



MICROMet3D – MONITORING STATIONS FOR METEOROLOGICAL AND ENVIRONMENTAL MEASUREMENTS IN LANDFILL AND WASTE-TO-ENERGY PLANTS (Rev.3 280121)

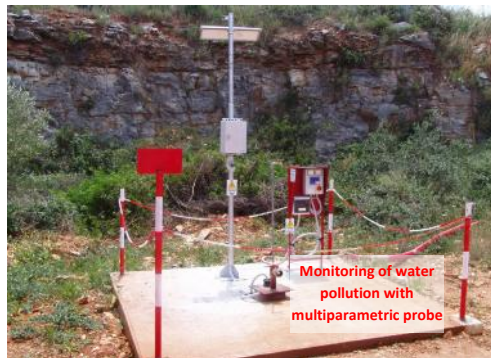
MicroMet3D stations have been designed for meteorological and environmental monitoring in dump plants in compliance with **WMO** guidelines (World Meteorological Organization – Annex 8), Italian and European standards for dumps management.

The stations employ all Geoves professional instruments that can be calibrated in external laboratories (eg Accredia). MicroMet systems can be configured with the following types of measurements:

1. **Meteorological:** air temperature and humidity, rain, wind speed and direction, evaporation (calculated by a pyranometer which allows to get the evaporation measure with the FAO-WMO Penman Monteith method; in this way no expensive pan evaporimeters are required)
2. **Hydrological:** groundwater level sensors, multiparametric probes for measurements of the groundwater pollution (macro-descriptor parameters)
3. **Atmospheric:** typically gaseous and odor-containing substances such as CH₄, CO₂, O₂, H₂, H₂S, NO₂, SO₂, O₃, total powders, NH₃, mercaptans and volatile compounds are monitored.

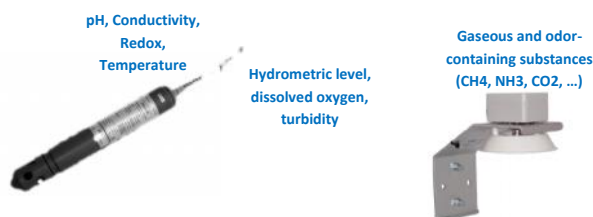
The datalogger, which is the cpu of the monitoring station, is able to display, acquire, store and transmit data remotely. Thanks to its modularity, the datalogger can receive up to 16 analog and 3 digital signals (e.g. from meteorological sensors) and 1 serial port to connect multiparametric probe for water monitoring.

Advantages



Underground water monitoring station in a landfill

- ✓ Instruments **WMO** compliant and **Accredia** certifiable
- ✓ **Low consumption** and possibility of powering with photovoltaic panel
- ✓ **No property communication protocol**
- ✓ **Standard text data format** (CSV format) compatible with Excel, database and the most common softwares available in the market.
- ✓ **No connection charges** (with GPRS wireless transmission and photovoltaic panel power supply)
- ✓ **Critical working conditions** (presence of salinity, ice, sand, corrosive agents, high temperature excursions, etc...)
- ✓ **Reliability, long-life and minimum requested maintenance**
- ✓ **High accuracy and resolution of the measure**
- ✓ **Fully italian technology**



Gaseous and odor-containing substances (CH₄, NH₃, CO₂, ...)

Hydrometric level, dissolved oxygen, turbidity

Technical Data

DATALOGGER	mMET3 – Multichannel Datalogger
I/O Channels	8 analog inputs (+ 8 option on Expa8 interface): in voltage or current (typ.0...5Vdc or 4...20mA); 2 insulated digital inputs (pulse counter) for sensors with “high” frequency up to 50KHz (anemometers, flow gauges, ecc...) and with “low” frequency output (rain gauges), sensors that requires the time counting (sunshine duration, leaf wetness,...), on/off signal (free-contacts); 1 diagnostic input for battery monitor
Power supply	10...14.4Vdc (typical 12Vdc); On-board battery charger, input from photovoltaic panel, with battery monitoring (deactivation of the load <10,5Vdc, restart >12Vdc) or power supplier 220Vac/12Vdc
Average autonomy of a weather station with 7 measures	>15days: with 12Vdc/7Ah battery, 20W photov. panel, storage: 5’ transmission: 60’ >30days: with 12Vdc/18Ah battery, 30W photov. panel, storage: 5’ transmission: 60’
Data communication	<u>Wireless</u> via GSM/GPRS on FTP area <u>wired</u> via RS232/LAN cable with PC free software for data download
Alarms transmission	via e-mail using MeteoGraph web (with GPRS data transmission)
Programming	On site: setting of text file in the SD Card memory
Settable parameters	- Date and time with NTP synchronization (network time protocol) - Anemometer and rain gauge constants - Storage rate (5, 10, 15, 30 or 60’); - Transmission rate (5, 10, 15, 30 or 60’);
Elaborations	Min, max (gust), arithmetic average, standard deviation, turbulence; trigonometric average; sum; diagnostic measure for battery voltage. Calculable measurements (if the weather sensors that allow the calculation are present): Evapotranspiration Et0, TD Dew point temperature, TWB wet bulb temperature
Data storage	Data backup of 500 days with circular storage
Conformity	Annex 8 – WMO (World Meteorological Organization)
Working temperature	-30...+70°C
IP65 Enclosure (basic version)	Plastic material Dim.(LxHxP): 250x350x160mm, key closure and universal brackets for mounting on the pole.



