



Your Reliable Business Partner

MODULES & LINERS & PISTONS & ASSEMBLY SUPPLIED FOR MUD PUMP MODELS

Bomco/Emsco	F-350	F-500	F-800	FB-1300	FB-1600	DA-700
	F-1000	F-1300	F-1600	FA-1300	DB-550	D-700
	FA-1600	FC-2200	D-300/500			
National	7P50	8P80	9P100	10P130	12P160	14p220
	N1300	C-250	E-700	G-100	K-500	K-380
	K-500A	K-700A	C-250	C-350	JWS-400	JWS-165L
Gardner Denver	P27	PZ8/9	PZ10/11	FK-FXK	FG-FXG	
	FF-FXP	KG-KXG	FQ-FXQ	FF-FXF		
Oilwell	A-560-PT	A-600-PT	A-850-PT	A-1100-PT	A-1400-PT	A-1700-PT
Russian	UNBT-950	UNB-600	8T-650	NBT600	UNB1180	UNB1180L
Ideco	T-500	T-800	T-1000	T-1300	T-1600	
Wirth	TPK1000	TPK1600	TPK2000			
Ellis	E-447	E-2200	Drillmec	9T1000	12T1600	
Emsco	D300/500	D375	DB550/700	F350	F500	F650
	F800	F1000	FB1300	FB1600		
GASO	1740/1742	1743	2652			
WEATHERFORD	425					
LEWCO	3NB1300C	3NB1600C	9W100	15W600		
OPI	350D	700HDL	1000HDL			
BREWSTER	B550F	B1000T	B1100T	B1300T	B1600T	
WILSON	600					

PREMIUM LINERS

High Chrome sleeve Liner

APT premium liners combine the strength of a forged steel outer shell with the abrasion and corrosion resistance of a high chromium iron inner sleeve. These liners feature a centrifugally cast high chrome iron sleeve which is machined and heat treated to a minimum uniform bore hardness of 62 RC. Each liner is machined to close tolerances to assure ease of installation and long liner life with the inside diameter of these premium liners honed to a mirror-like finish for smooth even wear during the life of the liner. APT premium liners are made for superior performance under tough corrosive and abrasive conditions.

Our company has the professional technical engineers who have specialized producing and designing experience of more than 20 years of this line. We cooperate with top-tier universities research programs and scientific measures.



Inner Sleeve:

- Hy-chrome forged steel (centrifugal forged)
- Annealing hardness: HRC≤40
- Quenching hardness: HRC59-67

Outer Sleeve:

- 45#forged steel
- Tensile strength is $\sigma_b > 610$ Mpa
- Yield strength is $\sigma_s > 450$ Mpa
- elongation is $\sigma > 17\%$
- hardness is HRC 180-200



FEATURES

- Rated for all drilling operations up to 7,500 psi
- Bore hardness is 62-69 Rockwell
- “HP” lip design to prevent inner sleeve slippage
- Extremely long service life

CHROME-PLATED LINERS

APT supplies chrome-plated liners made from premium forged steel with the core plated by chrome. The chrome-plated liners have hardening characteristics of 62 to 65 Rockwell C hardness. The bore is plated by chrome, thickness is 0.10-0.15 mm.



- Material: 45#forged steel
- Tensile strength: $\sigma_b > 610$ Mpa
- Yield Strength: $\sigma_s > 450$ Mpa
- Elongation: $\sigma > 17\%$
- Hardness: HRC 180-200

FEATURES

- Premium forged alloy steel
- Chrome plate .010-.015" depth
- 62-65 Rockwell C hardness
- Long lasting service life



HARDENED LINERS

APT Hardened liners offer economy in a liner that is made for normal to mildly corrosive mud conditions. These liners are hardened and heat treated under

strict quality control to a minimum of 60 RC hardness and a depth of 125 inches. Each liner is honed to a mirror-like finish for smooth and even wear during the life of the liner and is machined to close tolerances to assure easy installation and long life.



CERAMIC / ZIRCONIA LINERS

APT Ceramic liners combine the strength of a forged steel outer shell with the abrasion and corrosion resistance of a ceramic inner sleeve. We provide Zirconia (ZrO_3) Sleeves as well as Alumina (Al_2O_3) sleeves, of which Zirconia exhibits better impact strength, higher hardness and be honed to finer surface finishes than alumina.



