



# Pump & Motor Division

PGP/PGM 600 Series in  
Single and Multiple Configurations



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- Technical innovation
- Premier customer service

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- Truck/Bus
- Material handling
- Forestry
- Agriculture
- Industrial
- Turf care



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**Pump/Motor Products**

**PGP/PGM 610**

- ▶ *Continuous pressures to 275 bar / 4000 psi*
- ▶ *Displacements from 7 to 32 cc/rev (.43 to 1.95 cir)*
- ▶ *SAE B 13-tooth spline available*
- ▶ *Integral valve options*

**PGP/PGM610**



**PGP/PGM 620**

- ▶ *Continuous pressures to 275 bar / 4000 psi*
- ▶ *Displacements from 19 to 50 cc/rev (1.16 to 3.05 cir)*
- ▶ *Multiple sections and cross frames with common inlet*
- ▶ *Integral valve options*

**PGP/PGM620**



**PGP/PGM 640**

- ▶ *Continuous pressures to 275 bar / 4000 psi*
- ▶ *Displacements from 30 to 80 cc/rev (1.83 to 4.88 cir)*
- ▶ *Multiple sections and cross frames with common inlet*
- ▶ *Integral valve options*

**PGP/PGM640**



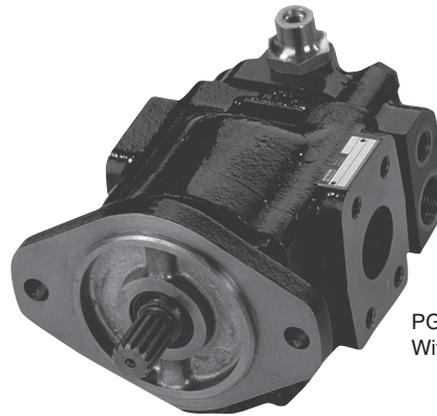
**PGP/PGM 600**

Parker Hydraulics has supplied gear pumps and motors to worldwide mobile and industrial markets for many years, especially for material handling, turf care, agricultural, and construction equipment applications. Many Parker pumps and motors have been developed and tested for the specific needs of these industries.

Parker's defined strategy to provide engineered solutions, coupled with an award-winning flexible manufacturing system has resulted in the availability of a wide range of special options.

**Features of PGP/PGM 600**

- Interlocking body design
- Multiple section and cross-frame pumps available
- Common inlets available for multiple section pumps
- Continuous operating pressures up to 275 bar (4000 psi)
- Pressure balanced thrust plate design for high efficiency



PGP620  
With LS Priority

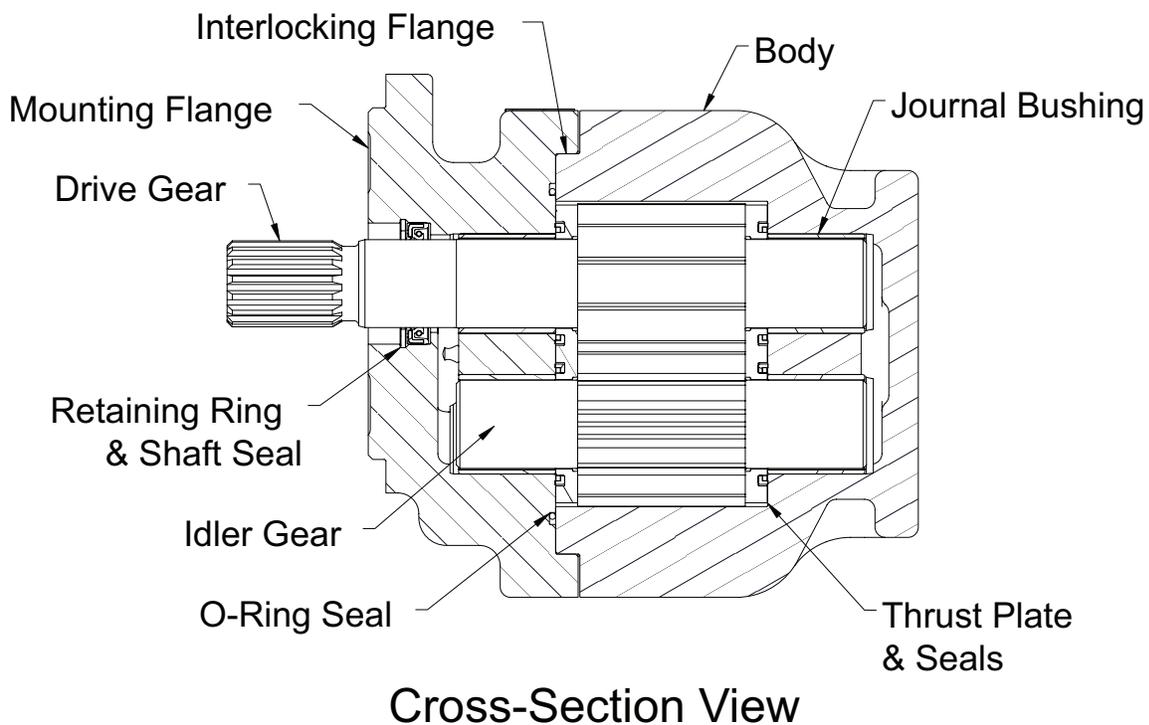
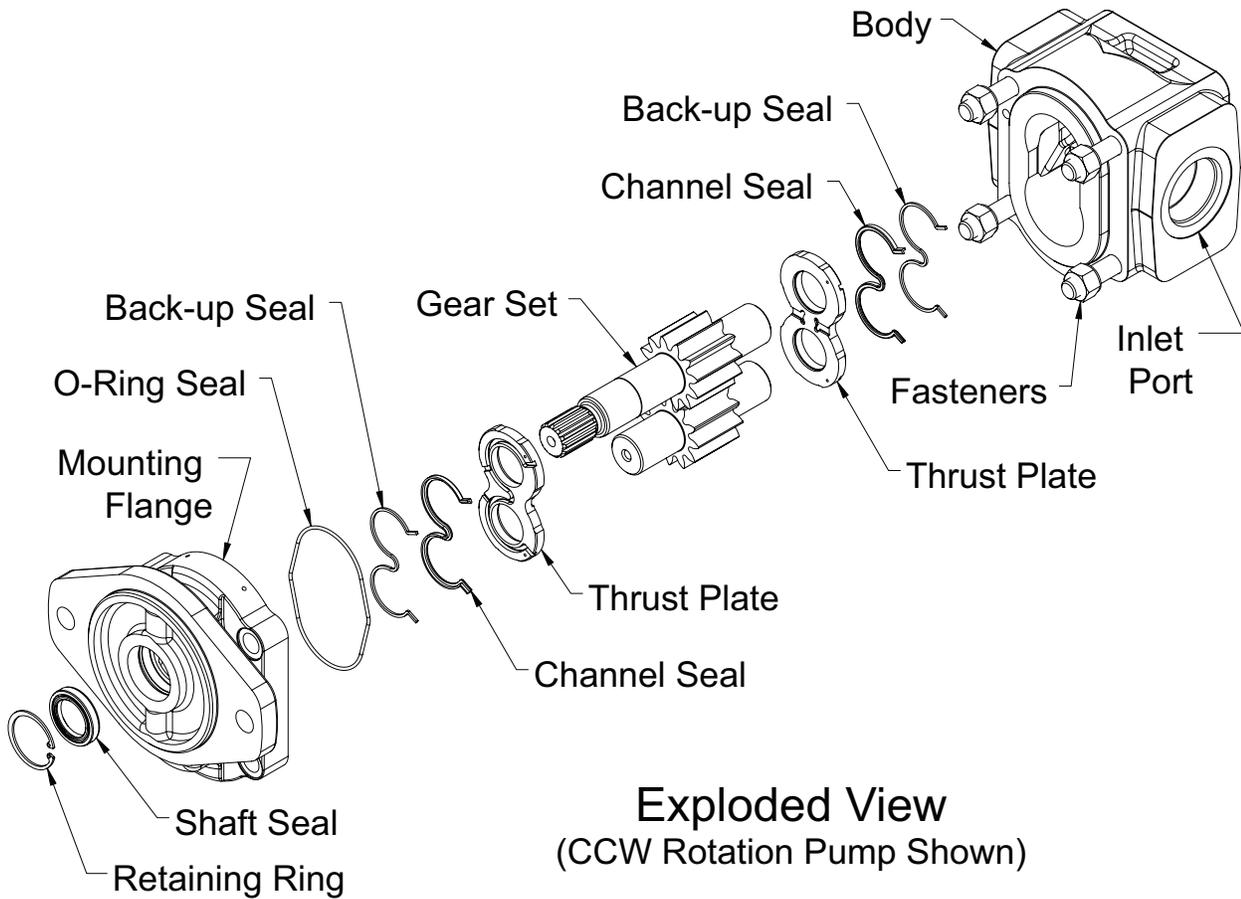
- Reduced system noise levels compared to earlier models and competitors' pumps
- High power through-drive capability
- Wide range of integral valves for power steering, power brakes, fan drives and implement hydraulics

**Characteristics**

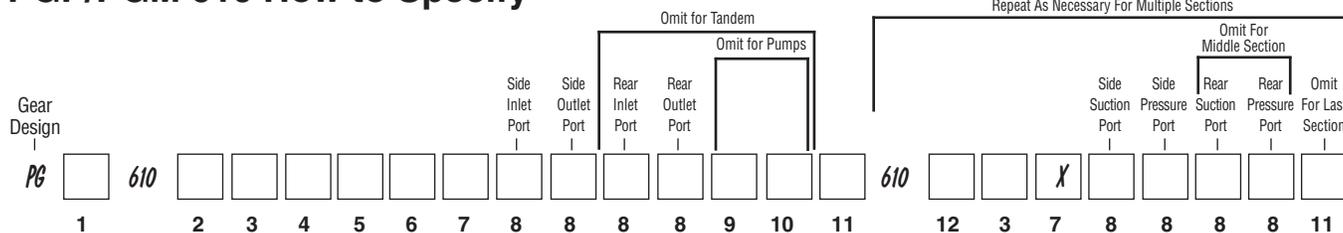
Product Features	Description
<b>Pump/motor type</b>	Heavy-duty, cast iron, external gear.
<b>Mounting</b>	SAE, 2-bolt and 4-bolt
<b>Ports</b>	SAE split flange, straight thread o-ring
<b>Shaft style</b>	SAE splined, keyed, tapered.
<b>Speed range</b>	See tables, <a href="#">pages 17-19</a>
<b>Displacement</b>	See codes <a href="#">pages 6,8,10</a>
<b>Rotation</b>	Clockwise, counterclockwise or birotational.
<b>Pump inlet pressure</b>	1.0 bar (15 psig) Maximum 13 cm (5 in) Hg Maximum Vacuum at operating temperature
<b>Inlet flow velocity</b>	3.0 mps (10 fps) Max Pump
<b>Outlet pressure</b>	See <a href="#">pages 7, 9, 11</a>
<b>Axial / radial shaft loads</b>	Call product support, call 1-888-700-7411
<b>Hydraulic fluids</b>	Petroleum oil (mineral base) Biodegradable oil Fire resistant fluids such as: - water-oil emulsions 60/40, HFB - water-glycol, HFC - phosphate-esters, HFD Note: Pressure ratings are reduced by 35 bar (500 psi) when using water-oil emulsions or water glycol, see <a href="#">pages 20-21</a> for details.
<b>Fluid temperature</b>	Range of operating temperature -15 to +80°C (5 to 176°F). Temperature for cold start -20 to -15°C (-4 to +5°F) at speed ≤ 1500 rpm. Maximum permissible operating pressure is dependent on fluid temperature.

