

**Operator's manual for
Pentruder® MD1 Modular Drilling System
with HF-motor and Pentpak® HF-power pack**



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Support & Service document
Original instructions



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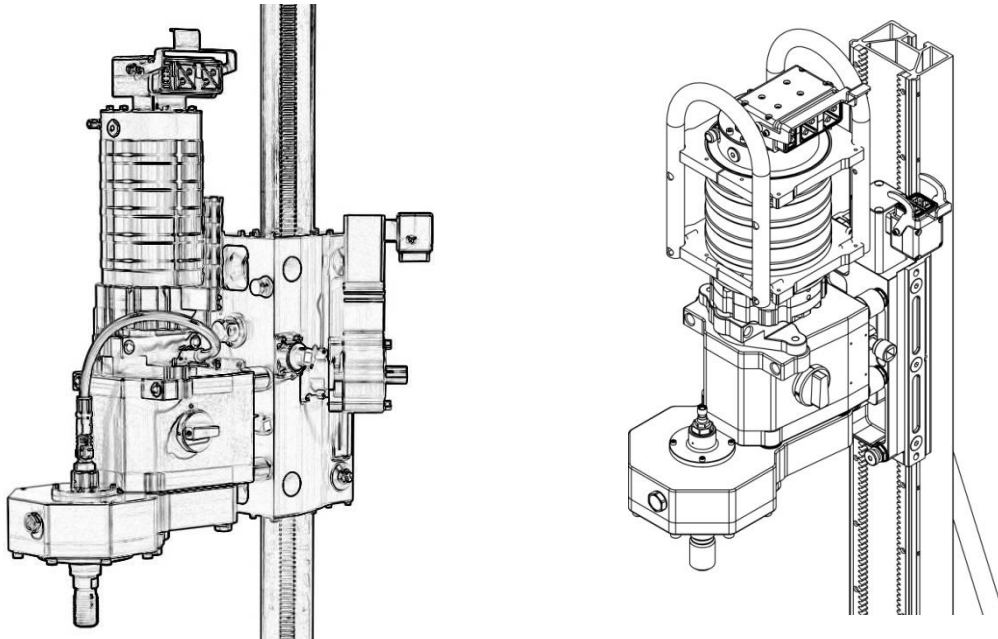
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1 Introduction

Thank you very much for your confidence in our product! You have chosen to invest in a product which will give you many years of efficient and profitable production. The Pentruder Modular Drill System has been developed based on 25 years of experience in this specialized field. With correct handling it offers outstanding performance, safety and reliability.

It is essential that all personnel working with or in close proximity to the drilling machine have read and understood the contents of this manual before commencing operations. By reading and understanding the manual the operator will be able to take advantage of the many features and benefits of the Pentruder Modular Drill System. Should questions arise, please contact our sales agent.



We are confident that your investment in this equipment and its many design features will enhance your business competitive edge and profitability!

Product:

Pentruder® MD1 Modular Drill Machine with HF-motor and Pentpak® HF-power pack

There are two choices for the drill stand, namely the 70 mm column system and the Pentruder Modular Concrete Cutting System (MCCS) based on the saw track.

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2 Description of the machine

2.1 Features

The Pentruder Modular Drill System MD1 is a versatile and powerful drilling system. The 4-speed MG41 gearbox gives the system a very smooth and efficient run and with two exchangeable spindle units it offers a wide speed range for different sizes of drill bits.

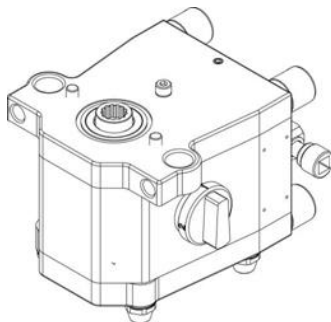
Quick disconnect couplings reduce the set up time. Small and big drill bits can be drilled in a shorter time than anyone thought possible.

Pentruder MD1 drill system can be driven by a 15, 18 or 22 kW HF-motor. Together with the MG41 gearbox and a ST2 or ST3 spindle unit and a Pentpak HF-power packs up to 1200 mm big holes can be drilled easily and efficiently.

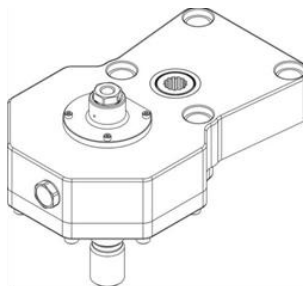
Pentruder MD1 HF-drilling machine can either be built on the wall saw track (MCCS) or on the 70 mm column system.

2.2 Modules MD1

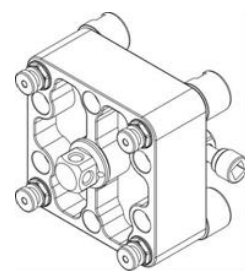
- MG41 4-speed gearbox
- ST2 / ST3 (QDC-)Spindle unit for MG41 (quick disconnect coupling for drill bit optional)
- ERMD1 Extension Adapter for MD1 (Extends capacity by Ø 190 mm per adapter and up to 3 pcs can be used.)



MG41



ST2/ST3



ERMD1

2.2.1 MG41 Gearbox

The Pentruder drill system has a 4-speed gearbox to offer a wide speed range for various drill bit diameters. Performance and safety is increased as the spindle speed cannot be increased over the adjusted speed during drilling.

2.2.2 ST2 / ST3 (QDC-)Spindle unit

The concept with exchangeable spindle units makes it possible to get a very wide spindle speed range with only one drilling machine. The ST2 spindle unit gives lower spindle speeds than the ST3 spindle unit. See chart on page 27 for spindle speeds. The spindle units can be ordered with or without Quick Disconnect Coupling (QDC) for the drill bit.

2.2.3 ERMD1 Extension adapter MD1

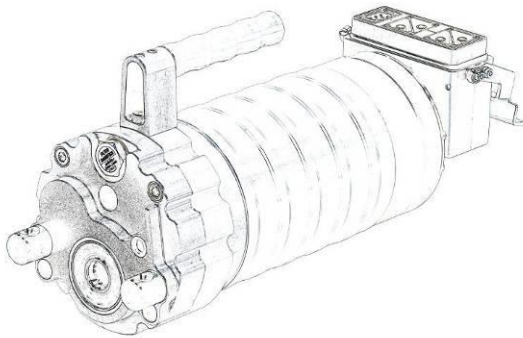
When drilling big diameter holes over Ø 600 mm (23.6") an extension adapter must be used to extend the distance between drill column and spindle, giving more clearance for bigger diameter drills. Each adapter

extends the drill unit 90 mm (3.5") further away from the column, i.e. gives additional clearance for a 180 mm (7") bigger drill bit. Up to 3 pcs can be used together.

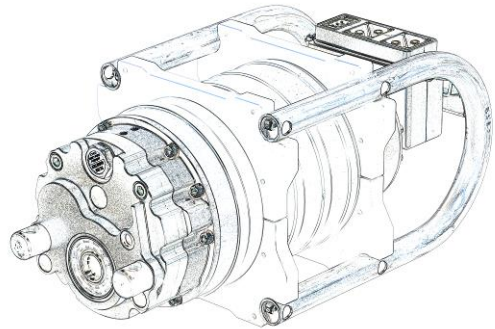
2.3 Main drive HF-motor and adapter HFMR-MG41

- HFR415, 15 kW HF-motor, 400 V
- HFR418, 18 kW HF-motor, 400 V
- HFR422, 22 kW HF-motor, 400 V
- HFMR-MG41 Adapter for HF-motor on MG41

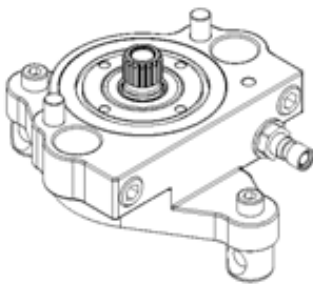
The same HF-Motor as is used for drilling is also used for wire sawing and wall sawing. We especially recommend the 15 and 18 kW HF-motors for drilling.



HFR415



HFR418, HFR422



HFMR-MG41

2.4 Rig for MD1 drilling machine with 70 mm column system

2.4.1 Standard modules for electric MD1 drill rig with 70 mm column system

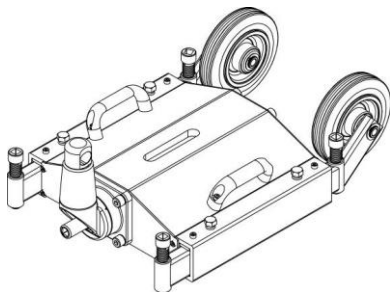
- BE1 Base plate fixed / BE2 adjustable quick disconnect coupling
- BETC Base plate w top mount fixed quick disconnect coupling
- CN Columns F/M-70 Female / Male coupling, extendable, 0.5 / 1.2 / 1.5 m
- CN Columns F/J-70 Female / Jack screw, 0.5 / 1.2 / 1.5 m
- CN Column Female / plastic cap, 2 m (only extendable at the bottom)
- ET70 Eccentric bolt for TTFF and JTFF/JTFM tracks
- RST-CN-M Rear support for 70 mm column with male coupling, 2.1-3.2 m
- RST-CN-U Rear support for 70 mm column universal, fastened directly on the column, 2.1-3.2 m
- CE1 Carriage for 70 mm columns
- PT-MD1 electric feed unit
- FE1 Friction clutch
- Connector w. ID-chip for MD1 70mm (if the HF MD1 is used without PT-MD1 electric feed unit)

2.4.2 Base plates for CN columns and TTFF/JTFF tracks

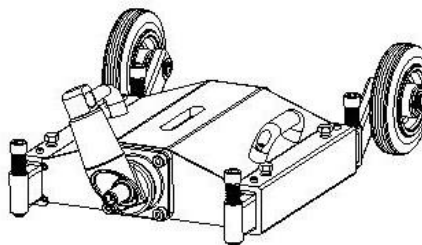
The BE1, BE2 and BETC base plates are used with CN columns, TTFF or JTFF tracks.

On BE2 the conical quick coupling can be swivelled sideways in increments of 5° for angular drilling operations. The conical quick coupling on BE1 is fixed. The base plate BETC has a top mount fixed conical quick coupling.

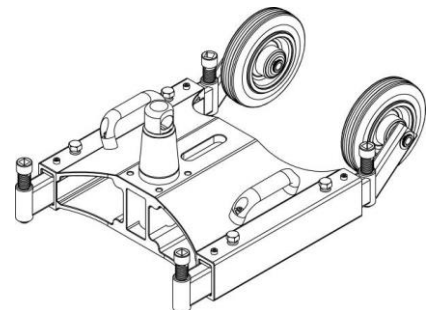
The columns fitted on the conical quick release coupling can be swivelled around its own axis, and great flexibility is offered to simplify set-up.



BE1



BE2 with swiveled column coupling



BETC

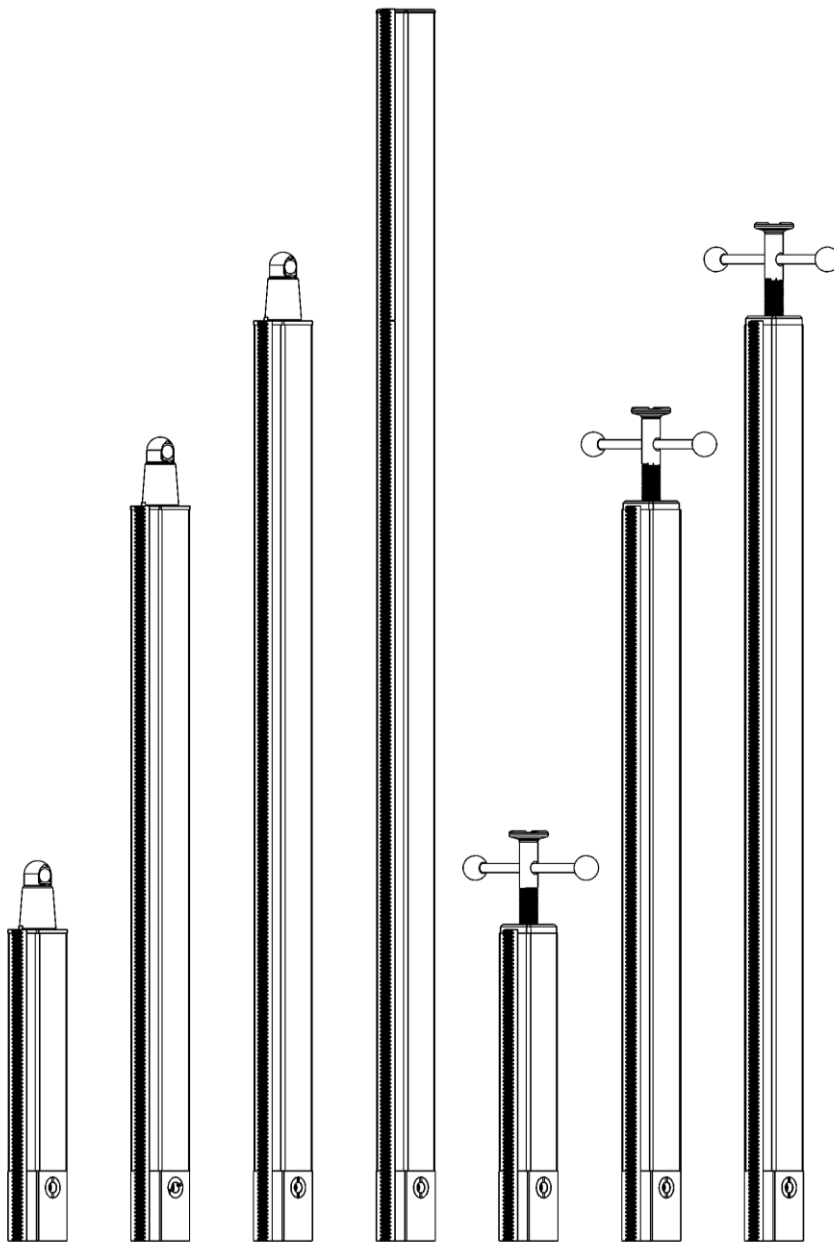
2.4.3 CN Columns

There are three types of 70 mm columns. Extendable columns CN F/M-70 with a female / male configuration, meaning that each column is fitted with a female conical quick release coupling at one end, and a male coupling at the other end.

