

Safety Instructions

Proline Promass 100

Modbus RS485

NEPSI: Zone 1, Zone 21
Ex i version



Document: XA01249D
Safety instructions for electrical apparatus for explosion-
hazardous areas →  3

Proline Promass 100

Modbus RS485

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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
 - Smart phone/tablet: *Endress+Hauser Operations App*
- In the Download Area of the Endress+Hauser web site: www.endress.com → Download

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

Measuring device	Modbus RS485
Promass A 100	BA01179D
Promass E 100 (8E1B**-...)	BA01056D
Promass E 100 (8E1C**-...)	BA01711D
Promass F 100	BA01057D
Promass G 100	BA01345D
Promass H 100	BA01177D
Promass I 100	BA01058D
Promass O 100	BA01180D
Promass P 100	BA01059D
Promass S 100	BA01060D
Promass X 100	BA01181D

Additional documentation

Contents	Document type	Documentation code
Explosion Protection	Brochure	CP00021Z/11

Please note the documentation associated with the device.

Manufacturer's certificates

NEPSI Declaration of Conformity

Certificate number:

GYJ13.1225

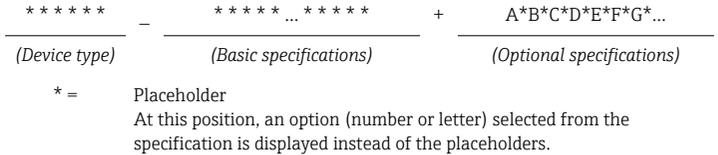
Affixing the certificate number certifies conformity with the following standards (depending on the device version):

- GB3836.1-2010
- GB3836.4-2010
- GB3836.20-2010
- GB12476.1-2013
- GB12476.5-2013

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



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	8	Coriolis flowmeter
2	Sensor	A, E, F, G, H, I, O, P, S, X	Sensor type
3	Transmitter	1	Transmitter type: 4-wire, compact version
4	Generation index	B, C	Platform generation
5, 6	Nominal diameter	DN 1 ... 350 DN 1: 01 DN 2: 02 ... DN 350: 3E, 3F, 3R	Nominal diameter of sensor

Basic specifications

Relevant features of the basic specifications and the device type

Position	Order code	Selected option	Device type		Explosion protection	
			Position 2 Sensor	Position 5, 6 Nominal Diameter	Transmitter/sensor	Safety Barrier Promass 100
1, 2	Approval	NG	A	01, 02, 04	Ex ia IIC T1 ~ T6 Gb, Ex tD A21 IP6X T*	Ex nA [ia Ga] IIC T4 Gc
			E, F	08, 15, 25, 40, 50		
			G	08, 15, 25		
			H, S, P	08, 15, 25, 40		
			I	08, 15, 16, 25, 26, 40		
			E	80	Ex ia IIB T1 ~ T6 Gb, Ex tD A21 IP6X T*	
			F, O	80, 1H, 1F, 2F		
			H, P, S	50		
			I	41, 50, 51, 80		
X	3E, 3F, 3R					

Position	Order code	Selected option	Device type		Explosion protection	
			Position 2 Sensor	Position 5, 6 Nominal Diameter	Transmitter/sensor	Safety Barrier Promass 100
1, 2	Approval	NF	E	80	Ex ia IIC T1 ~ T6 Gb, Ex tD A21 IP6X T*	
			F, O	80, 1H, 1F, 2F		
			H, P, S	50		
			I	41, 50, 51, 80		
			X	3E, 3F, 3R		
1, 2	Approval	NU	A	01, 02, 04	Ex ia IIC T1 ~ T6 Gb	
			E, F	08, 15, 25, 40, 50		
			G	08, 15, 25		
			H, S, P	08, 15, 25, 40		
			I	08, 15, 16, 25, 26, 40		
		E	80	Ex ia IIB T1 ~ T6 Gb		
		F, O	80, 1H, 1F, 2F			
		H, P, S	50			
		I	41, 50, 51, 80			
		X	3E, 3F, 3R			
1, 2	Approval	NV	E	80	Ex ia IIC T1 ~ T6 Gb	
			F, O	80, 1H, 1F, 2F		
			H, P, S	50		
			I	41, 50, 51, 80		
			X	3E, 3F, 3R		

Position	Order code	Selected Option	Description
3	Input; Output	M	Modbus RS485
4	Display; Operation	A	W/o; via communication
5	Housing	A	Compact, alu, coated
		B	Compact hygienic, stainless
		C	Ultra compact hygienic, stainless
13, 14	Device model ¹⁾	A1	1

1) Order code for "Device model" only for measuring devices with product code 8E1C**-...

