

C101™/C102™ Series

Combination Pump/Valves

Catalog HY09-101/US



- Patented relief valve protection
- Pressure to 2500 psi
- Flows from 9.5 to 48 gpm
- Includes G101/G102 Series
- Speeds to 2400 rpm
- 2 & 3 line installation
- Air shift kits available

HEAVY DUTY CAST IRON

Combination Pump/Valves

C101™/C102™ Series

The Parker Hannifin Gear Pump Division Assures:

- Consistent quality
- Technical innovation
- Premier customer service

Worldwide Sales and Service

Parker operates sales and service centers in major industrial areas worldwide. Call 1-800-C-PARKER for more information, or for a synopsis of the Gear Pump Division, contact a Parker representative.

The Gear Pump Division's ability to engineer specialty products for unique applications has kept us at the forefront of technology, and ensured our position as the industry leader. Our success has come from providing a quality product with excellent sales and service support.

We manufacture hydraulic components for a wide range of industries including:

- Construction
- Refuse/dump truck
- Material handling
- Forestry
- Agriculture
- Industrial



WARNING

FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS AND/OR SYSTEMS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

This document and other information from Parker Hannifin Corporation, its subsidiaries and authorized distributors provide product and/or system options for further investigation by users having technical expertise. It is important that you analyze all aspects of your application and review the information concerning the product or system in the current product catalog. Due to the variety of operating conditions and applications for these products or systems, the user, through its own analysis and testing, is solely responsible for making the final selection of the products and systems and assuring that all performance, safety and warning requirements of the application are met.

The products described herein, including without limitation, product features, specifications, designs, availability and pricing, are subject to change by Parker Hannifin Corporation and its subsidiaries at any time without notice.

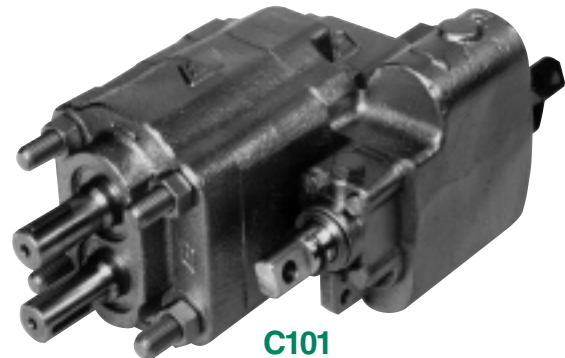
Offer of Sale

The items described in this document are hereby offered for sale by Parker Hannifin Corporation, its subsidiaries or its authorized distributors. This offer and its acceptance are governed by the provisions stated in the "Offer of Sale".

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Pump/Valve Products

C101/C102

- 39 & 48 gpm @ 1800 rpm
- Pressures to 2500 psi
- Speeds to 2400 rpm
- Choice of mountings
- Air remote operators available
- Relief valve protects pump & cylinder

G101/G102

- 9.5, 21 & 29 gpm @ 1800 rpm
- Pressures to 2500 psi
- Speeds to 2400 rpm
- 2- or 3-line installations
- Choice of mountings
- Air remote operators available
- Relief valve protects pump & cylinder

G104/G105

- 9.5, 21 & 29 gpm @ 1800 rpm
- Pressures to 2500 psi
- Speeds to 2400 rpm
- 3- or 4-line installations
- Choice of mountings
- Air remote operators available
- Main relief valve protects pump & cylinder when valve spool is in either work position
- Optional cylinder port relief valve for lower position

The Broadest Choice

We sell more pump/valve combinations for dump trucks and trailers than any other manufacturer for two reasons: our pump/valve family offer the broadest choice of flow ratings; these units provide the most reliable, trouble-free control for dump trucks.

Underbody Hoist to Big Trailers - We Have Your Pump

Our dump body pump/valve products deliver the right flow range for most applications at 1800 rpm/2000 psi. Models with two shafts (C101/G101/G104) can be mounted to remote PTO's operating in either direction of rotation. Single shaft units (C102/G102/G105) mount directly to the vehicle drive train. All (except G104/G105 models) can be connected in two- or three-line circuits to control single-acting cylinders. The G104/G105 range offers the choice of three- or four-line hookups and a three, or detented fourth, position valve for use with double-acting cylinders. **All units are supplied with factory-set 2000 psi relief valves.**

Combination Pump/Valves

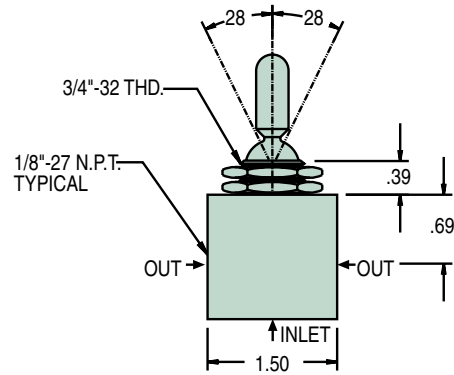
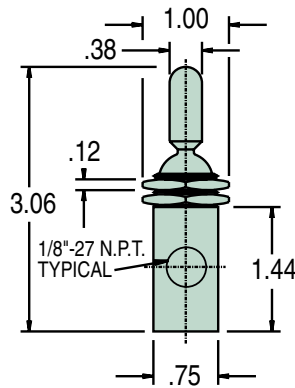
C101™/C102™ Series

Air Shift Kits

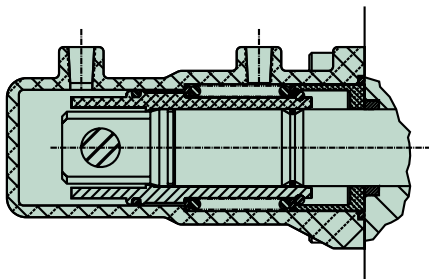
All dump units can be shifted from the cab by cable or by air with our Air Shift kit.

The kit consists of an air cylinder that mounts on the valve unit, a pneumatic control valve that mounts in the cab, 30' of air hose and all necessary connections. A minimum of 80 psi air pressure is required, which can be taken off the brake system or on-board compressor. The shifter can be retro-fit easily to existing pump/valve units by following the simple instructions with each kit.

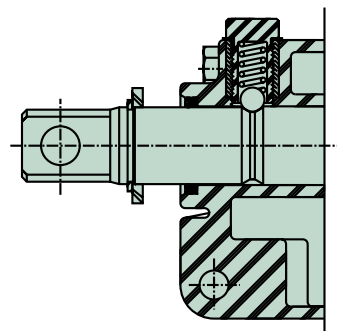
C101/G102 AIR SHIFT KITS	10 Digit Part No.
ASK-5 with Toggle	314-9414-005
ASK-6 without Toggle	314-9414-006
ASK-13 with Air Metering Controller	314-9414-013
ASK-17 without Air Hose, Fittings	314-9414-017
G101/G102 AIR SHIFT KITS	10 Digit Part No.
ASK-15 with Toggle	308-9414-015
ASK-16 without Toggle	308-9414-016
ASK-20 with Air Metering Controller	308-9414-020
G104/G105 AIR SHIFT KITS	10 Digit Part No.
ASK-29 with Toggle	308-9414-029
ASK-28 without Toggle	308-9414-028
ASK-30 with Air Metering Controller	308-9414-030



Air Toggle



C101 Air-Shift Installation



Standard C101

Model Features

Model Number	Maximum psi	gpm @ 1800 rpm				Maximum Speed	Available Features
		¾"	1½"	2"	2½"		
G101	2500	9.5	21	29		2400 rpm	A, B, D*, E
G102	2500	9.5	21	29		2400 rpm	A, B, C*, F
G104	2500	9.5	21	29		2400 rpm	B, D*, E
G105	2500	9.5	21	29		2400 rpm	B, C*, F
C101	2500			39	48	2400 rpm	A, B, D*, E
C102	2500			39	48	2400 rpm	A, B, C*, F

- A:** Two- or Three-line Hookup
- B:** Remote Valve Actuation
- C:** Factory Set Rotation
- D:** Either Shaft Rotation
- E:** 1.00" diameter Keyed Shaft
- F:** SAE "B" Splined Shaft (13 teeth, 16/32 pitch)

Note: G104/G105 units are for installations requiring 3- 4-line hookup and 4-way control valves.

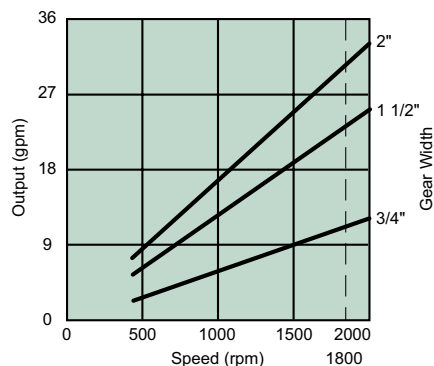
* All C102/G102/G105 units can be ordered for either direction of rotation from the factory; all C101/G101/G104 units can be field set for either direction of rotation.

Performance Curves

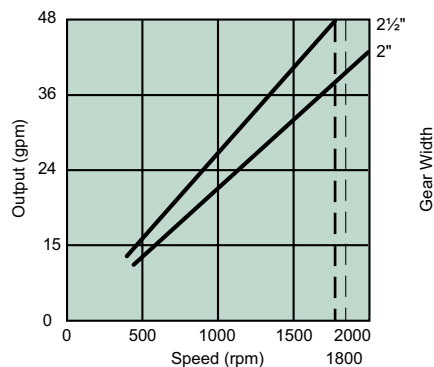
Average Pump Output @ 2000 psi

Performance data shown are average results based on a series of production units and are not representative of any one unit. Tests were run with the oil reservoir temperature at 120°F, viscosity of 150 SUS at 100°F. Requests for more specific data should be directed to our Product Support Department through your sales representative.

G101/G102/G104/G105



C101/C102



Warning

These warnings apply to all pump/valve units.

- **A device to lock the control lever in the neutral position must be installed. Pump/valve units without a lockable control lever may allow the dump bed to rise unintentionally while in transit. Failure to provide such a lock may lead to loss of vehicle control, accidental injury and/or property damage.**
- **Failure to disengage the PTO from driving the pump/valve when in transit may allow the dump bed to rise unintentionally. This may lead to loss of vehicle control, accidental injury and/or property damage.**
- The pump/valves are equipped with a neutral stop device for those applications using a pull-out cable. This device allows the pull-out cable to move the valve spool from the raise to the neutral position only. Since shock loading in the cable is possible, **it is essential that a spring (Part no. 391-3581-854 or equal) be incorporated in the pull-out cable hookup.** Failure to do so could result in breakage of the neutral stop device and could lead to injury. We recommend that the cable be fully enclosed and directly in line with the spool.
- **Never work under a raised dump bed without first securely blocking the bed to prevent its accidental lowering.**
- Three-line installations are recommended whenever possible. Three-line circuits consist of a pump inlet line, a line to the cylinder and a return line to tank. A sleeve must be installed in the pump's inlet to allow oil to circulate through the unit and return to tank when running in neutral. Lower operating temperatures and the ability to install a return-line filter are two advantages of a three-line circuit. Be sure the return line is always below the oil level in the reservoir. Two-line installations are for intermittent operation only.

If you do not understand these warnings or have any questions about any of them, contact your distributor or the Product Support Group at: Phone (330) 746-8011 or Fax (330) 740-8344.

Combination Pump/Valves

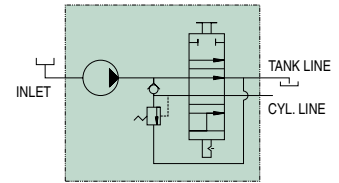
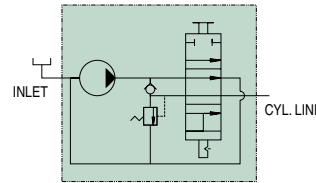
C101™/C102™ Series

Typical Flow Paths in C101/C102 Pump/Valve Units

Explanation of single-acting valve.

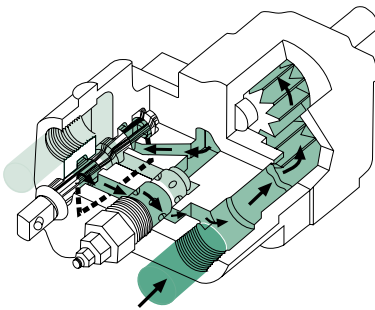
C101/C102: 2-line Installation
For intermittent operation.

C101/C102: 3-line Installation
For continuous or intermittent operation.

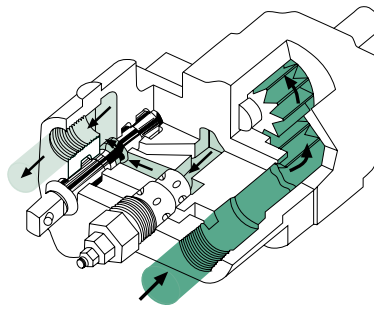


2-line Installation

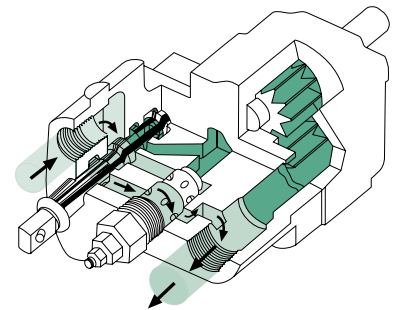
One line to the cylinder, one line to the reservoir.
For intermittent operation only.



Spool in Neutral:
Oil recirculates internally.



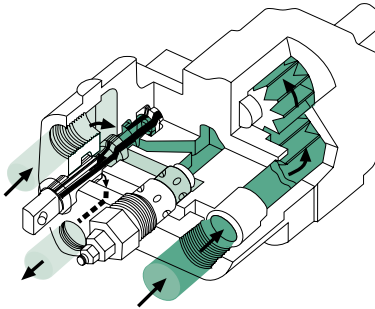
Raise Position:
Oil is routed through work port to raise the cylinder.



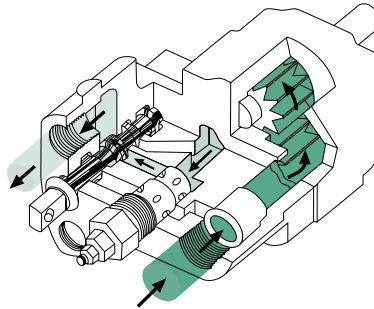
Lower Position:
Oil flows from the cylinder through the relief valve to return to tank.

3-line Installation

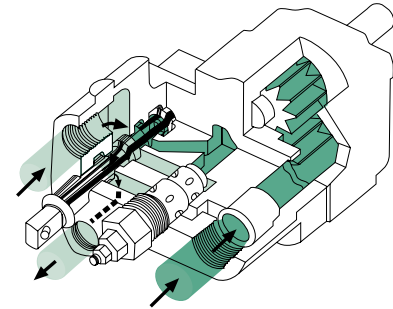
One line to the cylinder, two lines to the reservoir.
For continuous or intermittent operation.



Spool in Neutral:
Oil circulates through the pump and returns to tank.



Raise Position:
Oil is routed through work port to raise the cylinder.



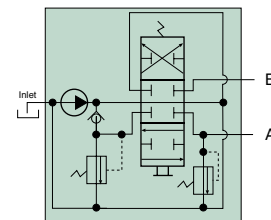
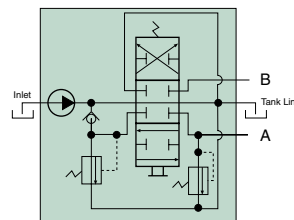
Lower Position:
Oil flows from the cylinder, through the bottom port and returns to tank.

Typical Flow Paths in G104/G105 Pump/Valve Units

Explanation of single-acting valve.

G104/G105: 4-line Installation
For continuous or intermittent operation.

G104/G105: 3-line Installation
For intermittent operation.



