Scientific instruments and Systems for meteorological and environmental monitoring

Environment
Agriculture

Forest fire
prevention

Renewable
Energy

Meteorology

Hydrology

Air monitoring

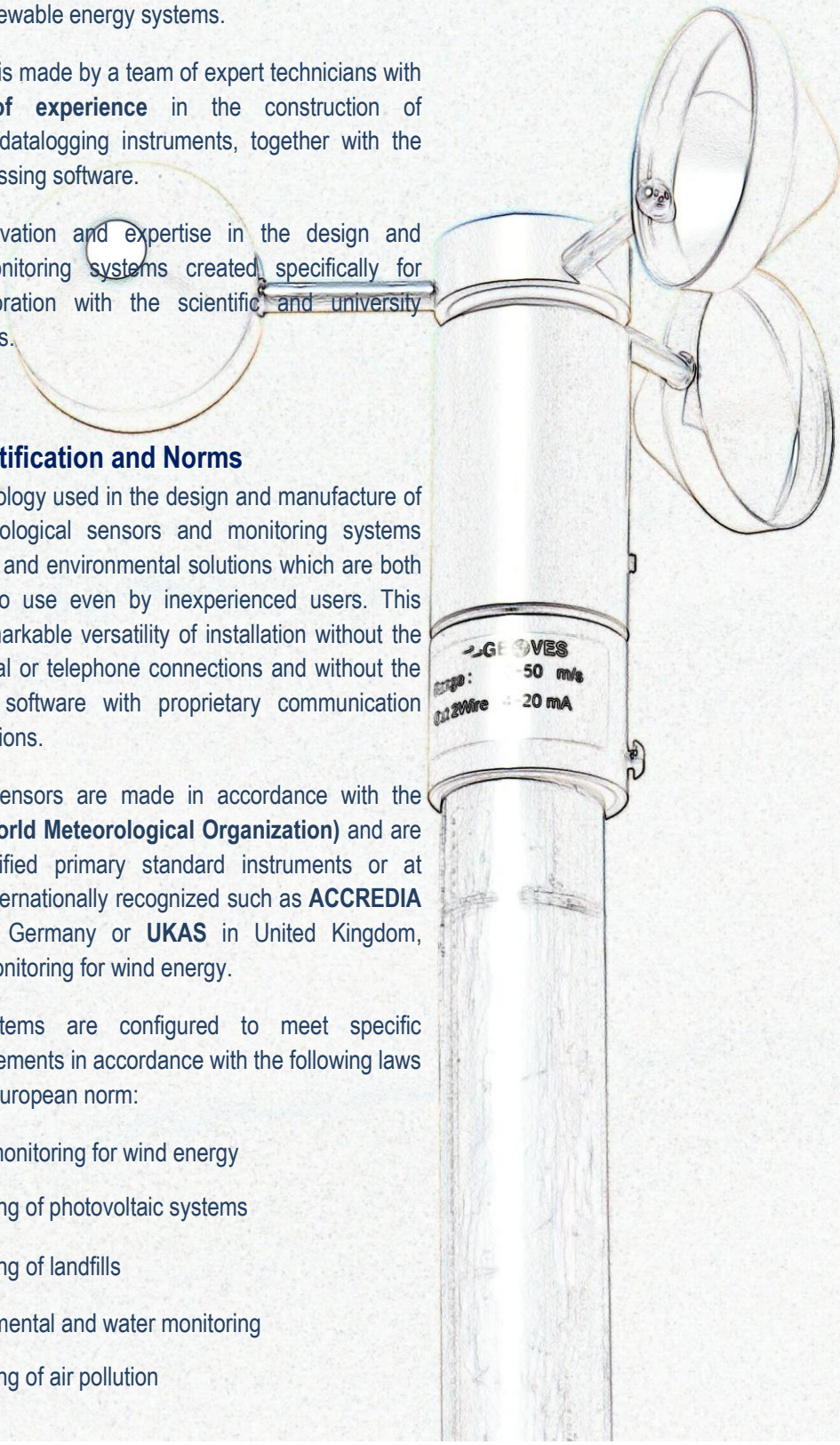
COMPANY PROFILE AND CATALOGUE

About us

Geoves designs, manufactures, sells and installs a wide range of meteorological sensors and systems for the monitoring of the environment and renewable energy systems.

All of our equipment is made by a team of expert technicians with over **25 years of experience** in the construction of meteorological and datalogging instruments, together with the accompanying processing software.

Geoves offers innovation and expertise in the design and manufacture of monitoring systems created specifically for research in collaboration with the scientific and university research communities.



Technology, Certification and Norms

The advanced technology used in the design and manufacture of dataloggers, meteorological sensors and monitoring systems allows for low-power and environmental solutions which are both efficient and easy to use even by inexperienced users. This translates into a remarkable versatility of installation without the constraint of electrical or telephone connections and without the need to resort to software with proprietary communication protocols and restrictions.

All meteorological sensors are made in accordance with the WMO **- Annex 8 (World Meteorological Organization)** and are calibrated with certified primary standard instruments or at centres which are internationally recognized such as **ACCREDIA** in Italy, **DAkkS** in Germany or **UKAS** in United Kingdom, **MeasNet** for wind monitoring for wind energy.

All monitoring systems are configured to meet specific environmental requirements in accordance with the following laws in Italian transpose European norm:

IEC61400-12 Wind monitoring for wind energy

IEC61724-1 Monitoring of photovoltaic systems

1999/31/CE Monitoring of landfills

2009/90/CE Environmental and water monitoring

2008/50/CE Monitoring of air pollution

ACCREDIA
L'ENTE ITALIANO DI ACCREDITAMENTO

Measuring Network of Wind Energy Institutes
measnet

World Meteorological Organization
Weather • Climate • Water

DESIGN AND MANUFACTURING

Thanks to years of experience in the field of monitoring, Geoves designs and manufactures data loggers, meteorological sensors and professional equipment for environmental analysis in accordance with **ISO9001** norms and the main standards recognized in Europe and worldwide.

Benefiting from the collaboration with the scientific communities Geoves offers innovation and expertise in the design of professional equipment for meteorology and environmental monitoring. Given the different installation requirements of each sector monitoring, Geoves designs and manufactures support structures and pole mounted brackets which are customized and suitable for installation in the open field, in urban areas, on bridges and embankments (hydrology), in industrial areas, on sites using wind power and photovoltaic systems.

Installation and Maintenance

Geoves has a team of technicians with many years of experience operating in compliance with current safety regulations (Law 81/08) and it can perform installations on site of the following types of monitoring stations:

- Weather Stations (Annex 8 WMO) and for monitoring landfill (1999/31/CE)
- Hydrological snow measuring stations (Annex 8 WMO)
- Stations for water quality monitoring (2009/90/CE)
- Anemometric Stations (IEC61400-12, MeasNet and WMO)
- Weather and radiometric Stations- (IEC60904 and WMO)
- Weather stations for urban air pollution monitoring (96/62/CE)

Teams of technicians employed by Geoves are equipped to assemble various types of stations on masts and towers of varying height from a few meters up to 100m.

