D5072-096

I.S. SIL2 Thermocouple/mV Repeater

Models D5072S-096, D5072D-096

INSTRUCTION MANUAL

Data specified in this document are merely descriptive of the products and should be integrated with relevant technical specifications. Our products are in constant development and the information presented herein refers to the time of document issue. No statements concerning a certain condition or suitability for a certain application can be derived from our information. The information given does not release the user from the obligation of own judgment and verification. Terms & Conditions can be found at our website. For more information refer to instruction manual.

SUMMARY OF CONTENT

1. Characteristics 2
2. Technical data 2
3. Programming 3
4. Ordering information 4
4.1 Ordering codes 4
4.2 Accessories 4
5. OVERALL DIMENSIONS 4
6. Terminal block connections 4
6.1 Hazardous Side 4
6.2 Safe Side 4
7. Verification of intrinsically safe circuits 4
7.1 Intrinsically safe parameters table 5
8. Function diagram 6
9. Warning 7
10. Operation 7
11. Installation 7
12. Start-up 8
13. INPUT SPECIFICATIONS 9

1. CHARACTERISTICS

General Description:
The single and dual channel Isolating Repeater D5072S-096 and D5072D-096 accepts a low level dc signal from millivolt or thermocouple sensor, located in Hazardous Area, and repeats, with isolation, the signal to Safe Area, suitable for applications requiring SIL 2 (according to IEC 61508:2010) in safety related systems for high risk industries. For D5072D-096 module: duplicator function provides two independent outputs from one single input. Mounting on standard DIN-Rail, with or without Power Bus, in Safe Area / Non Hazardous Location or in Zone 2 / Class I, Division 2 or Class I, Zone 2.

Fault Detection:
D5072-096 module is able to detect the breakage of the sensor lines (Burnout), as well as internal unrecoverable module errors.

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 SIL3.

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: 35 mA.
Power dissipation @ 24 V: 0.85 W.

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: millivolt or any type of thermocouple within Input Range.
Integration time: 75 ms (fast), 375 ms (slow), user selectable.
Resolution: 1 µV.
Input range: -10 to +100 mV.
Thermocouple burnout current: ≤ 50 µA.

Fault: Output reflects burnout/internal fault condition via highscale (+110 mV) value forcing. Fault condition is also signalled via BUS and red LED on front panel.

To acquire the cumulative fault signal on the power bus, GM D5202S or D5203S module must be used. For details on their features and differences, see proper documentation - datasheet and instruction manual - for these models.

Data specified in this document are merely descriptive of the products and should be integrated with relevant technical specifications. Our products are in constant development and the information presented herein refers to the time of document issue. No statements concerning a certain condition or suitability for a certain application can be derived from our information. The information given does not release the user from the obligation of own judgment and verification. Terms & Conditions can be found at our website. For more information refer to instruction manual.

Output: millivolt.
***Transfer characteristic**:* linear.
Response time: ≤ 20 ms (10 to 90 % step).
Output range: -10 to +100 mV.

Performance: Ref. Conditions 24 V supply, 23 ± 1 °C ambient temperature, slow integration mode.

Input: **Calibration and linearity accuracy:** ≤ ±10 µV.
Temperature influence: ≤ ±3 µV/°C, typical.

Output: **Calibration and linearity accuracy:** ≤ ±10 µV.
Temperature influence: ≤ ±3 µV/°C, typical.

Compatibility:

CE mark compliant, conforms to Directive: 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.
Storage: temperature limits – 45 to + 80 °C.
Max altitude: 2000 m a.s.l.

