Safety Instructions

Proline t-mass 65

EAC: 1Ex db ia [ia Ga] IIC T4... T1 Gb X
1Ex db e ia [ia Ga] IIC T4... T1 Gb X
1Ex db [ia Ga] IIC T6 Gb X
1Ex db e [ia Ga] IIC T6 Gb X
1Ex db e ia IIC T4... T1 Gb X
1Ex db e [ia] IIC T6 Gb X
1Ex db ia IIC T4... T1 Gb X
1Ex ia IIC T4... T1 Gb X
1Ex db [ia] IIC T6 Gb X
Ga /Gb Ex db ia [ia Ga] IIC T4... T1 X
Ga /Gb Ex ia IIC T4... T1 X
Ga /Gb Ex db ia IIC T4... T1 X
Ga /Gb Ex db e ia [ia Ga] IIC T4... T1 X
Ga /Gb Ex db e ia IIC T4... T1 X
Ex tb IIIC T *** °C Db X
Ex tb [ia Da] IIIC T *** °C Db X

EAC Ex

en   Document: XA02239D
Safety instructions for electrical apparatus for explosion-hazardous areas
according to Technical Regulation of Customs Union TR CU 012/2011

Endress+Hauser

People for Process Automation

Safety Instructions

Proline t-mass 65

Ex documentation

This document is an integral part of the following Operating Instructions:

- BA00111D, Proline t-mass 65 HART
- BA00113D, Proline t-mass 65 PROFIBBUS DP/PA
- BA00115D, Proline t-mass 65 Modbus RS 485
- BA00135D, Proline t-mass 65 FOUNDATION Fieldbus

Contents

Endress+Hauser

People for Process Automation

Associated documentation   All documentation is available:
- On the CD-ROM supplied.
- Internet: www.endress.com/deviceviewer.
- Smart phone/Tablet: *Endress+Hauser Operations App*
- In the Download Area of the Endress+Hauser web site: www.endress.com → Download

Additional documentation:

Document type	Contents	Documentation code
Brochure	Explosion Protection	CP00021Z/11

Please note the documentation associated with the device.

General warnings
- Compliance with national regulations relating to the installation, connection to the electricity supply, commissioning and maintenance of devices in potentially explosive atmospheres is mandatory, if such regulations exist.

- Installation, connection to the electricity supply, commissioning and maintenance of the devices must be carried out by qualified specialists trained to work on Ex-rated devices.

- Compliance with all of the technical data of the device (see nameplate) is mandatory.

- Open the transmitter only when it is de-energized (and after a delay of at least 10 minutes following shutdown of the power supply) or in an area free of explosive atmospheres.

- It is not permissible to connect into the service adapter whilst the atmosphere is considered to be explosive.

- Opening the transmitter housing and the connection housing of the remote version is only permitted for a brief time. During this time, ensure that no dust or moisture enters the housing.

- To guarantee resistance to dust, the transmitter housing, the connection housing of the remote version and the cable entries must be tightly sealed.

- Use of the devices is restricted to fluids against which the process-wetted materials are adequately resistant.

- The suitability of the device in the event of simultaneous occurrence of gas-air and dust-air mixtures requires an additional assessment.

Special conditions
- The device must be integrated into the potential equalization system. Potential matching must exist along the intrinsically safe sensor circuits. For more information, refer to the chapter on "Potential equalization" → 🗐 11.

- For Zone 0:
  Parts of the sensor in contact with the fluid must have adequate stability and be protected against mechanical load.

Installation instructions

- For terminals No. 20 to 27 of the transmitter, only devices with ratings $U_m \leq 260$ V and $I_m \leq 500$ mA are allowed to be connected (does not apply to intrinsically safe circuits).

- The measuring device must only be used in the permitted temperature class.
  The values of the individual temperature classes can be found in the temperature tables →⊟ 9.