Product Features	Description
<b>Recommended fluid viscosity (petroleum oil)</b>	Range of operating viscosity 15 to 75 cSt. Max. operating viscosity should not exceed 1600 cSt. Recommended min. viscosity 8 cSt. See <a href="#">pages 20-21</a> for more details.
<b>Recommended filtration</b>	According to ISO 4406 code. 20/18/15 at 140 bar (2000psi) 19/17/14 at 210 bar (3000psi) 17/15/12 at 275 bar (4000psi)
<b>Multiple pump assemblies</b>	- Available in two or three section configurations. - Max. shaft loading must conform to the limitations shown in the Shaft Load Capacity table, see <a href="#">page 14</a> . - The max. load is determined by adding the torque values for each pumping section that will be simultaneously loaded.
<b>Separate or common inlet capability</b>	Separate Inlet configuration: - Each gear housing has individual inlet and outlet ports.  Common Inlet configuration: - Two or more gear sets share a common inlet.
<b>Valve options</b>	-Load sensing priority -Constant primary flow priority -Relief valves -Anti-cav checks (motor)

### PGP/PGM 600 Series Construction



### PGP/PGM 610 How to Specify



1 Pump/Motor	
<b>P</b>	Pump
<b>M</b>	Motor

2 Unit		
	Pump	Motor
<b>A</b>	Single unit	Standard Motor w/o checks
<b>B</b>	Multiple unit	Standard Motor w/ two checks
<b>C</b>	—	Standard Motor w/one anti cavitation check (ACC)

3 Displacement	
<b>0070</b>	7 cc/rev (0.43 in <sup>3</sup> /rev)
<b>0100</b>	10 cc/rev (0.61 in <sup>3</sup> /rev)
<b>0140</b>	14 cc/rev (0.85 in <sup>3</sup> /rev)
<b>0160</b>	16 cc/rev (0.98 in <sup>3</sup> /rev)
<b>0180</b>	18 cc/rev (1.10 in <sup>3</sup> /rev)
<b>0210</b>	21 cc/rev (1.28 in <sup>3</sup> /rev)
<b>0230</b>	23 cc/rev (1.40 in <sup>3</sup> /rev)
<b>0260</b>	26 cc/rev (1.59 in <sup>3</sup> /rev)
<b>0280</b>	28 cc/rev (1.71 in <sup>3</sup> /rev)
<b>0320</b>	32 cc/rev (1.95 in <sup>3</sup> /rev)

4 Rotation	
<b>C</b>	Clockwise
<b>A</b>	Counter clockwise
<b>B</b>	Bi-directional (Motor Only)

5 Shaft*	
<b>A1</b>	9T, SAE "A" spline
<b>C1</b>	11T, SAE 19-4 spline
<b>D1</b>	13T, SAE "B" spline
<b>K1</b>	32L, SAE "A" parrallel
<b>L6</b>	32L, SAE "19-1" parrallel

\*See Note 1

6 Flange	
<b>H2</b>	SAE "A" 2-bolt
<b>H3</b>	SAE "B" 2-bolt

7 Shaft Seal*	
<b>X</b>	No seal
<b>N</b>	NBR (Buna-N) (pump only)
<b>V</b>	FPM, FKM (Fluorocarbon) (pump only)
<b>M</b>	Double NBR (Buna-N) (pump only)
<b>W</b>	Double FPM (Fluorocarbon) (pump only)
<b>H</b>	High Pres. (7bar) (motor only)

\*See Note 2

9 Motor Drain Option	
<b>B1</b>	No drain
<b>A</b>	SAE-4, straight thread o-ring
<b>C</b>	SAE-6, straight thread o-ring

10 Motor Drain Position	
<b>4</b>	Rear drain

11 Inlet Options (Multi Section Units Only)	
<b>C</b>	Common
<b>S</b>	Separate

12 Multiple Unit	
<b>A</b>	Last section
<b>B</b>	Middle section

8 Port Options*			
Code	Description	Rear Ports	Available Displacements for Side Ports
<b>B1</b>	No ports	n/a	7 thru 32 cc
<b>D3</b>	SAE-8 straight thread o-ring	Yes	7 thru 32 cc
<b>D4</b>	SAE-10 straight thread o-ring	Yes	7 thru 32 cc
<b>D5</b>	SAE-12 straight thread o-ring	Yes	7 thru 32 cc
<b>D6</b>	SAE-16 straight thread o-ring	No	7 thru 32 cc
<b>D7</b>	SAE-20 straight thread o-ring	No	14 thru 32 cc
<b>S1</b>	½" Split Flange, SAE Code 61	No	7 thru 32 cc
<b>S2</b>	¾" Split Flange, SAE Code 61	No	7 thru 32 cc
<b>S3</b>	1" Split Flange, SAE Code 61	No	14 thru 32 cc
<b>S4</b>	1¼" Split Flange, SAE Code 61	No	14 thru 32 cc

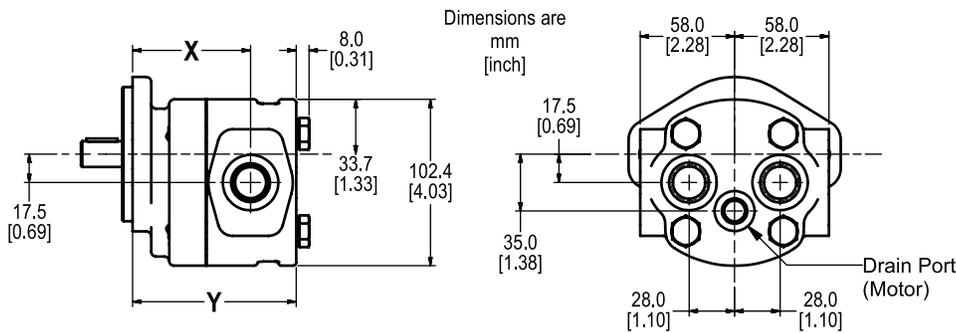
\*See Note 3

**Notes:**

1. See shaft load capacity table, [page 14](#), to check shaft strength.
2. Specify "V" or "W" code if phosphate ester fluid is used or if operating temperatures exceed 80°C (176°F).
3. See [page 16](#) for recommended maximum flows.

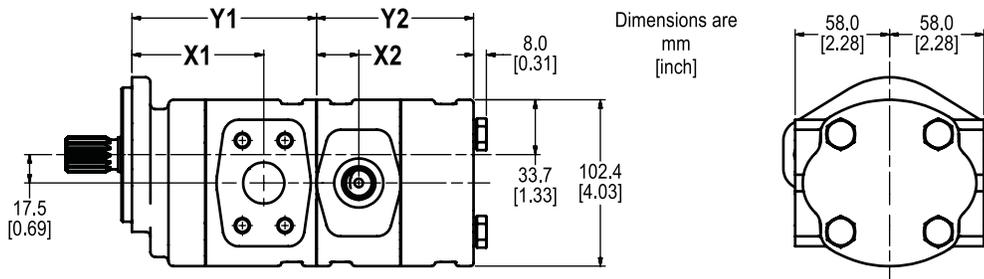
**PGP/PGM 610 Specification - Standard Displacements - Single Unit**

Pump Displacement	Code	0070	0100	0140	0160	0180	0210	0230	0260	0280	0320
	cc/rev	7.0	10.0	14.0	16.0	18.0	21.0	23.0	26.0	28.0	32.0
	in <sup>3</sup> /rev	0.43	0.61	0.85	0.98	1.10	1.28	1.40	1.59	1.71	1.95
Continuous Pressure	bar	275	275	275	275	265	245	235	215	200	175
	psi	3989	3989	3989	3989	3843	3553	3408	3118	2901	2538
Intermittent Pressure	bar	300	300	300	300	290	270	260	240	220	175
	psi	4351	4351	4351	4351	4206	3916	3771	3480	3190	2538
Port Location "X"	mm	71.0	75.5	75.0	78.0	81.0	81.5	83.5	81.0	84.0	90.5
	inch	2.80	2.97	2.95	3.07	3.19	3.21	3.29	3.19	3.31	3.56
Overall Length "Y"	mm	99.0	103.5	109.5	112.5	115.5	120.0	122.0	123.5	126.5	135.0
	inch	3.90	4.07	4.31	4.43	4.55	4.72	4.80	4.86	4.98	5.31
Weight*	kg	5.9	6.2	6.5	6.8	6.8	7.1	7.2	7.3	7.5	8.0
	lb	13.1	13.6	14.4	14.9	15.0	15.6	15.9	16.2	16.5	17.6



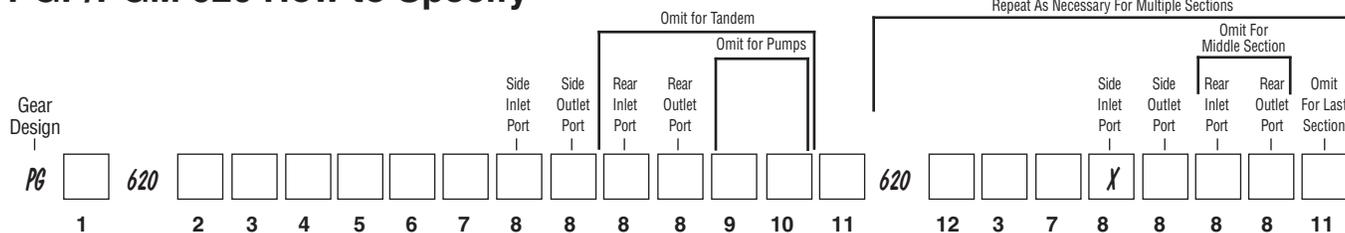
**PGP/PGM 610 Specification - Standard Displacements - Tandem Unit**

Pump Displacement	Code	0070	0100	0140	0160	0180	0210	0230	0260	0280	0320
	cc/rev	7.0	10.0	14.0	16.0	18.0	21.0	23.0	26.0	28.0	32.0
	in <sup>3</sup> /rev	0.43	0.61	0.85	0.98	1.10	1.28	1.40	1.59	1.71	1.95
Front Port Location "X1"	mm	71.0	75.5	75.0	78.0	81.0	81.5	83.5	81.0	84.0	90.5
	inch	2.80	2.97	2.95	3.07	3.19	3.21	3.29	3.19	3.31	3.56
Front Overall Length "Y1"	mm	96.0	100.5	106.5	109.5	112.5	117.0	119.0	120.5	123.5	132.5
	inch	3.78	3.96	4.19	4.31	4.43	4.61	4.69	4.74	4.86	5.22
Rear Port Location "X2"	mm	25.0	25.0	31.5	31.5	31.5	35.5	35.5	39.5	39.5	42.0
	inch	0.98	0.98	1.24	1.24	1.24	1.40	1.40	1.56	1.56	1.65
Rear Overall Length "Y2"	mm	95.5	100.0	106.0	109.0	112.0	116.5	118.5	120.0	123.0	132.0
	inch	3.76	3.94	4.17	4.29	4.41	4.59	4.67	4.72	4.84	5.20
Weight - Front Section*	kg	5.6	5.9	6.2	6.4	6.5	6.8	6.9	7.0	7.2	7.7
	lb	12.4	12.9	13.7	14.2	14.3	14.9	15.2	15.5	15.8	17.0
Weight - Rear Section*	kg	5.7	5.9	6.3	6.5	6.5	6.8	7.0	7.1	7.2	7.8
	lb	12.5	13.0	13.8	14.3	14.4	15.0	15.3	15.6	15.9	17.2



\*All weights are approximate. The actual weight of an assembly will depend upon the porting and the type of shaft and mounting specified. The weight of a tandem pump will be the sum of the weights of each section.

