

CCS100 - February 17, 2025

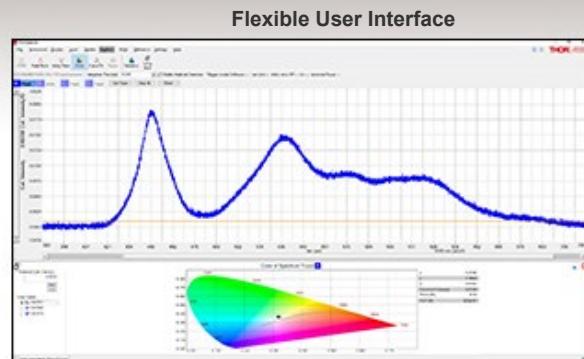
Item # CCS100 was discontinued on February 17, 2025. For informational purposes, this is a copy of the website content at that time and is valid only for the stated product.

COMPACT CCD SPECTROMETERS

- ▶ Three Models for Wavelengths Ranging from 200 to 1000 nm
- ▶ Compact Size: 122 mm x 79 mm x 29.5 mm
- ▶ External Trigger Input
- ▶ Cosine Correctors Available Separately for Free-Space Measurements



CCS100
Cables, Power Supply,
and Software Included



CCSB1
Cosine Corrector for
Thorlabs' CCD Spectrometer

Versatile Display
and Analysis Options

OVERVIEW**Features**

- Models for the Visible, NIR, or UV to NIR Spectral Ranges
- Rugged Czerny-Turner Spectrometer Design with No Moving Parts
- Auto Compensation for Dark Current Noise
- Amplitude Corrected and Shipped with Calibration Report
- High-Speed USB Connection Allows up to 200 Scans per Second
- Trigger Input for External Synchronization (TTL)
- 16-Bit A/D-Converter
- 3648 Pixel CCD Line Array
- Includes Multimode Fiber Patch Cable
- Cosine Correctors Available Separately Allow Free-Space Input
- Round-to-Linear Fiber Bundles Optimized for Spectrometer Use Available Separately Below

Item #	CCS100	CCS175	CCS200
Wavelength Range	350 - 700 nm ^a	500 - 1000 nm	200 - 1000 nm ^{a,b}
FWHM Spectral Accuracy	<0.5 nm @ 435 nm	<0.6 nm @ 633 nm	<2 nm @ 633 nm
S/N Ratio		≤2000:1	
CCD Sensitivity		160 V / (lx · s)	
Integration Time		10 µs - 60 s	

- a. The spectrometers cannot be amplitude corrected below 380 nm.
- b. A large difference in the relative response of the system from the UV to the visible inhibits reliable power readings in the UV when performing broadband measurements. Features in the UV may still be visible with the use of a bandpass or shortpass filter to prevent saturation at longer wavelengths.

Note: These specifications are valid only when the spectrometer is used with the included fiber patch cable. See the *Specs* tab for details about the included cables.

Thorlabs' fiber-based, compact, Czerny-Turner CCD spectrometers are available in three models. Two are sub-nanometer accuracy models that provide detection in the 350 - 700 nm or 500 - 1000 nm range. A third model offers a wide 200 - 1000 nm spectral range with better than 2 nm accuracy. With a footprint that measures roughly the size of a portable hard drive (122 mm x 79 mm x 29.5 mm), the performance of these CCD spectrometers is ideal for educational applications or fiber-

based systems. Each unit comes amplitude corrected and is shipped with a calibration report.

Although small, the unit shares features with larger, more expensive spectrometers such as the ability to be synchronized via a TTL trigger input (up to 100 Hz) and to automatically compensate for noise created by dark current. The three models share the same design with the CCD chips, gratings, and lenses being optimized for the specified wavelength range.

Each spectrometer ships with an SMB-to-BNC adapter cable for external trigger signals, a 1.5 m high-speed USB cable, and a fiber optic patch cable with SMA905 connectors. The CCS100 and CCS175 include our M14L01 patch cable, which is 1 m long and has a Ø50 µm core, while the CCS200 includes our M15L01 patch cable, which is 1 m long and has a Ø200 µm core. Each spectrometer is factory calibrated with the included patch cable prior to shipment; if a replacement patch cable is required, Thorlabs recommends recalibration using the new cable. Note that the spectrometers cannot be amplitude corrected below 380 nm. Thorlabs recommends recalibrating these spectrometers every 12 months and offers a factory recalibration service. To order this service, scroll to the bottom of the page and select Item # CAL-CCS2.

Note: A glass window in front of the CCD causes etalon effects which vary from unit to unit. If you require more information to determine if these spectrometers are suitable for your application, please contact Tech Support.

Mounting Options

For ease and stability of mounting, our compact CCD spectrometers are each equipped with two bottom-located taps separated by 1" (25.4 mm). The imperial versions feature 1/4"-20 taps, while the metric versions are equipped with M6 taps.

Software Package for the CCD Spectrometers

The spectrometer comes with a software package that has a graphical user interface (GUI) and an extensive set of drivers (C/C++, LabWindows/CVI, Dot NET, NI LabVIEW^a, and Visual Basic). The GUI can display the spectra, background, and peaks in a single window if desired. Additionally, diverse algorithms can be applied for smoothing, averaging, or calculating absorption and transmission. The measurement results can be compared with other stored profiles. The included drivers allow for complete functional control of the Czerny-Turner Spectrometers featured here, allowing the user to design his or her own interface software or to integrate the unit with a test and measurement setup for automated testing. Please see the *User Interface* tab for more details. The link to download the software can be found on the Software tab. This software package is also designed to operate our optical spectrum analyzers.

