



DELMAG

Drill Rigs RH Models



DELMAG - a company with a rich tradition

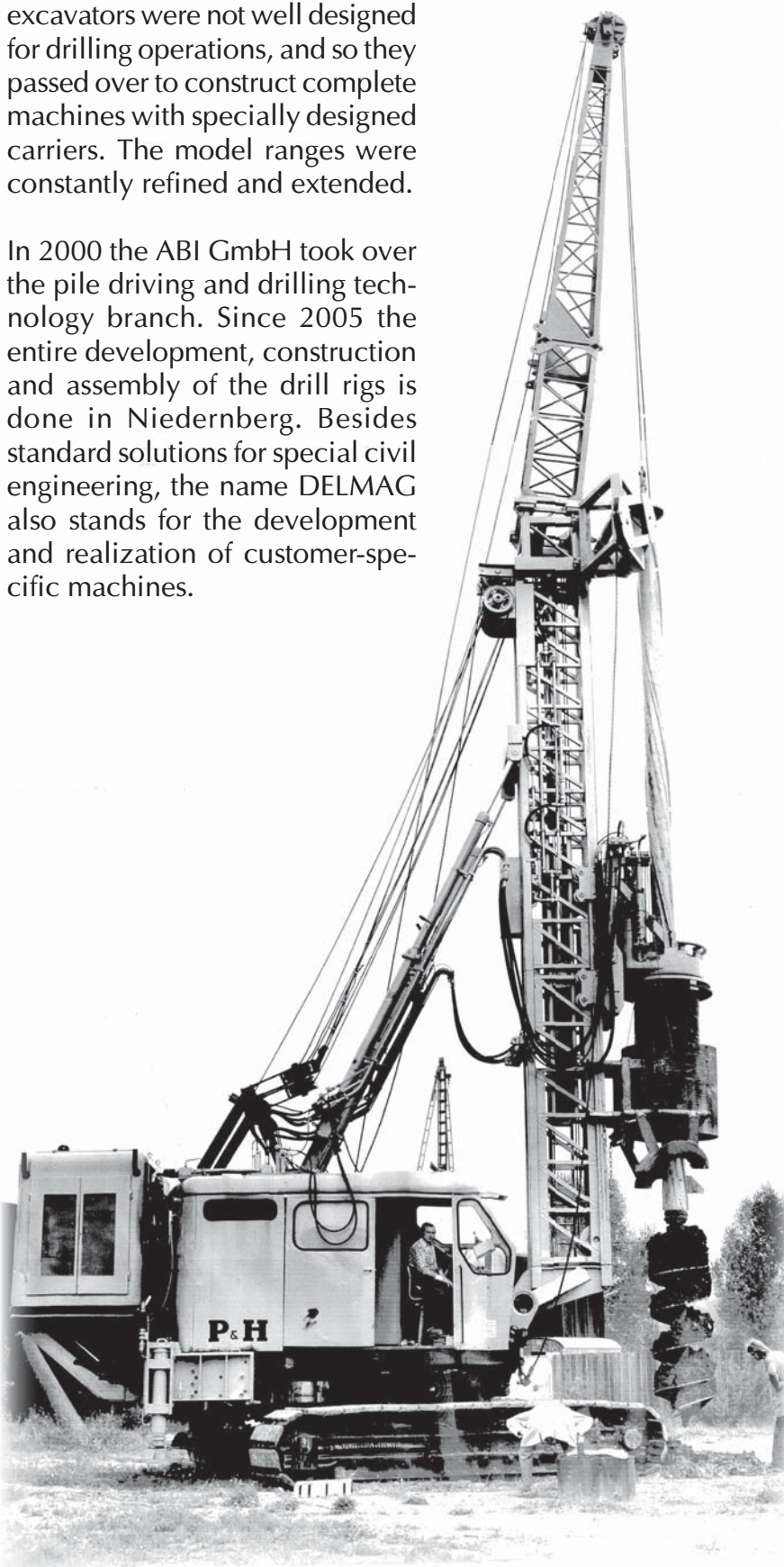
The history of DELMAG is inseparably tied to the name Dornfeld. Reinhold Dornfeld (1887 - 1961) was a man of much spirit of enterprise and optimism. As the new partner at the Elektromotorenwerk Fischer & Co. that was in need of rehabilitation, he pushed through the amalgamation with the Esslinger Holzbearbeitungsmaschinenfabrik „Pflüger und Steinert“. Thus, on August 17, 1922 the “DELMAG” – Deutsche Elektromaschinen und Motoren-Bau-Aktiengesellschaft (German electric machine and motor construction plc) – was born.

Reinhold Dornfeld had a fine antenna for new markets and technologies and placed the future of DELMAG on an invention: “The combustion powered impact hammer”, invented by the graduated engineer Konrad Haage and the engineer Albert Pflüger, the founder of the Esslinger Holzbearbeitungsmaschinenfabrik. The frog rammer in 1926 was followed by numerous further patents and DELMAG specialized in the manufacturing of road construction and civil engineering equipment.

DELMAG continued to expand with pile driving units and compactors. In the mid-1960's a new sector was added – the drilling technique. In 1968 the first soil auger RH 155 came to the market, as drill attachment on a cable-operated excavator at that time.

Experience on the construction sites showed that the cable-operated excavators were not well designed for drilling operations, and so they passed over to construct complete machines with specially designed carriers. The model ranges were constantly refined and extended.

