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# Deep Water Icone

digital cone for water depths up to 4,000 meters



## features

- high accuracy at all water depths from 500 to 4,000 m
- pressure compensation to maintain required accuracy
- XY-inclinometer integrated behind the tip
- realtime data acquisition
- calibration data in cone memory
- digital data transfer with automatic recognition

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# Deep Water Icone, digital cone for water depths up to 4,000 meters



## introduction

Ever since the eighties A.P. van den Berg has designed and supplied CPT technology to execute offshore soil investigation for foundations of civil works, oil and gas installations and wind farms. Various pushing systems are offered for shallow to ultra-deep water, whereby each has to cope with

its range of water pressures. As all A.P. van den Berg's pushing systems work in conjunction with the digital Icone data acquisition system, the different water pressures are considered in the cone designs also. Icones are available in a standard version for shallow to medium water depths as well as this pressure compensated version for deeper water.

## description

The Deep Water Icone is a pressure compensated cone, allowing measurements relative to the hydrostatic pressure at cone level, resulting in high accuracy over the full range of water depths. Like the standard Icone, the deep water version measures the four parameters: cone tip resistance ( $q_c$ ), sleeve friction ( $f_s$ ), pore water pressure ( $u$ ) and inclination ( $Ix/y$ ). The inclination is measured directly behind the tip. The DW Icone can be pushed into the seabed with any ROSON seabed CPT system and WISON-APB wireline CPT system. The Deep Water ROSON and WISON-APB-3000 are most suitable. Icones are calibrated in accordance with the ISO 22476-1 class 2 (standard) and on request to class 1. Both the calibration data as well as the CPT data is stored in the cone's memory. The calibration data is automatically recognized and read out when the cone is connected to a computer system running Ifield software.

## reliable and accurate intelligence

All cones need to resist the ambient hydrostatic water pressures at the pre-determined water depths while maintaining the accuracies in accordance with the ISO 22476-1 standards. With proper sealing this is guaranteed with the standard Icone for every parameter except for the pore water pressure. The standard Icone can measure the pore water pressure with sufficient accuracy up to 2,000 m water depth. At greater depths the ambient hydrostatic water pressure requires sensors with such a large range (200 – 400 bar) that the small variations of the excess pore water pressure cannot be detected anymore. Therefore the DW Icone is available. The DW Icone can already be deployed at water depths starting at 500 m. The maximum water depth is 4,000 m.

## fully digital data transfer

The DW Icone is part of the modular Icone data acquisition concept that is based on fully digital data transfer. The acquisition system consists of the digital Icontrol data logger and the Ifield software for real-time data presentation.

### Technical specifications

Resolution	24 bits ( $Ix/y$ 16 bits)
Cone tip area	10 or 15 cm <sup>2</sup>
Available parameters	$q_c$ , $f_s$ , $u$ , $Ix/y$
Memo function	16 Mbit (8 hrs. CPT operations)
Realtime data processing	
Cone resistance ( $q_c$ ):	
Nom. range	75 MPa
Max. range	150 MPa
Accuracy for class 2 (standard)	100 kPa or 5%
Accuracy for class 1	35 kPa or 5%
Sleeve friction ( $f_s$ ):	
Nom. range	1 MPa
Max. range	1.5 MPa
Accuracy for class 2 (standard)	15 kPa or 15%
Accuracy for class 1	5 kPa or 10%
Pore water pressure ( $u$ ):	
Nom. range	2 MPa
Accuracy for class 2 (standard)	25 kPa or 3%
Accuracy for class 1	10 kPa or 2%
Inclination ( $Ix/y$ ):	
Nom. range	20°
Max. range	25°
Accuracy for class 2 (standard)	2°
Accuracy for class 1	2°



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