PIECAL 434

Automated Diagnostic 4-20 mA Calibrator

Actual Size

- **Easy to use**
  With the PIECAL 434 you can check, calibrate and measure all your current signal instruments in a 4 to 20 milliamp DC loop. It can be used at any access point in your loop. Source & Read 0.000 to 24.000 mA, Simulate a 2 Wire Transmitter or use the PIECAL 434 to simultaneously power your 2 Wire Transmitter and measure its output.
- **Easy to read**
  Turn on backlight & easily see the display in dark areas of the plant.
- **Troubleshoot loop problems**
  Quickly diagnose ground fault and current leakage with the patented loop diagnostic technology (US Patent# 7,248,058).
- **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 0.001 mA with the adjustable digital potentiometer "**DIAL**" or use preset **4.000 mA (0.00%)** and **20.000 mA (100.00%)** EZ-CHECK™ settings.
- **Automatic output stepping & ramping**
  Press & hold the dial to automatically step from 4 to 20 in 2, 3 or 5 steps or choose a continuous ramp.
- **Calibrate using loop power**
  Check loop wiring and receivers by using the PIECAL 434 in place of a 2 Wire transmitter. Uses any loop power from 2 to 60 V DC.
- **Read loop current**
  Check controller outputs or measure the milliamp signal anywhere in the loop. The PIECAL 434 measures 0.000 to 24.000 mA (-25.00 to 125.00%) signals with greater accuracy than a typical multimeter.
- **Power & measure 2 wire transmitters**
  The PIECAL 434 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. Powers HART™ transmitters with built-in 250 ohm resistor simplifying hookups with HART communicators.
- **Read DC volts**
  The PIECAL 434 can measure from -60.00 to +60.00 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.
- **Evolutionary design**
  PIECAL 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 PIECAL 434 improves upon other brands by including a rubber boot, tilt stand, backlit display with larger digits, rugged switches and a battery compartment for fast battery changes.

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

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Ground Leak Detection

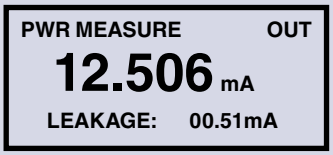
Have you ever replaced a “faulty” transmitter only to find the problem was somewhere else in the loop? And did you end up throwing the transmitter away after you fixed the other problem “just in case” the transmitter was faulty?

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.

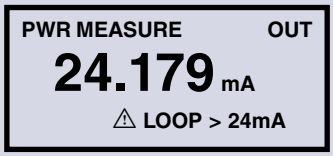
If you have some loops that are erratic after it rains there may be moisture present in a junction box or where insulation has broken down. Turn on Ground Leak Detection and use the PIECAL 434 to power up the loop. Any current that isn't controlled by the transmitter or other current control element will be indicated as leakage on the PIECAL 434 display.

The PIECAL 434 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.

Typical Error Conditions



The PIECAL 434 is supplying the loop voltage. A calibrated transmitter is limiting the loop current to 12.00 mA. An additional 0.51 mA is not controlled by the transmitter and is leaking somewhere in the loop.



The PIECAL 434 is supplying the loop voltage. There is an control loop error. This may be a transmitter (set for upscale burnout) with a bad or missing sensor, or a short in the loop.

Using Ground Leak Detection (From the Instruction Manual)

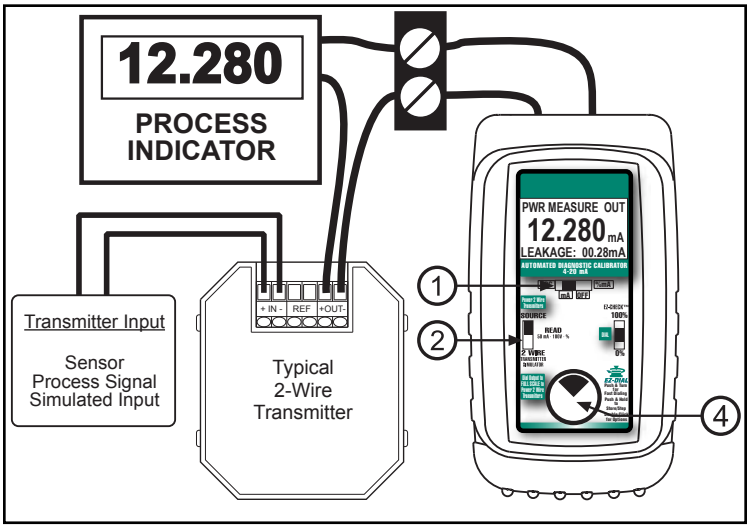
mA OUT, % OUT (Percent of 4 to 20 mA)

Find current leaks in loops caused by ground faults, moisture or corrosion. The 434 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) Disconnect one or both input wires from the device to be calibrated.
2) Select **“mA”** or **“% 4 to 20mA”** with slide switch ①.
3) Select **“SOURCE”** using slide switch ②.
4) Turn the knob ④ clockwise several times until full scale output (>24.000 mA/125.00%) The display will indicate **“PWR MEASURE”** and **“LEAKAGE:”**
5) Connect the red source lead of the PIECAL 434 to the plus (+) input of the device and the black source lead to the minus (-).

