1. Fault Finding Guide

The majority of faults are usually down to wiring issues. The first stage of any diagnosis would be to check the wiring conforms to one of the previous diagrams, and is of the correct form for the SCADA input.

For more detailed diagnosis, some test equipment will be required. Most tests can be performed with a good-quality multi-meter, ideally one with a frequency counter capability. Suitable instruments include the Fluke 170 multi-meter.

The normal test / verification process would be:

1) Check all wiring, paying careful attention to polarities and wiring colours. Ensure that all screw-terminals are done up tight and are not trapping wire insulation. Ensure that the SCADA system is active and supplying power.

2) Check that at least +10V DC is supplied between the V+ and OV terminals. Check polarity, positive to the V+ terminal. Ensure that no more that 24V DC is present between these terminals. Check that no AC voltage is present between these terminals. If the voltage is outside this range (10V to 24V dc) or AC voltage is shown, then check the wiring back to the SCADA for proper connection.

3) Check that +5V is available between the register '+' and '-' terminals. If the voltage is outside the range +4.5V to +5.5V then the Flo-Unit is most likely faulty.

4) Check that there is a positive voltage of at least 8V between the L+ and OL terminals. Check that the L+ is the more positive of these two terminals. If less than 8V or greater than 24V DC is present, then a wiring fault between the SCADA and the Flo-Unit is the likely cause. A second reason could be a failure of the Flo Unit.

5) Connect the multi-meter across the '-' and 'S' terminals of the register wiring, set the Multi-meter in frequency mode. Ensure that the red lead of the Multi-meter is connected to the 'S' terminal. With no water flow the multi-meter should read 0Hz. Next turn on the water, the Multi-meter should now show some frequency. The actual value is not known as this is dependent on many factors, including water flow rate, meter size, pick-up type. If 0Hz is not displayed when no water flow, or there is no frequency when there is water flow then the Register Pick-up is likely faulty.

6) Remove the link between the OL and OV (or L+ and V+) terminals and insert the multi-meter in mA DC mode (Ensuring that the 400mA DC input terminal is used on the multi-meter) in place of this removed link. With no water flow through the meter, the multi-meter should read 4mA (3.9 to 4.1mA due to

calibration variance). Turning on the water flow should result in the current rising. Please be aware that there can be a slight delay due to noise filtering within the Flow-Unit. The actual current now displayed is not known, again this is dependent on many factors, as detailed previously. If the measured current is not between 3.8mA and 4.2mA when there is no water flow, then the Flo Unit may be faulty. If the current does not rise when water is flowing, then again the Flo-Unit is likely faulty

If all the above appears correct then re-attach the link between the OL and OV (or O+ and V+) terminals. In this case the Flo-system is functioning correctly, and further analysis of the SCADA system, and the wiring of the Flo-Unit to the SCADA system needs to be performed.

If it is not possible to control the flow of water to perform tests 5 and 6 above then the following steps should be done.

In the event of continual water flow, perform step 5) above and confirm that there is a frequency displayed on the multi-meter. Next perform step 6) and observe that there is some current above 4mA displayed (but less than 20mA) Next remove the connection between the register pickup and the 'S' terminal of the Flo Unit (usually the Blue wire). The output current should now fall to 4mA. Please note this could take a couple of seconds due to noise filtering within the Flo Unit. If the current isn't greater than 4 mA when water is flowing, or around 4mA with the 'S' terminal disconnected, the it is likely that the Flo Unit is faulty.

If a frequency generator is available (not normally a field test instrument) then it would be possible to test the Flo-Unit more thoroughly. To do this, first set the test as given in step 6) above. Next set the frequency generator for 'square wave' output, output level 0 to 5Vdc. Fully disconnect the register pick-up and connect the frequency generator between the '-' terminal and the 'S' terminal, ensuring that the ground output of the frequency generator is attached to the '-' terminal. Set the frequency generator to give 0Hz output. The multi-meter should read 4mA. Increase the frequency of the generator, towards 100Hz. The current measured on the multi-meter should now increase. Slowly increase the frequency until the output current just reads 20mA (ensure you do not overshoot, check by reducing the frequency slightly to observe the current falling). Once the frequency required to give 20mA is fixed, record this frequency and check with Mueller to see if this is the expected value for the type of meter installed.