

# INSTALLATION & OPERATION MANUAL

## SP718-mA REV. A Modulated Carrier Amplifier 4-20mA Transmitter

DOC#: MN-718MA-A.doc



***LIQUID CONTROLS SPONSLER, INC.***

**FLOW MEASURING DEVICES AND CONTROLS**

**A Unit of the IDEX Corporation**

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## SPECIFICATIONS

<b>Temperature:</b>	Operating 0 – 70°C Storage –20 – 85°C
<b>Input Voltage:</b>	110VAC 60Hz or 12 – 16.5VDC 100mA MAX Observe Polarity Consult factory for other Input Voltages
<b>Signal Input:</b>	Frequency 0 – 3500 Hz w/ 50kHz carrier (requires P/U Coil 1 – 1.3 mh)
<b>Analog Output:</b>	4mA @ 0Hz, 20 mA @ desired Full Scale Frequency Full Scale Range 25Hz – 3500 Hz Selectable Consult factory for other Ranges Response Time 95% of change in 1 second Linearity .3% F/S Tempco <2% of Reading over entire Temperature Range Maximum Load Resistance 500 ohms
<b>Features:</b>	LED Power Indicator Mounts directly on flowmeter
<b>Enclosure:</b>	FM Approved, CSA Certified Class I Groups B, C, D Class II Groups E, F, G Weight 1.7 lbs.

The SP718-mA Modulated Carrier Amplifier and Analog Transmitter is a meter mounted device designed to combine the advantages of the Modulated Carrier principle with the convenience of an analog output in a single PCB assembly. The SP718-mA linearly converts the detected carrier frequency shift rate to an equivalent 4-20mA current output. When incorporated with a turbine flowmeter a current representation proportional to flow is obtainable. Data transmission in a current format exhibits excellent noise immunity and the capability of long distance transmissions.

The SP718-mA produces a carrier frequency in conjunction with an RF pickup coil, detects the shift in the carrier frequency (Modulation) that occurs with the passage of magnetic material and linearly generates a 4-20mA output that is proportional to the rate of modulation.

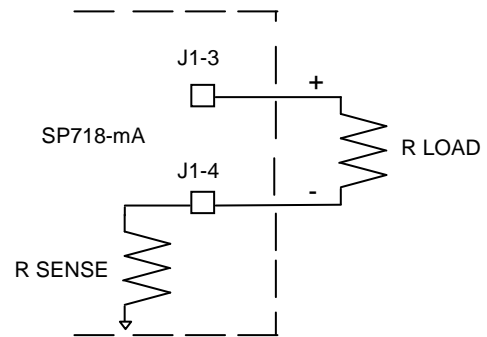
A full-scale frequency range of 25-3500Hz is jumper selectable. The Span Adjustment establishes the frequency point at which a 20mA output is achieved.

The Modulated Carrier principle introduces no drag on the passing magnetic device; therefore, when utilized with a turbine flowmeter extension of the flowmeter's nominal linear range at the low end of the flow spectrum is realized. This parameter is particularly useful when measuring a low mass gas and the operating flowrate is at the flowmeter's low end.

## BENCH TEST CALIBRATION PROCEDURE

**Required Equipment:** Power Supply 12-16.5VDC or 110VAC  
 Digital Multimeter (DMM)  
 Frequency Generator  
 Frequency Counter  
 Oscilloscope

Refer to Figure



### Test Procedure:

**NOTE:** All test equipment power cords should be equipped with 2-prong 'cheater' plugs.

- A) Connect Flowmeter with RF Pick-up Coil to J1-1,2
- B) Connect Power Supply Positive (HOT) & Negative (NEU) Leads to J1-6,5 Respectively
- C) Connect O'Scope Positive & Negative Leads to J1-1,2 Respectively
- D) Connect DMM Positive & Negative Leads to J1-3,4 Respectively, Set Function to mA DC
- E) Install Jumper @ JU1-3 for desired Full Scale Frequency Range
- F) Turn Power Supply 'ON', LED D1 Illuminates & O'Scope displays a 50KHz +/- 5KHz 6Vp-p Carrier Sinewave
- G) Adjust 'ZERO' (R25) for a DMM Indication of 4.00mA
- H) Set Frequency Generator function to Sinewave, Amplitude to 500mVp-p with 2.5VDC OFFSET & Frequency to desired Full Scale Frequency. Connect Frequency Generator POSITIVE Lead to TP1 (R11) & NEGATIVE Lead to J1-2.
- I) Adjust 'SPAN' (R23) for DMM Indication of 20.00mA
- J) Reduce Signal Amplitude of Frequency Generator to Zero, Adjust 'ZERO' (R25) for DMM Indication of 4.00mA if necessary
- K) Increase Signal Amplitude of Frequency Generator to 500mVp-p, 2.5VDC OFFSET; Adjust 'SPAN' (R23) for DMM Indication of 20.00mA if necessary
- L) Adjust Frequency of Frequency Generator to 0, 25, 50, 75, & 100% of Full Scale Frequency of Step H

To check for Linearity at any Frequency Point, incorporate the following formula -  
 $(F/F \text{ Max} \times 16) + 4 = \text{mA}$

