PIE 820-ELITE

Multifunction Diagnostic Process Calibrator

Carry eight single function calibrators in the palm of your hand!

Actual Size

- **Lighten up your toolbox**
  Compact calibrator replaces toolbox of single function devices
  Milliamp • Voltage • Frequency • pH
  Thermocouples • RTDs • Check Continuity • Pressure
- **Technician friendly operation**
  Intuitive *EZ-DIAL Double Click Menu* makes it easier to setup than other multifunction calibrators. Same as the single function PIE Calibrators.
- **Use it as a milliamp and voltage calibrator**
  Source 0 to 24.000 mA, 0 to 10.250 V dc, -20.000 to 99.999 mV and -500.00 to 999.99 mV
  Read to 24.000 mA, 60.00 V dc ±99.999 mV and ±999.99 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
- **Troubleshoot loop problems**
  Quickly diagnose ground fault and current leakage with patented loop diagnostic technology (US Patent 7,248,058).
- **Calibrate directly in temperature to 0.1°C & 0.1°F**
  Compatible with the instruments you use including all brands of smart transmitters and PLCs with 14 thermocouple & 9 RTD types.
- **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.
- **Simulate 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
- **Measure pressure with optional pressure modules**
  Three modules for 30 PSI/2 bar gauge, 500 PSI/35 bar gauge and 30 PSI/2 bar absolute
- **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 with the adjustable "DIAL" plus store any three output settings for instant recall with the EZ-CHECK™ switch. 2, 3, 5 & 11 steps automatically increment output in 100%, 50%, 25% or 10% of span. Select RAMP to smoothly increase and decrease the output. Set step/ramp time to 5, 6, 7, 8, 10, 15, 20, 25, 30 & 60 seconds.
- **Measure temperature sensors, frequency pickups, loop currents, voltage levels & pressures**
  Check the values of your process sensors. Instantly recall MAX and MIN values to see process variability.
- **Evolutionary design**
  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 *820-ELITE* 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.

Milliamp Calibrator

- **Easy to use**
  With the 820-ELITE 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 820-ELITE 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 0.001 mA with the adjustable digital potentiometer "**EZ-DIAL**" or use preset **4.000 mA (0.00%)** and **20.000 mA (100.00%)** EZ-CHECK™ settings.

- **Calibrate using loop power**
  Check loop wiring and receivers by using the 820-ELITE 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 820-ELITE 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 820-ELITE 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 three ranges of mV & V dc**
  With the 820-ELITE you can check, calibrate and measure all your voltage, millivolt and pH signal instruments in your plant. Source 0.000 to 10.250 V dc, -500.00 to 999.99 mV and -20.000 to 99.999 mV.

- **Read DC volts**
  The 820-ELITE can measure from 0.000 to 10.250 V, -999.99 to 999.99 mV, -99.999 to 99.999 mV and 0.00 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 820-ELITE 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 to 0.1°C & 0.1°F**
  Stop carrying around a millivolt source and thermocouple tables. The 820-ELITE 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 820-ELITE measures the probe to 0.1 degree C or F.

RTD, Resistance Calibrator

- **Easy to use**
  With the 820-ELITE you can check & calibrate all your RTD instruments and measure RTD Sensors.

- **Calibrate directly in temperature (°C & °F)**
  Stop carrying around a decade box and RTD resistance tables. The 820-ELITE 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 0.00 to 401.00 and from 0.0 to 4001.0 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**
  Connect your two, three or four wire RTDs and the 820-ELITE measures the RTD to 0.1 degree C or F.

pH Simulator

- **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. Adjusting the pH transmitter or analyzer without a probe allows you to make sure the device is calibrated and doesn't require too much offset with the probe. If the probe requires more than the manufacturer's recommendations (typically 5%) it is time to replace the probe. The 820-ELITE simulates 0.000 to 14.000 pH @ 25°C corresponding to -414.12 to +414.12 mV. For BNC connections you may use the optional BNC Female to Double Banana adapter (020-0218).

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.

