INSTRUCTION & SAFETY MANUAL

SIL 2 Temperature Signal Converter
Multifunction, DIN-Rail and Termination Board,
Models D6072S, D6072D

Characteristics

General Description:

The single and dual channel Temperature Signal Converter D6072S and D6072D accepts a low level dc signal from millivolt, thermocouple or 2-3-4 wire resistance/RTD or transmitting potentiometer sensor and converts, with isolation, the signal to drive a load, suitable for applications requiring SIL 2 level (according to IEC 61511) in safety related systems for high risk industries. Output signal can be direct or reverse.Modbus RTU RS-485 output is available on Bus connector.

Cold junction compensation can be programmed as:

- Automatic: provided by an internal temperature sensor;
- Fixed: to a user-customizable temperature value;
- Remote: (only D6072D) connecting compensation RTD to one of the two ch.

For D6072D module: duplicator function provides two independent outputs from one single input. Output function can be configured as: Adder, subtractor, 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 customized Termination Boards, in Safe Area.

Fault Detection:

D6072S and D6072D modules are able to detect multiple fault sources:

- Sensor Burnout (i.e. when input is disconnected);
- Sensor out of configured range;
- Analog output saturation (beyond user-configured output limits);
- Internal module fault;
- Module out of allowed temperature range (-40 to + 70 °C).

Modules can be programmed to reflect fault status on Analog or Alarm Output. All data is available also via Modbus Output.

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: 55 mA (D6072D), 45 mA (D6072S) with 20 mA out typical.
Power dissipation: 1.15 W for 2 channels D6072D, 1.0 W for 1 channel D6072S 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 (IEC), Pt100 (ANSI 0.3916), Ni100, Ni120 (DIN43760), Pt46, Pt50, Pt100, Pt200, Pt300, Pt400, Pt500, Cu50, Cu53, Cu100 (GOST6651 russian standard) and Cu9.035 (or Cu10), or 3 wire transmitting potentiometer (100 Ω to 10 kΩ). 4-wire RTD input only on D6072S.
Possibility of configuring user customized sensor (TC or RTD). Choice between °C/°F.
See section "Input specifications" for more details on Input sensors.
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 pot.
Visualization: 0.1 °C on temp.,10 µV on mV, 100 mΩ on resistance, 0.1 % on pot.
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 (D6072D).
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.
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 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 Directives:
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.
Approvals:

TUV Certificate conforms to IEC61511 (Pending).
Mounting: T35 DIN-Rail according to EN50022, with or without Power Bus or on customized Termination Board.
Weight: about 145 g D6072D, 120 g D6072S.
Connection: by polarized plug-in disconnect screw terminal blocks to accomodate terminations up to 2.5 mm^2.
Location: Safe Area/Non Hazardous Location installation.
Protection class: IP 20.
Dimensions: Width 12.5 mm, Depth 123 mm, Height 120 mm.

Programming

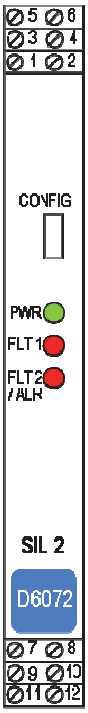
The module is fully programmable. Operating parameters can be changed from PC via PPC5092 adapter connected to USB serial line and SWC5090 software.
Measured values and diagnostic alarms can be read on both serial configuration or Modbus output line.
SWC5090 software also allows the Monitoring and Recording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

Ordering Information

Model:	D6072	
1 channel		S
2 channels		D

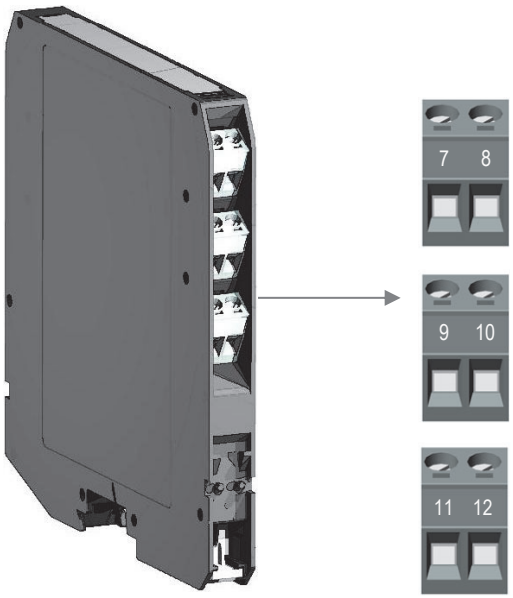
Power Bus and DIN-Rail accessories:
Connector JDFT049 — Cover and fix MCHP196
Terminal block male MOR017 — Terminal block female MOR022

