

Drilling Rig

LB 20-230

Litronic®

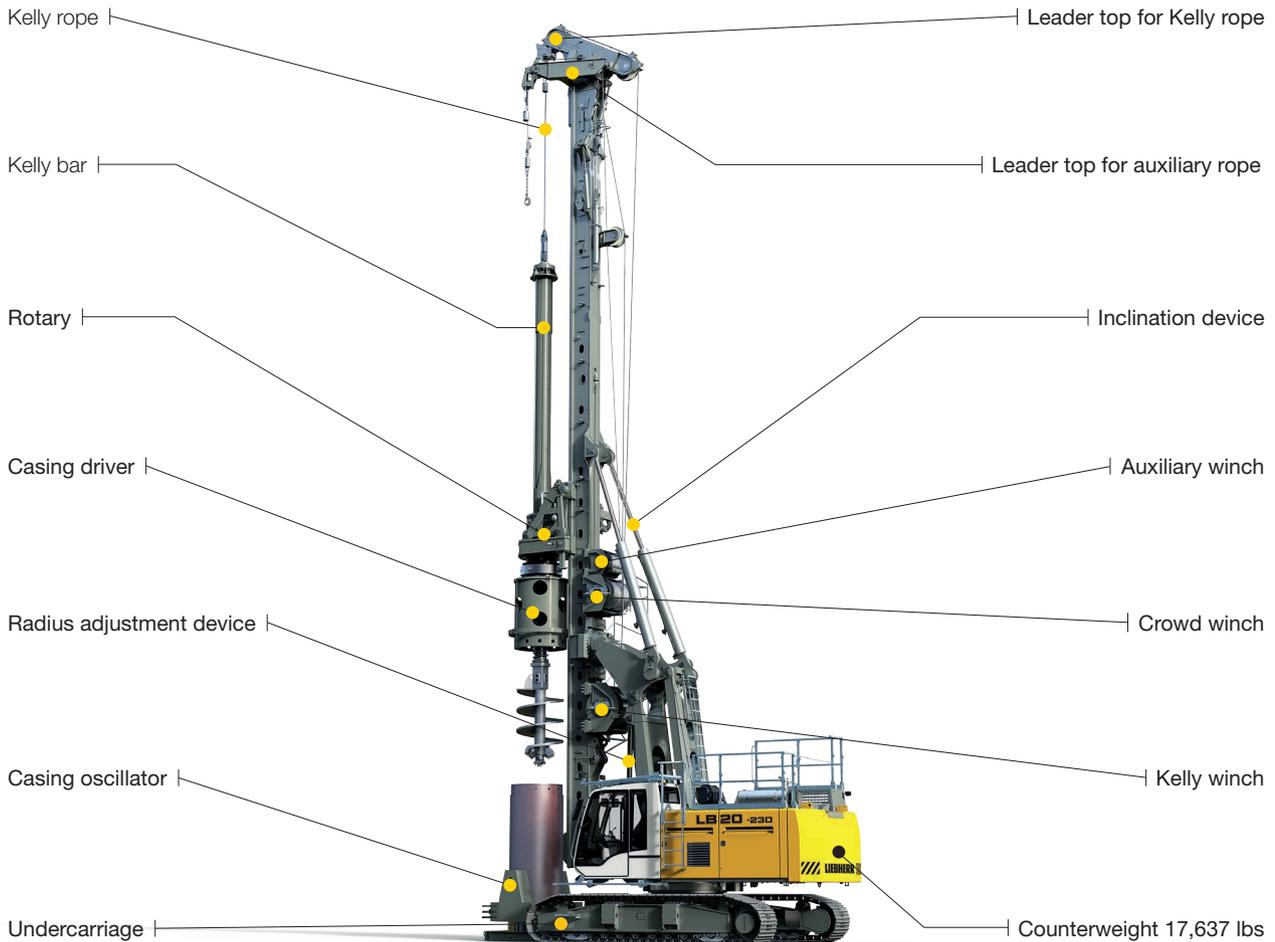
enUS

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.

