Pit Viper PV-316 Blasthole Drills

Multi-pass rotary drilling

Epiroc

Technology runs deep

As mining becomes more challenging and the location of minerals becomes deeper, the PV-316 answers the call to meet deep drilling requirements extremely efficiently.

The PV-316 takes everything that makes the Pit Viper series stand out and makes it even better. The large, ergonomic cab offers excellent visibility and operator comfort — it's like getting an upgrade to first class on your flight. With a 110,000 lb (50 tonne) bit load capacity and Epiroc's Rig Control System (RCS) standard, the PV-316 can add unsurpassed productivity to your mining operations.

Key benefits

Highly efficient drilling
The PV-316 is one of the most efficient tricone drills available for drilling 9 in to 12-1/4 in (229 mm to 311 mm) holes. The live tower is capable of clean hole single-pass drilling to depths of up to 47 ft (14.3 m) with bit changing above deck, or multi-pass drilling to a total depth of 297 ft (90.5 m) using a 5-rod carousel with 50 ft (15.2 m) rods.

Proven technology and features
The PV-316 offers reliable, customer-preferred features from previous rigs in the Pit Viper series, including the hydraulic top-head drive rotary head, the automatically tensioned hydraulic cable feed system, and hydraulic-powered breakout tools.

During rigorous field testing at a copper mine in the U.S., the PV-316 had no trouble managing rough conditions while consistently hitting its targeted depth and maximizing the quality of the holes drilled.

For details on how the Pit Viper series can enhance your profitability contact your Epiroc representative or visit epiroc.com.

Designed for maximum productivity and value

+ Operator comfort

The PV-316 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 on-board 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. Standard valve and filter racks also enhance accessibility.

+ Enhanced safety

The PV-316 is equipped with a FOPS cab with double safety glass, as well as ground-level battery/tram/starter isolation. The unit also has 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 slip-resistant fibergrate decking. In addition, automation options are available to further increase safety.

Service and support

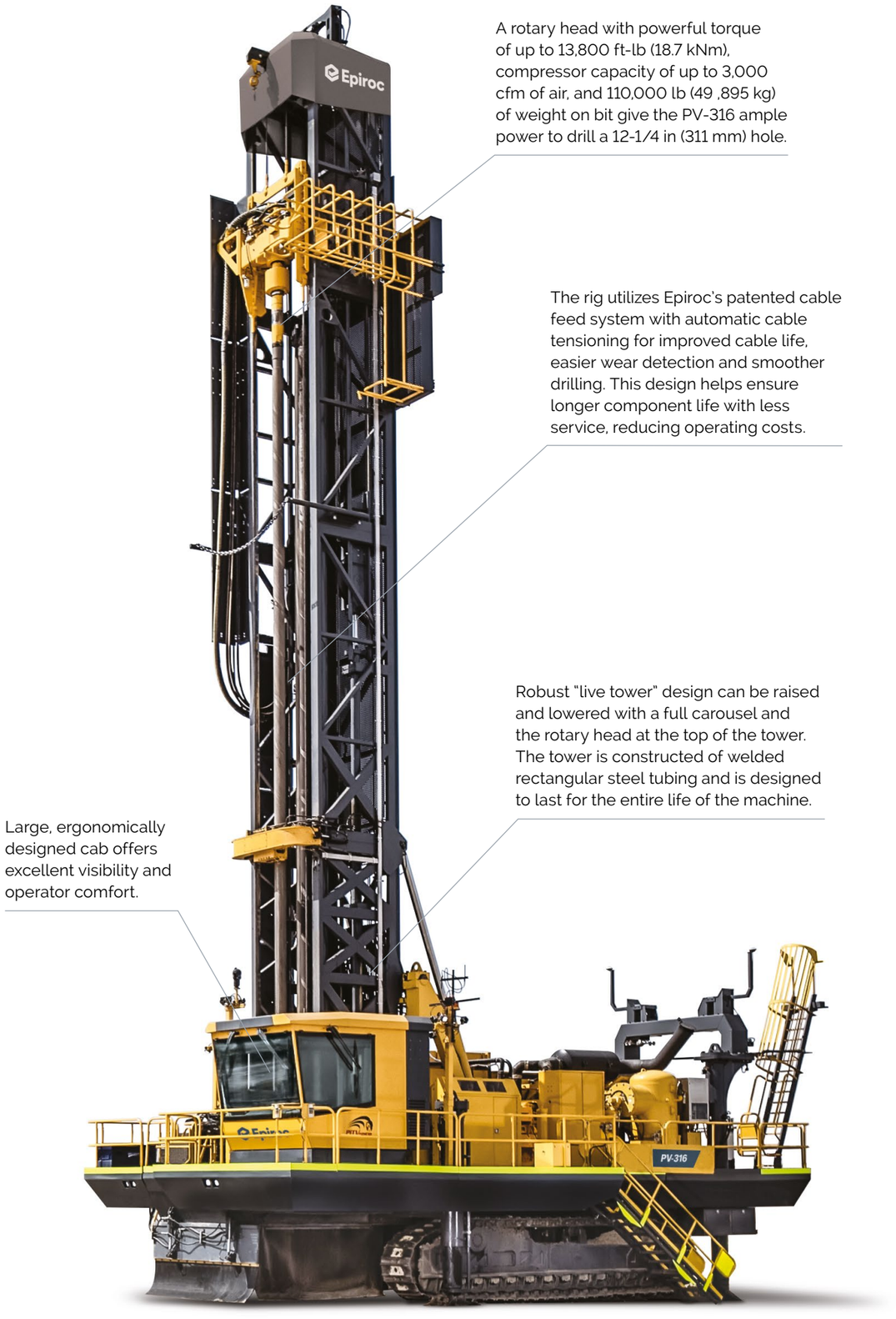
Epiroc offers several types of service agreements to meet your operational requirements and maximize your productivity:

