

Maximizer II® Pumping Units



Maximizer II
Pumping Units

Introduction

The Maximizer II unit looks deceptively like a conventional pumping unit, but the similarity ends there. This unit is an API Class I, enhanced-geometry pumping unit with rear-mounted geometry and phased counterbalance. The engineering and manufacturing experience used to produce it results in a versatile, energy-efficient pumping unit that maximizes production and minimizes cost.

The Maximizer II 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.



Maximizer II Pumping Units

Features, Advantages, and Benefits

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

Tangible benefits over 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 over push-up special geometry

- Extended distance from the wellhead enables easier and safer well servicing.
- Smaller torque factors provide higher mechanical efficiency.
- 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.
- Useful permissible load range increases when both types are loaded with counterbalance to achieve maximum structure loading.
- Increased uniform loading of prime mover results in lower energy costs.
- Requires eight to ten 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 ideal 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 1824.

Maximizer II Pumping Units

Gear Reducer

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 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.

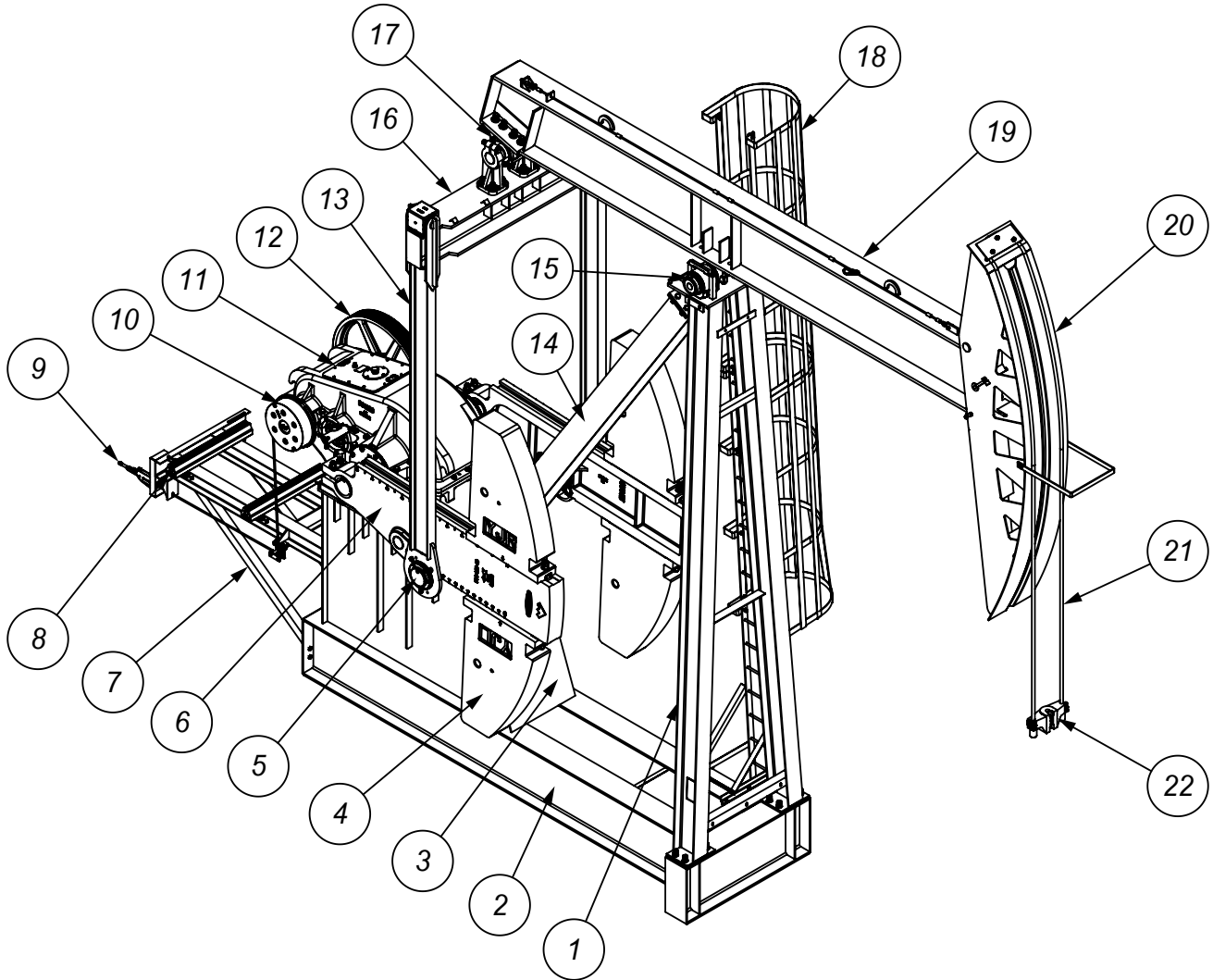
Structural Bearings

- 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.



