

JANDEL ENGINEERING LTD.

Jandel Multi Purpose Four Point Probing System

Multi Height Microposition Probe with ResTest Meter



The **Multi Height Microposition Probe** combined with the **ResTest Meter** is an excellent four point probing system for use in measuring both small and large samples. It includes a fine X-Y stage for positioning small samples under the four point probe tips. The X-Y stage can be easily removed for measuring large samples such as substrates up to 12" x 12" (optional 10" x 10" base plate if bench space is limited), and tall materials up to 6" in height.

The **ResTest Meter** features a large color screen, internal precision resistors for accuracy, settings for linear and square array probes, and a sheet resistance measurement range from 10 milliohms-per-square up to 1 megohm-per-square with better than 0.1% accuracy. The volume resistivity range is from 10 milliohms-cm up to 5 Kohms-cm. More details can be found on page 3.

Multi Height Microposition Probe

The Multi Height Microposition Probe comprises a hard anodised aluminium base 25cm wide, 29cm deep and 0.8cm thick. A 19mm diameter stainless steel column 20cm high screwed to the base supports the probe head raising and lowering mechanism incorporating the vertical slide, operating lever shaft, and micro-switch. The vertical slide carries the probe-head, secured by a clamp screw. The probe-head is positioned so that the micro-switch does not pass current until the probes have made contact; lost motion ensures that the current is switched off before the probes are raised. The probe arm can be easily positioned on the vertical shaft to various heights to allow probing onto either flat materials or large or thick materials. For example, a shallow dish containing LN2 could be placed on the base plate and the arm could be positioned to allow the probe to be lowered onto a sample submerged in liquid nitrogen. With the X-Y stage removed, materials up to 10" x 10" x 6" tall can be positioned under the probe arm. If necessary, a taller vertical post can be supplied for use in measuring taller items. The Multi Height Microposition Probe includes a removable X-Y stage which can be bolted to the base plate to aid in positioning the materials accurately when probing onto small samples.

Features of the Removeable X-Y Stage:

- Precision ball-bearing X-Y stage with micrometer adjustments
- 25 mm x 25 mm X-Y travel
- 360 degree theta
- Sample holder for materials up to 76 mm in diameter
- Vacuum facility for use when needed - one hole in center

The Jandel ResTest Meter is a specialty electronics instrument designed specifically for the four point probe measurement. It features high accuracy, an excellent range, and many features which simplify the four point probing measurement.

MEASUREMENT RANGE

10 milliohms-ohms-per-square to 10^6 ohms-per-square

FEATURES

- Large color display
- Fast response time
- Displays either sheet resistance, volume resistivity, wafer resistivity, or ohms
- Saves data using a PC connection.
- Up to 99 measurements can be stored internally, thousands can be saved to the USB memory stick provided, or data can be saved to a PC using the provided software
- Settings for either linear or square array probes and 6 choices of probe tip spacings

SUPPORTS FOUR MEASUREMENT TYPES

- Sheet Resistance - Primary measurement value displayed in Ohms/Square
- Wafer Resistivity - Primary measurement value displayed in Ohms/Cm
- Volume Resistivity - Primary measurement value displayed in Ohms/Cm
- Ohms Resistance - Primary measurement value displayed in Ohms

Three available current ranges:

0.5mA to 10mA

10uA to 100uA

1uA to 10uA

Interfaces with Jandel four point probing units

Includes USB connection software for data logging

Can be controlled by a remote PC using command set



See next page for a comparison of the ResTest to the RM3000 Test Unit

Comparison of the Jandel ResTest Meter to the Jandel RM3000 Test Unit.

The Jandel **ResTest Meter** is a specialty electronics instrument designed specifically for the four point probe measurement. It features high accuracy, an excellent range, and many features which simplify the four point probing measurement. The following are features of the ResTest Meter:

- 1) The measurement range of the ResTest Meter is from 10 milliohms-per-square up to 1 megohm-per-square with better than 0.1% accuracy. The volume resistivity range is from 10 milliohms-cm up to 5 Kohms-cm, however, the resistivity range refers to measuring a bulk material directly as opposed to measuring a thin film and converting to volume resistivity using the software. For example, a thin layer of copper up to about 1.6 microns can be measured and the bulk resistivity can be determined if one knows the thickness, which can be entered into the software to calculate the volume resistivity.
- 2) The ResTest includes PC control software which can be used for data logging (storing data in the CSV format) and measurement conversion to ohms-per-square or ohms-cm. The ResTest can also be controlled via a remote PC by issuing commands via USB or RS-232
- 3) The ResTest reads-out directly in ohms-per-square, ohms-cm, or ohms on its display (or one can toggle to reading out in millivolts) without requiring the use of the software or a PC. The ohms-cm value can be for a thin film / wafer if one enters the sample thickness, or for a bulk sample if the tip spacing is entered.
- 4) The ResTest has onboard non-volatile memory so that up to 99 measurements can be stored internally and then downloaded and saved using the software. Alternately, each measurement can be saved to a PC as it is made, in which case the amount of saved data depends on the disk drive space.
- 5) Measured values can be stored directly to the included USB memory stick which can store thousands of measurements
- 6) The ResTest has a "zero" button as well as "forward" (FWD) and "reverse" (REV) buttons as the RM3000 has, however, the zero function it is not really needed as it zeros itself prior to any measurements (fast enough to not be noticed). The zero was added in case there WERE offset measurements just to check that the offset was definitely being caused by something external (such as light sensitivity or poor contact). For this reason it is also not necessary to check forward and reverse readings too often although it is a useful function to have confidence in the readings.
- 7) The ResTest allows the input of correction factor for samples that need to be corrected for size.
- 8) The ResTest has a date and time stamp feature
- 9) The ResTest has a large color display

