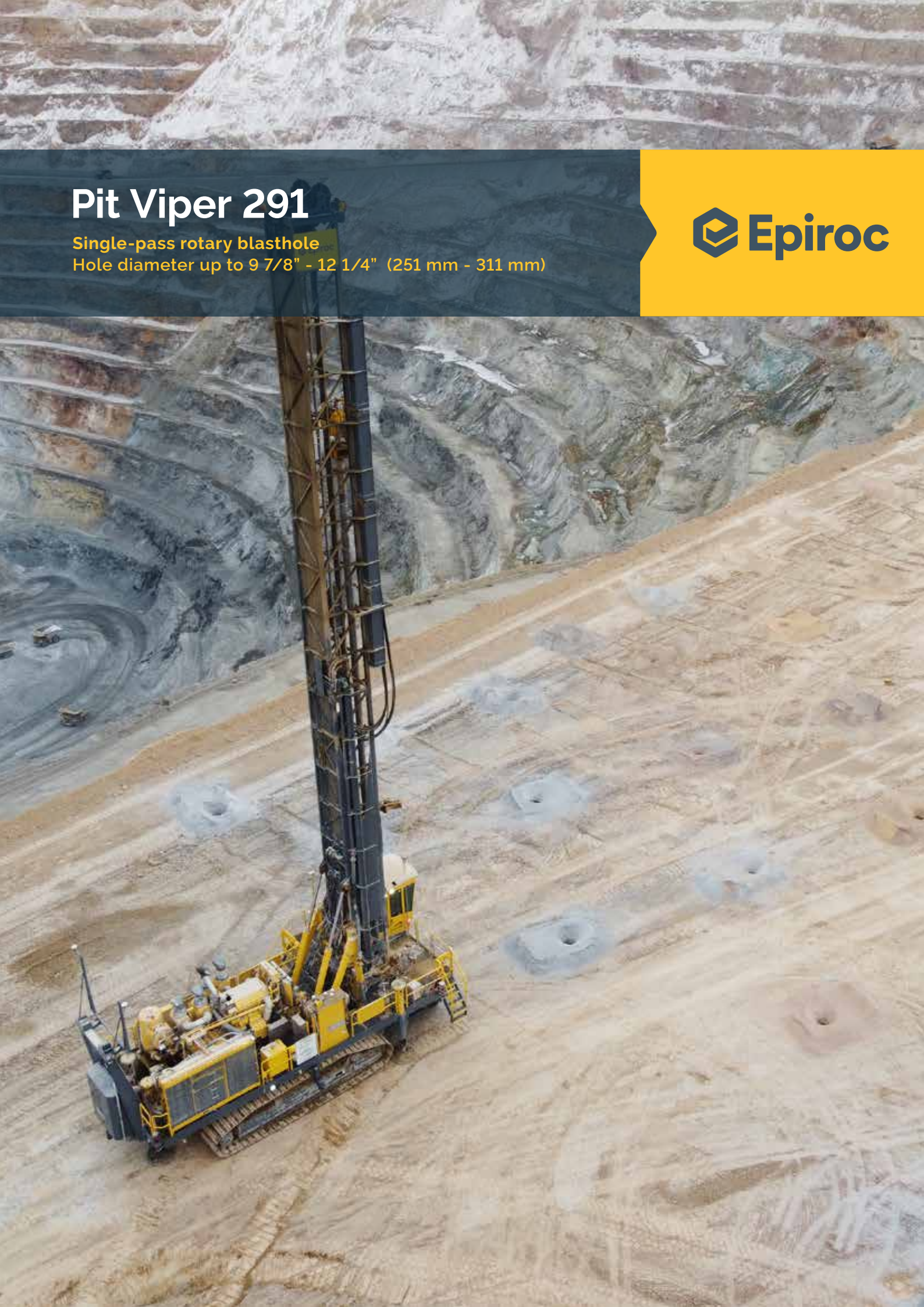
Pit Viper 291

Single-pass rotary blasthole
Hole diameter up to 9 7/8" - 12 1/4" (251 mm - 311 mm)

Epiroc



More power, bigger bite

A combination of increased pulldown force, rotary torque, and high volume airend, the Pit Viper 291 drill rig is one of the most powerful drills for blasthole drilling. Tested and proven throughout differing regions and conditions around the world. The Pit Viper 291 exceeds all in its class.