## PGP/PGM 620 How to Specify



1 Pump/Motor	
<b>P</b>	Pump
<b>M</b>	Motor

2 Unit		
	Pump	Motor
<b>A</b>	Single unit	Standard Motor w/o checks
<b>B</b>	Multiple unit	Standard Motor w/ two checks
<b>C</b>	—	Standard Motor w/one anti cavitation check (ACC)

3 Displacement	
<b>0190</b>	19 cc/rev (1.16 in <sup>3</sup> /rev)
<b>0230</b>	23 cc/rev (1.40 in <sup>3</sup> /rev)
<b>0260</b>	26 cc/rev (1.59 in <sup>3</sup> /rev)
<b>0290</b>	29 cc/rev (1.77 in <sup>3</sup> /rev)
<b>0330</b>	33 cc/rev (2.01 in <sup>3</sup> /rev)
<b>0370</b>	37 cc/rev (2.26 in <sup>3</sup> /rev)
<b>0410</b>	41 cc/rev (2.50 in <sup>3</sup> /rev)
<b>0440</b>	44 cc/rev (2.69 in <sup>3</sup> /rev)
<b>0500</b>	50 cc/rev (3.05 in <sup>3</sup> /rev)

4 Rotation	
<b>C</b>	Clockwise
<b>A</b>	Counter clockwise
<b>B</b>	Bi-directional (Motor Only)

5 Shaft	
<b>C1</b>	SAE 19-4 spline, 11T
<b>D1</b>	SAE "B" spline, 13T
<b>E1</b>	SAE "B-B" spline, 15T
<b>M1</b>	SAE "B" parallel key
<b>M2</b>	SAE "B-B", parallel key
<b>L6</b>	SAE 19-1 parallel key
<b>R3</b>	SAE "B" taper 8:1

\*See Note 1

6 Flange	
<b>A3</b>	SAE "B" 4-bolt square
<b>A4</b>	SAE "C" 4-bolt square
<b>H2</b>	SAE "A" 2-bolt
<b>H3</b>	SAE "B" 2-bolt

7 Shaft Seal	
<b>X</b>	No seal
<b>N</b>	NBR (Buna-N) (pump only)
<b>V</b>	FPM, FKM (Fluorocarbon) (pump only)
<b>M</b>	Double NBR (Buna-N) (pump only)
<b>W</b>	Double FPM (Fluorocarbon) (pump only)
<b>H</b>	High Pres.(5bar) (motor only)

\*See Note 2

9 Motor Drain Option	
<b>B1</b>	No drain
<b>C</b>	SAE-6, straight thread o-ring

10 Motor Drain Position	
<b>4</b>	Rear drain

11 Inlet Options (Multi Section Units Only)	
<b>C</b>	Common
<b>S</b>	Separate

12 Multiple Unit	
<b>A</b>	Last section
<b>B</b>	Middle section

8 Port Options*			
Code	Description	Rear Ports	Available Displacements for Side Ports
<b>B1</b>	No ports	n/a	19 thru 50 cc
<b>D3</b>	SAE-8 straight thread o-ring	Yes	19 thru 50 cc
<b>D4</b>	SAE-10 straight thread o-ring	Yes	19 thru 50 cc
<b>D5</b>	SAE-12 straight thread o-ring	Yes	19 thru 50 cc
<b>D6</b>	SAE-16 straight thread o-ring	Yes	19 thru 50 cc
<b>D7</b>	SAE-20 straight thread o-ring	No	19 thru 50 cc
<b>D8</b>	SAE-24 straight thread o-ring	No	29 thru 50 cc
<b>S1</b>	½" Split Flange, SAE Code 61	No	19 thru 50 cc
<b>S2</b>	¾" Split Flange, SAE Code 61	No	19 thru 50 cc
<b>S3</b>	1" Split Flange, SAE Code 61	No	19 thru 50 cc
<b>S4</b>	1¼" Split Flange, SAE Code 61	No	19 thru 50 cc
<b>S5</b>	1½" Split Flange, SAE Code 61	No	29 thru 50 cc
<b>S6</b>	2" Split Flange, SAE Code 61	No	29 thru 50 cc

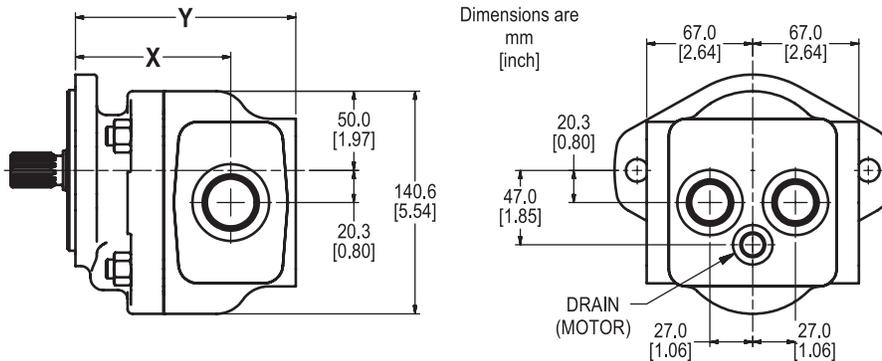
\*See Note 3

**Notes:**

- See shaft load capacity table, [page 14](#), to check shaft strength.
- Specify "V" or "W" code if phosphate ester fluid is used or if operating temperatures exceed 80°C (176°F).
- See [page 16](#) for recommended maximum flows.

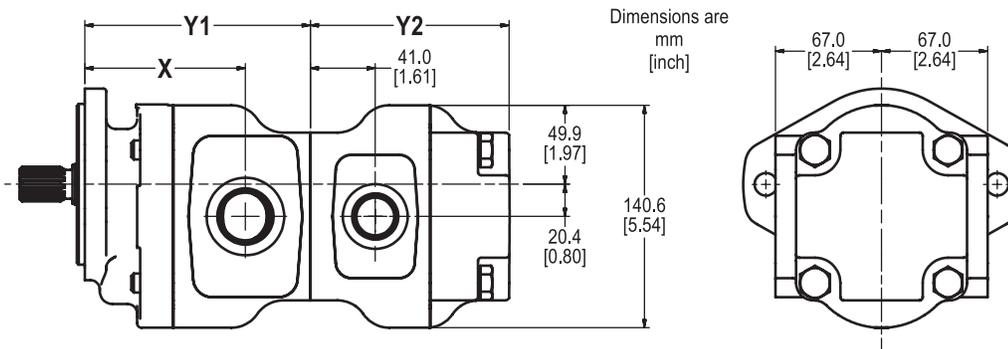
**PGP/PGM 620 Specification - Standard Displacements - Single Unit**

Pump Displacement	Code	0190	0230	0260	0290	0330	0370	0410	0440	0500
	cc/rev	19.0	23.0	26.0	29.0	33.0	37.0	41.0	44.0	50.0
	in <sup>3</sup> /rev	1.16	1.40	1.59	1.77	2.01	2.26	2.50	2.68	3.05
Continuous Pressure	bar	275	275	275	275	275	250	220	210	210
	psi	3989	3989	3989	3989	3989	3626	3191	3046	3046
Intermittent Pressure	bar	300	300	300	300	300	275	245	230	210
	psi	4351	4351	4351	4351	4351	3989	3553	3336	3046
Port Location "X"	mm	82.5	86.9	90.2	93.5	97.9	102.3	106.7	110.0	116.6
	inch	3.25	3.42	3.55	3.68	3.85	4.03	4.20	4.33	4.59
Overall Length "Y"	mm	123.5	127.9	131.2	134.5	138.9	143.3	147.7	151.0	157.6
	inch	4.86	5.04	5.17	5.30	5.47	5.64	5.81	5.94	6.20
*Weight	kg	12.1	12.2	12.3	12.6	12.7	12.9	13.0	13.1	13.3
	lb	26.7	26.9	27.1	27.8	28.0	28.4	28.7	28.9	29.3



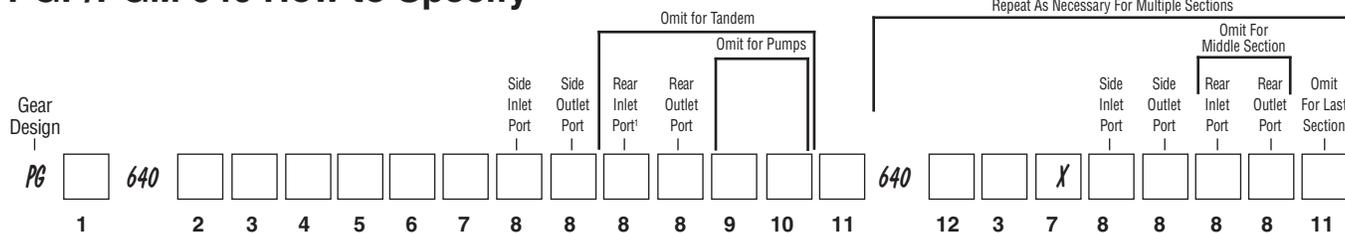
**PGP/PGM 620 Specification - Standard Displacements - Tandem Unit**

Pump Displacement	Code	0190	0230	0260	0290	0330	0370	0410	0440	0500
	cc/rev	19.0	23.0	26.0	29.0	33.0	37.0	41.0	44.0	50.0
	in <sup>3</sup> /rev	1.16	1.40	1.59	1.77	2.01	2.26	2.50	2.68	3.05
Front Port Location "X"	mm	82.5	86.9	90.2	93.5	97.9	102.3	106.7	110.0	116.6
	inch	3.25	3.42	3.55	3.68	3.85	4.03	4.20	4.33	4.59
Front Overall Length "Y"	mm	123.5	127.9	131.2	134.5	138.9	143.3	147.7	151.0	157.6
	inch	4.86	5.04	5.17	5.30	5.47	5.64	5.81	5.94	6.20
Rear Overall Length "Y"	mm	123.5	127.9	131.2	134.5	138.9	143.3	147.7	146.0	157.6
	inch	4.86	5.04	5.17	5.30	5.47	5.64	5.81	5.75	6.20
*Weight Front Section	kg	12.1	12.2	12.3	12.6	12.7	12.9	13.0	13.1	13.3
	lb	26.7	26.9	27.1	27.8	28.0	28.4	28.7	28.9	29.3
*Weight Rear Section	kg	12.1	12.2	12.3	12.6	12.7	12.9	13.0	11.5	13.3
	lb	26.7	26.9	27.1	27.8	28.0	28.4	28.7	25.4	29.3



\*All weights are approximate. The actual weight of an assembly will depend upon the porting and the type of shaft and mounting specified. The weight of a tandem pump will be the sum of the weights of each section.

## PGP/PGM 640 How to Specify



1 Pump/Motor	
<b>P</b>	Pump
<b>M</b>	Motor

2 Unit		
	Pump	Motor
<b>A</b>	Single unit	Standard Motor w/o checks
<b>B</b>	Multiple unit	Standard Motor w/ two checks
<b>C</b>	—	Standard Motor w/one anti cavitation check (ACC)

3 Displacement	
<b>0300</b>	30 cc/rev (1.83 in <sup>3</sup> /rev)
<b>0350</b>	37 cc/rev (2.14 in <sup>3</sup> /rev)
<b>0450</b>	45 cc/rev (2.75 in <sup>3</sup> /rev)
<b>0550</b>	55 cc/rev (3.36 in <sup>3</sup> /rev)
<b>0650</b>	65 cc/rev (4.00 in <sup>3</sup> /rev)
<b>0750</b>	75 cc/rev (4.58 in <sup>3</sup> /rev)
<b>0800</b>	80 cc/rev (4.88 in <sup>3</sup> /rev)

4 Rotation	
<b>C</b>	Clockwise
<b>A</b>	Counter clockwise
<b>B</b>	Bi-directional (Motor Only)

5 Shaft	
<b>D1</b>	SAE "B" spline, 13T
<b>E1</b>	SAE "B-B" spline, 15T
<b>E4</b>	SAE "C" spline, 14T
<b>M2</b>	SAE "B-B" parallel key
<b>N1</b>	SAE "C" parallel key

\*See Note 1

6 Flange	
<b>A3</b>	SAE "B" 4-bolt square
<b>A4</b>	SAE "C" 4-bolt square
<b>H3</b>	SAE "B" 2-bolt flange
<b>K3</b>	SAE "C" 2-bolt flange

7 Shaft Seal	
<b>X</b>	No seal
<b>N</b>	NBR (Buna-N) (pump only)
<b>V</b>	FPM, FKM (Fluorocarbon) (pump only)
<b>M</b>	Double NBR (Buna-N) (pump only)
<b>W</b>	Double FPM (Fluorocarbon) (pump only)
<b>H</b>	High Pres. (5bar) (motor only)

\*See Note 2

9 Motor Drain Option	
<b>B1</b>	No drain
<b>C</b>	SAE-6, Straight thread o-ring

10 Motor Drain Position	
<b>4</b>	Rear drain

11 Inlet Options (Multi Section Units Only)	
<b>C</b>	Common inlet (passage)
<b>S</b>	Separate

12 Multiple Unit	
<b>A</b>	Last section
<b>B</b>	Middle section

8 Port Options*			
Code	Description	Rear Ports	Available Displacements for Side Ports
<b>B1</b>	No ports	n/a	30 thru 80 cc
<b>D5</b>	SAE-12 straight thread o-ring	Yes	30 thru 80 cc
<b>D6</b>	SAE-16 straight thread o-ring	Yes	30 thru 80 cc
<b>D7</b>	SAE-20 straight thread o-ring	Yes	30 thru 80 cc
<b>D8</b>	SAE-24 straight thread o-ring	Yes	30 thru 80 cc
<b>D9</b>	SAE-32 straight thread o-ring	No	30 thru 80 cc
<b>S2</b>	¾" Split Flange, SAE Code 61	No	30 thru 80 cc
<b>S3</b>	1" Split Flange, SAE Code 61	No	30 thru 80 cc
<b>S4</b>	1¼" Split Flange, SAE Code 61	No	30 thru 80 cc
<b>S5</b>	1½" Split Flange, SAE Code 61	No	30 thru 80 cc
<b>S6</b>	2" Split Flange, SAE Code 61	No	40 thru 80 cc

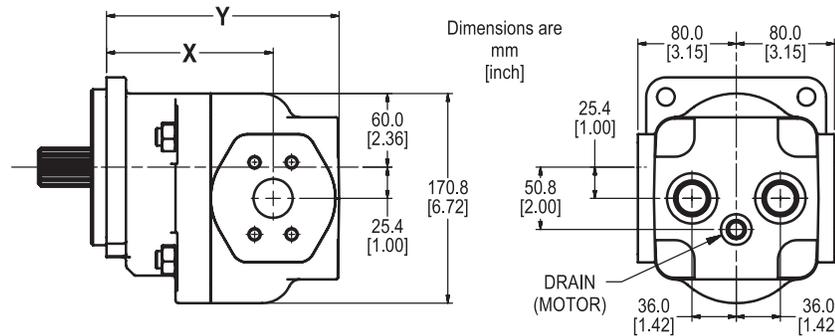
\*See Note 3

**Notes:**

- See shaft load capacity table, [page 14](#), to check shaft strength.
- Specify "V" or "W" code if phosphate ester fluid is used or if operating temperatures exceed 80°C (176°F).
- See [page 16](#) for recommended maximum flows.

