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Safety Instructions
Proline Prosonic Flow P 500

JPN: Zone 1
Zone 21

Endress+Hauser
People for Process Automation

Proline Prosonic Flow P 500

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About this document

The document number of these Safety Instructions (XA) must match the information on the nameplate.

Associated documentation

For an overview of the scope of the associated Technical Documentation, refer to the following:

- *Device Viewer* (www.endress.com/deviceviewer): Enter serial number from nameplate.
- *Endress+Hauser Operations app*: Enter serial number from nameplate or scan matrix code on nameplate.

To commission the device, please observe the Operating Instructions pertaining to the device:

Measuring device	Documentation code	
	HART	Modbus RS485
Prosonic Flow P 500	BA02025D	BA02026D

Additional documentation

Contents	Document type	Documentation code
Explosion Protection	Brochure	CP00021Z/11

Please note the documentation associated with the device.

Certificates and declarations

JPN Type Examination Certificate

Certificate number:

CML 17JPN2347X (Proline 500)

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

- JNIOSH-TR-46-1: 2020
- JNIOSH-TR-46-2: 2018
- JNIOSH-TR-46-6: 2015
- JNIOSH-TR-46-9: 2018

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*...
(Device type)		*(Basic specifications)*		*(Optional specifications)*

* = 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).

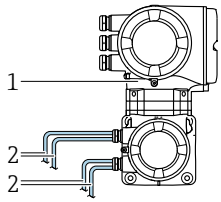
More detailed information about the device is provided in the following tables. These tables describe the individual positions and IDs in the extended order code which are relevant to hazardous locations.

Device type

Position	Order code for	Option selected	Description
1	Instrument family	9	Ultrasonic transit time flowmeter
2 [1)]	Sensor	P	Sensor type
3	Transmitter	5	Transmitter type: 4-wire, remote version

Position	Order code for	Option selected	Description
4	Generation index	B	Platform generation
5, 6 [2]	Nominal diameter	DN 15...4000	Nominal diameter of sensor

1) For replacement transmitter only: X
2) For replacement transmitter only: XX

Proline 500
Order code for "Integrated ISEM Electronic", option **B** "Transmitter"


1 Transmitter with integrated ISEM
2 Sensor cable

Basic specifications

Position 1, 2 Order code for "Approval" Option selected	Position 10 Order code for "Integrated ISEM electronics" Option selected	Type of protection	
		Transmitter	Sensor
JD	B	Ex db ia [ia Ga] IIC T6...T5 Gb Ex tb [ia Da] IIIC T85 °C Db [1]	Ex ia IIC T6...T1 Gb Ex ia IIIC T** °C Db [1]

1) The marking may be applied depending on users' applications.

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

Position	Order code for	Option selected	Description
		E	Pulse/frequency/switch output
		F	Pulse output, phase-shifted
		G	Pulse/frequency/switch output Ex-i passive
		H	Relay
		I	4-20mA input
		J	Status input
7	Output, input 3	A	W/o
		B	4-20mA
		C	4-20mA Ex-i passive
		D	Configurable I/O initial setting off
		E	Pulse/frequency/switch output
		F	Pulse output, phase-shifted
		G	Pulse/frequency/switch output Ex-i passive
		H	Relay
		I	4-20mA input
		J	Status input
8	Display; Operation	F	4-line, illuminated; touch control
		G	4-line, illuminated; touch control + WLAN
9	Integrated ISEM Electronic	B	Transmitter
10	Transmitter Housing	A	Alu, coated
		L	Cast, stainless
12	Sensor Version	AA	C-030
		AB	C-050
		AC	C-100
		AD	C-200
		AE	C-500
		AG	CH-050
		AH	CH-100
14	Process Temperature	A	−20 to +80 °C (−4 to +176 °F)
		B	−40 to +80 °C (−40 to +176 °F)
		C	0 to +170 °C (+32 to +338 °F)
		D	−40 to +100 °C (−40 to +212 °F)
		E	−40 to +150 °C (−40 to +302 °F)

Position	Order code for	Option selected	Description
		H	+150 to +220 °C (302 to +428 °F)
		I	+210 to +370 °C (410 to +698 °F)
		J	+350 to +550 °C (+662 to +1 022 °F)
19	Device Model	A2	2

Optional specifications

ID	Order code for	Option selected	Description
Jx	Test, certificate	JN	Ambient temperature transmitter −50 °C; sensor see specification

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. JNIOSH-TR-NO.44)
- 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.
- 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.
- Alterations 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 in explosion protection Ex db 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

- In devices with damaged Ex d threads:
  - Use in hazardous areas is not permitted.
  - Repair of Ex d threads is not permitted.
- 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.

