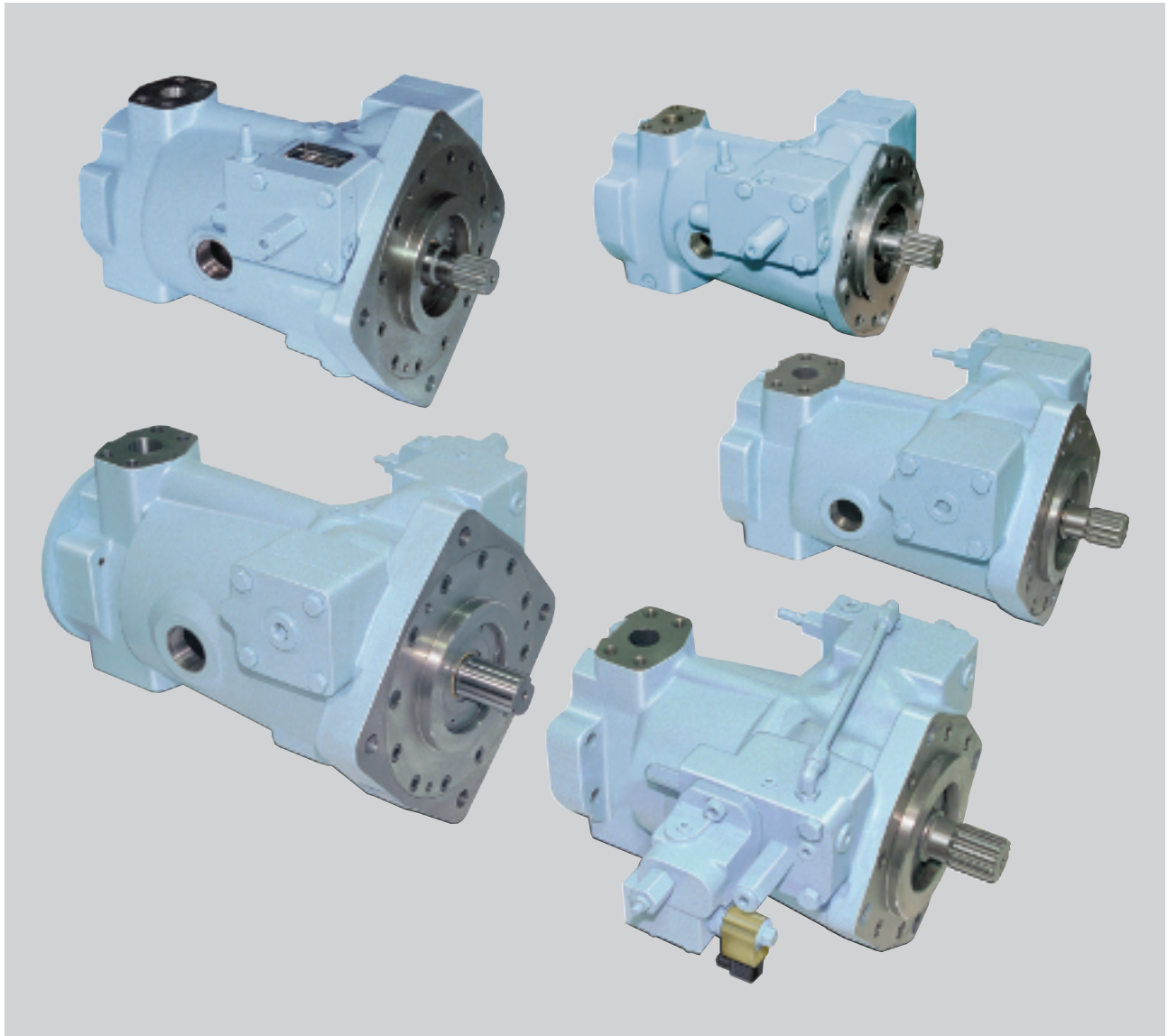


DENISON HYDRAULICS

Premier Series

piston pumps for open circuits

SAE, ISO & DIN

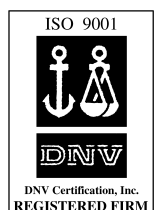


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Revised 12/05



Internet: <http://www.denisonhydraulics.com>



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TECHNICAL DATA

Series		Terms	P05/080	P07/110	P09/140	P12/200	P16/260
Displacement	Max. displacement	in ³ /rev.	4.9	6.7	8.6	12.2	16.0
		cm ³ /rev.	80,3	109,8	140,9	200,0	262,2
Pressure	Continuous	psi	6000	6000	6000	6000	6000
		bar	414	414	414	414	414
	1) Intermittent	psi	7250	7250	7250	7250	7250
		bar	500	500	500	500	500
Speed	@ atmospheric inlet	rpm	2550	2450	2300	2100	1850
	max. with boost	rpm	3200	3000	2800	2700	2500*
Mounting	Flange-4 bolt	SAE	152-4 (D)	152-4 (D)	152-4 (D)	165-4 (E)	165-4 (E)
		ISO3019/2B4HW	180	180	180	224	250
	Shaft - keyed	SAE	44-1 (D)	44-1 (D)	44-1 (D)	44-1 (E)	44-1 (E)
		ISO 3019/2	40mm	40mm	50mm	50mm	50mm
		DIN 6885	40mm	40mm	50mm	50&60mm	60mm
	Shaft - splined	SAE	44-4 (D)	44-4 (D)	44-4 (D)	44-4 (E)	44-4 (E)
		ISO 4156	40mm	40mm	50mm	50mm	50mm
		DIN 5480	40mm	40mm	50mm	50&60mm	60mm
	Shaft - splined (Hi-Torque P16 only)		SAE	N/A	N/A	N/A	50-4 (F)
			lbs	156	177	220	300
Weight			kg.	71	80	100	136
Rotating inertia			lbs/in ²	65	92	152	245
			kg.m ²	0,019	0,027	0,044	0,072
Rotating inertia	(P16/260H)	lbs/in ²	-	-	-	-	349
		kg.m ²	-	-	-	-	0,102
Rotating inertia	(P16/260Q)	lbs/in ²	-	-	-	-	360
		kg.m ²	-	-	-	-	0,105
Case pressure: maximum allowable	continuous	psi	25	25	25	25	25
		bar	1,7	1,7	1,7	1,7	1,7
	intermittent	psi	50	50	50	50	50
		bar	3,4	3,4	3,4	3,4	3,4

Controls

Compensator response (per SAE J497 @ 5000 psi, 345 bar)							
	off-stroke	sec.	0.06	0.07	0.06	0.09	0.10
	on-stroke	sec.	0.11	0.13	0.11	0.15	0.15
Compensator adjustment	psi/turn		2000	2000	2000	2000	2000
	bar/turn		138	138	138	138	138
Minimum compensating pressure	psi		250	250	250	250	250
	bar		17,2	17,2	17,2	17,2	17,2
Minimum servo pressure	psi		800	800	700	700	700
	bar		55	55	48	48	48
Maximum servo pressure	psi		1500	1500	1500	1500	1500
	bar		103	103	103	103	103
Min. comp. override pressure at above listed min. servo.	psi		1500	1500	1050	1050	1050
	(servo, electric & hydraulic stroker)		bar	103	103	72,4	72,4
Handwheel turns, full to zero stroke	turns		9.0	9.3	8.1	9.5	10.2
Torque to turn handwheel at 1000 psi, 70 bar	in.-lbs		75	100	125	140	150
	Nm		9	11	15	16	17
Torque to turn handwheel at 7250 psi, 500 bar	in.-lbs		175	225	275	315	350
	Nm		20	25	32	36	40
Servo shaft rotation, 0 to full stroke	degrees		47-52°	47-52°	52-57°	60-65°	65-70°
Torque to turn rotary servo shaft	in.-lbs		20	20	20	20	20
	Nm		2,3	2,3	2,3	2,3	2,3

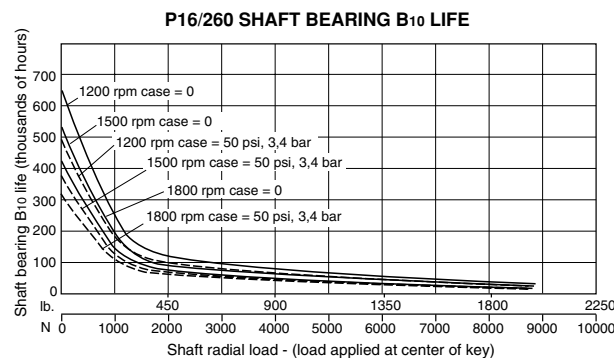
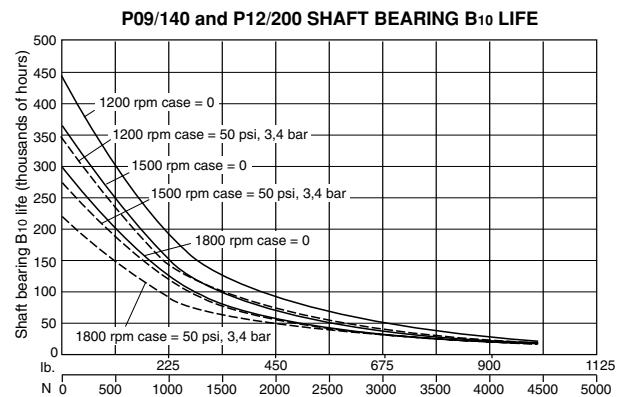
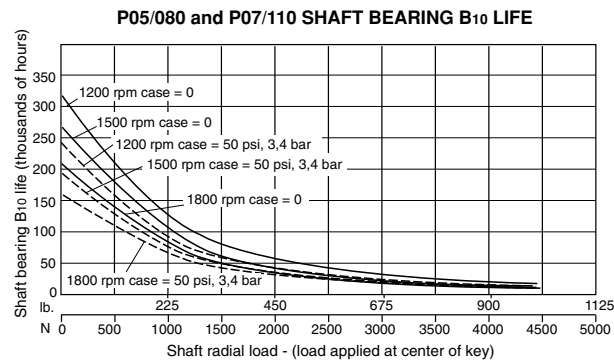
*P16H, P260H only

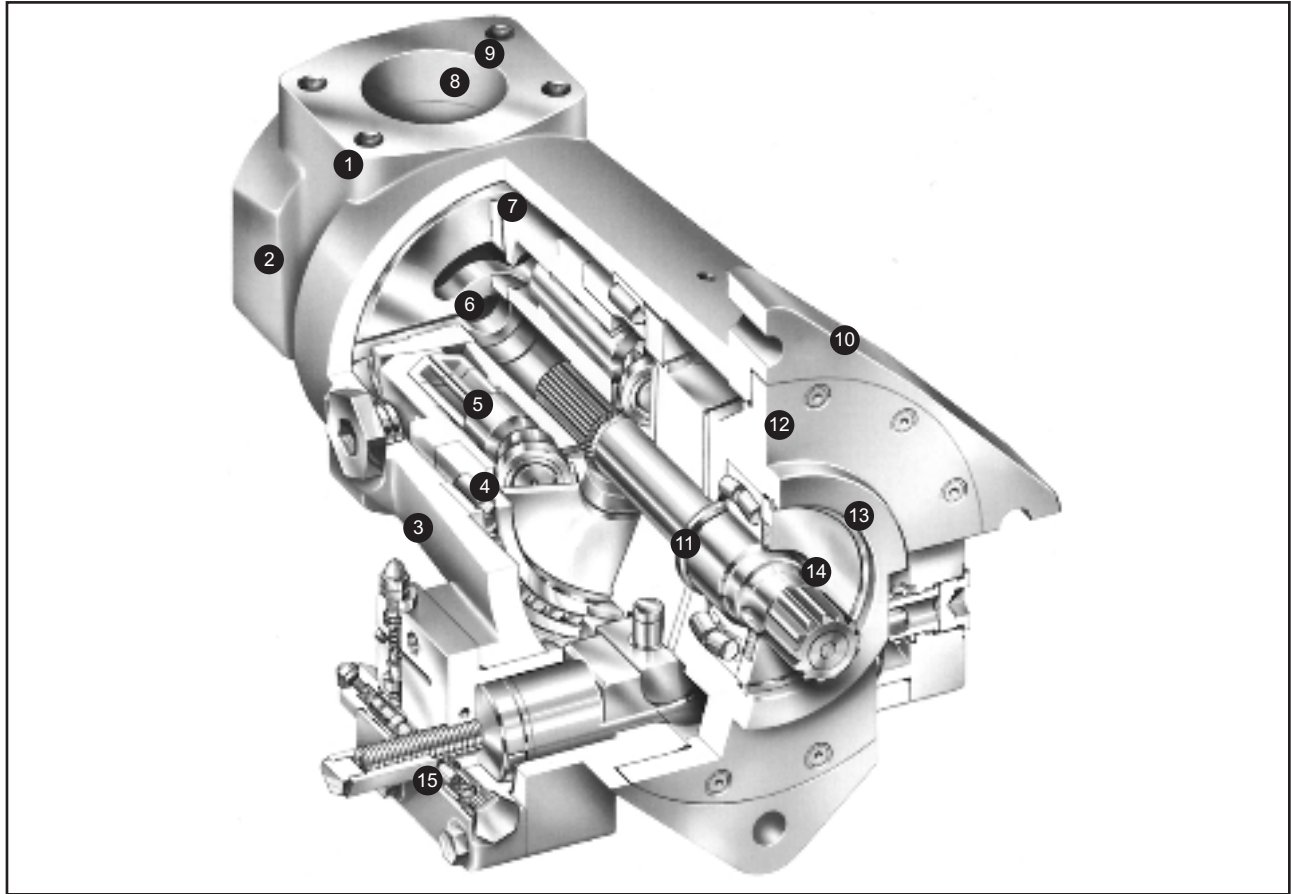
1) 10 % of operation time, not exceeding 6 successive seconds

REAR DRIVE TORQUE CAPACITY

SERIES	FRONT INPUT SHAFT		REAR MOUNTINGS												REAR OUTPUT SHAFT	
	TYPE	TORQUE CAPACITY	SAE					ISO								TORQUE CAPACITY
			A	B	C	D	E	100	125	160	180	200	224	250		
P05	Keyed SAE 44-1(D) Spline SAE 44-4(D)	11300 in-lbs. (1278 Nm)	•	•	•	•		•	•	•	•				5650 in-lbs. (639 Nm)	
P080	Keyed ISO 40mm Keyed DIN 40mm Spline ISO 40mm Spline DIN 40mm	1292 Nm (11435 in-lbs.)	•	•	•	•		•	•	•	•				646 Nm (5718 in-lbs.)	
P07	Keyed SAE 44-1(D) Spline SAE 44-4(D)	15924 in-lbs. (1800 Nm)	•	•	•	•		•	•	•	•				7962 in-lbs. (900 Nm)	
P110	Keyed ISO 40mm Spline ISO 40mm Keyed DIN 40mm Spline DIN 40mm	1800 Nm (15924 in-lbs.)	•	•	•	•		•	•	•	•				900 Nm (7962 in-lbs.)	
P09	Keyed SAE 44-1(D) Spline SAE 44-4(D)	19800 in-lbs. (2237 Nm)	•	•	•	•		•	•	•	•				9900 in-lbs. (1118 Nm)	
P140	Keyed ISO 50mm Spline ISO 50mm Keyed DIN 50mm Spline DIN 50mm	2237 Nm (19800 in-lbs.)	•	•	•	•		•	•	•	•				1118 Nm (9900 in-lbs.)	
P12	Keyed SAE 44-1(E) Spline SAE 44-4(E)	2288 Nm (20250 in-lbs) 2825 Nm (25000 in-lbs)	•	•	•	•	•	•	•	•	•	•	•	•	13800 in-lbs. (1559 Nm)	
P200	Keyed ISO 50mm Spline ISO 50mm Keyed DIN 50mm Spline DIN 50mm Keyed DIN 60mm Spline DIN 60mm	2288 Nm (20250 in-lbs) 3163 Nm (27996 in-lbs) 2288 Nm (20250 in-lbs) 3163 Nm (27994 in-lbs) 2288 Nm (20250 in-lbs) 4384 Nm (38800 in-lbs)	•	•	•	•	•	•	•	•	•	•	•	•	1559 Nm (13800 in-lbs.)	
P16	Keyed SAE 44-1(E) Spline SAE 44-4(E) Spline SAE 50-4(F)	20250 in-lbs. (2288 Nm) 25000 in-lbs. (2825 Nm) 38800 in-lbs. (4384 Nm)	•	•	•	•	•	•	•	•	•	•	•	•	13600 in-lbs. (1537 Nm) 13600 in-lbs. (1537 Nm) 19400 in-lbs. (2192 Nm)	
P260	Keyed ISO 50mm Spline ISO 50mm Keyed DIN 60mm Spline DIN 60mm	2288 Nm (20250 in-lbs) 4384 Nm (38800 in-lbs) 2288 Nm (20250 in-lbs) 4384 Nm (38800 in-lbs)	•	•	•	•	•	•	•	•	•	•	•	•	1537 Nm (13600 in-lbs) 2192 Nm (19400 in-lbs) 1537 Nm (13600 in-lbs) 2192 Nm (19400 in-lbs)	

SHAFT BEARING LIFE





- 1 Highest rated pressure** of any comparable pump available in the market place today.
- 2 Full power through drive capability** allows two (2) pumps of the same displacement to be run in tandem at full rated pressure and flow, simultaneously.
- 3 Fast, compensator** response minimizes pressure overshoot. Two stage, pilot operated compensator provides sharp pressure cutoff at compensator setting, typically regulating pressure within 50 psi (3.5 bar). Compensator may easily be remotely controlled or used in load sensing circuits.
- 4 Precision barrel bearing** absorbs radial forces, allowing longer operation at higher pressure and higher speeds.
- 5 Piston design** minimizes trapped oil volume to maximize efficiency.
- 6 Angled barrel ports** reduce the piston circle diameter, which allows oil to enter at reduced velocity. This allows the pump to run faster, with atmospheric inlet pressure.
- 7 Spherical port plate and barrel face** provides support to barrel to offset forces from angled ports.
- 8 Large suction port** reduces inlet flow velocity to allow the pumps to run at higher speeds with atmospheric inlet.
- 9 Standard SAE split flange with inch or metric bolts, depending on pump version (SAE or metric)**
- 10 Conforms to SAE or ISO mounting standards.**
- 11 Damped low inertia rocker cam** allows very quick compensation, resulting in more stable and quieter pump.
- 12 Heavy duty shaft bearing** to absorb side and thrust loads.
- 13 High pressure shaft seal** allows higher case pressure without external leakage. Note: it is always advisable to maintain the lowest possible case pressure.
- 14 Drive shaft options** include keyed or splined in SAE, ISO and DIN.
- 15 Optional controls**
A wide variety of optional controls are available and are designed with simplicity and a maximum of common elements.

GENERAL

The open loop Premier Series pumps are variable displacement piston pumps with emphasis on superior design with few maintenance requirements. Low inlet velocity requirements allow the pumps to run faster than competitive models without the added expense of boosting the inlet. Modified pistons that reduce the amount of trapped fluid volume result in improved efficiency.

The Premier Series pumps have been designed to operate in a wide range of industries where variable flow, high pressure and/or high speeds are required; such as: presses, construction machinery, injection molding, wood, aircraft, drilling, mining, steel and cranes.

MOUNTING

This pump is designed to operate in any position. For vertical mounting with shaft upward, it is recommended that a 5 psi (0,3 bar) check valve be installed in the case drain port and that the air bleed port (DG on page 36) be connected to the reservoir in order to circulate oil past the shaft bearing. The mounting hub and four bolt mounting flange are in full conformance with SAE/ISO standards. The pump shaft must be in alignment with the shaft of the source driver and should be checked with a dial indicator. The mating pilot bore and coupling must be concentric.

INPUT SHAFT INFORMATION

Splined: The shafts must be aligned within a max. 0.006" , 0,15 mm TIR relative to pilot diameter. Angular misalignment at the external and internal spline axis must be less than $\pm .002$ " per inch , .002 mm per mm radius relative to pilot face. The coupling interface must be lubricated. Denison recommends lithium molydisulfide or similar grease. The internal coupling should be hardened to 27-34 Rc. and must conform to SAE J498B (1971) class 1 flat root side fit, ISO 4156 and DIN 5480.

Keyed: High strength heat treated keys must be used. Replacement keys must be hardened to 27-34 Rc. The key corners must be chamfered .030" - .040", 075 - 1 mm at 45° to clear radii that exist in the keyway. If a flexible coupling is not used, the alignment of keyed shafts must be within tolerances given for splined shafts.

CASE PRESSURE/PLUMBING

The case drain line should be as large as the drain port on the pump. The return to the reservoir must be below the surface of the oil and as far from the suction as possible.

The maximum case pressure is 25 psi (1,7 bar) continuous, 50 psi (3,4 bar) intermittent. Case pressure must never exceed inlet pressure by more than 25 psi (1,7 bar).

When connecting the case drain line, make certain that the drain plumbing passes above the highest point of the pump before returning to the reservoir. If not, install a 5 psi, 0,3 bar case pressure check valve to ensure the case is filled with oil at all times.

All fluid lines, whether pipe, tubing, or hose, must be of adequate size and strength to assure proper operation.

Caution: Do not use galvanized pipe. The coating can flake off with continued use.

MAINTENANCE & SERVICE

Make sure the entire hydraulic system is free of dirt, lint, or other foreign material. This pump is self-lubricating and preventative maintenance is limited to keeping system fluid clean. Do not operate at pressures and speeds in excess of the recommended limit.

Denison Service manuals provide customer support in troubleshooting, installation, and assembly/disassembly and reworking of parts. For additional support, your local Denison Hydraulics representative is available.

