



Level



Pressure



Flow



Temperature



Liquid  
Analysis



Registration



Systems  
Components



Services



Solutions

## Safety Instructions

# Proline Promag 50 HART

Division 1

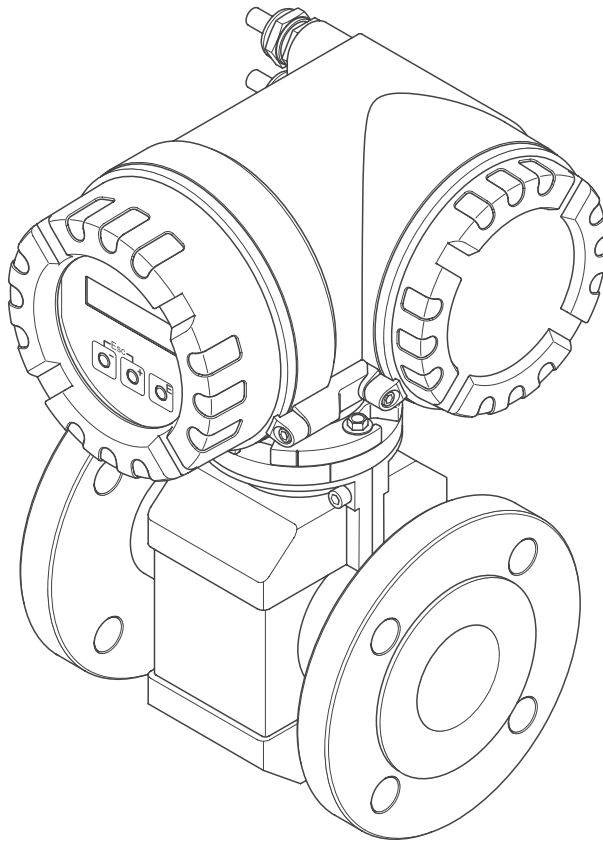
Ex documentation



Ex documentation for the Operating Instructions according to  
FACTORY MUTUAL standards → **Page 3**



Ex documentation for the Operating Instructions according to  
CANADIAN STANDARDS ASSOCIATION → **Page 13**



### Examples for markings according to FM and CSA:



**Temperature Class**

Maximum surface temperature		
T1	842 °F	450 °C
T2	572 °F	300 °C
T2A	536 °F	280 °C
T2B	500 °F	260 °C
T2C	446 °F	230 °C
T2D	419 °F	215 °C
T3	392 °F	200 °C
T3A	356 °F	180 °C
T3B	329 °F	165 °C
T3C	320 °F	160 °C
T4	275 °F	135 °C
T4A	248 °F	120 °C
T5	212 °F	100 °C
T6	185 °F	85 °C

Example: **XP / I / 1 / ABCD**

Factory Mutual	Type of Protection	
	XP	Explosionproof
	IS	Intrinsically Safe Apparatus
	AIS	Associated Apparatus with Intrinsically Safe Connections
	ANI	Associated Nonincendive Field Wiring Apparatus
	PX,PY,PZ	Pressurized
	APX,APY,APZ	Associated Pressurization Systems/Components
	NI	Nonincendive
	DIP	Dust-Ignitionproof
	S	Special Protection
Class		
I	Class I (Gas)	
II	Class II (Dust)	
III	Class III (Fibre)	
Division		
1	Division 1	
2	Division 2	
Group		
FM /NEC	Gases, vapours and dust examples	Min. ignition temperature [µJ]
A	Acetylene, carbon disulfide (Class I)	0.02
B	Hydrogen, ethyl nitrate (Class I)	0.02
C	Ethylene, isoprene (Class I)	0.06
D	Acetone, ethane, benzene, ethanoic acid, gasolines, diesel oil, aircraft fuel, methane, heating oil, crude oil, hexane, ether (Class I)	0.18
E	Metallic powder (Class II)	
F	Coal dust (Class II)	
G	Mill dust (Class II)	
	Textile fibres (Class III)	



**Temperature Class**

Maximum surface temperature		
T1	450 °C	842 °F
T2	300 °C	572 °F
T2A	280 °C	536 °F
T2B	260 °C	500 °F
T2C	230 °C	446 °F
T2D	215 °C	419 °F
T3	200 °C	392 °F
T3A	180 °C	356 °F
T3B	165 °C	329 °F
T3C	160 °C	320 °F
T4	135 °C	275 °F
T4A	120 °C	248 °F
T5	100 °C	212 °F
T6	85 °C	185 °F

Example: **Class I, Division 1, Group ABCD**

Canadian Standards Association	Class		
	I	Class I (Gas)	
	II	Class II (Dust)	
	III	Class III (Fibre)	
	Division		
	1	Division 1	
	2	Division 2	
	Group		
	CSC /NEC	Gases, vapours and dust examples	Min. ignition temperature [µJ]
	A	Acetylene, carbon disulfide (Class I)	0.02
B	Hydrogen, ethyl nitrate (Class I)	0.02	
C	Ethylene, isoprene (Class I)	0.06	
D	Acetone, ethane, benzene (Class I)	0.18	
E	Metallic powder (Class II)		
F	Coal dust (Class II)		
G	Mill dust (Class II)		
	Textile fibres (Class III)		
Type of Protection			
Explosionproof			
Intrinsically Safe Apparatus			
Associated Apparatus with Intrinsically Safe Connections			
Associated Nonincendive Field Wiring Apparatus			
Pressurized			
Associated Pressurization Systems/Components			
Nonincendive			
Dust-Ignitionproof			
Special Protection			



Level



Pressure



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Temperature



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Solutions

## Safety Instructions

# Proline Promag 50 HART

## Division 1



## Ex documentation

**This documentation is an integral part of the following Operating Instructions:**

- BA046D, Operating Instruction, Proline Promag 50

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**Measuring system compact version**

Hazardous area		Safe area
Division 1 / Zone 1	Division 2 / Zone 2	
<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">                         P = DN 1/2" ...12"                      W = DN 1" ...12"                 </div> <div style="text-align: center;">                       ---                        H = DN 1/12" ...1"                 </div> <div style="text-align: center;">                       H = DN 1 1/2" ...4"                 </div> </div>		 <small>F06-50xxxxZZ-16-xx-xx-yy-012</small>
Division 1 / Zone 1	Division 2 / Zone 2	Safe area
Hazardous area		Safe area
<p><b>Transmitter Promag 50:</b></p> <ul style="list-style-type: none"> <li>■ Measuring system:                      XP-IS-DIP / I, II, III / 1 / ABCDEFG / T5-T3C                      and                      XP-IS / I / 1 / IIC / T5-T3C</li> <li>■ Available Sensors:                      – Promag H; DN 1/12" ...4"                      – Promag P; DN 1/2" ...12"                      – Promag W; DN 1" ...12"</li> <li>■ Ambient-/fluid temperature ranges and temperature class, see Page 5.</li> <li>■ Cable entries, see Page 9.</li> <li>■ ① = Connection compartment transmitter                      (XP version) power supply / I/O cable</li> <li>■ ② = Operation via HART handheld terminal DXR 375                      (Ex version only for intrinsically safe circuit)</li> <li>■ ③ = Operation via HART handheld terminal DXR 375                      (Ex version only for non intrinsically safe circuit)</li> </ul>		

