

Control drawing  
**Temperature Multi Input Device**  
**\*D0-TI\***

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**HAZARDOUS (CLASSIFIED) LOCATION**  
**CLASS I, ZONE 1, GROUP IIC, IIB, IIA**  
**CLASS I, DIVISION 1, GROUPS A - D**

Table 1: Intrinsically safe supply

Model number	Terminals	Ui (V) (Vmax)	Ii (mA) (Imax)	Pi (W) (Pmax)	Ci (µF)	Li (mH)
F2D0-TI-EX*.* RD0-TI-EX*.*	Bus + -	24	380	5.32	0	0

**HAZARDOUS (CLASSIFIED) LOCATION**  
**CLASS I, ZONE 2, GROUP IIC, IIB, IIA**  
**CLASS I, DIVISION 2, GROUPS A - D**  
**or UNCLASSIFIED LOCATION**

Table 2: Non-intrinsically safe supply

Model number	Terminals	Un (V) (Vmax)	Um (V)
F2D0-TI-EX*.* RD0-TI-EX*.*	Bus + -	35	253

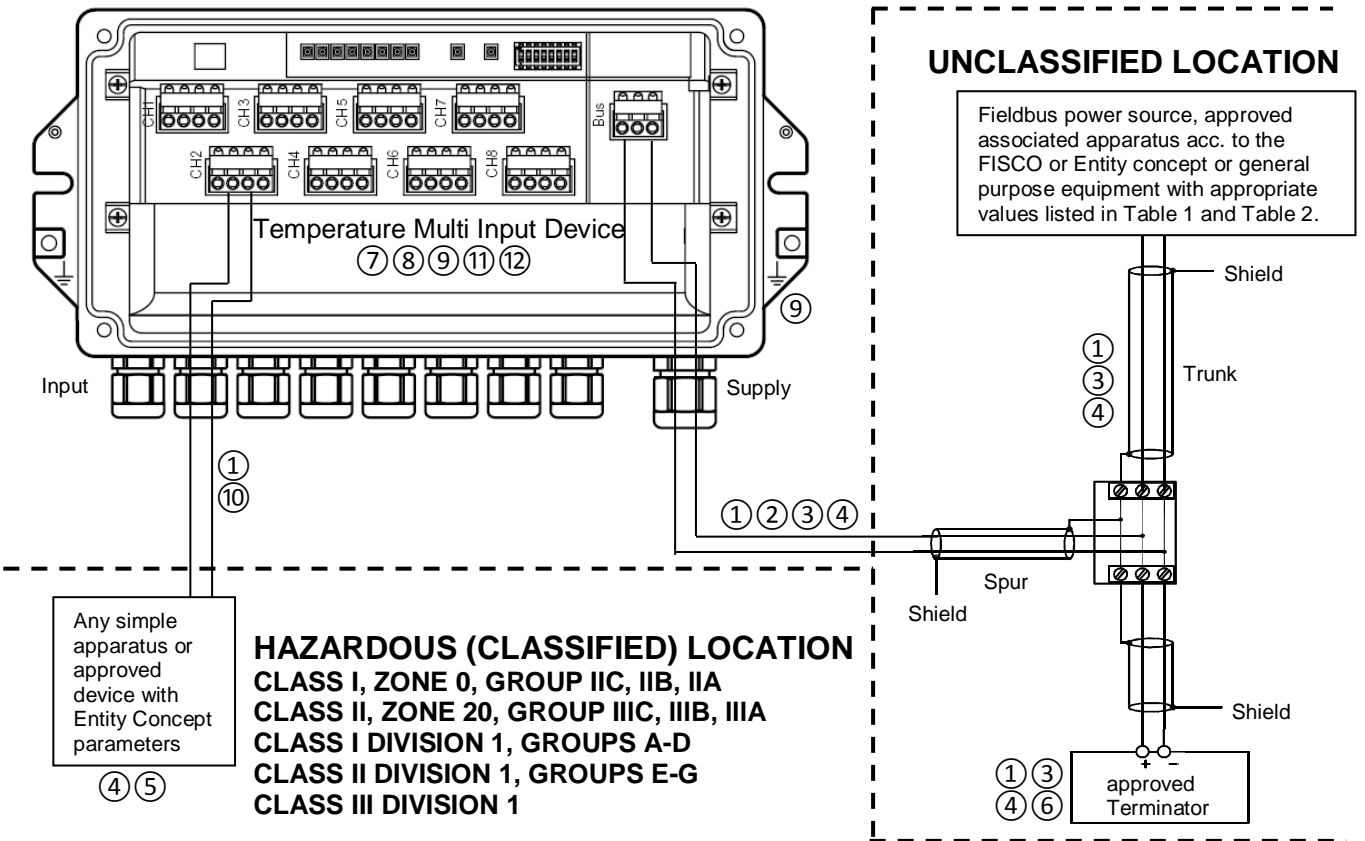


Table 3: Intrinsically safe values of the inputs

MODEL NUMBER	TERMINALS	Uo (V) (Voc)	Io (mA) (Isc)	Po (mW)	Co (µF) (Ca)			Lo (mH) (La)		
					IIC	IIB	IIA	IIC	IIB	IIA
					(A,B)	(C,E)	(D,F,G)	(A,B)	(C,E)	(D,F,G)
F2D0-TI-EX*.* RD0-TI-EX*.*	CH 1 +, H, L, - to CH 8 +, H, L, -	7.2	6.5	11.7	13.5	240	240	100	100	100

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- ① Wiring methods must be in accordance with the Electrical Code of the country in use.
- ② The supply power is intrinsically safe or non-intrinsically safe, depending on the area in which the Temperature Multi Input Device shall be mounted.
- ③ The FISCO concept allows interconnection of an intrinsically safe apparatus with an associated apparatus not specifically examined in such combination. The criteria for the interconnection is that the voltage ( $U_i$  or  $V_{max}$ ), ( $I_i$  or  $I_{max}$ ) and ( $P_i$  or  $P_{max}$ ) which the 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 5nF and 10uH respectively.

