

# Safety Instructions

## Proline Prowirl 200

JPN: Zone 1, Zone 0/1  
Zone 21  
Ex d version



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# Proline Prowirl 200

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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](http://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 Ex ia	XA01714F
Explosion Protection	Brochure	CP00021Z/11

Certificates and declarations

**JPN Type Examination Certificate**

Certificate number:

CML 18JPN1032X

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

- JNIO SH-TR-46-1
- JNIO SH-TR-46-2
- JNIO SH-TR-46-6
- IEC 60079-26

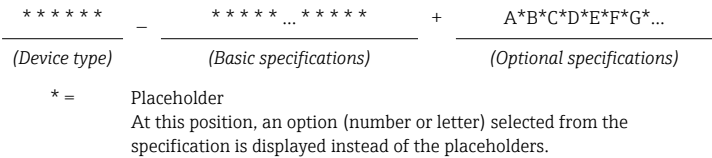
Manufacturer  
address

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



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 <sup>1)</sup>	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 <sup>2)</sup>	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

- 1) Transmitter only: X  
2) Transmitter only: XX.

Basic specifications

Position	Order code for	Selected option	Type of protection		
			Transmitter	Sensor	
				Sensor connection housing	Sensor <sup>1)</sup>
1, 2	Approval	JC	Ex db [ia] IIC T6...T1 Ga/Gb	–	Ex ia IIC T6...T1 Ga/Gb
			Ex db [ia] IIC T6...T1 Gb	Ex ia IIC T6...T1 Ga/Gb	Ex ia IIC T6...T1 Ga/Gb

- 1) The marking may not be shown on the nameplate.

Position	Order code for	Selected option	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
		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 <sup>1)</sup>
		M	Prepared for display FHX50 + custom connection <sup>1)</sup>
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

Position	Order code for	Selected option	Description
		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
16, 17	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

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. JNIO SH-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.
- 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.



- 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 +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 JNIOHS-TR-NO.44.  
Accordingly, the connection terminal does not include any ignition sources.
- When the measuring device is connected, attention must be paid to the type of protection at the transmitter.
- 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 the device is energized.
- When connecting through a conduit entry approved for this purpose, mount the associated sealing unit directly at the enclosure.
- Seal unused entries 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 blanking elements. The metal sealing plugs supplied meet this requirement.

*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**

The device can be connected to the remote display FHX50 with explosion protection; refer to the Special Documentation and Ex documentation.


### **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.

### **Safety instructions: Zone 0**

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

### **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.
  - Only use certified cable entries. 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 IIC.
- Connection values →  19

### **Temperature tables**

#### **Minimum ambient temperature**

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

$T_{a, \min} = -40\text{ }^{\circ}\text{C}$

Basic specification, position 3 (Output; Input) = A, B, D in conjunction with optional specification, ID Jx (Test, Certificate) = JN:

$T_{a, \min} = -50\text{ }^{\circ}\text{C}$

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
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Sensor remote version

$T_{a, \max}$	+85 °C
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Transmitter remote version

Basic specification, position 3 Output; Input	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 <sup>1)</sup>	50 <sup>2)</sup>	70 <sup>3)</sup>
C	all	40	55	70 <sup>4)</sup>
D	all	35	50	65
E G	all	40	55	70 <sup>4)</sup>
S T	all	40	55	65

- 1)  $T_{a, \max} = 40\text{ }^{\circ}\text{C}$  for pulse/frequency/switch output  $P_i = 0.85\text{ W}$
- 2)  $T_{a, \max} = 60\text{ }^{\circ}\text{C}$  for pulse/frequency/switch output  $P_i = 0.85\text{ W}$
- 3)  $T_{a, \max} = 75\text{ }^{\circ}\text{C}$  for pulse/frequency/switch output  $P_i = 0.85\text{ W}$
- 4)  $T_{a, \max} = 75\text{ }^{\circ}\text{C}$  for pulse/frequency/switch output  $P_i = 0\text{ W}$

Minimum medium temperature

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

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

Maximum medium temperature compact version

T<sub>m, max</sub> See the corresponding temperature tables.

