

INSTRUCTION MANUAL

SIL 2 Thermocouple/mV Repeater, DIN-Rail
Models D6072S-096, D6072D-096



Characteristics

General Description:

The single and dual channel Isolating Repeater D6072S-096 and D6072D-096 accepts a low level dc signal from millivolt or thermocouple sensor and repeats, with isolation, the signal to drive a load, suitable for applications requiring SIL 2 level (according to IEC 61508 ed.2) in safety related systems for high risk industries.

For D6072D-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.

Fault Detection:

D6072-096 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.



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 (D6072D-096), 30 mA (D6072S-096).

Power dissipation: 0.85 W for 2 channels D6072D-096, 0.6 W for 1 channel D6072S-096 with 24 V supply voltage.

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 μ V.

Input range: -10 to +100 mV.

Thermocouple burnout current: ≤ 50 μ A.

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.

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: $\leq \pm 10$ μ V.

Temperature influence: $\leq \pm 3$ μ V/°C, typical.

Output: Calibration and linearity accuracy: $\leq \pm 10$ μ V.

Temperature influence: $\leq \pm 3$ μ V/°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.

Max altitude: 2000 m a.s.l.

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

Safety Description:



ATEX: II 3G Ex ec IIC T4 Gc

IECEX: Ex ec IIC T4 Gc

UL: NI / I / 2 / ABCD / T4; **C-UL:** NI / I / 2 / ABCD / T4

Approvals:

BVS 20 ATEX E 059 X conforms to EN60079-0, EN60079-7.

IECEX BVS 20.0047X conforms to IEC60079-0, IEC60079-7.

UL & C-UL E222308 conforms to UL 61010-1 and UL 121201 for UL and CAN/CSA C22.2 No.61010-1-12 and CSA C22.2 No. 213 for C-UL.

TÜV Certificate No. C-IS-722160171, SIL 2 conforms to IEC61508:2010 Ed.2.

TÜV Certificate No. C-IS-236198-09, SIL 3 Functional Safety Certificate conforms to IEC61508:2010 Ed.2, for Management of Functional Safety.

Mounting:

EN/IEC60715 TH 35 DIN-Rail, with or without Power Bus.

Weight: about 135 g D6072D-096, 130 g D6072S-096.

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

Location: installation in Safe Area/Non Hazardous Locations or Zone 2, Group IIC T4 or Class I, Division 2, Group A,B,C,D, T4.

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.

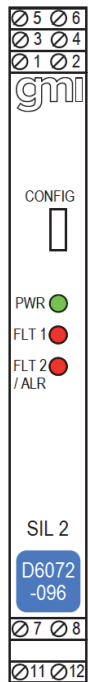
Ordering Information

Model:	D6072	-096
1 channel	S	
2 channels	D	

Power Bus and DIN-Rail accessories:
 Connector JDFT049
 Terminal block male MOR017

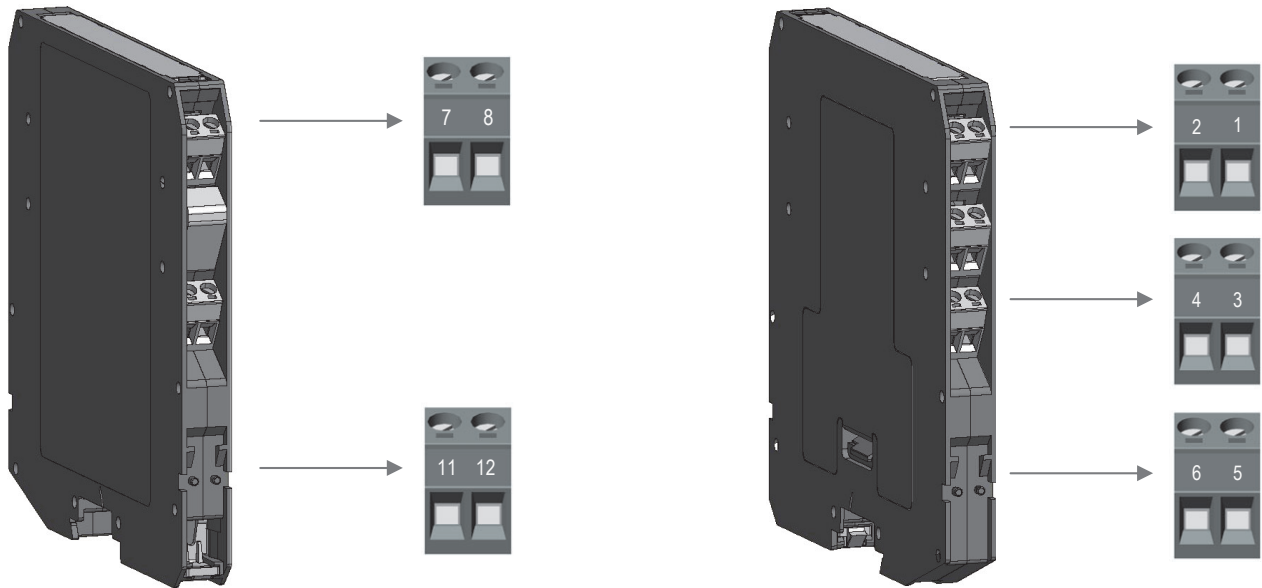
Cover and fix MCHP196
 Terminal block female MOR022

