

# Safety Instructions

## Proline Promag P 10

CSA: Class I, Zone 1  
Zone 21





# Proline Promag P 10

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**Associated documentation**

All documentation is available:

- On the CD-ROM supplied (not included in the delivery for all device versions).
- Available for all device versions via:
  - Internet: [www.endress.com/deviceviewer](http://www.endress.com/deviceviewer)
  - Smart phone/tablet: *Endress+Hauser Operations App*
- In the Download Area of the Endress+Hauser web site: [www.endress.com](http://www.endress.com) → Download.

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

Measuring device	Documentation code	
	HART	Modbus
Promag P 10	BA02069D	BA02072D

*Additional documentation*

Contents	Document type	Documentation code
Explosion Protection	Brochure	CP00021Z/11
Control drawing		As wanted on the nameplate.

Please note the documentation associated with the device.

**Manufacturer's certificates**

**Certificate number**  
CSA 21CA80077052

**Notified body**  
CSA Group

**Manufacturer address**

Endress+Hauser Flowtec AG  
Kägenstrasse 7  
4153 Reinach BL  
Switzerland

**Extended order code**

The extended order code is indicated on the nameplate, which is affixed to the device in such a way that it is clearly visible. Additional information about the nameplate is provided in the associated Operating Instructions.

## Structure of the extended order code

$$\frac{\text{* * * * *}}{\text{(Device type)}} - \frac{\text{* * * * * ... * * * * *}}{\text{(Basic specifications)}} + \frac{\text{A*B*C*D*E*F*G*...}}{\text{(Optional specifications)}}$$

\* = Placeholder  
At this position, an option (number or letter) selected from the specification is displayed instead of the placeholders.

### Device type

The device and the device design is defined in the "Device type" section (Product root).

### Basic specifications

The features that are absolutely essential for the device (mandatory features) are specified in the basic specifications. The number of positions depends on the number of features available.

The selected option of a feature can consist of several positions.

### Optional specifications

The optional specifications describe additional features for the device (optional features). The number of positions depends on the number of features available. The features have a 2-digit structure to aid identification (e.g. JA). The first digit (ID) stands for the feature group and consists of a number or a letter (e.g. J = Test, Certificate). The second digit constitutes the value that stands for the feature within the group (e.g. A = 3.1 material (wetted parts), inspection certificate).

More detailed information about the device is provided in the following tables. These tables describe the individual positions and IDs in the extended order code which are relevant to hazardous locations.

### Device type

Position	Order code for	Option selected	Description
1	Instrument family	5	Electromagnetic flowmeter
2	Sensor	P	Sensor type
3	Transmitter	B	Transmitter type:
4	Generation index	B	Platform generation
5, 6	Nominal diameter	DN 15 to 600	Nominal diameter of sensor

## Basic specifications

Position 1, 2 Order Code "Approval; Transmitter + Sensor" Option selected	Position 4, 5 Order Code "Output; Input" Option selected	Type of protection
C1	C, U	Cl.I Zone 1, AEx/Ex db eb ib  ib  IIB T4...T1 Gb Zone 2 1, AEx/Ex tb  ib  IIIC T** °C Db
	B, M	Cl.I Zone 1, AEx/Ex db eb ib IIB T4...T1 Gb Zone 2 1, AEx/Ex tb IIIC T** °C Db
C3	C, U	Cl.I Zone 1, AEx/Ex db eb  ib  IIB T4...T1 Gb Zone 2 1, AEx/Ex tb  ib  IIIC T** °C Db
	B, M	Cl.I Zone 1, AEx/Ex db eb IIB T4...T1 Gb Zone 2 1, AEx/Ex tb IIIC T** °C Db

Position	Order code for	Option selected	Description
6	Output, input 1	B	4-20mA HART, Pulse/frequency/switch output
		C	4-20mA HART, Pulse/frequency/switch output Ex i
		M	Modbus RS485, 4-20mA
		U	Modbus RS485, 4-20mA Ex i
7	Display; Operation	A	W/o; via communication
		H	W/o; SmartBlue app
		J	LCD, 2,40"; SmartBlue app
		K	LCD, 2,40"; Touch Screen, SmartBlue app
8	Housing	A	Compact, alu, coated
		P	Remote, alu, coated
17, 18	Device Model	A1	1

## Optional specifications

No options specific to hazardous locations are available.

