SMx-485 – Multiparametric probe for water analysis (Rev.6 260324)

Description

The SMx-485 multiparametric probes measures the following chemical-phisical water parameters:

- ✓ Conductivity
- ✓ Water Temperature
- ✓ Water Depth (differential pressure sensor and vented cable for the atmospheric pressure compensation)
- ✓ pH
- ✓ ORP (Oxidation Reduction Potential or Redox)
- ✓ Dissolved Oxygen (standard: polarographic cell)

Furthermore the following **options** are available:

- ✓ Dissolved Oxygen with optic probe (as an alternative to the standard polarographic cell). In particular this solution is suitable for turbid and sea waters
- ✓ N.1 auxiliary measure at your choice between the turbidity and the chlorides

In the standard model the probe diameter is **ø70mm** for using in wells ≥3"; in the "micro" version mod. **mSM** the diameter is just **ø44.5mm** suitable for wells from ø2": in this version it's possible mount up to the following 5 measures: Conductivity, Temperature, Depth and pH (option: ORP electrode).
Both models are made to work with external supply and are particularly suitable to be added in monitoring systems and networks to survey the water quality.
The multiparametric probes can be connected as follows:

- By RS485 serial port with proprietary protocol to connecting to the Geoves' dataloggers
- By RS485 serial port with Modbus standard protocol to connecting to the several models of industrial PLC or data acquisition systems

mSM probe

The probe also has the following features:

- Fast-plug electrodes
- Electrods protection cap
- self-supporting cable with stainless steel hook and barometric compensation tube for hydrometric level measurement

Advantages

- ✓ Excellent quality / price ratio
- ✓ Good measure resolution
- ✓ Excellent robustness
- ✓ Certificability ISO

Main applications

- ✓ Continuous hydrological analyzes and laptops
- ✓ Marine monitoring (buoys, platforms, portable measurements)
- ✓ Measurements in aquifers (natural wells, piezometers, etc ...)
- ✓ Surface water monitoring (rivers, lakes, watercourses, dams, etc.)
- ✓ Landfills
- ✓ Civil and industrial cleaners

Particular of the multiparametric probe with 7

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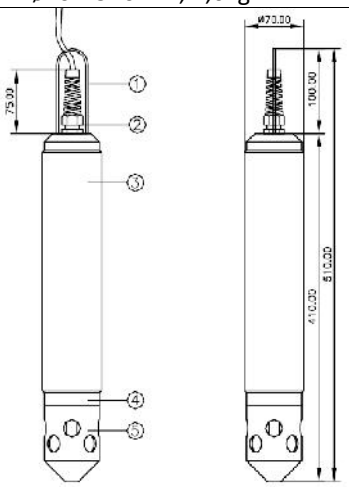
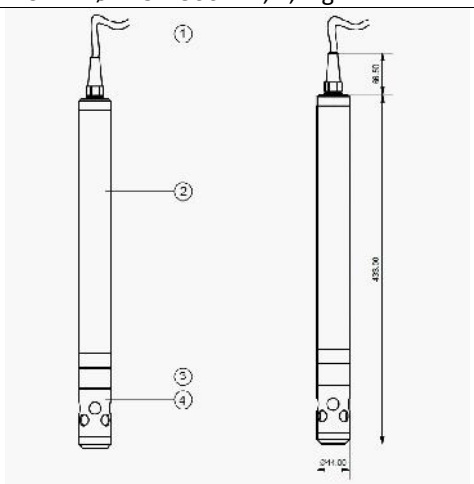
Technical Data