On-site maintenance

The on-site maintenance can be of two types:

- Ordinary maintenance (scheduled intervention)
- Extraordinary maintenance (intervention on call)

Maintenance and repairs in the laboratory

The equipment may be sent to the Geoves' laboratory for routine, checks, repairs or calibrations.

MAIN APPLICATIONS

Main fields of application

The monitoring fields where Geoves provides her instrumentation are:

WIND POWER
Anemometer stations comply IEC61400-12 aimed at assessing the suitability of the site for installation of wind turbines. Use of anemometers and data loggers certified / tested by MeasNet laboratories

PHOTOVOLTAIC
Meteo-radiometric stations conforms to IEC60904 (CEI 82-5), designed for performance ratio evaluation of photovoltaic plants. Use of pyranometers complies with WMO and ISO9060 guide lines. Data transmission via Ethernet cable and GPRS

METEOROLOGY, AGROMETEOROLOGY, DUMPS, DAMS
"Compact" weather station for the following applications:

- Meteorology: urbans monitoring, road conditions, dams, …
- Agriculture: systems for the prevention of plant disease (vineyards, orchards, etc ...) and of water stress
- Dumps: weather monitoring with automatic calculation of evapotranspiration in compliance with Penman Monteith's FAO-WMO method; water quality in the wells

RESEARCH
Weather station WMO compliant, with automatic calculation of evapotranspiration, dew point, wind chill. The station measures the weather and climate conditions to monitoring the wind turbines power-curve behaviour (project in collaboration with the Italian University). Pneumatic telescopic pole with folding tripod for portable applications.

WATER POLLUTION MONITORING
Hydrological station D.Lgs.152/06 compliant (Italian law answering to European norms) for measuring of the quality of water in the wells of the dump; monitoring of pH, temperature, conductivity, ORP, dissolved oxygen, turbidity, hydrometric level (other measures on request). GPRS data transmission via FTP, supplied by low power photovoltaic panel. Elaboration data and alarm manager software

FOREST FIRE
Monitoring network consists of wireless smart sensors mod. Butterfly for the remote surveillance of forest fires (measurements of CO2, O3, temperature and humidity) and a meteorological station with fire hazard sensor.

AIR POLLUTION MONITORING
Weather station for climate parameters measuring to elaborate the atmospheric stability class and the wind rose for the dispersion of pollutants. The meteorological data are correlated with those from the analyzers for air quality measuring (NO-NO2-NOx, SO2, CO, O3, PM10 dusts, etc…) in conformity to 2008/50/CE.

MONITORING OF BIOGAS PLANTS
Monitoring system of a biogas plant by measuring the following parameters:

- Weather-climate for the evaluation of the classes of atmospheric stability and the calculation of the wind rose and the dispersion of pollutants.
- Measuring of the efficiency of odorous substances suction plant
- Measuring the temperature, humidity and pH of the tanks composting

WEATHER MONITORING IN MARINE APPLICATION
Anemometric and meteorological measuring in the MO.S.E. plant in Venice (Italy) for management and control of boats access; data acquisition, visualization and storage in the control room.
Water quality monitoring on the marine buoy (fix and mobile)

HYDROMETRIC MONITORING
Hydrometric system for the rivers remote surveillance and sending of SMS in conditions of pre-alarm and critic alarm. GPRS data transmission via FTP. Monitoring with web-cam powered by photovoltaic panel.

INDUSTRIALS MONITORING
Anemometric instruments for automatic control system for management of irrigation.

ALARM and MONITORING of WIND and DUST
System of continuous monitoring of the wind speed and the concentration of fine particles with a warning in case of strong wind and high presence of air particles conditions. The system acquires, processes, stores and transmits data; furthermore it manages alarms sending a SMS at the overflow of two settable thresholds.
The system is designed in compliance with the WMO and LCPC Setra 2000 guidelines

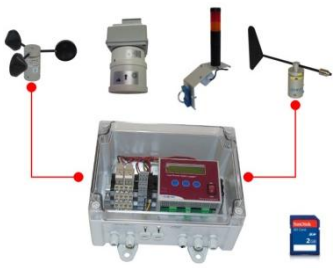
Very low-power datalogger *Micro 1* and *2* series

Very low-power dataloggers with alkaline batteries, for connection of not powered or low consumption sensors; storage on removable SD Card.

Application	Wind power (IEC61400-12)		Meteorology (WMO), Photovoltaic(IEC60904)	Hydrometry (WMO), Hydrology (D.Lgs.152/06)
Model	**mVEN1-LP**	**mVEN2-LP**	**mMET2-LP**	**mHYD2-LP**
Input Channels (from passive sensors)	1 anemometer, 1 wind vane, 1 thermometer, % Residual Energy	2 anemometer, 2 wind vane, 1 thermometer, % Residual Energy	1 Pt100 thermometer (3 wires), 1 pyranometer, 2 sensors 3Vdc powered max, 3 digital channels for anemometer, rain gauge, counters, % Residual Energy	Actives: 2 analog inputs 4...20mA (eg.hydrometer) Passives: 1 Pt100 input, 1 digital input % Residual Energy
IP65 Box	Plastic housing Dim.: 160x110x80mm, locking with cover with screw closure and universal brackets for fastening on poles			
Sampling	1s			
Data Storage SD Card up to 2GB	10' (600 samples)		Programmable 5', 10', 30', 60', 12h, 24h	
Power supply:	Alkaline batteries (not rechargeable) LR20A 2x1,5Vdc, D type	Rechargeable lithium batteries with photovoltaic cell + Alkaline batteries LR20A D type, 2 x1,5Vdc		
Elaborations	Wind speed: min, max (gust), arithmetical average, standard deviation, turbulence; Wind Direction: trigonometric average; Air temperature: arithmetical average		min, max (gust), arithmetical average, trigonometric average, sum, time counter	min, max, arithmetical average, sum, time counter
Human interface	Multifunction buttons and 2 rows display			
Certifications	From Measnet calibration laboratories			
Connectable sensors	Geoves, Davis, NRG, Young (other on request)		Geoves (other on request)	

Wind alarm logger

MICROVEN-ALARM is a datalogger designed to warn people in case of strong wind and put in safety conditions plants and workplaces. MicroVEN-Alarm acquires, elaborates and storage the anemometric data, managing alarms on relay contacts in case of 2 settable threshold overflow. The thresholds can be set both by wind speed and wind direction (wind sector of source)



Model	mVEN-ALARM – Alarm wind Datalogger
I/O Channels	n.1 analog input (0...5Vdc, 4...20mA, potentiometer) n.1 frequency pulse count (0...1kHz typical 0...250Hz), for anemometers with Reed Switch, Hall effect and optic TTL 5Vdc outputs n.2 outputs (pre-alarm and alarm) with n.2 double contact relays (V=12Vdc, Imax=500mA) with status leds
Box IP65	Plastic housing Dim.: 240x190x90mm, transparent cover, screw closure, fastening on the wall
Sampling rate	1s
Programming	Date and hour; anemometric constants; threshold alarm values; units of measure: m/s, km/h, mph, kn
Typical data storage	10' (standard WMO) on **SD Card** up to 2GB (typical endurance: 1,5 year)
Power	12Vdc from outside grid or from supplied 220Vac/12Vdc 1A feeder (cod. AL220-5i)
WMO Elaborations	min, max, arithmetic average, standard deviation, turbulence; trigonometric average
Human interface	2 rows display, programming buttons, test and temporary silencing alarm buttons
Conformity	WMO, LCPC Setra 2000, IEC61400-12
Operative Temperature	-40...+80°C

Low power multi-channel dataloggers with data transmission

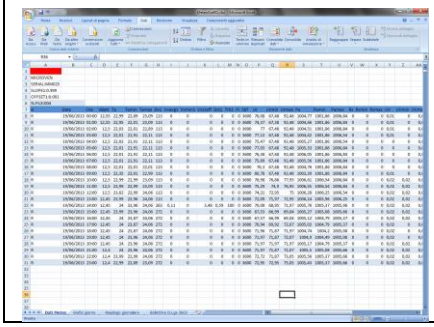
LPDL are low power multi-channel dataloggers with data storage on a SD Card and data transmission via GPRS or via cable RS485/LAN.

