

# *promag 53*

## *Division 1*



Ex documentation for the BA 047D and BA 048D operating instructions according to FACTORY MUTUAL standards



Ex documentation for the BA 047D and BA 048D operating instructions according to CANADIAN STANDARDS ASSOCIATION



# Endress + Hauser

The Power of Know How





# promag 53 Division 1

## Ex documentation for the BA 047D and BA 048D operating instructions according to FACTORY MUTUAL standards



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

### Type of Protection

XP	Explosionproof
IS	Intrinsically Safe Apparatus
AIS	Associated Apparatus with Intrinsically Safe Connections
ANI	Nonincendive Field Wiring Circuit
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 dusts (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

FM 3611	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

Factory Mutual



Hazardous area		Safe area
Division 1 / Zone 1	Division 2 / Zone 2	
<p>            Operation via HART handheld DXR 275***I5* (Ex version, only for intrinsically safe current circuits)         </p> <p>           Promag 53            P = DN 1/2"...12"            W = DN 2 1/2"...12"         </p>		<p>            Operation via HART handheld DXR 275 (only for non-intrinsically safe current circuits)         </p>
<p>           Promag 53            H = DN 1/12"...1"         </p>	<p>           Promag 53            H = DN 1 1/2"...4"         </p>	
Division 1 / Zone 1	Division 2 / Zone 2	
Hazardous area		Safe area

F-53xxxZZ-16-xx-xx-en-002

- Promag 53 flow measuring system in:  
 XP-IS-DIP / I,II,III / 1 / ABCDEFG/T5 to T3C  
 and  
 XP-IS / I / 1 / IIC / T5 to T3C
- For ambient and medium temperature ranges, and temperature class, see Page 3.

③ Transmitter terminal compartment (XP version) power supply/ I/O-cable

## Temperature tables

### Measuring system Promag 53 W/P/H (compact version)

<i>at <math>T_a = 104\text{ }^\circ\text{F}</math></i>		Max. medium temperature [ $^\circ\text{F}$ ] in			
		T5	T4A	T4	T3C
<b>Promag H</b>	DN 1/12"...4"	122	230	266	302
<b>Promag P</b>	DN 1"...8" (PFA lining)	122	230	266	302
<b>Promag P</b>	DN 1/2"...12" (PTFE lining)	122	230	266	–
<b>Promag W</b>	DN 2 1/2"...12" (hard-rubber lining)	122	–	–	–

<i>at <math>T_a = 113\text{ }^\circ\text{F}</math></i>		Max. medium temperature [ $^\circ\text{F}$ ] in			
		T5	T4A	T4	T3C
<b>Promag H</b>	DN 1/12"...4"	122	230	266	–
<b>Promag P</b>	DN 1"...8" (PFA lining)	122	230	266	–
<b>Promag P</b>	DN 1/2"...12" (PTFE lining)	122	230	266	–
<b>Promag W</b>	DN 2 1/2"...12" (hard-rubber lining)	122	–	–	–

<i>at <math>T_a = 122\text{ }^\circ\text{F}</math></i>		Max. medium temperature [ $^\circ\text{F}$ ] in			
		T5	T4A	T4	T3C
<b>Promag H</b>	DN 1/12"...4"	122	230	–	–
<b>Promag P</b>	DN 1"...8" (PFA lining)	122	230	–	–
<b>Promag P</b>	DN 1/2"...12" (PTFE lining)	122	230	–	–
<b>Promag W</b>	DN 2 1/2"...12" (hard-rubber lining)	122	–	–	–



#### Note!

At the specified medium temperatures, the equipment is not subjected to temperatures impermissible for the temperature class in question.

## Approvals

No. / approval type	Description
J. I. 3002554  (see Page 5 for notes on special conditions)	for the electric flow measuring system Promag 53  <b>Identification:</b> see below

Measuring system Promag 53 (compact version)	
Promag 53***-*****.	<ul style="list-style-type: none"> <li>A = current HART, frequency</li> <li>B = current HART, frequency, 2 x relay</li> <li>C = current HART, frequency, 2 x relay, flexible module</li> <li>D = current HART, frequency, relay, status input, flexible module</li> <li>L = current HART, 2 x relay, status input, flexible module</li> <li>M = current HART, 2 x frequency, status input, flexible module</li> <li>S = current HART (IS) active, frequency (IS)</li> <li>T = current HART (IS) passive, frequency (IS)</li> <li>2 = current HART, frequency, current, relay, flexible module</li> </ul>
Promag 53 H DN 1/12"...4":	<b>XP-IS-DIP / I,II,III / 1 / ABCDEFG / T5 to T3C and XP-IS / I / 1 / IIC / T5 to T3C</b>
Promag 53 P DN 1/2"...12":	<b>XP-IS-DIP / I,II,III / 1 / ABCDEFG / T5 to T3C and XP-IS / I / 1 / IIC / T5 to T3C</b>
Promag 53 W DN 2 1/2"...12":	<b>XP-IS-DIP / I,II,III / 1 / ABCDEFG / T5 to T3C XP-IS / I / 1 / IIC / T5 to T3C</b>

## Notified body

The Promag measuring system was tested for approval by the following named entity:

FM: Factory Mutual Research

## Special conditions

1. Install per National Electrical Code ANSI/NFPA 70.
2. Control room equipment shall not use or generate more than 250 V rms.
3. The specified temperature class in conjunction with the ambient temperature and the medium temperature must be in compliance with the tables on Page 3.
4. Use of the devices is restricted to mediums against which the process-wetted materials are adequately resistant.



Caution!

5. Use supply wires suitable for 5 °C above ambient temperature, but at least for 176 °F.

## General warnings



- 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).

## Electrical connections

### Power supply connection

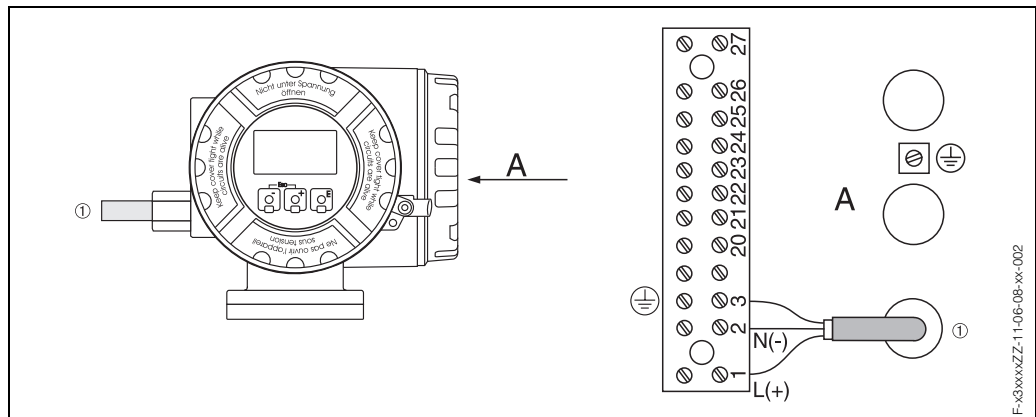


Fig. 1: ① = power supply cable  
A = view A

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

### Transmitter Promag 53

Terminals	1	2	3
+ / -	L (+)	N (-)	
Designation	Power supply ①		Ground
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		
Intrinsically safe circuit	no		
U <sub>max</sub> =	260 V AC		



**Input/output circuit**

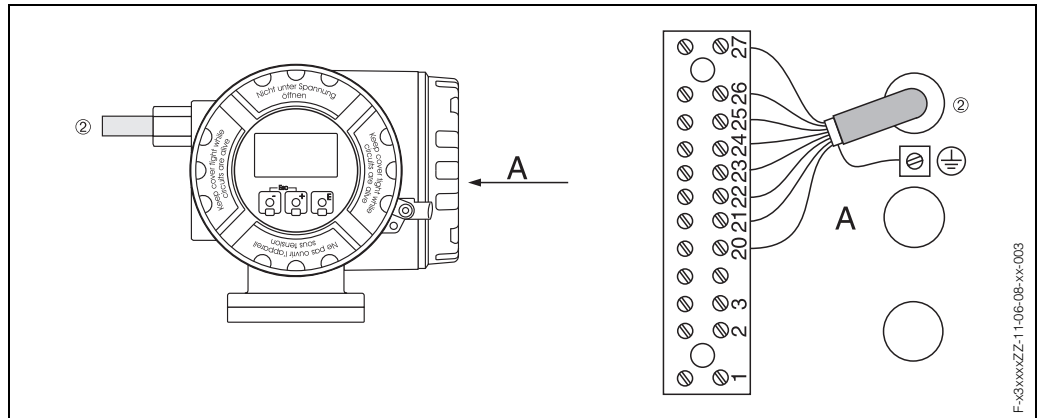


Fig. 2: ② = input/output circuit cable  
A = view A



**Note!**

The table below contains the values that are not identical for all versions, in other words 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.