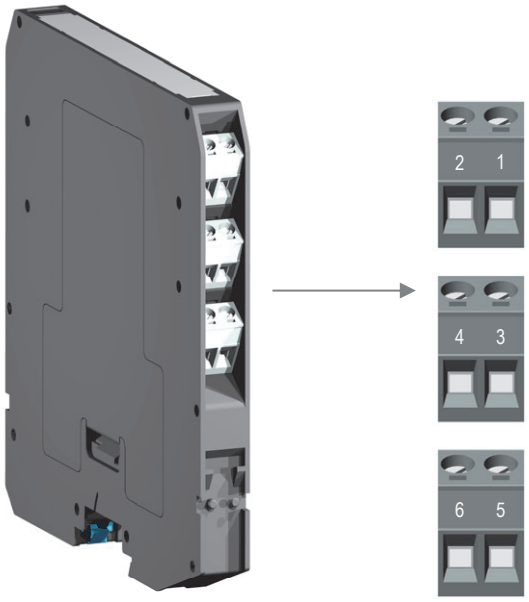
Front Panel and Features



- D6072 SIL 2 according to IEC 61511
- 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 D6072D.
- Modbus RTU RS-485 Output.
- 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.
- TÜV Functional Safety Certification.
- Fully programmable operating parameters.
- 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.
- Data logging and monitoring via software.