Front Panel and Features



- SIL 2 according to IEC 61508:2010 (Route 2H) with Tproof = 2 / 5 years ($\leq 10\%$ / $> 10\%$ of total SIF).
- SC 3: Systematic Capability SIL 3.
- Installation in Zone 2 / Division 2.
- mV or thermocouple Input Signal.
- Output duplication possible for D6072D-096.
- High Accuracy, μ P 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.
- ATEX, IECEx Certifications.
- UL & C-UL, TÜV Certifications.
- High Density, two channels per unit.
- Simplified installation using standard DIN-Rail and plug-in terminal blocks, with or without Power Bus.
- Data logging and monitoring via software.

Terminal block connections



7 +Input Ch1 for thermocouple TC or for millivolt source

8 -Input Ch1 for thermocouple TC or for millivolt source

11 +Input Ch2 for thermocouple TC or for millivolt source

12 -Input Ch2 for thermocouple TC or for millivolt source

1 +Output Ch1

2 -Output Ch1

3 +Output Ch2

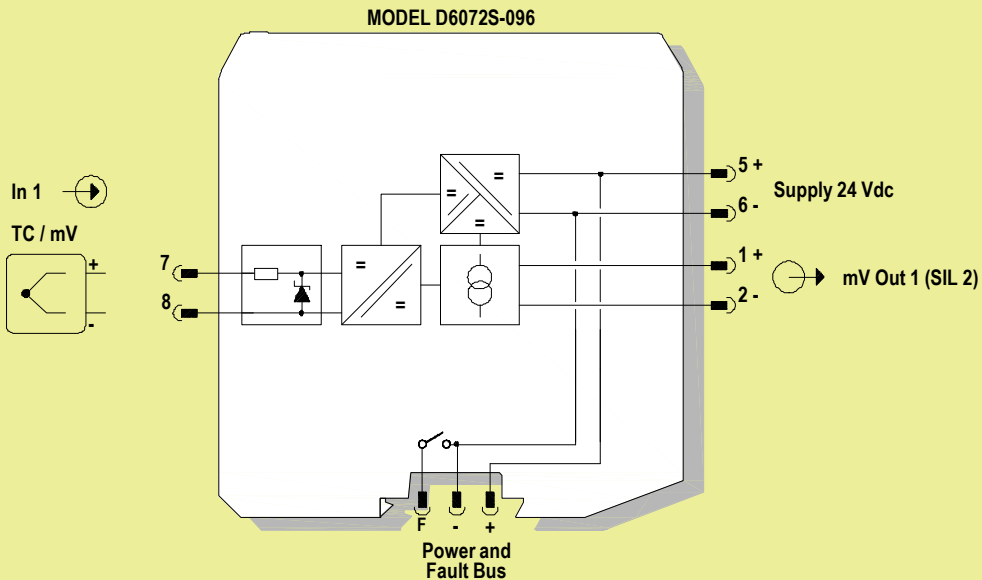
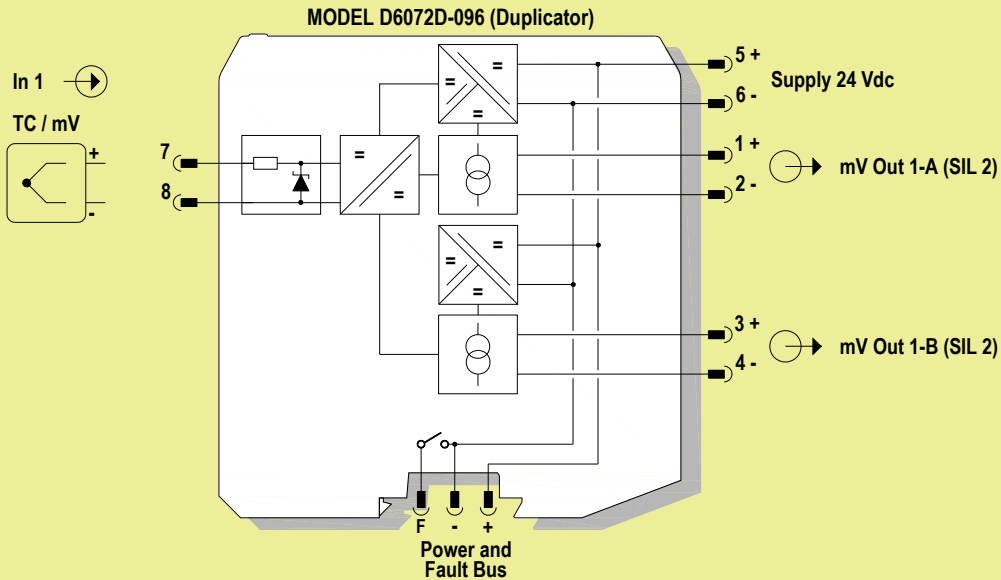
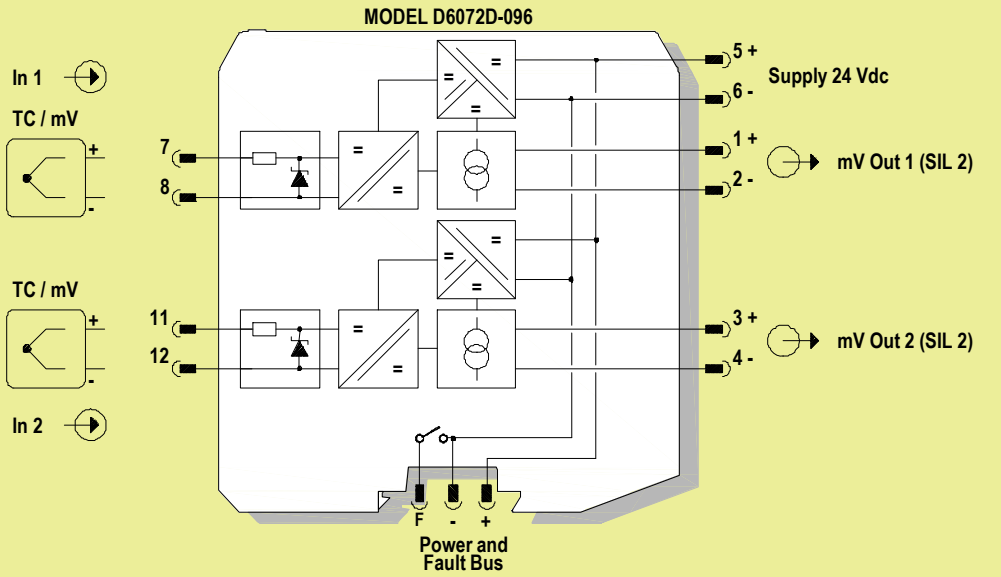
4 -Output Ch2

