PIE 525B
Automated Thermocouple & RTD Calibrator
Operating Instructions

CE

Practical Instrument Electronics

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Calibrate all your T/C & RTD Instruments

- **Easy to use**
  With the PIE 525B you can check and calibrate all your thermocouple and RTD instruments and measure temperature sensors.
- **Take it into the shop, plant or field**
  Carry it without worry - it comes protected with a rubber boot and rugged, low profile switches. Easy to operate even in the dark areas of the plant with the backlit display.
- **Calibrate T/C instruments to 0.1 & 0.01 °F & °C**
  The PIE 525B 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). Or calibrate from -13.0000 to +80.0000 mV.
- **Calibrate RTD instruments to 0.1 & 0.01 °F & °C**
  Stop carrying around a decade box and RTD resistance tables. The 525B works with the RTDs you use including 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.

- **Fast calibration with automatic output stepping**
  Easily set any value quickly to within 0.1° or 0.01° with the adjustable digital potentiometer "DIAL" plus store any three temperatures for instant recall with the EZ-CHECK™ switch. Choose between 2, 3, 5, 11 steps and ramp to automatically increment the output in 100%, 50%, 25%, 10% or 5% of span. Select step time from 5, 6, 7, 8, 9, 10, 15, 20, 25, 30 & 60 seconds.
- **Compatible with ALL process instruments**
  No competitor's calibrator is compatible with as many process instruments! Connect directly to the temperature inputs of transmitters, PLCs, DCS & multichannel recorders to verify their outputs or displays. RTD simulation works with older instruments with fixed excitation currents and newer multichannel instruments that switch the excitation current between input channels.
- **Perform Heat Treating Uniformity Surveys and System Accuracy Tests**
  The PIE 525B meets or exceeds the requirement of AMS 2750 as a Secondary Standard & as a Field Test Instrument.
- **Measure thermocouple & RTD sensors**
  The PIE 525B measures probes to 0.1 or 0.01 °C or °F. Secondary display shows the millivolt or resistance value corresponding to the sensor

temperature. For T/Cs the cold junction temperature measured by the calibrator. For RTDs the fixed or pulsed sensor current outputted by the measuring instrument is measured by the calibrator.

- **Find problems with troubleshooting tools**
  Open thermocouples and thermocouples that have high resistance indicating impending failure are indicated by OPEN TC on the display. Troubleshoot RTD sensor connections and find broken wires with patented technology. Connect your two, three or four wire RTDs and the PIE 525B automatically detects the connections.
- **Calibration Lab Accurate & Stable**
  The internal cold junction thermistor is accurate to ±0.05°C and is traceable to NIST. The sensor is thermally bonded to an isothermal mass which includes brass blocks with screw terminals for connection of bare thermocouple wires along with a miniature thermocouple connector for fast connections. The circuitry uses an extremely stable voltage reference and low drift components which make the PIE 525B more accurate than most other handheld and bench top thermocouple calibrators.

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

Connections

Simulating or reading thermocouples requires the use of thermocouple or extension grade thermocouple wire.

Plug thermocouple wires into the miniature jack or place bare thermocouple wires onto the brass block under the screws.

The PIE 525B has two banana jacks (1+ & 2-) mounted in the top end of the housing. These are not temperature compensated and are to be used only for millivolt signals or thermocouple signals with the cold junction turned off.

Simulating or reading RTDs uses copper wire.

Plug 2, 3 or 4 wires into the corresponding jacks on the calibrator. For RTD source the PIE 525B simulates the (+) RTD from jacks 1 & 4 and the (-) RTD from jacks 2 & 3.

When reading an RTD sensor the PIE 525B uses patented circuitry to automatically detect if 2, 3 or 4 wires are connected. This is helpful to troubleshoot sensor connection (see Troubleshooting an RTD Sensor).

Accessories

INCLUDED:

Four "AA" Alkaline batteries, Certificate of Calibration

Evolution Hands Free Carrying Case	Part No. 020-0211
Dark Blue Rubber Boot	Part No. 020-0213
Test Leads - one pair with banana plug & 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:

Ni-MH 1 Hour Charger with 4 Ni-MH AA Batteries (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

*Three feet (1 meter) of T/C extension wire, stripped on one end with a miniature T/C male connector on the other end.

FIELD & BENCH USE

PIE 525B comes with a carrying case designed for hands-free operation and a rubber boot with a built-in tilt stand. The PIE 525B is held in the case by elastic straps for use with the carrying case open. The tilt stand is easily raised by pulling the stand until it locks into place.

CHANGING BATTERIES

Low battery is indicated by a battery symbol on the display. Approximately one to four hours of typical operation remain before the PIE 525B will automatically turn off. To change the batteries remove the rubber boot and remove the battery door from the back of the unit by sliding the door downward. This allows access to the battery compartment. Replace with four (4) "AA" 1.5V batteries being careful to check the polarity. Replace the battery door and replace the boot. All stored configuration options (T/C Type, EZ-CHECK Memories, etc.) are reset to factory settings when the batteries are removed.

Note: Alkaline batteries are supplied and recommended for typical battery life and performance. Optional rechargeable batteries (charged externally) are available.

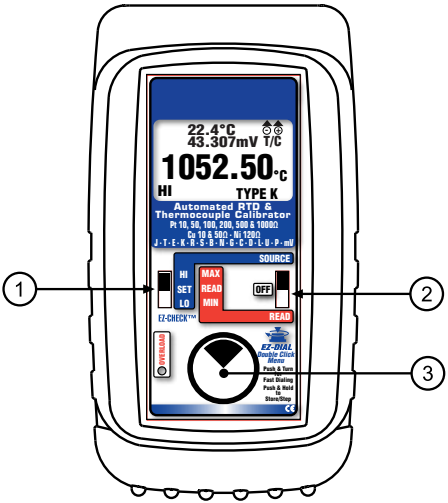
STORING HI and LO EZ-CHECK Source Outputs

Speed up your calibration by storing Span & Zero output setting for instant recall with the EZ-CHECK switch.

