

# 8100 SERIES

ADVANCED 8.5 / 7.5 DIGIT  
MULTIMETER



# 8100 SERIES ADVANCED PRECISION MULTIMETER



The 8100 Series is aimed at laboratories, manufacturers and design facilities requiring a wide range of measurement parameters with specifications as low as 4ppm.

The 8100 is designed with metrologists in mind, with great care taken in the design of sensitive input electronics. Ultra low input bias current on DC Voltage inputs minimise errors when utilised as a null meter with Resistive Dividers, and High Input Impedance on AC Voltage up to 10V reduces errors when measuring current through use of current shunts to enable the 8100 Series ensuring reliable measurements across multiple functions.

Dynamic display of accuracy, measurement uncertainty, standard deviation and more provide metrologists with immediate feedback of their measurement and enable users to maximise performance while improving confidence in measurements.

## KEY FEATURES

- Large full colour screen
- USB, GPIB (IEEE 488), RS232 and Ethernet Interfaces as standard
- 30A DC/AC Current Ranges without the need for external shunts
  - Enhanced Maths functionality
  - Dynamic display of Accuracy & Measurement Uncertainty
- Programmable Front / Rear Terminals with Ratio Functionality (8104 Only)
- Electrometer input for currents ranges down to 10nA (8104 Only)

# 8100 SERIES HIGHLIGHTS



## FULL COLOUR SCREEN

The 8100 has been designed around ease of use. Utilising a large full colour screen enables clear display of measurements, menus and more.

## LOW THERMAL BINDING POSTS

Fitted with low thermal beryllium copper terminals, the 8100 Series enables connection with 4mm banana jacks, spades and bare wire without the need for additional adapters.



```
*IDN?  
CONF:RES 100  
CALC:FUNC NULL  
READ?  
DCV 1,TWO_WR,RESL7  
NPLC 20
```

## SOFTWARE COMPATIBILITY

The 8100 Series features an advanced command set including emulation modes for popular remote languages. This enables the 8100 Series to be used with Legacy metrology software that does not yet support LabWave equipment.

As with all LabWave products, compatibility with ProCal calibration software is guaranteed.

## EXTENDED RANGES

The 8100 Series offers the widest range of inputs of any multimeter on the market, with current input of 30A without the need for external current shunts and dedicated low noise electrometer input



### ACTIVE TERMINAL INDICATORS

Clear confirmation of active terminals to simplify connections. A feature on all LabWave products since 2004

### 7.2" HIGH RESOLUTION COLOUR SCREEN

Clear, easy to read LED backlit screen with enables display of advanced measurement statistics and provides an intuitive menu structure



### CARRY HANDLES

Rugged handles protect input connections and assist movement around the laboratory

### QUICK SELECT KEYS

Immediate and direct access to the required range through dedicated soft keys

### USB, GPIB, RS232 AND LAN REMOTE INTERFACES AS STANDARD

LabWave's ProCal software provides auto configuration for the 8100 Series when connected over the convenient USB interface, and the GPIB (IEEE-488) interface enables integration into Legacy Systems. Looking to the future, the LAN interface control over a local network

### ADVANCED MATHS FUNCTIONALITY

The 8100 Series features advanced maths functionality including standard deviation, number of samples, rolling average and much more.

All measurement parameters are viewable on the clear screen and fully user configurable

### DEDICATED MEASUREMENT KEYS

Fast direct selection of measurement modes with dedicated keys for common functions such as Null and Filter

### DIGITAL ROTARY CONTROL

Quickly navigate through menus with the digital control, with press functionality for ease of use



### FAST NUMERICAL ENTRY

Calculator style numerical entry with direct access accelerates manual entry of values.

### ELECTROMETER INPUTS (8104)

Shielded BNC Inputs enable low noise measurements of pico amp level currents

### USB DATA OFFLOAD & UPLOAD

Enable direct offload and upload of data via the front mounted USB port for system updates and data offload.

Calibration factors can be backed up prior to calibration and restored in the event of incorrect adjustments to ensure calibration integrity.



