SuperTran cryostats
ST-100 & ST-200

SuperTran Cryostats

ST-100 optical and **ST-200** non-optical cryostats

The versatile Lake Shore **ST-100** and **ST-200** continuous-flow cryostats offer easy operation and are supplied with a high-efficiency transfer line for use with either LHe or LN_2. The cryostats provide a variable temperature sample environment for electrical measurements (as well as optical measurements with the ST-100) from <2 K (with LHe) or 77 K (with LN_2) to 500 K. They can be combined with the RGC4 recirculating cooler for cryogen-free operation.

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Lake Shore CRYOTRONICS environment by JANIS

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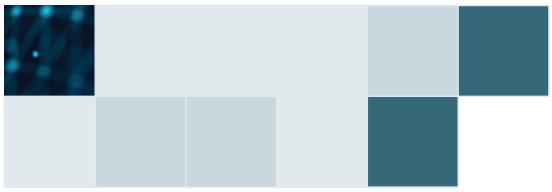

ST-100 optical and **ST-200** non-optical cryostats

The Lake Shore SuperTran ST-100 and ST-200 continuous-flow cryostats offer operating temperatures from <2 K to 500 K (700 K optional). Simple to operate, they use a high-efficiency transfer line to deliver LHe or LN_2 to the sample mount for cooling the user sample. A built-in heater and sensor provide precision variable temperature capability. Temperatures below 4.2 K are achieved by reducing the venting helium gas pressure using a mechanical vacuum pump. High temperature capability (to 700 K) is provided using an optimized sensor (type E thermocouple) and heaters.

Access to the sample compartment is provided by a quick-disconnect clamp. Samples are mounted in a 76 mm (3 in) diameter vacuum space and can be connected with cryogenic-service wiring (single conductor, twisted-pair, or coaxial cables). On the ST-100, the four-way optical sample chamber (with a numeric aperture of f1.0) can be configured for reflectance or transmission measurements. Standard windows are UV-grade fused silica, offering transmission from the UV to near-IR regions (optional window materials can be installed to span the far/mid-IR, VUV, and x-ray regions for a variety of spectroscopic measurements).

The ST-100 or ST-200 can be combined with the RGC4 recirculating gas cooler for fully cryogen-free operation throughout the entir temperature range. The RGC4 enables unattended cryostat operation, ideal for extended duration measurements.

Typical applications include materials characterization (resistivity, Hall effect), magnetoelectric studies, and RF component cooling and testing. The ST-100 is also ideal for spectroscopy (photoluminescence, FTIR, UV-visible) applications. Low cost, light weight, portability, reliability, and ease of use have made these workhorse cryostats the choice of laboratories around the world for more than 50 years.

Custom configurations can be fabricated to fit restricted spaces (such as in a magnet system or spectrometer) or to allow the insertion of very large samples (such as semiconductor wafers or “cold plates” to cool several samples at once).

Key features

- Sample-in-vacuum configuration
- Continuous-flow design, using a high-efficiency transfer line to deliver a steady stream of LHe or LN_2 from a storage Dewar to the sample mount
- Variable temperature sample mount and sample holder, with temperature regulated via internal heater and calibrated silicon diode (and external temperature controller)
- Sample is accessed by opening a single clamp
- Continuous temperature range from <2 K to 500 K (LHe) or 77 K to 500 K (LN_2); 700 K maximum temperature capability can be selected at time of order
- Compatible with RGC4 recirculating gas cooler for cryogen-free operation
- O-ring sealed ports accept DC and RF electrical feedthroughs
- Optional DC and RF wires and cables for electrical measurements
- Four optical window ports (f = 1.0) on ST-100 model can be used for optical measurements from UV to IR

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SuperTran cryostats ST-100 & ST-200

ST-100/ST-200

Featured components

- Copper sample mount with removable sample holder
- Integrated control heater and calibrated silicon diode control sensor
- Cylindrical vacuum shroud (optical ST-100 has four o-ring sealed window ports on shroud)
- Polished aluminum thermal radiation shield
- Instrumentation adapter with 10-pin electrical feedthrough, three spare o-ring sealed ports, evacuation valve, and safety pressure relief valve
- High-efficiency LHe/LN_2 transfer line with needle valve flow control

