



DRG-SC-RTD RTD Input, Field Configurable Isolator

Instruction Sheet M2400/0796

DESCRIPTION

The DRG-SC-RTD is a DIN rail mount, RTD input signal conditioner with 1800VDC isolation between input, output and power. The field configurable input and output offers flexible, wide ranging capability for Platinum and Copper RTDs.

The input of the DRG-SC-RTD can be configured for any one of up to sixteen temperature ranges (see Tables 1 & 2). The output is linear to the RTD temperature input and can be set for either 0-5V, 0-10V, 0-1mA, 0-20mA or 4-20mA.

Wide ranging, precision zero and span pots allow 50% adjustability of offset and span turn-down within each of the sixteen switch selectable ranges. For example, the 0-100°C range could be offset and turned down to provide a 4-20mA signal representing 0-50°C (or 50-100°C).

APPLICATION

The DRG-SC-RTD field configurable RTD input isolator is useful in eliminating ground loops and interfacing RTD sensors to data acquisition and control systems.

Three way isolation completely eliminates ground loops from any source. Isolation protects expensive SCADA systems from ground faults and significantly reduces the effect of high common mode voltages which are prevalent in many RTD applications.

The constant current RTD excitation circuitry uses the third lead of the RTD to sense and compensate for the RTD lead resistance, resulting in an accurate RTD temperature measurement.

High density DIN rail mounting offers an extremely compact solution for saving valuable panel space.

DIAGNOSTIC LED

The DRG-SC-RTD is equipped with a dual function LED signal monitor. The green, front mounted LED indicates both DC power and input signal status. Active DC power is indicated by an illuminated LED. If the input signal is more than 110% of the full scale range, the LED will flash at 8Hz. Below 0%, the flash rate is 4Hz.

CONFIGURATION

A major advantage of the DRG-SC-RTD is its wide ranging capabilities and ease of configuration. The DRG-SC-RTD has 16 input temperature range settings, six RTD type settings and five output range settings. Trim potentiometers allow 50% input zero and span adjustability within each of the 16 full scale input ranges.

Unless otherwise specified, the factory presets the Model DRG-SC-RTD as follows:

Input: Pt100Ω
Range: -200 to 600°C
Output: 4-20mA

The DC power input accepts any DC source between 9 and 30V; typically a 12V or 24VDC source is used.

For other I/O ranges, refer to Tables 1 through 6 and reconfigure switches SW1, SW2 and SW3 for the desired input type, range and output.

WARNING: Do not attempt to change any switch settings with power applied. Severe damage will result!

1. Choose the desired temperature range from table 1 or 2 depending on RTD type.

2. With DC power off, position input switches 1 through 5 on "SW2" for the desired temperature range (Table 3).

3. Set position 6 through 8 of input range switch "SW2" for the desired RTD type (Table 4).

4. Set position 1 through 8 of excitation switch "SW3" for the desired RTD type (Table 5).

5. Set position 1 through 8 of output range switch "SW1" for the desired output signal (Table 6).

CALIBRATION

1. After configuring the dip switches, connect the input to a calibrated RTD source or decade resistance box. Connect the output to the actual device load (or a load approximately equivalent to the actual device load value) and apply power.

Note: To maximize thermal stability, final calibration should be performed in the operating installation, allowing approximately 1 to 2 hours for warm up and thermal equilibrium of the system.

2. Set the calibrator to the desired minimum temperature and adjust the zero potentiometer for the desired minimum output.

3. Set the calibrator to the desired maximum temperature and adjust the span potentiometer for the desired maximum output.

4. Repeat steps 2 and 3, as necessary for best accuracy.

Table 1: DRG-SC-RTD Platinum RTD Temperature Ranges

Pt 100, Pt 500, Pt 1000		Range
-200 to 600°C	-328 to 1112°F	1
-200 to 400°C	-328 to 752°F	2
-100 to 400°C	-148 to 752°F	3
-200 to 260°C	-328 to 500°F	4
-200 to 0°C	-328 to 32°F	5
-200 to -100 °C	-328 to -148°F	6
-100 to 260°C	-148 to 500°F	7
-100 to 100°C	-148 to 212°F	8
-50 to 50°C	-58 to 122°F	9
-18 to 50°C	0 to 122°F	10
-18 to 100°C	0 to 212°F	11
-18 to 260°C	0 to 500°F	12
-18 to 300°C	0 to 572°F	13
-18 to 400°C	0 to 752°F	14
-18 to 500°C	0 to 932°F	15
-18 to 600°C	0 to 1112°F	16

