

Warning

D5048, D5049 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.

D5048, D5049 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 D5048, D5049 must be cleaned only with a damp or antistatic cloth.

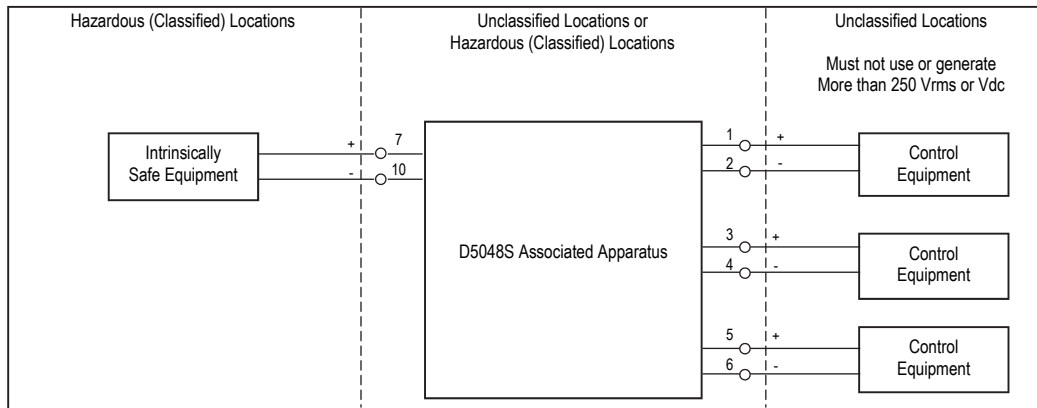
Any penetration of cleaning liquid must be avoided to prevent damage to the unit. Failure to properly install or use of the equipment may risk to damage the unit or severe personal injury.

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 be performed when the area is known to be nonhazardous or with equipment suitable for the area classification.

