min./max. temp.	79	ENUM16	2	Static	x	AUTO
noise_signal_val	Noise of signal	63	FLOAT	4	Dynamic		
used_calculation	Used calculation	80	ENUM16	2	Dynamic		
tank_trace_state	Tank trace state	81	ENUM16	2	Dynamic		
max_draining_speed	Max. draining speed	82	FLOAT	4	Dynamic	x	AUTO
max_filling_speed	L max. fill speed	83	FLOAT	4	Dynamic	x	AUTO
time_max_level	Time max. level	84	STRING		Dynamic		
max_level_value	Max. level value	85	FLOAT	4	Dynamic	x	AUTO
time_min_level	Time min. level	86	STRING		Dynamic		
min_level_value	Min. level value	87	FLOAT	4	Dynamic	x	AUTO
reset_min_max	Reset min./max.	94	ENUM16	2	Static	x	AUTO
interf_max_drain_speed	I max. drain speed	88	FLOAT	4	Dynamic	x	AUTO
interf_max_fill_speed	I max. fill speed	89	FLOAT	4	Dynamic	x	AUTO
time_max_interface	Time max. interface	90	STRING		Dynamic		
max_interface_value	Max. interface value	91	FLOAT	4	Dynamic	x	AUTO
time_min_interface	Time min. interface	92	STRING		Dynamic		
min_interface_value	Min. interface value	93	FLOAT	4	Dynamic	x	AUTO
application_parameter	Application parameter	95	ENUM16	2	Dynamic		
operating_mode_ro	Operating mode	108	ENUM16	2	Static	x	OOS
temperature_unit	Temperature unit	72	ENUM16	2	Static	x	AUTO
activate_sw_option	Activate SW option	110	UINT32	4	Static	x	AUTO
target_echo_status	Status	56	ENUM8	1	Dynamic		
iface_target_echo_status	Status	61	ENUM8	1	Dynamic		
signal_noise_status	Status	64	ENUM8	1	Dynamic		
sens_temp_status	Status	67	ENUM8	1	Dynamic		

Name	Label	Index	Data type	Size (Bytes)	Storage Class	Write access	MODE_BLK
eop_shift_status	Status	70	ENUM8	1	Dynamic		
terminal_voltage_1	Terminal voltage 1	97	FLOAT	4	Dynamic		
calculated_dc_value	Calculated DC value	100	FLOAT	4	Dynamic	x	AUTO
upper_interface_thickness	Upper interface thickness	103	FLOAT	4	Dynamic		
debug_value	Debug value	106	FLOAT	4	Dynamic	x	AUTO
sw_option_active_overview	SW option active overview	111	BIT_ENUM32	4	Static		
locking_status	Locking status	113	BIT_ENUM16	2	Dynamic		
decimal_places_menu_ro	Decimal places menu	109	ENUM16	2	Static	x	AUTO
linearization_type	Linearization type	104	ENUM16	2	Static	x	OOS
eop_level_evaluation	EOP level evaluation	112	ENUM16	2	Static	x	OOS
access_status_tooling	Access status tooling	114	ENUM16	2	Static		
calculated_dc_status	Status	99	UINT8	1	Dynamic		
status_up_iface_thickness	Customized upper phase thickness status	102	UINT8	1	Dynamic		
debug_status		107	UINT8	1	Dynamic	x	AUTO

9.6.7 Service Sensor Transducer Block

The parameters of the **Service Sensor** Transducer Block can only be operated by authorized Endress+Hauser service personnel.

9.6.8 Service Information Transducer Block

The parameters of the **Service Information** Transducer Block can only be operated by authorized Endress+Hauser service personnel.

9.6.9 Data Transfer Transducer Block

The parameters of the **Data Transfer Transducer Block** are described in GP01015F: "Levelflex FMP5x – Description of Device Parameters – FOUNDATION Fieldbus"

Name	Label	Index	Data type	Size (Bytes)	Storage Class	Write access	MODE_BLK
used_calculation	Used calculation	87	ENUM16	2	Dynamic		
bdt_cfg_rdwr_ctrl		101	UINT16	2	Static	x	AUTO
bdt_transferred_ctrl		102	BYTEARRAY		Static	x	AUTO
bdt_data_trans		103	BYTEARRAY		Static	x	AUTO
bdt_prepare		99	BYTEARRAY		Static	x	AUTO
bdt_status		100	BYTEARRAY		Static		
sw_option_active_overview	SW option active overview	98	BIT_ENUM32	4	Static		
digits_at_0_mVdB		90	FLOAT	4	Dynamic	x	AUTO
digits_per_mVdB		91	FLOAT	4	Dynamic	x	AUTO
actual_diagnostics	Actual diagnostics	97	UINT32	4	Static		
electric_probe_length	Electric probe length	92	FLOAT	4	Dynamic		
empty_calibration_ro	Empty calibration	93	FLOAT	4	Static	x	OOS
full_calibration_ro	Full calibration	94	FLOAT	4	Static	x	OOS
distance_unit_ro	Distance unit	95	ENUM16	2	Static	x	OOS
operating_mode_ro	Operating mode	88	ENUM16	2	Static	x	OOS

Name	Label	Index	Data type	Size (Bytes)	Storage Class	Write access	MODE_BLK
present_probe_length_ro	Present probe length	89	FLOAT	4	Dynamic	x	AUTO
trend_operation_hours		104	UINT32	4	Static		
trend_package_size		105	UINT8	1	Static	x	AUTO
trend_storage_time	Trend storage time	106	UINT32	4	Static		
trend_sup_pack_size		107	UINT8	1	Static		
gpc_mode_ro	GPC mode	109	ENUM16	2	Static	x	OOS
eop_level_evaluation_ro	EOP level evaluation	110	ENUM16	2	Static	x	OOS
temperature_unit_ro	Temperature unit	111	ENUM16	2	Static	x	OOS
max_trend_entries		108	UINT16	2	Static		
line_mapping_point_number	Line mapping point number	126	UINT16	2	Static	x	AUTO
line_mapping_array_x	Line mapping array X	127	FLOAT	4	Static	x	AUTO
line_mapping_array_y	Line mapping array Y	128	FLOAT	4	Static	x	AUTO
mapping_end_point_ro	Mapping end point	125	FLOAT	4	Static	x	AUTO
mapping_start_point	Mapping start point	124	FLOAT	4	Static	x	AUTO
function_block_table		143	UINT32	4	Static		
custom_empty_value		112	FLOAT	4	Static		
custom_full_value		113	FLOAT	4	Static		
customized	Customized	121	UINT8	1	Static		
reset_ordered_configuration	Reset ordered configuration	122	ENUM16	2	Static	x	AUTO
empty_scale		114	FLOAT	4	Static	x	AUTO
eop_map_point_number		116	UINT16	2	Static	x	AUTO
factory_data_valid		123	UINT8	1	Static		
fieldbus_type	Fieldbus Type	144	ENUM8	1	Static		
full_scale		115	FLOAT	4	Static	x	AUTO
init_map_point_number		117	UINT16	2	Static	x	AUTO
max_not_assoc_track		118	UINT16	2	Static	x	AUTO
ref_max_dist	Ref max. dist.	119	FLOAT	4	Static	x	AUTO
ref_min_dist	Ref min. dist.	120	FLOAT	4	Static	x	AUTO
line_mapping_accuracy	Line mapping accuracy	130	FLOAT	4	Static	x	AUTO
mapping_curve_left_margin	Mapping curve left margin	131	FLOAT	4	Static	x	AUTO
device_calib_changed		133	ENUM16	2	Static	x	AUTO
echo_thresh_attenuat_const_ee	Threshold attenuation constant	134	FLOAT	4	Dynamic	x	AUTO
echo_threshold_far_ee		135	FLOAT	4	Static	x	AUTO
echo_thresh_inactive_len		137	FLOAT	4	Static	x	AUTO
echo_threshold_near_ee		136	FLOAT	4	Static	x	AUTO
present_probe_length_ee		138	FLOAT	4	Static	x	AUTO
reset_appl_para_chg_flags		139	ENUM16	2	Static	x	AUTO
reset_dyn_persistent		140	ENUM16	2	Static	x	AUTO
locking_status	Locking status	142	BIT_ENUM16	2	Dynamic		
decimal_places_menu	Decimal places menu	96	ENUM16	2	Static	x	AUTO
access_status_tooling	Access status tooling	141	ENUM16	2	Static		
level_linearized	Level linearized	147	FLOAT	4	Dynamic		

Name	Label	Index	Data type	Size (Bytes)	Storage Class	Write access	MODE_BLK
bdt_transferred_ctrl		197	UINT8	1	Static	x	AUTO
bdt_cfg_rdwr_ctrl		196	UINT16	2	Static	x	AUTO

9.7 Methods

The FOUNDATION Fieldbus Specification includes the use of methods to make device operation easier. A method is a sequence of interactive steps to be carried out in the specified order so as to configure certain device functions.

The following methods are available for the device:

- **Restart**
  This method is located in the Resource Block and directly prompts the setting of the **Device reset** parameter. This resets the device configuration to a defined state.
- **ENP Restart**
  This method is located in the Resource Block and directly prompts the setting of the parameters of the Electronic Name Plate (ENP).
- **Setup**
  This method is located in the SETUP Transducer Block and allows to set the most important parameters in this block for device configuration (measuring units, type of tank or vessel, type of medium, empty and full calibration).
- **Linearization**
  This method is located in the ADV_SETUP Transducer Block and allows to manage the linearization table by which the measured value is converted into volume, mass or flow.
- **Self Check**
  This method is located in the EXPERT_CONFIG Transducer Block and prompts the device self check parameters.

10 Commissioning via operating menu (On-site display, FieldCare)

10.1 Installation and function check

Make sure that all final checks have been completed before you start up your measuring point:

- Checklist "Post-installation check" (→ 57)
- Checklist "Post-connection check" (→ 63)

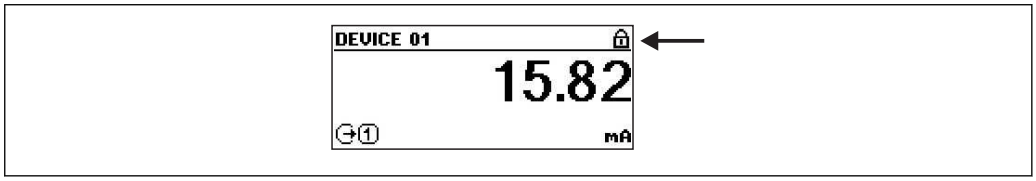
10.2 Adjust the display contrast

- + + E (pressed simultaneously): increases the contrast.
- − + E (pressed simultaneously): decreases the contrast.

10.3 Unlock the device

If the device has been locked, it must be unlocked before the measurement can be configured.

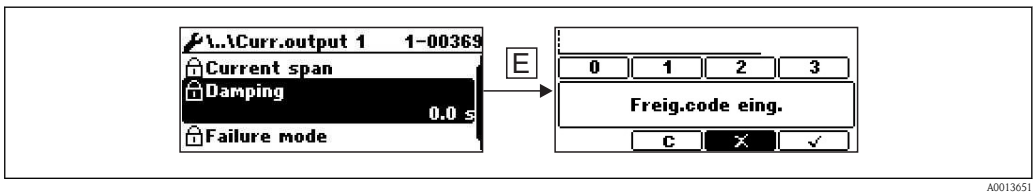
10.3.1 Revoke hardware locking



25 *Mesured value screen of a hardware-locked device*

The padlock in the header of the measured value screen indicates that the device is hardware-locked. In order to unlock the device, shift the locking switch (which is located below the display module and is marked by "WP") into the "off" position (→ 67).

10.3.2 Revoke software locking

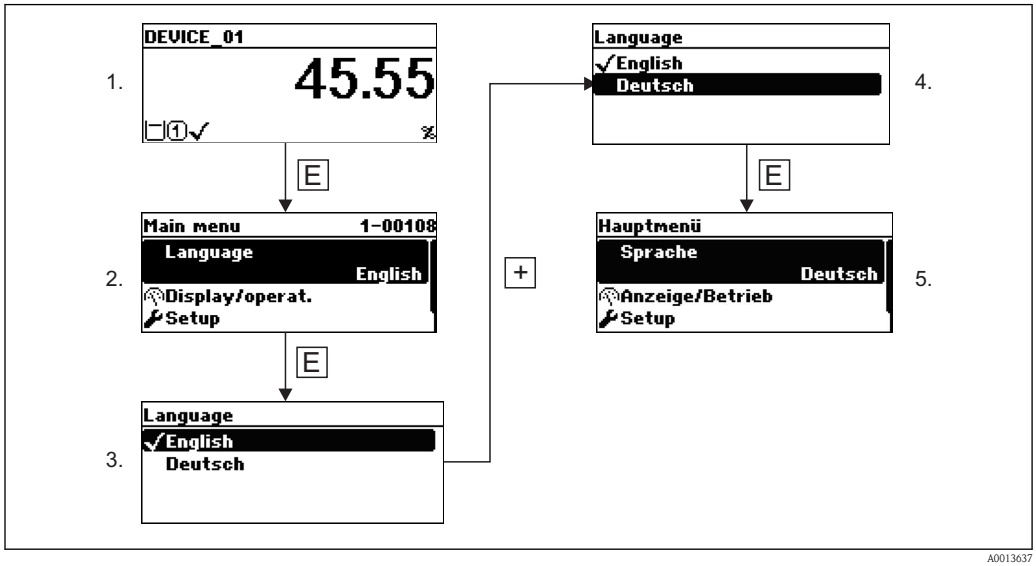


26 *Input prompt for the access code to unlock software-locked parameters.*

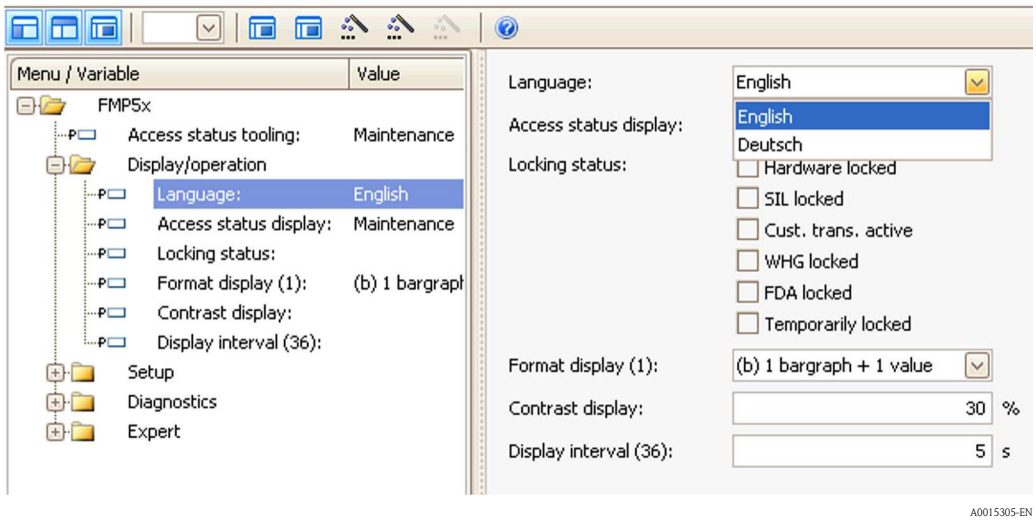
Parameters affected by the software lock are marked by a padlock in front of the parameter name. After pressing E an input prompt appears. Enter the user defined locking code to unlock the device (→ 68).

10.4 Setting the operating language

10.4.1 Setting the operating language via the display module



10.4.2 Setting the language via operating tool (FieldCare)



10.5 Checking the reference distance

This section is only valid for FMP54 with gas phase compensation (product structure: feature 540 "Application Package", option EF or EG).

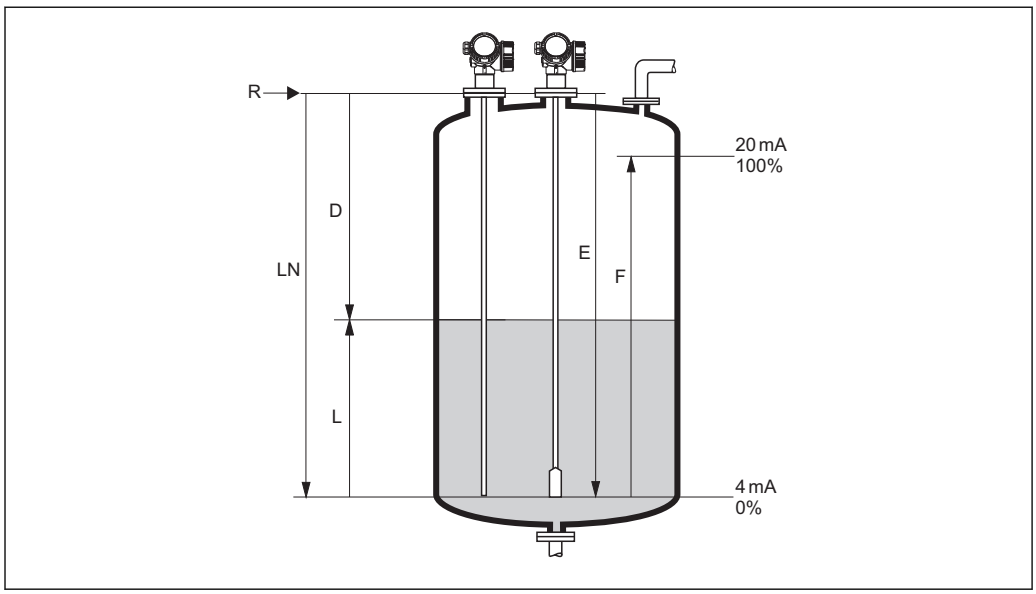
Coax probes with gas phase compensation are calibrated on delivery. Rod probes, on the other hand, must be recalibrated after mounting:

After mounting the rod probe in the stilling well or bypass, check and – if necessary – correct the setting of the reference distance in the unpressurized state. Whilst doing so the level should be at least 200 mm below the reference distance L_{ref} to achieve maximum accuracy.

Step	Parameter	Action
1	Expert → Sensor → Gas phase compensation → GPC mode	Select the "On" option in order to activate gas phase compensation.
2	Expert → Sensor → Gas phase compensation → Present reference distance	Check whether the displayed reference distance matches the nominal value (300 mm or 550 mm, respectively; see the nameplate). If yes: nor further actions required. If no: continue with step 3.
3	Expert → Sensor → Gas phase compensation → Reference distance	Enter the value indicated in "Present reference distance".

For a detailed description of all parameters concerning the gas phase compensation see:

10.6 Configuration of a level measurement



27 *Configuration parameters for level measurements in liquids*

LN = Length of probe
D = Distance
L = Level
R = Reference point of the measurement
E = Empty calibration (= Zero point)
F = Full calibration (= span)

If for rope probes the DC value is less than 7, then measurement is not possible in the area of the straining weight. In these cases, the maximum recommended value for the empty calibration E is *LN* - 250 mm (*LN* - 10 in).

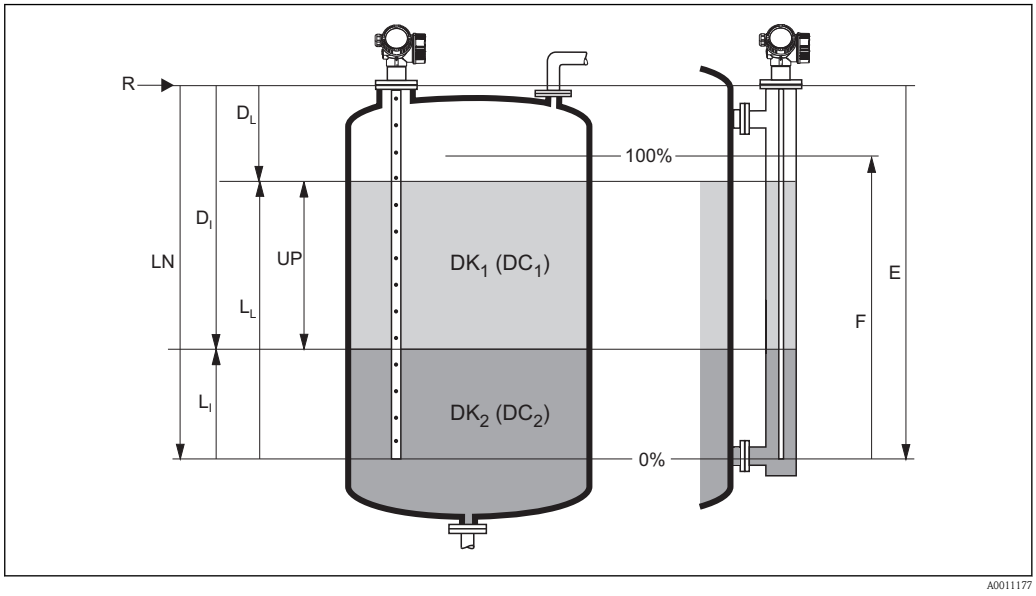
Step	Parameter	Action	Description
1	Setup → Distance unit	Select distance unit.	(→ 144)
2	Setup → Operating mode [1]	Select "Level".	(→ 144)
3	Setup → Tank type	Select tank type.	(→ 145)
4	Setup → Tube diameter [2]	Enter the diameter of the bypass or stilling well.	(→ 145)
5	Setup → Medium group	Select medium group ("water based": DC>4 or "other": DC≥ 1.9) [3].	(→ 145)
6	Setup → Empty calibration	Enter the distance E between the reference point R and the minimum level (0%).	(→ 147)
7	Setup → Full calibration	Enter distance F between the minimum (0%) and maximum (100%) level.	(→ 148)
8	Setup → Level	Displays the measured level L.	(→ 148)
9	Setup → Distance	Displays the distance D between the reference point R and the level L.	(→ 149)

Step	Parameter	Action	Description
10	Setup → Signal quality	Displays the signal quality of the level echo.	(→ 150)
11	Setup → Mapping → Confirm distance [4]	Compare the displayed distance to the real distance in order to start the recording of the mapping curve.	(→ 152)

1) only visible for devices with "interface measurement" application package
2) only visible for coated probes and if "Tank type" = "Bypass/pipe"
3) If required, lower DCs can be entered into "Setup → Advanced Setup → Level → Medium property". However, for DC<1.6 the measuring range may be reduced. For details please contact Endress+Hauser.
4) For FMP54 with gas phase compensation (product structure: feature 540 "Application Package", option EF or EG) a map must NOT be recorded.

10.7 Configuration of an interface measurement

Only devices with the respective software option can be used for interface measurements. This option is selected in the product structure: Feature 540 "Application package", option EB "Interface measurement".



