

# SuperTran cryostats ST-100 FTIR



## *SuperTran Cryostats*

### **ST-100-FTIR** optical cryostat

The Lake Shore **ST-100-FTIR** is a continuous flow cryostat optimized for use with commercial FTIR spectrometers. An integrated linear translator enables aligning either a reference or multiple samples with the IR source. The ST-100-FTIR is easy to operate and is supplied with a high-efficiency transfer line for use with either LHe or LN<sub>2</sub>. It provides a variable temperature sample environment for optical and electrical measurements from 2.5 K (with LHe) or 77 K (with LN<sub>2</sub>) to 500 K. It can be combined with the RGC4 recirculating cooler for cryogen-free operation.



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manufactured by JANIS

# SuperTran cryostats

## ST-100 FTIR

### ST-100-FTIR optical cryostat

The Lake Shore SuperTran ST-100-FTIR cryostat from Lake Shore Cryotronics is based on the versatile continuous flow ST-100 cryostat, offering operating temperatures from 2.5 K to 500 K (700 K optional). Simple to operate, the ST-100-FTIR uses a high-efficiency transfer line to deliver LHe or LN<sub>2</sub> to the sample mount for sample cooling. 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. Temperatures to 700 K are provided using an optimized sensor (type E thermocouple) and heaters.

The ST-100-FTIR is optimized for use with commercial FTIR spectrometers. An integrated translation stage is used to move either a reference or sample into alignment with the IR beam. Sample holders can be customized to accept samples of different sizes and shapes, and integrated sample rotation provides additional control over sample-to-beam alignment. Mounting flanges are available with provisions for securing to a wide range of FTIR sample compartments including both purged and evacuated configurations.

Access to the sample compartment is provided by a quick disconnect clamp. The four-way optical sample chamber can be configured for reflectance or transmission measurements. Optional window materials can be installed to span the far/mid-IR, VUV, and x-ray regions for a variety of spectroscopic measurements. A compact vacuum shroud is available for use with the reflectance accessory of most commercial FTIR spectrometers.

The ST-100-FTIR 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.

In addition to FTIR measurements, the ST-100-FTIR can be used for other applications including photoluminescence, materials characterization (resistivity, Hall effect), as well as low-temperature imaging, microscopy, and component testing. Electrical measurements can be performed using Lake Shore or user-installed cryogenic-service wiring (single conductor, twisted-pair, or coaxial cables).

#### Key features

Sample-in-vacuum configuration, with continuous operation using the included high-efficiency transfer line

Integrated sample translator

Copper sample mount with multiposition removable optical sample holder

Continuous temperature range from 2.5 K (LHe) or 77 K (LN<sub>2</sub>) to 500 K with optional 700 K high temperature

Compatible with RGC4 recirculating gas cooler for cryogen-free operation

Optical vacuum shroud with 4 o-ring sealed window ports

Instrumentation adapter with 10-pin electrical feedthrough, 3 spare o-ring sealed ports evacuation valve, and safety pressure relief valve

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

p. 2 | Lake Shore Cryotronics, Inc. | 614.891.2243 | [sales@lakeshore.com](mailto:sales@lakeshore.com) | [www.lakeshore.com](http://www.lakeshore.com)



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## ST-100 FTIR

### ST-100-FTIR

#### Featured components

25 mm (1 in) diameter copper sample mount with removable multi-position optical sample holder

Integrated linear sample translator for shifting between a reference position and multiple samples

Sample rotation relative to the vacuum shroud, with degree indicator for precise alignment with IR source

Integrated control heater and calibrated silicon diode control sensor

Compact optical vacuum shroud with 4 o-ring sealed window ports—enables compatibility with FTIR reflectance accessories and increased numerical aperture

High-efficiency, flexible LHe/LN<sub>2</sub> transfer line

Mounting flanges to integrate with many commercial spectrometers (consult Lake Shore for details)

Polished aluminum thermal radiation shield

Integrated concentricity supports to maintain precise sample alignment with IR source

10-pin electrical feedthrough, 3 spare o-ring sealed feedthrough ports, evacuation valve, and safety pressure relief valve

### Selections

#### Maximum temperature

700 K high temperature

#### Manipulation upgrades

Precision rotary platform

Linear sample translator motor control

Rotation stage motor control

#### Transfer line

6 ft standard (182.8 cm) 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™

# SuperTran cryostats ST-100 FTIR

## Options

### Windows

Custom window options are available, including IR-grade fused silica, KBr, TPX, or wedged windows. Contact Lake Shore for more information.

