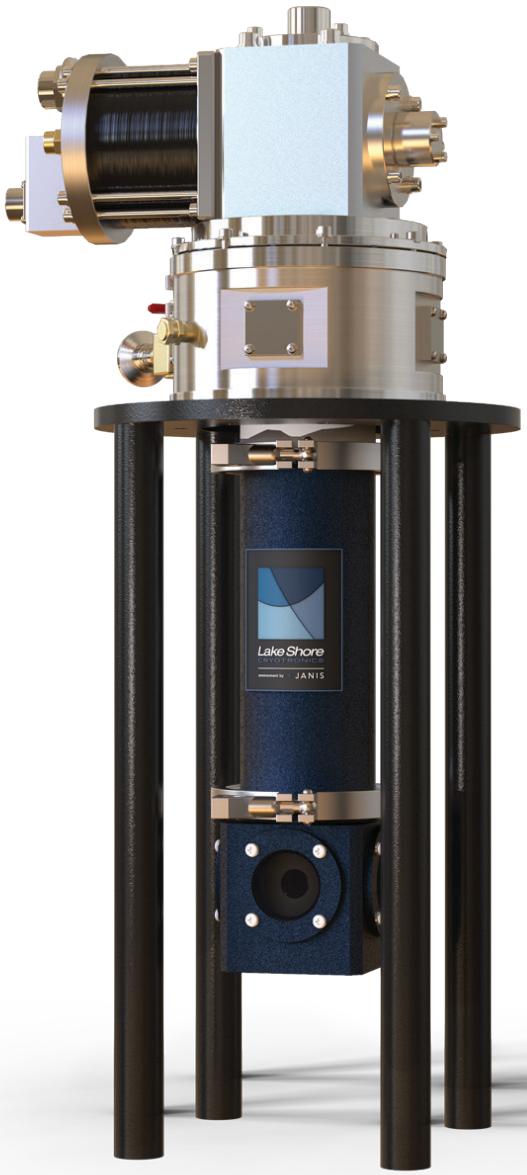
Lake Shore CRYOTRONICS

environment by JANIS



4 K CCR Cryostats

SHI-4-XX, **SHI-4S-XX**, **SHI-4T-XX,** and **SHI-4ST-XX optical and non-optical cryogen-free cryostats—** sample in vacuum

The Lake Shore SHI-4 Series cryostats provide cryogen-free cooling for electrical measurements from <4 K to 325 K. They are equipped with interchangeable optics and include provisions for a wide variety of electrical connectors. The SHI-4T-XX and SHI-4ST-XX are equipped with non-optical vacuum shrouds, while the SHI-4ST-XX and SHI-4S-XX include a small diameter tail for insertion into an electromagnet. A wide variety of electrical connectors and wiring is available, and 500 K and 800 K high-temperature options are available on most models.

SHI-4-XX, **SHI-4T-XX, SHI-4S-XX,** and **SHI-4ST-XX** optical and non-optical cryogen-free cryostats—sample in vacuum

The Lake Shore SHI-4 Series cryostats provide cryogen-free cooling to temperatures <4 K. Cryogen-free operation eliminates the need for liquid helium or nitrogen, and enables unattended operation for days, weeks, or months. Samples can be connected with cryogenic-service wiring (single conductor, twisted-pair, or coaxial cables) for electrical measurements.

Typical applications for the standard optical SHI-4-XX include spectroscopy (photoluminescence, UV- visible) and electrical materials characterization. SHI-4-XX provides a four-way optical sample chamber that enables both reflectance and transmission geometries. Standard fused silica windows provide transmission from the UV to near-IR regions. Alternatively, optional window materials can be installed for IR measurements. High-temperature options (500 K and 800 K) are available for most models. SHI-4T-XX systems are equipped with non-optical cylindrical vacuum shrouds and are ideal for electrical materials characterization, and for device cooling. SHI-4ST-XX and SHI-4S-XX subcompact models include an additional cold finger extension and compact vacuum shroud, making them ideal for insertion into an electromagnet pole gap.

