

PIE CALIBRATORS

Calibrate and Troubleshoot Control Loops and Process Instruments

Multifunction Calibrators

Find hidden problems in loops & transmitters

Milliamp & Voltage Calibrators

Uncover intermittent mA leakage in flooded conduits

Thermocouple Calibrators

See temperature, mV & cold junction compensation

RTD Calibrators

Troubleshoot sensors with 2, 3 & 4 Wire detection

Frequency Calibrators

Eliminate stop watch with totalizer functions



PIE

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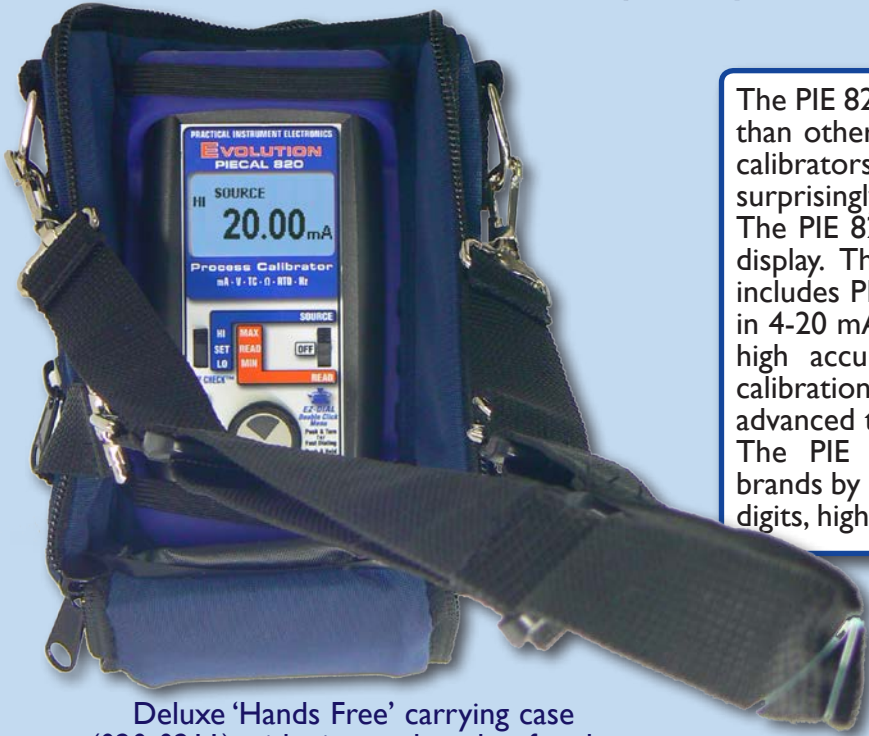
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Carry Less and Do More

PIE Multifunction Process Calibrators

Milliamp • Voltage • Thermocouple • pH
RTD • Frequency • Continuity Tester



Deluxe 'Hands Free' carrying case (020-0211) with zippered pocket for the manual, test leads & spare batteries.

The PIE 820, 820-ELITE and 830 are smaller and easier to use than other multifunction calibrators. Multiple single function calibrators with advanced features are squeezed into a single surprisingly small pocket sized package.

The PIE 820 is a basic multifunction calibrator with a single display. The 820-ELITE has better accuracy, sources pH, includes PIE's patented 'Leak Detection' for finding problems in 4-20 mA loops, and measures pressure. The 830 combines high accuracy, a dual display for standalone transmitter calibration along with several functions making it the most advanced troubleshooting tool for the instrument technician. The PIE Multifunction Calibrators improve upon other brands by including a rubber boot, a backlit display with larger digits, higher accuracy and more ranges for greater flexibility.

It's the best value of multifunction calibrator combining ease of use, accuracy, signal compatibility and compact size to make calibration easy as pie!

Technician Friendly Calibrators

Become a troubleshooting technician

Stop wasting time swapping out instruments to locate loop problems. PIE calibrators have automatic troubleshooting functions to locate problems caused by corrosion or moisture in conduits, excessive loop loads, broken RTD wires and flaky loop power supplies. No other brand of calibrator has these patented features!

PIE helps you simplify your job with calibrators that are technician friendly. They are compact, easy to learn, simple to setup and accurate. PIE technician friendly calibrators are all about ease of use. The unique and intuitive EZ-DIAL Double Click Menu makes them simpler to setup than larger calibrators with their complicated button filled panels and confusing menus. Use PIE right out of the box instead of wasting time learning to use more complex calibrators.

Technician suggested evolutionary design

PIE Calibrators include features requested by I & E technicians. They are designed and built by members of the same team that created the calibrators now manufactured by Fluke* under the Altek* label. We have been designing calibrators since the 1980s and for PIE since 2001. Improvements over other brands include simple "Double Click Menu", rubber boot with tilt stand, backlit displays with larger digits, rugged switches and battery compartments for fast battery changes. All calibrators come with a Certificate of Calibration Card (see page 15). From simple thermocouple and RTD sources to Diagnostic Multifunction Calibrators PIE has what you are looking for at a price to fit your budget.

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

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Calibrate your process controls with the PIE 820 & 820-ELITE

- **Technician friendly operation**

The unique and intuitive EZ-DIAL Double Click Menu makes it easier to setup than other multifunction calibrators. Uses the same menus as the single function Evolution Calibrators.

- **Use it as a milliamp and voltage calibrator**

820 Source	820-ELITE Source
0 to 24.00 mA	0.000 to 24.000 mA
0 to 10.25 V dc	0.000 to 10.250 V dc
-10.00 to 80.00 mV	-20.000 to 99.999 mV & -500.00 to 99.99 mV

820 Read	820-ELITE Read
0.00 to 24.00 mA	0.000 to 24.000 mA
0.00 to 10.25 V dc	0.000 to 10.250 V dc
0.0 to 60.0 V dc	0.00 to 60.00 V dc
-10.00 to 80.00 mV	±99.999 mV & ±999.99 mV

Simulate 2-Wire Transmitters

Power up transmitters & loops with the built-in 24V power supply

Simplify HART hookups with built-in 250 Ohm resistor

- **Calibrate directly in temperature with 0.1°C/°F resolution**

The PIE 820 & 820-ELITE work with the instruments you use.