Troubleshoot Loop Problems

- **Locate Loop Current Leakages**
  Automatic indication 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).

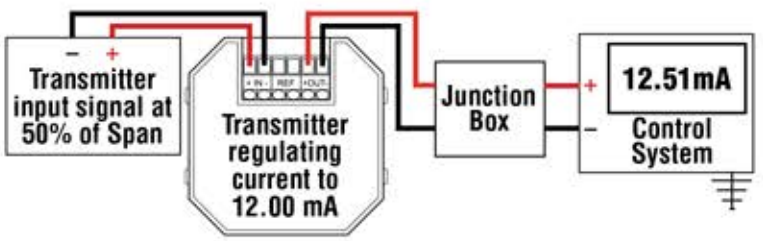
Typical problem found with Leak Detection

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?

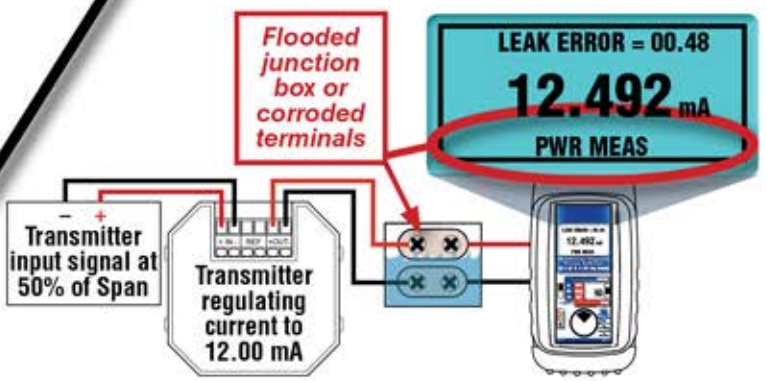
If you find a loop where the transmitter is calibrated correctly but all the readings elsewhere in the loop have a fixed offset this is due to a *Zero Shift*. This zero shift is typically caused by some current in the loop bypassing the transmitter. This might be caused by ground faults, moisture or 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 820-ELITE 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 820-ELITE display.

The PIE 820-ELITE 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 820-ELITE to power up the loop the technician detects a leakage of 0.48 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.

Measure Pressure

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

Purchase any of the Multical millivolt output pressure modules from Crystal Engineering to quickly read up to 500 psi/35 bar of pressure. The three available are 30 PSI gauge, 500 psi gauge & 30 psi absolute.

30 psi/2 bar Gauge & Absolute Modules	
Units	**Maximum**
PSI	30.000
Inches H2O@4°C	830.40
Inches H2O@20°C	831.90
Inches H2O@60°F	831.22
Inches HG@0°C	61.080
bar	2.0684
mbar	2068.4
kPa	206.84
MPa	0.2068
Kgf/CM2	2.1092
cm H2O@4°C	2109.2
cm H2O@23°C	2114.4
mm H2O@4°C	21092
mm H2O@23°C	21144
mm Hg @ 0°C	1551.4

500 psi/35 bar Gauge Module	
Units	**Maximum**
PSI	500.00
Inches H2O@4°C	999.99*
Inches H2O@20°C	999.99*
Inches H2O@60°F	999.99*
Inches HG@0°C	1018.0
bar	34.474
mbar	34474
kPa	3447.4
MPa	3.4474
Kgf/CM2	35.153
cm H2O@4°C	35153
cm H2O@23°C	35240
mm H2O@4°C	99999*
mm H2O@23°C	99999*
mm Hg @ 0°C	25857

