

## Warning

D5040 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 -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 AEx or Ex enclosure meeting at least IP54 degree protection, suitable for Division/Zone of installation, in a controlled pollution degree 2 environment. Not to be connected to control equipment that uses or generates more than 250 Vrms or Vdc with respect to earth ground. D5040 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. Intrinsically safe circuits must be wired and separated in accordance with Article 504.20 of the National Electrical Code (ANSI/NFPA 70) or other local codes, as applicable.

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 D5040 must be cleaned only with a damp or antistatic cloth.**

**Danger électrostatique: pour éviter le danger électrostatique, l'enveloppe de D5040 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.

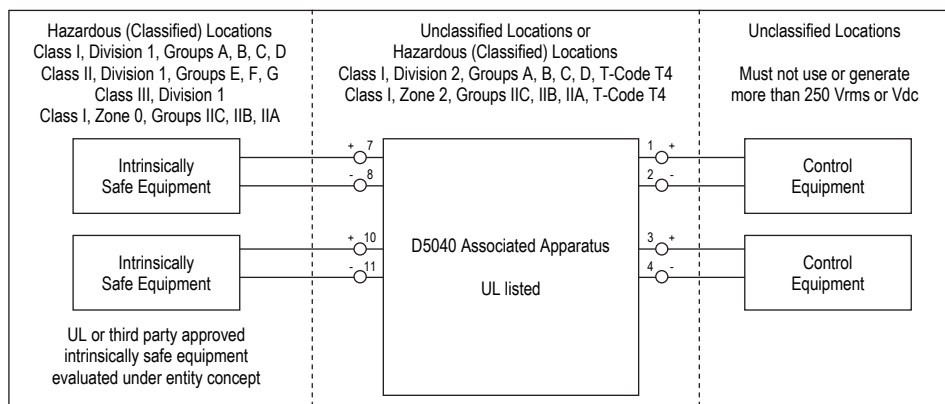
The unit cannot be repaired by the end user and must be returned to the manufacturer or his authorized representative. Any unauthorized modification must be avoided.

## Safety Description

Proc. Cont. Eq. for use in Class I, Division 2, Groups A, B, C, D, Temperature Code T4; Class I, Zone 2, AEx nA [ja Ga] IIC T4 Gc and Class I, Zone 2, Ex nA [ja Ga] IIC T4 Gc 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.

## Connections for driving Solenoid Valves (OUT A)



### NOTE:

When installed in Class I, Division 2 or Class I, Zone 2 Hazardous Locations, the module must be mounted in supplemental AEx or Ex enclosure meeting at least IP54 degree protection, suitable for Division/Zone of installation, in a controlled pollution degree 2 environment.

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.

D5040 Terminals	Associated Apparatus Parameters	must be	Hazardous Area/Hazardous Locations Device Parameters
Ch1	7 - 8	$\leq$	$U_i / V_{max}$
Ch2	10 - 11	$\leq$	$I_i / I_{max}$
		$\leq$	$P_i / P_i$

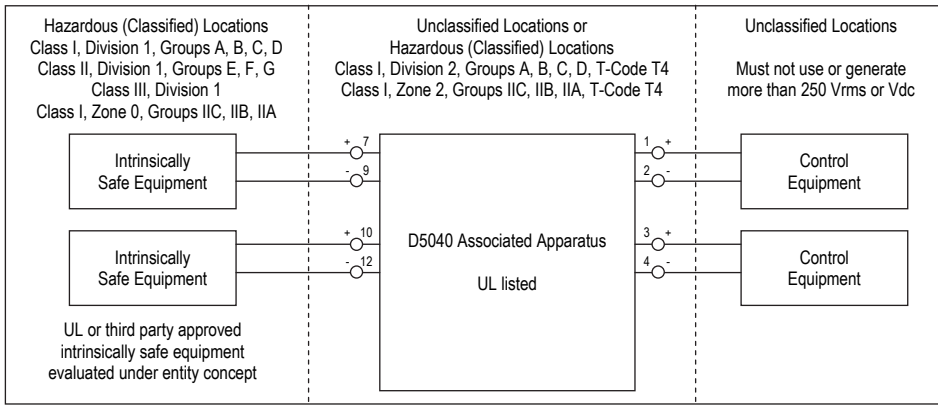
The output current of this associated apparatus is limited by a resistor such that the output voltage-current plot is straight line drawn between open-circuit voltage and short-circuit current.

