

Tunneling Excavators

R 924
Compact

R 944 C
Litronic®

Product Information

	R 924 Compact	R 944 C Litronic
Operating Weight:	33,000 - 34,500 kg	43,600 - 44,200 kg
Engine Output:	129 kW / 175 HP	190 kW / 258 HP
Tunnel Height:	4.75 - 7.50 m	5.40 - 8.00 m



LIEBHERR

R 924 Compact

Litronic®

Operating Weight: 33,000 - 34,500 kg
Engine Output: 129 kW / 175 HP
Tunnel Height: 4.75 - 7.50 m

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Operating Weight: 43,600 - 44,200 kg
Engine Output: 190 kW / 258 HP
Tunnel Height: 5.40 - 8.00 m



Performances

Tunnel construction is one of the toughest environments for excavator operation that exists. The operation of a tunnel excavator becomes efficient when the machine, despite the harsh conditions, can cut out the tunnel profile required as rapidly as possible but in economical fashion. This means that a tunnel excavator must produce a high hydraulic capacity and, above all, be provided with operational fittings which are tailored to the particular application. The hydraulic system used with Liebherr tunnel excavators is optimized for milling. Liebherr tunnel excavators meet all the high demands imposed in tunnel construction in every respect, with both the basic machine and the attachment precisely matched to this particular type of work, and consistently designed to achieve real economical performance.

Reliability

Liebherr tunnel excavators are the result of decades of practical experience in the development of truly reliable special equipment for demanding situations. All the materials used have undergone intensive, long-term tests and meet high Liebherr quality standards even under the hardest conditions. In addition to being extremely robust, the attachment on Liebherr tunnel excavators is able to rotate $2 \times 45^\circ$. The mechanical quick coupling system is provided with a reinforced locking unit and a wear protection element on the hook side. The sophisticated concept and the tried and trusted quality make Liebherr tunnel excavators the absolute standard for reliability.


Safety

The special cab is safeguarded with FOPS and FGPS as standard. To prevent damage from falling rocks, all the hoses in exposed locations on the equipment fittings are additionally secured by protection plates. The bucket cylinder is also attached in a lower position, and a cover fitted to both the lifting rams protects the hoses running between them.

Comfort

Characteristic of the special cab on the Liebherr tunnel excavator are the ergonomic design and high standard of operating comfort and convenience. The windows on the right and at the rear are fitted with polycarbonate panes, resistant to scratches and impacts, and feature extremely good visibility properties. As an option, the cab is also available with polycarbonate window panes all round.





Equipment

- Special tunnel boom with 2 x 45° tilting mechanism
- Optimal disposition and protection of hoses and pipes
- Liebherr quick coupler for a simpler tool changing
- Special position of cylinders to be better protected

Undercarriage

- Dozer blade with cylinder protection
- Deflector blades
- Travel drive protection
- 3 or 4 track guides at each track frame

Tunneling version

Operator's cab

- Adjustable seat with synthetic leather seat cover, easy to clean
- Good visibility in height
- Integrated FOPS protection and FGPS in the front
- Electronic components with protection (display and keyboard)

Tunneling specificities

- Upperstructure with steel structure
- Back-up warning
- Working headlights with protection
- Hydraulic system optimized for the cutting head application



Technical Data



Engine

Rating per ISO 9249	129 kW (175 HP) at 1,800 RPM
Model	Liebherr D 934 S
Type	4 cylinder in-line
Bore/Stroke	122/136 mm
Displacement	6.36 l
Engine operation	4-stroke diesel unit pump system turbo-charged after-cooled reduced emissions
Cooling	water-cooled and integrated motor oil cooler
Air cleaner	dry-type air cleaner with pre-cleaner, primary and safety elements
Fuel tank	345 l
Electrical system	
Voltage	24 V
Batteries	2 x 135 Ah/12 V
Starter	24 V/7.8 kW
Alternator	three phase current 24 V/100 A
Engine idling	sensor controlled



Hydraulic System

Hydraulic pump	Positive Control Classic, regulation with Liebherr variable flow swash plate double pump, proportional controller hydraulically steered
Max. flow	2 x 214 l/min.
Max. pressure	350 bar
Pump regulation	electro-hydraulic with electronic engine speed sensing regulation, pressure compensation, flow compensation, automatic oil flow optimizer, swing circuit with priority and torque control
Hydraulic tank	147 l
Hydraulic system	max. 360 l
Hydraulic oil filter	1 full flow filter (20 µm) in return line with integrated fine filter area (5 µm) and an additional leakage filter
Hydraulic oil cooler	compact cooler, consisting of a water and fuel cooler, sandwiched with hydraulic oil cooler and after-cooler cores and hydro-statically driven fan
MODE selection	adjustment of machine performance and the hydraulics via a mode selector to match application
ECO	for especially economical and environmentally friendly operation
POWER	for maximum digging power and heavy duty jobs
LIFT	for lifting
FINE	for precision work and lifting through very sensitive movements
Super-Finish	adjustable working speed for grading
RPM adjustment	stepless adjustment of engine output via the rpm at each selected mode
Tool Control	ten preadjustable pump flows and pressures for add on tools



Hydraulic Controls

Power distribution	via monoblock control valve with integrated safety valves
Servo circuit	
Attachment and swing	proportional via joystick levers
Travel	proportional via foot pedals or removable hand levers
	– speed pre-selection
Additional functions	via foot pedals or joystick toggle switch for milling cutter/hammer, 2 x 45° rotator and dozer blade



Swing Drive

Drive by	Liebherr swash plate motor
Transmission	Liebherr compact planetary reduction gear
Swing ring	Liebherr, sealed single race ball bearing swing ring, internal teeth
Swing speed	0 – 12.7 RPM stepless
Swing torque	70.2 kNm
Holding brake	wet multi-disc (spring applied, pressure released)
Option	pedal controlled positioning brake