Table 2: DRG-SC-RTD Copper RTD Temperature Ranges

Cu 10, Cu 25, Cu 100		Range
-200 to 260°C	-328 to 500°F	4
-200 to 0°C	-328 to 32°F	5
-200 to -100°C	-328 to -148°F	6
-100 to 260°C	-148 to 500°F	7
-100 to 100°C	-148 to 212°F	8
-50 to 50°C	-58 to 122°F	9
-18 to 50°C	0 to 122°F	10
-18 to 100°C	0 to 212°F	11
-18 to 260°C	0 to 500°F	12

Table 3: Temperature Input Range Switch Settings (SW2 - 1 through 5)

Range	SW2				
	1	2	3	4	5
1	■	■	■	■	■
2	■	■	■	■	■
3	■	■	■	■	■
4	■	■	■	■	■
5	■	■	■	■	■
6	■	■	■	■	■
7	■	■	■	■	■
8	■	■	■	■	■
9	■	■	■	■	■
10	■	■	■	■	■
11	■	■	■	■	■
12	■	■	■	■	■
13	■	■	■	■	■
14	■	■	■	■	■
15	■	■	■	■	■
16	■	■	■	■	■

SW2-1: Has no function

Table 4: RTD Input Type Switch Settings (SW2 - 6 through 8)

	SW2		
	6	7	8
Pt 100	■	■	■
Pt 500	■	■	■
Pt 1000	■	■	■
Cu 10	■	■	■
Cu 25	■	■	■
Cu 100	■	■	■

KEY ■ = ON

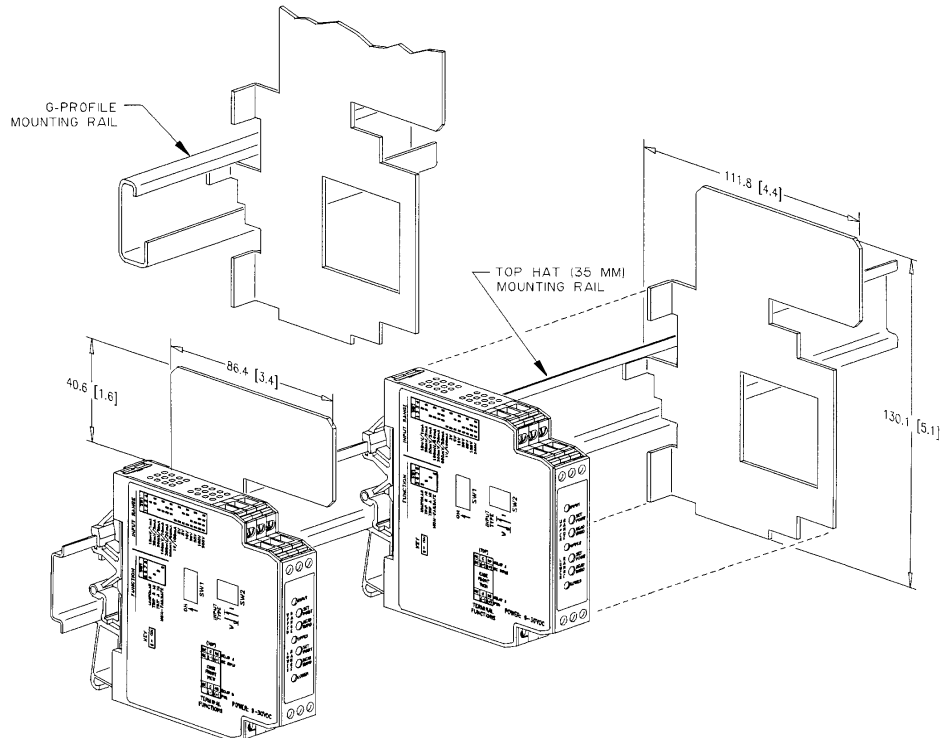
Table 5: Excitation Type Switch Settings (SW3 - 1 through 8)

	SW3							
	1	2	3	4	5	6	7	8
Pt 100, Cu 100	■	■	■	■	■	■	■	■
Pt 500	■	■	■	■	■	■	■	■
Pt 1000	■	■	■	■	■	■	■	■
Cu 10	■	■	■	■	■	■	■	■
Cu 25	■	■	■	■	■	■	■	■

SW3-8: Has no function

Table 6: Output Switch Settings (SW1 - 1 through 8)

	SW1							
	1	2	3	4	5	6	7	8
0-5V	■	■	■	■	■	■	■	■
0-10V	■	■	■	■	■	■	■	■
0-1mA	■	■	■	■	■	■	■	■
4-20mA	■	■	■	■	■	■	■	■
0-20mA	■	■	■	■	■	■	■	■



Note 1: All modules are designed and tested to operate in ambient temperatures from 0 to 55° C, when mounted on a horizontal DIN rail. When five or more modules are mounted on a vertical rail, circulating air or model DRG-HS01 Heat Sink is recommended.

