



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 pro-

gramming 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 the 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 $\pm 0.1\%$ 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 $\pm 0.1\%$ of the minimum selected output. 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

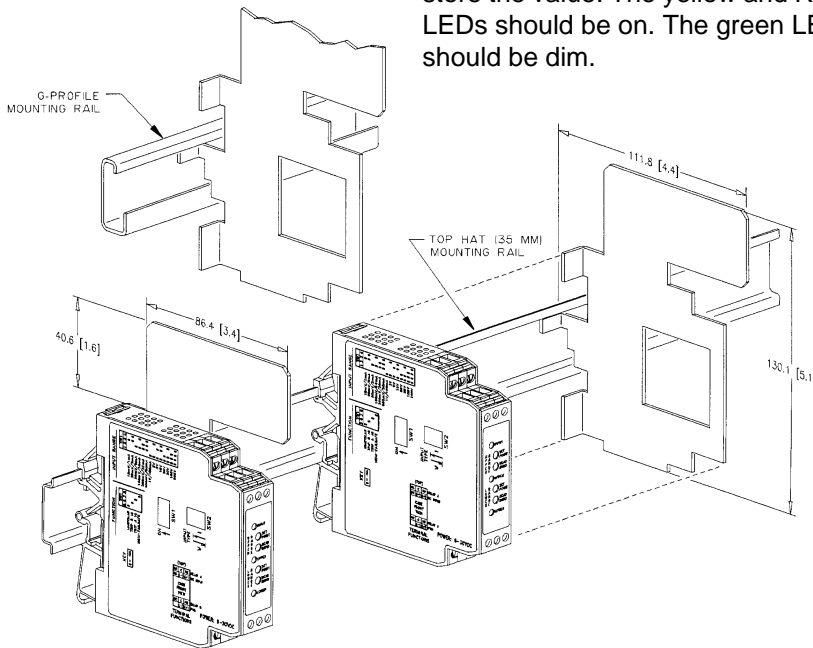
If the amplitudes of the input frequency is within the sensitivity parameters (i.e. 150mVp - 1Vp for LO and 0.5Vp - 10Vp for HI), then the sensitivity parameters can be set for optimum noise rejection.

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.



Note 1: 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 DGR-HS01 Heat Sink is recommended.

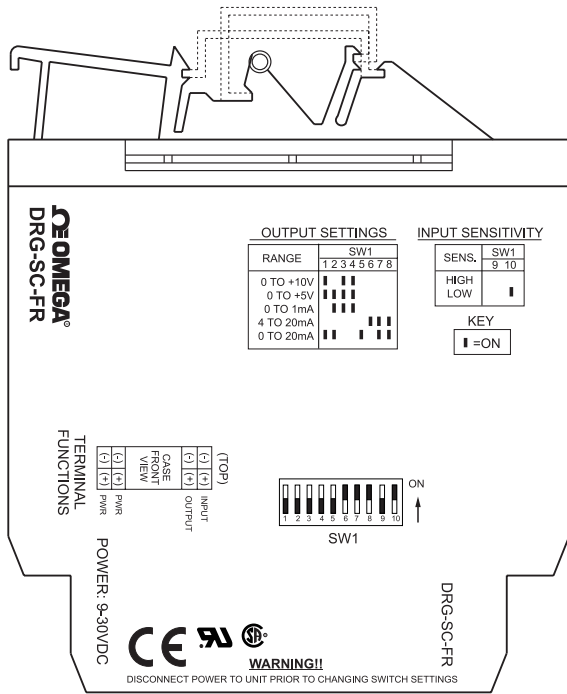


Figure 1: Factory Calibration;
0 to 1,000Hz, 1Vrms, 4-20mA

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

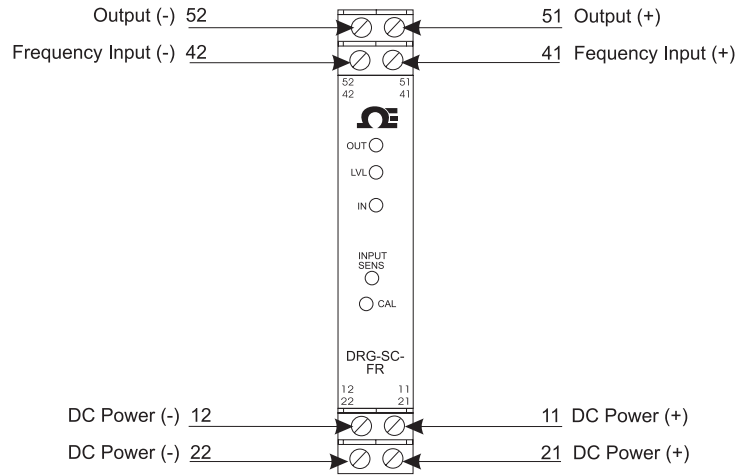


Figure 2: Wiring Diagram for DRG-SC-FR

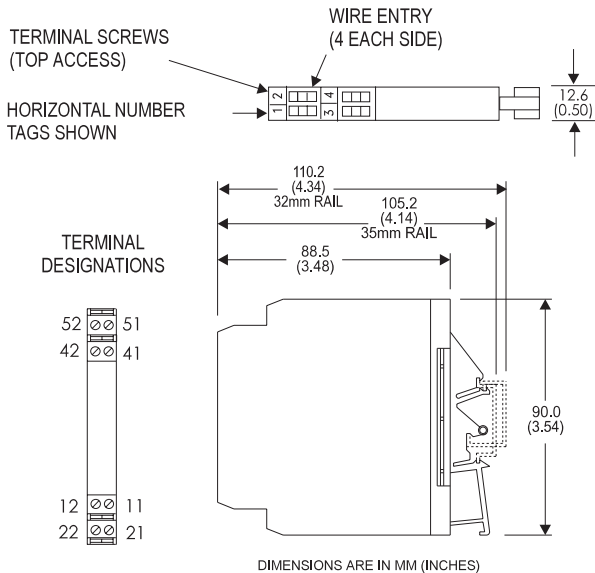


Figure 3: Mechanical Dimensions for DRG-SC-FR

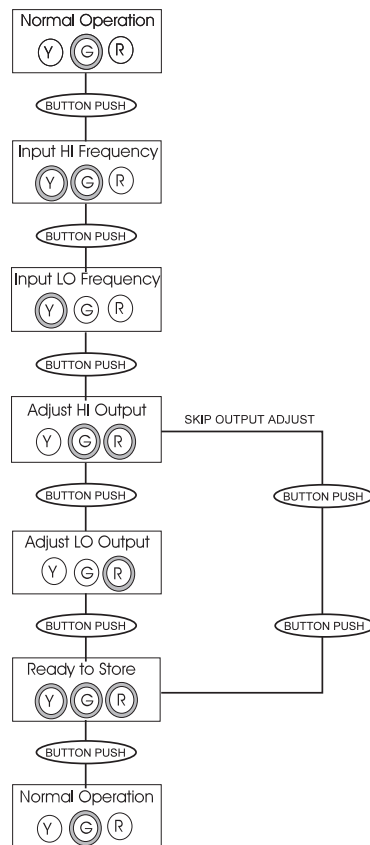


Figure 4: DRG-SC-FR Calibration Flow Chart

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		HIGH: 0.5-10Vp 150Vrms max. LOW: 150mVp-1Vp 50Vrms max.
	9	10	
HIGH	█	█	
LOW	█	█	

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-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 ≤ 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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3. Repair instructions and/or specific problems relative to the product

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