

Drilling Rig

LB 20-230

Litronic®

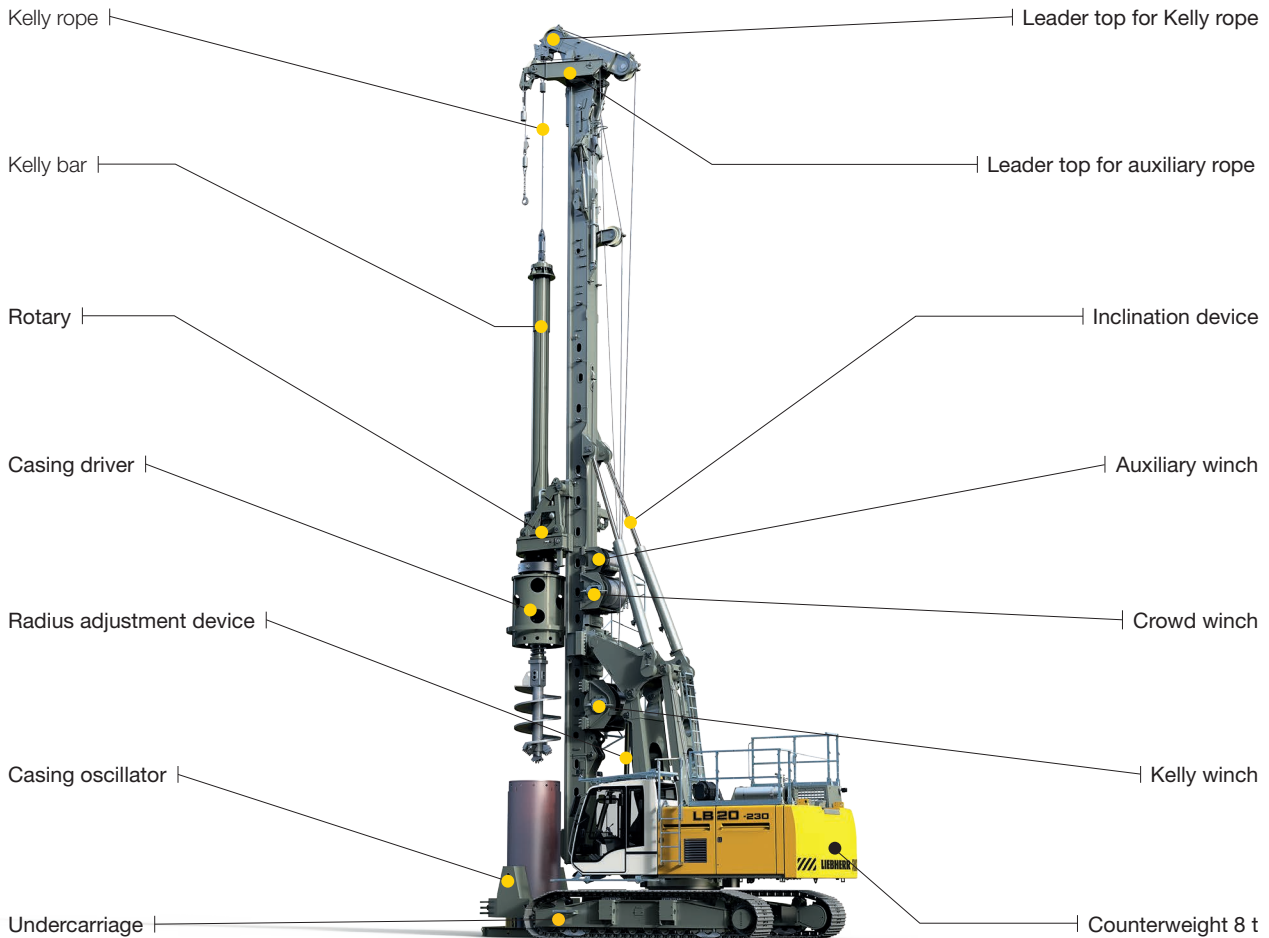
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LB 2002.05



LIEBHERR

Concept and characteristics



The robust universal machine for a wide variety of applications:

- Kelly drilling
- Auger drilling
- Full displacement drilling
- Double rotary drilling

The solid undercarriage offers excellent stability and low ground bearing pressure.

The uppercarriage with its small swing radius enables operation in restricted space.

Parallel kinematics with a large working area allow to fold the leader back.

The rigid leader absorbs high torque and is fitted with a rope crowd system for high pull forces.

All winches are mounted on the leader, which provides a direct view of the main winch from the operator's cab.

The rotary drive of the BAT series combines exceptional torque with optimum operating comfort.

The powerful Liebherr diesel engine is low in emission and economical through SCR technology.

The Litronic control with assistance systems supports the operator:

- Cruise Control for the drilling process
- Joystick control for all machine functions
- Automatic shake-off function for working tools
- Leader inclination memory etc.

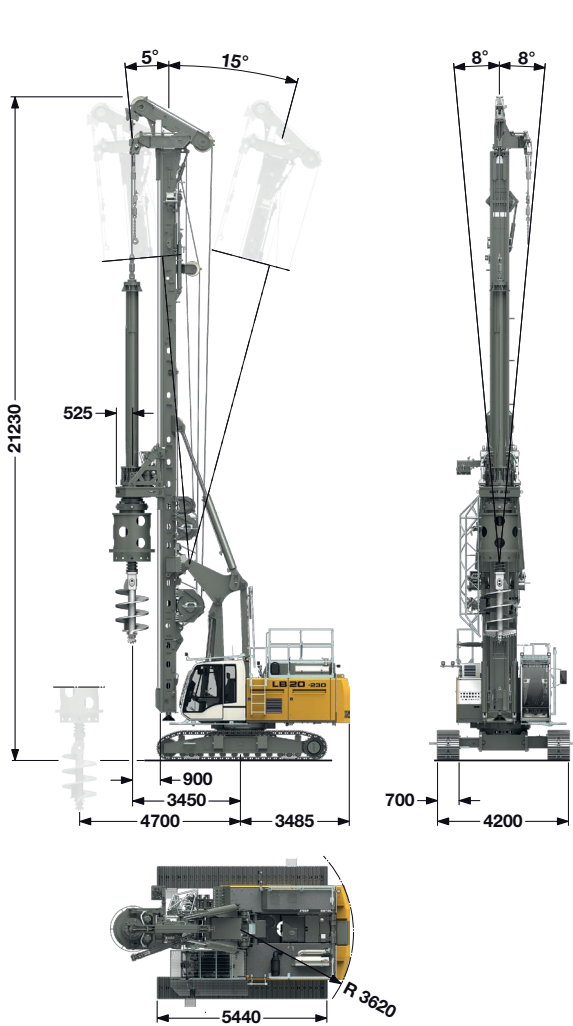
Sophisticated solutions provide safe operation and maintenance of the machine:

- Cab design for optimum visibility
- Acoustic and optic warnings
- Walkways on the uppercarriage
- Safety rails on top of the uppercarriage
- Rear and side view cameras etc.

