

Safety Instructions

Proline t-mass 65

NEPSI Zone 1, Zone 21

Ex documentation

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

- BA00111D, Proline t-mass 65 HART
- BA00113D, Proline t-mass 65 PROFIBUS DP/PA
- BA00115D, Proline t-mass 65 MODBUS RS485
- BA00135D, Proline t-mass 65 FOUNDATION Fieldbus

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General warnings

- For installation, use and maintenance of the flow meter, the instruction manual and the following standards shall be observed:
 - GB50257-2014 "Code for construction and acceptance of electric device for explosive atmospheres and fire hazard electrical equipment installation engineering"
 - GB3836.13-2013 "Explosive atmospheres – Part 13: Equipment repair, overhaul and reclamation"
 - GB3836.15-2000 "Electrical apparatus for explosive gas atmospheres – Part 15: Electrical installations in hazardous area (other than mines)"
 - GB3836.16-2006 "Electrical apparatus for explosive gas atmospheres – Part 16: Inspection and maintenance of electrical installation (other than mines)"
 - GB15577-2018: Safety regulations for dust explosion prevention and protection". (Only if installed in dust hazardous areas.)
 - GB12476.2-2010 "Electrical apparatus for use in the presence combustible dust – Part 2: Selection and installation" (Only if installed in dust hazardous areas).
 - GB3836.18-2010 "Explosive atmospheres – Part 18: Intrinsically safe system".
- The flow meter shall not be modified in order to ensure the explosion protection performance of the equipment. Any change may impair safety.
- 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 device only when it is de-energized (and after a delay of at least 10 minutes following shutdown of the power supply) or in non-hazardous (classified) locations.
- It is not permissible to connect 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 water enters the housing.
- To guarantee resistance to dust and water, 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 mediums 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 must be equalized along the intrinsically safe sensor circuits. Further information is provided in the "Potential equalization" section on → 9.

Parts of the sensor in contact with the fluid must have adequate stability and be protected against mechanical load (for Zone 0).

Installation instructions

- For terminals No. 20 to No. 27 of the transmitter, only devices with ratings $U_m \leq 260 \text{ V}$ and $I_m \leq 500 \text{ mA}$ 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 on → 6.
For Zone 21: The surface temperature of the measuring device must not exceed $\frac{2}{3}$ of the ignition temperature of a dust cloud. The maximum surface temperature must maintain a safe limit of $75 \text{ }^\circ\text{C}$ to the smolder temperature of a dust layer of 5 mm.
Example: Operation in temperature class T4 ($135 \text{ }^\circ\text{C}$) is, therefore, suitable for dust with an ignition temperature of $202.5 \text{ }^\circ\text{C}$ ($1.5 \times 135 \text{ }^\circ\text{C}$ or $135 \text{ }^\circ\text{C} = \frac{2}{3}$ of $202.5 \text{ }^\circ\text{C}$) and a smolder temperature of $210 \text{ }^\circ\text{C}$ ($135 \text{ }^\circ\text{C} + 75 \text{ }^\circ\text{C}$).
- The following applies when using the terminal compartment in type of protection "flameproof/Ex d": Only cable entries and cable glands, which are approved by NEPSI in accordance with GB3836.1-2010, GB3836.2-2010, GB3836.3-2010 and which are suitable for an operating temperature of up to $80 \text{ }^\circ\text{C}$, they shall be used.

**Installation instructions
(continued)**

- The following applies when using the terminal compartment in type of protection "increased safety/Ex e":
Only cable entries, cable glands and blanking plugs, which are approved by NEPSI in accordance with GB3836.1-2010, GB3836.2-2010, GB3836.3-2010 and which are suitable for an operating temperature of up to 80 °C and for an ingress protection of IP 67, they shall be used. Alternatively Ex e cable glands specified or provided by Endress+Hauser Flowtec AG can be used. The cables must be installed in such a way, that they are fixed in place in order to ensure adequate strain relief.
- Suitable cables and suitable, certified cable glands, cable entries and blanking plugs must be used for measuring devices operated at temperatures below -20 °C.
- 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
- 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) or when the area is known to be non-hazardous.