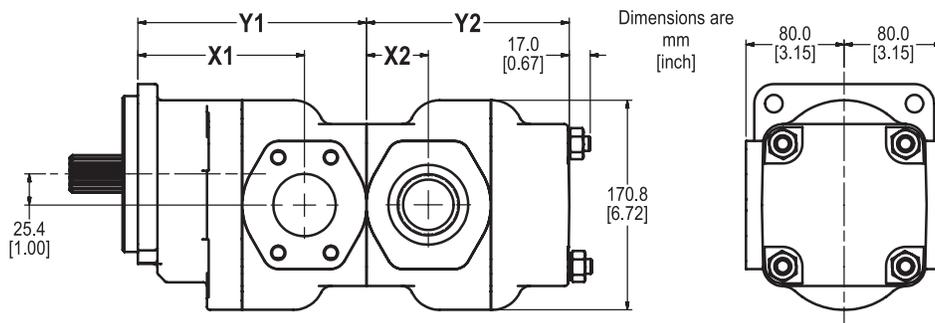
**PGP/PGM 640 Specification - Standard Displacements - Single Unit**

Pump Displacement	Code	0300	0350	0450	0550	0650	0750	0800
	cc/rev	30.0	35.0	45.0	55.0	65.0	75.0	80.0
	in <sup>3</sup> /rev	1.83	2.14	2.75	3.36	3.97	4.58	4.88
Continuous Pressure	bar	275	275	275	275	275	235	215
	psi	3989	3989	3989	3989	3843	3408	3118
Intermittent Pressure	bar	300	300	300	300	300	260	240
	psi	4351	4351	4351	4351	4206	3771	3481
Port Location "X"	mm	128.6	128.6	131.8	135.6	138.4	142.2	142.2
	inch	5.07	5.07	5.19	5.34	5.45	5.60	5.60
Overall Length "Y"	mm	176	176	183	189	196	203	203
	inch	6.90	6.93	7.19	7.45	7.71	7.99	7.99
*Weight	kg	20.6	20.6	21.2	22.0	22.6	23.3	24.0
	lb	42.2	45.4	46.7	48.5	49.8	51.4	53.0



**PGP/PGM 640 Specification - Standard Displacements - Tandem Unit**

Pump Displacement	Code	0300	0350	0450	0550	0650	0750	0800
	cc/rev	30.0	35.0	45.0	55.0	65.0	75.0	80.0
	in <sup>3</sup> /rev	1.83	2.14	2.75	3.36	3.97	4.58	4.88
Front Port Location "X1"	mm	128.6	128.6	131.8	135.6	138.4	142.2	142.2
	inch	5.06	5.06	5.19	5.34	5.45	5.60	5.60
Rear Port Location "X2"	mm	44.5	44.5	47.9	50.7	54.5	58.0	58.0
	inch	1.75	1.75	1.89	2.00	2.15	2.28	2.28
Front Overall Length "Y"	mm	173.1	173.1	179.7	186.3	192.9	200.2	200.2
	inch	6.81	6.81	7.07	7.33	7.59	7.88	7.88
Rear Overall Length "Y"	mm	150.9	150.9	157.5	164.1	170.7	178.0	178.0
	inch	5.94	5.94	6.20	6.46	6.72	7.01	7.01
*Weight Front Section	kg	20.3	20.3	20.9	21.7	22.3	23.0	23.0
	lb	44.8	44.8	46.1	47.8	49.2	50.7	50.7
*Weight Rear Section	kg	19.3	19.3	19.9	20.7	21.3	22.0	22.0
	lb	42.5	42.5	43.9	45.6	47.0	48.5	48.5



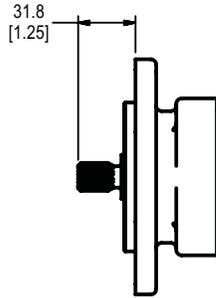
\*All weights are approximate. The actual weight of an assembly will depend upon the porting and the type of shaft and mounting specified. The weight of a tandem pump will be the sum of the weights of each section.

**PGP/PGM 600 Spline Shaft**

Dimensions are shown as  $\frac{\text{mm}}{[\text{in}]}$

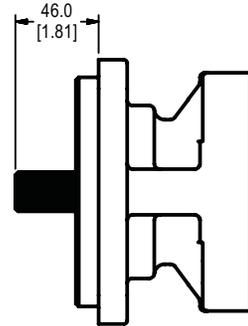
**Code A1 (610 only)**

9T, 16/32 PITCH, 32L S.A.E. "A" SPLINE  
 FLAT ROOT SIDE FIT



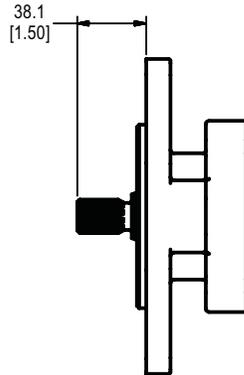
**Code E1 (620 & 640 only)**

15T, 16/32 PITCH, 46L S.A.E. "B-B" SPLINE  
 FLAT ROOT SIDE FIT



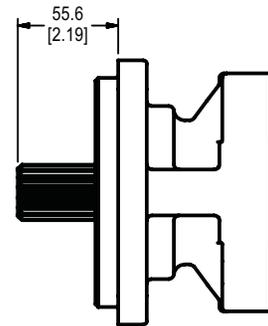
**Code C1 (610 & 620 only)**

11T, 16/32 PITCH, 38.1L S.A.E. "19-4" SPLINE  
 FLAT ROOT SIDE FIT



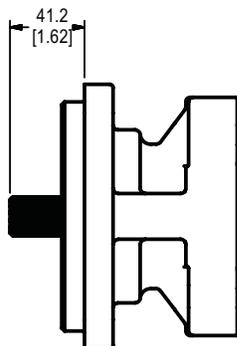
**Code E4 (640 only)**

14T, 12/24 PITCH, 55.6L S.A.E. "C" SPLINE  
 FLAT ROOT SIDE FIT



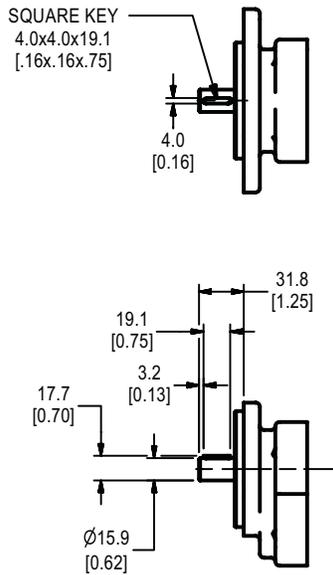
**Code D1 (610, 620 & 640)**

13T, 16/32 PITCH, 41.2L S.A.E. "B" SPLINE  
 FLAT ROOT SIDE FIT

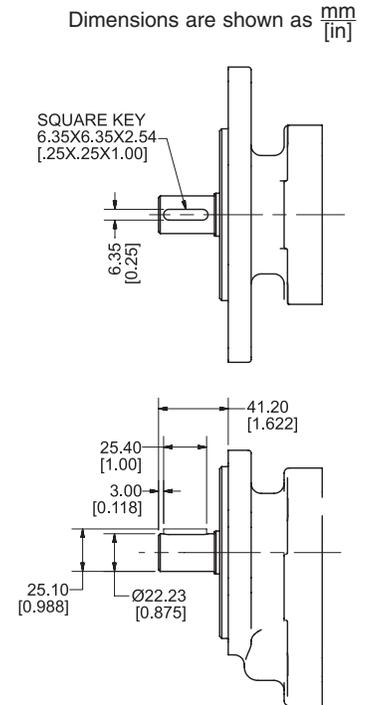


**PGP/PGM 600 Drive Shaft**

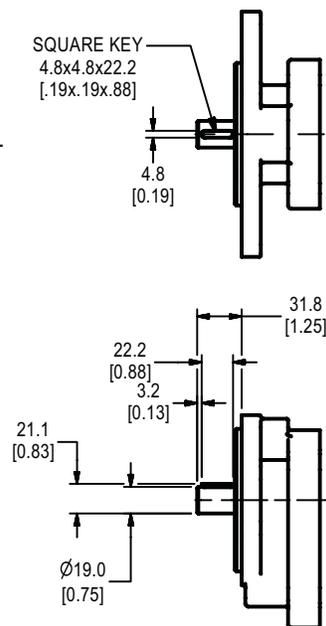
**Code K1 (610 only)**  
 Ø15.88, 4.0 KEY,  
 NO THREAD, 32L  
 S.A.E. "A" PARALLEL



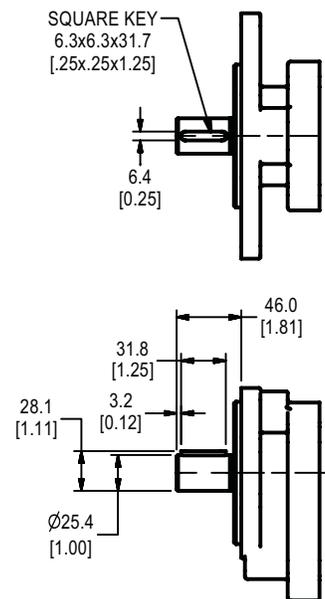
**Code M1**  
**(620 only)**  
 Ø22.22, 6.3 KEY,  
 NO THREAD, 41.2L  
 S.A.E. "B" PARALLEL



**Code L6**  
**(610 & 620 only)**  
 Ø19.05, 4.8 KEY,  
 NO THREAD, 32L  
 S.A.E. "19-1" PARALLEL



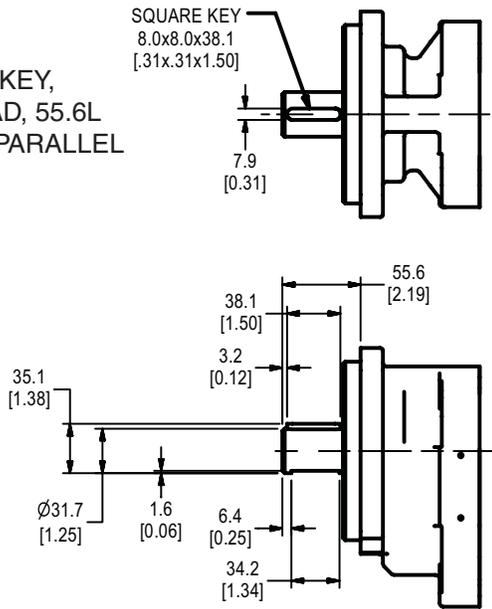
**Code M2**  
**(620 & 640 only)**  
 Ø25.4, 6.3 KEY,  
 NO THREAD, 46L  
 S.A.E. "B-B" PARALLEL



