

D5015

I.S. SIL2 2/4-Wire HART® Transmitter Power Supply
Models D5015SS, D5015SK



INSTRUCTION MANUAL

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1. CHARACTERISTICS

General Description:

The single channel Repeater Power Supply, D5015SS and D5015SK modules, is a high integrity analog input interface suitable for applications requiring SIL 2 level (according to IEC 61508:2010 Ed.2) in safety related systems for high risk industries. Provides a fully floating dc supply for energizing conventional 2 wires passive 4-20 mA or 4 wires (active) transmitters located in Hazardous Area, and repeats the current in floating circuit to drive a Safe Area load. The circuit allows bi-directional communication signals, for HART® transmitters. Mounting on standard DIN-Rail, with or without Power Bus, or on customized Termination Boards, in Safe Area / Non Hazardous Location or in Zone 2 / Class I, Division 2 or Class I, Zone 2.

D5015SS: Single channel, source output.

D5015SK: Single channel, sink output.

Functional Safety Management Certification:

G.M. International is certified by TUV to conform to IEC61508:2010 part 1 clauses 5-6 for safety related systems up to and included SIL 3.

2. 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: 50 mA with 20 mA output typical.

Power dissipation: 0.90 W 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; Out/Supply 500 V.

Input:

4 to 20 mA (separately powered input, voltage drop ≤ 0.5 V) or

4 to 20 mA (2 wires Tx current limited at ≈ 25 mA), reading range 0 to 24 mA.

Transmitter line voltage:

16.5 V typical at 20 mA with max.

Output:

4 to 20 mA, on max. 550 Ω load in source mode (typical 12 V compliance);

V min. 8 V at 0 Ω load V max. 30 V in sink mode, current limited at ≈ 25 mA.

Response time: 5 ms (0 to 100 % step change).

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: $\leq \pm 0.05$ % 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: $\leq \pm 0.01$ % of full scale on zero and span for a 1°C change.

Compatibility:

CE mark compliant, conforms to Directives:

2014/34/EU ATEX, 2014/30/EU EMC, 2014/35/EU LVD, 2011/65/EU RoHS.

Environmental conditions:

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

Max altitude: 2000 m a.s.l.

Storage: temperature limits – 45 to + 80 °C.

Safety Description:

ATEX: II 3(1)G Ex ec [ia Ga] IIC T4 Gc, II (1)D [Ex ia Da] IIIC, I (M1) [Ex ia Ma] I

IECEX: Ex ec [ia Ga] IIC T4 Gc, [Ex ia Da] IIIC, [Ex ia Ma] I

UL: NI / I / 2 / ABCD / T4, AIS / I, II, III / 1 / ABCDEFG, AEx nA [ia Ga] IIC T4 Gc

C-UL: NI / I / 2 / ABCD / T4, AIS / I, II, III / 1 / ABCDEFG, Ex nA [ia Ga] IIC T4 Gc X

EAC-EX: 2Ex ec [ia Ga] IIC T4 Gc X, [Ex ia Da] IIIC, [Ex ia Ma] I.

CCC: Ex ec [ia Ga] IIC T4 Gc; [Ex ia Ga] IIC; [Ex ia Da] IIIC

associated apparatus and non-sparking electrical equipment.

Uo/Voc = 26.8 V, Io/Isc = 92 mA, Po/Po = 614 mW at terminals 7-8,

Uo/Voc = 1.1 V, Io/Isc = 56 mA, Po/Po = 16 mW at terminals 8-11,

Ui/Vmax = 30 V, Ii/Imax = 128 mA, Ci = 0 nF, Li = 0 nH at terminals 8-11,

Um = 250 Vrms or Vdc, -40 °C \leq Ta \leq 70 °C.

Approvals:

BVS 20 ATEX E 023 X conforms to EN60079-0, EN60079-11, EN60079-7.

IECEX BVS 20.0016X conforms to IEC60079-0, IEC60079-11, IEC60079-7.

UL & C-UL E222308 conforms to UL 61010-1, UL913, UL 60079-0, UL60079-11, UL60079-15, UL121201 for UL and CAN/CSA C22.2 No. 61010-1-12, CSA-E60079-0, CSA-E60079-11, CSA-E60079-15 and CSA-C22.2 No. 213 for C-UL.

