AIM & THURLBY THANDAR INSTRUMENTS

1908 | 1908P



5½ digit high performance bench/portable multimeter

High accuracy and resolution: 0.02%, 1µV, 1mΩ, 100nA, 0.01Hz, 10pF

Internal rechargeable batteries for true portability

Dual display and dual measurement capability

Frequency, capacitance and temperature measurements

Wide range of maths and data logging functions

USB, RS232, GPIB and LAN (LXI) interfaces

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Aim-TTi

1908 and 1908P 5½ digit bench/portable multimeters

affordable, portable precision



Key Features

- Dual display and dual measurement capability
- Internal rechargeable batteries for true portability
- High accuracy and resolution: 0.02%, 1nA, 1mΩ, 100nA
- Frequency, capacitance and temperature measurements
- Wide range of maths and data logging functions
- 2 or 4 terminal ohms measurement
- Wide true RMS AC; AC + DC measurements
- Software for remote control and logging included
- USB, RS232, GPIB and LAN (LXI) interfaces*

* RS232, GPIB and LAN interfaces on 1908P only.

Internal rechargeable batteries for 'use anywhere' versatility

Unlike most high performance bench multimeters, the 1908 and 1908P can operate without AC power whenever required.

The batteries are charged from the internal power supply and can give up to 35 hours of operation.

This enables the meter to be used in locations where no AC line power is available, or moved around multiple room locations without the nuisance of having to find a power socket.

When precision measurements are needed, handheld portable multimeters may not be up to the task. The 1908/1908P not only offers fully portable precision, but also built-in data logging for remote locations.

Two models - 1908 and 1908P

The 1908 multimeter incorporates a USB interface for remote control and readback.

The 1908P incorporates USB, RS232, GPIB and LXI compliant LAN interfaces making it suitable for a wider range of system applications.

Both models can operate from either AC-line power or internal batteries, but the 1908P requires AC-line power when using the remote interfaces.*

*USB does not require AC line power on either model

Dual display and dual measurement system

The 1908 has both a main display and a secondary display. The two displays can be used for a variety of purposes:

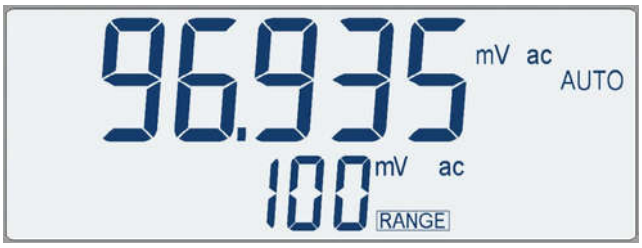
- To display a measurement together with the selected range (e.g. 100 Vdc).
- To display a measurement in two different units (e.g. ac volts and dBm).
- To display the result of a calculated function (e.g. value and % deviation).
- To measure and display two parameters of one signal (e.g. ac and dc volts).
- To measure and display two different signals (e.g. ac volts and dc current).

Dual measurement/display combinations					
Primary Display	**Secondary Display Choices**				
DCV	ACV	DCI*	ACI*		
ACV	DCV	ACI*	DCI*	Hz	
ACV +DCV	ACV	DCV	Hz		
DCI	ACI	DCV*	ACV*		
ACI	DCI	ACV*	DCV*	Hz	
ACI + DCI	ACI	DCI	Hz		
dB	ACV	DCV	Hz	ACI*	DCI*
* requires multi-lead connection					

Automatic or Manual ranging

Quick response auto-ranging is provided for all measurement parameters ensuring the best possible resolution at all times.

Alternatively manual ranging can be selected. The secondary display can show the range value, giving greater clarity.



Wideband True RMS AC

True RMS AC gives accurate measurements regardless of the waveform shape.

The wide bandwidth attenuator provides high accuracy within the audio band and gives extended response to avoid errors when measuring switching waveforms.

Measurements are normally AC coupled but, when required, the true RMS value of the AC plus DC components can be shown.



Frequency & Capacitance

High accuracy frequency measurement (better than 0.01%) is available from 10Hz to 120kHz. A reciprocal counting technique is used to give up to 0.01Hz resolution and fast update.

Capacitance measurement is also built-in with five ranges up to 120µF.



NOTE: *the display illustrations on this page are actual size when printed at A4.*

Temperature Measurement

Linearised measurement is incorporated for PT100 and PT1000 platinum resistance temperature detectors (RTDs). It can use either a 2 wire or 4 wire connection and can be displayed in °C or °F.



Smart functions for added power

Linear scaling with offset

This function enables a reading to be multiplied by a scale factor (A) and for an offset (b) to be added or subtracted.

