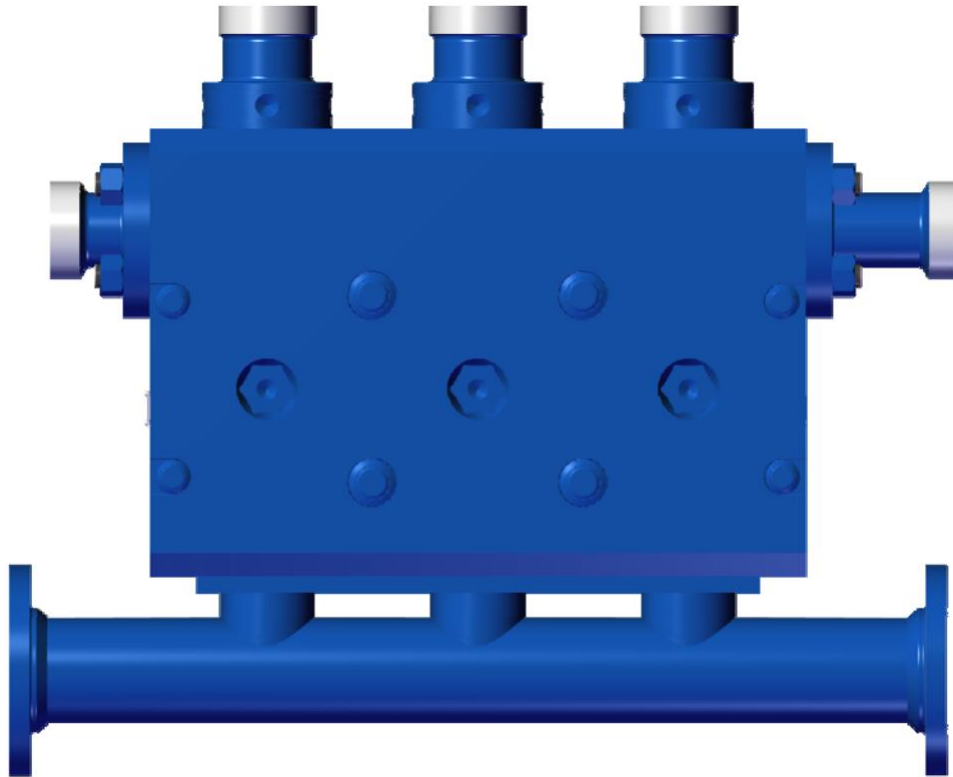


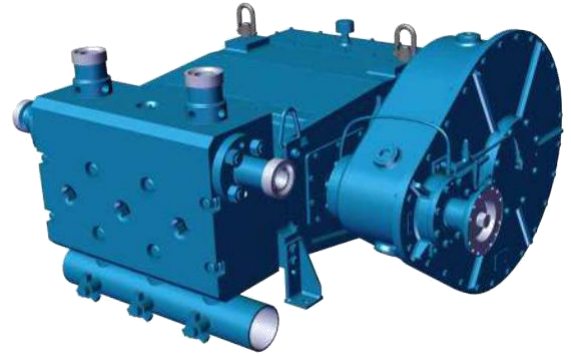
SPM® Well Service Pumps Technical Sheet

TWS600S Fluid End



TWS 600S HD Well Service Pump

The SPM® TWS 600S HD pump is specifically engineered to reduce downtime due to maintenance while improving rod load and high pressure capabilities. The Heavy Duty design is built with quick and practical maintenance in mind, while supplying 6% higher rod load at pressures of 15,000 psi utilizing a 3" plunger and 20,000 psi utilizing a 2.5" plunger. The TWS 600S HD pump is designed to eliminate contamination from pumping media into the power end, extending pump component life. Retrofit kits are available for customers currently operating TWS 600S pumps, helping them make the transition to the TWS 600S HD pump. Customers are able to update their units to the latest technology without the capital investment of a complete new unit.



This pump is available certified by DNV, ABS, CE, and/or ISO.

APPLICATIONS: Cementing, acidizing, gravel packing, snubbing.

Rated Max. Brake HP.....	600 BHP (447 kW)
Maximum Rod Load.....	106,000 lbf (48,094 kg)
Number of Cylinders.....	3
Stroke Length.....	6" (152.4 mm)
Gear Ratio.....	4.61:1
Length.....	50" (1,270 mm)
Width.....	53" (1,346 mm)
Height.....	24" (610 mm)
Weight Dry (Approx.).....	4,600 lb (2,086 kg)

Note: Pump dimensions and weight are approximate. For full, detailed drawings, please contact Weir.