EA3C RU C-IT.AA87.B.01516/25 conforms to GOST 31610.0, GOST 31610.7, GOST 31610.11.

CCC n. 2020322316000978 conforms to GB/T 3836.1, GB/T 3834.3, GB/T 3834.4.

TUV Certificate No. TUV IT 25 SIL 0634 SIL 2 conforms to IEC61508:2010 Ed. 2.

SIL 3 Functional Safety TÜV Certificate conforms to IEC61508:2010 Ed.2, for Management of Functional Safety.

DNV Type Approval Certificate No. TAA00001U0 and KR No.MIL20769-EL002 Certificates for maritime applications.

Mounting:

EN/IEC60715 TH 35 DIN-Rail, with or without Power Bus or on customized Termination Board.

Weight: about 130 g.

Connection: by polarized plug-in disconnect screw terminal blocks to accommodate terminations up to 2.5 mm² (13 AWG).

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.

3. ORDERING INFORMATION

3.1 Ordering codes

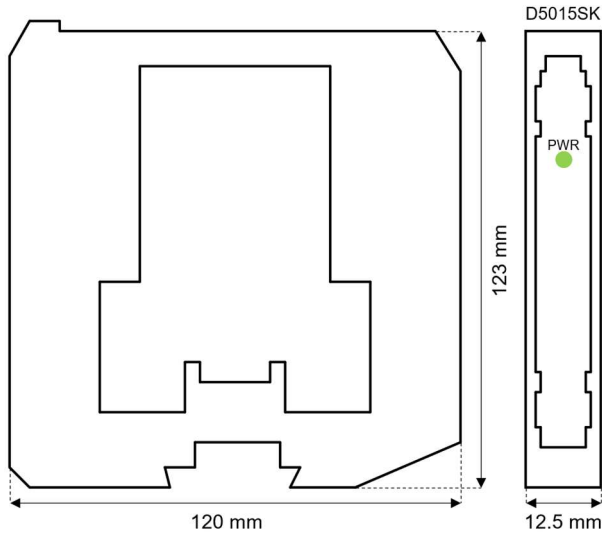
D5015SS: 1 channel source output

D5015SK: 1 channel sink output

3.1 Accessories

Bus Connector JDFT049, Bus Mounting Kit OPT5096.

4. OVERALL DIMENSIONS



5. TERMINAL BLOCK CONNECTIONS

5.1 Hazardous Side / Field Side

7: + Input Ch 1 for 2 wires Transmitters

8:- Input Ch 1 for 2 wires Transmitters or + Input Ch 1 for External Powered Transmitters

11: - Input Ch 1 for External Powered Transmitters

5.2 Safe Side / System Side

1: + Output Ch 1

2: - Output Ch 1

5: + Power Supply 24 Vdc

6: - Power Supply 24 Vdc

6. VERIFICATION OF INTRINSICALLY SAFE CIRCUITS

In the system safety analysis, always check that field device maximum allowable voltage, current and power are not exceeded by the safety parameters of the associated apparatus connected to it. Check also that added connecting cable and field device capacitance and inductance do not exceed the limits given in the associated apparatus parameters for the effective gas group (Co, Lo, Lo/Ro).

Associated apparatus		Field device
Uo or Voc	≤	Ui or Vmax
Io or Isc	≤	Ii or Imax
Po or Pout	≤	Pi or Pmax
Co or Ca	≥	Ci + Ccable
Lo or La	≥	Li + Lcable
Lo/Ro	≥	Li/Ri and Lcable/Rcable

When used with separate powered intrinsically safe devices, check also that maximum allowable voltage, current and power of the associated apparatus are not exceeded by the safety parameters of the field device.