mMET3



Datalogger mounting in the IP65 container

METEOROLOGICAL SENSORS

Model	mSTAU – Air temperature-humidity sensor
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	mPA, BAR – Barometers for indoor or outdoor (with static port)
Range (typical)	800...1100 hPa (on request 600...1100 hPa for sites over 1000m above s.l.)
Transducer	Piezoresistive
Average accuracy @ 25°C	BAR: ±0.5hPa; mPA: ±0.6hPa
Long-term stability	±0.01hPa/year

Model	PIRSC – Silicon cell pyranometer
Measuring range	0...2000 W/m ²
Spectral Range	0.4...1.1µm
Transducer	Silicon cell
Accuracy (typ.)	±4%



Models	mWS1 – Wind speed sensors
Range	0...75m/s
Transducer	Magnetic with sinusoidal AC signal not powered
Rotation	High performance bearings
Anti-icing heater	12Vdc/1W (only for WS2 model)
Accuracy	< ±0.1m/s



Models	mWD1 – Wind direction sensors
Range	0...359°
Transducer	Linear Potentiometer with continuous 360°
Rotation	High performance bearings
Anti-icing heater	12Vdc/1W (only for WD2 model)
Accuracy	< ±2°



Model	RG200 – Rain gauge (available with anti-icing heater)
Range	infinite
Orifice area	200cm ² (option: 400 cm ²)
Transducer	Double contact (n.o.) tilting bucket
Accuracy	Class B UNI 11452:2012 (class A connected 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



HYDROLOGICAL SENSORS

Model	SMx-485 - Multiparametric Probe	
Detectable Measures	Standard range	Accuracy
1. Temperature:	-5...+55 °C	±0,25 °C
2. ORP (Redox):	± 1.000,0 mV	±30 mV
3. pH:	-2...16 pH	±0,25 pH
4. Conductivity:	0...6.000 mS autorange (o 0...60.000 mS)	±0,25% v.m.
5. Depth:	0...20m; (0...350m vers.-P)	±0,02 m
6. Dissolved Oxygen:	0...20ppm, mg/l or 0...200% (other ranges on request)	±0,1 ppm, mg/l
Options		
7 Turbidity :	0...4.000 NTU	± 5% v.m.
or		
7a n.1 chemical parameter at your choice among:	1) Ammonia, 2) Chlorides, 3) Nitrates (max water depth 5m)	
Working pressure	3bar or 35bar on demand	
Power and consumption	9...14Vdc (typ.12Vdc 30mA max)	
Communication	RS485 (option: RS232 converter) with proprietary protocol for Geoves datalogger or Modbus RS485-RTU protocol	
Standard Cable	30m freestanding vented cable (other lights on request)	
Housing material	PVC	
Dimensions	mod.: SMx: ø70mm x 510mm, Weight: 1,6kg mod.: mSMx: ø42mm x 500mm, Weight: 1,2kg	



Model	SLP Pressure transmitter level sensor (immersion sensor)
Range	0...10m (other range available on demand)
Transducer	piezoresistive
Typical accuracy	<0.5% f.s.
Output	4...20mA
Power	12...24Vdc



BIO-GAS SENSORS

Modello e Misura	Range	Resolution
SCO2-I Carbon dioxide (CO ₂)	0...2000 or 5000ppm	0,5% f.s.
SCH4-I Methane (CH ₄)	0...100% Vol.	0,5% f.s.
SNH3-I Ammonia (NH ₃)	0...100ppm	1ppm
SSO2-I Sulphur dioxide (SO ₂)	0...20ppm	0,2ppm
SH2S-I Sulphured hydrogen (H ₂ S)	0...100ppm	0,1ppm
SNO-I Nitrogen oxide (NO)	0...100 or 300ppm	0,5ppm
SNO2-I Nitrogen dioxide (NO ₂)	0...10ppm	0,05ppm
SO2-I Oxygen (O ₂)	0...25%	0,5% f.s.