Cosine Correctors

Thorlabs cosine correctors (available below) are designed to mate with either an SMA connectorized fiber or the input port of our CCD spectrometer. They feature diffusers at the input apertures and allow the spectrometers to be used for free-space measurements.

Fiber Bundles

In addition to the SMA to SMA cable included with each spectrometer (detailed above), Thorlabs offers linear-to-round fiber bundles, which are sold below. These bundles are optimized for use with spectrometers and have a linear fiber array on the spectrometer side of the cable, which matches the geometry of the spectrometer slit. This provides higher signal levels in the spectrometer. Please note that while these bundles increase signal strength, a single small-core fiber should be used to maintain full spectral precision of the high-accuracy spectrometers.

Thorlabs also offers a large selection of alternative fiber optic patch cables and bundles that may be purchased separately. For example, the M16L01 is an SMA-to-FC/PC-connectorized cable that contains the same fiber as the M14L01 patch cable included with our CCS100 and CCS175 spectrometers. Our reflection probe fiber bundles are a single-cable solution that connects to the spectrometer, light source, and sample for reflection spectroscopy applications (see the *Application* tab for details). We also offer custom patch cables, which can be ordered here.

- a. The software package supports LabVIEW from version 8.5 onwards. For earlier versions the code can be converted. Please contact Technical Support for details.

SPECS

Item #	CCS100	CCS175	CCS200
Optical Specs			
Wavelength Range	350 - 700 nm ^a	500 - 1000 nm	200 - 1000 nm ^{a,b}
Spectral Accuracy	<0.5 nm FWHM @ 435 nm	<0.6 nm FWHM @ 633 nm	<2 nm FWHM @ 633 nm
Slit (W x H)		20 µm x 2 mm ^c	
Grating	1200 Lines/mm, 500 nm Blaze	830 Lines/mm, 800 nm Blaze	600 Lines/mm, 800 nm Blaze

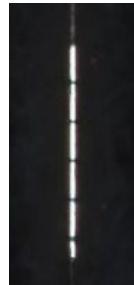
Grating Efficiency (Click for Graph)			
Fiber Connector	SMA 905		
Sensor Specs			
Detector Range (CCD Chip)	350 - 1100 nm		200 - 1100 nm
CCD Pixel Size	8 μm x 200 μm (8 μm pitch)		
CCD Sensitivity	160 V / ($\text{lx} \cdot \text{s}$)		
CCD Dynamic Range ^d	300		
CCD Pixel Number	3648		
Resolution	10 px/nm	6 px/nm	4 px/nm
Integration Time	10 μs - 60 s		
Scan Rate Internal Trigger	Max 200 Scans/s ^e		
S/N Ratio ^f	≤2000 : 1		
External Trigger			
Trigger Input	SMB		
Trigger Signal	TTL, Rising Edge		
Trigger Input Impedance	10 k Ω		
Trigger Input Voltage	5 V		
Trigger Frequency, Scan Rate	Max 100 Hz, 100 Scans/s		
Trigger Pulse Length	Min 0.5 μs		
Trigger Delay	8.125 μs ± 125 ns		
General Specs			
Interface	Hi-Speed USB 2.0 (480 Mbit/s)		
Dimensions (L x W x H)	122 mm x 79 mm x 29.5 mm		
Weight	<0.4 kg		
Included Patch Cable			
Patch Cable Item #	M14L01g,h		M151L01g,i
Fiber Item #	FG050LGA		FG200UCC
Core Diameter	50 μm ± 2%		200 ± 8 μm
Cladding Diameter	125 ± 1 μm		240 ± 5 μm
Coating Diameter	250 μm ± 4%		260 ± 6 μm
NA	0.22 ± 0.02		0.22 ± 0.02
Wavelength Range	400 to 2400 nm		250 to 1200 nm
Connectors	SMA905		

- a. The spectrometers cannot be amplitude corrected below 380 nm.
- b. A large difference in the relative response of the chip from the UV to the visible inhibits reliable power readings in the UV when performing broadband measurements. Features in the UV may still be visible with the use of a bandpass or shortpass filter to prevent saturation at longer wavelengths.
- c. There is a Ø1.2 mm mechanical aperture adjacent to the entrance slit which limits the effective dimensions of the slit to 20 μm x 1.2 mm. See *Slit Dimensions Note*, below, for more details.
- d. Ratio of saturation voltage to dark current voltage.
- e. Scan rates up to 200 Hz (with 5 ms integration time) are only possible when using internal triggering. In external triggering mode, the maximum scan rate for the same integration time is 100 Hz.
- f. With 10x averaging, depending on integration time; for single-shot applications, signal-to-noise is limited by the dynamic range of the CCD.
- g. If the fiber patch cable is switched or replaced, the spectrometer will need to be recalibrated. Thorlabs offers a factory recalibration service, which can be ordered by scrolling to the bottom of the page and selecting Item # CAL-CCS2.
- h. The M16L01 is an SMA to FC/PC fiber patch cable that uses the same fiber (FG050LGA) as the M14L01 patch cable included with CCS100 and CCS175 spectrometers. Each spectrometer is calibrated with the included patch cable.
- i. The M91L01 is an SMA to FC/PC fiber patch cable with a wavelength range of 250 to 1200 nm that can be used with the CCS200 spectrometer. Each spectrometer is calibrated with the included patch cable.

