WIRING AND CALIBRATION
Transmitter Options W, X, Y & Z

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1. Installation & Wiring

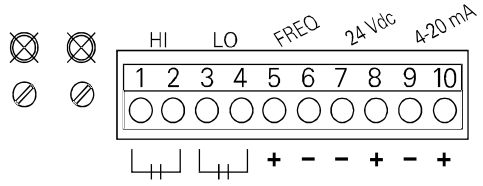
1.1 General

The transmitter board is fitted inside the enclosure of either the threaded or wafer style flowmeter. Option W provides a 4-20mA dc signal, option Y provides a 0-1000 Hz frequency signal, option X provides set point switching and option Z combines W, X & Y.

The position of the gear lever is detected using a pair of magnets mounted on the lever and a solid state Hall effect sensor mounted on the circuit board. The output of the transmitter is linear with flow. The transmitter is powered by an external 24Vdc power supply provided by the user. A rated capacity of 100mA is required to power all options. ***Note: Transmitters are factory calibrated and tested***.

1.2 Precautions

The power supply used to power the transmitter MUST BE ISOLATED. This means that the power supply ground and input signal ground must NOT be common. Some batch controllers and counters have auxiliary power supplies which are not isolated. Use of these non-isolated power supplies will cause a failure of the power supply and/or the transmitter board.



Terminal Strip
Figure 1

Important: Do not connect terminals 7 and 9 together. Damage will result. The installation must be 4-wire. One pair for 24Vdc, one pair frequency, one pair current and two pairs limit switches. ***Note: Recommended wire 22 AWG wire.***

2.

Interfacing the frequency output

2.1 Frequency output interfacing

The frequency output is always factory set to 1000 Hz at full scale flow. To count the total flow from the frequency output, it is necessary to scale this output. The scaling factor, K is derived as follows:

$$K = \frac{1000 \text{ pulses / sec} \times 60 \text{ sec / min}}{\text{full scale flow rate (units / min)}}$$

The table below was computed from the above equation and is presented for your convenience.

Scale	K-factor	Scale	K-factor	Scale	K-factor	Scale	K-factor
1	60000	20	3000	120	500	600	100
2	30000	25	2400	150	400	800	75
3	20000	30	2000	200	300	1000	60
4	15000	40	1500	240	250	2000	30
6	10000	50	1200	250	240	3000	20
8	7500	60	1000	300	200	4000	15
10	6000	80	750	400	150	6000	10
15	4000	100	600	500	120		

K-factor Table
Figure 2

The frequency output is a square wave with an amplitude of 5 Vp (into a 10K ohm or greater impedance). The on time is controlled at 270 microseconds ± 30 microseconds.

The frequency output falls to 0 Hz whenever the flow rate falls below approximately 20% F.S.

Important: Do not connect terminals 6 and 7 together. Damage will result. The installation must be 4-wire.

3.

Interfacing & setting the limit switches

3.1 Limit switch interfacing and setting

Power is required (24Vdc) to the transmitter board in order for the limit switches to operate. When no power is available, both switches are open and do not close regardless of the flow rate. Each switch can be independently set anywhere in the range. Therefore, the terminology of HI/LO is purely arbitrary. The user can achieve the desired fail system wiring by reversing the convention if necessary.

LO Switch (Green) VR5:
When power is applied at zero flow, the LO switch closes “ON”. As flow increases to the set point 95% of F.S., the LO switch opens “OFF”.

