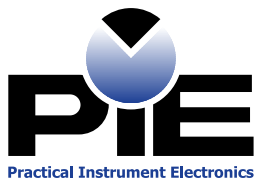




Advanced Test Equipment Corp.

www.atecorp.com 800-404-ATEC (2832)



**PIE 820PM**  
**Panel Mounted**  
**Multifunction Process Calibrator**  
 mA • V • TC • Ω • RTD • Hz  
**Operating Instructions**



## Basic Operation

Switches & Knobs .....	4
Connections.....	4
MAIN Menu - Functions, Units & Ranges.....	5
FEATURE Menu - Stepping & Ramping / Auto Off / Backlight.....	6
Storing EZ-CHECK Outputs & Automatic Stepping .....	7

## Functions and Hookup Diagrams

Milliamp	
Source mA, Simulate 2 Wire Transmitters .....	8, 9
Read mA, Power/Measure Transmitters .....	10, 11
Voltage & Millivolt	
Source V & mV; Read V & mV .....	12, 13
Thermocouple	
Source T/C & Read T/C Sensors .....	14, 15
Resistance	
Source Resistance, Read Resistance & Continuity .....	16, 17
RTD	
Source RTD & Read RTD Sensors .....	18, 19
Frequency	
Source KHz, Hz & CPM; Read KHz, Hz & CPM.....	20, 21

## Warranty & Accessories

Warranty & Additional Information.....	22
Accessories .....	23

## Specifications

General .....	24-25
Thermocouple Ranges & Accuracies .....	26-27
RTD Ranges & Accuracies.....	28

## Installation

Panel Cutout Dimensions .....	29
Mounted in Panel .....	30, 31

## Product Description

- **Technician friendly operation**

The unique and 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 & -10.00 to 80.00 mV dc  
Read 0 to 24.00 mA, 0 to 10.25 V, 0 to 60.0 V and -10.00 to 80.00 mV dc  
Simulate 2-Wire Transmitters & Power up transmitters & loops

- **Calibrate in temperature with 0.1°C/°F resolution**

Stop carrying around a millivolt source and thermocouple tables. The PIE 820PM works with the thermocouples you use including types J, T, E, K, R, S, B, N, G, C, D, L (J-DIN), U (T-DIN) and Platinel II. Pt 100 Ohm (3850, 3902, 3916, 3926) & 100 Ohm (3850) RTD; Copper 10 & 50 Ohm, Nickel 100 and 120 Ohm RTD. Guaranteed compatible with all instrumentation.

- **Quickly set any 3 outputs Plus automatic step & ramp**

Easily set any value quickly with the adjustable "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% of span or continuously ramp between span and zero. Select the step time to match your system from 5, 6, 7, 8, 9, 10, 15, 20, 25, 30 and 60 seconds.

- **Compatible with all process instruments**

Connect directly to the thermocouple inputs of smart transmitters, PLCs, DCS and multichannel recorders and verify their outputs or displays.

- **Measure temperature sensors, frequency pickups, mA & V**

Check the values of your process sensors. Instantly recall MAX and MIN values to see process variability. The PIE 820PM measures thermocouple or RTD probes in degrees C or F.

- **Checkout resistance instruments, loop & wiring problems**

Source and read resistance from 0.0 to 401.0 and 0 to 4010 ohms. 'Beep' out connections with the built-in continuity checker.

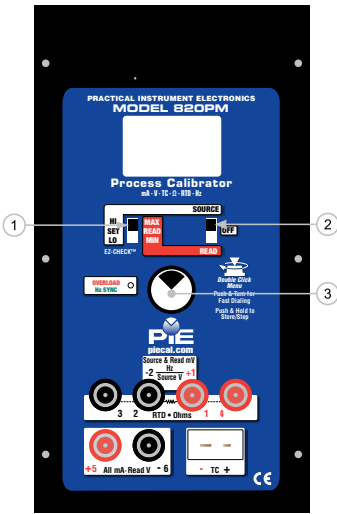
- **Checkout flow and vibration systems**

Source & read frequency from 0 to 2000 CPM (Counts-Per-Minute), 0.00 to 999.99 Hz, 0.0 to 9999.9 Hz and 0.000 to 20.000 kHz.

- **Easy to read**

Turn on the backlight & easily see the display in dark areas of the plant.

## Basic Operation



### 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 820PM 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 820PM will display the current input value. Slide the switch to HI and the highest value measured since turn-on or reset will be displayed; slide the switch to LO and the lowest value measured since turn-on or reset will be displayed.

### ② SOURCE/OFF/READ Switch

Select “SOURCE” to output mA, V, T/C,  $\Omega$ , RTD or Hz.

Select “READ” to read mA, V, T/C,  $\Omega$ , RTD or Hz.

### 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.

Double Click the EZ-DIAL knob to change the function of the calibrator and to select ranges, units and other user settings.

## Connections

Test leads with shielded or non shielded banana plugs may be plugged into the protected banana jacks labeled 1 through 6.

Simulating or reading thermocouples requires the use of thermocouple or extension grade thermocouple wire terminated with a miniature thermocouple plug.

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## Configuration

### Double Click Menus

Double click the EZ-DIAL knob to access the Double Click Menus to select each function and the options for each function. Available choices are shown in grey.

#### Source mA & Simulate 2 Wire Transmitters

<b>MAIN</b>	
> EXIT (1/2)	
FUNCTION	mA
MODE	SOURCE 2W SIM
UNITS	mA %
HART 250Ω	ON OFF

#### Read mA & Power/Measure Transmitters

> EXIT (1/2)	
FUNCTION	mA
MODE	READ PWR MEAS
UNITS	mA %
HART 250Ω	ON OFF

#### Source Volts & Millivolts

> EXIT (1/2)	
FUNCTION	V
RANGE	10V 80mV

#### Read Volts & Millivolts

> EXIT (1/2)	
FUNCTION	V
RANGE	10V 60V 80mV

#### Source & Read Frequency

> EXIT (1/2)	
FUNCTION	FREQ
RANGE	20KHZ 10000HZ 1000HZ 2000CPM

#### Source & Read Thermocouples

> EXIT (1/2)	
FUNCTION	T/C
UNITS	°C °F
T/C TYPE	J K ETR SBN L U G C D P
COLD JUNC	ON

#### Source RTD

> EXIT (1/2)	
FUNCTION	RTD
UNITS	°C °F
RTD	Pt 100 α=3850 [* RTD Types]
WIRE MODE	234W

#### Read RTD

> EXIT (1/2)	
FUNCTION	RTD
UNITS	°C °F
RTD	Pt 100 α=3850 [* RTD Types]
WIRE MODE	3W 2W 4W

\* RTD Types: Pt 100 α=3850, α=3902,  
α=3916, α=3926  
Pt 1000 α=3850;  
Cu 10 α=4274, Cu 50 α=4280  
Ni 120 α=6720, Ni 110 α=5801

#### Source Ohms

>EXIT (1/2)	
FUNCTION	OHMS
RANGE	400Ω 4000Ω
WIRE MODE	234W

#### Read Ohms

>EXIT (1/2)	
FUNCTION	OHMS
RANGE	400Ω 4000Ω CONT
WIRE MODE	3W 2W 4W

### Double Click Menu - STEPPING, AUTO OFF & BACKLIGHT

#### 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:

<b>MAIN</b>	
> EXIT (1/2)	
FUNCTION	mA
MODE	SOURCE
UNITS	mA
HART 250Ω	ON

Turn the ③ DIAL KNOB to move to the second menu (FEATURES) page.

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.