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 / INMETRO: 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.
D5072S-096:Uo/Voc = 7.2 V, Io/Isc = 23 mA, Po/Po = 40 mW, Ui/Vmax = 12.8 V, Ci = 0 nF, Li = 0 nH at terminals 7-8.
D5072D-096: 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, 11-12.
Um = 250 Vrms or Vdc, -40 °C ≤ Ta ≤ 70 °C.
Approvals:
BVS 12 ATEX E 053 X conforms to EN60079-0, EN60079-7, EN60079-11.
IECEx BVS 12.0050X conforms to IEC60079-0, IEC60079-7, IEC60079-11.
INMETRO DNV 13.0110 X conforms to ABNT NBR IEC60079-0, ABNT NBR IEC60079-7, ABNT NBR IEC60079-11.
UL & C-UL E222308 conforms to UL913, UL 60079-0, UL60079-11, UL60079-15, UL121201 for UL
and CSA-E60079-0, CSA-E60079-11, CSA-E60079-15 and CSA-C22.2 No. 213 for C-UL.
EAЭC 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 3836.3, GB/T 3834.4
TÜV Certificate No. TUV IT 25 SIL 0636, 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.
Weight: about 135 g D5072D-096, 130 g D5072S-096.
Connection: by polarized plug-in disconnect screw terminal blocks to accommodate terminations up to 2.5 mm^2.
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. PROGRAMMING

The module is fully programmable. Operating parameters can be changed from PC via PPC5092 adapter connected to USB serial line and SWC5090 software. Measured values and diagnostic alarms can be read on both serial configuration or Modbus output line.

SWC5090 software also allows the Monitoring and Recording of values. For details please see SWC5090 manual ISM0154.

Data specified in this document are merely descriptive of the products and should be integrated with relevant technical specifications. Our products are in constant development and the information presented herein refers to the time of document issue. No statements concerning a certain condition or suitability for a certain application can be derived from our information. The information given does not release the user from the obligation of own judgment and verification. Terms & Conditions can be found at our website. For more information refer to instruction manual.

4. ORDERING INFORMATION

4.1 Ordering codes

D5072S-096: 1 channel

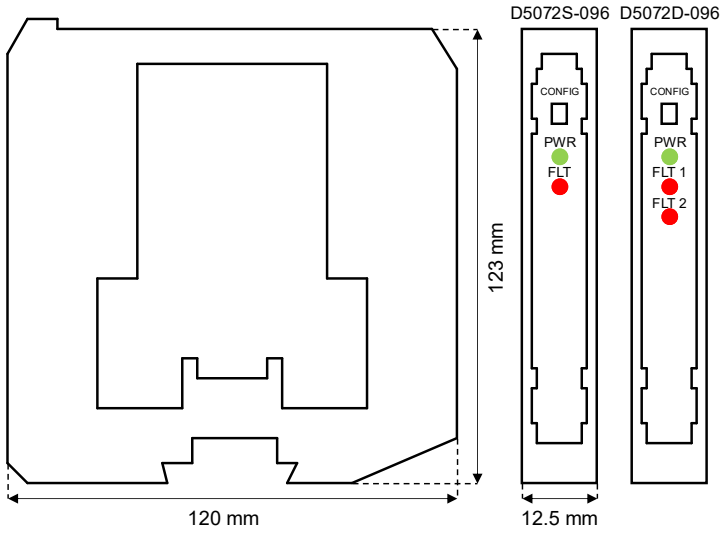
D5072D-096: 2 channels

4.2 Accessories

Bus Connector JDFT049, Bus Mounting Kit OPT5096.

Programmable USB serial line Kit PPC5092 + SWC5090.

5. OVERALL DIMENSIONS



6. TERMINAL BLOCK CONNECTIONS

6.1 Hazardous Side

7: +Input Ch1 for thermocouple TC or for millivolt source

8: -Input Ch1 for thermocouple TC or for millivolt source

9: +Input Ch2 for thermocouple TC or for millivolt source

10: -Input Ch2 for thermocouple TC or for millivolt source

6.2 Safe Side

1: + Output Ch 1

2: - Output Ch 1

3: + Output Ch 2

4: - Output Ch 2

5: + Power Supply 24 Vdc

6: - Power Supply 24 Vdc

7. 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

Data specified in this document are merely descriptive of the products and should be integrated with relevant technical specifications. Our products are in constant development and the information presented herein refers to the time of document issue. No statements concerning a certain condition or suitability for a certain application can be derived from our information. The information given does not release the user from the obligation of own judgment and verification. Terms & Conditions can be found at our website. For more information refer to instruction manual.

