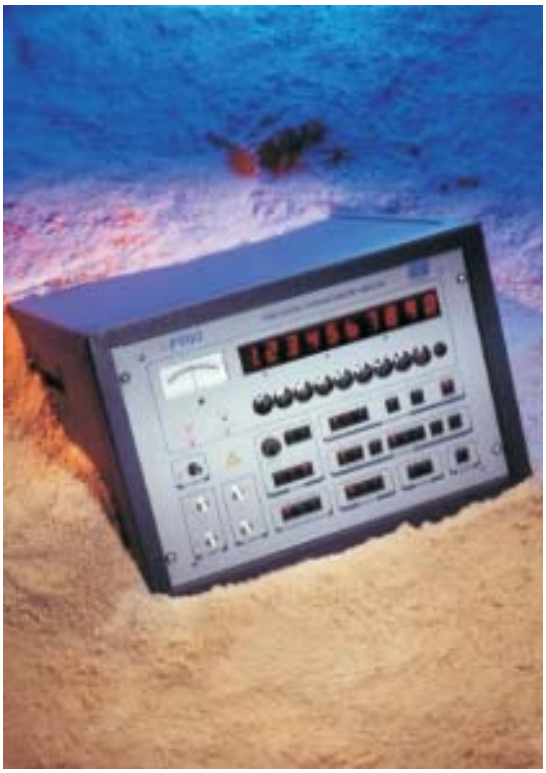
F900

AUTOMATIC SYSTEMS LABORATORIES

Precision Thermometry

- F900 Performance Validation Report
- F900 Noise model



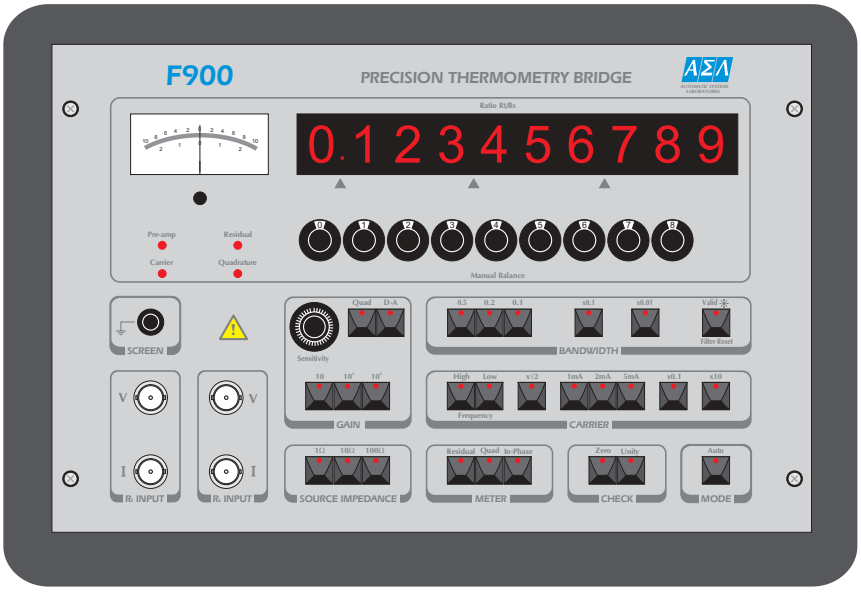
TYPICAL APPLICATIONS

- Primary Thermometer Calibration
- Research
- Oceanography

www.isotechna.com

F900 PRECISION THERMOMETRY BRIDGE

In world class metrology, the most important consideration is the quality of the fundamental measurement. ASL's F900 AC bridge technology represents a new peak of performance in resistance thermometer measurement and exploits the inherent advantages of AC bridge technology to maintain repeatable measurements of the highest precision under practical operating conditions.



Like to know more about AC and why AC measurement techniques are better than DC ?

See our web page listed below, or call our application engineers and ask for the leaflet "Why is AC better than DC ?"

http://www.aslltd.co.uk/acvdc.htm

MAIN FEATURES

- Accuracy <±20ppb (±5μK) ♦
- Resolution 0.5ppb (0.125μK) ♦
- Fast measurement time (2 seconds balance)
- Differential and absolute measurement
- No warm up time
- Traceable to International Standards

♦ e.g. 25.5Ω SPRT referenced to a 25Ω reference resistor

A FEW FACTS

The Model F900 is designed specifically for resistance thermometry to provide you with the best possible accuracy. The 25 Hz or 75 Hz operating frequency provides fast, continuous measurement with high immunity to thermal emfs and supply frequency noise sources. Practical measurements involve cables, connectors and imperfect operating environments, the F900 achieves its full specification under a wide range of real operating conditions. For example, you can add cable probe extensions and extra terminal junctions without concern for thermal emfs generated by the temperature gradients in your laboratory. Design features such as the unique input guard ensure that you really can obtain the specified accuracy of 20 ppb over the range of 0.2Ω to 390Ω. This equates to a temperature measurement accuracy of 5μK for a 25.5Ω SPRT referenced to a 25Ω reference resistor. AC bridge technology will always out-perform measurements made using DC technology with slow current reversal. These benefits are inherent to the fundamentals of electrical measurement and not just the implementation.

