

New TERRA-DRILL 150x7 V for larger drill depths

Since its introduction in 2009, the vertical TERRA-DRILL 4407 V has operated successfully throughout Europe. Now TERRA has designed a bigger brother, the TERRA-DRILL 150x7 V for drilling to greater depths in nearly all ground conditions. Due to the ingenious design it can even drill in small front gardens to assist in the renovation of old buildings, where conventional large drilling machines cannot gain access.

Geothermal bores up to 150 m (500 ft)

The TERRA-DRILL 150x7 V is a vertical drilling machine for geothermal bores. It can drill (uncased bores) down to 150 m (500 ft) in most ground conditions. It has 15'000 Nm (11'000 ft.lbs) of torque and allows the drilling of 152 mm (6") casing pipes down to 135 m (450 ft) and their removal without difficulty.

Only 0.95 m (3 ft) wide

A unique feature of this powerful geothermal drill is that you can fold it to a transportation width of only 0.95 m (3 ft) allowing the TERRA-DRILL to drive through small garden entrance doorways to gain access for drilling in established and confined garden spaces.

Air drilling and fluid drilling

In rocky ground the air powered down-the-hole hammer is most suited and has a high rate of production. The air driven DTH hammer produces the bore channel while compressed air blows the earth particles to the surface, into a mud container. Casing pipes are used to protect the drill string through the top layers of loose ground until contact is made with the rocky layers below.

If the geology consists of loose ground, even at great depths, the TERRA-DRILL can be equipped with an optional drilling fluid pump to allow drilling using the "fluid method". Here up to 1'000 ltr/min (250 gpm) of bentonite drilling fluid is pumped into the bore channel.



Machine technology

Two powerful hydraulic motors located in the driving saddle produce a torque of 15'000 Nm (11'000 ft.lbs) and thrust and pulling forces of 70 kN (7 tons, 15'400 lbs); more than most large drills.

The TERRA-DRILL is of modular design. It is equipped with an on-board small power pack allowing it to be self propelled. A separate, larger power pack stands can stand independently outside the front garden. Its 97 kW (132 HP) PERKINS Diesel engine drives three independent hydraulic circuits for thrust, rotation and the bentonite pump.

Its rubber crawlers prevent damage to the garden and pathways and once it has crawled inside the property, through the narrow entranceway, they can be telescopically extended to increase their width from 0.90 m (3 ft) to 1.40 m (4.6 ft). This increases the stability of the rig and prevents it from overturning.

The four hydraulic outriggers align the drill and transmit the high torque into the ground.

The casings and drill rods are 2 m (6.6 ft) long, for fast drilling and removal on completion.

The patented duplex connector (mud spill preventer)

The TERRA-DRILL operates with only one driving head. Thus TERRA has designed a new patented duplex connector (mud spill preventer) which allows simultaneous insertion of the casing pipe, the down-the-hole hammer and the drill rods. The duplex connector conducts the drill mud cleanly into the mud containers ensuring that the job site is always clean. As soon as the casings have reached the upper rock edge, the bayonet connection on the duplex connector is released. From that moment on only the drill rods with the down-the-hole hammer proceed to drill further down.

The duplex connector of the TERRA-DRILL 150x7 V can be aligned longitudinally enabling the drill operator to align the position of the drill bit in relation to the casing pipe bit.

Triplex clamping and break-apart system

The TERRA-DRILL is equipped with a triplex clamping and break-apart system. The assembly and disassembly of the casing pipes and the drill rods are undertaken hydraulically.

Cable winch with handling device

The electric cable winch and the specially developed rod handling device enables the lifting and loading of a single casing and a single drill rod simultaneously into the drill rig where they are assembled hydraulically.

Remote control

The TERRA-DRILL is operated via a cable remote control with two joysticks. The operator may stand in a location where he has a view of the entire operation.

Top of Europe

The Swiss ski resort Grindelwald - Kleine Scheidegg required a new snow machine for the winter season 2010/2011. To achieve this 4 pipes needed to be installed underneath the railway track.