Operator's Cab

Cab	according to guidelines for tunnel application: FOPS, FGPS plus Polycarbonate windows on attachment side
Operator's seat	shock absorbing suspension, adjustable to operator's weight, 6-way adjustable seat
Joysticks	integrated into adjustable seat consoles
Monitoring	menu driven query of current operating conditions via the LCD display. Automatic monitoring, display, warning (acoustical and optical signal) and saving machine malfunction data, for example, engine overheating, low engine oil pressure or low hydraulic oil level
Noise emission	
2000/14/EC	L _{WA} (surround noise) = 102 dB(A)



Undercarriage

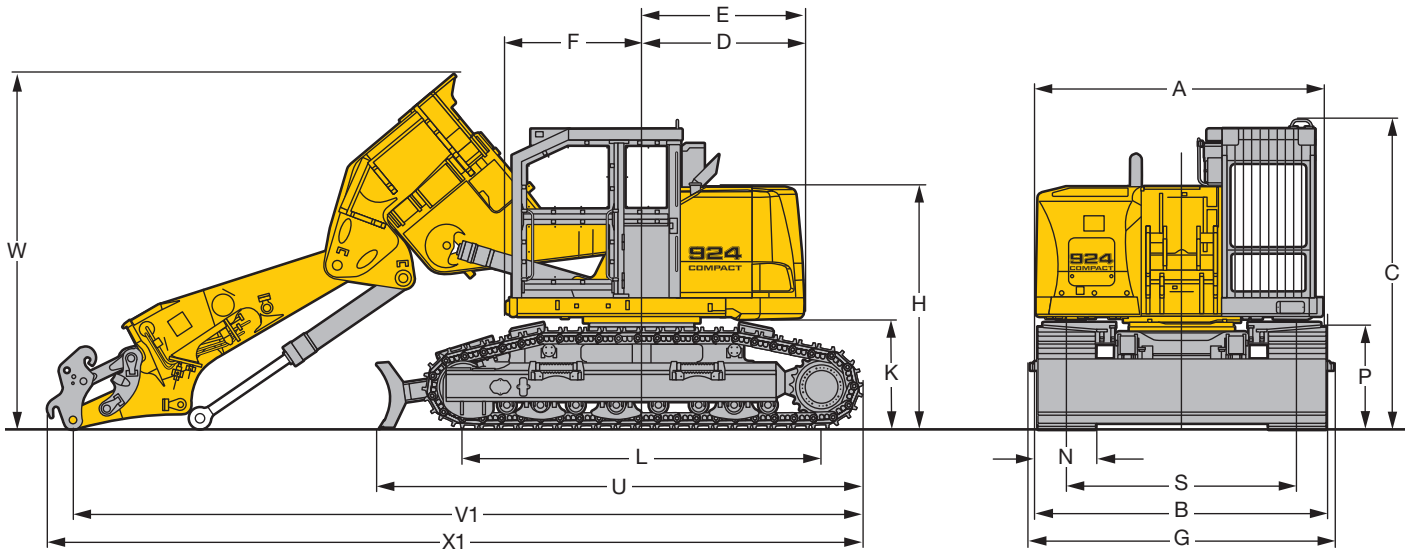
HD-SL	heavy duty, wide gauge and longer crawler length
Drive	Liebherr swash plate motors with integrated brake valves on both sides
Transmission	Liebherr planetary reduction gears
Travel speed	low range – 3.2 km/h high range – 5.3 km/h
Net drawbar pull on crawler	208 kN
Track components	D 6 C, maintenance-free
Track rollers/Carrier rollers	8/2
Track pads	double or triple grouser
Tracks	sealed and greased
Digging locks	wet multi-discs (spring applied, pressure released)
Brake valves	integrated into travel motor



Attachment

Type	combination of resistant steel plates and cast steel components
Hydraulic cylinders	Liebherr cylinders with special seal-system, shock absorbed
Pivots	sealed, low maintenance
Lubrication	fully automatic Liebherr central lubrication system (except bucket tilt linkage)
Hydraulic connections	pipes and hoses equipped with SAE split-flange connections
Basic boom	3.03 m or 3.30 m with 2 x 45° rotator
Stick	3.20 m or 4.20 m with integrated bucket tilt cylinder
Bucket	HD ripper bucket with cutting width 700 mm

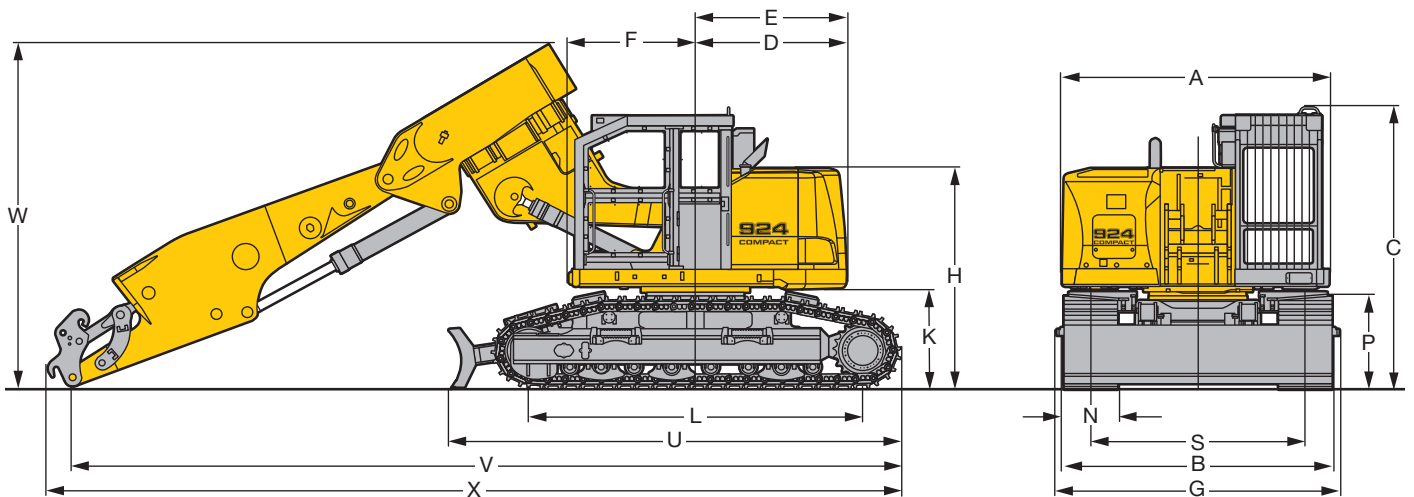
Dimensions



	mm
A	2,990
C	3,230
D	1,690
E	1,690
F	1,415
H	2,525
K	1,145
L	3,750
P	1,065
S	2,400
U	5,070
N	600
B	3,000
G	3,160

Boom 3.03 m with 2 x 45° Rotator and Stick 3.20 m		mm
V		8,080
V1		8,240
W		3,860
W1		3,710
X		8,360
X1		8,510

