

HAZARDOUS (CLASSIFIED) LOCATION
Class I, Div. 1, 2, Groups A, B, C, D
Class I, Zone 0, IIC
Class II, Div. 1, 2, Groups E, F, G
Class III

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_0 or V_{max}), the current (I_0 or I_{max}) and the power (P_0 or P_{max}) which intrinsically safe apparatus can receive and remain intrinsically safe, considering faults, must be equal or greater than the voltage (U_0 or V_0 , or V_1), the current (I_0 or I_1 or I_2) and the power (P_0 or P_{max}) 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 (U_0 or V_0 or V_1) 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 splice: ≤ 1 m
At each end of the trunk cable an approved inflexible line termination 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.

Intrinsically safe installation

Intrinsically safe (entity), Class I, Div. 1, Group A, B, C, D or Zone 0, IIC Hazardous Location Installation

1. FM approved apparatus must be installed in accordance with manufacturer instructions.
2. FM approved associated apparatus must meet following requirements:
 U_0 or V_{oc} or $V_1 \leq U_1$ (V_{max}) and I_0 or I_{sc} or $I_1 \leq I_1$ (I_{max}) and P_0 or $P_{max} \leq P_1$ (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 (NEC) and ANSI / ISA RP12.06.01 (except chapter 5).
5. Multiple earthing of the screen is allowed only if high integrity equipotential system is realised between the points of bonding (see sheet 8).

6. Caution: Use only supply wires suitable for 5K above surrounding temperature.

7. Warning: Substitution of components may impair intrinsic safety.

8. The polarity for connecting “(L)” and “(N)” is of no importance due to an internal rectifier.

9. The surge protection device (OVP) fulfils the requirements of EN/IEC 60079-14 clause 12.3.

Division 2 and Zone 2 installation

Nonincendive Class I, Div. 2, Group A, B, C, D Hazardous Location Installation
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 33 V. 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 $V_{max} \geq V_{oc}$ or V_1 , C_0 or $C_1 \geq C_1$ + C_{cable} , L_0 or $L_1 \geq L_1$ + L_{cable} .
Transmitter non incandive field wiring parameters for this current controlled circuit are as follows:
 $V_{max} = 33V$, $C_1 \leq 5nF$, $L_1 \leq 10\mu H$, $I_{max} = 30mA$

3. For this current controlled circuit, the parameter I_{max} is not required and need not be aligned with parameter I_{sc} or I_0 of the barrier or associated nonincendive field wiring 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: Explosion hazard - substitution of components may impair suitability for Class I, Div. 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
 $V_{nom} = 9...33V$, $I_{nom} = 15mA$

For installation acc. - ENTITY-Concept see sheet 7.

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: T12 enclosure with integrated surge protection (OVP) -40 ... +80 °C resp. -40 ... +176 °F

Type	Type of sensor	Operation temperature [°C resp. °F]
LUC-M10-	1 1/2"-sensor	-40 to +80 resp. -40 to +176
LUC-M20-	2"-sensor	-40 to +80 resp. -40 to +176
LUC-M40-	3"-sensor	-40 to +80 resp. -40 to +176

Temperature class with / without Display VU 331	Permissible maximum medium temperature	Permissible maximum ambient (T _a) of electronic compartment (F-Type enclosure)
T6	+60 °C	LUC-M10- +60 °C
T5	+80 °C	LUC-M20- +75 °C
T4	+80 °C	+80 °C +80 °C

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LUC-M10, LUC-M20, LUC-M40
FM control drawing (T12-OVP, FISCO model, PROFIBUS PA or FOUNDATION Fieldbus)



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NON HAZARDOUS LOCATION

HAZARDOUS LOCATION

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

Notes:

Intrinsically safe installation

- Control room equipment may not use or generate over 250Vrms.
- Installation should be in accordance with the National Electrical Code NFPA 70 (NEC) and ANSI / ISA RP12.06.01.
- Warning: Substitution of components may impair intrinsic safety.
- Use FM Approvals Entity-Approved intrinsic safety barrier with $U_o/V_{oc} \leq U_{Vmax}$, $I_o/I_{sc} \leq I_{Isc}$, $C_o/C_i \geq C_i + C_{cable}$, $L_o/L_s \geq L_i + L_{cable}$
Barrier must be incapable of delivering more than defined value (P_{max}) to a matched load.
Transmitter entity parameters are as follows:

