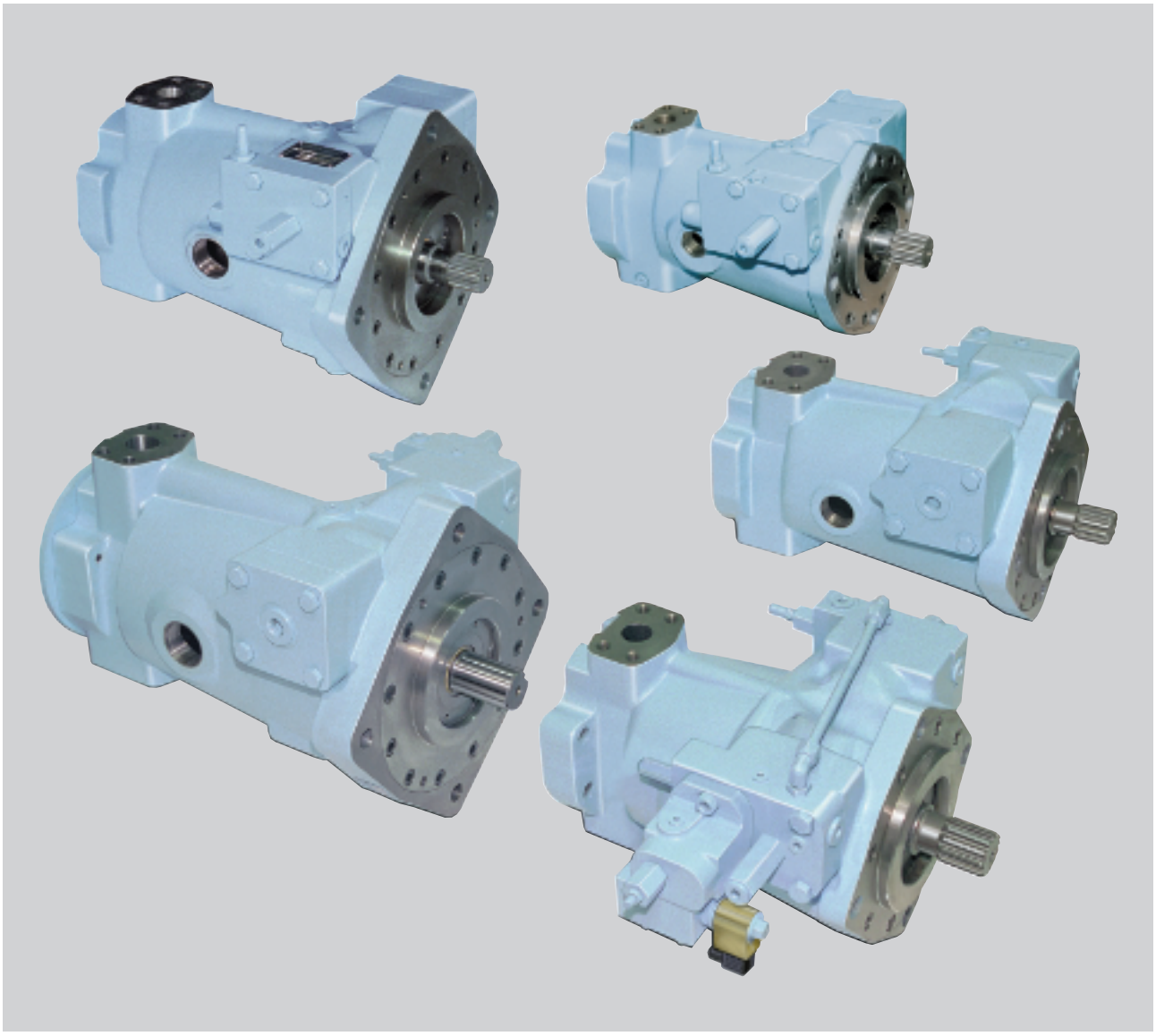
# DENISON HYDRAULICS

# *Premier Series*

# piston pumps for open circuits

# SAE, ISO & DIN



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DENISON Hydraulics

Internet: http://www.denisonhydraulics.com

ISO 9001

DNV

DNV Certification, Inc.

REGISTERED FIRM

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| Series | | Terms | P05/080 | P07/110 | P09/140 | P12/200 | P16/260 |
|---|---|---|---|---|---|---|---|
| **Displacement** | Max. displacement | **in³/rev.** | **4.9** | **6.7** | **8.6** | **12.2** | **16.0** |
| | | cm³/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** | **N/A** | **50-4 (F)** |
| **Weight** | | **lbs** | **156** | **177** | **220** | **300** | **325** |
| Mass | | kg. | 71 | 80 | 100 | 136 | 147 |
| **Rotating inertia** | | **lbs/in²** | **65** | **92** | **152** | **245** | see below |
| | | kg.m² | 0,019 | 0,027 | 0,044 | 0.072 | see below |
| **Rotating inertia** | **(P16/260H)** | **lbs/in²** | **-** | **-** | **-** | **-** | **349** |
| | | kg.m² | - | - | - | - | 0,102 |
| **Rotating inertia** | **(P16/260Q)** | **lbs/in²** | **-** | **-** | **-** | **-** | **360** |
| | | kg.m² | - | - | - | - | 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** |
| (compensator, torque limiter, or load sensing) | 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. | **psi** | **1500** | **1500** | **1050** | **1050** | **1050** |
| servo. (servo, electric & hydraulic stroker) | bar | 103 | 103 | 72,4 | 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

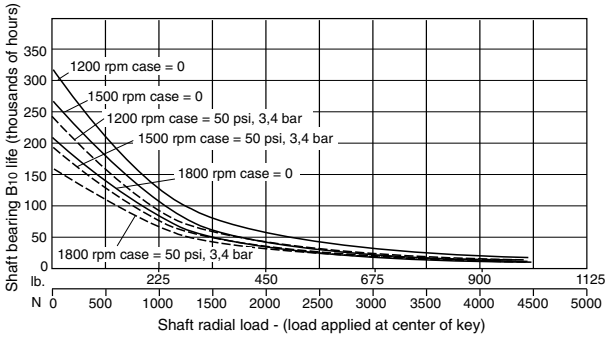
1) 10% of operation time, not exceeding 6 successive seconds

## REAR DRIVE TORQUE CAPACITY

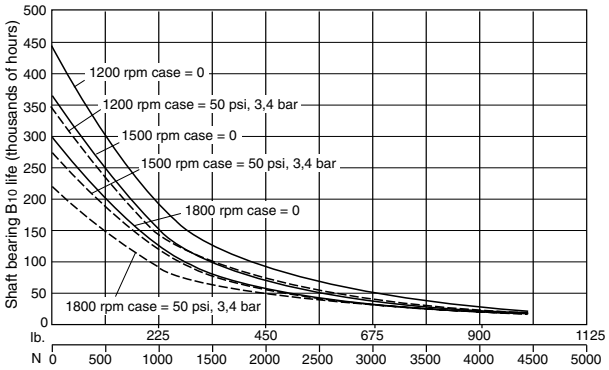
| SERIES | FRONT INPUT SHAFT TYPE | FRONT INPUT SHAFT TORQUE CAPACITY | REAR MOUNTINGS SAE A | B | C | D | E | ISO 100 | 125 | 160 | 180 | 200 | 224 | 250 | REAR OUTPUT SHAFT TORQUE CAPACITY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **P05** | **Keyed SAE 44-1(D)** | **11300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

## SHAFT BEARING LIFE

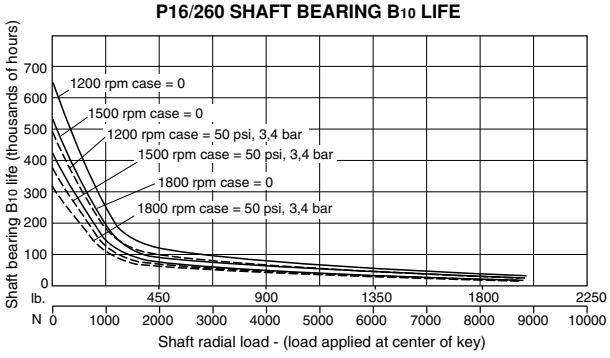
**P05/080 and P07/110 SHAFT BEARING $B_{10}$ LIFE**

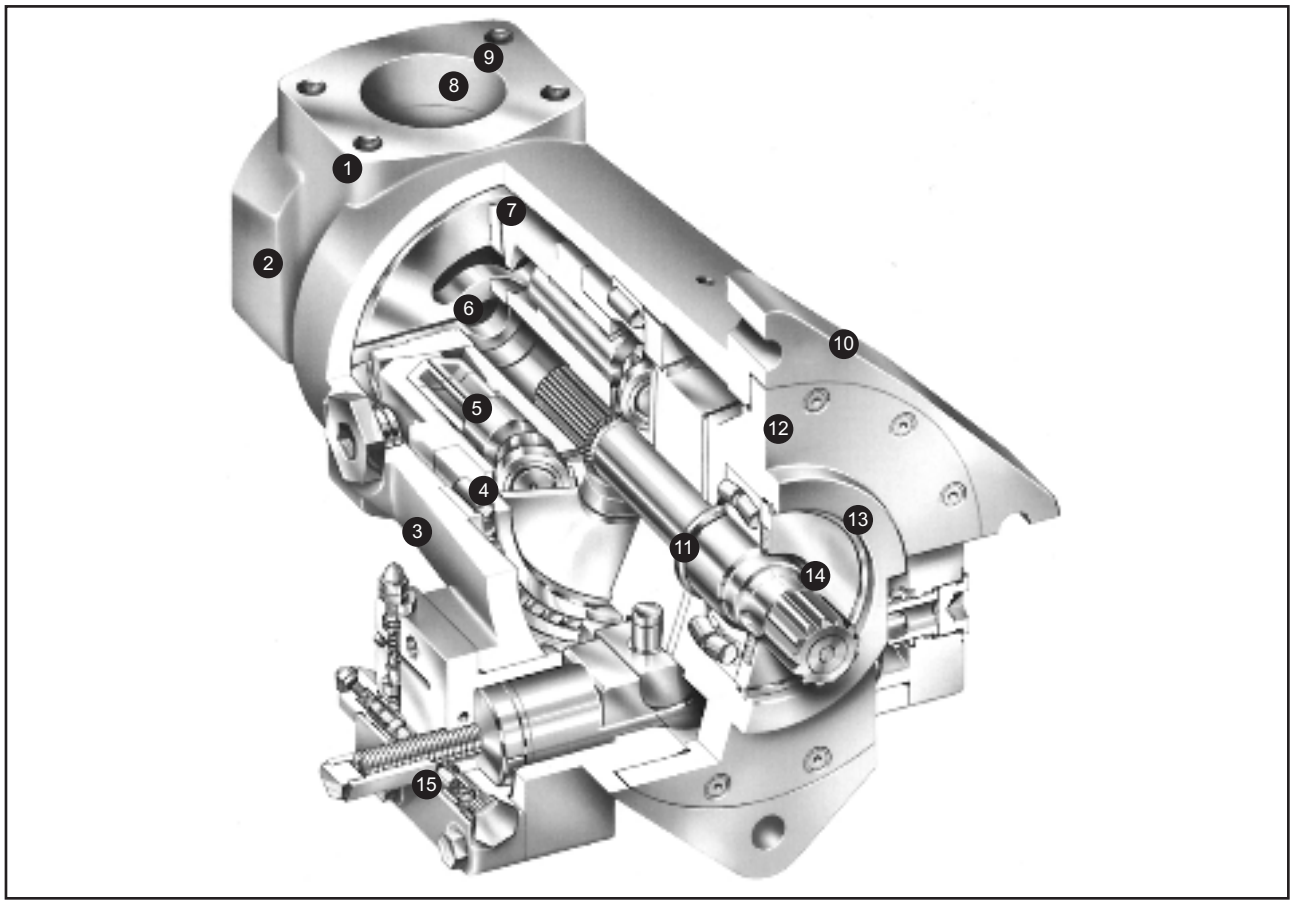



**P09/140 and P12/200 SHAFT BEARING $B_{10}$ LIFE**




**P16/260 SHAFT BEARING $B_{10}$ 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 ± .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

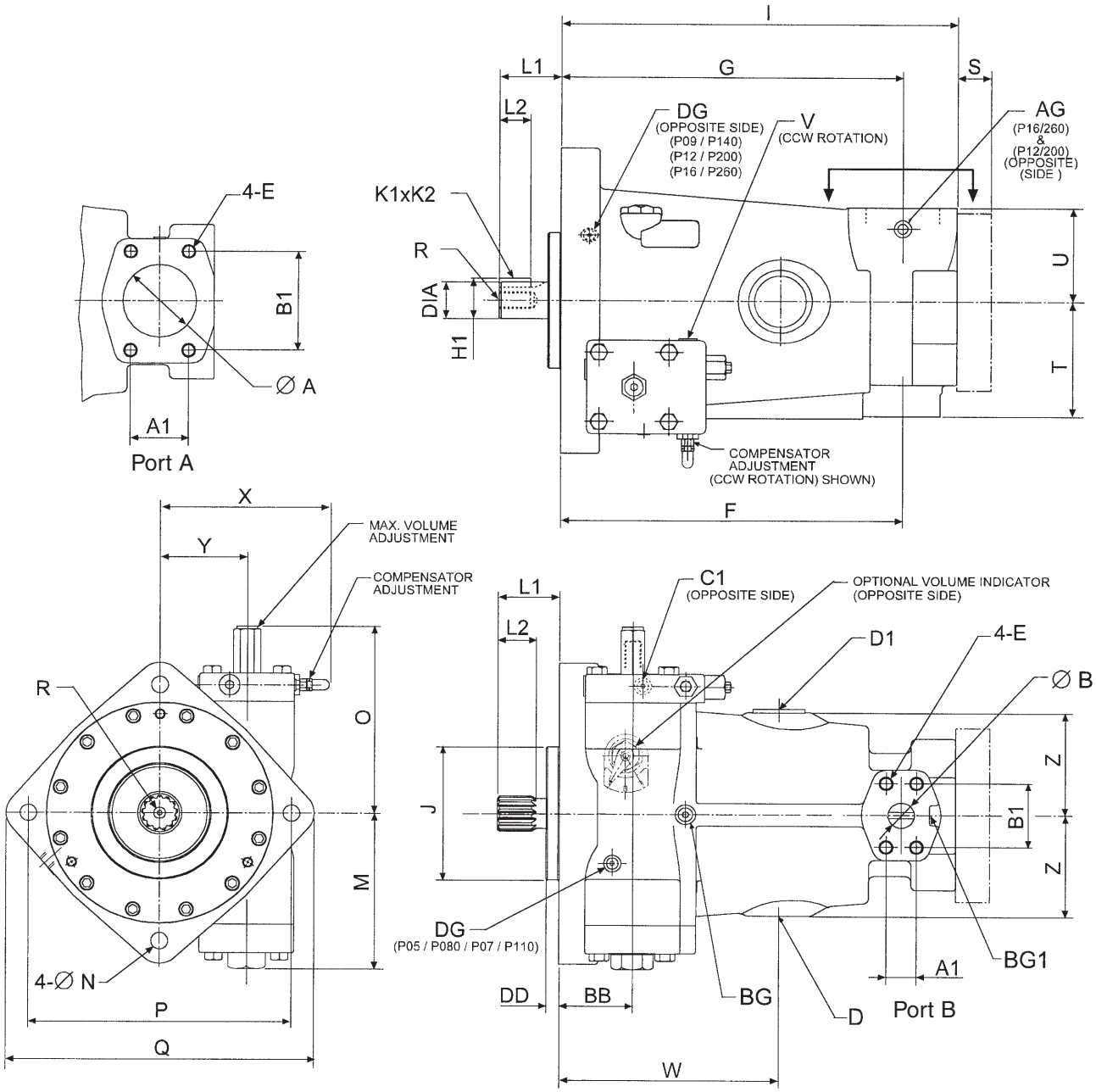
See DENISON HYDRAULICS bulletin **SPO-AM305** for more information

## 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.




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

* Without reardrive

** With reardrive

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

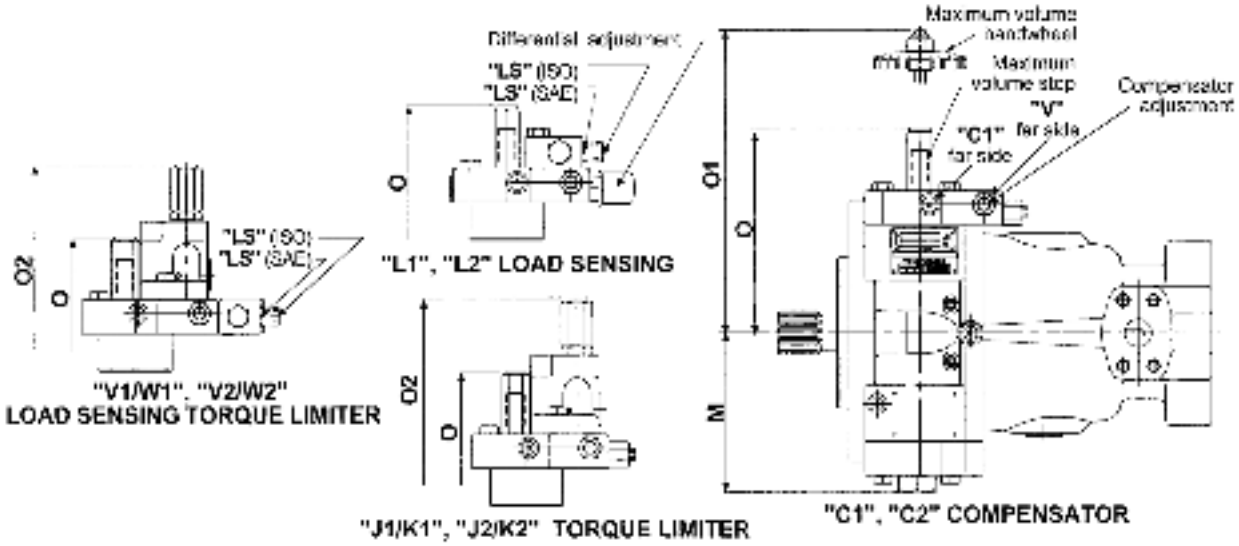
Items not bold are ISO version and millimeters in *italics*

