DRG-SC-AC
AC Input, Field Configurable Isolator
Instruction Sheet M2389/0796

DESCRIPTION
The field configurable DRG-SC-AC is a DIN rail mount, AC input signal conditioner with 1800VDC isolation between input, output and power. The field configurable input and output offers flexible, wide ranging capability for scaling, converting or buffering AC inputs ranging from 5mA to 100mAAC or 50mV to 200VAC. The DC output of the DRG-SC-AC is proportional to the average of the of the fully-rectified AC input signal, and is calibrated for sine waves between 40-400Hz.

For current inputs above 100mAAC, it is recommended that an input shunt resistor be used and the DRG-SC-AC be configured for the proper input range. For example, a 5AAC current transformer output can use a 0.1Ω, 5W shunt resistor and set the input of the DRG-SC-AC for 0-500mVAC.

APPLICATION
The DRG-SC-AC is useful in applications requiring an isolated, conditioned DC output from an AC signal. Typical applications include energy management, load shedding, motor current/load monitoring, locked rotor detection, isolation and data acquisition. The output of the DRG-SC-AC can drive a digital meter for direct display or can interface with alarming or control devices including PLCs and computers.

DIAGNOSTIC LED
The DRG-SC-AC 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 quickly flash at 8Hz. If this continues to occur, you may wish to change your full-scale input range setting.

CONFIGURATION
A major advantage of the DRG-SC-AC is its wide ranging capabilities and ease of configuration. The DRG-SC-AC has 15 input range switch settings.

Trim potentiometers allow 50% input zero and span adjustablity within each of the 15 full-scale input ranges.

For example, the 200V switch setting in Table 1 configures the input for a 0 to 200VAC range. Since the span can be contracted by 50%, this enables an input span as narrow as 100VAC of the range. This span can be positioned anywhere within the 0-200VAC range with a zero offset as large as 50% of the full scale range (e.g. 100 to 200VAC range).

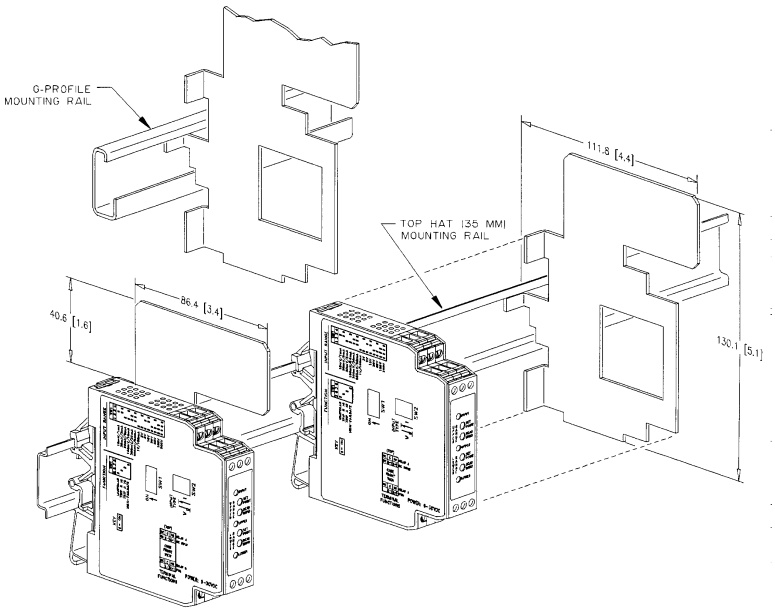
Unless otherwise specified, the factory presets the Model DRG-SC-AC as follows:

Input Range:	0-500mVAC
Output:	4-20mA

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

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

Refer to Tables 1 through 3 for the proper switch settings. With power disconnected, use the switches on SW1 to select the input type (voltage or current), on SW2 to select the HI or LO input ranges, and on SW4 to select the desired input range. Using the switches on SW3, select the desired type of output.



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.

CALIBRATION

1. After configuring the DIP switches, connect the input to a calibrated AC source. Connect the output of the actual device load (or a load approximately equivalent to the actual device load value) and apply power. Refer to the Terminal Wiring Diagram. (Figure 3)

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

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

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

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

Figure 1: DRG-SC-AC Input Range Selector-Switch Settings

Voltage	Current	SW1 1	2	3	4	5	6	7	8
100mV	10mA				■				■
200mV	20mA				■		■		■
500mV	50mA			■		■	■		■
1V	100mA			■	■				■
2V				■	■		■		■
5V		■		■		■	■		
10V		■		■	■				
20V		■		■	■		■		
50V			■	■		■	■		
100V			■	■	■				
200V			■	■	■		■		
250V				■	■		■	■	

Figure 2: DRG-SC-AC Output Range Selector-Switch Settings

RANGE	SW2 1	2	3	4	5	6	7	8
0 to +5V	■	■	■	■				
0 to +10V	■		■	■				
0 to 1mA		■	■	■				
4 to 20mA						■	■	■
0 to 20mA	■	■				■	■	■

Figure 3: DRG-SC-AC Input Jumper Settings

TYPE	SW1 9	10
CURRENT		■
VOLTAGE	■	

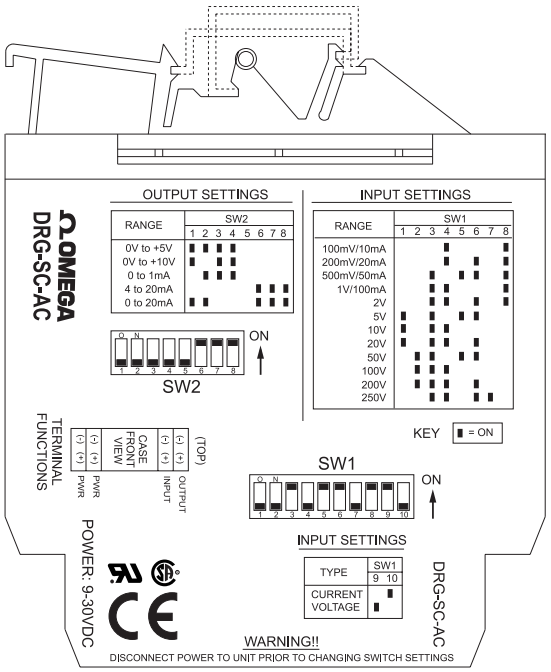


Figure 1: DRG-SC-AC Factory Calibration: 0-500mVAC, 4-20mA

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

TYPICAL APPLICATION

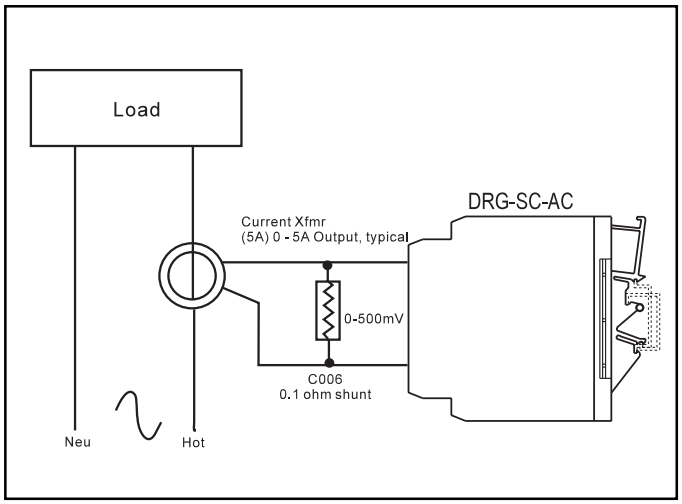


Figure 2: Load monitoring using a current transformer and the DRG-SC-AC

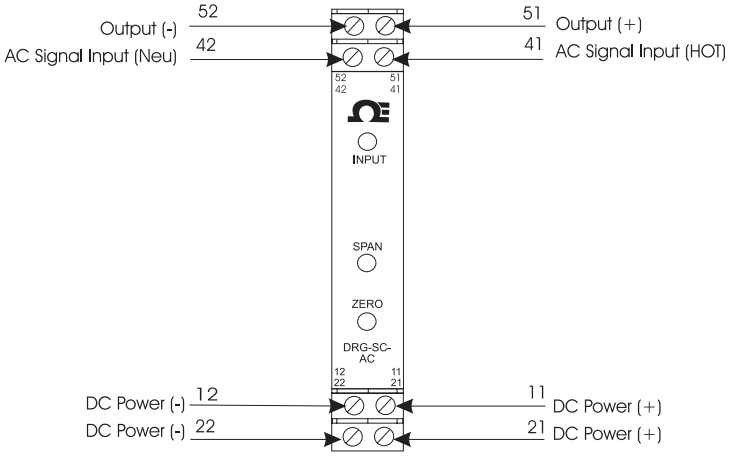


Figure 3: Wiring Diagram for DRG-SC-AC

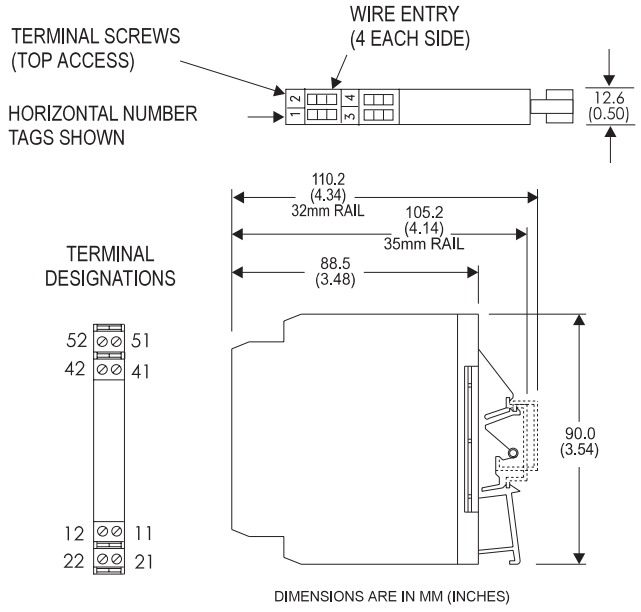


Figure 5: Mechanical Dimensions for DRG-SC-AC

SPECIFICATIONS

Inputs

Voltage Input
- Ranges: 100mV to 200VAC
- Impedance: >100KΩ
- Overvoltage: 300VAC

Current Input
- Ranges:10mA to 100mAAC
- Impedance: 20Ω, typical
- Overcurrent: 200mAAC
- Overvoltage: 60V peak

Frequency Range: 40 to 400Hz, factory calibrated at 60Hz

Common Mode(Input to Ground): 1800VDC, max.

Zero and Span Range:
- Zero Turn-Up: 50% of full scale range
- Span Turn-Down: 50% of full scale range

Output

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

Current Output
- Output: 0-1mA, 0-20mA, 4-20mA
- Source Impedance: >100KΩ
- Compliance:
  - 0-1mA; 7.5V, max. (7.5KΩ, max.)
  - 0-20mA; 12V, max. (600Ω, max.)
  - 4-20mA; 12V, max. (600Ω, max.)

LED Indicator (green)

8Hz flash when input is 10% above full scale range (FSR)

Accuracy (Including Linearity, Hysteresis)

±0.1% of span, typical
±0.5% of span, maximum

Stability

±0.025%/°C of selected input span, typical.