1) Store your high (SPAN) output temperature by moving the EZ-CHECK switch to the **HI** position and turning the EZ-Dial knob until the desired output value is on the display. Press and hold the EZ-Dial knob until **STORED** appears to store the value. Release the EZ-Dial knob.

2) Store your low (ZERO) output value by moving the EZ-CHECK switch to the **LO** position and turning the EZ-Dial knob until the desired output value is on the display. Press and hold the EZ-Dial knob until **STORED** appears to store the value. Release the EZ-Dial knob.

3) Instantly output your SPAN and ZERO output settings by moving the EZ-CHECK switch between HI and LO. You may also select any third output setting (such as mid-range) using the SET position on the EZ-CHECK switch.



① **EZ-CHECK™ SWITCH**

SOURCE: Instantly output two preset settings by moving the EZ-CHECK™ switch to the **"LO"** position or **"HI"** position. For fast three point checks select the **"SET"** position. The PIE 525B will remember the last **"SET"** value, even with the power off.
These values can easily be changed to suit the calibration requirements. The values stored in the HI and LO positions are also used for Auto Stepping.

READ: Slide the switch to the SET position. The PIE 525B will display the current reading from the sensor or device being measured. Slide the switch to MAX and the highest value measured since turn-on or reset will be displayed; slide the switch to MIN and the lowest value measured since turn-on or reset will be displayed.

② **SOURCE/OFF/READ Switch**

Select "**SOURCE**" to output mV, T/C, Ω or RTD.
Select "**READ**" to read mV, T/C, Ω or RTD.
Select "**OFF**" to turn off the 525B.

③ **EZ-DIAL™ KNOB**

SOURCE: Turn the knob to adjust the output level. Turn clockwise to increase the output, counter clockwise to decrease the output in one least significant digit step at a time. Push down and turn the EZ-DIAL knob for faster dialing.

Press and hold the knob for two seconds to store desired EZ-Check™ HI/LO points in SOURCE mode. Continue to press and hold the knob for two more seconds to start the automatic ramping.

READ: Press and hold to transfer the current temperature into the EZ-Check™ MIN/MAX points. This clears the MIN/MAX readings which will update as the input value changes.

SELECTING FUNCTIONS

The EZ-DIAL knob is used to setup the PIE 525B to match the instrument to be calibrated or signal to be measured. Each time you turn on the PIE 525B the LCD displays the following screen for about 1 second followed by operating in the function used the last time it was operated.

PIE 525B
DOUBLE CLICK
EZ-DIAL KNOB
FOR CONFIGURATION

Double Click the EZ-DIAL knob to change the function of the calibrator and to select ranges, units and other user settings. Each function (mV, T/C, Ohms, RTD) has up to three pages of menus. The first menu page has settings for the function and the last menu page has settings for STEPPING, AUTO OFF and BACKLIGHT. Settings are remembered even with the power off but are reset when the batteries are changed.

Double Click Menus - MAIN Page

Double click the EZ-DIAL knob to access the Double Click Menus. Shown are the **MAIN** menus for each function. Turn the knob to scroll thru the menus and press the knob to select. Default values are in black and available choices are shown in grey.

Source V

```
>EXIT     (1/3)
 FUNCTION     V
 RANGE        80mV
```

Read V

```
>EXIT     (1/3)
 FUNCTION     V
 RANGE        80mV
```

Source & Read Thermocouples

```
>EXIT  (1/3)
 FUNCTION          T/C
 UNITS             °C °F
 T/C TYPE          J K E T R S B N L U G C D P
 COLD JUNC         ON OFF
```

Source Ohms

```
>EXIT     (1/3)
 FUNCTION     OHMS
 RANGE        400Ω 4000Ω
```

Read Ohms

```
>EXIT     (1/3)
 FUNCTION     OHMS
 RANGE        400Ω 4000Ω
```

Source RTD

```
>EXIT  (1/3)
 FUNCTION  RTD
 UNITS     °C °F
 RTD       Pt 100 α=3850  [*RTD Types - See Read RTD]
```

Read RTD

```
>EXIT  (1/3)
 FUNCTION  RTD
 UNITS     °C °F
 RTD       Pt 100 α=3850, Pt 200 α=3850, Pt 500 α=3850,
Pt 1000 α=3850, Pt 100 α=3902, Pt 100 α=3916,
Pt 100 α=3926, Cu 10 α=4274, Cu 50 α=4280, Ni 120 α=6720
Pt 10 α=3850, Pt 50 α=3850
```

Double click the ③ DIAL KNOB at any time the unit is on and then turn the ③ DIAL KNOB to move to the second menu page so the word **DISPLAY** appears at the top of the menu.
Turn the ③ DIAL KNOB to move through the menu. Press the ③ DIAL KNOB to toggle between LOW and HIGH or OFF and ON.