**Transmitter Promag 53\*\*\*-\*\*\*\*\*A**

Terminals	20	21	22	23	24	25	26	27
+ / -	+	-	+	-	+	-	+	-
Designation					Pulse/frequency output ②		Current output HART ②	
Functional values					f = 2...10000 Hz active: 24 V DC/ 25 mA passive: 30 V DC/ 250 mA		active: 0/4...20 mA R <sub>L</sub> < 700 Ω R <sub>L</sub> HART ≥ 250 Ω passive: 4...20 mA max. 30 V DC	
Intrinsically safe circuit					no		no	
U <sub>max</sub> =					260 V AC		260 V AC	
I <sub>max</sub> =					500 mA			

**Transmitter Promag 53\*\*\*-\*\*\*\*\*B**

Terminals	20	21	22	23	24	25	26	27
+ / -	+	-	+	-	+	-	+	-
Designation	Relay ②		Relay ②		Pulse/frequency output ②		Current output HART ②	
Functional values	42 V DC/100 mA or 30 V AC/500 mA		42 V DC/100 mA or 30 V AC/500 mA		f = 2...10000 Hz active: 24 V DC/ 25 mA passive: 30 V DC/ 250 mA		active: 0/4...20 mA $R_L < 700 \Omega$ $R_L \text{ HART} \geq 250 \Omega$ passive: 4...20 mA max. 30 V DC	
Intrinsically safe circuit	no		no		no		no	
$U_{\max} =$	260 V AC		260 V AC		260 V AC		260 V AC	
$I_{\max} =$	500 mA							

**Transmitter Promag 53\*\*\*-\*\*\*\*\*C**

Terminals	20	21	22	23	24	25	26	27
+ / -	+	-	+	-	+	-	+	-
Designation	Relay ②		Relay ②		Pulse/frequency output ②		Current output HART ②	
Functional values	42 V DC/100 mA or 30 V AC/500 mA		42 V DC/100 mA or 30 V AC/500 mA		f = 2...10000 Hz active: 24 V DC/ 25 mA passive: 30 V DC/ 250 mA		active: 0/4...20 mA $R_L < 700 \Omega$ $R_L \text{ HART} \geq 250 \Omega$ passive: 4...20 mA max. 30 V DC	
Intrinsically safe circuit	no		no		no		no	
$U_{\max} =$	260 V AC		260 V AC		260 V AC		260 V AC	
$I_{\max} =$	500 mA							

**Transmitter Promag 53\*\*\*-\*\*\*\*\*D**

Terminals	20	21	22	23	24	25	26	27
+ / -	+	-	+	-	+	-	+	-
Designation	Status input ②		Relay ②		Pulse/frequency output ②		Current output HART ②	
Functional values	3...30 V DC $R_i = 5 \text{ k}\Omega$		42 V DC/100 mA or 30 V AC/500 mA		f = 2...10000 Hz active: 24 V DC/ 25 mA passive: 30 V DC/ 250 mA		active: 0/4...20 mA $R_L < 700 \Omega$ $R_L \text{ HART} \geq 250 \Omega$ passive: 4...20 mA max. 30 V DC	
Intrinsically safe circuit	no		no		no		no	
$U_{\max} =$	260 V AC		260 V AC		260 V AC		260 V AC	
$I_{\max} =$	500 mA							

**Transmitter Promag 53\*\*\*-\*\*\*\*\*L**

Terminals	20	21	22	23	24	25	26	27
+ / -	+	-	+	-	+	-	+	-
Designation	Status input ②		Relay ②		Relay ②		Current output HART ②	
Functional values	3...30 V DC $R_i = 5 \text{ k}\Omega$		42 V DC/100 mA or 30 V AC/500 mA		42 V DC/100 mA or 30 V AC/500 mA		active: 0/4...20 mA $R_L < 700 \Omega$ $R_L \text{ HART} \geq 250 \Omega$ passive: 4...20 mA max. 30 V DC	
Intrinsically safe circuit	no		no		no		no	
$U_{\max} =$	260 V AC		260 V AC		260 V AC		260 V AC	
$I_{\max} =$	500 mA							

**Transmitter Promag 53\*\*\*-\*\*\*\*\*M**

Terminals	20	21	22	23	24	25	26	27
+ / -	+	-	+	-	+	-	+	-
Designation	Status input ②		Pulse/frequency output ②		Pulse/frequency output ②		Current output HART ②	
Functional values	3...30 V DC $R_i = 5 \text{ k}\Omega$		f = 2...10000 Hz active: 24 V DC/ 25 mA passive: 30 V DC/ 250 mA		f = 2...10000 Hz active: 24 V DC/ 25 mA passive: 30 V DC/ 250 mA		active: 0/4...20 mA $R_L < 700 \Omega$ $R_L \text{ HART} \geq 250 \Omega$ passive: 4...20 mA max. 30 V DC	
Intrinsically safe circuit	no		no		no		no	
$U_{\max} =$	260 V AC		260 V AC		260 V AC		260 V AC	
$I_{\max} =$	500 mA							

**Transmitter Promag 53\*\*\*\_\*\*\*\*\*S**

Terminals	20	21	22	23	24	25	26	27
+ / -	+	-	+	-	+	-	+	-
Designation					Pulse/frequency output ②		Current output HART ②	
Functional values					f = 0...5000 Hz passive: 30 V DC/ 250 mA		active: 0/4...20 mA $R_L < 400 \Omega$ $R_L \text{ HART} \geq 250 \Omega$	
Intrinsically safe circuits					EEx ia		EEx ia	
$U_o =$							21.8 V DC	
$I_o =$							90 mA	
$P_o =$							490 mW	
$L_o =$							4.1 mH	
$C_o =$							150 nF	
$U_i =$					30 V DC		30 V DC	
$I_i =$					300 mA		10 mA	
$P_i =$					600 mW		0.3 W	
$L_i =$					negligible		negligible	
$C_i =$					6 nF		6 nF	

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

**Transmitter Promag 53\*\*\*\_\*\*\*\*\*T**

Terminals	20	21	22	23	24	25	26	27
+ / -	+	-	+	-	+	-	+	-
Designation					Pulse/frequency output ②		Current output HART ②	
Functional values					f = 0...5000 Hz passive: 30 V DC/ 250 mA		passive: 0/4...20 mA Voltage drop $\leq 9 \text{ V}$ $R_L < \frac{V_{\text{supply}} - 9 \text{ V}}{25 \text{ mA}}$	
Intrinsically safe circuits					EEx ia		EEx ia	
$U_i =$					30 V DC		30 V DC	
$I_i =$					300 mA		100 mA	
$P_i =$					600 mW		1.25 W	
$L_i =$					negligible		negligible	
$C_i =$					6 nF		6 nF	

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

**Transmitter Promag 53\*\*\*-\*\*\*\*\*2**

Terminals	20	21	22	23	24	25	26	27
+ / -	+	-	+	-	+	-	+	-
Designation	Relay ②		Current output ②		Pulse/frequency output ②		Current output HART ②	
Functional values	42 V DC/100 mA or 30 V AC/500 mA		active: 0/4...20 mA $R_L < 700 \Omega$ passive: 4...20 mA max. 30 V DC		f = 2...10000 Hz active: 24 V DC/ 25 mA passive: 30 V DC/ 250 mA		active: 0/4...20 mA $R_L < 700 \Omega$ $R_L \text{ HART} \geq 250 \Omega$ passive: 4...20 mA max. 30 V DC	
Intrinsically safe circuit	no		no		no		no	
$U_{\max} =$	260 V AC		260 V AC		260 V AC		260 V AC	
$I_{\max} =$	500 mA							

## 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

- ③ *Cable entries for the transmitter terminal compartment (XP version)  
power supply / I/O-cable: (Promag 53\*\*\*-\*\*\*\*N\*\*\*\*\*)*  
Thread for cable entries 1/2" NPT.

