



environment by  JANIS



### *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<sub>2</sub>. 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<sub>2</sub>) to 500 K. They can be combined with the RGC4 recirculating cooler for cryogen-free operation.



## 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 (800 K optional). Simple to operate, they use a high-efficiency transfer line to deliver LHe or LN<sub>2</sub> 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 800 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  $f/1.0$ ) 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 entire 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

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Sample-in-vacuum configuration

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Continuous-flow design, using a high-efficiency transfer line to deliver a steady stream of LHe or LN<sub>2</sub> from a storage Dewar to the sample mount

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Variable temperature sample mount and sample holder, with temperature regulated via internal heater and calibrated silicon diode (and external temperature controller)

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Sample is accessed by opening a single clamp

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Continuous temperature range from ~2 K to 500 K (LHe) or 77 K to 500 K (LN<sub>2</sub>); 800 K maximum temperature capability can be selected at time of order

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Compatible with RGC4 recirculating gas cooler for cryogen-free operation

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O-ring sealed ports accept DC and RF electrical feedthroughs

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Optional DC and RF wires and cables for electrical measurements

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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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## 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<sub>2</sub> transfer line with needle valve flow control

## Selections

### Maximum temperature

500 K: Standard, using calibrated silicon diode sensor

800 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™

## 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<sub>2</sub> [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](#)

Bottom window [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

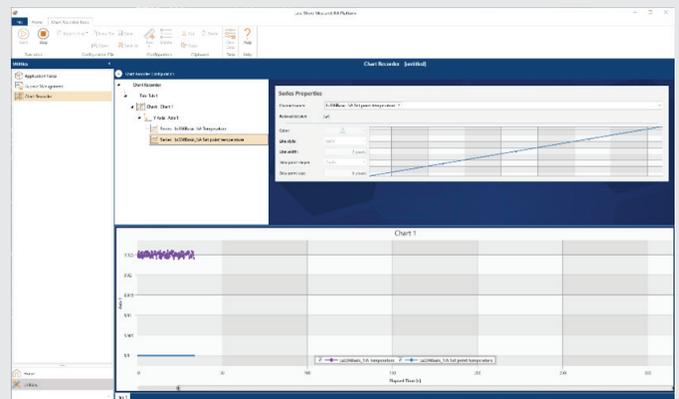
Easily create nested, multi-level measurement loop sequences

See real-time internal cryostat temperatures in Process View

Charts and log all system variables with Chart Recorder

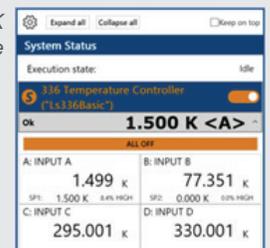
No programming required — drag and drop to create temperature sweeps, access measurements, and add third-party instruments

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™

## 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 800 K operation only) [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

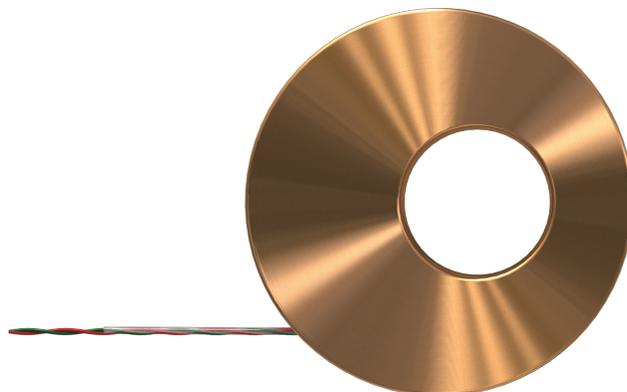
Available at [www.lakeshore.com](http://www.lakeshore.com)

LHe storage Dewar [CF-100](#)

LN<sub>2</sub> storage Dewar [LN-50](#)

Vacuum pumping station [10RVP, 10DDP, or TS-85-D](#)

Temperature controller [325, 335, or 336 \(335 included as standard\)](#)



Cernox CU-HT sensor



336 temperature controller

## Specifications



ST-100



ST-200

Initial cooldown time (LHe to 5 K)	15 min	
Temperature range	~2 K to 500 K (800 K optional)	~2.5 K to 500 K (800 K optional)
Typical temperature stability <sup>1</sup>	±50 mK	
Orientation <sup>2</sup>	Any	
Cryogen consumption (LHe room to base temp)	0.4 L	
Cryogen consumption (LHe at 5 K)	0.6 L/h	
Cryogen consumption (LN <sub>2</sub> at 80 K)	0.1 L/h	
Initial vacuum level requirement <sup>3</sup>	~10 <sup>-3</sup> Torr	
Typical base pressure during operation	~10 <sup>-5</sup> Torr	