Hang from your neck for hands free calibrating

Thermocouple Ranges & Accuracies @ 23°C

T/C	Degrees C Range	°C	Degrees F Range	°F	T/C Material
J	-200.0 to -50.0	±0.5°	-328.0 to -58.0	±1.0°	+Iron -Connstantan
	-50.0 to 300.0	±0.2°	-58.0 to 572.0	±0.4°	
	300.0 to 900.0	±0.3°	572.0 to 1652.0	±0.6°	
	900.0 to 1200.0	±0.4°	1652.0 to 2192.0	±0.8°	
K	-230.0 to -50.0	±1.2°	-382.0 to -58.0	±2.2°	+ Chromel® -Alumel®
	-50.0 to 550.0	±0.3°	-58.0 to 1022.0	±0.6°	
	550.0 to 1000.0	±0.5°	1022.0 to 1832.0	±0.8°	
	1000.0 to 1371.1	±0.6°	1832.0 to 2500.0	±1.1°	
T	-260.0 to -230.0	±2.9°	-436.0 to -382.0	±5.2°	+Copper -Constantan
	-230.0 to -210.0	±1.0°	-382.0 to -346.0	±1.9°	
	-210.0 to -50.0	±0.8°	-346.0 to -58.0	±1.4°	
	-58.0 to 50.0	±0.3°	-58.0 to 122.0	±0.6°	
	50.0 to 400.0	±0.2°	122.0 to 752.0	±0.4°	
E	-240.0 to -200.0	±0.9°	-400.0 to -328.0	±1.7°	+Chromel -Constantan
	-200.0 to 0.0	±0.5°	-328.0 to 32.0	±0.8°	
	0.0 to 350.0	±0.2°	32.0 to 662.0	±0.3°	
	350.0 to 1000.0	±0.3°	662.0 to 1832.0	±0.6°	
R	-18.3 to 100.0	±2.1°	-1.0 to 212.0	±3.8°	+Pt/13Rh -Platinum
	100.0 to 500.0	±1.3°	212.0 to 932.0	±2.4°	
	500.0 to 1400.0	±1.0°	932.0 to 2552.0	±1.8°	
	1400.0 to 1767.8	±1.2°	2552.0 to 3214.0	±2.0°	
S	-18.3 to 100.0	±2.0°	-1.0 to 212.0	±3.7°	+Pt/10Rh -Platinum
	100.0 to 350.0	±1.4°	212.0 to 662.0	±2.5°	
	350.0 to 1600.0	±1.1°	662.0 to 2912.0	±2.0°	
	1600.0 to 1767.8	±1.3°	2912.0 to 3214.0	±2.4°	
B	315.6 to 600.0	±3.2°	600.0 to 1122.0	±5.7°	+Pt/30Rh -Pt/6Rh
	600.0 to 850.0	±1.7°	1122.0 to 1562.0	±3.1°	
	850.0 to 1100.0	±1.3°	1562.0 to 2012.0	±2.4°	
	1100.0 to 1820.0	±1.1°	2012.0 to 3308.0	±2.0°	

T/C	Degrees C Range	°C	Degrees F Range	°F	T/C Material
N	-230.0 to -150.0	±1.9°	-382.0 to -238.0	±3.4°	+Nicrosil -Nisil
	-150.0 to -50.0	±0.7°	-238.0 to -58.0	±1.2°	
	-50.0 to 950.0	±0.4°	-58.0 to 1742.0	±0.8°	
	950.0 to 1300.0	±0.5°	1742.0 to 2372.0	±1.0°	
G (W)	100.0 to 350.0	±1.7°	212.0 to 662.0	±3.0°	+Tungsten -W26/Re
	350.0 to 1700.0	±0.8°	662.0 to 3092.0	±1.5°	
	1700.0 to 2000.0	±1.0°	3092.0 to 3632.0	±1.8°	
	2000.0 to 2320.0	±1.1°	3632.0 to 4208.0	±2.1°	
C (W5)	-1.1 to 100.0	±0.8°	30.1 to 212.0	±1.4°	+W5/Re -W26/Re
	100.0 to 1000.0	±0.7°	212.0 to 1832.0	±1.3°	
	1000.0 to 1750.0	±1.2°	1832.0 to 3182.0	±2.1°	
	1750.0 to 2320.0	±2.0°	3182.0 to 4208.0	±3.5°	
D	-1.1 to 150.0	±1.0°	30.1 to 302.0	±1.8°	+W3/Re -W25/Re
	150.0 to 1100.0	±0.7°	302.0 to 2012.0	±1.3°	
	1100.0 to 1750.0	±1.0°	2012.0 to 3182.0	±1.8°	
	1750.0 to 2320.0	±2.0°	3182.0 to 4208.0	±3.6°	
P	0.0 to 600.0	±0.3°	32.0 to 1112.0	±0.6°	+Pd55/Pt31/Au14 -Au65/Pd35
	600.0 to 900.0	±0.4°	1112.0 to 1652.0	±0.8°	
	900.0 to 1200.0	±0.6°	1652.0 to 2192.0	±1.1°	
	1200.0 to 1395.0	±0.7°	2192.0 to 2543.0	±1.2°	
L J-DIN	-200.0 to -50.0	±0.4°	-328.0 to -58.0	±0.7°	+Iron -Connstantan
	-50.0 to 300.0	±0.2°	-58.0 to 572.0	±0.4°	
	300.0 to 900.0	±0.3°	572.0 to 1652.0	±0.5°	
U T-DIN	-200.0 to -50.0	±0.6°	-328.0 to -58.0	±1.1°	+Copper -Constantan
	-50.0 to 50.0	±0.3°	-58.0 to 122.0	±0.5°	
	50.0 to 550.0	±0.2°	122.0 to 1022.0	±0.4°	
	550.0 to 600.0	±0.3°	1022.0 to 1112.0	±0.5°	