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

## Technical data

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

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

## Device identification

Promag 53 transmitter and W/P/H sensor

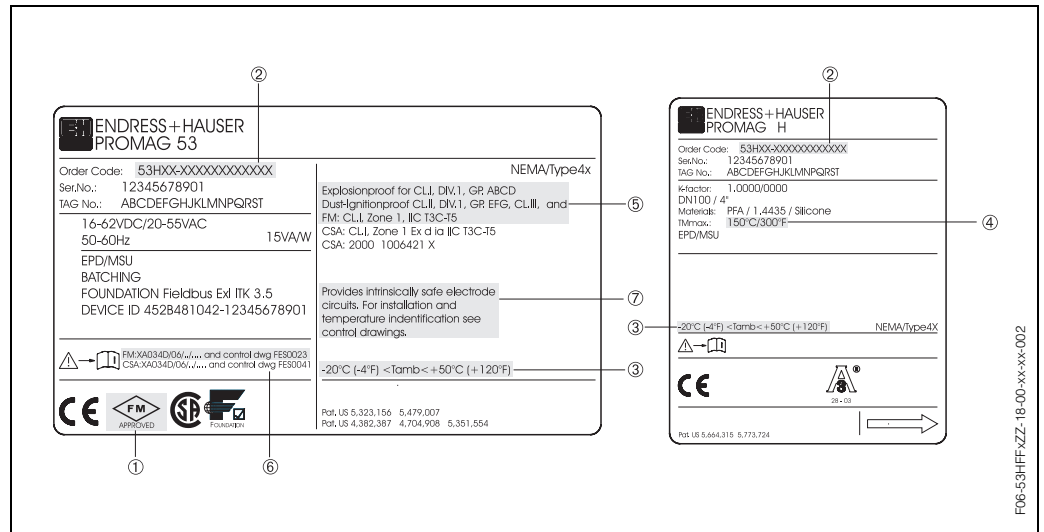


Fig. 3: Nameplate of transmitter and nameplate of sensor (example)

Key to nameplates (Figure 5)

No.	Meaning	No.	Meaning
①	Label of the notified body: Factory Mutual Research	⑤	Type of protection and explosion group for the Promag 53 measuring system
②	Type code	⑥	Applicable Ex documentation
③	Ambient temperature range	⑦	Warning
④	Maximum medium temperature		

# 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 50 P / H and PROMAG 53 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

**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.
- Install per NEC ANSI/NFPA 70 Article 500

Anderungen:		Ersteller: FES / ID 1006	
A	27.09.00 / Bn	F	FILE: M:\ZEICHN\G\FES0023\000411C.DOC
B		G	
C		H	
D		J	
E		K	

<p>FM Control Drawing Div. 1 / Zone 1 Class I Zone 1</p> <p>PROMAG 5x compact version</p>	Gezeichnet	4. Jan. 2000	UD
	Geprüft		
	Ex-geprüft	27.09.00	Bn
	Gesehen		
<b>FES0023-0000FOA</b>			<b>1/5</b>

Note!  
These figure (2/5) contains no data relevant to your standard device.

**HAZARDOUS LOCATIONS**  
Cl. I Div. 1 Groups A,B,C,D  
Cl. I Zone 1 Group IIC  
Cl. I Div. 2 Group A,B,C,D  
Cl. I Zone 2 Group IIC  
Cl. II, III Div. 1 Group E,F,G

**NON HAZARDOUS LOCATIONS**

**Notes:**  
Intrinsically safe signal output:  
1) Wire intrinsically safe circuits per ISA RP 12.6. or in conduit per NEC ANSI/NFPA 70.  
2) **WARNING: SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY.**  
3) Control room equipment may not use or generate more than 250 V rms.  
PROMAG Type: 5\*\*\*-\*\*\*\*\*F  
**Terminals: 26 (+), 27 (-) (Profibus PA):**  
Passive intrinsically safe PROFIBUS PA circuit:  
For connecting the intrinsically safe circuit (PROFIBUS PA) according to the FISCO-CONCEPT see page 4 of this control document.

**Nonintrinsically safe signal output:**  
4) Transmitter circuit wiring in conduit in accordance with NEC ANSI/NFPA 70.  
5) **WARNING: EXPLOSION HAZARD - SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I, DIVISION 1.**  
6) Control room equipment may not use or generate over 250 Vrms.

PROMAG Type: 5\*\*\*-\*\*\*\*\*H  
**Terminals 26 (+), 27 (-) (PROFIBUS PA)**  
V ≤ 32 V, I = 10 mA

PROMAG Type: 5\*\*\*-\*\*\*\*\*J  
**Terminals 24 (+5V), 25 (GND), 26 (DPA), 27 (DPB) (PROFIBUS DP)**  
Terminals: +5V, GND, DPA, DPB  
V = 5 V, I = 100 mA

Anderungen:		Erstellt durch:	
A	27.09.00 / Bn	F	Alle gesetzlichen Urheberrechte vorbehalten.
B		G	Diese Zeichnung darf ohne unsere
C		H	Genehmigung weder vervielfältigt werden noch
D		J	dritten Personen und Konkurrenzfirmen
E		K	zugänglich gemacht werden.

<p>FM Control Drawing Div. 1 / Zone 1 PROMAG 5. W / P / H PROFIBUS PA / IS installation PROFIBUS PA / DP non-IS installation</p>	Massstab	%	Gezeichnet	4. Jan. 2000	UD
	Geprüft				
	Ex-geprüft	27.09.00	Bn		
	Gesehen				
<b>FES0023-0000FOA</b>					<b>2/5</b>



Note!  
These figure (3/5) contains no data relevant to your standard device.

**HAZARDOUS LOCATIONS**  
Cl. I Div. 1 Groups A,B,C,D  
Cl. I Zone 1 Group IIC  
Cl. I Div. 2 Group A,B,C,D  
Cl. I Zone 2 Group IIC  
Cl. II, III Div. 1 Group E,F,G

**NON HAZARDOUS LOCATIONS**

**Notes:**  
**Intrinsically safe signal output:**  
1) Wire all intrinsically circuits per ISA RP 12.6. or in conduit per NEC ANSI/NFPA 70  
2) **WARNING: SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY.**  
3) Control room equipment may not use or generate more than 250 Vrms.

**PROMAG Type: 5\*\*\*-\*\*\*\*\*G**  
**Terminals: 26, 27 (Foundation Fieldbus):**  
Intrinsically safe circuit:

V <sub>max</sub> / U <sub>i</sub>	I <sub>max</sub> / I <sub>i</sub>	P <sub>max</sub> / P <sub>i</sub>	C <sub>i</sub>	L <sub>i</sub>
30 V	500 mA	5,5 W	≤ 5 nF	≤ 10 μH

Connect to entity approved associated apparatus with  
I<sub>SC</sub>, I<sub>i</sub> or I<sub>0</sub> ≤ I<sub>max</sub> or I<sub>i</sub> and  
V<sub>OC</sub>, V<sub>i</sub> or U<sub>0</sub> ≤ V<sub>max</sub> or U<sub>i</sub>  
(P<sub>0</sub> ≤ P<sub>max</sub> or P<sub>i</sub>)  
Cable parameters for Intrinsic Safety:  
C<sub>cable</sub> ≤ C<sub>2</sub> / C<sub>0</sub> - Σ C<sub>i</sub>  
L<sub>cable</sub> ≤ L<sub>2</sub> / L<sub>0</sub> - Σ L<sub>i</sub> or  
L/R<sub>cable</sub> ≤ L/R<sub>Associated Apparatus</sub> and L<sub>i</sub> of each I.S. apparatus ≤ 10 μH

Keine Änderungen ohne vorherige Factory Mutual Genehmigung

**Nonintrinsically safe signal output:**  
4) Transmitter circuit wiring in conduit in accordance with NEC ANSI/NFPA 70.  
5) **WARNING: EXPLOSION HAZARD - SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I, DIVISION 1.**  
6) Control room equipment may not use or generate over 250 Vrms.