In 2000 the ABI GmbH took over the pile driving and drilling technology branch. Since 2005 the entire development, construction and assembly of the drill rigs is done in Niedernberg. Besides standard solutions for special civil engineering, the name DELMAG also stands for the development and realization of customer-specific machines.



DELMAG drill rigs are used to produce:

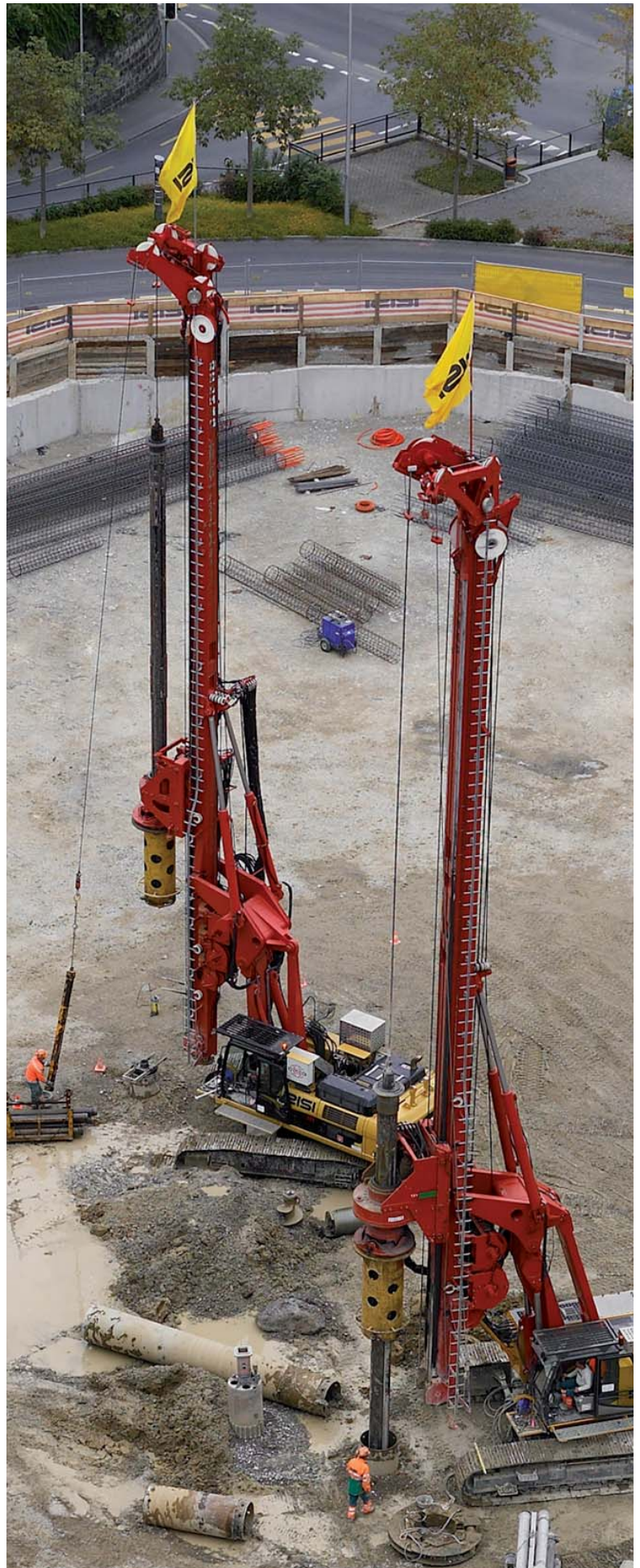
- cased and uncased boreholes using the Kelly drilling procedure,
- boreholes with continuous flight auger (CFA),
- boreholes with full displacement auger
- as well as for special procedures, like e.g. soil mixing, VDW and double rotary head procedures

In addition to drilling operations, the DELMAG drill rigs can also be used in impact operations. In this case the rotary head is replaced with a diesel hammer or a hydraulic impact hammer.

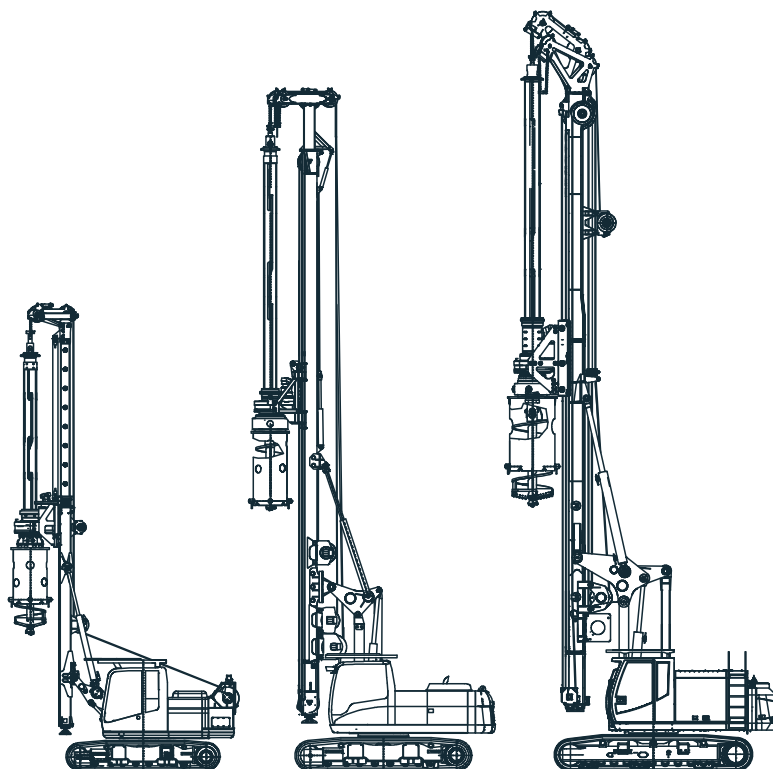
The existing drill rig models are continuously developed further and adapted to the customer's needs. An optimum power efficiency with the highest possible reliability and durability are always the top priority in the design phase.

