10 K CCR Sample in vacuum cryostats
CCS series

CCS-100, **CCS-200**, **CCS-300S**, and **CCS-400** 10 K optical cryostats

Lake Shore CCS Series cryostats provide cryogen-free cooling for optical and electrical measurements from ~7 to 11 K to 325 K. They are equipped with interchangeable optics and include provisions for a wide variety of electrical connectors. A sturdy mounting stand provides convenient mounting to an optical table in any orientation. 500 K and 800 K options are available on most models.

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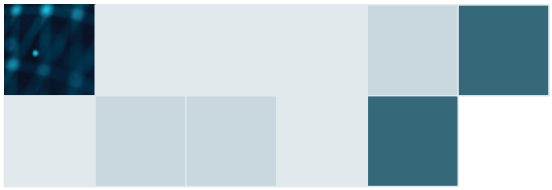

CCS-100, **CCS-200**, **CCS-300S**, and **CCS-400**
10 K optical cryostats

Lake Shore CCS cryostats provide cryogen-free cooling to temperatures down to 7 to 11 K, depending on the model. Cryogen-free operation eliminates the need for liquid helium or nitrogen and enables unattended operation for days, weeks, or months.

Samples are easily accessed by removing the outer vacuum shroud clamp and the thermal shield. Samples can be connected with cryogenic-service wiring (single conductor, twisted-pair, or coaxial cables) for electrical measurements, while the four-way optical sample chamber enables both reflectance and transmission geometries. Standard fused quartz windows provide transmission from the UV to near-IR regions. Alternatively, optional window materials can be installed for IR measurements. High-temperature options (500 K and 800 K), non-optical designs, and sub-compact configurations are available for most models.

Typical applications for the standard optical CCS include spectroscopy (photoluminescence, FTIR, UV-visible) and electrical materials characterization. Several models are factory-stocked for quick delivery.

Key features

- Cryogen-free operation (no liquid helium or liquid nitrogen required)
- Continuous temperature range from base temperature to 325 K (500 or 800 K optional)
- Sample-in-vacuum configuration
- Four optical window ports for optical measurements from UV to IR
- Gold-plated copper sample holder
- Integrated cartridge heater and calibrated silicon diode temperature sensor for precise temperature control (sub-compact models have a Cernox® temperature sensor, 800 K models have a thermocouple)
- Easy sample access by opening a single clamp and removing the thermal shield
- O-ring sealed ports accept DC and RF electrical feedthroughs
- Optional DC and RF wires and cables for electrical measurements

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Featured components

Copper sample mount, with optical sample holder

Cartridge style control heater and silicon diode sensor

Optical vacuum shroud with four o-ring sealed quartz windows

Thermal radiation shield with four apertures

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

Cryostat mounting stand

Compatible compressor with stainless steel helium gas supply and return lines

Selections

Cryocooler model

CCS-100/204: CH-204

CCS-100/204N: CH-204N

CCS-100/202: CH-202

High-temperature stage

None (standard)

500 K: using silicon diode sensor, model becomes CCS-400/20XX

800 K: using Type E thermocouple sensor, model becomes CCS-400H/204X (not applicable for CH-202 cryocooler)

Non-optical vacuum shroud

Model becomes CCS-200/20XX

Rotatable vacuum shroud

R option

Subcompact extension-optical

38.1 mm (1.5 in) window block to fit between poles of a magnet

Model becomes CCS-300S/20XX

Temperature sensor changes to a Cernox®

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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Selections

Subcompact extension-non-optical

32.75 mm (1.25 in) diameter tubular vacuum shroud to fit between poles of a magnet

Model becomes CCS-300ST/20XX

Temperature sensor changes to a Cernox®

Additional selections

Gas introduction ports installed on vacuum shroud (for matrix isolation usually installed in combination with rotatable vacuum shroud option)

Fifth window port

Options

Windows

Fused quartz windows are standard. Custom window options are available, including UV grade fused silica, sapphire, ZnSe, CaF_2, KBr, and TPX. Contact Lake Shore for more information.

Sapphire: 3 mm thick

Fused silica: 3 mm thick

ZnSe: 3 mm thick

ZnSe: 3 mm thick, wedged

KBr: 6 mm thick

CaF_2: 3 mm thick

TPX: 3 mm thick

Sample holders

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

Blank

Resistivity

Fixed probe (DLTS)

LCC

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

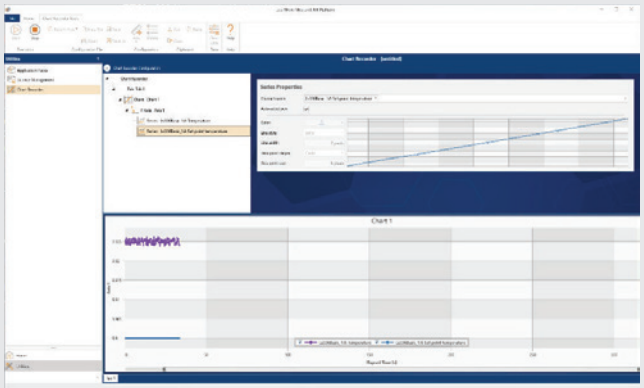
Easily create nested, multi-level measurement loop sequences

See real-time internal cryostat temperatures in Process View

Charts and log all system variables with Chart Recorder

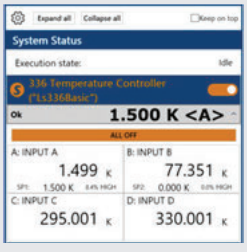
No programming required — drag and drop to create temperature sweeps, access measurements, and add third-party instruments