Columns CN F/J-70 with a Jack Screw in one end, where the male coupling sits on an extendable column, are used to jack the machine against ceiling or wall.

There is also a column CN-3P8 with a female coupling in one end and a blanking plug in the other end. This column is 2.0 meters and mostly used for the Pentruder 3P8 wire saw.

The CN F/M and CN F/J columns are available in three lengths, 0.5 m, 1.2 m and 1.5 m.



CN 0.5 F/M, CN1.2 F/M, CN1.5 F/M, CN 2.0-3P8, CN 0.5 F/J, CN 1.2 F/J, CN 1.5 F/J

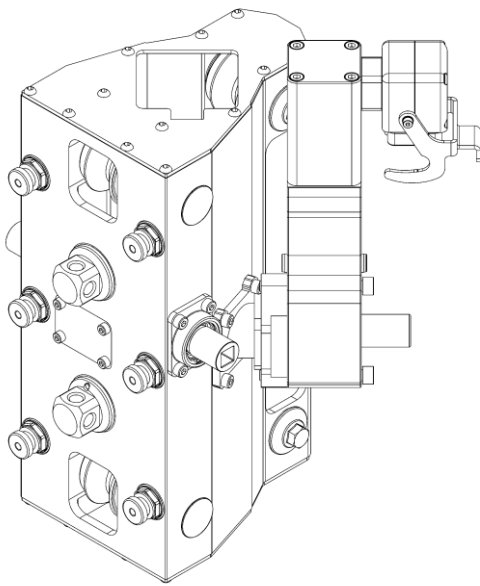
2.4.4 RST-CN Rear support

There are two rear supports for the CN-columns. The RST-CN-M is fastened on the male cone at the top of the column. The RST-CN-U is fastened directly on the column and can be fitted on any side of the column as there are two openings for the rack and the clamp can be turned upside down as well. The rear supports are 2.1 meter long when fully pushed in and can be pulled out to a length of 3.2 meters.

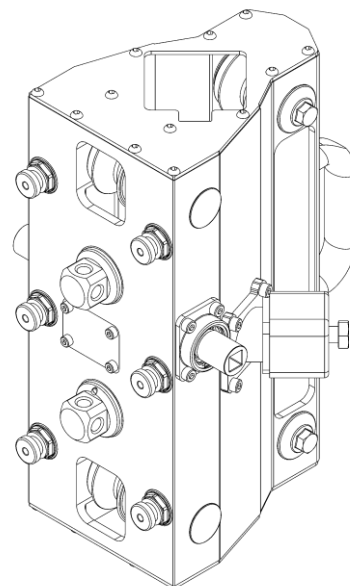
2.4.5 CE1 carriage and PT-MD1 automatic feed unit / FE1 Friction clutch

The MD1 HF-drilling machine can be used with or without automatic feed unit. If the automatic feed unit is not used, there is a friction clutch instead, to prevent the carriage from sliding on the column. The CE1 can be fed manually, even if the automatic feed unit is fitted.

Please note that when the MD1 has no automatic feed unit a blind plug is needed to activate the software in the Pentpak which controls the HF-motor.



CE1 with PT-MD1 automatic feed unit



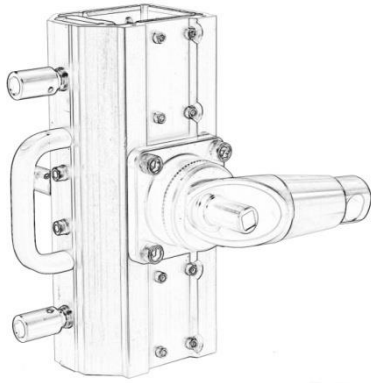
CE1 with FE1 Friction clutch

2.4.6 Pivoting head

- PD1/PD2 Pivoting head

An universal pivoting head can be used to simplify set-up in many cases. The Pivoting Head can for example be fitted on a vertical column and a horizontal column fitted to the Pivoting Head conical quick coupling.

The column quick coupling is of the same type as on Base Plate BE2, with a swiveling face tooth coupling allowing for adjustment of drill angle in 5° increments.



PD1/PD2

2.5 Rig for MD1 HF-drilling machine with saw track (MCCS)

2.5.1 Standard modules for MD1 drill rig with saw track (MCCS)

- BTS3 Base plate for TS type tracks, triangular, 220 x 320 mm
- BTS4 Base plate for TS type tracks, rectangular, 220 x 320 mm
- TS T-slot type track, 0.85 / 1.15 / 1.7 / 2.0 / 2.3 / 3.45 m
- RST-TS1 Rear support for TS-track, 2.1-3.2 m
- CEG-E-MD1 Carriage, gliding, MD1 QDC coupling. Automatic feed. Max feed speed 0.8 m/min.
- CEG-M25 Carriage, gliding. Manual feed. Reduction 25:1
- CER-M3-U Carriage, roller type, MD1 QDC coupling. Manual feed, reduction 3:1
- Connector w. ID-chip for MD1 70mm (if the HF MD1 is used without electric feed unit)
- HK-1 Hand crank for CER and CEG carriages

2.5.2 Base plates BTS3/BTS4 - MCCS



Base plate BTS3 and BTS4.

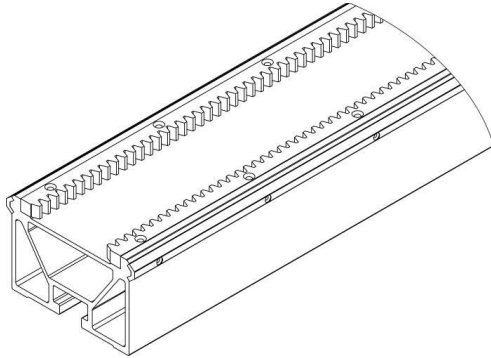
There are two different base plates for the TS track, the BTS3 and BTS4.

The BTS3 with only three leveling screws is not recommended for heavy drilling and for drilling with the drill spindle turned to one side. It is excellent for light duty drilling and in several other applications where side loads do not occur.

2.5.3 TS T-slot type track - MCCS

The Modular Concrete Cutting System (MCCS) builds on the t-slot type track which has been used for the Pentruder wall saw since 1997. The TS track is very light weight, yet offers great stiffness and stability to the system.

The TS tracks are available in the lengths 0.85, 1.15, 2, 2.3 and 3.45 m and the weight is 6.95 kg per meter.

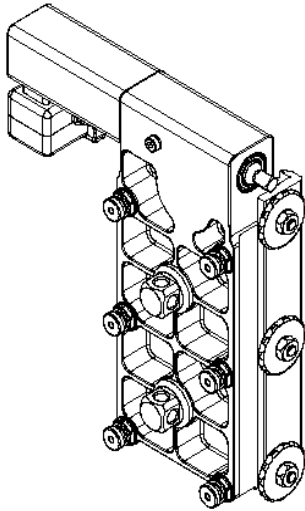


2.5.4 RT-TS1 Rear support

The RT-TS1 rear support is fastened on TS track with a . The RT-CN-U is fastened directly on the column with a t-slot profile (which also is used together with the track feet for the Pentruder wall saws). The rear support is 2.1 meter long when fully pushed in and can be pulled out to a length of 3.2 meters.

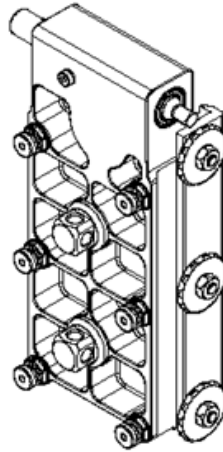
2.5.5 CEG/CER Carriages - MCCS

The MG41 gearbox and ST spindle units can be used either with a CEG gliding carriage or a CER roller carriage. If automatic feed is required, there is the CEG-E-MD1. Please note that when a carriage without automatic feed is used, a blind plug is needed to activate the software in the Pentpak which controls the HF-motor.



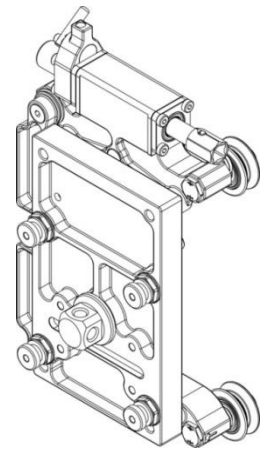
CEG-E-MD1 Carriage, Gliding, with electric feed motor

Carriage which glides on the track with teflon liners.
Electric automatic feed for MD1 high frequency drilling machine.
No manual feed possible.
Total gear ratio 2500:1.
Max feed speed 0.8 m/min



CEG-M25 with manual feed

Carriage which glides on the track with teflon liners.
Manual feed. Lower carriage for 3P8 wire saw. Suitable for heavy drilling with big drill bits, chain sawing and more applications to come.

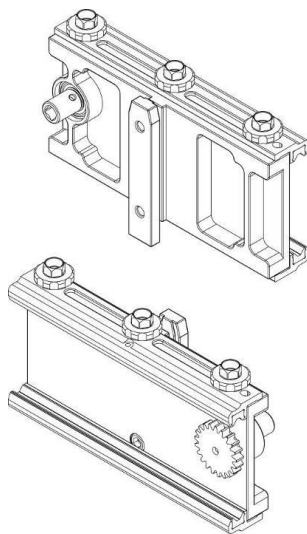


CER-M3-MD1 with manual feed

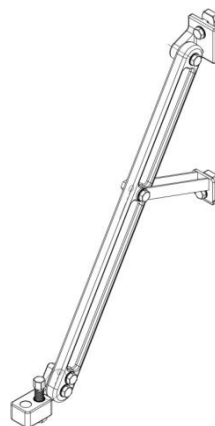
Carriage with tapered rollers like on the wall saws.
Manual feed.
Coupling for MD1 drilling machine.
Gear ratio 3:1

Overview CEG and CER carriages for Pentruder MD1 HF-drilling machine

2.5.6 CEL-TS Carriage line and corner drilling



*CEL-TS Carriage line and corner drilling
From two different views.*



CT-CEL Back support for CEL-TS

3 Safety instructions

3.1 Safety instructions which are used in this operator's manual



Note!

This sign indicates technical specifics and methods which will facilitate the job.



Important!

Here we inform about risks connected with use of the machine, and, if the safety precautions are not respected, can result in damage to property and persons in close proximity to the machine.



WARNING!

In these we inform about risks connected with use of the machine, and, if the safety precautions are not respected, can result in serious injury and even to fatal injuries to persons in close proximity to the machine.

3.2 Intended use of the drilling machine



WARNING!

The drilling machine may only be used for core drilling in concrete, masonry or similar materials. Other use is non intended and therefore to refrain from.



WARNING!

Before drilling is commenced, make sure that;

- There are no power lines, gas or oil pipes in the way.
- The statics of the building are not imperiled because of the drilled holes.
- No damage is done on other side of the wall when drilling through the wall.

Other use is non-intended and therefore to refrain from. For maximum drill bit size, see Technical Data.

This drilling machine may not be used before the operator is fully educated by our sales distributor in handling the machine. It is the obligation of the buyer to make sure that the operator really has received the information necessary to operate and take care of the machine in a correct and safe way. Incorrect handling can lead to serious or even fatal injury to the operator and persons in proximity to the machine.

Tractive AB is not responsible for damage on property or persons whether they originate from incorrect handling or deficient maintenance or as a consequence from not checking the machine for damage and/or defects before taking it into use.

The following safety instructions are important to know and follow.

3.3 Not intended use of the drill rig

This drill rig may not be used for:

- any kind of stirring jobs, for instance stirring of paint or similar.
- drilling in soil, for instance drilling holes for poles.
- free hand drilling.



WARNING!

The drill rig may not be used on loose masonry as the anchors may come loose.

3.4 General safety instructions

WARNING - DANGER OF LIFE!



It is potentially fatal to drill in a power line which is energized. The drill rig can get energized.

A circuit breaker doesn't protect against this danger.



WARNING!

- The drill rig is state of the art and follows the present regulations. However, incorrect handling of the machine can lead to serious or even fatal injury to the operator and persons in proximity to the machine.
 - To maintain the level of safety inherent in the design of this machine, only Tractive original spare parts may be fitted. Tractive AB disclaims all responsibility for damages occurring as a result of use of non-original parts.
 - All persons which are operating or in any way working on the drilling machine has to read and understand the whole operator's manual and especially the safety instructions, before any work is commenced. It is the obligation of the buyer to make sure that the operator really has received the information necessary to operate and take care of the machine in a correct and safe way.
 - The drill rig may only be operated and serviced by authorized and trained personnel. The personnel should be trained by personnel which is authorized by the manufacturer.
 - No work should be commenced which cannot be judged to be safe.
 - The operator is obligated to immediately inform about changes on the drill rig which can impair the safety of the machine.
 - The user is liable that the drill rig is in faultless condition and that all functions are in order before work is commenced.
 - Modifications or changes on the drill rig which might impair the safety of the machine are not allowed.
 - Before any kind of service or mounting on the drill rig is commenced, the drill motor must always be switched off and the 32/63 Amp plug and cable disconnected from the drill motor.
 - Tractive AB is not responsible for damage on property or persons whether they originate from incorrect handling or deficient maintenance or as a consequence from not checking the machine for damage and/or defects before taking it into use.
 - Safety regulations at the work place must be followed as well as the safety regulations of the operator's manual for the drill motor used.
 - The drilling machine may not be used in an environment where explosion protected equipment is demanded.
-

3.5 Safety precautions at site



WARNING!