The sturdy drill rigs of the RH range stand out for their high performance and compact transport dimensions. The solid execution of the components provides for a maximum of stability.

The carriers that are specially designed for use with drill rigs, are equipped with up-to-date hydraulics and telescopic chassis. The position of the winch in the lower area of the leader is ideally chosen with regard to the visibility while drilling, the routing of the cable and the service life. A reversing winch provides for high feed forces and a high lift of the rotary head. The operating sequences are ensured by the ergonomic layout of the controls and a very good visibility.

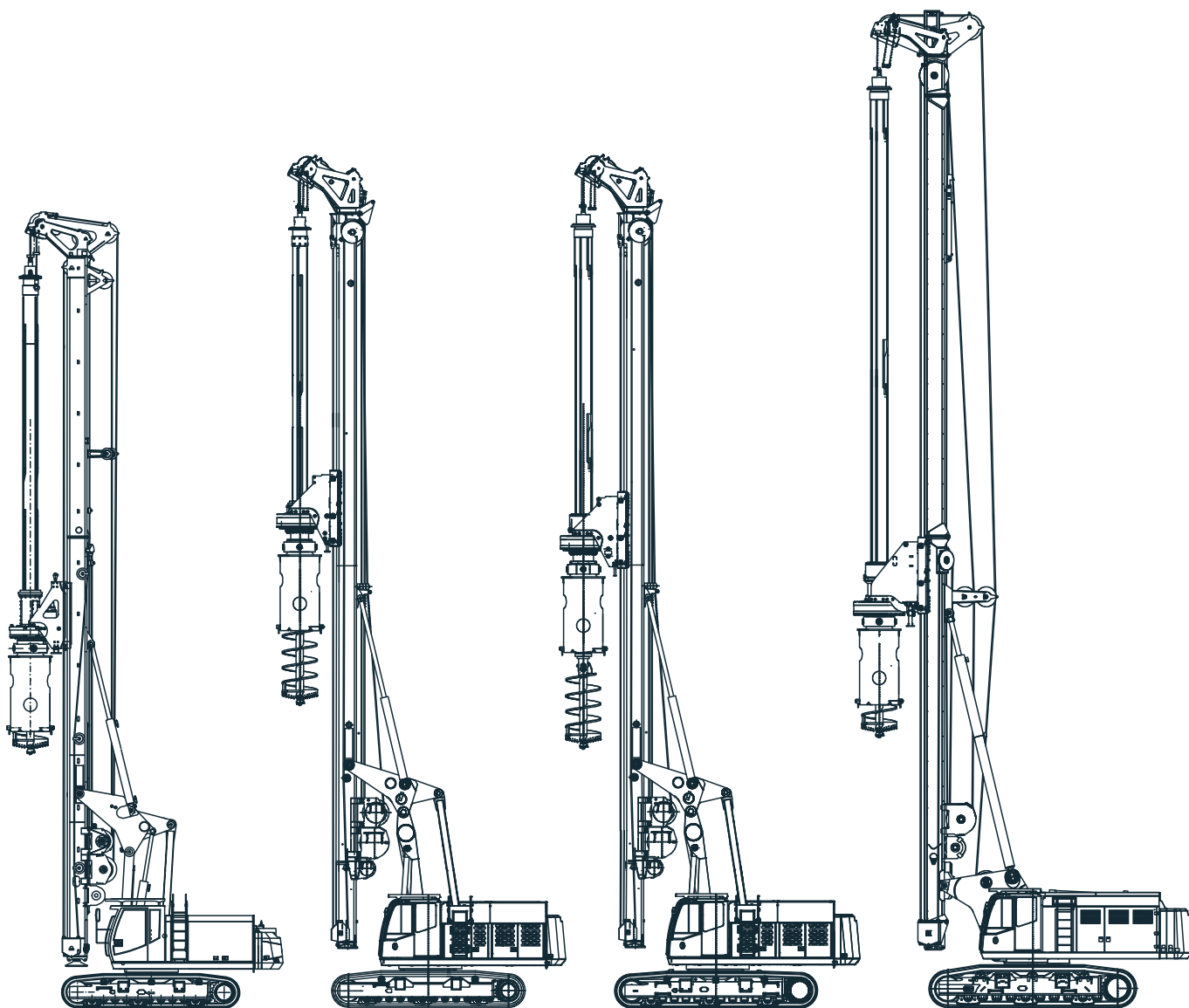


DELMAG Drill Rigs - Overview



Model		RH06	RH12	RH18
Engine power	kW	67	187	257
Drilling depth up to ¹	approx. m	18	20	21
Free diameter in front of the rope pulleys	mm	1450	1450	1600
Stroke rotary head	mm	4750	12000	12500
Crowd system		cylinder	winch	winch
Torque rotary head up to	kNm	60	125	180
Operating weight ²	approx. t	25	48	65

¹ drilling depth depends on mounted Kelly bar, ² with rotary head and standard Kelly bar



RH24	RH28	RH34	RHV40
257	331	405	405
30	42	60	60
1950	1960	2200	2430
17350	17500	17500	21000
winch	winch	winch	winch
245	285	335	405
75	97	102	140

DELMAG - Drill Rigs

DELMAG has a proper drill rig for nearly every drilling task. The smallest machine of the RH range is the RH 06. It is compact, light-weight and maneuverable and can bring these advantages to bear for urban and smaller drilling tasks in particular.