The PIECAL 434 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 PIECAL 434 along with an indication of leakage current at the bottom of the display. If there is an uncontrolled loop, a transmitter with upscale burnout, bad or missing sensor or a short the display shows “⚠LOOP > 24mA”

Note: Many installed transmitters will normally indicate 0.01 to 0.10 mA leakage without significant control problem. Unstable readings may indicate loose connections or the presence of moisture.



Warranty

Our equipment is warranted against defective material and workmanship (excluding batteries) for a period of three years from the date of shipment. Claims under warranty can be made by returning the equipment prepaid to our factory. The equipment will be repaired, replaced or adjusted at our option. The liability of Practical Instrument Electronics (PIE) is restricted to that given under our warranty. No responsibility is accepted for damage, loss or other expense incurred through sale or use of our equipment. Under no condition shall Practical Instrument Electronics, Inc. be liable for any special, incidental or consequential damage.

PIECAL 434 Specifications

(Unless otherwise indicated all specifications are rated from a nominal 23°C, 70% RH for 1 year from calibration)

General	
Operating Temperature Range	-20 to 60 °C (-5 to 140 °F)
Storage Temperature Range	-30 to 60 °C (-22 to 140 °F)
Relative Humidity Range	10 % ≤RH ≤90 % (0 to 35 °C), Non-condensing
	10 % ≤RH≤ 70 % (35 to 60 °C), Non-condensing
Size	5.63 x 3.00 x 1.60 in, 143 x 76 x 41mm (LxWxH)
Weight	12.1 ounces, 0.34 kg (including boot & batteries)
Batteries	Four "AA" Alkaline 1.5V (LR6)
Optional AC Adaptors	120 VAC 50/60 Hz [Part # 020-0100] 240 VAC 50/60 Hz [Part # 020-0101]
Optional NiMh Rechargeable battery kit	120 VAC for North America Only; charger, four NiMh batteries, AC & DC cords [Part # 020-0103]
Low Battery	Low battery indication with nominal 1 hour of operation left
Protection against misconnection	Over-voltage protection to 135 vrms (rated for 30 seconds) or 240 vrms (rated for 15 seconds)
Display	High contrast graphic liquid crystal display with 0.315" (8.0 mm) high digits. LED backlighting for use in low lit areas.

Read mA	
Ranges and Resolution	0.000 to 24.000 mA or -25.00 to 125.00% of 4-20 mA
Accuracy	≤ ± (0.01 % of Reading +0.002 mA)
Voltage burden	≤ 2V at 50 mA
Overload/Current limit protection	25 mA nominal
Battery life	≥ 125 Hours nominal ≥ 100 hrs with backlight on

Source/Power & Measure Two Wire Transmitters	
Ranges and Resolution	0.000 to 24.000 mA or -25.00 to 125.00% of 4-20 mA
Accuracy	≤ ± (0.01 % of Reading +0.002 mA)
Noise	≤ ± ½ Least Significant Digit
Temperature effect	≤ ± 0.005 %/°C of FS
Loop compliance voltage	≥ 24 DCV @ 20.00mA
Loop drive capability - Leak Detection Off	1200 Ω at 20 mA for 15 hours nominal; 950 Ω with Hart Resistor enabled
Loop drive capability - Leak Detection On	1000 Ω at 20 mA for 15 hours nominal; 750 Ω with Hart Resistor enabled
Battery life	≥ 30 hrs at 12 mA nominal; ≥ 25 hrs with backlight on

2-Wire Transmitter Simulation	
Accuracy	Same as Source/Power & Measure
Voltage burden	≤ 2V at 20 mA
Overload/Current limit protection	24 mA nominal
Loop voltage limits	2 to 60 VDC (fuse-less protected from reverse polarity connections)
Battery life	≥ 125 hours nominal; ≥ 100 hrs with backlight on

Voltage Read	
Range and Resolution	-60.00 to +60.00 VDC Full Span (FS)
Accuracy	≤ ± 0.05 % of FS
Temperature effect	≤ ± 100 ppm/°C of FS
Input resistance	≥ 2 MΩ
Battery life	≥ 125 hours nominal; ≥ 100 hrs with backlight on

Accessories

INCLUDED:

Rubber Boot, Four "AA" Alkaline batteries, Certificate of Calibration

Small Carrying Case with PIE Logo — Part No. 020-0205

Test Leads - one pair: 1 meter (3') long with retractable shield banana plug & alligator clips — Part No. 020-0207

OPTIONAL:

AC ADAPTOR (200 to 240 VAC) — Part No. 020-0100

AC ADAPTOR (100 to 120 VAC) — Part No. 020-0101

Ni-MH 1 Hour Charger with 4 Ni-MH AA Batteries — Part No. 020-0103
(100-120 V AC input for North America Only)
(100-120 V AC input for North America Only)

Additional Information

PIE Calibrators are manufactured in the USA. This product is calibrated on equipment traceable to NIST and includes a Certificate of Calibration. Test Data is available for an additional charge.

Practical Instrument Electronics recommends a calibration interval of one year. Contact your local representative for recalibration and repair services.

PIE
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