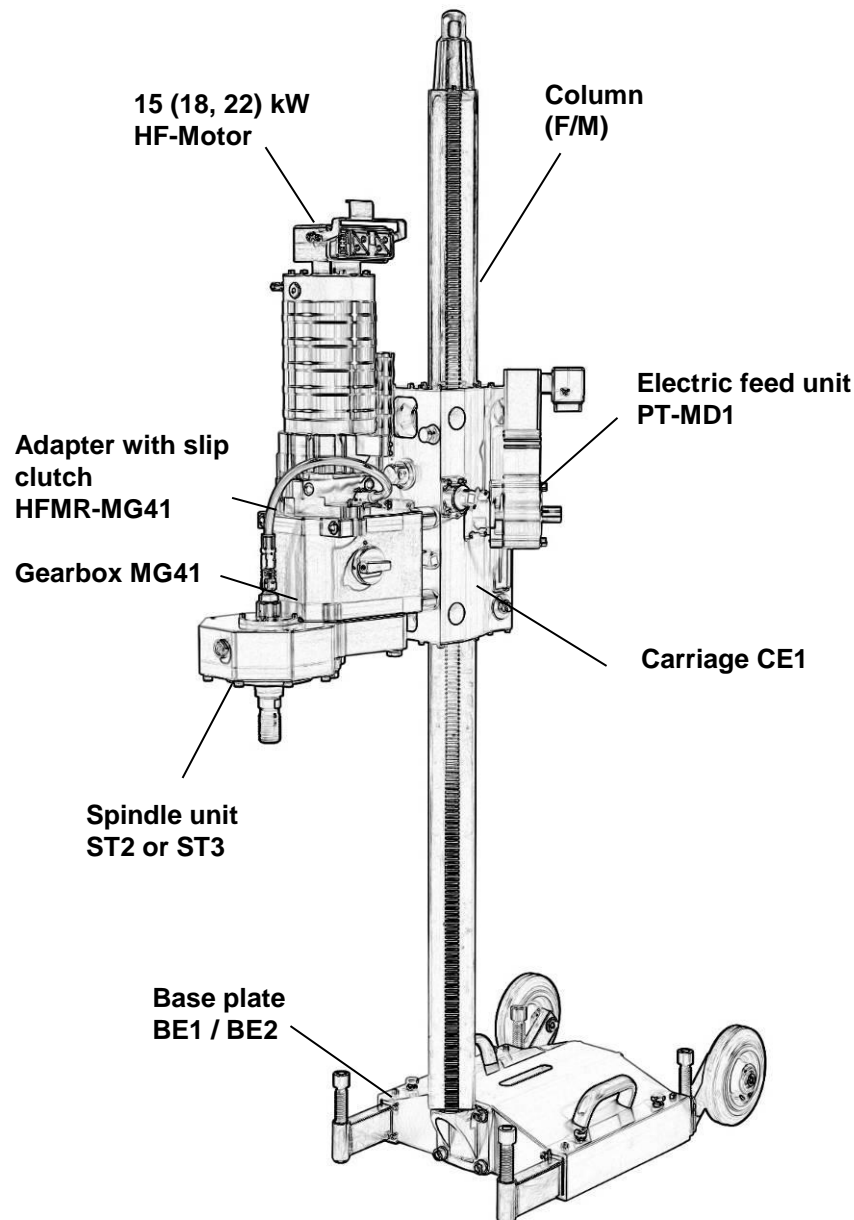
- Always check that the equipment is in faultless condition and that all functions are in order before work is commenced.
- No mounting, for instance change of drill bit, may be performed on the drill rig unless it is disconnected electrically from the mains.
- Safety regulations at the work place must be followed as well as the safety regulations of the operator's manual for the drill motor used.
- All persons working with, or in the proximity to the drilling rig should wear safety equipment, i.e. protection helmet, protection shoes, gloves, eye and ear protectors. Other safety regulations at the work place must be followed. The noise level at drilling might lead to permanent hearing disorders if not ear guards are worn.
- The operator should have good supervision over the drill system and inform passing persons about possible risks.
- Unauthorized persons shall not be within the risk area (the area around the drill unit).
- The drill bit may not be touched when the drill motor is in operation.
- Never connect the hydraulic hoses to either drill unit or power pack while the power pack is running. The power pack must be disconnected from the power supply by removing the 32 or 63 Amp plug and cable from the power pack before any connections are made.
- The power pack must always be switched off and the 32/63 Amp plug and cable disconnected from the power pack before any kind of service is commenced.
- Mounting and dismounting of the drilling unit and drill bit may only take place when the drill motor is disconnected from the power pack by removing the 400V power cable.
- The power pack is water cooled and must be drained from water when the ambient temperature is in the proximity of or below 0 degrees Celsius.
- The electric motor of the power pack is water cooled and the water pressure must therefore be limited to max 5 bar. The incoming water supply may only be connected to the lower connection on the power pack. The quick disconnect couplings may not be replaced with couplings that are not fully open when disconnected.
- Always lift the drill unit ergonomically correct. The Pentpak is not provided with hooks for lifting. Should this unit need to be lifted with a crane, this should only be done after permission and instructions have been given by a person responsible for safety on the site. Contact your sales agent for instructions on how the lifting can be done in the best way.
- The base plate must always be securely anchored to perform safe drilling.
- Never run the drill unit without water cooling. The seals are quickly worn and water leak can occur. Should the cooling water cease to function, stop the machine immediately.
- Before drilling is commenced all persons involved must know how the emergency stop button is working.
- Remember always to cover drilled holes so that no person falls down and hurts himself.

-
- Only connect the power pack to the Pentruder drill system or such equipment which has been manufactured or approved by Tractive AB.
 - Should the drilling machine fall down from the ceiling it could cause severe injuries. Keep away from the working area of the drilling machine.
 - Don't use any extension or lever to get a higher feeding power.
 - A heavy core in a drill bit which rotates outside of the drilled hole can lead to heavy vibrations so that the drilling machine can come loose from the anchor. Stop the drill bit shortly before it comes out of the drilled hole.
 - Re-bars which have been cut off can be stuck between the core and the drill bit and block and/or damage the drill bit. Before the drilling is commenced, make sure that no segments are left in the drilled hole.
 - Should the drill bit get stuck, turn off the drill motor and unplug it. Use a wrench to move the drill bit forwards and backwards until it is disengaged and can be pulled out of the hole.
 - When drilling upwards, make sure the core cannot fall down by securing it properly. Rope off the working area.
 - Only change gear when the main HF-motor is stopped.
 - The power pack must only be operated when in an upright position.
 - Remember always to cover drilled holes so that no person falls down and hurts himself.
-

4 Getting started

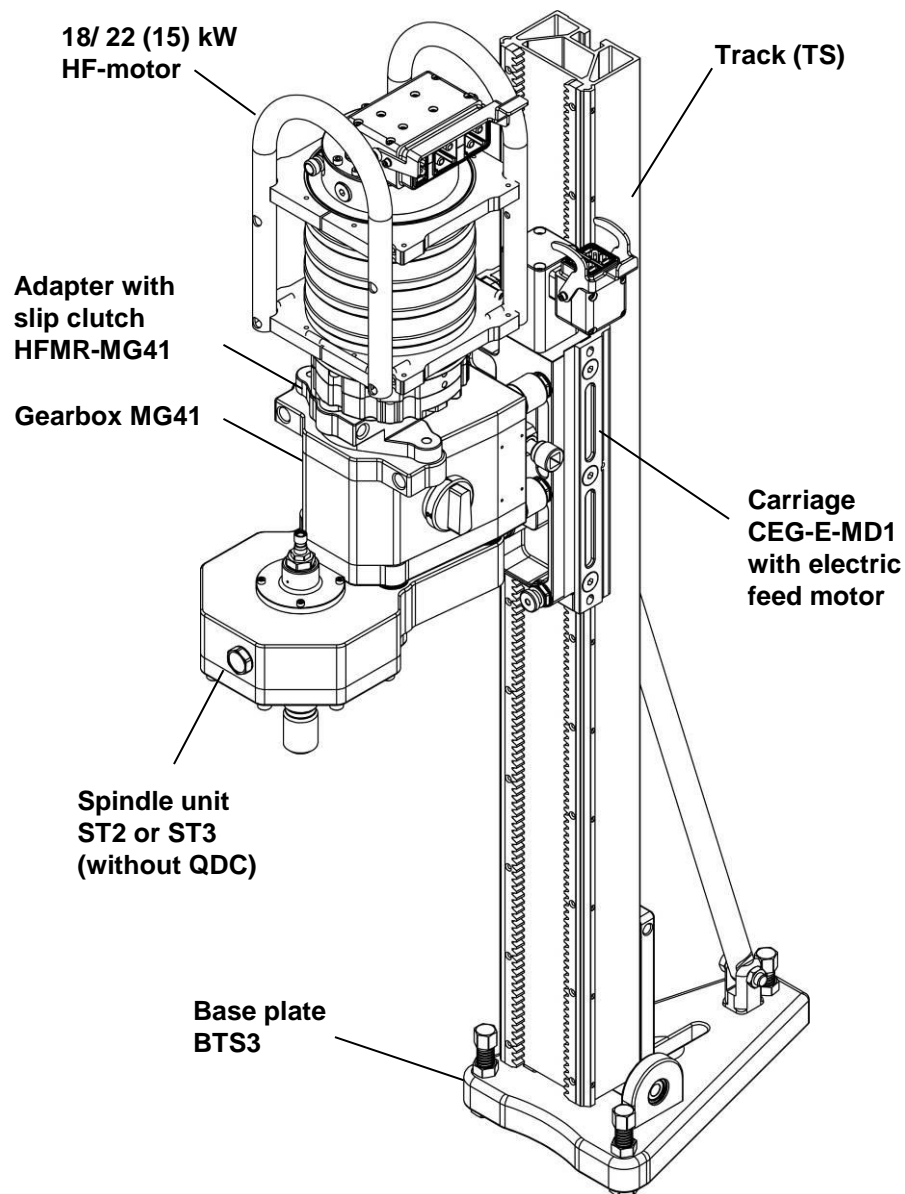
Before drilling with the MD1 drilling machine, it is essential that all personnel working with or in close proximity to the drill stand have read and understood the contents of this operator's manual. By reading and understanding the manual the operator will be able to take advantage of the many features and benefits of the Pentruder MD1 drilling machine.

4.1 Overview Pentruder MD1 with 70 mm column system



MD1 HF-drilling machine and 70 mm column system drill stand

4.2 Overview Pentruder MD1 with TS track (MCCS)



MD1 Drill unit and MCCS drill stand.

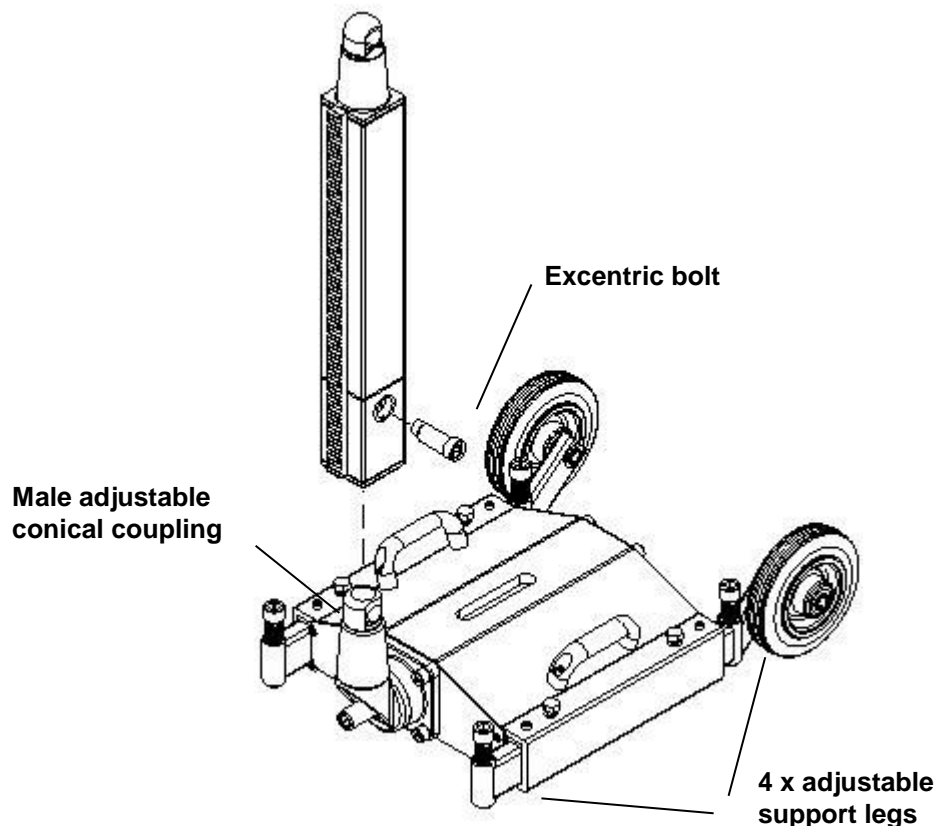
4.3 Equipment needed for drilling

The operator should have the following material at hand:

- **Hammer drill:** Used to drill holes to secure the base plate.
- **Hammer:** Securing anchors.
- **Anchors and bolts:** Mounting the base plate and removal of drilled cores.
- **Tools for mounting the drill stand and adjustments:** Tool set
- **Level:** To mount the column correctly at set up and control during drilling.
- **Measuring tape:** Positioning of base plate in relation to cored hole.
- **Extension adapter:** Used when drilling big diameter holes to increase the distance between drill bit and spindle.
- **Hoses and electrical plugs:** When needed, extension hoses for the power pack and hydraulic motor can be used.
- **Industrial vacuum cleaner:** Collection of concrete slurry and water retention.
- **Water collector ring:** To avoid spreading the water around the drill hole during drilling.
- **Equipment for safe removal of drilled cores:** Small cores can be removed by hand, big diameter cores must be removed with a crane or other lifting equipment.
- **Helmet, eye- and ear protection, dust guards in dusty environments, protective clothes, shoes and gloves.**

4.4 Mounting of drill stand 70 mm column system

4.4.1 Assembly of BE base plate- and CN F/M-70 column



Assembly of BE2 base plate- and CN 0.5 F/M-70 column.