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

Version with max. T <sub>m, max range</sub> = 280 °C						
T <sub>a, max</sub> [°C]	T <sub>m, max</sub>					
	T6 [85 °C]	T5 [100 °C]	T4 [135 °C]	T3 [200 °C]	T2 [300 °C]	T1 [450 °C]
40	80 <sup>1)</sup>	95 <sup>1)</sup>	130 <sup>1)</sup>	195 <sup>1)</sup>	280 <sup>1)</sup>	280 <sup>1)</sup>
60	–	95 <sup>2) 1)</sup>	130 <sup>1)</sup>	195 <sup>1)</sup>	280 <sup>1)</sup>	280 <sup>1)</sup>
65	–	–	130 <sup>1)</sup>	195 <sup>1)</sup>	280 <sup>1)</sup>	280 <sup>1)</sup>
70	–	–	130 <sup>1)</sup>	130 <sup>1)</sup>	130 <sup>1)</sup>	130 <sup>1)</sup>

- 1) 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).
- 2) T<sub>a, max</sub> = 55 °C for device versions with pressure component option DA, DB, DC, DD.

Version with max. T <sub>m, max range</sub> = 440 °C						
T <sub>a, max</sub> [°C]	T <sub>m, max</sub>					
	T6 [85 °C]	T5 [100 °C]	T4 [135 °C]	T3 [200 °C]	T2 [300 °C]	T1 [450 °C]
40	80 <sup>1)</sup>	95 <sup>1)</sup>	130 <sup>1)</sup>	195 <sup>1)</sup>	290 <sup>1)</sup>	440 <sup>1)</sup>
60	–	95 <sup>2) 1)</sup>	130 <sup>1)</sup>	195 <sup>1)</sup>	290 <sup>1)</sup>	440 <sup>1)</sup>
70	–	–	130 <sup>1)</sup>	195 <sup>1)</sup>	290 <sup>1)</sup>	440 <sup>1)</sup>

- 1) 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).
- 2) T<sub>a, max</sub> = 55 °C for device versions with pressure component option DA, DB, DC, DD.

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

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

- 1) 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).
- 2)  $T_{a, \max} = 65\text{ °C}$  for pulse/frequency/switch output  $P_1 = 0.7\text{ W}$
- 3)  $T_{a, \max} = 70\text{ °C}$  for pulse/frequency/switch output  $P_1 = 0.7\text{ W}$

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

- 1) 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).
- 2)  $T_{a, \max} = 70\text{ °C}$  for pulse/frequency/switch output  $P_1 = 0.85\text{ W}$

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

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

- 1) 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).
- 2)  $T_{a, \max} = 65\text{ °C}$  for pulse/frequency/switch output  $P_1 = 0\text{ W}$

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

- 1) 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).
- 2)  $T_{a, \max} = 70\text{ °C}$  for pulse/frequency/switch output  $P_1 = 0\text{ W}$

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

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

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

- 1) 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. $T_{m, \max \text{ range}} = 280\text{ °C}$						
$T_{a, \max}$ [°C]	$T_{m, \max}$					
	T6 [85 °C]	T5 [100 °C]	T4 [135 °C]	T3 [200 °C]	T2 [300 °C]	T1 [450 °C]
40	80 <sup>1)</sup>	95 <sup>1)</sup>	130 <sup>1)</sup>	195 <sup>1)</sup>	280 <sup>1)</sup>	280 <sup>1)</sup>
50	–	95 <sup>1)</sup>	130 <sup>1) 2)</sup>	195 <sup>1) 2)</sup>	280 <sup>1) 2)</sup>	280 <sup>1) 2)</sup>

