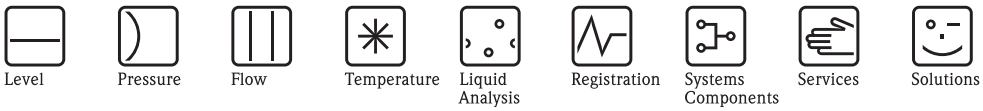

Safety Instructions

Proline Promass 40

NEPSI Zone 1, Zone 21

This document is an integral part of the following Operating Instructions:
- BA00061D, Proline Promass 40 HART

Contents

XA00120D/06/EN/14.17
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Endress+Hauser
People for Process Automation

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)"
  - GB15577-2007: 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 of combustible dust – Part 2: Selection and installation". (Only if installed in dust hazardous areas.)
- Any maintenance shall be done after power off or the area known to be non-hazardous.
- 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 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 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: → 🖹 7.

Installation instructions

- For terminals No. 20 to No. 27 of the transmitter, only devices with ratings $U_m \leq 260$ V and $I_m \leq 500$ mA are allowed to be connected (does not apply to intrinsically safe circuits).
- The measuring device must only be used in the permitted temperature class.
  The values of the individual temperature classes can be found in the temperature tables: → 🖹 6.
- 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 and GB3836.2-2010 and which are suitable for an operating temperature of up to 80 °C, they shall be used.
- 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 and 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.
- If the active intrinsically safe communication circuits (input/output option S, T; terminals 24/25 resp. 24/25) are fed into areas that require 1D or 2D apparatus, the connected apparatus must be tested and certified accordingly.
- In Zone 0, potentially explosive vapor/air mixtures may only occur under atmospheric conditions. If no potentially explosive mixtures are present, or if additional protective measures have been taken, the devices may be operated under other atmospheric conditions in accordance with the manufacturer's specifications.

Installation instructions (continued)

- 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).

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.

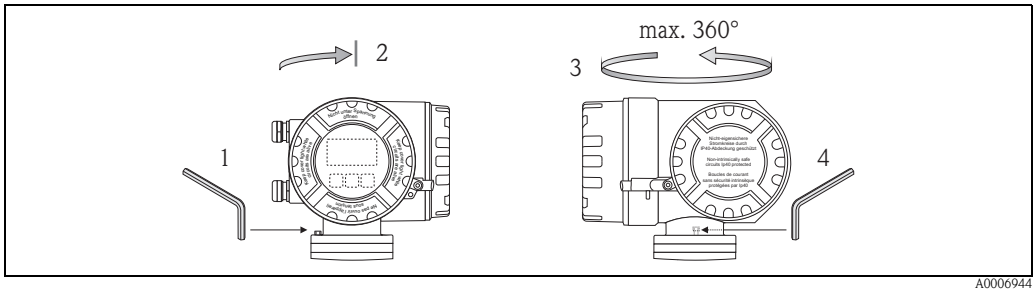

Fig. 1: Turning the transmitter housing

COC Certificates of Conformity

COC certificates of conformity

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

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

Certification numbers:

- GYJ16.1472X

Inspection body

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

Description of measuring system

The measuring system consists of a transmitter and sensor which together form a mechanical unit.

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.