  For Zone 21:
  The surface temperature of the measuring device must not exceed 2/3 of the ignition temperature of a dust cloud. The maximum surface temperature must maintain a safe distance of 75 ℃ to the smolder temperature of a dust layer of 5 mm.
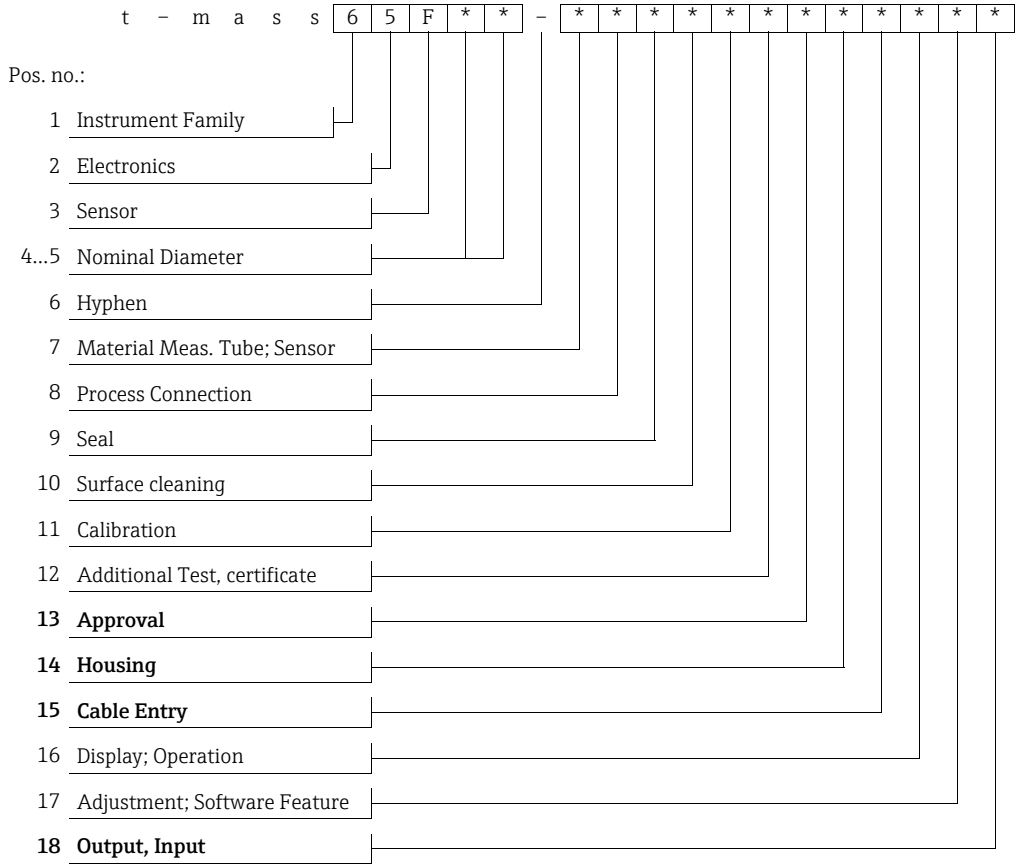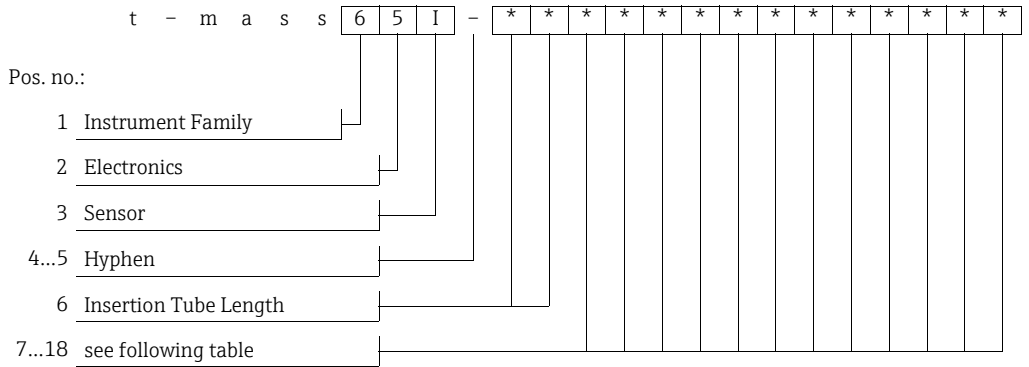
  Example:
  Operation in temperature class T4 (135 ℃) is, therefore, suitable for dust with an ignition temperature of 202.5 ℃ (1.5 × 135 ℃ or 135 ℃ = 2/3 of 202.5 ℃) and a smolder temperature of 210 ℃ (135 ℃ + 75 ℃).

- The following applies when connecting the transmitter with a connection compartment in Ex db:
  Only use separately certified cable and wire entries (Ex db IIC) which are suitable for operating temperatures up to 80 ℃ and for IP 66/67. If using conduit entries, the associated sealing mechanisms must be mounted directly on the housing. Plastic sealing plugs act as transport protection and have to be replaced by suitable, individually approved installation material. The mounted metal thread extensions and dummy plugs are tested and certified as part of the housing for type of protection Ex db IIC. The thread extension or the dummy plug labeled as follows for identification purposes:
  – Md: M20 × 1.5
  – NPTd: NPT ½"
  – Gd: G ½"

- The following applies when connecting the transmitter with a connection compartment in Ex eb:
  Only use separately certified cable and wire entries and sealing plugs (Ex eb IIC), which are suitable for operating temperatures up to 80 ℃ and for IP 66/67. The cables must be routed such that they are securely seated, and sufficient strain relief must be ensured. The mounted metal thread extensions and dummy plugs supplied are tested and certified as part of the housing for type of protection Ex eb IIC. Plastic sealing plugs act as transport protection and have to be replaced by suitable, individually approved installation material. Supplied cable glands are separately certified and marked as components and meet device specification requirements.

- Suitable cables and suitable, certified cable glands, cable entries and drain plugs must be used for measuring devices operated at temperatures below –20 ℃.

- The cable must be installed using permanent methods for ambient temperatures below -30 ℃.

- The cable entries and openings not used must be sealed tight with suitable components.

- Turning the transmitter housing: the housing of the Ex-rated transmitter can be turned in 90° steps. Whereas the non-Ex version has a bayonet adapter, however, the Ex version has a thread. Recesses for centering the setscrew prevent unwanted turning of the transmitter housing. It is permitted to turn the transmitter housing by a maximum of 180° during operation (in either direction) without compromising explosion protection.
  After the housing is turned, the setscrew must be securely tightened again.

- Turning the local display: the screw cap has to be removed before the local display can be turned, and this must be done with the device de-energized (and after a delay of at least 10 minutes following shutdown of the power supply).

- When connecting the intrinsically safe circuits of explosion protection category ia of the measuring device to certified intrinsically safe circuits of explosion protection category ib with the explosion group IIC and IIB respectively, the explosion protection changes to Ex ib IIC and Ex ib IIB respectively. Intrinsically safe circuits of category ib are suitable for areas that require Category 2 apparatus.

- If the active intrinsically safe communication circuits (Order code "Output, Input" option R (terminals 24/25 and 26/27), and option S (terminals 26/27)) are fed into areas that require 1D or 2D apparatus, the connected apparatus must be tested and certified accordingly.

- In Zone 0, potentially explosive vapor/air mixtures may only occur under atmospheric conditions. If no potentially explosive mixtures are present, or if additional protective measures have been taken according to EN 1127-1, the devices may be operated under other atmospheric conditions in accordance with the manufacturer's specifications.