Key features

- Cryogen-free operation (no liquid helium or liquid nitrogen required)
- Continuous temperature range from <4 K to 325 K
- Sample-in-vacuum configuration
- Four optical window ports (f = 1.0) for optical measurements from UV to IR (SHI-4-XX and SHI-4S-XX series)
- Gold plated copper sample holder
- Integrated cartridge heater and calibrated silicon diode sensor for precise temperature control
- Easy sample access by opening a single clamp and removing the thermal shield
- O-ring sealed ports accept DC and RF electrical feedthroughs
- Optional DC and RF wires and cables for electrical measurements
- 500 K and 800 K options available for most models
- Non-optical cylindrical vacuum shroud (SHI-4T-XX and SHI-4ST-XX series)

SHI-4 Series

Featured components

- Copper sample mount with sample holder
- Cartridge style control heater and calibrated silicon diode sensor
- Thermal radiation shield
- Optical vacuum shroud with four o-ring sealed quartz windows (SHI-4-XX and SHI-4S-XX series)
- Compact non-optical (cylindrical) vacuum shroud and thermal radiation shield (SHI-4T-XX and SHI-4ST-XX series)
- Instrumentation adapter with 10-pin electrical feedthrough, three spare o-ring sealed ports, evacuation valve, safety pressure relief valve
- Cryostat mounting stand
- Compatible compressor with stainless steel helium gas supply and return lines

Selections

Cryocooler model

SHI-4-2 RDK-101-J
SHI-4-7 RDK-205-J
SHI-4-10 RDK-408-J
SHI-4-12 RDK-412-J
SHI-4-15 RDK-415-J
SHI-4-18 RDK-418-J
SHI-4T-2 RDK-101-J
SHI-4T-7 RDK-205-J
SHI-4T-10 RDK-408-J
SHI-4T-12 RDK-412-J
SHI-4T-15 RDK-415-J
SHI-4T-18 RDK-418-J
SHI-4S-2 RDK-101-J
SHI-4S-7 RDK-205-J
SHI-4S-10 RDK-408-J
SHI-4S-12 RDK-412-J
SHI-4S-15 RDK-415-J
SHI-4S-18 RDK-418-J
SHI-4ST-2 RDK-101-J
SHI-4ST-7 RDK-205-J
SHI-4ST-10 RDK-408-J
SHI-4ST-12 RDK-412-J
SHI-4ST-15 RDK-415-J
SHI-4ST-18 RDK-418-J

High temperature stage

None
500 K: using calibrated silicon diode sensor
800 K: using Type E thermocouple sensor (not available for -2 or -7 models)

Other selections (SHI-4-XX series)

Gas introduction ports installed on vacuum shroud (for matrix isolation. Usually installed in combination with rotatable vacuum shroud option)
Fifth window port

Easily add DC, AC, and mixed DC+AC measurement capabilities to your cryostat with an M81-SSM

This modular, multichannel system provides highly synchronized DC, 100 kHz AC, and mixed DC + AC sourcing and measuring — including both voltage and current lock-in measurement capabilities — for low-temperature material research performed in your cryostat. It supports up to three remote-mountable source and three measure modules per a single M81-SSM-6 instrument and, owing to its modularity, allows signal and source amplifiers to be located as close as possible to the sample being characterized. This minimizes the signal wiring to the sample, reduces noise, and increases measurement sensitivity. The modules also leverage patent-pending MeasureSync™ real-time sampling technology to ensure synchronous sourcing and measuring across all channels. Plus, by having both DC and AC sourcing and measurement in one instrument, the M81-SSM can eliminate the need for mixed-instrument setups, greatly simplifying the setup of complex characterization configurations.

