



PRODUCTION

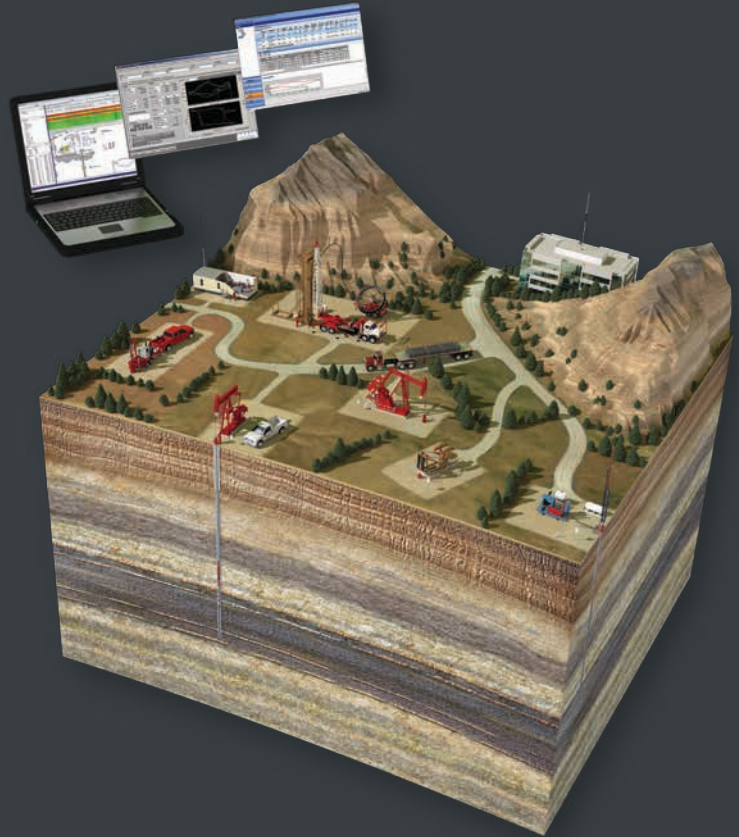
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Surface Pumping Units

Engineered, manufactured, and quality controlled by Weatherford



Strongest offering and experience. Only from Weatherford.



Known traditionally as the iron workhorse of artificial lift, reciprocating rod lift (RRL) plays an integral role in our offerings. Weatherford precision-engineered surface and subsurface equipment, supported by our pumping unit service, repair, and refurbishment, stands unmatched in the industry. Our integrated approach with highly trained professionals, experienced technical support, and in-depth analysis programs extends traditional performance capabilities of this oldest form of lift.

Total accountability, from design to delivery.

Our international sales and service teams, depth and breadth of product offerings, and extensive global manufacturing capacity are all supported by Weatherford engineering. With our vast product offering and worldwide presence, we will get you the right system tailored to your well conditions, production goals, and budget.

The entire offering of industry-leading pumping units from Weatherford is built on our extensive history of reliability and innovation.

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An optimized RRL system consists of a surface pumping unit powered by an electric or gas prime mover, a rod string, a positive displacement pump, a controller, and software.

Weatherford offers a complete package and full range of reciprocating rod lift (RRL) hardware, electronics, software, and services for all of your application requirements.

Advantages and Benefits

- The wide range of products and the improved equipment performance and longevity result in maximum well production and efficiency.
- In-house engineers provide optimal design and predictives to maximize system performance.
- The comprehensive integrated solution includes rods, pumping units, downhole pumps, prime movers, instruments, controllers, and real-time analysis software for single-source accountability.
- Weatherford provides economical repair and service.
- Positive displacement/strong drawdown maximizes performance.
- Upgraded materials reduce corrosion concerns.
- Production speed is remotely controlled by optimization hardware and software, to adapt to changing well conditions.
- Packaged unit components and global shipment capabilities ease assembly and operation.
- Surface and downhole equipment offer high salvage value.
- Original equipment manufacturer equivalent (OEME) parts, service, and repair are available for all brands of surface pumping units.
- Variable- and fixed-speed advanced controllers are offered for optimal performance.

Applications

- Virtually all applications, including sandy, gaseous, and high viscosity
- Wide range of fluid levels from near surface to seating nipple depth
- Low to medium volume lift capabilities
- All types of wells, including horizontal, slant, directional, and vertical reservoirs
- Industry standard for land and remote applications

Application Considerations	Typical Range	Maximum
Operating true vertical depth (TVD)	100 to 11,000 ft (30.5 to 3,352.8 m)	16,000 ft (4,876.8 m)
Operating volume (BFPD)	5 to 1,500	5,000
Operating temperature	100 to 350°F (37.8 to 176.7°C)	550°F (287.8°C)
Wellbore deviation	0° to 20° landed pump	0° to 90° pump displacement <15°/100 ft build angle
Corrosion handling	Good to excellent	
Gas handling	Fair to good	
Solids handling	Fair to good	
Fluid gravity	>8° American Petroleum Institute (API)	
Servicing	Workover or pulling rig	
Prime mover type	Gas or electric	
Offshore application	Limited	

Equipment

Surface pumping units and reducers represent practical and effective technology at work. This rugged, serviceable equipment is designed to perform reliably under the most adverse conditions. These pumping units are available with a standard T- or wide-frame base, that is skid-mounted for easy relocation. The Sampson posts are a three-legged design; the third leg is removable to facilitate shipping. Walking beams are rated in accordance with the latest API specifications and constructed from a minimum of A36 wide flange steel.

Pumping units come with a complete list of standard equipment. A wide selection of optional items is also available.

Standard

- T-frame base (except Strapjack® unit)
- High-mount package
- Sampson post ladder with ring (not applicable for Strapjack unit)
- Brake assembly
- Crank pin and weight wrenches
- Wireline assembly
- Adjustable motor rails
- Reducer sheave
- Crank guards
- Gear oil
- Belt guard
- Ground level lubrication system

Optional

- Wide-frame base (standard for Strapjack unit)
- Low-mount extension package
- Direct-mount extension package
- Single or dual tiedowns
- Mesh crank guards
- Counterweights
- Concrete base
- Prime mover (electric motor or gas engine)
- Belts and sheave for the prime mover
- Complete software and controller optimization packages
- Caged Sampson post ladder (not applicable for Strapjack unit)
- Jackshaft assembly

Transportation and installation on location will be quoted on request. Complete maintenance packages are available.



Increase production and reduce energy costs with the efficient design of our Maximizer® unit. You can be confident knowing that each product is designed to exceed the latest API Specification 11E and is backed by the API Specification Q1 Quality Assurance Program.

Maximizer® Pumping Units

Weatherford state-of-the-art facilities in Katy, Texas, and WFTSC (Weatherford Sichuan) are dedicated to these pumping units and continually enhance capabilities to address tomorrow's technological challenges. The Maximizer unit goes beyond conventional geometry, which typically divides the crank rotation evenly with 180° on the upstroke and downstroke. The improved conventional geometry of the Maximizer unit makes it one of the most versatile products on the market. This surface unit devotes a full 186° of its clockwise crank rotation to the upstroke to maximize production.

Features and Benefits

- The Maximizer unit can be run in both directions. Its polished rod motion is favorable to both steel or fiberglass rods.
- An improved phase I geometry design increases production, saves energy, and reduces operating costs.
- The API approved double-helical-involute gear design is the most efficient form of gear reduction and provides greater longevity.
- A gravity-fed positive oiling system lubricates at speeds as low as one stroke per minute without additional modification or required parts.
- The unit can be set on a two-point foundation, saving concrete costs and installation time.

Gear Reducer Description

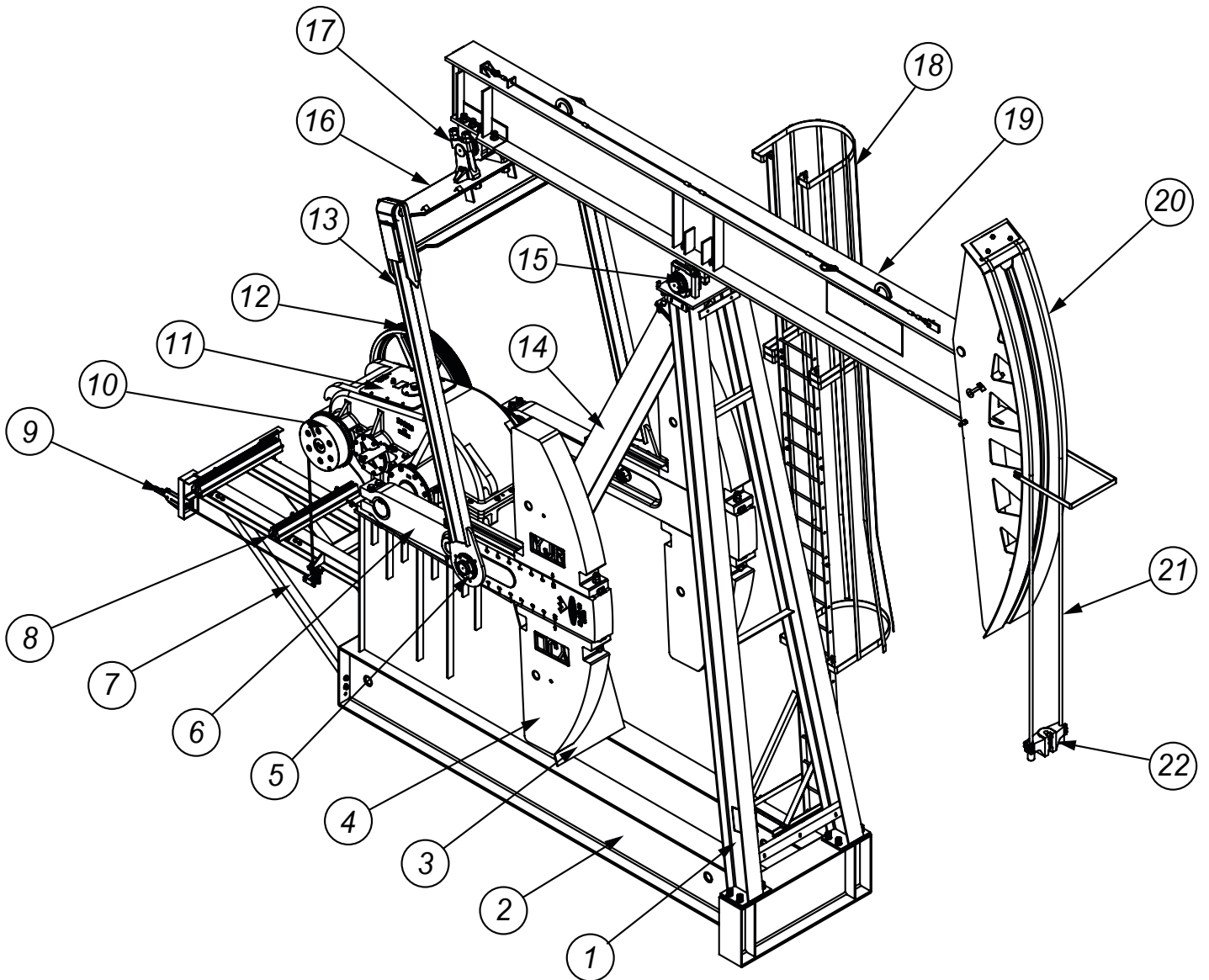
The Maximizer pumping unit has a two-piece reducer case and bolt-on crank arm attachment, each of which can be easily and quickly changed in the field, which reduces costly downtime.

- Inside the gearbox is a precisely engineered gear train featuring tough, rugged, double-reduction, gear design.
- Strong 42CrMo heat-treated alloy steel pinions and ductile iron gears, machined to precise tolerances and assembled in-house, result in optimal fit and high efficiency.
- Anti-friction bearings provide high efficiency.
- Each bearing is set in a carrier for ease of removal and installation.
- The smooth and efficient gear reducer reduces noise and vibration, and every gearbox is thoroughly factory tested.
- The unique gearbox lubrication system provides an ample supply of oil to each bearing, regardless of rotational direction or pumping speed, and lubricates at speeds as low as one stroke per minute without modification.
- The positive stop pawl of the high-capacity industrial brakes can be engaged with notches in the brake drum for added safety.
- The gear reducer is available in sizes 57 through 1824.

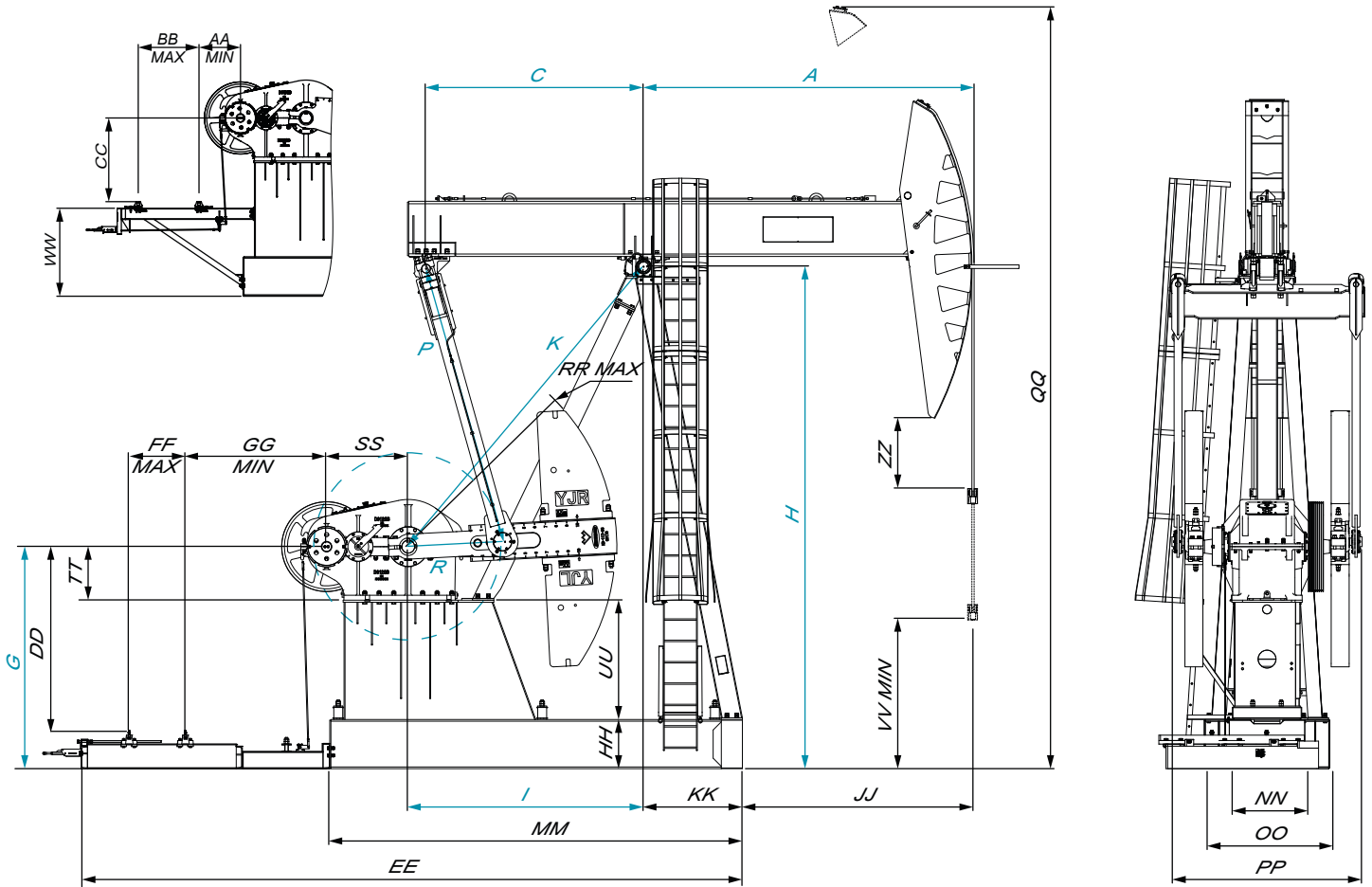
Structural Bearings

- Anti-friction bearings on the Maximizer unit enhance drive efficiency and require minimal maintenance for reliable performance.
- All Maximizer units have high-efficiency roller bearings.
- Crank pin bearings are self-aligning, spherical roller bearings with a one-piece outer race that eliminates the need for field adjustment.
- All units use tapered roller bearings in the center and equalizer bearing assemblies.
- The upper Pitman connection used on all Maximizer units is uniquely designed for easy assembly and minimal maintenance.

