

Safety Instructions

Proline t-mass 300

Cl. I, II, III Div.1 for XP



Document: XA01969D
Safety instructions for electrical apparatus for explosion-
hazardous areas →  3

Proline t-mass 300

Table of contents

Associated documentation	4
Manufacturer's certificates	4
Manufacturer address	4
Extended order code	5
Safety instructions: General	7
Safety instructions: Installation	8
Safety instructions: Class II, Class III	9
Temperature tables	9
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	Documentation code	
	HART	Modbus RS485
t-mass F 300	BA01992D	BA01994D
t-mass I 300	BA01993D	BA01995D

Additional documentation

Contents	Document type	Documentation code
Remote display and operating module DKX001	Special documentation	SD01763D
	Safety Instructions Zone 1, Zone 21; Class I, Division 1	XA01499D
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 16.70087366

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

*****	-	***** ... *****	+	A*B*C*D*E*F*G*...
<i>(Device type)</i>		<i>(Basic specifications)</i>		<i>(Optional specifications)</i>

* = 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	6	Thermal mass flowmeter
2	Sensor	F, I	Sensor type
3	Transmitter	3	Transmitter type: 4-wire, compact version

Position	Order code for	Option selected	Description
4	Generation index	B	Platform generation
5, 6	Nominal diameter	<ul style="list-style-type: none"> ■ t-mass F 300: DN 15 to 100 ■ t-mass I 300: Insertion length 235 to 608 mm 	Nominal diameter of sensor

Basic specifications

Position 1, 2 Order code for "Approval" Option selected	Type of protection	
	Transmitter	Sensor
CD	Cl.I, Div.1, Cl.II, III, Gps. A-G T4...T1	Cl.I, Div.1, Cl.II, III, Gps. A-G T4...T1

Position	Order code for	Option selected	Description
4, 5	Output, input 1	BA	4-20mA HART
		CA	4-20mA HART Ex-i passive
		CC	4-20mA HART Ex-i active
		MA	Modbus RS485
6	Output, input 2	A	W/o
		B	4-20mA
		C	4-20mA Ex-i passive
		D	Configurable I/O initial setting off
		E	Pulse/frequency/switch output
		G	Pulse/frequency/switch output Ex-i passive
		H	Relay
		I	4-20mA input
		J	Status input
		7	Output, input 3
B	4-20mA		
C	4-20mA Ex-i passive		
D	Configurable I/O initial setting off		
E	Pulse/frequency/switch output		
G	Pulse/frequency/switch output Ex-i passive		
H	Relay		
I	4-20mA input		
J	Status input		
8	Display; Operation		

Position	Order code for	Option selected	Description
		F	4-line, illuminated; touch control
		G	4-line, illuminated; touch control + WLAN
		M	W/o; prepared for remote display DKX001 ¹⁾
		O	Separate, with remote display DKX001 ¹⁾ , 4-line, illuminated; 10 m / 30 ft cable; touch control
9	Housing	A	Alu, coated
17, 18	Device Model	A2	2

1) DKX001 is approved according to CSA 160686-70030937.

Optional specifications

ID	Order code for	Option selected	Description
Jx	Test, certificate	JP	Ambient temperature, measuring device –50 °C
Px	Enclosed accessories	P8	Wireless antenna, wide area (external WLAN antenna) ¹⁾

1) The external WLAN antenna is available with the order code for "Accessory Enclosed", option P8.

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.

- Open the housing cover of the transmitter housing 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**
- Observe all the technical data of the device (see nameplate).
- 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
- 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**

- Continuous service temperature of the connecting cable:
 -40 to +80 °C (-50 to +60 °C for optional specifications, ID Jx (Test, Certificate) = JP); 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).
- Only use certified cable entries suitable for the application. Observe national regulations and standards.
- When the measuring device is connected, attention must be paid to explosion protection at the transmitter.
- Turning the transmitter housing
 - Loosen both hexagon socket screws until the transmitter housing can be turned.
 - Turn transmitter housing to desired position (mechanically limited); if necessary turn 270° in other direction.
 - Tighten both hexagon socket screws with a maximum of 7 Nm.
- 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.
- 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.
- Transmitter enclosures are factory sealed when using in ambient temperature of not lower than -40 °C.