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 ≤ 50 % of Co or Ca and Li device + L cable ≤ 50 % of Lo or La). The reduced capacitance of the external circuit (including cable) shall not be greater than 1 µF 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 µH per meter (0.20 µH per foot).

7.1 Intrinsically safe parameters table

	Group	Co or Ca [uF]	Lo or La [mH]	Lo/Ro [uH/Ω]
Term. 11-12, 7-8 (D5072D-096): Uo(Voc)=7.2 V; Io(Isc)=16 mA; Po(Pout)=27 mW Ui(Vmax)=12.8 V; Ci=0 nF; Li=0 µH Characteristic: linear	IIC (A, B)	13.5	138	1290
	IIB (C)	240	555	5160
	IIA (D)	1000	1111	10330
	I	1000	1822	16950
	IIIC (E, F, G)	240	555	5160
Term. 7-8 (D5072S-096): Uo(Voc)=7.2 V; Io(Isc)=23 mA; Po(Pout)=40 mW Ui(Vmax)=12.8 V; Ci=0 nF; Li=0 µH Characteristic: linear	IIC (A, B)	13.5	67.2	875
	IIB (C)	240	268.8	3500
	IIA (D)	1000	537.7	7000
	I	1000	882.2	11480
	IIIC (E, F, G)	240	268.8	3500

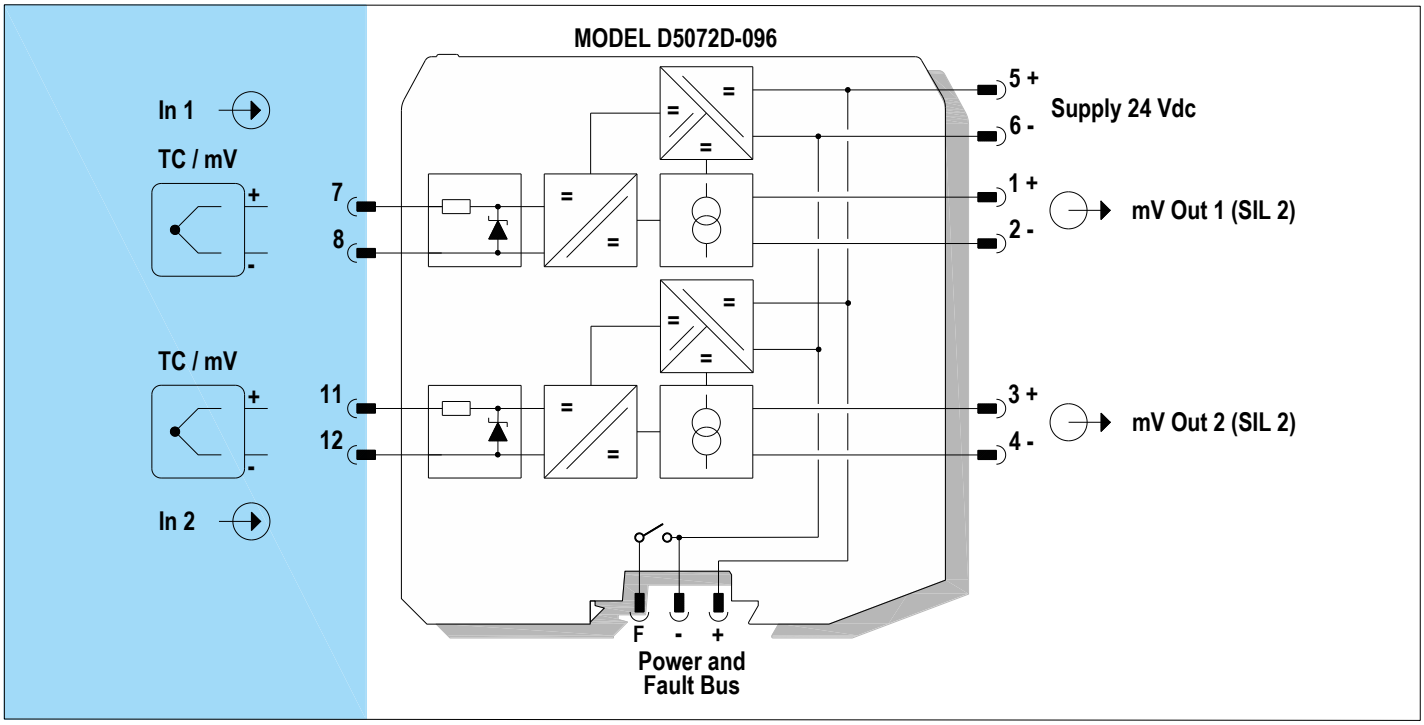
Isolation in accordance with EN/IEC 60079-11 clause 6.3.13 is provided between non-intrinsically safe circuits and intrinsically safe circuits. Isolation in accordance with EN/IEC 60079-11 clause 6.3.13 is provided between separated intrinsically safe circuits.

