

DRG-AR-TC

Field Configurable Limit Alarm

Instruction Sheet M2398/0796

DESCRIPTION

The DRG-AR-TC is a DIN rail mount, thermocouple 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 six temperature ranges available for each thermocouple type to ensure accuracy and maximize setpoint resolution. A bipolar input switch is provided for temperature ranges below 0°C.

The DRG-AR-TC is configurable as a single or dual setpoint alarm, with HI or LO trips, upscale or downscale thermocouple burnout detection and failsafe or non-failsafe operation. Also included are adjustable deadbands (0.25 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-TC is equipped with three front panel LEDs. The first is a dual function LED labeled INPUT. This green LED indicates DC power and input signal status. Active DC power is indicated by an illuminated LED. If this LED is off, check line power and wiring connection. If the input signal is more than 110% of the full scale range, 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-TC 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 set point and deadband.

OPERATION

The field configurable DRG-AR-TC 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 low 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.

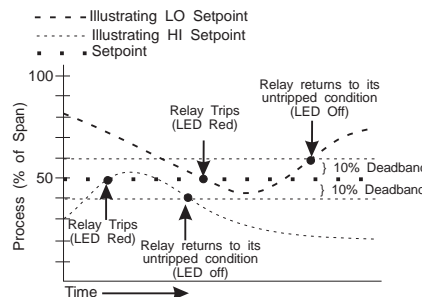


Figure 1: Limit alarm operation and effect of deadband(s).

DYNAMIC DEADBAND

LSI circuitry in the DRG-AR-TC 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.

CONFIGURATION

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

Input:	J Type
Range:	0 to 350°C
Output:	Dual, SPDT
Trip:	A: HI, B: LO
Failsafe:	No
Deadband:	A, B: 0.25%

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 Table 1 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!

1. With DC power off, position switch SW1-1, 2, 3 and SW2-1 through 6 for the desired input range (Table 1).
2. Set positions 4 and 5 of function switch “SW1” to ON for a HI trip setpoint or OFF for a LO trip setpoint (Figure 4).
3. Set position 6 of function switch “SW1” to ON for non-failsafe operation or OFF for failsafe operation (e.g. alarm trips upon power failure).
4. Set positions 7 and 8 of function switch “SW1” to upscale or downscale burn-out.

CALIBRATION

1. After configuring the DIP switches, connect the input to a calibrated TC source and apply power. Refer to the terminal wiring (Figure 5).

NOTE: to maximize thermal stability, final calibration should be performed in the operation 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 thermocouple millivolt 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 thermocouple millivolt input until relay trips. Readjust deadband to 5% (fully clockwise). Set voltage/current input to desired deadband position. Slowly adjust deadband until relay untrips

Table 1: DRG-AR-TC Input Range Selector -Switch Settings

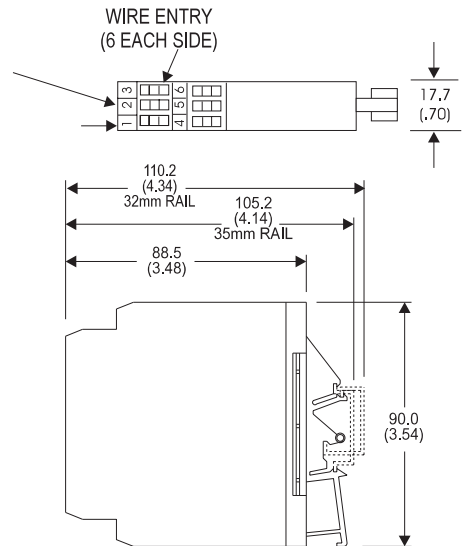
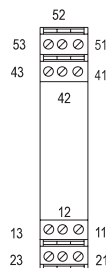
KEY: ■ = ON

TC TYPE	TEMP RANGE	SW1			SW2						
		1	2	3	1	2	3	4	5	6	
B	0 to 1490°C 32 to 2714°F		■			■					■
B	0 to 1820°C 32 to 3308°F		■	■		■					■
E	0 to 150°C 32 to 302°F		■			■					■
E	0 to 290°C 32 to 554°F		■	■		■					■
E	0 to 660°C 32 to 1220°F	■				■					■
E	0 to 1000°C 32 to 1832°F	■		■		■					■
E	-270 to 150°C -454 to 302°F		■			■					
E	-270 to 290°C -454 to 554°F		■	■		■					
J	0 to 190°C 32 to 374°F		■							■	■
J	0 to 350°C 32 to 662°F		■	■						■	■
J	0 to 760°C 32 to 1400°F	■								■	■
J	-210 to 190°C -346 to 374°F		■								■
J	-210 to 350°C -346 to 662°F		■	■							■
K	0 to 250°C 32 to 482°F		■							■	■
K	0 to 480°C 32 to 896°F		■	■						■	■
K	0 to 1280°C 32 to 2336°F	■								■	■
K	0 to 1372°C 32 to 2502°F	■		■						■	■
K	-270 to 250°C -454 to 482°F		■							■	
K	-270 to 480°C -454 to 896°F		■	■						■	
R	0 to 970°C 32 to 1778°F		■					■			■
R	0 to 1690°C 32 to 3000°F		■	■				■			■
R	0 to 1760°C 32 to 3200°F	■						■			■
S	0 to 1050°C 32 to 1922°F		■					■			■
S	0 to 1750°C 32 to 3182°F		■	■				■			■
T	0 to 210°C 32 to 410°F		■					■			■
T	0 to 390°C 32 to 734°F		■	■				■			■
T	-270 to 210°C -454 to 410°F		■					■			
T	-270 to 390°C -454 to 734°F		■	■				■			