ZIRCONIA LINER

Zirconia liner offers lifetime cost savings, significantly longer service, better performance and safer operation than those made of more commonly used alumina ceramic. HC's zirconia liner is a proprietary Zirconium-based matrix that has significantly improved mechanical characteristics.

Zirconia has three important property advantages compared to alumina.

- Zirconia exhibits better impact strength
- Zirconia is harder than alumina
- Zirconia can be honed to finer surface finishes than alumina. Finished to 4 RMS, the zirconia liners provide a surface finish that's three to four times finer than alumina.



All three of these property advantages translate to lower ownership costs. The improved wear directly extends the service life of the sleeve, while the improved impact strength cuts down on the significant costs of replacing broken liners in the field. The surface finish improvements,

meanwhile, have an indirect effect. The finer surface finish means less friction with the elastomer- and-metal pump pistons, which in turn extends piston life and reduces pump-cooling requirements.

- HP design with shoulder-on-hull design to prevent sleeve slippage
- Reduced liner and piston wear
- Increased impact characteristics
- Lower thermal load on the liner wash system
- Higher thermal ratings
- Good performance on the high temperature application
- Surface finish: 4-- - 8 RMS
- Hardness: HV 0.3 kg/mm – 1100/1200 (92 -94 Rc)
- I.D. tolerances: +.010" / -.000"
- Liner sizes: 4 ½ " to 7"
- Recommend using together with urethane piston

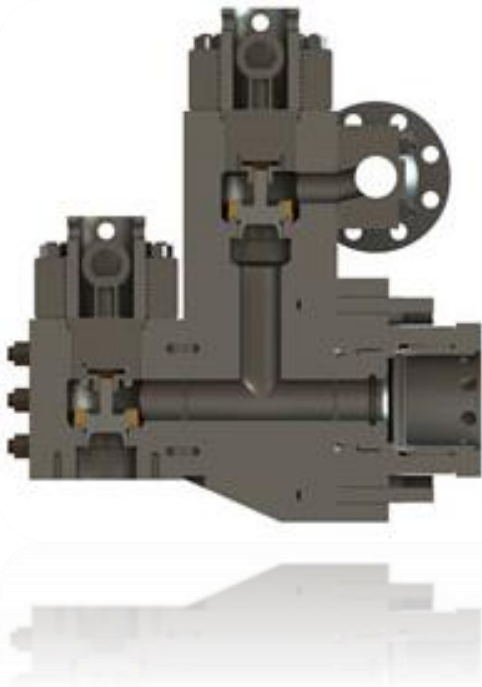
PERFORMANCE COMPARISON OF LINER TYPES



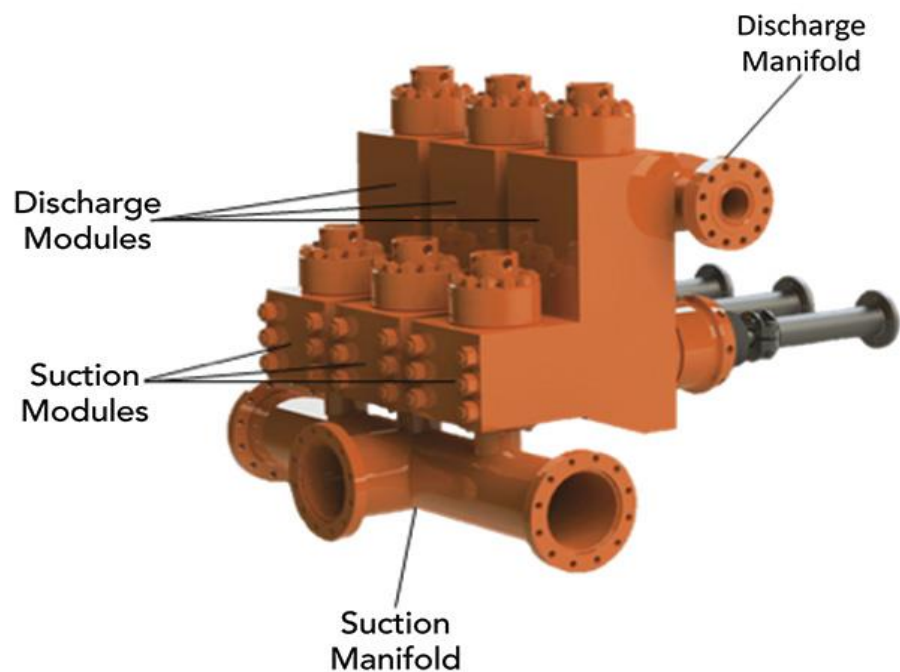
Liner Gaskets & Replacement Parts are available in a variety of materials to fit any need. Our products are available in rubber, urethane, hi-temp urethane and other specialty compounds as needed. All of our replacement parts are USA made from high quality materials and processes.