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.

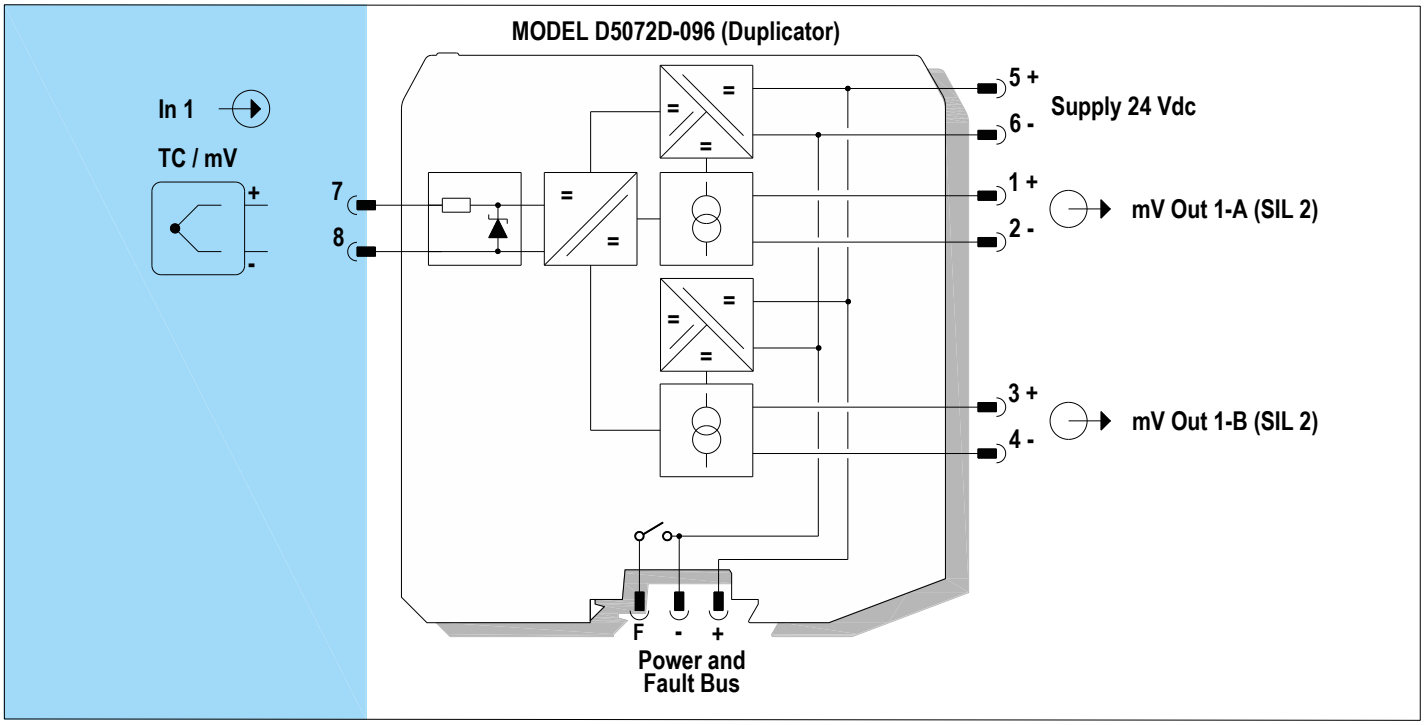
Data specified in this document are merely descriptive of the products and should be integrated with relevant technical specifications. Our products are in constant development and the information presented herein refers to the time of document issue. No statements concerning a certain condition or suitability for a certain application can be derived from our information. The information given does not release the user from the obligation of own judgment and verification. Terms & Conditions can be found at our website. For more information refer to instruction manual.

