

NEO SPECTRORADIOMETER

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Specification

ADMESY

colorimeters | spectroradiometers | lightmeters

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NEO SERIES: HIGH END SPECTRORADIOMETER

The Neo series spectroradiometer offers a unique combination of ease of use and accurate measurement capabilities packed in an extra robust package. The Neo utilizes a high-end cooled CCD detector for low noise and high dynamic range. An ideal device for measurements where ease of use, stability, performance and price are of the essence. All in all, the perfect solution for hassle free integration in your product or process. The Neo spectroradiometer can virtually cover any wavelength range in the 250-1100nm range. There are two versions available. A broadband and a visible version. The broadband has a dispersion range of ~850nm while the visible has a dispersion of around 580nm

The Neo series is available with a variety of accessories, lenses, cosine correctors and spheres. The accessories can be directly coupled or by means of a fiber. In both cases this is done with by means of the ultra-robust industrial fiber coupler The fiber can withstand large forces which makes it ideal for avoiding fiber damage by bending or breaking it. If you want to stick to a SMA coupler this can be done by placing a sma converter to the fiber coupler. Through the Neo it is also possible to drive active accessories like a LED light source or a filter wheel.



HIGHLIGHTS

- Various spectral ranges including UV, VIS and NIR within the 200-1100nm range
- Cooled high-end CCD detector, cooled to -10 degrees Celsius
- High optical throughput design
- Internal mechanical Shutter
- Low noise
- Auto-range function
- Wavelength calibrated
- Very low stray light
- Excellent linearity, internally compensated within 1%
- Dark current compensated, virtually zero over entire integration range
- USBTMC compliant, SCPI command set, high speed device
- USB3, RS232, Ethernet connections and trigger in & out for ideal system integration
- Internal calculations for most common parameters, saving processing power in production environments
- Robust housing, optimized for mounting and protection in harsh production environments
- Very robust fiber connection
- Direct control of accessories through the Neo, up to 3 active accessories can be controlled through the Neo

SPEED & EASE OF USE

Admesy strongly believes in developing and manufacturing devices where ease of use and speed are key factors. In order to achieve these aspects, Admesy considers the following aspects of spectroradiometers to be taken care of:

- Wavelength calibration
- Dark current
- Linearity
- Absolute calibration (limited to irradiance and radiance)

All this is possible due to the high speed processor inside the Neo combined with algorithms developed for this specific device. In production processes, no external calculation power is needed from computers. Data can be used directly in production settings without any delay of processing data afterwards. This saves time and processing power of the operating system of a production line.

When for example the integration time is set to 10ms, the full calibrated spectral data is processed and transferred through USB3.

CUSTOM OR OEM

The Neo is a modular spectroradiometer. The diversity is almost unlimited. Admesy can configure the Neo with almost any grating or slit. Please consult our distributor or sales engineers for your specific configuration. For OEM customers we additionally offer customized electrical, mechanical and firmware designs as well as system integration support.

NEO PASSIVE ACCESSORIES

Accessories can be connected directly to the Neo or through a fiber.

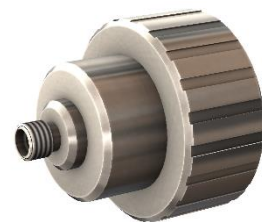
Accessories available are the following:

- cosine correctors
- lens systems
- spheres
- Cuvette holder



SMA COUPLER

If you still like to work with SMA fibers or all your existing accessories are SMA based you can use the SMA converter to convert the NEO to an SMA coupling



NEO ACTIVE ACCESSORIES

Admesy also supplies active accessories like light sources and a neutral density filter wheel. These accessories can be directly controlled by the Neo through the internal usb hub interface or trigger interface.

Active accessories available are the following:

- Light sources
- Neutral density filter wheel



NEO GENERAL SPECIFICATIONS

Neo	
Spectral range	250 – 1100nm
Non-linearity	<1%
Data output resolution	Can be set by software to virtually any resolution
Focal length	115mm
NA optical bench	0.10
FWHM	See spectral ranges and FWHM
Order sorting filter	Linear variable filter
Wavelength accuracy	+/- 0.3nm
Stray light	~0.05% (measured @ 400nm with 455nm cut-off filter with broadband light source)
Detector	High end Hamamatsu cooled detector (S7031)
Dark noise (RMS)	~ 3 to 5 counts (16 bit ADC)
S/N*	>1300:1
Mechanical shutter	Shutter lifetime > 1000000 operations
Integration time	4.8ms – 60minutes
Cooling temperature	-10°C
Interfaces	High speed USB, RS232, Ethernet, Trigger connections
Measurement parameters	Spectral output, radiometric data or colour data (Lumen, x,y, DWL, PWL, CRI, CCT, etc.)
Data processing time	15ms
Size (LxWxH)	See mechanical dimensions
Weight	5.3kg
Operating temperature	10-35°C
Power input	Typical 15V DC (14.5-15.5V DC range)
Power consumption	Typical 12W. Max 30W
Fiber connection	Industrial fiber connector

