

## Warning

D5072 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.

D5072 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 D5072 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

**Supply:** 24 Vdc nom (18 to 30 Vdc) reverse polarity protected, ripple within voltage limits  $\leq 5$  Vpp, 2 A time lag fuse internally protected.

**Current consumption @ 24 V:** 60 mA (D5072D), 50 mA (D5072S) with 20 mA out typical.

**Power dissipation:** 1.5 W for 2 channels D5072D, 1.3 W for 1 channel D5072S with 24 V supply voltage and 20 mA output typical.

**Isolation (Test Voltage):** 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.

**Input:** (for details see Input specifications table on page 8) millivolt or thermocouple type A1, A2, A3, B, E, J, K, L, LR, N, R, S, T, U, or 2-3-4 wire RTD Pt50, Pt100, Pt200, Pt300, Pt400, Pt500, Pt1000 to IEC, Pt100 to ANSI, Ni100, Ni120 to DIN43760, Pt46, Pt50, Pt100, Pt200, Pt300, Pt400, Pt500, Cu50, Cu53, Cu100 to GOST6651 (russian standard) and Cu9.035 (or Cu10), or 3 wire transmitting potentiometer (100  $\Omega$  to 10 k $\Omega$ ). 4-wire RTD input only on D5072S. Possibility of configuring user customized sensor (TC or RTD). Choice between °C/°F

**Integration time:** from 50 ms to 500 ms depending on sensor and fast/slow integration.

**Resolution:** 1  $\mu$ V on mV/TC, 1 m $\Omega$  on RTD/resistance, 0.0001 % on transmitting potentiometer.

**Visualization:** 0.1 °C on temp., 10  $\mu$ V on mV, 100 m $\Omega$  on resistance, 0.1 % on potentiometer.

**Input range:** within sensor limits (-50 to +80 mV for TC/mV, 0-4 k $\Omega$  for resistance).

**Measuring RTD current:**  $\leq 0.15$  mA.

**2 wire RTD line resistance compensation:**  $\leq 100$   $\Omega$  (programmable).

**Thermocouple Reference Junction Compensation:** programmable as automatic with internal compensator, fixed (-60 to +100 °C), or remote using 1 channel (D5072D).

**Thermocouple burnout current:**  $\leq 50$   $\mu$ A.

**Fault:** enabled or disabled. Analog output can be programmed to reflect fault conditions via downscale, highscale or customized value forcing. Fault conditions are also signaled via BUS and by red LED on front panel for each channel. Fault conditions are: Sensor burnout, Sensor out of range, Output saturation, Internal fault, Module out of temperature range.

**Output:** Fully customizable 0/4 to 20 mA, on max. 300  $\Omega$  load source mode, current limited at 24 mA. In sink mode, external voltage generator range is V min. 3.5V at 0 $\Omega$  load and V max. 30V. If generator voltage Vg > 10 V, a series resistance  $\geq (Vg - 10)/0.024$   $\Omega$  is needed. The maximum value of series resistance is (Vg - 3.5)/0.024  $\Omega$ .

**Resolution:** 1  $\mu$ A current output.

**Transfer characteristic:** linear, direct or reverse on all input sensors.

**Response time:**  $\leq 20$  ms (10 to 90 % step).

**Output ripple:**  $\leq 20$  mVrms on 250  $\Omega$  load.

**Modbus Output:** Modbus RTU protocol up to 115.200 baud on Bus connector.

**Alarm: Trip point range:** within rated limits of input sensor (see input step resolution).

**ON-OFF delay time:** 0 to 1000 s, 100 ms step.

**Hysteresis:** 0 to 500 °C for TC/RTD sensor input, 0 to 50 mV for mV input, 0 to 50 % for potentiometer input, 0 to 2 K $\Omega$  for resistance (see input for step resolution).

**Output:** voltage free SPST photoMOS: 100 mA, 60 Vdc ( $\leq 1$  V voltage drop).

**Performance:** Ref. Conditions 24 V supply, 250  $\Omega$  load, 23  $\pm 1$  °C ambient temperature, slow integration mode, 4-wires configuration for RTD.

**Input: Calibration and linearity accuracy:** see section "Input Specifications".

**Temperature influence:**  $\leq \pm 2$   $\mu$ V on mV or thermocouple,  $\pm 20$  m $\Omega$  on RTD ( $\leq 300$   $\Omega$  @ 0°C) or  $\pm 200$  m $\Omega$  on RTD ( $> 300$   $\Omega$  @ 0°C),  $\pm 0.02$  % on potentiometer for a 1 °C change.

**Ref. Junction Compensation influence:**  $\leq \pm 1$  °C (thermocouple sensor).

**Analog Output: Calibration accuracy:**  $\leq \pm 0.05$  % of full scale.

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

**Supply voltage influence:**  $\leq \pm 0.02$  % of full scale for a min to max supply change.

**Load influence:**  $\leq \pm 0.02$  % 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.

**Compatibility:** CE mark compliant, conforms to Directives: 94/9/EC Atex, 2004/108/CE EMC, 2006/95/EC LVD, 2011/65/EU RoHS.