Associated apparatus		Field device
Ui or Vmax	≥	Uo or Voc
Ii or Imax	≥	Io or Isc
Pi or Pmax	≥	Po or Pout
Ci + Ccable	≤	Co or Ca
Li + Lcable	≤	Lo or La

For installations in which both the Ci and Li of the Intrinsically Safe apparatus exceed 1% of the Co or Ca and Lo or La parameters of the Associated Apparatus (excluding the cable), then 50% of Co or Ca and Lo or La parameters are applicable and shall not be exceeded (50% of the Co or Ca and Lo or La become the limits which must include the cable such that Ci device + C cable \leq 50 % of Co or Ca and Li device + L cable \leq 50 % of Lo or La). The reduced capacitance of the external circuit (including cable) shall not be greater than 1 μ F for Groups I, IIA (or D), IIB (or C) and 600 nF for Group IIC (or A, B). If the cable parameters are unknown, the following value may be used: Capacitance 200 pF per meter (60 pF per foot), Inductance 1 μ H per meter (0.20 μ H per foot).

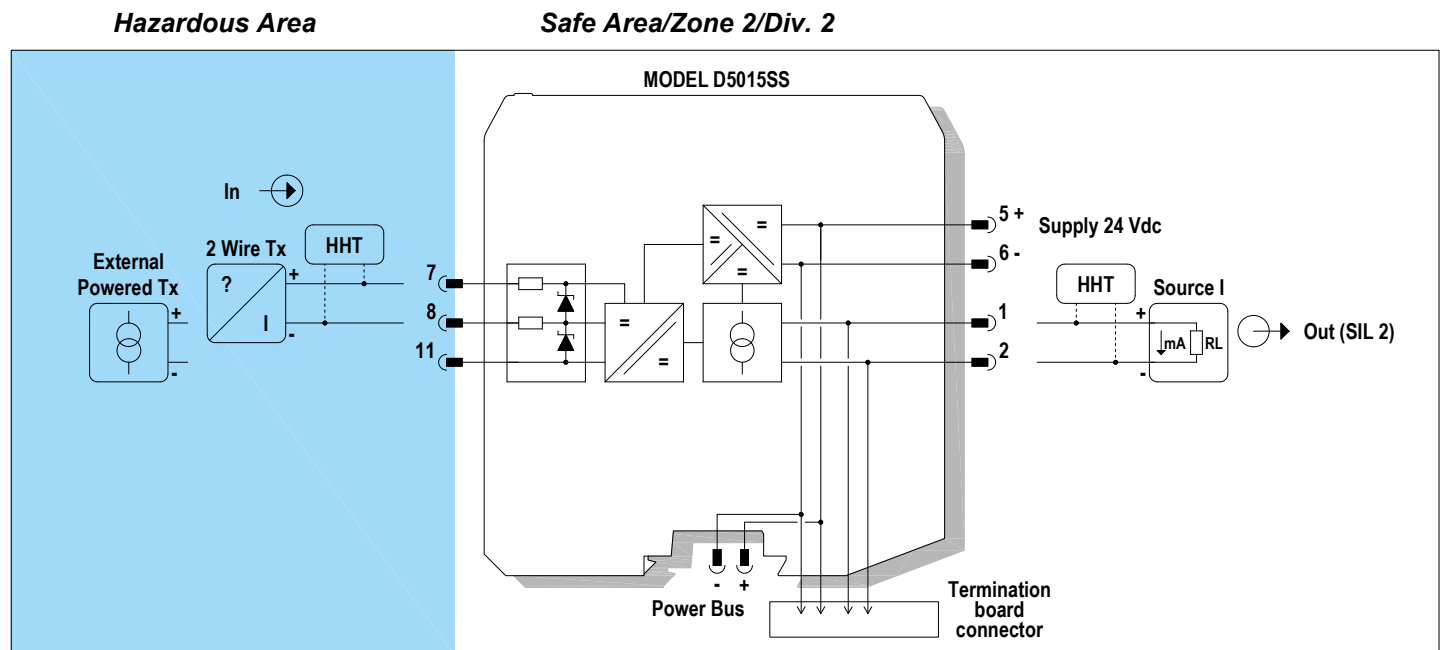
6.1 Intrinsically safe parameters table

	Group	Co or Ca [uF]	Lo or La [mH]	Lo/Ro [uH/Ω]
Term. 7-8: Uo(Voc)=26.8 V; Io(Isc)=92 mA; Po(Pout)=614 mW Characteristic: linear	IIC (A, B)	0.092	4.2	57.9
	IIB (C)	0.72	16.9	231.6
	IIA (D)	2.37	33.8	463.3