Parts Identification



1	Sampson post A-leg	9	Brake lever	16	Equalizer beam
2	Main frame	10	Brake assembly	17	Equalizer bearing assembly
3	Reducer sub-base	11	Gear reducer	18	Sampson post ladder
4	Counterweights	12	Reducer sheave	19	Walking beam
5	Crank pin assembly	13	Pitman arm	20	Horsehead
6	Crank	14	Sampson post support leg	21	Wireline
7	High-mount base extension	15	Center bearing assembly	22	Polish rod hanger
8	Motor rails				



Specifications

API Size	Maximum Polished Rod Capacity (lb)	Standard Strokes-Fourth Stroke Optional (in.)	Torque Factor at 90°-Fourth Stroke Optional (in.)	Wireline Size (in.)	Wireline Center (in.)
144-143-64	14,300	64, 56, 46	30, 26, 22	1.00 x 276.00	12.00
114-173-64	17,300	64, 56, 46	30, 26, 22	1.00 x 276.00	12.00
114-143-74	14,300	74, 63, 52	35, 30, 26	1.00 x 276.00	12.00
114-119-86	11,900	86, 73, 61	40, 35, 30	1.00 x 276.00	12.00
114-119-100	11,900	100, 85, 71	47, 41, 34	1.00 x 276.00	12.00
160-143-064	14,300	64, 55, 46	31, 26, 22	1.00 x 360.00	12.00
160-200-074	20,000	74, 63, 52	35, 30, 25	1.00 x 348.00	12.00
160-173-086	17,300	86, 73, 61	41, 35, 29	1.00 x 348.00	12.00
160-173-100	17,300	100, 85, 71	47, 41, 34	1.00 x 348.00	12.00
228-246-086	24,600	86, 73, 61	41, 35, 29	1.25 x 348.00	12.00
228-213-100	21,300	100, 86, 73	47, 41, 35	1.25 x 408.00	12.00
228-213-120	21,300	120, 103, 87	57, 50, 43	1.25 x 408.00	16.00
320-305-100	30,500	100, 86, 73	47, 41, 35	1.25 x 408.00	12.00
320-305-120	30,500	120, 103, 87	57, 50, 43	1.25 x 408.00	16.00
320-256-120	25,600	120, 103, 87	57, 50, 43	1.25 x 408.00	16.00
320-213-144	21,300	144, 124, 105	68, 60, 51	1.25 x 408.00	16.00
320-256-144	25,600	144, 124, 105	68, 60, 51	1.25 x 408.00	16.00
456-256-120	25,600	120, 103, 87	57, 50, 43	1.375 x 408.00	16.00
456-305-120	30,500	120, 103, 87	57, 50, 43	1.375 x 408.00	16.00
456-365-120	36,500	120, 103, 86	57, 50, 42	1.375 x 408.00	16.00
456-256-144	25,600	144, 124, 105	68, 60, 51	1.375 x 408.00	16.00
456-305-144	30,500	144, 123, 104	68, 59, 51	1.375 x 468.00	16.00
456-365-144	36,500	144, 123, 104	68, 59, 51	1.375 x 408.00	16.00
456-305-168	30,500	168, 144, 121	80, 69, 59	1.375 x 468.00	16.00
640-305-120	30,500	120, 103, 86	57, 50, 42	1.375 x 408.00	16.00
640-305-144	30,500	144, 123, 104	68, 59, 51	1.375 x 408.00	16.00
640-365-144	36,500	144, 123, 104	68, 59, 51	1.375 x 468.00	16.00
640-305-168	30,500	168, 144, 121	80, 69, 59	1.375 x 468.00	16.00
640-365-168	36,500	168, 144, 121	80, 69, 59	1.375 x 468.00	16.00
640-365-192	36,500	192, 165, 138	91, 80, 68	1.375 x 492.00	16.00
912-365-144	36,500	144, 123, 104	68, 59, 51	1.375 x 468.00	16.00
912-427-144	42,700	144, 123, 104	68, 59, 51	1.375 x 408.00	16.00
912-365-168	36,500	168, 144, 121	80, 69, 59	1.375 x 468.00	16.00
912-427-168	42,700	168, 144, 121	80, 70, 59	1.375 x 492.00	16.00
912-305-192	30,500	192, 164, 138	91, 79, 67	1.375 x 492.00	16.00
912-365-192	36,500	192, 165, 138	92, 80, 68	1.375 x 492.00	16.00
1280-365-192	36,500	192, 165, 139	92, 80, 68	1.375 x 492.00	16.00
1824-427-216	42,700	216, 188, 161	102, 90, 78	1.375 x 552.00	16.00

Maximum Effective Counterbalance*

Calculate ECB for other crank arm positions using the Effective Counterbalance Chart. When selecting counterweights, the value in the table must be equal to or greater than the required counterbalance.

API Size	Structural imbalance	Crank number	Crank only**	4-B	4-D	4-F	4-H	4-J	4-L	4-N	4-P
114-143-64	1117	KLB-64-36	3520	6310	7270	8200	9010	10070	10890	12390	13190
			3860	7060	8160	9220	10150	11360	12300	14020	
			4360	8130	9430	10670	11770	13200			
114-143-74	843	KLB-64-36	2930	5370	6210	7010	7720	8640	9350	10660	11360
			3250	6050	7020	7940	8760	9820	10640	12150	12950
			3700	7020	8160	9260	10230	11490	12460	14240	
114-119-86	461	KLB-64-36	2260	4360	5080	5770	6380	7180	7790	8920	9510
			2530	4950	5780	6570	7280	8190	8900	10200	10880
			2920	5780	6760	7710	8540	9630	10460		
114-119-100	98	KLB-64-36	1640	3440	4060	4660	5180	5870	6390	7360	7870
			1880	3950	4670	5350	5950	6740	7350	8460	9050
			2210	4670	5510	6320	7040	7970	8690	10010	10710
160-143-64	1371	KB-76-36	7070	10370	11520	12660	13670				
			7950	11760	13090						
			9180	13700							
160-173-86	657	KB-76-36	4940	7430	8290	9150	9910	10880	11660	13110	13860
			5620	8490	9490	10480	11360	12490	13390		
			6560	9980	11170	12340	13390				
160-200-74	1044	KB-76-36	6020	8910	9910	10900	11790	12920	13820	15510	16380
			6810	10140	11310	12450	13470	14790	15830	17780	18790
			7900	11870	13250	14610	15830	17390	18630		
228-213-100	1504	KB-99-43	10040	12930	13960	15010	15960	17160	18140	20030	
			11260	14570	15750	16950	18030	19410	20530	22690	
			12920	16790	18170	19570	20840				
228-213-120	559	KB-99-43	7670	10080	10940	11810	12600	13610	14420	16000	16790
			8690	11450	12430	13430	14330	15480	16410	18210	19120
			10070	13300	14450	15610	16670	18010	19100	21210	
228-246-86	684	KB-76-36	4970	7460	8330	9180	9940	10920	11690	13140	
			5650	8520	9520	10510	11390	12520	13420	15100	
			6590	10000	11200	12370	13420	14760	15830	17830	

*At the polished rod at maximum stroke, in pounds
 **Crank only column references longest to shortest stroke length

Maximum Effective Counterbalance* (continued)

Calculate ECB for other crank arm positions using the Effective Counterbalance Chart. When selecting counterweights, the value in the table must be equal to or greater than the required counterbalance.

API Size	Structural imbalance	Crank number	Crank only**	4-B	4-D	4-F	4-H	4-J	4-L	4-N	4-PJ	4-RJ	4-XJ
320-213-144	-180	KB-99-43	5750	7760	8470	9200	9860	10690	11370	12680	13340	15000	20230
			6600	8900	9710	10540	11300	12250	13030	14530	15280	17180	
			7750	10440	11390	12370	13250	14370	15280	17030	17910	20120	
320-256-120	608	KB-99-43	7720	10130	10990	11860	12650	13660	14470	16040	16830	18820	25100
			8740	11500	12480	13480	14380	15530	16460	18260	19160	21430	
			10120	13350	14500	15660	16720	18060	19150	21260	22310	24970	
320-256-144	-180	KB-99-43	5750	7760	8470	9200	9860	10690	11370	12680	13340	15000	20230
			6600	8900	9710	10540	11300	12250	13030	14530	15280	17180	23160
			7750	10440	11390	12370	13250	14370	15280	17030	17910	20120	
320-305-100	1586	KB-99-43	10120	13020	14050	15090	16040	17240	18220	20110	21060	23440	
			11350	14660	15830	17030	18110	19490	20610	22770	23850	26580	
			13000	16870	18250	19650	20920	22530	23840	26360	27630		
320-305-120	608	KB-99-43	7720	10130	10990	11860	12650	13660	14470	16040	16830	18820	25100
			8740	11500	12480	13480	14380	15530	16460	18260	19160	21430	28610
			10120	13350	14500	15660	16720	18060	19150	21260	22310	24970	
456-256-120	613	KB-99-43	7730	10140	11000	11870	12660	13660	14480	16050	16840	18830	25100
			8740	11500	12480	13480	14390	15530	16470	18260	19170	21440	
			10130	13350	14500	15670	16720	18060	19160	21260	22320	24970	
456-256-144	-142	KB-99-43	5780	7800	8510	9240	9900	10730	11410	12720	13380	15040	20270
			6630	8930	9750	10580	11340	12290	13070	14570	15320	17210	23190
			7790	10470	11430	12400	13280	14400	15310	17070	17950	20160	
456-305-120	613	KB-99-43	7730	10140	11000	11870	12660	13660	14480	16050	16840	18830	25100
			8740	11500	12480	13480	14390	15530	16470	18260	19170	21440	28610
			10130	13350	14500	15670	16720	18060	19160	21260	22320	24970	
456-305-144	534	KB-117-53	8610	11060	11940	12850	13680	14730	15590	17280	17890	19890	26610
			9790	12610	13620	14660	15620	16820	17810	19740	20440	22740	30440
			11430	14740	15930	17150	18280	19690	20850	23120	23950	26650	
456-305-168	-470	KB-117-53	6450	8550	9310	10090	10800	11700	12440	14410	16120	21880	28480
			7470	9880	10750	11640	12460	13490	14340	16600	18560	25170	
			8870	11710	12730	13780	14740	15950	16950	19610	21920	29690	
456-365-120	1483	KB-117-53	11170	14110	15170	16260	17260	18520	19550	21570	22310	24710	32770
			12590	15970	17190	18440	19580	21020	22210	24530	25370	28120	
			14550	18530	19950	21430	22770	24470	25860	28590	29580	32820	
456-365-144	534	KB-117-53	8610	11060	11940	12850	13680	14730	15590	17280	17890	19890	26610
			9790	12610	13620	14660	15620	16820	17810	19740	20440	22740	30440
			11430	14740	15930	17150	18280	19690	20850	23120	23950	26650	35710

*At the polished rod at maximum stroke, in pounds
 **Crank only column references longest to shortest stroke length

Maximum Effective Counterbalance* (continued)

Calculate ECB for other crank arm positions using the Effective Counterbalance Chart.

When selecting counterweights, the value in the table must be equal to or greater than the required counterbalance.

API Size	Structural imbalance	Crank number	Crank only	4-F	4-H	4-J	4-L	4-N	4-P	4-PJ	4-RJ	4-XJ	4-YJ
640-305-120	1594	KB-117-53	11280	16380	17380	18630	19670	21690	22690	22430	24820		
			12710	18550	19700	21140	22320	24640	25790	25490	28240		
			14660	21540	22880	24580	25980	28700	30060	29700			
640-305-144	612	KB-117-53	8690	12930	13760	14810	15680	17360		17970	19970	26690	
			9870	14740	15700	16900	17890	19820		20530	22820		
			11510	17230	18360	19770	20930	23200		24030	26730		
640-305-168	-401	KB-117-53	6520	10160	10870	11770	12510			14480	16190	21950	28560
			7540	11710	12530	13560	14410			16670	18630	25240	
			8940	13850	14810	16020	17020			19680	21990	29760	
640-305-192	-1080	KB-117-53	4980	8170	8790	9580				11950	13450	18490	24270
			5870	9530	10240	11140				13870	15590	21370	28000
			7100	11400	12240	13300				16500	18520	25320	
640-365-144	612	KB-117-53	8690	12930	13760	14810	15680			17970	19970	26690	34390
			9870	14740	15700	16900	17890			20530	22820	30520	
			11510	17230	18360	19770	20930			24030	26730	35790	
640-365-168	-479	KB-117-53	6440	10080		11690	12430			14400	16120	21880	28480
			7460	11640		13480	14330			16590	18560	25160	32730
			8860	13770		15940	16940			19600	21910	29680	
640-365-192	-761	KC-117-53	6770	9880		11250	11880			13570	15040	19950	25570
			7890	11460		13040	13770			15710	17390	23030	29490
			9420	13630		15490	16340			18630	20610	27250	34850

API Size	Structural imbalance	Crank number	Crank only	4-F	4-H	4-J	4-L	4-PJ	4-RJ	4-XJ	4-YJ	4-ZJ	4-1ZJ
912-305-192	-1068	KB-117-53	4990	8180		9590	10240	11960	13460	18510	24290	29860	
			5880	9540		11160	11900	13880	15600	21380	28010		
			7110	11410		13310	14180	16510	18530	25340			
912-365-144	650	KB-117-53	8720	12970	13800	14850	15710	18010	20010	26730	34430		
			9910	14780	15740	16940	17930	20560	22860	30560			
			11540	17270	18390	19810	20970	24070	26770	35830			
912-365-168	-449	KB-117-53	6470	10110		11720	12460	14430	16150	21910	28510	34870	
			7490	11670		13510	14360	16620	18590	25190	32760		
			8890	13800		15970	16970	19630	21940	29710			
912-365-192	-713	KC-117-53	6820	9930		11300	11930	13620	15090	19990	25620	31030	34580
			7940	11510		13090	13810	15760	17440	23080	29540	35750	
			9470	13680		15540	16390	18680	20660	27290	34900		
912-427-144	432	KB-117-53	8510	12750	13580	14630	15500	17790	19790	26510	34210	41640	
			9690	14560	15520	16720	17710	20350	22640	30340	39180		
			11330	17050	18180	19590	20750	23850	26550	35610			
912-427-168	13	KC-117-53	8610	12170		13730	14450	16390	18060	23660	30090	36260	40320
			9890	13970		15780	16600	18820	20750	27180	34560	41660	
			11650	16450		18570	19550	22160	24420	32000	40690		