Table based on Thermocouple Accuracy: ≤ ± (0.02 % of Reading +0.01 mV)

Note: Doesn't include cold junction error of ±0.1°C

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 0.0	±0.2°	-328.0 to 32.0	±0.4°
		0.0 to 340.0	±0.3°	248.0 to 644.0	±0.6°
		340.0 to 640.0	±0.4°	644.0 to 1184.0	±0.8°
		640.0 to 850.0	±0.5°	1184.0 to 1562.0	±1.0°
Pt 100 Ohm (Burns)	1.3902 (0.003902)	-200.0 to 10.0	±0.2°	-328.0 to 50.0	±0.4°
		10.0 to 350.0	±0.3°	50.0 to 662.0	±0.6°
		350.0 to 650.0	±0.4°	662.0 to 1202.0	±0.8°
		650.0 to 850.0	±0.5°	1202.0 to 1562.0	±0.9°
Pt 100 Ohm (Old JIS 1981)	1.3916 (0.003916)	-200.0 to 20.0	±0.2°	-328.0 to 68.0	±0.4°
		20.0 to 360.0	±0.3°	68.0 to 680.0	±0.6°
		360.0 to 650.0	±0.4°	680.0 to 1202.0	±0.8°
		650.0 to 850.0	±0.5°	1202.0 to 1562.0	±0.9°
Pt 100 Ohm (US Lab)	1.3926 (0.003926)	-200.0 to 20.0	±0.2°	-328.0 to 68.0	±0.4°
		20.0 to 360.0	±0.3°	68.0 to 680.0	±0.6°
		360.0 to 660.0	±0.4°	680.0 to 1220.0	±0.8°
		660.0 to 850.0	±0.5°	1220.0 to 1562.0	±0.9°

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 0.0	±0.2°	-328.0 to 32.0	±0.4°
		0.0 to 340.0	±0.3°	248.0 to 644.0	±0.6°
		340.0 to 640.0	±0.4°	644.0 to 1184.0	±0.8°
		640.0 to 850.0	±0.5°	1184.0 to 1562.0	±1.0°
Copper 10 Ohm (Minco)	1.4274 (0.004274)	-200.0 to 260.0	±2.0°	-328.0 to 500.0	±3.6°
Copper 50 Ohm	1.4280 (0.00428)	-50.0 to 150.0	±0.4°	-58.0 to 302.0	±0.8°
Ni 120 Ohm (Pure)	1.6720 (0.00672)	-80.0 to 260.0	±0.1°	-112.0 to 500.0	±0.3°
Ni 110 (Bristol 7 NA)	1.5801 (0.005801)	-100.0 to 260.0	±0.2°	-148.0 to 500.0	±0.4°

