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Safety Instructions
Proline Prowirl 200

UKEX: II2G, II1/2G, II1G Ex ia
II2D

Endress+Hauser
People for Process Automation

Proline Prowirl 200

Table of contents

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 instrument	Documentation code				
	HART	FOUNDATION Fieldbus	PROFIBUS PA	PROFINET over Ethernet-APL	Modbus TCP over Ethernet-APL
Prowirl D 200	BA01685D	BA01693D	BA01689D	BA02133D	BA02397D
Prowirl F 200	BA01686D	BA01694D	BA01690D	BA02132D	BA02398D
Prowirl O 200	BA01687D	BA01695D	BA01691D	BA02134D	BA02399D
Prowirl R 200	BA01688D	BA01696D	BA01692D	BA02135D	BA02400D

Additional documentation

Contents	Document type	Documentation code
Remote display FHX50	Special documentation	SD01007F
	Safety Instructions II2G, II2D Ex ia	XA01053F
Overvoltage Protection (OVP)	Special documentation	SD01090F
Explosion Protection	Brochure	CP00021Z/11

Please note the documentation associated with the device.

Certificates and declarations

UK Declaration of Conformity

Documentation code: UK_00356

UKCA type-examination certificate

Certificate number: CML 21UKEX11112X

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	Selected option	Description
1	Instrument family	7	Vortex flowmeter
2	Sensor	D, F, O, R	Sensor type
3	Transmitter	2	Transmitter type: 2-wire, compact version Remote version
4	Generation index	C	Platform generation
5, 6	Nominal diameter	D: DN 15...150 F: DN 15...300 O: DN 15...300 R: ▪ Reducer DN 25...200 ▪ Super reducer DN 40...250	Nominal diameter of sensor

Basic specifications

Position	Order code for	Selected option	Description
1, 2	Approval	UA	Ex ia IIC T6...T1 Ga
		UB	Ex ia IIC T6...T1 Ga/Gb
		UJ	Ex ia IIC T6...T1 Gb
		U2	Ex ia IIC T6...T1 Ga/Gb
			Ex tb IIIC T** °C Db [1]

1) For versions without remote display FHX50 or pressure tapping.

Position	Order code for		Description
3	Output; Input	A	4-20mA HART
		B	4-20mA HART, Pulse/frequency/switch output
		C	4-20mA HART + 4-20mA analog
		D	4-20mA HART, pulse/frequency/switch output; 4-20mA input
		E	FOUNDATION Fieldbus, Pulse/frequency/switch output
		G	PROFIBUS PA, Pulse/frequency/switch output
		S	PROFINET over Ethernet-APL/SPE, 10Mbit/s

Position	Order code for		Description
		T	Modbus TCP over Ethernet-APL/SPE, 10Mbit/s
4	Display; Operation	A	W/o; via communication
		C	SD02 4-line; push buttons + data backup function
		E	SD03 4-line, illum.; touch control + data backup function
		L	Prepared for display FHX50 + M12 connection [1]
		M	Prepared for display FHX50 + custom connection [1]
8, 9	Sensor version; DSC sensor; measuring tube Only available for sensors F, O, R with the HART communication protocol.	DA	Mass steam; 316L; 316L (integrated pressure/temperature measurement), −200 to +400 °C (−328 to +750 °F)
		DB	Mass gas/liquid; 316L; 316L (integrated pressure/temperature measurement), −40 to +260 °C (−40 to +500 °F)
		DC	Mass steam; Alloy 718; 316L (integrated pressure/temperature measurement), −200 to +400 °C (−328 to +750 °F)
		DD	Mass gas/liquid; Alloy 718; 316L (integrated pressure/temperature measurement), −40 to +100 °C (−40 to +212 °F)
11	Pressure component Only available for sensors F, O, R with the HART communication protocol.	A	Not used
		B	Pressure measuring cell 2bar/29psi abs
		C	Pressure measuring cell 4bar/58psi abs
		D	Pressure measuring cell 10bar/145psi abs
		E	Pressure measuring cell 40bar/580psi abs
		F	Pressure measuring cell 100bar/1450psi abs
		G	Pressure measuring cell 160bar/2320psi abs
	Device Model	A1	1

1) FHX50 is separately approved.

Optional specifications

ID	Order code for	Selected option	Description
Jx	Test, certificate	JN	Ambient temperature transmitter −50 °C
Nx	Accessory mounted	NA	Overvoltage Protection (OVP)

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. EN 60079-14)
- 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.
- 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.
- 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 +80 °C for optional specifications, ID Jx (Test, Certificate) = JN); 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 glands suitable for the application. Observe selection criteria as per EN 60079-14.
- When the measuring device is connected, attention must be paid to the type of protection at the transmitter.