Selections

Maximum temperature

- 500 K: Standard, using calibrated silicon diode sensor
- 700 K: Replaces standard silicon diode sensor with Type E thermocouple

Transfer line

- 6 ft (182.8 cm) standard flex length
- Custom flex length consult Lake Shore
- Right angle leg(s) consult Lake Shore

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™

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SuperTran cryostats ST-100 & ST-200

Options

Windows (ST-100 only)

Custom window options are available, including diamond and polypropylene. Contact Lake Shore for more information.

Fused silica	WR-STD-FS
Sapphire	WR-STD-SAPH
ZnSe	WR-STD-ZNSE
CaF_2	WR-ST-CAR2
KBr	WR-6MM-KBR
TPX	WR-STD-TPX
Custom large diameter	consult Lake Shore

Other options

Reentrant window flange assembly (ST-100 only)	consult Lake Shore
Fifth bottom window (ST-100 only)	consult Lake Shore

Sample holders

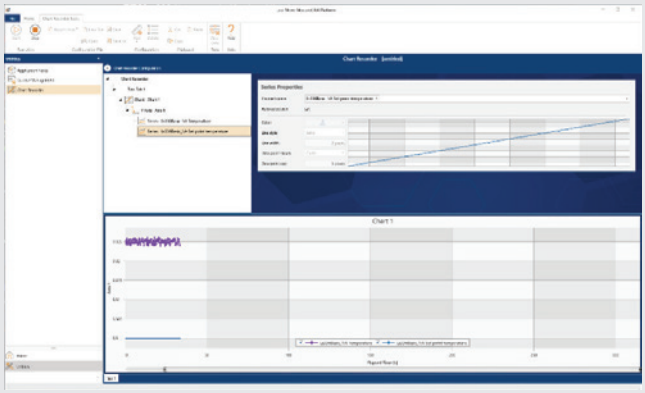
Custom sample holders are available. Contact Lake Shore for more information.

Optical	SH-OPTICAL-1.25-STD
Blank	SH-BLANK-1.25-STD
Resistivity	SH-RESISTIVITY-1.25-STD
Fixed probe (DLTS)	SH-FIXED-1.25-STD
LCC	consult Lake Shore
DIP	SH-DIP-1.25-STD

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

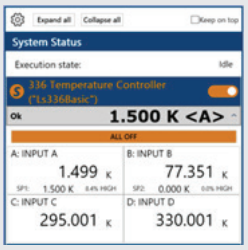
Our optional MeasureLINK software enables a wide range of capabilities including charting and logging, system monitoring with a cryostat-specific process view, and even controlling Lake Shore equipment as well as some third-party instrumentation, in a non-programming environment. You can also create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

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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 (for 700 K operation)	consult Lake Shore

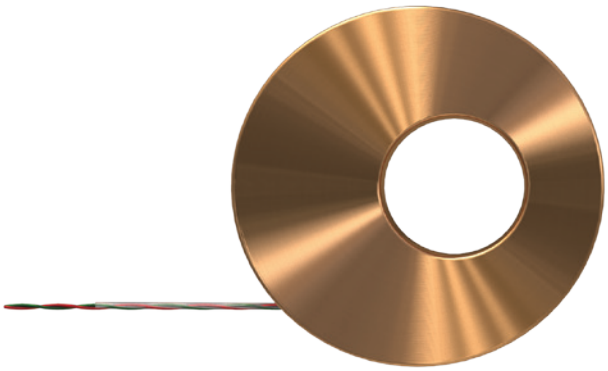
Installed wiring

(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), or (26) PhBr wires	WIRE-PHBR

Accessories

Available at www.lakeshore.com

LHe storage Dewar	CF-100
LN_2 storage Dewar	LN-50
Vacuum pumping station	10RVP, 10DDP, or TS-85-D
Temperature controller	325, 335, or 336



