

**NEW**  
**Patented**

The newest and most advanced addition to the IET Labs Programmable Resistance Substituter (PRS) family that can replace both manual decade resistors and individual resistance standards.



PRS-370 brings performance and features not previously available in any programmable remote controlled or manual resistance box.

## NEW & ADVANCED FEATURES

- Better than 10 ppm accuracy; the PRS-300M can automatically control the Keysight 3458A or Fluke 8508A and 8588A DMMs and automatically fine adjust the resistance output
- Basic accuracy of 70 ppm in source resistance mode
- Resistance range from 0.1  $\Omega$  to 20 M $\Omega$
- Built-in routine to automatically calibrate the internal resistors when used with the Keysight 3458A or Fluke 8508A and 8588A DMMs
- Use for RTD applications is straightforward without additional "subtractions"
- Built-in RTD tables for PT100 and PT1000  
May be used with 2 or 4 terminals connections
- Large color touch screen and softkeys
- Reduced number of components and resistors for longer term reliability
- Standard GPIB interface for computer control
- Front and rear binding posts for connection to the DMM and DUT simultaneously
- For other interfaces such as Ethernet and USB see PRS-330

## PRS-DMM RESISTANCE AND SOURCE RESISTANCE MODES

### Source Resistance Mode

In Source Resistance mode the PRS-370 operates as a conventional programmable decade resistor or RTD simulator.

The resistance value can be entered via the keypad or remotely programmed via the GPIB interface.

The accuracy in this mode is 70 ppm with 1  $\mu\Omega$  resolution.

Tables are also available to enter a temperature in Fahrenheit or Celsius and the PRS-370 will automatically select the correct resistance, tables for PT-100 and PT-1000 come programmed as standard.

### PRS-DMM Resistance Mode

In PRS-DMM resistance mode the PRS-370 can control either the Fluke 8508A, 8588A or Keysight 3458A DMM via the GPIB interface.

The PRS-370 instructs the DMM to make a measurement of the source resistance and then automatically fine adjusts the output resistance to achieve the "best" accuracy to the nominal resistance value, typically better than 10 ppm.

The nominal value, measured resistance from DMM, delta from nominal and basic uncertainty of the DMM are all reported on the color display of the PRS-370.

PRS-DMM mode makes the PRS-370 a true 4 terminal resistance standard, capable of replacing traditional working resistance standards.

Front and rear connections allow connection of both the DMM and DUT simultaneously.



### PRS-DMM RESISTANCE

#### No PC or software required

The PRS-370 is fine "Adjusting" its output resistance by configuring the Fluke 8508A for Tru $\Omega$ , or  $\Omega$  mode and then reading the resistance back from the DMM and readjusting its output resistance.



#### Display all relevant data

Once the fine "Adjusting" has completed;

- Deviation from nominal
- Measured value from the DMM
- Uncertainty of the DMM is shown on the color display of the PRS-370.

#### Stable over time

Once fine "Adjusting" is complete the front connections are switched in on the PRS-370 so both the DMM and DUT can be simultaneously connected to the PRS-370.

#### Need a 199 $\Omega$ resistance standard?

It is just a touch away....with the PRS-370

When the source resistance is measured with a DMM 15 minutes later the source resistance shows no significant change.

This allows the PRS-370 to become a 4 terminal, short-term stable variable laboratory resistance standard with an uncertainty close to the uncertainty of the DMM used.



After adjustment, there is less than 5 ppm difference when the source resistance is measured at the front terminals



### SOURCE RESISTANCE MODE

For applications not requiring connection to a DMM, the GPIB interface can be used in listener mode and controlled via a PC like any standard instrument. This allows the user to automate resistance testing.

The PRS-370 features an advanced algorithm to create a easy to use programmable decade resistor with 30% improved accuracy and 1000 times better resolution than traditional laboratory decade boxes and RTD Simulators.

The PRS-370 was designed with the right mix of features for it to be efficient for both manual and automated application in both laboratory and production environments.

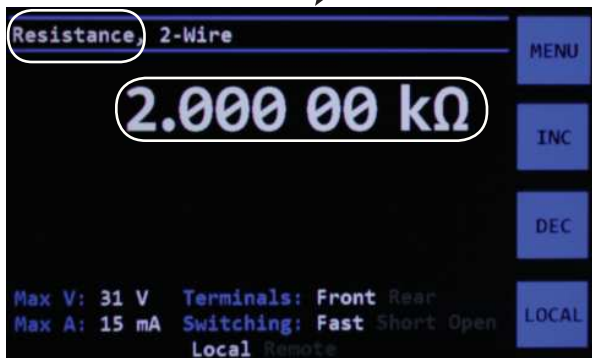
At the touch of a button the built-in firmware routine allows for automatic calibration of the internal resistors by just connecting a DMM to the PRS-370 . No entering values or manual trimming saves significant time.

A table can be viewed to see the history of each internal resistor to review drift and performance. The calibration table data can be retrieved via the GPIB interfaces as well for further analysis.

The source resistance can either be connected to the front or rear binding posts.

