

GLIMPSE

Features of the Model CRX-EM-HF Cryogen-free Horizontal Field Electromagnet Probe Station

- Cryogen-free operation
- Allows unsupervised cool down
- Standard probing plus in-plane horizontal field electromagnetic measurements
- Generate full field without cooldown
- Probes configured at 30° angles to accommodate electromagnet
- Optional 360° rotation



The Lake Shore Model CRX-EM-HF probe station is a cryogen-free closed cycle refrigerant probe station with a ± 0.6 T horizontal, n-plane electromagnet. All standard CV, IV, microwave, and electro-optical probing, plus in-plane horizontal field electromagnetic measurements can be performed on this versatile probe station. Researchers can use the CRX-EM-HF for testing magneto-transport parameters. It is Lake Shore's premier cryogen-free probe station for vector-dependent magneto-transport measurements. To maximize magnetic field at the sample, the CRX-EM-HF has its probes configured at 30° angles for probing wafers up to 25 mm (1 in) in diameter.

Using a self-contained closed cycle refrigerator (CCR), the CRX-EM-HF will cool down to cryogenic temperatures unassisted, eliminating the need for monitoring by the researcher. A 360° sample stage rotation option allows measurement of angular-dependent and anisotropic magneto-transport properties.

Specifications

Sample cooling assembly

Type:	2-stage (sample + radiation shield)
Radiation shielding:	Radiation shield with top viewport surrounds sample
Cooling source:	2-stage closed cycle refrigerator (CCR) with 1 W cooling power at 4.2 K

Magnetic field

Magnet type:	Electromagnet
Field of orientation:	Horizontal (parallel to the sample plane)
Field control:	Hall probe installed in station for closed loop control
Field capability:	± 6 kOe (± 0.6 T)
Field homogeneity:	0.6% over 10 mm diameter; 2.6% over 25 mm diameter
Landed probe tip movement:	< 5 μm full field ramp

Temperature¹

Base temperature	Control range	Configuration
8 K	10 K to 400 K	Up to 4 probe arms installed
20 K	20 K to 675 K	with PS-HTA-EM option

¹Base temperature assumes heat load for probes thermally anchored as listed in probing section

Control stability

Sample stage temperature	Stability
Base temperature (no heater control)	Not specified
< 10 K	± 50 mK
10 K to 100 K	± 20 mK
101 K to 250 K	± 20 mK
251 K to 350 K	± 20 mK
351 K to 500 K	± 50 mK

Standard TPS-FRG

Pump down time	30 min (to reach $< 1 \times 10^{-3}$ Torr)
Room temperature	$< 5 \times 10^{-4}$ Torr
Base temperature	$< 1 \times 10^{-5}$ Torr
Maximum temperature	$< 5 \times 10^{-4}$ Torr

Cycle time:	4.5 h
Pump down:	0.5 h
Station cooldown:	2.25 h
Station warmup:	1.75 h

Vibration at sample:	< 1 μm
-----------------------------	---------------------

Sample

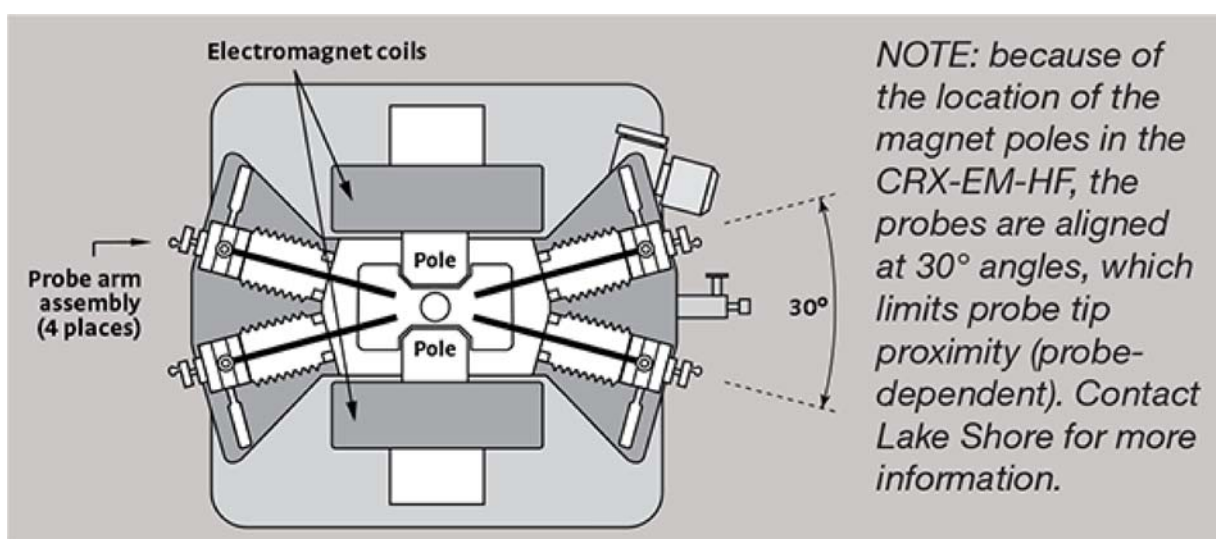
Maximum sample size:	25.4 mm (1 in) diameter
Sample backside optical access:	Not an option
Sample rotation:	Optional 360° rotation stage (PS-360-EMPX)

