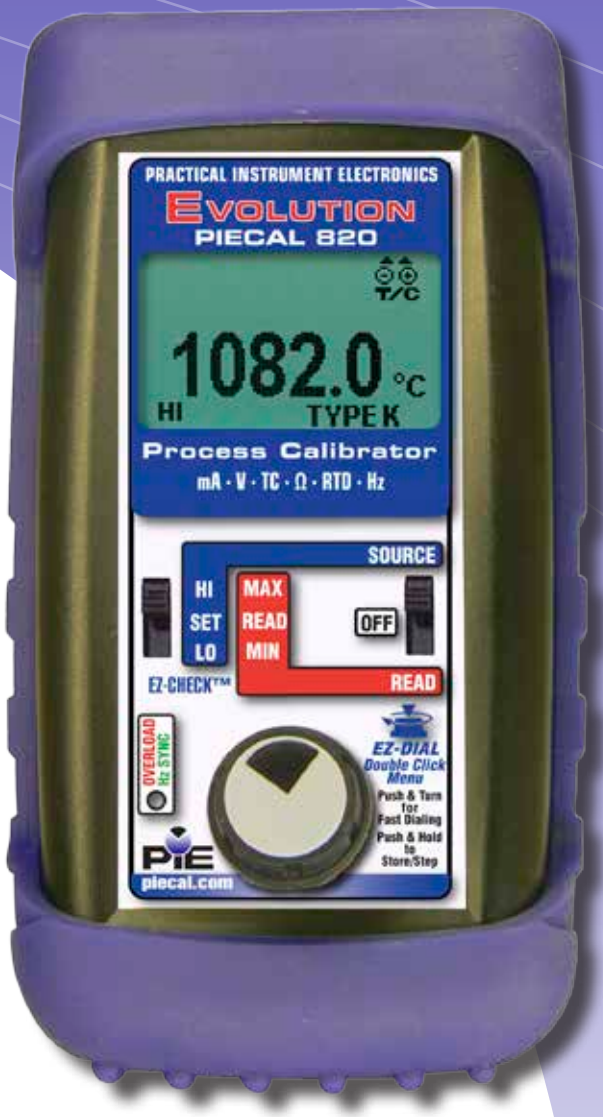
PIECAL 820

Multifunction Process Calibrator

Carry six single function calibrators in the palm of your hand with the PIECAL 820



Actual Size

CE

- **Lighten up your toolbox**
  Pocket sized calibrator replaces toolbox of single function devices
  Milliamp • Voltage • Frequency
  Thermocouples • RTDs • Check Continuity
- **Technician friendly operation**
  Intuitive *EZ-DIAL Double Click Menu* makes it easier to setup than other multifunction calibrators. Uses the same menus as the single function PIE Evolution Calibrators. Icons on the display indicate where to plug in the test leads.
- **Use it as a milliamp and voltage calibrator**
  Source 0 to 24.00 mA, 0 to 10.25 V and -10.00 to 80.00 mV dc
  Read to 24.00 mA, 10.25 V, 60.0 V and -10.00 to 80.00 mV dc
  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 (°C & °F)**
  The PIECAL 820 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 to 2000 CPM (Counts-Per-Minute), 999.99 Hz, 9999.9 Hz & to 20.000 kHz.
- **Troubleshoot loop & wiring problems**
  'Beep' out connections with the built-in continuity checker.
- **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 between 2, 3, 5 & 11 steps to automatically increment the output in 100%, 50%, 25% or 10% of span. Select RAMP to smoothly increase and decrease the output between Zero and Span. Set step/ramp time to match your system 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.
- **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 820 improves upon other brands by including a rubber boot, a backlit display with larger digits, higher accuracy and more ranges for greater flexibility.

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

Practical Instrument Electronics
82 E. Main Street Suite 3.14 • Webster, NY 14580 Tel: 585.872.9350 • Fax: 585.872.2638 • sales@piecal.com • www.piecal.com

Milliamp Calibrator

• Easy to use

With the PIECAL 820 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 0.00 to 24.00 mA, Simulate a 2 Wire Transmitter or use the PIECAL 820 to simultaneously power your 2 Wire Transmitter and measure its output.

