

## Warning

D5030, D5031 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 FM3600, FM3610, FM3611, ANSI/ISA 60079-0, ANSI/ISA 60079-11, ANSI/ISA 60079-15, ANSI/ISA 61241-0, ANSI/ISA 61241-11, CSA-C22.2 NO. 157, CSA-C22.2 NO. 213, CSA-C22.2 NO. 60079-0, CSA-C22.2 NO. 60079-11, CSA-C22.2 NO. 60079-15) within the specified operating temperature limits Tamb -40 to +70 °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. D5030, D5031 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.

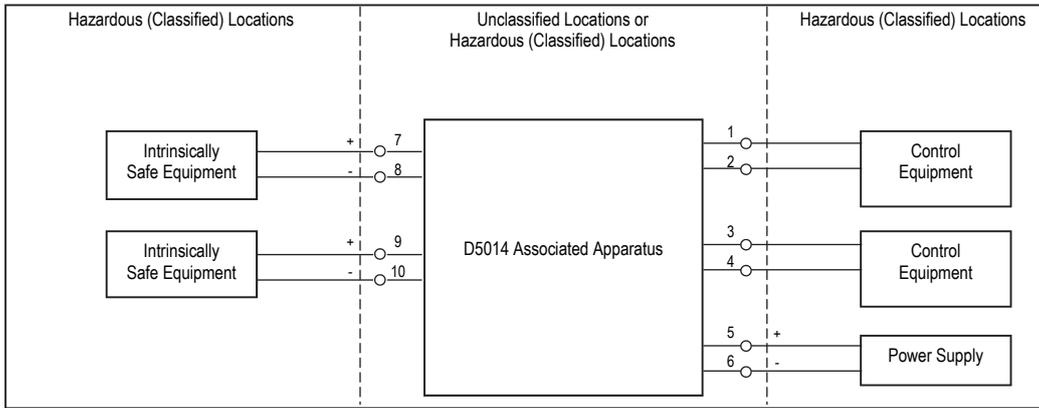
**Warning: substitution of components may impair Intrinsic Safety and suitability for Division 2, Zone 2. Explosion Hazard: to prevent ignition of flammable or combustible atmospheres, disconnect power before servicing or unless area is known to be nonhazardous.** The enclosure provides, according to 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 D5030, D5031 must be cleaned only with a damp or antistatic cloth.**

Any penetration of cleaning liquid must be avoided to prevent damage to the unit. Failure to properly install 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 performed when the area is known to be nonhazardous or with equipment suitable for the area classification.