**Temperature tables  
compact version**

Max. medium temperature [°F] (at T <sub>a</sub> = 104 °F)		T5	T4A	T4	T3C	T3B
Promag H	DN 1/2"...4"	122	230	266	302	302
Promag P	DN 1"...8" (PFA lining)	122	230	266	302	302
	DN 1/2"...12" (PTFE lining)	122	230	266	266	266
Promag W	DN 1"...12" (hard-rubber lining)	122	176	176	176	176
	DN 1"...12" (polyurethan)	122	140	140	140	140

Max. medium temperature [°F] (at T <sub>a</sub> = 113 °F)		T5	T4A	T4	T3C	T3B
Promag H	DN 1/2"...4"	122	230	266	266	266
Promag P	DN 1"...8" (PFA lining)	122	230	266	266	266
	DN 1/2"...12" (PTFE lining)	122	230	266	266	266
Promag W	DN 1"...12" (hard-rubber lining)	122	176	176	176	176
	DN 1"...12" (polyurethan)	122	140	140	140	140

Max. medium temperature [°F] (at T <sub>a</sub> = 122 °F)		T5	T4A	T4	T3C	T3B
Promag H	DN 1/2"...4"	122	230	230	230	230
Promag P	DN 1"...8" (PFA lining)	122	230	230	230	230
	DN 1/2"...12" (PTFE lining)	122	230	230	230	230
Promag W	DN 1"...12" (hard-rubber lining)	122	176	176	176	176
	DN 1"...12" (hard-rubber lining)	122	140	140	140	140

**Note!**

- At the specified medium temperatures, the equipment is not subjected to temperatures impermissible for the temperature class in question.
- Determine the temperature class dependent on the ambient temperature and the medium temperature.
- The minimum ambient temperature is -4 °F. A version for ambient temperatures up to -40 °F is optionally available.

**Approvals**

Nr. / Approval type	Description
<b>J. I. 3002554</b> (Special conditions, see Page 6)	for the electric flow measuring system Proline Promag 50 Identification: see below

**Compact version**

**P r o m a g 5 0 \* \* \* - \* \* \* \* \* \* \* \* \* \* \***

W = Current HART  
 A = Current HART, Frequency  
 D = Current HART, Frequency, Status, Status input  
 S = Current HART (IS) active, Frequency (IS)  
 T = Current HART (IS) passive, Frequency (IS)

Promag 50 H	DN 1/12"...4"	<b>XP-IS-DIP / I, II, III/ 1 / ABCDEFG / T5-T3C</b>
Promag 50 P	DN 1/2"...12"	<b>and XP-IS / I / 1 / IIC / T5-T3C</b>
Promag 50 W	DN 1"...12"	

**Notified body**

The measuring system was tested for approval by the following named entity: FM Global Technologies LLC

**Special conditions**

1. The flowmeter must be integrated into the potential equalisation system. Potential must be equalized along the intrinsically safe sensor circuits.
2. Control room equipment shall not use or generate more than 250 V rms.
3. Ratings for devices connected to terminals Nos. 26 to 27 of the transmitter must not exceed  $U_m = 250$  V and  $I_m = 500$  mA. It is impermissible to connect devices with higher ratings to these terminals (Does not apply to Promag 5\*\*\*\*\_\*\*\*\*\*S/T with intrinsically safe output circuits).


**Caution!**

4. Use supply wires suitable for 41 °F above ambient temperature, but at least for 176 °F.
5. Class II Group G: The surface temperature of the apparatus cannot exceed 329 °F.
6. Transmitter enclosure G02 explosionproof for use in Cl. I Div. 1 Groups A, B, C, D (Seal not required) and dust-ignition proof for Class II, III Div. 1 Groups E, F, G.
7. It is not permissible to connect the service adapter while area is known to be hazardous.
8. Install per National Electrical Code. Install intrinsically safe circuits per NEC ANSI/NFPA 70 and ISA RP 12.6 respecting the explosionproof integrity of the transmitter enclosure.

**⚠ Warning!**

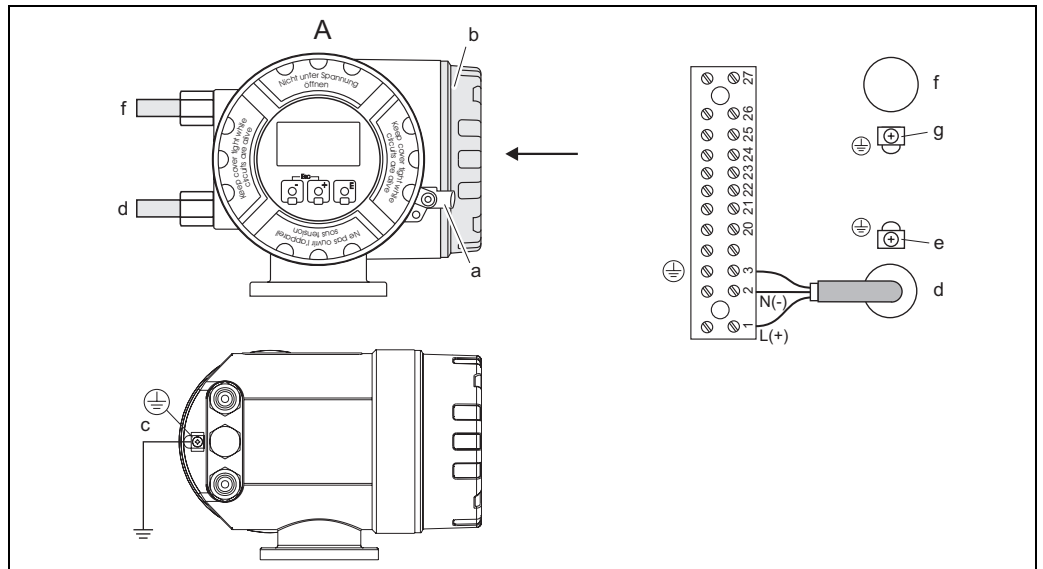
9. Substitution of components may impair intrinsic safety.

**General warnings**
**⚠ Warning!**

- Installation, connection to the electricity supply, commissioning and maintenance of the devices must be carried out by qualified specialists trained to work on Ex-rated devices.
- Compliance with national regulations relating to the installation of devices in potentially explosive atmospheres is mandatory, if such regulations exist.
- Open the device only when it is de-energized (and after a delay of at least 10 minutes following shutdown of the power supply).
- The housing of the Ex-rated transmitter can be turned in 90° steps. Whereas the non-Ex version has a bayonet adapter, however, the Ex version has a thread. Recesses for centering the worm screw are provided to prevent inadvertent movement of the transmitter housing. It is permissible to turn the transmitter housing through a maximum of 180° during operation (in either direction), without compromising explosion protection. After turning the housing the worm screw must be tightened again.
- The screw cap has to be removed before the local display can be turned, and this must be done with the device de-energized (and after a delay of at least 10 minutes following shutdown of the power supply). Be sure that the device is closed properly, before connecting it to power again.