**Safety instructions:**  
**General**

- Staff must meet the following conditions for mounting, electrical installation, commissioning and maintenance of the device:
  - Be suitably qualified for their role and the tasks they perform
  - Be trained in explosion protection
  - Be familiar with national regulations or guidelines (e.g. CEC or NEC)
- Install the device according to the manufacturer's instructions and national regulations.
- Do not operate the device outside the specified electrical, thermal and mechanical parameters.
- Only use the device in media to which the wetted materials have sufficient durability.
- Refer to the temperature tables for the relationship between the permitted ambient temperature for the sensor and/or transmitter, depending on the range of application, and the temperature classes.
- Modifications to the device can affect the explosion protection and must be carried out by staff authorized to perform such work by Endress+Hauser.
- When using in hybrid mixtures (gas and dust occurring simultaneously), observe additional measures for explosion protection.
- Observe all the technical data of the device (see nameplate).
- Open the housing cover of the transmitter housing in explosion protection Ex db only if one of the following conditions is met:
  - An explosive atmosphere is not present.
  - A waiting time of 10 minutes is observed after switching off the power supply.

The following warning notice is on the device:  
WARNING – AFTER DE-ENERGIZING, DELAY 10 MINUTES  
BEFORE OPENING ENCLOSURE IN TYPE OF PROTECTION EX D
- Avoid electrostatic charge (e.g. caused by friction, cleaning, maintenance, strong currents in the medium):  
on the attached stainless steel nameplate and on painted metallic housings that are not integrated into the local potential equalization system
- Attached nameplates must be included in potential equalization.
- Devices with damaged Ex d threads may no longer be used in hazardous location. It is not permitted to repair or mend Ex d threads.
- Replaced transmitter or sensors shall not be re-used in any other application.

**⚠ WARNING**

**Substitution of components is not permitted.**

- ▶ Substitution of components may impair intrinsic safety.

## Safety instructions: Installation

- In potentially explosive atmospheres:
  - Do not disconnect the electrical connection of the power supply circuit when energized.
  - Do not open the connection compartment cover when energized.
- Continuous service temperature of the connecting cable: -40 to +80 °C; in accordance with the range of service temperature taking into account additional influences of the process conditions ( $T_{a,min}$  and  $T_{a,max} + 20$  K).
- Seal unused entry glands with approved sealing plugs that correspond to the type of protection. The plastic transport sealing plug does not meet this requirement and must therefore be replaced during installation.
- Only use certified cable entries or sealing plugs. The metal sealing plugs supplied meet this requirement.
- Supplied cable glands  $M20 \times 1.5$  are only suitable for fixed installation of cables and connections. In the installation, a strain relief must be provided.
- Only use certified cable entries suitable for the application. Observe national regulations and standards.
- The following applies when connecting the transmitter with a connection compartment in AEx/Ex db:
 

Only use separately certified cables and wire entries (AEx/Ex db IIB or AEx/Ex db IIC) which are suitable for operating temperatures up to 85 °C and for IP 66/67. If using conduit entries, the associated sealing mechanisms must be mounted directly on the housing. Plastic sealing plugs act as transport protection and have to be replaced by suitable, individually approved installation material. The mounted metal thread extensions and blind plugs are tested and certified as part of the housing for type of protection AEx/Ex db IIB. The thread extension or the blind plug labeled as follows for identification purposes:

d: NPT ½"
- The following applies when connecting the transmitter with a connection compartment in Ex AEx/Ex eb:
 

Only use separately certified cable and wire entries and sealing plugs (AEx/Ex eb IIB or AEx/Ex eb IIC) which are suitable for operating temperatures up to 85 °C and for IP 66/67. The cables must be routed such that they are securely seated, and sufficient strain relief must be ensured.

The mounted metal thread extensions and blind plugs supplied are tested and certified as part of the housing for type of protection AEx/Ex eb IIB. Plastic sealing plugs act as transport protection and have to be replaced by suitable, individually approved installation material.

Supplied cable glands are separately certified and marked as components and meet device specification requirements.
- When the measuring device is connected, attention must be paid to explosion protection at the transmitter.



