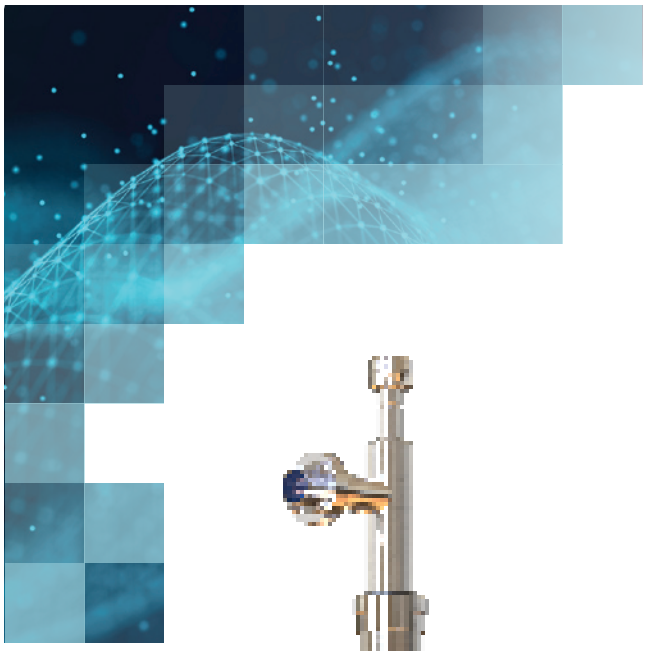
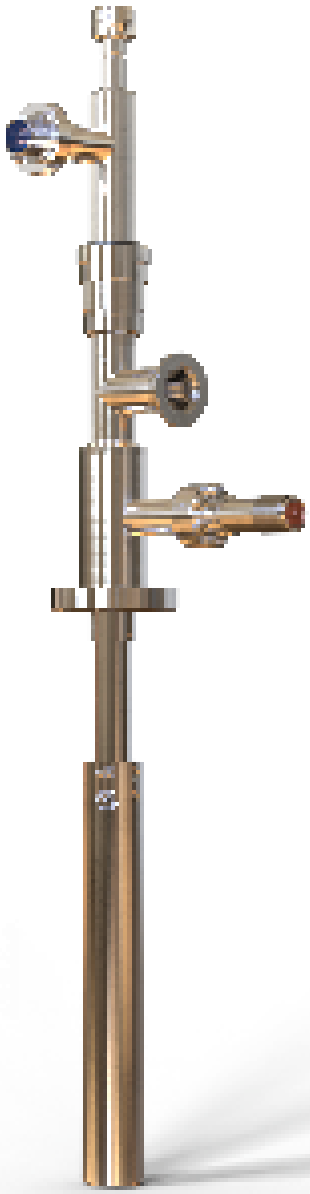
SuperTran cryostats
ST-400





SuperTran Cryostats

ST-400 ultra-high vacuum cryostat

The Lake Shore **ST-400** offers all the convenience of the standard SuperTran cryostats, optimized for use in ultra-high vacuum (UHV) environments. Each cryostat is built to order; the cold finger length and metal sealed CF-style vacuum flange are sized to match the experimental chamber. It can be combined with the RGC4 recirculating cooler for cryogen-free operation.

Quantum Design
1 avenue de l'Atlantique
Bâtiment Fuji-Yama
91940 Les Ulis - France

Tél. : +33 1 69 19 49 49
france@qd-europe.com
www.qd-europe.com

SuperTran cryostats
ST-400

ST-400 ultra-high vacuum cryostat

The Lake Shore SuperTran ST-400 cryostat is a versatile continuous flow cryostat offering operating temperatures from <2 K to 500 K (800 K optional) in a UHV environment. Simple to operate, the ST-400 uses 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 800 K) is provided using an optimized sensor (type E thermocouple) and heaters.

The ST-400 is mounted to the user-supplied vacuum chamber CF entry port. Samples can be connected to the UHV-compatible electrical feedthrough with cryogenic-service wiring (single conductor, twisted-pair, or coaxial cables). The sensor and heater (housekeeping) wires are not exposed to the UHV space, enabling operation to the $10E^{-11}$ mbar pressure range.

