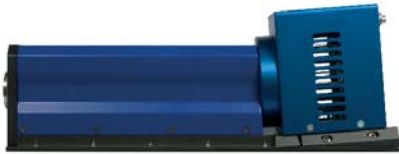


SPECTRAL CAMERA *NIR*

Family of hyperspectral cameras operating in the range of 900 - 1700 nm. The cameras provide high resolution and high speed solutions for chemical imaging applications from moisture monitoring to food analysis and sorting applications in various recycling processes.



Cased camera



OEM camera

SPECIM's Spectral Camera is an integrated combination of an ImSpector imaging spectrograph and an area monochrome camera. It works as a push-broom type line scan camera providing full, contiguous spectral information for each pixel in the line.

SPECIM offers several Spectral Camera models in the NIR range in order to meet various application requirements. They provide 320 and 640 pixel spatial resolution and image rate from 50 to 350 Hz. Each Spectral Camera NIR model consists of an ImSpector N17E imaging spectrograph for the wavelength region 900 - 1700 nm and a temperature stabilized InGaAs camera. The transmission diffraction grating

and lens optics included in the spectrograph provide high light throughput and a high quality and distortionless image which is designed to meet the unique requirements of the associated detector.

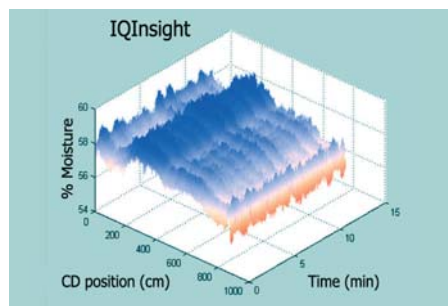
The maintenance free cooling unit is designed to keep the detector temperature stable throughout a wide ambient temperature range.

Both a cased camera and uncased OEM model are available. The cased camera is equipped with an electro-mechanical shutter for dark image acquisition. The camera housing is designed for easy handling connectivity and operation. The cameras are delivered with separate power supply/control unit, frame grabber and the necessary cables.

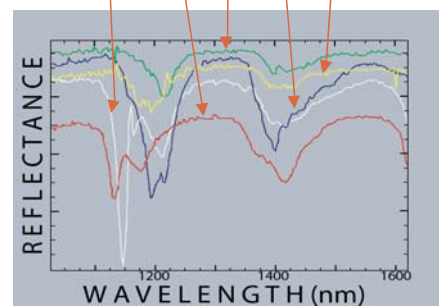
Applications

- Moisture profiling
- Food analysis
- Chemical sorting
- Recycling
- Pharmaceutical QA
- Medical imaging
- Cosmetics

SWIR camera available for the range 970 -2500 nm. Check our detailed brochure for Spectral Camera SWIR.



Example of paper moisture profiles obtained with the IQ moisture monitoring system by Metso Automation. The system employs 100 fiber optical probes installed across the paper machine. All the probes are connected to a single Spectral Camera NIR for simultaneous moisture measurement in all the 100 spots.

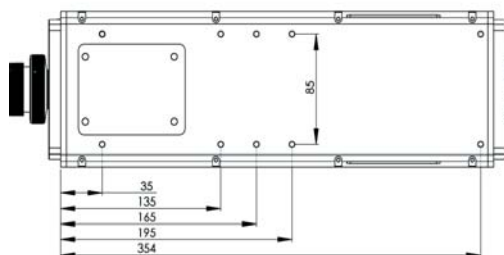


Plastic sorting: each image pixel is associated with spectral information to identify and sort the plastic pieces

