

Atlas Copco Geotechnical Engineering Products

Mustang geotechnical drilling rigs



Atlas Copco



Mustang geotechnical drilling rig – designed for your productivity

The Mustang series of rigs is a flexible concept for geotechnical drilling, designed by experience. This is the rig which can provide maximum productivity not only for the drilling operation, but for the ownership as a whole.

Flexibility of use - better rig utilization

In today's competitive business, drilling needs to be efficient and utilization of drilling rig must be as high as possible. When facing a multitude of applications, it is good to know that your partner on the job can deliver results for any kind of geotechnical drilling application. The Mustang rigs support most drilling methods on the market, including auger, core, rotary and percussive drilling (DTH and topammer). The rigs can as well be used in combination with overburden drilling systems like Odex and Symmetrix.

Keeping life time cost low

A rig investment must pay off today as well as tomorrow. The business climate changes quickly, and the winners will be the ones who can adapt to changing requirements quicker than the competition. Regardless whether the job is tieback anchoring today, the rig must be able to cope with auger drilling in loose ground tomorrow. A Mustang can be the difference that decides whether tomorrow will bring challenges or opportunities. Mustang means flexibility to expand the business.

Flexibility of design

The Mustang family is based on four series - the Mustang 4, 5, 9 and 13,

classified according to feed/lifting capacity. Each serie has been designed for a range of uses and environments, based on many years of experience.

We use standard modular components - feeds, rotation units, boom systems and basic frames - all which can be combined on a large variety of carriers. Add to this a wide selection of options to choose from - rod holders and breakers, winches, flush pumps, diverter heads, jet grouting kits etc. - and you have a real opportunity to specify the ideal rig to meet your needs.

Simple solution dedicated to the job

The Mustang rigs are dedicated to the job they are assigned to. With a simple design, where each component does what it's intended for, the rig is not only reliable, but also very service friendly. This means not only high utilization, but also lower cost of operation.

One-man operated

Thanks to the centered user-friendly control panel, the Mustang rigs can be operated by one person. All the gauges and levers are ergonomically designed and easy to use and read. For example, with a pull of a lever, the Mustang rig's positioning device moves the feed accurately and safely into place.

Green in many ways

As a standard all Mustang drilling rigs are equipped with green Tier 3 diesel engines. Its load-sensing valves and pressure-compensating pumps guarantee low fuel consumption while harmful and unpleasant exhaust fumes are kept to a minimum. By utilizing the optional multi purpose diverter head attached to the casing top opening, rock cuttings from the drill hole can be blown directly into a waste container, which reduces debris around the site.

Quality - our word for operational economy

Assured built-in quality is the Atlas Copco way of offering operational economy to our customers. For over a century, Atlas Copco has designed and built robust, high-performance equipment for mining and construction in a never ending quest for the highest quality. The Mustang range is rooted in this philosophy with more than three decades of knowledge put into the product. The experience we have from productive drilling is continuously used to improve our design on key technical details, to make the Mustang rigs more efficient and more user-friendly.

Key components

1

Winch

Rods can be lifted into place with the aid of the main winch. Depending on model, this winch can handle up to three tonnes.

2

Feed

Feed is selected to meet the requirements on feed/lifting capacity and length to suite your application. The feed comes with an "off hole shift function" which by use of a hydraulic cylinder moves the rotation unit sideways, for free access to the drill center and easy "hole service". The feed cradle is equipped with heavy duty rollers for low maintenance. Use of a planetary gear reducer enables same feed and pull force and accurate adjustment of feed speed and weight on bit.

3

Rotation unit

The field-proven rotation units offer optimal speed and torque combinations. All rotation units come with a floating spindle which keeps the wear of the rod thread and the rotation unit itself to a minimum.

4

Rod handling components

The rod holders and breaker are designed with a variety of wrenches and guides that facilitate quick and easy rod changes during operation. Fixed or tiltable rod racks as well as casing lifting devices are available as options.

5

Power pack

A diesel engine powers the pressure compensated hydraulic pumps. To ensure safe operation, these pumps power one main function each on the drilling rig. All available diesel engines are Tier 3 classified. As an option for some models, electric power packs are available.



Rotation unit



6

Carrier

The modular rig concept allows a choice of different carrier types to fit customer requirements.