Response Time (10 to 90%)

250mSec., typical.

Common Mode Rejection

DC to 60Hz: 120dB

Isolation

1800VDC between input, output 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: 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.
Range: 9 to 30VDC

Wire Terminations

Screw terminals 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).CE Compliance per EMC directive 89/336/EEC and Low Voltage 73/23/EE.

Mounting

32mm and 35mm DIN Rail

PIN CONNECTIONS

11 DC Power (+)
12 DC Power (-)
21 DC Power (+)
22 DC Power (-)
41 AC Signal Input (Hot)
42 AC Signal Input (Neu)
51 Output (+)
52 Output (-)

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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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2. Model and serial number of product, and
3. Repair instructions and/or specific problems relative to the product.

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WARNING: These product are not designed for use in, and should not be used for, patient connected applications.

DRG-SC-BG
Bridge Input, Field Configurable Signal Conditioner
Instruction Sheet M2390/0796

DESCRIPTION
The DRG-SC-BG is a DIN rail mount, bridge or strain-gage input signal conditioner with 1800VDC isolation between input, output and power. The field configurable input and output offers flexible, wide ranging capability for bridge or strain-gage input applications from 0.5mV/V to over 50mV/V.

Wide ranging, precision zero and span pots allow 50% adjustablity of offset and gain within each of the 11 switch selectable input ranges. The output can be set for either 0-5V, 0-10V, 0-1mA, 0-20mA or 4-20mA.

This flexibility, combined with an adjustable (1 to 10VDC) bridge excitation source, provides the user a reliable, accurate instrument to isolate and condition virtually any bridge or strain-gage input.

APPLICATION
The DRG-SC-BG field configurable, bridge input signal conditioner is useful in isolating ground loops and interfacing bridge 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 provides filtering for noise reduction which can be a significant problem with small, millivolt, bridge signals.

Wide ranging flexibility allows the user to easily zero out dead-loads in weighing systems or configure bipolar input ranges for expansion-compression or vacuum-pressure bridge applications.

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

DIAGNOSTIC LEDS
The DRG-SC-BG 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. If this continues to occur, you may wish to change your full-scale input range setting.

CONFIGURATION
A major advantage of the DRG-SC-BG is its wide ranging capabilities and ease of configuration. The DRG-SC-BG has 11 input range switch settings.Trim potentiometers allow 50% input zero and span adjustablity within each of the 11 full-scale, input ranges.

For example, the 200mV switch setting in Table 1 configures the input for a 0 to 200mV range. Since the span can be contracted by 50%, this enables an input span as narrow as 100mV of the range, or 50%. This span can be positioned anywhere within the 0-200mV range with a zero off-set as large as 50% of the full scale range (e.g. 100 to 200mV input).

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

Input Setting:	0 to 50mV
Input Range:	0 to 30mV (3mV/V)
Excitation:	10V
Operation:	Direct
Output:	4 to 20mA

The DC power input accepts any DC source between 18 and 30V, typically a 24VDC source is used .

For other I/O ranges refer to Tables 1 through 4 and reconfigure switches SW1 and SW2 for the desired input range, function, excitation and output range.

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

CALIBRATION
1. After configuring the DIP switches, connect the input to a calibrated millivolt source. Connect the output to the actual device load (or a load equivalent to the actual device load value) and apply power. (see Wiring Diagram, Figure 2 or 3).

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 and adjust the zero potentiometer for the desired mimimum output.

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

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

Table 1: Input Range Selector-Switch Settings

	SW1 1	2	3	4	5
0 to 10mV	■			■	■
0 to 20mV	■	■			■
0 to 50mV	■	■	■	■	■
0 to 100mV	■				■
0 to 200mV	■			■	■
-5 to 5mV		■			
-10 to 10mV		■		■	
-20 to 20mV		■	■		
-50 to 50mV		■	■	■	
-100 to 100mV	■				
-200 to 200mV	■			■	

KEY ■ = ON

Table 2: Direct or Reverse Operation Setting

	SW1 6
DIRECT	
REVERSE	■

Table 3: Bridge Excitation Selector-Switch Settings

	SW1 7	8
9.8 to 10.1V	■	
4.8 to 5.2V		
0 to 10V	■	■
0 to 2.5V		■

Table 4: Output Range Selector-Switch Settings

	SW2 1	2	3	4	5	6	7	8
0 to 5V	■	■	■	■				
0 to 10V	■		■	■				
0 to 1mA		■	■	■				
4 to 20mA					■	■	■	
0 to 20mA	■	■			■		■	■

KEY ■=ON

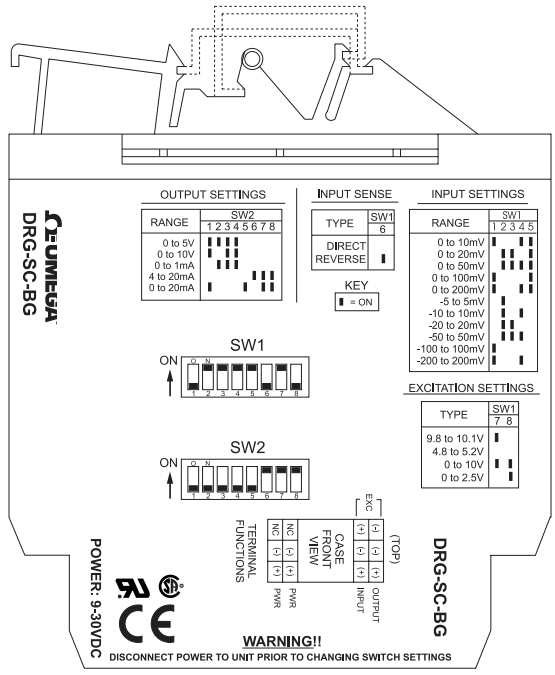
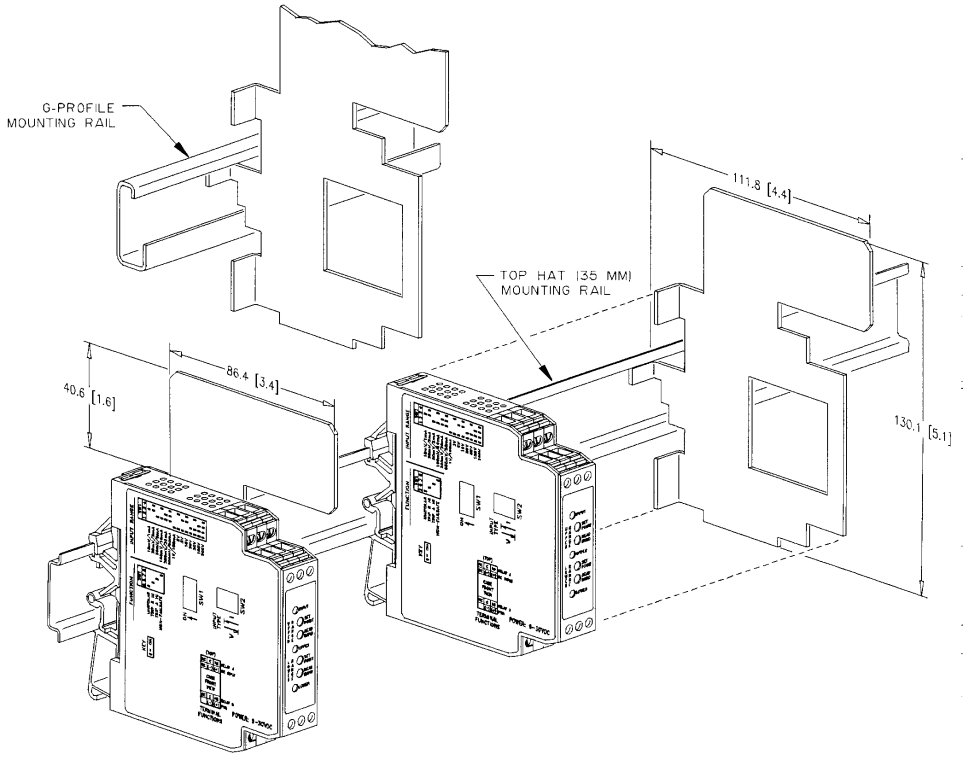


Figure 1: DRG-SC-BG Factory Calibration; 0 to 30mV (0 -50mV switch settings) 10V excitation, direct operation, 4-20mA output



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. Please refer to DRG-HS01 Technical Bulletin or contact factory for assistance.

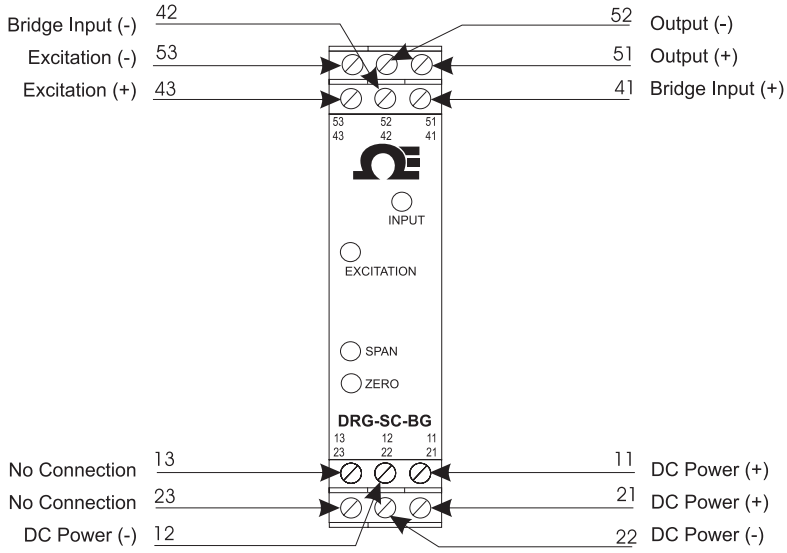


Figure 2: Wiring Diagram for DRG-SC-BG

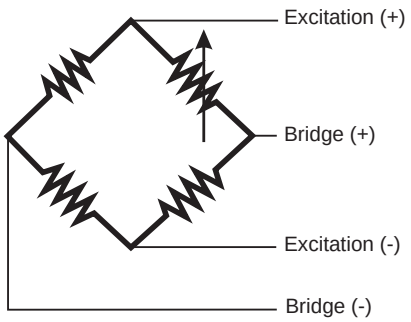


Figure 3: Bridge Reference Designations

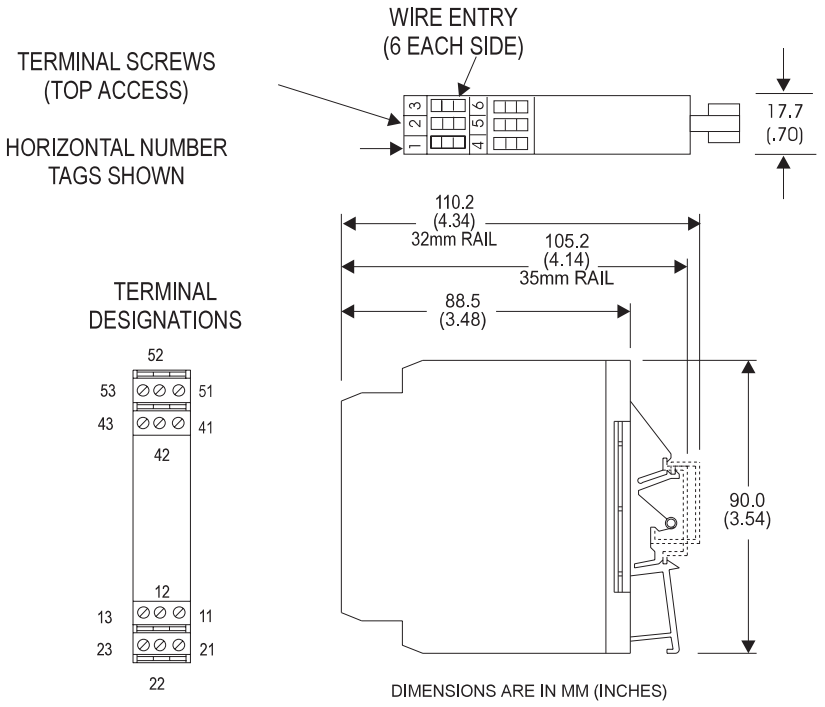


Figure 4: Mechanical Dimensions for DRG-SC-BG

SPECIFICATIONS

Input

Voltage Input
Full Scale Range: 10mV to ±200mV (Table 1).
Impedance: >1MΩ
Overvoltage: 400Vrms, max. (intermittent); 264Vrms, max. (continuous).
Common Mode (Input to Ground): 1800VDC, max.
Zero Turn-Up: 50% of full scale range
Span Turn-Down: 50% of full scale range
Operation: direct or reverse acting

