

# Hydrogeological Logging with 6CH Probe

- Natural Gamma
- Flowmeter
- Temperature
- Conductivity

Geophysical measurements in boreholes are used to determine geological and hydrogeological properties. While the probe is travelling through the borehole, measuring data on natural gamma of the rock formation, temperature, conductivity and flow rate of the fluid is continuously transmitted to a field computer where it is recorded.

## Natural Gamma

The natural gamma log measures the natural radioactivity (gamma emissions) of the rocks. For example, shale usually emits more gamma radiation than limestone, sandstone or dolomite. Therefore, this log is used to define the lithological formation or for correlation with other borehole data.

Measurement can be performed in an open or cased borehole.

## Flowmeter

Measurements are performed by means of an impeller (microreel) in the immersed part of the borehole. They provide data on the vertical flow direction as well as the flowrate. Usually, measurements are done in 2 stages:

- a stationary measurement
- a measurement during a pumping test.

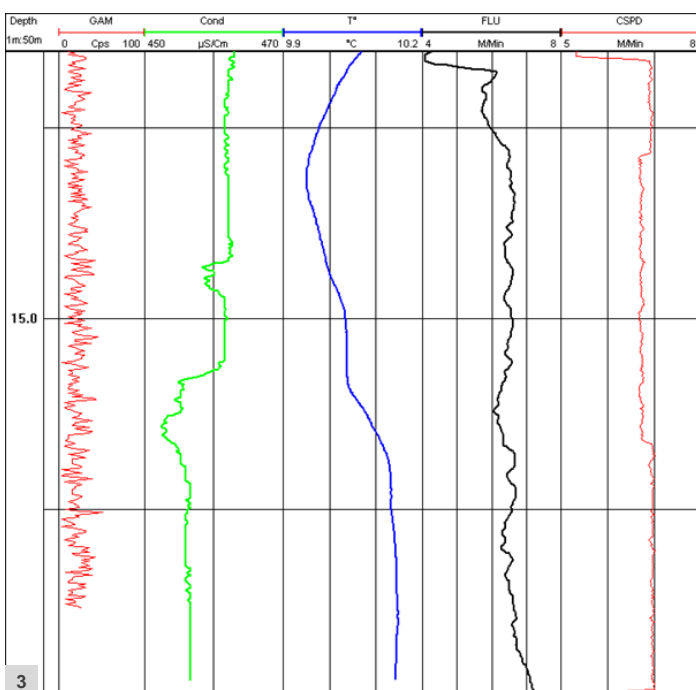
The analysis of those two measurements provides data on the permeability (K value) of the saturated zones.

## Temperature

The vertical variation of the water temperature in a borehole is used to define water migration or to localise a thermal anomaly.

## Conductivity

The water conductivity in a borehole shows the concentration of soluble ions. Therefore, a water with a high degree of mineralisation also has a high conductivity. If changes of the conductivity are observed, this is an indication for water infiltration.



- 1) Winch and microreel
- 2) 6CH probe
- 3) Example of data measured with a 6CH probe

## Technical Data

Diameter	60 mm
Length	122 cm
Weight	5.5 kg
Max. temperature	70° C
Max. pressure	200 bar
Cable length on the winch	Max. 530 m
<b>Natural Gamma</b>	
Measuring principle	A scintillator of sodium iodide measures the counting rate of the natural gamma radiation and transforms these into electrical impulses.
Unit	CPS (counts per second)
<b>Flowmeter</b>	
Measuring principle	An impeller is driven by the vertical waterflows in a borehole. A magnetic sensor measures speed and direction of rotation.
Resolution	0.001 m/min
Measuring range	0 to 65 m/min
<b>Temperature</b>	
Measuring principle	Water temperature is measured by a sensor PT100
Resolution	0.001 °C
Precision	+/- 0.5 °C
Measuring range	0 to 65°C
<b>Conductivity</b>	
Measuring principle	The water conductivity is determined by measuring the alternating current in the water by means of 4 golden electrodes.
Resolution	1µS
Precision	+/- 2,5 %
Measuring range	50 to 3'000 µS