28 *Configuration parameters for interface measurements*

R = Reference pioint of the measurement
E = Empty calibration (= zero point)
F = Full calibration (= span)
LN = Length of probe
UP = Thickness of upper medium
D_I = Distance of interface (Distance from reference point to lower medium)
L_I = Interface level
D_L = Distance from reference point R to total level
L_L = total level

Schritt	Parameter	Aktion	Beschreibung
1	Setup → Distance unit	Select distance unit.	(→ 144)
2	Setup → Operating mode [1]	Select "Interface".	(→ 144)
3	Setup → Tank type	Select tank type.	(→ 145)
4	Setup → Tube diameter [2]	Enter the diameter of the bypass or stilling well.	(→ 145)

Schritt	Parameter	Aktion	Beschreibung
5	Setup → Tank level	Select tank level: ■ Partially filled (typical selection for measurements in tanks) ■ Flooded (typical selection for measurements in bypasses)	(→ 145)
6	Setup → Distance upper connection	■ For measurements in bypasses: Enter the distance from the reference point R to the lower edge of the upper connection. ■ Otherwise: Keep the factory setting.	(→ 146)
7	Setup → DC value	Enter dielectric constant of the upper medium.	(→ 147)
8	Setup → Empty calibration	Enter the distance E between the reference point R and the minimum level (0%).	(→ 147)
9	Setup → Full calibration	Enter distance F between the minimum (0%) and maximum (100%) level.	(→ 148)
10	Setup → Level	Displays the measured level L.	(→ 148)
11	Setup → Interface	Displays the interface height L_I.	(→ 149)
12	Setup → Distance	Displays the distance D between the reference point R and the level L.	(→ 149)
13	Setup → Interface distance	Displays the distance D_I between the reference point R and the interface L_I.	(→ 150)
14	Setup → Signal quality	Displays the signal quality of the level echo.	(→ 150)
15	Setup → Mapping → Confirm distance	Compare the displayed distance to the real distance in order to start the recording of the mapping curve.	(→ 152)

1) only visible for devices with "interface measurement" application package
2) only visible for coated probes and if "Tank type" = "Bypass/pipe"

10.8 Configuration of the on-site display

10.8.1 Factory settings of the on-site display for level measurements

Parameter	Factory setting for devices with 1 current output	Factory setting for devices with 2 current outputs
Format display	1 value, max. size	1 value, max. size
Value 1 display	Levele linearized	Levele linearized
Value 2 display	Distance	Distance
Value 3 display	Current output 1	Current output 1
Value 4 display	None	Current output 21

10.8.2 Factory settings of the on-site display for interface measurements

Parameter	Factory setting for devices with 1 current output	Factory setting for devices with 2 current outputs
Format display	1 value, max. size	1 value, max. size
Value 1 display	Interface	Interface
Value 2 display	Level linearized	Level linearized
Value 3 display	Upper interface thickness	Current output 1
Value 4 display	Current output 1	Current output 2

10.8.3 Adjustment of the on-site display

The on-site display can be adjusted in the following menu:

Setup → Advanced setup → Display (→ 179)

10.9 Configuration management

After commissioning, you can save the current device configuration, copy it to another measuring point or restore the previous device configuration. You can do so using the **Configuration management** parameter and its options.

Navigation path
Setup → Advanced setup → Conf.backup disp → Config. managem.

Functions of the parameter options

Options	Description
Execute backup	A backup copy of the current device configuration in the HistoROM is saved to the display module of the device. The backup copy comprises the transmitter data of the device.
Restore	The last backup copy of the device configuration is copied from the display module to the HistoROM of the device. The backup copy comprises the transmitter data of the device.
Duplicate	The transmitter configuration from another device is duplicated to the device using the display module.
Compare	The device configuration saved in the display module is compared to the current device configuration of the HistoROM.
Clear backup data	The backup copy of the device configuration is deleted from the display module of the device.

HistoROM
A HistoROM is a "non-volatile" device memory in the form of an EEPROM.

While this action is in progress, the configuration cannot be edited via the local display and a message on the processing status appears on the display.

10.10 Protection of the settings against unauthorized changes

There are two ways to protect the settings against unauthorized changes:

- Via locking switch (hardware locking) (→ 67)
- Via parameter settings (software locking) (→ 68)

11 Commissioning with a FOUNDATION Fieldbus configuration program

11.1 Function check

Carry out a post-installation and a post-connection check as per the checklist before commissioning the device:

- "Post-installation check" checklist (→ 57)
- "Post-connection check" checklist (→ 63)

11.2 Block configuration

11.2.1 Preparatory steps

1. Switch on the device.
2. Note the DEVICE_ID (→ 76).
3. Open the configuration program.
4. Load Cff and device description files into the host system or the configuration program. Make sure you are using the right system files.
5. Identify the device using the **DEVICE_ID** (see Point 2). Assign the desired tag name to the device by means of the **Pd-tag/FF_PD_TAG** parameter.

11.2.2 Configuring the Resource Block

1. Open the Resource Block.
2. If necessary, disable the lock for device operation (→ 67).
3. If necessary, change the block name. Factory setting: RS-xxxxxxxxxxx (RB2)
4. If necessary, assign a description to the block by means of the **Tag Description/ TAG_DESC** parameter.
5. If necessary, change other parameters as per the requirements.

11.2.3 Configuring the Transducer Blocks

The measurement and the display module are configured using the Transducer Blocks. The general procedure is the same for all Transducer Blocks:

1. If necessary, change the block name.
2. Set the block mode to OOS by means of the **Block Mode/MODE_BLK** parameter, **TARGET** element.
3. Configure the device in accordance with the measuring task (→ 100) (→ 101).
4. Set the block mode to **Auto** by means of the **Block Mode/MODE_BLK** parameter, **TARGET** element.

The block mode must be set to **Auto** for the measuring device to function correctly.

11.2.4 Configuring the Analog Input Blocks

The device has 2 Analog Input Blocks that can be assigned as required to the various process variables.

Default settings	
Analog Input Block	**CHANNEL**
AI 1	32949: Level linearized
AI 2	32856: Distance

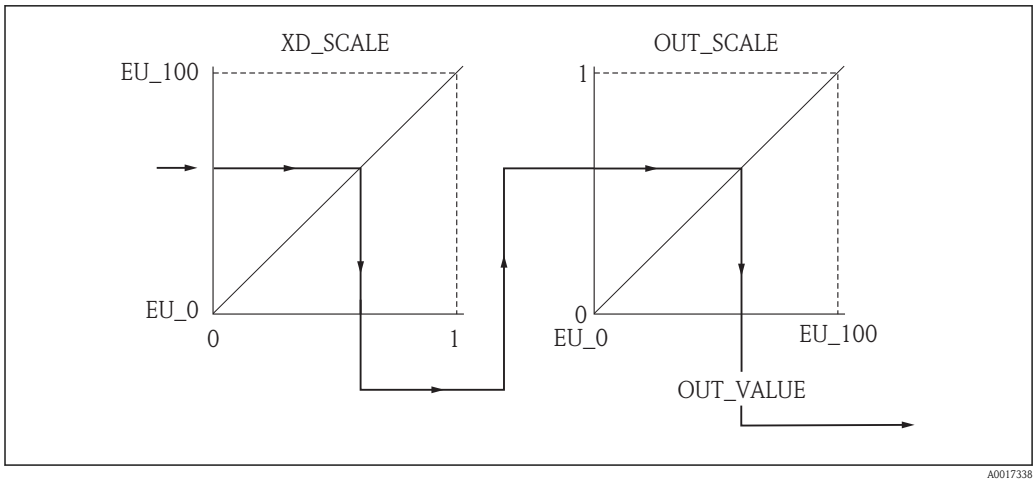
1. If necessary, change the block name.
2. Set the block mode to **OOS** by means of the **Block Mode/MODE_BLK** parameter, **TARGET** element.
3. Use the **Channel/CHANNEL** parameter to select the process variable which should be used as the input value for the Analog Input Block (→ 78).
4. Use the **Transducer Scale/XD_SCALE** parameter to select the desired unit and the block input range for the process variable (→ 97). Make sure that the unit selected suits the process variable selected. If the process variable does not suit the unit, the **Block Error/ BLOCK_ERR** parameter reports **Block Configuration Error** and the block mode cannot be set to **Auto**.
5. Use the **Linearization Type/L_TYPE** parameter to select the type of linearization for the input variable (factory setting: **Direct**). Make sure that the settings for the **Transducer Scale/XD_SCALE** and **Output Scale/ OUT_SCALE** parameters are the same for the **Direct** linearization type. If the values and units do not match, the **Block Error/ BLOCK_ERR** parameter reports **Block Configuration Error** and the block mode cannot be set to **Auto**.
6. Enter the alarm and critical alarm messages by means of the **High High Limit/HI_HI_LIM**, **High Limit/HI_LIM**, **Low Low Limit/LO_LO_LIM** and **Low Limit/LO_LIM** parameters. The limit values entered must be within the value range specified for the **Output Scale/ OUT_SCALE** parameter (→ 97).
7. Specify the alarm priorities by means of the **High High Priority/HI_HI_PRI**, **High Priority/ HI_PRI**, **Low Low Priority/LO_LO_PRI** and **Low Priority/LO_PRI** parameters. Reporting to the field host system only takes place with alarms with a priority greater than 2.
8. Set the block mode to **Auto** using the **Block Mode/MODE_BLK** parameter, **TARGET** element. For this purpose, the Resource Block must also be set to the **Auto** block mode.

11.2.5 Additional configuration

1. Link the function blocks and output blocks.
2. After specifying the active LAS, download all the data and parameters to the field device.

11.3 Scaling of the measured value in an AI Block

If the type of linearisation **L_TYPE** = **indirect** has been selected in an AI block, the measured value can be scaled within the block. The input range is defined by the **XD_SCALE** parameter Through its **EU_0** and **EU_100** elements. This range is mapped linearly to the output ranged defined by the **OUT_SCALE** parameter through its **EU_0** and **EU_100** elements.



29 Scaling of the measured value in an AI Block

- If you have selected the **Direct** mode for the **L_TYPE** parameter, you cannot change the values and units for **XD_SCALE** and **OUT_SCALE**.
- The **L_TYPE**, **XD_SCALE** and **OUT_SCALE** parameters can only be changed in the OOS block mode.

11.4 Language selection

Step	Block	Parameter	Action
1	DISPLAY (TRDDISP)	Language (language)	Select language [1]. **Selection:** ■ 32805: Arabian ■ 32824: Chinese simplified ■ 32842: Czech ■ 32881: Dutch ■ 32888: English ■ 32917: French ■ 32920: German ■ 32945: Italian ■ 32946: Japanese ■ 32948: Korean ■ 33026: Polish ■ 33027: Portuguese ■ 33062: Russian ■ 33083: Spanish ■ 33103: Thai ■ 33120: Vietnamese ■ 33155: Bahasa ■ 33166: Turkish

1) When ordering a device the set of available languages is defined. Refer to the product structure, feature 500 "Additional Operation Language".

11.5 Checking the reference distance

This section is only valid for FMP54 with gas phase compensation (product structure: feature 540 "Application Package", option EF or EG).

Coax probes with gas phase compensation are calibrated on delivery. Rod probes, on the other hand, must be recalibrated after mounting:

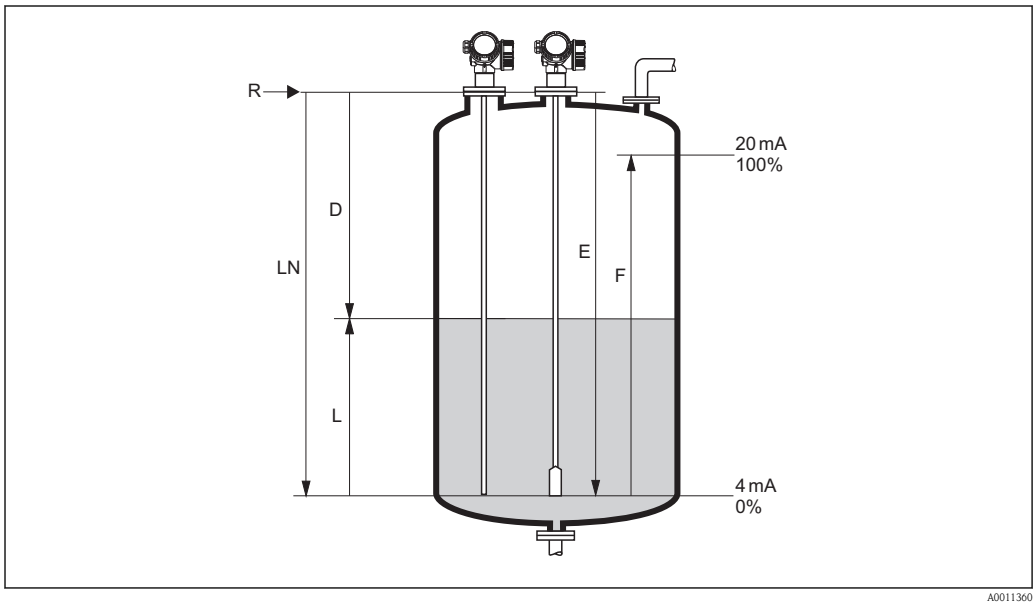
After mounting the rod probe in the stilling well or bypass, check and – if necessary – correct the setting of the reference distance in the unpressurized state. Whilst doing so the level should be at least 200 mm below the reference distance L_{ref} to achieve maximum accuracy.

Step	Block	Parameter	Action
1	EXPERT_CONFIG (TRDEXP)	GPC mode (gpc_mode)	Select the **On (33006)** option in order to activate gas phase compensation.
2	EXPERT_CONFIG (TRDEXP)	Present reference distance (present_reference_distance)	Check whether the displayed reference distance matches the nominal value (300 mm or 550 mm, respectively; see the nameplate). If yes: nor further actions required. If no: continue with step 3.
3	EXPERT_CONFIG (TRDEXP)	Reference distance (reference_distance)	Enter the value indicated in "Present reference distance".

For a detailed description of all parameters concerning the gas phase compensation see: GP010151F, "Levelflex – Description of device parameters – FOUNDATION Fieldbus"

11.6 Configuration of a level measurement

The **Setup** method can also be used to configure the measurement. It is called up via the SETUP (TRDSUP) transducer block.



30 *Configuration parameters for level measurements in liquids*

LN = Length of probe
D = Distance
L = Level
R = Reference point of the measurement
E = Empty calibration (= Zero point)
F = Full calibration (= span)

If for rope probes the DC value is less than 7, then measurement is not possible in the area of the straining weight. In these cases, the maximum recommended value for the empty calibration E is *LN* - 250 mm (*LN* - 10 in).

Step	Block	Parameter	Action	Description
1	SETUP (TRDSUP)	Distance unit (distance_unit)	Select distance unit. **Selection:** ■ 1010: m ■ 1013: mm ■ 1018: in ■ 1019: ft	(→ 144)
2	SETUP (TRDSUP)	Operating mode (operating_mode) [1]	Select **32949: Level**.	(→ 144)
3	SETUP (TRDSUP)	Tank type (tank_type)	Select tank type. **Selection:** ■ 32816: Bypass / pipe ■ 33288: Metallic ■ 33302: Coaxial ■ 33432: Twin rope ■ 33433: Twin rod ■ 33437: Rope centering disc metallic ■ 33438: Rod centering disc metallic ■ 33441: Non metallic ■ 33444: Mounted outside	(→ 145)
4	SETUP (TRDSUP)	Tube diameter (tube_diameter) [2]	Enter the diameter of the bypass or stilling well.	(→ 145)

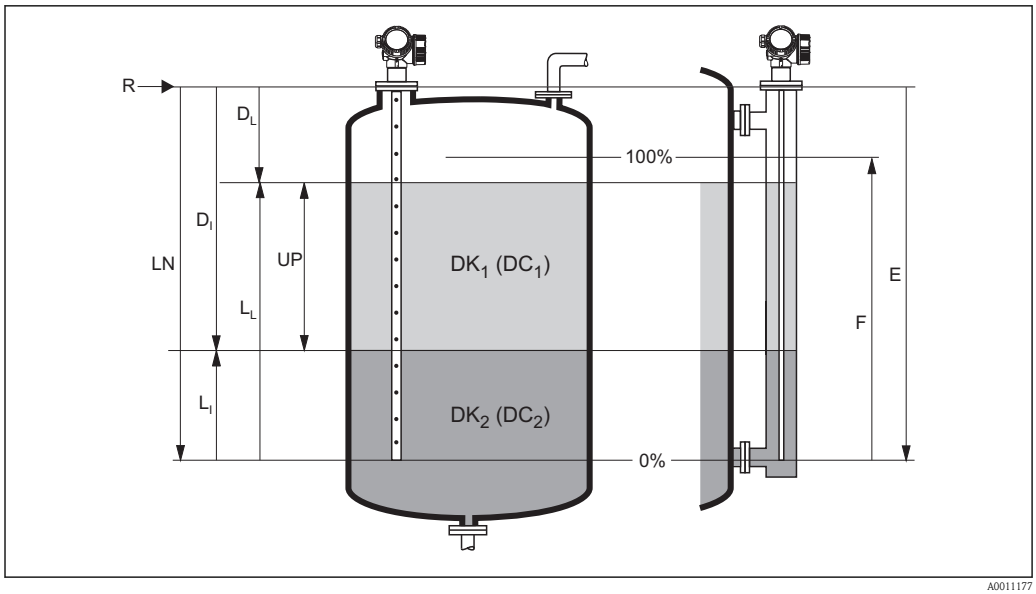
Step	Block	Parameter	Action	Description
5	SETUP (TRDSUP)	Medium group (medium_group)	Select medium group. **Selection:** ■ 316: water based (DC>4) ■ 256: other (DC≥ 1.9) [3]	(→ 145)
6	SETUP (TRDSUP)	Empty calibration (empty_calibration)	Enter the distance E between the reference point R and the minimum level (0%).	(→ 147)
7	SETUP (TRDSUP)	Full calibration (full_calibration)	Enter distance F between the minimum (0%) and maximum (100%) level.	(→ 148)
8	SETUP (TRDSUP)	Level (level)	Displays the measured level L.	(→ 148)
9	SETUP (TRDSUP)	Distance (filtered_dist_val)	Displays the distance D between the reference point R and the level L.	(→ 149)
10	SETUP (TRDSUP)	Signal quality (signal_quality)	Displays the signal quality of the level echo.	(→ 150)
11	SETUP (TRDSUP)	Confirm distance (confirm_distance)	Compare the displayed distance to the real distance in order to start the recording of the mapping curve. **Selection:** ■ 179: Manual map ■ 32847: Delete all ■ 32859: Distance ok ■ 32860: Distance too big ■ 32861: Distance too small ■ 32862: Distance unknown ■ 33100: Tank empty	(→ 152)

1) only available for devices with "interface measurement" application package
2) only available for coated probes and "Tank type" = "Bypass/pipe"
3) If required, lower DCs can ben entered into the "DC value (dc_value)" parameter. However, for DC<1.6 the measuring range may be reduced; for details please contact Endress+Hauser.

11.7 Configuration of an interface measurement

Only devices with the respective software option can be used for interface measurements. This option is selected in the product structure: Feature 540 "Application package", option EB "Interface measurement".

The **Setup** method can also be used to configure the measurement. It is called up via the SETUP (TRDSUP) transducer block.



31 Configuration parameters for interface measurements

R = Reference pioint of the measurement
E = Empty calibration (= zero point)
F = Full calibration (= span)
LN = Length of probe
UP = Thickness of upper medium
D_I = Distance of interface (Distance from reference point to lower medium)
L_I = Interface level
D_L = Distance from reference point R to total level
L_L = total level

Schritt	Block	Parameter	Aktion	Beschreibung
1	SETUP (TRDSUP)	Distance unit (distance_unit)	Select distance unit. **Selection:** ■ 1010: m ■ 1013: mm ■ 1018: in ■ 1019: ft	(→ 144)
2	SETUP (TRDSUP)	Operating mode (operating_mode) [1]	Select **32938: Interface**.	(→ 144)
3	SETUP (TRDSUP)	Tank type (tank_type)	Select tank type. **Selection:** ■ 32816: Bypass / pipe ■ 33288: Metallic ■ 33302: Coaxial ■ 33432: Twin rope ■ 33433: Twin rod ■ 33437: Rope centering disc metallic ■ 33438: Rod centering disc metallic ■ 33441: Non metallic ■ 33444: Mounted outside	(→ 145)
4	SETUP (TRDSUP)	Tube diameter (tube_diameter) [2]	Enter the diameter of the bypass or stilling well.	(→ 145)
5	SETUP (TRDSUP)	Tank level (tank_level)	Select tank level. **Selection:** ■ 32919: Fully flooded (typical for bypass measurements) ■ 33021: Partially filled (typical for measurements directly in tank)	(→ 145)

Schritt	Block	Parameter	Aktion	Beschreibung
6	SETUP (TRDSUP)	Distance to upper connection (distance_to_upper_connection)	■ For measurements in bypasses: Enter the distance from the reference point R to the lower edge of the upper connection. ■ Otherwise: Keep the factory setting.	(→ 🖹 146)
7	SETUP (TRDSUP)	DC value (dc_value)	Enter dielectric constant of the upper medium.	(→ 🖹 147)
8	SETUP (TRDSUP)	Empty calibration (empty_calibration)	Enter the distance E between the reference point R and the minimum level (0%).	(→ 🖹 147)
9	SETUP (TRDSUP)	Full calibration (full_calibration)	Enter distance F between the minimum (0%) and maximum (100%) level.	(→ 🖹 148)
10	SETUP (TRDSUP)	Level (level)	Displays the measured level L.	(→ 🖹 148)
11	SETUP (TRDSUP)	Interface (interface)	Displays the interface height L_I.	(→ 🖹 149)
12	SETUP (TRDSUP)	Distance (filtered_dist_val)	Displays the distance D between the reference point R and the level L.	(→ 🖹 149)
13	SETUP (TRDSUP)	Interface distance (interface_distance)	Displays the distance D_I between the reference point R and the interface L_I.	(→ 🖹 150)
14	SETUP (TRDSUP)	Signal quality (signal_quality)	Displays the signal quality of the level echo.	(→ 🖹 150)
15	SETUP (TRDSUP)	Confirm distance (confirm_distance)	Compare the displayed distance to the real distance in order to start the recording of the mapping curve. **Selection:** ■ 179: Manual map ■ 32847: Delete all ■ 32859: Distance ok ■ 32860: Distance too big ■ 32861: Distance too small ■ 32862: Distance unknown ■ 33100: Tank empty	(→ 🖹 152)

1) only available for devices with "interface measurement" application package
2) only available for coated probes and "Tank type" = "Bypass/pipe"

11.8 Configuration of the on-site display

11.8.1 Factory settings of the on-site display for level measurements

Parameter	Factory setting for devices with 1 current output	Factory setting for devices with 2 current outputs
Format display	1 value, max. size	1 value, max. size
Value 1 display	Levele linearized	Levele linearized
Value 2 display	Distance	Distance
Value 3 display	Current output 1	Current output 1
Value 4 display	None	Current output 21

The on-site display can be adjusted in the **DISPLAY (TRDDISP)** transducer block.

11.8.2 Factory settings of the on-site display for interface measurements

Parameter	Factory setting for devices with 1 current output	Factory setting for devices with 2 current outputs
Format display	1 value, max. size	1 value, max. size
Value 1 display	Interface	Interface
Value 2 display	Level linearized	Level linearized
Value 3 display	Upper interface thickness	Current output 1
Value 4 display	Current output 1	Current output 2

The on-site display can be adjusted in the **DISPLAY (TRDDISP)** transducer block.

11.9 Configuration management

After commissioning, you can save the current device configuration, copy it to another measuring point or restore the previous device configuration. You can do so using the **Configuration management** parameter and its options.

Navigation path in the operating menu
Setup → Advanced setup → Conf.backup disp → Config. managem.

Block operation
Block: **DISPLAY (TRDDISP)**
Parameter: **Configuration management (configuration_management)**

Functions of the parameter options

Options	Description
33097: Execute backup	A backup copy of the current device configuration in the HistoROM is saved to the display module of the device. The backup copy comprises the transmitter data of the device.
33057: Restore	The last backup copy of the device configuration is copied from the display module to the HistoROM of the device. The backup copy comprises the transmitter data of the device.
33838: Duplicate	The transmitter configuration from another device is duplicated to the device using the display module.
265: Compare	The device configuration saved in the display module is compared to the current device configuration of the HistoROM.
32848: Clear backup data	The backup copy of the device configuration is deleted from the display module of the device.

HistoROM
A HistoROM is a "non-volatile" device memory in the form of an EEPROM.

