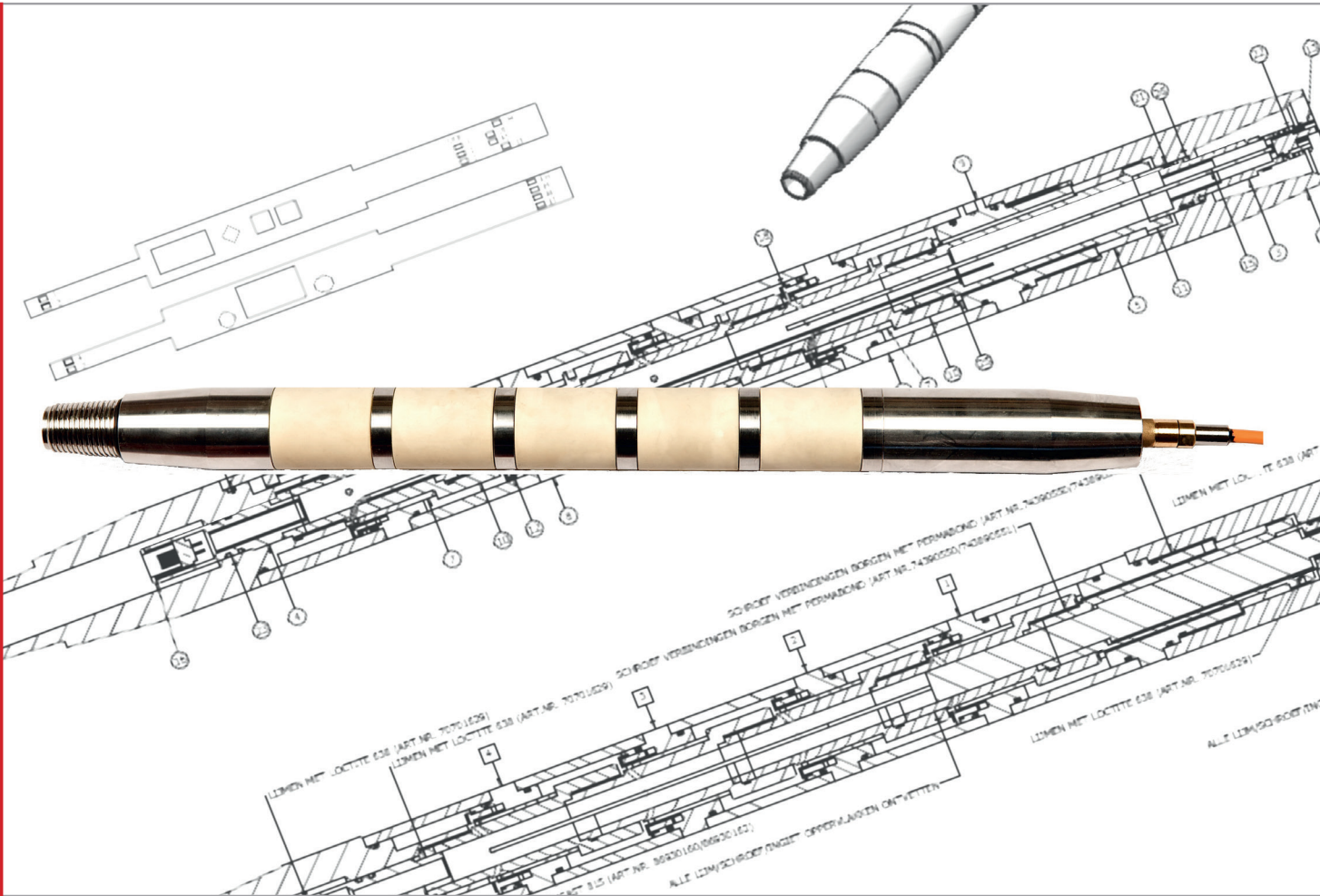




**a.p. van den berg**  
*The CPT factory*

# Icone Conductivity Module

easy access to additional data with a click-on module



## features

- modular plug & play extension to the standard Icone system
- detection of sand/clay layers, saltwater-carrying layers & contamination
- four-electrode array for more accurate measurements
- built-in temperature sensor
- suitable for 5, 10 and 15 cm<sup>2</sup> Icones
- automatically recognized by Ifield software