Combination Pump/Valves

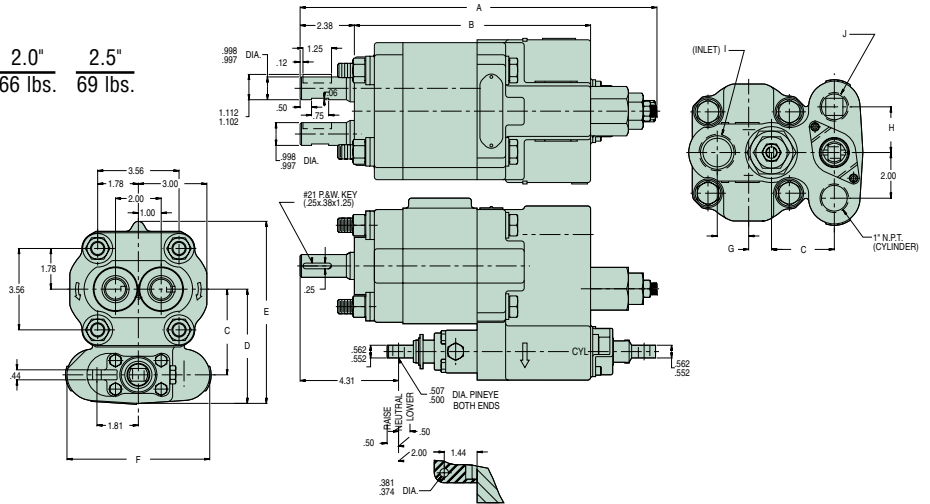
C101™/C102™ Series

Dimensions

C101

Gear Width $\frac{1.5"}{63 \text{ lbs.}}$ $\frac{2.0"}{66 \text{ lbs.}}$ $\frac{2.5"}{69 \text{ lbs.}}$
 Gear Weight

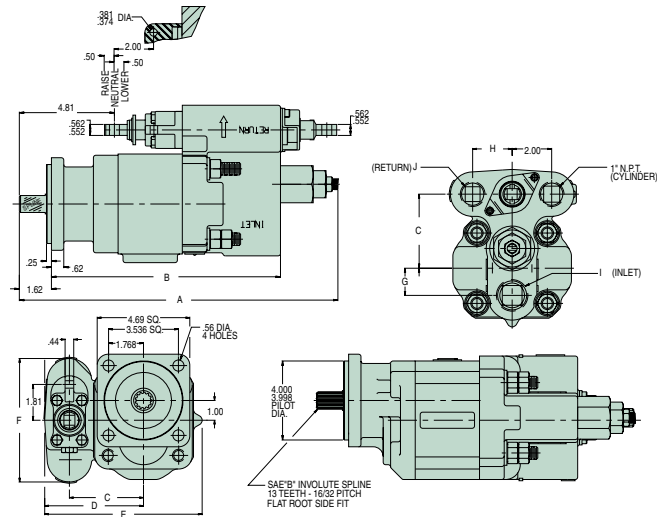
A	13.12+GW
B	7.84+GW
C	3.75
D	5.00
E	7.97
F	6.25
G	1.38
H	2.00
I	1 1/4" NPT
J	1" NPT



C102

Gear Width $\frac{1.5"}{65 \text{ lbs.}}$ $\frac{2.0"}{68 \text{ lbs.}}$ $\frac{2.5"}{71 \text{ lbs.}}$
 Gear Weight

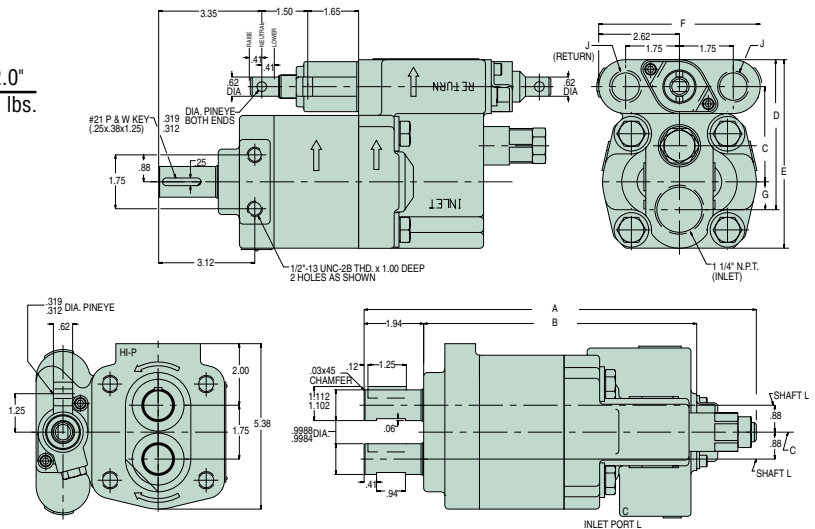
A	13.62+GW
B	9.09+GW
C	3.75
D	5.00
E	7.97
F	6.25
G	1.38
H	2.00
I	1 1/4" NPT
J	1" NPT



G101

Gear Width $\frac{.75"}{31 \text{ lbs.}}$ $\frac{1.5"}{35 \text{ lbs.}}$ $\frac{2.0"}{38 \text{ lbs.}}$
 Gear Weight

A	10.56 + GW
B	6.88 + GW
C	3.09
D	3.96
E	6.12
F	5.25
G	.91
H	1.75
I	1 1/4" N.P.T.
J	3/4" N.P.T.

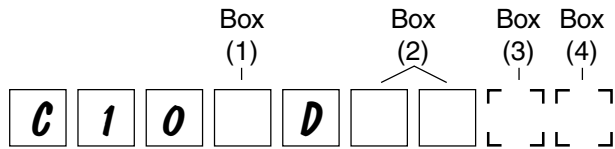


Combination Pump/Valves

C101™/C102™ Series

Coding: C101/C102 Series

Example:



Box 1 Load-sense (from another valve)	
1	Remote Mount
2	Direct Mount

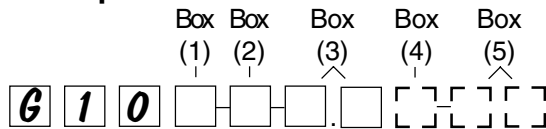
Box 2 Displacements: In. 3/cm ³			
	Gear Width	in. ³ / rev.	cm ³ / rev.
20	2.0	5.10	83.6
25	2.5	6.38	104.5

Box 3 Neutral Stop Device	
Blank	Standard (Cap)
B	Special (Bracket Type)

Box 4 Rotation C102 Direct Mount Only	
Blank	Clockwise
1	Counter Clockwise

Coding: G101/G102 Series

Example:



Box 1 Mounting	
1	Remote Mount
2	Direct Mount

Spool Options (Box 2)	
1	Detent
2	Spring Return

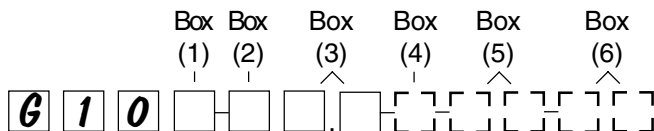
Box 2 Displacements: In. 3/cm ³			
	Gear Width	in. ³ / rev.	cm ³ / rev.
0.7	0.7	1.48	24.2
1.5	1.5	2.96	48.4
2.0	2.0	3.94	64.6

Box 4 Rotation G105 Only	
R	Clockwise
L	Counter Clockwise

Box 5 Mounting Flange G105 Only	
2S	SAE 2 Bolt B
CS	Cloverleaf Mount
4S	SAE 4 Bolt B

Coding: G104/G105 Series

Example:



Box 1 Mounting	
4	G104 Remote Mount
5	G105 Direct Mount

Spool Options	
3	3-Position
4	4-Position

Box 2 Displacements: In. 3/cm ³			
	Gear Width	in. ³ / rev.	cm ³ / rev.
0.7	0.7	1.48	24.2
1.5	1.5	2.96	48.4
2.0	2.0	3.94	64.6

Box 4 Rotation G105 Only	
R	Clockwise
L	Counter Clockwise

Box 5 Mounting Flange G105 Only	
2S	SAE 2 Bolt B
CS	Cloverleaf Mount
4S	SAE 4 Bolt B

Box 6 Optional Port Relief Valve	
RV	With Port Relief Valve
NR	No Port Relief Valve



Offer of Sale

The items described in this document are hereby offered for sale at prices to be established by Parker Hannifin Corporation, its subsidiaries and its authorized distributors. This offer and its acceptance by any customer ("Buyer") shall be governed by all of the following Terms and Conditions. Buyer's order for any item described in its document, when communicated to Parker Hannifin Corporation, its subsidiary or an authorized distributor ("Seller") verbally or in writing, shall constitute acceptance of this offer.

1. Terms and Conditions of Sale: All descriptions, quotations, proposals, offers, acknowledgments, acceptances and sales of Seller's products are subject to and shall be governed exclusively by the terms and conditions stated herein. Buyer's acceptance of any offer to sell is limited to these terms and conditions. Any terms or conditions in addition to, or inconsistent with those stated herein, proposed by Buyer in any acceptance of an offer by Seller, are hereby objected to. No such additional, different or inconsistent terms and conditions shall become part of the contract between Buyer and Seller unless expressly accepted in writing by Seller. Seller's acceptance of any offer to purchase by Buyer is expressly conditional upon Buyer's assent to all the terms and conditions stated herein, including any terms in addition to, or inconsistent with those contained in Buyer's offer. Acceptance of Seller's products shall in all events constitute such assent.

2. Payment: Payment shall be made by Buyer net 30 days from the date of delivery of the items purchased hereunder. Any claims by Buyer for omissions or shortages in a shipment shall be waived unless Seller receives notice thereof within 30 days after Buyer's receipt of the shipment.

3. Delivery: Unless otherwise provided on the face hereof, delivery shall be made F.O.B. Seller's plant. Regardless of the method of delivery, however, risk of loss shall pass to Buyer upon Seller's delivery to a carrier. Any delivery dates shown are approximate only and Seller shall have no liability for any delays in delivery.

4. Warranty: Seller warrants that the item sold hereunder shall be free from defects in material or workmanship for a period of 547 days from the date of shipment to Buyer, or 3,000 hours of use, whichever expires first. **THIS WARRANTY COMPRISES THE SOLE AND ENTIRE WARRANTY PERTAINING TO ITEMS PROVIDED HEREUNDER. SELLER MAKES NO OTHER WARRANTY, GUARANTEE, OR REPRESENTATION OF ANY KIND WHATSOEVER. ALL OTHER WARRANTIES, INCLUDING BUT NOT LIMITED TO, MERCHANTABILITY AND FITNESS FOR PURPOSE, WHETHER EXPRESS, IMPLIED, OR ARISING BY OPERATION OF LAW, TRADE USAGE, OR COURSE OF DEALING ARE HEREBY DISCLAIMED.**

NOTWITHSTANDING THE FOREGOING, THERE ARE NO WARRANTIES WHATSOEVER ON ITEMS BUILT OR ACQUIRED WHOLLY OR PARTIALLY, TO BUYERS DESIGNS OR SPECIFICATIONS.

5. Limitation of Remedy: SELLER'S LIABILITY ARISING FROM OR IN ANY WAY CONNECTED WITH THE ITEMS SOLD OR THIS CONTRACT SHALL BE LIMITED EXCLUSIVELY TO REPAIR OR REPLACEMENT OF THE ITEMS SOLD OR REFUND OF THE PURCHASE PRICE PAID BY BUYER, AT SELLER'S SOLE OPTION IN NO EVENT SHALL SELLER BE LIABLE FOR ANY INCIDENTAL OR SEQUENTIAL OR SPECIAL DAMAGES OF ANY KIND OR NATURE WHATSOEVER, INCLUDING BUT NOT LIMITED TO LOST PROFITS ARISING FROM OR IN ANY WAY CONNECTED WITH THIS AGREEMENT OR ITEM SOLD HEREUNDER, WHETHER ALLEGED TO ARISE FROM BREACH OF CONTRACT, EXPRESS OR IMPLIED WARRANTY, OR IN TORT, INCLUDING WITHOUT LIMITATION, NEGLIGENCE, FAILURE TO WARN OR STRICT LIABILITY.

6. Changes, Reschedules and Cancellations: Buyer may request to modify the designs or specifications for the items sold hereunder as well as the quantities and delivery dates thereof, or may request to cancel all or part of this order, however, no such requested modification or cancellation shall become part of the contract between Buyer and Seller unless accepted by Seller in a written amendment to this Agreement. Acceptance of any such requested modification or cancellation shall be at Seller's discretion, and shall be upon such terms and conditions as Seller may require.

7. Special Tooling: A tooling charge may be imposed for any special tooling, including without limitation, dies, fixtures, molds and patterns, acquired to manufacture items sold pursuant to this contract. Such special tooling shall be and remain Seller's property notwithstanding payment of any charges by Buyer. In no event will Buyer acquire any interest in apparatus belonging to Seller which is utilized in the manufacture of the items sold hereunder, even if such apparatus has been specially converted or adapted for such manufacture and notwithstanding any charges paid by Buyer. Unless otherwise agreed, Seller shall have the right to alter, discard or otherwise dispose of any special tooling or other property in its sole discretion at any time.

8. Buyer's Property: Any designs, tools, patterns, materials, drawings, confidential information or equipment furnished by Buyer or any other items which become Buyer's property, may be considered obsolete and may be destroyed by Seller after two (2) consecutive years have elapsed without Buyer placing an order for the items which are manufactured using such property. Seller shall not be responsible for any loss or damage to such property while it is in Seller's possession or control.

9. Taxes: Unless otherwise indicated on the face hereof, all prices and charges are exclusive of excise, sales, use, property, occupational or like taxes which may be imposed by any taxing authority upon the manufacture, sale or delivery of the items sold hereunder. If any such taxes must be paid by Seller or if Seller is liable for the collection of such tax, the amount thereof shall be in addition to the amounts for the items sold. Buyer agrees to pay all such taxes or to reimburse Seller therefore upon receipt of its invoice. If Buyer claims exemption from any sales, use or other tax imposed by any taxing authority, Buyer shall save Seller harmless from and against any such tax, together with any interest or penalties thereon which may be assessed if the items are held to be taxable.

10. Indemnity For Infringement of Intellectual Property Rights: Seller shall have no liability for infringement of any patents, trademarks, copyrights, trade dress, trade secrets or similar rights except as provided in this Part 10. Seller will defend and indemnify Buyer against allegations of infringement of U.S. patents, U.S. trademarks, copyrights, trade dress and trade secrets (hereinafter 'Intellectual Property Rights'). 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 an allegation that an item sold pursuant to this contract infringes the Intellectual Property Rights of a third party. Seller's obligation to defend and indemnify Buyer is contingent on Buyer notifying Seller within ten (10) days after Buyer becomes aware of such allegations of infringement, and Seller having sole control over the defense of any allegations or actions including all negotiations for settlement or compromise. If an item sold hereunder is subject to a claim that it infringes the Intellectual Property Rights of a third party, Seller may, at its sole expense and option, procure for Buyer the right to continue using said item, replace or modify said item so as to make it noninfringing, or offer to accept return of said item and return the purchase price less a reasonable allowance for depreciation. Notwithstanding the foregoing Seller shall have no liability for claims of infringement based on information provided by Buyer, or directed to items delivered hereunder for which the designs are specified in whole or part by Buyer, or infringements resulting from the modification, combination or use in a system of any item sold hereunder. The foregoing provisions of this Part 10 shall constitute Seller's sole and exclusive liability and Buyer's sole and exclusive remedy for infringement of Intellectual Property Rights.

If a claim is based on information provided by Buyer or if the design for an item delivered hereunder is specified in whole or in part by Buyer, Buyer shall defend and indemnify Seller for all costs, expenses or judgments resulting from any claim that such item infringes any patent, trademark, copyright, trade dress, trade secret or any similar right.

11. Force Majeure: Seller does not assume the risk of and shall not be liable for delay or failure to perform any of Seller's obligations by reason of circumstances beyond the reasonable control of Seller (hereinafter 'Events of Force Majeure'). Events of Force Majeure shall include without limitation, accidents, acts of God, strikes or labor disputes, acts, laws, rules or regulations of any government or government agency, fires, floods, delays or failures in delivery of carriers or suppliers, shortages of materials and any other cause beyond Seller's control.

12. Entire Agreement/Governing Law: The terms and conditions set forth herein, together with any amendments, modifications and any different terms or conditions expressly accepted by Seller in writing, shall constitute the entire Agreement concerning the items sold, and there are no oral or other representations or agreements which pertain thereto. This Agreement shall be governed in all respects by the law of the State of Ohio. No actions arising out of the sale of the items sold hereunder or this Agreement may be brought by either party more than two (2) years after the cause of action accrues.



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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 electromechanical 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.



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Gear Pump Division
1775 Logan Avenue
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Catalog HY09-101/US
05/01, T&M, 5M



PGP020™ Series

Pumps and Motors

Catalog HY09-020/US



The Parker Hannifin Gear Pump Division Assures:

- Consistent quality
- Technical innovation
- Premier customer service

Worldwide Sales and Service

Parker operates sales and service centers in major industrial areas worldwide. Call 1-800-C-PARKER for more information, or for a synopsis of the Gear Pump Division, contact a Parker representative.

The Gear Pump Division's ability to engineer specialty products for unique applications has kept us at the forefront of technology, and ensured our position as the industry leader. Our success has come from providing a quality product with excellent sales and service support.

We manufacture hydraulic components for a wide range of industries including:

- Construction
- Refuse/dump truck
- Material handling
- Forestry
- Agriculture
- Industrial



WARNING

FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS AND/OR SYSTEMS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

This document and other information from Parker Hannifin Corporation, its subsidiaries and authorized distributors provide product and/or system options for further investigation by users having technical expertise. It is important that you analyze all aspects of your application and review the information concerning the product or system in the current product catalog. Due to the variety of operating conditions and applications for these products or systems, the user, through its own analysis and testing, is solely responsible for making the final selection of the products and systems and assuring that all performance, safety and warning requirements of the application are met.

The products described herein, including without limitation, product features, specifications, designs, availability and pricing, are subject to change by Parker Hannifin Corporation and its subsidiaries at any time without notice.

Offer of Sale

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Big Performance In A Small Package

Parker Hannifin’s PGP020 gear pumps and motors are an ideal power for the truck industry. With the ½" gears, it measures only 6" from mounting flange to the port end cover and weighs only 25 lbs.

The PGP020 can produce flows up to 29 gpm @ 2400 rpm up to 3000 psi; output to 39 gpm @ 2400 rpm up to 2500 psi. Motors and pumps can be bi-rotational.

A variety of drive shafts and mounting styles are offered to meet your needs. Standard features include rigid, one-piece drive shaft and gears and pressure-balanced thrust plated, which assure top efficiency. A rugged, high-strength, cast iron body provides durability.