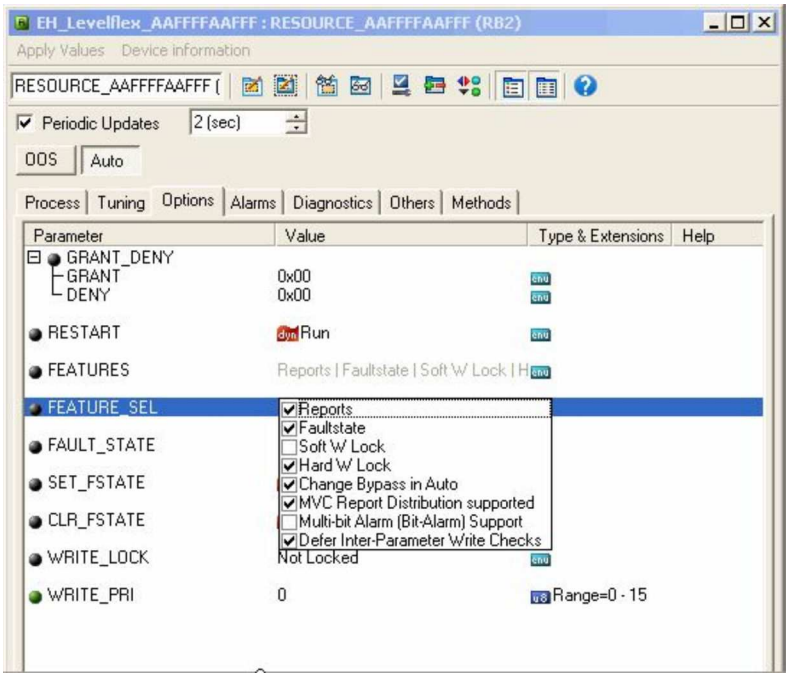
While this action is in progress, the configuration cannot be edited via the local display and a message on the processing status appears on the display.

11.10 Configuration of the event behavior according to the FOUNDATION Fieldbus specification FF912

The device complies with the FOUNDATION Fieldbus specification FF912. This has - among other things - the following consequences:

- The diagnsotic category according to NAMUR recommendation NE107 is transmitted via the fieldbus in a manufacturer-independent form:
  - F: Failure
  - C: Function check
  - S: Out of specification
  - M: Maintenance required
- The diagnostic category of pre-defined groups of events can be adjusted by the user according to the requirements of the specific application.
- Certain events can be separated from their group and can be handled individually:
  - 941: Echo lost
  - 942: In safety distance
- Additional information and remedial measures are transmitted together with the event message via the fieldbus.

The diagnostic messages according to FF912 are available in the host only if the **Multi-bit support** option has been activated in the **FEATURE_SEL** parameter of the Resource block. For reasons of compatibility, this option is **not** activated on delivery:



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11.10.1 Groups of events

The diagnostic messages are classified into 16 groups according to the **source** and **severity** of the respective event. A **default diagnostic category** is allocated to each group. Each group is also represented by one bit of the allocation parameters.

Severity of the event	Default diagnostic category	Source of the event	Bit	Events within the group
Highest severity	Failure (F)	Sensor	31	■ F003: Broken probe detected ■ F046: Build-up detected ■ F083: Memory content ■ F104: HF cable ■ F105: HF cable ■ F106: Sensor
		Electronics	30	■ F242: Software incompatible ■ F252: Modules incompatible ■ F261: Electronic modules ■ F262: Module connecting ■ F270: Main electronic failure ■ F271: Main electronic failure ■ F272: Main electronic failure ■ F273: Main electronic failure ■ F275: I/O-Modul failure ■ F276: I/O module failure ■ F282: Datenspeicher ■ F283: Electronic memory ■ F311: Memory content
		Configuration	29	■ F410: Data transfer ■ F411: Up-/download ■ F435: Linearization ■ F437: Configuration incompatible
		Process	28	■ F803: Current loop 1 ■ F825: Current loop 1 ■ F936: EMC interference ■ F941: Echo lost [1)] ■ F970: Linearization

1) This event can be removed from the group in order to define its behavior individually; see section "Configurable area".

Severity of the event	Default diagnostic category	Source of the event	Bit	Events within the group
High severity	Function check (C)	Sensor	27	not used in Levelflex
		Electronics	26	not used in Levelflex
		Configuration	25	■ C411: Up-/download ■ C431: Trim ■ C484: Simulation failure mode ■ C485: Simulation measured value ■ C491: Simulation current output ■ C585: Simulation distance
		Process	24	not used in Levelflex

Severity of the event	Default diagnostic category	Source of the event	Bit	Events within the group
Low severity	Out of specification (S)	Sensor	23	not used in Levelflex
		Electronics	22	not used in Levelflex

Severity of the event	Default diagnostic category	Source of the event	Bit	Events within the group
		Configuration	21	S441: Current output 1
		Process	20	■ S801: Energy too low ■ S825: Operating temperature ■ S921: Change of reference ■ S942: In safety distance [1] ■ S943: In blocking distance ■ S944: Level range ■ S968: Level limited

1) This event can be removed from the group in order to define its behavior individually; see section "Configurable area".

Severity of the event	Default diagnostic category	Source of the event	Bit	Events within the group
Lowest severity	Maintenance required (M)	Sensor	19	not used in Levelflex
		Elektronics	18	■ M270: Main electronics failure ■ M272: Main electronics failure ■ M311: Electronics failure
		Configuration	17	M438: Data set
		Process	16	M803: Current loop 1

11.10.2 Allocation parameters

The allocation of event categories to the event groups is controlled by the allocation parameters. They reside in the **RESOURCE (RB2)** block:

- **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 allocation parameter consists of 32 bits with the following meaning:

- **Bit 0:** reserved by the Fieldbus Foundation
- **Bits 1 to 15:** Configurable area; here, a number of predefined diagnostic events can be allocated irrespective of the group of events they belong to. In this case they are removed from their group and their bahavior can be configured individually (→ 🖹 111). With Levelflex, the following parameters can be allocated to the configurable area:
  – 941: Echo lost
  – 942: In safety distance
- **Bits 16 ... 31:** Standard area; these bits are permanently allocated to a specific group of events. If a bit is set to **1**, the respective event category is assigned to the group.

The following table represents the default setting of the allocation parameters. In the default setting there is a unique relationship between the severity of the event and its category (i.e. its allocation parameter).

Default setting of the allocation parameters

	Standard area																**Configurable area**
Severity of the event	**Highest severity**				**High severity**				**Low severity**				**Lowest severity**				
Source of the event [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

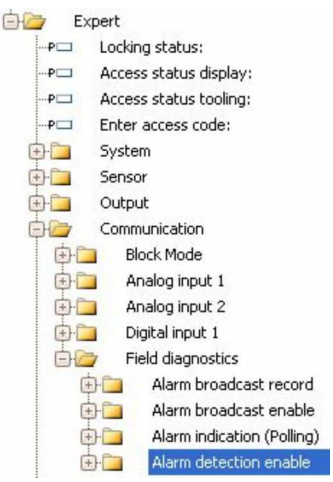
In order to change the diagnostic behavior of a group of events, proceed as follows:

1. Open the allocation parameter to which the group is currently allocated.
2. Switch the bit of the group from **1** to **0**. In the case of operation via FieldCare this is done by deactivating the respective checkbox (see the example below).
3. Open the allocation to which the group is to be allocated.
4. Switch the bit of the group from **0** to**1**. In the case of operation via FieldCare this is done by activating the respective checkbox (see the example below).

Example

The **Highest severity / Configuration** group contains the messages **410: Data transfer**, **411: Up-/Download**, **435: Linearization** and **437: Configuration incompatible**. These messages are no longer to be classified as **Failure (F)** but as **Funcktion check (C)**.

1.



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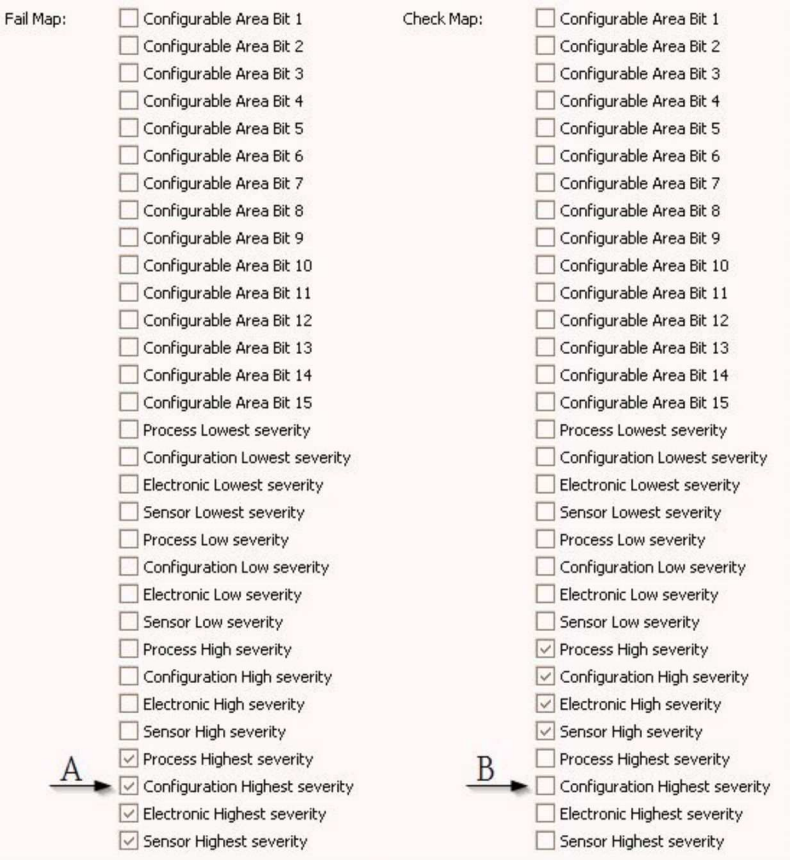
Use the FieldCare navigation window to navigate to the the following screen: **Expert → Communication → Field diagnostics → Alarm detection enable**.

2.



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32 *Default state of the "Fail Map" and "Check Map" columns*

Look for the **Configuration Highest Severity** group in the **Fail Map** column and deactivate the associated checkbox (A). Activate the respective checkbox in the **Check Map** column (B). Remember to confirm each change by pressing the Enter key.

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33 *Changed state of the "Fail Map" and "Check Map" columns*

Make sure that for each group the corresponding bit is set to **1** in at least one of the allocation parameters. Otherwise no event category is transmitted with the event message. As a consequence the message will not be recognized by the control system.

The **Alarm detection enable** screen is used to configure the detection of diagnostic events but not the transmission of event messages to the bus. The latter is configured on the **Alarm broadcast enable** screen, which is operated exactly in the same way as the **Alarm detection enable** screen. Status information is only transmitted to the bus if the Resource Block is in the **Auto** mode.

11.10.3 Configurable area

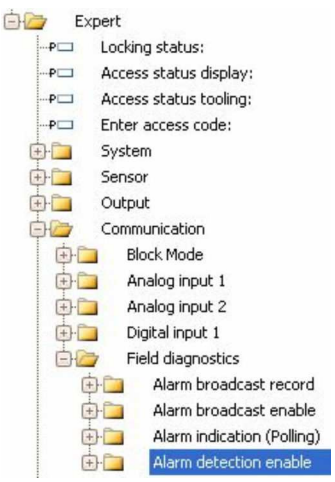
An event category can be individually defined for the following parameters – irrespective of the group of events they belong to by default.

- **F941**: Echo lost
- **S942:** In safety distance

Prior to changing the event category, the event must be allocated to one of the bits 1 to 15. This is performed by the parameters **FF912 ConfigArea_1** to **FF912ConfigArea_15** in the **DIAGNOSTIC (TRDDIAG)** block. Thereafter, the selected bit can be switched from **0** to **1** in the desired allocation parameter.

Example

To change the category of error **942 "In safety distance"** from **Out of specification (S)** (default), to **Function check (C)**, proceed as follows.

1. 

A0017618

   Use the FieldCare navigation window to navigate to the the following screen: **Expert → Communication → Field diagnostics → Alarm detection enable**.

2. 

A0017616

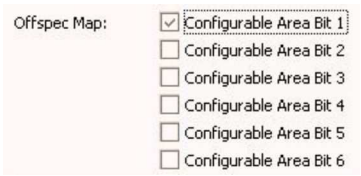
   By default all **Configurable Area Bits** are set to **not used**.

3. 

A0017619

   Select one of these bits (in the example: Configurable Area Bit 1) and select **In safety distance** from the associated drop-down menu. Confirm the selection by pressing the Enter key.

4.



A0017620

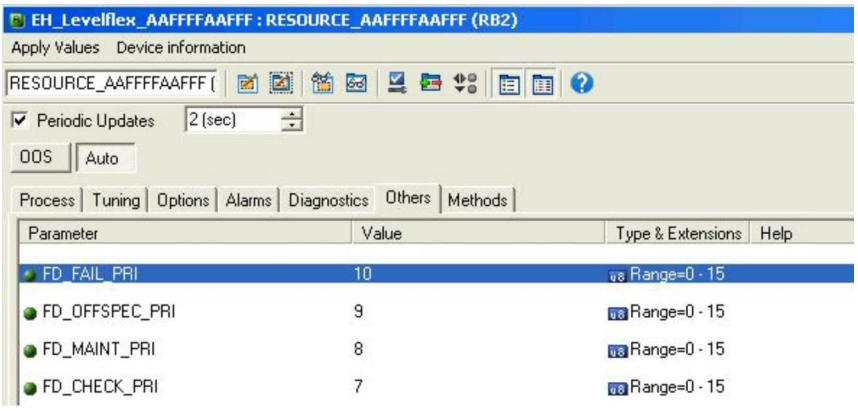
Got to the **Offspec Map** column and activate the checkbox of the respective bit (in the example: **Configurable Area Bit 1**). Confirm the selection by pressing the Enter key.

A change of the error category of **In safety distance** does not affect an error which is already present. The new category is only assigned if a new error of this type occurs after the change.

11.10.4 Transmission of the event meassages to the bus

Event priority

Event messages are only transmitted to the bus if their priority is between 2 and 15. Events of priority 1 are indicated on the display but not transmitted to the bus. Events of priority 0 are ignored. By default, the priority is 0 for all events. The priority can be adjusted individually for each allocation parameter. This is done by the following four priority parameters:



A0017638

Suppression of individual events

For individual events, the transmission to the bus can suppressed by the use of a mask. The corresponding events will be displayed but not transmitted to the bus. In FieldCare, this mask can be found at **Expert → Communication → Field diagnostics → Alarm broadcast enable**. This mask functions as a negative mask, which means that, if a field is marked, the corresponding events will **not** be transmitted to the bus.

11.11 Protection of the settings against unauthorized changes

There are two ways to protect the settings against unauthorized changes:

- Via locking switch (hardware locking) (→ 67)
- Via operating menu (software locking) (→ 68)
- Via block operation:
  - Block: **DISPLAY (TRDDISP)**; parameter: **Define access code (define_access_code)**
  - Block: **EXPERT_CONFIG (TRDEXP)**; parameter: **Enter access code (enter_access_code)**

12 Trouble shooting

12.1 Trouble-shooting instructions

Parametrization errors for level measurements

Error	Possible cause	Remedial action
Measured value wrong	If measured distance(**Setup → Distance**) matches the real distance: Calibration error	▪ Check the **Empty calibration** parameter and adjust it if necessary(→ 147). ▪ Check the **Full calibration** parameter and adjust it if necessary (→ 148). ▪ Check linearization and adjust it if necessary (→ 165).
	If measured distance(**Setup → Distance**) does not match the real distance: An interference echo affects the measurement.	Perform mapping (interference echo suppression) (→ 152).
No change of the measured value when emptying/filling the tank	An interference echo affects the measurement.	Perform mapping (interference echo suppression) (→ 152).
	Build-up at the probe.	Clean the probe.
Diagnostic event F941 or S941 "Echo lost" appears after switching on the supply voltage.	Echo threshold too high.	Check the **Medium group** parameter (→ 147). If necessary select a more detailed setting in the **Medium property** parameter (→ 156).
	Level echo suppressed.	Ausblendung löschen und gegebenenfalls neu aufnehmen.
Device displays a level when the tank is empty.	Incorrect probe length	Carry out probe length correction (→ 172).
	Interference echo	Carry out mapping over entire probe when the tank is empty (→ 152).
Wrong slope of the level in the entire measuring range	Wrong tank type selected.	Set the **Tank type** parameter correctly (→ 145).

Parametrization errors for interface measurements

Error	Possible cause	Remedial action
When "flooded" is selected in "Tank level", the measured interface level jumps to higher values during draining operations.	The total level is detected outside the upper blocking distance.	Increase the blocking distance (→ 161).
		Select "Tank level" = "Partially filled" (→ 145).
When "Partially filled" is selected in "Tank level", the measured total level jumps to lower values during filling operations.	The total level runs into the upper blocking distance.	Reduce blocking distance (→ 161).
Wrong slope of the measured interface level	Wrong dielectric constant (DC value).	Enter the correct dielectric constant (DC value) of the upper medium (→ 147).
The measured values for the interface and the total level are identical	Echo threshold for the total level too high due to a wrong dielectric constant.	Enter the correct dielectric constant (DC value) of the upper medium (→ 147).

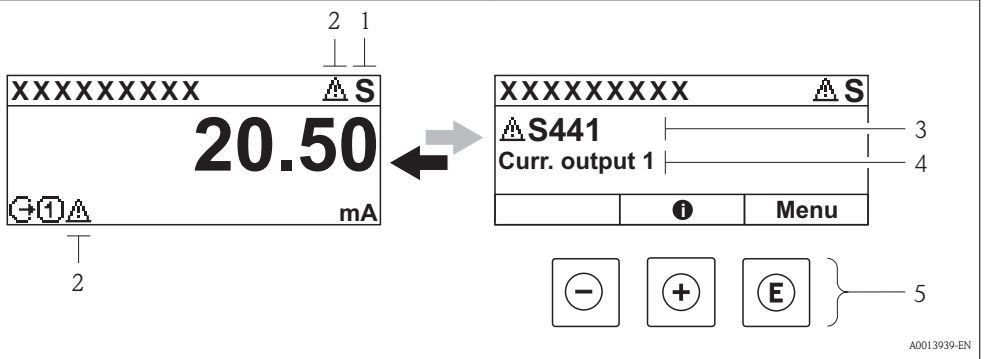
Error	Possible cause	Remedial action
If the interface layers are thin, the total level jumps to the interface level.	The thickness of the upper medium is less than 60 mm (2.4 in).	Interface measurement is only possible if the thickness of the interface is greater than 60 mm (2.4 in).
The measured interface layer jumps.	Emulsion layer present.	Emulsion layers affect the measurement. Please contact Endress+Hauser.

12.2 Diagnostic information on local display

12.2.1 Diagnostic message

Faults detected by the self-monitoring system of the measuring device are displayed as a diagnostic message in alternation with the measured value display.

Measured value display in alarm condition	Diagnostic message



1 Status signal
2 Status symbol (symbol for event level)
3 Status symbol with diagnostics event
4 Event text
5 Operating elements

Status signals

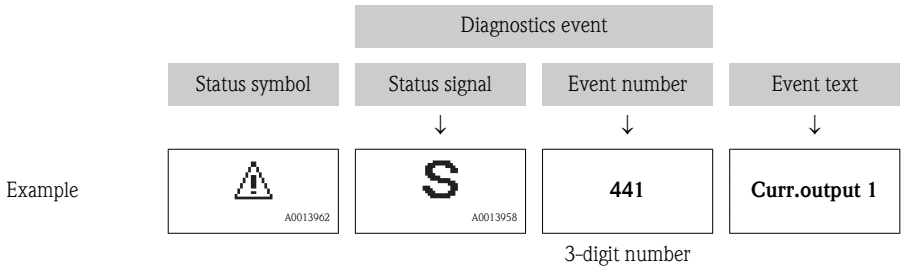
F A0013956	**"Failure"** A device error is present. The measured value is no longer valid.
C A0013959	**"Function check"** The device is in service mode (e.g. during a simulation).
S A0013958	**"Out of specification"** The device is operated: ▪ Outside of its technical specifications (e.g. during startup or a cleaning) ▪ Outside of the configuration carried out by the user (e.g. level outside configured span)
M A0013957	**"Maintenance required"** Maintenance is required. The measured value is still valid.

Status symbol (symbol for event level)

A0013961	**"Alarm" status** The measurement is interrupted. The signal outputs take on the defined alarm condition. A diagnostic message is generated.
A0013962	**"Warning" status** The device continues to measure. A diagnostic message is generated.

Diagnostics event and event text

The fault can be identified using the diagnostics event. The event text helps you by providing information about the fault. In addition, the corresponding symbol is displayed before the diagnostics event.



If two or more diagnostic messages are pending simultaneously, only the message with the highest priority is shown. Additional pending diagnostic messages can be shown in the **Diagnostics list** submenu (Verweisziel existiert nicht, aber @y.link.required='true').

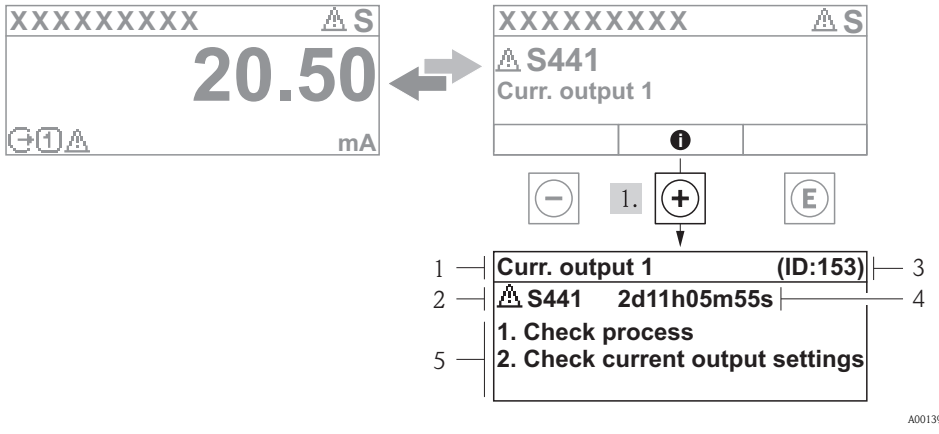
Past diagnostic messages that are no longer pending are shown in the **Event logbook** submenu (Verweisziel existiert nicht, aber @y.link.required='true').

Operating elements

Operating functions in menu, submenu	
A0013970	**Plus key** Opens the message about the remedial measures.
A0013952	**Enter key** Opens the operating menu.

12.2.2 Calling up remedial measures

Message for remedial measures



1 Event text
2 Symbol for event level with diagnostic event
3 Event ID for service
4 Operation time of occurrence
5 Remedial measures

The user is in the diagnostic message.

1. Press the ⊞ key (ⓘ symbol).

✔ The message for the remedial measures for the diagnostic event opens.

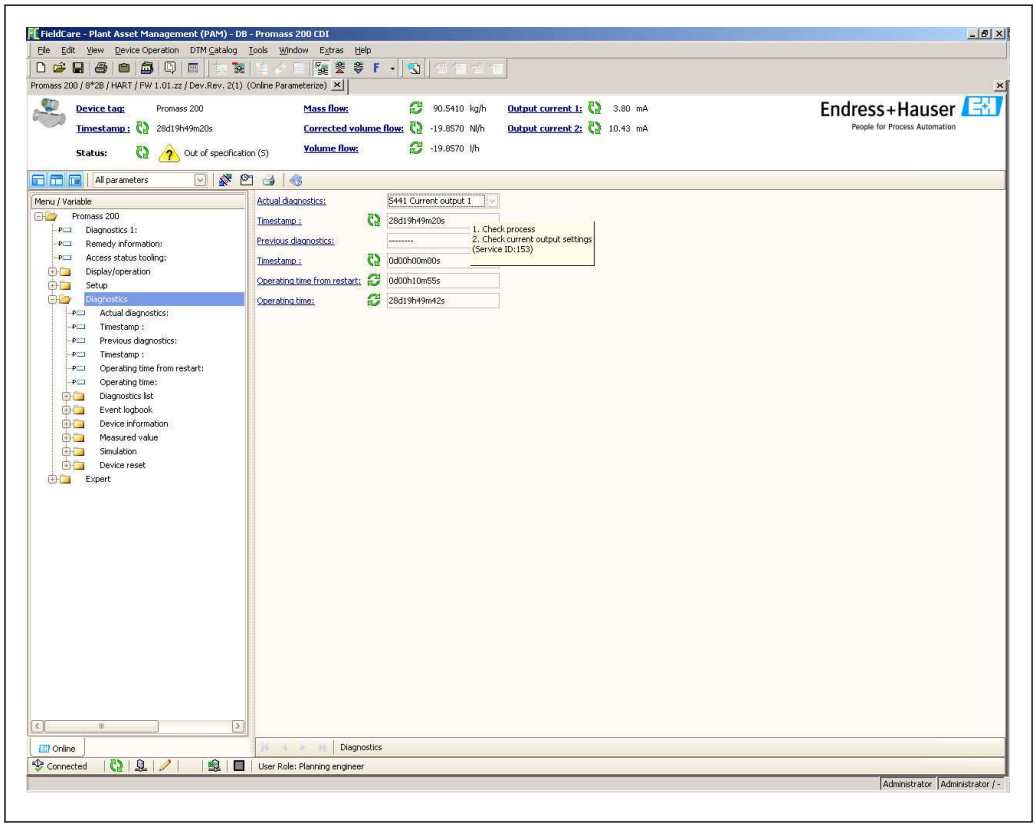
2. Press − + + simultaneously.