7

Operators panel

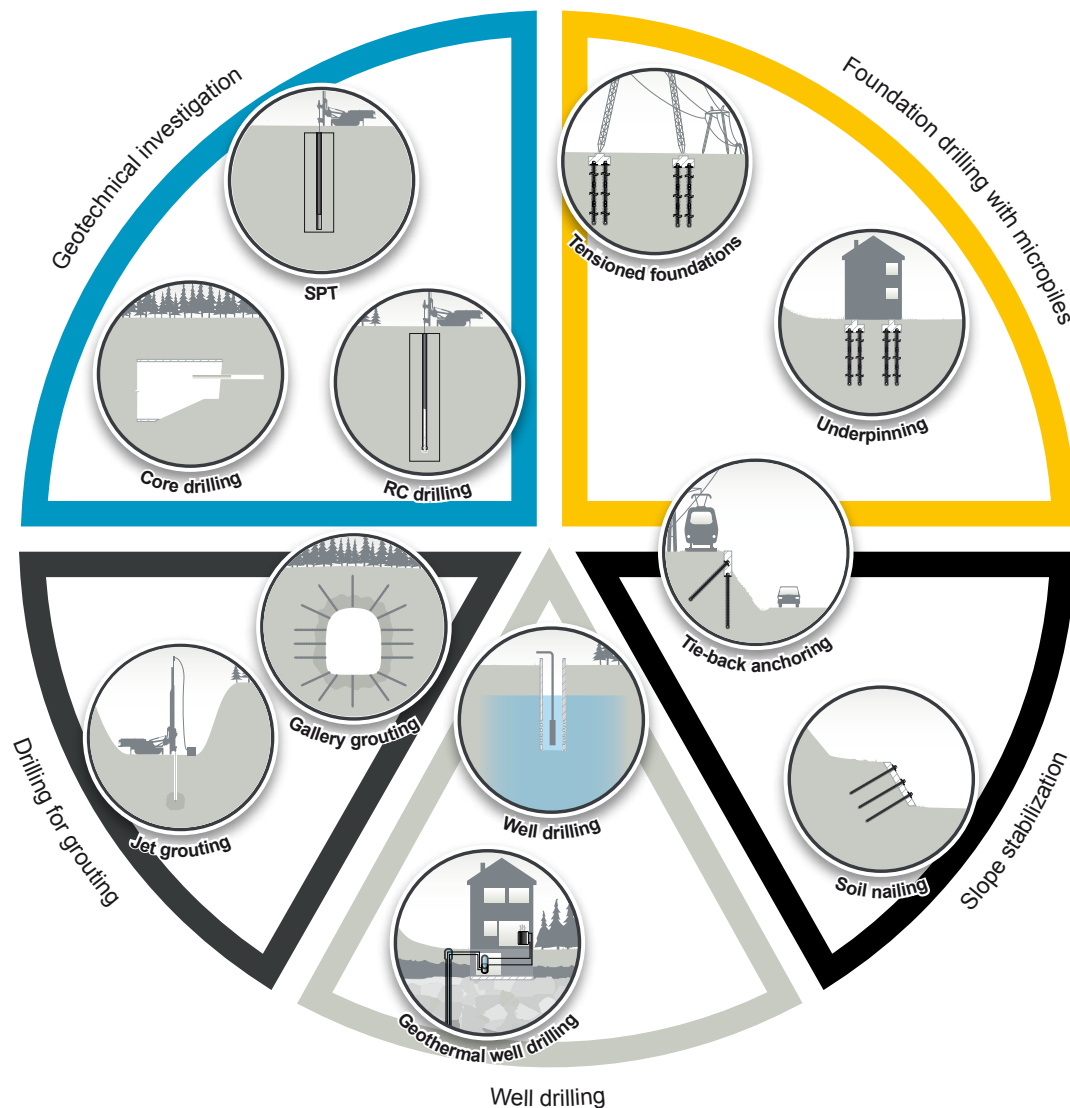
The compact operator's panel has a central position and is designed to give an easy overview of the operation. Easily accessible controls provide better ergonomics and safe working environment.

Applications

The Mustang rigs are designed to meet different requirements in geotechnical drilling. There are a number of applications for which the Mustang rig is an excellent choice.

If you are operating in more than one of the applications below, a Mustang may be the solution to help you fulfill the needs of the different work sites.

Mustang rigs operate in soil investigation, piling, slope stabilization, grout hole drilling or well drilling. They handle rock conditions from soil and gravel to solid rock, and work perfectly with any type of drilling method. In short - the Mustang is the most flexible solution you can find for a multitude of geotechnical drilling applications.





