

FM Approvals
1151 Boston Providence Turnpike
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CERTIFICATE OF COMPLIANCE

HAZARDOUS (CLASSIFIED) LOCATION ELECTRICAL EQUIPMENT

This certificate is issued for the following equipment:

PROSONIC FLOW 92abb-cdefghiklmno

IS / I, II, III / 1 / ABCDEFG / T* — FES0103, Entity / FISCO, Type 4X;

I / 1 / AEx ia / IIC / T* — FES0103, Entity / FISCO, Type 4X;

NI / I / 2 / ABCD / T* — FES0103, NIFW / FNICO, Type 4X;

I / 2 / AEx nC IIC / T* — FES0103, NIFW / FNICO, Type 4X;

Entity / Nonincendive Field Wiring Parameters:

Terminals	V_{max} (V)	I_{max} (mA)	P_i (W)	C_i (nF)	L_i (μ H)
1 and 2	30	300	1.0	5.3	9.0
3 and 4	30	100	1.0	0	9.0

FISCO / FNICO Wiring Parameters:

Terminals	V_{max} (V)	I_{max} (mA)	P_i (W)	C_i (nF)	L_i (μ H)
1 and 2	17.5	600	8.5	0	0

OR

1 and 2	24	250	1.2	0	0
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For option i = F (sensor remote housing environmental rating is Type 6P, IP67).

a = Type of sensor: F or X.

bb = Size: 25, 40, 80, 1H, 1F, or XX.

c = Sensor Type, Process Temperature: Not safety relevant.

d = Measuring Tube Material: S or X.

e = Process Connection: Not safety relevant.

f = Calibration: Not safety relevant.

g = Additional Tests: Not safety relevant.

h = Approvals: N.

i = Housing: A, E, F, or X.

k = Sensor Cable: any single number or letter (maximum length of 100m.)

l = Cable Entry: A, B, C, J, K, L or X.

m = Display: 0, 4, 6, or X.

n = Software: Not safety relevant.

o = I/O's: A, H, W, K, or X.

Special Conditions of Use:

1. For installation instructions and the Temperature Class (*), which applies to specific models, ambient

temperatures (Ta), and process medium temperatures (Tmed), refer to Control Drawing.

PROSONIC FLOW 92abb-cdefghiklmno

XP-AIS / I / 1 / ABCD / T* — FES0105, Type 4X;

DIP-AIS / II, III / 1 / EFG / T* — FES0105, Type 4X;

I / 1 / AEx d [ia] IIC / T* — FES0105, Type 4X;

For option i = F (sensor remote housing environmental rating is Type 6P, IP67).

a = Type of sensor: F or X.

bb = Size: 25, 40, 80, 1H, 1F, or XX.

c = Sensor Type, Process Temperature: Not safety relevant.

d = Measuring Tube Material: S or X.

e = Process Connection: Not safety relevant.

f = Calibration: Not safety relevant.

g = Additional Tests: Not safety relevant.

h = Approvals: P.

i = Housing: A, E, F, or X.

k = Sensor Cable: any single number or letter (maximum length of 100m.)

l = Cable Entry: B or X.

m = Display: 0, 4, 6, or X.

n = Software: Not safety relevant.

o = I/O's: A, H, W, K, or X.

Special Conditions of Use:

1. For installation instructions and the Temperature Class (*), which applies to specific models, ambient temperatures (Ta), and process medium temperatures (Tmed), refer to Control Drawing.

Equipment Ratings:

Prosonic Flow 92 series Ultrasonic Flowmeter as Intrinsically Safe Apparatus for use in Class I, II, III, Division 1, Group A, B, C, D, E, F, & G indoor/ outdoor hazardous (classified) locations, utilizing Type 4X and Type 6P, IP67 enclosure. Also rated as Class I, Zone 0, AEx ia IIC. FISCO requirements satisfied. The installation of the products should be in accordance with Control Drawing FES0103.

Prosonic Flow 92 series Ultrasonic Flowmeter as Nonincendive Apparatus for use in Class I, II, III, Division 2, Group A, B, C, D, E, F, & G indoor/ outdoor hazardous (classified) locations, utilizing Type 4X and Type 6P, IP67 enclosure with Nonincendive Field Wiring connections to Class I, II, III, Division 2, Groups A, B, C, D, E, F, & G indoor/outdoor hazardous (classified) locations. Also rated as Class I, Zone 2, AEx nC IIC. FNICO requirements satisfied. The installation of the products should be in accordance with Control Drawing FES0103.

