



71069663

CSA Control Drawing 960409-2176 C

Levelflex M
FMP4x
FISCO-Model
PROFIBUS PA, FOUNDATION Fieldbus

Endress+Hauser

People for Process Automation



FISCO-Concept
The FISCO Concept allows interconnection of intrinsically safe apparatus to associated apparatus not specifically examined in such connection.
The criteria for interconnection is that the voltage (UI), the current (II) 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), the current (Io) and the power (Po) levels which can be delivered by the associated apparatus, considering faults and applicable factors.
In addition, the maximum unprotected capacitance (C) and inductance (L) 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 14 V to 24 V DC. 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
- inductance 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:

- CSA Certified apparatus must be installed in accordance with manufacturer instructions.
- CSA Certified associated apparatus must meet the following requirements:
 - Uo ≤ UI and Io ≤ II and Po ≤ PI
- The maximum non-hazardous area voltage must not exceed 250 V.
- The installation must be in accordance with the Canadian Electrical Code.
- Be aware of multiple earthing of the screen. The screen must be connected in accordance with the Canadian Electrical Code.
- Caution: Use only supply wires suitable for 5 K above surrounding temperature.
- Warning: Substitution of components may impair intrinsic safety.
- The polarity for connecting + (2) and - (1) is of no importance due to an internal rectifier.
- Use specific cables, supplied with the Service Interface Commubox FXA193 or Remote Display FHX40.
- Refer to the applicable Control Drawing.
- FMP43 with separable probe in separated mode shall be closed by protective cover.

CLASS I, DIV. 2, GROUPS A, B, C, D, or EX-nC IIC AND DIP, FOR CLASS II AND CLASS III, DIV. 1, GROUPS E, F, G HAZARDOUS LOCATION INSTALLATION:

- Depending on Location install per Canadian Electrical Code (CEC) using wiring methods described in Rule 18-156 or Rule 18-302 or Rule 18-302. Intrinsic safety barrier not required max. supply voltage 30 V. For T-code see table.
- Warning: Explosion Hazard - Do not disconnect equipment unless power has been switched off or the area is known to be non-hazardous.
Avertissement: Risque d'explosion - Avant de déconnecter l'équipement, couper le courant ou s'assurer que l'emplacement est désigné non dangereux.
- Probes made out of special materials like Alloy C22 marked as FMP40-1..... or FMP40-2..... should be used only in liquids or lightweight solids (e.g. plastic granulate, fly-ash, ...).
Maximum permissible tensile force at the rope or rod 2000 N.

Warning: Explosion Hazard - Substitution of components may impair suitability for Class I, Div. 2.
Avertissement: Risque d'explosion - La substitution de composants peut rendre ce matériel inacceptable pour les emplacements de Classe I, Div. 2.

For CLASS II and III: Div. 1:
Warning: Keep cover tight unless power has been switched off or the area is known to be non-hazardous.

HAZARDOUS (CLASSIFIED) LOCATION

Class I, Zone 0, Ex ia IIC T6
Class I, Division 1, Groups A, B, C, D
Class II, Division 1, Group G + Coal Dust
Class III, Division 1

Option (1):
prepared to connect CSA certified display FHX40 from Endress+Hauser.

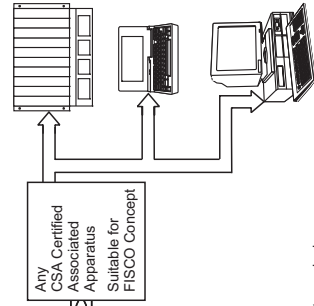
Levelflex FMP4x- with electronic insert for PROFIBUS PA or FOUNDATION Fieldbus (FISCO-Model)
UI (Vmax) = 17.5 V
II (Imax) = 500 mA
PI (Pmax) = 5.5 W
CI ≤ 5 nF, LI ≤ 10 µH
Leakage current ≤ 50 µA

Area of application:
The compact instruments are suitable for use in areas subject to explosion caused by gases, vapours or mists.