Manufacturer's certificates	TR CU 012 /2011

Certification body
ООО "НАНИО ЦСВЭ"

Certificate number
ЕАЭС RU C-CH.AA87.B.00340/20

Affixing the certificate number certifies conformity with the following standards (depending on the device version):
- ГОСТ 31610.0-2014 (IEC 60079-0:2011)
- ГОСТ IEC 60079-1-2013
- ГОСТ 31610.11-2014 (IEC 60079-11:2011)
- ГОСТ Р МЭК 60079-7-2012
- ГОСТ IEC 60079-31-2013
- ГОСТ 31610.15-2014/ IEC 60079-15:2010

Manufacturer address	Endress+Hauser Flowtec AG

Kägenstrasse 7
4153 Reinach BL
Switzerland

Description of measuring system	The measuring system consists of transmitters and sensors.

Two versions are available:
- Compact version: transmitters and sensors form a mechanical unit.
- Remote version: transmitters and sensors are separated by open ground when installed and connected to each other via a connecting cable.

Type code

The type code describes the exact design and the equipment of the measuring system.
It can be read on the nameplate of the transmitter and sensor and is structured as follows:

```
t – m a s s 6 5 I – * * * * * * * * * * * * * * *
```

Pos. no.:

1	Instrument Family
2	Electronics
3	Sensor
4...5	Hyphen
6	Insertion Tube Length
7...18	see following table

```
t – m a s s 6 5 F * * – * * * * * * * * * * * *
```

Pos. no.:

1	Instrument Family
2	Electronics
3	Sensor
4...5	Nominal Diameter
6	Hyphen
7	Material Meas. Tube; Sensor
8	Process Connection
9	Seal
10	Surface cleaning
11	Calibration
12	Additional Test, certificate
13	**Approval**
14	**Housing**
15	**Cable Entry**
16	Display; Operation
17	Adjustment; Software Feature
18	**Output, Input**

Cable entry (Pos. no. 15 in the type code)

Cable entry	Thread (cable entry)
A	M20×1.5
B	NPT ½"
C	G ½"

Approval; Housing; Output, Input (Pos. no. 13, 14, 18 in the type code)

Approval	Output, Input	Housing/design		Identification: Explosion protection
B	F, G, R, S, T, U (Ex ia)	Compact: A, 1		1Ex db ia [ia Ga] IIC T4... T1 Gb X Ex tb [ia Da] IIIC T *** ℃ Db X
		Remote: G, H, J, 6, 7, 8	Transmitter t-mass 6*	1Ex db [ia Ga] IIC T6 Gb X Ex tb [ia Da] IIIC T85 ℃ Db X
			Sensor t-mass F/I	1Ex ia IIC T4... T1 Gb X Ex tb IIIC T *** ℃ Db X
	A, B, C, D, E, H, J, K, L, M, N, P, Q, V, W, 0, 2, 3, 4, 5, 6, 7, 8, 9 (not Ex ia)	Compact: A, 1		1Ex db ia IIC T4... T1 Gb X Ex tb IIIC T***℃ Db X
		Remote: G, H, J, 6, 7, 8	Transmitter t-mass 6*	1Ex db [ia] IIC T6 Gb X Ex tb IIIC T85 ℃ Db X
			Sensor t-mass F/I	1Ex ia IIC T4... T1 Gb X Ex tb IIIC T *** ℃ Db X
D	F, G, R, S, T, U (Ex ia)	Compact: A, 1		1Ex db e ia [ia Ga] IIC T4... T1 Gb X Ex tb [ia Da] IIIC T *** ℃ Db X
		Remote: G, H, J, 6, 7, 8	Transmitter t-mass 6*	1Ex db e [ia Ga] IIC T6 Gb X Ex tb [ia Da] IIIC T85 ℃ Db X
			Sensor t-mass F/I	1Ex ia IIC T4... T1 Gb X Ex tb IIIC T *** ℃ Db X
	A, B, C, D, E, H, J, K, L, M, N, P, Q, V, W, 0, 2, 3, 4, 5, 6, 7, 8, 9 (not Ex ia)	Compact: A, 1		1Ex db e ia IIC T4... T1 Gb X Ex tb IIIC T***℃ Db X
		Remote: G, H, J, 6, 7, 8	Transmitter t-mass 6*	1Ex db e [ia] IIC T6 Gb X Ex tb IIIC T85 ℃ Db X
			Sensor t-mass F/I	1Ex ia IIC T4... T1 Gb X Ex tb IIIC T *** ℃ Db X
3	F, G, R, S, T, U (Ex ia)	Compact: A, 1 (nur t-mass 6*I)		Ga /Gb Ex db ia [ia Ga] IIC T4... T1 X Ex tb [ia Da] IIIC T *** ℃ Db X
		Remote: G, H, J, 6, 7, 8	Transmitter t-mass 6*	1Ex db [ia Ga] IIC T6 Gb X Ex tb [ia Da] IIIC T85 ℃ Db X
			Sensor t-mass F/I	Ga /Gb Ex ia IIC T4... T1 X
	A, B, C, D, E, H, J, K, L, M, N, P, Q, V, W, 0, 2, 3, 4, 5, 6, 7, 8, 9 (not Ex ia)	Compact: A, 1 (nur t-mass 6*I)		Ga /Gb Ex db ia IIC T4... T1 X Ex tb IIIC T***℃ Db X
		Remote: G, H, J, 6, 7, 8	Transmitter t-mass 6*	1Ex db [ia] IIC T6 Gb X Ex tb IIIC T85 ℃ Db X
			Sensor t-mass F/I	Ga /Gb Ex ia IIC T4... T1 X
5	F, G, R, S, T, U (Ex ia)	Compact: A, 1 (nur t-mass 6*I)		Ga /Gb Ex db e ia [ia Ga] IIC T4... T1 X Ex tb [ia Da] IIIC T *** ℃ Db X
		Remote: G, H, J, 6, 7, 8	Transmitter t-mass 6*	1Ex db e [ia Ga] IIC T6 Gb X Ex tb [ia Da] IIIC T85 ℃ Db X
			Sensor t-mass F/I	Ga /Gb Ex ia IIC T4... T1 X
	A, B, C, D, E, H, J, K, L, M, N, P, Q, V, W, 0, 2, 3, 4, 5, 6, 7, 8, 9 (not Ex ia)	Compact: A, 1 (nur t-mass 6*I)		Ga /Gb Ex db e ia IIC T4... T1 X Ex tb IIIC T***℃ Db X
		Remote: G, H, J, 6, 7, 8	Transmitter t-mass 6*	1Ex db e [ia] IIC T6 Gb X Ex tb IIIC T85 ℃ Db X
			Sensor t-mass F/I	Ga /Gb Ex ia IIC T4... T1 X

✎ Note!
A detailed explanation of these values, regarding the available outputs and inputs, as well as a description of the associated terminal assignments and connection data can be found from →🗐 13 onwards.