Terminal block connections

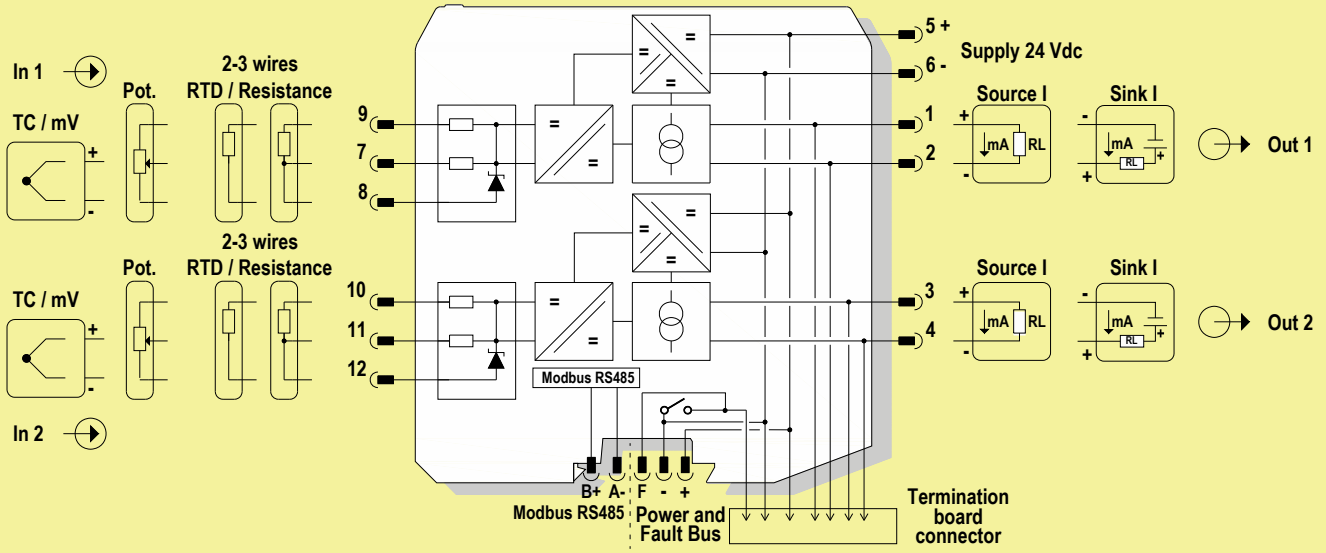




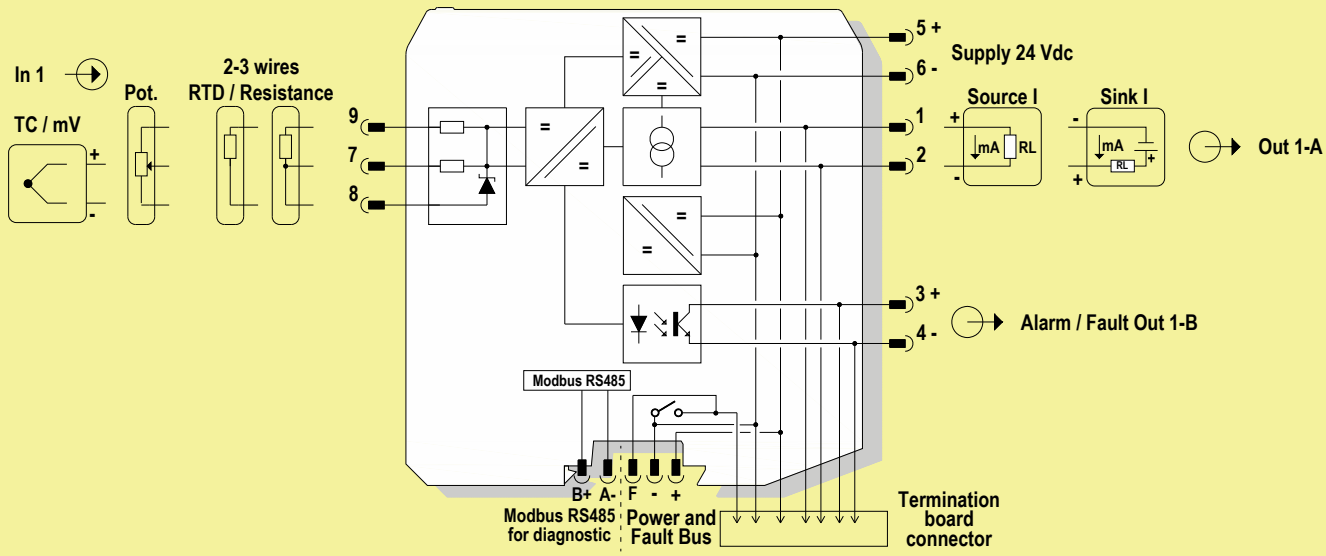
7	D6072S: + Input for thermocouple TC or for 3, 4 wire RTD or potentiometer D6072D: + Input Ch1 for thermocouple TC or for 3 wire RTD or potentiometer
8	D6072S: - Input for thermocouple TC or for 2, 3, 4 wire RTD or potentiometer D6072D: - Input Ch1 for thermocouple TC or for 2, 3 wire RTD or potentiometer
9	D6072S: Input for 2, 3, 4 wire RTD or potentiometer D6072D: Input Ch1 for 2, 3 wire RTD or potentiometer
10	D6072S: Input for 4 wire RTD + Power Supply 24 Vdc D6072D: Input Ch2 for 2, 3 wire RTD or potentiometer
11	D6072D: + Input Ch2 for thermocouple TC or for 3 wire RTD or potentiometer
12	D6072D: - Input Ch2 for thermocouple TC or for 2, 3 wire RTD or potentiometer

1	D6072S, D6072D (Ch1): + Output (source current mode) or - Output (sink current mode)
2	D6072S, D6072D (Ch1): - Output (source current mode) or + Output (sink current mode)
3	D6072S (Alarm), D6072D (Ch2 Current/Alarm or Ch1 Duplicator/Alarm): +Output (source current) or - Output (sink current) or +Output (Alarm/Burnout)
4	D6072S (Alarm), D6072D (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

