APPLICATION NOTE

GMP
GENERAL MICROTECHNOLOGY & PHOTONICS

UNDERSTANDING THE SPECTRAL CHARACTERISTICS OF YOUR DETECTOR

This technical note explains how to understand the spectral characteristics of a Gentec-EO detector. In this text, you will find, among others, a clear definition for *calibrated spectral range, range of available wavelengths and spectral range.*

CALIBRATED SPECTRAL RANGE

(contained in the range of available wavelengths)

The *calibrated spectral range* is the range of wavelengths that is NIST[1] or NRC[2] traceable and to which a calibration uncertainty (%) is specified. Absolute measurement is thus possible ONLY in that range. Wavelengths outside this range are NOT calibrated and thus it is not possible to specify a calibration uncertainty. However, the spectral response of most absorbers (MB, H) is very flat from 2 µm to 20 µm.

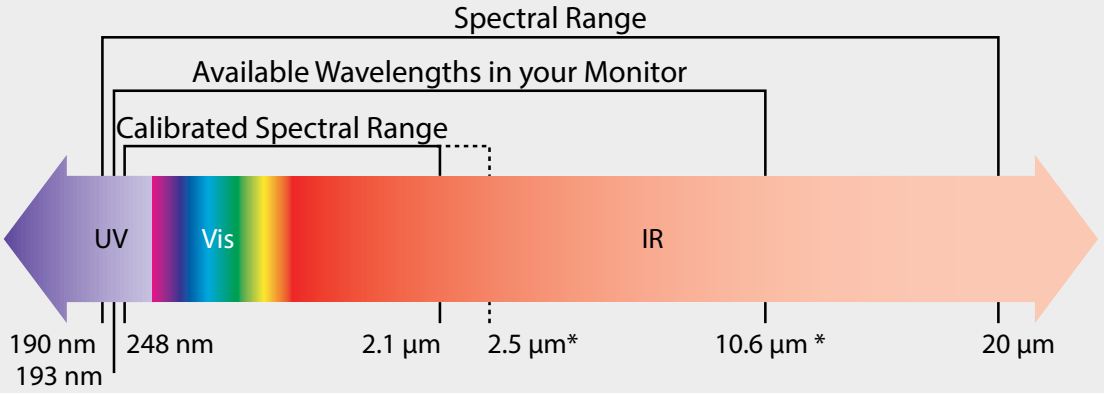
RANGE OF AVAILABLE WAVELENGTHS IN MONITOR

(contained in spectral range)

The *range of available wavelengths* contains the wavelengths that one can select in his monitor prior to a measurement. Generally, a traceable calibrated sensitivity saved in the EEPROM of the detector is applied for each of them. There are three exceptions to this rule. The first exception is the CO_2 (10.6 µm) wavelength. It can be calibrated upon request. If a detector is not calibrated at this wavelength, a typical value is provided. The second exception is below 248 nm. For historical reasons, these wavelengths are still available in a monitor and are still present in the PWC (Personal Wavelength Correction Certificate), but are not traceable anymore. The third exception is above 2.5 µm. For these wavelengths, a typical sensitivity is used but it is not traceable.

SPECTRAL RANGE

The *spectral range* is the range of wavelengths to which a detector is sensitive. A detector will give a signal response to any wavelength contained in its spectral range, and thus at least relative measurement is possible all over this range. A typical curve exists for this range.



[1] National Institute of Standards and Technology, Gaithersburg, USA
[2] National Research Council, Ottawa, Canada

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EXAMPLE

(UP19K-15S-H5-D0 connected to a Maestro)

Spectral Range: 0.19 µm – 20 µm

This thermopile power detector will give a signal response to any laser source that has a wavelength contained in that range, as long as the average power of the source is above the noise level. A typical curve exists for this range.

Available Wavelengths when Connected to Maestro: 0.193 µm – 10.6 µm

Even if this detector is sensitive between 0.19 µm and 20 µm, one can only select wavelengths contained between 0.193 µm and 10.6 µm in the Maestro.