Foundation drilling with micropiles

Micropiles are small diameter reinforced piles that are drilled and grouted to support structures in all ground conditions. This method is growing in popularity when it comes to reducing the effects of settlement for both existing and new constructions. In comparison with conventional piling, micropiling is the method of choice in low access areas and confined spaces. A Mustang rig combined MAI SDA self-drilling anchors can offer a winning reinforcement solution for these conditions.

Slope stabilization

Tie-back anchors are typically installed to provide support for existing slopes. They may be installed in combination with a foundation wall structure or as a stand alone retaining wall system. If the structure once built is stable and by itself retains the ground behind it, the tie-back anchors are redundant and can be detensioned. Soil nails are usually of small diameters and are commonly installed closely spaced as support in slopes.



Drilling for grouting

Grouting operations are performed to seal, strengthen or consolidate rock and soil in for example dams and foundation works. When drilling grout holes, rotary drilling and percussive drilling are the most commonly used methods. In tunnels, gallery grouting is made in a fan pattern to strengthen the lining of the excavation. Jet grouting is a method to reinforce the ground by pumping in a cement paste into the soil at high pressure, with purpose to build either cement columns or totally consolidate the formation. The Mustang rigs have as option jet grouting kits, for execution of single, dual and tripple tube injection.

Geotechnical investigation

Before the construction starts it is good to know the conditions! Investigating the soil is a good way to map the challenges ahead. Depending on ground conditions and required drilling depth, core drilling or RC drilling can be the methods of choice. SPT or Standard Penetration Tests are performed by recording the number of hammer blows needed to drive a sample tube up to a certain depth in to the ground. This would indicate the relative density of the soil. The Mustang rigs can be equipped with kits to suit either one of these investigation methods.



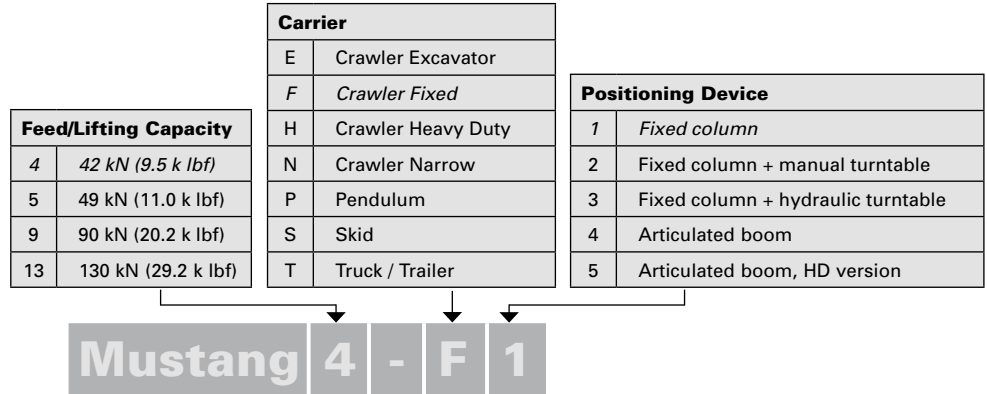
Well drilling

Water well drill rigs are designed to penetrate the earth's surface to the water table below and allow the water to flow into contained areas or wells. The water is then routed into the home. Water wells generally consist of a larger diameter, cased and sealed surface portion, followed by a drilled well bore. Moreover, with the price of energy rising, households are turning to new ways of heating and cooling their properties and geothermal drilling has become an interesting business opportunity. Well drilling is frequently done in urban, developed areas where the customer wants a well drilled with minimum impact on surroundings. The Mustang rigs offer a well drilling solution for low access areas and manages to drill without churning up the garden or blocking access ways. With the flexibility of use provided by the Mustang rigs, a contractor can drill wells for both geothermal heating and water supply.

A guide to the Mustang range

A modularized system

The Mustang range consists of four series, based on feed/lifting capacity. Furthermore, each serie can be divided into several models, based on the choice of carrier type and positioning device.



