

## Applications:

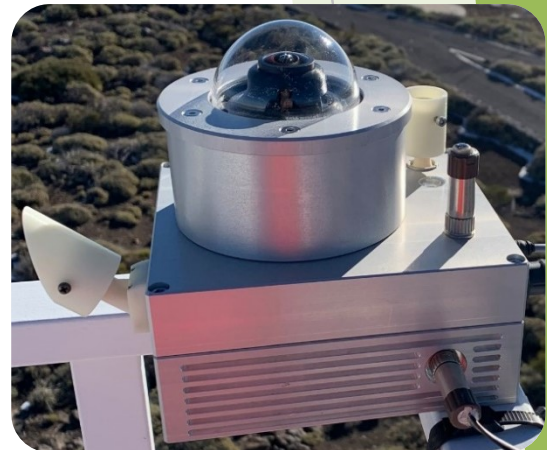
- ▶ **Free Space Optical satellite telecommunications**, ground site survey, network deployment, link budget and operation
- ▶ **Solar power**, planning, site survey and power production forecasting
- ▶ **Atmospheric studies** short term weather prediction and pollution monitoring
- ▶ **Astronomy**, site survey, robotic telescope management, fireball detection & tracking

## Sensor array:

- ▶ **Night seeing monitor**, turbulence and optical transmission
- ▶ **Day seeing monitor** turbulence, especially the ground layer
- ▶ **Visible all sky camera**, 350-1000nm 185° fov 6 Mpixels.
- ▶ **Thermal all sky camera** 8-14μm, 180° fov, 640x480, radiometrically calibrated
- ▶ **Irradiance sensor** sky brightness, including light pollution
- ▶ **Pyrgeometer** (long wave down welling radiation) 40° fov
- ▶ **Zenital total column water vapor**
- ▶ **Zenital Sky temperature**
- ▶ **Standard meteorological sensors** (temperature, pressure, humidity, wind, rain...)

The **Integrated Sky Monitor** is a compact, rugged and carrier grade appliance which continuously monitors the atmosphere with passive optical sensors using an Intel iCore system running Linux Debian. The sensor acquisition software written in C++ is **partially open source** and leaves 80% free CPU capacity leaving plenty of room for custom **onboard data processing** and upgrades.

With a small form factor and low energy requirement, the ISM is **easy and quick to deploy** in the field. Data may be backhauled using a low bandwidth connection and the total power requirement is **<40W**.



## Acquired data:

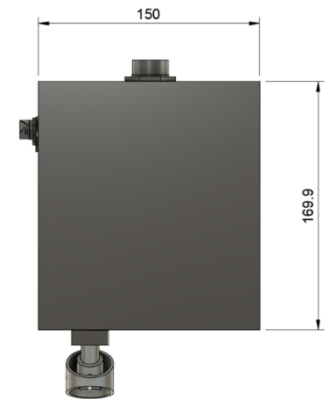
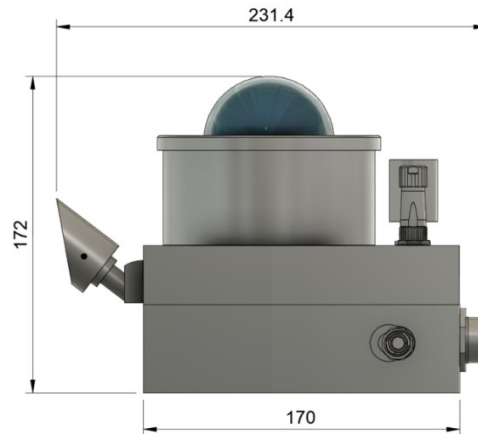
Data	Unit	Dynamic /resolution	Accuracy	Periodicity	FoV	Availability	Quantity
Allsky visible	ADU	8 or 12 bits	NA	1ms to 10s	180°	Always	Clouds
Allsky LWIR (Optional)	°C	16 bit	±2K or ±2.0%	60s	180°	Always	
Seeing night	ArcSec	NA	NA	30s	Polaris	Clear night	Turbulence
Night r0	cm	NA	NA	30s	Polaris	Clear 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 <sup>-2</sup>	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 <sup>2</sup>	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	km/h	1 km/h	±3.2km/h	10s	NA	Always	
Rain/Rain rate	mm	0.2 mm	±4%	20s	NA	Always	

**ISM main unit:** Dimensions in mm.

ISM main unit 15x17x17cm, 2.8kg IP67

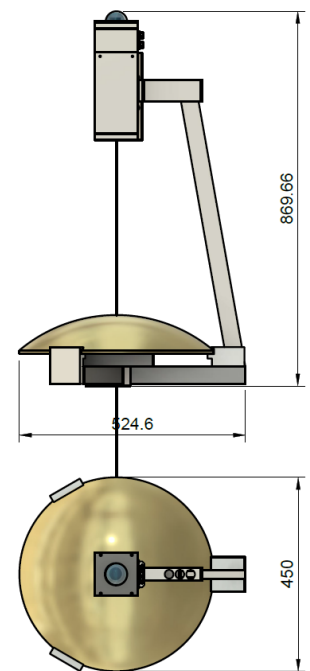
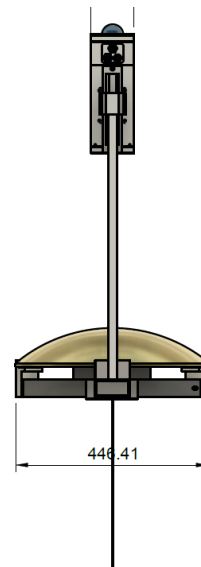
Night Seeing Monitor, 38x16x16cm, 2.5kg IP67

External sensors, pylon mounted, 36x24x37, 2kg



**Thermal All Sky camera (Optional):** Dimensions in mm.

Parameter	Value
Detector	Uncooled microbolometer FPA
Resolution	640 x 480 pixels
Acquisition period	10 to 60s
Spectral range	8µm to 14µm
Temperature range radiometrically calibrated	-40°C to +120°C ±2K or ±2.0%
Digitization	16bit, <60mK resolution
Field of view	180°
Aperture	f/1.0
Dimensions	45cm diameter, 87cm height
Weight	10kg
Interface	GigE
Protection class	IP67
Environmental resistance	-25°-+50°C operating -40°-+70°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° with radiometric calibration
GPS	Integrated GPS receiver
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:

- ▶ Integrated or deported SSM probe, up to 1m cable,
- ▶ NSM ethernet cable length from switch,
- ▶ Weather station cable length from the ISM,
- ▶ Preferred IP address for the ISM and the NSM on the same domain.

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