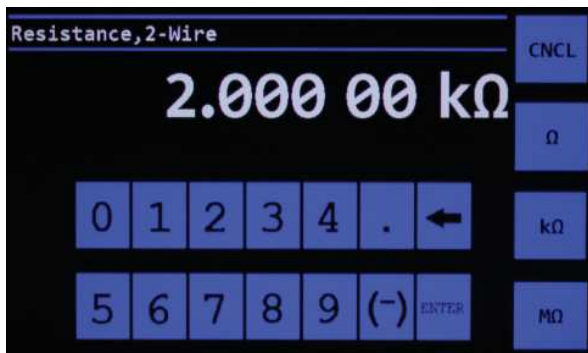
Touch the word resistance to change from Source Resistance to PRS-DMM mode

Touch resistance value to bring up entry screen or just enter resistance using keypad



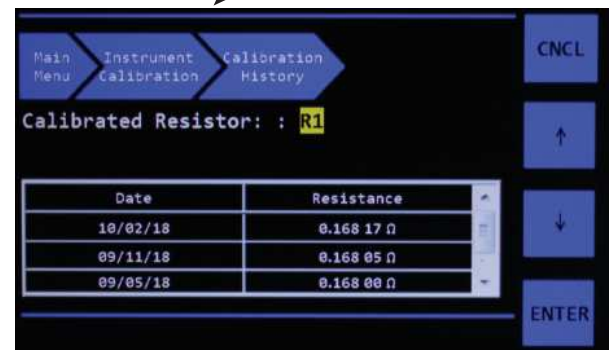
Source Resistance Screen

See relevant setup parameters on the main screen



Resistance Entry Screen  
Keypad or touch screen can be used to enter resistance value

Bread crumbs allow easy navigation in menus



Calibration History Screen shows each calibrated resistor value and calibration date, and can be exported



### SPECIFICATIONS

**User interface:**

Numeric keypad, softkeys and color capacitive touch screen

**Accuracy:**

$\pm(70 \mu\Omega/\Omega + 1 \text{ m}\Omega)$  2 and 4 Terminal at 23°C  $\pm 5^\circ\text{C}$

**Minimum setting:** 0.100 000  $\Omega$

**Resolution:** 1  $\mu\Omega$  or 6 digits

**Range:** 0.1  $\Omega$  - 20 M $\Omega$

**Stability:**  $\pm 50$  ppm/year ;  $< \pm 5$  ppm/30 minutes

**Thermal emf:**  $< 15 \mu\text{V}$

**Resistance error front to rear binding posts:**

$< \pm(2 \text{ ppm} + 20 \mu\Omega)$

**Maximum load:** 2 A, 200 V (peak), 0.5 W whichever applies first

**Resistors:** Precision wire-wound and metal foil

**Relays<sup>1</sup>:** Silver Alloy contacts, expected life of  $10^8$  cycles

**RTD tables:**

4 RTD tables can be entered into memory to allow user selection of temperature and the correct value of resistance will automatically be programmed.

PT-100 and PT-1000 tables for both Fahrenheit and Celsius are pre-programmed into memory locations 1 to 4.

**Terminals:**

Front and rear connections each consisting of 4 low-emf, gold-plated, tellurium-copper 5-way binding posts are used for **HI** and **LO** terminal pairs for **CURRENT** and **SENSE**. **GND** binding post is connected to the case, to chassis ground.

**Adjustment:**

Automatic adjustment procedure utilizing a high precision DMM eliminates the requirement for manual trimming of resistors.

**ac frequency response:**

Residual Capacitance Terminals to GND:  $< 850 \text{ pF}$

Resistance	Typical ac/dc difference @ 1 kHz
0.1 $\Omega$ - 10 k $\Omega$	$< 100$ ppm
10 - 100 k $\Omega$	$< 200$ ppm
100 k $\Omega$ - 1 M $\Omega$	$< 1\%$
1 - 20 M $\Omega$	$< 20\%$

**Switching time:**  $< 10$  ms second per change

**Switching:** Default, Open and Short

 **GPIB:**

GPIB standard 24 pin connector, conforms to IEEE-488.2

SCPI 1994.0 command set;

Address range of 1 to 30

Listener and controller modes

**Power requirements:**

90 - 264 Vac , 47 - 63 Hz., 30 Watts Max.

**Fuse:** T 0.8 A, 250 V, 5 x 20 mm

**Environmental conditions:**

**Operating:** 10°C to 40°C;  $< 80\%$  RH

**Storage:** -40°C to 70°C

**Dimensions:**

Bench model: 43 cm W x 8.9 cm H x 33 cm D (17" x 3.5" x 13") in front of panel: 3.8 cm (1.5").

**Weight:**

Bench model: 5.5 kg (12 lb) weight specifications are nominal.

<sup>1</sup> Note: Warranty does not cover relays beyond expected life

### ORDERING INFORMATION

**STANDARD MODELS**

**PRS-370** Programmable Resistance Substituter  
Includes: Instruction Manual  
Calibration Certificate Traceable to SI

**OTHER OPTIONS**

**PRS-300-RM** Rack mount ears