TWS 600S HD PUMP PERFORMANCE CHART^{1,2}

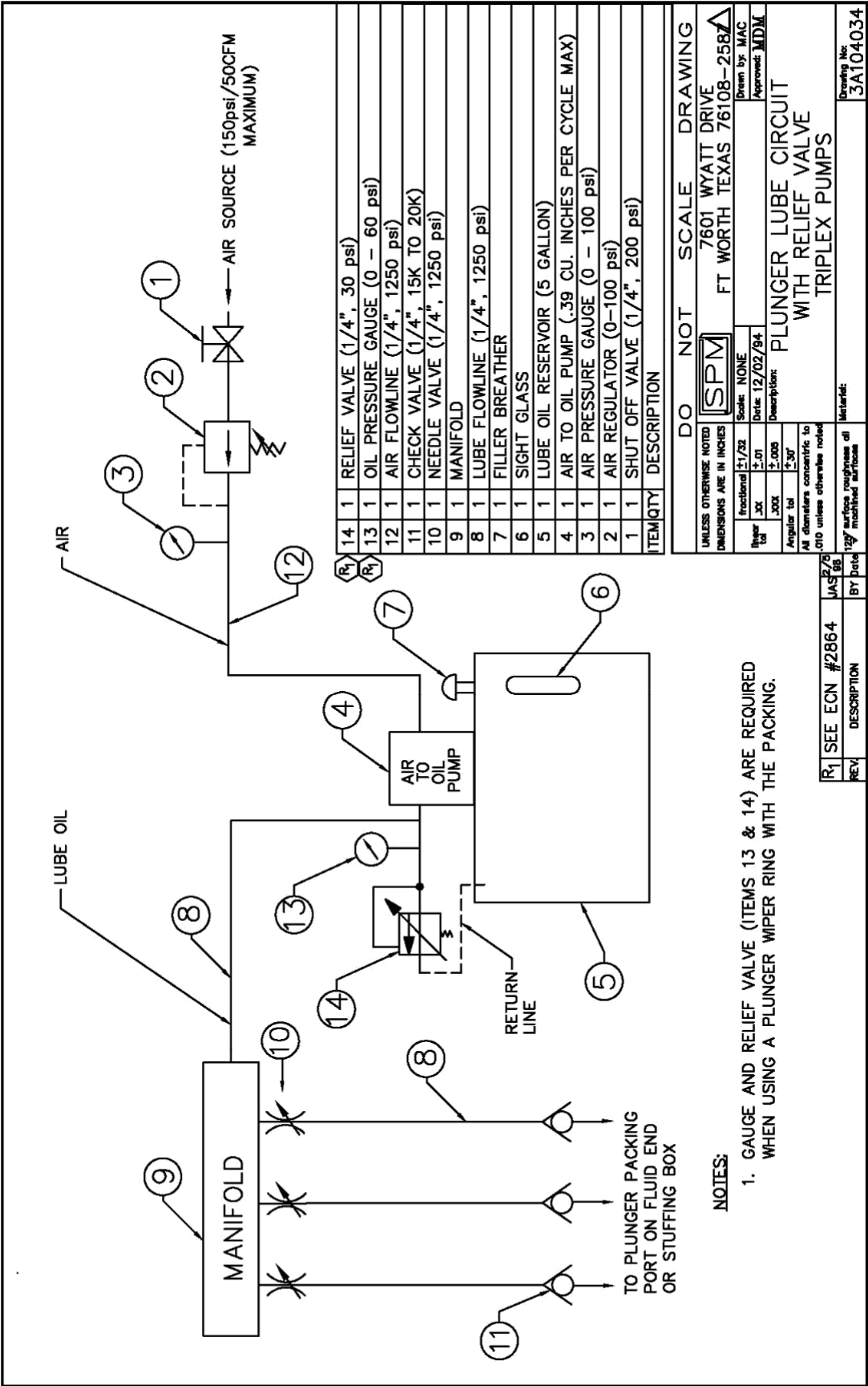
Plunger Diameter in (mm)	Displace. Per Rev gal/rev (liter/rev)	DISPLACEMENT AT PUMP STROKES PER MINUTE/PINION RPM											
		50 gpm (lpm)	231 psi (MPa)	100 gpm (lpm)	461 psi (MPa)	112 gpm (lpm)	516 psi (MPa)	200 gpm (lpm)	922 psi (MPa)	350 gpm (lpm)	1614 psi (MPa)	455 gpm (lpm)	2096 psi (MPa)
2 1/2 (63.5)	0.38 (1.4)	19 (72)	21600 (149)	38 (145)	21600 (149)	43 (162)	21599 (149)	76 (290)	12099 (84)	134 (507)	6914 (48)	174 (658)	5322 (37)
2 3/4 (69.9)	0.46 (1.8)	23 (88)	17851 (123)	46 (175)	17851 (123)	52 (196)	17851 (123)	93 (350)	9999 (69)	162 (613)	5714 (40)	210 (797)	4398 (30)
3 (76.2)	0.55 (2.1)	28 (104)	15000 (104)	55 (208)	15000 (104)	62 (234)	15000 (104)	110 (417)	8402 (58)	193 (730)	4801 (33)	250 (948)	3696 (26)
3 1/2 (88.9)	0.75 (2.8)	37 (142)	11020 (76)	75 (284)	11020 (76)	84 (318)	11020 (76)	150 (568)	6173 (43)	262 (993)	3527 (24)	341 (1290)	2715 (19)
4 (101.6)	0.98 (3.7)	49 (185)	8438 (58)	98 (371)	8438 (58)	110 (415)	8437 (58)	196 (741)	4726 (33)	343 (1297)	2701 (19)	445 (1685)	2079 (14)
4 1/2 (114.3)	1.24 (4.7)	62 (235)	6667 (46)	124 (469)	6667 (46)	139 (526)	6666 (46)	248 (938)	3734 (263)	434 (1642)	2134 (15)	564 (2133)	1642 (11)
INPUT POWER: BHP (kW)		268 (200)		536 (400)		600 (448)		600 (448)		600 (448)		600 (448)	