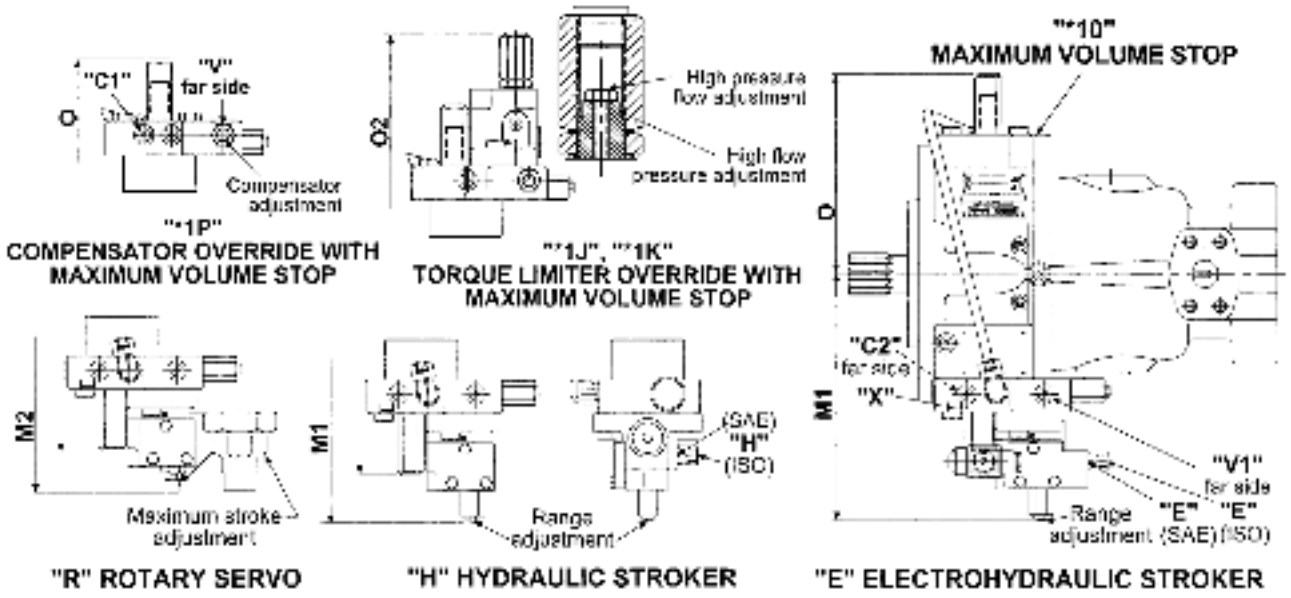
NOTE: For port identification see page 36.

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

| Ports | | Dimensions | | | | Threads | Ports | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ∅ 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**

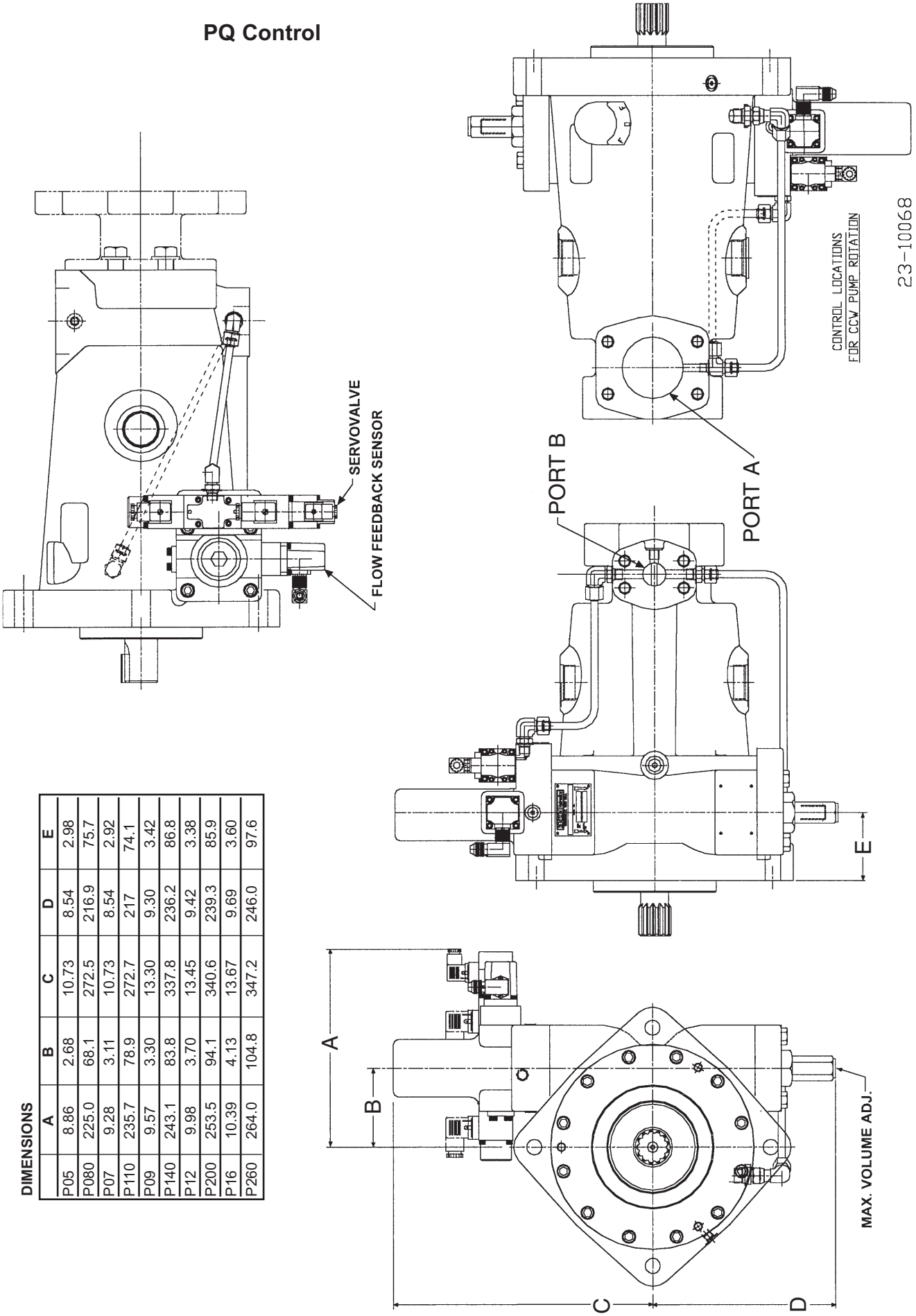
For clockwise rotation, the top and bottom control caps are interchanged.

| | "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 informance refer to the individual pump installation drawings. These are available on CD contact your nearest sales representative or distributor.

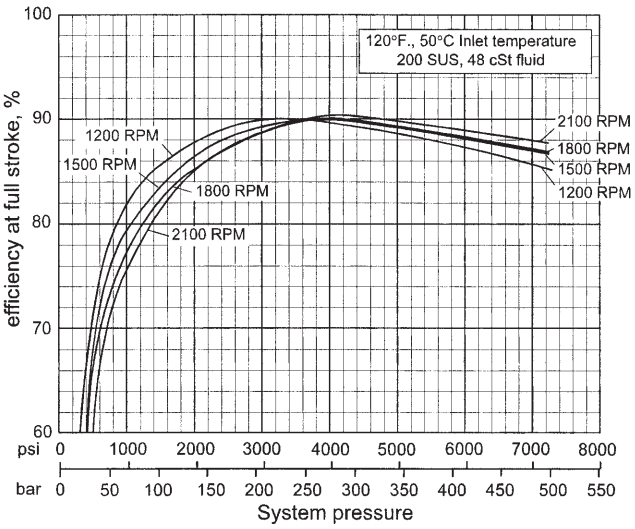
## PQ Control



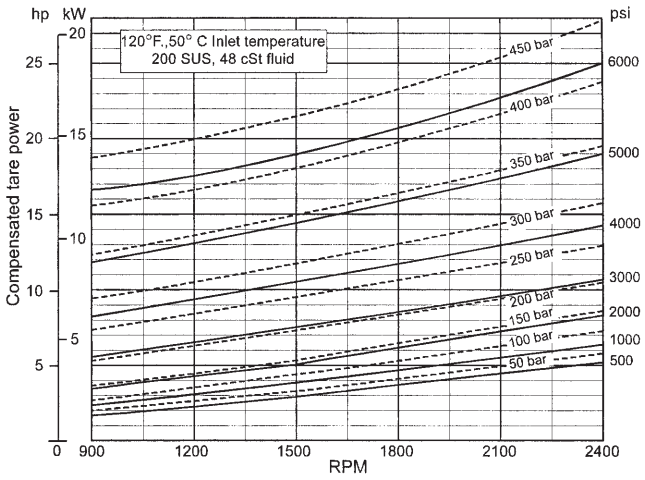

DIMENSIONS

| | 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 |

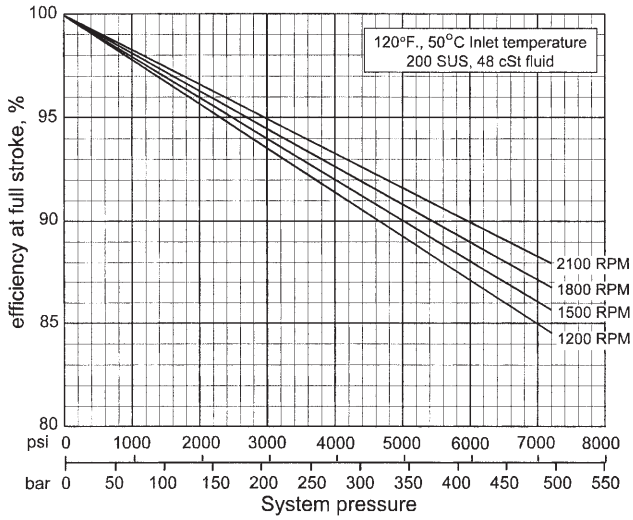
## OVERALL EFFICIENCY @ FULL STROKE



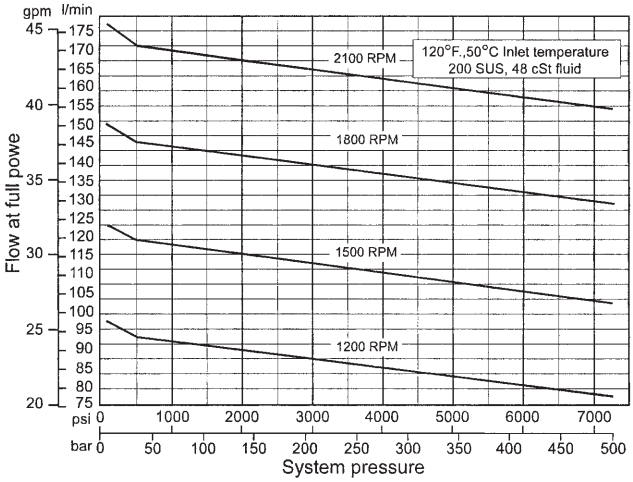

## COMPENSATED TARE POWER



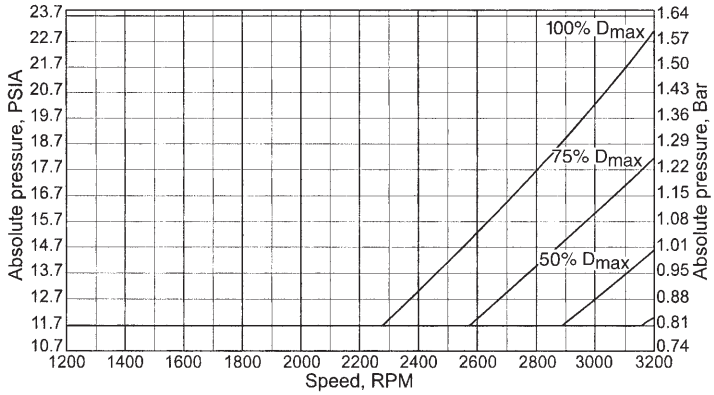

## VOLUMETRIC EFFICIENCY @ FULL STROKE




## FLOW VS PRESSURE @ FULL STROKE

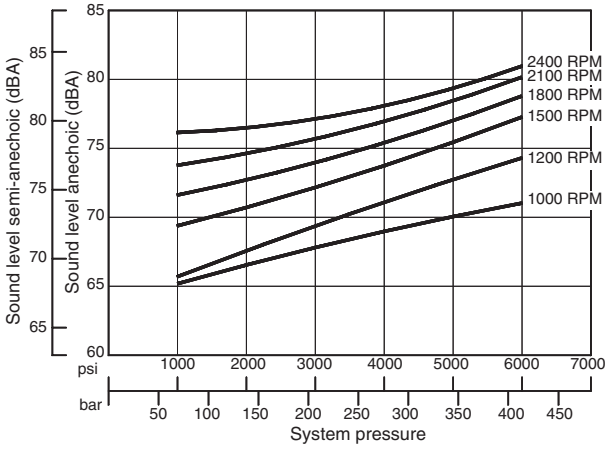



## INLET CONDITIONS

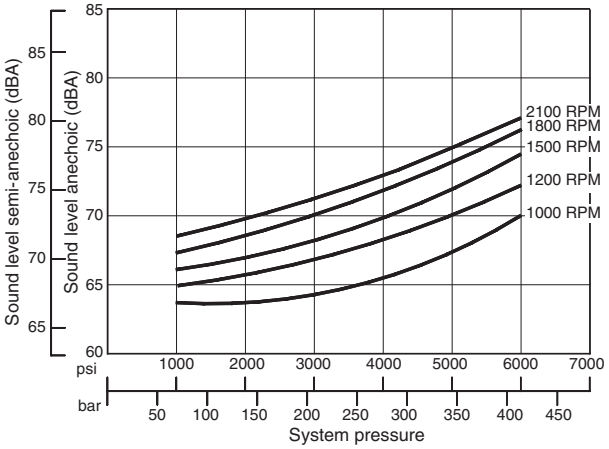



**Note:** The absolute inlet pressure is the pressure required to fill the pump with petroleum based fluids. The maximum pressure in the inlet port is 200 psi, 14 bar. For unboosted systems, the diameter of the suction line must be sized to allow a maximum velocity not higher than 4 ft/sec., 1,22 m/sec. 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

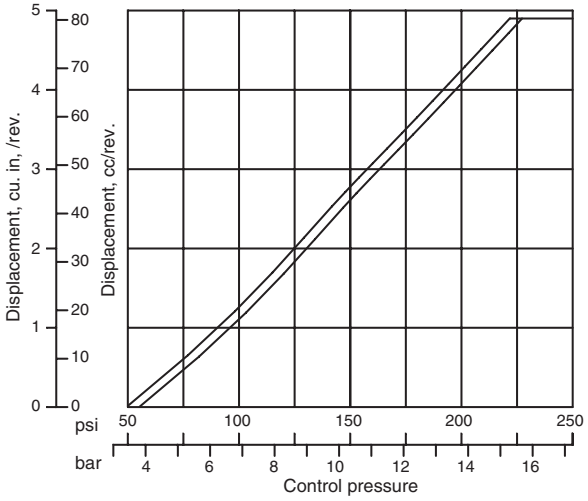



## SOUND PRESSURE LEVEL (dBA) COMPENSATED

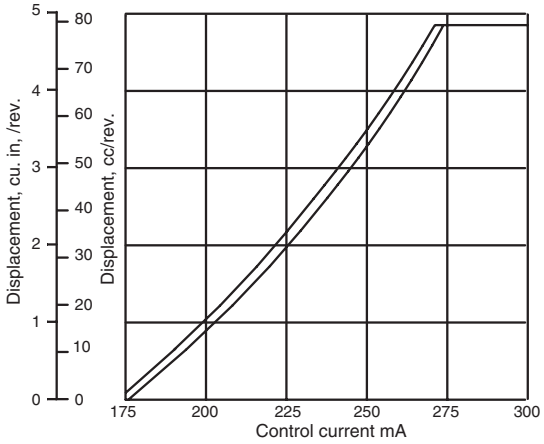



**Note:** Pump acoustical data was determined in accordance with ANSI/B93.71M, Hydraulic Fluid Power Pumps test code for the determination of airborne noise levels. Semi-anechoic values are presented according to the standard. Anechoic values are calculated for comparison with DIN 45635, part 1. The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