This means, for example, that the electrical output of a transducer can be scaled to give a direct readout of the physical parameter e.g. temperature or weight.

It is particularly useful with 4-20mA current loops.



dB measurements

AC voltages can be displayed in dB as well as voltage. Built-in zero reference scaling enables voltages to be displayed in dBm relative to a choice of impedance from 50Ω up to 8kΩ.

The voltage can be displayed simultaneously in the secondary display.



Limits comparison

This function enables the reading to be tested against high and low limits set by the user. The display then shows HI, LO or PASS in addition to the measurement result.



Percentage deviation (%)

This function enables the meter to display the percentage amount by which the reading differs from a nominal value chosen by the user.

It is invaluable for measuring tolerance or stability.



Min-Max storage

The Min-Max function stores the highest and lowest values of a set of readings.

This facility has many uses such as checking for power supply glitches and recording peak temperature excursions.



Power measurement in Watts or VA

In addition to dBs, power can be measured in Watts or VA.

For resistive loads the Watts function calculates V^2/R for any load resistance between 1Ω and 10kΩ, a particularly useful function for audio measurements.



The VA function makes use of the dual measurement capability and displays the product of voltage and current.

Automatic data logging

The 1908 can store up to 500 readings at any required time interval from 1 reading per second up to 1 reading every 3 hours.

A simple recall sequence allows the readings to be scrolled onto the display whenever required. Alternatively results can be downloaded using the remote interfaces.

As a result, tedious time related measurement sequences can be handled automatically without disrupting your work.

Manual storage of readings is also available, eliminating the need for paper and pencil when making a series of measurements.

Storage can also be triggered from an opto-isolated external trigger input, or from the digital interfaces.



External Triggering

An external trigger connector is provided on the rear panel.

This provides for external triggering of measurement hold or measurement log.

An opto-isolated open collector output is available for synchronisation with the measurement update.

Safety | Calibration

Comprehensive safety protection

The meters incorporate extensive protection against damage from accidental overloads on all ranges including 10 Amps.

They also meet the stringent safety requirements of EN61010-1 2010 and EN61010-2-030 2010 for measurements up to 300v (Cat. III), 600V (Cat. II) or 100Vdc/750Vac (for circuits isolated from AC line)

Kensington Security Slot

A Kensington® security slot is incorporatedinto the rear panel.

This enables the instrument to be secured using the widely used Kensington cable system.

Closed case calibration

The meter stores its calibration constants in protected memory and can be recalibrated without ever opening the case.

Remote Interfaces

1908 - USB interface

The 1908 incorporates a USB interface for remote control and readback.

The interface is powered from the controlling device enabling the meter to operate from batteries without additional power drain.

1908P - comprehensive bus interfaces

To meet a wider variety of system needs, the 1908P adds a comprehensive array of digital bus interfaces. USB, RS-232, GPIB and LAN (Ethernet) with LXI support are all included.

(Note that operation of the GPIB, RS232 and LAN interfaces require the meter to be powered from an AC line.)

The GPIB interface is compliant with IEEE-488.1 and IEEE-488.2. GPIB remains a widely used interface for system applications.

An RS-232/RS-423 interface is provided for use with legacy systems. This type of serial interface remains in common useage and is perfectly satisfactory for lower speed applications.

USB provides a simple and convenient means of connection to a PC and is particularly appropriate for small system use. A USB driver is provided which supports Windows 2000 and above including Win 8 and 10.

The LAN interface uses a standard 10/100 base-T Ethernet hardware connection with ICMP and TCP/IP Protocol for connection to a Local Area Network or direct connection to a single PC. This interface supports LXI and is highly appropriate for system use because of its scalable nature and low cost interconnection.

The LAN interface is LXI compliant. LXI (LAN eXtensions for Instrumentation) is the next-generation, LAN-based modular architecture standard for automated test systems managed by the LXI Consortium, and is expected to become the successor to GPIB in many systems.

For more information on LXI and how it replaces GPIB, or operates along side it, go to: www.aimtti.com/go/lxi

IVI Driver

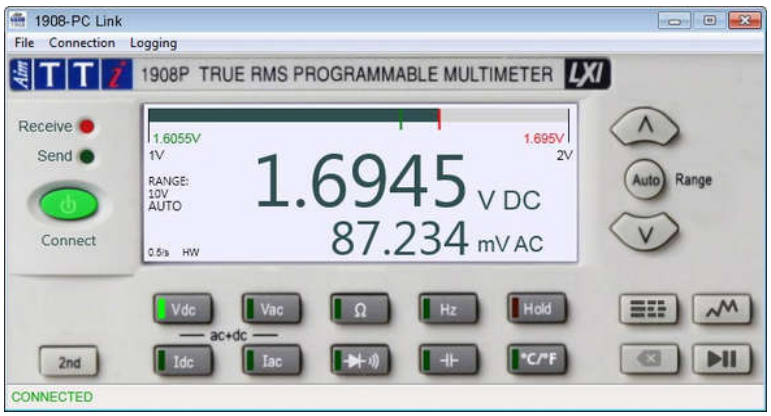
An IVI driver for Windows* is included. This provides support for common high-level applications such as LabView*, LabWindows*, and Keysight VEE*.

