

WATER LEVEL MEASUREMENTS

Water level measurements form the basis of hydrologic soil examination (porosity of the soil, determination of the current direction of the groundwater, etc.).

Several systems are available for measuring and registering water levels in boreholes, casing tubes, monitoring well pipes, water wells, open water, tanks, etc. The sounding apparatus, with acoustic and light signal, are used to determine liquid levels in boreholes, monitoring well pipes, etc. The measurements are performed and read-out manually. When mechanical recorders are used, the water level changes are registered by means of a writing mechanism.

The electronic water level meters usually measure the water level with a pressure transducer. The data are recorded by means of a datalogger. With a floating layer thickness meter, we can distinguish between the level of conductive and non-conductive liquids.

11.03 Sounding devices with acoustic and light signal

The devices are provided with a probe, which is connected to a measuring tape with centimeter graduation.

When the probe touches a conductive liquid, a clear acoustic and light signal is produced. If the cable is then lifted a little, the signal will stop. Determination of this point allows the user to read the depth directly from the measuring tape (accuracy: ± 0.5 cm).

The measuring tapes are available in several lengths, on a reel, with or without a frame.

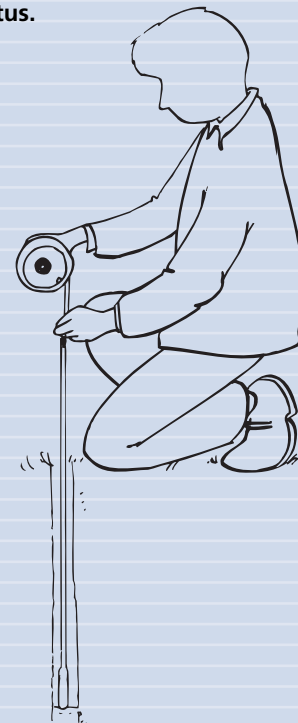
Advantages

- An inexpensive and simple, but reliable instrument.
- Solid construction of cold-resistant synthetic material.
- Small diameter of the probe allows application in virtually any monitoring well pipe.

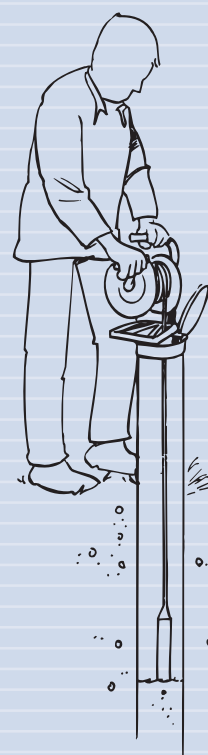


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Measuring the water level with the aid of the hand-operated sounding apparatus.



Measuring the water level with the sounding apparatus, provided with a frame, in deeper monitoring wells.



Sounding apparatus with acoustic and light signal

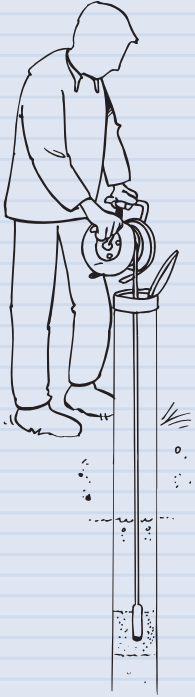


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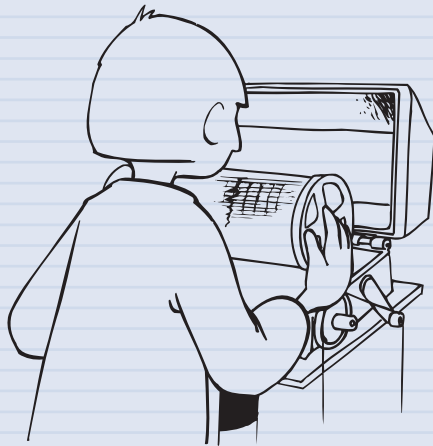


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The floating layer thickness meter is used to determine position and thickness of a floating layer.



Changing the paper in the mechanical water level recorder.



11.01 Sounding devices with measuring tape

A sounding device is really just a small tube, closed on one side, with a diameter of 17 mm. When the open bottom touches the liquid level at a fair speed, a “plopping” sound can be heard. In normal conditions the sound is clearly audible until a depth of 5 meters. When it has reached its depth, the device is moved up and down over short distances for a more accurate level determination. Its accuracy is ± 0.5 cm. The measuring tapes are designed for use with the sounding device, allowing the reading at ground level to be consistent with the actual depth of the groundwater. The measuring tapes are available in various lengths.