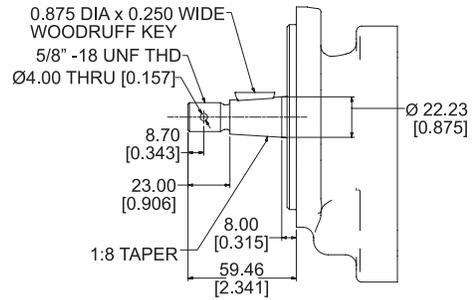
**PGP/PGM 600 Drive Shaft**

Dimensions are shown as  $\frac{mm}{[in]}$

**Code N1  
 (640 only)**  
 Ø31.7, 8.0 KEY,  
 NO THREAD, 55.6L  
 S.A.E. "C" PARALLEL



**Code R3 (620 only)**  
 SAE "B" TAPER w/Key



**PGP/PGM 600- Shaft Load Capacity - Continuous Rating**

Code	Type	Shaft Description	Maximum Allowable Torque					
			PGP610		PGP620		PGP640	
			Nm	lb-ft	Nm	lb-ft	Nm	lb-ft
A1	spline	SAE A, 9 tooth, 16/32 pitch	85	62	N/A	N/A	N/A	N/A
C1	spline	SAE 19-4, 11 tooth, 16/32 pitch	125	92	125	92	N/A	N/A
D1	spline	SAE B, 13 tooth, 16/32 pitch	245	181	245	181	350	258
E1	spline	SAE B-B, 15 tooth, 16/32 pitch	N/A	N/A	390	288	535	395
E4	spline	SAE C, 14 tooth, 12/24 pitch	N/A	N/A	N/A	N/A	1040	767
n/a	spline	Connecting Shaft-Tandem Units	130	96	225	166	435	321
K1	key	SAE A, 0.625" dia, 0.156" key	85	63	N/A	N/A	N/A	N/A
L6	key	SAE 19-1, 0.750" dia, 0.188" key	170	125	170	125	N/A	N/A
M1	key	SAE B, 0.875" dia, 0.250" key	200	148	200	148	N/A	N/A
M2	key	SAE BB, 1.000" dia, 0.250" key	N/A	N/A	320	236	320	236
N1	key	SAE C, 1.250" dia, 0.312" key	N/A	N/A	N/A	N/A	630	465
R3	taper	SAE B, 1:8 taper, 5/8" - 18 thd	N/A	N/A	190	140	N/A	N/A

To calculate the theoretical torque of a pump or motor:

$$\text{Torque (Nm)} = \frac{\text{Pressure (bar)} \times \text{Displacement (cc/rev)}}{62.8}$$

$$\text{Torque (lb-ft)} = \frac{\text{Pressure (psi)} \times \text{Displacement (cuin/rev)}}{75.4}$$

Approximate actual torque to drive a pump = 1.1 x theoretical torque.

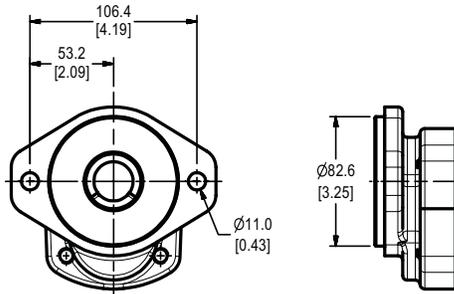
Approximate actual torque from a motor = .9 x theoretical torque.

The total shaft torque for a multiple section unit will be the sum of the values for each section.  
 Each connecting shaft should also be checked for torque load capacity.

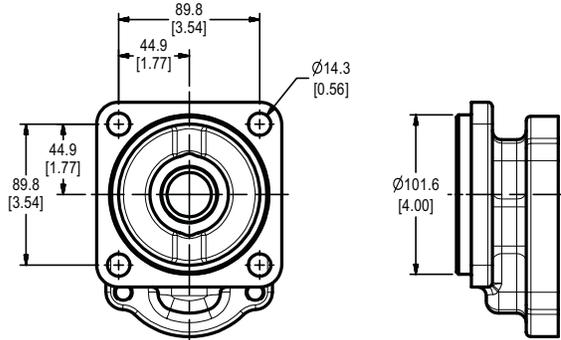
**PGP/PGM 600 Mounting Flange**

Dimensions are shown as  $\frac{\text{mm}}{\text{in}}$

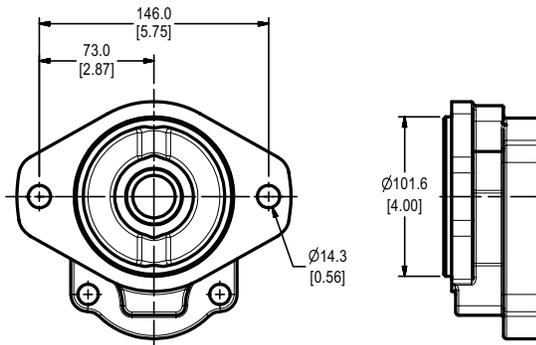
**Code H2 (610 & 620 only)**  
 S.A.E. "A" 2-BOLT



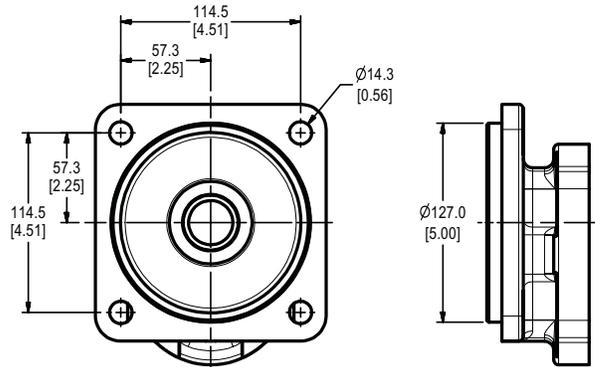
**Code A3 (620 & 640 only)**  
 S.A.E. "B" 4-BOLT



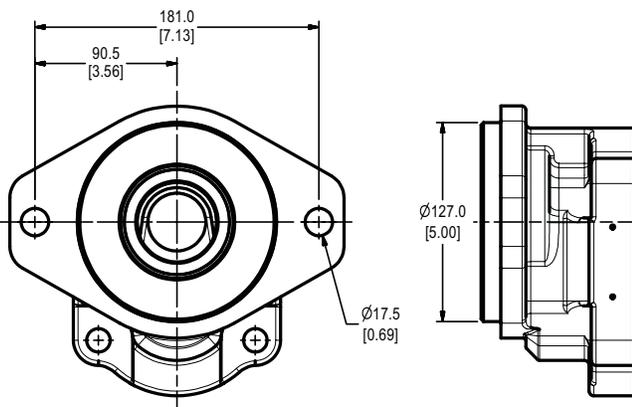
**Code H3 (610, 620 & 640)**  
 S.A.E. "B" 2-BOLT



**Code A4 (620 & 640 only)**  
 S.A.E. "C" 4-BOLT



**Code K3 (640 only)**  
 S.A.E. "C" 2-BOLT

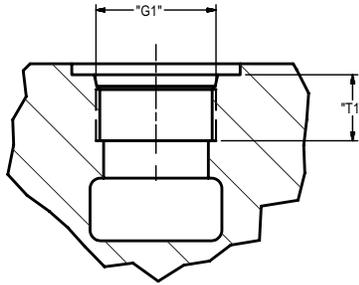


PGP/PGM 600 Porting

Dimensions are shown as  $\frac{mm}{[in]}$

Porting Code D

SAE J1926 STRAIGHT THREAD O-RING

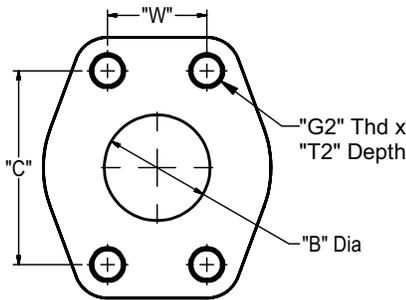


\*Note: The pump inlet flow velocity should not exceed 3.0 m/s (10 fps). Pump outlet and motor inlet or outlet flow velocities should not exceed 6.1 m/s (20 fps).

Code	Dash Size	Nominal Tube OD	"G1" Thd Size inch	"T1" Full Thd Min mm (inch)	Recommended Max Flow* lpm (gpm)	
					Pump Inlet	Pump Outlet & Motor
D3	-8	1/2"	3/4"-16	14.3 (.56)	14 (3.8)	28 (7.5)
D4	-10	5/8"	7/8"-14	16.7 (.66)	22 (5.7)	44 (11.5)
D5	-12	3/4"	1-1/16"-12	19.0 (.75)	34 (9.1)	69 (18.2)
D6	-16	1"	1-5/16"-12	19.0 (.75)	66 (17.4)	132 (34.9)
D7	-20	1 1/4"	1-5/8"-12	19.0 (.75)	108 (28.5)	215 (56.9)
D8	-24	1 1/2"	1-7/8"-12	19.0 (.75)	160 (42.2)	319 (84.3)
D9	-32	2"	2-1/2"-12	19.0 (.75)	294 (77.7)	588 (155.3)

Porting Code S

FOUR BOLT SPLIT FLANGE TYP SAE J518 CODE 61



\*Note: The pump inlet flow velocity should not exceed 3.0 m/s (10 fps). Pump outlet and motor inlet or outlet flow velocities should not exceed 6.1 m/s (20 fps).

Code	Dash Size	Nominal ID	"G2" Thd Size inch	"T2" Full Thd Min mm (inch)	"B" Dia mm (inch)	"C" mm (inch)	"W" mm (inch)	Recommended Max Flow* lpm (gpm)	
								Pump Inlet	Pump Outlet & Motor
S1	-8	1/2"	5/16"-18	15.0 (0.59)	12.7 (0.50)	38.10 (1.500)	17.48 (0.688)	23 (6.1)	46 (12.2)
S2	-12	3/4"	3/8"-16	14.0 (0.56)	19.0 (0.75)	47.63 (1.875)	22.23 (0.875)	52 (13.8)	104 (27.5)
S3	-16	1"	3/8"-16	20.6 (0.81)	25.4 (1.00)	52.37 (2.062)	26.19 (1.031)	93 (24.5)	185 (49.0)
S4	-20	1 1/4"	7/16"-14	20.6 (0.81)	31.8 (1.25)	58.72 (2.312)	30.17 (1.188)	145 (38.3)	290 (76.5)
S5	-24	1 1/2"	1/2"-13	27.0 (1.06)	38.1 (1.50)	69.85 (2.750)	35.71 (1.406)	208 (55.1)	417 (110.2)
S6	-32	2"	1/2"-13	27.0 (1.06)	50.8 (2.00)	77.77 (3.062)	42.88 (1.688)	370 (97.9)	742 (195.9)