The RH 34 is a standard machine mounted on a ABI carrier. With an engine output of over 400 kW this drill rig is perfectly ready for various drilling operations. The carrier was specially designed for drilling applications. The rotary head delivers a torque of 335 kNm.



The biggest machine of the RH range is the drill rig RHV 40. The flagship of DELMAG combines state of the art technology with sturdy design. The RHV 40 is the right choice for the „really big“ tasks.



Components



- | | |
|---------------|--------------------------------|
| 1 Sheave head | 6 Auxiliary winch |
| 2 Leader mast | 7 Uppercarriage |
| 3 Rotary head | 8 Undercarriage |
| 4 Crowd winch | 9 Connection casing oscillator |
| 5 Kelly winch | |

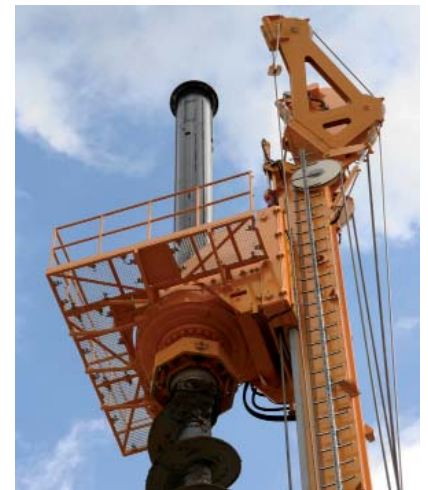
DELMAG drill rigs are produced in small batches or according to customer requirements. The leader mast is the basic component and build as a box structure with large system width. The connection to the carrier is realized using robust kinematics. Together with the telescopic undercarriage this combination allows for lateral inclinations of up to 9.5 degrees. The included winches excel by high pulling forces that are supported by a low-wear and low-maintenance rope guide outside the leader.

In addition to the extensive standard equipment, the DELMAG drill rigs can be fitted with many options:

- connection for casing oscillators of different manufacturers (from RH 18)
- working platform at the rotary head
- Kelly bar guide
- auger guide for continuous flight auger
- leader mast stabilizing cylinder
- operation specific attachment kits (e.g. for CFA, VDW, DDK, displacement augering, impact-driving with diesel pile hammer or hydraulic impact hammer), etc.



Kelly bar guide



Working platform



Auger guide



connection for casing oscillator

Carriers

Since 2008 ABI also builds the carriers for selected models of the RH range. The decision to build the carriers for the drill rigs ourselves resulted from the requirements of the market. On the one hand, the know-how gathered over the years with regard to the construction of drill rigs could be consequently applied in the construction of the carriers, on the other hand, ABI can react to customer requests in a more flexible manner.

In particular, the entire machine, i.e. leader, kinematics and carrier, were regarded as a unit during the new development. The hydraulic and electric systems were designed particularly for drilling applications.

Three models are built at the moment: a carrier T82D for the drill rig RH 28, a carrier T102D for the RH 34, and a T122D for the RHV 40.



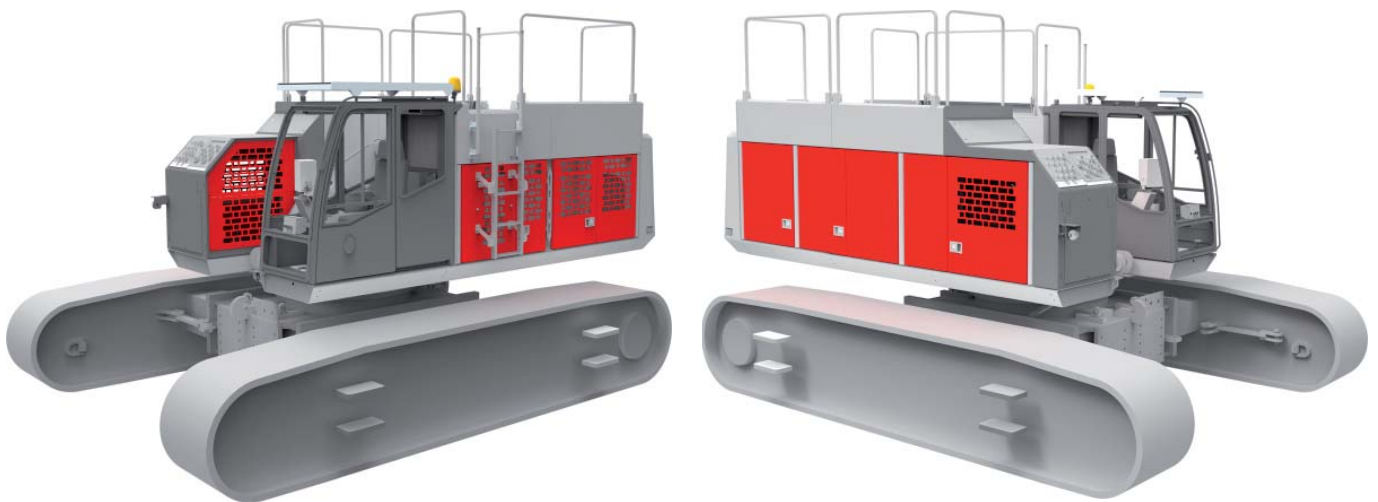
Motorisation

The powerful and at the same time environmentally friendly diesel engines comply with the current exhaust-emission requirements of the European Union and Northern America. From 2014 on the last level of the regulation for the time being, the EU stage IV or US EPA Tier 4 final for engines from 130 to 560 kW, comes into effect. The legal provisions have a massive influence on the exhaust treatment that has to be integrated with the carrier.

