

# INSTALLATION & OPERATION MANUAL

## SP720-2 Loop Powered 2 Wire Modulated Carrier Amplifier 4-20mA Transmitter

DOC#: MN-720



***LIQUID CONTROLS SPONSLE, INC.***

**FLOW MEASURING DEVICES AND CONTROLS**

**A Unit of the IDEX Corporation**

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## SPECIFICATIONS

<b>Temperature:</b>	Operating -40 to 85°C Storage -65 to 125°C
<b>Input Voltage:</b>	Minimum = $7V + (20mA \times RL)$ Maximum = $28V + (4mA \times RL)$ Protected against polarity reversal
<b>Signal Input:</b>	Frequency 0-3500Hz with 50KHz Carrier (Requires pickup coil 1-1.3mh)
<b>Analog Output:</b>	4mA @ 0Hz, 20mA @ desired full scale frequency Full scale range = 35Hz-3500Hz selectable Response time = 95% of change in 1 second Linearity = .3% F/S Tempco = <2% of reading over entire temperature range
<b>Features:</b>	LED Signal 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 SP720-2 Loop Powered 2 Wire Modulated Carrier Amplifier 4-20mA Transmitter is a unique meter mounted device designed to combine the advantages of the modulated carrier principle with the convenience and accuracy of a loop powered 4-20mA transmitter. When incorporated with a frequency-generating device such as a turbine flowmeter, data transmission in a current format proportional to flow is obtainable.

The Modulated Carrier produces a carrier frequency in conjunction with a RF pickup coil, detects and amplifies the shift in the carrier frequency (modulation) that occurs with the passage of magnetic material and generates a squarewave pulse with each shift in carrier frequency. The pulse's frequency is proportional to the input frequency and is converted linearly to a representative current output through a load. The full-scale frequency of 35-3500Hz is selectable via S1. LED D1 illuminates when a signal is present.

The Modulated Carrier principle introduces no drag on the passing magnetic device. Therefore, extension of the low end of a flowmeter's nominal linear range is realized. This parameter is particularly useful when measuring a low mass gas. Installation of the SP720-2 requires only 2 wires because it is a true 2-wire transmitter in that input power and analog output utilize the same wires.

## **BENCH TEST CALIBRATION PROCEDURE**

**Required Equipment:** Power Supply 5-28 VDC, Digital Multimeter (DMM), Frequency Generator, Frequency Counter, Oscilloscope

### **Test Procedure:**

- A) Connect DMM positive lead to power supply positive and the DMM negative lead to J1-3, Set DMM function to mA DC
- B) Connect power supply negative lead to J1-5
- C) Connect RF pickup coil to J1-1, 2
- D) Connect oscilloscope positive and negative leads to J1-1, 2 respectively
- E) Set S1 for desired full scale frequency range
- F) Turn power supply 'ON'. Observe oscilloscope displays 50KHz  $\pm$  5KHz 6Vp-p carrier sinewave
- G) Adjust 'ZERO' (R25) for 4.00mA DMM indication
- H) Disconnect oscilloscope @ J1-1,2. Connect frequency generator positive and negative leads to J1-1,2 respectively, set function to squarewave and amplitude to 5Vp-p (0-5v) and frequency to the desired full scale point
- I) Adjust 'SPAN' (R20) for 20.00mA DMM indication
- J) Reduce signal amplitude to frequency generator to zero, adjust 'ZERO' (R25) for 4.00mA DMM indication if necessary
- K) Adjust signal amplitude of frequency generator to 5Vp-p, adjust 'SPAN' (R20) for 20.00mA DMM indication if necessary
- L) Adjust frequency of frequency generator to exactly 50% of the maximum frequency point in step H, DMM should indicate 12.00mA  $\pm$ .06, repeat 25%, 75% points

To check for linearity @ any frequency point incorporate the following formula-

$$(F/F \text{ max} \times 16) + 4 = \text{mA}$$

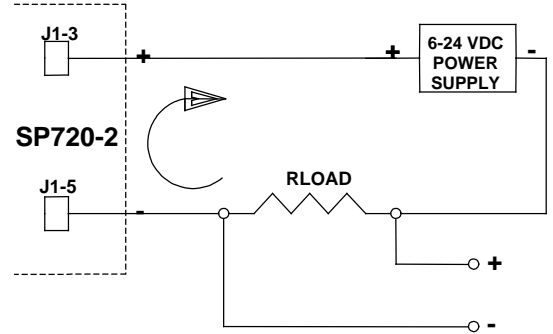
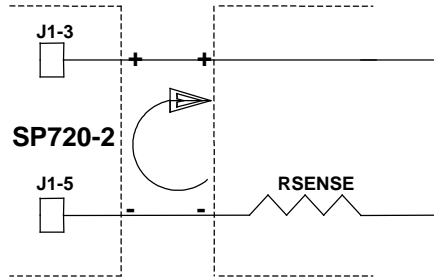
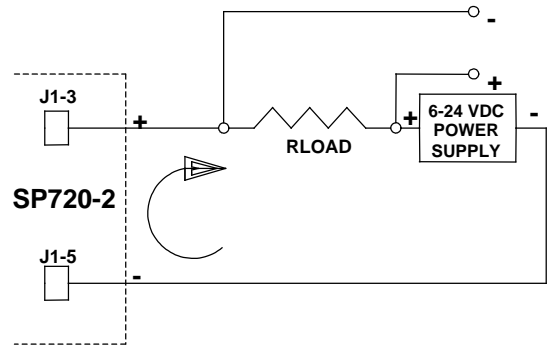
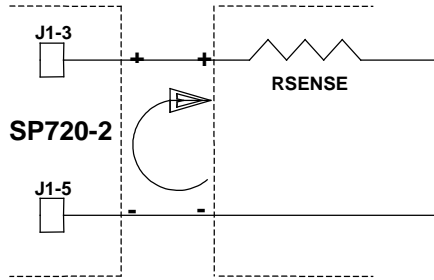
Example: Assume maximum frequency point = 2000Hz (20.00mA point)  
Check for linearity @ 750Hz point