• 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 "**EZ-DIAL**" or use preset **4.00 mA (0.0%)** and **20.00 mA (100.0%)** EZ-CHECK™ settings.

• Calibrate using loop power

Check loop wiring and receivers by using the PIECAL 820 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 820 measures 0.00 to 24.00 mA (-25.0 to 125.0%) signals with greater accuracy than a typical multimeter.

• Power & measure 2 wire transmitters

The PIECAL 820 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.

Voltage Calibrator

• Source mV & V dc

With the PIECAL 820 you can check, calibrate and measure all your voltage, millivolt and pH signal instruments in your plant. Source 0 to 10.25 V dc and -10.00 to 80.00 mV.

• Read DC volts

The PIECAL 820 can measure from 0 to 10.25 V, -10.00 to 80.00 mV and 0.0 to 60.0 VDC. Use it to check loop power supplies, I/V converters, 1 to 5 Volt signals, and other voltages.

Frequency Calibrator

• Calibrate flow meters and frequency instruments

Generate zero crossing square waves to check, calibrate and measure all the frequency signal instruments in your plant. Source and read frequencies from 1 to 2000 CPM (Counts-Per-Minute), 0.01 to 999.00 Hz, 0.1 to 9999.9 Hz and 0.001 to 20.000 kHz.

• Checkout optical pickups

The PIECAL 820 has a green LED that flashes in sync with the output frequency. Select a frequency and hold the calibrator up to the optical sensor.

Thermocouple Calibrator

• Calibrate directly in temperature (°C & °F)

Stop carrying around a millivolt source and thermocouple tables. The PIECAL 820 works with the thermocouples you use including types J, K, T, E, R, S, B, N, G, C, D, L (J-DIN), U (T-DIN) and P (Platinel II). Easily set any value quickly to within 0.1° with the adjustable digital potentiometer "**EZ-DIAL**" plus recall any three temperatures for instant recall with the EZ-CHECK™ switch.

• Measure thermocouple sensors

Trouble shoot sensor connections and find broken wires or corroded connections. Connect your thermocouple with a miniature thermocouple connector and the PIECAL 820 measures the probe in degrees C or F.

RTD, Resistance Calibrator

- **Easy to use**

  With the PIECAL 820 you can check & calibrate all your RTD instruments and measure RTD Sensors. Automatic indication of connections on the display for simple hookups.

- **Calibrate directly in temperature (°C & °F)**

  Stop carrying around a decade box and RTD resistance tables. The PIECAL 820 works with the RTDs you use including Platinum 100 (alpha = 3850, 3902, 3916, 3926) & 1000 (alpha = 3850) Ohm, Copper 10 & 50 Ohm, Nickel 100 and 120 Ohm. Easily set any value quickly to within 0.1° with the adjustable digital potentiometer "**EZ-DIAL**" plus store any three temperatures for instant recall with the EZ-CHECK™ switch. Or use like a decade box from 0.0 to 401.0 and from 0 to 4010 Ohms.

- **Compatible with *ALL* process instruments**

  No competitor's calibrator is compatible with as many process instruments! Connect directly to the RTD inputs of smart transmitters, PLCs, DCS and multichannel recorders and verify their outputs or displays. Works with older instruments with fixed excitation currents and newer multichannel instruments that switch the excitation current between input channels.

