

## Portable and Bench-Top Diffuse Transmittance/Reflectance Spectrophotometers



i-Spec™ series products are diffuse transmittance/reflectance spectrophotometers with built-in integrating spheres, or fiber optic remote probes, and other accessory options for bench-top as well as portable applications. The UV-SNIR and NIR models employ TE cooled CCD array detectors (200-1050 nm), InGaAs array (920-1700 nm), and PbS array (1100-2900 nm) detection systems, respectively for optimal UV, Vis and NIR measurement sensitivity and dynamic range to be achieved. The i-Spec™ products use high intensity and long lifetime illumination sources and high speed detection systems, enabling fast spectral capturing of 20 to >100 spectra per second thus, are ideal for spectrophotometric studies where high spectrum capture rate is essential. The spectrophotometers come with a USB 1.1/2.0 interface providing plug-and-play computer connectivity. Windows based spectrophotometer operating software with OCX interface to major chemometrics software packages is provided. An integration sphere with high spectral reflectivity is an integral part of the sphere based models. The built-in reflectance sample holders and transmittance sample cells in sphere based models and variety of fiber optic sampling accessories for the fiber coupled versions are easy to use and flexible in handling various sample formats. White reflectance reference standards options are available.

### Features

- 250-1000 nm UV-NIR sphere based model
- 920-1700 nm NIR sphere based model
- 350-1700 nm Vis/NIR fiber optic based model
- 920-1700 nm NIR fiber optic based model
- USB 2.0/1.1 plug-and-play interface
- Built-in PTFE integration sphere for sphere versions
- Flexible fiber coupling for fiber optic versions
- Variety of fiber optic sampling accessories
- No moving parts
- TE cooled/regulated for long term stability
- Built-in sample holders for sphere based models

### Applications

- Agricultural, pharmaceutical, and petrochemical
- Material spectral diffuse property characterizations
- Opaque chemical solution analysis
- Bench-top and field spectrophotometric measurements



## Technical Specifications for:

BWS015 Vis/NIR Fiber Coupled Diffused Transmittance/Reflectance Spectrophotometer and  
BWS025 NIR Fiber Coupled Diffused Transmittance/Reflectance Spectrophotometer

	<b>BWS015</b>	<b>BWS025</b>
<b>Principle</b>	Single beam fiber optic coupling, light source stabilized, diffuse transmittance/reflectance/ and absorbance, Vis-NIR Spectrophotometer with USB PC interface, controlled by personal computer with associated programs installed.	Single beam fiber optic coupling, light source stabilized, diffuse transmittance/ references/absorbance, NIR Spectrophotometer with USB PC interface, controlled by personal computer with associated programs installed.
<b>Optical System</b>	Crossed Czerny-Turner spectrograph optical layout, high throughput optics with Vis-NIR sensitivity enhancement sensor array detection.	Crossed Czerny-Turner spectrograph optical layout, high throughput optics with NIR sensitivity enhancement sensor array detection.
<b>Light coupling</b>	Both illumination and collection via fiber optic cables (provided separately) with SMA905 connectors	Both illumination and collection via fiber optic cables (provided separately) with SMA905 connectors
<b>Illumination light source</b>	Built-in 5 W long lifetime Tungsten	Built-in 5 W long lifetime Tungsten
<b>Detector</b>	TE cooled and temperature stabilized high dynamic range CCD and InGaAs arrays	TE cooled and temperature stabilized high dynamic range InGaAs array
<b>Wavelength Range</b>	400 nm – 1700 nm	920 nm - 1700 nm
<b>Computer Interface</b>	USB 2.0/1.1	USB 2.0/1.1
<b>Integration Time</b>	5 - 65,535 ms controlled via BWSpec software	1 - 65,535 ms controlled via BWSpec software
<b>Software Interface</b>	<i>My Instrument OCX Control</i> for interfacing to GRAMS AI spectral analytic software	<i>My Instrument OCX Control</i> for interfacing GRAMS AI spectral analytic software
<b>Instrument Dimension</b>	6.30 x 13.2 x 5.98 inches [160 x 335 x 152 mm]	6.30 x 3.2 x 5.98 inches [160 x 335 x 152 mm]
<b>Instrument Weight</b>	10 lbs [4.5 kg]	8 lbs [3.6 kg]
<b>Power</b>	100 VAC–240 VAC, 50/60 Hz; 20 VA, battery option available	100 VAC–240 VAC, 50/60 Hz; 15 VA, battery option available
<b>Temperature</b>	0°C to 45°C	0°C to 45°C

## Technical Specifications for:

BWS005 Vis/NIR Fiber Coupled Diffused Transmittance/Reflectance Spectrophotometer and  
BWS045 NIR Fiber Coupled Diffused Transmittance/Reflectance Spectrophotometer