FLUID END MODULES

Fluid modules are made from 35CrMo or 40CrMnMo alloy steel with the forging ratio no less than 4:1. After the process of heating and forging, the high mechanical performance and a long working life is available.



- API 7K quality standards
- Thermal refining treatment, rigid inspection
- Heat-treated and internally hardened for high durability
- Working pressure: Max. 10000 psi
- Inner surface hardness: HB285-330
- The mechanical property: $\sigma_b > 850/\text{MPC}$
 $\sigma_b > 670/\text{MPC}$
 $\sigma > 15\%$ $\Psi \geq 13\%$





Supplied 7500 PSI module include:

- **BOMCO-F1600HL**
- **SOUTHWEST 12P160**
- **HHF1600HL**
- **EMSCO- FB1600**
- **GARDNER DENVER- PZ11**
- **HH - F1600**
- **NATIONAL - 12P160**



VALVE & SEAT

APT Valve & Seat Features



- Specified for all drilling operations up to and exceeding 7500 psi
- Maximum operating temperature 338 ° F
- Patnted polyurethane insert is noted for its “Double angle” 131 ° F seal contact surface
- Cylinder priming during pump shutdown
- Sizes fit most mud pumps
- Shelf life of polyurethane insert is maximum of 5 years
- Working life: ≥500 h
- Body is a one-piece design, configured to give maximum containment of the insert with minimum use of mateiral
- Combination of a gorged alloy steel upper body with precision casing to minimize flow restriction and fluid turbulence
- API 6 7 8 Available



FULL OPEN VALVES AND SEATS

Full open valve and seat is designed designed for Maximum Flow Characteristics with the combination of strength of a forged alloy steel upper body with precision casting to minimize flow restriction and fluid turbulence.



FOUR-WEB VALVE AND SEAT



Four-web valve and seat is designed for maximum flow characteristics by adopting premium forged steel with the performance of high strength and high hardness. The rubber is fixed on the valve body, the seats have high strength and resistance to impact, suitable for high pressure jet drilling.



THREE-WEB VALVE AND SEAT

The Three-web valve and seat is designed to enable maximum flow characteristics, offering additional bearing area for valve that minimize stress and promotes a long service life.



Valve Seats Features

- Forged alloy steel AISI4119 construction
- Heavy-duty valve design
- Deep carburized wear surfaces
- Heavy-duty durable retainer threads
- Taper post-heat treat machined to remove warpage
- Working life: ≥ 500 h

INTERCHANGEABLE WELL SERVICE PUMP VALVE AND SEAT



Interchangeable well service pump valve is designed for maximum flow characteristics with combination of the strength of a forged alloy steel upper body with precision casting to minimize flow restriction and fluid turbulence.

- High Temperature Urethane
- High Pressure
- Enhanced resistance to abrasion and extrusion
- Resist oil mud and water mud



**Assembly and
replacement parts**



PISTONS AND ASSEMBLY



PREMIUM REPLACEMENT PISTON

APT provides premium replacement pistons, fully interchangeable with other API standard designed pistons.

Rubbers are made with tough and durable Buna N Rubber for all pressures, ideally suited for either oil-base or water-base mud. The special processed fabric provides an unusual waterproof bond of seals to piston which assures a longer life with high tensile strength rated with resistance to chemicals, hydrocarbo for all drilling conditions.

RUBBER BONDED PISTONS (HNBR OR NBR)

The one-piece bonded constructed piston is designed and manufactured to handle the tough assignments encountered during land and offshore drilling. A special processing of the fabric eliminates leakage points and resistance to abrasion. The fluid expanded lip is not damaged by high pressure and fast pump strokes. The Fail-Safe piston seals off to greater diameter as liner wears.

