

# HMS-5000, HMS-5300, & HMS-5500 Van der Pauw Hall Effect Measurement System

**Temperature dependent measurement within the following ranges:**

**HMS-5000: 80K to 350K (only)**

**HMS-5300: 80°K to 350°K &/or  
300°K to 573°K or**

**HMS-5500: 80°K to 350°K &/or  
300°K to 773°K**



PC not included. Runs on MS Windows operating systems.

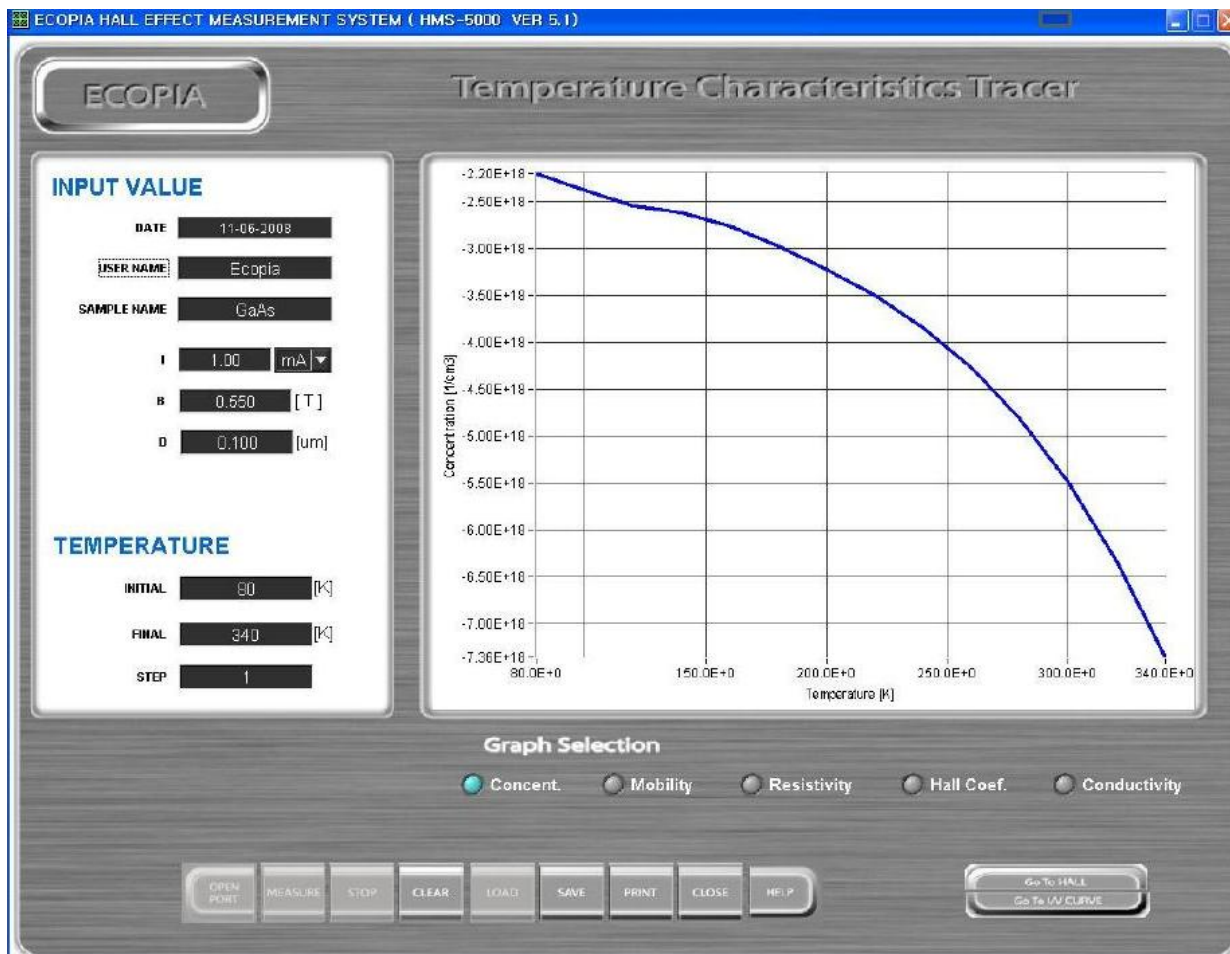
The HMS-5000, HMS-5300, and HMS-5500 Hall Effect Measurement Systems plot concentration versus temperature, mobility versus temperature, resistivity versus temperature, conductivity versus temperature, and Hall coefficient versus temperature. The systems provides the test results as tabular data as well as in graph form. The user defines the desired temperature steps within the temperature range, fills the two LN2 reservoirs if performing sub ambient testing, and then the system automatically applies and switches the input current, measures the voltages, changes temperature, and moves the magnets all without user intervention. Once the test is finished, the temperature dependent graphs and tabular data are ready for viewing. The magnet movement is motor controlled and automated, variable temperature capability, and powerful analysis software. The systems ramp to each user defined temperature, stabilize, makes the measurement (including moving the magnet automatically), and then plots the various temperature dependent material electrical properties.

