SuperTran cryostats
ST-300 & ST-300T

SuperTran Cryostats

ST-300 optical and **ST-300T** non-optical compact cryostats

The ST-300 is the compact optical version and the ST-300T is the compact non-optical version of Lake Shore's SuperTran continuous flow cryostat. The compact vacuum shroud is optimized for use in narrow gap electromagnets and optical configurations with limited available space. They provide a variable temperature sample environment for optical (ST-300 only), electrical, and magnetic measurements 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

ST-300 and **ST-300T** compact cryostats

The Lake Shore SuperTran ST-300 and ST-300T are compact continuous flow cryostats offering 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. Magnetic field independent Cernox® sensors can be installed for operation to 420 K.

Access to the sample compartment is provided by a quick disconnect clamp. Samples are mounted in a 36 mm (1.5 in) diameter vacuum space and can be connected with cryogenic-service wiring (single conductor, twisted-pair, or coaxial cables). In the ST-300, the four-way optical sample chamber 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-300 and ST-300T 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 for the ST-300/ST-300T include spectroscopy (photoluminescence, FTIR, UV-visible), materials characterization (resistivity, Hall effect), as well as low-temperature imaging and microscopy. When mounted to an electromagnet, magneto-electric and magneto-optical measurements are possible.

Custom configurations include replacement of the standard epoxy-sealed windows with o-ring-sealed windows for rapid window changes, rotatable vacuum shroud, sub-compact vacuum shroud, and extended length vacuum shroud.

Key features

- Sample-in-vacuum configuration, with continuous operation using the included high-efficiency transfer line
- Optional DC and RF wires and cables for electrical measurements
- Sample is easily accessed by opening a single clamp
- Four optical window ports can be used for optical measurements from UV to IR (ST-300 only)
- Continuous temperature range from <2 K to 500 K or 77 K to 500 K with optional 700 K high temperature
- Compatible with RGC4 recirculating gas cooler for cryogen-free operation
- O-ring sealed ports accept DC and RF electrical feedthroughs
- Variable temperature sample mount and sample holder, with temperature regulated by internal heater and calibrated silicon diode (and external temperature controller)

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SuperTran cryostats ST-300 & ST-300T

ST-300/ST-300T

Featured components

- 22.4 mm (0.88 in) diameter copper sample mount
- Integrated control heater and calibrated silicon diode control sensor
- High-efficiency, flexible LHe/LN_2 transfer line
- Vacuum shroud with 4 epoxy-sealed window ports (ST-300 only)
- Polished aluminum thermal radiation shield
- 10-pin electrical feedthrough, 3 spare o-ring sealed feedthrough ports, evacuation valve, and safety pressure relief valve

Selections

Temperature

- 500 K: standard using silicon diode sensor
- 420 K: replaces standard sensor with calibrated field-independent Cernox® sensor
- 700 K: replaces standard sensor with type E thermocouple

Vacuum shroud

- Rotatable
- Extended length
- Sub-compact diameter

Transfer line

- 6 ft (183 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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Options

Windows

ST-300 only. Custom window options are available, including fused silica, sapphire, ZnSe, CaF_2, KBr, and TPX. Contact Lake Shore for more information.

Mounting plates

Black anodized aluminum baseplate compatible with commercial optical tables.

Baseplate (imperial threads)	BASE-ST-VPF
Baseplate (metric threads)	BASE-ST-VPF-M

Sample holders

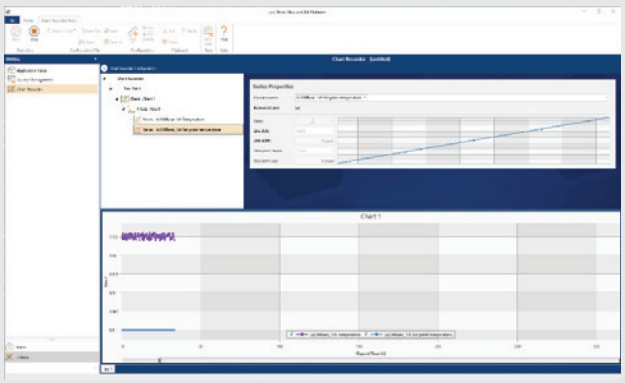
Custom sample holders are available. Contact Lake Shore for more information.