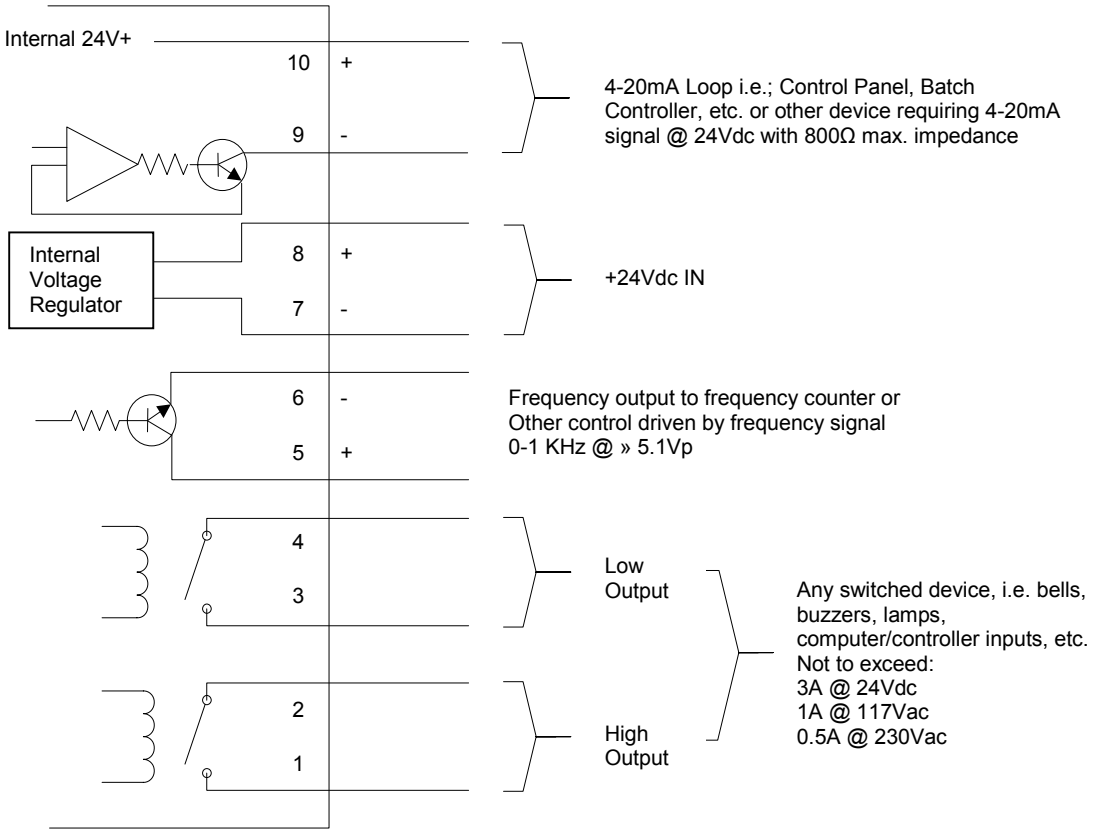
HI Switch (Red): VR4:
When power is applied at zero flow, the HI switch remains Open “OFF”. As flow increases to the set point 95% of F.S., the HI switch closes “ON”.

VR4 and VR5 are 300° turn pots for HI/LO switching. **See figure 4 for pot location.**

Turn pot CCW to decrease set point and CW to increase set point. Factory setting HI/LO at 95% full scale.

4.

Field Calibration 4-20mA DC



Note: ALL GROUNDS, 24Vdc, 4-20mA and frequency output must be isolated from each other.
Note: Recommended wire 22 AWG wire.

Transmitter Connection
Figure 3

4.1 Test Equipment

Fluke 9600A digital multimeter or equivalent and non-metallic screwdriver.

