

SC-FI Series

Frequency to Current Signal Conditioner

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Description:

The SC-FI is a two wire frequency to analog converter that converts a pulse rate input into a 4-20 mA output signal proportional to frequency or rate.

The input pulse rate is amplified and filtered by the input signal conditioning circuitry. Two forms of input signal conditioning are provided, one for magnetic pickups and the other being an isolated pulse input.

The amplified frequency signal is then converted to an analog signal using a precision frequency to analog converter.

The output stage derives its power from the output current loop. The output stage converts the input signal into the desired output range. Multi-turn potentiometers provide for the necessary trimming of span and zero.

SPECIFICATIONS:**Operating Temperature**

32° F (0°C) to 158°F (70°C)

High Level Pulse Input

Type: Opto-Isolated

Logic 1: 4-30 VDC

Logic 0: 0-1 VDC

Frequency Range: 0-10 kHz

Fault Protection: Reverse Polarity Protection

Over Voltage Protection

Isolation Voltage: 500 V

Fast Transient Immunity: 500 V

Maximum Rise Time: No Limit

Maximum Fall Time: No Limit

Magnetic Pickup Input

Differential Input

Input Impedance: 10 kΩ

Frequency Response: 0-3500 Hz

Trigger Sensitivity: 30 mV p-p

Over Voltage Protection: ± 30 VDC

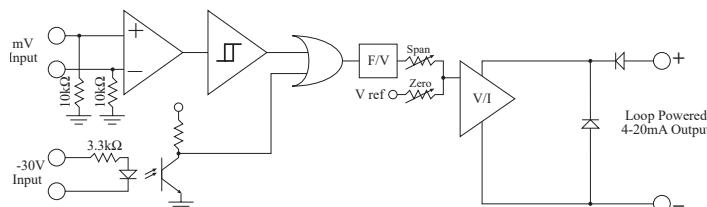
Frequency to Current Conversion

Range Selection: DIP Switch Selectable

Available Ranges: 150 Hz, 300 Hz, 600 Hz, 1200 Hz,

2500 Hz, 5000 Hz, 10,000 Hz

Factory Default: 1000 Hz

Simplified Block Diagram**Analog Output**

Accuracy: ± 0.1% Span (@ 20° C)

Output Type: Two Wire, Loop Powered

Range: 4-20 mA (10 - 50 mA optional)

Compliance Voltage: 10 to 40 VDC

Loop Burden: < 10 VDC (less than 500 Ω)

Trim Controls: Zero & Span, non-interacting

Span (20 mA) Trim Range: 50% to 100% of full scale

Linearity: < ±0.1% Span

Output Voltage Effect: < ± 0.002% Span/Volt

Temperature Effect: < 200 PPM/C°

Reverse Polarity Protected

Noise Content: < 0.2% Span

Response Time: 0.1 second (1 sec. jumper selectable)

Over-current Limiting: 35 mA

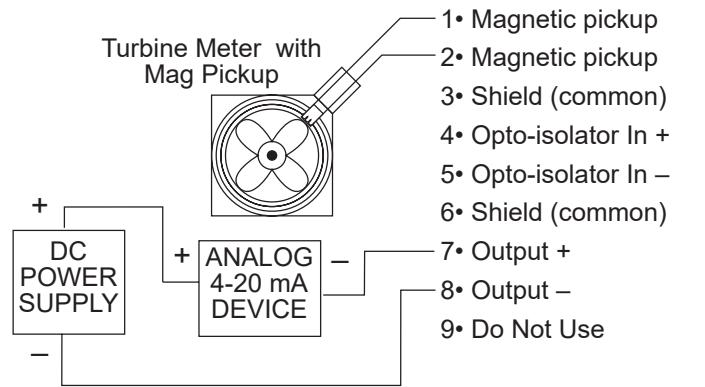
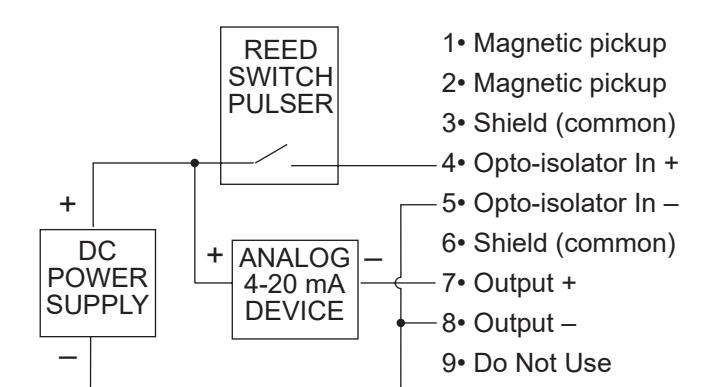
Output Loop Indicator: LED illuminates when output loop is powered by proper polarity and blinks proportionally to the input frequency.

