

# DSCP61 Configuration Guide

## Pt100-to-DC Current/Voltage Converter

### Description

Each DSCP61 RTD Pt100 Converter provides a single channel of RTD input which is amplified, linearized and converted to a high-level current or voltage output. Inputs may be connected by 2, 3, or 4 wires and measurement range may be configured by dip-switch to cover a range of -150°C to +650°C. 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.

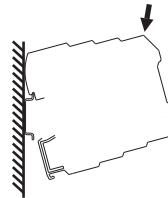
### Specifications Typical at T<sub>A</sub>=+25°C and +24VDC power

| Module  | DSCP61   |
|---|--|
| Input (selectable)<br>Pt100 Probe<br>EN 60751 | Accepts 2-, 3-, or 4-wire RTDs<br>Sensor current: <900µA<br>Cable resistance: 20Ω per wire (max)<br>Measurement range: -150°C to +650°C (settable)<br>Span: 50°C (min)<br>Input voltage: 32VDC (max) |
| Accuracy                                      | ±0.1% (max)  |
| Thermal Drift                                 | <100ppm/°K   |
| A/D Conversion                                | 14-bit   |
| Processing                                    | Floating point 32-bit  |
| Response Time, 90% Span (selectable)          | <50ms (without filter), <200ms (with filter)   |
| 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<br>Load resistance: 500Ω (max)  |
| Current Output Maximum                        | 25mA   |
| 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<br>Load resistance: 2kΩ (min)  |
| Power Supply                                  | 19.2 to 30VDC  |
| Power Consumption                             | 500mW (21mA 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"<br>(6.2mm x 93.1mm x 102.5mm)  |
| Housing                                       | Terminal housing for mounting on 35mm DIN 46277  |
| Connections                                   | Spring cage clamp  |
| Weight  | 1.8 ounces (50g)   |

### Installation rules

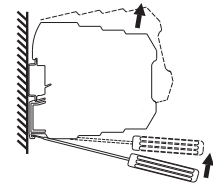
This module is designed for assembly on a DIN 46277 rail. Assembly in a vertical position is recommended to increase the module's ventilation. Be sure that no raceways or other objects that compromise aeration are positioned in the vicinity, and do not position the module above equipment that generates 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.

### Inserting module in DIN rail



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

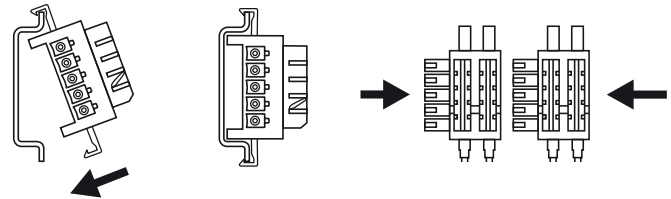
### Extracting module from DIN rail



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:

|                                     |   |
|-------------------------------------|---|
| Pt100 wiring                        | 3 wires   |
| Input filter                        | Enabled   |
| Output signal                       | 4 to 20mA   |
| Measurement range start             | 0°C   |
| Measurement full-scale              | 0°C   |
| 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 |

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.

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**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.

| Pt100 wiring |             |
|--------------|-------------|
| SW1          | 1           |
|              | ● 2-/4-wire |
|              | 3-wire      |

| Input filter |   |               |                       |
|--------------|---|---------------|-----------------------|
| SW1          | 2 |               | 10-90% response, 50Hz |
|              |   | ● Not enabled | <200ms                |
|              |   | Enabled       | <50ms                 |
|              |   |               | 10-90% response, 60Hz |
|              |   |               | <200ms                |
|              |   |               | <50ms                 |