Safety instructions: Installation

- Continuous service temperature of the connecting cable:
  −40 to +80 °C (−50 to +60 °C for optional specification, ID Jx (Test, certificate) = JN); but at least according to the operating temperature range of the application plus allowance for process conditions ($T_{a, min}$ and $T_{a, max}$ + 20 K).
- Only use certified cable glands suitable for the application. Observe selection criteria as per JNIOSH-TR-NO.44.
- The following applies when connecting the transmitter with a connection compartment in Ex db:
  Only use separately certified cables and wire entries (Ex db IIC) which are suitable for operating temperatures up to 85 °C and for IP 66/67.
  If using conduit entries, the associated sealing mechanisms must be mounted directly on the housing.
  Plastic sealing plugs act as transport protection and have to be replaced by suitable, individually approved installation material.
  The mounted metal thread extensions and blind plugs are tested and certified as part of the housing for type of protection Ex db IIC. The thread extension or the blind plug labeled as follows for identification purposes:
  - Md: M20 x 1.5
  - d: NPT ½"
  - Gd: G ½"
- The following cable glands approved by an Ex certification body may be installed on the devices with order code "Approval", option (for details, contact our service center):
  - Ex d, Ex t approved cable glands, e.g. EXTC-16MG
  - Ex d approved cable glands, e.g. KXBF-20·16
- Yellow cap attached to the cable glands is a transportation measure only, and is to be removed when the delivered device is installed.

- If the third cable gland is not used, remove it and seal the thread hole with Ex d blind plug (M20 x 1.5).
- Information on our service center: Service Desk, 5-70-3 Nisshin-cho, Fuchu-shi, Tokyo-to
  Tel: 042-314-1911
  Fax: 042-314-1951
- When the measuring device is connected, attention must be paid to the type of protection at the transmitter.
- When connecting through a conduit entry approved for this purpose, mount the associated sealing unit directly at the enclosure.
- 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 sealing plugs. The metal sealing plugs supplied meet this requirement.

Intrinsic safety

- Observe the guidelines for interconnecting intrinsically safe circuits (e.g. JNIOSH-TR-NO.44).
- When the intrinsically safe Ex ia circuits of the device are connected to certified intrinsically safe circuits of Category Ex ib for Equipment Groups IIC or IIB, the type of protection changes to Ex ib IIC or Ex ib IIB.

Potential equalization

Integrate the device into the potential equalization .

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- To ensure dust-tightness, securely seal all housing openings, cable entries and sealing plugs.
- Only open all housing briefly, ensuring that no dust or moisture enters the housing.
- Only use certified cable entries. The metal cable entries, extensions and sealing plugs supplied meet this requirement.
- Cable routing shall be arranged so that the cables are not exposed to friction effects and static buildup due to the passage of dust. Precautions shall be taken to prevent the build-up of static an surfaces of cables.

Temperature tables

Ambient temperature

Minimum ambient temperature

- $T_{a, min}$ = −40 °C depending on the device version selected (see nameplate)
- *Optional specification, ID Jx (Test, Certificate) = JN*
  $T_{a, min}$ = −50 °C depending on the selected device variant (see nameplate)

Maximum ambient temperature

$T_{a, max}$ = +80 °C depending on the medium temperature, sensor and temperature class.

Proline 500 transmitter

$T_{a, max}$ [°C]	
T6 [85 °C]	**T5 [100 °C]**
55	60

Medium temperature

Minimum medium temperature

$T_{m, min}$ = −40 °C depending on the sensor version.

Maximum medium temperature

$T_{m, max}$ for T6…T1 depending on the maximum ambient temperature $T_{a, max}$.

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

For sensor type, temperature range and applicable device group, see name plate.