Mounting Styles

DIN Rail Mount: Plastic enclosure with a snap fastener for fitting to DIN 46 277 and DIN EN 50 022 assembly rails.

NEMA 4X: 4.92" x 4.92" NEMA 4X Enclosure for wall mounting.

Explosion Proof: Aluminum enclosure for:
Class I, Division 1, Groups B, C & D
Class II, Division I, Groups E, F & G.

Typical Wiring Hookup**Magnetic Pickup Hookup****High Level Pulse Hookup**

INPUT & OUTPUT SETTINGS

REMOVING THE CASE:

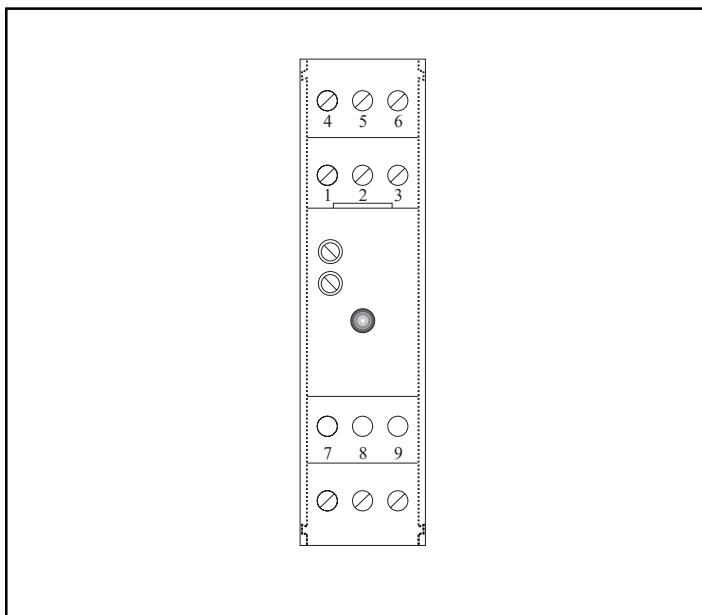
The case must be removed to change switch settings. To remove the case proceed as follows:

Refer to FIGURE 1. Using finger tips, carefully pry the case away from the terminal blocks (as shown with dotted lines).

Pry far enough to release the restraining clips on both sides of the case.

Press up on terminal block with thumbs. The assembly will pop out allowing it to be removed from case.

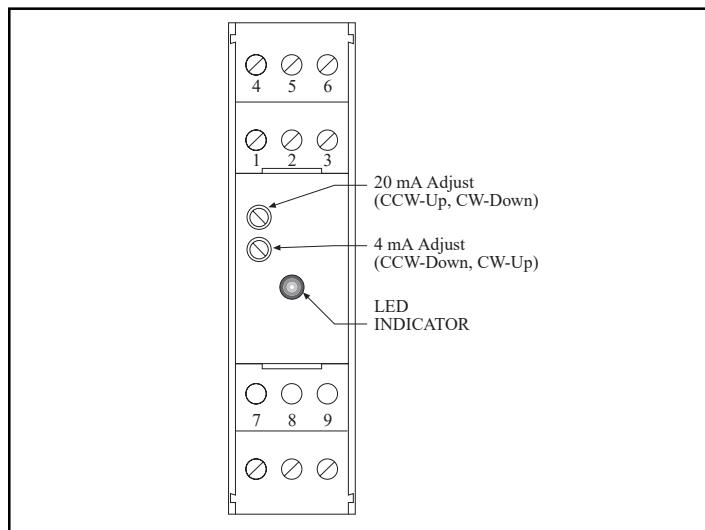
FIGURE 1:



OUTPUT ADJUSTMENTS:

The unit has two potentiometers for adjustment. The upper potentiometer controls the 20mA setpoint and the lower potentiometer controls the 4mA setpoint (see Figure 2). The 4mA output range can be adjusted from 3mA to 5mA. The 20mA output range can be trimmed from 50% to 100% of the selected range. To adjust the output, initially turn the 20ma adjust 20 turns CW for starting position. Input 0 frequency and adjust the 4 mA pot. Connect your maximum frequency and adjust the 20 mA pot.

FIGURE 2:



RESPONSE TIME SETTING:

Switch #8 controls the output response time.

<u>Switch #8</u>	<u>Response Time</u>
OFF	0.1 second
ON	1 second

Turn switch #8 ON to provide damping of the output resulting in a 1 second response time.

LED INDICATOR:

The SC-FI has a LED which indicates the status of the unit. The table below describes the 3 states for the LED.

LED STATUS: MEANING:

OFF The unit is off.

ON (constant) The unit is loop powered.

BLINKING The unit is receiving an input frequency. The LED will blink at a rate proportional to the input frequency. (The LED may appear to be constant at high input frequencies)

INPUT FREQUENCY RANGE SETTINGS:

The appropriate range is selected by turning "ON" the corresponding switch.

<u>Range:</u>	<u>Switch # "ON"</u>
0-150Hz	1
0-300Hz	2
0-600Hz	3
0-1200Hz	4*
0-2500Hz	5
0-5000Hz	6
0-10000Hz	7

* Factory Default. The unit is setup at the factory for the range 0-1000Hz.

"L" Option SPECIFICATIONS

Description:

The SC-FI with option "L" is a two wire frequency to analog converter that converts a pulse rate input into a 4-20 mA output signal proportional to frequency or rate.

The SC-FI with option "L" is intended for use with lower full scale input frequencies. Full scale frequencies of 15 Hz to 2000 Hz are possible. The unit includes both a contact closure input and an opto-isolated input. Output response time is selectable 1 or 10 seconds.

The amplified frequency signal is then converted to an analog signal using a precision frequency to analog converter.

The output stage derives its power from the output current loop. The output stage converts the input signal into the desired output range. Multi-turn potentiometers provide for the necessary trimming of span and zero.

SPECIFICATIONS:

Operating Temperature

32° F (0°C) to 158°F (70°C)

High Level Pulse Input

Type: Opto-Isolated

Logic 1: 4-30 VDC

Logic 0: 0-1 VDC

Frequency Range: 0-10 kHz

Fault Protection: Reverse Polarity Protection
Over Voltage Protection

Isolation Voltage: 500 V

Fast Transient Immunity: 500 V

Maximum Rise Time: No Limit

Maximum Fall Time: No Limit

Contact Closure Input

Sensor Compatibility- Requires an isolated, contact closure

Maximum Contact Voltage- 5 V

Maximum Contact Current- 0.12 mA

Nominal Pullup Resistance - 47 Kohm to 5 Vdc

Frequency Range - 0-100 Hz

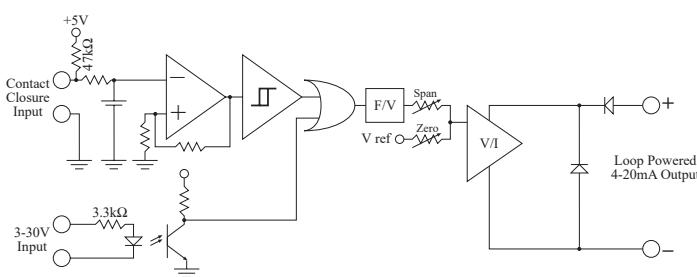
Frequency to Current Conversion

Range Selection: DIP Switch Selectable

Available Ranges: 30 Hz, 60 Hz, 120 Hz, 240 Hz,
480 Hz, 960 Hz, 1920 Hz

Factory Default: 100 Hz

Simplified Block Diagram



Analog Output

Accuracy: $\pm 0.1\%$ Span (@ 20° C)