Temperature table compact version

Max. fluid temperature [°C] for T4...T1 in relation to the maximum ambient temperature T_a

	T_a	T4 (135 °C)	T3 (200 °C)	T2 (300 °C)	T1 (450 °C)
t-mass 65F**-************	+55 °C	80	80	100	100
	+60 °C	80	80	80	80

	T_a	T4 (135 °C)	T3 (200 °C)	T2 (300 °C)	T1 (450 °C)
t-mass 65I-*************	+60 °C	80	80	130	130

Seal and sensor depending on the fluid temperature T_M

t-mass 65F	t-mass 65F**-**2********* t-mass 65F**-**3*********	−20...+100 °C
	t-mass 65F**-**4*********	−40...+100 °C

t-mass 65I	t-mass 65I-****3*********	−20...+130 °C
	t-mass 65I-****1*********	−35...+130 °C
	t-mass 65I-****0********* t-mass 65I-****4*********	−40...+130 °C

The minimum ambient temperature is −20 °C.
A version for ambient temperatures to −40 °C is optionally available.

Temperature table remote version

Sensor
Max. fluid temperature [°C] for T4...T1 in relation to the maximum ambient temperature T_a

	T_a	T4 (135 °C)	T3 (200 °C)	T2 (300 °C)	T1 (450 °C)
t-mass 65F**-************	+55 °C	80	80	100	100
	+60 °C	80	80	80	80

	T_a	T4 (135 °C)	T3 (200 °C)	T2 (300 °C)	T1 (450 °C)
t-mass 65I-*************	+60 °C	80	80	130	130

Seal and sensor depending on the fluid temperature T_{med}

t-mass 65F	t-mass 65F**-**2********* t-mass 65F**-**3*********	−20...+100 °C
	t-mass 65F**-**4*********	−40...+100 °C

t-mass 65I	t-mass 65I-****3*********	−20...+130 °C
	t-mass 65I-****1*********	−35...+130 °C
	t-mass 65I-****0********* t-mass 65I-****4*********	−40...+130 °C

The minimum ambient temperature is −20 °C.
A version for ambient temperatures to −40 °C is optionally available.

Transmitter
The transmitter of the remote version has the temperature class T6 when installing into the Ex db housing up to an ambient temperature of T_a = 60 °C.

The maximum ambient temperature range is −20 to +60 °C.
A version for ambient temperatures to −40 °C is optionally available.

Gas and dust explosion protection

- Determine the temperature class for gas in relation to the ambient T_a and fluid temperature T_M.
- Determine the maximum surface temperature for dust in relation to the ambient temperature T_a and fluid temperature T_M.

Example:
Measuring device: compact version, t-mass 65F
Maximum ambient temperature: $T_a = 60\ °C$
Fluid temperature: $T_M = 75\ °C$

	T_a	T4 (135 °C)	T3 (200 °C)	T2 (300 °C)	T1 (450 °C)
t-mass 65F*-***********	+55 °C	80	80	100	100
	+60 °C	80	80	80	80

$T_a max = 60\ °C$ $T_M = 75\ °C\ (\le 80°C)$
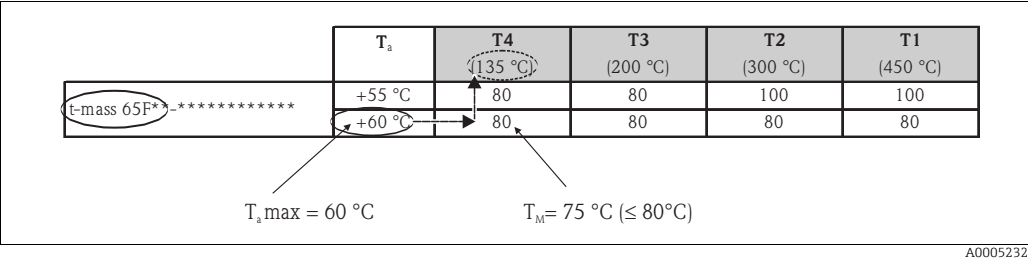
A0005232

Fig. 1:   Procedure for calculating the max. surface temperature

1. In the associated temperature table (compact version), the selection of the measuring device (t-mass 65F) and the ambient temperature T_a (60 °C) determine the line in which the max. fluid temperature can be found.

2. The max. fluid temperature T_M (75 °C) which is smaller or equal to the max. fluid temperature of a cell, determines the column, i.e. the temperature class for gas (75 °C $\le$ 80 °C → T4).

3. The maximum temperature of the calculated temperature class corresponds to the maximum surface temperature (T4 = 135 °C = maximum surface temperature for dust).