LOW resolution is 0.001 mV, 0.01Ω in 400Ω Range, 0.1Ω in 4000Ω Range and 0.1° for T/C & RTD. HIGH resolution is 0.0001 mV, 0.001Ω in 400Ω Range, 0.01Ω in 4000Ω Range and 0.01° for T/C & RTD.

```
          DISPLAY          [Millivolts]
>  EXIT      (2/3)
   RESOLUTION      LOW HIGH
```

```
          DISPLAY          [Thermocouple]
>  EXIT      (2/3)
   RESOLUTION      LOW HIGH
   DISPLAY mV      OFF ON
   DISPLAY CJ      OFF ON [Cold Junction Temperature]
```

```
          DISPLAY          [Ohms]
>  EXIT      (2/3)
   RESOLUTION      LOW HIGH
   SENSOR mA*      OFF ON
```

```
          DISPLAY          [RTD]
>  EXIT      (2/3)
   RESOLUTION      LOW HIGH
   DISPLAY OHMS    OFF ON
   SENSOR mA*      OFF ON
```

* SENSOR mA is only available when sourcing Ohms & RTD.

EXIT MENU - exits this menu immediately and saves any changes. Menu will automatically exit after 15 seconds of inactivity. Settings are remembered even with the power off.

To change the Automatic Stepping settings

Double click the ③ DIAL KNOB at any time the unit is on and the following typical display (will be different for each FUNCTION) will appear for 15 seconds:

MAIN	
> EXIT (1/3)	
FUNCTION	T/C
UNITS	°C
T/C TYPE	J
COLD JUNC	ON

Turn the ③ DIAL KNOB to move to the third menu page so the word **FEATURES** appears at the top of the menu.

FEATURES	
> EXIT (3/3)	
AUTO OFF	ON
BACKLIGHT	ON
STEPS/RAMP	3
STEP/RAMP TIME	5

Turn the ③ DIAL KNOB to move through the menu. Press the ③ DIAL KNOB to toggle between OFF and ON or to change the STEPS/RAMP and the STEP/RAMP TIME settings. These settings are remembered even with the power off.

EXIT MENU - exits this menu immediately and saves any changes. Menu will automatically exit after 15 seconds of inactivity.

AUTO OFF - If AUTO OFF is ON, the unit will turn off after 30 minutes of inactivity to save battery life. If AUTO OFF is OFF the unit will stay on until the POWER SWITCH is moved to the off position.

STEPS/RAMP - pressing the knob will cycle through 2, 3, 5, 11 and RAMP. The endpoints of the steps or ramp are based on the values stored in the **HI** and **LO** EZ-CHECK outputs.

2 steps will automatically switch between the values stored in the HI & LO EZ-CHECK (0 & 100%).

3 steps between the HI, Midpoint and LO EZ-CHECK (0, 50 & 100%).

5 steps between the HI and LO EZ-CHECK in 25% increments (0, 25, 50, 75 & 100%).

11 steps between the HI and LO EZ-CHECK in 10% increments (0, 10, 20...80, 90 &100%).

RAMP continuously ramps up and down between the HI and LO EZ-CHECK outputs.

STEP/RAMP TIME - pressing the knob will cycle through 5, 6, 7, 8, 9, 10, 15, 20, 25, 30 and 60 seconds.

To start the Automatic Stepping
Start automatic stepping or ramping by placing the EZ-CHECK Switch into the HI or LO position then press and hold the ③ DIAL KNOB for 6 seconds (the word STORE will appear on the display after 3 seconds and continue to press the EZ-DIAL KNOB) until the word STEPPING appears on the display. The word STEPPING will appear on the display anytime the selected automatic function is running. Stop the stepping by again pressing and holding the ③ DIAL KNOB for 3 seconds.

BACKLIGHT - If BACKLIGHT is ON the backlight will light all the time the unit is powered up. For maximum battery life turn the backlight off when using the calibrator in areas with enough ambient light to read the display.

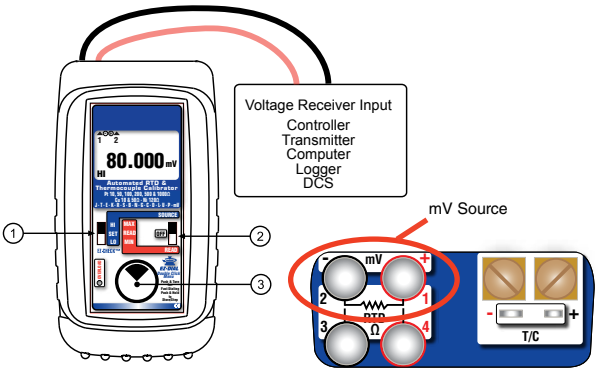
SOURCE mV

Choose this function to provide an output from -13.000 to 80.000 mV in LOW resolution and -13.0000 to 80.0000 mV in HIGH resolution. The source current is a nominal 12 mA to provide the driving power to analog thermocouple meters.

Move the power switch ② to SOURCE then Double Click the EZ-DIAL knob to get into the Menu. Turn the knob to scroll through the settings and press the knob to make your selection. Select V for the FUNCTION.

Connect the output leads of the PIE 525B to the inputs of the device being calibrated, making sure to check polarity. Red lead to the plus (+) input and black lead to the minus (-) input.

Instantly output your SPAN and ZERO output settings by moving the EZ-CHECK switch between HI and LO. You may also select any third output setting (such as mid-range) using the SET position on the EZ-CHECK switch. The output is adjusted in 0.001 mV increments in LOW and 0.0001 increments in HIGH resolution by turning the knob ③. Press and turn the knob for faster dialing with 0.100 mV increments in LOW and 0.0100 mV increments in HIGH resolution.