- Sample size: 5 mm x 5mm up to 15m x 15mm
- Resistivity:  $10^{-4}$  to  $10^7$  (Ohms-cm)
- Magnet : Permanent magnet, 30 mm diameter
- Magnet Flux Density: 0.55T nominal +/-1% of marked value
- Mobility: ( $\text{cm}^2/\text{Volt-sec}$ )  $1 \sim 10^7$
- Concentration: ( $\text{cm}^{-3}$ ):  $10^7 \sim 10^{21}$
- Current Source: Range: 1nA-20mA Compliance: 12V
- Minimum Hall Voltage:  $1\mu\text{V}$

Temperature Ranges: HMS-5000: 80K to 350K (only)

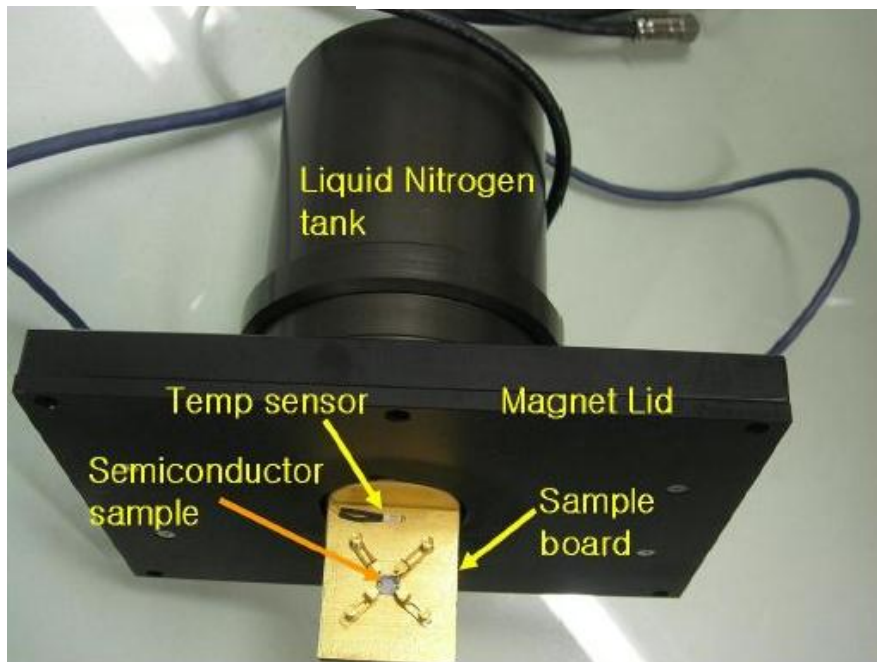
HMS-5300: 80°K to 350°K &/or 300°K to 573°K

