DRG-AR-RTD
RTD Input, Field Configurable Limit Alarm
Instruction Sheet M2395/0796

DESCRIPTION
The DRG-AR-RTD is a DIN rail mount, RTD input limit alarm with dual setpoints and two contact closure outputs. The field configurable input and alarm functions offer flexible setpoint capability. There are up to eight temperature ranges available for each RTD type to ensure accuracy and maximize setpoint resolution.

The DRG-AR-RTD is configurable as a single or dual setpoint alarm, with HI or LO trips and failsafe or non-failsafe operation. Also included are adjustable deadbands (1.0 to 5% of full scale input) for each setpoint and a flexible DC power supply which accepts any voltage between 9 and 30VDC.

DIAGNOSTIC LEDS
The DRG-AR-RTD is equipped with three front panel LEDs. The first is a dual function LED labeled INPUT. This green LED indicates line power and input signal status. Active DC power is indicated by an illuminated LED. If this LED is off, check DC power and wiring connection. If the input signal is more than 110% of full scale, the LED will flash at 8 Hz. Below 0%, the flash rate is 4 Hz.

Two red LED's indicate the relay state for each setpoint. An illuminated red LED indicates the tripped condition.

OUTPUT
The DRG-AR-RTD is equipped with two SPDT (form C) relays, rated at 120VAC or 28VDC at 5 amperes. Each of these relays is independently controlled by the field configurable setpoint and deadband.

OPERATION
The field configurable DRG-AR-RTD limit alarm setpoints can be configured for HI or LO, failsafe or non-failsafe operation. Each of the setpoints has a respective HI or LO deadband. In a tripped condition, the setpoint is exceeded and the appropriate red LED will illuminate. The trip will reset only when the process falls below the HI deadband or rises above the LO deadband (see Figure 1). For proper deadband operation, the HI setpoint must always be set above the LO setpoint.

In failsafe operation, the relay is energized when the process is below the HI setpoint or above the LO setpoint (opposite for non-failsafe). In the failsafe mode, a power failure results in an alarm state output.

DYNAMIC DEADBAND
LSI circuitry in the DRG-AR-RTD prevents false trips by repeatedly sampling the input. The input must remain beyond the setpoint for 100 milliseconds, uninterrupted, to qualify as a valid trip condition. Likewise, the input must fall outside the deadband and remain there for 100 milliseconds to return the alarm to an untripped condition. This effectively results in a "dynamic deadband" — based on time— in addition to the normal deadband.

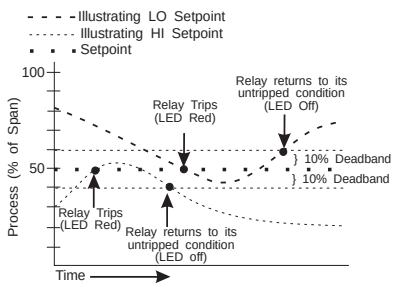


Figure 1: Limit alarm operation and effect of deadband(s).

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

Input:	Platinum (100Ω)
Range:	0 to 250°C
Output:	Dual, SPDT
Trip:	A:HI, B:LO
Failsafe:	No
Deadband:	A, B: 1.0%

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 3 and reconfigure switches SW1 and SW2 for the desired input type, range and function.

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

Input

1. With DC power off, position input switches 1 through 6 on "SW2" for RTD type (see Table 1).

2. Set position 1 through position 4 of input range switch "SW1" for the desired RTD type and input temperature range (Table 3).

3. Set position 5 and 6 of input range switch "SW1" to ON for a HI trip setpoint or OFF for a LO trip setpoint (Figure 4).

4. Set position 7 of input range switch "SW1" to ON for non-failsafe operation or OFF for failsafe operation (e.g. alarm trips upon power failure).

CALIBRATION

1. After configuring the DIP switches, connect the input to a calibrated RTD source or a resistance decade box and apply power. (Figure 6).

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. Setpoint: set deadband at its minimum (fully counter clockwise) before adjusting the setpoint. With the desired trip RTD resistance input applied, adjust setpoint until the relay trips. For HI trip calibration, start with the setpoint above the desired trip (full clockwise). For LO trip calibration, start below the desired trip (full counter clockwise).

