

# Education goes full circle

## Application Note

### Upgrading refinery instrumentation

Back when Bill Wilcox decided that a career as an electrician was his calling, he made his move through a local four-year IBEW 176 JATC program outside of Chicago.

Over time, that training program has evolved into the National Joint Apprenticeship and Training Committee's (NJATC) five-year apprenticeship program - today considered the premier U.S. training program for electricians.

Mr. Wilcox, who now works out of Meade Electric's (McCook, IL) Joliet facility, has spent the majority of his career in the many Joliet area refineries as an instrumentation/electrical technician.

He credits his training with giving him the necessary blend of on-the-job and classroom training to handle the variety of jobs he's tackled in his career to date. As his experience grew, Wilcox was assigned to projects of increasing complexity, the most recent of which was a 15-month, five-phase instrumentation upgrade project at Exxon Mobil's Joliet refinery.

"This project placed great demands on my instrumentation skills and experience," Wilcox says. "All sorts of instrumentation and valves were upgraded as part of a comprehensive overhaul of the facility's systems and 4-20 mA control schemes. Sometimes only part of a system received upgrading and in other areas we added entirely new systems."

"Our crew made good use of our Fluke 744 process calibrators," he notes, adding "not only did we have to bench check many of the instruments (most of which had HART capability) but also, once installed, all instruments had to be calibrated with their control loops energized and then rechecked."

"The project required checking a wide variety of values, including volts, frequencies, pressure control signals, and lots of RTDs and thermocouples. Both the functionality of deviation alarms for monitoring valve actuation and the performance of overall facility safety systems were of prime importance to Exxon Mobil."

Wilcox feels strongly about his NJATC training and what it has contributed to the success of his career. Strongly enough, in fact, that he's become a part-time evening class instructor at a local NJATC training facility. He teaches an 18-session instrumentation course to 5th year apprentices.

"The goal here is to give my students a good understanding of the basics of pressure, temperature, level and flow measurements, as well as instrumentation troubleshooting and calibration techniques. Fluke Corporation has supported me in the classroom by donating calibrators for classroom demonstrations. I now use a 744 as a training aid. They've also supported me with training when I needed it, whether on the job or in the classroom. I appreciate their contributions to the success of NJATC training."



Wilcox also teaches the occasional EPRI Level I certificate course in instrumentation to journeymen electricians. When asked why, Wilcox was quick to reply that he felt he should "give back" to those who were following him into the trade. Bill Wilcox's electrical apprenticeship training has gone full circle.

## Calibrating pressure switches with the new 718 pressure calibrator

One of the finer points of managing a pressure process flow is the pressure switch. They're used in a wide variety of monitoring and control applications – such as HVAC air provers, defrost sensors, filter indicator applications, oil/hydraulic filter alerts and process break detectors – and until recently, they required advanced tools and training to calibrate.

A pressure switch is triggered by changes in pressure within a system, measured as pressure, vacuum, or differential between two pressure inputs. In each case, the pressure switch employs a diaphragm, piston, or other pressure-responsive sensor coupled to a switch actuating mechanism.

In its most basic form, a pressure switch can monitor air flow in a heating system or control gas pressure in a water heater, acting as the watchdog in many process monitoring applications.

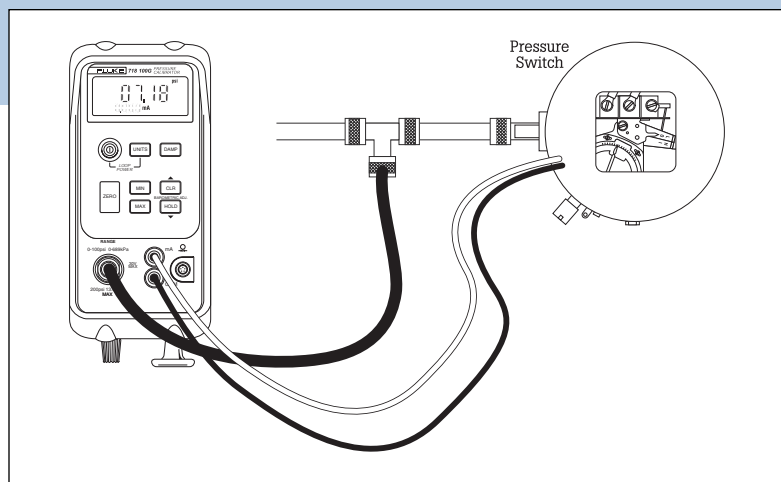
Accurate calibration of pressure switches is a critical step in ensuring process quality and safe equipment operation. But even the most savvy process technicians may not fully understand the correct method of calibrating pressure switches.

Fortunately, technology advances have greatly simplified pressure switch calibration. Basic pressure calibrators like the newest Fluke 718 include a self-contained pressure switch test feature that, as illustrated in Figure 1, can apply pressure to a pressure switch and simultaneously measure the mA signal or switch contacts.

## How to calibrate a pressure switch

1. Depressurize and isolate the pressure switch from the process.
2. Plumb the 718 and make connections as in Figure 1.
3. Turn on the 718 and open the vent valve. Press the zero button to clear the zero offset. Close the vent.
4. Press the Switch Test button to enter the switch test mode.
5. Apply pressure slowly with the hand pump until you approach the setpoint. Using the fine adjust vernier, adjust the pressure until the switch opens and OPEN is displayed on the 718.
6. Release the pressure slowly, using the fine adjust vernier until RCL is displayed.
7. Press the Switch Test button once to read the pressure values for switch opening and again to see the pressure at switch closing.
8. Press and hold the Switch Test button for 3 seconds to clear the test results and start over.
9. Adjust the pressure switch setpoint until the switch contacts open and close at the desired pressure.
10. Continue to monitor the process until the switch is returned to service.

Once the pressure switch is calibrated, render it tamper resistant by sealing the threads of the adjustment screw or sealing the openings that were accessed for factory calibration.



**Figure 1.** Pressure switch calibration. Verify the setpoint and deadband of pressure switched using the 717 and 718 pressure calibrators.

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