**Environmental conditions:**

**Operating:** temperature limits -40 to +70 °C, relative humidity 95 %, up to 55 °C.

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

**Safety Description:**

**ATEX:** II 3(1) G Ex nA [ja Ga] IIC T4 Gc, II (1) D [Ex ia Da] IIC, I (M1) [Ex ia Ma] I **IECEX / INMETRO:** Ex nA [ja Ga] IIC T4 Gc, [Ex ia Da] IIC, [Ex ia Ma] I,

**FM:** NI-AIS / I / 2 / ABCD / T4, AIS / I,II,III / 1 / ABCDEFG, I / 2 / AEx nA [ja] / IIC / T4 **FMC:** NI-AIS / I / 2 / ABCD / T4, AIS / I,II,III / 1 / ABCDEFG, I / 2 / Ex nA [ja] / IIC / T4

**GOST R:** 2 Ex nA [ja Ga] IIC T4 Gc X.

associated apparatus and non-sparking electrical equipment.

D5072S: Uo/Voc = 7.2 V, Io/Isc = 23 mA, Po/Po = 40 mW, Ui/Vmax = 12.8 V, Ii/Imax = 28.7 mA, Ci = 0 nF, Li = 0 nH at terminals 7-8-9-10.

D5072D: Uo/Voc = 7.2 V, Io/Isc = 16 mA, Po/Po = 27 mW, Ui/Vmax = 12.8 V, Ci = 0 nF, Li = 0 nH at terminals 7-8-9, 10-11-12. Um = 250 Vrms, -40 °C  $\leq$  Ta  $\leq$  70 °C.

**Approvals:**

BVS 12 ATEX E 053 X conforms to EN60079-0, EN60079-11, EN60079-15, EN60079-26, EN50303.

IECEX BVS 12.0050X conforms to IEC60079-0, IEC60079-11, IEC60079-15, IEC60079-26.

INMETRO DNV 13.0110 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, 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.

Conforms to GOST 12.2.007.0-75, IEC 60079-0, IEC 60079-11, 60079-15. DNV Type Approval Certificate for marine applications No.A-13625.

**Mounting:** T35 DIN-Rail according to EN50022, with or without Power Bus or on customized Termination Board.

**Weight:** about 135 g D5072D, 130 g D5072S.

**Connection:** by polarized plug-in disconnect screw terminal blocks to accommodate terminations up to 2.5 mm<sup>2</sup>.

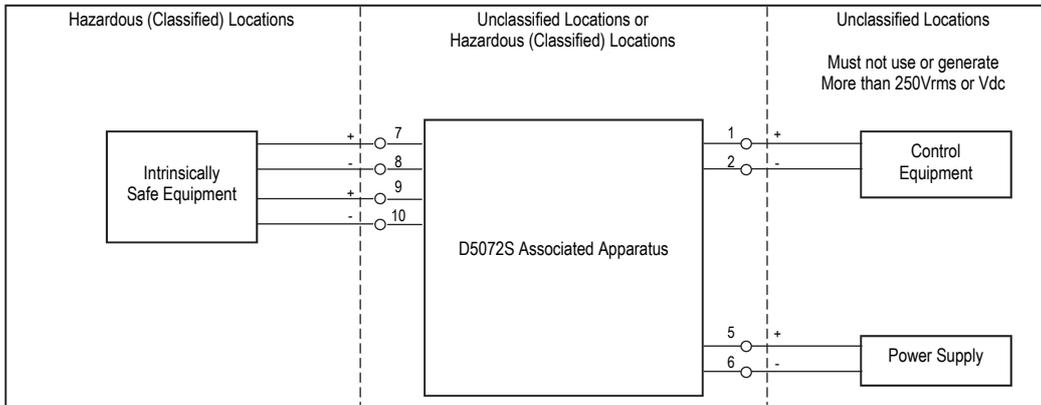
**Location:** installation in Safe Area/Non Hazardous Locations or Zone 2, Group IIC T4 or Class I, Division 2, Group A,B,C,D, T4 or Class I, Zone 2, Group IIC, T4.

**Protection class:** IP 20.

**Dimensions:** Width 12.5 mm, Depth 123 mm, Height 120 mm.

Model:	D5072	
1 channel		S
2 channels		D

Operating parameters are programmable from PC by the GM Pocket Portable Adapter PPC5092 via USB serial line and SWC5090 Configurator software.