# ELECTROMETER FUNCTIONS (8104)



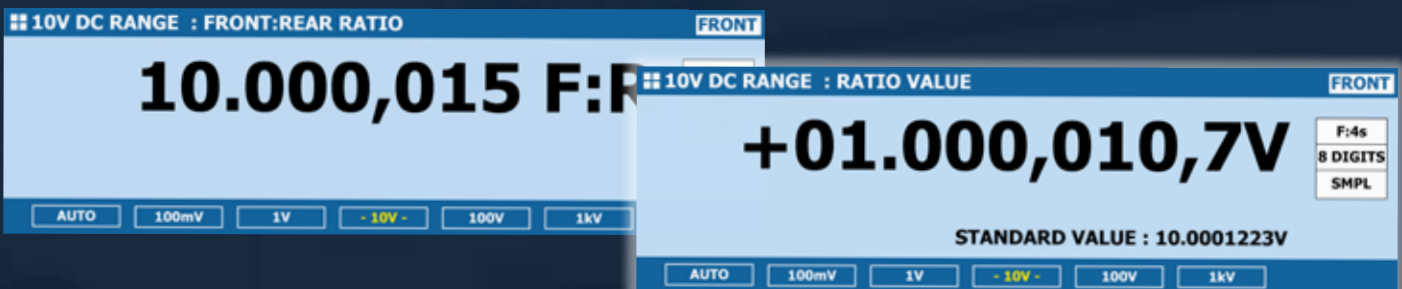
The dedicated electrometer input of the 8104 enables measurement of both low currents with resolution of 0.01 pA and high value resistance in excess of 1 TΩ with exceptional noise performance and fast settling time.

**CURRENT RANGES DOWN TO 10nA  
WITH RESOLUTION OF 0.01pA**

**SELECTABLE MEASUREMENT  
VOLTAGE FROM 10V TO 300V**

**ENABLES MEASUREMENT OF RESISTANCE UP TO 1 TΩ**

## REAR PANEL INPUTS (8104)



The 8104 comes fitted with electronically switchable rear panel inputs as standard enabling the 8104 to perform ratio measurements between two sources. Combined with exception linearity the ratio functionality can replace the use of Kelvin Varley Dividers in precision voltage measurement.

Advanced firmware functionality enables a certified value to be entered and a corrected measurement displayed, ideal for performing resistance and voltage transfers from primary to secondary standards



Included standard with the 8104 is the ability to measure temperature through 2, 3 and 4 wire PRT's and SPRT's with inbuilt support for both IEC 751 and ITS 90 probe coefficients. The 8104 displays both the calculated temperature and resistance simultaneously as well as the ability to ratio between two probes

**IEC 751 & ITS 90 COEFFICIENTS**

**UUT AND REFERENCE PROBE  
SCANNING FUNCTIONALITY**

**STORE COEFFICIENTS FOR MULTIPLE PROBES IN MEMORY**

## THERMOCOUPLE MEASUREMENT (8104)



The 8104 offers direct thermocouple conversion to simplify measurement of thermocouples and thermocouple simulators. The 8104 dynamically displays the currently measured voltage as well as the conversion to temperature simultaneously for ease of use.

In addition, when used with the optional TCLEAD accessory the cold junction can be measured dynamically and the true temperature displayed without the need for an ice bath and additional calculations

# ADVANCED MEASUREMENT MODES



The 8100 Series has been optimised for use with LabWave's range of AC/DC current shunts enabling DC and offset parameters to be entered in providing direct measurement of applied current on the screen. The 8100 simultaneously measures the voltage and frequency and performs a real time correction based upon the AC/DC difference at the current frequency and the value of the shunt.

The high input impedance of the 8100 series below 10V AC removes the requirement for buffer amplifiers minimising sources of errors and simplifying connections.