- High tensile strength
- Performs best in water-based mud
- Excellent chemical and abrasion resistance
- Maximum operating temperature of 482°F
- Extended service life



BONDED URETHANE PISTONS

Currently running in pumps using exotic muds and highest drilling pressure ! Bonded construction-no joints, no leakage. Longer piston and liner life. This piston will run in higher-pressure, fast stroking pumps, and is resistant to oil base muds and other additives currently being used. This Premium Piston has been in service for years, proving unmatched performance under extreme drilling conditions. The one-piece bonded unit provides the same series of advantages, being impervious to oil.

GREEN DUO URETHANE BONDED PISTON

Green Duo Urethane Bonded Piston is constructed of oil-resistant polyurethane bonded to a solid metal hub, offering a longer service life than replacement rubber pistons. As fluid pressure increases, the urethane surface of the piston expands against the liner to complete the seal, even in the enlarged diameter of a worn liner bore.

- Manufactured from advanced polymer compounds
- Increased mechanical values provide resistance to head abrasion and extrusion
- Capable of operating in fluid temperature up to 572°F



HIGH TEMPERATURE URETHANE BONDED PISTON



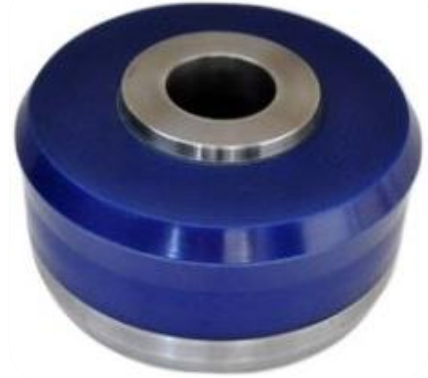
High Temperature Urethane Bonded Piston is designed to perform in the harshest of drilling conditions with compatible applications and mud types.

- Withstand operating temperature from 20 °F to 325°F
- With pressure up to 7500 psi
- Proven, reliable performance in every piston
- Resistance to high pressure, abrasion, heat and extrusion
- Multi-durometer bonded urethane allows for longer life

BULLNOSE URETHANE PISTON

Engineered to perform in the harshest drilling conditions, APT “Bullnose” is composed of multi-durometer bonded urethane for superior performance with longer life.

- Withstand operating temperature up to 220°F
- With pressure up to 7500 psi
- Cut back hub design dramatically reduces wear on the liner
- Resistant to higher pressure, abrasion, heat and extrusion



PISTON RODS

Piston rods are made with premium grade, heat treated alloy steel, offering excellent resistance to fatigue, corrosion and heavy loads. A full line of piston rods are available for various pumps.

- Withstand operating temperature up to 220°F
- With pressure up to 7500 psi
- Cut back hub design dramatically reduces wear on the liner
- Resistant to higher pressure, abrasion, heat and extrusion



PULSATION DAMPENER

APT supplies pulsation dampeners with the following standards

- Standard: API Spec 7K and API 6A
- Materials: Forged
- Capacity: 10 (20) gallons
- Operating Pressure: 5000 (7500) psi
- Nominal Diameter: 22 .7/8" (28 1/4")
- Overall Height: 29 .3/16" (35" 1/8")
- Maximum fluid opening: 2"



MUD PUMPS



F-2200 (5000 PSI) AND F2200HL (7500 PSI)

APT offers F-2200 (5000 psi) and F2200 HL (7500 psi), the displacement can reach 51.85L/S and 77.65L/S respectively, which is the best choice for deep well, super deep well, large displacements horizontal well, high pressure jet bit drilling, off-shore platform and other drilling rigs.



Fluid End

The fluid end mainly consists of cylinders, discharge pipe, pulsation dampener, valve assembly, liners and pistons.

- Each sealing part adopts rigidity compaction, which has good high pressure tightness
- Vertical fluid end features good suction performance
- L fluid end features high pressure resistance, convenient for replacing the valve assembly
- Discharge desurger, shear relief valve and discharge strainer are fitted at the discharge outlet

Power End

The power end assembly mainly consists of frame, crankshaft, pinion shaft, extension rod, and crosshead, etc.

