

## MULTISPECTRAL INFRARED CAMERAS.

The MS-IR infrared camera allows the scene to be split into eight different spectral bands rather than only one broadband image, thus enabling spectral signature analysis. The filter wheel is a fast-rotating mechanism designed to maximize the cameras' frame rate. Rotating speed is adjustable up to 105 Hz per filter, allowing a frame rate up to 2 900 fps in a synchronised mode.



The MS-IR.

## KEY BENEFITS

### MULTISPECTRAL CAPABILITIES

Performs 8-channel multispectral analysis using a high-speed filter wheel. In fast-rotating mode, the image acquisition is synchronised so that one image per filter is acquired. The filter wheel can also be used in static mode.

### HIGH DYNAMIC RANGE

Unique Telops proprietary non-linearity correction and exposure time independent calibration algorithms ensure observation of scene targets with the highest possible contrast and accuracy.

In addition, optional fast automated attenuation filter mechanisms can be added to measure scenes with extreme temperature variations.

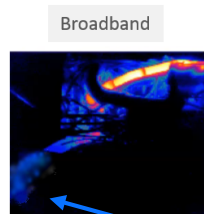
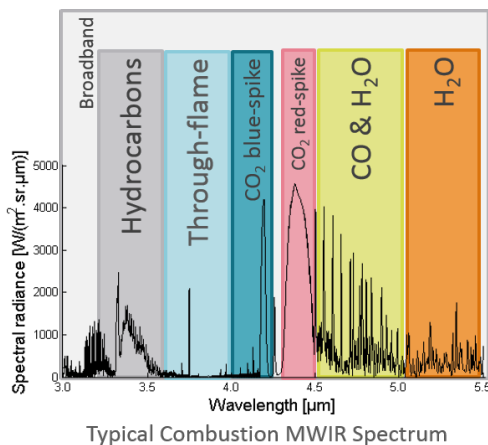
### ADVANCED CALIBRATION

Real-time processing of infrared images including NUC, radiometric temperature, in-band radiance, automated exposure control (AEC) and enhanced high dynamic range imaging (EHDMI). With these unique features, scientists benefit from ease of use and operation flexibility while getting accurate measurements over the entire camera's operation range.

### HIGH SENSITIVITY

Temperature differences as small as 20 mK are detectable.

## EXAMPLE OF A TYPICAL USE



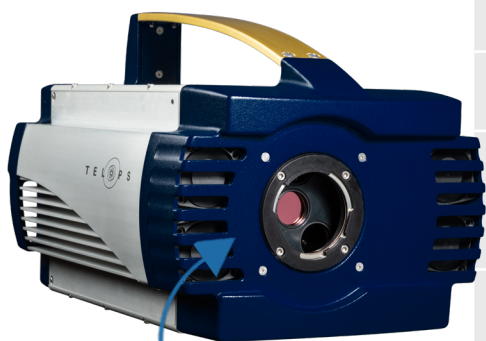
The spectral emissivity of typical combustion gases is not constant as a function of wavelength as illustrated in the MWIR spectra of typical combustion products. These spectral features can be seen in real time with time-resolved multispectral imaging.

MIDWAVE SERIES			
SPECIFICATIONS	MS M3 <i>k</i>	MS M2 <i>k</i>	MS M1 <i>k</i>
DETECTOR TYPE	Cooled InSb	Cooled InSb	Cooled InSb
SPECTRAL RANGE	1.5 μm to 5.5 μm	1.5 μm to 5.5 μm	1.5 μm to 5 μm
SPATIAL RESOLUTION	320 × 256 pixels	320 × 256 pixels	640 × 512 pixels
DETECTOR PITCH	30 μm	30 μm	25 μm
APERTURE SIZE	F/2.5	F/2.5	F/2.5
MAXIMUM FRAME RATE IN FULL WINDOW (STATIC FILTER WHEEL MODE)	3 100 Hz	1 900 Hz	1 012 Hz
MAXIMUM FRAME RATE IN SUBWINDOW (STATIC FILTER WHEEL MODE)	100 000 Hz @ 64 × 4	90 000 Hz @ 64 × 4	40 000 Hz @ 64 × 8
MAXIMUM FRAME RATE IN ROTATING FILTER WHEEL MODE	800 Hz	800 Hz	800 Hz
MINIMUM EXPOSURE TIME	1 μs in full frame	1 μs in full frame	0.3 μs in full frame
TYPICAL NETD	30 mK	30 mK	25 mK
LENS MOUNT	Bayonet interface	Bayonet interface	Threaded interface

SPECIFICATIONS	MS M350	MS M100 <i>hd</i>
DETECTOR TYPE	Cooled InSb	Cooled InSb
SPECTRAL RANGE	1.5 μm to 5.4 μm	1.5 μm to 5.4 μm
SPATIAL RESOLUTION	640 × 512 pixels	1280 × 1024 pixels
DETECTOR PITCH	15 μm	15 μm
APERTURE SIZE	F/3	F/3
MAXIMUM FRAME RATE IN FULL WINDOW (STATIC FILTER WHEEL MODE)	355 Hz	105 Hz
MAXIMUM FRAME RATE IN SUBWINDOW (STATIC FILTER WHEEL MODE)	4 980 Hz @ 132 × 4	2 900 Hz @ 132 × 8
MAXIMUM FRAME RATE IN ROTATING FILTER WHEEL MODE	800 Hz	800 Hz
MINIMUM EXPOSURE TIME	0.5 μs in full frame	1 μs in full frame
TYPICAL NETD	20 mK	25 mK
LENS MOUNT	Bayonet interface	Bayonet interface

