

# UL Control drawing Enclosure Leakage Sensor ELS-1\*

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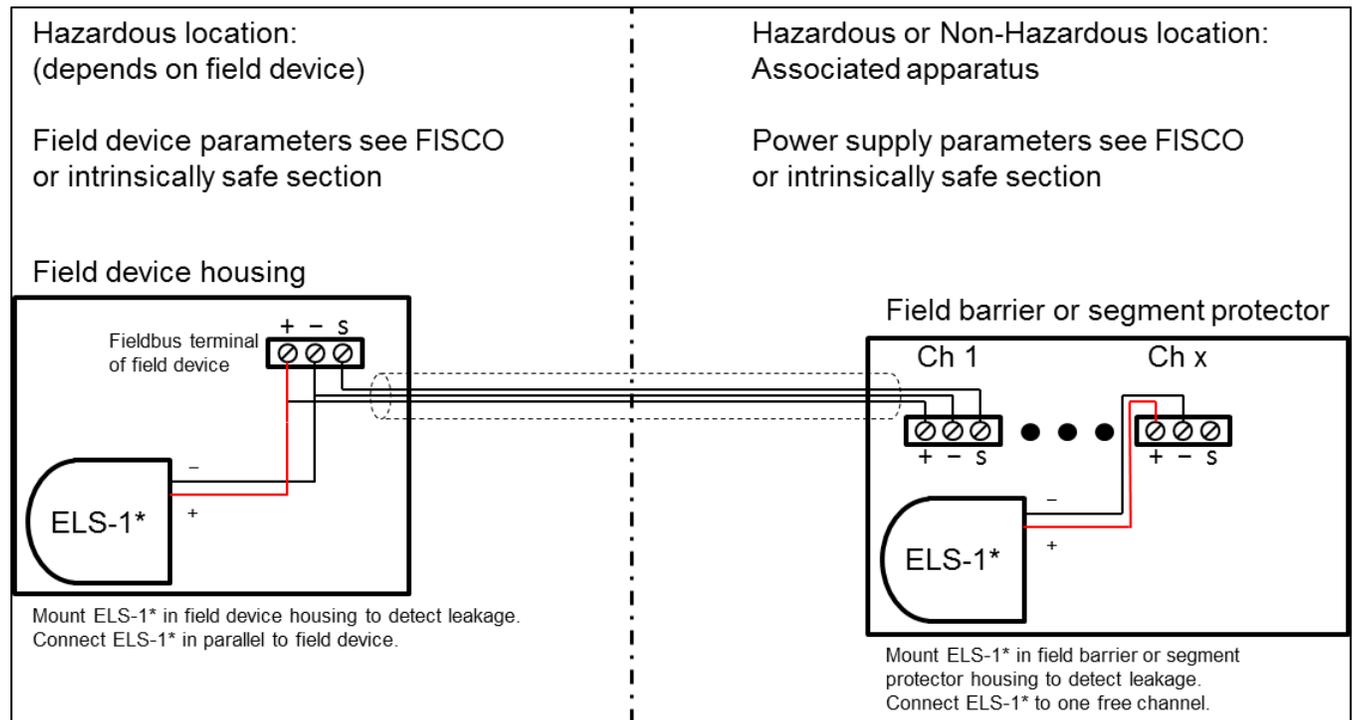
## ■ Hazardous location

Class I, Division 1, Groups A-D  
Class I, Division 2, Groups A-D  
Class I, Zone 0 IIC  
Class I, Zone 1 IIC  
Class I, Zone 2 IIC

## ■ Permissible ambient temperature and temperature code

Temperature code	Permissible ambient temperature
T4	-40 ... + 80 °C

## ■ Description – Mounting types



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## ■ FISCO Installation

<b>Intrinsically safe in level of protection "ia"</b>	
Class I, Division 1, Groups A-D Class I, Zone 0 IIC Class I, Zone 1 IIC	
<b>FISCO Field Device Input Parameters</b>	<b>FISCO Power Supply Parameters</b>
■ $U_i = 17.5 \text{ V}$	■ $U_o \leq 17.5 \text{ V}$
■ $I_i = 380 \text{ mA}$	■ $I_o \leq 380 \text{ mA}$
■ $P_i = 5.32 \text{ W}$	■ $P_o \leq 5.32 \text{ W}$
■ $C_i = 0 \text{ nF}$	■ $C_i \leq 5 \text{ nF}$
■ $L_i = 0 \text{ } \mu\text{H}$	■ $L_i \leq 10 \text{ } \mu\text{H}$

- The FISCO concept allows interconnection of intrinsically safe apparatus to associated apparatus not specially examined in such combination. The criteria for interconnection is that the voltage ( $U_i$ ), the current ( $I_i$ ), and the power ( $P_i$ ) which an intrinsically safe apparatus can receive and remain intrinsically safe considering faults, must be equal or greater than voltage ( $U_o$ ), the current ( $I_o$ ) and the power ( $P_o$ ) levels which can be delivered by the associated apparatus, considering faults and applicable factors. In addition, the maximum unprotected capacitance ( $C_i$ ) and the 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 uH respectively.

In each intrinsic safety fieldbus segment only one active device, normally the associated apparatus, is allowed to provide the necessary energy for the fieldbus. The voltage ( $U_o$ ) of the associated apparatus is limited to a range of 14 V to 17.5 V. All other equipment connected to the bus cable must be passive, meaning that they are not allowed to provide energy to the system, except a leakage current of 50  $\mu\text{A}$  for each connected device. Separately powered equipment requires galvanic isolation to assure that the intrinsically safe fieldbus circuit remains passive.