Sapphire: 3 mm thick [consult Lake Shore](#)

UV-grade fused silica: 3 mm thick [consult Lake Shore](#)

ZnSe: 3 mm thick [consult Lake Shore](#)

CaF<sub>2</sub>: 3 mm thick [consult Lake Shore](#)

### Sample compartment interface

Sample compartment top plate or base plate to match FTIR spectrometer sample compartment (specify the commercial spectrometer model)

Sample compartment interface [consult Lake Shore](#)

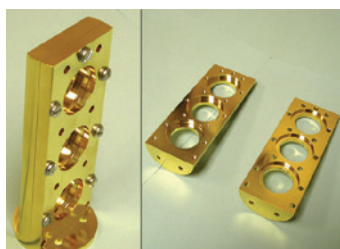
### Sample holders

Specify the number and size of samples

Custom multi-position optical holder [consult Lake Shore](#)



Custom flange



Custom sample holder

## 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

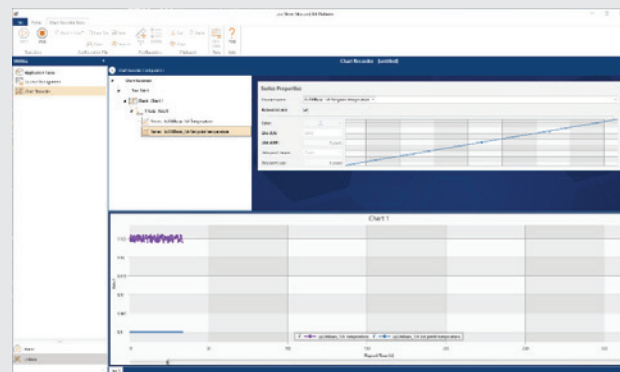
Easily create nested, multi-level measurement loop sequences

See real-time internal cryostat temperatures in Process View

Charts and log all system variables with Chart Recorder

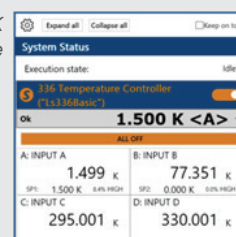
No programming required — drag and drop to create temperature sweeps, access measurements, and add third-party instruments

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™

# SuperTran cryostats

## ST-100 FTIR

### Options

#### Electrical feedthroughs

(1) BNC grounded	<a href="#">EF-BNC-1-B-AL</a>
(2) BNC grounded	<a href="#">EF-BNC-2-S-AL</a>
(6) BNC grounded	<a href="#">EF-BNC-6-G</a>
(1) BNC insulated	<a href="#">EF-BNC-1-B-NC</a>
(2) BNC insulated	<a href="#">EF-BNC-2-S-NC</a>
(6) BNC insulated	<a href="#">EF-BNC-6-I</a>
(1) triaxial grounded	<a href="#">EF-TRIAX-1-B-AL</a>
(6) triaxial grounded	<a href="#">EF-TRIAX-6-G</a>
(1) triaxial insulated	<a href="#">EF-TRIAX-1-B-NC</a>
(6) triaxial insulated	<a href="#">EF-TRIAX-6-I</a>
(2) SMA grounded	<a href="#">EF-SMA-2-B-AL</a>
(6) SMA grounded	<a href="#">EF-SMA-6-G</a>
(2) SMA insulated	<a href="#">EF-SMA-2-B-NC</a>
(6) SMA insulated	<a href="#">EF-SMA-6-I</a>
10-pin	<a href="#">10P-ASSEMBLY</a>
19-pin	<a href="#">19P-ASSEMBLY</a>
26-pin	<a href="#">26P-ASSEMBLY</a>
32-pin	<a href="#">32P-ASSEMBLY</a>

#### Additional temperature sensors

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

Silicon diode, calibrated	<a href="#">DT-670-CU-HT-1.4L</a>
Cernox® magnetic field independent, calibrated	<a href="#">CX-1050-CU-HT-1.4M</a>
Thermocouple, Type E	<a href="#">consult Lake Shore</a>