Types J, K, T, E, R, S, B, N, G, C, D, L (J DIN), U (T DIN) and P (Platinel II)

Pt 100 Ohm (3850, 3902, 3916, 3926) & 1000 Ohm (3850)

Copper 10 & 50 Ohm, Nickel 110 and 120 Ohm

- **Checkout flow and vibration systems**

Source & read frequency from 0 to 2000 CPM (Counts-Per-Minute),

0.00 to 999.99 Hz, 0.0 to 9999.9 Hz and 0.000 to 20.000 kHz

- **Checkout resistance instruments - Source and read resistance**

820	820-ELITE
0.0 to 401.0 Ohms	0.00 to 401.00 Ohms
0 to 4010 Ohms	0.0 to 4010.0 Ohms

- **Troubleshoot loop & wiring problems**

'Beep' out connections with the built-in continuity checker.

- **Repeatability you can count on**

Accuracy at	820	820-ELITE
4 mA	±0.01 mA	±0.004 mA
5 V	±0.003 V	±0.002 V
10 kHz	±0.006 kHz	±0.004 kHz
Type T 400.0°C/742.0°F	±0.4°C/0.7°F	±0.2°C/0.4°F
Pt 100Ω 0.0°C/32.0°F	±0.5°C/0.9°F	±0.2°C/0.4°F

- **Guaranteed Compatible with all Instrumentation**

Works with Rosemount & Honeywell Smart Transmitters, PLCs, DCSs, Multi-Channel Recorders and other pulsed excitation devices

- **Detect 'hidden' loop problems (820-ELITE Only)**

Quickly diagnose troublesome ground faults & current leakage with patented Loop Diagnostic technology. *Undetectable with other instruments!*

- **Source pH probes into transmitters & analyzers (820-ELITE Only)**

Source from 0.000 to 14.000 pH @ 25°C (77°F) corresponding to -414.12 to 414.12 mV to verify the pH system is operating properly.

- **Measure pressure with optional pressure modules (820-ELITE Only)**

Measure pressure in up to 32 engineering units with one of 32 pressure modules for gauge, differential non-isolated, differential isolated, compound or absolute pressure. Optional pressure modules for the 820-ELITE & 830 are listed on page 12.

- **Easy to read - Turn on the backlight & easily see the display in dark areas of the plant.**

- **Quickly set any three outputs plus automatic stepping & ramping**

Easily set any value quickly with the adjustable "DIAL" plus store any three output settings for instant recall with the EZ-CHECK™ switch. Choose 2, 3, 5 or 11 steps to automatically change the output in 100%, 50%, 25% or 10% of span. Select RAMP to smoothly move the output between Zero and Span from 5, 6, 7, 8, 9, 10, 15, 20, 25, 30 and 60 seconds.

- **Measure temperature sensors, frequency pickups, loop currents and voltage levels**

Check the values of your process sensors. Instantly recall MAX and MIN values to see process variability.

- **Ready to go right out of the box**

The PIE 820 & 820-ELITE come with a rubber boot with tilt stand, deluxe hands free carrying case (020-0211), four test leads with spade lugs for RTD and ohms, two test leads with alligator clips for milliamp, volt, frequency & continuity, and a free NIST Certificate of Calibration Card.

- **Optional Accessories**

Wire & Mini T/C Plug: J, T, E, K (020-0202); B, R/S, K (020-0203); Individual Wire & Mini T/C Plug (020-0210-*) *Choose Type J, K, T, E, R/S, N or B; NiMh Batteries & Charger 120 VAC/12V DC (020-0103); Calibration report with test data



Diagnostic Process Calibrator

PIE 830 - More tools in a Smaller Calibrator

Carry eight single function calibrators

plus an isolated milliamp calibrator with loop supply
plus a loop troubleshooter in the palm of your hand!

Milliamp • Voltage • Frequency • pH
Ohms • Thermocouples • RTDs • Pressure
Loop Diagnostics • Transmitter Supply
Emulate an Isolated Transmitter

First calibrator with FIVE troubleshooting tools

- 1 Detect 'hidden' loop problems**
Quickly diagnose troublesome ground faults & current leakage with patented **Loop Diagnostic** technology. These problems are undetectable with other instruments!
- 2 Check all loop parameters at once with the LoopScope™**
LoopScope simultaneously displays & updates the loop current, voltage and resistance to show you the changing conditions as the process is running. Finds problems with power supplies & loops with too many loads. Patented by PIE!
- 3 Automatically detect 2, 3 or 4 wire RTDs**
Trouble shoot sensor connections and find broken wires with patented technology. LCD indicates which of the four wires are connected to an RTD sensor.
- 4 Swap out faulty transmitters to diagnose control issues** Easily setup the 830 as a universal isolated transmitter for temperature, frequency, millivolt or pressure. If the loop is back under control you know the transmitter was faulty. Turn on the LoopScope to simultaneously see the loop current, power supply voltage and loop loads for troubleshooting.
- 5 Troubleshoot wiring problems without a multimeter**
Built in continuity checker with 'beeper' quickly finds broken wires or shorts in instrumentation wiring. Also handy for checking operation of relays and controller outputs.



The PIE Model 830 (and the 10-50 mA Model 850 on page 9) is more than a multifunction calibrator. It is also a **loop detective** that is able to diagnose common problems that other test equipment just can't find. Have a flooded junction box or unknown ground faults? Our Loop Diagnostic technology will detect it. Or use the LoopScope to see at a glance all the parameters - milliamps, voltage and resistance - in the loop.

Stop wasting time and throwing away perfectly good transmitters only to find the problem is somewhere else in the loop. Setup the PIE Model 830 as an isolated universal transmitter and turn on the Loop Diagnostics. The display will tell you EXACTLY the sensor input, the current output and if there is any uncontrolled current in the loop due to a ground fault, corrosion bridge or moisture. If the control system sees no problem when the 830 is acting as a transmitter THEN you can replace the faulty transmitter. With RTDs the 830 automatically detects which of the 2, 3 or 4 wires are connected and unbroken, quickly alerting you to a sensor problem. Diagnostic features are covered by US Patent #7,248,058.

Become a troubleshooting technician with Patented Diagnostic Technology - Available only with PIE Calibrators!