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]
60	–	–	130 <sup>1)</sup>	195 <sup>1)</sup>	280 <sup>1)</sup>	280 <sup>1)</sup>
65	–	–	130 <sup>1)</sup>	195 <sup>1)</sup>	280 <sup>1) 3)</sup>	280 <sup>1) 3)</sup>
70	–	–	130 <sup>1)</sup>	195 <sup>1) 4)</sup>	280 <sup>1) 4)</sup>	280 <sup>1) 4)</sup>

- 1) 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 DPC2.1 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).
- 2)  $T_{a, \max}$  = 60 °C for pulse/frequency/switch output  $P_1 = 0$  W
- 3)  $T_{a, \max}$  = 65 °C for pulse/frequency/switch output  $P_1 = 0$  W
- 4)  $T_{a, \max}$  = 70 °C for pulse/frequency/switch output  $P_1 = 0$  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	80 <sup>1)</sup>	95 <sup>1)</sup>	130 <sup>1)</sup>	195 <sup>1)</sup>	290 <sup>1)</sup>	440 <sup>1)</sup>
50	–	95 <sup>1)</sup>	130 <sup>1) 2)</sup>	195 <sup>1) 2)</sup>	290 <sup>1) 2)</sup>	440 <sup>1) 2)</sup>
65	–	–	130 <sup>1)</sup>	195 <sup>1)</sup>	290 <sup>1)</sup>	440 <sup>1)</sup>
70	–	–	130 <sup>1)</sup>	195 <sup>1) 3)</sup>	290 <sup>3) 1)</sup>	440 <sup>3) 1)</sup>

- 1) 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 DPC2.1 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).
- 2)  $T_{a, \max}$  = 60 °C for pulse/frequency/switch output  $P_1 = 0$  W
- 3)  $T_{a, \max}$  = 70 °C for pulse/frequency/switch output  $P_1 = 0$  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	80 <sup>1)</sup>	95 <sup>1)</sup>	130 <sup>1)</sup>	195 <sup>1)</sup>	280 <sup>1)</sup>	280 <sup>1)</sup>
50	–	95 <sup>1)</sup>	130 <sup>1)</sup>	195 <sup>1)</sup>	280 <sup>1)</sup>	280 <sup>1)</sup>



Version with max. $T_{m, \text{max range}} = 280\text{ °C}$						
$T_{a, \text{max}}$ [°C]	$T_{m, \text{max}}$					
	T6 [85 °C]	T5 [100 °C]	T4 [135 °C]	T3 [200 °C]	T2 [300 °C]	T1 [450 °C]
55	–	–	130 <sup>1)</sup>	195 <sup>1)</sup>	280 <sup>1)</sup>	280 <sup>1)</sup>
60	–	–	130 <sup>1)</sup>	195 <sup>1)</sup>	280 <sup>1)</sup>	280 <sup>1)</sup>

- 1) 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. $T_{m, \text{max range}} = 440\text{ °C}$						
$T_{a, \text{max}}$ [°C]	$T_{m, \text{max}}$					
	T6 [85 °C]	T5 [100 °C]	T4 [135 °C]	T3 [200 °C]	T2 [300 °C]	T1 [450 °C]
40	80 <sup>1)</sup>	95 <sup>1)</sup>	130 <sup>1)</sup>	195 <sup>1)</sup>	290 <sup>1)</sup>	440 <sup>1)</sup>
50	–	95 <sup>1)</sup>	130 <sup>1)</sup>	195 <sup>1)</sup>	290 <sup>1)</sup>	440 <sup>1)</sup>
60	–	–	130 <sup>1)</sup>	195 <sup>1)</sup>	290 <sup>1)</sup>	440 <sup>1)</sup>

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

- 1)  $T_{a, \max} = 40^\circ\text{C}$  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  $40^\circ\text{C}$  for T6 ...T5 and to  $90^\circ\text{C}$  for T4 ... T1. In the case of T4 ... T1 and medium temperatures  $> 90^\circ\text{C}$ , 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)  $T_{a, \max} = 55^\circ\text{C}$  for device versions with pressure component option DA, DB, DC, DD.