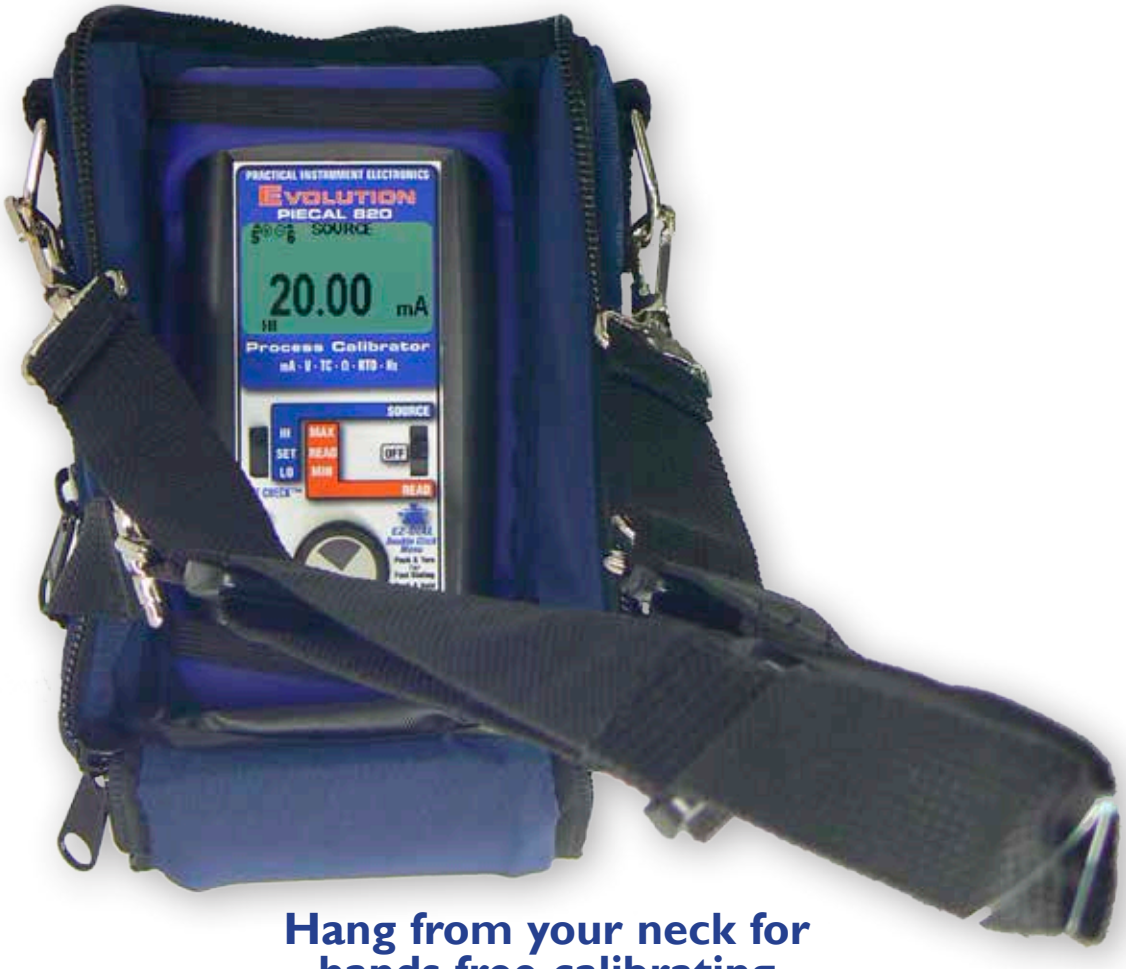
- **Measure RTD sensors**

  Trouble shoot sensor connections and find broken wires with patented technology. Connect your two, three or four wire RTDs and the PIECAL 820 measures the RTD in degrees C or F.

Continuity Checker

- **Troubleshoot wiring and connection problems**

  Use the built-in continuity checker to look at wiring and connections during installation or to locate shorts. Beeps from 0 to 100 Ohms.



Hang from your neck for hands free calibrating

Thermocouple Ranges & Accuracies

Based on ±(0.03% of 80 mV)