Maximizer II Pumping Units

Parts Identification

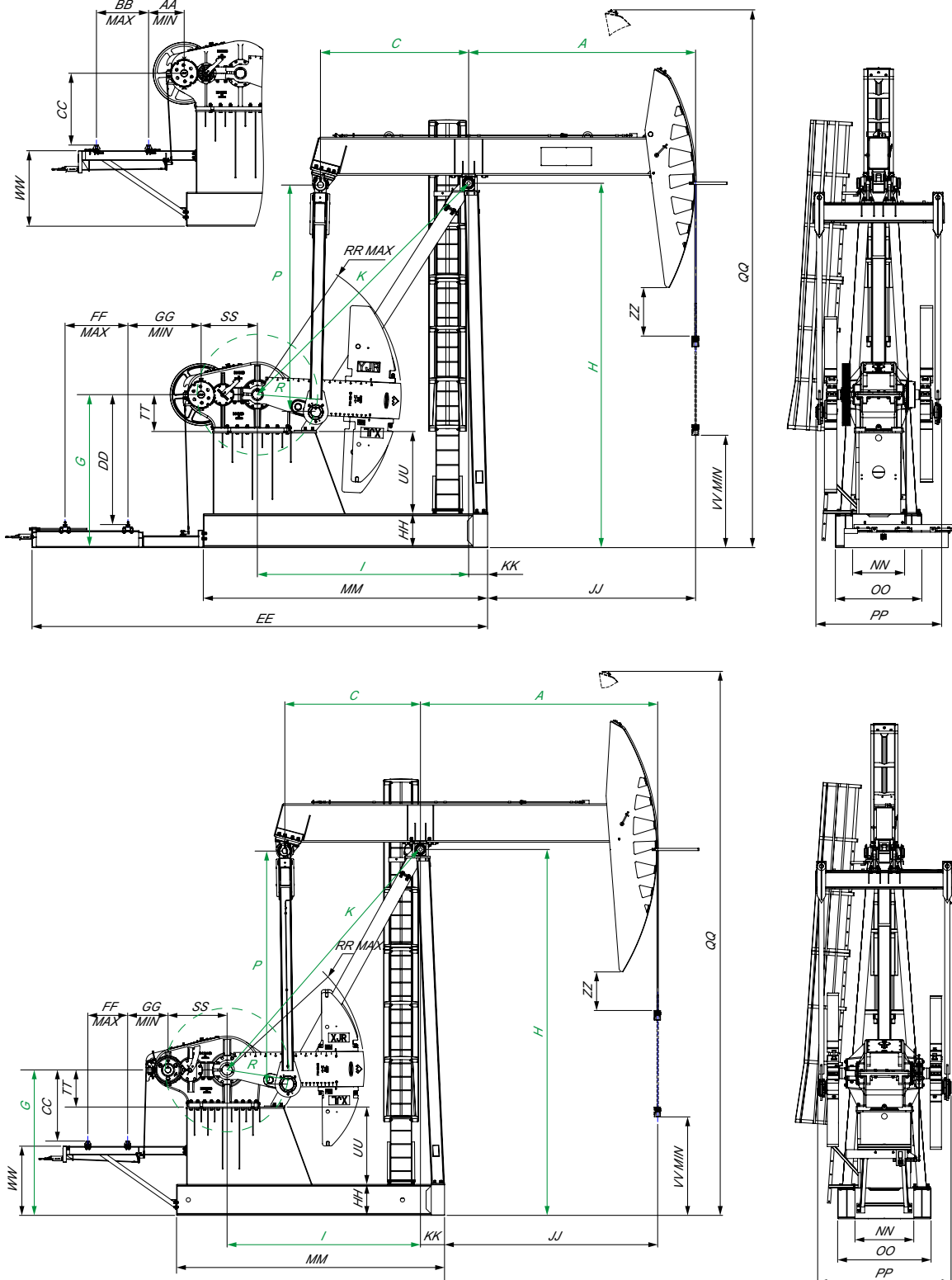


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1 Sampson post A-leg	9 Brake lever	16 Equalizer beam
2 Main frame	10 Brake assembly	17 Equalizer bearing assembly
3 Reducer sub-base	11 Gear reducer	18 Sampson post ladder
4 Counterweights	12 Reducer sheave	19 Walking beam
5 Crank pin assembly	13 Pitman 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		

Maximizer II Pumping Units

Pumping Units



Maximizer II Pumping Units

3C and 4C 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	79.31	49.94	58.63
	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	79.56	49.94	34.25
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	77.88	61.38	64.25
	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	77.88	61.38	63.75
	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	77.88	61.38	64.25
	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	78.13	61.38	39.63
	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	78.13	61.38	39.50
	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	78.13	61.38	39.50
	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	78.13	61.38	39.63
	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	67.19	61.38	29.38
	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	67.06	61.38	41.50

5C Dimensional Data with API Dimensions

Size	API Dimensional Data (in.)								Dimensional Data (in.)																
	A	C	G	H	I	K	P	R	CC	FF MAX	GG MIN	HH	JJ	KK	MM	NN	OO	PP	QQ	RR MAX	SS	TT	UU	VV MIN	WW
1280-427-216	211.00	120.63	129.31	325.31	172.00	260.77	207.38	55.63	63.63	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	66.63	61.50
1280-427-192	187.38	120.63	129.31	301.31	172.00	243.25	185.75	54.69	63.63	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	40.63	61.50

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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 x 420	16.00
320-256-144	25,600	144, 121, 100	66, 56, 47	1.25 x 420	16.00
456-305-144	30,500	144, 119, 96	65, 55, 45	1.25 x 480	16.00
456-305-168	30,500	168, 139, 112	76, 65, 53	1.25 x 480	16.00
640-365-144	36,500	144, 119, 96	65, 55, 45	1.25 x 480	16.00
640-365-168	36,500	168, 139, 112	76, 65, 53	1.25 x 480	16.00
912-427-144	42,700	144, 119, 96	65, 55, 45	1.25 x 480	16.00
912-365-168	36,500	168, 139, 112	76, 65, 53	1.25 x 480	16.00
912-427-168	42,700	168, 139, 112	76, 65, 53	1.25 x 480	16.00
912-365-192	36,500	192, 159, 128	87, 74, 60	1.25 x 504	16.00
913-427-192	42,700	192, 159, 128	87, 74, 60	1.25 x 528	16.00
1280-427-192	42,700	192, 157, 126	86, 72, 59	1.25 x 564	16.00
1280-427-216	42,700	216, 179, 145	98, 83, 68	1.25 x 564	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	28720
			10300	13620	14800	16000	17080	18460	19580	21740	22850	25580	34190
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	27810