<b>FEATURES</b>	
> EXIT (2/2)	
AUTO OFF	ON
BACKLIGHT	ON
STEPS/RAMP	3
STEP/RAMP TIME	5

**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.

**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.

**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 STEP appears on the display. The word STEP will appear on the display anytime the selected automatic function is running. Stop the stepping or ramping by again pressing and holding the ③ DIAL KNOB for 3 seconds.

# Storing EZ-CHECK Outputs

## STORING HI and LO EZ-CHECK Outputs

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

- 1) Store your high (SPAN) output temperature by moving the EZ-CHECK switch to the **HI** position and turn the ③ EZ-Dial knob until the desired temperature 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 temperature by moving the EZ-CHECK switch to the **LO** position and turn the ③ EZ-Dial knob until the desired temperature 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 temperature outputs by moving the EZ-CHECK switch between HI and LO. You may also select any third temperature output (such as mid-range) using the SET position on the EZ-CHECK switch.

# Automatic Stepping

## To change the Automatic Stepping settings

Double click the ③ DIAL KNOB at any time the unit is on and the menu will appear for 15 seconds.

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

FEATURES	
> EXIT (3/3)	
AUTO OFF	ON OFF
BACKLIGHT	ON OFF
STEPS/RAMP	2 3 5 11 RAMP
STEP/RAMP TIME	5 6 7 8 9 10 15 20 25 30 60

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

**STEPS** - pressing the knob will cycle through 2, 3, 5 and 11 then reverse direction. The endpoints of the steps 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 between the HI and LO EZ-CHECK.

**STEP 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 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.

## Operating Instructions

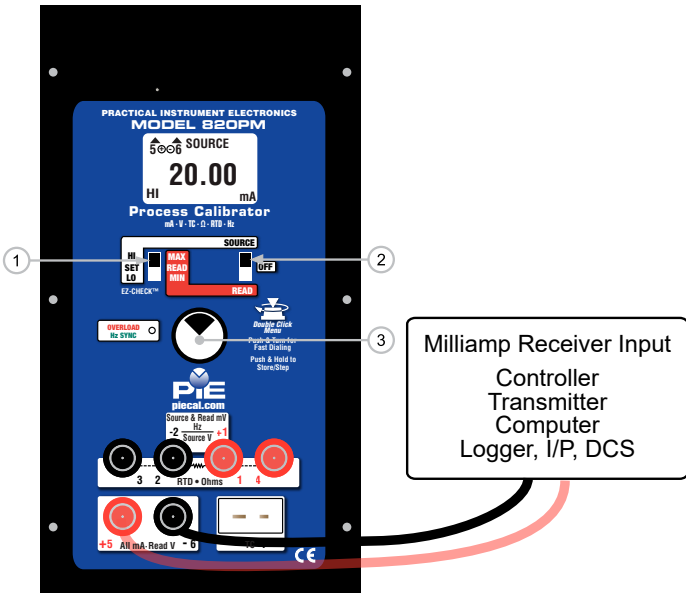
### SOURCE mA / SOURCE % (Percent of 4 to 20 mA)

Choose this function to provide an output from 0.00 to 24.00 milliamps. The compliance voltage is a nominal 24 VDC to provide the driving power to your milliamp receivers.

Move the power switch ① to SOURCE 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 mA for the FUNCTION and SOURCE for the MODE. Choose either mA or % and whether you need the 250Ω HART resistor active in the loop.

Connect the output leads of the PIE 820PM to the inputs of the device being calibrated, making sure to check polarity. Red lead from jack (5) to the plus (+) input and black lead from jack (6) to the minus (-) input. Open loops and signals above the maximum scale are limited by protection circuitry with “ERROR” or “OVER RANGE” flashed on the display and the red OVERLOAD LED lit.

Instantly output your SPAN and ZERO output settings by moving the EZ-CHECK switch between HI and LO (defaults to 20 & 4 mA). 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 0.01 mA (0.1%) increments by turning the knob ③. Press and turn the knob for faster dialing with 1.00 mA (10.0%) increments.



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## Operating Instructions

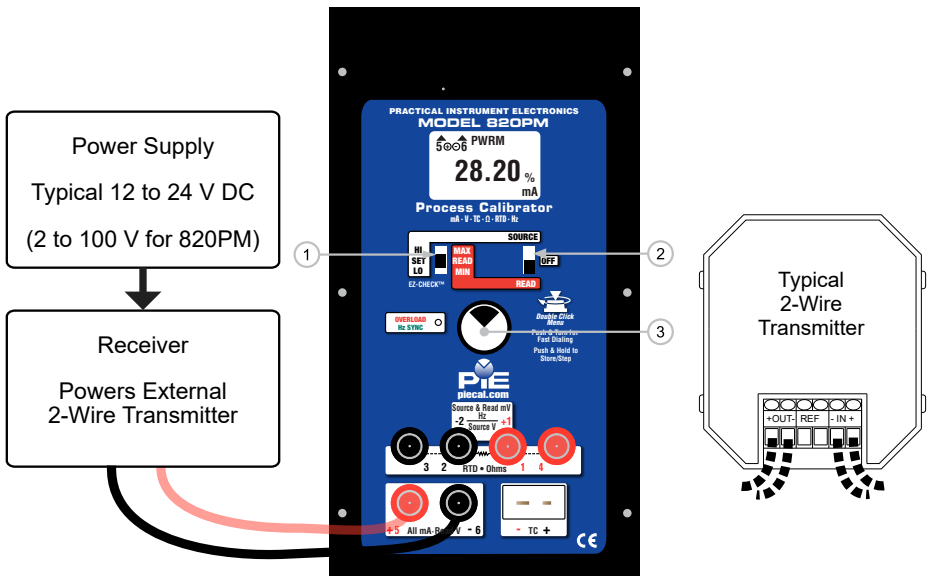
### 2 Wire SIM mA, 2 Wire SIM % (Percent of 4 to 20 mA)

Choose this function to simulate a 2 Wire Transmitter output from 0.00 to 24.00 milliamps. Operates in loops with power supply voltages from 2 to 60 VDC.

Move the power switch ② to SOURCE 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 mA for the FUNCTION and 2W SIM for the MODE. Choose either mA or % and whether you need the 250Ω HART resistor active in the loop.

Connect the output leads of the PIE 820PM to the inputs of the device being calibrated, making sure to check polarity. Red lead from jack (5) to the plus (+) input and black lead from jack (6) to the minus (-) input. Open loops and signals above the maximum scale are limited by protection circuitry with "ERROR" or "OVER RANGE" flashed on the display and the red OVERLOAD LED lit.

Instantly output your SPAN and ZERO output settings by moving the EZ-CHECK switch between HI and LO (defaults to 20 & 4 mA). 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 0.01 mA (0.1%) increments by turning the knob ③. Press and turn the knob for faster dialing with 1.00 mA (10.0%) increments.



## Operating Instructions

### READ mA, READ % (Percent of 4 to 20 mA)

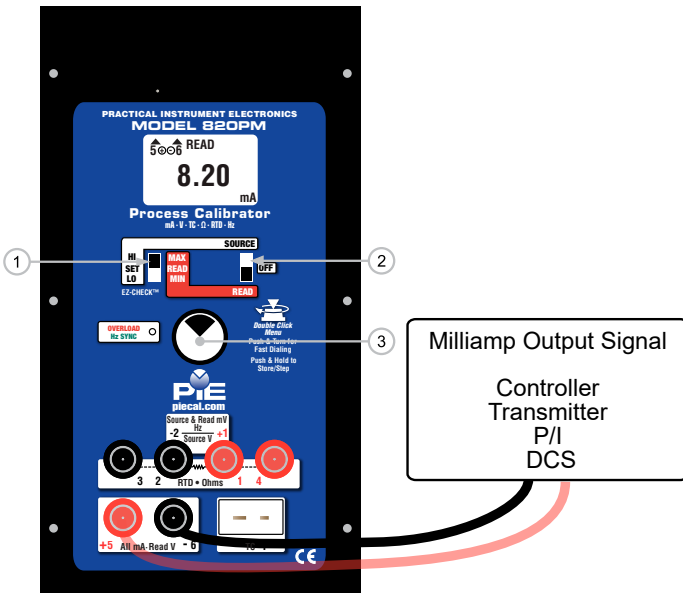
Choose this function to measure from 0.00 to 24.00 milliamps or -25.0 to 125.0%.