Electrical connections

Power supply



P06-5xxxxxZZ-04-00-xx-xx-004

Fig. 1: Electrical connections power supply and potential equalisation

- A Transmitter housing, front view
- a Securing clamp
- b Connection compartment cover
- c Screw terminal for connecting to potential equalisation
- d Power supply cable
- e Ground terminal
- f Input/Output circuit cable (see Fig. 2)
- g Ground terminal

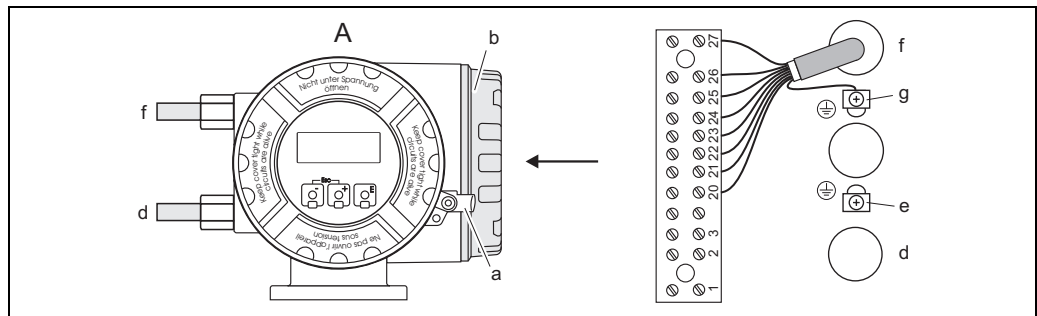


**Caution!**

The transmitter is to be securely connected to the potential equalization system using either the screw terminal on the outside of the transmitter housing.

The table below contains the values that are identical for all versions, irrespective of the type code:

Terminals	1 L (+)	2 N (-)	3
Designation	Power supply		Protective earth
Functional values	AC: U = 85...260 V or AC: U = 20...55 V or DC: U = 16...62 V Power consumption: 15 VA / 15 W		Caution: Follow ground network requirements for the facility!
Intrinsically safe circuit	no		
U <sub>m</sub>	260 V AC		

**Input/output circuit**


F06-5xxxxxZZ-04-00-xx-xx-005

Fig. 2: Electrical connections input/output circuit cable

- A Transmitter housing, front view
- a Securing clamp
- b Connection compartment cover
- c – (see Fig. 1)
- d Power supply cable (see Fig. 1)
- e Ground terminal
- f Input/Output circuit cable
- g Ground terminal

**Note!**

The table below contains the values which depend on the type code (type of device). Always remember to compare the type code in the table with the code on the nameplate of your device.

**Terminal assignment of input/output circuits with an intrinsically safe circuit**
**Note!**

If multiple intrinsically safe outputs are fed through one cable gland, the twisted pairs must be individually shielded.

Promag 50\*\*\*\_\*\*\*\*\*S

Type code	20 (+)	21 (-)	22 (+)	23 (-)	24 (+)	25 (-)	26 (+)	27 (-)
50***_*****S	–		–		Pulse / Frequency output (IS)		Current output HART, active (IS)	
Safety-related relevant values								
Intrinsically safe circuit					yes		yes	
U <sub>oc</sub>					–		21.8 V DC	
I <sub>sc</sub>					–		90 mA	
P <sub>max</sub>					–		490 mW	
L <sub>a</sub>					–		4.1 mH	
C <sub>a</sub>					–		150 nF	
V <sub>max</sub>					30 V DC		30 V DC	
I <sub>max</sub>					300 mA		10 mA	
P <sub>max</sub>					600 mW		0.3 W	
L <sub>i</sub>					0		0	
C <sub>i</sub>					6 nF		6 nF	
Functional values → see table “Functional values of input/output circuits” on Page 9								

Promag 50\*\*\*\_\*\*\*\*\*T

Type code	20 (+)	21 (-)	22 (+)	23 (-)	24 (+)	25 (-)	26 (+)	27 (-)
50***_*****T	–		–		Pulse / Frequency output (IS)		Current output HART, passive (IS)	
Safety-related relevant values								
Intrinsically safe circuit					yes		yes	
V <sub>max</sub>					30 V DC		30 VDC	
I <sub>max</sub>					300 mA		100 mA	
P <sub>max</sub>					600 mW		1.25 W	
L <sub>i</sub>					0		negligible	
C <sub>i</sub>					6 nF		6 nF	
Functional values → see table “Functional values of input/output circuits” on Page 9								



**Terminal assignment of input/output circuits**

Type code	20 (+)	21 (-)	22 (+)	23 (-)	24 (+)	25 (-)	26 (+)	27 (-)
50***_*****W		–		–		–		Current output HART
50***_*****A		–		–		Pulse / Frequency output		Current output HART
50***_*****D		Status input		Status output		Pulse / Frequency output		Current output HART
Safety-related relevant values								
Intrinsically safe circuit	No							
$U_m$	260 V AC							
$I_m$	500 mA							
Functional values → see following Table								

**Functional values of input/output circuits**

Input/output circuit	Functional values
Current output HART	galvanically isolated <ul style="list-style-type: none"> <li>■ active: 0/4...20 mA; <math>R_L &lt; 700 \Omega</math>, (HART <math>R_L \geq 250 \Omega</math>)</li> <li>■ passive: 4...20 mA; supply voltage <math>V_S = 18...30 \text{ V DC}</math>; <math>R_i \geq 150 \Omega</math></li> </ul>
Current output HART (IS)	galvanically isolated <ul style="list-style-type: none"> <li>■ active: 0/4...20 mA; <math>R_L &lt; 400 \Omega</math> (<math>R_L</math> HART <math>\geq 400 \Omega</math>)</li> <li>■ passive: 0/4...20 mA; voltage drop <math>\bar{V} \leq 9 \text{ V DC}</math>; <math>R_L &lt; (V_S - 9 \text{ V}) / 25 \text{ mA}</math></li> </ul>
Pulse/Frequency output	galvanically isolated <ul style="list-style-type: none"> <li>■ passive: Open Collector, 30 V DC, 250 mA</li> <li>■ Frequency output <ul style="list-style-type: none"> <li>Full scale frequency: 2...1000 Hz (<math>f_{\max} = 1.25 \text{ kHz}</math>)</li> <li>on/off ratio 1:1; pulse width max. 10 s</li> </ul> </li> <li>■ Pulse output <ul style="list-style-type: none"> <li>pulse value and pulse polarity selectable</li> <li>pulse width configurable (0,5...2000 ms)</li> </ul> </li> </ul>
Pulse/Freq. output (IS)	galvanically isolated <ul style="list-style-type: none"> <li>■ passive: 30 V DC; 250 mA; <math>f = 0...5000 \text{ Hz}</math></li> </ul>
Status output	<ul style="list-style-type: none"> <li>■ galvanically isolated</li> <li>■ Open Collector, max. 30 V / 250 mA</li> </ul>
Status input	galvanically isolated <ul style="list-style-type: none"> <li><math>U = 3...30 \text{ V DC}</math>; <math>R_i = 5 \text{ k}\Omega</math></li> </ul>

**Service adapter**

The service adapter is exclusively for connection to Endress+Hauser approved service interfaces.

**⚠ Warning!**

It is not permissible to connect the service adapter in explosive atmospheres.