Optical (to 500 K)	SH-OPTICAL-0.88-STD
Optical (to 700 K)	SH-OPTICAL-0.88-700
Blank (to 500 K)	SH-BLNK-0.88-STD
Blank (to 700 K)	SH-BLNK-0.88-700
Resistivity	SH-RESISTIVITY-0.88-STD

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

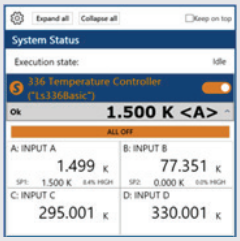
Our optional MeasureLINK software enables a wide range of capabilities including charting and logging, system monitoring with a cryostat-specific process view, and even controlling Lake Shore equipment as well as some third-party instrumentation, in a non-programming environment. You can also create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

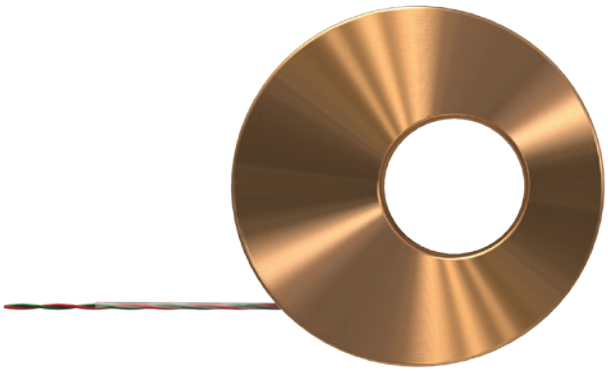
Installed wiring

(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

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-300

ST-300T

Initial cooldown time (LHe to 5 K)	15 min
Temperature range	<2 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

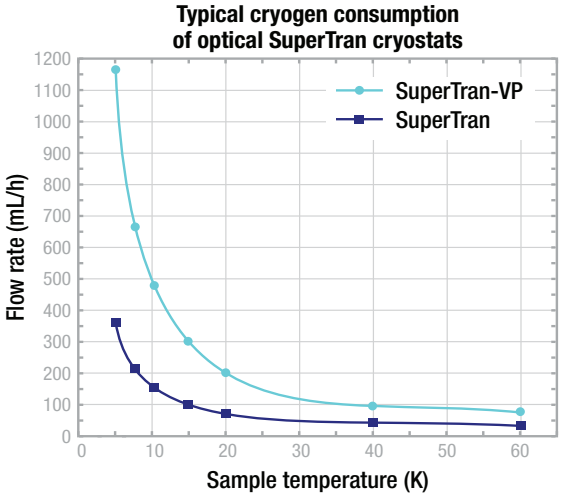
Size

Height	583 mm (23 in)
Inner diameter (at sample region)	29 mm (1.13 in)
Sample mount diameter	22.4 mm (0.88 in)
Weight (excluding transfer line, nominal)	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)	2057.4 × 660.4 × 127 mm (81 × 26 × 5 in)

[1] Measured with temperature controller

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

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



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Ordering information

Options

Windows
ST-300 only. Custom window options are available, including fused silica, sapphire, ZnSe, CaF_2, KBr and TPX. Contact Lake Shore for more information.

Mounting plates
Black anodized aluminum baseplate compatible with commercial optical tables.

BASE-ST-VPF	Baseplate (imperial threads)
BASE-ST-VPF-M	Baseplate (metric threads)

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

SH-OPTICAL-0.88-STD	Optical (to 500 K)
SH-OPTICAL-0.88-700	Optical (to 700 K)
SH-BLNK-0.88-STD	Blank (to 500 K)
SH-BLNK-0.88-700	Blank (to 700 K)
SH-RESISTIVITY-0.88-STD	Resistivity

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
CONSULT	Thermocouple, Type E

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), (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

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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