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

- 1)  $T_{a, \max} = 40^\circ\text{C}$  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  $40^\circ\text{C}$  for T6 ...T5 and to  $90^\circ\text{C}$  for T4 ... T1. In the case of T4 ... T1 and medium temperatures  $> 90^\circ\text{C}$ , 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)  $T_{a, \max} = 55^\circ\text{C}$  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:  $T_{a, \max} = 63^\circ\text{C}$
- Measured maximum medium temperature:  $T_{m, \max} = 108^\circ\text{C}$

$T_a$ [°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	-

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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.
  - ↳  $T_{a, \max} = 65^\circ\text{C}$ .  
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:  
 $108^\circ\text{C} \leq 130^\circ\text{C} \rightarrow T4$ .
3. The maximum temperature of the temperature class determined corresponds to the maximum surface temperature for dust:  $T4 = 135^\circ\text{C}$ .

### 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:  $L/R \leq 38.2 \mu\text{H}/\Omega$

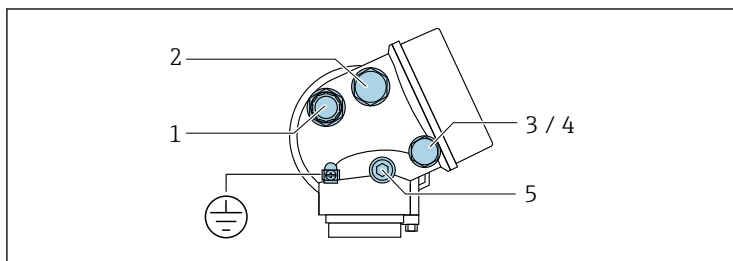
The cable supplied by Endress+Hauser complies with the specifications.

**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:  $L/R \leq 38.2 \mu\text{H}/\Omega$

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 <sup>1)</sup>	JC	Ex db	<p>Plastic sealing plugs act as safeguards during transportation and must be replaced by suitable, individually approved installation material.</p> <p>The metal extensions and dummy plugs supplied are tested and certified as part of the housing for type of protection Ex d IIC. The various threaded versions are labeled as follows for identification purposes:</p> <ul style="list-style-type: none"> <li>■ Md: M20 x 1.5</li> <li>■ NPTd: NPT 1/2"</li> <li>■ Gd: G 1/2"</li> </ul>
2	Cable entry for output 2 <sup>1)</sup>	JC	Ex db	<p>Plastic sealing plugs act as safeguards during transportation and must be replaced by suitable, individually approved installation material.</p> <p>The metal extensions and dummy plugs supplied are tested and certified as part of the housing for type of protection Ex d IIC. The various threaded versions are labeled as follows for identification purposes:</p> <ul style="list-style-type: none"> <li>■ Md: M20 x 1.5</li> <li>■ NPTd: NPT 1/2"</li> <li>■ Gd: G 1/2"</li> </ul>
3	Optional order code <sup>2)</sup> ; Cable entry of the remote display and operating module FHX50	JC	Ex ia	–
4	Optional order code <sup>3)</sup> ; Cable entry of pressure measuring cell	JC	Ex ia	–
Position		Description		
5	Pressure compensation plug	<p><b>NOTICE</b></p> <p><b>Housing degree of protection voided due to insufficient sealing of the housing.</b></p> <p>► Do not open - not a cable entry.</p>		
⊕	Potential equalization	<p><b>NOTICE</b></p> <p><b>Terminal for connection to potential equalization.</b></p> <p>► Pay attention to the grounding concept of the facility.</p>		

1) Please see below: Further notes on cable glands.