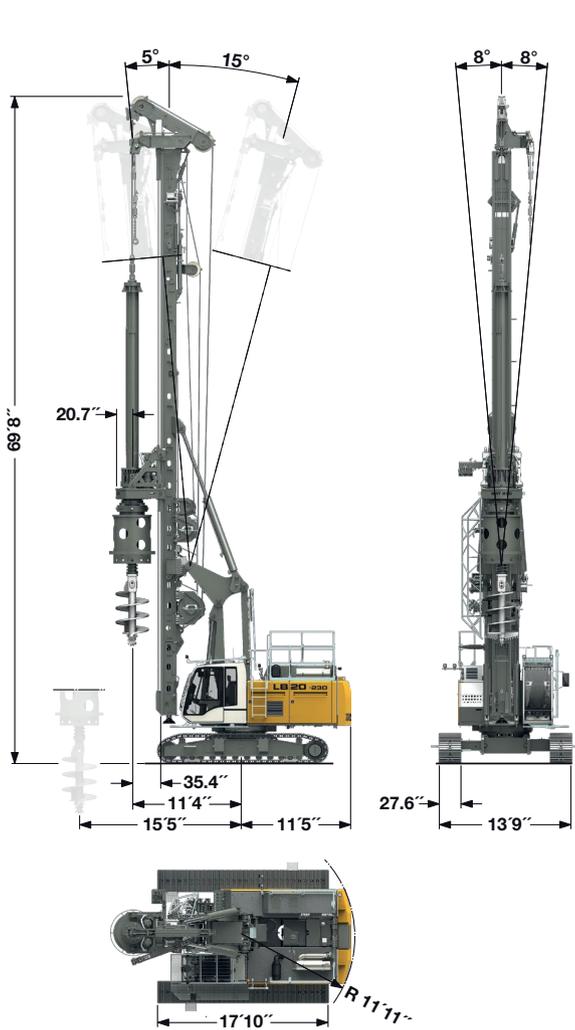
Sophisticated solutions provide safe operation and maintenance of the machine:

- 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

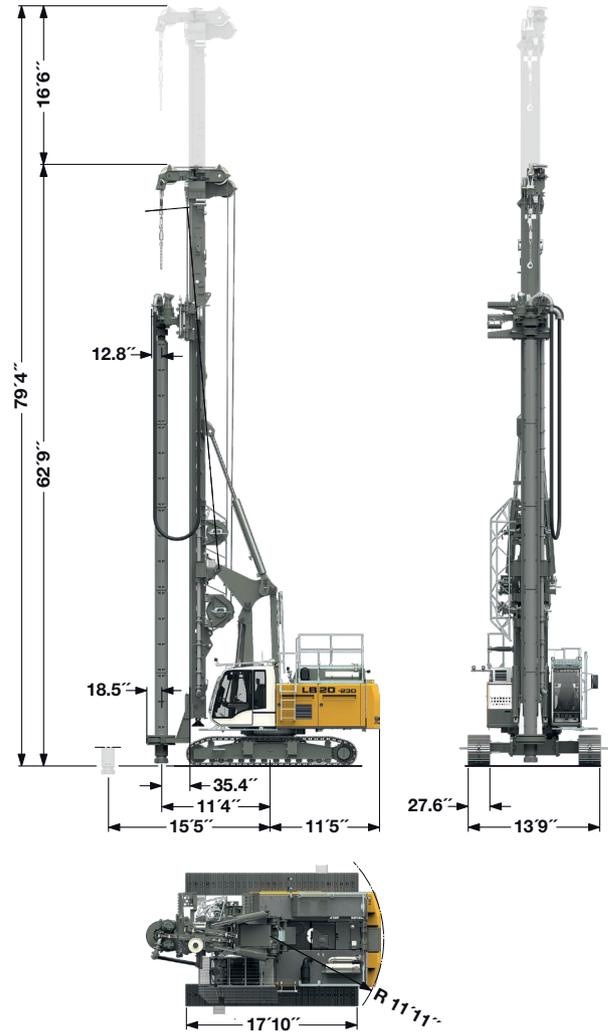
Technical data

Total height	69.65 ft
Continuous rig inclination adjustment	
Lateral inclination	± 8°
Forward inclination	5°
Backward inclination	15°

Operating weight

Total weight with 27.6 inch 3-web shoes	151,458 lbs
Total weight with 31.5 inch 3-web shoes	152,339 lbs

The operating weight includes the basic machine (with rotary and Kelly bar MD 20/3/24) and 17,637 lbs counterweight, without equipment for casing oscillator.