Selecting the ideal rig

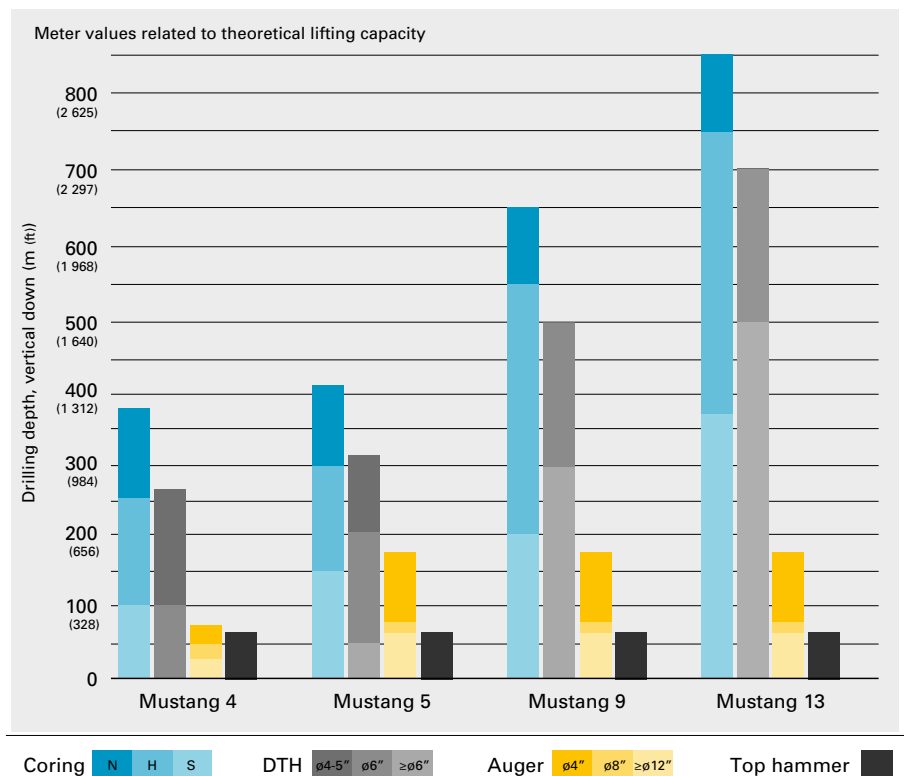
Selecting the ideal rig to suit specific needs is a question of teamwork. Close interaction between our customers and Atlas Copco specialists enables requirements to be fully understood and capabilities realistically appraised. This is something we welcome as the key to finding the best available solution for the job. The following sections aim to give a better understanding of the factors determining the choice of rig.

What is the choice of drilling method and what drilling depth required for the application.

Feed/lifting capacity

The Mustang rigs can provide productive drilling with all common methods. The preferred method of drilling determines what rotation unit to equip the Mustang with.

The desired drilling depth will put demands on feed/lifting capacity to handle and lift the drill string. The decision on feed/lifting capacity basically determines which Mustang series to choose.

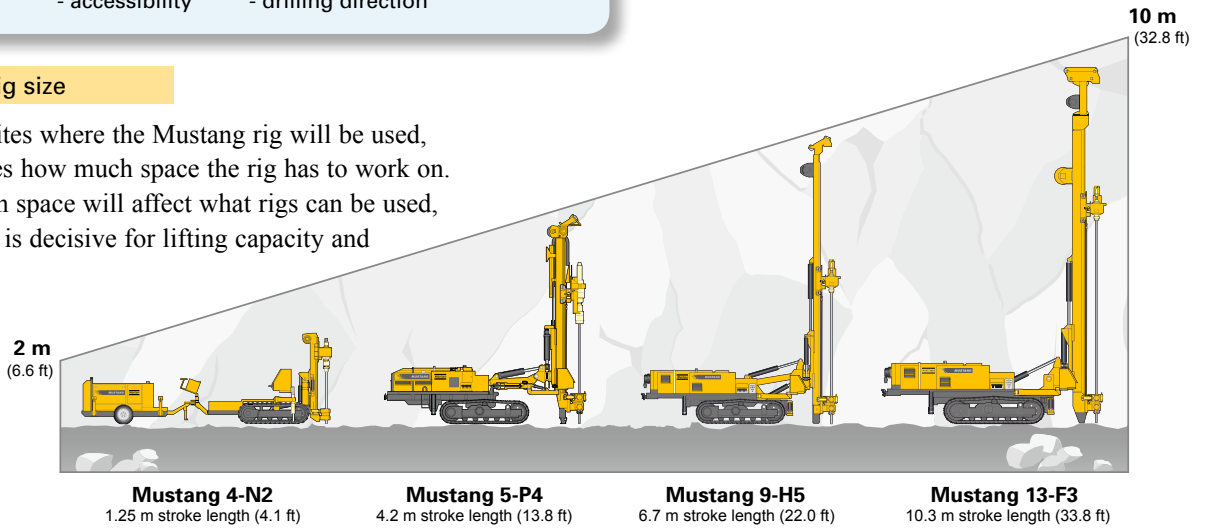


To determine suitable carrier type, rig size and positioning device, we need to know the drill site conditions i.e.