This railway is used by more than 600'000 tourists every year, who wish to visit the "Jungfrau Joch" ("Top of Europe"). The contractor, Peter Roth (from Grindelwald) decided to employ his TERRA-HAMMER T 135 F to undertake these crossings.

After the first 135 ø pilot bore the bore channel was increased by an expander ø 203 mm (8"). The HDPE pipe ø 162 mm (6.4") was pulled in simultaneously. The other three crossings required smaller pipes, so they could be pulled in immediately with the T 135 F without an expander. These pipe sleeves were used for water, electrical power and control cables. Peter Roth was very satisfied with the successful pipe laying job which was finished within half a working day.



The Fat Lady Has Sung: TR 565 in Hong Kong

A 535 m (1'800 ft) long HDD bore was to be installed for a new waste water system on an island near Hong Kong. For environmental safety reasons the first 105 m (350 ft) beneath the mainland must be protected by a steel casing. To achieve this, a 1400 mm (55") steel pipe needed to be installed as an exterior protective sleeve for the first 18 m (60 ft). Thereafter a 1200 mm (47") steel pipe would be rammed into the sea bed for a length of 105 m (350 ft).

For this most challenging task, contractor Paul Y Construction Ltd. chose the TERRA-HAMMER TR 565, which was affectionately nicknamed "the fat lady".

Even with the ramming power of 2'400 tons this was a challenge for „the fat lady“. To facilitate the successful ram, TERRA's engineers proposed that Paul Y Construction undertake a lubricated pipe ram, using a specialised bentonite mix as is common in HDD drilling operations.

Following this methodology, the 1200 mm (47") steel pipe was successfully rammed in for the required 105 m (350 ft). A 350 ton pull-back HDD rig was then able to commence with the pilot bore for the new 800 mm (32") pipe, which was installed through the steel pipe rammed pipe underneath the ocean to the island.



50 geothermic bores finished on schedule

A modern schoolhouse was built in Malisheva, Kosovo to the highest environmental standards. The project was financed jointly by Kosovo and Norway. The heating needed to be eco-friendly with geothermal power.

This required 50 vertical bores with diameters of 150 mm (6") to be drilled to a depth of 125 m (400 ft). Geothermal ground probes were lowered down into each bore to harness the "free" geothermal energy. Drilling through the solid rock was a challenge requiring extremely efficient rock drilling equipment that is also light and easily manoeuvrable. The company NNE Nartel from Prishtina acted as the main contractor and completed the project on a turnkey basis. Nartel decided to buy a TERRA-DRILL 4407



V as this vertically drilling system was ideally suited to the demands of this construction project.

NNE Nartel is one of the largest building companies in Kosovo employing 150-160 staff and has its own planning office with 20 engineers and architects.

To achieve the required programme operators worked a double-shift operation. That meant that the TERRA-DRILL 4407 V worked between 16 to 18 hours every day and performed brilliantly without any failures or break-downs. The drilling speed through the rock was 12 to 18 m per hour. The rock began at depths between 2 to 9 m (6-20 ft) requiring the first 3 to 10m of the bore to be cased to support the collapseable material until the solid rock was reached.



The entire project was complete and ready by Christmas 2010.

TERRA-JET 3008 ES Drills Steep Incline in Switzerland

Swiss contractor Tschanz Grabenlos AG, who are based in Luterbach (nearby Solothurn) used their TERRA-JET 3008 ES pit machine to undertake a steep HDD bore in Bibrist. The TERRA-JET 3008 ES can undertake directional bores in lengths up to 150 m (500 ft) and backream diameters up to 420 mm (16.5").

This challenging job involved installing a new HDPE pipe with an outer diameter of 132 mm (5.2") beneath a staircase having a downward inclination of 48 %.

The TERRA-JET 3008 ES pit machine was installed in the entrance pit at the same 48% inclination. The drill path required drilling the pilot bore straight (at 48% inclination) for the first 12 m (40 ft).

