

NEAR INFRA RED diode array spectrometers



Advantages :

- **Compact NIR-Spectrometers**
- **Fast measurements because of diode array technology**
- **High detector sensitivity**
- **High Signal/Noise-ratio because of T.E. cooled InGaAs–diode array-detector**
- **No moving parts and therefore Maintenance-free**
- **Portable for Lab or Field use**

System overview:

Product name	Spectral range	Spectral resolution	Interface	Detector	Features
getSpec NIR1.7-128-TS	900 – 1700 nm	12 nm FWHM	USB	128 Element InGaAs Array, Temperature stabilized	affordable price for standard NIR applications
getSpec NIR1.7-128-PC	900-1700 nm	12nm FWHM	USB	128 Element InGaAs Array, single stage T.E. Cooled	Best price solution!
getSpec NIR1.7-256-PC	900 – 1700 nm	6 nm FWHM	USB	256 Element InGaAs Array, single stage T.E. Cooled	reliable, rugged, approved – our most standard device
getSpec NIR1.7-512-PC	900 – 1700 nm	3 nm FWHM	USB	512 Element InGaAs Array, single stage T.E. Cooled	high resolution in the NIR up to 1700 nm
getSpec NIR2.2-256-PC	1100 – 2200 nm	8 nm FWHM	USB	Extended 256 Element InGaAs Array, dual stage T.E. Cooled	weak noise signal and extended spectral range

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Properties of getSpec.com's NIR – spectrometer

The NIR spectrometers are each available with one of four different detectors covering the NIR wavelength range (900-2200nm). The spectrometers are connected to your computer with Windows platform using an USB interface integrated into the spectrometer. Sophisticated SPEC™ Instrument software to control the device, readout and display data is included. This uses Microsoft Windows™ as the base operating system. All components are sealed and mounted inside the spectrometer housing, requiring no adjustments or maintenance. Our NIR spectrometer performs repeatable, high-speed measurements (as short as 10 micro-seconds integration times and 2 millisecond sample rate). The permanent wavelength calibration (within 1 nm, ask for this option) makes the NIR spectrometer the ideal instrument for process control or laboratory use. Thermo-electrically cooled InGaAs diode array systems provide good stability. Additional features include internal or external trigger mode, single or continuous scan, with various trigger modes all software selectable. Light is collected from a variety of accessory sample holders and optomechanical geometries using a 400 micron active diameter fibre optic. This allows transmission, absorbance, reflectance and irradiance measurements to be made. A frequently used light source with these spectrometers is the getLight-HAL in HP setting. In addition to the free delivered SPEC™ Software (including colour values), a GRAMS® 32 package, a 32Bit-DLL and a MyInstrument driver are available. Using the driver the spectrometer can directly run under GRAMS® 32 Software. This allows you to build easier your chemometric models.

Different probes can be connected via optical fibres with SMA connectors to the spectrometers. So measurements in transmission as well in reflectance are possible.

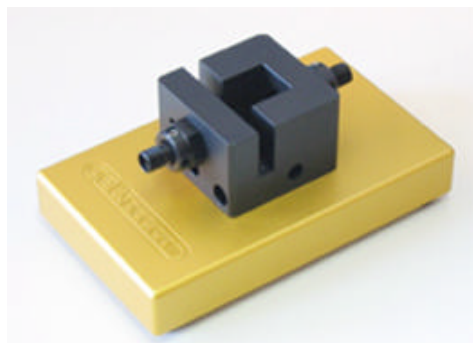


Figure 1: cuvette holder for transmission measurements of liquid samples for cuvettes up to 10 mm



Figure 2: reflection probe with 6 illumination fibres and one reading fibre which can be connected to the spectrometer