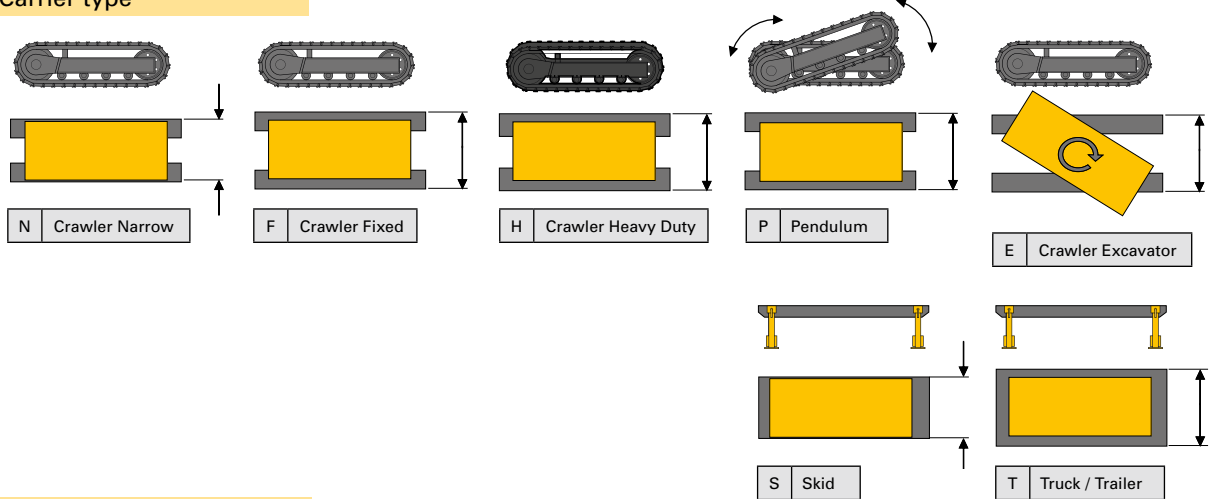
- site dimensions
- accessibility
- drilling direction

Maximum rig size

The type of sites where the Mustang rig will be used, also influences how much space the rig has to work on. Restrictions in space will affect what rigs can be used, which in turn is decisive for lifting capacity and stroke length.

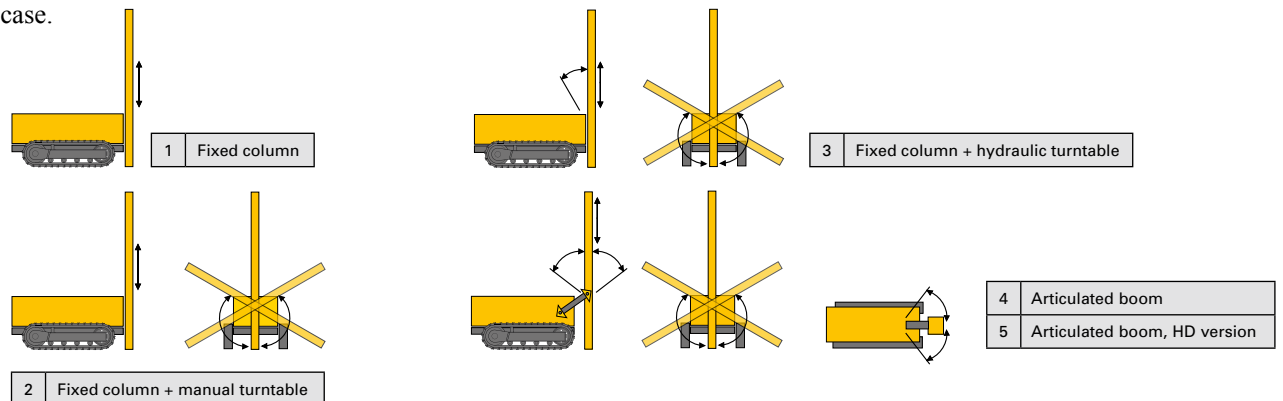


Carrier type



Positioning device

Depending on application and site conditions, there are different needs of flexibility in positioning the feed. The Mustang rig can be equipped with different types of positioning devices to meet the specific requirements in each case.



What are the needs beyond today's worksite?

If all questions have been answered, and the right Mustang has been selected, the only consideration left is "What is the next job?". The work the Mustang will do tomorrow may differ from today, and when designing the Mustang for today, remember to bring in the requirements for tomorrow's job into the equation. That's when the Mustang will truly pay off!