Note: These specs are valid only in combination with the included fiber patch cables.

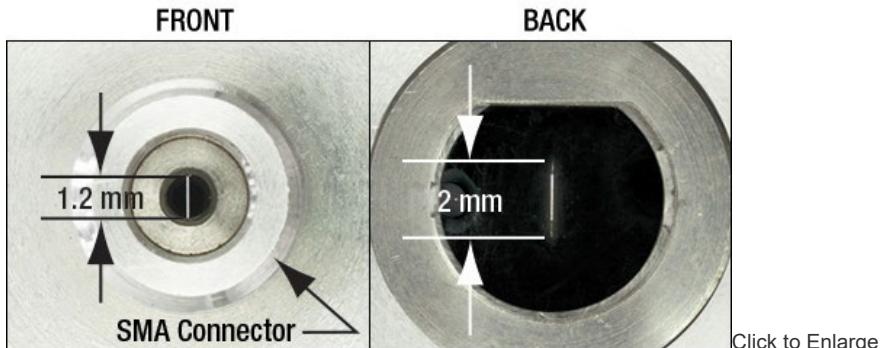
Slit Dimensions Note

Our CCD spectrometers have a mechanical entrance slit dimension of 20 μm x 2 mm. However, there is a Ø1.2 mm mechanical aperture built into the SMA fiber bulkhead and adjacent to the slit, which limits the effective slit dimension to 20 μm x 1.2 mm.



Click for Details
BFL200HS02
Ø200 μm core,
seven fiber
bundle behind the
entrance slit of a
CCS100
spectrometer.
The outer ~2
fibers of the
bundle are
truncated by the
Ø1.2 mm
aperture.

CCD Spectrometer SMA Bulkhead and Entrance Slit



Click to Enlarge

USER INTERFACE

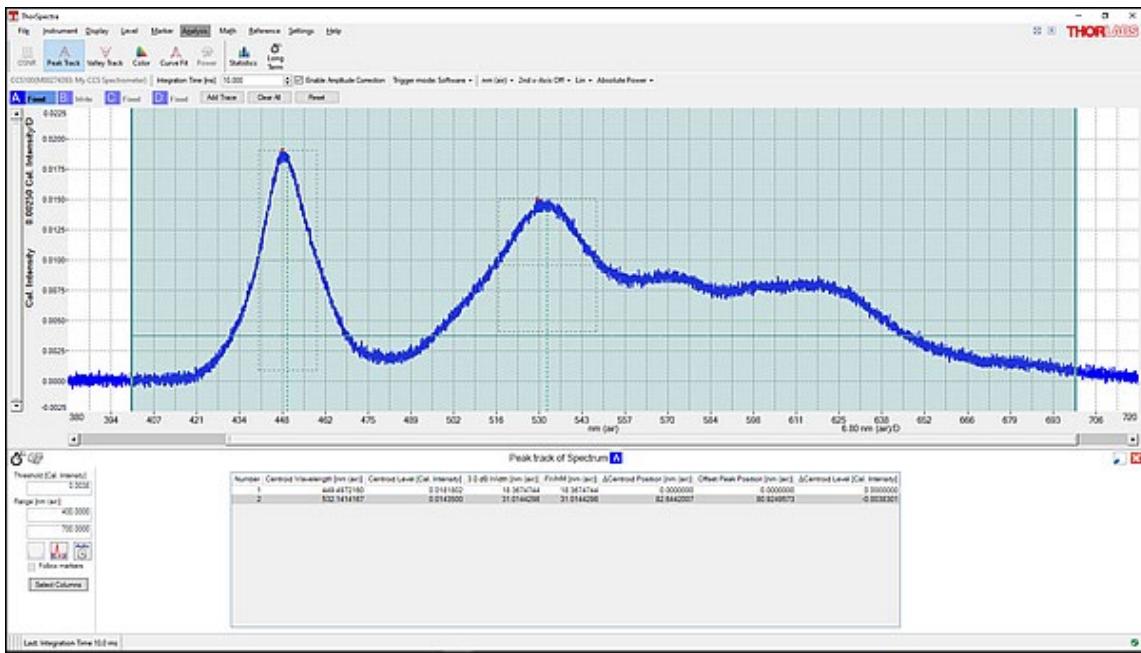
Graphical User Interface

Features

- Operates up to 10 Devices Simultaneously
- Auto-Detection of Compatible Devices
- Available Filters: Peak Finder, Smoothing, Averaging, Flip/Revert Picture
- Algorithms: Gaussian Transformation, Absorbance, Transmittance and Relative Difference Measurement
- Normalized Y Axis
- Persistence Option
- User Wavelength Calibration
- Different Thread for Data Acquisition for Better Responsiveness to User Input
- User Selectable Colors and Shapes
- Saving and Retrieval of Scans (JCAMP-DX or CSV)
- Copy Function to Clipboard
- Printable Windows
- Tabbed or Floating Windows
- Polynomial or Gaussian Data Fitting

Adjustable Parameters

- Integration Time
- Trigger Modes: Internal, External, Continuous, Single Shot
- Averaging Method: Gliding or Block Average
- Smoothing Method: Block Smoothing
- Picture Flip and Revert
- Display Mode: nm or pixel



The CCS Series Spectrometers feature an easy-to-use software package with a graphical user interface. The package is designed for laboratory and manufacturing applications. The data, background, and peaks can be shown in a single graph. With the help of smoothing and averaging algorithms the user is able to enhance specific features of the spectra. Furthermore the software is able to handle several devices at one time which are presented in a single graph.