Probing configurations

Maximum probes:	4 (see orientation diagram)
Adjacent probe proximity:	Due to the orientation of the probe arms, adjacent probes have minimum landing distance. Contact Lake Shore for additional information.
Probe arm sensor:	Included for monitoring probe temperature
Cooled probe mounts:	<20 K with sample at base temperature
Probe mount:	Thermally anchored to sample stage
Probe arm:	Thermally anchored to radiation shield
DC/RF probes and DC/RF flexible probes:	Electrical isolation >100 GΩ for low leakage measurements
Microwave probes:	Frequency range DC up to 67 GHz for RF measurements
Fiber optic probes:	Available for electro-optical measurements
Probe landing:	All probes can land at single point in a 25.4 mm (1 in) diameter circle

Cryogen consumption

Room to base temperature (total):	Not required
Helium at 5 K:	Not required



Station details

Temperature equipment

Sample stage sensor/heater power:	CX-1050-CU-HT-1.4M/100 W
Radiation shield sensor/heater power:	DT-670C-CU silicon diode/50 W
CCR 2nd stage sensor/heater power:	DT-670A-CU silicon diode/50 W
CCR 1st stage sensor/heater power:	DT-670C-CU silicon diode/100 W
Probe arm:	DT-670C-SD silicon diode (on one probe arm)/no active control
Electronics console::	
Temperature controllers:	Two Model 336s
Gaussmeter:	Model 475
Magnet power supply:	Model 625
Helium transfer line:	Not required

Included sample holder:

Removable SH-1.00-G-EM, 25.4 mm (1 in) max sample size, grounded

Station footprint:

911 mm (36 in) width × 660 mm (26 in) depth
(does not include console or CCR compressor)

Vacuum chamber

Material:	Electroless nickel-plated aluminum
Overall size:	191 mm (7.5 in) × 340 mm (13.4 in) × 213 mm (8.4 in) tall

Chamber access:	133.4 mm (5.25 in) × 243.2 mm (9.58 in) opening
Viewport:	63.5 mm (2.50 in) diameter fused quartz
Viewing area:	54.0 mm (2.13 in) diameter
Pump port:	NW 40 with included vacuum isolation valve
Gauge port:	NW 25
Gas port:	0.25 in NPT with valve
Over pressure safety:	3.5 kPa (0.5 psi) pressure relief valve

Radiation shielding

Material:	Electroless nickel-plated aluminum
Sample access:	59 mm (2.3 in) × 157 mm (6.2 in)
Viewport:	50 mm (1.97 in) diameter IR absorbing window
Viewing area:	50 mm (1.97 in) diameter

Vision system

Included kits

Tool kit:	Included tools for standard operation
Spares kit:	Included kit for common consumable items
Probe starter kit:	ZN50R-25-W (qty 2), ZN50R-25-BECU (qty 2) for training

Utilities

1-phase voltage:	100/120/220/240 VAC (+5%, -10%), 50/60 Hz
1-phase power:	2 kVA recommended
3-phase voltage (CCR):	200 VAC (50/60 Hz) or 380/400/415 VAC 50 Hz or 480 VAC 60 Hz
3-phase power (CCR):	6.6 to 6.9 kW at 50 Hz; 7.5 to 7.8 kW at 60 Hz
Cooling water power dissipation (CCR):	8.5 kW max, 6.9 kW steady state at 50 Hz; 9.0 kW max, 7.8 kW steady state at 60 Hz
3-phase voltage (EM):	200/208, 220/230, 380, 400/415 VAC (±10%), 50/60 Hz
3-phase power (EM):	5.5 kVA max, 50/60 Hz
Cooling water power dissipation (EM):	5 kW max, 50/60 Hz

Approval:

All instruments CE marked