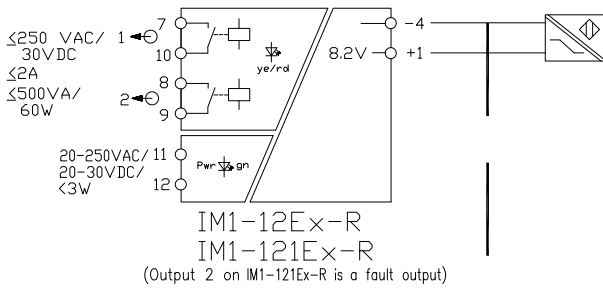


# Discrete Input Devices with Intrinsically Safe Field Circuits

NON-HAZARDOUS LOCATION



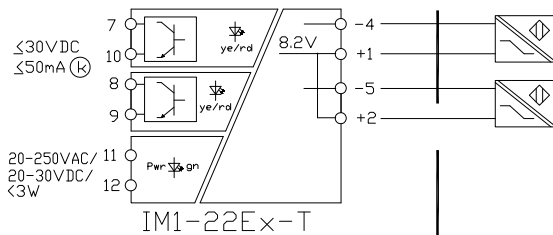
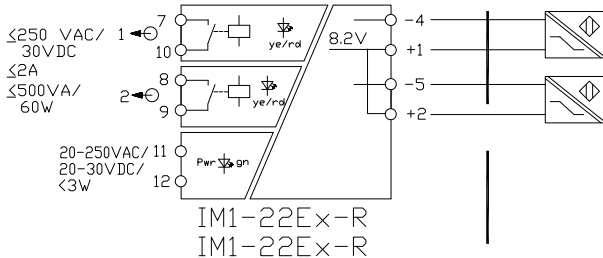
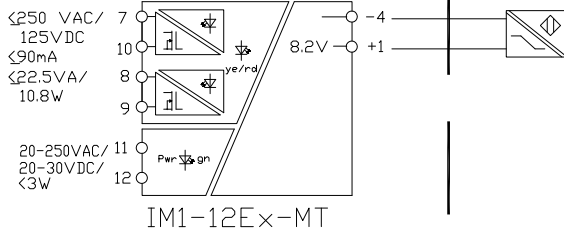
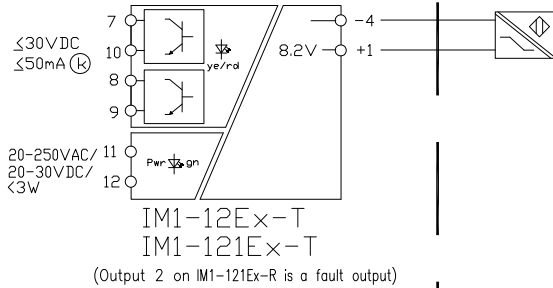
HAZARDOUS (CLASSIFIED) LOCATION

Class I, Div. 1, Group A, B, C or D;  
Class II, Div. 1, Group E, F or G;  
Class III, Div. 1; or  
Class I, Zone 0, Group IIC, IIB or IIA

Entity Parameters: Class I, Division 1; Class II, Division 1; Class III, Division 1  
Class I, Zone 0, 1, or 2  
Circuit Characteristic: Linear

Model	Terminals	$V_{oc}/U_o$ (V)	$I_{sc}/I_o$ (mA)	$P_o$ (mW)	$C_a/C_o$ (uF)		$L_a/L_o$ (mH)	
					AB/IIC	CDEFG/IIB,IIA	AB/IIC	CDEFG/IIB,IIA
IM1-12Ex-R, IM1-12Ex-MT, IM1-12Ex-T, IM1-121Ex-R, IM1-121Ex-T	1-4	9.6	11	26	1.1	5.2	1	2
					0.83	3.8	5	10
IM1-22Ex-R, IM1-22Ex-T, IM1-22Ex-MT, IM12-22Ex-R	1-4, 2-5				0.74	3.4	10	20

$P_o$  of the barrier is calculated using the formula  $P_o = (V_{oc} * I_{sc})/4$



