Level Pressure Flow Temperature Liquid Analysis Registration Systems Components Services Solutions

Safety Instructions

Proline Promass 83, 84

Division 1

Safety instructions for electrical apparatus for explosion-hazardous areas according to FACTORY MUTUAL standards → 3

Safety instructions for electrical apparatus for explosion-hazardous areas according to CANADIAN STANDARDS ASSOCIATION → 21

XA00102D/06/EN/13.11
71147024

Endress+Hauser
People for Process Automation

Examples for markings according to FM and CSA:

FM APPROVALS

Example: **XP / I / 1 / ABCD**

Type of Protection

XP	Explosionproof
IS	Intrinsically Safe Apparatus
AIS	Associated Apparatus with Intrinsically Safe Connections
ANI	Associated Nonincendive Field Wiring Apparatus
PX,PY,PZ	Pressurized
APX,APY,APZ	Associated Pressurization Systems/Components
NI	Nonincendive
DIP	Dust-Ignitionproof
S	Special Protection

Class

I	Class I (Gas)
II	Class II (Dust)
III	Class III (Fibre)

Division

1	Division 1
2	Division 2

Group

FM /NEC	Gases, vapours and dust examples	Min. ignition temperature [µJ]
A	Acetylene, carbon disulfide (Class I)	0.02
B	Hydrogen, ethyl nitrate (Class I)	0.02
C	Ethylene, isoprene (Class I)	0.06
D	Acetone, ethane, benzene, ethanoic acid, gasolines, diesel oil, aircraft fuel, methane, heating oil,crude oil, hexane, ether (Class I)	0.18
E	Metallic powder (Class II)	
F	Coal dust (Class II)	
G	Mill dust (Class II)	
	Textile fibres (Class III)	

Temperature Class

Maximum surface temperature		
T1	842 °F	450 °C
T2	572 °F	300 °C
T2A	536 °F	280 °C
T2B	500 °F	260 °C
T2C	446 °F	230 °C
T2D	419 °F	215 °C
T3	392 °F	200 °C
T3A	356 °F	180 °C
T3B	329 °F	165 °C
T3C	320 °F	160 °C
T4	275 °F	135 °C
T4A	248 °F	120 °C
T5	212 °F	100 °C
T6	185 °F	85 °C

CSA (Canadian Standards Association)

Example: **Class I, Division 1, Group ABCD**

Class

I	Class I (Gas)
II	Class II (Dust)
III	Class III (Fibre)

Division

1	Division 1
2	Division 2

Group

CSA / CSC	Gases, vapours and dust examples	Min. ignition temperature [µJ]
A	Acetylene, carbon disulfide (Class I)	0.02
B	Hydrogen, ethyl nitrate (Class I)	0.02
C	Ethylene, isoprene (Class I)	0.06
D	Acetone, ethane, benzene (Class I)	0.18
E	Metallic powder (Class II)	
F	Coal dust (Class II)	
G	Mill dust (Class II)	
	Textile fibres (Class III)	

Type of Protection

Explosionproof
Intrinsically Safe Apparatus
Associated Apparatus with Intrinsically Safe Connections
Associated Nonincendive Field Wiring Apparatus
Pressurized
Associated Pressurization Systems/Components
Nonincendive
Dust-Ignitionproof
Special Protection

Temperature Class

Maximum surface temperature		
T1	450 °C	842 °F
T2	300 °C	572 °F
T2A	280 °C	536 °F
T2B	260 °C	500 °F
T2C	230 °C	446 °F
T2D	215 °C	419 °F
T3	200 °C	392 °F
T3A	180 °C	356 °F
T3B	165 °C	329 °F
T3C	160 °C	320 °F
T4	135 °C	275 °F
T4A	120 °C	248 °F
T5	100 °C	212 °F
T6	85 °C	185 °F

A0005630


Level


Pressure


Flow


Temperature


Liquid Analysis


Registration


Systems Components


Services


Solutions

Safety Instructions

Proline Promass 83, 84

Division 1

FM Ex documentation

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

- BA00059D, Proline Promass 83 HART
- BA00063D, Proline Promass 83 PROFIBBUS DP PA
- BA00065D, Proline Promass 83 FOUNDATION Fieldbus
- BA00107D, Proline Promass 83 Modbus RS 485
- BA00109D, Proline Promass 84 HART
- BA00129D, Proline Promass 84 Modbus RS 485

Table of Contents (FM)

XA00102D/06/EN/13.11
71147024

Endress+Hauser

People for Process Automation

Special conditions

- Install per National Electrical Code. Install intrinsically safe circuits per NEC ANSI/ NFPA 70 and ISA RP 12.6 respecting the explosionproof integrity of the enclosure.
- Control room equipment shall not use or generate more than 250 V rms.
- The device must be integrated into the potential equalization system.
- For terminals No. 20 to No. 27 of the transmitter, only devices with ratings $U_m \leq 250$ V and $I_m \leq 500$ mA are allowed to be connected (does not apply to Promass 83***-**********F with intrinsically safe output circuits).
- The specified temperature class in conjunction with the ambient temperature and the medium temperature must be in compliance with the tables: → 9.
- It is not permissible to connect the service adapter whilst the atmosphere is considered to be explosive.
- Use of the devices is restricted to mediums against which the process-wetted materials are adequately resistant.
- Class II Group G: The surface temperature of the apparatus cannot exceed 329 °F.
- Transmitter enclosure G02 explosionproof for use in Class 1 Division 1 Groups A, B, C, D (seals not required) and dust-ignition proof for Class II, III Division 1 Groups E, F, G.
- Sensor circuits intrinsically safe for Cl. I, II, III Div. 1 Group A, B, C, D, E, F, G except
  Promass E: DN 3" (sensor version Group C-D)
  Promass I: DN 1½" FB; 2"; 2" FB; 3" (sensor version Group C-D)
  Promass F: DN 3"; 4"; 6"; 10" (sensor version Group C-D)
  Promass H, P, S: DN 2" (sensor version Group C-D)
  Promass O: DN 3"; 4"; 6"(sensor version Group C-D)
  Promass X: DN 14" (sensor version Group C-D)
  which are only suitable for Cl. I, II, III Div. 1 Group C, D, E, F, G.
  (optionally, a version for Groups A and B is available).
- Substitution of components may impair intrinsic safety.

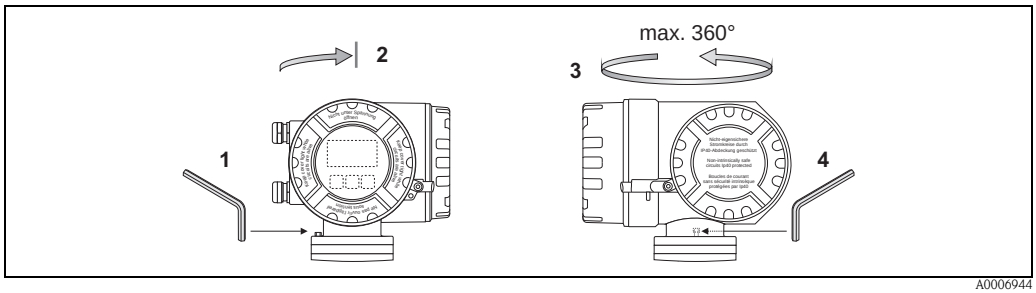
Caution!
- Use supply wires suitable for 9 °F above ambient temperature, but at least for 176 °F.

General warnings

- 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 national regulations relating to the installation of devices in potentially explosive atmospheres is mandatory, if such regulations exist.
- Open the device only when it is de-energized (and after a delay of at least 10 minutes following shutdown of the power supply).
- 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).

Turning the transmitter housing

1. Unscrew the grub screw.
2. Rotate the transmitter housing cautiously clockwise until the end stop (end of the thread).
3. Rotate the transmitter housing counter-clockwise (max. 360°) in the wanted position.
4. Tighten the grub screw again.



A0006944

Fig. 1: Turning the transmitter housing

Approvals

General

The system meets the fundamental health and safety requirements for the design and construction of devices and protective systems intended for use in potentially explosive atmospheres in accordance with the National Electrical Code.

No. / approval type

J.I. 3002554

Notified body

FM APPROVALS

Identification

The identification of the system must contain the following specifications:
- XP-IS-DIP / I, II, III / 1 / ABCDEFG / T6-T1 or
- XP-IS-DIP / I, II, III / 1 / CDEFG / T6-T1

Caution!
The installation instructions for the safe use of the system must be observed → 4.

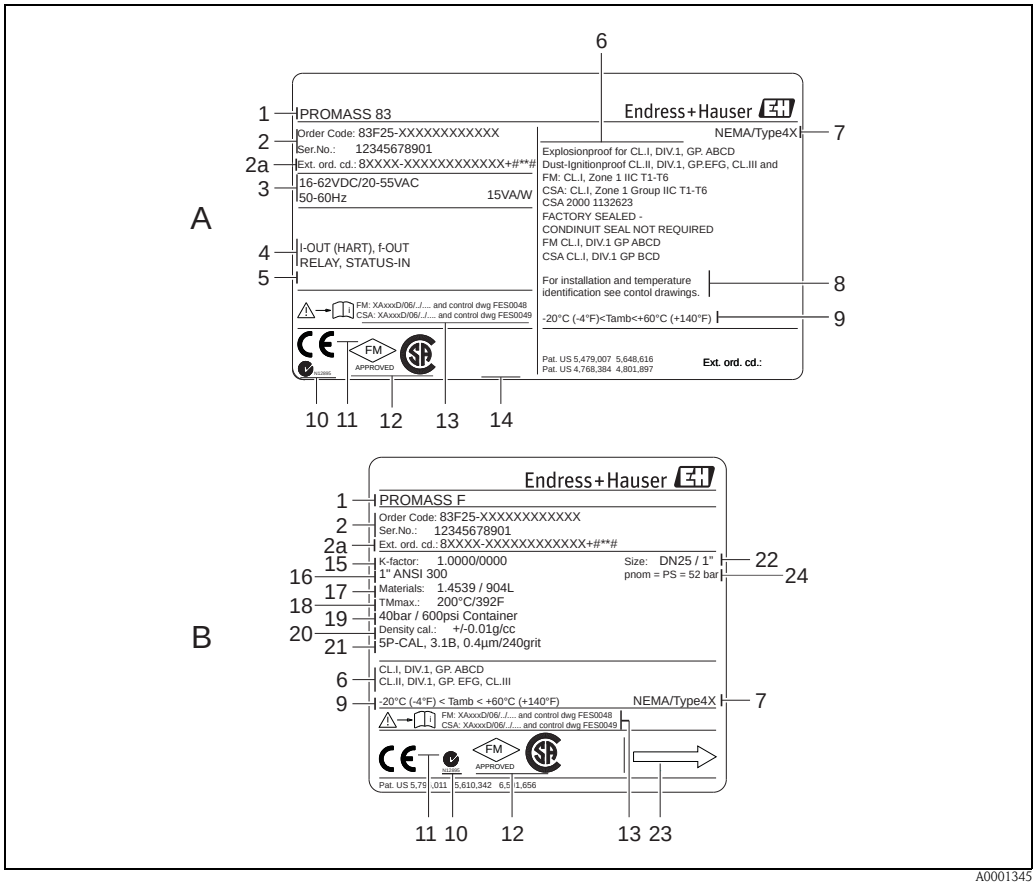
Description of measuring system

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.

Nameplate

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.