3. Deadband: Set deadband to its minimum (fully counter clockwise). Set the setpoint to desired trip. Adjust RTD resistance input until relay trips. Readjust deadband to 5% (fully clockwise). Set RTD resistance input to desired deadband position. Slowly adjust deadband until relay untrips

Table 3: Input Range switch settings (SW1-1 through 4)

Pt 100, 500, 1000 (α :00385)	SW1 1 2 3 4	Resistance *Pt 100 (Ω)
0 to 50°C (32 to 122°F)	■ ■ ■	100 to 119.4
-50 to 50°C (-58 to 122°F)	■ ■	80.3 to 119.4
0 to 100°C (32 to 212°F)	■ ■	100 to 138.5
-100 to 100°C (-148 to 212°F)	■	60.2 to 138.5
0 to 250°C (32 to 482°F)	■ ■ ■	100 to 194.1
-200 to 250°C (-328 to 482°F)	■ ■	18.5 to 194.1
0 to 550°C (32 to 1022°F)	■ ■ ■	100 to 297.4
0 to 850°C (32 to 1562°F)	■ ■ ■ ■	100 to 390.3
Cu10	**1 2 3 4**	**Cu 10 (Ω)**
25 to 70°C (77 to 158°F)	■ ■ ■	10.0 to 11.74
-30 to 70°C (-22 to 158°F)	■ ■	7.876 to 11.74
25 to 120°C (77 to 248°F)	■ ■	10.0 to 13.67
-70 to 120°C (-94 to 248°F)	■	6.318 to 13.67
25 to 260°C (77 to 500°F)	■ ■ ■	10.0 to 19.116
-200 to 260°C (-328 to 500°F)	■ ■	1.058 to 19.116
Cu 100	**1 2 3 4**	**Cu 100 (Ω)**
25 to 75°C (77 to 167°F)	■ ■ ■	100.0 to 115.5
-25 to 75°C (-13 to 167°F)	■ ■	80.7 to 115.5
25 to150°C (77 to 302°F)	■ ■	100 to 148.3
-100 to 150°C (-148 to 302°F)	■	51.3 to 148.3
25 to 260°C (77 to 500°F)	■ ■ ■	100 to 191.2
-200 to 260°C (-328 to 500°F)	■ ■	10.6 to 191.2
Ni 120	**1 2 3 4**	**Ni 120 (Ω)**
-30 to 30°C (-22 to 86°F)	■ ■	99.4 to 142.1
-80 to 30°C (-112 to 86°F)	■	66.6 to 142.1
-30 to 100°C (-22 to 212°F)	■ ■ ■	99.4 to 200.6
-30 to 200°C (-22 to 392°F)	■ ■ ■	99.4 to 303.5
-30 to 320°C (-22 to 608°F)	■ ■ ■ ■	99.4 to 471.2
NiFe 604	**1 2 3 4**	**NiFe 604 (Ω)**
-40 to 0°C (-40 to 32°F)	■ ■ ■	499.1 to 604.0
-40 to 50°C (-40 to 122°F)	■ ■	499.1 to 751.8
-200 to 50°C (-328 to 122°F)	■	245.3 to 751.8
-200 to 100°C (-328 to 212°F)	■ ■	245.3 to 917.3
-200 to 240°C (-328 to 464°F)	■ ■	245.3 to 1475.6

**Note: Resistance values for Pt 500(Ω) and Pt 1000(Ω) are 5 and 10 times the resistance value of Pt100 (Ω), respectively.*

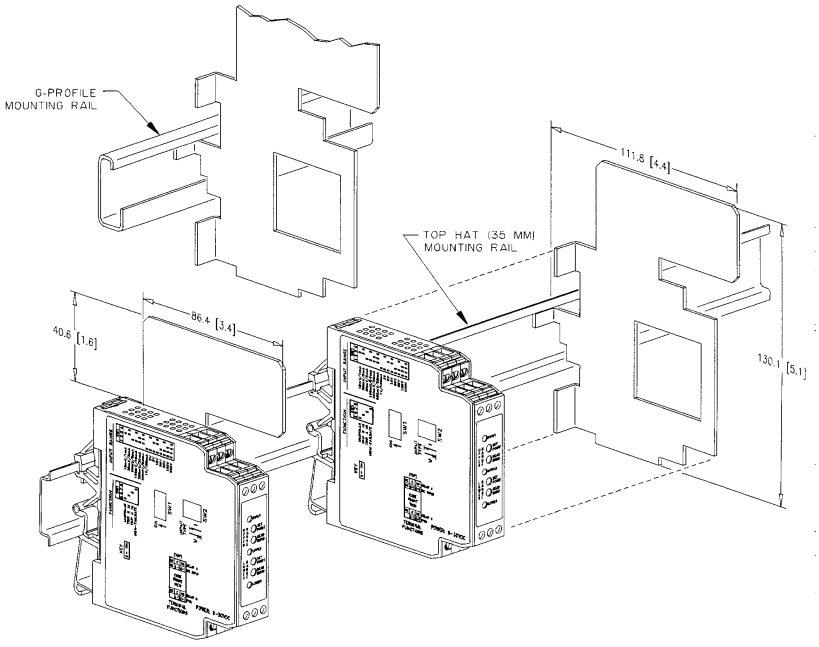
Table 1: RTD Input Type switch settings (SW2 - 1 through 6)

	SW2 1 2 3 4 5 6
Cu 10	■ ■ ■
Pt 100, Cu 100	■
Pt 500, NiFe 604	■ ■
Pt 1000	■
Ni 120	■

Table 2: Setpoint Function switch settings (SW1 - 5 through 8)

	SW1 5 6 7 8
TRIP B HI	■
TRIP A HI	■
NON-FAILSAFE	■

KEY ■ = ON



Note1: All DRG Series modues 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.

