INSTRUCTION MANUAL

SIL 2 Temperature Signal Converter
Multifunction, DIN-Rail and Termination Board,
Models D5072S, D5072D

Characteristics

General Description: The single and dual channel Temperature Signal Converter D5072S and D5072D accepts a low level dc signal from millivolt, thermocouple or 2-3-4 wire resistance/RTD or transmitting potentiometer sensor, located in Hazardous Area, and converts, with isolation, the signal to drive a Safe Area load, suitable for applications requiring SIL 2 level (according to IEC 61508) in safety related systems for high risk industries. Output signal can be direct or reverse. Cold junction compensation can be programmed as: Automatic: provided by an internal temperature sensor; Fixed: to a user-customizable temperature value;Remote: (only D5072D) connecting compensation RTD to one of the two channels.
For D5072D module: duplicator function provides two independent outputs from one single input. Adder, subtractor, low/high selector functions provide two independent outputs representing input A, input B, input A plus input B, input A minus input B, low/high selector.Modules are provided with alarm function which is available via photoMOS output, Termination Board and Power Bus. Mounting on standard DIN-Rail, with or without Power Bus, or on customizedTermination Boards, in Safe Area or in Zone 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: 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: 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 (0.3916), 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 Ω to 10 kΩ). 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 µV on mV/TC, 1 mΩ on RTD/resistance, 0.0001 % on transmitting potentiometer-
Visualization: 0.1 °C on temp.,10 µV on mV, 100 mΩ on resistance, 0.1 % on potentiometer.
Input range: within sensor limits (-50 to +80 mV for TC/mV, 0-4 kΩ for resistance).
Measuring RTD current: ≤ 0.15 mA.
2 wire RTD line resistance compensation: ≤ 100 Ω (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: ≤ 50 µA.
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 Ω load source mode, current limited at 24 mA. In sink mode, external voltage generator range is V min. 3.5V at 0Ω load and V max. 30V. If generator voltage Vg > 10 V, a series resistance ≥ (Vg - 10)/0.024 Ω is needed. The maximum value of series resistance is (Vg - 3.5)/0.024 Ω.
Resolution: 1 µA current output.
Transfer characteristic: linear, direct or reverse on all input sensors.
Response time: ≤ 20 ms (10 to 90 % step).
Output ripple: ≤ 20 mVrms on 250 Ω load.
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 KΩ for resistance (see input for step resolution).
Output: voltage free SPST photoMOS: 100 mA, 60 Vdc (≤ 1 V voltage drop).
Performance: Ref. Conditions 24 V supply, 250 Ω load, 23 ± 1 °C ambient temperature, slow integration mode, 4-wires configuration for RTD.
Input: Calibration and linearity accuracy: see section "Input Specifications".
Temperature influence: ≤ ± 2 µV on mV or thermocouple,
± 20 mΩ on RTD (≤ 300 Ω @ 0°C) or ± 200 mΩ on RTD (> 300 Ω @ 0°C),
± 0.02 % on potentiometer for a 1 °C change.
Ref. Junction Compensation influence: ≤ ± 1 °C (thermocouple sensor).
Analog Output: Calibration accuracy: ≤ ± 0.05 % of full scale.
Linearity error: ≤ ± 0.05 % of full scale.
Supply voltage influence: ≤ ± 0.02 % of full scale for a min to max supply change.
Load influence: ≤ ± 0.02 % of full scale for a 0 to 100 % load resistance change.
Temperature influence: ≤ ± 0.01 % on zero and span for a 1 °C change.
Compatibility:
CE mark compliant, conforms to 94/9/EC Atex Directive and to 2004/108/CE EMC Directive.
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 [ia Ga] IIC T4 Gc, II (1) D [Ex ia Da] IIIC, I (M1) [Ex ia Ma] I
IECEx: Ex nA [ia Ga] IIC T4 Gc, [Ex ia Da] IIIC, [Ex ia Ma] I,
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 ≤ Ta ≤ 70 °C.
Approvals: ATEX conforms to EN60079-0, EN60079-11, EN60079-15, EN60079-26, IECEx conforms to IEC60079-0, IEC60079-11, IEC60079-15, IEC60079-26.
SIL 2 conforms to IEC61508.
Mounting: T35 DIN-Rail according to EN50022, with or without Power Bus or on customized Termination Board.
Weight: about 145 g D5072D, 120 g D5072S.
Connection: by polarized plug-in disconnect screw terminal blocks to accomodate terminations up to 2.5 mm^2.
Location: Safe Area/Non Hazardous Locations or Zone 2, Group IIC T4 installation.
Protection class: IP 20.
Dimensions: Width 12.5 mm, Depth 123 mm, Height 120 mm.

Programming

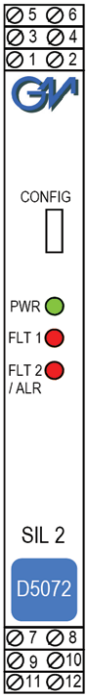
The module is fully programmable. Operating parameters can be changed from PC via PPC5092 adapter connected to USB serial line and SWC5090 software.
Measured values and diagnostic alarms can be read on both serial configuration or Modbus output line.
SWC5090 software also allows the Monitoring and Recording of values. For details please see SWC5090 manual ISM0154.

