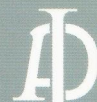


Tim Snelson's Pumping Unit Service

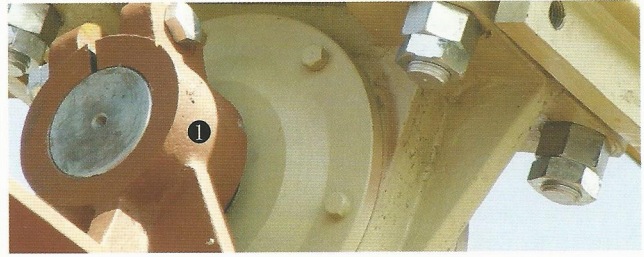


PERMIAN
PUMPING UNITS

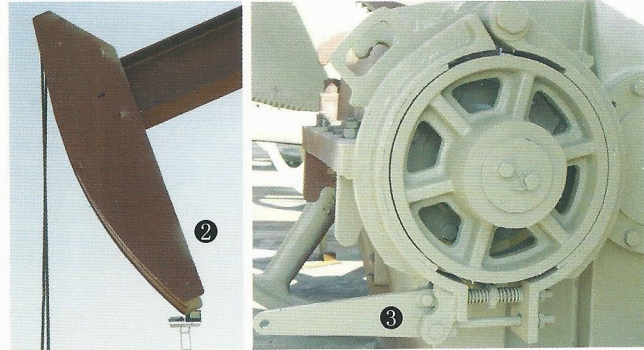


① EQUALIZER BEAM BEARING ASSEMBLY:

Unmatched in the industry for strength and durability, the assembly features machined ductile iron casting, oversized double row, self aligning roller bearing, metal to metal seals and large lubrication reservoirs. Permian's design ensures constant equalization of loads to the pitman arms and crank pins which is proven to be easy maintenance and extremely reliable.

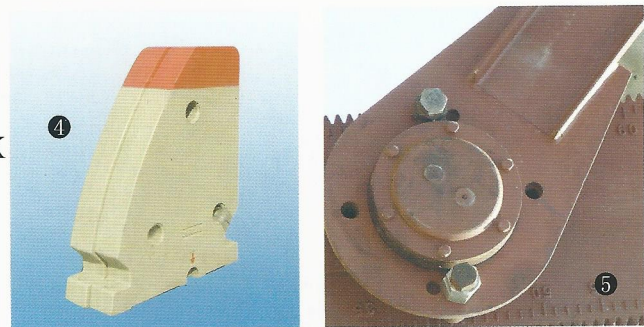


② HORSEHEAD: Fitted with robust steel casting to provide full bridle support, the horsehead is easily attached and removed for well servicing.

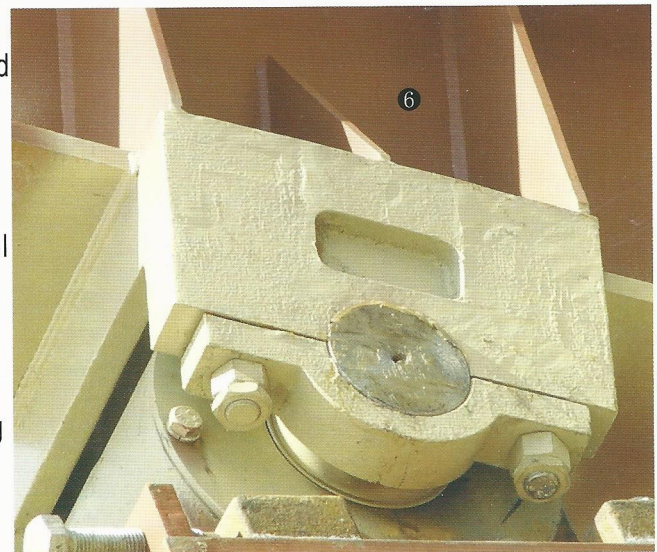


③ BRAKE: Equipped with a positive-stop locking pawl, the Permian brake ensures totally safe lockouts during inclement weather and regular maintenance.

④ COUNTERBALANCE WEIGHTS AND CRANK ARMS: Massive crank arms utilize integral T-Slots and graduate markings for fast and easy installation and positioning of counterweights. The cast rack and pinion locks the weights in place.



⑤ CRANK PINS: Pins assemblies feature oversized self-aligning double roller bearings mounted in machined ductile iron housings. Hardened, ground tapers of extended length on the high-tensile steel wrist pins create additional surface contact. Cast steel knockoff pin nuts are standard on all units.



⑥ CENTER BEAM BEARING ASSEMBLY: Constructed of fully machined ductile iron, the casting houses over-sized self aligning roller bearings and a large lubricant reservoir, angular gussets transfer vertical and tensional stresses to the walking beam.

