



MICROMET3-SMP – HYDROLOGICAL STATIONS FOR WATER QUALITY MONITORING

(Rev.0 050221)

The stations of the **MicroMet** series have been designed to monitor the quality of the water and the main environmental parameters in compliance with European law for environmental regulations and with Italian norms for the landfill management.

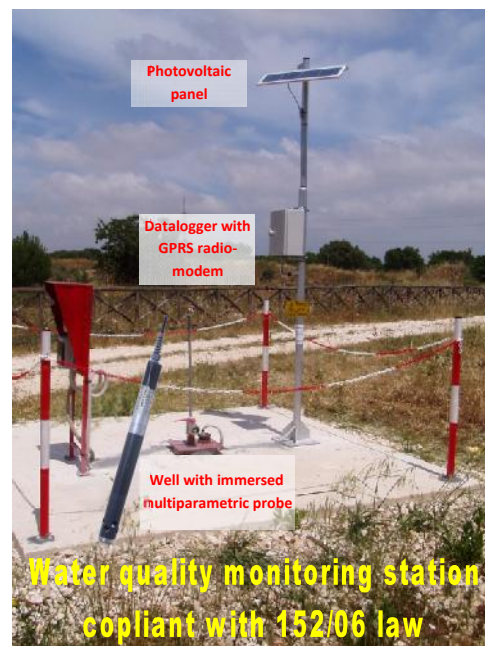
The stations use all Geoves professional instruments that can be calibrated in external laboratories (eg **Accredia**). MicroMet-SMP monitoring stations can be configured as follows:

1. **Configuration 1) Hydrological and environmental:** continuous monitoring (**fixed station**) of the macro descriptive parameters of water quality with 1 multiparametric probe for measuring pH, temperature, conductivity, redox potential, dissolved oxygen (polarographic or optical) , hydrometric level and turbidity (or a chemical parameter chosen from chlorides, nitrates and ammonium); other meteorological measurements or polluting gases in the air can also be acquired
2. **Configuration 2) Multipoint hydrological:** continuous monitoring of macro descriptive parameters of water quality on max 3 measurement points with 3 multiparametric probes configured as in point 1
3. **Configuration 3) Portable hydrological:** portable monitoring of macro descriptive parameters of water quality with 1 multiparametric probe configured as in point 1

The data logger, which forms the core of the monitoring station, is able to view, acquire, store and transmit data remotely. The data transmitted remotely is in CSV text format and therefore compatible with Notepad, Excel, Access and any external software application. If the data is sent to the Geoves FTP area, the data can be processed and displayed with the MeteoGraph web software available without the need to install any proprietary software. MeteoGraph is available on PC (using an internet browser, eg. Chrome), on Android tablet or smartphone by downloading a free App.

Advantages

- ✓ **Low consumption** and possibility of powering from a solar panel
- ✓ **No proprietary communication protocol**
- ✓ Data in **standard text format (CSV format)** compatible with Excel, database and with the most common software available on the market.
- ✓ **No connection charges** (with GPRS wireless transmission and power supply from photovoltaic panel)
- ✓ **Reliability over time** and **minimum maintenance required**
- ✓ **High measurement accuracy and resolution**
- ✓ **Completely Italian technology**



Deep water monitoring station in a waste dump



Water monitoring station on a sea buoy

General technical data common to configurations 1) and 2) for FIX STATIONS

DATALOGGER	LPDL – Low power dataloggers
Power	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 mains 220Vac/12Vdc power supplier
Data transmission	<u>Wireless</u> : GSM/GPRS via FTP (via e-mail on request) <u>Wired</u> : RS232, RS485, LAN 10/100Mbit with free software Geodesk for data download
Alarm transmission	via e-mail by using MeteoGraph web software (GPRS transmission)
Setup	Locally: by using Geodesk software
Configurable parameters	<ul style="list-style-type: none"> Date and hour with NTP synchronization (network time protocol) Anemometer and rain gauge constants Storage rate (5-10-15-30-60' at your choice) Transmission rate (5-10-15-30-60' at your choice)
Storage	on 2GB SD Card with circular data management (500 days)
Working temperature	-30...+70°C
IP65 enclosure (basic model)	Plastic key enclosure Dim.: (Lxhxd) Box1: 250x350x160mm, crossarms for fastening on poles (ø50...150mm) or on walls.



