



FM Control Drawing 960009203 A

Liquiphant M/S
 FTL50(H), FTL51(H), FTL51C, FTL70/71
 PROFIBUS PA, FOUNDATION Fieldbus
 (IS / NI)

Endress+Hauser
 People for Process Automation



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_t), the current (I_o or I_{sc} or I_t) 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_t) 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 Ohm, 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.

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_t ≤ U_i (V_{max}) and I_o or I_{sc} or I_t ≤ I_i (I_{max}) and P_o or P_{max} ≤ 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 of 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.
 9. NEC, cl. 50 70-394: "Flammable fluid seals" classification according ANSI/ISA 12.27.01.
 Single seal device; Gas tight conduit seal not required.

Division 2 and Zone 2 installation

- Nonincendive Class I, Div. 2, Groups A, B, C, D, Hazardous location installation (not for separate housing)
10. Installation shall be in accordance with NEC using threaded conduits or other wiring methods in accordance with articles 500 to 510.
 Intrinsic safety barrier not required. Max. supply voltage 32 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.
 11. 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 V_{max} ≥ V_{oc} or V_t, C_a ≥ C_i + C_{cab}, L_a ≥ L_i + L_{cab}.

Transmitter parameters are as follows: V_{max} = 32 VDC; C_i ≤ 5 nF; L_i ≤ 10 µH; I_{max} = see note 12.

For these current controlled circuit, the parameter I_{max} is not required and need not to be aligned with parameter I_{sc} and I_t of the nonincendive field wiring or associated apparatus.

14. NEC, cl. 50 70-394: "Flammable fluid seals" classification according ANSI/ISA 12.27.01.
 Single seal device; Gas tight conduit seal not required.

Warning: Substitution of components may impair suitability for Class I, Div. 2.

15. The transmitter is suitable to be installed according the FISCO concept.

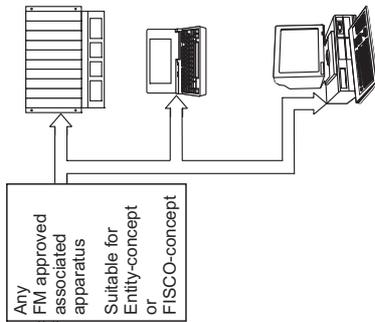
Class II, III installation

- DIP for Class II and III, Div. 1, Groups E, F, G, Hazardous location installation (not for separate housing)
16. Installation of transmitter wiring according to NEC using threaded conduits or other wiring methods in accordance with articles 500 to 510.

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

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



NON HAZARDOUS LOCATION

Liquiphant M/S with electronic insert for PROFIBUS PA / FOUNDATION Fieldbus (Entity-Concept)	
U _i (V _{max}) = 24 V	
I _i (I _{max}) = 250 mA	
P _i (P _{max}) = 1,2 W	
C _i ≤ 5 nF, L _i ≤ 10 µH	
Leakage current ≤ 50 µA	
Temperature classification	T6
Max. ambient temperature	60°C 140°F
Min. ambient temp.:	-40°C (optional -50°C)

Liquiphant M/S with electronic insert for PROFIBUS PA / FOUNDATION Fieldbus (FISCO-Concept)	
U _i (V _{max}) = 17.5 V	
I _i (I _{max}) = 500 mA	
P _i (P _{max}) = 5.5 W	
C _i ≤ 5 nF, L _i ≤ 10 µH	
Leakage current ≤ 50 µA	
Temperature classification	T6
Max. ambient temperature	60°C 140°F
Min. ambient temp.:	-40°C (optional -50°C)