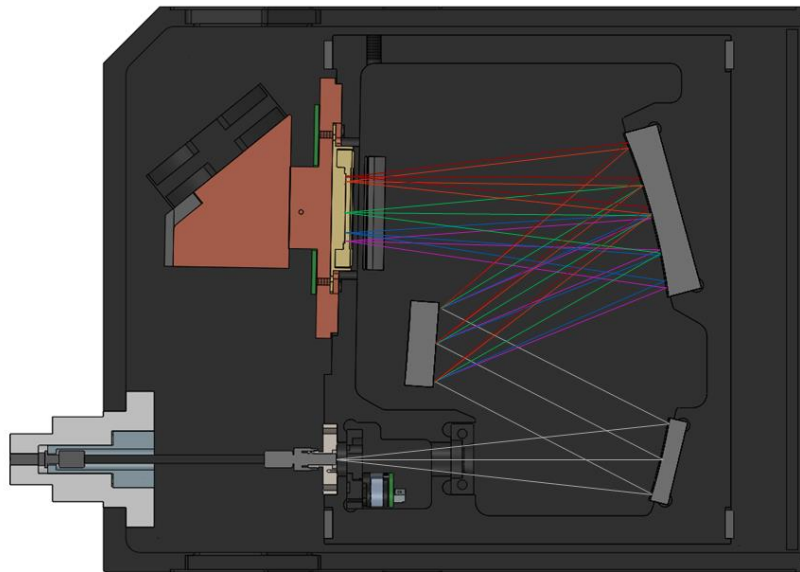
Note: *S/N is calculated at peak wavelength (almost full saturation) with 100 spectral measurements. Calculation method: average divided by standard deviation.

Note: Spectral range depends on internal and (external) optical configuration. Neo types equipped with cosine corrector have typical best response between 250 – 1050nm.



Typical cosine corrector calibration correction factors.

NEO AT A GLANCE



The Neo spectroradiometer has a Czerny-Turner configuration. The optical bench consists of a slit, a mirror, a grating, a second mirror, a collector lens, a linear variable filter (OSF) and a cooled detector.

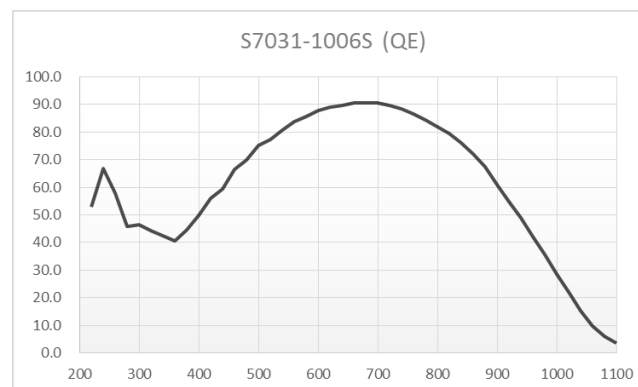
System response

The system response is mainly determined by the grating and the detector response. In the next chapter you can see the system response for each grating. In the system response we have included the detector, grating and the mirrors. This data is based on simulation data and is only meant for realistic indication purposes. System response data can be found in the following chapter.

Detector

The Neo uses a cooled CCD detector from Hamamatsu. Currently the Neo supports detectors for the range of 250-1100nm.

Quantum efficiency of the detector is illustrated in the following graph.



Slit size

The slit size defines the amount of light entering the optical bench. The Neo can be configured with various slit sizes. The slit size influences the FWHM. See chapter 7 for all options currently available.

Gratings

The grating disperses the light into individual wavelengths. The amount of dispersion is determined by the number of grooves. The blaze wavelength determines the optimal efficiency at a certain wavelength. Admesy keeps on extending its stock of gratings. If a grating is not on the list or you require something different please contact our distributor or sales engineers to see what the possibilities are.

Dispersion range

The higher the number of grooves the wider the dispersion. However, this also limits the range of wavelengths which can be resolved because the detector has a fixed width. For a broad wavelength range low groove gratings can be used and for a detailed analysis of a small wavelength range high grooves gratings can be used. This range is defined as the dispersion range. The number of grooves also has influence on the FWHM.