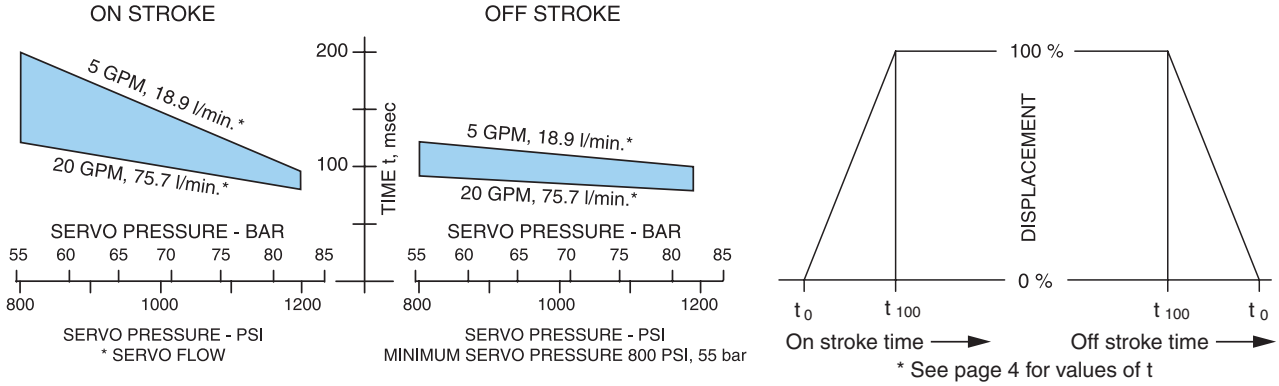
## HYDRAULIC STROKER




## ELECTROHYDRAULIC STROKER (24 VOLT)

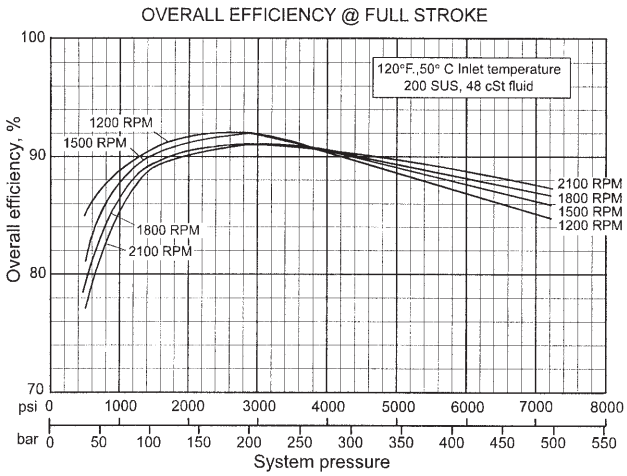



## STROKER RESPONSE VS SERVO PRESSURE, SERVO FLOW*

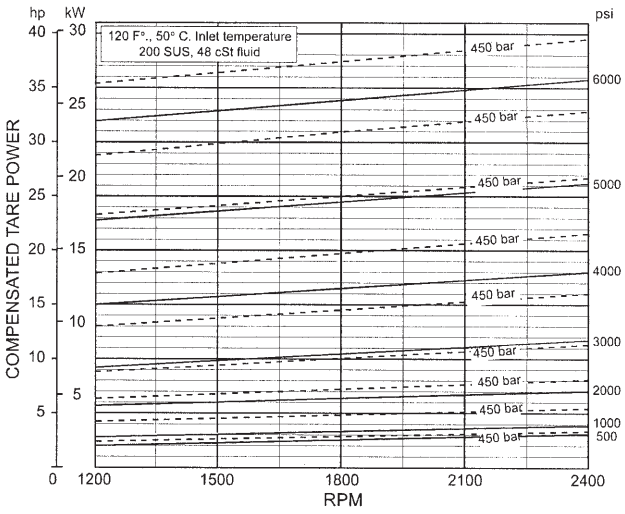



* See page 4 for values of t

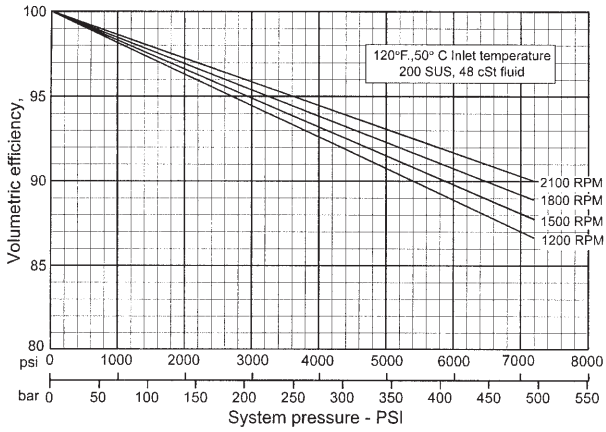
## OVERALL EFFICIENCY @ FULL STROKE



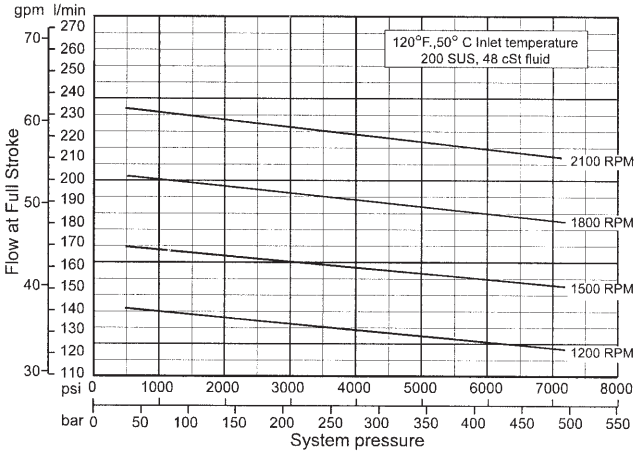

## COMPENSATED TARE POWER



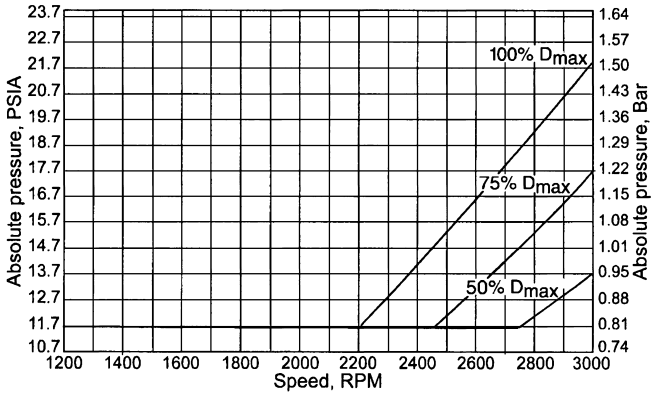

## VOLUMETRIC EFFICIENCY @ FULL STROKE




## FLOW VS PRESSURE @ FULL STROKE

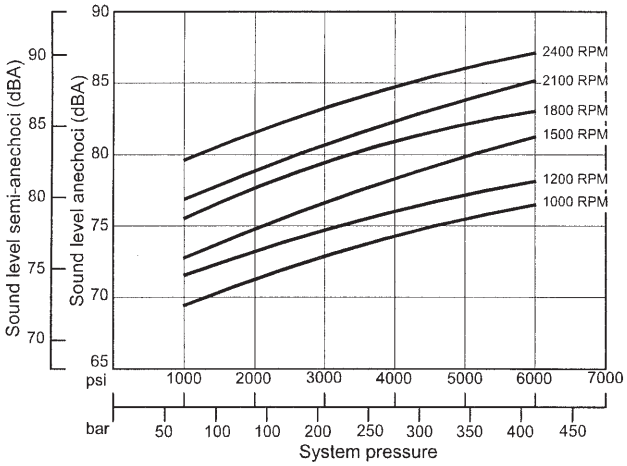



## INLET CONDITIONS

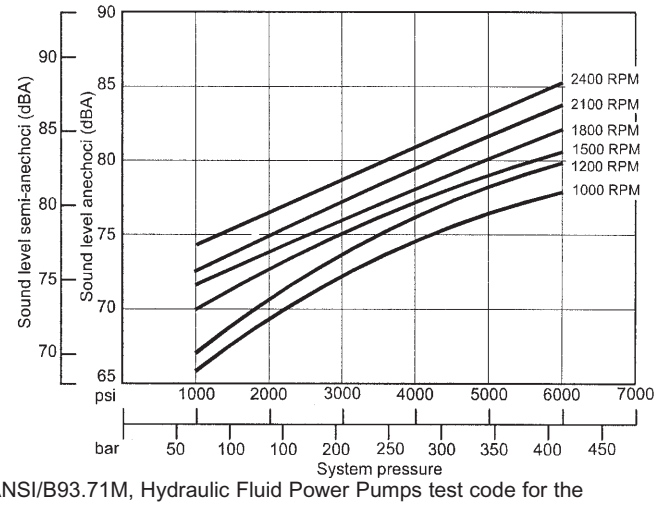



**Note:** The absolute inlet pressure is the pressure required to fill the pump with petroleum based fluids. The maximum pressure in the inlet port is 200 psi, 14 bar. For unboosted systems, the diameter of the suction line must be sized to allow a maximum velocity not higher than 4 ft/sec., 1,22 m/sec. 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

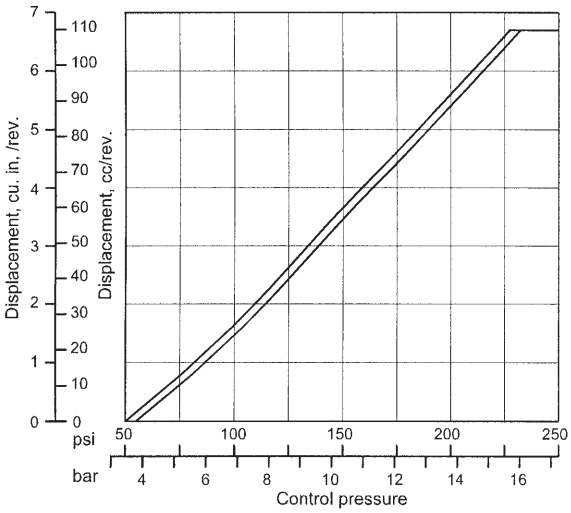



## SOUND PRESSURE LEVEL (dBA) COMPENSATED

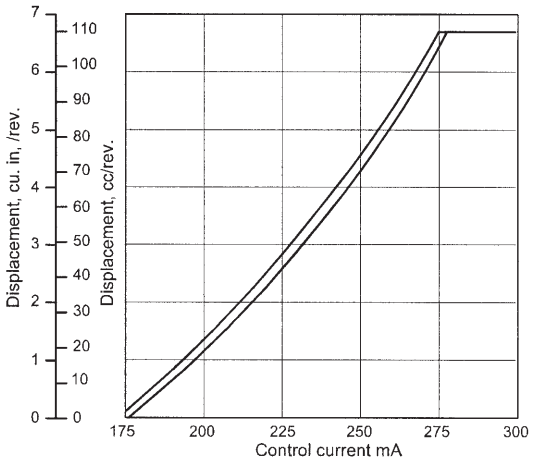



**Note:** Pump acoustical data was determined in accordance with ANSI/B93.71M, Hydraulic Fluid Power Pumps test code for the determination of airborne noise levels. Semi-anechoic values are presented according to the standard. Anechoic values are calculated for comparison with DIN 45635, part 1. The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