U_o/V_{oc} (V)	I_o/I_{sc} (mA)	P_o/P_{max} (W)	C_i (nF)	L_i (μ H)
17.5	273	1.2	≤ 5	≤ 10
or	24	250	1.2	≤ 10

- Use supply wires suitable for 5K above surrounding ambient.
- Intrinsic safety barrier manufacturer's installation drawing must be followed when installing this equipment.
The configuration of the intrinsic safety barrier(s) must be approved by FM Approvals.
- The polarity for connecting + (2) and - (1) is of no importance due to an internal rectifier.
- The surge protection device (OVP) fulfills the requirements of ENIEC 60079-14 clause 12.3.

Division 2 and Zone 2 installation

- Nonincendive Class I, Div. 2, Group A, B, C, D Hazardous Location Installation
- 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 33 V. For T-code see table.
 - 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 $V_{max} \geq V_{oc}$ or V_i , C_o or $C_i \geq C_i + C_{cable}$, L_o or $L_s \geq L_i + L_{cable}$
 $V_{max} = 33V$, $C_i \leq 5nF$, $L_i \leq 10\mu H$, I_{max} see note 3
 - For this current controlled circuit, the parameter I_{max} is not required and need not be aligned with parameter I_{sc} or I_o of the barrier or associated nonincendive field wiring apparatus.
 - Warning: Explosion Hazard - Do not disconnect equipment unless power has been switched off or the area is known to be non-hazardous.
Warning: Explosion hazard - substitution of components may impair suitability for Class I, Div. 2.

Class II, III installation

- DIP for Class II and III, Div. 1, Group E, F, G Hazardous Location Installation
- Installation shall be in accordance with NEC using threaded conduits or other wiring methods in accordance with Article 500 through Article 510.
 - Use a dust tight seal at the conduit entry.

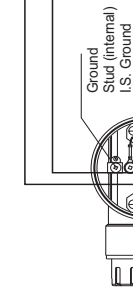
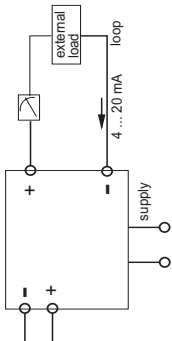
Functional Ratings

These ratings do not supersede Hazardous Locations Values
 $V_{nom} = 9...33V$, $I_{nom} = 15mA$

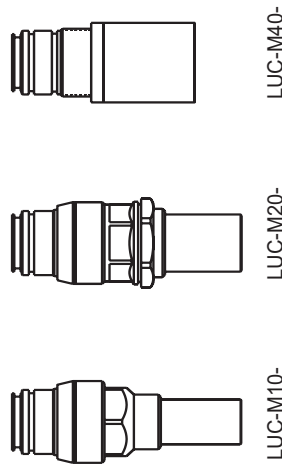
Temperature class with / without Display VU 331	Permissible maximum medium temperature at the sensors	Permissible maximum ambient (T_a) of electronic compartment (T12 enclosure with integrated OVP)
T6	+60 °C	LUC-M10- +60 °C
T5	+80 °C	LUC-M20- +60 °C
T4	+80 °C	LUC-M20- +75 °C
		LUC-M40- +75 °C
		LUC-M40- +80 °C

For installation acc. -FISCO- Concept see sheet 6.

Any FM approved associated apparatus or associated non-incendive field wiring apparatus



T12-OVP Housing:
IS / I, II, III / I, A, B, C, D, E, F, G



Area of application:
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Permissible ambient temperature:
Electronic: T12 enclosure with integrated surge protection (OVP) -40 ... +80 °C resp. -40 ... +176 °F

Type	Type of sensor	Operation temperature [°C resp. °F]
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LUC-M10, LUC-M20, LUC-M40
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PROFIBUS PA or FOUNDATION Fieldbus)



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