

Weather monitoring

WEATHER STATION

Obscape's Weather Station is a robust and user-friendly device which combines Obscape's Power and Telemetry Module with an industrystandard weather sensor

Our Weather Station provides a wide range of weather measurements, including:

- relative humidity
- solar radiation
- Lightning
- Rainfall
- wind speed and direction
- air temperature and pressure

KEY FEATURES

- Comprehensive weather data
- Completely wireless ų
- Real-time data ų.
- Solar powered ų



OFFSHORE WEATHER STATION

Weather impacts every aspect of operations on offshore platforms, ships, and in ports. Rapid changes in weather and sea conditions make monitoring of both meteorological and oceanographic parameters a critical part of ensuring safety, while also maintaining operational efficiency.

- Apparent wind speed and angle,
- Air temperature,
- Barometric Pressuresolar
- Radiation

KEY FEATURES

- Ideal for marine operations on offshore platforms, buoys, ships, and in ports.
- Completely wireless
- Real-time data
- Solar powered



Site specific weather reporting

While weather reports and forecasts are freely available sources from third parties via the media, and internet based, the main parameter that cannot be confirmed by third parties is the full spectrum of Weather Conditions at the deployed location, because this is highly dependent on measurement-based data derived from exact conditions onsite. Obscape Weather Stations can be deployed on onsite to report real time ground truthing of Solar, Rain, Humidity, Temperature and rainfall to name a few.

Obscape Data Portal

The free and powerful Obscape Data Portal is web-based. The client can securely log in from anywhere in the world through any internet based electronic device. An unrestricted license for the data portal is included free of charge

when you purchase any Obscape monitoring device and will remain so for the lifetime of the device.

The following secure data is available free of charge on the Obscape Data Portal:

- Real-time Weather data
- Downloadable reports
- Threshold alerts
- Device manuals,
- Easy to follow Quick Start-up and deployment guides and videos





Weather Sensor specifications

The Obscape All-in-One Weather Station is designed for continuous monitoring of enviro weather measurements The ATMOS 41 sensor measures the following: MEAS

Solar radiation

- Precipitation
- Air temperature
- Barometric pressure
- Vapor pressure
- **Relative humidity**

- Wind speed
- Wind direction
- Maximum wind gust
- Lightning strikes
- Lightning distance
- Tilt Ű.

All sensors are integrated into a single, small form-factor unit which is interfaced with the PTM and requires minimal installation effort. A robust, no moving parts design That prevents errors because of wear or fouling make the weather station ideal for long-term, remote installations. Obscape Weather Stations can be used for a variety of applications. Additional advantages include its low-power design that supports the solar powered PTM data logger interface. A tilt sensor warns the user of out-of-level condition, and no configurations are necessary.

SENSOR COMPLIANCE Manufactured under ISO 9001:2015

EM ISO/IEC 17050:2010 (CE Mark)

vironmental variables, including all standard											
IEASUREMENT SPECIFICATIONS											
Solar Radiation											
Range	0–1	0–1750 W/m²									
Resolution	1 W	1 W/m²									
Accuracy	±5%	±5% of measurement typical									
Precipitation											
Range	0-4)–400 mm/h									
Resolution	0.0	0.017 mm									
Accuracy	±5%	±5% of measurement from 0 to 50 mm/h									
Vapor Pressure											
Range	0-4	0-47 kPa									
Resolution	0.0	0.01 kPa									
Accuracy	Var	Varies with temperature and humidity, see specification chart.									
		100	± 0.03	±0.05	±0.09	±0.16	± 0.27	± 0.44	± 0.69	± 1.33	±2.38
		90	± 0.03	±0.05	±0.09	±0.15	± 0.26	± 0.42	±0.66	± 1.26	±2.24
	0	80 70	± 0.03	±0.04	±0.07	±0.12	± 0.21	± 0.34	± 0.63	± 1.20	± 2.10
	°RH	60	± 0.02	± 0.04	±0.07	±0.12	± 0.18	± 0.32	± 0.00	± 1.06	±1.82
	گ	50	± 0.02	± 0.03	±0.06	±0.10	± 0.17	± 0.28	± 0.45	± 0.99	±1.68
	Ē	40	± 0.02	± 0.03	±0.05	±0.09	± 0.16	± 0.26	± 0.42	± 0.76	±1.54
	-										