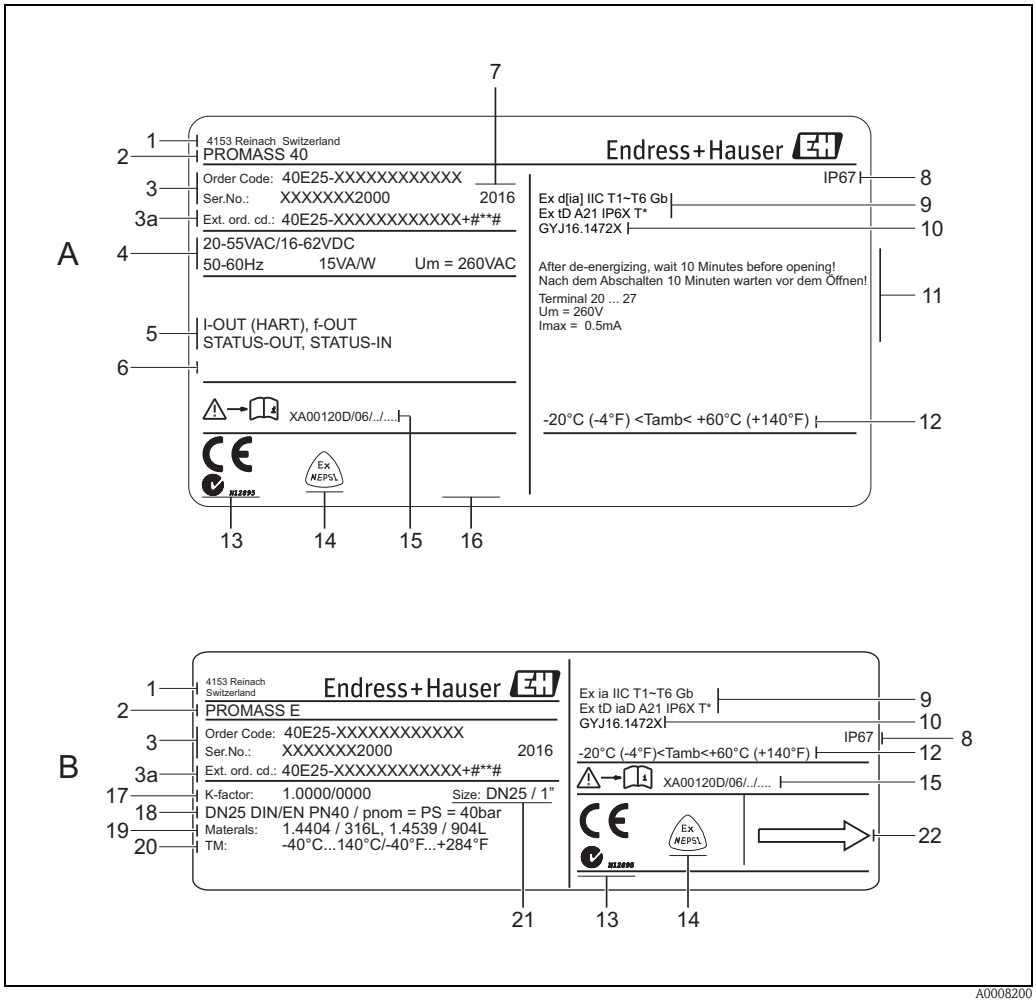

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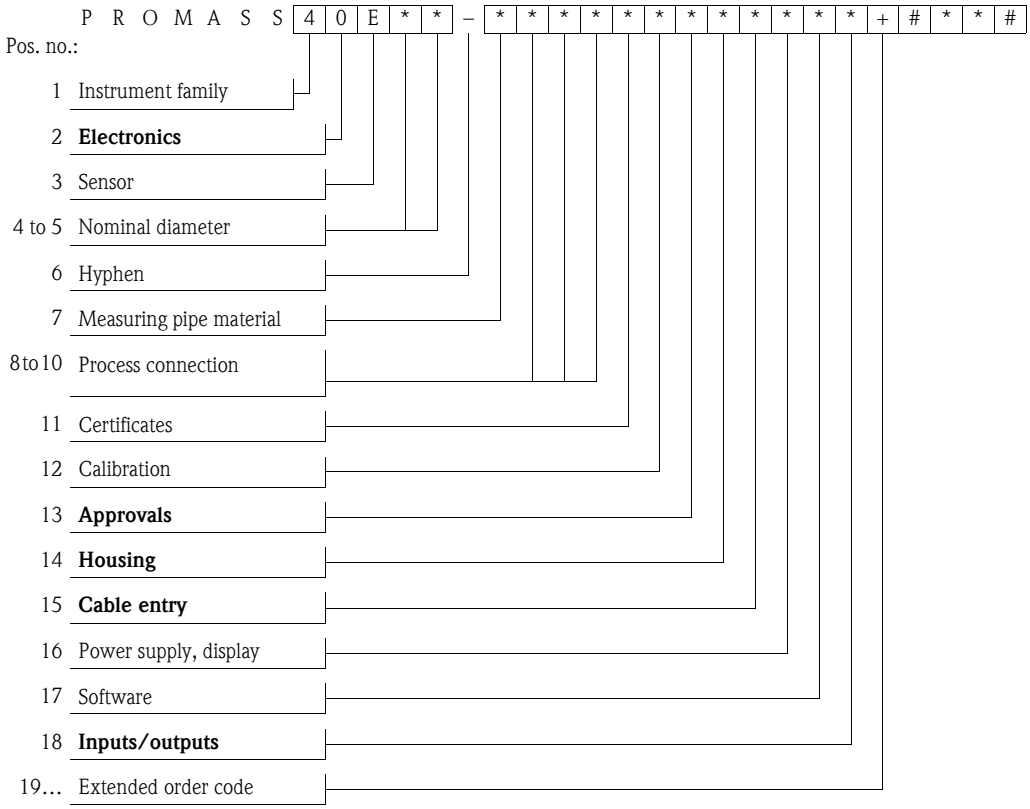
Fig. 2: Example for nameplates of a transmitter and of a sensor