HMS-5500: 80°K to 350°K &/or 300°K to 773°K

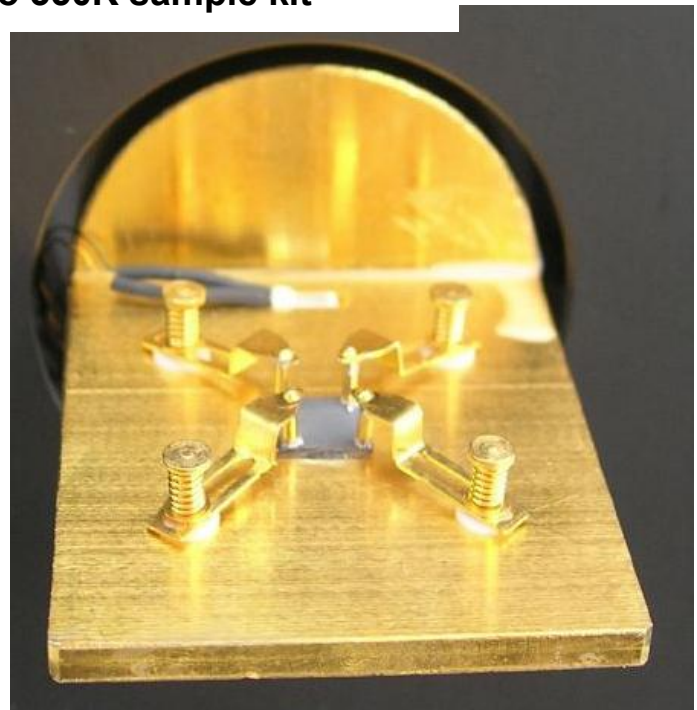


Software displaying carrier concentration versus temperature in range from 80K to 340K

Shown are parts for the 80K to 350K sample kit



Sample Mounting Fixture with upper cooling reservoir

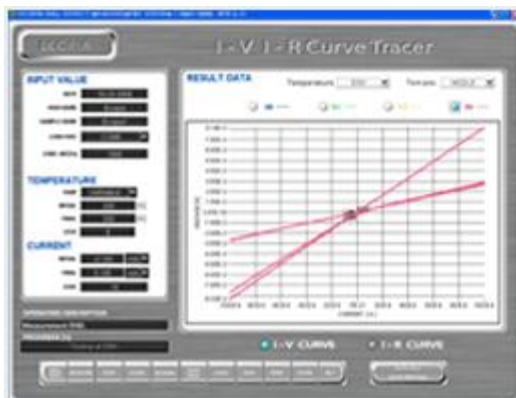


Sample Mounting Fixture

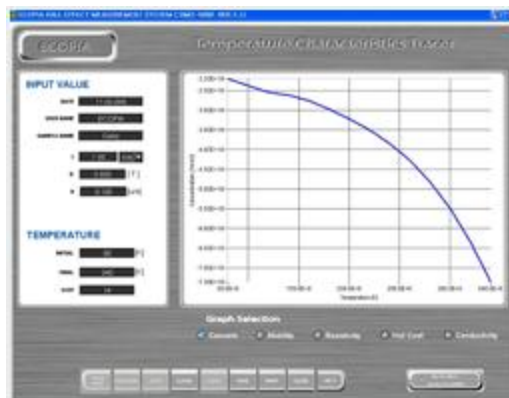
For best results, samples should be square in shape and can be from 5mm x 5mm up to 15mm x 15mm in size.



HMS-5000's Main Test Page



I-V, I-R graph per temp variation



Carrier concentration vs temp variation



Carrier mobility vs temp variation



Resistivity vs temp variation

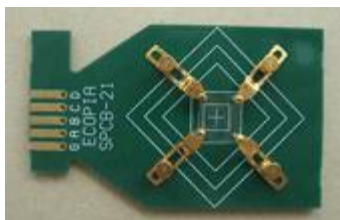


Hall Coefficient vs temp variation



Conductivity vs temp variation

An optional room-temperature / LN<sub>2</sub> temperature sample kit lid with sample board is available as an option for the HMS-5000