Output

Voltage Output
Output: 0-5V, 0-10V
Impedance: <10Ω
Drive: 10mA, max. (1KΩ, min. @ 10V)
Current Output
Output: 0-1mA, 0-20mA, 4-20mA
Impedance: >100KΩ
Compliance:
0-1mA; 7.5V, max.(7.5KΩ, max.)
0-20mA; 12V, max. (600Ω, max.)
4-20mA; 12V, max. (600Ω, max.)

Bridge Excitation

1 to 10VDC, 120mA max.

Accuracy (Including Linearity, Hysteresis)

±0.1% typical, ±0.2% maximum of selected range at 25°C.

Stability

±0.025%/°C typical, 0.05%/°C maximum, of selected full scale range.

Output Noise (maximum)

0.1% of span, rms, or 10mV whichever is greater.

Response Time (10 to 90%)

<200mSec., typical.

Common Mode Rejection

DC to 60Hz:≥120dB
≥100dB (0 -1mA, range)

Isolation

1800VDC between input, output and power.

EMC Compliance

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

LED Indication (green)

Input Range (approx.)
>110% input: 8Hz flash
<0% input: 4Hz flash

Humidity (Non-Condensing)

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

Temperature Range[1]

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. (one 350Ω bridge), 4W max. (four 350Ω bridges).
Range: 18 to 30VDC

Wire Terminations

Screw terminals for 12-22 AWG

Mounting:

32mm or 35mm DIN Rail

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 Conformance per EMC directive 89/336/EEC and low voltage 73/23/EEC.

PIN CONNECTIONS

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

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DRG-SC-DC
DC Input Field Configurable Isolator
Instruction Sheet M2394/0796

DESCRIPTION
The DRG-SC-DC is a DIN rail mount, DC input signal conditioner with 1800VDC isolation between input, output and power. The field configurable input and output offers flexible, wide ranging capability for DC current and voltage signals.

The input of the DRG-SC-DC can be configured for any one of 12 voltage ranges from 10mV to 100V or 6 current ranges from 1mA to 100mA (see table 1). The output is linear to the input and can be set for either 0-5V, 0-10V, 0-1mA, 0-20mA or 4-20mA (for model DRG-SC-DC-U) and -5 to +5V or -10 to +10V (for model
DRG-SC-DC-B).

Wide ranging, precision zero and span pots allow 50% adjustability of offset and span turn-down within each of the 18 switch selectable ranges. For example, the 0-2mA input range could be turned down to 0-1mA and provide a full scale output signal (e.g. 4-20mA), or turned down and offset to achieve a 1-2mA/4-20mA I/O combination.

The DRG-SC-DC accepts bipolar inputs (e.g. 10V range set to bipolar = -10 to +10V) and offers selectable normal, or reverse operation (e.g. 4-20mA/20-4mA). The ASIC based I/O channel is optically isolated to 1800VDC and is transformer isolated from the power supply.

APPLICATION
The DRG-SC-DC field configurable isolator is useful in eliminating ground loops, converting signal levels, and providing signal drive. The field configurable, wide ranging capability ensures maximum flexibility for most DC to DC applications, minimizing spare part requirements.

DIAGNOSTIC LED
The DRG-SC-DC 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 -10%, the flash rate is 4Hz.

CONFIGURATION
A major advantage of the DRG-SC-DC is its wide ranging capability and ease of configuration. The DRG-SC-DC has 18 input range settings. Trim potentiometers allow 50% input zero and span adjustability within each of the 18 full scale input ranges.

Unless otherwise specified, the factory presets Model DRG-SC-DC-U and DRG-SC-DC-B as follows:

DRG-SC-DC-U
Input Range: 4-20mA
Output Range: 4-20mA

DRG-SC-DC-B
Input Range: 4-20mA
Output Range: -10 to +10V

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

Redundant (parallel) power terminals are provided as a wiring convenience. When multiple units are powered from the same source, power can be connected from one unit to the next, in parallel strings of up to 24 units (5 Amps maximum).

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

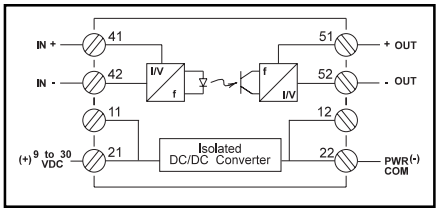


Figure 1: DRG-SC-DC block diagram.

Refer to Tables 1 through 5 for the proper switch settings. Use the switches on SW3 to select the input type (voltage or current), SW1 to select the desired input range and function setting and SW2 to select the desired type of output.

CALIBRATION
1. After configuring the dip switches, connect the input to a calibrated DC source. 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 input and adjust the zero potentiometer for the desired minimum output.

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

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

Table 1: Input Range Selector- Switch settings for both DRG-SC-DC-U and DRG-SC-DC-B.

Input Ranges		SW1			
Voltage	Current	1	2	3	4
20mV	2mA			■	■
50mV	5mA		■		
100mV	10mA		■		■
200mV	20mA		■	■	
500mV	50mA		■	■	■
1 V	100mA	■			
2 V		■			■
5 V		■		■	■
10 V		■	■		
25 V		■	■		■
50 V		■	■	■	
100 V		■	■	■	■

Table 2: Input Range and function settings for both DRG-SC-DC-U and DRG-SC-DC-B.

Functions	SW1	
	5	6
Unipolar	■	X
Bipolar		X
Normal	X	
Reverse	X	■

KEY ■ =ON
X =Don't Care

Table 3: Input Voltage or Current Selector- Switch settings for both DRG-SC-DC-U and DRG-SC-DC-B.

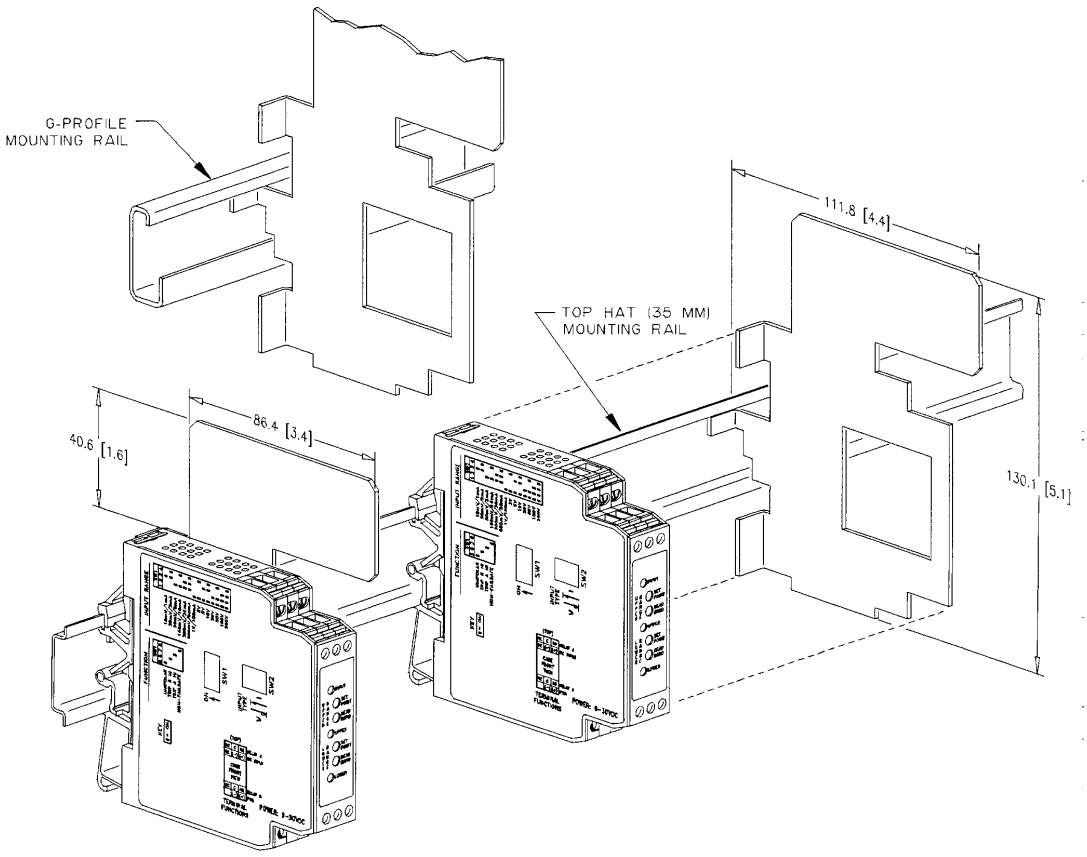
Input	SW1	
	7	8
Voltage	■	
Current		■

Table 4: Output Range Selector-Switchsettings for DRG-SC-DC-U.

Output Ranges	SW2							
DRG-SC-DC-U	1	2	3	4	5	6	7	8
0 to 5V	■	■	■	■				
0 to 10V	■		■	■				
0 to 1mA		■	■	■				
4 to 20mA						■	■	■
0 to 20mA	■	■				■	■	■

Table 5: Output Range Selector-Switch settings for DRG-SC-DC-B.

Output Ranges	SW1	
DRG-SC-DC-B	9	10
-5 to +5V	X	■
-10 to +10V	X	



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.