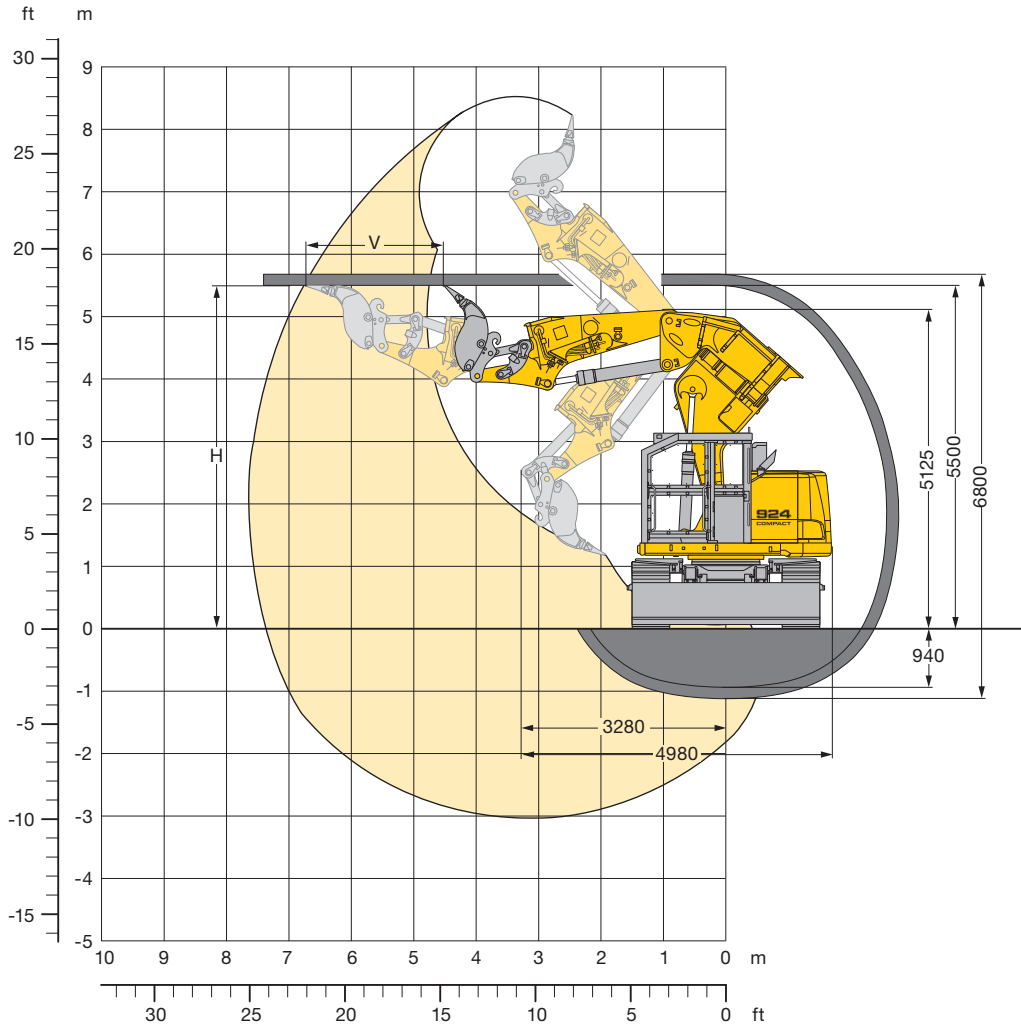
Boom 3.30 m with 2 x 45° Rotator and Stick 4.20 m		mm
V		9,300
W		4,000
X		9,600



Tunneling Excavator

with Boom 3.03 m, 2 x 45° Rotator and Stick 3.20 m

R 924 Compact



Digging Envelope

Basic boom bolted in position II of upper carriage

Tunnel height H m	Advance V m
4.75	1.20
5.00	2.05
5.50	2.25
6.00	2.10

Operating Weight and Ground Pressure

Operating weight includes basic machine with boom 3.03 m, 2 x 45° rotator, stick 3.20 m, quick coupler 48 and bucket 0.16 m³ (700 kg).