API Size	Structural imbalance	Crank number	Crank only	4-B	4-F	4-J	4-L	4-PJ	4-RJ	4-XJ	4-YJ	4-ZJ	4-1ZJ
1280-365-192	-640	KC-117-53	6890	8690	10000	11380	12010	13700	15160	20070	25700	31110	34660
			8010	10080	11590	13160	13890	15830	17510	23150	29610	35830	
			9540	11980	13750	15610	16460	18750	20730	27370	34980		

API Size	Structural imbalance	Crank number	Crank only	4-B	4-F	4-J	4-L	4-PJ	4-RJ	4-XJ	4-YJ	4-ZJ	4-1ZJ
1824-427-216	-1234	KC-117-59	5750	7370	8550	9790	10360	11880	13200	17620	22690	27570	30760
			6650	8490	9820	11220	11860	13580	15080	20070	25800	31310	34920
			7860	9970	11510	13120	13860	15840	17560	23320	29920	36260	

*At the polished rod at maximum stroke, in pounds

Maximizer Gear Reducers

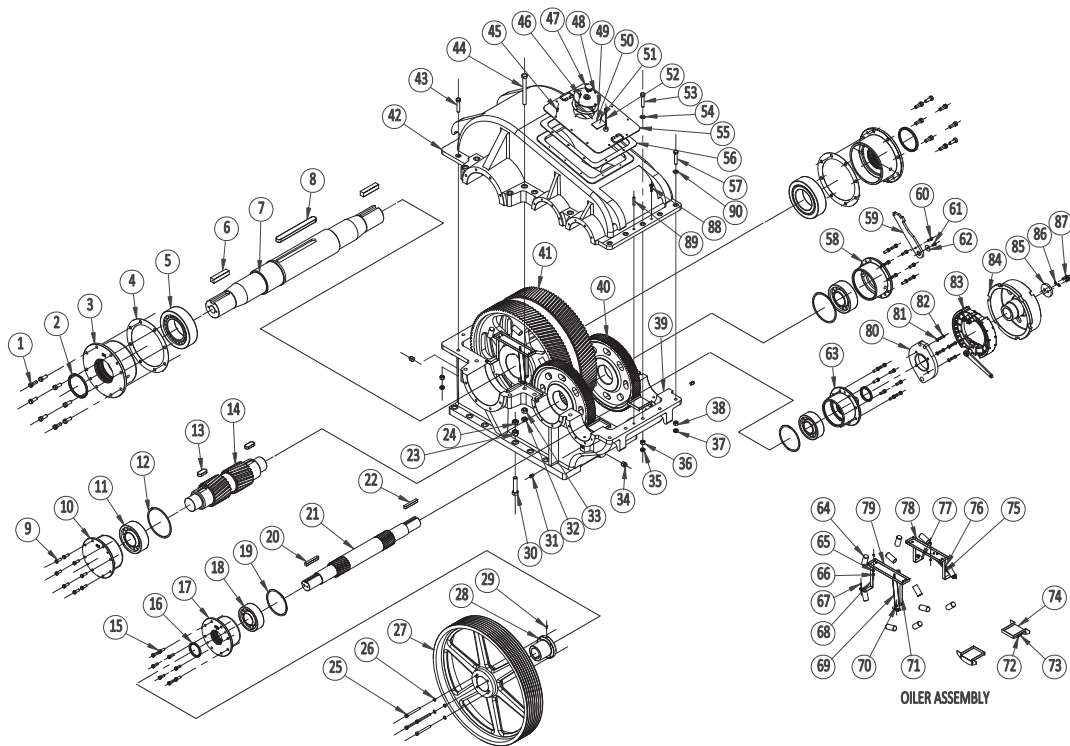
Technical Data

Model Size	Torque Rating (in.-lb)	Gear Ratio	Crank Shaft Diameter Conventional (in.)	Sheave Bore Diameter (in.)	Sheave Size Belt Section/Pitch Diameter (in.)	Oil Capacity (gal)
1824	1,824,000	28.333:1	9.00	5.50	12C/58	173
1280	1,280,000	28.05:1	9.00	5.00	10C/50	141
912 (6TC)	912,000	31.49:1	8.63	4.25	8C/50	121
912	912,000	31.49:1	7.25	4.25	8C/50	121
640 (6TC)	640,000	31.49:1	8.63	4.25	6C/50	111
640	640,000	31.49:1	7.25	4.25	6C/50	111
456	456,000	28.396:1	7.25	3.62	5C/50	80
320	320,000	30.72:1	7.25	3.50	4C/44	48
228	228,000	30.227:1	6.00	3.13	3C/36	43
160	160,000	29.21:1	6.00	2.94	3C/36	22
114	114,000	29.2837:1	5.50	2.25	3C/33	16

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Parts Identification



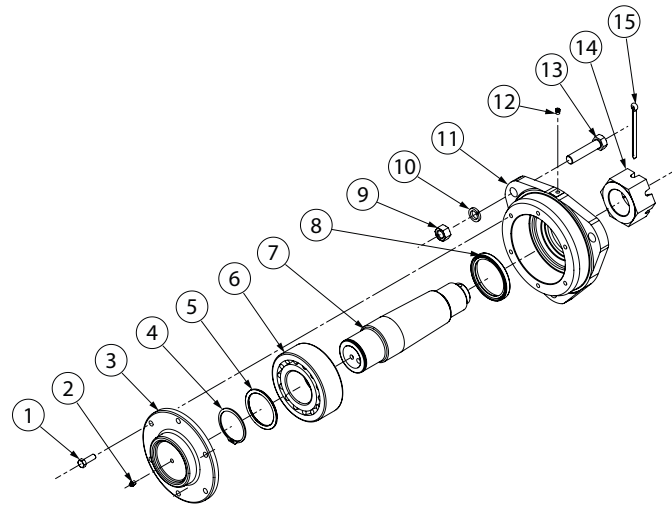
1 Hex bolt	31 Square head plug	61 Hex bolt
2 Seal	32 Jam hex nut	62 Plate
3 Low-speed bearing housing	33 Hex nut	63 High-speed housing (RH)
4 Shim	34 Square head plug	64 Oil cup
5 Bearing	35 Jam hex nut	65 Flat washer
6 Crank arm key	36 Hex nut	66 Hex nut
7 Low-speed shaft	37 Jam hex nut	67 Hex bolt
8 Key	38 Hex nut	68 Plate (LH)
9 Hex bolt	39 Gear case, lower half	69 Plate (LH)
10 Intermediate-speed housing (LH)	40 High-speed gear	70 Slotted panhead screw
11 Bearing	41 Low-speed gear	71 Plate (LH)
12 Retaining ring	42 Gear case, upper half	72 Hex bolt
13 Key	43 Hex bolt	73 Flat washer
14 Intermediate-speed pinion	44 Hex bolt	74 High-speed oil tray
15 Hex bolt	45 Hex bolt	75 Plate (RH)
16 Seal	46 Hex bolt	76 Plate (RH)
17 High-speed housing (LH)	47 Breather	77 Plate (RH)
18 Bearing	49 Gear case inspection cover	78 Oil tray (RH)
19 Retaining ring	49 Oil resistant, polyethylene gasket	79 Oil tray (LH)
20 Reducer sheave key	50 Reducer nameplate	80 Backing plate
21 High-speed pinion	51 Drive screws	81 Lock washer
22 Brake key	52 Dipstick	82 Socket head screw
23 Hex nut	53 Hex bolt	83 Brake support assembly
24 Jam hex nut	54 Flat washer	84 Brake drum
25 Hex bolt	55 Gear case inspection cover	85 High-speed pinion cover
26 Lock washer	56 Oil resistant, polyethylene gasket	86 Lock washer
27 Sheave	57 Hex bolt	87 Hex bolt
28 QD hub	58 Intermediate-speed housing (RH)	88 Hex bolt
29 Slotted flat screw	59 Pawl	89 Taper pin
30 Hex bolt	60 Hex bolt	90 Flat washer

Maximizer Components

Crank Pin Assembly

Group CA, 3TC, 4TC, 5TC,
and 6TC Crank Pin Assembly

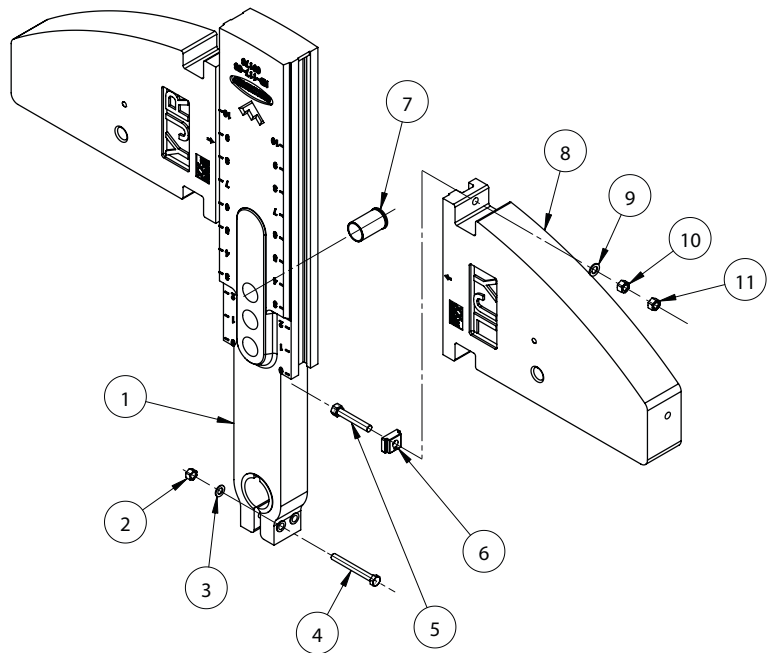
1	Hex bolt
2	Grease fitting
3	Crank pin cover
4	Retaining ring
5	Support washer
6	Bearing
7	Crank pin
8	Oil Seal
9	Hex nut
10	Lock washer
11	Crank pin housing
12	Relief fitting
13	Hex bolt
14	Crank pin nut
15	Cotter pin



Crank and Counterbalance

Group CA, 3TC, 4TC, 5TC, and
6TC Crank and Counterbalance

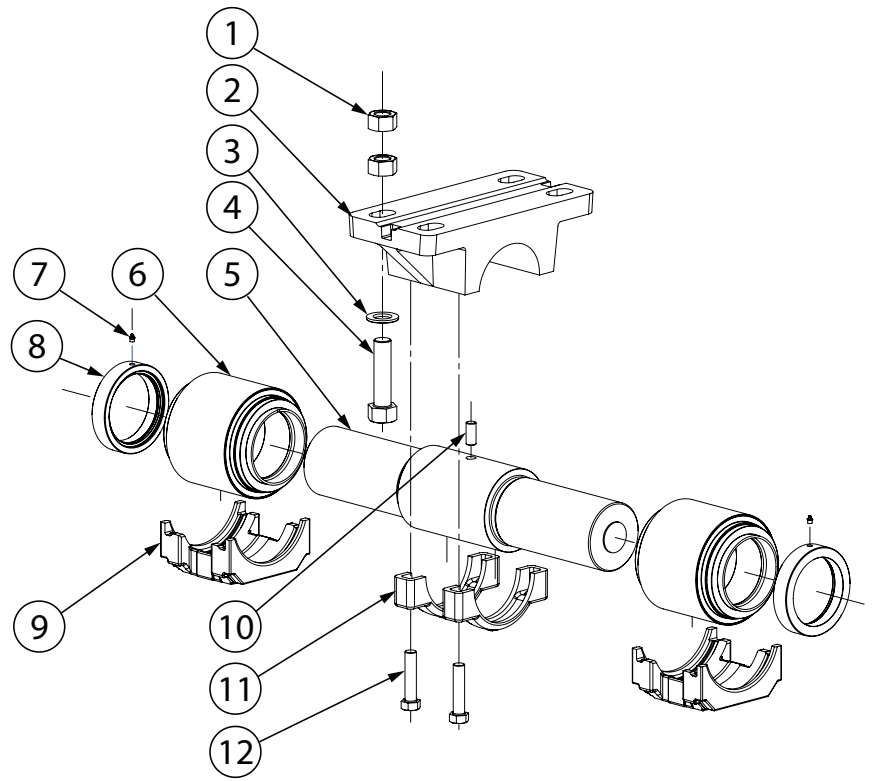
1	Crank
2	Hex nut
3	Flat washer
4	Hex bolt
5	Hex bolt
6	Tee slot adapter cast
7	Precision tapered insert (PTI)
8	Counterweight
9	Flat washer
10	Hex nut
11	Hex nut



Center Bearing Assembly

Group CA, 3TC, 4TC, 5TC, and 6TC Center Bearing

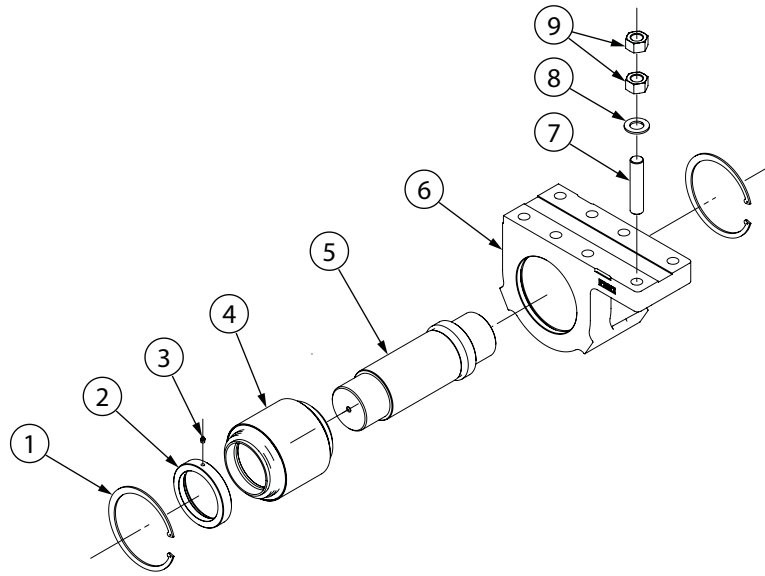
1	Hex nut
2	Trunnion
3	Flat washer
4	Hex bolt
5	Shaft
6	Bearing
7	Grease fitting
8	Retainer ring
9	Pedestal adaptor
10	Dowel pin
11	Trunnion clamp
12	Hex nut



Equalizer Bearing Assembly

Group CA, 3TC, 4TC, 5TC, and
6TC Equalizer Bearing

1	Retaining ring
2	Retainer ring
3	Grease fitting
4	Bearing
5	Shaft
6	Equalizer bearing housing
7	Stud bolt
8	Flat washer
9	Hex nut





The Maximizer II unit looks deceptively like a conventional pumping unit, but the similarity ends there. This is an API Class I pumping unit with rear-mounted geometry and phased crank counterbalance that maximizes production and minimizes cost.