Temperature Class T4, Ta = 80°C (transmitter) - Refer to control drawing for additional information

Temperature Class T5, Ta = 80°C (sensor) - Refer to control drawing for additional information

Evaluation for the Prosonic Flow 92 series Ultrasonic Flowmeter as Explosionproof for use in Class I, Division 1, Group A, B, C and D; Dust-Ignitionproof for use in Class II, III, Division 1, Group E, F and G indoor/ outdoor hazardous (classified) locations, utilizing Type 4X and Type 6P, IP67 enclosure with Intrinsically Safe connection to Class I, II, III, Division 1, Groups A, B, C, D, E, F, & G indoor/outdoor hazardous (classified) locations. Also rated as Class I, Zone 1, AEx d [ia] IIC. The installation of the products should be in accordance with Control Drawing FES0105.

Marked as "Dual Seal" in accordance with ANSI/ISA-12.27.01.

FM Approved for:

Endress + Hauser Flowtec AG
Kägenstraße 7
CH-4153 Reinach BL 1
Switzerland

This certifies that the equipment described has been found to comply with the following Approval Standards and other documents:

Class 3600	1998
Class 3610	2010
Class 3611	2004
Class 3615	1989
Class 3810	2005
ISA-60079-27	2006
ANSI/ISA-12.12.02	2003
ANSI/ISA-60079-0	2005
ANSI/ISA-60079-1	2005
ANSI/ISA 60079-11	2009
NEMA Pub. 250	1991
IEC60529	1999

Original Project ID: 3026261

Approval Granted: June 14, 2006

Subsequent Revision Reports / Date Approval Amended

Report Number	Date	Report Number	Date
090403	September 11, 2009		
3041673	April 21, 2011		

FM Approvals LLC



J. E. Marquedant
Group Manager, Electrical

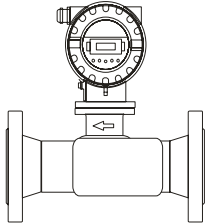
21 April 2011

Date

Hazardous Locations

Class I Division 1 Groups ABCD, Class II Division 1 Groups EFG and Class III or
Class I, Zone 0, Group IIC or
Class I, Division 2 Groups ABCD or Class I Zone 2 Group IIC

Compact version

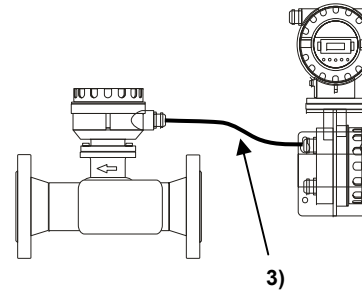


	Max. fluid temperature*)				
	T6 2)	T5 2)	T4	T3	T2 - T1
Ta = 40°C	80°C	95°C	130°C	195°C	200°C
Ta = 55°C	—	95°C	130°C	195°C	200°C
Ta = 60°C	—	—	130°C	195°C	200°C

*) but not exceeding the max. fluid temperature marked on the device

Minimum ambient temperature: -40°C
Minimum fluid temperature: -40°C

Remote version



Sensor:

	Max. fluid temperature*)				
	T6 2)	T5 2)	T4	T3	T2 - T1
Ta = 60°C	80°C	95°C	130°C	195°C	200°C
Ta = 80°C	—	95°C	130°C	195°C	200°C

*) but not exceeding the max. fluid temperature marked on the device

Minimum ambient temperature: -40°C
Minimum fluid temperature: -40°C

Transmitter:

	T6 2)	T5 2)	T4 - T1
Ta =	40°C	55°C	80°C

Minimum ambient temperature: -40°C

Notes:

1) Assignment of Control Drawings:

Drawing-No.	Model Codes:
FES0103	Prosonic Flow 92***-*****N*****
FES0103-0001	Prosonic Flow 92***-*****N*****A and Prosonic Flow 92***-*****N*****W
FES0103-0002, FES0103-0003, FES0103-0004, FES0103-0005	Prosonic Flow 92***-*****N*****H and Prosonic Flow 92***-*****N*****K