| Output signal |   |   |   |            |
|---------------|---|---|---|------------|
| SW1           | 3 | 4 | 5 |            |
|               |   |   |   | 4 to 20mA  |
|               |   |   | ● | 0 to 20mA  |
|               |   | ● |   | 20 to 4mA  |
|               | ● | ● |   | 20 to 0mA  |
|               |   |   | ● | 0 to 10VDC |
|               |   | ● | ● | 10 to 0VDC |
|               | ● | ● |   | 0 to 5VDC  |
|               | ● |   | ● | 1 to 5VDC  |

| Measurement range start |   |   |   |      |
|-------------------------|---|---|---|------|
| SW1                     | 6 | 7 | 8 | °C   |
|                         |   |   |   | 0    |
|                         |   |   | ● | -10  |
|                         |   | ● |   | -20  |
|                         | ● | ● |   | -30  |
|                         |   |   | ● | -40  |
|                         | ● | ● |   | -50  |
|                         |   | ● | ● | -100 |
|                         | ● | ● | ● | -150 |

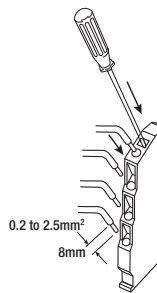
| Measurement full scale |   |   |   |   |   |   |     |     |   |   |   |   |   |   |     |     |   |   |   |   |   |   |    |     |
|------------------------|---|---|---|---|---|---|-----|-----|---|---|---|---|---|---|-----|-----|---|---|---|---|---|---|----|-----|
| SW2                    | 1 | 2 | 3 | 4 | 5 | 6 | °C  | SW2 | 1 | 2 | 3 | 4 | 5 | 6 | °C  | SW2 | 1 | 2 | 3 | 4 | 5 | 6 | °C |     |
|                        |   |   |   |   |   |   | 0   |     |   |   |   |   |   |   | 120 |     |   |   |   |   |   |   |    | 340 |
|                        |   |   |   |   |   |   | 5   |     | ● | ● | ● |   |   |   | 130 |     | ● | ● | ● |   |   |   |    | 350 |
|                        |   |   |   |   |   |   | 10  |     | ● | ● | ● | ● |   |   | 140 |     | ● | ● | ● | ● |   |   |    | 360 |
|                        |   |   |   |   |   |   | 15  |     |   |   |   |   |   |   | 150 |     | ● | ● | ● | ● |   |   |    | 370 |
|                        |   |   |   |   |   |   | 20  |     |   |   |   |   |   |   | 160 |     |   |   |   |   | ● |   |    | 380 |
|                        |   |   |   |   |   |   | 25  |     | ● | ● |   |   |   |   | 170 |     | ● |   |   |   | ● |   |    | 390 |
|                        |   |   |   |   |   |   | 30  |     | ● | ● | ● |   |   |   | 180 |     | ● |   |   |   | ● | ● |    | 400 |
|                        |   |   |   |   |   |   | 35  |     | ● | ● | ● | ● |   |   | 190 |     | ● | ● |   |   | ● | ● |    | 410 |
|                        |   |   |   |   |   |   | 40  |     |   |   |   |   |   |   | 200 |     |   | ● |   |   | ● | ● |    | 420 |
|                        |   |   |   |   |   |   | 45  |     | ● | ● | ● | ● |   |   | 210 |     | ● | ● |   |   | ● | ● |    | 430 |
|                        |   |   |   |   |   |   | 50  |     |   |   |   |   |   |   | 220 |     |   | ● | ● |   | ● | ● |    | 440 |
|                        |   |   |   |   |   |   | 55  |     | ● |   |   |   |   |   | 230 |     | ● | ● |   |   | ● | ● |    | 450 |
|                        |   |   |   |   |   |   | 60  |     |   | ● |   |   |   |   | 240 |     |   |   |   |   | ● | ● |    | 480 |
|                        |   |   |   |   |   |   | 65  |     | ● | ● |   |   |   |   | 250 |     | ● |   |   |   | ● | ● |    | 500 |
|                        |   |   |   |   |   |   | 70  |     |   |   | ● |   |   |   | 260 |     |   | ● |   |   | ● | ● |    | 520 |
|                        |   |   |   |   |   |   | 75  |     | ● | ● | ● |   |   |   | 270 |     | ● | ● | ● |   | ● | ● |    | 550 |
|                        |   |   |   |   |   |   | 80  |     |   |   |   |   |   |   | 280 |     |   | ● | ● |   | ● | ● |    | 580 |
|                        |   |   |   |   |   |   | 85  |     | ● | ● | ● |   |   |   | 290 |     | ● | ● | ● |   | ● | ● |    | 600 |
|                        |   |   |   |   |   |   | 90  |     |   |   |   |   |   |   | 300 |     |   |   |   |   | ● | ● |    | 620 |
|                        |   |   |   |   |   |   | 95  |     | ● | ● | ● |   |   |   | 310 |     | ● | ● | ● |   | ● | ● |    | 650 |
|                        |   |   |   |   |   |   | 100 |     |   |   |   |   |   |   | 320 |     |   | ● | ● |   |   |   |    |     |
|                        |   |   |   |   |   |   | 110 |     | ● | ● | ● |   |   |   | 330 |     |   |   |   |   |   |   |    |     |