Output signal 4...20mA

Power and consumption 12...24Vdc 30mA (average)

Note: To get a better measurement resolution, it is recommended to use specific analyzers or sensors (on request)



Fix, telescopic and tiltable poles	PF2-55	PF3-55	PF4-55	PRBF10-110
Models:				
Heights (m)	2	3	4	10 max
Raising	None (fix)	telescopic	Telescopic	Balanced tiltable
Diameters (mm)	Base: 55 Top: 55	Base: 55 Top: 50	Base: 55 Top: 45	Base: 170 Top: 70
Weight (kg) guy wires and accessories excluded	6kg	11kg	15kg	170kg
N. of guy wires	none	none	3	none
N. elements	1	1	3	2
Housing material	Galvanized steel			
Required workers for installation	1	1	1	1+truck with crane

*Other poles are available on request



APPLICATION EXAMPLES WITH MicroMET3D MONITORING STATIONS



PF3-55 - Pole h=3m with base for fixing on the plinth or concrete pavement



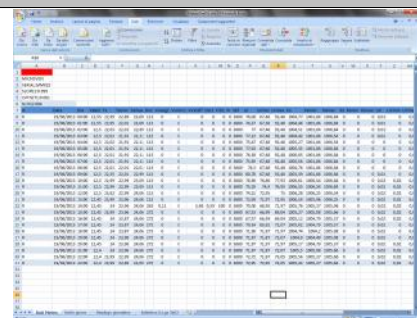
PF4-55 - Pole h=4m (or 5m) with base for fixing on the plinth or concrete pavement



PRBF10-110 – Tiltable balanced pole h=10m with mounting on plinth

SOFTWARE

Model



Geodesk & MeteoGraph

Geodesk is a basic 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, Micro3 and LPDL Geoves dataloggers

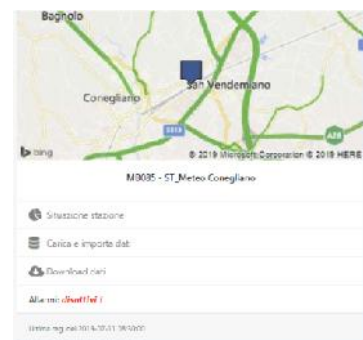


MeteoGraph is a web application for the numerical and graphic display of data transmitted via GPRS on FTP area from environmental monitoring stations with Geoves datalogger.

The software relies on an FTP Geoves area where data is sent autonomously by the control units at fixed times and are available in **standard text format** with fields separated by commas (**CSV format**).

The data is therefore **always usable without the need to use proprietary communication protocols or specific programs for data decoding**; furthermore, the software **does not 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.

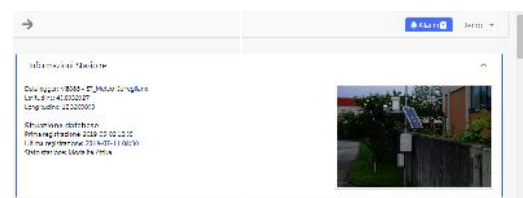
The data in text format are processed by MeteoGraph to obtain on the web page both the measurement in numeric format (eg average minimum maximum trend, etc.) and in graphic format that can be downloaded in jpg bitmap format.



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:
 - o Date and time of Start data storage
 - o Date and time Last data storage
 - o 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.)

Selezionare il periodo di osservazione

Intervallo dati

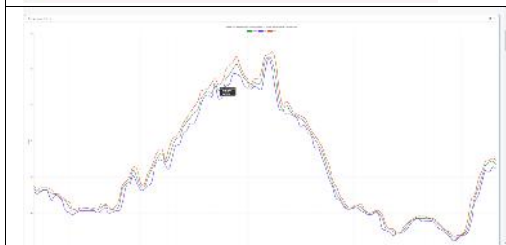
Da: 01/07/2019 00:00

A: 01/07/2019 22:59

Aggiorna

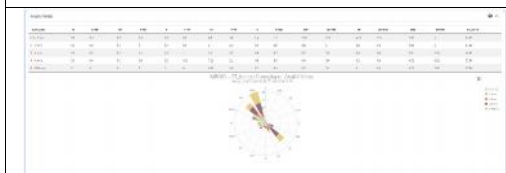
Observation period

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



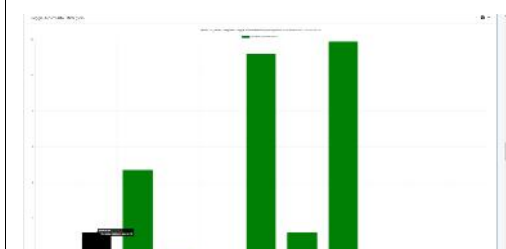
Graphic elaborations

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



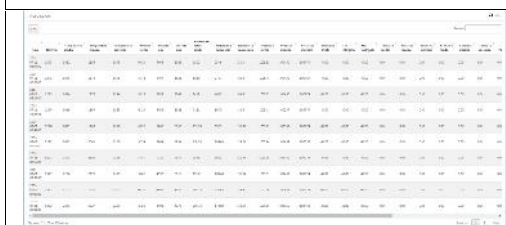
Graphic elaborations

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



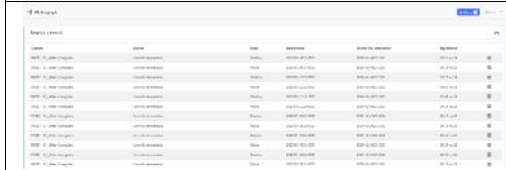
Graphic elaborations for precipitation

- 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



Alarm management

To manage alarms, the software allows you to set upward (> value) or downward (<value) intervention thresholds, after which alert emails are sent to the personnel in charge.

The alarms are then represented on the screen with adequate effects and colors to attract the attention of the operator