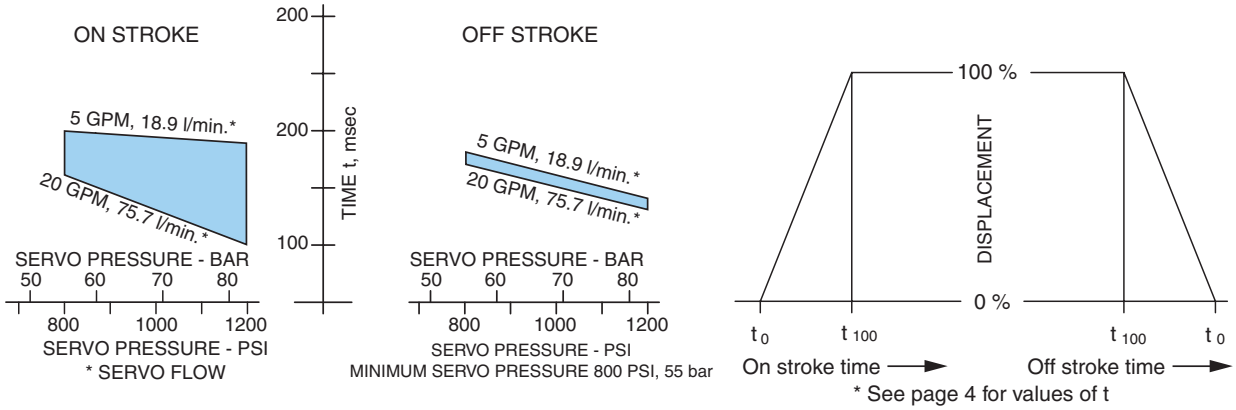
## HYDRAULIC STROKER



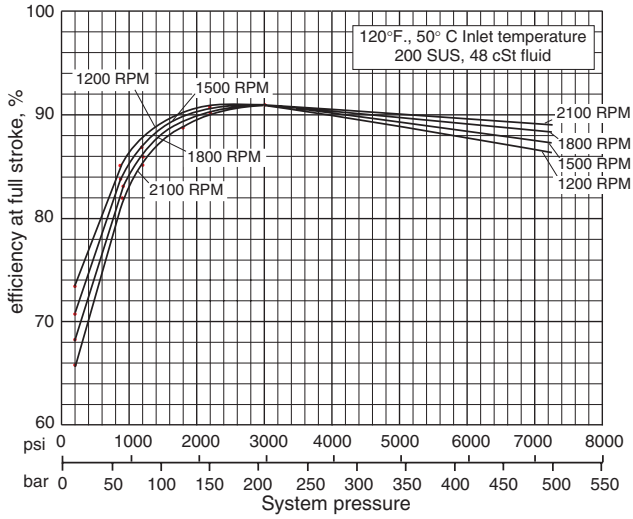

## ELECTROHYDRAULIC STROKER (24 VOLT)



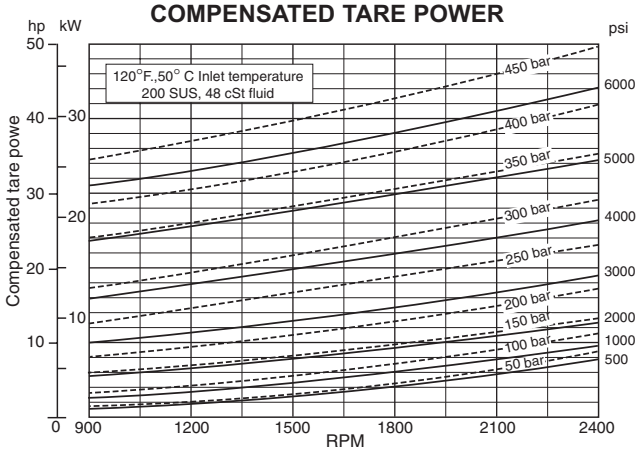

## STROKER RESPONSE VS SERVO PRESSURE, SERVO FLOW* (see note on page 13)



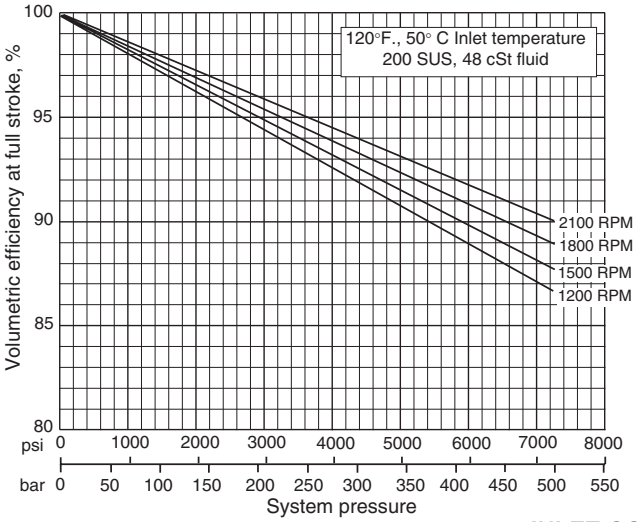
## OVERALL EFFICIENCY @ FULL STROKE



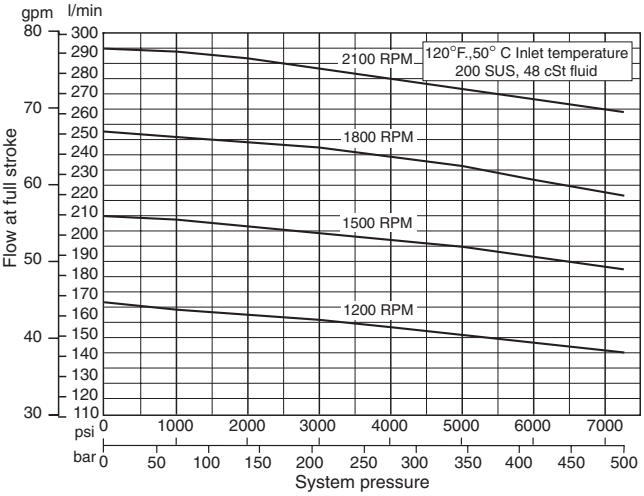

## COMPENSATED TARE POWER



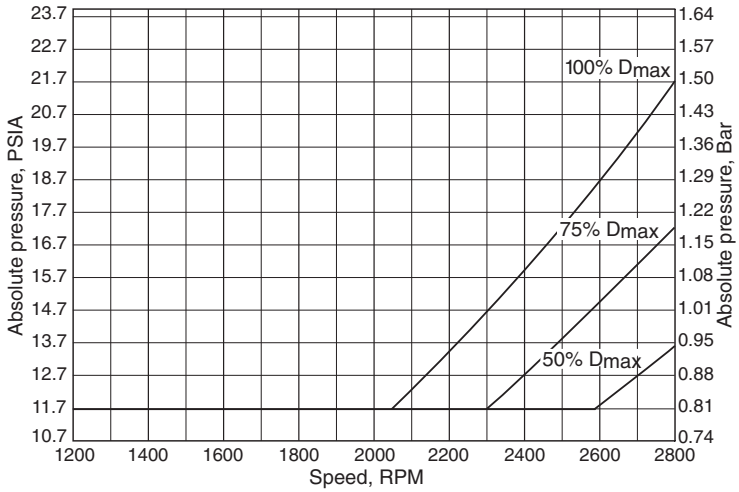

## VOLUMETRIC EFFICIENCY @ FULL STROKE




## FLOW VS PRESSURE @ FULL STROKE

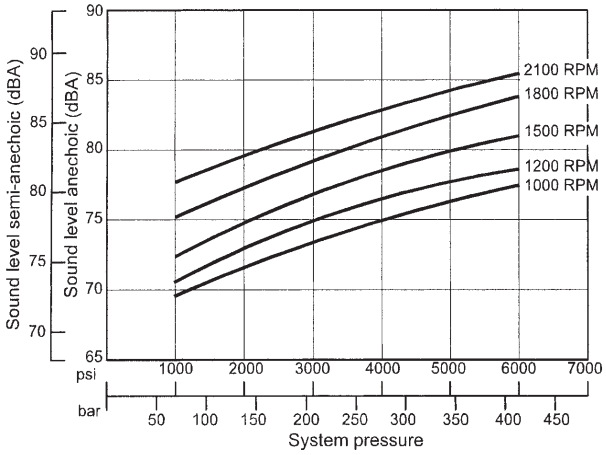



## INLET CONDITIONS

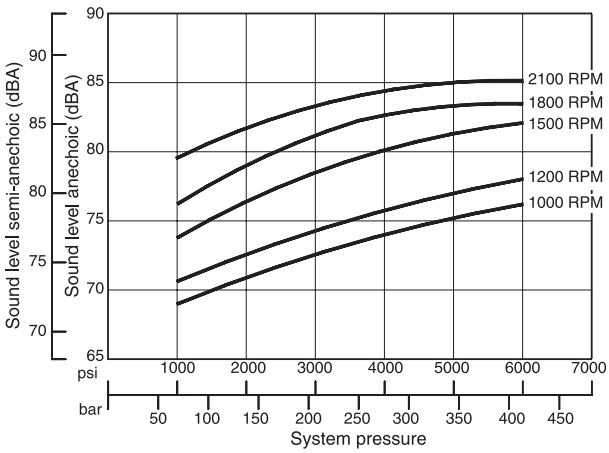



**Note:** The absolute inlet pressure is the pressure required to fill the pump with petroleum based fluids. The maximum pressure in the inlet port is 200 psi, 14 bar. For unboosted systems, the diameter of the suction line must be sized to allow a maximum velocity not higher than 4 ft/sec., 1,22 m/sec. 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

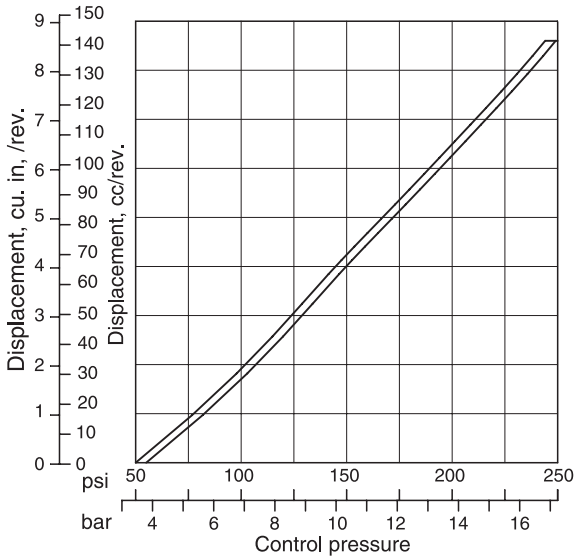



## SOUND PRESSURE LEVEL (dBA) COMPENSATED

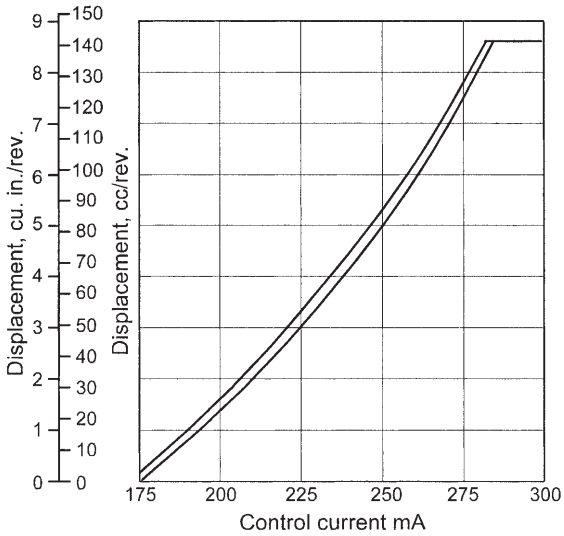



**Note:** Pump acoustical data was determined in accordance with ANSI/B93.71M, Hydraulic Fluid Power Pumps test code for the determination of airborne noise levels. Semi-anechoic values are presented according to the standard. Anechoic values are calculated for comparison with DIN 45635, part 1. The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

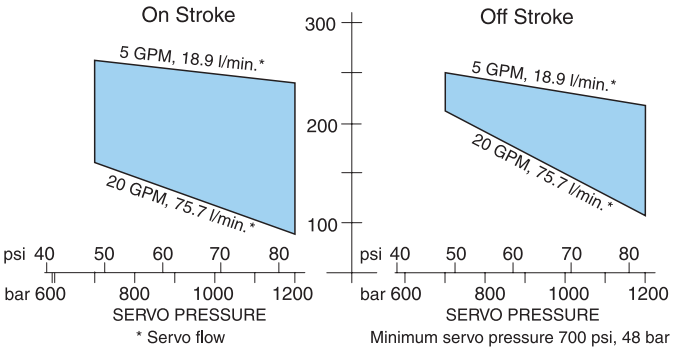
## HYDRAULIC STROKER




## ELECTROHYDRAULIC STROKER (24 VOLT)

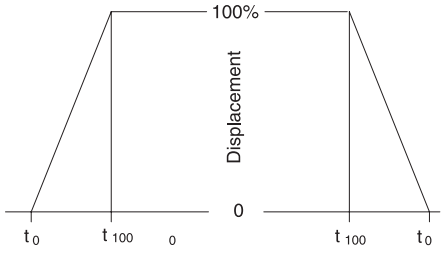



## STROKER RESPONSE VS SERVO PRESSURE, SERVO FLOW* (see note on page 13)



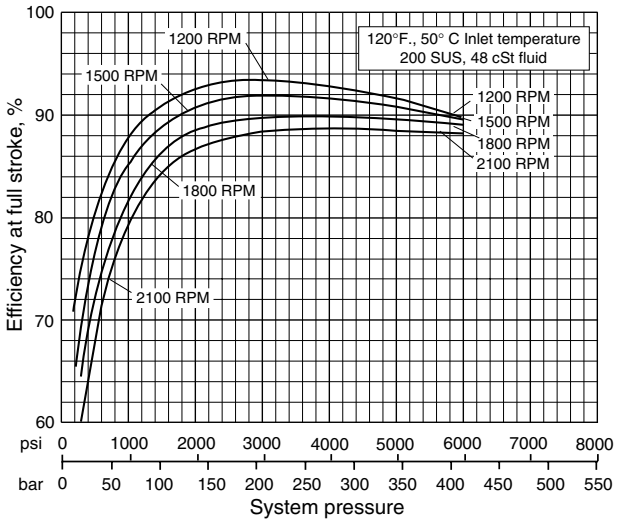

* Servo flow

Minimum servo pressure 700 psi, 48 bar

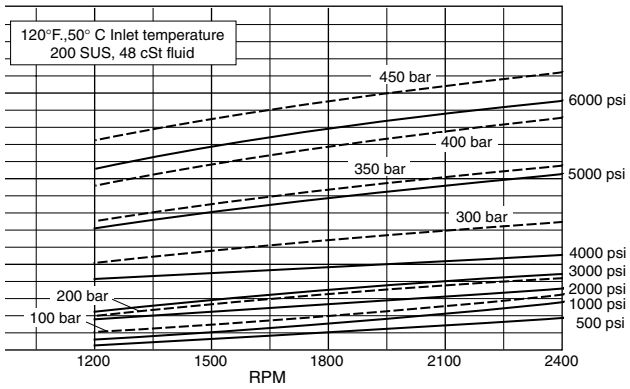



* See page 4 for values of t

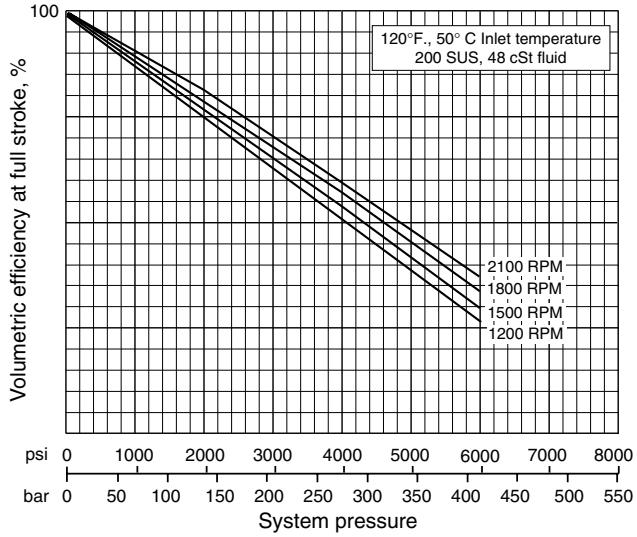
## OVERALL EFFICIENCY @ FULL STROKE



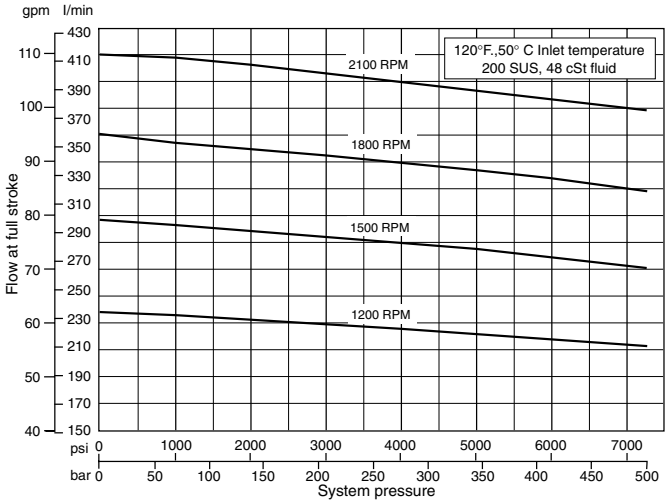

## COMPENSATED TARE POWER



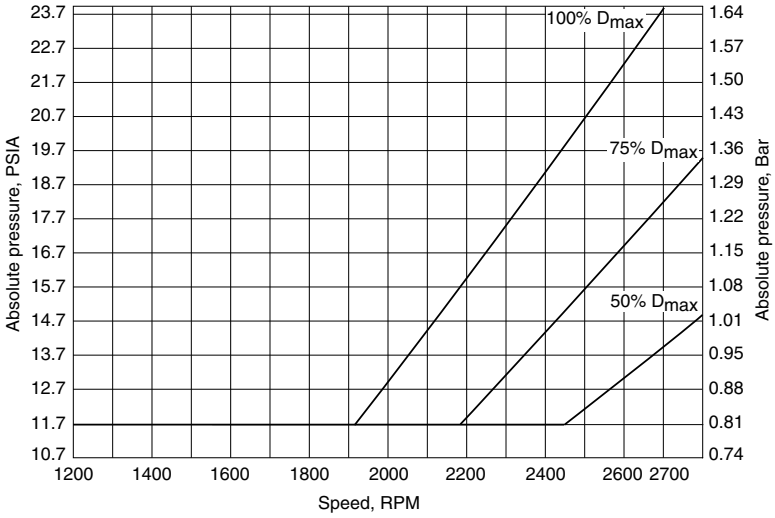

## VOLUMETRIC EFFICIENCY @ FULL STROKE




## FLOW VS PRESSURE @ FULL STROKE

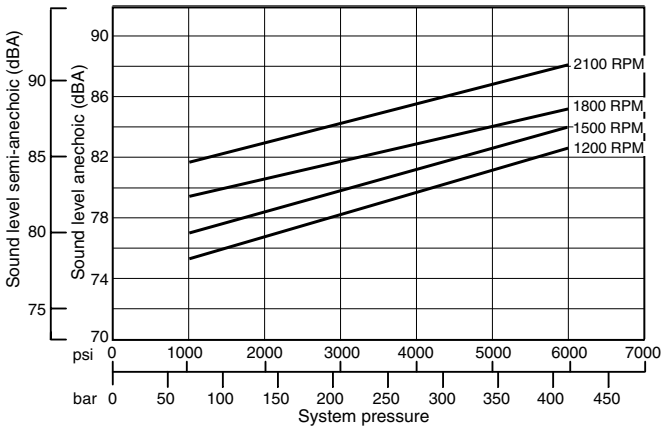



## INLET CONDITIONS

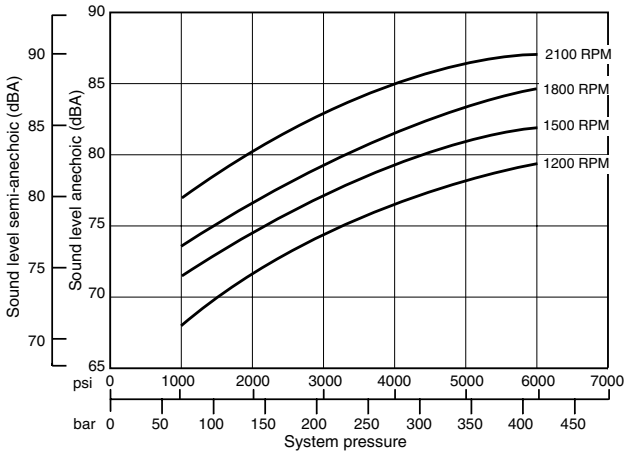



**Note:** The absolute inlet pressure is the pressure required to fill the pump with petroleum based fluids. The maximum pressure in the inlet port is 200 psi, 14 bar. For unboosted systems, the diameter of the suction line must be sized to allow a maximum velocity not higher than 4 ft/sec., 1,22 m/sec. 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

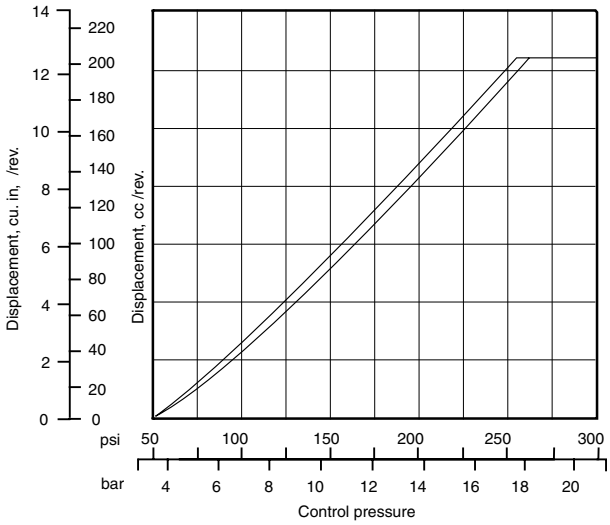



## SOUND PRESSURE LEVEL (dBA) COMPENSATED

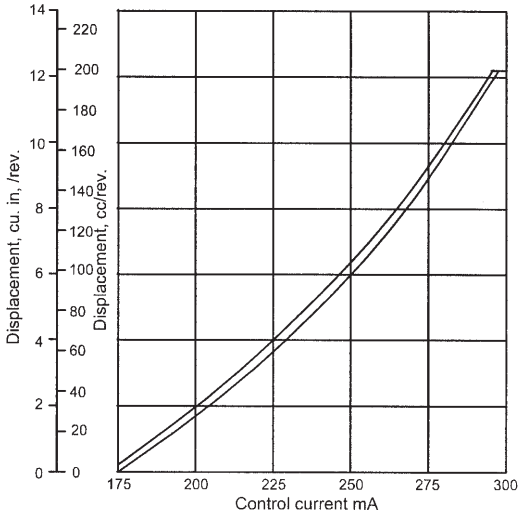



**Note:** Pump acoustical data was determined in accordance with ANSI/B93.71M, Hydraulic Fluid Power Pumps test code for the determination of airborne noise levels. Semi-anechoic values are presented according to the standard. Anechoic values are calculated for comparison with DIN 45635, part 1. The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