The ABI carriers are offered with two different exhaust treatment systems. For the first solution the exhaust treatment is done by reducing the nitrogen oxides inside a SCR catalyst (selective catalytic reduction). This system operates at a relatively high combustion temperature with injection of urea, and is also known under the name of AdBlue. These engines excel by a particularly low specific diesel consumption.

The second system offered is equipped with diesel particulate filter and exhaust gas recirculation. The exhaust gas recirculation reduces the combustion temperature and thus decreases the formation of nitrogen oxides. A diesel particulate filter collects the soot components from the exhaust flow. Depending on the degree of soiling the regeneration can be done automatically or forced by the operator.

Both systems make high demands on the fuels used. They may only be operated with low-sulfur fuel as well as with low-ash and low-sulfur engine oil. That is why they may not be operated in countries with low or no regulation. For these countries ABI offers alternative engines with lower pollutant classes.



Operator's Cabin

The cabin has an ergonomic design. The operator enters the spacious cabin comfortably through a sliding door. The control and display elements are adjustable with the seat. The sensitivity of the main control elements (joysticks) of the electro-hydraulic proportional control can be adjusted individually. Several movements can be activated sensitively at the same time.

The layout of the elements enables free visibility of the working area and fluent operating sequences. For security reasons, areas that the operator can hardly see are monitored with a camera system with the images being transmitted on a screen inside the cabin.



Transport

- Transport with rotary head and Kelly bar up to RH 18
- Shorter set-up times
- Easy and fast assembly
- Removable crawler track units standard from RH 28



Transport dimensions and weight are important criteria with construction machinery. The smaller models up to RH 18 can be transported with the rotary head and Kelly bar installed. This property guarantees minimum set-up times. With only a few steps the machine is operational:

1. driving the machine down from the low-bed trailer
2. performing a visual inspection of the machine
3. erecting
4. installation of the drilling tool

On bigger models the rotary head, the Kelly bar and, if necessary, also the counterweight are removed for transport. From model RH 28 on the transport weight can be reduced further by removing the crawler track units.

Drilling Procedures

Due to the manifold fields of application and the numerous variations the Kelly drilling procedure is one of the most employed drilling procedures used for making cased and uncased drilled piles. Other drilling procedures are the continuous flight auger drilling and the displacement drilling. For rocky soils a down-the-hole hammer can be attached to the rotary head as well. Drill rigs are also more and more used for soil improvement measures, like e.g. for soil mixing.

As an alternative, selected models of the RH range can also be fitted with a VDW or DDK system. In this procedure the soil auger and the casing are sunk in one operation using two independently driven auger drives. The rugged DELMAG drill rigs also allow to operate hydraulic impact hammers or diesel pile hammers which can be used to impact-drive different pile elements into the soil.



