ZD163F/00/en/08.04
CCS/FM6.0
FM
52022281

Control drawing 960414-1067 A

additional dwg. 960373-1022 (ZD021F)

Levelflex M FMP41C
F23 / FISCO-Model
PROFIBUS PA or 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 combination.
The criteria for interconnection is that the voltage (Ui or Vmax), the current (Ii or Imax) and the power (Pi or Pmax) which intrinsically safe apparatus can receive and remain intrinsically safe, considering faults, must be equal or greater than the voltage (Uo or Voc or Vt), the current (Io or Isc or It) and the power (Po or Pmax) 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 (or Voc or Vt) 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
- 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 lenght 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.

Intrinsically safe installation

Intrinsically safe (entity),, Class I, Div. 1, Group A, B, C, D Hazardous Location Installation.

1. FM approved apparatus must be installed in accordance with manufacturer instructions
2. FM approved associated apparatus must meet the following requirements:
   Uo or Voc or Vt ≤ Ui (Vmax) **and** Io or Isc or It ≤ Ii (Imax) **and** Po or Pmax ≤ Pi (Pmax)
3. The maximum non-hazardous area voltage must not exceed 250 V.
4. The installation must be in accordance with the National Electrical Code NFPA 70 and ANSI/ISA RP 12.06.01 (except chapter 5).
5. Multiple earthing of screen is allowed only, if high integrity equipotential system is realised between the points of bonding (see drawing No. 960373-1022 A)..
6. Caution: Use only supply wires suitable for 5 K above surrounding temperature
7. Warning: Substitution of components may impair intrinsic safety.
8. The polarity for connecting + (2) and - (1) is of no importance due to an internal rectifier.

For Installaion acc. -ENTITY- Concept see Control dwg. 960414-1068 (part ENTITY)

Division 2 and Zone 2 installation

Nonincendive, Class I, Div. 2, Group A, B, C, D Hazardous Location Installation.

1. Installation shall be in accordance with NEC using threaded conduits or other wiring methods in accordance with Article 500 through Article 510 . Intrinsic safety barrier not required. Max. supply voltage 33V. For T-code see table.
2. Nonincendive field wiring installation
   The Nonincendive Field Wiring Circuit Concept allows interconnection of nonincendive field wiring apparatus with associated nonincendive field wiring apparatus or associated apparatus not specifically examined in combination as a system using any of the wiring methods permitted for unclassified locations, when Vmax ≥ Voc or Vt, Ca ≥ Ci + C_{cable}, La ≥ Li + L_{cable}
   Transmitter non incendive field wiring parameters for these current controlled circuit are as follows:
   Vmax.= 33V; Ci ≤ 5nF; Li ≤ 10 µH; Imax = see note 3
3. For these current controlled circuit, the parameter Imax is not required and need not to be aligned with parameter Isc and It of the associated nonincendive field wiring apparatus or associated apparatus.
4. Warning: Explosion Hazard - do not disconnect equipment unless power has been switched off or the area is known to be Non-Hazardous.
   Warning: Substitution of components may impair suitability for Class I, Division 2.