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.



A rotary head with powerful torque of up to 13,800 ft-lb (18.7 kNm), compressor capacity of up to 3,000 cfm of air, and 110,000 lb (49 ,895 kg) of weight on bit give the PV-316 ample power to drill a 12-1/4 in (311 mm) hole.

The rig utilizes Epiroc's patented cable feed system with automatic cable tensioning for improved cable life, easier wear detection and smoother drilling. This design helps ensure longer component life with less service, reducing operating costs.

Robust "live tower" design can be raised and lowered with a full carousel and the rotary head at the top of the tower. The tower is constructed of welded rectangular steel tubing and is designed to last for the entire life of the machine.

Large, ergonomically designed cab offers excellent visibility and operator comfort.

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-316. 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-316 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

Sub structure

Mainframe 162 lb/ft (241 kg/m)	
• Weld fabricated I-beam type using wide flange structural steel beam 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: 125 psi (862 kPa) Non-drill end: 76 psi (524 kPa)
Position indication	"Jack up" indicator light on console or RCS screen with proximity switches
Capacities	
Fuel tank	700 gal (2,650 L); optional 1,400 gal (5,300 L)
Water tank (diesel)	1,200 gal (4,542 L); optional 1,900 gal (7,192 L)
Hydraulic tank	350 gal (1,325 L)
Undercarriage and propel system	
Make	Epiroc BERCO
Mounting	Oscillating walking beam; 2.5° each side, 5° total
Total length	25 ft (7.62 m)
Ground contact	20 ft 11 in (6.38 m)
Take-up adjustment	Hydraulic slack adjustment; spring recoil
Rollers	12 lower / 4 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: 29.5 in (749 mm) Ground pressure: 24.1 psi (166.2 kPa)
Drive	Hydrostatic closed loop through speed reducer to drive sprockets
Propel motors	Two - Hydraulic, axial piston, rating (each): 340 HP (253 kW)
Propel speed range	2 speeds 0 – 0.93 mph (0 – 1.5 km/h) 0 – 1.48 mph (0 – 2.4 km/h)

Tower, carousel and drill rod handling

Tower		
Tower construction	Four main member, open front ASTM A500 Grade B rectangular tubing	
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	47 ft (14.3 m)	
Maximum hole depth	297 ft (90.5 m)	
Carousel (carousel internal to the tower with key-lock retention)		
Rod length	50 ft (15.2 m)	
Capacity	Five pieces	
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 x 50 ft (15.2 m)	**Thread**	**Suggested bit diameter**
7-5/8 (194 mm)	5-1/4 in BECO	9 in – 9-7/8 in (229 mm – 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 (219 mm)	6 in BECO	10-5/8 in – 11 in (270 mm – 279 mm)
9-1/4 in (235 mm)	6 in BECO	11 in – 12-1/4 in (279 mm – 311 mm)
9-3/4 in (248 mm)	7 in BECO	12-1/4 in (311 mm)
10-3/4 in (273 mm)	8 in BECO	12-1/4 in (311 mm)
Rotary head		
Speed range	Variable 0 – 240 RPM	
Torque	Variable 0 – 13,800 lbf-ft (0 – 18,710 Nm) at 0 – 140 RPM 7,800 lbf-ft (10,575 Nm) at 240 RPM	
Type of motor	Variable displacement axial piston	
Reduction	Two-stage spur gear (14.8:1)	
Horsepower	340 HP (253 kW)	
Travel length	Standard: 56 ft 5 in (17.2 m)	
Feed system		
Pulldown capacity	Up to 100,000 lbf (0 – 445 kN)	
Pullback capacity	0 – 50,000 lbf (0 – 222 kN)	
Weight on bit	Variable, 0 – 110,000 lb (0 – 49,895 kg)	
Mechanism type	Two dual rod, dual piston hydraulic cylinders (patented design)	
Number of cables - diameter	Two pulldown – 1-1/4 in (31.7 mm); two pullback – 1 in (25.4 m)	
Number of sheaves - outside diameter	Four pulldown – 35.5 in (901.7 mm); six pullback – 31.75 in (806.4 m)	
Automatic tensioning	Static tensioning on pulldown cable (hydraulic motor actuated); dynamic tensioning on pullback cables	
Feed speed	157 ft/min (47.8 m/min)	
Retract speed	167 ft/min (50.9 m/min)	