Start and stop wavelength

Start and stop wavelength are depending on the grating choice and alignment. For example, the 300 grooves grating with a dispersion range of 580nm can be used from 300nm to 880nm as well as from 400nm to 980nm. In order to keep every system the same we have also implemented a start and stop wavelength. These start and stop wavelengths are defined by an additional configuration order code which, combined with the Neo order code, ensures that the Neo is configured with the exact required wavelength range.

SYSTEM CONFIGURATION

The following table describes each grating with its corresponding range. The normalized total system response graphs are included on the next pages for indicative purposes. The Code is specified as the grooves per mm and Blaze wavelength. Both are divided by 10 in the code. Additionally the type of grating can be chosen. H stands for holographic and R for ruled. Currently Admesy supports only holographic gratings.

Code	Type	Grooves/mm	Blaze wl[nm]	Dispers. range[nm]	Used range
020030H	Hologr.	200	300	~850	UV-NIR (broadband)
030040H	Hologr.	300	400	~580	UV-NIR (visible)
030060H	Hologr.	300	600	~580	VIS-NIR (visible)
030100H	Hologr.	300	1000	~580	VIS-NIR (visible)

Note: Small deviations can occur for the dispersion range.

Note: Double values at the dispersion range define the ranges for low and high wavelengths.

Note: Combine this data with the system response graphs to check whether your required range is feasible with respect to the total spectral system efficiency.

Note: We recommend being on the safe side when choosing a dispersion range

The following table defines the expected FWHM values for each type of grating (classified by the number of grooves/mm) and the slit size.

FWHM [nm] S7031-1006 detector (1024 pixels)				
Grating G/mm	100 μm	50 μm	25 μm	10 μm
200	3.7	2.7	2.4	2.3
300	2.6	1.8	1.6	1.5

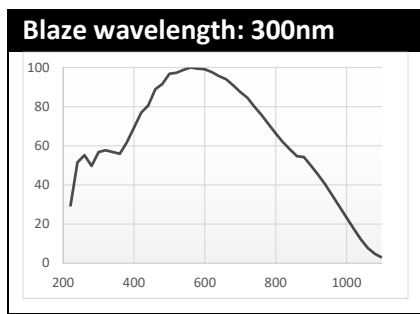
Note: FWHM values are approximations and are based on simulation.

Note: Double values are for lower and higher wavelengths.

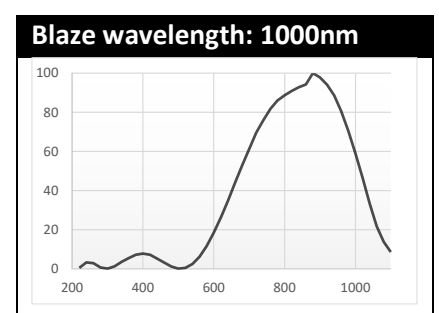
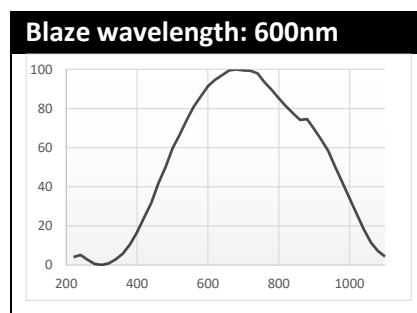
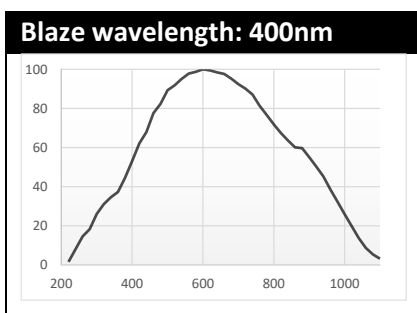
Note: We recommend being on the safe side when choosing a slit.

The graphs in the following chapters describe the system response (grating + detector + mirrors), they are purely for indication and can differ slightly.

200 grooves/mm system response



300 grooves/mm system response



SYSTEM PERFORMANCE

Admesy believes in providing its customers with plug and play solutions. Therefore, several compensations are done inside each single spectroradiometer before it is shipped out.

Dark current

We use a sophisticated dark current software compensation algorithm inside the spectroradiometer to make sure that the user does not have to compensate for dark current himself when using the device in normal conditions. Normal measurement commands do not (end need not) include a dark level subtraction. In extreme circumstances such as very low light levels or very long integration times, subtracting a dark current measurement could improve measurement accuracy.