	I	4.2	55.4	760.1
	IIIC (E, F, G)	0.72	16.9	231.6
Term. 8-11 (passive input): Uo(Voc)=1.1 V; Io(Isc)=56 mA; Po(Pout)=16 mW Ui(Vmax)=30 V; Ii(Imax)=128 mA; Ci=0 nF; Li=0 μ H Characteristic: linear	IIC (A, B)	100	11.5	2327.2
	IIB (C)	1000	46	9309
	IIA (D)	1000	92.1	18618.1
	I	1000	151.2	30545.4
	IIIC (E, F, G)	1000	46	9309

Isolation in accordance with EN/IEC 60079-11 clause 6.3.13 is provided between non-intrinsically safe circuits and intrinsically safe circuits.

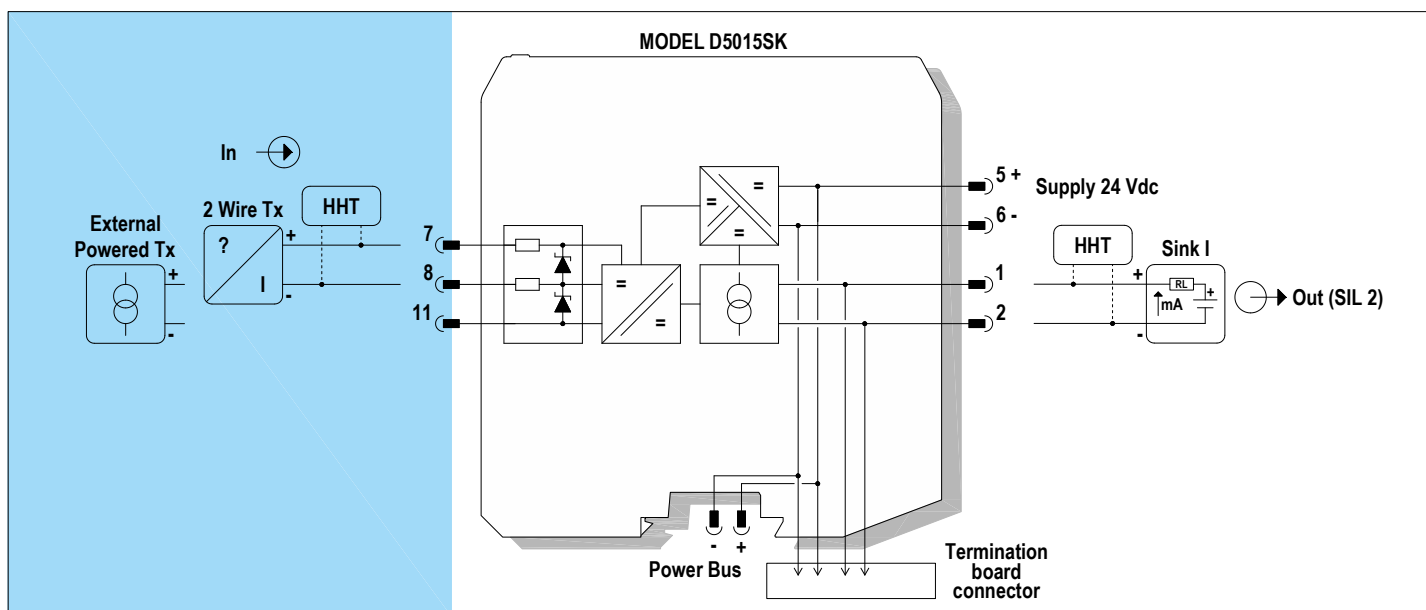
IS parameters listed above comply with all applicable certifications for this product. For details regarding IS parameters of a specific certification, please refer to the certificate itself, that can be found on www.gminternational.com website.

7. FUNCTION DIAGRAM



Hazardous Area

Safe Area/Zone 2/Div. 2



8. WARNING

D5015 series are isolated Intrinsically Safe Associated Apparatus installed into standard EN/IEC60715 TH 35 DIN-Rail located in Safe Area or Zone 2, Group IIC, Temperature T4 or Class I, Division 2, Group A, B, C, D, T4 Hazardous Area within the specified operating temperature limits T_{amb} -40 to +70 °C, and connected to equipment with a maximum limit for power supply U_m of 250 Vrms or Vdc.