AC/DC Shunts are available from 1mA to 100A offering superior AC/DC difference characteristics for measuring high accuracy AC Current sources



# 8500 LOW THERMAL SCANNER



Extend the 8100 Series to a full measurement system with the addition of the 8500 Low Thermal Scanner. Each channel provides four terminal measurement providing voltage, current and resistance measurement.

Utilizing break-before-make connections the 8500 can be used to connect multiple precision voltage sources (such as the LabWave 3000ZR) for automating inter-comparison and ratio measurements.

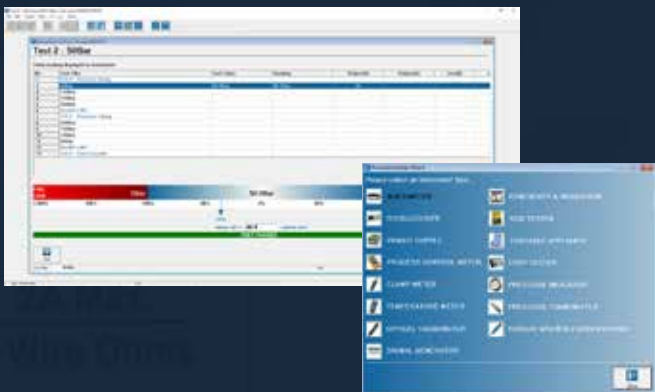
Channels	10
Switching	4 Contact Kelvin Switching : 2 Voltage, 2 Current
Maximum Voltage	200 V
Maximum Current	1 A
Thermal EMF	< 120 nV
Connection	4mm Binding Posts, Low Thermal gold on Copper
Switch Resistance	< 0.2 Ohms
Relay Type	Latching
Interface	RS232



# PROCAL CALIBRATION SOFTWARE

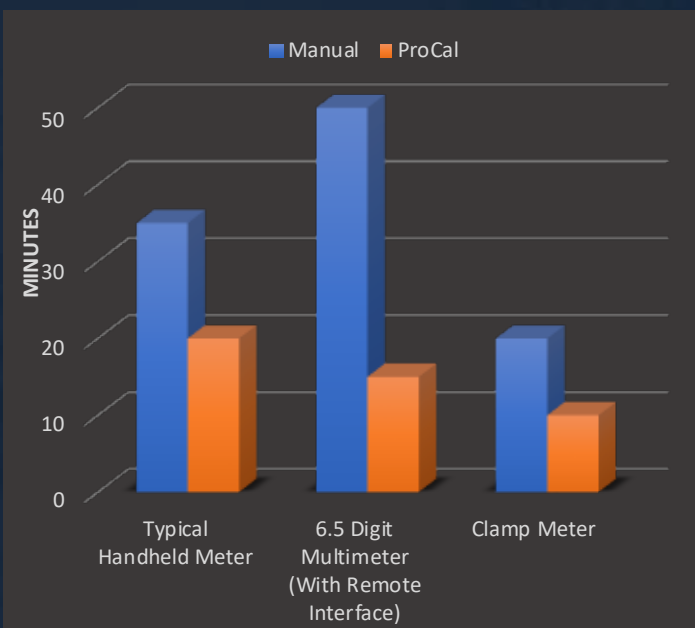
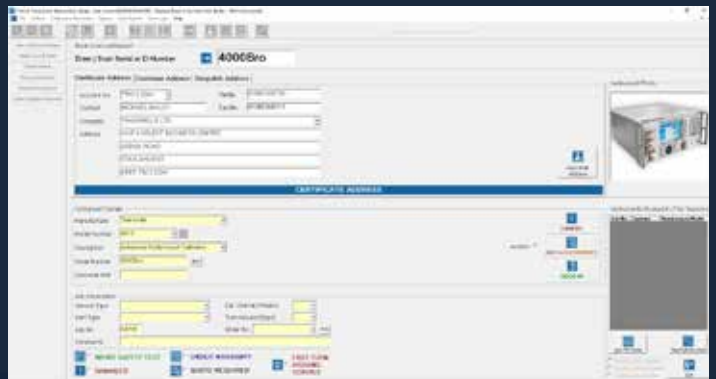
LabWave's ProCal software suite provides a powerful and easy to use multi-discipline calibration software solution. The software allows for full control of the calibration laboratory, with a range of programs designed for system setup, instrument calibration, procedure management, certificate printing, instrument management, sales tracking and more.