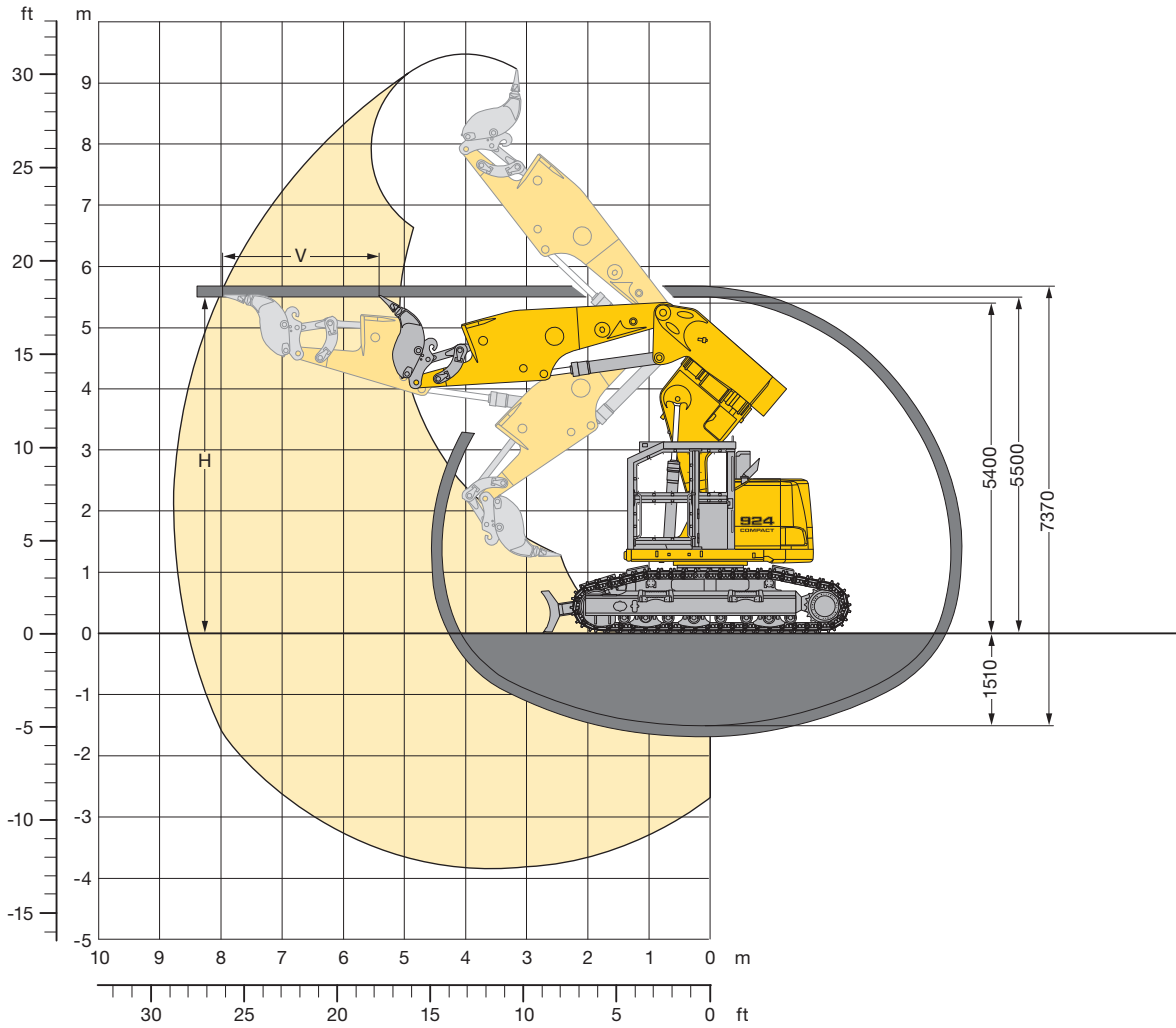
Undercarriage		HD-SL
Pad width	mm	600
Weight	kg	33,000
Ground pressure	kg/cm ²	0.68

Digging Forces without Quick Coupler

Max. digging force ISO	kN	142
	t	14.5
Max. breakout force ISO	kN	145
	t	14.8

Tunneling Excavator

with Boom 3.30 m, 2 x 45° Rotator and Stick 4.20 m



Digging Envelope

Basic boom bolted in position II of upper carriage

Tunnel height H m	Advance V m
5.50	2.50
6.00	2.40
6.50	2.20
7.00	2.10
7.50	1.90

Operating Weight and Ground Pressure

Operating weight includes basic machine with boom 3.30 m, 2 x 45° rotator, stick 4.20 m, quick coupler 48 and bucket 0.16 m³ (700 kg).

Undercarriage		HD-SL
Pad width	mm	600
Weight	kg	34,500
Ground pressure	kg/cm ²	0.71

Digging Forces without Quick Coupler

Max. digging force ISO	kN	116
	t	11.8
Max. breakout force ISO	kN	144
	t	14.7

Technical Data



Engine

Rating per ISO 9249	190 kW (258 HP) at 1,800 RPM
Model	Liebherr D 936 L
Type	6 cylinder in-line
Bore/Stroke	122/150 mm
Displacement	10.5 l
Engine operation	4-stroke diesel unit pump system turbo-charged after-cooled reduced emissions
Cooling	water-cooled and integrated motor oil cooler
Air cleaner	dry-type air cleaner with pre-cleaner, primary and safety elements
Fuel tank	580 l
Electrical system	
Voltage	24 V
Batteries	2 x 170 Ah/12 V
Starter	24 V/6.6 kW
Alternator	three phase current 28 V/100 A
Engine idling	sensor controlled



Hydraulic System

Hydraulic pump for attachment and travel drive	Liebherr variable flow, swash plate double pump
Max. flow	2 x 245 l/min. (+ 60 l/min. for milling cutter operation)
Max. pressure	350 bar
Pump regulation	electro-hydraulic with electronic engine speed sensing regulation, pressure compensation, flow compensation, automatic oil flow optimizer
Hydraulic pump for swing drive	reversible, variable flow, swash plate pump, closed-loop circuit
Max. flow	149 l/min.
Max. pressure	350 bar
Hydraulic tank	340 l
Hydraulic system	550 l
Hydraulic oil filter	1 full flow filter in return line with integrated fine filter area (5 µm)
Hydraulic oil cooler	compact cooler, consisting of a water cooler, sandwiched with hydraulic oil cooler and fuel and after-cooler cores and hydrostatically driven fan
MODE selection	adjustment of machine performance and the hydraulics via a mode selector to match application
ECO	for especially economical and environmentally friendly operation
POWER	for maximum digging power and heavy duty jobs
LIFT	for lifting
FINE	for precision work and lifting through very sensitive movements
RPM adjustment	stepless adjustment of engine output via the rpm at each selected mode



Hydraulic Controls

Power distribution	via monoblock control valve with integrated safety valves
Flow summation	to boom and stick
Closed-loop circuit	for uppercarriage swing drive
Servo circuit	
Attachment and swing	proportional via joystick levers
Travel	proportional via foot pedals or removable hand levers
	– speed pre-selection
Additional functions	via foot pedals or joystick toggle switch for milling cutter/hammer, 2 x 45° rotator and dozer blade