Output Type: Two Wire, Loop Powered

Range: 4-20 mA (10 - 50 mA optional)

Compliance Voltage: 10 to 40 VDC

Loop Burden: < 10 VDC (less than 500 Ω)

Trim Controls: Zero & Span, non-interacting

Span (20 mA) Trim Range: 50% to 100% of full scale

Linearity: < $\pm 0.1\%$ Span

Output Voltage Effect: < $\pm 0.002\%$ Span/Volt

Temperature Effect: < 200 PPM/C°

Reverse Polarity Protected

Noise Content: < 0.2% Span

Response Time: 1 second (10 sec. jumper selectable)

Over-current Limiting: 35 mA

Output Loop Indicator: LED illuminates when output loop is powered by proper polarity and blinks proportionally to the input frequency.

Mounting Styles

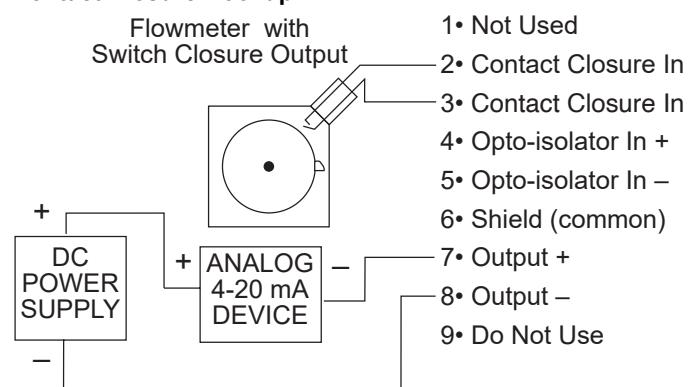
DIN Rail Mount: Plastic enclosure with a snap fastener for fitting to DIN 46 277 and DIN EN 50 022 assembly rails.

NEMA 4X: 4.92" x 4.92" NEMA 4X Enclosure for wall mounting.

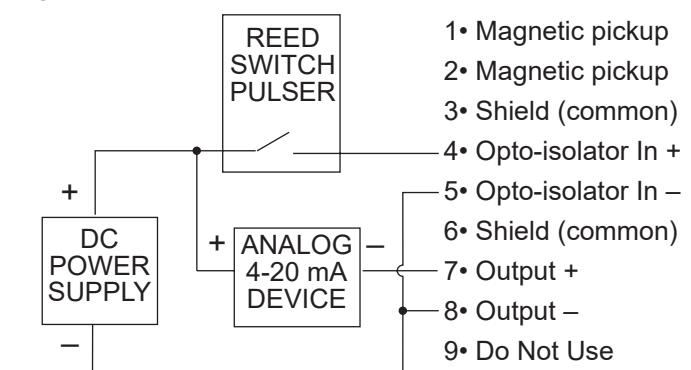
Explosion Proof: Aluminum enclosure for:
Class I, Division 1, Groups B, C & D
Class II, Division I, Groups E, F & G.