Permissible ambient temperature:
Electronic: F23 enclosure:
Probes: FMP40, FMP45 or FMP43;

-40...+80 °C
refer Technical Information

NON HAZARDOUS LOCATION



Temperature class without display VU331	Permissible maximum ambient temperature of the electronic compartment (Ta)			
	FMP40 with 3/4" probe, compact (process connection)	FMP40 with 1 1/2" probe, remote electronic compact with distance tube	FMP40 with 1 1/2" probe, remote electronic with flexible tube	FMP43 with 1 1/2" probe, compact or compact separable, remote cable
T6	+55 °C + 80 °C	+55 °C +60 °C	+60 °C +60 °C	+55 °C +60 °C
T5	+70 °C + 95 °C	+70 °C +75 °C	+70 °C +75 °C	+60 °C +70 °C
T4	+75 °C +130 °C	+75 °C +80 °C	+75 °C +80 °C	+75 °C +80 °C
T3	+80 °C +150 °C	+80 °C +75 °C	+80 °C +75 °C	+80 °C +80 °C
(functional)*	+80 °C	+80 °C	+80 °C	+80 °C

Note: The applicable temperature of probe must be within their specified limits;

* functional means max. permissible process temperature

Temperature class without display VU331	Permissible max. ambient temperature of the electronic compartment (Ta)	
	FMP45 type A (HT version)	FMP45 type B or C (HT version)
T6	+57 °C + 80 °C	+58 °C +60 °C
T5	+72 °C + 95 °C	+73 °C +75 °C
T4	+75 °C +130 °C	+75 °C +80 °C
T3	+80 °C +150 °C	+80 °C +74 °C
(functional)*	+80 °C	+80 °C
T2	+80 °C	+80 °C
T1	+80 °C	+80 °C
(functional)*	+80 °C	+80 °C

Note: The applicable temperature of probe must be within their specified limits;

* functional means max. permissible process temperature

NON HAZARDOUS LOCATION

1. Control room equipment may not use or generate over 250 Vrms.
2. Install per the Canadian Electrical Code.
3. Warning: Substitution of components may impair intrinsic safety.

4. Ex is IS defined as intrinsically safe.

5. For entity installation use CSA certified safety barrier or other associated equivalent.

$Uo/Voc \leq Ui/Vmax$, $|Io/Isc| \leq |Ii/Imax$, $Co/Ca \geq Ci + Ccable$, $Lo/La \geq Li + Lcable$

Ui/Vmax. (V)	Ii/Imax. (mA)	Pi/Pmax. (W)	Ci (nF)	Li (μH)
17.5	500	5.5	≤ 5	10
24	250	1.2	≤ 5	10

6. For system installation use: CSA certified safety barriers as follows: (a) 28 V / 300 Ω + Ground or (b) 28 V / 300 Ω + 28 V / Diode or (c) 28 V / 300 Ω + 10 V / 50 Ω

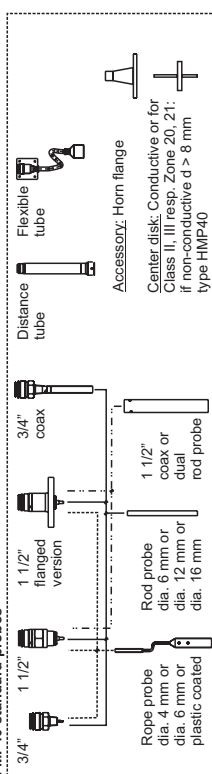
7. Use supply wires suitable for 5 K above surrounding ambient.

3. Install barrier/associated equipment in accordance with manufacturer's instruction.

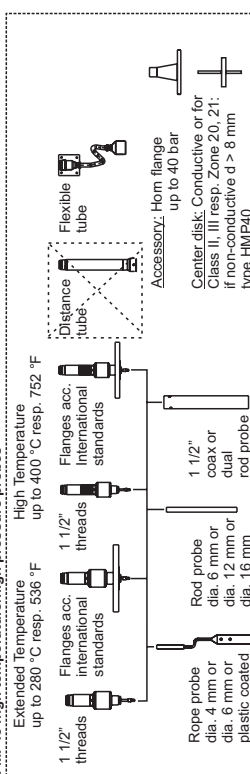
10. Probes made out of special materials like Alloy C22 marked as FMP40-1, or FMP40-2, should be used only in liquids or lightweight solids (e.g. plastic granulate, fly-ash, ...). Maximum permissible tensile force at the rope or rod 2000 N. Use specific cables, supplied with the Service interface Comboxhub EXA193 or Remote Display FHX40.