D5040 Terminals	Associated Apparatus Parameters	must be	Hazardous Area/Hazardous Locations Device + Cable Parameters
Ch1	$C_o / C_a = 107 \text{ nF}$ $C_o / C_a = 820 \text{ nF}$ $C_o / C_a = 2.9 \text{ }\mu\text{F}$ $C_o / C_a = 820 \text{ nF}$	$\geq$	$C_i / C_i \text{ device} + C \text{ cable}$
	$L_o / L_a = 1.67 \text{ mH}$ $L_o / L_a = 6.71 \text{ mH}$ $L_o / L_a = 13.42 \text{ mH}$ $L_o / L_a = 6.71 \text{ mH}$	$\geq$	$L_i / L_i \text{ device} + L \text{ cable}$
Ch2	$L_o / R_o = 38.8 \text{ }\mu\text{H}/\Omega$ $L_o / R_o = 155.3 \text{ }\mu\text{H}/\Omega$ $L_o / R_o = 310.7 \text{ }\mu\text{H}/\Omega$ $L_o / R_o = 155.3 \text{ }\mu\text{H}/\Omega$	$\geq$	$L_i / R_i \text{ device and } L \text{ cable} / R \text{ cable}$

**NOTE: for installations in which both the  $C_i$  and  $L_i$  of the Intrinsically Safe apparatus exceed 1 % of the  $C_o/C_a$  and  $L_o/L_a$  parameters of the Associated Apparatus (excluding the cable), then 50 % of  $C_o/C_a$  and  $L_o/L_a$  parameters are applicable and shall not be exceeded (50 % of the  $C_o/C_a$  and  $L_o/L_a$  become the limits which must include the cable such that  $C_i \text{ device} + C \text{ cable} \leq 50 \% \text{ of } C_o/C_a$  and  $L_i \text{ device} + L \text{ cable} \leq 50 \% \text{ of } L_o/L_a$ ). The reduced capacitance of the external circuit (including cable) shall not be greater than 1  $\mu\text{F}$  for Groups C, D / IIA, IIB and 600 nF for Group A, B / IIC. 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 60 pF per foot (200 pF per meter), inductance 0.20  $\mu\text{H}$  per foot (1  $\mu\text{H}$  per meter).**

**NOTE:** channel 2 is not available for D5040S.

## Connections for driving Solenoid Valves (OUT B)



**NOTE:**

When installed in Class I, Division 2 or Class I, Zone 2 Hazardous Locations, the module must be mounted in supplemental AEx or Ex enclosure meeting at least IP54 degree protection, suitable for Division/Zone of installation, in a controlled pollution degree 2 environment.

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.

D5040 Terminals		Associated Apparatus Parameters	must be	Hazardous Area/Hazardous Locations Device Parameters
Ch1	7 - 9	$U_o / V_{oc} = 25.2 \text{ V}$	$\leq$	$U_i / V_{max}$
		$I_o / I_{sc} = 108 \text{ mA}$	$\leq$	$I_i / I_{max}$
Ch2	10 - 12	$P_o / P_o = 676 \text{ mW}$	$\leq$	$P_i / P_i$

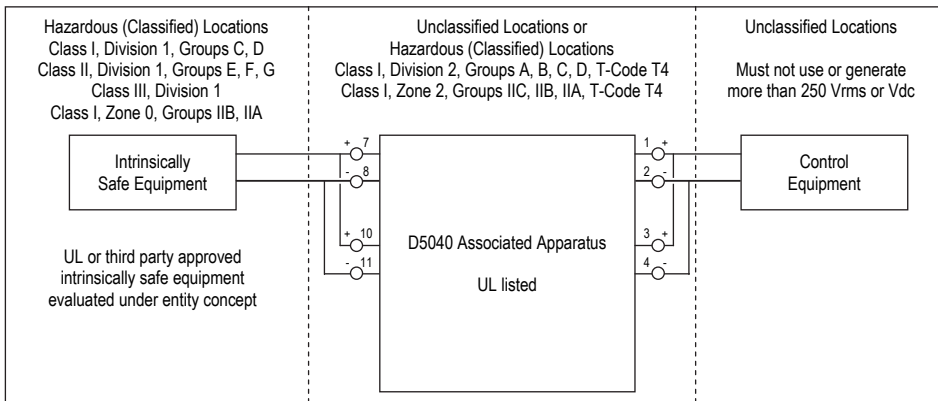
The output current of this associated apparatus is limited by a resistor such that the output voltage-current plot is straight line drawn between open-circuit voltage and short-circuit current.