Multiple Units

PGP020 pumps and motors can be assembled in tandem to provide additional pump flow or more motor torque from on the drive shaft. Each gear section is connected to the drive shaft by a connecting shaft. The strength of the shafts (their PL factor) determines the maximum gear width the pump or motor can turn at a given pressure.

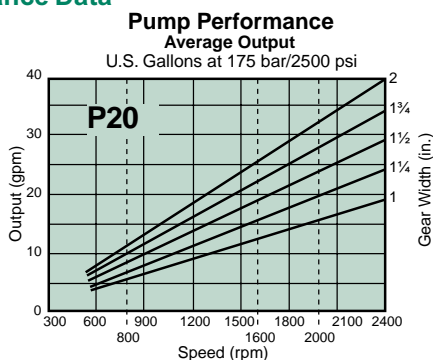
To determine the unit’s PL, multiply the operating pressure (P) by the total gear width (L). Example: Assume a PGP020 pump will be operating at 3000 psi and have a 1½" gear housing. Multiply the total gear width of 1½" by the operating pressure.

$(1.5" \text{ gear width} \times 3000 \text{ psi}) = 4500$

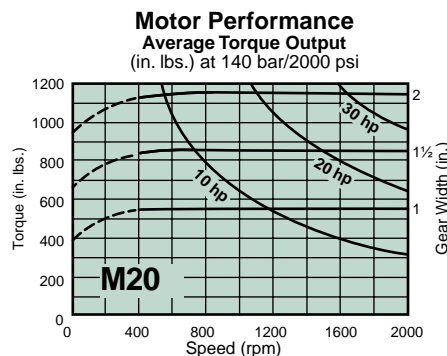
This pump needs a drive shaft with a PL factor of 4500 or more to operate successfully. The PL factor for each drive shaft is given on pages 10 and 11.

NOTE: In accordance with our policy of continuing product development, we reserve the right to change specifications shown in this catalog without notice.

Performance Data



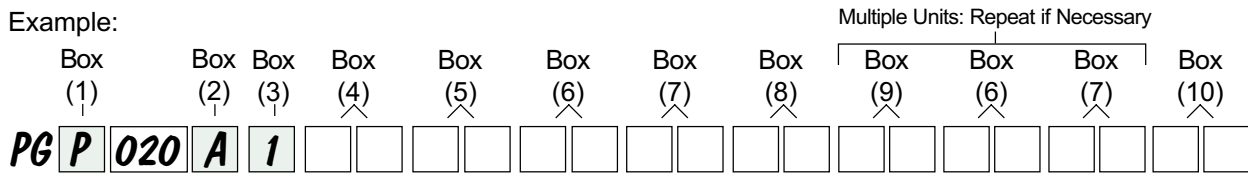
Pump Speed	Gear Width-Output (GPM)				
	1"	1¼"	1½"	1¾"	2"
900	6.5	8.0	10.0	12.0	13.5
1200	9.0	11.5	14.0	16.0	18.5
1500	11.5	14.5	17.5	20.5	23.5
2100	16.5	21.0	25.0	29.5	34.0



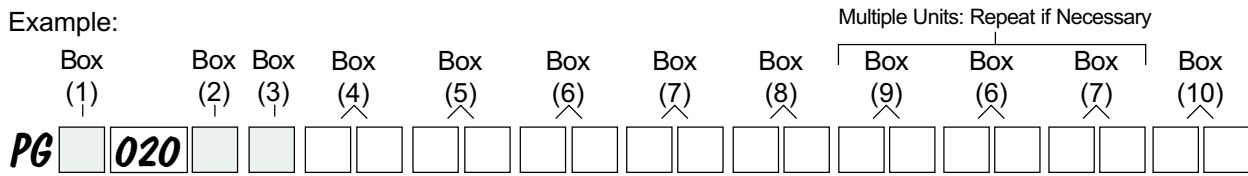
Motor Speed	Gear Width					
	1" Torque in lbs.	GPM	1½" Torque in lbs.	GPM	2" Torque in lbs.	GPM
800	550	9.0	870	13.0	1150	17.0
1200	550	13.0	870	18.0	1150	23.5
1600	550	16.0	860	23.0	1140	30.5
2000	550	19.5	850	28.0	1125	37.0

PGP020™ How to Specify Code (Boxes 1-3)

Example:



Example:



Box 1 Description	
P	Pump
M	Motor

Box 2 Unit	
A	Single
B	Tandem

Box 3 Shaft End Cover	
ORDER CODE	ROTATION – OUTBEARING – DRAIN PORT
1	Clockwise (CW) rotation
2	Counter clockwise rotation (CCW); no outboard bearing
3	Double rotation; no outboard bearing
4	CW rotation with outboard bearing
5	CCW rotation with outboard bearing
6	Double rotation with outboard bearing
8	Double rotation with outboard bearing (motor) ¼" NPT drain
9	Double rotation ; no outboard bearing (motor) ¼" NPT drain

PGP020™ How to Specify (Box 4)

Example:

Multiple Units: Repeat if Necessary

Box (1)	Box (2)	Box (3)	Box (4)	Box (5)	Box (6)	Box (7)	Box (8)	Box (9)	Box (6)	Box (7)	Box (10)
PG	P	020	A	1	0	5					

Example:

Multiple Units: Repeat if Necessary

Box (1)	Box (2)	Box (3)	Box (4)	Box (5)	Box (6)	Box (7)	Box (8)	Box (9)	Box (6)	Box (7)	Box (10)
PG		020									

Box 4 Shaft End Cover Codes				Box 4 Shaft End Cover Codes			
ORDER CODE		PICTURE / MOUNTING FLANGE TYPE		ORDER CODE		PICTURE / MOUNTING FLANGE TYPE	
05				6 BOLT FLANGE – 3.25 DIA. BOLT CIRCLE			
10				2 BOLT PAD MOUNT			
27				4 BOLT CLOVERLEAF			
42				SAE 4 BOLT “B” ANSI 101-4			
46				SAE 2/4 BOLT “B” ANSI 101 – 2/4			
94				SAE 2 BOLT “A” ANSI 82-2			
96				SAE 2 BOLT “B” ANSI 101-2 TYPE II			
97				SAE 2 BOLT “B” ANSI 101-2			

PGP020™ How to Specify (Box 5)

Example:

Multiple Units: Repeat if Necessary

Box (1)	Box (2)	Box (3)	Box (4)	Box (5)	Box (6)	Box (7)	Box (8)	Box (9)	Box (6)	Box (7)	Box (10)
PG	P	020	A	1	0	5	C	E			

Example:

Multiple Units: Repeat if Necessary

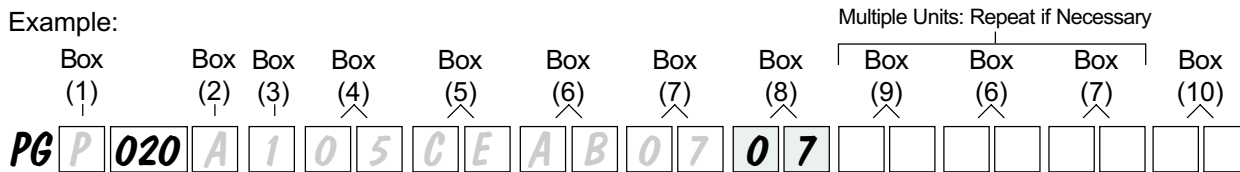
Box (1)	Box (2)	Box (3)	Box (4)	Box (5)	Box (6)	Box (7)	Box (8)	Box (9)	Box (6)	Box (7)	Box (10)
PG		020									

Box 5 Port End Cover Codes						Box 5 Port End Cover Codes					
Order Codes			O.D.T. Porting			Order Codes			N.P.T. Porting		
Single Units W/O ST		Tandem Units W/ST	Port Size LEFT		RIGHT	Single Units W/O ST		Tandem Units W/ST	Port Size LEFT		RIGHT
CE	CY	CI	CY	¾	none	BE	BY	BI	BY	no port	no port
DE	DY	DI	DY	none	¾	KE	KY	KI	KY	¾	none
FE	FY	FI	FY	¾	¾	LE	LY	LI	LY	none	¾
GE	GY	GI	GY	1	¾	ME	MY	MI	MY	¾	¾
HE	HY	HI	HY	¾	1	QU	QQ	QD	QQ	1	1
JE	JY	JI	JY	1	1	AI		AI		¾	1
MA	YO	MU	YO	1	none	EI		EI		1	¾
RA	RO	SU	RO	none	1						

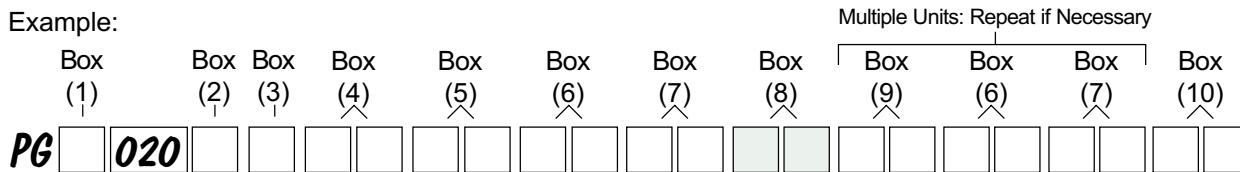
NOTE: W/O ST columns denote units without support studs, and W/ST columns denote units with support studs.

PGP020™ How to Specify (Box 8)

Example:



Example:

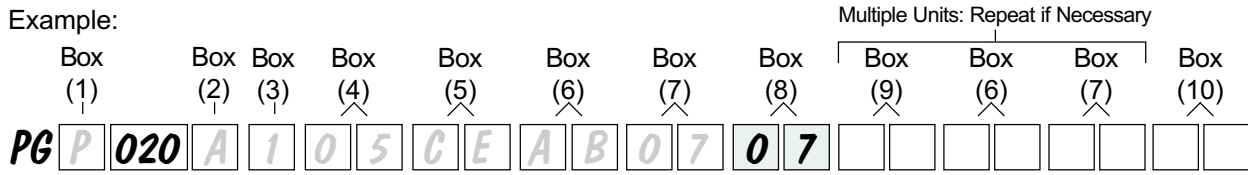


Box 8 Drive Shafts		Box 8 Drive Shafts	
ORDER CODE	PICTURE / MOUNTING FLANGE TYPE	ORDER CODE	PICTURE / MOUNTING FLANGE TYPE
07	<p>PL=5850</p> <p>S.A.E. "C" SPLINE/ANSI 32-4 (2 PIECE SHAFT,CONTINENTAL)</p>	30	<p>PL=4925</p> <p>S.A.E. "B" KEYED ANSI 22-1</p>
12	<p>PL=4150</p> <p>.750 DIA. KEYED SHAFT (.19 WIDE KEY) (2 PIECE SHAFT,CONTINENTAL)</p>	32	<p>PL=4630</p> <p>CLUTCH PUMP SHAFT</p>
15	<p>PL=4925</p> <p>S.A.E. "B" THREADED + KEY ANSI 22-2 (2 PIECE SHAFT,CONTINENTAL)</p>	43	<p>PL=7850</p> <p>S.A.E. "B-B" KEYED ANSI 25-1 MODIFIED</p>
25	<p>PL=8580</p> <p>S.A.E. "B" SPINE ANSI 22-4</p>	65	<p>PL=6035</p> <p>S.A.E. "B" SPLINE ANSI 22-4 TYPE II</p>

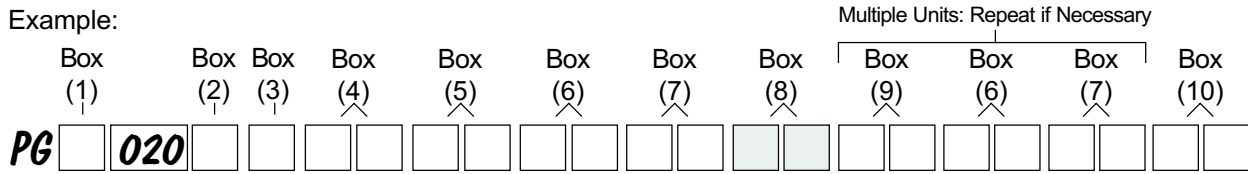
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PGP020™ How to Specify (Box 8)

Example:



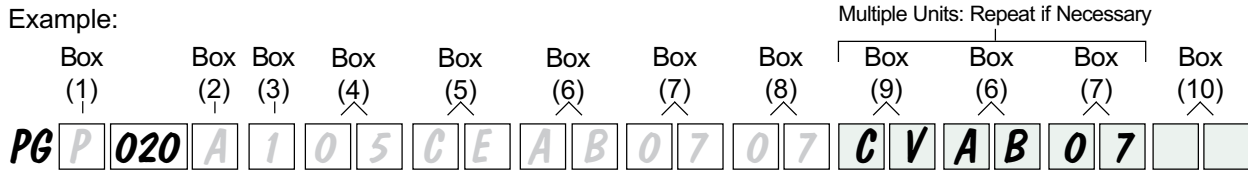
Example:



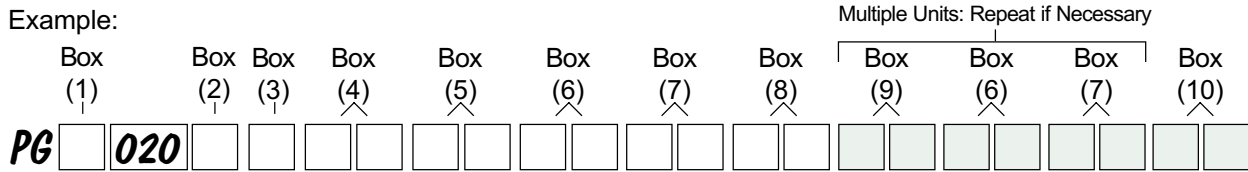
Box 8 Drive Shafts		Box 8 Drive Shafts	
ORDER CODE	PICTURE / MOUNTING FLANGE TYPE	ORDER CODE	PICTURE / MOUNTING FLANGE TYPE
66	<p>PL=4925</p> <p>S.A.E. "B" KEYED ANSI 22-1 TYPE II</p>	90	<p>PL=4925</p> <p>S.A.E. "B" THREADED + KEY ANSI 22-2 MODIFIED</p>
67	<p>PL=7850</p> <p>S.A.E. "B" KEYED ANSI 22-1 TYPE II</p>	95	<p>PL=2850</p> <p>S.A.E. "A" SPLINE ANSI 16-4</p>
68	<p>PL=12000</p> <p>1.00 DIA. 6 TOOTH SPLINE SHAFT</p>	98	<p>PL=13180</p> <p>S.A.E. "B-B" SPLINE ANSI 25-4</p>

PGP020™ How to Specify (Box 9)

Example:



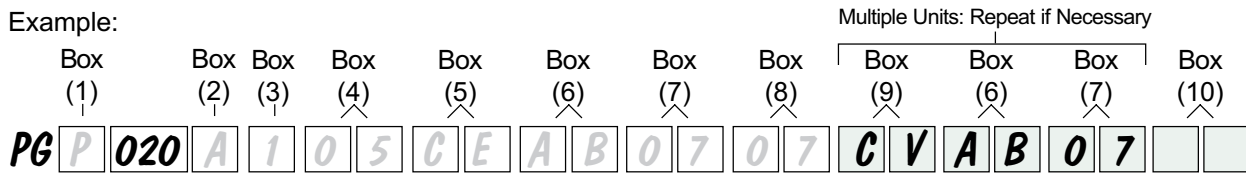
Example:



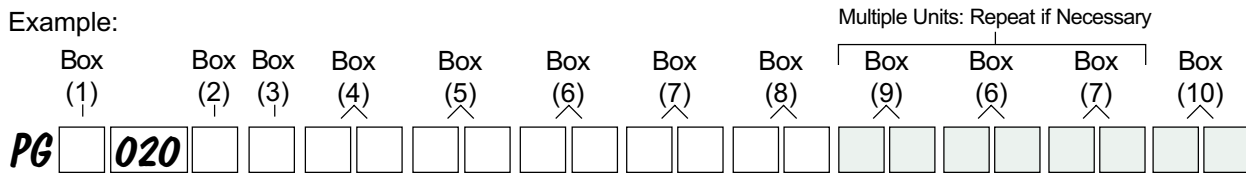
Box 9 Bearing Carrier Codes- Flow Dividers									
ROTATION FLOWPATH CW-Clockwise CCW-Cnt. Clockwise	N.P.T. PORTING PORT SIZE			SPLIT FLANGE PORTING PORT SIZE			O.D.T. PORTING PORT SIZE		
	CODE	LEFT	RIGHT	CODE	LEFT	RIGHT	CODE	LEFT	RIGHT
CD SHT RF 20-H1 	C	none	none	LB	1	none	CB	1	none
	TB	1	none	-	-	-	DB	1 ¼	none
	VB	1 ¼	none	-	-	-	FB	1 ½	none
CD SHT RF 20-H2 	D	none	none	BL	none	1	BC	none	1
	BT	none	1	-	-	-	BD	none	1 ¼
	BV	none	1 ¼	-	-	-	BF	none	1 ½
CD SHT RF 20-H4 	TX	1	¾	LR	1	¾	CJ	1	¾
	VX	1 ¼	¾	BR	none	¾	DJ	1 ¼	¾
	VZ	1 ¼	1	-	-	-	DK	1 ¼	1
	-	-	-	-	-	-	FJ	1 ½	¾
	-	-	-	-	-	-	FK	1 ½	1
CD SHT RF 20-H5 	JT	¾	1	XL	¾	1	RC	¾	1
	JV	¾	1 ¼	-	-	-	RD	¾	1 ¼
	KV	1	1 ¼	-	-	-	RF	¾	1 ½
	-	-	-	-	-	-	SD	1	1 ¼
	-	-	-	-	-	-	SF	1	1 ½
CD SHT RF 20-H6 	TJ	1	¾	LX	1	CR	1	¾	
	VJ	1 ¼	¾	-	-	DR	1 ¼	¾	
	VK	1 ¼	1	-	-	-	DS	1 ¼	1
	-	-	-	-	-	-	FR	1 ½	¾
	-	-	-	-	-	-	FS	1 ½	1
CD SHT RF 20-H7 	XT	¾	1	RB	¾	none	JC	¾	1
	XV	¾	1 ¼	RL	¾	1	JD	¾	1 ¼
	ZV	1	1 ¼	-	-	-	JP	¾	none
	-	-	-	-	-	-	JF	¾	1 ½
	-	-	-	-	-	-	KD	1	1 ¼
CD SHT RF 20-H8 	ZX	1	¾	SR	1	¾	KJ	1	¾

