



Level



Pressure



Flow



Temperature



Liquid
Analysis



Registration



Systems
Components



Services



Solutions

Safety Instructions

Cubemass

MODBUS RS485

Division 1

Dokument-Nr.: XA147D



Safety instructions for electrical apparatus for explosion-hazardous areas classified according to the National Electrical Code (NEC) and Canadian Electrical Code (CEC)

Cubemass

MODBUS RS485

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Associated documentation

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

- MODBUS RS485
 - BA142D, Cubemass MODBUS RS485

The Operating Instructions pertaining to the device apply.

Supplementary documentation

Explosion-protection brochure:
CP021Z/00

The Explosion-protection brochure is available:

- In the download area of the Endress+Hauser website (www.endress.com)

Approvals

General

The system meets the fundamental health and safety requirements for the design and construction of devices and protective systems intended for use in potentially explosive atmospheres in accordance with the National Electrical Code (NEC) and Canadian Electrical Code (CEC).

No. / approval type

160686-1882928

Notified body

CSA: Canadian Standard Association

Identification

The identification of the system must contain the following specifications:

CSA	CSA _{US}
<ul style="list-style-type: none"> ■ Class I, Groups ABCD ■ Class I, Zone 1, Group IIC ■ Class II, Groups EFG ■ Class III 	<ul style="list-style-type: none"> ■ XP-IS-DIP / I, II, III / 1 / ABCDEFG / T6-T1



Caution!

- The installation instructions for the safe use of the system must be observed → Page 6 .

Order code

The order code is indicated on the nameplate, which is affixed to the device in such a way that it is clearly visible.

Additional information on the nameplate is provided in the associated Operating Instructions.

Structure of the order code

* * * * *	_ * * * * * * * * * * * * * * *	+ A* B* C* D* E* F* G* H* I* J* ...
Device type	Basic specifications	Optional specifications

* Placeholder: An option (number or letter) that depends on the device specification is displayed instead of the placeholders.

- **Device type**
The device type section of the order code describes the device and the device construction.
- **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. JE). The first digit (ID) stands for the feature group (e.g. J = test, certificate) and consists of a number or a letter. The second digit constitutes the value that stands for the feature within the group (e.g. E = NACE).

More detailed information on the device is provided in the following tables. These tables describe the individual positions or IDs in the order code which are relevant to hazardous areas.

Device type

Position	Selected option	Description
1 Instrument family	8	Coriolis flow measuring system
2 Sensor	C	Sensor C
3 Electronics	M	Cubemass 8CM transmitter
4 5 Nominal diameter	01 to 06 (1/24 to 1/4")	Nominal diameter of the sensor

Basic specifications

Position		Application/zone		
1 2	Approval	C3, 84	Compact version	<ul style="list-style-type: none"> ■ Class I, Groups ABCD ■ Class I, Zone 1, Group IIC ■ Class II, Groups EFG ■ Class III
3	Output	B		Non-intrinsically safe outputs
7	Housing	A	Compact version	Min. ambient temperature $T_{a \text{ min}} = -40 \text{ °C} (-40 \text{ °F})$
8	Cable entry	A		Thread: M20 × 1.5
		B		Thread: NPT 1/2"
		C		Thread: G 1/2"

 **Note!**

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 can be found from Page 8 onwards.