Move the power switch ② to READ then Double Click the EZ-DIAL knob to get into the Double Click Menu. Turn the knob ③ to scroll through the settings and press the knob to make your selection. Select mA for the FUNCTION and READ for the MODE. Choose either mA or % and whether you need the 250Ω HART resistor active in the loop.

Connect the red input lead from jack (5) of the PIE 820PM to the more positive point of the break and the black input lead from jack (6) to the more negative point.

Signals below 0 mA or open circuits are indicated by 0.00 mA (-25.0%) on the display. Signals above 24 mA are current limited by protection circuitry with “OVER RANGE” on the display and the red OVERLOAD LED lit.

The PIE 820PM 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.



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## Operating Instructions

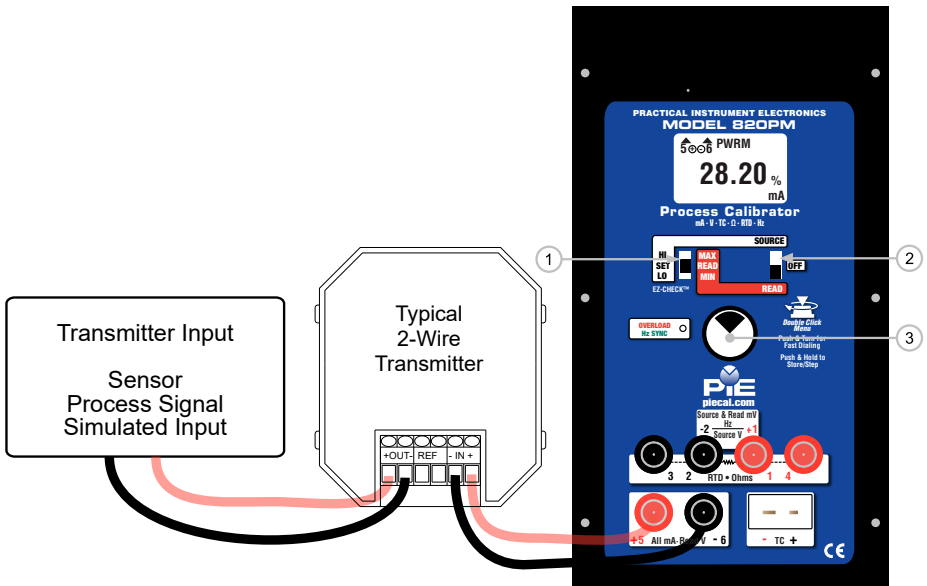
### Power/Measure mA, Power/Measure % (Percent of 4 to 20 mA)

Choose this function to simultaneously supply power to a 2 Wire Transmitter while displaying the 4 to 20 mA output of the transmitter.

Move the power switch ② to READ then Double Click the EZ-DIAL knob to get into the Double Click Menu. Turn the knob ③ to scroll through the settings and press the knob to make your selection. Select mA for the FUNCTION and PWR MEAS for the MODE. Choose either mA or % and whether you need the 250Ω HART resistor active in the loop.

Disconnect one or both input wires from the device to be calibrated. Connect the red source lead of the PIE 820PM from jack (5) to the plus (+) input of the device and the black source lead from jack (6) to the minus (-).

The PIE 820PM supplies a nominal 24 volts DC at 24 mA to the 2 Wire Transmitter. The current passed by the transmitter will be accurately displayed by the PIE 820PM. Calibrate the transmitter in the usual manner and disconnect the PIE 820PM. Signals above 24 mA are current limited by protection circuitry with "OVER RANGE" on the display and the red OVERLOAD LED lit.



## Operating Instructions

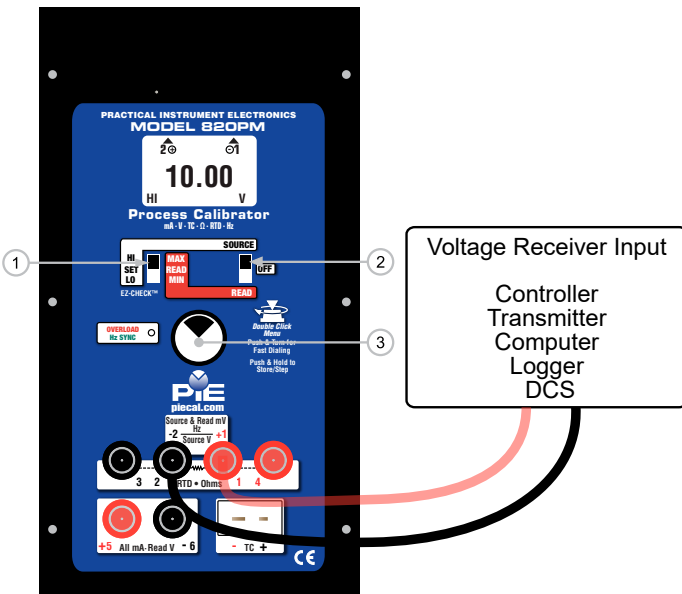
### SOURCE mV / V

Choose this function to provide an output from 0.00 to 80.00 mV or from 0.00 to 10.25 V. The source current is a nominal 24 mA to provide the driving power to your voltage receivers.

Move the power switch ② to SOURCE 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 V for the FUNCTION and 10V or 80 mV for the RANGE.

Connect the output leads of the PIE 820PM to the inputs of the device being calibrated, making sure to check polarity. Connect the Red lead from jack (1) to the plus (+) input and black lead from jack (2) 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 0.01 mV or V increments by turning the knob ③. Press and turn the knob for faster dialing with 1.00 mV or V increments.



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## Operating Instructions

### Read mV / V

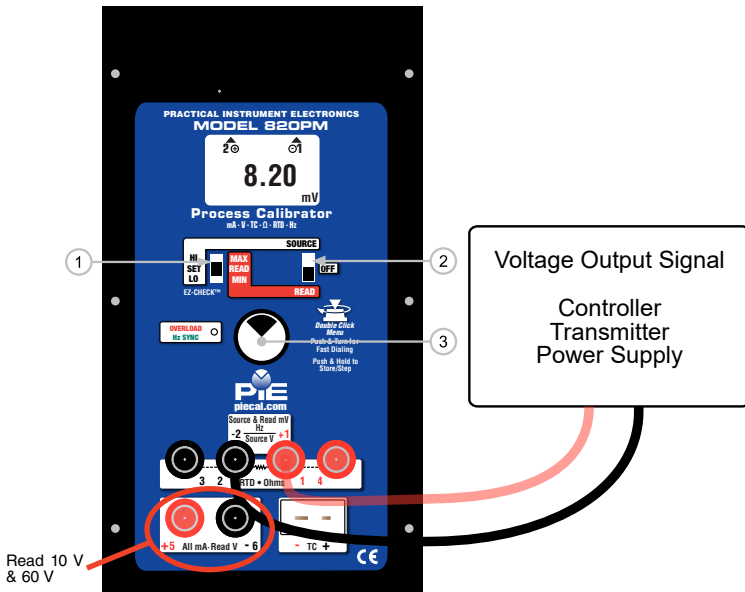
Choose this function to measure from 0.00 to 80.00 millivolts, 0.00 to 10.25 V dc or 0.0 to 60.0 V dc.