- Temperature class T6 and T5 is not allowed for versions of Profibus PA and Fieldbus Foundation
(not for Prosonic Flow 92***-*****N*****H and
Prosonic Flow 92***-*****N*****K)
- Max. cable length for intrinsically safe installation 100m for using cable parameters
 $L_{\text{Cable}} = 1\text{mH/km}$ and $C_{\text{Cable}} = 1\mu\text{F/km}$
- Caution: Use supply wires suitable for 10°C above maximum ambient temperature
- Caution: Surface temperature of transmitter enclosure can exceed 70°C depending on ambient temperature or medium temperature
- Dust tight seals must be used at conduit entries for Class II and III installation
- Fieldbus cable connectors are suitable for Class I, Div. 2, Groups A,B,C,D if non-incendive circuits are connected (see FES0103-0005)
- Compact version and remote version are intended for use in Zone 1 or Zone 0. When installed in Zone 1 the interior of measuring tube is permissible for use in Zone 0
- Prosonic Flow 92 transmitter is intended for installation to Service Interface FXA 193 or FXA 291
- Prosonic Flow 92 is a Dual Seal rated device if the optional rupture disk is present.

Änderungen:

A	12.09.08/BDA	F
B	17.05.10/PAM	G
C	08.08.12/BIF	H
D		J
E		K

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Ersatz für:
Ersteller: FES/Bn

File: FES0103C.doc ID 1159

FM CONTROL DRAWING PROSONIC FLOW 92 (IS and NI) Compact Version, Remote version

Massstab

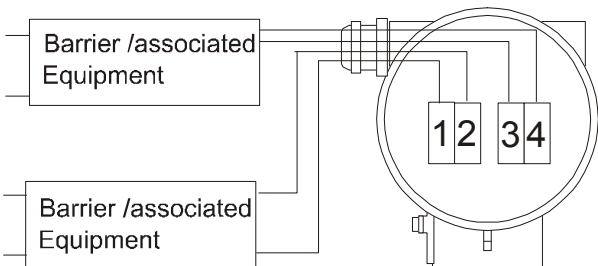
Gezeichnet	14.10.05	Bn
Geprüft		
Ex-geprüft	08.08.12	BIF
Gesehen		

Endress+Hauser 
Endress+Hauser Flowtec AG, CH-4153 Reinach

FES0103 C

Hazardous Locations

Class I Division 1 Groups ABCD, Class II Division 1 Groups EFG and Class III or
Class I, Zone 0, Group IIC or
Class I, Division 2 Groups ABCD or Class I Zone 2 Group IIC



Intrinsically safe installation

- 1) Control room equipment may not use or generate over 250 Vrms.
- 2) Wire all circuits for power supply per ISA RP 12.06.01
- 3) Use entity approved safety barrier or other associated equipment that satisfy the following conditions:

$V_{oc} \leq V_{max}$, $I_{sc} \leq I_{max}$, $C_a \geq C_l + C_{cable}$, $L_a \geq L_l + L_{cable}$ transmitter entity parameters are as follows:

Terminals 1 and 2 (Hart, current output)

$V_{\max}$	$I_{\max}$	P_i	C_i	L_i
30 V	300 mA	1 W	5.3 nF	9 μ H

Terminals 3 and 4 (Pulse)

$V_{\max}$	$I_{\max}$	P_i	C_i	L_i
30 V	300 mA	1 W	0	9 μ H

- 4) **WARNING:** SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY.
- 5) Ex ia is defined as Intrinsically Safe

Notes:

This page applies to model code:

Prosonic Flow 92***-*****N*****A and
Prosonic Flow 92***-*****N*****W

Division 2 and Zone 2 installation (without barrier)

- 6) Installation of transmitter circuit wiring according to NEC using threaded conduit or other wiring methods in accordance with articles 500 to 510.
- 7) **WARNING:** EXPLOSION HAZARD - SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I, DIVISION 2 OR ZONE 2.
- 8) Rated Parameters
Terminal 1 and 2
Supply voltage: HART 12 ... 35 V
Signal current: 4 ... 20 mA (max. 25 mA)
Terminal 3 and 4
Pulse Output: max. 35 V, max. 30 mA
- 9) For non-incendive field wiring installation see entity parameters as listed in note 3)

Class II, III installation (without barrier)

- 10) Installation of transmitter circuit wiring according to NEC using threaded conduit or other wiring methods in accordance with article 500 to 510.