The cable used to interconnect devices needs to have the parameters in the following range:

■ <b>Loop Resistance <math>R_c</math></b>	= 15 $\Omega$ /km to 150 $\Omega$ /km
■ <b>Loop Inductance <math>L_c</math></b>	= 0.4 mH/km to 1 mH/km
■ <b>Capacitance per unit length <math>C_c</math></b>	=45 nF/km to 200 nF/km $C_c = C_c \text{ line/line} + 0.5 C_c \text{ line/screen}$ , (if both lines are floating) or $C_c = C_c \text{ line/line} + C_c \text{ line/screen}$ , (if screen is connected to one line)
■ <b>Maximum length of spur cable</b>	= 60 m
■ <b>Maximum length of trunk cable (including length of all spurs)</b>	= 1000 m

At each end of the trunk cable an approved infallible line terminator with the following parameters should be installed:

■ <b>R</b>	$\geq 90 \Omega$
■ <b>C</b>	$\leq 2.2 \mu\text{F}$ (including tolerances)

One of the allowed terminations may be integrated in the fieldbus associated apparatus.

FISCO limits the number of passive devices connected to a single segment to 32 devices. If the above rules are respected, a total length of up to 1000 m of cable is permitted (sum of trunk and spur cables). The inductance and capacitance of the cable will not impair the intrinsic safety of the installation.

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## ■ Intrinsically Safe Installation

<b>Intrinsically safe in level of protection "ia"</b>
<b>Class I, Division 1, Groups A-D</b>
<b>Class I, Zone 0 IIC</b>
<b>Class I, Zone 1 IIC</b>
■ <b>U<sub>i</sub> = 24 V</b>
■ <b>I<sub>i</sub> = Limited by internal resistance</b>
■ <b>P<sub>i</sub> = Limited by internal resistance</b>
■ <b>C<sub>i</sub> = 0 nF</b>
■ <b>L<sub>i</sub> = 0 μH</b>

- Selected associated apparatus must be third party listed as providing intrinsically safe circuits for the application, and have  $V_{oc}$  or  $V_t$  not exceeding  $V_{max}$  (or  $U_o$  not exceeding  $U_i$ ),  $I_{sc}$  or  $I_t$  not exceeding  $I_{max}$  (or  $I_o$  not exceeding  $I_i$ ), and the  $P_o$  of the associated apparatus must be less than or equal to the  $P_{max}$  or  $P_i$  of the intrinsically safe equipment, as shown in the Table above.  
Capacitance and inductance of the field wiring from the intrinsically safe equipment to the associated apparatus shall be calculated and must be included in the system calculations as shown in the Table above. Cable capacitance,  $C_{cable}$ , plus intrinsically safe equipment capacitance,  $C_i$ , must be less than the marked capacitance,  $C_a$  (or  $C_o$ ), shown on any associated apparatus used. The same applies for inductance ( $L_{cable}$ ,  $L_i$  and  $L_a$  or  $L_o$ , respectively). Where the cable capacitance and inductance per foot are not known, the following values shall be used:  
 $C_{cable} = 60\text{pF/ft}$   
 $L_{cable} = 0.20\text{uH/ft}$
- Associated apparatus must be installed in accordance with its manufacturer's control drawing and Article 504 of the National Electrical Code (ANSI/NFPA 70) for installation in the United States, or Section 18 of the Canadian Electrical Code for installations in Canada.
- Associated apparatus may be in a Division 2 or Zone 2 location if so approved.

## ■ Division 2 Installation

<b>Non-arching "nA"</b>
<b>Class I, Division 2, Groups A-D</b>
<b>Class I, Zone 2 IIC</b>
■ <b>U<sub>i</sub> = 33 V</b>

- WARNING - EXPLOSION HAZARD - DO NOT DISCONNECT WHILE CIRCUIT IS LIVE UNLESS AREA IS KNOWN TO BE NON-HAZARDOUS.**  
**AVERTISSEMENT - RISQUE D'EXPLOSION. NE PAS DEBRANCHER TANT QUE LE CIRCUIT EST SOUS TENSION, A MOINS QU'IL NE S'AGISSE D'UN EMPLACEMENT NON DANGEREUX.**
- Using the device in combination with circuits that are not intrinsically safe the device must be used within a suitable end-use enclosure. The suitability of the enclosure is subject to investigation by the local authority having jurisdiction at the time of installation. The temperature inside the enclosure shall not exceed the permissible ambient temperature of the device.

## ■ General Information

- WARNING:** Substitution of components may impair suitability for hazardous (classified) Locations.  
**ADVERTISEMENT:** La substitution de composants peut compromettre emplacements.

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8. **WARNING:** The device is provided with a non-metallic housing material. Care must be taken to avoid ignition hazards due to potential electrostatic charging hazard.

**ADVERTISEMENT:** Le dispositif est fourni avec un boîtier non métallique. Il faut prendre soin d'éviter tout risque d'inflammation en raison de charges électrostatiques potentiellement dangereuses.

9. The Enclosure Leakage Sensor must be supplied by a Class 2 or limited-energy source in accordance with UL 61010-1, Third Edition.
10. The protective sleeve provided with the equipment must be installed in accordance with the instruction.
11. The device is designed for use in altitudes up to 2000 m.
12. The maximum specified relative humidity is 100 %.
13. Protection of the operating personnel and the overall system is not ensured if the product is not being used according to its intended purpose.

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