Thereafter the drill operator Rolf Kauer drilled in a sharp upward curve at the minimum bending radius of 35 m (115 ft) until the an upward inclination of 10% was achieved.

The pilot bore then continued straight at this 10% upward inclination until the drill head reached the target pit. In the target pit the drill head was disassembled and replaced by a backreamer which was connected to the new 132 mm (5.2") HDPE pipe.

During back-reaming the drill operator decided to thicken the bentonite drilling fluid due to the hard ground encountered during the pilot bore. The pilot bore was back-reamed up to \varnothing 180 mm (7") and the new HDPE pipe was pulled in for a length of 48 m (160 ft).



Dynamic bursting sleeve 610 mm (24") for X 400

The dynamic bursting sleeve 610 mm (24") is designed to pipe burst old pipes, including concrete pipes, of ID 400 mm and 500mm (16" & 20") and to replace them with new HDPE pipes of OD 500 mm (20") in lengths of over 100 m (330 ft).



A combination of the cable burster TERRA-EXTRACTOR X 400 and the TERRA ram TR 220 is used. The TERRA ram TR 220 delivers the main ramming force of 370 tons and is equipped with a remote controlled start/stop valve which ensures an easy and reliable start-up of the hammer, even over long distances.

The TERRA-EXTRACTOR X 400 cable burster delivers an additional pulling force of 400 kN (40 tons) and pulls the cable only during its load stroke. The pulling cable is clamped during the Extractors' return stroke. In order to provide constant tension, a tension spring assembly is attached to the front of the dynamic bursting sleeve. This spring assembly



maintains the pulling tension during the Extractors' return stroke, so there is always the necessary tension on the pulling cable.

The photo shows the dynamic bursting sleeve together with Manfred Neumann, one of its designers.

New T 055 SK "mini" only 0.9 m (3 ft)

The TERRA-HAMMER T 055 SK is an extremely popular and powerful machine with a length of 1.04 m (3.4 ft). It is suitable for most trenchless applications.

A Trenchless contractor in the Netherlands required the length of this underground piercing tool (mole) to be reduced to 0.90 m (3 ft) without any reduction of power. The request was based on the fact that in the Netherlands most of the sidewalk flagstones are 0.30 m x 0.30 m (1 ft x 1 ft).

Using a 0.90 m (3 ft) long piercing tool the contractor would only need to remove three flagstones. Whereas using a longer piercing



tool four flagstones are needed to be removed, requiring a longer and more expensive starting pit of 1.20 m (4 ft).

The Swiss engineers of TERRA AG successfully designed a very short new (B-36) end cone. This makes the T 055 SK "mini" only 0.90 m (3 ft) long. All other components of the piercing tool such as the main piston (striker) and the machine body remain the same. Thus the machine retains its full power.

The machine is also exceptionally handy where the exit pit is too small to take the piercing tool out as the reverse speed has also been doubled, allowing the machine to be reversed back to the entry pit to achieve faster lateral connections.

The reverse is controlled by a simple 1/4 turn of the air hose, which is locked during operation by means of the patented S version pneumatic lock – an innovative TERRA invention. Being a version K, the Machine is able to be opened without heat for servicing, and as with all TERRA moles there is a 3 year warranty for the main piston - still unique worldwide.

TERRA AG

für Tiefbautechnik
Hauptstrasse 92
6260 Reiden
Switzerland
Phone.: +41-62-749 10 10
Fax: +41-62-749 10 11
E-Mail: terra.ch@bluewin.ch
Internet: www.terra-eu.eu

TERRA Deutschland GmbH

Grabenlose Bohrsysteme
Schulze-Delitzsch-Straße 2
68542 Heddeshelm, Germany
Phone: +49-6203-40 31 50
Fax: +49-6203-40 31 55
E-Mail: info@terra-de.de
Internet: www.terra-eu.eu

Editorial staff / Editor

Dietmar Jenne, TERRA AG
Herbert Reissnecker
Martin Siegrist
Sam Efrat (Contributor)

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