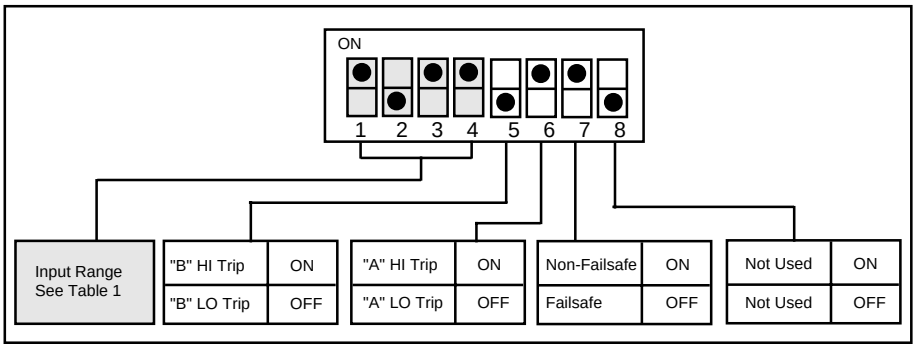


Figure 4: DRG-AR-RTD Input Range/Function Selection (SW1)
Factory Default Settings

RELAY PROTECTION AND EMI SUPPRESSION

When switching inductive loads, maximum relay life and transient EMI suppression is achieved using external protection (see Figures 2 and 3). Place all protection devices directly across the load and minimize all lead lengths. For AC inductive loads, place a properly-rated MOV across the load in parallel with a series RC snubber. Use a 0.01 to 0.1µF pulse film capacitor (foil polypropylene recommended) of sufficient voltage, and a 47Ω, 1/2W carbon resistor. For DC inductive loads, place a diode across the load (PRV > DC supply, 1N4006 recommended) with (+) to cathode and (-) to anode (the RC snubber is an optional enhancement).

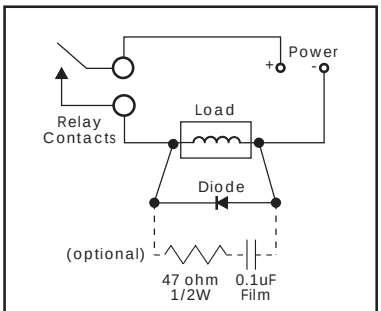


Figure 2: DC Inductive Loads

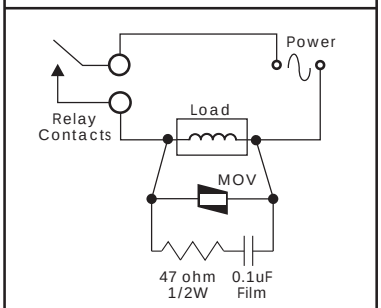


Figure 3: AC Inductive Loads

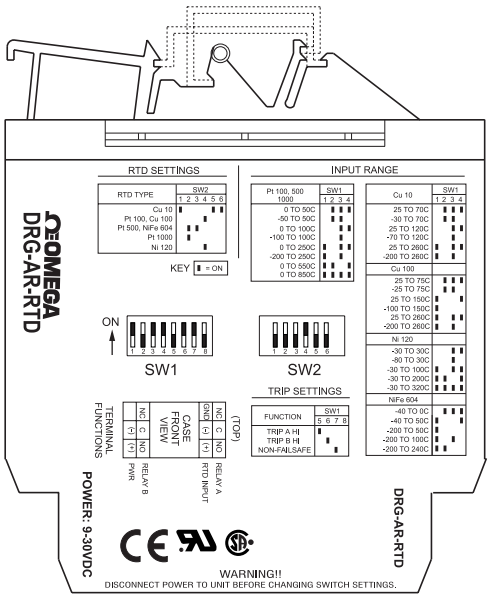


Figure 5: DRG-AR-RTD Factory Calibration; 0-250°C (Pt 100), A-HI/B-LO, Non-Failsafe

Warning: *Do not attempt to change any switch settings with power applied. Severe damage may occur!*