Liebherr Kelly bars feature strongly overlapping elements resulting in less wear.

Precise and robust Liebherr casings and drilling tools provide excellent drilling performance.

Dimensions



LB 20-230

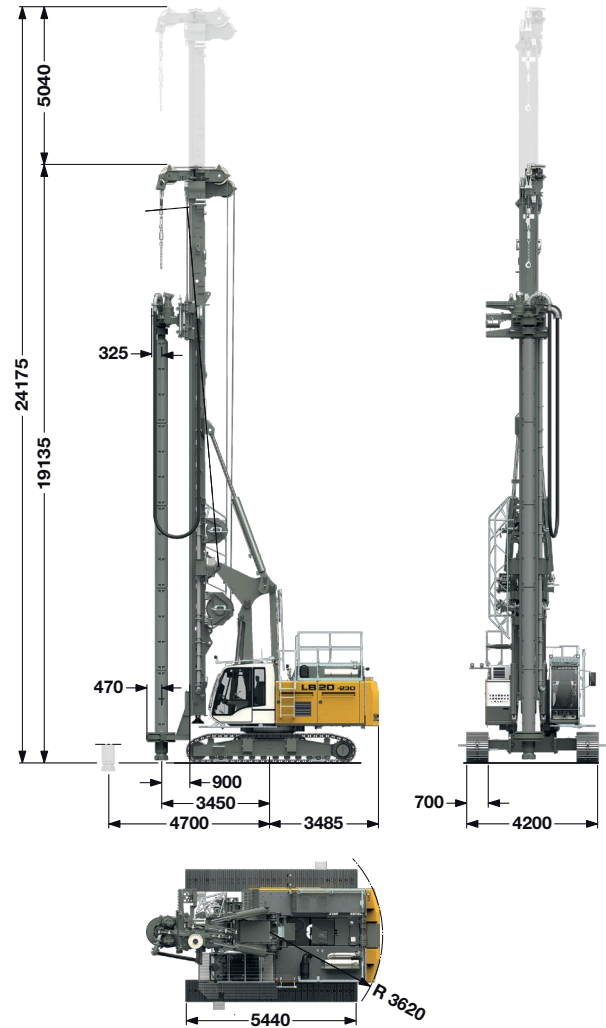
Technical data

Total height	21.23 m
Continuous rig inclination adjustment	
Lateral inclination	± 8°
Forward inclination	5°
Backward inclination	15°

Operating weight

Total weight with 700 mm 3-web shoes	68.7 t
Total weight with 800 mm 3-web shoes	69.1 t

The operating weight includes the basic machine (with rotary and Kelly bar MD 20/3/24) and 8 t counterweight, without equipment for casing oscillator.



LB 20-230 down-the-hole drilling with RHP 10

Technical data

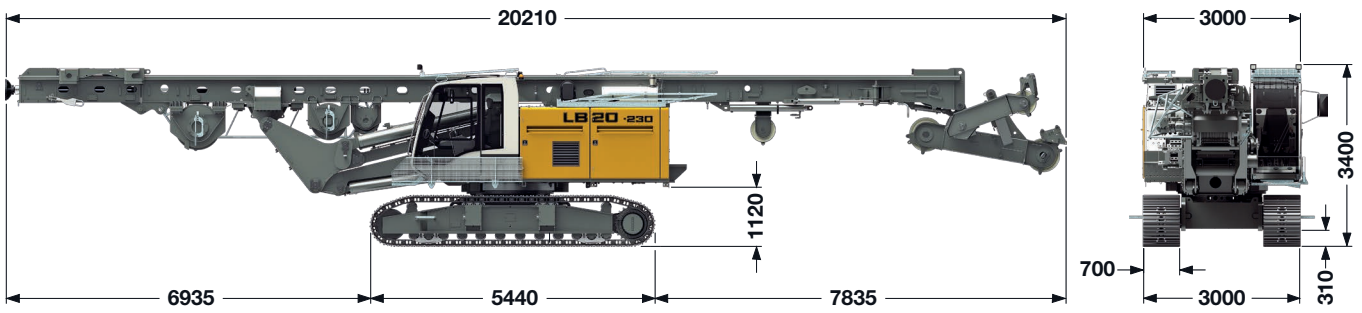
Total height	19.14 m
Total height with leader extension	24.18 m

Operating weight

Total weight with 700 mm 3-web shoes	62.2 t
Total weight with 800 mm 3-web shoes	62.6 t

The operating weight includes the basic machine (with sliding rotary RHP 10) and 8 t counterweight, without equipment for casing oscillator.

Transport dimensions and weights

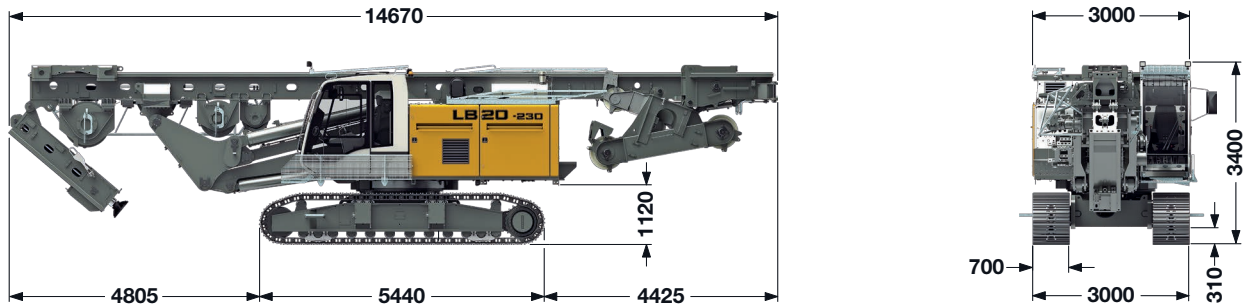


Transport standard

includes the basic machine (ready for operation*) with leader, without attachment (such as rotary, Kelly bar etc.) and without counterweight.