A0001345

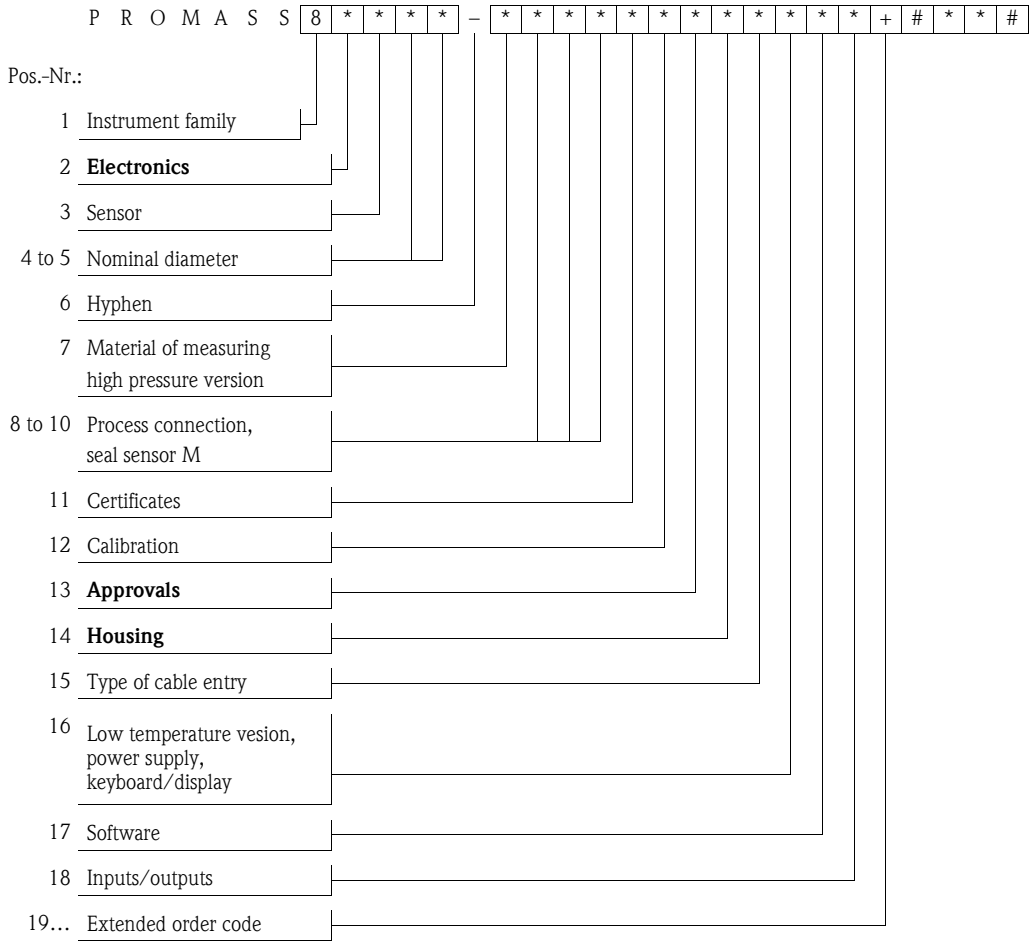
Fig. 2: Example for nameplates of a transmitter and of a sensor

A Transmitter nameplate
B Sensor nameplate

1 Transmitter or sensor type
2 Order code and serial number
2a Extended order code
3 Available inputs/outputs
4 Space for additional information on special products
5 Space for additional information
6 Type of protection
7 Space for notes, e.g. delays, etc. (only if necessary)
8 Ambient temperature range
9 C-Tick symbol
10 Space for notified body for quality assurance monitoring
11 Label of notified body: Factory Mutual Research
12 Associated Ex documentation
13 Space for other approval specifications and certificates, e.g. PROFIBUS, etc. (only if present)
14 Calibration factor/zero point
15 Nominal diameter/nominal pressure
16 Lining material
17 Fluid temperature range
18 Pressure range of secondary containment
19 Accuracy of density measurement
20 Additional information (examples): 5P-CAL = 5-point calibration, 3.1B = 3.1 B certificate for wetted materials
21 Nominal diameter device
22 Flow direction
23 Nominal pressure

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:



Electronics (Pos. no. 2 in the type code)

*	Transmitter
3	Promass 83
4	Promass 84

Housing (Pos. no. 14 in the type code)

*	Type
A, B [1], L [1], M [1], N [1]	Compact
E, F, G [1], H [1], J [1], K [1], 1 [1], 4 [1], 7 [1], 8 [1] U [1], V [1], W [1]	Remote

[1] Not for Promass F high temperature

Approvals (Pos. no. 13 in the type code)

*	Type	Application/zone		
N	Compact	■ Class I, Groups ABCD ■ Class I, Zone 1, Group IIC ■ Class II, Groups EFG ■ Class III		
	Remote	**Transmitter**		
		■ Class I, Groups ABCD ■ Class I, Zone 1, Group IIC ■ Class II, Groups EFG ■ Class III		
		Sensor		
		Promass A Promass H [1], I [1], P [1], S [1] Promass E [1] Promass F Promass F (HT)	DN 1/24" to 1/8" DN 3/8" to 1½" DN 3/8" to 2" DN 3/8" to 2" DN 1", 2"	■ Class I, Groups ABCD ■ Class I, Zone 1, Group IIC ■ Class II, Groups EFG ■ Class III
P	Compact	■ Class I, Groups CD ■ Class I, Zone 1, Group IIB ■ Class II, Groups EFG ■ Class III		
	Remote	**Transmitter**		
		■ Class I, Groups CD ■ Class I, Zone 1, Group IIB ■ Class II, Groups EFG ■ Class III		
		Sensor		
		Promass H [1], P [1], S [1] Promass I [1] Promass E [1] Promass F Promass F (HT) Promass O Promass X	DN 2" DN 1½" FB, DN 2", DN 2" FB, DN 3" DN 3" DN 3" to 10" DN 3" DN 3" to 6" DN 14"	■ Class I, Groups CD ■ Class I, Zone 1, Group IIB ■ Class II, Groups EFG ■ Class III
O	Compact	■ Class I, Groups ABCD ■ Class I, Zone 1, Group IIC ■ Class II, Groups EFG ■ Class III		
	Remote	**Transmitter**		
		■ Class I, Groups ABCD ■ Class I, Zone 1, Group IIC ■ Class II, Groups EFG ■ Class III		
		Sensor		
		Promass H [1], P [1], S [1] Promass I [1] Promass E [1] Promass F Promass F (HT) Promass O Promass X	DN 2" DN 1½" FB, DN 2", DN 2" FB, DN 3" DN 3" DN 3" to 10" DN 3" DN 3" to 6" DN 14"	■ Class I, Groups ABCD ■ Class I, Zone 1, Group IIC ■ Class II, Groups EFG ■ Class III

HT = high temperature
FB = full bore
[1] Not available for Promass 84

✎ Note!
For a detailed explanation of these values with regard to the outputs and inputs available, as well as a description of the associated terminal assignment and connection data: → 🖹 13 ff.

Temperature table (compact version)

Max. medium temperature [°F] for T1–T6 in relation to the maximum ambient temperature T_a

	Nominal diameter [in]	T_a [°F]	T6 (185 °F)	T5 (212 °F)	T4A (248 °F)	T4 (275 °F)	T3A (356 °F)	T2C (446 °F)	T2B (500 °F)	T1 (842 °F)
8*A**-…	1/24" to 1/8"	+140	140	203	239	266	284	392	392	392

	Nominal diameter [in]	T_a [°F]	T6 (185 °F)	T5 (212 °F)	T4A (248 °F)	T4 (275 °F)	T3A (356 °F)	T2C (446 °F)	T2B (500 °F)	T1 (842 °F)
8*F**-…	3/8" to 1½"	+122	131	158	185	212	302	365 [3]	392 [3]	392 [3]
	2" to 10"		140	158	185	221	302	365 [3]	392 [3]	392 [3]
	3/8" to 1½"	+140	131	158	185	212	302 [3]	365 [3]	392 [3]	392 [3]
	2" to 10"		140	158	185	212	302 [3]	365 [3]	392 [3]	392 [3]

	Nominal diameter [in]	T_a [°F]	T6 (185 °F)	T5 (212 °F)	T4A (248 °F)	T4 (275 °F)	T3A (356 °F)	T2C (446 °F)	T2B (500 °F)	T1 (842 °F)
8*E**-…	3/8" to 2"	+113	113	212	248	266	284	284	284	284
	1" to 2"	+122	122	212	248	266	284	284	284	284
		+140	–	212	248	266	284	284	284	284
	3"		140	167	203	230	284	284	284	284

	Nominal diameter [in]	T_a [°F]	T6 (185 °F)	T5 (212 °F)	T4A (248 °F)	T4 (275 °F)	T3A (356 °F)	T2C (446 °F)	T2B (500 °F)	T1 (842 °F)
8*F**-1… 8*F**-2… 8*F**-3… 8*F**-4…	1", 2", 3"	+140	158	185	212	239 [3]	320 [3]	401 [3]	455 [3]	662 [3]

	Nominal diameter [in]	T_a [°F]	T6 (185 °F)	T5 (212 °F)	T4A (248 °F)	T4 (275 °F)	T3A (356 °F)	T2C (446 °F)	T2B (500 °F)	T1 (842 °F)
8*H**-…	3/8"	+122	122	149	185	212	284	365	392	392
	½" to 2"		140	167	212	239	320	392	392	392
	3/8"	+140	122	149	185	212	284	365 [3]	392 [3]	392 [3]
	½" to 2"		140	167	212	239	320	392 [3]	392 [3]	392 [3]

	Nominal diameter [in]	T_a [°F]	T6 (185 °F)	T5 (212 °F)	T4A (248 °F)	T4 (275 °F)	T3A (356 °F)	T2C (446 °F)	T2B (500 °F)	T1 (842 °F)
8*I**-…	3/8" to 1" [1]	+122	140	203	203	230	302	302	302	302
	1½" to 3" [2]		158	185	221	248	302	302	302	302
	3/8" to 1" [1]	+140	140	203	203	230	302 [3]	302 [3]	302 [3]	302 [3]
	1½" to 3" [2]		158	185	221	248	302 [3]	302 [3]	302 [3]	302 [3]

[1] as well as DN ½" FB
[2] as well as DN 1" FB, 1½" FB, 2" FB
(FB = full bore)

	Nominal diameter [in]	T_a [°F]	T6 (185 °F)	T5 (212 °F)	T4A (248 °F)	T4 (275 °F)	T3A (356 °F)	T2C (446 °F)	T2B (500 °F)	T1 (842 °F)
8*M**-…	3/8" to 3"	+122	122	140	185	221	302	302	302	302
		+140	-	140	185	212	212	212	212	212

	Nominal diameter [in]	T_a [°F]	T6 (185 °F)	T5 (212 °F)	T4A (248 °F)	T4 (275 °F)	T3A (356 °F)	T2C (446 °F)	T2B (500 °F)	T1 (842 °F)
8*P**-… 8*S**-…	3/8"	+122	–	149	185	212	284	365	392	392
	½" to 1"		122	167	212	239	320	392	392	392
	1½"		131	167	212	239	320	392	392	392
	2"		140	167	203	230	311	392	392	392
	3/8"	+140	–	149	185	212	284	365 [3]	392 [3]	392 [3]
	½" to 1½"		–	167	212	239	320	392 [3]	392 [3]	392 [3]
	2"		140	167	203	230	311	392 [3]	392 [3]	392 [3]

	Nominal diameter [in]	T_a [°F]	T6 (185 °F)	T5 (212 °F)	T4A (248 °F)	T4 (275 °F)	T3A (356 °F)	T2C (446 °F)	T2B (500 °F)	T1 (842 °F)
8*O**-…	3" to 6"	+122	140	158	185	221	302	365 [3]	392 [3]	392 [3]
		+140	140	158	185	212	302 [3]	365 [3]	392 [3]	392 [3]
	Nominal diameter [in]	**T_a** [°F]	**T6** (185 °F)	**T5** (212 °F)	**T4A** (248 °F)	**T4** (275 °F)	**T3A** (356 °F)	**T2C** (446 °F)	**T2B** (500 °F)	**T1** (842 °F)
8*X**-…	14"	+122	140	158	185	221	302	365 [3]	392 [3]	392 [3]
		+140	140	158	185	212	302 [3]	365 [3]	392 [3]	392 [3]

[3] The maximum permissible medium temperatures only apply if the transmitter is installed in such a way that the transmitter is not fitted above the sensor and there is free convection on all sides.