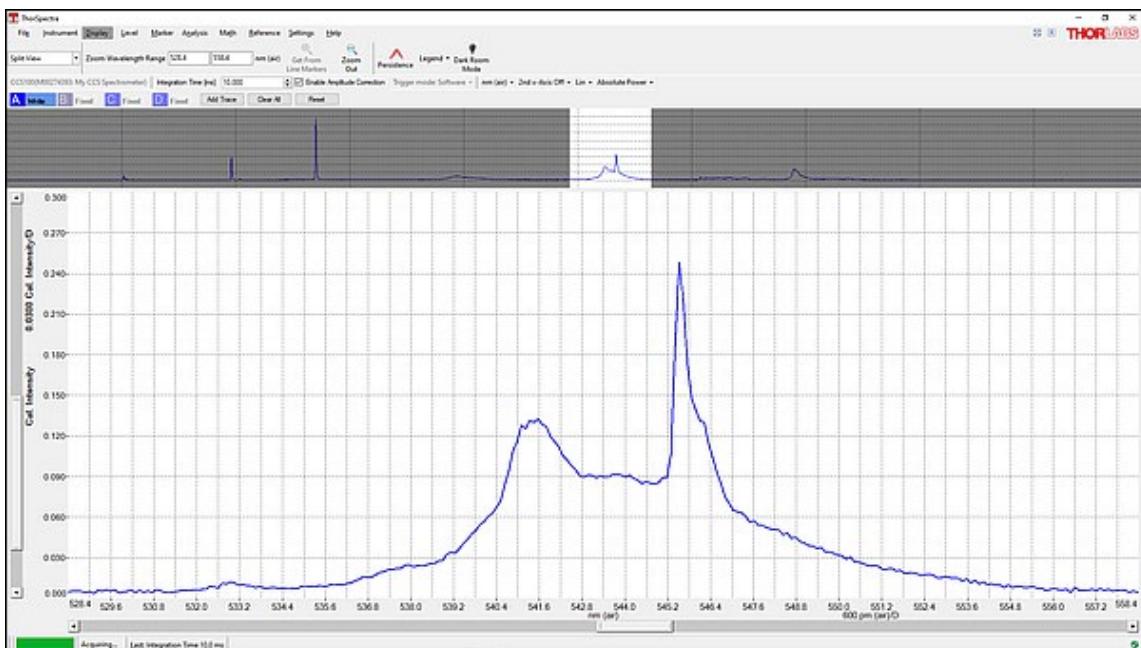
The above screenshot shows the Peak Track analysis mode, which allows the position, amplitude, and width of peaks in the spectrum to be tracked over time. As long as track peak mode is active, the track peak analysis area will be displayed below the graph. A table with information on each peak is to the lower right while the lower left of the screen contains a small toolbox used to set the criteria for identifying the peaks.

Additionally, Thorlabs provides drivers for C/C++, LabWindows/CVI, Dot NET, NI LabVIEW, and Visual Basic for more specific demands. The software package supports NI LabVIEW from version 8.5 onwards. For earlier versions the code can be converted. Please contact techsupport@thorlabs.com for details.

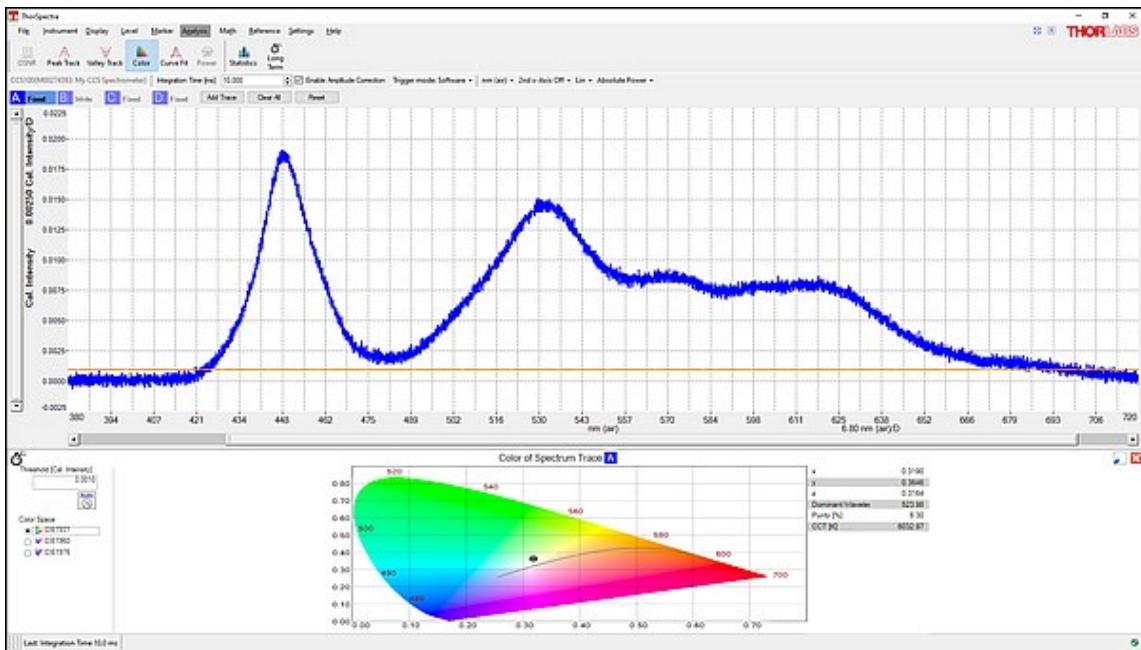
Data Processing

The software allows stored data to be loaded for comparison. This data can be used to calculate and show the absorbance, transmittance or relative difference view.