Dimensions and weights

Length	20.21 m
Weight complete without counterweight	51.5 t

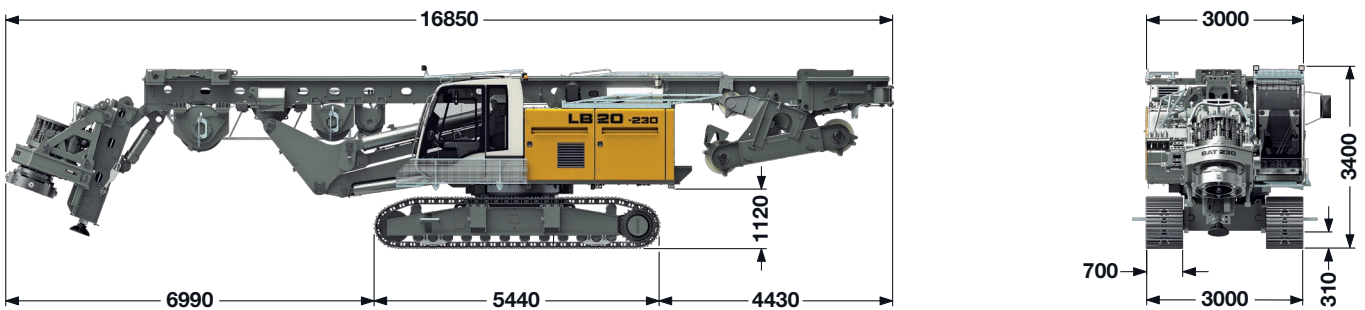


Transport option leader folded*

includes the basic machine (ready for operation*) with leader, without attachment (such as rotary, Kelly bar etc.) and without counterweight.

Dimensions and weights

Length	14.67 m
Weight complete without counterweight	51.5 t



Transport - leader folded with rotary**

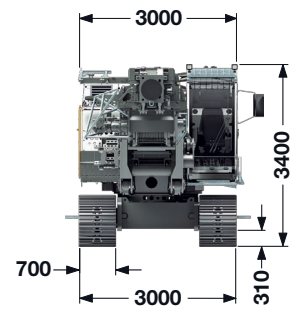
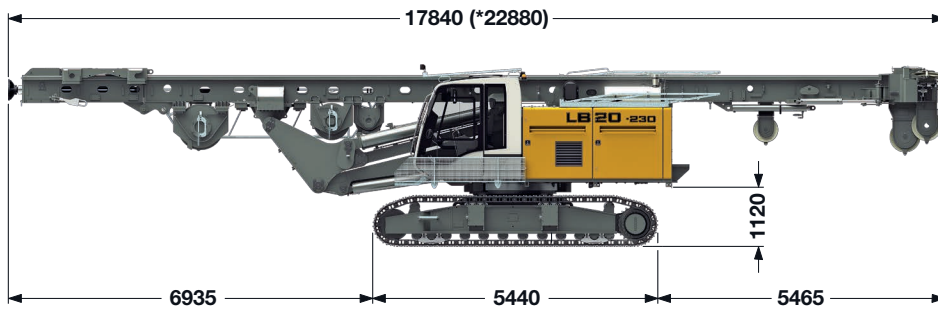
includes the basic machine (ready for operation) with leader and rotary, without attachment (such as Kelly bar etc.) and without counterweight.

Dimensions and weights

Length	16.85 m
Weight complete, with rotary and without counterweight	57.0 t

*) Folding cylinder for leader upper part recommended

**) Folding cylinder recommended for leader upper part and necessary for leader lower part



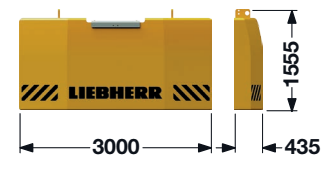
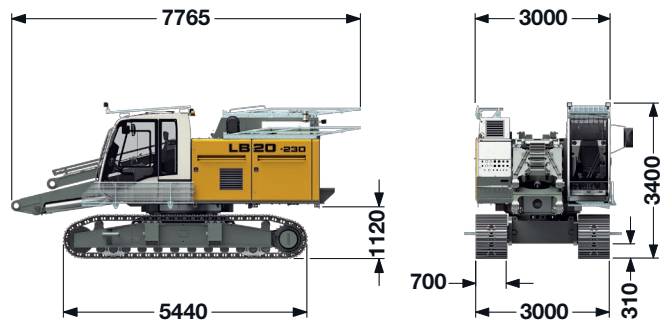
Transport down-the-hole drilling

includes the basic machine (ready for operation) with leader, without sliding and/or folding rotary and without counterweight.

* Possible variation: leader with extension.

Dimensions and weights

Length	17.84 m
Weight complete without counterweight	50.8 t
with leader extension	52.0 t



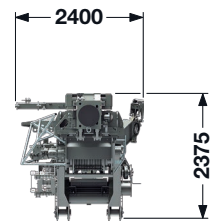
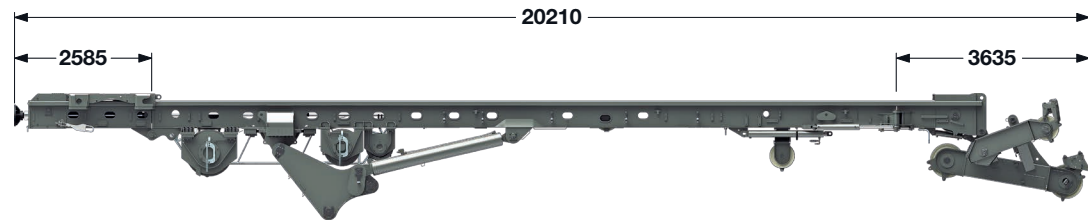
Transport basic machine

ready for operation, without counterweight

Transport weight	34.4 t
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Counterweight