¹ Based on 90% ME and 100% VE ---- intermittent service only.

² Pumps operating in excess of 15000 psi require special gauge and discharge flanges. Contact a local Weir representative for information.

³ Cells highlighted in blue are intermediate zones where erosion is more prevalent when 3" iron is used (MAX 778GPM).

Plunger Lube Circuit Diagram:



Troubleshooting Guide:

TROUBLE SYMPTOM:	PROBABLE CAUSE:
A.) Abnormally high vacuum at power end lube pump suction inlet (may or may not be accompanied by abnormally low oil pressure).	1. Extremely cold ambient temperature/dangerously high oil viscosity. 2. Clogged lube system suction strainer. 3. Kinked or collapsed lube system suction hose. 4. Clogged oil reservoir breather. 5. Erroneous gauge reading. 6. Closed tank valve.
B.) Abnormally low power end lube oil pressure with normal to low vacuum reading at lube pump suction (may or may not be accompanied by high oil temperature).	1. Leak in lube pump suction piping, which allows air to be drawn into the system. 2. Worn or damaged lube pump. 3. Leak in lube pump pressure piping. 4. Low oil level in reservoir. 5. Clogged oil filter element. 6. Faulty lube system relief valve. 7. Extremely hot lube oil temperature/dangerously low oil viscosity. 8. Erroneous gauge reading.
C.) Abnormally high power end lube oil temperature (may or may not be accompanied by low oil pressure).	1. Extremely warm ambient temperature/dangerously low oil viscosity/incorrect grade of gear oil. 2. Gear oil contaminated with water, trash, or air bubbles. 3. Plunger pump has been operated continuously for too long a period of time at or near its maximum horsepower or torque rating. 4. Heat exchanger or oil cooler malfunction. 5. Erroneous gauge reading. 6. Internal power end damage or power end wear. 7. Thermostatic valve malfunction.
D.) Leaking power end oil seals.	1. Extremely cold ambient temperature/high oil viscosity. 2. Damaged seal surface on mating parts. 3. Clogged oil breather/high crankcase pressure. 4. Worn or damaged seal. 5. Contaminated lube oil. 6. Loose inspection cover bolts, torn inspection cover gaskets, or sealing bonded inspection cover bolt washers.
E.) Leaking lube lines.	1. Loose fittings, damaged hoses, or fittings.
F.) Leaking fluid end seals.	1. Seal installed improperly. 2. Seal cut or pinched on installation. 3. Mating seal surface not cleaned properly prior to seal installation. 4. Damaged or corroded mating seal surface. 5. Sealing part not properly tightened.

TROUBLE SYMPTOM:	PROBABLE CAUSE:
G.) Plunger and/or packing fluid leak.	1. Packing nut not tightened properly. 2. Worn or damaged packing. 3. Packing installed improperly. 4. Mating seal surface not cleaned properly prior to packing installation. 5. Damaged or corroded mating seal surface. 7. Fluid being pumped is incompatible with the style packing being used. 8. Wiper ring damaged or installed improperly.
H.) Fluid knock or hammer.	1. Air entering supercharge system through loose, worn or damaged connections. 2. Air entering supercharge system through leaking charge pump seals. 3. Fluid being pumped contains gas or vapor. 4. Insufficient supercharge flow or pressure. 5. Valve cocked open/broken valve spring or valve stop. 6. Worn or damaged valve, valve insert, or valve seat. 7. Improperly charged or ineffective suction pulsation dampener.
I.) Low discharge pressure/rough running pump.	1. Worn or damaged valve assemblies. 2. Insufficient supercharge flow or pressure. 3. Air, gas, or vapor in fluid being pumped. 4. Improperly charged or ineffective suction pulsation dampener. 5. Two or more plunger pumps being supercharged by a common charge pump and getting "in phase" with each other. 6. Pump has not been primed properly.