Split View

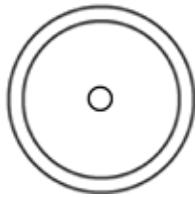


Color Analysis Screen



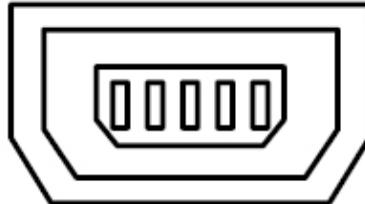
PIN DIAGRAMS

Trigger Input
SMB Male



TTL, 5V, Max 100 Hz

Computer Connection
USB Type Mini-B



USB Type Mini-B to Type A Cable Included

SOFTWARE

Software for CCD Spectrometers

The software package for Thorlabs' Compact CCD Spectrometers includes a GUI and instrument drivers. For information on writing your own application, including information on additional drivers and tools, see chapter 4 of the CCS Series Spectrometer manual.

Software

Version 3.35

This version includes a GUI for controlling the CCD spectrometers, as well as a "virtual device" mode ideal for evaluating the software prior to purchase.

[Software](#) 

SHIPPING LIST

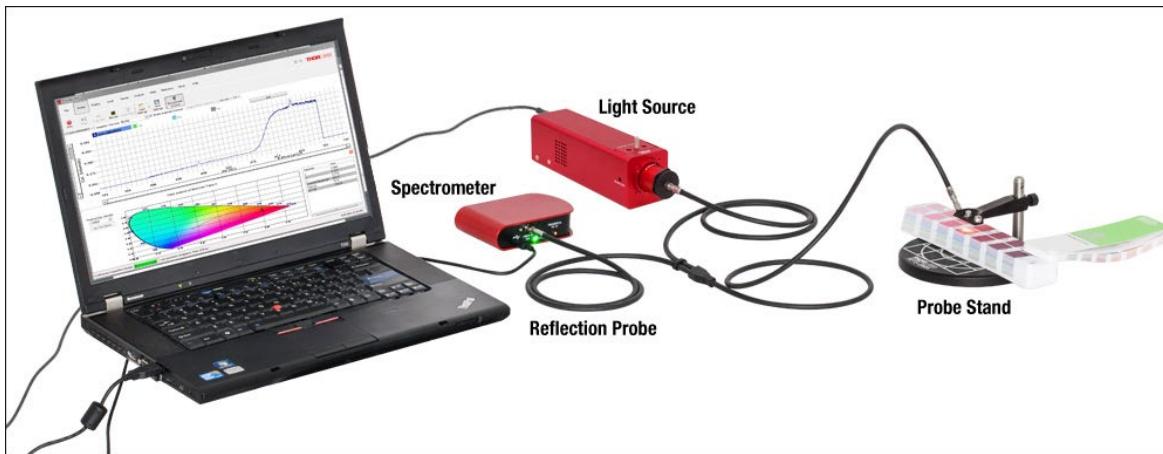
CCS100	CCS175	CCS200	Part
x			Compact Spectrometer for 350 - 700 nm
	x		Compact Spectrometer for 500 - 1000 nm
		x	Compact Spectrometer with Extended Range for 200 - 1000 nm
x	x		M14L01 SMA MM Fiber Patch Cable, Low OH, NA 0.22, 50 µm Core, 1 m ^a
		x	M15L01 SMA MM Fiber Patch Cable, High OH, NA 0.22, 200 µm Core, 1 m ^a
x	x	x	SMB to BNC Adapter Cable
x	x	x	USB 2.0 Cable A to Mini B, 1.5 m
x	x	x	Quick Reference Guide

- a. Each spectrometer is calibrated with the included patch cable.

APPLICATION

Reflection Spectroscopy Application

These CCD spectrometers can be used along with our reflection spectroscopy probes, broadband fiber-coupled light sources, and fiber probe holders to take diffuse reflection, specular reflection, and color measurements.



Spectrometers

Thorlabs offers several CCD-based spectrometers for use in the visible, NIR, or UV to NIR spectral ranges. The CCS100 and CCS175 operate in the 350 - 700 nm and 500 - 1000 nm spectral ranges with 0.5 nm and 0.6 nm resolution, respectively. The extended-range CCS200 operates in the 200 - 1000 nm spectral range with

2.0 nm resolution, but the UV range may be heavily attenuated when analyzing broadband spectra.

Light Sources

The SLS201L tungsten-halogen fiber-coupled light source delivers a 2796 K blackbody-type spectrum in the 360 - 2600 nm wavelength range and has active electronic stabilization for low spectral and intensity drift. Alternatively, the SLS203F Globar fiber-coupled light source provides a 1500 K temperature and 500 - 9000 nm emission range. We also offer fiber-coupled LEDs available with a selection of peak wavelengths or a broadband white-light emission spectra and our line of fiber-coupled laser sources offers a selection of options for intense single-wavelength illumination.

