

# Practical Instrument Electronics



**FLUIDPRO**

Dosing Systems

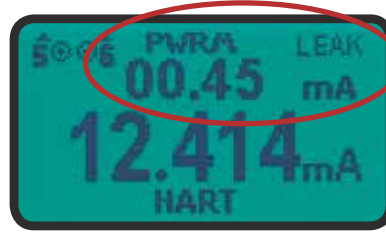
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## Troubleshoot Loop Problems

### • Find current leaks in loops before swapping instruments

Automatic indication of Loop Current and Leakage Current (US Patent #7,248,058). Measure ground current leakage from faulty wiring, flooded conduit and corrosion bridges to help you decide if there is a wiring problem in the loop (diagrams below).



*830 detects uncontrolled current in the loop due to a flooded junction box.*

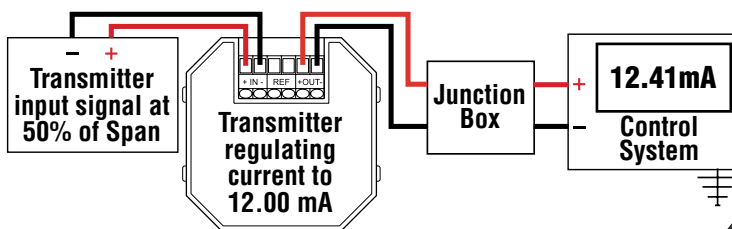
## Typical problem found with Leak Detection

Have you ever replaced a “faulty” transmitter only to find the problem was somewhere else in the loop? And did you end up throwing the transmitter away after you fixed the other problem “just in case” the transmitter was faulty?

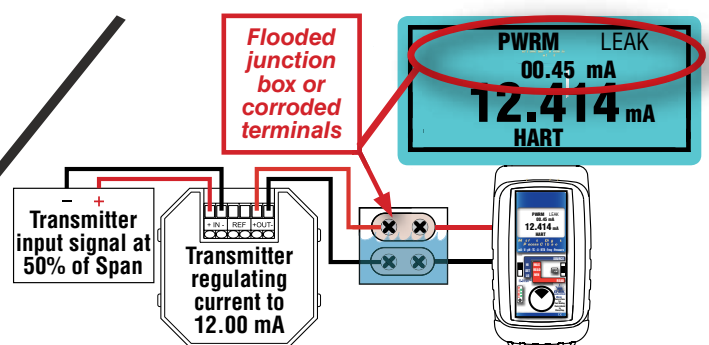
If you find a loop where the transmitter is calibrated correctly but all the readings elsewhere in the loop have a fixed offset this is due to a *Zero Shift*. This zero shift is typically caused by some current in the loop bypassing the transmitter. This might be caused by ground faults, moisture or corrosion.

If you have some loops that are erratic after it rains there may be moisture present in a junction box or where insulation has broken down. Turn on Ground Leak Detection and use the PIE 830 to power up the loop. Any current that isn't controlled by the transmitter or other current control element will be indicated as leakage on the PIE 830 display. Undetected current leaks may cause calibration errors which can lead to dangerous operating conditions or catastrophic results.

The PIE 830 powers up the 2-Wire transmitter or loop and indicates the total current and the uncontrolled current. This provides information useful in troubleshooting loop errors.



Here is a loop where a technician has just recalibrated the transmitter but the control room still sees a problem. The problem started just after a rainstorm.



Using the PIE 830 to power up the loop the technician detects a leakage of 0.45 mA - approximately the offset seen in the control room. He walks the loop and opens a junction box releasing a stream of water. The loop is again in control.

## Become a Loop Detective - Locate hidden loop problems with LoopScope

When you need to find out why a loop is out of control and all the wiring seems to be in order turn on the 830's LoopScope and simultaneously see all the parameters of the loop. The LoopScope simultaneously displays the current, DC voltage and total resistance in the loop. Observing the SUPPLY (DC voltage) and the LOAD (resistance) lets you see if the loop power supply has enough capacity to power all the devices in the loop.

By observing all three signals at the same time you can see how the voltage and resistance respond as the current changes. If the voltage drops too far as the current goes up you may need a power supply with more capacity or the power supply itself may be failing. If the resistance in the loop is too high you may have more devices in the loop than the power supply can handle or there may be an instrument in the loop that is drawing too much power and requires replacement.

## Troubleshoot Transmitter Problems

- Find out if your control problems are due to a faulty transmitter

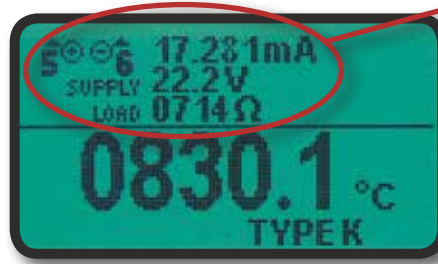
If a loop is having problems and you suspect the transmitter you can quickly swap it out for the PIE 830 configured as a *universal isolated transmitter*.

