

# HYPERSPECTRAL SCANNERS

SPECIM provides several scanner accessories for its Spectral Cameras and AISA sensors. With a scanner, a line imaging push-broom hyperspectral camera can be easily used to scan an image of a stationary target or scenery in the lab and field.



Mirror Scanner unit



Mirror Scanner mounted on a cased Spectral Camera on top of a standard tripod

## Mirror Scanner

SPECIM's Mirror Scanner accessory fits to the front plate of all of our AISA sensors as well as to the Spectral Cameras based on ImSpector Enhanced series spectrograph. The Mirror Scanner comes in two versions; VNIR version optimised for 380 to 1700 nm, and SWIR version optimised for 900 to 2500 nm wavelength range.

The Mirror Scanner unit includes a precision stepper motor and gear, which turn the high quality front surface mirror in front of the lens of the camera when the scanner unit is mounted to the camera. The mirror is inside an enclosure which is closed with a window to prevent dust getting onto the mirror. While the mirror turns in front of fore lens, the full spectral image (data cube) of the target is built line by line.

The field of view (FOV) of the image line is defined by the fore lens, and the number of pixels in the line is defined by the camera used. The user can set the scanning range, maximum being 80 degrees.

SPECIM's SpectralDAQ software supports the operation of the camera with the scanner unit.

## SPECIFICATIONS

- First surface mirror (400 - 1700 or 900 - 2500 nm)
- Protecting window, optimised for the wavelength range
- Stepper motor
- Serial interface for control
- +24 V DC operating voltage
- FOV 80 x 30 degrees maximum depending on the fore objective lens
- Scan speed 0,01 degrees/s – 25 degrees/s
- Weight ~2 kg



Rotating Scanner mounted on a cased Spectral Camera on top of a standard tripod

## Rotating Scanner

The Rotating Scanner unit can be attached directly to a standard tripod with a 3/8" screw. The Spectral Camera is attached to the Rotating Scanner with an adapter that is equipped with a special bayonet enabling quick installation and release of the Spectral Camera.

The Rotating Scanner has one connector for both operating voltage (+24 VDC) and the scanner control (serial RS232 interface). A cased Spectral Camera can be electrically connected directly to the Rotating Scanner, without any additional power supply and serial cable to the computer. For an OEM type Spectral Camera, the Rotating Scanner is delivered with a separate power supply/serial cable. There is a switch for immediate stop of the scanner operation in emergency.

The Rotating Scanner can be controlled for scanning speed and angle with SPECIM SpectralDAQ data acquisition software.

The max scanning angle of the Rotating Scanner is limited to 180 degrees with electrical limit switches. It can be extended up to 270 degrees by special request.

## SPECIFICATIONS

- Stepper motor
- Serial interface for control
- +24 V DC operating voltage
- FOV 180 x 60 degrees maximum, depending on the fore objective used
- Scan speed 0,01 degrees/s – 25 degrees/s
- Size (L x W x H) 212 x 122 x 78 mm
- Weight 4,5 kg

## Comparison of the Scanners

Main advantages of the Rotating Scanner over the Mirror Scanner are:

- Larger scanning angle, not limited by the mechanics.
- Possibility to use the full selection of available fore objectives with different field-of-views, not limited by the mechanics.
- Free access to the fore objective for focusing and other adjustments.
- Possible to use with the full line of SPECIM Spectral Cameras and AISA sensors. Also multiple sensor integrations are possible.

Disadvantages compared to the Mirror Scanner are:

- Physical movement of the full sensor (safety issue in some cases)
- Larger scanner mass and larger moving mass; requires stable tripod.

## Applications

**Vegetation research and mapping**

**Environmental research and monitoring**

**Urban planning**

**Spectral color scanning**

**Mineralogical mapping for research and mine face scanning**

**Water reservoir monitoring**

**Target detection and security applications**

**Scanning of human body and other biological targets**



Dual VNIR and SWIR camera setup on a rotary scanner