Basic specification, position 8, 9 (sensor version; DSC sensor; measuring tube) = DA, DB, DC, DD and position 11 (pressure component) = B, C, D, E, F, G

- The maximum medium temperature is limited for device versions with a pressure component that is installed directly on the sensor F, O, R:
  - To 40 °C for T6 and T5
  - To 90 °C for T4 and T1
- In the case of T4 ... T1 and medium temperatures > 90 °C the pressure component DPC21 must be installed using a spacer tube between the pressure component and the sensor F, O, R.
  - The spacer tube must have a minimum length of 50 cm (19.7 in).
  - The spacer tube supplied meets this requirement.

Intrinsic safety

- Observe the guidelines for interconnecting intrinsically safe circuits (e.g. EN 60079-14 , proof of intrinsic safety).
- The intrinsically safe input power circuit of the device is isolated from ground. If the device is only equipped with one input, the dielectric strength of the input is at least 500 V_{rms}. If the device is equipped with more than one input, the dielectric strength of each individual input to ground is at least 500 V_{rms}, and the dielectric strength of the inputs vis-à-vis one another is also at least 500 V_{rms}.
- The device can be connected to the Endress+Hauser FXA291 service tool: refer to the Operating Instructions.
- The device can be connected to the remote display FHX50 with explosion protection; refer to the Special Documentation and Ex documentation.

Basic specification, position 3 (Output; input) = A, B, C, D, E, G , S, T:

- 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.
- When the intrinsically safe Ex ia circuits of the device are connected to certified intrinsically safe circuits of Category Ex ic for Equipment Groups IIB, the type of protection changes from Ex ia to Ex ic IIB.

Potential equalization

- Integrate the device into the 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.

Overvoltage protection

Optional specification, ID Nx (Accessory Mounted) = NA

- Minimum ambient temperature when using Overvoltage Protection (OVP): −40 °C
- When using the internal overvoltage protection: Reduce the admissible ambient temperature at the housing by 2 K.
- For installations which require overvoltage protection to comply with national regulations or standards, install the device using overvoltage protection (e.g. HAW56x from Endress+Hauser).
- Observe the safety instructions of the overvoltage protection.
- If an overvoltage protection according to against atmospheric over voltages is required: no other circuits may leave the housing during normal operation without additional measures.
- The intrinsically safe input power circuit of the device is isolated from ground. If the device is only equipped with one input, the dielectric strength of the input is at least 290 V_{rms}. If the device is equipped with more than one input, the dielectric strength of each individual input to ground is at least 290 V_{rms}, and the dielectric strength of the inputs vis-à-vis one another is also at least 290 V_{rms}.

Safety instructions: Zone 0

Basic specification, position 1, 2 (Approval) = UB, U2

Install the measuring instrument in Zone 1. For measuring instruments with Ga/Gb the zone 0 is permitted in the measuring tube.

Basic specification, position 1, 2 (Approval) = UA

The sensor's coated aluminum AlSi10Mg transmitter or connector housing installed in Zone 0: Mechanical shock-proof installation.

Safety instructions: Zone 21

- 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.
- Seal unused entry glands with approved blanking elements 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 blanking elements. The metal cable entries, extensions and sealing plugs supplied meet this requirement.
- If the transmitter is connected to the remote display FHX50, the circuit has type of protection Ex ia IIIC.
  Connection values → 🖹 20

Temperature tables

Minimum ambient temperature

Basic specification, position 3 (Output; input) = A, B, C, D, E, G , S, T:

$T_{a, min}$ = −40 °C

Basic specification, position 3 (Output; Input) = A, B, D in conjunction with *optional specification, ID Jx (Test, Certificate) = JN*:
$T_{a, min}$ = −50 °C
(Not permitted in conjunction with *optional specification, ID Nx (Accessory Mounted) = NA* → 🖹 9)

Maximum ambient temperature

$T_{a, max}$ depending on temperature class, maximum medium temperature and device-specific features. See the corresponding temperature tables.

Compact version

$T_{a, max}$	+70 °C

Sensor remote version

$T_{a, max}$	+85 °C

Transmitter remote version

Basic specification, position 3 Output; Input [1]	Basic specification, position 1, 2 Approval	$T_{a, max}$ [°C]		
		T6 [85 °C]	T5 [100 °C]	T4 [135 °C]
A	all	40	60	75
B	all	35 [2]	50 [3]	70 [4]
C	all	40	55	70 [5]
D	all	35	50	65
E G	all	40	55	70 [5]
S T	all	40	55	65

1) The following applies for installations with overvoltage protection in conjunction with basic specification, position 1, 2 (approval) = UA, UB, UJ, U2: $T_{a, max} = T_{a, max}$ - 2 K
2) $T_{a, max}$ = 40 °C for pulse/frequency/switch output P_i = 0.85 W
3) $T_{a, max}$ = 60 °C for pulse/frequency/switch output P_i = 0.85 W
4) $T_{a, max}$ = 75 °C for pulse/frequency/switch output P_i = 0.85 W
5) $T_{a, max}$ = 75 °C for pulse/frequency/switch output P_i = 0 W

Minimum medium temperature

The following relationship of ambient temperature to minimum medium temperature applies when $T_{m, min} < -50$ °C

$T_{m, min}$ [°C]	-50	-100	-150	-200
$T_{a, min}$ [°C]	-50	-47	-44	-39

Maximum medium temperature compact version

$T_{m, max}$ See the corresponding temperature tables.