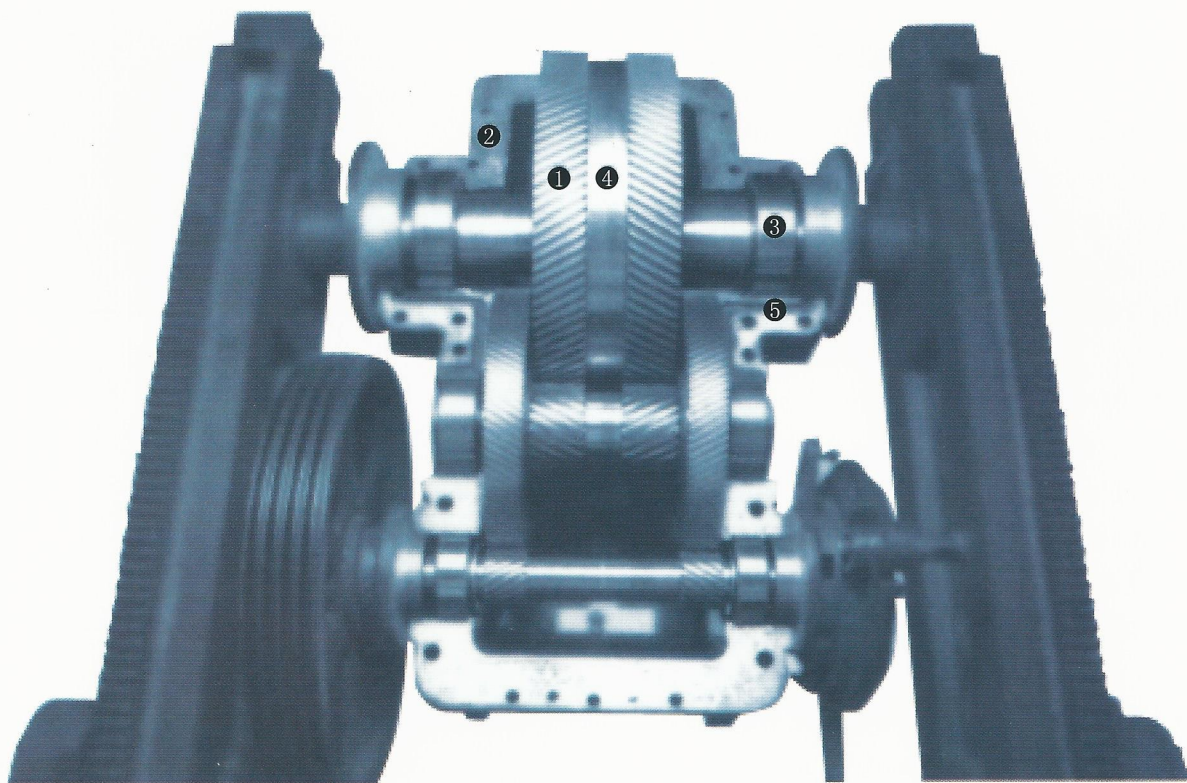


The Permian gear box utilizes a combination of a ductile iron housing, and forged high-tensile cast-steel gearing to produce a gear box that is vastly superior to the common cast and steel combination.

All Permian gear reducers features precision machined high tensile **Double Helical Gears**①. The heat-treated steel gear teeth significantly exceed the API criteria for pitting and bending stresses. Our design allows extra wide gear tooth interfaces for uniform loading and equalized stress during peak torque operations.

A rugged, fully machined **Ductile Iron Case**② houses component gears, with a split centerline for easy disassembly while **Alloy Steel Shafts**③ rotate in oversized precision roller bearings ensuring that there is no bronze bushing to seize and no shaft wear from rotational contact.

In addition, there is no oil pump to fail or maintain. Add to that a generous **Center Relief**④ that ensures positive flow to all gear tooth interfaces and a submerged gear and wiper system which delivers a constant supply of lubricant to the **Oil Galleries**⑤ and you have a hardworking gear box of the highest possible quality and craftsmanship.