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

Technical data

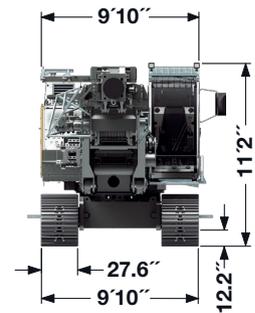
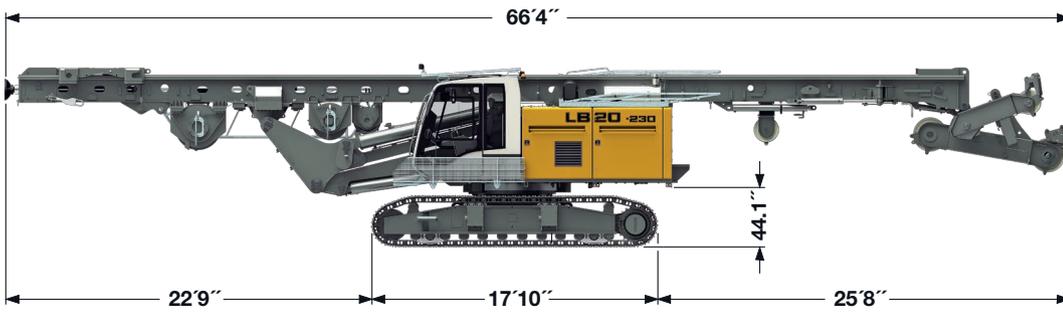
Total height	62.79 ft
Total height with leader extension	79.33 ft

Operating weight

Total weight with 27.6 inch 3-web shoes	137,128 lbs
Total weight with 31.5 inch 3-web shoes	138,009 lbs

The operating weight includes the basic machine (with sliding rotary RHP 10) and 17,637 lbs counterweight, without equipment for casing oscillator.

Transport dimensions and weights

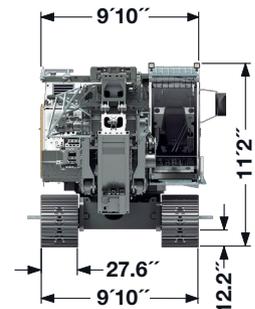
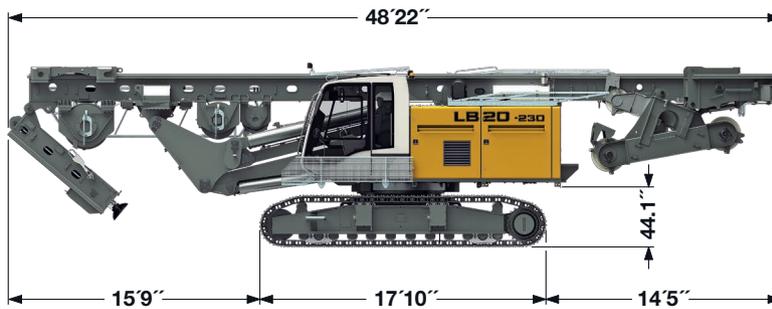


Transport standard

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

Dimensions and weights

Length ————— 66.30 ft
 Weight complete without counterweight ————— 113,538 lbs

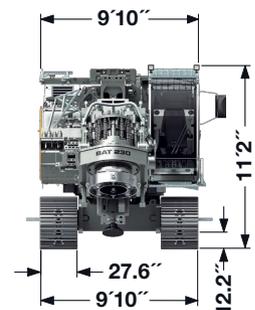
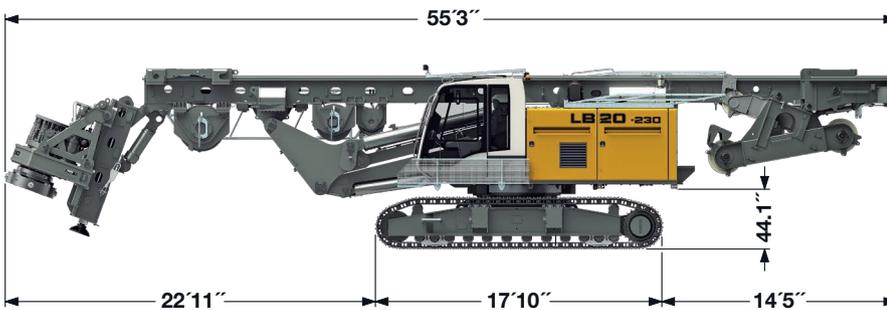