The Jandel **RM3000 Test Unit** is a specialty electronics instrument designed specifically for the four point probe measurement. It features high accuracy, an excellent range, and many features which simplify the four point probing measurement. The following are features of the RM3000 Test Unit:

- 1) The measurement range of the RM3000 Test Unit is from 1 milliohm-per-square (10^{-3}) up to 5×10^8 ohms-per-square with 0.3% accuracy. The volume resistivity range is from 1 milliohm-cm (10^{-3}) up to 10^6 ohms-cm, however, the resistivity range refers to measuring a bulk material directly as opposed to measuring a thin film and converting to volume resistivity using the software. For example, a thin layer of copper up to about 16 microns thick can be measured and the bulk resistivity can be determined if one knows the thickness, which can be entered into the software to calculate the volume resistivity.
- 2) The RM3000 includes PC control software which can be used for data logging (storing data in the CSV format) and measurement conversion to ohms-per-square or ohms-cm. The RM3000 can also be controlled via a remote PC by issuing commands via USB or RS-232
- 3) The RM3000 reads-out directly in ohms-per-square or ohms-cm on its display (or one can toggle to reading out in millivolts) without requiring the use of the software or a PC. The ohms-cm value can be for a thin film / wafer if one enters the sample thickness, or for a bulk sample if the tip spacing is entered.
- 4) The RM3000 has onboard non-volatile memory so that up to 50 measurements can be stored internally and then downloaded and saved using the software. Alternately, each measurement can be saved to a PC as it is made, in which case the amount of saved data depends on the disk drive space.
- 5) The RM3000 has an auto-range button that can be used to automatically determine the optimum input current for a given material without using the trial and error method.
- 6) The RM3000 has forward (FWD) and reverse (REV) buttons to reverse the direction of current flow. A common way to determine if a measurement is valid is to reverse the direction of current flow and then check to see if the forward and reverse voltage readings correlate well, i.e., the values should be similar, but with the reverse current voltage being a negative value.
- 7) The RM3000 allows the input of correction factor for samples that need to be corrected for size.
- 8) The RM3000 has a date and time stamp feature
- 9) The RM3000 interfaces with optional AFPP motorized Z-motion arm which is an available option on some Jandel models.

Comparing the ResTest to the RM3000:

The ResTest can store internally 99 measurements instead of 50

The ResTest has a large color screen

The ResTest has settings for linear & square array so when using a square array probe you read values corrected

The ResTest has a somewhat easier to use dial control which also acts as a pushbutton.

The ResTest can save data to a USB thumb-drive

The ResTest performs measurements somewhat quicker

The ResTest automatically "zeros" itself before each measurement

The ResTest is lower in cost

In addition to reading out in ohms-per-square, ohms-cm, and mV, the ResTest will read-out in ohms.

Comparing the RM3000 to the ResTest:

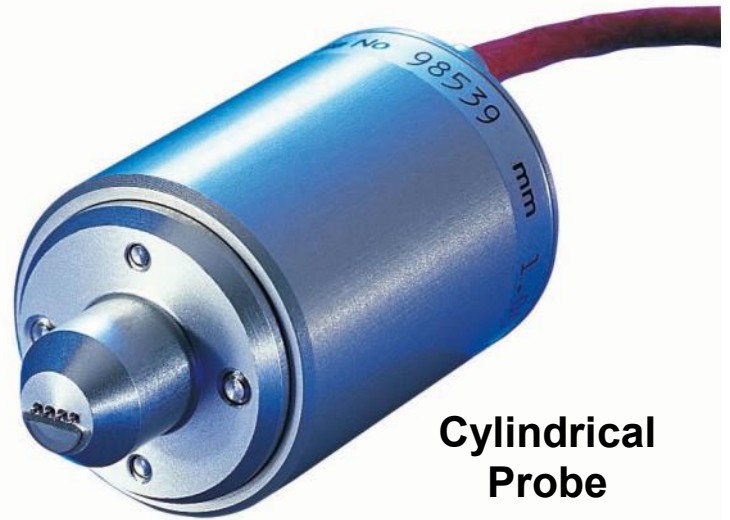
The RM3000 has a greater measurement range on both ends of the spectrum

The RM3000 can control Jandel's AFPP motorized Z motion probe arm (optional for some Jandel Probe models)

The RM3000 has an auto-range feature to determine the best choice of input current for a given material

The RM3000 has four preset buttons for storing commonly use input currents

All Jandel four point probing systems include the jewel bearing Cylindrical probe which is built to a high level of accuracy. Calibrated instruments are used to guarantee accuracy of tip spacing, spring pressure, tip radii and tip planarity.



Cylindrical Probe



Cylindrical Probe Pressure Adjustment

The Cylindrical Probe has spring loads which are user adjustable within one of three ranges. The probe shown here has been factory set to 100 grams per tip, however, the user can increase the load to as high as 150 grams per tip or as low as 60 gram per tip by moving the red Teflon knob towards either the “H” for higher or towards the “L” for lower.



Downloads:

ResTest Manual: <http://www.fourpointprobes.com/restest-user-manual.pdf>

Cylindrical Probe: <http://www.fourpointprobes.com/jandelcylindrical.pdf>

Multi Height Microposition Probe: <http://www.fourpointprobes.com/jandel-mhmp.pdf>