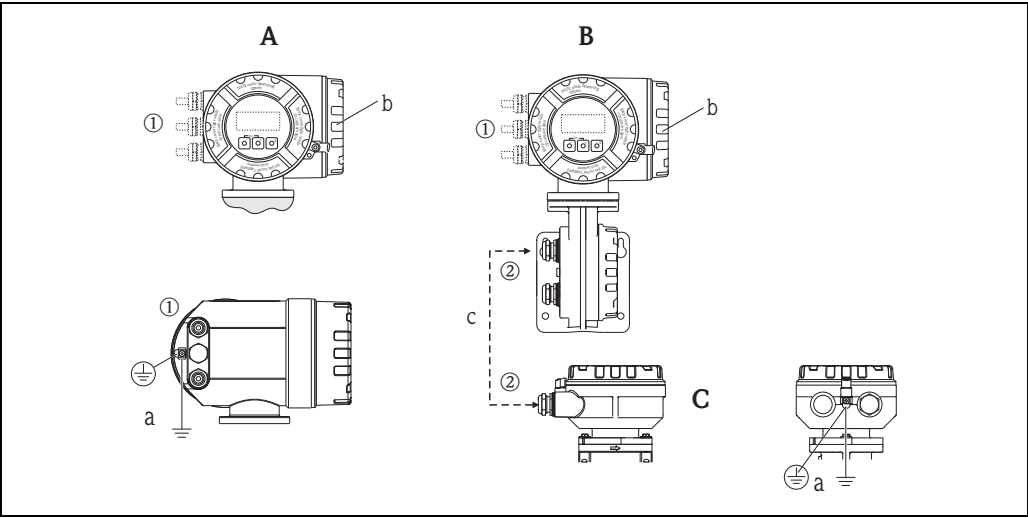**Design of measuring system**

A0005237

Fig. 2:   Design of the measuring system, compact/remote version

A   Transmitter housing (compact version)
B   Transmitter housing on connection housing, remote version
C   Sensor connection housing, remote version:

a   Screw terminal for connecting to the potential equalization
b   Connection compartment cover
c   Remote version connecting cable
① and ②, see the following chapter on "Cable entries".

✎ Note!
Connection of remote version connecting cable →📄 12

Cable entries

- ① for connection compartment (Ex db version): power supply cable and cable of the communication circuit →Choice of thread for cable entries M20 × 1.5, ½" NPT or G ½".

  Make sure that the Ex db cable glands/entries are secured to prevent working loose and that the seals are installed immediately adjacent to the housing.

- ① for connection compartment (Ex eb version): power supply cable and cable of the communication circuit → Choice of cable gland M20 × 1.5 or thread for cable entries ½" NPT or G ½". The cables must be installed such that they are fixed in place. Adequate strain relief must be ensured.

- ② for remote version connecting cable:
  → Choice of cable gland M20 ×1.5 or thread for cable entries ½" NPT or G ½".

⚠ Warning!
The leak-tight of the cable glands and cable entries is to ensure.

Cable specification

You can find information about the cable specification in the associated Operating Instructions. Furthermore, note the following:
- Total inductivity $L_{cable} \leq 0.09$ mH
- Total capacitance $C_{cable} \leq 0.1$ μF
- Dielectric strength ≥ 500 V
- Maximum line length ≤100 m

⚠ Warning!
The cable shall be designed/manufactured as such, that the build up of electrostatic charge on the cable does not impair dust explosion protection or a warning label should instruct the user how to avoid the build up of electrostatic charge.

Potential equalization

- The transmitter (compact and remote version) must be securely integrated into the potential equalization via the screw terminal on the exterior of the transmitter housing. Alternatively, the compact version of the transmitter can be integrated into the potential equalization via the pipeline as long as the pipeline provides a ground connection conforming to regulations.

- When using the remote version, the connection housing of the sensor must be grounded via the external screw terminal. Alternatively, the sensor can be integrated into the potential equalization via the pipeline as long as the pipeline provides a ground connection conforming to regulations.

✎ Note!
Further information about potential equalization, shielding and grounding can be found in the associated Operating Instructions.

Potential equalization when both sides of the screen are grounded, for Fieldbus version

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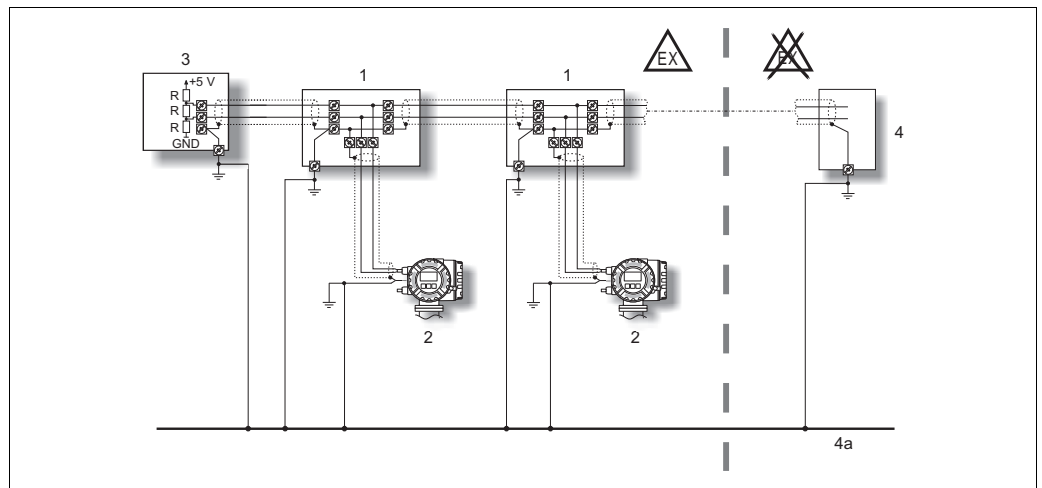
Fig. 3:   Example for connecting potential equalization lines

1   Distributor/T-Box
2   Bus devices for potentially explosive atmospheres
3   PROFIBUS DP and Modbus bus termination
4   Bus power supply unit or automation system
4a   The potential equalization line is connected throughout the safe area.

✎ Note!
The length of the spur must be observed.