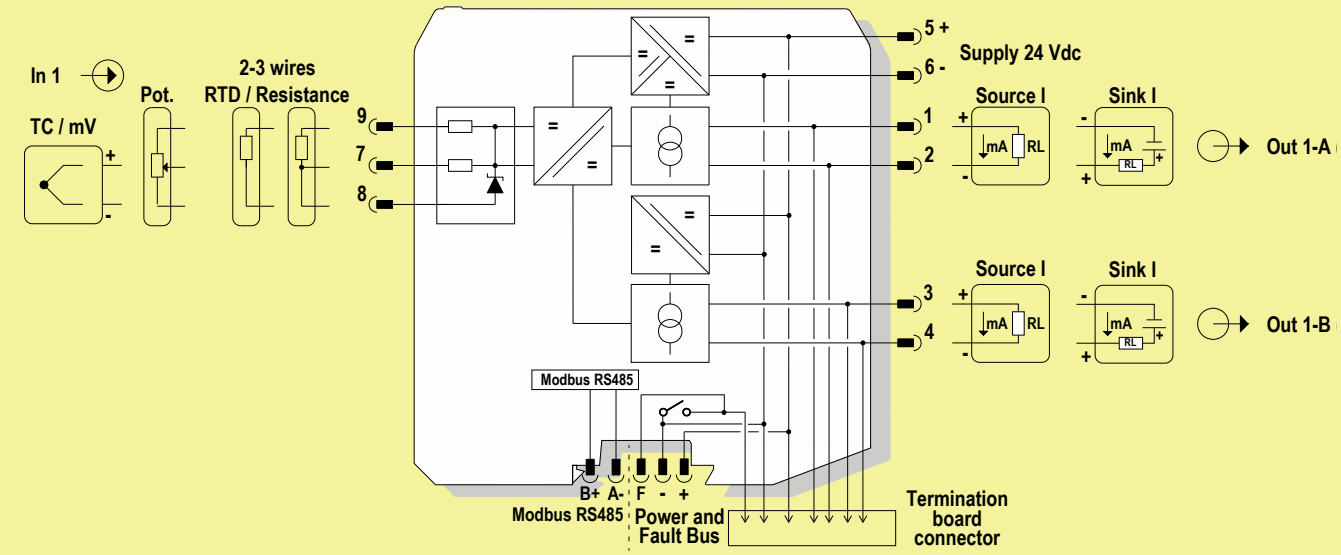
Model D6072D



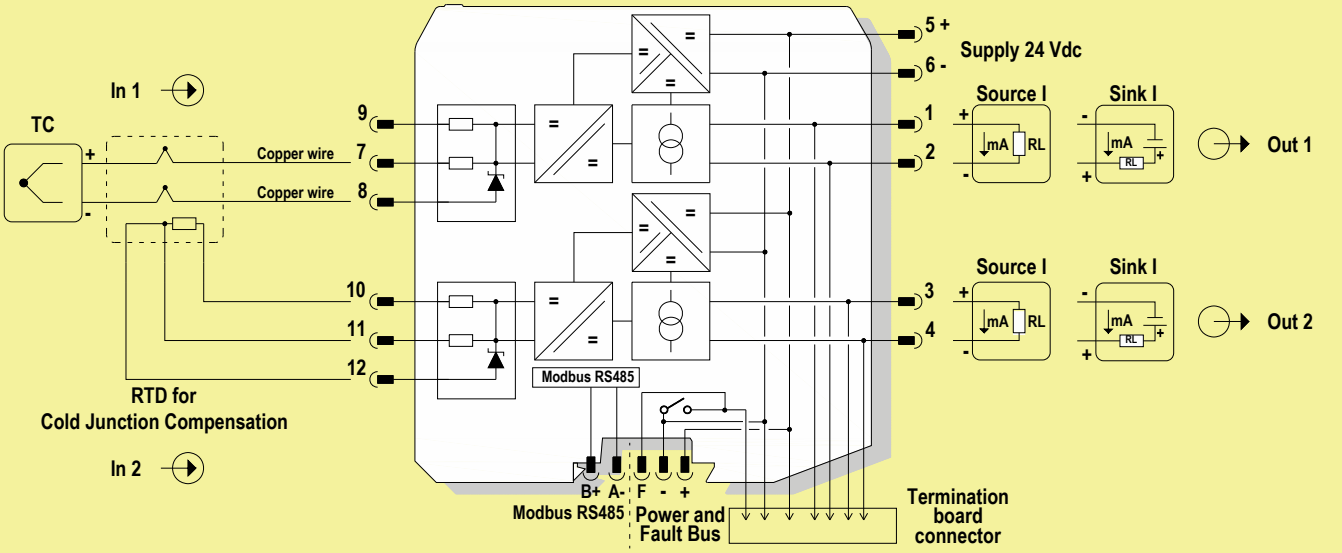
Model D6072D Alarm / Burnout



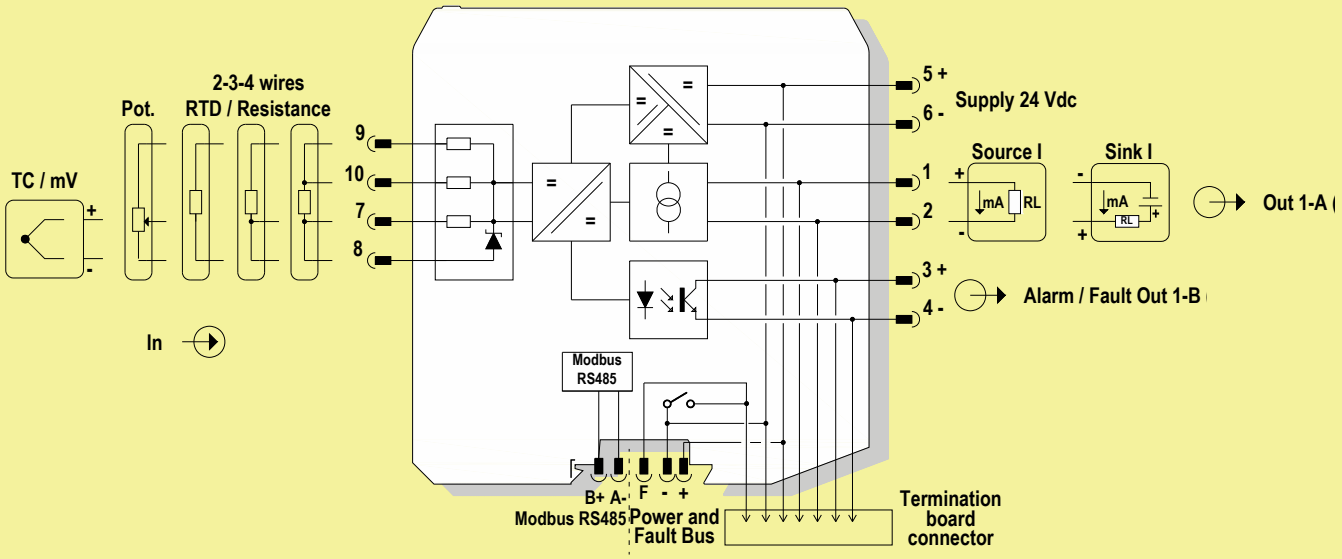
Model D6072D (Duplicator)



Model D6072D (with CJC)



Model D6072S



Warning

D6072 series must be installed, operated and maintained only by qualified personnel, in accordance to the relevant national/international installation standards.
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 D6072 accepts a low level dc signal from millivolt, thermocouple or 2-3-4 wire RTD temperature or transmitting potentiometer sensor and converts, with isolation, the signal to a 4-20 mA floating output current to drive a 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.
D6072D 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

D6072 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.
D6072 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.
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. D6072S is a single channel model and D6072D 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 D6072S connect positive output of channel 1 at terminal “1” and negative output at “2”.
