Geo-Corer 3000 + 6000

High Frequency Vibrocoring System

Applications

- Geotechnical investigations
- Stratigraphic studies
- Geological mapping
- Mineral exploration
- Environmental surveys
- Pollution investigations

Proven Performance

The Geo-Corer 3000 + 6000 has a proven performance over many years, even in extreme conditions. The very fast penetration rate results in high quality cores with a minimum of sediment disturbance. Up to 20 good quality cores have been recovered within a 12-hour working day.

Lightweight Structure & Small Vessel Operation

This modular system can be assembled manually in two hours (a crane is required to bring it upright) and can be deployed from a relatively small vessel. Because of its lightweight construction and smart pull-out system, it requires a limited hoisting power of five tonnes maximum when working in stiff clays. Also, its low overall weight minimises transportation costs.

Deep Water Operation

The standard Geo-Corer is rated to a maximum water depth of 150 m. It can be upgraded to the pressure-compensated version for operation in water depths down to 500 m. For depths greater than 500 m, please contact us to find a solution.

Operational Features

- High frequency vibration
- Proven performance & high quality cores
- Small vessel operation
- Reliable, lightweight & cost effective
- Modular construction (cores of 3 m or 6 m)
- Pivoting core barrel head
- Optional pressure-compensated module (for water depths > 150 m)
- NEW (mid-2008) - Integration with CPT

High Frequency Vibration

The Geo-Corer 3000 + 6000 is a high frequency (28 Hz), electrically driven vibrocoring system. It can penetrate fast (thereby enhancing the quality of the core) into all common unconsolidated sediments, including compact sands and stiff clays, and even unconsolidated chalk.

Variable Coring Parameters

The two standard configurations are designed to take high quality cores of 6 m or 3 m length, in ordinary PVC liners with an internal diameter of 106 mm.
The penetrative force can be adjusted by varying the deadweights on the vibrator head.

Pivoting Core Barrel Head

The pivoting head allows rapid change-out of the core barrel and easy retrieval of the core liner, while the vibrocorer remains in the upright position.

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Technical Specifications

Type	Geo-Corer 3000 + 6000
Manufacturer	Geo-Resources Instruments
Maximum weight in air Maximum weight in water	About 1000-1200 kg, depending on deadweights About 850-1050 kg, depending on deadweights
Fully containerised system (optional)	The system is designed to fit into a standard 20-foot container. The same container is used for the storage of barrels / liners during operation offshore.
Total height	7.4 m (6 m core barrel) 4.5 m (3 m core barrel)
Base frame footprint	Diameter 4.7 m (6 m core barrel) Diameter 3.2 m (3 m core barrel)
Corrosion protection / maintenance	All structural steel parts are hot-dip galvanised
Vibromotor Vibrating frequency Vibration swing force Deadweights on vibrator head	Electrically driven double vibrator (5.5 kVA) 28 Hz 30 kN Adjustable, from 100 kg to 300 kg
Electric power	380 V AC, 3-phase, 50 Hz Starting power 16 A Running power 2 A to 6 A, depending on soil type
Electric power umbilical	Standard version: Cable reel: (316 stainless steel) with integrated connector. Umbilical: 250-500 m in length, 12 leads of 1 mm^2 each for power and controls, Kevlar-reinforced, polyurethane insulated, outside diameter of 16 mm, and high quality (Hydrovolt) underwater connectors.
Stainless Steel Cable Reel	Overall diameter 0.9 m, width 0.5 m, mounted on steel A-frame (hot-dip galvanised), with four wheels for easy manoeuvrability on deck.
Electrical control unit	Rugged HMPE housing, protecting a watertight suspended electric power control unit that contains ampere meter, fuses, start and stop buttons, and green (ON) and red (OFF) LEDs. Automatic switch-off REED contact (when fully penetrated). Optional depth transducer.
Core barrel	ID / OD: 113 mm / 121 mm (seamless stainless steel 316) Length: 6 m or 3 m Core catcher (stainless steel 316) Replaceable cutting shoe (carbon steel) Special non-return valve Pivoting core barrel head
Core liner	ID / OD: 106 mm / 110 mm, PVC or transparent PVC length: 5.9 m (6 m barrel), 3.0 m (3 m barrel)
Operational depth	150 m for Geo-Corer standard version 500 m for the pressure-compensated version, using two 5 litre / 200 bar compressed air bottles
Hoisting requirements	Minimum 5 t crane or A-frame 12-14 mm anti-twist steel cable, type 35 x 7 (N.B. The provision of a hoisting cable is optional)
Required height below A-frame	8.5 m minimum (6 m core barrel) 5.5 m minimum (3 m core barrel)
Required deck space	Minimum 12 m length for placing the core barrel into horizontal position to extract the core liner

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Working Principle (& Pressure Compensation)

Working Principle & Functionality

(The system main parts and their identifying numbers are given in the diagram overleaf.)