Connection of remote version connecting cable
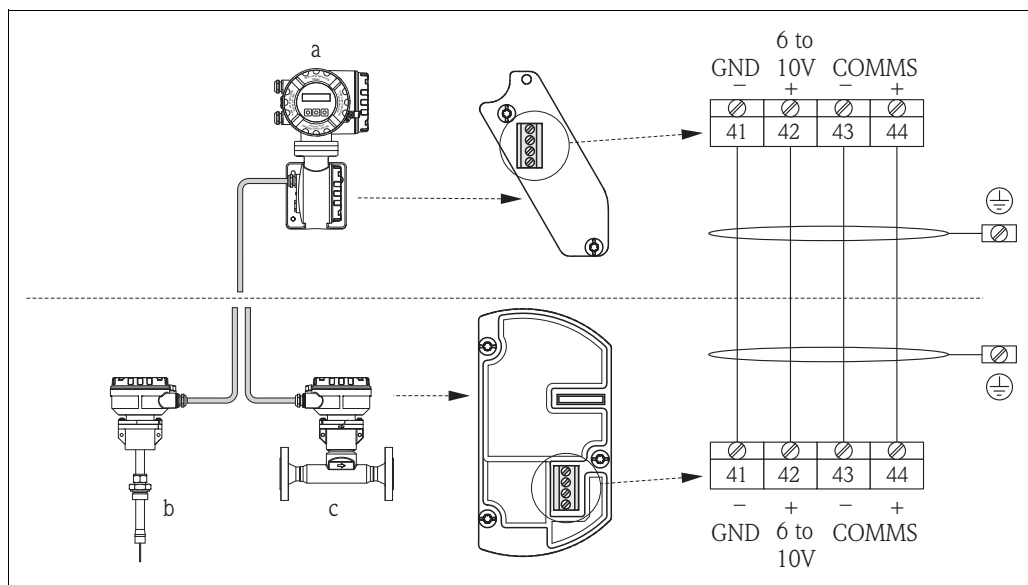

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Fig. 4:   Connection of remote version connecting cable

a   Wall-mount housing: ATEX II2G / Zone 1)
b   Remote version, insertion version
c   Remote version, flanged version

Wire colors (color-coded in accordance with DIN 47100)
→ Terminal number: 41 = white, 42 = brown, 43 = green, 44 = yellow

The connection of the remote version between the sensor and transmitter conforms to explosion protection Ex ia.

The maximum cable length is 100 m.

Electrical connection

Connection compartment

Transmitter housing compact/remote version (terminal assignment, connection data →🖺 13 ff.).

4...20 mA HART	PROFIBUS PA Ex ia FOUNDATION Fieldbus

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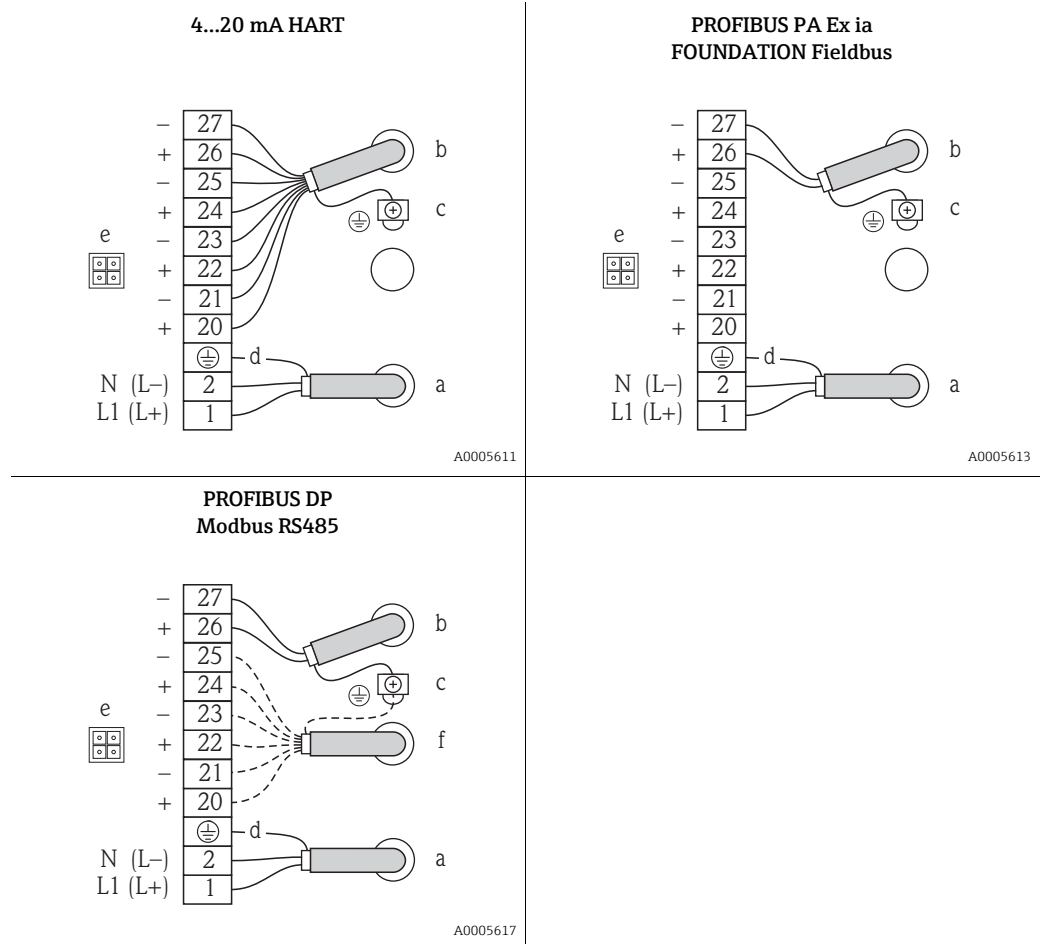

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PROFIBUS DP
Modbus RS485

A0005617

Fig. 5: Electrical connections

a Power supply cable (terminal assignment, connection data →🖺 13)
b Signal cable (terminal assignment, connection data →🖺 14 ff.)
c Ground terminal for signal cable shield / fieldbus cable / RS485 line
d Ground terminal for protective ground
e Service adapter for connecting service interface FXA 193 (Fieldcheck, FieldCare)
f Further connections:
   – PROFIBUS DP: Cable for external termination, optional (terminal assignment, connection data →🖺 17)
   – PROFIBUS DP / Modbus RS485: Signal cable (terminal assignment, connection data →🖺 17)