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	B	17.05.10/PAM	G						
	C	08.08.12/BIF	H						
	D		J						
	E		K						
FM CONTROL DRAWING PROSONIC FLOW 92 (IS and NI) Current output, Hart, Pulse ENTITY INSTALLATION						Massstab	Gezeichnet	14.10.05	Bn
							Geprüft		
							Ex-geprüft	08.08.12	BIF
							Gesehen		
							Endress+Hauser  Endress+Hauser Flowtec AG, CH-4153 Reinach		

This page applies to model code: **Prosonic Flow 92***-*****N*****H and Prosonic Flow 92***-*****N*****K**

FISCO-Concept

The FISCO Concept allows interconnection of intrinsically safe apparatus to associated apparatus not specifically examined in such combination. The criteria for interconnection is that the voltage (Ui or Vmax), the current (Ii or Imax) and the power (Pi) which intrinsically safe apparatus can receive and remain intrinsically safe, considering faults, must be equal or greater than the voltage (Uo or Voc), the current (Io or Isc) and the power (Po) levels which can be delivered by the associated apparatus, considering faults and applicable factors. In addition, the maximum unprotected capacitance (Ci) and inductance (Li) 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 Uo of the associated apparatus has to be limited to the 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 to a leakage current of 50 µA 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 parameters in the following range:

- loop resistance R' : 15 150 Ω/km
- inducance per unit length L' : 0.4 1 mH/km
- capacitance per unit length C' : 80 200 nF/km
- 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 spur cable : ≤ 30 m
- length of trunk cable : ≤ 1 km
- length of splice : ≤ 1 m

At each end of the trunk cable an approved infallible line termination with the following parameters is suitable:

- R = 90 100 Ω
- C = 0 2.2 µF

One of the allowed terminations might already be integrated in the associated apparatus.

The number of passive devices 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 the length of trunk cable and all spur cables), the inductance and capacitance of the cable will not impair the intrinsic safety of the installation.

Notes:

Intrinsically safe installation

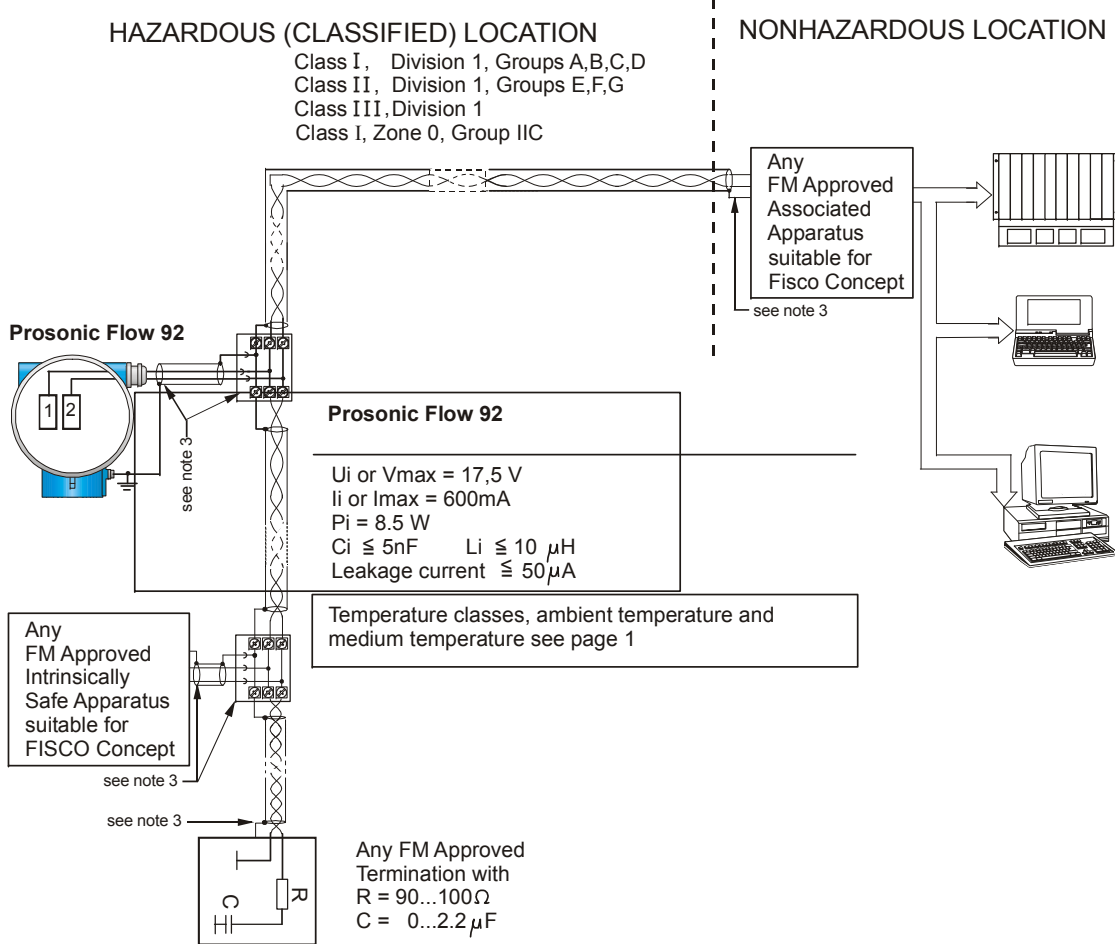
- 1) Control room equipment may not use or generate over 250 Vrms.
- 2) Installation of transmitter circuit wiring according to NEC using threaded conduit or other wiring methods in accordance with articles 500 to 510.
- 3) Be aware of multiple earthing of the screen. The screen must be connected in accordance with ISA RP 12.06.01
- 4) WARNING: SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY.