Model	SMx-485 Multiparametric Probe		
Detectable Measures	**Standard range**	**Accuracy**	**Resolution**
1. Temperature:	-5…+55 °C	±0,25 °C	0,005 °C
2. ORP (Redox):	± 1.000,0 mV	±30 mV	0,1 mV
3. pH:	-2…16 pH	±0,25 pH	0,002 pH
4. Conductivity:	0…6.000 µS autorange (o 0…60.000 µS)	±0,25% v.m.	0.6 µS (or 6µS)
5. Depth:	0…20m; (0…350m vers.-P)	±0,02 m	0,002 m
6. Dissolved Oxygen:	0…20ppm, mg/l or 0…200% (0…30ppm OT version)	±0,1 ppm, mg/l	0,001 ppm, mg/l
Options			
7 Turbidity :	0…4.000 NTU	± 5% v.m.	0,1NTU
or			
7a Chlorides	Measurement in raw units (to be calculated separately using Nernst formula), maximum water column head 5m. The sensor is used as a 'watch-dog' to monitor any exceedances as the best expected accuracy (with frequent calibrations) is ±15%.		
Working pressure	3bar with Depth, Temperature, Conductivity, pH, ORP, Dissolved Oxygen 35bar on demand		
Power and consumption	9...14Vdc (typ.12Vdc) 30mA max		
Communication	RS485 (option: RS232 converter) with protocol for Geoves dataloggers or Modbus-RTU protocol		
Standard Cable	30m freestanding vented cable (other lengths on request)		
Housing material	PVC		
Dimensions and weight	**SMx**: ø70 x 510mm; 1,6kg	**mSMx**: ø44.5 x 500mm; 1,2kg	

Legend

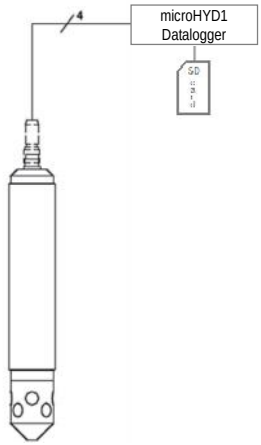
1. Safety hook
2. Strain
3. Body of probe
4. Sensors camera
5. Sensors protection cap



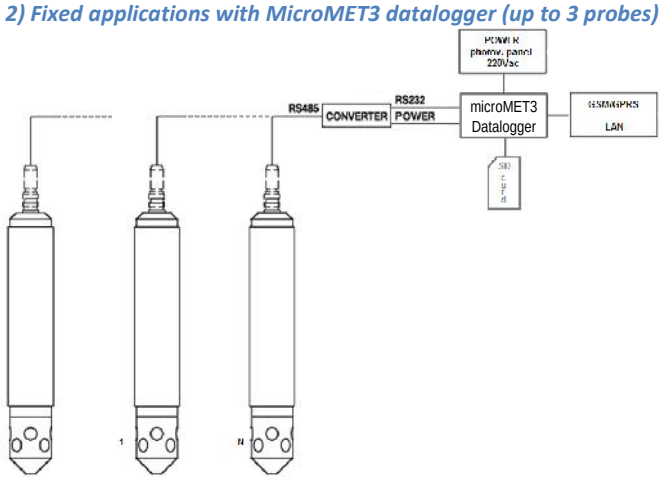


Electrical connection

1) Portable applications (Connection to the MicroHYD1 datalogger)



2) Fixed applications with MicroMET3 datalogger (up to 3 probes)



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PORTABLE applications	*FIXED applications*
The probe can be connected to the MicroHYD1 Geoves portable data logger via the cable supplied with the probe. The probe power is supplied by the internal datalogger batteries. MicroHYD1 allows display of real-time data and automatic or command storage on a 2GB SD Card. The data is in text format that can be traced back to a CSV file that is compatible with most popular spreadsheets (eg Excel) and databases.	The probe can be connected to a MicroMET3 Geoves Datalogger via an RS485 / RS232 serial converter. The power supply is supplied by the data logger, which in turn can be powered by 220Vac or solar panel, 12Vdc buffer battery and charge controller. Acquired data is backed up to SD card and transmitted via GPRS or LAN cable. The probe can optionally be provided with MODBUS standard communication protocol.
 **MicroHyd1 portable Datalogger**, powered by rechargeable internal batteries, display and SD Card for data storage	 **MicroMet3 Fix Datalogger** with GSM/GPRS and multiparametric 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 for instantaneous data Remaining % battery power indication Setting of date and time	Data Storage with programmable rate: 5-10-15-30-60 minutes Storage of elaborated measurements (average, min, max, ecc…) Display for instantaneous data Data transmission wired (LAN) or wireless (GPRS via FTP) Automatic wizard to get the best tracking of the GPRS antenna Setting of date and time
Power: 4 rechargeable batteries, type AA.R6, Ni-MH, 1.2Volt/2850mA Batteries charger with 220Vac 50Hz or cigarette lighter adapter	By photovoltaic panel or by mains 220Vac (at your choice) with 12Vdc rechargeable battery (amperage in base of the application) and recharger
Batteries Autonomy: About 12h @ 5 minutes maximum storage rate	Depending on the numbers of data sampling, storage and transmissions and on the battery dimensioning
Storage: On a 2GB removable SD Card	On a 2GB removable SD Card
HMI: 4 rows display and 4 multi-function buttons	2 rows display and 3 multi-function buttons