The PIE 830 is easily setup as a thermocouple, RTD, frequency, millivolt or pressure transmitter. Simply set it to read, choose your sensor type, select linearized, non-linearized or square root operation, upscale or downscale burnout, and store the endpoints into the XMTR MIN & MAX memories.

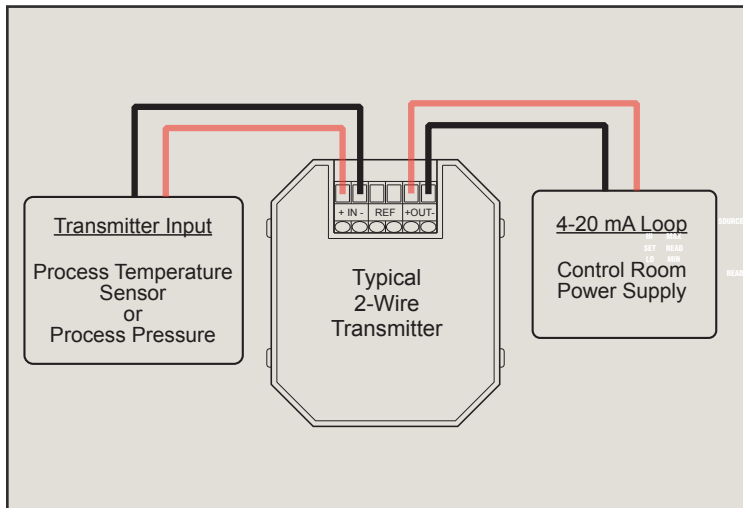
Now you can check out the loop, locally and at the control room, and see if replacing the transmitter fixed the problem. If the problem is fixed you may leave the PIE 830 in place while you go to the shop to obtain and configure a replacement transmitter.



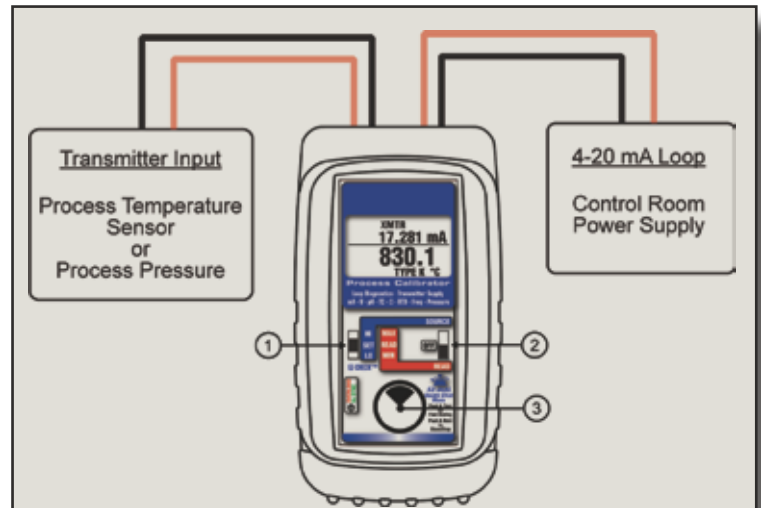
Use the 830 as an *Emergency Transmitter Replacement* to keep the loop running while you grab a replacement from stock and configure it.



With LoopScope running the 830 simultaneously displays the sensor input along with the loop current, power supply voltage and loop load in ohms.



Typical loop with 2-Wire Transmitter



Typical loop with PIE 830 in place of Transmitter

## Why buy a PIE calibrator with loop diagnostics

Undiagnosed loop problems often cause calibration errors which can lead to dangerous operating conditions or catastrophic results. The PIE 830 is the *only multifunction calibrator* that can detect and indicate these problems due to the patented troubleshooting features.

## Evolutionary Design

- Designed for you by experienced calibrator manufacturers

PIE Calibrators are designed and built by members of the same team that designed and built the calibrators manufactured by Fluke\* under the Altek\* label. The 830 improves upon other brands by including a rubber boot, backlit display with larger digits, troubleshooting tools, higher accuracy and more ranges for flexibility.

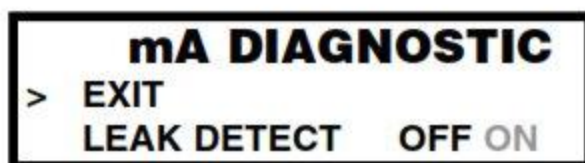
\* PIE Calibrators are not manufactured or distributed by Fluke Corp or Altek Industries Inc, manufacturers of Altek Calibrators.