D5040 Terminals		Associated Apparatus Parameters		must be	Hazardous Area/Hazardous Locations Device + Cable Parameters
Ch1 Ch2	7 - 9 10 - 12	$C_o / C_a = 107 \text{ nF}$ $C_o / C_a = 820 \text{ nF}$ $C_o / C_a = 2.9 \text{ }\mu\text{F}$ $C_o / C_a = 820 \text{ nF}$	IIC (A, B) IIB (C) IIA (D) (E, F, G)	$\geq$	$C_i / C_i \text{ device} + C \text{ cable}$
		$L_o / L_a = 3.07 \text{ mH}$ $L_o / L_a = 12.3 \text{ mH}$ $L_o / L_a = 24.61 \text{ mH}$ $L_o / L_a = 12.3 \text{ mH}$	IIC (A, B) IIB (C) IIA (D) (E, F, G)	$\geq$	$L_i / L_i \text{ device} + L \text{ cable}$
		$L_o / R_o = 52.6 \text{ }\mu\text{H}/\Omega$ $L_o / R_o = 210.4 \text{ }\mu\text{H}/\Omega$ $L_o / R_o = 420 \text{ }\mu\text{H}/\Omega$ $L_o / R_o = 210.4 \text{ }\mu\text{H}/\Omega$	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 Intrinsically Safe apparatus exceed 1 % of the  $C_o/C_a$  and  $L_o/L_a$  parameters of the Associated Apparatus (excluding the cable), then 50 % of  $C_o/C_a$  and  $L_o/L_a$  parameters are applicable and shall not be exceeded (50 % of the  $C_o/C_a$  and  $L_o/L_a$  become the limits which must include the cable such that  $C_i \text{ device} + C \text{ cable} \leq 50 \% \text{ of } C_o/C_a$  and  $L_i \text{ device} + L \text{ cable} \leq 50 \% \text{ of } L_o/L_a$ ). The reduced capacitance of the external circuit (including cable) shall not be greater than 1  $\mu\text{F}$  for Groups C, D / IIA, IIB and 600 nF for Group A, B / IIC. 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 60 pF per foot (200 pF per meter), inductance 0.20  $\mu\text{H}$  per foot (1  $\mu\text{H}$  per meter).**

**NOTE:** channel 2 is not available for D5040S.

## Connections for driving Solenoid Valves (OUT A + OUT A)



**NOTE:**

When installed in Class I, Division 2 or Class I, Zone 2 Hazardous Locations, the module must be mounted in supplemental AEx or Ex enclosure meeting at least IP54 degree protection, suitable for Division/Zone of installation, in a controlled pollution degree 2 environment.

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.

D5040 Terminals		Associated Apparatus Parameters	must be	Hazardous Area/Hazardous Locations Device Parameters
Ch1//2	7-8//10-11	$U_o / V_{oc} = 25.2 \text{ V}$	$\leq$	$U_i / V_{max}$
		$I_o / I_{sc} = 292 \text{ mA}$	$\leq$	$I_i / I_{max}$
		$P_o / P_o = 1831 \text{ mW}$	$\leq$	$P_i / P_i$

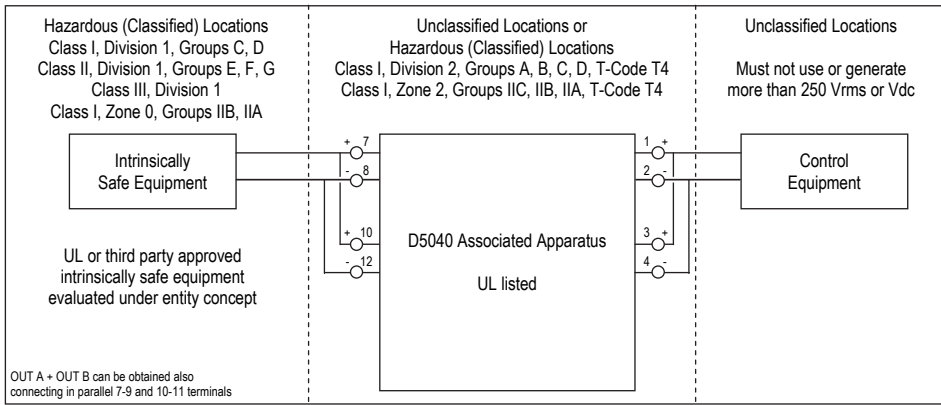
The output current of this associated apparatus is limited by a resistor such that the output voltage-current plot is straight line drawn between open-circuit voltage and short-circuit current.