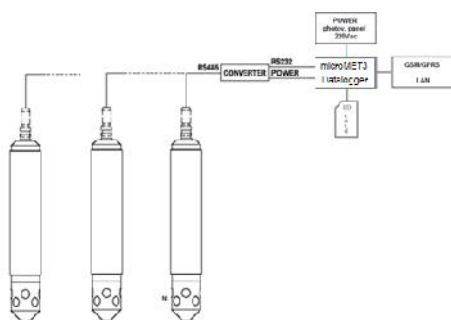
Configuration 1) for ENVIRONMENTAL and WATER QUALITY monitoring

Configuration name	MicroMET3
I/O channels	8 analog inputs (+ 8 optionals on Expa8 interface) for meteorological sensors such as pyranometers, hydrometers, thermometers, barometers or chemical sensors 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 voltage 1 serial input for smart sensors connection (n.1 multiparametric probe mod. SMx for water analysis)
Data elaborations	Min, max (gust), arithmetic average, standard deviation, turbulence; trigonometric average; sum; diagnostic measure for battery voltage.
Average autonomy of a station with 1 probe	<ul style="list-style-type: none"> >10days: with 12Vdc/12Ah battery, 20W photovoltaic panel, storage: 5' transmission: 60' >14days: with 12Vdc/18Ah battery, 30W photovoltaic panel, storage: 5' transmission: 60'



Configuration 2) for WATER QUALITY monitoring up to 3 multiparametric probes

Configuration name	LPDL-3SMP7
I/O channels	1 diagnostic input for battery voltage 1 serial input for the connection of max 3 multiparametric probes mod. SMx for water analysis
Data elaborations	arithmetic average, sum, diagnostic measure for battery voltage
Average autonomy of a station with 3 probes	<ul style="list-style-type: none"> >8days: with 12Vdc/12Ah battery, 20W photov. panel, storage: 5' transmission: 60' >12days: with 12Vdc/18Ah battery, 30W photov. panel, storage: 5' transmission: 60'
Typical applications	Dam monitoring, dumps, quality of groundwater and surface water

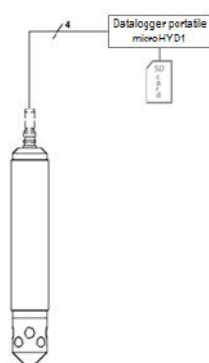


FIX water monitoring station

Technical data of configuration 3) for PORTABLE STATIONS

The **MicroHyd1** Geoves portable data logger is powered by internal rechargeable batteries, has a LCD display and a data storage SD Card. The probe is connected to the data logger using its supplied cable from which it receives power through the internal batteries. MicroHYD1 allows the visualization of the data on the display in real time and the automatic storage or on command on a 2GB SD Card. The data is in text format traceable to a CSV file and therefore compatible with the most popular spreadsheets (eg Excel) and databases.

DATALOGGER	MicroHYD1 – data acquisition handheld datalogger
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 for instantaneous data Remaining % battery power indication Setting of date and time
Power	4 rechargeable batteries, type AA.R6, Ni-MH, 1.2Volt/2850mA Provided accessories: Batteries charger with 220Vac 50Hz or cigarette lighter adapter
Batteries Autonomy	About 12h @ 5 minutes maximum storage rate
Storage	500 days data backup on a 2GB removable SD Card
Working temperature	-30...+70°C
HMI	4 rows display and 4 multi-function buttons
Housing	Plastic Dim.(LxHxD): 100x170x50mm, with IP68 connector



PORTABLE Water monitoring station



Shockproof case for housing the probe and the handheld data logger

MULTIPARAMETRIC PROBES			SMx-485 and mSMx-485
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% (0...30ppm OT vers.)	±0,1 ppm, mg/l	
<u>Options</u>			
7a Turbidity :	0...4.000 NTU	± 5% v.m.	
or			
7b 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 (available option only with SMPx models)		
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		



Correlation between measured parameters with multiparameter probes

Based on the essential knowledge of electrochemistry, it is possible to establish correlations between some of the parameters of water quality instrumentally measured and the type of macro-pollution in progress or recent progression in the sample, or to have some indication of the operating conditions of some Sensors in use.

A practical example is the use of multiparameter probes in groundwater, to monitor and monitor over time the temperature parameters, specific electrical conductivity, pH, Redox potential and dissolved oxygen, as well as naturally at the Feather Level itself.