5 +Power Supply 24 Vdc

6 -Power Supply 24 Vdc

Function Diagram

SAFE AREA, ZONE 2 GROUP IIC T4,
NON HAZARDOUS LOCATIONS, CLASS I, DIVISION 2,
GROUPS A, B, C, D T-Code T4



Warning

D6072-096 series are isolated apparatus installed into standard EN/IEC60715 TH 35 DIN-Rail located in Safe Area/Non Hazardous Locations or Zone 2, Group IIC 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.

D6072-096 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. 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 suitability for Zone 2/ Division 2. Avertissement: la substitution des composants peut nuire à l'aptitude à la Zone 2/Div. 2. Explosion Hazard: to prevent ignition of flammable atmospheres, disconnect power before servicing or unless area is known to be nonhazardous. Danger d'Explosion: pour éviter l'inflammation d'atmosphères inflammables, débrancher l'alimentation avant l'entretien ou à moins que région est connue pour être non dangereuse.

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 D6072-096 accepts a low level dc signal from millivolt or thermocouple sensor and repeats, with isolation, the signal 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-096 module has double input and output channel, and can also be programmed to interface a single input and obtain dual output channel (duplicator)

Installation

D6072-096 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.

D6072-096 series can be mounted with any orientation over the entire ambient temperature range.

Electrical connection are accommodated by polarized plug-in removable screw terminal blocks which can be plugged in/out into a powered unit without suffering or causing any damage **(for Zone 2 installations check the area to be nonhazardous before servicing)**. Connect only one individual conductor per each clamping point, use conductors up to 2.5 mm² (13 AWG) and a torque value of 0.5-0.6 Nm. Use only cables that are suitable for a temperature of at least 85°C. The wiring cables have to be proportionate in base to the current and the length of the cable.

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

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

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 D6072-096 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.

D6072-096 series must be connected to SELV or SELV-E supplies.

All circuits connected to D6072-096 series must comply with the overvoltage category II (or better) according to EN/IEC60664-1.

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.

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 output.

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

Notes:

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