M81-SSM synchronous source measure system

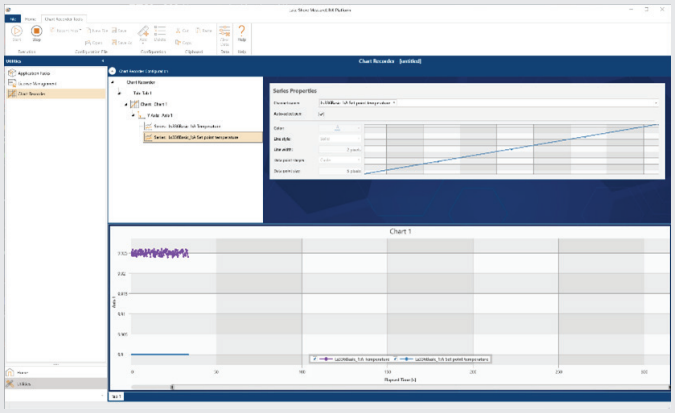
Real-time sampling architecture for synchronous sourcing/measuring
All source and measure channels are capable of DC and AC to 100 kHz signals
100% linear circuitry for the lowest possible source/measure noise
Optimized for fundamental, harmonic, and phase AC plus DC biased measurements
Unique, flexible instrument/distributed module architecture
Provides the absolute precision of DC plus the detection sensitivity performance of AC instrumentation
Uses a clean, simple UI and common programming API for fast setup
Included MeasureLINK software enables full end-to-end measurement and cryostat temperature control

MeasureLINK™

For total control of measurements performed in a cryostat, add our MeasureLINK software

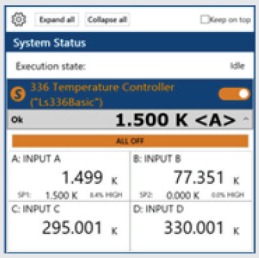
Our optional MeasureLINK software enables a wide range of capabilities including charting and logging, system monitoring with a cryostat-specific process view, and even controlling Lake Shore equipment as well as some third-party instrumentation, in a non-programming environment. You can also create unlimited functionality using the scripting development environment.

- Create multiple configurations to support separate measurements
- Monitor temperature and change setpoints with the monitor pane
- Easily create nested, multi-level measurement loop sequences
- See real-time internal cryostat temperatures in Process View
- Charts and log all system variables with Chart Recorder
- No programming required — drag and drop to create temperature sweeps, access measurements, and add third-party instruments
- Custom scripting function allows you to construct new and edit existing measurement scripts



The chart recorder utility enables charting and logging of all system variables, for example, so you can keep a close eye on temperature trends in a cryostat experiment in real-time; it also helps you determine when steady-state conditions have been reached.

MeasureLINK Monitor Pane



MeasureLINK™

Options

Windows

Custom window options are available—contact Lake Shore for more information.

- Fused silica: 3 mm thick consult Lake Shore
- Sapphire: 3 mm thick consult Lake Shore
- ZnSe: 3 mm thick, wedged consult Lake Shore
- KBr: 6 mm thick consult Lake Shore
- CaF_2: 3 mm thick consult Lake Shore
- TPX: 3 mm thick consult Lake Shore

Sample holders

Custom sample holder options are available—contact Lake Shore for more information.

- Optical consult Lake Shore
- Blank consult Lake Shore
- Resistivity consult Lake Shore
- Fixed probe (DLTS) consult Lake Shore
- LCC consult Lake Shore
- DIP consult Lake Shore

Options

Electrical feedthroughs

(1) BNC grounded	EF-BNC-1-B-AL
(2) BNC grounded	EF-BNC-2-S-AL
(6) BNC grounded	EF-BNC-6-G
(1) BNC insulated	EF-BNC-1-B-NC
(2) BNC insulated	EF-BNC-2-S-NC
(6) BNC insulated	EF-BNC-6-I
(1) triaxial grounded	EF-TRIAX-1-B-AL
(6) triaxial grounded	EF-TRIAX-6-G
(1) triaxial insulated	EF-TRIAX-1-B-NC
(6) triaxial insulated	EF-TRIAX-6-I
(2) SMA grounded	EF-SMA-2-B-AL
(6) SMA grounded	EF-SMA-6-G
(2) SMA insulated	EF-SMA-2-B-NC
(6) SMA insulated	EF-SMA-6-I
10-pin	10P-ASSEMBLY
19-pin	19P-ASSEMBLY
26-pin	26P-ASSEMBLY
32-pin	32P-ASSEMBLY

Additional temperature sensors

One Lake Shore calibrated diode is now included on every cryostat as the control sensor

Silicon diode, calibrated	DT-670-CU-HT-1.4L
Cernox® magnetic field independent, calibrated	CX-1050-CU-HT-1.4M
Thermocouple, Type E	consult Lake Shore