T/C	Degrees C Range	°C	Degrees F Range	°F	T/C Material
J	-200.0 to -150.0	±1.2°	-328.0 to -238.0	±2.0°	+Iron -Connstantan
	-150.0 to -50.0	±0.7°	-238.0 to -58.0	±1.3°	
	-50.0 to 100.0	±0.5°	-58.0 to 212.0	±0.9°	
	100.0 to 1200.0	±0.4°	212.0 to 2192.0	±0.8°	
K	-230.0 to -150.0	±2.6°	-382.0 to -238.0	±4.7°	+ Chromel® -Alumel®
	-150.0 to 0.0	±1.0°	-238.0 to 32.0	±1.8°	
	0.0 to 1100.0	±0.6°	32.0 to 2012.0	±1.1°	
	1100.0 to 1371.1	±0.7°	2012.0 to 2500.0	±1.2°	
T	-260.0 to -230.0	±6.1°	-436.0 to -382.0	±11.0°	+Copper -Constantan
	-230.0 to -150.0	±2.2°	-382.0 to -238.0	±4.0°	
	-150.0 to 50.0	±1.1°	-238.0 to 122.0	±2.0°	
	50.0 to 300.0	±0.5°	122.0 to 572.0	±1.0°	
	300.0 to 400.0	±0.4°	572.0 to 752.0	±0.7°	
E	-240.0 to -150.0	±2.5°	-400.0 to -238.0	±4.5°	+Chromel -Constantan
	-150.0 to -50.0	±0.7°	-238.0 to -58.0	±1.1°	
	-50.0 to 150.0	±0.4°	-58.0 to 302.0	±0.8°	
	150.0 to 1000.0	±0.3°	302.0 to 1832.0	±0.6°	
R	-18.3 to 50.0	±6.5°	-1.0 to 122.0	±11.7°	+Pt/13Rh -Platinum
	50.0 to 500.0	±3.7°	482.0 to 932.0	±6.6°	
	500.0 to 800.0	±2.2°	932.0 to 1472.0	±4.0°	
	800.0 to 1767.8	±2.0°	1472.0 to 3214.0	±3.5°	
S	-18.3 to 50.0	±6.1°	-1.0 to 122.0	±10.9°	+Pt/10Rh -Platinum
	50.0 to 300.0	±3.7°	122.0 to 572.0	±6.6°	
	300.0 to 600.0	±2.6°	572.0 to 1112.0	±4.7°	
	600.0 to 1767.8	±2.3°	1112.0 to 3214.0	±4.2°	
B	315.6 to 600.0	±7.9°	600.0 to 1122.0	±14.2°	+Pt/30Rh -Pt/6Rh
	600.0 to 1050.0	±4.0°	1122.0 to 1922.0	±7.3°	
	1050.0 to 1400.0	±2.5°	1922.0 to 2552.0	±4.6°	
	1400.0 to 1820.0	±2.1°	2552.0 to 3308.0	±3.8°	

T/C	Degrees C Range	°C	Degrees F Range	°F	T/C Material
N	-230.0 to 0.0	±4.2°	-382.0 to 32.0	±7.5°	+Nicrosil -Nisil
	0.0 to 450.0	±0.9°	32.0 to 842.0	±1.7°	
	450.0 to 1150.0	±0.6°	842.0 to 2102.0	±1.1°	
	1150.0 to 1300.0	±0.7°	2102.0 to 2372.0	±1.2°	
G (W)	100.0 to 300.0	±4.5°	212.0 to 572.0	±8.2°	+Tungsten -W26/Re
	300.0 to 650.0	±2.1°	572.0 to 1202.0	±3.7°	
	650.0 to 1800.0	±1.3°	1202.0 to 3272.0	±2.4°	
	1800.0 to 2320.0	±1.9°	3272.0 to 4208.0	±3.5°	
C (W5)	-1.1 to 200.0	±1.8°	30.0 to 392.0	±3.2°	+W5/Re -W26/Re
	200.0 to 1350.0	±1.4°	392.0 to 2462.0	±2.6°	
	1350.0 to 2000.0	±1.9°	1742.0 to 3632.0	±3.4°	
	2000.0 to 2320.0	±2.6°	3632.0 to 4208.0	±4.7°	
D (W3)	-1.1 to 400.0	±2.5°	30.0 to 752.0	±4.5°	+W3/Re -W25/Re
	400.0 to 1500.0	±1.3°	752.0 to 2732.0	±2.4°	
	1500.0 to 2000.0	±2.3°	2732.0 to 3632.0	±3.0°	
	2000.0 to 2320.0	±2.6°	3682.0 to 4208.0	±4.6°	
P Platinel	0.0 to 150.0	±0.8°	32.0 to 302.0	±1.5°	+Pd55/Pt31/Au14 -Au65/Pd35
	150.0 to 1100.0	±0.6°	302.0 to 2012.0	±1.1°	
	1100.0 to 1395.0	±0.8°	2012.0 to 2543.0	±1.5°	
L J-DIN	-200.0 to 0.0	±0.7°	-328.0 to 32.0	±1.3°	+Iron -Connstantan
	0.0 to 550.0	±0.5°	32.0 to 1022.0	±0.8°	
	550.0 to 900.0	±0.4°	1022.0 to 1652.0	±0.7°	
U T-DIN	-200.0 to -25.0	±1.4°	-328.0 to -13.0	±2.6°	+Copper -Constantan
	-25.0 to 100.0	±0.7°	-13.0 to 212.0	±1.2°	
	100.0 to 300.0	±0.5°	212.0 to 572.0	±0.9°	
	300.0 to 600.0	±0.4°	572.0 to 1112.0	±0.7°	