PIE 830 - More tools in a Smaller Calibrator

- **Use it as a milliamp and voltage calibrator**

Source 0 to 24.000 mA, 0 to 10.25 V dc and -10.00 to 80.00 mV, Read to 24.00 mA, 60.00 V dc and -10.00 to 80.00 mV
 Simulate 2-Wire Transmitters, Power up transmitters & loops with the built-in 24 V power supply
 Simplify HART hookups with built-in 250 Ohm resistor

- **Calibrate directly in temperature with 0.1°C/°F resolution**

The PIECAL 830 works with the instruments you use. Types J, K, T, E, R, S, B, N, G, C, D, L (J DIN), U (T DIN) and P (Platinel II)
 Pt 100 Ohm (3850, 3902, 3916, 3926) & 1000 Ohm (3850), Copper 10 & 50 Ohm, Nickel 100 and 120 Ohm

- **Checkout flow and vibration systems**

Source & read frequency from 0 to 2000 CPM (Counts-Per-Minute), 0.00 to 999.99 Hz, 0.0 to 9999.9 Hz and 0.000 to 20.000 kHz

- **Checkout resistance instruments**

Source and read resistance from 0.00 to 401.00 and 0.0 to 4010.0 ohms Guaranteed compatible with all instruments including Rosemount & Honeywell Smart Transmitters, PLCs, DCSs, Multi-Channel Recorders and other pulsed excitation devices

- **Repeatability you can count on**

Accurate to ±0.008 mA, ±0.003 V, ±0.006 kHz, ±0.3°C/0.5°F

- **Quickly set any three outputs plus automatic stepping & ramping**

Easily set any value quickly with the adjustable EZ-DIAL plus store any three output settings for instant recall with the EZ-CHECK™ switch. Choose 2, 3, 5 or 11 steps to automatically change the output in 100%, 50%, 25% or 10% of span. Select RAMP to smoothly move the output between Zero and Span from 5, 6, 7, 8, 9, 10, 15, 20, 25, 30 and 60 seconds.

- **Measure temperature sensors, frequency pickups, loop currents and voltage levels**

Check the values of your process sensors. Instantly recall MAX and MIN values to see process variability.

- **Ready to go right out of the box**

The PIECAL 830 comes with a rubber boot with tilt stand, deluxe hands free carrying case (020-0211), four test leads with spade lugs for RTD and ohms, two test leads with alligator clips for milliamp, volt, frequency & continuity and a free NIST Certificate of Calibration card.

- **Optional Accessories**

Wire & Mini T/C Plug: J, T, E, K (020-0202); B, R/S, K (020-0203); Individual Wire & Mini T/C Plug (020-0210-*) *Choose Type J, K, T, E, R, S, N or B; NiMh Batteries & Charger 120 VAC/12V DC (020-0103); calibration report with test data.
 Optional pressure modules are listed on page 12.



Upgraded Hands Free carrying case (020-0233) with pockets for the PIE 830/820-ELITE, the Pressure Module & a zippered pocket for the manual, test leads, hoses & pressure fittings. Included when the 830/820-ELITE & a pressure module are ordered together.

Use the PIE 830 as a Universal Isolated Transmitter

Swap out a faulty transmitter to diagnose control issues. If replacing the transmitter fixes the problem leave the 830 in place while you go to the shop to obtain and configure a replacement. Turn on LoopScope while running as a transmitter and see the status of the loop. Use the LoopScope to simultaneously display current, power supply voltage and loop resistance (load) in live loops.

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

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

Detect hidden loop problems caused by ground faults & current leakages.

Automatically detect 2, 3 or 4 wire RTDs.

Continuity tester with beeper to find broken wires & shorts.

830 shows where to plug in the test leads for each function.

Sources pH - 830 has a pH range as well as wider millivolt ranges

Milliamp Loop Calibrators

PIE Model 334 - Just Like an Old Friend

- **Source milliamps**

Calibrate recorders, digital indicators, stroke valves or any instruments that get their input from a 4 to 20 mA loop. Easily set any value quickly to within 0.01 mA with the adjustable digital potentiometer "DIAL" or use preset **4.00 mA (0.0%)** and **20.00 mA (100.0%)** EZ-CHECK™ settings.

- **Calibrate with Confidence - Accurate to ±0.025% of Span at 4.00 & 20.00 EZ-CHECK outputs**

- **Power up all the devices in your loop**

Drive up to 1200 Ohm loads in a fully loaded loop even when the batteries get low. Many competitive calibrators drive less than 1000 ohm loads and their output voltage drops as the batteries drain.

- **Calibrate using loop power**

Check loop wiring and receivers by using the PIECAL 334 in place of a 2 Wire transmitter. Uses any loop power from 2 to 100V DC.

- **Read loop current**

Check controller outputs or measure the milliamp signal anywhere in the loop. The PIECAL 334 measures 0.00 to 52.00 mA (-25.0 to 300.0%) signals with greater accuracy than a typical multimeter.

- **Keep the loop running while replacing a sensor or transmitter**

Use the PIECAL Model 334 as a manual loading station. Set it up to simulate a 2-Wire transmitter and adjust the dial to simulate the running process.

- **Power & measure 2 wire transmitters**

The PIECAL 334 can simultaneously output 24V DC to power any and all devices in a process loop using the internal batteries and internal switching power supply, while measuring the output of a 2 Wire Transmitter and any other loop devices.

- **Read DC volts**

The PIECAL 334 can measure from -99.99 to +99.99 VDC with 0.01 Volt resolution. Use it to check loop power supplies, I/V converters, 1 to 5 Volt signals, and other voltages making it unnecessary to carry a multimeter.

- **Easy-to Read Backlit Display - Use in the Plant, Field or Shop**

Includes Rubber Boot, Attached Test Leads & free NIST Certificate of Calibration. Low profile switches resist accidental damage.

- **Simple Battery Changes**

Some competitive calibrators use from one to three expensive 9V batteries requiring you to take the calibrator out of the enclosure just to replace the batteries. The PIECAL Model 334 has a separate compartment for no-tool battery changes with four inexpensive "AA" batteries. Plus the PIECAL Model 334 has much longer battery life.

- **Optional Accessories**

AC Adaptor 120 V (020-0101); 240 V (020-0100); NiMh Batteries & Charger 120 VAC/12V DC (020-0103)
Deluxe Hands Free Carrying Case (020-0211); Calibration report with test data

Now with
Backlit
Display



How do you improve upon an industry standard milliamp loop calibrator? Make it **MUCH** more rugged with low profile switches and a rubber boot. Make it easier to read even in the dark with a backlit display. Make it more accurate and reliable with better long term stability. Make it easier and cheaper to replace the batteries with **LONGER** battery life. Get **ALL** these improvements plus the same ease of use in the PIECAL Model 334 - *the perfect upgrade for your worn out mA calibrators.*

Evolutionary PIE 134 - Small Size, Big Performance

- **Calibrate Milliamp Instruments**

Source & Read 0.00 to 24.00 mA & -25.00 to 125.0% of 4-20 mA; Simulate 2-Wire Transmitters Power & Read 2-Wire Transmitters; Selectable 250 Ohm resistor for HART compatibility

- **Calibrate with Confidence**

Accurate to ±(0.05% of Reading + 0.01 mA) - Includes free NIST Certificate of Calibration

- **Compact & Affordable**

Pocket sized with built-in belt clip & attached test leads. Includes two "AA" batteries.