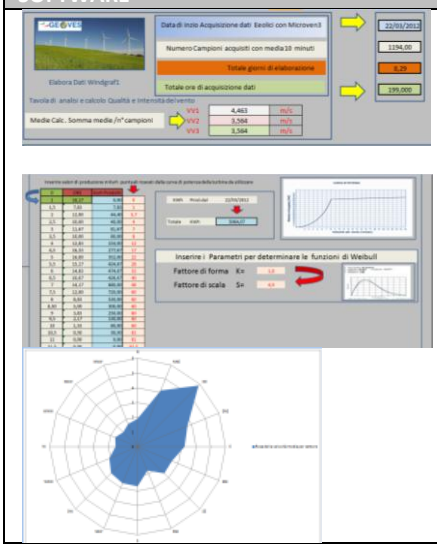
Data elaboration is compliant to WMO, IEC61400-12, IEC60904 1999/31/CE, 2009/90/CE and 2008/50/CE norms.

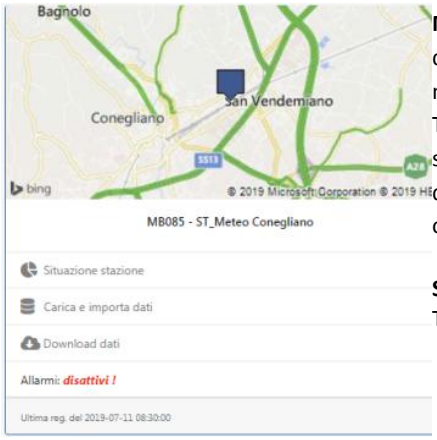
Type: Configurations:	***LPDL* – Multichannel Dataloggers** **mMET3 (weather, dams and dumps monitoring, photovoltaic plants);** **mHYD3 (level alarm); Butterfly (agriculture, alarms); mVEN3 (wind assessment);**
I/O Channels	**8 analog inputs** (+ 8 optional channels on separated interface) for meteorological sensors such as pyranometers, hydrometers, thermometers, barometers or chemical sensors **2 digital inputs (pulse counter)** for sensors with "high" frequency up to 50KHz (anemometers, flow gauges, etc…) and with "low" frequency output (rain gauges), sensors that requires the time counting (sunshine duration, leaf wetness,…), on/off signal (free-contacts) **1 serial port** for interface of intelligent sensors (multi-parametric probes, sonic anemometers, etc…) **1 diagnostic input** for battery voltage (or inside temperature, mains monitoring, ...) **2 digital insulated i/o** normally used to manage the switching-on of external devices)
Elaborations with 1s sampling rate	Min, max (gust), arithmetic average, standard deviation, turbulence; trigonometric average; sum; istantaneous value
Data storage	Programmable 5-10-15-30-60' (other on request); on SD Card up to 2GB
Communication ports	n.1 RS232 for GPRS or LAN devices for PC connections n.1 switched serial port for USB connection or for interface of multiparametric sensors
Data Transmission	Wireless: GSM/GPRS via FTP Wired: RS232, RS485, LAN 10/100Mbit with Geodesk data download
Alarm Transmission	Via SMS at the overflow of two settable thresholds (just for mHYD3 and Butterfly versions)
Local Alarm	n.2 double contact relais (pre-alarm and alarm) , V=12Vdc, Imax=500mA, with status led (only for vers. mHYD3)
Local HMI	n.3 multifunction buttons 2r. 16 crt. display LCD with sliding pages
Op.Temperature	-40…+80°C
Power supply	12…30Vdc from 12Vdc battery
Consumption	<10mA@12Vdc
Fastening	DIN bar
Dim. (Lxhxp)	Datalogger (excluded outdoor housing): 160x94x62mm
ACCESSORIES Photovoltaic panel power supply	• n.1 Photovoltaic panel 20W (typ.), Vnom. 12Vdc, Vmax 21Vdc@1000W/m2 @ 25°C • n.1 12Vdc/12Ah backup sealed battery • n.1 on-board battery charger with automatic management of battery monitor
Mains (220Vac) power supply	• n.1 2A sectionalising switch • n.1 12Vdc/2Ah backup sealed battery • n.1 power supply unit with integrated battery charger; IN:220Vac / OUT:12Vdc@2A with automatic management device for battery monitor
Outdoor housing	IP65 enclosure, in polycarbonate with anti-radiation treatment. Key enclosure, cross-arms for fastening on poles (ø50…150mm) or on walls.
Optional interfaces	Interface with 8 analog added channel (4…20mA or 0…5Vdc)

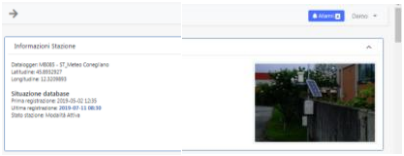
Data management softwares for Geoves dataloggers

Geoves has different types of software of varying complexity, used for the management of the individual measuring stations or for the monitoring networks with several stations in telemetry. In the first case the software is free supplied with the station, while in the second the software is customized and set according to specific application requirements and customer.

SOFTWARE	Geodesk
	Geodesk is a service software, free supplied with all Geoves datalogger, that can import data recorded (on SD card or sent via GPRS or transmitted by cable from the datalogger) and generate a single data file in Excel format. In this way it's possible to create data aggregation of desired period (eg. Monthly) and then derive the tabular and graphical reports. Besides Geodesk creates the setup configuration for the functioning of Butterfly and Micro3 devices

SOFTWARE	Windgraf1
	WindGraf1 is a free software that allows the management of wind data coming from MicroVEN dataloggers to derive calculations aimed at performance assessment of wind turbines. With Windgraf1 it can put the power curve of the chosen wind turbine and then compare the turbine with the highest return for the chosen site. The performance evaluation is done through various graphical and tabular processing which provides the following information: 1. Preliminary wind power analysis report 2. "Hours of wind frequency" graph 3. "Correlation between different anemometers heights and stored wind speeds" Report 4. "Hours of wind frequency" graph 5. "Generated Wind Power" report 6. "Weibull probability density" and "Weibull cumulated probability" graphs 7. "Wind Rose" graph