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	4-YJ
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	
456-305-168	30	P14-117-49	6470		9270	10040	10730	11610	12330	13740	14280	15960	21580	28020
			7650		10970	11870	12690	13730	14590	16250	16890	18880	25530	33140
			9330		13390	14500	15500	16770	17820	19850	20630	23060	31180	40490

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	4-YJ	4-ZJ
640-365-144	1096	P14-117-49	8710	11990	12880	13690	14710	15560	17200		17830	19790	26340	33850	
			10090	13970	15020	15980	17190	18190	20130		20880	23200	30950	39840	
			12060	16800	18080	19260	20740	21960	24330		25240	28080	37550	48410	
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	40450
			9340			14500	15500	16770	17820	19850	20630	23070	31180	40490	49420

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	4-1ZJ
912-427-144	1010	P9-117-49	8110	12400	13240	14300	15170	16860	17500	19520	26290	34050	41510	
			9410	14490	15480	16730	17760	19770	20520	22920	30920	40110	48930	
			11280	17480	18700	20220	21480	23930	24850	27780	37560	48780	59570	
912-365-168	66	P9-117-49	6150	9830	10550	11460	12200	13650	14200	15930	21740	28390	34780	
			7270	11620	12470	13540	14430	16150	16790	18840	25710	33580	41150	
			8870	14190	15230	16540	17610	19720	20500	23010	31400	41020	50260	
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	45090
			9190		15360	16630	17680	19710	20490	22920	31040	40350	49280	55120
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	38740
			7310		12710	13820	14740	16520	17200	19330	26440	34590	42410	47530
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	47170

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
1280-427-192	-358	P15-122-54	8750	12070	12720	13540	14210	16000	17560	22830	28870	34700	38550
			10420	14350	15120	16090	16890	19010	20860	27090	34240	41140	45700
			12820	17620	18560	19750	20730	23320	25570	33200	41930	50370	55950
1280-427-216	-1267	P13-122-55	6370	9300	9870	10600	11190	12770	14150	18800	24120	29270	32670
			7740	11200	11870	12720	13430	15290	16910	22390	28660	34730	38740
			9690	13890	14710	15750	16600	18860	20830	27490	35120	42500	47370

