

# CAS 140CT-HR

## High Resolution Array Spectroradiometer

### Product highlights

- ▲ Spectral resolution down to 0.2 nm
- ▲ Typical measuring ranges of 80, 120 and 160 nm customized within the spectral range from 800 to 1000 nm
- ▲ High-end back-thinned CCD detector for utmost measuring sensitivity and dynamic measuring range
- ▲ Integrated density filter wheel enables an extremely wide intensity measuring range



The high resolution CAS 140CT-HR is based on Instrument Systems' high-end array spectrometer CAS 140CT, a product line that has achieved extraordinary success around the world. The CAS 140CT-HR is particularly designed for the measurement of narrow band emitters, e.g. laser diodes. Therefore, the spectroradiometers combine the demands of high spectral resolution and short testing times for sophisticated measurement tasks in production and laboratory environments.

All CAS 140CT-HR models are offered including a PTB traceable calibration together with a large variety of accessories such as integrating spheres and optical probes for irradiance. They are factory-equipped with a USB interface and optionally available with PCI interface for extended triggering possibility. The integrated density filter wheel and the dark shutter additionally facilitate fully automated measurements over an extremely broad detector signal range. The spectroradiometers can be operated with Instrument Systems' SpecWin Pro software for advanced laboratory applications. In addition, they are compatible with DLL and LabVIEW drivers for creating proprietary programs and integration into production equipment.



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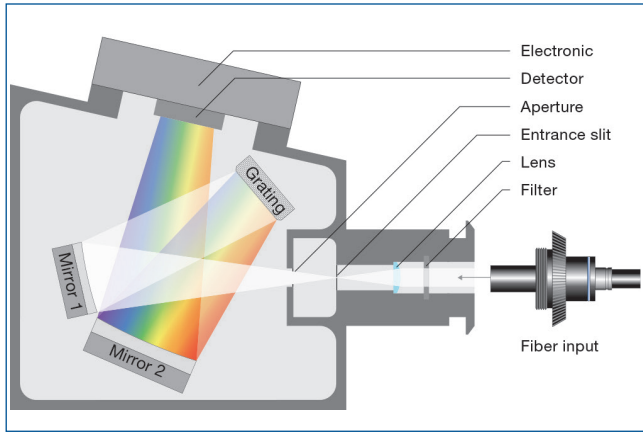
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## Proven optical setup

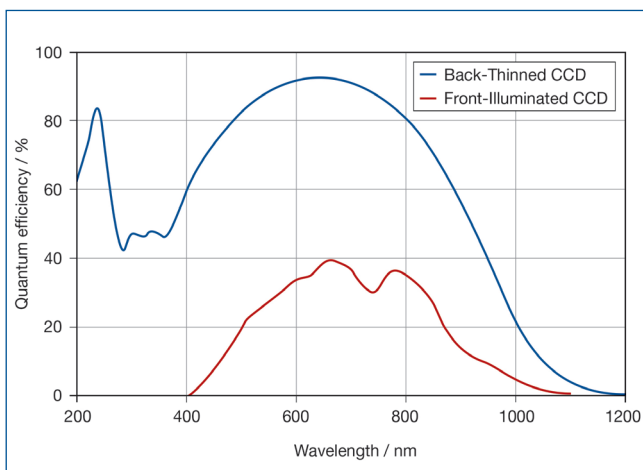
A Crossed Czerny-Turner spectrograph forms the core of the CAS 140CT-HR. The optical setup is adopted from the proven CAS 140CT which is the undisputed industry standard for laboratory and production applications. This design assures maximum optical precision with exceptionally good stray light rejection.



Optical setup of the CAS 140CT-HR with optimized Crossed Czerny Turner Spectrograph.

## Back-illuminated CCD sensor

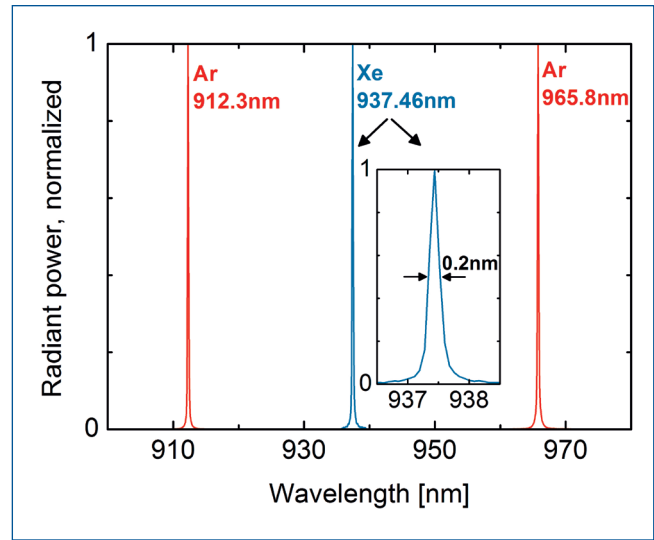
A back-thinned and back-illuminated CCD area sensor with 1024 x 128 pixels is used for light detection in the CAS 140CT-HR. This sensor design in combination with hardware binning of the vertical pixels offers a high level of sensitivity and large dynamic range. The CCD allows capture of the spectrum of an optical emitter in a single exposure. Additionally, short integration times down to 10 ms make the CAS 140CT-HR particularly suitable for the measurement of emitters with a pulsed operating mode in the order of milliseconds.