**Device fuse**
**⚠ Warning!**

Use only fuses of the following types; the fuses are installed on the power supply board:

- Voltage 20...55 V AC / 16...62 V DC:  
fuse 2.0 A slow-blow, disconnect capacity 1500 A  
(Schurter, 0001.2503 or Wickmann, Standard Type 181 2.0 A)
- Voltage 85...260 V AC:  
fuse 0.8 A slow-blow, disconnect capacity 1500 A  
(Schurter, 0001.2507 or Wickmann, Standard Type 181 0.8 A)

**Cable entries**

Cable entries for the transmitter terminal compartment (XP version)  
power supply / input /output circuit cable: (Promass 50\*\*\*\_\*\*\*\*\*N\*\*\*\*\*)  
Choice of thread for cable entries, 1/2" NPT.

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

**Technical data**
**Dimensions**

Differences in dimensions and weight due to the use of an XP housing:

- Height + 0.6 inch more than the standard version (see Technical Information)
- Weight + approx. 4.4 lbs more than the standard version (see Technical Information)

**Note!**

Applicable "Technical Information":

- Promag 50/53 H → TI048D
- Promag 50/53 P → TI047D
- Promag 50/53 W → TI046D

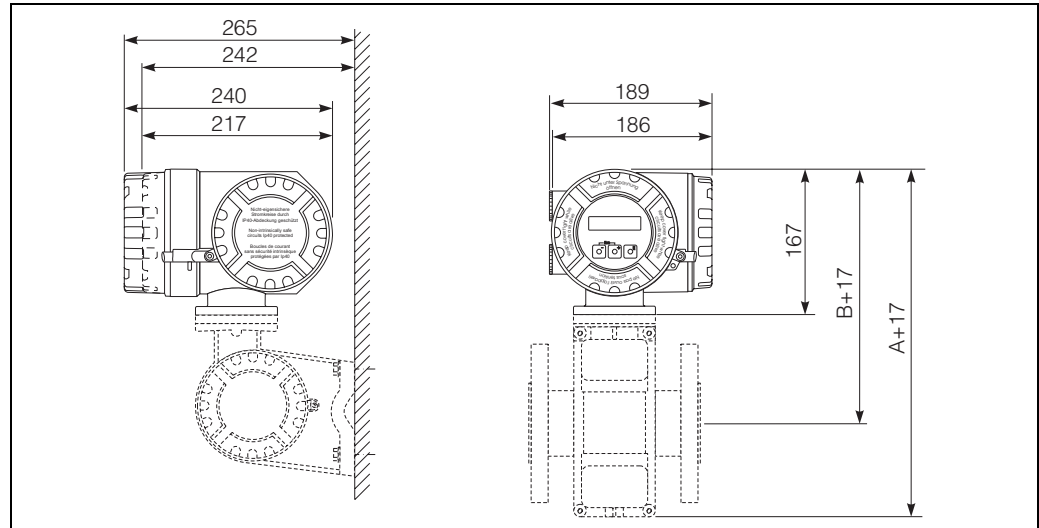


Fig. 3: Dimensions of the Ex-transmitter housing

F06-x0xxxxZZ-06-06-xx-xx-003

**Device identification**

Transmitter Promag 50 and W/H/P sensor.

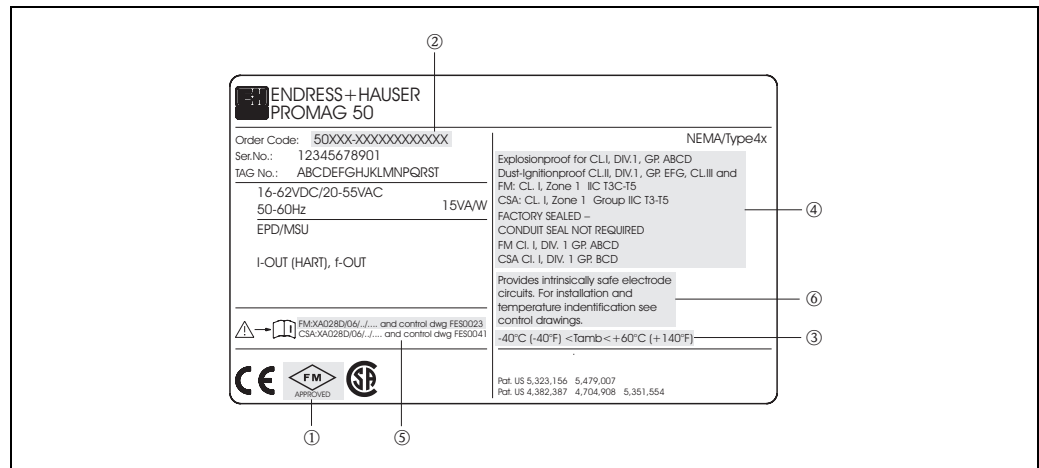


Fig. 4: Nameplate of transmitter and nameplate of sensor (example)

F06-50HxxxZZ-18-00-xx-xx-002

- 1 Label of the notified body: Factory Mutual Research
- 2 Type code
- 3 Ambient temperature range
- 4 Type of protection and explosion group for the measuring system
- 5 Applicable Ex documentation
- 6 Warning

Control drawings

Endress+Hauser Reinach hereby declares that the product is in conformity with the requirements of the FACTORY MUTUAL standards.

**Hazardous Locations**  
Class I Division 1 Groups ABCD or Class I Zone 1 Groups IIC and Class II and III Division 1 Groups EFG

Promag 5. W / PPromag 5. H

**PROMAG 5. W / P / H**  
XP / I / 1 / ABCD; DIP / II, III / 1 / EFG  
AIS / I, II, III / 1 / ABCDEFG  
FM Cl. I, Zone 1, Group IIC

Temperature table

Max. ambient temperature	Max. medium temperature depending temperature classes			
	T5	T4A	T4	T3C
50 °C / 122°F	50 °C / 122°F	110 °C / 230°F		
45 °C / 113°F	50 °C / 122°F	110 °C / 230°F	130 °C / 266°F	
40 °C / 104°F	50 °C / 122°F	110 °C / 230°F	130 °C / 266°F	150 °C / 302°F

Max. allowed medium temperature depending liner material

Liner material	Max. medium temperature
PU (polyurethan)	60 °C / 140°F
HG (hard rubber)	80 °C / 176 °F
PTFE	130 °C / 266°F
PFA	150 °C / 302°F

Communication Options	Control Drawing
I/O option = F, H, J, Q	see FES 0023-0001
I/O option = G, K	see FES 0023-0002
I/O option = S, T	see FES 0023-0004
I/O option = R, U	see FES 0023-0005

**WARNING: SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY.**

Notes:

- Control room equipment shall not use or generate more than 250 V rms.
- Caution: Use supply wires suitable for 5 °C above ambient temperature, but at least for 80 °C / 176°F.
- Class II Group G: The surface temperature of the apparatus cannot exceed 165 °C / 329°F.
- Transmitter enclosure PROLINE G02 is factory sealed for use in Cl. I Div. 1 Groups A, B, C, D. Means that a conduit seal is not required within 18 inches (450mm) of the enclosure.
- Install per NEC ANSI/NFPA 70 Article 500

Änderungen:				Ersteller: FES / ID 1006	
A	03.12.01 / MDI	F		FILE: MUZEICHN\FES0023\011203_ac.DOC	
B	27.01.03 / MDI	G			
C	27.04.04/MDI	H			
D	03.10.04/MDI	J			
E		K			