$$750/2000 = .375$$

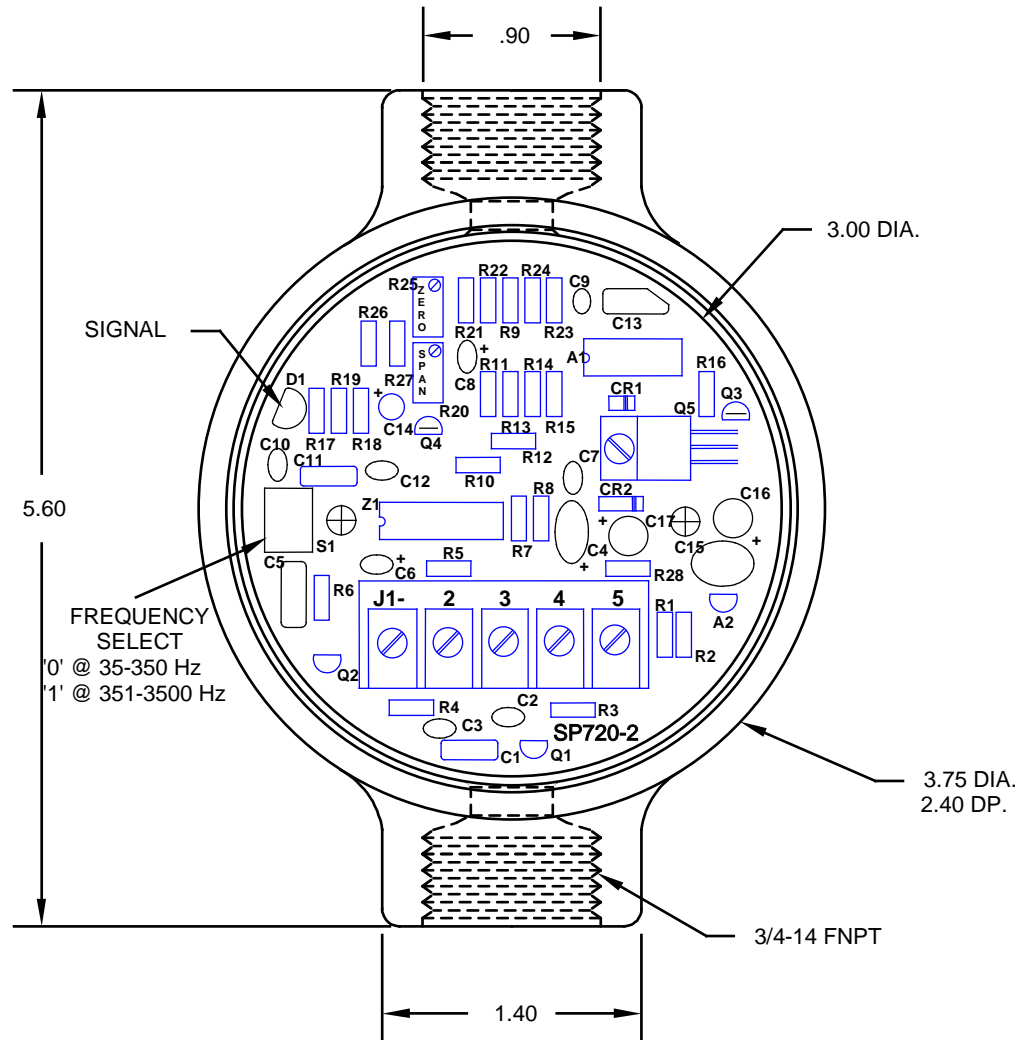
$$16 \times .375 = 6$$

$$6 + 4 = 10 \text{ DMM should indicate } 10.00\text{mA @ } 750\text{Hz input}$$

# TYPICAL LOOP CONFIGURATIONS



DATE	REV	REVISION RECORD	AUTH	DR	CK



TERMINAL LOCATION

- 1 SIGNAL IN +
  - 2 SIGNAL IN -
  - 3 LOOP IN +
  - 4 N/C
  - 5 LOOP IN -
- } 4-20mA

NOTE: DIMENSIONS ARE IN INCHES

<b>SPONSLER, INC.</b>			
FILE NAME: ELECT\SP720-2.DWG			
DESCRIPTION SP720-2 loop powered transmitter		DRAWN BY TN DATE 5-5-97	
MATERIAL		SCALE NONE	REVIEWED BY DATE
COD EM	DRAWING NUMBE SP720-2	REV. #	APPR. BY DATE

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