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
Type E thermocouple: for 800 K configurations only

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

Vacuum pumping station	10RVP, 10DDP, or TS-85-D
Temperature controller	336, 335, or 325

336 temperature controller

335 temperature controller

325 temperature controller

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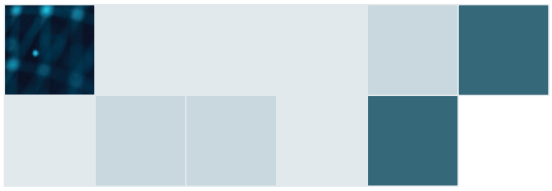

Specifications

Configuration	Cryocooler base temperature <7 K	Cryocooler base temperature <9 K	Cryocooler base temperature <11 K
Standard optical	**CCS-100/204N** <7 K to 325 K Cooldown: ~60 min to 10 K Height: 630 mm (24 in) Weight: 12.7 kg (28 lb)	**CCS-100/204** <9 K to 325 K Cooldown: ~60 min to 10 K Height: 630 mm (24 in) Weight: 12.7 kg (28 lb)	**CCS-100/202** <11 K to 325 K Cooldown: ~90 min to 12 K Height: 600 mm (23 in) Weight: 11.1 kg (24.5 lb)
Standard non-optical	**CCS-200/204N** <7 K to 325 K Cooldown: ~60 min to 10 K Height: 630 mm (24 in) Weight: 17 kg (37 lb)	**CCS-200/204** <9 K to 325 K Cooldown: ~60 min to 10 K Height: 630 mm (24 in) Weight: 17 kg (37 lb)	**CCS-200/202** <11 K to 325 K Cooldown: ~90 min to 12 K Height: 600 mm (23 in) Weight: 16 kg (35 lb)
Sub-compact optical	**CCS-300S/204N** <7 K to 325 K Cooldown: ~90 to 120 min to 10 K Height: ~680 to 840 mm (26 to 33 in) Weight: 17 kg (37 lb)	**CCS-300S/204** <9 K to 325 K Cooldown: ~90 to 120 min to 10 K Height: ~680 to 840 mm (26 to 33 in) Weight: 17 kg (37 lb)	**CCS-300S/202** <11 K to 325 K Cooldown: ~120 to 150 min to 12 K Height: ~635 to 810 mm (25 to 32 in) Weight: 16 kg (35 lb)
Sub-compact non-optical	**CCS-300ST/204N** <7 K to 325 K Cooldown: ~90 to 120 min to 10 K Height: ~680 to 840 mm (26 to 33 in) Weight: 17 kg (37 lb)	**CCS-300ST/204** <9 K to 325 K Cooldown: ~90 to 120 min to 10 K Height: ~680 to 840 mm (26 to 33 in) Weight: 17 kg (37 lb)	**CCS-300ST/202** <11 K to 325 K Cooldown: ~120 to 150 min to 12 K Height: ~635 to 810 mm (25 to 32 in) Weight: 16 kg (35 lb)
High temperature (500 K)	**CCS-400/204N** <8 K to 500 K Cooldown: ~90 min to 10 K Height: 660 mm (26 in) Weight: 17 kg (37 lb)	**CCS-400/204** <10 K to 500 K Cooldown: ~90 min to 10 K Height: 660 mm (26 in) Weight: 17 kg (37 lb)	**CCS-400/202** <12 K to 500 K Cooldown: ~150 min to 12 K Height: 635 mm (25 in) Weight: 16 kg (35 lb)
Ultra-high temperature (800 K)	**CCS-400H/204N** <10 K to 800 K Cooldown: ~120 min to 12 K Height: 700 mm (27.5 in) Weight: 17 kg (37 lb)	**CCS-400H/204** <12 K to 800 K Cooldown: ~120 min to 12 K Height: 700 mm (27.5 in) Weight: 17 kg (37 lb)	—
Cold head cooling power	1.8 W at 20 K (60 Hz) 2.2 W at 20 K (50 Hz)	7.1 W at 20 K (60 Hz) 6.7 W at 20 K (50 Hz)	3 W at 10 K (60 Hz) 2.5 W at 10 K (50 Hz)
Recommended maintenance	13,000 h		
Window block size	Standard optical (CCS-100, CCS-400, CCS-400H): 3.25 in to 3.75 in square Subcompact optical (CCS-300S): 1.5 in square		

All heights and weights approximate

All cooldown times typical

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Ordering information

Options

Windows

Fused quartz windows are standard. Custom window options are available, including UV grade fused silica, sapphire, ZnSe, CaF_2, KBr, and TPX. Contact Lake Shore for more information.

CONSULT	Sapphire: 3 mm thick
CONSULT	Fused silica: 3 mm thick
CONSULT	ZnSe: 3 mm thick
CONSULT	ZnSe: 3 mm thick, wedged
CONSULT	KBr: 6 mm thick
CONSULT	CaF_2: 3 mm thick
CONSULT	TPX: 3 mm thick

Sample holders

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

CONSULT	Blank
CONSULT	Resistivity
CONSULT	Fixed probe (DLTS)
CONSULT	LCC
CONSULT	DIP

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

CONSULT	Silicon diode, calibrated (one included with cryostat)
CONSULT	Type E thermocouple: for 800 K configurations only

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

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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