*At the polished rod at maximum stroke, in pounds



Maximizer II Pumping Units

Gear Reducers

Technical Data

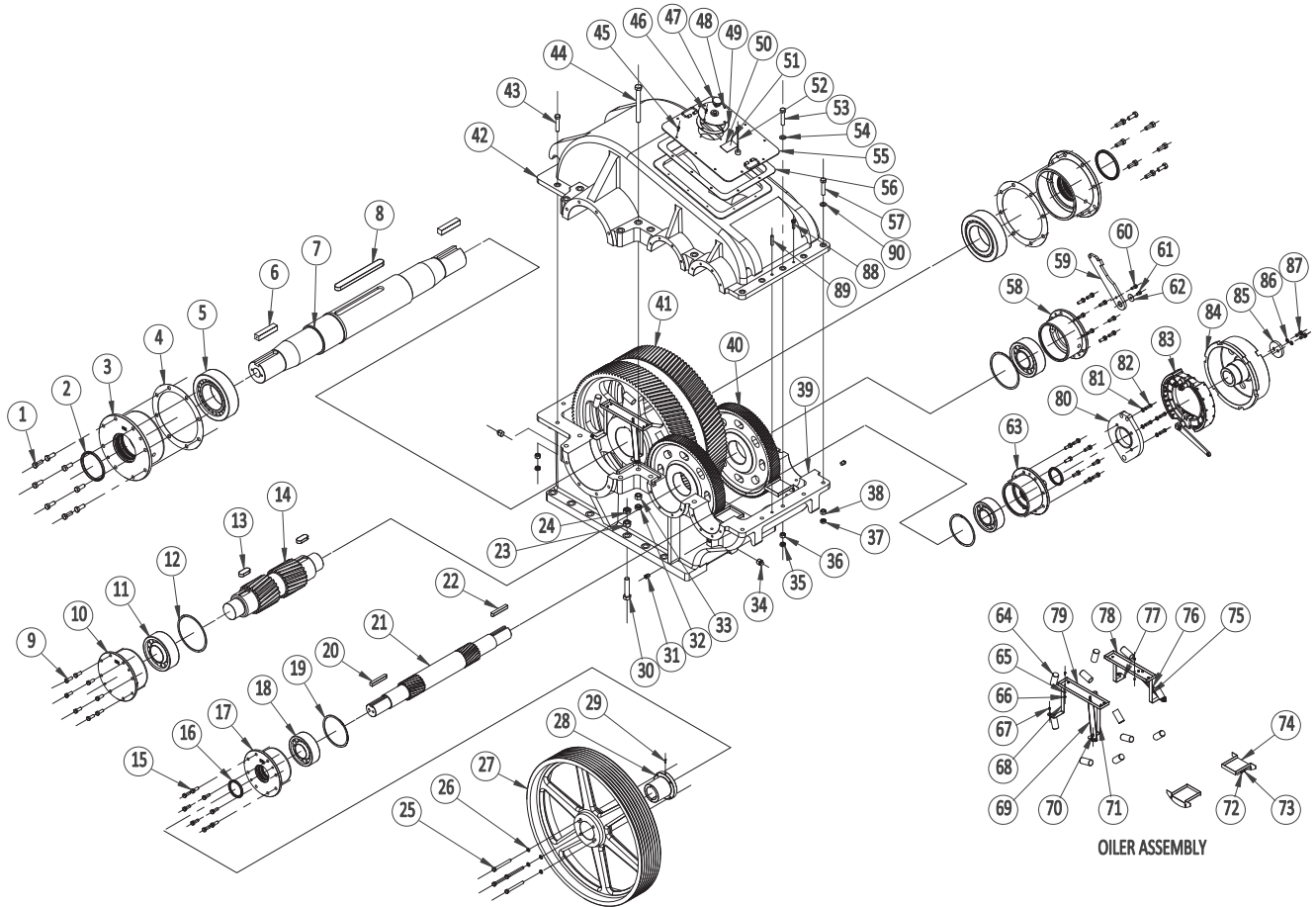
Model Size	Torque Rating (in.-lb)	Gear Ratio	Crank Shaft Diameter Maximizer II (in.)	Sheave Bore Diameter (in.)	Sheave Size Belt Section/Pitch Diameter (in.)	Oil Capacity	
						(gal)	(l)
1280	1,280,000	28.05:1	9.25	5.00	10C/50	141	641
912	912,000	31.49:1	8.63	4.25	8C/50	121	550
640	640,000	31.49:1	8.63	4.25	6C/50	111	505
456	456,000	28.396:1	7.75	3.62	5C/50	80	364
320	320,000	30.72:1	7.75	3.50	4C/44	48	218



Maximizer II Pumping Units

Parts Identification

Maximizer II Gear Reducers (for illustration purposes only)