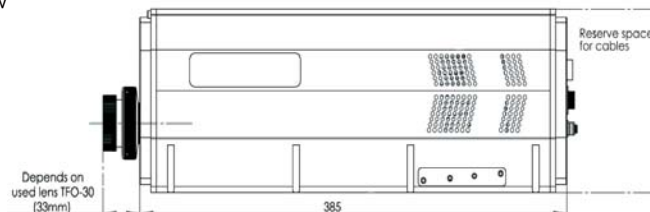
Performance Specifications

| SPECTRAL CAMERA | XLNIR | XHNIR | VLNIR | |
|--------------------------------------|--|--------------------------------|--------------------------------|-----------------------|
| Optical characteristics | | | | |
| Spectrograph | ImSpector N17E | | | |
| Spectral range | 900 - 1700 nm ±10nm | | | |
| Spectral resolution | 5 nm (30 µm slit) | | | |
| Spectral sampling / pixel | 4 nm | 2.6 nm | 4 nm | |
| Spatial resolution | rms spot radius < 15 µm | | | |
| Aberrations | Insignificant astigmatism, smile or keystone | | | |
| Numerical aperture | F/2.0 | | | |
| Slit width options | 30 µm (18, 50, 80 µm optional) | | | |
| Effective slit length | 9.6 mm | 12.8 mm | 9.6 mm | |
| Total efficiency (typical) | > 50%, independent of polarization | | | |
| Stray light | < 0.5 % (halogen lamp, 1400 nm notch filter) | | | |
| Electrical characteristics | | | | |
| Sensor | TE-cooled InGaAs photodiode array | | | |
| Pixels in image frame | 320 x 256 | 640 x 512 | 320 x 256 | |
| Active pixels | 320 (spatial) x 240 (spectral) | 640 (spatial) x 360 (spectral) | 320 (spatial) x 240 (spectral) | |
| Pixel size | 30 x 30 µm | 20 x 20 µm | 30 x 30 µm | |
| Cooling | Forced convection cooling | | | |
| Camera output | 12-bit, USB2, CameraLink | 14-bit, USB2, LVDS, CameraLink | 12-bit, CameraLink | |
| Frame rate | 100 fps / 350 fps | 15 (USB2) / 60 / 90 fps | 50 fps | |
| Exposure time range | 1 µs – 500 ms | | | |
| Power consumption | < 4 W, Cooler ~30 W | | < 30 W | |
| Input voltage | 12 V | | | |
| Environmental characteristics | | | | |
| Storage | -20 ... +85°C | | | |
| Operating | +5 ... +40°C, non-condensing | | | |
| Mechanical characteristics | | | | |
| | XLNIR, XHNIR | | VLNIR | |
| | OEM | CASED | OEM | CASED |
| Size (L x W x H) | 350 x 100 x 130 mm | 385 x 120 x 135 mm | 350 x 100 x 115 mm | 385 x 120 x 135 mm |
| Weight | 4.5 kg | 5.38 kg | 4.4 kg | 5.28 kg |
| Body | Anodized aluminium with mounting screw holes | | | |
| Lens Mount | Standard C-mount | | | |
| User adjustments | None | | | |
| Shutter | Optional | YES, with USB control | Optional | YES, with USB control |

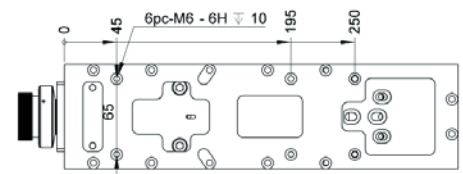
Cased camera
Bottom view



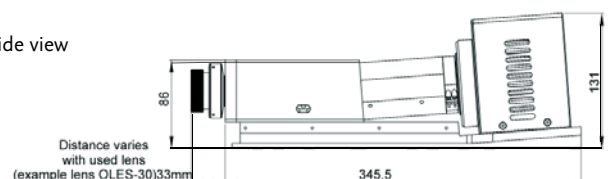
Side view



XLNIR/XHNIR
OEM camera
Bottom view



Side view



ACCESSORIES

SPECIM can provide various accessories for the Spectral Cameras to broaden their applicability.

- Several fore objective lenses with different FOVs are available which have been designed to provide the optimal image and spectral quality across the full spectral range of the Spectral Camera.
- In addition to standard lenses, also a 900-2500nm corrected 1:1 imaging macro lens, OLESMacro, is available for NIR and SWIR Spectral Cameras
- The Spectral Camera can also be delivered with collection fiber optics to convert the camera into a multiple point spectrometer. All the points are measured simultaneously without a moving multiplexer.
- The Spectral Camera can be delivered with a Mirror Scanner or rotating stage for scanning static targets and outdoor scenes, or with X-stage sample mover for desktop and microscope applications.

SPECTRALDAQ SOFTWARE

SPECIM Spectral Camera NIR is supported by SpectralDAQ software, which allows:

- data acquisition and saving data in the hard disk
- camera parameters settings
- basic visualization in real time

Datacubes are saved in ENVI compatible format that allows further processing by several software packages for hyperspectral data processing.