RTD Ranges & Accuracies

RTD Type	Alpha	Degrees C Range	°C	Degrees F Range	°F
Pt 100 Ohm DIN/IEC/JIS 1989 Based on ITS-90	1.3850 (0.00385)	-200.0 to 120.0 120.0 to 430.0 430.0 to 850.0	±0.5° ±0.6° ±0.7°	-328.0 to 248.0 248.0 to 806.0 806.0 to 1562.0	±0.9° ±1.0° ±1.2°
Pt 100 Ohm (Burns)	1.3902 (0.003902)	-195.6 to 160.0 160.0 to 460.0 460.0 to 648.9	±0.5° ±0.6° ±0.7°	-320.0 to 320.0 320.0 to 860.0 860.0 to 1200.0	±0.9° ±1.0° ±1.2°
Pt 100 Ohm (Old JIS 1981)	1.3916 (0.003916)	-200.0 to 170.0 170.0 to 480.0 480.0 to 648.9	±0.5° ±0.6° ±0.7°	-328.0 to 338.0 338.0 to 896.0 896.0 to 1200.0	±0.9° ±1.0° ±1.2°
Pt 100 Ohm (US Lab)	1.3926 (0.003926)	-200.0 to 180.0 180.0 to 490.0 490.0 to 850.0	±0.5° ±0.6° ±0.7°	-328.0 to 356.0 356.0 to 914.0 914.0 to 1562.0	±0.9° ±1.0° ±1.2°

RTD Type	Alpha	Degrees C Range	°C	Degrees F Range	°F
Pt 1000 Ohm DIN/IEC/JIS 1989	1.3850 (0.00385)	-200.0 to 120.0 120.0 to 430.0 430.0 to 850.0	±0.5° ±0.6° ±0.7°	-328.0 to 248.0 248.0 to 806.0 806.0 to 1562.0	±0.9° ±1.0° ±1.2°
Copper 10 Ohm (Minco)	1.4274 (0.004274)	-200.0 to 260.0	±5.1°	-328.0 to 500.0	±9.2°
Copper 50 Ohm	1.4280 (0.00428)	-50.0 to 150.0	±0.9°	-58.0 to 302.0	±1.7°
Ni 120 Ohm (Pure)	1.6720 (0.00672)	-80.0 to 260.0	±0.3°	-112.0 to 500.0	±0.5°
Ni 110 (Bristol 7 NA)	1.5801 (0.005801)	-100.0 to 260.0	±0.3°	-148.0 to 500.0	±0.5°