## Size

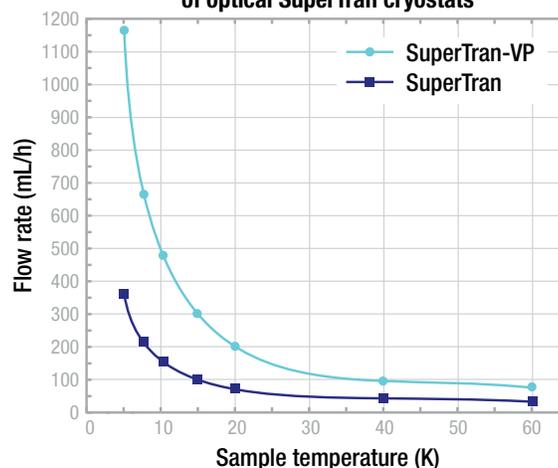
Height	583 mm (23 in)
Inner diameter (at sample region)	62 mm (2.43 in)
Sample mount diameter	32 mm (1.25 in)
Weight (excluding transfer line)	~4.6 kg (10 lb)
Shipping weight (cryostat only)	8.6 kg (19 lb)
Shipping weight (transfer line)	9.1 kg (20 lb)
Shipping dimensions (cryostat only)	762 × 508 × 508 mm (30 × 20 × 20 in)
Shipping dimensions (transfer line)	2057 × 660 × 127 mm (81 × 26 × 5 in)

<sup>1</sup> Measured with temperature controller

<sup>2</sup> Cryogenic consumption may be higher during non-vertical operation

<sup>3</sup> Pressure measured at room temperature, prior to adding cryogen

**Typical cryogen consumption of optical SuperTran cryostats**



## Ordering information

### Options

#### Windows

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

<b>WR-STD-FS</b>	Fused silica
<b>WR-STD-SAPH</b>	Sapphire
<b>WR-STD-ZNSE</b>	ZnSe
<b>WR-STD-CAF2</b>	CaF <sub>2</sub>
<b>WR-6MM-KBR</b>	KBr
<b>WR-STD-TPX</b>	TPX
<b>CONSULT</b>	Custom large diameter

#### Other options

<b>CONSULT</b>	Reentrant window flange assembly (ST-100 only)
<b>CONSULT</b>	Bottom window

#### Sample holders

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

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

#### Electrical feedthroughs

<b>EF-BNC-6-G</b>	(6) BNC grounded
<b>EF-BNC-6-I</b>	(6) BNC insulated
<b>EF-TRIAx-6-G</b>	(6) triaxial grounded
<b>EF-TRIAx-6-I</b>	(6) triaxial insulated
<b>EF-SMA-6-G</b>	(6) SMA grounded
<b>EF-SMA-6-I</b>	(6) SMA insulated
<b>10P-ASSEMBLY</b>	10-pin
<b>19P-ASSEMBLY</b>	19-pin
<b>26P-ASSEMBLY</b>	26-pin

#### Additional temperature sensors

<b>DT-670-CU-HT-1.4L</b>	Silicon diode, calibrated (one included with cryostat)
<b>CX-1050-CU-HT-1.4M</b>	Cernox® magnetic field independent, calibrated
<b>CONSULT</b>	Thermocouple (for 800 K operation only)

#### Installed wiring

<b>CABLEASSY-63340</b>	(1), (2), or (6) coaxial cables, SMA
<b>CABLEASSY-63342</b>	(1), (2), or (6) coaxial cables, BNC
<b>CABLEASSY-63341</b>	(1) or (6) triaxial cables
<b>WIRE-PHBR</b>	(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.

<b>M81-SSM-2</b>	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
<b>M81-SSM-4</b>	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
<b>M81-SSM-6</b>	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
<b>ML-MCS</b>	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

<b>CF-100</b>	100 L LHe storage Dewar
<b>LN-50</b>	50 L LN <sub>2</sub> storage Dewar
<b>10RVP</b>	Vacuum pumping station
<b>10DDP</b>	Vacuum pumping station
<b>TS-85-D</b>	Turbomolecular pumping station
<b>336</b>	Model 336 temperature controller
<b>335</b>	Model 335 temperature controller (included as standard)
<b>325</b>	Model 325 temperature controller



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