RECOMMENDED FLUIDS

See DENISON HYDRAULICS bulletin **SPO-AM305** for more information

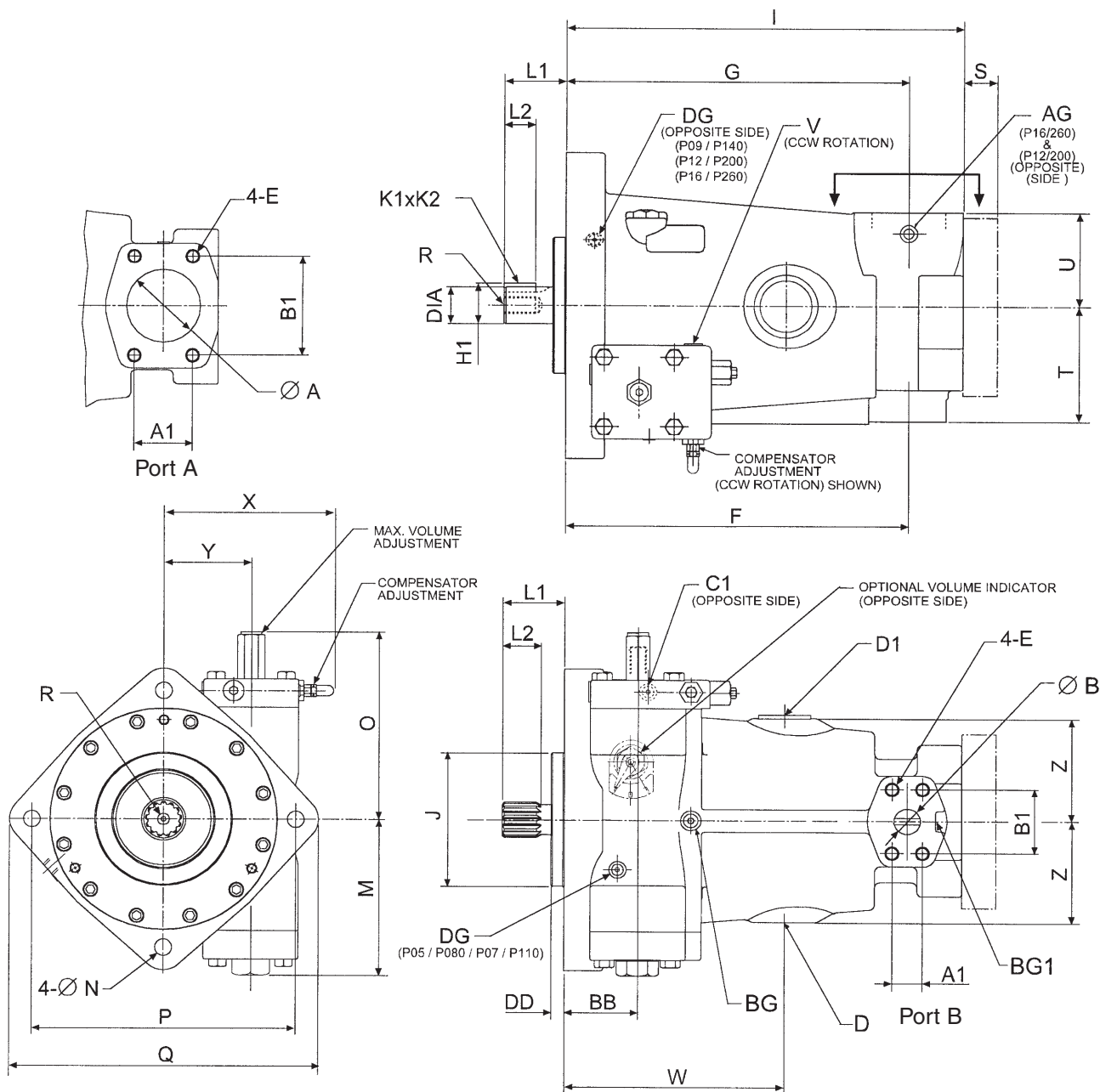
TEMPERATURE

Maximum temperature is limited by the viscosity characteristics of the fluid used. Because high temperatures degrade seals, reduce the service life of the fluid, and create hazards, fluid temperatures should not exceed 180° F, 82° C at the case drain.

FLUID CLEANLINESS

Fluid must be cleaned before adding to the system, and continuously during operation by filters that maintain a cleanliness level of NAS 1638 Class 8. This approximately corresponds to ISO 17/14.

DIMENSIONS



CCW PUMP

Dimensions

	F	G	I-w/o*	I-w**	J	M	N	O	P	Q
P05	11.36	11.60	13.76	13.40	6.000-5.998	6.23	Ø .81	8.18	9.00	10.50
P080	288,5	294,6	349,5	340,4	180,0-179,93	158,2	Ø 18,0	207,8	224,0	266,7
P07	11.89	12.41	14.89	14.71	6.000-5.998	6.26	Ø .81	8.22	9.00	10.50
P110	302,0	315,2	378,2	373,6	180,0-179,93	159,2	Ø 18,0	208,8	224,0	266,7
P09	13.24	13.66	16.09	15.91	6.000-5.998	6.79	Ø .81	8.72	9.00	11.9
P140	336,2	347,0	408,7	404,1	180,0-179,93	172,3	Ø 18,0	221,5	224,0	302,2
P12	14.11	14.79	17.26	17.15	6.500-6.498	6.92	Ø .81	8.85	12.50	14.8
P200	358,4	375,7	438,4	435,6	224,00-223,95	175,8	Ø 22,	224,8	280,0	376,0
P16	16.3	16.3	19.02	18.75	6.500-6.498	7.27	Ø .81	9.11	12.50	14.66
P260	420,1	420,1	489,2	482,3	250,00-249,96	184,8	Ø 25,4	231,3	315,0	372,4

* Without reardrive

** With reardrive

Items in **bold** are SAE version and inches

Items not bold are ISO version and millimeters in *italics*

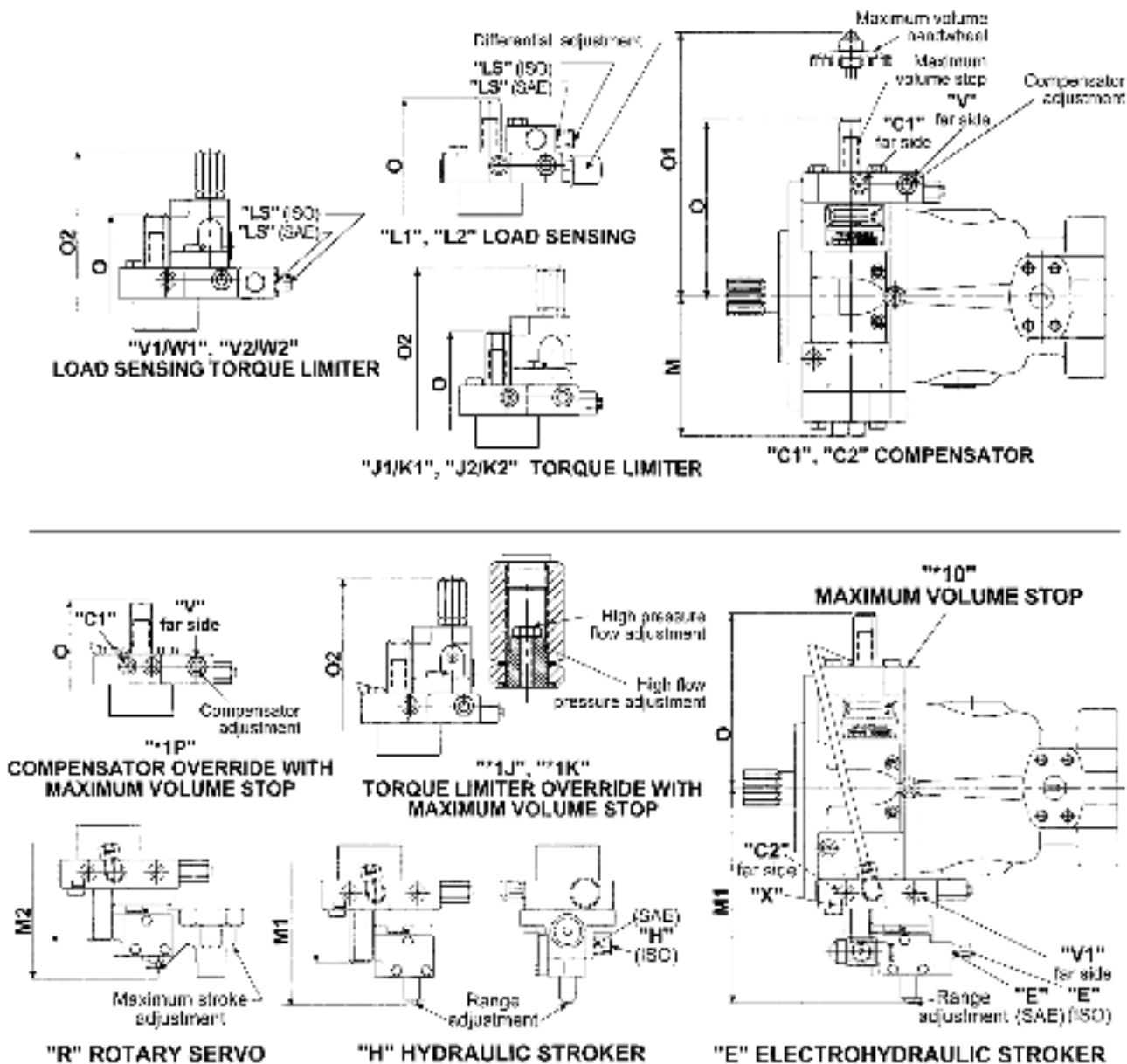
NOTE: For port identification see page 36.

DIMENSIONS

code	Shafts	Pumps	05	080	07	110	09	140	12	200	16	260	L1	L2	DIA	K1 x K2	H1	R
02	Keyed SAE44-1 (D&E)		●		●		●		●		●		2.94	1.50	1.7500-1.7494	7/16	1.943	3/8-16 x.65
	Keyed ISO 3019/2 40mm			●		●							92	63	40,018-40,002	12 x 8	42,9	M12 x 28
	Keyed ISO 3019/2 50mm							●		●		●	92	38	50,018-50,002	14 x 9	53,4	M10 x 16.5
06	Keyed DIN 6885 40mm			●		●							80	63	40,018-40,002	12 x 8	42,9	M12 x 28
	Keyed DIN 6885 50mm							●		●			92	70	50,018-50,002	14 x 9	53,4	M16 x 32
	Keyed DIN 6885 60mm									●		●	113	100	60,000-60,02	18 x 11	64,0	M20 x 42
03	Splined SAE44-4 (D)		●		●		●						2.94	1.62	side fit, 30°, class 1, 8/16p,13 teeth			3/8-16 x.65
	Splined SAE44-4 (E)								●		●		2.94	1.50	side fit, 30°, class 1, 8/16p,13 teeth			3/8-16 x.65
	Splined ISO 4156 40mm			●		●							92	53	side fit, 30°, mod.1,0 - 39 teeth			M10 x 16.5
07	Splined ISO 4156 50mm							●		●		●	92	53	side fit, 30°, mod.2,5 -19 teeth			M10 x 16.5
	Splined DIN 5480 40mm			●		●							55	30	side fit, 30°, mod.2,0 -18 teeth			M12 x 28
	Splined DIN 5480 50mm							●		●			65	40	side fit, 30°, mod.2,0 -24 teeth			M16 x 32
	Splined DIN 5480 60mm									●		●	66	47	side fit, 30°, mod.2,0 - 28 teeth			M20 x 42
05	Splined SAE 50-4 (F)										●		3.44	2.21	side fit, 30°, class 1, 8/16p,15 teeth			3/8-16 x.65
	Hi-Torque																	

Ports		Dimensions				Threads		Ports					
		Ø A/B	A1	B1	T/U	E	V	D/D1	AG	BG	BG1	C1	DG
P05	A	2.50	2.00	3.50	4.37	1/2-13 x 1.19	SAE - 8	SAE - 12	SAE - 4	SAE - 4	SAE - 6	SAE - 4	SAE - 4
	B	1.25	1.25	2.63	4.37	1/2-13 x 1.19							
P080	A	64	50,8	88,9	111,1	M12 x 30,2	3/8 BSPP	3/4 BSPP	1/4 BSPP	1/4 BSPP	1/4 BSPP	1/4 BSPP	3/8 BSPP
	B	32	31,8	66,7	111,1	M14 x 50							
P07	A	3.00	2.44	4.19	4.37	5/8-11 x 1.19	SAE - 8	SAE - 16	SAE - 4	SAE - 6	SAE - 6	SAE - 4	SAE - 4
	B	1.25	1.25	2.63	4.52	1/2-13 x 1.19							
P110	A	76	61,9	106,4	111,1	M16 x 38,1	3/8 BSPP	1 BSPP	1/4 BSPP	1/4 BSPP	1/4 BSPP	1/4 BSPP	1/4 BSPP
	B	32	31,8	66,7	114,9	M14 x 50							
P09	A	3.00	2.44	4.19	4.50	5/8-11 x 1.50	SAE - 8	SAE - 20	SAE - 4	SAE - 4	SAE - 6	SAE - 4	SAE - 4
	B	1.50	1.44	3.13	4.83	5/8-11 x 1.50							
P140	A	76	61,9	106,4	114,3	M16 x 38,1	3/8 BSPP	1-1/2 BSPP	1/4 BSPP	1/4 BSPP	1/4 BSPP	1/4 BSPP	1/8 BSPP
	B	38	36,5	79,37	122,7	M16 x 38,1							
P12	A	3.50	2.76	4.75	4.50	5/8-11 x 1.38	SAE - 8	SAE - 24	SAE - 4	SAE - 6	SAE - 6	SAE - 4	SAE - 4
	B	1.50	1.44	3.13	5,37	5/8-11 x 1.50							
P200	A	89	70,0	120,65	114,3	M16 x 38,1	3/8 BSPP	1-1/2 BSPP	1/4 BSPP	1/4 BSPP	1/4 BSPP	1/4 BSPP	1/4 BSPP
	B	38	36,5	79,37	136,4								
P16	A	3.50	2.76	4.75	4.50	5/8-11 x 1.38	SAE - 8	SAE - 24	SAE - 4	SAE - 6	SAE - 6	SAE - 4	SAE - 4
	B	1.50	1.44	3.13	5.50	5/8-11 x 1.38							
P260	A	89	70,0	120,65	114,3	M16 x 38,1	3/8 BSPP	1-1/2 BSPP	1/4 BSPP	1/4 BSPP	1/4 BSPP	1/4 BSPP	1/4 BSPP
	B	38	36,5	79,37	146,0	M16 x 38,1							

NOTE: For port identification see page 36.



COUNTER-CLOCKWISE ROTATION SHOWN

For clockwise rotation, the top and bottom control caps are interchanged.

	"C1"	"C2"	"E"	"H"	"R"	"V"	"V1"	"X"	M	M1	M2	O	O1	O2
P05	SAE-4	SAE-4	SAE-4	SAE-4	SAE-4	SAE-8	SAE-4	SAE-6	6.23	10.09	9.87	8.16	13.44	11.08
P080	1/4" BSPP	1/4" BSPP	1/4" BSPP	1/4" BSPP	1/4" BSPP	3/8" BSPP	1/4" BSPP	3/8" BSPP	158,2	256,2	250,8	207,3	341,3	281,4
P07	SAE-4	SAE-4	SAE-4	SAE-4	SAE-4	SAE-8	SAE-4	SAE-6	6.26	10.15	9.93	8.22	13.48	11.14
P110	1/4" BSPP	1/4" BSPP	1/4" BSPP	1/4" BSPP	1/4" BSPP	3/8" BSPP	1/4" BSPP	3/8" BSPP	159,2	257,8	252,4	208,8	342,4	282,9
P09	SAE-4	SAE-4	SAE-4	SAE-4	SAE-4	SAE-8	SAE-4	SAE-8	6.79	12.21	10.63	8.72	14.19	11.84
P140	1/4" BSPP	1/4" BSPP	1/4" BSPP	1/4" BSPP	1/4" BSPP	3/8" BSPP	1/4" BSPP	3/8" BSPP	172,3	310,1	270,0	221,5	360,4	300,7
P12	SAE-4	SAE-4	SAE-4	SAE-4	SAE-4	SAE-8	SAE-4	SAE-8	6.92	12.34	10.76	8.85	14.32	11.97
P200	1/4" BSPP	1/4" BSPP	1/4" BSPP	1/4" BSPP	1/4" BSPP	3/8" BSPP	1/4" BSPP	3/8" BSPP	175,8	313,4	273,3	224,8	363,7	304,0
P16	SAE-4	SAE-4	SAE-4	SAE-4	SAE-4	SAE-8	SAE-4	SAE-8	7.29	12.6	11.02	9.11	14.58	12.23
P260	1/4" BSPP	1/4" BSPP	1/4" BSPP	1/4" BSPP	1/4" BSPP	3/8" BSPP	1/4" BSPP	3/8" BSPP	185,2	320	279,9	231,4	370,3	310,6

Items in **bold** are SAE version and inches.

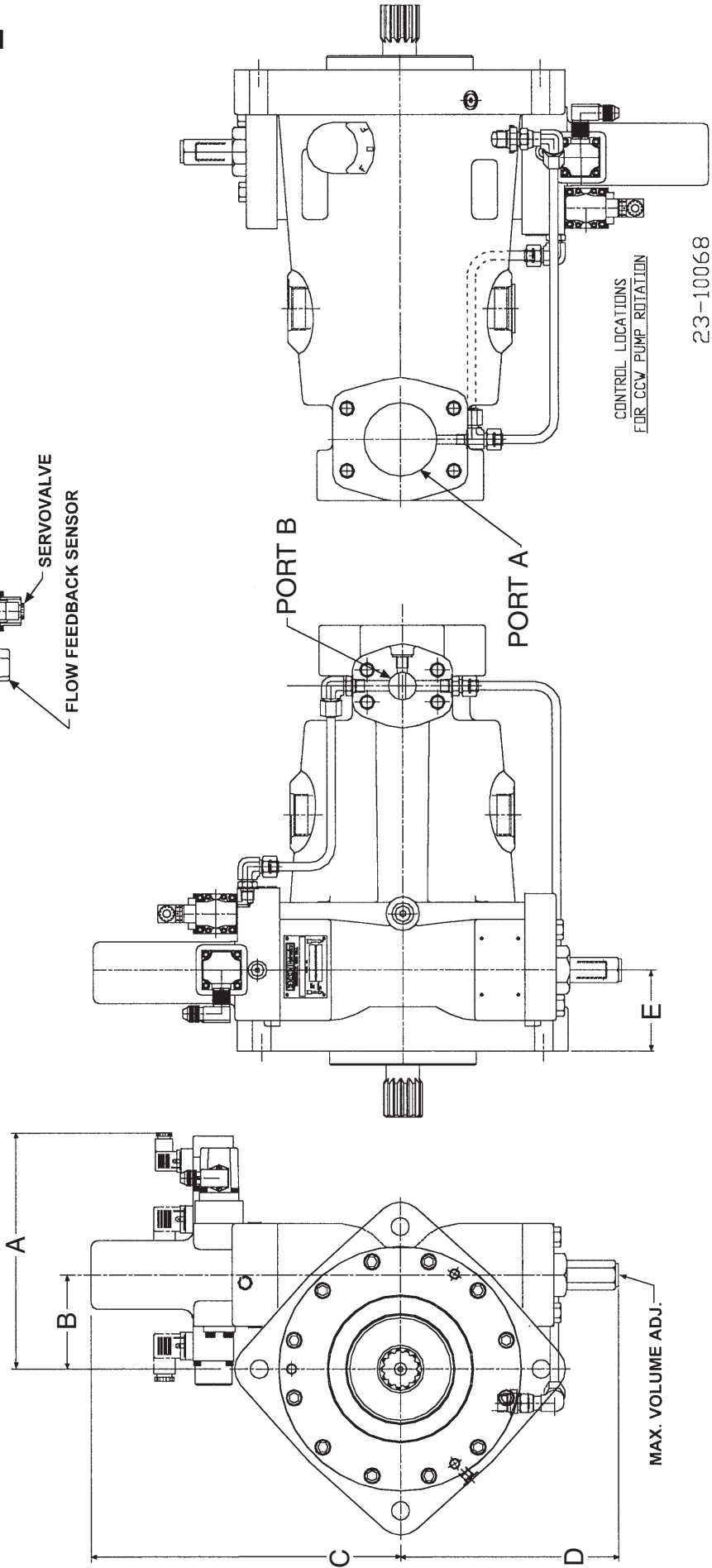
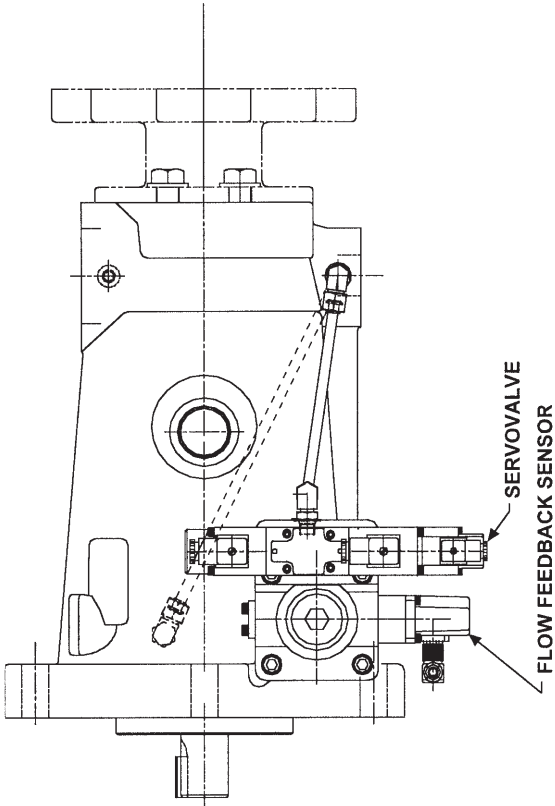
Italic dimensions are in millimeters

NOTE: For more detail information refer to the individual pump installation drawings. These are available on CD contact your nearest sales representative or distributor.