When it comes to drilling single-pass holes up to 59 ft (18 m)[1] with diameters up to 12-1/4 in (311 mm), the new PV-291 proves itself time and time again. With a 96,000 lb (43,545 kg) bit load capacity, the new PV-291 brings unsurpassed performance to your operation.

If technology, productivity and long asset life with the lowest total cost of ownership are on your list of priorities, look no further than the Pit Viper series. Equipped with a standard Rig Control System (RCS) operating platform, the new PV-291 raises the bar for efficiency.

Key benefits

Highly efficient drilling
The PV-291 is one of the most productive drills available for rotary tricone drilling of 9 7/8" - 12 1/4" (251 mm - 311 mm) diameter holes. Single-pass drilling can improve drilling efficiency by up to 25% when drilling in soft material by eliminating rod change time and allowing more time for drilling. Eliminating rod changes also reduces the risk for operational errors.

Smooth operation with long life
The rig utilizes Epiroc's patented cable feed system with automatic cable tensioning coupled to a rotary head designed to handle higher pulldown and reduce possibility of rotational stalling to increase the life of the bit and the drill string.

Tailor-made for your application
The PV-291 offers more than 100 different options to configure the perfect drill rig for your specific application.

Proven and reliable operating platform
Rig Control System (RCS) operating platform provides scalable automating features.

For details on how the Pit Viper series can enhance your profitability contact your Epiroc representative or visit epiroc.com.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Designed for maximum productivity and value

+ Operator comfort

The PV-291 features an insulated, pressurized cab with an air-ride operator seat — providing high suspension comfort with excellent visibility. The large cab is equipped with Rig Control System (RCS) controls, providing onboard automation capabilities as part of the standard drill package for added safety and productivity.

+ Ease of maintenance

The deck layout on the Pit Viper series offers easy access to all major service components. Ground-level, fast fuel fill connections are standard, and optional ground-level live sampling is available. Spool valves are also centrally located above the deck for accessibility.

+ Enhanced safety

The PV-291 is equipped with a number of features to help keep operators safe on the job. Features include a FOPS cab with double safety glass, as well as safety interlocks through the RCS system and safety shutdowns for temperature, low level, and pressure. Other features include spring-applied, hydraulic-released brakes on the tramming system, and optional ground-level battery/tram/starter isolation.

Service and support

Epiroc offers several types of service agreements to meet your operational requirements and maximize your productivity:

Variable-price repairs
Service when you need it.

Fixed-price repairs
Service with controlled costs.

Equipment audit
Scheduled equipment quality control.

Preventive maintenance programs
Peace of mind so you can focus on your core business.

Rotary head is designed with new lower spindle bearings to handle higher pulldown and internal flywheels to reduce possibility of rotational stalling.