DIMENSIONS

TERMINAL SCREWS
(TOP ACCESS)
HORIZONTAL NUMBER
TAGS SHOWN

TERMINAL
DESIGNATIONS



DIMENSIONS ARE IN MM (INCHES)

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 0.1 μ F pulse film capacitor (foil polypropylene recommended) of sufficient voltage, and a 47 Ω , 1/2W carbon resistor. For DC in-

ductive 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).

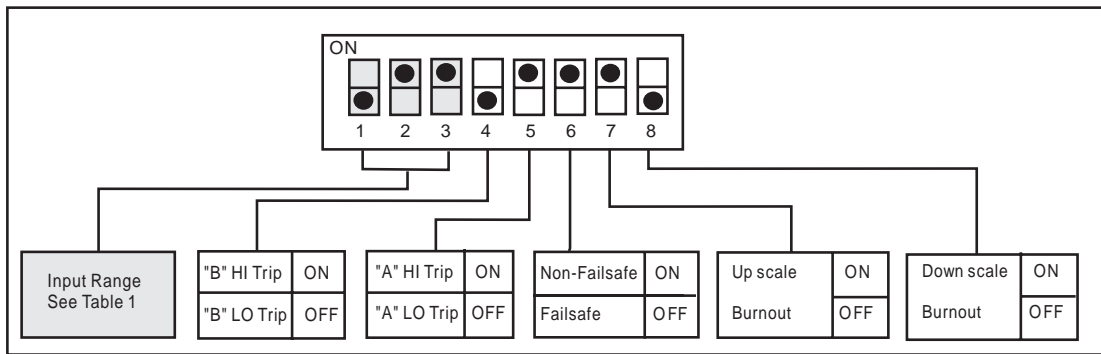
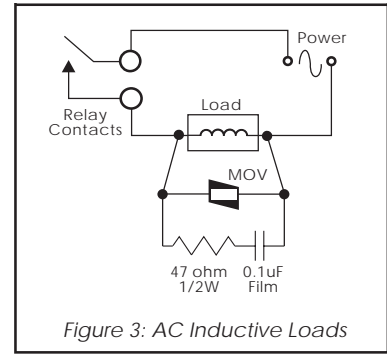
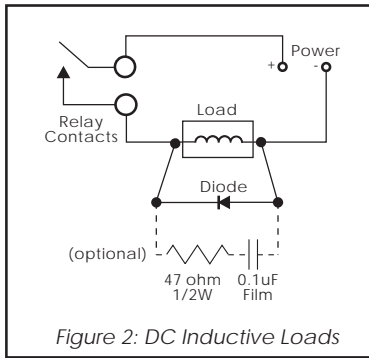


Figure 4: Input Range/Function Selection (SW1) Factory Default Settings

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

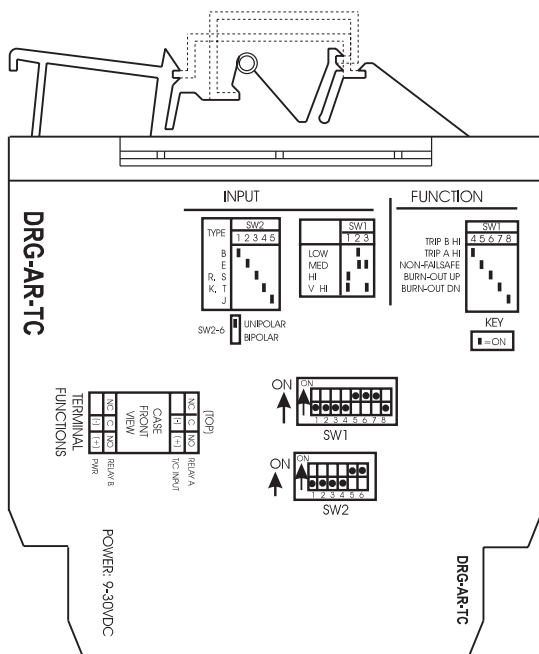


Figure 5: DRG-AR-TC Factory Calibration: J-Type, 0 to 350°C, A-HI/B-LO, non-failsafe

