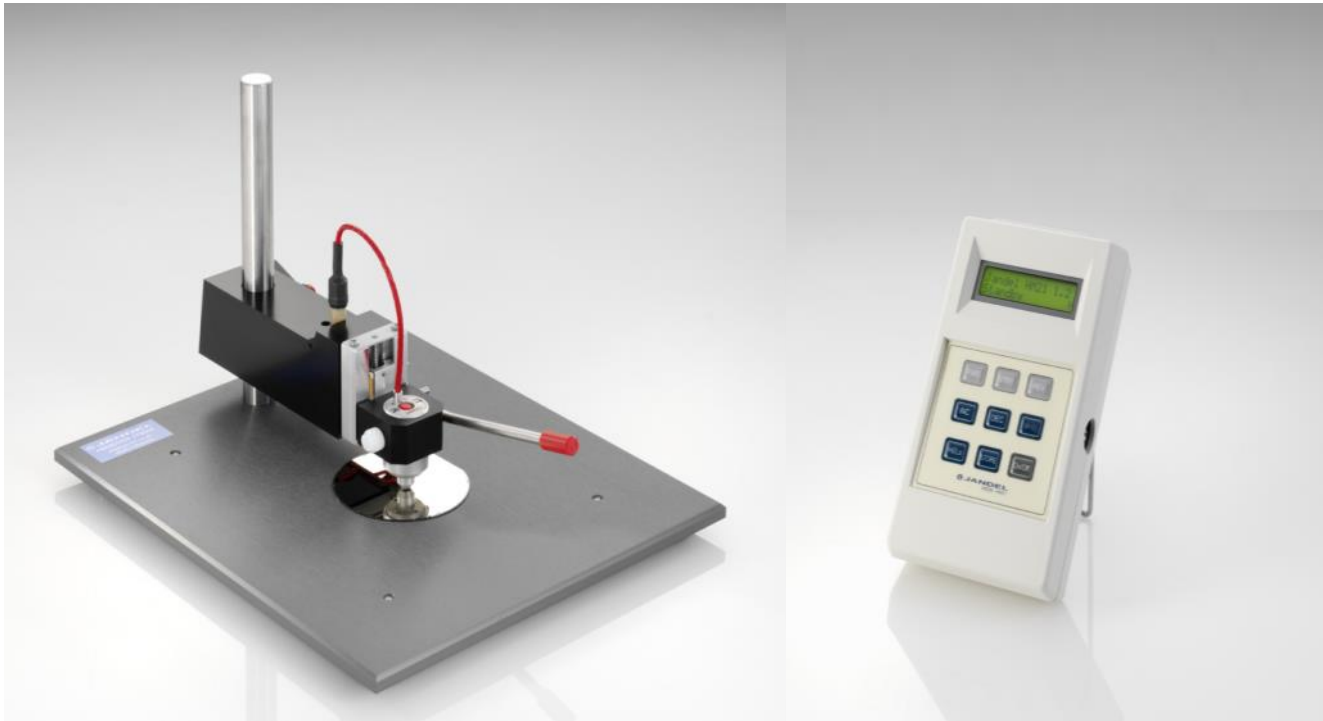


JANDEL ENGINEERING LTD. Jandel Four Point Probing System Multi Height Probe with HM21 Hand Held Meter



The Multi Height Probe combined with the HM21 Hand Held Meter is an excellent system for use in measuring a wide range of materials and sample sizes when the greater measurement range of the RM3000 Test Unit is not necessary.

The probe portion of the system, the Multi Height Probe, comprises a hard anodized aluminum 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. 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 Probe can withstand temperature up to 80C. The Cylindrical probe head, one of which is included with the Multi Height Probe, can withstand temperatures from 77K up to 120C in it's standard configuration. A modification to the Cylindrical probe will allow it to withstand temperatures from 77K up to 200C, however, the Multi Height Probe is still limited to the 80C temperature limit.

The system 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>



The Jandel HM21 is a portable meter designed for use with a four point probe to make sheet resistance and volume resistivity measurements. 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 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 HM21 has on-board non-volatile memory so that 50 measurements can be stored in memory and then downloaded later to a PC

using the included software. The HM21 can save the data as sheet resistance, or bulk resistivity values (ohms-cm) can be calculated if measuring thick materials. Bulk resistivity of thin films can also be calculated if the film thickness is entered using the software. 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 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' button. 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.