Maximizer II Pumping Unit

The engineering and manufacturing experience used to produce the Maximizer II unit results in a versatile, energy-efficient pumping unit that maximizes production and minimizes cost.

This unit enables phasing the clockwise counterbalance movement to optimize the lifting cycle, further decreasing gear-reducer torque and energy requirements. The enhanced geometry delivers greater productivity at a highly efficient rate.

Features and Benefits

- Two-piece reducer case and bolted crank-arm attachment are easily and quickly changeable in the field, which reduces costly downtime.
- The unit can be installed on a two-point foundation, saving concrete costs and installation time (foundation plan available).

Tangible benefits compared to conventional geometry

- Gearbox reducer torque is lower in most cases, allowing for a smaller unit.
- Lower horsepower requirements enable the use of a smaller prime mover to reduce lifting costs.
- The unit achieves 25 percent larger useful load range when loaded with required counterbalance.
- Slower upstroke allows more time for better pump fillage.

Tangible benefits compared to push-up special geometry

- Extended distance from the wellhead enables easier and safer well servicing.
- Smaller torque factors provide higher mechanical efficiency.
- The unit reduces polished rod acceleration during the critical first 40 percent of the upstroke.

- The reduced fluid pound effects result in longer rod lift and less downtime.
- The useful permissible load range increases when both types are loaded with counterbalance to achieve maximum structure loading.
- Increased uniform loading of the prime mover results in lower energy costs.
- The unit requires 8 to 10 percent less energy to lift the same amount of fluid as push-ups.

Another means of evaluating the efficiency of a pumping unit is the shape and range of the permissible-load diagram. The horizontal shape and wide permissible-load range for any given counterbalance value makes the Maximizer II unit well suited for a broad range of operating conditions.

The geometry of the Maximizer II unit contributes to reduced torsional loads on the gearbox, which can enable the producer to use a smaller gearbox than required for a conventional geometry unit. These reductions may increase some internal structural loads, which are fully compensated for in the Maximizer II unit by using heavier structural materials and larger structural bearings.

By design, the Maximizer II pumping unit provides more open area around the wellhead for personnel and equipment when workover is required. This advantage results in easier, safer working conditions.

The Maximizer II pumping unit is available with gear-reducer sizes 320 to 1280.

Gear Reducer Description

The Maximizer II pumping unit has a two-piece reducer case and bolt-on crank arm attachment, each of which can be easily and quickly changed in the field, which reduces costly downtime.

- Inside the gearbox is a precisely engineered gear train featuring a rugged, double-reduction, double-helical-involute, involute gear design.
- Strong 42CrMo heat-treated alloy steel pinions and ductile iron gears, machined to precise tolerances and assembled in-house, result in optimal fit and high efficiency.
- Anti-friction bearings increase efficiency.
- Each bearing is set in a carrier for ease of removal and installation.
- The smooth and efficient gear reducer reduces noise and vibration, and every gearbox is thoroughly factory tested.
- The unique, positive-oil gear-reducer lubrication system provides an ample supply of oil to each bearing.
- The system lubricates at speeds as low as one stroke per minute without modification.
- The positive stop pawl of the high-capacity industrial brakes can be engaged with notches in the brake drum for added safety.
- All components are designed to exceed API Specification 11E and backed by API Specification Q1 Quality Assurance Program.
- The gear reducer is available in sizes 320 through 1280.

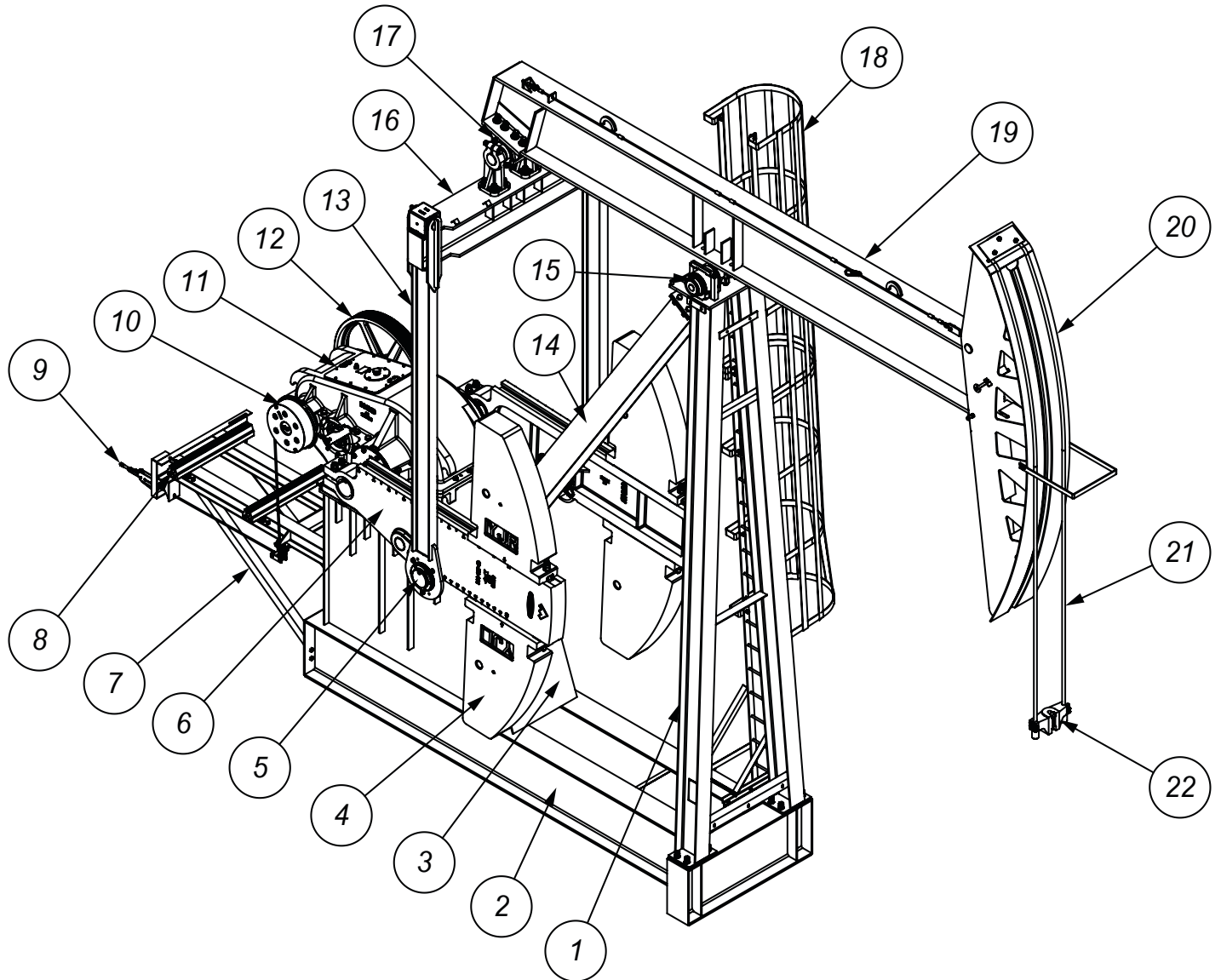
Structural Bearings

- Anti-friction bearings on the Maximizer II unit enhance drive efficiency and require minimal maintenance for reliable performance.
- All Maximizer II units have high-efficiency roller bearings.
- Crank pin bearings are self-aligning, spherical roller bearings with a one-piece outer race that eliminates the need for field adjustment.
- All units use tapered roller bearings in the center and equalizer bearing assemblies.
- The upper Pitman connection used on all Maximizer II units is uniquely designed for easy assembly and minimal maintenance.

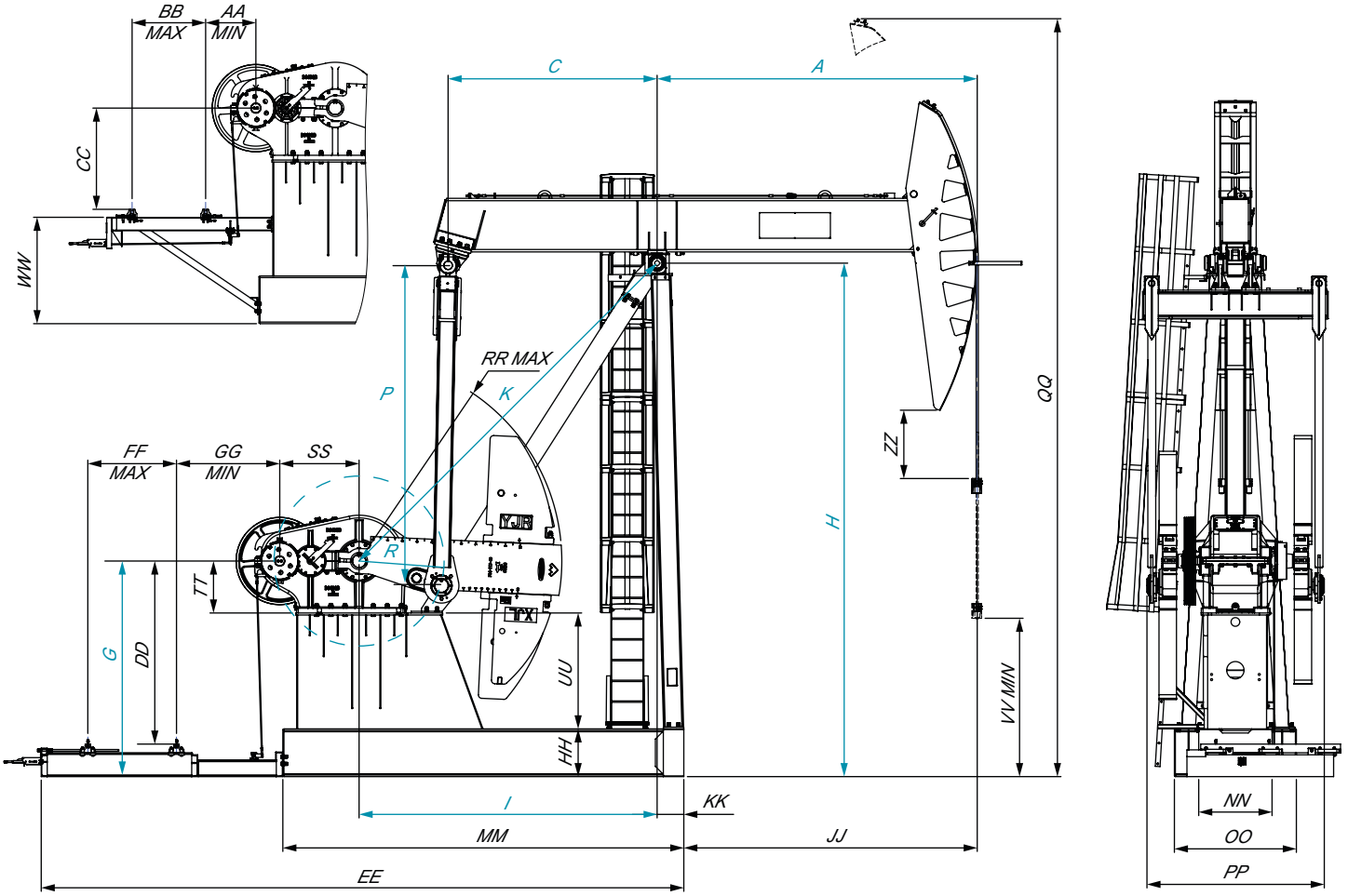
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Parts Identification



1 Sampson post A-leg	9 Brake lever	16 Equalizer beam
2 Main frame	10 Brake assembly	17 Equalizer bearing assembly
3 Reducer sub-base	11 Gear reducer	18 Sampson post ladder
4 Counterweights	12 Reducer sheave	19 Walking beam
5 Crank pin assembly	13 Pitman arm	20 Horsehead
6 Crank	14 Sampson post support leg	21 Wireline
7 High-mount base extension	15 Center bearing assembly	22 Polish rod hanger
8 Motor rails		



3C, 4C, and 5C Dimensional Data with API Dimensions

Family	Size	API Dimensional Data (in.)								Dimensional Data (in.)																						
		A	C	G	H	I	K	P	R	AA MIN	BB MAX	CC	DD	EE	FF MAX	GG MIN	HH	JJ	KK	MM	NN	OO	PP	QQ	RR MAX	SS	TT	UU	VV MIN	WW	ZZ	
3C	320-256-120	132.00	96.25	103.03	267.75	110.00	218.16	174.75	40.00	25.88	50.38	48.50	84.25	331.88	71.00	62.50	23.63	121.88	10.13	191.75	37.81	68.00	86.13	378.00	99.00	35.67	24.00	55.44	80.50	49.94	55.40	
	320-256-144	158.38	96.25	103.03	267.75	110.00	218.16	174.75	40.00	25.88	50.38	48.50	84.25	331.88	71.00	62.50	23.63	148.19	10.13	191.75	37.81	68.00	86.13	399.63	99.00	35.67	24.00	55.44	80.50	49.94	30.80	
4C	456-305-144	158.38	120.63	122.49	296.50	172.00	244.66	186.75	49.63	25.00	56.50	56.50	103.70	370.88	71.00	62.50	27.50	143.00	15.38	231.38	42.38	70.38	90.88	428.75	117.00	39.92	28.00	66.88	78.60	61.38	60.80	
	456-365-144	158.38	120.63		296.50	172.00											27.50	132.00	15.38	231.38	42.38	70.38	90.88		117.00	39.92	28.00	66.88	77.88	61.38	60.80	
	640-365-144	158.38	120.63	124.49	296.50	172.00	243.25	185.00	49.63	19.13	58.50	58.50	105.70	370.88	71.00	57.00	27.50	143.00	15.38	231.38	42.38	70.38	102.25	428.75	117.00	45.79	30.00	66.88	78.40	61.38	60.80	
	912-427-144	158.38	120.63	124.49	296.50	172.00	243.25	185.00	49.63	19.13	58.50	58.50	105.70	370.88	71.00	57.00	27.50	143.00	15.38	231.38	42.38	70.38	106.19	427.75	117.00	45.79	30.00	66.88	78.50	61.38	60.70	
	456-305-168	184.75	120.63	122.49	296.50	172.00	244.66	186.75	49.63	25.00	56.50	56.50	103.70	370.88	71.00	62.50	27.50	169.38	15.38	231.38	42.38	70.38	90.88	448.25	117.00	39.92	28.00	66.88	78.90	61.38	35.90	
	640-365-168	184.75	120.63	124.49	296.50	172.00	243.25	185.00	49.63	19.13	58.50	58.50	105.70	370.88	71.00	57.00	27.50	169.38	15.38	231.38	42.38	70.38	102.25	449.13	117.00	45.79	30.00	66.88	78.70	61.38	35.90	
	912-365-168	184.75	120.63	124.49	296.50	172.00	243.25	185.00	49.63	19.13	58.50	58.50	105.70	370.88	71.00	57.00	27.50	169.38	15.38	231.38	42.38	70.38	106.19	448.75	117.00	45.79	30.00	66.88	78.70	61.38	35.90	
	912-427-168	184.75	120.63	124.49	296.50	172.00	243.25	185.00	49.63	19.13	58.50	58.50	105.70	370.88	71.00	57.00	27.50	169.38	15.38	231.38	42.38	70.38	106.19	428.75	117.00	45.79	30.00	66.88	78.70	61.38	36.00	
	912-365-192	211.00	120.63	124.49	296.50	172.00	243.25	185.00	49.63	19.13	58.50	58.50	105.70	370.88	71.00	57.00	27.50	195.63	15.38	231.38	42.38	70.38	106.19	470.75	117.00	45.79	30.00	66.88	67.90	61.38	25.60	
	912-427-192	211.00	120.63	124.49	296.50	172.00	243.25	185.00	49.63	19.13	58.50	58.50	105.70	370.88	71.00	57.00	27.50	195.63	15.38	231.38	42.38	70.38	106.19	470.00	117.00	45.79	30.00	66.88	55.90	61.38	37.60	
5C	1280-427-216	211.00	120.63	129.31	325.31	172.00	260.77	207.38	55.63							55.13	31.88	27.50	189.63	21.38	238.38	52.38	83.13	118.56	511.63	122.00	52.54	33.00	68.75	68.20	61.50	27.60
	1280-427-192	187.38	120.63	129.31	301.31	172.00	243.25	185.75	54.69							55.13	31.88	27.50	166.00	21.38	238.38	52.38	83.13	118.56	467.13	122.00	52.54	33.00	68.75	43.50	61.50	55.40

