

# JANDEL ENGINEERING LTD. Jandel Portable Four Point Probing System Hand Applied Probe with HM21 Hand Held Meter



**The Hand Applied Probe combined with the HM21 Hand Held Meter** is a high quality portable four point probe measurement system which incorporates the Jandel Cylindrical probe head. The system can be used to measure a wide range of materials with varying shapes and sizes.

**The Hand Applied Probe** is ideally suited for use in measuring large substrates and flat panels, however, it can be used to measure wafers and even small samples as well. When measuring small samples, you will sometimes need another piece or two of the same thickness of material underneath the back side of the probe body so that the entire unit rests on the material in the same plane, i.e., to keep it level. A discussion of using the Hand Applied Probe on small samples can be seen on page four of the following PDF file:

<http://www.fourpointprobes.com/jandel-hap.pdf>

## **HAND APPLIED PROBE GENERAL DESCRIPTION**

The unit comprises a Teflon body containing a cylindrical brass mass sufficient to cause the probe needles of the 4-point head (loaded up to 200g each) to be completely retracted. The Teflon body incorporates a lead about 1m long to connect to the associated electronic measuring equipment. There is a toggle switch marked 'S' (shorted) and 'R' (read) which permits the probe head to be raised off the sample, or placed on it, with no sparking. The current source is shorted at position 'S' on the hand applied probe independent of the FWD, SBY, REV switch on the power supply. Of course, when the probe head is in position the FWD/REV positions can be used in the usual way to observe forward and reverse readings.

## HAND APPLIED PROBE OPERATION

The probe head should be installed so that its acrylic insulating pad (adjacent to the projecting probe needles) lies in the same plane as the lower Teflon surface. Rotate the probe head so that its needles lie at right angles to the longitudinal axis of the Teflon holder, and clamp firmly with the two red screws. To present the probe head to the specimen it is best to make contact with the rear end of the block (where the switch is) and rock the block downwards so that it effectively pivots about the rear. In this way the probe points will retract without scrubbing on the specimen surface. The actual position of the probe points can be seen via the cutaway.

The Hand Applied Probe incorporates the Jandel Cylindrical probe head which is built to high standards of quality and accuracy. A brochure regarding the Cylindrical probe can be found here:

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

Information regarding the constructions and specifications of the Jandel Cylindrical probe can be seen here: [http://www.fourpointprobes.com/cylindrical\\_app\\_notes.pdf](http://www.fourpointprobes.com/cylindrical_app_notes.pdf)

**The Jandel HM21 Hand Held Meter** is a battery powered four point probe meter which includes a universal AC power adaptor so that it does not have to run on batteries when portability is not important. The Jandel HM21 is a portable current source / meter specifically designed for the four point probe measurement technique. For successful measurements the HM21 supplies a constant current and displays either the resultant voltage or the sheet resistance in ohms/square depending which function has been chosen. The sheet resistance measurement range is 1 ohm/square up to 10 Megohms/square (in practice you can measure down to around 0.01 ohms/square, but the accuracy may be compromised slightly). This equates to a bulk (or volume) resistivity range of approx. 0.01 ohm.cm to 100 Kohm.cm. The current is changeable in 6 steps - 100nA, 1uA, 10uA, 100uA, 1mA, 10mA. The compliance voltage is above 8.5V but slightly reduces to 7.5V at 10mA, however 10mA would usually only be used with more conductive samples where the compliance voltage is not so critical. Overall accuracy is better than 0.5% where the DVM receives greater than 1mV. For the mid ranges the accuracy is better than 0.3% The DVM has two ranges - high sensitivity up to 150mV and low range up to 1.25V. The unit is push button operated. The current is increased with the 'INC' button and decreased with the 'DEC' button. Forward and reverse current can be selected using the 'FWD' and 'REV' buttons, which is a common way to check the validity of a measurement by checking the forward and reverse voltage values for consistency. When the battery mode is used, the unit returns to standby automatically to save power and turns off altogether after some period of inactivity. The automatic time to return to standby is 70 seconds with low current and with the 3 highest currents 40 seconds. This is because the lower current ranges are used with higher impedance which can take longer to settle, and the higher currents drain the power faster. The unit can be zeroed to remove any offset by pressing the Standby button when the unit is already in Standby. The HM21 includes on-board non-volatile memory so that fifty measurements can be stored in the unit and then downloaded to a PC later. When connected to a PC using the **included** software, the HM21 can save the data, or bulk resistivity values (ohms-cm) can be calculated. If the HM21 is connected to a PC using the software, the unit can be operated via the user interface which is an illustration of the HM21 on the computer screen. Clicking the "save" button on the computer screen saves the data to the PC. Files are stored in the CSV format which opens automatically in Excel. The HM21 reads-out directly in sheet resistance (ohms-per-square) without using a PC or the software.

**The instruction manual for the HM21 software can be downloaded here:**

[http://www.fourpointprobes.com/hm20\\_software.pdf](http://www.fourpointprobes.com/hm20_software.pdf)

Click here to request a price quotation for the Jandel Portable Four Point Probing System:

[sales@bridgetec.com](mailto:sales@bridgetec.com)

Click here to visit the web page for the <http://www.fourpointprobes.com/haphm21.html>