PIE Model 901

WIRELESS DIAGNOSTIC CALIBRATOR

4-20 mA • V • PRESSURE

Actual Size

- **Compact, Accurate & Easy to use**
  With the PIE 901 you can check, calibrate and measure all your current, voltage and pressure instruments in a 4 to 20 milliamp DC loop. It can be used at any access point in your loop. Source & Read to 24.000 mA, Simulate a 2 Wire Transmitter or use the PIE 901 to simultaneously power your 2 Wire Transmitter and measure its output. Source up to 24.000 V DC to calibrate voltage inputs. Measure from -60.000 to +60.00 V DC to check loop power supplies & batteries without carrying a separate multimeter. Pressure modules may be connected via a cable or wirelessly with future PIE Bluetooth pressure modules. Rugged design with bright, color display for use in the shop, field, or on the bench. Optional rechargeable "AA" batteries and AC adapter for charging or for bench use.

- **Troubleshoot Loop Problems**
  Quickly diagnose ground fault and current leakage with the patented loop diagnostic technology (US Patent# 7,248,058).

- **Calibrate I/P, P/I & other Pressure Instruments**
  Compact design for easy carrying & connection directly to hand pump or process. Use a cable for long term pressure tests on the bench or with future wireless pressure modules.

- **Calibrate Milliamp & Voltage Receivers**
  Calibrate recorders, digital indicators, stroke valves or any instruments that get their input from a 4 to 20 mA loop or voltage devices. Easily set any value quickly to within 0.001 mA or 0.001 V with the adjustable digital potentiometer "DIAL" or use preset LO 4.000 mA (0.00%) and HI 20.000 mA (100.00%) EZ-CHECK™ settings. Store any three mA or V output values for instant recall.

- **Calibrate quickly with automatic output stepping**
  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 PIE 901 in place of a 2 Wire transmitter with any loop power from 3 to 60 V DC.

- **Measure Milliamp Control Signals**
  Check controller outputs or measure the milliamp signal anywhere in the loop. Measure 0.000 to 24.000 mA (-25.00 to 125.00%) signals with greater accuracy than a typical multimeter.

- **Calibrate 2 Wire Transmitters with Built-In power supply**
  The PIE 901 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.

CE

Practical Instrument Electronics

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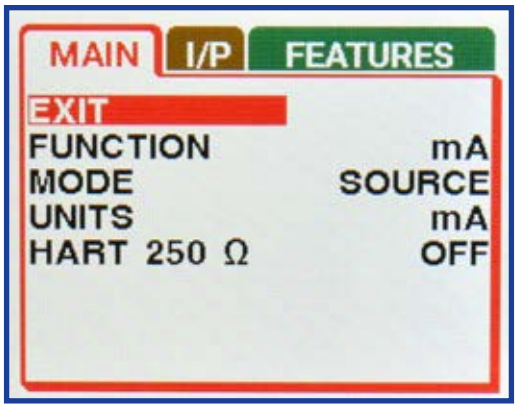
Easy to Read and Simple to Use

The PIE 901 has a large color LCD which makes navigation of the menus clearer and simpler than ever. The “Easy as PIE” double click menus are easier to navigate than ever before with colored tabs to instantly see where you are, and where you need to head to choose the settings you need.



When you have to calibrate in bright sunlight switch the PIE 901 to “DARK MODE” and easily read the high contrast display. You may turn off DARK MODE when you come back inside and have to calibrate in the dark recesses of your plant.

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 Model 901 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 Model 901 display.

The Model 901 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 Model 901 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.

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.

Pressure sensors that have been damaged by over pressurization or contaminated by process chemicals are not covered by our warranty. Pneumatic pumps that are contaminated with process chemicals are also not covered by our warranty.

Measure Pressure

- **Easily measure pressure with an optional 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 (requires optional cable 020-0241 for PIE 900 Series to PIE/Meriam pressure modules).

