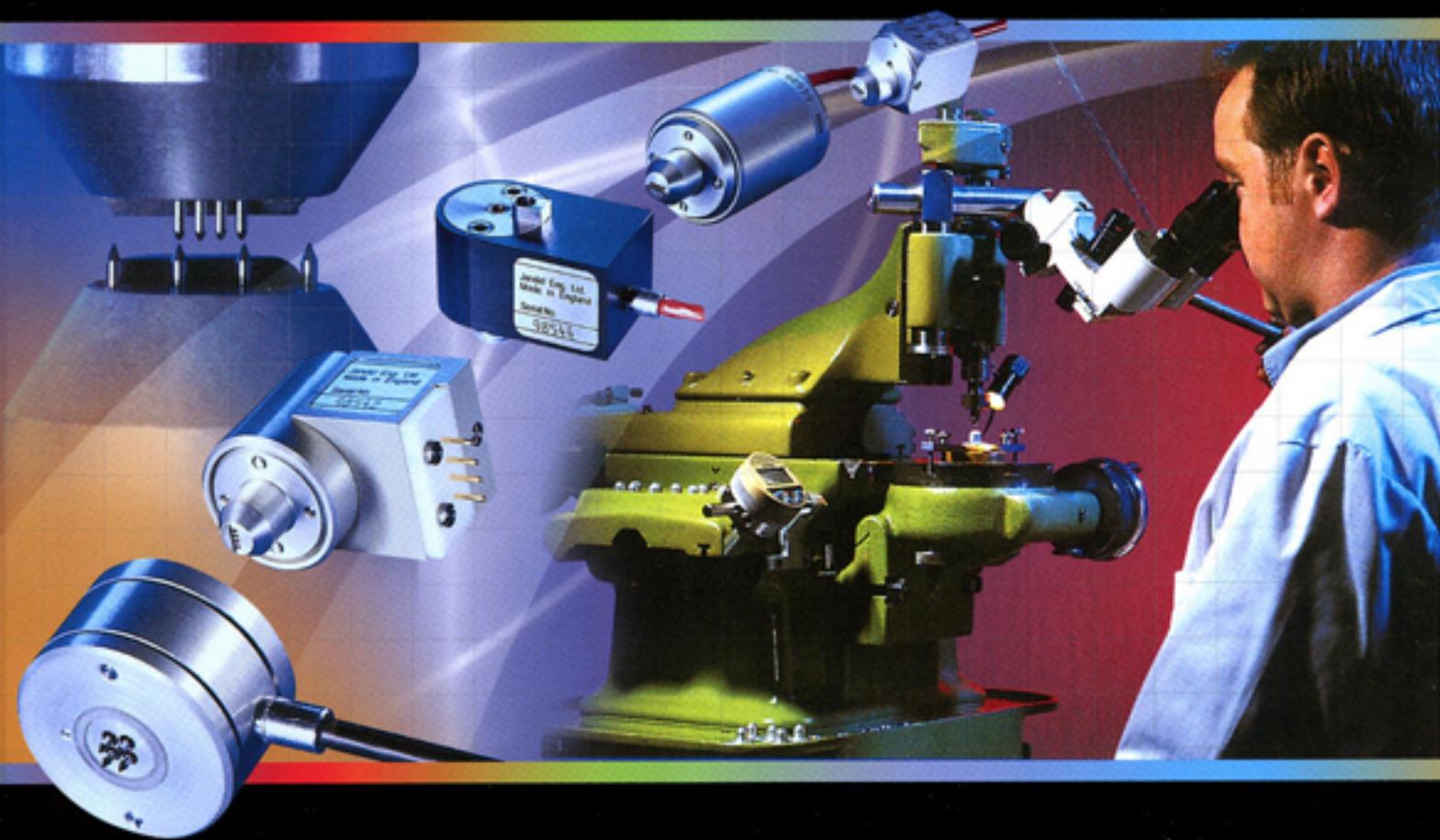


 **JANDEL**

HM21 SOFTWARE INSTRUCTIONS



Accuracy & Precision



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HM21 Test Unit Software Instructions

(for installation instructions please see the software set up leaflet)

When the software is opened it gives a graphical representation of the unit itself. Anything displayed on the unit's LCD screen is displayed in the green area of the software.