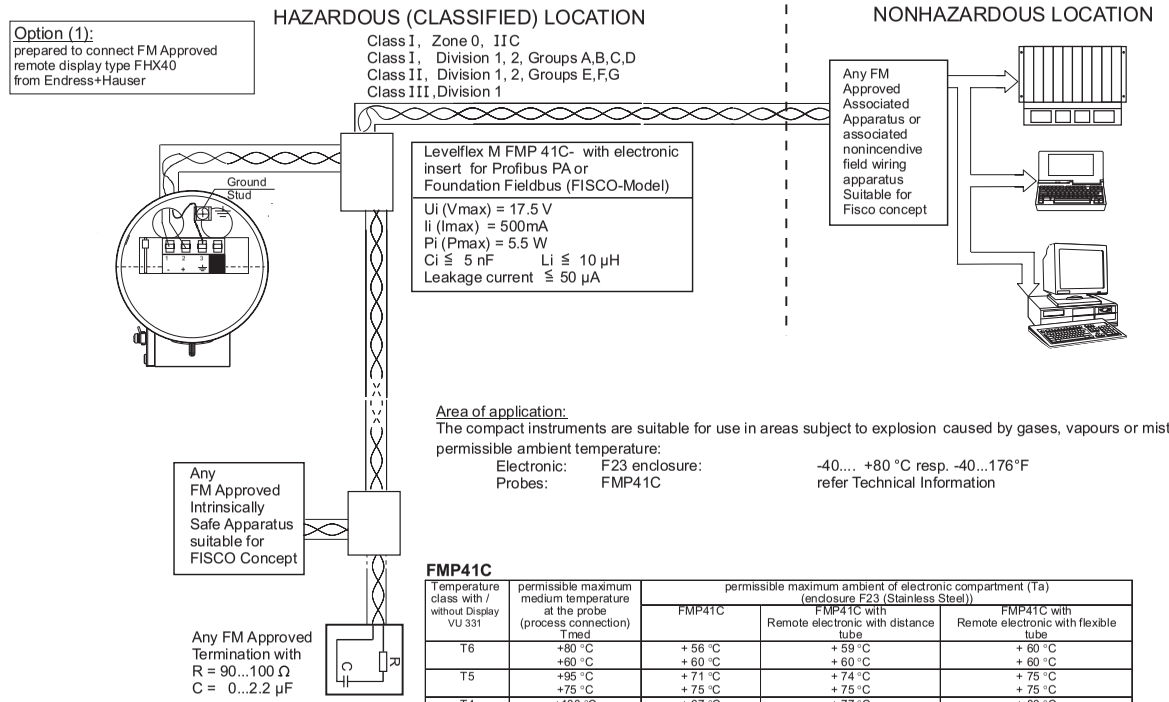
Class II, III installation

DIP for Class II and III, Div.1, Group E, F, G Hazardous Location Installation.

1. Installation shall be in accordance with NEC using threaded conduits or other wiring methods in accordance with Article 500 through Article 510 .
2. Use a dust tight seal at the conduit entry.

Functional ratings:
These ratings do not supersede Hazardous Locations values Unom ≤ 33 V, Inom = 15 mA

Option (1):
prepared to connect FM Approved remote display type FHX40 from Endress+Hauser



Option (2):
Interconnection with FM Approved Service Interface Commubox FXA193 with ToF-Cable; from Endress + Hauser

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:	-40.... +80 °C resp. -40...176°F
Probes:	FMP41C	refer Technical Information

FMP41C

Temperature class with / without Display VU 331	permissible maximum medium temperature at the probe (process connection) Tmed	permissible maximum ambient of electronic compartment (Ta) (enclosure F23 (Stainless Steel))		
		FMP41C	FMP41C with Remote electronic with distance tube	FMP41C with Remote electronic with flexible tube
T6	+80 °C +60 °C	+ 56 °C + 60 °C	+ 59 °C + 60 °C	+ 60 °C + 60 °C
T5	+95 °C +75 °C	+ 71 °C + 75 °C	+ 74 °C + 75 °C	+ 75 °C + 75 °C
T4	+130 °C +80 °C	+ 67 °C + 80 °C	+ 77 °C + 75 °C	+ 80 °C + 80 °C
T3 (functional)[1)]	+150 °C +80 °C	+ 62 °C + 80 °C	+ 75 °C + 75 °C	+ 80 °C + 80 °C
T3	+195 °C +80 °C	+ 51 °C + 80 °C	+ 73 °C + 75 °C	+ 80 °C + 80 °C

note: the applicable temperature of probe must be within their specified limits
[1)]functional means max. permissible process temperature

Zone Concept:
Electrostatic (X-Marking)
The probes (rod and rope) of the Levelflex M FMP41C- consists out of plastic coated surfaces, which are able to load up with electrostatic charge.
For hazardous (classified) Locations Zone 0 resp. Zone 1 groups IIC through IIA the following limits are required:

Zone	permissible transferred load Q in nC		
	II A	**IIB**	**IIC**
Zone 0	60	30	10
Zone 1	60	30	10
Zone 2	no limit		

Applied to the Levelflex M FMP41C-..... the following context is stated:

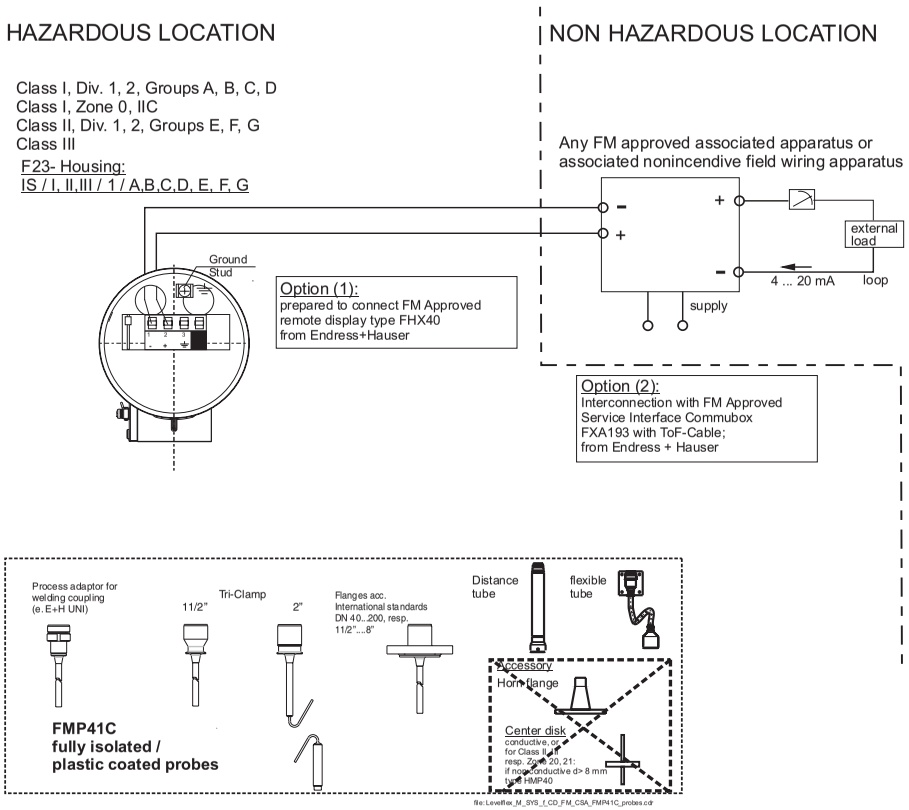
Area with plastic surfaces	measured transferred load [nC] (Test Report)	X-Marking for following gas groups required		
Flange cladding	< 75	IIA	IIB	IIC
Rod	< 30	–	--	IIC
Rope	< 10	–	--	–
Weight of rope	< 30	–	--	IIC