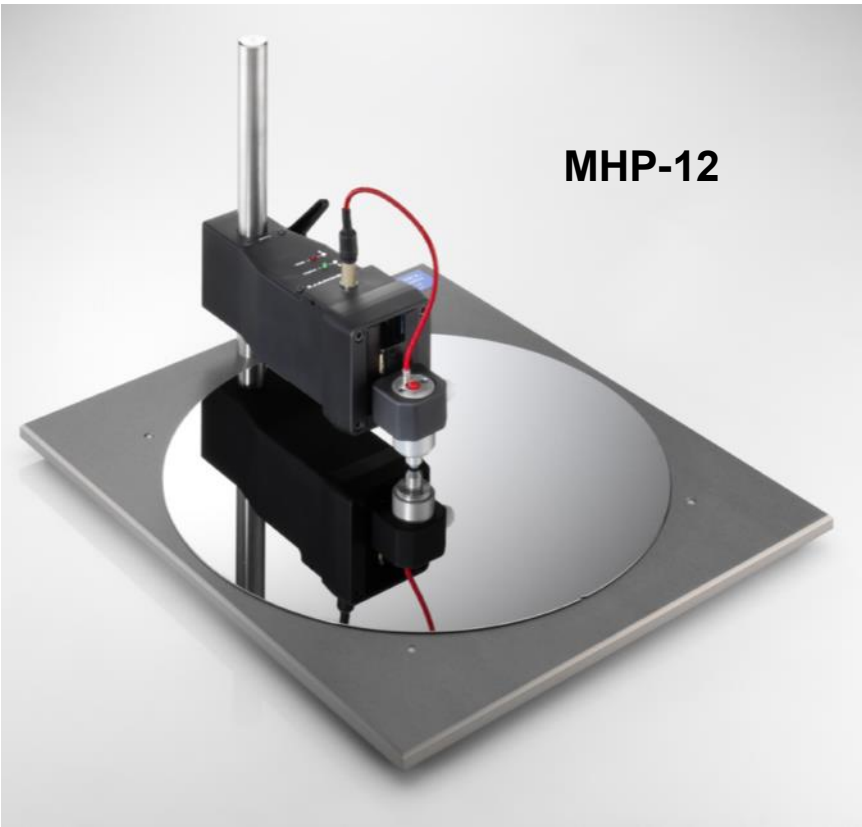
Downloads:

[Instruction manual \(476K PDF file\) for the Multi Height Probe](#)

[A high resolution image of the Multi Height Probe](#)

[Instruction manual for the HM21 Hand Held Meter](#)

MHP-12



Multi Height Probe with Optional Large Base Plate for Probing Substrates up to 12" x 12"

Same Price as 10" x 10" sample Base Plate.

Shown with Optional AFPP Motorized Z Motion Arm

To have the AFPP centered over the baseplate, the 12" baseplate must be purchased.

The 12" working area baseplate is required for future upgrade to add the Multi-PT6 or Multi-PT8 wafer stages as shown at the bottom of the next page.

Cylindrical Probe

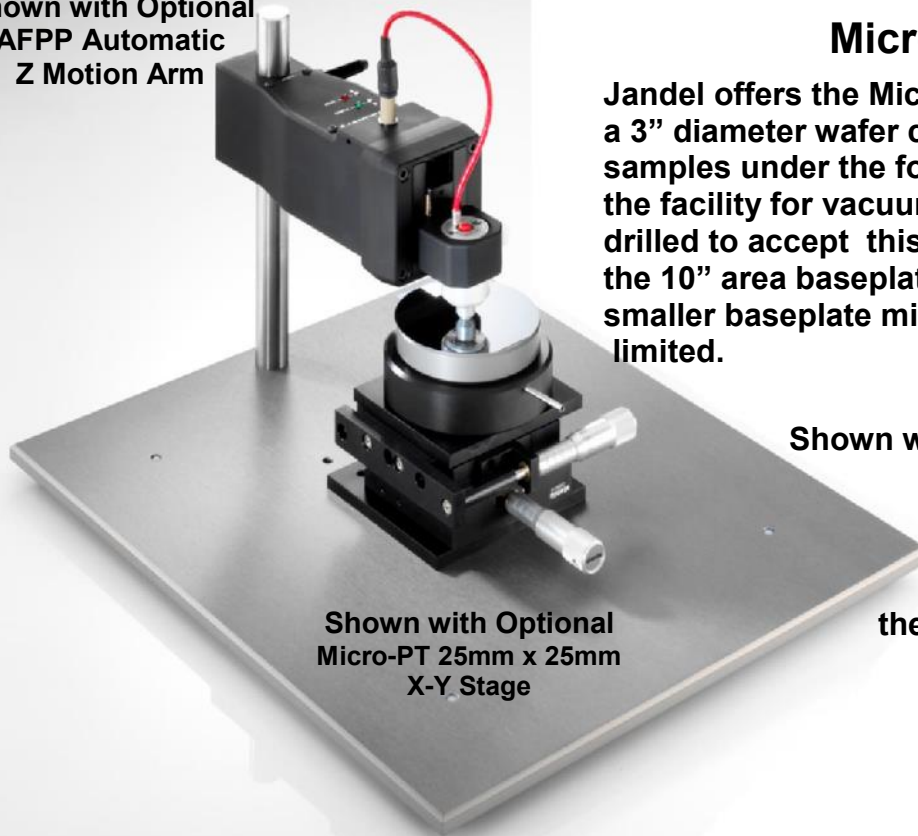
One Jandel Cylindrical probe is included with the Multi Height Probe



Cylindrical Probe Tip Pressure can be user adjusted within one of three ranges by turning the small knob on top of the probe towards either the "H" for higher or "L" for lower pressure.