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

D5015 series must be installed, operated and maintained only by qualified personnel, in accordance to the relevant national/international installation standards (e.g. EN/IEC60079-14 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 Zone 2.

Explosion Hazard: to prevent ignition of flammable atmospheres, disconnect power before servicing or unless area is known to be nonhazardous.

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.

9. OPERATION

D5015 provides fully floating DC supply for energizing 2 wires 4-20 mA transmitters, or separately powered 4 wires, 4-20 mA transmitters located in Hazardous Area and repeats the current to a 4-20 mA floating output signal to drive a Safe Area load. The circuit allows bi-directional communication signal for smart transmitters, a "POWER ON" green led for each channel lights when input power is present.

10. INSTALLATION

D5015 series are Repeater power supply HART® compatible housed in a plastic enclosure suitable for installation on EN/IEC60715 TH 35 DIN-Rail, with or without Power Bus or on customized Termination Board. D5015 series can be mounted with any orientation over the entire ambient temperature range. Electrical connections are accommodated by polarized plug-in removable screw terminal blocks which can be plugged in/out into a powered unit without suffering or causing any damage (**for Zone 2 installations check the area to be nonhazardous before servicing**). Connect only one individual conductor per each clamping point, use conductors up to 2.5 mm² (13 AWG) and a torque value of 0.5-0.6 Nm. Use only cables that are suitable for a temperature of at least 85°C. The wiring cables have to be proportionate in base to the current and the length of the cable.

In case of installation in zone 2, the connecting cables of non-intrinsically safe circuits must be safely routed in a cable duct or similar. The distance between the pluggable connection terminal and the cable duct should not exceed 500 mm cable length.

On the section "Function Diagram" and enclosure side a block diagram identifies all connections.

Intrinsically Safe conductors must be identified and segregated from non I.S. and wired in accordance to the relevant national/international installation standards (e.g. EN/IEC60079-14 Electrical apparatus for explosive gas atmospheres - Part 14: Electrical installations in hazardous areas (other than mines)), make sure that conductors are well isolated from each other and do not produce any unintentional connection. Isolation in accordance with EN/IEC 60079-11 clause 6.3.13 is provided between non-intrinsically safe circuits and intrinsically safe circuits.

The enclosure provides, according to EN60529, an IP20 minimum degree of protection (or similar to NEMA Standard 250 type 1). The equipment shall only be used in an area of at least pollution degree 2, as defined in IEC 60664-1. When installed in EU Zone 2, the unit shall be installed in an enclosure that provides a minimum ingress protection of IP54 in accordance with IEC 60079-0. When installed in a Class I, Zone 2 Hazardous Location, the unit shall be mounted in a supplemental AEx or Ex enclosure that provides a degree of protection not less than IP54 in accordance with UL/CSA 60079-0. When installed in a Class I, Division 2 Hazardous Location, the unit shall be mounted in a supplemental enclosure that provides a degree of protection not less than IP54. The enclosure must have a door or cover accessible only by the use of a tool. The end user is responsible to ensure that the operating temperature of the module is not exceeded in the end use application. 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 D5015 series must be cleaned only with a damp or antistatic cloth.

Any penetration of cleaning liquid must be avoided to prevent damage to the unit.

Any unauthorized modification must be avoided.

D5015 series must be connected to SELV or PELV supplies.

All circuits connected to D5015 series must comply with the overvoltage category II (or better) according to EN/IEC60664-1.

11. START-UP

Before powering the unit check that all wires are properly connected, particularly supply conductors and their polarity, input and output wires, also check that Intrinsically Safe conductors and cable trays are segregated (no direct contacts with other non I.S. conductors) and identified either by color coding, preferably blue, or by marking. Check conductors for exposed wires that could touch each other causing dangerous unwanted shorts. Turn on power, the "power on" green leds must be lit, for 2 wires transmitter connection output signal should be corresponding to the input from the transmitter. If possible change the transmitter output and check the corresponding Safe Area output.