**PROMAG Type: 5\*\*\*-\*\*\*\*\*K**  
**Terminals 26,27 (FIELDBUS FOUNDATION NON I.S.):**  
V ≤ 32 V, I = 10 mA

Anderungen:	A	27.09.00 / Bn	F	Alle gesetzlichen Urheberrechte vorbehalten. Diese Zeichnung darf ohne unsere Genehmigung weder vervielfältigt werden noch dritten Personen und Konkurrenzfirmen zugänglich gemacht werden.	Ersetzt durch:
B	G				Ersteller: FES / ID 1006 File: M:\ZEICHN\G\FES0023\000411C.DOC
C	H				
D	J				
E	K				

**FM Control Drawing Div. 1 / Zone 1**  
**PROMAG 5. W / P / H**  
**Fieldbus Foundation I.S. installation**

Masstab	Gezeichnet	4. Jan. 2000	UD
%	Geprüft		
	Ex-geprüft	27.09.00	Bn
	Gesehen		

**FES0023-0000F0A 3/5**

Note!  
These figure (4/5) contains no data relevant to your standard device.

**FISCO CONCEPT**  
The FISCO Concept allows interconnection of intrinsically safe apparatus to associated apparatus not specially examined in such combination. The criteria for interconnection is that the voltage (U<sub>i</sub> or V<sub>max</sub>), the current (I<sub>i</sub> or I<sub>max</sub>), and the power (P<sub>i</sub> or P<sub>max</sub>) which intrinsically safe apparatus can receive and remain intrinsically safe, considering faults, must be equal or greater than the voltage (U<sub>0</sub>, V<sub>oc</sub> or V<sub>t</sub>), the current (I<sub>0</sub>, I<sub>sc</sub> or I<sub>i</sub>) and the power (P<sub>0</sub> or P<sub>max</sub>) levels which can be delivered by the associated apparatus, considering faults and applicable factors. In addition, the maximum unprotected capacitance (C<sub>i</sub>) and inductance (L<sub>i</sub>) of each apparatus (other than the termination) connected to the fieldbus must be less than or equal to 5 nF and 10 μH respectively.  
In each segment only one active device, normally the associated apparatus, is allowed to provide the necessary energy for the fieldbus system. The voltage U<sub>0</sub> (or V<sub>oc</sub> or V<sub>t</sub>) of the associated apparatus is limited to a range of 14V to 24V d.c. All other equipment connected to the bus cable has to be passive, meaning that they are not allowed to provide energy to the system, except a leakage current of 50μA for each connected device. Separately powered equipment needs a galvanic isolation to assure that the intrinsically safe fieldbus circuit remains passive.  
The cable used to interconnect the devices needs to have the parameter in the following range:

Loop Resistance R'	15...150 Ohm/km
Inductance per unit length L'	0.4...1 mH/km
Capacitance per unit length C'	80...200 nF

C' = C' line/line + 0.5 C' line/screen, if both lines are floating, or  
C' = C' line/line + C' line/screen, if the screen is connected to one line  
Length of trunk cable: ≤ 1000 m  
Length of spur cable: ≤ 30 m  
Length of splice: ≤ 1 m

At each end of the trunk cable an approved infallible line termination with following parameters is suitable:  
R = 90...100 Ohm      C = 0...2.2 μF

One of the allowed terminations might already be integrated in the associated apparatus. The number of passive apparatus connected to the bus segment is not limited due to I. S. reasons. If the above rules are respected, up to a total length of 1000 m (sum of trunk and all spur cables), the inductance and the capacitance of the cable will not impair the intrinsic safety of the installation.

**Notes:**  
**Intrinsically safe Class I, Div. 1, Groups A,B,C,D**  
1. Approved associated apparatus must be installed in accordance with manufacturers instructions.  
2. FM approved associated apparatus must meet the following parameters:  
U<sub>0</sub> or V<sub>oc</sub> or V<sub>t</sub> ≤ U<sub>i</sub> (V<sub>max</sub>) and I<sub>0</sub> or I<sub>sc</sub> or I<sub>i</sub> ≤ I<sub>i</sub> (I<sub>max</sub>) and P<sub>0</sub> or P<sub>max</sub> ≤ P<sub>i</sub> (P<sub>max</sub>)  
3. The maximum non-hazardous area voltage must not exceed 250V  
4. The installation must be in accordance with the National Electrical Code NFPA 70, and ANSI/ISA-Rp 12.6, (except chapter 5).  
5. Multiple earthing of screen is allowed only, if high integrity equipotential system is realized between the points of bonding (see drawing No. FES 0014).  
6. Caution: Use only supply wires suitable for 5°C above surrounding temperature.  
7. Warning: Substitution of components may impair intrinsic safety.  
8. The polarity for connection PA+ (26) and PA- (27) is of no importance due to an internal rectifier.

**HAZARDOUS (CLASSIFIED) LOCATION**  
Class I, Division 1, Groups A,B,C,D  
Class II, Division 1, Groups E,F,G  
Class III, Division 1

**NONHAZARDOUS LOCATION**

Keine Änderungen ohne vorherige Factory Mutual Genehmigung

**PROMAG 5\* -\*\*\*\*\*F**  
**PROFIBUS PA: PA+(26) PA-(27) (FISCO-Model)**  
U<sub>i</sub> (V<sub>max</sub>) = 30 V      C<sub>i</sub> ≤ 5 nF  
I<sub>i</sub> (I<sub>max</sub>) = 500 mA      L<sub>i</sub> ≤ 10 μH  
P<sub>i</sub> (P<sub>max</sub>) = 5.5 W  
Leakage current: ≤ 50μA  
Apparatus provides galvanic isolation up to 250V rms between fieldbus circuit and any other circuit.  
Temperature Classification: T6  
Max. ambient Temperature: 50°C / 122°F

Anderungen:	A	27.09.00 / Bn	F	Alle gesetzlichen Urheberrechte vorbehalten. Diese Zeichnung darf ohne unsere Genehmigung weder vervielfältigt werden noch dritten Personen und Konkurrenzfirmen zugänglich gemacht werden.	Ersetzt durch:
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C	H				
D	J				
E	K				

**FM Control Drawing Div. 1 / Zone 1**  
**PROMAG 5. W / P / H**  
**Intrinsically safe PROFIBUS PA FISCO concept**

Masstab	Gezeichnet	4. Jan. 2000	UD
%	Geprüft		
	Ex-geprüft	27.09.00	Bn
	Gesehen		

**FES0023-0000F0A 4/5**

**NON HAZARDOUS LOCATION**

ENTITY APPROVED Barrier  
 $V_{oc}$  Barrier     $I_{SO}$  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:**  
 1) Use supply wires suitable for 5 °C above surrounding ambient, but at least for 80°C / 176°F.

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

**PROMAG Type: 53\* \*\*.....\*\*\*\*\*S**  
**Terminals: 26, 27 (HART current output):**  
 Active intrinsically safe circuit:

$V_{oc} / U_o$	$I_{sc} / I_o$	$P_{max} / P_o$	$C_a / C_o$	$L_a / L_o$
21.8 V	90 mA	490 mW	0.15 µF	4.1 mH

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

$V_{max} / U_i$	$I_{max} / I_i$	$P_{max} / P_i$	$C_i$	$L_i$
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)  $\geq 21.8 V$   
 $L_{cable} \leq 4.1 mH$

**Terminal 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  $U_o \leq V_{max}$      $P_{max}$  or  $P_o \leq P_{max} / P_i$   
 Cable parameters for Intrinsic Safety:  
 $C_{cable} \leq C_a$  (C<sub>a</sub>) - 6 nF     $L_{cable} \leq L_a$  (L<sub>a</sub>)

**PROMAG Type: 53\* \*\*.....\*\*\*\*\*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  $U_o \leq V_{max} / U_i$   
 $I_{sc}, I_i$  or  $I_o \leq I_{max} / I_i$   
 Cable parameters for Intrinsic Safety:  
 $C_{cable} \leq C_a$  Barrier OR  $C_o$  Barrier - 6 nF  
 $L_{cable} \leq L_a$  Barrier OR  $L_o$  Barrier

**Terminal 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  $U_o \leq V_{max}$      $P_{max}$  or  $P_o \leq P_{max} / P_i$   
 Cable parameters for Intrinsic Safety:  
 $C_{cable} \leq C_a$  (C<sub>a</sub>) - 6 nF     $L_{cable} \leq L_a$  (L<sub>a</sub>)

Keine Änderungen ohne vorherige Factory Mutual Genehmigung

Änderungen:	A	27.09.00 / Bn	F			Alle gesetzlichen Urheberrechte vorbehalten. Diese Zeichnung darf ohne unsere Genehmigung weder vervielfältigt werden noch Dritten Personen und Konkurrenzfirmen zugänglich gemacht werden.	Ersetzt durch:
	B		G				Erstellt für:
	C		H				Ersteller: FES / ID 1006
	D		I				File: 53-Zeichnung/53PROMAG/0270900.doc
	E		J				
			K				