Reflection Probe Fiber Bundles

Thorlabs offers reflection probes with either high-OH or low-OH multimode fiber for wavelengths from 250 - 1200 nm and 400 - 2400 nm, respectively. Probes are available with a sample end that terminates in either a Ø1/4" probe or an SMA905 connector. We also offer Ø1/4" and SMA-terminated probes with linear fiber bundle spectrometer ends that provide increased spectrometer coupling efficiency for samples with low reflectance.

If the coaxial illumination provided by a reflection probe bundle is not critical, separate fiber patch cables or bundles with SMA connectors can be used for illumination and signal collection. Our large-core round bundles maximize illumination intensity, while our single-fiber multimode SMA patch cables are useful for precise illumination, or for connection to a fiber-coupled laser. We also offer round-to-linear fiber bundles, which maximize signal strength at the spectrometer.



Click to

Enlarge

Diffuse Measurement Taken at 45° Using RPH Holder Block

Reflection Probe Holders

Thorlabs offers the RPS and RPS-SMA fiber probe stands (RPS-SMA shown above and to the right), which allow for precise, stable positioning of the fiber optic probe at an angle of 90° or 45° relative to the sample. The probe holder arms (also sold separately) can also be integrated into other optomechanical setups using Ø1/2" posts. Alternatively, the RPH and RPH-SMA probe holder blocks sit directly on a sample, allowing the fiber tip to be positioned close to the surface and also blocking out room lights from the area under test.

BUNDLES VS CABLES

Linear Fiber Bundles vs. Single-Fiber Patch Cables

Entrance Slit Throughput Comparison

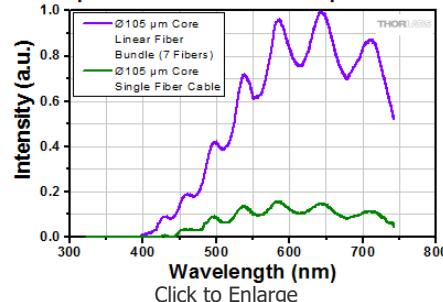
Our linear fiber bundles (sold below) can be used in place of the single-fiber patch cables included with these spectrometers to provide a significant increase in signal strength. The images below show how light exiting a linear fiber bundle more closely matches the geometry of the spectrometer's entrance slit than that from a standard patch cable. The accompanying graphs show comparison spectra of an SLS201L broadband light source measured with a CCS100 spectrometer when using a linear bundle versus a standard patch cable. As shown in the graphs below, the Ø105 µm core linear bundles provide a maximum power increase of ~500% versus a comparable single-fiber cable, while the Ø200 µm core linear bundles provide a maximum power increase of ~300%.



Left: Light exiting the end face of a BFL105HS02 linear bundle placed behind the 20 µm x 2 mm entrance slit of the CCS100 spectrometer.

Right: Light exiting the end face of an M15L01 fiber patch cable placed behind the 20 µm x 2 mm entrance slit of the CCS100 spectrometer.

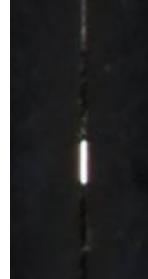
Ø105 µm Core Fiber and CCS Spectrometer



Comparison of the spectra of an SLS201L broadband light source obtained with a CCS100 spectrometer when using the BFL105HS02 linear fiber bundle versus an M15L01 single-fiber patch cable. The linear bundle provides a ~500% maximum increase in signal strength.

Ø200 µm Core Cable Comparison

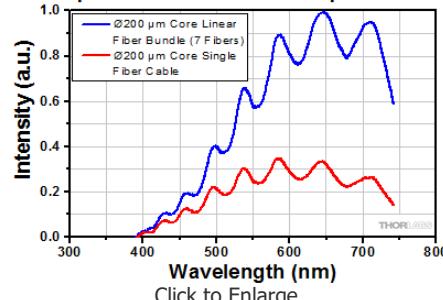
7 Fiber Bundle Single-Fiber Cable



Left: Light exiting the end face of a BFL200HS02 linear bundle placed behind the 20 µm x 2 mm entrance slit of the CCS100 spectrometer. Note: The outer ~2 fibers of the bundle are truncated by an internal Ø1.2 mm aperture adjacent to the slit in the spectrometer (see the Specs tab for details).

Right: Light exiting the end face of an M25L01 fiber patch cable placed behind the 20 µm x 2 mm entrance slit of the CCS100 spectrometer.

Ø200 µm Core Fiber and CCS Spectrometer



Comparison of the spectra of an SLS201L broadband light source obtained with a CCS100 spectrometer when using the BFL200HS02 linear fiber bundle versus an M25L01 single-fiber patch cable. The linear bundle provides a ~300% maximum increase in signal strength.

Compact CCD Spectrometers

- ▶ Czerny-Turner Spectrometer Design with No Moving Parts
- ▶ Choose from Three Wavelength Ranges:
 - 350 - 700 nm^a
 - 500 - 1000 nm



CCS175

- 200 - 1000 nm^{a,b}
- ▶ Accuracies from 0.6 to 2 nm Available (See Table in Overview tab for Details)
- ▶ High-Speed USB Connection Offers up to 200 Scans per Second

Thorlabs' Czerny-Turner spectrometers are fiber-based, compact devices roughly the same size as a portable hard drive. Each spectrometer is calibrated using the included patch cable. All units are amplitude corrected and are shipped with a calibration report, which is valid for both the spectrometer and patch cable. Thorlabs recommends recalibrating the spectrometers every 12 months and offers a factory recalibration service. To order this service, scroll to the bottom of the page and select Item # CAL-CCS2.

