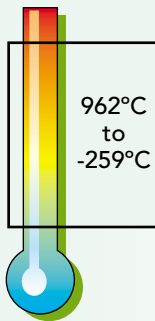


True Temperature

Indicator 3 (T.T.I. 3)



This is our most sophisticated instrument.

This automated bridge is made for us by Measurements International of Canada. Isotech call it the T.T.I. 3. It is the solution to sub-millikelvin measurement problems. In co-operation with the National Research Council in Ottawa, this design has been tested and approved to the highest standards. Used in conjunction with two or more of our standard PRT's this bridge is capable of the most demanding measurements.

Thermometers are described on pages 29 to 33.

A 20-way Matrix Scanner and full software control is available with this indicator.

The only changes made for us by this supplier is the repositioning of the terminals to the front panel for ease of use.

Stand alone operation or IEEE-488 bus controllable
Auto balancing measurements to nine significant digits

Microprocessor controlled self calibration

Accuracy	<0.05 PPM
Linearity	<0.01 PPM
Resolution	0.001 PPM of Full Scale
Stability	<0.02 PPM/Year
Measurement Range	1.5 to 1 Ratio
Lead Connections	True Four Terminal
Measurement Time	<20 Seconds to Full Balance
Filter Selection	0.5s, 1.0s, 3s, None
Thermometers	0.25, 2.5, 25.5, 100 Ohms
Standard Resistor Range	0.1 to 1000 Ohms
Sensor Current	Reversed DC (Frequency: 2 to 1000 seconds), Resolution 16 bits, Ranges 2 μ A, 20 μ A, 200 μ A, 2mA, 20mA, 200mA FS $\sqrt{2}$ & $1/\sqrt{2}$ of any value, Accuracy 100 PPM, Temperature Coefficient 5 PPM/ $^{\circ}$ C, Output Impedance: Infinite
Noise	<2nV
Insulation resistance	>10 ¹¹ (typically 10 ¹²)
Temperature Coefficient	0
IEEE488 Interface	Yes

General

Thermometer Connections:	Four Terminal Front or Rear Panel Connections for external standard resistor and sensor connections.
Balancing Modes:	Automatic via Front Panel Push Buttons & IEEE488
Power	110/120/220/240 Vac 50/60 Hz 40 VA
Warm-up-time	No Warm Up
Ambient Temperature	10 $^{\circ}$ C to 35 $^{\circ}$ C
Size	266mm x 451mm x 306mm
Weight	22.7 Kg

An Enhanced accuracy TT13H.A. is available with accuracy <0.02ppm. Please contact Isotech for details

Stand alone operation or IEEE-488 bus controllable
Auto balancing measurements to nine significant digits
Linearity of 0.02ppm or better
Measurement range from 0.001 ohms to 10 kilohms



True Temperature

Indicator 3 (T.T.I. 3)

AUTOMATED RESISTANCE THERMOMETER BRIDGE SYSTEM:

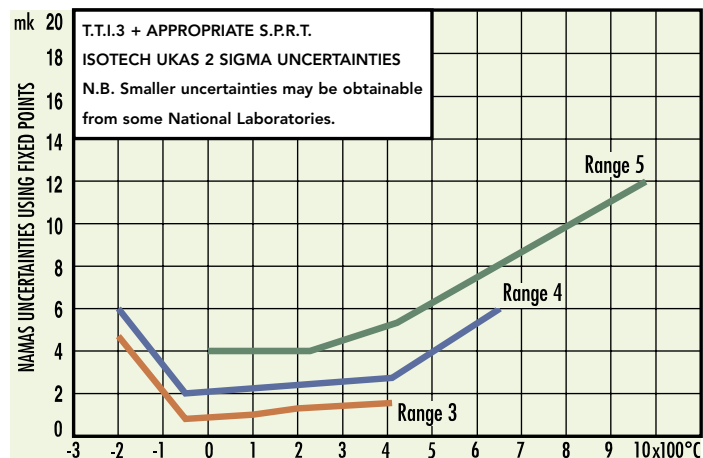
APPLICATIONS

- Calibration of resistance standards
- Calibration of resistance boxes
- Calibration of platinum resistance thermometers (PRTs)

THE T.T.I 3 RESISTANCE BRIDGE

Improvements on the basic principle of the Direct Current Comparator are the basis for Measurements International's Model T.T.I.3 self-balancing resistance/thermometer bridge. Used as a stand alone bridge for ratio measurements or controlled over the IEEE-488 interface bus for measuring resistance and temperature, the Model T.T.I 3 was designed to decrease the workload of calibration personnel while increasing throughput with better uncertainties.

The Model T.T.I 3 meets the laboratory requirements of scaling between the certified 1 ohm standard resistor and 10 kilohm standard resistors. With a measurement range of 0.001 ohm to 10 kilohms and a resolution of ± 0.01 ppm of full scale, it covers the entire range of Platinum Resistance Thermometers (PRT). Temperature measurements are further enhanced by the $\sqrt{2}$ and $1/\sqrt{2}$ times the test currents. Test currents are selectable from 0.1mA to 100 mA in 0.001mA steps. Through automatic self-calibration, ratios to nine significant digits with linearity deviations of less than 0.01ppm can be achieved.



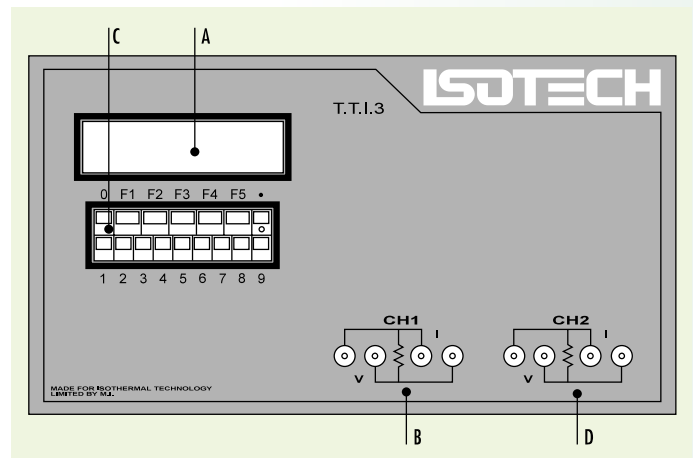
Microprocessor controlled self calibration
 Measurement uncertainty < 0.2 ppm of full scale
 < 0.05 mK for a 25.5ohm thermometer

ELIMINATES THERMOCOUPLE EFFECTS

Model T.T.I 3 eliminates thermocouple effects sometimes generated during DC measurements. A generator reversal technique is used to effectively cancel out any errors created by thermal voltages that may appear during measurements. Generator reversal rates from 4 to 1000 seconds can be selected in 1 second intervals. The DC generator reversal rate also eliminates the quadrature component normally associated with AC resistance bridges.

OPERATION

Menu driven firmware for the T.T.I 3 bridge is displayed on the front panel LCD display. Menus control all of the measurement parameters using the function and numerical buttons located directly below the display. Setup parameters include selecting: generator current (Ix) through the PRT or standard resistor, generator reversal rate (settling time). A measurement sequence is then initiated by selecting the measurement function, either continuous or a set number of measurements. There are no other adjustments required. The Model T.T.I 3 will measure the ratio of two resistors, or with the addition of a Model 4220A Matrix Scanner up to 20 resistors can be measured in a single run.



- A. L.C.D. display
- B. Channel 1
- C. Keypad for local operation
- D. Channel 2