The ST-400 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-400 include photo-emission spectroscopy (ARPES), ion source cooling, spectroscopic ellipsometry, and x-ray diffraction. Each ST-400 is built to user-specified dimensions to match the experimental chamber requirements.

Custom configurations include vertically-oriented vent and electrical ports (for rotation within a limited radius) and feedthroughs, and the use of different sized conflat flanges installation of additional UHV-compatible ports.

Key features

- Sample-in-UHV configuration, with continuous operation using the included high-efficiency transfer line
- Continuous temperature range from <2 K (LHe) or 77 K (LN_2) to 500 K with optional 800 K high temperature
- Compatible with RGC4 recirculating gas cooler for cryogen-free operation
- Heater and sensor wiring are not exposed to the UHV space, eliminating potential vacuum contamination
- Variable temperature sample mount and sample holder, with temperature regulated by internal heater and calibrated silicon diode (and external temperature controller)
- A metal-sealed port accepts DC or RF electrical feedthroughs
- Optional DC and RF wires and cables for electrical measurements
- Optional vertical feedthrough and vent ports permit rotation without interfering with the backplane of a vacuum chamber-mounted linear translation stage
- Optional conical vacuum adapter permits installation of additional UHV access ports
- Standard design compatible with ports as small as 69.85 mm (2.75 in) conflat

Quantum Design
1 avenue de l'Atlantique
Bâtiment Fuji-Yama
91940 Les Ulis - France

Tél. : +33 1 69 19 49 49
france@qd-europe.com
www.qd-europe.com

SuperTran cryostats
ST-400

ST-400

Featured components

Copper sample mount with threaded mounting holes

Integrated control heater and calibrated silicon diode control sensor

Heater, sensor, and housekeeping wiring are not exposed to the UHV region

Metal-sealed CF flange for mounting to user-supplied UHV chamber

Polished gold-plated copper thermal radiation shield

High-efficiency, flexible LHe/LN_2 transfer line

10-pin electrical feedthrough for heater and sensor

10-pin UHV feedthrough for electrical access to sample region

Selections

Maximum temperature

800 K high temperature

Vertically oriented feedthrough and vent ports

Eliminates interference with z-stage assembly during rotation

Up to five mini-conflat ports within a 174.244 mm (6.86 in) diameter circle

CF flange size

69.85 mm (2.75 in), 114.3 mm (4.5 in), or 152.4 mm (6 in) sizes available as standard; custom options also available

Cold finger length

From CF flange to sample mount; specify at time of order

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™

Quantum Design

Quantum Design
1 avenue de l'Atlantique
Bâtiment Fuji-Yama
91940 Les Ulis - France

Tél. : +33 1 69 19 49 49
france@qd-europe.com
www.qd-europe.com

Lake Shore CRYOTRONICS

SuperTran cryostats ST-400

Options

Sample holders

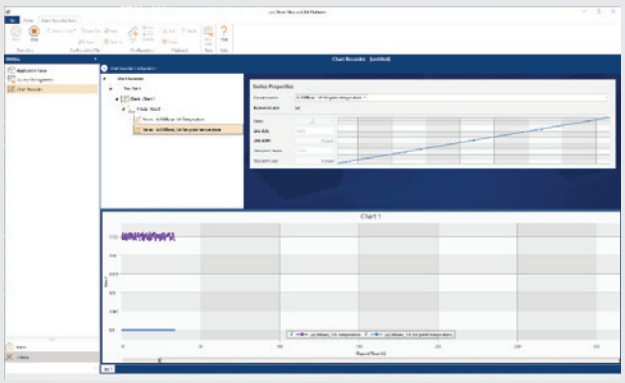
Custom sample holders are available. Contact Lake Shore for more information.

Model ST-400 custom configuration for optical measurements

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

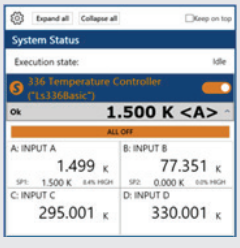
Our optional MeasureLINK software enables a wide range of capabilities including charting and logging, system monitoring with a cryostat-specific process view, and even controlling Lake Shore equipment as well as some third-party instrumentation, in a non-programming environment. You can also create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

Quantum Design

Quantum Design
1 avenue de l'Atlantique
Bâtiment Fuji-Yama
91940 Les Ulis - France

Tél. : +33 1 69 19 49 49
france@qd-europe.com
www.qd-europe.com

Lake Shore CRYOTRONICS

SuperTran cryostats
ST-400

Options

Electrical feedthroughs

Custom electrical feedthroughs are available. Contact Lake Shore for more information.

