

Warning

D1010 series are isolated Intrinsically Safe Associated Apparatus located in Non Hazardous Locations or Class I, Division 2, Groups A, B, C, D, Temperature Code T4 and Class I, Zone 2, Group IIC, IIB, IIA Temperature Code T4 Hazardous Locations (according to ANSI/ISA 12.12.01-13, UL60079-15, CSA-C22.2 No. 213-M1987, CAN/CSA C22.2 No. 60079-15:12) within the specified operating temperature limits Tamb -20 to +60 °C, and connected to equipment with a maximum limit for AC power supply Um of 250 Vrms. When installed in Class I, Division 2 or Class I, Zone 2 Hazardous Locations, the module must be mounted in supplemental enclosure meeting at least IP54 degree protection. Not to be connected to control equipment that uses or generates more than 250 Vrms or Vdc with respect to earth ground.

D1010 series must be installed, operated and maintained only by qualified personnel, in accordance to the relevant national/international installation standards (e.g. ANSI/ISA RP12.06.01 Installation of Intrinsically Safe System for Hazardous (Classified) Locations, National Electrical Code NEC ANSI/NFPA 70 Section 504 and 505, Canadian Electrical Code CEC) following the established installation rules, particular care shall be given to segregation and clear identification of I.S. conductors from non I.S. ones. De-energize power source (turn off power supply voltage) before plug or unplug the terminal blocks when installed in Hazardous Locations or unless area is known to be nonhazardous.

Warning: substitution of components may impair Intrinsic Safety and suitability for Division 2, Zone 2.

Avertissement: le remplacement des composants peut dégrader la Sécurité Intrinsèque et la conformité pour Div. 2, Zone 2.

Explosion Hazard: to prevent ignition of flammable or combustible atmospheres, disconnect power before servicing or unless area is known to be nonhazardous.

Danger d'Explosion: pour prévenir une inflammation de l'atmosphère inflammable ou combustible, couper l'alimentation avant de réparer à moins de savoir que l'emplacement n'est pas dangereux.

The enclosure provides, according to EN60529, an IP20 minimum degree of mechanical protection (or similar to NEMA Standard 250 type 1) for indoor installation, outdoor installation requires an additional enclosure with higher degree of protection (i.e. IP54 to IP65 or NEMA type 12-13) consistent with the effective operating environment of the specific installation. Units must be protected against dirt, dust, extreme mechanical (e.g. vibration, impact and shock) and thermal stress, and casual contacts.

If enclosure needs to be cleaned use only a cloth lightly moistened by a mixture of detergent in water.

Electrostatic Hazard: to avoid electrostatic hazard, the enclosure of D1010 must be cleaned only with a damp or antistatic cloth.

Danger électrostatique: pour éviter le danger électrostatique, l'enveloppe de D1010 doit être nettoyée au moyen d'un chiffon humide ou antistatique.

Any penetration of cleaning liquid must be avoided to prevent damage to the unit.

Failure to properly installation or use of the equipment may risk to damage the unit or severe personal injury.

The unit cannot be repaired by the end user and must be returned to the manufacturer or his authorized representative. Any unauthorized modification must be avoided.

If calibration requires the use of an adjustable power supply, current meter, or voltmeter, it should be only be performed when the area is known to be nonhazardous or with equipment suitable for the area classification.

Technical Data

Supply: 24 Vdc nom (20 to 30 Vdc) reverse polarity protected, ripple within voltage limits ≤ 5 Vpp.

Current consumption @ 24 V: 115 mA for 2 channels D1010D, 60 mA for 1 channel D1010S with 20 mA output typical.

Power dissipation: 1.9 W for 2 channels D1010D, 1.0 W for 1 channel D1010S with 24 V supply voltage and 20 mA output typical.

Max. power consumption: at 30 V supply voltage and short circuit condition, 3.7 W for 2 channels D1010D, 2.0 W for 1 channel D1010S.

Isolation (Test Voltage): I.S. In/Out 1.5 KV; I.S. In/Supply 1.5 KV; I.S. In/I.S. In 500 V; Out/Supply 500 V; Out/Out 500 V.