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 V for the FUNCTION and 10V, 60V or 80 mV for the RANGE.

Connect the red input lead (+) of the PIE 820PM to the more positive point of the break and the black input to the more negative point. When measuring up to 80 mV connect the red lead to jack (1) and the black lead to jack (2). When measuring up to 10 V or 60 V connect the red lead to jack (5) and the black lead to jack (6).

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

The PIE 820PM 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.



## Operating Instructions

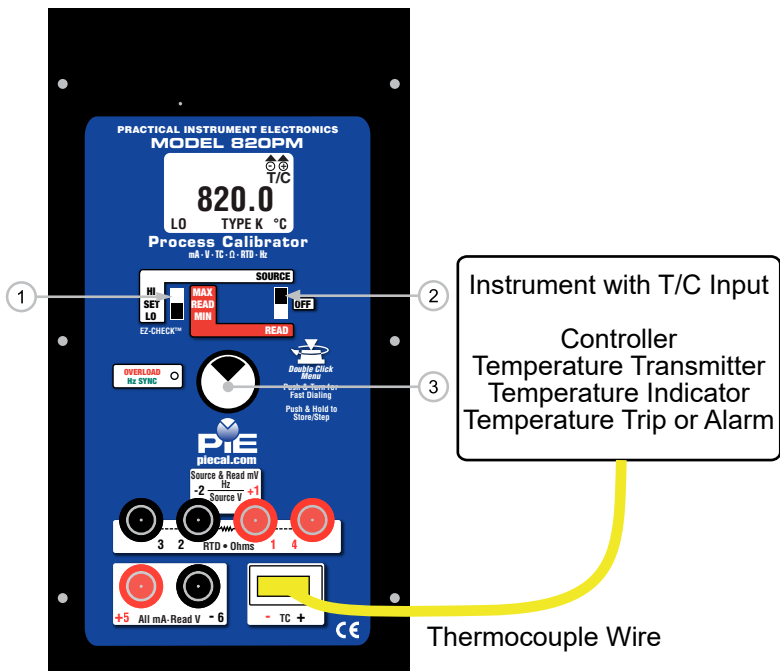
### Source Thermocouple

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 ① to SOURCE 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, T, E, R, S, B, N, G, C, D, L (J-DIN), U (T-DIN) or P (Platinel II) and internal COLD JUNC ON or OFF (ON is the default).

Connect the PIE 820PM to the inputs of the device being calibrated using the proper type of thermocouple wire via the miniature thermocouple socket.

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 by turning the knob ③. Press and turn the knob for faster dialing with 10.0° increments.



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## Operating Instructions

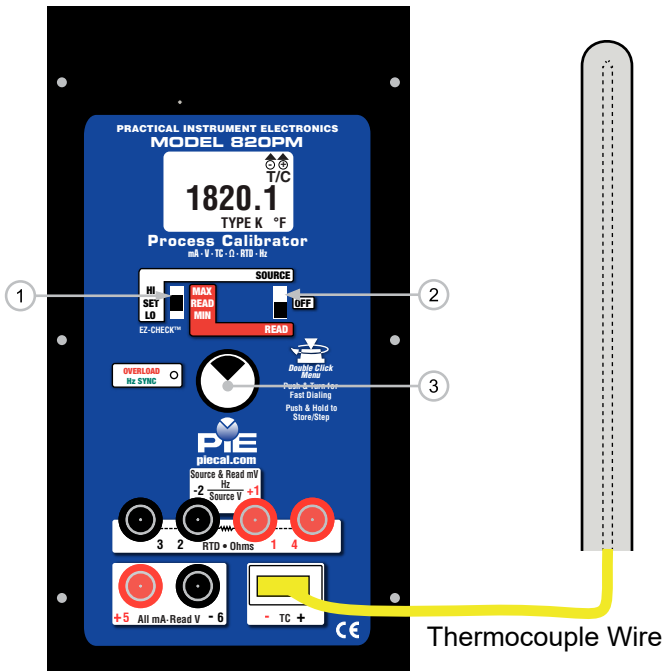
### Read Thermocouple Sensors

Choose this function to measure temperatures with a thermocouple probe or sensor.

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, T, E, R, S, B, N, G, C, D, L (J-DIN), U (T-DIN) or P (Platinel II) and COLD JUNC ON or OFF (ON is the default).

Connect the PIE 820PM to the inputs of the device being calibrated using the proper type of thermocouple wire via the miniature thermocouple socket. 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 and the red OVERLOAD LED lit.

The PIE 820PM 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.



## Operating Instructions

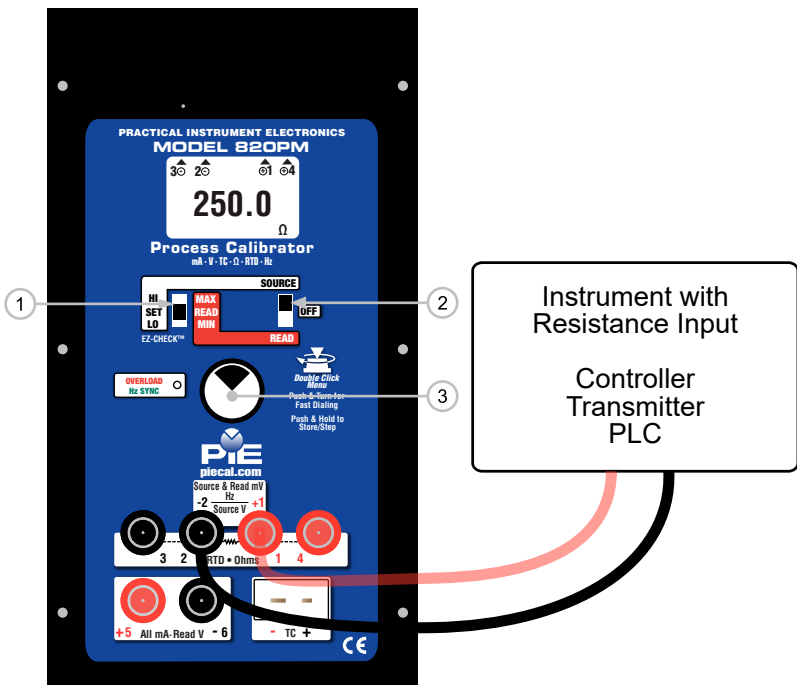
### Source Resistance

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 Double Click Menu. Turn the knob to scroll through the settings and press the knob to make your selection. Select OHMS for the FUNCTION, 400 $\Omega$  or 4000 $\Omega$  for the RANGE.

Disconnect all sensor wires from the devices to be calibrated and connect the PIE 820PM to the inputs of the device using 2, 3 or 4 wires. For 2 Wire resistance connect the read lead into jack (1) and the black lead into jack (2). For 3 wire resistance add a black lead plugged into jack (3) and for 4 wire resistance add a red lead plugged into jack (4).

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 $\Omega$ /1 $\Omega$  increments by turning the knob ③. Press and turn the knob for faster dialing with 10.0 $\Omega$ /100 $\Omega$  increments.



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## Operating Instructions

### Read Resistance & Check Continuity

Choose this function to measure resistance or check continuity.