Table based on 3 & 4 Wire RTD Accuracy: ≤ ± (0.02 % of Reading +0.075 Ohms)

PIE 820-*ELITE* 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	≤ ± 0.005 %/°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	0.000 to 24.000 mA or -25.00 to 125.00% of 4-20 mA
Accuracy	≤ ± (0.02 % of Reading + 0.003 mA)
Voltage burden	≤ 2V at 24 mA
Overload/Current limit protection	25 mA nominal

Source mA / 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	≤ ± (0.02 % of Reading + 0.003 mA)
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	24 mA nominal
Loop voltage limits	2 to 60 VDC (fuse-less protected from reverse polarity connections)

Voltage Read	
Range and Resolution	±99.999 mV, ±999.99mV, 0 to 10.250 V, 0.00 to 60.00 V DC
Accuracy	≤ ± (0.02 % of Reading + 0.01% Full Scale)
Input resistance	≥ 1 MΩ

Specifications subject to change without notice.

Source V dc	
Ranges and Resolution	-20.000 to 99.999 mV, -500.00 to 999.99 mV, 0.000 to 10.250V
Accuracy	≤ ± (0.02 % of Reading + 0.01% Full Scale)
Source Current	≥ 24 mA
Sink Current	> 16 mA
Output Impedance	< 1 Ohm
Short Circuit Duration	Infinite

pH Source	
Accuracy in mV	≤ ± (0.02 % of Reading in mV + 0.1 mV)
Accuracy in pH	≤ ± 0.003 pH @ 25°C

Thermocouple Source	
Accuracy	≤ ± (0.02 % of Reading + 0.01 mV)
Cold Junction Compensation	± (0.1°C + 0.01%/°C)
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	0.00 to 401.00, 0.0 to 4010.0 Ohms
Accuracy	±(0.02% of Reading + 0.075 Ohms)
Excitation Current	1.0 mA to 401 Ohms, 0.5 mA to 4010 Ohms (nominal)
Continuity	0.0 to 401.0 Ohms; Beeps from 0.0 to 100.0 Ohms

RTD and OHMS Source	
3 Wire & 4 Wire Accuracy	
From 1 to 10.2 mA External Excitation Current	±(0.02% of Reading + 0.075 Ohms)
Below 1 mA of External Excitation Current	±(0.02% of Reading+0.075 Ohms + $\frac{0.025\ mV}{mA\ Excitation\ Current}$)
2 Wire Accuracy	Add 0.1 Ohms to 3 Wire & 4 Wire Accuracy
Resistance Ranges	0.00 to 410.0, 00 to 4001.0 Ohms
Allowable Excitation Current Range	<401 Ohms: 10.2 mA max; steady or pulsed/intermittent 401 to 4001 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	±(0.02% of Reading + 0.01% 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	±(0.02% of Reading + 0.01% of Full Scale)
Trigger Level	1 V rms, dc coupled
Input Impedance	> 1 Meg Ohm + 60 pF

Standard 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.

Optional Repair/Replacement Warranty

Under our Repair/Replacement Warranty (RP-WAR-B), our equipment is warranted against ANY damage or malfunction that may cause the unit to fail for a period of three (3) years from the date of shipment.

This warranty is limited to one complete replacement against any damage or malfunction during the warranty period. If replaced, the new calibrator will carry our Standard Warranty for the remainder of the three (3) years or a minimum of one (1) year from the date of shipment.

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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Accessories

INCLUDED:

Four "AA" Alkaline batteries, Certificate of Calibration

Blue Rubber Boot	Part No. 020-0212
Evolution Hands Free Carrying Case	Part No. 020-0211
Evolution mA/V Test Leads 1 Red & 1 Black Lead with Banana Plugs & Alligator Clips	Part No. 020-0207
Evolution RTD Wire Kit 2 Red & 2 Black Leads with Banana Plugs & Spade Lugs	Part No. 020-0208

OPTIONAL:

Three Year Repair/Replacement Warranty	Part No. RP-WAR-B
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
BNC Female to Double Banana Plug Adapter	Part No. 020-0218

Flip out stand for bench use