

# Cone Penetration Testing Products



*Meet the difference*

**Eijkelkamp GeoPoint SoilSolutions B.V.** is a specialised developer and manufacturer of high quality geotechnical instruments. Eijkelkamp GeoPoint SoilSolutions carries the widest range of CPT cones in the industry, specialised CPT software and a large stock on spare parts. We are proud to have, or be able to devise a solution for every CPT challenge, regardless of the uniqueness of the question.

Eijkelkamp GeoPoint SoilSolutions is your partner for supplying a wide range geotechnical instruments and helping you solve specific challenges. All Eijkelkamp GeoPoint SoilSolutions products are designed and manufactured according the highest standards. We are proud to offer the strongest cones and the widest portfolio available on the market.

Our CPT cones meet all the international standards including EN-ISO 22476-1, NORSOK G-001 and ASTM D5778-12. The instrumentation in use allows calibration and repairs to be traced back to the cone.

## Digital, Electrical and Mechanical CPT Cones

High-quality cone penetration products in digital, analogue as well as mechanical versions to meet the standards required by EN ISO 22476-1.

Possibilities to choose from:

- Subtraction and compression type (class 1)
- 32-bit digital cones (class 1+)
- Analogue cones, with or without built-in amplifier
- Mechanical cones
- 1, 2, 5, 10 or 15 cm<sup>2</sup> cross-sectional area
- Ball- or T-bar cone
- 10 to 200 kN max load

Expandable with modules to measure and capture:

- Water pressure
- XY inclination
- Magnetic field
- Temperature
- Video
- Fluorescence
- Electrical conductivity
- Thermal conductivity
- Seismic waves
- Water content/dielectric constant



# CPT Cones

## Digital, electrical and mechanical CPT cones

The CPT(u) cone consists of temperature-compensated strain gauge transducers for measuring both cone resistance and local sleeve friction. The subtraction cones have been developed to address the durability problems inherent in other cone designs. This design is therefore much more robust than a compression-type cone. The precision strain gauge electronics, built-in analogue to digital conversion (32-bit resolution) and built-in cone ID with calibration factors eliminates the effects of user and system errors on the measurements. A standard subtraction or compression cone is capable of measuring simultaneously the following channels: tip, local friction, pore pressure, temperature and inclination (biaxial).

- Subtraction and compression type
- Digital with 32-bit resolution (Class 1+)
- New quadrax connector
- Analogue cones, with or without built-in amplifier
- Optional pore pressure; CPTu1, CPTu2 or CPTu3



*New Quadrax connector*

## Electrical SonicCPT cone

This cone is designed to overcome friction and is statically pushed to the desired depth. Once too much friction is encountered it is possible to engage a little vibration to be able to keep penetrating.

- Subtraction type
- 10 of 15 cm<sup>2</sup> cross-sectional area
- 100 to 200 kN max load
- Sonic proof!

## Seismic cone

Seismic cone penetration testing (SCPT or SCPTu) has proved to be a very accurate and reliable method to determine low strain in situ compression (P) and shear (S) wave velocity profiles. The accurate determination of P-wave and S-wave arrival times is needed to calculate reliable seismic wave velocities and areas sensitive to vibrations.

- Determination of earthquake resistance of existing and new buildings
- Determination of vibration sensitivity in surface structures with dynamic loads (wind turbines, gas distribution stations, machine foundations)
- Determination of ground conditions at locations with traffic load
- Measuring vibrations caused by mineral extraction

- Subtraction or compression type
- CPTu with triaxial acceleration sensor
- CPTu with triaxial geophone package with true interval possibility

## Magnetic module

The magnetic cone is capable of simultaneously measuring: CPTu, magnetic field, pore pressure, temperature and inclination (biaxial). The combination of these parameters provides geotechnical information useful in determining the stratigraphy of the soil and magnetic field intensity with direction in one test. The magnetic field intensity can be used for the detection of unexploded bombs (UXB) and other metal objects in the ground that cause magnetic anomalies. The magnetic cone can detect UXB up to 2 m away laterally so each probe position clears a vertical cylinder of land up to 4 m diameter. The magnetic module with built-in XY inclinometer can also be used without a cone as a stand-alone unit to perform unexploded ordnance (UXO) testing.

- CPTu with triaxial magnetic field measurement
- Subtraction type non-magnetic cone
- 15 cm<sup>2</sup> cross-sectional area
- Determines the position of metal objects
- Clears a cylinder of 4 m diameter (depending on the objects to be detected)



## Dielectric cone

The dielectrical parameters of the soil, the electrical conductivity and the electrical permittivity vary predominantly with the soil's water content and the presence of contamination with hydrocarbons. Furthermore, electrical conductivity is inversely proportional to particle size. That is, clays usually have higher conductivity than sands. Electrical conductivity measurements yield important lithological information and identify the locations that may be permeable and non-permeable zones. By measuring these parameters between two insulated electrodes, using the soil mass as dielectric correlated with CPT results as tip resistance and local sleeve friction, the contamination by hydrocarbons can be determined.

- CPTu combined with dielectric constant, bulk conductivity or resistivity and temperature
- Stratigraphy, moisture content, salt water intrusion and/or environmental contamination of the soil
- Detection of heavy metal contamination
- Dielectric constant: ranges from 1 to 80 (accuracy 0.5 % of the FS)
- Conductivity: ranges from 0 to 500 mS/m (accuracy 0.5 % of the FS)
- Soil moisture content from 0 to 100 % (accuracy 0.5 % of the FS)

## Conductivity module

Soil conductivity in combination with CPT(u) is a method of accurately classifying soil. Soil conductivity, in general, varies with grain size. Lower values indicate sand and gravel, higher values indicate silt and clay. Electrical conductivity is also a very popular test to find contaminated ground.