Input: 0/4 to 20 mA (separately powered input, voltage drop ≤ 0.9 V) or 4 to 20 mA (2 wire Tx current limited at ≈ 25 mA).

Transmitter line voltage: ≥ 15.0 V at 20 mA with max. 20 mVrms ripple on 0.5 to 40 KHz frequency band.

Output: 0/4 to 20 mA, on max. 600 Ω load in source mode; V min. 5 V at 0 Ω load V max. 30 V in sink mode, current limited at ≈ 23 mA or 0/1 to 5 V on internal 250 Ω shunt (or 0/2 to 10 V on internal 500 Ω shunt on request).

Response time: 50 ms (10 to 90 % step change).

Output ripple: ≤ 20 mVrms on 250 Ω communication load on 0.5 to 40 KHz band.

Frequency response: 0.5 to 40 KHz bidirectional within 3 dB (Hart and higher frequency protocols).

Performance: Ref. Conditions 24 V supply, 250 Ω load, 23 ± 1 °C ambient temperature.

Calibration accuracy: $\leq \pm 0.1$ % of full scale.

Linearity error: $\leq \pm 0.05$ % of full scale.

Supply voltage influence: $\leq \pm 0.05$ % of full scale for a min to max supply change.

Load influence: $\leq \pm 0.05$ % of full scale for a 0 to 100 % load resistance change.

Temperature influence: $\leq \pm 0.01$ % on zero and span for a 1 °C change.

Environmental conditions: Operating: temperature limits -20 to + 60 °C, relative humidity max 90 % non condensing, up to 35 °C.

Storage: temperature limits - 45 to + 80 °C.

Safety Description:

for use in Class I, Division 2, Groups A, B, C, D, Temperature Code T4; Class I, Zone 2, AEx nC [ja] IIC T4 and Class I, Zone 2, Ex nC [ja] IIC T4 Hazardous Locations.

Provides intrinsically safe circuits for use in Class I, Division 1, Groups A, B, C, D; Class II, Division 1, Groups E, F, G; Class III, Division 1 and Class I, Zone 0, Group IIC Hazardous Locations.

Approvals: UL & C-UL E222308 conforms to UL 913 (Div. 1, 8th Ed., Rev. 2013-12-06), UL 60079-0 (General, All Zones, 6th Ed.), UL 60079-11 (Intrinsic Safety "I" Zones 0 & 1, 6th Ed.), UL 60079-15 ("n" Zone 2, 4th Ed.), ANSI/ISA 12.12.01-2013 (Div. 2), UL 61010-1 (3rd Ed., Rev. 2012-05-11) for UL

and CAN/CSA-C22.2 No. 157-92 (Reaffirmed 2012, Div. 1), CAN CSA-C22.2 No. 60079-0:11 (General, All Zones), CAN/CSA-C22.2 No. 60079-11:14 (Intrinsic Safety "I" Zones 0 & 1), CSA-C22.2 No. 213-M1987 (R2013, Div. 2), CAN/CSA-C22.2 No. 60079-15:12 ("n" Zone 2), CAN/CSA-C22.2 No. 61010-1-12 (3rd Ed.) for C-UL.

Mounting: T35 DIN Rail according to EN50022.

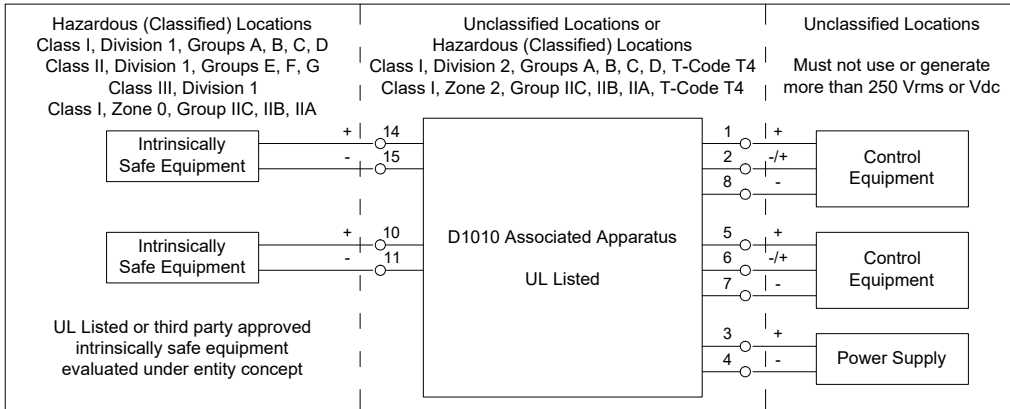
Weight: about 175 g D1010D, 125 g D1010S.