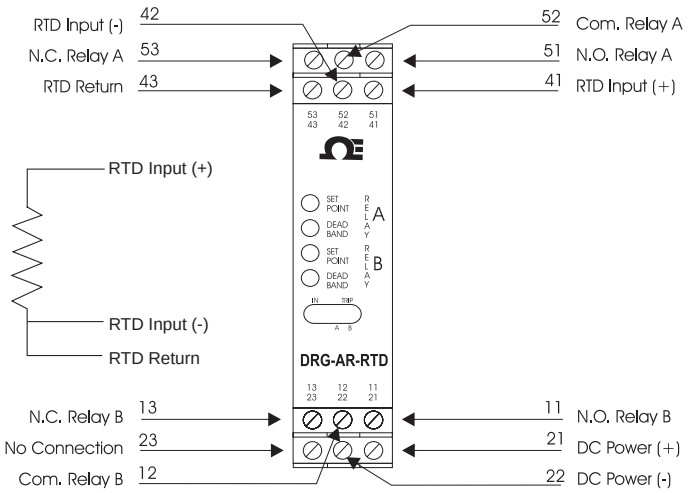


Figure 6: Wiring Diagram for DRG-AR-RTD

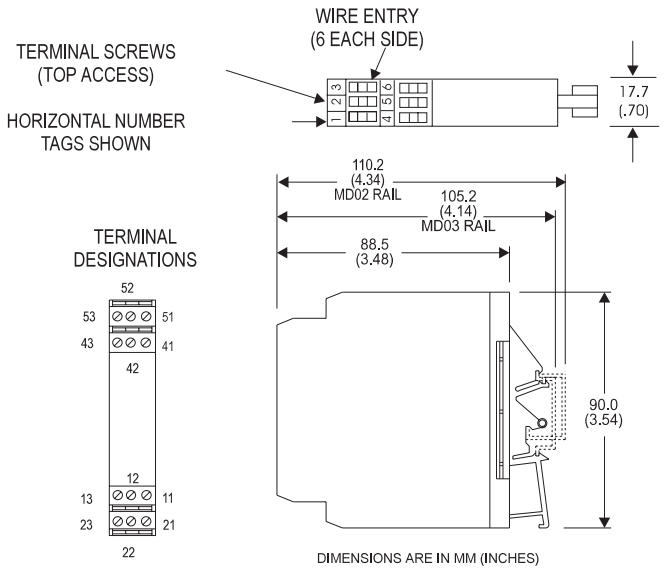


Figure 7: Mechanical Dimensions for DRG-AR-RTD

SPECIFICATIONS

Inputs
Sensor Types: Pt100, Pt500, Pt1000 (0.00385Ω/Ω/°C); Cu10, Cu100; Ni120, NiFe604
Sensor Connection: 3-wire.
Input Ranges: see table 1.

Excitation Current (Maximum)
<2mA for Pt100, Pt500, Pt1000, Ni120, Cu100 or NiFe604
<10mA for Cu10, Cu25.

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

Leadwire Effect
Less than 1% of selected span over entire leadwire resistance range.

Input Protection
Normal Mode: Withstands ±5VDC.
Common Mode(Input to Ground): 1800VDC, max.

LED Indicators
Input Range (Green)
>110% input: 8Hz flash
<0% input: 4Hz flash
Setpoint (Red)
Tripped: Solid red
Safe: Off

Limit Differentials (Deadbands)
1.0% to 5% of span

Response Time
Dynamic Deadband: Relay status will change when proper setpoint/process condition exists for 100msec.
Normal Mode (analog filtering): <250mSec, (10-90%)

Setpoints
Effectivity: Setpoints are adjustable over 100% of the selected input span
Repeatability (constant temp.): ±0.2% of full scale

Stability
Line Voltage: ±0.01%/%, max.
Temperature: ±0.05% of full scale/°C, max.

Common Mode Rejection
DC to 60Hz: 120dB
>60Hz: 100dB

Isolation
1800VDC between contacts, input and power

EMC Compliance (CE Mark)
Emissions: EN50081-1
Immunity: EN50082-2
Safety: EN50178

Humidity (Non-Condensing)
Operating: 15 to 95% (@45°C)
Soak: 90% for 24 hours (@65°C)

Temperature Range
Operating: -15 to 55°C (5 to 131°F)
Storage: -25 to 75°C (-13 to 158°F)

Power
Consumption: 1.5W typical, 2.5W max.
Supply Range: 9 to 30VDC, inverter isolated
In-rush Current: 300mA, max.

Relay Contacts
2 SPDT (2 form C) Relays
1 Relay per setpoint
Current Rating (resistive)
120VAC: 5A
240VAC: 2A
28VDC: 5A
Material: Silver-Cadmium Oxide
Electrical Life:10^5 operations at rated load
Note: External relay contact protection is required for use with inductive loads (see Figures 2 & 3).
Mechanical Life: 10^7 operations

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

Mounting
32mm and 35mm DIN Rail

PIN CONNECTIONS

11 N.O. Relay B
12 Com. Relay B
13 N.C. Relay B
21 DC Power (+)
22 DC Power (-)
23 No Connection
41 RTD Input (+)
42 RTD Input (-)
43 RTD Return
51 N.O. Relay A
52 Com. Relay A
53 N.C. Relay A

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