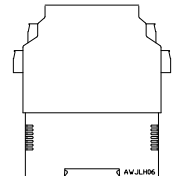
IM1-1.., IM1-2.., and IM12-2.. models



Associated Equipment Appareillage Connexe  
Nonhazardous Locations, providing intrinsically safe  
circuits for use in hazardous locations Cl I, Div 1,  
Grps A,B,C,D; Cl II, Div 1, Grps E,F,G; Cl III, Div 1;  
[AEx ia] IIC or [Ex ia] IIC; when installed per Turck  
control drawing IS-1.301.  $-25^{\circ}\text{C} < T_o < +60^{\circ}\text{C}$



Terminal Identification

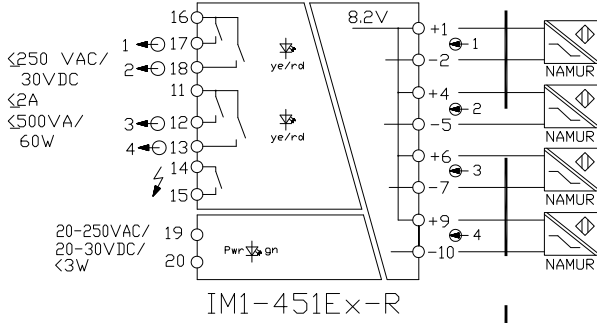


Date Code Location

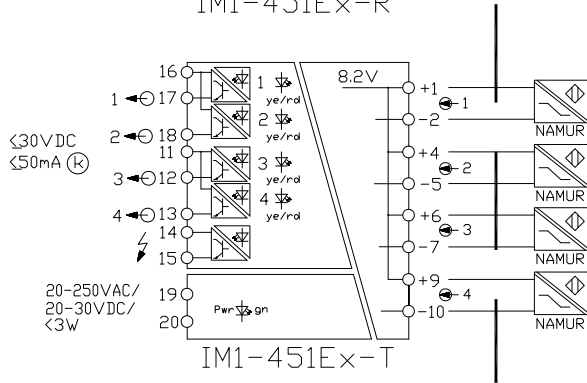
Drawing No.: <b>IS-1.301</b>		<b>TURCK</b> 3000 Campus Drive Plymouth, MN 55441 Phone: (763) 553-7300	
Title: Control Drawing for UL Listed IM1-..Ex-. and IM12-..Ex-. Isolator Barriers with I/S (Entity) Field Circuits		Scale: NONE	
Rev	Description	Drft	Date
Sheet 1 of 2			

D	Add C/US for IM1-1.., IM1-2.., and IM12-2..	BVL	4/28/15
C	Standard update evaluation	BVL	11/2/12
B	Remove Obsolete Models	BVL	5/25/10
A	Release	BVL	6/6/07

NON-HAZARDOUS LOCATION



IM1-451Ex-R



IM1-451Ex-T

HAZARDOUS (CLASSIFIED) LOCATION

Class I, Div. 1, Group A, B, C or D;  
 Class II, Div. 1, Group E, F or G;  
 Class III, Div. 1; or  
 Class I, Zone 0, Group IIC, IIB or IIA

Entity Parameters: Class I, Division 1; Class II, Division 1; Class III, Division 1  
 Class I, Zone 0, 1, or 2  
 Circuit Characteristic: Linear

Model	Terminals	V <sub>oc</sub> / U <sub>o</sub> (V)	I <sub>sc</sub> / I <sub>o</sub> (mA)	P <sub>o</sub> (mW)	C <sub>a</sub> /C <sub>o</sub> (uF)		L <sub>a</sub> /L <sub>o</sub> (mH)	
					AB/IIC	CDEFG/IIB,IIA	AB/IIC	CDEFG/IIB,IIA
IM1-451Ex-R	1-2, 4-5, 6-7, 9-10	11.3	13	36	0.84	4	1	2
IM1-451Ex-T					0.62	2.8	5	10
					0.55	2.5	10	20

P<sub>o</sub> of the barrier is calculated using the formula P<sub>o</sub> = (V<sub>oc</sub> \* I<sub>sc</sub>)/4