SOFTWARE	MeteoGraph
	**MeteoGraph** is a web application for the numerical and graphic display of data transmitted via GPRS on FTP area from environmental monitoring stations with Geoves datalogger. The software **doesn't require any installation** as Internet access is sufficient and a username and password must be entered to enter the dedicated web page and display the measurements from a PC, tablet or smartphone. **Station dashboard** The available functions are: • *Station situation*: access to the graphic processing page and to the station's synoptic • *Load and import data*: the data saved on the datalogger SD card are imported, or on a PC folder (or other support) • *Data download*: data are downloaded in text format with fields separated by commas for simple backups or subsequent processing with other applications (eg Excel, Access, external databases or other commercially available software) • *Alarms*: access to the station alarm management menu (optional on request)



Station situation - *Station information*

The parameters displayed are:

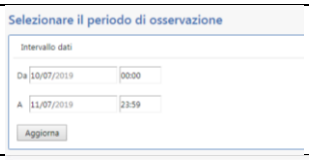
- Station unique identifier (ID)
- Name of the station
- Geographic coordinates (Latitude and Longitude)
- Data base status:
    - Date and time of Start data storage
    - Date and time Last data storage
    - Operation status of the station
- Photos of the station

Real-time synoptic of the station

The synoptic is a very useful tool for assessing the situation of the latest measurements taken by the monitoring station and assessing the meteorological or environmental situation of the site. For each measurement it is possible to associate one or more dedicated processes. For example, for the temperature it is possible to indicate the minimum and maximum value and the time in which it occurred in addition to other calculated measures such as the dew point.

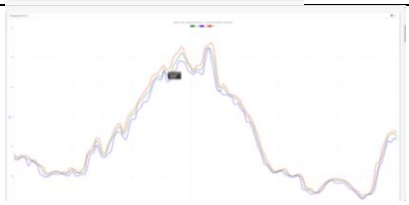
The synoptic also shows:

- calculated measures
- Diagnostic data (eg battery voltage)
- Significant data for the interpretation of the measure (eg barometric tendency, wind chill, monthly precipitation, etc.)



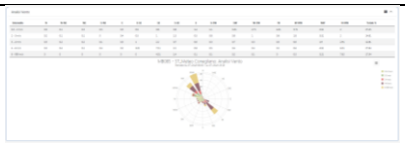
Observation period

It is possible to select the observation period in which to carry out all the elaborations that are displayed by MeteoGraph



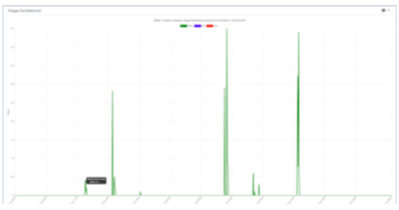
Graphic elaborations

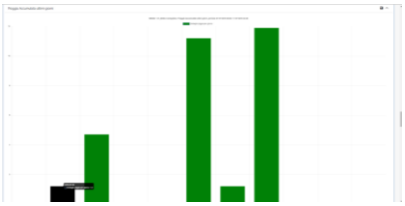
- **Linear multi-line** for measurements where the arithmetic average is applied (eg temperature, humidity, pressure, etc.) with representation of the minimum and maximum value



Graphic elaborations

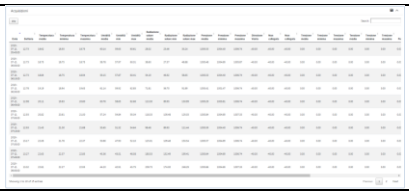
- **Wind-rose** for the anemometer measurements





Graphic elaborations for precipitation

- Graph with hourly summation
- Monthly or annual precipitation histogram
- Other graphs are available on request or can be customized with simple filters



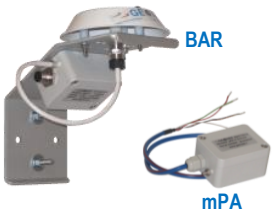
Tabular elaborations

- Daily data table can be downloaded both in text and in .png image format

Meteorologic Sensors

Geoves weather sensors are designed and built in conformity to the Annex 8 of WMO (World Meteorological Organization). All sensors are made in stainless materials suitable to work in critical operative and environmental conditions (thermic variations, salinity, ice, etc…); they are also supplied by universal connector to facilitate the electrical connection and by pole mounting system.

Model	BAR – Barometer with static port (outdoor applications) mPA – Micro Barometer (indoor applications)
Range (typical)	800…1100 hPa (on request 600…1100 hPa for sites over 1000m above s.l.)
Transducer	Piezoresistive
Accuracy	BAR: ±0.5hPa @ 25°C; mPA: ±0.6hPa @ 25°C
Output signals	-V 0…5Vdc; -I 4…20mA



Model	mWS1 – Wind speed sensor
Range	0…50 m/s (typical) gusts >75m/s
Transducer	Magnetic with sinusoidal AC signal not powered
Accuracy	±0.1m/s
Output signals	-N freq. AC; -RS freq. reed switch SqW (Square Wave); -T freq. TTL SqW; -V 0…5Vdc; -I 4…20mA

Model	mWD1 – Wind direction sensor
Range	0…359°
Transducer	Linear Potentiometer with continuous 360°
Accuracy	±2°
Output signals	-N: 10KOhm potentiometer; -V: 0…5Vdc; -I: 4…20mA

Model	WS2 – Wind speed sensor high performance (available with anti-icing heater)
Range	0…50 m/s (typical) gusts >75m/s
Transducer	Magnetic with sinusoidal AC signal not powered
Accuracy	±0.02m/s, R=>0.99998 (typ.)
Heating	12Vdc@1W (vers.WS1R)
Output signals	-N freq. AC; -T freq. TTL SqW; -V 0…5Vdc; -I 4…20mA

Model	WD2 – Wind direction sensor high performance (available with anti-icing heater)
Range	0…359°
Transducer	Linear Potentiometer with continuous 360°
Accuracy	±1,5°
Heating	12Vdc@1W (vers.WD1R)
Output signals	-N: 10KOhm potentiometer; -V: 0…5Vdc; -I: 4…20mA

Model	IAN420-2C – Anemometers interface with galvanic insulation and thermostatation
Typical applications	– Wind Turbines – Anemometer installations beyond 20m (cableways, lattice masts, cranes, lighting towers, etc…)
Power supply	12…24Vdc ±10%
Inputs **Wind speed sensors:** **Wind direction sensors:**	 freq. AC 500Hz 100mVpp; freq. square wave 1000Hz 5V potentiometer 1K…50KΩ (Ref. 200mV)
Electrical outputs	0…10Vdc; 4…20mA; others on request
Insulation	Galvanic
Thermostat set point	Automatic, On <5°C Off >5°C ±0.3°C

Model	RG200, RG400 – Rain gauges (available with anti-icing heater)
Range	infinite
Orifice area	RG200: 200cm^2; RG400: 400cm^2
Transducer	Double contact (n.o.) tilting bucket
Accuracy	Class B UNI 11452:2012 (class A with connection to the Geoves' datalogger)
Resolution	0.2 mm/commutation (or 0.1mm 400cm^2 version)
Power supply	Without heater: none With heater (Vers.-R): 12-24Vdc 60W
Output signals	-N pulses; with device CP-VI: 0…10Vdc or 4…20mA