CFA drilling



Uncased Kelly drilling



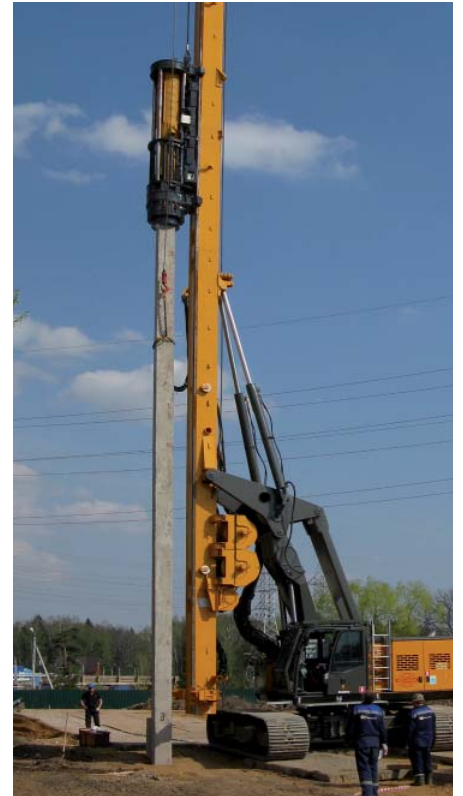
Full displacement drilling



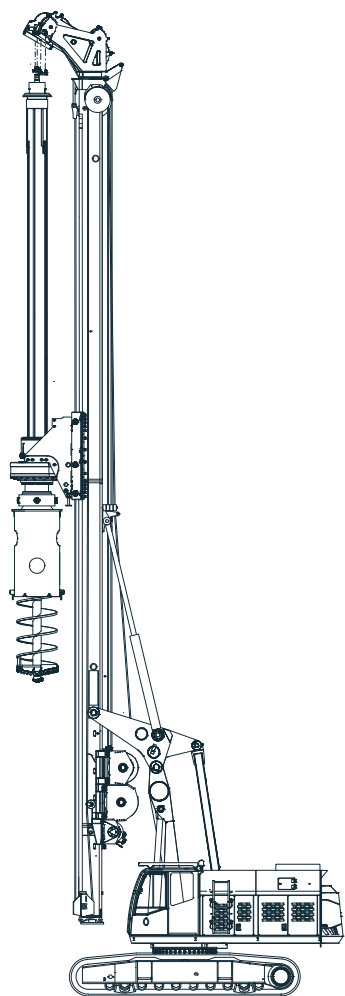
Down the hole hammer



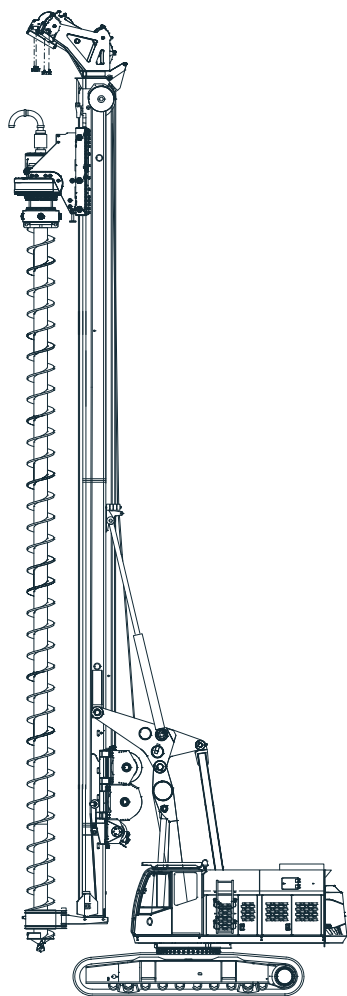
Soil mixing (RH 12 short mast version)



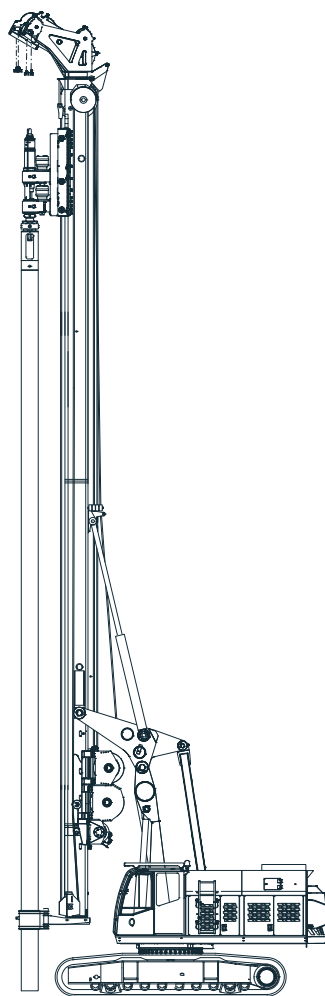
Impacting with hydraulic impact hammer SuperRAM