The minimum **medium temperature** is –58 °F for Promass A/F/I/H/M/O/P/S/X, and –40 °F for Promass E.

The minimum **ambient temperature** T_a to –4 °F.
A version for an ambient temperature Ta to –40 °F is also optionally available.

Temperature table (remote version)

Sensor

Max. medium temperature [°F] for T1-T6 in relation to the maximum ambient temperature T_a

	Nominal diameter [in]	T_a [°F]	T6 (185 °F)	T5 (212 °F)	T4A (248 °F)	T4 (275 °F)	T3A (356 °F)	T2C (446 °F)	T2B (500 °F)	T1 (842 °F)
8*A**-…	1/24" to 1/8"	+140	140	203	239	266	284	392	392	392

	Nominal diameter [in]	T_a [°F]	T6 (185 °F)	T5 (212 °F)	T4A (248 °F)	T4 (275 °F)	T3A (356 °F)	T2C (446 °F)	T2B (500 °F)	T1 (842 °F)
8*E**-…	3/8" to 2"	+113	113	212	248	266	284	284	284	284
	1" to 2"	+140	–	212	248	266	284	284	284	284
	3"		140	167	203	230	284	284	284	284

	Nominal diameter [in]	T_a [°F]	T6 (185 °F)	T5 (212 °F)	T4A (248 °F)	T4 (275 °F)	T3A (356 °F)	T2C (446 °F)	T2B (500 °F)	T1 (842 °F)
8*F**-…	3/8" to 1½"	+140	131	158	185	212	302	365	392	392
	2" to 10"		140	158	185	221	302	365	392	392

	Nominal diameter [in]	T_a [°F]	T6 (185 °F)	T5 (212 °F)	T4A (248 °F)	T4 (275 °F)	T3A (356 °F)	T2C (446 °F)	T2B (500 °F)	T1 (842 °F)
8*F**-1… 8*F**-2… 8*F**-3… 8*F**-4…	1", 2", 3"	+140	158	185	212	239	320	401	455	662

	Nominal diameter [in]	T_a [°F]	T6 (185 °F)	T5 (212 °F)	T4A (248 °F)	T4 (275 °F)	T3A (356 °F)	T2C (446 °F)	T2B (500 °F)	T1 (842 °F)
8*H**-…	3/8"	+140	122	149	185	212	284	365	392	392
	½" to 2"		140	167	212	239	320	392	392	392

	Nominal diameter [in]	T_a [°F]	T6 (185 °F)	T5 (212 °F)	T4A (248 °F)	T4 (275 °F)	T3A (356 °F)	T2C (446 °F)	T2B (500 °F)	T1 (842 °F)
8*I**-…	3/8" to 1" [1]	+140	140	203	203	230	302	302	302	302
	1½" to 3" [2]		158	185	221	248	302	302	302	302

[1] as well as DN ½" FB
[2] as well as DN 1" FB, 1½" FB, 2" FB
(FB = full bore)

	Nominal diameter [in]	T_a [°F]	T6 (185 °F)	T5 (212 °F)	T4A (248 °F)	T4 (275 °F)	T3A (356 °F)	T2C (446 °F)	T2B (500 °F)	T1 (842 °F)
8*M**-…	3/8" to 3"	+140	122	140	185	221	302	302	302	302

	Nominal diameter [in]	T_a [°F]	T6 (185 °F)	T5 (212 °F)	T4A (248 °F)	T4 (275 °F)	T3A (356 °F)	T2C (446 °F)	T2B (500 °F)	T1 (842 °F)
8*P**-… 8*S**-…	3/8"	+122	–	149	185	212	284	365	392	392
	½" to 1"		122	167	212	239	320	392	392	392
	1½"		131	167	212	239	320	392	392	392
	3/8"	+140	–	149	185	212	284	365	392	392
	½" to 1½"		–	167	212	239	320	392	392	392
	2"		140	167	203	230	311	392	392	392

	Nominal diameter [in]	T_a [°F]	T6 (185 °F)	T5 (212 °F)	T4A (248 °F)	T4 (275 °F)	T3A (356 °F)	T2C (446 °F)	T2B (500 °F)	T1 (842 °F)
8*O**-…	3" to 6"	+140	140	158	185	221	302	365	392	392

	Nominal diameter [in]	T_a [°F]	T6 (185 °F)	T5 (212 °F)	T4A (248 °F)	T4 (275 °F)	T3A (356 °F)	T2C (446 °F)	T2B (500 °F)	T1 (842 °F)
8*X**-…	14"	+140	140	158	185	221	302	365	392	392

The minimum **ambient temperature** T_a to –4 °F.
The minimum **medium temperature** is –58 °F for Promass A/F/H/I/M/O/P/S/X, and –40 °F for Promass E.

Transmitter

The transmitter of the remote version is temperature class T6 when installed in the Ex d housing up to an **ambient temperature** of T_a = 140 °F. The maximum ambient temperature range is –4 to +140 °F. A version for an ambient temperature Ta to –40 °F is also optionally available.

Design of measuring system

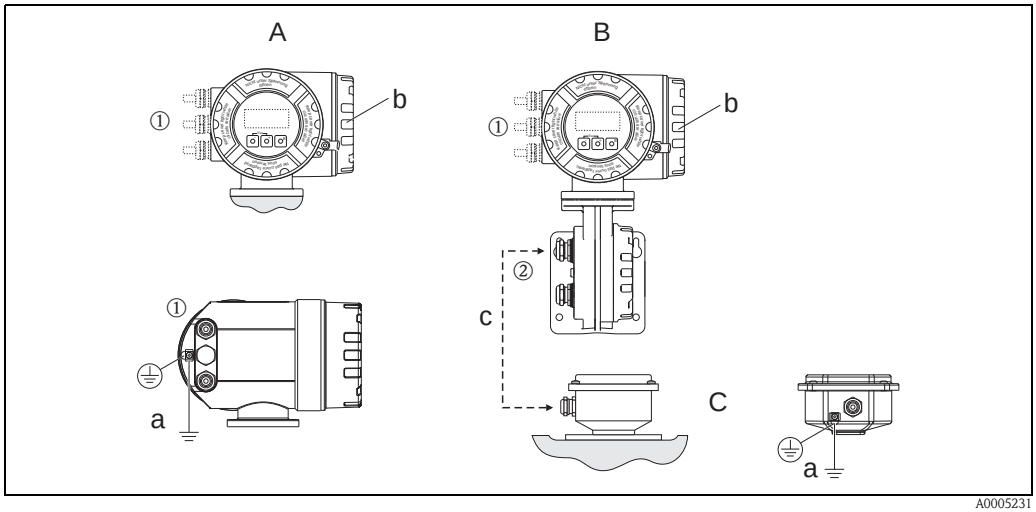


Fig. 3: Design of the measuring system, compact/remote version

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 following chapter "Cable entries"

✎ Note!
For connecting the remote version connecting cable → 🖹 13

Cable entries

① Cable entries for transmitter terminal compartment (XP version) power supply/communication cable.
Choice of thread for cable entry: ½" NPT.

Make sure that the XP cable glands/entries are secured to prevent working loose.

② For remote version connecting cable:
Choice of thread for cable entry: ½" NPT.

Cable specification

You can find information about the cable specification in the associated Operating Instructions.

Potential equalization

The transmitter (compact and remote version) must be safely integrated into the potential equalization via the screw terminal on the outside of the transmitter housing. Alternatively, the transmitter of the compact version as of serial number 4Axxxxxx000 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, screening and grounding can be found in the associated Operating Instructions.

Potential equalization for fieldbus versions, when both sides of the screen are grounded

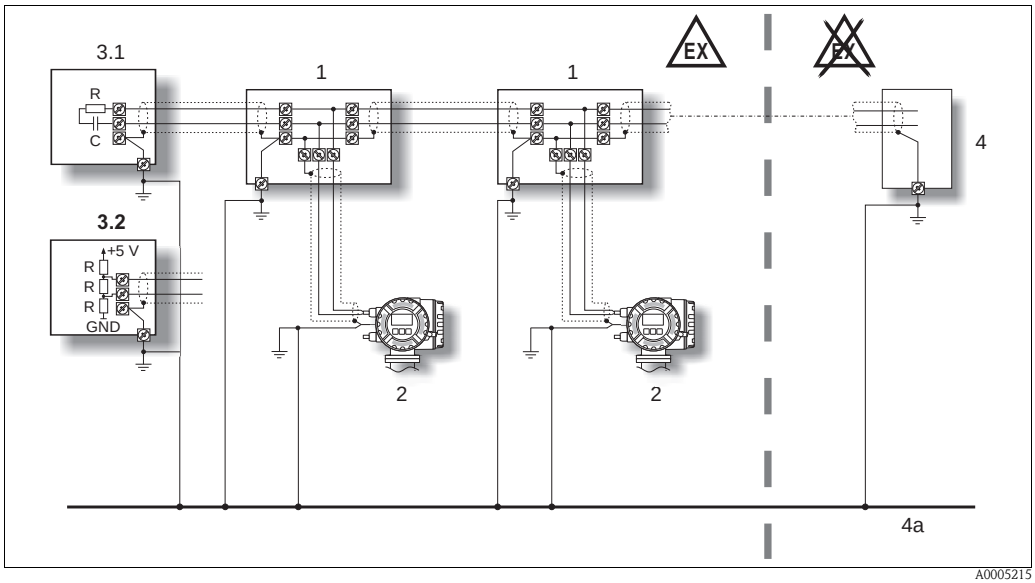


Fig. 4: Example for connecting potential equalization lines
1 Distributor/T-Box
2 Bus devices for potentially explosive atmospheres
3.1 Bus termination PROFIBUS PA or FOUNDATION Fieldbus
3.2 Bus termination PROFIBUS DP or MODBUS RS485
4 Bus power supply unit or automation system
4a Potential equalization line is fed out into the safe area

✎ Note!
The length of the spurs is to be considered.

Connecting the remote version connecting cable

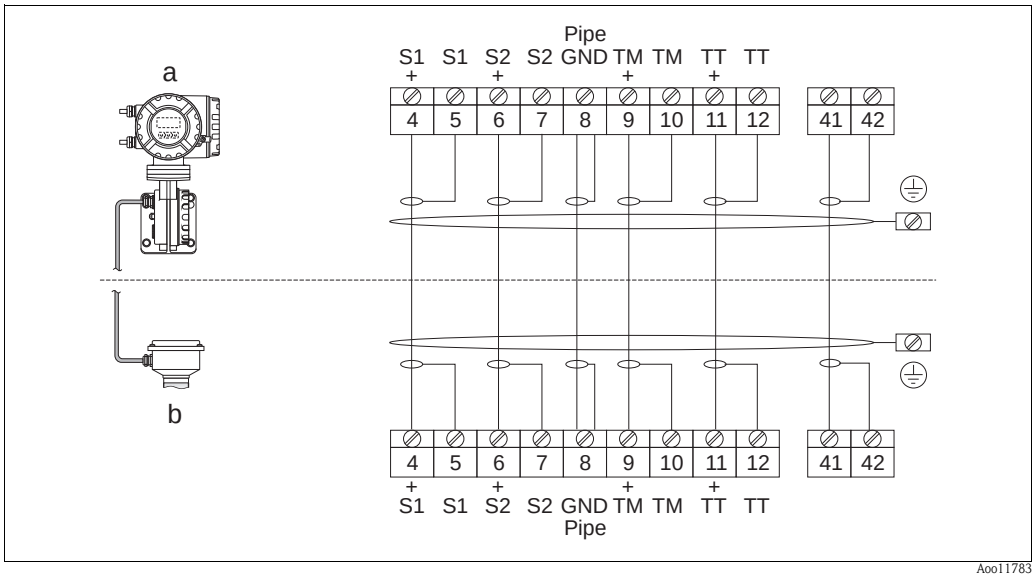


Fig. 5: Connecting the remote version connecting cable
a Wall-mount housing: Zone 1
b Remote version flange version
Wire colors (color code according to DIN 47100):
Terminal number: 4/5 = gray; 6/7 = green; 8 = yellow; 9/10 = pink; 11/12 = white; 41/42 = brown

Terminal assignment and connection data
The remote version connection between the sensor and the transmitter is carried out with explosion protection IS.