 $0.01 \pm 0.02 \pm 0.04 \pm 0.07 \pm 0.12 \pm 0.21$ ± 0.33 ± 0.55 ± 0.19 ± 0.30 ± 0.48 ± 0.99 10 20 30 40 50 60 70 TEMPERATURE (°C)

+0.23

 ± 1.13

80

20

Humidity Monitoring:

Relative Humidity											
Range	0-1	0-100% RH (0.00-1.00)									
Resolution	0.1	0.1% RH									
Accuracy	Var	Varies with temperature and humidity, see specification chart									
										. 0. 00/	
		100	±2.0%	±2.0%	±2.0%	±2.0%	±2.0%	±2.0%	±2.0%	±2.0%	±2.0%
		90	+2.0%	+1 5%	+1 5%	+1.5%	+1.5%	+1 5%	+2.0%	+2.0%	+2.0%
	ПУ (%RH)	70	+1.5%	+1.5%	+1.5%	+1.5%	+1.5%	+1.5%	+1.5%	+2.0%	+2.0%
		60	+1.5%	+1.5%	+1.5%	+1.5%	±1.5%	+1.5%	+1.5%	+2.0%	+2.0%
		50	±1.5%	±1.5%	±1.5%	±1.5%	±1.5%	±1.5%	±1.5%	±2.0%	±2.0%
	Ę	40	±1.5%	±1.5%	±1.5%	±1.5%	±1.5%	±1.5%	±1.5%	±1.5%	±2.0%
	Ę	30	±1.5%	±1.5%	±1.5%	±1.5%	±1.5%	±1.5%	±1.5%	±1.5%	±2.0%
	-	20	±1.5%	±1.5%	±1.5%	±1.5%	±1.5%	±1.5%	±1.5%	±1.5%	±2.0%
		10	±1.5%	±1.5%	±1.5%	±1.5%	±1.5%	±1.5%	±1.5%	±1.5%	±2.0%
		0	±1.5%	±1.5%	±1.5%	±1.5%	±1.5%	±1.5%	±1.5%	±1.5%	±2.0%
			0	10	20	30	40	50	60	70	80
	TEMPERATURE (*C)										
		Figure 5 RH sensor accuracy									
Hysteresis	±0.	±0.80% RH, typical									
Long-Term Drift	±0.	±0.25% RH/year, typical									
Air Temperature											
Range	-50	–50 to 60 °C									
Resolution	0.1	0.1 °C									
Accuracy	±0.6 °C										
Humidity Sensor Te	-40 to 50 °C										
Range											
Resolution	0.1 °C										

Unlike relative humidity, vapor pressure does not depend on temperature, and is generally conservative over time and space.

The vapor pressure of the atmosphere near the relative humidity sensor is the same as the vapor pressure at the relative humidity sensor, even if the relative humidity sensor is not at the same temperature as the atmosphere. Additionally, it is the vapor pressure of the atmosphere (not RH) that controls the rate of vapor phase water transport (e.g., evaporation, transpiration, and distribution of water vapor). Therefore, vapor pressure is a much more useful measure of atmospheric moisture than relative humidity.

The METER ZENTRA system of the ATMOS41 calculates and outputs vapor pressure deficit (VPD) in the standard data stream. VPD is simply es(Tair) – ea and gives a good indication of evaporative demand.

The Obscape Weather Station's ATMOS 41 sensor measures the vapor pressure once every 60 s and records the instantaneous values. When queried, the ATMOS 41 outputs the average of the instantaneous measurements since the last query.

Rainfall :

The Obscape Weather Station's ATMOS 41 sensor contains a 9.31-cm diameter rain gauge. During rain events, the flared hole forms the rain into drops that pass by the drip counter. The spring acts as a filter to keep out large particles but still allows enough flow so water does not back up. Gold pins measure each drop of rain. Because the flared hole forms a drop of a known size, the ATMOS 41 counts the drops and calculate the water volume. As the rain intensity increases, the drops become smaller, but the ATMOS 41 firmware contains an algorithm to automatically compensate for drop size as the rain increases.