A Transmitter nameplate
B Sensor nameplate

1 Production site
2 Transmitter or sensor type
3 Order code and serial number
3a Extended order code
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
17 Calibration factor/zero point
18 Nominal diameter/nominal pressure
19 Materials in contact with the medium
20 Fluid temperature range
21 Device nominal diameter
22 Direction of flow

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 (Pos. no. 13 in type code)

*	Type of explosion protection		
	Compact version		Sensor
	Ex ia input/output	Non-intrinsically safe	
K, M	Ex d[ia Ga] IIC T1~T6 Gb Ex tD [iaD 20] A21 IP6X T*	Ex d[ia] IIC T1~T6 Gb Ex tD A21 IP6X T*	Ex ia IIC T1~T6 Gb Ex tD iaD A21 IP6X T*
L	Ex d[ia Ga] IIB T1~T6 Gb Ex tD [iaD 20] A21 IP6X T*	Ex d[ia] IIB T1~T6 Gb Ex tD A21 IP6X T*	Ex ia IIB T1~T6 Gb Ex tD iaD A21 IP6X T*
S, Q	Ex de[ia Ga] IIC T1~T6 Gb Ex tD [iaD 20] A21 IP6X T*	Ex de[ia] IIC T1~T6 Gb Ex tD A21 IP6X T*	Ex ia IIC T1~T6 Gb Ex tD iaD A21 IP6X T*
T	Ex de[ia Ga] IIB T1~T6 Gb Ex tD [iaD 20] A21 IP6X T*	Ex de[ia] IIB T1~T6 Gb Ex tD A21 IP6X T*	Ex ia IIB T1~T6 Gb Ex tD iaD A21 IP6X T*

Housing (Pos. no. 14 in type code)

*	Type	Min. ambient temperature $T_{a\ min}$
A	Compact	–20 °C
1		–40 °C

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

*	Thread form
A	M20 × 1.5
B	1/2" – 14 NPT
C	G 1/2"

Inputs/outputs (Pos. no. 18 in type code)

*	Type of protection
A, D	Non-intrinsically safe
S, T	Ex ia

✎ Note!
For 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: → 🖹 7 onwards.

Temperature table compact version

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

	DN [mm]	T_a [°C]	T6 (85 °C)	T5 (100 °C)	T4 (135 °C)	T3 (200 °C)	T2 (300 °C)	T1 (450 °C)
Promass 4*E**-…	8 to 15	+50	–	100	130	140	140	140
	25 to 50		50	100	130	140	140	140
	8 to 50	+60	–	100	130	140	140	140
	80		60	95	110	140	140	140

- The minimum **medium temperature** is –40 °C for Promass E.
- The minimum **ambient temperature** is –20 °C.
  A version for ambient temperatures T_a up to –40 °C is optionally available.

Gas and dust explosion protection

Determining the temperature class and surface temperature with the temperature table
Determine the temperature class for gas in relation to the ambient T_a and the medium temperature T_m.
Determine the maximum surface temperature for dust in relation to the maximum ambient temperature T_a and the max. medium temperature T_m.