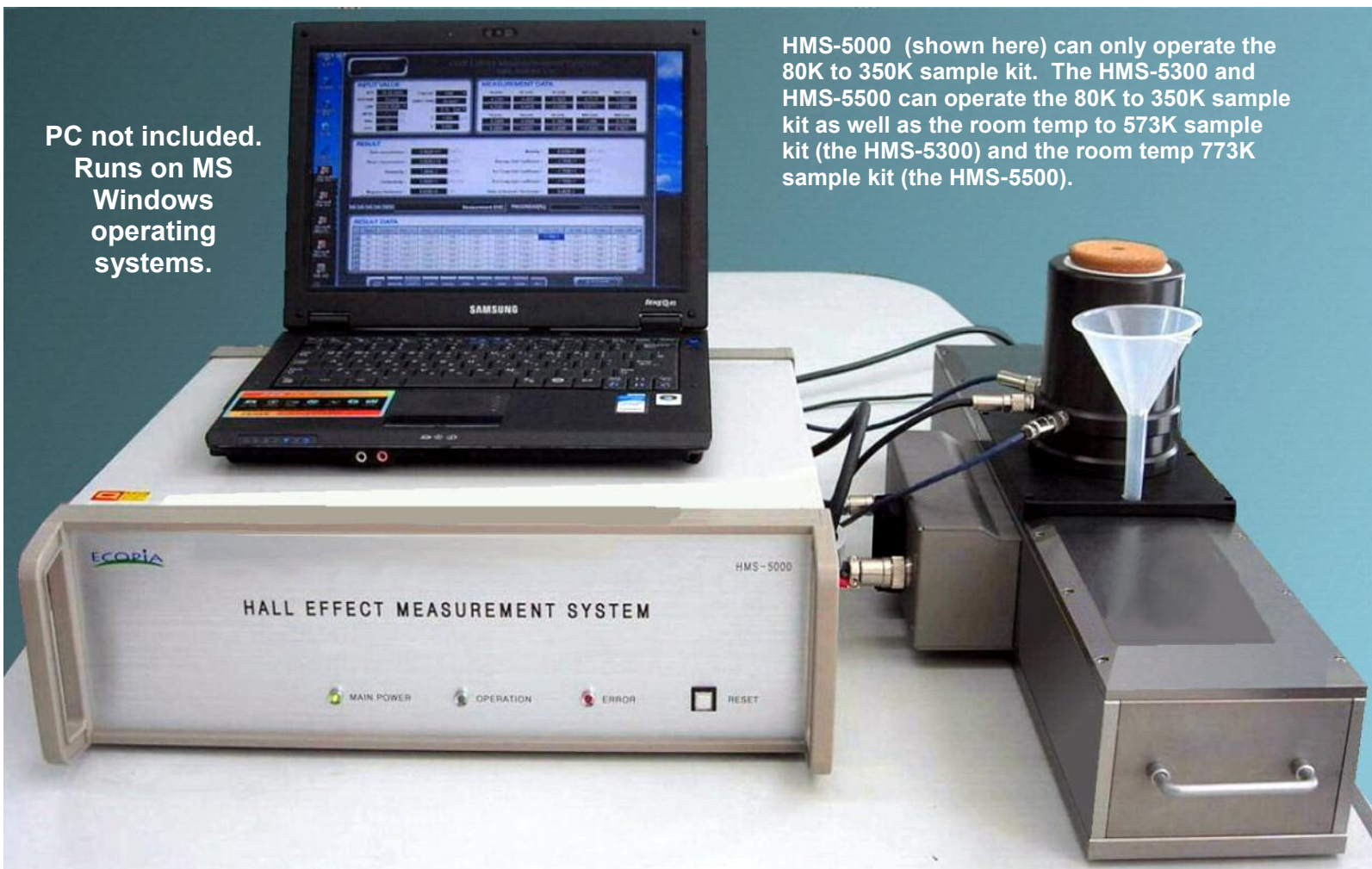


SPCB-21 spring mount board for use with HMS-5000 when equipped with the optional room-temperature / LN<sub>2</sub> temperature sample kit. For samples up to 20mm square.