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

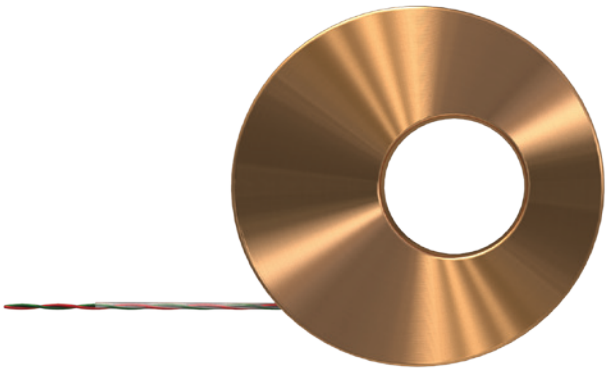
Installed wiring

Custom installed wiring are available. Contact Lake Shore for more information.

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

Quantum Design
1 avenue de l'Atlantique
Bâtiment Fuji-Yama
91940 Les Ulis - France

Tél. : +33 1 69 19 49 49
france@qd-europe.com
www.qd-europe.com

SuperTran cryostats
ST-400

Specifications

ST-400

Initial cooldown time (LHe to 5 K)	15 min
Temperature range	<2 K to 500 K
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^{-11} Torr

Size

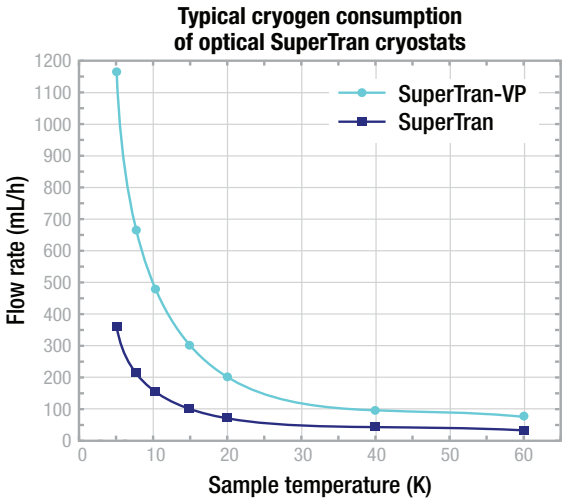
Height	User-specified
Standard radiation sheild diameter	33.27 mm (1.32 in) or 38.1 mm (1.5 in)
Sample mount diameter	25 mm (1.0 in)
Weight (excluding transfer line, approximate)	4.6 kg (10 lb)
Shipping weight (cryostat only)[4]	8.6 kg (19 lb)
Shipping weight (transfer line)	9.1 kg (20 lb)
Shipping dimensions (cryostat only)[4]	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

[4] May be larger for long cryostats



Quantum Design

Quantum Design
1 avenue de l'Atlantique
Bâtiment Fuji-Yama
91940 Les Ulis - France

Tél. : +33 1 69 19 49 49
france@qd-europe.com
www.qd-europe.com

Lake Shore CRYOTRONICS

SuperTran cryostats
ST-400

Ordering information

Options

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

CONSULT	Custom sample holders

Electrical feedthroughs
Custom electric feedthroughs are available. Contact Lake Shore for more information.

CONSULT	Custom electric feedthrough

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
Custom installed wiring are available. Contact Lake Shore for more information.

CONSULT	Custom installed wiring

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.