Intrinsic safety

- Observe the guidelines for interconnecting intrinsically safe circuits (e.g. Proof of Intrinsic Safety).
- The device can be connected to the remote display DKX001 which has IS explosion protection: refer to the Special documentation and Ex documentation.
- 
 - When using the remote display and operating module DKX001 the internal display and operating module must be removed.
 - When using the separate approved, remote display and operating module DKX001, only use the following variants: Basic specification of the remote display and operating module DKX001, order code "Approval", option CE

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 and sensor housing, cable entries and sealing plugs.
- Only open the transmitter and sensor housing briefly, ensuring that no dust or moisture enters the housing.
- If the transmitter is connected to the remote display and operating module DKX001: Connection values →  11

Temperature tables

Ambient temperature

Minimum ambient temperature

- $T_a = -40\text{ °C}$
- *Optional specification, ID Jx (Test, Certificate) = JP*
 $T_a = -50\text{ °C}$ depending on the selected device variant (see nameplate)

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 T4...T1 depending on the maximum ambient temperature T_a

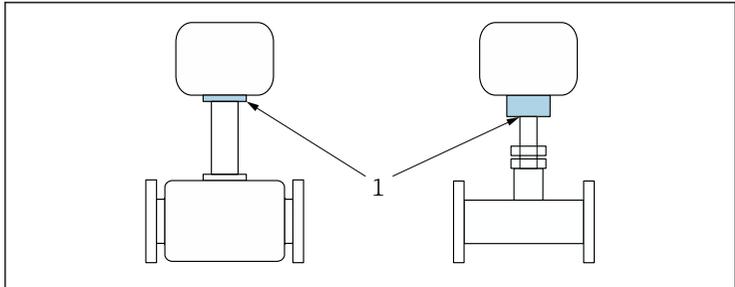
Maximum medium temperature with or without thermal insulation according to Endress+Hauser specifications

DN	$T_{a, \max}$ [°C]	$T_{m, \min}$ [°C]	$T_{m, \max}$ [°C]	T_m [°C]					
				T6 [85 °C]	T5 [100 °C]	T4 [135 °C]	T3 [200 °C]	T2 [300 °C]	T1 [450 °C]
All	50	-50	180	-	-	115	150	180	180
	55			-	-	115	155	160 (180) ¹⁾	160 (180) ¹⁾
	60			-	-	100 (115) ¹⁾	100 (130) ¹⁾	100 (130) ¹⁾	100 (130) ¹⁾

1) Values in brackets for applications in which the transmitter is not located above the sensor.

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.



A0041667

1 Position of reference point for temperature measurement

1 Reference point (T_{ref})

Reference temperature T_{ref}

T6 [85 °C]	T5 [100 °C]	T4 [135 °C]	T3 [200 °C]	T2 [300 °C]	T1 [450 °C]
-	-	73	76	77	77

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: supply voltage, input/outputs

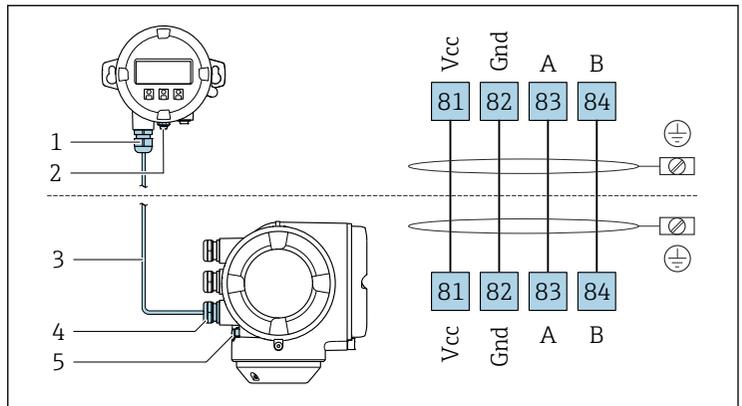
HART

Supply voltage		Input/output 1		Input/output 2		Input/output 3	
1 (+)	2 (-)	26 (+)	27 (-)	24 (+)	25 (-)	22 (+)	23 (-)
Device-specific terminal assignment: adhesive label in terminal cover.							