✔ The message about the remedial measures closes.

12.3 Diagnostic event in the operating tool

If a diagnostic event is present in the operating tool, the status signal appears in the top left status area along with the corresponding symbol for event level in accordance with NAMUR NE 107:

- Failure (F)
- Function check (C)
- Out of specification (S)
- Maintenance required (M)



A0014014-EN

Calling up remedial measures

1. Navigate to the "Diagnostics" menu.

✔ In the "Actual diagnostics" parameter, the diagnostic event is shown with event text.

2. On the right in the display range, hover the cursor over the "Actual diagnostics" parameter.

✔ A tool tip with remedial measures for the diagnostic event appears.

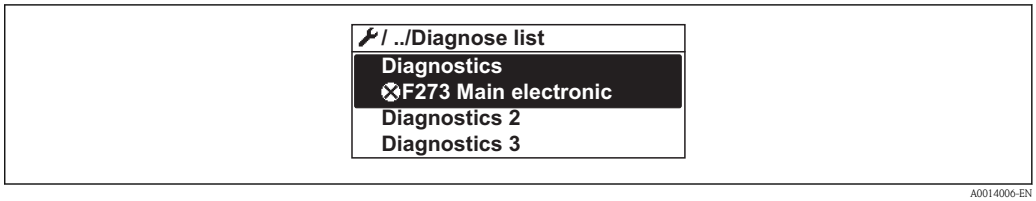
12.4 Diagnostic messages in the DIAGNOSTIC Transducer Block (TRDDIAG)

- The **Actual diagnostics** parameter displays the message with the highest priority. Every message is also output as per the FOUNDATION Fieldbus Specification by means of the **XD_ERROR** and **BLOCK_ERROR** parameters.
- A list of diagnostic messages is displayed in the **Diagnostics 1** to **Diagnostics 5** parameters. If more than 5 messages are currently active, only those with the highest priority are displayed.
- You can view a list of alarms which are no longer active (event log) via the **Previous diagnostics** parameter.

12.5 Diagnostic list

In the **Diagnostics list** submenu, up to 5 currently pending diagnostic messages can be displayed. If more than 5 messages are pending, the messages with the highest priority are shown on the display.

Navigation path
Diagnostics → Diagnostics list



A0014006-EN

Calling up and closing the remedial measures

1. Press E.
   ✔ The message for the remedial measures for the selected diagnostic event opens.
2. Press − + + simultaneously.
   ✔ The message about the remedial measures closes.

About the structure of the remedial measure message (→ 115)

12.6 Overview of diagnostic events

12.6.1 Sensor element failures

Diagnostic event		Maintenance instructions	Error behavior
Code	Description		
F003	Broken probe detected	1. Check map. 2. Check sensor.	Alarm
F046	Build-up detected	Clean sensor.	Alarm
F083	Memory content	1. Restart device. 2. Restore S-Dat data. 3. Change sensor.	Alarm
F104	HF cable	1. Dry HF cable connection and check sealing. 2. Change HF cable.	Alarm

Diagnostic event		Maintenance instructions	Error behavior
Code	Description		
F105	HF cable	1. Tighten HF cable connection. 2. Change HF cable.	Alarm
F106	Sensor	1. Check probe isolation. 2. Change sensor.	Alarm

12.6.2 Electronic failures

Diagnostic event		Maintenance instructions	Error behavior
Code	Description		
F242	Software incompatible	1. Check software. 2. Flash or change main electronics module.	Alarm
F252	Modules incompatible	1. Check electronic modules. 2. Change I/O or main electronic module.	Alarm
F261	Electronic modules	1. Restart device. 2. Check electronic modules. 3. Change IO module or main electronics.	Alarm
F262	Module connection	1. Check module connection. 2. Change electronic modules.	Alarm
F270 M270	Main electronic failure	Change main electronic module.	Alarm Warning
F271	Main electronic failure	1. Restart device. 2. Change main electronic module.	Alarm
F272 M272	Main electronic failure	1. Restart device. 2. Contact service.	Alarm
F273	Main electronic failure	1. Emergency operation via display. 2. Change main electronics.	Alarm
F275	I/O-Modul failure	Change I/O module.	Alarm
F276	I/O-Modul failure	1. Restart device 2. Change I/O module	Alarm
F282	Electronic memory	1. Restart device. 2. Contact service.	Alarm
F283	Memory content	1. Restart device. 2. Contact service.	Alarm
F311 M311	Electronic failure	1. Transfer data or reset device. 2. Contact service.	Alarm Warning

12.6.3 Configuration failures

Diagnostic event		Maintenance instructions	Error behavior
Code	Description		
F410	Data transfer	1. Check connection. 2. Check configuration (languages, outputs). 3. Retry data transfer.	Alarm
F411 C411	Up-/download	Up-/download active, please wait.	Alarm Warning
C431	Trim		Warning
F435	Linearization	Check linearization table.	Alarm
F437	Configuration incompatible	1. Restart device. 2. Contact service.	Alarm

Diagnostic event		Maintenance instructions	Error behavior
Code	Description		
M438	Data set	1. Check data set file. 2. Check device configuration. 3. Up- and download new configuration.	Warning
S441	Current output 1	1. Check process. 2. Check current output settings.	Warning
C484	Simulation failure mode	Deactivate simulation.	Alarm
C485	Simulation measured value	Deactivate simulation.	Warning
C491	Simulation current output	Deactivate simulation.	Warning
C585	Simulation distance	Deactivate simulation.	Alarm

12.6.4 Process induced failures

Diagnostic event		Maintenance instructions	Error behavior
Code	Description		
S801	Energy too low	1. Increase voltage. 2. Change I/O module	Warning
F803 M803	Current loop 1	1. Check wiring. 2. Check I/O module.	Alarm Warning
F825 S825	Operating temperature	1. Check ambient temprature. 2. Check process temperature.	Alarm Warning
S921	Change of reference	1. Check reference configuration. 2. Check pressure. 3. Check sensor.	Warning
F936	EMC interference	Check installation on EMC.	Alarm
F941 S941	Echo lost	Check parameter "DC value"	Alarm/Warning [1]
S942	In safety distance	1. Check level. 2. Check safety distance. 3. Reset self holding.	Warning/Alarm [2]
S943	In blocking distance	Check level.	Warning
S944	Level range	Reduced accuracy. Level at process connection.	Warning
S968	Level limited	1. Check level. 2. Check limit parameters.	Warning
F970	Linearization	1. Check level. 2. Check linearization settings.	Alarm

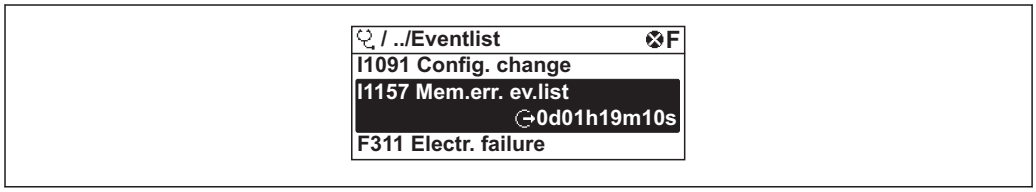
1) The behavior of this error can be defined in the Setup menu (Setup → Advanced Setup → Safety settings → Output echo loss)
2) The behavior of this error can be defined in the Expert menu (Expert → Sensor → Safety settings → In safety distance)

12.7 Event logbook

12.7.1 Event history

A chronological overview of the event messages that have occurred is provided in the **Events list** submenu.

Navigation path
Diagnostics → Event logbook → Events list



A0014008-EN

A maximum of 20 event messages can be displayed in chronological order. If the advanced HistoROM function is enabled in the device (order option), up to 100 entries can be displayed.

The event history includes entries for:
- Diagnostic events
- Information events

In addition to the operation time of its occurrence, each event is also assigned a symbol that indicates whether the event has occurred or is ended:
- Diagnostic event
  - ⊕: Event has occurred
  - ⊖: Event has ended
- Information event
  ⊕: Event has occurred

Calling up and closing the remedial measures

1. Press E.
   ✔ The message for the remedial measures for the selected diagnostic event opens.
2. Press − + + simultaneously.
   ✔ The message about the remedial measures closes.

- About the structure of the remedial measure message (→ 115)
- For filtering the displayed event messages (→ 120)

12.7.2 Filtering the event logbook

Using the **Filter options** parameter, you can define which category of event messages is displayed in the **Events list** submenu.

Navigation path
Diagnostics → Event logbook → Filter options

Filter categories
- All
- Failure (F)
- Maintenance required (M)
- Function check (C)
- Out of specification (S)
- Information (I)

12.7.3 Overview of information events

Unlike a diagnostic event, an information event is displayed in the event logbook only and not in the diagnose list.

Information event	Event text
I1000	——— (device OK)
I1089	PowerOn
I1090	Configuration reset
I1091	Configuration modified
I1092	Data logging cleared
I1110	Write protection switch changed
I1111	Density adjust. error
I1137	Electronics changed
I1151	History reset
I1154	Minimum/maximum terminal voltage reset
I1155	Electronics temperature reset
I1156	Trend block memory error
I1157	Memory content events list
I1185	Device saved in display
I1186	Device with display restored
I1187	Measuring point copied via display
I1188	Display data cleared
I1189	Device backup compared
I1264	Safety sequence aborted
I1335	Firmware changed

12.8 Software history

Date	Software version	Modifications	Documentation (FMP51, FMP52, FMP54, PROFIBUS)			
			CD-ROM	Operating Instructions	Description of Parameters	Technical Information
04.2012	01.00.zz	Original software	CD00518F/00/ A2/16.12	BA01052F/00/EN/ 01.12	GP01015F/00/EN/ 01.12	TI01001F/00/EN/15.12

13 Repairs

13.1 General information on repairs

13.1.1 Repair concept

The Endress+Hauser repair concept assumes that the devices have a modular design and that repairs can be done by the Endress+Hauser service or specially trained customers.

Spare parts are contained in suitable kits. They contain the related replacement instructions.

For more information on service and spare parts, contact the Service Department at Endress +Hauser.

13.1.2 Repairs to Ex-approved devices

When carrying out repairs to Ex-approved devices, please note the following:

- Repairs to Ex-approved devices may only be carried out by trained personnel or by the Endress +Hauser Service.
- Comply with the prevailing standards, national Ex-area regulations, safety instructions (XA) and certificates.
- Only use original spare parts from Endress+Hauser.
- When ordering a spare part, please note the device designation on the nameplate. Only replace parts with identical parts.
- Carry out repairs according to the instructions. On completion of repairs, carry out the specified routine test on the device.
- Only Endress+Hauser Service may convert a certified device into a different certified variant.
- Document all repair work and conversions.

13.1.3 Replacement of an electronics module

If an electronics module has been replaced, it is not necessary to perform a new basic setup as the calibration parameters are stored in the HistoROM which is located in the housing. However, after exchanging the main electronics module it may be necessary to record a new mapping (interference echo suppression).

13.1.4 Replacement of a device

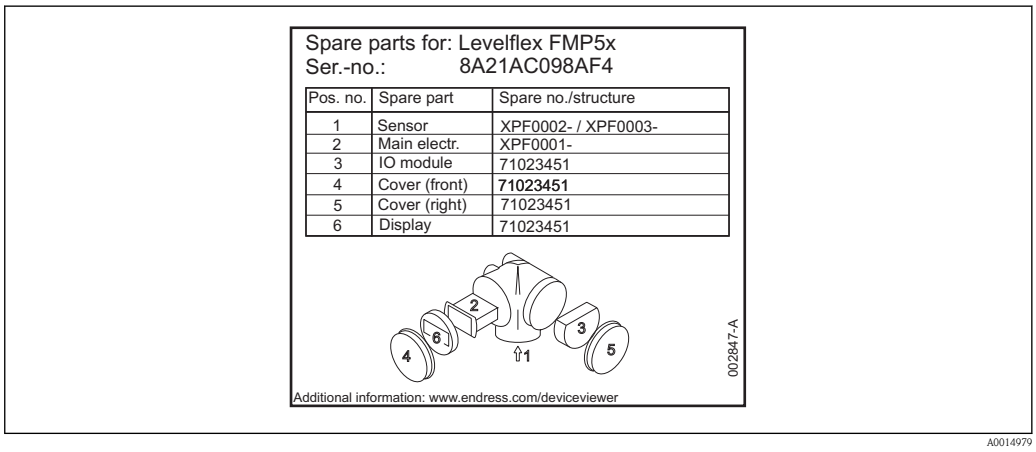
After a complete device or electronic module has been replaced, the parameters can be downloaded into the instrument again in one of the following ways:

- Via the display module
  Condition: The configuration of the old device has been saved in the display module (→ 📄 186).
- Via FieldCare
  Condition: The configuration of the old device has been saved to the computer via FieldCare.

You can continue to measure without carrying out a new setup. Only a linearization and a tank map (interference echo suppression) have to be recorded again.

13.2 Spare parts

- A few interchangeable measuring device components are identified by a spare part nameplate. This contains information about the spare part.
- The connection compartment cover of the device contains a spare part nameplate that includes the following information:
  – A list of the most important spare parts for the measuring device, including their ordering information.
  – The URL for the *W@M Device Viewer* (www.endress.com/deviceviewer): There, all spare parts for the measuring device are listed, including the order code, and can be ordered. If available, the corresponding Installation Instructions can also be downloaded there.



34 *Example for spare part nameplate in connection compartment cover*

Measuring device serial number:
- Is located on the device and spare part nameplate.
- Can be read out via the "Serial number" parameter in the "Device information" submenu.

14 Maintenance

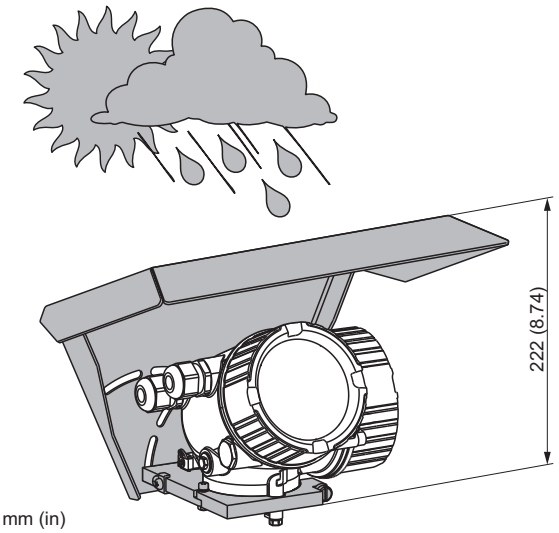
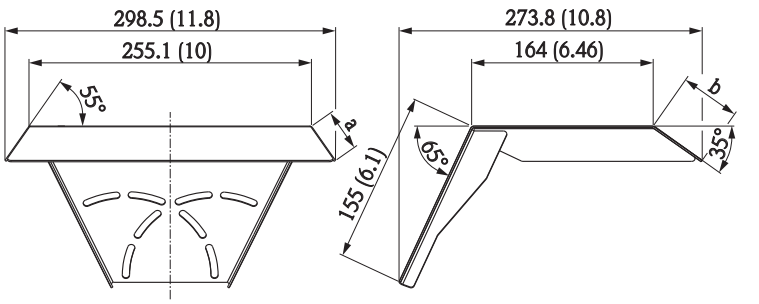
The measuring device requires no special maintenance.

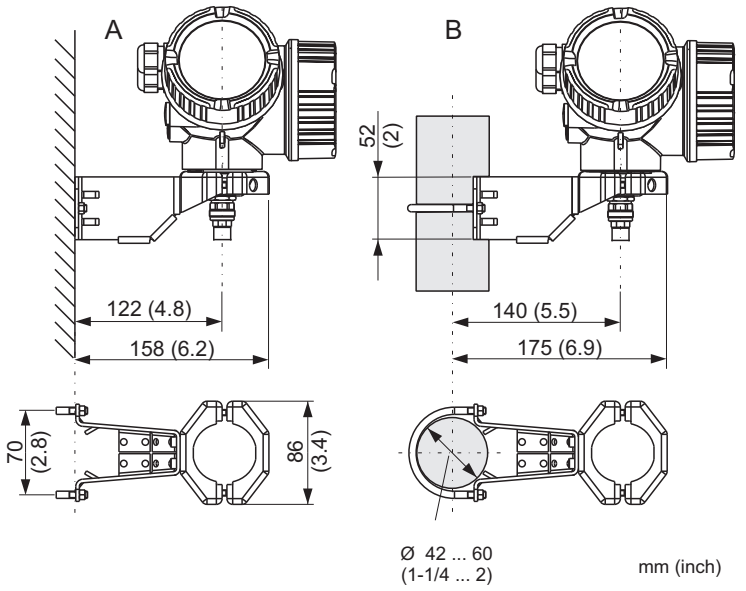
14.1 Exterior cleaning

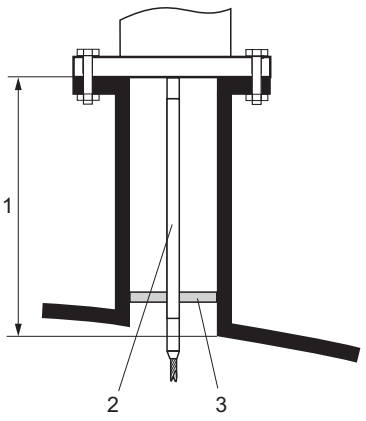
When exterior-cleaning the device, always use cleaning agents that do not attack the surface of the hosuing and the seals.

15 Accessories

15.1 Device-specific accessories

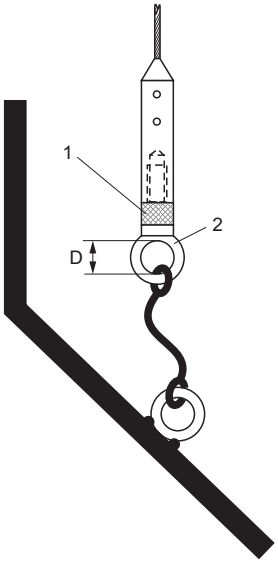
Accessory	Description
Weather protection cover	 mm (in) A0015466  mm (in) A0015472 *a* *37.8 mm (1.49 in)* *b* *54 mm (2.13 in)* The weather protection cover can be ordered together with the device (product structure, feature 620 "Accessory Enclosed", option PB "Weather Protection Cover"). Alternatively, it can be separately ordered as an accessory; order code 71132889.

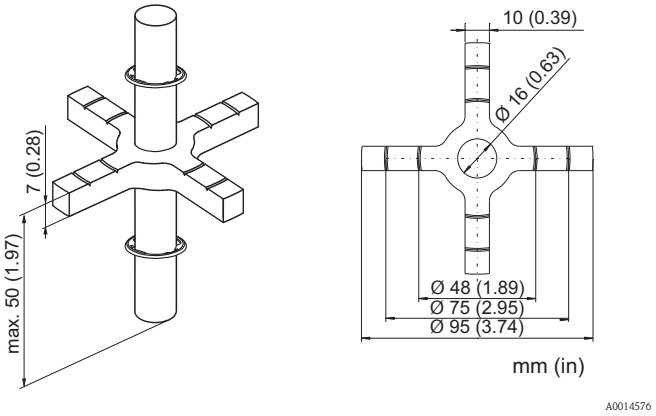
Accessory	Description
Mounting bracket for the electronics housing	 *A Wall mounting* *B Pipe mounting* For the "Sensor remote" device version (see feature 060 of the product structure), the mounting bracket is part of the delivery. If required, it can also be ordered as an accessory (order code 71102216).

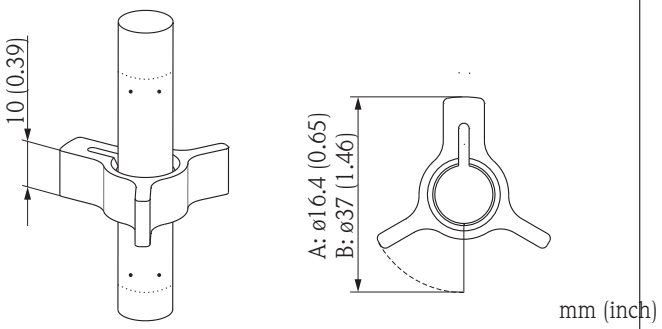
Accessory	Description
Extension rod / centering HMP40 ■ can be used for: FMP54 ■ Admissible temperature at lower nozzle edge: -40 to 150 °C (-40 to 302 °F) ■ Additional information: SD01002F	 *1 Nozzle height* *2 Extension rod* *3 Center washer*

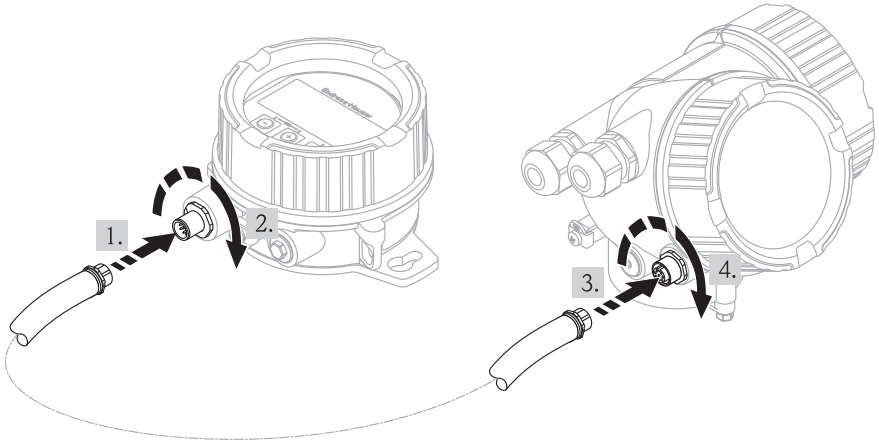
010	**Approval:**
A	A: Non-hazardous area
M	M: FM DIP Cl.II Div.1 Gr.E-G N.I., zone 21,22
P	P: CSA DIP Cl.II Div.1 Gr.G + coal dust N.I.
S	S: FM Cl.I, II, III Div.1 Gr.A-G N.I., zone 0,1,2,20,21,22
U	U: CSA Cl.I, II, III Div.1 Gr.A-G N.I., zone 0,1,2
1	1: ATEX II 1G
2	2: ATEX II 1D
020	**Extension rod; nozzle height:**

Accessory	Description	
	1	115mm; 150-250mm / 6-10"
	2	215mm; 250-350mm / 10-14"
	3	315mm; 350-450mm / 14-18"
	4	415mm; 450-550mm / 18-22"
	9	Special version, TSP-no. to be spec.
	030	**Center washer:**
	A	Not selected
	B	DN40 / 1-1/2", inside-d. = 40-45mm, PPS
	C	DN50 / 2", inside-d. = 50-57mm, PPS
	D	DN80 / 3", inside-d. = 80-85mm, PPS
	E	DN80 / 3", inside-d. = 76-78mm, PPS
	G	DN100 / 4", inside-d. = 100-110mm, PPS
	H	DN150 / 6", inside-d. = 152-164mm, PPS
	J	DN200 / 8", inside-d. = 210-215mm, PPS
	K	DN250 / 10", inside-d. = 253-269mm, PPS
	Y	Special version, TSP-no. to be spec.