**FM Control Drawing Div. 1 / Zone 1**  
Class I Zone 1

PROMAG 5x compact version

Gezeichnet	3. Dez. 2001	MDI
Geprüft		
Ex-geprüft	03.10.04	MDI
Gesehen		

FES0023 C

F06-5xxxxxZZ-01-xx-xx-en-022.pdf

**NON HAZARDOUS LOCATION**

ENTITY APPROVED Barrier  
 $V_{oc}$  Barrier,  $I_{sc}$  Barrier,  $C_a$  Barrier,  $L_a$  Barrier

ENTITY APPROVED Supply  
 $V_{max} = 30V$   
 $P_{max} = 600 mW$

**HAZARDOUS LOCATION**  
Cl. I, II, III Div. 1 Group A,B,C,D,E,F,G or Cl. I Div. 2 Group A,B,C,D, and Cl. II, III Div. 1 Group E,F,G

IS - HART  
IS - Passive frequency  
Power Supply

Notes:

- Use supply wires suitable for 5 °C above surrounding ambient, but at least for 80°C / 176°F.

**Intrinsically safe signal output:**

- Wire all intrinsically circuits per ISA RP 12.6. or in conduit per NEC ANSI/NFPA 70
- WARNING: SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY.**
- Control room equipment may not use or generate more than 250 Vrms.

**PROMAG Type: 5\*\* \*\* \* \*\*\*\*\*S**  
**Terminals: 26, 27 (HART current output):**  
Active intrinsically safe circuit:

$V_{oc} / U_0$	$I_{sc} / I_0$	$P_{max} / P_0$	$C_a / C_0$	$L_a / L_0$
21.8 V	90 mA	490 mW	0.15 µF	4.1 mH

$V_{max} / U_i$  |  $I_{max} / I_i$  |  $P_{max} / P_i$  |  $C_i$  |  $L_i$   
30 V | 10 mA | 300 mW | 6 nF | 0

Cable parameters for Intrinsic Safety:  
 $C_{cable} \leq 0.15 \mu F$  if  $V_{oc}$  (of Barrier)  $\leq 21.8 V$   
 $C_{cable} \leq C_a$  Barrier - 6 nF if  $V_{oc}$  (of Barrier)  $\geq 21.8 V$   
 $L_{cable} \leq 4.1 mH$

**Terminals 24, 25 (Passive intrinsically safe circuit):**

$V_{max} / U_i$	$I_{max} / I_i$	$P_{max} / P_i$	$C_i$	$L_i$
30 V	300 mA	600 mW	6 nF	0

Entity approved supply must meet the following requirements:  
 $V_{oc}, V_i$  or  $U_0 \leq V_{max}$  |  $P_{max}$  or  $P_0 \leq P_{max} / P_i$   
Cable parameters for Intrinsic Safety:  
 $C_{cable} \leq C_a (C_0) - 6 nF$  |  $L_{cable} \leq L_a (L_0)$

**PROMAG Type: 5\*\* \*\* \* \*\*\*\*\*T**  
**Terminals: 26, 27 (HART current output):**  
Passive intrinsically safe circuit:

$V_{max} / U_i$	$I_{max} / I_i$	$P_{max} / P_i$	$C_i$	$L_i$
30 V	100 mA	1.25 W	6 nF	negligible

Connect to entity approved Barrier with  
 $V_{oc}, V_i$  or  $U_0 \leq V_{max} / U_i$   
 $I_{sc}, I_i$  or  $I_0 \leq I_{max} / I_i$

Cable parameters for Intrinsic Safety:  
 $C_{cable} \leq C_a$  Barrier or  $C_0$  Barrier - 6 nF  
 $L_{cable} \leq L_a$  Barrier or  $L_0$  Barrier

**Terminals 24, 25 (Passive intrinsically safe circuit):**

$V_{max} / U_i$	$I_{max} / I_i$	$P_{max} / P_i$	$C_i$	$L_i$
30 V	300 mA	600 mW	6 nF	0

Entity approved apparatus must meet the following requirements:  
 $V_{oc}, V_i$  or  $U_0 \leq V_{max}$  |  $P_{max}$  or  $P_0 \leq P_{max} / P_i$   
Cable parameters for Intrinsic Safety:  
 $C_{cable} \leq C_a (C_0) - 6 nF$  |  $L_{cable} \leq L_a (L_0)$

Änderungen:				Erstellt durch:	
A	03.12.01 / MDI	F		Erstellt durch:	
B	27.01.03 / MDI	G		Erstellt für:	
C	27.04.04/MDI	H		Ersteller: FES / ID 1006	
D	03.10.04/MDI	J		FILE: MUZEICHN\FES0023\011203_ac.DOC	
E		K			

**FM CONTROL DRAWING Cl.1, Div. 1**  
PROMAG 5. W / P / H  
Entity concept Commodul HART IS

Gezeichnet	03. Dez. 01	MDI
Geprüft		
Ex-geprüft	03.10.04	MDI
Gesehen		

FES0023-0004 C

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Level



Pressure



Flow



Temperature



Liquid  
Analysis



Registration



Systems  
Components



Services



Solutions

## Safety Instructions

# Proline Promag 50 HART

## Division 1

### Ex documentation

**This documentation is an integral part of the following Operating Instructions:**

- BA046D, Operating Instruction, Proline Promag 50

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**Measuring system compact version**

Hazardous area		Safe area
Division 1 / Zone 0 / Zone 1	Division 2 / Zone 2	
<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">                       ②                 </div> <div style="text-align: center;">                       ①                      P = DN 15...300                      W = DN 25...300                 </div> </div> <div style="display: flex; justify-content: space-around; margin-top: 20px;"> <div style="text-align: center;">                       ①                      H = DN 2...25                 </div> <div style="text-align: center;">                       ①                      H = DN 40...100                 </div> </div>	 EX	<div style="text-align: center;">   <del>EX</del> </div> <div style="text-align: center; margin-top: 20px;">                       ③                 </div>
Division 1 / Zone 0 / Zone 1	Division 2 / Zone 2	Safe area
Hazardous area		Safe area
<p><b>Transmitter Promag 50:</b></p> <ul style="list-style-type: none"> <li>■ Explosionproof and Dust-Ignitionproof for                             <ul style="list-style-type: none"> <li>– Class I, Groups ABCD oder Class I, Zone 1, Group IIC</li> <li>– Class II, Groups EFG</li> <li>– Class III</li> </ul> </li> <li>■ Sensor:                             <ul style="list-style-type: none"> <li>– Promag H; DN 2...100</li> <li>– Promag P; DN 15...300</li> <li>– Promag W; DN 25...300</li> </ul> </li> <li>■ Ambient-/fluid temperature ranges and temperature class, see Page 15.</li> <li>■ Cable entries, see Page 19.</li> <li>■ ① = Connection compartment transmitter (XP version) power supply / I/O cable</li> <li>■ ② = Operation via HART handheld terminal DXR 375 (Ex version only for intrinsically safe circuit)</li> <li>■ ③ = Operation via HART handheld terminal DXR 375 (Ex version only for non intrinsically safe circuit)</li> </ul>		

F06-50xxxxZZ-16-xx-xx-yy-013




**Special conditions**


1. The flowmeter must be integrated into the potential equalisation system. Potential must be equalized along the intrinsically safe sensor circuits.
2. Control room equipment shall not use or generate more than 250 V rms.
3. Ratings for devices connected to terminals Nos. 26 to 27 of the transmitter must not exceed  $U_m = 250$  V and  $I_m = 500$  mA. It is impermissible to connect devices with higher ratings to these terminals (Does not apply to Promag 5\*\*\*\*\_\*\*\*\*\*S/T with intrinsically safe output circuits).