		MODEL					
		C114-143-64	C160-173-74	C228-173-74	C160-200-74	C228-200-74	C320-246-74
Basic Parameters	load Rating(lbs)	14,300	17,300	17,300	20,000	20,000	24,600
	Stroke length(in)	64/53/40	74/64/53	74/64/53	74/64/53	74/64/53	74/64/53
	Max stroke frequency(r/min)	12	12	12	12	12	12
	Rated torque(in.lbs)	114,000	160,000	228,000	160,000	228,000	320,000
	Balanced type	Crank balanced					
	Crank direction	Counterclockwise or clockwise					
Gear Reducer	Rated torque(in.lbs)	114,000	160,000	228,000	160,000	228,000	320,000
	Model	114D	160D	228D	160 D	228D	320 D
	Gear type	Divided-flow type herringbone involute gear reducer					
	Gear ratio	29.818	28.506	28.873	28.506	28.873	28.807
	Center range(in)	25.59	33.46	33.46	33.46	33.46	37.40
	Center height(in)	16.93	17.72	17.72	17.72	19.69	23.23
	Oil storage quantity(U.S.gal)	29	37	42.8	37	42.8	75
	Lubricant	ISO VG 150 gear lubricant in winter, ISO VG 200 gear lubricant in summer					
	Big pulley diameter(in)	30	30.4	36.4	30.4	36.4	36.4
	Pulley groove type	3C	3C	4C	3C	4C	5C
Balance Assembly	Weight of counter weight(lbs)	1,212×4	1,047×4	1,047×4	1,212×4	1,212×4	1,212×4
	Weight of crank(lbs)	1,256×2	1,962×2	1,962×2	1,962×2	1,962×2	1,962×2
	Wrist pin bore positions(in)	26.8	32.0	32.0	32.0	32.0	
		21.9	27.0	27.0	27.0	27.0	
		16.9	22.0	22.0	22.0	22.0	22.0
	Stroke length(in)	64	74	74	74	74	
54		64	64	64	64		
40		53	53	53	53	53	
Wire Line	Type	6×19S -24	6×19S -24	6×19S -24	6×19S -24	6×19S -24	6×19S -24
	Length(in)	205	222	222	222	222	222
	Structure Unbalance(lbs)	142	168	168	168	168	168
	Overall Dimensions Length × Width × Height(in)	332×76×186	314×83×222	323×8 5×232	314×83×222	323×8 5×232	323× 92 ×23 5
	Total Weight(lbs)	21,010 Gas -engine base	25,258 Hi -motor base	27,135 Hi -motor base	25,960 Hi -motor base	28,110 Hi -motor base	30,135 Hi -motor base



		MODEL					
		C114-119-86	C160-173-86	C228-213-86	C320-213-86	C228-246-86	C320-246-86
Basic Parameters	load Rating(lbs)	11,900	17,300	21,300	21,300	24,600	24,600
	Stroke length(in)	86/74/62	86/74/62	86/74/62	86/74/62	86/74/62	86/74/62
	Max stroke frequency(r/min)	12	12	12	12	12	12
	Rated torque(in.lbs)	114,000	160,000	228,000	320,000	228,000	320,000
	Balanced type	Crank balanced					
	Crank direction	Counterclockwise or clockwise					
Gear Reducer	Rated torque(in.lbs)	114,000	160,000	228,000	320,000	228,000	320,000
	Model	114D	160D	228D	320 D	228D	320D
	Gear type	Divided-flow type herringbone involute gear reducer					
	Gear ratio	29.818	28.506	28.873	28.807	28.873	28.807
	Center range(in)	25.59	29.53	33.46	37.40	33.46	37.40
	Center height(in)	16.93	17.72	19.69	23.23	19.69	23.23
	Oil storage quantity(U.S.gal)	29	37	42.8	75	42.8	75
	Lubricant	ISO VG 150 gear lubricant in winter, ISO VG 200 gear lubricant in summer					
	Big pulley diameter(in)	30	30.4	36.4	36.4	36.4	36.4
	Pulley groove type	3C	3C	4C	5C	4C	5C
Balance Assembly	Weight of counter weight(lbs)	915 ×4	1,047×4	1,212×4	1,212×4	2205 ×4	2205 ×4
	Weight of crank(lbs)	1,256×2	2,315 ×2	2,315 ×2	2,315 ×2	2,315 ×2	2,315 ×2
	Wrist pin bore positions(in)	37.0	37.0	37.0	37.0	37.0	37.0
		32.0	32.0	32.0	32.0	32.0	32.0
		27.0	27.0	27.0	27.0	27.0	27.0
	Stroke length(in)	86	86	86	86	86	86
74		74	74	74	74	74	
62		62	62	62	62	62	
Wire Line	Type	6×19S -24	6×19S -24	6×19S -24	6×19S -24	6×19S -24	6×19S -24
	Length(in)	268	268	268	268	268	268
	Structure Unbalance(lbs)	188	188	203	203	203	203
	Overall Dimensions Length × Width × Height(in)	356 × 76 × 2 86	356 × 8 3 × 2 86	366 × 8 5 × 2 88	370 × 8 5 × 2 94	366 × 8 5 × 2 88	370 × 92 × 2 94
	Total Weight(lbs)	25,258 Hi-motor base	26,258 Hi-motor base	29,318 Hi-motor base	31,270 Hi-motor base	30,150 Hi-motor base	32,380 Hi-motor base