1. Secure the base plate to the floor or wall with an expanding anchor and minimum 12 mm (1/2") bolt. Be observant on what material the base plate will be mounted on. For safety it is important that the base plate is properly secured. If mounted on brick or light concrete we recommend to secure the base plate with through bolts.
2. When drilling with large drill bits we recommend using two anchors of M16 size to fasten the base plate.
3. Fit the column on the base plate.
4. Pull out the support legs and check with the level to see that the column stands vertical and steady. If not, adjust with the screws on the support legs until the column stands correctly.
5. To mount the column on the base plate, or a pivoting head, or to join two columns, an eccentric bolt is inserted in the hole in the column, and tightened clockwise with an 1/2" knuckle bar or ratchet.
6. The column is locked by turning the eccentric bolt Clockwise.
7. To release the column, the eccentric bolt is turned Counter Clockwise until it lifts from the cone, the eccentric bolt is removed and the column can be removed.



WARNING!

- The base plate must be securely fastened to perform safe drilling
- Be careful to clean the mounting hole for the base plate with water or air before fitting an expander bolt.



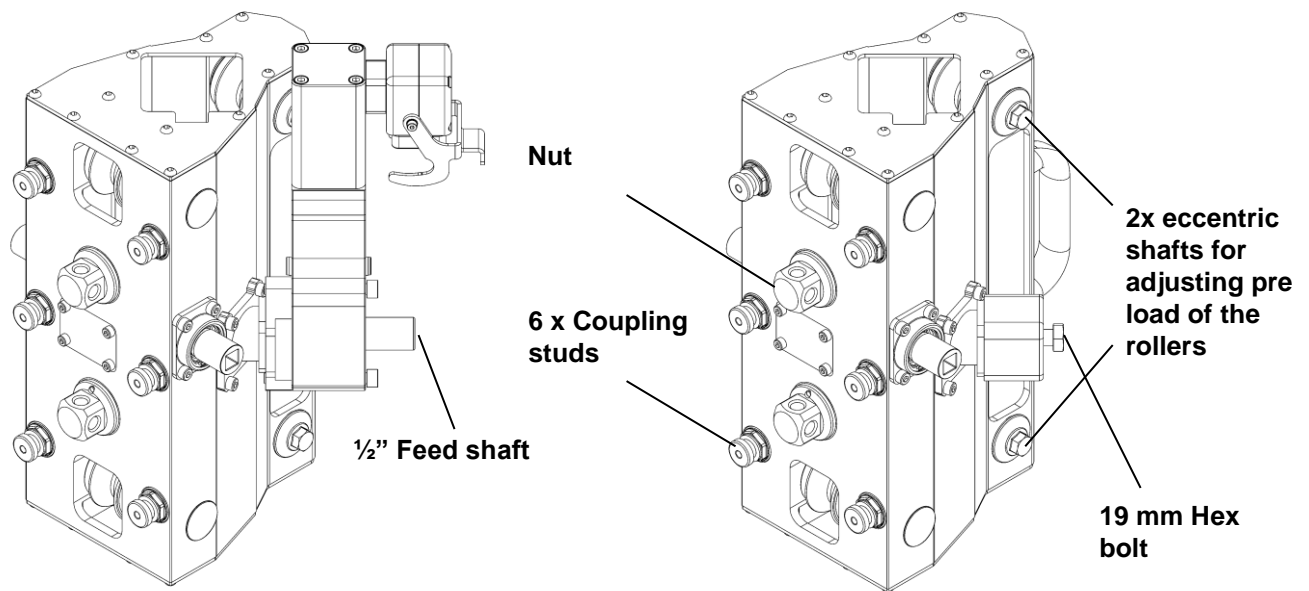
Important!

- Never hit the column into position with a hammer or the like.

4.4.2 Back support for 70 mm column

For most drill operations a back support is needed to give greater stability, for example when drilling with high pressure and high load. The back support should always be used to stabilize the column, especially where circumstances are hard and demanding.

4.4.3 Mounting of carriage CE1 on 70 mm column



CE1-70 carriage with PT feed unit

CE1-70 carriage with friction brake

1. Loosen the socket on the hydraulic feed unit or the 19 mm Hex bolt on the friction brake.
2. Put the carriage on the column.
3. Adjust the height of the carriage by turning the feed shaft with a knuckle bar.
4. Tighten the socket on the feed unit or the hex bolt on the friction brake until the carriage doesn't slide down the column.
5. For optimum preload of the rollers on the column, the rear rollers should be adjusted using a 1/2" spanner and a 15 mm wrench. Adjusted correctly, this eliminates all play between the carriage and the column. Do not set the rollers too hard. The result will be premature wear of the column.
6. Lock the eccentric shafts for correct pre load of the rollers, by tightening the screw with a 15 mm wrench.

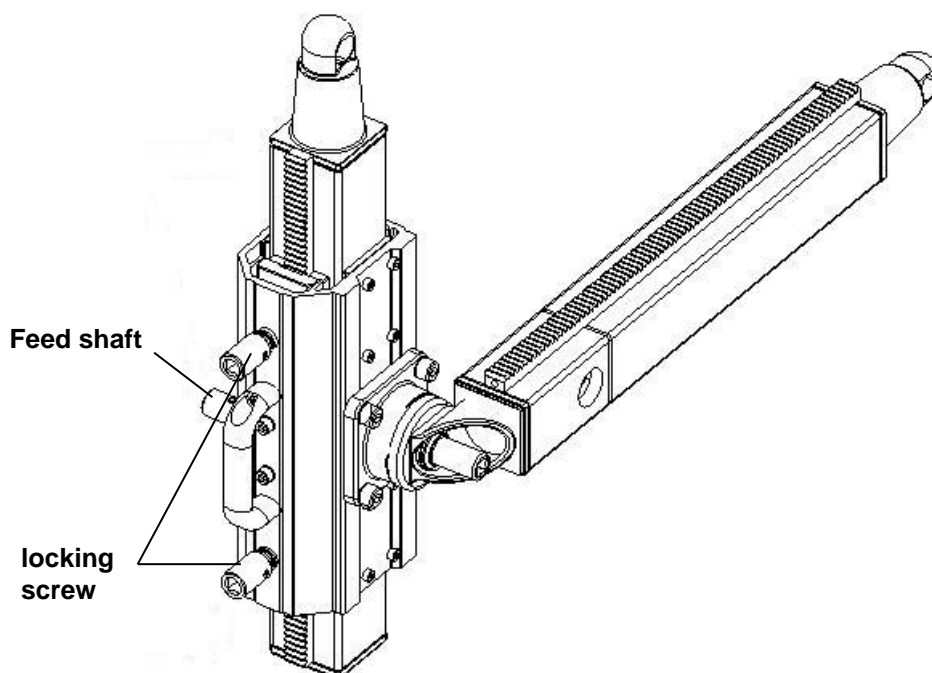
The drill unit (gearbox, spindle unit and hydraulic motor) can mounted on the carriage with the drill spindle pointing in both directions along the column. Note that the drill unit can be mounted in two positions along the carriage.



Important!

- Be careful when mounting the carriage on the column. Make sure the socket / hex bolt is tightened to avoid clamp injuries. Do not overtighten!

4.4.4 Mounting of pivoting head for 70 mm column



Pivoting head-PD1 with assembled column.

1. Mount the pivoting head on the column.
2. Tighten the locking screws so that the pivoting head doesn't glide on the column.
3. Use the ratchet to move the pivoting head to the desired position on the column.
4. Lock the pivoting head with the locking screws on the desired height.
5. To mount the column on the pivoting head, an eccentric bolt is inserted in the hole in the column, and tightened Clockwise with a $\frac{1}{2}$ " handle or ratchet.
6. Now you can mount the carriage on the horizontal column, see mounting of carriage CE1 on page 19.



Important!

- Be observant so that the eccentric bolt doesn't slip out of the column when the column is put on the pivoting head. It **MUST** be completely flush with the column side face.
 - When the adjustable male-coupling shall be adjusted please make sure the teeth are correctly in mesh.
 - When the pivoting head is mounted, be sure that the locking screws are tightened to give enough friction between column and pivoting head, to keep the pivoting head from sliding down the column in an uncontrolled way.
-

4.5 Standard mounting sequence of MCCS drill stand

1. Track on base plate
2. Base plate on concrete
3. Carriage on track

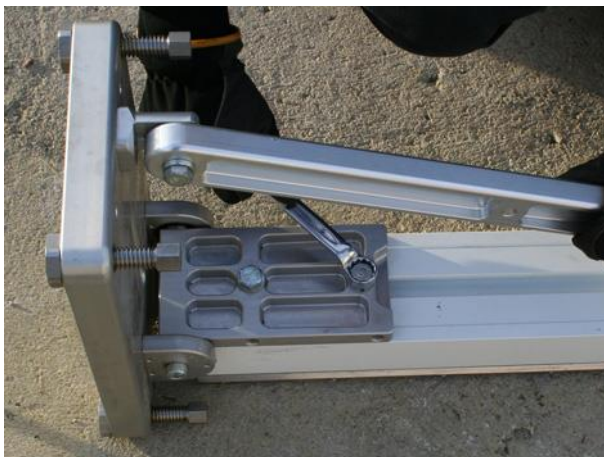
4.5.1 Mounting the track on the base plate

We recommend to assemble the base plate on the track first, and then fastening the assembled rig on the concrete.



a. Slide the upper clamp in to the track. Older tracks with only one rack can be used. In this case make sure the rack is on the left side seen from the rack side of the track.

b. Slide the lower clamp in to the track.



c. Tighten the two bolts on the lower clamp.



d. Tighten the upper bolt loosely.



e. When the track is in the right position, tighten the bolt properly.



f. Next tighten the upper bolt on the back brace.



g. Tighten the lower bolt on the back brace.

Pictures a-h: Mounting track on base plate

4.5.2 Mounting of base plate on concrete

1. Secure the base plate to the floor or wall with an expanding anchor and minimum 12 mm (1/2") bolt. Be observant on what material the base plate will be mounted on. For safety it is important that the base plate is properly secured. If mounted on brick or light concrete we recommend to secure the base plate with through bolts.
2. When drilling with large or long drill bits we recommend to use two anchors of M16 size to fasten the base plate. The base plate BTS-3 is not recommended for drilling with large drill bits.

**WARNING!**

- The base plate must be securely fastened to perform safe drilling
 - Be careful to clean the mounting hole for the base plate with water or air before fitting an expander bolt.
-

**Important!**

- The MD1 can use very high torque on the spindle and if the base plate is not fastened according to the recommendations above, the base can twist under load and cause misalignment between drill bit and hole.
 - Never hit the column into position with a hammer or the like.
-

4.5.3 Mounting of CEG carriages, gliding type carriages

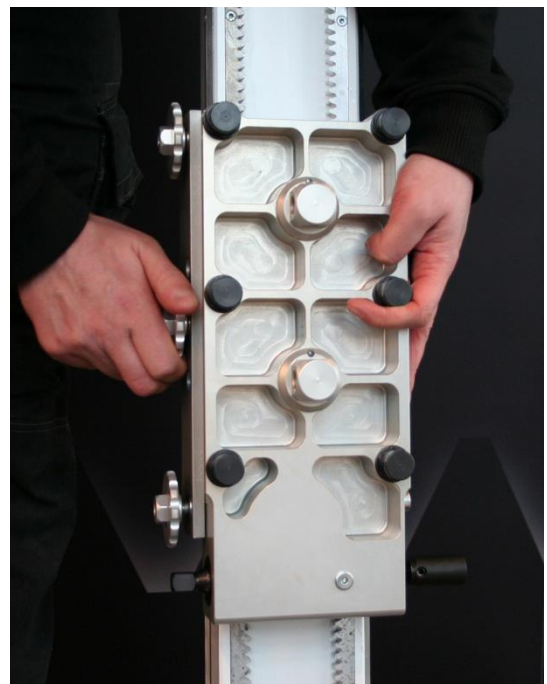
1. Open the three clamp nuts.
2. Put the carriage on the track as shown in the picture and align the feed gear with the rack on the track.
3. Tighten all three clamp nuts firmly first by hand and then with a 19 mm spanner to be firmly tightened, but not solid.



Note! Tighten firmly, but do not over tighten!



Note! The steel liner on the track and the green nylon slide on the carriage has to be clean before drilling is started. Lubricate the green nylon slides with some oil or fat.



Mounting of CEG carriage

4.5.4 Mounting of CER carriage, roller type carriage with manual feed

1. There is a latch on the CER carriage which prevents it from sliding along the track.



a. Locked position, in either direction.

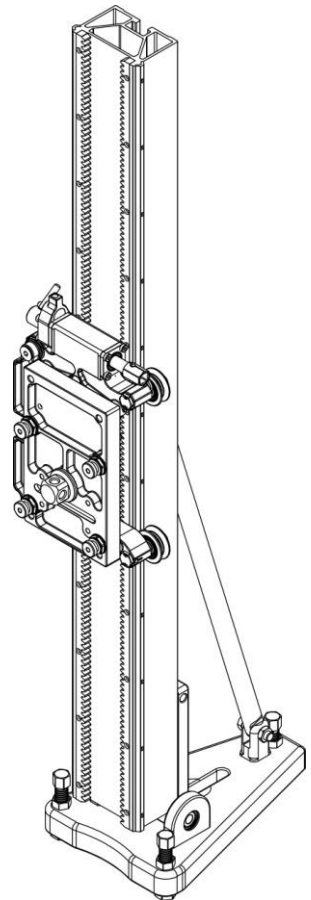


b. Neutral position, used when drilling.



Important! When mounting the CER carriage on the track it is important to don't let go of it until you are sure the latch is in a position so the drill motor cannot unintentionally slide along the track, see pictures above.