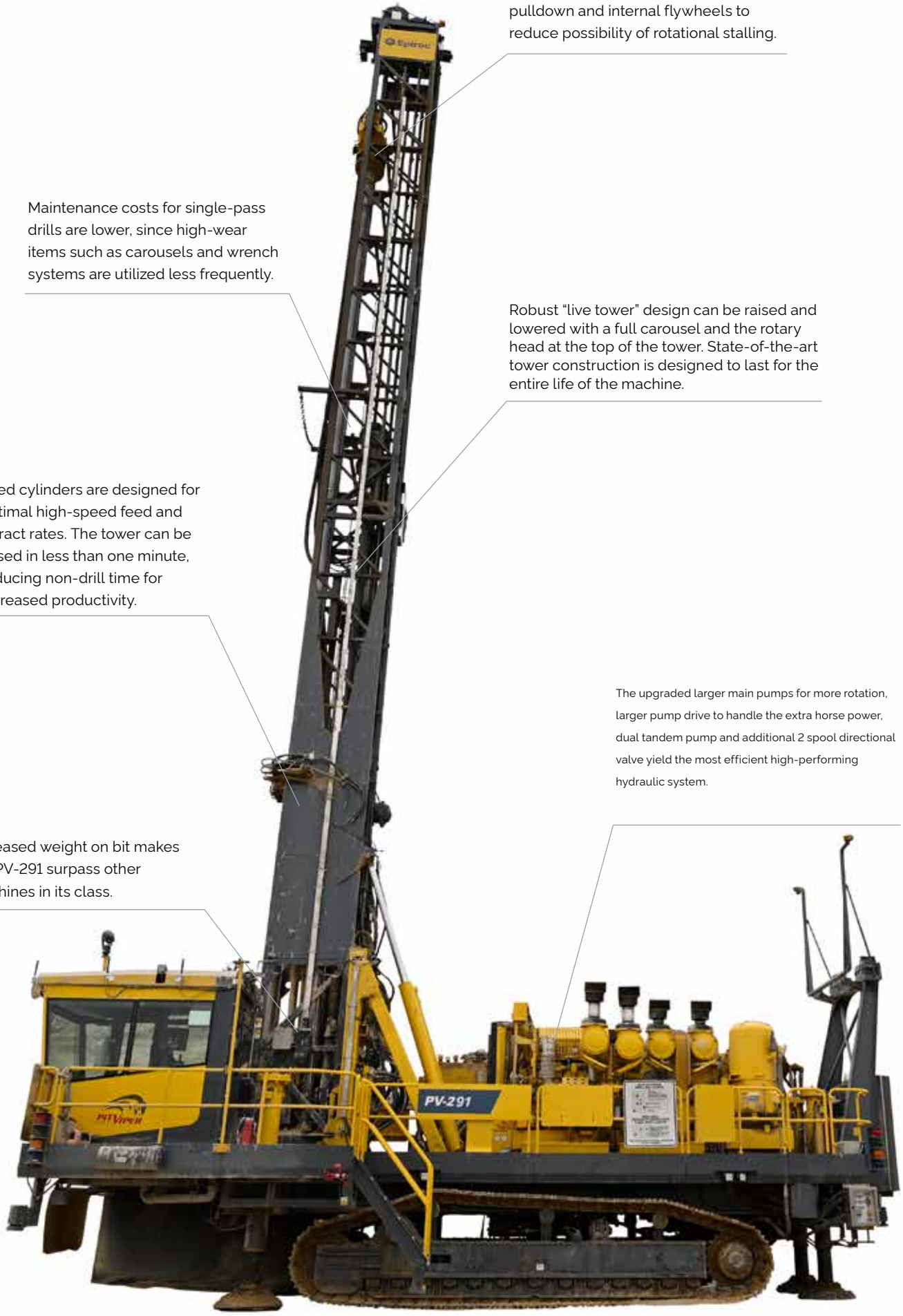
Maintenance costs for single-pass drills are lower, since high-wear items such as carousels and wrench systems are utilized less frequently.

Robust “live tower” design can be raised and lowered with a full carousel and the rotary head at the top of the tower. State-of-the-art tower construction is designed to last for the entire life of the machine.

Feed cylinders are designed for optimal high-speed feed and retract rates. The tower can be raised in less than one minute, reducing non-drill time for increased productivity.

The upgraded larger main pumps for more rotation, larger pump drive to handle the extra horse power, dual tandem pump and additional 2 spool directional valve yield the most efficient high-performing hydraulic system.

Increased weight on bit makes the PV-291 surpass other machines in its class.