- Direct measurement of in situ bulk conductivity
- Calculation of conductivity of fluids together with CPTu parameters
- Conductivity from 0 to 500 mS/m (accuracy 0.5 % of the FS)

## Video cone

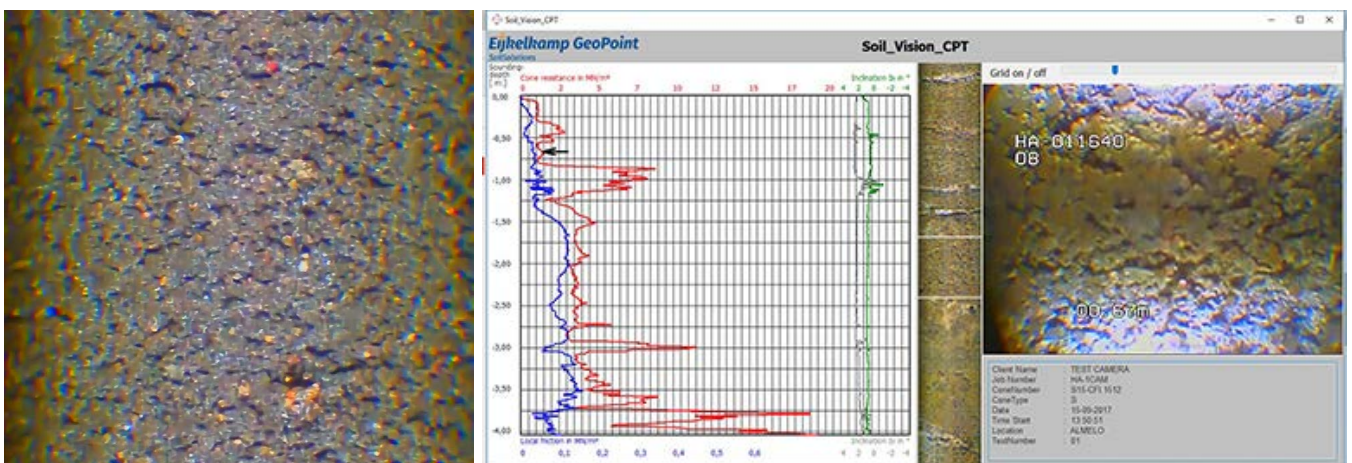
The video cone module consists of a single element, temperature-compensated strain gauge transducer for measuring both cone resistance and local sleeve friction. It has a a miniature colour video camera with six high-brightness LED light sources and double layered durable scratch-resistance sapphire windows, a sensitive pressure transducer and an accurate XY inclinometer.

The video cone is capable of measuring all CPTu characteristics as well having a real-time, high-resolution view of the soil.

The video cone also shows soil texture, colour, grain size and other features, eliminating the need for expensive and time consuming soil sampling.

All compounds exhibit adsorption (UV or visible), but only a few fluoresce. The ones that do fluoresce mostly contain aromatic rings. Nearly all fuel compounds will fluoresce when excited by an ultraviolet (UV) light source; chlorinated solvents do not fluoresce in UV or the visible range.

- Shows soil texture, colour, grain size
- Produces bore logs from video images
- Has UV fluorescence mode for oil contamination detection
- Generates no drilling or sampling waste: employees not exposed to contaminants
- Obtains bore log and geotechnical data in one single push



## Field Testing Equipment

Beside instruments for CPT applications, Eijkelkamp GeoPoint SoilSolutions develops and manufactures in-house field testing equipment, including the widely used static pore pressure meters. These are designed to be placed with standard CPT equipment. The pore pressure meters are mounted in a PVC or stainless steel cone-shaped housing with four filter locations. They are available in a range of 200, 500 or 1000 kPa with an accuracy of 0.2%. For logging and monitoring water levels, Eijkelkamp GeoPoint SoilSolutions offers its own range of accurate and robust sensors and data loggers



### Static pore pressure meters

- Single use or recoverable
- 200, 500 and 1,000 kPa
- PVC or stainless steel housing

### Data loggers

- Eco-Sense: standard four-channel field data logger
- Mini-Sense: manual field monitoring device
- Tiny-Sense: smart versatile two-channel data logger, equipped with a built-in 4G modem
- Tiny-Sense 4: the newest, compact four-channel data logger, equipped with a built-in 4G modem
- MicroSense LoRa™ : LoRa™ IoT network (868 MHz ISM) logger with low transmission cost
- MicroSense Sigfox™ : the first logger with a certified Sigfox™ transceiver



SigFox™ is a registered trademark of SigFox.

## Compact CPT Rig

The Compact CPT Rig is small but powerful. It is designed with user-friendliness and difficult access sites in mind. The width of the frame is only 76 cm/3 ft to be able to access most doors and garden fences. For use in basements, shops, residential buildings and many more where it's not possible to use the complete unit due to accessibility, noise or exhaust gases we created the ability to take the CPT tower and bolt this to a floor or wall. The Compact CPT Rig will power the CPT tower remotely as a hydraulic power pack. Reaction force will be created by two or four ground anchors that are available in different sizes. With 1,250 kg (including CPT rods, four anchors, fluids and CPT system) it is still transportable in the back of a van. This makes it perfect for use in urban areas.



### Specifications

- |                                |                        |
|--------------------------------|------------------------|
| ■ Engine:                      | Kubota diesel          |
| ■ Power:                       | 14.6 HP @ 3200 rpm     |
| ■ Width:                       | 76 cm/3 ft             |
| ■ Weight:                      | 1,150 kg / 2,535 lbs   |
| ■ Pushing force (10T version): | 100 kN / 22,480 lbs    |
| ■ Reaction force:              | Through ground anchors |

