

Warning

D5020 series are isolated Intrinsically Safe Associated Apparatus installed into standard EN50022 T35 DIN-Rail located in Safe Area or Zone 2, Group IIC, Temperature T4, Hazardous Area (according to EN/IEC60079-15) within the specified operating temperature limits $T_{amb} -40$ to $+70$ °C, and connected to equipment with a maximum limit for AC power supply U_m of 250 Vrms.

Not to be connected to control equipment that uses or generates more than 250 Vrms or Vdc with respect to earth ground.

D5020 series must be installed, operated and maintained only by qualified personnel, in accordance to the relevant national/international installation standards (e.g. IEC/EN60079-14 Electrical apparatus for explosive gas atmospheres - Part 14: Electrical installations in hazardous areas (other than mines)), 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 Area 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 D5020 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

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

Current consumption @ 24 V: 70 mA for 2 channels D5020D, 35 mA for 1 channel D5020S with 20 mA output on 500 Ω load.

Power dissipation: 1.3 W for 2 channels D5020D, 0.65 W for 1 channel D5020S with 24 V supply voltage and 20 mA output on 500 Ω load.

Isolation (Test Voltage): I.S. Out/In 2.5 KV; I.S. Out/Supply 2.5 KV; I.S. Out/Fault 2.5 KV; I.S. Out/I.S. Out 500 V;

In/Supply 500 V; In/In 500 V; Fault/In 500 V; Fault/Supply 500V; Fault/Fault 500 V.

Input: 4 to 20 mA with ≤ 2.5 V voltage drop, reverse polarity protected in normal operation, ≥ 5 K Ω impedance (≈ 2 mA sinking from 10 to 30 Vdc) when fault condition detected.

Output: 4 to 20 mA, on max. 700 Ω load.

Response time: 25 ms (0 to 100 % step change).

Output ripple: ≤ 20 mVrms on 250 Ω communication load on 0.5 to 2.5 KHz band.

Frequency response: 0.5 to 2.5 KHz bidirectional within 3 dB (Hart protocol).

Fault detection: field device and wiring open circuit or short circuit detection; short circuit detection can be disabled via dip-switch.

Short output detection: load resistance < 50 Ω or < 100 Ω dip-switch selectable (≈ 2 mA forcing to detect fault).

Open output detection: load resistance $> (21$ V / Loop current) - 300 Ω (for example, if Loop current = 20 mA: load resistance $> (21$ V / 20 mA) - 300 $\Omega = 750$ Ω).

Fault signalling: voltage free NE SPST optocoupled open-collector transistor (output de-energized in fault condition) available when mounted on Termination Board for model D5020D; for model D5020S in addition to Termination Board connection, also available on Safe Area side Terminal Block.

Open-collector rating: 100 mA at 35 Vdc (≤ 1.5 V voltage drop).

Leakage current: ≤ 50 μ A at 35 Vdc.

Response time: ≤ 30 ms.

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

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

Load influence: $\leq \pm 0.1$ % of full scale for a 0 to 100 % load resistance change.

Temperature influence: $\leq \pm 0.01$ % of full scale 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] IIIC, I (M1) [Ex ia Ma] I

IECEX / INMETRO: Ex nA [ja Ga] IIC T4 Gc, [Ex ia Da] IIIC, [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: 2ExnA[ia]IIC T4 X. **GOST:** 2Exs[ia]IIC T4 X

associated apparatus and non-sparking electrical equipment.

$U_o/V_o = 25.9$ V, $I_o/I_{sc} = 93$ mA, $P_o/P_o = 595$ mW at terminals 7-8, 9-10. $U_m = 250$ Vrms, -40 °C $\leq T_a \leq 70$ °C.

Approvals:

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.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, 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.

TÜV Certificate No. C-IS-236198-04, SIL 2 / SIL 1 conforms to IEC61508:2010 Ed. 2.. 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 145 g D5020D, 130 g D5020S.

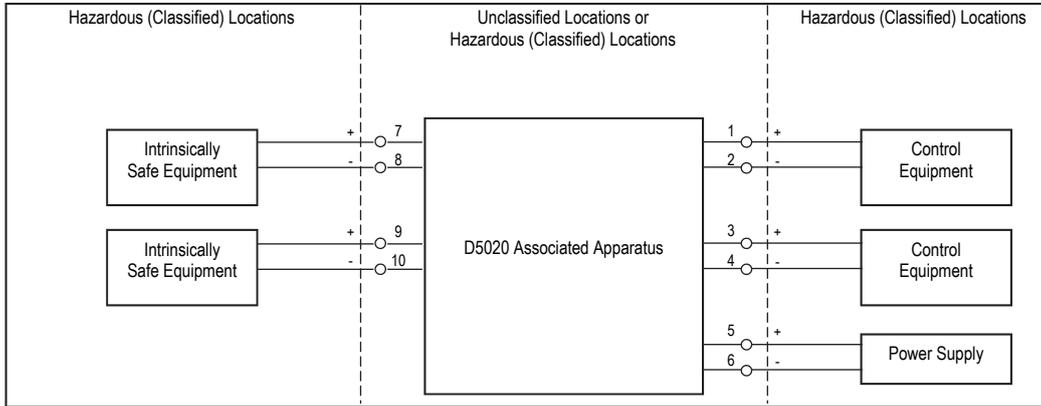
Connection: by polarized plug-in disconnect screw terminal blocks to accommodate terminations up to 2.5 mm².

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:	D5020
1 channel	S
2 channels	D



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.

D5020 Terminals		Associated Apparatus Parameters	Must be	Hazardous Area/ Hazardous Locations Device Parameters
Ch1	7 - 8	$U_o / V_{oc} = 25.9 \text{ V}$	\leq	U_i / V_{max}
		$I_o / I_{sc} = 93 \text{ mA}$	\leq	I_i / I_{max}
Ch2	9 - 10	$P_o / P_o = 595 \text{ mW}$	\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.

D5020 Terminals		D5020 Associated Apparatus Parameters Zones (Divisions)		Must be	Hazardous Area/ Hazardous Locations Device + Cable Parameters
Ch1 Ch2	7 - 8	$C_o / C_a = 100 \text{ nF}$ $C_o / C_a = 770 \text{ nF}$ $C_o / C_a = 2.63 \text{ }\mu\text{F}$ $C_o / C_a = 770 \text{ nF}$	IIC (A, B) IIB (C) IIA (D) (E, F, G)	\geq	$C_i / C_i \text{ device} + C \text{ cable}$
	9 - 10	$L_o / L_a = 4.1 \text{ mH}$ $L_o / L_a = 16.7 \text{ mH}$ $L_o / L_a = 33.5 \text{ mH}$ $L_o / L_a = 16.7 \text{ mH}$	IIC (A, B) IIB (C) IIA (D) (E, F, G)	\geq	$L_i / L_i \text{ device} + L \text{ cable}$
		$L_o / R_o = 59.9 \text{ }\mu\text{H}/\Omega$ $L_o / R_o = 239.7 \text{ }\mu\text{H}/\Omega$ $L_o / R_o = 479.4 \text{ }\mu\text{H}/\Omega$ $L_o / R_o = 239.7 \text{ }\mu\text{H}/\Omega$	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 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).