Rig Control System

Flexibility for the future

Epiroc's Rig Control System (RCS) is based on proven CAN-bus technology and comes standard on the PV-291. RCS provides a number of safety and interlock features, as well as a foundation to add new functionality/options later without a major rebuild of the machine. With RCS, you can run your PV-291 with an operator on board using options such as Autodrill and Autolevel — or you can run with the operator off the drill with the optional BenchREMOTE package, allowing one operator to run one or multiple units. You can even implement autonomous drilling with almost no human interaction with the drill.

Add-on features:

Autodrill
Executes fast, safe and efficient drilling processes in a consistent way.

Autolevel
Closes the gap between less experienced and expert operators.

Wireless remote tramming
Allows the operator to tram a Pit Viper from the bench within a 32.8 – 65.6 ft (10 – 20 m) distance.

Teleremote
Allows safe, productive and effective single- or multi-drill remote operations (control room and drill solutions sold separately).

High-precision GPS hole navigation system
Imports drill plans to RCS and ensures that each blasthole is precisely positioned with accuracies of up to ±3.9 in (±10 cm), depending on installation and the number of satellites.

Office pack
Includes:
- **Common Communications Interface (CCI)**
  Allows data transfer to and from the RCS system.
- **Surface Manager**
  Provides production reporting.
- **Rig Remote Access (RRA)**
  Wirelessly sends files to and from the drill rigs.
- **Desktop Viewer**
  Allows remote access to the drill's operational screens.

Technical specifications

Substructure

Mainframe 162 lb/ft (241 kg/m)

- Weld fabricated I-beam type using wide flange structural steel for both rails and crossbeams
- Designed by Epiroc, and weld fabricated by certified welders
- Designed with the latest FEA technology and verified by dynamic strain gauging

Leveling jack	
Type	Hydraulic cylinder
Quantity	Four jacks
Calculated jack pad bearing pressure	Drill end: 68.9 psi (475 kPa) Non-drill end: 66.7 psi (460 kPa)
Position indication	"Jack up" indicator lights on console or RCS screen
Capacities	
Fuel tank	350 gal (1,325 L); 500 gal (1892.7 L); 612 gal (2316.7 L); 762 gal (2884.5 L)
Water tank	400 gal (1,514 L) or 662 gal (2,506 L)
Additional water tank	422 gal (1,597 L)
Hydraulic tank	150 gal (568 L)
Undercarriage and propel system	
Make	Epiroc 3400 EXTENDED or Caterpillar 345XL
Mounting	Oscillating walking beam: 5° each side, total 10°
Total length	Epiroc 3400: 21 ft 4.6 in (6.52 m), Caterpillar 345XL: 21 ft 3 in (6.48 m)
Ground contact	Epiroc 3400: 18 ft 1 in (5.51 m), Caterpillar 345XL: 17 ft 11 in (5.46 m)
Take-up adjustment	Grease slack adjustment; spring recoil
Rollers	13 lower / 3 upper
Location	Equally spaced between idler and sprocket
Roller bearings	Sealed for life
Track pads	Type: Triple bar grouser — for increased grip and reduced ground pressure Width: 34.5 in (900 mm) Ground pressure: 13 psi (89.6 kPa)
Drive	Hydrostatic closed loop through speed reducer to drive sprockets
Propel motors	Two - Hydraulic, axial piston, rating (each): 170 HP (126.8 kW)
Propel speed range	Epiroc: 0 – 1.0 mph (0 – 1.6 km/h), Catepillar: 0 – 1.1 mph (0 – 1.8 km/h)