Division 2 and Zone 2 installation

- 5) Installation of transmitter circuit wiring according to NEC using threaded conduit or other wiring methods in accordance with articles 500 to 510.
- 6) WARNING: EXPLOSION HAZARD – SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY.

Class II installation

- 7) Transmitter circuit wiring in conduit in accordance with the NEC

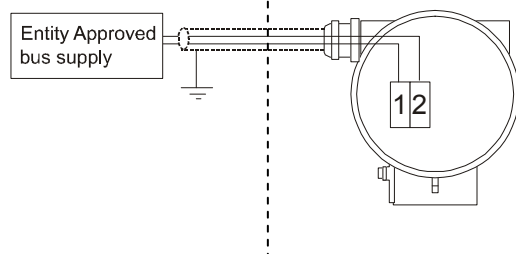


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	B	17.05.10/PAM	G					
	C	08.08.12/BIF	H					
	D		J					
	E		K					
FM CONTROL DRAWING Prosonic Flow 92 Division 1 FISCO - Concept					Massstab	Gezeichnet	14.10.05	Bn
						Geprüft		
						Ex-geprüft	08.08.12	BIF
						Gesehen		
Endress+Hauser  Endress+Hauser Flowtec AG, CH-4153 Reinach					FES0103-0002 C			

Non Hazardous Locations

Hazardous Locations

Class I Division 1 Groups ABCD and Class II and III Division 1
Groups EFG or
Class I, Zone 0, Group IIC or
Class I Division 2 Groups ABCD or
Class I Zone 2 Group IIC



This page applies to model code:

Prosonic Flow 92***-*****N*****H and
Prosonic Flow 92***-*****N*****K

Intrinsically safe installation:

- 1) Control room equipment may not use or generate over 250 Vrms.
- 2) Wire all circuits for power supply per ISA RP 12.6.
- 3) Use entity approved safety barrier or other associated equipment that satisfy the following conditions:
 $V_{oc} \leq V_{max}$, $I_{sc} \leq I_{max}$, $C_a \geq C_i + C_{cable}$, $L_a \geq L_i + L_{cable}$ transmitter entity parameters are as follows:
 Terminals 1 and 2

$V_{\max}$	$I_{\max}$	P_i	C_i	L_i
17.5 V	600 mA	8.5 W	≤ 5 nF	≤ 10 μ H
or 24 V	250 mA	1.2 W	≤ 5 nF	≤ 10 μ H

- 4) **WARNING:** SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY.
- 5) Ex ia is defined as Intrinsically Safe

Division 2 and Zone 2 installation (without barrier):

- 6) Control room equipment may not use or generate over 250 Vrms.
- 7) Installation of transmitter circuit wiring according to NEC using threaded conduit or other wiring methods in accordance with articles 500 to 510.
- 8) Wire all circuits for power supply per ISA RP 12.06.01
- 9) **WARNING:** SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I DIVISION 2 AND ZONE 2.

Class II, III installation (without barrier)

- 10) Transmitter circuit wiring according to NEC using threaded conduit or other wiring methods in accordance with article 500 to 510.