## Technical Data

D5030	D5031
<p><b>Supply:</b> 24 Vdc nom (18 to 30 Vdc) reverse polarity protected, ripple within voltage limits <math>\leq 5</math> Vpp, 2 A time lag fuse internally protected.</p> <p><b>Current consumption @ 24 V:</b> 35 mA for 2 channels D5030D, 18 mA for 1 channel D5030S with short circuit input and relay energized, typical.</p> <p><b>Power dissipation:</b> 0.85 W for 2 channels D5030D, 0.45 W for 1 channel D5030S with 24 V supply voltage, short circuit input and relay energized, typical.</p> <p><b>Isolation (Test Voltage):</b> I.S. In/Out 2.5 KV; I.S. In/Supply 2.5 KV; I.S. In/ I.S In 500 V; Out/Supply 2.5 KV; Out/Out 2.5 KV.</p> <p><b>Input switching current levels:</b> ON <math>\geq 2.1</math> mA (1.9 to 6.2 mA range), OFF <math>\leq 1.2</math> mA (0.4 to 1.3 mA range), switch current <math>\approx 1.65</math> mA <math>\pm 0.2</math> mA hysteresis.</p> <p><b>Fault current levels:</b> open fault <math>\leq 0.2</math> mA, short fault <math>\geq 6.8</math> mA (when enabled both faults de-energize channel relay with single channel unit D5030S or de-energize channel relay with D5030D used as dual channel unit or actuate the fault relay out with D5030D used as fault signaling unit).</p> <p><b>Input equivalent source:</b> 8 V 1 K<math>\Omega</math> typical (8 V no load, 8 mA sc).</p> <p><b>Output:</b> voltage free SPST (D5030D) or SPDT (D5030S) relay contact.</p> <p><b>Contact material:</b> Ag Alloy (Cd free).</p> <p><b>Contact rating:</b> 4 A 250 Vac 1000 VA, 4 A 250 Vdc 120 W (resistive load), limit current to 100 mA maximum for SIL 3 appl.</p> <p><b>DC Load breaking capacity:</b></p>	<p><b>Supply:</b> 24 Vdc nom (18 to 30 Vdc) reverse polarity protected, ripple within voltage limits <math>\leq 5</math> Vpp, 2 A time lag fuse internally protected.</p> <p><b>Current consumption @ 24 V:</b> 22 mA for 2 channels D5031D, 12 mA for 1 channel D5031S with short circuit input and transistor closed, typical.</p> <p><b>Power dissipation:</b> 0.53 W for 2 channels D5031D, 0.30 W for 1 channel D5031S with 24 V supply voltage, short circuit input and transistor closed, typical.</p> <p><b>Isolation (Test Voltage):</b> I.S. In/Out 2.5 KV; I.S. In/Supply 2.5 KV; I.S. In/ I.S In 500 V; Out/Supply 500 V; Out/Out 500 V.</p> <p><b>Input switching current levels:</b> ON <math>\geq 2.1</math> mA (1.9 to 6.2 mA range), OFF <math>\leq 1.2</math> mA (0.4 to 1.3 mA range), switch current <math>\approx 1.65</math> mA <math>\pm 0.2</math> mA hysteresis.</p> <p><b>Fault current levels:</b> open fault <math>\leq 0.2</math> mA, short fault <math>\geq 6.8</math> mA (when enabled both faults de-energize channel transistor with single channel unit D5031S or de-energize channel transistor with D5031D used as dual channel unit or actuate the fault transistor out with D5031D used as fault signaling unit).</p> <p><b>Input equivalent source:</b> 8 V 1 K<math>\Omega</math> typical (8 V no load, 8 mA short circuit).</p> <p><b>Output:</b> voltage free SPST optocoupled open-collector transistor.</p> <p><b>Open-collector rating:</b> 100 mA at 35 Vdc (<math>\leq 1.5</math> V voltage drop).</p> <p><b>Leakage current:</b> <math>\leq 50</math> <math>\mu</math>A at 35 Vdc.</p> <p><b>Response time:</b> <math>\leq 100</math> <math>\mu</math>s.</p> <p><b>Frequency response:</b> 5 KHz maximum.</p> <p><b>Environmental conditions:</b> <b>Operating:</b> temperature limits - 40 to + 70 °C, relative humidity 95 %, up to 55 °C. <b>Storage:</b> temperature limits - 45 to + 80 °C.</p>
<p><b>Mechanical / Electrical life:</b> <math>5 * 10^6 / 3 * 10^4</math> operation, typical.</p> <p><b>Operate / Release time:</b> 8 / 4 ms typical.</p> <p><b>Bounce time NO / NC contact:</b> 3 / 8 ms typical.</p> <p><b>Frequency response:</b> 10 Hz maximum.</p> <p><b>Environmental conditions:</b> <b>Operating:</b> temperature limits - 40 to + 70 °C, relative humidity 95 %, up to 55 °C. <b>Storage:</b> temperature limits - 45 to + 80 °C.</p>	
<p><b>Safety Description:</b> <b>ATEX:</b> II 3(1) G Ex nA nC [ia Ga] IIC T4 Gc, II (1) D [Ex ia Da] IIIC, I (M1) [Ex ia Ma] I <b>IECEx / INMETRO:</b> Ex nA nC [ia Ga] IIC T4 Gc, [Ex ia Da] IIIC, [Ex ia Ma] I, <b>FM:</b> NI-AIS / I / 2 / ABCD / T4, AIS / I,II,III / 1 / ABCDEFG, I / 2 / AEx nA nC [ia] / IIC / T4 <b>FMC:</b> NI-AIS / I / 2 / ABCD / T4, AIS / I,II,III / 1 / ABCDEFG, I / 2 / Ex nA nC [ia] / IIC / T4 <b>GOST R:</b> 2ExnAnC[ia]IIC T4 X. <b>GOST:</b> 2Exs[ia]IIC T4 X associated apparatus and non-sparking electrical equipment. Uo/Voc = 10.5 V, Io/Isc = 22 mA, Po/Po = 56 mW at terminals 7-8, 9-10. Um = 250 Vrms, -40 °C <math>\leq</math> Ta <math>\leq</math> 70 °C.</p> <p><b>Approvals:</b> BVS 10 ATEX E 113 X conforms to EN60079-0, EN60079-11, EN60079-15, EN60079-26, EN50303, IECEx BVS 10.0072 X conforms to IEC60079-0, IEC60079-11, IEC60079-15, IEC60079-26. INMETRO DNV 13.0109 X conforms to ABNT NBR IEC60079-0, ABNT NBR IEC60079-11, ABNT NBR IEC60079-15, ABNT NBR IEC60079-26. FM 3046304 and FMC 3046304C conforms to Class 3600, 3610, 3810, 3611, ANSI/ISA-60079-0, ANSI/ISA-60079-11, ANSI/ISA-60079-15, C22.2 No.142, C22.2 No.213, C22.2 No. 60079-0, C22.2 No. 60079-11, C22.2 No. 60079-15. Conforms to GOST 12.2.007.0-75, R 51330.0-99, R 51330.10-99, R 51330.14-99. Conforms to GOST 12.2.007.0, 22782.0, 22782.3, 22782.5. TUV Certificate No. C-IS-236198-04, SIL 2 / SIL 3 conforms to IEC61508:2010 Ed. 2. DNV Type Approval Certificate for marine applications No.A-13625.</p> <p><b>Mounting:</b> T35 DIN-Rail according to EN50022, with or without Power Bus or on customized Termination Board.</p> <p><b>Weight:</b> about 135 g D5030D, D5031D 110 g D5030S, D5031S.</p> <p><b>Connection:</b> by polarized plug-in disconnect screw terminal blocks to accommodate terminations up to 2.5 mm<sup>2</sup>.</p> <p><b>Location:</b> 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.</p> <p><b>Protection class:</b> IP 20.</p> <p><b>Dimensions:</b> Width 12.5 mm, Depth 123 mm, Height 120 mm.</p>	