		MODEL					
		C160-173-100	C228-173-100	C228-213-100	C320-213-100	C320-256-100	C456-256-100
Basic Parameters	load Rating(lbs)	17,300	17,300	21,300	21,300	25,600	25,600
	Stroke length(in)	100 /85 /70	100 /85 /70	100 /85 /70	100 /85 /70	100 /85 /70	100 /85 /70
	Max stroke frequency(r/min)	12	12	12	12	12	12
	Rated torque(in.lbs)	160 ,000	228 ,000	228,000	320 ,000	320 ,000	456 ,000
	Balanced type	Crank balanced					
Crank direction	Counterclockwise or clockwise						
Gear Reducer	Rated torque(in.lbs)	160 ,000	228 ,000	228,000	320 ,000	320 ,000	456 ,000
	Model	160 D	228 D	228D	320 D	320D	456D
	Gear type	Divided-flow type herringbone involute gear reducer					
	Gear ratio	28.506	28.873	28.873	28.807	28.807	28.25
	Center range(in)	29.53	33.46	33.46	37.40	37.40	39.37
	Center height(in)	17.72	19.69	19.69	23.23	23.23	25.59
	Oil storage quantity(U.S.gal)	37	42.8	42.8	75	75	110
	Lubricant	ISO VG 150 gear lubricant in winter, ISO VG 200 gear lubricant in summer					
	Big pulley diameter(in)	30.4	36.4	36.4	36.4	36.4	50.4
Pulley groove type	3C	4C	4C	5C	5C	6C	
Balance Assembly	Weight of counter weight(lbs)	1,047 ×4	1,047×4	1,212 ×4	2,756 ×4	2,756 ×4	2,756 ×4
	Weight of crank(lbs)	4,064 ×2	3,064 ×2	3,064 ×2	3,064 ×2	3,064 ×2	3,064 ×2
	Wrist pin bore positions(in)	41.2	41.2	41.2	41.2	41.2	41.2
		35.8	35.8	35.8	35.8	35.8	35.8
		29.7	29.7	29.7	29.7	29.7	29.7
Stroke length(in)	100	100	100	100	100	100	
	85	85	85	85	85	85	
	70	70	70	70	70	70	
Wire Line	Type	6×19S -28	6×19S -28	6×19S -28	6×19S -28	6×19S -28	6×19S -28
	Length(in)	287	287	287	287	287	287
	Structure Unbalance(lbs)	210	223	223	223	223	223
	Overall Dimensions Length × Width × Heigh(in)	368 ×83 ×254	375 ×85 ×278	375 ×85 ×278	375 ×92 ×288	375 ×92 ×288	375 ×114 ×292
	Total Weight(lbs)	3,8481 Hi -motor base	3,9495 Hi -motor base	4,1430 Hi -motor base	41481 Hi -motor base	4,3240 Hi -motor base	4,8410 Hi -motor base



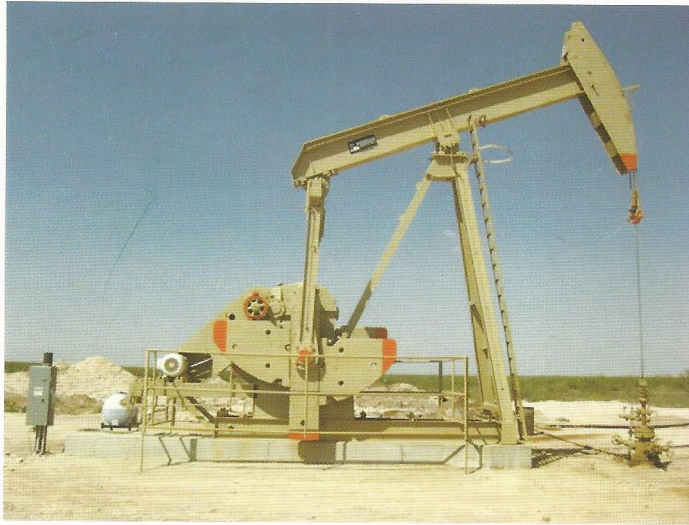
		MODEL					
		C228-213-120	C320-213-120	C456-213-120	C320-256-120	C456-256-120	C456-305-120
Basic Parameters	load Rating(lbs)	21,300	21,300	21,300	25,600	25,600	30,500
	Stroke length(in)	120/102/84	120/102/84	120/102/84	120/102/84	120/102/84	120/102/84
	Max stroke frequency(r/min)	12	12	12	12	12	12
	Rated torque(in.lbs)	228,000	320,000	456,000	320,000	456,000	456,000
	Balanced type	Crank balanced					
	Crank direction	Counterclockwise or clockwise					
Gear Reducer	Rated torque(in.lbs)	228,000	320,000	456,000	320,000	456,000	456,000
	Model	228 D	320 D	456 D	320 D	456D	456D
	Gear type	Divided-flow type herringbone involute gear reducer					
	Gear ratio	28.873	28.807	28.25	28.807	28.25	28.25
	Center range(in)	33.46	37.40	39.37	37.40	39.37	39.37
	Center height(in)	19.69	23.23	25.59	23.23	25.59	25.59
	Oil storage quantity(U.S.gal)	42.8	75	110	75	110	110
	Lubricant	ISO VG 150 gear lubricant in winter, ISO VG 200 gear lubricant in summer					
	Big pulley diameter(in)	36.4	36.4	50.4	36.4	50.4	50.4
	Pulley groove type	4C	5C	6C	5C	6C	6C
Balance Assembly	Weight of counter weight(lbs)	2,756 ×4	2,756 ×4	2,756 ×4	3,385 ×4	3,385 ×4	3,385 ×4
	Weight of crank(lbs)	3,064 ×2	3,064 ×2	3,064 ×2	3,064 ×2	3,064 ×2	3,064 ×2
	Wrist pin bore positions(in)	41.2	41.2	41.2	41.2	41.2	41.2
		35.8	35.8	35.8	35.8	35.8	35.8
		29.7	29.7	29.7	29.7	29.7	29.7
	Stroke length(in)	120	120	120	120	120	120
102		102	102	102	102	102	
84		84	84	84	84	84	
Wire Line	Type	6×19S -28	6×19S -28	6×19S -28	6×19S -28	6×19S -28	6×19S -28
	Length(in)	287	287	287	287	287	287
	Structure Unbalance(lbs)	328	328	328	328	328	328
	Overall Dimensions Length × Width × Height(in)	400 × 87 × 290	400 × 92 × 300	410 × 114 × 310	400 × 92 × 300	410 × 114 × 310	410 × 114 × 310
	Total Weight(lbs)	28,424 Hi-motor base	43,421 Hi-motor base	44,730 Hi-motor base	43,950 Hi-motor base	45,414 Hi-motor base	46,640 Hi-motor base