PIECAL 820 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)
Temperature effect	≤ ± 0.01 %/°C of Full Scale
Relative Humidity Range	10 % ≤RH ≤90 % (0 to 35 °C), Non-condensing
	10 % ≤RH≤ 70 % (35 to 60 °C), Non-condensing
Normal Mode Rejection	50/60 Hz, 50 dB
Common Mode Rejection	50/60 Hz, 120 dB
Noise	≤ ± ½ Least Significant Digit from 0.1 to 10 Hz
Size	5.63 x 3.00 x 1.60 in, 143 x 76 x 41mm (L x W x H)
Weight	12.1 ounces, 0.34 kg (including boot & batteries)
Batteries	Four "AA" Alkaline 1.5V (LR6)
Optional NiMh Rechargeable battery kit	120 VAC for North America Only; charger, four NiMh batteries, AC & DC cords [Part # 020-0103]
Battery Life	Read Functions: ≥ 20 hours Source mA: ≥ 14 hours @ 12 mA into 250Ω Pwr/Meas mA: ≥ 12 hours at 20 mA Source V, Ω, T/C, RTD & Hz: ≥ 20 hours
Low Battery	Low battery indication with nominal 1 hour of operation left
Protection against misconnection	Over-voltage protection to 60 vrms (rated for 30 seconds) Red LED indicates OVERLOAD or out of range conditions
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	0.00 to 24.00 mA or -25.0 to 125.0% of 4-20 mA
Accuracy	≤ ± (0.03 % of Full Scale)
Voltage burden	≤ 2V at 24 mA
Overload/Current limit protection	25 mA nominal

Source mA / Power & Measure Two Wire Transmitters	
Ranges and Resolution	0.00 to 24.00 mA or -25.0 to 125.0% of 4-20 mA
Accuracy	≤ ± (0.03 % of Full Scale)
Loop compliance voltage	≥ 24 DCV @ 20.00mA
Loop drive capability	1200 Ω at 20 mA for 15 hours nominal; 950 Ω with Hart Resistor enabled

mA 2-Wire Transmitter Simulation	
Accuracy	Same as Source/Power & Measure
Voltage burden	≤ 2V at 20 mA
Overload/Current limit protection	25 mA nominal
Loop voltage limits	2 to 60 VDC (fuse-less protected from reverse polarity connections)

Voltage Read	
Range and Resolution	0.00 to 80.00 mV, 0 to 10.25 V, 0.0 to 60.0 V DC
Accuracy	≤ ± 0.03 % of Full Scale
Input resistance	≥ 1 MΩ

Specifications subject to change without notice.

Source V dc	
Ranges and Resolution	-10.00 to 80.00 mV, 0 to 10.25 V
Accuracy	≤ ± (0.03 % of Full Scale)
Source Current	≥ 24 mA
Sink Current	> 16 mA
Output Impedance	< 1 Ohm
Short Circuit Duration	Infinite

Thermocouple Source	
Accuracy	±(0.03% of Full Scale) [Note: Full Scale is 80.00 mV]
Cold Junction Compensation	Included in accuracy
Output Impedance	< 1 Ohm
Source Current	> 20 mA (drives 80 mV into 10 Ohms)

Thermocouple Read	
Accuracy & Cold Junction Compensation	Same as Thermocouple Source
Input Impedance	> 1 Megohms
Open TC Threshold; Pulse	10K Ohms; <5 µamp pulse for 300 milliseconds (nominal)

RTD, OHMS and Continuity Read	
Resistance Ranges	0.0 to 401.0, 0 to 4010 Ohms
Accuracy	±(0.03% of Full Scale + 0.075 Ohms)
Excitation Current	1.0 mA to 401 Ohms, 0.6 mA to 4010 Ohms (nominal)
Continuity	0.0 to 401.0 Ohms; Beeps from 0.0 to 100.0 Ohms

RTD and OHMS Source	
Accuracy From 1 to 10.2 mA External Excitation Current	±(0.03% of Full Scale + 0.075 Ohms)
Below 1 mA of External Excitation Current	$\pm(0.03\%\ \text{of Full Scale} + 0.075\ \text{Ohms} + \frac{0.025\ \text{mV}}{\text{mA Excitation Current}})$
Resistance Ranges	0.0 to 401.0, 0 to 4010 Ohms
Allowable Excitation Current Range	<401 Ohms: 10.2 mA max; steady or pulsed/intermittent 401 to 4010 Ohms: 1 mA max; steady or pulsed/intermittent
Pulsed Excitation Current Compatibility	DC to 0.01 second pulse width