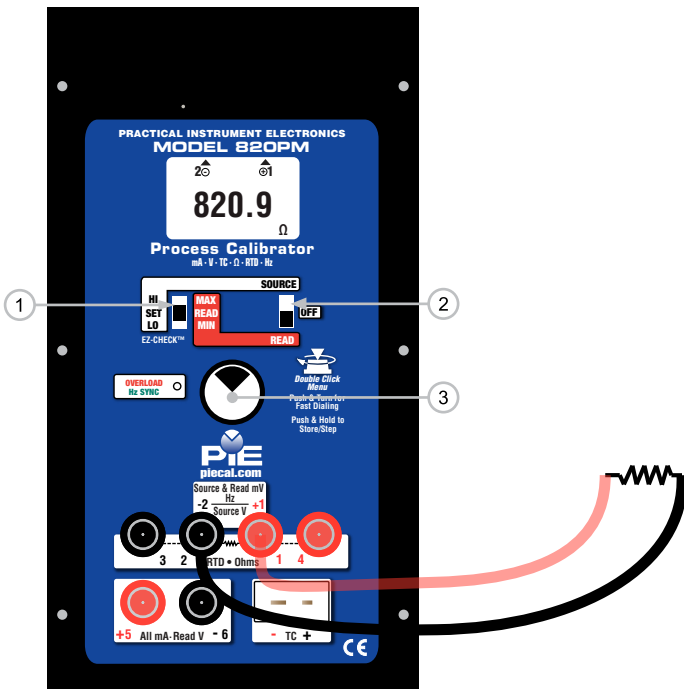
Move the power switch ② to READ then Double Click the EZ-DIAL knob to get into the Double Click Menu. Turn the knob to scroll through the settings and press the knob to make your selection. Select OHMS for the FUNCTION, 400 $\Omega$ , 4000 $\Omega$  or Continuity for the RANGE. You must also select the WIRE MODE for 2W, 3W or 4W to match the 2, 3 or 4 wires being used to measure resistance. For continuity the only choice is 2W.

Disconnect all wires from the sensor and connect the PIE 820PM to the inputs of the device using 2, 3 or 4 wires.

If continuity is selected, resistance is measured up to 400.0 $\Omega$ . The beeper will sound and )))) appears on the display when resistances < 100.0 $\Omega$  are measured.

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

The PIE 820PM 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.



## Operating Instructions

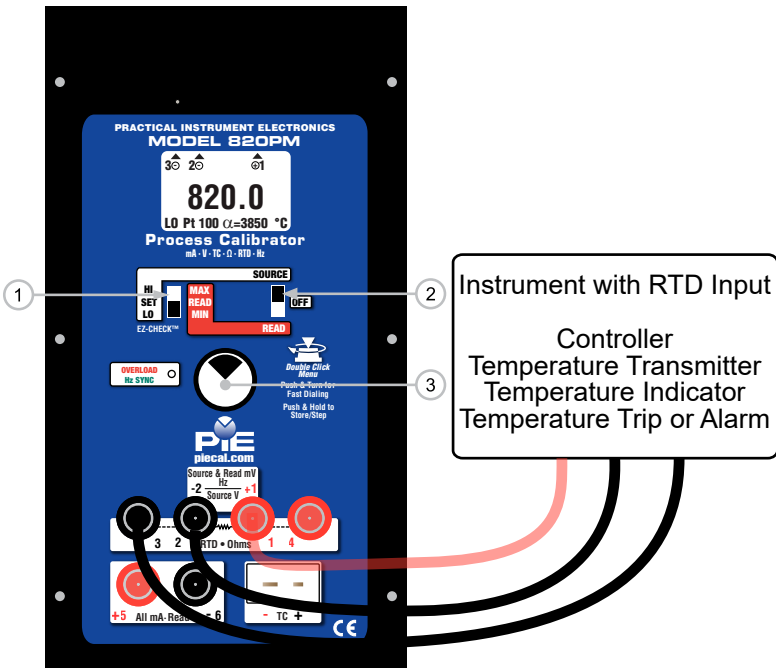
### Source RTD

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 Double Click 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 (Choose from one of Platinum 100Ω, or 1000Ω, Copper 10Ω or 50Ω, Nickel 120Ω or 110Ω curves). *Note: Pt 100Ω 3850 is the most common RTD type.*

Disconnect all sensor wires from the devices to be calibrated and connect the PIE 820PM to the inputs of the device using 2, 3 or 4 wires. For 2 Wire RTDs connect the red lead into jack (1) and the black lead into jack (2). For 3 wire RTDs add a black lead plugged into jack (3) and for 4 wire RTDs add a red lead plugged into jack (4).

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 by turning the knob ③. Press and turn the knob for faster dialing with 10.0° increments.



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## Operating Instructions

### Read RTD Sensors

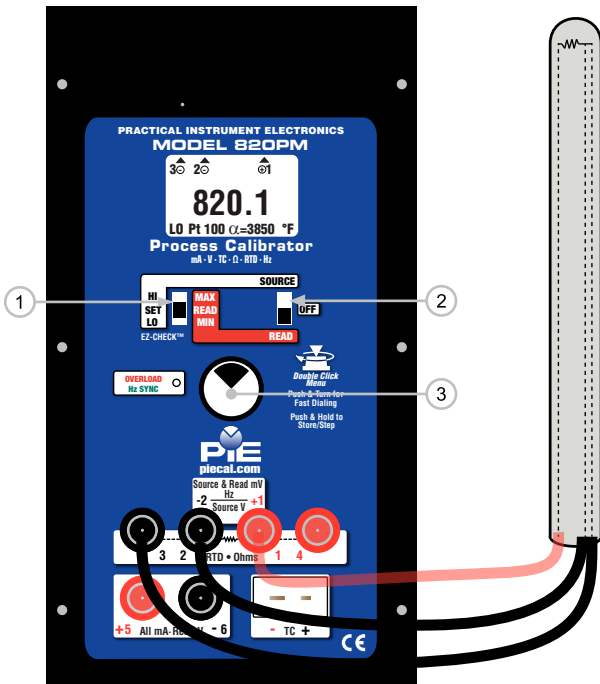
Choose this function to measure temperatures with an RTD probe or sensor.

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 RTD for the FUNCTION, °F or °C for the UNITS and RTD (Choose from one of Platinum 100Ω, or 1000Ω, Copper 10Ω or 50Ω, Nickel 120Ω or 110Ω curves). *Note: Pt 100Ω 3850 is the most common RTD type.* You must also select the WIRE MODE for 2W, 3W or 4W to match the 2, 3 or 4 wires on the RTD sensor.

Disconnect all wires from the sensor and connect the PIE 820PM to the inputs of the device using 2, 3 or 4 wires. For 2 Wire RTDs connect the read lead into jack (1) and the black lead into jack (2). For 3 wire RTDs add a black lead plugged into jack (3) and for 4 wire RTDs add a red lead plugged into jack (4).

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

The PIE 820PM 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.



## Operating Instructions

### Source Frequency

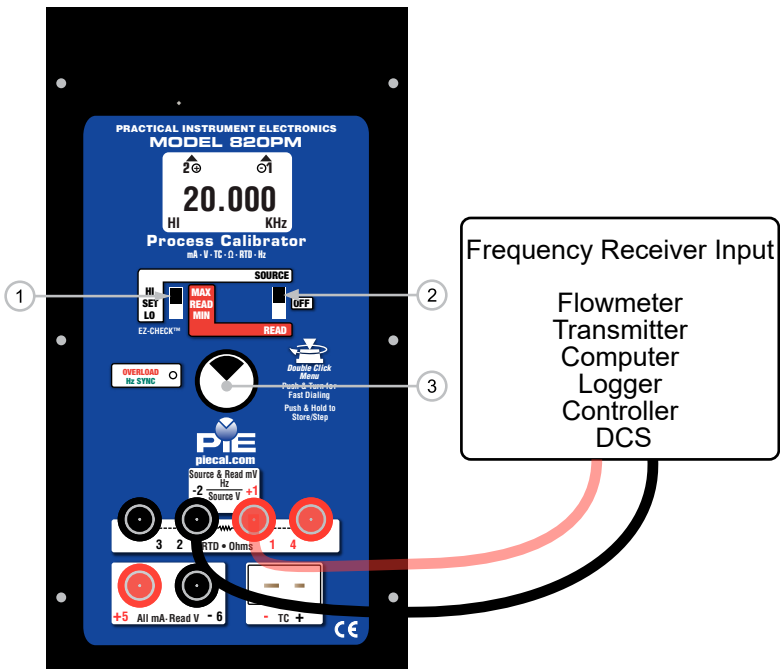
Choose this function to provide a frequency signal into any input devices that measure frequency.