Read mV

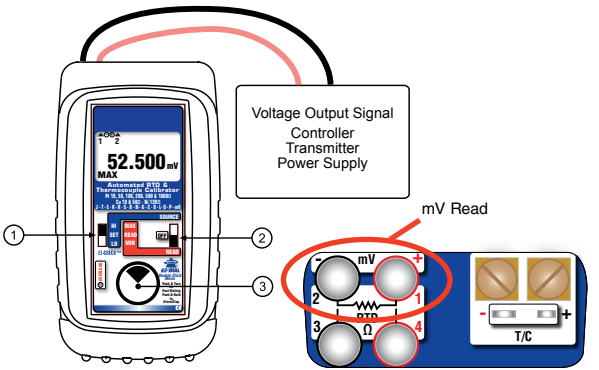
Choose this function to measure from -13.000 to 80.000 mV in LOW resolution and -13.0000 to 80.0000 mV in HIGH resolution.

Move the power switch ② to READ then Double Click the EZ-DIAL knob to get into the Menu. Turn the knob to scroll through the settings and press the knob to make your selection. Select V for the FUNCTION.

Connect the red input lead (+) of the PIE 525B to the more positive point and the black input lead (-) to the more negative point.

Signals above the maximum scale are limited by protection circuitry with “OVER RANGE” flashed on the display and the red OVERLOAD LED lit.

The PIE 525B measures the input signal and constantly updates the display with the current reading. Move the EZ-CHECK switch ① to MAX to see the highest reading and to MIN to see the lowest reading. Press and hold the knob ③ to clear the MAX and MIN readings.



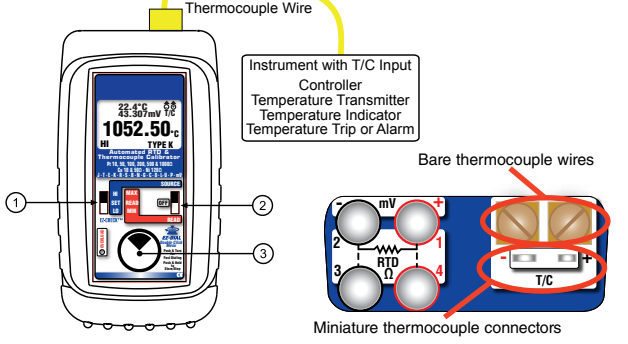
Source Thermocouple

Choose this function to provide a simulated thermocouple signal into controllers, temperature transmitters, indicators or any input devices that measure thermocouple sensors.

Move the power switch ② to SOURCE then Double Click the EZ-DIAL knob to get into the Menu. Turn the knob to scroll through the settings and press the knob to make your selection. Select T/C for the FUNCTION, °F or °C for the UNITS, T/C Type (J, K, E, T, R, S, B, N, L (J-DIN), U (T-DIN), G, C, D or P (Platinel II)) and internal COLD JUNC ON or OFF (ON is the default).

Connect the PIE 525B to the inputs of the device being calibrated using the proper type of thermocouple wire via the miniature thermocouple socket or place bare thermocouple leads under the brass screws.

Instantly output your SPAN and ZERO output settings by moving the EZ-CHECK switch between HI and LO. You may also select any third output setting (such as mid-range) using the SET position on the EZ-CHECK switch. The output is adjusted in 0.1° increments in LOW and 0.01° increments in HIGH resolution by turning the knob ③. Press and turn the knob for faster dialing with 10.0° increments in LOW and 1.00° increments in HIGH resolution.



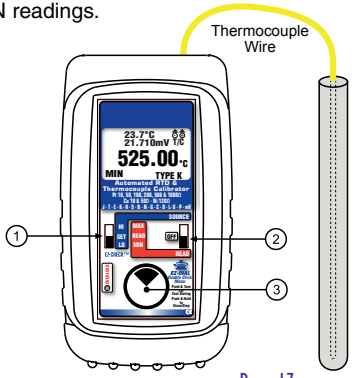
Read Thermocouple Sensors

Choose this function to measure temperatures with a thermocouple probe, sensor or any devices that output a thermocouple signal.

Move the power switch ② to READ then Double Click the EZ-DIAL knob to get into the Double Click Menu. Turn the knob to scroll through the settings and press the knob to make your selection. Select T/C for the FUNCTION, °F or °C for the UNITS, T/C Type (J, K, E, T, R, S, B, N, L (J-DIN), U (T-DIN), G, C, D or P (Platinel II)) and COLD JUNC ON or OFF (ON is the default).

Connect the PIE 525B to the inputs of the device being calibrated using the proper type of thermocouple wire via the miniature thermocouple socket or place bare thermocouple leads under the brass screws. If no sensor is connected, a wire is broken or the sensor is burned out, OPEN TC will appear on the display. Signals above the maximum scale are limited by protection circuitry with "OVER RANGE" on the display.

The PIE 525B measures the input signal and constantly updates the display with the current reading. Move the EZ-CHECK switch ① to MAX to see the highest reading and to MIN to see the lowest reading. Press and hold the knob ③ to clear the MAX and MIN readings.



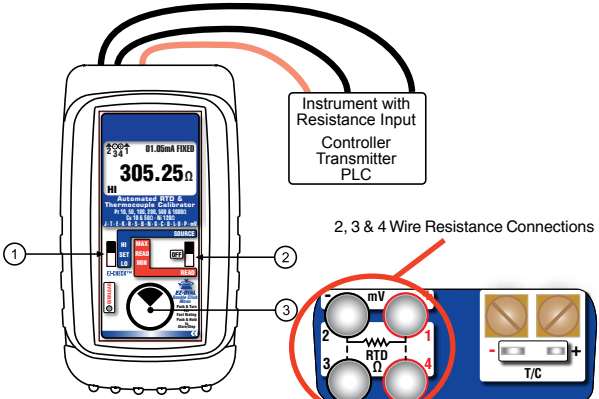
Source Resistance

Choose this function to provide a simulated resistance into any device that measures resistance.