** LabView and LabWindows are trademarks of National Instruments. Keysight VEE is a trademark of Keysight Technologies. Windows is a trademark of Microsoft.*

Graphical Interface for PC

Both the 1908 and 1908P are supplied with a Windows* based application called "1908-PC Link" that provides a graphical user interface (GUI) for remote control of the meter from a PC.

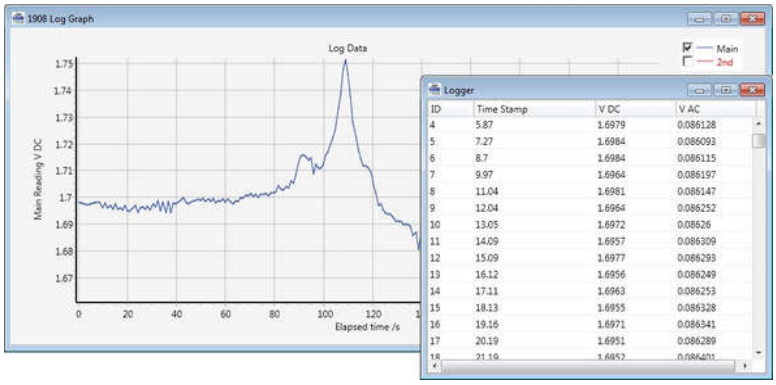
Connection can be via USB, RS-232, or LAN (Ethernet).



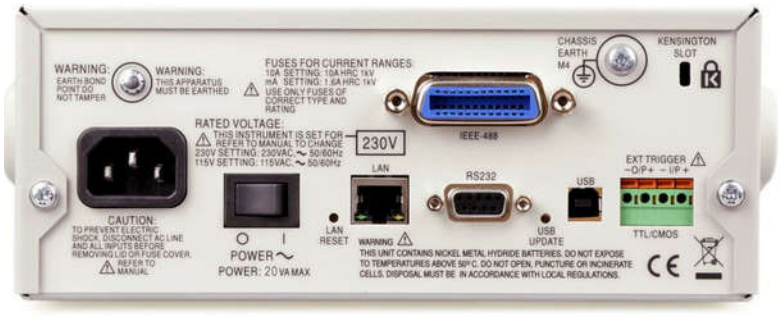
The application provides remote access to the instrument using a point-and-click interface arranged similarly to the actual instrument.

Measurement function can be selected for both the main and secondary displays, along with measurement range. The display includes an analog bar-graph with minimum and maximum reading markers.

A logger function enables both measurements to be recorded at set time intervals and displayed in both graphical and tabular views. The logged data can be exported to a CSV file.



The application also provides a means of downloading the contents of the internal logger of the meter itself, and exporting it to a CSV file.



1908 rear panel

(Protective buffer removed)

Technical Specifications - 1908 and 1908P

MEASUREMENT PARAMETERS & ACCURACY

Accuracies apply for 1 year 19°C to 25°C. Temperature coefficient outside these limits is <0.1 x quoted range accuracy per °C.

Scale Length

The scale length is 120,000 counts (unless otherwise stated) giving a maximum measured value for each range of 119999. Thus for the 100V range the maximum measured value is 119.999 volts
Accuracies are quoted in terms of a percentage of the measured value plus a number of least significant digits.

Reading Rate

Varies with measurement parameter. Selectable as 4 readings/second or 20 readings/second for most parameters.

DC Voltage

Range	Accuracy	Resolution	Input Impedance
100mV	0.02% ± 3 digits*	1µV	10.11MΩ
1000mV	0.02% ± 3 digits	10µV	10.11MΩ
10V	0.02% ± 3 digits	100µV	10.0MΩ
100V	0.02% ± 3 digits	1mV	10.1MΩ
1000V	0.02% ± 3 digits	10mV	10.11MΩ

* after null

Typical Input Impedance: 10MΩ//<1000pF, except for Vdc plus Vac measurement when the 1MΩ AC attenuator is in parallel with the 10MΩ DC attenuator.
Maximum Input: 1kV DC or AC peak, any range.
NMR: >60dB at 50/60Hz.
CMR: 1kΩ unbalanced CMR is >90dB at DC/50Hz/60Hz.