Optional specifications

ID	Order code for	Option selected	Description
Jx	Test, Certificate	JM	Ambient temperature transmitter -50 °C

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 (e.g. GB/T 3836.15-2017).
- Install the device according to the manufacturer's instructions and the following standards:
 - 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".
 - GB/T 3836.15-2017 "Explosive atmospheres – Part 15: Electrical installations design, selection and erection"
 - GB/T 3836.16-2017 "Explosive atmospheres – Part 16:Electrical installations inspection and maintenance"
 - GB3836.18-2010 "Explosive atmospheres-Part 18: Intrinsically safe system
 - 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 combustible dust – Part 2: Selection and installation". (Only if installed in dust hazardous areas.)
- 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.
- Observe all the technical data of the device (see nameplate).
- When using in hybrid mixtures (gas and dust occurring simultaneously), observe additional measures for explosion protection.

Safety instructions:
Installation

In the event of potentially explosive vapor/air mixtures, only operate the device under atmospheric conditions.

- Temperature: -20 to +60 °C
- Pressure: 80 to 110 kPa (0.8 to 1.1 bar)
- Air with normal oxygen content, usually 21 % (V/V)

If no potentially explosive mixtures are present, or if additional protective measures have been taken, the device may also be operated under non-atmospheric conditions in accordance with the manufacturer's specifications.

- Safety Barrier Promass 100
 - The device may only be used with the safety barrier supplied.
 - The safety barrier may only be installed in a non-hazardous area or Zone 2. If the safety barrier is installed in Zone 2, it must be installed in a housing. The housing must meet the requirements of GB3836.8-2014.
 - The connecting cable and installation between the safety barrier and device must meet the requirements of GB/T 3836.15-2017.
- Only use certified cable entries and connection plugs M12×1 suitable for the application. Please comply with the selection criteria as defined in GB/T 3836.15-2017.
- Continuous service temperature of the connecting cable: -40 to +80 °C (-50 to +80 °C for optional specifications, ID Jx (test, certificate) = JM); however, at least 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).
- Supplied cable glands M20 × 1.5 are only suitable for fixed installation of cables and connections. In the installation, a strain relief must be provided.

Basic specification, Position 5 (Housing) = B, C

To protect the housing of stainless steel housings ensure that the housing gasket is flat and not bent when closing the housing cover. Replace bent gaskets.

Intrinsic safety

- The device can be connected to the Endress+Hauser FXA291 service tool: refer to the Operating Instructions.
- Observe the guidelines for interconnecting intrinsically safe circuits (e.g. GB/T 3836.15-2017 , Proof of Intrinsic Safety).
- Observe the connection values when selecting the connection cable between Safety Barrier Promass 100 and the measuring device .

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 the transmitter housing, cable entries and sealing plugs.
- Only open the transmitter housing briefly, ensuring that no dust or moisture enters the housing.
- The metal extensions and blind plugs supplied are tested and certified as part of the enclosure for explosion protection Ex tb IIIC. Plastic sealing plugs in extensions 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.

Temperature tables

Ambient temperature

Minimum ambient temperature:

- $T_a = -40\text{ °C}$
- *Optional specification, ID Jx (Test, Certificate) = JM*
 $T_a = -50\text{ °C}$

Maximum ambient temperature:

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

Medium temperature

Minimum medium temperature

- Promass A, F, G, H, I, P, S, X:
 $T_m = -50\text{ °C}$
- Promass E, O:
 $T_m = -40\text{ °C}$

Maximum medium temperature

T_m for T1 ~ T6 depending on the maximum ambient temperature T_a

Compact version

Temperature values in brackets [] correspond to $T_{xx}\text{ °C}$ for Ex tD A21 (dust). →  11