- **Faster Calibrations**

Instantly select three outputs with EZ-CHECK switch & two speed EZ-DIAL knob

- **Optional Accessories**

Carrying case with belt loop (020-0201); Calibration report with test data



Milliamp Loop Diagnostic Calibrators

Locate hidden loop problems with the PIE 334Plus and get tighter calibrations with the Evolutionary PIE 434!

- Calibrate Milliamp Instruments**
 Source & Read 0.000 to 24.000 mA & -25.00 to 125.00% of 4-20 mA with five digit display
 Read -99.99 to 99.99 V; Simulate 2-Wire Transmitters, Power & Read Transmitters
 Menu selectable 250 Ohm resistor for HART compatibility
- Calibrate with Lab Accuracy -**
 PIE 334Plus accurate to $\pm(0.05\%$ of Span) - within 0.01 mA
 PIE 434 accurate to $\pm(0.01\%$ of Reading + 0.002 mA)
 PIE 434 is more accurate than similar calibrators - within ± 0.004 mA at 20 mA output!
- Locate Loop Current Leakages - 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 (diagrams below).
- Faster Calibrations** - Three output EZ-CHECK switch. 2 speed EZ-DIAL; Stepping & Ramping
- Easy-to-Read Backlit Display** - Includes Boot, Leads & free NIST Certificate of Calibration Card
- Optional Accessories** - AC Adaptor 120 V (020-0101); Calibration report with test data; NiMh Batteries & Charger 120 VAC/12V DC (020-0103); Deluxe Hands Free Carrying Case (020-0211) is included with PIE 434 and optional with PIE 334Plus



**LOOP
DIAGNOSTICS**

Calibrate & Troubleshoot Loop Problems with the Model 532

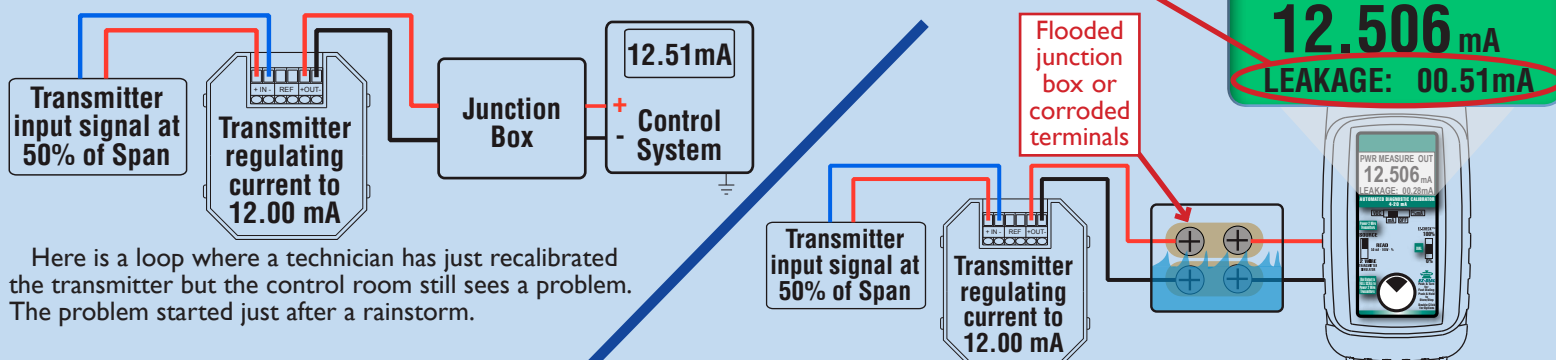
- Calibrate Milliamp & Voltage Instruments**
 Source to 24.000 mA & 24.000 Volts DC; Read 0.000 to 24.000 mA, 0.000 to 24.000 V, 24.01 to 30.00 V
 Simulate 2-Wire Transmitters, Power & Read 2-Wire Transmitters; 250 Ohm resistor - HART compatibility
- Calibrate with Confidence**
 Current: Accurate to $\pm(0.012\%$ of Reading + 0.002 mA); Voltage: Accurate to $\pm(0.012\%$ of Reading + 0.004 V)
- Troubleshoot Loops & Find Ground Faults**
 Loop diagnostics take dynamic loop readings under operating conditions (US Patent #7,248,058). Automatic indication of Loop Current, DC Voltage, Resistance and Leakage Current. Displays AC Volts & presence of HART.
- Locate Loop Current Leakages** - Find ground current leakage - faulty wiring, flooded conduits & corrosion bridges.
- Faster Calibrations** - Select 3 outputs with EZ-CHECK switch. 2 speed EZ-DIAL plus Stepping & Ramping
 Includes Attached Test Leads, Carrying Case with Shoulder Strap (020-0204) & free NIST Certificate of Calibration Card
- Optional Accessories** - AC Adaptor 120 V (020-0101); 240 V (020-0100); Calibration report with test data



Typical problem found with Loop Diagnostics

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.

Turn on Ground Leak Detection and use the PIE 334Plus, 434, 532, 820-ELITE or 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 calibrator's display!



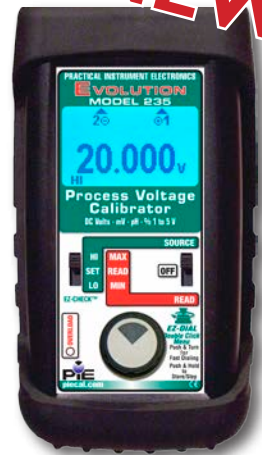
Here is a loop where a technician has just recalibrated the transmitter but the control room still sees a problem. The problem started just after a rainstorm.

Using a PIE 434 to power the loop the technician detects a leakage of 0.51 mA - the same 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.