Ordering Information

Model:	D5072	
1 channel		S
2 channels		D

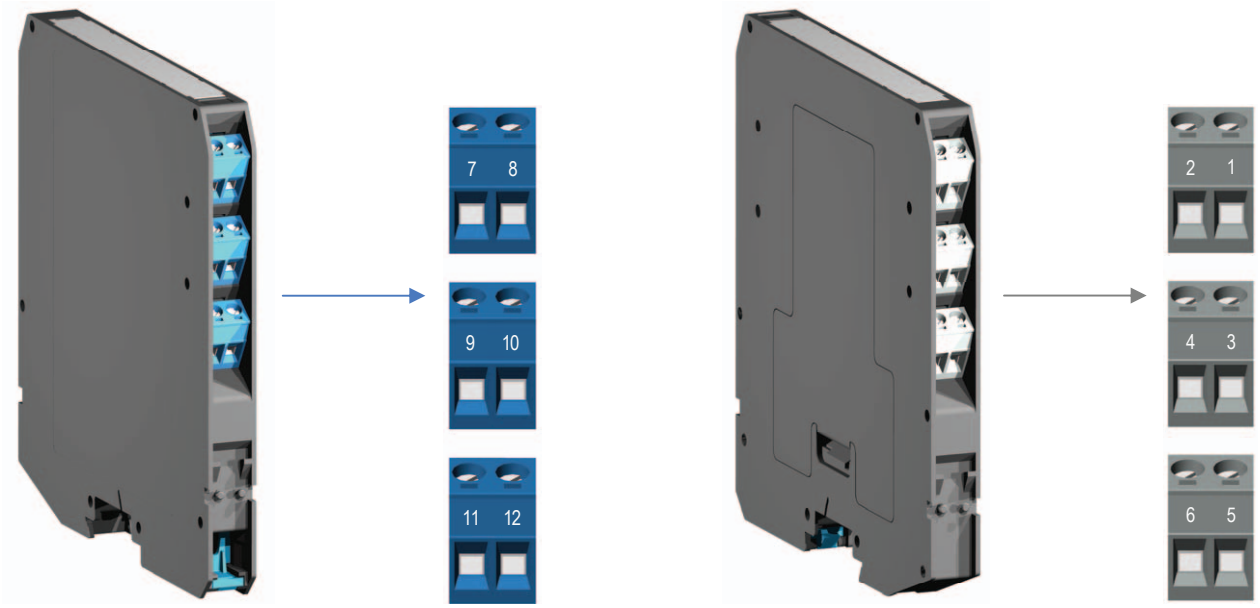
Power Bus and DIN-Rail accessories:
Connector JDFT049 — Cover and fix MCHP196
Terminal block male MOR017 — Terminal block female MOR022

Front Panel and Features



- D5072 SIL 2 according to IEC 61508 for Tproof = 5 years (10 % of total SIF).
- Input from Zone 0 (Zone 20), installation in Zone 2.
- mV, thermocouple, 2 or 3 or 4 wire resistance/RTD or transmitting potentiometer Input Signal.
- 2-wire RTD line resistance compensation.
- Internal Reference Junction Compensation automatic or fixed (programmable value).
- Fastest integration time: 50 ms
- Fully customizable Output range from 0 to 24 mA Output Signal linear or reverse (typical 0/4-20 mA).
- Output duplication possible for D5072D.
- Independent multiple Fault detection.
- Programmable alarm available on photoMOS output or Termination Board connector.
- High Accuracy, µP controlled A/D converter.
- Three port isolation, Input/Output/Supply.
- EMC Compatibility to EN61000-6-2, EN61000-6-4, EN61326-1, EN61326-3-1 for safety system.
- Fully programmable operating parameters.
- ATEX, IECEx Certifications.
- High Density, two channels per unit.
- Simplified installation using standard DIN-Rail and plug-in terminal blocks, with or without Power Bus, or customized Termination Boards.
- 250 Vrms (Um) max. voltage allowed to the instruments associated with the barrier.
- Data logging and monitoring via software.

Terminal block connections



HAZARDOUS AREA

7	D5072S: + Input for thermocouple TC or for 3, 4 wire RTD or potentiometer D5072D: + Input Ch1 for thermocouple TC or for 3 wire RTD or potentiometer
8	D5072S: - Input for thermocouple TC or for 2, 3, 4 wire RTD or potentiometer D5072D: - Input Ch1 for thermocouple TC or for 2, 3 wire RTD or potentiometer
9	D5072S: Input for 2, 3, 4 wire RTD or potentiometer D5072D: Input Ch1 for 2, 3 wire RTD or potentiometer
10	D5072S: Input for 4 wire RTD + Power Supply 24 Vdc D5072D: Input Ch2 for 2, 3 wire RTD or potentiometer
11	D5072D: + Input Ch2 for thermocouple TC or for 3 wire RTD or potentiometer
12	D5072D: - Input Ch2 for thermocouple TC or for 2, 3 wire RTD or potentiometer

SAFE AREA

1	D5072S, D5072D (Ch1): + Output (source current mode) or - Output (sink current mode)
2	D5072S, D5072D (Ch1): - Output (source current mode) or + Output (sink current mode)
3	D5072S (Alarm), D5072D (Ch2 Current/Alarm or Ch1 Duplicator/Alarm): +Output (source current) or - Output (sink current) or +Output (Alarm/Burnout)
4	D5072S (Alarm), D5072D (Ch2 Current/Alarm or Ch1 Duplicator/Alarm): - Output (source current) or +Output (sink current) or - Output (Alarm/Burnout)
5	+ Power Supply 24 Vdc
6	- Power Supply 24 Vdc

Parameters Table

In the system safety analysis, always check the Hazardous Area/Hazardous Locations devices to conform with the related system documentation, if the device is Intrinsically Safe check its suitability for the Hazardous Area/Hazardous Locations and group encountered and that its maximum allowable voltage, current, power (Ui/Vmax, Ii/Imax, Pi/Pi) are not exceeded by the safety parameters (Uo/Voc, Io/Isc, Po/Po) of the D5072 series Associated Apparatus connected to it. Also consider the maximum operating temperature of the field device, check that added connecting cable and field device capacitance and inductance do not exceed the limits (Co/Ca, Lo/La, Lo/Ro) given in the Associated Apparatus parameters for the effective group. See parameters indicated in the table below:

	D5072 Terminals		D5072 Associated Apparatus Parameters		Must be	Hazardous Area/ Hazardous Locations Device Parameters
D5072S	Ch1	7 - 8 - 9 - 10	Uo / Voc = 7.2 V		≤	Ui / Vmax
D5072D	Ch1	7 - 8 - 9	Uo / Voc = 7.2 V		≤	Ui / Vmax
	Ch2	10 - 11 - 12	Uo / Voc = 7.2 V		≤	Ui / Vmax
D5072S	Ch1	7 - 8 - 9 - 10	Io / Isc = 23 mA		≤	Ii/ Imax
D5072D	Ch1	7 - 8 - 9	Io / Isc = 16 mA		≤	Ii/ Imax
	Ch2	10 - 11 - 12	Io / Isc = 16 mA		≤	Ii/ Imax
D5072S	Ch1	7 - 8 - 9 - 10	Po / Po = 40 mW		≤	Pi / Pi
D5072D	Ch1	7 - 8 - 9	Po / Po = 27 mW		≤	Pi / Pi
	Ch2	10 - 11 - 12	Po / Po = 27 mW		≤	Pi / Pi
	D5072 Terminals		**D5072 Associated Apparatus Parameters Cenelec (US)**		**Must be**	**Hazardous Area/ Hazardous Locations Device + Cable Parameters**
D5072S	Ch1	7 - 8 - 9 - 10	Co / Ca = 13.5 µF	IIC (A, B)	≥	Ci / Ci device + C cable
			Co / Ca = 240 µF	IIB (C)	≥	Ci / Ci device + C cable
			Co / Ca = 1000 µF	IIA (D)	≥	Ci / Ci device + C cable
			Co / Ca = 1000 µF	I	≥	Ci / Ci device + C cable
			Co / Ca = 240 µF	iaD (E, F, G)	≥	Ci / Ci device + C cable
D5072D	Ch1	7 - 8 - 9	Co / Ca = 13.5 µF	IIC (A, B)	≥	Ci / Ci device + C cable
			Co / Ca = 240 µF	IIB (C)	≥	Ci / Ci device + C cable
			Co / Ca = 1000 µF	IIA (D)	≥	Ci / Ci device + C cable
			Co / Ca = 1000 µF	I	≥	Ci / Ci device + C cable
			Co / Ca = 240 µF	iaD (E, F, G)	≥	Ci / Ci device + C cable
	Ch2	10 - 11 - 12	Co / Ca = 13.5 µF	IIC (A, B)	≥	Ci / Ci device + C cable
			Co / Ca = 240 µF	IIB (C)	≥	Ci / Ci device + C cable
			Co / Ca = 1000 µF	IIA (D)	≥	Ci / Ci device + C cable
			Co / Ca = 1000 µF	I	≥	Ci / Ci device + C cable
			Co / Ca = 240 µF	iaD (E, F, G)	≥	Ci / Ci device + C cable
D5072S	Ch1	7 - 8 - 9 - 10	Lo / La = 71 mH	IIC (A, B)	≥	Li / Li device + L cable
			Lo / La = 285 mH	IIB (C)	≥	Li / Li device + L cable
			Lo / La = 570 mH	IIA (D)	≥	Li / Li device + L cable
			Lo / La = 936 mH	I	≥	Li / Li device + L cable
			Lo / La = 285 mH	iaD (E, F, G)	≥	Li / Li device + L cable
D5072D	Ch1	7 - 8 - 9	Lo / La = 155 mH	IIC (A, B)	≥	Li / Li device + L cable
			Lo / La = 621 mH	IIB (C)	≥	Li / Li device + L cable
			Lo / La = 1243 mH	IIA (D)	≥	Li / Li device + L cable
			Lo / La = 2040 mH	I	≥	Li / Li device + L cable
			Lo / La = 621 mH	iaD (E, F, G)	≥	Li / Li device + L cable
	Ch2	10 - 11 - 12	Lo / La = 155 mH	IIC (A, B)	≥	Li / Li device + L cable
			Lo / La = 621 mH	IIB (C)	≥	Li / Li device + L cable
			Lo / La = 1243 mH	IIA (D)	≥	Li / Li device + L cable
			Lo / La = 2040 mH	I	≥	Li / Li device + L cable
			Lo / La = 621 mH	iaD (E, F, G)	≥	Li / Li device + L cable
D5072S	Ch1	7 - 8 - 9 - 10	Lo / Ro = 893 µH/Ω	IIC (A, B)	≥	Li / Ri device and L cable / R cable
			Lo / Ro = 3573 µH/Ω	IIB (C)	≥	Li / Ri device and L cable / R cable
			Lo / Ro = 7147 µH/Ω	IIA (D)	≥	Li / Ri device and L cable / R cable
			Lo / Ro = 11726 µH/Ω	I	≥	Li / Ri device and L cable / R cable
			Lo / Ro = 3573 µH/Ω	iaD (E, F, G)	≥	Li / Ri device and L cable / R cable
D5072D	Ch1	7 - 8 - 9	Lo / Ro = 1318 µH/Ω	IIC (A, B)	≥	Li / Ri device and L cable / R cable
			Lo / Ro = 5275 µH/Ω	IIB (C)	≥	Li / Ri device and L cable / R cable
			Lo / Ro = 10551 µH/Ω	IIA (D)	≥	Li / Ri device and L cable / R cable
			Lo / Ro = 17310 µH/Ω	I	≥	Li / Ri device and L cable / R cable
			Lo / Ro = 5275 µH/Ω	iaD (E, F, G)	≥	Li / Ri device and L cable / R cable
	Ch2	10 - 11 - 12	Lo / Ro = 1318 µH/Ω	IIC (A, B)	≥	Li / Ri device and L cable / R cable
			Lo / Ro = 5275 µH/Ω	IIB (C)	≥	Li / Ri device and L cable / R cable
			Lo / Ro = 10551 µH/Ω	IIA (D)	≥	Li / Ri device and L cable / R cable
			Lo / Ro = 17310 µH/Ω	I	≥	Li / Ri device and L cable / R cable
			Lo / Ro = 5275 µH/Ω	iaD (E, F, G)	≥	Li / Ri device and L cable / R cable

When used with separately powered intrinsically safe devices, check that maximum allowable voltage, current (Ui/Vmax, Ii/Imax) of the D5072 Associated Apparatus are not exceeded by the safety parameters (Uo/Voc, Io/Isc) of the Intrinsically Safe device, indicated in the table below:

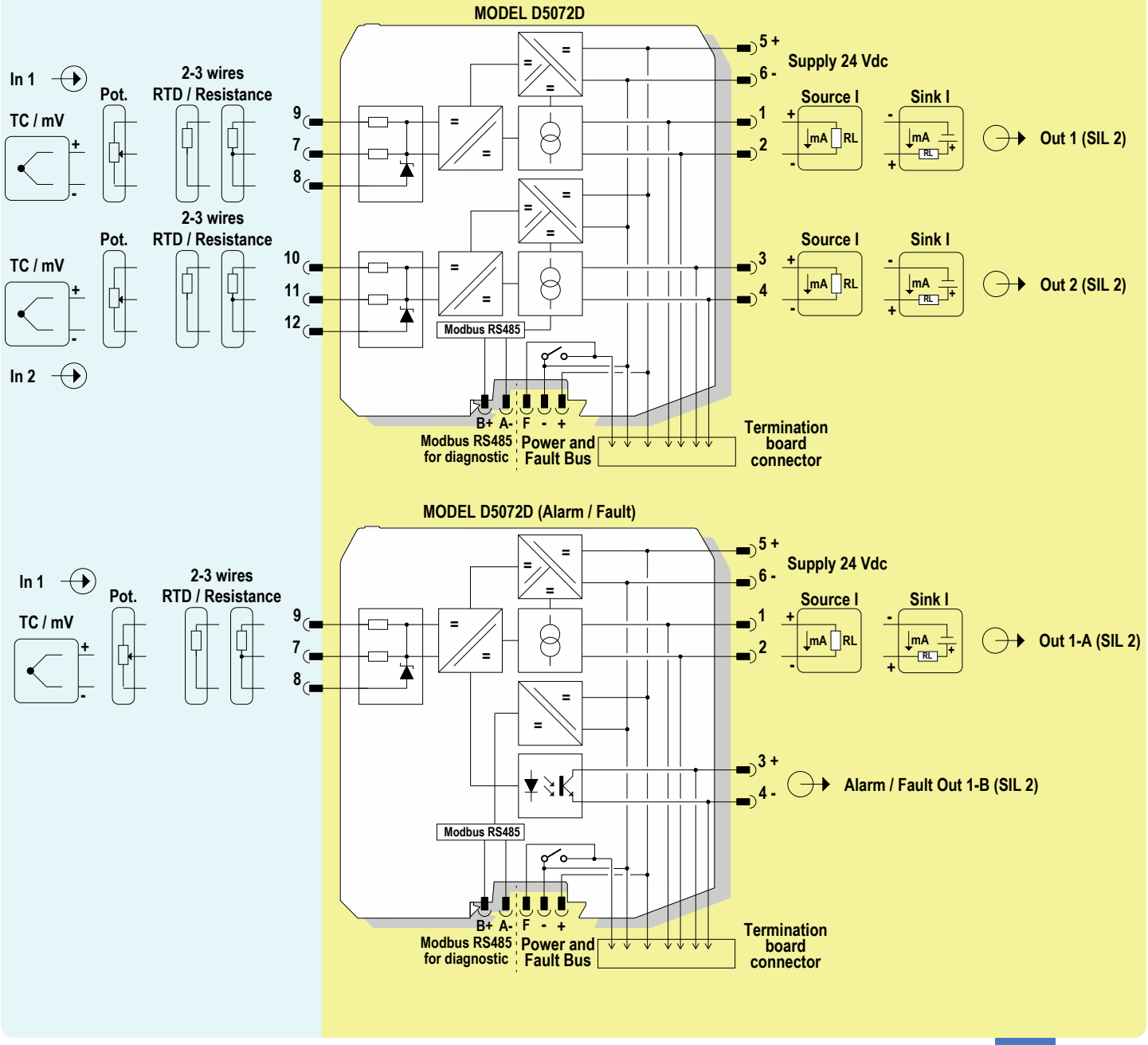
	D5072 Terminals		D5072 Associated Apparatus Parameters	Must be	Hazardous Area/ Hazardous Locations Device Parameters
D5072S	Ch1	7 - 8 - 9 - 10	Ui / Vmax = 12.8 V	≥	Uo / Voc
D5072D	Ch1	7 - 8 - 9			
	Ch2	10 - 11 - 12			
D5072S	Ch1	7 - 8 - 9 - 10	Ii / Imax = 28.7 mA	≥	Io / Isc
D5072S	Ch1	7 - 8 - 9 - 10	Ci = 0 nF, Li= 0 nH		
D5072D	Ch1	7 - 8 - 9			
	Ch2	10 - 11 - 12			

For installations in which both the Ci and Li of the Intrinsically Safe apparatus exceed 1 % of the Co and Lo parameters of the Associated Apparatus (excluding the cable), then 50 % of Co and Lo parameters are applicable and shall not be exceeded (50 % of the Co and Lo become the limits which must include the cable such that Ci device + C cable ≤ 50 % of Co and Li device + L cable ≤ 50 % of Lo).
If the cable parameters are unknown, the following value may be used: Capacitance 180pF per meter (60pF per foot), Inductance 0.60µH per meter (0.20µH per foot).