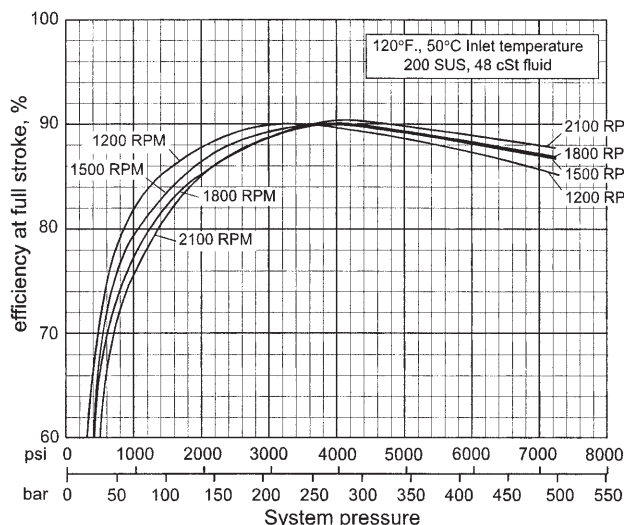
PQ Control

DIMENSIONS

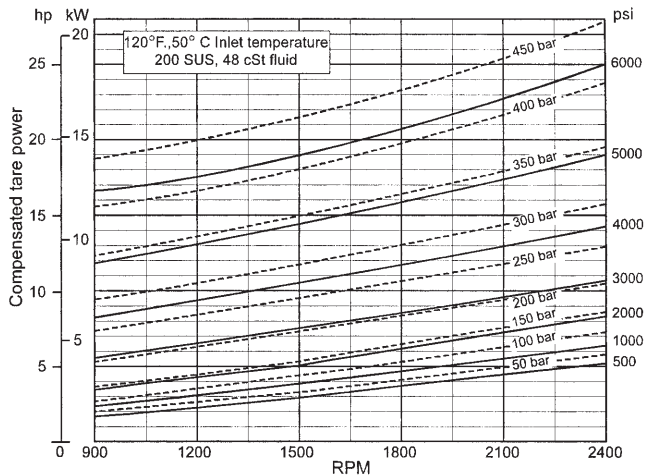
	A	B	C	D	E
P05	8.86	2.68	10.73	8.54	2.98
P080	225.0	68.1	272.5	216.9	75.7
P07	9.28	3.11	10.73	8.54	2.92
P110	235.7	78.9	272.7	217	74.1
P09	9.57	3.30	13.30	9.30	3.42
P140	243.1	83.8	337.8	236.2	86.8
P12	9.98	3.70	13.45	9.42	3.38
P200	253.5	94.1	340.6	239.3	85.9
P16	10.39	4.13	13.67	9.69	3.60
P260	264.0	104.8	347.2	246.0	97.6



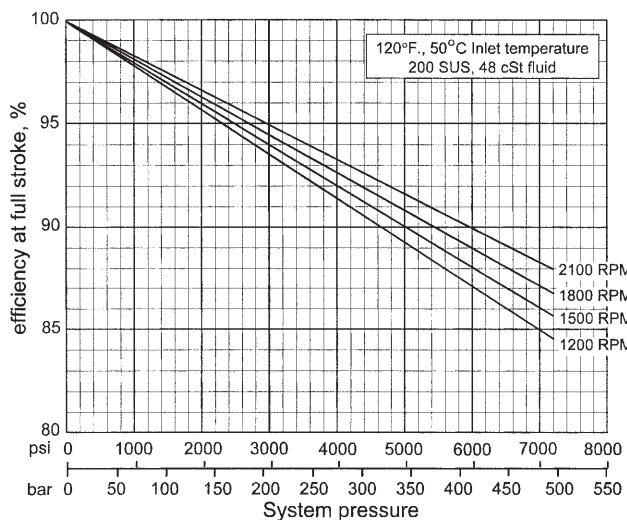
OVERALL EFFICIENCY @ FULL STROKE



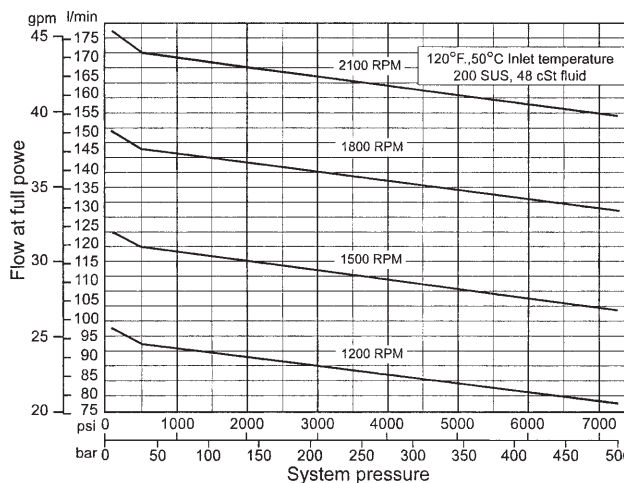
COMPENSATED TARE POWER



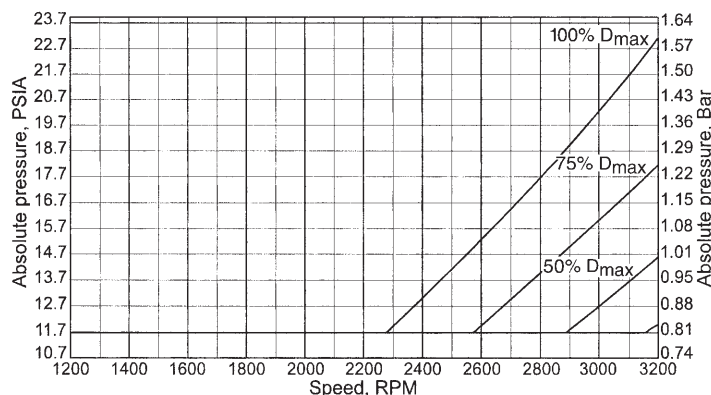
VOLUMETRIC EFFICIENCY @ FULL STROKE



FLOW VS PRESSURE @ FULL STROKE

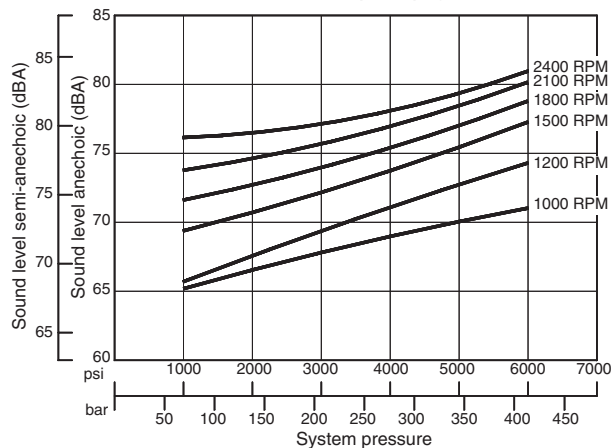


INLET CONDITIONS

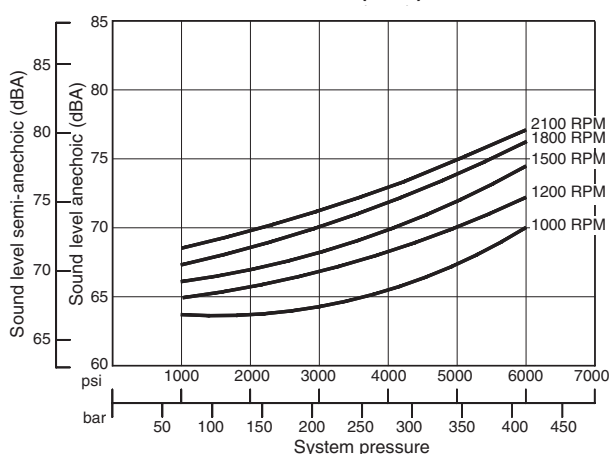


Note: The absolute inlet pressure is the pressure required to fill the pump with petroleum based fluids. The maximum pressure in the inlet port is 200 psi, 14 bar. For unboosted systems, the diameter of the suction line must be sized to allow a maximum velocity not higher than 4 ft/sec., 1.22 m/sec. A coarse screen may be considered in the suction line, no filter. For water in oil invert emulsions and water glycols increase the inlet absolute pressure by 25%, for phosphate ester increase the absolute inlet pressure by 35%. Any inlet pressures above atmospheric may increase noise levels and decrease efficiencies noted in this literature. Please consult your nearest Denison Office for further details.

SOUND PRESSURE LEVEL (dBA) @FULL STROKE

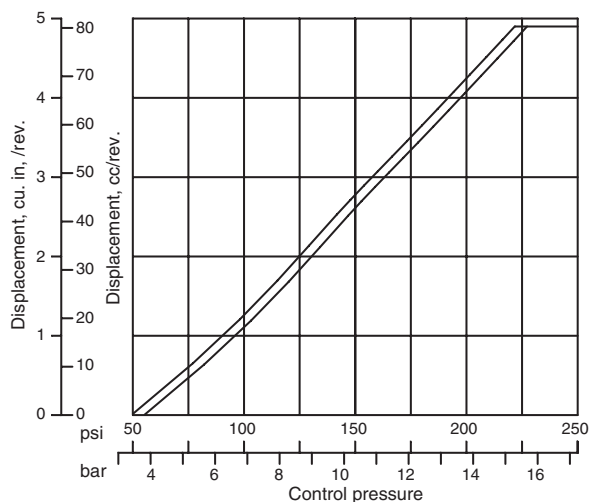


SOUND PRESSURE LEVEL (dBA) COMPENSATED

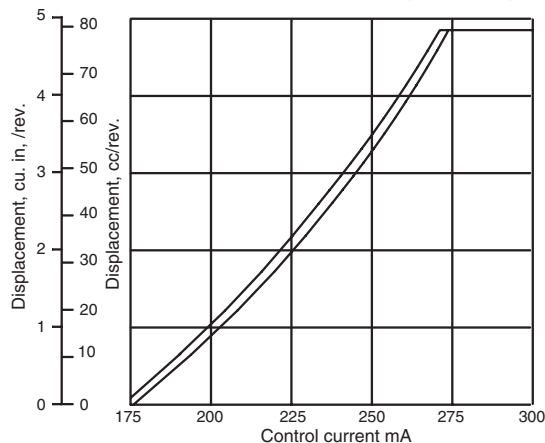


Note: Pump acoustical data was determined in accordance with ANSI/B93.71M, Hydraulic Fluid Power Pumps test code for the determination of airborne noise levels. Semi-anechoic values are presented according to the standard. Anechoic values are calculated for comparison with DIN 45635, part 1. The DIN standards measures sound levels over different surface areas so comparisons are not exact.

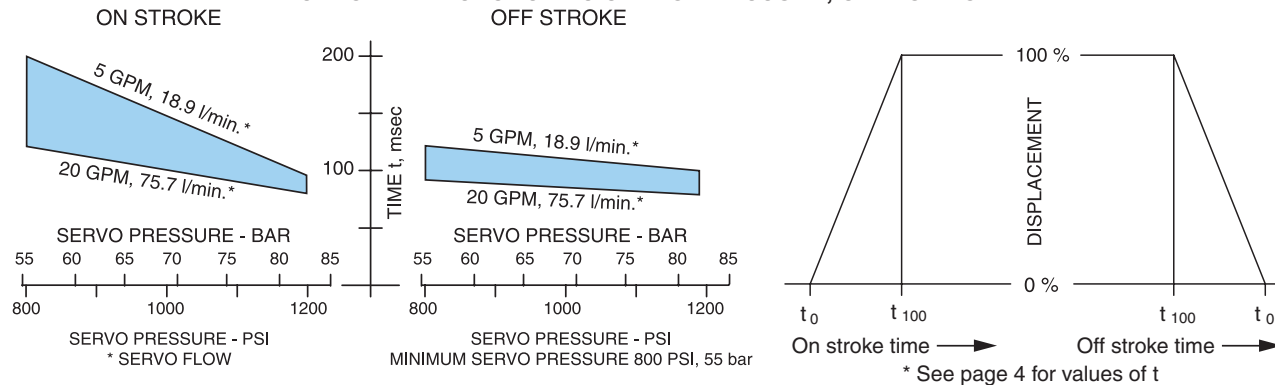
HYDRAULIC STROKER



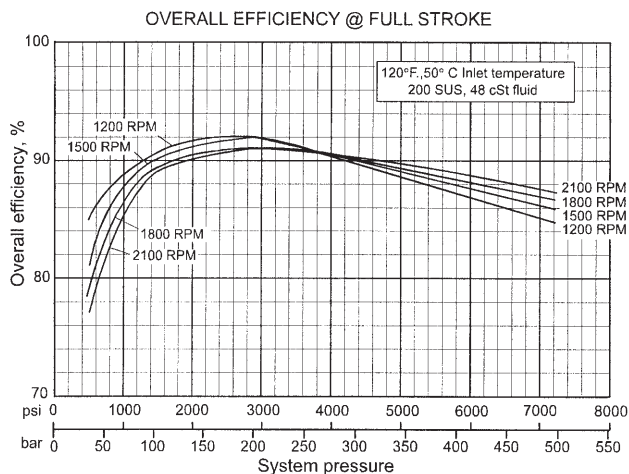
ELECTROHYDRAULIC STROKER (24 VOLT)



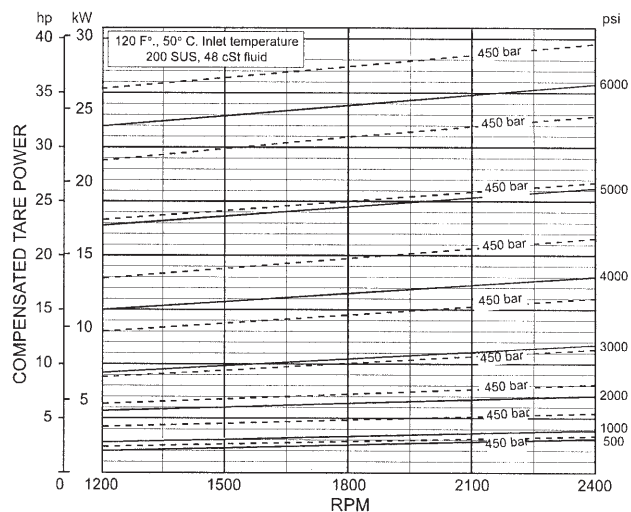
STROKER RESPONSE VS SERVO PRESSURE, SERVO FLOW*



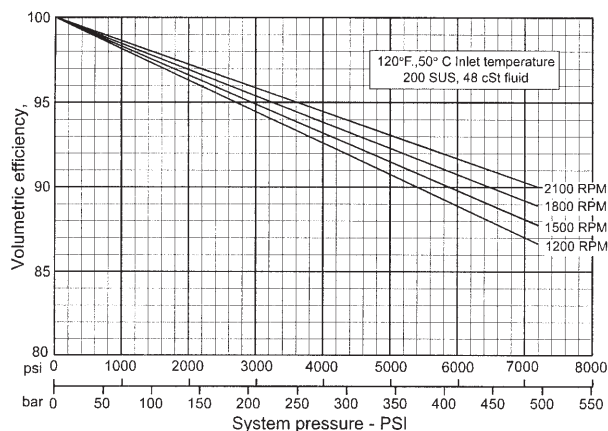
OVERALL EFFICIENCY @ FULL STROKE



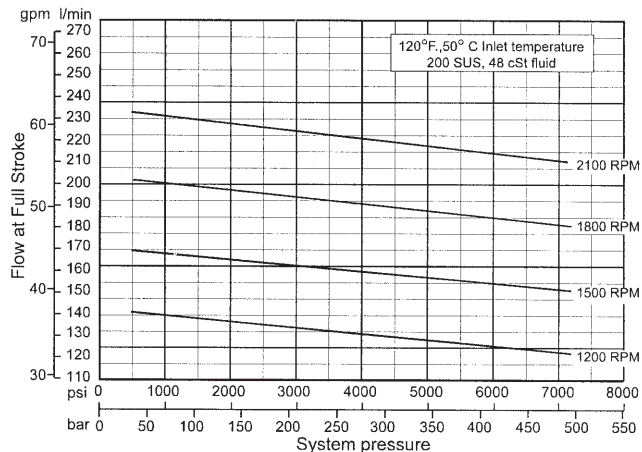
COMPENSATED TARE POWER



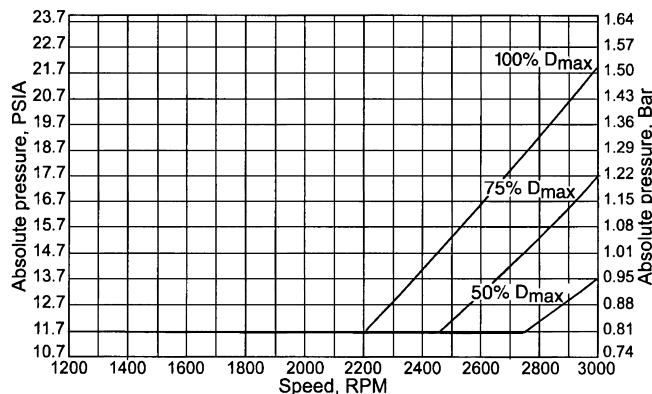
VOLUMETRIC EFFICIENCY @ FULL STROKE



FLOW VS PRESSURE @ FULL STROKE

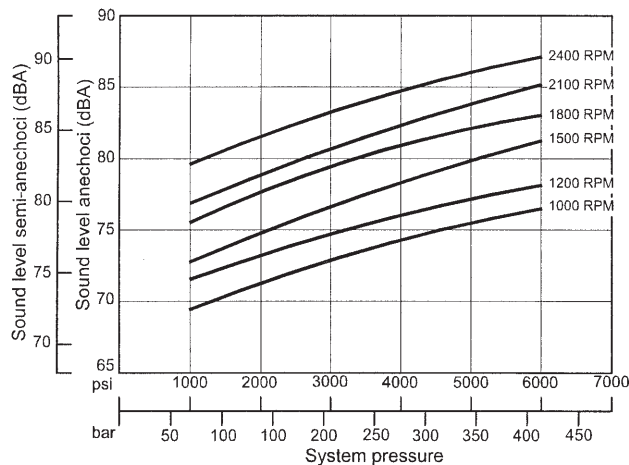


INLET CONDITIONS

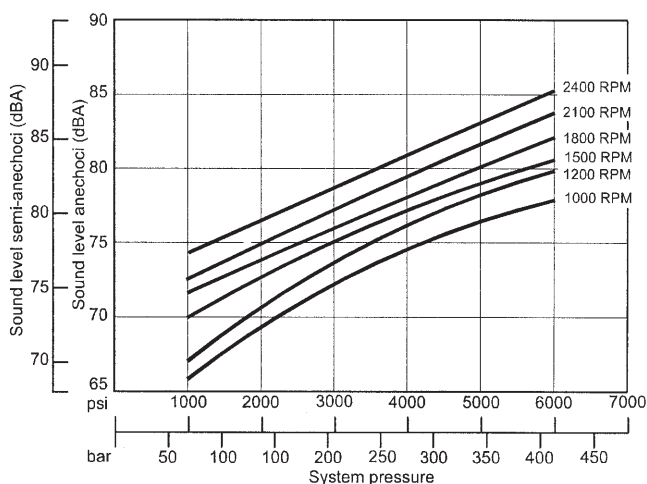


Note: The absolute inlet pressure is the pressure required to fill the pump with petroleum based fluids. The maximum pressure in the inlet port is 200 psi, 14 bar. For unboosted systems, the diameter of the suction line must be sized to allow a maximum velocity not higher than 4 ft/sec., 1,22 m/sec. A coarse screen may be considered in the suction line, no filter. For water in oil invert emulsions and water glycols increase the inlet absolute pressure by 25%, for phosphate ester increase the absolute inlet pressure by 35%. Any inlet pressures above atmospheric may increase noise levels and decrease efficiencies noted in this literature. Please consult your nearest Denison Office for further details.

SOUND PRESSURE LEVEL (dBA) @FULL STROKE

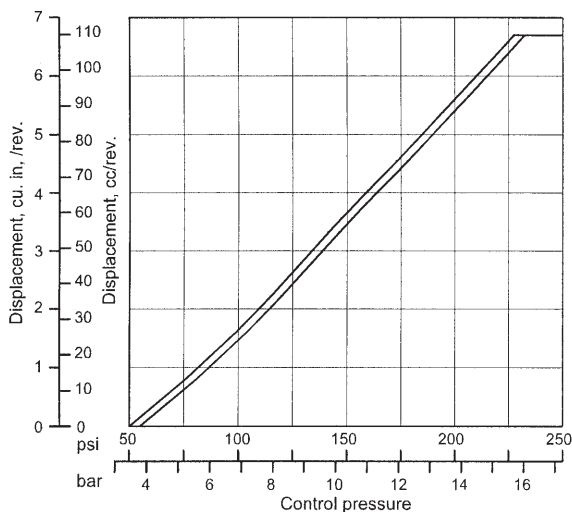


SOUND PRESSURE LEVEL (dBA) COMPENSATED

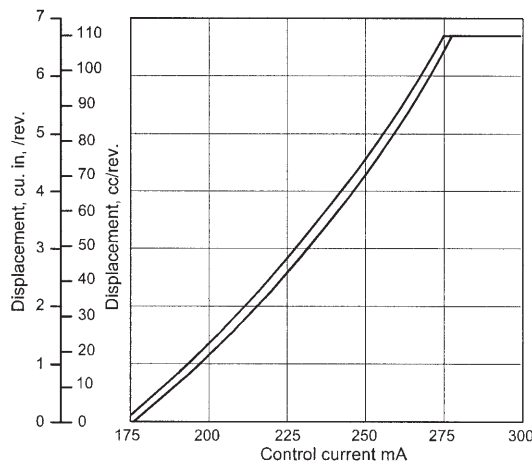


Note: Pump acoustical data was determined in accordance with ANSI/B93.71M, Hydraulic Fluid Power Pumps test code for the determination of airborne noise levels. Semi-anechoic values are presented according to the standard. Anechoic values are calculated for comparison with DIN 45635, part 1. The DIN standards measures sound levels over different surface areas so comparisons are not exact.