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

Massstab

Gezeichnet 27.09.00 Bn

Geprüft

Ex-geprüft 27.09.00 Bn

Sesehen

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

**FES0023-0000F0A**    **5/5**

**Supplementary documentation**

TI 046D/06  
 TI 047D/06  
 TI 048D/06

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# promag 53 Division 1

## Ex documentation for the BA 047D and BA 048D operating instructions according to CANADIAN STANDARDS ASSOCIATION



Example: **Class I, Division 1, Groups 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 dusts (Examples)	Min. ignition temperature [ $\mu$ J]
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	Grain dust (Class II)	
	Textile fibres (Class III)	


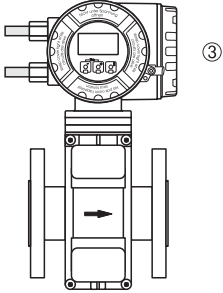
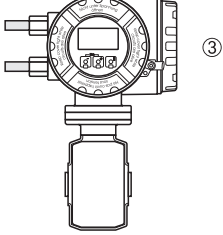
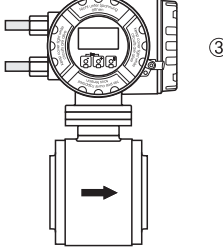

  

Type of Protection	
	Explosionproof
	Intrinsically Safe Apparatus
	Associated Apparatus with Intrinsically Safe Connections
	Nonincendive Field Wiring Circuit
	Pressurized
	Associated Pressurization Systems/Components
	Nonincendive
	Dust-Ignitionproof
	Special Protection

Temperature Class		
CSA	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



Hazardous area		Safe area
Division 1 / Zone 1	Division 2 / Zone 2	
 <p>Operation via HART handheld DXR 275***16* (Ex version, only for intrinsically safe current circuits)</p> <p>Promag 53 P = DN 15...300 W = DN 65...300</p>  <p>Promag 53 H = DN 2...25</p>  <p>Promag 53 H = DN 40...100</p> 		 <p>Operation via HART handheld DXR 275 (only for non-intrinsically safe current circuits)</p>
Division 1 / Zone 1	Division 2 / Zone 2	
Hazardous area		Safe area

F-53xxxZZ-16-xx-xx-eh-003

- Promag 53 flow measuring system in:  
Explosionproof and Dust-Ignitionproof for  
Class I, Groups ABCD or Class I, Zone 1, Group IIC  
Class II, Groups EFG  
Class III
- For ambient and medium temperature ranges, and temperature class, see Page 3.

③ Transmitter terminal compartment power supply / I/O-cable

## Temperature tables

### Measuring system Promag 53 W/P/H (compact version)

<i>at <math>T_a = 40\text{ °C}</math></i>		Max. medium temperature [°C] in			
		T5	T4A	T4	T3C
<b>Promag H</b>	DN 2...100	50	110	130	150
<b>Promag P</b>	DN 25...200 (PFA lining)	50	110	130	150
<b>Promag P</b>	DN 15...300 (PTFE lining)	50	110	130	–
<b>Promag W</b>	DN 65...300 (hard-rubber lining)	50	–	–	–

<i>at <math>T_a = 45\text{ °C}</math></i>		Max. medium temperature [°C] in			
		T5	T4A	T4	T3C
<b>Promag H</b>	DN 2...100	50	110	130	–
<b>Promag P</b>	DN 5...200 (PFA lining)	50	110	130	–
<b>Promag P</b>	DN 15...300 (PTFE lining)	50	110	130	–
<b>Promag W</b>	DN 65...300 (hard-rubber lining)	50	–	–	–

<i>at <math>T_a = 50\text{ °C}</math></i>		Max. medium temperature [°C] in			
		T5	T4A	T4	T3C
<b>Promag H</b>	DN 2...100	50	110	–	–
<b>Promag P</b>	DN 5...200 (PFA lining)	50	110	–	–
<b>Promag P</b>	DN 15...300 (PTFE lining)	50	110	–	–
<b>Promag W</b>	DN 65...300 (hard-rubber lining)	50	–	–	–

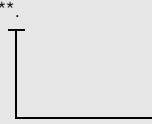


#### Note!

At the specified medium temperatures, the equipment is not subjected to temperatures impermissible for the temperature class in question.

## Approvals

No. / approval type	Description
Approval 160686-1006421  (See Page 5 for notes on special conditions)	for the electric flow measuring system Promag 53  Identification: <b>Explosionproof and Dust-Ignitionproof for                      Class I, Groups ABCD or                      Class I, Zone 1, Group IIC                      Class II, Groups EFG                      Class III</b>

Promag 53 measuring system (compact version)	
Promag 53***-*****. 	<ul style="list-style-type: none"> <li>A = current HART, frequency</li> <li>B = current HART, frequency, 2 x relay</li> <li>C = current HART, frequency, 2 x relay, flexible module</li> <li>D = current HART, frequency, status, status input, flexible module</li> <li>L = current HART, 2 x relay, status input, flexible module</li> <li>S = current HART (IS) active, frequency (IS)</li> <li>T = current HART (IS) passive, frequency (IS)</li> <li>M = current HART, 2 x frequency, status input, flexible module</li> <li>2 = current HART, frequency, current, relay, flexible module</li> </ul>
Promag 53 H DN 2...100: Promag 53 P DN 15...600: Promag 53 W DN 65...300:	<b>see description above</b>

## Notified body

The Promag measuring system was tested for approval by the following named entity:

CSA: Canadian Standards Association

## Special conditions

1. Install per Canadian Electrical Code.
2. Control room equipment shall not use or generate more than 250 V rms.
3. The specified temperature class in conjunction with the ambient temperature and the medium temperature must be in compliance with the tables on Page 3.
4. Use of the devices is restricted to mediums against which the process-wetted materials are adequately resistant.



Caution!

5. Use supply wires suitable for 5 °C above ambient temperature, but at least for 80 °C.

## General warnings



- 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).

## Electrical connections

### Power supply connection

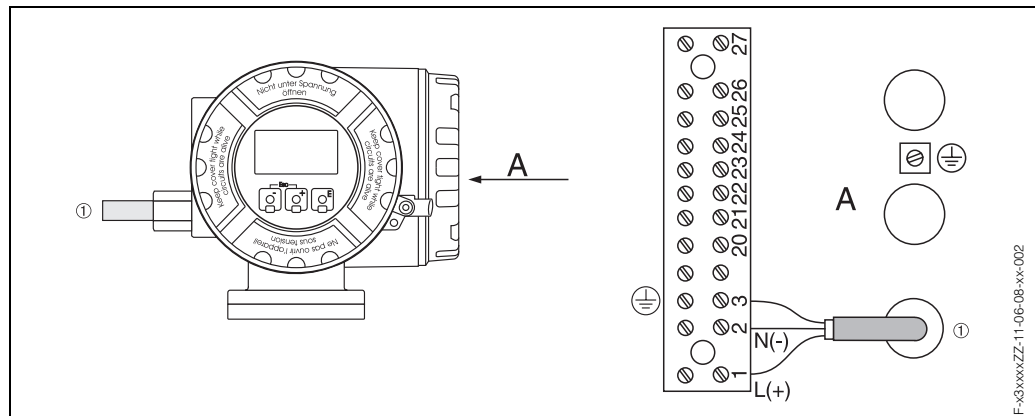


Fig. 1: ① = power supply cable  
A = view A

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

### Transmitter Promag 53

Terminals	1	2	3
+ / -	L (+)	N (-)	
Designation	Power supply ①		Ground
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		
Intrinsically safe circuit	no		
U <sub>max</sub> =	260 V AC		



### Input/output circuit

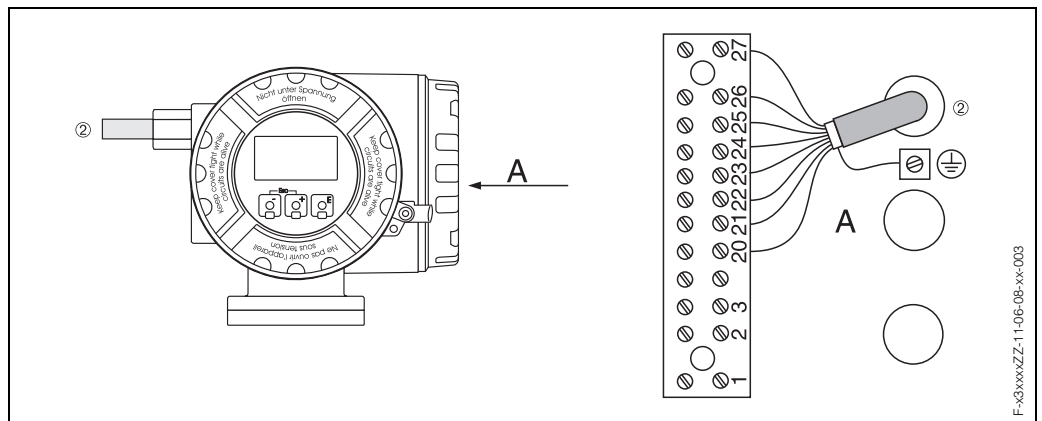


Fig. 2: ② = input/output circuit cable  
A = view A



#### Note!

The table below contains the values that are not identical for all versions, in other words 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.