☝ Caution!
Only connecting cables preterminated and supplied by Endress+Hauser may be used.

Electrical connection

Connection compartment

Transmitter housing compact/remote version (terminal assignment, connection data → 14 ff.)

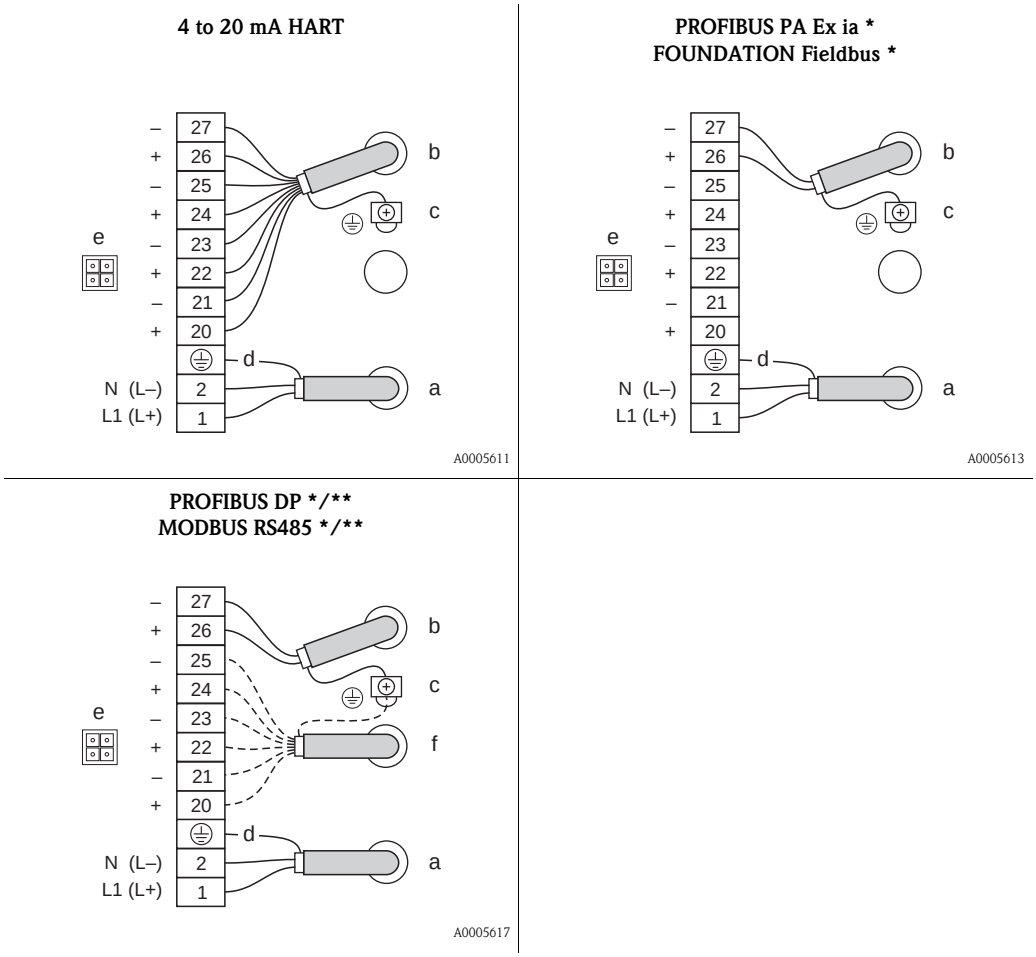


Fig. 6: Electrical connections

**) Fixed communication boards (permanent assignment)*

***) Flexible communication boards*

a Power supply cable (terminal assignment, connection data → 14)

b Signal cable/fieldbus cable (terminal assignment, connection data → 15 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

All transmitters	1 L (+)	2 N (–)	⏚
Designation	Supply voltage		Protective earth
Functional values	AC: U = 85 to 260 V; AC: U = 20 to 55 V DC: U = 16 to 62 V Power consumption: 15 VA / 15 W		Caution! Observe the grounding plans 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. For a graphic representation of the electrical connections: → 🖹 14.

Terminal assignment of transmitter 83*-**********F+#**#**

Transmitter	Terminal no. (inputs/outputs)							
	20 (+)	21 (–)	22 (+)	23 (–)	24 (+)	25 (–)	26 (+)	27 (–)
Assignment	–		–		–		PROFIBUS PA	
							PA +	PA –
Electric circuit	–		–		–		intrinsically safe	
Safety-related values	–		–		–		U_i 30 V DC I_i 500 mA P_i 5.5 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 83*-**********G+#**#**

Transmitter	Terminal no. (inputs/outputs)							
	20 (+)	21 (–)	22 (+)	23 (–)	24 (+)	25 (–)	26 (+)	27 (–)
Assignment	–		–		–		FOUNDATION Fieldbus	
							FF +	FF –
Electric circuit	–		–		–		intrinsically safe	
Safety-related values	–		–		–		U_i 30 V DC I_i 500 mA P_i 5.5 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 83*-**********R+#**#**

Transmitter	Terminal no. (inputs/outputs)							
	20 (+)	21 (–)	22 (+)	23 (–)	24 (+)	25 (–)	26 (+)	27 (–)
Assignment	–		–		Current output, active		Current output HART, active	
Electric circuit	–		–		intrinsically safe		intrinsically safe	
Safety-related values	–		–		U_o 21.8 V DC I_o 90 mA P_o 490 mW L_o IIC/IIB 4.1 mH/15 mH C_o IIC/IIB 150 nF/1160 nF [1] L_o IIC/IIB 2 mH/10 mH [1] C_o IIC/IIB 80 nF/300 nF U_i 30 V DC [2] I_i 10 mA [2] P_i 0.3 W [2] L_i negligible C_i 6 nF		U_o 21.8 V DC I_o 90 mA P_o 490 mW L_o IIC/IIB 4.1 mH/15 mH C_o IIC/IIB 150 nF/1160 nF [1] L_o IIC/IIB 2 mH/10 mH [1] C_o IIC/IIB 80 nF/300 nF U_i 30 V DC [2] I_i 10 mA [2] P_i 0.3 W [2] L_i negligible C_i 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] Permitted values if concentrated inductance and capacitance occur simultaneously.
[2] The interconnection must be assessed according to the valid construction provisions.

Terminal assignment of transmitter 83/84*-**********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	–		–		intrinsically safe		intrinsically safe	
Safety-related values	–		–		U_i 30 V DC I_i 500 mA P_i 600 mW L_i negligible C_i 6 nF		U_o 21.8 V DC I_o 90 mA P_o 490 mW L_o IIC/IIB 4.1 mH/15 mH C_o IIC/IIB 150 nF/1160 nF [1] L_o IIC/IIB 2 mH/10 mH [1] C_o IIC/IIB 80 nF/300 nF U_i 30 V DC [2] I_i 10 mA [2] P_i 0.3 W [2] L_i negligible C_i 6 nF	
Functional values	–		–		galvanically isolated, passive: 30 V DC / 250 mA Open Collector Full scale frequency 2 to 5000 Hz		galvanically isolated, active: 0/4 to 20 mA R_L < 400 Ω R_L HART ≥ 250 Ω	

[1] Permitted values if concentrated inductance and capacitance occur simultaneously.
[2] The interconnection must be assessed according to the valid construction provisions.

Terminal assignment of transmitter 83/84*-**********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	–		–		intrinsically safe		intrinsically safe	
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 5000 Hz		galvanically isolated, passive: 4 to 20 mA voltage drop ≤ 9 V $R_L < [(V_{p.\ supply} - 9\ V) \div 25\ mA]$	

Terminal assignment of transmitter 83*-**********U+#**#**

Transmitter	Terminal no. (inputs/outputs)							
	20 (+)	21 (–)	22 (+)	23 (–)	24 (+)	25 (–)	26 (+)	27 (–)
Assignment	–		–		Current output passive		Current output HART, passive	
Electric circuit	–		–		intrinsically safe		intrinsically safe	
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 $R_L < [(V_{p.\ supply} - 9\ V) \div 25\ mA]$		galvanically isolated, passive: 4 to 20 mA voltage drop ≤ 9 V $R_L < [(V_{p.\ supply} - 9\ V) \div 25\ mA]$	

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. For a graphic representation of the electrical connections: → 🖹 14.

Terminal assignment

Order caracteristic "Inputs/outputs"	Terminal no. (inputs/outputs)							
	20 (+)	21 (–)	22 (+)	23 (–)	24 (+)	25 (–)	26 (+)	27 (–)
Non-convertible communication boards (fixed assignment)								
A	–		–		Pulse/frequency output		Current output HART	
B	Relay output 2		Relay output 1		Pulse/frequency output		Current output HART	
J	–		–		External termination +5 V	DGND	PROFIBUS DP [1] B	A
K	–		–		–		FOUNDATION Fieldbus FF +	FF –
Q	–		–		Status input		MODBUS RS485 [1] B	A
Convertible communication boards								
C	Relay output 2		Relay output 1		Pulse/frequency output		Current output HART	
D	Status input		Relay output		Pulse/frequency output		Current output HART	
E	Status input		Relay output		Current output 2		Current output 1 HART	
L	Status input		Relay output 2		Relay output 1		Current output HART	
M	Status input		Pulse/frequency output 2		Pulse/frequency output 1		Current output HART	
N	Current output		Pulse/frequency output		Status input		MODBUS RS485 [1] B	A
P	Current output		Pulse/frequency output		Status input		PROFIBUS DP [1] B	A
V	Relay output 2		Relay output 1		Status input		PROFIBUS DP [1] B	A
W	Relay output		Current output 3		Current output 2		Current output 1 HART	
0	Status input		Current output 3		Current output 2		Current output 1 HART	
1	Relay output		Pulse/frequency output 2		Pulse/frequency output 1		Current output HART	
2	Relay output		Current output 2		Pulse/frequency output		Current output 1 HART	
3	Current input		Relay output		Current output 2		Current output 1 HART	
4	Current input		Relay output		Pulse/frequency output		Current output HART	
5	Status input		Current input		Pulse/frequency output		Current output HART	
6	Status input		Current input		Current output 2		Current output HART	
7	Relay output 2		Relay output 1		Status input		MODBUS RS485 [1] B	A

Safety-related and functional values of signal circuits → 🖹 *18*

[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 can be selected: ■ active: 0/4 to 20 mA R_L < 700 Ω, R_L HART ≥ 250 Ω ■ passive: 4 to 20 mA V_s = 18 to 30 V DC, R_i ≥ 150 Ω	intrinsically safe = no U_m = 260 V I_m = 500 mA
Current output	galvanically isolated, active/passive can be selected: ■ active: 0/4 to 20 mA R_L < 700 Ω ■ passive: 4 to 20 mA V_s = 18 to 30 V DC, R_i ≥ 150 Ω	
Pulse/frequency output	galvanically isolated, active/passive can be selected: ■ active: 24 V DC / 25 mA (max. 250 mA during 20 ms) R_L > 100 Ω ■ passive: 30 V DC / 250 mA Open Collector Full scale frequency 2 to 10 000 Hz (f_{max} = 12 500 Hz)	
Relay output	galvanically isolated, max. 30 V AC / 500 mA max. 60 V DC / 100 mA	
Current input	galvanically isolated, active/passive can be selected: ■ active: 4 to 20 mA R_i ≤ 150 Ω U_{out} = 24 V DC, short-circuit proof ■ passive: 0/4 to 20 mA R_i < 150 Ω U_{max} = 30 V DC	
Status input Promass 83: options "Inputs/outputs" D, L, M Promass 84: options "Inputs/outputs D, M	galvanically isolated, 3 to 30 V DC R_i = 5 kΩ	
Status input Promass 83: options "Inputs/outputs" N, P, Q, V, 7	galvanically isolated, 3 to 30 V DC R_i = 3 kΩ	
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!
Only use the following fuse types that are mounted on the power unit 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 refer to the respective Technical Information for these dimensions:

- Promass 80A, 83A → TI00054D
- Promass 80E, 83E → TI00061D
- Promass 80F, 83F → TI00101D
- Promass 80M, 83M→ TI00102D
- Promass 80H, 83H → TI00074D
- Promass 80I, 83I → TI00075D
- Promass 80P, 83P → TI00078D
- Promass 80S, 83S → TI00076D
- Promass 83O → TI00112D
- Promass 83X → TI00110D
- Promass 84A → TI00068D
- Promass 84F → TI00103D
- Promass 84M → TI00104D
- Promass 84O → TI00116D
- Promass 84X → TI00111D

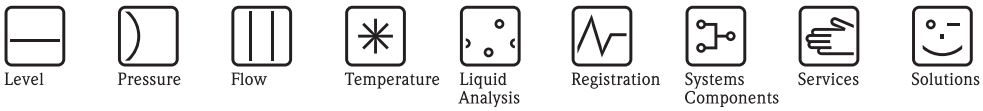
Weight

- The weight of the XP version is approx. 4.4 lbs greater than that of the standard version.
- The weight of the XP version in stainless steel is approx. 20 lbs greater than that of the standard version.

Control Drawings

Endress+Hauser Reinach hereby declares that the product is in conformity with the requirements of the FACTORY MUTUAL standard.

✎ Note!
The "Documentation/Important Information" folder provided with the measuring device contains a CD-ROM with all the Control Drawings.



Safety Instructions

Proline Promass 83, 84

Division 1

Ex documentation

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

- BA00059D, Proline Promass 83 HART
- BA00063D, Proline Promass 83 PROFIBBUS DP PA
- BA00065D, Proline Promass 83 FOUNDATION Fieldbus
- BA00107D, Proline Promass 83 Modbus RS 485
- BA00109D, Proline Promass 84 HART
- BA00129D, Proline Promass 84 Modbus RS 485

Table of Contents (CSA)

XA00102D/06/EN/13.11
71147024

Endress+Hauser
People for Process Automation

Special conditions

- Install per Canadian Electrical Code.
- Control room equipment shall not use or generate more than 250 V rms.
- The device must be integrated into the potential equalization system.
- For terminals No. 20 to No. 27 of the transmitter, only devices with ratings $U_m \leq 250$ V and $I_m \leq 500$ mA are allowed to be connected (does not apply to Promass 83***-**********F with intrinsically safe output circuits).
- The specified temperature class in conjunction with the ambient temperature and the medium temperature must be in compliance with the tables: → 27.
- It is not permissible to connect the service adapter whilst the atmosphere is considered to be explosive.
- Use of the devices is restricted to mediums against which the process-wetted materials are adequately resistant.
- Class II Group G: The surface temperature of the apparatus cannot exceed 165 °C.
- Transmitter enclosure G02 explosionproof for use in Class 1 Division 1 Groups A, B, C, D (seals not required) and dust-ignition proof for Class II, III Division 1 Groups E, F, G.
- Sensor circuits intrinsically safe for Cl. I, II, III Div. 1 Group A, B, C, D, E, F, G except
  Promass E: DN 80 (sensor version Group C-D)
  Promass I: DN 40FB; 50; 50FB; 80 (sensor version Group C-D)
  Promass F: DN 80; 100; 150; 250 (sensor version Group C-D)
  Promass H, P, S: DN 50 (sensor version Group C-D)
  Promass O: DN 80; 100; 150(sensor version Group C-D)
  Promass X: DN 350 (sensor version Group C-D)
  which are only suitable for Cl. I, II, III Div. 1 Group C, D, E, F, G.
  (optionally, a version for Groups A and B is available)
- Substitution of components may impair intrinsic safety.

Caution!
- Use supply wires suitable for 5 °C above ambient temperature, but at least for 80 °C.

General warnings

- 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 national regulations relating to the installation of devices in potentially explosive atmospheres is mandatory, if such regulations exist.
- Open the device only when it is de-energized (and after a delay of at least 10 minutes following shutdown of the power supply).
- 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).

Turning the transmitter housing

1. Unscrew the grub screw.
2. Rotate the transmitter housing cautiously clockwise until the end stop (end of the thread).
3. Rotate the transmitter housing counter-clockwise (max. 360°) in the wanted position.
4. Tighten the grub screw again.

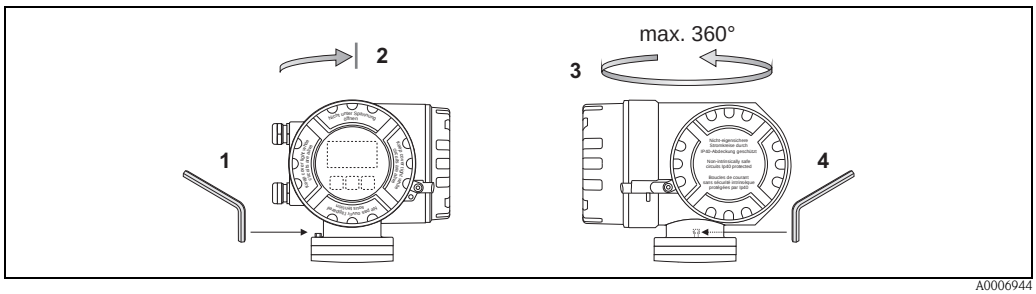


Fig. 1: Turning the transmitter housing

Approvals

General

The system meets the fundamental health and safety requirements for the design and construction of devices and protective systems intended for use in potentially explosive atmospheres in accordance with the Canadian Electrical Code.

No. / approval type

160686-1132623

Notified body

CSA: Canadian Standard Association

Identification

The identification of the system must contain the following specifications:

- Class I, Groups ABCD
- Class I, Zone 1, Group IIC
- Class II, Groups EFG
- Class III

or

- Class I, Groups CD
- Class I, Zone 1, Group IIB
- Class II, Groups EFG
- Class III

Caution!

The installation instructions for the safe use of the system must be observed → 22.

Description of measuring system

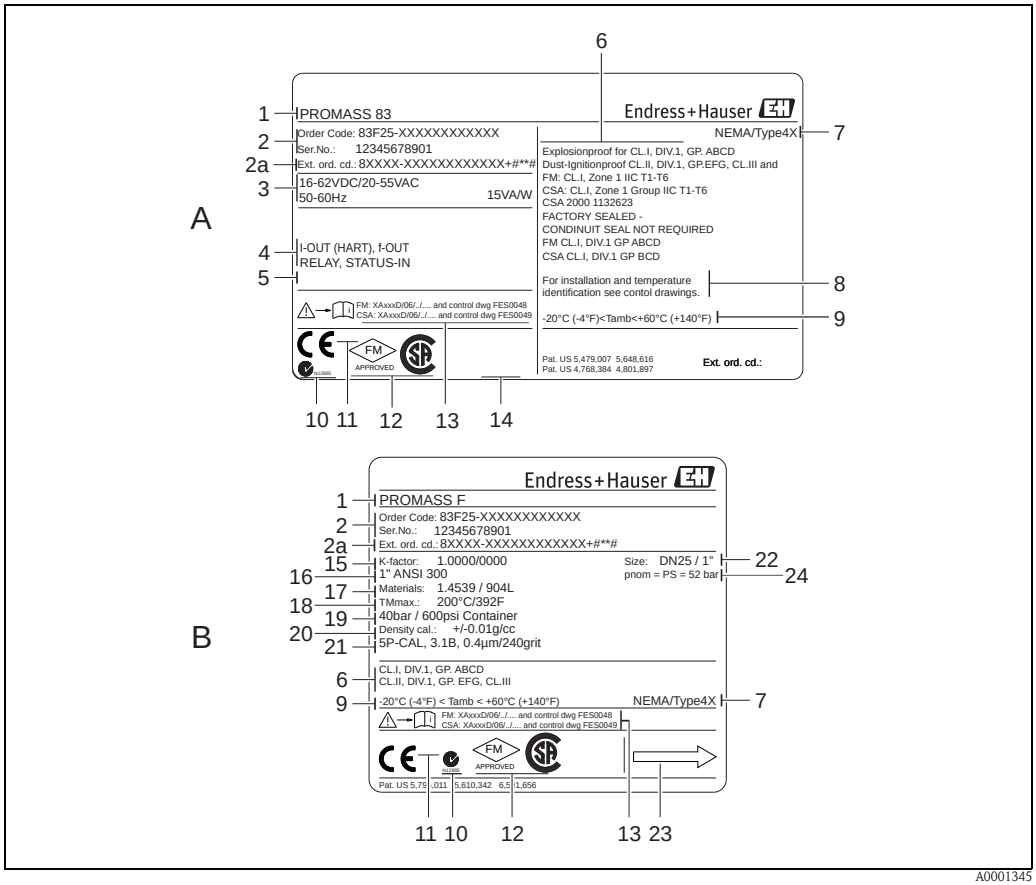
The measuring system consists of transmitters and sensors.

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.

Nameplate

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.



A0001345

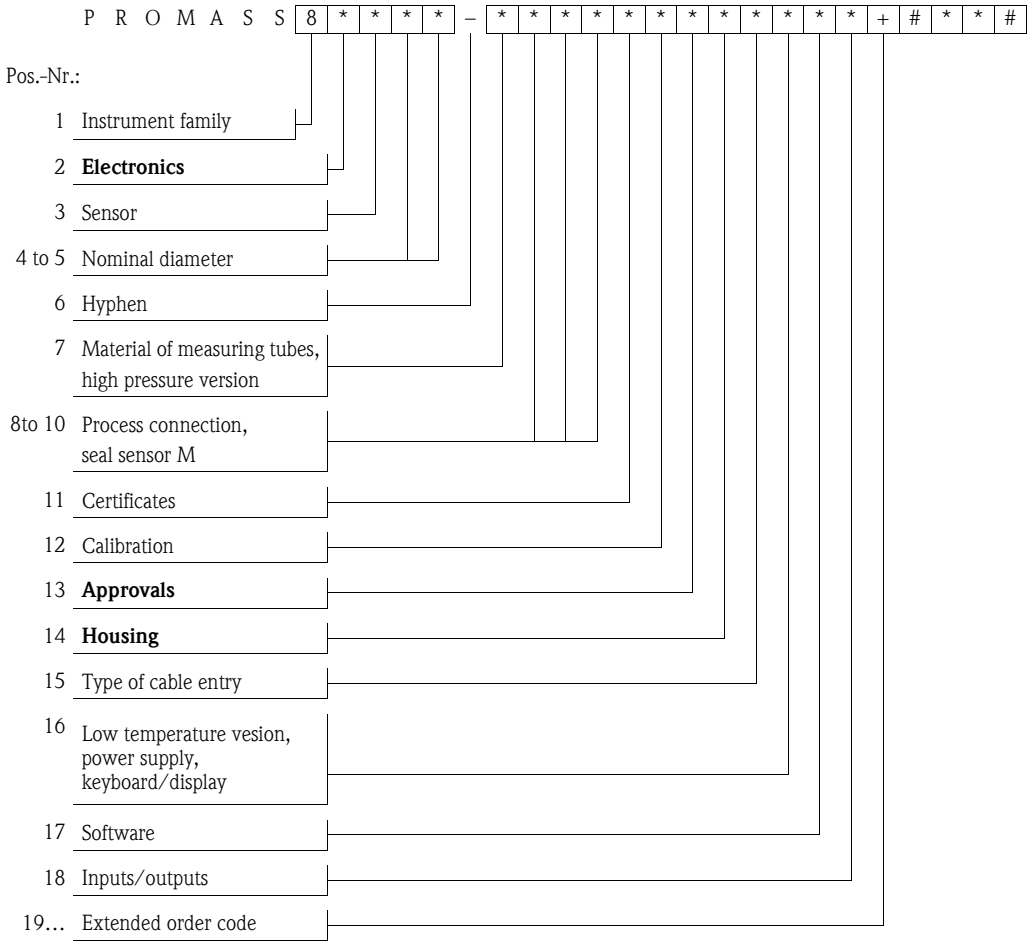
Fig. 2: Example for nameplates of a transmitter and of a sensor