Refer to the applicable Control Drawing.

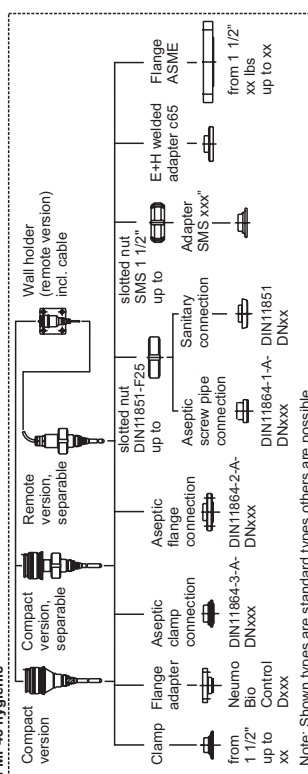
EMP40 standard probes



FMP45 high temperature/high pressure probes



EMP43 hygienic



Note: Shown types are standard types others are possible.

Area of application:
The compact instruments are suitable for use in areas subject to explosion caused by gases, vapours or mists.

0-9

Permissible ambient temperature:
Electronic: F23 enclosure: -40 +80 °C

Probes: FMP40, FMP45 or FMP43 refer Technical Information

Note: the applicable temperature of probe must be within their specified limits:

¹ functional means max. permissible process temperature

Temperature class with/without display VU331	Permissible temperature at the probe (process connection)	Permissible maximum ambient temperature of the electronic compartment (Ta) (enclosure F23 (stainless steel))					
		FMP40 with 3/4" probe, compact	FMP40 with 3/4" probe, remote electronic with distance tube	FMP40 with 1 1/2" probe, compact	FMP40 with 1 1/2" probe, remote electronic with distance tube	FMP40 with remote electronic with flexible tube	FMP43 separable, remote cable
T6	+ 80 °C + 60 °C	+55 °C +60 °C	+55 °C +60 °C	+55 °C +60 °C	+60 °C +60 °C	+55 °C +60 °C	+60 °C +60 °C
T5	+ 95 °C + 75 °C	+70 °C +75 °C	+70 °C +75 °C	+70 °C +75 °C	+75 °C +75 °C	+70 °C +75 °C	+75 °C +75 °C
T4	+130 °C + 80 °C	+65 °C +80 °C	+75 °C +80 °C	+75 °C +80 °C	+80 °C +80 °C	+65 °C +80 °C	+80 °C +80 °C
T3	+150 °C + 80 °C	+55 °C +80 °C	+75 °C +80 °C	+75 °C +80 °C	+80 °C +80 °C	+55 °C +80 °C	+80 °C +80 °C
Functional*)							

Note: the applicable temperature of probe must be within their specified limits:

*¹ functional means max permissible process temperature

Temperature class with/without display VU331	Permissible max. medium temperature at the probe (process connection) T _{med}	Permissible max. ambient temperature of the electronic compartment (T _a) (enclosure F23 (stainless steel))		
		FMP45 type A (XT version)	FMP45 type B or C (HT version)	FMP45 with remote electronic with flexible tube
T6	+ 80 °C + 60 °C	+57 °C +60 °C	+58 °C +60 °C	+60 °C +60 °C
T5	+ 95 °C + 75 °C	+72 °C +75 °C	+73 °C +75 °C	+75 °C +75 °C
T4	+ 130 °C + 80 °C	+74 °C	+76 °C	+80 °C
T3	+ 150 °C	+69 °C	+74 °C	+80 °C
T3 (functional)*	+ 80 °C	+80 °C	+80 °C	+80 °C
T3	+195 °C + 80 °C	+66 °C +80 °C	+70 °C +80 °C	+80 °C +80 °C
T2	+250 °C + 80 °C	+60 °C +80 °C	+66 °C +80 °C	+80 °C +80 °C
T2 (functional)*	+ 80 °C			
T2	+290 °C + 80 °C	280 °C, +56 °C +80 °C	+63 °C +80 °C	+80 °C +80 °C
T1 (functional)*	+ 80 °C			
T1	+400 °C + 80 °C	not allowed	+54 °C	+80 °C
T1 (functional)*	+ 80 °C			+80 °C

Note: the applicable temperature of probe must be within their specified limits:

¹ functional means max. permissible process temperature