## Using Ground Leak Detection

### mA OUT, % OUT (Percent of 4 to 20 mA)

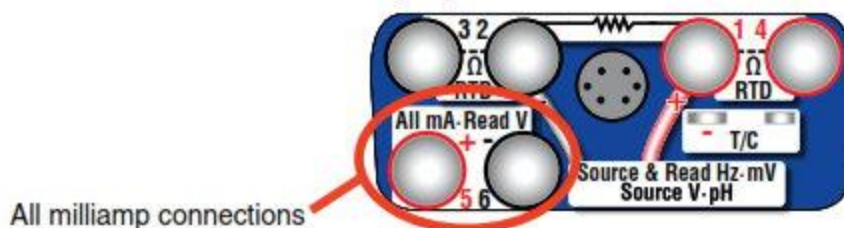
Find current leaks in loops caused by ground faults, moisture or corrosion. The 830 simultaneously supplies power to a 2 Wire Transmitter (or loop with a transmitter) while displaying the 4 to 20 mA output and the amount of current leaking in the loop.

- 1) Move the power switch ② to READ then Double Click the EZ-DIAL knob to get into the Menu. Turn the knob ③ to scroll through the settings and press the knob to make your selection. Select mA for the FUNCTION and PWR MEAS for the MODE. Choose either mA or %.
- 2) Turn the knob ③ until the following menu appears.



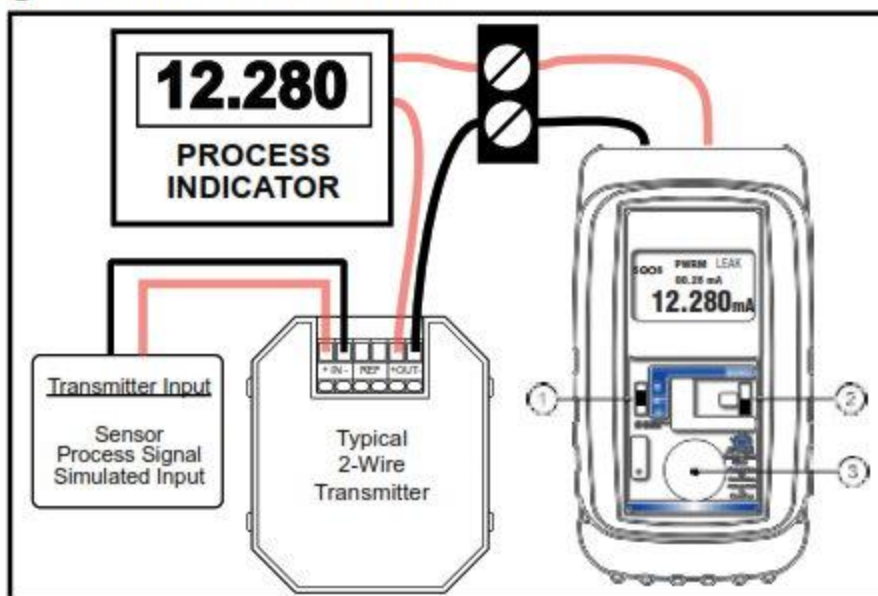
- 3) Turn the knob ③ to scroll through the settings and press the knob to make your selection. Turn on the LEAK DETECT.
- 4) Connect the red source lead from the mA (+) jack of the 830 to the plus (+) input of the device and the black source lead from the mA (-) to the minus (-).

The PIE 830 supplies a nominal 24 volts DC at 24 mA to the 2 Wire Transmitter or loop. The current passed by the transmitter will be accurately displayed by the 830 along with an indication of leakage current at the top of the display. If there is an uncontrolled loop, a transmitter with upscale burnout and bad or missing sensor or a short the display shows "OVER RANGE"





## Using Ground Leak Detection



## Typical Error Conditions

PWRM LEAK  
00.28 mA  
**12.280** mA

The PIE 830 is supplying the loop voltage. A calibrated transmitter is limiting the loop current to 12.00 mA. An additional 0.28 mA is not controlled by the transmitter and is leaking somewhere in the loop.

PWRM LEAK  
mA  
**OVER RANGE** mA

The PIE 830 is supplying the loop voltage. There is a control loop error. This may be a transmitter (set for upscale burnout) with a bad or missing sensor, or a short in the loop.

**Note:** Many installed transmitters will normally indicate 0.01 to 0.02 mA leakage without significant control problem. Unstable readings may indicate loose connections or the presence of moisture.