8. FUNCTION DIAGRAM

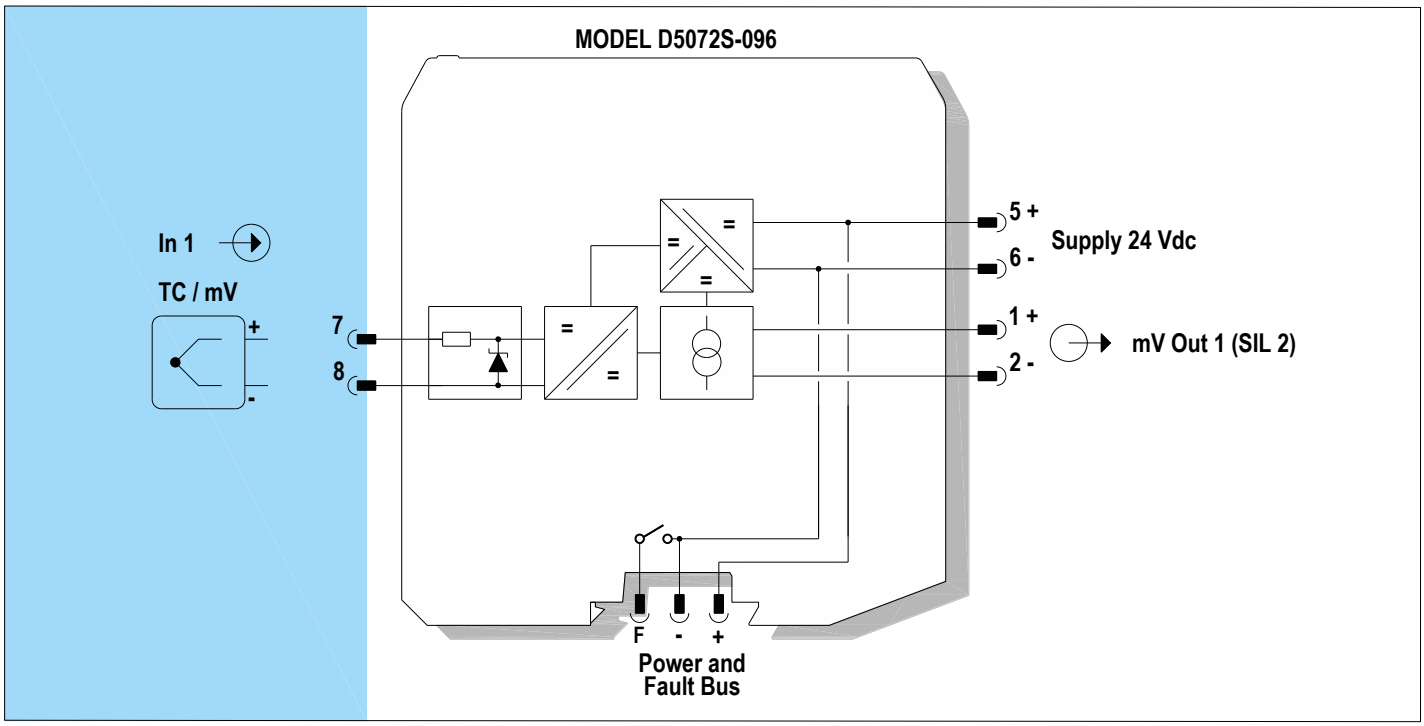
Hazardous Area *Safe Area/Zone 2/Div. 2*