For model D6072D 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.
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.
Any penetration of cleaning liquid must be avoided to prevent damage to the unit. Any unauthorized card modification must be avoided.
According to EN61010, D6072 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.
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.

Type:
- ☐ 4-20 mA Sink
- ☐ 0-20 mA Sink
- ☐ Custom Sink fully customizable range from 0 to 24 mA, Sink mode
- ☐ 4-20 mA Source
- ☐ 0-20 mA Source
- ☐ Custom Source fully customizable range from 0 to 24 mA, Source mode

Downscale: output downscale in normal condition (range 0 to 24 mA)

Upscale: output upscale in normal condition (range 0 to 24 mA)

Under Range: analog output downscale in Under Range condition (range 0 to 24 mA)

Over Range: analog output upscale in Over Range 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 Under Range or above Over Range,
- ☐ 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

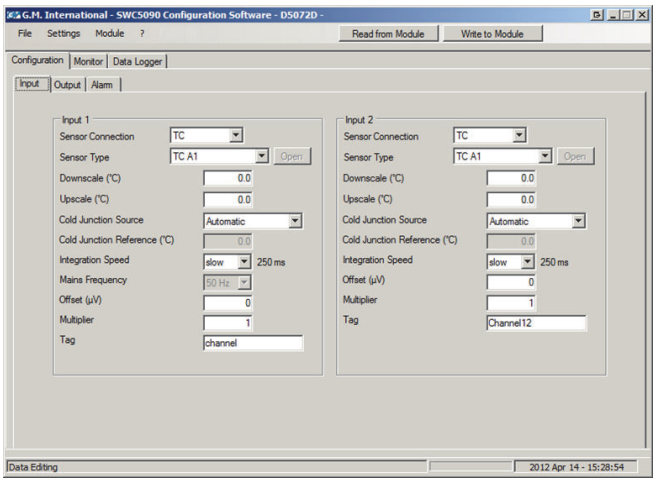
Off Delay: time for which the source variable has to be in normal condition before the alarm output is deactivated; configurable from 0 to 1000 seconds in steps of 100 ms