A Transmitter nameplate
B Sensor nameplate

1 Transmitter or sensor type
2 Order code and serial number
2a Extended order code
3 Power supply, frequency and power consumption
4 Available inputs/outputs
5 Space for additional information on special products
6 Space for additional information
7 Type of protection
8 Space for notes, e.g. delays, etc. (only if necessary)
9 Ambient temperature range
10 C-Tick symbol
11 Space for notified body for quality assurance monitoring
12 Label of notified body: Canadian Standards Association
13 Associated Ex documentation
14 Space for other approval specifications and certificates, e.g. PROFIBUS, etc. (only if present)
15 Calibration factor/zero point
16 Nominal diameter/nominal pressure
17 Lining material
18 Fluid temperature range
19 Pressure range of secondary containment
20 Accuracy of density measurement
21 Additional information (examples): 5P-CAL = 5-point calibration, 3.1B = 3.1 B certificate for wetted materials
22 Nominal diameter device
23 Flow direction
24 Nominal pressure

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:



Electronics (Pos. no. 2 in the type code)

*	Transmitter
3	Promass 83
4	Promass 84

Housing (Pos. no. 14 in the type code)

*	Type
A, B [1], L [1], M [1], N [1]	Compact
E, F, G [1], H [1], J [1], K [1], 1 [1], 4 [1], 7 [1], 8 [1] U [1], V [1], W [1]	Remote

[1] Not for Promass F high temperature

Approvals (Pos. no. 13 in the type code)

*	Type	Application/zone		
N	Compact	■ Class I, Groups ABCD ■ Class I, Zone 1, Group IIC ■ Class II, Groups EFG ■ Class III		
	Remote	**Transmitter**		
		■ Class I, Groups ABCD ■ Class I, Zone 1, Group IIC ■ Class II, Groups EFG ■ Class III		
		Sensor		
		Promass A Promass H [1], I [1], P [1], S [1] Promass E [1] Promass F Promass F (HT)	DN 1 to 4 DN 8 to 40 DN 8 to 50 DN 8 to 50 DN 25, DN 50	■ Class I, Groups ABCD ■ Class I, Zone 1, Group IIC ■ Class II, Groups EFG ■ Class III
P	Compact	■ Class I, Groups CD ■ Class I, Zone 1, Group IIB ■ Class II, Groups EFG ■ Class III		
	Remote	**Transmitter**		
		■ Class I, Groups CD ■ Class I, Zone 1, Group IIB ■ Class II, Groups EFG ■ Class III		
		Sensor		
		Promass H [1], P [1], S [1] Promass I [1] Promass E [1] Promass F Promass F (HT) Promass O Promass X	DN 50 DN 40 FB, DN 50, DN 50 FB, DN 80 DN 80 DN 80 to 250 DN 80 DN 80 to 150 DN 350	■ Class I, Groups CD ■ Class I, Zone 1, Group IIB ■ Class II, Groups EFG ■ Class III
O	Compact	■ Class I, Groups ABCD ■ Class I, Zone 1, Group IIC ■ Class II, Groups EFG ■ Class III		
	Remote	**Transmitter**		
		■ Class I, Groups ABCD ■ Class I, Zone 1, Group IIC ■ Class II, Groups EFG ■ Class III		
		Sensor		
		Promass H [1], P [1], S [1] Promass I [1] Promass E [1] Promass F Promass F (HT) Promass O Promass X	DN 50 DN 40 FB, DN 50, DN 50 FB, DN 80 DN 80 DN 80 to 250 DN 80 DN 80 to 150 DN 350	■ Class I, Groups ABCD ■ Class I, Zone 1, Group IIC ■ Class II, Groups EFG ■ Class III

HT = high temperature
FB = full bore
[1] Not available for Promass 84

✎ Note!
For a detailed explanation of these values with regard to the outputs and inputs available, as well as a description of the associated terminal assignment and connection data: → 🖹 31 onwards.

Temperature table (compact version)

Max. medium temperature [°C] for T1–T6 in relation to the maximum ambient temperature T_a

	Nominal diameter [mm]	T_a [°C]	T6 (85 °C)	T5 (100 °C)	T4A (120 °C)	T4 (135 °C)	T3A (180 °C)	T2C (230 °C)	T2B (260 °C)	T1 (450 °C)
8*A**-…	1 to 4	+60	60	95	115	130	140	200	200	200

	Nominal diameter [mm]	T_a [°C]	T6 (85 °C)	T5 (100 °C)	T4A (120 °C)	T4 (135 °C)	T3A (180 °C)	T2C (230 °C)	T2B (260 °C)	T1 (450 °C)
8*E**-…	8 to 50	+45	45	100	120	130	140	140	140	140
	25 to 50	+50	50	100	120	130	140	140	140	140
		+60	–	100	120	130	140	140	140	140
	80		60	75	95	110	140	140	140	140

	Nominal diameter [mm]	T_a [°C]	T6 (85 °C)	T5 (100 °C)	T4A (120 °C)	T4 (135 °C)	T3A (180 °C)	T2C (230 °C)	T2B (260 °C)	T1 (450 °C)
8*F**-…	8 to 40	+50	55	70	85	100	150	185 [3]	200 [3]	200 [3]
	80 to 250		60	70	85	105	150	185 [3]	200 [3]	200 [3]
	8 to 40	+60	55	70	85	100	150 [3]	185 [3]	200 [3]	200 [3]
	50 to 250		60	70	85	100	150 [3]	185 [3]	200 [3]	200 [3]

	Nominal diameter [mm]	T_a [°C]	T6 (85 °C)	T5 (100 °C)	T4A (120 °C)	T4 (135 °C)	T3A (180 °C)	T2C (230 °C)	T2B (260 °C)	T1 (450 °C)
8*F**-1… 8*F**-2… 8*F**-3… 8*F**-4…	25, 50, 80	+60	70	85	100	115 [3]	160 [3]	205 [3]	235 [3]	350 [3]

	Nominal diameter [mm]	T_a [°C]	T6 (85 °C)	T5 (100 °C)	T4A (120 °C)	T4 (135 °C)	T3A (180 °C)	T2C (230 °C)	T2B (260 °C)	T1 (450 °C)
8*H**-…	8	+50	50	65	85	100	140	185	200	200
	15 to 50		60	75	100	115	160	200	200	200
	8	+60	50	65	85	100	140	185 [3]	200 [3]	200 [3]
	15 to 50		60	75	100	115	160	200 [3]	200 [3]	200 [3]

	Nominal diameter [mm]	T_a [°C]	T6 (85 °C)	T5 (100 °C)	T4A (120 °C)	T4 (135 °C)	T3A (180 °C)	T2C (230 °C)	T2B (260 °C)	T1 (450 °C)
8*I**-…	8 to 25 [1]	+50	60	95	95	110	150	150	150	150
	40 to 80 [2]		70	85	105	120	150	150	150	150
	8 to 25 [1]	+60	60	95	95	110	150 [3]	150 [3]	150 [3]	150 [3]
	40 to 80 [2]		70	85	105	120	150 [3]	150 [3]	150 [3]	150 [3]

[1] as well as DN 15 FB
[2] as well as DN 25 FB, 40 FB, 50 FB
(FB = full bore)

	Nominal diameter [mm]	T_a [°C]	T6 (85 °C)	T5 (100 °C)	T4A (120 °C)	T4 (135 °C)	T3A (180 °C)	T2C (230 °C)	T2B (260 °C)	T1 (450 °C)
8*M**-…	8 to 80	+50	50	60	85	105	150	150	150	150
		+60	-	60	85	100	100	100	100	100

	Nominal diameter [mm]	T_a [°C]	T6 (85 °C)	T5 (100 °C)	T4A (120 °C)	T4 (135 °C)	T3A (180 °C)	T2C (230 °C)	T2B (260 °C)	T1 (450 °C)
8*P**-… 8*S**-…	8	+50	–	65	85	100	140	185	200	200
	15 to 25		50	75	100	115	160	200	200	200
	40		55	75	100	115	160	200	200	200
	50		60	75	95	110	155	200	200	200
	8	+60	–	65	85	100	140	185 [3]	200 [3]	200 [3]
	15 to 40		–	75	100	115	160	200 [3]	200 [3]	200 [3]
	50		60	75	95	110	155	200 [3]	200 [3]	200 [3]

	Nominal diameter [mm]	T_a [°C]	T6 (85 °C)	T5 (100 °C)	T4A (120 °C)	T4 (135 °C)	T3A (180 °C)	T2C (230 °C)	T2B (260 °C)	T1 (450 °C)
8*O**-…	80 to 150	+50	60	70	85	105	150	185 [3]	200 [3]	200 [3]
		+60	60	70	85	100	150 [3]	185 [3]	200 [3]	200 [3]

	Nominal diameter [mm]	T_a [°C]	T6 (85 °C)	T5 (100 °C)	T4A (120 °C)	T4 (135 °C)	T3A (180 °C)	T2C (230 °C)	T2B (260 °C)	T1 (450 °C)
8*X**-…	350	+50	60	70	85	105	150	185 [3]	200 [3]	200 [3]
		+60	60	70	85	100	150 [3]	185 [3]	200 [3]	200 [3]

[3] The maximum permissible medium temperatures only apply if the transmitter is installed in such a way that the transmitter is not fitted above the sensor and there is free convection on all sides.

The minimum **medium temperature** is –50 °C for Promass A/F/H/I/M/O/P/S/X, and –40 °C for Promass E.

The minimum **ambient temperature** T_a to –20 °C. A version for an ambient temperature Ta to –40 °C is also optionally available.