Voltage Calibrator

Verify all your DC voltage instruments with the Model 235

- **Source three ranges of mV & V dc plus percent of 1 to 5 volts**
With the 235 you can check, calibrate and measure all your voltage, millivolt and pH signal instruments in your plant. Source -500.00 to 999.00 mV, 1.000 to 5.000 V, 0.0 to 100.0% of 1 to 5 V; 0.000 to 20.000 V.
- **Power your loops with over 1,000 Ohm loads**
The 20.000 V range has an extended span of up to 24.000 Volts giving you a portable source for powering your loops.
- **Read DC volts**
The 235 can measure from -500.00 to +999.00 mV, 0.000 to 5.100 V, 0.0 to 100.0 % of 1 to 5 V; 0 to 20.000 V and 0.00 to 60.00 V DC. Use it to check loop power supplies, I/V converters, 1 to 5 Volt signals, and other voltages.
- **Save time calibrating recorders and monitors in 4 to 20 mA loops**
Other brands of calibrators require that you break the loop to calibrate voltage inputs. With the PIE 235 you simply clip the test leads across the voltage inputs in a live 4 to 20 mA loop **without disconnecting any wires**.
- **Simulate pH probes into transmitters & analyzers**
Use the pH simulator to verify proper operation of pH devices before you place a probe into a calibrated buffer.
- **Faster Calibrations** - Three output EZ-CHECK switch. 2 speed EZ-DIAL; Stepping & Ramping
- **Calibrate with Lab Accuracy** -
Accurate to $\pm(0.025\%$ of Reading + 4 lsd) - within 0.01 mA
- **Calibrate with Confidence**
Accurate to $\pm 0.02\%$ of Reading + 0.01% Full Scale. Out of range or over current is indicated by an audible alarm, flashing display and the OVERLOAD LED will light.
- **Includes everything you need**
Rubber Boot with Stand, Deluxe Hands Free Carrying Case (020-0211), Test Leads (020-0207)
- **Optional Accessories**
NiMh Batteries & Charger 120 VAC/12V DC (020-0103); Calibration report with test data



CE

Voltage & 4 to 20/10 to 50 Milliamp Calibrator



Keep Power Plant 10-50 mA loops up with the Model 535

- **Calibrate Milliamp & Voltage Instruments**
Source & Read 0.000 to 52.000 mA & -25.00 to 125.00% of 10-50 and 4-20 mA with five digit display
Source 0.000 to 20.000 V & Read -99.99 to 99.99 V, Simulate 2-Wire Transmitters, Power & Read Transmitters
Menu selectable 250 Ohm resistor for HART compatibility
- **Stroke 10-50 mA valves and power transmitters**
Built-in 45 Volt power supply delivers the power to operate your I/Ps where other calibrators fail.
Custom Model 535-50 available with 50 Volt power supply for instruments running in 48V loops.
- **Calibrate with Lab Accuracy** -
Accurate to $\pm(0.025\%$ of Reading + 4 lsd) - within 0.01 mA
- **Includes everything you need**
AC Adaptor 120 V (020-0101); 240 V (020-0100); Carrying Case with Shoulder Strap (020-0204), Test Leads (020-0207) and Certified Test Data
- **Optional Accessories**
NiMh Batteries & Charger 120 VAC/12V DC (020-0103)

PIE 10-50 mA calibrators were designed with input from professionals in the power industry to meet the unique requirements found in nuclear power plants. PIE 10 to 50 mA calibrators have the power to drive **ALL** the instruments in your 10 to 50 mA loops. Many other calibrators have underpowered supplies of only 24 Volts which are insufficient for many of the control elements requiring 36 to 48 Volts. The PIE Models 535 mA/V Calibrator and the 850 Multifunction Calibrator will let you stroke valves and power up your loops with over 42 Volts. The custom Model 535-50 will even drive valves requiring up to 48 Volts!

Multifunction 10 to 50 Milliamp Diagnostic Calibrator

Multifunction Calibrator for all your power plant instruments

• Technician friendly operation

The unique and intuitive EZ-DIAL Double Click Menu makes it easier to setup than other multifunction calibrators. Uses the same menus as the single function Evolution Calibrators.

• Use it as a milliamp and voltage calibrator

Source 0.000 to 24.000 mA & 0.000 to 52.000 mA
0.000 to 24.000 V dc, -500.00 to 999.99 mV & -20.000 to 99.999 mV
Read 0.000 to 24.000 mA & 0.000 to 52.000 mA
0.000 to 10.250 & 0.00 to 60.00 V dc, ±99.999 mV & ±999.99 mV

Simulate 2-Wire Transmitters

Power up transmitters & loops with built-in supplies of 24V for 20 mA & 40V for 50 mA loops

Simplify 4 to 20 mA HART hookups with built-in 250 Ohm resistor

• Calibrate directly in temperature with 0.1°C/°F resolution

The PIE 850 works with the instruments you use.

Types J, K, T, E, R, S, B, N, G, C, D, L (J DIN), U (T DIN) and P (Platinel II)

Pt 100 Ohm (3850, 3902, 3916, 3926) & 1000 Ohm (3850)

Copper 10 & 50 Ohm, Nickel 110 and 120 Ohm

• Checkout flow and vibration systems

Source & read frequency from 0 to 2000 CPM (Counts-Per-Minute),

0.00 to 999.99 Hz, 0.0 to 9999.9 Hz and 0.000 to 20.000 kHz

• Checkout resistance instruments - Source and read resistance

0.00 to 401.00 Ohms & 0.0 to 4010.0 Ohms

• Troubleshoot loop & wiring problems

'Beep' out connections with the built-in continuity checker.

• Repeatability you can count on

Accuracy at

4 mA	±0.007 mA
50 mA	±0.013 mA
5 V	±0.002 V
10 kHz	±0.004 kHz
Type T 400.0°C/742.0°F	±0.2°C/0.4°F
Pt 100Ω 0.0°C/32.0°F	±0.3°C/0.6°F

• Guaranteed Compatible with all Instrumentation

Works with Rosemount & Honeywell Smart Transmitters, PLCs, DCSs, Multi-Channel Recorders and other pulsed excitation devices

• Detect 'hidden' loop problems

Quickly diagnose troublesome ground faults & current leakage with patented Loop Diagnostic technology. *Undetectable with other instruments!*

• Source pH probes into transmitters & analyzers

Source from 0.000 to 14.000 pH @ 25°C (77°F) corresponding to -414.12 to 414.12 mV to verify the pH system is operating properly.

• Measure pressure with optional pressure modules

Measure pressure in up to 32 engineering units with one of 32 pressure modules for gauge, differential non-isolated, differential isolated, compound or absolute pressure. Optional pressure modules are listed on page 12.

• Easy to read - Turn on the backlight & easily see the display in dark areas of the plant.

• Quickly set any three outputs plus automatic stepping & ramping

Easily set any value quickly with the adjustable "DIAL" plus store any three output settings for instant recall with the EZ-CHECK™ switch. Choose 2, 3, 5 or 11 steps to automatically change the output in 100%, 50%, 25% or 10% of span. Select RAMP to smoothly move the output between Zero and Span from 5, 6, 7, 8, 9, 10, 15, 20, 25, 30 and 60 seconds.

• Measure temperature sensors, frequency pickups, loop currents and voltage levels

Check the values of your process sensors. Instantly recall MAX and MIN values to see process variability.