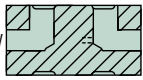
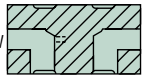
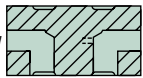
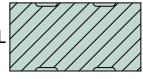
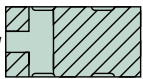
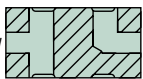
PGP020™ How to Specify (Box 9) (Continued)

Example:



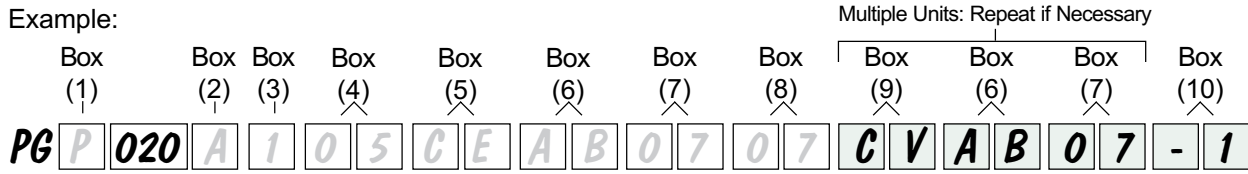
Example:



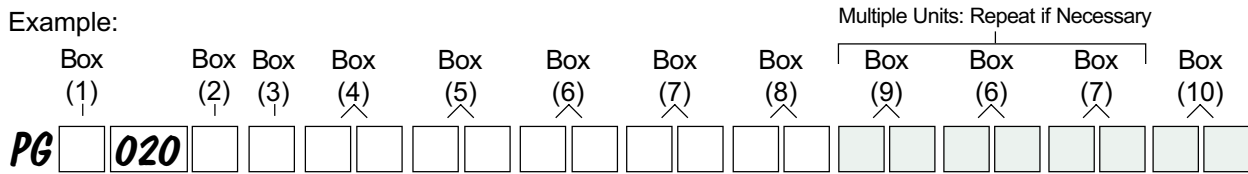
Box 9 Bearing Carrier Codes- Flow Dividers									
ROTATION FLOWPATH CW-Clockwise CCW-Cnt. Clockwise	N.P.T. PORTING PORT SIZE			SPLIT FLG. PORTING PORT SIZE			O.D.T. PORTING PORT SIZE		
	CODE	LEFT	RIGHT	CODE	LEFT	RIGHT	CODE	LEFT	RIGHT
CD SHT RF 20-H9  CCW	XZ	¾	1	RS	¾	1	JK	¾	1
CD SHT RF 20-H10  CW	ZS	1	¾	RZ	1	¾	KX	1	¾
CD SHT RF 20-H11  CCW	SZ	¾	1	ZR	¾	1	XK	¾	1
Bearing Carrier Codes- Motors									
CD SHT RF 20-H16  DBL	B	-	-	B	-	-	B	-	-
CD SHT RF 20-H21  CW	M	1	none	J	1	none	F	1	none
	N	1 ¼	none	-	-	-	G	1 ¼	none
	E	none	none	-	-	-	H	1 ½	none
CD SHT RF 20-H24  CW	BX	none	¾	GR	none	¾	GJ	none	¾
	GX	1	¾	HR	1	¾	HJ	1	¾
	HZ	1 ¼	¾	MT	none	1	MJ	1 ¼	¾
	LZ	1 ¼	1	-	-	-	RJ	1 ½	¾
	KZ	none	1	-	-	-	PK	1 ¼	1
	-	-	-	-	-	-	RK	1 ½	1
	-	-	-	-	-	-	BK	none	1

PGP020™ How to Specify (Box 9) (Continued)
(See below for How to Specify Box 10)

Example:



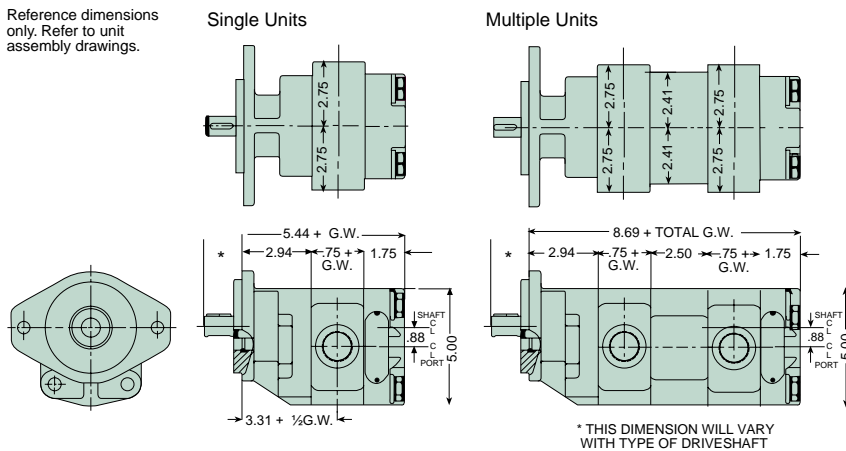
Example:



Box 9 Bearing Carrier Codes- Flow Dividers									
ROTATION FLOWPATH CW-Clockwise CCW-Cnt. Clockwise	N.P.T. PORTING PORT SIZE			SPLIT FLG. PORTING PORT SIZE			O.D.T. PORTING PORT SIZE		
	CODE	LEFT	RIGHT	CODE	LEFT	RIGHT	CODE	LEFT	RIGHT
	CD SHT RF 20-H26 	CV	none	3/4	FD	none	3/4	JH	none
CD SHT RF 20-H28 	GV	1	3/4	GD	1	3/4	PH	1	3/4
	MV	1 1/4	3/4	JG	none	1	RH	1 1/4	3/4
	TK	1 1/4	1	-	-	-	WH	1 1/2	3/4
	NK	none	1	-	-	-	QC	1 1/4	1
	-	-	-	-	-	-	VC	1 1/2	1
CD SHT RF 20-H29 	-	-	-	-	-	-	PC	none	1
	VG	1	3/4	WL	1	3/4	MC	1	3/4
	WG	1	3/4	ZL	1	3/4	SC	1	3/4

Dimensional Data (inches)

Reference dimensions only. Refer to unit assembly drawings.



PGP020™
How to Specify (Box 10)
(See above for example)

Box 10 Connecting Shaft

For connecting tandem units.
-1 Connecting Shaft - Multiple Units
PL=5850

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2. Payment: Payment shall be made by Buyer net 30 days from the date of delivery of the items purchased hereunder. Amounts not timely paid shall bear interest at the maximum rate permitted by law for each month or portion thereof that the Buyer is late in making payment. Any claims by Buyer for omissions or shortages in a shipment shall be waived unless Seller receives notice thereof within 30 days after Buyer's receipt of the shipment.

3. Delivery: Unless otherwise provided on the face hereof, delivery shall be made F.O.B. Seller's plant. Regardless of the method of delivery, however, risk of loss shall pass to Buyer upon Seller's delivery to a carrier. Any delivery dates shown are approximate only and Seller shall have no liability for any delays in delivery.

4. Warranty: Seller warrants that the items sold hereunder shall be free from defects in material or workmanship for a period of 18 months from date of shipment from Parker Hannifin Corporation. **THIS WARRANTY COMPRISES THE SOLE AND ENTIRE WARRANTY PERTAINING TO ITEMS PROVIDED HEREUNDER. SELLER MAKES NO OTHER WARRANTY, GUARANTEE, OR REPRESENTATION OF ANY KIND WHATSOEVER. ALL OTHER WARRANTIES, INCLUDING BUT NOT LIMITED TO, MERCHANTABILITY AND FITNESS FOR PURPOSE, WHETHER EXPRESS, IMPLIED, OR ARISING BY OPERATION OF LAW, TRADE USAGE, OR COURSE OF DEALING ARE HEREBY DISCLAIMED. NOTWITHSTANDING THE FOREGOING, THERE ARE NO WARRANTIES WHATSOEVER ON ITEMS BUILT OR ACQUIRED WHOLLY OR PARTIALLY, TO BUYER'S DESIGNS OR SPECIFICATIONS.**

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6. Changes, Reschedules and Cancellations: Buyer may request to modify the designs or specifications for the items sold hereunder as well as the quantities and delivery dates thereof, or may request to cancel all or part of this order, however, no such requested modification or cancellation shall become part of the contract between Buyer and Seller unless accepted by Seller in a written amendment to this Agreement. Acceptance of any such requested modification or cancellation shall be at Seller's discretion, and shall be upon such terms and conditions as Seller may require.

7. Special Tooling: A tooling charge may be imposed for any special tooling, including without limitation, dies, fixtures, molds and patterns, acquired to manufacture items sold pursuant to this contract. Such special tooling shall be and remain Seller's property notwithstanding payment of any charges by Buyer. In no event will Buyer acquire any interest in apparatus belonging to Seller which is utilized in the notwithstanding any charges paid by Buyer. Unless otherwise agreed, Seller shall have the right to alter, discard or otherwise dispose of any special tooling or other property in its sole discretion at any time.

8. Buyer's Property: Any designs, tools, patterns, materials, drawings, confidential information or equipment furnished by Buyer or any other items which become Buyer's property, may be considered obsolete and may be destroyed by Seller after two (2) consecutive years have elapsed without Buyer placing an order for the items which are manufactured using such property, Seller shall not be responsible for any loss or damage to such property while it is in Seller's possession or control.

9. Taxes: Unless otherwise indicated on the face hereof, all prices and charges are exclusive of excise, sales, use, property, occupational or like taxes which may be imposed by any taxing authority upon the manufacture, sale or delivery of the items sold hereunder. If any such taxes must be paid by Seller or if Seller is liable for the collection of such tax, the amount thereof shall be in addition to the amounts for the items sold. Buyer agrees to pay all such taxes or to reimburse Seller therefore upon receipt of its invoice. If Buyer claims exemption from any sales, use or other tax imposed by any taxing authority, Buyer shall save Seller harmless from and against any such tax, together with any interest or penalties thereon which may be assessed if the items are held to be taxable.

10. Indemnity For Infringement of Intellectual Property Rights: Seller shall have no liability for infringement of any patents, trademarks, copyrights, trade dress, trade secrets or similar rights except as provided in this Part 10. Seller will defend and indemnify Buyer against allegations of infringement of U.S. Patents, U.S. Trademarks, copyrights, trade dress and trade secrets (hereinafter 'Intellectual Property Rights'). 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 an allegation that an item sold pursuant to this contract infringes the Intellectual Property Rights of a third party. Seller's obligation to defend and indemnify Buyer is contingent on Buyer notifying Seller within ten (10) days after Buyer becomes aware of such allegations of infringement, and Seller having sole control over the defense of any allegations or actions including all negotiations for settlement or compromise. If an item sold hereunder is subject to a claim that it infringes the Intellectual Property Rights of a third party, Seller may, at its sole expense and option, procure for Buyer the right to continue using said item, replace or modify said item so as to make it noninfringing, or offer to accept return of said item and return the purchase price less a reasonable allowance for depreciation. Notwithstanding the foregoing, Seller shall have no liability for claims of infringement based on information provided by Buyer, or directed to items delivered hereunder for which the designs are specified in whole or part by Buyer, or infringements resulting from the modification, combination or use in a system of any item sold hereunder. The foregoing provisions of this Part 10 shall constitute Seller's sole and exclusive liability and Buyer's sole and exclusive remedy for infringement of Intellectual Property Rights.

If a claim is based on information provided by Buyer or if the design for an item delivered hereunder is specified in whole or in part by Buyer, Buyer shall defend and indemnify Seller for all costs, expenses or judgments resulting from any claim that such item infringes any patent, trademark, copyright, trade dress, trade secret or any similar right.

11. Force Majeure: Seller does not assume the risk of and shall not be liable for delay or failure to perform any of Seller's obligations by reason of circumstances beyond the reasonable control of Seller (hereinafter 'Events of Force Majeure'). Events of Force Majeure shall include without limitation, accidents, acts of God, strikes or labor disputes, acts, laws, rules or regulations of any government or government agency, fires, floods, delays or failures in delivery of carriers or suppliers, shortages of materials and any other cause beyond Seller's control.

12. Entire Agreement/Governing Law: The terms and conditions set forth herein, together with any amendments, modifications and any different terms or conditions expressly accepted by Seller in writing, shall constitute the entire Agreement concerning the items sold, and there are no oral or other representations or agreements which pertain thereto. This Agreement shall be governed in all respects by the law of the State of Ohio. No actions arising out of the sale of the items sold hereunder or this Agreement may be brought by either party more than two (2) years after the cause of action accrues.

9/91P



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Catalog HY09-020/US
08/03, T&M, 5M



PGP030/031™
PGP050/051™
PGP075/076™ Series
Single and Multiple Pumps and Motors

Catalog HY09-030/US



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- Technical innovation
- Premier customer service

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We manufacture hydraulic components for a wide range of industries including:

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- Material handling
- Forestry
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- Industrial



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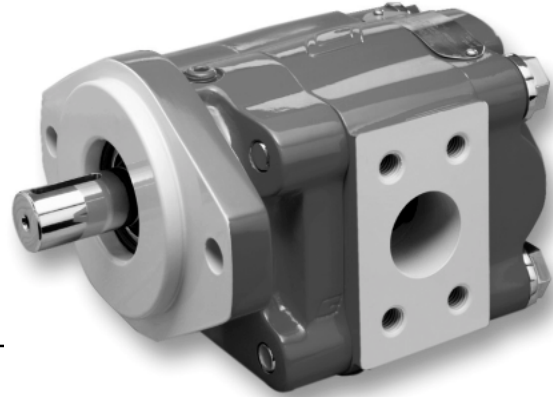
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Parker Hannifin Corporation
Gear Pump Division
Youngstown, Ohio USA

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Pump/Valve Products

PGP030/031

- Flows to 41 GPM
- Pressures to 3000 psi
- Speeds to 2400 rpm
- Priority valves
- Two-speed valves
- Piggybacks
- Winch motors
- Flow dividers

PGP050/051

- Flows to 66 GPM
- Pressures to 3000 psi
- Speeds to 2400 rpm
- Priority valves
- Two-speed valves
- Unloader valve
- Winch motors
- Flow dividers
- Piggybacks

PGP075/076

- Flows to 128 GPM
- Pressures to 3000 psi
- Speeds to 2400 rpm
- Two-speed valves
- Piggybacks
- Winch motors
- Flow dividers

Performance Data

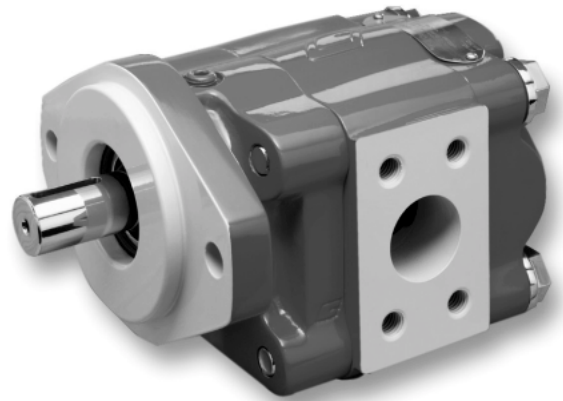
Performance data shown are the average results based on a series of laboratory tests of production units and are not necessarily representative of any one unit. Tests were run with the oil reservoir temperature at 120°F and

viscosity 150 SSU at 100°F. Requests for more specific data should be directed to our Product Support Department through our sales representatives.

PGP030/031

Flow data at 2500 PSI (172 bar) unless noted.

Speed RPM	Gear Width Output (gpm/lpm)				
	1"	1 ¼"	1 ½"	1 ¾"	2"
900	6.5	8	10	12	13.5
	24.5	30	38	45.5	51
1200	9	11.5	14	16	18.5
	34	43.5	53	60.5	70
1500	11.5	14.5	17.5	20.5	23.5
	43.5	55	66	77.5	89
1800	14	18	21.5	25	29
	53	68	81.5	94.5	110
2100	16.5	21	25	29.5	34
	62.5	79.5	94.5	112	129
2400	19	24	29	34	39
	72	91	110	129	148



PGP050/051

Flow data at 2500 PSI (172 bar) unless noted.