		MODEL					
		C640-305-120	C640-365-120	C456-365-120	C320-256-144	C456-256-144	C640-256-144
Basic Parameters	load Rating(lbs)	30,5 00	36,5 00	36,5 00	25,6 00	25,600	30,500
	Stroke length(in)	120 /102 /84	120 /102 /84	120 /102 /84	144 /126 /107	144 /126 /107	144 /126 /107
	Max stroke frequency(r/min)	12	12	12	12	12	12
	Rated torque(in.lbs)	640 ,000	640 ,000	456 ,000	320 ,000	456 ,000	640 ,000
	Balanced type	Crank balanced					
	Crank direction	Counterclockwise or clockwise					
Gear Reducer	Rated torque(in.lb s)	640 ,000	640 ,000	456 ,000	320 ,000	456 ,000	640 ,000
	Model	640 D	640 D	456 D	320 D	456D	640 D
	Gear type	Divided-flow type herringbone involute gear reducer					
	Gear ratio	28.36	28.36	28.25	28.807	28.25	28.36
	Center range(in)	41.34	41.34	39.37	37.40	39.37	41.34
	Center height(in)	25.98	25.98	25.59	23.23	25.59	25.98
	Oil storage quantity(U.S.gal)	106	106	110	75	110	106
	Lubricant	ISO VG 150 gear lubricant in winter, ISO VG 200 gear lubricant in summer					
	Big pulley diameter(in)	50.4	50.4	50.4	36.4	50.4	50.4
	Pulley groove type	6C	6C	6C	5C	6C	6C
Balance Assembly	Weight of counter weight(lbs)	3,385 ×4	3,968 ×4	3,968 ×4	3,385 ×4	3,385 ×4	3,385 ×4
	Weight of crank(lbs)	3,064 ×2	3,064 ×2	3,064 ×2	3,254 ×2	3,254 ×2	3,254 ×2
	Wrist pin bore positions(in)	41.2	41.2	41.2	46.9	46.9	46.9
		35.8	35.8	35.8	40.7	40.7	40.7
		29.7	29.7	29.7	36.4	36.4	36.4
	Stroke length(in)	120	120	120	144	144	144
102		102	102	126	126	126	
84		84	84	107	107	107	
Wire Line	Type	6×19S -28	6×19S -28	6×19S -28	6×19S -28	6×19S -28	6×19S -28
	Length(in)	287	287	287	391	391	391
	Structure Unbalance(lbs)	328	328	328	250	250	250
	Overall Dimensions Length × Width × Height(in)	430 ×108 ×300	430 ×108 ×300	410 ×114 ×300	445 ×92 ×340	445 ×114 ×340	445 ×108 ×340
Total Weight(lbs)	47,550	48,620	46,920	38,125	39,625	40,835	
	Hi-motor base	Hi-motor base	Hi-motor base	Hi-motor base	Hi-motor base	Hi-motor base	