Maximizer II Pumping Units

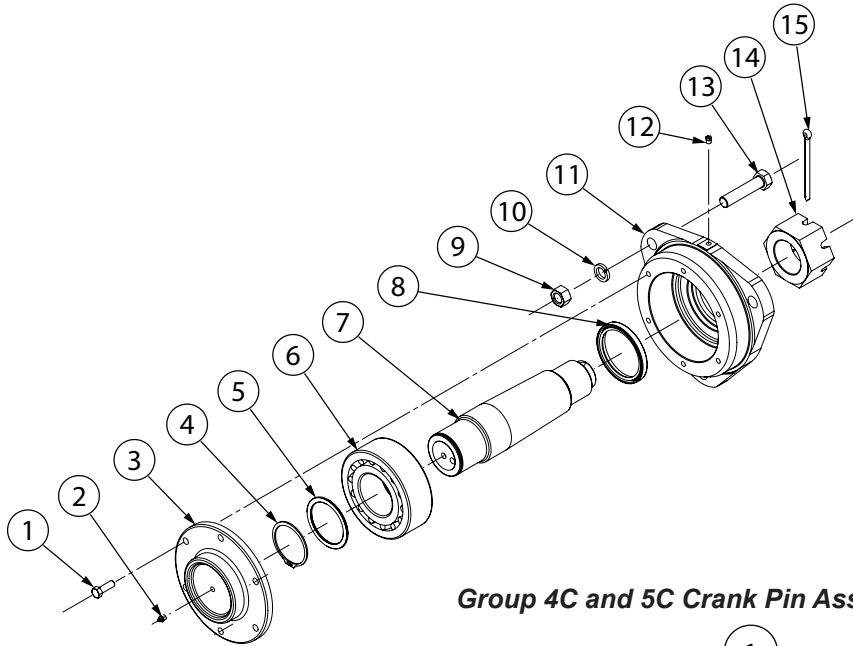
1	Hex bolt	31	Square head plug	61	Hex bolt
2	Seal	32	Jam hex nut	62	Plate
3	Low-speed bearing housing	33	Hex nut	63	High-speed housing (RH)
4	Shim	34	Square head plug	64	Oil cup
5	Bearing	35	Jam hex nut	65	Flat washer
6	Crank arm key	36	Hex nut	66	Hex nut
7	Low-speed shaft	37	Jam hex nut	67	Hex bolt
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	

