

Safety Instructions

Proline Promass 100

Modbus RS485

Class I, Division 1; Zone 1 for IS
(Ex i Intrinsically safe version)



Proline Promass 100

Modbus RS485

Table of contents

| | |
|--|----|
| Associated documentation | 4 |
| Manufacturer's certificates | 4 |
| Manufacturer contact address | 5 |
| Extended order code | 5 |
| Safety instructions: General | 7 |
| Safety instructions: Installation | 8 |
| Safety instructions: Class II, Class III | 9 |
| Temperature tables | 10 |
| Connection values: Signal circuits | 11 |

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:

| Document type | Contents | Documentation code |
|----------------------|----------|-----------------------------|
| Installation Drawing | | As wanted on the nameplate. |

Please note the documentation associated with the device.

Manufacturer's certificates

Certificate number

160686-2537178

Notified body

CSA: Canadian Standards Association

Manufacturer contact 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

| | | |
|--|------------------------|--------------------------|
| ***** | - ***** ... ***** | + A*B*C*D*E*F*G*... |
| Device type | Basic specifications | Optional specifications |
| * = Spaceholder: 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 | Selected option | 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 Nomial Diameter | Transmitter/sensor | Safety Barrier Promass 100 |
| 1, 2 | Approval | C2, 85 | A | 01, 02, 04 | Intrinsically safe for Class I, Division 1, Group ABCD Dust-Ignitionproof Class II, Division 1 for Group EFG Class III | Suitable for Class I, Division 2, Group ABCD or Class I Zone 2, IIC T4 installation Intrinsically safe outputs: Class I, Division 1 for Group ABCD Class II, Division 1 for Group EFG Class III |
| | | | 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 | Intrinsically safe for Class I, Division 1 for Group CD Dust-Ignitionproof Class II, Division 1 for Group EFG Class III | |
| | | | F, O | 80, 1H, 1F, 2F | | |
| | | | H, P, S | 50 | | |
| | | | I | 41, 50, 51, 80 | | |
| X | 3F | | | | | |

| Position | Order code | Selected option | Device type | | Explosion protection | |
|----------|------------|-----------------|-------------------|-------------------------------|--|----------------------------|
| | | | Position 2 Sensor | Position 5, 6 Nomial Diameter | Transmitter/sensor | Safety Barrier Promass 100 |
| 1, 2 | Approval | C5, 84 | E | 80 | Intrinscally safe for Class I, Division 1, Groups ABCD Dust-Ignitionproof Class II, Division 1 for Group EFG Class III | |
| | | | F, O | 80, 1H, 1F, 2F | | |
| | | | H, P, S | 50 | | |
| | | | I | 41, 50, 51, 80 | | |
| | | | X | 3F | | |

| 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. 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), additional measures should be taken. Please see approval body.
- Observe all the technical data of the device (see nameplate).
- Class II Group G: The surface temperature of the apparatus cannot exceed +165 °C.

WARNING

Substitution of components is not permitted.

- ▶ Substitution of components may impair intrinsic safety.

Safety instructions: Installation

- The measuring device should only be used with the supplied Safety Barrier Promass 100 (safety barrier).
- When the Safety Barrier Promass 100 is located in Class I Division 2 (respectively safe area) it shall be mounted inside an additional enclosure which meets the requirements of CSA C22.2 No.213, CAN/CSA 60079-15, ANSI/ISA 60079-15 and FM 3611 (respectively as CAN/CSA C22.2 No. 61010-1 and FM 3810).
- Continuous service temperature of the connecting cable: -40 to +80 °C (-50 to +80 °C for optional specifications, ID Jx (Test, Certificate) = JM); 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).
- The connection cable and the installation between Safety Barrier Promass 100 and the measuring device must meet the requirements of CEC or NEC.
- Only use certified cable entries and connection plugs M12 × 1 suitable for the application. Observe selection criteria as per CEC or NEC.
- 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.
- Control room equipment shall not use or generate more than 250 V_{rms}.

- Install the transmitter circuit wiring according to Canadian Electrical Code (CEC) respective National Electrical Code (NEC) using threaded conduit or other wiring methods in accordance with articles 500 to 510.
- Install all Intrinsically Safe Circuits:
 - Per Canadian Electrical Code (CEC) Part I Section 18 and Appendix F
 - Per National Electrical Code (NEC) ANSI/NFPA 70 and ISA RP 12.6
- The following sensors are Dual Seal devices in accordance with ANSI/ISA-12.27.01-2003: Promass A, E (8E1C**-... and O8E1C**-...), F, G, H, O, P, S, and X .
Promass E, potted neck version (8E1B**-... and O8E1B**-...) is a Dual Seal device if the optional rupture disk is present.