Terminal assignment and connection data, power supply

Terminal assignment and connection data

all Transmitter	L1 (L+) 1	N (L−) 2	⊕
Designation	Supply voltage (as per nameplate)		Protective earth
Functional values	AC: U = 85 to 260 V; 18.2 VA or AC: U = 20 to 55 V; 14 VA DC: U = 16 to 62 V; 8 W		Caution! Observe the grounding scheme of the system!
Intrinsically safe circuit	no		
U_m	260 V AC		

Terminal assignment and connection data for signal circuits (intrinsically safe circuits)

✎ Note!
The following tables contain values/specifications, which are dependent on the type code (type of measuring device). Please compare the following type code to the one shown on the nameplate of your measuring device. A graphic representation of the electrical connections can be found on →🖹 13.

Terminal assignment of transmitter 65F**-*...*F, 65I-*...*F

Transmitter	Terminal no. (Output, Input)							
	20 (+)	21 (−)	22 (+)	23 (−)	24 (+)	25 (−)	26 (+)	27 (−)
Assignment	–		–		–		PROFIBUS PA	
							PA +	PA −
Electric circuit	–		–		–		Ex ia	
Safety-related values	–		–		–		U_i 30 V DC I_i 600 mA P_i 8.5 W L_i ≤ 10 µH C_i ≤ 5 nF FISCO Field device	
Functional values	–		–		–		galvanically isolated, U_{Bus} 9 to 32 V DC I_{Bus} 11 mA IEC 61158-2 (MBP)	

Terminal assignment of transmitter 65F**-*...*G, 65I-*...*G

Transmitter	Terminal no. (Output, Input)							
	20 (+)	21 (−)	22 (+)	23 (−)	24 (+)	25 (−)	26 (+)	27 (−)
Assignment	–		–		–		FOUNDATION Fieldbus	
							FF +	FF −
Electric circuit	–		–		–		Ex ia	
Safety-related values	–		–		–		U_i 30 V DC I_i 600 mA P_i 8.5 W L_i ≤ 10 µH C_i ≤ 5 nF FISCO Field device	
Functional values	–		–		–		galvanically isolated, U_{Bus} 9 to 32 V DC I_{Bus} 12 mA IEC 61158-2 (MBP)	

Terminal assignment of transmitter 65F**-*...*R, 65I-*...*R

Transmitter	Terminal no. (Output, Input)							
	20 (+)	21 (−)	22 (+)	23 (−)	24 (+)	25 (−)	26 (+)	27 (−)
Assignment	−		−		Current output, active		Current output HART, active	
Electric circuit	−		−		Ex ia		Ex ia	
Safety-related values	−		−		U_o I_o P_o L_o IIC/IIB C_o IIC/IIB U_i I_i P_i L_i C_i	21.8 V DC 90 mA 491 mW 4.1 mH/15 mH 160 nF/1160 nF 30 V DC [1] 10 mA [1] 0.3 W [1] negligible 6 nF	U_o I_o P_o L_o IIC/IIB C_o IIC/IIB U_i I_i P_i L_i C_i	21.8 V DC 90 mA 491 mW 4.1 mH/15 mH 160 nF/1160 nF 30 V DC [1] 10 mA [1] 0.3 W [1] negligible 6 nF
Functional values	−		−		galvanically isolated, active: 0/4 to 20 mA R_L < 400 Ω R_L HART ≥ 250 Ω		galvanically isolated, active: 0/4 to 20 mA R_L < 400 Ω R_L HART ≥ 250 Ω	

[1] The interconnection must be assessed according to the valid national installation standard.

Terminal assignment of transmitter 65F**-*...*S, 65I-*...*S

Transmitter	Terminal no. (Output, Input)							
	20 (+)	21 (−)	22 (+)	23 (−)	24 (+)	25 (−)	26 (+)	27 (−)
Assignment	−		−		Pulse/frequency output, passive		Current output HART, active	
Electric circuit	−		−		Ex ia		Ex ia	
Safety-related values	−		−		U_i I_i P_i L_i C_i	30 V DC 500 mA 600 mW negligible 6 nF	U_o I_o P_o L_o IIC/IIB C_o IIC/IIB U_i I_i P_i L_i C_i	21.8 V DC 90 mA 491 mW 4.1 mH/15 mH 160 nF/1160 nF 30 V DC [1] 10 mA [1] 0.3 W [1] negligible 6 nF
Functional values	−		−		galvanically isolated, passive: 30 V DC / 250 mA Open Collector Full scale frequency 2 to 1000 Hz		galvanically isolated, active: 0/4 to 20 mA R_L < 400 Ω R_L HART ≥ 250 Ω	

[1] The interconnection must be assessed according to the valid national installation standard.

Terminal assignment of transmitter 65F-*...*T, 65I-*...*T**

Transmitter	Terminal no. (Output, Input)							
	20 (+)	21 (−)	22 (+)	23 (−)	24 (+)	25 (−)	26 (+)	27 (−)
Assignment	−		−		Pulse/frequency output, passive		Current output HART, passive	
Electric circuit	−		−		Ex ia		Ex ia	
Safety-related values	−		−		U_i 30 V DC I_i 500 mA P_i 600 mW L_i negligible C_i 6 nF		U_i 30 V DC I_i 100 mA P_i 1.25 W L_i negligible C_i 6 nF	
Functional values	−		−		galvanically isolated, passive: 30 V DC / 250 mA Open Collector Full scale frequency 2 to 1000 Hz		galvanically isolated, passive: 4 to 20 mA voltage drop ≤ 9 V $R_L < [(V_{Power supply} − 9 V) ÷ 25 mA]$	