COC certificates of conformity**COC certificates of conformity**

By affixing the certification number the product conforms with the following standards:

- GB3836.1/2/3/4 - 2010
- GB3836.19/20 - 2010
- GB12476.1/5 - 2013
- GB12476.4 - 2010

Certification numbers:

- GYJ22.1053X

Inspection body

NEPSI, National Supervision and Inspection Centre for Explosion Protection and Safety of Instrumentation

**Description of measuring
system**

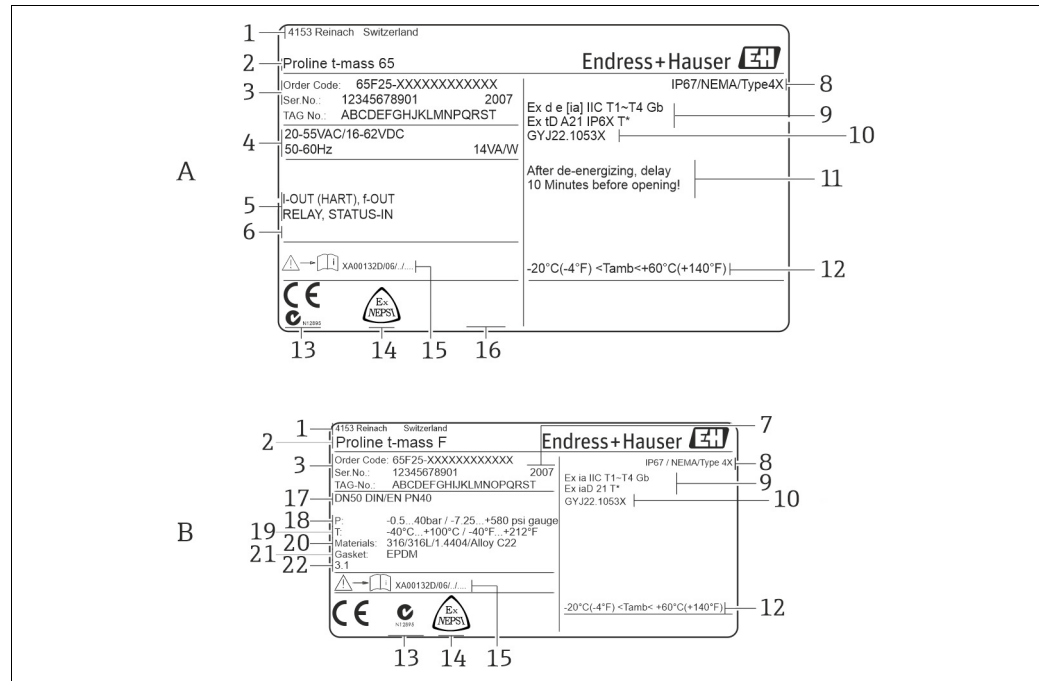
The measuring system consists of transmitters and sensors.

Two versions are available:

- Compact version: transmitters and sensors form a mechanical unit.
- Remote version: transmitters and sensors are installed separately and connected to each other via connecting cables.

Nameplates

The nameplates, which are mounted in a clearly visible position on the transmitter and sensor, contain all of the relevant information about the measuring system.



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Fig. 1: Example for nameplates of a transmitter and of a sensor