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	B	17.05.10/PAM	G						
	C	08.08.12/BIF	H						
	D		J						
	E		K						
FM CONTROL DRAWING						Massstab	Gezeichnet	14.10.05	Bn
PROSONIC FLOW 92 (IS and NI)							Geprüft		
Fieldbus Foundation and Profibus PA							Ex-geprüft	08.08.12	BIF
IS installation, Entity - Concept							Gesehen		
Endress+Hauser  Endress+Hauser Flowtec AG, CH-4153 Reinach						FES0103-0003 C			

This page applies to model code: **Prosonic Flow 92***_*****N*****H and Prosonic Flow 92***_*****N*****K**

FNICO Concept

The FNICO Concept allows interconnection of intrinsically safe apparatus to associated apparatus not specifically examined in such combination. The criteria for interconnection is that the voltage (Ui or Vmax), the current (Ii or Imax) and the power (Pi) which intrinsically safe apparatus can receive and remain intrinsically safe, considering faults, must be equal or greater than the voltage (Uo or Voc), the current (Io or Isc) and the power (Po) levels which can be delivered by the associated apparatus, considering faults and applicable factors. In addition, the maximum unprotected capacitance (Ci) and inductance (Li) 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 Uo of the associated apparatus has to be limited to the range of 35V 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 to a leakage current of 50 µA 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 parameters in the following range:

- loop resistance R' : 15 150 Ω/km
- inducance per unit length L' : 0.4 1 mH/km
- capacitance per unit length C' : 80 200 nF/km
- 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 spur cable : ≤ 30 m
- length of trunk cable : ≤ 1 km
- length of splice : ≤ 1 m

At each end of the trunk cable an approved infallible line termination with the following parameters is suitable:

- R = 90 100 Ω
- C = 0 2.2 µF

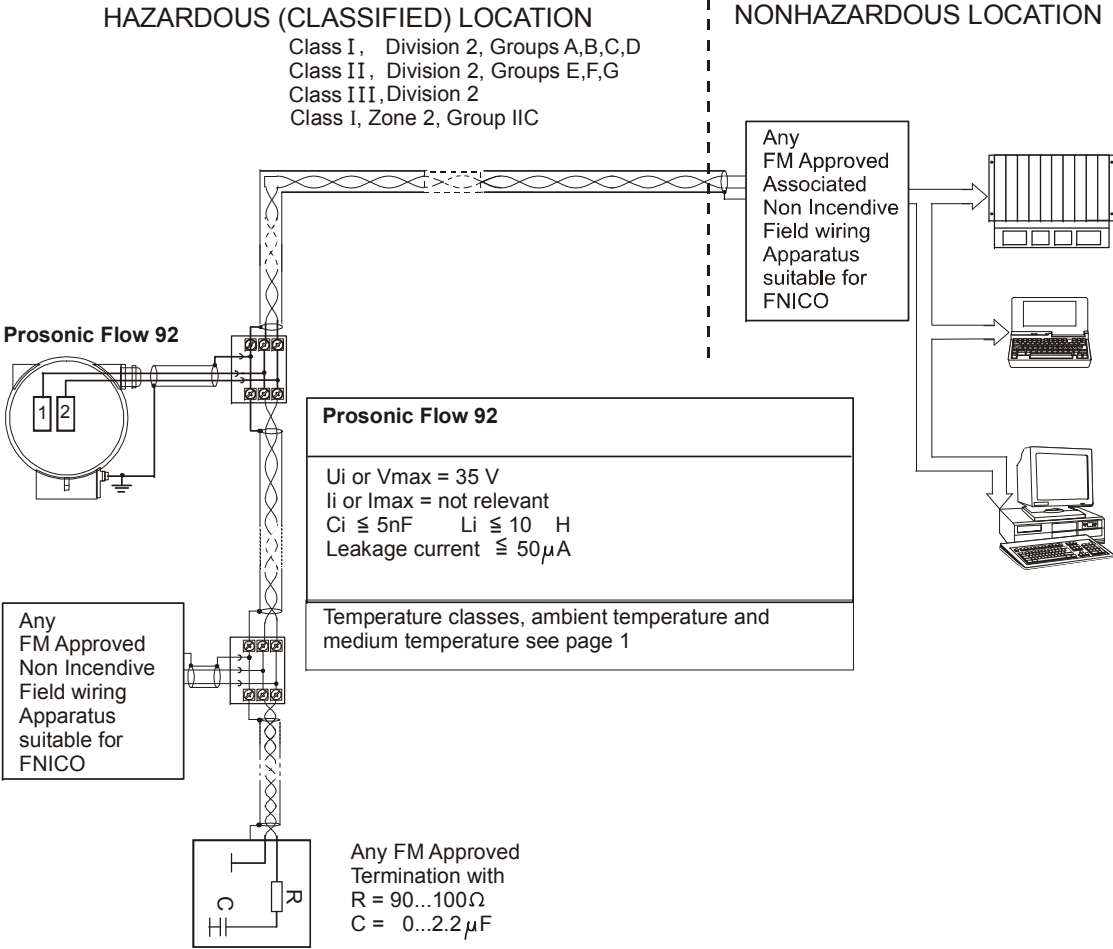
One of the allowed terminations might already be integrated in the associated apparatus. The associated apparatus has to be installed within 30 m from the end of the trunk cable.