Connection: by polarized plug-in disconnect screw terminal blocks to accommodate terminations up to 2.5 mm².

Location: Non Hazardous Locations or Class I, Division 2, Groups A, B, C, D Temperature Code T4 and Class I, Zone 2, Group IIC, IIB, IIA T4 installation.

Protection class: IP 20.

Dimensions: Width 22.5 mm, Depth 99 mm, Height 114.5 mm.



NOTE:
when installed in Class I, Division 2 or Class I, Zone 2 Hazardous Locations, the module must be mounted in supplemental enclosure meeting at least IP54 degree protection.

This associated apparatus may also be connected to simple apparatus as defined in Article 504.2 and installed and temperature classified in accordance with article 504.10(B) of the National Electrical Code (ANSI/NFPA 70), or other local codes, as applicable.

Where multiple circuits extend from the same piece of associated apparatus, they must be installed in separate cables or in one cable having suitable insulation. Refer to Article 504.30(B) of the National Electrical Code (ANSI/NFPA 70) and Instrument Society of America Recommended Practice ISA RP12.6 for installing intrinsically safe equipment.

This associated apparatus has not been evaluated for use in combination with another associated apparatus.

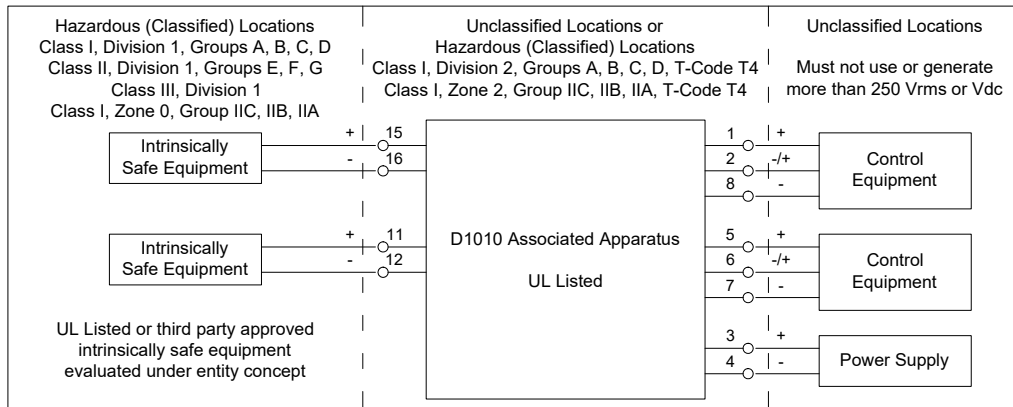
This associated apparatus provides galvanically isolated intrinsically safe circuits.

D1010 Terminals	Associated Apparatus Parameters	Must be	Hazardous Area/ Hazardous Locations Device Parameters
Ch1 14 - 15	$U_o / V_{oc} = 26.3 \text{ V}$	\leq	U_i / V_{max}
	$I_o / I_{sc} = 91 \text{ mA}$	\leq	I_i / I_{max}
Ch2 10 - 11	$P_o / P_o = 597 \text{ mW}$	\leq	P_i / P_i

The output current of this associated apparatus is limited by a resistor such that the output voltage-current plot is straight line drawn between open-circuit voltage and short-circuit current.