Counterweight	8 t
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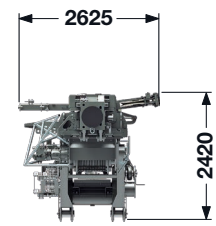
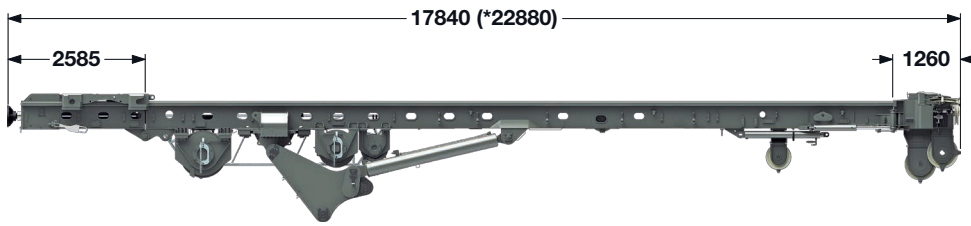
Transport leader

includes the leader without attachment (such as rotary, Kelly bar etc.).

Weights and dimensions can vary with the final configuration of the machine. The figures in this brochure may include options which are not within the standard scope of supply of the machine.

Dimensions and weights

Length	20.21 m
Weight complete	17.1 t
Leader lower part	1.2 t
Leader upper part with leader top	2.1 t



Transport leader down-the-hole drilling

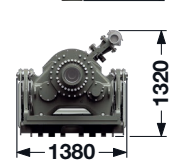
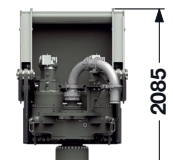
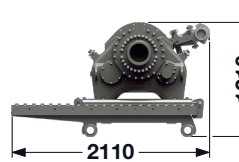
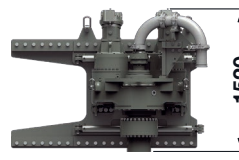
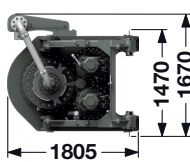
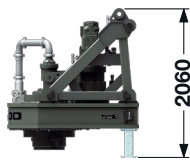
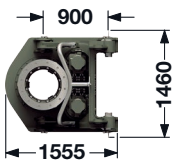
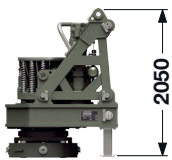
includes the leader without sliding and/or folding rotary

Weights and dimensions can vary with the final configuration of the machine. The figures in this brochure may include options which are not within the standard scope of supply of the machine.

* Possible variation: leader with extension.

Dimensions and weights

Length	17.84 m
Weight complete without leader extension	16.3 t
Weight complete with leader extension	17.5 t
Leader extension	1.2 t
Leader lower part	1.2 t
Leader top	1.3 t



Rotary BAT 230

Transport weight
BAT 230 ——— 5.2 t

Mixing drive MAT 100

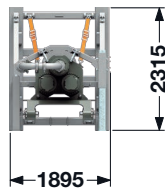
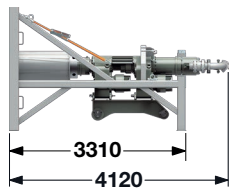
Transport weight
MAT 100 ——— 6.4 t

Sliding rotary RHP 10

Transport weight
RHP 10 ——— 3.5 t

Folding rotary RHP 10

Transport weight
RHP 10 ——— 3.5 t



Double rotary drive DBA 80

Transport weight
DBA 80 ——— 5.8 t

Technical data



Engine

Power rating according to ISO 9249, 320 kW (429 hp) at 1700 rpm
Engine type ————— Liebherr D 936 A7-04
Fuel tank ————— 700 l capacity with continuous level indicator and reserve warning
Engine complies with 97/68 EC Stage IV and NRMM exhaust certification EPA/CARB Tier 4f.



Hydraulic system

The main pumps are operated by a distributor gearbox. Axial piston variable displacement pumps work in open circuits supplying oil only when needed (flow control on demand). Hydraulic pressure peaks are absorbed by the integrated automatic pressure compensation, which relieves the pumps and saves fuel.

Pumps for working tools ————— 2x 270 l/min
Separate pump for kinematics ————— 130 l/min
Hydraulic oil tank ————— 600 l
Max. working pressure ————— 350 bar

A system of electronically monitored pressure and return filters cleans the hydraulic oil. Any clogging is displayed in the cabin. The use of synthetic environmentally friendly oil is also possible.



Crawlers

Propulsion through axial piston motor, hydraulically released multi-disc brake, maintenance-free crawler tracks, hydraulic chain tensioning device.

Drive speed ————— 0-2 km/h
Track force ————— 417 kN
Width of 3-web grousers ————— 700 mm
Transport width ————— 3000 mm

Option:
Width of 3-web grousers ————— 800 mm
Transport width ————— 3400 mm



Noise emission

Noise emissions correspond with 2000/14/EC directive.
Guaranteed average sound pressure level L_{PA} in the cabin — 75.8 dB(A)

Guaranteed sound power level L_{WA} ————— 110 dB(A)
Option: Eco-Silent Mode
Reduction of guaranteed sound power level L_{WA} ————— 4 dB(A)

Vibration transmitted to the hand-arm system of the machine operator ————— < 2.5 m/s²
Vibration transmitted to the whole body of the machine operator ————— < 0.5 m/s²



Swing

Consists of triple-row roller bearing with external teeth and two swing drives, fixed axial piston hydraulic motor, hydraulically released multi-disc holding brake, planetary gearbox and pinion. Selector for 3 speed ranges to increase swing precision.
Swing speed from 0 – 3.4 rpm continuously variable.



Control

The control system – developed and manufactured by Liebherr – is designed to withstand extreme temperatures and the many heavy-duty construction tasks for which this machine has been designed. Complete machine operating data are displayed on a high resolution monitor screen. A GSM/GPRS telematics module allows for remote inquiry of machine data and operational conditions. To ensure clarity of the information on display, different levels of data are shown in enlarged lettering and symbols.

Control and monitoring of the sensors are also handled by this high technology system. Error indications are automatically displayed on the monitor in clear text. The machine is equipped with proportional control for all movements, which can be carried out simultaneously. Two joysticks are required for operation. Pedal control can be changed to hand control.