Tower, carousel and drill rod handling

Tower		
Tower construction	Four main member, open front ASTM A500 Grade B rectangular tubing; cold sawed and welded	
Tower raising	Two hydraulic cylinders; live tower (raise and lower with full carousel and rotary head at top of tower)	
Rod support	Hydraulic cylinder clamping and actuation to center drill rod	
Rated capacity		
Single pass depth with manual bit breaking basket	57 ft (17.4 m)	
Single pass depth with ABC[1]	59 ft (18 m)	
Maximum hole depth with manual bit breaking basket	107 ft (32.6 m)	
Maximum hole depth with ABC	109 ft (33.2 m)	
When using 9 1⁄4" pipe:		
Maximum hole depth with manual bit breaking basket	82 ft (25 m)	
Maximum hole depth with ABC	84 ft (25.6 m)	
Carousel (carousel internal to the tower with key-lock retention)		
Rod length	25 ft (7.6 m)	
Capacity	Two piece; one piece (9 1/4" drill pipe)	
Actuation	Two hydraulic cylinders	
Safety	• Drill pipe is held securely in carousel by "key lock design" mechanism • No bump system to prevent damage if carousel not stowed	
Drill rods		
Drill pipe diameter	**Thread**	**Suggested bit diameter**
7-5/8 in (194 mm)	5-1/4 in BECO	9-7/8 in (251 mm)
8 in (203 mm)	5-1/4 in BECO	9-7/8 in – 10-5/8 in (251 mm – 270 mm)
8-5/8 in (219 mm)	6 in BECO	10-5/8 in (270 mm)
9-1/4 in (235 mm)	6 in BECO	11 in – 12-1/4 in (279 mm – 311 mm)
Rotary head		
Speed range	Variable (0-180 RPM)	
Torque	(0-11,000 ft-lb)	
Number of motors	Two	
Type of motor	Variable displacement axial piston	
Reduction	(14.7:1)	
Horsepower	181 HP (135 kW) at 100% efficiency	
Travel length	66.48 ft (20.26 m)	
Feed system		
Pulldown capacity	Up to 85,000 lbf (378 kN)	
Pullback capacity	0 – 35,000 lbf (0 – 156 kN)	
Weight on bit*	Up to 96,000 lb (43,545 kg)*	
Mechanism type	Two dual rod, dual piston hydraulic cylinders (patented design)	
Number of cables - diameter	Two Pulldown - 1.125 in (28.57mm), Two Pullback - 1 in (25.4mm)	
Number of sheaves - outside diameter	Six - 23.5 in (597mm), Four - 24.0 in (609.6mm)	
Automatic tensioning	Hydraulic motor driven jackscrews for pulldown cables; hydraulic cylinders for pullback cables (patented design)	
Feed speed	126.7 ft/min (38.4 m/min)	
Retract speed	158.1 ft/min (48.2 m/min)	

Performance specifications are theoretical and based off 100% system efficiency.
**Varies on pipe size*

Cab and controls

Cab	
• Quiet, single piece design with no seams or leaks (tested @ less than 80 dBA) • Insulated, pressurized with heater and under cab mounted air conditioning • Falling Object Protective Structure (FOPS) certified • Ergonomically designed control system and excellent visibility (with unobstructed view to drill table)	
Controls (Standard Rig Control System – RCS)	
RCS Control	**Integrated control touchscreen** (penetration rate, rotation torque, rotation pressure, pulldown force, pulldown pressure, hole depth indicator, etc.) **Two joy sticks** (attached to the operator's seat) and push buttons on the operator panel controls (propel and leveling jack, pulldown feed control, holdback feed control) **Standard interlocks/features**
Hydraulic system	
• Four hydraulic pumps mounted on a 4-hole pump drive gear box driven off the engine through the drive shaft • Two main pumps - drilling functions (drill feed and rotation) or tram functions (propel) • Two tandem gear pumps - fans and other auxiliary functions	