Move the power switch ② to SOURCE then Double Click the EZ-DIAL knob to get into the Menu. Turn the knob to scroll through the settings and press the knob to make your selection. Select OHMS for the FUNCTION, 400Ω or 4000Ω for the RANGE.

Disconnect all sensor wires from the devices to be calibrated and connect the PIE 525B to the inputs of the device using 2, 3 or 4 wires.

Instantly output your SPAN and ZERO output settings by moving the EZ-CHECK switch between HI and LO. You may also select any third output setting (such as mid-range) using the SET position on the EZ-CHECK switch. The output is adjusted for 400Ω/4000Ω ranges in 0.01Ω/0.1Ω increments in LOW and 0.001Ω/0.01Ω increments in HIGH resolution by turning the knob ③. Press and turn the knob for faster dialing with 1.00Ω/10.0Ω increments in LOW and 0.100Ω/1.00Ω increments in HIGH resolution.



Read Resistance

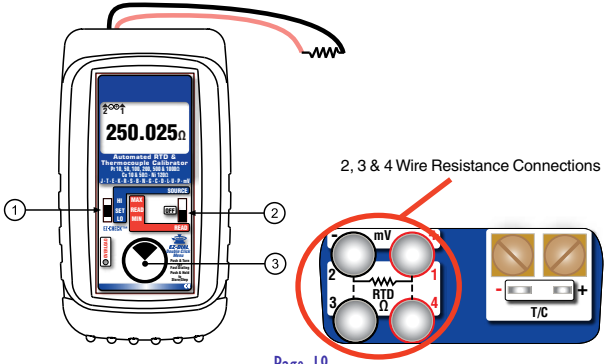
Choose this function to measure resistance.

Move the power switch ② to READ then Double Click the EZ-DIAL knob to get into the Menu. Turn the knob to scroll through the settings and press the knob to make your selection. Select OHMS for the FUNCTION, 400Ω or 4000Ω for the RANGE.

Connect the PIE 525B to the resistor or sensor using 2, 3 or 4 wires. The PIE 525B automatically detects how many wires are connected using a patented circuit and indicates each wire that is connected. Any wires that are not connected or broken are indicated by the 525B. This is useful for troubleshooting the sensor.

Signals above the maximum scale are limited by protection circuitry with “OVER RANGE” on the display.

The PIE 525B measures the input signal and constantly updates the display with the current reading. Move the EZ-CHECK switch ① to MAX to see the highest reading and to MIN to see the lowest reading. Press and hold the knob ③ to clear the MAX and MIN readings.



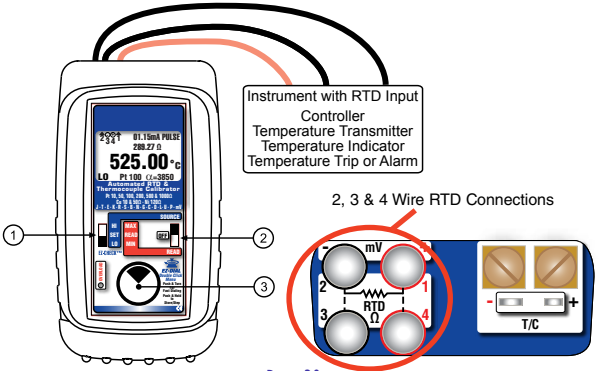
Source RTD

Choose this function to provide a simulated RTD signal into controllers, temperature transmitters, indicators or any input devices that measure RTD sensors.

Move the power switch ② to SOURCE then Double Click the EZ-DIAL knob to get into the Menu. Turn the knob to scroll through the settings and press the knob to make your selection. Select RTD for the FUNCTION, °F or °C for the UNITS and RTD (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).
Note: Platinum (Pt) 100Ω 3850 is the most common RTD type.

Disconnect all sensor wires from the devices to be calibrated and connect the PIE 525B to the inputs of the device using 2, 3 or 4 wires.

Instantly output your SPAN and ZERO output settings by moving the EZ-CHECK switch between HI and LO. You may also select any third output setting (such as mid-range) using the SET position on the EZ-CHECK switch. The output is adjusted in 0.1° increments in LOW and 0.01° increments in HIGH resolution by turning the knob ③. Press and turn the knob for faster dialing with 10.0° increments in LOW and 1.00° increments in HIGH resolution.



Read RTD Sensors

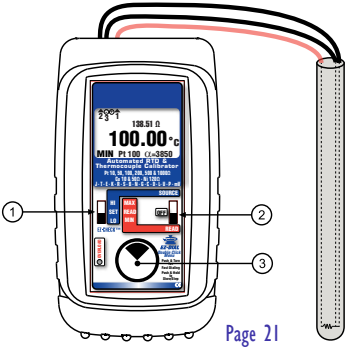
Choose this function to measure temperatures with an RTD probe, sensor or any devices that output an RTD signal.

Move the power switch ② to READ then Double Click the EZ-DIAL knob to get into the Menu. Turn the knob to scroll through the settings and press the knob to make your selection. Select RTD for the FUNCTION, °F or °C for the UNITS and RTD (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).
Note: Platinum (Pt) 100Ω 3850 is the most common RTD type.

Connect the PIE 525B to the RTD sensor using 2, 3 or 4 wires. The PIE 525B automatically detects how many wires are connected using a patented circuit and indicates each wire that is connected. Any wires that are not connected or broken are indicated by the 525B. This information is useful for troubleshooting the sensor.

Signals above the maximum scale are limited by protection circuitry with "OVER RANGE" on the display.

The PIE 525B measures the input signal and constantly updates the display with the current reading. Move the EZ-CHECK switch ① to MAX to see the highest reading and to MIN to see the lowest reading. Press and hold the knob ③ to clear the MAX & MIN readings.