When mated to the PTM, the ATMOS 41 counts water drops continuously and adds each drop to an accumulated total. When queried, the ATMOS 41 outputs the total rainfall (in millimetres) that has accumulated since the last query. Precipitation maximum intensity

Temperature Monitoring:

Unlike most air temperature measurements, the weather station sensor is not covered with louvered plates to protect from solar heating. Instead, it sits in open air, susceptible to solar heating of the instrument body. However, the Obscape Weather Station's ATMOS 41 sensor calculates the air temperature accurately because solar radiation and the wind speed are known. These are the two main parameters that determine the error between measured air temperature and the actual air temperature. Therefore, it is possible to solve the energy balance to get what the actual temperature should be based on the solar load of the body and the convective cooling of that temperature sensor. When powered on, the ATMOS 41 measures the air temperature once every 10 s and records the instantaneous values. When queried, the Obscape Weather Station's ATMOS 41 sensor outputs the average of the instantaneous measurements since the last query.





Figure 12 shows the results from the temperature correction compared to the aspirated temperature, which shows data sampled at 1 min and not averaged over time. The estimated accuracy of the air temperature measurement, based on two standard deviations (95% confidence interval), is 0.42 °C. To provide an idea of how comparable the data are, a concurrently tested temperature sensor in a radiation shield (typical measurement approach) showed an accuracy of 0.66 °C, also based on a two-standard deviation estimate. Thus, the temperature correction of the Obscape Weather Station's ATMOS 41 sensor appears to give a better estimate of actual air temperature than the generally accepted radiation shield technique. NOTE: Without correction, the accuracy of the temperature measurement is ±2 °C.

Solar Monitoring

PYRANOMETER:

Solar radiation is measured by a pyranometer that is integrated into the lip of the rain gauge funnel at the top of the Obscape Weather Station's ATMOS 41 sensor. Designed, manufactured, and calibrated by experts at Apogee Instruments, the miniature pyranometer uses a silicon-cell sensor to measure the total incoming (direct and diffuse) solar radiation. A carefully developed cosine-correcting head ensures accurate readings regardless of sun angle, while the painstakingly researched optical filter material balances cost and performance to ensure the silicon-cell provides

the Obscape Weather Station's ATMOS 41 sensor:

Good accuracy regardless of temperature or sensor age. Silicon-cell sensors have excellent

- response time to changing radiation conditions and acceptable sensitivity across the solar
- spectrum (Figure 6), which make them perfect for use on the ATMOS 41.

The pyranometer is factory calibrated and the sensor-specific calibration value can be found on the interior of the rain funnel. This factor has already been added into the Obscape Weather Station's ATMOS 41 sensor so there is no need to do anything with it. In the event that this value is needed, it can be found by taking the funnel off the base and checking underneath. Follow the steps in Section 3.5 to remove the funnel.

When powered on, the ATMOS 41 measures the solar radiation once every 10 s and records the instantaneous values. When queried, the Obscape Weather Station's ATMOS 41 sensor outputs the average of the instantaneous measurements since the last query.



Figure 6 Spectral response estimate of Apogee silicon-cell pyranometers

WIND MONITORING:

- The space underneath the rain gauge is where the ATMOS 41 measures wind speed. Ultrasonic signals emitted from transducers at right angles to each other bounce off the porous sintered glass plate and back up to the opposite sensor. The speed of sound is affected by the wind, and the wind speed is calculated by measuring differences in the time it takes for sound to travel back and forth between sensors.
- When powered on, the ATMOS 41 measures the wind speed and direction once every 10 s and records the instantaneous wind vector components. When queried, the ATMOS 41 outputs the average of the instantaneous measurements since the last query for wind speed and direction and the maximum instantaneous wind speed value for wind gust.



The ATMOS 41 measures wind speed every 10 s and keeps a running average of the last 10 measurements. If an instantaneous measurement is more than eight times the running average, the instantaneous measurement is rejected. It is not reported as the maximum gust or included in the data that are averaged over the output interval.