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 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: Class II, Class III

- 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.
- 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 and sealing plugs. The metal cable entries, extensions and sealing plugs supplied meet this requirement.

Temperature tables

Ambient temperature

Minimum ambient temperature:

$$T_a = -40\text{ °C}$$

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 T6...T1 depending on the maximum ambient temperature T_a

Compact version

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)} | 150 ^{1) 3)} |
| 50 | – | 85 | 120 | 150 ^{1) 2)} | 150 ^{1) 3)} | 150 ^{1) 3)} |
| 60 | – | – | 120 | 150 ^{1) 2)} | 150 ^{1) 3)} | 150 ^{1) 3)} |

- 1) The medium temperature for Promass 8E1B**... is limited to $T_m = 140\text{ °C}$.
- 2) The following applies to specified sensors with a maximum fluid temperature $T_m = 205\text{ °C}$: $T_m = 170\text{ °C}$
- 3) The following applies to specified sensors with a maximum fluid temperature $T_m = 205\text{ °C}$: $T_m = 205\text{ °C}$

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] |
|---------------|---------------|----------------|----------------|----------------------|----------------------|----------------------|
| | – | 85 | 120 | 150 ^{1) 2)} | 150 ^{1) 3)} | 150 ^{1) 3)} |
| | – | – | 120 | 150 ^{1) 2)} | 150 ^{1) 3)} | 150 ^{1) 3)} |



- 1) The medium temperature for Promass 8E1B**... is limited to $T_m = 140\text{ °C}$.
- 2) The following applies to specified sensors with a maximum fluid temperature $T_m = 205\text{ °C}$: $T_m = 170\text{ °C}$
- 3) The following applies to specified sensors with a maximum fluid temperature $T_m = 205\text{ °C}$: $T_m = 205\text{ °C}$

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

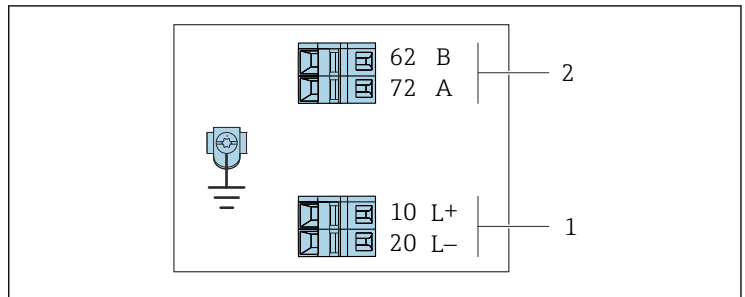
 The order code constitutes part of the extended order code. For detailed information on the device features and the structure of the extended order code →  5.

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.



A0030219

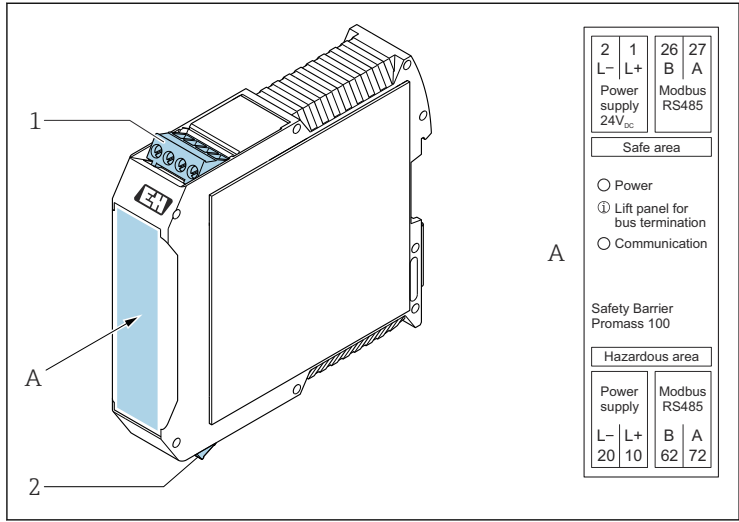
 1 *Modbus RS485 terminal assignment, connection version for use in intrinsically safe areas (connection via Safety Barrier Promass 100)*

- 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

2 Safety Barrier Promass 100 with terminals

- 1 Non-hazardous area, Zone 2, Class I Division 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 (B) | 27 (A) |
| $U_{nom} = DC\ 24\ V$ $U_{max} = AC\ 260\ V$ | | $U_{nom} = DC\ 5\ V$ $U_{max} = AC\ 260\ V$ | |

Intrinsically safe values

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

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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