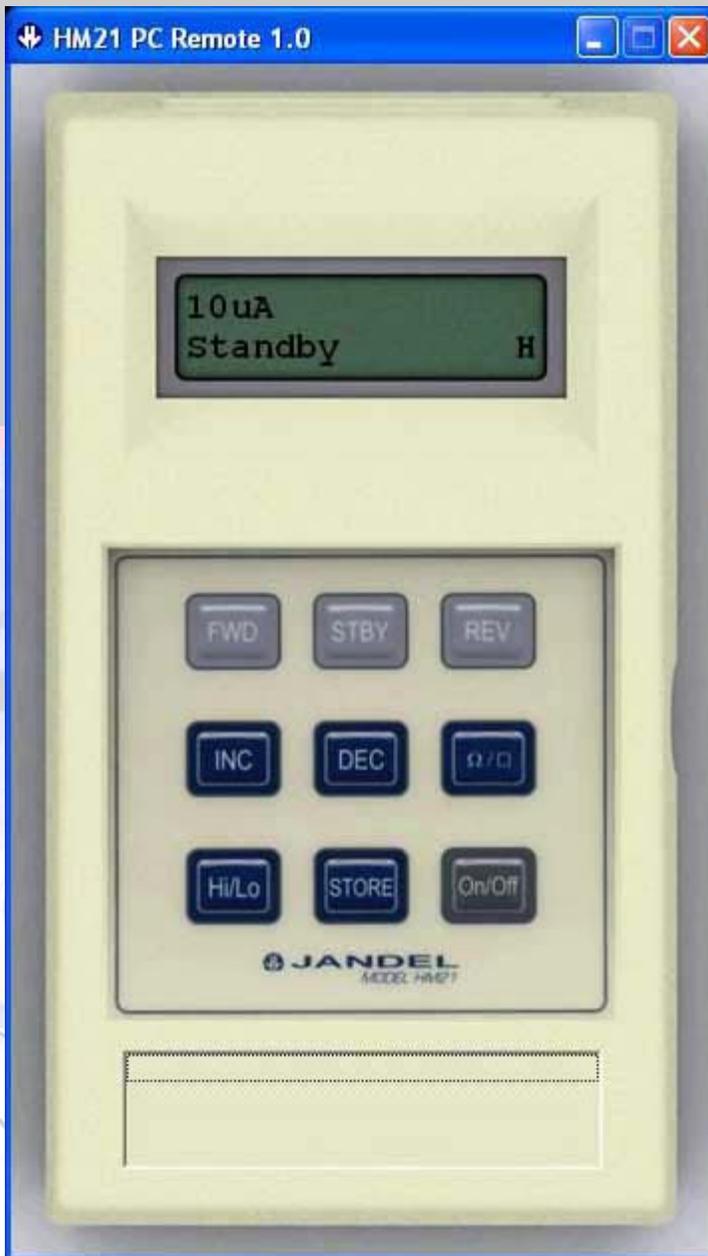


FIGURE 1



Accuracy & Precision

The HM21 can be controlled via the software by clicking on the display buttons as if pressing the unit's buttons. Please refer to the HM21 instruction manual for how to use the unit.

Stored Readings

Stored readings are shown at the bottom of the software display with the most recently taken reading at the top. The number of readings stored is shown by the number to the left of the top reading shown. When more than four readings are stored it is possible to scroll through the readings using the scroll buttons to the right of the 'stored readings' area.

Deleting Readings

If a reading has been taken which the user no longer requires it is possible to delete it from the list. Scroll through the readings so that the reading to be deleted is on display and click on the reading to highlight it. If you now 'right click' the reading will be erased.

It is not possible to recover deleted readings.

Pop-up menu.

Right clicking on the software screen will give a pop-up menu as shown in Figure 2.