Uncertainty estimates in weather conditions

The uncertainty estimates can be calculated from the Weather Station based data. This will be provided by the secure and easy to use Obscape Data Portal, which confirms accurate readings of 12 different weather parameters and reports real time conditions in the period the Weather Stations have been in operation at each plant

Based on the Data Portal's generated reports over a set sampling period against Real time measurements of current condition, the customer can calculate measured deviations from the exact conditions in the past and apply this to current and expected Metweather conditions in site specific areas to confirm each Weather Station's forecasted:

- Usable quantities of runoff water from rainfall
- Solar irradiation strength ad UV exposure



EU Declaration of Conformity According to EN 17050:2010 & ISO/IEC 17050:2010 Product Environmental Monitoring Station Manufacture METER Group Inc. 2365 NE Hopkins Ct. Pullman, WA 99163 USA **Application of Council Directive** 2011/65/EU **Restriction of Hazardous Substances Directive** (RoHs2) 2014/30/EU Electromagnetic Compatibility Directive (EMC) Standards to which conformity EN 61326-1-2013 is de

Standards to which comorning	EN 01320-1.2013
is declared	Electrical equipment for measurement, control and
	laboratory use - EMC requirements - for use in
	industrial locations.
	EN 50581:2012
	Technical documentation for the assessment of
	electrical and electronic products with respect to the
	restriction of hazardous substances.
Type of Equipment	Environmental Monitoring Station
Model Number	ATMOS 41
	ClimaVUE50
	Bird Spike Kit

Year of First Manufacture

The undersigned hereby declares on behalf of METER Group, Inc that the above referenced product, to which this declaration relates, fully conforms to the provisions of the Council Directive and standards referenced above.

2016

Mile B. Wadswood

Michael B. Wadsworth Director of Engineering mike.wadsworth@metergroup.com 1-25-2019

METER Group, Inc. USA 2365 NE Hopkins Court, Pullman, WA 99163 T 509.332.2756 F 509.332.5158 E info@metergroup.com W metergroup.com

Certificate of Conformance

Products/Part Number	SENSOR LEAF WETNESS METER	40029-CNFG46
	SENSOR LEAF WETNESS METER	40029-CNFG48
	SENSOR LEAF WETNESS METER	40029-CNFG56
	CLIMAVUE50 REPLACEMENT	10573
	FAB SCREW U-BOLT V-SHAPED	14361
	FAB GEOKON VWANALYZER	15682
	FAB GEOKON VWANALYZER	15690
	CLIMAVUE50 REPLACEMENT	20658
	CLIMAVUE50 REPLACEMENT	30415
	CLIMAVUE50 BIRD SPIKE KIT	40828
	SENSOR CLIMAVUE50 COMPACT	40724
Manufacture	METER Group Inc.	
	2365 NE Hopkins Ct.	
	Pullman, WA 99163 USA	
The listed products above are in compliance with	h the PoHS Directive post/6-/ELL and	the accordated PoUS Phthalater
Amendment 2015/863/ELL (amending Anney II)	Pous Directive 2011/05/20, and	ditional amondment requires
restriction of the additional following substance	s: Ris(2-ethylbeyyl) phthalate (DEHP)	Butyl benzyl obthalate (BBP)
Dibutyl opthalate (DRP) Disobutyl opthalate (DIRP) in electrical and electronic produ	ucts sold in the European Lloion
biblight pricialate (bbr), bisbbich pricialate (t	sion), in electrical and electronic produ	ces sold in the coropean onion.
The restricted substances, as outlined per RoHS	2 Directive 2011/65/EU, Annex II. (and	the RoHS Phthalates
Amendment 2015/863/EU):		
1. Lead (0.1%)		
2. Mercury (0.1%)		
3. Cadmium (0.01%)		
 Hexavalent chromium (0.1%) 		
5. Polybrominated biphenyls (0.1%)		
6. Polybrominated diphenyl ethers (PBD	E) (0.1%)	
7. Bis(2-ethylhexyl) phthalate (DEHP) (o	.1%)	
8. Butyl benzyl phthalate (BBP) (0.1 %)		
 Dibutyl phthalate (DBP) (0.1%) 		
10. Diisobutyl phthalate (DIBP) (0.1%)		
The undersigned hereby declares on behalf of N	IFTER Group Inc that the above refere	enced products to which this
		the second second second second

declaration relates, fully conforms to the provisions of the Directive referenced above.

Micha B. Wadswood

Michael B. Wadsworth Director of Engineering mike.wadsworth@metergroup.com 8-5-2021

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MANY THANKS FOR YOUR CONSIDERATION.





ENVIRONMENTAL OBSERVATIONS