Swing Drive

Drive by	Liebherr swash plate motor with integrated brake valves
Transmission	Liebherr compact planetary reduction gear
Swing ring	Liebherr, sealed single race ball bearing swing ring, internal teeth. Lubrication via a grease distributor and a grease nipple
Swing speed	0 – 8.2 RPM stepless
Swing torque	84 kNm
Holding brake	wet multi-disc (spring applied, pressure released)
Option	pedal controlled positioning brake



Operator's Cab

Cab	according to guidelines for tunnel application: FOPS, FGPS plus Polycarbonate windows on attachment side
Operator's seat	shock absorbing suspension, adjustable to operator's weight, 6-way adjustable seat
Joysticks	integrated into adjustable seat consoles
Monitoring	menu driven query of current operating conditions via the LCD display. Automatic monitoring, display, warning (acoustical and optical signal) and saving machine malfunction data, for example, engine overheating, low engine oil pressure or low hydraulic oil level
Noise emission 2000/14/EC	L _{WA} (surround noise) = 105 dB(A)



Undercarriage

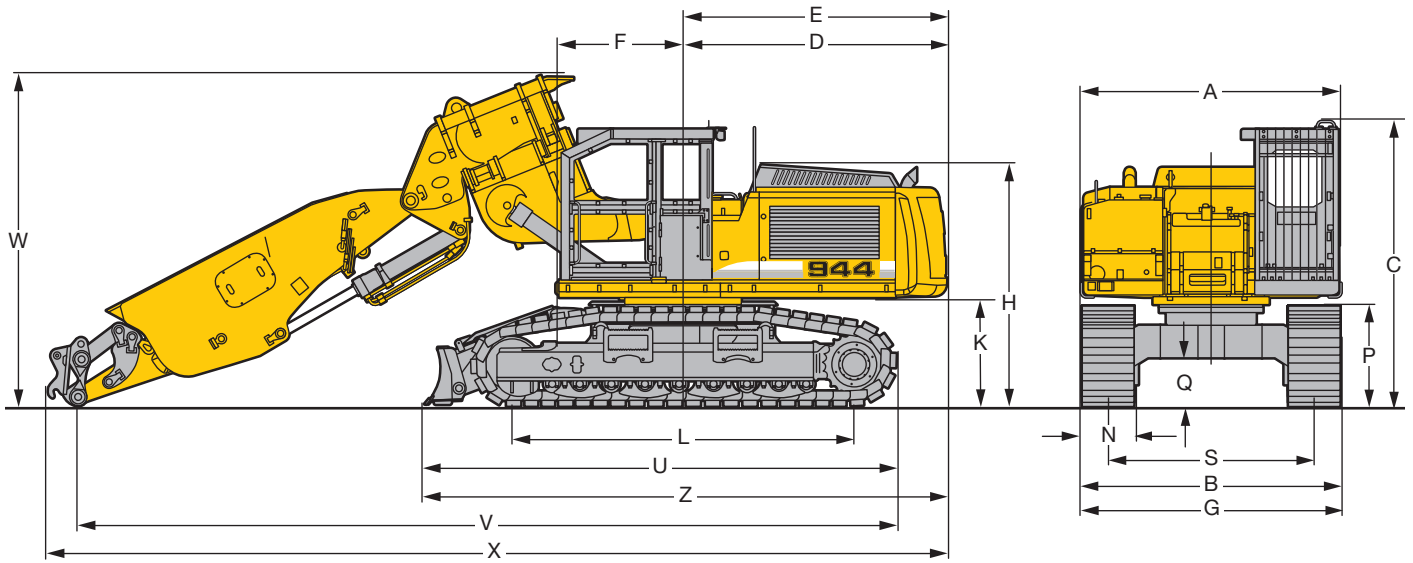
Drive	Liebherr swash plate motors with integrated brake valves on both sides
Transmission	Liebherr planetary reduction gears
Travel speed	low range – 2.8 km/h high range – 5.0 km/h
Net drawbar pull on crawler	246 kN
Track components	D 7 G, maintenance-free
Track rollers/Carrier rollers	9/2
Track pads	double or triple grouser
Tracks	sealed and greased
Digging locks	wet multi-discs (spring applied, pressure released)
Brake valves	integrated into travel motor



Attachment

Type	combination of resistant steel plates and cast steel components
Hydraulic cylinders	Liebherr cylinders with special seal-system, shock absorbed
Pivots	sealed, low maintenance
Lubrication	fully automatic Liebherr central lubrication system (except bucket tilt linkage)
Hydraulic connections	pipes and hoses equipped with SAE split-flange connections
Basic boom	3.07 m or 3.70 m with 2 x 45° rotator
Stick	4.50 m with integrated bucket tilt cylinder
Bucket	HD ripper bucket with cutting width 700 mm