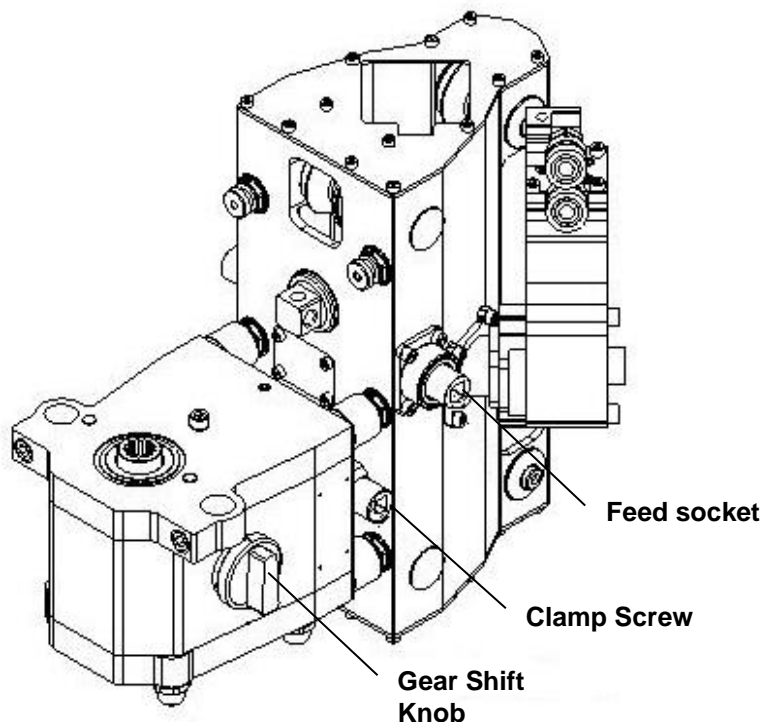
2. Open the handles.
3. Fold the carriage CER on to the track with the side without handles first.
4. Fold on the other side of the CER-carriage and close the handles. First the lower handle.
5. Adjust the carriage CER along the track so that the feed gear fits the rack on the track, then, close the upper handle.
6. Put the latch so that it cannot unintentionally be moved downwards when the drill rig is mounted for vertical drilling downwards.



CER-M3-MD1 roller type carriage with manual feed

4.6 Mounting of MD1 modules

4.6.1 Mounting of MG41 4-speed Gearbox



Gearbox - MG41 mounted on the carriage - CE1

The Pentruder drill system has a 4-speed gearbox to offer a wide speed range for various drill bit diameters. Performance and safety is increased as the spindle speed cannot be increased over the adjusted speed during drilling. Please see the chart on page 27 for gears and spindle speeds.

Mounting the gearbox on the carriage or extension adapter

1. Mount the gearbox on the quick release couplings on the carriage or the extension adapter. The quick release couplings make mounting and demounting easy and quick.
2. The Drill Motor assembly can be fitted in two positions for height, and upside down, without having to turn the carriage on the column.
3. Screw the clamp screw into the nut on the carriage. Do not over tighten the clamp bolt or the nut will be damaged.
4. Adjust the height of the carriage by turning the feed socket with a knuckle bar or with the feed unit.



Important! • Do not over tighten the clamp bolt or the nut will be damaged.

4.6.2 Gear change

1. Switch off the HF-motor by using the remote control. Disconnect the cable to the HF-motor and if automatic feed unit is used, disconnect the cable to this unit as well to prevent unforeseen movements.
2. Push and turn the gear shift knob to desired gear position. To make the gear engagement dogs mesh, turn the drill bit at the same time as the index knob is turned.
3. Connect the cables again and start the power pack.



Important!

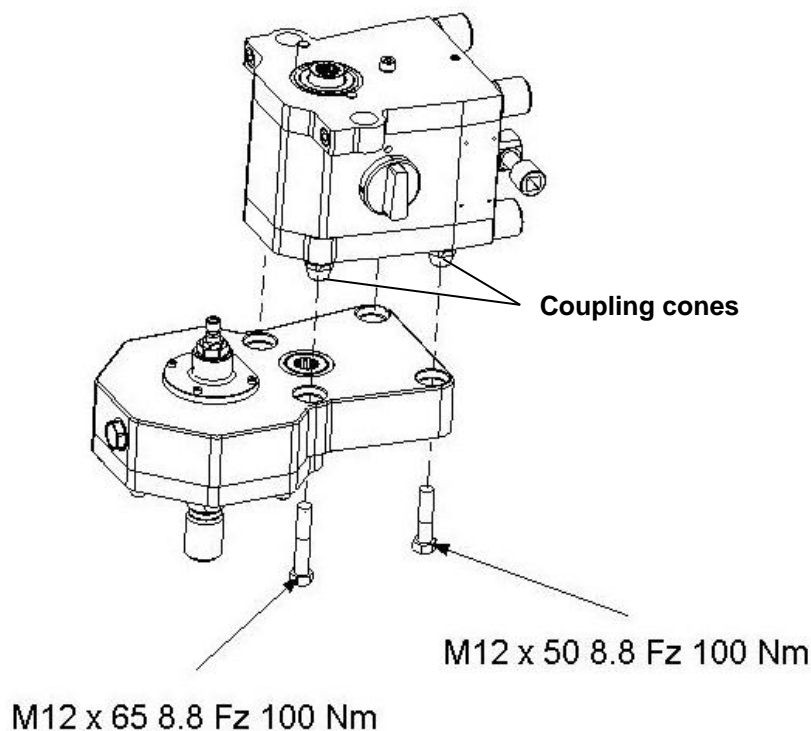
- Make sure the gear change knob is in the correct position before drilling is commenced. The gear position number should be aligned with the spot adjacent to the knob on the gearbox casing. Should drilling be started with the gear in the wrong position, the gearbox may be damaged.



WARNING!

- To avoid uncontrolled movement of the drill bit or carriage, always disconnect the cable to the HF-motor and if such a unit is used, the cable to the automatic feed unit before changing drill bit.

4.6.3 Mounting of Spindle unit - ST2/ST3



Spindle unit ST2/ST3 and gearbox MG41.

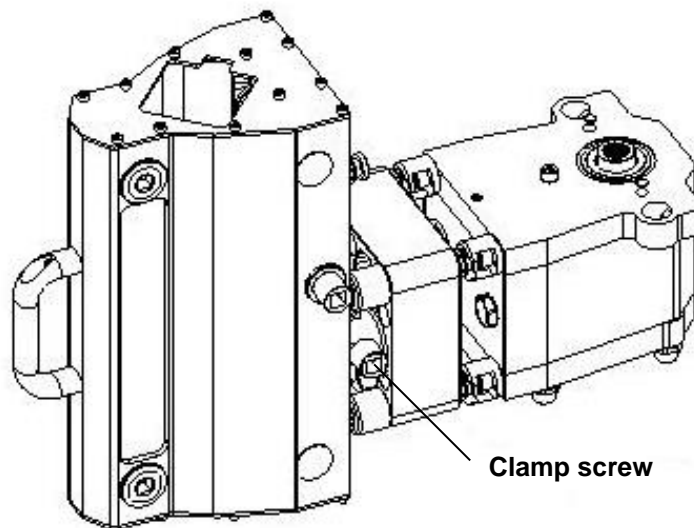
Two different spindle units are available to give a very wide speed range still using the same gearbox. The spindle unit can be exchanged and the speed can be adapted to what the work requires.

1. Clean the coupling cones thoroughly.
2. Mount the spindle unit on the gearbox and tighten the screws to 100Nm.

4.6.4 Mounting of extension adapter

1. Mount the extension adapter on the quick couplings on the carriage. Screw the clamp screw into the nut on the carriage. Don't over tighten as the thread in the nut can be damaged.
2. Fit the gearbox.

Note: The adapter can be mounted in two positions. In the picture below the adapter is mounted in the "lower position".



Extension adapter ERMD1 mounted between carriage CE1 and gearbox MG41

4.6.5 Spindle speeds

The chart below describes the spindle speeds of ST2 and ST3 with different HF-motors.

Spindle rpm with spindle units ST2 and ST3

Pentpak 418/422/427	1:st gear	2:nd gear	3:rd gear	4:th gear
15 kW HF-motor + ST2:	0-80 rpm	0-125 rpm	0-215 rpm	0-345 rpm
15 kW HF-motor + ST3:	0-160 rpm	0-260 rpm	0-445 rpm	0-700 rpm
18/22 kW HF-motor + ST2:	0-55 rpm	0-90 rpm	0-150 rpm	0-240 rpm
18/22 kW HF-motor + ST3:	0-115 rpm	0-180 rpm	0-315 rpm	0-500 rpm

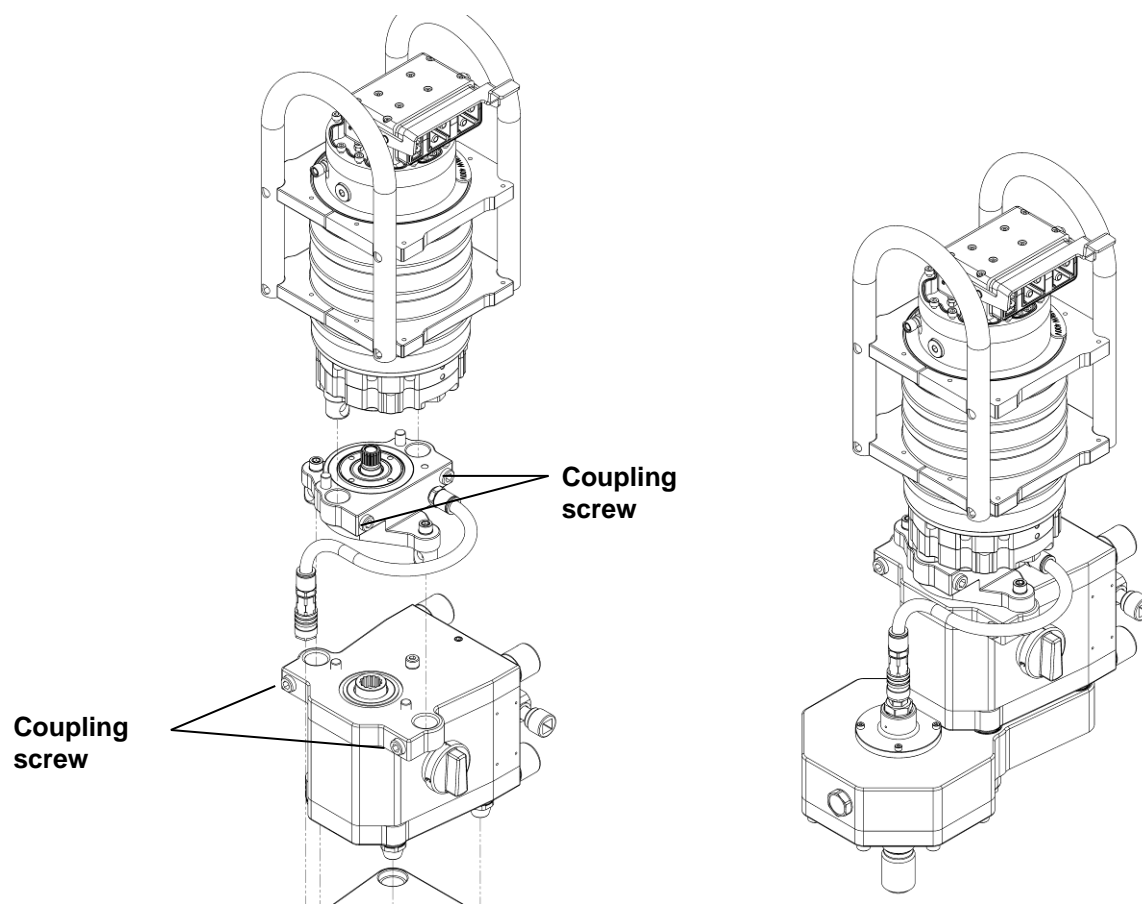
4.6.6 Peripheral speed

The peripheral speed (peripheral surface speed on the drill bit) is changed due to the diameter of the drill bit. A big diameter drill bit has a higher peripheral speed and a small drill bit has less speed at the same rotational speed. As a general rule, when choosing speed we can say:

- The harder the material to drill, the lower the peripheral speed should be.
- The more steel in the material to drill, the lower the peripheral speed should be.
- Porous material can be drilled with a higher peripheral speed.

Ask your Pentruder distributor for a chart with m/second for the spindle unit and HF-motor you have.

4.7 HF-motor 15, 18 and 22 kW

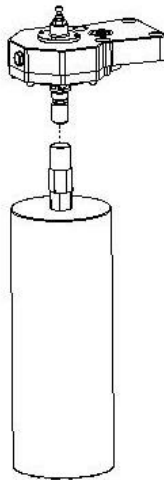


Positioning of HF-motor on HFMR-adapter and HFMR adapter on MG41 gearbox

4.7.1 Mounting of HF-motor and HFMR-MG41 adapter on the gearbox

1. Clean the adapter and gearbox before they are joined. Lubricate the splines lightly with grease.
2. Fit the adapter on top of the gearbox. Tighten the coupling screws with an 8-mm allen key.
3. Make sure the screws are carefully tightened. Remove and grease the coupling screws once a month.
4. Fit the HF-motor on top of the adapter and tighten the coupling screws with an 8-mm allen key.
5. Make sure the screws are carefully tightened. Remove and grease the coupling screws once a month.

4.8 Drill bit



Drill bit positioned to be fitted on the spindle unit - ST2/ST3

4.8.1 Mounting of the drill bit through threading

1. Clean the thread and lubricate with grease.
2. Thread the drill bit onto the spindle unit.
3. Check that the drill bit is correctly fastened.
4. If a "Slider" is used, be careful to check its condition prior to use. The ST1 and ST2 spindle units produce torque levels high enough to destroy the "Slider".



Important! • Don't use tools directly on the drill bit tube when mounting it.

4.8.2 Mounting of the drill bit using the Quick Disconnect Coupling (QDC) (if Spindle unit with QDC is used)

1. Before attempting to attach a drill bit to the spindle, make sure the drive motor, hydraulic or HF, is disconnected from its power source. If the spindle unit is equipped with a quick disconnect coupling, make sure the mating surfaces, the two slightly different diameters on the spindle, are clean and lightly lubricated with grease.
2. Make sure the mating surfaces inside the drill bit adapter are clean and lightly lubricated with grease.
3. Lightly tighten the lock screw on the spindle in a Clock Wise direction.
4. Attach the drill bit adapter, with drill bit, to the spindle, engaging the drive dogs with each other.
5. Firmly tighten the lock screw on the spindle in a Counter Clock Wise direction.
6. The drill bit is now ready to use.

4.8.3 Removing the drill bit using the Quick Disconnect Coupling

1. Before attempting to remove a drill bit from the spindle, make sure the drive motor, hydraulic or HF, is disconnected from its power source.
2. Turn the lock screw on the spindle in an anti Clock Wise direction until stop.
3. Remove the drill bit, carrying its weight with one hand, or get help from another operator if the drill bit is too heavy for one operator to handle safely.
4. Clean off any slurry on the spindle and inside the drill bit adapter after work is completed.