Mustang 4 series

The small but lively Mustang drilling rig in the 4 series has a feed/lifting capacity of 42.0 kN (9.5 k lbf). It is designed for ease of setup and transport. It is particularly useful for applications with restricted space. The basic model is equipped for rotary, rota-percussive and auger drilling. However, for applications that need extreme flexibility and use of tophammer versions of Odex and Symmetrix systems, or small size MAI self-drilling anchors, the 4 series can be equipped with high performance tophammers. The tophammer version makes it possible to use the rig also for normal DTH drilling and rotary drilling by simply fitting the appropriate shank adapter and cross over swivel to allow use of standard ITH tooling. Isn't that flexibility in the full sense?

Nine different versions are available:

4-S1 / 4-S3

The standard skid version with feed mounted on a fixed bracket, mainly used for vertical drilling. It can be fitted with rubber wheels and tow-bar as an option, and can easily be locally mounted on small-to-medium trucks or tractors. The 4-S3 version, comes with hydraulic turntable for more flexibility in positioning.

4-T1 / 4-T3

The truck version of 4-S1, built on a customized frame for mounting on small-to-medium trucks. Often sold and customized in close co-operation with our clients and following their preference of brand and type of truck. The 4-T3 version, comes with hydraulic turntable.

4-F1 / 4-F3

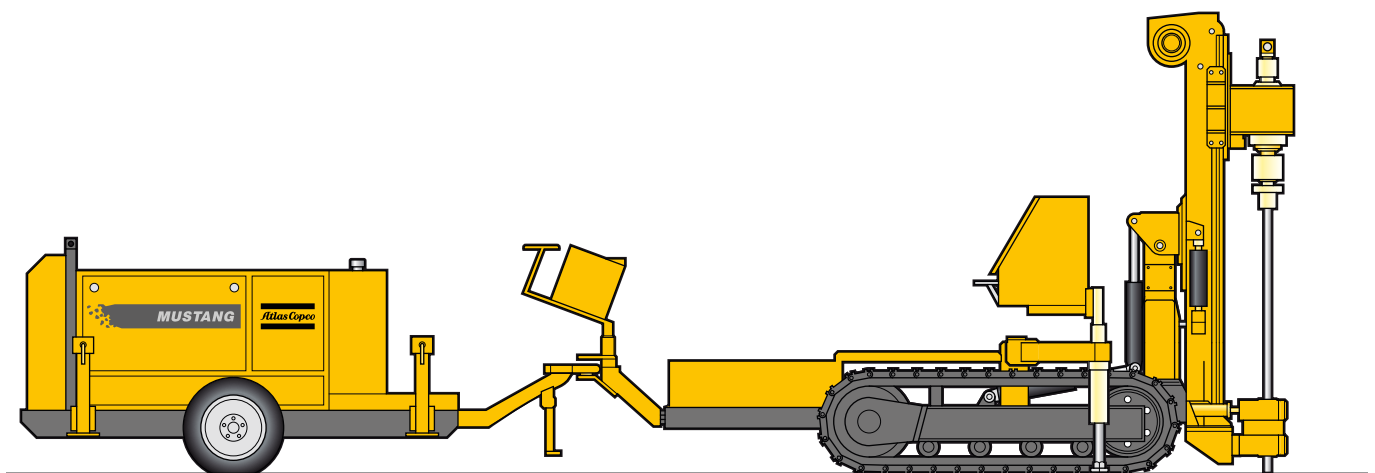
A new crawler version with higher ground clearance, which makes it easier to move over uneven ground. The right choice for mainly vertical drilling. The 4-F3 version, comes with hydraulic turntable. Depending on choice of options the width of the rigs might differ.

4-F4






A more complete crawler version with articulated boom, which is used in applications that require more flexibility in positioning i.e. soil nailing, tie-back anchoring and road embankment drilling.

4-N2 / 4-N3

A version of Mustang 4, which is designed for sites where lack of space is extreme i.e. micropile drilling in cellars or production drilling in narrow mines. The drill unit is narrow enough to fit through a standard door and the power pack, which is towed by the crawler, can be left up to 20 m (65.6 ft) away from the drill unit. A special short feed is standard for use in basements. The 4-N3 version, comes as a one unit rig with hydraulic turntable and either fitted with on-board diesel or electrical power pack and in a width of 1.4 m (4.6 ft).



The table shows the standard modules and will guide you towards the most suitable model of Mustang 4. To complete the rig a variety of options and accessories are available, see page 16.