Sensor Code	Application	Ranges Available
DNxxxx	**D**ifferential, **N**on-isolated	0 to 0010*, 0028, 0200, 0415, 2000" H2O
DIxxxx	**D**ifferential, **I**solated	0 to 0001, 0005, 0015, 0030, 0100, 0300, 0500 PSID
GIxxxx	**G**auge, **I**solated	0 to 0015, 0030, 0050, 0100, 0300, 0500, 1000, 3000 PSIG
CIxxxx	**C**ompound, **I**solated	-14.7 to +0015, 0030, 0050, 0100, 0300, 0500, 1000, 3000 PSIG
AIxxxx	**A**bsolute, **I**solated	0 to 0017, 0038, 0100, 1000 PSIA

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

PIE 901 with Optional Pressure Module, Pressure/Vacuum Pump & Hose

Model 901 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 range for the temperature ranges -20 to 18°C & 28 to 60°C
Relative Humidity Range	10 % ≤RH ≤90 % (0 to 35 °C), Non-condensing
	10 % ≤RH≤ 70 % (35 to 60 °C), Non-condensing
Isolation:	Voltage: 60 V rms between all mA & voltage functions / Pressure Common Mode: 50/60 Hz, 100 dB
Normal Mode Rejection	50/60 Hz, 50 dB
Noise	≤ ± ½ Least Significant Digit ???
Size	5.63 x 3.00 x 1.60 inches, 143 x 76 x 41 mm (L x W x H)
Weight	12.1 ounces, 0.34 kg (including boot & batteries)
Batteries	Four "AA" Alkaline 1.5V (LR6)
Optional AC Adaptor	100 to 240 VAC 50/60 Hz [Part # 020-0104]
Optional NiMh Rechargeable battery set	Four NiMh batteries [Part # 020-0105]
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)
Display	High contrast color graphic liquid crystal display with LED backlighting for use in low lit areas. Switch to DARK MODE for use in bight sunlight.

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	≤ 3V at 20 mA
Overload/Current limit protection	25 mA nominal
Battery life	Alkaline ≥ 10 hours NiMH ≥ 15 hours

Battery Charging	
Charge Time	<11.5 hours

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	≤ ± (0.01 % of Reading +0.002 mA)
Loop compliance voltage	≥ 24 DCV @ 20.00mA
Loop drive capability - Leak Detection Off Loop drive capability - Leak Detection On	1200 Ω at 20 mA 950 Ω with Hart Resistor enabled 1000 Ω at 20 mA 750 Ω with Hart Resistor enabled
Battery life	Alkaline ≥ 7.5 Hours nominal NiMH ≥ 10 Hours nominal

mA 2-Wire Transmitter Simulation	
Accuracy	Same as Source/Power & Measure
Voltage burden	≤ 3V at 20 mA
Overload/Current limit protection	25 mA nominal
Loop voltage limits	3 to 60 VDC (fuse-less protected from reverse polarity connections)

DC Voltage Read	
Range and Resolution	-60.000 to 60.000 VDC
Accuracy	≤ ± (0.02 % of Reading +0.01% Full Scale)
Input resistance	≥ 2 MΩ
Battery life	Alkaline ≥ 9 hours NiMH ≥ 15 hours

Source DC Voltage	
Range and Resolution	0.000 to 24.000 VDC
Accuracy	≤ ± (0.02 % of Reading +0.01% Full Scale)
Source Current; Sink Current	≥ 20 mA; > 16 mA
Output Impedance	< 0.3 Ohm
Short Circuit Duration	Infinite

Accessories

INCLUDED:

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

Hands Free Carrying Case — Part No. 020-0211

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

OPTIONAL:

AC Adaptor - 9V USB (100 to 240 VAC) — Part No. 020-0104

NiMH "AA" Batteries (4) — Part No. 020-0105

Cable for PIE 900 Series to PIE/Meriam Modules — Part No. 020-0241

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Additional Information

This product is calibrated on equipment traceable to NIST and includes a Certificate of Calibration. Test Data is available for an additional charge.

PIE Calibrators are designed, assembled, and calibrated in Webster, NY USA using parts from various countries.

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

Available From: