DSCP62 Configuration Guide

Thermocouple-to-DC Current/Voltage Converter with Relay Output

Description

Each DSCP62 Thermocouple Converter provides a single channel of thermocouple input which is amplified, linearized and converted to a high-level current or voltage output. Thermocouple type, measurement range, filter, output type and range, and fault indication may be configured by dip-switch. An auxiliary relay output is provided to generate an alarm or act as a thermostat. Power can be applied directly to the converter's terminals or through a DIN rail mounted bus connector accessory, eliminating the need to wire power to each individual converter.

Specifications

Typical at T_A=+25°C and +24VDC power

Module	DSCP62
Input (selectable)	
Thermocouple Type EN 60584-1	J, K, E, N, S, R, B, T Measurement range: Depends on thermocouple type and dip-switch setting Span: 100°C (min)
Input Impedance	10MΩ
Accuracy	±0.1% (max)
Cold Junction Error	1.5°C (max)
Thermal Drift	<120ppm/°K
A/D Conversion	14-bit
Processing	Floating point 32-bit
Response Time, 90% Span (selectable)	<25ms (without filter), <55ms (with filter)
CMRR	>135dB, referred to power supply side
Isolation	1500Vrms (1 minute), 3-Way
Dip-Switch Configuration	Sets input and output ranges, sensor type, filter and faults
Status Indicators (LED)	Internal fault, configuration error, connection fault
Output (selectable)	
Current	0 to 20, 4 to 20, 20 to 0 or 20 to 4mA Load resistance: 500Ω (max)
Current Output Protection	25mA (max)
Fault Output	102.5% or 105% of full-scale value in case of over-range
Voltage	0 to 5, 1 to 5, 0 to 10 or 10 to 0VDC Load resistance: 2kΩ (min)
Auxiliary Relay Output	Rated 60mA (max) at 24VAC
Power Supply	19.2 to 30VDC
Power Consumption	<600mW (24mA at 24VDC)
Hot Swapping	Yes
Environmental	
Operating Temp. Range	–20°C to +65°C
Storage Temp. Range	–40°C to +85°C
Relative Humidity	0 to 90%, Noncondensing
IP Protection	IP20
Emissions	EN61000-6-4
Immunity	EN61000-6-2
Mechanical Dimensions (w x h x d)	0.24" x 3.67" x 4.04" (6.2mm x 93.1mm x 102.5mm)
Housing	Terminal housing for mounting on 35mm DIN 46277
Connections	Spring cage clamp
Weight	1.6 ounces (46g)

Range and precision of the input			
Thermocouple	Range	Mean error	Resolution
J	–210 to 1200°C	0.025% + 0.29°C	0.12°C
K	–200 to 1372°C	0.025% + 0.4°C	0.17°C
E	–200 to 1000°C	0.025% + 0.2°C	0.92°C
N	–200 to 1300°C	0.025% + 0.42°C	0.19°C
S	–50 to 1768°C	0.025% + 1.34°C	0.66°C
R	–50 to 1768°C	0.025% + 1.19°C	0.59°C
B	250 to 1820°C *	0.025% + 1.87°C	0.9°C
T	–200 to 400°C	0.025% + 0.31°C	0.13°C

* Up to 250°C, the output is considered equivalent to 0°C.

Auxiliary Output

The auxiliary output is designed to drive an indicator, a relay of greater power, or the input of a supervisory control system. Through this output the DSCP62 module can generate an alarm or be utilized like a thermostat. The normal state of the output depends on the configuration for the fault of the primary output.

Setting the threshold

The regulation of the threshold is performed through a button located under the front cover of the module and accessible through the hole using a small screwdriver.

- Press and release the button. The primary output will start to represent the value of threshold and the red LED will flash slowly.
- If the button is not pressed again within 5 seconds, the system will return to standard functioning.
- Each time the button is pressed there is an increase or decrease of the primary output of approximately 0.2%; the direction of the variation depends on the configuration of the output.
- If the button is not released but continues to be pressed, a continuous 3% increase starts after 2 seconds.
- When the maximum/minimum value of the chosen scale is reached, the cycle starts again.
- During regulation of the threshold, the auxiliary output follows standard functioning, opening and closing as previously set.
- After 5 seconds of no button pressing, the set value is memorized and the module continues with standard functioning.