Cab and controls

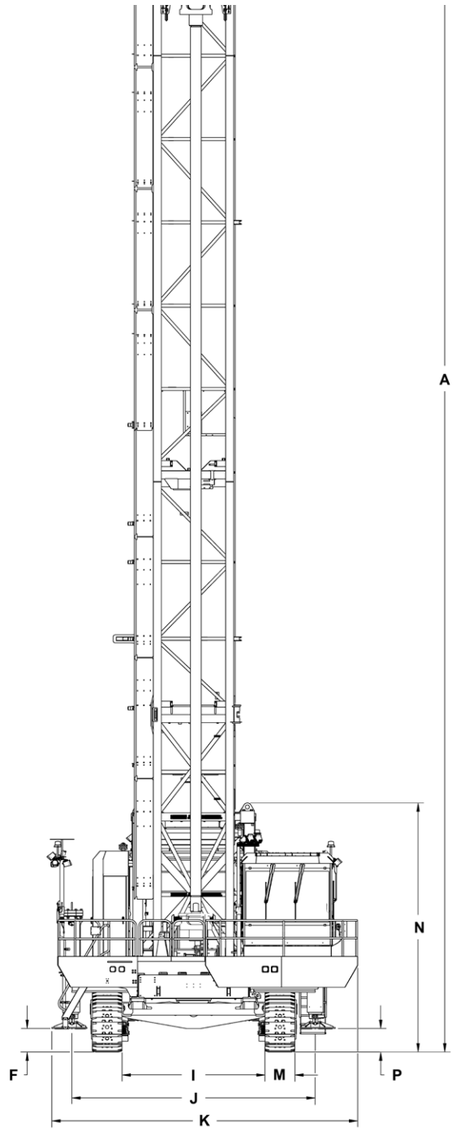
Cab	
• Quiet, single piece design with no seams or leaks (tested @ less than 80 dBA) • Insulated, pressurized with heater and under cab mounted air conditioning • Falling Object Protective Structure (FOPS) certified • Ergonomically designed control system and excellent visibility (with unobstructed view 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	
• Five hydraulic pumps mounted on a five hole gearbox directly driven by the engine • Two main piston pumps - drilling functions (drill feed and rotation) or tram functions (propel) • Two auxiliary piston pumps - auxiliary functions • One piston pump - cooler package fan • One gear pump	

Power package

Airend	
	3,000 cfm @ 110 psi (84.9 m^3/min @ 7.6 bar)
Electronic Air Regulation System (EARS)	
• Standard on the PV-316 • Compressor regulation • Two butterfly valves varying the inlet of the airflow (decreased airflow while maintaining constant restriction) • Optimal fuel efficiency while hole collaring • Reduced wear on drill string components	
Diesel engine (1,800 RPM)	
Diesel engine – non Tier 4	CAT C32 T2 - 1,125 HP (839 kW) CUMMINS QSK38C T2 – 1,260 HP (940 kW)
Diesel engine – Tier 4 Final	CAT C32 T4F – 1,125 HP (839 kW) MTU 16V2000 T4F – 1,300 HP (969 kW)