Measures:
Without any additional protection measures, it is allowed to use the apparatus with flange cladding in Hazardous (classified) Locations Zone 0 and Zone 1 for group IIB and IIA, if through the kind of installation the loading of the flange cladding with electrostatic charge is not possible (e.g. no free plastic surface or installation within metallic connection pieces / nozzle).

Control drawing 960414-1068 A

Levelflex M FMP41C
F23 / ENTITY-Model
PROFIBUS PA or FOUNDATION Fieldbus

Endress+Hauser
People for Process Automation



For Installation acc. -FISCO- Concept
see Control dwg.
960414-1067 (part FISCO)

Notes.

Intrinsically safe installation

Intrinsically safe (entity)., Class I, Div. 1, Group A, B, C, D Hazardous Location Installation.

1. Control room equipment may not use or generate over 250 Vrms.
2. Use FM Approvals Entity-Approved intrinsic safety barrier with Voc or Vt ≤ Vmax, Isc or It ≤Imax, Ca ≥ Ci + C cable, La ≥ Li + Lcable barrier must be incapable of delivering more than defined value (Pmax.) to a matched load.
   Transmitter entity parameters are as follows:

Vmax.=	17.5V	or 24V
Imax. =	500mA	250mA
Ci ≤	5nF	5nF
Li ≤	10µH	10µH
Pmax. =	5.5W	1.2W

3. Installation should be in accordance with ANSI / ISA RP12.06.01
   Installation of intrinsically safe systems for Hazardous (Classified) locations and the National Electrical code (ANSI / NFPA 70)
4. Warning: Substitution of components may impair intrinsic safety.
5. Intrinsic safty barrier manufacturer´s installation drawing must be followed when installing this equipment.
   The configuration of the intrinsic safety barrier(s) must be FM Approvals Approved.
6. Use supply wires suitable for 5 K above surrounding ambient.

Division 2 and Zone 2 installation

Nonincendive, Class I, Div. 2, Group A, B, C, D Hazardous Location Installation.

1. Installation shall be in accordance with NEC using threaded conduits or other wiring methods in accordance with Article 500 through Article 510 . Intrinsic safety barrier not required. Max. supply voltage 33V. For T-code see table.
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   Vmax.= 33V; Ci ≤ 5nF; Li ≤ 10 µH; Imax = see note 3
3. For these current controlled circuit, the parameter Imax is not required and need not to be aligned with parameter Isc and It of the associated nonincendive field wiring apparatus or associated apparatus.
4. Warning: Explosion Hazard - do not disconnect equipment unless power has been switched off or the area is known to be Non-Hazardous.
   Warning: Substitution of components may impair suitability for Class I, Division 2.

Class II, III installation

DIP for Class II and III, Div.1, Group E, F, G Hazardous Location Installation.

1. Installation shall be in accordance with NEC using threaded conduits or other wiring methods in accordance with Article 500 through Article 510 .
2. Use a dust tight seal at the conduit entry.

FMP41C

Temperature class with / without Display VU 331	permissible maximum medium temperature at the probe (process connection) Tmed	permissible maximum ambient of electronic compartment (Ta) (enclosure F23 (Stainless Steel))		
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Applied to the Levelflex M FMP41C-..... the following context is stated:

Area with plastic surfaces	measured transferred load [nC] (Test Report)	X-Marking for following gas groups required		
Flange cladding	< 75	IIA	IIB	IIC
Rod	< 30	--	--	IIC
Rope	< 10	--	--	--
Weight of rope	< 30	--	--	IIC

Measures:
Without any additional protection measures, it is allowed to use the apparatus with flange cladding in Hazardous (classified) Locations Zone 0 and Zone 1 for group IIB and IIA, if through the kind of installation the loading of the flange cladding with electrostatic charge is not possible (e.g. no free plastic surface or installation within metallic connection pieces / nozzle).

Functional ratings:
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