**Caution!**

4. Use supply wires suitable for 5 °C above ambient temperature, but at least for 80 °C.
5. Class II Group G: The surface temperature of the apparatus cannot exceed 165 °C.
6. Transmitter enclosure G02 explosionproof for use in Cl. I Div. 1 Groups A, B, C, D (Seal not required for Groups B, C and D) and dust-ignition proof for Class II, III Div. 1 Groups E, F, G.
7. It is not permissible to connect the service adapter while area is known to be hazardous.
8. Install per Canadian Electrical Code. Intrinsically safe circuits per CEC Part 1, Section 18 and Appendix F, respecting the explosionproof integrity of the enclosure.

 **Warning!**

9. Substitution of components may impair intrinsic safety.
- 

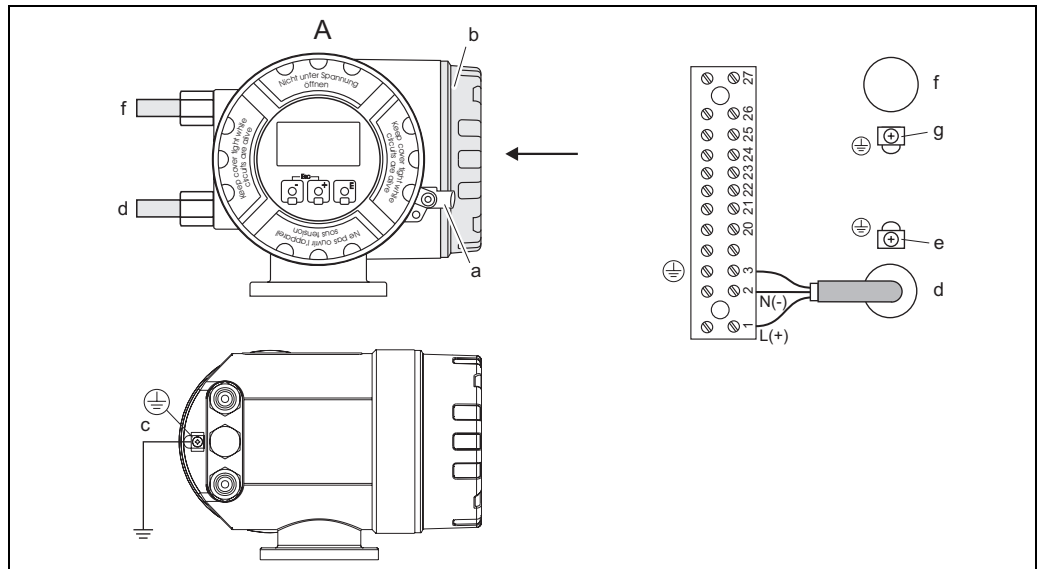
**General warnings**
 **Warning!**

- Installation, connection to the electricity supply, commissioning and maintenance of the devices must be carried out by qualified specialists trained to work on Ex-rated devices.
- Compliance with national regulations relating to the installation of devices in potentially explosive atmospheres is mandatory, if such regulations exist.
- Open the device only when it is de-energized (and after a delay of at least 10 minutes following shutdown of the power supply).
- The housing of the Ex-rated transmitter can be turned in 90° steps. Whereas the non-Ex version has a bayonet adapter, however, the Ex version has a thread. Recesses for centering the worm screw are provided to prevent inadvertent movement of the transmitter housing. It is permissible to turn the transmitter housing through a maximum of 180° during operation (in either direction), without compromising explosion protection. After turning the housing the worm screw must be tightened again.
- The screw cap has to be removed before the local display can be turned, and this must be done with the device de-energized (and after a delay of at least 10 minutes following shutdown of the power supply). Be sure that the device is closed properly, before connecting it to power again.



Electrical connections

Power supply



P06-5xxxxxZZ-04-00-xx-xx-004

Fig. 5: Electrical connections power supply and potential equalisation

- A Transmitter housing, front view
- a Securing clamp
- b Connection compartment cover
- c Screw terminal for connecting to potential equalisation
- d Power supply cable
- e Ground terminal
- f Input/Output circuit cable (see Fig. 6)
- g Ground terminal

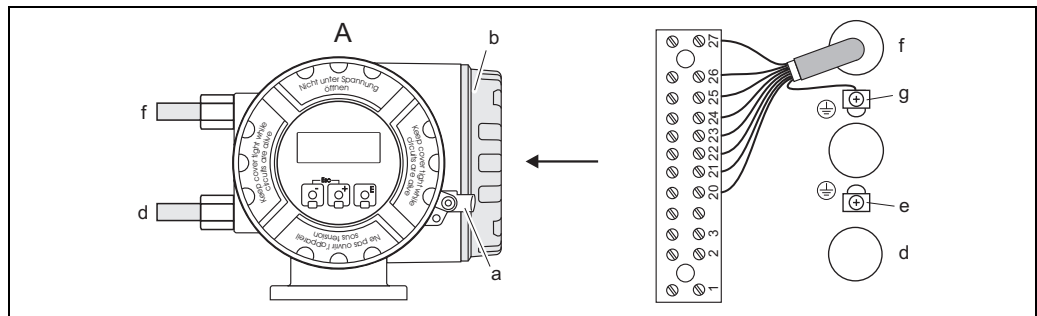


**Caution!**

The transmitter is to be securely connected to the potential equalization system using either the screw terminal on the outside of the transmitter housing.

The table below contains the values that are identical for all versions, irrespective of the type code:

Terminals	1 L (+)	2 N (-)	3
Designation	Power supply		Protective earth
Functional values	AC: $U = 85...260\text{ V}$ or AC: $U = 20...55\text{ V}$ or DC: $U = 16...62\text{ V}$ Power consumption: 15 VA / 15 W		Caution: Follow ground network requirements for the facility!
Intrinsically safe circuit	no		
$U_m$	260 V AC		

**Input/output circuit**


F06-5xxxxxZZ-04-00-xx-xx-005

Fig. 6: Electrical connections input/output circuit cable

- A Transmitter housing, front view
- a Securing clamp
- b Connection compartment cover
- c – (see Fig. 5)
- d Power supply cable (see Fig. 5)
- e Ground terminal
- f Input/Output circuit cable
- g Ground terminal

**Note!**

The table below contains the values which depend on the type code (type of device). Always remember to compare the type code in the table with the code on the nameplate of your device.

**Terminal assignment of input/output circuits with an intrinsically safe circuit**
**Note!**

If multiple intrinsically safe outputs are fed through one cable gland, the twisted pairs must be individually shielded.