Power package

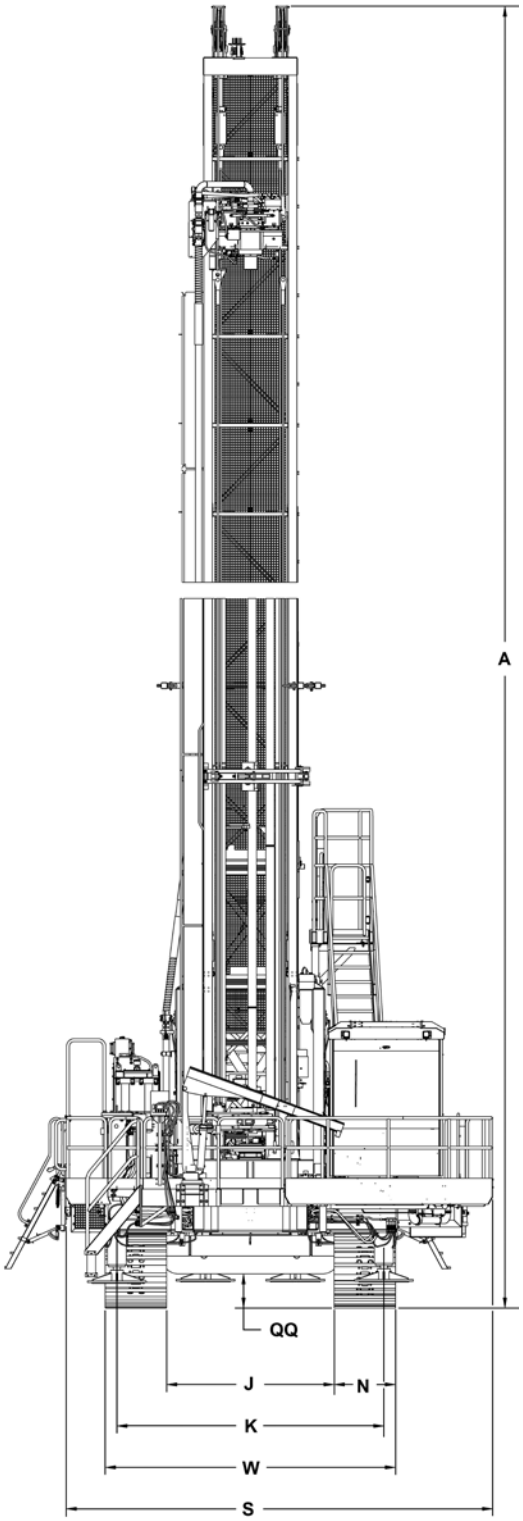
Airend	
	2,600 cfm / 110 psi (73.6 m^3/min / 7.6 bar)
Electronic Air Regulation System (EARS)	
• Standard on the PV-291 • Deliver variable air volume control (within system capacity), while still maintaining constant air pressure • Optimal fuel efficiency while hole collaring • Reduced wear on drill string components	
Diesel engine	
Diesel engine – non Tier 4	CAT C32 T2 - 950 HP (708 kW)
Diesel engine – Tier 4	CAT C32 T4F – 950 HP (708 kW)

Shipping dimensions and weight (standard machine)*

Tower	
Length	85 ft (25.91 m)
Width	7 ft 4 in (2.23 m)
Height	8 ft (2.44 m)
Gross weight	46,000 lb (20.9 tonnes)
Main frame (stripped)**	
Length	40 ft (12.19 m)
Width	17 ft (5.18 m)
Height	15 ft (4.57 m)
Gross weight	135,000 lb (61.2 tonnes)
Operating weight	
Estimated weight	170,000 – 210,000 lb (77 – 95 tonnes)

