6 Digit Flowrate Indicator 97RA

INSTALLATION
AND
OPERATION

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MODEL 97RA DIGITAL FLOWRATE INDICATOR/TRANSMITTER

The 97RA has been designed for use with any type of pulse producing flowmeter and will provide a six digit display of flowrate in terms of any engineering units.

Although incorporating modem microprocessor and circuitry techniques, we have successfully produced a ‘user friendly’ instrument regarding the minimum of setting up.

Main features of this unit are:

Six digit bright LED display of flowrate in any units
Built in high and low flow alarm facilities as standard
4-20mA output proportional to displayed reading
Controls and factor adjustments behind a clean front panel
Small compact size 96 x 48mm
Low power consumption
10 volts dc auxiliary supply for feeding transducers etc
Fully adjustable decimal point
Six digit factorising for great accuracy
Use as a flow ratio indicator transmitter with two flowmeter inputs

<u>Set Up instructions For 97RA</u>

Wire the unit according to the diagram on page 7/8. Ensure the power supply is suitable for the instrument. On power up, the unit will display the following:- "FREQ A - NO SIG". If the instrument is being fed with a signal from the flowmeter, a number may be displayed in place of "NO SIG".

To program the unit to read in engineering units. a factor must be inserted in the memory of the 97RA. This is achieved by pressing the run/set switch located at the top right of the front of the instrument. Access is gained to the program switches, carefully removing the bezel and withdrawing the front panel.

If the run/set switch is pressed once, the following will be displayed:- ''FREQ A - SET - SCALE O". If the unit has been pre-set at the factory a number will be displayed instead of “O”.

The factor is calculated as follows:-

$$\frac{\text{Display readout required}}{\text{Frequency at maximum flow rate}} = \text{factor}$$

The "frequency at maximum flowrate" figure will be found on the calibration certificate supplied with the flowmeter.

The "Display readout required" is normally the maximum flowrate of the flowmeter, and can be converted to any convenient engineering units

Example:-

$$\frac{50 \text{ (gallons per minute)}}{1432 \text{ (Hz at 50 gallons per minute)}} = .034962 \text{ (factor)}$$

Enter the factor by pressing the switches below the LED displays. The decimal point position is selected next by pressing the bottom right button several times to move it across the display.

When the meter factor is correct, pressing the run/set switch sends the unit back into normal operating mode, and saves the factor into memory. The flow rate display resolution can be adjusted by moving the decimal point position of the factor.

All programming is carried out in a similar manner, and high/low flow alarms, decimal point position, 4-20mA (if fitted) can be adjusted.

To view the parameters set into the unit, press the run/set switch once. The unit will display "FREQ A - SET - SCALE - O" as before. Press the function button (right hand centre) to display the various parameters. The sequence is “OFFSET - ALA L - ALA H - REF – F.S. –“ and back to "SCALE". on each press of the function button, the parameter will be displayed for one second, followed by the value in that part of the memory.

For example, to move the decimal point position of the flowrate indication, step round to the parameter “OFFSET” and enter the decimal point position required by using the bottom right button to step across the display. For example, to set the 4-20mA transmission (if fitted), step round to the parameter "F.5." and enter the maximum flowrate figure. In our earlier example this would be 50.

For example, to set the high alarm level, step round to the parameter "ALA H" and enter the flowrate figure required.

Always remember to press the run/set switch after changing data to save it in memory.

DETAILED DESCRIPTION OF SWITCHES

RunlSet Switch

This switch is located in the top right hand comer of the front panel and has the following function:

When in the RUN mode, the instrument will display the measured signal. In this mode the function switch can be used to observe the pre-set parameters, but the D.P. (Decimal Point), 0-9 switches and the polarity switch are disabled. Pressing the switch changes the unit to the 5ET mode, and activates the D.P., 0-9 and polarity switches.

Function Switch

This is located directly below the RUN/SET switch and is used when it is required to observe or set the programmable parameters. Pressing the function switch steps through the parameters in the sequence shown below:-

1. SCALE (Scaling Factor)
2. OFFSET
3. ALA L (Alarm Low)
4. ALA H (Alarm High)

Each of the above headings is displayed for one second before the display automatically switches to display the set value. At this stage it is necessary to enter a value if required or step to the next parameter by a single depression of the function switch. If the RUN/SET switch is in the RUN mode, and the instrument is displaying a measured value, a single depression of the function switch will step the display automatically through all the programmable parameters at a pre-determined rate of approximately one per second. On completion of this cycle, the display will return to the measured value.

D.P. (Decimal Point) Switch

This is located under the function switch and is used to set the position of the decimal point as required. A single depression of the switch will move the point one decade. Holding the switch depressed will cause the point to move in decade steps from right to left at a pre-determined rate.

0-9 Switch

Located under each decade, these switches are used to set the value of all programmable parameters. Each depression increments the display one digit. Holding the switch depressed steps the display through ' 0-9 at a pre-determined rate.

+/- Switch

Located at the lower left hand corner of the front panel, this switch selects negative values when required by displaying a negative sign. No sign is displayed for + values.