Transport option leader folded*

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

Dimensions and weights

Length ————— 48.13 ft
 Weight complete without counterweight ————— 113,538 lbs



Transport - leader folded with rotary**

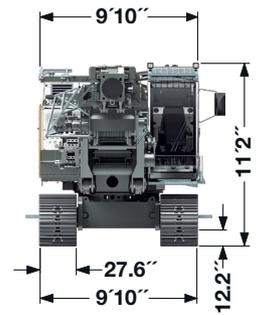
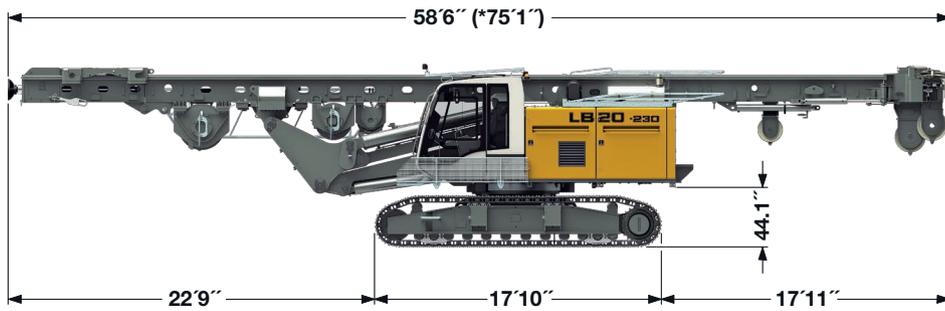
includes the basic machine (ready for operation) with leader and rotary, without attachment (such as Kelly bar etc.) and without counterweight.

Dimensions and weights

Length ————— 55.31 ft
 Weight complete, with rotary and without counterweight - 125,663 lbs

*) Folding cylinder for leader upper part recommended

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



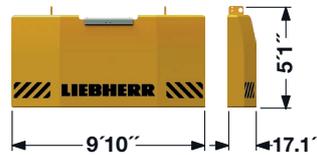
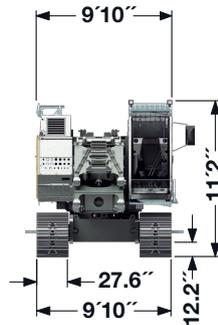
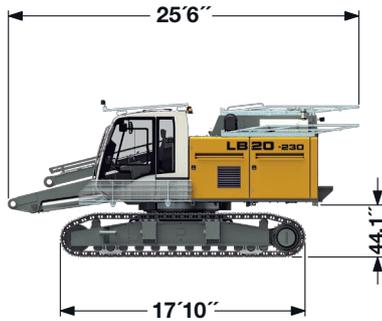
Transport down-the-hole drilling

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	58.53 ft
Weight complete without counterweight	111,995 lbs
with leader extension	114,640 lbs



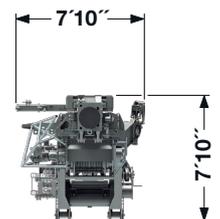
Transport basic machine

ready for operation, without counterweight

Transport weight — 75,839 lbs

Counterweight

Counterweight — 17,637 lbs



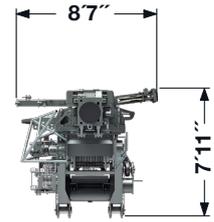
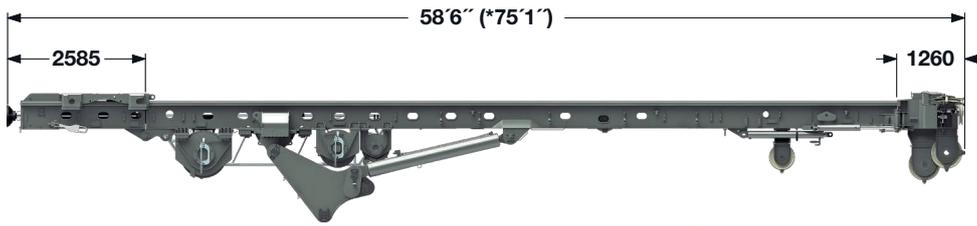
Transport leader

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	66.31 ft
Weight complete	37,699 lbs
Leader lower part	2,646 lbs
Leader upper part with leader top	4,629 lbs



Transport leader down-the-hole drilling

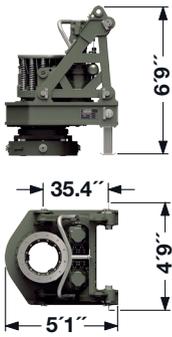
includes the leader without sliding and/or folding rotary

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.