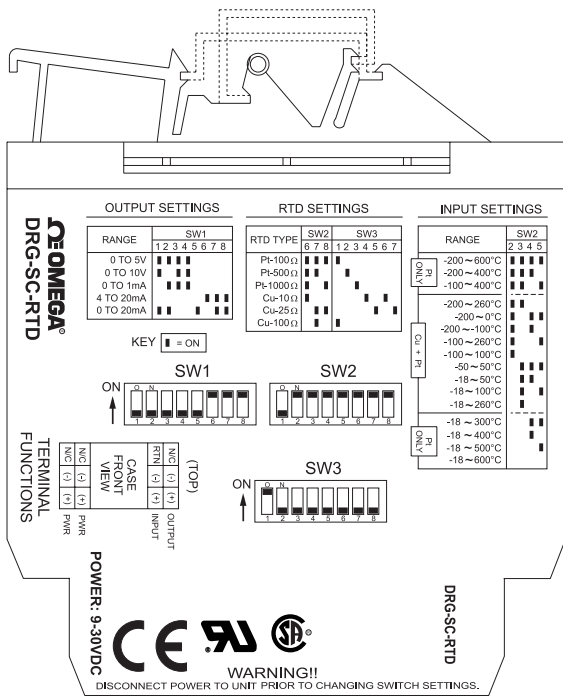


Figure 1: DGR-SC-RTD Factory Calibration:
-200 to 600°C (Pt 100) input; 4-20mA output