Basic specification, position 3 (output; input) = A

Version with max. $T_{m, max\ range}$ = 280 °C						
$T_{a, max}$ [°C]	$T_{m, max}$					
	T6 [85 °C]	T5 [100 °C]	T4 [135 °C]	T3 [200 °C]	T2 [300 °C]	T1 [450 °C]
40 [1]	80 [2]	95 [2]	130 [2]	195 [2]	280 [2]	280 [2]
60 [1]	–	95 [3] [2]	130 [2]	195 [2]	280 [2]	280 [2]
65	–	–	130 [2]	195 [2]	280 [2]	280 [2]
70	–	–	130 [2]	130 [2]	130 [2]	130 [2]

1) The ambient temperature changes for installations with overvoltage protection in conjunction with temperature classes T5 and T6: $T_{a, max} = T_{a, max}$ - 2 K
2) For device versions with a pressure component that is installed directly on the sensor F, O, R, the maximum medium temperature is limited to 40 °C for T6 ...T5 and to 90 °C for T4 ... T1. In the case of T4 ... T1 and medium temperatures > 90 °C, the pressure component DPC21 must be installed using a spacer tube between the pressure component and the sensor F, O, R. The length of the spacer tube must be at least 50 cm (19.7 in).
3) $T_{a, max}$ = 55 °C for device versions with pressure component option DA, DB, DC, DD.

Version with max. $T_{m, max\ range}$ = 440 °C						
$T_{a, max}$ [°C]	$T_{m, max}$					
	T6 [85 °C]	T5 [100 °C]	T4 [135 °C]	T3 [200 °C]	T2 [300 °C]	T1 [450 °C]
40 [1]	80 [2]	95 [2]	130 [2]	195 [2]	290 [2]	440 [2]
60 [1]	–	95 [3] [2]	130 [2]	195 [2]	290 [2]	440 [2]
70	–	–	130 [2]	195 [2]	290 [2]	440 [2]

1) The ambient temperature changes for installations with overvoltage protection in conjunction with temperature classes T5 and T6: $T_{a, max} = T_{a, max}$ - 2 K
2) For device versions with a pressure component that is installed directly on the sensor F, O, R, the maximum medium temperature is limited to 40 °C for T6 ...T5 and to 90 °C for T4 ... T1. In the case of T4 ... T1 and medium temperatures > 90 °C, the pressure component DPC21 must be installed using a spacer tube between the pressure component and the sensor F, O, R. The length of the spacer tube must be at least 50 cm (19.7 in).
3) $T_{a, max}$ = 55 °C for device versions with pressure component option DA, DB, DC, DD.

Basic specification, position 3 (output; input) = B

Version with max. $T_{m, max\ range}$ = 280 °C						
$T_{a, max}$ [°C]	$T_{m, max}$					
	T6 [85 °C]	T5 [100 °C]	T4 [135 °C]	T3 [200 °C]	T2 [300 °C]	T1 [450 °C]
35 1) 2)	80 3)	95 3)	130 3)	195 3)	280 3)	280 3)
50 1) 4)	–	95 3)	130 3)	195 3)	280 3)	280 3)
60	–	–	130 3)	195 3)	280 3)	280 3)
65	–	–	130 3)	195 3)	280 3) 5)	280 3) 5)
70	–	–	130 3)	195 3) 6)	280 6)	280 6)

1) The ambient temperature changes for installations with overvoltage protection in conjunction with temperature classes T5 and T6: $T_{a, max} = T_{a, max}$ - 2 K
2) $T_{a, max}$ = 40 °C for pulse/frequency/switch output P_i = 0.85 W
3) For device versions with a pressure component that is installed directly on the sensor F, O, R, the maximum medium temperature is limited to 40 °C for T6 ...T5 and to 90 °C for T4 ... T1. In the case of T4 ... T1 and medium temperatures > 90 °C, the pressure component DPC21 must be installed using a spacer tube between the pressure component and the sensor F, O, R. The length of the spacer tube must be at least 50 cm (19.7 in).
4) $T_{a,max}$ = 55 °C for pulse/frequency/switch output P_i = 0.85 W
5) $T_{a,max}$ = 65 °C for pulse/frequency/switch output P_i = 0.7 W
6) $T_{a, max}$ = 70 °C for pulse/frequency/switch output P_i = 0.7 W