Options:
PDE®: Process data recording



Kelly winch with freewheeling

Line pull effective (2nd layer) ————— 180 kN
Rope diameter ————— 28 mm
Rope speed ————— 0 -85 m/min



Auxiliary winch

Line pull effective (1st layer) ————— 80 kN
Rope diameter ————— 20 mm
Rope speed ————— 0-82.5 m/min



Rope crowd system

Crowd force (push/pull) ————— 300/300 kN
Line pull (effective) ————— 150 kN
Rope diameter ————— 24 mm
Travel with standard leader between mechanical limit stops, without extension ————— 14.7 m
Travel reduction (with short leader lower part) ————— 1.6 m
Rope speed ————— 0-88 m/min

The winches are outstanding in their compact design and easy assembly. Propulsion is via a maintenance-free planetary gearbox in oil bath. Load support by the hydraulic system; additional safety factor by a spring-loaded, multi-disc holding brake. All line pull values are effective values. The efficiency factor of approx. 25% has already been deducted.

Rotary BAT 230 with shock absorber



Automatic gearbox for best operating comfort

- No stopping required to change gears
- No interruption of the drilling process
- Automatic torque adjustment
- Continuous optimization of speed
- Four electronically adjustable speed ranges

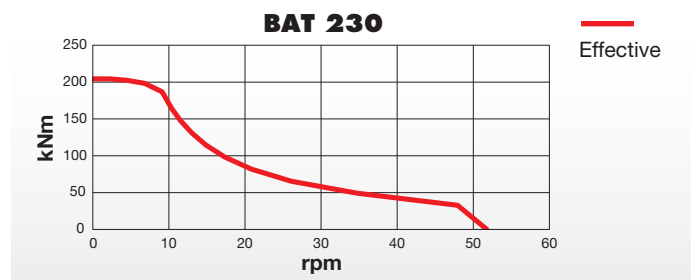
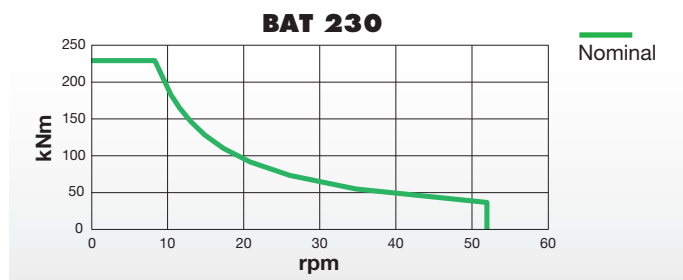
Highest availability through easy set-up

- No mechanical shift gearbox
- Higher availability thanks to less moving parts
- Less maintenance required

- No pressure lubrication necessary
- No interferences through defective lubrication pump
- Simplified hydraulics
- Lower risk of hydraulics leakages

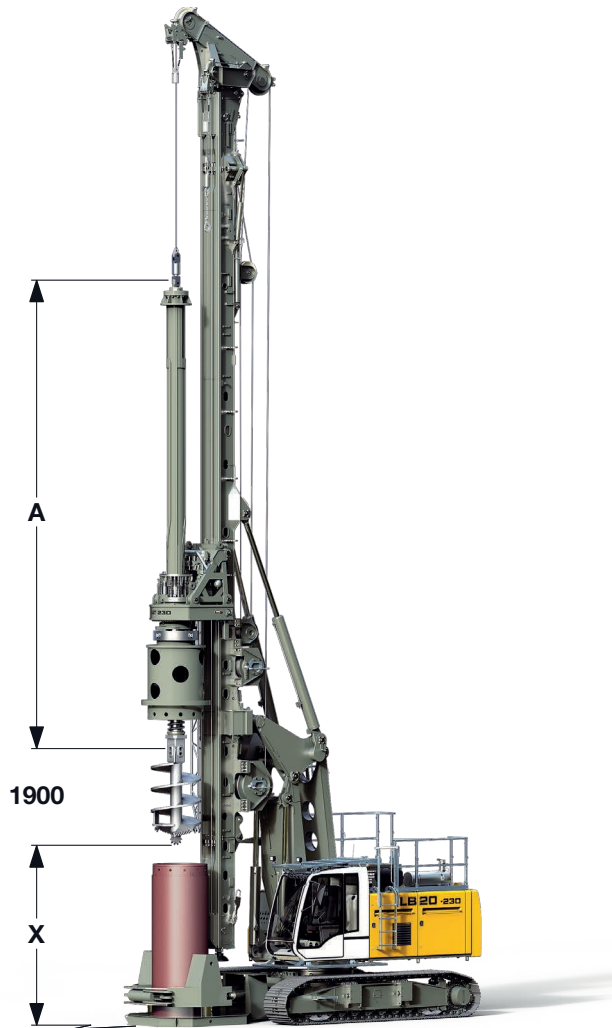
Flexibility through modular design

- Exchangeable drive adapters for use of other Kelly bars
- Exchangeable cardan joint for other casing drivers
- Quickly exchangeable equipment for other methods of operation

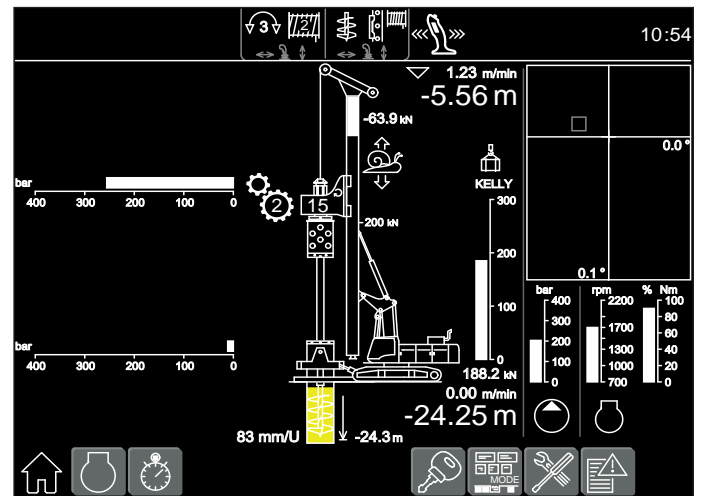


Kelly drilling

LB 20-230



Short leader lower part



Display for Kelly drilling

Technical data

Rotary drive - torque	0 – 230 kNm
Rotary drive - speed	0 – 54 rpm

Performance data

Max. drilling diameter**	1500 mm uncased with short leader lower part 2500 mm uncased
Max. drilling diameter*	1200 mm cased

*) Other drilling diameters on request. Other Kelly bars available on request.