The input port accepts SMA905-connectorized fibers, and the CCSB1 cosine corrector available below can be used to adapt the spectrometers for free-space applications. Explore the tabs above for a detailed description of these spectrometers and their specifications.

- The spectrometers cannot be amplitude corrected below 380 nm.
- A large difference in the relative response of the system from the UV to the visible inhibits reliable power readings in the UV when performing broadband measurements. Features in the UV may still be visible with the use of a bandpass or shortpass filter to prevent saturation at longer wavelengths.



[Click to Enlarge](#)
CCS200 with Cosine Corrector and
Included Fiber Patch Cable. Cosine
Correctors are Available Separately
Below

Part Number	Description	Price	Availability
CCS100/M	Compact Spectrometer, 350 - 700 nm, Metric	\$2,368.72	2 Weeks
CCS175/M	Compact Spectrometer, 500 - 1000 nm, Metric	\$2,368.72	2 Weeks
CCS200/M	Compact Spectrometer, Extended Range: 200 - 1000 nm, Metric	\$3,340.44	Lead Time
CCS100	Compact Spectrometer, 350 - 700 nm	\$2,368.72	Lead Time
CCS175	Customer Inspired! Compact Spectrometer, 500 - 1000 nm	\$2,368.72	Today
CCS200	Customer Inspired! Compact Spectrometer, Extended Range: 200 - 1000 nm	\$3,340.44	Lead Time

Cosine Correctors for CCS Series Spectrometers

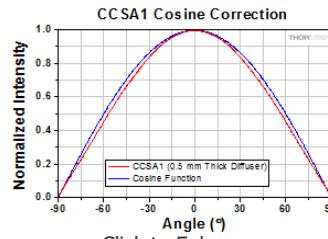


- ▶ Small Diffuser Connects to SMA-Connectorized Fibers or Spectrometer Input Port
- ▶ Allows Thorlabs' CCD Spectrometers to be Used for Free-Space Measurements
- ▶ Reduces the Source Alignment Sensitivity of Measurements

Thorlabs' Cosine Correctors allow Thorlabs' CCD spectrometers to be used for free-space measurements. The correctors incorporate a diffuser in a tightly toleranced metal housing. The CCSA1 and CCSA2 correctors are designed to mate with SMA-connectorized fiber optic cables. The third corrector, the CCSB1, is designed to mate directly to the input port of the spectrometer. An image of each cosine corrector connected to a spectrometer can be viewed by clicking on the photos in the table below.

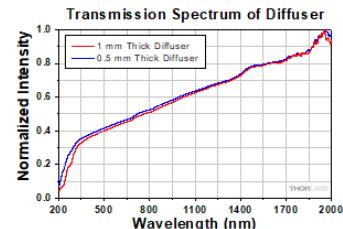
The diffuser in a cosine corrector allows light to be collected from up to a 180° angle with the diffuser surface. This minimizes issues caused by sampling geometry inherent to other devices such as bare fiber optics or collimating lenses. As such, these diffuser packages are ideal for use in spectral measurements or as irradiance probes.

A plot showing the transmission spectrum of spectralon is shown to the right. Each curve is normalized to the maximum measured transmission through that sample. Please note that the transmission is highly wavelength dependent when selecting a cosine corrector for your application.



[Click to Enlarge](#)

The cosine correction plot for each diffuser can be viewed by clicking on the info icons in the table below.



[Click to Enlarge](#)

The transmission of the diffuser material used in the cosine correctors. Each curve is normalized to the maximum measured transmission through that sample.

The cosine correction plot and transmission spectrum for each cosine corrector can be viewed by clicking on the blue info buttons (i) in the table below.

Item #	CCSA1	CCSA2	CCSB1

(Click Photo for Details)			
Cosine Correction and Transmission (Click for Details)	i	i	i
Diffuser Thickness	0.5 mm		1 mm
Transmission @ 660 nm ^a	0.2%		0.1%
Clear Aperture	Ø4 mm		Ø8.5 mm
Housing at Input Aperture	Smooth Ø7.5 mm	Externally SM05 (0.535"-40) Threaded	Smooth Ø12.0 mm
Housing Material	Anodized Aluminum		
Output Port	Accepts SMA Connectors		Connects Directly to CCS Series Spectrometer Input
Suggested Mounting Adapters	AD8F	SM1A6T, AD12T	AD12NT, AD12F

a. Determined by comparing the integration time of the CCS200 spectrometer with and without the cosine corrector attached.