Speed RPM	Gear Width Output (gpm/lpm)						
	1"	1 ¼"	1 ½"	1 ¾"	2"	2 ¼"	2 ½"
900	8.5	10.5	13	15	17.5	20	22
	32	39.5	49	57	66	75.5	83.5
1200	12	15	18	21	24	27	30
	45.5	57	68	79.5	91	102	114
1500	15	19	23	27	31	35	39
	57	72	87	102	117	132	148
1800	18	23	27.5	32.5	37.5	42	47
	68	87	104	123	142	159	178
2100	21.5	27	32.5	38.5	44	49.5	55
	81.5	102	123	146	167	187	208
2400	25	31	37	44	51	57	63.5
	94.5	117	140	167	193	216	240

PGP075/076

Flow data at 2500 PSI (172 bar) unless noted.

Speed RPM	Gear Width Output (gpm/lpm)								
	1"	1 ¼"	1 ½"	1 ¾"	2"	2 ¼"	2 ½"	2 ¾"	3"
900	11.5	15.5	19.5	23	27	30.5	34.5	38	42
	43.5	58.5	74	87	102	115.5	130.5	144	159
1200	17	22	27	32	37.5	42	48	52.5	58
	64.5	83.5	102	121	142	159	182	199	220
1500	22	29	35.5	41.5	48	54.5	61	67	74
	83.5	110	134	157	182	206	231	254	280
1800	27.5	35.5	43.5	51	59	66	74	81.5	90
	104	134	165	193	223	250	280	308	341
2100	33	42	51.5	60	69.5	78	87	96.5	106
	125	159	195	227	263	295	329	365	401
2400	38	49	59.5	70	80	90	101	111	122
	144	185	225	265	303	341	382	420	462

*Flow data at 2000 PSI (138 bar) rated pressure.

PL FACTOR

Each section of a multiple pump or motor should be regarded as a single unit with corresponding delivery and power input requirements. Since the entire input horsepower is fed through a common drive shaft, the power delivered to or from the unit is limited by the physical strength of the shaft. This limit is defined as a

“PL” factor; “P” being the operating pressure and “L” the summation of gear widths.

In multiple units the “PL” must be calculated for the first connecting shaft as well as the drive shaft. Each style or type of shaft has a unique “PL” factor as noted in the table below.

PGP030/031

Power data at 2500 PSI (172 bar) unless noted.

Speed RPM	Gear Width Inches (HP/kW)				
	1"	1 ¼"	1 ½"	1 ¾"	2"
900	14	17	20	23	25
	11	13	15	17	19
1200	19	22	26	30	33
	14	17	20	22	25
1500	23	28	33	37	42
	17	21	24	27	31
1800	27	33	39	44	50
	20	25	29	33	37
2100	32	38	45	51	58
	24	29	34	38	43
2400	36	44	51	58	66
	26	33	38	43	49

Pressure X Total Gear Width = PL
PL MUST NOT EXCEED NUMBER
SHOWN FOR APPROPRIATE SHAFT.

PL Chart		
Shaft Style	Integral Shaft & Gear	Two Piece Style
030/031		
SAE "A" Spline	2,600	2,600
SAE "B" Spline	7,900	5,850
SAE "B" Key	4,850	4,850
SAE "BB" Spline	12,150	--
SAE "BB" Key	7,250	5,850
SAE "C" Spline	--	5,850
Connecting Shaft	--	5,850
050/051		
SAE "B" Spline	6,100	6,100
SAE "B-B" Spline	9,400	--
SAE "B-B" Key	5,600	5,600
SAE "C" Spline	12,900	8,500
SAE "C" Key	10,900	8,500
Connecting Shaft	--	8,500
075/076		
SAE "C" Single	8,000	8,000
SAE "C" Tandem	12,500	--
SAE "C" Key	7,500	7,500
Connecting Shaft	--	10,000

PGP050/051

Input data at 2000 PSI (138 bar) rated pressure.

Speed RPM	Gear Width Inches (HP/kW)						
	1"	1 ¼"	1 ½"	1 ¾"	2"	2 ¼"	2 ½"
900	19	22	26	30	34	38	42
	14	17	20	23	26	29	32
1200	25	30	34	40	45	51	56
	18	22	26	30	34	38	42
1500	31	37	43	50	56	63	69
	23	27	32	37	42	47	51
1800	36	44	51	59	67	75	82
	27	33	38	44	50	56	61
2100	42	51	60	69	78	87	96
	31	38	44	51	58	65	72
2400	47	57	68	79	89	99	110
	35	43	51	59	66	74	82

PGP075/076

Input data at 2000 PSI (138 bar) rated pressure.

Speed RPM	Gear Width Inches (HP/kW)								
	1"	1 ¼"	1 ½"	1 ¾"	2"	2 ¼"	2 ½"	2 ¾"*	3"*
900	26	32	39	45	51	58	64	57	62
	19	24	29	34	38	43	48	42	46
1200	35	43	52	60	69	78	86	76	83
	26	32	39	45	51	58	64	57	62
1500	44	55	65	76	87	98	109	96	105
	33	41	49	57	65	73	81	72	78
1800	53	66	79	93	106	119	132	116	127
	39	49	59	69	79	89	99	87	95
2100	62	77	93	108	124	139	154	136	148
	46	58	69	81	92	104	115	101	111
2400	71	88	106	124	141	159	176	155	169
	53	66	79	92	105	118	132	116	126

*Power data at 2500 PSI (172 bar) unless noted.



PGM030

Motor performance data at 2000 PSI (138 bar).

Speed RPM	1" Gear			1 ½" Gear			2" Gear		
	Output		Input	Output		Input	Output		Input
	Torque	Power	Flow	Torque	Power	Flow	Torque	Power	Flow
800	550	7	9	870	11	13	1150	14.5	17
	62	5	34	98.5	8	49	130	11	64.5
1200	550	10.5	13	870	16.5	18	1150	22	23.5
	62	8	49	98.5	12.5	68	130	16.5	89
1600	550	14	16	860	22	23	1140	29	30.5
	62	10.5	60.5	97	16.5	87	129	21.5	115
2000	550	17.5	19.5	850	27	28	1125	36	37
	62	13	74	96	20	106	127	27	140

U.S./Metric Torque: In.-lbs. Flow: GPM Power: HP
Nm LPM kW

PGM050

Motor performance data at 2000 PSI (138 bar).

Speed RPM	1" Gear			1 ½" Gear			2" Gear			2½" Gear		
	Output		Input	Output		Input	Output		Input	Output		Input
	Torque	Power	Flow	Torque	Power	Flow	Torque	Power	Flow	Torque	Power	Flow
800	670	8.5	10.5	1070	13.5	15.5	1450	18	21	1850	23.5	26
	75.5	6.5	39.5	121	10	58.5	164	13.5	79.5	209	17.5	98.5
1200	680	13	15.5	1075	20.5	22.5	1450	27.5	30.5	1840	35	37.5
	77	9.5	58.5	121.5	15	85	164	20.5	115	208	26	142
1600	670	17	20	1045	26.5	30	1440	36.5	40	1750	44.5	49.5
	75.5	12.5	75.5	118	20	114	162.5	27	151	197.5	33	187
2000	660	21	25	1030	32.5	37	1415	44.5	49	1720	54.5	61.5
	74.5	15.5	94.5	116.5	24	140	160	33	185	194.5	40.5	233

U.S./Metric Torque: In.-lbs. Flow: GPM Power: HP
Nm LPM kW

PGM075

Motor performance data at 2000 PSI (138 bar).

Speed RPM	1" Gear			1 ½" Gear			2" Gear			2½" Gear			3" Gear		
	Output		Input	Output		Input	Output		Input	Output		Input	Output		Input
	Torque	Power	Flow	Torque	Power	Flow	Torque	Power	Flow	Torque	Power	Flow	Torque	Power	Flow
800	1050	13.5	20.5	1650	21	28	2200	28	35.5	2875	36.5	43	3625	46	50.5
	118.5	10	77.5	186.5	15.5	106	248.5	21	134	325	27	163	409.5	34.5	191
1200	1025	19.5	27.5	1600	30.5	38	2200	42	49.5	2850	54	60.5	3575	68	72
	116	14.5	104	181	22.5	144	248.5	31.5	187	322	40.5	229	404	50.5	273
1600	1000	25.5	34	1575	40	49	2175	55	64	2800	71	78.5	3500	89	93
	113	19	129	178	30	185	245.5	41	242	316.5	53	297	395.5	66.5	352
2000	950	30	41.5	1550	49	59	2175	67.5	78	2750	87	96.5	3425	109	114
	107.5	22.5	157	175	36.5	223	245.5	50.5	295	310.5	65	365	387	81.5	431

U.S./Metric Torque: In.-lbs. Flow: GPM Power: HP
Nm LPM kW

PGM031

Motor performance data at 2500 PSI (172 bar).

Speed RPM	1" Gear			1 ½" Gear			2" Gear		
	Output		Input	Output		Input	Output		Input
	Torque	Power	Flow	Torque	Power	Flow	Torque	Power	Flow
800	675	8.5	9	1035	13	13	1385	17.5	17
	76.5	6.5	34	117	9.5	49	156.5	13	64.5
1200	685	13	13	1055	20	18	1410	27	23.5
	77.5	9.5	49	119	15	68	159.5	20	89
1600	680	17.5	16	1030	26	23	1390	35	30.5
	77	13	60.5	116.5	19.5	87	157	26	115
2000	660	21	19.5	1010	32	28	1370	43.5	37
	74.5	15.5	74	114	24	106	155	32.5	140

U.S./Metric Torque: In.-lbs. Flow: GPM Power: HP
Nm LPM kW

PGM051

Motor performance data at 2500 PSI (172 bar).

Speed RPM	1" Gear			1 ½" Gear			2" Gear			2½" Gear		
	Output		Input	Output		Input	Output		Input	Output		Input
	Torque	Power	Flow	Torque	Power	Flow	Torque	Power	Flow	Torque	Power	Flow
800	825	10.5	10.5	1310	16.5	15.5	1810	23	21	2330	29.5	26
	93	8	39.5	148	12.5	58.5	204.5	17	79.5	263.5	22	98.5
1200	850	16	15.5	1340	25.5	22.5	1830	35	30.5	2340	44.5	37.5
	96	12	58.5	151.5	19	85	207	26	115	264.5	33	142
1600	830	21	20	1330	34	30	1805	46	40	2300	58.5	49.5
	94	15.5	75.5	150.5	25.5	114	204	34.5	151	260	43.5	187
2000	800	25.5	25	1290	41	37	1770	56	49	2250	71.5	61.5
	90.5	19	94.5	146	30.5	140	200	42	185	254	53.5	233

U.S./Metric Torque: In.-lbs. Flow: GPM Power: HP
Nm LPM kW

PGM076

Motor performance data at 2500 PSI (172 bar).

Speed RPM	1" Gear			1 ½" Gear			2" Gear			2½" Gear			3" Gear*		
	Output		Input	Output		Input	Output		Input	Output		Input	Output		Input
	Torque	Power	Flow	Torque	Power	Flow	Torque	Power	Flow	Torque	Power	Flow	Torque	Power	Flow
800	1410	18	20.5	2140	27	28	2875	36.5	35.5	3650	46.5	43	3625	46	50.5
	159.5	13.5	77.5	242	20	106	325	27	134	412.5	34.6	163	409.5	34.5	191
1200	1400	26.5	27.5	2140	41	38	2870	54.5	49.5	3650	69.5	60.5	3575	68	72
	158	20	104	242	30.5	144	324.5	40.5	187	412.5	52	229	404	50.5	273
1600	1375	35	34	2110	53.5	49	2830	72	64	3600	91.5	78.5	3500	89	93
	155.5	26	129	238.5	40	185	319.5	53.5	242	406.5	68	297	395.5	66.5	352
2000	1350	43	41.5	2090	66.5	59	2800	89	78	3500	111	96.5	3425	109	114
	152.5	32	157	236	49.5	223	316.5	66.5	295	395.5	83	365	387	81.5	431

U.S./Metric Torque: In.-lbs. Flow: GPM Power: HP
Nm LPM kW

*Motor performance data at 2000 PSI (138 bar).



Pumps and Motors (see drawings on page 7)

Model		A ⁽¹⁾	Bs ⁽²⁾⁽³⁾	Bm ⁽³⁾⁽⁴⁾	C ⁽⁵⁾⁽⁶⁾	D ⁽⁵⁾⁽⁷⁾	E ⁽³⁾	F ⁽²⁾	G	H	I	J	K	L ⁽³⁾⁽⁸⁾	M ⁽⁴⁾
030/031	in.	1.62	5.44	8.69	5.44	5.88	2.94	0.75	1.75	2.50	0.88	2.69	5.38	3.31	3.25
	mm.	41.3	138.1	220.7	138.1	149.2	74.6	19.1	44.5	63.5	22.2	68.3	136.5	84.1	82.6
050/051	in.	2.19	5.88	9.50	5.44	5.88	3.38	0.75	1.75	2.88	1.00	3.00	6.00	3.75	3.62
	mm.	55.6	149.2	241.3	138.1	149.2	85.7	19.1	44.5	73.0	25.4	76.2	152.4	95.3	92.1
075/076	in.	2.19	6.75	10.75	7.75	7.94	3.75	1.00	2.00	3.00	1.25	3.94	7.88	4.75	4.00
	mm.	55.6	171.5	273.1	196.9	201.6	95.3	25.4	50.8	76.2	31.8	100.0	200.0	120.7	101.6

U.S./Metric

NOTES

1. Dimension will vary with shaft type
2. Dimension + gear width
3. Dimension is for Type 1 SEC. For Type 2: subtract 1.12" (28.4 mm) for 030/031; subtract 1.00" (25.4 mm) for 050/051.
4. Dimension + total gear width
5. Dimension will vary with port type. Subtract 0.25" (6.4 mm) for S.F. ports.
6. For 2.25" and 2.50" gear width in 050/051 series, dimension is 6.75" (171.5 mm).
7. Dimension is for wide B-C. Narrow B-C dimensions: 5.00" (127 mm) for 030/031 and 050/051; 7.19" (182.6 mm) for 075/076.
8. Dimension + ½ front section gear width

Approximate Weight: Pumps and Motors

Single Unit

Model	Unit Weight	1"	1 ¼"	1 ½"	1 ¾"	2"	2 ¼"	2 ½"	2 ¾"	3"
030/031	Pounds	33	34	35	36	37	-	-	-	-
	KG	15	15.5	16	16.5	17	-	-	-	-
050/051	Pounds	37	38.5	40	41.5	43	48.5	50	-	-
	KG	17	17.5	18	19	19.5	22	22.5	-	-
075/076	Pounds	72	75	77	80	82	85	87	90	92
	KG	33	34	35	36	37	39	40	41	42

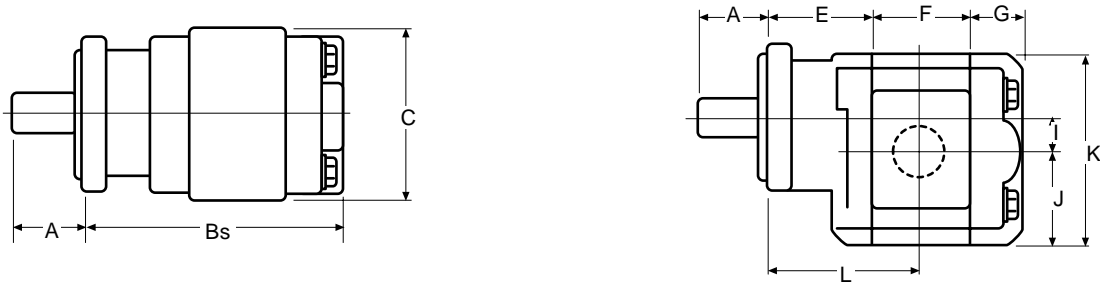
Approximate Weight: Pumps and Motors

Multiple Unit*

Model	Add per gear section	1"	1 ¼"	1 ½"	1 ¾"	2"	2 ¼"	2 ½"	2 ¾"	3"
030/031	Pounds	27	28	29	31	32	-	-	-	-
	KG	12	12.5	13	14	14.5	-	-	-	-
050/051	Pounds	31	32.5	34	35.5	37	42.5	44	-	-
	KG	14	15	15.5	16	17	19	20	-	-
075/076	Pounds	59	62	64	67	69	72	74	77	79
	KG	27	28	29	31	32	33	34	35	36

*Determine the approximate weight from Single Unit chart and add weight of each additional assembly from this chart.