-  Geotechnical investigation
-  Foundation drilling with micropiles
-  Drilling for grouting
-  Well drilling
-  Slope stabilization

Standard models									
Standard components	4-N2	4-N3	4-S1	4-S3	4-F1	4-F3	4-F4	4-T1	4-T3
Feeds									
Stroke length 1.25 m (4.1 ft)									
Stroke length 1.8 m (5.9 ft)									
Stroke length 3.9 m (12.8 ft)									
Stroke length 6.7 m (22.0 ft)									
Standard rotation units and drifters									
DTH < 5" (127 mm) ^a									
DTH > 6" (152 mm) ^b									
Coring N, H, S (optional SPT kit) ^c									
Tophammer / DTH < 6" (152 mm) ^d									
Tophammer < 4" (102 mm) ^e									
Rod holders and breakers									
Diameters up to 180 mm (7.1")									
Diameters up to 250 mm (9.8")									
Diameters up to 310 mm (12.2") (manual)									
Positioning devices									
Fixed column									
Manual turntable (fixed column)									
Hydraulic turntable (fixed column)									
Articulated boom									
Carriers									
Crawler narrow - steel pads									
Crawler narrow - rubber pads									
Crawler fixed - rubber pads									
Crawler fixed - steel pads									
Truck 4x4									
Skid									
Power packs									
Diesel engine 72.5 kW (97.2 hp) (at 2300 rpm)									
Diesel engine 86.5 kW (116.0 hp) (at 2300 rpm)									
Electric engine 55kW (73.8 hp)									
Electric engine 75kW (100.6 hp)									

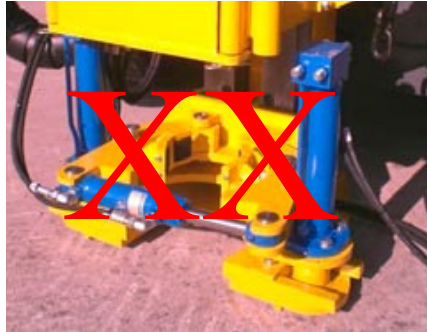
Rotation units: a) DHR48H56, b) DHR48H65, c) RH50, d) HB30A, e) COP1240ME

Additional options and accessories



Rod racks

To facilitate rod handling and easy access to the rods while operating, there are four different rod racks available as options, suitable for most rig models. Depending on the need for maneuverability you can choose either a fixed or tiltable rod rack. For further improvement of rod and tube handling, we can also offer the hydraulically operated "Lazy Susan" arm.



Casing lifting device

For recovery of casings, the rig can be equipped with a casing lifting device designed with a lifting capacity of 12 tonnes (26.5 k lb) and variety of jaws to handle most common casings used in geotechnical applications.



ITH tool service and welding unit

The ITH tool service provides an on-board access for on-site bit grinding allowing extended bit life and high performance drilling. Moreover, standard non threaded casings can be welded together on-site thanks to the optional rig-mounted hydraulically operated welder.



Flush pumps (foam/mud)

There are several optional hydraulically driven flush pumps available to fit either DTH drilling or coring. In DTH drilling the Mustang rig can be equipped with a foam water pump. If mud drilling, you can choose between two types of mud pumps depending on requested capacity by means of flow and pressure.



Diverter heads

Depending on choice of rotation unit, drillers can choose between several different diverter heads attachable to the most commonly used casings. By utilizing a diverter head, rock cuttings from the drill hole are blown directly into a waste container, which reduces debris around the site. Also when collecting samples for geotechnical investigation, the diverter heads come of good use.



Weight On Bit (WOB) control

Accurate weight on bit is always essential for smooth and proper drilling as well as for cost control. This hold-back system comes as a standard on most rig models and provides correct down-force control for increased drilling speed and improved bit life. This is of particular use in DTH drilling and coring applications.



Winches

Depending on the needed lifting capacity there are several types of winches to choose among. For core drilling, two different wire-line hoists are available as options.



Lubrication system

Down-the-hole hammers require lubrication for proper operation. The optional Mustang lubrication system (Venturi) includes injection system for correct dosage. By using Atlas Copco lubricants, this in turn minimizes the risk for soil pollution.



Slope stabilization options

The guide attachment and extendable foot enable accurate and safe collaring and minimizes hole deviation. The tie-back anchoring kit is a boom modification that increases worksite ergonomics and safety through higher visible access to the hole.



SPT kit

The Standard Penetration Test kit includes a hydraulically operated SPT hammer with feed attachment, controls and a digital stroke counter.