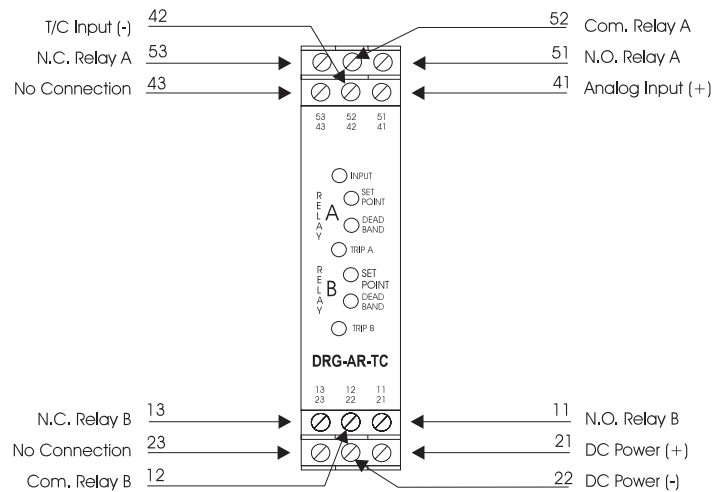


Figure 6: Wiring Diagram for DRG-AR-TC

SPECIFICATIONS

Inputs

Range: See Table 1
Impedance: >1 Megaohm
Input Bias Current (burnout detection): <1.5 microamp
Overvoltage: ±10V differential
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)

0.25% 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%)

Setpoint

Effectivity: Setpoint(s) are adjustable over 100% of the selected input span
Repeatability (constant temp.):
0.2% for temp > 0°C
0.3% for temp < 0°C

Stability

Temperature: ±0.05% of full scale/°C, max.

Common Mode Rejection

DC to 60Hz: 120dB

Isolation

1800VDC between contacts, input and power

ESD Susceptibility

Meets IEC 801-2, Level 2 (4KV)

Humidity (Non-Condensing)

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

Temperature Range

Operating: 0 to 55°C (32 to 131°F)
Storage: -15 to 70°C (5 to 158°F)

Power

Consumption: 1.5W typical, 2.5W max.
Supply Range: 9 to 30 VDC, 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: 10⁵ operations at rated load

Note: External relay contact protection is required for use with inductive loads (see relay protection Figures 2 & 3).

Mechanical Life: 10⁷ operations

Wire Termination

Screw terminations for 12-22 AWG

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)

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 T/C Input (+)
- 42 T/C Input (-)
- 43 No Connection
- 51 N.O. Relay A
- 52 Com. Relay A
- 53 N.C. Relay A



OMEGAnet™ On-Line Service
<http://www.omega.com>

Internet e-mail
info@omega.com

Servicing North America:

USA: One Omega Drive, Box 4047
Stamford, CT 06907-0047
Telephone: (203) 359-1660 Fax: (203) 359-7700
e-mail: info@omega.com

Canada: 976 Bergar
Laval (Quebec) H7L 5A1
Telephone: (514) 856-6928 Fax: (514) 856-6886
e-mail: canada@omega.com

For immediate technical service or application assistance:

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En Espanol: (203) 359-1660 ext. 2203 e-mail: espanol@omega.com

Servicing Europe:

Benelux: Postbus 8034, 1180 LA Amstelveen, The Netherlands
Tel: (31) 20 6418405 Fax: (31) 20 6434643
Toll Free in Benelux: 06 0993344
e-mail: nl@omega.com

Czech Republic: Ostravska 767, 733 01 Karvina
Tel: 42 (69) 6311899 Fax: 42 (69) 6311114
e-mail: czech@omega.com

France: 9, rue Denis Papin, 78190 Trappes
Tel: 33 0130-621-400 Fax: 33 0130-699-120
Toll Free in France: 05-4-06342
e-mail: france@omega.com

Germany/Austria: Daimlerstrasse 26, D-75392 Deckenpfronn, Germany
Tel: 49 (07056) 3017 Fax: 49 (07056) 8540
Toll Free in Germany: 0130 11 21 66
e-mail: germany@omega.com

United Kingdom: 25 Swannington Road, P.O. Box 7, Omega Drive
Broughton Astley, Leicestershire, Irlam, Manchester,
LE9 6TU, England M44 5EX, England
Tel: 44 (1455) 285520 Tel: 44 (161) 777-6611
Fax: 44 (1455) 283912 Fax: 44 (161) 777-6622
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