Function Diagram

HAZARDOUS AREA ZONE 0 (ZONE 20) GROUP IIC

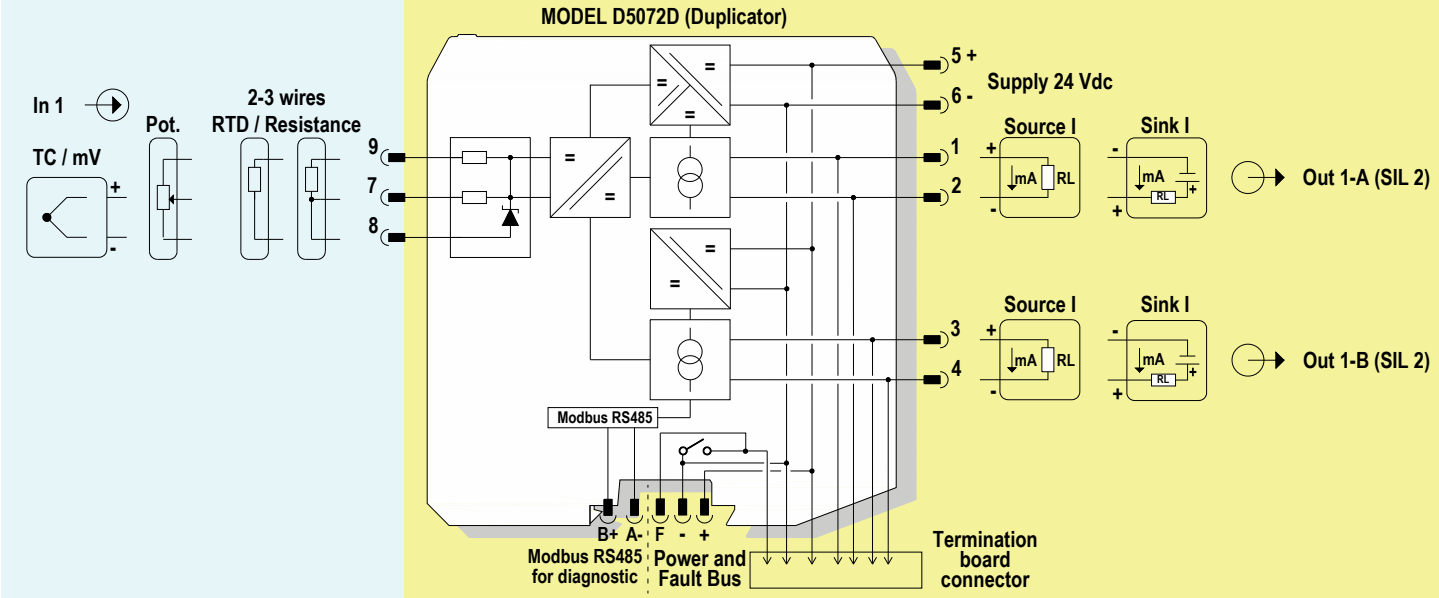
SAFE AREA, ZONE 2 GROUP IIC T4

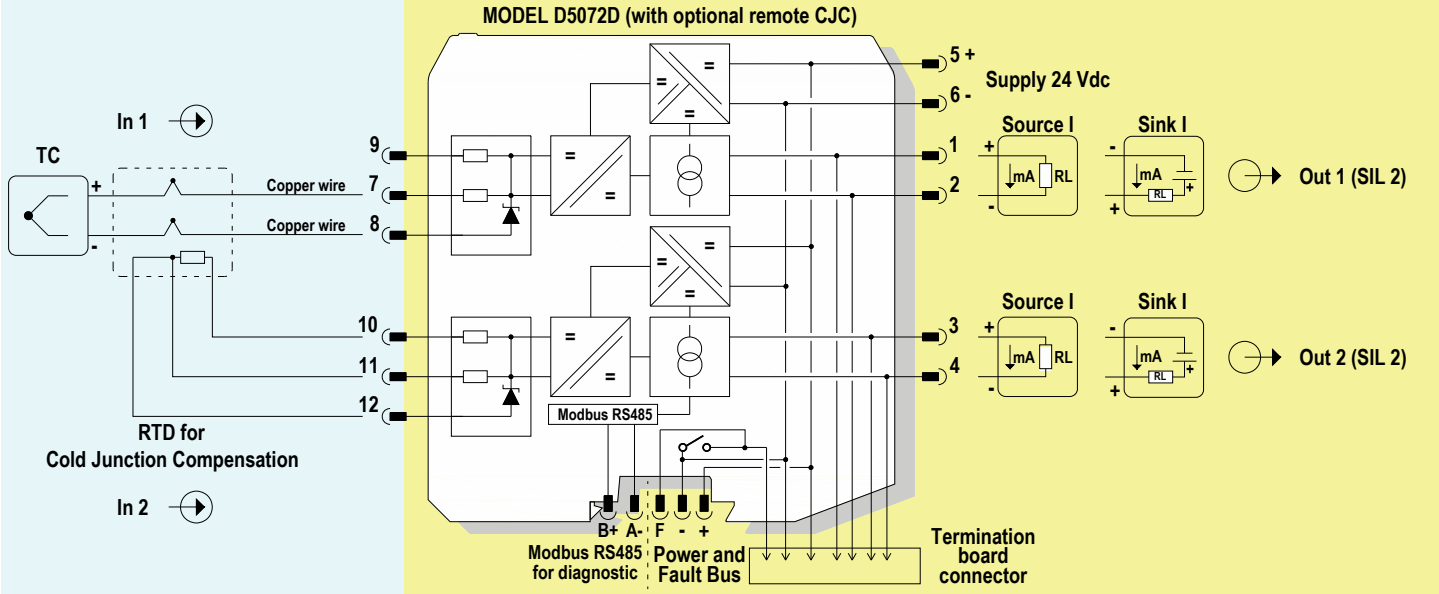


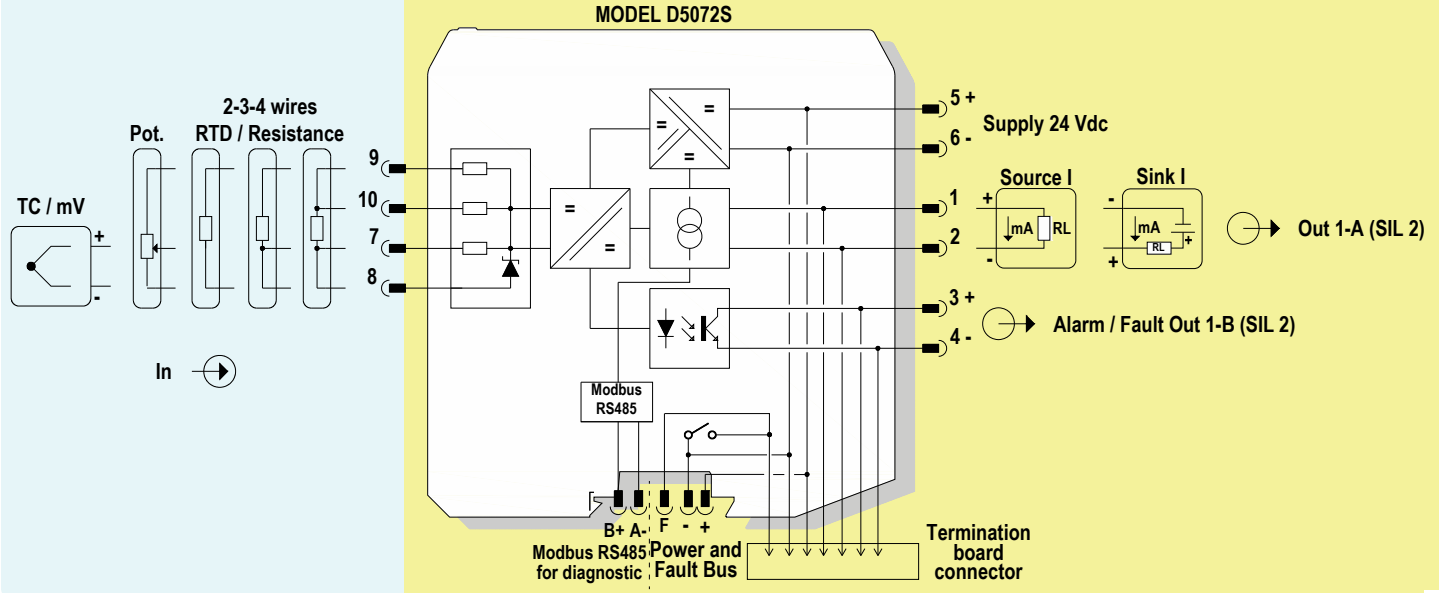
Function Diagram

HAZARDOUS AREA ZONE 0 (ZONE 20) GROUP IIC

SAFE AREA, ZONE 2 GROUP IIC T4







Warning

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

Operation

Each input channel of Temperature Signal Converter D5072 accepts a low level dc signal from millivolt, thermocouple or 2-3-4 wire RTD temperature or transmitting potentiometer sensor, located in Hazardous Area, and converts, with isolation, the signal to a 4-20 mA floating output current to drive a Safe Area load.
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 module has double input and output channel, and can also be programmed to interface a single input and obtain dual output channel (duplicator) or configurable output channel (outputs can repeat the corresponding inputs or be proportional to the sum or difference of the two input process variables or with low/high selector function).