Version with max. $T_{m, max\ range}$ = 440 °C						
$T_{a, max}$ [°C]	$T_{m, max}$					
	T6 [85 °C]	T5 [100 °C]	T4 [135 °C]	T3 [200 °C]	T2 [300 °C]	T1 [450 °C]
35 1) 2)	80 3)	95 3)	130 3)	195 3)	290 3)	440 3)
50 1) 4)	–	95 3)	130 3)	195 3)	290 3)	440 3)
65	–	–	130 3)	195 3)	290 3)	440 3)
70	–	–	130 3)	195 5) 3)	290 3) 5)	440 3) 5)

1) The ambient temperature changes for installations with overvoltage protection in conjunction with temperature classes T5 and T6: $T_{a, max} = T_{a, max}$ - 2 K
2) $T_{a, max}$ = 40 °C for pulse/frequency/switch output P_i = 0.85 W
3) For device versions with a pressure component that is installed directly on the sensor F, O, R, the maximum medium temperature is limited to 40 °C for T6 ...T5 and to 90 °C for T4 ... T1. In the case of T4 ... T1 and medium temperatures > 90 °C, the pressure component DPC21 must be installed using a spacer tube between the pressure component and the sensor F, O, R. The length of the spacer tube must be at least 50 cm (19.7 in).
4) $T_{a,max}$ = 55 °C for pulse/frequency/switch output P_i = 0.85 W
5) $T_{a,max}$ = 70 °C for pulse/frequency/switch output P_i = 0.85 W

Basic specification, position 3 (output; input) = C

Version with max. $T_{m, max\ range}$ = 280 °C						
$T_{a, max}$ [°C]	$T_{m, max}$					
	T6 [85 °C]	T5 [100 °C]	T4 [135 °C]	T3 [200 °C]	T2 [300 °C]	T1 [450 °C]
40 1)	80 2)	95 2)	130 2)	195 2)	280 2)	280 2)
55 1)	–	95 2)	130 2)	195 2)	280 2)	280 2)
60	–	–	130 2)	195 2)	280 2)	280 2)
65	–	–	130 2)	195 2)	280 2) 3)	280 2) 3)
70	–	–	130 2)	130 2)	130 2)	130 2)

1) The ambient temperature changes for installations with overvoltage protection in conjunction with temperature classes T5 and T6: $T_{a, max} = T_{a, max}$ - 2 K
2) For device versions with a pressure component that is installed directly on the sensor F, O, R, the maximum medium temperature is limited to 40 °C for T6 ...T5 and to 90 °C for T4 ... T1. In the case of T4 ... T1 and medium temperatures > 90 °C, the pressure component DPC21 must be installed using a spacer tube between the pressure component and the sensor F, O, R. The length of the spacer tube must be at least 50 cm (19.7 in).
3) $T_{a, max}$ = 65 °C for pulse/frequency/switch output P_i = 0 W

Version with max. $T_{m, max\ range}$ = 440 °C						
$T_{a, max}$ [°C]	$T_{m, max}$					
	T6 [85 °C]	T5 [100 °C]	T4 [135 °C]	T3 [200 °C]	T2 [300 °C]	T1 [450 °C]
40 1)	80 2)	95 2)	130 2)	195 2)	290 2)	440 2)
55	–	95 2)	130 2)	195 2)	290 2)	440 2)
65	–	–	130 2)	195 2)	290 2)	440 2)
70	–	–	130 2)	195 2) 3)	290 3) 2)	440 3) 2)

1) The ambient temperature changes for installations with overvoltage protection in conjunction with temperature classes T5 and T6: $T_{a, max} = T_{a, max}$ - 2 K
2) For device versions with a pressure component that is installed directly on the sensor F, O, R, the maximum medium temperature is limited to 40 °C for T6 ...T5 and to 90 °C for T4 ... T1. In the case of T4 ... T1 and medium temperatures > 90 °C, the pressure component DPC21 must be installed using a spacer tube between the pressure component and the sensor F, O, R. The length of the spacer tube must be at least 50 cm (19.7 in).
3) $T_{a, max}$ = 70 °C for pulse/frequency/switch output P_i = 0 W

Basic specification, position 3 (output; input) = D

Version with max. $T_{m, max\ range}$ = 280 °C						
$T_{a, max}$ [°C]	$T_{m, max}$					
	T6 [85 °C]	T5 [100 °C]	T4 [135 °C]	T3 [200 °C]	T2 [300 °C]	T1 [450 °C]
35 [1]	80 [2]	95 [2]	130 [2]	195 [2]	280 [2]	280 [2]
50 [1]	–	95 [2]	130 [2]	195 [2]	280 [2]	280 [2]
55	–	–	–	195 [2]	280 [2]	280 [2]
60	–	–	–	195 [2]	195 [2]	195 [2]

1) The ambient temperature changes for installations with overvoltage protection in conjunction with temperature classes T5 and T6: $T_{a, max} = T_{a, max}$ - 2 K
2) For device versions with a pressure component that is installed directly on the sensor F, O, R, the maximum medium temperature is limited to 40 °C for T6 ...T5 and to 90 °C for T4 ... T1. In the case of T4 ... T1 and medium temperatures > 90 °C, the pressure component DPC21 must be installed using a spacer tube between the pressure component and the sensor F, O, R. The length of the spacer tube must be at least 50 cm (19.7 in).