Move the power switch ② to SOURCE 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 FREQ for the FUNCTION and 20KHZ, 10000HZ, 1000HZ or 2000CPM for the RANGE.

Disconnect all input wires from the devices to be calibrated and connect the PIE 820PM to the input of the device matching polarity. Connect the Red lead from jack (1) to the plus (+) input and black lead from jack (2) to the minus (-) input.

The green HZ SYNC LED pulses in synch with the output pulses and may be used to calibrate optical pickups. The output signal is a zero crossing square wave with a fixed amplitude of 6 V peak-to-peak from -1 and + 5 V.

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 1 count increments by turning the knob ③. Press and turn the knob for faster dialing with 100 count increments.



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# Operating Instructions

## Read Frequency

Choose this function to count frequency.

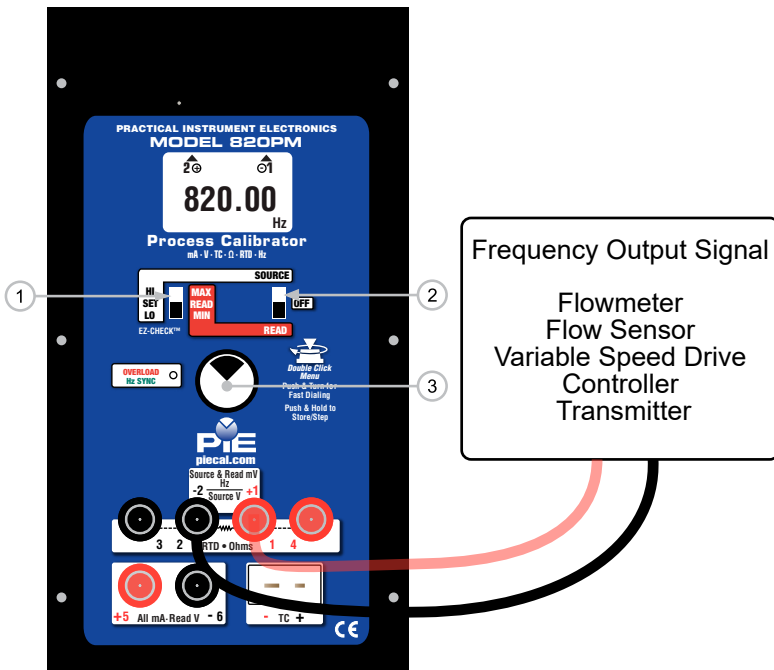
Move the power switch ② to READ then Double Click the EZ-DIAL knob to get into the Double Click Menu. Turn the knob to scroll through the settings and press the knob to make your selection. Select FREQ for the FUNCTION and 20KHZ, 10000HZ, 1000HZ or 2000CPM for the RANGE.

Disconnect all input wires from the devices to be calibrated and connect the PIE 820PM to the output of the device matching polarity. 820PM to the input of the device matching polarity. Connect the Red lead from jack (1) to the plus (+) input and black lead from jack (2) to the minus (-) input.

The green HZ SYNC LED pulses in synch with the input frequency.

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

The PIE 820PM 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.



## 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 designed, assembled and calibrated 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:

AC Adaptor (Part No. 020-0101 for 100 to 120V, 020-0100 for 220/230V ac),  
Certificate of Calibration, Six (6) Mounting Screws

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

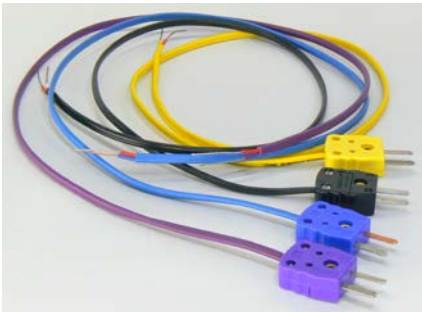
### OPTIONAL:

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

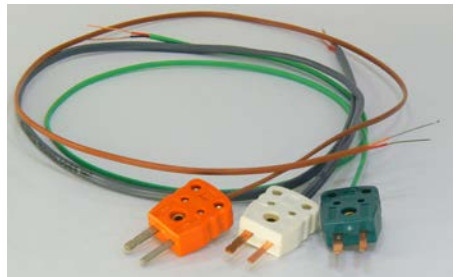
\* Thermocouple extension wire, stripped on one end with a corresponding miniature thermocouple male connector on the other end.



020-0820 RTD & mA/mV Test Leads Included



020-0202 J, T, E & K  
Thermocouple Wire (Optional)



020-0203 B, R/S & N  
Thermocouple Wire (Optional)

## Specifications

### DC Voltage Read

Range and Accuracy	0.00 to 80.00 mV, $\leq \pm(0.03\%$ of Full Scale) 0 to 10.25 V, $\leq \pm(0.03\%$ of FS + 0.005V) 0.0 to 60.0 V, $\leq \pm(0.03\%$ of FS + 0.05V)
Accuracy	$\leq \pm 0.03 \%$ of Full Scale
Input resistance	$\geq 1 \text{ M}\Omega$

### Source V dc

Range & Accuracy	-10.00 to 80.00 mV, $\leq \pm (0.03\%$ of Full Scale) 0.00 to 10.25 V, $\leq \pm (0.03\%$ of FS +0.005V)
Accuracy	$\leq \pm (0.03 \%$ of Full Scale)
Source Current	$\geq 24 \text{ mA}$
Sink Current	$> 16 \text{ mA}$
Output Impedance	$< 1 \text{ Ohm}$
Short Circuit Duration	Infinite

### Thermocouple Source

Accuracy	$\pm(0.03\%$ of Full Scale) [Note: Full Scale is 80.00 mV]
Cold Junction Compensation	$\pm 0.1^\circ\text{C}$ (Thermistor traceable to NIST for 11 years)
Output Impedance	$< 1 \text{ Ohm}$
Source Current	$> 20 \text{ mA}$ (drives 80 mV into 10 Ohms)

### Thermocouple Read

Accuracy & Cold Junction Compensation	Same as Thermocouple Source
Input Impedance	$> 1 \text{ Megohms}$
Open TC Threshold; Pulse	10K Ohms; $<5 \mu\text{amp}$ pulse for 300 milliseconds (nominal)

### RTD, OHMS and Continuity Read

Resistance Ranges	0.0 to 401.0, 0 to 4010 Ohms
Accuracy	$\pm(0.03\%$ of Full Scale + 0.075 Ohms)
Excitation Current	1.0 mA to 401.0 Ohms, 0.5 mA to 4010 Ohms (nominal)
Continuity	0.0 to 401.0 Ohms; Beeps from 0.0 to 100.0 Ohms



## Specifications

<b>RTD and OHMS Source</b>	
Accuracy From 1 to 10.2 mA External Excitation Current	$\pm(0.03\% \text{ of Full Scale} + 0.075 \text{ Ohms})$
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 Ohm: 10.2 mA max; steady or pulsed/intermittent 401 to 4000 Ohms: 1 mA max; steady or pulsed/intermittent
Pulsed Excitation Current Compatibility	DC to 0.01 second pulse width

<b>Frequency Source</b>	
Ranges	1 to 2000 CPM, 0.01 to 999.99 Hz, 0.1 to 9999.9 Hz, 0.001 to 20.000 kHz
Accuracy	$\pm(0.03\% \text{ of Full Scale})$
Output Waveform	Square Wave, Zero Crossing -1.0 to +5 V peak-to-peak $\pm 10\%$
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