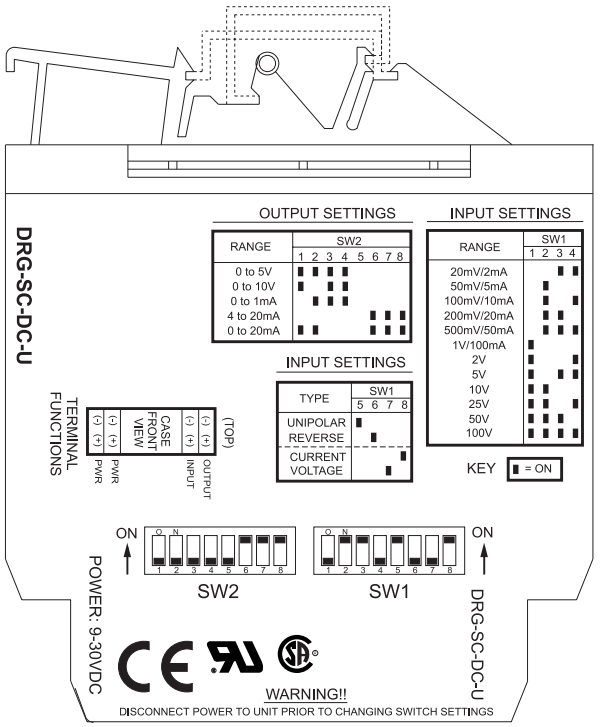


Figure 2: DRG-SC-DC-U factory calibration; 4-20mA, unipolar input, normal operation, 4-20mA output.

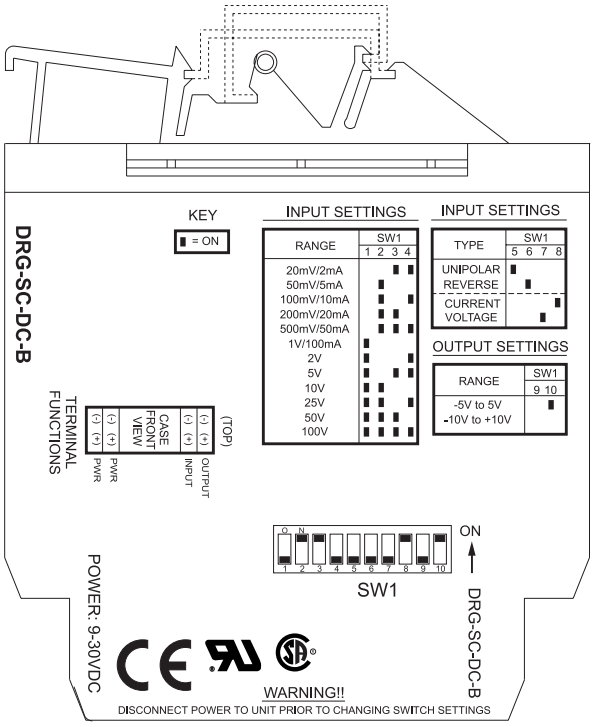


Figure 3: DRG-SC-DC-B factory calibration; 4-20mA, unipolar input, normal operation, -10 to +10V output.

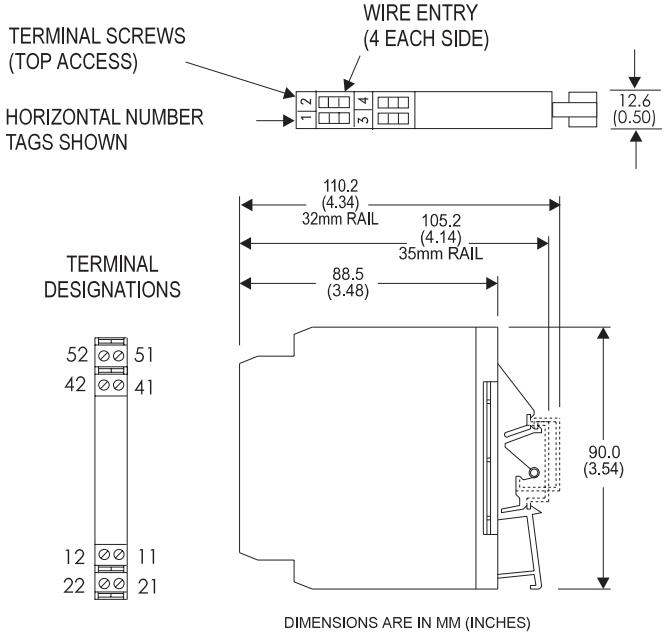


Figure 4: Mechanical dimensions for both DRG-SC-DC-U and DRG-SC-DC-B.

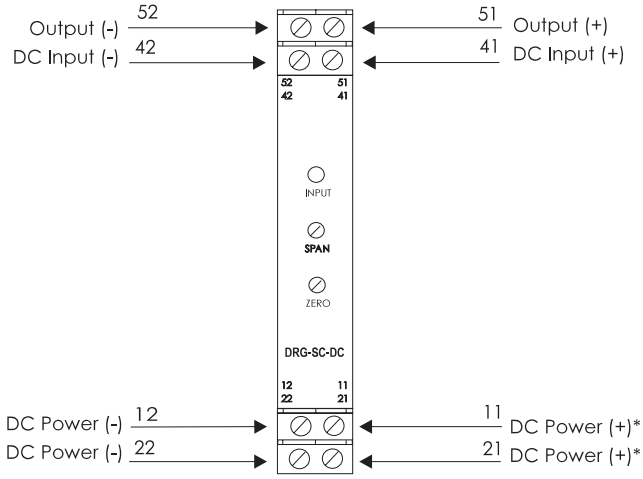


Figure 5: Wiring diagram for both DRG-SC-DC-U and DRG-SC-DC-B

**NOTE: Redundant (parallel) power terminals are provided to daisy chain power connections in high density applications.*

SPECIFICATIONS

Input

Voltage Input
- Range Limits: 10mV to 100V
- Impedance: >100KΩ
- Overload: 400 VRMS, max.

Current Input
- Range Limits: 1mA to 100mA
- Impedance: 20Ω, typical
- Overcurrent: 170mA RMS, max.
- Overvoltage: 60VDC
- Zero Turn-Up: 50% of full scale input
- Span Turn-Down: 50% of full scale input

Common Mode (Input to Ground)
- 1800 VDC, max.

Output (DRG-SC-DC-U)

Voltage Output
- Output: 0-5V, 0-10V
- Source Impedance: <10Ω
- Drive: 10mA, max.

Current Output
- Output:0-1mA,4-20mA,0-20mA
- Source Impedance: >100KΩ
- Compliance:
  - 0-1mA: 7.5V, max (7.5KΩ)
  - 4-20mA: 12V, max (600Ω)
  - 0-20mA: 12V, max (600Ω)

Output (DRG-SC-DC-B)

Voltage Output
- Output:-5 to +5V,-10 to +10V
- Impedance: <10Ω
- Drive:10mA, max.

LED indication (green)

Input Range
- >110%(approx) input:8Hz flash
- < -10%(approx) input: 4Hz flash

Accuracy (Including Linearity, Hysteresis)

- <2mA/<20mV:± 0.35% of full scale, typical; 0.5%,max.
- >2mA/>20mV:± 0.1% of full scale, typical; 0.2%, max.

Response Time (10-90%)

200mSec., typical

Stability (Temperature)

±0.025% of full scale/°C,typical; ±0.05%/°C, max.

Common Mode Rejection

DC to 60Hz: 100dB

Isolation (Input to Output)

1800VDC between input, output and power

EMC Compliance (CE Mark)

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

Mean Time Between Failures

60K Hours (DRG-SC-DC)

Humidity (Non-Condensing)

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

Temperature Range [1]

Operating: 0 to 55°C (32 to 131°F)
Storage: -25 to 70°C (-13 to 158°F)

Wire Terminal

Screw terminals for 12-22AWG

Power

Consumption: 1.5W typical, 2.5W max.
Range: 9 to 30VDC

Mounting

32mm or 35mm DIN rail

Weight

.5lbs

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** Conformance per EMC directive 89/336/EEC and low voltage 73/23/EEC (Input ≤ 75VDC).

PIN CONNECTIONS

11 DC Power (+)
12 DC Power (-)
21 DC Power (+)
22 DC Power (-)
41 Input (+)
42 Input (-)
51 Output (+)
52 Output (-)

---

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DRG-SC-FR
Frequency Input, Field Configurable Signal Conditioner

Instruction Sheet M2392/0796

DESCRIPTION

The Model DRG-SC-FR is a DIN rail mount, frequency input signal conditioner with 1800VDC isolation between input, output and power. The field configurable input and output offer flexible, wide ranging capability for variable frequency drives, magnetic pick-ups, turbine flow meters, and other pulse or frequency output transducers.

The input of the DRG-SC-FR can be configured for any frequency span from 2Hz to 10,000Hz. Pulse threshold sensitivity can be adjusted from 50mVp to 150Vrms to ensure accurate frequency measurement and minimize transient noise related errors. The output can be set for either 0-5V, 0-10V, 0-1mA, 0-20mA or 4-20mA.

Advanced digital technology allows the DRG-SC-FR to be field configured for virtually any frequency input to DC signal output within the ranges specified. Calibration utilizes 'Touch-Sample' technology where the user simply applies the minimum and maximum input frequencies, touching a recessed button to configure the corresponding minimum and maximum output range.

The very narrow DRG Series housing enables installations of up to 24 unit per linear foot. The wide ranging power supply is inverter isolated and accepts any voltage between 9 and 30VDC.

APPLICATION

The DRG-SC-FR field configurable frequency input signal conditioner is useful in eliminating ground loops and interfacing pulse output transducers, such as turbine flow meters and magnetic pick-ups, to data acquisition and control systems.

Advanced digital technology, combined with ASIC technology, provides a stable output at low frequencies for higher accuracy, and three way isolation which completely eliminates ground loops from any source.

'TOUCH-SAMPLE' TECHNOLOGY

The DRG-SC-FR utilizes 'Touch-Sample' technology which greatly simplifies configuration. To set the input frequency range, the user simply applies the high input frequency and pushes the CAL button while the INPUT LED is lit. The low input frequency is then input and pushing the CAL button again stores the low frequency input.

The high and low ranges are stored in non-volatile memory and correspond to the high and low output range which is selected via DIP switches.

To precisely adjust the output, the user adjusts the input frequency while the OUTPUT LED is lit until the desired output level is achieved. The output levels are locked-in by pushing the CAL button. Status LEDs show the operation mode of the device.

STATUS LEDS

The DRG-SC-FR utilizes three status LEDs. One is to display the frequency level of the input signal and the other two are used while calibrating the device.

The green LEVEL (LVL) LED is on (or flashing) when there is a signal being sensed at the input to the device and in the calibration mode. Its intensity varies with the frequency of the input signal during normal operation.

The yellow INPUT (IN) LED, when on, denotes input programming modes. The red OUTPUT (OUT) LED, when on, denotes output programming modes (see Configuration, Calibration and Figure 4 for details).

CONFIGURATION

A major advantage of the DRG-SC-FR is its wide ranging capabilities and ease of configuration. The DRG-SC-FR enables virtually 99% zero and span adjustability. Any 2Hz range from 0 to 10,000Hz can be converted to a full scale output signal (e.g. 0-2Hz /4-20mA or 9998-10,000Hz/4-20mA).

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

Input Range: 0 to 1000Hz
Sensitivity: 1Vrms
Output Range: 4 to 20mA

Note: Sensitivity refers to the noise rejection level or the trigger threshold of the input.

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 for output range (SW1) switch settings and Figure 5 for sensitivity switch setting. For quick and easy calibration mode reference, see the step by step flow chart in Figure 4.

1. With DC power off, choose the desired output voltage/current range from Table 1 and set position 1 through 8 of output switch selector (SW1).