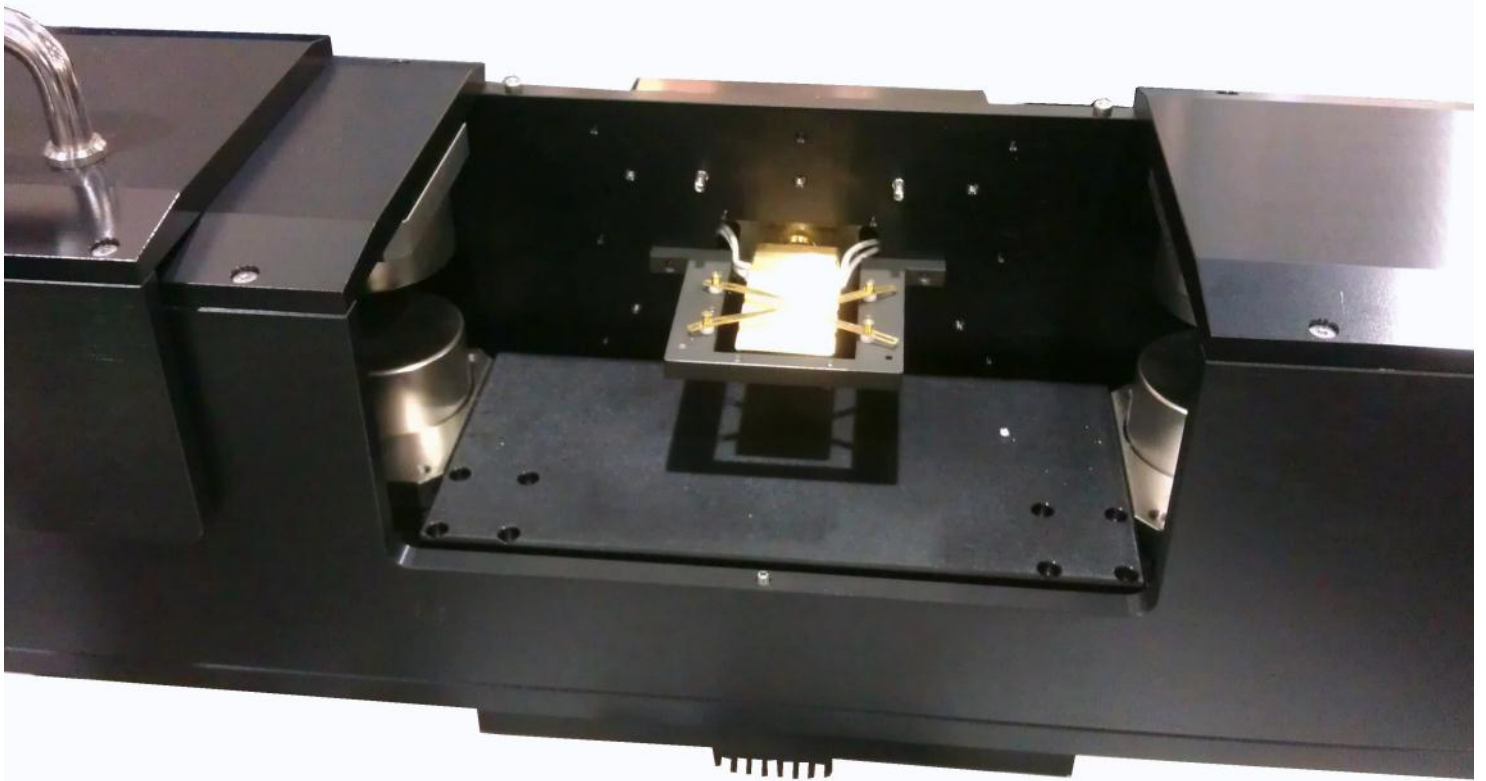


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HMS-5000 (shown here) can only operate the 80K to 350K sample kit. The HMS-5300 and HMS-5500 can operate the 80K to 350K sample kit as well as the room temp to 573K sample kit (the HMS-5300) and the room temp 773K sample kit (the HMS-5500).