Sensor type	$T_{m, max\ range}$ [°C]		$T_{a, max}$ [°C]		$T_{m, max}$ [°C]					
	min	max	min	max	T6 [85 °C]	T5 [100 °C]	T4 [135 °C]	T3 [200 °C]	T2 [300 °C]	T1 [450 °C]
C-030-A	-40	120	-50	80	80	95	120	120	120	120
C-100-B	-40	80	-40	50	50	80	80	80	80	80
				80	–	80	80	80	80	80
C-100-C	0	170	-40	50	50	95	130	170	170	170
				80	–	95	130	170	170	170
C-200-B	-40	80	-40	65	65	80	80	80	80	80
				80	–	80	80	80	80	80
C-200-C	0	170	-40	65	65	95	130	170	170	170
				80	–	95	130	170	170	170
C-500-A	-40	150	-40	75	75	95	130	150	150	150
				80	–	95	130	150	150	150
CH-050-A	-40	435	-50	75	75	95	130	190	285	435
				80	–	95	130	190	285	435
CH-100-A	-40	435	-50	75	75	95	130	190	285	435
				80	–	95	130	190	285	435

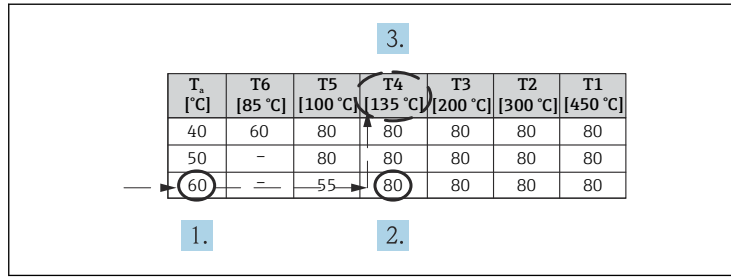
Explosion hazards arising from gas and dust

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 $T_{a, max}$ and the maximum medium temperature $T_{m, max}$.
- In the case of dust: Determine the maximum surface temperature as a function of the maximum ambient temperature $T_{a, max}$ and the maximum medium temperature $T_{m, max}$.

Example

- Measured maximum ambient temperature: $T_{a, max}$ = 55 °C
- Measured maximum medium temperature: $T_{m, max}$ = 78 °C



T_a [°C]	T6 [85 °C]	T5 [100 °C]	T4 [135 °C]	T3 [200 °C]	T2 [300 °C]	T1 [450 °C]
40	60	80	80	80	80	80
50	–	80	80	80	80	80
60	–	55	80	80	80	80

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1 Procedure for determining the temperature class and surface temperature

1. In the column for the maximum ambient temperature $T_{a, max}$ select the temperature that is immediately greater than or equal to the maximum ambient temperature $T_{a, max}$ that is present.
   ↳ $T_{a, max}$ = 60 °C.
   The row showing the maximum medium temperature is determined.
2. Select the maximum medium temperature $T_{m, max}$ of this row, which is immediately greater than or equal to the maximum medium temperature $T_{m, max}$ that is present.
   ↳ The column with the temperature class for gas is determined: 78 °C ≤ 80 °C → T4.
3. The maximum temperature of the temperature class determined corresponds to the maximum surface temperature for dust: T4 = 135 °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: 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.					

Safety-related values

Order code "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 "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 **F**	Pulse output, phase-shifted	$U_N = 30\ V_{DC}$ $U_M = 250\ V_{AC}$			

Order code "Output; input 2"; "Output; input 3"	Output type	Safety-related values			
		Output; input 2		Output; input 3	
		24 (+)	25 (–)	22 (+)	23 (–)
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 V I_i = 100 mA P_i = 1.25 W L_i = 0 µH C_i = 6 nF	
Option CC	Current output 4-20mA HART Ex-i active	**Ex ia** [1] U_0 = 21.8 V I_0 = 90 mA P_0 = 491 mW L_0 = 4.1 mH(IIC)/ 15 mH(IIB) C_0 = 160 nF(IIC)/ 1 160 nF(IIB) U_i = 30 V I_i = 10 mA P_i = 0.3 W L_i = 5 µH C_i = 6 nF	

1) Only for the order code for "Approval", option

Order code "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 V I_i = 100 mA P_i = 1.25 W L_i = 0 C_i = 0			
Option G	Pulse/frequency/switch output Ex-i passive	U_i = 30 V I_i = 100 mA P_i = 1.25 W L_i = 0 C_i = 0			

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