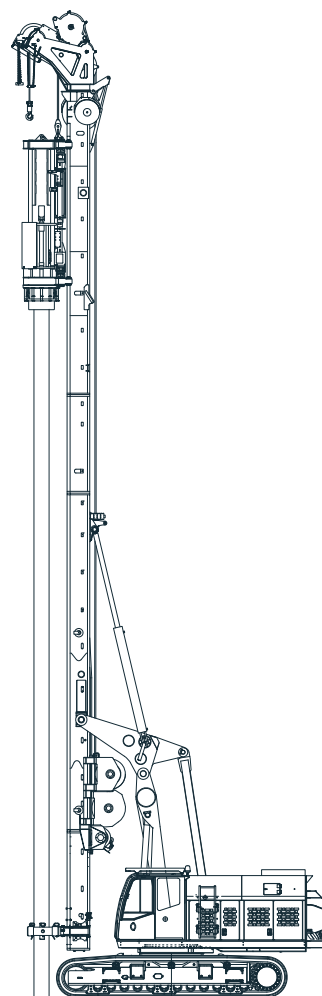
Kelly drilling equipment



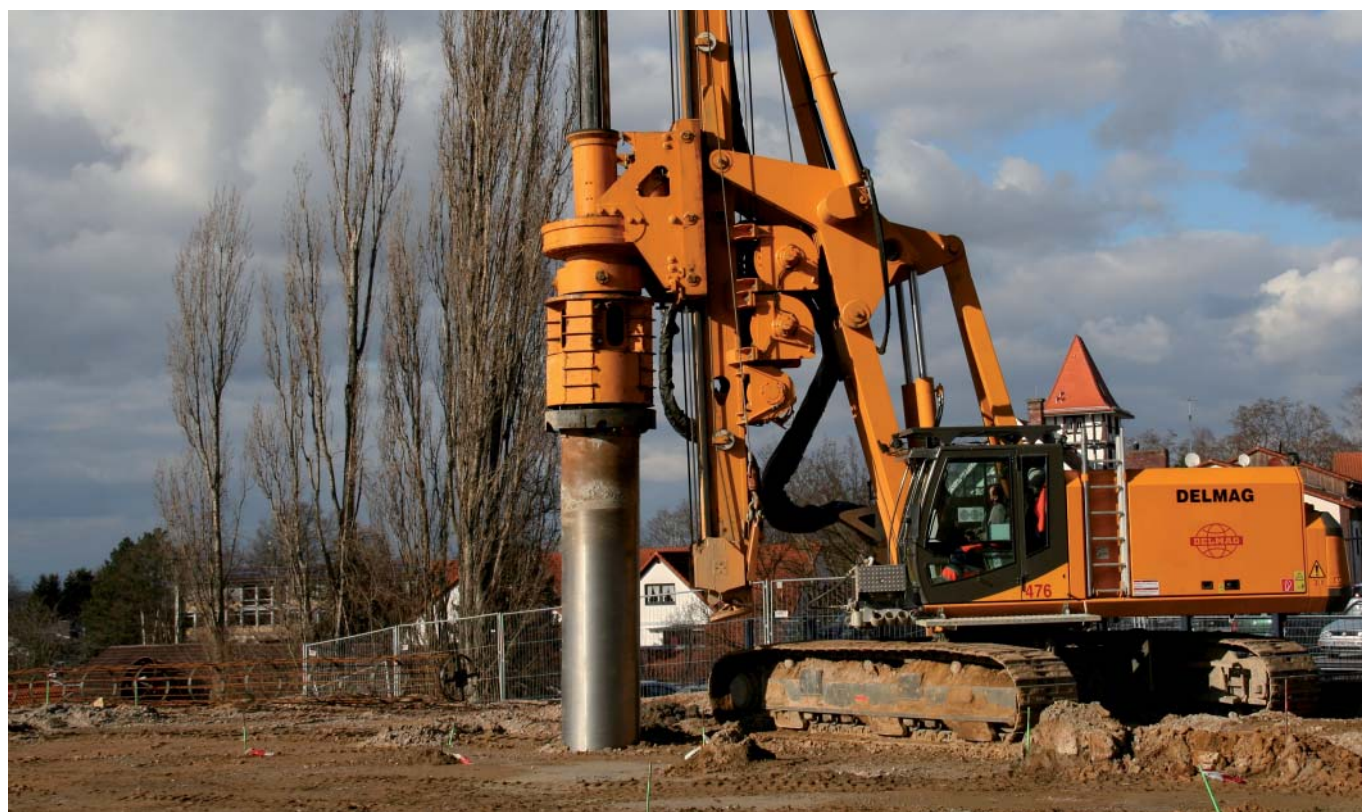
CFA equipment



VDW or DDK
equipment



Hydraulic impact
hammer equipment



Control System

The control system is one of the most important components of a machine because as the interface between man and machine it decisively influences the efficiency of the machine.

The up-to-date control system has the following advantages:

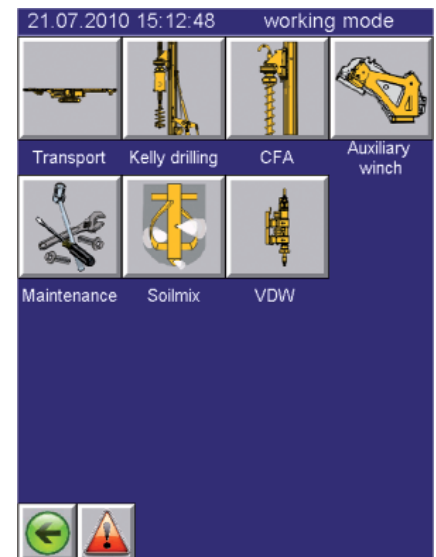
- extensive standard equipment, e.g. automatic alignment system, error diagnosis, etc.
- error diagnosis with clear text display reduces downtimes and maintenance times
- high reliability and availability through shorter signaling paths
- easy expand

In addition to the standard scope of delivery the machine can be equipped with different options:

- data acquisition with integrated measuring computer
- data backup on USB stick and optional printout on site
- transfer and analysis of the site data in the office using special software
- error diagnosis via modem
- anti-theft protection and location via GPS
- camera monitoring systems (e.g. winch monitoring)
- transmission of logged data and working data via Internet
- automatic return slewing
- diesel tank monitoring



