

In-field valve positioner checks using the Fluke 789 ProcessMeter™

Application Note

Valves, the actuators that move them, and the electronic circuits that control them, are all subject to the effects of aging soon after they are installed. The valve seat wears not only from the repeated seating of the valve, but from the liquid or gas that passes through it. Depending on the application, a valve can be stroked from hundreds to tens of thousands of times over a one-year period. This amount of mechanical motion inevitably causes screws to reposition, springs to weaken and mechanical linkage to loosen. In addition, electronic components change value over time. The results are valves that don't fully open or close, close prematurely, or operate erratically and cause improper regulation of

the gas or liquid under its control. This is more commonly referred to as "calibration drift."

To keep a system operating properly, a good preventative maintenance program that mandates periodic checks of valve positioners is required. These checks need to be conducted quickly to minimize down time. When these checks reveal calibration drift, recalibration of the electronic valve positioner must be performed quickly. With the varied locations in which a valve can be installed and the difficulty in removing it, the equipment used to perform the checks must be brought to the valve positioner itself. Therefore, this "in-field" tester must be portable, easy to use and rugged. Fluke's 789 ProcessMeter™ is a perfect solution.

With its signal sourcing capability, the Fluke 789 can simulate a controller connected to a valve positioner's input. Through the controls on the ProcessMeter, you can set the positioner's input current to a specified level and visually inspect the reaction of the valve's position using the mechanical position indicator, the valve stem position or flow indicators. In addition, the Fluke 789 can continuously adjust the source current in a ramping or stepping fashion, allowing you to check the valve's linearity and response time.

An example will help explain how simple it is to use a Fluke 789 ProcessMeter for these checks. This example only demonstrates the basic principles in making position checks on a valve positioner. Manufacturer's specific instructions should always be consulted for proper and appropriate valve positioner testing and calibration.

General steps in checking valve positioning.

The first order of business is to set up the ProcessMeter in the sourcing mode using the appropriate range of current for the positioner. The Fluke 789 uses a separate pair of jacks to source current. First connect the test leads into the 24 V loop power mA output jacks. Next, select the 4-20 mA range by moving the function switch from Off to the first mA output position. Now you're ready to connect the 789 to the input terminals of the valve positioner.

With the test equipment properly set up and connected to the positioner, it's time to determine if the positioner fully closes the valve at the 4 mA input current level. Using the push buttons on the ProcessMeter, adjust the source current to 4.0 mA. Now, while watching the valve for any movement, press the Coarse Down button once to decrease the current to 3.9 mA. There should be no movement of the valve. In setting the point at which the valve starts to open, you want to be sure there is no counter pressure by the actuator against the force holding the valve closed when there is 4.0 mA on the controller's input. In a spring-to-close valve, there should be no pressure on the diaphragm. With a double acting piston actuator, there should be no pressure on one side of the piston. You may want to set the start of opening between 4.1 and 4.2 mA to get that insurance at the closed setting. To check the opening of the valve, press the Coarse button up from 4.0 mA. The ProcessMeter will increase 0.1 mA for each press of the Coarse button. You should adjust the zero adjustment on the posi-





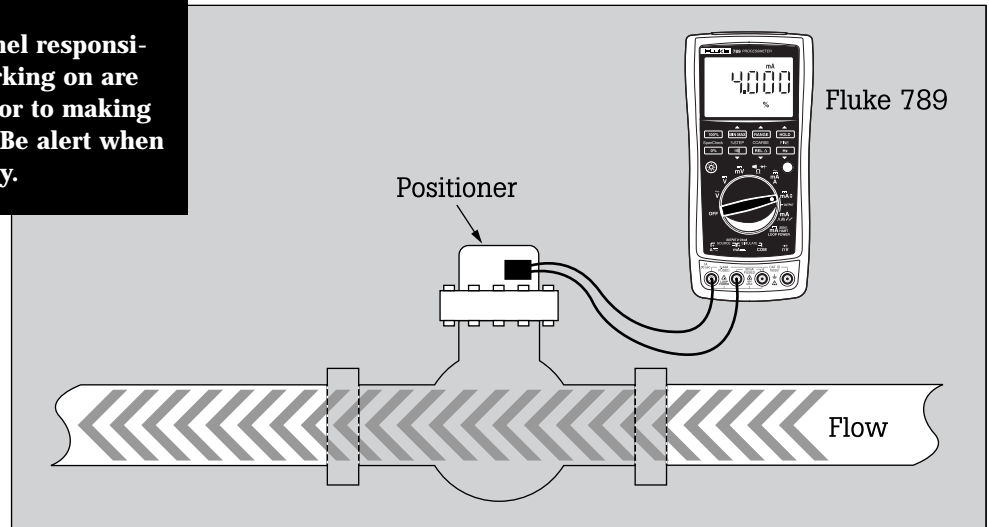
Safety note:

Always ensure that the personnel responsible for the process you are working on are informed of your intentions prior to making any checks of valve operation. Be alert when touching any moving machinery.

tioner to set the valve for the closing you desire.

The next check is with the valve at the next extreme: fully open. This is referred to as a span position check. Using the range buttons on the ProcessMeter, adjust the source current for a 20 mA reading and allow time for the valve to stabilize. While watching or feeling for valve movement, press the Coarse Up range button once to 20.1 mA. This movement should be as small as possible and can be adjusted using the span adjustment on the positioner. Using the coarse control of the 789, adjust current up and down between 20.1 mA and 19.9 mA. There should be no movement of the valve stem from 20.1 to 20 mA and slight movement from 20 mA and 19.9 mA.

In most valves, there is an interaction between the zero and span settings of a valve controller. Therefore, it is best to ensure proper valve position adjustment by repeating the test of the fully closed and fully open positions until no further adjustment is necessary.



For valves with linear action, linearity can be checked by setting the Fluke 789 to 4 mA and then, using the % Step button, step the current to 12 mA (50 %) and confirm the valve position indicator is at 50 % travel. If your valve is of a non-linear type, refer to the valve manual for proper operation.

Checking for smooth valve operation is easy with the Fluke 789's Slow Ramp function. Set the rotary switch to output mA and select Slow Ramp using the blue button. Allow the 789 to ramp through several cycles while watching or feeling for any abnormal operation of the valve. The valve should NOT oscillate or hunt at any of the step positions of the Slow Ramp. At the same time however, the valve should not be sluggish. You set the gain of the valve controller to a point that gives the best response between these two conditions.

As the example above shows, the Fluke 789 ProcessMeter brings all the necessary tools to the job site for checking and recalibrating electronic valve positioners. In addition, the Fluke 789 not only simulates a current loop transmitter, but it's a measurement tool as well. Along with the normal DMM measurements (dc/ac volts, dc/ac current, and resistance), the 789 can also measure frequency. Additional features include MIN/MAX, Relative measurements, Diode Test and AutoHold. A feature-rich product designed specifically for the loop process technician, the Fluke 789 ProcessMeter also complies with IEC 1010-1 standard for CAT III 1000 V environments. Contact your local Fluke distributor for pricing and availability.

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