Warning! • The torque on the spindle is very high and careless handling of tools and an accidental start of the drive motor could cause severe or fatal injury to the operator.

4.8.4 Water cooling of the drill bit

The drill bit is cooled by water with first has been used to cool the HF-motor and Pentpak. The water is fed through the Pentpak and then to the drill unit through the hoses.

5 Pentpak HF-power pack

5.1.1 Positioning the power pack



Important! The power pack should be positioned away from where the drilling takes place and should be kept dry at all times. It should preferably be placed on a flat surface.



Important! Do NOT leave the power pack outside in the rain. The unit is ventilated but to prevent possible damage to electronic components we recommend that it is kept dry to prevent excessive condensation forming

5.1.2 Power connections

Electric power to the drive motor is supplied by one 18 mm diameter orange colour 9 m (30 ft) cord. The feed motor, if used, is supplied by one smaller diameter orange colour 9 m (30 ft) cord packaged together with a 10 mm water hose.

5.1.3 Connection to water supply:



Note! The power pack is water cooled and needs a minimum of 4 litres (1 gallon) of cool water per minute at full power output. The water pressure should be at least 1 bar (45 PSI) and maximum 5 bar (70 PSI). The water supply may only be connected to the short hose on the power pack water valve.

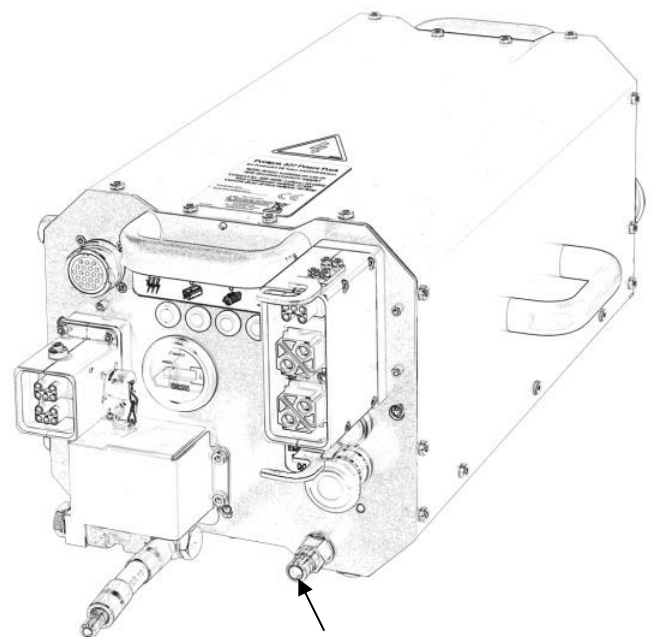


Important! In sub zero temperatures the remaining water inside the power pack cooling circuit must be blown out with compressed air.

Leaving water in the power pack in sub zero temperatures will destroy components in the power pack and potentially cause a complete failure of all electronic equipment inside the box.

The power must be switched ON, the water valve must be switched ON, the water couplings must be disconnected, and then the water can be blown out using compressed air.

Alternatively, if no electric power is available, blow backwards with compressed air in the coupling going to the saw head. The check valve in the water ON/OFF-valve will then open and the remaining water in the power pack can then be blown out.



HF-Pentpak

In sub zero temperatures, and if electrical power to the unit is not available, blow with compressed air in this coupling to remove water from the heat sink and tubing inside the power pack.

5.1.4 Connecting to remote control

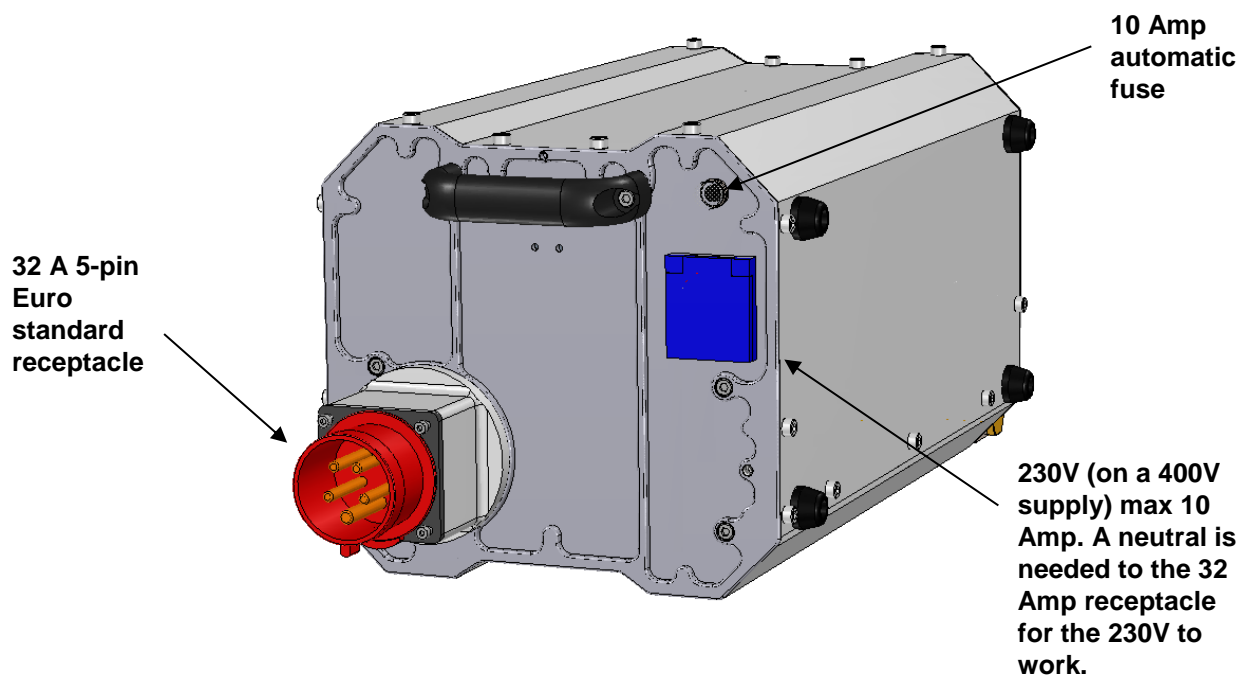
The multi pin connector must be in the correct position with the notch pointing upwards for the clamping ring to close.

5.1.5 Power supply

The power pack must be connected to a 5-pin 380 - 480V 3-phase supply with minimum 16 A fuses or 4-pin 200-230V 3-phase supply minimum 32 A fuses. A neutral wire is not needed other than for the 230V single phase supply (380-480V version only).

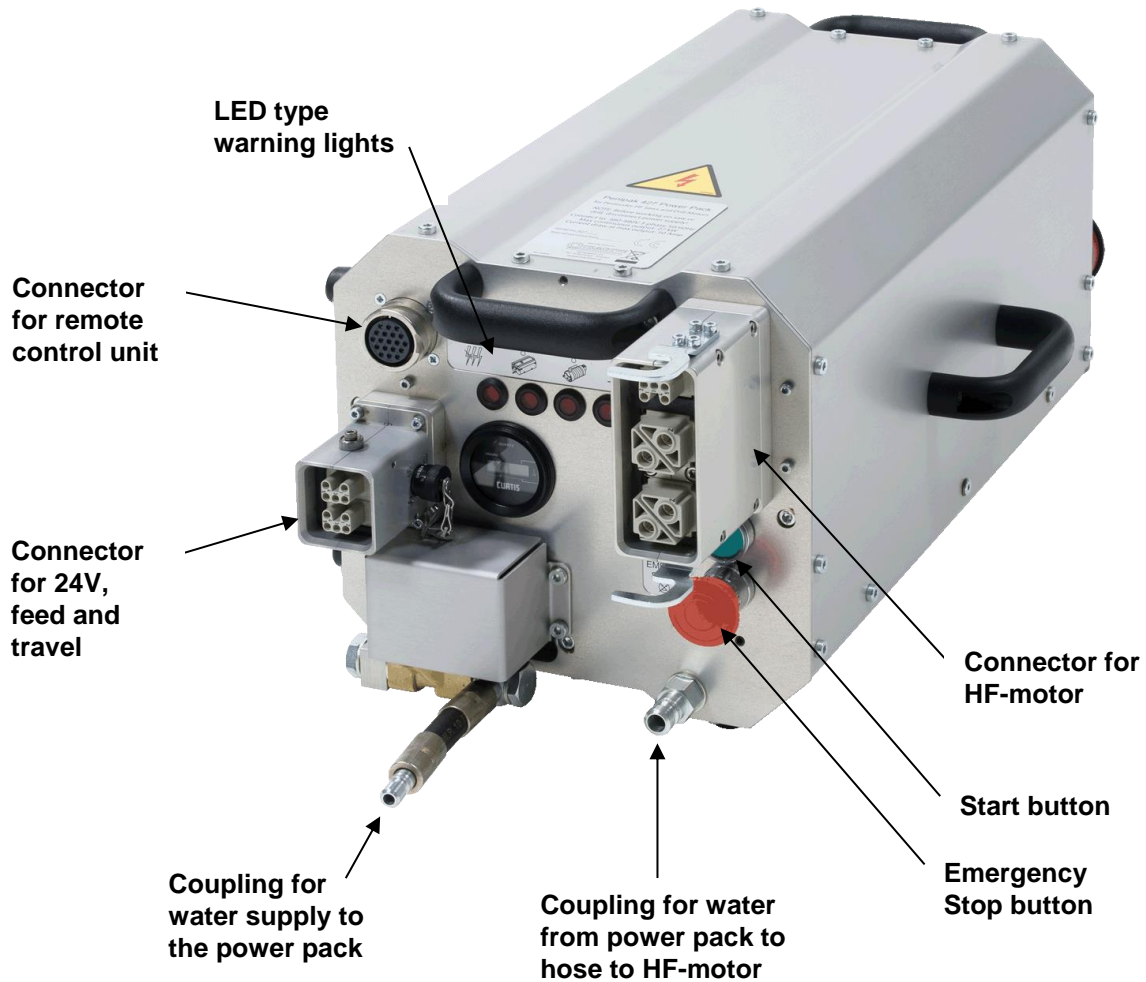
5.1.6 Connecting to mains

The power pack is equipped with a 32 A (380-480V) / 63 A (200-230V) receptacle . To use other sizes than 32 Amp plugs an adaptor must be fitted.



5.1.7 Starting the HF-power pack

Connect all cords, i.e. HF-motor, feed and travel, remote control to the power pack and lastly the main supply 380-480V / 200-230V. Then press the green start button. A green light in the button should then come on.



5.1.8 LED type warning lights on the power pack

There are four red warning LED:s on the Pentpak. Below is an explanation of the respective functions.

LED for indication of loss of one or more phases

One blink:



Loss of phase on mains. Loss of one power supply phase line can be caused by a blown fuse, faulty cords, faulty plugs or receptacles, or other problems. If the light is on, check fuses, input voltage, cords etc.

Two blinks:



Too low incoming voltage. This can be caused by too long and/or small extension cables. Check voltage, connectors, cords and generator if applicable.

Three blinks:

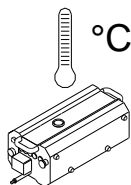
Too high incoming voltage. Connect only to 3-phase 380-480V / 200-230V. Check voltage, connectors, cords and generator if applicable.

With one phase missing from the power supply, feeding may work, but the HF-motor will not start.

General advice to eliminate any of the above fault conditions: Eliminate the cause of the problem, i.e. replace blown fuses, repair cords, repair or replace plugs and receptacles.

LED indicating status for the Pentpak

One blink:



Overcurrent alarm. May occur if the blade is jammed/drill bit or wire is blocked in the cut. Press start HF-motor switch to reset or unplug the unit for 60 seconds.

Two blinks:

Unknown device connected to Pentpak. Software update needed in Pentpak.

Three blinks:

Other alarm for frequency inverter. Unplug the unit from the power supply, wait at least one minute and plug it in again. If the alarm has gone away you can proceed as normal. If the alarm doesn't go away, the unit must be checked by a technician trained on Pentruder equipment.

Four blinks:

Frequency inverter alarm. This must be checked by a technician trained on Pentruder equipment.

Quick blinks:

Temperature in the frequency inverter has risen to a too high level. Protect Pentpak from direct sunlight, increase water flow.

Continuously on:

The Pentpak is shut off due to over temperature.

LED indicating status for the HF-motor

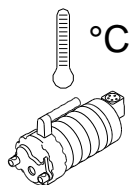
- 1) Pentpak is powered, but the green start button on the Pentpak button has not yet been pressed. A test is made for the digital communication to the HF-motor and the chassis.

One blink: Short circuit in the digital communication system. The fault can be in the HF-motor, motor cable or inside the Pentpak.

- a) Disconnect motor cable from Pentpak. If the alarm disappears, go on to b). If the alarm remains the same the Pentpak is faulty.
- b) Connect motor cable to Pentpak and disconnect HF-motor. If the alarm disappears, go on to c). If the alarm appears when connecting, the cable is faulty.
- c) Connect motor cable to Pentpak and HF-motor. If the alarm appears when connecting, the connector on the HF-motor is faulty.

- 2) Pentpak is powered, and the green start button on the Pentpak button has been pressed.

One blink:



The HF-motor chassis-ID is wrong. Nothing is broken, but the HF-motor is incompatible with the Pentpak or the machine. Pentpak software update needed.

Two blinks:

HF-motor temperature sensor in windings is not working correctly.

Three blinks:

HF-motor or motor cable is not working correctly. Short or open circuit.

Quick blinks:

HF-motor temperature is high, output power is automatically reduced. Increase water flow.

Continuously on:

HF-motor has been shut off due to over temperature. This can also indicate that no HF-motor is connected or that the power pack doesn't find a motor, e.g. damaged motor-ID chip or motor cable.