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

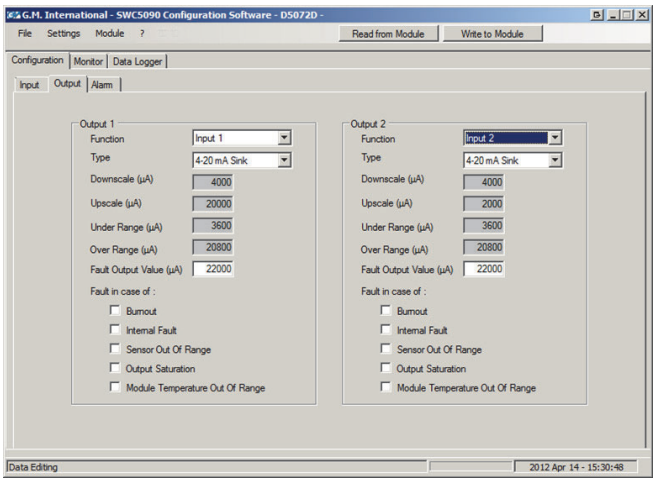
Faults: if "Type" is set to "Fault repeater" select which faults will be repeated by alarm output; if "In case of fault" is different from "Ignore", select which faults should influence alarm output behaviour.

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

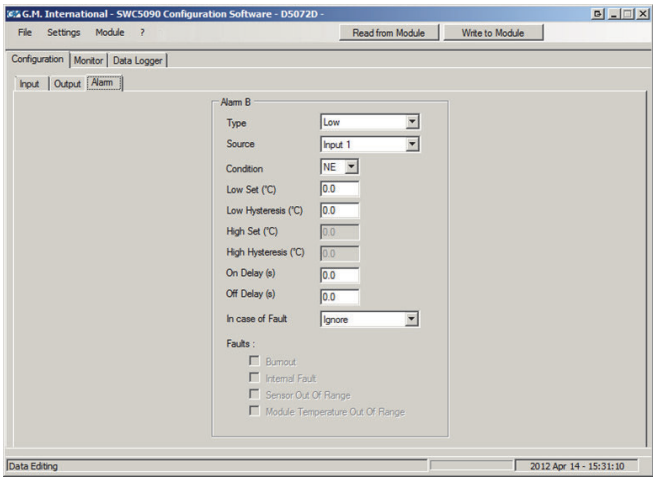
Screenshots:



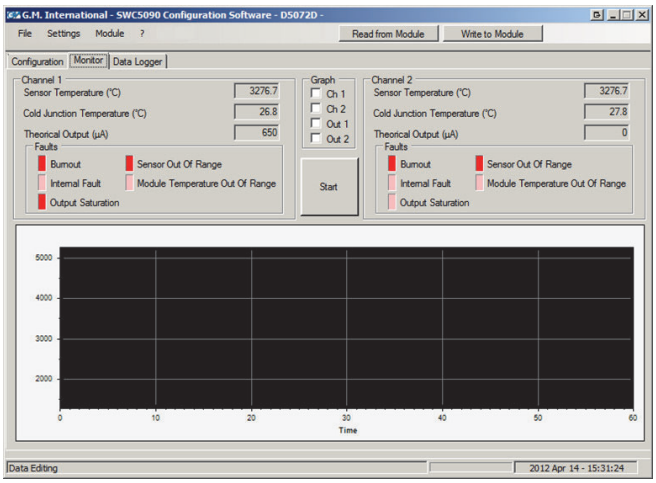
Input configuration



Output configuration



Alarm configuration



Monitor

Supported Modbus parameters:

The unit can communicate via Modbus RTU RS-485 protocol. Below is a list of all available registers.