1) When using a casing oscillator, value X has to be reduced by 1200 mm.
When using a Kelly bar guide, value X has to be reduced by 500 mm.

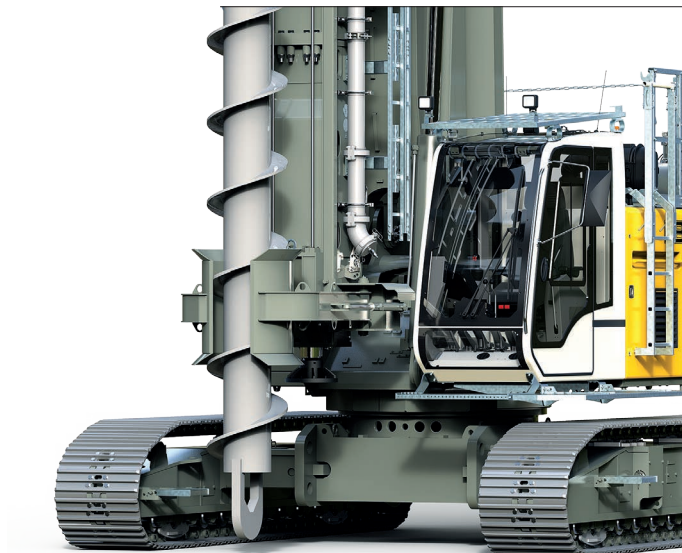
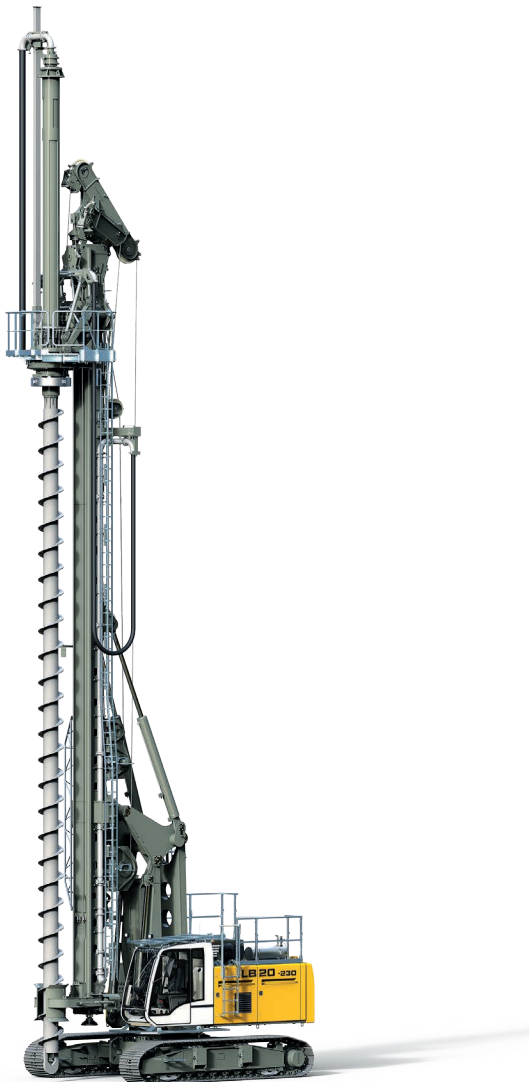
2) When using a short leader lower part the drilling depth is reduced by 1600 mm.

3) Installation only possible using auxiliary equipment.

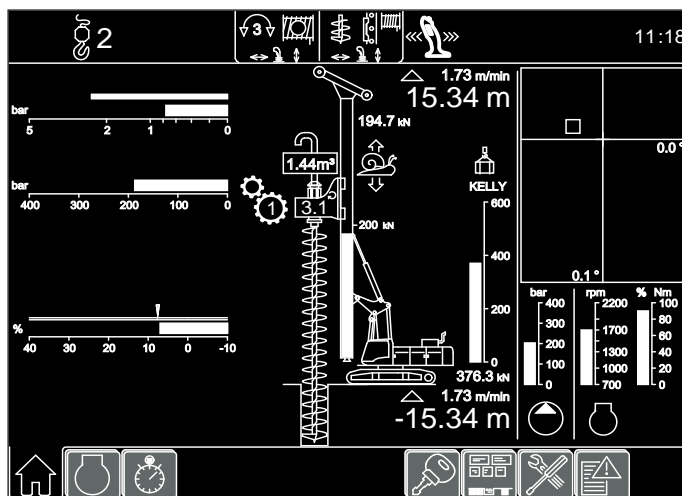
Kelly bars

	A	X ¹	Drilling depth ²	Weight	Kelly Ø
	(mm)	(mm)	(m)	(t)	(mm)
MD 20/3/24	9800	6900	22.5	4.4	368
MD 20/3/27	10800	5900	25.5	4.5	368
MD 20/3/30	11800	4900	28.5	4.9	368
MD 20/3/33	12800	3900	31.5	5.2	368
MD 20/4/36	11355	5400	34.6	6.2	368
MD 20/4/42	12855	3900	40.6	7.1	368
MD 20/4/48	14355	2400	46.6	7.8	368
MD 20/4/54 ³	15855	900	52.6	8.6	368

Continuous flight auger drilling



Auger with auger guide



Display for continuous flight auger drilling

Technical data

Rotary drive - torque	0 – 230 kNm
Rotary drive - speed	0 – 54 rpm

Performance data

Drilling depth with auger cleaner*	13.4 m
Drilling depth with 6 m Kelly extension, with auger cleaner	19.4 m
Max. pull force (crowd winch and Kelly winch)	660 kN
Max. drilling diameter**	1000 mm