Recommended max.peak AC + DC voltage while measuring DC voltage

Range	100mV	1000mV	10V	100V	1000V
Max. AC	1.8V	1.8V	18V	180V	1000V

The table shows the maximum peak AC (45Hz-50Hz) plus DC voltage that can be applied without affecting the accuracy of the DC measurement due to overload clamping. These values only apply when the DC component does not exceed the range maximum and the analogue 50/60Hz rejection filter is enabled.

AC Voltage (True RMS)

Range	Accuracy			Resolution
	45Hz - 10kHz	10kHz - 30kHz	30kHz - 50kHz	
100mV	0.2% ± 150 dig.	1.5% ± 200 dig.	-	1µV
1000mV	0.2% ± 100 dig.	0.5% ± 100 dig.	2% ± 200 dig.	10µV
10V	0.2% ± 100 dig.	0.5% ± 100 dig.	2% ± 200 dig.	100µV
100V	0.2% ± 100 dig.	0.5% ± 100 dig.	2% ± 200 dig.	1mV
750V	0.2% ± 100 dig.	0.5% ± 100 dig.	2% ± 200 dig.	10mV

Accuracy specifications apply for readings between 10,000 and 120,000 counts.
Maximum crest factor = 3 at nominal range maximum.
Input Impedance: 1MΩ//<1000pF
Maximum Input: 750V rms, 1000V peak; any range.
CMR: 1kΩ Unbalanced CMR is >60dB at DC/50Hz/60Hz

AC + DC Voltage

Total measurement error will not exceed the sum of the separate AC and DC accuracy specifications plus 10 digits.

Resistance

2-wire or 4-wire measurement

Range	Accuracy	Resolution
100Ω	0.05% ± 8 digits	1mΩ
1000Ω	0.05% ± 5 digits	10mΩ
10kΩ	0.05% ± 5 digits	100mΩ
100kΩ	0.05% ± 5 digits	1Ω
1000kΩ	0.3% ± 2 digits	10Ω
10MΩ	0.3% ± 2 digits	100Ω

Maximum Input: 1000V DC or AC rms, any range.
Max. O/C Voltage: 3.5V

DC Current

Range	Accuracy	Resolution
10mA	0.05% ± 5 digits	100nA
100mA	0.05% ± 5 digits	1µA
1000mA	0.2% ± 5 digits	10µA
10A (<5A)	0.2% ± 5 digits	100µA
10A (>5A)	0.5% ± 10 digits	100µA

Maximum Input: mA ranges - 1.6A DC or AC rms, 1000V, fuse protected.
10A range - 10A DC or AC rms, 1000V, fuse protected.
Voltage Burden: 10mA range - <100mV; 100mA, 1A, 10A ranges - <600mV

AC Current (True RMS)

Range	Accuracy (45Hz to 10kHz)	Resolution
10mA	0.35% ± 20 digits	100nA
100mA	0.35% ± 20 digits	1µA
1000mA	0.5% ± 20 digits	10µA
10A (<5A)	0.5% ± 20 digits	100µA
10A (>5A)	1% ± 20 digits	100µA

Accuracy specifications apply for readings between 10,000 and 120,000 counts.
Maximum crest factor = 3 is typically 0.5%.
Maximum Input: mA ranges - 1.6A DC or AC rms, 1000V, fuse protected.
10A range - 10A DC or AC rms, 1000V, fuse protected.
Voltage Burden: 10mA range - <100mV; 100mA, 1A, 10A ranges - <600mV

AC + DC Current

Total measurement error will not exceed the sum of the separate AC and DC accuracy specifications plus 10 digits.

Frequency

Range	Accuracy	Resolution
100Hz	0.01% ± 1 digit	0.01Hz
1000Hz	0.01% ± 1 digit	0.1Hz
10kHz	0.01% ± 1 digit	1Hz
100kHz	0.01% ± 1 digit	10Hz

Scale Length: 12,000 counts
Frequency Range: 10Hz to >100kHz
Input sensitivity: Better than 30mVrms (100mV range);
better than 10% of range for all other Vac and Iac ranges.

Capacitance

Range	Accuracy	Resolution
10nF	2% ± 5 digits	10pF
100nF	2% ± 5 digits	100pF
1µF	2% ± 5 digits	1nF
10µF	2% ± 5 digits	10nF
100µF	5% ± 5 digits	100nF

Scale Length: 1200 counts

Temperature

Linearised measurement for PT100 or PT1000 RTD probes, 2-wire or 4-wire measurement, display in °C or °F.