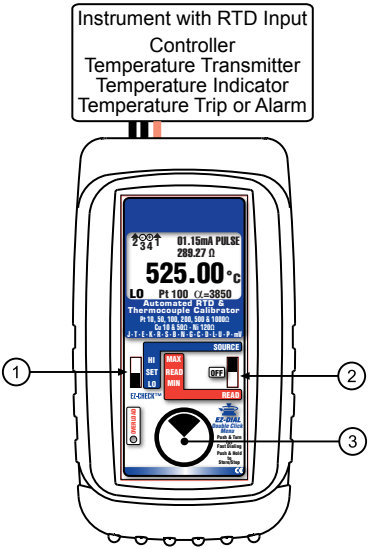


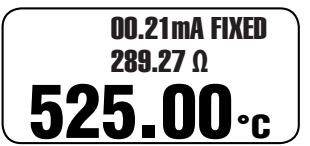
Troubleshooting RTD Instruments

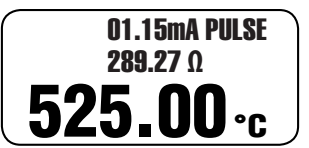
When you are having an issue where an instrument won't read an RTD sensor or you don't know if the calibrator is connected properly the PIE 525B has a function to measure and display the fixed or pulsed sensor (excitation) current that the instrument uses to measure the resistance of the RTD sensor.

Double click the ③ DIAL KNOB at any time the unit is on and then turn the ③ DIAL KNOB to move to the second menu page so the word **DISPLAY** appears at the top of the menu.
Turn the ③ DIAL KNOB to move through the menu until the cursor is pointing at SENSOR mA. Press the ③ DIAL KNOB to toggle SENSOR mA ON.

Disconnect all sensor wires from the devices to be calibrated and connect the PIE 525B to the inputs of the device using 2, 3 or 4 wires. The sensor current generated by the instrument will be indicated on the display followed by the word FIXED or PULSE. Older single channel RTD instruments used a constant (fixed) current source to measure an RTD sensor. Smart transmitters, multichannel recorders and PLC or DCS input cards switch the current source sequentially through the channels which is seen as an intermittent (pulsed) current.







Troubleshooting RTD Sensors

When troubleshooting a problem with an RTD input it is useful to check that the sensor and the wiring to the instrument is operating properly.

The PIE 525B automatically detects 2, 3 and 4 wire RTD connections with a patented circuit. It will also display the connections on the display and indicate when there is a missing connection due to a loose connector, corrosion or a broken wire.

Here is an example of the 525B reading a sensor with all 4 wire connected.

Here is an example where connections are made to a 4 wire sensor and the PIE 525B indicates that only Wires 1, 2 & 4 are connected. There may be a loose connection or a break in wire 3 somewhere between the sensor and the 525B.

PIE 525B Specifications

Unless otherwise indicated all specifications (except Cold Junction) 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	≤ ±50 ppm/°C; Cold Junction Sensor ≤ ±25 ppm/°C
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
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 with 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	50 Hours
Low Battery	Low battery indication with nominal 1 hour of operation left

PIE 525B Specifications

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. LED backlighting for use in low lit areas.

Voltage Source	
Ranges and Resolution	-13.000 to 80.000 mV & -13.0000 to 80.0000 mV
Accuracy	±(0.008% of Setting + 0.006 mV)
Source Current	≥ 10 mA
Output Impedance	< 0.3 Ohm
RMS Noise	≤ ± 0.0005 mV from 0.1 to 10 Hz
Short Circuit Duration	Infinite

Voltage Read	
Range and Resolution	Same as Voltage Source
Accuracy	±(0.008% of Reading + 0.006 mV)
Input resistance	≥ 10 MΩ

PIE 525B Specifications

Thermocouple Source	
Accuracy	±(0.008% of Setting + 0.006 mV)
Cold Junction Compensation	± 0.09°F (±0.05 °C) - Thermistor traceable to NIST for 11 years
Output Impedance	< 0.3 Ohms
Source Current	> 10 mA (drives 80 mV into 10 Ohms)
RMS Noise	≤ ± 0.0005 mV from 0.1 to 10 Hz

Thermocouple Read	
Accuracy	±(0.008% of Reading + 0.006 mV)
Cold Junction Compensation	± 0.09°F (±0.05 °C) - Thermistor traceable to NIST for 11 years
Input Impedance	> 10 Megohms
Open Thermocouple	Threshold: 10,000 Ohms nominal Pulse: < 10 microamp pulse for 300 milliseconds

PIE 525B Specifications

RTD and Ohms Source	
3 Wire & 4 Wire Accuracy From 1 to 10.2 mA External Excitation Current	±(0.015% of Setting + 0.05 Ohms)
Below 1 mA of External Excitation Current	Add $\left(\frac{0.025\ \text{mV}}{\text{mA Excitation Current}}\right)$ to Accuracy
2 Wire Accuracy	Add 0.1 Ohms to 3 Wire & 4 Wire Accuracy
Resistance Ranges	400 Ohm Range: 0.00 to 401.00 & 0.000 to 401.000 4000 Ohm Range: 0.0 to 4010.0 & 0.00 to 4010.00
RMS Noise	400 Ohm Range: ≤ ± 0.005 Ohms from 0.1 to 10 Hz 4000 Ohm Range: ≤ ± 0.05 Ohms from 0.1 to 10 Hz
Allowable Excitation Current Range	400 Ohm Range:10.2 mA max; steady or pulsed/ intermittent 4000 Ohms Range: 1 mA max; steady or pulsed/ intermittent
Pulsed Excitation Current Compatibility	DC to 0.01 second pulse width

