



Integrated Sky Monitor

Since September 2018, the Integrated Sky Monitor is the **only instrument providing complete characterization of optical atmospheric conditions** including:

- Cloud cover,
- Turbulence, night & day,
- Absorption.

Capitalizing on **40 years of experience**, development and testing in astronomy and in compliance with the specifications from the CCSDS for **Free Space Optical Communications**, enabling:

- Site survey,
- Optical terminal design & operations,
- Ground segment optimization.

The Integrated Sky Monitor includes a **complete array of passive sensors** in a compact, rugged, carrier grade package which is quickly deployed on site and provides **local, real time and continuous measurements**:

- Night seeing monitor, turbulence and optical transmission,
- Day seeing monitor turbulence,
- Visible all sky camera, 350-1000nm,
- Thermal all sky camera 8-14µm, radiometrically calibrated,
- Irradiance, Pyrgeometer, Water vapor, Sky temperature,
- Standard meteorological sensors (temperature, pressure, humidity, wind, rain...)



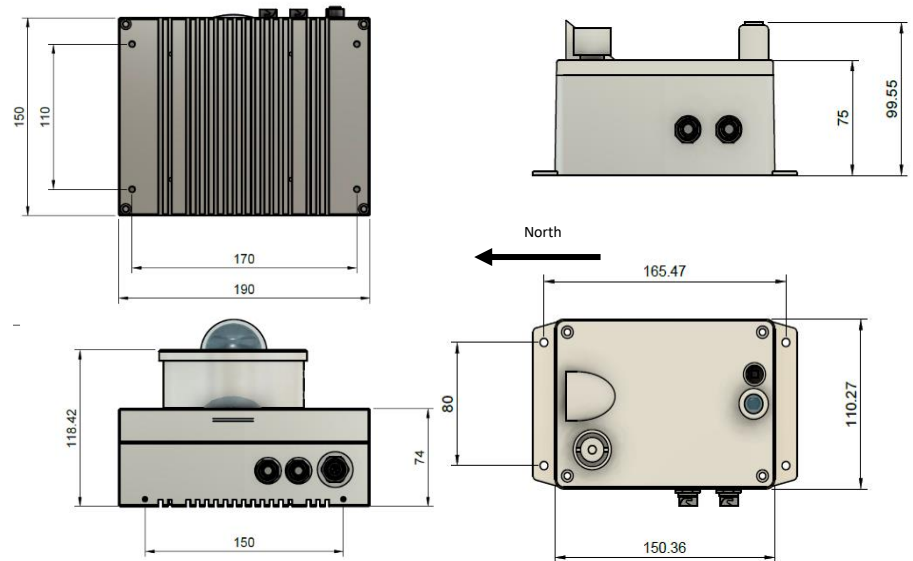
Data	Unit	Dynamic	Accuracy	Periodicity	FoV	Availability	Quantity
Allsky visible	ADU	8 or 12 bits	NA	1ms to 10s	180°	Always	Clouds
Allsky LWIR	°C	16 bit	±2K or ±2.0%	60s	180°	Always	
Seeing night	ArcSec	NA	NA	30s	Polaris	Clear night	Turbulence
Night r0	cm	NA	NA	30s	Polaris	Clear night	
Scintillation	ADU	16 bits	>99%	30s	Polaris	Clear night	
Transparency	ADU	16 Bits	>99%	30s	Polaris	Clear night	
Seeing day	ArcSec	NA	NA	≥ 0.5s	180°	Clear Day	
Day r0	cm	NA	NA	≥ 0.5s	180°	Clear Day	
Pyrgeometer	Wm ⁻²	17 bits	>95%	10s	80°	Always	Aerosols
Sky Temp	°C	17 bits	±0.5C°	10s	10°	Always	
Total Water Column	Cm	17 bits	±20% RMS	10s	10°	Clear sky	
Irradiance	Mag / ArcSec ²	21 bits	TBD	10s	40°	Dusk-Dawn	Meteorological
Ext Temp	°C	0.1°	±0.3°	10s	NA	Always	
Pressure	hPa	300-1100hPa	±1hPa	10s	NA	Always	
Humidity	%	1%	±3%	60s	NA	Always	
Wind	Speed, km/h direction	1 km/h 0-360°	±3.2km/h ±1°	10s	NA	Always	
Rain/Rain rate	mm	0.2 mm	±4%	20s	NA	Always	