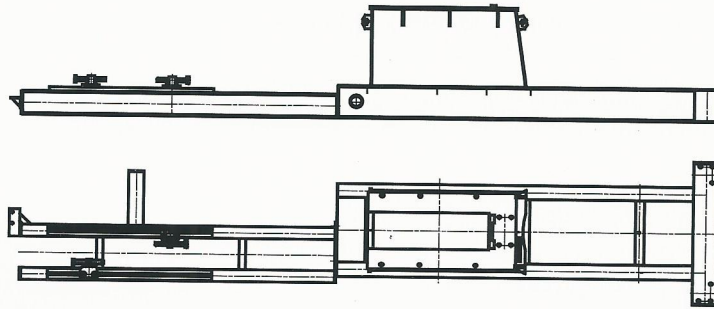


		MODEL					
		C456-305-144	C640-305-144	C640-365-144	C912-365-144	C912-427-144	C456-305-168
Basic Parameters	load Rating(lbs)	30,5 00	36,5 00	36,5 00	36,5 00	42,700	30,500
	Stroke length(in)	144 /126 /107	144 /126 /107	144 /126 /107	144 /126 /107	144 /126 /107	168 /144 /120
	Max stroke frequency(r/min)	12	12	12	12	12	10
	Rated torque(in.lbs)	456 ,000	640 ,000	640 ,000	912 ,000	912 ,000	456 ,000
	Balanced type	Crank balanced					
	Crank direction	Counterclockwise or clockwise					
Gear Reducer	Rated torque(in.lbs)	45 6,000	640 ,000	640 ,000	912 ,000	912 ,000	456 ,000
	Model	456 D	640 D	640 D	912 D	456D	456D
	Gear type	Divided-flow type herringbone involute gear reducer					
	G ear ratio	28.25	28.36	28.36	31.05	31.05	28.25
	Center range(in)	39.37	41.34	41.34	51.18	51.18	39.37
	Center height(in)	25.59	25.98	25.98	31.50	31.50	25.59
	Oil storage quantity(U.S.gal)	110	106	106	127	127	110
	Lubricant	ISO VG 150 gear lub ricant in winter, ISO VG 200 gear lubricant in summer					
	Big pulley diameter(in)	50.4	50.4	50.4	53.1	53.1	50.4
	Pulley groove type	6C	6C	6C	5C	6C	6C
Balance Assembly	Weight of counter weight(lbs)	3,086 ×4	3,086 ×4	3,968 ×4	3,968 ×4	4,960 ×4	3,086 ×4
	Weight of crank(lbs)	3,25 4×2	3,25 4×2	3,25 4×2	3,25 4×2	3,25 4×2	4,321 ×2
	Wrist pin bore positions(in)	46.9	46.9	46.9	46.9	46.9	46.9
		40.7	40.7	40.7	40.7	40.7	40.2
		36.4	36.4	36.4	36.4	36.4	33.5
	Stroke length(in)	120	120	120	144	144	168
102		102	102	126	126	144	
84		84	84	107	107	120	
Wire Line	Type	6×19S -28	6×19S -28	6×19S -28	6×19S -28	6×19S -28	6×19S -32
	Length(in)	391	391	391	391	391	448
	Structure Unbalance(lbs)	250	250	250	250	250	342
	Overall Dimensions Length × Width × Heigh(in)	445 ×114 ×340	445 ×108 ×340	445 ×108 ×340	445 ×114 ×340	445 ×114 ×340	475 ×114 ×353
	Total Weight(lbs)	39,62 5 Hi -motor base	50,835 Hi -motor base	51,870 Hi -motor base	55,630 Hi -motor base	56,760 Hi -motor base	60,600 Hi -motor base