Hazardous Area *Safe Area/Zone 2/Div. 2*



Data specified in this document are merely descriptive of the products and should be integrated with relevant technical specifications. Our products are in constant development and the information presented herein refers to the time of document issue. No statements concerning a certain condition or suitability for a certain application can be derived from our information. The information given does not release the user from the obligation of own judgment and verification. Terms & Conditions can be found at our website. For more information refer to instruction manual.



9. WARNING

D5072-096 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 Tamb -40 to +70 °C, and connected to equipment with a maximum limit for power supply Um 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.

D5072-096 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 or combustible 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.

10. OPERATION

Each input channel of Temperature Signal Converter D5072-096 accepts a low level dc signal from millivolt or thermocouple sensor, located in Hazardous Area, and repeats, with isolation, the signal to Safe Area.

Presence of supply power is displayed by a “POWER ON” green signaling LED; integrity of field sensor and connecting line can be monitored by a configurable burnout circuit which, if enabled, can drive output signal to upscale or downscale limit. Burnout condition is signaled by red front panel LED for each channel.

D5072D-096 module has double input and output channel, and can also be programmed to interface a single input and obtain dual output channel (duplicator).

11. INSTALLATION

D5072-096 series are Temperature Signal Converter housed in a plastic enclosure suitable for installation on EN/IEC60715 TH 35 DIN-Rail, with or without Power Bus. D5072-096 series can be mounted with any orientation over the entire ambient temperature range. Electrical connection are accommodated by polarized plug-in removable screw

Data specified in this document are merely descriptive of the products and should be integrated with relevant technical specifications. Our products are in constant development and the information presented herein refers to the time of document issue. No statements concerning a certain condition or suitability for a certain application can be derived from our information. The information given does not release the user from the obligation of own judgment and verification. Terms & Conditions can be found at our website. For more information refer to instruction manual.

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.

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 D5072-096 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.
D5072-096 series must be connected to SELV or PELV supplies.
All circuits connected to D5072-096 series must comply with the overvoltage category II (or better) according to EN/IEC60664-1.

12. 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.

Check that the module has been correctly configured through SWC5090 software. For details please see SWC5090 manual ISM0154.

Turn on power, the “power on” green LED must be lit, output on each channel must be in accordance with the corresponding input signal value and input/output chosen transfer function.

If possible change the sensor condition and check the corresponding Safe Area output.

Data specified in this document are merely descriptive of the products and should be integrated with relevant technical specifications. Our products are in constant development and the information presented herein refers to the time of document issue. No statements concerning a certain condition or suitability for a certain application can be derived from our information. The information given does not release the user from the obligation of own judgment and verification. Terms & Conditions can be found at our website. For more information refer to instruction manual.