Installed wiring

(1), (2), or (6) coaxial cables, SMA	CABLEASSY-63340
(1), (2), or (6) coaxial cables, BNC	CABLEASSY-63342
(1) or (6) triaxial cables	CABLEASSY-63341
(10), (19), (26), or (32) PhBr wires	WIRE-PHBR

Accessories

Available at www.lakeshore.com

Vacuum pumping station	7DDP, 10DDP, or TS-85-D
Temperature controller	336 or 335

336 temperature controller

335 temperature controller

Specifications

	SHI-4-2 SHI-4T-2 SHI-4S-2 SHI-4ST-2	SHI-4-7 SHI-4T-7 SHI-4S-7 SHI-4ST-7	SHI-4-10 SHI-4T-10 SHI-4S-10 SHI-4ST-10	SHI-4-12 SHI-4T-12 SHI-4S-12 SHI-4ST-12	SHI-4-15 SHI-4T-15 SHI-4S-15 SHI-4ST-15	SHI-4-18 SHI-4T-18 SHI-4S-18 SHI-4ST-18
Temperature range	<4 K (<3 K optional) to 325 K	<4 K (<4.5 K SHI-4-05) to 325 K	<4 K to 325 K	<4 K to 325 K	<4 K to 325 K	<4 K to 325 K
Cold head cooling power	0.2 W	0.7 W	1.0 W	1.2 W	1.5 W	1.8 W
500 K option available	✓	✓	✓	✓	✓	✓
800 K option available	✗	✗	✓	✓	✓	✓
Typical initial cooldown time[1]	120 min to 5 K at 60 Hz (150 min to 5 K at 50 Hz)	70 min to 4.5 K	60 min to 4 K			
Recommended maintenance	10,000 h					

Size[2]

Height	584 mm (23 in)	762 mm (30 in)	838 mm (33 in)			
Inner diameter (at sample region)	64 mm (2.5 in)		76 mm (3 in)			
Sample mount diameter	38 mm (1.5 in)		51 mm (2 in)			
Weight (approximate)	16 kg (36 lb)	24 kg (53 lb)	28 kg (62 lb)	30 kg (66 lb)	29 kg (63 lb)	30 kg (66 lb)
Shipping weight (approximate)	156 kg (345 lb)	215 kg (473 lb)	Contact Lake Shore			
Shipping dimensions (approximate)	4/4T: 813 mm × 813 mm × 991 mm (32 in × 32 in × 39 in); 4S/4ST: 813 mm × 813 mm × 864 mm (32 in × 32 in × 34 in)	4/4T: 813 mm × 813 mm × 1194 mm (32 in × 32 in × 47 in); 4S/4ST: 813 mm × 813 mm × 1321 mm (32 in × 32 in × 52 in)	Contact Lake Shore			

[1] Cooldown time shown is for SHI-4T-XX models; cooldown time for SHI-4S-XX and SHI-4ST-XX varies depending upon cold finger length and diameter, and may be longer

[2] Sizes shown are for the SHI-4-XX and SHI-4T-XX series; please contact us for the SHI-4S-XX and SHI-4ST-XX subcompact series dimensions

Ordering information

Options

Windows

Custom window options are available—contact Lake Shore for more information.

CONSULT	Fused silica, 3 mm thick
CONSULT	Sapphire: 3 mm thick
CONSULT	ZnSe: 3 mm thick, wedged
CONSULT	KBr: 6 mm thick
CONSULT	CaF_2: 3 mm thick
CONSULT	PX: 3mm thick

Sample holders

Custom sample holder options are available—contact Lake Shore for more information.