11.08 Floating layer thickness meter with acoustic and light signal

The probe of the floating layer thickness meter distinguishes between conductive and non-conductive liquids. A light signal indicates which liquid is at that moment touching the probe. The floating

layer thickness meter can be used to determine the (ground-)water level, the oil level, and the thickness of the floating layer. The meter is available with cable length of 30 meter.

11.05 Mechanical float operated water level recorder

The mechanical float operated water level recorder is a self-registrating water level meter. This meter is applied particularly in continuous registration of water stages in rivers, lakes, or tanks (possibly in monitoring well pipes with a diameter larger than 90 mm). The meter is accommodated in solid, weather-resistant housing. Float wheels are available for various water fluctuations.

Advantages

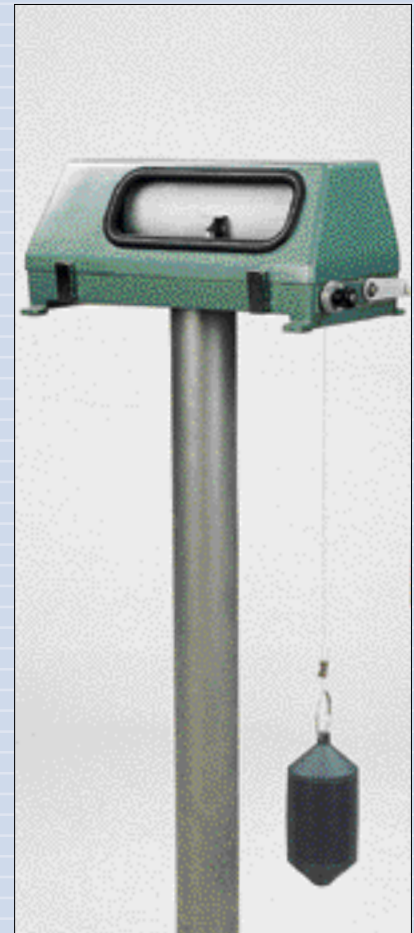
- Quick and easy assembly.
- Weather-resistant.
- No electricity needed.
- Allows continuous measurements at various water fluctuations.



Measuring tapes with sounding device

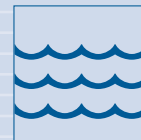


Floating layer thickness meter



Mechanical water level recorder

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11.11 Diver

The **Diver** is the smallest instrument in the world for automatic measurement and registration of groundwater levels and temperatures. The instrument fits in the palm of your hand and is remarkably light. With its length of only 125 mm and a diameter of 22 mm the Diver can be used in virtually any monitoring well.

The pressure sensor, temperature sensor, as well as the datalogger and battery are contained within a hermetically sealed stainless steel housing. This ensures that the Diver is less sensitive to moisture or external electrical influences (Faraday cage). The Diver can be installed in the monitoring well simply suspended from a steel wire. Once installed, no part of the monitoring system is left protruding above ground level, greatly reducing the risk of vandalism. The Diver can now automatically measure the groundwater level and temperature and register these data in the internal memory (capacity 2 x 24.000 measurements). This means that you can execute and store a measurement

every ten minutes over a six-month period before the memory is full. The built-in battery has a life of approximately 10 years.

Do you wish to measure several times per hour, once a day, or use the special pump test options? Anything is possible. Program the Diver in accordance with your wishes and you will receive the information exactly as you wish it. Programming and reading the data is a simple matter with the use of a read-out unit and a PC (laptop or field computer).

The Diver measures the groundwater level with an accurate pressure sensor. The weight of the water column above the instrument is a determining factor. However, the variations in atmospheric pressure also influence the measurements. To chart these atmospheric pressure variations for each measuring area the **Baro-Diver** is used. Compensation for these atmospheric pressure variations is carried out simply and easily with the use of the EnviroMon software.