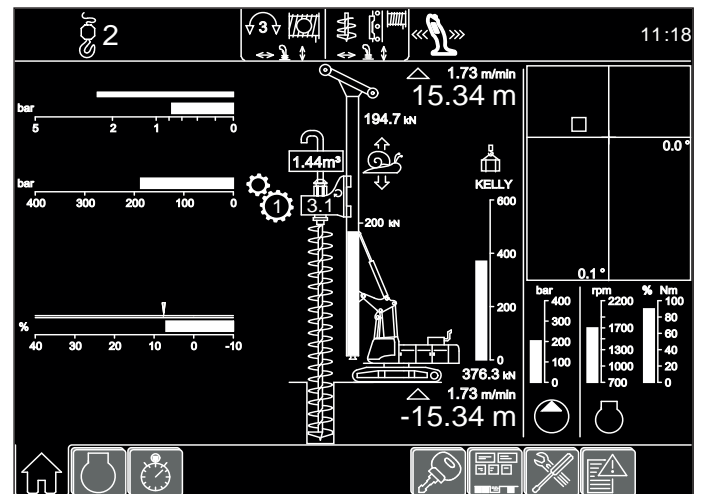
*) Without Kelly extension

**) Other drilling diameters available on request

Full displacement drilling



Full displacement tool with auger guide



Display for full displacement drilling

Technical data

Rotary drive - torque	0 – 230 kNm
Rotary drive - speed	0 – 30 rpm

Performance data

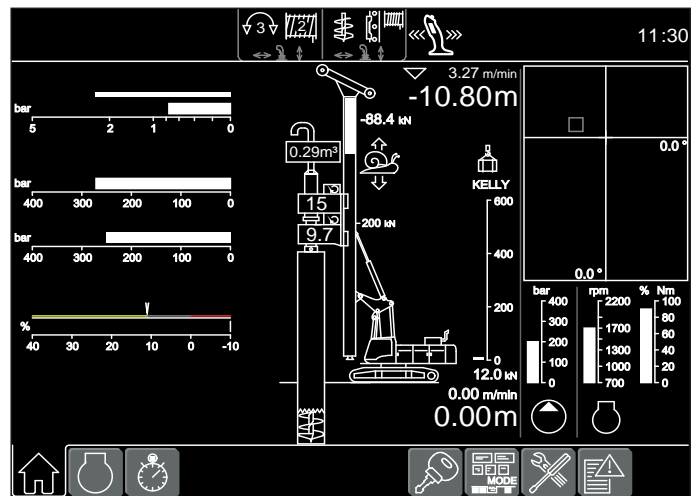
Drilling depth*	14.0 m
Drilling depth with 6 m Kelly extension	20.2 m
Max. pull force (crowd winch and Kelly winch)	660 kN
Max. drilling diameter**	500 mm

*) Without Kelly extension

**) Other drilling diameters available on request

Double rotary drilling

Model DBA 80



Display for double rotary drilling

Technical data

Drilling drive I – torque	1 st gear	83 kNm
Drilling drive I – speed	1 st gear	16 rpm
Drilling drive I – torque	2 nd gear	41 kNm
Drilling drive I – speed	2 nd gear	32 rpm
Drilling drive II – torque	1 st gear	62 kNm
Drilling drive II – speed	1 st gear	21.5 rpm
Drilling drive II – torque	2 nd gear	31 kNm
Drilling drive II – speed	2 nd gear	43 rpm

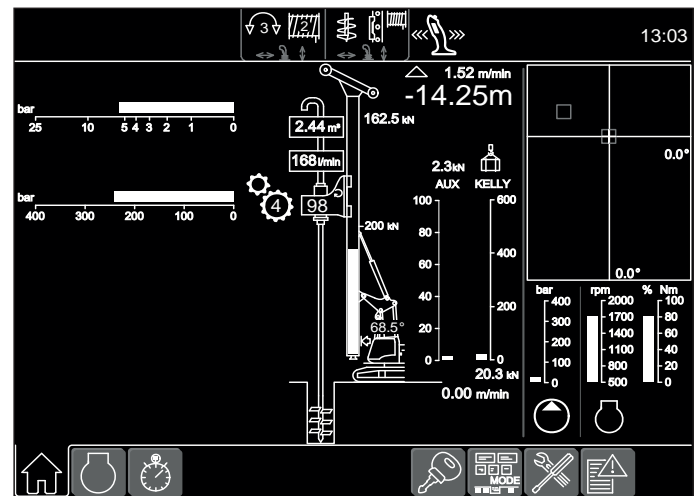
Performance data

Max. drilling diameter*	620 mm
Max. drilling depth	14.2 m
Max. pull force	300 kN

*) Other drilling diameters on request

Soil mixing

Model MAT 100



Display for soil mixing

Technical data

Mixing drive - torque	0 – 95 kNm
Mixing drive - speed	0 – 100 rpm

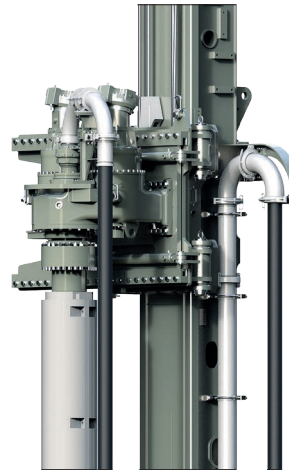
Performance data

Max. mixing depth	14.2 m
Max. mixing diameter*	1500 mm

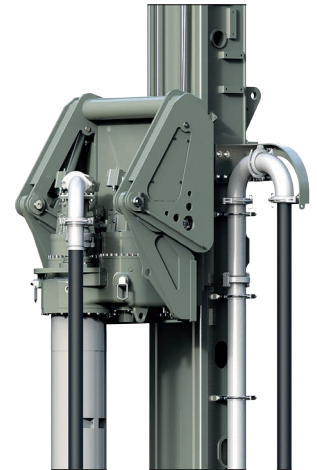
*) Other mixing diameters on request

Down-the-hole drilling

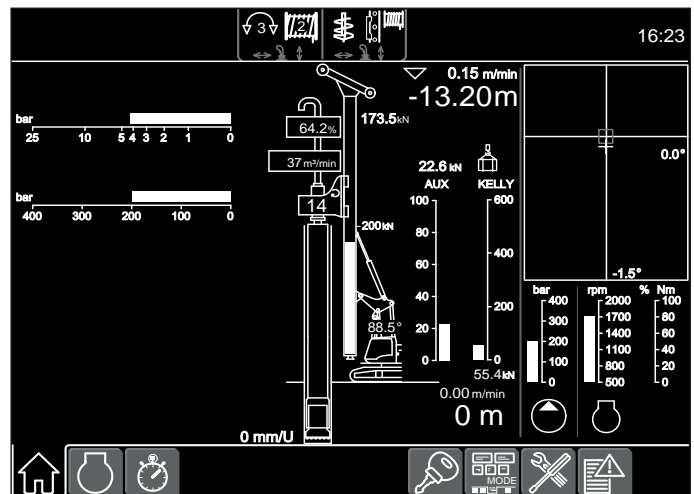
Model RHP 10



Sliding rotary



Folding rotary



Display for down-the-hole drilling

Technical data

Torque	1 st gear	106 kNm
Speed	1 st gear	24.8 rpm
Torque	2 nd gear	53 kNm
Speed	2 nd gear	49.6 rpm