RTD	Range	Accuracy	Resolution
PT100	-50 to 400°C	0.05% ± 0.5°C	0.1°C
PT1000	-50 to 400°C	0.05% ± 0.5°C	0.1°C

N. B. Accuracy specifications apply to multimeter only, they do not account for additional probe accuracy errors.

Continuity and Diode Test

Continuity: 100Ω range selected; audible tone sounds for impedance <10Ω.
Diode Test: Test current approximately 1mA; displays voltages up to 1.2V.
Max. O/C Voltage: 3.5V
Maximum Input: 1000V DC or AC rms, any range.

Technical Specifications - 1908 and 1908P (continued)

EXTERNAL REMOTE TRIGGER (TTL/CMOS)

Connection:	Terminal block on rear panel.
Input:	Input to the LED of an opto-isolator through 1kΩ resistor. Apply >+3V to trigger remote input. Max. Voltage 10V.
Output:	Opto-isolated open collector output, conducts for 250ms on completion of input trigger. Max. off-state Voltage: 10V. On state sink current 2mA (typical).

DISPLAY

Display Type:	High contrast backlit transflective LCD. Main display 5½ digits 17mm high, Secondary display 6 digits 10mm high.
Scale Length:	120,000 counts for most measurement parameters
Annunciators:	LCD annunciators for all ranges, functions and program modes.
Overrange:	Displays OFL if input too large for range.
Overflow:	Displays -Or- if calculated result overflows display.

COMPUTING FUNCTIONS

Null (Relative)	Stores current reading and subtracts it from future readings.
Ω Null:	Additional non-volatile function for nulling test lead resistance.
Hold:	Reading is frozen
T-Hold:	(Touch & Hold) Reading is frozen when stable.
dB:	Displays measurement in dBm relative to 600Ω or other user-entered impedance.
AC plus DC:	The RMS value of the AC plus DC parts of the signal is calculated and displayed.
% Deviation:	Displays % deviation from entered reference value.
Ax+b:	Linear scaling of results, with offset.
Limits:	Reading displayed with HI, LO, or PASS with respect to user-defined high and low limits.
Min/Max:	Minimum and maximum reading stored.
Power:	Calculates V^2/R and displays in Watts with respect to a user-defined impedance.
VA:	Calculates and displays Volts x Amps.
Data Logger:	Manual or automatic storage of 500 measurements. Storage interval 1s to 9999s or at the measurement sample rate, manually from keyboard, or by external triggering.

DIGITAL INTERFACES - 1908

Full digital remote control facilities are available through a USB connection.

USB:	Standard USB 2.0 hardware connection. Host Powered.

DIGITAL INTERFACES - 1908P

Full digital remote control facilities are available through the RS232, LAN, USB and GPIB interfaces.(AC line power is required for RS232, LAN and GPIB interfaces.)

RS232:	Standard 9-pin D-connector. Baud rate 9600.
USB:	Standard USB 2.0 hardware connection. Host powered.
LAN:	Ethernet 100/10base-T hardware connection.
LXI Conformance:	1.4 LXI Core 2011.
GPIB:	Conforms with IEEE488.1 and IEEE488.2.
Remote Command Processing Time:	Typically <100ms.

SOFTWARE SUPPLIED

IVI Driver:	An IVI driver for Windows is supplied.
LV/CVI Driver:	Full installation for CVI and LabVIEW instrument drivers.
USB Driver:	An installation file is supplied calling a standard Windows* USB driver.

POWER REQUIREMENTS

AC Input:	220V-240V or 110-120V AC ±10%, 50/60Hz, by internal adjustment; 20VA max. Installation Category II.
Batteries:	Internal rechargeable Nickel Metal Hydride
Battery Life:	> 20 hours with the backlight enabled. Battery life can be increased to > 35 hours with the backlight disabled.

GENERAL

Operating Range:	+5°C to + 40°C, 20% to 80% RH
Storage Range:	-20°C to + 60°C
Environmental:	Indoor use at altitudes up to 2000m, Pollution Degree 2.
Safety and EMC:	Complies with EN61010-1, EN61010-2-030, EN61010-2-033 & EN61326-1. For details, request the EU Declaration of Conformity for this instrument via http://www.aimtti.com/support (serial no. needed)
Security:	Kensington security slot incorporated.
Size:	250(W) x 97(H) x 295(D)mm in bench-top configuration 213.5(W) x 86.5(H) x 269(D)mm (2U/ ½ - rack) in rack mount format.
Weight:	3.2kg.

Thurlby Thandar Instruments Ltd. operates a policy of continuous development and reserves the right to alter specifications without prior notice.

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