Multi Height Probe Sample Stage Options

Shown with Optional
AFPP Automatic
Z Motion Arm



Shown with Optional
Micro-PT 25mm x 25mm
X-Y Stage

Micro-PT Stage Option

Jandel offers the Micro-PT 25mm (1") travel X-Y stage with a 3" diameter wafer chuck for use when positioning small samples under the four point probe needles. Included is the facility for vacuum hold-down. The baseplate is pre-drilled to accept this option as a future upgrade for either the 10" area baseplate or the 12" area baseplate. The smaller baseplate might be preferred if bench space is limited.

Shown with optional AFPP Automatic Z Motion Arm, however, the AFPP is not triggered by the ResTest and requires that a button on the AFPP is pressed to activate the motorized Z-Motion of the AFPP arm.

Shown with Optional
AFPP Automatic Z
Motion Arm which is
manually activated
when used with
the HM21 Meter

Multi-PT6 & Multi-PT8 Wafer Stage Options

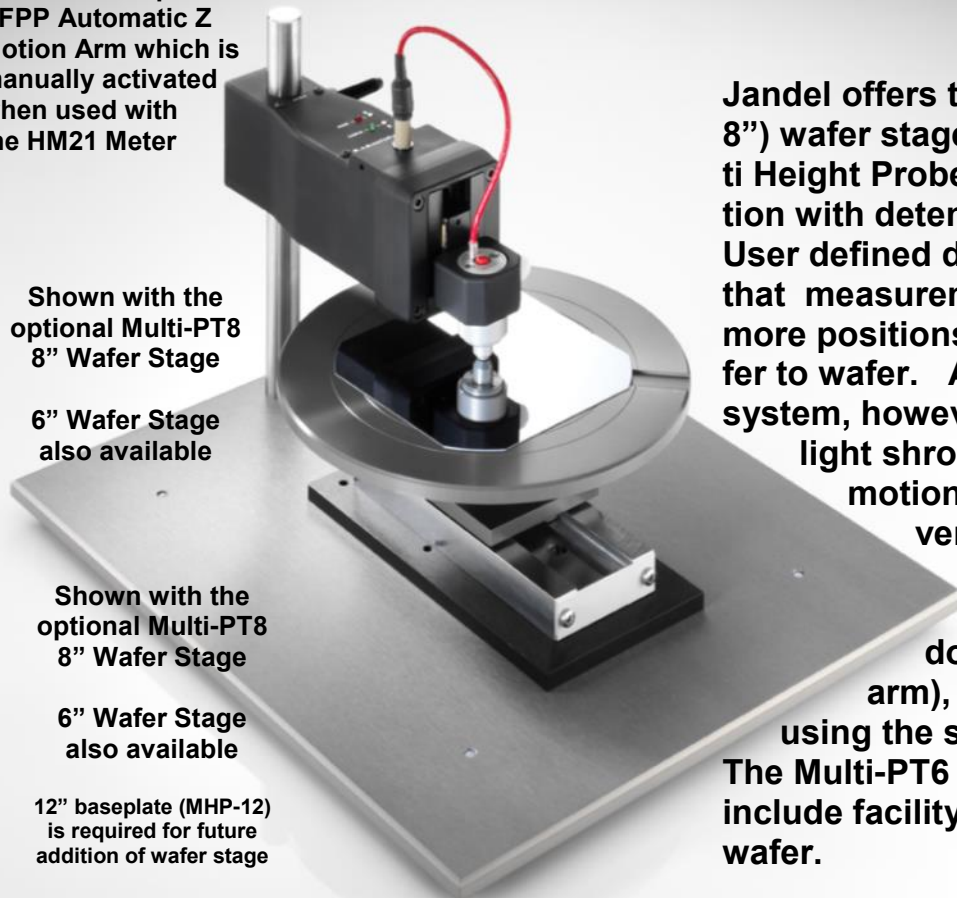
Shown with the
optional Multi-PT8
8" Wafer Stage

6" Wafer Stage
also available

Shown with the
optional Multi-PT8
8" Wafer Stage

6" Wafer Stage
also available

12" baseplate (MHP-12)
is required for future
addition of wafer stage



Jandel offers the Multi-PT6 and Multi-PT8 (6" or 8") wafer stages as options for use with the Multi Height Probe. The wafer stage has 360° rotation with detents at each 90 degree position. User defined detents are set along the Y axis so that measurements can be made at 1, 5, 9, or more positions with 1mm repeatability from wafer to wafer. A light shield is not built into the system, however, Jandel offers a black cloth light shroud if required. The probe Z motion arm can be either the motorized version as shown here (which is controlled by a push button on the arm since the HM21 Meter does not interface with the AFPP arm), or manually raised and lowered using the standard arm as shown on page 1. The Multi-PT6 and Multi-PT8 wafer stages include facility for vacuum hold-down for the wafer.