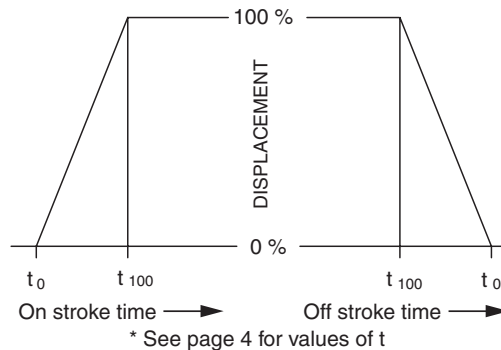
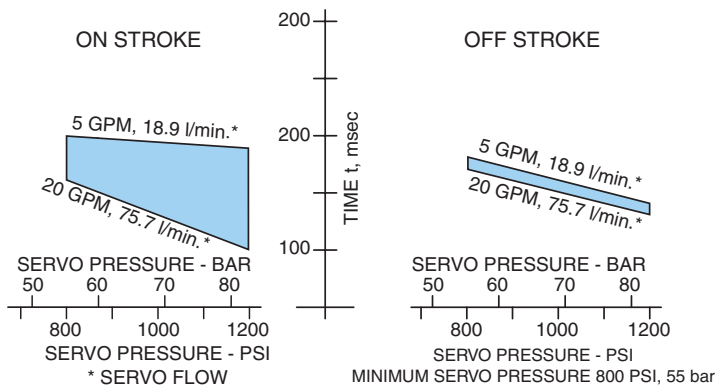
HYDRAULIC STROKER



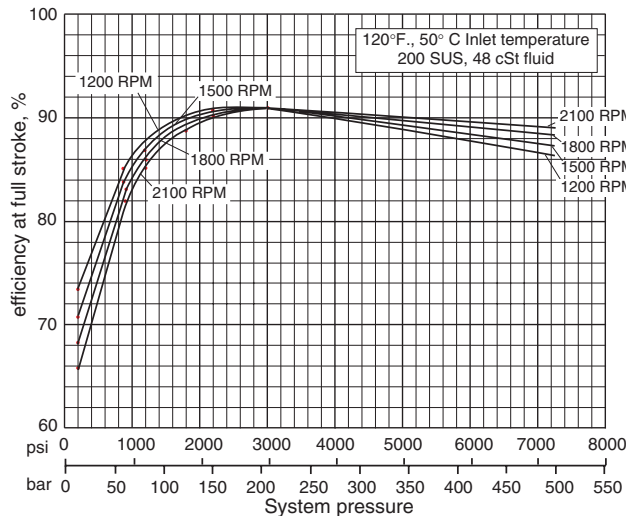
ELECTROHYDRAULIC STROKER (24 VOLT)



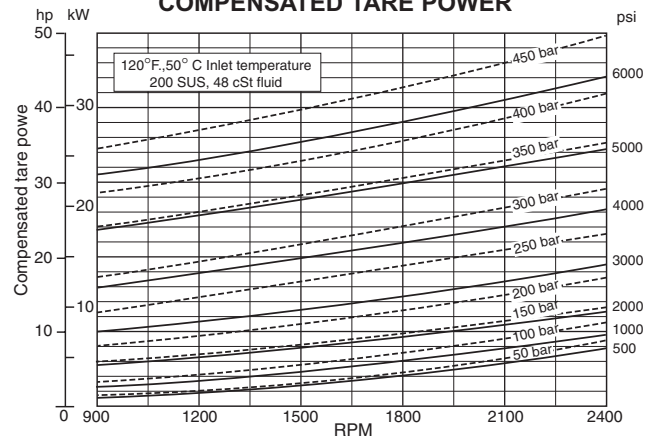
STROKER RESPONSE VS SERVO PRESSURE, SERVO FLOW* (see note on page 13)



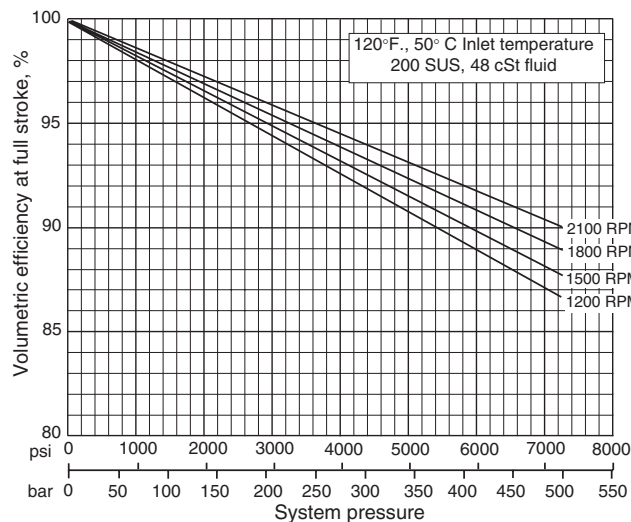
OVERALL EFFICIENCY @ FULL STROKE



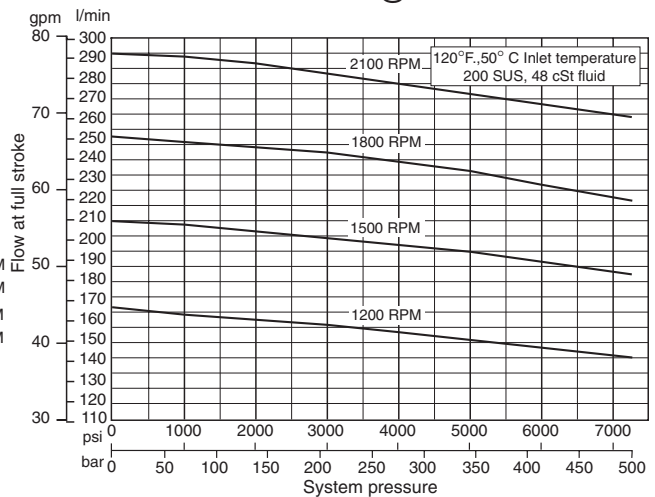
COMPENSATED TARE POWER



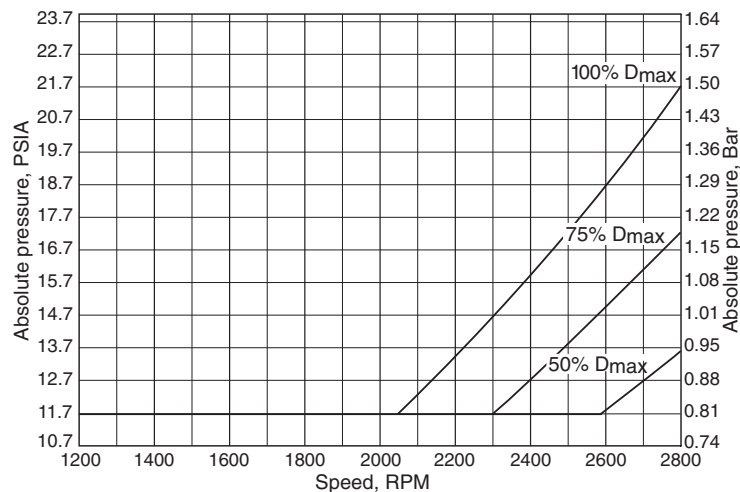
VOLUMETRIC EFFICIENCY @ FULL STROKE



FLOW VS PRESSURE @ FULL STROKE

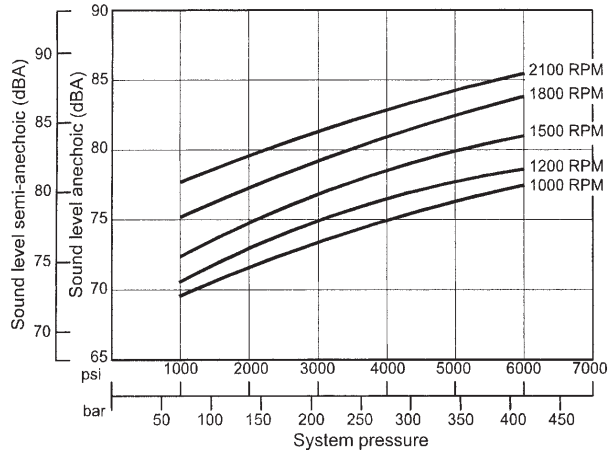


INLET CONDITIONS

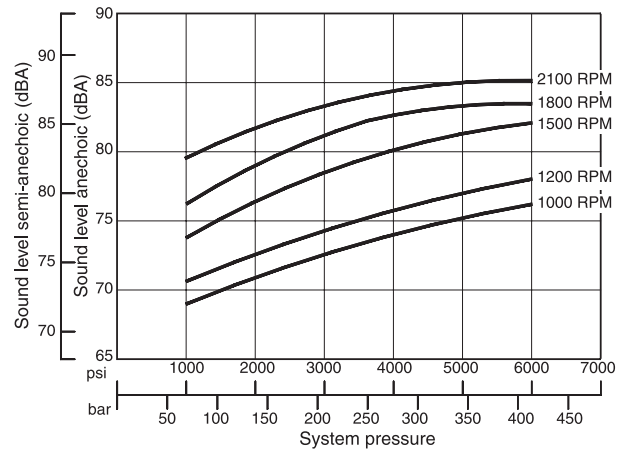


Note: The absolute inlet pressure is the pressure required to fill the pump with petroleum based fluids. The maximum pressure in the inlet port is 200 psi, 14 bar. For unboosted systems, the diameter of the suction line must be sized to allow a maximum velocity not higher than 4 ft/sec., 1.22 m/sec. A coarse screen may be considered in the suction line, no filter. For water in oil invert emulsions and water glycols increase the inlet absolute pressure by 25%, for phosphate ester increase the absolute inlet pressure by 35%. Any inlet pressures above atmospheric may increase noise levels and decrease efficiencies noted in this literature. Please consult your nearest Denison Office for further details.

SOUND PRESSURE LEVEL (dBA) @FULL STROKE

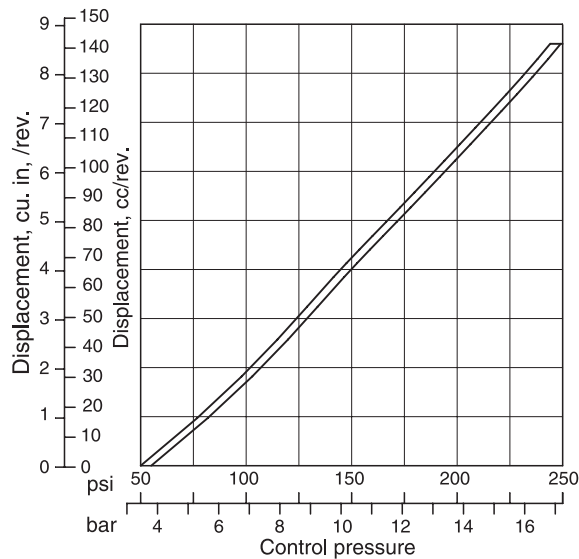


SOUND PRESSURE LEVEL (dBA) COMPENSATED

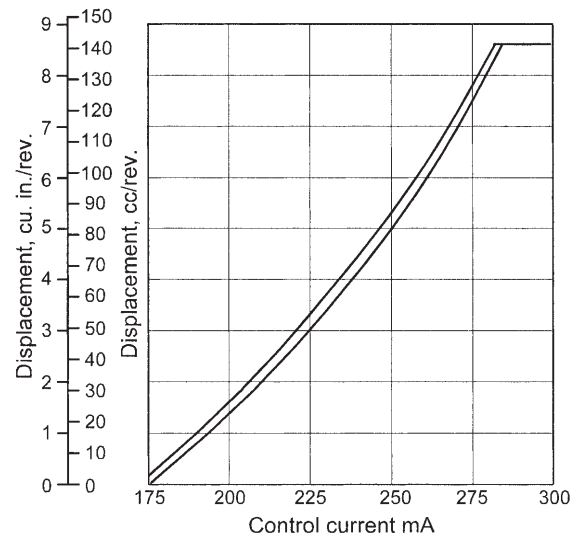


Note: Pump acoustical data was determined in accordance with ANSI/B93.71M, Hydraulic Fluid Power Pumps test code for the determination of airborne noise levels. Semi-anechoic values are presented according to the standard. Anechoic values are calculated for comparison with DIN 45635, part 1. The DIN standards measures sound levels over different surface areas so comparisons are not exact.

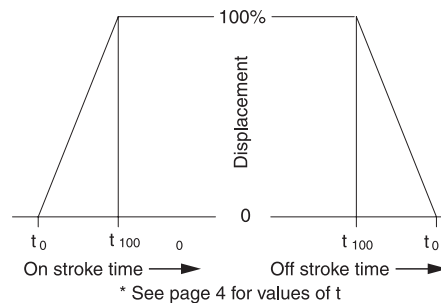
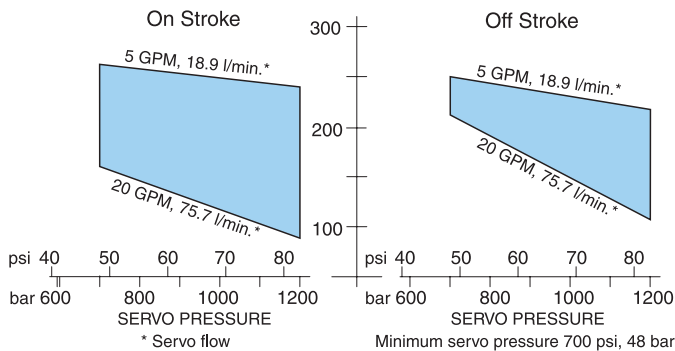
HYDRAULIC STROKER



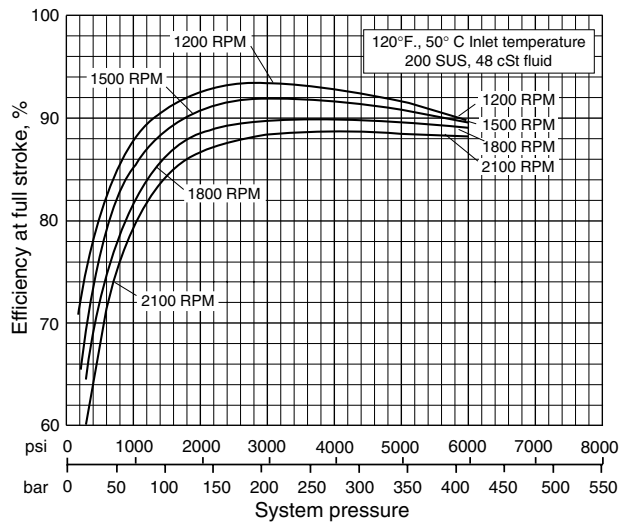
ELECTROHYDRAULIC STROKER (24 VOLT)



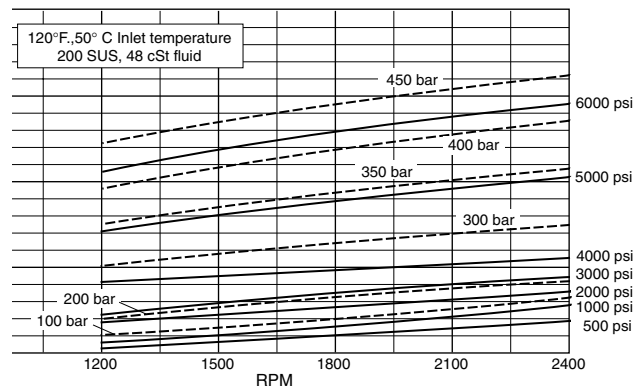
STROKER RESPONSE VS SERVO PRESSURE, SERVO FLOW* (see note on page 13)



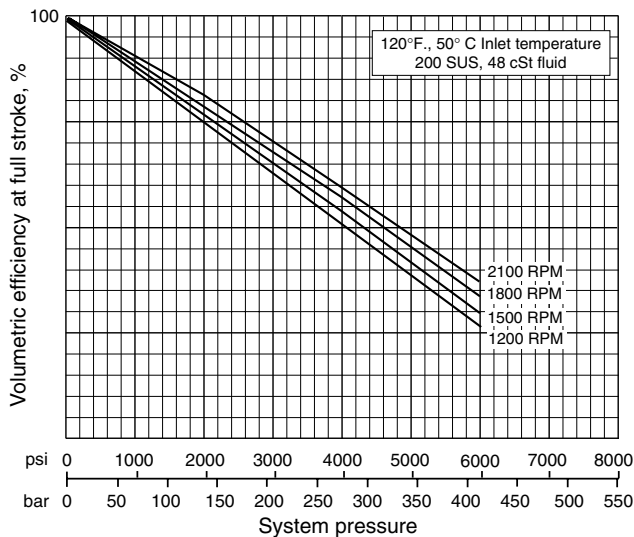
OVERALL EFFICIENCY @ FULL STROKE



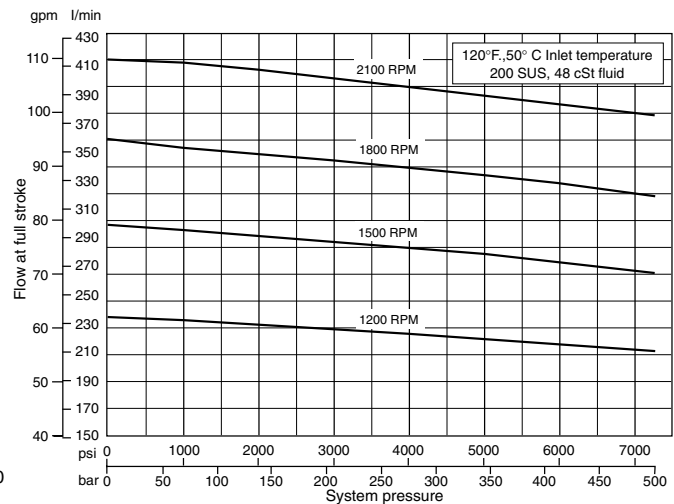
COMPENSATED TARE POWER



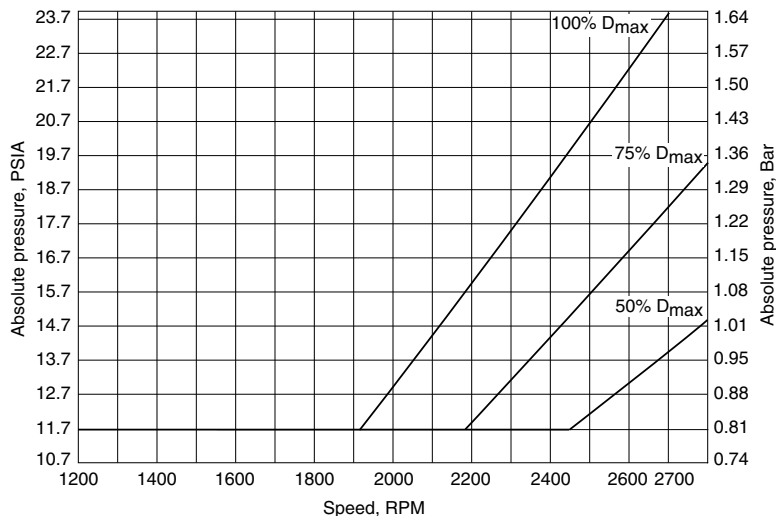
VOLUMETRIC EFFICIENCY @ FULL STROKE



FLOW VS PRESSURE @ FULL STROKE

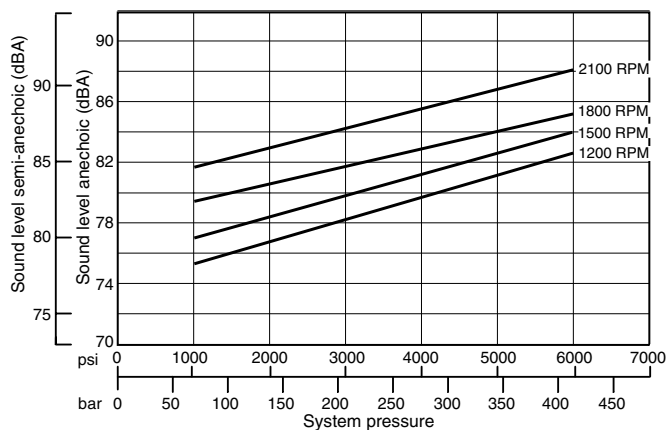


INLET CONDITIONS

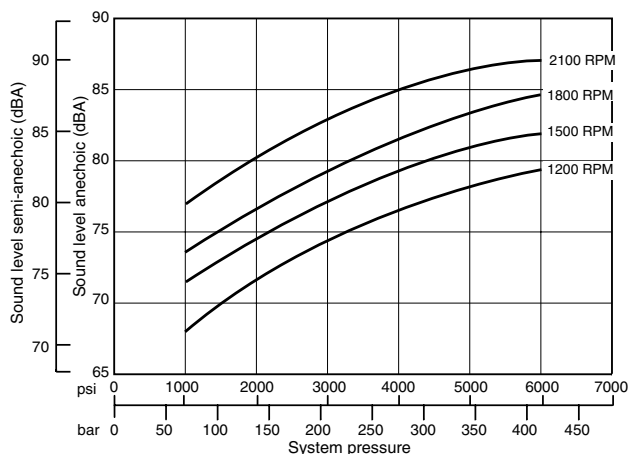


Note: The absolute inlet pressure is the pressure required to fill the pump with petroleum based fluids. The maximum pressure in the inlet port is 200 psi, 14 bar. For unboosted systems, the diameter of the suction line must be sized to allow a maximum velocity not higher than 4 ft/sec., 1,22 m/sec. A coarse screen may be considered in the suction line, no filter. For water in oil invert emulsions and water glycols increase the inlet absolute pressure by 25%, for phosphate ester increase the absolute inlet pressure by 35%. Any inlet pressures above atmospheric may increase noise levels and decrease efficiencies noted in this literature. Please consult your nearest Denison Office for further details.