Model	CP-VI – Rain gauges interface with galvanic insulation and thermostatation
Power supply	12…24Vdc ±10%
Input	Pulses rain gauges
Electrical outputs	0…10Vdc; 4…20mA; others on request
Insulation	Galvanic
Thermostat set point	Automatic, On <5°C Off >5°C ±0.3°C
Automatic Reset	– Achievement of 100 f.s. pulses (default), 250 or 500 – After 60 minutes from the last pulse without rain

Model	EVAS – Evaporimeter with class A pan
Range of the measure sensor	0…30mm
Power supply	8…28Vdc
Transducer	Capacitive with polynomial temperature compensation
Accuracy (between 10…50°C)	<0.1% f.s.
Evaporimeter accessories	Wooden platform with protective coatings AISI304 stainless steel pan, class A in compliance with WMO Annex 8 guidelines.
Output	4…20mA

Model	PIRSC – Silicon cell pyranometer
Measuring range	0…2000 W/m^2
Spectral Range	0.4…1.1µm
Transducer	Silicon cell
Accuracy (typ.)	±3%
Available Certifications	Geoves calibration report with comparison to 1st Class CM6 Kipp&Zonen
Output signals	-N 10µV/W/m^2; -V 0…5Vdc; -I 4…20mA

Model	PIR2S, PIR01, PIR02 – Thermopile Pyranometers
Measuring range	0…2000 W/m^2
Spectral Range	0.3…3µm
Transducer	Thermopile with single dome: mod.PIR02 (2nd class) Thermopile with double dome: mod. PIR01 (1st Class) and PIR2S (Secondary Standard Class)
Accuracy Class (ISO9060 and WMO)	PIR02: 2nd class o "Moderate quality" PIR01: 1st class o "Good quality" PIR2S: Secondary Standard Class o "High quality"
Available Certifications	ISO9001 in conformity to ISO9847 norms
Output signals	-N 10µV/W/m^2; -V 0…5Vdc; -I 4…20mA; -S RS485 Modbus

Model	NSR – Net Radiometer
Measuring range	±2000 W/m^2
Transducer	Thermopile with spectral range 0,3…100µm
Sensitivity	10µV/W/m^2
Available Certifications	ISO9001 in conformity to ISO7726 norms
Output signals	-V 0…5Vdc; -I 4…20mA

	mSTA – Outdoor air temperature sensor mSTAUR – Outdoor air temperature-humidity sensor
Output signals	-V 0…5Vdc; -I 4…20mA; -N 4 wires Pt100 (T) and 0…5Vdc (RH)
Temperature - Range	-40…+60 °C
Transducer	Pt100 with anti-radiation shields
Accuracy	±0.2°C
Rel. Humidity - Range	0…100 %
Transducer	Capacitive with anti-radiation shields
Accuracy	±2%

Model	STQ – Soil/water temperature probe
Range	-40…+60 °C
Transducer	Pt100 1/3DIN with AISI316 stainless steel head
Accuracy	±0.2°C
Output signals	-N 4 wires Pt100; -V 0…5Vdc; -I 4…20mA

Model	STC – Contact sticky temperature probe for walls and photovoltaic panels
Range	-50…+100 °C
Transducer	Pt100 1/3DIN with aluminium sticky head
Accuracy	±0.2°C
Output signals	-N 4 wires Pt100; -V 0…5Vdc; -I 4…20mA

Model	STP – Penetration temperature probe for bio-compost and dumps
Range	-40…+60 °C
Transducer	Pt100 1/3DIN with ø5x1000mm stainless steel probe
Accuracy	±0.2°C
Output signals	-N 4 wires Pt100; -V 0…5Vdc; -I 4…20mA

Model	mSTI – Air temperature sensor (indoor application) mSTS – Air surface temperature sensor
Range	-40…+60 °C
Transducer	Pt100 with anti-radiation shield
Accuracy	±0.2°C
Output signals	-V 0…5Vdc; -I 4…20mA; -N Pt100 4 wires

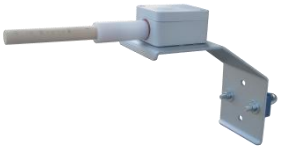
Model	STBB – Air temperature sensor with wet and dry bulb (forced ventilation psychrometer)
Range	-40…+60 °C
Transducer	n.2 Pt100 1/3DIN
Accuracy	±0.2°C
Outputs	-N Pt100 3 wires; -I 4…20mA

Model	RHT – Soil moisture probe
Typ. Range	0…50% VWC (soil Volumetric Water Content)
Transducer	Dielectric
Power supply / consumption	+12Vdc / 1mA
Typical output	4…20mA
Accuracy / Resolution	±3% VWC / 0,08% VWC

Model	RHTT – Soil moisture and temperature probe
Typ. Range	RH: 0…60% VWC (soil Volumetric Water Content) T: -40…+60°C
Transducer	Capacitive (RH) and NTC thermo-resistance (T)
Power supply / consumption	+12Vdc / 8mA
Accuracy	RH: ± 3% VWC between 0…50VWC (standard mineral soil, EC <5 mS/cm) T: ±0.5°C (long term stability: 0.1°C/year)
Typical outputs	n.2 x 0…5Vdc

Model	WLS – Leaf wetness sensor
Measuring range	0…100% of leaf wetness and wetness duration (s)
Transducer	Capacitive
Typical output	0,5…3Vdc
Operative Temperature	-30…+60°C

Model	SFTH – Fuel moisture temperature sensor for monitoring of forest fires
Output signals	-V 0…5Vdc; -I 4…20mA;
Temperature - Range	-40…+60 °C
Transducer	Pt100 with certified ponderosa pine stick
Accuracy	±0.2°C
Rel. Humidity - Range	0…100 %
Transducer	Capacitive with certified ponderosa pine stick
Accuracy	±2%



Model	BRINO – Detector of Frost/Ice-Dew-Rain-Snow-Hail atmospheric events
Transducer	Cpu with acoustic transducer combined to a thermo-hygrometer and a wetness leaf sensor
n.4 Analog outputs (0…5000mV)	Out n°1: 0Vdc=no event, 5Vdc=Hail Out n°2: 0Vdc=no event, 2.5Vdc=Rain, 5Vdc=Snow Out n°3: 0Vdc=no event, 5Vdc=Ice/Frost Out n°4: 0Vdc=no event, 5Vdc=Condensation/Wetting
Power and consumption	12…24Vdc ±10% <15mA @ 24Vdc
Power supply for heating system	12…24Vdc 250mA Max @ 24Vdc
Optional thermostat (cod. TERMST)	On <5°C Off >5°C ±0.3°C

Meteorological Sensors and accessories for special applications

Solar radiation sensor for special applications:

- Pyranometers with ventilation/heating unit
- Pyranometers with shade ring for diffuse radiation measuring
- Albedo measuring sensors
- Sunshine duration sensors
- Solar radiation device for automatic measuring of global and diffuse radiations (calculation of direct radiation by datalogger) and sunshine duration
- Pyrheliometers
- Pyrgeometer
- UVA and UVB Radiometers
- PAR

Sonic anemometers, biaxial and triaxial available also in multi-parametric and heated version with RS232, 485, SDI-12 and ModBus serial ports or with some analog outputs.