Accessory	Description
Mounting kit, isolated	 A0013586 *1 Insulating sleeve* *2 Eye-bolt* For reliably insulated fixing of the probe. Maximum process temperature: 150 °C (300 °F) For rope probes 4 mm (1/6 in) or 6 mm (1/4 in) with PA>steel: ■ Eye-bolt M8 DIN 580 ■ Diameter D = 20 mm (0.8 in) ■ Order-No.: 52014249 For rope probes 6 mm (1/4 in) or 8 mm (1/3 in) with PA>steel: ■ Eye-bolt M10 DIN 580 ■ Diameter D = 25 mm (1 in) ■ Order-No.: 52014250 Due to the risk of electrostatic charge, the insulating sleeve is not suitable for use in hazardous areas. In these cases the fixing must be reliably grounded. The mounting kit can also be ordered directly with the device (see the Levelflex product structure, feature 620 "Accessory Enclosed", option PG "Mounting kit, isolated, rope").

Accessory	Description
Centering disk PEEK ∅ 48 to 95 mm (1.89 to 3.74 inch) can be used for ■ FMP51 ■ FMP54	 The centering disk is suitable for probes with a rod diameter of Ø 16 mm (0.63in) and can be used in pipes from DN40 (1½") up to DN100 (4"). Markings on the 4-leg centering disk ensure a simple tailoring. Hence the centering disk can be adapted to the pipe diameter. See also Operating Instructions BA377F. ■ Material of centering disk: PEEK (statically dissipative) ■ Material of retaining rings: PH15-7Mo (UNS S15700) ■ Admissible process temperature: –60 to +200 °C (–76 to +392 °F) ■ Order code: 71069064 If the centering disk is inserted in a bypass, it must be positioned below the lower bypass outlet. This has to be accounted for when choosing the probe length. Generally, the centering disk should not be mounted higher than 50 mm (1.97") from the probe end. It is recommended not to insert the PEEK centering disk in the measuring range of the rod probe. The PEEK centering disk can also be ordered directly with the device (see the Levelflex product structure, feature 610 "Accessory mounted", option OD). In this case it is not fastened by the retaining rings. Instead it is fixed to the end of the probe rod by a hexagonal headed bolt (A4-70) and a Nord-Lock washer (1.4547).

Accessory	Description
Centering disk PFA ∅ 37 mm (1.46") can be used for ■ FMP51 ■ FMP52 ■ FMP54	 *A For 8mm (0.3 in) probes* *B: For 12 mm (0.47 in) and 16 mm (0.63 in) probes* The centering disk is suitable for probes with a rod diameter of 8 mm (0.31 in), 12 mm (0.47 in) and 16 mm (0.63 in) (also coated rod probes) and can be used in pipes from DN40 (1½") up to DN50 (2"). See also Operating Instructions BA378F. ■ Material: PFA ■ Admissible process temperature: -200 to +200 °C (-328 to +392 °F) ■ Order code – Probe 8 mm (0.31 in): 71162453 – Probe 12 mm (0.47 in): 71157270 – Probe 16 mm (0.63 in): 71069065 The PFA centering disk can also be ordered directly with the device (see the Levelflex product structure, feature 610 "Accessory mounted", option OE).

Accessory	Description
Remote display FHX50	 A0019128 ■ Material: – Plastics PBT – 316L (in preparation) ■ Suitable for the display modules: – SD02 (push buttons) – SD03 (touch control) (in preparation) ■ Connection cable: – Cable with M12 plug; supplied with the FHX50; up to 30 m (98 ft) – Customer supplied standard cable; up to 60 m (196 ft) ■ If the remote display is to be used, the Levelflex must be ordered in the version "Prepared for display FHX50" (feature 030, option L or M). For the FHX50, on the other hand, the option A: "Prepared for display FHX50" has to be selected in feature 050: "Option Measurement Device". ■ If a Levelflex has not been ordered in the version "Prepared for display FHX50", but is nevertheless to be equipped with an FHX50, it is essential to select the option B: "Not prepared for display FHX50" in feature 050: "Option Measurement Device" of the FHX50. In this case, a retrofit kit, needed to prepare the Levelflex for the remote display, is supplied together with the FHX50. For details refer to the document SD01007F.

15.2 Communication-specific accessories

Accessory	Description
Commubox FXA291	Connects Endress+Hauser field devices with CDI interface (= Endress+Hauser Common Data Interface) to the USB interface of a computer. For details refer to Technical Information TI405C/07

Accessory	Description
Field Xpert SFX100	Compact, flexible and robust industry handheld terminal for remote parametrization and measured value inspection via the HART output or via FOUNDATION Fieldbus . For details refer to Operating Instructions BA060S/04

15.3 Service-specific accessories

Accessory	Description
FieldCare	Endress+Hauser's FDT-based Plant Asset Management tool. Helps to configure and maintain all field devices of your plant. By supplying status information it also supports the diagnosis of the devices. For details refer to Operating Instructions BA027S/04 and BA059S/04

15.4 System components

16 Return

The measuring device must be returned if repairs or a factory calibration are required, or if the wrong measuring device has been ordered or delivered. According to legal regulations, Endress +Hauser, as an ISO-certified company, is required to follow certain procedures when handling returned products that are in contact with medium.

To ensure swift, safe and professional device returns, please read the return procedures and conditions on the Endress+Hauser website at www.services.endress.com/return-material

17 Disposal

In case of disposal please separate the different components according to their material consistence.

18 Overview of the operating menu

Language		(→ 140)
Display/operation →	Access status display	(→ 141)
	Locking status	(→ 141)
	Format display	(→ 141)
	Contrast display	(→ 143)
	Display interval	(→ 144)

Setup →	Operating mode	(→ 144)
	Distance unit	(→ 144)
	Tank type	(→ 145)
	Tube diameter	(→ 145)
	Tank level	(→ 145)
	Distance upper connection	(→ 146)
	DC value	(→ 147)
	Medium group	(→ 147)
	Empty calibration	(→ 147)
	Full calibration	(→ 148)
	Level	(→ 148)
	Interface	(→ 149)
	Distance	(→ 149)
	Interface distance	(→ 150)
	Signal quality	(→ 150)

Setup →	**Mapping →**	Confirm distance	(→ 152)
		Mapping end point	(→ 152)
		Record map	(→ 153)

Setup →	**Advanced setup →**	Locking status	(→ 141)
		Access status display	(→ 141)
		Enter access code	(→ 153)
		Define access code	(→ 154)
		Device tag	(→ 154)

Setup →	**Advanced setup →**	**Level →**	Medium type	(→ 156)
			Medium property	(→ 156)
			Process property	(→ 156)
			Advanced conditions	(→ 157)
			Level unit	(→ 158)

			Blocking distance	(→ 158)
			Level correction	(→ 159)

Setup →	**Advanced setup →**	**Interface →**	Process property	(→ 156)
			DC lower medium	(→ 160)
			Level unit	(→ 158)
			Blocking distance	(→ 158)
			Level correction	(→ 159)

Setup →	**Advanced setup →**	**Interface / Automatic DC calculation →**	Manual interface thickness	(→ 163)
			DC value	(→ 163)
			Calculated DC	(→ 163)
			Use calculated DC	(→ 164)

Setup →	**Advanced setup →**	**Linearization →**	Linearization type	(→ 165)
			Unit linearized	(→ 165)
			Free text	(→ 166)
			Maximum value	(→ 166)
			Diameter	(→ 167)
			Intermediate height	(→ 167)
			Table mode	(→ 167)
			Table number	(→ 168)
			Level	(→ 168)
			Customer value	(→ 169)
			Activate table	(→ 169)

Setup →	**Advanced setup →**	**Safety settings →**	Output echo lost	(→ 170)
			Value echo lost	(→ 170)
			Ramp echo lost	(→ 170)
			Blocking distance	(→ 158)

Setup →	**Advanced setup →**	**Probe length correction →**	Confirm length	(→ 172)
			Present length	(→ 173)

Setup →	**Advanced setup →**	**Switch output →**	Switch output function	(→ 173)
			Assign status	(→ 173)
			Assign limit	(→ 174)
			Assign diagnostic level	(→ 174)
			Switch-on value	(→ 175)

			Switch-on delay	(→ 175)
			Switch-off value	(→ 175)
			Switch-off delay	(→ 177)
			Switch output failure mode	(→ 177)
			Switch status	(→ 177)
			Invert output signal	(→ 178)

Setup →	**Advanced setup →**	**Display →**	Format display	(→ 141)
			Value 1 display	(→ 179)
			Decimal places 1	(→ 179)
			Value 2 display	(→ 180)
			Decimal places 2	(→ 180)
			Value 3 display	(→ 181)
			Decimal places 3	(→ 181)
			Value 4 display	(→ 182)
			Decimal places 4	(→ 182)
			Display interval	(→ 144)
			Display damping	(→ 183)
			Header	(→ 183)
			Header text	(→ 184)
			Separator	(→ 184)
			Number format	(→ 184)
			Decimal places menu	(→ 185)

Setup →	**Advanced setup →**	**Config. backup display →**	Operating time	(→ 186)
			Last backup	(→ 186)
			Configuration management	(→ 186)
			Comparison result	(→ 187)

Diagnostics →	Actual diagnostics			(→ 188)
	Previous diagnostics			(→ 188)
	Operating time from restart			(→ 188)
	Operating time			(→ 186)

Diagnostics →	**Diagnostics list →**	Diagnostics 1		(→ 190)
		Diagnostics 2		(→ 190)
		Diagnostics 3		(→ 190)
		Diagnostics 4		(→ 190)
		Diagnostics 5		(→ 190)

Diagnostics →	**Event logbook →**	Filter options	(→ 191)
		Event list	(→ 191)

Diagnostics →	**Device information →**	Device tag	(→ 193)
		Serial number	(→ 193)
		Firmware version	(→ 193)
		Extended order code	(→ 193)
		Extended order code 1	(→ 193)
		Extended order code 2	(→ 193)

Diagnostics →	**Measured value →**	Distance	(→ 149)
		Level linearized	(→ 195)
		Interface distance	(→ 150)
		Interface linearized	(→ 195)
		Interface thickness	(→ 195)
		Switch status	(→ 177)

Diagnostics →	**Measured value →**	**Analog input 1...5 →**	Block tag	(→ 196)
			Channel	(→ 196)
			Output state	(→ 196)
			Out value	(→ 196)
			Units index	(→ 197)

Diagnostics →	**Measured value →**	**Digital input 1...3 →**	Block tag	(→ 197)
			Channel	(→ 197)
			Output state	(→ 197)
			Out value	(→ 197)

Diagnostics →	**Data logging →**	Assign channel 1	(→ 198)
		Assign channel 2	(→ 198)
		Assign channel 3	(→ 198)
		Assign channel 4	(→ 198)
		Logging interval	(→ 198)
		Clear logging	(→ 199)
		Display channel 1	(→ 199)
		Display channel 2	(→ 199)
		Display channel 3	(→ 199)
		Display channel 4	(→ 199)

Diagnostics →	**Simulation →**	Assignment of measured variable	(→ 201)
		Value measured variable	(→ 201)
		Switch output simulation	(→ 201)
		Switch status	(→ 202)
		Simulation device alarm	(→ 202)

Diagnostics →	**Device check →**	Start device check	(→ 203)
		Result device check	(→ 203)
		Last check time	(→ 203)
		Level signal	(→ 203)
		Launch signal	(→ 204)
		Interface signal	(→ 204)

Diagnostics →	**Device reset →**	Restart (→ 205)

Expert	The "Expert" menu is described in the document GP01000F ("Description of device parameters").

19 Description of device parameters (operating menu)

- : Marks the navigation path to the parameter via the display and operating module.
- : Marks the navigation path to the parameter via an operating tool (e.g. FieldCare).
- : Marks parameters which can be locked via the software locking (→ 68).

Language

Navigation
Language
Display/operation → Language

Description
Language setting for the local display

Options
- English
- One additional operating language (see product structuture, feature 500, "Additional Operation Language")

Factory setting
English

19.1 "Display/operation" menu

This menu only appears if the device has a local display.

Access status display

Navigation

Display/operation → Access stat. disp.
Setup → Advanced setup → Access stat. disp.

Description

Use this function to view the access authorization to parameters via onsite operation. If a symbol appears in front of a parameter, the parameter cannot be changed via the local display with the current access authorization.

- The access authorization can be changed via the **Enter access code** parameter (→ 153).
- If additional write protection is active, this restricts the current access authorization even further. The write protection status can be viewed via the **Locking status** parameter (→ 141).

Display options

- Operator
- Maintenance

Additional information

For information on the "Operator" and "Maintenance" user roles: (→ 67)

Locking status

Navigation

Display/operation → Locking status
Setup → Advanced setup → Locking status

Description

Use this function to view the active write protection. If two or more types of write protection are active, the write protection with the highest priority is shown on the display.

The symbol appears in front of parameters that cannot be modified since they are write-protected.

Display options

- Hardware locked (priority 1)
  The DIP switch for hardware locking is activated on the main electronics module. This locks write access to the parameters (e.g. via local display or operating tool).
- Temporarily locked (priority 2)
  Write access to the parameters is temporarily locked on account of internal processes in progress in the device (e.g. data upload/download, reset etc.). The parameters can be modified as soon as the processes are complete.
- See access status (priority 3)
  The access authorization displayed in the **Access status display** parameter applies (→ 141).

Format display

Navigation

Display/operation → Format display
Setup → Advanced Setup → Display → Format display

Description

Use this function to select how the measured value is shown on the local display. The display format (size, bar graph etc.) and number of measured values displayed simultaneously (1 to 4) can be configured. This setting only applies to normal operation.

- The **Value 1 display - Value 4 display** parameters are used to specify what measured values are shown on the display and in what order (→ 179).
- If more measured values are specified than the display mode selected permits, the values alternate on the device display. The display time until the next change is configured using the **Display interval** parameter (→ 144).

Options

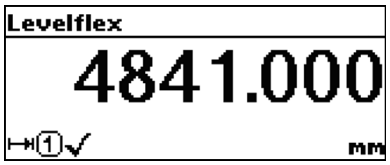
- 1 value, max. size
- 1 bargraph + 1 value
- 2 values
- 1 value large + 2 values
- 4 values

Factory setting

1 value, max. size

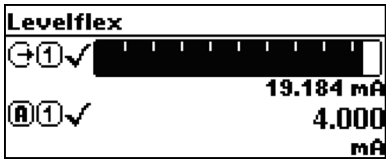
Additional information

1 value, max. size



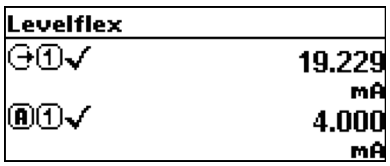
A0011948-EN

1 bargraph + 1 value



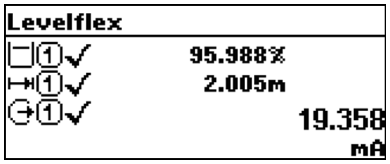
A0012011-EN

2 values



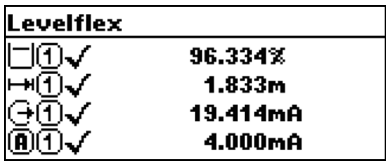
A0012013-EN

1 value large + 2 values



A0012016-EN

4 values



A0012019-EN

Contrast display

Navigation

Display/operation → Contrast display

Description

Use this function to adapt the display contrast to the ambient conditions (e.g. the lighting or reading angle).

Set the contrast via push-buttons:
- Brighter: press the ⊖ E buttons simultaneously
- Darker: press the ⊕ E buttons simultaneously

Input range

20 to 80 %

Factory setting 30 %

Display interval

Navigation Display/operation → Display interval
Setup → Advanced Setup → Display → Display interval

Description Use this function to set the length of time the measured values are displayed if the values alternate on the display. This type of alternating display only occurs automatically if the number of measured values defined exceeds the number of values the selected display format can display simultaneously.

- The **Value 1 display - Value 4 display** parameters are used to specify what measured values are shown on the display (→ 179).
- The display format of the displayed measured values is specified using the **Format display** parameter (→ 141).

Input range 1 to 10 s

Facotry setting 5 s

19.2 "Setup" menu

Operating mode

Navigation Setup → Operating mode

Conditions Only visible for devices with "interface measurement" application package (product structure: Feature 540 "Application package", Option EB "Interface measurement").

Description Defines the operating mode

Selection
- Level
- Interface

Factory setting Level

Distance unit

Navigation Setup → Distance unit

Description Defines the distance unit

Selection
- m
- ft
- in
- mm

Factory setting m

Tank type

Navigation Setup → Tank type
Setup → Advanced setup → Interface → Tank type

Description Defines the tank type

Selection
- Metallic
- Bypass/pipe
- Non metallic
- Mounted outside

Depending on the probe there may be further options.

Factory setting Depending on the type of probe.

Additional information For coax probes the "Tank type" is always fixed to "Coax".

Tube diameter

Navigation Setup → Tube diameter

Conditions Only visible if the following conditions are met:
- "Tank type" = "Bypass/pipe"
- The probe is coated.

Description Defines the diameter of the bypass or stilling well.

Input range 0 to 9999 mm (0 to 390 inch)

Factory setting 80 mm (3.15 inch)

Tank level

Navigation Setup → Tank level

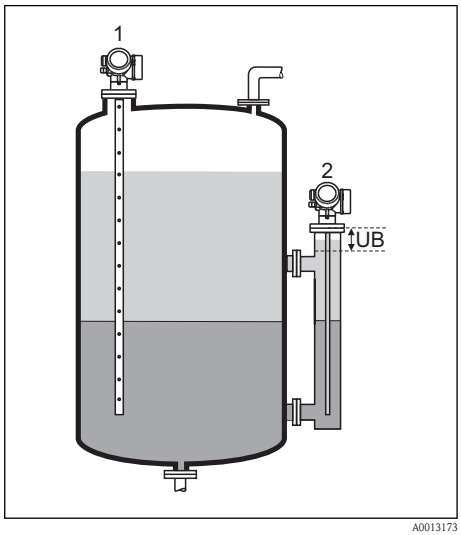
Conditions Only visible for devices with "interface measurement" application package (product structure: Feature 540 "Application package", Option EB "Interface measurement").

Description Selection of the tank level

Selection
- Partially filled
- Flooded

Factory setting Partially filled

Additional information
- Partially filled:
  The device searches for 2 echo signals, one for the interface and one for the total level.
- Flooded:
  The device searches for the interface level only. With this setting it is essential that the upper level signal always is within the upper blocking distance (UB) so that it is not evaluated by mistake.



A0013173

1 Partially filled
2 Flooded
UB Upper blocking distance

Distance upper connection

Navigation Setup → Distance upper connection

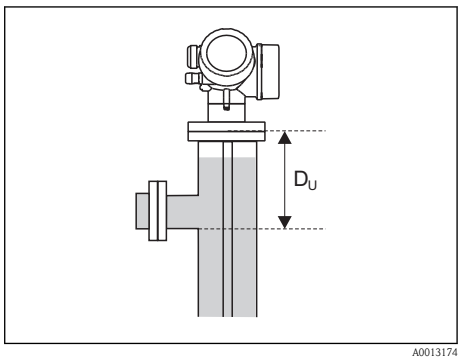
Conditions Only visible for devices with "Interface measurement" application package (Product structure: Feature 540 "Application package", option EB "Interface measurement")

Description Defines the distance D_U to the upper connection

Input range 0 to 9999 mm (0 to 390 inch)

Factory setting
- For "Tank level" = "Partially filled": 0 mm (0 ft)
- For "Tank level" = "Flooded": 250 mm (0.8202 ft)

Additional information
- For "Tank level" = "Partially filled" (typical selection for stilling well applications) this value has no significance. Therefore the standard setting (0 mm) can be kept.
- For "Tank level" = "Flooded" (typical selection for bypass applications) enter the distance D_U from the reference point of the measurement to the lower edge of the upper connection.



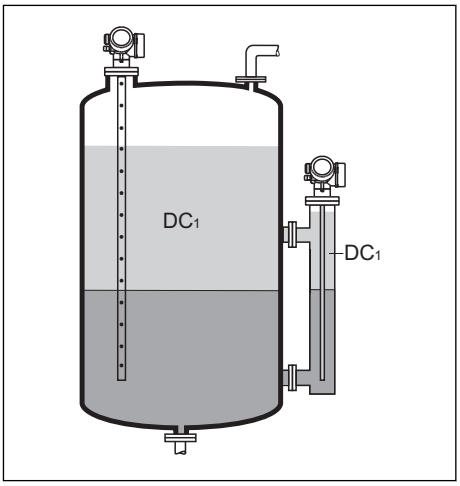
A0013174

DC value

Navigation Setup → DC value

Conditions Only visible for devices with "Interface measurement" application package (Product structure: Feature 540 "Application package", option EB "Interface measurement")

Description Defines the relative dielectric constant ε_r of the upper phase (DC_1).



Input range 0 to 20

Factory setting 1.9

Additional information Dielectric constants of important media commonly used in the industry are summarized in the document SD106F, which can be downloaded from the Endress+Hauser web page (www.endress.com).

Medium group

Navigation Setup → Medium group

Condition Only visible for "Operating mode" = "Level".

Description Defines the medium group of the measured product.

Selection
- Water bsed DC > 4
- Others DC ≥ 1.9

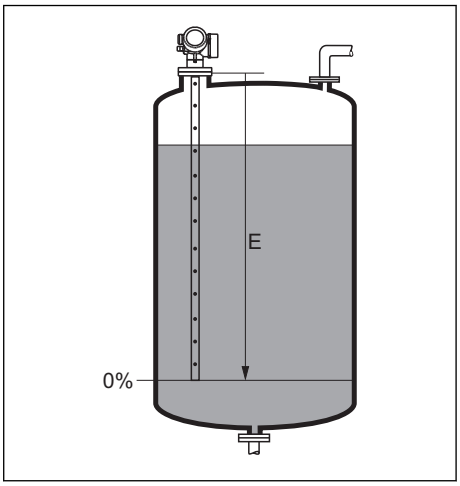
Factory setting Others DC ≥ 1.9

Empty calibration

Navigation Setup → Empty calibration

Description

Defines the empty calibration E.
E is the distance between the reference point (lower edge of the flange or threaded connection) and the minimum level (0%).



Input range

Depending on the selected distance unit and the probe.

Factory setting

Depending on the selected distance unit and the probe.

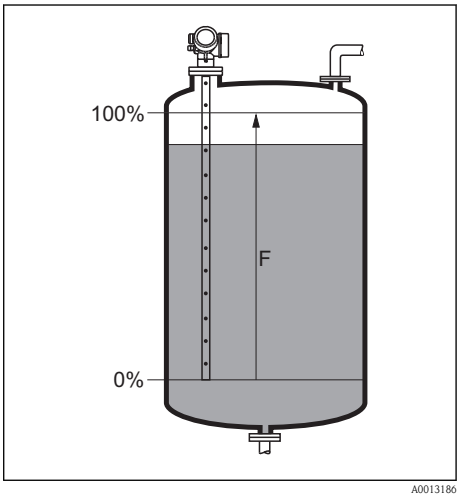
Full calibration

Navigation

Setup → Full calibration

Description

Defines the full calibration F.
F is the distance between the minimum level (0%) and the maximum level (100%).



Input range

Depending on the selected distance unit and the probe.

Factory setting

Depending on the selected distance unit and the probe.

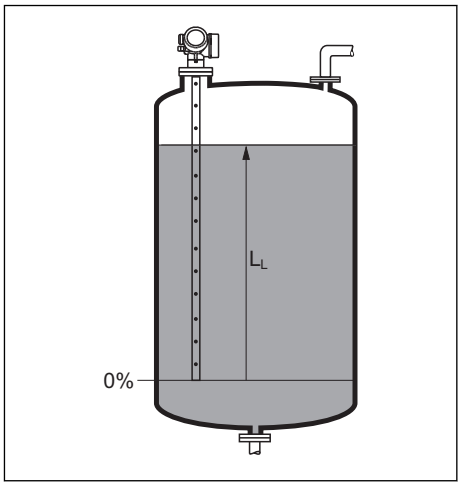
Level

Navigation

Setup → Level

Description

Displays the measured level L_L (before linearization)



Additional information

The value is displayed in the selected "Level unit" (→ 158).