Specifications

API Size	Maximum Polished Rod Capacity (lb)	Standard Strokes—Fourth Stroke Optional (in.)	Torque Factor at 90°—Fourth Stroke Optional (in.)	Wireline Size (in.)	Wireline Center (in.)
320-256-120	25,600	120, 101, 83	55, 47, 39	1.25 × 420	16.00
320-256-144	25,600	144, 121, 100	66, 56, 47	1.25 × 408	16.00
456-305-144	30,500	144, 119, 96	65, 55, 45	1.375 × 408	16.00
456-305-168	30,500	168, 139, 112	76, 65, 53	1.375 × 468	16.00
456-365-144	36,500	144, 119, 96	65, 55, 45	1.375 × 408	16.00
640-365-144	36,500	144, 119, 96	65, 55, 45	1.375 × 408	16.00
640-365-168	36,500	168, 139, 112	76, 65, 53	1.375 × 468	16.00
912-427-144	42,700	144, 119, 96	65, 55, 45	1.375 × 408	16.00
912-365-168	36,500	168, 139, 112	76, 65, 53	1.375 × 468	16.00
912-427-168	42,700	168, 139, 112	76, 65, 53	1.375 × 492	16.00
912-365-192	36,500	192, 159, 128	87, 74, 60	1.375 × 492	16.00
912-427-192	42,700	192, 159, 128	87, 74, 60	1.375 × 516	16.00
1280-427-192	42,700	192, 157, 126	86, 72, 59	1.375 × 452	16.00
1280-427-216	42,700	216, 179, 145	98, 83, 68	1.375 × 452	16.00

Maximum Effective Counterbalance*

Calculate ECB for other crank arm positions using the Effective Counterbalance Chart. When selecting counterweights, the value in the table must be equal to or greater than the required counterbalance.

API Size	Structural imbalance	Crank number	Crank only	4-B	4-D	4-F	4-H	4-J	4-L	4-N	4-PJ	4-RJ	4-XJ
320-256-120	717	P15-99-40	7560	9930	10770	11630	12400	13390	14190	15720	16520	18470	24610
			8730	11510	12500	13500	14410	15560	16500	18310	19240	21520	
			10300	13620	14800	16000	17080	18460	19580	21740	22850	25580	
320-256-144	-81	P15-99-40	5620	7600	8300	9010	9660	10480	11140	12430	13090	14720	19840
			6600	8920	9740	10570	11330	12290	13070	14580	15350	17260	23260
			7900	10670	11660	12650	13560	14710	15640	17440	18360	20640	
API Size	Structural imbalance	Crank number	Crank only	4-B	4-D	4-F	4-H	4-J	4-L	4-N	4-PJ	4-RJ	4-XJ
456-305-144	1120	P14-117-49	8630	11040	11900	12790	13600	14630	15470	17110	17740	19710	26260
			10000	12860	13880	14930	15890	17100	18100	20040	20790	23110	30860
			11980	15460	16710	17990	19170	20650	21870	24240	25150	27990	37460
			6470		9270	10040	10730	11610	12330	13740	14280	15960	21580
456-305-168	30	P14-117-49	7650		10970	11870	12690	13730	14590	16250	16890	18880	25530
			9330		13390	14500	15500	16770	17820	19850	20630	23060	

Maximum Effective Counterbalance* (continued)

Calculate ECB for other crank arm positions using the Effective Counterbalance Chart. When selecting counterweights, the value in the table must be equal to or greater than the required counterbalance.

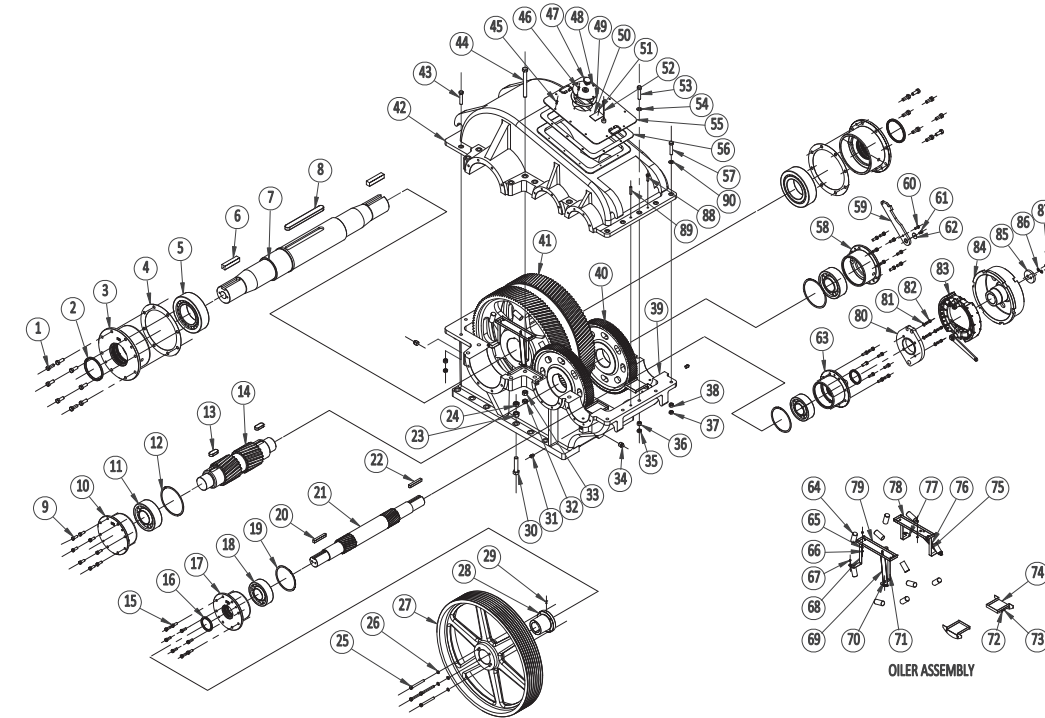
API Size	Structural imbalance	Crank number	Crank only	4-F	4-H	4-J	4-L	4-N	4-PJ	4-RJ	4-XJ	4-YJ	4-ZJ
640-365-144	1096	P14-117-49	8710	13690	14710	15560	17200			17830	19790	26340	33850
			10090	15980	17190	18190	20130		20880	23200	30950		
			12060	19260	20740	21960	24330		25240	28080			
640-365-168	31	P14-117-49	6470	10030	10730	11610	12330	13740	14280	15960	21570	28010	34190
			7650	11870	12690	13730	14590	16250	16890	18880	25530	33140	
			9340	14500	15500	16770	17820	19850	20630	23070	31180		
API Size	Structural imbalance	Crank number	Crank only	4-H	4-J	4-L	4-N	4-PJ	4-RJ	4-XJ	4-YJ	4-ZJ	4-1ZJ
912-427-144	1010	P9-117-49	8110	13240	14300	15170	16860	17500	19520	26290	34050	41510	
			9410	15480	16730	17760	19770	20520	22920	30920	40110		
			11280	18700	20220	21480	23930	24850	27780	37560			
912-365-168	66	P9-117-49	6150	10550	11460	12200	13650	14200	15930	21740	28390	34780	
			7270	12470	13540	14430	16150	16790	18840	25710	33580		
			8870	15230	16540	17610	19720	20500	23010	31400			
912-427-168	-111	P14-117-49	6320	10590	11470	12190	13600	14140	15820	21430	27870	34050	38090
			7500	12550	13590	14450	16110	16750	18740	25380	33000	40310	
			9190	15360	16630	17680	19710	20490	22920	31040	40350		
912-365-192	-832	P14-117-49	4800	8530	9300	9930	11160	11640	13110	18030	23660	29070	32610
			5830	10250	11160	11910	13370	13920	15670	21490	28160	34560	
			7310	12710	13820	14740	16520	17200	19330	26440	34590		
912-427-192	-1196	P14-117-49	4440	8170	8940	9570	10800	11280	12750	17670	23300	28710	32250
			5470	9890	10800	11550	13010	13560	15310	21130	27800	34200	38380
			6950	12350	13460	14380	16160	16840	18970	26080	34230	42050	
API Size	Structural imbalance	Crank number	Crank only	4-F	4-H	4-J	4-L	4-PJ	4-R				

Maximizer II Gear Reducers

Technical Data

Model Size	Torque Rating (in.-lb)	Gear Ratio	Crank Shaft Diameter Maximizer II (in.)	Sheave Bore Diameter (in.)	Sheave Size Belt Section/Pitch Diameter (in.)	Oil Capacity (gal)
1280	1,280,000	28.05:1	9.25	5.00	10C/50	141
912	912,000	31.49:1	7.75	4.25	8C/50	121
640	640,000	31.49:1	7.75	4.25	6C/50	111
456	456,000	28.396:1	7.75	3.62	5C/50	80
320	320,000	30.72:1	7.75	3.50	4C/44	48

Parts Identification



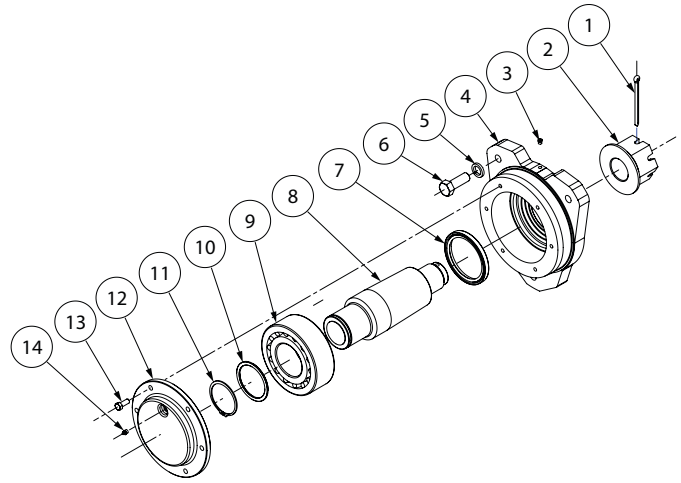
Maximizer II Gear Reducers (for illustration purposes only)

1 Hex bolt	31 Square head plug	61 Hex bolt
2 Seal	32 Jam hex nut	62 Plate
3 Low-speed bearing housing	33 Hex nut	63 High-speed housing (RH)
4 Shim	34 Square head plug	64 Oil cup
5 Bearing	35 Jam hex nut	65 Flat washer
6 Crank arm key	36 Hex nut	66 Hex nut
7 Low-speed shaft	37 Jam hex nut	67 Hex bolt
8 Key	38 Hex nut	68 Plate (LH)
9 Hex bolt	39 Gear case, lower half	69 Plate (LH)
10 Intermediate-speed housing (LH)	40 High-speed gear	70 Slotted panhead screw
11 Bearing	41 Low-speed gear	71 Plate (LH)
12 Retaining ring	42 Gear case, upper half	72 Hex bolt
13 Key	43 Hex bolt	73 Flat washer
14 Intermediate-speed pinion	44 Hex bolt	74 High-speed oil tray
15 Hex bolt	45 Hex bolt	75 Plate (RH)
16 Seal	46 Hex bolt	76 Plate (RH)
17 High-speed housing (LH)	47 Breather	77 Plate (RH)
18 Bearing	49 Gear case inspection cover	78 Oil tray (RH)
19 Retaining ring	49 Oil resistant, polyethylene gasket	79 Oil tray (LH)
20 Reducer sheave key	50 Reducer nameplate	80 Backing plate
21 High-speed pinion	51 Drive screws	81 Lock washer
22 Brake key	52 Dipstick	82 Socket head screw
23 Hex nut	53 Hex bolt	83 Brake support assembly
24 Jam hex nut	54 Flat washer	84 Brake drum
25 Hex bolt	55 Gear case inspection cover	85 High-speed pinion cover
26 Lock washer	56 Oil resistant, polyethylene gasket	86 Lock washer
27 Sheave	57 Hex bolt	87 Hex bolt
28 QD hub	58 Intermediate-speed housing (RH)	88 Hex bolt
29 Slotted flat screw	59 Pawl	89 Taper pin
30 Hex bolt	60 Hex bolt	90 Flat washer

Maximizer II Components

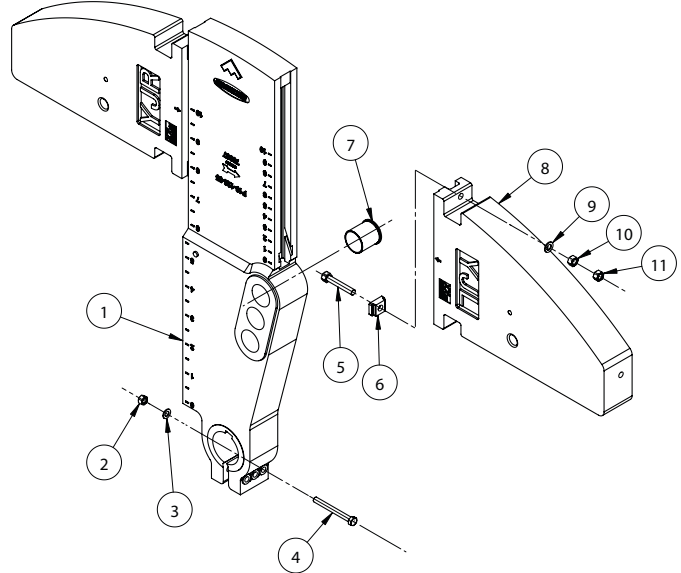
Group 3C, 4C, and 5C Crank Pin Assembly

1	Cotter pin
2	Crank pin nut
3	Relief fitting
4	Crank pin housing
5	Lock washer
6	Hex bolt
7	Oil seal
8	Crank pin
9	Bearing
10	Support washer
11	Retaining ring
12	Crank pin cover
13	Hex bolt
14	Grease fitting