Technical Data

D5048S	D5049S
<p>Loop Input: loop powered control signal.</p> <p>Loop Supply: 24 Vdc nom (20 to 30 Vdc) reverse polarity protected, 2 A time lag fuse internally protected. Supplies also diagnostic monitoring control circuit.</p> <p>Current consumption @ 24 V: 65 mA with 45 mA output typical in normal operation, ≤ 10 mA when fault circuit enabled and fault condition detected.</p> <p>Power dissipation: 1.1 W with 24 V supply, output energized at 45 mA nominal load.</p> <p>Override Input: override control signal de-energizes output when enabled by dip-switch.</p> <p>Override range: 24 Vdc nom (20 to 30 Vdc) to disable (field device controlled by input), 0 to 5 Vdc to de-energize field device, reverse polarity protected.</p> <p>Current consumption @ 24 V: 5 mA.</p> <p>Isolation (Test Voltage): I.S. Out/In 2.5 KV; I.S. Out/Fault 2.5 KV; I.S. Out/Override 2.5 KV; In/Fault 500 V; In/Override 500 V; Fault/Override 500 V.</p>	<p>Supply: 24 Vdc nom (20 to 30 Vdc) reverse polarity protected, ripple within voltage limits ≤ 5 Vpp, 2 A time lag fuse internally protected.</p> <p>Current consumption @ 24 V: 65 mA with 45 mA output typical in normal operation.</p> <p>Power dissipation: 1.1 W with 24 V supply, output energized at 45 mA nominal load.</p> <p>Isolation (Test Voltage): I.S. Out/In 2.5 KV; I.S. Out/Supply 2.5 KV; I.S. Out/Fault-Override 2.5 KV; In/Supply 500 V; In/Fault-Override 500 V; Supply/Fault-Override 500V.</p> <p>Control Input: voltage free contact, logic level reverse polarity protected.</p> <p>Trip voltage levels: OFF status ≤ 5.0 V, ON status ≥ 20.0 V (maximum 30 V).</p> <p>Current consumption @ 24 V: 5 mA.</p> <p>Override Input: override control signal de-energizes output when enabled by dip-switch.</p> <p>Override range: 24 Vdc nom (20 to 30 Vdc) to disable (field device controlled by input), 0 to 5 Vdc to de-energize field device, reverse polarity protected.</p> <p>Current consumption @ 24 V: 5 mA.</p>
<p>Output: 45 mA at 13.0 V (21.0 V no load, 174 Ω series resistance) at terminals 7-10 Out A. 45 mA at 10.2 V (21.0 V no load, 236 Ω series resistance) at terminals 8-10 Out B. 45 mA at 8.5 V (21.0 V no load, 275 Ω series resistance) at terminals 9-10 Out C.</p> <p>Short circuit current: ≥ 50 mA (55 mA typical).</p> <p>Response time: 75 ms.</p> <p>Fault detection: field device and wiring open circuit or short circuit detection dip-switch selectable. When fault is detected output is de-energized until normal condition is restored.</p> <p>Short output detection: load resistance ≤ 50 Ω (≈ 2 mA forcing to detect fault).</p> <p>Open output detection: load resistance > 10 KΩ.</p> <p>Fault signalling: voltage free NE SPST optocoupled open-collector transistor (output de-energized in fault condition and when input power not present).</p> <p>Open-collector rating: 100 mA at 35 Vdc (≤ 1.5 V voltage drop).</p> <p>Leakage current: ≤ 50 μA at 35 Vdc.</p> <p>Loop input consumption: ≤ 10 mA when fault detected.</p> <p>Response time: ≤ 5 ms.</p> <p>Environmental conditions:</p> <p>Operating: temperature limits - 40 to + 70 °C, relative humidity 95 %, up to 55 °C.</p> <p>Storage: temperature limits - 45 to + 80 °C.</p> <p>Safety Description:</p> <p>ATEX: II 3(1) G Ex nA [ja Ga] IIC T4 Gc, II (1) D [Ex ia Da] IIIC, I (M1) [Ex ia Ma] I</p> <p>IECEX / INMETRO: Ex nA [ja Ga] IIC T4 Gc, [Ex ia Da] IIIC, [Ex ia Ma] I,</p> <p>FM: NI-AIS / I / 2 / ABCD / T4, AIS / I,II,III / 1 / ABCDEFG, I / 2 / AEx nA [ja] / IIC / T4</p> <p>FMC: NI-AIS / I / 2 / ABCD / T4, AIS / I,II,III / 1 / ABCDEFG, I / 2 / Ex nA [ja] / IIC / T4</p> <p>GOST R: 2ExnA[ja]IIC T4 X. GOST: 2Exs[ja]IIC T4 X</p> <p>associated apparatus and non-sparking electrical equipment.</p> <p>Uo/Voc = 24.8 V, Io/Isc = 147 mA, Po/Po = 907 mW at terminals 7-10 Out A. Uo/Voc = 24.8 V, Io/Isc = 108 mA, Po/Po = 667 mW at terminals 8-10 Out B. Uo/Voc = 24.8 V, Io/Isc = 93 mA, Po/Po = 571 mW at terminals 9-10 Out C. Um = 250 Vrms, -40 °C ≤ Ta ≤ 70 °C.</p> <p>Approvals:</p> <p>BVS 10 ATEX E 113 X conforms to EN60079-0, EN60079-11, EN60079-15, EN60079-26, EN50303.</p> <p>IECEX BVS 10.0072 X conforms to IEC60079-0, IEC60079-11, IEC60079-15, IEC60079-26.</p> <p>INMETRO DNV 13.0109 X conforms to ABNT NBR IEC60079-0, ABNT NBR IEC60079-11, ABNT NBR IEC60079-15, ABNT NBR IEC60079-26.</p> <p>FM 3046304 and FMC 3046304C conforms to Class 3600, 3610, 3611, 3810, ANSI/ISA-60079-0, ANSI/ISA-60079-11, ANSI/ISA-60079-15, C22.2 No.142, C22.2 No.157, C22.2 No.213, C22.2 No. 60079-0, C22.2 No. 60079-11, C22.2 No. 60079-15.</p> <p>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.</p> <p>TUV Certificate No. C-IS-204194-01, SIL 2 / SIL 3 conforms to IEC61508. DNV Type Approval Certificate for marine applications No.A-13625.</p> <p>Mounting: T35 DIN-Rail according to EN50022, with or without Power Bus or on customized Termination Board.</p> <p>Weight: about 130 g.</p> <p>Connection: by polarized plug-in disconnect screw terminal blocks to accommodate terminations up to 2.5 mm².</p> <p>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.</p> <p>Protection class: IP 20.</p> <p>Dimensions: Width 12.5 mm, Depth 123 mm, Height 120 mm.</p>	<p>D5048 Output Diagram</p> <p>Vo ≥ 21.0 V (no load) Rout ≤ 174 Ω (Out A) Rout ≤ 236 Ω (Out B) Rout ≤ 275 Ω (Out C) Ilim ≥ 50 mA</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.