### Transmitter Promag 53\*\*\*-\*\*\*\*\*A

Terminals	20	21	22	23	24	25	26	27
+ / -	+	-	+	-	+	-	+	-
Designation					Pulse/frequency output ②		Current output HART ②	
Functional values					f = 2...10000 Hz active: 24 V DC/ 25 mA passive: 30 V DC/ 250 mA		active: 0/4...20 mA R <sub>L</sub> < 700 Ω R <sub>L</sub> HART ≥ 250 Ω passive: 4...20 mA max. 30 V DC	
Intrinsically safe circuit					no		no	
U <sub>max</sub> =					260 V AC		260 V AC	
I <sub>max</sub> =					500 mA			

**Transmitter Promag 53\*\*\*-\*\*\*\*\*B**

Terminals	20	21	22	23	24	25	26	27
+ / -	+	-	+	-	+	-	+	-
Designation	Relay ②		Relay ②		Pulse/frequency output ②		Current output HART ②	
Functional values	42 V DC/100 mA or 30 V AC/500 mA		42 V DC/100 mA or 30 V AC/500 mA		f = 2...10000 Hz active: 24 V DC/ 25 mA passive: 30 V DC/ 250 mA		active: 0/4...20 mA $R_L < 700 \Omega$ $R_L \text{ HART} \geq 250 \Omega$ passive: 4...20 mA max. 30 V DC	
Intrinsically safe circuit	no		no		no		no	
$U_{\max} =$	260 V AC		260 V AC		260 V AC		260 V AC	
$I_{\max} =$	500 mA							

**Transmitter Promag 53\*\*\*-\*\*\*\*\*C**

Terminals	20	21	22	23	24	25	26	27
+ / -	+	-	+	-	+	-	+	-
Designation	Relay ②		Relay ②		Pulse/frequency output ②		Current output HART ②	
Functional values	42 V DC/100 mA or 30 V AC/500 mA		42 V DC/100 mA or 30 V AC/500 mA		f = 2...10000 Hz active: 24 V DC/ 25 mA passive: 30 V DC/ 250 mA		active: 0/4...20 mA $R_L < 700 \Omega$ $R_L \text{ HART} \geq 250 \Omega$ passive: 4...20 mA max. 30 V DC	
Intrinsically safe circuit	no		no		no		no	
$U_{\max} =$	260 V AC		260 V AC		260 V AC		260 V AC	
$I_{\max} =$	500 mA							

**Transmitter Promag 53\*\*\*-\*\*\*\*\*D**

Terminals	20	21	22	23	24	25	26	27
+ / -	+	-	+	-	+	-	+	-
Designation	Status input ②		Relay ②		Pulse/frequency output ②		Current output HART ②	
Functional values	3...30 V DC $R_i = 5 \text{ k}\Omega$		42 V DC/100 mA or 30 V AC/500 mA		f = 2...10000 Hz active: 24 V DC/ 25 mA passive: 30 V DC/ 250 mA		active: 0/4...20 mA $R_L < 700 \Omega$ $R_L \text{ HART} \geq 250 \Omega$ passive: 4...20 mA max. 30 V DC	
Intrinsically safe circuit	no		no		no		no	
$U_{\max} =$	260 V AC		260 V AC		260 V AC		260 V AC	
$I_{\max} =$	500 mA							

**Transmitter Promag 53\*\*\*-\*\*\*\*\*L**

Terminals	20	21	22	23	24	25	26	27
+ / -	+	-	+	-	+	-	+	-
Designation	Status input ②		Relay ②		Relay ②		Current output HART ②	
Functional values	3...30 V DC $R_i = 5 \text{ k}\Omega$		42 V DC/100 mA or 30 V AC/500 mA		42 V DC/100 mA or 30 V AC/500 mA		active: 0/4...20 mA $R_L < 700 \Omega$ $R_L \text{ HART} \geq 250 \Omega$ passive: 4...20 mA max. 30 V DC	
Intrinsically safe circuit	no		no		no		no	
$U_{\text{max}} =$	260 V AC		260 V AC		260 V AC		260 V AC	
$I_{\text{max}} =$	500 mA							

**Transmitter Promag 53\*\*\*-\*\*\*\*\*M**

Terminals	20	21	22	23	24	25	26	27
+ / -	+	-	+	-	+	-	+	-
Designation	Status input ②		Pulse/frequency output ②		Pulse/frequency output ②		Current output HART ②	
Functional values	3...30 V DC $R_i = 5 \text{ k}\Omega$		f = 2...10000 Hz active: 24 V DC/ 25 mA passive: 30 V DC/ 250 mA		f = 2...10000 Hz active: 24 V DC/ 25 mA passive: 30 V DC/ 250 mA		active: 0/4...20 mA $R_L < 700 \Omega$ $R_L \text{ HART} \geq 250 \Omega$ passive: 4...20 mA max. 30 V DC	
Intrinsically safe circuit	no		no		no		no	
$U_{\text{max}} =$	260 V AC		260 V AC		260 V AC		260 V AC	
$I_{\text{max}} =$	500 mA							

**Transmitter Promag 53\*\*\*-\*\*\*\*\*S**

Terminals	20	21	22	23	24	25	26	27
+ / -	+	-	+	-	+	-	+	-
Designation					Pulse/frequency output ②		Current output HART ②	
Functional values					f = 0...5000 Hz passive: 30 V DC/ 250 mA		active: 0/4...20 mA $R_L < 400 \Omega$ $R_L \text{ HART} \geq 250 \Omega$	
Intrinsically safe circuits					EEx ia		EEx ia	
$U_o =$							21.8 V DC	
$I_o =$							90 mA	
$P_o =$							490 mW	
$L_o =$							4.1 mH	
$C_o =$							150 nF	
$U_i =$					30 V DC		30 V DC	
$I_i =$					300 mA		10 mA	
$P_i =$					600 mW		0.3 W	
$L_i =$					negligible		negligible	
$C_i =$					6 nF		6 nF	

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

**Transmitter Promag 53\*\*\*-\*\*\*\*\*T**

Terminals	20	21	22	23	24	25	26	27
+ / -	+	-	+	-	+	-	+	-
Designation					Pulse/frequency output ②		Current output HART ②	
Functional values					f = 0...5000 Hz passive: 30 V DC/ 250 mA		passive: 0/4...20 mA Voltage drop $\leq 9 \text{ V}$ $R_L < \frac{V_{\text{supply}} - 9 \text{ V}}{25 \text{ mA}}$	
Intrinsically safe circuits					EEx ia		EEx ia	
$U_i =$					30 V DC		30 V DC	
$I_i =$					300 mA		100 mA	
$P_i =$					600 mW		1.25 W	
$L_i =$					negligible		negligible	
$C_i =$					6 nF		6 nF	

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

**Transmitter Promag 53\*\*\*-\*\*\*\*\*2**

Terminals	20	21	22	23	24	25	26	27
+ / -	+	-	+	-	+	-	+	-
Designation	Relay ②		Current output ②		Pulse/frequency output ②		Current output HART ②	
Functional values	42 V DC/100 mA or 30 V AC/500 mA		active: 0/4...20 mA $R_L < 700 \Omega$ passive: 4...20 mA max. 30 V DC		f = 2...10000 Hz active: 24 V DC/ 25 mA passive: 30 V DC/ 250 mA		active: 0/4...20 mA $R_L < 700 \Omega$ $R_L \text{ HART} \geq 250 \Omega$ passive: 4...20 mA max. 30 V DC	
Intrinsically safe circuit	no		no		no		no	
$U_{\max} =$	260 V AC		260 V AC		260 V AC		260 V AC	
$I_{\max} =$	500 mA							

## 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

③ *Cable entries for the transmitter terminal compartment  
power supply / I/O-cable: (Promag 53\*\*\*-\*\*\*\*N\*\*\*\*\*)*

Thread for cable entries 1/2" NPT.