Safety instructions: General

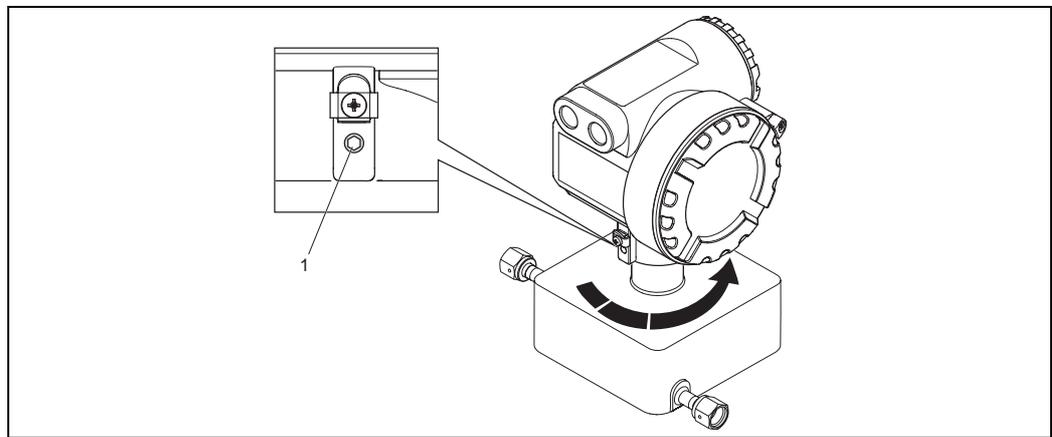
- Install all intrinsically safe circuits per Canadian Electrical Code (CEC) Part I Section 18 and Appendix F resp. per National Electrical Code (NEC) ANSI/ NFPA 70 and ISA RP 12.6 respecting the explosionproof integrity of the enclosure.
- Control room equipment shall not use or generate more than 250 V rms.
- The device must be integrated into the potential equalization system.
- It is not permissible to connect the service adapter whilst the atmosphere is considered to be explosive.
- Use of the devices is restricted to mediums against which the process-wetted materials are adequately resistant.
- Class II Group G: The surface temperature of the apparatus cannot exceed 165 °C (329 °F). The user must limit the process temperature for Group G to 140 °C (284 °F).
- Use supply wires suitable for 5 °C (9 °F) above ambient temperature, but at least for 80 °C (176 °F).
- Transmitter enclosure explosionproof for use in Class 1 Division 1 Groups A, B, C, D (factory sealed, conduit seal not required) and dust-ignition proof for Class II, III Division 1 Groups E, F, G.
- Sensor circuits are intrinsically safe for Cl. I, Div. 1, Group A, B, C, D. Sensor enclosure is dust ignition proof for Cl. II, III, Div. 1, Group E, F, G.
- Substitution of components may impair intrinsic safety.
- Cubemass is a dual seal related device.
- All ratings of the flow meter (see also nameplate) have to be respected.
- 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 national regulations relating to the installation of devices in potentially explosive atmospheres is mandatory, if such regulations exist.

Safety instructions: Mounting

Turning the transmitter housing

The transmitter housing can be rotated counterclockwise continuously up to 360°.

1. Loosen the Allen setscrew (1) partially, but do not unscrew it all the way.
2. Rotate the transmitter housing into the desired position.
3. Tighten the Allen setscrew (1).



A0013094

Fig. 1: Turning the transmitter housing

Safety instructions: Installation

- For terminals No. 22 to No. 27 of the transmitter, only devices with ratings $U_m \leq 253$ V and $I_m \leq 1$ A are allowed to be connected.
- 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 table on Page 7.

Cable entries

① Cable entries for transmitter terminal compartment (XP version) power supply/communication cable. Choice of thread for cable entry: 1/2" NPT.

Make sure that the XP cable glands/entries are secured to prevent working loose.

② For remote version connecting cable: Choice of thread for cable entry: 1/2" NPT.

Cable specification

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

Potential equalization

The transmitter 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 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, screening and grounding can be found in the associated Operating Instructions.

Potential equalization with shield grounded at both sides for MODBUS version.