Meteorological shelters made in treated and painted wood built in conformity to WMO guidelines. Self-recording meteorological sensors (rain gauges, thermometers, barometers, etc…)

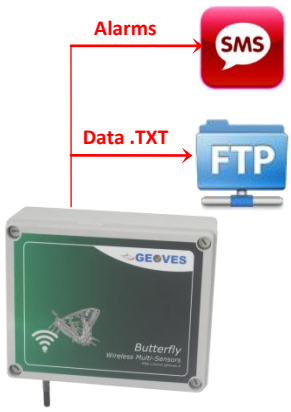
Multi-sensori wireless GPRS mod. BUTTERFLY

The Butterfly multiparameter sensors are devices for the monitoring of environmental parameters with wireless data transmission and sending alarms to the overcoming of programmable thresholds.

Thanks to the realization with advanced technologies, Butterfly presents a very low power consumption that allows it to use small batteries and solar cells getting a very compact device and a low environmental impact.

Wireless technology combined with power supply should allow you to install Butterfly at any point of interest constituting a real network telemetry.

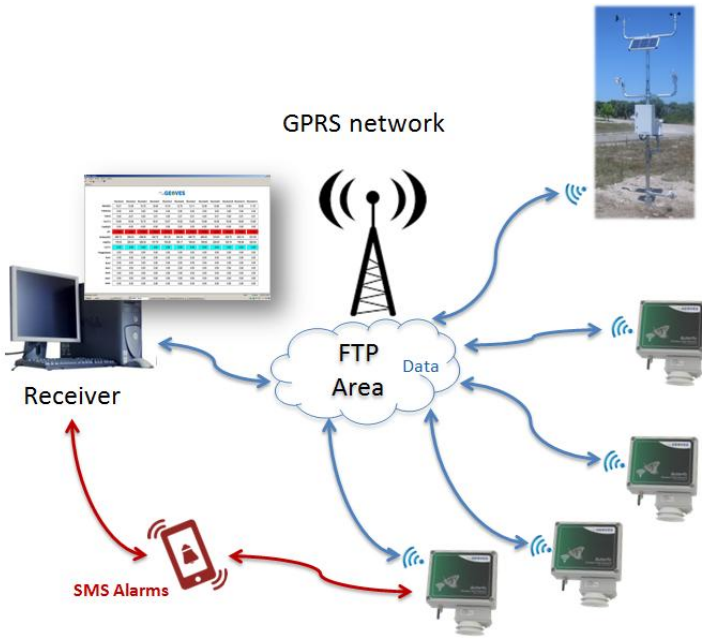
Model	Butterfly – Wireless multi-parametric sensor
I/O Channels	5 analog inputs (in voltage or current), 1 dedicated input for battery monitoring 2 digital inputs used as pulse counter (e.g. rain gauge), frequency-meter (e.g. anemometer) or time counter from on/off contact (e.g. rain presence, sunshine duration, leaves wetness, etc…)
Power supply	Rechargeable 12Vdc battery with 5W photovoltaic panel, integrated recharger with intelligent battery management (11,5Vdc: battery safe threshold; 12,5Vdc: threshold of power restore to the load)
Data communication	via GPRS on FTP area
Alarms transmission	via SMS or e-mail with change of data transmission rate
Measuring	Elaborated data in the data storage period
Data format	.TXT standard text with CSV format (Comma Separated Value)
Data storage	Backup of one day data with circular storage
Programming	On site: setting of text file in the SD Card memory By remote: by sending of setting file on FTP area
Settable parameters	• Alarm threshold for every measure (settable as rising or falling overflows) • Storage rate (5, 10, 15, 30 or 60') • Transmission rate (5, 10, 15, 30 or 60') • Date&time with NTP synchronization (network time protocol)
Conformity	Annex 8 – WMO (World Meteorological Organization)
Working temperature	-30…+70°C
IP56 Enclosure	Plastic material Dim.(LxHxP): 240x190x100mm, screw closure and universal brackets for mounting on the pole. Metallic bands with several diameters on request.



Application:

Butterfly-3T with 3 temperature probes and data storage

Layout of the data transmission system



Typical applications of the BUTTERFLY device

Forest fires

Model	Butterfly-F1 – Multi-parametric sensor "Forest Fire version"		
Description	**Butterfly-F1** is a wireless multi-parametric sensor for the **forest monitoring and fire alert.** Butterfly can transmit the data with an on-board GPRS modem which sends it in protected internet area (**FTP area**); besides it can send alarms via SMS in real-time to alert the available personnel quickly. The macro-descriptors parameters of a forest fire measured from Butterfly-F are typically: the air temperature and humidity, the carbon dioxide (CO_2).		
Measures		Range	Resolution
	Air Temperature:	-40…+60 °C	±0.01°C
	Air rel. humidity:	0…100% RH	±0.02%
	Carbon dioxide (CO_2):	0…2000ppm	±1% f.s.
	.		

Butterfly-F1 Model for monitoring and alarm of forest fires

Weather forecast, Agriculture, Zootechnics, Geology

Model	Butterfly – Multi-parametric sensor for monitoring and alert of meteorological parameters
Description	**Butterfly** is a wireless multi-parametric sensor for **monitoring and alert** of weather parameters. Butterfly can transmit the data with an on-board GPRS modem which sends it in protected internet area (**FTP area**); besides it can send alarms via SMS in real-time to alert the available personnel quickly.
Versions and applications **Agriculture** (prevention of vineyards and orchards diseases, water plant stress, etc…) **Climate control:** **Zootechnics** (confort of animal farms): **Geology:**	Depending on the application the following versions are available: 1. METEOVIGNA1 with measures of: rain, air temperature-humidity, leaves wetness 2. METEOAGRO1 with measures of: rain, air temperature-humidity, leaves wetness, solar radiation, wind speed 3. METEOAGRO2 with measures of: rain, air temperature-humidity, leaves wetness, soil temperature-humidity 4. METEO1 with measures of: rain, air temperature-humidity, atmospheric pressure, solar radiation, wind speed and direction 5. ZOO1 with measures of: brightness, air temperature-humidity, ammonia (NH3), methane (CH4), carbon dioxide (CO2) 6. GEO1 with measures of: rain, underground water level, air temperature, geological sensors (crackmeters, inclinometers, load cells, …) All versions are customizable on request.

Butterfly for meteorology, agriculture, geology, zootechnics

Cloudburst, hail, snow and ice ALARM (typical applications: agriculture, railways and roads, research, civil protection, geology)

Model	Butterfly-P – Multi-parametric wireless sensor for monitoring and alert of rainfall and atmospheric events
Description	**Butterfly-P** is a **rainfall monitoring and alert system.** Butterfly can transmit the data with an on-board GPRS modem which sends it in protected internet area (**FTP area**); besides it can send alarms via SMS in real-time to alert the available personnel quickly. Combining to the rain gauge the BRINO sensor, it's possible recognizing the type of rainfall (**rain- snow-hail**) and evaluate the possible presence of **ice**.
Working logic	When a set threshold is exceeded, Butterfly-P sends an SMS to the available staff and increases the data storage and transmission (Rain rate) to 1 minute, in such a way that the precipitation event can be analyzed in its most critical steps. In this way you can get a TRUE RAIN RATE (not estimated) with a virtually "instantaneous measurement" of the rain intensity.