Basic specification, Position 5 (Housing) = A, B

T _a [°C]	T6 [85 °C]	T5 [100 °C]	T4 [135 °C]	T3 [200 °C]	T2 [300 °C]	T1 [450 °C]
35	50	85	120	150 ^{1) 2)}	150 ^{1) 3) 4)}	150 ^{1) 3) 4)}
50	–	85	120	150 ^{1) 2)}	150 ^{1) 3) 4)}	150 ^{1) 3) 4)}
60	–	–	120	150 ^{1) 2)}	150 ^{1) 3) 4)}	150 ^{1) 3) 4)}

- 1) The medium temperature for Promass 8E1B**... is limited to $T_m = 140$ °C.
- 2) The following applies to specified sensors with a maximum medium temperature $T_m = 205$ °C: $T_m = 170$ °C
- 3) The following applies to specified sensors with a maximum medium temperature $T_m = 205$ °C: $T_m = 205$ °C
- 4) Maximum medium temperature = 240 °C for Promass F version with maximum $T_m = 240$ °C. For medium temperature above 205 °C, the transmitter shall not be installed above the sensor.

Basic specification, Position 5 (Housing) = C

T _a [°C]	T6 [85 °C]	T5 [100 °C]	T4 [135 °C]	T3 [200 °C]	T2 [300 °C]	T1 [450 °C]
35	50	85	120	150 ^{1) 2)}	150 ^{1) 3) 4)}	150 ^{1) 3) 4)}
45	–	85	120	150 ^{1) 2)}	150 ^{1) 3) 4)}	150 ^{1) 3) 4)}
50	–	–	120	150 ^{1) 2)}	150 ^{1) 3) 4)}	150 ^{1) 3) 4)}

- 1) The medium temperature for Promass 8E1B**... is limited to $T_m = 140$ °C.
- 2) The following applies to specified sensors with a maximum fluid temperature $T_m = 205$ °C: $T_m = 170$ °C
- 3) The following applies to specified sensors with a maximum medium temperature $T_m = 205$ °C: $T_m = 205$ °C
- 4) Maximum process temperature = 240 °C for Promass F version with maximum $T_m = 240$ °C. For process temperature above 205 °C, the transmitter shall not be installed above the sensor.

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: $T_{ma} = 47$ °C
- Measured maximum medium temperature: $T_{mm} = 108$ °C

	Ta [°C]	T6 [85°C]	T5 [100°C]	T4 [135°C]	T3 [200°C]	T2 [300°C]	T1 [450°C]
	35	50	85	120	140	140	140
	50	-	85	120	140	140	140
	60	-	-	120	140	140	140
	35	50	85	120	140	140	140
	45	-	85	120	140	140	140
	50	-	-	120	140	140	140

Diagram annotations: 1. Arrow pointing to the 50 in the Ta column of the last row. 2. Arrow pointing to the 50 in the T6 column of the last row. 3. Arrow pointing to the 120 in the T4 column of the last row. 4. Arrow pointing to the 135 in the T4 header.

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1 Procedure for determining the temperature class and surface temperature

1. Select device (optional).
2. 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.
 - ↳ $T_a = 50\text{ °C}$.
The row showing the maximum medium temperature is determined.
3. 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:
 $108\text{ °C} \leq 120\text{ °C} \rightarrow T_4$.
4. The maximum temperature of the temperature class determined corresponds to the maximum surface temperature for dust: $T_4 = 135\text{ °C}$.

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.

Terminal assignment

Transmitter

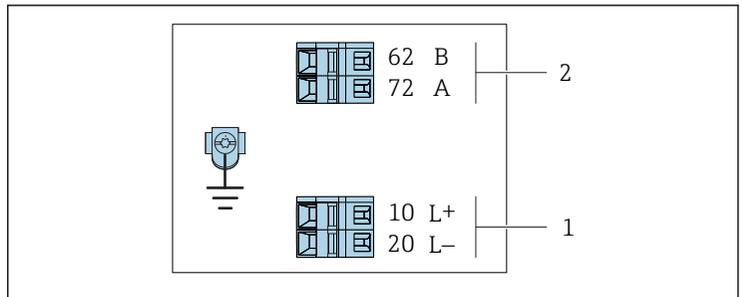
 The order code constitutes part of the extended order code. For detailed information on the device features and the structure of the extended order code →  5.

Modbus RS485 connection version

 For use in the intrinsically safe area. Connection via Safety Barrier Promass 100.