**Important:**

- The motor will be switched off automatically when the motor winding temperature is over 140°C (284°F). The coolant water should then be left running through the power pack and HF motor to avoid terminal overheating.
- **If the water is turned off after the motor has been switched off automatically, and when the warning light is on, terminal damage to the motor windings may occur.**
- The outside temperature of the motor is no indication of the inside temperature of the motor. The temperature sensor is placed inside the motor windings and does not monitor the outside temperature of the motor. The windings can be working at a high temperature even if the motor is cold on the outside.
- The warning light will be off when the temperature has gone down to a temperature below 110°C. The motor cannot be restarted until the warning light goes off.

LED indicating status for the feed and travel drive system

- 1) Pentpak is powered, but the green start button on the Pentpak button has not yet been pressed. A test is made for the can-bus to the HF-motor and the chassis.

Three blinks:

Short circuit in the digital communication system. The fault can be in the saw head, 24V cable or inside the Pentpak.

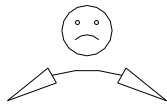
- a) Disconnect 24V cable from Pentpak. If the alarm disappears, go on to b). If the alarm remains the same the Pentpak is faulty.
- b) Connect 24V cable to Pentpak and disconnect saw head. If the alarm disappears, go on to c).
If the alarm appears when connecting, the cable is faulty.
- c) Connect 24V cable to Pentpak and saw head. If the alarm appears when connecting, the connector on the saw head is faulty.

- 2) Pentpak is powered, and the green start button on the Pentpak button has been pressed.

One blink:

Short circuit in the feed cable, saw head or any of the feed motors.

Two blinks:



24V under voltage alarm. The voltage has dropped below 18V.

Three blinks:



Automatic identification of machine type not working correctly. The chassis-ID is wrong. Nothing is broken, but the HF-motor is incompatible with the Pentpak or the machine. Software update needed in Pentpak.

Four blinks:

No digital servo found. Digital servo is defective.

Continuously on:

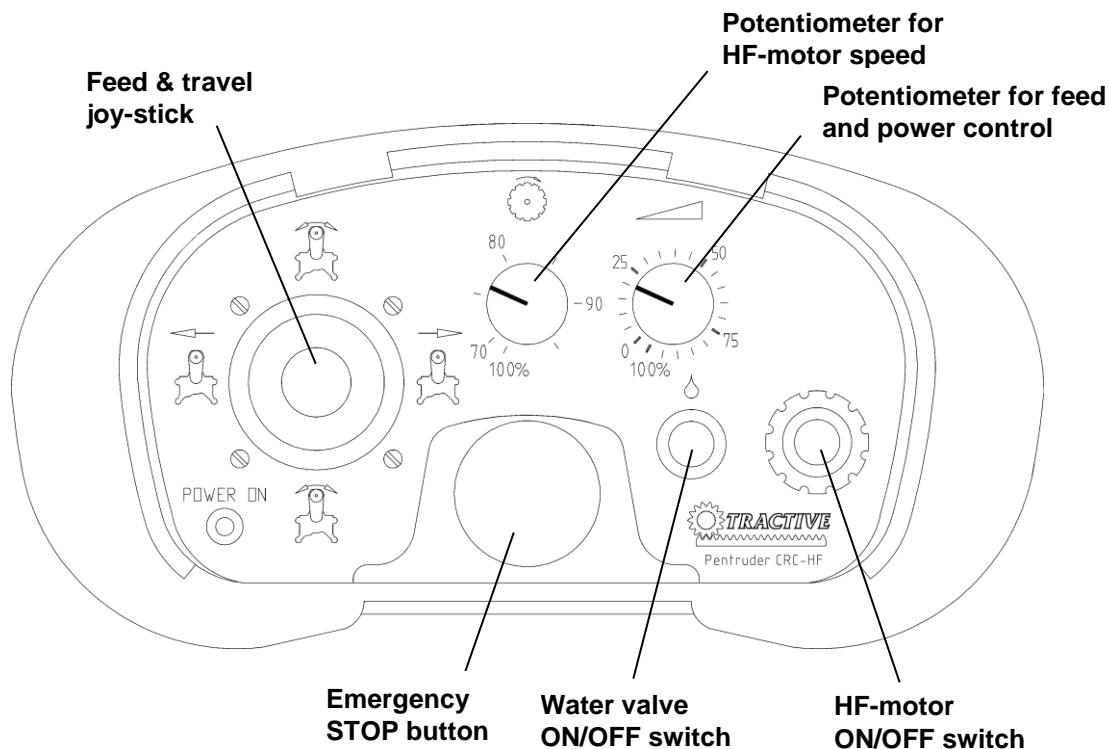
The digital servo has shut off due to over temperature. Push the emergency stop button to reset.

This can also indicate that no saw head is connected or that the power pack doesn't find the saw head, e.g. damaged chassis-ID chip or 24V cable.

To reset the alarm, press the emergency stop button and wait until the alarm lamp goes out. Then press the green start button to start the power pack again.

5.2 Remote control unit

The remote control unit is connected to the power pack through a 19-pole round connector. It is not possible to control any functions on the power pack unless the remote control is connected to the power pack.



Available functions:

HF-motor ON/OFF switch: First push forward and hold the switch for Water ON/OFF and then, within 5 seconds, push the HF-motor ON/OFF switch forward to start the HF-motor. The drill bit will start rotating slowly. Turn up the rpm by turning HF-motor speed knob. See below and also 6.2 starting the Pentruder MD1 HF-drilling machine and 4.6.5 Spindle speeds.

To stop the blade, push the Blade ON/OFF switch forward once again.

Switch for water valve: Move the switch forward to start and stop the water flow through the machine. The water flow will be switched on automatically when the HF-motor is started. The water will be left running when the HF-motor is stopped and the water must be switched off by using the Water valve ON/OFF switch.

Potentiometer for HF-motor speed:

The minimum speed is set at approximately 3% of the maximum speed. Full power is available when the potentiometer knob is between 85 % and 100 % on the potentiometer scale. At its maximum CW position the motor power output is 100%.

Manual feed: Potentiometer for feed and power control:

When manual feed is used, the potentiometer for feed and power control can be used as a maximum power limiter. If set to a certain value the rpm will drop on the drill bit when that limit is reached. This can help the operator not to overload the drill bit.

**Automatic feed:
Potentiometer for feed
and power control:**

As long as the HF-motor has no or very low load, the potentiometer is used only to control feed speed on the track/column. From the moment the drill bit touches the concrete and a preset amperage draw is exceeded, the potentiometer changes its function and is then used to control the power used on the drill bit.

Between 80 - 100% the system will always try to reach maximum power. At 100 % the feed regulation is more aggressive than at 90 or 80%, but the machine will always try to reach maximum power also at the 80% or 90% setting. If the potentiometer is turned below 80% the power output will be reduced correspondingly.

Feed and travel joystick: Flick the joystick up or down to move the carriage along the track/column (only when automatic feed is used).

**In case of a jammed
drill bit:**

The power pack has an automatic function for resetting the frequency inverter if the drill bit is jammed. Move the drill bit out of the cut, or at least to a position where it can be started without too much resistance, and press the HF-motor ON/OFF switch forward once, then it takes approximately 15 seconds for it to reset. Certain reset procedures are activated depending on how sudden the stop was.

If the drill bit is jammed very, very abrupt, the reset procedure might not be enough. In this case you need to unplug the unit from the power supply, wait for 30 seconds and plug it in again.



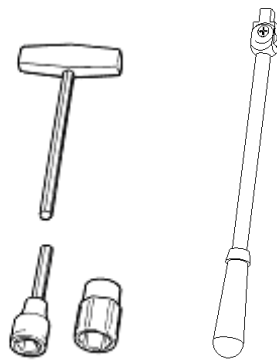
Note!

If one of the emergency stop buttons are pressed or the unit has been unplugged from the power supply, both the blade speed and the feed and travel potentiometer must be returned to zero before the machine is operational again.

6 Drilling

6.1 Preparations before commencing work.

- Cleaning:** The machine should be carefully cleaned and all functions checked and be found normal before use of the machine.
- Base plate:** Be sure to mount the base plate as securely as possible.
- Tools:** Use only those tools that are intended to be used to operate the machine: Knuckle bar 400 mm 1/2" and an extension 1/2" L = 125 mm (not shown in the picture.) 15 mm wrench to adjust carriage rollers.



Tool kit.

- Quick disconnects:** Check all quick disconnect couplings for correct function and cleanliness.
- Remote Control unit:** Check the remote control unit for correct function and that the multi-pin-plug is free from dirt and undamaged.
- Water feed:** Check that the machine can be supplied with clean cold water.
- Cables/hose:** Check that all cables and water hose are in faultless condition.
- Power supply:** Check if sufficient power is available on the site. The power pack must be connected to a 5-pin 380 - 480V 3-phase supply with minimum 16 A fuses or 4-pin 200-230V 3-phase supply minimum 32 A fuses. A neutral wire is not needed other than for the 230V single phase supply (380-480V version only).
- Safety precautions on the site:** Check with the foreman responsible that all necessary precautions have been performed before commencing work. Await the approval of the safety precautions and mounting position of the machine from a responsible person before work is commenced.
- Safety** Show all persons involved how the emergency stop on the machine is working.

6.2 Starting the Pentruder MD1 HF-drilling machine

All preparations above should be finished before starting the machine. The safety instructions have to be followed.

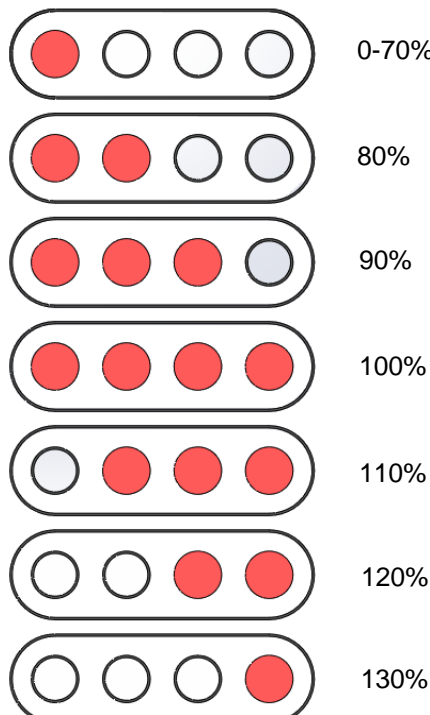
6.2.1 Starting sequence

1. **Make sure** that the drill bit runs true and is not damaged, for instance that no segment is missing.
2. **Make sure** that correct RPM is used for the drill bit diameter.
3. **Check** if something is embedded in the concrete, or instance re-bars, and adjust the drilling thereafter.
4. **Push** the green start button on the Pentpak.
5. **Check** that the cooling water to the power pack is on and that water feeds to the drill bit through the spindle unit by pressing the water switch on the remote control.
6. **Turn** the HF-motor speed control and feed control knob on the remote control to max CCW position (lowest speed).
7. **Start the drill bit rotation:** push forward and hold the switch for Water ON/OFF and then, within 5 seconds, push the HF-motor ON/OFF switch forward to start the HF-motor. The drill bit will start rotating slowly. Turn up the rpm with the HF-motor speed knob on the remote control to achieve the appropriate spindle speed.
8. **Manual feed:** Use a knuckle bar to feed the carriage along the column or track. When using manual feed, the LED's on the Pentpak will work as a display and show the power of the HF-motor. The pressure on the drill bit can be followed on the LED's. The function as warning lights has priority and in case of an alarm this will be shown instead of the HF-motor power.

The function of the LED's is shown from the left to the right as follows:

LED:s on Pentpak

HF-Motor-power on the drill bit



9. **Automatic feed:** Turn the potentiometer for feed and power control on the remote control to adjust the speed and pressure/power on the drill bit. The feeding speed is regulated until a smooth and even speed is achieved.

**Important!**

Don't increase the feeding speed/pressure of the drill bit when drilling in re-bars. Decrease the feeding speed instead until the re-bars are drilled through.

10. **Gear change:** Shut off the operation of the drill unit with the HF-motor ON/OFF switch on the remote control. Disconnect all cables from the machine before changing gear. Push the index knob when changing gear. The change of gear is facilitated if the drill bit is turned at the same time as the index knob.

**Important!**

- Never change the gear while the drill bit or the HF-motor is running.
 - Make sure the gear is in the correct position before drilling is commenced. Should drilling be started with the gear in the wrong position, the gearbox may be damaged.
-

11. **Re-start after gear change:** Connect the cables again and start, see above.
12. **Change of drill bit:** See also page 29 Drill bit. Shut off the operation of the drill unit with the HF-motor ON/OFF switch on the remote control. Disconnect all cables from the machine before removing the drill bit. Mount the new drill bit by threading it on to the spindle unit.
13. **Re-start after change of drill bit:** Connect the cables again and start, see above.
14. **Drilling is finished:** Shut of the operation of the HF-motor with the HF-motor ON/OFF-switch and then the power pack.
If there is a risk of temperatures below zero, the remaining water inside the power pack cooling circuit must be blown out with compressed air. The power must be switched ON, the water valve must be switched ON, the water couplings must be disconnected, and then the water can be blown out using compressed air. Alternatively, if no electric power is available, blow backwards with compressed air in the coupling going to the saw head. The check valve in the water ON/OFF-valve will then open and the remaining water in the power pack can then be blown out.

**Important!**

- If material should get stuck between the drill bit and the wall of the drill hole, shut off the spindle, the power pack and try to remove the bit.
 - Remember to cover drilled holes.
 - If the drill core should get stuck in the drill bit when removing it, increase the water flow if possible and tap lightly on the drill bit until the drill core gets loose.
 - Never leave the drill core in the drill bit when taking the drill bit out after drilling a hole in a wall. The drill core can weigh a lot and make the drill spindle break and the drill column fall down due to overload of the pivoting head and its couplings. First remove the drill bit from the drill spindle, then remove the drill bit with the drill core from the wall using a crane or other device.
 - Inspect the drill bit before drilling is commenced to see if the drill bit runs true or if segments are missing. Never use a faulty drill bit!
-

**Warning!**

If there is a possibility that Drill CORES may fall causing injury or damage to persons or property then they must be secured before starting work. The risk area must be roped off and a responsible person left in charge, in a safe place, to prevent entry of unauthorized persons.

6.2.2 Drilling with a big or long drill bit

When drilling with a big or long drill bit a big and heavy body is in movement which contains a lot of energy when rotating. Therefore it is crucial to assemble the drilling machine following the instructions given in this operator's manual. The following are steps which are extra important when drilling with a big or long drill bit.