2) Basic specification, position 4 (display; operation) = L, M

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

**Further notes on cable glands:**

Cable Gland code 6 may be selected for following approved cable glands by Ex CBs to be installed on the device with Approval code, JC:

- Cable glands approved suitable for Ex d, Ex t: e.g. EXTC-16MG
- Cable glands suitable for Ex d: e.g. KXBF-20-16

Yellow cap attached to the cable glands is a transportation safety 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 (M20x1.5).

**Information on our service center:**



Service Desk 5-70-3 Nisshin-cho, Fuchu-shi, Tokyo-to

Tel: 042-314-1911

Fax: 042-314-1951

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 <b>A</b>	4-20mA HART (passive)		-		-	
Option <b>B</b> <sup>1)</sup>	4-20mA HART (passive)		Pulse/frequency/switch output (passive)		-	
Option <b>C</b> <sup>1)</sup>	4-20mA HART (passive)		4-20mA analog (passive)		-	
Option <b>D</b> <sup>1) 2)</sup>	4-20mA HART (passive)		Pulse/frequency/switch output (passive)		4-20mA current input (passive)	
Option <b>E</b> <sup>1) 3)</sup>	FOUNDATION Fieldbus		Pulse/frequency/switch output (passive)		-	
Option <b>G</b> <sup>1) 4)</sup>	PROFIBUS PA		Pulse/frequency/switch output (passive)		-	
Option <b>S</b>	PROFINET over Ethernet-APL/SPE, 10Mbit/s		-		-	
Option <b>T</b>	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.

Safety-related 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 d*

Order code for "Output"	Output type	Safety-related values
Option A	4-20mA HART	$U_{nom} = DC\ 35\ V$ $U_{max} = 250\ V$
Option B	4-20mA HART	$U_{nom} = DC\ 35\ V$ $U_{max} = 250\ V$
	Pulse/frequency/switch output	$U_{nom} = DC\ 35\ V$ $U_{max} = 250\ V$ $P_{max} = 1\ W^{1)}$
Option C	4-20mA HART	$U_{nom} = DC\ 30\ V$
	4-20mA analog	$U_{max} = 250\ V$
Option D	4-20mA HART	$U_{nom} = DC\ 35\ V$ $U_{max} = 250\ V$
	Pulse/frequency/switch output	$U_{nom} = DC\ 35\ V$ $U_{max} = 250\ V$ $P_{max} = 1\ W^{1)}$
	4 to 20 mA current input	$U_{nom} = DC\ 35\ V$ $U_{max} = 250\ V$
Option E	FOUNDATION Fieldbus	$U_{nom} = DC\ 32\ V$ $U_{max} = 250\ V$ $P_{max} = 0.88\ W$
	Pulse/frequency/switch output	$U_{nom} = DC\ 35\ V$ $U_{max} = 250\ V$ $P_{max} = 1\ W^{1)}$
Option G	PROFIBUS PA	$U_{nom} = DC\ 32\ V$ $U_{max} = 250\ V$ $P_{max} = 0.88\ W$
	Pulse/frequency/switch output	$U_{nom} = DC\ 35\ V$ $U_{max} = 250\ V$ $P_{max} = 1\ W^{1)}$
Option S	PROFINET over Ethernet-APL/SPE, 10Mbit/s	$U_{nom} = DC\ 17.5\ V$ $U_{max} = 250\ V$ $P_{nom} = 0.9\ W$
Option T	Modbus TCP over Ethernet-APL/SPE, 10Mbit/s	

1) Internal circuit limited by  $R_i = 760.5\ \Omega$



Remote display FHX50

Basic specification, position 1, 2 Approval	Cable specification	Basic specification, position 4 Display; operation Option L, M
Option JC	Max. cable length: 60 m (196.85 ft)	$U_o = 7.3 \text{ V}$
		$I_o = 327 \text{ mA}$
		$P_o = 362 \text{ mW}$
		$L_o = 149 \text{ }\mu\text{H}$
		$C_o = 388 \text{ nF}$
		$C_c \leq 125 \text{ nF}$
		$L_c \leq 149 \text{ }\mu\text{H}$

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