Calibrated Spectral Range: 0.248 µm – 2.5 µm (from 2.1 µm to 2.5 µm and 10.6 µm on special request)

With this detector, traceable absolute measurement is possible between 0.248 µm and 2.5 µm and at 10.6 µm. Calibration uncertainty at the wavelength of calibration (1064 nm) is ±2.5%. Calibration uncertainty cannot be specified outside this range. However, wavelengths from 0.193 µm to 0.248 µm are corrected with values measured by the spectrophotometer, and wavelengths from 2.5 µm to 10.6 µm are corrected with typical values.

WHAT TO DO FOR EACH WAVELENGTH RANGE (UP19K-15S-H5-D0 connected to Maestro)

0.193 µm to 0.247 µm:

Select your wavelength in the monitor and make your measurement. The measurement will not be NIST traceable but will be corrected with values measured by the spectrophotometer. Calibration uncertainty is not specified in this range.

0.248 µm to 2.1 µm (up to 2.5 µm for some products[3]):

Select your wavelength in the monitor and make your measurement. The measurement will be NIST traceable. The calibration uncertainty in this range is ±2.5% at the wavelength of calibration (1064 nm).

2.5 µm to 10.6 µm:

Select your wavelength in the monitor and make your measurement. The measurement will not be NIST traceable but will be corrected with a typical value. Calibration uncertainty is not specified in this range.

10.6 µm:

Select this wavelength in the monitor and make your measurement. The measurement is NIST traceable if the detector has been calibrated for CO_2. Calibration uncertainty is specified in this case. If the detector was not calibrated at 10.6 µm, a typical value is provided.

Between 10.6 µm and 20 µm:

Select 10.6 µm in the monitor and make your measurement. The measurement will not be NIST traceable but will be corrected with the typical or calibrated value at 10.6 µm. The absorption is very flat between 10.6 µm and 20 µm for most absorbers. Calibration uncertainty is not specified.

[3] Check the PWC certificate of your detector to know the calibrated spectral range available.

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WAVELENGTH RANGES BY PRODUCT SERIES

PRODUCT SERIES	SPECTRAL RANGE	AVAILABLE RANGE IN MONITOR	CALIBRATED SPECTRAL RANGE	CO_2 (10.6 µm) CALIBRATION
QE-B	0.19 µm – 20 µm	0.193 µm – 2.1 µm	0.19 µm – 20 µm	NO
QE-MB Without QED	0.19 µm – 20 µm	0.193 µm – 10.6 µm	0.248 µm – 2.5 µm*	Available in option
QE-MT Without QED	0.19 µm – 20 µm	0.193 µm – 2.1 µm	0.19 µm – 20 µm	NO
QE-MB/MT With QED	0.3 µm – 2.1 µm	0.3 µm – 2.1 µm	0.3 µm – 2.1 µm	NO
XLP12-3S-H2, UP-H, UP-HD, HP-HE/HD	0.19 µm – 20 µm	0.193 – 10.6 µm	0.248 µm – 2.5 µm*	Available in option
UP-W	0.19 µm – 10 µm	0.193 µm – 2.1 µm	0.248 µm – 2.5 µm*	Available in option
UP-VR	0.266 µm – 2.5 µm	0.266 µm – 2.1 µm	0.3 µm – 2.5 µm*	NO
Pronto-250	0.19 µm – 20 µm	0.193 µm – 10.6 µm	0.248 µm – 2.5 µm and 10.6 µm (CO2)	Included
FLASH	0.19 µm – 20 µm	YAG (1.064 µm) and custom (0.25 µm – 2.5 µm)	YAG (1.064 µm) and custom (0.25 µm – 2.5 µm)	Available in option

* Calibration from 2.1 µm to 2.5 µm on special request only

** Note: Please refer to user manuals for more details**

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