Terminal assignment of transmitter 65F-*...*U, 65I-*...*U**

Transmitter	Terminal no. (Output, Input)							
	20 (+)	21 (−)	22 (+)	23 (−)	24 (+)	25 (−)	26 (+)	27 (−)
Assignment	−		−		Current output passive		Current output HART, passive	
Electric circuit	−		−		Ex ia		Ex ia	
Safety-related values	−		−		U_i 30 V DC I_i 100 mA P_i 1.25 W L_i negligible C_i 6 nF		U_i 30 V DC I_i 100 mA P_i 1.25 W L_i negligible C_i 6 nF	
Functional values	−		−		galvanically isolated, passive: 4 to 20 mA voltage drop ≤9 V $R_L < [(V_{Power supply} − 9 V) ÷ 25 mA]$		galvanically isolated, passive: 4 to 20 mA voltage drop ≤9 V $R_L < [(V_{Power supply} − 9 V) ÷ 25 mA]$	

Terminal assignment and connection data for signal circuits (non-intrinsically safe circuits)

✎ Note!
The following tables contain values/specifications, which are dependent on the type code (type of measuring device). Please compare the following type code to the one shown on the nameplate of your measuring device. A graphic representation of the electrical connections can be found on →▣ 13.

Terminal assignment

Transmitter	Terminal no. (Output, Input)							
	20 (+)	21 (−)	22 (+)	23 (−)	24 (+)	25 (−)	26 (+)	27 (−)
Fixed communication boards (permanent assignment)								
65F**-*...*A 65I-*...*A	–		–		Pulse/frequency output		Current output HART	
65***-*...*B 65I-*...*B	Relay output 2		Relay output 1		Pulse/frequency output		Current output HART	
65***-*...*J 65I-*...*J	–		–		External termination		PROFIBUS DP [1]	
					+5 V	DGND	B	A
65***-*...*J 65I-*...*J	–		–		–		FOUNDATION Fieldbus	
							FF +	FF −
65***-*...*Q 65I-*...*Q	–		–		Status input		Modbus RS485 [1]	
							B	A
Flexible communication boards								
65F**-*...*C 65I-*...*C	Relay output 2		Relay output 1		Pulse/frequency output		Current output HART	
65F**-*...*D 65I-*...*D	Status input		Relay output		Pulse/frequency output		Current output HART	
65F**-*...*E 65I-*...*E	Status input		Relay output		Current output 2		Current output 1 HART	
65F**-*...*2 65I-*...*2	Relay output		Current output 2		Pulse/frequency output		Current output 1 HART	
65F**-*...*4 65I-*...*4	Current input		Relay output		Pulse/frequency output		Current output HART	
65F**-*...*5 65I-*...*5	Status input		Current input		Pulse/frequency output		Current output HART	
65F**-*...*6 65I-*...*6	Status input		Current input		Current output 2		Current output HART	
65F**-*...*8 65I-*...*8	Status input		Pulse/frequency output		Current output 2		Current output HART	
Safety-related and functional values of signal circuits →▣ 16 [1] *PROFIBUS DP, Modbus RS485:* *– Terminal 26 (+) → B (RxD/TxD-P)* *– Terminal 27 (−) → A (RxD/TxD-N)*								

Safety-related and functional values of signal circuits

Signal circuits	Functional values	Safety-related values

Current output HART	galvanically isolated, active/passive selectable:
	• active: 0/4 to 20 mA
	  $R_L < 700\,\Omega$, R_L HART $\geq 250\,\Omega$
	• passive: 4 to 20 mA
	  V_s = 18 to 30 V DC, $R_i \geq 150\,\Omega$
		intrinsically safe = no
		U_m = 260 V
		I_m = 500 mA

Current output	galvanically isolated, active/passive selectable:
	• active: 0/4 to 20 mA
	  $R_L < 700\,\Omega$
	• passive: 4 to 20 mA
	  V_s = 18 to 30 V DC, $R_i \geq 150\,\Omega$	

Pulse/frequency output	galvanically isolated, active/passive selectable:
	• active: 24 V DC / 25 mA
	  (max. 250 mA during 20 ms)
	  $R_L > 100\,\Omega$
	• passive: 30 V DC / 250 mA
	  Open Collector
	
	Full scale frequency 2 to 1000 Hz
	(f_{max} = 1250 Hz)	

Relay output	galvanically isolated, max. 30 V AC / 500 mA max. 60 V DC / 100 mA	

Current input	galvanically isolated, active/passive selectable:
	• active: 4 to 20 mA
	  $R_i \leq 150\,\Omega$
	  U_{out} = 24 V DC, short-circuit proof
	
	• passive: 0/4 to 20 mA
	  $R_i < 150\,\Omega$
	  U_{max} = 30 V DC	

Status input	galvanically isolated, 3 to 30 V DC R_i = 5 kΩ	
FOUNDATION Fieldbus	galvanically isolated, U_{Bus} = 9 to 32 V DC I_{Bus} = 12 mA IEC 61158-2 (MBP)	
PROFIBUS DP, external termination	galvanically isolated, RS485 as per Standard EIA/TIA-485 Terminal 24: +5 V Terminal 25: DGND	
Modbus RS485	galvanically isolated, RS485 as per Standard EIA/TIA-485	

Service adapter

The service adapter is only used for connecting service interfaces approved by Endress+Hauser.

⚠ Warning!
It is not permissible to connect into the service adapter whilst the atmosphere is considered to be explosive.

Device fuse

⚠ Warning!
Use only fuses of the following types; the fuses are installed on the power supply board:

• Voltage 20 to 55 V AC / 16 to 62 V DC:
  fuse 2.0 A slow-blow, disconnect capacity 1500 A
  (Schurter, 0001.2503 or Wickmann, Standard Type 181 2.0 A)

• Voltage 85 to 260 V AC:
  fuse 0.8 A slow-blow, disconnect capacity 1500 A
  (Schurter, 0001.2507 or Wickmann, Standard Type 181 0.8 A)

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