<b>PGP610 Typical Outlet Flow and Input Power</b>											
<b>120°F (50°C), ISO VG32 Fluid</b>											
<b>Speed rpm</b>	<b>units</b>	<b>Displacement / Maximum Allowable Continuous Pressure</b>									
	<b>cc in<sup>3</sup> bar psi</b>	<b>7</b>	<b>10</b>	<b>14</b>	<b>16</b>	<b>18</b>	<b>21</b>	<b>23</b>	<b>26</b>	<b>28</b>	<b>32</b>
<b>900</b>	<b>lpm</b>	6.0	8.5	11.9	13.6	15.3	17.9	19.6	22.1	23.8	27.2
	<b>gpm</b>	1.6	2.2	3.1	3.6	4.0	4.7	5.2	5.8	6.3	7.2
	<b>kw</b>	3.1	4.4	6.2	7.1	7.4	7.8	7.8	7.8	7.7	9.0
	<b>hp</b>	4.2	5.9	8.3	9.5	9.9	10.4	10.4	10.4	10.3	12.1
<b>1200</b>	<b>lpm</b>	8.0	11.3	15.9	18.1	20.4	23.8	26.1	29.5	31.8	36.3
	<b>gpm</b>	2.1	3.0	4.2	4.8	5.4	6.3	6.9	7.8	8.4	9.6
	<b>kw</b>	4.1	5.9	8.3	9.5	9.9	10.4	10.4	10.3	10.2	12.0
	<b>hp</b>	5.6	7.9	11.1	12.7	13.2	13.9	13.9	13.9	13.7	16.1
<b>1500</b>	<b>lpm</b>	10.0	14.3	20.1	22.9	25.8	30.1	32.9	37.2	40.1	45.8
	<b>gpm</b>	2.6	3.8	5.3	6.1	6.8	7.9	8.7	9.8	10.6	12.1
	<b>kw</b>	5.2	7.5	10.5	12.0	12.5	13.1	13.1	13.1	12.9	15.2
	<b>hp</b>	7.0	10.0	14.0	16.0	16.7	17.6	17.6	17.5	17.3	20.4
<b>1800</b>	<b>lpm</b>	12.1	17.3	24.2	27.6	31.1	36.3	39.7	44.9	48.4	55.3
	<b>gpm</b>	3.2	4.6	6.4	7.3	8.2	9.6	10.5	11.9	12.8	14.6
	<b>kw</b>	6.3	9.0	12.6	14.3	15.0	15.8	15.8	15.7	15.5	18.3
	<b>hp</b>	8.4	12.0	16.8	19.2	20.1	21.1	21.1	21.0	20.8	24.5
<b>2100</b>	<b>lpm</b>	14.2	20.3	28.4	32.4	36.5	42.6	46.6	52.7	56.7	64.8
	<b>gpm</b>	3.7	5.4	7.5	8.6	9.6	11.2	12.3	13.9	15.0	17.1
	<b>kw</b>	7.4	10.6	14.8	16.9	17.7	18.6	18.6	18.5	18.3	21.5
	<b>hp</b>	9.9	14.2	19.9	22.7	23.7	24.9	24.9	24.8	24.6	28.9
<b>2400</b>	<b>lpm</b>	16.3	23.3	32.6	37.2	41.9	48.9	53.5	60.5	65.2	74.5
	<b>gpm</b>	4.3	6.1	8.6	9.8	11.1	12.9	14.1	16.0	17.2	19.7
	<b>kw</b>	8.6	12.2	17.1	19.6	20.4	21.5	21.5	21.4	21.2	24.9
	<b>hp</b>	11.5	16.4	22.9	26.2	27.4	28.8	28.8	28.7	28.42	33.4
<b>2700</b>	<b>lpm</b>	18.3	26.2	36.7	41.9	47.1	55.0	60.2	68.1	73.3	83.8
	<b>gpm</b>	4.8	6.9	9.7	11.1	12.5	14.5	15.9	18.0	19.4	22.1
	<b>kw</b>	9.7	13.9	19.5	22.2	23.2	24.4	24.4	24.3	24.1	28.3
	<b>hp</b>	13.1	18.6	26.1	29.8	31.1	32.7	32.7	32.6	32.3	38.0
<b>3000</b>	<b>lpm</b>	20.4	29.1	40.7	46.6	52.4	61.1	66.9	75.7	81.5	93.1
	<b>gpm</b>	5.4	7.7	10.8	12.3	13.8	16.1	17.7	20.0	21.5	24.6
	<b>kw</b>	10.9	15.6	21.9	25.0	26.1	27.4	27.4	27.3	27.0	31.8
	<b>hp</b>	14.7	21.0	29.3	33.5	35.0	36.8	36.8	36.6	36.3	42.7
<b>3300</b>	<b>lpm</b>	22.3	31.8	44.6	51.0	57.3	66.9	73.2	82.8	89.2	101.9
	<b>gpm</b>	5.9	8.4	11.8	13.5	15.1	17.7	19.3	21.9	23.6	26.9
	<b>kw</b>	12.2	17.4	24.3	27.8	29.0	30.5	30.5	30.4	30.1	35.4
	<b>hp</b>	16.3	23.3	32.6	37.3	38.9	40.9	40.9	40.8	40.4	47.5

<b>PGP620 Typical Outlet Flow and Input Power 120°F (50°C), ISO VG32 Fluid</b>										
Speed rpm	units	Displacement / Maximum Allowable Continuous Pressure								
	cc in <sup>3</sup> bar psi	19	23	26	29	33	37	41	44	50
900	lpm	16.2	19.6	22.1	24.7	28.1	31.5	34.9	37.4	42.5
	gpm	4.3	5.2	5.8	6.5	7.4	8.3	9.2	9.9	11.2
	kw	8.4	10.2	11.5	12.9	14.6	14.9	14.5	14.9	16.9
	hp	11.3	13.7	15.5	17.2	19.6	20.0	19.5	20.0	22.7
1200	lpm	21.7	26.1	29.5	32.9	37.4	42.0	46.5	49.9	56.7
	gpm	5.7	6.9	7.8	8.7	9.9	11.1	12.3	13.2	15.0
	kw	11.2	13.6	15.4	17.2	19.5	19.9	19.4	19.9	22.6
	hp	15.1	18.2	20.6	23.0	26.2	26.7	26.0	26.6	30.3
1500	lpm	27.2	32.9	37.2	41.5	47.3	53.0	58.7	63.0	71.6
	gpm	7.2	8.7	9.8	11.0	12.5	14.0	15.5	16.7	18.9
	kw	14.2	17.2	19.4	21.7	24.7	25.1	24.5	25.1	28.5
	hp	19.0	23.0	26.1	29.1	33.1	33.7	32.9	33.7	38.3
1800	lpm	32.8	39.7	44.9	50.1	57.0	63.9	70.8	76.0	86.4
	gpm	8.7	10.5	11.9	13.2	15.1	16.9	18.7	20.1	22.8
	kw	17.0	20.6	23.3	26.0	29.6	30.2	29.4	30.1	34.2
	hp	22.8	27.7	31.3	34.9	39.7	40.4	39.4	40.4	45.9
2100	lpm	38.5	46.6	52.7	58.8	66.9	75.0	83.1	89.2	101.3
	gpm	10.2	12.3	13.9	15.5	17.7	19.8	21.9	23.6	26.8
	kw	20.1	24.3	27.5	30.7	34.9	35.6	34.7	35.5	40.4
	hp	26.9	32.6	36.9	41.1	46.8	47.7	46.5	47.7	54.2
2400	lpm	44.2	53.5	60.5	67.5	76.8	86.1	95.4	102.4	116.4
	gpm	11.7	14.1	16.0	17.8	20.3	22.8	25.2	27.1	30.7
	kw	23.2	28.1	31.8	35.4	40.3	41.1	40.1	41.1	46.7
	hp	31.1	37.7	42.6	47.5	54.1	55.1	53.8	55.1	62.6
2700	lpm	49.8	60.2	68.1	76.0	86.4	96.9	107.4	115.2	131.0
	gpm	13.1	15.9	18.0	20.1	22.8	25.6	28.4	30.4	34.6
	kw	26.4	32.0	36.2	40.3	45.9	46.8	45.6	46.7	53.1
	hp	35.4	42.9	48.5	54.1	61.5	62.7	61.2	62.7	71.2
3000	lpm	55.3	66.9	75.7	84.4	96.0	107.7	119.3	128.0	145.5
	gpm	14.6	17.7	20.0	22.3	25.4	28.4	31.5	33.8	38.4
	kw	29.7	35.9	40.6	45.3	51.6	52.6	51.3	52.5	59.7
	hp	39.8	48.2	54.5	60.8	69.1	70.5	68.7	70.4	80.0

<b>PGP640 Typical Outlet Flow and Input Power 120°F (50°C), ISO VG32 Fluid</b>								
<b>Speed rpm</b>	<b>units</b>	<b>Displacement / Maximum Allowable Continuous Pressure</b>						
	<b>cc in<sup>3</sup> bar psi</b>	<b>30</b>	<b>35</b>	<b>45</b>	<b>55</b>	<b>65</b>	<b>75</b>	<b>80</b>
<b>900</b>	<b>lpm</b>	25.5	31.5	38.3	46.8	55.3	63.8	68.0
	<b>gpm</b>	6.7	8.3	10.1	12.4	14.6	16.9	18.0
	<b>kw</b>	13.3	16.4	20.0	24.4	27.8	27.2	27.1
	<b>hp</b>	17.8	22.0	26.8	32.7	37.3	36.5	36.3
<b>1200</b>	<b>lpm</b>	34.2	42.0	51.0	62.4	73.7	85.1	90.7
	<b>gpm</b>	9.0	11.1	13.5	16.5	19.5	22.5	24.0
	<b>kw</b>	17.7	21.9	26.6	32.5	37.0	36.3	36.1
	<b>hp</b>	23.8	29.3	35.7	43.6	49.7	48.7	48.4
<b>1500</b>	<b>lpm</b>	43.0	53.0	64.5	78.8	93.1	107.4	114.6
	<b>gpm</b>	11.4	14.0	17.0	20.8	24.6	28.4	30.3
	<b>kw</b>	22.4	27.6	33.6	41.1	46.8	45.9	45.7
	<b>hp</b>	30.1	37.1	45.1	55.1	62.8	61.5	61.2
<b>1800</b>	<b>lpm</b>	51.8	63.9	77.8	95.0	112.3	129.6	138.2
	<b>gpm</b>	13.7	16.9	20.5	25.1	29.7	34.2	36.5
	<b>kw</b>	26.9	33.2	40.4	49.3	56.2	55.0	54.8
	<b>hp</b>	36.1	44.5	54.1	66.1	75.3	73.8	73.5
<b>2100</b>	<b>lpm</b>	60.8	75.0	91.2	111.5	131.7	152.0	162.1
	<b>gpm</b>	16.1	19.8	24.1	29.4	34.8	40.2	42.8
	<b>kw</b>	31.7	39.1	47.6	58.2	66.3	64.9	64.6
	<b>hp</b>	42.6	52.5	63.8	78.0	88.8	87.0	86.7
<b>2400</b>	<b>lpm</b>	69.8	86.1	104.8	128.0	151.3	174.6	186.2
	<b>gpm</b>	18.4	22.8	27.7	33.8	40.0	46.1	49.2
	<b>kw</b>	36.7	45.2	55.0	67.2	76.6	75.0	74.7
	<b>hp</b>	49.2	60.6	73.8	90.1	102.7	100.6	100.1
<b>2700</b>	<b>lpm</b>	78.6	96.9	117.9	144.0	170.2	196.4	209.5
	<b>gpm</b>	20.8	25.6	31.1	38.1	45.0	51.9	55.3
	<b>kw</b>	41.7	51.4	62.6	76.5	87.1	85.3	84.9
	<b>hp</b>	55.9	69.0	83.9	102.6	116.8	114.4	113.9
<b>3000</b>	<b>lpm</b>	87.3	107.7	131.0	160.1	189.2	218.3	232.8
	<b>gpm</b>	23.1	28.4	34.6	42.3	50.0	57.7	61.5
	<b>kw</b>	46.9	57.8	70.3	85.9	97.9	95.9	95.5
	<b>hp</b>	62.9	77.5	94.3	115.2	131.2	128.6	128.0

## GEAR PUMP FLUID RECOMMENDATIONS

### PETROLEUM OILS (Mineral-based)

#### Viscosity Recommendations

Optimum operating viscosity is considered to be about 20 cSt (100 SUS).

Minimum: approximately 7.5 - 10 cSt (50 - 60 SUS)

Maximum at start up: approximately 1600 cSt (7500 SUS)

#### Recommended Viscosity Grades

Grade	Viscosity at 40°C (100°F)	Viscosity at 100°C (210°F)
SAE 10	32 cSt (150 SUS)	4 cSt (41 SUS)
SAE 20	71 cSt (300 SUS)	7 cSt (51 SUS)
ISO 32	32 cSt (165 SUS)	5 cSt (44 SUS)
ISO 46	46 cSt (240 SUS)	7 cSt (49 SUS)

#### Other Desirable Properties

Viscosity Index: 90 minimum

Aniline Point: 175 minimum

#### Additives Usually Recommended

Rust and Oxidation Inhibitors

Foam Depressant

**Note:** Antiwear (AW) additives are not recommended. In some instances the presence of zinc compounds can actually be harmful to copper, bronze, or brass components used in the system. The use of AW oil is optional with our gear units.

#### General Recommendations

High quality hydraulic oils are essential for satisfactory performance and long life of any hydraulic system. Such oils are usually prepared from highly refined, turbine oil stocks with which select additives are compounded. We suggest following the manufacturer's specifications or the recommendations of a reputable oil supplier for the specific oil requirements on your machine.

A high viscosity oil will generally give better performance and longer life than a thin oil. Oil of around 20 cSt (100 SUS) viscosity will give optimum performance. Your selection should be as near to optimum as possible at operating temperature but not so heavy at start-up as to cause cavitation. Cold start-up procedures which allow the use of heavier oils should prove worthwhile by increasing pump life.