1. **Fasten the base plate securely with two anchors** of preferable M16 size, or minimum M12. Otherwise the base can twist under load and cause misalignment between drill bit and hole.
2. **Tighten all bolts** on the base plate, the back brace and the track. Do not overtighten the two bolts that clamps the track to the base plate. If over tightened, the track T-slot can be deformed, and then the base-to-track stability is compromised.
3. **Clean and lubricate the green plastic liners**, on the CEG drill carriage, with some grease. Tighten the adjustment nuts on the drill carriage so that any play is eliminated. The CER-carriage with rollers should not be used for drill bits bigger than 600 mm.
4. **Clean and lightly grease** the QDC quick disconnect coupling (if a QDC is used), both the spindle on the ST2 or ST3 spindle unit and the internal part of the drill bit adapter, and the lock screw. If a fixed spindle is used this should also be cleaned and lightly greased as well as the thread on the drill bit.
5. **Start approaching the wall with the drill bit, with a much reduced speed of the drill bit** by positioning the ON/OFF lever in an intermediate position. Do not use full speed. It is necessary to be very gentle when the drill bit is fed into the wall. The first 10 mm are crucial for successful drilling when the drill bit plunges further in. If the drill bit starts with a misalignment, then this misalignment will grow the deeper the drill goes, ending up in a lot of friction between the drill bit inside and outside wall, and the hole. It is crucial to get a very good alignment from the start. If the alignment is good, then the friction between the drill bit and the hole will be greatly reduced, and the torque needed to drill the hole will be much lower. This will minimize problems with twisting.
6. **Drill gently for at least the first 10 – 20 mm, or more**, then full speed can be applied. When the drill bit has penetrated about 10 - 20 mm into the wall, full speed can be applied.



Important!

- Please remember that the MG41 and ST2 puts out enormous torque (see chart on page 43), and with an operator which is not used to this high torque, there will be problems with twisting of the track/column.
 - The motor will not stop because of the high drill pressure, it will drive the drill bit with very high torque and the result will be a twist in the track, and misalignment of drill bit in relation to the hole.
-



Warning!

- The operator must understand that the feed is very powerful too. It is driven by a really slow worm gear transmission, and very little effort is needed on the feed handle to give an enormous feed force on the drill bit. With only one M12 anchor, the anchor can actually be pulled out of the concrete.
-

7 MAINTENANCE

For the Pentruder modular drill system / Pentpak 15/20/25 to remain in a condition which is safe for operation at all times, certain maintenance is needed. Please read the instructions below carefully before any service work is commenced.

For safe and uninterrupted operation of the machine, we strongly recommend that the complete machine is brought back to your dealer for service once a year. At this service the machine is checked for proper function and all components critical for safe and reliable operation are checked and replaced if necessary.

Please respect the following maintenance instructions:



Warning!

- No service or maintenance may be performed on the power pack unless it is disconnected electrically from the mains.
 - No service or maintenance may be performed on the saw head unless it is disconnected electrically from the power pack.
-

7.1.1 Remote control unit

Check the remote control unit for correct function and that the multi-pin-plug is free from dirt and undamaged.

7.1.2 Gearbox MG41 - Oil change

The Pentruder drill system has a separate 4-speed gearbox which is lubricated in a separate oil bath. To change oil, unscrew the oil-plug and drain completely. Refill with 0.4 L of GL5 specification gearbox oil, preferably synthetic oil with 75W/90 viscosity. Clean the magnetic plug, fit it and tighten firmly again.

7.1.3 Spindle unit ST2/ST3 - Oil change

The Pentruder drill system has a separate output gearbox or spindle unit which is lubricated in a separate oil bath. To change oil, unscrew the oil-plug and drain completely. Refill with 0.2 L of GL5 specification gearbox oil, preferably synthetic oil with 75W/90 viscosity. Clean the magnetic plug, fit it and tighten firmly again.

7.1.4 Cleaning

The machine should be carefully cleaned and all functions checked and be found normal before use of the machine.

7.1.5 Cable / Water hose

Check that all cables and water hose are in faultless condition.

7.1.6 Slip clutch for HF-motor

If the overload clutch (slip clutch) has been overloaded or worn, this can be repaired at a workshop which is authorized to repair Pentruder machines.

8 Technical Data

Pentruder MD1 – Modular HF-Drilling Machine

4-speed gearbox- MG41

Technical data for 4-speed gearbox MG41

	MG41
Max power throughput:	12 kW (16 HP)
Number of speeds:	4
Width including gear shift knob mm / inch:	192 / 7.6
Height mm / inch:	142 / 5.6
Depth mm / inch:	213 / 8.4
Weight kg / lbs:	7.1 / 15.7

Spindle units - ST2 and ST3

Technical data for spindle units ST2 and ST3

	ST2	ST3
Spindle thread:	1-1/4" – 7 UNC	1-1/4" – 7 UNC
Weight kg / lbs:	7.0 / 3.1	7.0 / 3.1
Lubrication:	Oil	Oil

Spindle rpm with spindle units ST2 and ST3

Pentpak 418/422/427	1:st gear	2:nd gear	3:rd gear	4:th gear
15 kW HF-motor + ST2	0-80 rpm	0-125 rpm	0-215 rpm	0-345 rpm
15 kW HF-motor + ST3	0-160 rpm	0-260 rpm	0-445 rpm	0-700 rpm
18/22 kW HF-motor + ST2	0-55 rpm	0-90 rpm	0-150 rpm	0-240 rpm
18/22 kW HF-motor + ST3	0-115 rpm	0-180 rpm	0-315 rpm	0-500 rpm

Torque with spindle units ST2 and ST3

Pentpak 418/422/427	1:st gear	2:nd gear	3:rd gear	4:th gear
15 kW HF-motor + ST2	1450 Nm	910 Nm	530 Nm	330 Nm
15 kW HF-motor + ST3	700 Nm	440 Nm	250 Nm	160 Nm
18 kW HF-motor + ST2	1740 Nm	1100 Nm	640 Nm	400 Nm
18 kW HF-motor + ST3	840 Nm	530 Nm	310 Nm	190 Nm
22 kW HF-motor + ST2	2120 Nm	1340 Nm	780 Nm	490 Nm
22 kW HF-motor – ST3	1020 Nm	640 Nm	370 Nm	230 Nm

Extension adapter – ERMD1:*Technical data for extension adapter ERMD1*

	ERMD1
Extends distance between column and spindle mm / inch:	90 / 3.5
Weight kg / lbs:	3.3 / 7.3

Max drill bits with and without Extension adapter ERMD1

Max Ø drill bit with: (mm / inch)	Track (MCCS)	70 mm Column
Spindle unit ST2/ST3 (w/o ERMD1):	630 / 24.8	600 / 23.6
Spindle unit ST2 + 1 x ERMD1:	820 / 32.3	790 / 31.1
Spindle unit ST2 + 2 x ERMD1:	1010 / 39.7	980 / 38.5
Spindle unit ST2 (3 x ERMD1:	1200 / 47.2	1170 / 46

Base plates – 70 mm column system:*Technical data for Base plates BE1, BE2 and BETC*

	BE1	BE2	BETC
Width including wheels mm / inch:	492 / 19.4	492 / 19.4	492 / 19.4
Width less wheels mm / inch:	380 / 15	380 / 15	380 / 15
Length including support legs and wheels mm / inch:	610 / 24 with support legs in	610 / 24 with support legs in	610 / 24 with support legs in
Length less wheels, front and rear legs mm / inch:	426 / 16.7	426 / 16.7	426 / 16.7
Height not including coupling cone mm / inch:	111 / 4.4	111 / 4.4	111 / 4.4
Length / width of slot for anchoring mm / inch:	100 x 22 / 4 x 0.9	100 x 22 / 4 x 0.9	100 x 22 / 4 x 0.9
Size of wheels mm / inch:	Ø 160 / 6.3	Ø 160 / 6.3	Ø 160 / 6.3
Weight including wheels and support legs kg / lbs:	18.5 / 40.7	19.5 / 43	14.8 / 32.6
Weight less wheels and support legs kg / lbs:	12.8 / 28.2	13.8 / 30.4	9.1 / 20
Coupling	Fixed, front mounted	Swivelling, front mounted	Fixed, top mounted

Columns – CN – 70 mm:*Technical data for column CN*

	CN 0.5 F/M-70	CN 1.2 F/M-70	CN 1.5 F/M-70	CN 0.5 F/J-70	CN 1.2 F/J-70	CN 1.5 F/J-70
Length mm / inch:	508 / 20	1200 / 47.2	1500 / 59	508 / 20	1200 / 47.2	1500 / 59
Weight kg / lbs:	6.4 / 14.1	11.9 / 26.2	14.3 / 31.5	6.6 / 14.5	12.1 / 26.6	14.5 / 32
Coupling:	Female/Male	Female/Male	Female/Male	Female / Jack screw	Female / Jack screw	Female / Jack screw
Extendable:	Yes	Yes	Yes	No	No	No
Fits base plates:	BE1, BE2, BETC	BE1, BE2, BETC	BE1, BE2, BETC	BE1, BE2, BETC	BE1, BE2, BETC	BE1, BE2, BETC

CE1 carriage and PT-MD1 feed unit– 70 mm column system:*Technical data for CE1 carriage and PT-MD1 feed unit*

	CE1
Width incl ½" socket mm/inch	219 / 8.6
Width housing mm / inch:	150 / 5.9
Length mm / inch:	376 / 14.8
Depth mm / inch	228 / 9
Weight l kg / lbs:	9.3 / 20.5

Pivoting head - PD1 – 70 mm column system:*Technical data for pivoting head PD1*

	PD1
Width including coupling and ½" drive socket mm / inch:	236 / 9.3
Width housing mm / inch:	106 / 4.2
Length mm / inch:	320 / 12.6
Depth incl. clamp screws mm / inch:	170 / 6.7
Weight kg / lbs:	7.7 / 17

Base plate – BTS3/BTS4 – MCCS:*Technical data for base plates BTS3 and BTS4*

	BTS3	BTS4
Width mm / inch:	492 / 19.4	492 / 19.4
Length mm / inch:	610 / 24	610 / 24
Weight kg / lbs:	18.5 / 40.7	19.5 / 43

Tracks TS:*Technical data for track TS*

	TS0.85	TS1.15	TS2.0	TS2.3	TS3.45
Length mm / inch	850 / 33.5	1150 / 45	2000 / 79	2300 / 90	3450 / 136
Weight kg / lbs	5.9 / 13	8.0 / 17.6	13.9 / 30.6	16.0 / 35.3	24.0 / 52.9
Fits base plates	BTS3, BTS4	BTS3, BTS4	BTS3, BTS4	BTS3, BTS4	BTS3, BTS4

Carriages CEG/CER - MCCS:*Technical data for CEG and CER carriages*

	CEG-E-MD1	CEG-M25	CER-M3-MD1
Type:	Gliding	Gliding	Rollers
Feed:	Automatic	Manual, 1:25	Manual, 1:3
Max drill bit Ø mm:	1200	1200	600

Hörfrekvensmotorer – HFR:*Technical data Pentrunder HF-motors*

	HFR418 - 18 kW	HFR422 - 22 kW	HFR427 - 27 kW
Weight kg:	16.5	18	18

Pentpak power packs

	Pentpak 418 / 422 / 427	Pentpak 200* / 218 / 222
Input voltage:	380 – 480 V	200 – 230 V
Input frequency:	50 – 60 Hz	50 – 60 Hz
Output frequency:	300 – 500 Hz	300 – 500 Hz
Input power maximum:	31 kW	31 kW
Max. continuous output power (depending on motor size):	15 / 18 / 22 / 27 kW	15 / 18 / 22 / 27 kW
Minimum fuse**:	16 Ampere(25 Ampere for 27 kW)	40 Ampere
Recommended fuse:	40 Ampere	80 Ampere
Current draw at max. output:	56 Ampere (15 – 22 kW)	90 Ampere
Recommended generator size:	45 kVA	45 kVA
Output voltage to feed and travel motors:	24 VDC	24 VDC
Height (incl. handles connectors etc.):	28 cm (11")	28 cm (11")
Width (incl. handles connectors etc.):	30 cm (11.8")	30 cm (11.8")
Length:	68 cm (26.8")	68 cm (26.8")
Weight:	26 kg (57.3 lbs)	26 kg (57.3 lbs)

*400 Hz

** The power output must be reduced to about 65% by turning the feed rate knob to 65%.

Declaration of conformity

We, Tractive AB declare that the machine

Manufacturer: Tractive AB
Gjutargatan 54
78170 Borlänge
Sweden

Category: Hydraulic Drilling System

Type: Pentruder MD1 High Frequency Drilling Machine

Is in conformity with the provisions of the Machinery Directive 2006/42/EC.

Is in conformity with the provisions of the following other EC-directives:

- Low Voltage Directive 2006/95/EC
- EMC-Directive 2004/108/EC

In accordance with the EC-declaration of conformity, the product must not be modified without the manufacturer's permission. If this occurs, this documented EC-declaration ceases to apply and the modifier is considered to be the manufacturer and must verify and draw up an addendum to the EC-declaration and file technical data for the inspection authority.

Borlänge 21st of February, 2011



Anders Johnsen

Technical Director

Declaration of conformity

We, **Tractive AB** declare that the machine

Manufacturer: Tractive AB
Gjutargatan 54
78170 Borlänge
Sweden

Category: High Frequency Power Pack
Make: Pentpak
Type: 427 / 422 / 418 / 222 / 218 / 200

Is in conformity with the provisions of the Machinery Directive 2006/42/EC.

Is in conformity with the provisions of the following other EC-directives:

- Low Voltage Directive 2006/95/EC
- EMC-Directive 2004/108/EC

In accordance with the EC-declaration of conformity, the product must not be modified without the manufacturer's permission. If this occurs, this documented EC-declaration ceases to apply and the modifier is considered to be the manufacturer and must verify and draw up an addendum to the EC-declaration and file technical data for the inspection authority.

Borlänge 21st of February, 2011



Anders Johnsen

Technical Director