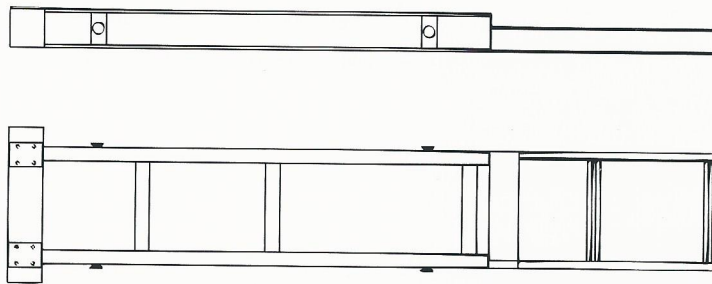


TYPE	POLISHED ROD LOAD (LBS)	STROKE (INS)	REDUCER RATING TORQUE (LB.IN)
RM-912D-427-192	42700	192	912000
RM-912D-365-192	36500	192	912000
RM-912D-305-192	30500	192	912000
RM -640D-305-192	30500	192	640000
RM -912D-427-168	42700	168	912000
RM-912D-365-168	36500	168	912000
RM-640D-365-168	36500	168	640000
RM-912D-305-168	30500	168	912000
RM-640D-305-168	30500	168	640000
RM-456D-305-168	30500	168	456000
RM-912D-427-144	42700	144	912000
RM-640D-427-144	42700	144	640000
RM-912D-365-144	36500	144	912000
RM-640D-365-144	36500	144	640000
RM-456D-365-144	36500	144	456000
RM-912D-305-144	30500	144	912000
RM-640D-305-144	30500	144	640000
RM-456D-305-144	30500	144	456000
RM-640D-256-144	25600	144	640000
RM-456D-256-144	25600	144	456000
RM-320D-256-144	25600	144	320000
RM-456D-365-120	36500	120	456000
RM-640D-305-120	30500	120	640000
RM-456D-305-120	30500	120	456000
RM-320D-305-120	30500	120	320000
RM-640D-256-120	25600	120	640000
RM-456D-256-120	25600	120	456000
RM-320D-256-120	25600	120	320000
RM-320D-213-120	21300	120	320000
RM-228D-213-120	21300	120	228000
RM-320D-305-100	30500	100	320000
RM-320D-256-100	25600	100	320000
RM-228D-256-100	25600	100	228000
RM-228D-213-100	21300	100	228000
RM-228D-173-100	17300	100	228000
RM-320D-246-86	24600	86	320000
RM-228D-246-86	24600	86	228000
RM-228D-213-86	21300	86	228000
RM-228D-200-74	20000	74	228000
RM-228D-173-74	17300	74	228000