2. Set the input sensitivity switch to LO for input amplitudes between 150mVp and 50Vrms, with noise rejection to 1Vp. Set SW2 to HI for input amplitudes between 500mVp and 150Vrms, with noise rejection up to 10Vp.

CALIBRATION

1. After configuring the DIP switches, connect the input to a calibrated frequency source. Connect the output to the actual device load (or a load approximately equivalent to the actual device load value) and apply power (see wiring diagram, Figure 2).

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

2. Adjust the input frequency to the desired maximum and observe that the green LEVEL LED increase intensity as the frequency is increased. If this is not observed, turn the sensitivity potentiometer in a counter clockwise direction until the green LEVEL LED varies with frequency.

Note: The LEVEL LED may not appear to be on, if the new range is less than 10% of the previously calibrated range.

3. With the green LED illuminated press the CAL button once to enter the calibration mode. The yellow and green LEDs should now be on.

WARNING: Do not attempt to change any DIP SWITCH settings for the output (SW1) while power is applied. Severe damage will result!

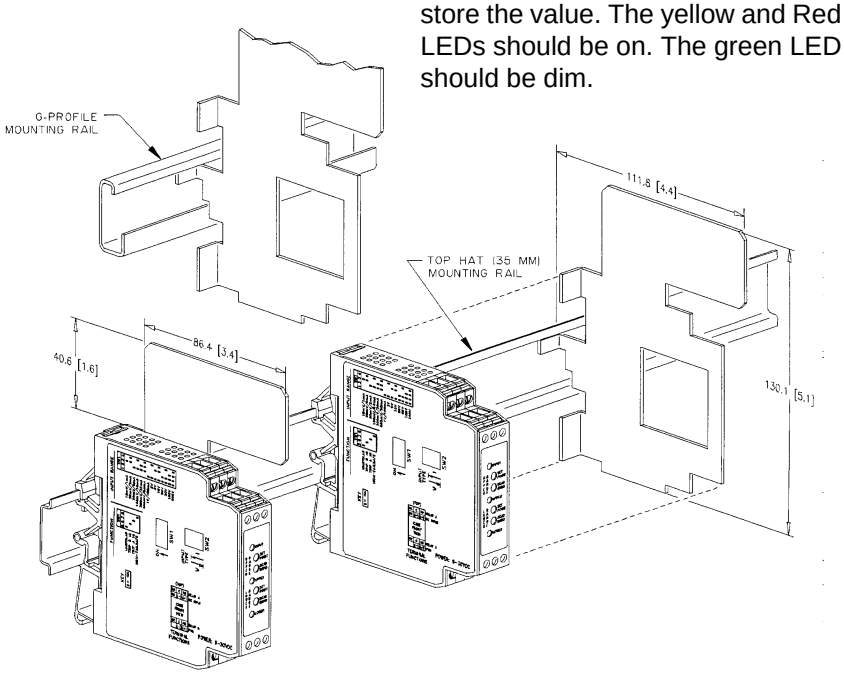
4. Input the maximum desired frequency (if not done already) and press the CAL button to store. The yellow INPUT LED should now be the only LED on.

5. Input the minimum desired frequency and press the CAL button to store. The green and red LEDs should now be on.

Note: The most reliable way to input 0Hz is to short circuit the input pins (42 and 41)

6. To precisely adjust the maximum output, adjust the input frequency until the output reads within ±0.1% of the maximum selected output range. This typically occurs near 90% of the HI input frequency. Press the CAL button to store the value. The red LED will now be on.

7. To precisely adjust the minimum output, lower the input frequency until the output reads within ±0.1% of the minimum selected ouput. This typically occurs near 10% of the HI input frequency. Press the CAL button to store the value. The yellow and Red LEDs should be on. The green LED should be dim.



8. Press the CAL button one final time to exit the calibration mode. The green LED should now be on and its intensity should increase with an increasing input frequency.

9. Check the minimum and maximum input to output calibration. Repeat steps 1 through 8 if calibration is not within desired specifications.

Note 1: To skip Steps 6 and 7 (output adjustment), press CAL button two times after Step 5.

Note 2: Removing power to the unit at any time prior to Step 8 will restore previous settings and calibration.

OPTIMAL SENSITIVITY

If the amplitudes of the input frequency is within the sensitivity parameters (i.e. 150mVp - 1Vp for LO and 0.5Vp - 10Vp for HI), then the sensitivity parameters can be set for optimum noise rejection.

1)Set the input near midrange (50% input) or to a frequency that exhibits the minimum pulse amplitude.
2)Turn the sensitivity pot (SENS) clockwise (CW) until the output drops to minimum.
3) Turn the sensitivity pot counter-clockwise(CCW) a turn or two until the output returns to the previous level.
4)Run the input through the full frequency range to make sure that the pulses are sensed at both the low and high input frequencies. If the output drops out during this test, when the input freq. >0% then turn the sensitivity pot counter-clockwise another turn or two until the output picks up. Repeat to validate sensitivity settings.

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 DGR-HS01 Heat Sink is recommended.

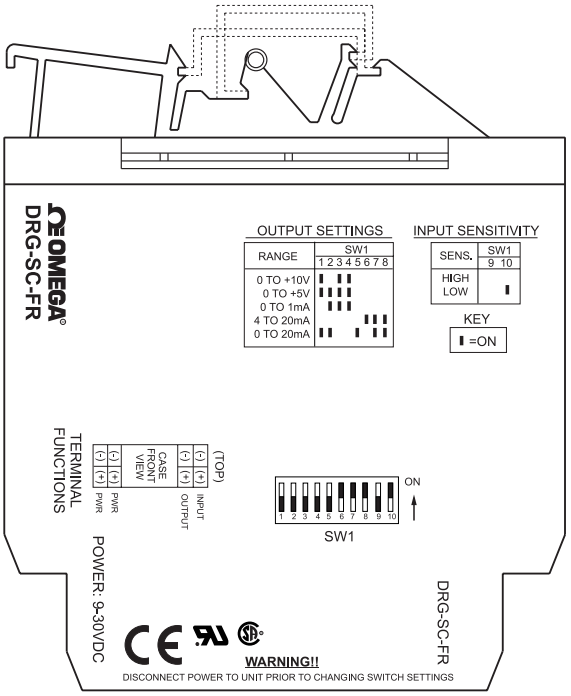


Figure 1: Factory Calibration; 0 to 1,000Hz, 1Vrms, 4-20mA

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

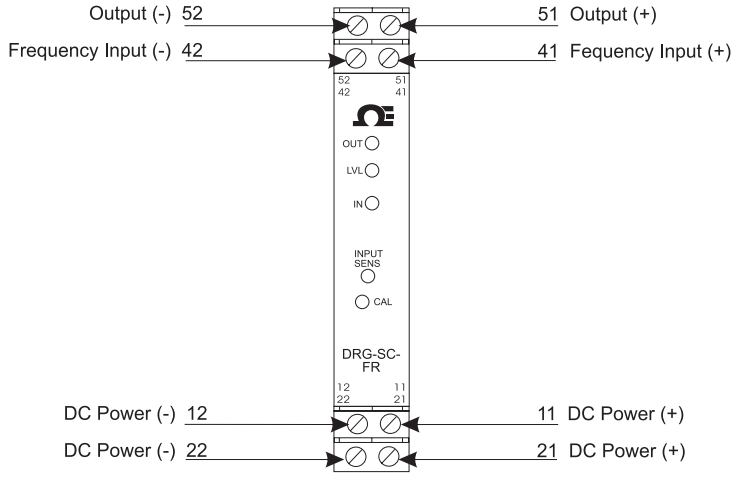


Figure 2: Wiring Diagram for DRG-SC-FR

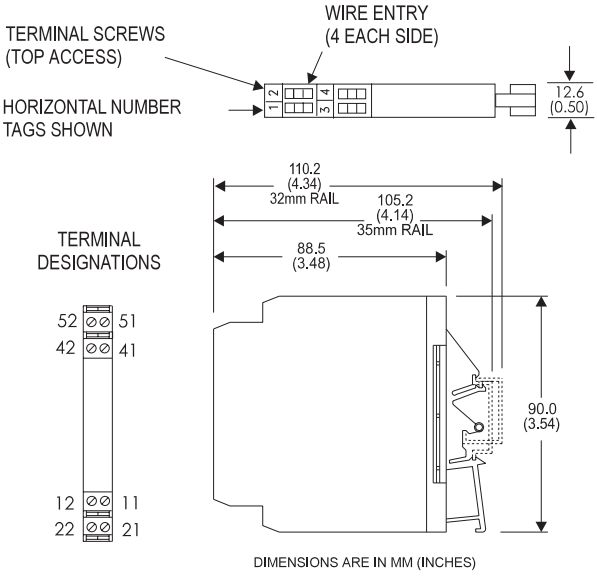


Figure 3: Mechanical Dimensions for DRG-SC-FR

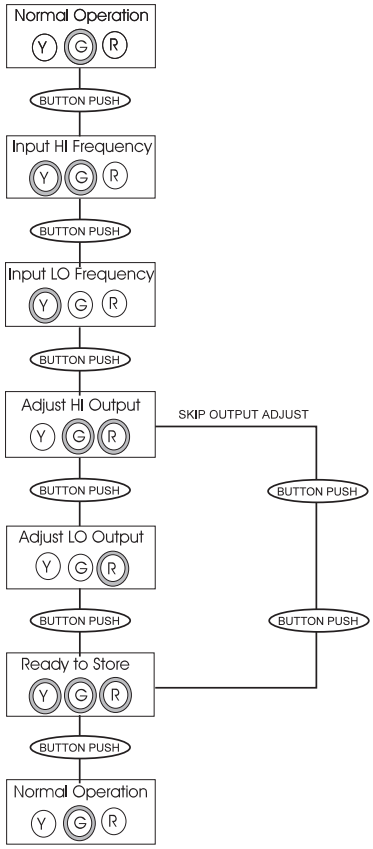


Figure 4: DRG-SC-FR Calibration Flow Chart

Table 1: Output Switch Settings (SW1, 1 through 8)

RANGE	SW1 1 2 3 4 5 6 7 8
0 TO +10V	▮ ▮
0 TO +5V	▮ ▮ ▮ ▮
0 TO 1mA	▮ ▮ ▮
4 TO 20mA	▮ ▮ ▮
0 TO 20mA	▮ ▮ ▮ ▮ ▮

KEY
▮ =ON

SENS.	SW1 9 10
HIGH	
LOW	▮

HIGH: 0.5-10Vp 150Vrms max.
LOW: 150mVp-1Vp 50Vrms max.

Figure 5: Input Sensitivity Settings (SW1, 9 & 10)

SPECIFICATIONS

Input

Frequency Input

Full Scale Range: 2 Hz to 10,000Hz.

Amplitude Range: 150mV to 150Vrms

Impedance: >10KΩ

Over-voltage: 180Vrms, max.

Over-range: 20KHz, max.

Common Mode (Input to Ground): 1800VDC, max.