Typical Wiring Hookup (option "L")

Contact Closure Hookup



High Level Pulse Hookup



"L" Option INPUT & OUTPUT SETTINGS

REMOVING THE CASE:

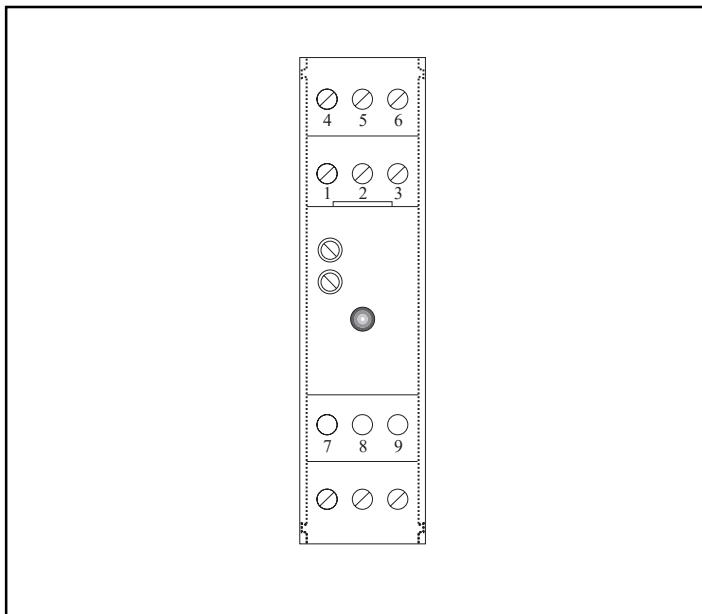
The case must be removed to change switch settings. To remove the case proceed as follows:

Refer to FIGURE 1. Using finger tips, carefully pry the case away from the terminal blocks (as shown with dotted lines).

Pry far enough to release the restraining clips on both sides of the case.

Press up on terminal block with thumbs. The assembly will pop out allowing it to be removed from case.

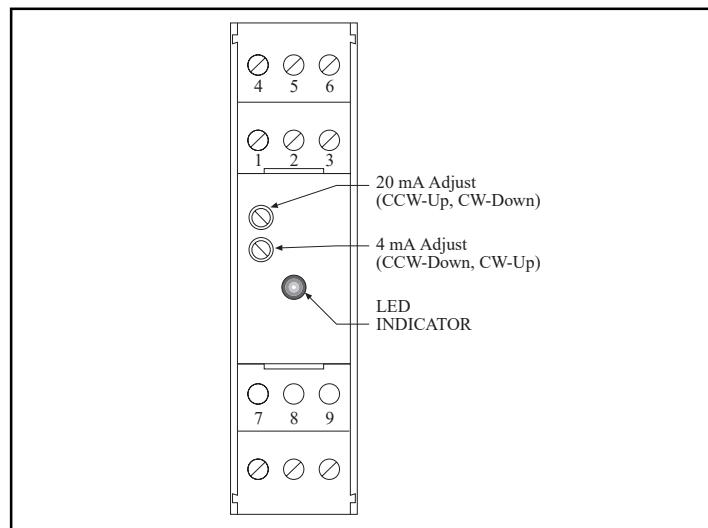
FIGURE 1:



OUTPUT ADJUSTMENTS:

The unit has two potentiometers for adjustment. The upper potentiometer controls the 20mA setpoint and the lower potentiometer controls the 4mA setpoint (see Figure 2). The 4mA output range can be adjusted from 3mA to 5mA. The 20mA output range can be trimmed from 50% to 100% of the selected range. To adjust the output, initially turn the 20mA adjust 20 turns CW for starting position. Input 0 frequency and adjust the 4 mA pot. Connect your maximum frequency and adjust the 20 mA pot.

FIGURE 2:



RESPONSE TIME SETTING:

Switch #8 controls the output response time.

<u>Switch #8</u>	<u>Response Time</u>
OFF	1 second
ON	10 second

Turn switch #8 ON to provide damping of the output resulting in a 10 second response time.

LED INDICATOR:

The MS660 has a LED which indicates the status of the unit. The table below describes the 3 states for the LED.

LED STATUS: MEANING:

OFF The unit is off.

ON (constant) The unit is loop powered.