Dimensions

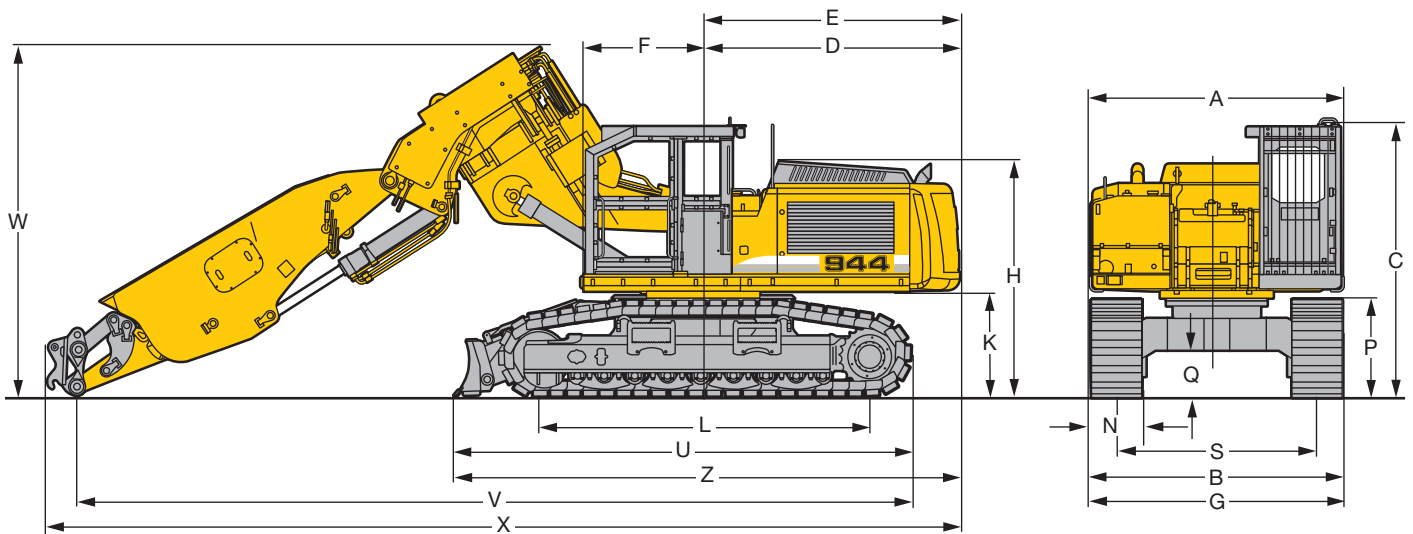


R 944 C

	mm
A	3,035
C	3,340
D	3,075
E	3,075
F	1,465
H	2,815
K	1,240
L	4,000
P	1,170
Q	555
S	2,400
U	5,500
Z	6,090
N	500 600
B	3,020 3,020
G	3,050 3,050

Boom 3.07 m with 2 x 45° Rotator and Stick 4.50 m		mm
V		9,550
W		3,900
X		10,550

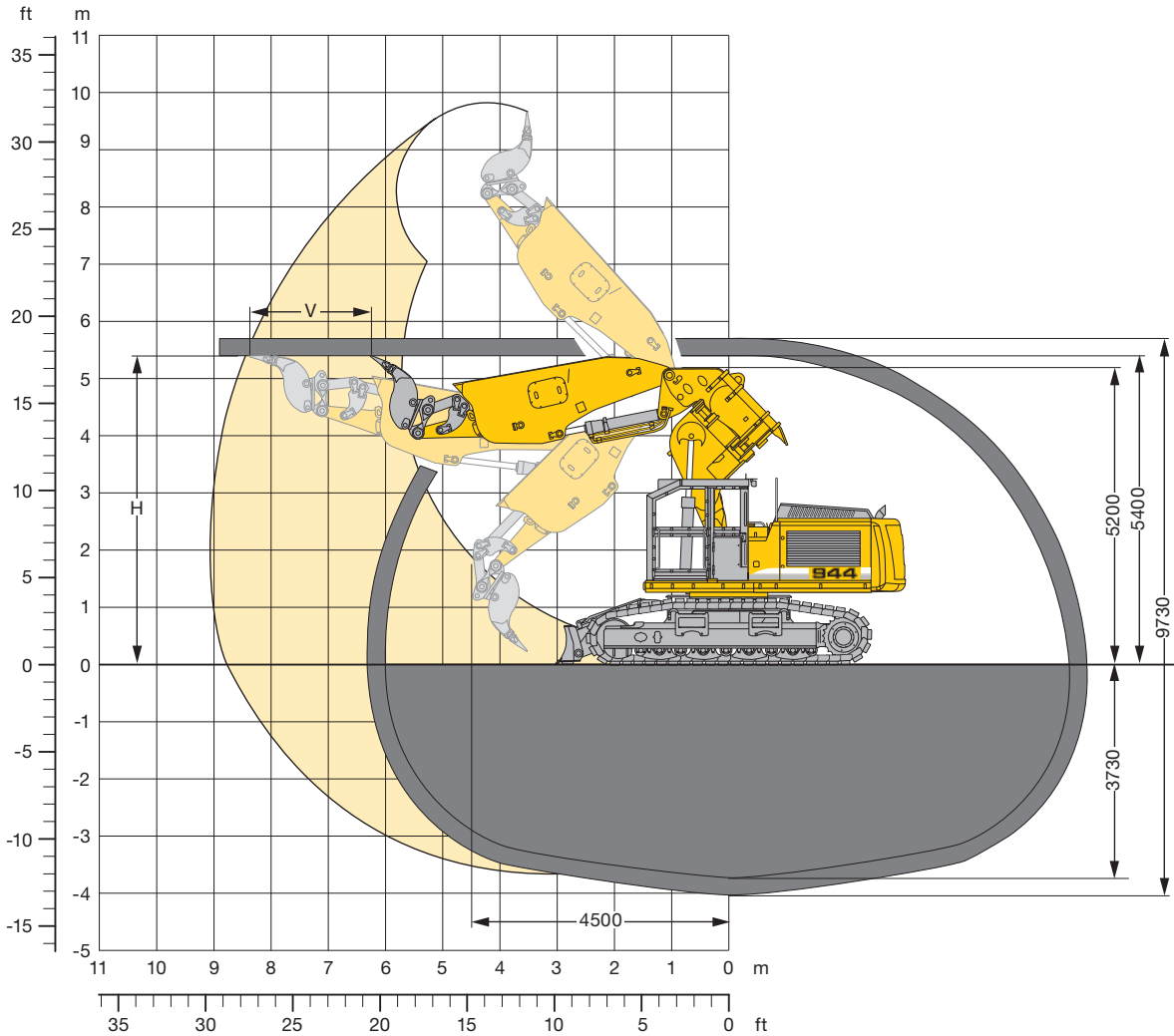
Boom 3.70 m with 2 x 45° Rotator and Stick 4.50 m		mm
V		10,000
W		4,200
X		11,000



Tunneling Excavator

with Boom 3.07 m, 2 x 45° Rotator and Stick 4.50 m

R 944 C



Digging Envelope

Basic boom bolted in position II of upper carriage

Tunnel height	Advance
H	V
m	m
5.40	2.10
6.00	1.90
6.50	1.75
7.00	1.60

Operating Weight and Ground Pressure

Operating weight includes basic machine with boom 3.07 m, 2 x 45° rotator, stick 4.50 m, quick coupler 48 and bucket 0.16 m³ (700 kg).