The F900 includes a wide range of features specifically tailored for temperature metrology. These include accurate programmable excitation current, √2 current, analogue outputs, selectable source impedance matching, gain and filter bandwidth. Manual or automatic bridge balancing together with manual or automatic control (IEEE interface) of the instrument ensure that the F900 can provide solutions in a wide range of measurement applications.

A TRUE PEDIGREE

National standards laboratories around the world require the best instrumentation for their work. The majority of these organisations use ASL AC bridges to set the temperature standard in their country. These include 20 out of the 22 members of the international C.C.T. (Consultative Committee of Thermometry).

FEATURES

Digital display

R_t/R_s digital display 0.000 000 000 to 1.299 999 999

Bandwidth

Selectable: 0.5, 0.2, 0.1, 0.05, 0.02, 0.01, 0.005, 0.002, 0.001 Hz.

External Standard

AC/DC standard resistor or resistance thermometer.

Sensor current

0.1, 0.2, 0.5, 1, 2, 5, 10, 20, 50mA or x √2 any value.

Sensor current frequency

User selectable frequencies: 25 or 75 Hz with 50 Hz supply
30 or 90 Hz with 60 Hz supply
Phase locked to supply frequency.

Bridge balancing modes

Automatic: via full self balance algorithm.
Manual: via front panel switches (to 0.01ppm) and analogue meter

Self check modes

Zero: verifies bridge zero accuracy.
Unity: verifies bridge slope accuracy.

Lead connections

True four wire connections for resistance thermometer (R_t) and standard resistor (R_s). Accuracy is unaffected by series lead resistance, permitting measurements with long cables (100 metres for 25.5Ω SPRT referenced to a 25Ω reference resistor).

Quadrature balance

Eliminates effects of thermometer, resistor and cable reactance.

Active input guard

Eliminates effects of leakage from any terminal to ground.

Analogue output

Null balance: ±10V (unfiltered).
Programmable: 0 - 10V (3 scale ranges).

Call the Sales Office for further information

ACCESSORIES

SB148

10 channel auto/manual multiplexer, with individual preset "keep warm" current.

SB148.01

As SB148, with 4 individual "keep warm" currents per channel.

SB158

Driver/interface for up to 2 x SB148 or SB148.01 multiplexers (Specify RS232 or IEEE).

SB158.01

Driver/interface for up to 6 x SB148 or SB148.01 multiplexers (Specify RS232 or IEEE).

F900/AS1 System

F900 complete with SB148 and SB158 multiplexer in 19"/16U cabinet complete with power distribution and cutout.

F900/AS2 System

As AS1 system, but with SB148.01 multiplexer.

RW1, 10, 25, 100, 300

"Wilkins" AC/DC standard resistor. Values: 1, 10, 25, 100 and 300Ω.

RWTE

Thermal enclosure for RW resistors.

FA-1

Co-axial cable set converting from BNC to spade terminals.

FA-2

Co-axial cable set with BNC connectors at one end.

FA-3

4 terminal to 2 x BNC connector, adaptor box.

F/ACC

FA-1, FA-2 and FA-3 cable set.

F900 °C °F Ω K mV 0.01 °C

SPECIFICATION

Accuracy

<±20ppb This is equivalent to a temperature of ±5μK for a 25.5Ω SPRT at 0°C referenced to a 25Ω standard resistor, or ±20mK for a 25.5Ω SPRT using a 100Ω standard resistor (κ = 2).

Resolution

	Ratio Resolution	Standard Resistor	SPRT	Temperature Resolution
IEEE	0.5ppb	100Ω 25Ω	25.5Ω 25.5Ω	0.5μK 0.125μK
Front Panel	10ppb	100Ω 25Ω	25.5Ω 25.5Ω	10μK 2.5μK

Measurement time

20 seconds for full balance.
2 seconds for incremental balance.

Warm up time

None -first reading meets specification.

Thermometers

$R_{0.01}$ of 100Ω, 25.5Ω, 2.5Ω, 0.25Ω and any intermediate value.

Standard resistor range

1Ω to 300Ω AC/DC resistance.

Measurement range

0 to 1.299 999 999 ratio of two resistors, R_t to R_s, via IEEE-488 interface and 1.299 999 99 via front panel LED display using any value of R_s between 1Ω and 300Ω. e.g. 0 to 129.999 999 9Ω in 0.1μΩ steps (R_s = 100Ω).

Differential measurements between two external resistors or SPRTs can be made. e.g. an SPRT on each R_t and R_s input.

Operating conditions

10°C to 29°C (50°F to 85°F), 10 to 90% RH.

Power requirements

240, 220, 120, 100 VAC (±10%) selectable on rear panel, 50 or 60 Hz, 250VA max

Specifications are subject to change without prior notice.

CE

Isotech North America
158 Brentwood Drive, Unit #4
Colchester, VT 05446

Phone: (802) 863-8050
Fax: (802) 863-8125

sales@isotechna.com
www.isotechna.com

QUALITY ASSURANCE FIRM ISO 9001 SGS
UKAS QUALITY MANAGEMENT 005