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Featured Applications

Reflection measurement on plants in NIR-Range

- getSpec NIR1.7-128-PC

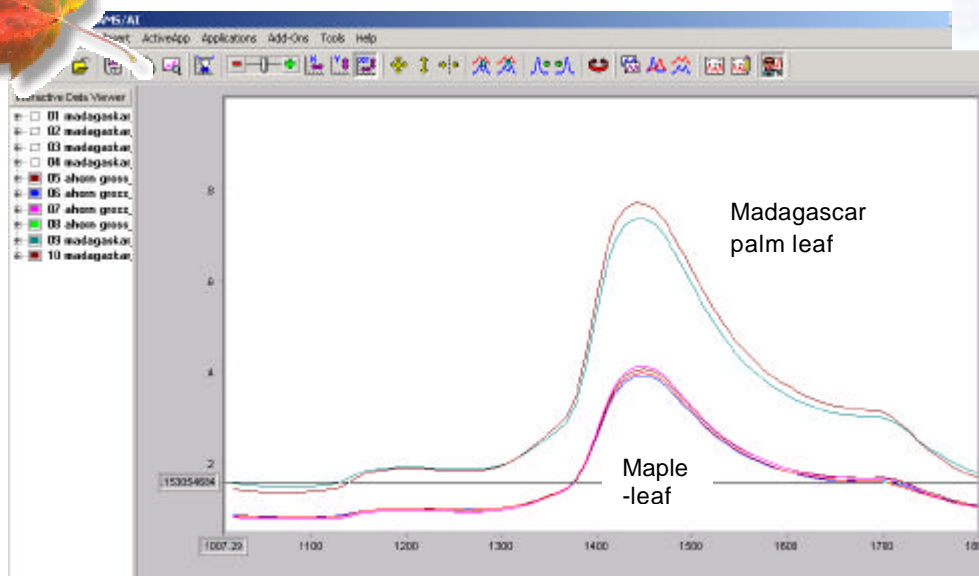


Figure 3: NIR-spectra of different leaves, spectrum computed with Grams AI – Software

For the analysis of different parameters of leaves we recommend our reflection measurement head SentroHead 50/30 VIS/NIR in addition with the getSpec NIR1.7-128-PC spectrometer. After the measurement of the dark and reference signal you place the samples below the measurement head. Afterwards you receive the sample spectrum as shown in figure 3.



Figure 4: SentroHead 50/30 VIS/NIR

The SentroHead 50/30 was especially designed for reflectance measurements in the visible and NIR spectral range. Due to the direct illumination (without any optical fibres) of the sample by the integrated halogen light source, there is a high intensity of light on the sample. This enables you to measure samples with low reflectance.

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Transmission measurement of chemicals in NIR-Range

- getSpec NIR1.7-256-PC

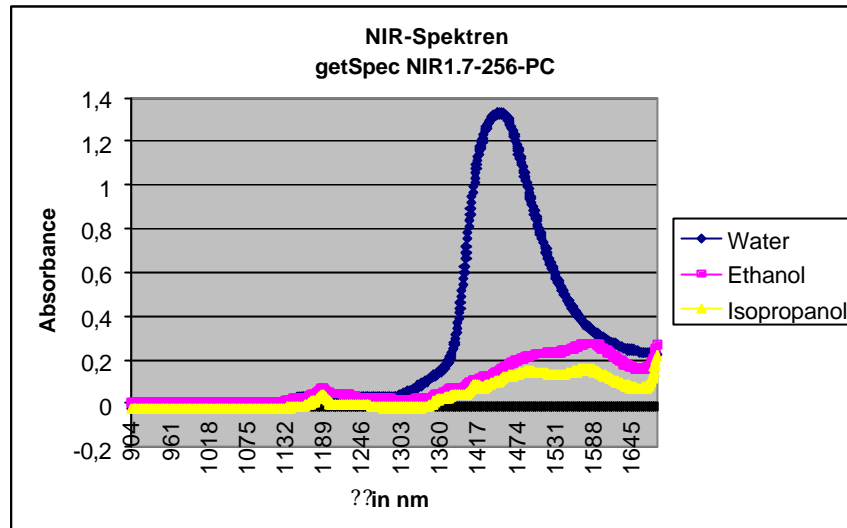


Figure 5: Absorbance spectra of water, alcohol and isopropanol

Well suited for transmission measurements of chemicals in a laboratory set-up is our 256 Element getSpec NIR1.7-256-PC. The measurement set-up consists of a light source, e.g.

getLight-HAL-S, a cuvette sample holder, e.g. our getCUV, LOH fibre cables and the getSpec NIR1.7-256-PC.