Version with max. $T_{m, max\ range}$ = 440 °C						
$T_{a, max}$ [°C]	$T_{m, max}$					
	T6 [85 °C]	T5 [100 °C]	T4 [135 °C]	T3 [200 °C]	T2 [300 °C]	T1 [450 °C]
35 [1]	80 [2]	95 [2]	130 [2]	195 [2]	290 [2]	440 [2]
50 [1]	–	95 [2]	130 [2]	195 [2]	290 [2]	440 [2]
55	–	–	–	195 [2]	290 [2]	440 [2]
60	–	–	–	195 [2]	290 [2]	440 [2]
65	–	–	–	–	290 [2]	290 [2]

1) The ambient temperature changes for installations with overvoltage protection in conjunction with temperature classes T5 and T6: $T_{a, max} = T_{a, max}$ - 2 K
2) For device versions with a pressure component that is installed directly on the sensor F, O, R, the maximum medium temperature is limited to 40 °C for T6 ...T5 and to 90 °C for T4 ... T1. In the case of T4 ... T1 and medium temperatures > 90 °C, the pressure component DPC21 must be installed using a spacer tube between the pressure component and the sensor F, O, R. The length of the spacer tube must be at least 50 cm (19.7 in).

Basic specification, position 3 (output; input) = E, G

Version with max. $T_{m, max\ range}$ = 280 °C						
$T_{a, max}$ [°C]	$T_{m, max}$					
	T6 [85 °C]	T5 [100 °C]	T4 [135 °C]	T3 [200 °C]	T2 [300 °C]	T1 [450 °C]
40 [1]	80 [2]	95 [2]	130 [2]	195 [2]	280 [2]	280 [2]
50 [1]	–	95 [2]	130 [2] [3]	195 [2] [3]	280 [2] [3]	280 [2] [3]
60	–	–	130 [2]	195 [2]	280 [2]	280 [2]
65	–	–	130 [2]	195 [2]	280 [2] [4]	280 [2] [4]
70	–	–	130 [2]	195 [2] [5]	280 [2] [5]	280 [2] [5]

1) The ambient temperature changes for installations with overvoltage protection in conjunction with temperature classes T5 and T6: $T_{a, max} = T_{a, max}$ - 2 K
2) For device versions with a pressure component that is installed directly on the sensor F, O, R, the maximum medium temperature is limited to 40 °C for T6 ...T5 and to 90 °C for T4 ... T1. In the case of T4 ... T1 and medium temperatures > 90 °C, the pressure component DPC21 must be installed using a spacer tube between the pressure component and the sensor F, O, R. The length of the spacer tube must be at least 50 cm (19.7 in).
3) $T_{a, max}$ = 60 °C for pulse/frequency/switch output P_i = 0 W
4) $T_{a, max}$ = 65 °C for pulse/frequency/switch output P_i = 0 W
5) $T_{a, max}$ = 70 °C for pulse/frequency/switch output P_i = 0 W

Version with max. $T_{m, max\ range}$ = 440 °C						
$T_{a, max}$ [°C]	$T_{m, max}$					
	T6 [85 °C]	T5 [100 °C]	T4 [135 °C]	T3 [200 °C]	T2 [300 °C]	T1 [450 °C]
40 [1]	80 [2]	95 [2]	130 [2]	195 [2]	290 [2]	440 [2]
50 [1]	–	95 [2]	130 [2] [3]	195 [2] [3]	290 [2] [3]	440 [2] [3]
65	–	–	130 [2]	195 [2]	290 [2]	440 [2]
70	–	–	130 [2]	195 [2] [4]	290 [4] [2]	440 [4] [2]

1) The ambient temperature changes for installations with overvoltage protection in conjunction with temperature classes T5 and T6: $T_{a, max} = T_{a, max}$ - 2 K
2) For device versions with a pressure component that is installed directly on the sensor F, O, R, the maximum medium temperature is limited to 40 °C for T6 ...T5 and to 90 °C for T4 ... T1. In the case of T4 ... T1 and medium temperatures > 90 °C, the pressure component DPC21 must be installed using a spacer tube between the pressure component and the sensor F, O, R. The length of the spacer tube must be at least 50 cm (19.7 in).
3) $T_{a, max}$ = 60 °C for pulse/frequency/switch output P_i = 0 W
4) $T_{a, max}$ = 70 °C for pulse/frequency/switch output P_i = 0 W