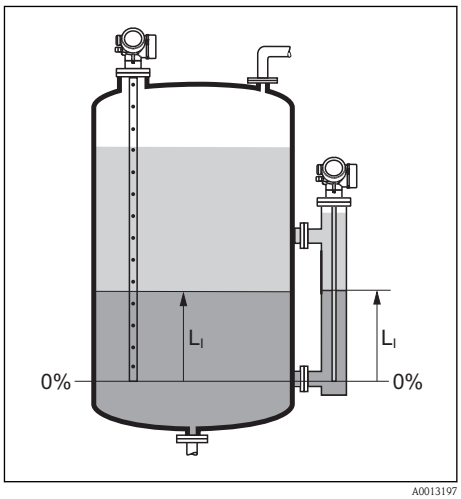
Interface

Navigation

Setup → Interface

Description

Displays the interface level L_I (before linearization)



Additional information

The value is displayed in the selected "Level unit" (→ 158).

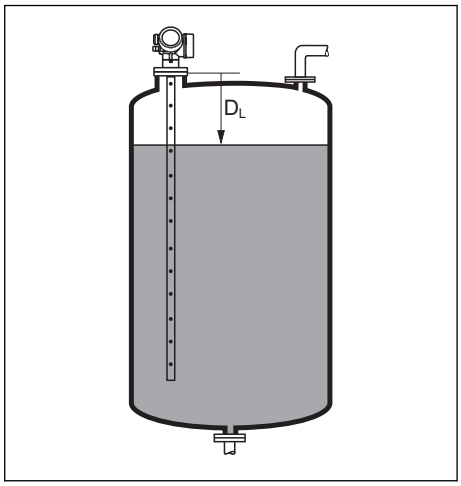
Distance

Navigation

Setup → Distance
Diagnostics → Measured val. → Distance

Description

Displays the measured distance D_L from the reference point (lower edge of the flange or threaded connection) to the level.



A0013198

Additional Information

The value is displayed in the selected "Level unit"(→ 158).

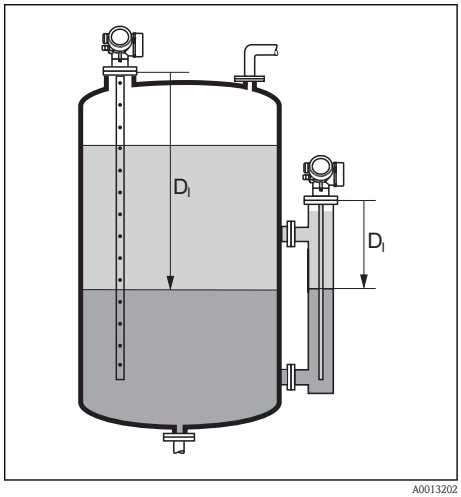
Interface distance

Navigation

Setup → Interface distance
Diagnostics → Measured val. → Interface distance

Description

Displays the measured distance D_I from the reference point (lower edge of the flange or threaded connection) to the interface layer.



A0013202

Additional Information

The value is displayed in the selected "Level unit" (→ 158).

Signal quality

Navigation

Setup → Signal quality

Description

Displays the signal quality

Display options

- Strong
  The evaluated echo exceeds the threshold by at least 10 mV
- Medium
  The evaluated echo exceeds the threshold by at least 5 mV.
- Weak
  The evaluated echo exceeds the threshold by less than 5 mV.
- No signal
  The device does not find a usable echo and generates the following error message
  – F941 if the **Alarm** option has been selected in the **Output echo lost** parameter (→ 170).
  – S941 if another option has been selected in the **Output echo lost** parameter (→ 170).

Additional information

The signal quality indicated in this parameter always refers to the currently evaluated echo: either the level/interface echo [1] or the end-of-probe echo. To differentiate between these two, the quality of the end-of-probe echo is always displayed in brackets.

1) Of these two echos the one with the lower quality is indicated.

19.2.1 "Mapping" sequence

Confirm distance

Navigation Setup → Mapping → Confirm distance

Description Confirmation whether the measured distance matches the actual distance. Depending on the selection, the device automatically determines the range over which the mapping will be recorded.

Selection

- Manual map
  To be selected if the range of mapping is to be defined manually in the **Mapping end point** parameter. In this case it is not necessary to confirm the distance.
- Distance ok
  To be selected if the measured distance matches the actual distance. The device performs a mapping and quits the sequence ("End of sequence" appears on the display).
- Distance unknown
  To be selected if the actual distance is unknown. A mapping can not be performed and the device quits the sequence ("End of sequence" appears on the display).
- Distance too small
  To be selected if the measured distance is smaller than the actual distance. The device performs a mapping and returns to the **Confirm distance** parameter. The distance is recalculated and displayed. The comparison must be repeated until the displayed distance matches the actual distance.
- Distance too big
  To be selected if the measured distance is bigger than the actual distance. The device adjusts the signal evaluation and returns to the **Confirm distance** parameter. The distance is recalculated and displayed. The comparison must be repeated until the displayed distance matches the actual distance.
- Tank empty
  To be selected if the tank is completely empty. The device records a mapping covering the complete length of the probe and quits the sequence ("End of sequence" appears on the display).
- Delete all
  To be selected if the present mapping curve (if one exists) is to be deleted. The device returns to the **Confirm distance** parameter and a new mapping can be recorded.

Factory setting Distance unknown

Additional information For reference purposes the measured distance is displayed together with this parameter.
For interface measurements the distance always refers to the total level (not to the interface level).

If the teaching procedure **Distance too small** or **Distance too big** is quit before the distance has been confirmed, a map is **not** recorded and the teaching procedure is reset after 60 s.

For FMP54 with gas phase compensation (product structure: feature 540 "Application Package", option EF or EG) a map must NOT be recorded.

Mapping end point

Navigation Setup → Mapping → Map. end point

Condition Only visible if the **Manual map** option has been selected in the **Confirm distance** parameter.

Description Definition of the distance up to which the mapping curve will be recorded.

Input range 0.1 m (0.33 ft) to length of probe (LN)

Factory setting 0.1 m (0.33 ft)

Additional information The distance is measured from the reference point, i.e. from the lower edge of the mounting flange or the threaded connection.
For reference purposes the **Present mapping** parameter is displayed together with this parameter. **Present mapping** states up to which distance a mapping has already been recorded.

Record map

Navigation Setup → Mapping → Record map

Conditions Only visible if a value has been entered into the **Mapping end point** parameter.

Description Starts the recording of the map.

Selection
- No
  The map is not recorded. The device quits the sequence ("End of sequence" is displayed).
- Record map
  The map is recorded. When the recording is completed, the new measured distance and the new mapping range appear on the display. These values must be confirmed by pressing ✓. The device quits the sequence. ("End of sequence" is displayed.)
- Delete all
  The mapping (if one exists) is deleted and the device displays the recalculated measured distance and the mapping range. These values must be confirmed by pressing ✓. The device quits the sequence. "End of sequence" is displayed.

Factory setting No

19.2.2 "Advanced setup" submenu

Locking status (→ 141)

Access status display (→ 141)

Enter access code

Navigation Setup → Advanced setup → Enter access code

Description

Use this function to enable write-protected parameters via local operation or an operating tool.
For local operation, the customer-specific access code defined in the **Define access code** parameter is entered (→ 154). If an incorrect access code is entered, the user retains his current access authorization.
The write protection affects all parameters marked with the symbol in the document. On the local display, the symbol in front of a parameter indicates that the parameter is write-protected.
If no key is pressed for 10 minutes, or the user goes from the navigation and editing mode back to the measured value display mode, the device automatically locks the write-protected parameters after another 60 s .

Please contact your Endress+Hauser Sales Center if you lose your access code

Input range

0 to 9999

Define access code

Navigation

Setup → Advanced setup → Define access code

Description

Use this function to restrict write-access to parameters to protect the configuration of the device against unintentional changes via local operation. A user-specific access code is specified for this purpose.
The write protection affects all parameters marked with the symbol in the document. On the local display, the symbol in front of a parameter indicates that the parameter is write-protected.

Once the access code has been defined, write-protected parameters can only be modified if the access code is entered in the **Enter access code** parameter (→ 153).

Changing the access code
- Enter the current access code in the **Enter access code** parameter and confirm.
- Define the new access code.

Please contact your Endress+Hauser Sales Center if you lose your access code

Input range

0 to 9999

Factory setting

0

Additional information

User entry
A message is displayed if the access code is not in the input range.

Factory setting
If the factory setting is not changed or 0 is defined as the access code, the parameters are not write-protected and the configuration data of the device can then always be modified. The user is logged on in the role of *Maintenance* .

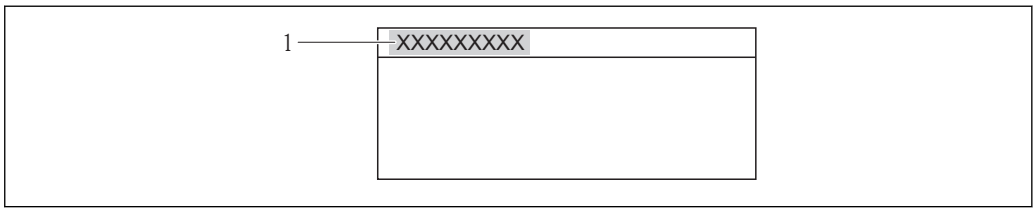
Device tag

Navigation

Setup → Advanced Setup → Device tag

Description

Use this function to enter a unique name for the measuring point so it can be identified quickly within the plant. The name is displayed in the header:



1 Header text

Input range

Max. 32 characters, such as letters, numbers or special characters (e.g. @, %, /)

Factory setting

Levelflex

The "Level" submenu

This submenu is only visible for "Operating mode" = "Level".

Medium type

Navigation Setup → Advanced Setup → Level → Medium type

Description Defines the type of medium

Options
- Liquid
- Solid

Factory setting Liquid

Medium property

Navigation Setup → Advanced Setup → Level → Medium property

Description Defines the dielectric constant

Options
- Unknown
- DC 1.4 ... 1.6
- DC 1.6 ... 1.9
- DC 1.9 ... 2.5
- DC 2.5 ... 4
- DC 4 ... 7
- DC 7 ... 15
- DC > 15

Factory setting Unknown

Additonal information Dielectric constants of important media commonly used in the industry are summarized in the document SD106F, which can be downloaded from the Endress+Hauser web page (www.endress.com).

Process property

Navigation Setup → Advanced Setup → Level → Process property

Description Defines a typical rate of level change

Options

For "Medium type" = "Liquid"
- Fast > 1 m(40")/min
- Standard < 1 m(40")/min
- Medium < 10 cm(4")/min
- Slow < 1 cm(0.4")/min
- No filter

For "Medium type" = "Solid"
- Fast > 10 m(33ft)/h
- Standard < 10 m(33ft)/h
- Medium < 1 m(3ft)/h
- Slow < 0.1 m(0.3ft)/h
- No filter

Factory setting

Standard < 1m(40")/min

Additional information

The device adjusts the signal evaluation filters and the damping of the output signal to the typical rate of level change defined in this parameter:

For "Medium type" = "Liquid"

Process property	**Step response time [s]**
Fast > 1m(40")/min	3
Standard < 1 m(40")/min	13
Medium < 10 cm(4")/min	38
Slow < 1 cm(0.4")/min	73
No filter	< 0.8

For "Medium type" = "Solid"

Process property	**Step response time [s]**
Fast > 10 m(33ft)/h	37
Standard < 10 m(33 ft)/h	74
Medium < 1 m(3ft)/h	145
Slow < 0.1 m (0.03ft)/h	290
No filter	< 0.8

Advanced conditions

Navigation

Setup → Advanced setup → Level → Adv. conditions

Description

Defines additional process conditions (if necessary)

Options
- Build up
- None

Additionally for "Medium type" = "Liquid"
- Emulsion layer
- Probe near bottom

Factory setting

None

Additional information "Advanced conditions" should only be applied in the "Level" operating mode.
For two-phase media the "Emulsion layer" option ensures that always the total level is detected (Example: Oil/condensate application).
The "Probe near bottom" option helps to improve the empty detection, especially if the probe is mounted close to the tank bottom.

Level unit

Navigation Setup → Advanced setup → Level → Level unit

Description Defines the level unit

Options
- %
- m
- mm
- ft
- in

Factory setting %

Additional information The level unit may differ from the distance unit as defined in the **Distance unit** parameter (→ 144):
- The distance unit is used for the basic calibration ("Empty calibration" and "Full calibration").
- The level unit is used to display the (unlinearized) level.

Blocking distance

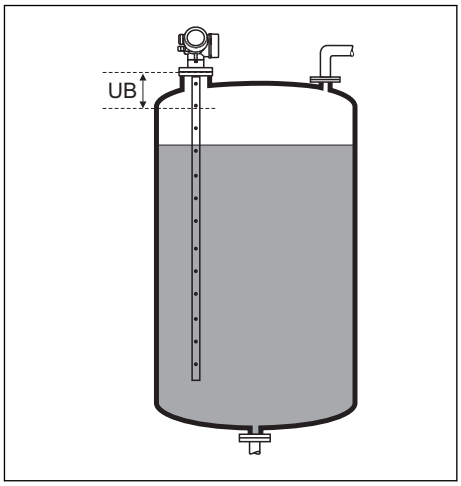
Navigation Setup → Advanced setup → Level → Blocking dist.
Setup → Advanced setup → Safety settings → Blocking dist.

Description Defines the upper blocking distance UB

Input range 0 to 200 mm (0 to 7.8 in)

Factory setting For level measurement:
- with coax probes: 0 mm
- with rod and rope probes up to 8 m (26 ft): 200 mm (8")
- with rod and rope probes exceeding 8 m (26 ft): 0,025 * (length of probe)

Additional information No echos are evaluated within the blocking distance UB. Therefore, UB can be used to suppress interference echos within the upper end of the probe.



Level correction

Navigation Setup → Advanced setup → Level → Level correction

Description Defines a level correction

Input range **Depending on the selected level unit:**
- -100,0 to 100,0 %
- -200,0 to +200,0 m
- -656,2 to +656,2 ft
- -7874,0 to +7874,0 inch
- -200.000,0 to +200.000,0 mm

Factory setting 0%

Additional information The value specified in this parameter is added to the measured level (before linearization).

The "Interface" submenu

This submenu is only visible for "Operating mode" = "Interface".

Process property

Navigation Setup → Advanced Setup → Interface → Process property

Description Defines a typical rate of level change

Options
- Fast > 1 m(40")/min
- Standard < 1 m(40")/min
- Medium < 10 cm(4")/min
- Slow < 1 cm(0.4")/min
- No filter

Factory setting Standard < 1m(40")/min

Additional information The device adjusts the signal evaluation filters and the damping of the output signal to the typical rate of level change defined in this parameter:

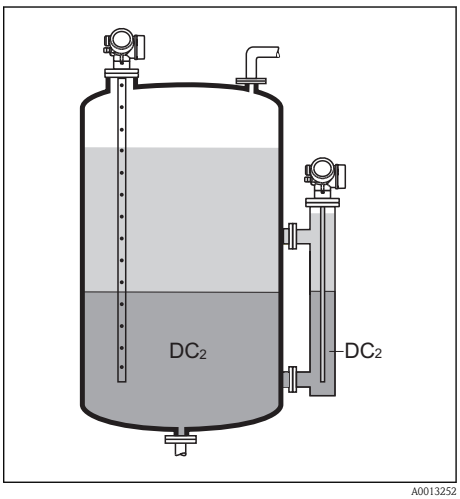
For interface measurements

Process property	Step response time [s]
Fast > 1m(40")/min	5
Standard < 1 m(40")/min	15
Medium < 10 cm(4")/min	40
Slow < 1 cm(0.4")/min	74
No filter	2.2

DC lower medium

Navigation Setup → Advanced setup → Interface → DC lower medium

Description Defines the dielectric constant of the lower medium (DC_2)



Input range 10 ... 100

Factory setting 80 (Dielelectric constant of water at 20 °C / 68 °F)

Additional information Dielectric constants of important media commonly used in the industry are summarized in the document SD106F, which can be downloaded from the Endress+Hauser web page (www.endress.com).

Level unit

Navigation Setup → Advanced setup → Interface → Level unit

Description Defines the level unit

Options
- %
- m
- mm
- ft
- in

Factory setting %

Additional information The level unit may differ from the distance unit as defined in the **Distance unit** parameter (→ 144):
- The distance unit is used for the basic calibration ("Empty calibration" and "Full calibration").
- The level unit is used to display the (unlinearized) level.

Blocking distance

Navigation Setup → Advanced setup → Interface → Blocking dist.
Setup → Advancede setup → Safety settings → Blocking dist.

Desription Defines the upper blocking distance, UB

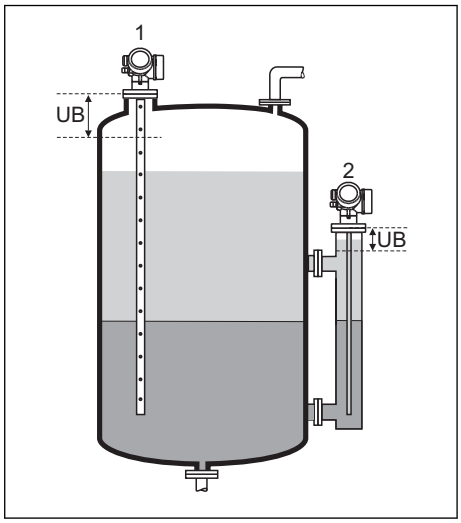
Input range 0 to 200 mm (0 to 7.8 in)

Factory setting 0 m (0 ft)

Additional information

Echoes from within the blocking distance are not taken into account in the signal evaluation. The upper blocking distance is used

- to suppress interference echoes at the top end of the probe (1).
- to suppress the echo of the total level in the case of flooded bypasses (2).



Level correction

Navigation Setup → Advanced setup → Interface → Level correction

Description Defines the level correction

Input range

Depending on the selected level unit:
- -100,0 ... 100,0 %
- -200,0 ... +200,0 m
- -656,2 ... +656,2 ft
- -7874,0 ... +7874,0 inch
- -200.000,0 ... +200.000,0 mm

Factory setting 0%

Additional information The value specified in this parameter is added to the measured total and interface level.

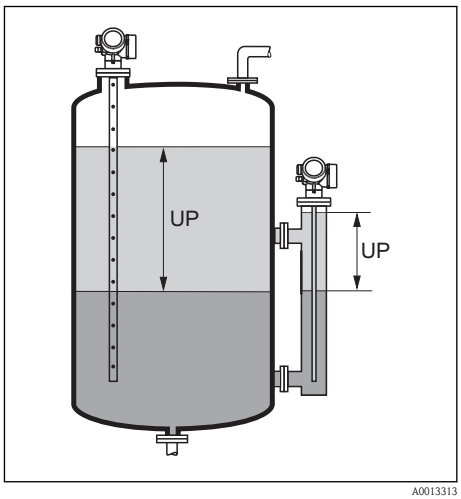
The "Automatic DC calculation" sequence

If – in the case of interface measurements – the thickness of the upper medium is known at a certain point of time (e.g. through a manual measurement), the **Automatic DC calculation** sequence can be used to calculate the dielectric constant of the upper medium.

Manual interface thickness

Navigation Setup → Advanced setup → Interface → Autom. DC calc. → Man. int. thickn.

Meaning Input of the manually determined interface thickness UP (i.e. the thickness of the upper medium).



A0013313

Input 0 to 200 m (0 to 656 ft)

Factory setting 0 m (0 ft)

Additional information The measured interface thickness is indicated on the display together with the manual interface thickness. By comparing these two values the device can automatically adjust the DC value of the upper medium.

DC value

Navigation Setup → Advanced setup → Interface → Autom. DC calc. → DC value

Meaning Displays the DC of the upper medium (before correction).

Calculated DC

Navigation Setup → Advanced setup → Interface → Autom. DC calc. → Calcul. DC

Meaning Displays the calculated DC of the upper medium.

Use calculated DC

Navigation Setup → Advanced setup → Interface → Autom. DC calc. → Use calc. DC

Meaning Confirm if the automatically calclualted DC is to be used.

Selection
- Save and exit
  The calculated DC is accepted. The device quits the sequence ("End of sequence" is displayed).
- Cancel and exit
  The calculated DC is rejected; the device continues to use the old DC and quits the sequence ("End of sequence" is displayed).
- Re-input thickness
  The calculated DC is rejected. The device returns to the **Manual interface thickness** parameter, so that a corrected value of the manual interface thickness can be entered.

Factory setting Cancel and exit

Additional information The calculated DC is indicated on the display together with this parameter.

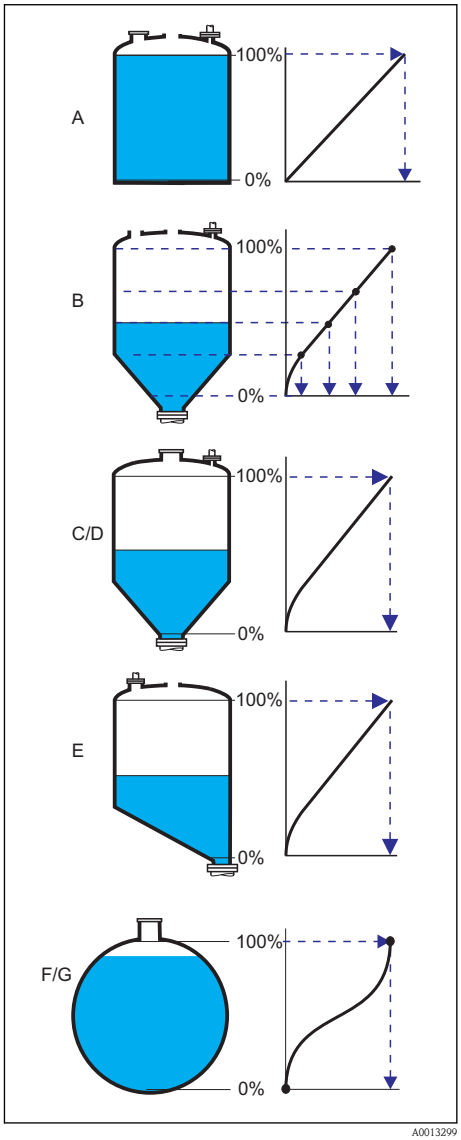
The "Linearization" submenu

Linearization type

Navigation Setup → Advanced setup → Linearization → Linearization type

Description Defines the type of linearization

Selection
- None
  The level is transmitted to the output without linearization.
- Linear (A)
- Table (B)
- Pyramid bottom (C)
- Conical bottom (D)
- Angled bottom (E)
- Horizontal cylinder (F)
- Sphere (G)



Factory setting None

Unit linearized

Navigation Setup → Advanced setup → Linearization → Unit linearized

Condition Only visible if a linearization has been selected (i.e. **Linearization type** ≠ **None**)

Description Defines the unit of the linearized value.

Selection
- Free text
- t
- lb
- ton
- kg
- impGal
- UsGal
- cf
- cm^3
- dm^3
- m^3
- hl
- l
- %

Factory setting %

Additional information The selected unit is only used to be indicated on the display. The measured value is **not** transformed according to the selected unit.

Free text

Navigation Setup → Advanced setup → Linearization → Free text

Condition Only visible for **Unit lienarized** = **Free text**.

Description Definiton of the unit

Input range Up to 32 alphanumerical characters (letters, numbers, special characters)

Factory setting **Free text**

Maximum value

Navigation Setup → Advanced setup → Linearization → Maximum value

Condition Only visible if one of the following linearization types has been selected:
- Linear
- Pyramid bottom
- Conical bottom
- Angled bottom
- Horizontal cylinder
- Sphere

Description Definition of the maximum content of the vessel (100%), as measured in the **Unit linearized**.