<b>Frequency Read</b>	
Ranges & Accuracy	Same as Frequency Source
Accuracy	$\pm(0.03\% \text{ of Full Scale})$
Trigger Level	1 V rms, dc coupled
Input Impedance	> 1 Meg Ohm + 60 pF

## Thermocouple Ranges & Accuracies

Table based on  $\leq \pm (0.03 \% \text{ of } 80 \text{ mV})$   
 Note: Doesn't include cold junction error of  $\pm 0.1^\circ\text{C}$

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

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## Thermocouple Ranges & Accuracies

Table based on  $\leq \pm (0.03\% \text{ of } 80 \text{ mV})$   
 Note: Doesn't include cold junction error of  $\pm 0.1^\circ\text{C}$

T/C Type	Degrees C Range	Accuracy °C	Degrees F Range	Accuracy °F	T/C Material	ISA/ANSI Color
N	-230.0 to 0.0	$\pm 4.2^\circ$	-382.0 to 32.0	$\pm 7.5^\circ$	+Nicrosil -Nisil Jacket	Orange Red Orange
	0.0 to 450.0	$\pm 0.9^\circ$	32.0 to 842.0	$\pm 1.7^\circ$		
	450.0 to 1150.0	$\pm 0.6^\circ$	842.0 to 2102.0	$\pm 1.1^\circ$		
	1150.0 to 1300.0	$\pm 0.7^\circ$	2102.0 to 2372.0	$\pm 1.2^\circ$		
G (W)	100.0 to 300.0	$\pm 4.5^\circ$	212.0 to 572.0	$\pm 8.2^\circ$	+Tungsten -W26/Re Jacket	White Red White/Blue
	300.0 to 650.0	$\pm 2.1^\circ$	572.0 to 1202.0	$\pm 3.7^\circ$		
	650.0 to 1800.0	$\pm 1.3^\circ$	1202.0 to 3272.0	$\pm 2.4^\circ$		
	1800.0 to 2320.0	$\pm 1.9^\circ$	3272.0 to 4208.0	$\pm 3.5^\circ$		
C (W5)	-1.1 to 200.0	$\pm 1.8^\circ$	30.0 to 392.0	$\pm 3.2^\circ$	+W5/Re -W26/Re Jacket	White Red White/Red
	200.0 to 1350.0	$\pm 1.4^\circ$	392.0 to 2462.0	$\pm 2.6^\circ$		
	1350.0 to 2000.0	$\pm 1.9^\circ$	1742.0 to 3632.0	$\pm 3.4^\circ$		
	2000.0 to 2320.0	$\pm 2.6^\circ$	3632.0 to 4208.0	$\pm 4.7^\circ$		
D (W3)	-1.1 to 400.0	$\pm 2.5^\circ$	30.0 to 752.0	$\pm 4.5^\circ$	+W3/Re -W25/Re Jacket	White Red White/Yellow
	400.0 to 1500.0	$\pm 1.3^\circ$	752.0 to 2732.0	$\pm 2.4^\circ$		
	1500.0 to 2000.0	$\pm 2.3^\circ$	2732.0 to 3632.0	$\pm 3.0^\circ$		
	2000.0 to 2320.0	$\pm 2.6^\circ$	3632.0 to 4208.0	$\pm 4.6^\circ$		
P Platinel®	0.0 to 150.0	$\pm 0.8^\circ$	32.0 to 302.0	$\pm 1.5^\circ$	+Pd55/Pt31/Au14 -Au65/Pd35 Jacket	Yellow Red Black
	150.0 to 1100.0	$\pm 0.6^\circ$	302.0 to 2012.0	$\pm 1.1^\circ$		
	1100.0 to 1395.0	$\pm 0.8^\circ$	2012.0 to 2543.0	$\pm 1.5^\circ$		
<b>DIN Colors</b>						
L J-DIN	-200.0 to 0.0	$\pm 0.7^\circ$	-328.0 to 32.0	$\pm 1.3^\circ$	+Iron -Constantan Jacket	Red Blue Blue
	0.0 to 550.0	$\pm 0.5^\circ$	32.0 to 1022.0	$\pm 0.8^\circ$		
	550.0 to 900.0	$\pm 0.4^\circ$	1022.0 to 1652.0	$\pm 0.7^\circ$		
U T-DIN	-200.0 to -75.0	$\pm 0.3^\circ$	-328.0 to -103.0	$\pm 0.5^\circ$	+Copper -Constantan Jacket	Red Brown Brown
	-75.0 to 100.0	$\pm 0.2^\circ$	-103.0 to 212.0	$\pm 0.4^\circ$		
	100.0 to 600.0	$\pm 0.1^\circ$	212.0 to 1112.0	$\pm 0.2^\circ$		

## RTD Ranges & Accuracies

Based on  $\pm(0.03\%$  of  $400\Omega$ ) / Pt  $1000\Omega$  Based on  $\pm(0.03\%$  of  $4000\Omega$ )

RTD Type	Degrees C Range	°C	Degrees F Range	°F
Pt 100 Ohm DIN/IEC/JIS 1989 1.3850 (ITS-90)	-200.0 to 120.0	$\pm 0.5^\circ$	-328.0 to 248.0	$\pm 0.9^\circ$
	120.0 to 430.0	$\pm 0.6^\circ$	248.0 to 806.0	$\pm 1.0^\circ$
	430.0 to 850.0	$\pm 0.7^\circ$	806.0 to 1562.0	$\pm 1.2^\circ$
Pt 100 Ohm (Burns) 1.3902	-195.6 to 160.0	$\pm 0.5^\circ$	-320.0 to 320.0	$\pm 0.9^\circ$
	160.0 to 460.0	$\pm 0.6^\circ$	320.0 to 860.0	$\pm 1.0^\circ$
	460.0 to 648.9	$\pm 0.7^\circ$	860.0 to 1200.0	$\pm 1.2^\circ$
Pt 100 Ohm (Old JIS 1981) 1.3916	-200.0 to 170.0	$\pm 0.5^\circ$	-328.0 to 338.0	$\pm 0.9^\circ$
	170.0 to 480.0	$\pm 0.6^\circ$	338.0 to 896.0	$\pm 1.0^\circ$
	480.0 to 648.9	$\pm 0.7^\circ$	896.0 to 1200.0	$\pm 1.2^\circ$
Pt 100 Ohm (US Lab) 1.3926	-200.0 to 180.0	$\pm 0.5^\circ$	-328.0 to 356.0	$\pm 0.9^\circ$
	180.0 to 490.0	$\pm 0.6^\circ$	356.0 to 914.0	$\pm 1.0^\circ$
	490.0 to 850.0	$\pm 0.7^\circ$	914.0 to 1562.0	$\pm 1.2^\circ$
Pt 1000 Ohm DIN/IEC/JIS 1989 1.3850	-200.0 to 120.0	$\pm 0.5^\circ$	-328.0 to 248.0	$\pm 0.9^\circ$
	120.0 to 430.0	$\pm 0.6^\circ$	248.0 to 806.0	$\pm 1.0^\circ$
	430.0 to 850.0	$\pm 0.7^\circ$	806.0 to 1562.0	$\pm 1.2^\circ$
Copper 10 Ohm 1.4274 (Minco)	-200.0 to 260.0	$\pm 5.1^\circ$	-328.0 to 500.0	$\pm 9.2^\circ$
Copper 50 Ohm 1.4280	-50.0 to 150.0	$\pm 0.9^\circ$	-58.0 to 302.0	$\pm 1.7^\circ$
Ni 120 Ohm 1.6720 (Pure)	-80.0 to 260.0	$\pm 0.3^\circ$	-112.0 to 500.0	$\pm 0.5^\circ$
Ni 110 Ohm (Bristol 7 NA) 1.5801	-100.0 to 260.0	$\pm 0.3^\circ$	-148.0 to 500.0	$\pm 0.5^\circ$