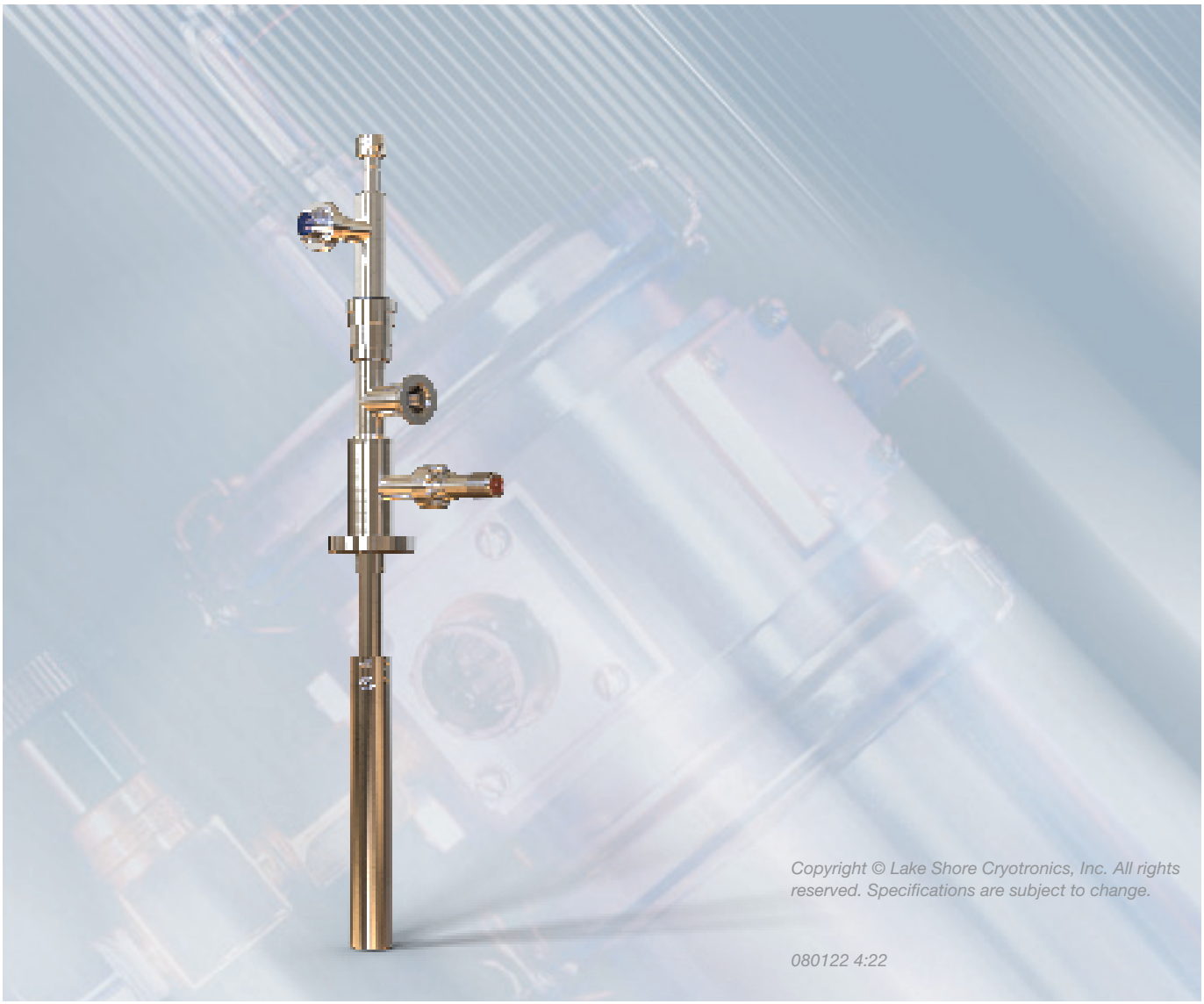
M81-SSM-2	M81-SSM instrument with 1 source and 1 measure channel, including M81-SSM accessory kit (USB-A to USB-C adapter, USB-A male to USB-B male cable, terminal connectors for digital I/O, terminal connectors for chassis ground, quick-start guide) and a 2 m (6.6 ft) LEMO to BNC adapter cable
M81-SSM-4	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

Quantum Design
Quantum Design
1 avenue de l'Atlantique
Bâtiment Fuji-Yama
91940 Les Ulis - France
Tél. : +33 1 69 19 49 49
france@qd-europe.com
www.qd-europe.com
Lake Shore CRYOTRONICS

SuperTran cryostats
ST-400



Quantum Design

Quantum Design
1 avenue de l'Atlantique
Bâtiment Fuji-Yama
91940 Les Ulis - France

Tél. : +33 1 69 19 49 49
france@qd-europe.com
www.qd-europe.com

Lake Shore CRYOTRONICS