D5040 Terminals		Associated Apparatus Parameters		must be	Hazardous Area/Hazardous Locations Device + Cable Parameters
Ch1//2	7-8//10-11	$C_o / C_a = 820 \text{ nF}$ $C_o / C_a = 2.9 \text{ }\mu\text{F}$ $C_o / C_a = 820 \text{ nF}$	IIB (C) IIA (D) (E, F, G)	$\geq$	$C_i / C_i \text{ device} + C \text{ cable}$
		$L_o / L_a = 1.67 \text{ mH}$ $L_o / L_a = 3.35 \text{ mH}$ $L_o / L_a = 1.67 \text{ mH}$	IIB (C) IIA (D) (E, F, G)	$\geq$	$L_i / L_i \text{ device} + L \text{ cable}$
		$L_o / R_o = 77.6 \text{ }\mu\text{H}/\Omega$ $L_o / R_o = 155.3 \text{ }\mu\text{H}/\Omega$ $L_o / R_o = 77.6 \text{ }\mu\text{H}/\Omega$	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 Intrinsically Safe apparatus exceed 1 % of the  $C_o/C_a$  and  $L_o/L_a$  parameters of the Associated Apparatus (excluding the cable), then 50 % of  $C_o/C_a$  and  $L_o/L_a$  parameters are applicable and shall not be exceeded (50 % of the  $C_o/C_a$  and  $L_o/L_a$  become the limits which must include the cable such that  $C_i \text{ device} + C \text{ cable} \leq 50 \% \text{ of } C_o/C_a$  and  $L_i \text{ device} + L \text{ cable} \leq 50 \% \text{ of } L_o/L_a$ ). The reduced capacitance of the external circuit (including cable) shall not be greater than 1  $\mu\text{F}$  for Groups C, D / IIA, IIB. 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 60 pF per foot (200 pF per meter), inductance 0.20  $\mu\text{H}$  per foot (1  $\mu\text{H}$  per meter).**

**NOTE:** this configuration is not available for D5040S.

## Connections for driving Solenoid Valves (OUT A + OUT B)



**NOTE:**

When installed in Class I, Division 2 or Class I, Zone 2 Hazardous Locations, the module must be mounted in supplemental AEx or Ex enclosure meeting at least IP54 degree protection, suitable for Division/Zone of installation, in a controlled pollution degree 2 environment.

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.

D5040 Terminals	Associated Apparatus Parameters	must be	Hazardous Area/Hazardous Locations Device Parameters
Ch1//2 7-8//10-12 or 7-9//10-11	$U_o / V_{oc} = 25.2 \text{ V}$	$\leq$	$U_i / V_{max}$
	$I_o / I_{sc} = 254 \text{ mA}$	$\leq$	$I_i / I_{max}$
	$P_o / P_o = 1592 \text{ mW}$	$\leq$	$P_i / P_i$

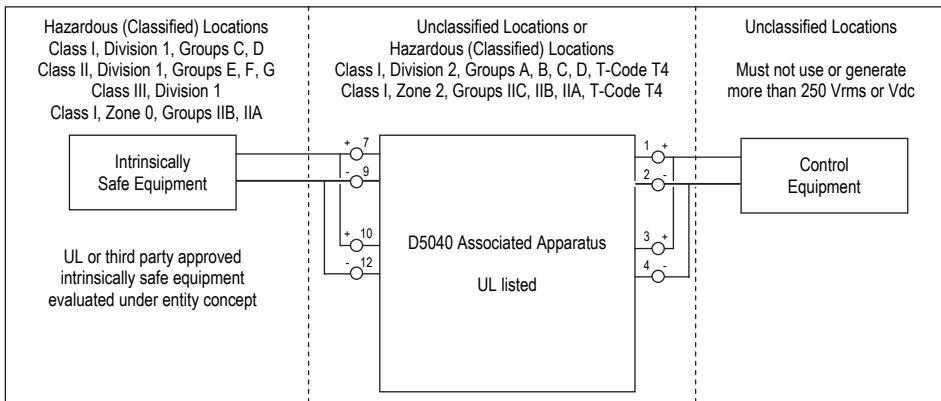
The output current of this associated apparatus is limited by a resistor such that the output voltage-current plot is straight line drawn between open-circuit voltage and short-circuit current.