• Ready to go right out of the box

The PIE 850 come with 4 high power "AA" lithium batteries, a rubber boot with tilt stand, deluxe hands free carrying case (020-0211), four test leads with spade lugs for RTD and ohms, two test leads with alligator clips for milliamp, volt, frequency & continuity, and a free NIST Traceable Calibration Report with test data.

• Optional Accessories

Wire & Mini T/C Plug: J, T, E, K (020-0202); B, R/S, K (020-0203); Individual Wire & Mini T/C Plug (020-0210-*) *Choose Type J, K, T, E, R/S, N or B;



Thermocouple Calibrators and Sources

Evolutionary PIE 322-I & 422 Automated T/C Calibrators

- **PIE 422 - Source and Read Fourteen T/C Types plus mV**
J, K, T, E, R, S, B, N, G, C, D, L (J DIN), U (T DIN) & P (Platinel); -13.000 to 80.000 mV
- **PIE 322-I - Source and Read Four T/C Types plus mV**
J, K, T, & E; -13.000 to 80.000 mV
- **Calibrate with Confidence** - Resolution of 0.1° F & C; Accurate to 0.2°
- **Faster Calibrations** - Instantly select three outputs with EZ-CHECK switch
Easily find trip points with two speed EZ-DIAL & Automatic Stepping.
- **Easily Change T/C Types & Scale** - Double click to select T/C type & °F & C
- **Easy-to-Read Display** - Turn on the backlight to read in dark areas of the plant
- **Use in the Plant, Field or Shop** - Low profile switches resist accidental damage.
Includes Rubber Boot, Deluxe Hands Free Carrying Case (020-0211), mV Test Leads & free NIST Certificate of Calibration Card.
- **Two ways to connect** - Plug T/C wires into the miniature thermocouple jack or place bare thermocouple wires onto the brass block under the screws.
- **Verify Cold Junction Temperature & Output (422 Only)**
Secondary display of compensated millivolt setting and cold junction temperature
- **Optional Accessories**
Wire & Mini T/C Plug; J, T, E, K (020-0202); B, R/S, K (020-0203);
Individual Wire & Mini T/C Plug (020-0210-*) *Choose Type J, K, T, E, R, S, N or B
NiMh Batteries & Charger 120 VAC/12V DC (020-0103); Calibration report with test data

422 displays mV, cold junction & temperature



Connections for bare wires or mini T/C connector

Thermocouple Source PIE 521B

- **Source Multiple Thermocouple Types plus mV**
J, K, T, E, R, S, N, B, G, C, D, L, U and P; -13.000 to 80.000 mV
- **Calibrate with Confidence**
Resolution of 0.1° F & C; Accurate to 0.4°; Backlit display
Included with PIE 520B & 521B: mV Test Leads & free NIST Certificate of Calibration Card.
- **Faster Calibrations**
Instantly select three outputs with EZ-CHECK switch
Easily find trip points with two speed EZ-DIAL
- **Optional Accessories for 520B & 521B**
Rubber Boot (020-0209), Deluxe Hands Free Carrying Case (020-0211), NiMh Batteries & Charger 120 VAC/12V DC (020-0103), Calibration report with test data
Wire & Mini T/C Plug - Types J, T, E, K (020-0202), Types B, R/S, K (020-0203),
Individual Wire & Mini T/C Plug (020-0210-*) *Choose Type J, K, T, E, R, S, N or B



PIE 520B

- **Source Only - Single Thermocouple Type plus mV**
Choose from Types J, K, T, E, R, S, N, B, G, C, D, L, U or P
(Optional boot shown)

Thermocouple Wire Kits

Each wire is stripped at one end with Mini T/C Plug on the other end.



Types J, T, E, K (020-0202)



Types B, R/S, N (020-0203)



Individual Wire & Mini T/C Plug (020-0210-*)

*Choose Type J, K, T, E, R/S, N or B

RTD Calibrators and Simulators

Evolutionary PIE 211 & 311 Automated RTD Calibrators

- **Calibrate with Ease** - Resolution to 0.1° F & C; Accurate to 0.2°
- **Source and Read Multiple RTD Curves plus Ohms**
Platinum 100 Ω: $\alpha=1.3850, 1.3902, 1.3926$; Platinum 1000 Ω: $\alpha=1.3850, 1.3750$
Copper 10 & 50 Ω; Nickel 120 Ω; 0.00 to 4001.0 Ω (PIE 211 limited to 2001.0 Ω)
Custom ranges available - consult factory
- **Automatically Detect 2, 3 & 4 Wire Connections**
Troubleshoot sensor connections & find broken wires with patented technology
- **Guaranteed Compatible with all Instrumentation**
Works with Rosemount & Honeywell Smart Transmitters, PLCs, DCSs, Multi-Channel Recorders and other pulsed excitation devices
- **Faster Calibrations** - Instantly select three outputs with EZ-CHECK switch
Easily find trip points with two speed EZ-DIAL knob & Automatic Stepping
- **Easily Change RTD Types & Scale** - Double click to select RTD Type & °F & °C
- **Verify RTD Temperature & Output (311 Only)** - Secondary display of Ohms
- **Easy-to-Read Display** - Turn on the backlight to read in dark areas of the plant
- **Use in the Plant, Field or Shop** - Includes Rubber Boot, RTD Wire Kit (020-0208), Deluxe Hands Free Carrying Case (020-0211) & free NIST Certificate of Calibration Card.
Optional: NiMh Batteries & Charger 120 VAC/12V DC (020-0103); Calibration report with test data

311 displays Ohms value & temperature



RTD Simulator PIE 511B

- **Simulate Multiple RTD Curves plus Ohms**
Pt 100 Ω: $\alpha=1.385, 1.3902, 1.3926, 1.3916$; 1000 Ω: $\alpha=1.385, 1.375$
Copper 10 & 50 Ω; Nickel 110 & 120 Ω;
0.00 to 410.00 & 410.1 to 4001.0 Ohms
- **Calibrate with Confidence**
Resolution of 0.1° F & C; Accurate to 0.3°; Backlit display
- **Faster Calibrations**
Instantly select three outputs with EZ-CHECK switch
Easily find trip points with two speed EZ-DIAL knob
- **Included with PIECAL 510B & 511B:** RTD Wire Kit (020-0208) & free NIST Certificate of Calibration Card
Optional: Rubber Boot (020-0209); Deluxe Hands Free Carrying Case (020-0211); NiMh Batteries & Charger 120 VAC/12V DC (020-0103); Calibration report with test data