creating tools that move your business

# Icône Conductivity Module, easy access to additional data with a click-on module

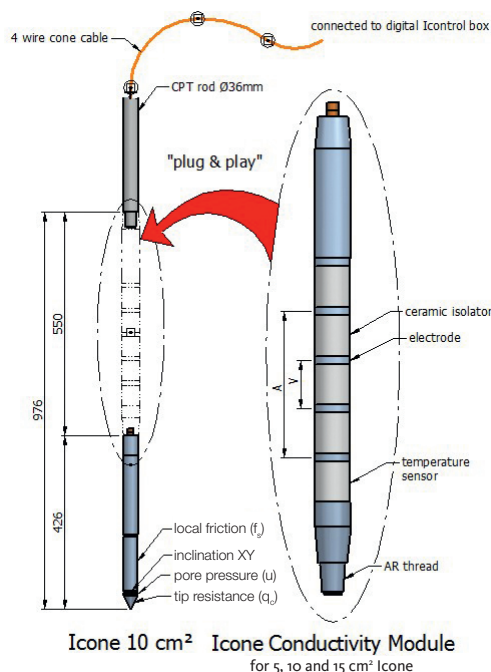
## introduction

What if you have to acquire the in-situ soil properties like porosity and density as well as the dynamic properties like electrical conductivity and stress? In general these parameters require separate systems (CPT and conductivity) and additional tests. Apart from being time consuming, this process may also negatively affect the accuracy of the information obtained. Our digital data acquisition system with the Icône and Icontrol data logger eliminates these drawbacks. The Icône is now easily extendable with the Conductivity click-on module.

## application area

The Icône Conductivity Module measures variations in the electrical conductivity in the soil. The output enables detection of sand/clay layers, tracking of saltwater-carrying layers and detection of contamination. Examples:

1. quantification of salt (sea)water intrusion into fresh water aquifers
2. identification of contaminated groundwater or soil
3. determination of soil layers by deviations from the typical electrical conductance of water



## measurement method

The A.P. van den Berg Conductivity Module consists of four electrode rings, which are isolated from each other by ceramic insulators. With a controlled voltage source inside the module, a known current (I) is generated through the soil between the outer electrodes. This current causes a voltage difference (V) across the inner electrodes. The difference is held at a constant value by in- or decreasing the current.

The conductivity (K) in milliSiemens per meter is calculated using the following equation:

$$K = C \cdot I / V$$

C in this formula is a calibration factor which is defined by direct calibration of the measurement module. This calibration factor makes the result of the equation independent of the in-

strumental geometry, so it can be directly compared to results from other instruments.

To prevent polarization of the soil and pollution of the electrodes, an AC current source is used. For the purpose of a correct interpretation, the soil temperature is measured simultaneously with conductivity.

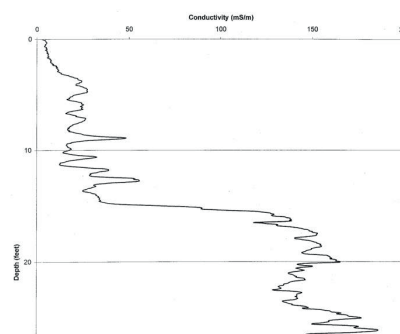
## Specifications

Module length	550 mm without Icône
Module diameter	44 mm
Module weight	3.7 kg without Icône
Sensors	Conductivity: - measuring range 50 - 1,500 mS/m - accuracy: 5% or 1 mS/m Temperature: - measuring range 0° - 50°C - accuracy: 1,5%
Data transfer options	- 4-wire Icône cable inside CPT-rods - Wireless Optical data transfer
Connector	- Quadrax swivel connector to Icône - Lemo 4-pins connector to Icontrol

## modular concept (plug & play)

The standard system consists of a completely digital cone, called Icône, and a digital data logger, called Icontrol. The Icône measures the four standard parameters cone tip resistance ( $q_c$ ), sleeve friction ( $f_s$ ), pore water pressure (u) and inclination (Ix/y). The modular set-up facilitates the application of the Conductivity Module only when it is required. In such case the Conductivity Module is simply connected directly behind the standard Icône with a small coupling piece. The Conductivity Module can also be used with just a dummy tip in case CPT-data is not required. Upon connection, the Icontrol and Ifield software for realtime data presentation will automatically recognize the Conductivity Module.

The figure below shows the results of a Conductivity test for measuring seawater intrusion into the main land and is drawn up in Ifield. The graph is generated by the Ifield software and shows clearly that the transition of fresh to salt water is located at a depth of 15 meter.



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