Promag 50\*\*\*\_\*\*\*\*\*S

Type code	20 (+)	21 (-)	22 (+)	23 (-)	24 (+)	25 (-)	26 (+)	27 (-)
50***_*****S	–		–		Pulse / Frequency output (IS)		Current output HART, active (IS)	
Safety-related relevant values								
Intrinsically safe circuit					yes		yes	
$U_{oc}$					–		21.8 V DC	
$I_{sc}$					–		90 mA	
$P_{max}$					–		490 mW	
$L_a$					–		4.1 mH	
$C_a$					–		150 nF	
$V_{max}$					30 V DC		30 V DC	
$I_{max}$					300 mA		10 mA	
$P_{max}$					600 mW		0.3 W	
$L_i$					0		0	
$C_i$					6 nF		6 nF	
Functional values → see table “Functional values of input/output circuits” on Page 19								

Promag 50\*\*\*\_\*\*\*\*\*T

Type code	20 (+)	21 (-)	22 (+)	23 (-)	24 (+)	25 (-)	26 (+)	27 (-)
50***_*****T	–		–		Pulse / Frequency output (IS)		Current output HART, passive (IS)	
Safety-related relevant values								
Intrinsically safe circuit					yes		yes	
$V_{max}$					30 V DC		30 VDC	
$I_{max}$					300 mA		100 mA	
$P_{max}$					600 mW		1.25 W	
$L_i$					0		negligible	
$C_i$					6 nF		6 nF	
Functional values → see table “Functional values of input/output circuits” on Page 19								

**Terminal assignment of input/output circuits**

Type code	20 (+)	21 (-)	22 (+)	23 (-)	24 (+)	25 (-)	26 (+)	27 (-)
50***_*****W		–		–		–		Current output HART
50***_*****A		–		–		Pulse / Frequency output		Current output HART
50***_*****D		Status input		Status output		Pulse / Frequency output		Current output HART
Safety-related relevant values								
Intrinsically safe circuit	No							
$U_m$	260 V AC							
$I_m$	500 mA							
Functional values → see following Table								

**Functional values of input/output circuits**

Input/output circuit	Functional values
Current output HART	galvanically isolated <ul style="list-style-type: none"> <li>■ active: 0/4...20 mA; <math>R_L &lt; 700 \Omega</math>, (HART <math>R_L \geq 250 \Omega</math>)</li> <li>■ passive: 4...20 mA; supply voltage <math>V_S = 18...30 \text{ V DC}</math>; <math>R_i \geq 150 \Omega</math></li> </ul>
Current output HART (IS)	galvanically isolated <ul style="list-style-type: none"> <li>■ active: 0/4...20 mA; <math>R_L &lt; 400 \Omega</math> (<math>R_L</math> HART <math>\geq 400 \Omega</math>)</li> <li>■ passive: 0/4...20 mA; voltage drop <math>\bar{V} \leq 9 \text{ V DC}</math>; <math>R_L &lt; (V_S - 9 \text{ V}) / 25 \text{ mA}</math></li> </ul>
Pulse/Frequency output	galvanically isolated <ul style="list-style-type: none"> <li>■ passive: Open Collector, 30 V DC, 250 mA</li> <li>■ Frequency output Full scale frequency: 2...1000 Hz (<math>f_{\max} = 1.25 \text{ kHz}</math>) on/off ratio 1:1; pulse width max. 10 s</li> <li>■ Pulse output pulse value and pulse polarity selectable pulse width configurable (0,5...2000 ms)</li> </ul>
Pulse/Freq. output (IS)	galvanically isolated <ul style="list-style-type: none"> <li>■ passive: 30 V DC; 250 mA; <math>f = 0...5000 \text{ Hz}</math></li> </ul>
Status output	<ul style="list-style-type: none"> <li>■ galvanically isolated</li> <li>■ Open Collector, max. 30 V / 250 mA</li> </ul>
Status input	galvanically isolated $U = 3...30 \text{ V DC}$ ; $R_i = 5 \text{ k}\Omega$

**Service adapter**

The service adapter is exclusively for connection to Endress+Hauser approved service interfaces.

**⚠ Warning!**

It is not permissible to connect the service adapter in explosive atmospheres.

**Device fuse**
**⚠ Warning!**

Use only fuses of the following types; the fuses are installed on the power supply board:

- Voltage 20...55 V AC / 16...62 V DC:  
fuse 2.0 A slow-blow, disconnect capacity 1500 A  
(Schurter, 0001.2503 or Wickmann, Standard Type 181 2.0 A)
- Voltage 85...260 V AC:  
fuse 0.8 A slow-blow, disconnect capacity 1500 A  
(Schurter, 0001.2507 or Wickmann, Standard Type 181 0.8 A)

**Cable entries**

Cable entries for the transmitter terminal compartment (XP version)  
power supply / input/output circuit cable: (Promass 50\*\*\*\_\*\*\*\*\*N\*\*\*\*\*)  
Choice of thread for cable entries, 1/2" NPT.

Make sure that the XP cable glands/entries are secured to prevent working loose and that the seals are installed immediately adjacent to the housing, if required.

**Technical data**
**Dimensions**

Differences in dimensions and weight due to the use of an explosionproof housing:

- Height + 15 mm more than the standard version (see Technical Information)
- Weight + approx. 2 kg more than the standard version (see Technical Information)

**Note!**

Applicable “Technical Information”:

- Promag 50/53 H → TI048D
- Promag 50/53 P → TI047D
- Promag 50/53 W → TI046D

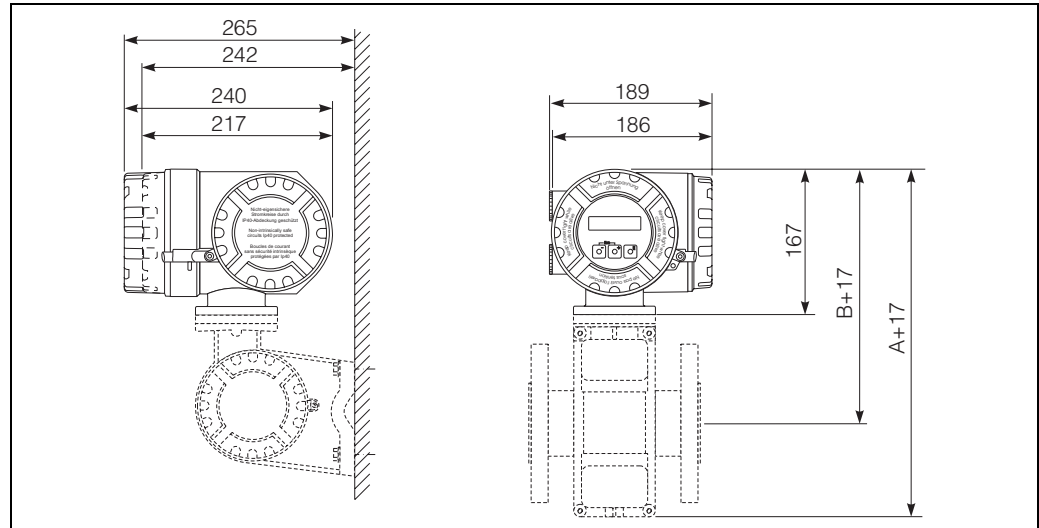


Fig. 7: Dimensions of the Ex-transmitter housing

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**Device identification**

Transmitter Promag 50 and W/H/P sensor.