D1010 Terminals	D1010 Associated Apparatus Parameters Zones (Divisions)	Must be	Hazardous Area/ Hazardous Locations Device + Cable Parameters
Ch1 14 - 15 Ch2 10 - 11	$C_o / C_a = 95 \text{ nF}$ $C_o / C_a = 738 \text{ nF}$ $C_o / C_a = 2.508 \mu\text{F}$ $C_o / C_a = 738 \text{ nF}$	\geq	$C_i / C_i \text{ device} + C \text{ cable}$
	$L_o / L_a = 4.3 \text{ mH}$ $L_o / L_a = 17.2 \text{ mH}$ $L_o / L_a = 34.5 \text{ mH}$ $L_o / L_a = 17.2 \text{ mH}$	\geq	$L_i / L_i \text{ device} + L \text{ cable}$
	$L_o / R_o = 59.6 \mu\text{H}/\Omega$ $L_o / R_o = 238.4 \mu\text{H}/\Omega$ $L_o / R_o = 476.8 \mu\text{H}/\Omega$ $L_o / R_o = 238.4 \mu\text{H}/\Omega$	\geq	$L_i / R_i \text{ device and } L \text{ cable} / R \text{ cable}$

NOTE: for installations in which both the C_i and L_i of the Intrinsically Safe apparatus exceed 1 % of the C_o and L_o parameters of the Associated Apparatus (excluding the cable), then 50 % of C_o and L_o parameters are applicable and shall not be exceeded (50 % of the C_o and L_o become the limits which must include the cable such that $C_i \text{ device} + C \text{ cable} \leq 50 \% \text{ of } C_o$ and $L_i \text{ device} + L \text{ cable} \leq 50 \% \text{ of } L_o$).
The reduced capacitance of the external circuit (including cable) shall not be greater than 1uF for Groups I, IIA (Group D), IIB (Group C), and 600nF for Group IIC (Group A and B).
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 entity parameters table.
If the cable parameters are unknown, the following may be used:
Capacitance 60pF per foot (180pF per meter),
Inductance 0.20uH per foot (0.60uH per meter).



NOTE:
when installed in Class I, Division 2 or Class I, Zone 2 Hazardous Locations, the module must be mounted in supplemental enclosure meeting at least IP54 degree protection.

This associated apparatus may also be connected to simple apparatus as defined in Article 504.2 and installed and temperature classified in accordance with article 504.10(B) of the National Electrical Code (ANSI/NFPA 70), or other local codes, as applicable.

Where multiple circuits extend from the same piece of associated apparatus, they must be installed in separate cables or in one cable having suitable insulation. Refer to Article 504.30(B) of the National Electrical Code (ANSI/NFPA 70) and Instrument Society of America Recommended Practice ISA RP12.6 for installing intrinsically safe equipment.

This associated apparatus has not been evaluated for use in combination with another associated apparatus.

This associated apparatus provides galvanically isolated intrinsically safe circuits.

D1010 Terminals		Associated Apparatus Parameters	Must be	Hazardous Area/ Hazardous Locations Device Parameters
Ch1	15 - 16	$U_o / V_{oc} = 1.1 V$	\leq	U_i / V_{max}
		$I_o / I_{sc} = 38 mA$	\leq	I_i / I_{max}
Ch2	11 - 12	$P_o / P_o = 11 mW$	\leq	P_i / P_i

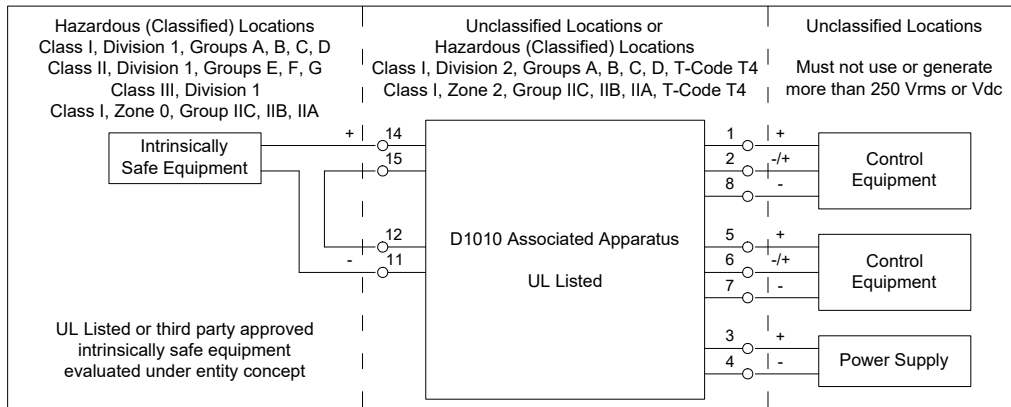
The output current of this associated apparatus is limited by a resistor such that the output voltage-current plot is straight line drawn between open-circuit voltage and short-circuit current.