Addr.	Description	Notes	Type(10)
0	G.M. Factory Code	Identification Data	R
1	Instrument Code		
2	Option Code		
3	Hardware Release		
4	Software Release		
16	Modbus Address	Communication Data	R/W
17	Modbus Baudrate (1)		
18	Modbus Format (1)		
71	Ch. 1 Measured Value (Low 16 bits)(5)	Input Data	R
72	Ch. 1 Measured Value (High 16 bits)(5)		
73	Ch. 1 Cold Junction value (2)		
74	Ch. 1 Input temperature (3) (8)		
75	Ch. 1 Fault status (1)		
76	Ch. 2 Measured Value (Low 16 bits) (5)		
77	Ch. 2 Measured Value (High 16 bits)(5)		
78	Ch. 2 Cold Junction value (2)		
79	Ch. 2 Input temperature (3) (8)		
80	Ch. 2 Fault status (1)		
116	Ch. 1 Input Configuration (1)	Input Configuration	R/W
117	Ch. 1 Sensor Type (1)		
118	Ch. 1 Fixed Cold junction temp. value (8)		
119	Ch. 1 Offset (Low 16 bits) (5)		
120	Ch. 1 Offset (High 16 bits) (5)		
121	Ch. 1 Multiplier		
122	Ch. 1 Divider		
123	Ch. 1 Downscale (Low 16 bits) (6)		
124	Ch. 1 Downscale (High 16 bits) (6)		
125	Ch. 1 Highscale (Low 16 bits) (6)		
126	Ch. 1 Highscale (High 16 bits) (6)		
127	Ch. 2 Input Configuration (1)		
128	Ch. 2 Sensor Type (1)		
129	Ch. 2 Fixed Cold junction temp. value (8)		
130	Ch. 2 Offset (Low 16 bits) (5)		
131	Ch. 2 Offset (High 16 bits) (5)		
132	Ch. 2 Multiplier		
133	Ch. 2 Divider		
134	Ch. 2 Downscale (Low 16 bits) (6)		
135	Ch. 2 Downscale (High 16 bits) (6)		
136	Ch. 2 Highscale (Low 16 bits) (6)		
137	Ch. 2 Highscale (High 16 bits) (6)		
138	Cold Junction source selection (1)		
160	Ch. 1 Output configuration (1)	Output Configuration	R/W
161	Ch. 1 Downscale (7)		
162	Ch. 1 Under Range (7)		
163	Ch. 1 Upscale (7)		
164	Ch. 1 Over Range (7)		
166	Ch. 1 Fault current (7)		
167	Ch. 2 Output configuration (1)		
168	Ch. 2 Downscale (7)		
169	Ch. 2 Under Range (7)		
170	Ch. 2 Upscale (7)		
171	Ch. 2 Over Range (7)		
173	Ch. 2 Fault current (7)		
253	Alarm B Configuration (1)	Alarm Control	R/W
254	Alarm B Fault Configuration (1)		
255	Alarm B Source (1)		
256	Alarm B Low Threshold (Low 16 bits) (6)		
257	Alarm B Low Threshold (High 16 bits) (6)		
258	Alarm B Low Hysteresis (Low 16 bits) (6)		
259	Alarm B Low Hysteresis (High 16 bits)(6)		
260	Alarm B High Threshold (Low 16 bits) (6)		
261	Alarm B High Threshold (High 16 bits)(6)		
262	Alarm B High Hysteresis (Low 16 bits)(6)		
263	Alarm B High Hysteresis (High 16 bits)(6)		
264	Alarm B Delay ON (9)		
265	Alarm B Delay OFF (9)		

Addr.	Description	Notes	Type(10)
464	Command execution (4)	Command	W
524	Ch. 1 Output Current Saturation Fault	Output data	R
525	Ch. 1 Theorical Output Current (7)		
526	Ch. 2 Output Current Saturation Fault		
527	Ch. 2 Theorical Output Current (7)		
533	Alarm B Status	Alarm data	R
556	Ch. 1 chars 0, 1	Tags	R/W
557	Ch. 1 chars 2, 3		
558	Ch. 1 chars 4, 5		
559	Ch. 1 chars 6, 7		
560	Ch. 1 chars 8, 9		
561	Ch. 1 chars 10, 11		
562	Ch. 1 chars 12, 13		
563	Ch. 1 chars 14, 15		
564	Ch. 2 chars 0, 1		
565	Ch. 2 chars 2, 3		
566	Ch. 2 chars 4, 5		
567	Ch. 2 chars 6, 7		
568	Ch. 2 chars 8, 9		
569	Ch. 2 chars 10, 11		
570	Ch. 2 chars 12, 13		
571	Ch. 2 chars 14, 15		

Supported modbus functions:

Code	Name	Notes
03	read holding registers	reads a stream of words from memory
04	read input registers	reads a stream of words from memory
08	diagnostics: subcode 0	returns query data
06	write single register	writes a word in memory
16	write multiple registers	writes a stream of words in memory

Notes:

Each Modbus parameter is described by one 16-bit word.
Commands related to Channel 2 are valid only for model D6072D

(1) See command details on next page.
(2) Returned value must be divided by 16 to obtain Temperature in ° Celsius.
(3) Value is valid only when Input source is Tc or RTD.
(4) All configurations must be confirmed via Addr. 464, see details on next page.
(5) Expressed in:
    µV when Input Connection is Tc or Voltage;
    mΩ when Input Connection is RTD or Resistance;
    ppm when Input Connection is Potentiometer.
(6) Expressed in:
    µV when Input Connection is Voltage;
    Tenths of °C when Input Connection is Tc or RTD;
    mΩ when Input Connection is Resistance;
    ppm when Input Connection is Potentiometer.
(7) Expressed in µA.
(8) Expressed in Tenths of ° Celsius.
(9) Expressed in Tenths of seconds.
(10) Parameter Type:
    R = read only,
    W = write only,
    R/W = read and write.