Maximizer II Pumping Units

Components

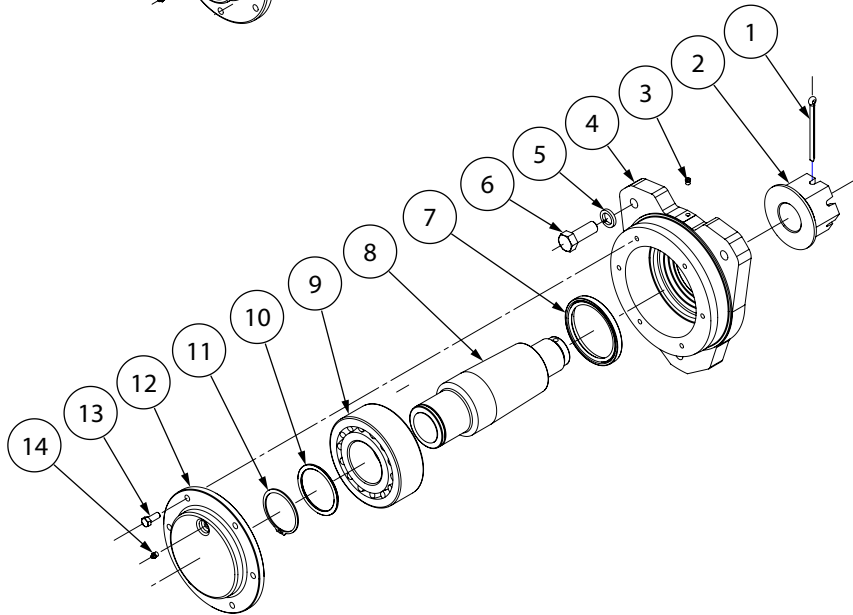
Crank Pin Assembly

Group 3C 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

Group 4C and 5C Crank Pin Assembly



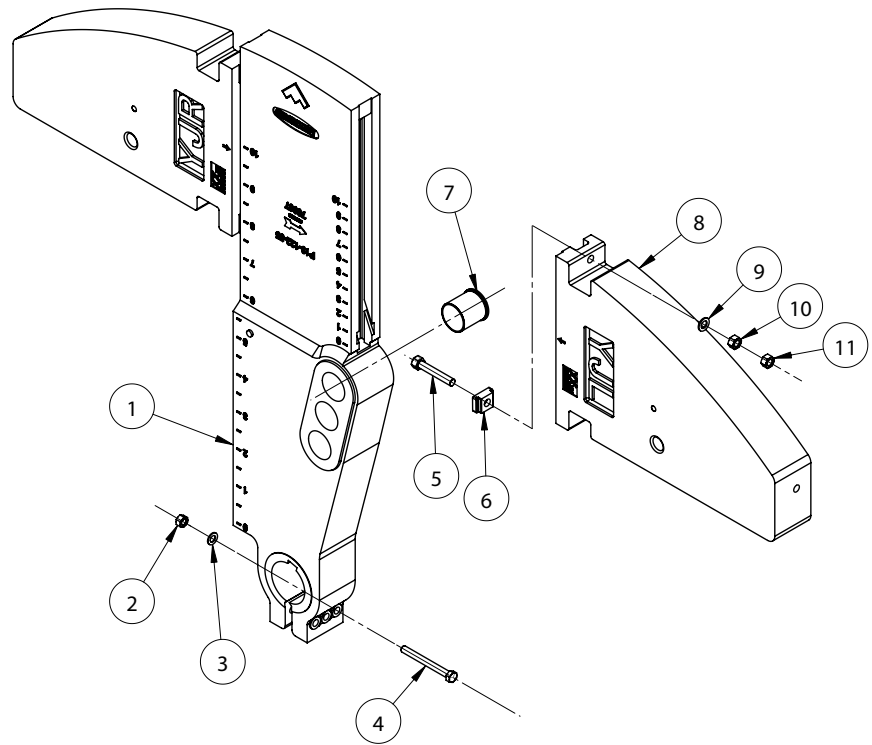
1	Cotter pin
2	Crank pin nut
3	Relief fitting
4	Crank pin housing
5	Lock washer
6	Hex bolt
7	Oil seal
8	Crank pin