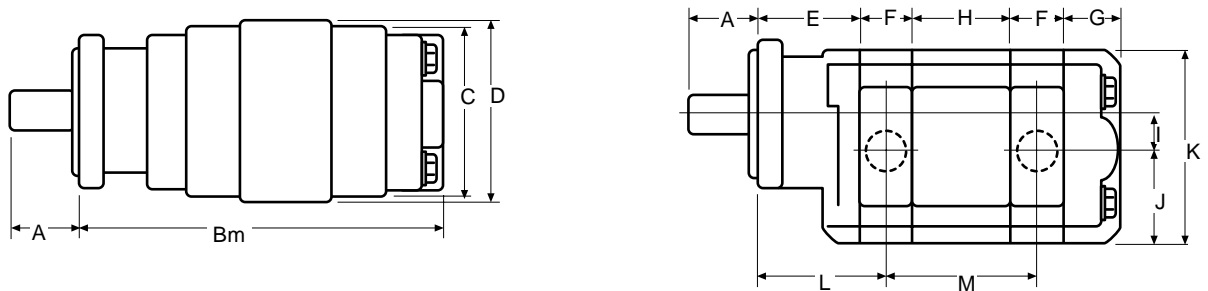
Single Unit - 030/031/050/051



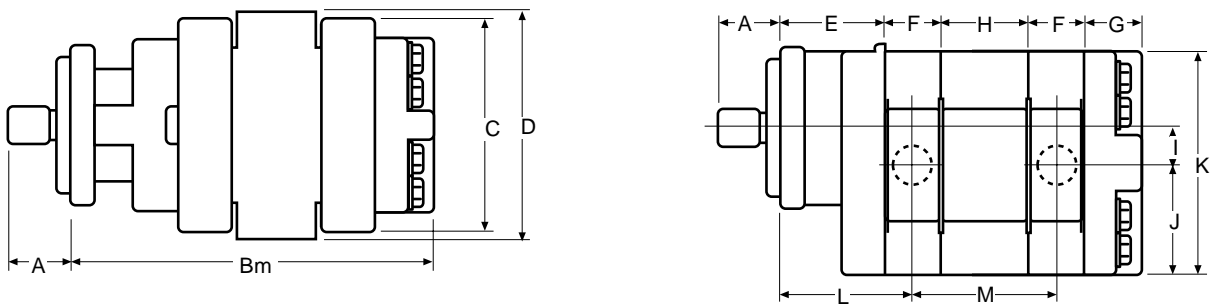
Single Unit - 075/076

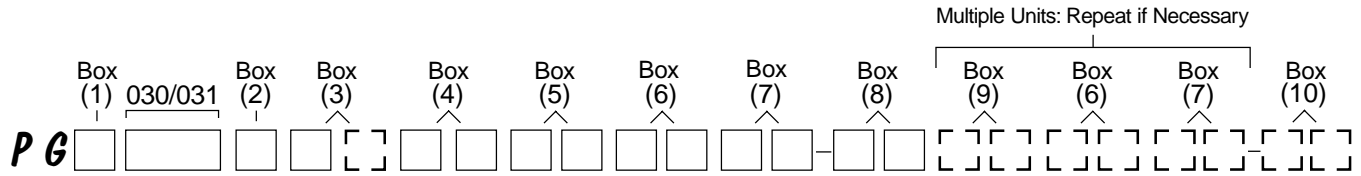


Multiple Unit - 030/031/050/051



Multiple Unit - 075/076





Box 1 Pump/Motor

P	Pump
M	Motor

Box 2 Unit

A	Single Unit
B	Tandem Unit
C	Single or Tandem w. two-piece shaft (O.B. bearing required)

Box 3 Shaft End Cover

1	Pump, cw w/o O.B. bearing
2	Pump, ccw w/o O.B. bearing
3	Pump, bi-rotational w/o O.B. bearing (030 series only)
4	Pump, cw with O.B. bearing
5	Pump, ccw with O.B. bearing
6	Pump, bi-rotational with O.B. bearing (030 series only)
8	Motor, bi-rot. with O.B. bearing + 1/4" NPT drain
9	Motor, bi-rot. w/o O.B. bearing + 1/4" NPT drain
18	Motor, bi-rot. with O.B. bearing + 1/4" BSPP drain
19	Motor, bi-rot. w/o O.B. bearing + 1/4" BSPP drain

Box 4 Shaft End Cover (type 1 unless noted)

00	Pad mount
05	6 bolt flange - 3.25" dia. bolt circle: Pilot Dia. 2 5/8"
42	SAE 4 bolt "B" ANSI 101-4: Pilot Dia. 4"
78	SAE 4 bolt "C" ANSI 127-4: Pilot Dia. 5"
91	030-030, 031-031, & 050-030, 051-031 for piggyback: Pilot Dia. 4"
92	075-030, 076-031 for piggyback: Pilot Dia. 5"
94	SAE 2 bolt "A" ANSI 82-2: Pilot Dia. 3 1/4"
96	SAE 2 bolt "B" ANSI 101-2, type 2 : Pilot Dia. 4"
(not available with O.B. bearing)	
97	SAE 2 bolt "B" ANSI 101-2: Pilot Dia. 4"

Box 5 Port End Cover (Rear Ported)

Left	Right	Single	Tandem	Extended Studs
Unported				
-	-	BE	BI	BY
NPT Porting (030 series only)				
3/4"	-	KE	KI	KY
-	3/4"	LE	LI	LY
3/4"	3/4"	ME	MI	MY
NPT Porting (030 series only) - Modified Casting*				
1"	1"	QU	QU	-

For All Units
 To determine direction of shaft rotation, view the unit with the shaft pointing toward you, and the idler (driven) gear beneath the shaft. With clockwise rotation, flow will be left to right. The pump inlet port will be on the left, outlet on the right. The flow is in the opposite direction with counter-clockwise rotation. Inverting the pump will reverse the inlet and outlet ports but not the direction of rotation.

Box 5 Port End Cover (Rear Ported) continued

Left	Right	Single	Tandem	Extended Studs
O.D.T. Porting				
3/4"	-	CE	CI	CY
-	3/4"	DE	DI	DY
3/4"	3/4"	FE	FI	FY
1"	3/4"	GE	GI	GY
3/4"	1"	HE	HI	HY

O.D.Tube Porting (30 series only)				
1"	1"	JE	JI	JY

O.D.Tube Porting - Modified Casting*				
3/4"	-	CA	CU	CO
-	3/4"	DA	DU	DO
3/4"	3/4"	JA	JU	BO
1"	3/4"	KA	KU	-
3/4"	1"	LA	LU	-
1"	-	MA	MU	YO
-	1"	RA	SU	RO
1"	1"	ZA	ZU	ZO
1 1/4"	1"	GU	GU	-
1"	1 1/4"	HU	HU	-

BSPP Porting				
3/4"	-	WE	WI	WY
-	3/4"	XE	XI	XY
3/4"	3/4"	ZE	ZI	ZY

Metric Straight Thread				
3/4"	-	NE	NI	NY
-	3/4"	PE	PI	PY
3/4"	3/4"	QE	QI	QY
1"	3/4"	RE	RI	RY
3/4"	1"	SE	SI	SY

Port End Cover (5) (Side Ported)

Left	Right	Single	Tandem	Extended Studs
O.D.Tube Porting - Modified Casting*				
1 1/4"	1"	TU	TU	-
1"	1 1/4"	XU	XU	-
CW CCW Double				
Piggyback Port End - Pump Only				
Type 030-030, 031-031				
(double 030-030 only)				
		KO	LO	MO

* Modified PEC casting is for higher pressure/larger port applications.

Box 6 Gear Housing												
		030 Series						031 Series				
Housing Code	07	10	12	15	17	20	10	12	15	17	20	
Displacement (C.I.R.)	1.48	1.97	2.46	2.96	3.45	3.94	1.97	2.46	2.96	3.45	3.94	
Maximum (PSI)	2500	2500	2500	2500	2250	2250	3000	3000	3000	2500	2500	
IN	OUT	CW	CCW									
-	-	AB	AB	X	X	X	X	X	X	X	X	
No Porting												
NPT Porting												
½"	-	IL	IM	X	X							
-	½"	IM	IL	X	X							
½"	½"	IR	IR	X								
¾"	-	IC	ID		X	X	X	X	X			
-	¾"	ID	IC		X	X	X		X			
¾"	¾"	IF	IF		X	X	X	X	X			
1"	¾"	IJ	IG		X*	X	X	X				
1 ¼"	¾"	IK	IH				X*	X				
1"	-	YC	YD		X*	X	X	X				
-	1"	YD	YC			X	X	X				
1"	1"	YF	YF			X	X	X	X			
1 ¼"	1"	YJ	YG				X*	X	X			
1 ¼"	-	IA	IB				X*	X	X			
-	1 ¼"	IB	IA					X	X			
1 ¼"	1 ¼"	YL	YL					X	X			
1 ½"	-	YA	YB								X*	
1 ½"	1 ¼"	YP	YM									X*
OD Tube Porting												
¾"	-	EC	ED		2000	X	X	X		X*	X	X
-	¾"	ED	EC		2000	X	X	X			X	X
¾"	¾"	EF	EF		2000	X	X	X	X		X	X
1"	¾"	EJ	EG		2000*	X*	X	X	X		X*	X*
1 ¼"	¾"	EK	EH				X*	X*			X*	X*
1 ½"	¾"	IP	IN					X*	X*			X*
7/8"	-	EZ	-			X						
-	7/8"	-	EZ			X						
1"	7/8"	EM	EL			X*						
1"	-	AC	AD		X*	2000	X	X	X	X*	X*	2500
-	1"	AD	AC			2000	X	X	X			2500
1"	1"	AF	AF				X	X	X			2500
1 ¼"	1"	AJ	AG				X*	X*	X			2500*
1 ½"	1"	AK	AH					X*	X*			X*
1 ¼"	-	AA	AO				X*	2000				X*
-	1 ¼"	AO	AA					2000				
1 ¼"	1 ¼"	AL	AL					2000	X			X
1 ½"	1 ¼"	AP	AM					2000*	X*			X*
1 ½"	-	AE	AU					X*	2000			X*
-	1 ½"	AU	AE						2000			

*This porting is acceptable for low pressure inlet port only.

NOTES

1. Shaded cells are acceptable for motor codes.
2. NPT ports are not recommended for use at pressures in excess of 1500 PSI.
3. "X" Means both codes are available.
4. "2000" or "2500" indicates maximum pressure rating on port.

Box 6 Gear Housing <i>continued</i>											
030 Series						031 Series					
Housing Code	07	10	12	15	17	20	10	12	15	17	20
Displacement (C.I.R.)	1.48	1.97	2.46	2.96	3.45	3.94	1.97	2.46	2.96	3.45	3.94
Maximum (PSI)	2500	2500	2500	2500	2250	2250	3000	3000	3000	2500	2500
IN	OUT	CW	CCW								
						Split Flange Porting					
¾"	-	UC	UD	X	X	UD	X	X	X	X	X
-	¾"	UD	UC	X	X	UD	X	X	X	X	X
¾"	¾"	UF	UF	X	X	X	X	X	X	X	X
1"	¾"	UJ	UG	X	X	UJ	UJ	X	X*	X*	
1 ¼"	¾"	UK	UH	X	X	X	X	X	X*	X*	
1"	-	OC	OD	X	X	X	OD	2500	X	X	
-	1"	OD	OC	X	X	X	OD	2500	X	X	
1"	1"	OF	OF	X	X	X	X	2500	X	X	X
1 ¼"	1"	OJ	OG	X*	X	X	X	X*	X*	X	X
1 ½"	1"	OK	OH	X	X	X	X	X	X*	X*	X*
1 ¼"	-	OA	OB	2000	X	X	X	X*	2500		
-	1 ¼"	OB	OA	2000	X	X	X		2500		
1 ¼"	1 ¼"	OL	OL	X	X	X	X			X	X
1 ½"	1 ¼"	OP	OM	X*	X	X	X			X*	X*
1 ½"	-	OE	OU	2000	X	X	X			X*	X
-	1 ½"	OU	OE	2000	X	X	X				X
						BSPP Porting					
¾"	-	YN	YQ	X*	X	X	X	2500	X	X	YQ
-	¾"	YQ	YN	X	X	X	X	2500	X	X	YQ
¾"	¾"	YS	YS	X	X	X	X	2500	X	X	X
1"	¾"	YV	YT	X*	X*	YV	YV	2500*	X*	YV*	X
1 ¼"	¾"	YW	YU	X*	X*	X*	X*		YU*	X*	
1"	-	SL	RQ	2000	X	X	X	SL*	2500	X	
-	1"	RQ	SL	2000	X	X	X		2500	X	
1"	1"	MP	MP	2000	X	X	X			X	X
1 ¼"	1"	IX	VY	X*	X*	X*	X*	2500*	X*		
1 ¼"	-	NJ	UI	2000	X	X	X				X*
-	1 ¼"	UI	NJ	2000	X	X	X				
1 ¼"	1 ¼"	PF	PF				2000				
1 ½"	1"	VI	HW							X*	X*
						Metric Straight Thread Porting					
¾"	-	EN	TQ	X	X	TQ	TQ	2500	X		
-	¾"	TQ	EN	X	X	TQ	TQ	2500	X		
¾"	¾"	ES	ES	X	X			2500	X		
1"	¾"	EV	ET	X*	X*	EV	EV		X*	X*	
1 ¼"	¾"	EW	EU						X*		
1"	-	NL	ER	X*	X	ER	ER		2500		
-	1"	ER	NL		X	ER	ER		2500		
1"	1"	CM	CM	2000	X				2500		
1 ¼"	1"	EX	VE	X*	X*	X*	X*		2500*		
1 ½"	1"	VA	HA	X*	X*	X*	X*			X*	X*
1 ¼"	1 ¼"	PA	PA			2000	X				
1 ½"	1 ¼"	SA	QA				X*				

* This porting is acceptable for low pressure inlet port only.

NOTES

1. Shaded cells are acceptable for motor codes.
2. "X" Means both codes are available.
3. "2000" or "2500" indicates maximum pressure rating on port.



Box 6 Gear Housing <i>continued</i>											
030 Series						031 Series					
Housing Code	07	10	12	15	17	20	10	12	15	17	20
Displacement (C.I.R.)	1.48	1.97	2.46	2.96	3.45	3.94	1.97	2.46	2.96	3.45	3.94
Maximum (PSI)	2500	2500	2500	2500	2250	2250	3000	3000	3000	2500	2500
IN	OUT	CW		CCW							
							Metric Straight Thread Porting				
¾"	-	VN	VQ	X	X	X	X	X	X	X	X
-	¾"	VQ	VN	X	X	X	X	X			X
¾"	¾"	VS	VS	X	X						
1"	¾"	RV	VT	X	X	X	X		X*	X	
1 ¼"	¾"	RW	RU		X*		X		X*	X*	
1"	-	UL	UR	X	X	X	X	X	2500	X	X
-	1"	UR	UL	X	X	X	X	X	2500	X	X
1"	1"	UM	UM		X	X	X		X	X	X
1 ¼"	1"	UX	VU		X*	X	X	X	X*	X*	X
1 ½"	1"	VO	HO				X*	X		X*	X*
1 ¼"	-	NO	UO			X		X	X*	2500	
-	1 ¼"	UO	NO			X		X	X*	2500	
1 ¼"	1 ¼"	PO	PO		X	X	X				X
1 ½"	1 ¼"	SO	QO			X*	X			X*	X*
1 ½"	-	UY	TO		X*	2000				X*	X
-	1 ½"	TO	UY			2000					X

* This porting is acceptable for low pressure inlet port only.

NOTES

1. Shaded cells are acceptable for motor codes.
2. "X" Means both codes are available.
3. "2000" or "2500" indicates maximum pressure rating on port.

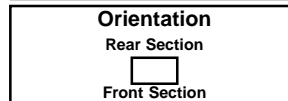
Box 7 Gear Width				
030 Series				
Gear Width	in. ³ /rev.	cm ³ /rev.	Max Pressure	
05 ½"	0.99	16.1	2500 psi (172 bar)	
07 ¾"	1.48	24.2	2500 psi (172 bar)	
10 1"	1.97	32.3	2500 psi (172 bar)	
12 1 ¼"	2.46	40.4	2500 psi (172 bar)	
15 1 ½"	2.96	48.4	2500 psi (172 bar)	
17 1 ¾"	3.45	56.5	2250 psi (155 bar)	
20 2"	3.94	64.6	2250 psi (155 bar)	
031 Series				
Gear Width	in. ³ /rev.	cm ³ /rev.	Max Pressure	
05 ½"	0.99	16.1	3000 psi (207 bar)	
07 ¾"	1.48	24.2	3000 psi (207 bar)	
10 1"	1.97	32.3	3000 psi (207 bar)	
12 1 ¼"	2.46	40.4	3000 psi (207 bar)	
15 1 ½"	2.96	48.4	3000 psi (207 bar)	
17 1 ¾"	3.45	56.5	2500 psi (172 bar)	
20 2"	3.94	64.6	2500 psi (172 bar)	

Box 8 Shaft Type (type 1 unless noted)

For single, tandem, or two-piece shaft unless noted.

07	SAE "C" 14 tooth spline 1.25" dia., ANSI 32-4 (two piece only)
12	Keyed shaft .75 dia., .19"X.19"X1.56" key (two piece only)
14	030-030, 031-031 piggyback shaft
22	050-030, 051-031 piggyback shaft
23	075-030, 076-031 piggyback shaft
25	SAE "B" 13 tooth spline .88" dia., ANSI 22-4
30	SAE "B" keyed .88" dia., ¼"X3/8" X 1" key, ANSI 22-1
32	Clutch pump shaft, tapered & keyed, 1:4 taper (single & two piece), #6 woodruff key
43	SAE "B-B" keyed 1.00" dia. ¼"X3/8"X1 ¼" key, ANSI 25-1 modified length
65	SAE "B" 13 tooth spline .875" dia., ANSI 22-4, type 2 (single & tandem)
66	SAE "B" keyed .88" dia, ¼"X3/8"X1" key, type 2 (single & tandem)
67	SAE "B-B" keyed 1.00" dia., ¼"X3/8"X1 ¼" key, ANSI 25-1 modified length, type 2 (single & tandem)
68	6 tooth spline 1.00" dia.
90	SAE "B" keyed w/ 5/8"-18 thread, .875" dia, ANSI 22-2 modified length (single & tandem)
95	SAE "A" 9 tooth spline, .62" dia. ANSI 16-4 (single only)
98	SAE "B-B" 15 tooth spline, 1.00" dia., ANSI 25-4 (single & tandem)

Box 9 Bearing Carriers Pump Only



Common Inlet Passage

IN	OUT	CW	CCW
-	-		
-	-	C	D
*	-	A	U

* 031 Series only. Used when only one adjacent gear housing has an inlet port.