The measurement procedure is very easy. At first you have to switch off the light source and take the dark signal with a blank cuvette. Secondly you have to take a reference. Switch on the light source and measure the blank cuvette. Now you can measure your samples. Fill the fluids

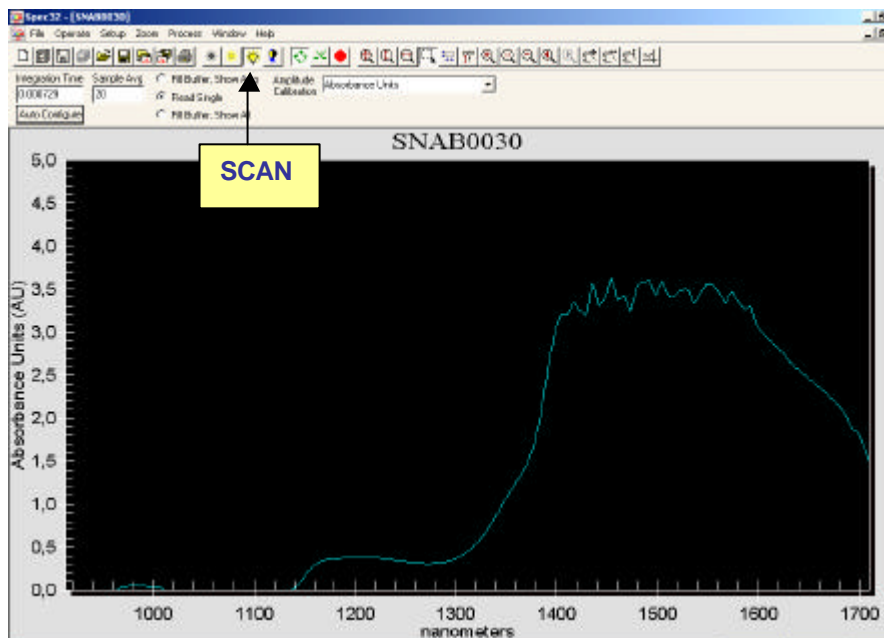


Figure 6: NIR-Spectrum of tap water in the cuvette and click on the Scan Button in the Spec 32-Software (see Fig.6).

Technical specification getSpec-NIR

Product	getSpec NIR1.7-128-TS or PC	getSpec NIR1.7-256-PC	getSpec NIR1.7-512-PC	getSpec NIR2.2-256-PC
Wavelength Range	900 – 1700 nm	900 – 1700 nm	900 – 1700 nm	1100 – 2200 nm
Input optical fibre	400 micron core Low OH - SMA	400 micron core Low OH - SMA	400 micron core Low OH - SMA	400 micron core Low OH - SMA
Input slit	50 micron slit	50 micron slit	25 micron slit	50 micron slit
Detector	InGaAs	InGaAs	InGaAs	Extended InGaAs
Pixels / pixel size	128 / 50 x 500 µm	256 / 50 x 500 µm	512 / 25 x 500 µm	256 / 50 x 500 µm
Resolution (FWHM)	12 nm	6 nm	3 nm	8 nm
TE Cooling (?T vs. ambient)	TS=Temperature stabilized, PC = Peltier cooling, Single stage TE-cooled delta T = 25 °C	Single stage TE-cooled delta T = 25 °C	Single stage TE-cooled delta T = 25 °C	Dual stage TE-cooled delta T = 32 °C
Photometric stability / repeatability	±0.05%, over 60 minutes, light source with optical feedback ±0.15%, over 60 minutes, light source without optical feedback	<0.00005 AU variation between 100 data points, each point consist of 1000 samples (8 sec. accumulation)	<0.00005 AU variation between 100 data points, each point consist of 1000 samples (8 sec. accumulation)	<0.001 AU over 30 minutes. Integration time = 0.3 ms. fill buffer. T.E. Cooler at -15°C. Ambient temperature 23°C.
Noise level	n.c.	<0.000280 AU RMS (1024 sample average, 8 second accumulation, 12.5 nm slit)	<0.000280 AU RMS (1024 sample average, 8 second accumulation, 12.5 nm slit)	<50 counts p-p Integration time = 5 ms. fill buffer. T.E. Cooler -15°C. Ambient temperature 23°C.
Wavelength stability	< 0.05 nm over 48 hours	< 0.05 nm over 48 hours.	< 0.05 nm over 48 hours.	< 0.05 nm over 48 hours
Stray Light	< 0.1%	< 0.2%	< 0.2%	< 0.2%
Integration time*	6 µs – 500 ms	10 µs - 8 s	10 µs - 8 s	20 ms
A/D converter	16 Bit, 330 KHz	16 Bit, 330 KHz	16 Bit, 330 KHz	16 Bit, 330 KHz
Outputs	Modular connector, trigger, two strobes, light source shutter control and two fibre optic switch controls	Modular connector, trigger, two strobes, light source shutter control and two fibre optic switch controls	Modular connector, trigger, two strobes, light source shutter control and two fibre optic switch controls	Modular connector, trigger, two strobes, light source shutter control and two fibre optic switch controls
PC Interface	USB	USB	USB	USB
Power Requirements	230 V / 50 Hz (12 VDC available on request)	230 V / 50 Hz (12 VDC available on request)	230 V / 50 Hz (12 VDC available on request)	230 V / 50 Hz (12 VDC available on request)
Dimensions	300 x 90 x 190 mm	300 x 90 x 190 mm	300 x 90 x 190 mm	300 x 90 x 190 mm
Weight	3 kg	3 kg	3 kg	3 kg

* **Readout Time:** 2.062 milliseconds **Cycle time:** readout time + integration time

The readout time is the time needed to transfer the pixel data of the linear array detector to the A/D converter sequentially. During this time no integration is possible.

The cycle time is the shortest time to repeat measurements, if there is no additional delay caused by the software.

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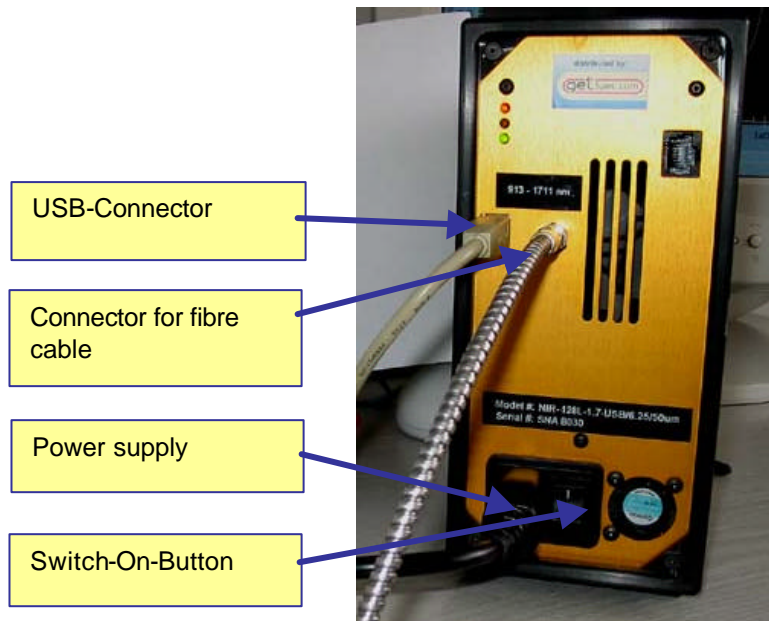
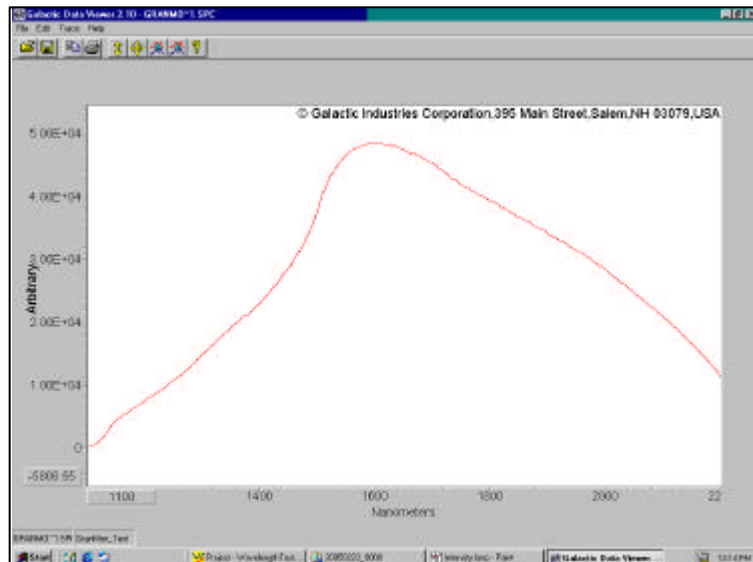