- The main structure of the vibrocorer consists of the 'spider' base frame (2), which can be folded together for transportation; the two guiding poles (5); the sliding frame (11) with the vibromotor (12); and up to six deadweights (13) that allow the adjustment of the downward penetration force. A high density polyethylene block (4), in the base frame, guides the core barrel during penetration.
- The standard length of the guiding poles for 3 m coring is 4.5 m; for 6 m coring, a shorter pole of 2.9 m is added to the standard pole. (N.B. The maximum pole length of 4.5 m fits easily into a 20-foot container.) Both guiding poles are connected at their top to a rigging head (15), which is kept in place by four stainless steel stays (6) secured to the spider base frame.
- The vibromotor is driven by a 5.5 kVA / 3-phase AC motor located in the centre of its housing, and is powered from the vessel via the underwater power umbilical (17). Two gearboxes, with gearwheels of eccentric weights, are mounted at the sides of the housing. The vertical vibration force is created by the centrifugal force of the rotating eccentric weights; the horizontal components of the centrifugal force cancel each other out, but the vertical components reinforce each other. The resulting up/down motion (a sinusoidal motion of 28 Hz) of the vibromotor is transmitted by two springs (14) to the sliding frame and deadweights, thereby providing the downward penetrative force.
- The core barrel (7) is made of stainless steel 316, and contains a PVC liner of 106 mm inner diameter and wall thickness of 2 mm. The core barrel is connected to the barrel pivot (10) by two locking bolts - this pivotal connection allows the core barrel to be positioned horizontally for extracting the core liner.
- The core barrel is provided with a carbon steel cutting shoe (3), which fixes the core catcher and core liner in position. The liner and its core sample can be easily extracted after unscrewing the cutting head. Liner caps are used to close the liner sections.
- The combined effect of the vibration motion and the non-return valve (9) at the top of the core barrel produce an under-pressure directly above the core sample. This is the 'suction effect'.
- Once the barrel has penetrated the seabed, this closing of the upper part of the core barrel helps to prevent the core sample from moving backwards during the pull-out from the seabed.
- Thanks to the unique internal core extraction system, the available force for pulling the core barrel out of the seabed is four times the hoisting force. This is achieved by passing the steel hoisting cable through two sheaves in the sliding frame and one sheave in the rigging head - resulting in a fourfold increase of the hoisting force available for extraction.
- For example, a three-tonne total hoisting force gives a two-tonne net hoisting force, (after correction for the system's own weight), which would increase fourfold to an eight-tonne extraction force. This increased force also means that the system is much less sensitive to bending of the core barrel during extraction - the main extraction force is always applied vertically, even if the vessel is not directly above the corer.
- A galvanised anti-twist steel hoisting cable (16) is used to deploy and recover the vibrocorer from the vessel, using a suitable crane or an A-frame plus winch, depending on available means, water depth, etc.
- The electric motor of the vibrator unit is operated (switched on/off) from the surface via the power cable and the control unit. The performance of the vibrator can be monitored via the ampere meter on the control unit.

Pressure Compensation for Deep Water Operation

- Pressure compensation for the vibromotor housing becomes necessary at water depths greater than 150 m - the pressure within the housing must be able to withstand the pressure from the surrounding water column.
- Two standard 5 litre diving bottles are installed on the sliding frame; each bottle is connected to the vibromotor housing via a high pressure hose and pressure-compensated valve. As the vibrocorer is lowered through the water column, the valve opens in response to the increase in the ambient water pressure, allowing the air from the diving bottles to flow into the vibromotor housing and equalise the interior/exterior pressures.
- When the vibrocorer is recovered to the surface, the high pressure air inside the vibromotor housing is released through an over-pressure bleed valve.