**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.

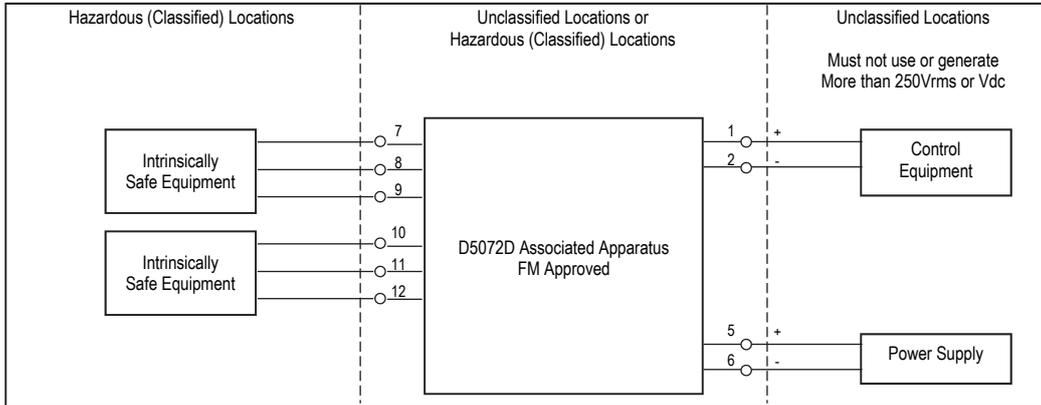
D5072S Terminals	Associated Apparatus Parameters	Must be	Hazardous Area/ Hazardous Locations Device Parameters
Ch1 7 - 8 - 9 - 10	$U_o / V_{oc} = 7.2 \text{ V}$	$\leq$	$U_i / V_{max}$
	$I_o / I_{sc} = 23 \text{ mA}$	$\leq$	$I_i / I_{max}$
	$P_o / P_o = 40 \text{ mW}$	$\leq$	$P_i / P_i$

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.

D5072S Terminals	Associated Apparatus Parameters	Must be	Hazardous Area/ Hazardous Locations Device Parameters
Ch1 7 - 8 - 9 - 10	$U_i / V_{max} = 12.8 \text{ V}$	$\geq$	$U_o / V_{oc}$
	$I_i / I_{max} = 28.7 \text{ mA}$	$\geq$	$I_o / I_{sc}$
	$C_i = 0 \text{ nF}$ $L_i = 0 \text{ nH}$		

D5072S Terminals	D5072S Associated Apparatus Parameters Zones (Divisions)	Must be	Hazardous Area/ Hazardous Locations Device + Cable Parameters
Ch1 7 - 8 - 9 - 10	$C_o / C_a = 13.5 \mu\text{F}$ $C_o / C_a = 240 \mu\text{F}$ $C_o / C_a = 1000 \mu\text{F}$ $C_o / C_a = 240 \mu\text{F}$	$\geq$	IIC (A, B) IIB (C) IIA (D) (E, F, G)  $C_i / C_i \text{ device} + C \text{ cable}$
	$L_o / L_a = 67.2 \text{ mH}$ $L_o / L_a = 268.8 \text{ mH}$ $L_o / L_a = 537.7 \text{ mH}$ $L_o / L_a = 268.8 \text{ mH}$	$\geq$	IIC (A, B) IIB (C) IIA (D) (E, F, G)  $L_i / L_i \text{ device} + L \text{ cable}$
	$L_o / R_o = 893 \mu\text{H}/\Omega$ $L_o / R_o = 3573 \mu\text{H}/\Omega$ $L_o / R_o = 7147 \mu\text{H}/\Omega$ $L_o / R_o = 3573 \mu\text{H}/\Omega$	$\geq$	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 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.

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

This associated apparatus provides galvanically isolated intrinsically safe circuits.

D5072D Terminals		Associated Apparatus Parameters	Must be	Hazardous Area/ Hazardous Locations Device Parameters
Ch1	7 - 8- 9	$U_o / V_{oc} = 7.2 V$	$\leq$	$U_i / V_{max}$
		$I_o / I_{sc} = 16 mA$	$\leq$	$I_i / I_{max}$
Ch2	10 - 11 - 12	$P_o / P_o = 27 mW$	$\leq$	$P_i / P_i$

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.

D5072D Terminals		Associated Apparatus Parameters	Must be	Hazardous Area/ Hazardous Locations Device Parameters
Ch1	7 - 8- 9	$U_i / V_{max} = 12.8 V$	$\geq$	$U_o / V_{oc}$
			$\geq$	$I_o / I_{sc}$
Ch2	10 - 11 - 12	$C_i = 0 nF$ $L_i = 0 nH$		

D5072D Terminals		D5072D Associated Apparatus Parameters Zones (Divisions)		Must be	Hazardous Area/ Hazardous Locations Device + Cable
Ch1 Ch2	7 - 8- 9	$C_o / C_a = 13.5 \mu F$ $C_o / C_a = 240 \mu F$ $C_o / C_a = 1000 \mu F$ $C_o / C_a = 240 \mu F$	IIC (A, B) IIB (C) IIA (D) (E, F, G)	$\geq$	$C_i / C_i \text{ device} + C \text{ cable}$
	10 - 11 - 12	$L_o / L_a = 138 mH$ $L_o / L_a = 555 mH$ $L_o / L_a = 1111 mH$ $L_o / L_a = 555 mH$	IIC (A, B) IIB (C) IIA (D) (E, F, G)	$\geq$	$L_i / L_i \text{ device} + L \text{ cable}$
		$L_o / R_o = 893 \mu H/\Omega$ $L_o / R_o = 3573 \mu H/\Omega$ $L_o / R_o = 7147 \mu H/\Omega$ $L_o / R_o = 3573 \mu H/\Omega$	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).