Example:
Device: compact version, Promass 40 E, DN 25
Max. ambient temperature: T_a = 60 °C, max. medium temperature: T_m = 98 °C

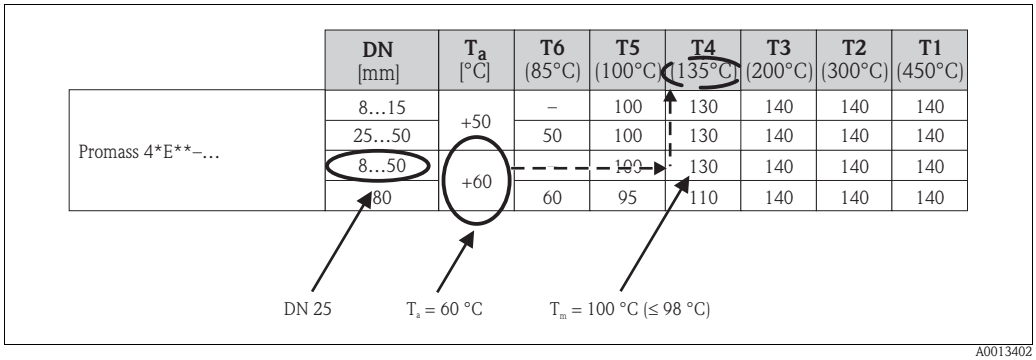


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Fig. 3: Procedure for calculating the max. surface temperature

1. Select the device (Promass 40 E), nominal diameter (DN 25) and ambient temperature Ta (50 °C) in the associated temperature table (compact version). The row showing the maximum medium temperature is determined.
2. Select the maximum medium temperature Tm (98 °C), which is smaller than or equal to the maximum medium temperature of a cell.
   The column with the temperature class for gas is determined (98 °C ≤ 100 °C → T5).
3. The maximum temperature of the temperature class determined corresponds to the maximum surface temperature: T5 = 100 °C = maximum surface temperature for dust.

Design of measuring system

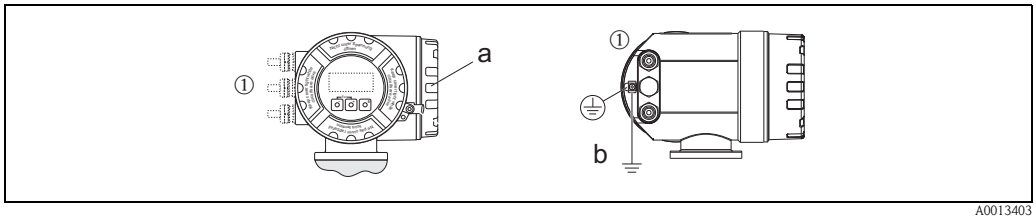

Fig. 4: Design of the measuring system, compact/remote version
a Connection compartment cover
b Screw terminal for connecting to the potential equalization
① see following section "Cable entries"

Cable entries

- For the connection compartment (Ex d version); power supply cable, circuit cable: Choice of cable gland M20 × 1.5 or thread for cable entries ½" NPT or G ½".

  Ensure that the Ex d cable glands/entries are secured against self-locking and the associated seals are arranged directly on the housing.
- For connection compartment (Ex e version); power supply cable, circuit cable: Choice of cable gland M20 × 1.5 or thread for cable entries ½" NPT or G ½". The cables must be installed such that they are fixed in place. Adequate strain relief must be ensured.

⚠ Warning!
When using cable glands M20 × 1.5:
- Only approved cable glands may be used (→ 🖹 2 "Installation instructions").
- The cable glands must be very leak-tight.

Cable specification

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

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 as of serial number 4Axxxxxx000 can be connected to the potential equalization system via the pipeline if a ground connection via the pipeline according to regulations can be assured.

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

Electrical connections

Connection compartment
Transmitter housing compact/remote version (terminal assignment, connection data → 🖹 8 ff.)