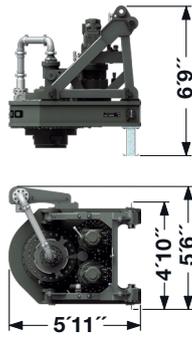
Dimensions and weights

Length	58.53 ft
Weight complete without leader extension	35,935 lbs
Weight complete with leader extension	38,581 lbs
Leader extension	2,646 lbs
Leader lower part	2,646 lbs
Leader top	2,866 lbs



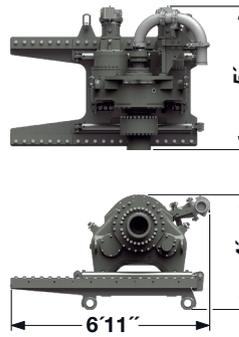
Rotary BAT 230

Transport weight
BAT 230 — 11,464 lbs



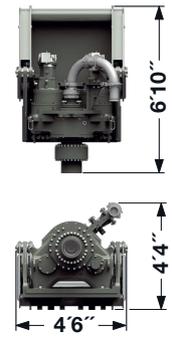
Mixing drive MAT 100

Transport weight
MAT 100 — 14,110 lbs



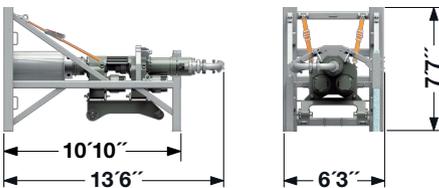
Sliding rotary RHP 10

Transport weight
RHP 10 — 7,716 lbs



Folding rotary RHP 10

Transport weight
RHP 10 — 7,716 lbs



Double rotary drive DBA 80

Transport weight
DBA 80 — 12,787 lbs

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 _____ 185 gal 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 71 gal/min
Separate pump for kinematics _____ 34 gal/min
Hydraulic oil tank _____ 159 gal
Max. working pressure _____ 5,076 PSI

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 _____ 0-1.2 mph
Track force _____ 93,745 lbf
Width of 3-web grousers _____ 27.6 inch
Transport width _____ 9.8 ft

Option:
Width of 3-web grousers _____ 31.5 inch
Transport width _____ 11.2 ft



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 _____ < 8.20 ft/s²
Vibration transmitted to the whole body of the machine operator _____ < 1.64 ft/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) _____ 40,466 lbf
Rope diameter _____ 28 mm
Rope speed _____ 0-279 ft/min



Auxiliary winch

Line pull effective (1st layer) _____ 17,985 lbf
Rope diameter _____ 20 mm
Rope speed _____ 0-271 ft/min



Rope crowd system

Crowd force (push/pull) _____ 67,443/67,443 lbf
Line pull (effective) _____ 33,721 lbf
Rope diameter _____ 24 mm
Travel with standard leader between mechanical limit stops, without extension _____ 48.23 ft
Travel reduction (with short leader lower part) _____ 5.25 ft
Rope speed _____ 0-289 ft/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