- Continuous tooth herringbone gear
- Replaceable crosshead guides
- Frame fabricated with welded steel plate provides the optimum rigidity, high strength and light weight
- Double sealing structure for extension rod provides good sealing
- Power end utilizes the combination lubricating system of forced lubrication and splashing lubrication

F-2200 TECHNICAL PARAMETERS

Strokes/Minutes	Power Rating		Liner Size, mm and Pressure Ratingm Mpa (psi)									
			230	220	210	200	190	180	170	160	150	140
	KW	HP	19.1 (2760)	20.8 (3015)	22.8 (3310)	25.1 (3645)	27.9 (4040)	31.0 (4505)	34.5 (5000)	34.5 (5000)	34.5 (5000)	34.5 (5000)
			Displacement L/S (GPM)									
*105	*1640	2200	77.65 (1231)	71.05 (1126)	64.73 (1026)	58.72 (931)	52.99 (840)	47.56 (754)	42.42 (672)	37.58 (596)	33.03 (524)	28.77 (456)
90	1406	1886	66.56 (1055)	54.13 (858)	49.32 (782)	44.74 (709)	40.37 (640)	36.24 (574)	32.32 (512)	28.63 (454)	25.16 (399)	21.92 (347)
80	1250	1676	59.16 (938)	47.36 (751)	43.16 (684)	39.14 (620)	35.33 (560)	31.71 (503)	28.28 (448)	25.05 (397)	22.02 (349)	19.18 (304)
70	1094	1467	51.76 (820)	40.60 (644)	36.99 (586)	33.55 (532)	30.28 (480)	27.18 (431)	24.24 (384)	21.47 (340)	18.87 (299)	16.44 (261)
60	937	1257	44.37 (703)	33.83 (536)	30.83 (489)	27.96 (443)	25.23 (400)	22.65 (359)	20.20 (320)	17.89 (284)	15.73 (249)	13.70 (217)
50	781	1048	36.9700 (586)	0.6766 (10.720)	0.6165 (9.772)	0.5592 (8.863)	0.5047 (8.000)	0.4530 (7.180)	0.4040 (6.404)	0.3579 (5.673)	0.3146 (4.986)	0.2740 (4.343)
1			0.7395 (11.72)	0.6766 (10.72)	55.49 (880)	50.33 (798)	45.42 (720)	40.77 (646)	36.36 (576)	32.21 (511)	28.31 (449)	24.66 (391)

F-2200HL TECHNICAL PARAMETERS

Strokes/Minutes	Power Rating		Liner Size, mm and Pressure Rating Mpa (psi)										
			230	220	210	200	190	180	170	*160	*150	*140	*140
			19.1 (2760)	20.8 (3015)	22.8 (3310)	25.1 (3645)	27.9 (4040)	31.0 (4505)	34.8 (5000)	39.3 (5000)	44.7 (5000)	51.3 (5000)	52.0 (5000)
KW		HP	Displacement L/S (GPM)										
*105	*1640	2200	77.65 (1231)	71.05 (1126)	64.73 (1026)	58.72 (931)	52.99 (840)	47.56 (754)	42.42 (672)	37.58 (596)	33.03 (524)	28.77 (456)	24.81 (393)
			90	1406	1886	66.56 (1055)	60.90 (964)	55.49 (880)	50.33 (798)	45.42 (720)	40.77 (646)	36.36 (576)	32.21 (511)
80	1250	1676	59.16 (938)	54.13 (858)	49.32 (782)	44.74 (709)	40.37 (640)	36.24 (574)	32.32 (512)	28.63 (454)	25.16 (399)	21.92 (347)	18.90 (300)
70	1094	1467	51.76 (820)	47.36 (751)	43.16 (684)	39.14 (620)	35.33 (560)	31.71 (503)	28.28 (448)	25.05 (397)	22.02 (349)	19.18 (304)	16.54 (262)
60	937	1257	44.37 (703)	40.60 (644)	36.90 (586)	33.55 (532)	30.28 (480)	27.18 (431)	24.24 (384)	21.47 (340)	18.87 (299)	16.44 (261)	14.18 (225)
50	781	1048	36.97 (586)	33.83 (536)	30.83 (489)	27.96 (443)	25.23 (400)	22.65 (359)	20.20 (320)	17.89 (284)	15.73 (249)	13.70 (217)	11.81 (187)
1			0.7395 (11.720)	0.6766 (10.720)	0.6165 (9.772)	0.5592 (8.863)	0.5047 (8.000)	0.4530 (7.180)	0.4040 (6.404)	0.3579 (5.673)	0.3146 (4.986)	0.2740 (4.343)	0.2363 (3.745)

- 1). Volumetric Efficiency as 100% and Mechanical Efficiency as 90%
- 2). *Recommended strokes and working input power

QPI-2500 MUD PUMP



APT offers QPI-2500 Mud Pump with the deflection structure of crankshaft and connect rod. The plunger pump crankshaft center is lower than the crosshead centerline by certain distance. The positive pressure between the crosshead and sleeve is reduced by 24% around compared to normal ones. Reduction of the crosshead-sleeve friction helps to improve the transmission efficiency and reliability.