Figure 7: Front side of the getSpec NIR1.7-128-TS

Technical Data Check - getSpec NIR1.7-256-PC

Sensitivity with calibrated light source

Light source: HL-2000-FHSA S/N: 210127
Fibre: 400µm, 2m
Integration time:0.07ms
Averaging: 10
Maximum @ 50676 A/D-Counts



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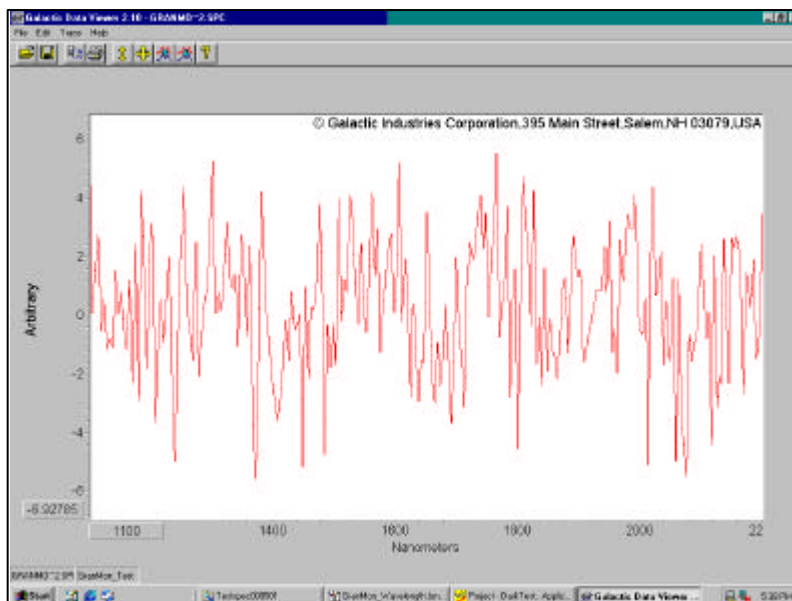
...more than spectroscopy!



Dark noise

Light source: off
Fibre: 400µm, 2m, end closed
Integration time: 0.07ms
Averaging: 10

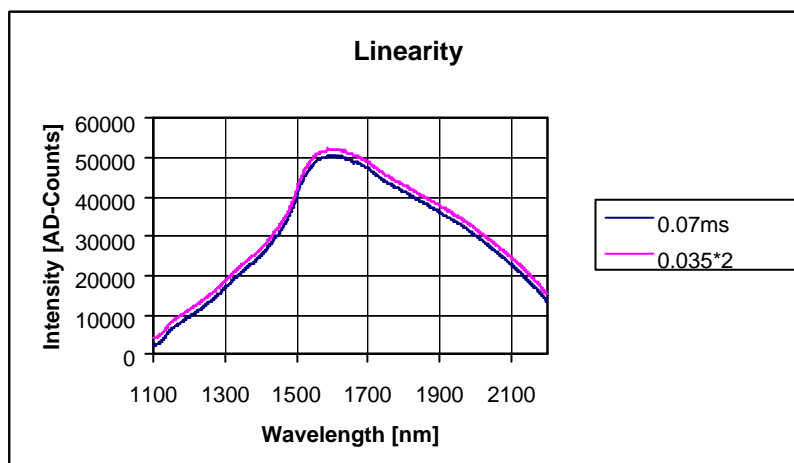
Measured: ?5AD-Counts



Detector linearity

Light source: HL-2000-FHSA S/N: 210127
Fibre: 400µm, 2m
Measured: Variation subject to integration time

Integration time: 0.07s
Averaging: 10 and
Integration time: 0.035ms
Averaging: 10



Should you have questions concerning the technical specification; our application scientists will be pleased to consult you.

For the purpose of improvement, technical specifications are subject to change without notice. (03/2005)

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