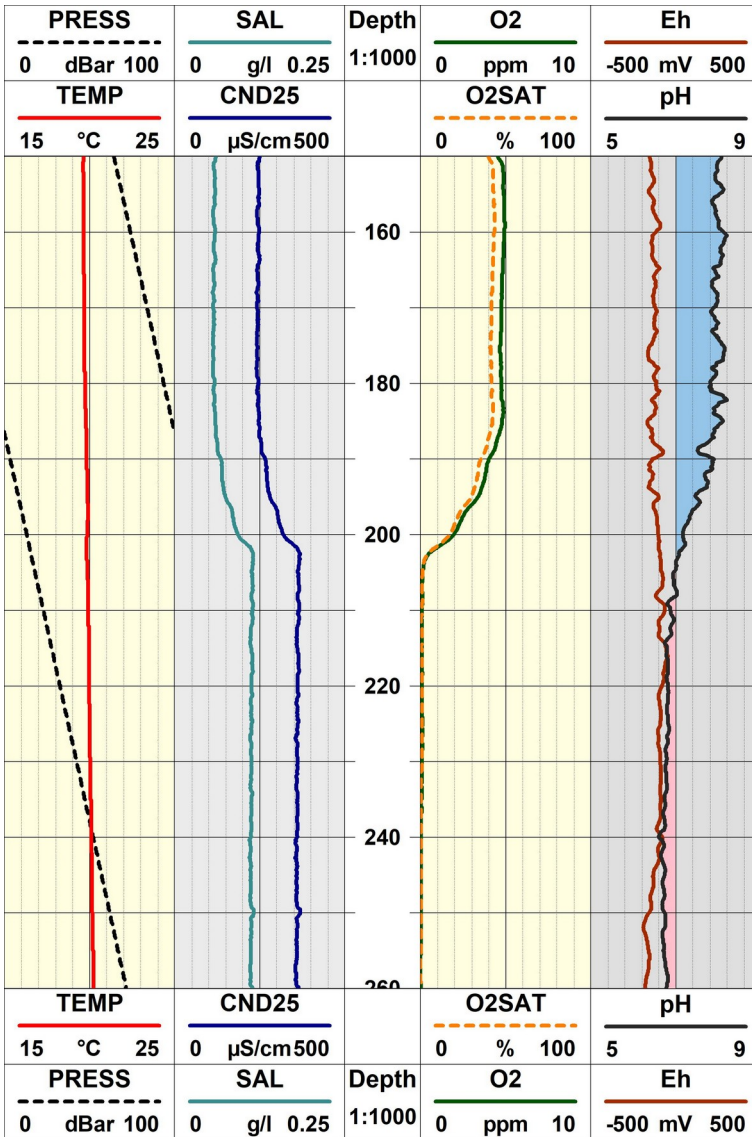




BOREHOLE LOGGING PROBE CASE STUDY WATER QUALITY PROBE WQP48



The multi-parameter **WQP48** water quality probe was used to record the example log shown opposite during the geological reconnaissance campaign for the new Lyon – Turin high-speed rail link currently under construction in the Franco-Italian Alps.

At the borehole location, trains will run in a tunnel situated several hundred metres below the local ground surface. For reasons related to optimising construction methods and materials, the geophysical logging programme for the series of reconnaissance boreholes of which this was one, included measurements of groundwater properties and flow volumes.

This log shows a significant change in fluid properties over the interval between 185 and 205 m.

Below 205m, the fluid column contained stagnant, slightly acid water with essentially zero dissolved oxygen content. Dating later showed that this water had resided for a considerable time period in the geological formations.

The upper section of the hole was filled with “recent” water having a significant dissolved oxygen content, lower electrical conductivity and a pH of approximately 8. This water was infiltrating down from the surface into the massif via a network of permeable faults and fractures.



The photo to the left shows a typical borehole location in the Maurienne valley study area.

The WQP48’s sensor array is protected by a stainless steel cage as shown on the photo to the right. The rapid reaction times of the sensors allows logging to be carried out at typical speeds of 5 to 8 metres per minute.



WATER QUALITY PROBE WQP48



The **WQP48** probe provides precise readings of the principal fluid parameters of interest in a hydrogeological or environmental context (see list below).

A calibration interface cable, standard solutions and maintenance kit are provided with the probe to ensure performance remains within specifications. The probe calibration routines can be accessed without removing the pressure housing.

Several optional sensors are available, one of which can be factory-installed on the probe if required. These sensors are, however, limited to fresh water operation at pressures not exceeding 100 bar.

Centralisers are recommended so as to avoid that the sensor cage comes into contact with the borehole wall.

Specifications

- Diam. (sensor cage / tool body): 48 mm / 42 mm
- Length: 1 670 mm
- Weight: 7.5 kg
- Max. operating temperature: 70°C
- Max. operating pressure: 150 bar

Data / sensor parameters

- Pressure range / resolution: 1500 dbar / 0.03 dbar
- Temperature range / resolution: -1 to 50°C / 0.001°C
- Conductivity range / resolution: 0 to 70 mS/cm / 0.001 mS/cm
- Dissolved O₂ range / resolution: 0 to 50 ppm / 0.01 ppm
- pH range / resolution: 0 to 14 pH / 0.001 pH
- Redox pot, range/resolution: ± 1000 mV / 0.1 mV

Accessories / options

- Additional sensors available: Nitrate, Ammonia, Chloride Sulphide, Iodide, Copper
- Bowspring centralisers

Borehole conditions

- Fluid-filled borehole
- Open or cased borehole