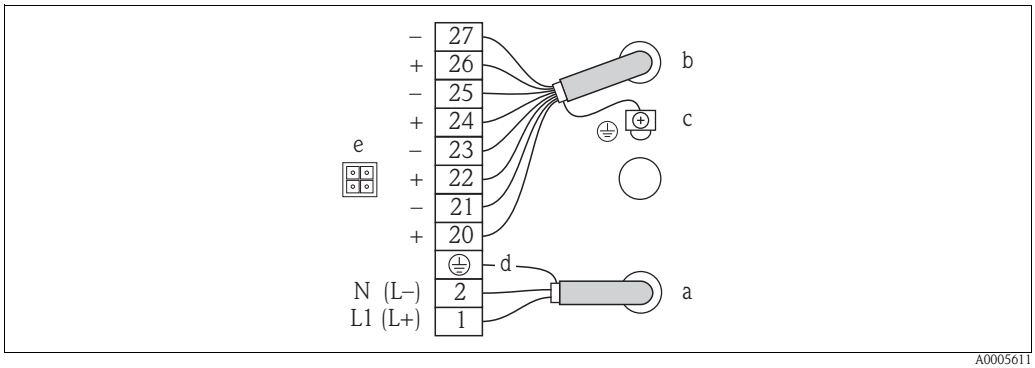

Fig. 5: Electrical connection for 4 to 20 mA HART
a Power supply cable (terminal assignment and connection data → 🖹 8)
b Signal cable (terminal assignment and connection data → 🖹 8)
c Ground terminal for signal cable shield / fieldbus cable / RS485 line
d Ground terminal for protective ground
e Service adapter for connecting service interface FXA 193 (Fieldcheck, FieldCare)

Terminal assignment and connection data, power supply

Terminal assignment and connection data

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 concepts 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 table below contains the values which depend on the type code (type of device). Always remember to compare the type code in the table with the code on the nameplate of your device.
For a graphic representation of the electrical connections: → 🖹 7.

Terminal assignment of transmitter 40*-**********S+#**#**

	Terminal no. (inputs and 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 I_i 500 mA P_i 600 mW L_i IIC negligible C_i IIC 6 nF		U_o 21.8 V DC I_o 90 mA P_o 491 mW L_o IIC/IIB 4.1 mH/15 mH C_o IIC/IIB 160 nF/1160 nF L_o IIC/IIB 2 mH/10 mH [1] C_o IIC/IIB 80 nF/300 nF [1] U_i 30 V DC [2] I_i 10 mA [2] P_i 0.3 W [2] L_i IIC negligible C_i IIC 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] Permissible values for simultaneous occurrence of concentrated inductances and capacitances.
[2] The circuitry must comply with the applicable regulations for electrical installations.

Terminal assignment of transmitter 40*-**********T+#**#**

	Terminal no. (inputs and 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 30 V DC I_i 500 mA P_i 600 mW L_i IIC negligible C_i IIC_i 6 nF		U_i 30 V DC I_i 100 mA P_i 1.25 W L_i IIC negligible C_i IIC_i 6 nF	
Functional values	–		–		galvanically isolated, passive: 30 V DC / 250 mA, Open Collector full scale frequency = 2 to 1000 Hz		galvanically isolated, passive: 0/4 to 20 mA voltage drop ≤ 9 V R_L < [($V_{p.\ supply}$ − 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. For a graphic representation of the electrical connections: → 🖹 7.

Terminal assignment

Order characteristic "Inputs/outputs"	20 (+)	21 (–)	22 (+)	23 (–)	24 (+)	25 (–)	26 (+)	27 (–)
A	–		–		Pulse/ frequency output		Current output HART	
D	Status input		Status output		Pulse/ frequency output		Current output HART	

Safety-related and functional values of non-instrinsically safe circuit

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
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)	
Status output	galvanically isolated, 3 to 30 V DC 250 mA	
Status input	galvanically isolated, 3 to 30 V DC R_i = 5 kΩ	

Service adapter

The service adapter is exclusively for connection to E+H approved service interfaces.

⚠ Warning!
It is not permissible to connect the service adapter in explosive atmospheres.

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 refer to the respective Technical Information for these dimensions:

- Promass 40E → TI00055D

Weight

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

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