A Transmitter nameplate

B Sensor nameplate

1 Production site

2 Transmitter or sensor type

3 Order code and serial number

4 Power supply, frequency and power consumption

5 Available inputs/outputs

6 Space for additional information on special products

7 Year of manufacture

8 Type of enclosure protection

9 Type of protection

10 Number of the NEPSI certificate of conformity

11 Space for notes, e.g. delays, etc. (only if necessary)

12 Ambient temperature range

13 C-Tick symbol

14 NEPSI Symbol

15 Associated Ex documentation

16 Space for other approval specifications and certificates, e.g. PROFIBUS, etc. (only if present)

17 Nominal diameter/nominal pressure

18 Fluid pressure range

19 Fluid temperature range

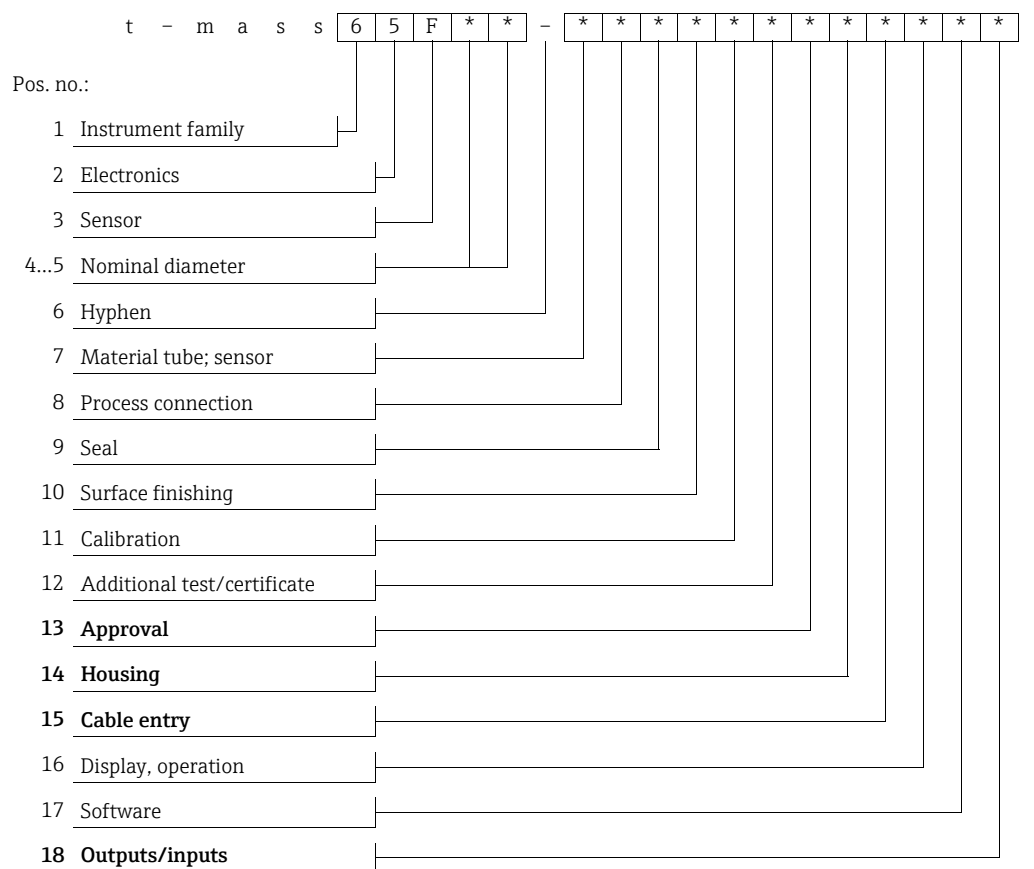
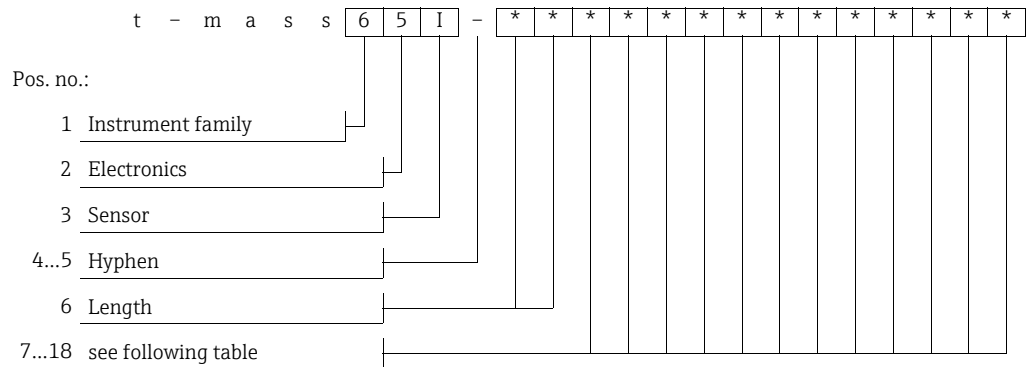
20 Materials in contact with the medium

21 Material of gasket

22 Additional specification, e.g. 3.1 = 3.1 certificate for wetted materials

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:



Approvals (Item No. 13 in type code)

*	Type of explosion protection				
	Transmitter				Sensor
	Remote version Ex ia input/output	Remote version other	Compact version with Ex ia input/output	Compact version other	
K	Ex d [ia Ga] IIC T6 Gb Ex tD [iaD 20] A21 IP6X T85°C	Ex d [ia] IIC T6 Gb Ex tD A21 IP6X T85°C	Ex d ia [ia Ga] IIC T1 ~ T4 Gb Ex tD [iaD 20] A21 IP6X T**C	Ex d ia IIC T1 ~ T4 Gb Ex tD A21 IP6X T**C	Ex ia IIC T1 ~ T4 Gb Ex tD A21 T**C
S	Ex d e [ia Ga] IIC T6 Gb Ex tD [iaD 20] A21 IP6X T85°C	Ex d e [ia] IIC T6 Gb Ex tD A21 IP6X T85°C	Ex d e ia [ia Ga] IIC T1 ~ T4 Gb Ex tD [iaD 20] A21 IP6X T**C	Ex d e ia IIC T1 ~ T4 Gb Ex tD A21 IP6X T**C	Ex ia IIC T1 ~ T4 Gb Ex tD A21 T**C

Type (compact/remote; Item No. 14 in type code)

*	Type	Min. ambient temperature $T_{a\min}$
A	Compact	-20 °C
1		-40 °C
G, H, J	Remote	-20 °C
6, 7, 8		-40 °C


Type of cable entry (Item No. 15 in type code)

*	Thread form
A	M20x1.5
B	NPT 1/2"
C	G 1/2"

Outputs/inputs (Item No. 18 in type code)

*	Type of protection
A,B,C,D,E,H,J,K,L,M,N,P,Q,V,W 0,2,3,4,5,6,7,8,9	none Ex ia (intrinsically safe) input /output
F, G, R, S, T, U	Ex ia (intrinsically safe) input /output

 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 →  11 onwards.