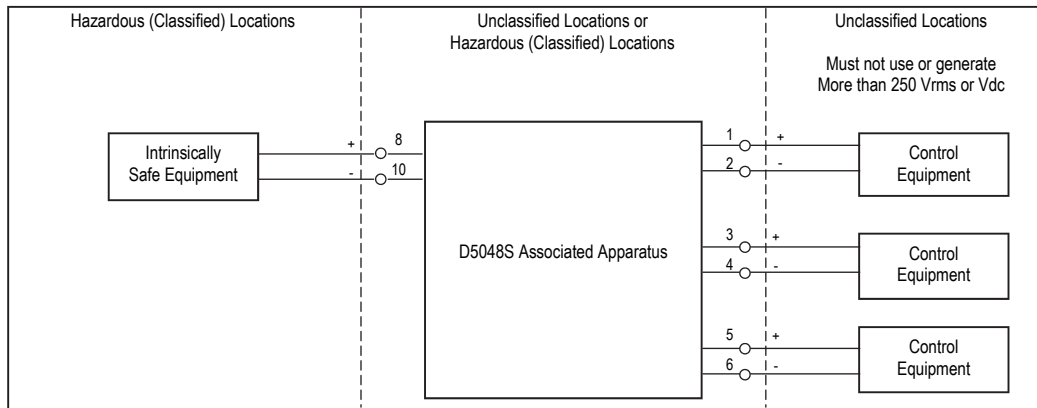
This associated apparatus provides galvanically isolated intrinsically safe circuits.

D5048, D5049 Terminals		Associated Apparatus Parameters	Must be	Hazardous Area/ Hazardous Locations Device Parameters
Out A	7 - 10	$U_o / V_{oc} = 24.8 \text{ V}$	\leq	U_i / V_{max}
		$I_o / I_{sc} = 147 \text{ mA}$	\leq	I_i / I_{max}
		$P_o / P_o = 907 \text{ mW}$	\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.

D5048, D5049 Terminals		D5048, D5049S Associated Apparatus Parameters Zones (Divisions)		Must be	Hazardous Area/ Hazardous Locations Device + Cable Parameters
Out A	7 - 10	$C_o / C_a = 113 \text{ nF}$ $C_o / C_a = 860 \text{ nF}$ $C_o / C_a = 3.05 \text{ }\mu\text{F}$ $C_o / C_a = 860 \text{ nF}$	IIC (A, B) IIB (C) IIA (D) (E, F, G)	\geq	$C_i / C_i \text{ device} + C \text{ cable}$
		$L_o / L_a = 1.65 \text{ mH}$ $L_o / L_a = 6.63 \text{ mH}$ $L_o / L_a = 13.27 \text{ mH}$ $L_o / L_a = 6.63 \text{ mH}$	IIC (A, B) IIB (C) IIA (D) (E, F, G)	\geq	$L_i / L_i \text{ device} + L \text{ cable}$
		$L_o / R_o = 39.2 \text{ }\mu\text{H}/\Omega$ $L_o / R_o = 156.8 \text{ }\mu\text{H}/\Omega$ $L_o / R_o = 313.6 \text{ }\mu\text{H}/\Omega$ $L_o / R_o = 156.8 \text{ }\mu\text{H}/\Omega$	IIC (A, B) IIB (C) IIA (D) (E, F, G)	\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 Intrinsic 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).



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.