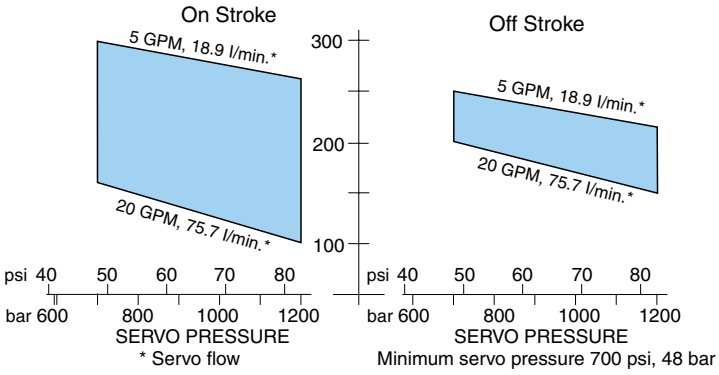
## HYDRAULIC STROKER




## ELECTROHYDRAULIC STROKER (24 VOLT)

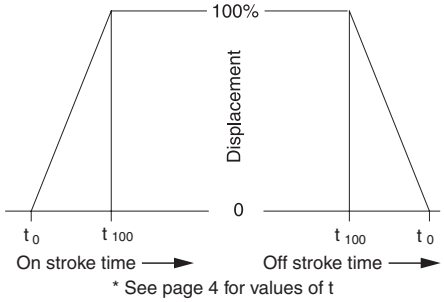



## STROKER RESPONSE VS SERVO PRESSURE, SERVO FLOW* (see note on page 13)



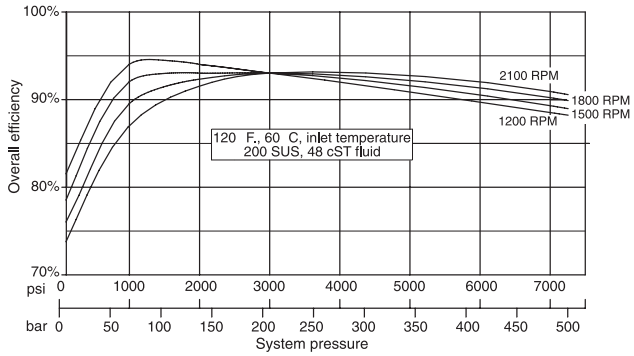

* Servo flow

Minimum servo pressure 700 psi, 48 bar

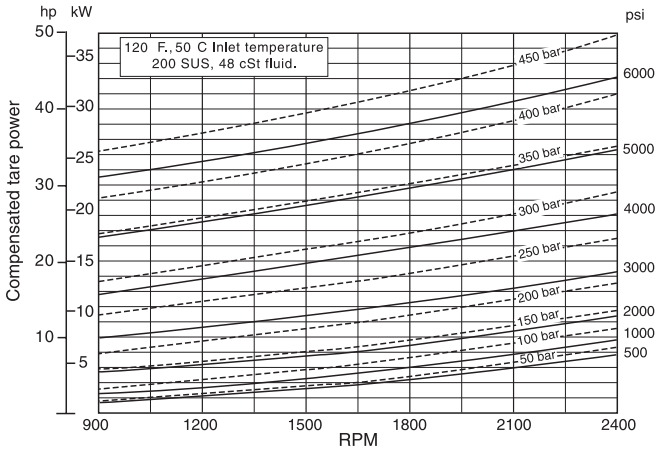



* See page 4 for values of t

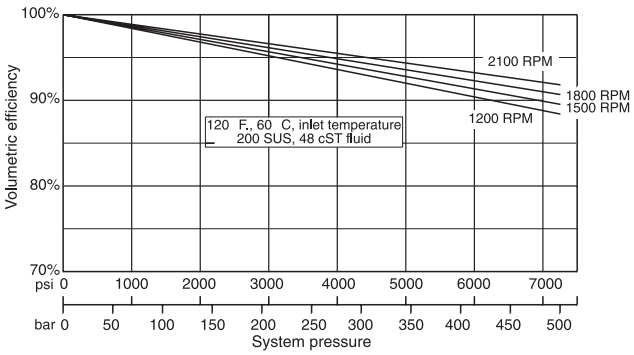
## OVERALL EFFICIENCY @ FULL STROKE



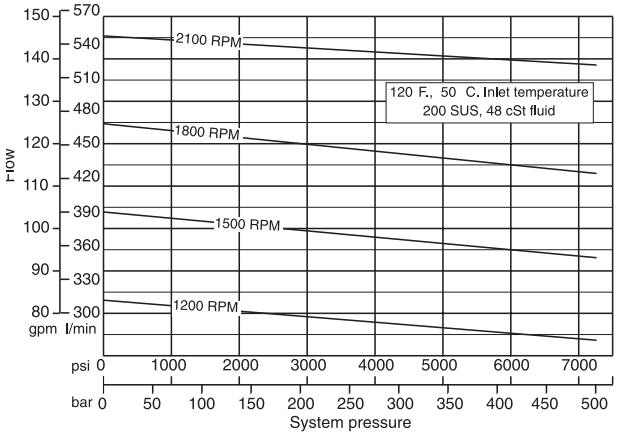

## COMPENSATED TARE POWER



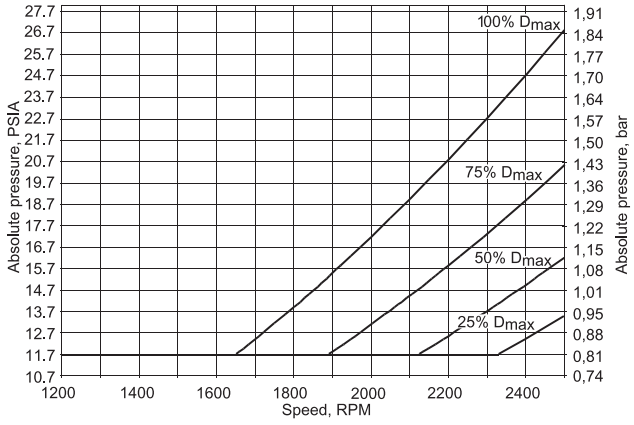

## VOLUMETRIC EFFICIENCY @ FULL STROKE




## FLOW VS PRESSURE @ FULL STROKE

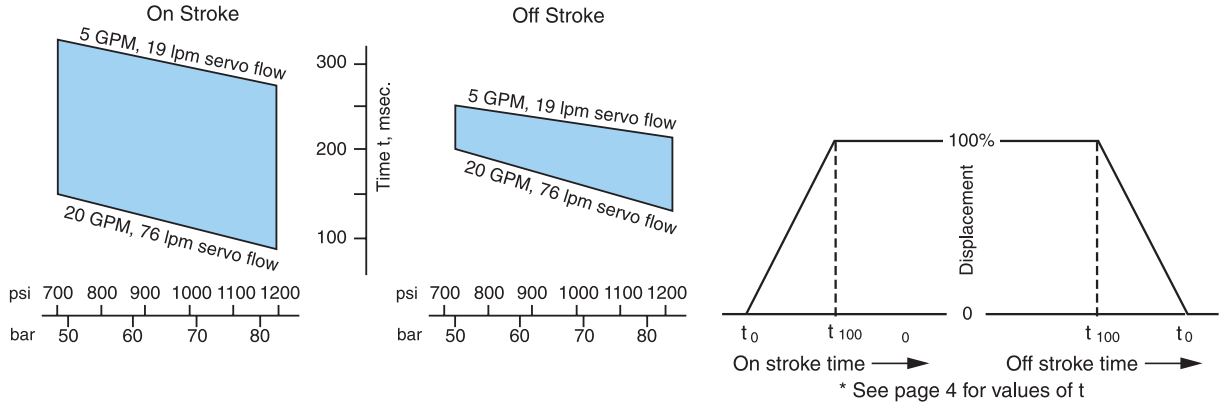



## INLET CONDITIONS



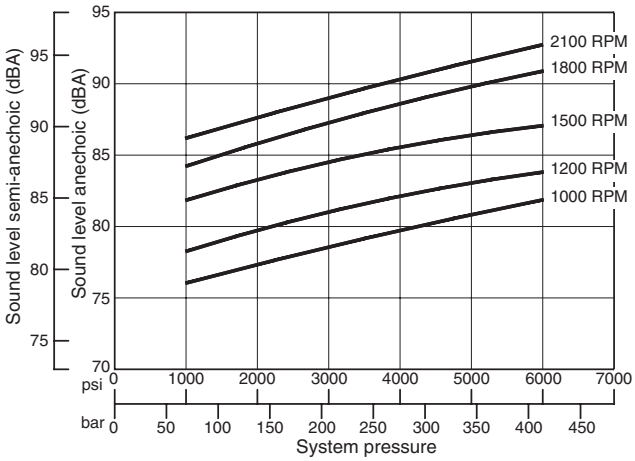

**Note:** The absolute inlet pressure is the pressure required to fill the pump with petroleum based fluids. The maximum pressure in the inlet port is 200 psi, 14 bar. For unboosted systems, the diameter of the suction line must be sized to allow a maximum velocity not higher than 4 ft/sec., 1,22 m/sec. 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)

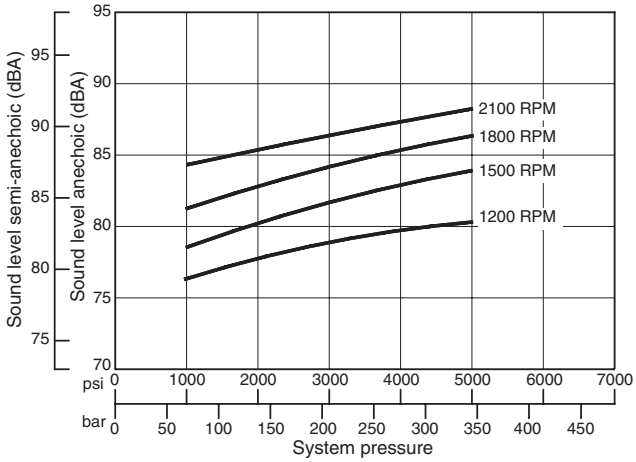



* See page 4 for values of t

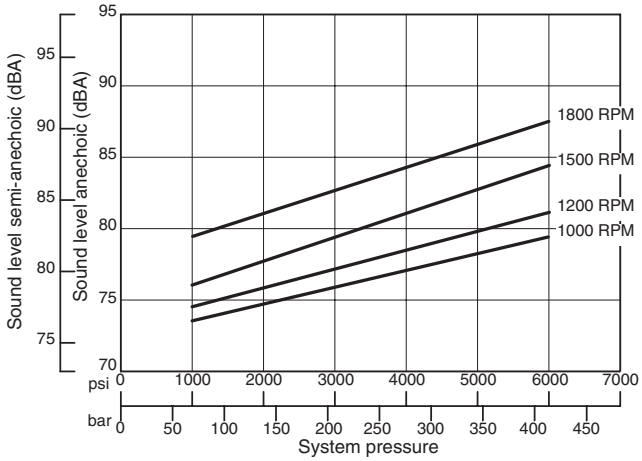
## SOUND PRESSURE LEVEL (dBA) @FULL STROKE P16 H



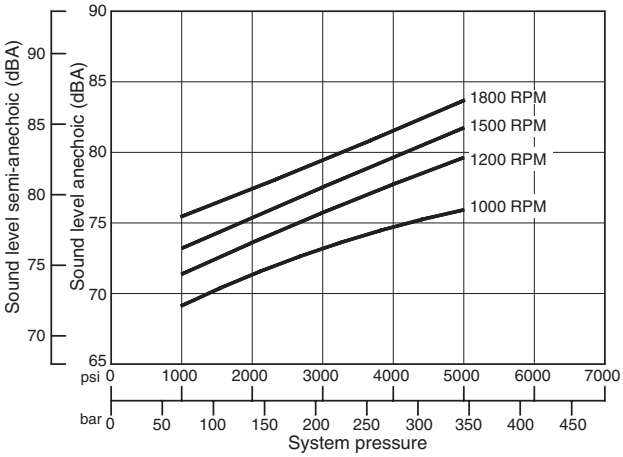

## SOUND PRESSURE LEVEL (dBA) COMPENSATED P16H



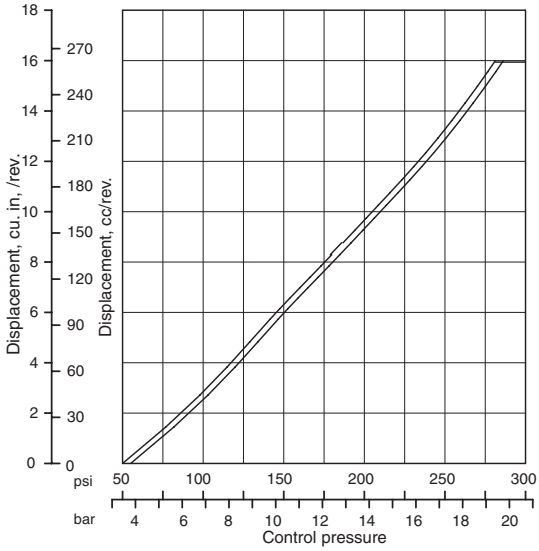

## SOUND PRESSURE LEVEL (dBA) @FULL STROKE P16Q



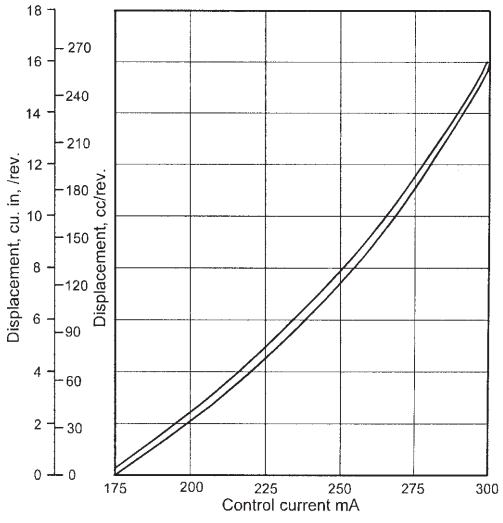

## SOUND PRESSURE LEVEL (dBA) COMPENSATED P16Q



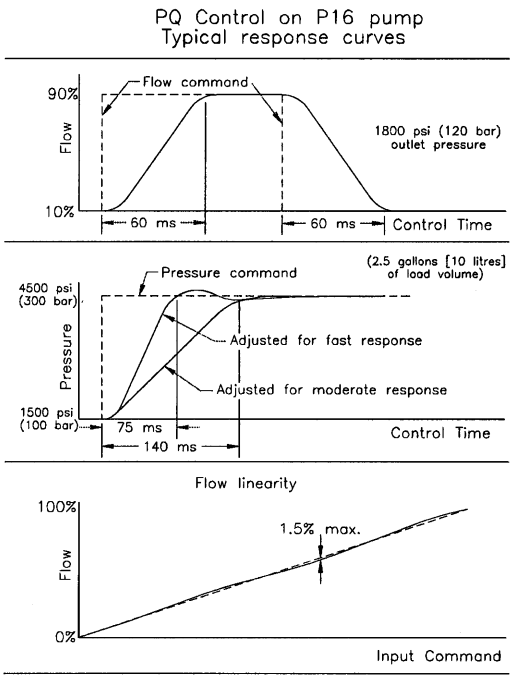

## HYDRAULIC STROKER




## ELECTROHYDRAULIC STROKER (24 VOLT)

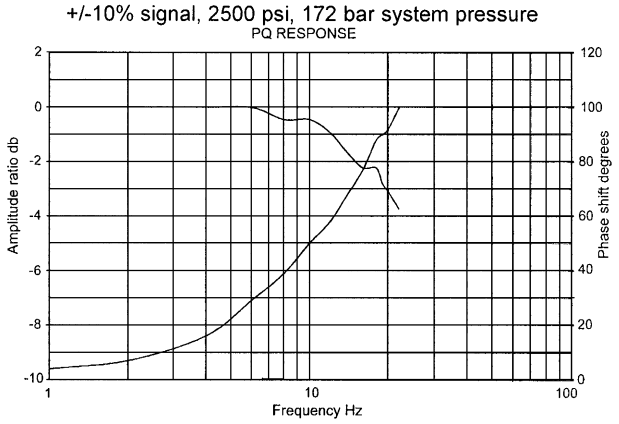


## TYPICAL RESPONSE CURVES

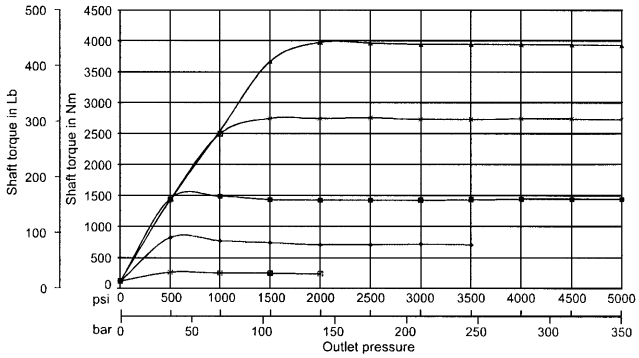



## FREQUENCY RESPONSE

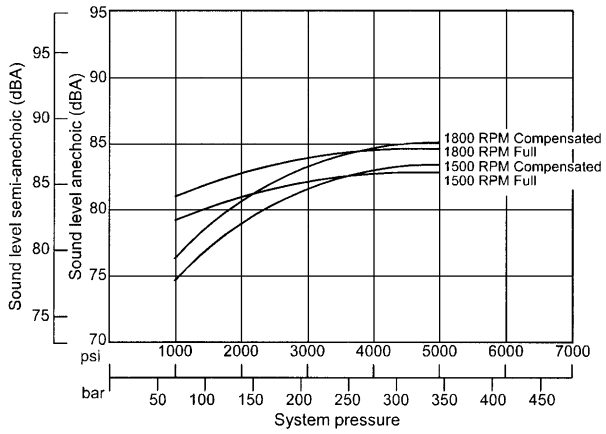
+/-10% signal, 2500 psi, 172 bar system pressure