NPT Porting
 (030 Series only)

1"	-	TB	BT
1 ¼"	-	VB	BV
1"	¾"	TX	XT
1 ¼"	¾"	VX	XV
1 ¼"	1"	VZ	ZV
1"	¾"	TJ	JT
1 ¼"	¾"	VJ	JV
1 ¼"	1"	VK	KV
1 ½"	1"	KW	-
1"	¾"	ZX	XZ
1"	¾"	ZS	SZ

ODT Porting

1"	-	CB	BC
1 ¼"	-	DB	BD
1 ½"	-	FB	BF
*	-	¾"	-
1"	¾"	CJ	JC
1 ¼"	¾"	DJ	JD
1 ½"	¾"	FJ	JF
1 ¼"	1"	DK	KD
1 ½"	1"	FK	KF
* 030 Series only.			
1"	¾"	CR	RC
1 ¼"	¾"	DR	RD
* 1 ½"	¾"	FR	RF
1 ¼"	1"	DS	SD
1 ½"	1"	FS	SF
* 030 Series only.			
1"	¾"	KJ	JK
1"	¾"	KX	XK

Split Flange Porting

IN	OUT	CW	CCW
1"	-	LB	BL
1 ¼"	-	MB	BM
1 ½"	-	NB	BN
-	¾"	BR	RB
1"	¾"	LR	RL
1 ¼"	¾"	MR	RM
1 ½"	¾"	NR	RN
1 ¼"	1"	MS	SM
1 ½"	1"	NS	SN
1"	¾"	LX	XL
1 ¼"	¾"	MX	XM
* 1 ½"	¾"	NX	XN
1 ¼"	1"	MZ	ZM
1 ½"	1"	NZ	ZN
* 030 Series only.			
1"	¾"	SR	RS
1"	¾"	RZ	ZR

BSP Porting

1"	-	CX	XC
1 ¼"	-	DX	XD
1 ½"	-	FX	XF
*	-	¾"	-
1"	¾"	CT	TC
1 ¼"	¾"	DT	TD
1 ½"	¾"	FT	TF
1 ¼"	1"	DV	VD
1 ½"	1"	FV	VF
* 031 Series only.			
1"	¾"	GM	MG
1 ¼"	¾"	HM	MH
1 ¼"	1"	HN	NH
1 ½"	1"	WN	NW
1"	¾"	PN	NP
1"	¾"	SX	XS

Box 9 Bearing Carriers (Pump Only) - continued

Metric Split Flange Porting			
IN	OUT	CW	CCW
1"	-	CH	HC
1 1/4"	-	DH	HD
1 1/2"	-	FH	HF
-	3/4"	PW	WP
1"	3/4"	CW	WC
1 1/4"	3/4"	DW	WD
1 1/2"	3/4"	FW	WF
1 1/4"	1"	DC	CD
1 1/2"	1"	FC	CF
1"	3/4"	GQ	QG
1 1/4"	3/4"	HQ	QH
1 1/4"	1"	HS	SH
1 1/2"	1"	WS	SW
1"	3/4"	ST	TS
1"	3/4"	PX	XP

Metric Straight Thread Porting			
IN	OUT	CW	CCW
1"	-	CL	LC
1 1/4"	-	DL	LD
1 1/2"	-	FL	LF
1"	3/4"	CZ	ZC
1 1/4"	3/4"	DZ	ZD
1 1/2"	3/4"	FZ	ZF
1 1/4"	1"	DN	ND
1 1/2"	1"	FN	NF
1"	3/4"	GT	TG
1 1/4"	3/4"	HT	TH
1 1/4"	1"	HV	VH
1 1/2"	1"	WV	VW
1"	3/4"	KL	LK
1"	3/4"	PV	VP

Box 9 Bearing Carriers (Motor Only)

No Ports		
IN	OUT	DUAL
-	-	B

NPT Porting (030 Series only)		
1"	1"	TT
1 1/4"	1 1/4"	VV

ODT Porting		
1"	1"	CC
1 1/4"	1 1/4"	BB
1 1/2"	1 1/2"	FF

Split Flange Porting		
1"	1"	LL
1 1/4"	1 1/4"	MM
1 1/2"	1 1/2"	NN

BSPP Porting		
1"	1"	EE
1 1/4"	1 1/4"	GG

Metric Split Flange Porting		
IN	OUT	DUAL
1"	1"	RR
1 1/4"	1 1/4"	SS

Metric Straight Thread Porting		
1"	1"	KK
1 1/4"	1 1/4"	JJ

Box 10 Connecting Shaft

For connecting tandem units.

1 Connecting Shaft - Multiple Units

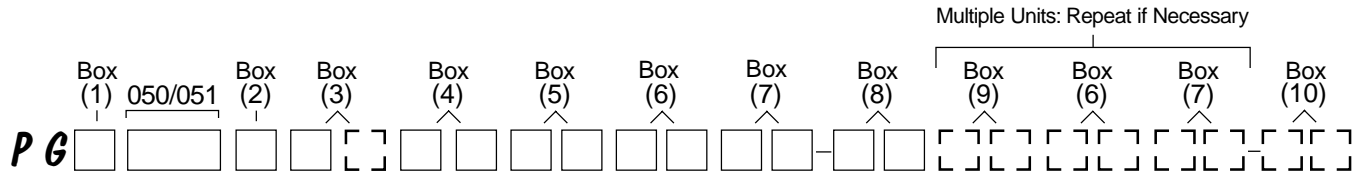
14 Piggyback Pump Connecting Shaft 030 to 030, 031 to 031

22 Piggyback Pump Connecting Shaft 050 to 030, 051 to 031

23 Piggyback Pump Connecting Shaft 075 to 030, 076 to 031

NOTE

Split flange thread depths may be more shallow than S.A.E. standard. Contact Product Support Department for actual dimensions.



Box 1 Pump/Motor

P	Pump
M	Motor

Box 2 Unit

A	Single Unit
B	Tandem Unit
C	Single or Tandem w. two-piece shaft (O.B. bearing required)

Box 3 Shaft End Cover

1	Pump, cw w/o O.B. bearing
2	Pump, ccw w/o O.B. bearing
3	Pump, bi-rotational w/o O.B. bearing (050 series only)
4	Pump, cw with O.B. bearing
5	Pump, ccw with O.B. bearing
6	Pump, bi-rotational with O.B. bearing (050 series only)
8	Motor, bi-rot. with O.B. bearing + ¼" NPT drain
9	Motor, bi-rot. w/o O.B. bearing + ¼" NPT drain
18	Motor, bi-rot. with O.B. bearing + ¼" BSPP drain
19	Motor, bi-rot. w/o O.B. bearing + ¼" BSPP drain

Box 4 Shaft End Cover (type 1 unless noted)

00	4 bolt pad mount
42	SAE 4 bolt "B" ANSI 101-4: Pilot dia. 4"
78	SAE 4 bolt "C" ANSI 127-4: Pilot dia. 5"
91	050-050, 051-051 for piggyback: Pilot dia. 4"
92	075-050, 076-051 for piggyback: Pilot dia. 5"
96	SAE 2 bolt "B" ANSI 101-2, type 2 : Pilot dia. 4"
97	SAE 2 bolt "B" ANSI 101-2: Pilot dia. 4"
98	SAE 2 bolt "C" ANSI 127-2: Pilot dia. 5"
99	SAE 2 bolt "C" ANSI 127-2, type 2 : Pilot dia. 5"

Box 5 Port End Cover (Rear Ported)

Left	Right	Single	Tandem	Extended Studs
Unported				
-	-	BE	BI	BY

NPT Porting (050 series only)

¾"	-	KE	KI	KY
-	¾"	LE	LI	LY
¾"	¾"	ME	MI	MY

O.D.T. Porting

¾"	-	CE	CI	CY
-	¾"	DE	DI	DY
¾"	¾"	FE	FI	FY

Box 5 Port End Cover continued

Left	Right	Single	Tandem	Extended Studs
BSPP Porting				
¾"	-	WE	WI	WY
-	¾"	XE	XI	XY
¾"	¾"	ZE	ZI	ZY

Metric Straight Thread

¾"	-	NE	NI	NY
-	¾"	PE	PI	PY
¾"	¾"	QE	QI	QY

Note
 ¾" PEC ports are rated to 2500 PSI max.

	CW	CCW	Double
Piggyback Port End - Pump Only			
Type 050-050, 051-051 & 050-030, 051-031	KO	LO	MO

- Optional:
- Port end cover with integral R/V
 - Larger rear ports
 - 1 ¼ x 1 S.F. or ODT
 - Larger side ports
 - 1 ¼ S.F. or ODT inlet
 - 1" ODT outlet
 - Larger rear ports, but requires special gear housing and cap screws
 - 1 ½ x 1 ½ NPT up to 1500 PSI

Contact Product Support Development for additional information.

FOR ALL UNITS
 To determine direction of shaft rotation, view the unit with the shaft pointing toward you, and the idler (driven) gear beneath the shaft. With clockwise rotation, flow will be left to right. The inlet pump port will be on the left, outlet on the right. The flow is in the opposite direction with counter-clockwise rotation. Inverting the pump will reverse the inlet and outlet ports but not the direction of rotation.

Box 6 Gear Housing																	
050 Series										051 Series							
Housing Code	07	10	12	15	17	20	22	25		10	12	15	17	20	22	25	
Displacement (C.I.R.)	1.91	2.55	3.19	3.83	4.46	5.10	5.74	6.38		2.55	3.19	3.83	4.46	5.10	5.74	6.38	
Maximum (PSI)	2500	2500	2500	2500	2000	2000	2000	2000		3000	3000	3000	3000	2500	2500	2500	
IN	OUT	CW	CCW														
-	-	AB	AB	X	X	X	X	X	X	X	X	X	X	No Porting			
														X	X	X	
NPT Porting																	
3/4"	-	IC	ID	X	ID	ID	ID										
-	3/4"	ID	IC	X	ID	ID	ID										
3/4"	3/4"	IF	IF	X	X	X	X	X									
1"	3/4"	IJ	IG	X*	X	X	IJ	IJ									
1 1/4"	3/4"	IK	IH					X									
1"	-	YC	YD			X	YD	YD	YD	YD							
-	1"	YD	YC			X	YD	YD	YD	YD							
1"	1"	YF	YF			X	X	X	X	X	X						
1 1/4"	1"	YJ	YG				X*	X	X	X	YJ						
1 1/4"	-	IA	IB				X*	X*	X	IB	IB						
-	1 1/4"	IB	IA						X	IB	IB						
1 1/4"	1 1/4"	YL	YL						X	X	X	X					
1 1/2"	1"	YK	YH														
1 1/2"	1 1/4"	YP	YM						X*	X	X						
1 1/2"	1 1/2"	YR	YR														
OD Tube Porting																	
3/4"	-	EC	ED	2000	2000	X	ED	X			X*	X*					
-	3/4"	ED	EC	2000	2000	X	ED	X									
3/4"	3/4"	EF	EF	2000	2000	X	X	X			2500		X				
1"	3/4"	EJ	EG	2000*	2000*	X	EJ*	EJ									
1 1/4"	3/4"	EK	EH				X*	X*			2500*		X*				
1"	-	AC	AD	X*	X*	2000	X	AD	AD	AD	X*	X*	X*	X*	X		
-	1"	AD	AC				2000	X	AD	AD	AD						
1"	1"	AF	AF				2000	X	X					X	X	X	
1 1/4"	1"	AJ	AG				2000*	X*	X*	AJ	AJ						
1 1/2"	1"	AK	AH						X*	X*	X*			X*			
1 1/4"	-	AA	AO				X*	X*	X*	AO	AO			X*	X*	X	X
-	1 1/4"	AO	AA								AO	AO					
1 1/4"	1 1/4"	AL	AL						X	X	X						
1 1/2"	1 1/4"	AP	AM						X*	X*	X			X*	X*	X	
1 1/2"	-	AE	AU						X*	X*							
-	1 1/2"	AU	AE														
1 1/2"	1 1/2"	AR	AR														

* This porting is acceptable for low pressure inlet port only.

NOTES

1. NPT ports are not recommended for use at pressures in excess of 1500 PSI.
2. Shaded cells are acceptable for motor codes.
3. "X" Means both codes are available.
4. "2000" or "2500" indicates maximum pressure rating on port.

Box 6 Gear Housing <i>continued</i>															
		050 Series							051 Series						
Housing Code	10	12	15	17	20	22	25	10	12	15	17	20	22	25	
Displacement (C.I.R.)	2.55	3.19	3.83	4.46	5.10	5.74	6.38	2.55	3.19	3.83	4.46	5.10	5.74	6.38	
Maximum (PSI)	2500	2500	2500	2000	2000	2000	2000	3000	3000	3000	3000	2500	2500	2500	
IN	OUT	CW	CCW												
3/4"	-	UC	UD	X	X	UD	UD	Split Flange Porting							
-	3/4"	UD	UC	X	X	UD	UD	2500	X						
3/4"	3/4"	UF	UF				X	X	2500	X	X				
1"	3/4"	UJ	UG	X*	X*	UJ	UJ	2500*	X*	X*					
1 1/4"	3/4"	UK	UH						X*	X*	X*				
1"	-	OC	OD	2000	X*	X	X	X	OD	X	X*	2500	X	X	
-	1"	OD	OC	2000	2000	X	X	X	OD	X	2500				
1"	1"	OF	OF				2000	X	X	X	X	2500	X	X	
1 1/4"	1"	OJ	OG				2000*	X*	X*	X	OJ	OJ	2500*	X*	
1 1/2"	1"	OK	OH				X*	X*	X*	X	X	2500*	X*	X*	
-	1 1/4"	-	OA	OB				X*	X*	X*	X	OB	OB	X*	
-	1 1/4"	OA	OB				X	OB	OB						
1 1/4"	1 1/4"	OL	OL				2000	X	X	X	X	X	X	X	
1 1/2"	1 1/4"	OP	OM				2000*	X*	X*	X	X	X*	X	X	
1 1/2"	-	OE	OU				X*	X*	X	X	X	X*	X*	X*	
-	1 1/2"	OU	OE				X	X	X						
1 1/2"	1 1/2"	OR	OR				X	X	X				X	X	
2"	-	XB	ZB				X*								
2"	1"	UQ	UB				X*	X*	X*						
2"	1 1/4"	OQ	ON				X*	X*	ON*				X*	X*	
2"	1 1/2"	OV	OS				X*	X*	X*				X*	X*	
2"	2"	OX	OX				X								
BSP Porting															
3/4"	-	YN	YQ	X*	X	YQ	YQ	X*	2500	2500	YQ	YQ			
-	3/4"	YQ	YN				X	YQ	YQ	2500	2500	YQ	YQ		
3/4"	3/4"	YS	YS	2000	X	X				2500	2500	X			
1"	3/4"	YV	YT	2000*	X*	YV*	YV*	YV				2500*	2500*		
1 1/4"	3/4"	YW	YU				YW*								
1"	-	SL	RQ				SL*	RQ*	RQ*	RQ	RQ	RQ	RQ	RQ	
-	1"	RQ	SL				RQ	RQ	RQ				2500	RQ	
1"	1"	MP	MP				2000	X	X	X				2500	
1 1/4"	1"	IX	VY				2000*	X*	VY*	IX	IX				2500*
1 1/2"	1"	VI	HW											X	
1 1/4"	-	NJ	UI				NJ*				UI	UI			
-	1 1/4"	UI	NJ							UI	UI				
1 1/4"	1 1/4"	PF	PF							X	X				
1 1/2"	1 1/4"	IS	IQ											X*	
Metric Straight Thread															
3/4"	-	EN	TQ	X*	TQ	TQ	TQ	X*	TQ*	TQ*	TQ	TQ			
-	3/4"	TQ	EN				TQ	TQ	TQ	2500	2500	TQ			
3/4"	3/4"	ES	ES	2000	X				2500						
1"	3/4"	EV	ET	2000*	X*	EV*	EV	EV				2500*	2500*		
1"	-	NL	ER				ER*	ER	ER	ER					
-	1"	ER	NL				ER	ER	ER						
1"	1"	CM	CM				2000	X	X				2500		
1 1/4"	-	UA				UA*	UA	UA				UA*	UA		
1 1/4"	1"	EX	VE				2000*	X*	EX*	EX	EX	2500*	X*		
1 1/4"	1 1/4"	PA	PA							X	X	X	X		
1 1/2"	1 1/4"	SA	QA				X*	X*	X				X*		

*This porting is acceptable for low pressure inlet port only.