Zero Turn-Up: 99% of full scale range (9998Hz)

Span Turn-Down: 99% of full scale range (2Hz)

Output

Voltage Output

Output: 0-5V, 0-10V

Source Impedance: <100Ω

Drive: 10mA, max. (1KΩ, min. @ 10V)

Current Output

Output: 0-1mA, 0-20mA, 4-20mA

Source Impedance: >100KΩ

Compliance:

0-1mA; 7.5V, max. (7.5KΩ, max.)

0-20mA; 12V, max. (600Ω, max.)

4-20mA; 12V, max. (600Ω, max.)

Accuracy (Including Linearity, Hysteresis)

±0.1% of selected range at 25°C.

Stability

±0.025%/°C maximum of selected range.

Response Time (10 to 90%)

500mSec., or 100 times the period of the full scale frequency.

Common Mode Rejection

DC: 100dB

>60Hz: 80dB

Isolation

1800VDC between input, output and power.

EMC Compliance (CE Mark)

Emmissions: EN50081-1

Immunity: EN50082-2

Safety: EN50178

LED Indication (green)

LEVEL (green): flash intensity varies with input frequency

INPUT (yellow): input range programming status

OUTPUT (red): output range programming status

Humidity (Non-Condensing)

Operating: 15 to 95% (@ 45°C)

Soak: 90% for 24 hours (@ 65°C)

Temperature Range

Operating: 0 to 55°C (5 to 131°F)

Storage: -25 to 70°C (-13 to 158°F)

Power

Consumption: 1.5W typical, 2.5W max.

Range: 9 to 30VDC

Wire Terminations

Screw terminals for 12-22 AWG

Agency Approvals

CSA certified per standard C22.2, No. 0-M91and142-M1987(File No.LR42272). **UL** recognized per standard UL508 (File No.E99775). **CE** Conformance per EMC directive 89/336/EEC and Low Voltage 73/23/EEC (Input≤ 75Vp, only).

Mounting

32mm and 35mm DIN Rail

PIN CONNECTIONS

11 DC Power (+)
12 DC Power (-)
21 DC Power (+)
22 DC Power (-)
41 Frequency Input (+)
42 Frequency Input (-)
51 Output (+)
52 Output (-)

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If the unit should malfunction, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of being damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components which wear are not warranted, including but not limited to contact points, fuses, and triacs.

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FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting OMEGA:
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3. Repair instructions and/or specific problems relative to the product

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WARNING: These product are not designed for use in, and should not be used for, patient connected applications.

DRG-SC-PT
Potentiometer Input, Field Configurable Signal Conditioner

Instruction Sheet M2393/0796

DESCRIPTION

The DRG-SC-PT is a DIN rail mount, potentiometer input signal conditioner with 1800VDC isolation between DC power and the input/output circuitry. The input provides a constant voltage and is designed to accept any three-wire potentiometer from 100Ω to 100KΩ. The field configurable output is switch selectable providing either 0-5V, 0-10V, 0-1mA, 0-20mA or 4-20mA DC signal.

Wide ranging, precision zero and span pots, used in conjunction with DIP switches, allow 80% adjustablity of offset and gain to transmit a full scale output from any 20% portion of the potentiometer input.

APPLICATION

The DRG-SC-PT field configurable, potentiometer input signal conditioner is useful in transmitting process control setpoints to remote PID controllers or interfacing position sensors to data acquisition and control systems.

The DRG-SC-PT's high density DIN rail mounting offers an extremely compact solution for saving valuable panel space.

CONFIGURATION

A major advantage of the DRG-SC-PT is its wide ranging capabilities and ease of configuration.

For example, in a valve positioning application a potentiometer is sometimes used as a feedback signal. Quite often a wide open valve is only a 25% turn of the feedback potentiometer. In this case the DRG-SC-PT can easily be adjusted with the zero and span to provide a full scale output signal (e.g. 4-20mA) representing 0-25% or even 50-75% of the potentiometer input.

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

Input Range: 0 to 100%
Output: 4 to 20mA

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

For other output ranges, refer to Tables 1 and 2 to reconfigure switches SW1 and SW2 for the desired input and output ranges.

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

CALIBRATION

1. With power disconnected, set the output and input switch selectors (SW1 and SW2) to the desired ranges (Tables 1 and 2).

2. Connect the input and output as shown in Figure 1. 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.

3. Set the input potentiometer to the desired minimum and adjust the zero potentiometer for the desired minimum output.

4. Set the input potentiometer to the desired maximum and adjust the span potentiometer for the desired maximum output.

5. Repeat steps 3 and 4, if necessary, for best accuracy.

Table 1: Input Range Switch Selector (SW2)

Span	SW2* 1	2	3	4	5	6
20 - 100%						
45 - 100%	▮					
85 - 100%		▮				
Offset	**1**	**2**	**3**	**4**	**5**	**6**
0 - 20%						
20 - 45%				▮		
45 - 65%			▮			
65 - 80%			▮	▮		

* SW2-5,6 Not used.

Table 2: Output Range Switch Selector (SW1)

	SW1 1	2	3	4	5	6	7	8
0 to +5V	▮	▮	▮	▮				
0 to +10V	▮		▮	▮				
0 to 1mA		▮	▮	▮				
4 to 20mA						▮	▮	▮
0 to 20mA	▮	▮				▮	▮	▮

KEY ▮ = ON

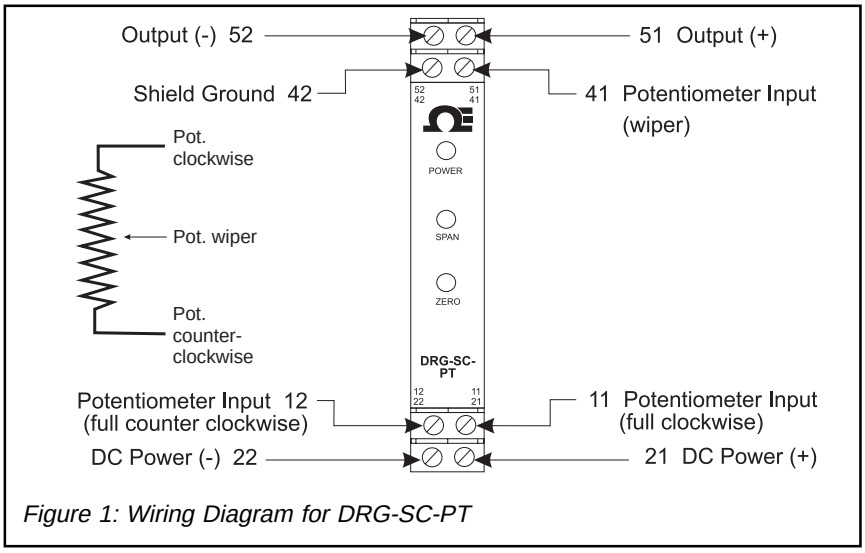
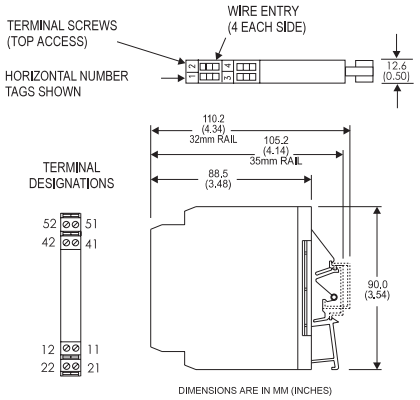


Figure 1: Wiring Diagram for DRG-SC-PT

DIMENSIONS



SPECIFICATIONS

Potentiometer Input
Resistance (End to End):
100Ω up to 100KΩ
Input Impedance: >1MΩ
Input Excitation: 500mV, 5mA maximum drive.
Zero Turn-Up: 80% of full scale input
Span Turn-Down: 80% of full scale input (Table 1)
Common Mode Rejection: 1800VDC (input to ground)

Output
Voltage Output
Output: 0-5V, 0-10V
Source Impedance: <10Ω
Drive: 10mA, max. (1KΩ min. @ 10V)
Current Output
Output: 0-1mA, 0-20mA, 4-20mA
Source Impedance: >100KΩ
Compliance:
0-1mA; 7.5V, max. (7.5KΩ, max.)
0-20mA; 12V, max. (600Ω, max.)
4-20mA; 12V, max. (600Ω, max.)

Accuracy (Including Linearity, Hysteresis)
±0.1% maximum at 25°C.

Stability
Temperature: <±0.05%/°C maximum of full scale range.
Line Voltage: <±0.01%/% maximum of full scale range.

Response Time (10 to 90%)
<200mSec., typical.

Common Mode Rejection
DC to 60Hz: 120dB

Isolation
1800VDC between line power and input, output

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

LED Indication (green)
Active DC power

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: -25 to 70°C (-13 to 158°F)

Mounting
Horizontal DIN rail mounting is recommended. Vertical DIN rail mounting requires heat sink (model HS01, included) and circulating air is recommended.

Power
Consumption: 1.5W typical, 2.5W max
Range: 9 to 30VDC

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 Conformance per EMC directive 89/336/EEC and Low Voltage 73/23/EEC.

Mounting
32mm and 35mm DIN Rail

PIN CONNECTIONS

11 Pot. Input (full clockwise)
12 Pot. Input (full counterclockwise)
21 DC Power (+)
22 DC Power (-)
41 Pot. Input (wiper)
42 Shield Ground
51 Output (+)
52 Output (-)

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If the unit should malfunction, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of being damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components which wear are not warranted, including but not limited to contact points, fuses, and triacs.

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WARNING: These product are not designed for use in, and should not be used for, patient connected applications.

721-0615-00B 11/97

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% adjustablity 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 equalibrium 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

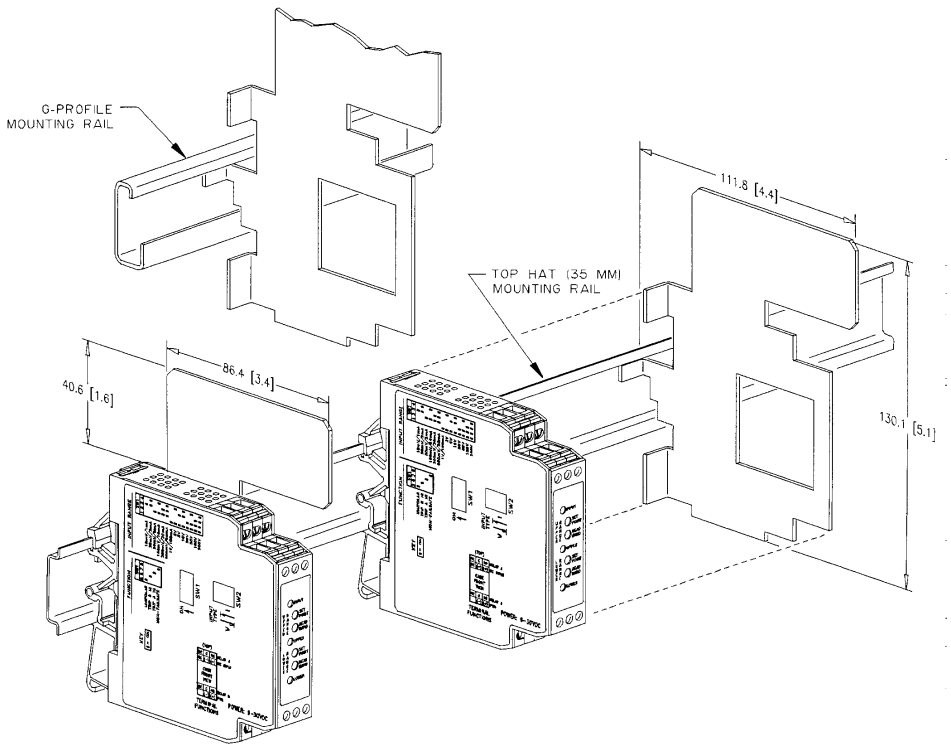
Table 5: Excitation Type Switch Settings (SW3 -1 through 8)

	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)

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



Note1: All 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.