In each segment only one active device, normally the associated apparatus is allowed to provide the necessary energy for the fieldbus system. The intrinsically safe output voltage ( $U_o$  or  $V_{oc}$  or  $V_t$ ) of the associated apparatus has to be limited to the range of 14 V to 17.5 V 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 for a leakage current of 50  $\mu$ A 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 connect the devices needs to have the parameters in the following range:

Loop resistance  $R'$ : 15 ... 150  $\Omega$ /km  
 Inductance per unit length  $L'$ : 0.4 ... 1 mH/km  
 Capacitance per unit length  $C'$ : 45 ... 200 nF/km  
 $C' = C'$  line/line + 0.5' 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:  $\leq$  60 m  
 Length of trunk cable:  $\leq$  1 km – sum of spur cables

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


- ④ The Entity Concept allows interconnection of an intrinsically safe apparatus with an associated apparatus not specifically examined in combination as a system when the approved values of ( $U_o$  or  $V_{oc}$  or  $V_t$ ), ( $I_o$  or  $I_{sc}$  or  $I_t$ ) and ( $P_o$ ) for the associated apparatus are less than or equal to ( $U_i$  or  $V_{max}$ ), ( $I_i$  or  $I_{max}$ ) and ( $P_{max}$ ) for the intrinsically safe apparatus and the approved values of ( $C_o$  or  $C_a$ ) and ( $L_o$  or  $L_a$ ) for the associated apparatus are greater than  $C_i + C_{cable}$  and  $L_i + L_{cable}$  respectively, for the intrinsically safe apparatus.

When connected according to the entity concept only one single approved associated apparatus shall be used. The intrinsically safe connections of the associated apparatus must be suitable for the hazardous (classified) location in which the intrinsically safe apparatus is mounted and be approved for connection to approved intrinsically safe apparatus according to the entity concept.

For a system that has a single-channel associated apparatus connected to more than one intrinsically safe apparatus, the interconnection is intrinsically safe if:

$V_{max}$  (or  $U_i$ )  $\geq$   $V_{oc}$  (or  $U_o$ ) for each intrinsically safe apparatus  
 $I_{max}$  (or  $I_i$ )  $\geq$   $I_{sc}$  (or  $I_o$ ) for each intrinsically safe apparatus  
 $P_i \geq P_o$   
 $C_o$  or  $C_a \geq (C_{itot} + C_{cable})$  where  $C_{itot}$  = sum of individual  $C_i$  values  
 $L_o$  or  $L_a \geq (L_{itot} + L_{cable})$  where  $L_{itot}$  = sum of individual  $L_i$  values

The parameters for  $L_o$  and  $C_o$  provided in table 3 apply when one of the two conditions below is met:

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- the total Li of the external circuit (excluding the cable) is  $\leq 1\%$  of the Lo value or
- the total Ci of the external circuit (excluding the cable) is  $\leq 1\%$  of the Co value.

The parameters for Lo and Co provided in table 3 are reduced to 50 % when both of the two conditions below are met:

- the total Li of the external circuit (excluding the cable) is  $> 1\%$  of the Lo value and
- the total Ci of the external circuit (excluding the cable) is  $> 1\%$  of the Co value.

Note: The reduced capacitance of the external circuit (including cable) shall not be greater than 1  $\mu\text{F}$  for C, D (IIA, IIB) and 600 nF for A, B (IIC).

- ⑤ Simple Apparatus is defined as an electrical component or combination of components of simple construction with well-defined electrical parameters that does not generate more than 1.5 V, 100 mA, and 25 mW, or a passive component that does not dissipate more than 1.3 W and is compatible with the intrinsic safety of the circuit in which it is used.
- ⑥ At each end of the trunk cable an approved infallible termination is suitable.
- ⑦ When used as intrinsically safe apparatus or as associated apparatus with intrinsically safe outputs the Temperature Multi Input Device type RD0-TI-EX\*. \* must be mounted in an enclosure which is suitable for the location in which it is installed and with a minimum ingress protection of IP20.
- ⑧ For non-incendive installations in Division 2 / Zone 2, Temperature Multi Input Device type RD0-TI-EX\*. \* must be mounted in an IP54 enclosure capable of accepting Class 1 Division2 / Zone 2 wiring methods as specified by the Electrical Code of the country in use.
- ⑨ The F2 Enclosure is conductive and must be grounded in accordance with the Electrical Code of the country in use.
- ⑩ To prevent summation of currents, install each analog input as a separate intrinsically safe circuit.
- ⑪ The device is allowed to be used in an ambient temperature of  $T_a = -40\text{ }^\circ\text{C} - 70\text{ }^\circ\text{C}$ . The device applies to temperature class T4
- ⑫ When the Temperature Multi Input Device is supplied with a non-intrinsically safe voltage, the device can only be installed in Zone 2 / Division 2 or unclassified locations.

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