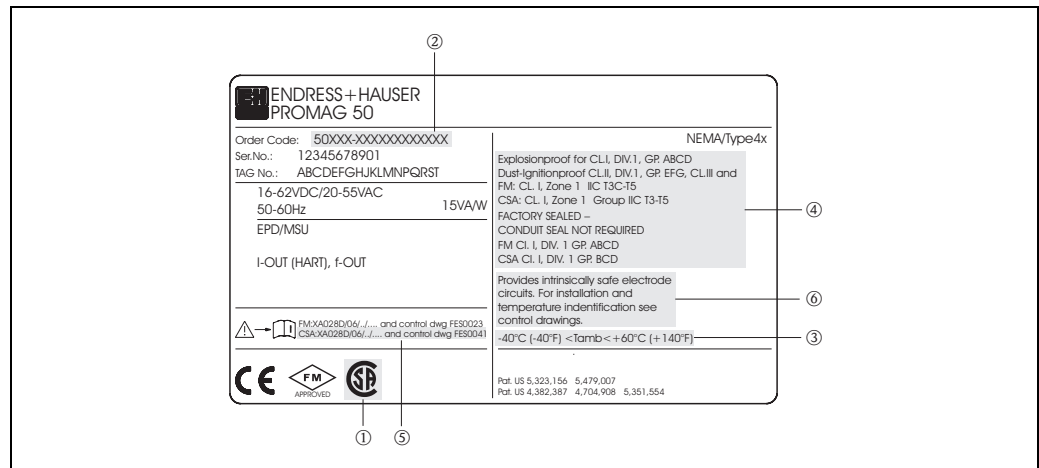


Fig. 8: Nameplate of transmitter and nameplate of sensor (example)

F06-50HxxxZZ-18-00-xx-xx-002

- 1 Label of the notified body: Factory Mutual Research
- 2 Type code
- 3 Ambient temperature range
- 4 Type of protection and explosion group for the measuring system
- 5 Applicable Ex documentation
- 6 Warning

Control drawings

Endress+Hauser Reinach hereby declares that the product is in conformity with the requirements of the FACTORY MUTUAL standards.

**Hazardous Locations**  
Class I Division 1 Groups ABCD or Class I Zone 1 Groups IIC and Class II and III Division 1 Groups EFG

Promag 5. W / P Promag 5. H

**PROMAG 5. W / P / H**

Temperature table

Max. ambient temperature	Max. medium temperature depending temperature classes			
	T5	T4A	T4	T3C
50 °C / 122°F	50 °C / 122°F	110 °C / 230°F		
45 °C / 113°F	50 °C / 122°F	110 °C / 230°F	130 °C / 266°F	
40 °C / 104°F	50 °C / 122°F	110 °C / 230°F	130 °C / 266°F	150 °C / 302°F

Max. allowed medium temperature depending liner material

Liner material	Max. medium temperature
PU (polyurethan)	60 °C / 140°F
HG (hard rubber)	80 °C / 176 °F
PTFE	130 °C / 266°F
PFA	150 °C / 302°F

Communication Options	Control Drawing
I/O option = F, H, J, Q	See FES 0041-0001
I/O option = G, K	See FES 0041-0002
I/O option = S, T	See FES 0041-0004
I/O option = R, U	see FES 0023-0005

**WARNING: SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY.**

Notes:

- Control room equipment shall not use or generate more than 250 V rms.
- Caution: Use supply wires suitable for 5 °C above ambient temperature, but at least for 80 °C / 176°F.
- Class II Group G: The surface temperature of the apparatus cannot exceed 165 °C / 329°F.
- Transmitter enclosure PROline G02 is factory sealed for use in Cl. I Div. 1 Groups B, C, D. Means that a conduit seal is not required within 18 inches (450mm) of the enclosure.
- Install per Canadian Electrical Code

Änderungen:	
A	03.12.01/MDI
B	03.10.04/MDI
C	
D	
E	
F	
G	
H	
I	
J	
K	

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Erstellt durch:  
Erstellt für:  
Ersteller: FES / ID 1077  
File: M:\ZEICHNUNG\FES0041\011203C.DOC

Gezeichnet	03.12.01	MDI
Geprüft		
Ex-geprüft	03.10.04	MDI
Gesehen		

CSA Control Drawing Div. 1 / Zone 1  
Class I Zone 1  
PROMAG 5x compact version

FES0041 B

Flowtec AG, Kaegenstrasse 7, CH-4153 Reinach BL1, Postfach

F06-5xxxxxZZ-01-xx-xx-en-020.pdf

**NON HAZARDOUS LOCATION**

CSA Certified Barrier or Associated Apparatus  
 $V_{OC} / U_0$  Barrier  $I_{SC} / I_0$  Barrier  
 $C_a / C_0$  Barrier  $L_a / L_0$  Barrier

CSA Certified Barrier or Associated Apparatus  
 $V_{max} = 30V$   
 $P_{max} = 600 mW$

**HAZARDOUS LOCATION**  
Cl. I, II, III Div. 1 Group A,B,C,D,E,F,G or  
Cl. I Div. 2 Group A,B,C,D, and Cl.II,III Div.1 Group E,F,G

IS - HART  
IS - Passive frequency  
Power Supply

Notes:

- Use supply wires suitable for 5 °C above surrounding ambient, but at least for 80°C / 176°F.

**Intrinsically safe signal output:**

- Wire all intrinsically circuits per Canadian Electrical Code
- WARNING: SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY.**
- Control room equipment may not use or generate more than 250 Vrms.

**PROMAG Type: 5\*\* \*\*-\*\*\*\*\*S**  
**Terminals: 26, 27 (HART current output):**  
Active intrinsically safe circuit:

$V_{oc} / U_0$	$I_{sc} / I_0$	$P_{max} / P_0$	$C_a / C_0$	$L_a / L_0$
21.8 V	90 mA	490 mW	0.15 µF	4.1 mH
$V_{max} / U_0$	$I_{max} / I_0$	$P_{max} / P_0$	$C_0$	$L_0$
30 V	10 mA	300 mW	6 nF	0

Cable parameters for Intrinsic Safety:  
 $C_{cable} \leq 0.15 \mu F$  if  $V_{oc} / U_0$  (of Barrier)  $\leq 21.8 V$   
 $C_{cable} \leq C_a / C_0$  Barrier - 6 nF if  $V_{oc} / U_0$  (of Barrier)  $\geq 21.8 V$   
 $L_{cable} \leq 4.1 mH$

**Terminals 24, 25 (Passive intrinsically safe circuit):**

$V_{max} / U_0$	$I_{max} / I_0$	$P_{max} / P_0$	$C_0$	$L_0$
30 V	300 mA	600 mW	6 nF	0

Entity approved supply must meet the following requirements:  
 $V_{oc} / U_0 \leq V_{max} / U_0$   $P_{max} / P_0 \leq P_{max} / P_0$   
Cable parameters for Intrinsic Safety:  
 $C_{cable} \leq C_a (C_0) - 6 nF$   $L_{cable} \leq L_a (L_0)$

CSA CONTROL DRAWING Cl.1, Div. 1  
PROMAG 5. W / P / H  
Entity concept Comnodul HART IS

FES0041-0004 B

Flowtec AG, Kaegenstrasse 7, CH-4153 Reinach BL1, Postfach

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