SOUND PRESSURE LEVEL (dBA) @FULL STROKE

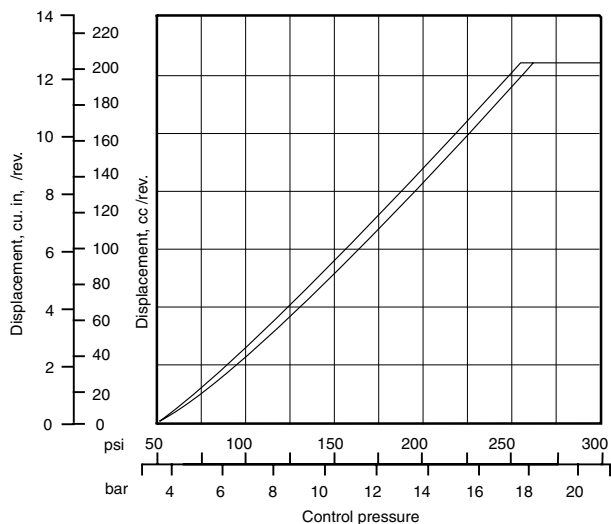


SOUND PRESSURE LEVEL (dBA) COMPENSATED

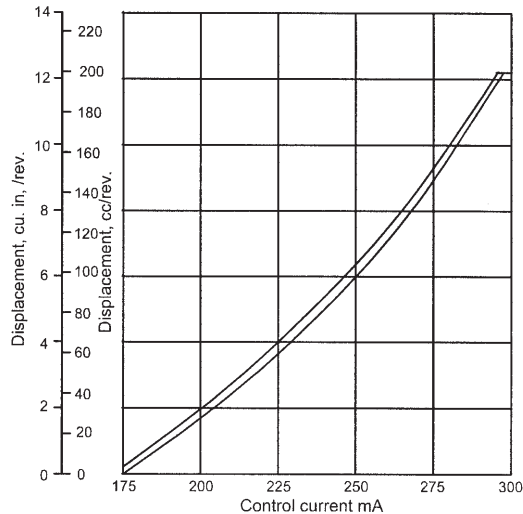


Note: Pump acoustical data was determined in accordance with ANSI/B93.71M, Hydraulic Fluid Power Pumps test code for the determination of airborne noise levels. Semi-anechoic values are presented according to the standard. Anechoic values are calculated for comparison with DIN 45635, part 1. The DIN standards measures sound levels over different surface areas so comparisons are not exact.

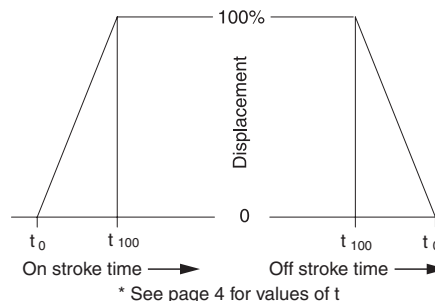
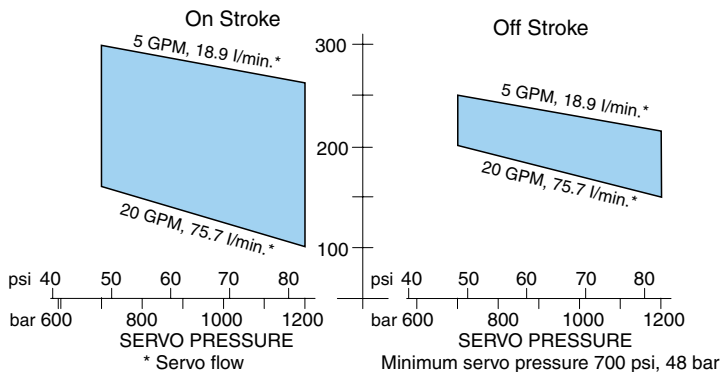
HYDRAULIC STROKER



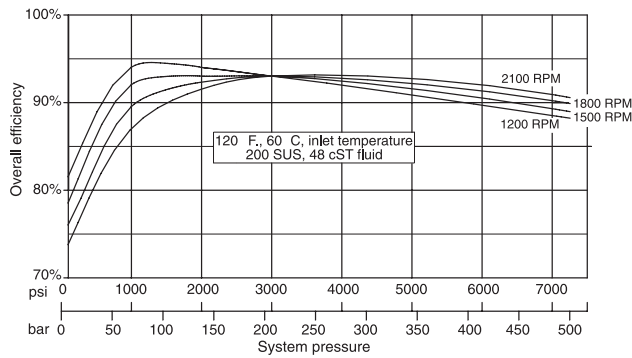
ELECTROHYDRAULIC STROKER (24 VOLT)



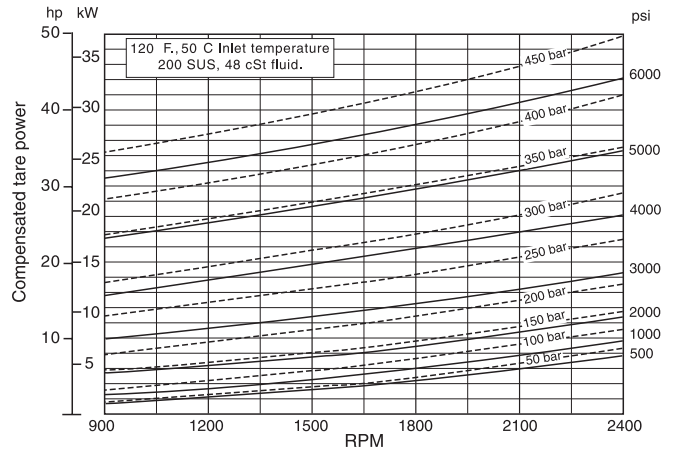
STROKER RESPONSE VS SERVO PRESSURE, SERVO FLOW* (see note on page 13)



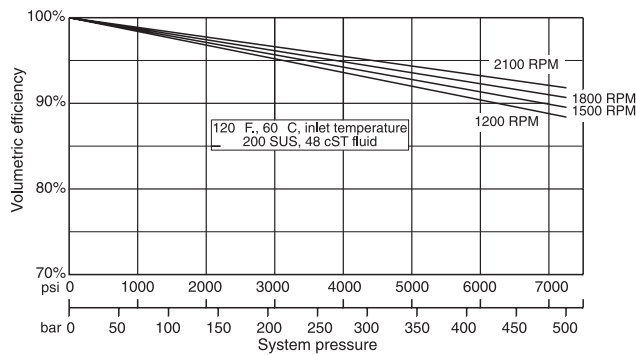
OVERALL EFFICIENCY @ FULL STROKE



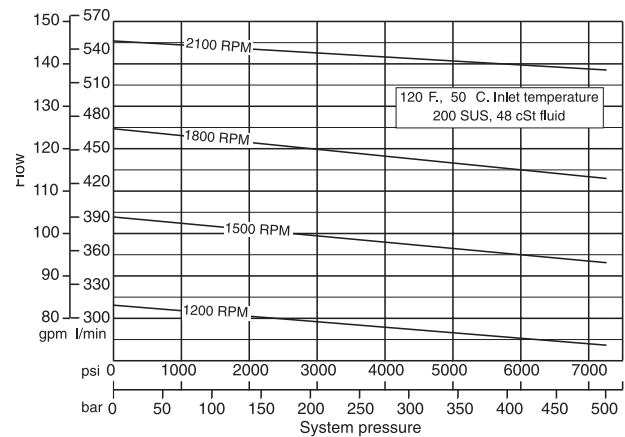
COMPENSATED TARE POWER



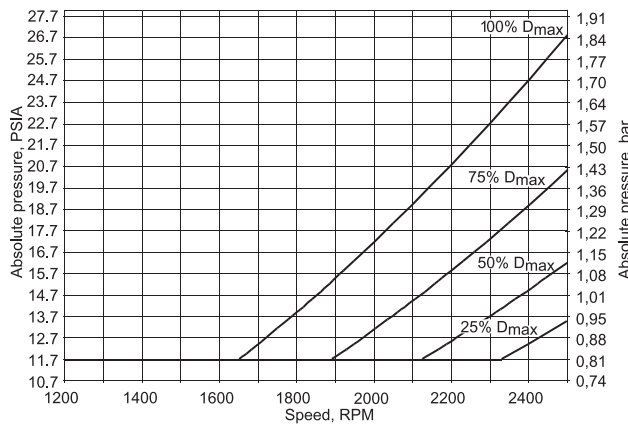
VOLUMETRIC EFFICIENCY @ FULL STROKE



FLOW VS PRESSURE @ FULL STROKE

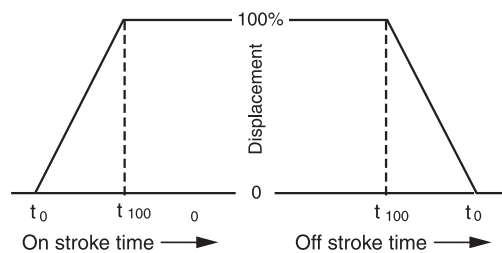
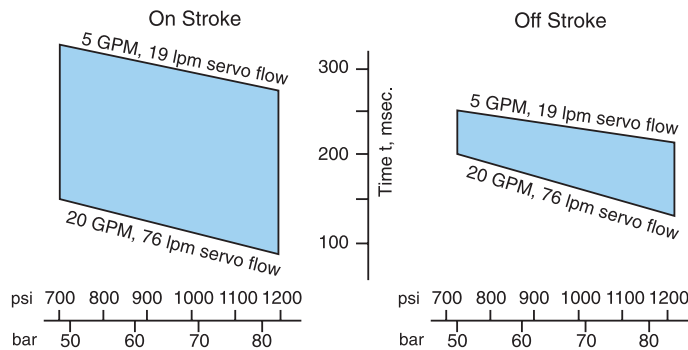


INLET CONDITIONS



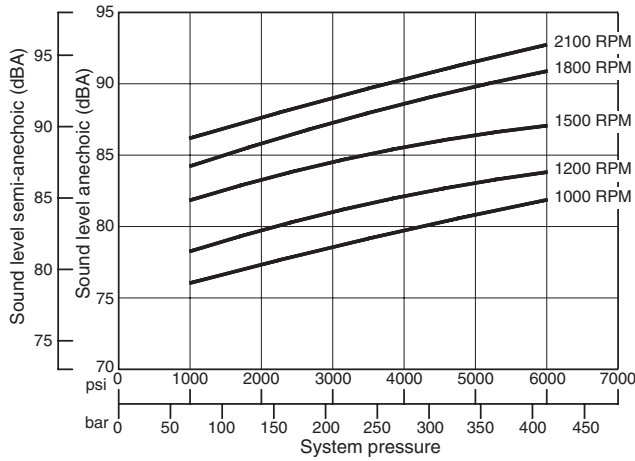
Note: The absolute inlet pressure is the pressure required to fill the pump with petroleum based fluids. The maximum pressure in the inlet port is 200 psi, 14 bar. For unboosted systems, the diameter of the suction line must be sized to allow a maximum velocity not higher than 4 ft/sec., 1.22 m/sec. A coarse screen may be considered in the suction line, no filter. For water in oil invert emulsions and water glycols increase the inlet absolute pressure by 25%, for phosphate ester increase the absolute inlet pressure by 35%. Any inlet pressures above atmospheric may increase noise levels and decrease efficiencies noted in this literature. Please consult your nearest Denison Office for further details.

STROKER RESPONSE VS SERVO PRESSURE, SERVO FLOW* (see note on page 13)

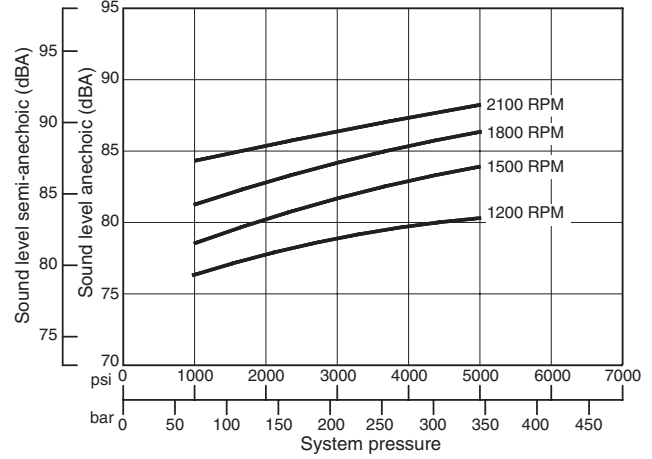


* See page 4 for values of t

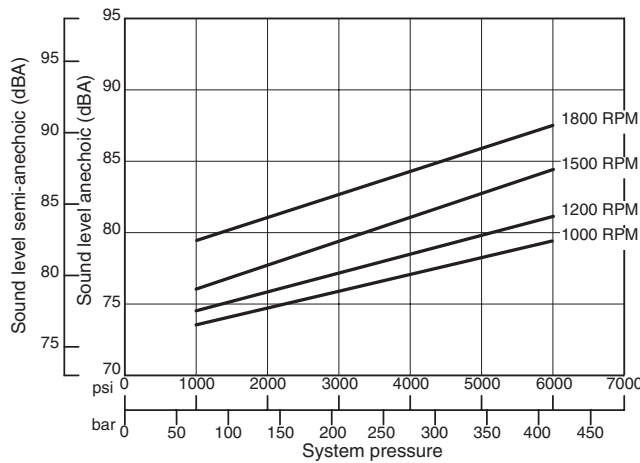
**SOUND PRESSURE LEVEL (dBA) @FULL STROKE
P16 H**



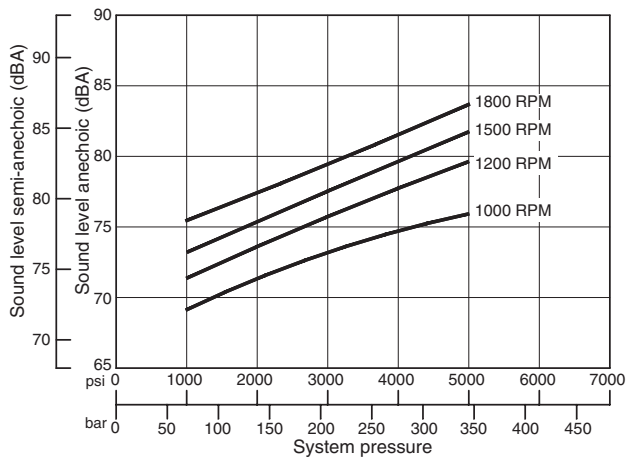
**SOUND PRESSURE LEVEL (dBA) COMPENSATED
P16H**



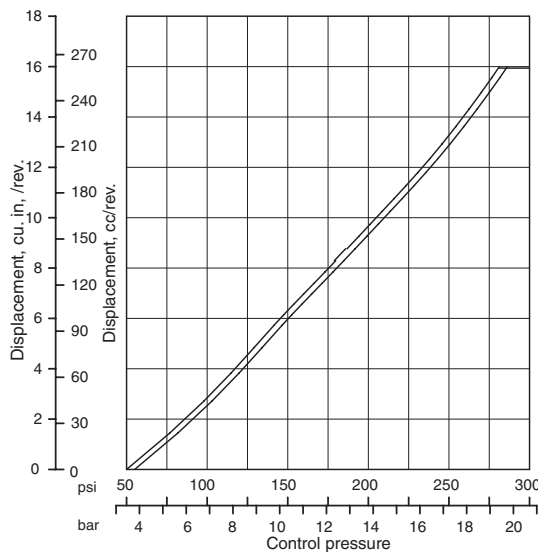
**SOUND PRESSURE LEVEL (dBA) @FULL STROKE
P16Q**



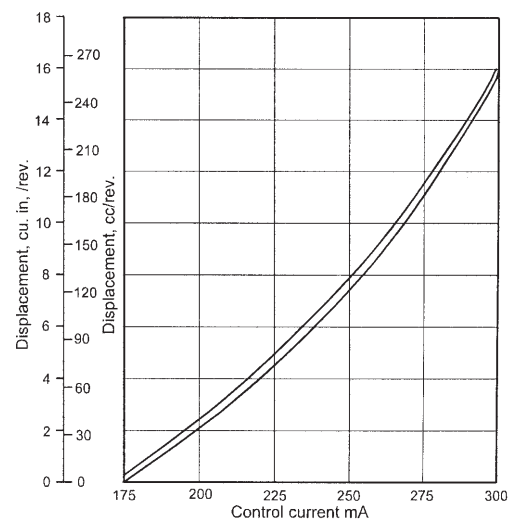
**SOUND PRESSURE LEVEL (dBA) COMPENSATED
P16Q**



HYDRAULIC STROKER

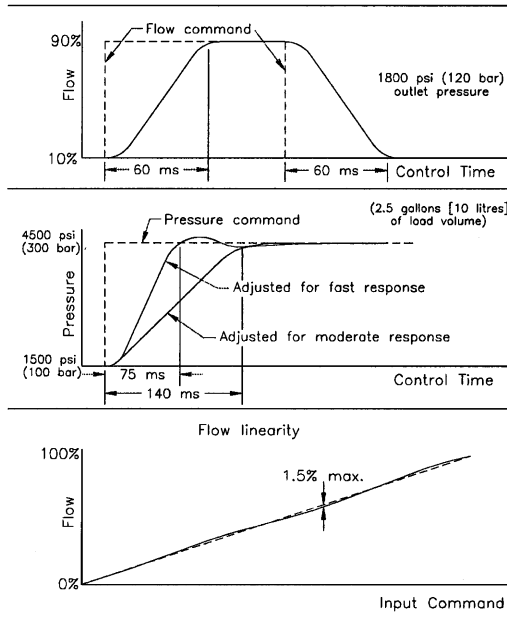


ELECTROHYDRAULIC STROKER (24 VOLT)

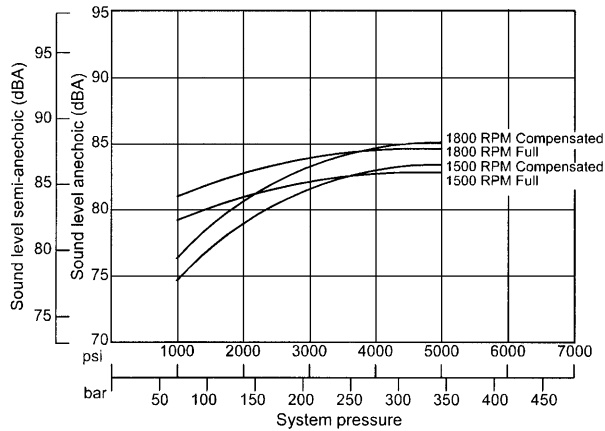


TYPICAL RESPONSE CURVES

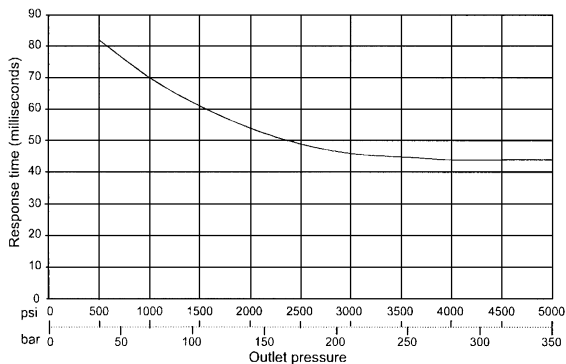
PQ Control on P16 pump
Typical response curves



SOUND PRESSURE LEVEL

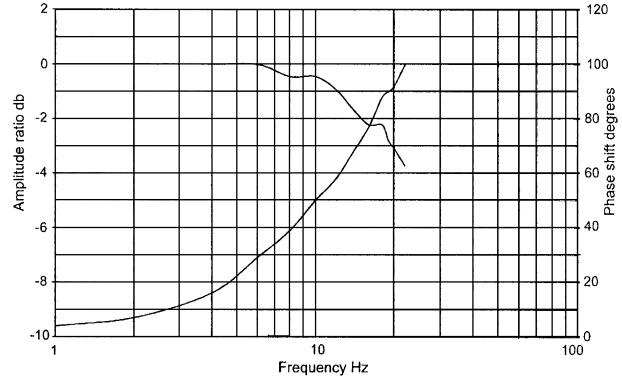


RESPONSE TIME VS OUTLET PRESSURE

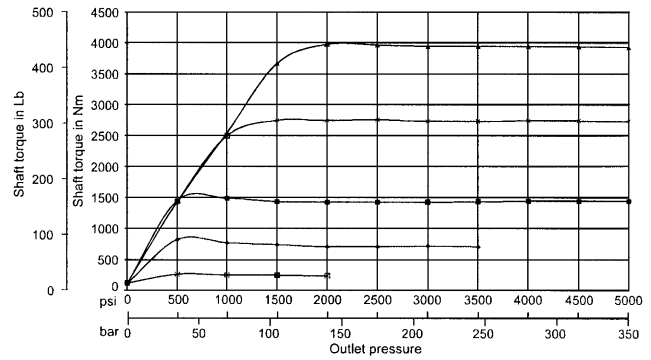


FREQUENCY RESPONSE

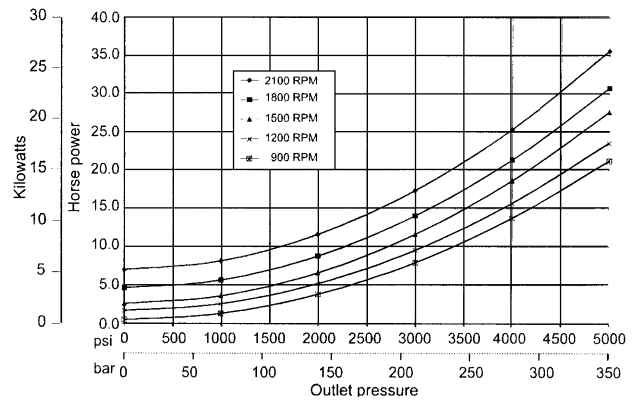
+/-10% signal, 2500 psi, 172 bar system pressure
PQ RESPONSE