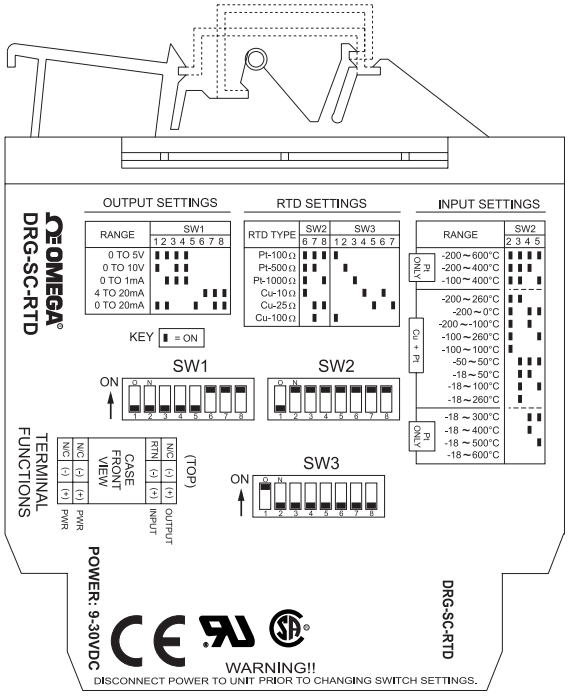


Figure 1:DGR-SC-RTD Factory Calibration: -200 to 600°C (Pt 100) input; 4-20mA output

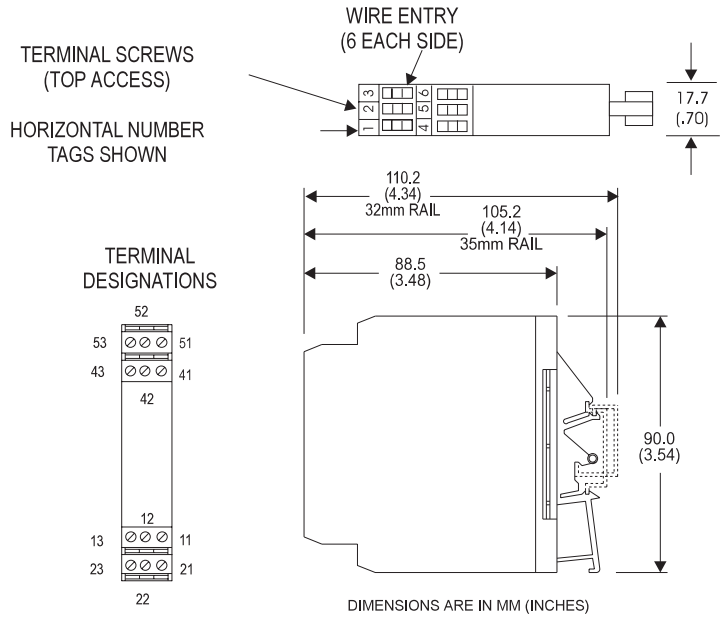


Figure 2: Mechanical Dimensions for DGR-SC-RTD

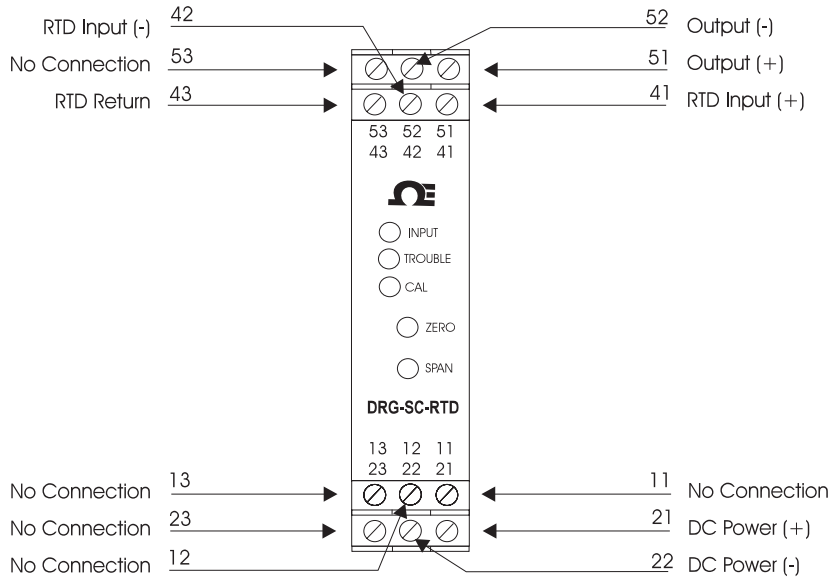


Figure 3: Wiring Diagram for DGR-SC-RTD

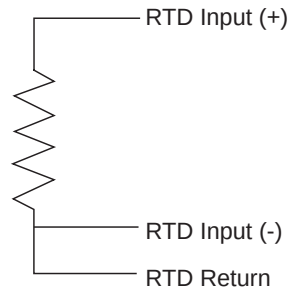


Figure 4: RTD Reference Designations

SPECIFICATIONS

Input

Sensor Types: Pt100, Pt500, Pt1000 (α: 0.00385Ω/Ω/°C or 0.00392Ω/Ω/°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 100Ω(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: <10Ω
Drive: 10mA, max.
(1KΩ, min @10V)
Current Output
Output: 0-1mA, 0-20mA, 4-20mA
Source Impedance: >100KΩ
Compliance:
0-1mA; 7.5V, max.(7.5KΩ)
0-20mA; 12V, max.(600Ω)
4-20mA; 12V, max.(600Ω)

LED Indication (green)

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

Accuracy (Including Linearity, Hysteresis)

±0.1% typical, ±0.2% max. of the maximum input temperature range configurable for the RTD type; @ 25°C ambient and 0Ω lead resistance.

Stability

±0.015% of the max. input temperature range for the RTD type per °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°C)
Soak: 90% for 24 hours(@ 65°C)

Temperature Range[1]

Operating: 0 to 55°C (32 to 131°F)
Storage: -25 to 70°C (-13 to 158°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 standard 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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721-0614-00B 8/97

DRG-SC-TC
Thermocouple Input, Field Configurable Isolator

Instruction Sheet M2397/0796

DESCRIPTION

The DRG-SC-TC is a DIN rail mount, thermocouple input signal conditioner with 1800VDC isolation between input, output and power. The field configurable input and output offer flexible, wide ranging capability for J, K, T, R, S, E and B type thermocouples.

The input of the DRG-SC-TC can be configured for over 60 different thermocouple temperature ranges (see Table 6). The output is linear to temperature 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% adjustablity of offset and span turn-down within each of the ranges. For example, the 0-1000°C range could be offset and turned down to provide a 4-20mA signal representing 500-1000°C. Similarly, adjustment can be referenced to the output range. The example from above could be used to provide a 12-20mA signal from a 750 to 1000°C temperature input.

APPLICATION

The DRG-SC-TC field configurable thermocouple input isolator is useful in eliminating ground loops and interfacing thermocouple 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 allows the noise reduction benefits of grounded thermocouples to be realized.

The DRG-SC-TC employs the latest in advanced analog signal processing technology. In addition to its multiple microprocessors, a special ASIC* chip is used for high accuracy and reliability. The DRG-SC-TC is also equipped with cold junction compensation (CJC) circuitry to provide ice-point reference. Upscale or downscale thermocouple burnout detection is switch selectable.

High density DIN rail mounting offers an extremely compact solution to save valuable panel space.

DIAGNOSTIC LEDS

The DRG-SC-TC is equipped with front panel LEDs for INPUT (green), TROUBLE (yellow) and CAL OK (yellow). At start-up, both the INPUT and the CAL OK LEDs flash alternately for 10 seconds while start-up takes place.

INPUT LED

This green LED is lit continuously when the input is within the specified range. In the full temperature range setting, for the over range condition the LED flashes at 8Hz, whereas for the under range condition it flashes at 4Hz. In a sub-range temperature setting, for the over range condition the LED flashes at 1Hz, whereas for the under range condition it flashes at 0.5Hz.

CAL OK LED

This yellow LED is continuously on when the device is calibrated.

TROUBLE LED

This yellow LED is off during the normal operation of the device. Consult factory if this LED is on, indicating a microprocessor malfunction.

CONFIGURATION

An advantage of the DRG-SC-TC is its wide ranging capabilities and ease of configuration. The DRG-SC-TC enables 50% input zero and span adjustablity DRG-SC-TC within each of the full-scale input ranges.

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

Input:	J-type
Range:	0 to 500°C
Output:	4 to 20mA
Burn Out:	Upscale

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

For other I/O ranges refer to Tables 1 through 6 and reconfigure switches SW1 and SW2 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 6, then use table 1 and 2 to configure the switches, as described in the following steps, for thermocouple type and range.

2. With DC power off, position input switches 1 and 2 on "SW2" for the desired burnout detection mode.

3. Set positions 4 through 10 on "SW2" for the desired thermocouple range and type.

4. Set positions 1 through 8 of output range switch "SW1" for the desired output signal. (Table 4)

* Application Specific Integrated Circuit

CALIBRATION

1. After configuring the dip switches, connect the input to a calibrated thermocouple source. 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 operation installation, allowing approximately 1 to 2 hours for warm up and thermal equilibrium of the system.

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

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

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

TABLE 1: Thermocouple type switch settings (SW2, positions 8, 9, 10)

TYPE	8	9	10
B	■	■	■
E	■	■	
J	■		■
K	■		
R		■	■
S		■	
T			■

KEY

■ = ON

TABLE 2
Range switch settings used in conjunction with Table 6 (SW2, positions 4, 5, 6, and 7)

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

TABLE 3: Thermocouple burnout detection switch settings (SW2, position 1, 2)
Note: SW2 position 3 is not used.