Example: Assume Maximum Frequency Point = 2KHz (20mA Point)

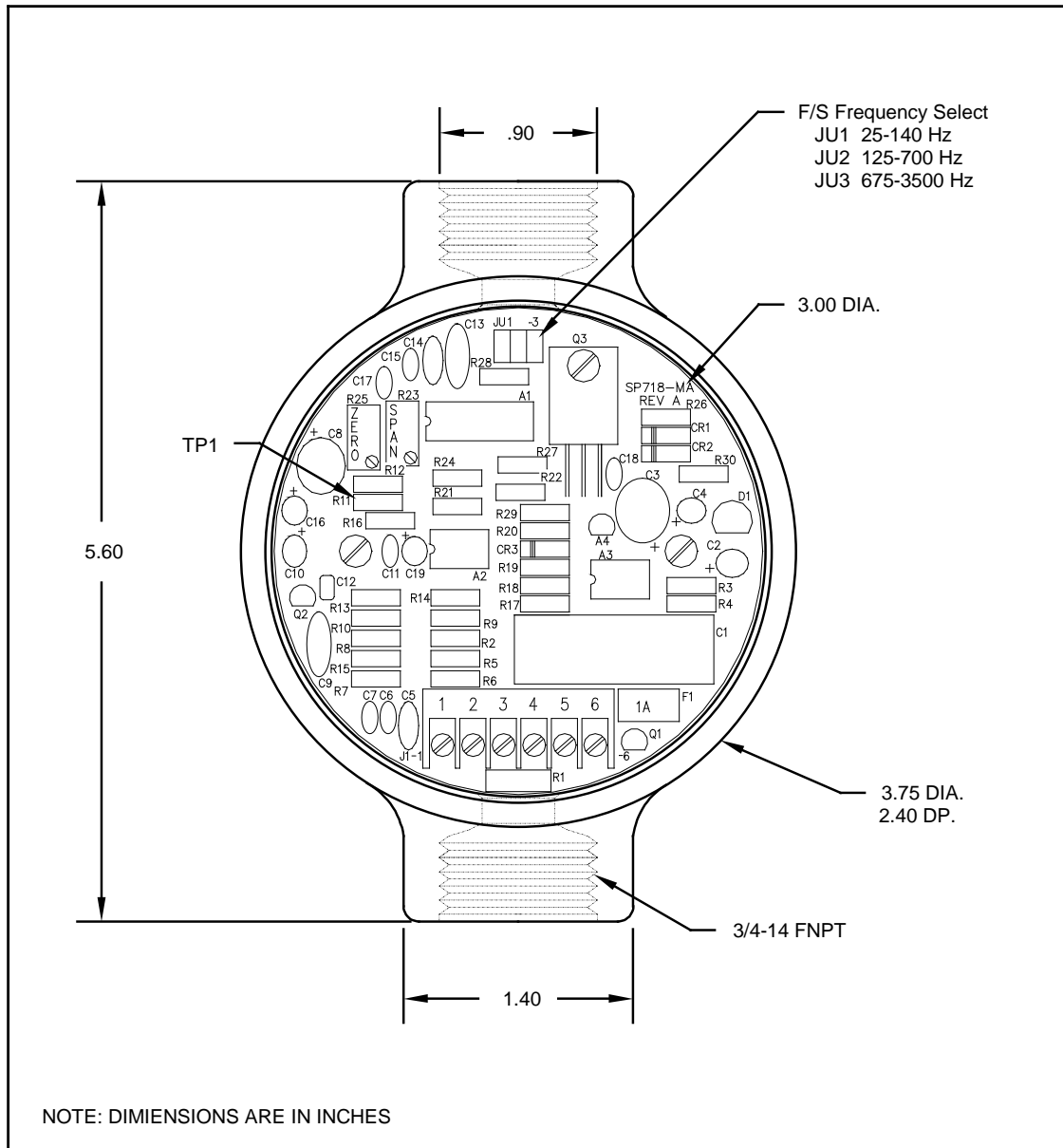
Check for Linearity at 750Hz

$$750/2000 = .375$$

$$16 \times .375 = 6$$

$$6 + 4 = 10 \text{ DMM Should indicate } 10.00\text{mA at } 750\text{Hz}$$

DATE	REV	REVISION RECORD	AUTH	DR	CK



F/S Frequency Select  
 JU1 25-140 Hz  
 JU2 125-700 Hz  
 JU3 675-3500 Hz

TERMINAL LOCATION

- 1 SIGNAL IN +
- 2 SIGNAL IN -
- 3 ANALOG OUT +
- 4 ANALOG OUT -
- 5 110 VAC NEU (DC-)
- 6 110 VAC HOT (DC+)

**NOTE:**  
 Condulet enclosure not available for 120 volts, consult factory

NOTE: DIMIENSIONS ARE IN INCHES

<b>SPONSLER, INC.</b>			
FILE NAME\ELECT\SP718mA.DWG			
DESCRIPTION		DRAWN BY TN	
SP718-mA Rev. A		DATE 5-5-97	
MATERIAL		SCALE	REVIEWED BY
		NONE	DATE
COD	DRAWING NUMBER	REV. #	APPR. BY
EM	SP718-mA		DATE