Admesy checks all Neo spectroradiometer on the performance of dark. In our factory this item is tested in "raw" mode. In the case raw 16-bit ADC data is checked.

Non-linearity

The non-linearity of a spectroradiometer is defined by the mismatch in the correlation between the actual amount of light and the resulting measurement value. Theoretically when the amount of light is doubled the spectroradiometer output should also double. Admesy calibrates for mismatches in linearity.

Wavelength calibration

Each spectroradiometer is calibrated using a monochromator guaranteeing the highest possible wavelength accuracy level.

Stray light

Stray light measurements are done with a halogen light source and a FGL455 cut-off filter, relative to the peak intensity of the unweighted spectral data. Measurement point is at 400nm.

Absolute calibration

Admesy offers NIST traceable calibration services for irradiance and radiance.

Spectroradiometer output

Spectroradiometer output from the Neo is compensated/calibrated for the following items:

- Wavelength
- Dark current
- Non-linearity
- Absolute calibration (optional)

Internally the output is divided by the integration time. So the output value does not change when the integration time is changed. This is correct since the integration time is no parameter for the amount of light.

Production

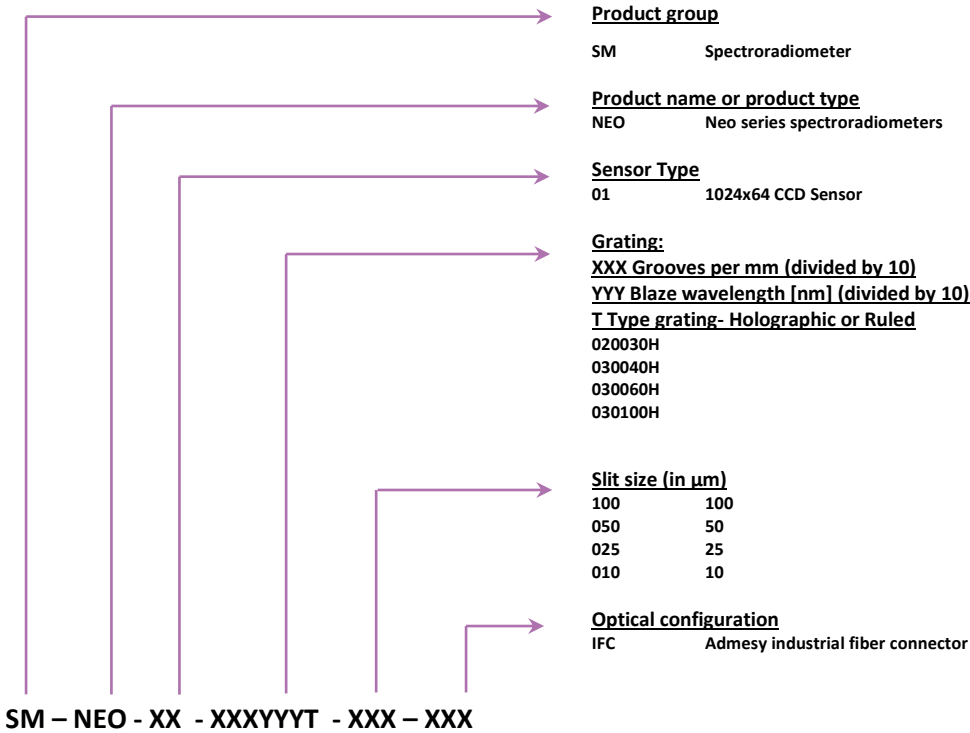
Each item above is checked and logged during production. We take pride in producing each spectroradiometer to meet and exceed device specifications.

ORDER CODES

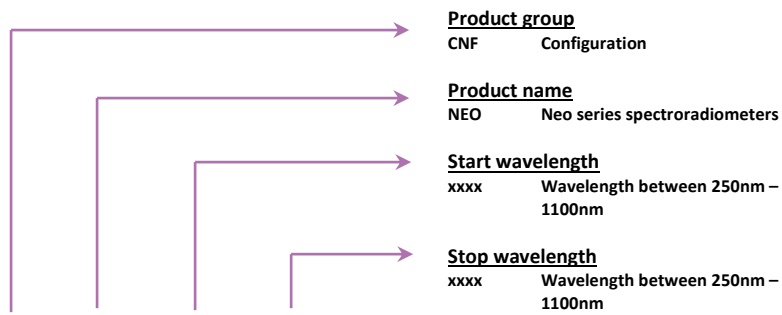
The Neo order code system consists of 2 parts:

- Neo system order code → defines the hardware configuration.
- Neo configuration order code → defines the start and stop wavelengths.