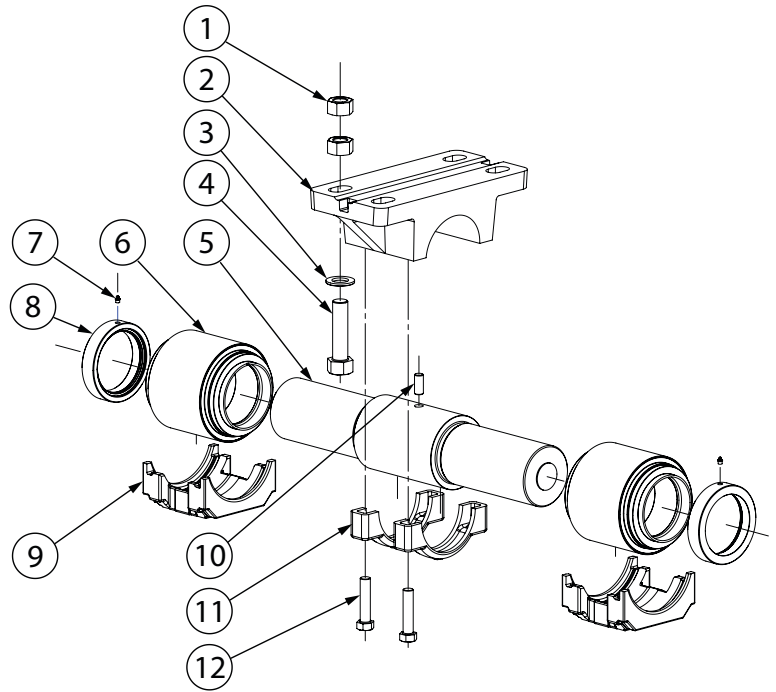
Crank and Counterbalance

1	Crank
2	Hex nut
3	Flat washer
4	Hex bolt
5	Hex bolt
6	Tee slot adapter cast
7	Precision tapered insert (PTI)
8	Counterweight
9	Flat washer
10	Hex nut
11	Hex nut



Center Bearing Assembly

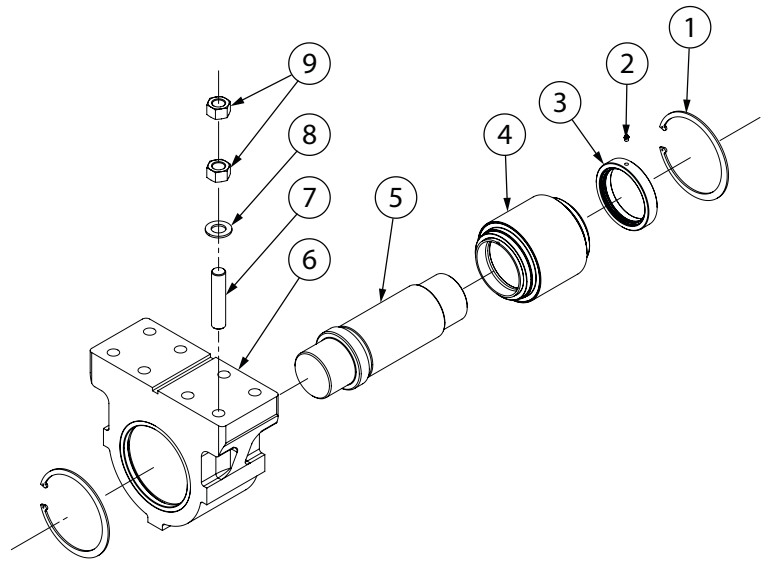
1	Hex nut
2	Trunnion
3	Flat washer
4	Hex bolt
5	Shaft
6	Bearing
7	Grease fitting
8	Retainer ring
9	Pedestal adaptor
10	Dowel pin
11	Trunnion clamp
12	Hex nut



Equalizer Bearing Assembly

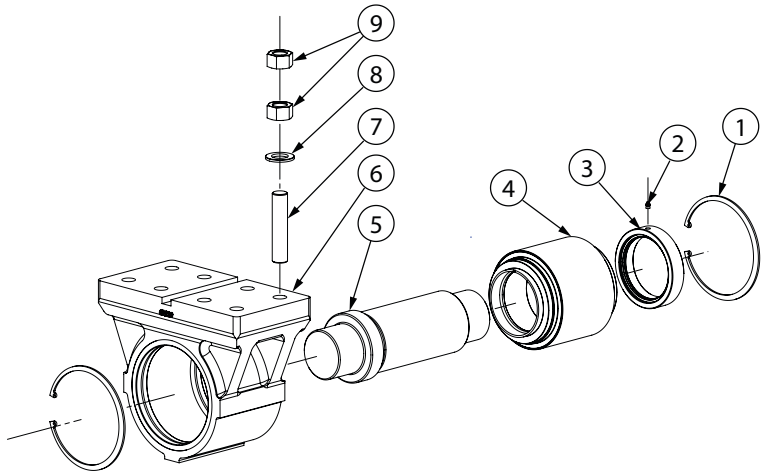
Group 3C Equalizer Bearing

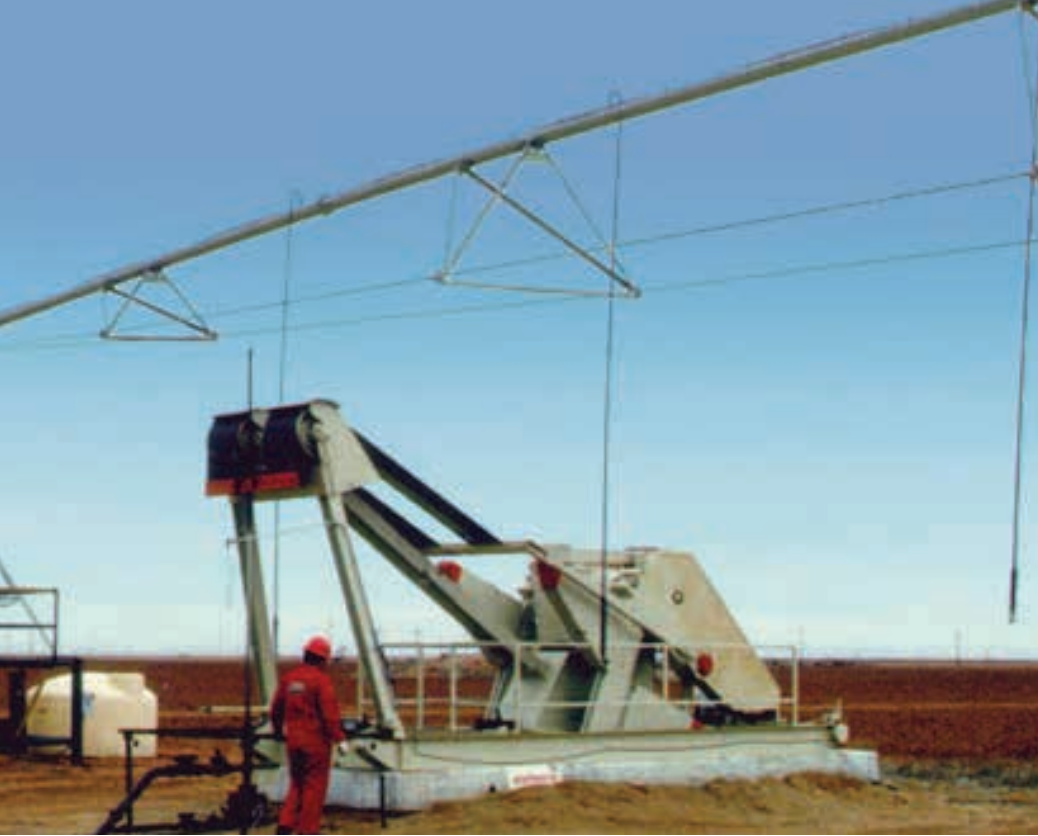
1	Retaining ring
2	Grease fitting
3	Retainer ring
4	Bearing
5	Shaft
6	Equalizer bearing housing
7	Stud bolt
8	Flat washer
9	Hex nut



Group 4C and 5C Equalizer Bearing

1	Retaining ring
2	Grease fitting
3	Retainer ring
4	Bearing
5	Shaft
6	Equalizer bearing housing
7	Stud bolt
8	Flat washer
9	Hex nut





The Strapjack® pumping unit combines maximum stroke length and minimum height requirements for continuous operation in low-clearance areas, such as under irrigation systems.

Low-Profile (Strapjack®) Pumping Units

Low-clearance applications and visually sensitive area rod pumping.

With its low-profile design, this unit is uniquely suited for special applications where visibility should be minimized, such as in parks and residential areas.

Engineered for Safety and Economy

The StrapJack unit carrier bar remains above the base of the skid at the bottom of the downstroke. This configuration means wellhead cellars can be much shallower and in some cases unnecessary. Where a cellar is required, it is often less than 4 ft (1.2 m) deep, eliminating the confined entry designation and saving considerable maintenance expense.

Easy Installation and Maintenance

The StrapJack unit ships pre-assembled for fast, easy setup and installation. A folding Sampson post assembly simplifies well maintenance. By removing a pin on the third leg and disconnecting the carrier bar from the polished rod, the Sampson post and roller assembly can be quickly and easily folded back, away from the wellhead. This helps maximize work space and safety during pulling or servicing operations.

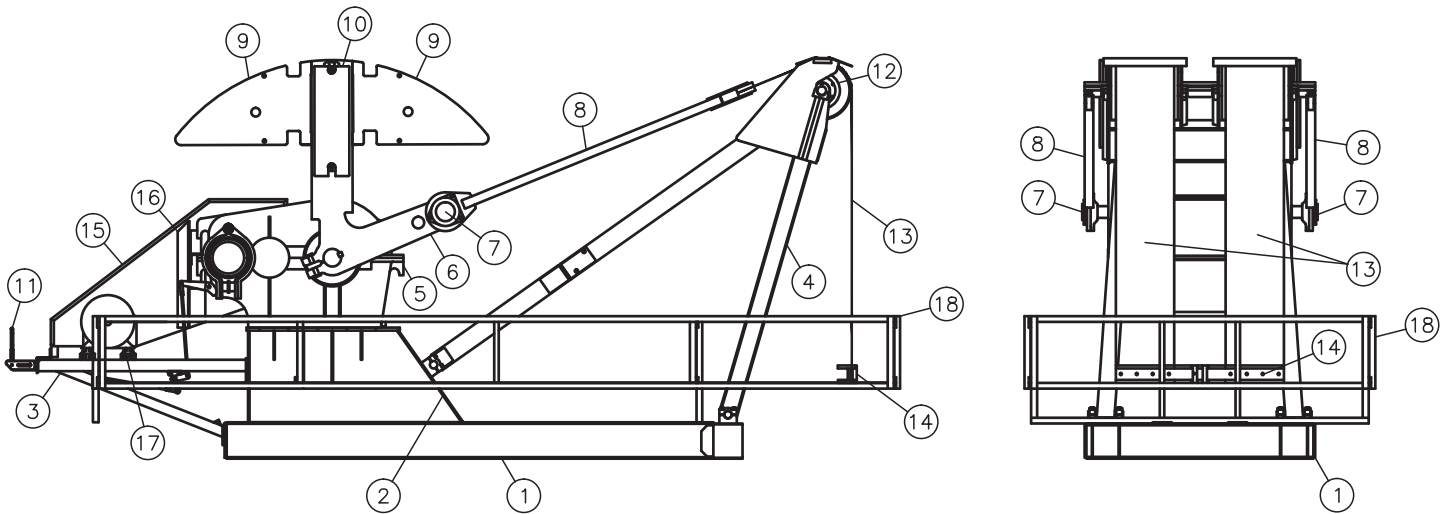
Applications

- Low-clearance installations
- Highly visible areas

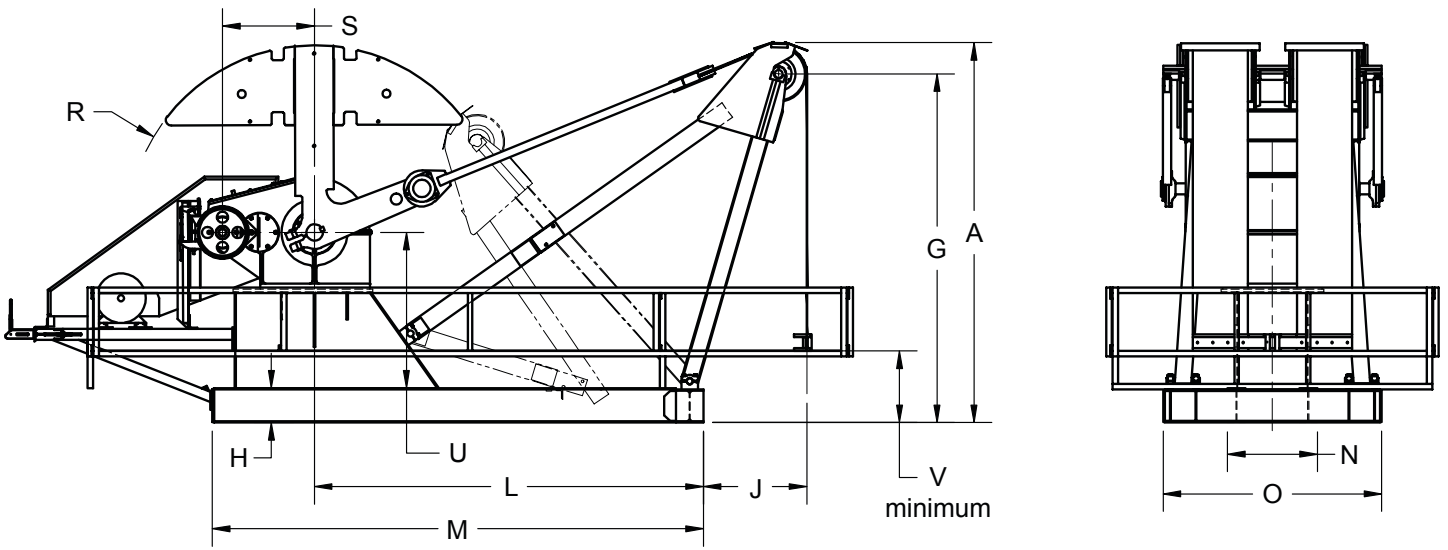
Features and Benefits

- Low-profile design is suitable for low-clearance applications, such as rod pumping under sprinkler systems.
- Low-profile design often eliminates the need and costs of a cellar, which alleviates risks associated with gas collection and confined entry.
- Low visibility contributes to positive relationships with landowners.
- Equal upstroke/downstroke velocities result in the same geometry in both directions for smooth, consistent operation.
- The unit operates without a horsehead, which reduces visual impact.
- The unit ships fully assembled for easy transport and fast setup.
- The Sampson post third leg folds for easy well servicing.