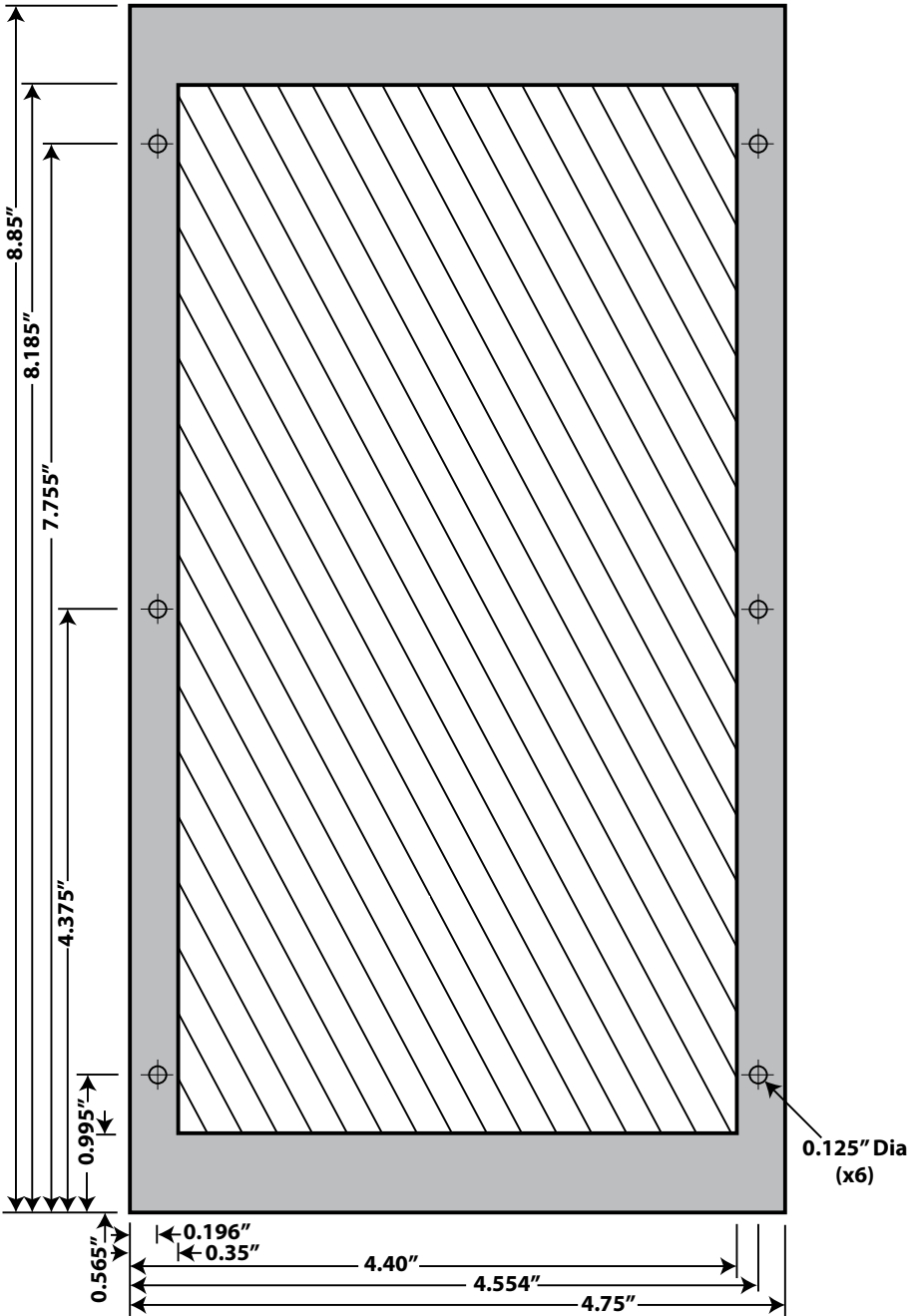
# Panel Cutout Dimensions

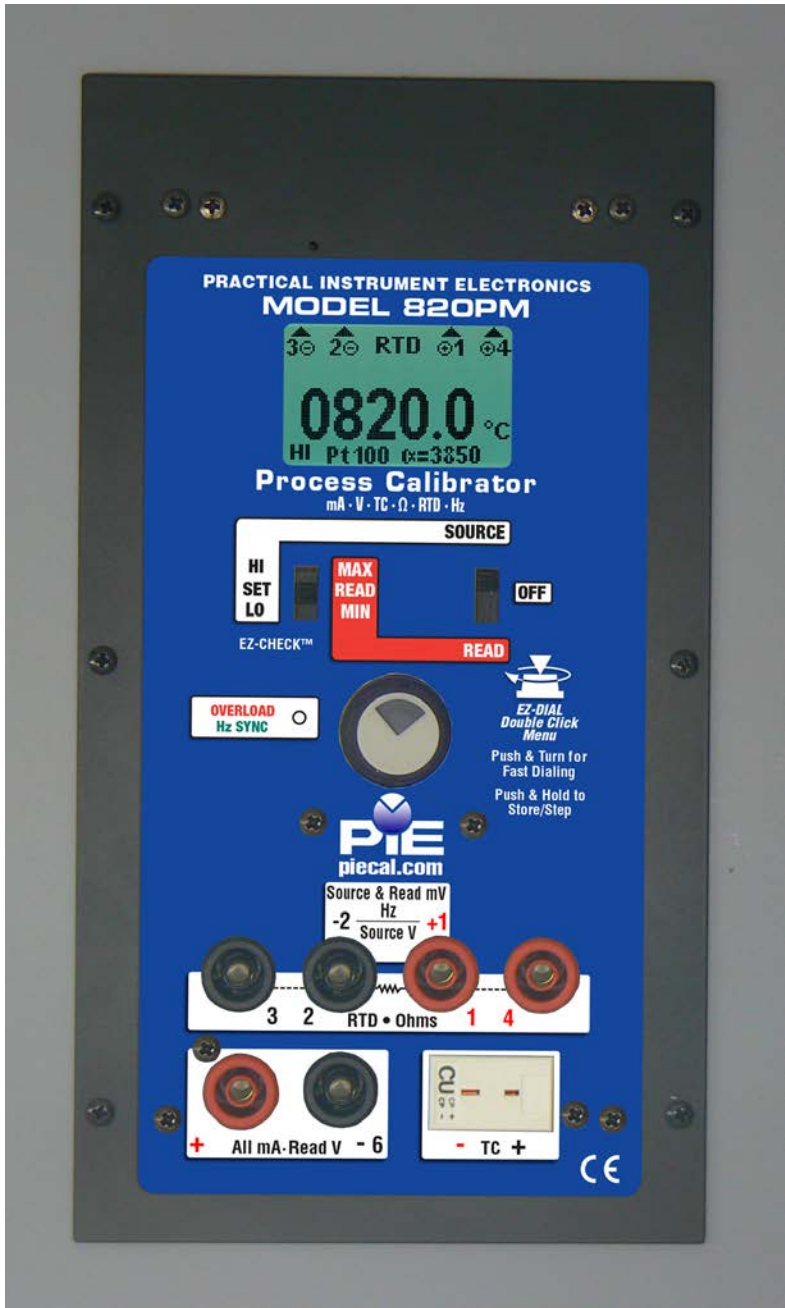


Bezel



Cutout





820PM mounted in a panel

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## Mounted in Panel



Rear view of 820PM mounted in a panel with AC Adapter

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