Modbus RS485

Supply voltage		Input/output 1		Input/output 2		Input/output 3	
1 (+)	2 (-)	26 (B)	27 (A)	24 (+)	25 (-)	22 (+)	23 (-)
Device-specific terminal assignment: adhesive label in terminal cover.							

Remote display and operating module DKX001



A0027518

- 1 Remote display and operating module DKX001
- 2 Protective earth (PE)
- 3 Connecting cable
- 4 Measuring device
- 5 Protective earth (PE)

Safety-related values

Order code for "Output; input 1"	Output type	Safety-related values "Output; input 1"	
		26 (+)	27 (-)
Option BA	Current output 4 to 20 mA HART	$U_N = 30 V_{DC}$ $U_M = 250 V_{AC}$	
Option MA	Modbus RS485	$U_N = 30 V_{DC}$ $U_M = 250 V_{AC}$	

Order code for "Output; input 2"; "Output; input 3"	Output type	Safety-related values			
		Output; input 2		Output; input 3	
		24 (+)	25 (-)	22 (+)	23 (-)
Option B	Current output 4 to 20 mA	$U_N = 30 V_{DC}$ $U_M = 250 V_{AC}$			
Option D	User-configurable input/output	$U_N = 30 V_{DC}$ $U_M = 250 V_{AC}$			
Option E	Pulse/frequency/ switch output	$U_N = 30 V_{DC}$ $U_M = 250 V_{AC}$			
Option H	Relay output	$U_N = 30 V_{DC}$ $I_N = 100 mA_{DC}/500 mA_{AC}$ $U_M = 250 V_{AC}$			
Option I	Current input 4 to 20 mA	$U_N = 30 V_{DC}$ $U_M = 250 V_{AC}$			
Option J	Status input	$U_N = 30 V_{DC}$ $U_M = 250 V_{AC}$			

Intrinsically safe values

Order code for "Output; input 1"	Output type	Intrinsically safe values "Output; input 1"	
		26 (+)	27 (-)
Option CA	Current output 4-20mA HART Ex-i passive	$U_i = 30 \text{ V}$ $I_i = 100 \text{ mA}$ $P_i = 1.25 \text{ W}$ $L_i = 0 \text{ } \mu\text{H}$ $C_i = 6 \text{ nF}$	
Option CC	Current output 4-20mA HART Ex-i active	Ex ia $U_0 = 21.8 \text{ V}$ $I_0 = 90 \text{ mA}$ $P_0 = 491 \text{ mW}$ $L_0 = 4.1 \text{ mH(IIC)}/$ 15 mH(IIB) $C_0 = 160 \text{ nF(IIC)}/$ 1160 nF(IIB) $U_i = 30 \text{ V}$ $I_i = 10 \text{ mA}$ $P_i = 0.3 \text{ W}$ $L_i = 5 \text{ } \mu\text{H}$ $C_i = 6 \text{ nF}$	

Order code for "Output; input 2"; "Output; input 3"	Output type	Intrinsically safe values			
		Output; input 2		Output; input 3	
		24 (+)	25 (-)	22 (+)	23 (-)
Option C	Current output 4 to 20 mA Ex i passive	$U_i = 30 \text{ V}$ $I_i = 100 \text{ mA}$ $P_i = 1.25 \text{ W}$ $L_i = 0$ $C_i = 0$			
Option G	Pulse/frequency/ switch output Ex i passive	$U_i = 30 \text{ V}$ $I_i = 100 \text{ mA}$ $P_i = 1.25 \text{ W}$ $L_i = 0$ $C_i = 0$			

Remote display DKX001

Basic specification, position 1, 2 Approval	Terminal assignment	Basic specification, position 8 Display; Operation Option O
Option ¹⁾ CD	81, 82, 83, 84	A connecting cable with the value $L/R \leq 24 \mu\text{H}/\Omega$ and $C_{\text{cable}} \leq 1000 \text{ nF}$ must be used for the version for connecting to the remote display DKX001 or ODKX001. The cable supplied meets this requirement.

1) With separate order of DKX001: CE

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