Input range -50000 ... +50000

Factory setting 100

Diameter

Navigation Setup → Advanced setup → Linearization → Diameter

Condition Only visible if one of the following linearization types has been selected:
- Horizontal cylinder
- Sphere

Description Definition of the tank diameter

Input range 0 ... 9999.999 m (32808 ft)

Factory setting 2 m (6.6 ft)

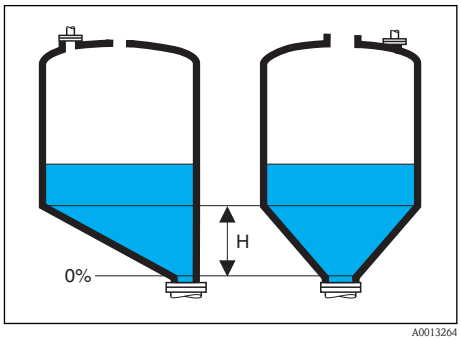
Additional information The value must be specified in the selected distance unit (→ 144).

Intermediate height

Navigation Setup → Advanced setup → Linearization → Intermediate height

Condition Only visible if one of the following linearization types has been selected:
- Pyramid bottom
- Conical bottom
- Angled bottom

Description Definition of the intermediate height H



Input range 0 to 200 m (0 to 656 ft)

Factory setting 0 m (0 ft)

Additional information The value must be specified in the selected distance unit (→ 144).

Table mode

Navigation Setup → Advanced setup → Linearization → Table mode

Condition Only visible if the "Table" linearization type has been selected.

Description Defines the method used to enter linearization points into the table.

Selection
- Manual
  The level and the associated linearized value are entered manually for each linearization point.
- Semi-automatic
  The level is measured by the device for each linearization point. The associated linearized value is entered manually.
- Clear table
  Deletes the existing linearization table.
- Sort table
  Rearranges the linerization points into an ascending order.

Factory setting Manual

Additional information Conditions the linearization table must meet:
- The table may consist of up to 32 pairs of values "Level - Linearized Value".
- The table must be monotonic (monotonically increasing or decreasing).
- The first linearization point must refer to the minimum level.
- The last linearization point must refer to the maximum level.

Table number

Navigation Setup → Advanced setup → Linearization → Table number

Condition Only visible if the "Table" linearization type has been selected.

Description Index of the linearization point which is entered in the subsequent parameters.

Input range 1 ... 32

Factory setting 1

Level

Navigation Setup → Advanced setup → Linearization → Level

Condition Only visible if the "Table" linearization type has been selected.

Description Definition or display of the (unlinearized) level of the respective linearization point.

Input range Depending on the parametrized measuring range. See the parameters **Empty calibration** (→ 147) and **Full calibration** (→ 148).

Factory setting 0

Additional information For **Table mode** = **Manual**: **Level** is a writable parameter.
For **Table mode** = **Semi-automatic**: **Level** is a read-only parameter.

Customer value

Navigation Setup → Advanced setup → Linearization → Customer value

Condition Only visible if the "Table" linearization type has been selected.

Description Specification of the linearized value of the respective linearization point.

Input range $-3{,}0 \times 10^{38}$ ... $+3{,}0 \times 10^{38}$

Factory setting 0

Activate table

Navigation Setup → Advanced setup → Linearization → Activate table

Condition Only visible if the "Table" linearization type has been selected.

Description Enables or disables the linearization table.

Selection
- Disable
  A linearization is not calculated. If the **Linearization type** parameter has been set to **Table**, the error message F435 is generated.
- Enable
  The measured value is linearized according to the table before being sent to the output.

Factory setting Disable

Additional information When editing the table, this parameter is automatically reset to the **Disable** option. After finishing the editing procedure it must be set to the **Enable** option again.

The "Safety settings" submenu

Output echo lost

Navigation Setup → Advanced setup → Safety settings → Output echo lost

Description Defines the output signal in the case of a lost echo.

Selection
- Last valid value
  The last valid value is kept in the case of a lost echo.
- Ramp echo lost
  In the case of a lost echo the output value is continously shifted towards 0% or 100%. The slope of the ramp is defined in the **Ramp echo lost** parameter.
- Value echo lost
  In the case of a lost echo the output assumes the value defined in the **Value echo lost** parameter.
- Alarm
  In the case of a lost echo the device generates an alarm and the output assumes the value defined in the **Failure mode** parameter .

Factory settings Last valid value

Value echo lost

Navigation Setup → Advanced setup → Safety settings → Value echo lost

Condition Only visible if the **Value echo lost** option has been selected in the **Output echo lost** parameter.

Description Defines the constant output value in the case of a lost echo.

Input range 0 to 200000

Factory setting 0

Additional information The unit is the same as for the output value:
- Without linearization: As defined in the **Level unit** parameter (→ 158).
- With linearization: As defined in the **Unit linearized** parameter (→ 165).

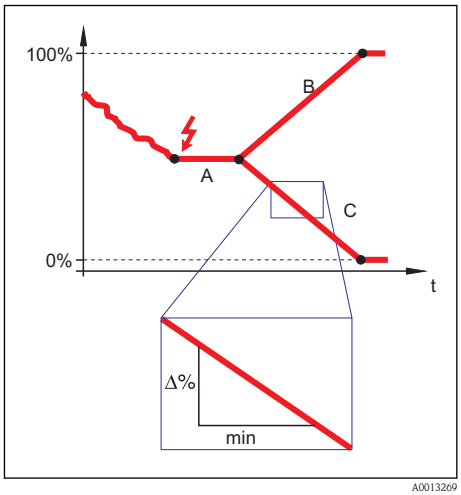
Ramp echo lost

Navigation Setup → Advanced setup → Safety settings → Ramp echo lost

Condition Only visible if the **Ramp echo lost** option has been selected in the **Output echo lost** parameter.

Description

Defines the slope of the ramp in the case of a lost echo.



A Delay echo lost
B Ramp echo lost (positive value)
C Ramp echo lost (negative value)

Input range

-9999999,0 to + 9999999,0 %/min

Factory setting

0 %/min

Additional information

- The unit for the slope of the ramp is "percentage of the measuring range per minute" (%/min).
- For a negative slope of the ramp: The measured value is continuously decreased until it reaches 0%.
- For a positive slope of the ramp: The measured value is continuosly increased until it reaches 100%.

Blocking distance (→ 158)

The "Probe length correction" sequence

The **Probe length correction** sequence helps to ensure that the end of probe signal within the envelope curve is correctly assigned by the evaluation algorithm. The assignment is correct if the length of probe indicated by the device matches the acutal lenght of the probe. The automatic probe length correction can only be performed if the probe is installed in the vessel and is completely uncovered (no medium). For partially filled vessels and if the probe length is known, select the **Manual input** option in the **Confirm length** parameter in order to enter the value manually.

If a mapping (interference echo suppression) has been recorded after shortening the probe, it is no longer possible to perform an automatic probe length correction. In this case there are two options:

- Delete the map (→ 152) before performing the automatic probe length correction. Thereafter a new map can be recorded.
- Alternative: Select the **Manual input** option in the **Confirm length** parameter and enter the probe length manually into the **Present length** parameter.

In the case of a grounded end of probe the **Positive EOP** option must be selected in the **Expert → Sensors → EOP evaluation → EOP search mode** parameter. Otherwise the automatic probe length correction will not work.

Confirm length

Navigation

Setup → Advanced setup → Probe length corr. → Confirm length

Description

Confirm whether the value indicated in the **Present length** parameter matches the actual length of the probe.

Selection

- Probe length OK
  To be selected if the indicated length is correct. An adjustment is not required. The device quits the sequence. ("End of sequence" is displayed).
- Length too small
  To be selected if the indicated length is smaller than the actual length of the probe. A different end of probe signal is allocated and the newly calculated length is indicated in the **Present length** parameter. This procedure has to be repeated until the displayed value matches the actual length of the probe.
- Length too big
  To be selected if the indicated length is bigger than the actual length of the probe. A different end of probe signal is allocated and the newly calculated length is indicated in the **Present length** parameter. This procedure has to be repeated until the displayed value matches the actual length of the probe.
- Probe covered
  To be selected if the probe is (partially or completely) covered. A probe length correction is impossible in this case. The device quits the sequence. ("End of sequence" is displayed.)
- Manual input
  To be selected if no automatic probe length correction is to be performed. Instead, the **Present length** parameter appears and the actual length must be entered manually.
  In the DTM **Manual input** needs not to be selected explicitly. Here, manual editing of the probe length is always possible.
- Length unknown
  A probe length correction is impossible in this case. The device quits the sequence. ("End of sequence" is displayed.)

Factory setting

Probe length OK

Present length

Navigation Setup → Advanced setup → Probe length corr. → Pres. length

Description Depending on the parametrization:

- In most cases:
  Displays the measured length of probe (according to the detected end of probe signal).
- Only for **Confirm length** = **Manual input**:
  Input parameter for the actual length of the probe.

Input range 0 to 200 m (0 to 656 ft)

Factory setting 4 m (13 ft)

"Switch output" submenu

Switch output function

Navigation Setup → Advanced setup → Switch output → Switch output function

Description Defines the function of the switch output (open collector).

Options

- Off
  The output is always open (not conductive).
- On
  The output is always closed (conductive).
- Event level
  The output is normally closed and is only opened if a diagnostic event is present. The **Assign diagnostic level** (→ 174) parameter determines at which type of event the output is opened.
- Limit
  The output is normally closed and is only opened if a measured varaible exceeds or falls below a defined limit. The limit values are defined by the parameters **Assign limit** (→ 174), **Switch-on value** (→ 175)and **Switch-off value** (→ 175).
- Digital output
  The switching state of the output tracks the output value of a DI function block. The function block is selected in the **Assign status** parameter.

Factory setting Off

Assign status

Navigation Setup → Advanced setup → Switch output → Assign status

Prerequisite Only visible for **Switch output function** = **Digital output**.

Description Allocates a DI block to the switch output.

Options
- Off
  No digital block is allocated.
- Digital output 1
- Digital output 2
- Digital output 3
- Digital output 4

Factory setting Off

Assign limit

Navigation Setup → Advanced setup → Switch output → Assign limit

Prerequisite Only visible for **Switch output function** = **Limit**.

Description Defines the variable to be checked for limit transgression and allocates it to the switch output.

Options
- Off
  No measured variable is allocated.
- Level linearized
- Distance
- Interface linearized
- Interface distance
- Upper interface thickness
- Terminal voltage
- Electronic temperature
- Relative echo amplitude
- Relative interface amplitude

Factory setting Off

Assign diagnostic level

Navigation Setup → Advanced setup → Switch output → Assign diagnostic level

Prerequisite Only visible for **Switch output function** = **Event level**.

Description Defines to which class of diagnostic events the output reacts.

Options
- Alarm
- Alarm + warning
- Warning

Factory setting Alarm

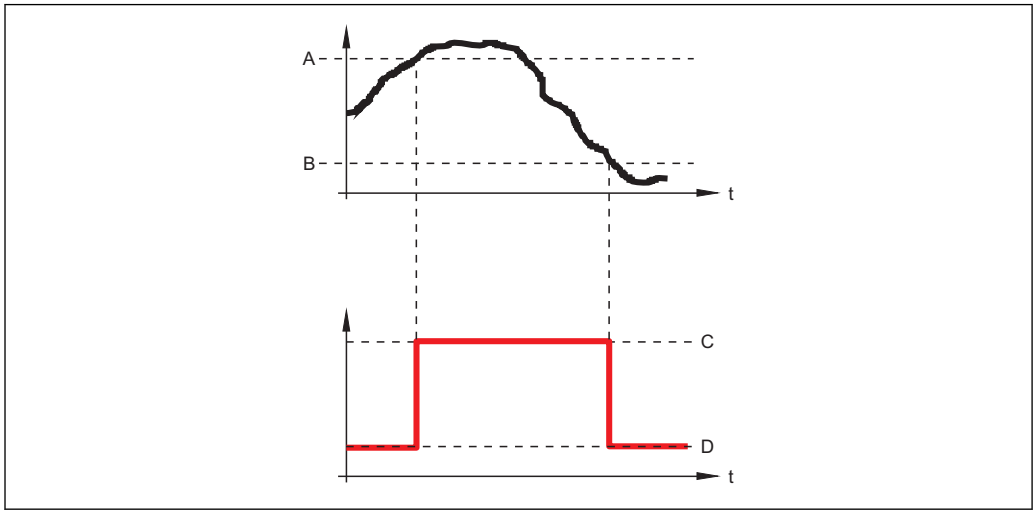
Switch-on value
Switch-off value

Navigation	Setup → Advanced setup → Switch output → Switch-on value / Switch-off value
Prerequisite	Only visible for **Switch output function** = **Limit** and **Assign limit** ≠ **Off**.
Description	Define the switch-on point and switch-off point for the limit evaluation.
Range of values	Depending on the selected measuring variable (Parameter **Assign limit**).
Factory setting	Depending on the selected measuring variable (Parameter **Assign limit**).

Additional information

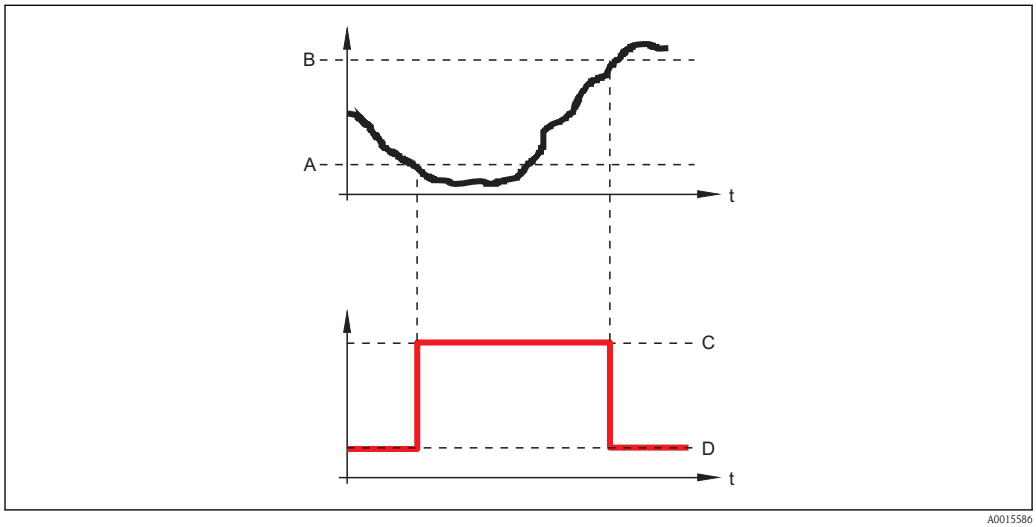
The switching behavior depends on the relative position of the two switch points.

Switch-on point > Switch-off point:
The output is closed if the measured value exceeds the switch-on point.
The output is opened if the measured value falls below the switch-off point.



A Switch-on point
B Switch-off point
C Output closed
D Output opened

Switch-on point < Switch-off point:
The output is closed if the measured value falls below the switch-on point.
The output is opened if the measured value exceeds the switch-off point.



A Switch-on point
B Switch-off point
C Output closed
D Output opened

Switch-on delay

Navigation

Setup → Advanced setup → Switch output → Switch-on delay

Prerequisite Only visible for **Switch output function** = **Limit** and **Assign limit** ≠ **Off**.

Description Defines the delay for the switching on of the output.

Range of values 0 to 100 s

Factory setting 0 s

Switch-off delay

Navigation Setup → Advanced setup → Switch output → Switch-off delay

Prerequisite Only visible for **Switch output function** = **Limit** and **Assign limit** ≠ **Off**.

Description Defines the delay for the switching off of the output.

Range of values 0 to 100 s

Factory setting 0 s

Switch output failure mode

Navigation Setup → Advanced setup → Switch output → Switch output failure mode

Description Defines the switching state of the output in the case of an error.

Options
- Actual status
  The switch output remains in the state it was in when the error occurred
- Open
- Closed

Factory setting Open

Switch status

Navigation Setup → Advanced setup → Switch output → Switch status
Diagnostics → Measured value → Switch status

Description Indicates the current state of the switch output.

Display options
- Open
- Closed

Invert output signal

Navigation Setup → Advanced setup → Switch output → Invert output signal

Description Allows to invert the behavior of the switch output.

Options
- No
  The behavior of the switch output is as described above.
- Yes
  The states **Opend** and **Closed** are inverted as compared to the description above.

The "Display" submenu

For operating tools: The **Display** submenu is only visible if a display module is connected to the device.

Format display (→ 141)

Value 1 display

Navigation Setup → Advanced setup → Display → Value 1 display

Description Use this function to select one of the measured values to be shown on the local display. If several measured values are displayed at once, the measured value selected here will be the first value to be displayed. The value is only displayed during normal operation.

The **Format display** parameter is used to specify how many measured values are displayed simultaneously and how (→ 141).

Options
- None
- Level linearized
- Distance
- Interface (only for **Operating mode** = **Interface** or **Interface with capacitance**)
- Interface distance (only for **Operating mode** = **Interface** or **Interface with capacitance**)
- Upper interface thickness (only for **Operating mode** = **Interface** or **Interface with capacitance**)
- Current output 1
- Current output 2
- Measured current
- Terminal voltage
- Electronics temperature

Factory setting

For level measurements
Level linearized

For interface measurements
Interface

Decimal places 1

Navigation Setup → Advanced setup → Display → Decimal places 1

Prerequisite A measured value is specified in the **Value 1 display** parameter (→ 179).

Description Use this function to specify the number of decimal places for measured value 1. This setting does not affect the measuring or computational accuracy of the device. The arrow displayed between the measured value and the unit indicates that the device computes with more digits than are shown on the local display.

Options
- x
- x.x
- x.xx
- x.xxx
- x.xxxx

Factory setting
x.xx

Value 2 display

Navigation
Setup → Advanced setup → Display → Value 2 display

Description
Use this function to select one of the measured values to be shown on the local display. If several measured values are displayed at once, the measured value selected here will be the second value to be displayed. The value is only displayed during normal operation.

The **Format display** parameter is used to specify how many measured values are displayed simultaneously and how (→ 141).

Options
- None
- Level linearized
- Distance
- Interface (only for **Operating mode** = **Interface** or **Interface with capacitance**)
- Interface distance (only for **Operating mode** = **Interface** or **Interface with capacitance**)
- Upper interface thickness (only for **Operating mode** = **Interface** or **Interface with capacitance**)
- Current output 1
- Current output 2
- Measured current
- Terminal voltage
- Electronics temperature

Factory setting
For level measurements
Distance

For interface measurements
Level linearized

Decimal places 2

Navigation
Setup → Advanced setup → Display → Decimal places 2

Prerequisite
A measured value is specified in the **Value 2 display** parameter (→ 180).

Description
Use this function to specify the number of decimal places for measured value 2. This setting does not affect the measuring or computational accuracy of the device. The arrow displayed between the measured value and the unit indicates that the device computes with more digits than are shown on the local display.
Defines the number of decimal places for the second display value.

Options
- x
- x.x
- x.xx
- x.xxx
- x.xxxx

Factory setting
x.xx

Value 3 display

Navigation
Setup → Advanced setup → Display → Value 3 display

Description
Use this function to select one of the measured values to be shown on the local display. If more than two measured values are displayed at once, the measured value selected here will be the third value to be displayed. The value is only displayed during normal operation.

The **Format display** parameter is used to specify how many measured values are displayed simultaneously and how (→ 141).

Options
- None
- Level linearized
- Distance
- Interface (only for **Operating mode** = **Interface** or **Interface with capacitance**)
- Interface distance (only for **Operating mode** = **Interface** or **Interface with capacitance**)
- Upper interface thickness (only for **Operating mode** = **Interface** or **Interface with capacitance**)
- Current output 1
- Current output 2
- Measured current
- Terminal voltage
- Electronics temperature

Factory setting
For level measurements
Current output 1

For interface measurements and 1 current output
Upper interface thickness

For interface measurements and 2 current outputs
Current output 1

Decimal places 3

Navigation
Setup → Advanced setup → Display → Decimal places 3

Prerequisite
A measured value is specified in the **Value 3 display** parameter (→ 181).

Description
Use this function to specify the number of decimal places for measured value 3. This setting does not affect the measuring or computational accuracy of the device. The arrow displayed between the measured value and the unit indicates that the device computes with more digits than are shown on the local display.

Options
- x
- x.x
- x.xx
- x.xxx
- x.xxxx

Factory setting
x.xx

Value 4 display

Navigation
Setup → Advanced setup → Display → Value 4 display

Description
Use this function to select one of the measured values to be shown on the local display. If four measured values are displayed at once, the measured value selected here will be the fourth value to be displayed. The value is only displayed during normal operation.

The **Format display** parameter is used to specify how many measured values are displayed simultaneously and how (→ 141).

Options
- None
- Level linearized
- Distance
- Interface (only for **Operating mode** = **Interface** or **Interface with capacitance**)
- Interface distance (only for **Operating mode** = **Interface** or **Interface with capacitance**)
- Upper interface thickness (only for **Operating mode** = **Interface** or **Interface with capacitance**)
- Current output 1
- Current output 2
- Measured current
- Terminal voltage
- Electronics temperature

Factory setting

For level measurements and 1 current output
None

For level measurements and 2 current outputs
Current output 2

For interface measurements and 1 current output
Current output 1

For interface measurements and 2 current outputs
Current output 2

Decimal places 4

Navigation
Setup → Advanced setup → Display → Decimal places 4

Prerequisite
A measured value is specified in the **Value 4 display** parameter (→ 182).

Description Use this function to specify the number of decimal places for measured value 4. This setting does not affect the measuring or computational accuracy of the device. The arrow displayed between the measured value and the unit indicates that the device computes with more digits than are shown on the local display.

Selection
- x
- x.x
- x.xx
- x.xxx
- x.xxxx

Factory setting x.xx

Display interval (→ 144)

Display damping

Navigation Setup → Advanced setup → Display → Display damping

Description Use this function to set the reaction time of the local display to fluctuations in the measured value caused by process conditions. A time constant is entered for this purpose: if a low time constant is entered, the display reacts very quickly to fluctuating measured variables. If a high time constant is entered, the display reaction is damped.

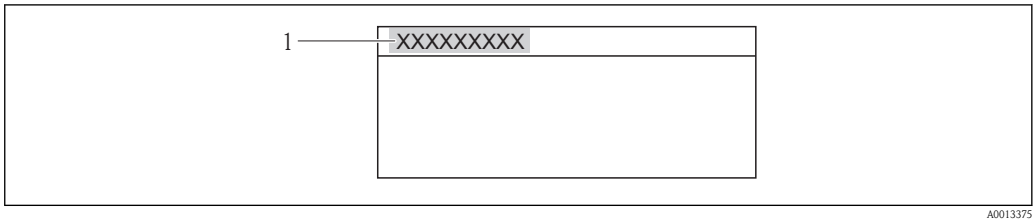
Input range 0 to 999 s

Factory setting 0 s

Header

Navigation Setup → Advanced setup → Display → Header

Description Use this function to select the contents of the header of the local display. The header text only appears during normal operation.



1 Position of the header text on the display

Options
- Device tag
- Free text

Factory setting Device tag

Additional information

Device tag
Is defined in the **Device tag** parameter (→ 154).

Free text
Is defined in the **Header text** parameter (→ 184).

Header text

Navigation

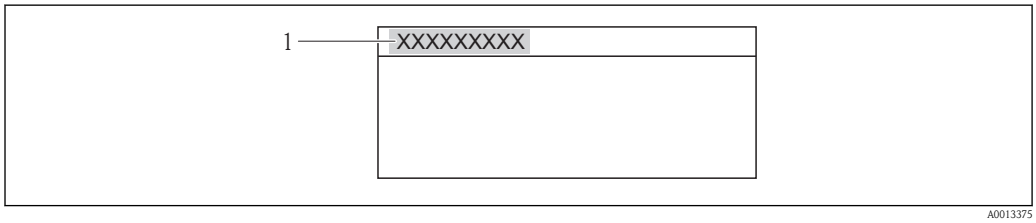
Setup → Advanced setup → Display → Header text

Prerequisite

The **Free text** option is selected in the **Header** parameter (→ 183).