Shipping dimensions and weight (standard machine)*

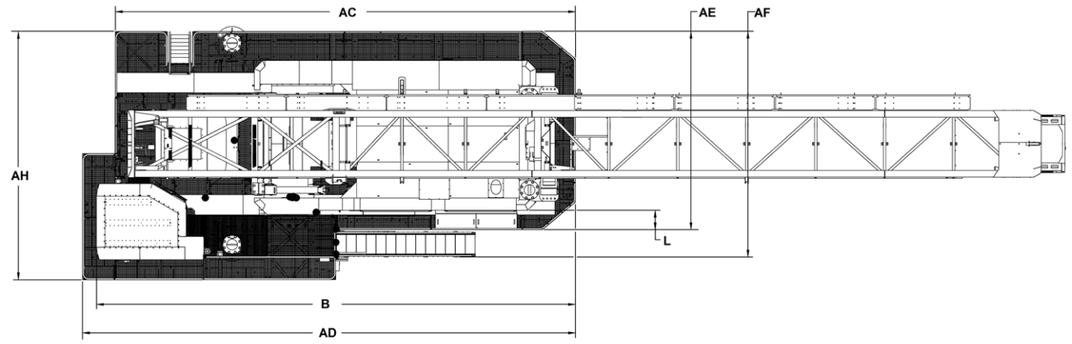
Tower		
Length	75 ft (22.86 m)	
Width	12 ft 2 in (3.71 m)	
Height	10 ft 6 in (3.2 m)	
Gross weight	72,000 lb (33 tonnes)	
Main frame (stripped)**		
Length	45 ft (13.72 m)	
Width	16 ft (4.88 m)	
Height	13 ft (3.96 m)	
Gross weight	115,000 lb (52.2 tonnes)	
Operating weight		
Estimated weight	345,000 – 370,000 lb (156 – 168 tonnes)	
Operating dimensions (Dimensions for PV-316; dimensions may vary by machine and options)		
	Description	**Dimensions in (m)**
A	Height – tower up	975 (24.76)
B	Length – cab to decking non drill end	577 (14.85)
C	Length – tower down	952 (24.19)
D	Length – undercarriage	300 (7.62)
E	Length – jack center to jack center	358 (9.09)
F	Height – jack to ground drill end	24 (0.60)
H	Height – tower down	357 (9.06)
I	Width – track inside to track inside	142 (3.62)
J	Width – jack center to jack center, drill end	242 (6.15)
K	Width – overall	304 (7.71)
L	Width – decking	23 (0.59)
M	Width – track	30 (0.75)
N	Height – tower off	248 (6.31)
P	Height – to lowest point	19 (0.48)
V	Height – top of cab to ground	198 (5.04)
AA	Height – jack to ground, non drill end	32 (0.80)
AC	Length – non cab side decking	554 (14.08)
AD	Length – cab side decking	593 (15.07)
AE	Width – decking	238 (6.06)
AF	Width – standard decking	272 (6.91)
AH	Width – overall decking	299 (7.59)
AK	Length – decking non drill end to tower end	359 (9.12)

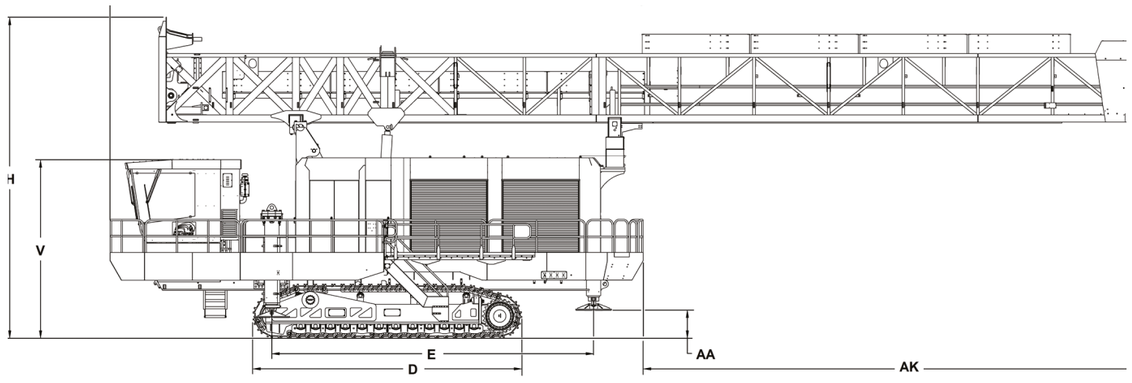


*Approximate shipping dimensions for crated PV-316 with 75 ft tower (actual dimensions will vary based on rig configuration).

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

Technical specifications





Optional equipment

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

- Wrap-around decking for 360° access around cab
- Cold-weather options for drill operation in extremely cold ambient conditions (-45° C)
- Automatic thread lubrication
- Hydraulic retractable stair
- Angle drilling package
- Water injection system
- Dust collector system
- Video camera system
- Bit viewing hatch
- Auxiliary crane

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