Basic specification, position 3 (output; input) = S, T

Version with max. $T_{m, max\ range}$ = 280 °C						
$T_{a, max}$ [°C]	$T_{m, max}$					
	T6 [85 °C]	T5 [100 °C]	T4 [135 °C]	T3 [200 °C]	T2 [300 °C]	T1 [450 °C]
40 [1]	80 [2]	95 [2]	130 [2]	195 [2]	280 [2]	280 [2]
50 [1]	–	95 [2]	130 [2]	195 [2]	280 [2]	280 [2]
55	–	–	130 [2]	195 [2]	280 [2]	280 [2]
60	–	–	130 [2]	195 [2]	280 [2]	280 [2]

1) The ambient temperature changes for installations with overvoltage protection in conjunction with temperature classes T5 and T6: $T_{a, max} = T_{a, max}$ - 2 K
2) For device versions with a pressure component that is installed directly on the sensor F, O, R, the maximum medium temperature is limited to 40 °C for T6 ...T5 and to 90 °C for T4 ... T1. In the case of T4 ... T1 and medium temperatures > 90 °C, the pressure component DPC21 must be installed using a spacer tube between the pressure component and the sensor F, O, R. The length of the spacer tube must be at least 50 cm (19.7 in).

Version with max. $T_{m, max\ range}$ = 440 °C						
$T_{a, max}$ [°C]	$T_{m, max}$					
	T6 [85 °C]	T5 [100 °C]	T4 [135 °C]	T3 [200 °C]	T2 [300 °C]	T1 [450 °C]
40 [1]	80 [2]	95 [2]	130 [2]	195 [2]	290 [2]	440 [2]
50 [1]	–	95 [2]	130 [2]	195 [2]	290 [2]	440 [2]
60	–	–	130 [2]	195 [2]	290 [2]	440 [2]

1) The ambient temperature changes for installations with overvoltage protection in conjunction with temperature classes T5 and T6: $T_{a, max} = T_{a, max}$ - 2 K
2) For device versions with a pressure component that is installed directly on the sensor F, O, R, the maximum medium temperature is limited to 40 °C for T6 ...T5 and to 90 °C for T4 ... T1. In the case of T4 ... T1 and medium temperatures > 90 °C, the pressure component DPC21 must be installed using a spacer tube between the pressure component and the sensor F, O, R. The length of the spacer tube must be at least 50 cm (19.7 in).

Maximum medium temperature remote version - sensor

$T_{m, max}$ See the corresponding temperature tables.

Version with max. $T_{m, max\ range}$ = 280 °C						
$T_{a, max}$ [°C]	$T_{m, max}$					
	T6 [85 °C]	T5 [100 °C]	T4 [135 °C]	T3 [200 °C]	T2 [300 °C]	T1 [450 °C]
55	80 [1) 2)]	95 [2)]	130 [2)]	195 [2)]	280 [2)]	280 [2)]
70	–	95 [2) 3)]	130 [2)]	195 [2)]	280 [2)]	280 [2)]
85	–	–	130 [2)]	195 [2)]	280 [2)]	280 [2)]

1) $T_{a, max}$ = 40 °C for device versions with pressure component option DA, DB, DC, DD.
2) For device versions with a pressure component that is installed directly on the sensor F, O, R, the maximum medium temperature is limited to 40 °C for T6 ...T5 and to 90 °C for T4 ... T1. In the case of T4 ... T1 and medium temperatures > 90 °C, the pressure component DPC21 must be installed using a spacer tube between the pressure component and the sensor F, O, R. The length of the spacer tube must be at least 50 cm (19.7 in).
3) $T_{a, max}$ = 55 °C for device versions with pressure component option DA, DB, DC, DD.

Version with max. $T_{m, max\ range}$ = 440 °C						
$T_{a, max}$ [°C]	$T_{m, max}$					
	T6 [85 °C]	T5 [100 °C]	T4 [135 °C]	T3 [200 °C]	T2 [300 °C]	T1 [450 °C]
55	80 [1) 2)]	95 [2)]	130 [2)]	195 [2)]	290 [2)]	440 [2)]
70	–	95 [2) 3)]	130 [2)]	195 [2)]	290 [2)]	440 [2)]
85	–	–	130 [2)]	195 [2)]	290 [2)]	440 [2)]

1) $T_{a, max}$ = 40 °C for device versions with pressure component option DA, DB, DC, DD.
2) For device versions with a pressure component that is installed directly on the sensor F, O, R, the maximum medium temperature is limited to 40 °C for T6 ...T5 and to 90 °C for T4 ... T1. In the case of T4 ... T1 and medium temperatures > 90 °C, the pressure component DPC21 must be installed using a spacer tube between the pressure component and the sensor F, O, R. The length of the spacer tube must be at least 50 cm (19.7 in).
3) $T_{a, max}$ = 55 °C for device versions with pressure component option DA, DB, DC, DD.