PIE 510B

- **Simulate Only - Single RTD Curves plus Ohms**
Choose any single RTD type from list:
510B-Pt-100-1 $\alpha=1.3850^*$
510B-Pt-100-2 $\alpha=1.3902$
510B-Pt-100-3 $\alpha=1.3916$
510B-Pt-100-4 $\alpha=1.3926$
510B-Pt-1000-5 $\alpha=1.3850$
510B-Pt-1000-6 $\alpha=1.375$
510B-Cu-10; 510B-Cu-50
510B-Ni-120; 510B-Ni-110
* Default Model - most common worldwide (Optional boot shown)

Lab Accurate Thermocouple and RTD Calibrator

Automated Thermocouple & RTD Calibrator - Model 525B

- **Calibrate with Precision** - High resolution to 0.1° and 0.01° F & °C; Accurate to 0.2°
- **Source and Read Multiple Thermocouple Types plus mV**
J, K, T, E, R, S, B, N, G, C, D, L (J-DIN), U (T-DIN) and P (Platinel II) -13.0000 to 80.0000 mV
- **Source and Read Multiple RTD Curves plus Ohms**
Platinum 10, 50, 100, 200, 500 & 1000 Ohm ($\alpha = 3850$), Platinum 100 Ohm ($\alpha = 3902, 3916, 3926$),
Copper 10 & 50 Ohm, and Nickel 120 Ohm. Or calibrate from 0.000 to 400.000 and 0.00 to 4000.00 Ohms.
- **Automatically Detect 2, 3 & 4 Wire Connections**
Troubleshoot sensor connections & find broken wires with patented technology. Also displays excitation current used to measure the RTD sensor for advanced diagnostics of the RTD measuring instrument.
- **Guaranteed Compatible with all Instrumentation**
Works with Rosemount & Honeywell Smart Transmitters, PLCs, DCSs, Multi-Channel Recorders and other pulsed excitation devices
- **Faster Calibrations** - Instantly select 3 outputs with EZ-CHECK switch; 2 speed EZ-DIAL; Auto Stepping.
Includes Hands Free Carrying Case (020-0211); RTD Wire Kit (020-0206) & free NIST Calibration Card
- **Optional Accessories** - Wire & Mini T/C Plug; J, T, E, K (020-0202); B, R/S, K (020-0203); Individual Wire & Mini T/C Plug (020-0210-*) *Choose Type J, K, T, E, R, S, N or B; Calibration report with test data



Pressure Modules

- **Easily measure pressure with a plug in pressure module**

Purchase any of the pressure modules from the table below along with one of the three hand pumps and tubing kits for a complete pressure calibration system. All pressure modules are compatible with the PIE Models 820-ELITE, 830 and 850.

- **Media Compatibility**

Non-isolated DN sensors: clean, dry, non-corrosive, non-condensing gases only

Isolated DI sensors: any media compatible with 316L SS & Viton®

Isolated GI, CI & AI sensors: any media compatible with 316L SS

- **Accuracy**

±0.025% of full scale including all effects of linearity, repeatability and hysteresis from -20° to +50°C (-4° to +122°F)

*The DN0010 sensor accuracy is ±0.050% of full scale

- **32 Engineering Units:**

PSI • inches, feet, mm, cm and meter of H2O @ 4°C, 20°C & 60°F

inches, meter, cm and mm of Hg @ 0°C

torr • kg/cm2 • kg/m2 • Pa • hPa • kPa • MPa • Bar • mBar • ATM • oz/in2 • lb/ft2

Sensor Code	Application	Ranges Available
DNxxxx	Differential, Non-isolated	0 to 0010*, 0028, 0200, 0415, 2000" H2O
DIxxxx	Differential, Isolated	0 to 0001, 0005, 0015, 0030, 0100, 0300, 0500 PSID
GIxxxx	Gauge, Isolated	0 to 0015, 0030, 0050, 0100, 0300, 0500, 1000, 3000 PSIG
CIxxxx	Compound, Isolated	-14.7 to +0015, 0030, 0050, 0100, 0300, 0500, 1000, 3000 PSIG
AIxxxx	Absolute, Isolated	0 to 0017, 0038, 0100, 1000 PSIA

Ordering Examples: **GI0300** is a Gauge, Isolated 0 to 300 PSI; **DN0415** is a Differential, Non-isolated 0 to 415 inches of water



PIE 830 with GI0100 Pressure Module, Pressure/Vacuum Pump & Hose

Hand Pumps, Tubing & Fitting Kits

- **Generate pressure with a full set of hand pumps**

Choose from a selection of hand pumps, tubing & fittings made in the USA by Ralston Instruments. All pumps have two pressure ports - one port & hose go to the PIE pressure module and the other to the pressure input of your instrument.

Pneumatic Scissor Hand Pump

020-0224
0 to 300 psi



Hydraulic Scissor Hand Pump

020-0225
0 to 3,000 psi



Pneumatic Pressure/Vacuum Pump

020-0226
0 to 125 psi & 0 to 23 inches vacuum



Quick-test™ Hoses - 020-0229

Microbore hoses provide a very quick, low volume, high pressure way of connecting any pressure instrumentation to the hand pump and pressure module.



Pressure Fitting Kit - 020-0228

Adapts from Quick-test™ hose to 1/4" male & female NPT, 1/8" male & female NPT and 1/4" tube fitting.



Pressure Fitting - 020-0227

Adapts from Quick-test™ hose with cap to 1/8" male NPT for mounting on pressure module or pressure instrument.

PIE Pressure kits include the pump, hose and a basic fitting to get you started when you buy a PIE pressure module.

PKIT1 020-0230: includes 020-0224 Pneumatic Scissor Pump, 020-0229 Hose & 020-0227 fitting

PKIT2 020-0231: includes 020-0225 Hydraulic Scissor Pump, 020-0229 Hose & 020-0227 fitting

PKIT3 020-0232: includes 020-0226 Pressure/Vacuum Pump, 020-0229 Hose & 020-0227 fitting

Frequency/Totalizer Calibrator

PIE 541 Frequency Calibrator

- **Calibrate Flow Meters and Frequency Instruments**
Generate Sine Waves, Zero based & Zero crossing Square Waves; Adjust amplitude from 100 mV to 12V p-to-p
- **Read with Built-in Frequency counter** - Measures waveforms from 0.1V-120V peak-to-peak
- **Calibrate with confidence - Accurate to $\pm 0.005\%$ of Range**
- **Compatible with Process Signal Ranges**
0.001 kHz to 20.000 kHz; 0.1 Hz to 2000.0 Hz; 0.01 Hz to 200.00 Hz
0.1 CPM (Counts-per-minute) to 2000.0 CPM; 1 CPH (Counts-per-hour) to 20000 CPH
- **Calibrate Totalizers** - Totalize Inputs/Outputs from 1 to 99999 counts in 0.1 to 100.0 minutes
- **Includes:** Attached Leads, Carrying Case & free NIST Certificate of Calibration
- **Optional Accessories** - AC Adaptor 120 V (020-0101); 240 V (020-0100); Calibration report with test data

The PIE Model 541 is designed for calibration, testing, and diagnosing turbine meters, frequency counters, vibration systems, tachometers, vortex shedders, integrators, and any other frequency devices in the shop, plant or field. Save hours of time compared to other calibration methods. When calibrating a totalizer, the Model 541 eliminates the need of a stop watch. Set the number of pulses and number of minutes required and it automatically stops when the selected number of pulses has been sent to the totalizer! The Model 541 has a handy LED indicator showing gate time for easy trigger level adjustment. The LED also pulses with the frequency output for calibration of optical pickups.