- Install spacer frame between power end and fluid end which ensures the concentric connection of crosshead slide hole and plunger packing, as well as the reduction wear at the crosshead and plunger packing.
- Super combined nut is designed for the connection between pump frame and module, therefore tightening a big nut can be decomposed into tightening a circle of small screws, remarkably reducing the intensity of manual operation.

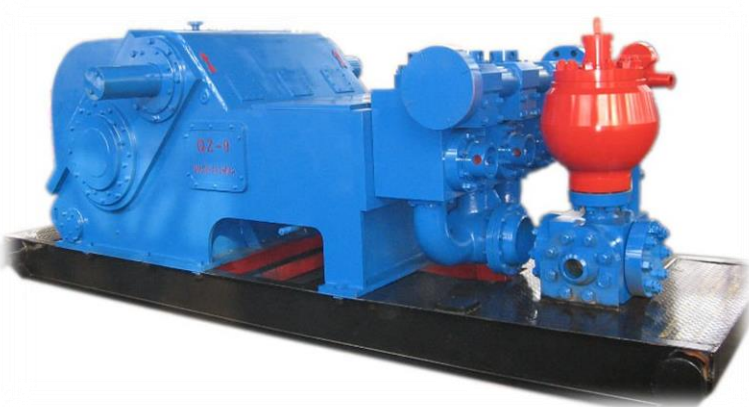
TECHNICAL PARAMETERS

Type	QPI - 2500		
Rated input power (kw)	1864 (2500 hp)		
Stroke length (mm)	203.2		
Rated Stroke (r/min)	115		
Max. Stroke (r/min)	330		
Plunger Diameter (inch)	4"	4 1/2 "	5"
Max. Discharge Pressure (Mpa)	105.5	83.4	67.5
Max. Displacement (L/S)	45.3	57.34	70.79
Max Plunger Rod Load (N)	855,505		
Gear Ratio	6.278:1		
Weight of Single Pump (kg)	8		

Plunger Diameter		115		150		200		250		300		330	
in	mm	L/s	Mpa	L/s	Mpa	L/s	Mpa	L/s	Mpa	L/s	Mpa	L/s	Mpa
4	101.60	15.79	105.50	20.59	81.50	27.46	61.10	34.32	48.90	41.19	40.70	45.30	37.00
4.5	114.30	19.98	83.40	26.06	64.40	34.75	48.30	43.44	38.60	52.12	32.20	57.34	29.30
5	127.00	24.67	67.50	32.18	52.10	42.90	39.10	53.63	31.30	64.35	26.10	70.79	23.70

Note:

- 1). Data in the table based on the continuous operating conditions, calculated at 90% mechanical efficiency and 100% volumetric efficiency
- 2). Actual discharge pressure depends on the actual power and fluid end pressure limit



QDP-3000 MUD PUMP

QDP – 3000 drilling pump is the largest power of quintuple drilling pump and pump package. The max pressure is 51.7MPa (7500 psi), and the largest displacement is 76.34 L/S. The largest displacement under the max pump pressure reaches 55.08 L/S, and the max pressure under the largest displacement is 27.0MPa, making it better than similar products. Without pulsation dampener, the displacement and pressure fluctuation of this quintuple pump is only about one third of triplex pump. The fluctuations are much less when pulsation dampener is installed. The pump package is inspired by ideas of modular and skid-mounted design, giving it reasonable layout, smooth operation, high transmission efficiency and reliability. This pump is particularly suitable for offshore platform purpose.