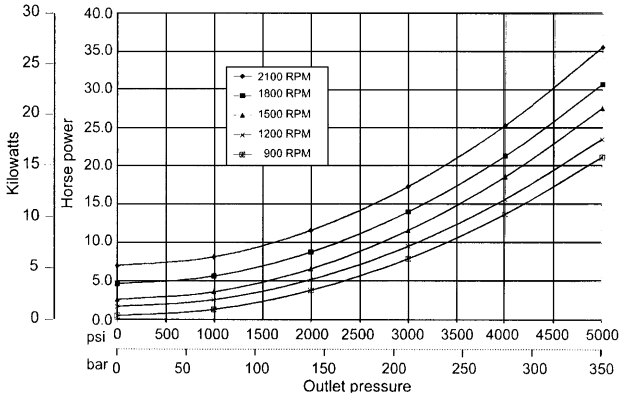

## PQ CONTROL WITH TORQUE LIMITING



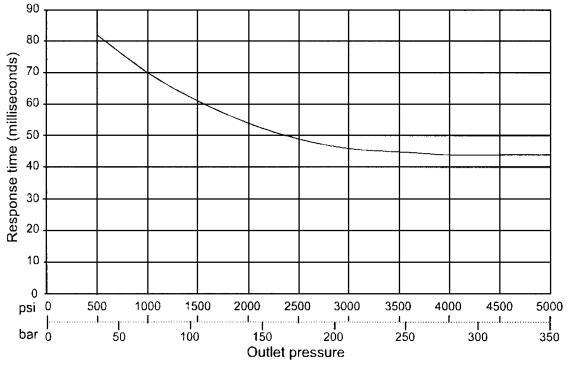

## SOUND PRESSURE LEVEL




## COMPENSATED TARE POWER

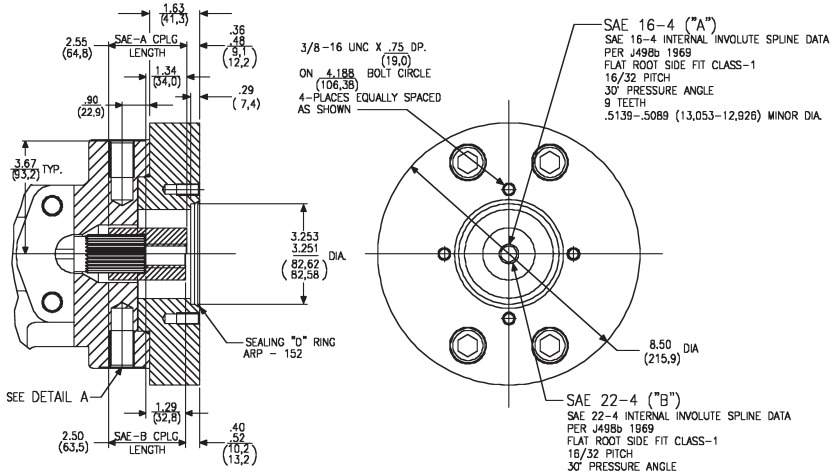



## RESPONSE TIME VS OUTLET PRESSURE

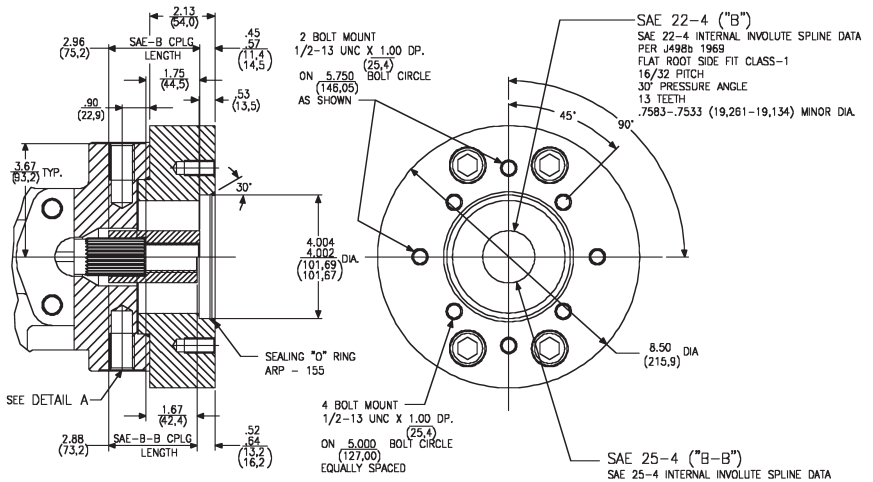


# SAE REAR AUX. MTG. ADAPTORS FOR ALL PREMIER SERIES

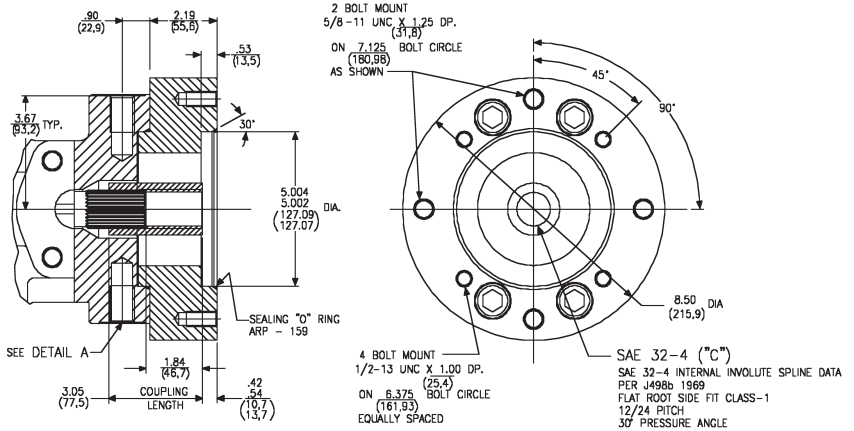
## SAE



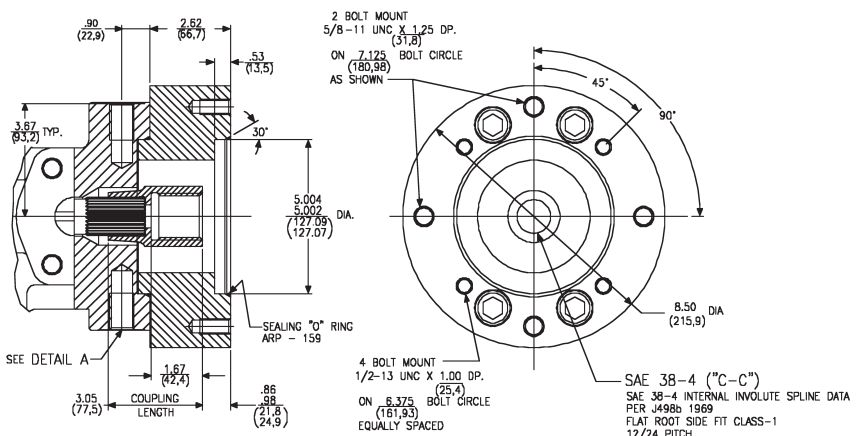

SAE 82-2 ("A" 2 BOLT)
SAE 82-2 ("A" WITH B CPLG)




SAE 101-2 ("B" & "B-B" 2 BOLT)
SAE 101-4 ("B" & "B-B" 4 BOLT)



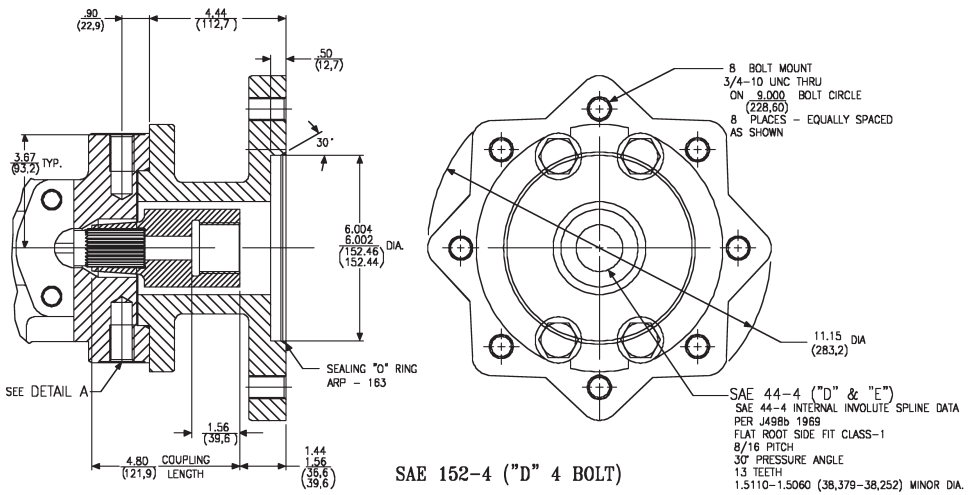

SAE 127-2 ("C" 2 BOLT)
SAE 127-4 ("C" 4 BOLT)



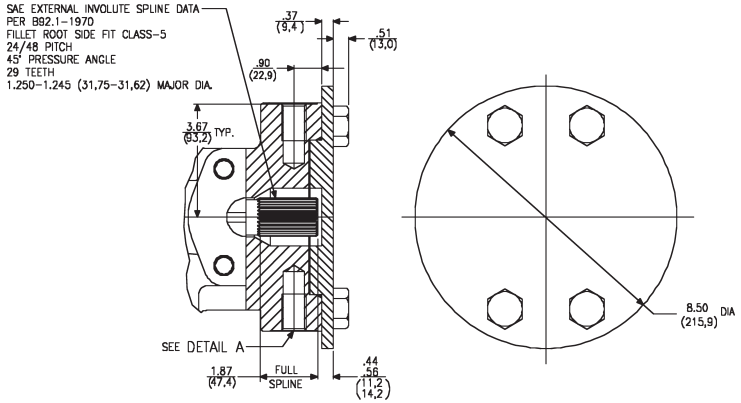

SAE 127-2 ("C-C" 2 BOLT)
SAE 127-4 ("C-C" 4 BOLT)

# SAE REAR AUX. MTG. ADAPTORS FOR ALL PREMIER SERIES

## SAE

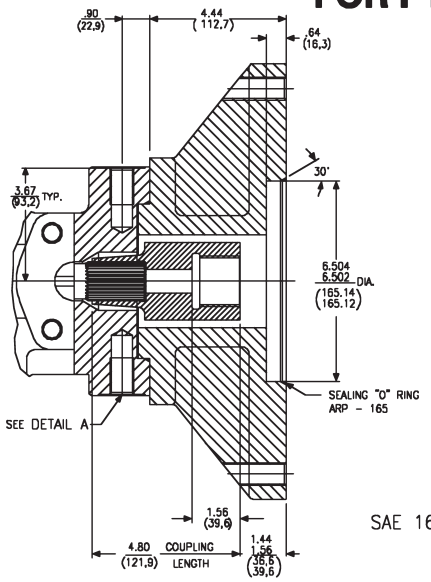


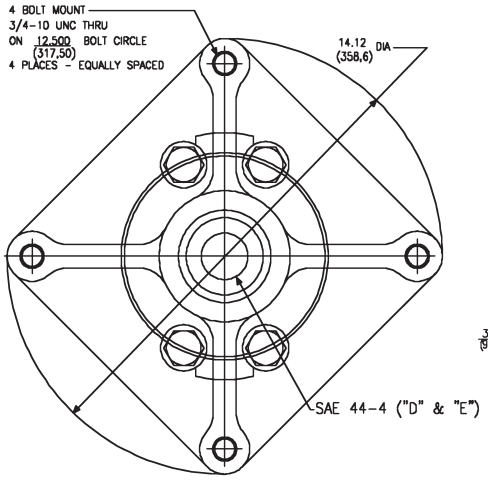

SAE 152-4 ("D" 4 BOLT)



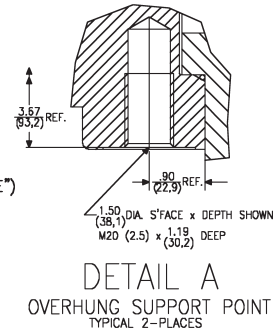

BLANKING PLATE

## FOR P16 AND P260 ONLY



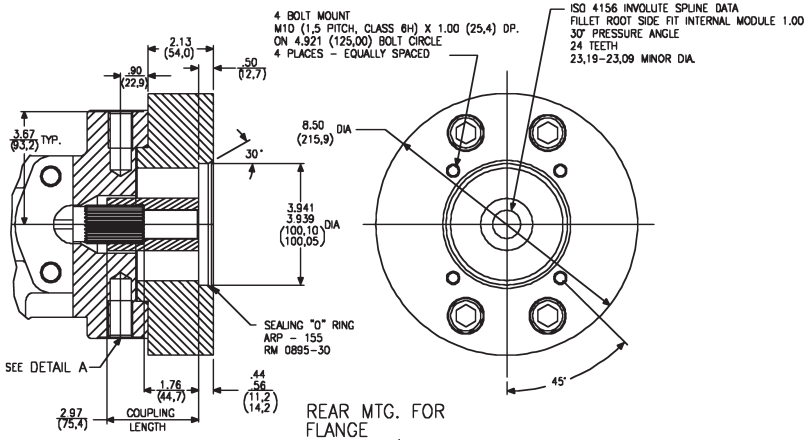

SAE 165-4 ("E" 4 BOLT)