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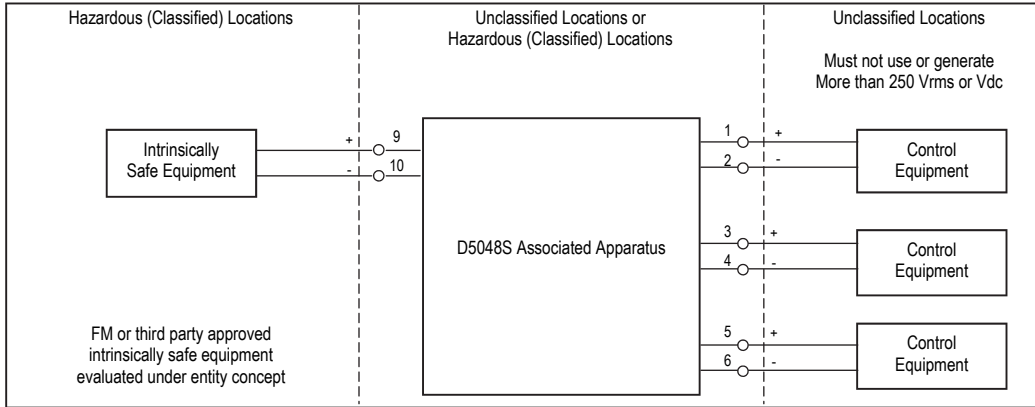
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D5048, D5049 Terminals		Associated Apparatus Parameters	Must be	Hazardous Area/ Hazardous Locations Device Parameters
Out B	8 - 10	$U_o / V_{oc} = 24.8 \text{ V}$	\leq	U_i / V_{max}
		$I_o / I_{sc} = 108 \text{ mA}$	\leq	I_i / I_{max}
		$P_o / P_o = 667 \text{ mW}$	\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.

D5048, D5049 Terminals		D5048, D5049S Associated Apparatus Parameters Zones (Divisions)		Must be	Hazardous Area/ Hazardous Locations Device + Cable Parameters
Out B	8 - 10	$C_o / C_a = 113 \text{ nF}$ $C_o / C_a = 860 \text{ nF}$ $C_o / C_a = 3.05 \text{ }\mu\text{F}$ $C_o / C_a = 860 \text{ nF}$	IIC (A, B) IIB (C) IIA (D) (E, F, G)	\geq	$C_i / C_i \text{ device} + C \text{ cable}$
		$L_o / L_a = 3.07 \text{ mH}$ $L_o / L_a = 12.30 \text{ mH}$ $L_o / L_a = 24.60 \text{ mH}$ $L_o / L_a = 12.30 \text{ mH}$	IIC (A, B) IIB (C) IIA (D) (E, F, G)	\geq	$L_i / L_i \text{ device} + L \text{ cable}$
		$L_o / R_o = 53.3 \text{ }\mu\text{H}/\Omega$ $L_o / R_o = 213.5 \text{ }\mu\text{H}/\Omega$ $L_o / R_o = 427.0 \text{ }\mu\text{H}/\Omega$ $L_o / R_o = 213.5 \text{ }\mu\text{H}/\Omega$	IIC (A, B) IIB (C) IIA (D) (E, F, G)	\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 Intrinsic 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).



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

This associated apparatus provides galvanically isolated intrinsically safe circuits.

D5048, D5049 Terminals		Associated Apparatus Parameters	Must be	Hazardous Area/ Hazardous Locations Device Parameters
Out C	9 - 10	$U_o / V_{oc} = 24.8 \text{ V}$	\leq	U_i / V_{max}
		$I_o / I_{sc} = 93 \text{ mA}$	\leq	I_i / I_{max}
		$P_o / P_o = 571 \text{ mW}$	\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.

D5048, D5049 Terminals		D5048, D5049S Associated Apparatus Parameters Zones (Divisions)		Must be	Hazardous Area/ Hazardous Locations Device + Cable Parameters
Out C	9 - 10	$C_o / C_a = 113 \text{ nF}$ $C_o / C_a = 860 \text{ nF}$ $C_o / C_a = 3.05 \text{ }\mu\text{F}$ $C_o / C_a = 860 \text{ nF}$	IIC (A, B) IIB (C) IIA (D) (E, F, G)	\geq	$C_i / C_i \text{ device} + C \text{ cable}$
		$L_o / L_a = 4.19 \text{ mH}$ $L_o / L_a = 16.79 \text{ mH}$ $L_o / L_a = 33.58 \text{ mH}$ $L_o / L_a = 16.79 \text{ mH}$	IIC (A, B) IIB (C) IIA (D) (E, F, G)	\geq	$L_i / L_i \text{ device} + L \text{ cable}$
		$L_o / R_o = 62.3 \text{ }\mu\text{H}/\Omega$ $L_o / R_o = 249.4 \text{ }\mu\text{H}/\Omega$ $L_o / R_o = 498.9 \text{ }\mu\text{H}/\Omega$ $L_o / R_o = 249.4 \text{ }\mu\text{H}/\Omega$	IIC (A, B) IIB (C) IIA (D) (E, F, G)	\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 Intrinsic 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).