9	Bearing
10	Support washer
11	Retaining ring
12	Crank pin cover
13	Hex bolt
14	Grease fitting



Maximizer II Pumping Units

Crank and Counterbalance

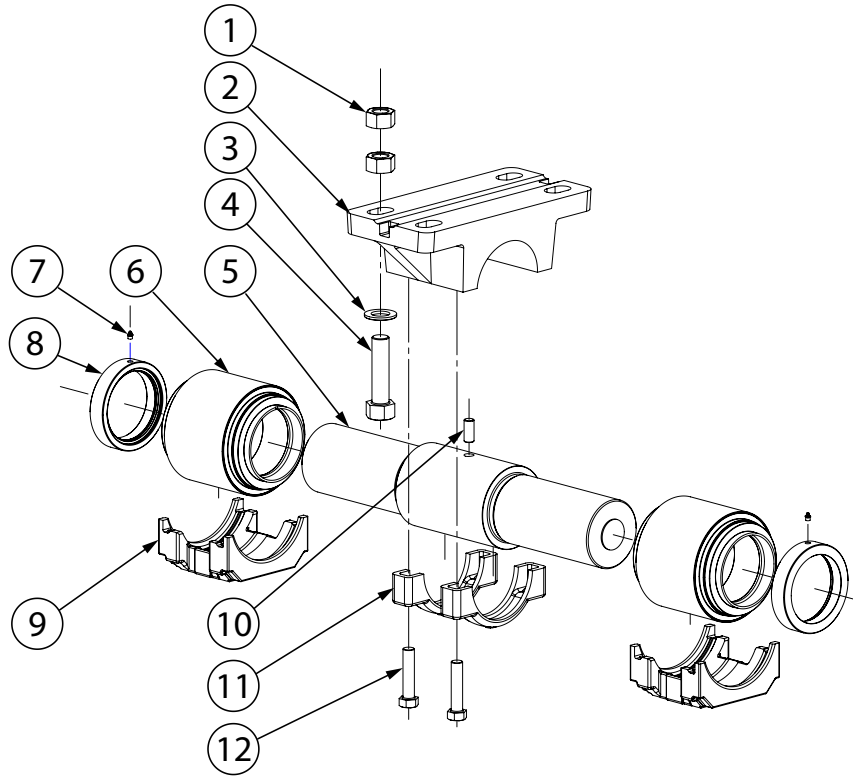
1	Crank
2	Hex nut
3	Flat washer
4	Hex bolt
5	Hex bolt
6	Tee slot adapter cast
7	Precision tapered insert (PTI)
8	Counterweight
9	Flat washer
10	Hex nut
11	Hex nut