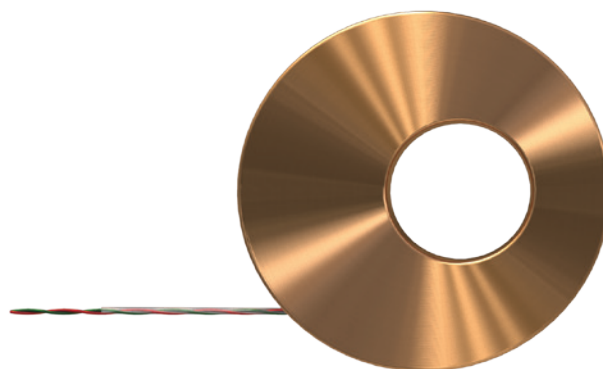
#### Installed wiring

(1), (2), or (6) coaxial cables, SMA	<a href="#">CABLEASSY-63340</a>
(1), (2), or (6) coaxial cables, BNC	<a href="#">CABLEASSY-63342</a>
(1) or (6) triaxial cables	<a href="#">CABLEASSY-63341</a>
(10), (19), (26), or (32) PhBr wires	<a href="#">WIRE-PHBR</a>

### Accessories

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

LHe storage Dewar	<a href="#">CF-100</a>
LN <sub>2</sub> storage Dewar	<a href="#">LN-50</a>
Vacuum pumping station	<a href="#">10RVP, 10DDP, or TS-85-D</a>
Temperature controller	<a href="#">325, 335, or 336</a>



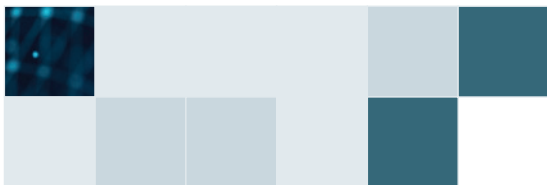
Cernox CU-HT sensor



336 temperature controller

# SuperTran cryostats

## ST-100 FTIR



### Specifications



ST-100-FTIR

Initial cooldown time (LHe to 5 K)	15 min
Temperature range	<2.5 K to 500 K
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

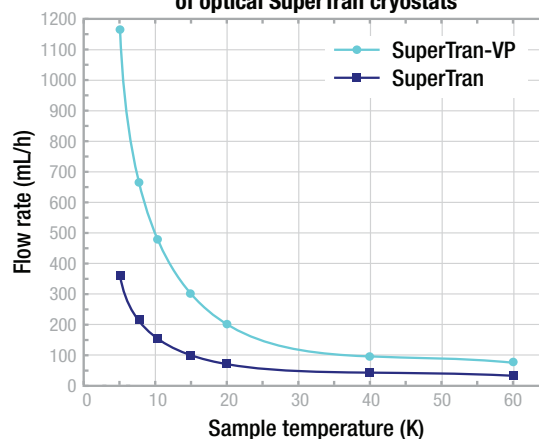
Height	557 to 608 mm (21.9 to 23.9 in)
Inner diameter (at sample region)	44.5 mm (1.75 in)
Sample mount diameter	25 mm (1 in)
Weight (excluding transfer line, approximate)	10 kg (23 lb)
Shipping weight (cryostat only)	13 kg (29 lb)
Shipping weight (transfer line)	9.1 kg (20 lb)
Shipping dimensions (cryostat only)	762 × 508 × 508 mm (30 × 20 × 20 in)
Shipping dimensions (transfer line)	2057.4 × 660.4 × 127 mm (81 × 26 × 5 in)

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

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

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

Typical cryogen consumption of optical SuperTran cryostats



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# SuperTran cryostats

## ST-100 FTIR

### Ordering information

#### Options

##### Windows

Custom window options are available, including IR-grade fused silica, KBr, TPX, or wedged windows. Contact Lake Shore for more information.

CONSULT	Sapphire, 3 mm thick
CONSULT	UV-grade fused silica, 3 mm thick
CONSULT	ZnSe, 3 mm thick
CONSULT	CaF <sub>2</sub> , 3 mm thick

##### Sample compartment interface

CONSULT	Sample compartment interface
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##### Sample holders

CONSULT	Custom multi-position optical holder
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##### 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 <sub>2</sub> 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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