#### Inlet Vacuum

Vacuum measured at the inlet port of the pump generally should not exceed 13 cm (5 in) Hg. Higher vacuum can result

in cavitation which may severely damage the pump. A usually acceptable rule of thumb is that the inlet line flow velocity should not exceed 3.0 mps (10 fps). A long inlet line or the use of several fittings may necessitate increasing the line size. We suggest that each inlet port of a tandem pump have its own line from the reservoir. If possible, the fluid level in the reservoir should be higher than the pump inlet.

#### Operating Temperature

The optimum oil operating temperature is in the range of 50 to 60°C (120-140°F). If the oil temperature will be above 82°C (180°F) for significant periods of time, then FPM or FKM (Viton) seals should be used. The oil temperature should not exceed 93°C (200°F), even if FPM or FKM seals are used. High temperatures result in rapid oil deterioration and indicate the need for an oil cooler or a larger reservoir. The nearer to optimum temperature, the longer the service life of the oil, pump and other components.

#### Reservoir

Reservoir capacity in gallons should at least equal total pump output in GPM. When filling the reservoir, oil should pass through a 100-mesh screen. Pour only **clean oil** from **clean containers** into the reservoir. The reservoir should have a breather to allow air in or out. The filler cap and breather should be sealed to prevent moisture from entering. A hydraulic oil water content of as little as 0.1% can cause damage to hydraulic components.

#### Filtration

Good filtration assures improved service life at today's high operating pressures. System filtration is recommended that will maintain a contamination level according to ISO 4406: 20/18/15 for 140 bar (2000 psi), 19/17/14 for 210 bar (3000 psi) and 17/15/12 for 275 bar (4000 psi). The specific filter recommendation should come from your equipment manufacturer or filter supplier.

A 100 mesh screen should be used in the suction line leading to the pump. It should be of sufficient size to handle twice the pump capacity. The screen must be cleaned and checked regularly to avoid pump and system damage.

Oil and filters should be changed on a regular schedule and the system flushed in accordance with the original equipment manufacturer's recommendations. Reservoir air breather filters should be cleaned periodically.

**FILTRATION IS NOT A SUBSTITUTE FOR PRACTICING CLEANLINESS AND PROPER PREVENTIVE MAINTENANCE.**

**Cold Weather Operation**

Oils for use in cold weather should have a viscosity not exceeding 7500 SUS (1620 cSt) at the minimum start up temperature and a pour point of at least 20°F (11°C) below that temperature. Experience in cold climates has been satisfactory without using special oils or fluids. Start-up procedures must allow for a gradual warm-up and equipment should not be operated at full pressure until the oil reaches a reasonably fluid state.

**Comments On The Use Of Other Oils And Fluids.****Biodegradable Oils (Vegetable-Based)**

Oils of this type with properties similar to recommended petroleum oils may be used with the PGP600 series pumps and motors. Performance, pressure ratings, and durability are not adversely affected.

**Automatic Transmission Fluid (ATF)**

In general these oils have low viscosity and may be used only at reduced operating pressures and oil temperatures.

**Diesel Fuel, Kerosene, Coal Oil**

Although sometimes used as a dilutant for cold weather operations, their use is not recommended because they are insufficiently refined products.

**Transformer Oil**

Sometimes used for extremely cold weather operation. It is not generally recommended as it becomes too thin at normal operating temperatures. Oil to U.S. Military Spec MIL-H-5606 is in this category.

**WATER BASE FIRE RESISTANT FLUIDS**

Two types of water base fluids (WBF) may be used with our gear pumps and motors.

Both types of WBF come in various viscosity grades. Select the grade best suited to the equipment and its operation in terms of pressure, speed, temperature, duty cycle, etc. The fluid used should be recommended by the O.E.M. or a reputable fluid supplier.

**Water-in Oil (60/40) Invert Emulsions**

Invert emulsions are approved for use with PGP600 series pumps but at pressures up to 3000 psi or 500 psi below rated pressures, whichever is lower.

**Water Glycol Solutions**

Water glycol solutions of the types normally used in hydrostatic systems may be used with PGP600 series pumps. These consist of about 60% glycol and about 40% water with additives to improve lubricity and other characteristics. Pressures up to 3000 psi are approved, depending on the displacement.

**OPERATING LIMITS GENERALLY RECOMMENDED WITH VARIOUS FLUIDS**

FLUID:	MAX. OPER. TEMP.	MAX. INLET LINE VELOCITY	MAX. INLET VACUUM AT PUMP
Petroleum Oil	82°C (180°F)	3.0m/s (10fps)	13cm (5") Hg
W/O Emulsion	65°C (150°F)	1.2m/s (4fps)	0cm (0") Hg
Water Glycol Solution	65°C (150°F)	1.2m/s (4fps)	0cm (0") Hg

**Note:** These figures represent generally accepted maximums and will not prove satisfactory in all installations. For very severe duty cycles, it will likely be advantageous to design and operate the system at something less than these maximum limits.

**WBF Filtration**

Filtration that seems to give the best results consists of a 100-mesh inlet screen and a return line filter. For water base fluids, the inlet screen should be sized up three to four times the pump capacity. The return line filter should have a rating and size recommended by the fluid and filter manufacturers to achieve the recommended ISO contamination level.

**Note:** Finer filtration may be required by other components in the system.

**High Water Base Fluids (HWBF)**

The use of 95/5 emulsion is not recommended.

**Phosphate Ester**

Phosphate ester does not appear to effect pump performance or service life, but FPM or FKM (Viton) seals should be used with this fluid. Viscosity characteristics of phosphate ester fluid limit the recommended ranges of operating and ambient temperatures.

- DO NOT USE ANY TYPE OF FLUID NOT RECOMMENDED IN THIS BULLETIN WITHOUT FIRST CONSULTING OUR PRODUCT SUPPORT.
- OBTAIN YOUR FINAL FLUID RECOMMENDATION FROM YOUR FLUID SUPPLIER.

**Parker Hannifin Gear Pump Division**  
**101 Canterbury Road, Kings Mountain, NC**  
**Telephone: 1-888-700-7411**







**PARKER-HANNIFIN CORPORATION**  
**OFFER OF SALE**

**1. Definitions.** As used herein, the following terms have the meanings indicated.

"Buyer" means any customer receiving a Quote for Products.

"Buyer's Property" means any tools, patterns, plans, drawings, designs, specifications materials, equipment, or information furnished by Buyer, or which are or become Buyer's property.

"Confidential Information" means any technical, commercial, or other proprietary information of Seller, including, without limitation, pricing, technical drawings or prints and/or part lists, which has been or will be disclosed, delivered, or made available, whether directly or indirectly, to Buyer.

"Goods" means any tangible part, system or component to be supplied by Seller.

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"Software" means any software related to the Goods, whether embedded or separately downloaded.

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addition to any other or further rights and remedies available at law or in equity. No waiver by Seller of any breach by Buyer of any provision of these terms will constitute a waiver by Seller of any other breach of such provision.

**4. Shipment; Delivery; Title and Risk of Loss.** All delivery dates are approximate, and Seller is not responsible for damages or additional costs resulting from any delay. All deliveries are subject to our ability to procure materials from our suppliers. Regardless of the manner of shipment, delivery occurs and title and risk of loss or damage pass to Buyer, upon placement of the Products with the carrier at Seller's facility. Unless otherwise agreed prior to shipment and for domestic delivery locations only, Seller will select and arrange, at Buyer's sole expense, the carrier and means of delivery. When Seller selects and arranges the carrier and means of delivery, freight and insurance costs for shipment to the designated delivery location will be prepaid by Seller and added as a separate line item to the invoice. Buyer shall be responsible for any additional shipping charges incurred by Seller due to Buyer's acts or omissions. Buyer shall not return or repackage any Products without the prior written authorization from Seller, and any return shall be at the sole cost and expense of Buyer.

**5. Warranty.** The warranty for the Products is as follows:

(i) Goods are warranted against defects in material or workmanship for a period of twelve (12) months from the date of delivery or 2,000 hours of use, whichever occurs first; (ii) Services shall be performed in accordance with generally accepted practices and using the degree of care and skill that is ordinarily exercised and customary in the field to which the Services pertain and are warranted for a period of six (6) months from the date of completion of the Services; and (iii) Software is only warranted to perform in accordance with applicable specifications provided by Seller to Buyer for ninety (90) days from the date of delivery or, when downloaded by a Buyer or end-user, from the date of the initial download. All prices are based upon the exclusive limited warranty stated above, and upon the following disclaimer: **EXEMPTION CLAUSE; DISCLAIMER OF WARRANTY, CONDITIONS, REPRESENTATIONS: THIS WARRANTY IS THE SOLE AND ENTIRE WARRANTY, CONDITION, AND REPRESENTATION, PERTAINING TO PRODUCTS. SELLER DISCLAIMS ALL OTHER WARRANTIES, CONDITIONS, AND REPRESENTATIONS, WHETHER STATUTORY, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THOSE RELATING TO DESIGN, NONINFRINGEMENT, MERCHANTABILITY, AND FITNESS FOR A PARTICULAR PURPOSE. SELLER DOES NOT WARRANT THAT THE SOFTWARE IS ERROR-FREE OR FAULT-TOLERANT, OR THAT BUYER'S USE THEREOF WILL BE SECURE OR UNINTERRUPTED, UNLESS OTHERWISE AUTHORIZED IN WRITING BY SELLER, THE SOFTWARE SHALL NOT BE USED IN CONNECTION WITH HAZARDOUS OR HIGH-RISK ACTIVITIES OR ENVIRONMENTS. EXCEPT AS EXPRESSLY STATED HEREIN, ALL PRODUCTS ARE PROVIDED "AS IS"**.

**6. Claims; Commencement of Actions.** Buyer shall promptly inspect all Products upon receipt. No claims for shortages will be allowed unless reported to Seller within ten (10) days of delivery. Buyer shall notify Seller of any alleged breach of warranty within thirty (30) days after the date the non-conformance is or should have been discovered by Buyer. Any claim or action against Seller based upon breach of contract or any other theory, including tort, negligence, or otherwise must be commenced within twelve (12) months from the date of the alleged breach or other alleged event, without regard to the date of discovery.

**7. LIMITATION OF LIABILITY. IN THE EVENT OF A BREACH OF WARRANTY, SELLER WILL, AT ITS OPTION, REPAIR OR REPLACE THE NON-CONFORMING PRODUCTS, RE-PERFORM THE SERVICES, OR REFUND THE PURCHASE PRICE PAID WITHIN A REASONABLE PERIOD OF TIME. IN NO EVENT IS SELLER LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES INCLUDING ANY LOSS OF REVENUE OR PROFITS, WHETHER BASED IN CONTRACT, TORT OR OTHER LEGAL THEORY. IN NO EVENT SHALL SELLER'S LIABILITY UNDER ANY CLAIM MADE BY BUYER EXCEED THE PURCHASE PRICE PAID FOR THE PRODUCTS.**

**8. Confidential Information.** Buyer acknowledges and agrees that Confidential Information has been and will be received in confidence and will remain the property of Seller. Buyer further agrees that it will not use Seller's Confidential Information for any purpose other than for the benefit of Seller and shall return all such Confidential Information to Seller within thirty (30) days upon request.

**9. Loss to Buyer's Property.** Buyer's Property will be considered obsolete and may be destroyed by Seller after two (2) consecutive years have elapsed without Buyer ordering the Products manufactured using Buyer's Property.

Also, Seller shall not be responsible for any loss or damage to Buyer's Property while it is in Seller's possession or control.

**10. Special Tooling.** Seller may impose a tooling charge for any Special Tooling. Special Tooling shall be and remain Seller's property. In no event will Buyer acquire any interest in the Special Tooling, even if such Special Tooling has been specially converted or adapted for manufacture of Goods for Buyer and notwithstanding any charges paid by Buyer. Unless otherwise agreed, Seller has the right to alter, discard or otherwise dispose of any Special Tooling or other property owned by Seller in its sole determination at any time.

**11. Security Interest.** To secure payment of all sums due from Buyer, Seller retains a security interest in all Products delivered to Buyer and, Buyer's acceptance of these Terms is deemed to be a Security Agreement under the Uniform Commercial Code. Buyer authorizes Seller as its attorney to execute and file on Buyer's behalf all documents Seller deems necessary to perfect Seller's security interest.