PQ CONTROL WITH TORQUE LIMITING

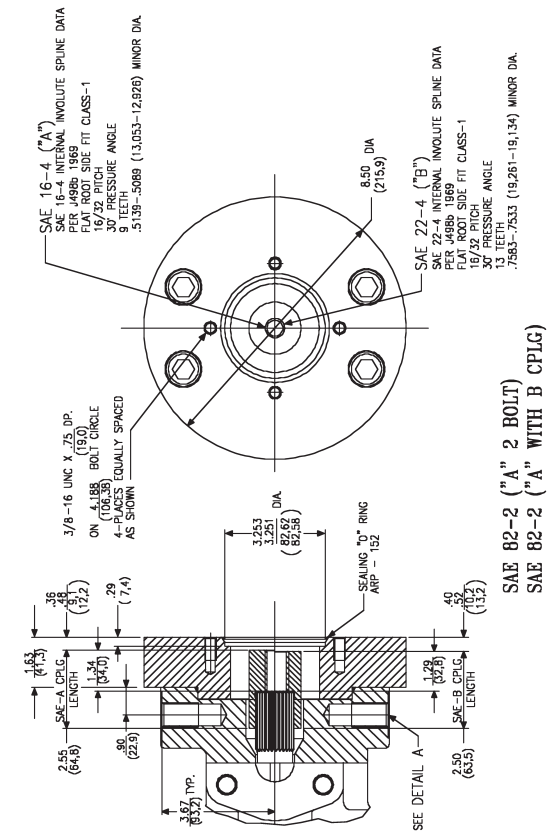


COMPENSATED TARE POWER

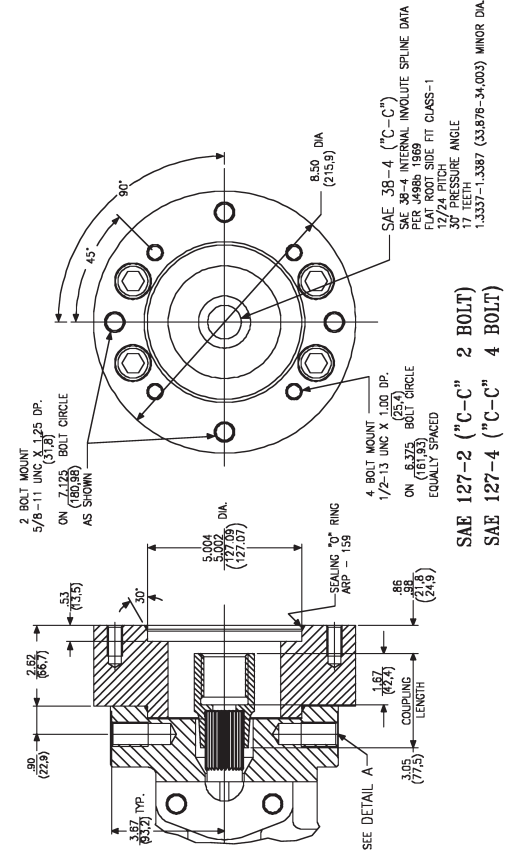
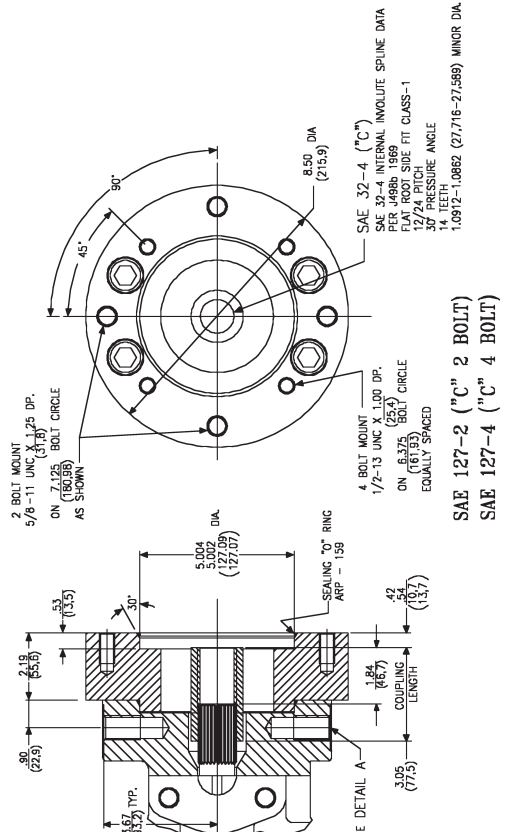
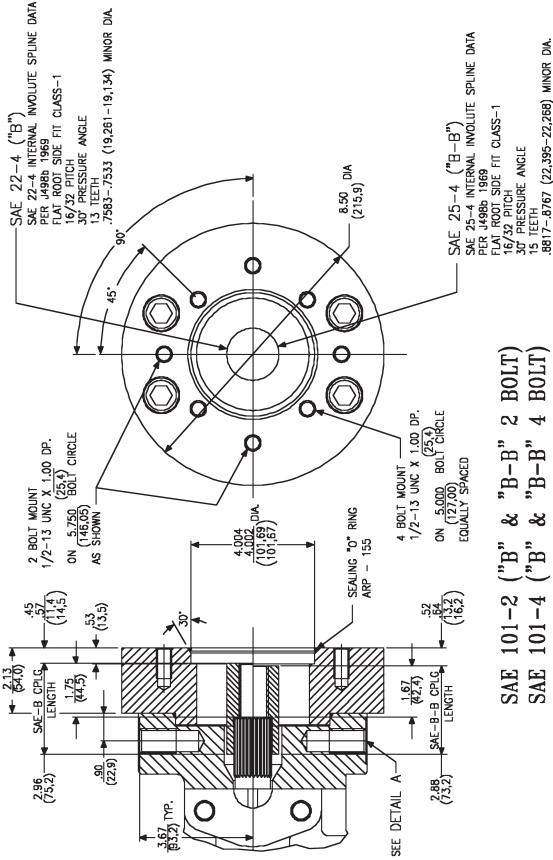


SAE REAR AUX. MTG. ADAPTORS FOR ALL PREMIER SERIES

REAR ADAPTERS

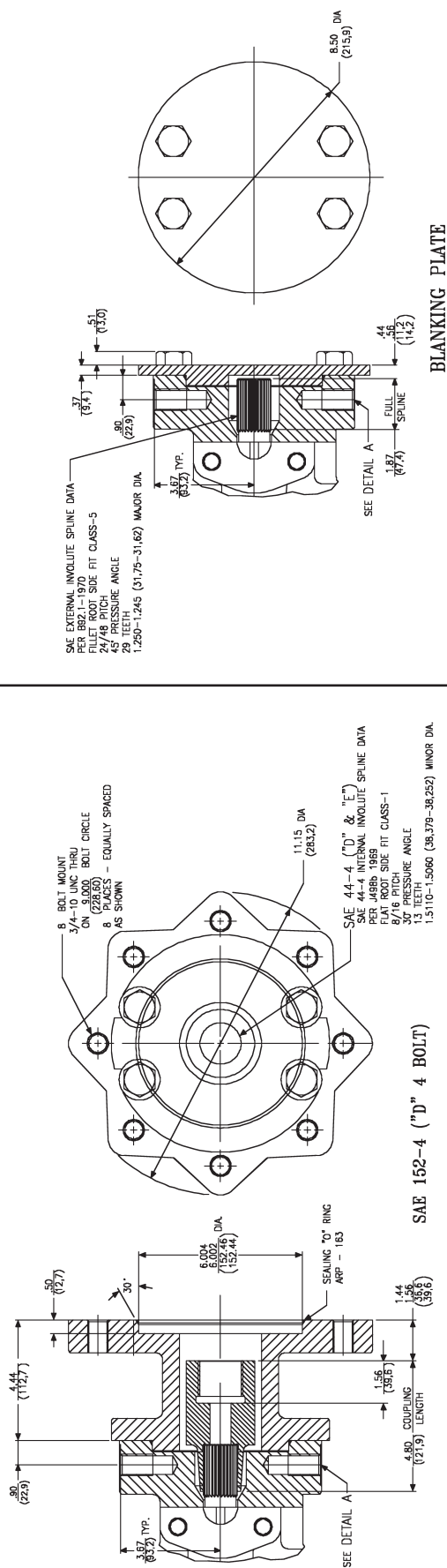


SAE 82-2 ("A") 2 BOLT
SAE 82-2 ("A") WITH B CPLG

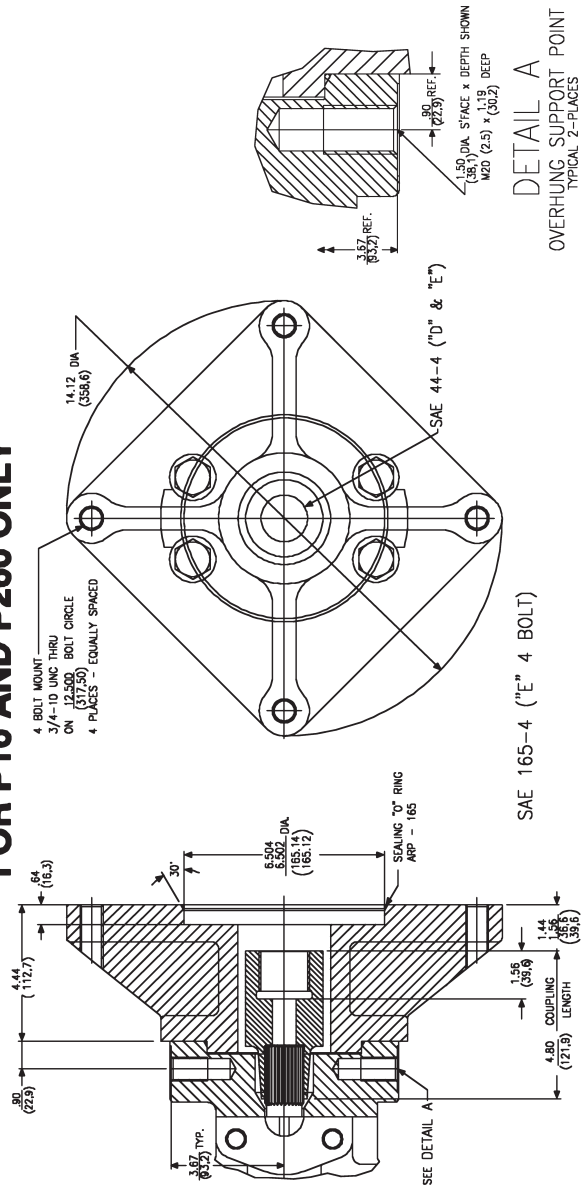


SAE REAR AUX. MTG. ADAPTORS FOR ALL PREMIER SERIES

SAE

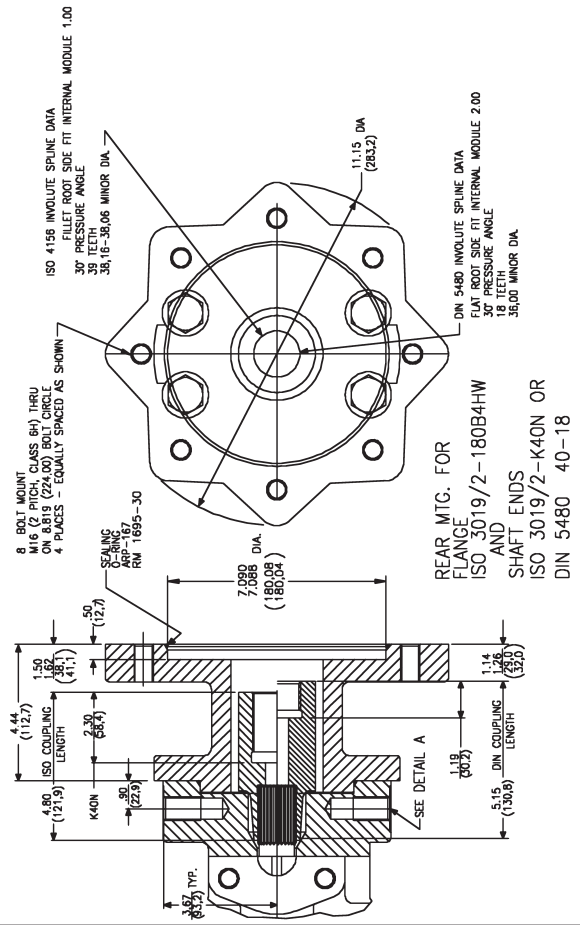
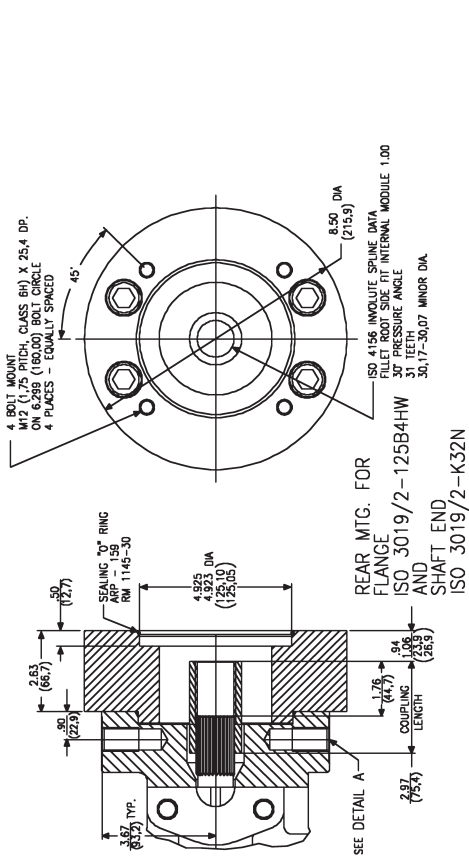
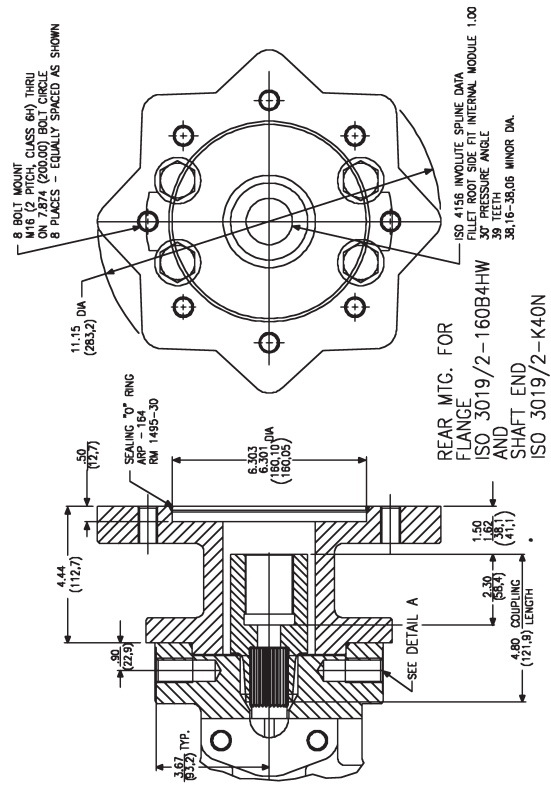
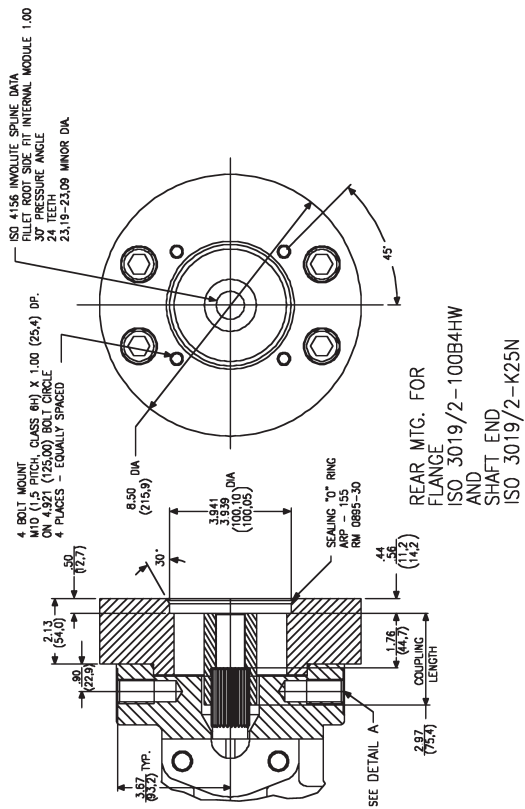


FOR P16 AND P260 ONLY



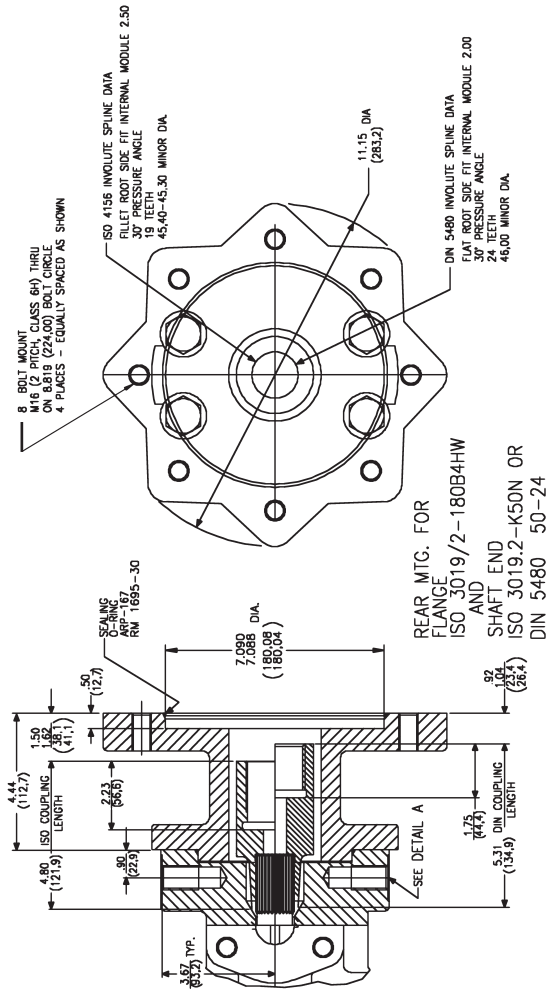
ISO REAR AUX. MTG. ADAPTORS FOR ALL PREMIER SERIES

ISO

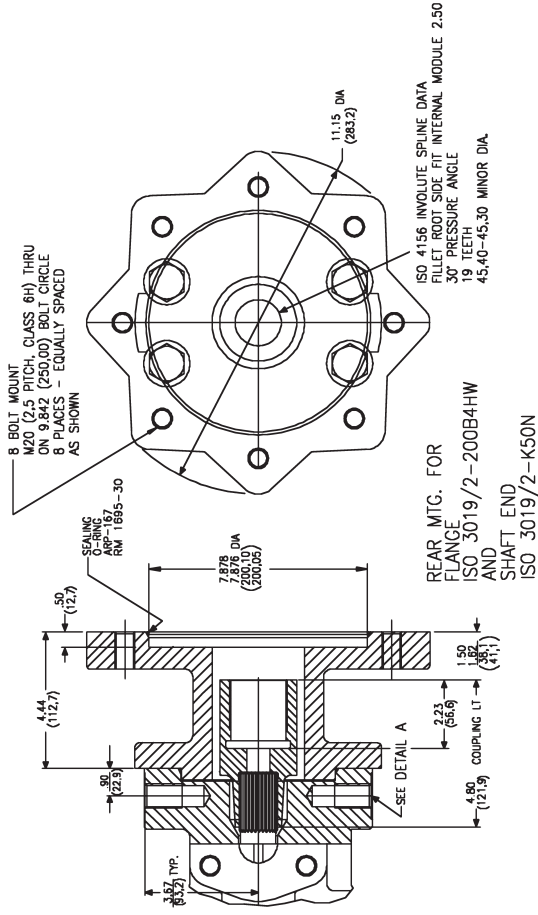


ISO

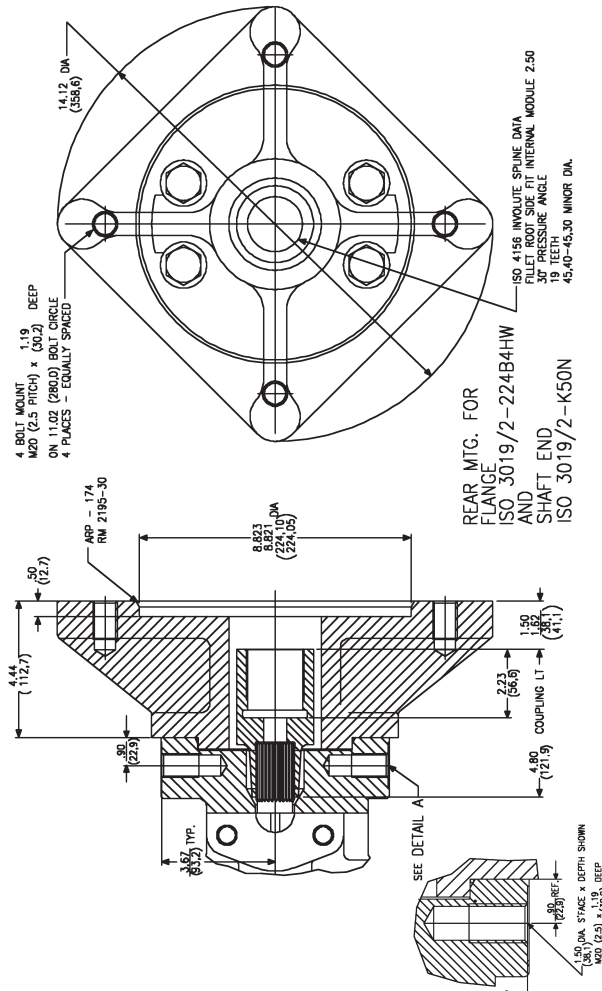
FOR P09, P140, P12, P200, P16 & P260 ONLY