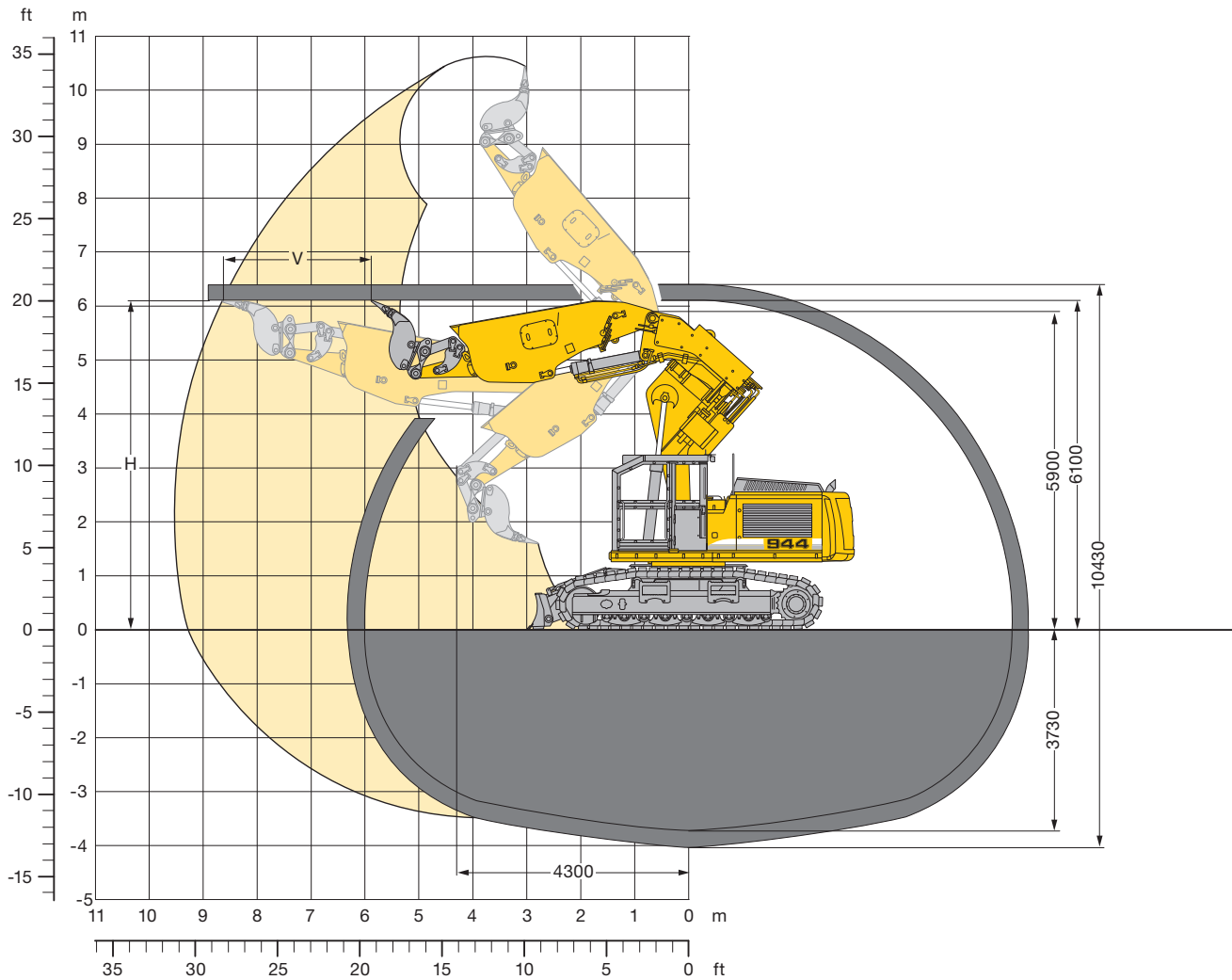
Undercarriage	HD-S	
Pad width	mm	500 600
Weight	kg	43,600 44,000
Ground pressure	kg/cm ²	1.00 0.84

Digging Forces without Quick Coupler

Max. digging force ISO	kN	164
	t	16.7
Max. breakout force ISO	kN	191
	t	19.5

Tunneling Excavator

with Boom 3.70 m, 2 x 45° Rotator and Stick 4.50 m



R 944 C

Digging Envelope

Basic boom bolted in position II of upper carriage

Tunnel height H m	Advance V m
6.10	2.70
6.50	2.60
7.00	2.40
7.50	2.20
8.00	2.00

Operating Weight and Ground Pressure

Operating weight includes basic machine with boom 3.70 m, 2 x 45° rotator, stick 4.50 m, quick coupler 48 and bucket 0.16 m³ (700 kg).

Undercarriage	HD-S	
Pad width	mm	500 600
Weight	kg	43,800 44,200
Ground pressure	kg/cm ²	1.01 0.85

Digging Forces without Quick Coupler

Max. digging force ISO	kN	171
	t	17.4
Max. breakout force ISO	kN	191
	t	19.5

Equipment



Undercarriage

3 track guide at each track frame	•
Double grouser pads 600 mm	•
Dozer blade with cylinder protection	•
Idler protection	•
Lifetime lubricated track rollers	•
Mud guards	•
Reinforced base-plate center-piece	•
Tracks sealed and greased	•
Travel gear protection	•
Two-stage travel motors	•



Uppercarriage

Alternator 100 A	•
Back-up alarm	•
Electrical device shut off	•
Engine hood with lift help and mechanical locking	•
Fire extinguisher	•
Handrails, non slip surfaces	•
Maintenance-free HD-batteries	•
Maintenance-free swing brake lock	•
Protection grid on radiator fan	•
Radiator protection grid	•
Sound insulation	•
Tool kit	•
Upper carriage protection	•
Customized colors	+
Electric fuel tank filler pump	+
Foot pedal swing positioning brake	+