Installation in base of the application

Application	Depth of installation	Operations to do
Groundwater (bogs, wells)	Known depth (e.g. 2m depth from surface water) detected by portable water level meter or Geoves' datalogger	Do not bend the cable with a radius of curvature less than 5 cm in order not to break the internal barometric compensation tube. The upper end of the atmospheric pressure compensation tube must be kept in a dry environment to avoid condensation of the air humidity in the cold zone normally at the lower end inside the probe. Use desiccants or equivalent devices appropriately housed near the tube. OPERATIONS BEFORE THE MEASURES • Before performing the measurement operations, you must: • Remove the plastic cap at the probe end and keep it in place for long periods of storage • Unscrew the perforated terminal • Remove retaining caps from reference electrodes, pH, redox and dissolved oxygen. • Store the caps for reuse when the probe is stored. • Replace the hollow tube • Immerse the probe for at least 30 minutes in a tap water container if the
Surface waters (rivers, streams, lakes, etc ...)	Depth based on the quench point of the calm/protective tube where the probe is housed. The level must be	

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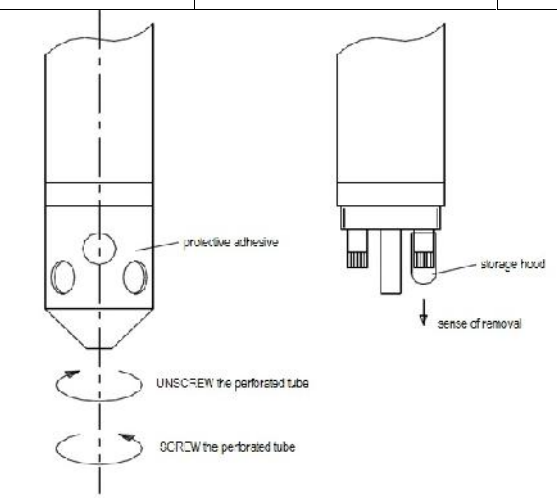
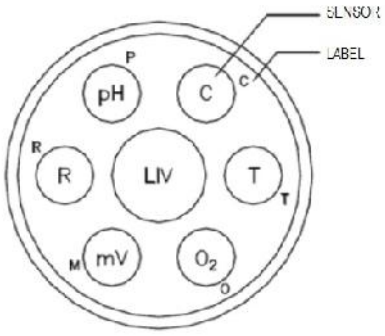
	measured by the Geoves datalogger, then calibrated and aligned with reference to the hydrometric zero of the site	sensor retaining caps are dry. • Dip the probe into the liquid to be measured for at least 5 minutes to bring it to the current liquid temperature conditions. • Turn on the probe for at least 5 minutes to polarize the dissolved oxygen cell. • Verify that the factory selection for the operation parameters of the measurements corresponds to the type of use desired.





SENSOR SIDE VIEW

ABER.	SENSOR	SYMBOL
LIV	level	
pH	p	P
R	reference	R
mV	ORP	M
O_2	diss. oxygen	O
T	temperature	T
C	conductivity	C

Example of installation in piezometric well for groundwater monitoring

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.

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- 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.

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