D5040 Terminals	Associated Apparatus Parameters	must be	Hazardous Area/Hazardous Locations Device + Cable Parameters
Ch1//2 7-8//10-12 or 7-9//10-11	$C_o / C_a = 820 \text{ nF}$ $C_o / C_a = 2.9 \text{ }\mu\text{F}$ $C_o / C_a = 820 \text{ nF}$	$\geq$	IIB (C) IIA (D) (E, F, G) $C_i / C_i \text{ device} + C \text{ cable}$
	$L_o / L_a = 2.22 \text{ mH}$ $L_o / L_a = 4.44 \text{ mH}$ $L_o / L_a = 2.22 \text{ mH}$	$\geq$	IIB (C) IIA (D) (E, F, G) $L_i / L_i \text{ device} + L \text{ cable}$
	$L_o / R_o = 89.3 \text{ }\mu\text{H}/\Omega$ $L_o / R_o = 178.7 \text{ }\mu\text{H}/\Omega$ $L_o / R_o = 89.3 \text{ }\mu\text{H}/\Omega$	$\geq$	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  $C_o/C_a$  and  $L_o/L_a$  parameters of the Associated Apparatus (excluding the cable), then 50 % of  $C_o/C_a$  and  $L_o/L_a$  parameters are applicable and shall not be exceeded (50 % of the  $C_o/C_a$  and  $L_o/L_a$  become the limits which must include the cable such that  $C_i \text{ device} + C \text{ cable} \leq 50 \%$  of  $C_o/C_a$  and  $L_i \text{ device} + L \text{ cable} \leq 50 \%$  of  $L_o/L_a$ ). The reduced capacitance of the external circuit (including cable) shall not be greater than 1  $\mu\text{F}$  for Groups C, D / IIA, IIB. 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 60 pF per foot (200 pF per meter), inductance 0.20  $\mu\text{H}$  per foot (1  $\mu\text{H}$  per meter).**

**NOTE:** this configuration is not available for D5040S.

## Connections for driving Solenoid Valves (OUT B + OUT B)



**NOTE:**

When installed in Class I, Division 2 or Class I, Zone 2 Hazardous Locations, the module must be mounted in supplemental AEx or Ex enclosure meeting at least IP54 degree protection, suitable for Division/Zone of installation, in a controlled pollution degree 2 environment.

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.

D5040 Terminals	Associated Apparatus Parameters	must be	Hazardous Area/Hazardous Locations Device Parameters
Ch1//2 7-9//10-12	$U_o / V_{oc} = 25.2 \text{ V}$	$\leq$	$U_i / V_{max}$
	$I_o / I_{sc} = 216 \text{ mA}$	$\leq$	$I_i / I_{max}$
	$P_o / P_o = 1352 \text{ mW}$	$\leq$	$P_i / P_i$

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.

D5040 Terminals	Associated Apparatus Parameters	must be	Hazardous Area/Hazardous Locations Device + Cable Parameters
Ch1//2 7-9//10-12	$C_o / C_a = 820 \text{ nF}$ $C_o / C_a = 2.9 \text{ }\mu\text{F}$ $C_o / C_a = 820 \text{ nF}$	$\geq$	IIB (C) IIA (D) (E, F, G) $C_i / C_i \text{ device} + C \text{ cable}$
	$L_o / L_a = 3.07 \text{ mH}$ $L_o / L_a = 6.15 \text{ mH}$ $L_o / L_a = 3.07 \text{ mH}$	$\geq$	IIB (C) IIA (D) (E, F, G) $L_i / L_i \text{ device} + L \text{ cable}$
	$L_o / R_o = 105.2 \text{ }\mu\text{H}/\Omega$ $L_o / R_o = 210.4 \text{ }\mu\text{H}/\Omega$ $L_o / R_o = 105.2 \text{ }\mu\text{H}/\Omega$	$\geq$	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  $C_o/C_a$  and  $L_o/L_a$  parameters of the Associated Apparatus (excluding the cable), then 50 % of  $C_o/C_a$  and  $L_o/L_a$  parameters are applicable and shall not be exceeded (50 % of the  $C_o/C_a$  and  $L_o/L_a$  become the limits which must include the cable such that  $C_i \text{ device} + C \text{ cable} \leq 50 \%$  of  $C_o/C_a$  and  $L_i \text{ device} + L \text{ cable} \leq 50 \%$  of  $L_o/L_a$ ). The reduced capacitance of the external circuit (including cable) shall not be greater than 1  $\mu\text{F}$  for Groups C, D / IIA, IIB. 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 60 pF per foot (200 pF per meter), inductance 0.20  $\mu\text{H}$  per foot (1  $\mu\text{H}$  per meter).**

**NOTE:** this configuration is not available for D5040S.