Rear Panel Terminals

l. LOW ALARM (Open Collector) 200mA 50V Max
2. HIGH ALARM (Open Collector) 200mA 60V Max
3. COMMON
4. MAINS EARTH
5. +10V UNREGULATED @ 50mA
6. RESET ALARM (If Latching Alarm is Specified)
7. MODE O
8. MODE I
9. COMMON
IO. SIGNAL A
1I. COMMON
i2. SIGNAL B

Mode Switches

MODE 1	MODE O	FUNCTION
OPEN	OPEN	FREQUENCY 'A'
GROUND	OPEN	FREQUENCY 'B'
OPEN	GROUND	RATIO A,B
GROUND	GROUND	RATIO B/A

It is intended that the user will connect an external switch between terminal 7 or 8 and the COMMON terminal 9 to obtain the required function as shown in the table above.

Output Options

D.C. Analogue: 0-5V*, 0-20mA and 4-20mA Outputs

When units are fitted with any of these options, the output is available via a red (+ve) and black (-ve) plug on the rear panel. The outputs are proportional to the display reading and not the input signal. With the Instrument in the SET mode, each depression of the function switch will step through the parameters in the following sequence:-

I. SET SCALE
2. OFFSET
3. ALA L (Alarm Low)
4. ALA H (Alarm High)
5. REF (0V) (OmA) (amA)
6. F.S. (5v) (20mA) (20mA)

* The maximum D.C. output voltage available with this option is +5V.

When using the outputs, values should be set into 5. and 6. as appropriate.
The REF will probably be zero.
The Full Scale (F.5.) value will depend on the application and the range Of display readings expected.

NOTE

The outputs are not affected when the unit is in the RUN mode, and the function switch is used to observe the parameters 1-6.

WARNING

THE INSTRUMENT CANNOT BE OPERATED ON AN EXTERNAL D.C. SUPPLY IF THE ANALOGUE OUTPUT IS REQUIRED.

Increasing the Discrimination of the Display

Having set the scaling factor, it may be an advantage to increase the discrimination of the displayed value (Ax) to monitor low frequencies.
This can be achieved by moving the decimal point when setting the scaling factor (x), as shown in the example below:-

Assume an input frequency of l000Hz and a calculated scaling factor
Of 1.52, then Ax - 1520
By moving the decimal point in the scaling factor one place to the right, an extra decade of discrimination can be achieved.
Thus if we make x = 15.2 then Ax will read 15200.
It is now necessary to position the decimal point. To do this, switch the instrument into the SET mode and select the OFFSET function. The D.P. switch should now be used to obtain a display of 0.0.
Switching back to the RUN mode will give a reading of 1520.0
The instrument is now set to give an extra decade of discrimination.

If two decades of discrimination are required, simply move the decimal point two places to the right in the calculated scaling factor, and position the D.P. accordingly in the OFFSET mode. The only limit when increasing the discrimination is if the display goes beyond 999999, in which case it will read HIGH and it is then necessary to reduce either the scaling factor or the input frequency.

Setting the Offset

The instrument has an OFFSET facility that can be either positive or negative. It is a very useful addition to the scaling factor and can be used to display percentage difference between A and B, or show the deviation from a nominal value. E.g., if the nominal frequency on input A is l000Hz, by setting the scaling factor to one and the offset to -i000, the display will indicate the deviation from l000Hz. Another use of the offset is in the display of percentage difference between signals A and B.

One of the signals is chosen as the reference (say signal A). The percentage is given by (B/A x 100) -100. Thus by setting the mode to read ratio B/A with a scaling factor of 100 and in offset of -100 the percentage difference between A and B will be displayed. If a decimal point is required, this should be inserted when setting the offset,

Sensitivity Control

This is located to the right of the rear terminal block and is a pre-set adjustment accessible through a hole in the rear panel. Maximum sensitivity is obtained when the control is fully clockwise.

Alarm Outputs

The HIGH alarm will be activated when the value shown on the display is equal to, or greater than, the value programrned into memory. The LOW alarm operates on a value equal to, or below, the programmed value.

The alarm outputs automatically reset when the value shown on the display returns to a no alarm level. The alarm outputs can be supplied with a latching facility and reset by grounding pin 6 on the rear terminal block.

Mains Earth

The unit is supplied with a three core mains cable and the earth connection from this cable is connected to terminal 4 on the rear panel. In some applications, it may be necessary to link the COMMON terminal to MAINS EARTH, i.e., link terminals 3 and 4 on the rear terminal block.

Transformer Connections

The 97RA can be operated from either 240V or 120V, 50l60Hz A.C. supplies. Instruments are set to operate from mains voltages specified at time of ordering. Should the user wish to change the mains operating voltage for any reason, the following procedure should be adhered to:-

i) Disconnect the mains supply.

ii) Gently prize off the front panel surround and allow the front panel to fall forward and out.

iii) Remove the two screws in the rear of the case, then push the tachometer out through the case front.

iv) The pads which select the operating voltage are located on the underside of the P.C.B. Links should be soldered across the appropriate pads and the instrument re-assernbled.