VERY LONG WAVE SERIES		
SPECIFICATIONS	MS V1K	MS V350
DETECTOR TYPE	Cooled SLS	Cooled SLS
SPECTRAL RANGE	7.5 $\mu\text{m}$ to 11.5 $\mu\text{m}$	7.7 $\mu\text{m}$ to 11.5 $\mu\text{m}$ (other ranges available)
SPATIAL RESOLUTION	640 $\times$ 512 pixels	320 $\times$ 256 pixels
DETECTOR PITCH	25 $\mu\text{m}$	30 $\mu\text{m}$
APERTURE SIZE	F/2.5	F/2
MAXIMUM FRAME RATE IN FULL WINDOW (STATIC FILTER WHEEL MODE)	1 012 Hz	345 Hz
MAXIMUM FRAME RATE IN SUBWINDOW (STATIC FILTER WHEEL MODE)	40 000 Hz @ 64 $\times$ 8	14 000 Hz @ 128 $\times$ 8
MAXIMUM FRAME RATE IN ROTATING FILTER WHEEL MODE	800 Hz	800 Hz
MINIMUM EXPOSURE TIME	0.3 $\mu\text{s}$ in full frame	5.1 $\mu\text{s}$ in full frame
TYPICAL NETD	30 mK	25 mK
LENS MOUNT	Threaded interface	Threaded interface

Specifications are subject to change without notice. Other configurations are available upon request.



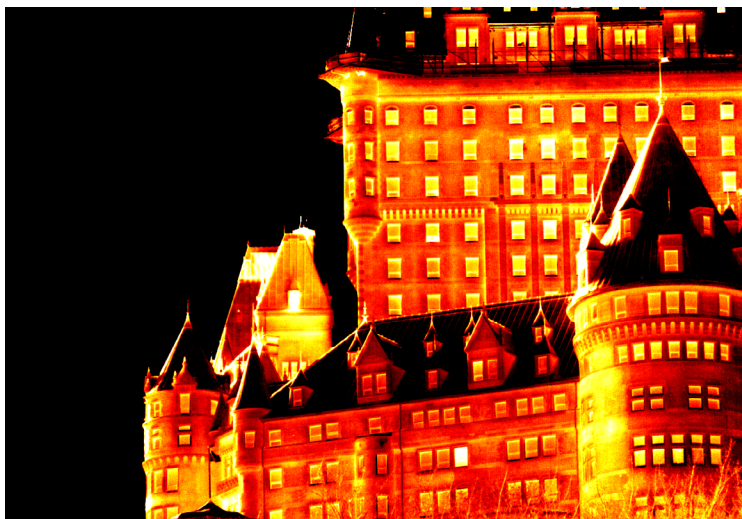
The motorized 8-filter wheel.

COMMON SPECS	
SENSOR COOLING	Rotary-stirling closed cycle
STANDARD SCENE TEMPERATURE RANGE	Up to 1500 $^{\circ}\text{C}$ Other ranges available.
DYNAMIC RANGE	16 bits
MEASUREMENT ACCURACY	1 K or 1 % ( $^{\circ}\text{C}$ ) from -15 $^{\circ}\text{C}$ to 150 $^{\circ}\text{C}$
MULTISPECTRAL FILTER WHEEL	8 $\times$ 1" filters; static or fast-rotating mode
SIZE W/O LENS	13.8" $\times$ 8.5" $\times$ 9.3" 352 mm $\times$ 216 mm $\times$ 236 mm
WEIGHT W/O LENS	< 13 kg

## ABOUT US

Telops is a leading supplier of high-performance scientific infrared cameras for the defence, academic, industrial, and environmental research industries. Telops also offers R&D services for optical systems technology development.

Since its beginning in 2000, Telops has distinguished itself with the quality of its technical personnel and its innovative approach to many technological challenges in the optics field. Today, the expertise of its scientists and the performances of its infrared cameras and hyperspectral imagers are internationally recognized.



Quebec City's Château Frontenac in infrared

## FEATURES & OPTIONS



### OUR IR CAMERAS' KEY FEATURES & OPTIONS

All our infrared cameras offer advanced features to address the most demanding research applications. They include:

- Blackbody-free permanent calibration;
- Calibration up to 2500 °C (optional);
- High-speed internal memory buffer: up to 32 GB (optional);
- Gig-E;
- Camera Link;
- Trigger In, Trigger Out;
- SDI, GPS, IRIG-B, RS232 and thermistor ports;
- Automatic exposure control (AEC);
- Enhanced high-dynamic-range imaging (EHDR).

### OUR INFRARED CAMERAS' LENS OPTIONS

Telops offers a variety of lens options depending on your camera configuration using either a flanged, threaded, or bayonet mount interface.

Customized optics are available, as well as many accessories, such as telescopes and microscopes.

FOR MORE INFORMATION | [TELOPS.COM](http://TELOPS.COM)

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