Temperature table (remote version)

Sensor

Max. medium temperature [°C] for T1-T6 in relation to the maximum ambient temperature T_a

	Nominal diameter [mm]	T_a [°C]	T6 (85 °C)	T5 (100 °C)	T4A (120 °C)	T4 (135 °C)	T3A (180 °C)	T2C (230 °C)	T2B (260 °C)	T1 (450 °C)
8*A**-…	1 to 4	+60	60	95	115	130	140	200	200	200

	Nominal diameter [mm]	T_a [°C]	T6 (85 °C)	T5 (100 °C)	T4A (120 °C)	T4 (135 °C)	T3A (180 °C)	T2C (230 °C)	T2B (260 °C)	T1 (450 °C)
8*E**-…	8 to 50	+45	45	100	120	130	140	140	140	140
	25 to 50	+60	–	100	120	130	140	140	140	140
	80		60	75	95	110	140	140	140	140

	Nominal diameter [mm]	T_a [°C]	T6 (85 °C)	T5 (100 °C)	T4A (120 °C)	T4 (135 °C)	T3A (180 °C)	T2C (230 °C)	T2B (260 °C)	T1 (450 °C)
8*F**-…	8 to 40	+60	55	70	85	100	150	185	200	200
	50 to 250		60	70	85	105	150	185	200	200

	Nominal diameter [mm]	T_a [°C]	T6 (85 °C)	T5 (100 °C)	T4A (120 °C)	T4 (135 °C)	T3A (180 °C)	T2C (230 °C)	T2B (260 °C)	T1 (450 °C)
8*F**-1… 8*F**-2… 8*F**-3… 8*F**-4…	25, 50, 80	+60	70	85	100	115	160	205	235	350

	Nominal diameter [mm]	T_a [°C]	T6 (85 °C)	T5 (100 °C)	T4A (120 °C)	T4 (135 °C)	T3A (180 °C)	T2C (230 °C)	T2B (260 °C)	T1 (450 °C)
8*H**-…	8	+60	50	65	85	100	140	185	200	200
	15 to 50		60	75	100	115	160	200	200	200

	Nominal diameter [mm]	T_a [°C]	T6 (85 °C)	T5 (100 °C)	T4A (120 °C)	T4 (135 °C)	T3A (180 °C)	T2C (230 °C)	T2B (260 °C)	T1 (450 °C)
8*I**-…	8 to 25 [1]	+60	60	95	95	110	150	150	150	150
	40 to 80 [2]		70	85	105	120	150	150	150	150

[1] as well as DN 15 FB
[2] as well as DN 25 FB, 40 FB, 50 FB
(FB = full bore)

	Nominal diameter [mm]	T_a [°C]	T6 (85 °C)	T5 (100 °C)	T4A (120 °C)	T4 (135 °C)	T3A (180 °C)	T2C (230 °C)	T2B (260 °C)	T1 (450 °C)
8*M**-…	8 to 80	+60	50	60	85	105	150	150	150	150

	Nominal diameter [mm]	T_a [°C]	T6 (85 °C)	T5 (100 °C)	T4A (120 °C)	T4 (135 °C)	T3A (180 °C)	T2C (230 °C)	T2B (260 °C)	T1 (450 °C)
8*P**-… 8*S**-…	8	+50	–	65	85	100	140	185	200	200
	15 to 25		50	75	100	115	160	200	200	200
	40		55	75	100	115	160	200	200	200
	8	+60	–	65	85	100	140	185	200	200
	15 to 40		–	75	100	115	160	200	200	200
	50		60	75	95	110	155	200	200	200

	Nominal diameter [mm]	T_a [°C]	T6 (85 °C)	T5 (100 °C)	T4A (120 °C)	T4 (135 °C)	T3A (180 °C)	T2C (230 °C)	T2B (260 °C)	T1 (450 °C)
8*O**-…	8 to 150	+60	60	70	85	105	150	185	200	200

	Nominal diameter [mm]	T_a [°C]	T6 (85 °C)	T5 (100 °C)	T4A (120 °C)	T4 (135 °C)	T3A (180 °C)	T2C (230 °C)	T2B (260 °C)	T1 (450 °C)
8*X**-…	350	+60	60	70	85	105	150	185	200	200

The minimum **ambient temperature** T_a to –20 °C.

The minimum **medium temperature** is –50 °C for Promass A/F/H/I/M/O/P/S/X, and –40 °C for Promass E.

Transmitter

The transmitter of the remote version is temperature class T6 when installed in the Ex d housing up to an **ambient temperature** of T_a = 60 °C. The maximum ambient temperature range is –20 to +60 °C. A version for an ambient temperature Ta to –40 °C is also optionally available.

Design of measuring system

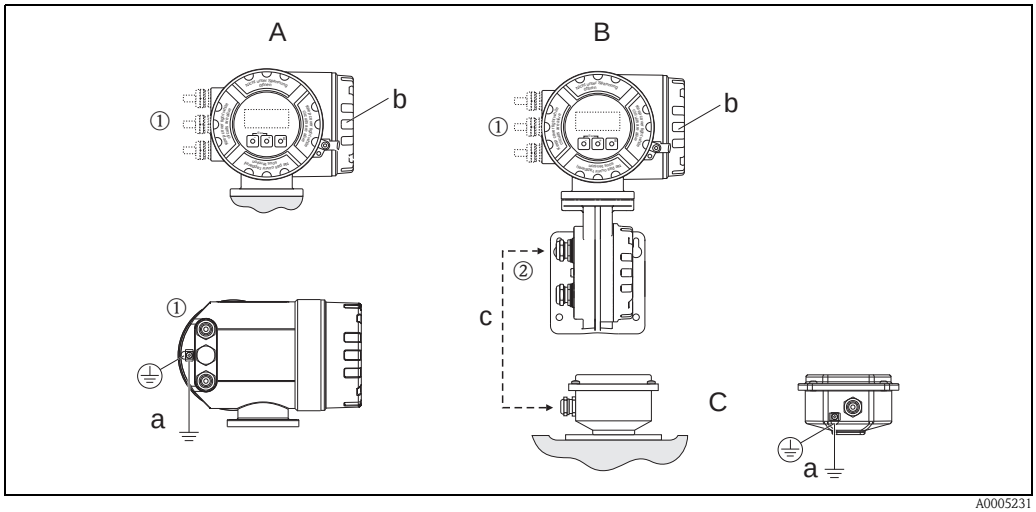


Fig. 3: Design of the measuring system, compact/remote version

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 following chapter "Cable entries"

✎ Note!
For connecting the remote version connecting cable → 🖹 31

Cable entries

① Cable entries for transmitter terminal compartment (XP version) power supply/communication cable.
Choice of thread for cable entry: ½" NPT.

Make sure that the XP cable glands/entries are secured to prevent working loose.

② For remote version connecting cable:
Choice of thread for cable entry: ½" NPT.

Cable specification

You can find information about the cable specification in the associated Operating Instructions.

Potential equalization

The transmitter (compact and remote version) must be safely integrated into the potential equalization via the screw terminal on the outside of the transmitter housing. Alternatively, the transmitter of the compact version as of serial number 4Axxxxxx000 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, screening and grounding can be found in the associated Operating Instructions.

Potential equalization for fieldbus versions, when both sides of the screen are grounded

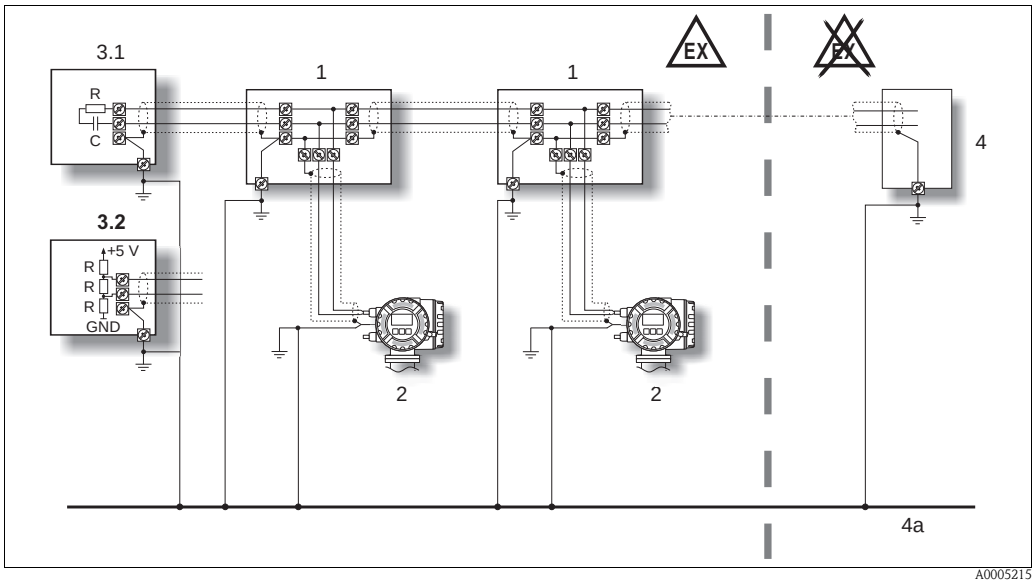


Fig. 4: Example for connecting potential equalization lines

1 Distributor/T-Box
2 Bus devices for potentially explosive atmospheres
3.1 Bus termination PROFIBUS PA or FOUNDATION Fieldbus
3.2 Bus termination PROFIBUS DP or MODBUS RS485
4 Bus power supply unit or automation system
4a Potential equalization line is fed out into the safe area

✎ Note!
The length of the spurs is to be considered.

Connecting the remote version connecting cable

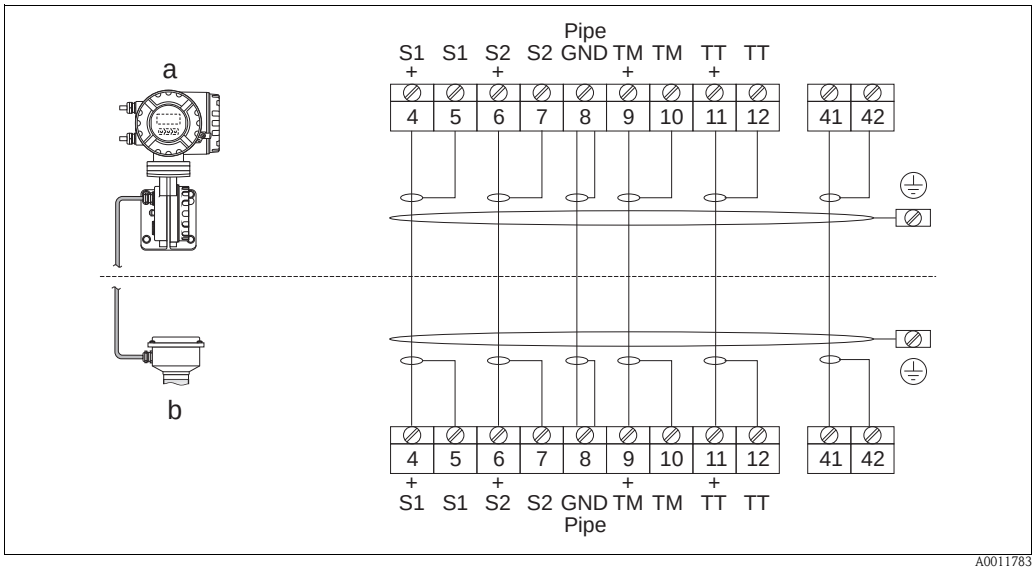


Fig. 5: Connecting the remote version connecting cable

a Wall-mount housing: Zone 1
b Remote version flange version

Wire colors (color code according to DIN 47100):
Terminal number: 4/5 = gray; 6/7 = green; 8 = yellow; 9/10 = pink; 11/12 = white; 41/42 = brown

Terminal assignment and connection data

The remote version connection between the sensor and the transmitter is carried out with explosion protection IS.

☝ Caution!
Only connecting cables preterminated and supplied by Endress+Hauser may be used.

Electrical connection

Connection compartment

Transmitter housing compact/remote version (terminal assignment, connection data → 📄 32 ff.)