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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 |

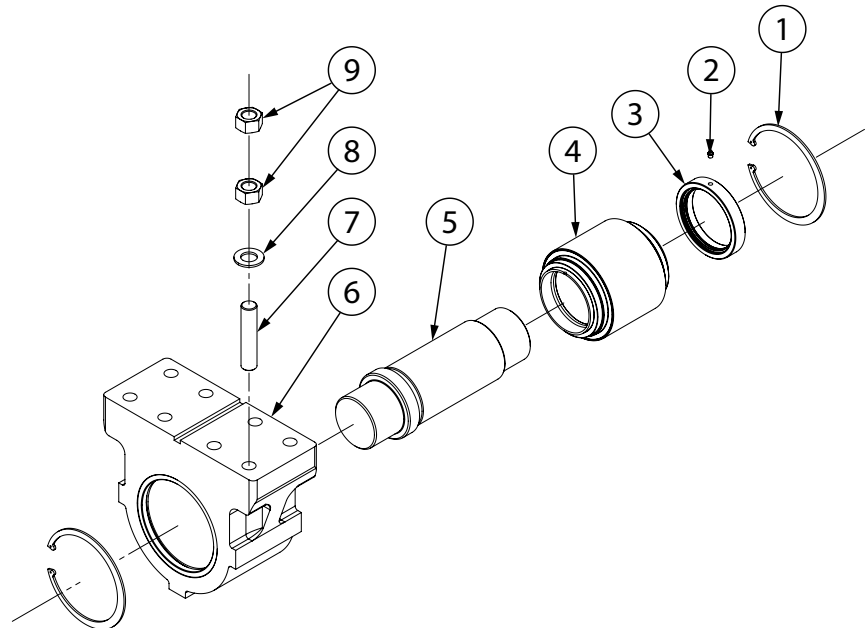


Maximizer II Pumping Units

Equalizer Bearing Assembly

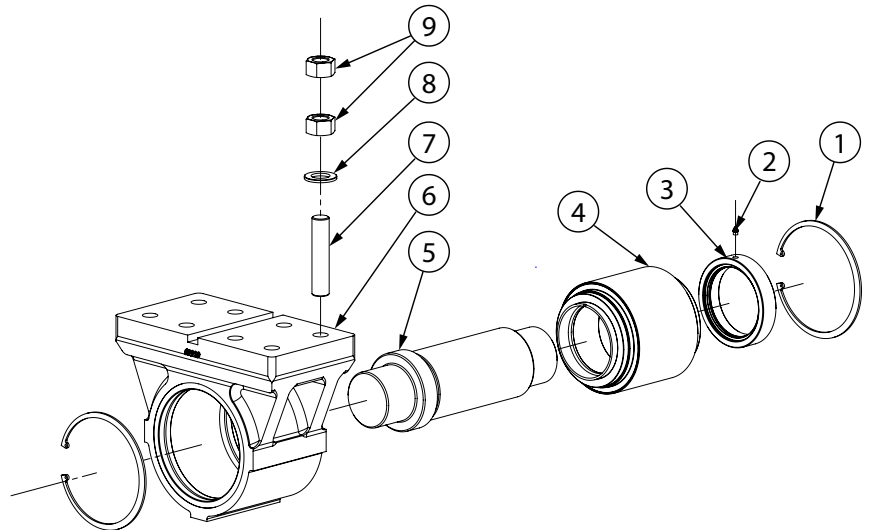
Group 3C Equalizer Bearing

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



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