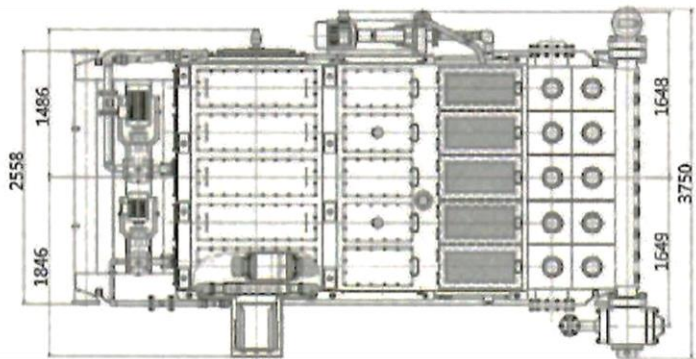
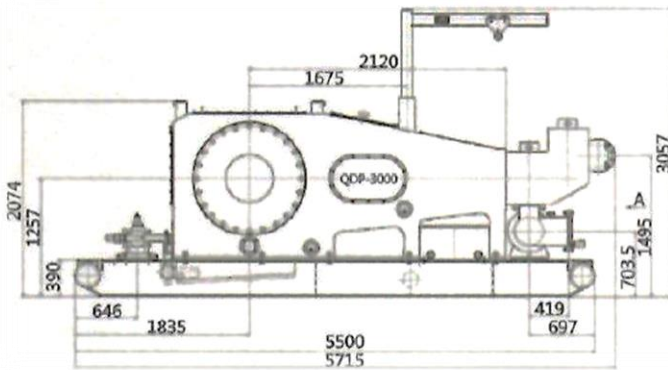


Technical Features

- With high power, small volume and light weight, it is especially suitable for offshore drilling or drilling vessel.
- Under the same liner size, it could run with stroke much higher than the rated value, therefore, it has a wide flow adjustment scope and greatly reduces the times of liner (piston) replacement.
- Split cylinder roller bearing is adopted for connecting rod bottom-end bearing, it allows to replace the connecting rod bearing, crosshead guide plate, etc. Without disassembling the crankshaft.
- The crosshead and intermediate rod are connected by spherical hinge head, avoiding eccentric wear of liner and piston essentially.
- The new “J” shaped fluid end with small volume, light weight, sound suction performance and convenience for replacing valve assembly.
- Reduction gears are installed externally with motor on the top to improve transmission efficiency and accuracy as well as save space.

TECHNICAL PARAMETERS OF QDP-3000 DRILLING PUMP

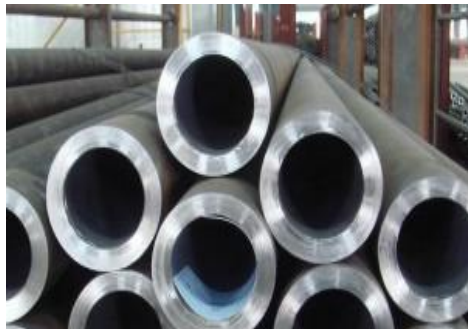
Rated Input Power (kw)	2237 (3000 hp)					
Stroke Length (mm)	300					
Rated Stroke (r/min)	117					
Diameter of Liner (mm)	Φ 130	Φ 140	Φ 150	Φ 160	Φ 170	Φ 180
Max. Stroke (r/min)	166	154	144	135	127	120
Max. Discharge Pressure (Mpa)	51.9	44.7	39.0	34.2	30.3	27.0
Max. Discharge (L/S)	55.08	59.27	63.62	67.86	72.07	76.34
Dia. Of Suction Pipe (mm)	Φ 305 (12 in)					
Dia. Of Discharge Pipe (mm)	Φ 130 (5-1/8" 10000 psi flange)					
Weight of single pump (kg)	41,018					
Pump Package Weight (kg)	62,500					



Related Product Lines

- API Mud Pump & Parts interchangeable to global brands
- API Fittings, Flanges, Hammer Unions, Swivel Joints, Pup Joints
- API OCTG Casing, Tubing, Drill Pipe, Sucker Rods, Couplings, Subs
- API Check Valves, Ball Valves, Gate Valves, Choke Valves, Pressure Gauges, Process Gauges
- Plain Materials

Utilizing our 40 plus years of combined experience with focus on customer demands, strength technology, and quality control, Amphibian Petroleum Technologies is well trained in the highest quality standards needed to provide our customers with a product that fit a wide range of land & offshore & petrochemical & power plant applications and ensure the longest life of our equipment. We are committed to providing the highest quality products the industry can offer with enhanced service durability and performance as well as low maintenance cost.



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