RTD and Ohms Read	
Resistance Ranges	Same as RTD and Ohms Source
Accuracy	±(0.015% of Reading + 0.05 Ohms)
Excitation Current	0.9 mA to 401 Ohms, 0.4 mA to 4010 Ohms (nominal)

Thermocouple Ranges & Accuracies

Table based on Accuracy:

≤ ± (0.008 % of Reading + 0.006 mV)

Note: Doesn't include cold junction error of ±0.05°C

T/C	Degrees C Range	°C	Degrees F Range	°F
J	-200.00 to -150.00	±0.25°	-346.00 to -238.00	±0.55°
	-150.00 to -50.00	±0.17°	-238.00 to -58.00	±0.35°
	-50.00 to 300.00	±0.13°	-58.00 to 572.00	±0.24°
	300.00 to 850.00	±0.15°	572.00 to 1562.00	±0.28°
	850.00 to 1200.00	±0.20°	1562.00 to 2192.00	±0.36°
K	-230.00 to -100.00	±0.70°	-382.00 to -148.00	±1.26°
	-100.00 to 600.00	±0.19°	-148.00 to 1112.00	±0.34°
	600.00 to 1000.00	±0.24°	1112.00 to 1832.00	±0.43°
	1000.00 to 1371.1	±0.31°	1832.00 to 2500.00	±0.55°
T	-260.00 to -240.00	±1.66°	-436.00 to -400.00	±2.98°
	-240.00 to -210.00	±0.60°	-400.00 to -346.00	±1.07°
	-210.00 to -100.00	±0.41°	-346.00 to -148.00	±0.74°
	-100.00 to 50.00	±0.18°	-148.00 to 122.00	±0.33°
	50.00 to 400.00	±0.14°	122.00 to 752.00	±0.24°
E	-240.00 to -225.00	±0.51°	-400.00 to -373.00	±0.92°
	-225.00 to -100.00	±0.27°	-373.00 to -148.00	±0.48°
	-100.00 to 750.00	±0.13°	-148.00 to 1382.00	±0.24°
	750.00 to 1000.00	±0.16°	1382.00 to 1832.00	±0.29°

Thermocouple Ranges & Accuracies

Table based on Accuracy:

≤ ± (0.008 % of Reading + 0.006 mV)

Note: Doesn't include cold junction error of ±0.05°C

T/C	Degrees C Range	°C	Degrees F Range	°F
R	-18.30 to 250.00	±1.26°	-1.00 to 482.00	±2.27°
	250.00 to 750.00	±0.64°	482.00 to 1382.00	±1.14°
	750.00 to 1600.00	±0.54°	1382.00 to 2192.00	±0.97°
	1600.00 to 1767.80	±0.63°	2192.00 to 3214.00	±1.13°
S	-18.30 to 150.00	±1.22°	-1.00 to 302.00	±2.20°
	150.00 to 500.00	±0.72°	302.00 to 932.00	±1.30°
	500.00 to 1650.00	±0.63°	932.00 to 3002.00	±1.14°
	1650.00 to 1767.80	±0.73°	3002.00 to 3214.00	±1.31°
B	315.60 to 550.00	±1.88°	600.00 to 1022.00	±3.39°
	550.00 to 900.00	±1.03°	1022.00 to 1652.00	±1.86°
	900.00 to 1150.00	±0.72°	1652.00 to 2102.00	±1.30°
	1150.00 to 1820.00	±0.63°	2102.00 to 3308.00	±1.14°
N	-230.00 to -100.00	±1.10°	-382.00 to -148.00	±1.98°
	-100.00 to 0.00	±0.30°	-148.00 to 32.00	±0.53°
	0.00 to 1100.00	±0.24°	32.00 to 2012.00	±0.44°
	1100.00 to 1300.00	±0.27°	2012.00 to 2372.00	±0.49°

Thermocouple Ranges & Accuracies

Table based on Accuracy:

≤ ± (0.008 % of Reading + 0.006 mV)

Note: Doesn't include cold junction error of ±0.05°C

T/C	Degrees C Range	°C	Degrees F Range	°F
G (W)	100.00 to 450.00	±1.14°	212.00 to 842.00	±2.05°
	440.00 to 1700.00	±0.44°	842.00 to 3092.00	±0.79°
	1700.00 to 2000.00	±0.54°	3092.00 to 3632.00	±0.97°
	2000.00 to 2320.00	±0.73°	3632.00 to 4208.00	±1.32°
C (W5)	-1.10 to 1150.00	±0.44°	30.00 to 2102.00	±0.80°
	1150.00 to 1750.00	±0.61°	2102.00 to 3182.00	±1.09°
	1750.00 to 2050.00	±0.74°	3182.00 to 3722.00	±1.33°
	2050.00 to 2320.00	±0.99°	3722.00 to 4208.00	±1.79°
D (W3)	-1.00 to 150.00	±0.63°	30.00 to 302.00	±1.13°
	150.00 to 1200.00	±0.41°	302.00 to 2192.00	±0.73°
	1200.00 to 1700.00	±0.51°	2192.00 to 3092.00	±0.92°
	1700.00 to 2320.00	±0.97°	3092.00 to 4208.00	±1.75°
P	0.00 to 950.00	±0.23°	32.00 to 1742.00	±0.41°
	950.00 to 1395.00	±0.34°	1742.00 to 2543.00	±0.61°

Thermocouple Ranges & Accuracies

Table based on Accuracy:

≤ ± (0.008 % of Reading + 0.006 mV)