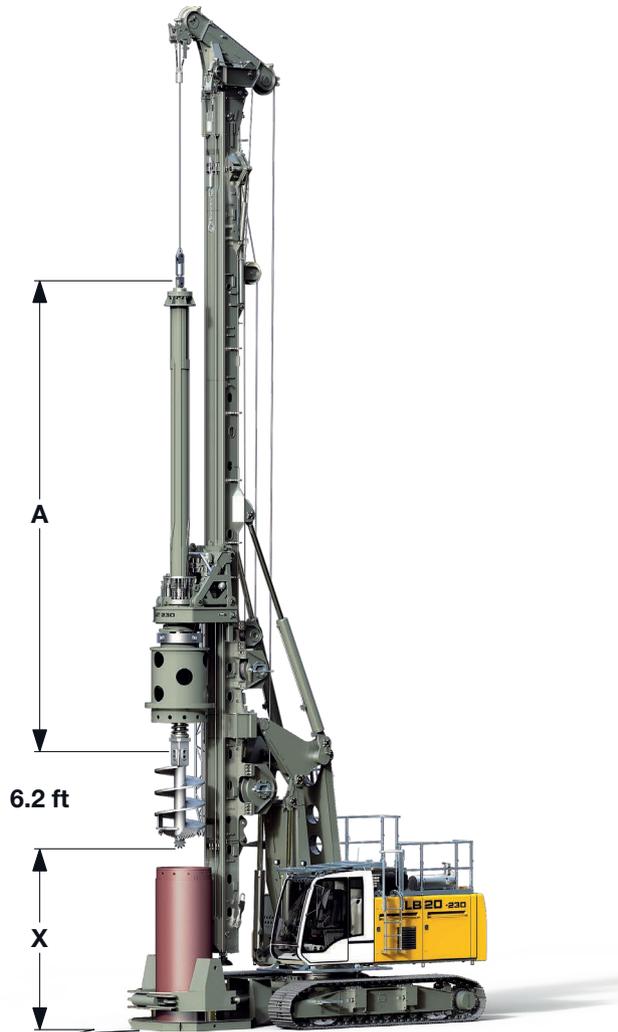
Flexibility through modular design

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

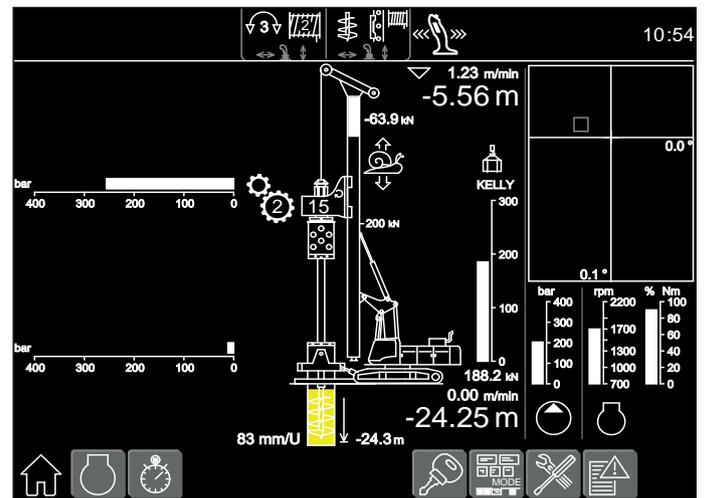


Kelly drilling

LB 20-230



Short leader lower part



Display for Kelly drilling

Technical data

Rotary drive - torque	0 – 169,639 lbf-ft
Rotary drive - speed	0 – 54 rpm

Performance data

Max. drilling diameter*	4.9 ft uncased
with short leader lower part	8.2 ft uncased
Max. drilling diameter*	3.9 ft 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 3.9 ft.
When using a Kelly bar guide, value X has to be reduced by 19.7 inch.

2) When using a short leader lower part the drilling depth is reduced by 5.2 ft.

3) Installation only possible using auxiliary equipment.

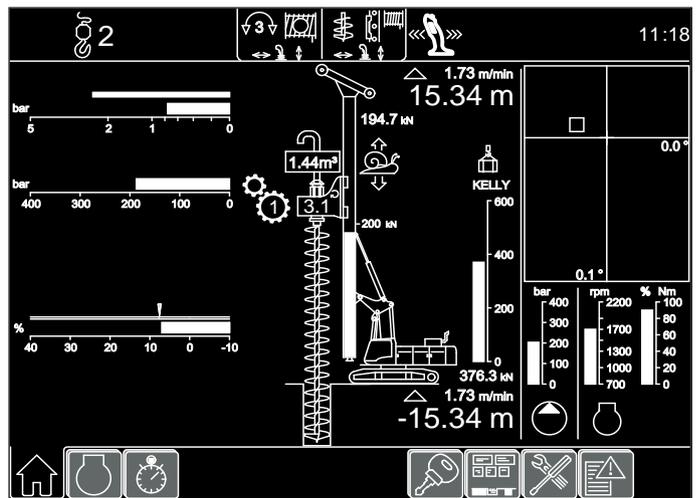
Kelly bars

	A	X ¹	Drilling depth ²	Weight	Kelly Ø
	(ft)	(ft)	(ft)	(lbs)	(inch)
MD 20/3/24	32.2	22.6	73.8	9,700	14.5
MD 20/3/27	35.4	19.4	83.7	9,920	14.5
MD 20/3/30	38.7	16.1	93.5	10,803	14.5
MD 20/3/33	42.0	12.8	103.3	11,464	14.5
MD 20/4/36	37.3	17.7	113.5	13,669	14.5
MD 20/4/42	42.2	12.8	133.2	15,653	14.5
MD 20/4/48	47.1	7.9	152.9	17,196	14.5
MD 20/4/54 ³	52.0	3.0	172.6	18,960	14.5