Modbus parameters details:

Address 17: Supported Modbus Baudrates

Index	Baudrate
0	4800
1	9600
2	19200
3	38400
4	57600
5	115200

Address 18: Supported Modbus Formats

High Byte								Low Byte							
Bit position															
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

Endianness 32 bit Data (0 = Little; 1 = Big)
Termination resistance (1 = enabled)
Supported Modbus Parity:
0 8 data bit, no parity, 1 stop bit
1 8 data bit, even parity, 1 stop bit
2 8 data bit, odd parity, 1 stop bit

Address 75 and 80: Input Fault status

High Byte								Low Byte							
Bit position															
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

Module temperature out of range
Internal communication fault
Input sensor out of range
Input sensor Burnout
Internal cold junction sensor fault

Address 116 and 127: Input Configuration

High Byte								Low Byte							
Bit position															
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

Mains supply freq. (0 = 50 Hz; 1 = 60 Hz)
Integration speed (0 = Slow; 1 = Fast)
Sensor connection:
0 Tc / Voltage (only SW revision 0)
1 RTD / Resistance 2-wires
2 RTD / Resistance 3-Wires
3 RTD / Resistance 4-Wires
4 Potentiometer
5 Tc / Voltage (only SW revision ≥ 1)

Address 117 and 128: Input Sensor Type

High Byte								Low Byte							
Bit position															
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

Available sensor types (see also page 8):

0	Tc A1	10	Tc R	20	Pt 1000 (IEC)	30	Ni 120 (DIN)
1	Tc A2	11	Tc S	21	Pt 100 (ANSI)	31	Cu 53 (GOST)
2	Tc A3	12	Tc T	22	Pt 46 (GOST)	32	Cu 50 (GOST)
3	Tc B	13	Tc U	23	Pt 50 (GOST)	33	Cu 100 (GOST)
4	Tc E	14	Pt 50 (IEC)	24	Pt 100 (GOST)	34	Cu 9.035
5	Tc J	15	Pt 100 (IEC)	25	Pt 200 (GOST)	35	Voltage
6	Tc K	16	Pt 200 (IEC)	26	Pt 300 (GOST)	36	Resistance
7	Tc L	17	Pt 300 (IEC)	27	Pt 400 (GOST)	37	Custom device
8	Tc Lr	18	Pt 400 (IEC)	28	Pt 500 (GOST)	38	Potentiometer
9	Tc N	19	Pt 500 (IEC)	29	Ni 100 (DIN)		

Address 242 and 255: Alarm Source

High Byte								Low Byte							
Bit position															
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

Alarm source:
0 Input 1
1 Input 2
2 In 1 + In 2
3 In 1 - In 2
4 Min (In 1, In 2)
5 Max (In 1, In 2)

Address 138: Cold Junction Source selection

High Byte								Low Byte							
Bit position															
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

All bits '0' for Automatic Internal CJC (SW rev.= 0)
Ch. 2 Automatic Internal CJC (SW rev. ≥ 1)
Ch. 1 Automatic Internal CJC (SW rev. ≥ 1)
Ch. 2 Cold Junction from RTD on Ch. 1
Ch. 1 Cold Junction from RTD on Ch. 2
Ch. 2 Fixed Cold Junction
Ch. 1 Fixed Cold Junction

Address 160 and 167: Output Configuration

High Byte								Low Byte							
Bit position															
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

Internal CJC Fault
Burnout
Output Saturation
Sensor out of range
Internal comm. fault
Out of temp. range
Output Source:
0 Input 1
1 Input 2
2 In 1 + In 2
3 In 1 - In 2
4 Min (In 1, In 2)
5 Max (In 1, In 2)
Out type:
0 Sink
1 Source

Address 240 and 253: Alarm Configuration

High Byte								Low Byte							
Bit position															
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

Alarm Condition:
0 NE
1 ND
Alarm Type:
0 None
1 Low
2 Low Lock
3 High
4 High Lock
5 Window
6 Flt repeat

Address 241 and 254: Alarm Fault Configuration

High Byte								Low Byte							
Bit position															
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

Out of temperature
Internal comm. fault
Sensor out of range
Burnout
Internal CJC fault
Configuration:
0 Ignore
1 Flt Lock
2 To ON
3 To OFF

Address 464: Various commands

High Byte								Low Byte							
Bit position															
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

1 Save Input/Output Configuration
2 Save Modbus configuration
8 Save Tags
9 Lock Alarms
10 Analog Output Sink/Source Switch