Parts Identification



1 Frame	7 Crank pin assembly	13 Bridle belt assembly
2 Sub-base	8 Equalizer/pitman assembly	14 Bridle assembly
3 Prime mover extension	9 Master and auxiliary counterweights	15 Belt guard assembly
4 Sampson post assembly	10 Auxiliary side counterweights	16 Belt guard mounting bracket
5 Reducer assembly	11 Unit brake assembly	17 Prime mover slide rail assembly
6 Crank	12 Roller drum assembly	18 Crank guard assembly



Dimensional Data

Group	Size	Dimensional Data (in.)													
		A	G	H	J	L	M*	M-WF*	N	O	O-WF*	R	S	U	V
2.1	114-173-54	96.00	84.00	10.19	31.69	87.13	117.00	216.89	22.00	66.75	83.25	47.50	24.60	38.19	16.13
	160-173-54	96.00	84.00	10.19	31.69	87.13	126.13	216.89	22.00	66.75	83.25	47.50	30.20	38.19	16.13
3.2	160-200-74	120.00	108.44	12.50	32.31	120.75	157.69	279.00	32.50	79.25	91.00	59.50	30.20	48.00	18.00
	228-246-74	120.00	108.44	12.50	32.31	120.75	157.69	279.00	32.50	79.25	93.50	59.50	30.20	48.00	18.00
	228-246-84	138.00	126.56	12.50	37.50	141.06	178.06	308.25	32.50	79.25	101.00	68.00	33.31	56.50	26.00
	320-246-74	120.00	108.44	12.50	32.31	120.75	157.69	279.00	32.50	79.25	101.00	59.50	30.20	48.00	18.00
	320-246-84	138.00	126.56	12.50	37.50	141.06	178.06	308.25	32.50	79.25	101.00	68.00	33.31	56.50	26.00

WF=Wide frame option.
 *Dimensions can vary depending on end user's prime mover requirements.

Effective Counterbalance*

Unit	114-173-54 160-173-54	160-200-74 228-246-74 320-246-74	228-246-84 320-264-84
Crank number	SC47-27	SC59-37	SC68-42
Counterweights	SJ-1	SJ-2	SJ-3
	ECB	ECB	ECB
Crank only	1670	1730	2270
Crank, MW**	5810	6200	9070
Crank, MW, 4 AW†	6580	6940	10280
Crank, MW, 8 AW	7380	7700	11520
Crank, MW, 12 AW	8160	8430	12730
Crank, MW, 16 AW	8940	9160	13940
Crank, MW, 20 AW	9710	9890	15150
Crank, MW, 24 AW	10490	10620	16410
Crank, MW, 28 AW	11270	11350	17620
Crank, MW, 32 AW	12090	12082	18840
Crank, MW, 36 AW		12860	
Crank, MW, 40 AW		13590	
Crank, MW, 32 AW, 2 SW††	12360	13840	19130
Crank, MW, 32 AW, 4 SW	12640	14090	19420
Crank, MW, 32 AW, 6 SW	12920	14340	19720
Crank, MW, 32 AW, 8 SW	13193	14590	20010
Crank, MW, 32 AW, 10 SW	13430	14840	20300
Crank, MW, 32 AW, 12 SW	13750	15090	20600
Crank, MW, 32 AW, 14 SW	14024	15340	20890
Crank, MW, 32 AW, 16 SW	14300	15590	21180
Crank, MW, 32 AW, 18 SW		15840	
Crank, MW, 32 AW, 20 SW		16090	
Maximum recommended moment – 114-173-54	14300		
Maximum recommended moment – 160-173-54	12360		
Maximum recommended moment – 160-200-74		15590	
Maximum recommended moment – 228-246-74		18060	
Maximum recommended moment – 320-246-74		15370	
Maximum recommended moment – 228-246-84			21184
Maximum recommended moment – 320-246-84			18431

*In pounds

**Master weight

†Auxiliary weight

††Side weight

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Low-Profile (Strapjack) Gear Reducer

Technical Data

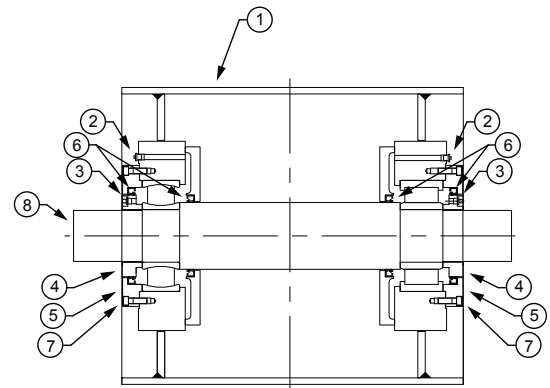
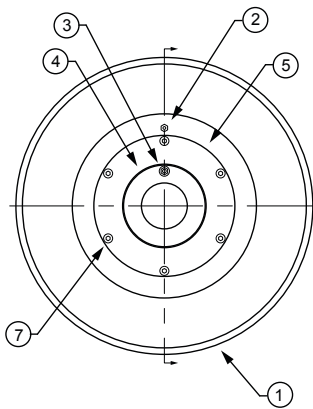
Double-helical, double-reduction, involute gear reducer data

Model Size	Torque Rating in.-lb	Gear Ratio	Bore (in.)	Sheave Dimensions (in.)							Oil Capacity		Crankshaft Diameter (in.)
											(gal)	(L)	
D114GB	114,000	29.28	2.25	20-3C	24-3C	30-3C	33-3C				14	53	5
D160GB	160,000	29.21	2.94	20-3C	24-3C	30-3C	36-3C				19	72	6
D228GB	228,000	30.22	3.13	20-4C	24-4C	30-4C	36-3C				33	125	6
D320GB	320,000	30.72	3.50	24-5C	30-5C	36-4C	44-4C	22-3D	27-3D	33-3D	43	143	7.25

Low-Profile (Strapjack) Components

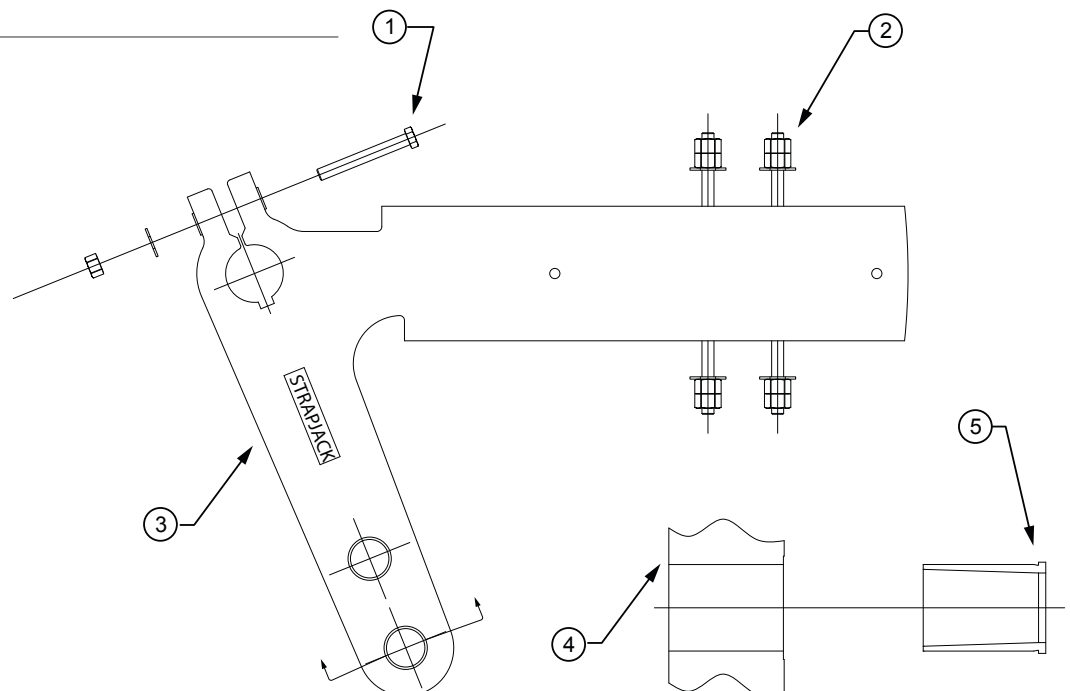
Head Roller Assembly

- 1 Head roller with bearing housing
- 2 Lube relief fitting
- 3 Lube inlet fitting
- 4 Bearing retaining ring
- 5 Housing cover
- 6 Seals
- 7 Cap screws
- 8 Shaft



Crank Arm Assembly

- 1 Crank arm bolting hardware
- 2 Master counterweight bolting hardware, T-slot adapters, bolts, nuts, and washers
- 3 Machined crank arm (right side shown, left side identical but opposite)
- 4 Machined crank arm
- 5 Precision tapered insert (PTI)





Experience and innovation.

Since 1957, Weatherford, the oldest and largest pumping unit service company in the industry, has repaired, serviced, moved, set, and erected hundreds of thousands of pumping units around the globe. Weatherford is the only company with expertise to service all forms of reciprocating rod lift to give you the most effective production solution for your needs. Because of our global footprint, we can position equipment and technicians to service your requirements wherever you are.

Pumping Unit Parts and Services

Unmatched Scope

- Only company with expertise in all forms of artificial lift
- Global footprint from which to stage equipment

Industry-Leading Service and Repairs

- Comprehensive servicing of all industry brands manufactured in the last century
- Experienced technicians that provide service wherever your well is located

Industry Firsts

- Specialization of infield moving and installation of pumping units
- Complete repair of all sizes and brands of pumping units
- Manufacture and installation of a self-lubricating, maintenance-free polytetrafluoroethylene (PTFE) pumping unit structural bearings
- Manufacture of steel-reinforced portable concrete pumping unit bases
- Manufacture and installation of OEM and OEME exchange structural bearings
- Manufacture of a complete line of replacement, API-licensed pumping unit gears, pinions, and shafts

- Complete crater repair service from disassembly to installation
- In-shop and in-field gear reducer repair service
- Specially trained crews for infield pumping unit repairs
- Full line of gas and electric prime movers
- Operation of a fleet of custom-designed field service cranes equipped with specialized tooling
- Rigorous, documented inspection and maintenance programs
- Cold-process structural member straightening and repair
- Customer-dedicated account representatives
- Redesign and retrofitting services
- Gear reducer assembly and repair
- Hotshot service to facilitate repairs
- On-site crank boring and sleeve installation
- Warrantied products and services

Weatherford pumping unit services have provided the most comprehensive servicing of all industry brands and OEM units manufactured in the last century:

- Inspection and maintenance programs
- Pumping unit inspection
- Complete pumping unit repair
- Pumping unit installation
- Turnkey pumping unit setting
- Bearing remanufacture using PTFE and manufacturer-style bearings
- Engineering and application assistance
- Cold-process structural member straightening and repair
- Gearbox assembly and repair
- Hotshot service to facilitate repairs
- OEME bearing assemblies
- Crank boring in the field
- Full line of gas and electric prime movers

Weatherford trucks and cranes are designed and rigged for complete turnkey optimization of your installation. Dispatched by radio and cell phone, our crews arrive at locations ready and fully trained to diagnose, quickly service, and perform needed repairs.

Weatherford has manufacturing facilities strategically located near major producing areas, and our plants are equipped to run 24 hours per day if needed. Our pumping unit services group provides efficient and cost-effective repairs.

Inspection and Preventive Maintenance Service

Using field inspection techniques developed and refined during 50+ years of experience and enhanced with custom engineered inspection vehicles, our trained operators provide a detailed inspection of the pumping unit and all its components. Recognizing the effects of wear or other issues before a problem develops saves time and money. Our team prepares a written report and reviews it with you to determine needed repairs or maintenance. Bearing lubrication and tightening of all bolts are included in this service.

Structural Bearings

Weatherford has the world's largest inventory of bearing assemblies for oil field pumping units. Our inventory includes the most frequently used structural bearing assemblies from all major pumping unit manufacturers. Parts for obsolete units are also available. Failed bearing assemblies can be exchanged for rebuilt assemblies by our specially rigged service trucks and cranes in a single trip to the location, which reduces expensive downtime and lost production time.

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Weatherford manufactures OEM and OEME pumping unit bearings in complete assemblies along with components and finished housings for the most frequently used structural bearing assemblies.

Developed in 1963, the Weatherford self-lubricated, long-life bearing for oil well pumping units significantly reduces field maintenance requirements. The sleeve-type bearing is made with a proprietary stabilized PTFE, a unique composite material that provides strength, weather resistance, self-lubrication, and long life. The bearing resists chemical degradation, blow-sand, and severe cold. Several hundred thousand bearings in use around the world have demonstrated its performance.

Gears, Pinions, and Shafts

Weatherford OEM and OEME gears, pinions, and shafts are designed to exceed API Specification 11E and backed by Q1 quality assurance program. Herringbone, double helical, and helical gears, pinions, and shafts made by Weatherford have earned a solid reputation as the industry's most reliable, cost effective replacement gearing. Our extensive inventory of gearbox components assures prompt delivery of a smoothly operating, repaired gear reducer for a fraction of the cost of a new one. All Weatherford gears are thoroughly inspected for precision and quality.

Weatherford can provide gears in a variety of sizes for pumping units from most original manufacturers. We offer quick turnaround, quality service, and an affordable price for equipment no longer supported by the original manufacturer. We also offer custom replacement, including evaluation of failure, design, materials, and engineering solutions.

Gear Reducer Repair

Weatherford Pumping Unit Services, staffed with trained crews and specially rigged equipment developed since 1957, offers full turnkey repair of pumping unit gear reducers from disassembly in the field, to the shop, and back to the field quickly and efficiently. Minor repairs such as replacing high speed pinions and bearings can be done in the field.

With 300- to 600-ton horizontal wheel presses located at strategic repair facilities, Weatherford Pumping Unit Services is fully equipped to furnish gears, pinions, and shafts along with labor to fully recondition the largest gear reducers. Repaired reducers are performance tested at Weatherford facilities to ensure oiling function and smooth, trouble-free operation before delivery for installation by our trained crews. Cratered or bad reducers can be picked up, delivered to a Weatherford repair shop, rebuilt, and put back in service quickly. In some cases a fully repaired reducer of the same make and size can be offered as an exchange to get the unit back in service in one day.

If the reducer is not repairable, requires obsolete parts, is of foreign make, or OEM gears are not available, a Weatherford or other brand reducer can be retrofitted to the pumping unit.

Weatherford reducer repairs include replacement of roller bearings, repair and replacement of the oiling system, and high-speed oilers for units that will not lubricate bearings at lower SPM. Brake repairs use OEM and OEME parts or retrofit Weatherford brake assemblies when obsolete brake parts are no longer available. Flush and oil change service is included.

Portable Concrete Pumping Unit Bases

Innovated and patented in 1957, Weatherford pre-stressed portable concrete bases are available and in stock for any pumping unit size or manufacturer. The bases are reinforced at points of greatest stress.

Prime Movers

Weatherford offers a full line of rugged, dependable gas and electric prime movers for all makes and models of pumping units. We also offer parts such as oil bath jack shafts, belts, sheaves, and QD hubs for all units and prime movers.

Gas Engines

Weatherford is a master distributor of new engines and parts for Arrow, Ford, GM, and Cummins. When they are available, we also provide rebuilt gas engines by Ajax, Arrow, Ford, Waukesha, and others.