Auger kit

In order to drill with augers, the auger kit includes an auger coupling with adaption plate for rotation units. The kit is used with both standard flight and hollow stem augers.



RC kits

The Reverse Circulation kits are divided into two options, first the adaption kit for the rotation unit and second a cyclone kit to optimize sample separation and collection.



Jet grouting kit

The jet grouting kit includes feed extension, hydraulic chuck and an electric control panel with display for rotation speed and timer for regulating height of grouting steps.



CE kit

The CE kit is standard for most markets and includes a fire extinguisher and a rig levelling kit for safe tramming.



Tooling

A large variety of swivels, shank adaptors and rod guides are available to fit different drilling methods.

A complete offer from Atlas Copco

Atlas Copco - your partner in geotechnical engineering

Atlas Copco has a long tradition of supplying geotechnical engineering contractors with a wide range of tools and services.

We are able to supply all that is needed for drilling in geotechnical applications, from compressors to a complete drill string with drill rods, casings, DTH hammers, drill bits and overburden systems. Self-drilling anchors and grouting solutions are two other key components offered by us to a number of ground control applications. Last but not least, the extensive support, parts and service needed to get the most out of your investment is always close at hand.

Only Atlas Copco can deliver such a unique in-house turnkey solution for your drilling operation. We are committed to prove our reputation as a leading supplier of geotechnical engineering solutions. We believe in interaction in the field with our customers and enjoy sharing and exchanging know-how and experience. Welcome to join us!

Products that complete the package

Secoroc rock drilling tools

As market leader in rock drilling tools, Atlas Copco offers the best DTH and top-hammer equipment on the market today. Secoroc hammers are ideal for high performance drilling as the valveless airflow allows deeper drilling and faster penetration in water-saturated holes than any other hammer type.



Symmetrix overburden drilling systems

Whether drilling in unconsolidated ground or a deep layer of overburden, Symmetrix is the ideal tool. By using retrievable Symmetrix, holes are drilled and cased in one single operation. With the help of the rotation unit, the Symmetrix drillstring and retrievable casing are removed as cement is poured into the hole. In especially difficult conditions, the mounted casing extractors facilitate casing removal. Moreover, when drilling through solid rock, drill-through Symmetrix drills as far as you wish without having to change drilling equipment.



Odex overburden drilling systems

Odex is an eccentric retrievable drilling system that's ideal for short holes up to 273 mm (10 3/4") in diameter. Well drillers often have an Odex drill bit at hand for simultaneous casing of water and geothermal wells. The advantage is that Odex drills and installs the casing quickly and efficiently. While the ingenious bit system allows the complete drill bit to be retrieved – ready to drill the next hole.





Atlas Copco site investigation tools

For site investigation and soil sampling, Atlas Copco can offer a complete range of core drilling tools.



Unigrout grouting platforms

The Atlas Copco Unigrout grouting platforms offers a range of grout systems designed to prepare and inject silicate/cementitious based grouts into a rock formation, soil or man made structure. The Unigrout grouting platforms are composed by one, or more, Cemix high-shear colloidal type mixer, a Cemag agitator and a Pumpac double acting single piston pump, or a ZM progressive cavities pump. The platforms are operated by fully hydraulic power units, with electric or diesel drive.



MAI SDA anchors

The Atlas Copco MAI SDA self-drilling anchoring system is a fully threaded hollow steel bar which can be drilled and grouted into loose or collapsing soils without the use of a casing. Using SDA anchors either as micropiles or soil retaining anchors, the speed of installation is high and no primary drilling is required. Drilling, placing and grouting can be performed in one single operation, making high outputs possible.



Atlas Copco Compressors

Atlas Copco is the leading manufacturer of portable compressed air machines in the world. Used in a wide variety of industries, Atlas Copco has developed a set of machines that successfully walk the line between size, output and capacity.

Mustang Care Service agreement

The best measurement of your drilling investment is to have a low cost per drilled meter. In order to keep a high productivity and increase your profit and growth, your equipment needs maintenance. The Mustang Care service agreement consists of four valuable parts:

- Scheduled service
- Inspection protocols
- Extended warranty
- Satellite monitoring

Together they will increase your productivity and make your equipment last longer.

Mustang Care is customized for:

- Increased productivity, more drilled meters
- Achieving better cost control
- Give you peace of mind
- Remote access and planned service

Through inspections and scheduled service, Mustang Care focuses on preventing drilling interruptions and minimizing the risk for unforeseen repairs. With Mustang Care in mind you will be able to keep a high availability on your machine and with the extended warranty you will have better possibilities to control your cost of operation.