4.2 Set-up

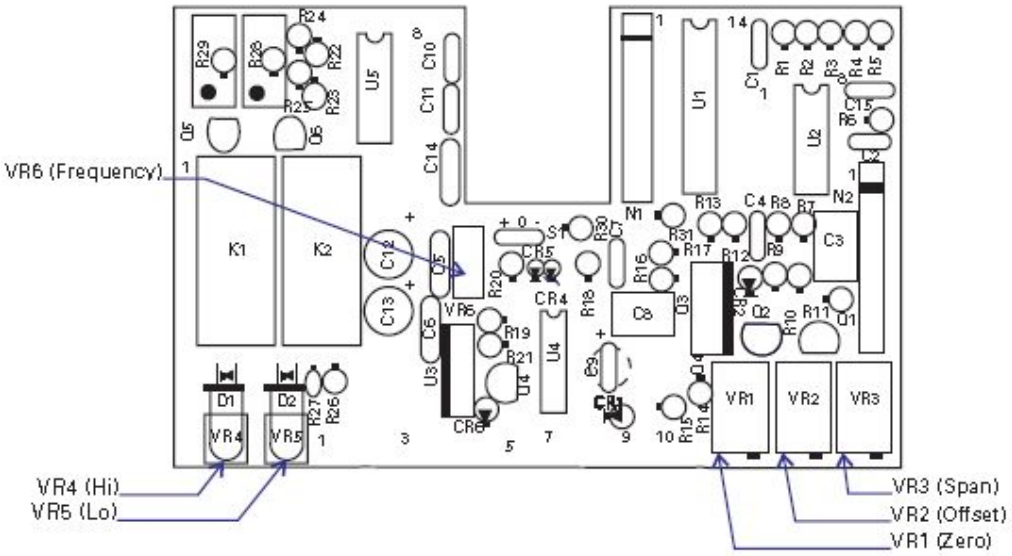
Remove the back cover plate to gain access to the adjustment pots and mechanical parts of the flowmeter. (Refer to the Installation, Operation and Maintenance Manual if necessary.) Remove housing lens (ABS only) to gain access to the pointer. Make all mechanical adjustments before proceeding. DO NOT APPLY POWER UNTIL ALL CONNECTIONS ARE MADE DAMAGE MAY RESULT.

Connect 24Vdc power supply positive to terminal 8 and negative to terminal 7. Set multimeter to milliamp scale and connect to terminal 9 and 10. Turn power ON and observe current output reading.

Important: One pair for 24Vdc, one pair frequency, one pair current and two pairs limit switches. ***Note: Recommend using 22 AWG wire.***

4.

Field Calibration 4-20mA DC



Transmitter Board
Figure 4

4.3 Adjustment pot location for 4-20mA output

Pots VR1, VR2 and VR3 are located just to the right of the terminal strip when viewing the flow meter from the rear. VR1 is adjacent to terminal 10, VR2 is the center pot and VR3 is the rightmost.

4.4 Calibration – 4-20mA

Note: Proper calibration is best done at the factory, the easiest way to set the pointer for calibration is using flow otherwise moving the vertical lever or pointer can also be used to simulate flow at any given point. (Take care not to flex the lever front to back as calibration will be affected).

IMPORTANT: If a zero adjustment is necessary use the course zero adjustment method which keeps the lever in the correct position. If the fine zero adjustment is performed re-calibration of the output would be required. Refer to M1 Installation Operation and Maintenance Manual Section 4.4 Coarse Zero Adjustment for details.

Adjust the zero pot VR1 fully CCW. Adjust 4mA output pot VR2 to 4.00mA. Set point to 30% and adjust VR1 to 8.80mA ± 0.2mA. Set pointer to 95% and adjust span pot VR3 to 19.20mA ± 0.2mA. Repeat zero (VR1) and span (VR3) adjustment until both adjust within specifications.

IMPORTANT: DO NOT CHANGE 4-20mA OUTPUT RANGE FROM FACTORY SETTING THE OUTPUT WILL NOT TRACK WITH FLOW PROPERLY.

5.

Field Calibration 0-1000 Hz

5.1 Calibration – 0-1000 Hz

If the transmitter is fitted with current output, adjust current output first. With the pointer at 95% F.S. set VR6 pot to 950 Hz ± 30 Hz. **See figure 4 for pot location.** If the current output is not fitted, the meter must be returned to the factory for calibration. Important: Take care not to move the Hall Effect sensor when making adjustments to VR6 this will alter the calibration if so the meter must be returned for recalibration by the factory.