Description

Use this function to enter a customer-specific text for the header of the local display. The header text only appears during normal operation.



1 Position of the header text on the display

User entry

Max. 12 characters, such as letters, numbers or special characters (e.g. @, %, /)

Factory setting

- - - - - - - - - - - -

Additional information

User entry
The number of characters displayed depends on the characters used.

Separator

Navigation

Setup → Advanced setup → Display → Separator

Description

Use this function to select the decimal separator.

Options

- . (point)
- , (comma)

Factory setting

. (point)

Number format

Navigation

Setup → Advanced setup → Display → Number format

Description Selection of the number format for the representation of measured values.

Selection
- Decimal
- ft-in-1/16" (Only valid for distance units)

Factory setting Decimal

Decimal places menu

Navigation Setup → Advanced setup → Display → Dec. places menu

Description Number of decimal places for the representation of numbers within the operating menu.

Selection
- x
- x.x
- x.xx
- x.xxx
- x.xxxx

Factory setting x.xxxx

Additional information This parameter only determines the representation of numbers within the operating menu (e.g. **Empty calibration**, **Full calibration**). It does not affect the measured value representation. For measured values, the number of decimal places is defined in the **Decimal places 1** to **Decimal places 4** parameters (→ 179).

The "Configuration backup display" submenu

The **Configuration backup display** submenu is only visible if a display module is connected to the device.

The configuration of the device can be saved to the display module at a certain point of time (backup). The saved configurateion can be restored to the device if required, e.g. in order to bring the device back into a defined state. The configuration can also be transferred to a different device of the same type using the display module.

Configurations can only be exchanged between devices which are in the same operating mode (see the **Setup → Operating mode** parameter).

Operating time

Navigation
Setup → Advanced setup → Conf. backup display → Operating time
Diagnostics → Operating time

Description
Use this function to display the length of time the device has been in operation up to now.

Display format
Days (d), hours (h), minutes (m) and seconds (s)

Additional information
Display
The maximum number of days is 9999, which is equivalent to 27 years.

Last backup

Navigation
Setup → Advanced setup → Conf. backup display → Last backup

Description
Use this function to display the time when a backup copy of the data was last saved to the display module.

Display format
Days (d), hours (h), minutes (m) and seconds (s)

Configuration management

Navigation
Setup → Advanced setup → Conf. backup display → Config. managem.

Description
Use this function to select an action to save the data to the display module. While this action is in progress, the configuration cannot be edited via the local display and a message on the processing status appears on the display.

Options

- Cancel
  No action is executed and the user exits the parameter.
- Execute backup
  A backup copy of the current device configuration in the HistoROM (built-in in the device) is saved to the display module of the device. The backup copy comprises the transmitter and sensor data of the device.
- Restore
  The last backup copy of the device configuration is copied from the display module to the HistoROM of the device. The backup copy comprises the transmitter and sensor data of the device.
- Duplicate
  The transmitter configuration is duplicated to another device using the transmitter display module.
- Compare
  The device configuration saved in the display module is compared to the current device configuration of the HistoROM.
- Clear backup data
  The backup copy of the device configuration is deleted from the display module of the device.

Factory setting

Cancel

Additional information

Compare
The result can be viewed in the **Comparison result** parameter (→ 187).

HistoROM
A HistoROM is a "non-volatile" device memory in the form of an EEPROM.

Comparison result

Navigation

Setup → Advanced setup → Conf. backup display → Compar. result

Description

Use this function to view the last result of comparing the current device configuration to the backup copy in the display module.

The comparison is started via the **Compare settings** option in the **Configuration management** parameter (→ 186).

Display options

- Settings identical
  The current device configuration of the HistoROM is identical to the backup copy in the display module.
- Settings not identical
  The current device configuration of the HistoROM is not identical to the backup copy in the display module.
- No backup available
  There is no backup copy of the device configuration of the HistoROM in the display module.
- Backup settings corrupt
  The current device configuration of the HistoROM is corrupt or not compatible with the backup copy in the display module.
- Check not done
  The device configuration of the HistoROM has not yet been compared to the backup copy in the display module.

19.3 The "Diagnostics" menu

Actual diagnostics

Navigation Diagnostics → Actual diagnos.

Description Use this function to display the current diagnostics message. If two or more messages occur simultaneously, the message with the highest priority is shown on the display.

Information on what is causing the message, and remedy measures, can be viewed via the ⓘ symbol on the display.

User interface Symbol for event behavior, diagnostics event, time the event occurred and event text

Additional information *User interface*

Example for display format:
⚠S441 01d4h12min30s
Current output 1

Previous diagnostics

Navigation Diagnostics → Prev. diagnsotics

Description Use this function to display the diagnostics message last displayed before the current message. This condition can still apply.

Information on what is causing the message, and remedy measures, can be viewed via the ⓘ symbol on the display.

Zusätzliche Information *Anzeige*

Beispiel zum Anzeigeformat:
⚠C411 01d5h14min20s
Up-/Download aktiv

Additional information *User interface*

Example for display format:
⚠C411 01d5h14min20s
Upload/download active

Operating time from restart

Navigation Diagnostics → Operatint time fr. restart

Description Use this function to display the time the device has been in operation since the last device restart.

User interface Days (d), hours (h), minutes (m) and seconds (s)

Operating time	(→ 186)

19.3.1 "Diagnsotics list" submenu

Up to 5 diagnostics messages currently pending are displayed in this submenu. If more than 5 messages are pending, the messages with the highest priority are shown on the display.

Information on what is causing the message, and remedy measures, can be viewed via the ⓘ symbol on the display.

Information on diagnostics measures in the device and an overview of all the diagnostics messages: (→ 114)

Diagnsotics 1-5

Navigation

Diagnostics → Diagnose list → Diagnostics 1
Diagnostics → Diagnose list → Diagnostics 2
Diagnostics → Diagnose list → Diagnostics 3
Diagnostics → Diagnose list → Diagnostics 4
Diagnostics → Diagnose list → Diagnostics 5

Description

Use this function to display the current diagnostics messages with the highest priority to the fifth-highest priority.

User interface

Symbol for event behavior, diagnostics event, time the event occurred and event text

Additional information

User interface

Example 1 for display format:
⚠S441 01d4h12min30s
Current output 1

Example 2 for display format:
⊗F276 10d8h12min22s
I/O module error

19.3.2 The "Event logbook" submenu

Filter options

Navigation Diagnostics → Event logbook → Filter options

Description Use this function to select the category (status signal) whose event messages are displayed in the events list.

The status signals are categorized according to NAMUR NE 107: F = failure, M = maintenance request, C = function check, S = out of specification

Options
- All
- Failure (F)
- Maintenance required (M)
- Function check (C)
- Out of specification (S)
- Information (I)

Factory setting All

Event list

Navigation Diagnostics → Event logbook → Event list

Description Use this function to display the history of event messages of the category selected in the **Filter options** parameter (→ 191). A maximum of 20 event messages are displayed in chronological order. If the advanced HistoROM function is enabled in the device, the event list can contain up to 100 entries.

The following symbols indicate whether an event has occurred or has ended (status symbols):
- : Event has occurred
- : Event has ended

Information on what is causing the message, and remedy measures, can be viewed via the ⓘ symbol on the display.

User interface
- For event messages in category I (status signal): status signal, event number, time event occurred, event text
- For event messages in category F, M, C, S (status signal): diagnostics event, status symbol, time event occurred, event text

Additional information

User interface

Example 1 for display format:
I 1091 → 24d12h13m00s
Configuration modified

Example 2 for display format:
S441 → 01d4h12min30s
Current output 1

HistoROM
A HistoROM is a "non-volatile" device memory in the form of an EEPROM.

To order the HistoROM with advanced capabilities, see the "Accessories" section of the "Technical Information" document.

19.3.3 "Device information" submenu

Device tag

Navigation Diagnostics → Device info → Device tag

Description Use this function to view the device tag.

Display Max. 32-digit character string comprising letters, numbers or special characters (e.g. @, %, /)

Factory setting Levelflex

Serial number

Navigation Diagnostics → Device info → Serial number

Description Use this function to view the serial number of the device. It can also be found on the nameplate.

Uses of the serial number
- To identify the device quickly, e.g. when contacting Endress+Hauser.
- To obtain specific information on the device using the Device Viewer: www.endress.com/deviceviewer

Display Max. 11-digit character string comprising letters and numbers

Firmware version

Navigation Diagnostics → Device info → Firmware version

Description Use this function to view the device firmware version installed.

Display Max. 6-digit character string in the format xx.yy.zz

Extended order code
Extended order code 1 ... 2

Navigation Diagnostics → Device info → Extended order code
Diagnostics → Device info → Extended order code 1
Diagnostics → Device info → Extended order code 2

Description

Use this function to display the first, second or third part of the extended order code. On account of length restrictions, the extended order code is split into a maximum of 3 parameters.
The extended order code indicates the selected options of all the features of the product structure for the device and thus uniquely identifies the device. It can also be found on the nameplate.

Uses of the extended order code
- To order an identical spare device.
- To check the ordered device features against the shipping note.

Display

Max. 20-digit character string

19.3.4 "Measured value" submenu

Distance (→ 149)

Level linearized

Navigation Diagnostics → Measured val. → Level linearized

Description Displays the linearized level.

Interface distance (→ 150)

Interface linearized

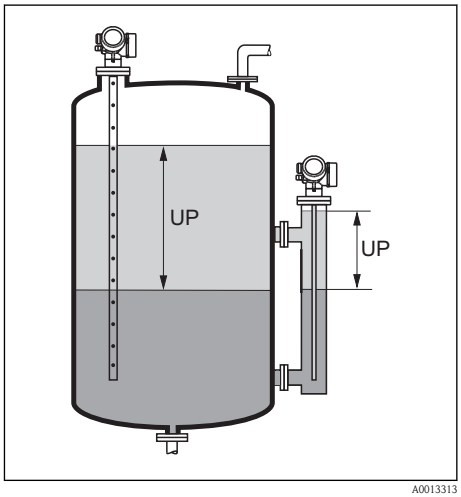
Navigation Diagnostics → Measured val. → Interf. lineariz.

Description Displays the linearized interface height.

Interface thickness

Navigation Diagnostics → Measured val. → Interface thickness

Description Displays the thickness of the upper medium, UP



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Switch status (→ 177)

"Analog input 1" ... "Analog input 5" submenu

Block tag

Navigation Diagnostics → Measured val. → Analog input 1...5 → Block tag

Description BLOCK_TAG of the AI Block according to the FOUNDATION Fieldbus specification

Channel

Navigation Diagnostics → Measured val. → Analog input 1...5 → Channel

Description Allocates a measured value to the AI block.

Options
- Level linearized
- Distance
- Interface linearized (only for **Operating mode** = **Interface**)
- Interface distance (only for **Operating mode** = **Interface**)
- Upper interface thickness (only for **Operating mode** = **Interface**)
- Terminal voltage
- Electronic temperature
- Absolute echo amplitude
- Relative echo amplitude
- Absolute interface amplitude (only for **Operating mode** = **Interface**)
- Relative interface amplitude (only for **Operating mode** = **Interface**)
- Absolute EOP amplitude
- Noise of signal
- EOP shift

Factory setting Level linearized

Output state

Navigation Diagnostics → Measured val.→ Analog input 1...5 → Output state

Description State of the block output value according to the FOUNDATION Fieldbus specification

Out value

Navigation Diagnostics → Measured val.→ Analog input 1...5 → Out value

Description Block output value according to the FOUNDATION Fieldbus specification

Units index

Navigation Diagnostics → Measured val.→ Analog input 1...5 → Units index

Description Units index of the block output value according to the FOUNDATION Fieldbus specification

"Digital input 1" ... "Digital input 3" submenu

Block tag

Navigation Diagnostics → Measured val. → Digital input 1...3 → Block tag

Description BLOCK_TAG of the DI Block according to the FOUNDATION Fieldbus specification

Channel

Navigation Diagnostics → Measured val. → Digital input 1...3 → Channel

Description Allocates a switching variable to the DI block.

Options
- None
- Switch output
  The DI block tracks the behavior of the switch output.

Factory setting None

Output state

Navigation Diagnostics → Measured val.→ Digital input 1...3 → Output state

Description Status of the block output value according to the FOUNDATION Fieldbus specification

Out value

Navigation Diagnose → Measured val.→ Digital input 1...3 → Out value

Description Block output value according to the FOUNDATION Fieldbus specification

19.3.5 "Data logging" submenu

Assign channel 1-4

Navigation
Diagnostics → Data logging → Assign channel 1
Diagnostics → Data logging → Assign channel 2
Diagnostics → Data logging → Assign channel 3
Diagnostics → Data logging → Assign channel 4

Description
Use this function to assign a process variable to the data logging channel.

A total of 1000 measured values can be logged. This means:
- 1000 data points if 1 logging channel is used
- 500 data points if 2 logging channels are used
- 333 data points if 3 logging channels are used
- 250 data points if 4 logging channels are used

If the maximum number of data points is reached, the oldest data points in the data log are cyclically overwritten in such a way that the last 1000, 500, 333 or 250 measured values are always in the log (ring memory principle).

The log contents are cleared if the option selected is changed.

Auswahl
- Off
- Level
- Distance
- Interface
- Interface distance
- Interface thickness
- Current output 1
- Measured current
- Terminal voltage
- Electronics temperature
- Absolute echo amplitude
- Relative echo amplitude
- Absolute interface amplitude
- Relative interface amplitude
- Absolute EOP amplitude
- Signal to noise
- Tank noise
- EOPshift
- Dielectric constant of upper medium

Factory setting
Off

Logging interval

Navigation
Diagnostics → Data logging → Logging interval

Description

Definition of the logging interval t_{log} for data logging. This defines the interval between the individual data points in the data log, and thus the maximum loggable process time T_{log}:

- If 1 logging channel is used: $T_{log} = 1000 \cdot t_{log}$
- If 2 logging channels are used: $T_{log} = 500 \cdot t_{log}$
- If 3 logging channels are used: $T_{log} = 333 \cdot t_{log}$
- If 4 logging channels are used: $T_{log} = 250 \cdot t_{log}$

Once this time elapses, the oldest data points in the data log are cyclically overwritten such that a time of T_{log} always remains in the memory (ring memory principle).

The log contents are cleared if the length of the logging interval is changed.

Input range

1.0 to 3600.0 s

Factory setting

10.0 s

Additional information

Example
If 1 logging channel is used:

- $T_{log} = 1000 \cdot 1$ s $= 1000$ s $\cong 15$ min
- $T_{log} = 1000 \cdot 10$ s $= 10000$ s $\cong 3$ h
- $T_{log} = 1000 \cdot 80$ s $= 80000$ s $\cong 1$ d
- $T_{log} = 1000 \cdot 3600$ s $= 3600000$ s $\cong 41$ d

Clear logging data

Navigation

Diagnostics → Data logging → Clear logging data

Description

Use this function to clear the entire logging data.

Options

- Cancel
  The data are not cleared. All the data are retained.
- Clear data
  The logging data are cleared. The logging process starts from scratch.

Factory setting

Cancel

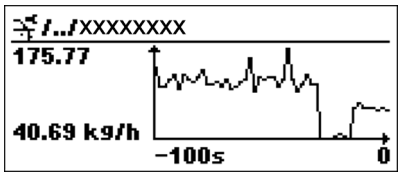
Display channel 1-4

Navigation

Diagnostics → Data logging → Display channel 1
Diagnostics → Data logging → Display channel 2
Diagnostics → Data logging → Display channel 3
Diagnostics → Data logging → Display channel 4

Description

Use this function to view the measured value trend for the logging channel in the form of a chart.



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- x-axis: depending on the number of channels selected displays 250 to 1000 measured values of a process variable.
- y-axis: displays the approximate measured value span and constantly adapts this to the ongoing measurement.

The process variable whose measured value curve is displayed is specified in the **Assign channel 1 - Assign channel 4** parameter (→ 198).

19.3.6 "Simulation" submenu

Assignment of measured variable

Navigation Diagnostics → Simulation → Assign. meas. var.

Description Use this function to select a process variable for the simulation process that is activated. The display alternates between the measured value and a diagnostics message of the *"function check" category (C)* while simulation is in progress:

The simulation value of the selected process variable is defined in the **Value process variable** parameter (→ 201).

Selection
- Off
- Level
- Interface (for Operating mode = Interface)
- Interface thickness (for Operating mode = Interface)
- Level linearized
- Interface linearized (for Operating mode = Interface)
- Thickness linearized (for Operating mode = Interface)

Factory setting Off

Value process variable

Navigation Diagnostics → Simulation → Value proc. var.

Prerequisite One of the following options is selected in the **Assignment of measured variable** parameter :
- Level
- Interface
- Interface thickness
- Level linearized
- Interface linearized
- Thickness linearized

Description Use this function to enter a simulation value for the selected process variable. Subsequent measured value processing and the signal output use this simulation value. In this way, users can verify whether the measuring device has been configured correctly.

Input range Depends on the process variable selected

Factory setting The current value of the selected process variable (at the moment the simulation is activated).

Switch output simulation

Navigation Diagnostics → Simulation → Switch output simulation

Description Use this parameter to activate or deactivate the simulation of the switch output.

Options
- Off
- On

Factory setting Off (i.e. no simulation)

Switch status

Navigation Diagnostics → Simulation → Switch status

Prerequisite Only visible for **Switch output simulation** = **On**.

Description Use this parameter to define the switch status for the simulation.

Options
- Open
- Closed

Factory setting Open

Simulation device alarm

Navigation Diagnostics → Simulation → Sim. alarm

Description Use this function to switch the device alarm on and off. In this way, users can verify the correct adjustment of the current output and the correct function of downstream switching units.
The display alternates between the measured value and a diagnostics message of the *"function check" category (C)* while simulation is in progress:

Options
- On
- Off

Factory setting Off

19.3.7 The "Device check" submenu

Start device check

Navigation Diagnostics → Device check → Start device check

Description Start of a device check.

Selection
- No
  No device check is performed.
- Yes
  A device check is performed.

If the error S941 "Echo lost" is present, a device check is not possible. First you have to eliminte the cause of this error.

Factory setting No

Result device check

Navigation Diagnostics → Device check → Result device check

Description Indicates the result of the device check.

Display
- Installation ok
- Accuracy reduced
  A measurement is possible. However, the measuring accuracy may be reduced due to the signal amplitudes.
- Measurement capability reduced
  A measurement is currently possible. Howerver, there is the risk of an echo loss. Check the mounting position of the device and the dielectric constant of the medium.
- Check not done

Last check time

Navigation Diagnostics → Device check → Last check time

Description Displays the operating time at which the last device check has been performed.

Additional information *Display format*
Days (d), hours (h), minutes (m), seconds (s): 0000d00h00m00s

Level signal

Navigation Diagnostics → Device check → Level signal

Conditions Only visible if a device check has been performed.

Description Displays the result of the device check for the level signal.

Display
- Check not done
- Check not ok
  Check the mounting position of the device and the dielectric constant of the medium.
- Check ok

Launch signal

Navigation Diagnostics → Device check → Launch signal

Condition Only visible if a device check has been performed.

Description Displays the result of the device check for the launch signal (fiducial).

Display
- Check not done
- Check not ok
  Check the mounting position of the device. In non-metallic vessels use a metal plate or a metal flange.
- Check ok

Interface signal

Navigation Diagnostics → Device check → Interface signal

Condition Only visible for devices with interface measurement option and if a device check has been performed.

Description Displays the result of the device check for the interface signal.

Display
- Check not done
- Check not ok
- Check ok

19.3.8 "Device reset" submenu

Restart

Navigation Diagnostics → Device reset → Restart

Description Use this function to reset the device configuration – either entirely or in part – to a defined state.

Options
- Cancel
  No action is executed and the user exits the parameter.
- To factory defaults
  Every parameter is reset to the order-code specific factory setting.
- To delivery settings
  Every parameter is reset to the delivery setting. The delivery setting may differ from the factory default if customer specific settings have been ordered.
- Of customer settings
  Every customer parameter is reset to its factory setting. Service parameters, however, retain their current value.
- To transducer defaults
  Every measurment-related parameter is reset to its factory setting. Service parameters and communication-related parameters, however, retain their current value.
- Restart device
  The restart resets every parameter whose data are in the volatile memory (RAM) to the factory setting (e.g. measured value data). The device configuration is not modified.

Factory setting Cancel

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W

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Endress+Hauser

People for Process Automation

Declaration of Hazardous Material and De-Contamination

Erklärung zur Kontamination und Reinigung

RA No. ☐☐☐☐☐☐☐☐

Please reference the Return Authorization Number (RA#), obtained from Endress+Hauser, on all paperwork and mark the RA# clearly on the outside of the box. If this procedure is not followed, it may result in the refusal of the package at our facility.

Bitte geben Sie die von E+H mitgeteilte Rücklieferungsnummer (RA#) auf allen Lieferpapieren an und vermerken Sie diese auch außen auf der Verpackung. Nichtbeachtung dieser Anweisung führt zur Ablehnung ihrer Lieferung.

Because of legal regulations and for the safety of our employees and operating equipment, we need the "Declaration of Hazardous Material and De-Contamination", with your signature, before your order can be handled. Please make absolutely sure to attach it to the outside of the packaging.

Aufgrund der gesetzlichen Vorschriften und zum Schutz unserer Mitarbeiter und Betriebseinrichtungen, benötigen wir die unterschriebene "Erklärung zur Kontamination und Reinigung", bevor Ihr Auftrag bearbeitet werden kann. Bringen Sie diese unbedingt außen an der Verpackung an.

Type of instrument / sensor
Geräte-/Sensortyp _____

Serial number
Seriennummer _____

☐ **Used as SIL device in a Safety Instrumented System /** *Einsatz als SIL Gerät in Schutzeinrichtungen*

Process data/ *Prozessdaten*

Temperature / *Temperatur* _____ [°F] _____ [°C]
Pressure / *Druck* _____ [psi] _____ [Pa]
Conductivity / *Leitfähigkeit* _____ [µS/cm]
Viscosity / *Viskosität* _____ [cp] _____ [mm²/s]

Medium and warnings
Warnhinweise zum Medium

	Medium /concentration *Medium /Konzentration*	Identification CAS No.	flammable *entzündlich*	toxic *giftig*	corrosive *ätzend*	harmful/ irritant *gesundheits-schädlich/ reizend*	other * *sonstiges**	harmless *unbedenklich*
Process medium / *Medium im Prozess*								
Medium for process cleaning / *Medium zur Prozessreinigung*								
Returned part cleaned with / *Medium zur Endreinigung*								

* explosive; oxidizing; dangerous for the environment; biological risk; radioactive
* *explosiv; brandfördernd; umweltgefährlich; biogefährlich; radioaktiv*

Please tick should one of the above be applicable, include safety data sheet and, if necessary, special handling instructions.
Zutreffendes ankreuzen; trifft einer der Warnhinweise zu, Sicherheitsdatenblatt und ggf. spezielle Handhabungsvorschriften beilegen.

Description of failure / *Fehlerbeschreibung* _____

_____

_____

Company data / *Angaben zum Absender*

Company / *Firma* _____
_____
Address / *Adresse*
_____
_____

Phone number of contact person / *Telefon-Nr. Ansprechpartner:*
_____
Fax / E-Mail _____
Your order No. / *Ihre Auftragsnr.* _____

"We hereby certify that this declaration is filled out truthfully and completely to the best of our knowledge.We further certify that the returned parts have been carefully cleaned. To the best of our knowledge they are free of any residues in dangerous quantities."
"Wir bestätigen, die vorliegende Erklärung nach unserem besten Wissen wahrheitsgetreu und vollständig ausgefüllt zu haben. Wir bestätigen weiter, dass die zurückgesandten Teile sorgfältig gereinigt wurden und nach unserem besten Wissen frei von Rückständen in gefahrbringender Menge sind."

_____ (place, date / *Ort, Datum*)

_____ Name, dept./*Abt.* (please print / *bitte Druckschrift*)

_____ Signature / *Unterschrift*

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