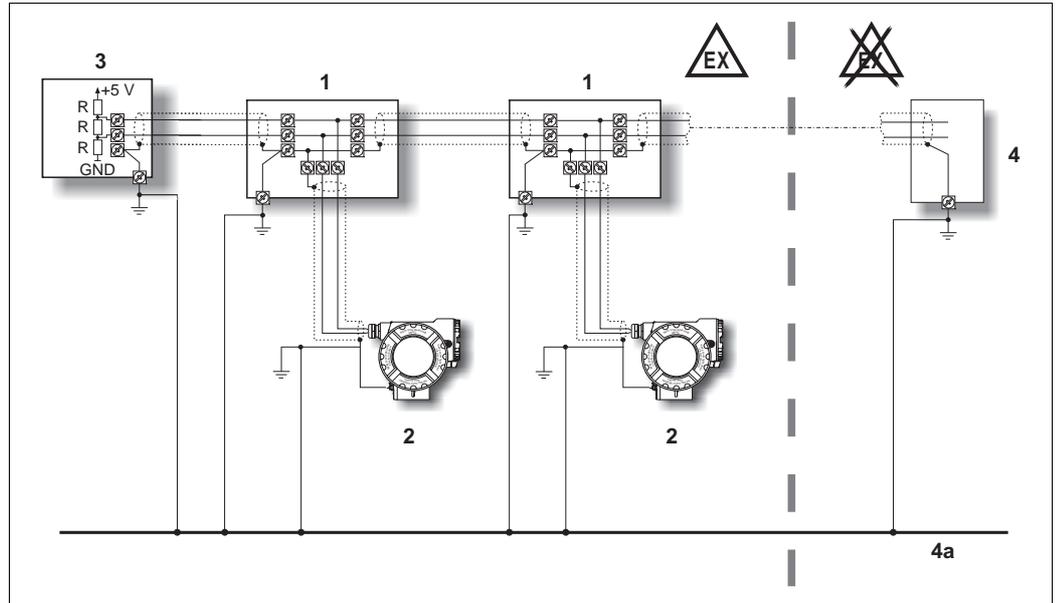


Fig. 2: Example for connecting potential equalization lines

- 1 Distributor/T-Box
- 2 Bus devices for potentially explosive atmospheres
- 3 Bus terminator MODBUS RS485
- 4 Bus supply unit or automation system
- 4a Potential equalization line is fed out into the safe area

Note!

The length of the spur must be observed.

**Temperature tables:
Compact version**

Ambient temperature

The minimum ambient temperature T_a for Cubemass is -20 °C (-4 °F).
A version for ambient temperatures T_a up to -40 °C (-40 °F) is optionally available.

Medium temperature

The minimum medium temperature for Cubemass is -50 °C (-58 °F).

Max. medium temperature [$^{\circ}\text{C}$] ($[^{\circ}\text{F}]$) for T1-T6 in relation to the maximum ambient temperature T_a

	DN	T_a $^{\circ}\text{C}$ ($^{\circ}\text{F}$)	T6 85 $^{\circ}\text{C}$ (185 $^{\circ}\text{F}$)	T5 100 $^{\circ}\text{C}$ (212 $^{\circ}\text{F}$)	T4 135 $^{\circ}\text{C}$ (275 $^{\circ}\text{F}$)	T3 200 $^{\circ}\text{C}$ (392 $^{\circ}\text{F}$)	T2 300 $^{\circ}\text{C}$ (572 $^{\circ}\text{F}$)	T1 450 $^{\circ}\text{C}$ (842 $^{\circ}\text{F}$)
Cubemass 8CM	DN 1/2/4/6	50 (122)	50 (122)	95 (203)	130 (266)	150 (302)	200 (392)	200 (392)
		60 (140)	–	95 (203)	130 (266)	150 (302)	200 (392)	200 (392)

Connection data: Power supply

All transmitters	1 L (+)	2 N (-)	⊕
Designation	Supply voltage		Protective earth
Functional values	AC: U = 20 to 28 V DC: U = 10 to 30 V Power consumption: AC: < 4.0 VA DC: < 3.2 W		Caution! Pay attention to the grounding concepts of the plant!
Intrinsically safe circuit	no		
U _m	253 V AC		

Connection data: Signal circuits (non-intrinsically safe circuits)

 Note!

The following tables contain values/specifications that depend on the transmitter type code and the input and output assignment. Please compare the following data to the information shown on the nameplate of your measuring device.

Terminal assignment for Cubemass 8CM

Safety-related and functional values of signal circuits, see Page 8

Outputs Basic specifications position 3	Terminal No.					
	22 (+)	23 (-)	24 (+)	25 (-)	26 (+)	27 (-)
<i>Non-convertible communication boards (fixed assignment)</i>						
8CM**_*B*****	Pulse / Frequency / Status output 2		Pulse / Frequency / Status output 1		MODBUS RS485* B A	
* MODBUS RS485: – Terminal 26 (+) → B (Rx/D/TxD-P) – Terminal 27 (-) → A (Rx/D/TxD-N)						

Safety-related and functional values of signal circuits

Signal circuits	Functional values	Safety-related values
Pulse/frequency output	galvanically isolated passive 30 V DC / 250 mA open collector end frequency 100 to 5000 Hz	intrinsically safe = no U _m = 253 V I _m = 1 A
Status output	galvanically isolated passive 30 V DC / 250 mA open collector	
MODBUS RS485	galvanically isolated RS485 as per Standard EIA/TIA-485	

Service adapter

The service adapter is only used for connecting service interfaces approved by Endress+Hauser.

 Warning!

It is not permissible to connect the service adapter whilst the atmosphere is considered to be explosive.

Technical Data**Dimensions**

The dimensions of the instruments for the hazardous area correspond to those in the Technical Information documentation.

Weight

The weight of the Ex d version is equivalent to the weight in the Technical Information documentation.

 Note!

Technical Information for Cubemass → TI106D

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