Temperature table compact version

Max. medium temperature [°C] for T1 ~ T4 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*****	-20...+100 °C
	t-mass 65F**_**3*****	
	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*****	-40...+130 °C
	t-mass 65I-****4*****	

The minimum ambient temperature is -20 °C.

A version for ambient temperatures up to -40 °C is optionally available

Temperature table remote version

Sensor

Max. medium temperature [°C] for T1 ~ T4 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 up to -40 °C is optionally available.

Transmitter

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

The maximum ambient temperature range is -20...+60 °C.
A version for ambient temperatures up 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 medium temperature T_M

Determine the maximum surface temperature for dust in relation to the max. ambient temperature T_a and max. medium temperature T_M

Example

Measuring device: compact version, t-mass 65F

Maximum ambient temperature: $T_a = 60$ °C

Fluid temperature: $T_M = 75$ °C

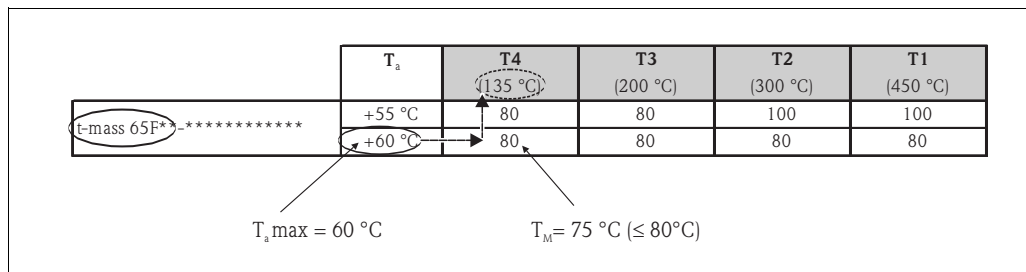
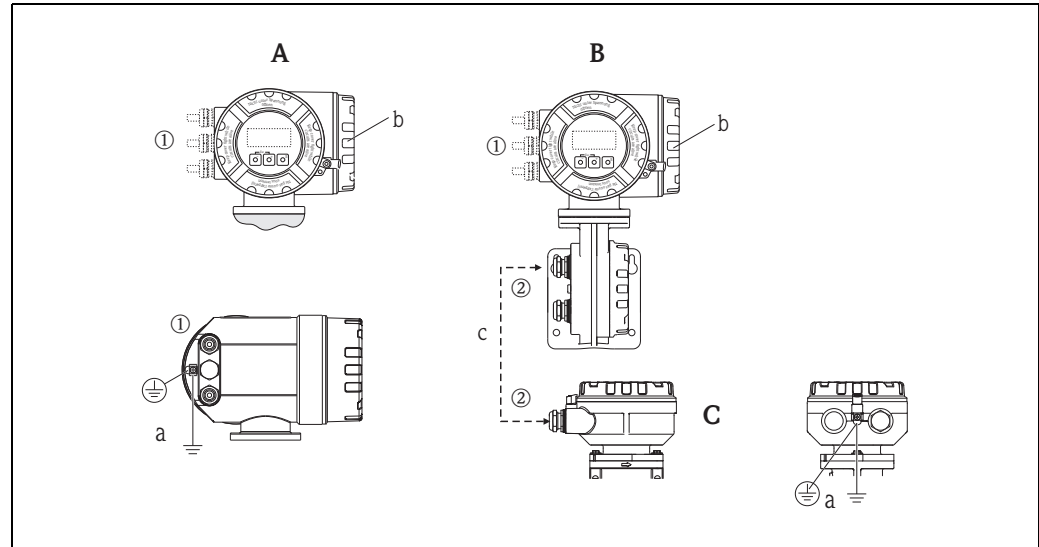


Fig. 2: Procedure for calculating the max. surface temperature

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 ≤ 80 °C → T4).

3. The maximum temperature of the calculated temperature class corresponds to the maximum surface temperature ($T_4 = 135\text{ °C}$ = maximum surface temperature for dust).

