

Applications:

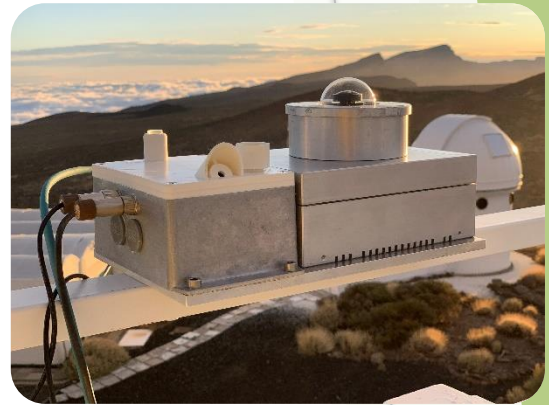
- ▶ **Free Space Optical satellite telecommunications**, ground site survey, network deployment, link budget and operation
- ▶ **Solar power**, planning, site survey and power production forecasting
- ▶ **Atmospheric studies** short term weather prediction and pollution monitoring
- ▶ **Astronomy**, 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	Aerosols
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	±0.5°	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	

Size and weight:

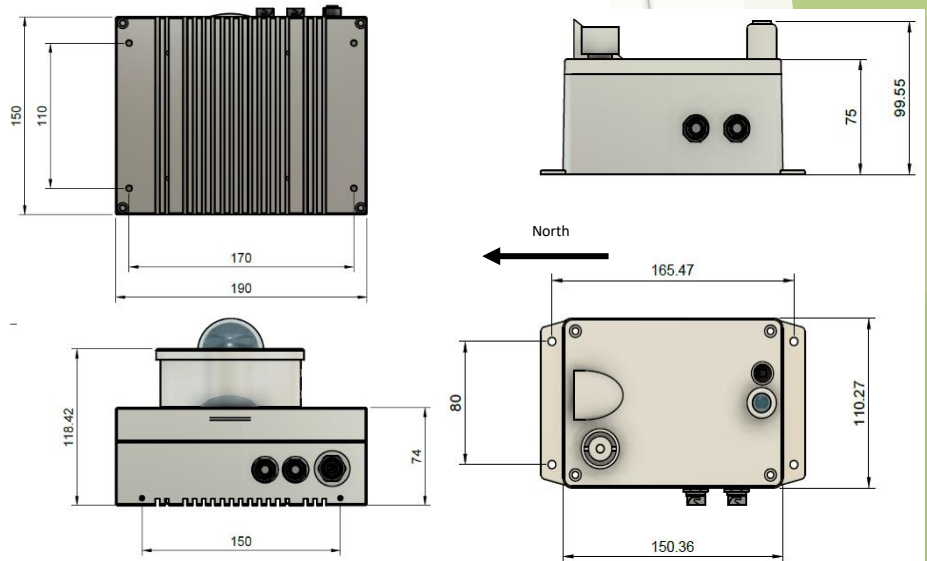
Dimensions in mm.

ISM main unit 150x190x170mm, 2.8kg

Night Seeing Monitor,
380x160x160mm, 2.5kg

Sensor cluster, 150x110x100mm, 0.4kg

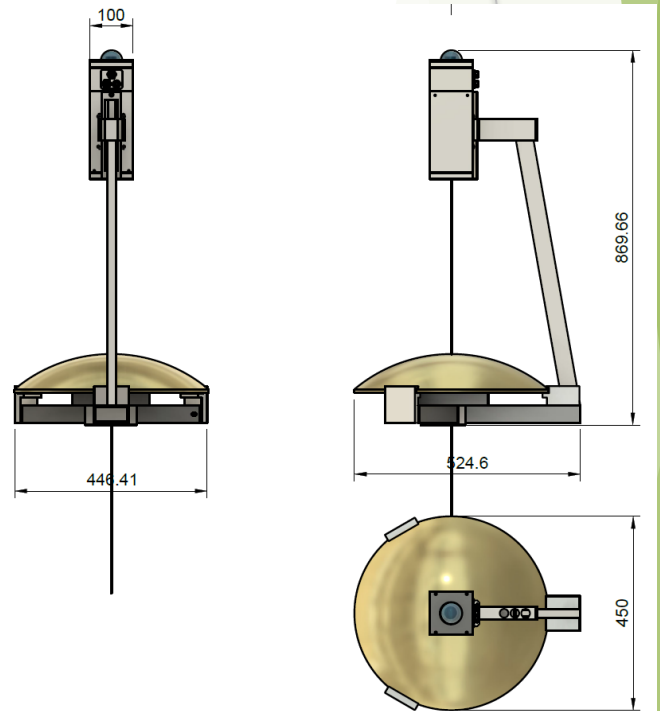
Weather sensors, 360x240x370, 2kg



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	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 resistance	-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
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,