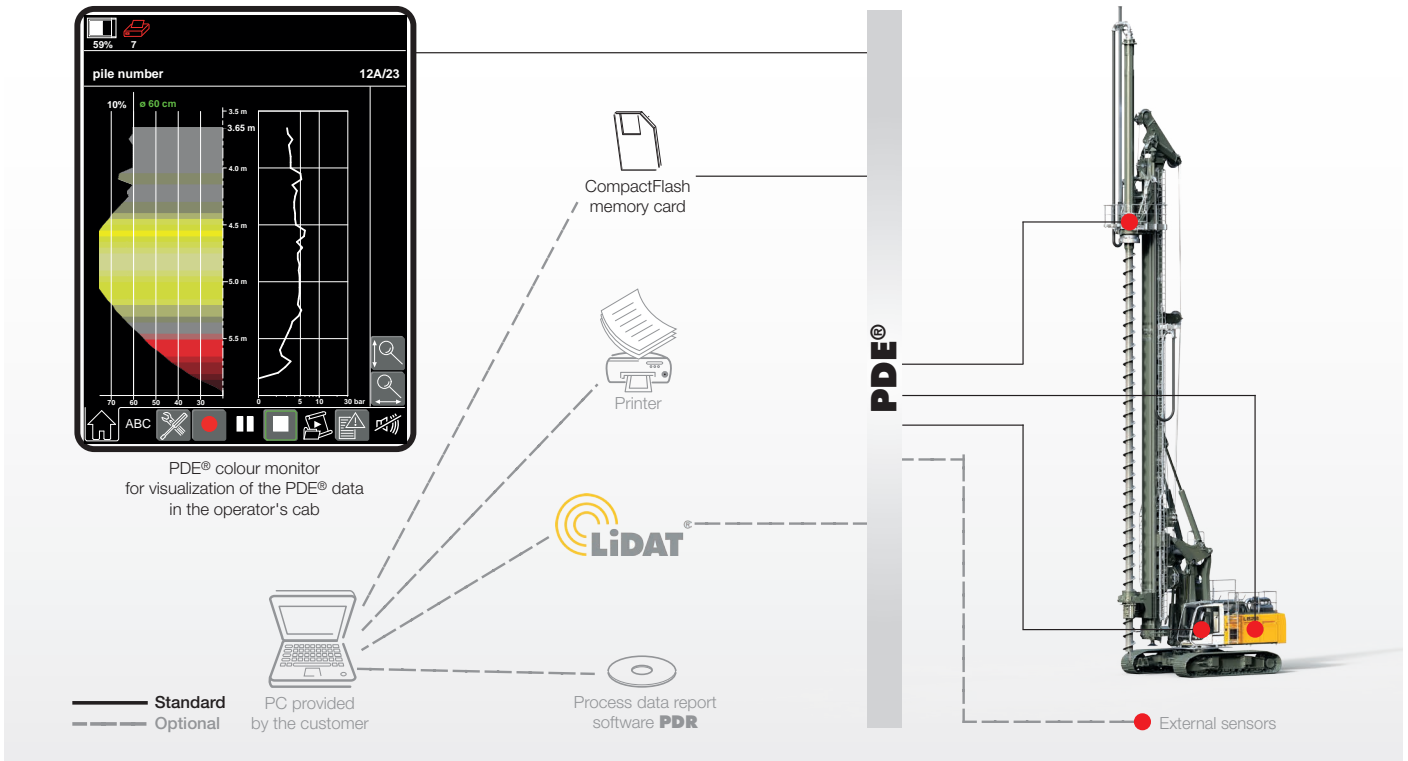
Performance data

Max. drilling depth	13.8 / 18.8* m
Max. drilling diameter	820 mm
Max. pull force (sliding rotary)	600 / 400* kN
Max. pull force (folding rotary)	500 / 400* kN

*) With leader extension

Process data recording system - PDE® (additional equipment)

The Liebherr process data recording system PDE® constantly records the relevant process data during the working process.



Depending on the application the recorded and processed data are displayed on the PDE® touchscreen in the operator's cab, e.g. in the form of an online cast-in-place pile.

At the same time the PDE® is operated using this touchscreen. The operator can enter various details (e.g. jobsite name, pile number, etc.) and start and stop recordings. A recording of every start-stop cycle carried out in the PDE® is established on a CompactFlash memory card.

The PDE® can be configured in a number of ways, e.g. for the connection of external sensors and/or for the generation of a simple protocol as graphic file.

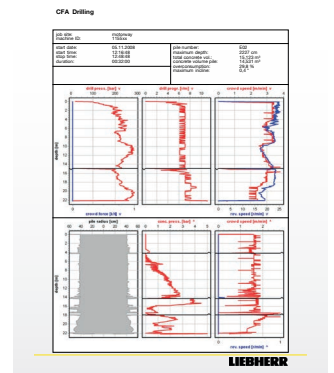
Process data reporting - PDR (additional equipment)

Comprehensive data evaluation and generation of reports on a PC is possible using the software PDR.

Recordings management - The recordings generated by the PDE® system can be imported and managed in PDR. The data can be imported directly from the CompactFlash card or via the Liebherr telematics system LiDAT. Certain recordings, e.g. for a particular day or jobsite, can be found using filter functions.

Viewing data - The data in each record is displayed tabularly. Combining several recordings provides results, for example, regarding the total concrete consumption or the average depth. Furthermore, a diagram editor is available for quick analysis.

Generating reports - A vital element of PDR is the report generator, which allows for the generation of individual reports. These can be printed out directly or stored as pdf files. In the process the size, colour, line thickness or even the desired logo can be configured. Moreover, the reports can be displayed in different languages, e.g. in English and in the national language.



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