

## SPECIFICATIONS

### Inputs

**Voltage Input**  
 Range: 100mV to 200VAC  
 Impedance: >100KΩ  
 Overvoltage: 300VAC, max.

**Current Input**  
 Range: 10mA to 100mAAC  
 Impedance: 20Ω, typical  
 Overcurrent: 200mAAC, max.  
 Overvoltage: 60V peak (protected by self resetting fuse)

Frequency Range: 40 to 400Hz  
 Common Mode (Input to Ground): 1800VDC, max.

### LED Indicators

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

### Limit Differentials (Deadbands)

>50mV/5mA: 0.25% to 5% of span  
 <50mV/5mA: 1% 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

Temperature: ±0.025% of full scale/°C, max.

### Common Mode Rejection

DC to 60Hz: 120dB

### Isolation

1800VDC between contacts, input and power

### EMC Compliance (CE Mark)

Emissions: EN50081-1  
 Immunity: EN500-82-2  
 Safety: EN50178

### Humidity (Non-Condensing)

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

### Temperature Range

Operating: 0 to 55°C (32 to 131°F)  
 Storage: -25 to 70°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<sup>5</sup> operations at rated load

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

Mechanical Life: 10<sup>7</sup> operations

### Wire Terminations

Screw terminals for 12-22 AWG

### Agency Approvals

CSA certified per standard C22.2, N o . 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 AC Signal Input (HOT)  
 42 AC Signal Input (Neu)  
 43 No Connection  
 51 N.O. Relay A  
 52 Com. Relay A  
 53 N.C. Relay A



## DRG-AR-AC

## AC Input, Field Configurable Limit Alarm

### Instruction Sheet M2396/0796

### DESCRIPTION

The DRG-AR-AC is a DIN rail mount, AC voltage or current input limit alarm with dual setpoints and two contact closure outputs. The field configurable input and alarm functions offer flexible setpoint capability. Input voltage spans from 100mV to 200VAC and input current spans from 10mA to 100mAAC can be field configured. For current input spans of 1 to 5 Amps a 0.1Ω (5W) shunt resistor should be used.

The DRG-AR-AC 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 (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-AC 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 DC power and wiring connection. If the input signal is more than 110% of the full scale range, the LED will flash at 8 Hz.

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

### OUTPUT

The DRG-AR-AC 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-AC limit alarm setpoints can be configured for HI or LO, failsafe or non-failsafe operation. Each of the setpoints have 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.

### DYNAMIC DEADBAND

LSI circuitry in the DRG-AR-AC prevents false trips by repeatedly sampling the input. The input must re

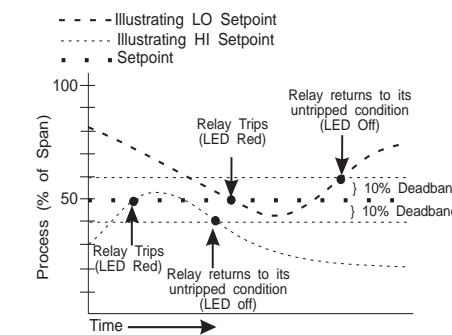


Figure 1: Limit alarm operation and effect of deadband(s).

main 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 the Model DRG-AR-AC as follows:

Input: Voltage  
 Range: 0-500mVAC  
 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 Figure 4 to reconfigure switches SW2, SW3 and SW4 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 input switch "SW1-9,10" for voltage or current.

2. Set position 1 through position 8 of input range switch "SW1" for the desired input range (see Table 1).

3. Set position 1 and 2 of function switch "SW2" to ON for a HI trip setpoint or OFF for a LO trip (see Figure 4).

4. Set position 4 of function switch "SW2" to ON for non-failsafe operation or OFF for failsafe operation (e.g. alarm trips when power fails).



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FOR WARRANTY RETURNS, please have the following information available BEFORE contacting OMEGA:

1. P.O. number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product

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1. P.O. number to cover the COST of the repair,
2. Model and serial number of product, and
3. Repair instructions and/or specific problems relative to the product.