Design of measuring system



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Fig. 3: 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 → 10

Cable entries

- For cable entries, appropriate cable glands or blind plugs shall be used which are approved by ExTL in accordance with GB3836.1-2010 and GB3836.2-2010 (terminal compartment in flameproof) or GB3836.1-2010 and GB3836.3-2010 (terminal compartment in increased safety). Otherwise/alternatively Ex e cable glands specified/provided by the manufacturer which are rated at least IP67 can be used (terminal compartment in increased safety only).

⚠ 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 $L_{\text{cable}} \leq 0.09\text{ mH}$
- Total capacitance $C_{\text{cable}} \leq 0.1\text{ }\mu\text{F}$
- Dielectric strength $\geq 500\text{ V}$
- Maximum cable length $\leq 100\text{ m}$

⚠ 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) is to be securely connected to the potential equalization system using the screw terminal on the outside of the transmitter housing. Alternatively, the transmitter of the compact version can be connected to the potential equalization system via the pipeline if a ground connection via the pipeline according to regulations can be assured.
- 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 with shield grounded at both sides for fieldbus version

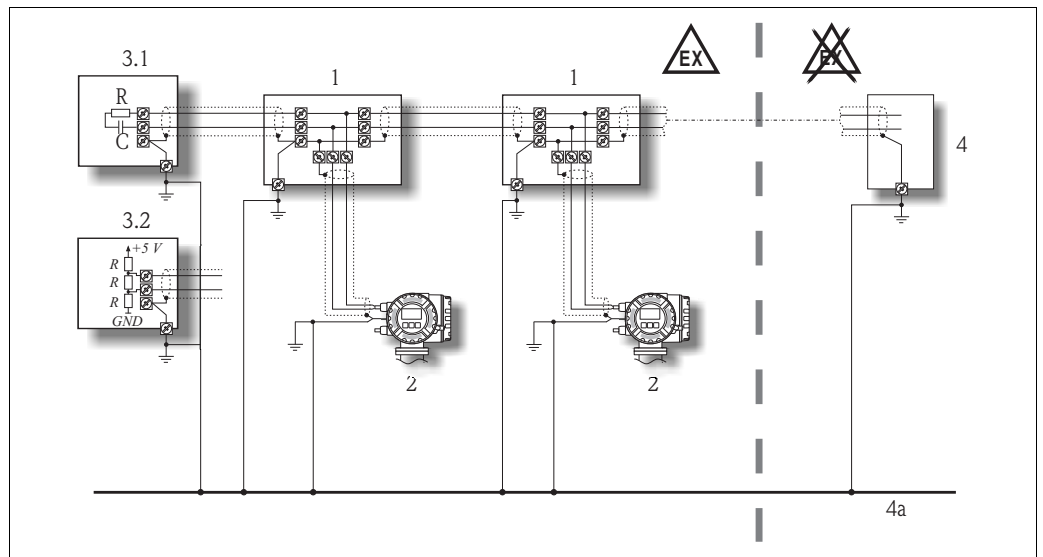


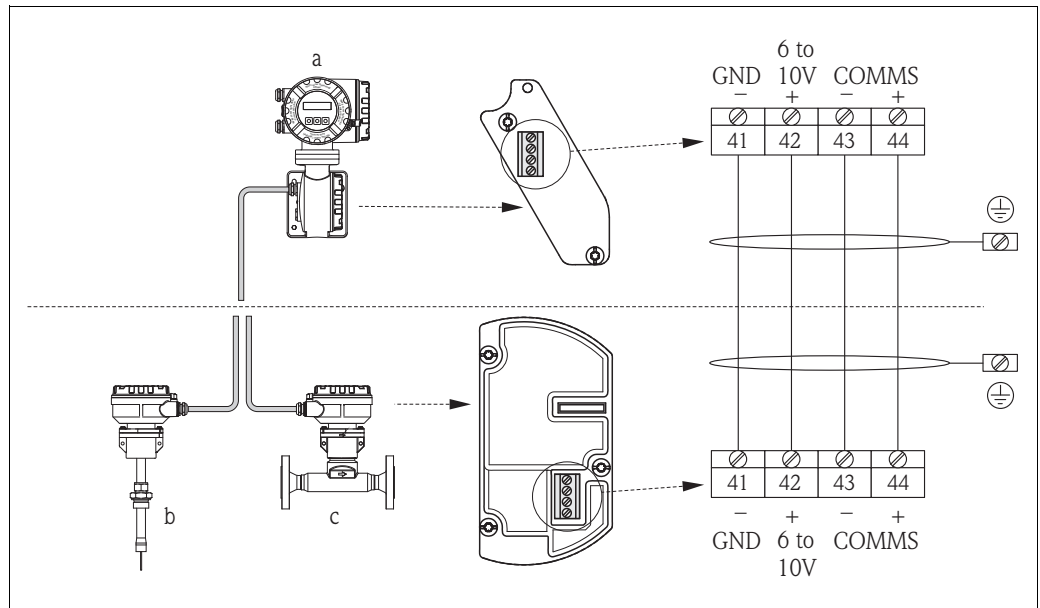
Fig. 4: Example for connecting potential equalization lines