Spectral sensitivity functions for back-thinned CCD and front-illuminated CCD.

## Very high resolution for narrow band optical emitters

The CAS 140CT-HR models are particularly designed for the measurement of narrow band emitters, e.g. laser diodes. They achieve very high spectral resolutions down to 0.2 nm for a spectral measuring range of 80 nm (see figure below). Measuring ranges of 120 and 160 nm result in spectral resolutions of 0.3 and 0.4 nm, respectively. These high resolutions allow very precise characterization of narrow band emitters in production and laboratory environments.



Spectral radiant power of selected Ar and Xe emission lines. They were measured with a CAS 140CT-HR model with a spectral range of 900 to 980 nm and corresponding spectral resolution of 0.2 nm.

## Customized wavelength ranges

Higher spectral resolution typically results in a narrower measuring range when using the same spectrograph. At the same time, different optical emitters need different spectral ranges. Therefore, the CAS 140CT-HR offers a selection of different gratings with 1200, 1500 and 1800 lines/mm. Their flexible adjustment in the spectrograph enables a balance between resolution and spectral range specific to the customer's application. Thus typical measuring ranges of 80, 120 and 160 nm are available in the spectral range from 800 to 1000 nm. Further spectral ranges in the VIS are available on request.

## Technical specifications CAS 140CT-HR\*

\*All specifications are preliminary and subject to change

Model	High Resolution Array Spectroradiometer
Accessible spectral range	800 – 1000 nm <sup>1</sup>
Detector	Back-thinned CCD
Number of pixels	1024 x 128
Gratings	1200, 1500, 1800 lines/mm
Measuring ranges (typical)	80 – 160 nm
Spectral resolution (typical)	0.2 – 0.4 nm
Data point interval (typical)	0.08 – 0.16 nm
Wavelength accuracy <sup>2</sup>	± 0.3 nm
Integration time	10 ms – 65 s
Shortest duration SOT to EOT <sup>3</sup>	< 15 ms
Non-Linearity	± 0.5%
Cooling	-10°C
<b>Spectrograph</b>	
Focal length, f number, grating type	approx. 120 mm, f/3.5, plane reflection grating
Filter wheel	Available density filters: OD 0.5, 1, 1.5, 2, 2.5, 3, 3.5, 4
<b>Electrical data</b>	
AD converter	15 bit resolution
PC interface	Standard: USB 2.0; optional: PCI bus plug-in card in place of USB 2.0
Triggering	Input: TTL ascending slope; output: 2 TTL outputs (software controlled), 1 TTL flash pulse
Baseline noise <sup>4</sup>	± 60 counts, or ± 0.4 %
<b>Miscellaneous</b>	
Dimensions (H, W, D)	192 mm x 330 mm x 348 mm
Power supply	Wide-range input 100 VAC to 240 VAC 50/60 Hz
Power consumption	max. 50 VA
Ambient temperature	15 – 35°C; relative humidity 70% max., non-condensing
Weight	approx. 10 kg
Valid standards	In conformity with EN 61010-1:2002-08 (safety requirements governing electrical equipment for measurement, control and laboratory use)

## Ordering Information

Order number	Description
CAS140CTHR1800	High resolution CAS 140CT, grating with 1800 lines/mm, wavelength range 900 to 980 nm, spectral resolution 0.2 nm, data-point interval 0.08 nm/pixel, density filter wheel with OD1 - 3, USB interface
CAS140CTHR1500	High resolution CAS 140CT, grating with 1500 lines/mm, wavelength range 840 to 960 nm, spectral resolution 0.3 nm, data-point interval 0.12 nm/pixel, density filter wheel with OD1 - 3, USB interface
CAS140CTHR1200	High resolution CAS 140CT, grating with 1200 lines/mm, wavelength range 820 to 980 nm, spectral resolution 0.4 nm, data-point interval 0.16 nm/pixel, density filter wheel with OD1 - 3, USB interface
Customized	High resolution CAS 140CT model with... ...spectral measuring range and/or emission wavelength(s) within 800 and 1000 nm <sup>1</sup> , ...typical resolution within 0.2 and 0.4 nm, ...density filters (OD 0.5, 1, 1.5, 2, 2.5, 3, 3.5, 4), ...and PC interface (USB, PCI).

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<sup>1</sup> Further spectral ranges upon request.

<sup>2</sup> Applies to Penray lamp or laser.

<sup>3</sup> From CAS trigger until measurement finish.

<sup>4</sup> At shortest integration time, without averaging and at 15.000 counts signal level. When averaged, this value improves (e.g. averaged over 9 times equals a threefold noise reduction).