13. INPUT SPECIFICATIONS

Input	Type	Standards	Min Span [°C (°F)]	Accuracy [°C (°F)]	Accuracy Range [°C (°F)]	Maximum Range [°C (°F)]	Temperature Influence per °C typical [°C (°F)]
TC	A1	GOST 8.585	150 (270)	±0.7 (±1.3)	0 to 2500 (32 to 4532)	0 to 2500 (32 to 4532)	≤ ±0.090 (≤ ±0.162)
	A2	GOST 8.585	100 (180)	±0.5 (±0.9)	0 to 1800 (32 to 3272	0 to 1800 (32 to 3272	≤ ±0.050 (≤ ±0.090)
	A3	GOST 8.585	100 (180)	±0.5 (±0.9)	0 to 1800 (32 to 3272	0 to 1800 (32 to 3272	≤ ±0.050 (≤ ±0.090)
	B	IEC 60584 GOST 8.585 ASTM E230	200 (360)	±1.1 (±2.0)	450 to 1820 (842 to 3308)	0 to 1820 (32 to 3308)	≤ ±0.060 (≤ ±0.108)
	C	ASTM E230 ASTM E988	100 (180)	±0.6 (±1.1)	0 to 2315 (32 to 4199)	0 to 2315 (32 to 4199)	≤ ±0.080 (≤ ±0.144)
	D	ASTM E988	100 (180)	±0.6 (±1.1)	0 to 2315 (32 to 4199)	0 to 2315 (32 to 4199)	≤ ±0.080 (≤ ±0.144)
	E	IEC 60584 GOST 8.585 ASTM E230	50 (90)	±0.2 (±0.4)	-150 to 1000 (-238 to 1832)	-270 to 1000 (-454 to 1832)	≤ ±0.050 (≤ ±0.090)
	J	IEC 60584 GOST 8.585 ASTM E230	50 (90)	±0.2 (±0.4)	-150 to 1200 (-238 to 2192)	-210 to 1200 (-346 to 2192)	≤ ±0.050 (≤ ±0.090)
	K	IEC 60584 GOST 8.585 ASTM E230	50 (90)	±0.3 (±0.5)	-150 to 1372 (-238 to 2502)	-270 to 1372 (-454 to 2502)	≤ ±0.050 (≤ ±0.090)
	L (type “L” DIN)	DIN 43710	50 (90)	±0.2 (±0.4)	-200 to 900 (-328 to 1652)	-200 to 900 (-328 to 1652)	≤ ±0.050 (≤ ±0.090)
	LR (type “L” GOST)	GOST 8.585	50 (90)	±0.3 (±0.5)	-200 to 800 (-328 to 1472)	-200 to 800 (-328 to 1472)	≤ ±0.050 (≤ ±0.090)
	N	IEC 60584 GOST 8.585 ASTM E230	50 (90)	±0.4 (±0.7)	-150 to 1300 (-238 to 2372)	-270 to 1300 (-454 to 2372)	≤ ±0.060 (≤ ±0.108)
	R	IEC 60584 GOST 8.585 ASTM E230	150 (270)	±0.8 (±1.4)	50 to 1768 (122 to 3214)	-50 to 1768 (-58 to 3214)	≤ ±0.060 (≤ ±0.108)
	S	IEC 60584 GOST 8.585 ASTM E230	150 (270)	±0.8 (±1.4)	50 to 1768 (122 to 3214)	-50 to 1768 (-58 to 3214)	≤ ±0.060 (≤ ±0.108)
	T	IEC 60584 GOST 8.585 ASTM E230	50 (90)	±0.2 (±0.4)	-100 to 400 (-148 to 752)	-270 to 400 (-454 to 752)	≤ ±0.020 (≤ ±0.036)
	U	DIN 43710	50 (90)	±0.4 (±0.7)	-200 to 600 (-328 to 1112)	-200 to 600 (-328 to 1112)	≤ ±0.040 (≤ ±0.072)

Input	Type	Min Span [mV]	Accuracy [µV]	Accuracy Range [mV]	Maximum Range [mV]	Temperature Influence per °C typical [µV]
mV	DC standard	1	±10	-50 to 80	-100 to 100	≤ ±3

Notes:

TC/mV Accuracy shown in slow acquisition mode, after calibration.

Data specified in this document are merely descriptive of the products and should be integrated with relevant technical specifications. Our products are in constant development and the information presented herein refers to the time of document issue. No statements concerning a certain condition or suitability for a certain application can be derived from our information. The information given does not release the user from the obligation of own judgment and verification. Terms & Conditions can be found at our website. For more information refer to instruction manual.