Butterfly-P – Wireless device for monitoring and alert of rainfall and atmospheric events

Air pollutants monitoring sensors

AIR POLLUTANTS MONITORING SENSORS			
Model and Measures		**Range**	**Resolution**
SCO- I	Carbon monoxide (CO)	0…200ppm	1ppm
SSO2-I	Sulphur dioxide (SO_2)	0…20ppm	0,2ppm
SH2S-I	Sulphured hydrogen (H_2S)	0…100ppm	0,1ppm
SNO-I	Nitrogen oxide (NO)	0…100ppm	0,5ppm
SNO2-I	Nitrogen dioxide (NO_2)	0…10ppm	0,05ppm
SO3-I	Ozone (O_3)	0…2ppm	0,02ppm
SCO2-I	Carbon dioxide (CO_2)	0…2000 or 5000ppm	0,5% f.s.
SNH3-I	Ammonia (NH_3)	0…100ppm	1ppm
SCL2-I	Chlorides (Cl_2)	0…10ppm	0,05ppm
SCH4-I	Methane (CH_4)	0…100% o 0…5% Vol.	0,5…1% f.s.
Output signal		4…20mA	
Power and consumption		12…24Vdc 30mA (average)	

*Other range and resolutions on request

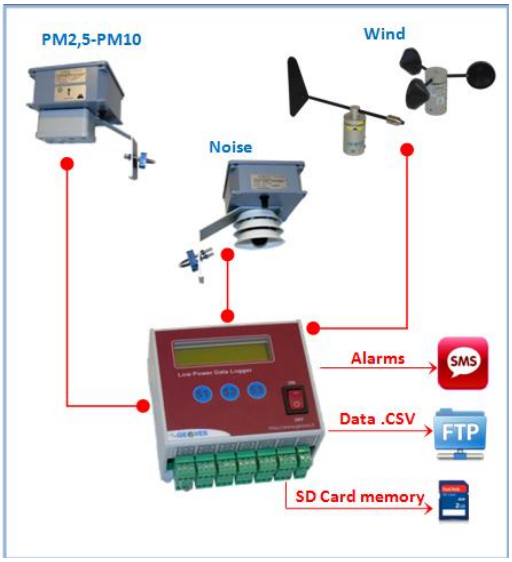
Particulate measurement	SPM10-2,5-I - SPM10-2,5-1-I
Working principle	Light laser scattering
Measuring range	PM2.5: 0…1000 µg/m^3 ; PM10: 0…1000 µg/m^3 ; PM1: option
Resolution	1µg/m^3
Accuracy	±10%
Warming time	≤ 120s
Response time	90s
Outputs	4…20mA
Power	12…24Vdc
Consumption	100mA@12Vdc
Load resistance	100Ohm@12Vdc (<600 Ohm@24Vdc)
Working conditions	-20…+60°C, 0…80%

Noise measurement	SFON-I
Transducer	Condenser microphone
Measurement range	30…120dB
Frequency range	20Hz…12.5 kHz
Accuracy	±0.5 dB (94dB a 1 KHz)
Resolution	0.1 dB
Response time	≤ 3s
Output	4…20mA
Power	12…24Vdc (typ.12Vdc)
Consumption	1.2W
Load resistance	100Ohm@12Vdc (<600 Ohm@24Vdc)
Working conditions	-20…+60°C, 10…90%

■ Overcoming wind, noise and fine dust monitoring station for: building, construction sites, ground handling, industrial monitoring

BUTTERFLY-PRV is a system designed to continuously monitor the anemometric data and the concentration of fine dusts by alerting the avilable personnel in situations of strong wind and high presence of particles in the air.

The datalogger acquires, processes, stores (black box function) and transmits the data; besides it transmits alarms via SMS when the measures are exceeding adjustable thresholds.



Main applications

1) Shipyards: excavation and ground handling (LCPC Setra 2000 Guidelines)
2) Construction: inert, calcify, cement plants, construction sites
3) Civil and industrial plants: volatile deposits, landfills
4) Environmental monitoring with control and alarms of wind&dust&noise and other weather parameters (rain, etc…)

Butterfly-PRV – Dust, noise and wind alarm station

Model	Butterfly-PRV – Wind-dust-noise alarm and monitoring system
I/O Channels	n.8 analog inputs (0…5Vdc, 4…20mA, potentiometer, etc…) n.2 digital inputs in frequency (typ. 0…250Hz), for anemometers with Reed Switch or Hall effect or TTL 5Vdc outputs and rain gauges with pulse output
User Interface	n.3 multifunction buttons, 2r. 16 crt. display LCD with sliding pages
Box IP65	IP65 enclosure, in polycarbonate with anti-radiation treatment (or stainless steel) Key enclosure, cross-arms for fastening on poles (ø50…150mm) or on walls.
Power supply	From photovoltaic panel and backup battery 12Vdc From mains 220Vac and backup battery 12Vdc
Measure sampling	1s
Typical data storage	10’ (WMO standard) on **SD Card** 2GB max (circular management)
Data Format	ASCII Standard .txt, compatible CSV (Comma separated value)
Data Transmission	Modem GSM/GPRS Via FTP (data) and via SMS (alarms)
Data transmission rate (via FTP)	In normal and pre-alarm conditions: every 60’ In alarm conditions: every 10’
Alarms transmission (via SMS)	@alarm threshold overcoming of wind, dust and/or noise @ threshold overcoming of minimum battery voltage
Settable thresholds	Wind speed measurements PM10 Dust measurements PM2,5 Dust measurements PM1 (option) Dust measurements Noise measurements
Programming	Date and hour; anemometric constants; threshold values of alarm; anemometric unit of measure: m/s, km/h, mph, kn; FTP parameters; n.2 mobile numbers of available staff
WMO Elaborations	min, max, arithmetic mean, standard deviation, turbulence; trigonometric mean;
Compliance	WMO, LCPC Setra 2000, IEC61400-12
Operative Temperature	-40…+80°C

Wet & Dry Sampler for separate collection of Dry (dusts) and Wet atmospheric depositions (Rain, Snow, etc.)

The sampler, typically used for acid rain monitoring, has two distinct and separate containers, one for dry deposition ("DRY" dusts) and one for wet depositions (rain, snow, dew, etc ... "WET"), which are alternatively covered by a mobile lid activated automatically upon the occurrence of a wet precipitation detected by an electronic rainfall sensor. Sampler heating is controlled by a thermostat circuit that activates at <5 ° C, allowing the lid to be activated even in the presence of snowfall or frost.