Cernox CU-HT sensor

336 temperature controller

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Specifications

ST-100

ST-200

Initial cooldown time (LHe to 5 K)	15 min	
Temperature range	<2 K to 500 K (700 K optional)	<2.5 K to 500 K (700 K optional)
Typical temperature stability[1]	±50 mK	
Orientation[2]	Any	
Cryogen consumption (LHe room to base temp)	0.4 L	
Cryogen consumption (LHe at 5 K)	0.6 L/h	
Cryogen consumption (LN_2 at 80 K)	0.1 L/h	
Initial vacuum level requirement[3]	~10^{-3} Torr	
Typical base pressure during operation	~10^{-5} Torr	

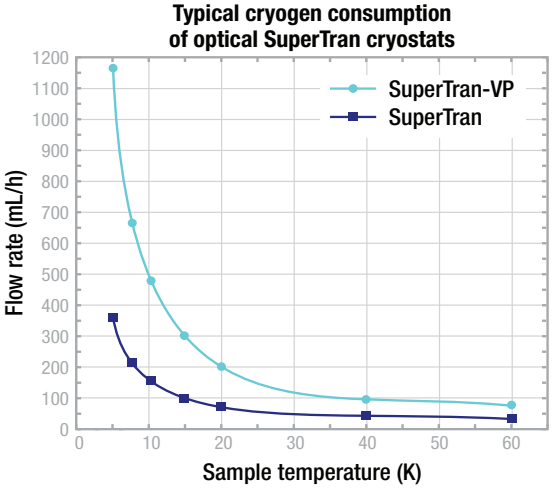
Size

Height	583 mm (23 in)	
Inner diameter (at sample region)	64 mm (2.5 in)	
Sample mount diameter	38 mm (1.5 in)	
Weight (excluding transfer line)	~4.6 kg (10 lb)	
Shipping weight (cryostat only)	8.6 kg (19 lb)	
Shipping weight (transfer line)	9.1 kg (20 lb)	
Shipping dimensions (cryostat only)	762 × 508 × 508 mm (30 × 20 × 20 in)	
Shipping dimensions (transfer line)	2057 × 660 × 127 mm (81 × 26 × 5 in)	

[1] Measured with temperature controller

[2] Cryogenic consumption may be higher during non-vertical operation

[3] Pressure measured at room temperature, prior to adding cryogen



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Ordering information

Options

Windows

Custom window options are available, including diamond and polypropylene. Contact Lake Shore for more information.

WR-STD-FS	Fused silica
WR-STD-SAPH	Sapphire
WR-STD-ZNSE	ZnSe
WR-STD-CAF2	CaF_2
WR-6MM-KBR	KBr
WR-STD-TPX	TPX
CONSULT	Custom large diameter

Other options

CONSULT	Reentrant window flange assembly (ST-100 only)
CONSULT	Fifth bottom window (ST-100 only)

Sample holders

Custom sample holders are available. Contact Lake Shore for more information.

SH-OPTICAL-1.25-STD	Optical
SH-BLANK-1.25-STD	Blank
SH-RESISTIVITY-1.25-STD	Resistivity
SH-FIXED-1.25-STD	Fixed probe (DLTS)
CONSULT	LLC
SH-DIP-1.25-STD	DIP (with cooled radiation shield window)

Electrical feedthroughs

EF-BNC-6-G	(6) BNC grounded
EF-BNC-6-I	(6) BNC insulated
EF-TRIAX-6-G	(6) triaxial grounded
EF-TRIAX-6-I	(6) triaxial insulated
EF-SMA-6-G	(6) SMA grounded
EF-SMA-6-I	(6) SMA insulated
10P-ASSEMBLY	10-pin
19P-ASSEMBLY	19-pin
26P-ASSEMBLY	26-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
CONSULT	Thermocouple (for 700 K operation)

Installed wiring

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

CF-100	100 L LHe storage Dewar
LN-50	50 L LN_2 storage Dewar
10RVP	Vacuum pumping station
10DDP	Vacuum pumping station
TS-85-D	Turbomolecular pumping station
336	Model 336 temperature controller
335	Model 335 temperature controller
325	Model 325 temperature controller

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