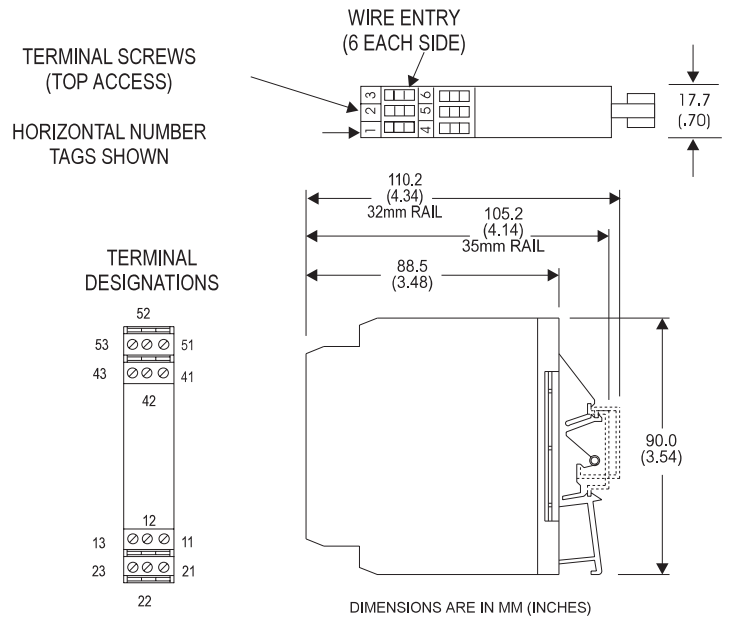


Figure 2: Mechanical Dimensions for DGR-SC-RTD

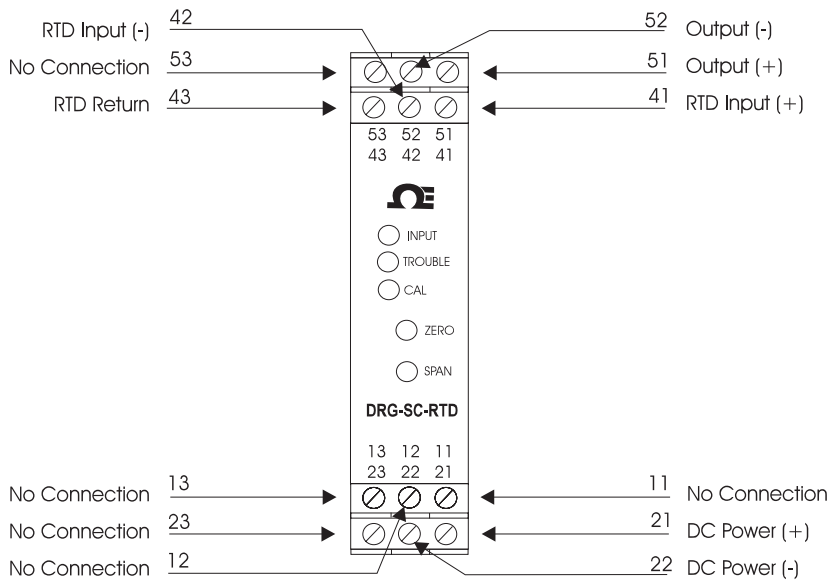


Figure 3: Wiring Diagram for DGR-SC-RTD

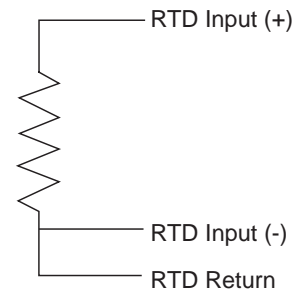


Figure 4: RTD Reference Designations

SPECIFICATIONS

Input

Sensor Types: Pt100, Pt500,
Pt1000 (α : 0.00385 $\Omega/\Omega/^\circ\text{C}$
or 0.00392 $\Omega/\Omega/^\circ\text{C}$);
Cu10, Cu25, Cu100.

Sensor Connection: 3-wire.
Input Ranges: see table 1.
Common Mode(Input to Ground):
1800VDC, max.

Zero Turn-Up: 50% of full scale
range

Span Turn-Down: 50% of full
scale range

Excitation Current

<2mA for Pt100, Pt500, Pt1000;
<5mA for Cu100;
<10mA for Cu10, Cu25.

Leadwire Resistance

40% of base sensor resistance or
100 Ω (whichever is less), max per
lead.

Leadwire Effect

Less than 1% of the maximum
input temperature span

Output

Voltage Output

Output: 0-5V, 0-10V
Source Impedance: <10 Ω
Drive: 10mA, max.
(1K Ω , min @10V)

Current Output

Output: 0-1mA, 0-20mA,
4-20mA
Source Impedance: >100K Ω

Compliance:

0-1mA; 7.5V, max.(7.5K Ω)
0-20mA; 12V, max.(600 Ω)
4-20mA; 12V, max.(600 Ω)

LED Indication (green)

Input Range (approx.)
>110% input; 8Hz flash
<0% input: 4Hz flash
CAL LED "ON" = OK

Accuracy (Including Linearity, Hysteresis)

$\pm 0.1\%$ typical, $\pm 0.2\%$ max. of the
maximum input temperature
range configurable for the RTD
type; @ 25 $^\circ\text{C}$ ambient and 0 Ω
lead resistance.

Stability

$\pm 0.015\%$ of the max. input
temperature range for the RTD
type per $^\circ\text{C}$ change in ambient
temperature, max.

Response Time (10 to 90%)

200mSec., typical.

Common Mode Rejection

DC to 60Hz: 120dB

Isolation

1800VDC between input, output
and power.

EMC Compliance (CE Mark)

Emmissions: EN50081-1
Immunity: EN50082-2
Safety: EN50178

Humidity (Non-Condensing)

Operating: 15 to 95% (@ 45 $^\circ\text{C}$)
Soak: 90% for 24 hours(@ 65 $^\circ\text{C}$)

Temperature Range¹

Operating: 0 to 55 $^\circ\text{C}$ (32 to 131 $^\circ\text{F}$)
Storage: -25 to 70 $^\circ\text{C}$ (-13 to 158 $^\circ\text{F}$)

Wire Terminations

Screw terminals for 12-22 AWG

Power

Consumption: 1.5W typical,
2.5 W Max.

Range: 9-30VDC

Agency Approvals

CSA certified per standard C22.2, No.
0-M91 and 142-M1987 (File No.
LR42272). UL recognized per stan-
dard UL508 (File No.E99775). CE
Conformance per EMC directive 89/
336/EEC and low voltage 73/23/EEC.

Mounting

32mm or 35mm DIN rail

PIN CONNECTIONS

- 11 No Internal Connection
- 12 No Internal Connection
- 13 No Internal Connection
- 21 DCPower (+)
- 22 DC Power (-)
- 23 No Internal Connection
- 41 RTD Input (+)
- 42 RTD Input (-)
- 43 RTD Return
- 51 Output (+)
- 52 Output (-)
- 53 No Internal Connection



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