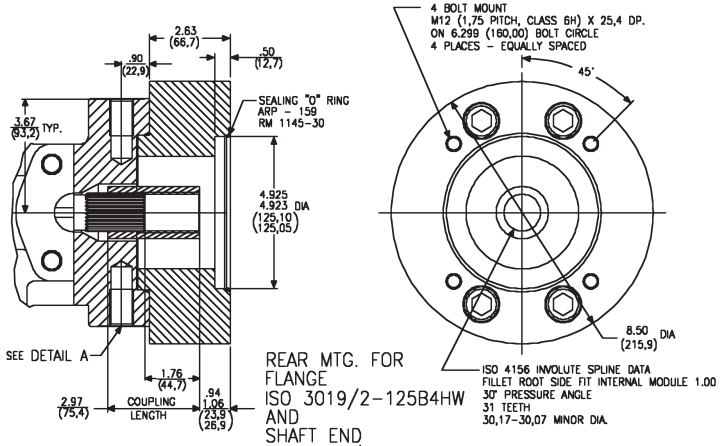

DETAIL A
OVERHUNG SUPPORT POINT
TYPICAL 2-PLACES

# ISO REAR AUX. MTG. ADAPTORS FOR ALL PREMIER SERIES

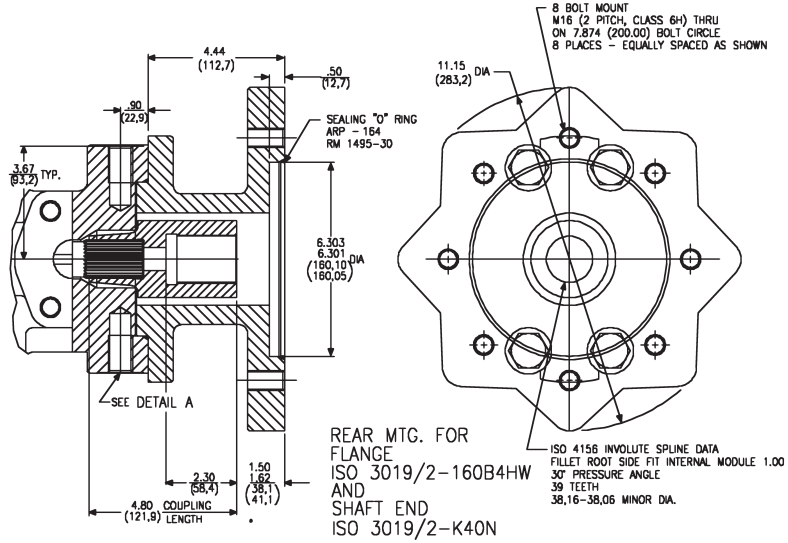
## ISO



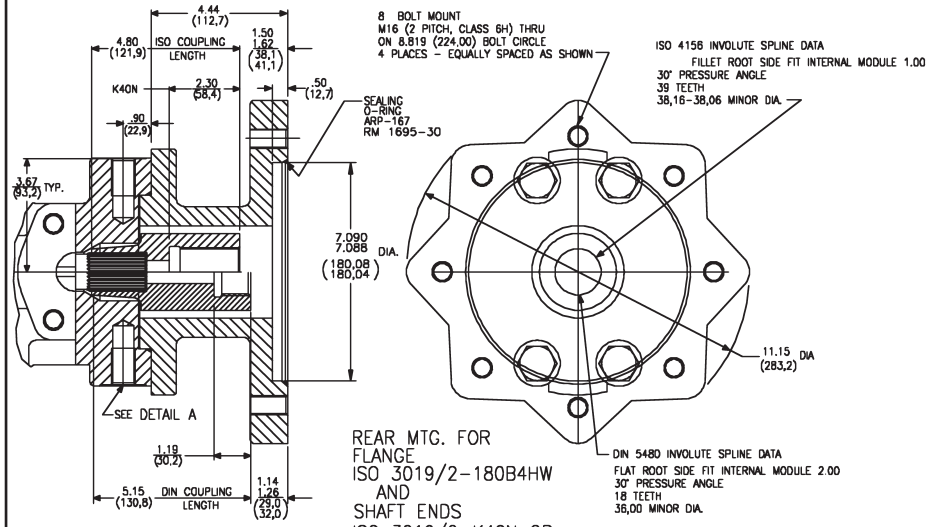

REAR MTG. FOR FLANGE ISO 3019/2–100B4HW AND SHAFT END ISO 3019/2–K25N




REAR MTG. FOR FLANGE ISO 3019/2–125B4HW AND SHAFT END ISO 3019/2–K32N



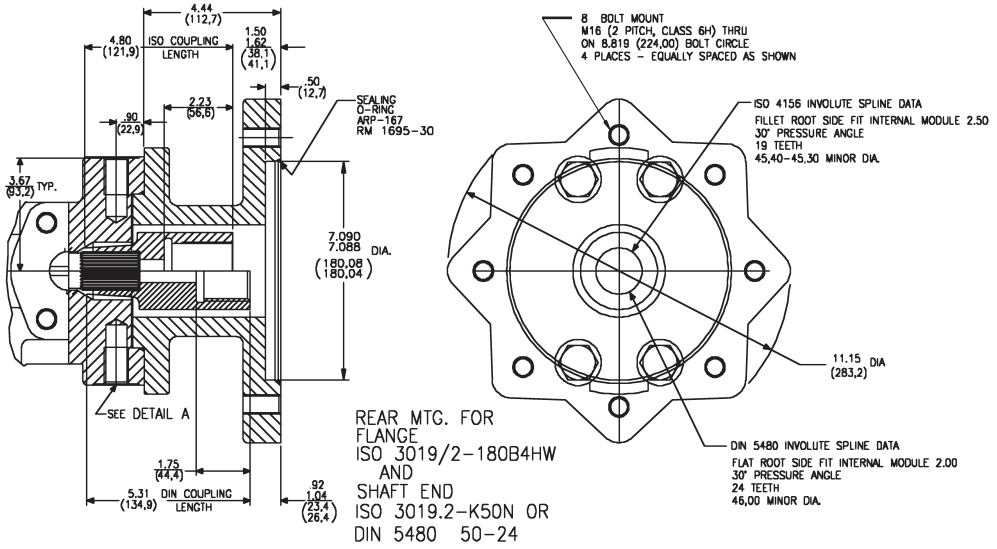

REAR MTG. FOR FLANGE ISO 3019/2–160B4HW AND SHAFT END ISO 3019/2–K40N




REAR MTG. FOR FLANGE ISO 3019/2–180B4HW AND SHAFT ENDS ISO 3019/2–K40N OR DIN 5480 40–18

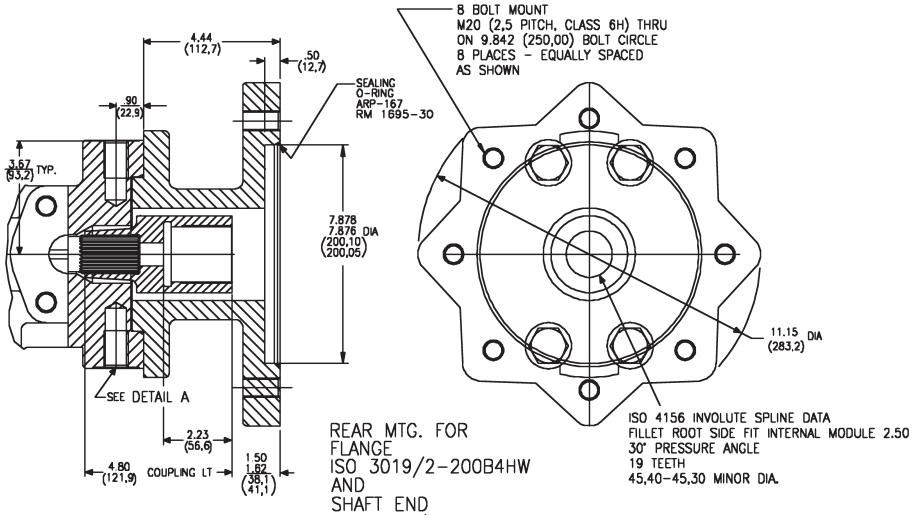
# ISO

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



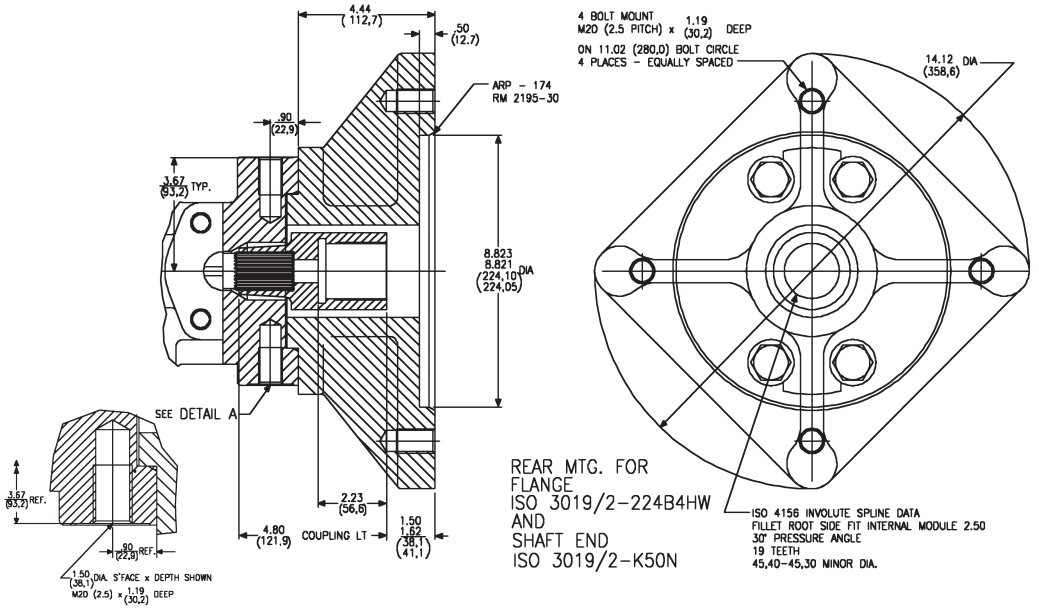

REAR MTG. FOR
FLANGE
ISO 3019/2-180B4HW
AND
SHAFT END
ISO 3019.2-K50N OR
DIN 5480 50-24

## FOR P12, P200, P16 & P260 0NLY




REAR MTG. FOR
FLANGE
ISO 3019/2-200B4HW
AND
SHAFT END
ISO 3019/2-K50N

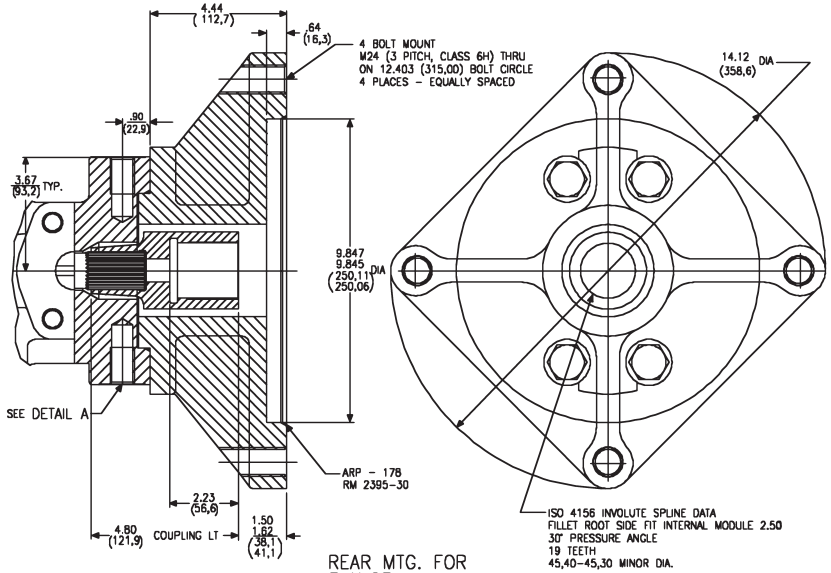
## FOR P12, P200, P16 & P260 ONLY




DETAIL A
OVERHUNG SUPPORT POINT
TYPICAL 2-PLACES

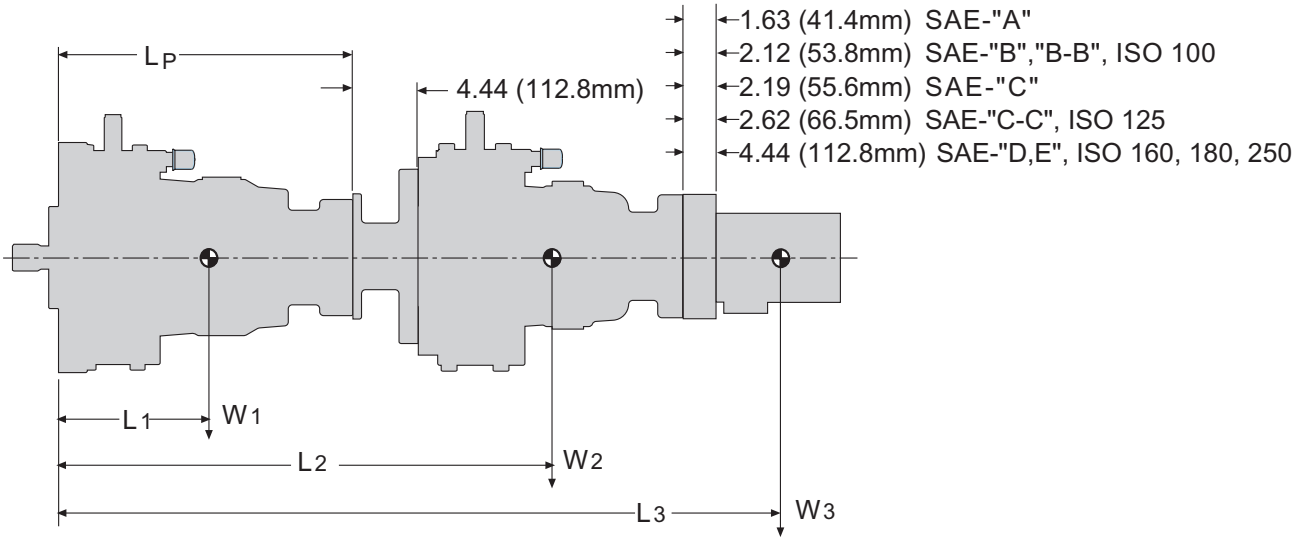
REAR MTG. FOR
FLANGE
ISO 3019/2-224B4HW
AND
SHAFT END
ISO 3019/2-K50N

## FOR P16 & P260 ONLY




REAR MTG. FOR
FLANGE
ISO 3019/2-250B4HW
AND
SHAFT END
ISO 3019/2-K50N

## MAXIMUM PERMISSIBLE BENDING MOMENT AT MOUNTING FLANGE




M={(L1•W1)+(L2•W2)+(L3•W3)---}

| 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 |

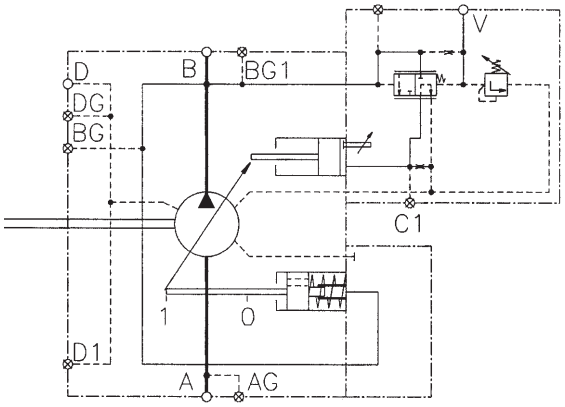
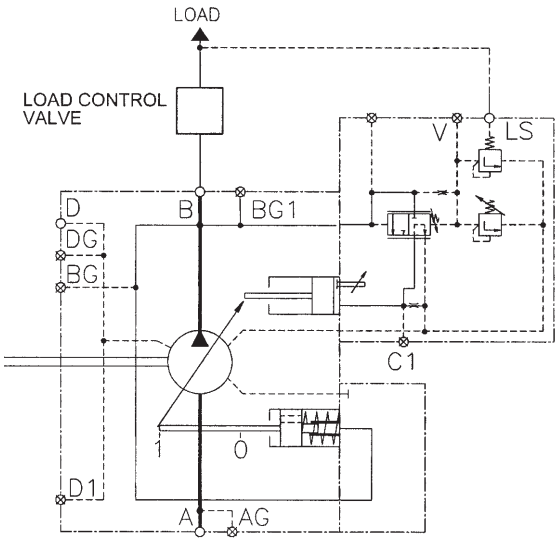
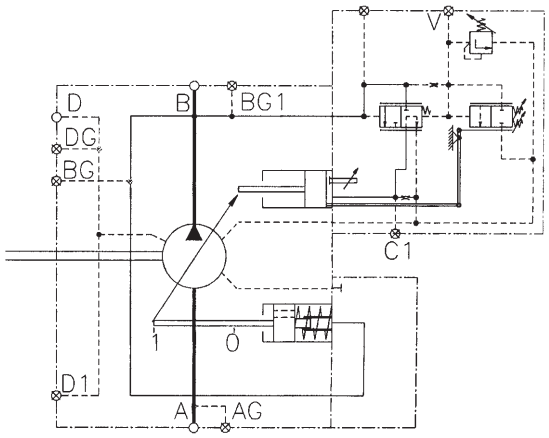
| SERIES | P260 | P200 | P140 | P110 | P080 |
|---|---|---|---|---|---|
| MAXIMUM MOMENT (Nm) | 1627 | 1141 | 938 | 712 | 565 |
| WEIGHT - W (Newtons) | 1446 | 1335 | 981 | 798 | 696 |
| DISTANCE - L1 (mm to C/G) | 264 | 218 | 216 | 203 | 178 |
| DISTANCE - Lp (mm) | 478 | 437 | 404 | 373 | 340 |

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

**Rear drives ordering code options** .....(P05-02R1C-C10-**0**0-M2)

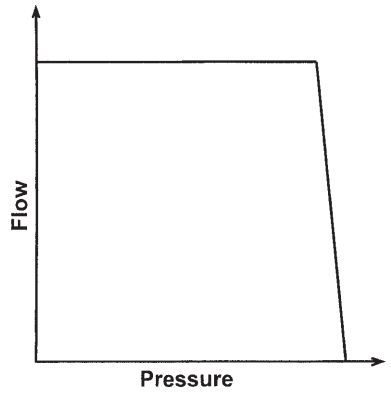
| | | SAE mounting & coupling | | | | | | | | ISO & DIN mounting & coupling | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mounting coupling | None / plugged | A A | A B | B B | B B/B | C C | C CC | D D/E | E DE | 100B4 K25N | 125B4 K32N | 160B4 K40N | 180B4 K40N | 180B4 K50N | 180B4 DIN40-18 | 180B4 DIN50-24 | 200B4 K50N | 224B4 K50N | 250B4 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

Minimum compensating pressure 250 PSI, 17,2 bar, pilot flow 115 $in^3$/min. (1.9 L/min).



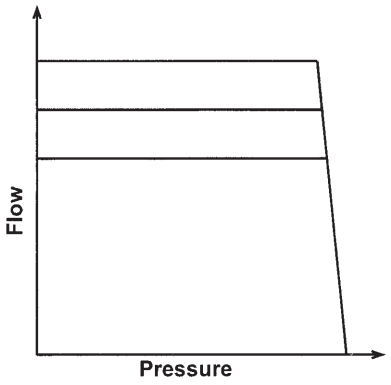

## DESCRIPTION OF OPERATION

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.

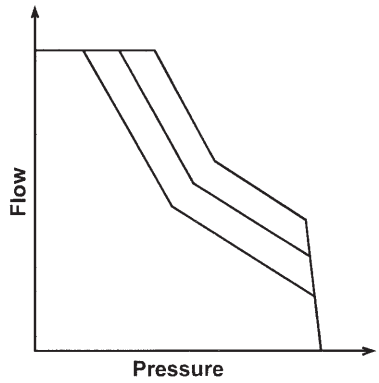
RESPONSE TIMES

| | 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 |




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.