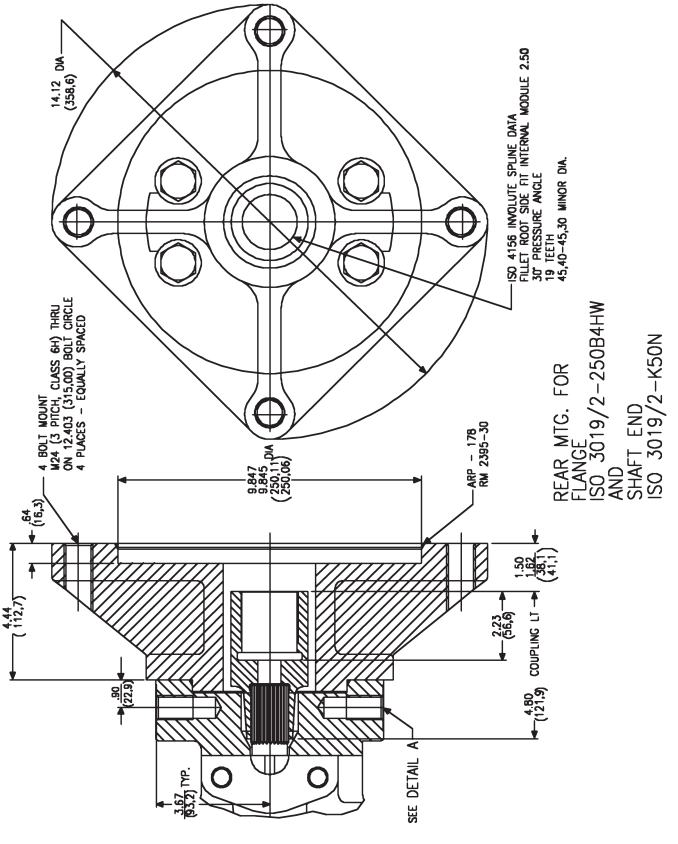
FOR P12, P200, P16 & P260 ONLY



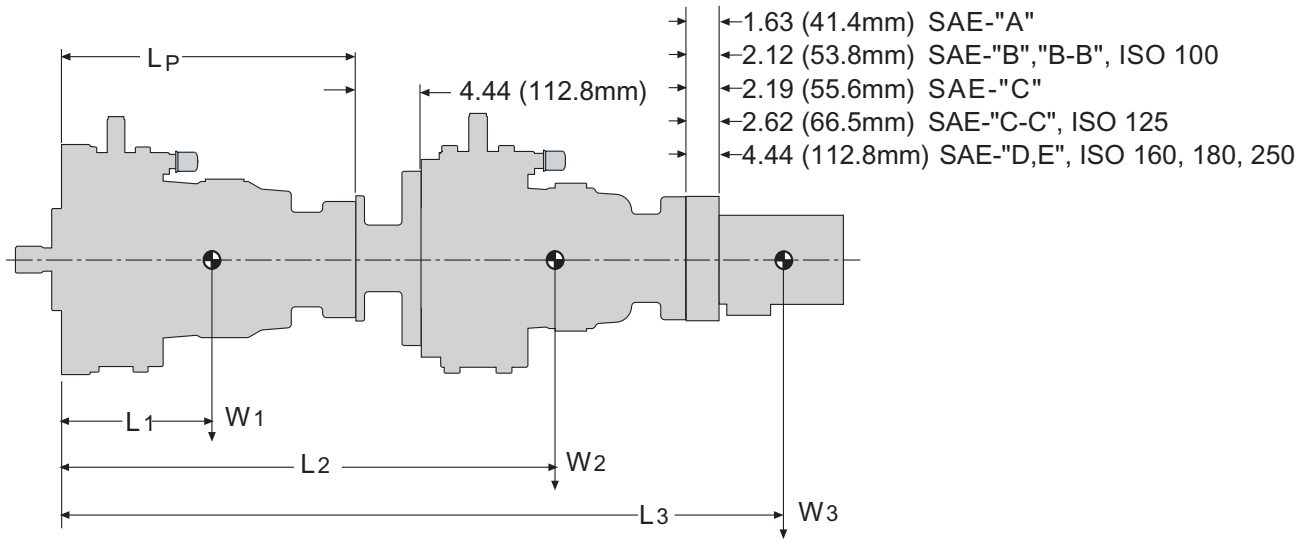
FOR P12, P200, P16 & P260 ONLY



FOR P16 & P260 ONLY



MAXIMUM PERMISSIBLE BENDING MOMENT
AT MOUNTING FLANGE



$$M = \{(L1 \cdot W1) + (L2 \cdot W2) + (L3 \cdot W3) \dots\}$$

SERIES	P16	P12	P09	P07	P05
MAXIMUM MOMENT (lb.in.)	14400	10100	8300	6300	5000
WEIGHT - W (pounds)	325	300	220	177	156
DISTANCE - L1 (inches to C/G)	10.4	8.6	8.5	8.0	7.0
DISTANCE - Lp (inches)	18.8	17.2	15.9	14.7	13.4

SERIES	P260	P200	P140	P110	P080
MAXIMUM MOMENT (Nm)	1627	1141	938	712	565
WEIGHT - W (Newtons)	1446	1335	981	798	696
DISTANCE - L1 (mm to C/G)	264	218	216	203	178
DISTANCE - Lp (mm)	478	437	404	373	340

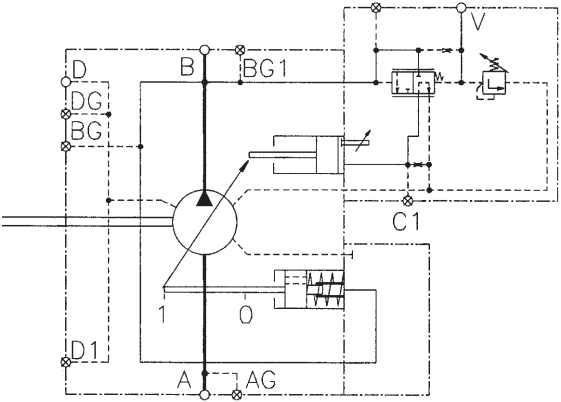
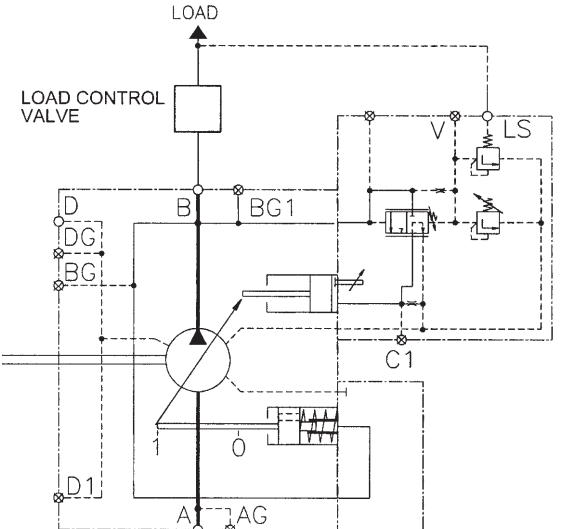
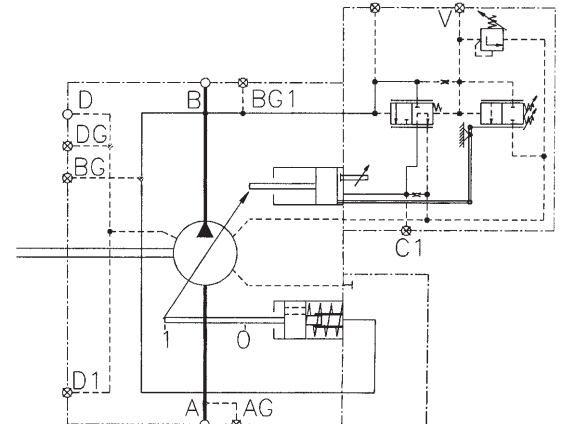
VALUES EXCEEDING MAXIMUM MOMENT MUST HAVE ADDITIONAL SUPPORT ON MOUNTED PUMP(S)

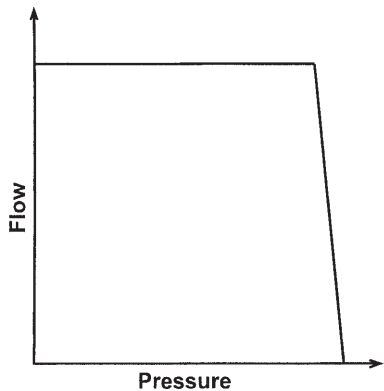
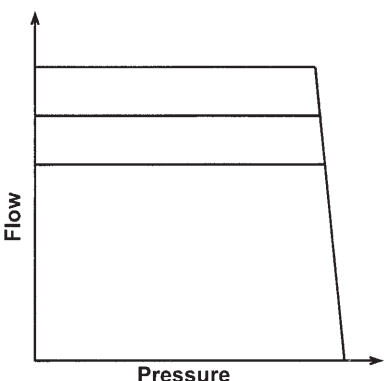
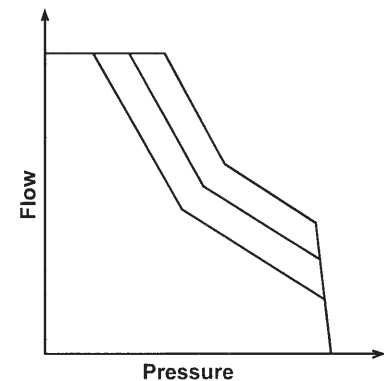
Rear drives ordering code options(P05-02R1C-C10-00-M2)

		SAE mounting & coupling								ISO & DIN mounting & coupling									
Mounting	None / plugged	A	A	B	B	C	C	D	E	100B4	125B4	160B4	180B4	180B4	180B4	180B4	200B4	224B4	250B4
coupling		A	B	B	B/B	C	CC	D/E	DE	K25N	K32N	K40N	K40N	K50N	DIN40-18	DIN50-24	K50N	K50N	K50N
P05/P080	0 / M	A	G	B	Q	C	N	D	-	Z	Y	X	T	U	-	-	-	-	-
P07/P110	0 / M	A	G	B	Q	C	N	D	-	Z	Y	X	T	U	-	-	-	-	-
P09/P140	0 / M	A	G	B	Q	C	N	D	-	Z	Y	X	T	U	-	-	-	-	-
P12/P200	0 / M	A	G	B	Q	C	N	D	E	Z	Y	X	T	U	-	-	W	R	-
P16/P260	0 / M	A	G	B	Q	C	N	D	E	Z	Y	X	T	U	L	S	W	R	V
Dim. S	.88	1.63	2.13	2.19	2.62	4.44	2.13	2.63		4.44									
Dim. S	22,4	41,4	54,0	55,6	66,6	112,7	54,0	66,8		112,7									

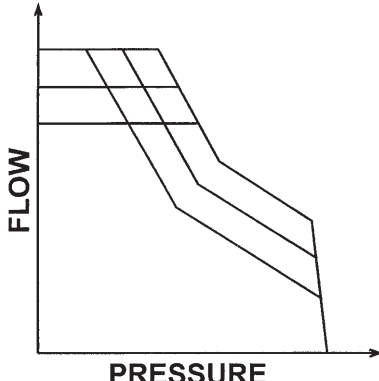
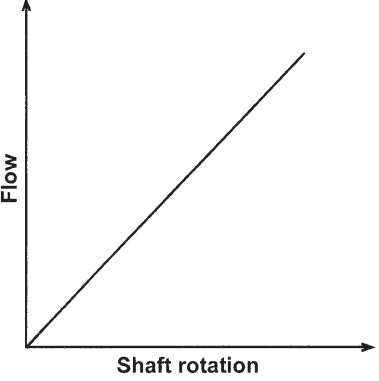
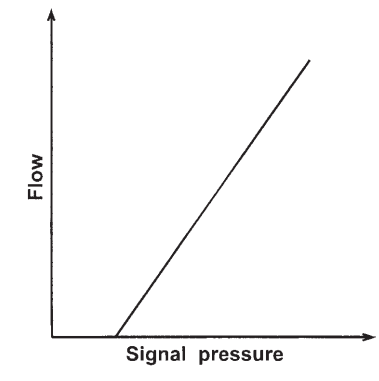
NOTE: Items in **bold** are SAE version and inches, *italic* dimensions are in millimeters

For more detailed information refer to the individual pump installation drawings. These are available on CD, contact your nearest sales representative or distributor.

CODE	DESCRIPTION	HYDRAULIC CIRCUIT
C	PRESSURE COMPENSATOR	
L	LOAD SENSING CONTROL	
J & K	TORQUE LIMITER WITH PRESSURE COMPENSATOR	

TYPICAL PERFORMANCE	DESCRIPTION OF OPERATION																																																																							
Minimum compensating pressure 250 PSI, 17,2 bar, pilot flow 115 in³/min. (1.9 L/min). 	When the pump operating pressure is below the compensator setting, a spring plus a piston pushes the stroking piston and the hanger toward full stroke. The stroking cylinder is connected to the case drain via the compensator spool. When the pump operating pressure reaches the compensator pressure setting, the pilot valve opens and a pressure drop is created over the orifice, causing the compensator spool to move against the spring force, directing pump discharge pressure to the stroking cylinder. The pump will destroke to maintain set pressure. When the pump operating pressure decreases below the compensator setting, the pilot valve will close and the compensator spool will move under spring force to its offset position, connecting the stroking cylinder to case. The spring plus the piston will move the stroking piston toward full displacement. <table border="1"><thead><tr><th colspan="3">RESPONSE TIMES</th></tr><tr><th></th><th>Off stroke time</th><th>on stroke time</th></tr></thead><tbody><tr><td>P05/P80</td><td>0.06</td><td>0.11</td></tr><tr><td>P07/P110</td><td>0.07</td><td>0.13</td></tr><tr><td>P09/P140</td><td>0.06</td><td>0.11</td></tr><tr><td>P12/P200*</td><td>0.09</td><td>0.15</td></tr><tr><td>P16/P260</td><td>0.10</td><td>0.15</td></tr></tbody></table>	RESPONSE TIMES				Off stroke time	on stroke time	P05/P80	0.06	0.11	P07/P110	0.07	0.13	P09/P140	0.06	0.11	P12/P200*	0.09	0.15	P16/P260	0.10	0.15																																																		
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	The "L" compensator utilizes a modulating valve to isolate the load from compensator pilot flow. The load sensing port detects the load pressure and establishes the pressure on the vent port of the compensator at 50 psi, 3,4 bar above the load pressure. By adjusting the differential pressure across the compensator spool, the compensator establishes pump outlet pressure at 200 to 350 psi, 13,8 to 24,1 bar above the load pressure. The customer valve, by metering pump flow at a fixed pressure drop, becomes a flow control. The pump supplies only the required flow, at 200 to 350 psi, 13,8 to 24,1 bar above the load pressure.																																																																							
	The torque limiter is mounted on the control piston cap, full stroke side. One side of the spool is connected to the vent port of the compensator, the other to case. As system pressure increases, force on the spool overcomes the spring force shifting the spool to allow the flow to bleed off to case. This maintains the pressure and spring forces on the compensator spool. Once the system pressure overcomes the pressure plus spring force the compensator spool shifts and the pump begins to reduce displacement. Once the displacement is reduced, a higher pressure is required to overcome the compensator spring load at this new position. Thereby, pressure and pump stroke are inversely related. The slope of the pressure/stroke curve is determined by the spring rate. At low pressure a single spring is in contact with the spool. As pressure increases, a second spring joins the first to increase the rate of change of pressure vs. stroke. To cover a range of torques, two versions are offered, "J" for low torque values and "K" for high. Maximum pressure limits are controlled by the compensator settings. <table border="1"><thead><tr><th colspan="9">Torque values for Torque Limiter and Torque Limiter Override controls</th></tr><tr><th rowspan="2">Model</th><th colspan="4">J or V</th><th colspan="4">K or W</th></tr><tr><th>Min. lb.-in.</th><th>Nm</th><th>Max. lb.-in.</th><th>Nm</th><th>Min. lb.-in.</th><th>Nm</th><th>Max. lb.-in.</th><th>Nm</th></tr></thead><tbody><tr><td>P05/080</td><td>800</td><td>90</td><td>1500</td><td>170</td><td>1500</td><td>170</td><td>3500</td><td>396</td></tr><tr><td>P07/110</td><td>1100</td><td>124</td><td>1850</td><td>209</td><td>1850</td><td>209</td><td>5300</td><td>599</td></tr><tr><td>P09/140</td><td>1400</td><td>158</td><td>2200</td><td>249</td><td>2200</td><td>249</td><td>6000</td><td>678</td></tr><tr><td>P12/200</td><td>1850</td><td>209</td><td>3400</td><td>384</td><td>3400</td><td>384</td><td>8000</td><td>905</td></tr><tr><td>P16/260</td><td>2500</td><td>283</td><td>6000</td><td>678</td><td>6000</td><td>678</td><td>10000</td><td>1129</td></tr></tbody></table>	Torque values for Torque Limiter and Torque Limiter Override controls									Model	J or V				K or W				Min. lb.-in.	Nm	Max. lb.-in.	Nm	Min. lb.-in.	Nm	Max. lb.-in.	Nm	P05/080	800	90	1500	170	1500	170	3500	396	P07/110	1100	124	1850	209	1850	209	5300	599	P09/140	1400	158	2200	249	2200	249	6000	678	P12/200	1850	209	3400	384	3400	384	8000	905	P16/260	2500	283	6000	678	6000	678	10000	1129
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CODE	DESCRIPTION	HYDRAULIC CIRCUIT
V & W	TORQUE LIMITER WITH LOAD SENSING PRESSURE COMPENSATOR	
R	MANUAL ROTARY SERVO	
H	HYDRAULIC STROKER	

TYPICAL PERFORMANCE	DESCRIPTION OF OPERATION																																																																							
	The V and W control offers the ability to control the torque and still operate as load sensing. The control operates as a load sense up to the point where pressure and flow cause torque to exceed the torque limiter setting. At this point the torque limiter destrokes the pump to the given setting. A modulating valve on the vent line isolates the load from compensator pilot flow; therefore protecting any sensitive valves that may be in the system. The V control is for low torque, and the W control is for high torque. Remote control of the pressure compensator of the torque limiter is also possible. The maximum pressure limit is controlled by the compensator setting. <table border="1"><caption>Torque values for Torque Limiter and Torque Limiter Override controls</caption><thead><tr><th rowspan="2">Model</th><th colspan="4">J or V</th><th colspan="4">K or W</th></tr><tr><th colspan="2">Min.</th><th colspan="2">Max.</th><th colspan="2">Min.</th><th colspan="2">Max.</th></tr><tr><th></th><th>lb.-in.</th><th>Nm</th><th>lb.-in.</th><th>Nm</th><th>lb.-in.</th><th>Nm</th><th>lb.-in.</th><th>Nm</th></tr></thead><tbody><tr><td>P05/080</td><td>800</td><td>90</td><td>1500</td><td>170</td><td>1500</td><td>170</td><td>3500</td><td>396</td></tr><tr><td>P07/110</td><td>1100</td><td>124</td><td>1850</td><td>209</td><td>1850</td><td>209</td><td>5300</td><td>599</td></tr><tr><td>P09/140</td><td>1400</td><td>158</td><td>2200</td><td>249</td><td>2200</td><td>249</td><td>6000</td><td>678</td></tr><tr><td>P12/200</td><td>1850</td><td>209</td><td>3400</td><td>384</td><td>3400</td><td>384</td><td>8000</td><td>905</td></tr><tr><td>P16/260</td><td>2500</td><td>283</td><td>6000</td><td>678</td><td>6000</td><td>678</td><td>10000</td><td>1129</td></tr></tbody></table>	Model	J or V				K or W				Min.		Max.		Min.		Max.			lb.-in.	Nm	lb.-in.	Nm	lb.-in.	Nm	lb.-in.	Nm	P05/080	800	90	1500	170	1500	170	3500	396	P07/110	1100	124	1850	209	1850	209	5300	599	P09/140	1400	158	2200	249	2200	249	6000	678	P12/200	1850	209	3400	384	3400	384	8000	905	P16/260	2500	283	6000	678	6000	678	10000	1129
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Maximum servo pressure 1500 psi, 103 bar 	The manual rotary servo control is located on the control piston cap, minimum stroke side. A shaft, when rotated, causes linear motion on a spool. The spool contains a passage which is opened or blocked by a sleeve. This passage meters pilot flow on one end of a four-way valve. The sleeve is connected by a linkage to the control piston. The four-way valve connects servo and tank to the control piston, causing motion in the direction to follow the motion of the spool. Backlash is minimized by spring loading on the linkages. Stroke time is affected by servo pressure, system pressure, and servo flow. Maximum servo pressure is 1500 psi, 103 bar. <table border="1"><caption>Servo shaft rotation, zero to full stroke</caption><thead><tr><th>P05/080</th><th>P07/110</th><th>P09/140</th><th>P12/200</th><th>P16/260</th></tr></thead><tbody><tr><td>47-52°</td><td>47-52°</td><td>52-57°</td><td>60-65°</td><td>65-70°</td></tr></tbody></table>	P05/080	P07/110	P09/140	P12/200	P16/260	47-52°	47-52°	52-57°	60-65°	65-70°																																																													
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	The hydraulic stroker control is located on the control piston cap, minimum stroke side. The hydraulic stroker is obtained by replacing the rotary servo shaft and cam mechanism of the rotary servo configuration with a spring loaded hydraulic piston coupled to the spool. The piston is spring biased to initially stroke the pump to zero displacement. Pilot pressure applied to the piston causes the spool to move in proportion to pressure, thereby causing the pump to go on stroke in proportion to pilot pressure. Typical hysteresis is 7%. Maximum pilot pressure in the control port is 1000 psi, 70 bar. Maximum servo pressure is 1500 psi, 103 bar. <table border="1"><caption>Hydraulic stroker signal pressure vs stroke</caption><thead><tr><th></th><th>P05/080</th><th>P07/110</th><th>P09/140</th><th>P12/200</th><th>P16/260</th></tr></thead><tbody><tr><td>zero stroke psi</td><td>50</td><td>50</td><td>50</td><td>50</td><td>50</td></tr><tr><td>zero stroke bar</td><td>3,4</td><td>3,4</td><td>3,4</td><td>3,4</td><td>3,4</td></tr><tr><td>full stroke psi</td><td>225</td><td>232</td><td>245</td><td>272</td><td>283</td></tr><tr><td>full stroke bar</td><td>15,4</td><td>16</td><td>16,9</td><td>18,8</td><td>19,5</td></tr></tbody></table>		P05/080	P07/110	P09/140	P12/200	P16/260	zero stroke psi	50	50	50	50	50	zero stroke bar	3,4	3,4	3,4	3,4	3,4	full stroke psi	225	232	245	272	283	full stroke bar	15,4	16	16,9	18,8	19,5																																									
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CODE	DESCRIPTION	HYDRAULIC CIRCUIT
E	ELECTRIC STROKER	
X	PQ CONTROL (available soon on all models)	