Part Number	Description	Price	Availability
CCSA1	Cosine Corrector for SMA-Connectorized Fiber	\$163.92	Lead Time
CCSA2	Cosine Corrector for SMA-Connectorized Fiber, External SM05 Threads	\$181.75	Lead Time
CCSB1	Cosine Corrector for CCS Series Spectrometers	\$218.58	Today

Fiber Bundles with Linear Output



- ▶ Optimized for Use with our CCD Spectrometers
- ▶ Available with One Linear and One Round End or with Two Linear Ends
- ▶ Low- or High-OH, Ø105 µm or Ø200 µm Core Multimode Fiber
- ▶ Linear End Matches the Entrance Slit of a Spectrometer for Higher Signal Levels

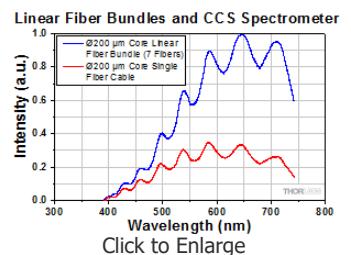
These fiber bundles contain 7 fibers arranged in a line configuration (linear) at one end and either a line configuration or a circular configuration (round) at the other end.

These fiber bundle cables are commonly used to increase the coupling efficiency into spectrometers that have an entrance slit, such as those sold above. The linear end matches the shape of the entrance slit better than a single fiber or round bundle configuration, and therefore increases the amount of light entering the spectrometer. These fiber bundles use SMA905 connectors for compatibility with most spectrometers. They are built with Ø105 µm or Ø200 µm core Thorlabs multimode fiber with either a high or a low hydroxyl ion (OH) content for 250 - 1200 nm or 400 - 2400 nm, respectively.

When plugging the linear end of the bundle cable into the spectrometer or another device, the fiber array must be aligned with the entrance slit. For ease of alignment, the fiber array's axis is indicated by a line on the connector sleeve. Precise alignment of the bundle and slit is not critical, but misalignment of more than $\pm 5^\circ$ can cause a reduction in signal strength. In order to maximize signal intensity, we recommend rotating the bundle while monitoring light levels in the spectrometer, and then tightening down the threaded portion of the SMA connector to lock the bundle in place. When using these bundles with our CCD Spectrometers, the fiber array should be oriented vertically.

Each patch cable includes two rubber and two metal protective caps that shield the connector ends from dust and other hazards. Additional CAPM Rubber Fiber Caps and CAPSM Metal Threaded Fiber Caps for SMA-terminated ends are also offered separately.

Please visit our Round-to-Linear Bundles Page or Linear-to-Linear Bundles Page for full product details. We also offer 4-to-1 Fan-Out Cables with Linear Common End Configurations.



Click to Enlarge
Spectra of an SLS201L light source taken with a CCS100 spectrometer and both BFL200HS02 and M25L01 cables.

Part Number	Description	Price	Availability
-------------	-------------	-------	--------------

BFL105HS02	Customer Inspired! Round-to-Linear Bundle, 7 x Ø105 µm Core Fibers, High-OH, SMA, 2 m Long	\$297.61	Today
BFL200HS02	Customer Inspired! Round-to-Linear Bundle, 7 x Ø200 µm Core Fibers, High-OH, SMA, 2 m Long	\$334.83	Today
BFL200LS02	Customer Inspired! Round-to-Linear Bundle, 7 x Ø200 µm Core Fibers, Low-OH, SMA, 2 m Long	\$324.91	Today
BFL105LS02	Customer Inspired! Round-to-Linear Bundle, 7 x Ø105 µm Core Fibers, Low-OH, SMA, 2 m Long	\$297.61	Today
BFA105HS02	Linear-to-Linear Bundle, 7 x Ø105 µm Core Fibers, High-OH, SMA, 2 m Long	\$403.03	Today
BFA105LS02	Linear-to-Linear Bundle, 7 x Ø105 µm Core Fibers, Low-OH, SMA, 2 m Long	\$403.03	Today
BFA200HS02	Linear-to-Linear Bundle, 7 x Ø200 µm Core Fibers, High-OH, SMA, 2 m Long	\$438.99	Lead Time
BFA200LS02	Linear-to-Linear Bundle, 7 x Ø200 µm Core Fibers, Low-OH, SMA, 2 m Long	\$438.99	Today

Recalibration Service for Compact CCD Spectrometers

Thorlabs offers a wavelength and amplitude recalibration service for our Compact CCD Spectrometers. To ensure accurate measurements, we recommend recalibrating the devices every 12 months. The table to the right lists the spectrometers for which the CAL-CCS2 recalibration service is available. When sending the part for recalibration, please include the patch cable that the spectrometer is being used with. For more information, please contact Tech Support.

Requesting a Calibration

Thorlabs provides two options for requesting a calibration:

1. Complete the Returns Material Authorization (RMA) form. When completing the RMA form, please enter your name, contact information, the Part #, and the Serial # of the item being returned for calibration; in the *Reason for Return* field, select "I would like an item to be calibrated." All other fields are optional. Once the form has been submitted, a member of our RMA team will reach out to provide an RMA Number, return instructions, and to verify billing and payment information.

[Submit Calibration Request](#)

Calibration Service Item #	Compatible Spectrometers
CAL-CCS2	CCS100(/M), CCS175(/M), CCS200(/M)

2. Enter the Part # and Serial # of the item that requires recalibration below and then Add to Cart. A member of our RMA team will reach out to coordinate return of the item for calibration. Should you have other items in your cart, note that the calibration request will be split off from your order for RMA processing.

Please Note: To ensure your item being returned for calibration is routed appropriately once it arrives at our facility, please do not ship it prior to being provided an RMA Number and return instructions by a member of our team.

Part Number	Description	Price	Availability
CAL-CCS2	Recalibration Service for the CCS Series Compact CCD Spectrometers	\$235.53	Lead Time