By examining the data provided by a probe immersed around 2-3 meters in depth, the most correlated indicators are as follows:

- pH and Conductivity: a deviation from normal pH values to both acid and alkaline pH, accompanied by an evident increase in Conductivity, may be indicative of inorganic pollution (swelling of acidic or alkaline concentrations in the ground). If the above addition also adds a variation of Redox potential from the usual values you may have further clues, as we shall see below
- Redox and Dissolved Oxygen Potential: If the mV value tends to drop to zero or even in the negative range accompanied by a decrease in dissolved oxygen values, organic pollution (percolated, concentrated liquids, etc.) may have occurred. Often, in these cases, Conductivity also undergoes an increase.
- redox and dissolved oxygen potential: if the mV value tends to rise and exceed 500-600 mV accompanied by a decrease in dissolved oxygen values, an inorganic chromium hexavalent pollution may occur (a fairly rare event) Dissolved oxygen remains stable or slightly increases the pollutant could be a strong inorganic oxidant (hypochlorite, persulphates, etc.). In this case, Conductivity is also an important accessory correlator.
- Dissolved Temperature and Oxygen: If the temperature normally rises, the amount of dissolved oxygen decreases. If this value drops considerably, it may be possible to grow micro-algae on the membrane of the sensor favored by the elevation of the current temperature: these micro-organisms "consume" the oxygen present near the sensor and not Allow it to function properly. An inspection with consequent maintenance can confirm or not the phenomenon.
- pH and Redox: Equal to the Redox equilibrium in solution, a decrease in pH rises to mV while a pH increase decreases the potential. This relationship is due to the primary sensitivity of the Platinum to Hydrogen ions in solution.
- pH and Redox: unstable or variable values in the short term (30 " - 60") may indicate the presence of organic matter on the sensors themselves, as well as fat or oil. The phenomenon is more visible on the pH as between the two is the highest electrical impedance sensor.

POLES		
Models	PF2-40	PF3-55
Heights (m)	2	3
Raising	fix	telescopic
Diameters (mm)	40	Base: 55 Top: 50
Weight (kg) guy wires and accessories excluded	6kg	11kg
Heights (m)	On the soil without civil works or plinth or wall	On the plinth or wall
N. elements	1	2
Materials	Galvanized steel	
Required workers for installation	1	1

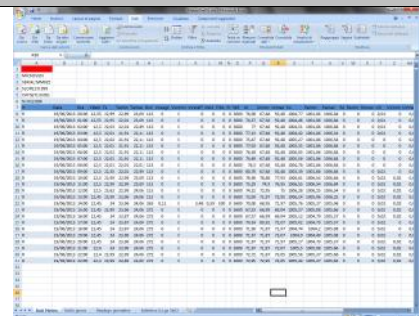


FIX Water monitoring stations with 2 and 3m poles

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.

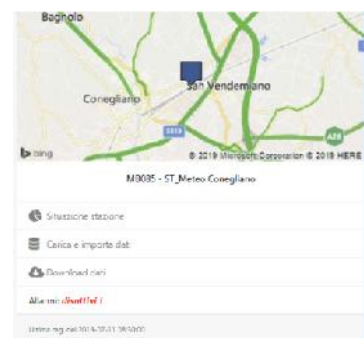
Besides Geodesk creates the setup configuration for the functioning of Butterfly, Micro3 and LPDL Geoves dataloggers



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.

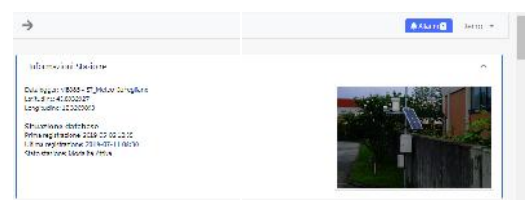
The data in text format are processed by MeteoGraph to obtain on the web page both the measurement in numeric format (eg average minimum maximum trend, etc.) and in graphic format that can be downloaded in jpg bitmap format.



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)



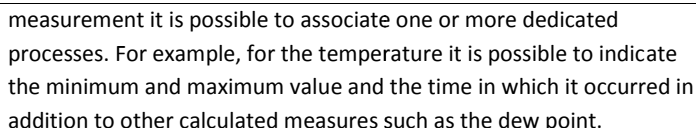
Station situation - Station information

The parameters displayed are:

- Station unique identifier (ID)
- Name of the station
- Geographic coordinates (Latitude and Longitude)
- Data base status:
 - 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



- 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



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



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



-) 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

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