The number of passive devices 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 the length of trunk cable and all spur cables), the inductance and capacitance of the cable will not impair the intrinsic safety of the installation.

Notes:

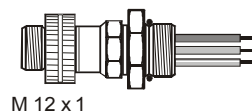
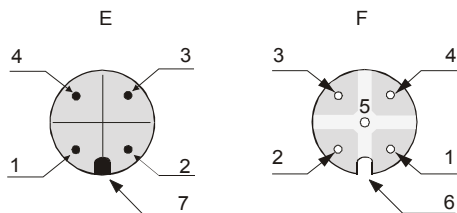
Non incendive installation

- 1) Be aware of multiple earthing of the screen. The screen must be connected in accordance with ISA RP 12.06.01

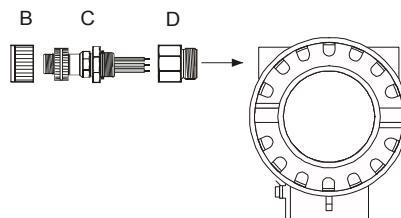
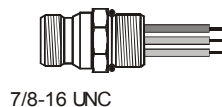
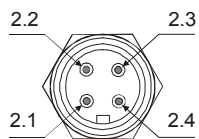


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	B	17.05.10/PAM	G					
	C	08.08.12/BIF	H					
	D		I					
	E		K					
FM CONTROL DRAWING PROSONIC FLOW 92 (NI) Class I Division 2 and Class I Zone 2 FNICO (fieldbus nonincendive concept)					Masstab	Gezeichnet	14.10.05	Bn
						Geprüft		
						Ex-geprüft	08.08.12	BIF
						Gesehen		
						Endress+Hauser  Endress+Hauser Flowtec AG, CH-4153 Reinach		

Profibus PA
connector



Fieldbus Foundation
connector



This page applies to model code:

Prosonic Flow 92*_*****N*****H and
Prosonic Flow 92***_*****N*****K
with Fieldbus Cable Connector**

Notes:

- 1) Fieldbus cable connectors are suitable for Class I, Div. 2, Groups A,B,C,D, Class I, Zone 2 Group IIC if non-incendive circuits are connected

B = Protection cap for connector,

D = Thread adapter

F = Connector (female)

C = Fieldbus connector,

E = Connector on housing (male),

Pin assignment:

Profibus PA

1 = Brown wire, PA+ (terminal 26)

2 = Not connected

3 = Blue wire, PA- (terminal 27)

4 = Black wire, ground

5 = Female connector not assigned

6 = Positioning groove

7 = Positioning key

Fieldbus Foundation

2.1 = Brown wire, FF+ (terminal 26)

2.2 = Blue wire, FF- (terminal 27)

2.3 = Grey wire, ground

2.4 = Not assigned

Änderungen:	A	12.09.08/BDA	F		Alle gesetzlichen Urheberrechte vorbehalten. Diese Zeichnung darf ohne unsere Genehmigung weder vervielfältigt werden noch dritten Personen und Konkurrenzfirmen zugänglich gemacht werden.	Ersatz für: Ersteller: FES/Bn File: FES0103C.doc ID 1159
	B	17.05.10/PAM	G			
	C	08.08.12/BIF	H			
	D		J			
	E		K			

FM CONTROL DRAWING

PROSONIC FLOW 92 (IS and NI)

Fieldbus Cable Connector

NI installation

Massstab	Gezeichnet	14.10.05	Bn
	Geprüft		
	Ex-geprüft	08.08.12	BIF
	Gesehen		

Endress+Hauser 
Endress+Hauser Flowtec AG, CH-4153 Reinach

FES0103-0005 C