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

## Technical data

Differences in dimensions and weights due to the use of an Explosionproof housing:

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

## Device identification

Promag 53 transmitter and W/P/H sensor

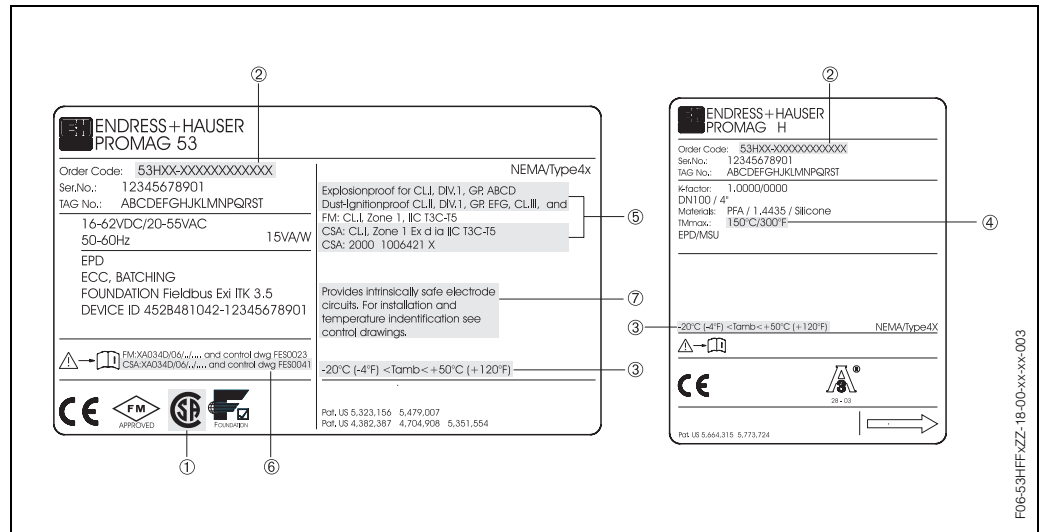


Fig. 3: Nameplate of transmitter and nameplate of sensor (example)

Key to nameplates (Figure 5)

No.	Meaning	No.	Meaning
①	Label of the notified body: Canadian Standards Association	⑤	Type of protection and explosion group for the Promag 53 measuring system
②	Type code	⑥	Applicable Ex documentation
③	Ambient temperature range	⑦	Warning
④	Maximum medium temperature		

## Control drawings

Endress+Hauser Reinach hereby declares that the product is in conformity with the requirements of the CADADIAN STANDARDS ASSOCIATION.

**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 50 P / H and PROMAG 53 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

**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.
- Install per Canadian Electrical Code

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<b>CSA Control Drawing Div. 1 / Zone 1</b> Class I Zone 1				Gezeichnet   12.04.00   Bn
<b>PROMAG 5x compact version</b>				Gepüft
				Ex-geprüft   28.09.00   Bn
				Gesehen
Flowtec AG, Kaeggenstrasse 7, CH-4153 Reinach BL1, Postfach			<b>FES0041-0000C0A 1/5</b>	

Note!  
These figure (2/5) contains no data relevant to your standard device.

**HAZARDOUS LOCATIONS**  
Cl. I Div. 1 Groups A,B,C,D  
Cl. I Zone 1 Group IIC  
Cl. I Div. 2 Group A,B,C,D  
Cl. I Zone 2 Group IIC  
Cl. II, III Div. 1 Group E,F,G

**NON HAZARDOUS LOCATIONS**

**Notes:**  
**Intrinsically safe signal output:**

- Wire intrinsically safe circuits per ISA RP 12.6, or in conduit per Canadian Electrical Code.
- WARNING: SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY.**
- Control room equipment may not use or generate more than 250 V rms.

PROMAG Type: 5\*\*\*\*-\*\*\*\*\*F  
**Terminals: 26 (+), 27 (-) (Profibus PA):**  
Passive intrinsically safe PROFIBUS PA circuit.  
For connecting the intrinsically safe circuit (PROFIBUS PA) according to the FISCO-CONCEPT see page 4 of this control document.

**Nonintrinsically safe signal output:**

- Transmitter circuit wiring in accordance with Canadian Electrical Code.
- WARNING: EXPLOSION HAZARD - SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I, DIVISION 1 OR CLASS I, ZONE 1**
- Control room equipment may not use or generate over 250 Vrms.

PROMAG Type: 5\*\*\*\*-\*\*\*\*\*H  
**Terminals 26 (+), 27 (-) (PROFIBUS PA)**  
V ≤ 32 V, I = 10 mA

PROMAG Type: 5\*\*\*\*-\*\*\*\*\*J  
**Terminals 24 (+5V), 25 (GND), 26 (DPA), 27 (DPB) (PROFIBUS DP)**  
Terminals: +5V, GND, DPA, DPB  
V = 5 V, I = 100 mA

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<b>CSA Control Drawing Div. 1 / Zone 1</b> PROMAG 5. W / P / H				Gezeichnet   12.04.00   Bn
<b>PROFIBUS PA / IS installation</b> PROFIBUS PA / DP non-IS installation				Gepüft
				Ex-geprüft   28.09.00   Bn
				Gesehen
Flowtec AG, Kaeggenstrasse 7, CH-4153 Reinach BL1, Postfach			<b>FES0041-0000C0A 2/5</b>	



Note!  
These figure (3/5) contains no data relevant to your standard device.

**HAZARDOUS LOCATIONS**  
 Cl. I Div. 1 Groups A,B,C,D  
 Cl. I Zone 1 Group IIC  
 Cl. I Div. 2 Group A,B,C,D  
 Cl. I Zone 2 Group IIC  
 Cl. II, III Div. 1 Group E,F,G

**NON HAZARDOUS LOCATIONS**

**Nonintrinsically safe signal output:**

- Transmitter circuit wiring in accordance with Canadian Electrical Code.
- WARNING: EXPLOSION HAZARD - SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I, DIVISION 1 OR CLASS I, ZONE 1.**
- Control room equipment may not use or generate over 250 Vrms.

PROMAG Type: 5\*\*\*\*,\*\*\*\*\*K  
**Terminals 26,27 (FIELDBUS FOUNDATION NON I.S.)**  
 $V \leq 32 V, I = 10 mA$

**Notes:**

**Intrinsically safe signal output:**

- Wire all intrinsically circuits per ISA RP 12.6. or in conduit per Canadian Electrical Code Part I
- WARNING: SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY.**
- Control room equipment may not use or generate more than 250 Vrms.

PROMAG Type: 5\*\*\*\*,\*\*\*\*\*G  
**Terminals: 26, 27 (Foundation Fieldbus):**  
 intrinsically safe circuit.

$V_{max} / U_i$	$I_{max} / I_i$	$P_{max} / P_i$	$C_i$	$L_i$
30 V	500 mA	5.5 W	$\leq 5 nF$	$\leq 10 \mu H$

Connect to entity approved associated apparatus with  
 $I_{sc}$  or  $I_o \leq I_{max}$  or  $I_i$  and  
 $V_{oc}$  or  $U_o \leq V_{max}$  or  $U_i$   
 $(P_o \leq P_{max}$  or  $P_i)$

Cable parameters for Intrinsic Safety:  
 $C_{cable} \leq C_c / C_o - \Sigma C_i$   
 $L_{cable} \leq L_c / L_o - \Sigma L_i$  or  
 $L/R_{cable} \leq L/R_{associated Apparatus}$  and  $L_i$  of each I.S. apparatus  $\leq 10 \mu H$

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<b>CSA Control Drawing Div. 1 / Zone 1 PROMAG 5. W / P / H Fieldbus Foundation I.S. installation</b>				Gezeichnet	12.04.00   Bn
				Geprüft	
				Ex-geprüft	28.09.00   Bn
				Gesehen	

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

**FES0041-0000COA**

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Note!  
These figure (4/5) contains no data relevant to your standard device.