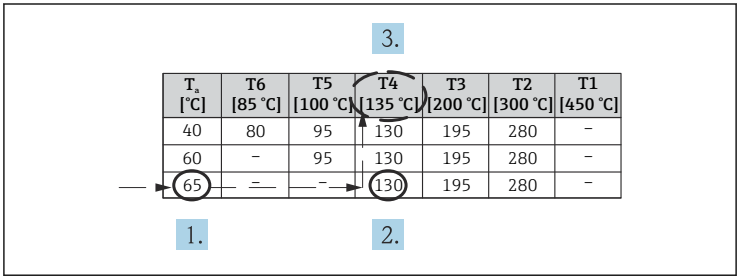
Explosion hazards arising from gas and dust

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: $T_{a, max}$ = 63 °C
- Measured maximum medium temperature: $T_{m, max}$ = 108 °C



T_a [°C]	T6 [85 °C]	T5 [100 °C]	T4 [135 °C]	T3 [200 °C]	T2 [300 °C]	T1 [450 °C]
40	80	95	130	195	280	–
60	–	95	130	195	280	–
65	–	–	130	195	280	–

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.
   ↳ $T_{a, max}$ = 65 °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: 108 °C ≤ 130 °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.

Cable specification: Connecting cable for remote version

The sensor cable connection between the sensor and the transmitter has type of protection Ex ia.

Cable parameter: L/R ≤ 38.2 µH/Ω

The cable supplied by Endress+Hauser complies with the specifications.

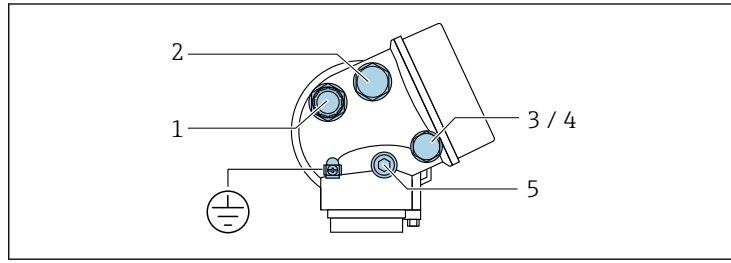
Cable specification for pressure measuring cell connecting cable

The cable connection between the transmitter and pressure component or between the sensor and pressure component has type of protection Ex ia IIC.

Cable parameter: L/R ≤ 38.2 µH/Ω

The cable supplied by Endress+Hauser complies with the specifications.

Connecting the transmitter



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Position		Basic specification, position 1, 2: Approval	Type of protection used for cable entry	Description
1	Cable entry for output 1	UA, UB, UJ U2	Ex ia Ex ia/Ex tb	The following applies for devices with basic specification, position 1, 2 (approval) = U2: In the case of device versions with a plastic transport sealing plug, this plug does not meet the explosion protection requirements and must be replaced during installation by a suitable entry that meets the approval specifications. In the case of device versions with a cable entry, this entry has a separate component approval and meets the requirements of the explosion protection indicated on the nameplate.
2	Cable entry for output 2	UA, UB, UJ U2	Ex ia Ex ia/Ex tb	The following applies for devices with basic specification, position 1, 2 (approval) = U2: In the case of device versions with metal extensions and sealing plugs, the latter are part of the device approval and meet the requirements of the explosion protection indicated on the nameplate. In the case of device versions with a cable entry, this entry has a separate component approval and meets the requirements of the explosion protection indicated on the nameplate.
3	Optional order code [1]: Cable entry of the remote display and operating module FHX50	UA, UB, UJ U2	Ex ia Ex ia/Ex tb [2]	The following applies for devices with basic specification, position 1, 2 (approval) = U2: In the case of device versions with metal extensions and sealing plugs, the latter are part of the device approval and meet the requirements of the explosion protection indicated on the nameplate. In the case of device versions with a cable entry, this entry has a separate component approval and meets the requirements of the explosion protection indicated on the nameplate.

Position		Basic specification, position 1, 2: Approval	Type of protection used for cable entry	Description
4	Optional order code [3]: Cable entry of pressure measuring cell	UA, UB, UJ	Ex ia	–

Position		Description
5	Pressure compensation plug	NOTICE **Housing degree of protection voided due to insufficient sealing of the housing.** ▶ Do not open - not a cable entry.
⏚	Potential equalization	NOTICE **Terminal for connection to potential equalization.** ▶ Pay attention to the grounding concept of the facility.

1) Basic specification, position 4 (display; operation) = L, M
2) For versions without remote display FHX50 or pressure tapping.
3) Basic specification, position 8, 9 (sensor version; DSC sensor; measuring tube) = DA, DA, DC, DD and position 11 (pressure component) = B, C, D, E, F, G

Terminal assignment

Transmitter

The order code is part of the extended order code. Detailed information on the features of the device and on the structure of the extended order code → 5.