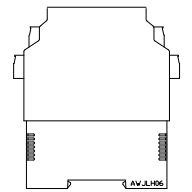
IM1-4.. models



Associated Apparatus, Nonhazardous Locations, providing intrinsically safe circuits for use in hazardous locations Cl I, Div 1, Grps A,B,C,D; Cl II, Div 1, Grps E,F,G; Cl III, Div 1; [AEx ia] IIC; when installed per Turck control drawing IS-1.301. -25°C < T<sub>a</sub> < +60°C



Terminal Identification



Date Code Location

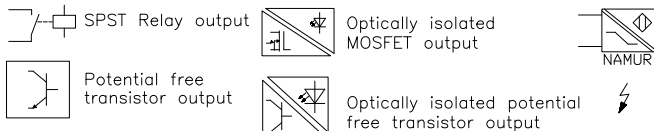
Notes:

- The symbol designates third party approved equipment with correct entity parameters meeting the relations shown in Table 1, or simple apparatus.
- Multiple circuits extending from the same piece of Associated Apparatus equipment must be installed in separate cables or in one cable having suitable insulation. Refer to Instrument Society of America Recommended Practice ISA RP12.6 for installing intrinsically safe equipment.
- A 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 1.5V, 100mA, and 25mW, or a passive component that does not dissipate more than 1.3W and is compatible with the intrinsic safety of the circuit in which it is used.
- Capacitance and inductance of the field wiring from the intrinsically safe equipment to the barrier should be calculated and should be included in the system calculations as shown in Table 1. Cable capacitance (C<sub>c</sub>) plus intrinsically safe equipment capacitance (C<sub>i</sub>) must be less than the marked capacitance (C<sub>a</sub>) shown on any barrier used. The same applies for inductance (L<sub>c</sub>, L<sub>i</sub> and L<sub>a</sub>, respectively). Where the cable capacitance and inductance per foot are not known, the following values shall be used:  
 C<sub>c</sub> = 60 pF/ft, L<sub>c</sub> = 0.2 uH/ft.
- WARNING: EXPLOSION HAZARD** – Do not connect/disconnect while circuit is live unless area is known to be nonhazardous.  
**AVERTISSEMENT: RISQUE D'EXPLOSION** – Ne pas connecter/deconnecter lorsque le circuit est sous tension sauf si la zone est connue pour etre non dangereux.
- WARNING: EXPLOSION HAZARD** – Substitution of components may impair intrinsic safety.  
**AVERTISSEMENT: RISQUE D'EXPLOSION** – La substitution de composants peut compromettre la securite intrinseque.
- Barriers must be installed in accordance with barrier manufacturer's control drawing, and:  
 – Article 504 of the National Electrical Code, ANSI/NFPA 70, for installation in the United States, or  
 – The Canadian Electrical Code, CSA 22.1 for installation in Canada
- Control equipment must not use or generate more than 250V rms or dc with respect to earth.
- WARNING:** To prevent ignition of flammable or combustible atmospheres, disconnect power before servicing.
- Environmental conditions:  
 – -25°C to +60°C  
 – Altitude ≤ 2000 meters  
 – Maximum relative humidity 92.5% non-condensing  
 – Pollution degree 2
- Barriers mount on 35 mm DIN rail or may be surface mounted by extending their surface mount 'feet' as shown.

Table 1

I.S. Equipment	Barrier	I.S. Equipment	Barrier
V <sub>max</sub>	≥ V <sub>oc</sub> (or V <sub>t</sub> )	U <sub>i</sub>	≥ U <sub>o</sub>
I <sub>max</sub>	≥ I <sub>sc</sub> (or I <sub>t</sub> )	I <sub>i</sub>	≥ I <sub>o</sub>
C <sub>i</sub> + C <sub>c</sub> cable	≤ C <sub>o</sub>	C <sub>i</sub> + C <sub>c</sub>	≤ C <sub>a</sub>
L <sub>i</sub> + L <sub>c</sub> cable	≤ L <sub>o</sub>	L <sub>i</sub> + L <sub>c</sub>	≤ L <sub>a</sub>
P <sub>i</sub>	≥ P <sub>o</sub>		

10. Symbology:



A discrete control circuit meeting the interoperability requirements of IEC 60947-5-6