**FISCO CONCEPT**  
 The FISCO Concept allows interconnection of intrinsically safe apparatus to associated apparatus not specially examined in such combination. The criteria for interconnection is that the voltage ( $U_i$  or  $V_{max}$ ), the current ( $I_i$  or  $I_{max}$ ), and the power ( $P_i$  or  $P_{max}$ ) which intrinsically safe apparatus can receive and remain intrinsically safe, considering faults, must be equal or greater than the voltage ( $U_o$  or  $V_{oc}$ ), the current ( $I_o$  or  $I_{sc}$ ) and the power ( $P_o$  or  $P_{max}$ ) levels which can be delivered by the associated apparatus, considering faults and applicable factors. In addition, the maximum unprotected capacitance ( $C_i$ ) and inductance ( $L_i$ ) of each apparatus (other than the termination) connected to the fieldbus must be less than or equal to  $5 nF$  and  $10 \mu H$  respectively.

In each segment only one active device, normally the associated apparatus, is allowed to provide the necessary energy for the fieldbus system. The voltage  $U_o$  or  $V_{oc}$  of the associated apparatus is limited to a range of 14V to 24Vd.c. All other equipment connected to the bus cable has to be passive, meaning that they are not allowed to provide energy to the system, except a leakage current of 50µA for each connected device. Separately powered equipment needs a galvanic isolation to assure that the intrinsically safe fieldbus circuit remains passive.

The cable used to interconnect the devices needs to have the parameter in the following range:

Loop Resistance R':	15...150 Ohm/km
Inductance per unit length L':	0.4...1 mH/km
Capacitance per unit length C':	80...200 nF

$C' = C \cdot \text{line/line} + 0.5 C' \cdot \text{line/screen}$ , if both lines are floating, or  
 $C' = C \cdot \text{line/line} + C' \cdot \text{line/screen}$ , if the screen is connected to one line

Length of trunk cable:  $\leq 1000 m$   
 Length of spur cable:  $\leq 30 m$   
 Length of splice:  $\leq 1 m$

At each end of the trunk cable an approved infallible line termination with following parameters is suitable:  
 $R = 90...100 Ohm$        $C = 0...2.2 \mu F$

One of the allowed terminations might already be integrated in the associated apparatus. The number of passive apparatus connected to the bus segment is not limited due to I. S. reasons. If the above rules are respected, up to a total length of 1000 m (sum of trunk and all spur cables), the inductance and the capacitance of the cable will not impair the intrinsic safety of the installation.

**Notes:**  
**Intrinsically safe Class I, Div. 1, Groups A,B,C,D**

- Approved associated apparatus must be installed in accordance with manufacturers instructions.
- CSA approved associated apparatus must meet the following parameters:  
 U or  $V_{oc} \leq U_i$  ( $V_{max}$ ) and  $I_o$  or  $I_{sc} \leq I_i$  ( $I_{max}$ ) and  $P_o \leq P_i$  ( $P_{max}$ )
- The maximum non-hazardous area voltage must not exceed 250V
- The installation must be in accordance with the Canadian Electrical Code
- Multiple earthing of screen is allowed only, if high integrity equipotential system is realized between the points of bonding (see drawing No. FES 0014).
- Caution: Use only supply wires suitable for 5°C above surrounding temperature.
- Warning : Substitution of components may impair intrinsic safety.
- The polarity for connection PA+ (26) and PA- (27) is of no importance due to an internal rectifier.

**HAZARDOUS (CLASSIFIED) LOCATION**  
 Class I, Division 1, Groups A,B,C,D  
 Class II, Division 1, Groups E,F,G  
 Class III, Division 1

**NONHAZARDOUS LOCATION**

**Notes:**

**Intrinsically safe PROFIBUS PA**

- Approved associated apparatus must be installed in accordance with manufacturers instructions.
- CSA approved associated apparatus must meet the following parameters:  
 U or  $V_{oc} \leq U_i$  ( $V_{max}$ ) and  $I_o$  or  $I_{sc} \leq I_i$  ( $I_{max}$ ) and  $P_o \leq P_i$  ( $P_{max}$ )
- The maximum non-hazardous area voltage must not exceed 250V
- The installation must be in accordance with the Canadian Electrical Code
- Multiple earthing of screen is allowed only, if high integrity equipotential system is realized between the points of bonding (see drawing No. FES 0014).
- Caution: Use only supply wires suitable for 5°C above surrounding temperature.
- Warning : Substitution of components may impair intrinsic safety.
- The polarity for connection PA+ (26) and PA- (27) is of no importance due to an internal rectifier.

PROMAG 5\*\*\*\*,\*\*\*\*\*F

PROFIBUS PA: PA+(26) PA-(27) (FISCO-Model)

$U_i$ ( $V_{max}$ ) = 30 V	$C_i \leq 5 nF$
$I_i$ ( $I_{max}$ ) = 500 mA	$L_i \leq 10 \mu H$
$P_i$ ( $P_{max}$ ) = 5.5 W	

Leakage current:  $\leq 50 \mu A$

Apparatus provides galvanic isolation up to 250V rms between fieldbus circuit and any other circuit

Temperature Classification:  
 Max. ambient Temperature: **50°C / 122°F**

Any CSA Approved Intrinsically Safe Apparatus suitable for FISCO Concept

Any CSA Approved Termination with  
 $R = 90...100 \Omega$   
 $C = 0...2.2 \mu F$

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<b>CSA Control Drawing Div. 1 / Zone 1 PROMAG 5. W / P / H Intrinsically safe PROFIBUS PA FISCO Concept</b>				Gezeichnet	12.04.00   Bn
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**NON HAZARDOUS LOCATION**

CSA Certified Barrier or Associated Apparatus  
 $V_{oc} / U_o$  Barrier     $I_{sc} / I_o$  Barrier  
 $C_a / C_o$  Barrier     $L_a / L_o$  Barrier

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

**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:**  
 1) Use supply wires suitable for 5 °C above surrounding ambient, but at least for 80°C / 176°F.  
 2) Wire all intrinsically circuits per Canadian Electrical Code  
 3) **WARNING: SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY.**  
 4) Control room equipment may not use or generate more than 250 Vrms.

**Intrinsically safe signal output:**  
 WARNING: SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY.

**PROMAG Type: 53\* \*\*-\*\*\*\*\*T**  
**Terminals: 26, 27 (HART current output):**  
 Active intrinsically safe circuit:

$V_{oc} / U_o$	$I_{sc} / I_o$	$P_{max} / P_o$	$C_a / C_o$	$L_a / L_o$
21.8 V	90 mA	490 mW	0.15 $\mu$ F	4.1 mH

Cable parameters for Intrinsic Safety:  
 $C_{cable} \leq 0.15 \mu F$  if  $V_{oc} / U_o$  (of Barrier)  $\leq 21.8 V$   
 $C_{cable} \leq C_a / C_o$  Barrier - 6 nF if  $V_{oc} / U_o$  (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	10 mA	300 mW	6 nF	0

Cable parameters for Intrinsic Safety:  
 $C_{cable} \leq C_a (C_o) - 6 nF$        $L_{cable} \leq L_a (L_o)$

**PROMAG Type: 53\* \*\*-\*\*\*\*\*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  
 $V_{oc}$  or  $U_o \leq V_{max} / U_i$   
 $I_{sc}$  or  $I_o \leq I_{max} / I_i$   
 Cable parameters for Intrinsic Safety:  
 $C_{cable} \leq C_a$  Barrier or  $C_o$  Barrier - 6 nF  
 $L_{cable} \leq L_a$  Barrier or  $L_o$  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:  
 $V_{oc}$  or  $U_o \leq V_{max}$        $P_{max}$  or  $P_o \leq P_{max} / P_i$   
 Cable parameters for Intrinsic Safety:  
 $C_{cable} \leq C_a (C_o) - 6 nF$        $L_{cable} \leq L_a (L_o)$

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	E		J				
	F		K				

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

	Massstab		Gezeichnet	28.09.00	Bn
			Geprüft		
			Ex-geprüft	28.09.00	Bn
			Gesehen		

**FES0041-0000C0A**  
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### Supplementary documentation

TI 046D/06  
 TI 047D/06  
 TI 048D/06

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