- When connecting through a conduit entry approved for this purpose, mount the associated sealing unit directly at the enclosure.
- Only use certified sealing plugs. The metal sealing plugs supplied meet this requirement.

### Intrinsic safety

- The device can be connected to the Endress+Hauser service tool FXA291; pay attention to the Operating Instructions. Connection to the service connector is only permitted if the atmosphere is not a potentially explosive atmosphere.
- Observe the guidelines for interconnecting intrinsically safe circuits (e.g. Proof of Intrinsic Safety).
- For display use only battery from Renata type lithium CR1632, 3V.
- The use of the device without a display module is not permitted.

### Potential equalization

- Integrate the device into the local potential equalization .
- If the ground connection has been established via the pipe as specified, it is also possible to integrate the sensor into the potential equalization system via the pipe.

### Safety instructions: Zone 21

- To ensure dust-tightness, securely seal all housing openings, cable entries and sealing plugs.
- Only open all housing briefly, ensuring that no dust or moisture enters the housing.
- Only use certified cable entries and sealing plugs. The metal cable entries, extensions and sealing plugs supplied meet this requirement.

### Temperature tables

#### Ambient temperature

*Minimum ambient temperature*

$$T_a = -40 \text{ }^\circ\text{C}$$

*Maximum ambient temperature*

$T_a = +60 \text{ }^\circ\text{C}$  depending on the medium temperature and temperature class.

#### Medium temperature

*Minimum medium temperature*

$T_m = -40 \text{ to } 0 \text{ }^\circ\text{C}$  depending on the selected device version (see nameplate!)

*Maximum medium temperature*

$T_m$  for T4...T1 depending on the maximum ambient temperature  $T_a$

**Compact version**

*Maximum medium temperature with or without thermal insulation according to Endress+Hauser specifications*

Without thermal insulation

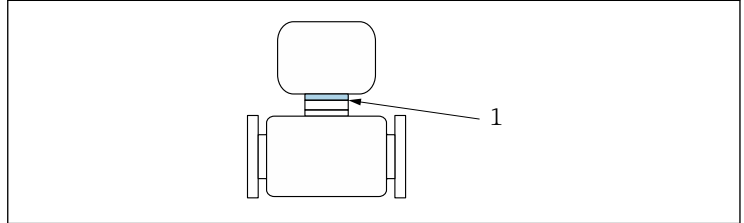
Extended neck for insulation (Optional specification, ID Cx (Sensor Option) = CG), with or without thermal insulation

Liner	$T_a$ [°C]	$T_m$ [°C]					
		T6 [85 °C]	T5 [100 °C]	T4 [135 °C]	T3 [200 °C]	T2 [300 °C]	T1 [450 °C]
PTFE (110 °C)	55	-	-	110	110	110	110
	60	-	-	100	100	100	100
PTFE (130 °C)	55	-	-	130	130	130	130
	60	-	-	100	100	100	100
PFA	40	-	-	-	150	150	150
	55	-	-	130	130	130	150
	60	-	-	100	100	100	100


*With thermal insulation without Endress+Hauser specifications*

The specified reference temperature  $T_{ref}$  and the maximum medium temperature  $T_{m,max}$  for each temperature class must not be exceeded:

→  10



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 1 Position of reference point for temperature measurement

1 Reference point

Reference temperature  $T_{ref}$

T6 [85 °C]	T5 [100 °C]	T4 [135 °C]	T3 [200 °C]	T2 [300 °C]	T1 [450 °C]
-	-	69	69	69	69

**Explosion hazards arising from gas and dust**

**Determining the temperature class and surface temperature with the temperature table**

- In the case of gas: Determine the temperature class as a function of the maximum ambient temperature  $T_a$  and the maximum medium temperature  $T_m$ .
- In the case of dust: Determine the maximum surface temperature as a function of the maximum ambient temperature  $T_a$  and the maximum medium temperature  $T_m$ .