Connection versions

Order code for "Output"	Terminal numbers					
	Output 1		Output 2		Input	
	1 (+)	2 (-)	3 (+)	4 (-)	5 (+)	6 (-)
Option **A**	4-20mA HART (passive)		-		-	
Option **B** [1]	4-20mA HART (passive)		Pulse/frequency/ switch output (passive)		-	
Option **C** [1]	4-20mA HART (passive)		4-20mA analog (passive)		-	
Option **D** [1] [2]	4-20mA HART (passive)		Pulse/frequency/ switch output (passive)		4-20mA current input (passive)	
Option **E** [1] [3]	FOUNDATION Fieldbus		Pulse/frequency/ switch output (passive)		-	
Option **G** [1] [4]	PROFIBUS PA		Pulse/frequency/ switch output (passive)		-	
Option **S**	PROFINET over Ethernet-APL/SPE, 10Mbit/s		-		-	
Option **T**	Modbus TCP over Ethernet-APL/SPE, 10Mbit/s		-		-	

1) Output 1 must always be used; output 2 is optional.
2) The integrated overvoltage protection is not used with option D: Terminals 5 and 6 (current input) are not protected against overvoltage.
3) FOUNDATION Fieldbus with integrated reverse polarity protection.
4) PROFIBUS PA with integrated reverse polarity protection.

Intrinsically safe values

The order code is part of the extended order code. Detailed information on the features of the device and on the structure of the extended order code → 5.

Type of protection Ex ia

Order code for "Output"	Output type	Intrinsically safe values	
Option A	4-20mA HART	U_i = DC 30 V I_i = 300 mA P_i = 1 W L_i = 0 µH C_i = 5 nF	
Option B	4-20mA HART	U_i = DC 30 V I_i = 300 mA P_i = 1 W L_i = 0 µH C_i = 5 nF	
	Pulse/frequency/switch output	U_i = DC 30 V I_i = 300 mA P_i = 1 W L_i = 0 µH C_i = 6 nF	
Option C	4-20mA HART	U_i = DC 30 V I_i = 300 mA P_i = 1 W L_i = 0 µH C_i = 30 nF	
	4-20mA analog		
Option D	4-20mA HART	U_i = DC 30 V I_i = 300 mA P_i = 1 W L_i = 0 µH C_i = 5 nF	
	Pulse/frequency/switch output	U_i = DC 30 V I_i = 300 mA P_i = 1 W L_i = 0 µH C_i = 6 nF	
	4 to 20 mA current input	U_i = DC 30 V I_i = 300 mA P_i = 1 W L_i = 0 µH C_i = 5 nF	
Option E	FOUNDATION Fieldbus	STANDARD U_i = 30 V I_i = 300 mA P_i = 1.2 W L_i = 10 µH C_i = 5 nF	FISCO U_i = 17.5 V I_i = 550 mA P_i = 5.5 W L_i = 10 µH C_i = 5 nF
	Pulse/frequency/switch output	U_i = 30 V I_i = 300 mA P_i = 1 W L_i = 0 µH C_i = 6 nF	

<table>
<tr><th>Order code for "Output"</th><th>Output type</th><th colspan="2">Intrinsically safe values</th></tr>
<tr><td rowspan="2">Option G</td><td>PROFIBUS PA</td><td>STANDARD
U_i = 30 V
I_i = 300 mA
P_i = 1.2 W
L_i = 10 µH
C_i = 5 nF</td><td>FISCO
U_i = 17.5 V
I_i = 550 mA
P_i = 5.5 W
L_i = 10 µH
C_i = 5 nF</td></tr>
<tr><td>Pulse/frequency/switch output</td><td colspan="2">U_i = 30 V
I_i = 300 mA
P_i = 1 W
L_i = 0 µH
C_i = 6 nF</td></tr>
<tr><td>Option S</td><td>PROFINET over Ethernet-APL/SPE, 10Mbit/s</td><td colspan="2" rowspan="2">2-WISE power load, APL port profile SLAA [1]
Ex ia
U_i = 17.5 V
I_i = 380 mA
P_i = 5.32 W
L_i = negligible
C_i = 1 nF
Cable specifications according to 2-WISE:
R_c = 15 to 150 Ω/km
L_c = 0.4 to 1 mH/km
C_c = 45 to 200 nF/km
C_c = C_c line/line + 0,5 C_c line/screen, if both lines are floating, or
C_c = C_c line/line + C_c line/screen, if the screen is connected to one line
Length of cable (not including cable stubs): ≤200 m (656.2)
Length of cable stubs: ≤1 m (3.3 ft)</td></tr>
<tr><td>Option T</td><td>Modbus TCP over Ethernet-APL/SPE, 10Mbit/s</td></tr>
</table>

1) For further options see Ethernet-APL Installation Drawing HE_01622.

Remote display FHX50

Basic specification, position 1, 2 Approval	Cable specification	Basic specification, position 4 Display; operation Option L, M
Option UA, UB, UJ, U2	Max. cable length: 60 m (196.85 ft)	U_o = 7,3 V
		I_o = 327 mA
		P_o = 362 mW
		L_o = 149 µH
		C_o = 388 nF
		$C_c \leq$ 125 nF
		$L_c \leq$ 149 µH

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