Control panel of DELMAG drill rig with keypad and big touch screen



Selection of working modes on the touch screen

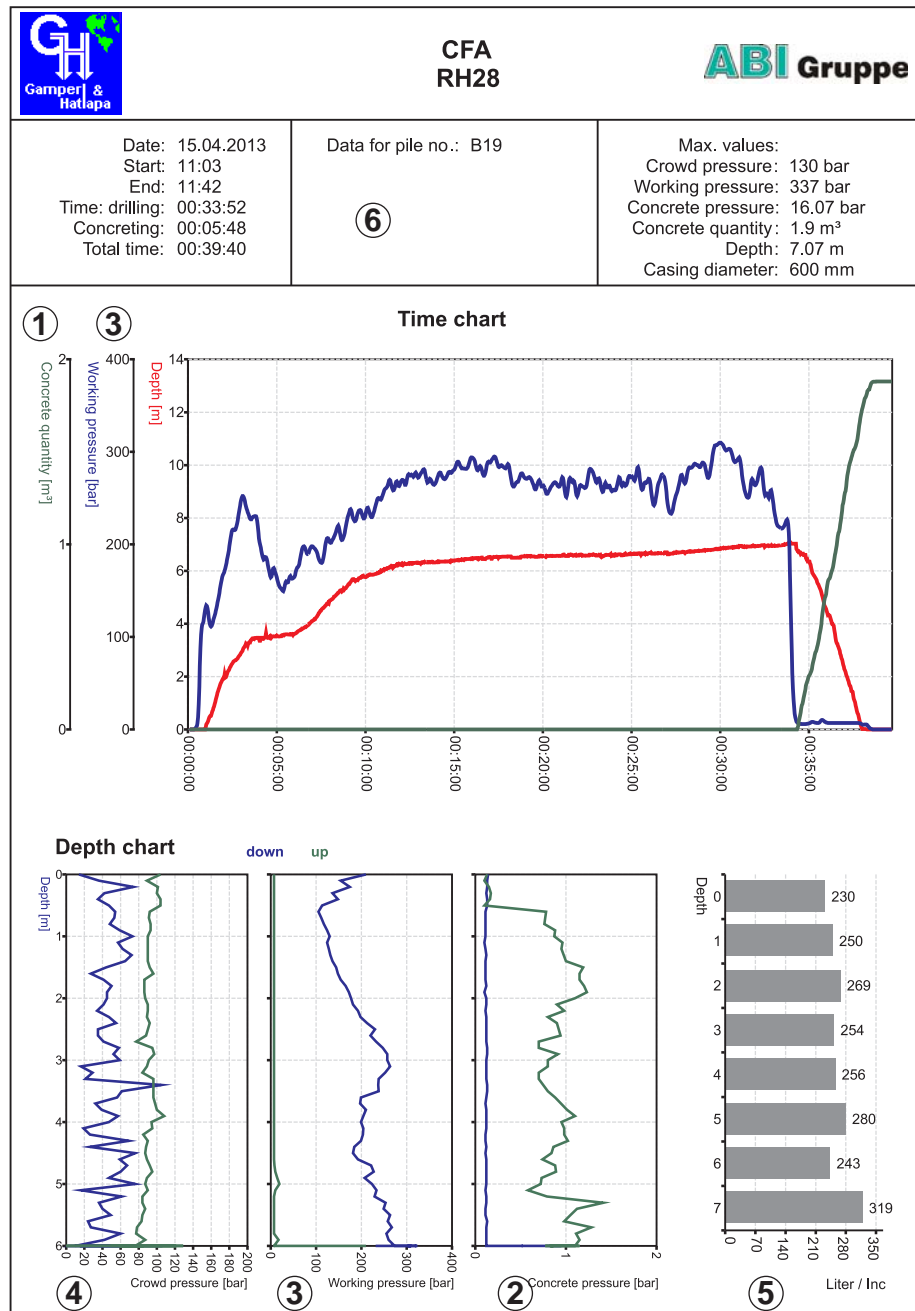
Data Recording

The procedure-specific data recording serves for quality assurance and documentation of the utilization. The operating data can be displayed directly on the touch screen as a line graph or saved to a USB stick. Then the saved data is available on a PC for analysis, management and report creation.

During measurement the measured values are logged every two seconds (for impact-driving procedures per impact). To be able to do so, the machine must be equipped with the necessary sensor system.

Using the analysis software the measured values are displayed in graphical form at the computer. The reports can be configured individually, e.g. with the customer's logo.

On procedures where aggregates are used, like concrete or suspension mixing, an idealized column can be displayed as well.



Example of a CFA report - with the DELMAG drill rig RH 28 a cast-in-situ pile with a length of 7,0 m was installed. Theraby the concrete quantity ①, the concrete pressure ②, the working pressure ③, the crowd pressure ④ and the idealized pile ⑤ were recorded. In the header ⑥ the site information as well as the maximum values are listed.

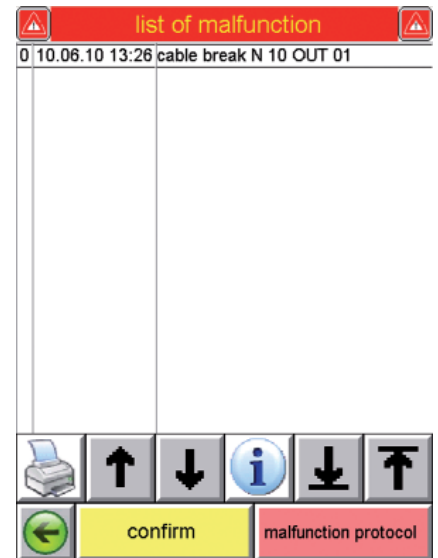
Diagnosis

Despite the use of high-quality components that are specially designed for operation on the construction site, and thorough outgoing inspection a malfunction may occur during the operation. In this case the control system considerably facilitates the error diagnosis.

The following malfunctions are monitored and displayed by the control system:

- short circuit
- cable break
- sensor failure
- failure of output modules
- failure of control elements (joystick, pedals)
- plausibility control (e.g. verification of the speed for the selected attachment)

In the event of a failure of control elements or sensor systems an emergency control device can be connected. It enables the operation of all important functions so that the machine can be e.g. driven out of a danger area or folded down for transport.



List of errors: All error messages are listed with date and time. In the malfunction protocol the error messages are archived incl. acknowledgment.

By pressing the info button additional information relating to the selected error message is shown, with indication of the location, if required.

After Sales Service

Machines are only profitable if they are permanently available. Inspections and instant troubleshooting contribute decisively to ensure a high availability.

The ABI mechanics regularly perform prescribed checks and inspections, eliminate errors or repair damages that can occur due to the rough applications.

Due to the fast availability of spare parts and competent contacts downtimes are minimized and a smooth and profitable application of the machines is ensured.



Marken der
Brands of **ABI Gruppe**



For further informations please contact your DELMAG sales assistant. Or you visit us on the Internet at www.delmag.de. Design subject to modifications. The details in this leaflet have to be regarded as approximate. The illustrations also can contain special outfits which are not part of the standard scope of supply. Not represented equipment variants can lead to modifications of the technical data.

ABI Maschinenfabrik
und Vertriebsgesellschaft mbH
Am Knüchel 4
D-63843 Niedernberg
Germany

Telefon: +49 (0) 6028 123-101, -102
Telefax: +49 (0) 6028 123-109
eMail: info@abi-gmbh.de