**PRIMARY CONTROL OPTIONS
MAXIMUM VOLUME SCREW**

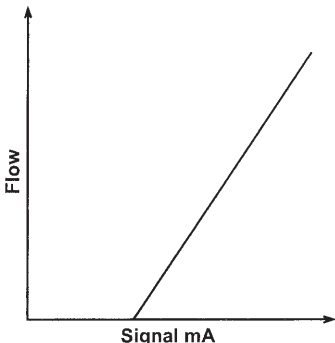
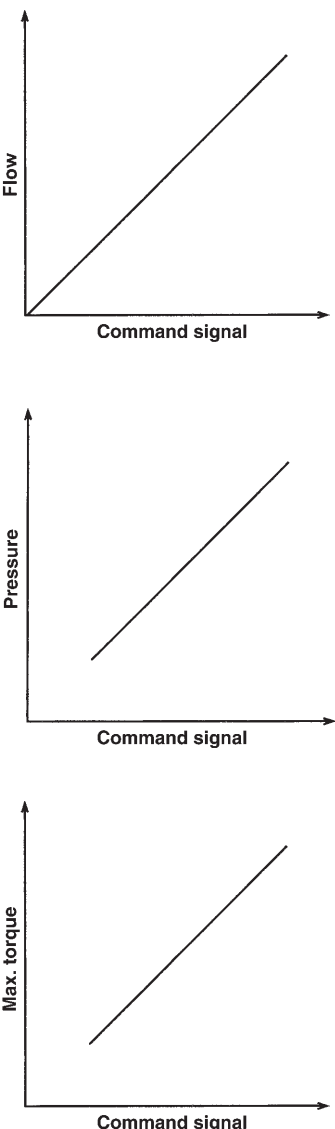
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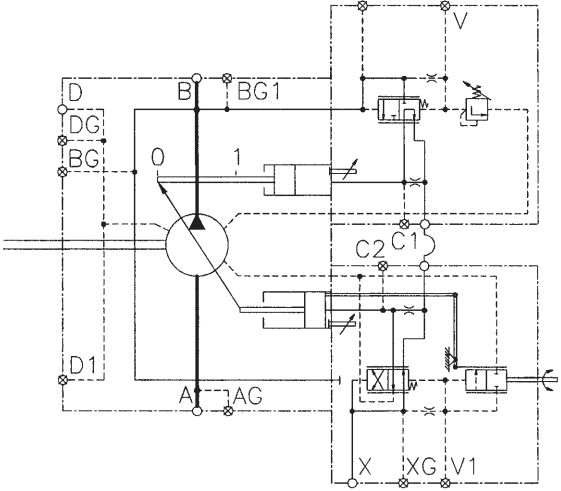
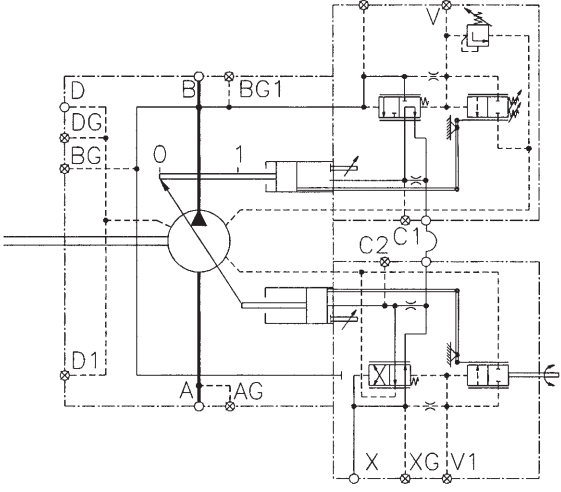
The standard maximum volume stop is an adjustment screw. To reduce volume, remove the plug on the end of the cover, loosen the cover, and turn the adjusting screw clockwise.

**HANDWHEEL MAXIMUM
VOLUME STOP**

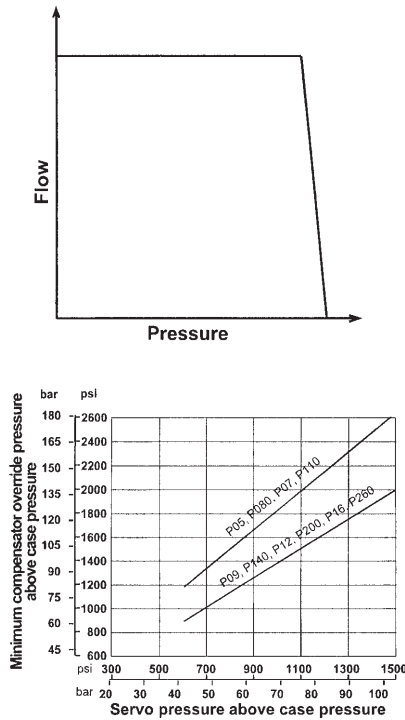
code 2

An optional handwheel maximum volume stop is available on the pressure compensator, load sensing and torque limiter controls. To reduce volume, loosen the locknut below the handwheel and turn the handwheel clockwise.

TYPICAL PERFORMANCE	DESCRIPTION OF OPERATION																														
	The electric stroker consists of the hydraulic stroker with an electrically modulated pressure control valve mounted. Pump stroke may be controlled with an electrical signal which controls the pressure to the control port of the hydraulic stroker. Servo pressure, not to exceed 1500 psi, (103 bar) is supplied to the inlet port on the electrically modulated pressure control valve. The Jupiter Driver card, S20-14078 or the Micro Proportional Driver plug, S20-14116 may be used to control the electric stroker. A 12 Volt coil is also available. Typical hysteresis 5%. <table border="1"><caption>Electrohydraulic stroker signal mA vs stroke</caption><thead><tr><th></th><th>P05/080</th><th>P07/110</th><th>P09/140</th><th>P12/200</th><th>P16/260</th></tr></thead><tbody><tr><td>zero stroke mA, 24 vdc</td><td>175</td><td>175</td><td>175</td><td>175</td><td>175</td></tr><tr><td>zero stroke mA, 12 vdc</td><td>350</td><td>350</td><td>350</td><td>350</td><td>350</td></tr><tr><td>full stroke mA, 24 vdc</td><td>273</td><td>276</td><td>283</td><td>295</td><td>300</td></tr><tr><td>full stroke mA, 12 vdc</td><td>546</td><td>552</td><td>566</td><td>590</td><td>600</td></tr></tbody></table>		P05/080	P07/110	P09/140	P12/200	P16/260	zero stroke mA, 24 vdc	175	175	175	175	175	zero stroke mA, 12 vdc	350	350	350	350	350	full stroke mA, 24 vdc	273	276	283	295	300	full stroke mA, 12 vdc	546	552	566	590	600
	P05/080	P07/110	P09/140	P12/200	P16/260																										
zero stroke mA, 24 vdc	175	175	175	175	175																										
zero stroke mA, 12 vdc	350	350	350	350	350																										
full stroke mA, 24 vdc	273	276	283	295	300																										
full stroke mA, 12 vdc	546	552	566	590	600																										
	The PQ Control provides very rapid electronic control of displacement for high performance requirements. A proportional valve directs oil from the pump outlet to the control piston, and from the opposite end of the control piston to reservoir. The PQ Driver card 020-14133 has been designed to control the PQ control. Feedback signals of valve position, pump displacement, and system pressure are compared with set values to limit pump displacement, pressure and input torque to the set values. A flange mounted preload valve and system relief valve, S26-86840, has been designed to maintain the required minimum control pressure of 300 psi, 20,7 bar and to also provide pressure control in case of electrical malfunction. Control pressure may also be provided from an external source to port "X".																														

CODE	DESCRIPTION	HYDRAULIC CIRCUIT
E1P H1P R1P	COMPENSATOR OVERRIDE	
E1J E1K H1J H1K R1J R1K	TORQUE LIMITER OVERRIDE, INCLUDING PRESSURE COMPENSATOR OVERRIDE	

TYPICAL PERFORMANCE

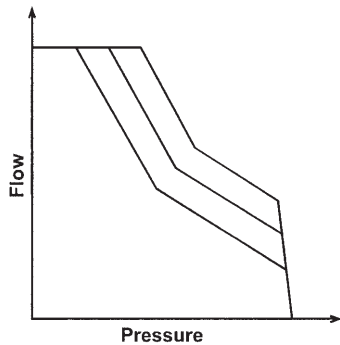


DESCRIPTION OF OPERATION

The pressure compensator override is located in the control piston cap, full stroke side. It may be installed with any of the three position controls, (servo, hydraulic, or electrohydraulic stroker). When pressure exceeds compensator setting, the compensator override ports system pressure into the off-stroke side of the control cylinder and blocks that flow path to the servo, hydraulic or electrohydraulic stroker. When system pressure is below the compensator override setting, the primary control functions to control pump stroke. Compensator override pressure must be sufficient to overcome servo pressure applied to the opposite side of the control piston.

RESPONSE TIMES, sec. at 800 psi (55 bar) servo pressure

	Off stroke time	on stroke time
P05/P80	0.06	.20
P07/P110	0.07	.20
P09/P140	0.06	.25
P12/P200		
P16/P260	0.10	.30

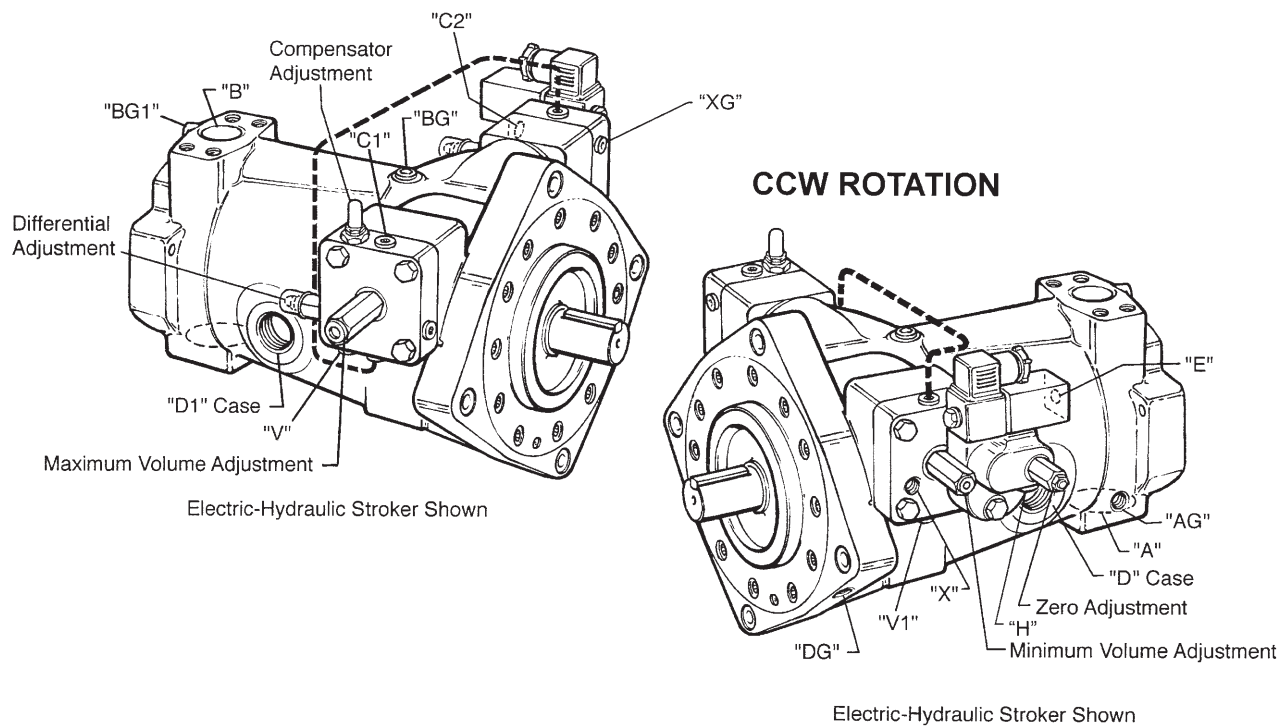


The torque limiter override is located in the control piston cap, full stroke side. It may be installed with any of the three position controls, (servo, hydraulic or electrohydraulic stroker). As with the pressure compensator override, the torque limiter override directs oil into the cylinder to overcome the servo pressure signal on the opposite side, causing the control cylinder to reduce stroke when the torque limiter setting is reached.

Minimum torque limiter
override settings as a function of servo pressure

Servo pressure (psi)	P05/080	P07/110	P09/140	P12/200	P16/260	Minimum torque
700			1800	2500	3100	lb.-in
800	1400	1800				lb.-in
1500	2700	3500	3400	4800	6200	lb.-in

Servo pressure (bar)	P05/080	P07/110	P09/140	P12/200	P16/260	Minimum torque
48			203	283	350	Nm
55	158	203				Nm
103	305	396	384	542	701	Nm



FLUID CONNECTIONS

DESCRIPTION

PORT A	INLET
PORT B	SYSTEM
PORT C1	OFF-STROKE CYL. GAGE
PORT C2	ON-STROKE CYL. GAGE
PORT D	CASE DRAIN
PORT D1	CASE DRAIN
PORT DG	DRAIN GAGE, AIR BLEED PORT
PORT AG	INLET GAGE
PORT BG	SYSTEM GAGE
PORT BG1	ALT. SYS. GAGE
PORT E	ELECTROHYDRAULIC STROKER SERVO SUPPLY
PORT H	HYDRAULIC STROKER SIGNAL
PORT LS	LOAD SENSING LINE (SEE PAGE 10)
PORT V	COMPENSATOR, TORQUE LIMITER, LOAD SENSING VENT
PORT V	OVERRIDE COMP, OVERRIDE TORQUE LIMITER VENT
PORT V1	SERVO VENT
PORT X	SERVO SUPPLY
PORT XG	SERVO GAGE

ORDERING CODE

Premier pumps										Model number sheet									
Example model code:										Revised 6/24/02									
Pump	P	16	H	-02	R	1	*	-C	0	0	-C	0							
Displacement	P																		
4.9 cu.in./rev.		05																	
80.3 cc/rev.		080																	
6.7 cu.in./rev.		07																	
109.8 cc/rev.		110																	
8.6 cu.in./rev.		09																	
140.9 cc/rev.		140																	
12.2 cu.in./rev.		12																	
200.0 cc/rev.		200																	
16.0 cu.in./rev.		16																	
262.2 cc/rev.		260																	
Style																			
High speed (>1800 RPM)(for P16/260 only)		H																	
Quiet (for P16/260 only)		Q																	
All other sizes		leave blank																	
Shaft																			
Keyed - SAE or ISO		-02																	
Splined - SAE or ISO		-03																	
Splined - SAE high torque (P16 only)		-05																	
Keyed - DIN (metric pumps only) (DIN 40mm for sizes 080 & 110, DIN 50mm for sizes 140 & 200, DIN 60mm for size 260)		-06																	
Splined - DIN (metric pumps only) (DIN 40mm for sizes 080 & 110, DIN 50mm for sizes 140 & 200, DIN 60mm for size 260)		-07																	
Keyed - DIN (DIN 60mm for size 200 only)		-08																	
Splined - DIN (DIN 60mm for size 200 only)		-09																	
Rotation																			
Clockwise		R																	
Counter-clockwise		L																	
Seals																			
Nitrile (Buna-N)		1																	
EPR (pump will be unpainted unless otherwise specified)		4																	
Fluorocarbon (Viton)		5																	
Design letter (assigned by manufacturer)							*												
Primary controls																			
Compensator		-C																	
Load sensing compensator (50 PSI pressure drop)		-L																	
Load sensing compensator (200 PSI pressure drop)		-M																	
Rotary servo		-R																	
Hydraulic servo		-H																	
Electro-hydraulic servo		-E																	
Low torque limiter		-J																	
High torque limiter		-K																	
Load sensing (L) + low torque limiter (J)		-V																	
Load sensing (L) + high torque limiter (K)		-W																	
PQ high response		-X																	
Load sensing (M) + low torque limiter (J)		-Y																	
Load sensing (M) + high torque limiter (K)		-Z																	
Primary control options																			
Max. volume screw without indicator		1																	
Handwheel max. volume control without indicator (not available w/ R, H, E, & X primary controls)		2																	
Max. volume screw with potentiometer		3																	
Max. volume screw with LVDT		4																	
Max. volume screw with mechanical cam angle indicator		5																	
Handwheel max. volume control with potentiometer (not available w/ R, H, E, & X primary controls)		6																	
Handwheel max. volume control with LVDT (not available w/ R, H, E, & X primary controls)		7																	
Handwheel max. volume control with mechanical cam angle indicator (not available w/ R, H, E, & X primary controls)		8																	
Secondary controls																			
None		0																	
Compensator override (for E, H, & R primary controls only)		P																	
Low torque limiter override (for E, H, & R primary controls only)		J																	
High torque limiter override (for E, H, & R primary controls only)		K																	
External drive																			
None		-0																	
rear blanking plate		-M																	
SAE-A (SAE 82-2) with SAE-A (SAE 16-4) coupling		-A																	
SAE-A (SAE 82-2) with SAE-B (SAE 22-4) coupling		-G																	
SAE-B (SAE 101-2 & SAE 101-4) with SAE-B (SAE 22-4) coupling		-B																	
SAE-B (SAE 101-2 & SAE 101-4) with SAE-BB (SAE 25-4) coupling		-Q																	
SAE-C (SAE 127-2 & SAE 127-4) with SAE-C (SAE 32-4) coupling		-C																	
SAE-C (SAE 127-2 & SAE 127-4) with SAE-CC (SAE 38-4) coupling		-N																	
SAE-D (SAE 152-2 & SAE 152-4) with SAE-D & SAE-E (SAE 44-4) coupling		-D																	
SAE-E (SAE 165-2 & SAE 165-4) with SAE-D & SAE-E (SAE 44-4) coupling (P12/200 and P16/260 only)		-E																	
ISO 180 B4HW Flange, K40N coupling		-T																	
ISO 180 B4HW Flange, K50N coupling		-U																	
ISO 180 B4HW Flange, DIN 40-18 coupling (P16/260 only)		-L																	
ISO 180 B4HW Flange, DIN 50-24 coupling (P16/260 only)		-S																	
ISO 224 B4HW Flange, K50N coupling (P12/200 and P16/260 only)		-R																	
ISO 250 B4HW Flange, K50N coupling (P16/260 only)		-V																	
ISO 200 B4HW Flange, K50N coupling (P12/200 and P16/260 only)		-W																	
ISO 160 B4HW Flange, K40N coupling		-X																	
ISO 125 B4HW Flange, K32N coupling		-Y																	
ISO 100 B4HW Flange, K25N coupling		-Z																	
External mounting																			
No external pump mounted		0																	
External pump mounted (requires special modification "-M2")(must be separately specified)		1																	
Special modification																			
None													omit						
No paint													-NP						
Other special modification (examples: bronze caged barrel bearing for low viscosity fluids, mechanical shaft seal, hydrostatic cam, tandem pumps, etc.)													-M2						
Allowable controls																			
C10, C20, C30, C40, C50, C60, C70, C80, E10, E30, E40, E50, E1P, E3P, E4P, E5P, E1J, E3J, E4J, E5J, E1K, E3K, E4K, E5K																			
H10, H30, H40, H50, H1P, H3P, H4P, H5P, H1J, H3J, H4J, H5J, H1K, H3K, H4K, H5K, J10, J20, J30, J40, J50, J60, J70, J80																			
K10, K20, K30, K40, K50, K60, K70, K80, L10, L20, L30, L40, L50, L60, L70, L80, M10, M20, M30, M40, M50, M60, M70, M80																			
R10, R30, R40, R50, R1P, R3P, R4P, R5P, R1J, R3J, R4J, R5J, R1K, R3K, R4K, R5K, V10, V20, V30, V40, V50, V60, V70, V80																			
W10, W20, W30, W40, W50, W60, W70, W80, X10, X50, Y10, Y20, Y30, Y40, Y50, Y60, Y70, Y80, Z10, Z20, Z30, Z40, Z50, Z60, Z70, Z80																			

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