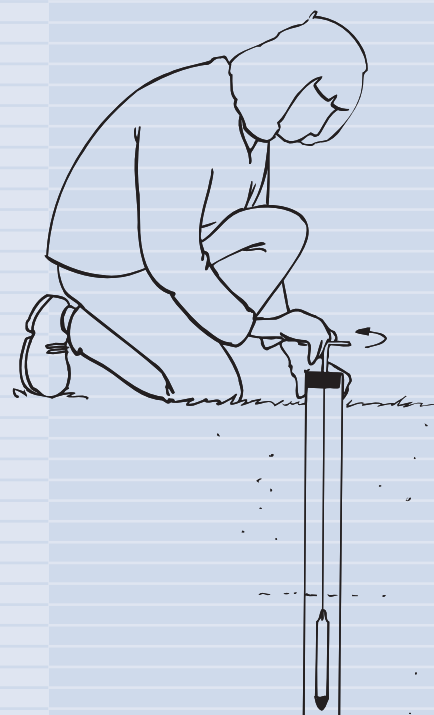
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Before installation all Divers for a project are programmed at the office with a PC.



Diver

After installing the Diver the monitoring well is closed completely (no equipment outside the well).





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In addition to measuring groundwater levels and temperature the **CTD-Diver** is also used to measure the conductivity of the groundwater. The CTD-Diver has a memory capacity of 3x16.000 measurements.

In addition to measuring level and temperature the **OTD-Diver** is able to take continuous measurements of oxygen concentrations in the surface and/or groundwater and to record these measurements.

Programming the Diver, either in the field or in the office, is a matter of just a few seconds. Simply enter the location, (future) starting time and measuring frequency and select either a fixed measuring frequency, a fixed set-up or an event-related frequency. In the case of the last 2 choices, the pumping tests will provide a very detailed picture of the groundwater flow. The readout data can be stored in your computer or, with the use of the EnviroMon software program, can be exported straight to a spreadsheet or other program.

11.20 Staff gauge

The "classical" staff gauge is used to read the water level in water courses.

11.21 Digital level marker

The digital level marker is used for water level measurements in surface water especially. The level marker registers the water levels over a particular period at intervals pre-determined by the user. The result of this is more constant water level measurements

The digital level marker is available in 3 versions which differ in the manner in which the data can be read.

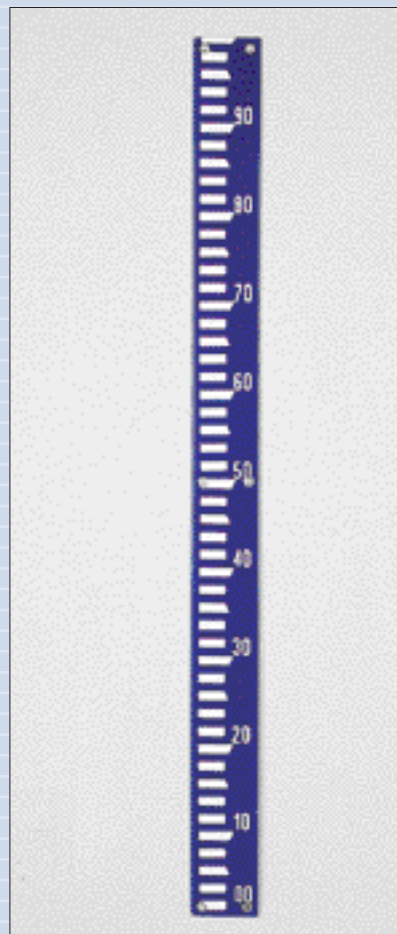
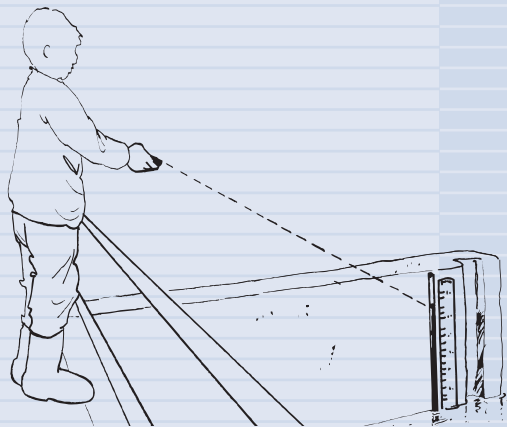
1. A signal of 4-20 mA
2. With an infrared connection with a laptop.
3. Using GSM to a databank on the Internet.

With the use of an **SMS modem** it is possible to program and read the Divers, the digital level marker and other intelligent sensors from a distance.

Programming and reading the data is a simple matter with the use of a read-out unit and a PC (laptop or field computer).



The digital level marker is read with the aid of the infrared read-out unit.



Staff gauge



Digital level marker