Ease of use is key for LabWave, and by using the Procal software suite you will be able to easily automate calibration with minimal training requirements.



ProCal simplifies the task of calibration by providing a graphical interface with clear indication of test status using a 'Traffic light' system, where Green indicates pass, Red indicates a fail and orange indicates a probable fail or probable pass condition.

Featuring powerful bar-code integration and instrument history management, ProCal Track provides all of the tools needed for the management of instruments from goods inwards through to despatch, and all points in-between.



ProCal and ProCal-Track provide a cost effective method of improving workflow throughout your laboratory or organisation.

Turnaround time of calibrations can be decreased by over 50%, reducing the cost per calibration and improving customer satisfaction and competitiveness.

# SUMMARY SPECIFICATIONS



	<b>8104</b>	<b>8109</b>
<b>DC VOLTAGE</b> <i>Best 1 Year Total Accuracy</i>	<b>0 - ±1025V</b> ± 4 ppm	<b>0 - ±1025V</b> ± 9 ppm
<b>DC CURRENT</b> <i>Best 1 Year Total Accuracy</i>	<b>0 - 30A</b> ± 7 ppm	<b>0 - 30A</b> ± 25 ppm
<b>DC CURRENT (Electrometer Input)</b> <i>Best 1 Year Total Accuracy</i>	<b>10nA - 10uA Range, 0.01pA Resl</b> ± 30 ppm	<b>N/A</b>
<b>AC VOLTAGE</b> <i>Best 1 Year Total Accuracy</i>	<b>20mV - 1000V, 10Hz - 1MHz</b> ± 0.015 %	<b>20mV - 1000V, 10Hz - 100kHz</b> ± 0.05 %
<b>AC CURRENT</b> <i>Best 1 Year Total Accuracy</i>	<b>20uA - 30A, 10Hz - 10kHz</b> ± 0.03 %	<b>20uA - 30A, 10Hz - 10kHz</b> ± 0.08 %
<b>RESISTANCE (2 &amp; 4 Wire)</b> <i>Best 1 Year Total Accuracy</i>	<b>0 Ohms - 1 GOhm</b> ± 8 ppm	<b>0 Ohms - 1 GOhm</b> ± 20 ppm
<b>RESISTANCE (Electrometer)</b> <i>Best 1 Year Total Accuracy</i>	<b>10 MOhms - 1T Ohm, 10V - 300V</b> 140 ppm	<b>N/A</b>
<b>FREQUENCY</b> <i>Best 1 Year Total Accuracy</i>	<b>10Hz - 1MHz</b> 5 ppm	<b>10Hz - 1MHz</b> 5 ppm
<b>TEMPERATURE (PRT / RTD)</b>	<b>2, 3 &amp; 4 Wire</b> <i>Support for IEC 751 &amp; ITS 90 Coefficients</i>	<b>N/A</b>
<b>TEMPERATURE (THERMOCOUPLE)</b> <i>Best 1 Year Total Accuracy</i>	<b>Support for over 8 Types</b> ±0.05°C	<b>N/A</b>
<b>REAR PANEL TERMINALS</b>	<b>Fitted as standard</b>	<b>N/A</b>

Line Voltage	110V / 230V Selectable 100V Option Available
Line Frequency	50 to 60 Hz
Operating Temperature	0°C to +50°C 32°F to 122°F
Dimensions (LxWxH)	52 x 42 x 11 cm 20.5 x 16.6 x 4.4 inches
Weight	Multimeter : 9.5 kg / 21 lbs In Shipping Box : 15 kg / 33 lbs In Transit Case : 30 kg / 66 lbs
Recommended Calibration Interval	12 Months
Warm-up Time	4 Hours to specification
Warranty Period	1 Year / Extended Warranties Available