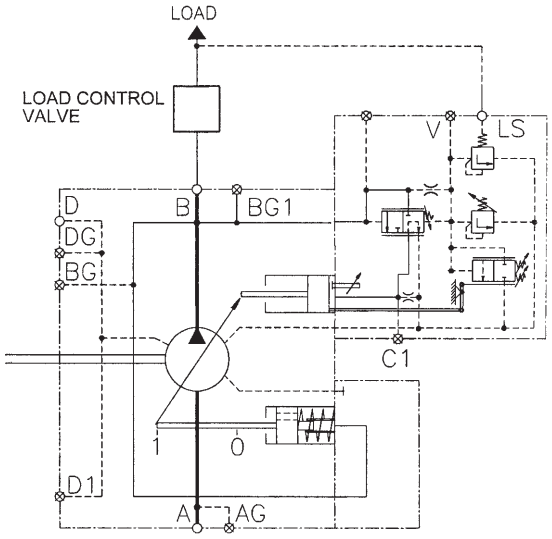
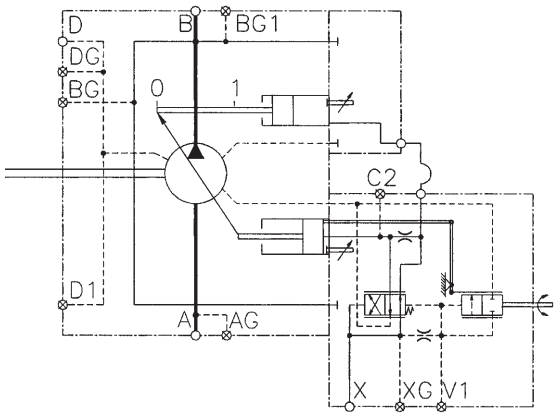
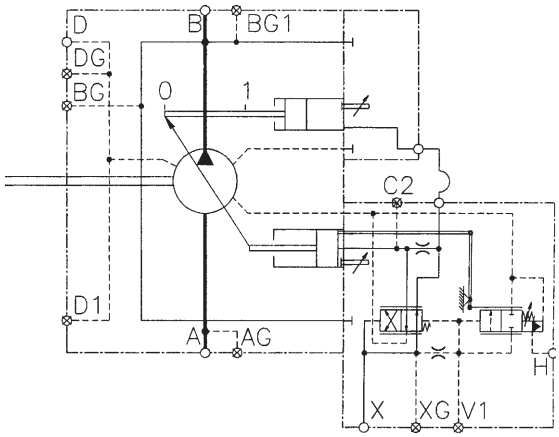

The torque limiter is mounted on the control piston cap, full stroke side. One side of the spool is connected to the vent port of the compensator, the other to case. As system pressure increases, force on the spool overcomes the spring force shifting the spool to allow the flow to bleed off to case. 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.

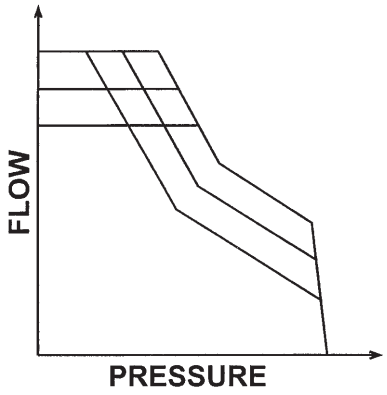
The slope of the pressure/stroke curve is determined by the spring rate. At low pressure a single spring is in contact with the spool. As pressure increases, a second spring joins the first to increase the rate of change of pressure vs. stroke. To cover a range of torques, two versions are offered, "J" for low torque values and "K" for high. Maximum pressure limits are controlled by the compensator settings.

**Torque values for Torque Limiter and Torque Limiter Override controls**

| 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 |

| 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

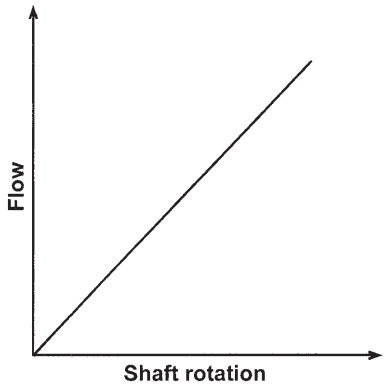
The V and W control offers the ability to control the torque and still operate as load sensing. The control operates as a load sense up to the point where pressure and flow cause torque to exceed the torque limiter setting. At this point the torque limiter destrokes the pump to the given setting. A modulating 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.

**Torque values for Torque Limiter and Torque Limiter Override controls**

| 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 |

Maximum servo pressure 1500 psi, 103 bar

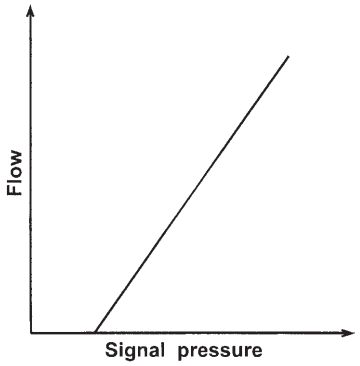



The manual rotary servo control is located on the control piston cap, minimum stroke side. A shaft, when rotated, causes linear motion on a spool. The spool contains a passage which is opened or blocked by a sleeve. This passage meters pilot flow on one end of a four-way valve. The sleeve is connected 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.

**Servo shaft rotation, zero to full stroke**

| P05/080 | P07/110 | P09/140 | P12/200 | P16/260 |
|---|---|---|---|---|
| 47-52º | 47-52º | 52-57º | 60-65º | 65-70º |

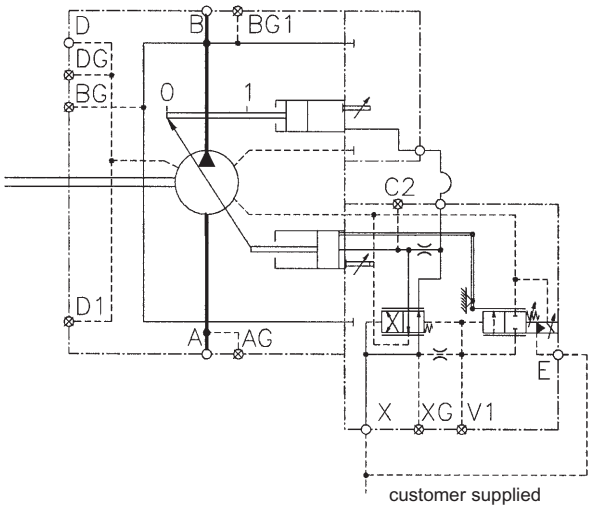
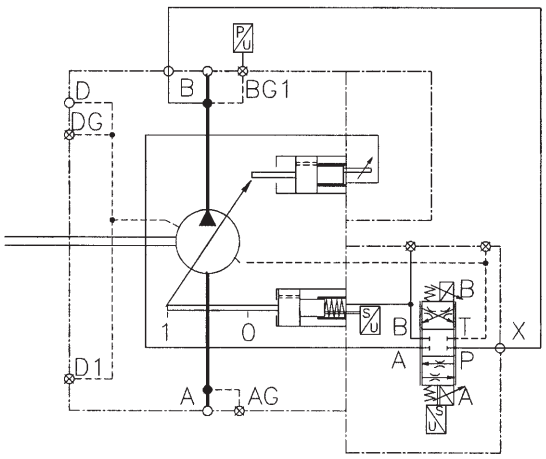



The hydraulic stroker control is located on the control piston cap, minimum stroke side. The hydraulic stroker is obtained by replacing the rotary servo shaft and cam mechanism of the rotary servo configuration with a spring loaded hydraulic piston coupled to the spool. The piston is spring biased to 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.

**Hydraulic stroker signal pressure vs stroke**

| | 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* |

| CODE | DESCRIPTION | HYDRAULIC CIRCUIT |
|---|---|---|
| E | ELECTRIC STROKER |  |
| X | PQ CONTROL<br>(available soon on all models) |  |

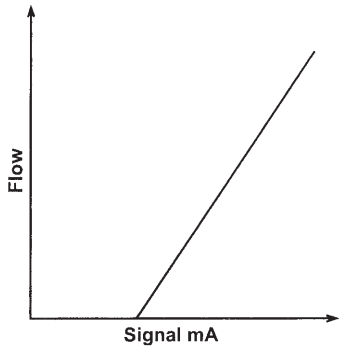
**PRIMARY CONTROL OPTIONS**
**MAXIMUM VOLUME SCREW**
*code 1*

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 |
|---|---|



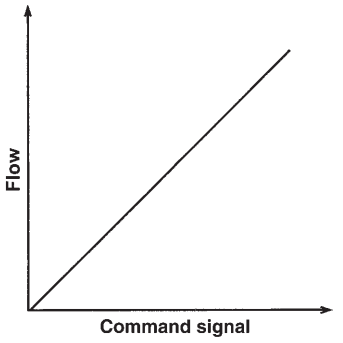

The electric stroker consists of the hydraulic stroker with an electrically modulated pressure control valve mounted. Pump stroke may be controlled with an electrical signal which con trols the pressure to the control port of the hydraulic stroker.

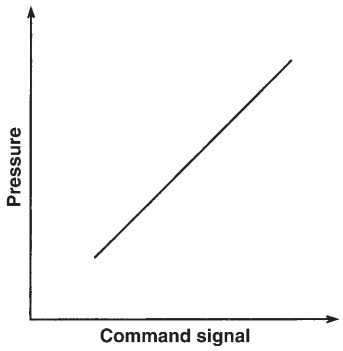
Servo pressure, not to exceed 1500 psi, (103 bar) is supplied to the inlet port on the electrically modulated pressure control valve. The Jupiter Driver card, S20-14078 or the Micro Proportional Driver plug, S20-14116 may be used to control the electric stroker. A 12 Volt coil is also available.

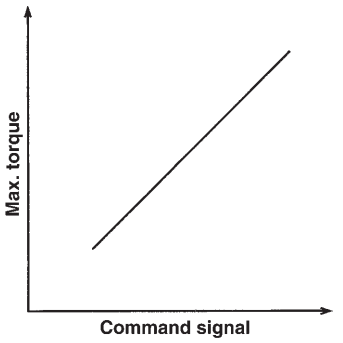
Typical hysteresis 5%.

**Electrohydraulic stroker signal mA vs stroke**

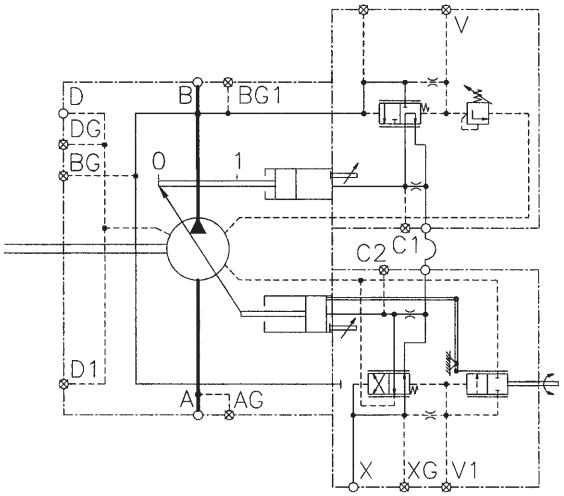
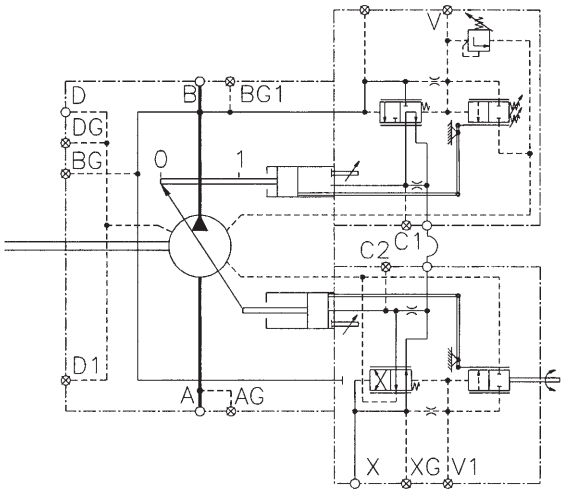
| | P05/080 | P07/110 | P09/140 | P12/200 | P16/260 |
|---|---|---|---|---|---|
| zero stroke mA, 24 vdc | 175 | 175 | 175 | 175 | 175 |
| zero stroke mA, 12 vdc | 350 | 350 | 350 | 350 | 350 |
| full stroke mA, 24 vdc | 273 | 276 | 283 | 295 | 300 |
| full stroke mA, 12 vdc | 546 | 552 | 566 | 590 | 600 |



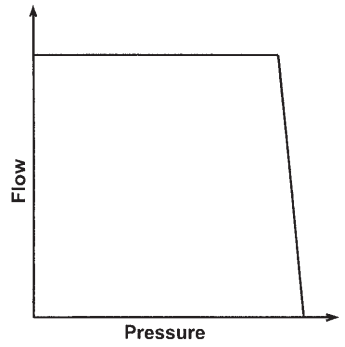



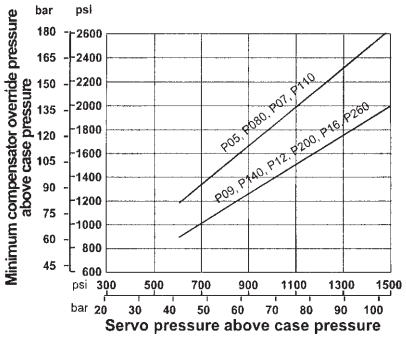




The PQ Control provides very rapid electronic control of displacement for high performance requirements. A proportional valve directs oil from the pump outlet to the control piston, and from the opposite end of the control piston to reservoir. The PQ Driver card 020-14133 has been designed to control 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<br>H1P<br>R1P | COMPENSATOR OVERRIDE |  |
| E1J<br>E1K<br>H1J<br>H1K<br>R1J<br>R1K | TORQUE LIMITER OVERRIDE, INCLUDING PRESSURE COMPENSATOR OVERRIDE |  |

## TYPICAL PERFORMANCE



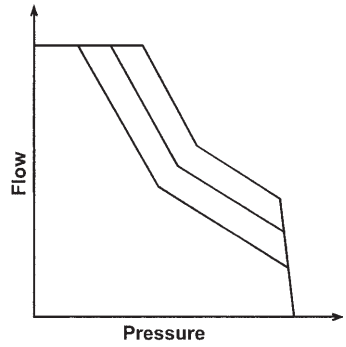



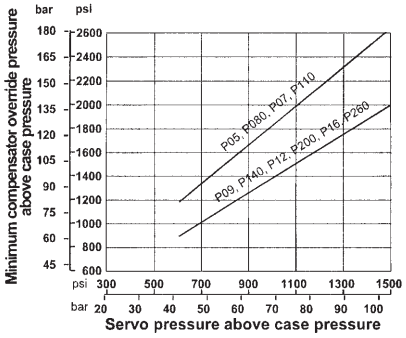

## DESCRIPTION OF OPERATION

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 |

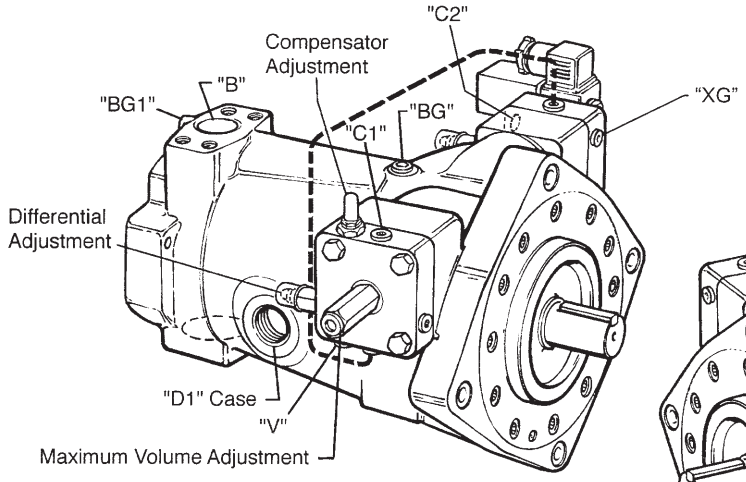


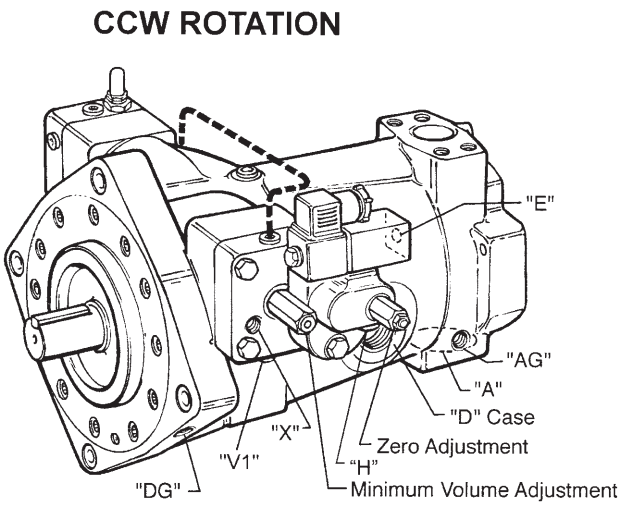

The torque limiter override is located in the control piston cap, full stroke side. It may be installed with any of the three position controls, (servo, hydraulic or electrohydraulic stroker). As with the pressure compensator override, the torque limiter override directs oil into the cylinder to overcome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




Electric-Hydraulic Stroker Shown




Electric-Hydraulic Stroker Shown

**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**

**Premier pumps** — **Model number sheet**

Example model code: P 16 H -02 R 1 * -C 0 0 -C 0

Revised 6/24/02

| | |
|---|---|
| **Pump** | P |
| **Displacement** | |
| 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 |
| Flourocarbon (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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