D1010 Terminals		Associated Apparatus Parameters	Must be	Hazardous Area/ Hazardous Locations Device Parameters
Ch1	15 - 16	$U_i / V_{max} = 30V$	\geq	U_o / V_{oc}
		$I_i / I_{max} = 104 mA$	\geq	I_o / I_{sc}
Ch2	11 - 12	$C_i = 1.05 nF$ $L_i = 0 nH$		

NOTE:
when used with separate powered intrinsically safe devices, check that maximum allowable voltage, current (U_i/V_{max} , I_i/I_{max}) of the D1010 Associated Apparatus are not exceeded by the safety parameters (U_o/V_{oc} , I_o/I_{sc}) of the Intrinsically Safe device.

D1010 Terminals		D1010 Associated Apparatus Parameters Zones (Divisions)	Must be	Hazardous Area/ Hazardous Locations Device + Cable Parameters
Ch1 Ch2	15 - 16 11 - 12	$C_o / C_a = 100 \mu F$ $C_o / C_a = 1000 \mu F$ $C_o / C_a = 1000 \mu F$ $C_o / C_a = 1000 \mu F$	\geq	$C_i / C_i \text{ device} + C \text{ cable}$
		$L_o / L_a = 11.3 mH$ $L_o / L_a = 45.3 mH$ $L_o / L_a = 90.7 mH$ $L_o / L_a = 45.3 mH$	\geq	$L_i / L_i \text{ device} + L \text{ cable}$
		$L_o / R_o = 3490 \mu H/\Omega$ $L_o / R_o = 13963 \mu H/\Omega$ $L_o / R_o = 27927 \mu H/\Omega$ $L_o / R_o = 13963 \mu H/\Omega$	\geq	$L_i / R_i \text{ device and } L \text{ cable} / R \text{ cable}$

**NOTE: for installations in which both the C_i and L_i of the Intrinsically Safe apparatus exceed 1 % of the C_o and L_o parameters of the Associated Apparatus (excluding the cable), then 50 % of C_o and L_o parameters are applicable and shall not be exceeded (50 % of the C_o and L_o become the limits which must include the cable such that $C_i \text{ device} + C \text{ cable} \leq 50 \% \text{ of } C_o$ and $L_i \text{ device} + L \text{ cable} \leq 50 \% \text{ of } L_o$).
The reduced capacitance of the external circuit (including cable) shall not be greater than 1uF for Groups I, IIA (Group D), IIB (Group C), and 600nF for Group IIC (Group A and B).
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 entity parameters table.
If the cable parameters are unknown, the following may be used:
Capacitance 60pF per foot (180pF per meter),
Inductance 0.20uH per foot (0.60uH per meter).**



NOTE:
when installed in Class I, Division 2 or Class I, Zone 2 Hazardous Locations, the module must be mounted in supplemental enclosure meeting at least IP54 degree protection.

This associated apparatus may also be connected to simple apparatus as defined in Article 504.2 and installed and temperature classified in accordance with article 504.10(B) of the National Electrical Code (ANSI/NFPA 70), or other local codes, as applicable.