- 1 Distributor/T-Box
- 2 Bus devices for potentially explosive atmospheres
- 3.1 Bus terminator PROFIBUS PA and FOUNDATION Fieldbus
- 3.2 Bus terminator PROFIBUS DP and MODBUS
- 4 Bus supply unit or automation system
- 4 Potential equalization line is fed out into the safe area

Note!

The length of the spur must be observed.

Connection of remote version connecting cable



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Fig. 5: Connection of remote version connecting cable

a Wall-mount housing: 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 → 11 ff.)

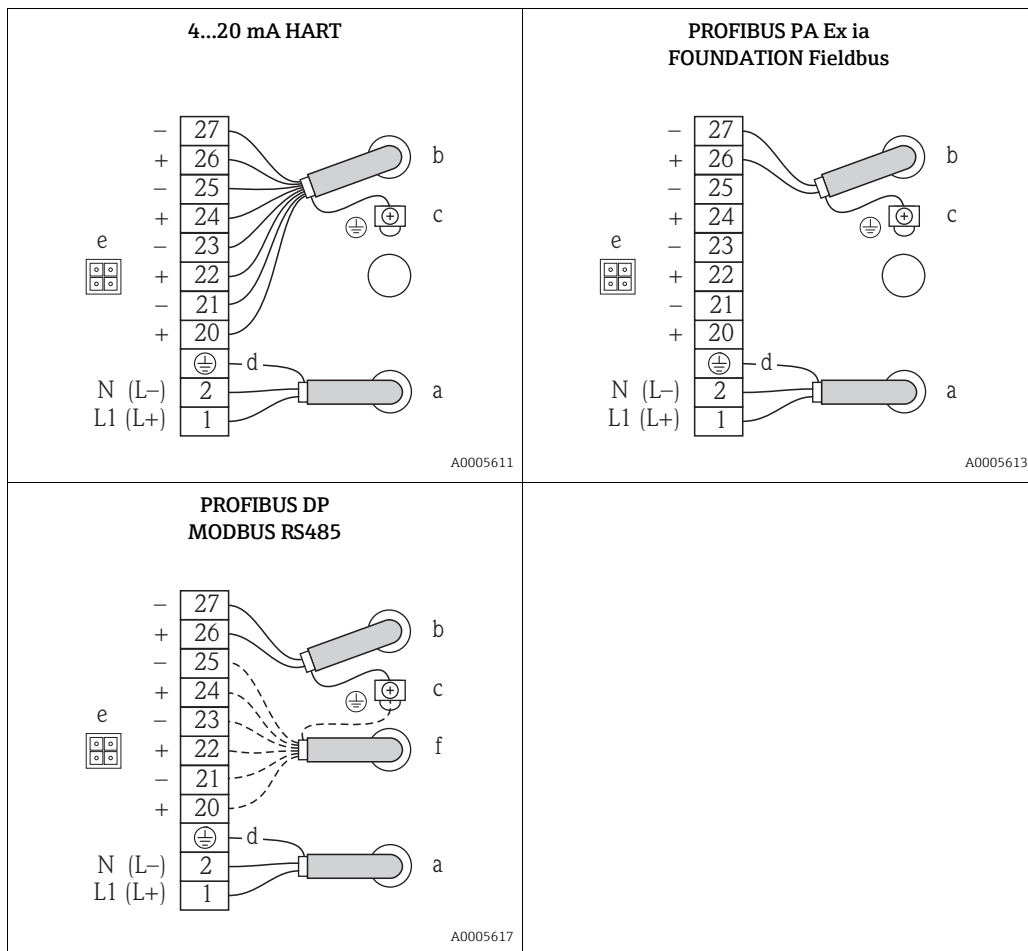


Fig. 6: Electrical connections

- a Power supply cable (terminal assignment, connection data → 11)
- b Signal cable (terminal assignment, connection data → 12 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 → 11)
 - PROFIBUS DP / MODBUS RS485: Signal cable (terminal assignment, connection data → 12)


Terminal assignment and connection data, power supply

Terminal assignment and connection data

All transmitters	L1 (L+) 1	N (L-) 2	⊕
Designation	Supply voltage (as per nameplate)		Protective earth
Functional values	AC: U = 85 to 260 V; 18.2VA or AC: U = 20 to 55 V; 14VA DC: U = 16 to 62 V; 8W		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 →  11.

