

Liquiphant M/S is suitable for the connection to a PROFIBUS PA/FOUNDATION Fieldbus system according to the Entity- or FISCO-concept (as described below).

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 (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} or V_i), the current (I_o or I_{sc} or I_i) 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 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_o (or V_{oc} or V_i) 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_i : 15...150 Ω/km
inductance per unit length L_i : 0.4...1 mH/km
capacitance per unit length C_i : 80...200 nF/km
 $C = C \text{ line/line} + 0.5 C \text{ line/screen}$, if both lines are floating or
 $C = C \text{ line/line} + C \text{ line/screen}$, 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:
 $R = 90...100 \text{ Ohm}$, $C = 0...2.2 \text{ µF}$.

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.

Intrinsically safe installations

Intrinsically safe for Class I, II, III, Div. 1, Groups A, B, C, D, E, F, G; AEx ia IIC T6

1. FM Approved apparatus must be installed in accordance with manufacturer instructions.

2. FM Approved associated apparatus must meet the following requirements:

U_o or V_{oc} or $V_i \leq U_i$ or V_{max} and I_o or I_{sc} or $I_i \leq I_i$ (I_{max}) and P_o or $P_{max} \leq P_i$ (P_{max}).

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. Be aware of multiple earthing or screen. The screen must be connected in accordance with National Electrical Code.

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 connecting PA+ (1) and PA- (2) is of no importance due to an internal rectifier.

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CCS/FM6.0
FM/- 23.03.09

FM Control Drawing 960009203 -

Liquiphant M/S (IS and NI)
PROFIBUS PA, FOUNDATION Fieldbus

Endress+Hauser
People for Process Automation



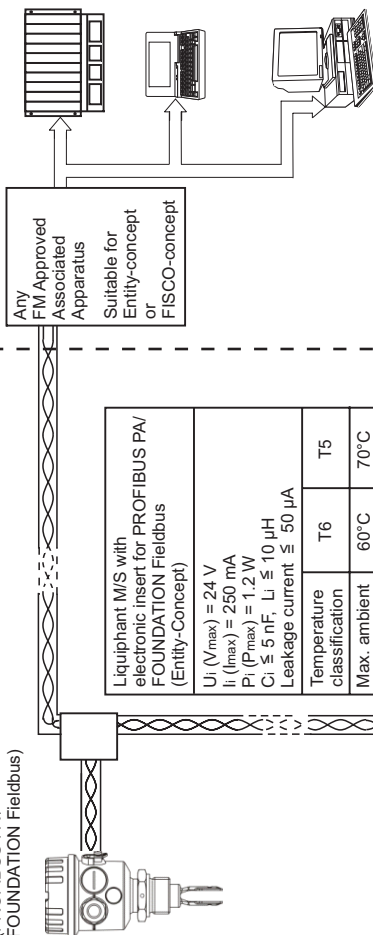
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HAZARDOUS (CLASSIFIED) LOCATION

Class I, Zone 0, IIC
Class I, Division 1, 2, Groups A, B, C, D
Class II, Division 1, 2, Groups E, F, G
Class III

HAZARDOUS (CLASSIFIED) LOCATION

Liquiphant M/S
with electronic insert FEL50A
(PROFIBUS PA/
FOUNDATION Fieldbus)



Liquiphant M/S with electronic insert for PROFIBUS PA/FOUNDATION Fieldbus (Entity-Concept)	
U_i (V_{max}) = 24 V	T_6
I_i (I_{max}) = 250 mA	T_5
P_i (P_{max}) = 1.2 W	60°C
$C_i \leq 5 \text{ nF}$, $L_i \leq 10 \text{ µH}$	140°F
Leakage current $\leq 50 \text{ µA}$	70°C
	158°F
Temperature classification	Min. ambient temp.: -40°C (optional -50°C)
Max. ambient temperature	

Liquiphant M/S with electronic insert for PROFIBUS PA/FOUNDATION Fieldbus (FISCO-Concept)	
U_i (V_{max}) = 17.5 V	T_6
I_i (I_{max}) = 500 mA	T_5
P_i (P_{max}) = 5.5 W	60°C
$C_i \leq 5 \text{ nF}$, $L_i \leq 10 \text{ µH}$	140°F
Leakage current $\leq 50 \text{ µA}$	70°C
	158°F
Temperature classification	Min. ambient temp.: -40°C (optional -50°C)
Max. ambient temperature	

Any FM Approved Intrinsically Safe Apparatus Suitable for Entity-concept or FISCO-concept

Any FM Approved Termination with
 $R = 90...100 \text{ Ω}$
 $C = 0...2.2 \text{ µF}$