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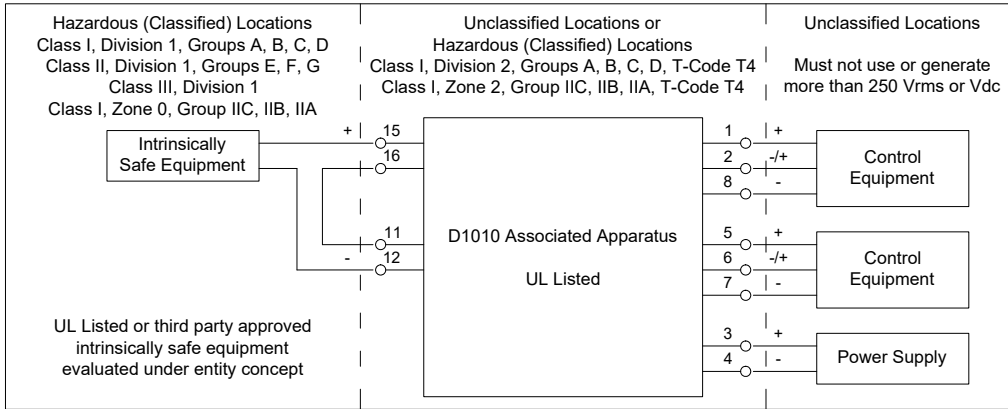
D1010 Terminals	Associated Apparatus Parameters	Must be	Hazardous Area/ Hazardous Locations Device Parameters
14 - 11 (with 15 - 12 shorted)	$U_o / V_{oc} = 27.4 \text{ V}$	\leq	U_i / V_{max}
	$I_o / I_{sc} = 91 \text{ mA}$	\leq	I_i / I_{max}
	$P_o / P_o = 624 \text{ mW}$	\leq	P_i / P_i

The output current of this associated apparatus is limited by a resistor such that the output voltage-current plot is straight line drawn between open-circuit voltage and short-circuit current.

D1010 Terminals	D1010 Associated Apparatus Parameters Zones (Divisions)	Must be	Hazardous Area/ Hazardous Locations Device + Cable Parameters
14 - 11 (with 15 - 12 shorted)	$C_o / C_a = 85 \text{ nF}$ $C_o / C_a = 675 \text{ nF}$ $C_o / C_a = 2.258 \text{ }\mu\text{F}$ $C_o / C_a = 675 \text{ nF}$	\geq	IIC (A, B) IIB (C) IIA (D) (E, F, G) $C_i / C_i \text{ device} + C \text{ cable}$
	$L_o / L_a = 4.3 \text{ mH}$ $L_o / L_a = 17.2 \text{ mH}$ $L_o / L_a = 34.5 \text{ mH}$ $L_o / L_a = 17.2 \text{ mH}$	\geq	IIC (A, B) IIB (C) IIA (D) (E, F, G) $L_i / L_i \text{ device} + L \text{ cable}$
	$L_o / R_o = 54.7 \text{ }\mu\text{H}/\Omega$ $L_o / R_o = 218.9 \text{ }\mu\text{H}/\Omega$ $L_o / R_o = 437.9 \text{ }\mu\text{H}/\Omega$ $L_o / R_o = 218.9 \text{ }\mu\text{H}/\Omega$	\geq	IIC (A, B) IIB (C) IIA (D) (E, F, G) $L_i / R_i \text{ device and } L \text{ cable} / R \text{ cable}$

NOTE: for installations in which both the C_i and L_i of the Intrinsically Safe apparatus exceed 1 % of the C_o and L_o parameters of the Associated Apparatus (excluding the cable), then 50 % of C_o and L_o parameters are applicable and shall not be exceeded (50 % of the C_o and L_o become the limits which must include the cable such that $C_i \text{ device} + C \text{ cable} \leq 50 \% \text{ of } C_o$ and $L_i \text{ device} + L \text{ cable} \leq 50 \% \text{ of } L_o$).
The reduced capacitance of the external circuit (including cable) shall not be greater than 1 μF for Groups I, IIA (Group D), IIB (Group C), and 600nF for Group IIC (Group A and B).
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 entity parameters table.
If the cable parameters are unknown, the following may be used:
Capacitance 60pF per foot (180pF per meter),
Inductance 0.20 μH per foot (0.60 μH per meter).