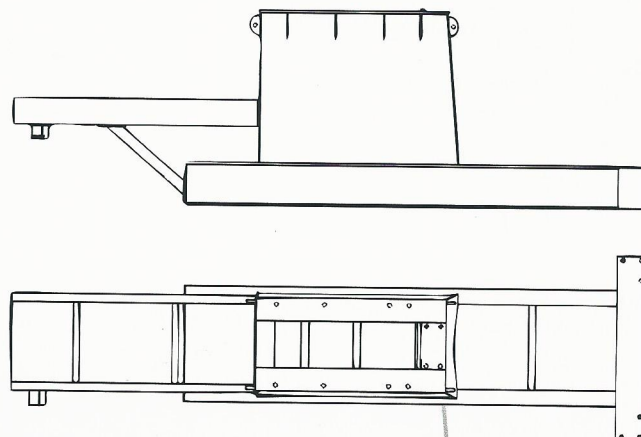
GAS ENGINE BASE UNIT



LOW PRIME UNIT



HIGH PRIME UNIT

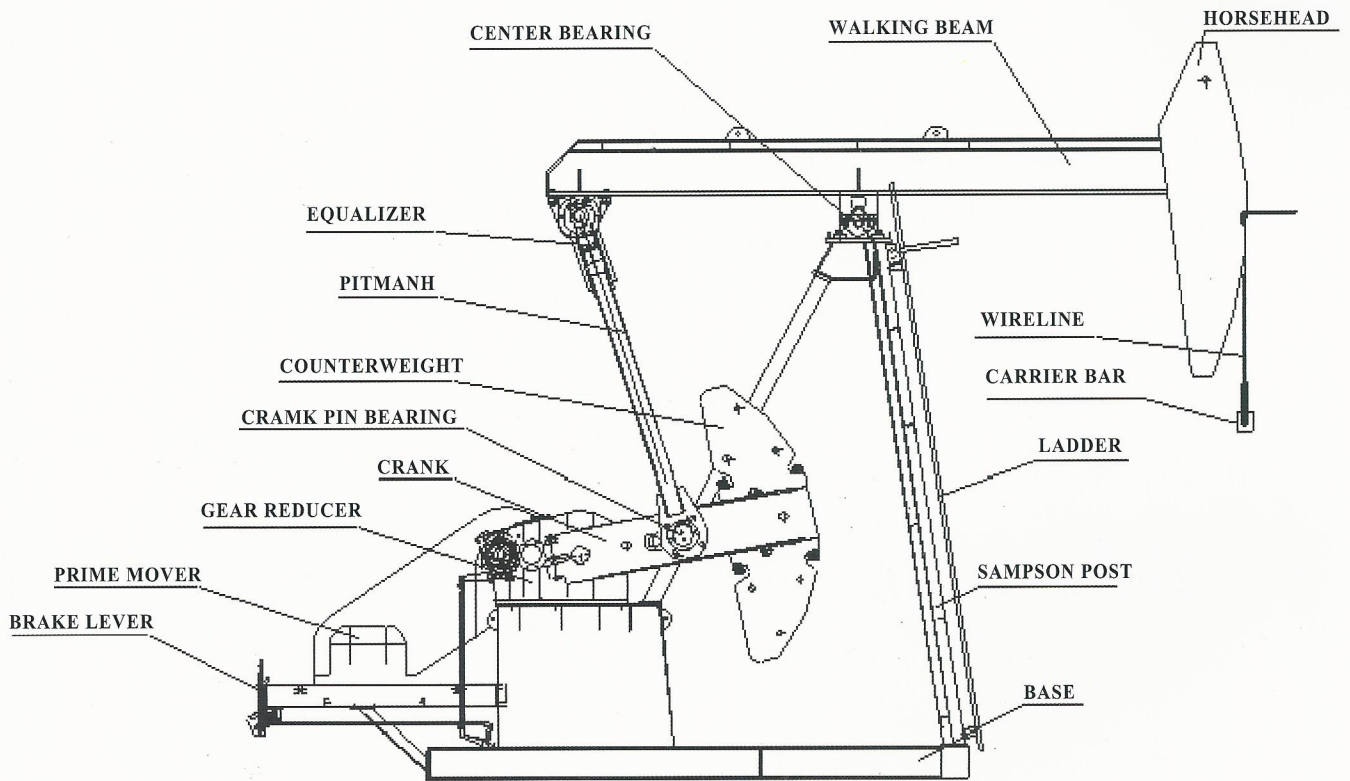


EXAMPLE

C228D-246-84

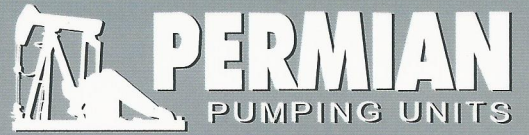
*Type Of Pumping Unit _____
Gear Reducer Peak Torque Rating (Thousands of Inch Lbs.) _____
Double Reduction Gear Reducer _____
Polished Rod/Structure Load Rating (Hundred Lbs.) _____
Maximum Stroke Length(Inches) _____

*Key For Type Of Pumping Unit
A = Air Balanced
B = Beam Balanced
C = Conventional



ARTIFICIAL LIFT APPLICATION FORMULAS

EXAMPLE			
INPUT	1150	RPM of Prime Mover	$SPM = \frac{RPM}{G_R} \times \frac{P_d}{P_D}$
INPUT	30.12	GR Gear Reducer Ratio	
INPUT	12	PD Pitch Diameter of Prime Mover Sheave	
INPUT	47	PD Pitch Diameter of Reducer Sheave	
OUTPUT	10	Strokes Per Minute	
EXAMPLE			
INPUT	9.92	SPM Strokes Per Minute	$d = \frac{SPM \times G_R \times P_D}{RPM}$
INPUT	30.12	GR Gear Reducer Ratio	
INPUT	47	PD Pitch Diameter of Reducer Sheave	
INPUT	1170	RPM of Prime of Reducer Mover	
OUTPUT	12	Prime Mover Sheave Diameter	
<i>use nearest size available depending upon belt selection and number of grooves in sheave</i>			
EXAMPLE			
INPUT	14.5	PD Pitch Diameter of Prime Move Pully	$v = \frac{\pi \times P_D \times RPM}{12}$
INPUT	1170	RPM of Prime Mover	
OUTPUT	4441.43	Feet Per Minute	
		Limit Between 2000 FPM and 5000FPM	
<i>Belt velocity less than 2000 results in poor belt life. Belt velocity more than 5000 fpm requires dynamically balanced sheaves</i>			
EXAMPLE			
INPUT	31	BB Horizontal Distance from Reducer Input shaft to Front Motor Mount	$cd = \sqrt{\left(BB + \frac{CC}{2}\right)^2 + (AA - DD)^2}$
INPUT	33.25	CC Horizontal Distance from Front Motor Mount to Rear Motor Mount	
INPUT	54	AA Vertical Distance from Reducer Input shaft Top of Motor Mount	
INPUT	8	DD Vertical Distance from Top of Motor Mount to Prime Mover Output Shaft	
OUTPUT	66.21	Inchs	
EXAMPLE			
INPUT	66.21	G Center Distance of Prime Mover Shaft to Reducer Input Shaft	$PL = 2G + 1.57(P_B + P_d) + \frac{(P_D - P_d)^2}{4 \times G}$
INPUT	47	PD Pitch Diameter of Gear Reducer Sheave	
INPUT	14.5	PD Pitch Diameter of Prime Mover Sheave	
OUTPUT	232.97	Inchs	
<i>use nearest belt size depending on type of sheaves selected</i>			
EXAMPLE			
INPUT	400	BPD Barrels Per Day @100% Pump Efficiency	$v = \frac{\pi \times P_D \times RPM}{12}$
INPUT	7500	Depth Feet Pump Setting	
OUTPUT	53.6	Use Next Even Horsepower	
EXAMPLE			
INPUT	400	Barrels Per Day @100% Pump Efficiency	$HP = \frac{BPD \times Depth}{56,000}$
INPUT	7500	Depth Feet Pump Setting	
OUTPUT	66.7	Use Next Even Horsepower	
EXAMPLE			
INPUT	100	PD Pitch Diameter of Reducer Sheave	$SPM = \sqrt[7]{\frac{60,000}{L}}$
OUTPUT	17	Strokes Per Minute	



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