| 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<br>(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   |

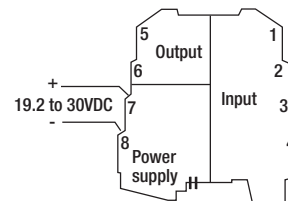
**Electrical connections**



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.

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## Input

The module accepts input from a Pt100 temperature probe (EN 60751) with 2-, 3-, or 4-wire connection.

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

## 2-wire connection

Use this connection for short distances (<10m) between module and probe, remembering that it adds an error to the measurement equivalent to the resistance added by the connection cables.

Set dip-switch SW1-1 in the ON position (2 / 4 wires) with bridges between terminals 1 and 2 and terminals 3 and 4.

## 3-wire connection

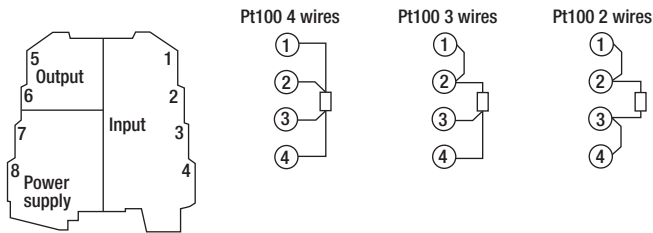
Use this connection for medium distances (>10m, <15m) between module and probe. The module compensates for the resistance added by the connection cables. However, the resistance values of all cables must be equal for the compensation to be correct because the module measures the resistance of only one cable and assumes the resistance value of the others is the same.

Set dip-switch SW1-1 in the OFF position (3 wires) with a bridge between terminals 3 and 4.

## 4-wire connection

Use this connection for long distances (>15m) between module and probe. It provides the maximum precision because the module measures the resistance of the sensor independently of the resistance of the connection cables.

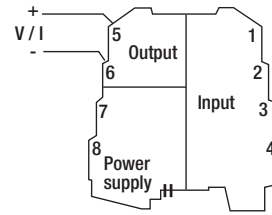
Set dip-switch SW1-1 in the ON position (2 / 4 wires).



**NOTE:** The module measures the value of the Pt100 by using pulsed excitation current to reduce module power consumption. For this reason, some electronic calibrators may not be able to generate the correct simulated signal.

## Output: Voltage / Current connections

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



**NOTE:** To reduce power dissipation, load must be  $\geq 250\Omega$  for current output option.

## LED indications on front of module

| LED                          | Meaning   |
|------------------------------|---|
| Rapid flashing, 3 pulses/sec | Internal fault  |
| Slow flashing, 1 pulse/sec   | Dip-switch setting error  |
| Steady light                 | Pt100 connection wire fault<br>3rd wire resistance out of range |

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