Neo system order code



Neo configuration order code



CNF – NEO - XXXX - XXXX

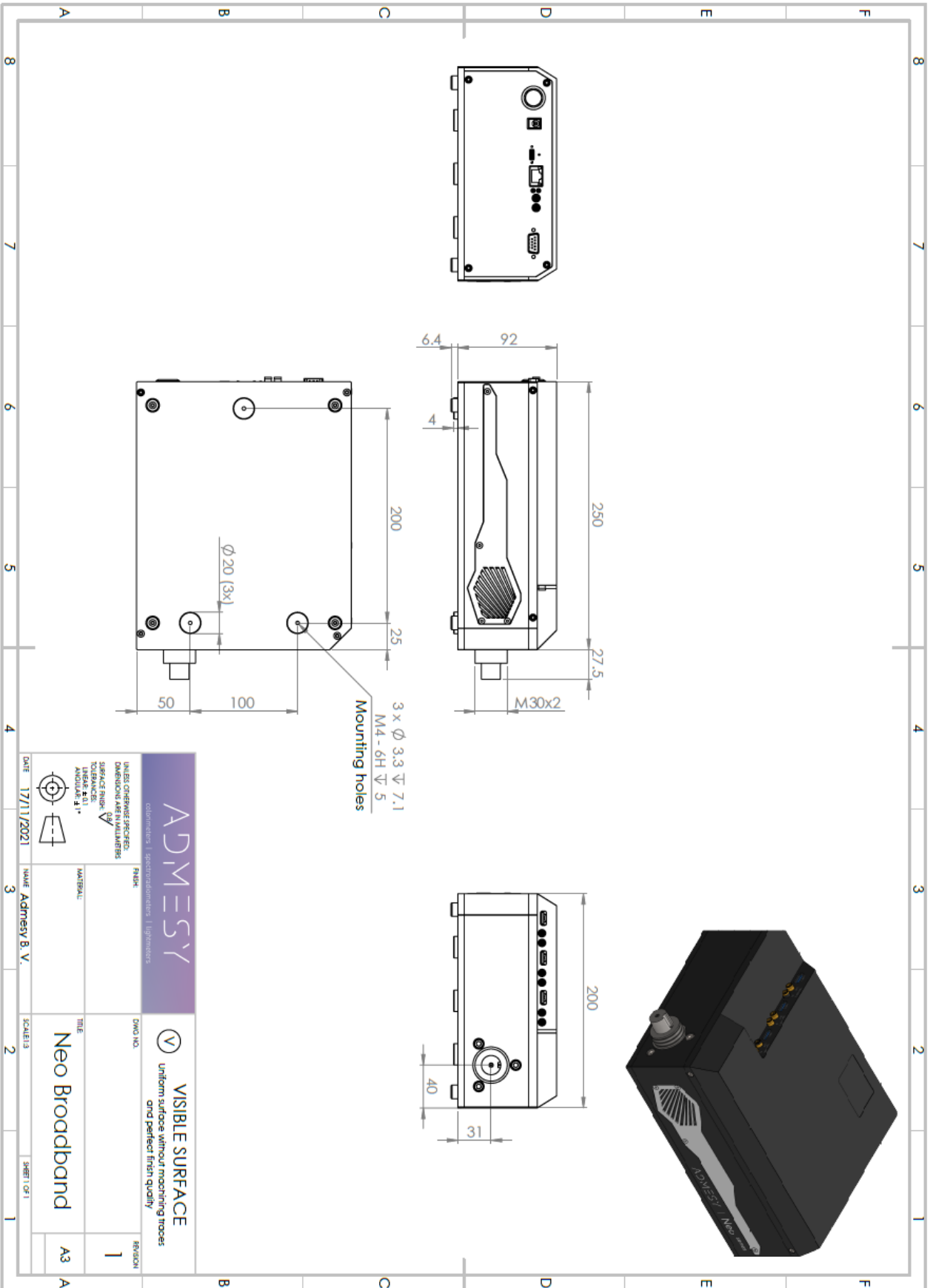
Neo order code example

Neo spectroradiometer with a 1024x64 CCD sensor, a holographic 300 grooves / mm grating with a blaze wavelength of 400 nm, a 100 µm slit and an SMA connector. Wavelength starting at 360 nm and ending at 900 nm.

SM – NEO – 01 – 030040H – 100 – SMA

CNF – NEO – 0360 – 0900

NEO DIMENSIONS



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colorimeters | spectroradiometers | lightmeters

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