	<b>BWS005</b>	<b>BWS045</b>
<b>Principle</b>	Single beam fiber optic coupling, light source stabilized, diffuse transmittance/reflectance/ and absorbance, Vis-NIR Spectrophotometer with USB PC interface, operated by personal computer with associated programs installed.	Single beam fiber optic coupling, light source stabilized, diffuse transmittance/ references/absorbance, NIR Spectrophotometer with USB PC interface, operated by personal computer with associated programs installed.
<b>Optical System</b>	Crossed Czerny-Turner spectrograph optical layout, high throughput optics with Vis-NIR sensitivity enhancement sensor arrays	Crossed Czerny-Turner spectrograph optical layout, high throughput optics with NIR sensitivity enhancement sensor array
<b>Light coupling</b>	Both illumination and collection via fiber optic cables (provided separately) with SMA905 connectors	Both illumination and collection via fiber optic cables (provided separately) with SMA905 connectors
<b>Illumination light source</b>	Built-in 5 W long lifetime Tungsten	Built-in 5 W long lifetime Tungsten
<b>Detector</b>	TE cooled and temperature stabilized high dynamic range CCD and PbS arrays	TE cooled and temperature stabilized PbS array
<b>Wavelength Range</b>	400 nm–2400 nm with resolution of 1 nm in 400-1050 nm, 15 nm in 1200-2400 nm	1200-2400 nm with a resolution of 15 nm
<b>Computer Interface</b>	USB 2.0/1.1	USB 2.0/1.1
<b>Integration Time</b>	5 - 65,535 ms for 400-1050 nm, and 3.3 ms - 128 ms for 1200-2400 nm controlled via BWSpec software	3.3 ms - 128 ms controlled via BWSpec software
<b>Software Interface</b>	<i>My Instrument OCX Control</i> for interfacing to GRAMS AI spectral analytic software	<i>My Instrument OCX Control</i> for interfacing GRAMS AI spectral analytic software
<b>Instrument Dimension</b>	6.30 x 13.2 x 5.98 inches [160 x 335 x 152 mm]	6.30 x 13.2 x 5.98 inches [160 x 335 x 152 mm]
<b>Instrument Weight</b>	10 lbs [4.5 kg]	8 lbs [3.6 kg]
<b>Power</b>	100 VAC–240 VAC, 50/60 Hz; 20 VA, battery option available	100 VAC–240 VAC, 50/60 Hz; 15 VA, battery option available

	<b>BWS003</b>	<b>BWS004</b>
<b>Principle</b>	Single beam integrating sphere, light source stabilized, UV/Vis/ Short Wave NIR transmittance/ absorbance/reflectance Spectrophotometer with USB interface, operated by personal computer with associated programs installed.	Single beam integrating sphere, light source stabilized, NIR transmittance/absorbance/ reflectance Spectrophotometer with USB interface, operated by personal computer with associated programs installed.
<b>Optical System</b>	Crossed Czerny-Turner spectrograph optical layout, high throughput optics with UV-NIR sensitivity enhancement sensor array detection.	Crossed Czerny-Turner spectrograph optical layout, high throughput optics with NIR sensitivity enhancement sensor array detection.
<b>Integration Sphere</b>	Default 4" Labsphere spectralon material based integrating sphere	Default 4" Spectralon material based integrating sphere
<b>Port Ratio</b>	5.0% : 4" integration sphere	5.0% : 4" integration sphere
<b>Detector</b>	UV enhanced TE cooled and temperature stabilized high dynamic range back-thinned 1024 pixel CCD	TE cooled and temperature stabilized high dynamic range 512 pixel InGaAs detector array for 920-1700 nm
<b>Detector Temperature</b>	0 °C	0 °C
<b>Temperature stability</b>	Better than ± 0.2 °C	Better than ± 0.2 °C
<b>Sampling</b>	Built-in sample holders for reflectance and transmittance/ absorbance	Lens and Fiber coupled
<b>Source</b>	5 W Pre-aligned Xenon Flash Light 10 <sup>9</sup> Flash Life-time	30 W Pre-aligned tungsten
<b>Wavelength Range</b>	250 nm–1000 nm or 200-950 nm	920 nm–1700 nm
<b>Pixel Resolution</b>	0.7 nm	4 nm for 920-1700 nm
<b>Wavelength Accuracy</b>	1 pixel	1 pixel
<b>Wavelength Reproducibility</b>	1 pixel	1 pixel

## Technical Specifications for:

BWS003 UV/Vis/NIR Diffused Transmittance/Reflectance Spectrophotometer and  
BWS004 NIR diffused Transmittance/Reflectance Spectrophotometer

<b>Stray light</b>	0.0007 %T at 370 nm	0.004 at 1420 nm
<b>Photometric repeatability</b>	0.005 A	0.01 A
<b>Photometric Range</b>	5 A	5 A
<b>Measuring Speed</b>	26 ms to 65,535 ms	1 ms to 65,535 ms
<b>Sample Holder (Transmittance)</b>	Standard 10 mm cuvette for liquid and powder measurement 1 mm – 10 mm thickness sheet sample allowed	Standard 10 mm cuvette for liquid and powder measurement 1 mm – 10 mm thickness sheet sample allowed
<b>Sample Holder (Reflectance)</b>	25 mm port diameter with frame reducer options	25 mm port diameter with frame reducer options
<b>In-process measurement probe</b>	FIP Fiber coupled stainless steel absorption immersion probe. Absorption length 5mm, 10mm and 20mm selectable.	FIP Fiber coupled stainless steel absorption immersion probe. Absorption length 5mm, 10mm and 20mm selectable.
<b>Computer interface</b>	USB 2.0/1.1	USB 2.0/1.1
<b>Maximum data throughput</b>	20 spectra / second	100 spectra / second
<b>Software Interface</b>	<i>My Instrument OCX Control</i> for interfacing to GRAMS AI spectral analytic software	<i>My Instrument OCX Control</i> for interfacing to GRAMS AI spectral analytic software
<b>Instrument Dimension</b>	17.7 x 13.2 x 8.5 inches [449 x 333 x 216 mm]	17.7 x 13.2 x 8.5 inches [449 x 333 x 216 mm]
<b>Instrument Weight</b>	15 lbs [6.75 kg]	15 lbs [6.75 kg]
<b>Power</b>	100 VAC–240 VAC, 50/60 Hz; 40 VA	100 VAC–240 VAC, 50/60 Hz; 60 VA
<b>Temperature</b>	5°C–35°C	5°C–35°C
<b>Recommended Humidity</b>	10–70% relative humidity, non-condensing	10–70% relative humidity, non-condensing