Continuous flight auger drilling



Auger with auger guide



Display for continuous flight auger drilling

Technical data

Rotary drive - torque	0 – 169,639 lbf-ft
Rotary drive - speed	0 – 54 rpm

Performance data

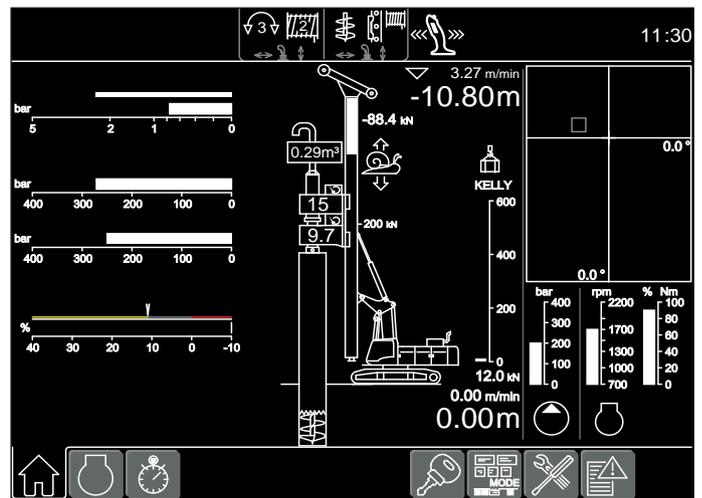
Drilling depth with auger cleaner*	44.0 ft
Drilling depth with 19.7 ft Kelly extension, with auger cleaner	63.6 ft
Max. pull force (crowd winch and Kelly winch)	148,374 lbf
Max. drilling diameter**	35.4 inch

*) 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	61,218 lbf-ft
Drilling drive I - speed	1 st gear	16 rpm
Drilling drive I - torque	2 nd gear	30,240 lbf-ft
Drilling drive I - speed	2 nd gear	32 rpm
Drilling drive II - torque	1 st gear	45,729 lbf-ft
Drilling drive II - speed	1 st gear	21.5 rpm
Drilling drive II - torque	2 nd gear	22,864 lbf
Drilling drive II - speed	2 nd gear	43 rpm

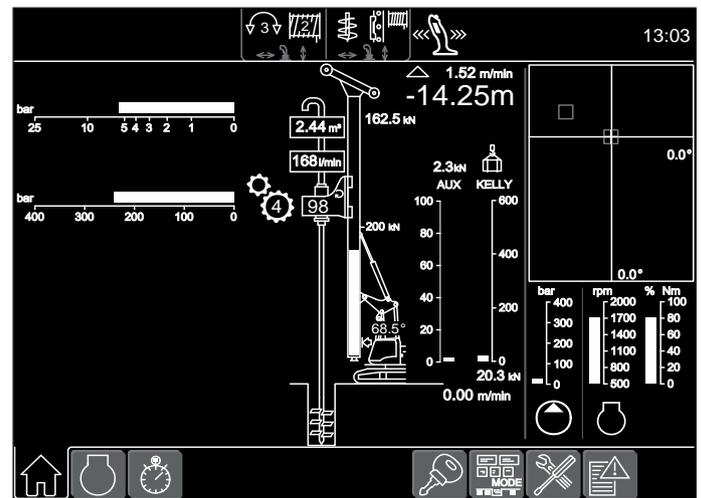
Performance data

Max. drilling diameter*	24.4 inch
Max. drilling depth	46.6 ft
Max. pull force	67,443 lbf

*) Other drilling diameters on request

Soil mixing

Model MAT 100



Display for soil mixing

Technical data

Mixing drive - torque	0 – 70,068 lbf-ft
Mixing drive - speed	0 – 100 rpm

Performance data

Max. mixing depth	46.6 ft
Max. mixing diameter*	4.9 ft

*) Other mixing diameters on request

Down-the-hole drilling

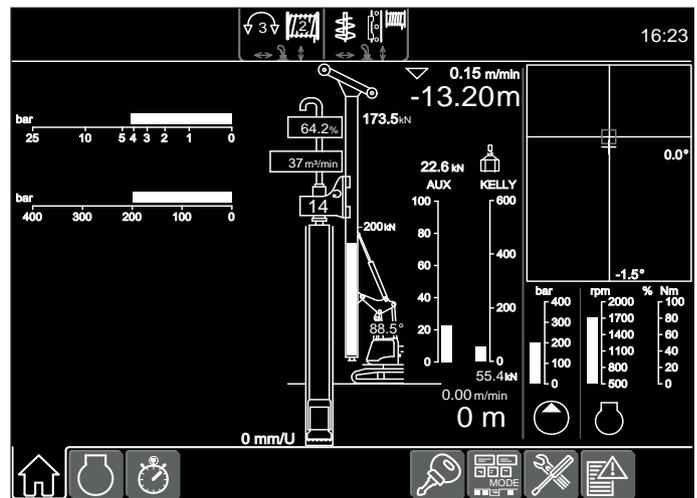
Model RHP 10



Sliding rotary



Folding rotary



Display for down-the-hole drilling

Technical data

Torque	1 st gear	78,182 lbf-ft
Speed	1 st gear	24.8 rpm
Torque	2 nd gear	39,091 lbf-ft
Speed	2 nd gear	49.6 rpm