- Engine rebuilding
- Cylinder head rebuilding and repair
- Engine machine shop services
- New engine sales and service
- Engine technical support
- Product training
- Parts department
- Emission equipment sales
- Emission testing and system installations

Weatherford Electric Motors

Weatherford has an extensive inventory of electric motors in various sizes, horsepower, and designs for most typical applications. Additionally, special designs and frames can be in inventory or available with a short lead time:

- Nema D for the dynamic loads of pumping units
- Nema B for steady-state loads, such as pumps
- Inverter-rated motors for use with a variable-frequency drive
- Special frame-construction motors for hazardous locations

Belts

Belts are available in single and power band in B, C, and D groove.

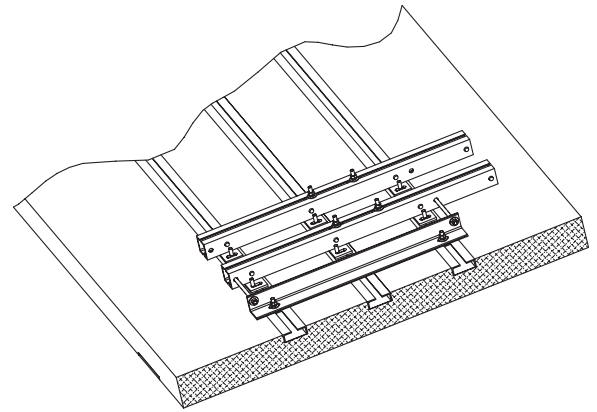
Sheaves and QD Hubs

We have available all sizes of sheaves in B, C, and D groove. We also have QD hubs for all models of units and prime movers.

Optional Components

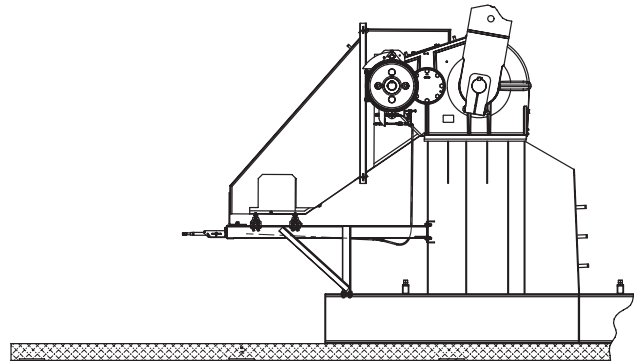
Direct-Mount Motor Extension

For applications where a concrete base is being used, we recommend using direct-mount rails to reduce engine vibration. A separate low-mount extension base with adjustable rails is also available for order. Either of these setups will accommodate gas or electric motors.



High-Mount Motor Extension

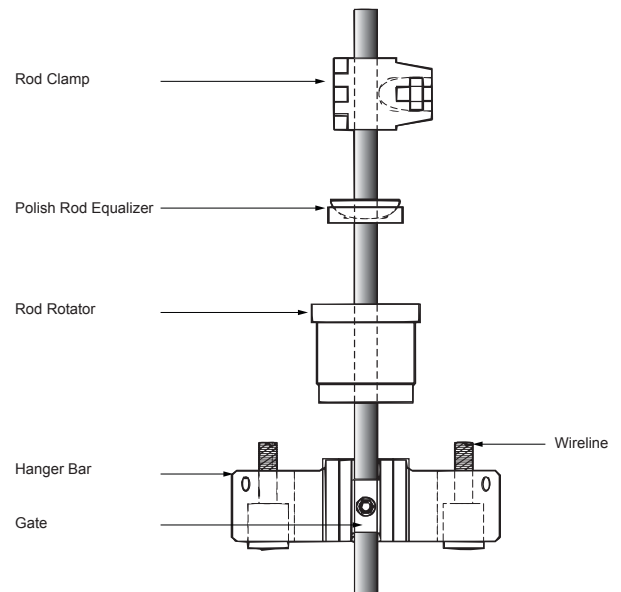
A high-mount extension is advisable if the pumping unit will be powered by an electric motor. This economical mount helps protect the electric motor from blowing snow and dust that reduce motor life. High-mount motor extensions are assembled with zinc plated adjusting rods for easy belt adjustment. Fully enclosed or swing-away belt guards are available at the time of order.



Hanger Bar and Polish Rod Equalizer

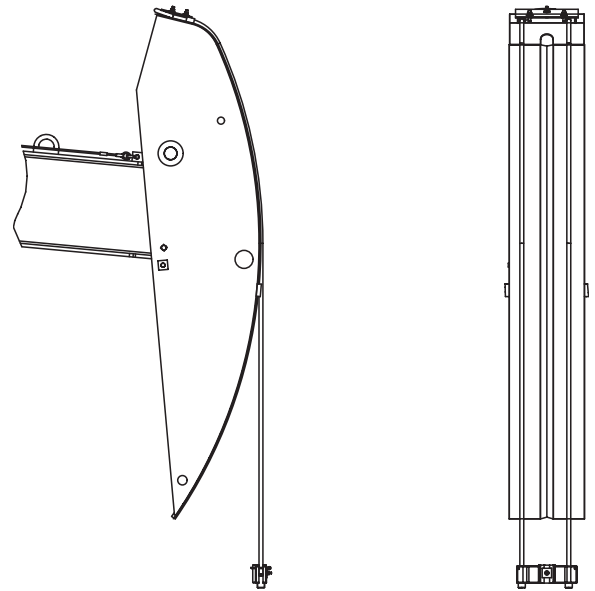
Ductile iron hanger bars come complete with ends for easy wireline replacement and adjustment. Machined surfaces provide positive contact between the hanger bar and the polish rod clamp. The use of a sliding gate allows field personnel to detach the polish rod with ease.

The polish rod equalizer is designed to continually adjust for any rod misalignment between the hanger bar, polish rod clamp, or rod rotator. A reduction in bending stresses significantly extends the life of the polish rod and reduces wear on the stuffing box and related equipment. The polish rod equalizer can be ordered to fit 1 1/4- or 1 1/2-in. polish rods and only takes a few minutes to install. The system requires no maintenance or lubrication.



Horsehead

The horsehead has been designed for easy removal and has ample clearance for well servicing. Adjusting screws on both the horsehead and the saddle trunnion permit lateral and longitudinal adjustments. The horsehead can be positioned precisely over the center of the well. Wireline retaining brackets come standard on all pumping units.

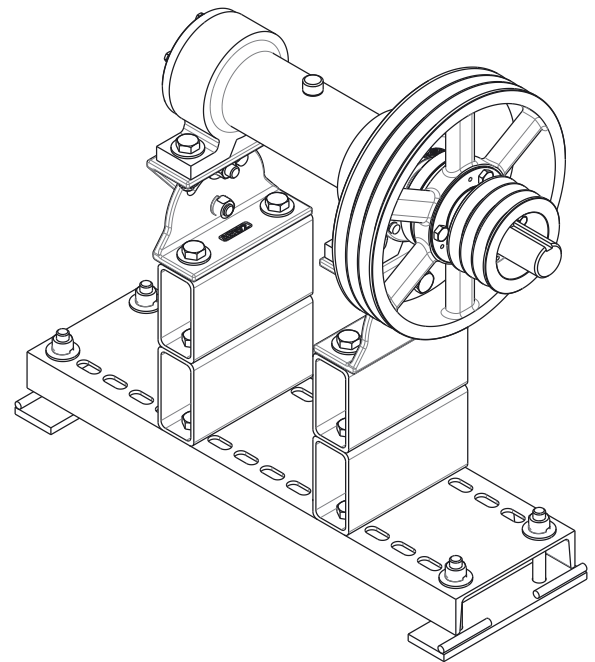


Jackshaft Assembly

The purpose of a jackshaft assembly is to enable the operator to slow down a pumping unit below its capabilities with standard sheaves and belts. Jackshafts are available with either a 2 1/4- or 2 7/8-in. single-shaft extension manufactured from 4140 annealed steel. The shaft is mounted on roller bearings and is housed and sealed to prevent contamination. An oil bath system supplies lubrication.

Jackshaft assemblies come complete with a universal-type mounting system, which allows an operator to retrofit the mounting system onto any type of pumping unit or directly onto the concrete base. The jackshaft is designed to carry sheaves that are up to 24 inches in diameter, which allows up to a 4 to 1 reduction, if necessary.

Another feature of this assembly is its swivel design, which allows for quick and uniform belt tensioning. This system permits the operator to release two bolts on the jackshaft, which allows the head to swivel back and forth. Both sets of belts can then be adjusted by moving the prime mover. When both sets of belts are at the desired tension, just retighten the swivel bolts to maintain belt tension.



Effective Counterbalance Chart

Maximizer and Maximizer II Pumping Units

Maximizer Crank No.	CBTC* (2 cranks; in.-lb)	Maximizer II Crank No.	CBTC* (2 cranks; in.-lb)
KB-117-53	551200	P9-117-49	471447
KC-117-53	689619	P14-117-49	506647
KB-99-43	405060	P15-117-54	506647
KB-76-36	174240	P15-99-39	390000
KLB-117-53	363107	P15-99-40	390000
KLB-99-43	243059	P15-122-54	761970
KLB-76-36	72899	P13-122-55	773357
KLB-64-36	72900	*CBTC of two cranks with wrist pins	
KC-117-59	709464		

CBTC= Counterbalance torque of cranks (in.-lb)

CBTW= Counterbalance torque of counterweights (in.-lb)

ECB = Effective counterbalance at polish rod (lb)

W = Total weight of counterweights used on two cranks (lb)

X = Distance of counterweights from the end of crank (in.)

G = Distance of center of gravity from counterweight bottom (in.)

TF = Torque factor at 90°, from catalog (in.)

SU = Structural imbalance at polish rod, from catalog (lb)

CG = Center of gravity

$$CBTW = [(Crank No.) - (X + G)] \times W$$

$$ECB = \frac{CBTC + CBTW + SU^*}{TF}$$

Where SU* is found in this catalog, and the value is added or subtracted depending on sign.

To determine X:

$$A = [(Crank No.) - G]$$

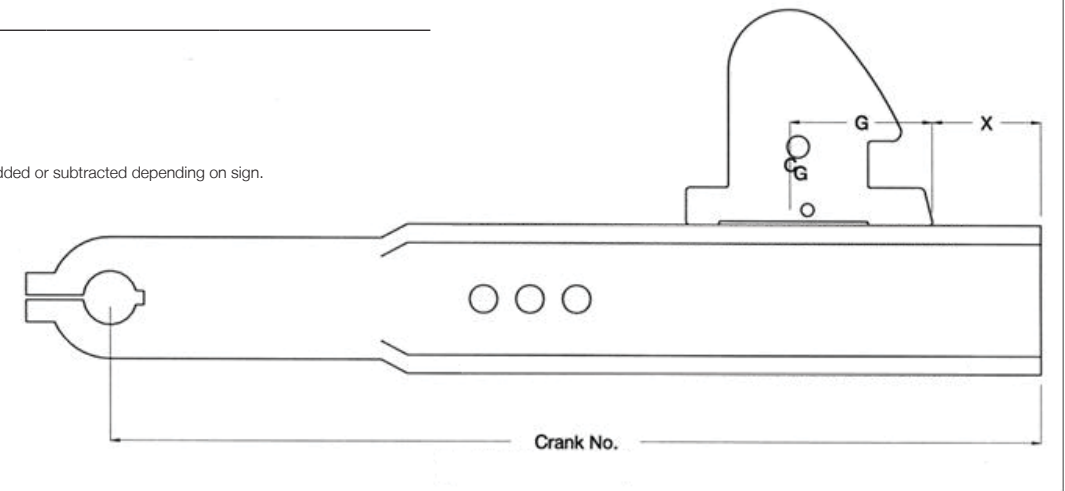
$$B = (ECB - SU)$$

$$C = (B \times TF)$$

$$D = \frac{(C - CBTC)}{W}$$

$$X = A - D$$

Maximizer and Maximizer II Counter Weights	Weight (lb)	G (in.)
A	250	10.625
B	400	10.625
D	550	11.813
F	715	14.000
H	870	15.750
J	1060	16.750
L	1225	18.000
N	1560	20.500
P	1720	21.000
R	2050	
S	2545	20.938
X	3470	24.750
PJ	1531	11.831
RJ	1890	13.451
XJ	3182	18.795
YJ	4755	23.273
ZJ	6336	26.125
1ZJ	7590	29.842



Useful Formulas

Strokes Per Minute (SPM)

Example:

d	= 12	pitch diameter of prime mover sheave
D	= 36	pitch diameter of gear reducer sheave
RPM	= 1170	revolutions per minute of prime mover
Ratio	= 30.03	ratio for 320 reducer

$$SPM = \left(\frac{RPM}{ratio}\right) \times \left(\frac{d}{D}\right) = \left(\frac{1170}{30.03}\right) \times \left(\frac{12}{36}\right) = 13$$

(rounded from 12.987)

Prime Mover Sheave Diameter (d)

Example:

SPM	= 13	strokes per minute
D	= 36	pitch diameter of gear reducer sheave
RPM	= 1170	revolutions per minute of prime mover
Ratio	= 30.03	ratio for 320 reducer

$$d = \left(\frac{SPM \times ratio \times D}{RPM}\right) = \left(\frac{13 \times 30.03 \times 36}{1170}\right) = 12$$

(rounded from 12.012)

Belt Velocity (v)

Example:

d	= 12	pitch diameter of prime mover sheave
π	= 3.142	
RPM	= 1170	revolutions per minute of prime mover

$$v = \frac{(\pi \times d \times RPM)}{12} = \frac{3.142 \times 12 \times 1170}{12} = 3676 \frac{ft}{min} \text{ or } FPM$$

Note: Limit between 2,000 and 5,000 ft/min (FPM).

Belt velocity less than 2,000 FPM results in poor belt life.
Belt velocity greater than 5,000 FPM requires dynamically balanced sheaves.

Belt Length

Example:

d	= 14.5 in.	pitch diameter of prime mover sheave
D	= 47 in.	pitch diameter of gear reducer sheave
CD	= 65.43 in.	distance from center of high speed pinion to center of prime mover shaft extension

$$BL = 2 \times CD + [1.57(D + d)] = 2 \times 65.43 + [1.57(47 + 14.5)] = 227.42"$$

Use C225 belts based on sheaves selected.

Horsepower of Prime Mover

Example:

BPD	= 217	barrels per day at 100% pump efficiency
Depth	= 5600 ft	pump setting
		Assume high-slip (NEMA D) motor

For high-slip electric motors and slow-speed engines

$$HP = \frac{BPD \times Depth}{56000} = \frac{217 \times 5600}{56000} = 21.7$$

For normal-slip electric motors and multi-cylinder engines
(use 25 HP motor)

$$HP = \frac{BPD \times Depth}{45000}$$

Strokes Per Minute Using a Jackshaft

Example:

RPM	= 1170	revolutions per minute of prime mover
R	= 30.03	ratio for 320 gear reducer
D	= 36 in.	pitch diameter of gear reducer sheave
d	= 12 in.	pitch diameter of prime mover sheave
J1	= 8 in.	jackshaft sheave diameter driving gear reducer sheave
J2	= 24 in.	jackshaft sheave diameter driving gear reducer sheave

$$PM = \frac{RPM}{R} + \left[\frac{D}{J_1} \times \frac{J_2}{d}\right] = \frac{1170}{30.03} + \left[\frac{36}{8} \times \frac{24}{12}\right] = 4.3$$

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