- Connect
- Save Readings
- Download
- Erase Memory
- Clear List
- About...
- Quit

FIGURE 2

There are a number of options and these can be used as follows:

Connect – if the computer and HM21 have ceased communicating after a period of inactivity then clicking this will reconnect them

Save Readings – if you want to save the readings that are showing in the ‘Stored Readings’ area of the software, clicking this will give you the save options (see ‘Exporting Measurements’ below).

Erase Memory – if the HM21 has readings stored in its memory then this will erase those readings. Erased readings cannot be recovered

Download – this will download any readings which have been stored to the internal memory of the HM21. While downloading readings you will see an information window showing progress (Figure 3). This only takes a few seconds and it is necessary to wait until the process is complete, at which time there is an option to clear the stored results from the HM21 memory.

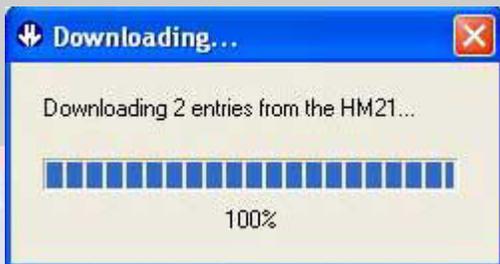


FIGURE 3

About – this gives software version and copywrite information

Quit – this will safely quit the HM21 software program

Exporting Measurements

By right clicking and selecting ‘Save Readings’ you can export readings to a spreadsheet in one of several formats.



FIGURE 4



In the 'Save Readings' window, clicking on the down arrow by 'Select Export Type' will give you 4 saving options (Figure 4). These can be used as follows:

Current / Voltage only – outputs the current setting and voltage measurement only for each stored reading

Sheet resistance – this outputs the current setting and voltage measurement, along with the calculated sheet resistance

(The next two options require user input for the calculation)



FIGURE 5

Bulk Resistivity for Wafers – this can be used where the bulk resistivity of a thin material is required. It outputs the current setting and voltage measurement, along with the calculated Bulk Resistivity. For this type of measurement it is necessary to input the sample thickness in *centimetres* (on the left in Figure 5) I.e. for a typical wafer thickness of 600 microns, the thickness is 0.06cm.

Bulk Resistivity – this can be used where the bulk resistivity of a large piece of material is required (typically samples > 5x probe spacing). It outputs the current setting and voltage measurement, along with the calculated Bulk Resistivity. For this type of measurement it is necessary to input the probe spacing in *centimetres* (on the right in Figure 5) I.e. for a typical probes spacing of 1.00mm, the spacing is 0.1cm.

When you have chosen your output and, if necessary, inputted the required information, click 'browse' to select an output file name and location on your computer. The program will output the results in a CSV format (comma separated variable) which can be displayed on the vast majority of spread sheet programs.

	A	B	C	D	E	F	G
1	Entry	Current Range		Reading		Sheet Resistance	
2	1	5 mA		68.05 mV		61.68596	
3	2	5 mA		-67.469 mV		-61.1593	
4	3	5 mA		69.773 mV		63.24783	
5	4	5 mA		-70.576 mV		-63.9757	
6	5	5 mA		69.386 mV		62.89702	
7	6	5 mA		-69.917 mV		-63.3784	
8	7	5 mA		69.68 mV		63.16353	
9	8	5 mA		-70.446 mV		-63.8579	
10	9	5 mA		69.731 mV		63.20976	
11	10	5 mA		-70.016 mV		-63.4681	

FIGURE 7

Figure 7 shows a typical spreadsheet output, in this instance showing the calculated sheet resistance. Note that the units and the values have been placed in separate columns so that if required it is possible to write algorithms to manipulate the numerical values.

Keyboard operation

With the software running, or through interface software such as HyperTerminal, it is possible to control the HM21 using the computer keyboard. The remote control commands simply mimic the operation of the keypad.

The keyboard controls are:

“T” to increase to the next set current

“p” to reduce to the next set current

“f” sets the forward current

“r” sets the reverse current

“s” puts the HM21 in standby mode

“z” zeros the reading

“h” sets high resistivity mode (either 2 or more decimal places max +/- 130mV)

“l” low sensitivity (1 decimal place max +/- 1250mv)

“q” changes display from ohms/sq to mV

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