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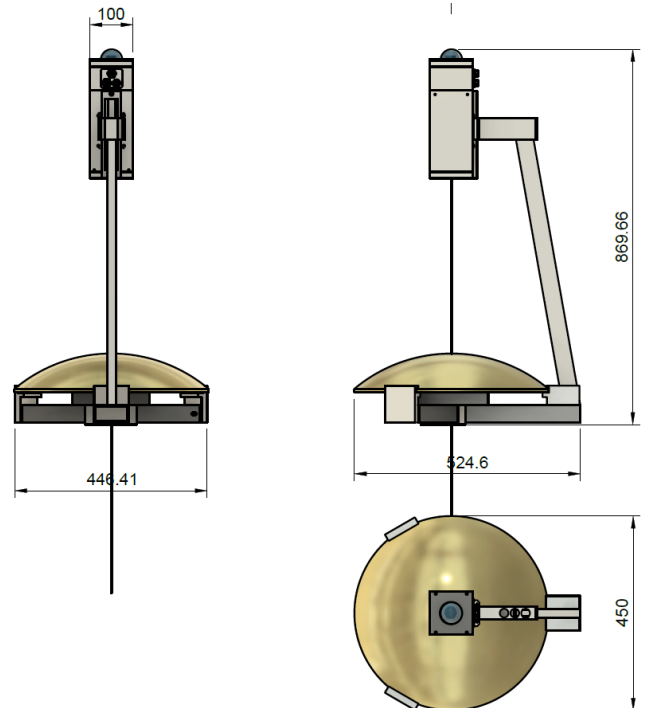
Size, Weight & Power:

- ISM main unit
150x190x170mm, 2.8kg
- Night Seeing Monitor
380x160x160mm, 2.5kg
- Sensor cluster
150x110x100mm, 0.4kg
- Weather sensors
360x240x370mm, 2kg
- Total power requirement <40w



Thermal All Sky camera: (Optional)

Parameter	Value
Detector	Uncooled microbolometer FPA
Resolution	640 x 480 pixels
Acquisition period	10 to 60s
Spectral range	8 μ m to 14 μ m
Temperature range radiometrically calibrated	-40 $^{\circ}$ C to +120 $^{\circ}$ C \pm 2K or \pm 2.0%
Digitization	16bit, <60mK resolution
Field of view	180 $^{\circ}$
Aperture	f/1.0
Dimensions	45cm diameter, 87cm height
Weight	10kg
Interface	GigE
Protection class	IP67
Environmental conditions	-25 $^{\circ}$ -+50 $^{\circ}$ C operating -40 $^{\circ}$ -+70 $^{\circ}$ C storage



Order information:

Part #	Description
ISM1	ISM, diurnal and nocturnal seeing, all sky imaging, irradiance, sky temperature and environmental parameters monitoring, GigE connectivity, <15x15x17cm, <40w
LWIR 640	All Sky LWIR camera 640x480, 360 $^{\circ}$ with radiometric calibration
IsoNSM	Additional Night Seeing Monitor providing isoplanatic angle measurement.
INST	On site installation per unit, up to two days and two nights
WARR	Additional warranty per year up to 5 years total

To be specified at the order:

- ▶ Installation location, northern hemisphere, southern hemisphere, equatorial,
- ▶ Distance from NSM to switch, distance from weather station to ISM,
- ▶ Dashboard access, <https://dashboard.miratlas.com/>