More than a Simple Boot



- **Rubber boot adds more than just protection**
The PIE Rubber boot makes it easier to hold in your hand or when wearing gloves and provides protection against accidental falls or when banging around in your toolbox. A swing out stand is handy when you are working on a bench.
- **Boot included with many models and optional for others**
Included with PIE 830, 820, 820-ELITE, 850, 334, 334Plus, 434, 235, 322-1, 422, 311 & 211.
Optional for PIE 510B, 511B, 520B & 521B.

Calibration Certificates

PIE Calibrators come calibrated

PIE Calibrators are made in the USA. Your calibrator come standard with a Certificate of Calibration Card and a Three Year Warranty. You may optionally purchase a Certificate of Calibration with Test Data. The test data must be requested when the calibrator is ordered.

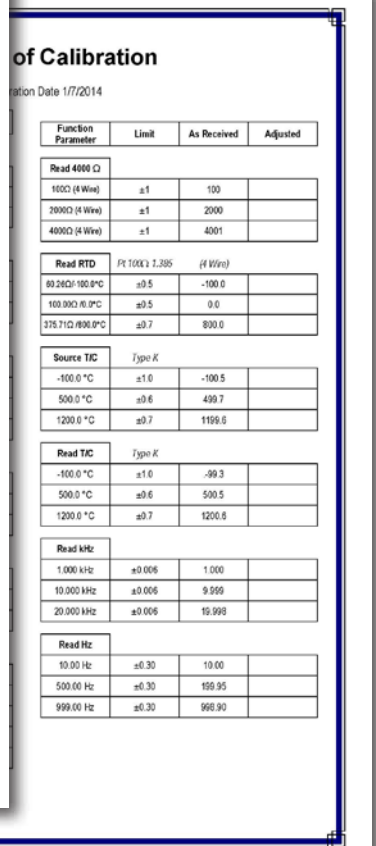
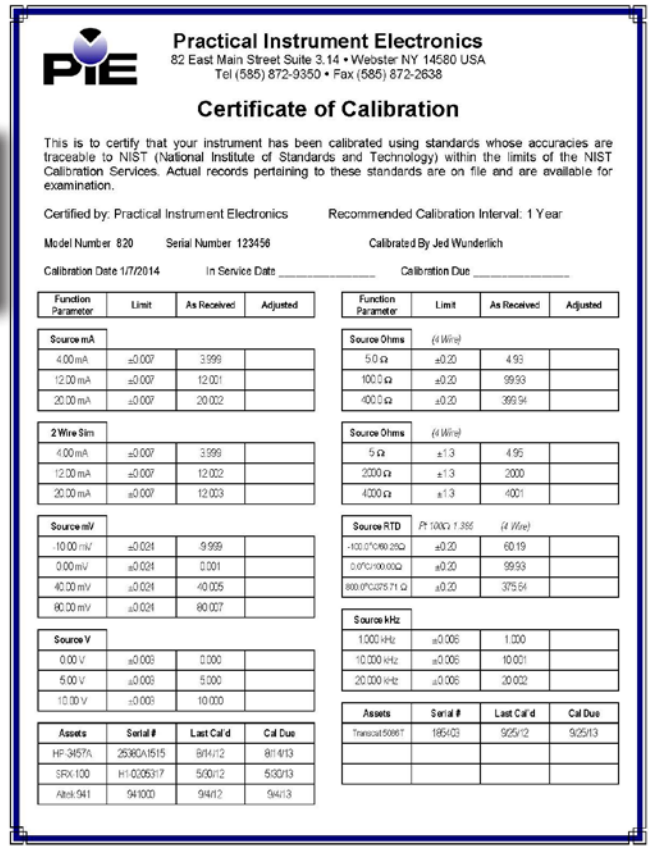
We recommend annual recalibration of our products. Contact PIE or your local distributor for factory recalibration. Calibration may also be performed by your company's calibration laboratory or by any of your qualified calibration vendors. Calibration procedures are posted on our website.



Standard Certificate of Calibration Card included free with each calibrator purchased.

Optional Certificate of Calibration with Test Data.

The Test Data must be requested at the time the calibrator is ordered.



Warranties

Standard Three Year Warranty

Three years of protection from any defects in materials or workmanship - included with every calibrator. If your calibrator should fail, and is physically undamaged, we will repair it free of charge under our Standard Warranty.

Repair/Replacement Three Year Warranty (-RW)

Available for a small additional charge at time of purchase. Three years of protection from any defects in materials or workmanship PLUS Three years of protection from physical damage. If you use calibrators frequently and under extreme conditions, the Repair/Replacement Warranty is the best choice. This warranty provides for the repair or replacement of the covered calibrator during the first three years no matter what happens to the calibrator! If the calibrator is dropped, run over, or is abused until it ceases to function, we will repair or replace it no charge. *No questions asked.*

PIE Calibrators



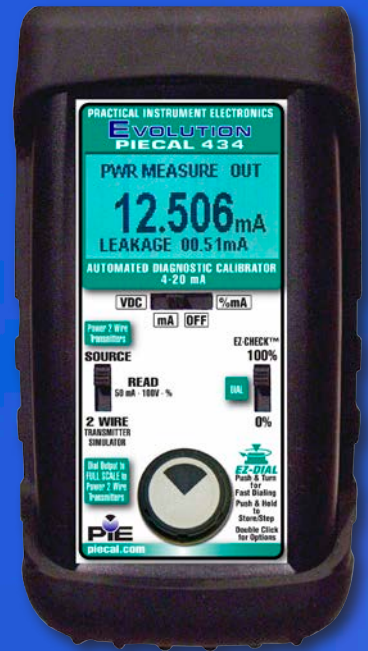
Multifunction



Frequency



**Thermocouple
& RTD**



**Milliamp
& Voltage**



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