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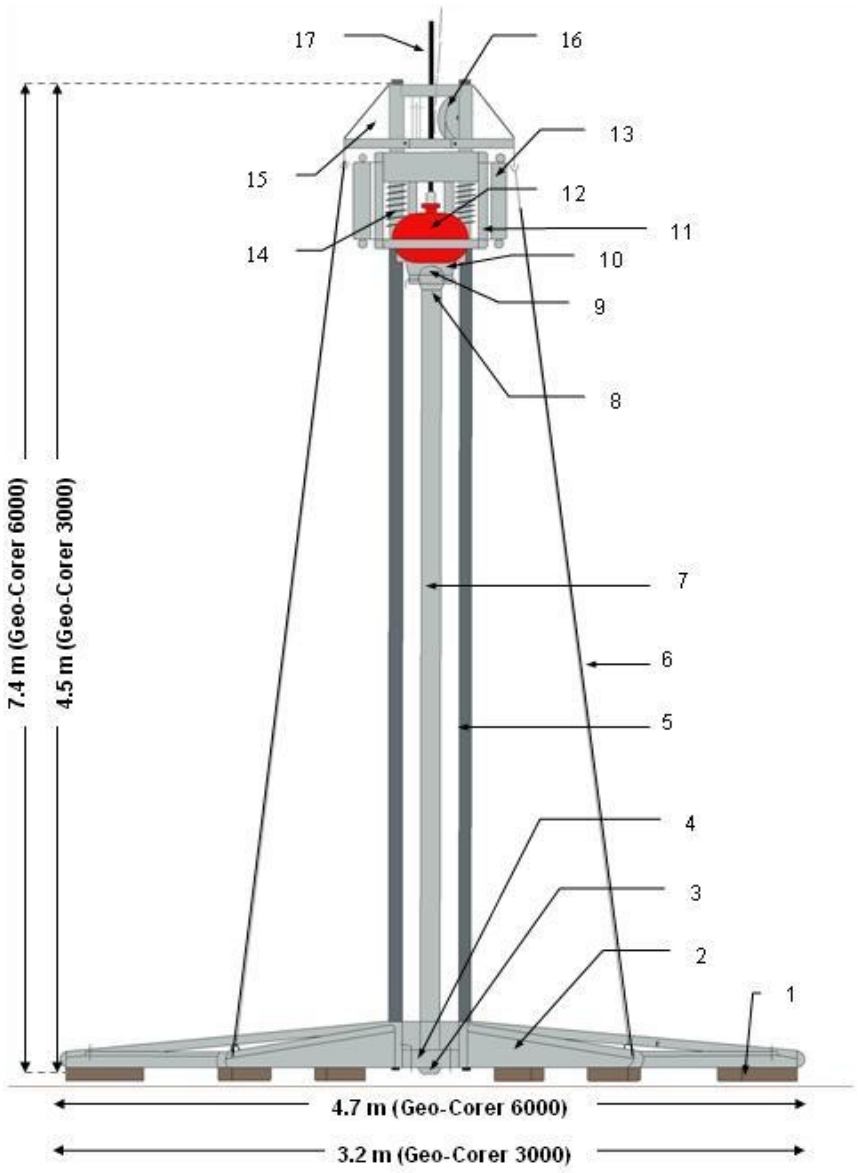
Main Parts



No.	Item	Material
1	protective anti-slip blocks	high quality waterproof plywood
2	spider base frame	carbon steel, hot-dip galvanised (can be folded)
3	core barrel cutting shoe	replaceable cutting shoe, carbon steel, with stainless steel core catcher
4	core barrel guiding block	HMPE
5	guiding poles	high strength steel
6	stays to rigging head	stainless steel 316
7	core barrel	ID/OD 113 x 121 mm stainless steel 316
8	pivoting core barrel head	stainless steel 316
9	non-return valve	Delrin and stainless steel
10	core barrel pivot	stainless steel, hot-dip galvanised
11	sliding frame	stainless steel, hot-dip galvanised
12	vibromotor	3-phase AC motor, 5.5 kVA
13	deadweights (on vibrator head)	adjustable, up to six pieces of 50 kg each
14	springs	transferring resonant vibration motion to 30 kN
15	rigging head	hot-dip galvanised
16	hoisting wire	anti-torsion 12-14 mm steel cable, type 35 x 7
17	underwater power cable	polyurethene, Kevlar-reinforced (12 x 1 mm^2)

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