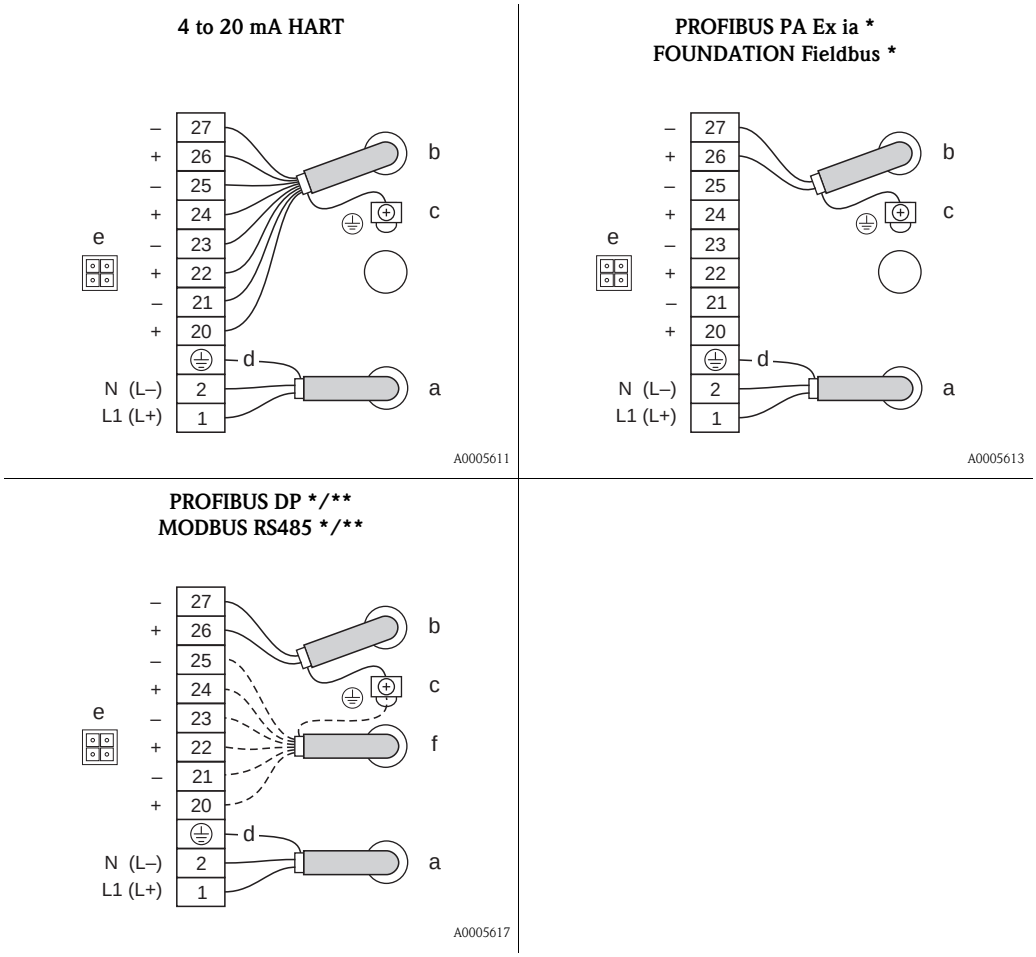


Fig. 6: Electrical connections

**) Fixed communication boards (permanent assignment)*

***) Flexible communication boards*

a Power supply cable (terminal assignment, connection data → 📄 32)

b Signal cable/fieldbus cable (terminal assignment, connection data → 📄 33)

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 → 📄 35)*
*– PROFIBUS DP **/ MODBUS RS485 */**: Signal cable (terminal assignment, connection data → 📄 35)*

Terminal assignment and connection data: Power supply

All transmitters	1 L (+)	2 N (–)	⏚
Designation	Supply voltage		Protective earth
Functional values	AC: U = 85 to 260 V; AC: U = 20 to 55 V DC: U = 16 to 62 V Power consumption: 15 VA / 15 W		Caution! Observe the grounding plans 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. For a graphic representation of the electrical connections: → 🖹 32.

Terminal assignment of transmitter 83***-**********F+#**#

Transmitter	Terminal no. (inputs/outputs)							
	20 (+)	21 (–)	22 (+)	23 (–)	24 (+)	25 (–)	26 (+)	27 (–)
Assignment	–		–		–		PROFIBUS PA	
							PA +	PA –
Electric circuit	–		–		–		intrinsically safe	
Safety-related values	–		–		–		U_i	30 V DC
							I_i	500 mA
							P_i	5.5 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 83***-**********G+#**#

Transmitter	Terminal no. (inputs/outputs)							
	20 (+)	21 (–)	22 (+)	23 (–)	24 (+)	25 (–)	26 (+)	27 (–)
Assignment	–		–		–		FOUNDATION Fieldbus	
							FF +	FF –
Electric circuit	–		–		–		intrinsically safe	
Safety-related values	–		–		–		U_i	30 V DC
							I_i	500 mA
							P_i	5.5 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 83***-**********R+#**#

Transmitter	Terminal no. (inputs/outputs)							
	20 (+)	21 (–)	22 (+)	23 (–)	24 (+)	25 (–)	26 (+)	27 (–)
Assignment	–		–		Current output, active		Current output HART, active	
Electric circuit	–		–		intrinsically safe		intrinsically safe	
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	490 mW	P_o	490 mW
					L_o IIC/IIB	4.1 mH/15 mH	L_o IIC/IIB	4.1 mH/15 mH
					C_o IIC/IIB	150 nF/1160 nF	C_o IIC/IIB	150 nF/1160 nF
					[1] L_o IIC/IIB	2 mH/10 mH	[1] L_o IIC/IIB	2 mH/10 mH
					[1] C_o IIC/IIB	80 nF/300 nF	[1] C_o IIC/IIB	80 nF/300 nF
					U_i	30 V DC [2]	U_i	30 V DC [2]
					I_i	10 mA [2]	I_i	10 mA [2]
					P_i	0.3 W [2]	P_i	0.3 W [2]
					L_i	negligible	L_i	negligible
					C_i	6 nF	C_i	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] Permitted values if concentrated inductance and capacitance occur simultaneously.
[2] The interconnection must be assessed according to the valid construction provisions.

Terminal assignment of transmitter 83/84***-**********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	–		–		intrinsically safe		intrinsically safe	
Safety-related values	–		–		U_i 30 V DC I_i 500 mA P_i 600 mW L_i negligible C_i 6 nF		U_o 21.8 V DC I_o 90 mA P_o 490 mW L_o IIC/IIB 4.1 mH/15 mH C_o IIC/IIB 150 nF/1160 nF [1] L_o IIC/IIB 2 mH/10 mH [1] C_o IIC/IIB 80 nF/300 nF U_i 30 V DC [2] I_i 10 mA [2] P_i 0.3 W [2] L_i negligible C_i 6 nF	
Functional values	–		–		galvanically isolated, passive: 30 V DC / 250 mA Open Collector Full scale frequency 2 to 5000 Hz		galvanically isolated, active: 0/4 to 20 mA $R_L < 400\ \Omega$ R_L HART $\geq 250\ \Omega$	

[1] Permitted values if concentrated inductance and capacitance occur simultaneously.
[2] The interconnection must be assessed according to the valid construction provisions.

Terminal assignment of transmitter 83/84***-**********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	–		–		intrinsically safe		intrinsically safe	
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 5000 Hz		galvanically isolated, passive: 4 to 20 mA voltage drop ≤ 9 V $R_L < [(V_{p.\ supply} - 9\ V) \div 25\ mA]$	

Terminal assignment of transmitter 83***-**********U+#**#

Transmitter	Terminal no. (inputs/outputs)							
	20 (+)	21 (–)	22 (+)	23 (–)	24 (+)	25 (–)	26 (+)	27 (–)
Assignment	–		–		Current output passive		Current output HART, passive	
Electric circuit	–		–		intrinsically safe		intrinsically safe	
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 $R_L < [(V_{p.\ supply} - 9\ V) \div 25\ mA]$		galvanically isolated, passive: 4 to 20 mA voltage drop ≤ 9 V $R_L < [(V_{p.\ supply} - 9\ V) \div 25\ mA]$	

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. For a graphic representation of the electrical connections: → 🖹 32.

Terminal assignment

Order characteristic "Inputs/outputs"	Terminal no. (inputs/outputs)							
	20 (+)	21 (–)	22 (+)	23 (–)	24 (+)	25 (–)	26 (+)	27 (–)
Non-convertible communication boards (fixed assignment)								
A	–		–		Pulse/frequency output		Current output HART	
B	Relay output 2		Relay output 1		Pulse/frequency output		Current output HART	
J	–		–		External termination +5 V	DGND	PROFIBUS DP [1] B	A
K	–		–		–		FOUNDATION Fieldbus FF +	FF –
Q	–		–		Status input		MODBUS RS485 [1] B	A
Convertible communication boards								
C	Relay output 2		Relay output 1		Pulse/frequency output		Current output HART	
D	Status input		Relay output		Pulse/frequency output		Current output HART	
E	Status input		Relay output		Current output 2		Current output 1 HART	
L	Status input		Relay output 2		Relay output 1		Current output HART	
M	Status input		Pulse/frequency output 2		Pulse/frequency output 1		Current output HART	
N	Current output		Pulse/frequency output		Status input		MODBUS RS485 [1] B	A
P	Current output		Pulse/frequency output		Status input		PROFIBUS DP [1] B	A
V	Relay output 2		Relay output 1		Status input		PROFIBUS DP [1] B	A
W	Relay output		Current output 3		Current output 2		Current output 1 HART	
0	Status input		Current output 3		Current output 2		Current output 1 HART	
1	Relay output		Pulse/frequency output 2		Pulse/frequency output 1		Current output HART	
2	Relay output		Current output 2		Pulse/frequency output		Current output 1 HART	
3	Current input		Relay output		Current output 2		Current output 1 HART	
4	Current input		Relay output		Pulse/frequency output		Current output HART	
5	Status input		Current input		Pulse/frequency output		Current output HART	
6	Status input		Current input		Current output 2		Current output HART	
7	Relay output 2		Relay output 1		Status input		MODBUS RS485 [1] B	A

Safety-related and functional values of signal circuits → 🖹 *36*

[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 can be selected: ■ active: 0/4 to 20 mA R_L < 700 Ω, R_L HART ≥ 250 Ω ■ passive: 4 to 20 mA V_s = 18 to 30 V DC, R_i ≥ 150 Ω	intrinsically safe = no U_m = 260 V I_m = 500 mA
Current output	galvanically isolated, active/passive can be selected: ■ active: 0/4 to 20 mA R_L < 700 Ω ■ passive: 4 to 20 mA V_s = 18 to 30 V DC, R_i ≥ 150 Ω	
Pulse/frequency output	galvanically isolated, active/passive can be selected: ■ active: 24 V DC / 25 mA (max. 250 mA during 20 ms) R_L > 100 Ω ■ passive: 30 V DC / 250 mA Open Collector Full scale frequency 2 to 10 000 Hz (f_{max} = 12 500 Hz)	
Relay output	galvanically isolated, max. 30 V AC / 500 mA max. 60 V DC / 100 mA	
Current input	galvanically isolated, active/passive can be selected: ■ active: 4 to 20 mA R_i ≤ 150 Ω U_{out} = 24 V DC, short-circuit proof ■ passive: 0/4 to 20 mA R_i < 150 Ω U_{max} = 30 V DC	
Status input Promass 83: options "Inputs/outputs" D, L, M Promass 84: options "Inputs/outputs" D, M	galvanically isolated, 3 to 30 V DC R_i = 5 kΩ	
Status input Promass 83: options "Inputs/outputs N, P, Q, V, 7	galvanically isolated, 3 to 30 V DC R_i = 3 kΩ	
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!
Only use the following fuse types that are mounted on the power unit 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 refer to the respective Technical Information for these dimensions:

- Promass 80A, 83A → TI00054D
- Promass 80E, 83E → TI00061D
- Promass 80F, 83F → TI00101D
- Promass 80M, 83M→ TI00102D
- Promass 80H, 83H → TI00074D
- Promass 80I, 83I → TI00075D
- Promass 80P, 83P → TI00078D
- Promass 80S, 83S → TI00076D
- Promass 83O → TI00112D
- Promass 83X → TI00110D
- Promass 84A → TI00068D
- Promass 84F → TI00103D
- Promass 84M → TI00104D
- Promass 84O → TI00116D
- Promass 84X → TI00111D

Weight

- The weight of the XP version is approx. 2 kg greater than that of the standard version.
- The weight of the XP version in stainless steel is approx. 9 kg greater than that of the standard version.

Control Drawings

Endress+Hauser Reinach hereby declares that the product is in conformity with the requirements of the CANADIAN STANDARDS ASSOCIATION.

✎ Note!
The "Documentation/Important Information" folder provided with the measuring device contains a CD-ROM with all the Control Drawings.

www.endress.com/worldwide

Endress+Hauser

People for Process Automation

XA00102D/06/EN/13.11
71147024
FM+SGML 9.0