Hydraulics

Additional hydraulic circuits	•
Control kit for emergency towing	•
Electronic pump regulation	•
Filter with integrated fine filter area (5 µm)	•
Flow compensation	•
Hydraulic tank shut-off valve	•
Liebherr Positive Control	•
Pressure compensation	•
Pressure storage for controlled lowering of attachments with engine turned off	•
Pressure test ports	•
Stepless work mode selector	•
Tool Control	•
Bio-degradable hydr. oil	+
Filter for secondary circuit	+
Hydraulic control for rotary drive	+



Engine

After-cooled	•
Air filter with pre-cleaner main- and safety element	•
Conform with stage IIIA/Tier 3 emission standard	•
Fuel water separator	•
Laminated radiator	•
Sensor controlled engine idling	•
Turbo-charged	•
Unit pump system	•
Liebherr particle filter	+



Operator's Cab

6-way adjustable operator seat with synthetic leather seat cover	•
Additional flood lights	•
Additional lights on cab roof (rear)	•
Cab for tunneling application	•
Display cover	•
Emergency exit rear window	•
Fire extinguisher	•
Multi-function display	•
Polycarbonate window at attachment side and rear window	•
Seat belt	•
Structural design according to guidelines: FOPS, FGPS	•
Structural design according to guidelines: ROPS	+
Totally enclosed cab (additional door and window) with windshield wiper	+



Attachment

12 t lifting hook with safety link on bucket or on quick coupler	•
Automatic lubrication system (except bucket tilt linkage)	•
Cylinders with shock absorber	•
Hydraulic lines for additional tools	•
Hydraulic lines protection	•
Mechanical quick coupler	•
Piston rod cover for hoist cylinder	•
ReGeneration plus	•
SAE split flanges on all high pressure lines	•
Sealed pivots/shaft seal between bucket and stick	•
Work light on boom and stick	•
Customized colors	+
High pressure circuit	+
Liebherr line of buckets	+
Quick disconnect hose couplers for additional tools	+
Special application buckets	+

• = Standard, + = Option

Options and/or special attachments, supplied by vendors other than Liebherr, are only to be installed with the knowledge and approval of Liebherr in order to retain warranty.

Equipment



Undercarriage

4 track guide at each track frame	•
Dozer blade with cylinder protection	•
Idler protection	•
Lifetime lubricated track rollers	•
Mud guards	•
Tracks sealed and greased	•
Travel gear protection	•
Two-stage travel motors	•



Uppercarriage

Alternator 100 A	•
Back-up alarm	•
Electrical device shut off	•
Engine hood with lift help and mechanical locking	•
Fire extinguisher	•
Handrails, non slip surfaces	•
Maintenance-free HD-batteries	•
Maintenance-free swing brake lock	•
Sound insulation	•
Tool kit	•
Upper carriage protection	•
Customized colors	+
Electric fuel tank filler pump	+
Foot pedal swing positioning brake	+



Hydraulics

Additional hydraulic circuits	•
Control kit for emergency towing	•
Electronic pump regulation	•
Filter with integrated fine filter area (5 µm)	•
Flow compensation	•
Hydraulic tank shut-off valve	•
Pressure compensation	•
Pressure storage for controlled lowering of attachments with engine turned off	•
Pressure test ports	•
Stepless work mode selector	•
Bio-degradable hydr. oil	+
Filter for secondary circuit	+
Hydraulic control for rotary drive	+
Hydraulic safeguard for overhead hammer work	+
Reversible fan	+
Swing brake torque reducer	+



Engine

Air pre-cleaner	•
Conform with stage IIIA/Tier 3 emission standard	•
Direct injection	•
Dry-type air cleaner w/pre-cleaner, main and safety element	•
Sensor controlled engine idling	•
Turbo charger	•
Liebherr particle filter	+



Operator's Cab

6-way adjustable operator seat with synthetic leather seat cover	•
Additional flood lights	•
Additional lights on cab roof (rear)	•
Cab for tunneling application	•
Display cover	•
Emergency exit rear window	•
Fire extinguisher	•
Polycarbonate window at attachment side and rear window	•
Storage room	•
Structural design according to guidelines: FOPS, FGPS	•
Structural design according to guidelines: ROPS	+
Totally enclosed cab (additional door and window) with windshield wiper	+



Attachment

12 t lifting hook with safety link on bucket or on quick coupler	•
Automatic lubrication system (except bucket tilt linkage)	•
Cylinders with shock absorber	•
Hydraulic lines for additional tools	•
Hydraulic lines protection	•
Piston rod cover for hoist cylinder	•
ReGeneration plus	•
SAE split flanges on all high pressure lines	•
Sealed pivots/Y sealant between bucket and stick	•
Work light on boom and stick	•
Customized colors	+
High pressure circuit	+
Liebherr line of buckets	+
Mechanical quick coupler	+
Quick disconnect hose couplers for additional tools	+
Special application buckets	+

• = Standard, + = Option

Options and/or special attachments, supplied by vendors other than Liebherr, are only to be installed with the knowledge and approval of Liebherr in order to retain warranty.

The Liebherr Group of Companies



Wide Product Range

The Liebherr Group is one of the largest construction equipment manufacturers in the world. Liebherr's high-value products and services enjoy a high reputation in many other fields. The wide range includes domestic appliances, aerospace and transportation systems, machine tools and maritime cranes.

Exceptional Customer Benefit

Every product line provides a complete range of models in many different versions. With both their technical excellence and acknowledged quality, Liebherr products offer a maximum of customer benefits in practical application.

State-of-the-art Technology

To provide consistent, top quality products, Liebherr attaches great importance to each product area, its components and core technologies. Important modules and components are developed and manufactured in-house, for instance the entire drive and control technology for construction equipment.

Worldwide and Independent

Hans Liebherr founded the Liebherr family company in 1949. Since that time, the enterprise has steadily grown to a group of more than 130 companies with over 38,000 employees located on all continents. The corporate headquarters of the Group is Liebherr - International AG in Bulle, Switzerland. The Liebherr family is the sole owner of the company.

www.liebherr.com

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