BLINKING The unit is receiving an input frequency. The LED will blink at a rate proportional to the input frequency. (The LED may appear to be constant at high input frequencies)

INPUT FREQUENCY RANGE SETTINGS:

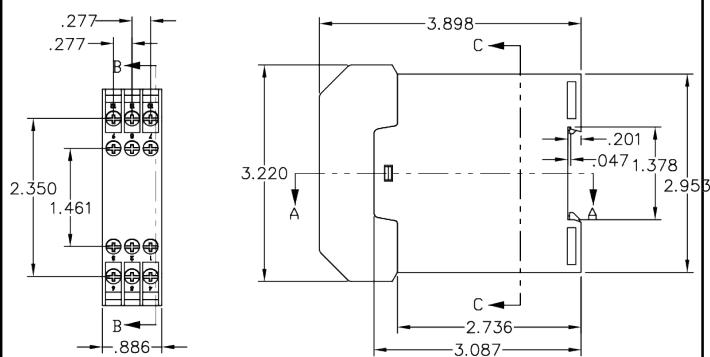
The appropriate range is selected by turning "ON" the corresponding switch.

<u>Range:</u>	<u>Switch # "ON"</u>
0-30Hz	1
0-60Hz	2
0-120Hz	3*
0-240Hz	4
0-480Hz	5
0-960Hz	6
0-1920Hz	7

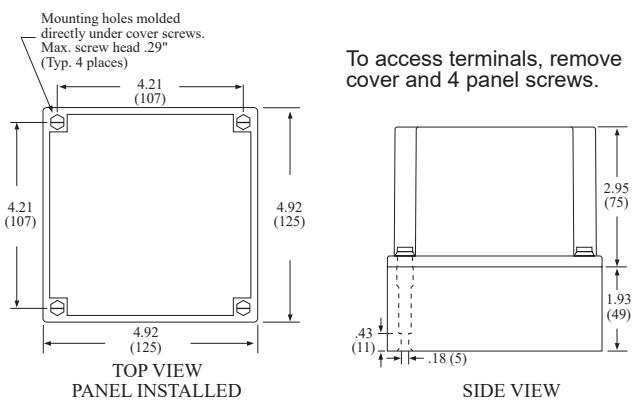
* Factory Default. The unit is setup at the factory for the range 0-100Hz.

Dimensions

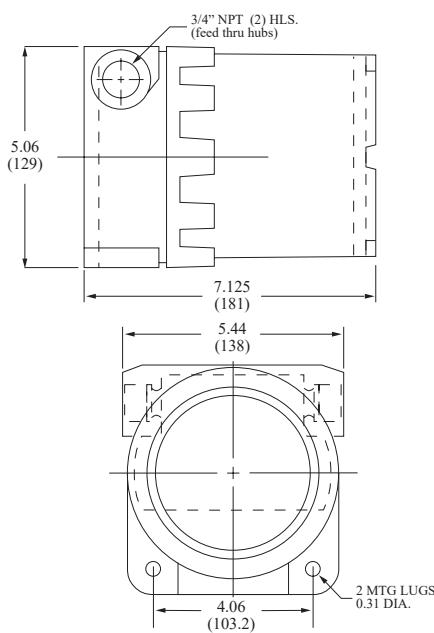
DIN Rail Mount



NEMA4X



Explosion Proof Enclosure



WARRANTY

This product is warranted against defects in materials and workmanship for a period of two (2) years from the date of shipment to Buyer.

The Warranty is limited to repair or replacement of the defective unit at the option of the manufacturer. This warranty is void if the product has been altered, misused, dismantled, or otherwise abused.

ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, ARE EXCLUDED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

Decoding Part Number

Example SC-FI D ET

Series _____

FI= Frequency to Current

Mounting: _____

B= Nema 4X

C= Explosion Proof

D= DIN Rail

Options: _____

ET=Extended Temp:-4° to 185°F (-20° to 85°C)

L=Low Count Speed for Contact Closure Inputs

T=Third 3/4" conduit entry for Explosion Proof Housing

H2 = 0.875" Hole for NEMA4 mounting style

CG = Cable Grip with Locking Nut used for H2 option

HF2 = 0.5" Female NPT Hub fitting

H3 = 1.125" Hole for NEMA4 mounting style

HF3 = 0.75" Female NPT Hub fitting

Accessories: (add to end of part number)

DR-4= 4" DIN Rail