The communication circuits, option F and G, they meet all requirements for a FISCO Field Device (IEC 60079-27).

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

Transmitter	Terminal no. (inputs/outputs)							
	20 (+)	21 (-)	22 (+)	23 (-)	24 (+)	25 (-)	26 (+)	27 (-)
Assignment	-	-	-	-	-	-	PROFIBUS PA passive 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. (inputs/outputs)							
	20 (+)	21 (-)	22 (+)	23 (-)	24 (+)	25 (-)	26 (+)	27 (-)
Assignment	-	-	-	-	-	-	FOUNDATION Fieldbus passive 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. (inputs/outputs)							
	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	21.8 V DC	U _o	21.8 V DC
					I _o	90 mA	I _o	90 mA
					P _o	491 mW	P _o	491 mW
					L _o IIC/IIB	4.1 mH/15 mH	L _o IIC/IIB	4.1 mH/15 mH
					C _o IIC/IIB	160 nF/1160	C _o IIC/IIB	160 nF/1160
					U _i	nF	U _i	nF
					I _i	30 V DC ¹⁾	I _i	30 V DC ¹⁾
					P _i	10 mA ¹⁾	P _i	10 mA ¹⁾
					L _i	0.3 W ¹⁾	L _i	0.3 W ¹⁾
					C _i	negligible	C _i	negligible
						6 nF		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. (inputs/outputs)							
	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	30 V DC	U _o	21.8 V DC
					I _i	500 mA	I _o	90 mA
					P _i	600 mW	P _o	491 mW
					L _i	negligible	L _o IIC/IIB	4.1 mH/15 mH
					C _i	6 nF	C _o IIC/IIB	160 nF/1160
							U _i	nF
							I _i	30 V DC ¹⁾
							P _i	10 mA ¹⁾
							L _i	0.3 W ¹⁾
							C _i	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. (inputs/outputs)							
	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 I _i P _i L _i C _i	30 V DC 500 mA 600 mW negligible 6 nF	U _i I _i P _i L _i C _i	30 V DC 100 mA 1.25 W negligible 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. (inputs/outputs)							
	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 I _i P _i L _i C _i	30 V DC 100 mA 1.25 W negligible 6 nF	U _i I _i P _i L _i C _i	30 V DC 100 mA 1.25 W negligible 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 →  11.

Terminal assignment

Transmitter	Terminal no. (inputs/outputs)							
	20 (+)	21 (-)	22 (+)	23 (-)	24 (+)	25 (-)	26 (+)	27 (-)
<i>Fixed communication boards (permanent assignment)</i>								
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 +5 V DGND		PROFIBUS DP ¹⁾ B A	
65***-*...*K 65I-*...*K	-	-	-	-	-		FOUNDATION Fieldbus FF + FF -	
65***-*...*Q 65I-*...*Q	-	-	-	-	Status input		MODBUS RS485 ¹⁾ B A	
<i>Flexible communication boards</i>								
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**-*...*L 65I-*...*L	Status input		Relay output 2		Relay output 1		Current output HART	
65F**-*...*2 65I-*...*2	Relay output		Current input		Pulse/frequency output		Current output 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	
<i>Safety-related and functional values of signal circuits →  16</i>								
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: <ul style="list-style-type: none"> ▪ active: 0/4 to 20 mA $R_L < 700 \Omega$, $R_L \text{ HART} \geq 250 \Omega$ ▪ passive: 4 to 20 mA $V_s = 18$ to 30 V DC, $R_i \geq 150 \Omega$ 	intrinsically = no safe = 260 V $U_m = 500$ mA I_m
Current output	galvanically isolated, active/passive selectable: <ul style="list-style-type: none"> ▪ 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: <ul style="list-style-type: none"> ▪ 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 $(f_{max} = 1250 \text{ Hz})$	
Relay output	galvanically isolated, max. 30 V AC / 500 mA max. 60 V DC / 100 mA	
Current input	galvanically isolated, active/passive selectable: <ul style="list-style-type: none"> ▪ 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 $R_i = 5 \text{ k}\Omega$	
PROFIBUS DP	galvanically isolated, RS485 as per Standard EIA/TIA-485	
PROFIBUS DP, external termination	galvanically isolated, RS485 as per Standard EIA/TIA-485 Terminal 24: +5 V Terminal 25: DGND	
FOUNDATION Fieldbus	galvanically isolated, $U_{BUS} = 9$ to 32 V DC $I_{BUS} = 12$ mA IEC 61158-2 (MBP)	
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 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:

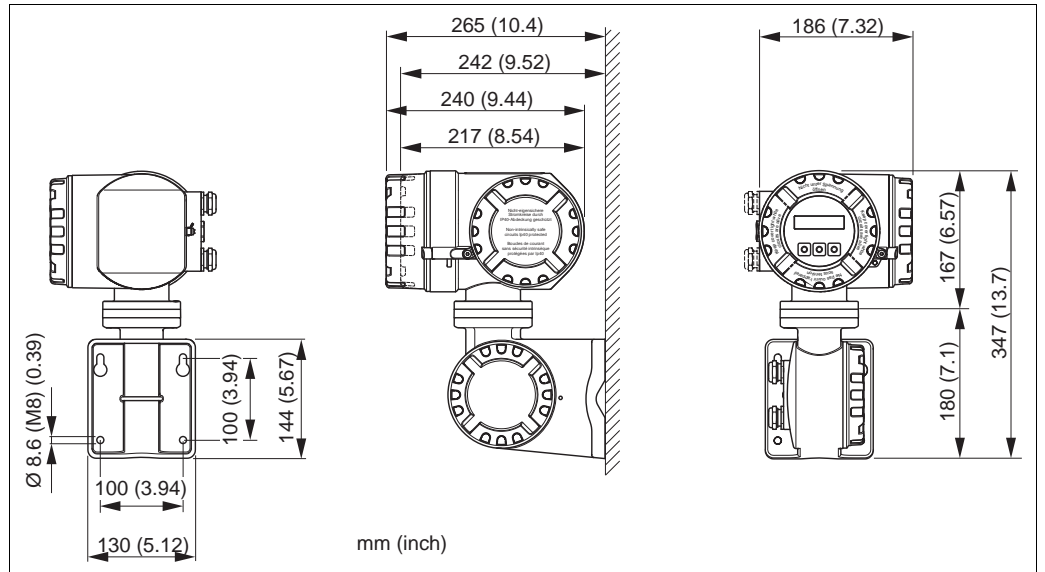
- Voltage 20 to 55 V AC / 16 to 62 V DC:
fuse 2.0 A slow-blow, disconnect capacity 1500 A
(Schurter, 0001.2503 or Wickmann, Standard Type 181 2.0 A)
- Voltage 85 to 260 V AC:
fuse 0.8 A slow-blow, disconnect capacity 1500 A
(Schurter, 0001.2507 or Wickmann, Standard Type 181 0.8 A)

Technical Data

Dimensions

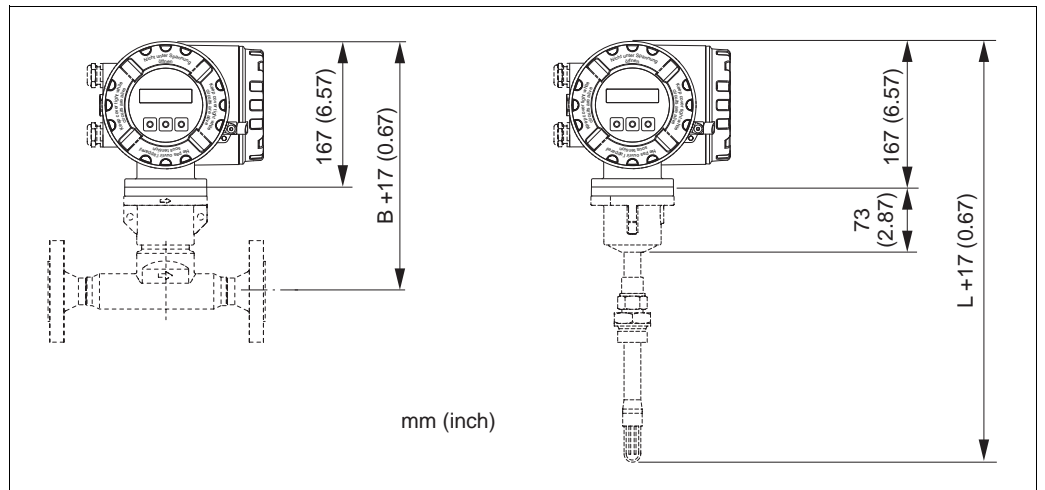
Please find the differences between the standard version transmitter and the EEx d version in the following diagram. These dimensions are valid both for the compact version and for the remote version. The dimensions of the sensor (B and L) correspond to the standard version. Refer to the following Technical information for these dimensions:

t-mass 65F, 65I → TI00069D



A0005156

Fig. 7: Dimensions of Ex-remote version



A0005516

Fig. 8: Dimensions of Ex-compact version

Weight

The weight of the Ex d version is approx. 2 kg greater than that of the standard version.