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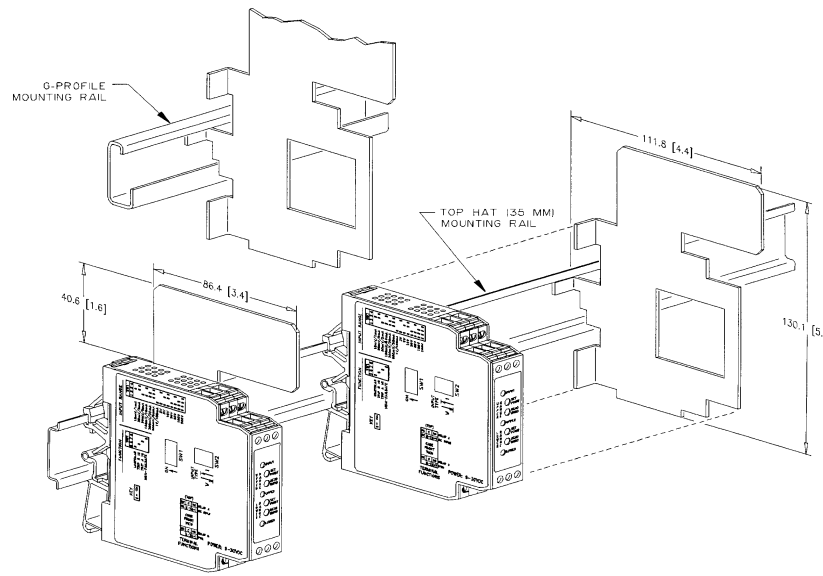
## CALIBRATION

1. After configuring the dip switches, connect the input to a calibrated AC source and apply power. Refer to the terminal wiring (Figure 6).

*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 voltage or current 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 voltage/current input until relay trips. Readjust deadband to 5% (fully clockwise). Set voltage/current input signal to desired deadband position. Slowly adjust deadband until relay untrips



*Note1: All DRG series 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.*

Table 1: G168 Input Range Selector-Switch Settings  
KEY ■ = ON

Voltage	Current	Input Range Selector									
		SW1									
		1	2	3	4	5	6	7	8	9	10
100mV	10mA				■						■
200mV	20mA				■		■				■
500mV	50mA			■		■	■				■
1V	100mA			■	■						■
2V				■	■		■				■
5V			■	■		■	■				
10V			■	■	■						
20V			■	■	■	■					
50V			■	■	■	■	■				
100V			■	■	■						
200V			■	■	■	■					
250V			■	■	■	■	■				
CURRENT											■
VOLTAGE											■

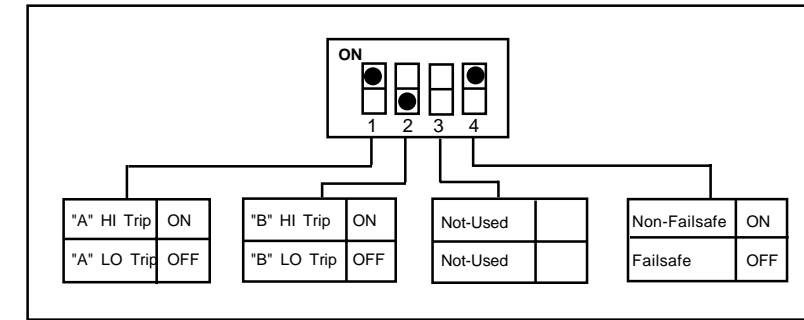


Figure 4: DRG-AR-AC Function Selection Switch-Settings (SW2) Factory Default Settings