Connections for Duplication of Externally Powered Transmitter



NOTE:

when installed in Class I, Division 2 or Class I, Zone 2 Hazardous Locations, the module must be mounted in supplemental enclosure meeting at least IP54 degree protection.

This associated apparatus may also be connected to simple apparatus as defined in Article 504.2 and installed and temperature classified in accordance with article 504.10(B) of the National Electrical Code (ANSI/NFPA 70), or other local codes, as applicable.

This associated apparatus has not been evaluated for use in combination with another associated apparatus.

This associated apparatus provides galvanically isolated intrinsically safe circuits.

D1010 Terminals	Associated Apparatus Parameters	Must be	Hazardous Area/ Hazardous Locations Device Parameters
15 - 12 (with 16 - 11 shorted)	$U_o / V_{oc} = 2.2 \text{ V}$	\leq	U_i / V_{max}
	$I_o / I_{sc} = 38 \text{ mA}$	\leq	I_i / I_{max}
	$P_o / P_o = 21 \text{ mW}$	\leq	P_i / P_i

The output current of this associated apparatus is limited by a resistor such that the output voltage-current plot is straight line drawn between open-circuit voltage and short-circuit current.

D1010 Terminals	Associated Apparatus Parameters	Must be	Hazardous Area/ Hazardous Locations Device Parameters
15 - 12 (with 16 - 11 shorted)	$U_i / V_{max} = 30 \text{ V}$	\geq	U_o / V_{oc}
	$I_i / I_{max} = 104 \text{ mA}$	\geq	I_o / I_{sc}
	$C_i = 1.05 \text{ nF}$ $L_i = 0 \text{ nH}$		

NOTE:

when used with separate powered intrinsically safe devices, check that maximum allowable voltage, current (U_i/V_{max} , I_i/I_{max}) of the D1010 Associated Apparatus are not exceeded by the safety parameters (U_o/V_{oc} , I_o/I_{sc}) of the Intrinsically Safe device.

D1010 Terminals	D1010 Associated Apparatus Parameters Zones (Divisions)	Must be	Hazardous Area/ Hazardous Locations Device + Cable Parameters
15 - 12 (with 16 - 11 shorted)	$C_o / C_a = 100 \mu\text{F}$ $C_o / C_a = 1000 \mu\text{F}$ $C_o / C_a = 1000 \mu\text{F}$ $C_o / C_a = 1000 \mu\text{F}$	\geq	$C_i / C_i \text{ device} + C \text{ cable}$
	$L_o / L_a = 11.3 \text{ mH}$ $L_o / L_a = 45.3 \text{ mH}$ $L_o / L_a = 90.7 \text{ mH}$ $L_o / L_a = 45.3 \text{ mH}$	\geq	$L_i / L_i \text{ device} + L \text{ cable}$
	$L_o / R_o = 849 \mu\text{H}/\Omega$ $L_o / R_o = 3396 \mu\text{H}/\Omega$ $L_o / R_o = 6793 \mu\text{H}/\Omega$ $L_o / R_o = 3396 \mu\text{H}/\Omega$	\geq	$L_i / R_i \text{ device and } L \text{ cable} / R \text{ cable}$

NOTE: for installations in which both the C_i and L_i of the Intrinsically Safe apparatus exceed 1 % of the C_o and L_o parameters of the Associated Apparatus (excluding the cable), then 50 % of C_o and L_o parameters are applicable and shall not be exceeded (50 % of the C_o and L_o become the limits which must include the cable such that $C_i \text{ device} + C \text{ cable} \leq 50 \% \text{ of } C_o$ and $L_i \text{ device} + L \text{ cable} \leq 50 \% \text{ of } L_o$). The reduced capacitance of the external circuit (including cable) shall not be greater than 1uF for Groups I, IIA (Group D), IIB (Group C), and 600nF for Group IIC (Group A and B). 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 entity parameters table. If the cable parameters are unknown, the following may be used: Capacitance 60pF per foot (180pF per meter), Inductance 0.20uH per foot (0.60uH per meter).