**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.

D5030, D5031, Terminals		Associated Apparatus Parameters	Must be	Hazardous Area/ Hazardous Locations Device Parameters
Ch1	7 - 8	$U_o / V_{oc} = 10.5 \text{ V}$	$\leq$	$U_i / V_{max}$
		$I_o / I_{sc} = 22 \text{ mA}$	$\leq$	$I_i / I_{max}$
Ch2	9 - 10	$P_o / P_o = 56 \text{ mW}$	$\leq$	$P_i / P_i$

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.

D5030, D5031 Terminals		Associated Apparatus Parameters Zones (Divisions)		Must be	Hazardous Area/ Hazardous Locations Device + Cable Parameters
Ch1 Ch2	7 - 8	$C_o / C_a = 2.41 \mu\text{F}$ $C_o / C_a = 16.8 \mu\text{F}$ $C_o / C_a = 75.0 \mu\text{F}$ $C_o / C_a = 16.8 \mu\text{F}$	IIC (A, B) IIB (C) IIA (D) (E, F, G)	$\geq$	$C_i / C_i \text{ device} + C \text{ cable}$
	9 - 10	$L_o / L_a = 78.3 \text{ mH}$ $L_o / L_a = 313.4 \text{ mH}$ $L_o / L_a = 626.9 \text{ mH}$ $L_o / L_a = 313.4 \text{ mH}$	IIC (A, B) IIB (C) IIA (D) (E, F, G)	$\geq$	$L_i / L_i \text{ device} + L \text{ cable}$
		$R_o / R_o = 635.9 \mu\text{H}/\Omega$ $R_o / R_o = 2543.9 \mu\text{H}/\Omega$ $R_o / R_o = 5087.9 \mu\text{H}/\Omega$ $R_o / R_o = 2543.9 \mu\text{H}/\Omega$	IIC (A, B) IIB (C) IIA (D) (E, F, G)	$\geq$	$L_i / R_i \text{ device and L cable} / R \text{ cable}$

**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  $L_i \text{ device} + L \text{ cable} \leq 50 \% \text{ of } L_o$ ). 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 0.20μH per foot (0.60μH per meter).