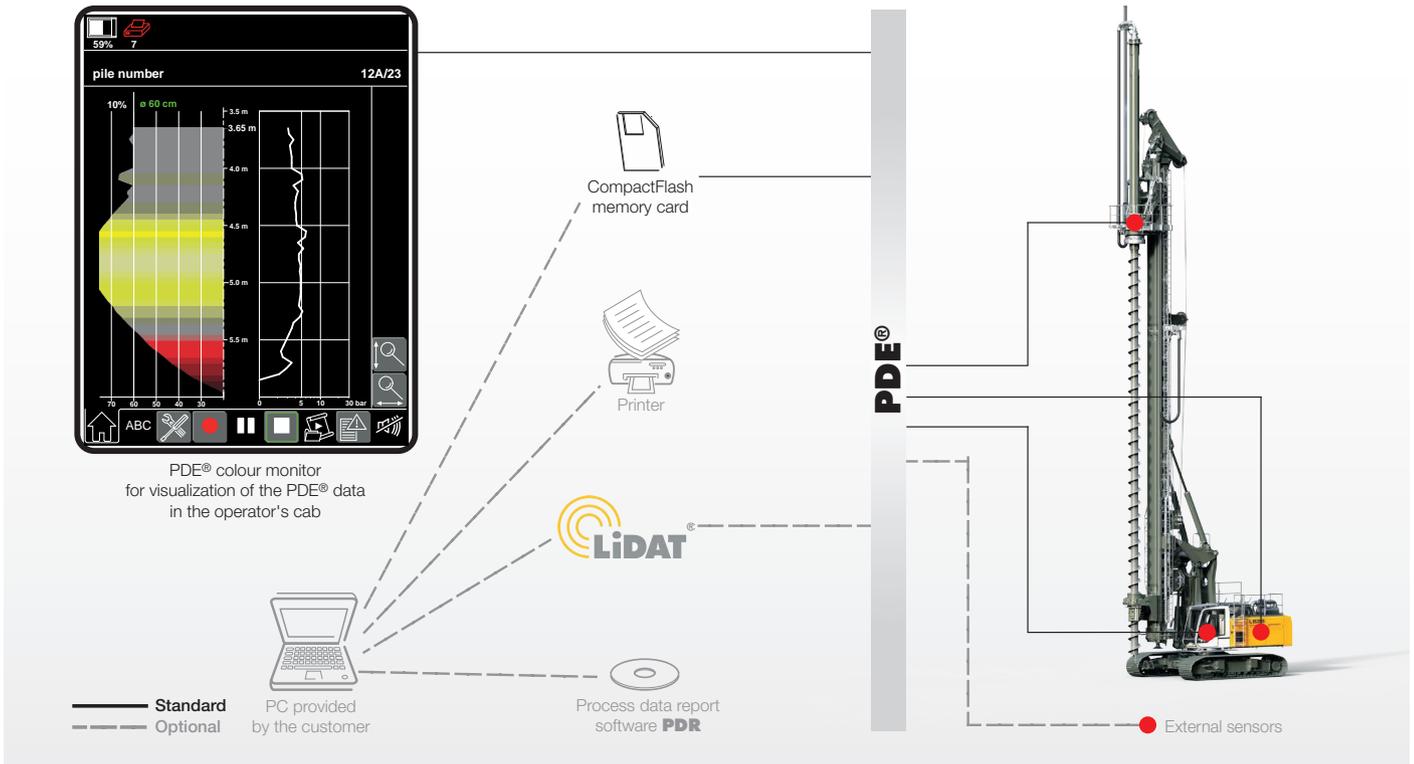
Performance data

Max. drilling depth	45.3 / 61.7* ft
Max. drilling diameter	32.3 inch
Max. pull force (sliding rotary)	134,885 / 89,924* lbf
Max. pull force (folding rotary)	112,404 / 89,924* lbf

*) 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.

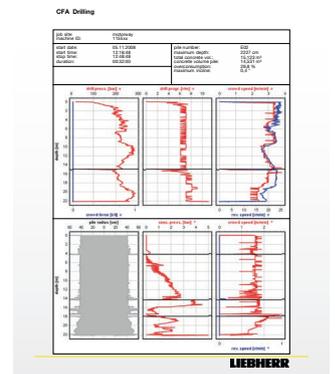
Process data reporting - PDR (additional equipment)

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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