Dip-switch SW2.7 details

SW2.7	Regulation type	Fault	Standard state	Set threshold
OFF	Furnace *	Upscale	Closed (LED ON)	Decrease
ON	Refrigerator *	Downscale	Open (LED OFF)	Increase

* In case of choice of direct output: 0(4) to 20mA, 0(1) to 5(10)V

Installation rules

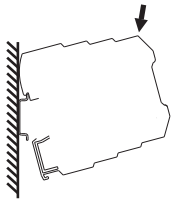
This module is designed for assembly on a DIN 46277 rail. Assembly in a vertical position is recommended to increase the module's ventilation. Be sure that no raceways or other objects that compromise aeration are positioned in the vicinity, and do not position the module above equipment that generates heat. We recommend positioning the module in the lower part of the control panel or container compartment. We also recommend rail-type assembly using the Power Bus connector, which eliminates the need to connect the power supply to each module.

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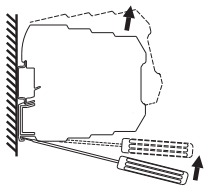
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Inserting module in DIN rail



1. Attach module in upper part of rail.
2. Press module downward.

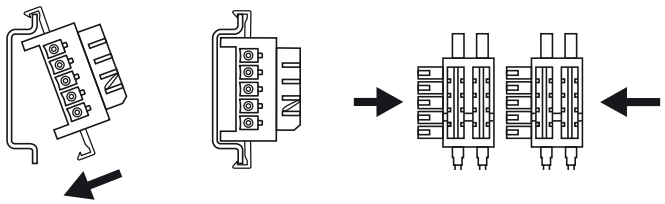
Extracting module from DIN rail



1. Apply leverage using a screwdriver (as shown in figure).
2. Rotate module upward.

Using the Power-Bus connector

Each expandable Power-Bus connector allows insertion of two modules. Insert Power-Bus connectors into the DIN rail by attaching to upper side of rail and rotating downward.



NOTE:
The Power-Bus must be inserted with protruding terminals on the left (as shown in figure above); otherwise the modules are turned upside down.

Never connect power supply directly to the bus connector on the DIN rail. Never tap power from the bus connector either directly or by using module terminals.

Factory dip-switch settings

The module leaves the factory with all dip-switches in the OFF position. The default configuration is as follows:

Thermocouple type	J
50/60Hz line rejection	50Hz
Input filter	Not enabled
Measurement range	0 to 1200°C
Output signal	4 to 20mA
Output signal in case of open input	Toward the top of the output range
Input over-range	Output signal is limited to +5% of max (or –5% of min) with input over-ranged
Auxiliary output threshold	0% of the nominal scale

This configuration is valid only with all dip-switches in the OFF position. If even one dip-switch is not in the OFF position, all parameters must be set as indicated in the following tables.

NOTE:
The indication • means the dip-switch is set in the ON position.
No indication means the dip-switch is set in the OFF position.

Thermocouple type				
SW1	1	2	3	
				J
	•			K
		•		R
	•	•		S
			•	T
	•		•	B
		•	•	E
	•	•	•	N

50/60Hz line rejection		
SW1	4	
	•	60Hz
		50Hz

Input filter				
SW1	5		10-90% response, 50Hz	10-90% response, 60Hz
	•	Enabled	<55ms	<55ms
		Not enabled	<25ms	<25ms

Measurement range start											
SW1	6	7	8	J type	K type	R type	S type	T type	B type	E type	N type
				Default *	0°C	0°C	0°C	0°C	0°C	0°C	0°C
	•			0°C	100°C	100°C	100°C	50°C	400°C	100°C	100°C
		•		100°C	200°C	200°C	200°C	100°C	500°C	200°C	200°C
	•	•		200°C	400°C	300°C	300°C	200°C	600°C	300°C	300°C
			•	300°C	600°C	400°C	400°C	–50°C	800°C	400°C	500°C
	•		•	500°C	800°C	600°C	600°C	–150°C	1000°C	500°C	700°C
		•	•	–100°C	–100°C	800°C	800°C	–100°C	1200°C	–100°C	–100°C
	•	•	•	–200°C	–200°C	1000°C	1000°C	–200°C	1400°C	–200°C	–200°C

* If all the dip-switches are in the OFF position, the default configuration is valid; otherwise the value of this parameter is 0°C, as for the other thermocouple types.