Note: Doesn't include cold junction error of ±0.05°C

DIN Wire				
T/C	**Degrees C Range**	**°C**	**Degrees F Range**	**°F**
L J-DIN	-200.00 to -100.00	±0.21°	-328.00 to -148.00	±0.38°
	-100.00 to 350.00	±0.13°	-148.00 to 662.00	±0.24°
	350.00 to 900.00	±0.15°	662.00 to 1652.00	±0.27°
U T-DIN	-200.00 to -150.00	±0.37°	-328.00 to -238.00	±0.66°
	-150.00 to 100.00	±0.22°	-238.00 to 212.00	±0.40°
	100.00 to 600.00	±0.15°	212.00 to 1112.00	±0.28°

RTD Ranges & Accuracies

Table based on 3 & 4 Wire RTD (ITS-90) Accuracy*:
≤ ± (0.015 % of Reading +0.05 Ohms)

RTD Type	Degrees C Range	°C	Degrees F Range	°F
Pt 100 Ohm	-200.00 to -150.00	±0.13°	-328.0 to -238.00	±0.24°
DIN/IEC/JIS	-150.00 to 360.00	±0.24°	-238.00 to 660.00	±0.44°
1989	360.00 to 740.00	±0.34°	660.00 to 1364.00	±0.61°
α=1.3850	740.00 to 850.00	±0.37°	1364.00 to 1562.00	±0.67°
Pt 10 Ohm	-200.00 to -120.00	±1.24°	-328.00 to -184.00	±2.24°
DIN/IEC/1989	-120.0 to 210.00	±1.44°	-184.00 to 410.00	±2.59°
α=1.3850	210.00 to 370.00	±1.54°	410.00 to 698.00	±2.77°
	370.00 to 650.00	±1.74°	698.00 to 1202.00	±3.14°
	650.00 to 850.00	±1.91°	1202.00 to 1562.00	±3.44°
Pt 50 Ohm	-200.00 to 200.00	±0.34°	-328.00 to 392.00	±0.62°
DIN/IEC/1989	200.00 to 550.00	±0.44°	392.00 to 1022.00	±0.80°
α=1.3850	550.00 to 850.00	±0.54°	1022.00 to 1562.00	±0.98°
Pt 200 Ohm	-200.00 to -120.00	±0.08°	-328.00 to -184.00	±0.14°
DIN/IEC/1989	-120.00 to 180.00	±0.14°	-184.00 to 356.00	±0.24°
α=1.3850	180.00 to 450.00	±0.19°	356.00 to 842.00	±0.34°
	450.00 to 680.00	±0.24°	842.00 to 1256.00	±0.44°
	680.00 to 850.00	±0.29°	1256.00 to 1562.00	±0.52°
Pt 500 Ohm	-200.00 to -90.00	±0.08°	-328.00 to -194.00	±0.14°
DIN/IEC/1989	-120.00 to 180.00	±0.14°	-184.00 to 356.00	±0.24°
α=1.3850	180.00 to 450.00	±0.19°	356.00 to 842.00	±0.34°
	450.00 to 680.00	±0.24°	842.00 to 1256.00	±0.44°
	680.00 to 850.00	±0.29°	1256.00 to 1562.00	±0.52°
Pt 1000 Ohm	-200.00 to 170.00	±0.08°	-328.00 to 338.00	±0.14°
DIN/IEC/1989	170.00 to 470.00	±0.14°	338.00 to 878.00	±0.24°
α=1.3850	470.00 to 730.00	±0.19°	878.00 to 1346.00	±0.34°
	730.00 to 850.00	±0.22°	1346.00 to 1562.00	±0.39°

*Read based on 1.0 mA of fixed excitation current

RTD Ranges & Accuracies

Table based on 3 & 4 Wire RTD (ITS-90) Accuracy*:
≤ ± (0.015 % of Reading +0.05 Ohms)

RTD Type	Degrees C Range	°C	Degrees F Range	°F
Pt 100 Ohm (Burns) α=1.3902	-200.00 to -100.00 -100.00 to 370.00 370.00 to 648.90	±0.14° ±0.24° ±0.31°	-328.00 to -148.00 -148.00 to 698.00 698.00 to 1200.00	±0.26° ±0.44° ±0.56°
Pt 100 Ohm (Old JIS 1981) α=1.3916	-200.00 to -140.00 -140.00 to 130.00 130.00 to 370.00 370.00 to 648.90	±0.13° ±0.19° ±0.24° ±0.31°	-328.00 to -220.00 -220.00 to 266.00 266.00 to 698.00 698.00 to 1200.00	±0.24° ±0.34° ±0.44° ±0.56°
Pt 100 Ohm (US Lab) α=1.3926	-200.00 to -140.00 -140.00 to 130.00 130.00 to 380.00 380.00 to 610.00 610.00 to 850.00	±0.13° ±0.19° ±0.24° ±0.30° ±0.37°	-328.00 to -220.00 -220.00 to 266.00 266.00 to 716.00 716.00 to 1130.00 1130.00 to 1562.00	±0.24° ±0.34° ±0.44° ±0.54° ±0.66°
Copper 10 Ohm (Minco) α=1.4274	-200.00 to -150.00 -150.00 to 90.00 90.00 to 260.00	±1.24° ±1.34° ±1.36°	-328.00 to -238.00 -238.00 to 194.00 194.00 to 500.00	±2.24° ±2.42° ±2.44°
Copper 50 Ohm α=1.4280	-50.00 to 150.00	±0.29°	-58.00 to 302.00	±0.52°
Ni 120 Ohm (Pure) α=1.6720	-80.00 to 260.00	±0.10°	-112.00 to 500.00	±0.17°

*Read based on 1.0 mA of fixed excitation current

Guaranteed compatible with smart transmitters, multichannel recorders as well as PLC and DCS input cards.

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.