Installation

D5072 series are temperature signal converters housed in a plastic enclosure suitable for installation on T35 DIN-Rail according to EN50022, with or without Power Bus or on customized Termination Board.
D5072 unit can be mounted with any orientation over the entire ambient temperature range.
Electrical connection of conductors up to 2.5 mm² 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)**.
The wiring cables have to be proportionate in base to the current and the length of the cable.
On the section “Function Diagram” and enclosure side a block diagram identifies all connections.
Identify the number of channels of the specific card (e.g. D5072S is a single channel model and D5072D is a dual channel model), the function and location of each connection terminal using the wiring diagram on the corresponding section, as an example (for each channel: thermocouple input, source current output):
Connect 24 Vdc power supply positive at terminal “5” and negative at terminal “6”.
For model D5072S connect positive output of channel 1 at terminal “1” and negative output at “2”.
For model D5072D in addition to channel 1 connections above, connect positive output of channel 2 at terminal “3” and negative output at “4”.
For channel 1, connect thermocouple positive extension wire at terminal “7”, negative and shield (if any) at terminal “8”.
For channel 2, connect thermocouple positive extension wire at terminal “11”, negative and shield (if any) at terminal “12”.
Make sure that compensating wires have the correct metal and thermal e.m.f. and are connected to the appropriate thermocouple terminal, note that a wrong compensating cable type or a swapped connection is not immediately apparent but introduces a misleading measurement error that appears as a temperature drift.

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 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. Any unauthorized card modification must be avoided.
According to EN61010, D5072 series must be connected to SELV or SELV-E supplies.

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, 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.

Input specifications:

Input	Type	Alpha	Ohms	Standards	Min Span	Accuracy	Accuracy Range	Maximum Range
RTD	Platinum	0.003850	50	IEC 60751	20 °C (36 °F)	±0.4 °C ±0.7 °F	-200 to 850 °C (-328 to 1562 °F)	-200 to 850 °C (-328 to 1562 °F)
			100	IEC 60751	20 °C (36 °F)	±0.2 °C ±0.4 °F	-200 to 850 °C (-328 to 1562 °F)	-200 to 850 °C (-328 to 1562 °F)
			200	IEC 60751		±0.2 °C ±0.4 °F	-200 to 850 °C (-328 to 1562 °F)	-200 to 850 °C (-328 to 1562 °F)
			300	IEC 60751		±0.2 °C ±0.4 °F	-200 to 850 °C (-328 to 1562 °F)	-200 to 850 °C (-328 to 1562 °F)
			400	IEC 60751		±0.2 °C ±0.4 °F	-200 to 850 °C (-328 to 1562 °F)	-200 to 850 °C (-328 to 1562 °F)
			500	IEC 60751		±0.2 °C ±0.4 °F	-200 to 850 °C (-328 to 1562 °F)	-200 to 850 °C (-328 to 1562 °F)
			1000	IEC 60751		±0.2 °C ±0.4 °F	-200 to 850 °C (-328 to 1562 °F)	-200 to 850 °C (-328 to 1562 °F)
		0.003916	100	ANSI	20 °C (36 °F)	±0.2 °C ±0.4 °F	-200 to 625 °C (-328 to 1157 °F)	-200 to 625 °C (-328 to 1157 °F)
		0.003910	46	GOST 6651	20 °C (36 °F)	±0.4 °C ±0.7 °F	-200 to 650 °C (-328 to 1202 °F)	-200 to 650 °C (-328 to 1202 °F)
			50	GOST 6651		±0.4 °C ±0.7 °F	-200 to 650 °C (-328 to 1202 °F)	-200 to 650 °C (-328 to 1202 °F)
			100	GOST 6651	20 °C (36 °F)	±0.2 °C ±0.4 °F	-200 to 650 °C (-328 to 1202 °F)	-200 to 650 °C (-328 to 1202 °F)
			200	GOST 6651		±0.2 °C ±0.4 °F	-200 to 650 °C (-328 to 1202 °F)	-200 to 650 °C (-328 to 1202 °F)
			300	GOST 6651		±0.2 °C ±0.4 °F	-200 to 650 °C (-328 to 1202 °F)	-200 to 650 °C (-328 to 1202 °F)
			400	GOST 6651		±0.2 °C ±0.4 °F	-200 to 650 °C (-328 to 1202 °F)	-200 to 650 °C (-328 to 1202 °F)
			500	GOST 6651		±0.2 °C ±0.4 °F	-200 to 650 °C (-328 to 1202 °F)	-200 to 650 °C (-328 to 1202 °F)
	Nickel	0.00618	100	DIN 43760	20 °C (36 °F)	±0.2 °C ±0.4 °F	-60 to 180 °C (-76 to 356 °F)	-60 to 180 °C (-76 to 356 °F)
		0.00672	120	DIN 43760		±0.2 °C ±0.4 °F	-80 to 320 °C (-112 to 608 °F)	-80 to 320 °C (-112 to 608 °F)
	Copper	0.00428	50	GOST 6651	20 °C (36 °F)	±0.4 °C ±0.7 °F	-50 to 200 °C (-58 to 392 °F)	-50 to 200 °C (-58 to 392 °F)
			53	GOST 6651	20 °C (36 °F)	±0.4 °C ±0.7 °F	-50 to 200 °C (-58 to 392 °F)	-50 to 200 °C (-58 to 392 °F)
			100	GOST 6651	20 °C (36 °F)	±0.2 °C ±0.4 °F	-50 to 200 °C (-58 to 392 °F)	-50 to 200 °C (-58 to 392 °F)
		0.00427	9.035	---	20 °C (36 °F)	±1.0 °C ±1.8 °F	-50 to 260 °C (-58 to 500 °F)	-50 to 260 °C (-58 to 500 °F)
Ohm	Resistance		0 to 4000	---	1 ohm	±0.4 ohm	0 to 4000	0 to 4000
	Potentiometer		100 to 10000	---	1 %	±0.1%	0 to 100%	0 to 100%
TC	A1		---	GOST 8.585-2001	20 °C (36 °F)	±0.75 °C ±1.35 °F	25 to 2500 °C (77 to 4532 °F)	-10 to 2500 °C (14 to 4532 °F)
	A2		---	GOST 8.585-2001	20 °C (36 °F)	±0.75 °C ±1.35 °F	25 to 1800 °C (77 to 3272 °F)	-10 to 1800 °C (14 to 3272 °F)
	A3		---	GOST 8.585-2001	20 °C (36 °F)	±0.75 °C ±1.35 °F	25 to 1800 °C (77 to 3272 °F)	-10 to 1800 °C (14 to 3272 °F)
	B		---	IEC 60584 GOST 8.585-2001	100 °C (180 °F)	±0.75 °C ±1.35 °F	180 to 1800 °C (356 to 3272 °F)	-10 to 1800 °C (14 to 3272 °F)
	E		---	IEC 60584 GOST 8.585-2001	20 °C (36 °F)	±0.3 °C ±0.6 °F	-100 to 1000 °C (-148 to 1832 °F)	-250 to 1000 °C (-418 to 1832 °F)
	J		---	IEC 60584 GOST 8.585-2001	20 °C (36 °F)	±0.3 °C ±0.6 °F	-125 to 750 °C (-193 to 1382 °F)	-200 to 1200 °C (-328 to 2192 °F)
	K		---	IEC 60584 GOST 8.585-2001	20 °C (36 °F)	±0.3 °C ±0.6 °F	-125 to 1350 °C (-193 to 2462 °F)	-250 to 1350 °C (-418 to 2462 °F)
	L		---	DIN 43710	20 °C (36 °F)	±0.3 °C ±0.6 °F	-100 to 800 °C (-148 to 1472 °F)	-200 to 800 °C (-328 to 1472 °F)
	LR		---	GOST 8.585-2001	20 °C (36 °F)	±0.3 °C ±0.6 °F	-75 to 800 °C (-103 to 1472 °F)	-200 to 800 °C (-328 to 1472 °F)
	N		---	IEC 60584 GOST 8.585-2001	20 °C (36 °F)	±0.3 °C ±0.6 °F	-100 to 1300 °C (-148 to 2372 °F)	-250 to 1300 °C (-418 to 2372 °F)
	R		---	IEC 60584 GOST 8.585-2001	20 °C (36 °F)	±0.5 °C ±0.9 °F	75 to 1750 °C (167 to 3182 °F)	-50 to 1750 °C (-58 to 3182 °F)
	S		---	IEC 60584 GOST 8.585-2001	20 °C (36 °F)	±0.5 °C ±0.9 °F	75 to 1750 °C (167 to 3182 °F)	-50 to 1750 °C (-58 to 3182 °F)
	T		---	IEC 60584 GOST 8.585-2001	20 °C (36 °F)	±0.3 °C ±0.6 °F	-100 to 400 °C (-148 to 752 °F)	-250 to 400 °C (-418 to 752 °F)
	U		---	DIN 43710	20 °C (36 °F)	±0.3 °C ±0.6 °F	-100 to 400 °C (-148 to 752 °F)	-200 to 600 °C (-328 to 1112 °F)
mV	DC		---	---	1 mV	±10 µV	-50 to 80 mV	-50 to 80 mV

Notes:

RTD/resistance accuracy shown in 4-wires configuration, in slow acquisition mode

TC/mV Accuracy shown in slow acquisition mode

Configuration parameters:

INPUT:

Sensor Connection:
- ☐ TC
- ☐ RTD
- ☐ Potentiometer
- ☐ Voltage
- ☐ Resistance

Sensor Type: input sensor type (see list in section "Input specifications")
possibility of configuring a completely customized TC/RTD input curve

Wires: 2, 3, 4 wires selection for RTD/Resistance inputs

Lowscale: input value of measuring range corresponding to defined low output value.

Upscale: input value of measuring range corresponding to defined high output value.

Cold Junction Source: reference junction compensation type (thermocouple only)
- ☐ Automatic via internal compensator (1 for each channel)
- ☐ Fixed programmable temperature compensation at fixed temperature
- ☐ Other Input remote compensation using RTD on remaining channel

Cold Junction Reference: fixed temperature compensation value (Cold Junction type Fixed only), range from –60 to +100 °C.

Integration speed:
- ☐ Slow 250 ms (mV/TC,2 wire RTD); 375 ms (Pot.), 500 ms (3,4 wire RTD)
- ☐ Fast 50 ms (mV/TC,2 wire RTD); 75 ms (Pot.), 100 ms (3,4 wire RTD)

Mains Frequency:
- ☐ 50 Hz
- ☐ 60 Hz only available with fast integration speed

Offset: value to be added/subtracted to input (µV or mΩ depending on input sensor);

Multiplier: input multiplication value;

Tag: 16 alphanumerical characters

OUTPUT:

Function:
- ☐ Input 1 analog output represents input of first channel,
- ☐ Input 2 analog output represents input of second channel,
- ☐ Input 1 + 2 analog output represents the sum of the two input channels,
- ☐ Input 1 - 2 analog output represents the subtraction of the two input ch.,
- ☐ Min(Input 1, Input 2) analog output represents the lower of the two input ch.,
- ☐ Max(Input 1, Input 2) analog output represents the higher of the two input ch.

Lowscale: analog output lowscale in normal working condition (range 0 to 24 mA)

Highscale: analog output lowscale in normal working condition (range 0 to 24 mA)

Underrange: analog output lowscale in underrange condition (range 0 to 24 mA)

Overrange: analog output lowscale in overrange condition (range 0 to 24 mA)

Fault Output Value: analog output value in case of fault condition (range 0 to 24 mA)

Fault in case of: analog output is forced to "Fault Output Value" in case of:
- ☐ Burnout input sensor interruption,
- ☐ Internal fault module internal fault,
- ☐ Sensor out of range input sensor out of configured input range,
- ☐ Output Saturation output is below Underrange or above Overrange,
- ☐ Module Temp. Out of range internal module temperature under or over specified module operating temperature limits.

ALARM:

Type:
- ☐ None alarm is disabled,
- ☐ Low alarm is triggered when source descends below "Low Set",
- ☐ LowLock alarm is inhibited until source ascends over "Low Set", and then, it behaves as a standard "Low" configuration,
- ☐ High alarm is triggered when source ascends over "High Set",
- ☐ HighLock alarm is inhibited until source descends below "High Set", and then, it behaves as a standard "High" configuration,
- ☐ Window alarm is triggered below "Low Set" and above "High Set",
- ☐ Fault Repeater alarm output reflects selected (one or more) Fault status.

Source: reference value for alarm triggering
- ☐ Input 1 input of first channel,
- ☐ Input 2 input of second channel,
- ☐ Input 1 + 2 sum of the two input channels,
- ☐ Input 1 - 2 subtraction of the two input channels,
- ☐ Min(Input 1, Input 2) lower of the two input channels,
- ☐ Max(Input 1, Input 2) higher of the two input channels.

Condition:
- ☐ NE alarm output is normally energized when deactivated,
- ☐ ND alarm output is normally de-energized when deactivated.

Low Set: source value at which the alarm is triggered (in Low, LowLock, Window)

Low Hysteresys: triggered Low alarm deactivates when source value reaches Low Set + Low Hysteresys (0-500 °C, 0-50 mV, 0-50 %, 0 to 2 KΩ)

High Set: source value at which the alarm is triggered (in High, HighLock, Window)

High Hysteresys: triggered High alarm deactivates when source value reaches High Set - High Hysteresys (0-500 °C, 0-50 mV, 0-50 %, 0 to 2 KΩ)

On Delay: time for which the source variable has to be in alarm condition before the alarm output is triggered; configurable from 0 to 1000 seconds in steps of 100 ms

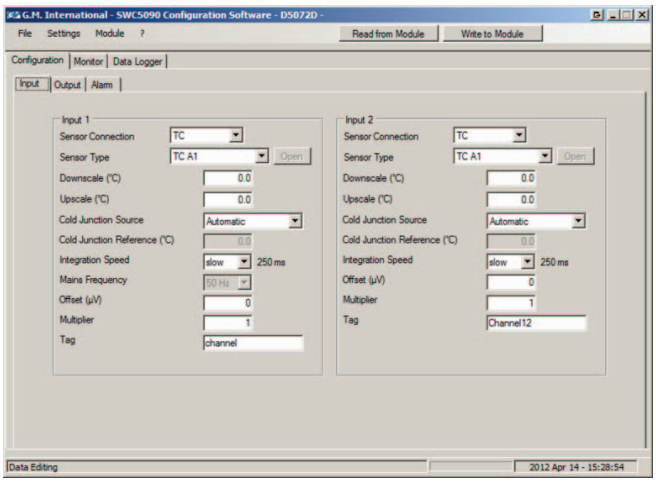
Off Delay: time for which the source variable has to be in normal condition before the alarm output is deactivated; configurable from 0 to 1000 seconds in steps of 100 ms

In case of fault:
- ☐ Ignore alarm is not affected
- ☐ Lock status alarm remains in the same status as it was before Fault occurred
- ☐ Go On alarm is triggered,
- ☐ Go Off alarm is deactivated

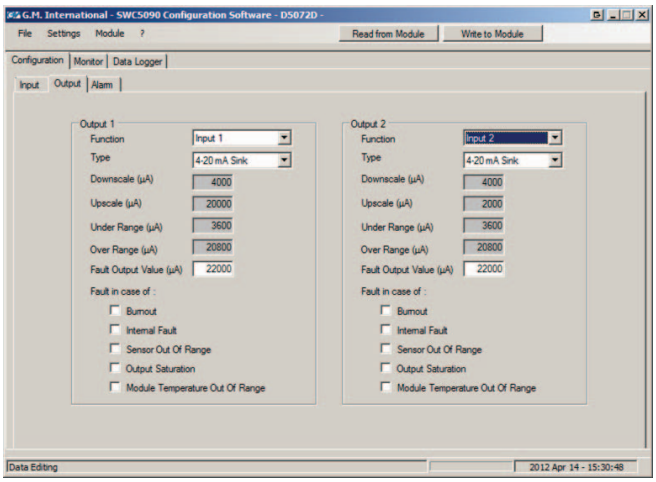
Faults: if "Type" is set to "Fault repeater" select which faults will be repeated by alarm output; if "In case of fault" is different from "Ignore", select which faults should influence alarm output behaviour.

Note: Each channel has completely independent configurations
See ISM0154 Manual for details on SWC5090 software.

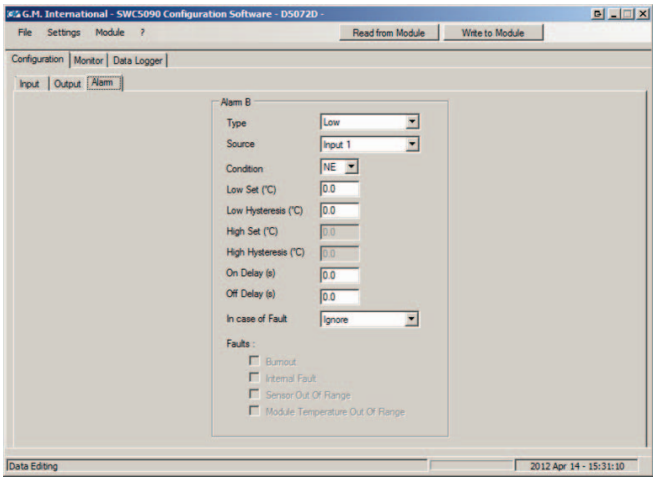
Screenshots:



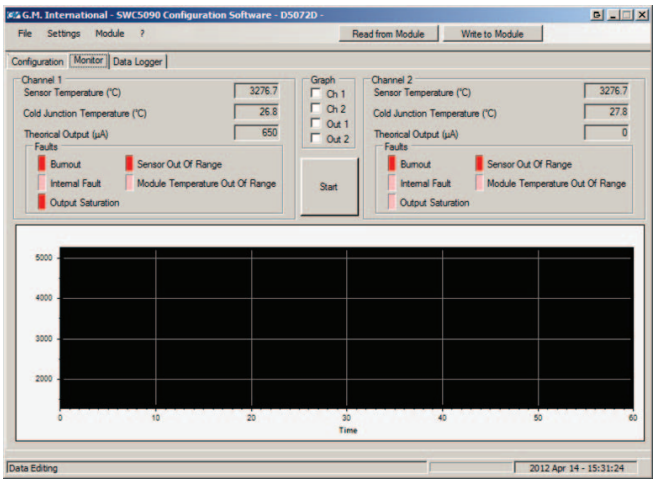
Input configuration



Output configuration



Alarm configuration



Monitor