Main applications

- ✓ Environmental analysis
- ✓ Monitoring of acid rain
- ✓ Monitoring organic and inorganic compounds
- ✓ Thermoelectric central monitoring
- ✓ Monitoring of industrial areas
- ✓ Monitoring of forest areas and cross-border pollution
- ✓ Monitoring of sites at high altitudes

Model	W&D –Sampler for collection of Dry and Wet depositions
Power supply	12Vdc Battery + 20W Photovoltaic panel + recharger
Consumption	Stand-by: <12mA (typ.) In movement: 450mA (typ.) with take-off peak of 800mA
Engine	Linear actuator @ 12Vdc
Lid transfer time	< 5 seconds
Working temperature	-20…+70°C (without ice)
Managements electronics • **Datalogger** • **Enclosure** • **Cover management**	 MicroMET3 Geoves with display and storage on SD Card IP65 box with lockable door automatic: by measuring of the rain presence sensor manual (for maintenance): switch of double wet/dry position
Containers	Two polyethylene containers dim.max: ø320xh320mm; on request: in silanized glass
Built in:	Stainless steel, aluminium and plastic
Dimensions, weight	Overall dim.: 500 x 1000 x h1200 mm, 40kg
Anti-icing heater: • **Electrical board:** • **Power:** • **Temperature of heater activation:**	Option: device mod.**AL-R** – Power supplier for mobile parts heater 220Vac/12Vdc with outdoor IP65 enclosure 30W@12Vdc <5°C with thermostatic control

Hydrological sensors

Water level and snow depth sensors (for measuring of water QUANTITY)

HYDROMETERS		
Type	**Pressure transmitter level sensor (immersion sensor)**	
Models (XX=mbar or m)	SLPXXXmbar	SLPXX
Range	0…30 or 100mbar	0…2-5-10m (other range available on demand)
Transducer	piezometric	
Typical accuracy	<0.1% f.s.	<0.5% f.s.
Output signal	4…20mA	
Model	**SLR Radar level sensor (without water contact)**	
Range	0…15m (20-30-35m or other range available on demand)	
Transducer	radar	
Typical accuracy	±2mm	
Output signal	4…20mA	
Model	**SLU Sonic level sensor (without water contact)** **Applications: HYDROMETER and SNOW DEPTH GAUGE**	
Range	0…6m	
Transducer	sonic	
Typical accuracy	<0,2% of measured value	
Output signal	4…20mA	

Hydrological instruments (for measuring of water QUALITY)

MULTIPARAMETRIC PROBE		
Model	**SMx-485** (where x = n. of connected measures)	
Detectable Measures	**Range**	**Resolution**
1. Temperature:	-5…+55 °C	0,01 °C
2. ORP:	± 1100 mV	0,1 mV
3. pH:	0…14 pH	0,001 pH
4. Conductivity:	0…6.000 µS autorange; 0…60.000 µS	1 µS
5. Water level:	0…20m; 0…350m (vers.SM-6MP)	0,001 m
6. Dissolved oxygen:	0…20 ppm o mg/l	0,001 ppm o mg/l
7a. Turbidity (option):	0…4.000 NTU	0,1NTU
or		
7b. n.1 of following parameter (option):	Ammonia, Chlorides, Nitrates	
Working pressure	30bar or 350bar on demand	
Power and consumption	12Vdc 30mA max	
Communication	RS485 (option: RS232 converter) with proprietary or Modbus protocol	
Standard Cable	30m freestanding vented cable	
Housing material	PVC	
Dimensions	ø70x510mm or ø44,5x510mm; weight: 2kg	

Handheld datalogger for multiparametric probes mod. SMx-485

Model	**mHYD1** portable datalogger for SMx-485 multi-parametric probe
Functions	Data Storage with programmable rate: 5-10-15-30-60 minutes Storage of instantaneous measurements on command (eg. for parameters profiling at different depths) Display of instantaneous data Remaining % battery power indication Setting of date and time
Power Supply	4 rechargeable batteries, type AA.R6, Ni-MH, 1.2Volt/2850mA Batteries charger with 220Vac 50Hz or cigarette lighter adapter
Battery autonomy	About 12h @ 5 minutes maximum storage rate
Data Storage	On a 2GB removable SD Card
Human Interface	4 rows display and 4 multi-function buttons

Hydrological sensors for special application

Dipmeters with temperature probe and micrologger powered with alkaline batteries, data storage on removable SD Card

Suspended solids/turbidity gauge with and micrologger powered with alkaline batteries, data storage on removable SD Card

Poles and brackets for weather, hydrological and environmental monitoring stations

Fix, telescopic and tiltable poles Models:	PF2-55	PF3-55	PTA6-60	PTA10-60	PTA10-70	PTA15-60	PRF20-60
Heights (m)	2	3	5 max 3 min	10 max 3 min	10 max 1,4 min	15 max 3 min	20 max 3 min
Raising	None (fix)	telescopic	tiltable	tiltable	telescopic	tiltable with ginpole and winch	
Wind resistance up to 1000m and without ice load	100km/h with gusts up to 130km/h						
Diameters (mm)	Base: 55 Top: 55	Base: 55 Top: 50	Base: 60 Top: 60	Base: 60 Top: 60	Base: 70 Top: 30	Base: 60 Top: 60	
Weight (kg) guy wires and accessories excluded	6kg	11kg	7kg	14kg	16kg	50kg	60kg
N. of guy wires	none	none	1x3@120°	2x3@120°	1x3@120°	2x4@90°	
N. elements	1	1	2	4	9	5	7
Housing material	Galvanized steel	Galvanized steel	Aluminium	Aluminium	Aluminium	Galvanized steel	
Required workers for installation	1	1	1	2	2	3	3

Poles for fix stations

Poles for portable/relocatable stations

Anchoring in the soil without civil works

Main services supplied by Geoves technical support are:

Laboratory Calibration

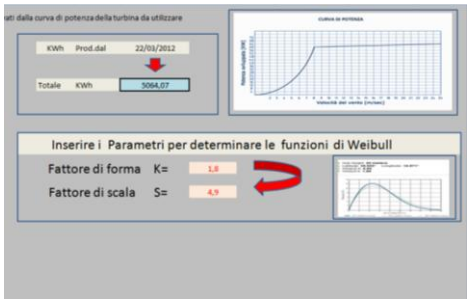
Using certified instruments in our laboratories it can carry out tests and functional tests of all the equipment supplied by us in compliance with **ISO9001** standards. Also making use of external laboratories accredited by which Geoves has established a relationship of constant collaboration, you can make calibration **ACCREDIA** for measures of temperature, humidity, pressure, wind speed / air flow, brightness, **ISO** for measures of solar radiation (pyranometer) and **MeasNet** for anemometers (wind energy applications).

Phone Service

Telephone support on the use of single instrumentation and monitoring systems.

Support for on-site installation

Assigning to it a qualified local staff for the activities of installation of monitoring systems with works supervision and plant start-up.



Assistance on data management

Ability to assist clients in the management of data acquired from Geoves monitoring systems. Such assistance may be made to spot or every programmed, agreed with the customer.

TRAINING

The customer can take advantage of training courses at the headquarters Geoves or directly on-site installation and delivery. The training is done by technicians with decades of experience that will educate the staff about the activities of installation, use and maintenance of equipment in addition to the theoretical training of the operation of all systems of measurement provided.

HEADQUARTERS

Our team has as a base the Veneto, but can count on various logistic bases and a network of partners located throughout the country, ensuring a remarkable dynamism and competitiveness, combined with fast response times and a strong local roots.

SERVICES AND TECHNICAL SUPPORT

Geoves Snc
Via Magg. Piovesana, 155/a 31015 Conegliano (TV) - Italy
tel.: +39 0438 22099 fax: +39 0438 420668
E-mail: info@geoves.it http://www.geoves.it

Agent / Local dealer