**Example**

- Measured maximum ambient temperature:  $T_{ma} = 63 \text{ °C}$
- Measured maximum medium temperature:  $T_{mm} = 108 \text{ °C}$

$T_a$ [°C]	T6 [85 °C]	T5 [100 °C]	T4 [135 °C]	T3 [200 °C]	T2 [300 °C]	T1 [450 °C]
40	80	95	130	150	150	150
55	-	95	130	150	150	150
60	-	95	130	150	150	150

Diagram illustrating the procedure for determining the temperature class and surface temperature. The table shows ambient temperature ( $T_a$ ) and corresponding medium temperatures (T1-T6) for different temperature classes (T1-T6). The maximum ambient temperature  $T_a$  is 60 °C (circled in blue, labeled 1.). The maximum medium temperature  $T_m$  is 130 °C (circled in blue, labeled 2.). The temperature class for gas is determined as T4 (135 °C) (circled in blue, labeled 3.).

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2 Procedure for determining the temperature class and surface temperature

1. In the column for the maximum ambient temperature  $T_a$  select the temperature that is immediately greater than or equal to the maximum ambient temperature  $T_{ma}$  that is present.

↳  $T_a = 60$  °C.

The row showing the maximum medium temperature is determined.

2. Select the maximum medium temperature  $T_m$  of this row, which is immediately greater than or equal to the maximum medium temperature  $T_{mm}$  that is present.

↳ The column with the temperature class for gas is determined:  
 $108$  °C  $\leq$   $130$  °C  $\rightarrow$  T4.

3. The maximum temperature of the temperature class determined corresponds to the maximum surface temperature for dust:  $T_4 = 135$  °C.

**Connection values: Signal circuits**

The following tables contain specifications which are dependent on the transmitter type and its input and output assignment. Compare the following specifications with those on the nameplate of the transmitter.

**Safety-related values**

Order code "Output; input"		Terminal assignment	Safety-related values
Option B	Current output 4 to 20 mA HART (active)	26 (+), 27 (-)	$U_N = 30 V_{DC}$ $U_M = 250 V_{AC}$
	Current output 4 to 20 mA HART (passive)	24 (+), 25 (-)	
	Pulse/frequency/switch output	22 (+), 23 (-)	
Option M	Current output 4 to 20 mA (active)	26 (+), 27 (-)	
	Current output 4 to 20 mA (passive)	24 (+), 25 (-)	
	Modbus RS485	22 (B), 23 (A)	

**Intrinsically safe values**

Order code "Output; input"		Terminal assignment	Safety-related values
Option C	Current output 4 to 20 mA HART (active)	26 (+), 27 (-)	$U_0 = 22.3 V$ $I_0 = 93 mA$ $P_0 = 520 mW$ $L_0 = 8 mH$ $C_0 = 500 nF$  $U_i = 6.5 V$ $I_i = 10 mA$ $P_i = 20 mW$
	Current output 4 to 20 mA HART (passive)	24 (+), 25 (-)	$U_i = 30 V$ $I_i = 100 mA$ $P_i = 1.25 W$ $L_i = 0 \mu H$ $C_i = 6 nF$
	Pulse/frequency/switch output	22 (+), 23 (-)	$U_i = 30 V$ $I_i = 10 mA$ $P_i = 20 mW$ $L_i = 0 \mu H$ $C_i = 10 nF$

Order code "Output; input"		Terminal assignment	Safety-related values
Option U	Current output 4 to 20 mA (active)	26 (+), 27 (-)	$U_0 = 22.3 \text{ V}$ $I_0 = 93 \text{ mA}$ $P_0 = 520 \text{ mW}$ $L_0 = 8 \text{ mH}$ $C_0 = 500 \text{ nF}$  $U_i = 6.5 \text{ V}$ $I_i = 10 \text{ mA}$ $P_i = 20 \text{ mW}$
	Current output 4 to 20 mA (passive)	24 (+), 25 (-)	$U_i = 30 \text{ V}$ $I_i = 100 \text{ mA}$ $P_i = 1.25 \text{ W}$ $L_i = 0 \text{ } \mu\text{H}$ $C_i = 6 \text{ nF}$
	Modbus RS485	22 (B), 23 (A)	$U_i = 4.2 \text{ V}$ $I_i = \text{N/A}$ $P_i = \text{N/A}$ $L_i = 0 \text{ } \mu\text{H}$ $C_i = 6 \text{ nF}$  $U_0 = 4.2 \text{ V}$ $I_0 = 120 \text{ mA}$ $P_0 = 130 \text{ mW}$ $L_0 = 10 \text{ mH}$ $C_0 = 900 \text{ } \mu\text{F}$ $L/R = 1.2 \text{ mH}/\Omega$





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