Frequency Source	
Ranges	1 to 2000 CPM, 0.01 to 999.99 Hz, 0.1 to 9999.9 Hz, 0.001 to 20.000 kHz
Accuracy	±(0.03% of Full Scale)
Output Waveform	Square Wave, Zero Crossing -1.0 to +5 V peak-to-peak ±10%
Risetime (10 to 90% of amplitude)	< 10 microseconds
Output Impedance	< 1 Ohm
Source Current	> 1 mA rms at 20 kHz
Short Circuit Duration	Infinite
Optical Coupling	Green LED (HZ SYNC) flashes at output frequency

Frequency Read	
Ranges & Accuracy	Same as Frequency Source
Accuracy	±(0.03% of Full Scale)
Trigger Level	1 V rms, dc coupled
Input Impedance	> 1 Meg Ohm + 60 pF

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.

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.

Accessories

INCLUDED:

Four "AA" Alkaline batteries, Certificate of Calibration

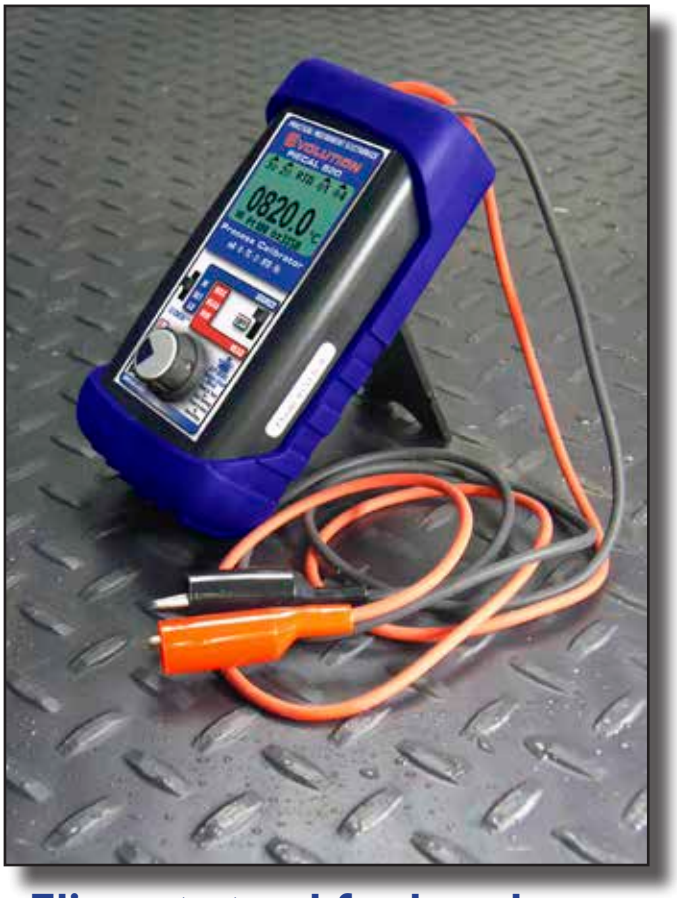
Dark Blue Rubber Boot	Part No. 020-0212
Evolution Hands Free Carrying Case	Part No. 020-0211
PIE Multifunction Wire Kit	Part No. 020-0820

1 Red & 1 Black Lead with Banana Plug & Alligator Clips
2 Red & 2 Black Leads with Banana Plugs & Spade Lugs

OPTIONAL:

Ni-MH 1 Hour Charger with 4 Ni-MH AA Batteries (100-120 V AC input for North America Only) (100-120 V AC input for North America Only)	Part No. 020-0103
T/C Wire Kit 1* for Types J, K, T & E	Part No. 020-0202
T/C Wire Kit 2* for Types B, R/S & N	Part No. 020-0203

* Thermocouple extension wire, stripped on one end with a corresponding miniature thermocouple male connector on the other end.



Flip out stand for bench use

PIE
Practical Instrument Electronics

Available From:

Practical Instrument Electronics
82 East Main Street Suite 3.14 • Webster, NY 14580 USA
Tel: 585.872.9350 • Fax: 585.872.2638
sales@piecal.com • www.piecal.com

Copyright © 2014 All rights reserved 820-9001 - Rev D 20 October 2014