

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: 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:**

1. Intrinsically safe Class I, Div. 1, Groups A, B, C, D, Class II, Div. 1, Groups E, F, G, Class III, Ex ia IIC T6 CSA certified apparatus must be installed in accordance with manufacturer instructions.
2. CSA certified associated apparatus must meet the following requirements:  
 $U_o$  or  $V_{oc}$  or  $V_i \leq U_i$  (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 Canadian Electrical Code.
5. Be aware of multiple earthing of screen. The screen must be connected in accordance with Canadian 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 is of no importance due to an internal rectifier.
9. Type of protection for Liquiphant M/S with electronic insert FEL50A:  
Intrinsically safe (Ex ia), Class I, Div. 1 Groups A, B, C, D, Class II, Div. 1, Groups E, F, G, Ex ia IIC T6.
10. CEC 2009, cl. 18-072: "Flammable fluid seals" classification acc. ANSI/ISA 12.27.01.  
Single seal device; gas tight conduit seal not required.

Suitable for Class I, Div. 2, Groups A, B, C, D, Class II, Div. 1, Groups E, F, G

**Hazardous locations installations**

1. Install per Canadian Electrical Code (CEC).
2. 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 - Ne pas débrancher tant que le circuit est sous tension, à moins qu'il s'agisse d'un emplacement non dangereux.  
Warning: Explosion hazard - Substitution of components may impair suitability for Class I, Div. 2.  
Avertissement : Risque d'explosion - La substitution de composant peut rendre ce matériel inacceptable pour les emplacements de Class I, Div. 2.

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

Non hazardous location