**12. User Responsibility.** Buyer, through its own analysis and testing, is solely responsible for making the final selection of the Products and assuring that all performance, endurance, maintenance, safety and warning requirements of the application of the Products are met. Buyer must analyze all aspects of the application and follow applicable industry standards, specifications, and any technical information provided with the Quote or the Products, such as Seller's instructions, guides and specifications. If Seller provides options of or for Products based upon data or specifications provided by Buyer, Buyer is responsible for determining that such data and specifications are suitable and sufficient for all applications and reasonably foreseeable uses of the Products. In the event Buyer is not the end-user of the Products, Buyer will ensure such end-user complies with this paragraph.

**13. Use of Products, Indemnity by Buyer.** Buyer shall comply with all instructions, guides and specifications provided by Seller with the Quote or the Products. If Buyer uses or resells the Products in any way prohibited by Seller's instructions, guides or specifications, or Buyer otherwise fails to comply with Seller's instructions, guides and specifications, Buyer acknowledges that any such use, resale, or non-compliance is at Buyer's sole risk. Further, Buyer shall indemnify, defend, and hold Seller harmless from any losses, claims, liabilities, damages, lawsuits, judgments and costs (including attorney fees and defense costs), whether for personal injury, property damage, intellectual property infringement or any other claim, arising out of or in connection with: (a) improper selection, design, specification, application, or any misuse of Products; (b) any act or omission, negligent or otherwise, of Buyer; (c) Seller's use of Buyer's Property; (d) damage to the Products from an external cause, repair or attempted repair by anyone other than Seller, failure to follow instructions, guides and specifications provided by Seller, use with goods not provided by Seller, or opening, modifying, deconstructing, tampering with or repackaging the Products; or (e) Buyer's failure to comply with these Terms, including any legal or administrative proceedings, collection efforts, or other actions arising from or relating to such failure to comply. Seller shall not indemnify Buyer under any circumstance except as otherwise provided in these Terms.

**14. Cancellations and Changes.** Buyer may not cancel or modify, including but not limited to movement of delivery dates for the Products, any order for any reason except with Seller's written consent and upon terms that will indemnify, defend and hold Seller harmless against all direct, incidental and consequential loss or damage and any additional expense. Seller, at any time, may change features, specifications, designs and availability of Products.

**15. Assignment.** Buyer may not assign its rights or obligations without the prior written consent of Seller.

**16. Force Majeure.** Seller is not liable for delay or failure to perform any of its obligations by reason of any events or circumstances beyond its reasonable control. Such circumstances include without limitation: accidents, labor disputes or stoppages, government acts or orders, acts of nature, pandemics, epidemics, other widespread illness, or public health emergency, cyber related disruptions, cyber-attacks, ransomware sabotage, delays or failures in delivery from carriers or suppliers, shortages of materials, sudden increases in the price of raw material or components, shutdowns or slowdowns affecting the supply of raw materials or components, or the transportation thereof, oil shortages or oil price increases, energy crisis, energy or fuel interruption, war (whether declared or not) or the serious threat of same, riots, rebellions, acts of terrorism, embargoes, fire or any reason whether similar to the foregoing or otherwise. Seller will resume performance as soon as practicable after the event of force majeure has been removed. All delivery dates affected by an event of force majeure shall be tolled for the duration of such event of force majeure and rescheduled for mutually agreed dates as soon as practicable after the event of force majeure ceases to exist. The right to allocate capacity is in the Seller's sole discretion. An event of force majeure shall not include

financial distress, insolvency, bankruptcy, or other similar conditions affecting one of the parties, affiliates and/or subcontractors. An event of force majeure in the meaning of these Terms means any circumstances beyond Seller's control that permanently or temporarily hinders performance, even where that circumstance was already foreseen. Buyer shall not be entitled to cancel any orders following its claim of an event of force majeure.

**17. Waiver and Severability.** Failure to enforce any provision of these Terms will not invalidate that provision; nor will any such failure prejudice either party's right to enforce that provision in the future. Invalidation of any provision of these Terms shall not invalidate any other provision herein and, the remaining provisions will remain in full force and effect.

**18. Duration.** Unless otherwise stated in the Quote, any agreement governed by or arising from these Terms shall: (a) be for an initial duration of one (1) year; and (b) shall automatically renew for successive one-year terms unless terminated by Buyer with at least 180-days written notice to Seller or if Seller terminates the agreement pursuant to Section 19 of these Terms.

**19. Termination.** Seller may, without liability to Buyer, terminate any agreement governed by or arising from these Terms for any reason and at any time by giving Buyer thirty (30) days prior written notice. Seller may immediately terminate, in writing, if Buyer: (a) breaches any provision of these Terms, (b) becomes or is deemed insolvent, (c) appoints or has appointed a trustee, receiver or custodian for all or any part of Buyer's property, (d) files a petition for relief in bankruptcy on its own behalf, or one is filed against Buyer by a third party, (e) makes an assignment for the benefit of creditors; or (f) dissolves its business or liquidates all or a majority of its assets.

**20. Ownership of Rights.** Buyer agrees that (a) Seller (and/or its affiliates) owns or is the valid licensee of Seller's IP and (b) the furnishing of information, related documents or other materials by Seller to Buyer does not grant or transfer any ownership interest or license in or to Seller's IP to Buyer, unless expressly agreed in writing. Without limiting the foregoing, Seller retains ownership of all Software supplied to Buyer. In no event shall Buyer obtain any greater right in and to the Software than a right in a license limited to the use thereof and subject to compliance with any other terms provided with the Software. Buyer further agrees that it will not, directly or through intermediaries, reverse engineer, decompile, or disassemble any Software (including firmware) comprising or contained within a Product, except and only to the extent that such activity may be expressly permitted, either by applicable law or, in the case of open source software, the applicable open source license.

**21. Indemnity for Infringement of Intellectual Property Rights.** Seller is not liable for infringement of any Intellectual Property Rights except as provided in this Section. Seller will defend at its expense and will pay the cost of any settlement or damages awarded in an action brought against Buyer based on a third-party claim that one or more of the Products infringes the Intellectual Property Rights of a third party in the country of delivery of the Products by Seller to Buyer. Seller's obligation to defend and indemnify Buyer is contingent on Buyer notifying Seller within ten (10) days after Buyer becomes aware of any such claim, and Seller having sole control over the defense of the claim including all negotiations for settlement or compromise. If one or more Products is subject to such a claim, Seller may, at its sole expense and option, procure for Buyer the right to continue using the Products, replace or modify the Products to render them non-infringing, or offer to accept return of the Products and refund the purchase price less a reasonable allowance for depreciation. Seller has no obligation or liability for any claim of infringement: (i) arising from information provided by Buyer (including Seller's use of Buyer's Property); or (ii) directed to any Products for which the designs are specified in whole or part by Buyer; or (iii) resulting from the modification, combination or use in a system of any Products. The foregoing provisions of this Section constitute Seller's sole and exclusive liability and Buyer's sole and exclusive remedy for claims of infringement of Intellectual Property Rights.

**22. Governing Law.** These Terms, the terms of any Quote, and the sale and delivery of all Products are deemed to have taken place in, and shall be governed and construed in accordance with, the laws of the State of Ohio, as applicable to contracts executed and wholly performed therein and without regard to conflicts of laws principles. Buyer irrevocably agrees and consents to the exclusive jurisdiction and venue of the courts of Cuyahoga County, Ohio with respect to any dispute, controversy or claim arising out of or relating to the sale and delivery of the Products.

**23. Entire Agreement.** These Terms, along with the terms set forth in the Quote, forms the entire agreement between the Buyer and Seller and constitutes the final, complete and exclusive expression of the terms of sale and purchase. In the event of a conflict between any term set forth in the Quote and these Terms, the terms set forth in the Quote shall prevail. All prior or contemporaneous written or oral agreements or negotiations with

respect to the subject matter shall have no effect. No modification to these Terms will be binding on Seller unless agreed to in a writing that is signed by an authorized representative of Seller, excluding email correspondence, 'clickwrap' or other purported electronic assent to different or additional terms. Sections 2-25 of these Terms shall survive termination or cancellation of any agreement governed by or arising from these Terms.

**24. No 'Wrap' Agreements/No Authority to Bind.** Seller's clicking any buttons or any similar action, such as clicking "I Agree" or "Confirm," to utilize Buyer's software or webpage for the placement of orders, is NOT an agreement to Buyer's Terms and Conditions. **NO EMPLOYEE, AGENT OR REPRESENTATIVE OF SELLER HAS THE AUTHORITY TO BIND SELLER BY THE ACT OF CLICKING ANY BUTTON OR SIMILAR ACTION ON BUYER'S WEBSITE OR PORTAL.**

**25. Compliance with Laws.** Buyer agrees to comply with all applicable laws, regulations, and industry and professional standards, including those of the United States of America, and the country or countries in which Buyer may operate, including without limitation the U.S. Foreign Corrupt Practices Act ("FCPA"), the U.S. Anti-Kickback Act ("Anti-Kickback Act"), U.S. and E.U. export control and sanctions laws ("Export Laws"), the U.S. Food Drug and Cosmetic Act ("FDCA"), and the rules and regulations promulgated by the U.S. Food and Drug Administration ("FDA"), each as currently amended. Buyer agrees to indemnify, defend, and hold harmless Seller from the consequences of any violation of such laws, regulations and standards by Buyer, its employees or agents. Buyer represents that it is familiar with all applicable provisions of the FCPA, the Anti-Kickback Act, Export Laws, the FDCA and the FDA and certifies that Buyer will adhere to the requirements thereof and not take any action that would make Seller violate such requirements. Buyer represents and agrees that Buyer will not make any payment or give anything of value, directly or indirectly, to any governmental official, foreign political party or official thereof, candidate for foreign political office, or commercial entity or person, for any improper purpose, including the purpose of influencing such person to purchase Products or otherwise benefit the business of Seller. Buyer further represents and agrees that it will not receive, use, service, transfer or ship any Products from Seller in a manner or for a purpose that violates Export Laws or would cause Seller to be in violation of Export Laws. Buyer agrees to promptly and reliably provide Seller all requested information or documents, including end-user statements and other written assurances, concerning Buyer's ongoing compliance with Export Law.



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## **Parker Hannifin Corporation**

### **About Parker Hannifin Corporation**

Parker Hannifin is a leading global motion-control company dedicated to delivering premier customer service. A Fortune 500 corporation listed on the New York Stock Exchange (PH), our components and systems comprise over 1,400 product lines that control motion in some 1,000 industrial and aerospace markets. Parker is the only manufacturer to offer its customers a choice of hydraulic, pneumatic, and electro-mechanical motion-control solutions. Our Company has the largest distribution network in its field, with over 7,500 distributors serving more than 350,000 customers worldwide.

### **Parker's Charter**

To be a leading worldwide manufacturer of components and systems for the builders and users of durable goods. More specifically, we will design, market and manufacture products controlling motion, flow and pressure. We will achieve profitable growth through premier customer service.

### **Product Information**

North American customers seeking product information, the location of a nearby distributor, or repair services will receive prompt attention by calling the Parker Product Information Center at our toll-free number: 1-800-C-PARKER (1-800-272-7537). In the UK, a similar service is available by calling 0500-103-203.

#### **The Aerospace Group**

is a leader in the development, design, manufacture and servicing of control systems and components for aerospace and related high-technology markets, while achieving growth through premier customer service.



#### **The Climate & Industrial Controls Group**

designs, manufactures and markets system-control and fluid-handling components and systems to refrigeration, air-conditioning and industrial customers worldwide.



#### **The Fluid Connectors Group**

designs, manufactures and markets rigid and flexible connectors, and associated products used in pneumatic and fluid systems.



**The Seal Group** designs, manufactures and distributes industrial and commercial sealing devices and related products by providing superior quality and total customer satisfaction.



#### **The Hydraulics Group**

designs, produces and markets a full spectrum of hydraulic components and systems to builders and users of industrial and mobile machinery and equipment.



#### **The Filtration Group**

designs, manufactures and markets quality filtration and clarification products, providing customers with the best value, quality, technical support, and global availability.



#### **The Automation Group**

is a leading supplier of pneumatic and electro-mechanical components and systems to automation customers worldwide.



#### **The Instrumentation Group**

is a global leader in the design, manufacture and distribution of high-quality critical flow components for worldwide process instrumentation, ultra-high-purity, medical and analytical applications.





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