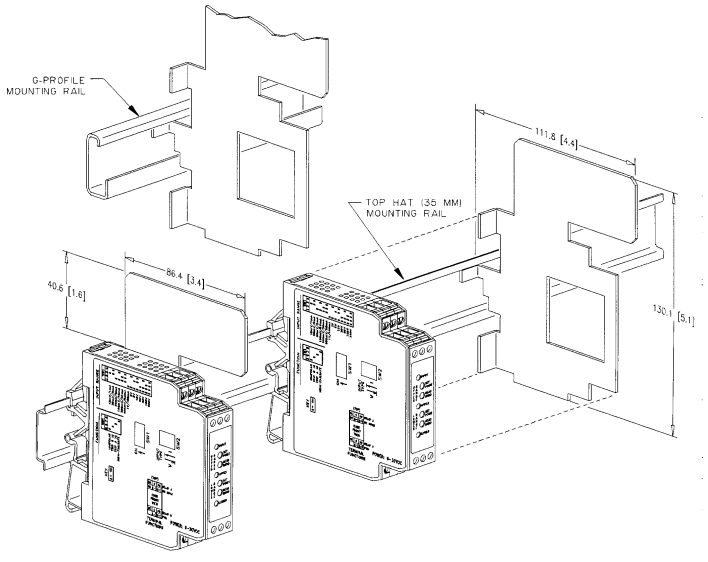
BURN OUT	1	2
NOT ALLOWED	■	■
UPSCALE	■	
DOWNSCALE		■
NONE		

TABLE 4
Output switch settings (SW1, position 1-8)

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

TABLE 5: Accuracy

TC Type	Temp. Range °C (°F)	Accuracy
J	-200 to 750°C (-328 to 1382°F)	±2.0 °C (±3.6°F)
K	-200 to -140°C (-328 to -220°F)	±5.0 °C (±9.0°F)
K	-140 to 1250°C (-220 to 2282°F)	±2.0 °C (±3.6°F)
K	1250 to 1370°C (2282 to 2498°F)	±4.0 ° (±7.2°F)
E	-150 to 1000°C (-238 to 1832°F)	±2.5 °C (±4.5°F)
T	-150 to 400°C (-238 to 752°F)	±3.0 °C (±5.4°F)
R	50 to 1760°C (122 to 3200°F)	±6.0 °C (±10.8°F)
S	50 to 1760°C (122 to 3200°F)	±6.0 °C (±10.8°F)
B	500 to 1820°C (932 to 3308°F)	±5.0 °C (±9.0°F)



Note1: 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.

Table 6: Thermocouple Range Settings

TC TYPE	RANGE	TEMPERATURE RANGE
B	6	500°C to 1820°C (932 to 3308°F)
	7	1000°C to 1820°C(1832 to 3308°F)
	8	500°C to 1000°C (932 to 1832°F)
	11	1500°C to 1820°C (2732 to 3308°F)
	12	750°C to 1000°C (1382 to 1832°F)
E	2	-18°C to 1000°C (0 to 1832°F)
	3	-18°C to 500°C (0 to 932°F)
	4	-18°C to 250°C (0 to 482°F)
	5	-18°C to 125°C (0 to 257°F)
	8	500°C to 1000°C (932 to 1832°F)
	9	250°C to 500°C (482 to 932°F)
	10	125°C to 250°C (257 to 482°F)
	12	750°C to 1000°C (1382 to 1832°F)
	13	375°C to 500°C (707 to 932°F)
	14	-150°C to 750°C (-238 to 1382°F)
	15	-150°C to 250°C (-238 to 482°F)
	16	-150°C to 0°C (-238 to 32°F)
J	2	-18°C to 750°C (0 to 1382°F)
	3	-18°C to 500°C (0 to 932°F)
	4	-18°C to 250°C (0 to 482°F)
	5	-18°C to 125°C (0 to 257°F)
	8	500°C to 750°C (932 to 1382°F)
	9	250°C to 500°C (482 to 932°F)
	10	125°C to 250°C (257 to 482°F)
	13	375°C to 500°C (707 to 932°F)
	14	-200°C to 750°C (-328 to 1382°F)
	15	-200°C to 250°C (-328 to 482°F)
	16	-200°C to 0°C (-328 to 32°F)
K	1	-18°C to 1370°C (0 to 2498°F)
	2	-18°C to 1000°C (0 to 1832°F)
	3	-18°C to 500°C (0 to 932°F)
	4	-18°C to 250°C (0 to 482°F)
	5	-18°C to 125°C(0 to 257°F)
	7	1000°C to 1370°C (1832 to 2498°F)
	8	500°C to 1000°C (932 to 1832°F)
	9	250°C to 500°C (482 to 932°F)
	10	125°C to 250°C (257 to 482°F)
	12	750°C to 1000°C (1382 to 1832°F)
	13	375°C to 500°C (707 to 932°F)
	14	-200°C to 750°C (-328 to 1382°F)
	15	-200°C to 250°C (-328 to 482°F)
	16	-200°C to 0°C (-328 to 32°F)
R,S	1	50°C to 1760°C (122 to 3200°F)
	2	50°C to 1000°C (122 to 1832°F)
	3	50°C to 500°C (122 to 932°F)
	4	50°C to 250°C (122 to 482°F)
	7	1000°C to 1760°C (1832 to 3200°F)
	8	500°C to 1000°C (932 to 1832°F)
	9	250°C to 500°C (482 to 932°F)
	10	125°C to 250°C (257 to 482°F)
	11	1500°C to 1760°C (2732 to 3200°F)
	12	750°C to 1000°C (1382 to 1832°F)
	13	375°C to 500°C (707 to 932°F)
T	3	-18°C to 400°C (0 to 752°F)
	4	-18°C to 250°C (0 to 482°F)
	5	-18°C to 125°C (0 to 257°F)
	9	250°C to 400°C (482 to 752°F)
	10	125°C to 250°C (257 to 482°F)
	13	375°C to 400°C (707 to 752°F)
	14	-150°C to 400°C (-238 to 752°F)
	15	-150°C to 250°C (-238 to 482°F)
	16	-150°C to 0°C (-238 to 32°F)

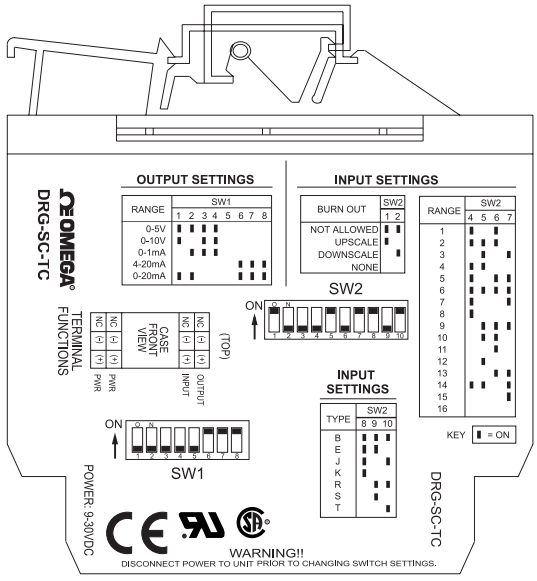


Figure 1: DRG-SC-TC Factory Calibration: J-Type, 0-500°C, 4-20mA, Upscale

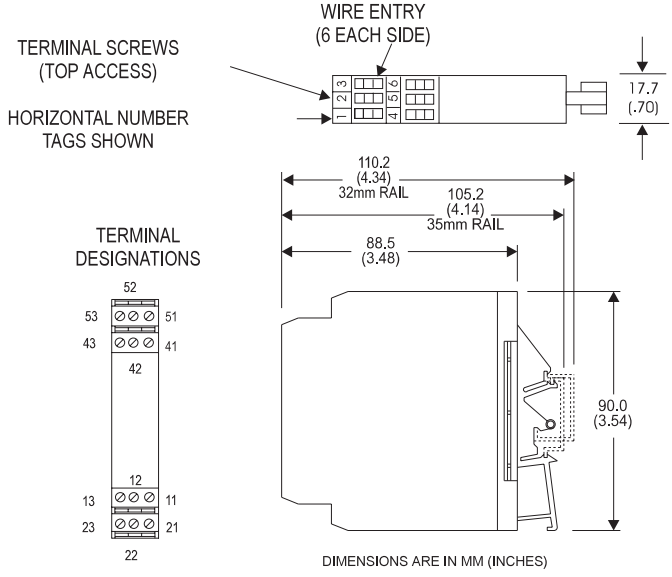


Figure 2: Mechanical dimensions for DRG-SC-TC

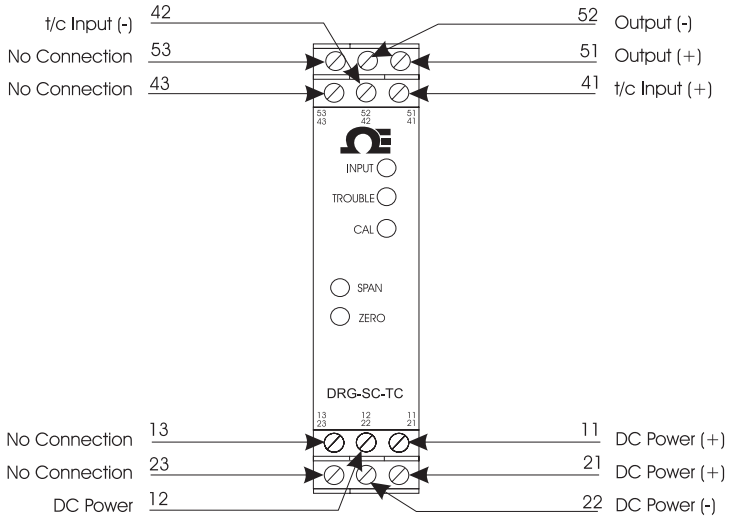


Figure 3: Wiring Diagram for DRG-SC-TC

SPECIFICATIONS

Inputs
Sensor Types: J, K, T, R, S, E, B
Input Ranges: see table 6.
Impedance: >1MΩ
Bias Current (burnout detection): <1.5microamp
Overvoltage: ±10V differential
Common Mode (Input to Ground): 1800VDC, max.

Zero and Span Adjustability
50% of any selected range

Output
Voltage Output
Output: 0-5V, 0-10V
Source Impedance: <10Ω
Drive: 10mA, max.
Current Output
Output: 0-1mA, 0-20mA, 4-20mA
Source Impedance: >100KΩ
Compliance:
0-1mA; 7.5V, max.(7.5KΩ)
0-20mA; 12V, max.(600Ω)
4-20mA; 12V, max.(600Ω)

Accuracy (Including Linearity, Hysteresis) see Table 5

Stability
±0.04% of the maximum full scale range per ºC change in ambient temperature, maximum.

Response Time (10 to 90%)
500mSec., typical.

Common Mode Rejection
DC to 60Hz: 120dB

Isolation
1800VDC between input, output and power.

EMC Compliance
Emissions: EN50081-1
Immunity: EN50082-2
Safety: EN50178

LED Indication
TROUBLE LED: Yellow, off during normal device operation.
INPUT LED: Green, continuously on if input is within selected range, flashes otherwise
CAL OK LED: Yellow, continuously on in normal device operation

Thermocouple Burnout Detect
Field configurable upscale, downscale, or disabled

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: -25 to 70°C (-13 to 158°F)

Power
Consumption: 1.5W typical, 2.5W max.
Range: 9 to 30VDC

Terminations and Wire
Screw terminals for 12-22 AWG. Use twisted pair for output and power connections.

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** Conformance per EMC directive 89/336/EEC and low voltage 73/23/EEC.

Mounting
32mm or 35mm DIN rail

PIN CONNECTIONS

11	DC Power(+)
12	DC Power (-)
13	No Connection
41	T/C Input(+)
42	T/C Input (-)
43	No Connection
21	DC Power (+)
22	DC Power(-)
23	No Connection
51	Output (+)
52	Output (-)
53	No Connection

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If the unit should malfunction, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of being damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components which wear are not warranted, including but not limited to contact points, fuses, and triacs.

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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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2. Model and serial number of product, and
3. Repair instructions and/or specific problems relative to the product.

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