CONSULT	Optical
CONSULT	Blank
CONSULT	Resistivity
CONSULT	DIP
CONSULT	LCC

Electrical feedthroughs

EF-BNC-1-B-AL	(1) BNC grounded
EF-BNC-2-S-AL	(2) BNC grounded
EF-BNC-6-G	(6) BNC grounded
EF-BNC-1-B-NC	(1) BNC insulated
EF-BNC-2-S-NC	(2) BNC insulated
EF-BNC-6-I	(6) BNC insulated
EF-TRIAX-1-B-AL	(1) triaxial grounded
EF-TRIAX-6-G	(6) triaxial grounded
EF-TRIAX-1-B-NC	(1) triaxial insulated
EF-TRIAX-6-I	(6) triaxial insulated
EF-SMA-2-B-AL	(2) SMA grounded
EF-SMA-6-G	(6) SMA grounded
EF-SMA-2-B-NC	(2) SMA insulated
EF-SMA-6-I	(6) SMA insulated
10P-ASSEMBLY	10-pin
19P-ASSEMBLY	19-pin
26P-ASSEMBLY	26-pin
32P-ASSEMBLY	32-pin

Additional temperature sensors

DT-670-CU-HT-1.4L	Silicon diode, calibrated (one included with cryostat)
CX-1050-CU-HT-1.4M	Cernox® magnetic field independent, calibrated

Installed wiring

CABLEASSY-63340	(1), (2), or (6) coaxial cables, SMA
CABLEASSY-63342	(1), (2), or (6) coaxial cables, BNC
WIRE-PHBR	(10), (19), (26), or (32) PhBr wires

Accessories

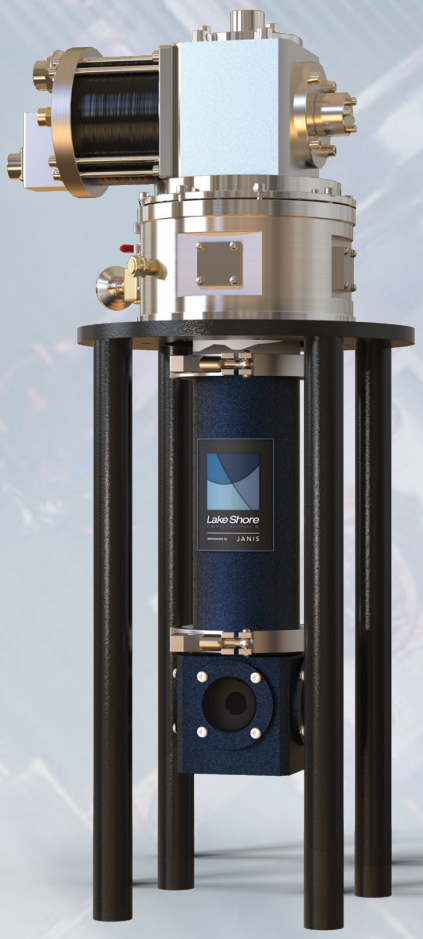
M81-SSM electronic synchronous source measure system

Contact us for standard/optical sample mounts or for interface cables/adapters for M81-SSM system/cryostat integration.
Also available: specially priced preconfigured M81-SSM/cryostat packages for certain cryostat models—contact Sales for details.

M81-SSM-2	M81-SSM instrument with 1 source and 1 measure channel, including M81-SSM accessory kit (USB-A to USB-C adapter, USB-A male to USB-B male cable, terminal connectors for digital I/O, terminal connectors for chassis ground, quick-start guide) and a 2 m (6.6 ft) LEMO to BNC adapter cable
M81-SSM-4	M81-SSM instrument with 2 source and 2 measure channels, including M81-SSM accessory kit (USB-A to USB-C adapter, USB-A male to USB-B male cable, terminal connectors for digital I/O, terminal connectors for chassis ground, quick-start guide) and a 2 m (6.6 ft) LEMO to BNC adapter cable
M81-SSM-6	M81-SSM instrument with 3 source and 3 measure channels, including M81-SSM accessory kit (USB-A to USB-C adapter, USB-A male to USB-B male cable, terminal connectors for digital I/O, terminal connectors for chassis ground, quick-start guide) and a 2 m (6.6 ft) LEMO to BNC adapter cable
ML-MCS	MeasureLINK-MCS software with scripting development license. Includes complete MeasureLINK installation with Lake Shore instrument drivers, chart recorder functionality and drag-and-drop measurement sequences. Some application packs sold separately.

Other accessories

7DDP	Vacuum pumping station
10DDP	Vacuum pumping station
TS-85-D	Turbomolecular pumping station
336	Model 336 temperature controller
335	Model 335 temperature controller



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