Order code for "Output", option **M**

Depending on the housing version, the transmitters can be ordered with terminals or device plugs.



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 2 *Modbus RS485 terminal assignment, connection version for use in intrinsically safe areas (connection via Safety Barrier Promass 100)*

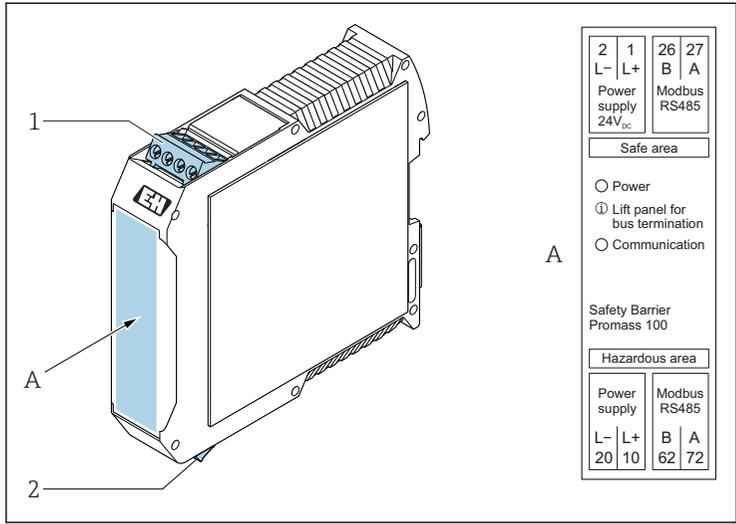
1 *Intrinsically safe power supply*

2 *Modbus RS485*

Order code "Output"	10 (L+)	20 (L-)	62 (B)	72 (A)
Option M	Intrinsically safe supply voltage		Modbus RS485 intrinsically safe	

Order code for "Output":
 Option **M**: Modbus RS485, for use in the intrinsically safe area (connection via Safety Barrier Promass 100)

Safety Barrier Promass 100



A0030220

3 *Safety Barrier Promass 100 with terminals*

- 1 *Non-hazardous area, Zone 2*
- 2 *Intrinsically safe area*

Intrinsically safe values

These values only apply for the following device version:
 Order code for "Output", option M "Modbus RS485", for use in
 intrinsically safe areas

Safety Barrier Promass 100

Safety-related values

Terminal numbers			
Supply voltage		Signal transmission	
2 (L-)	1 (L+)	26 (A)	27 (B)
$U_{nom} = DC\ 24\ V$ $U_{max} = AC\ 260\ V$		$U_{nom} = DC\ 5\ V$ $U_{max} = AC\ 260\ V$	

Intrinsically safe values

Terminal numbers			
Supply voltage		Signal transmission	
20 (L-)	10 (L+)	62 (A)	72 (B)
$U_o = 16.24 \text{ V}$ $I_o = 623 \text{ mA}$ $P_o = 2.45 \text{ W}$ With IIC ¹⁾ : $L_o = 92.8 \text{ } \mu\text{H}$, $C_o = 0.433 \text{ } \mu\text{F}$, $L_o/R_o = 14.6 \text{ } \mu\text{H}/\Omega$ With IIB: $L_o = 372 \text{ } \mu\text{H}$, $C_o = 2.57 \text{ } \mu\text{F}$, $L_o/R_o = 58.3 \text{ } \mu\text{H}/\Omega$			

1) The gas group depends on the sensor and nominal diameter → 6ff.

Transmitter

Intrinsically safe values

Terminal numbers			
Supply voltage		Signal transmission	
20 (L-)	10 (L+)	62 (A)	72 (B)
$U_i = 16.24 \text{ V}$ $I_i = 623 \text{ mA}$ $P_i = 2.45 \text{ W}$ $L_i = 0 \text{ } \mu\text{H}$ $C_i = 6 \text{ nF}$			

Pin assignment, device plug

Device plug for signal transmission with supply voltage (device side), MODBUS RS485 (intrinsically safe)

Pin	Assignment	
1	L+	Supply voltage, intrinsically safe
2	A	Modbus RS485 intrinsically safe
3	B	
4	L-	Supply voltage, intrinsically safe
5		Grounding/shielding
Coding		Plug/socket
A		Plug

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