

Safety Instructions


Cubemass 100

Modbus RS485

NEPSI: Zone 1, Zone 21 (Ex i version)



Document: XA01261D

Safety instructions for electrical apparatus for explosion-hazardous areas classified according to National Supervision and Inspection Centre for Explosion Protection and Safety of Instrumentation (NEPSI) →  3

Cubemass 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
Cubemass C 100	BA01178D

Additional documentation:

Document type	Contents	Documentation code
Brochure	Explosion Protection	CP00021Z/11

Please note the documentation associated with the device.

COC certificates of conformity**COC certificates of conformity**

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

Certification numbers

GYJ13.1225

Inspection body

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

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	C	Sensor type
3	Transmitter	1	Transmitter type: 4-wire, compact version
4	Generation index	B, C, ...	Platform generation
5, 6	Nominal diameter	DN 1: 01 DN 2: 02 DN 4: 04 DN 6: 06	Nominal diameter of sensor

Basic specifications

Position	Order code	Selected option	Explosion protection	
			Transmitter/sensor	Safety Barrier Promass 100
1, 2	Approval	NG	Ex ia IIC T1 ~ T6 Gb, Ex tD A21 IP6X T*	Ex nA [ia Ga] IIC T4 Gc
		NU	Ex ia IIC T1 ~ T6 Gb	Ex nA [ia Ga] IIC T4 Gc

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

Optional specifications

ID	Order code	Selected option	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. GB3836.15-2000).
- 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".
 - 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)"
 - 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), additional measures should be taken. Please see approval body.

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 GB3836.8-2003.
 - The connecting cable and installation between the safety barrier and device must meet the requirements of GB3836.15-2000.
- Only use certified cable entries and connection plugs M12×1 suitable for the application. Please comply with the selection criteria as defined in GB3836.15-2000.
- 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 pertaining to the interconnection of intrinsically safe circuits (e.g. GB3836.15-2000, proof of intrinsic safety).
- Observe the connection data when selecting the connecting cable between the 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.
- 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 cable entries and metal sealing plugs supplied meet this requirement.

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:

$T_m = -50\text{ °C}$

Maximum medium temperature:

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

Compact version

Temperature values in brackets | | correspond to Txx °C for Group IIIC (dust). →  10

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 [300 °C]
35	50	85	120	150 ¹⁾	150 ²⁾	150 ²⁾
50	-	85	120	150 ¹⁾	150 ²⁾	150 ²⁾
60	-	-	120	150 ¹⁾	150 ²⁾	150 ²⁾

- 1) The following applies to specified sensors with a maximum fluid temperature $T_m = 205\text{ °C}$: $T_m = 170\text{ °C}$
- 2) 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 [300 °C]
35	50	85	120	150 ¹⁾	150 ²⁾	150 ²⁾
45	–	85	120	150 ¹⁾	150 ²⁾	150 ²⁾
50	–	–	120	150 ¹⁾	150 ²⁾	150 ²⁾

- 1) The following applies to specified sensors with a maximum fluid temperature $T_m = 205\text{ °C}$: $T_m = 170\text{ °C}$
- 2) The following applies to specified sensors with a maximum fluid temperature $T_m = 205\text{ °C}$: $T_m = 205\text{ °C}$

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 ambient temperature T_a and the 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: $T_{ma} = 47\text{ °C}$
- Measured maximum medium temperature: $T_{mm} = 108\text{ °C}$

	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

4.

1. 2. 3.

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1 Procedure for determining the maximum 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 measured 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 larger or equal to the measured maximum medium temperature T_{mm} .
 - ↳ 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 data:
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.

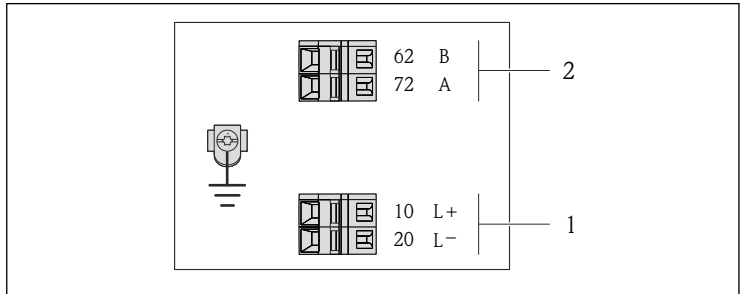
Modbus RS485 connection version



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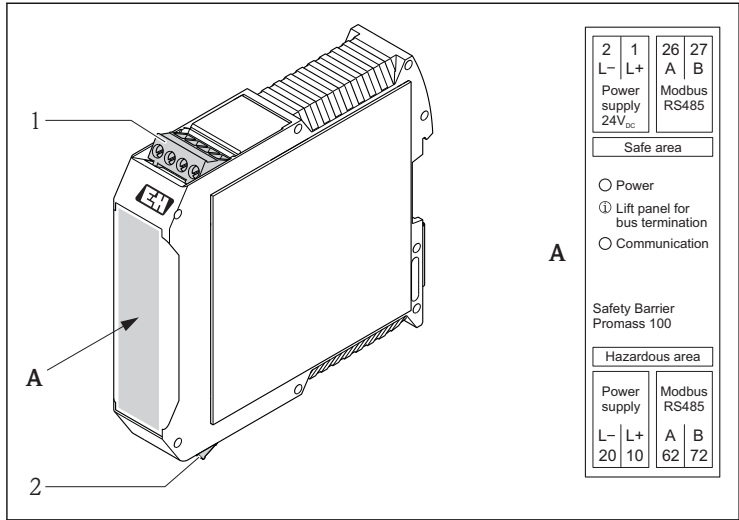
2 *Modbus RS485 terminal assignment, connection version for use in intrinsically safe areas (connection via Safety Barrier Promass 100)*

1 *Intrinsically safe power supply*

2 *Modbus RS485*

Order code for "Output"	20 (L-)	10 (L+)	72 (B)	62 (A)
Option M	Intrinsically safe supply voltage		Modbus RS485 intrinsically safe	
Order code for "Output": Option M : Modbus RS485, for use in intrinsically safe areas (connection via Safety Barrier Promass 100)				

Safety Barrier Promass 100



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3 *Safety Barrier Promass 100 with terminals*

- 1 Non-hazardous area and 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⁾ : $L_o = 92.8 \text{ } \mu\text{H}$, $C_o = 0.433 \text{ } \mu\text{F}$, $L_o/R_o = 14.6 \text{ } \mu\text{H}/\Omega$			

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

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)

<p style="text-align: right; font-size: small;">A0016809</p>	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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