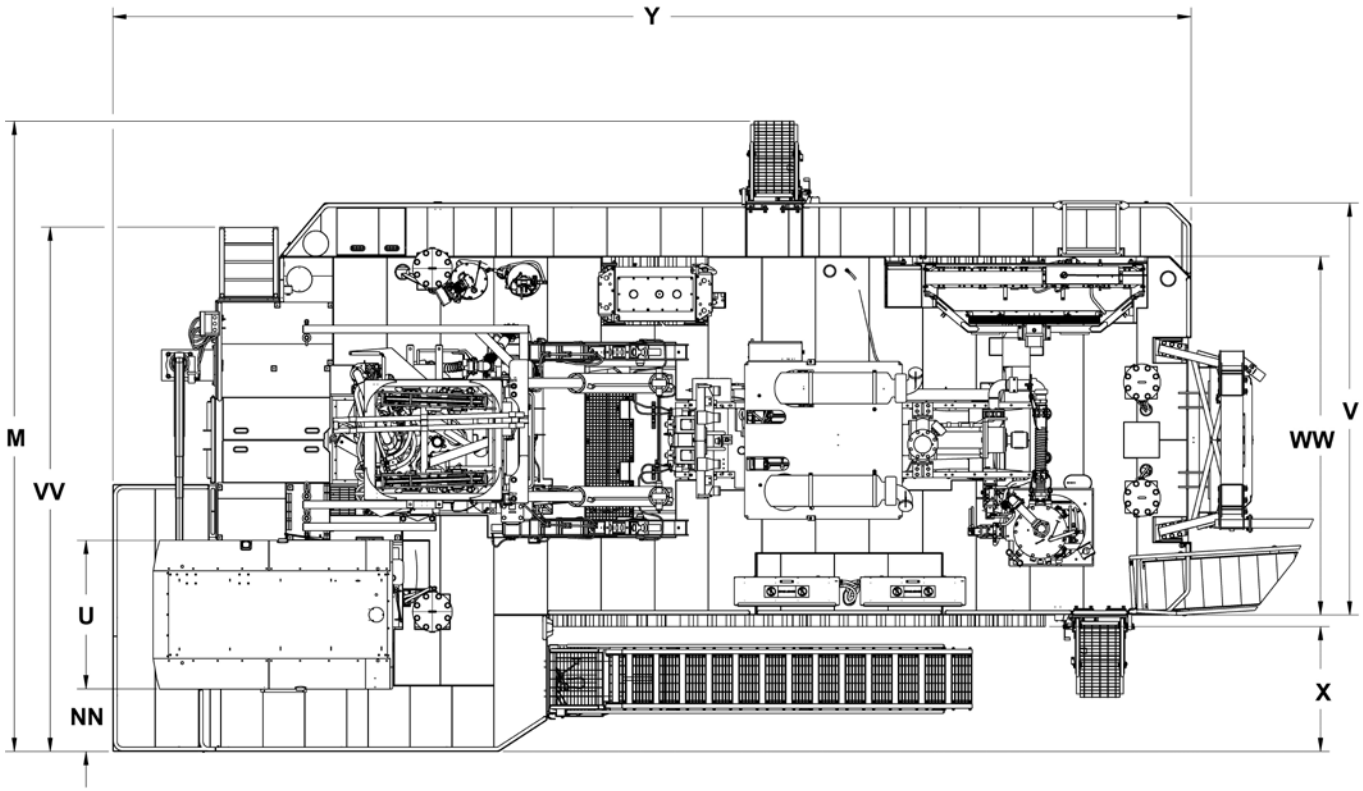
Operating dimensions (Dimensions for PV-291 diesel with Catepillar tracks; dimensions may vary by machine and options)

	Description	Dimensions ft (m)
A	Height – tower up, PV-291	90' 3" (27.52)
B	Length – tower up	53' 8" (16.39)
C	Length – tower down, PV-291	89' 5" (27.27)
D	Length – undercarriage	21' 3" (6.49)
E	Length – jack center to jack center	26' 6" (7.92)
F	Height – jack to ground non drill end	1' 2" (0.36)
G	Height – decking to ground	4' 9" (1.49)
H	Height – tower down, non drill end	22' 4" (6.82)
J	Width – track inside to track inside	8' 1" (2.46)
K	Width – jack center to jack center	12' 9" (3.93)
M	Width – overall	24' 2" (7.37)
N	Width – track	2' 3" (0.70)
P	Height – tower off	16' (4.87)
Q	Height – ground to cab top	13' 8" (4.20)
S	Width – drill end, less dust collector	20' 6" (6.27)
U	Cab width	5' 7" (1.73)
V	Width – decking extended	15' 4.5" (4.70)
W	Width – undercarriage assembly	14' (4.24)
X	Width – decking cab end to undercarriage edge	4' 5" (1.37)
Y	Length – decking	40' 4" (12.31)
BB	Height – jack to ground drill end	1' 2" (0.36)
CC	Length – cabin to undercarriage edge, front view	12' 1" (3.68)
DD	Length – cabin to jack center, front view	10' 5" (3.20)
KK	Height – ground to engine exhaust	13' 8" (4.20)
MM	Length – decking edge to cab edge	1' 5" (0.45)
NN	Width – decking edge to cab edge top view	2' 3" (0.70)
QQ	Height – ground to oscillation yoke bottom	1' 6" (0.48)
RR	Length – decking cab end to water tank edge	42' 7" (13.0)
VV	Width – Decking edge to ladder	19' 7" (6.0)
WW	Width – decking, standard	13' 4.5" (4.20)