## 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).

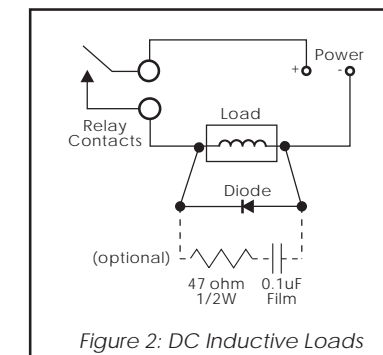


Figure 2: DC Inductive Loads

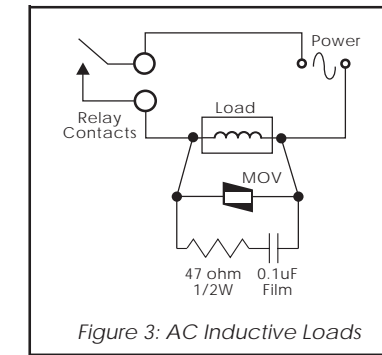


Figure 3: AC Inductive Loads

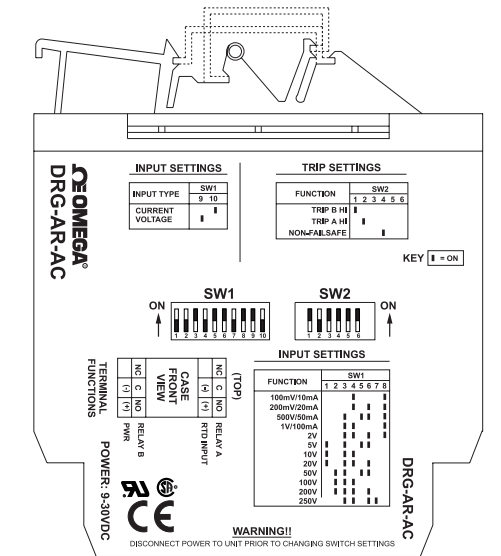


Figure 5: DRG-AR-AC Factory Calibration; 0-500mV, A-HI/B-LO, Non-Failsafe

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

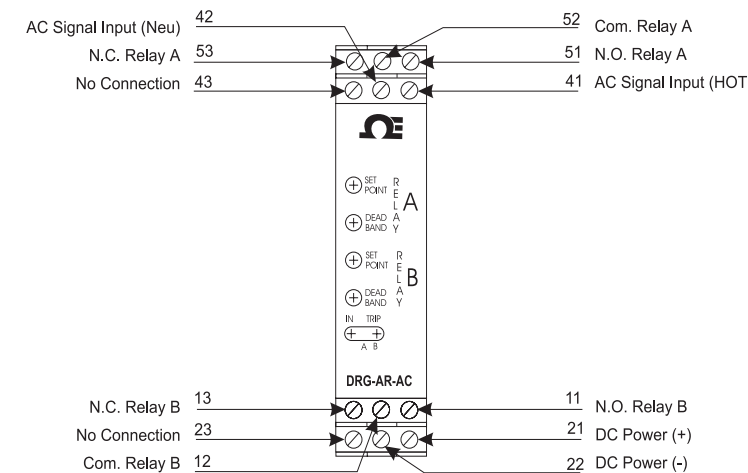


Figure 6: Wiring Diagram for DRG-AR-AC

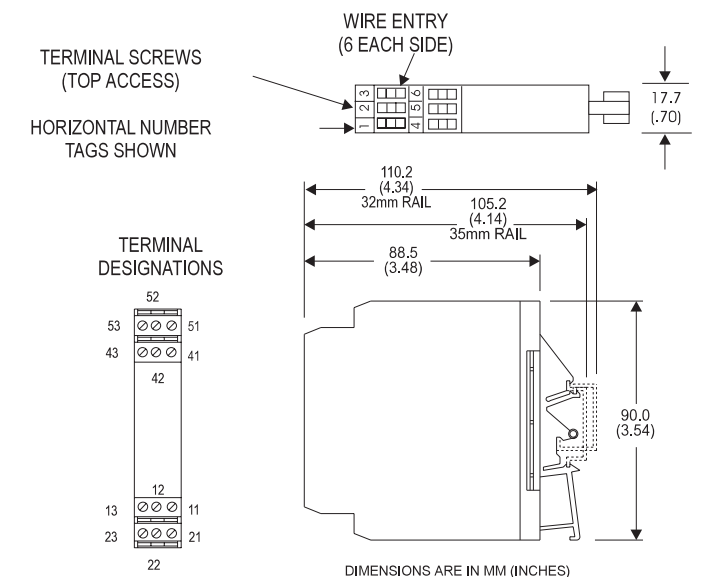


Figure 7: Mechanical Dimensions for DRG-AR-AC