Measurement range end											
SW2	1	2	3	J type	K type	R type	S type	T type	B type	E type	N type
				1200°C	1350°C	1750°C	1750°C	400°C	1800°C	1000°C	1300°C
	•			1000°C	1200°C	1500°C	1500°C	350°C	1600°C	800°C	1200°C
		•		800°C	1000°C	1300°C	1300°C	300°C	1500°C	600°C	1000°C
	•	•		600°C	800°C	1100°C	1100°C	250°C	1300°C	500°C	800°C
			•	500°C	700°C	900°C	900°C	200°C	1100°C	400°C	600°C
	•		•	400°C	500°C	700°C	700°C	150°C	900°C	300°C	500°C
		•	•	300°C	300°C	500°C	500°C	100°C	700°C	200°C	400°C
	•	•	•	200°C	200°C	300°C	300°C	50°C	500°C	100°C	200°C

Output signal				
SW2	4	5	6	
				4 to 20mA
	•			0 to 20mA
		•		20 to 4mA
	•	•		20 to 0mA
			•	0 to 10V
	•		•	1 to 5V
		•	•	10 to 0V
	•	•	•	0 to 5V

Output signal in case of open input		
SW2	7	
	•	ON: Toward the bottom of the output range
		OFF: Toward the top of the output range

Over-range / Under-range Options (See table below for corresponding values)		
SW2	8	
	•	ON: Output signal is limited to ±2.5% of full-scale setting with input over- / under-ranged
		OFF: Output signal is limited to ±5% of full-scale setting with input over- / under-ranged

Nominal output value	Over- / Under-range limited to ±2.5% of full-scale setting	Over- / Under-range limited to ±5% of full-scale setting
20mA	20.5mA	21mA
4mA	3.5mA	3mA
0mA	0mA	0mA
10VDC	10.25VDC	10.5VDC
5VDC	5.125VDC	5.25VDC
1VDC	0.875VDC	0.75VDC
0VDC	0VDC	0VDC

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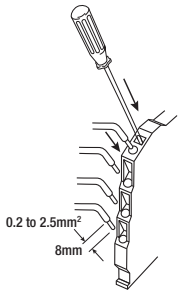
LED indications on front of module

Red LED	Meaning	Output fault
Fast flashing	Internal fault: power supply not sufficient, out of range offset or reference. Error on reading or writing in flash (at the start or on threshold setting).	Yes
Slow flashing	Dip-switch setting error	Yes
	Set threshold in progress	No *
Steady light	Disconnected thermocouple, out of range input or temperature compensation	Yes
	Output limiting in progress	No

* In this modality the output signal represents the value of the threshold.

Yellow LED	Meaning
ON	The auxiliary output is closed
OFF	The auxiliary output is open

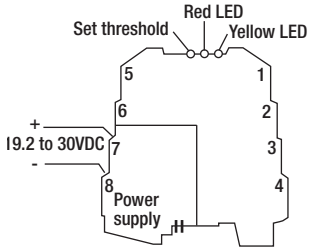
Electrical connections



The module is designed for spring cage clamp electrical connections.

1. Strip cables by 0.8mm.
2. Insert screwdriver in the square hole and press until the cable lock spring opens.
3. Insert cable in the round hole.
4. Remove screwdriver and ensure cable is tightly fastened in the terminal.

Power supply



There are three ways to power the DSCP6x series of signal converters.

1. Connect the 24VDC power supply directly to terminals 7 (+) and 8 (-) of each module.

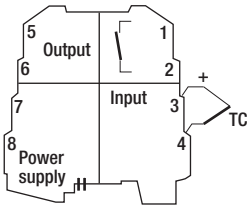
2. Connect power to one signal converter and use the expandable Power-Bus connector to distribute power to a maximum of 16 adjacent modules. The bus can be supplied from any of the modules, but the total current consumption of the bus must be less than 400mA. Higher consumption values can damage the module. An appropriately sized fuse must be connected in series with the power supply.

3. Use the DSCP70 Power Supply Connection Module and the expandable Power-Bus connector to distribute power to a maximum of 75 modules. The DSCP70 is designed to protect the modules connected via bus against overvoltage loads. The bus connector can be provided with power using the DSCP70 module if the total consumption of the bus is less than 1.5A. Higher consumption values can damage both the module and the bus. An appropriately sized fuse must be connected in series with the power supply.

Input

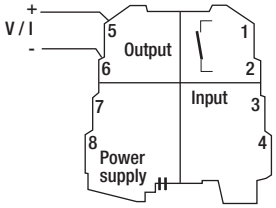
The module accepts input from the following types of thermocouples: J, K, R, S, T, B, E, N.

The use of shielded cables is recommended for the electronic connections



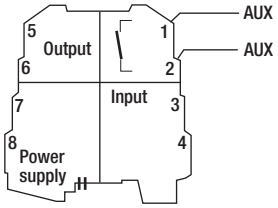
Output: Voltage / Current connections

The use of shielded cables is recommended for the electronic connections.



Auxiliary output

The auxiliary output is designed to drive an indicator, a relay of greater power, or the input of a supervisory control system.



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