## Room Temperature to 573°K or to 773°K Sample Kit for use with HMS-5300

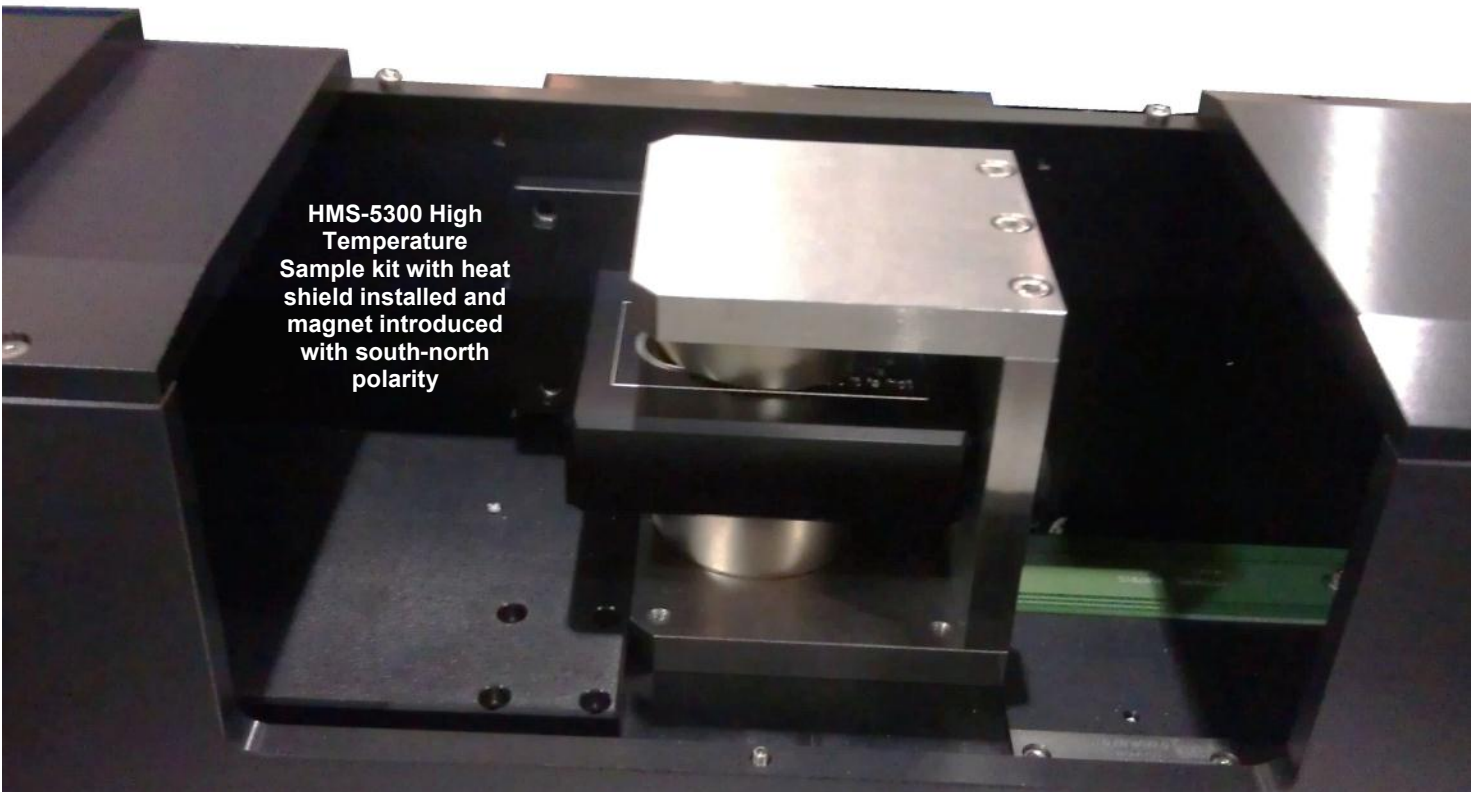
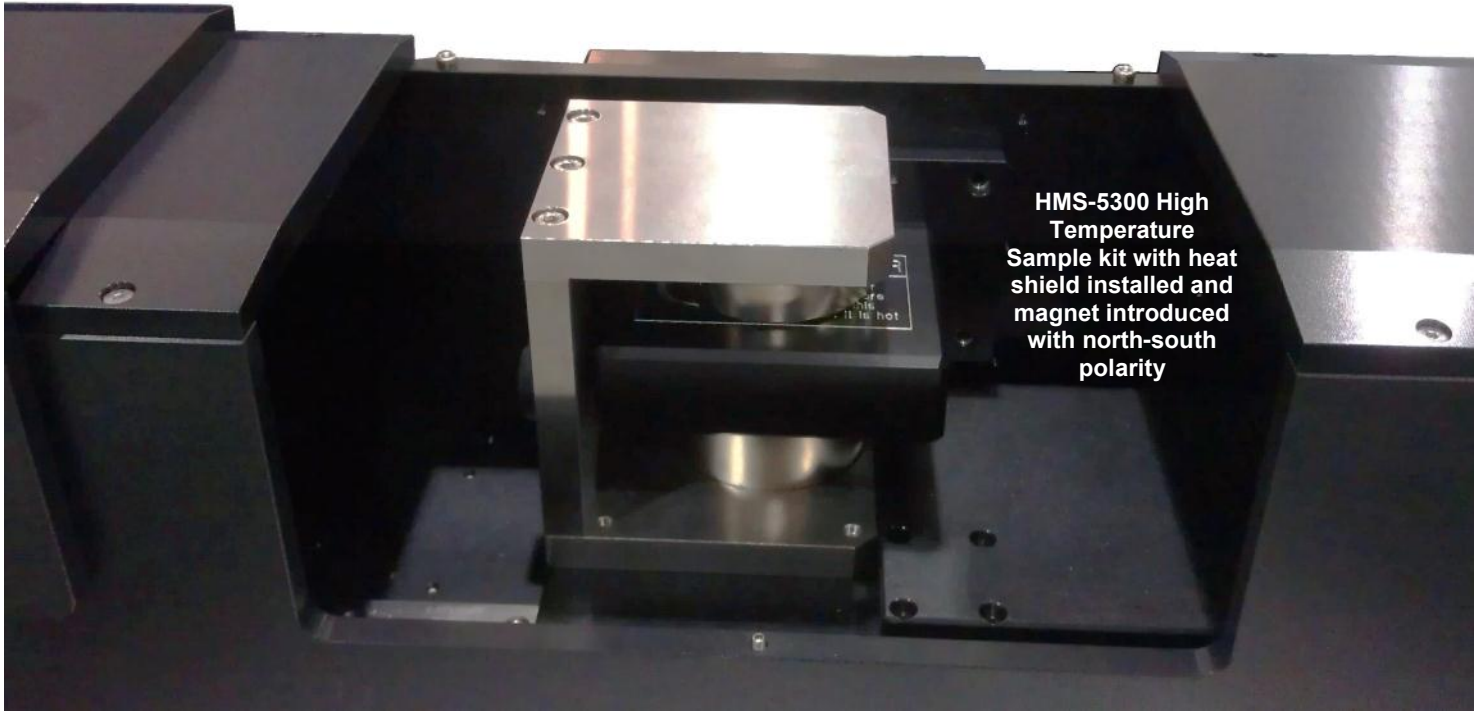


The HMS-5000 and HMS-5300 have two 0.55T magnet sets mounted on a ball bearing slide. A 0.55T magnet set is introduced by motor control from one direction, then with reversed polarity from the opposite direction. Shown above is the high temperature sample kit which is for use with the HMS-5300 only. The sample mounts horizontally onto the heater. Spring loaded probes make contact at four corners of the sample. The 80°K to 350°K sample kit mounts the sample vertically so that it can be submerged in liquid nitrogen.



The heat shield is placed over the sample/heater assembly when measuring at high temperatures up to 573°K (300°C) or up to 773°K (500°C). Gas ports on the back of the sample kit allow purge gas to flow during high temperature testing to prevent oxidation of the sample holder.

High temperature (room temperature to 573°K or to 773°K) sample kits for use with HMS-5300 shown with magnet introduced from one polarity, then from the other.



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