*Approximate shipping dimensions for crated PV-291 (actual dimensions will vary based on rig configuration).

**Fall off will vary greatly by machine and options.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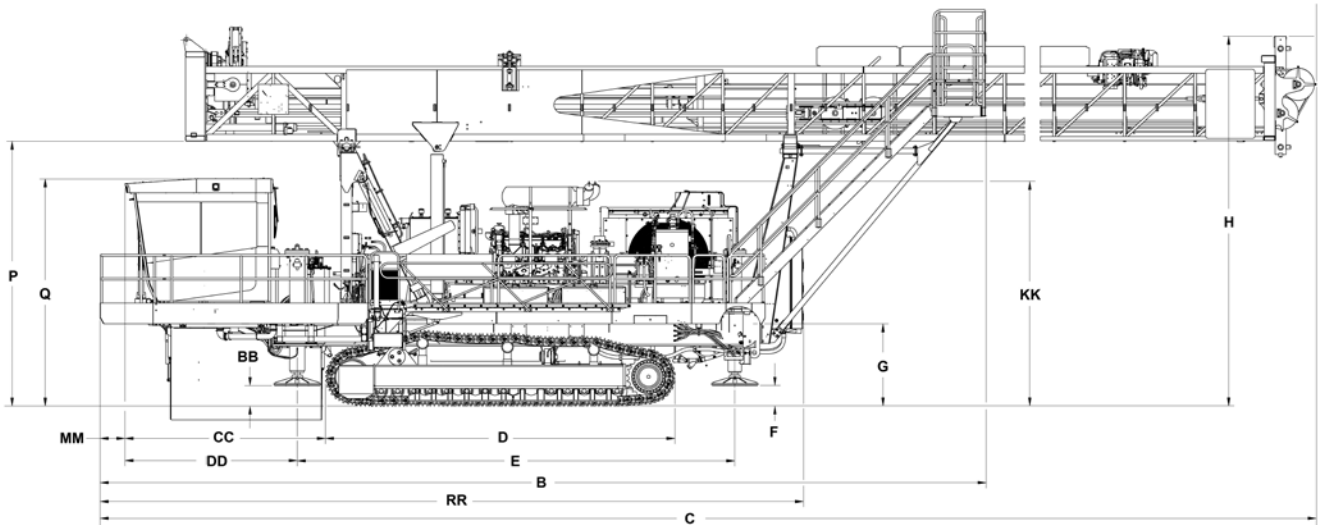
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Optional equipment

Following are some examples of available options. For a comprehensive list, please contact your local Epiroc Customer Center.

- Cold-weather options for drill operation in extremely cold ambient conditions (-45° C)
- Hydraulic retractable stair
- Water injection system
- Angle drilling package
- Auxiliary crane
- Video camera
- Dust collector
- Live work elimination pressure washer
- Live work elimination automatic oil sampling
- Spool valve guards
- Drill deck guarding system
- Hydraulic filter handles

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Performance unites us, innovation inspires us, and commitment drives us to keep moving forward. Count on Epiroc to deliver the solutions you need to succeed today and the technology to lead tomorrow.
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