NOTES

1. Shaded cells are acceptable for motor codes.
2. "X" Means both codes are available.
3. "2000" or "2500" indicates maximum pressure rating on port.



Box 6 Gear Housing <i>continued</i>																			
050 Series					051 Series														
Housing Code	10	12	15	17	20	22	25	10	12	15	17	20	22	25					
Displacement (C.I.R.)	2.55	3.19	3.83	4.46	5.10	5.74	6.38	2.55	3.19	3.83	4.46	5.10	5.74	6.38					
Maximum (PSI)	2500	2500	2500	2000	2000	2000	2000	3000	3000	3000	3000	2500	2500	2500					
IN	OUT	CW		CCW															
3/4"	-	VN	VQ	VQ	VQ	VQ	VQ	Metric Split Flange Porting											
-	3/4"	VQ	VN	VQ	VQ	VQ	VQ	X*											
1"	3/4"	RV	VT	X*	RV*	RV	RV	RV	2500*	X*									
1 1/4"	3/4"	RW	RU									X*	X*						
1"	-	UL	UR	UR*	UR	UR	UR	UR	X*	X*	X	X							
-	1"	UR	UL					UR	UR	UR	UR	X	X						
1"	1"	UM	UM	2000	X	X	X	X					2500	X	X	X			
1 1/4"	1"	UX	VU	2000*	UX*	UX*	UX	UX	UX	UX					2500*	X*	X*		
1 1/2"	1"	VO	HO					X*	X*	X*					2500*	X*	X*	X	
1 1/4"	-	NO	UO					UO*	UO	UO	UO	UO					X*	X*	
-	1 1/4"	UO	NO					UO	UO	UO	UO								
1 1/4"	1 1/4"	PO	PO	2000	X	X	X	X					X	X	X				
1 1/2"	1 1/4"	SO	QO	2000*	X*	X*	X	X					X*	X	X				
1 1/2"	-	UY	TO					X*	X*	X					X*	X*			
-	1 1/2"	TO	UY													X			
1 1/2"	1 1/2"	SV	SV					X	X	X					X	X			
2"	1 1/4"	JM	JR					X*	X*	X*					X*	X*	X*		
2"	1 1/2"	JQ	JN					X*	X*	X*					X*	X*			

*This porting is acceptable for low pressure inlet port only.

NOTES

1. Shaded cells are acceptable for motor codes.
2. "X" Means both codes are available.
3. "2000" or "2500" indicates maximum pressure rating on port.

Box 7 Gear Width				
050 Series				
	Gear Width	in. ³ /rev.	cm ³ /rev.	Max Pressure
05	1/2"	1.28	20.9	2500 psi (172 bar)
07	3/4"	1.91	31.3	2500 psi (172 bar)
10	1"	2.55	41.8	2500 psi (172 bar)
12	1 1/4"	3.19	52.2	2500 psi (172 bar)
15	1 1/2"	3.83	62.7	2500 psi (172 bar)
17	1 3/4"	4.46	73.1	2000 psi (138 bar)
20	2"	5.10	83.6	2000 psi (138 bar)
22	2 1/4"	5.74	94.0	2000 psi (138 bar)
25	2 1/2"	6.38	104.5	2000 psi (138 bar)
051 Series				
	Gear Width	in. ³ /rev.	cm ³ /rev.	Max Pressure
05	1/2"	1.28	20.9	3000 psi (207 bar)
07	3/4"	1.91	31.3	3000 psi (207 bar)
10	1"	2.55	41.8	3000 psi (207 bar)
12	1 1/4"	3.19	52.2	3000 psi (207 bar)
15	1 1/2"	3.83	62.7	3000 psi (207 bar)
17	1 3/4"	4.46	73.1	3000 psi (207 bar)
20	2"	5.10	83.6	2500 psi (172 bar)
22	2 1/4"	5.74	94.0	2500 psi (172 bar)
25	2 1/2"	6.38	104.5	2500 psi (172 bar)

Box 8 Shaft Type <i>(type 1 unless noted)</i>	
For single, tandem, or two-piece shaft unless noted.	
07	SAE "C" 14 tooth spline 1.25" dia., ANSI 32-4
11	SAE "C" keyed 1.25" dia., 5/16"X15/32"X1 1/2" key, ANSI 32-1
22	050-050, 051-051 piggyback shaft
23	075-050, 076-051 piggyback shaft
25	SAE "B" 13 tooth spline .88" dia., ANSI 22-4
43	SAE "B-B" keyed 1.00" dia. 1/4"X3/8"X1 1/4" key, ANSI 25-1
53	SAE "C" 14 tooth spline 1.25" dia., ANSI-32-4, type 2 (single & tandem)
65	SAE "B" 13 tooth spline .88" dia., ANSI 22-4, type 2 (single & tandem)
67	SAE "B-B" keyed 1.00 dia., 1/4"X3/8"X1 1/4" key, ANSI 25-1, type 2 (single & tandem)
73	SAE "C" keyed 1.25" dia., 5/16" x 15/32" x 2 1/4" key, extended length (two-piece only)
98	SAE "B-B" 15 tooth spline, 1.00" dia., ANSI 25-4 (single & tandem)

Box 9 Bearing Carriers Pump Only

Common Inlet Passage

IN	OUT	CW	CCW
-	-		
		C	D

* 051 Series only. Used when only one adjacent gear housing has an inlet port.

**NPT Porting
(050 Series only)**

1"	-	TB	BT
1 1/4"	-	VB	BV
1 1/2"	-	WB	BW
1"	3/4"	TX	XT
1 1/4"	3/4"	VX	XV
1 1/2"	3/4"	WX	XW
1 1/4"	1"	VZ	ZV
1 1/2"	1"	WZ	ZW
1"	3/4"	TJ	JT
1 1/4"	3/4"	VJ	JV
1 1/4"	1"	VK	KV
1 1/2"	1"	WK	KW
1"	3/4"	ZX	XZ

ODT Porting

1"	-	CB	BC
1 1/4"	-	DB	BD
1 1/2"	-	FB	BF
-	3/4"	PJ	*JP
1"	3/4"	CJ	JC
1 1/4"	3/4"	DJ	JD
1 1/2"	3/4"	FJ	JF
1 1/4"	1"	DK	KD
1 1/2"	1"	FK	KF
* 051 Series only.			
1"	3/4"	CR	RC
1 1/4"	3/4"	DR	RD
* 1 1/2"	3/4"	FR	RF
1 1/4"	1"	DS	SD
1 1/2"	1"	FS	SF
-	1"	HZ	*ZH
* 051 Series only.			
1"	3/4"	KJ	JK

Split Flange Porting

IN	OUT	CW	CCW
1"	-	LB	BL
1 1/4"	-	MB	BM
1 1/2"	-	NB	BN
-	3/4"	BR	RB
1"	3/4"	LR	RL
1 1/4"	3/4"	MR	RM
1 1/2"	3/4"	NR	RN
1 1/4"	1"	MS	SM
1 1/2"	1"	NS	SN
1"	3/4"	LX	XL
1 1/4"	3/4"	MX	XM
1 1/4"	1"	MZ	ZM
1 1/2"	1"	NZ	ZN
1"	3/4"	SR	RS

BSPF Porting

1"	-	CX	XC
1 1/4"	-	DX	XD
1 1/2"	-	FX	XF
* -	3/4"	-	TL
1"	3/4"	CT	TC
1 1/4"	3/4"	DT	TD
1 1/2"	3/4"	FT	TF
1 1/4"	1"	DV	VD
1 1/2"	1"	FV	VF
* 050 Series only.			
1"	3/4"	GM	MG
1 1/4"	3/4"	HM	MH
1 1/2"	3/4"	WM	MW
1 1/4"	1"	HN	NH
1 1/2"	1"	WN	NW
1"	3/4"	PN	NP

Bearing Carriers (9) Pump Only - continued

Metric Split Flange Porting

IN	OUT	CW	CCW
1"	-	CH	HC
1 1/4"	-	DH	HD
1 1/2"	-	FH	HF
-	3/4"	PW	WP
1"	3/4"	CW	WC
1 1/4"	3/4"	DW	WD
1 1/2"	3/4"	FW	WF
1 1/4"	1"	DC	CD
1 1/2"	1"	FC	CF
1"	3/4"	GQ	QG
1 1/4"	3/4"	HQ	QH
1 1/2"	3/4"	WQ	QW
1 1/4"	1"	HS	SH
1 1/2"	1"	WS	SW
1"	3/4"	ST	TS

Metric Straight Thread Porting

IN	OUT	CW	CCW
1"	-	CL	LC
1 1/4"	-	DL	LD
1 1/2"	-	FL	LF
1"	3/4"	CZ	ZC
1 1/4"	3/4"	DZ	ZD
1 1/2"	3/4"	FZ	ZF
1 1/4"	1"	DN	ND
1 1/2"	1"	FN	NF
1"	3/4"	GT	TG
1 1/4"	3/4"	HT	TH
1 1/2"	3/4"	WT	TW
1 1/4"	1"	HV	VH
1 1/2"	1"	WV	VW
1"	3/4"	KL	LK

Box 9 Bearing Carriers (Motor Only)

No Ports

IN	OUT	DUAL
-	-	B

**NPT Porting
(030 Series only)**

1"	1"	TT
1 1/4"	1 1/4"	VV
1 1/2"	1 1/2"	WW

ODT Porting

1"	1"	CC
1 1/4"	1 1/4"	BB
1 1/2"	1 1/2"	FF

Split Flange Porting

1"	1"	LL
1 1/4"	1 1/4"	MM
1 1/2"	1 1/2"	NN

BSPF Porting

IN	OUT	DUAL
1"	1"	EE
1 1/4"	1 1/4"	GG

Metric Split Flange Porting

1"	1"	RR
1 1/4"	1 1/4"	SS

Metric Straight Thread Porting

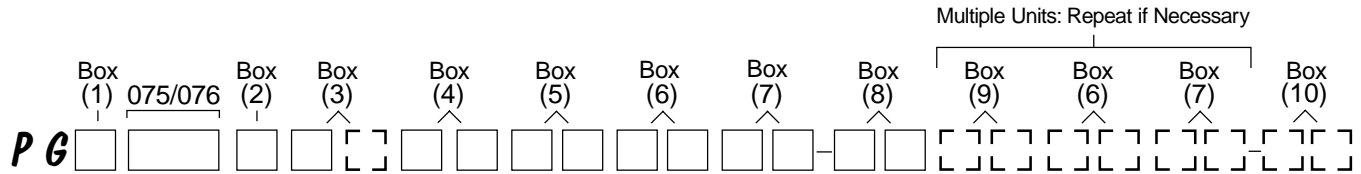
1"	1"	KK
1 1/4"	1 1/4"	JJ

Box 10 Connecting Shaft

For connecting tandem units.

- 1 Connecting Shaft - Multiple Units
- 22 Piggyback Pump Connecting Shaft for 050 to 050, 051 to 051
- 23 Piggyback Pump Connecting Shaft for 075 to 050, 076 to 051

NOTE
 Split flange thread depths may be more shallow than S.A.E. standard.
 Contact Product Support Department for actual dimensions.



Box 1 Pump/Motor	
P	Pump
M	Motor

Box 2 Unit	
A	Single Unit
B	Tandem Unit
C	Single or Tandem w/ two-piece shaft (O.B. bearing required)

Box 3 Shaft End Cover	
1	Pump, cw w/o O.B. bearing
2	Pump, ccw w/o O.B. bearing
3	Pump, bi-rotational w/o O.B. bearing (075 series only)
4	Pump, cw with O.B. bearing
5	Pump, ccw with O.B. bearing
6	Pump, bi-rotational w/ O.B. bearing (075 series only)
8	Motor, bi-rot. with O.B. bearing + ¼" NPT drain
9	Motor, bi-rot. w/o O.B. bearing + ¼" NPT drain
18	Motor, bi-rot. with O.B. bearing + ¼" BSPP drain
19	Motor, bi-rot. w/o O.B. bearing + ¼" BSPP drain

Box 4 Shaft End Cover (type 1 only)	
42	SAE 4 bolt "B" ANSI 101-4: Port dia. 4"
78	SAE 4 bolt "C" ANSI 127-4: Port dia. 5"
80	SAE 4 bolt "D" ANSI 152-4: Port dia. 6"
98	SAE 2 bolt "C" ANSI 127-2: Port dia. 5"

Box 5 Port End Cover (Rear Ported)				
Left	Right	Single	Tandem	Extended Studs
<i>Unported</i>				
-	-	BE	BI	BY

O.D.T. Porting				
1"	1"	JE	JI	JY

Metric Straight Thread				
1"	1"	TE	TI	TY

Piggyback Port End - Pump Only				
Type 075-050, 076-051 & 075-030, 076-031				
			CW	CCW
			Double	
		KO	LO	MO

For All Units
 To determine direction of shaft rotation, view the unit with the shaft pointing toward you, and the idler (driven) gear beneath the shaft. With clockwise rotation, flow will be left to right. The inlet pump port will be on the left, outlet on the right. The flow is in the opposite direction with counter-clockwise rotation. Inverting the pump will reverse the inlet and outlet ports but not the direction of rotation.

Gear Housing (6)																	
075 Series										075/076 Series		076 Series					
Housing Code	07	10	12	15	17	20	22	25	27	30	10	12	15	17	20	22	25
Displacement (C.I.R.)	3.07	4.1	5.12	6.15	7.17	8.2	9.22	10.25	11.275	12.3	4.1	5.12	6.15	7.17	8.2	9.22	10.25
Maximum (PSI)	2500	2500	2500	2500	2500	2500	2250	2250	2000	2000	3000	3000	3000	3000	2500	2500	2500
IN	OUT	CW	CCW	No Porting													
-	-	AB	AB	X	X	X	X	X	X	X	X	X	X	X	X	X	X
NPT Porting																	
3/4"	-	IC	ID	ID	ID	ID	ID	ID									
-	3/4"	ID	IC	ID	ID	ID	ID	ID									
1"	3/4"	IJ	IG		X	IJ	IJ										
1"	-	YC	YD			YD	YD		X/-								
-	1"	YD	YC			YD	YD		X/-								
1"	1"	YF	YF		X	X											
1 1/4"	1"	YJ	YG		X	X											
1 1/4"	1 1/4"	YL	YL		X	X	X										
OD Tube Porting																	
3/4"	-	EC	ED	ED	ED	ED	ED										
1"	3/4"	EJ	EG	X*		EJ	EJ				2500*						
1 1/4"	3/4"	EK	EH		X*							X*					
1"	-	AC	AD			AD	AD					2500	X				
-	1"	AD	AC			AD	AD					2500	X				
1"	1"	AF	AF		2000	X	X	X	X/-			2500	X				
1 1/4"	1"	AJ	AG		2000*	X*						2500*	X*				
1 1/2"	1"	AK	AH				X*						X*				
1 1/4"	1 1/4"	AL	AL			2000	2000	2000/-	X	X		X/-					
1 1/2"	1 1/4"	AP	AM			2000*	2000*										
1 1/2"	1 1/2"	AR	AR						X	X							
Split Flange Porting																	
3/4"	-	UC	UD	UD	UD	UD	UD										
-	3/4"	UD	UC	UD	UD	UD	UD										
1"	3/4"	UJ	UG	X	X	UJ	UJ	UJ	UJ			X					
1"	-	OC	OD		OD	X	OD	OD	OD								
-	1"	OD	OC		OD	X	OD	OD	OD								
1"	1"	OF	OF		X	X	X	X	X/X		X	X/-	X/-	X	X	X	X
1 1/4"	1"	OJ	OG		2000*	X	X	OJ	OJ/-	OJ	OJ		-/X	X*	X*		
1 1/2"	1"	OK	OH			X*	X*	X*	X/-	X				X*	X*	X*	
1 1/4"	-	OA	OB			OB	OB	OB	OB/-	OB	OB						
-	1 1/4"	OB	OA			OB	OB	OB	OB/-	OB	OB						
1 1/4"	1 1/4"	OL	OL		2000	X	X	X	X/X	X	X	X/X	X/X	2500	X	X	X
1 1/2"	1 1/4"	OP	OM			X*	X*	X*	X/X	X	X	OP/-	OP/-	2500*	X*	X*	X
1 1/2"	-	OE	OU					X/X	X	OU		OU/-	OU/-				X
-	1 1/2"	OU	OE					X/X	X	OU		OU/-	OU/-				X
1 1/2"	1 1/2"	OR	OR			2000	2000	X/X	X	X		X/X	X/X				X
2"	1"	UQ	-					X*/-									
2"	1 1/4"	OQ	ON				X*	X*/X*	X*	X*	X/X	X/X		X*	X*	X*	
2"	1 1/2"	OV	OS			2000*	X*/X*	X*	X*	X/X	X/X			X*	X*		
2"	2"	OX	OX						X	X/X	X/X						
2 1/2"	1 1/4"	US	UN														X*
2 1/2"	1 1/2"	OW	OT						X*	X*/X*	X*/X*						X*
2 1/2"	2"	OZ	OY							X*/-							

* This porting is acceptable for low pressure inlet port only.

NOTES

1. NPT ports are not recommended for use at pressures in excess of 1500 PSI.
2. Shaded cells are acceptable for motor codes.
3. "X" Means both codes are available.
4. "2000" or "2500" indicates maximum pressure rating on port.



Gear Housing (6) continued																	
		075 Series								075/076 Series		076 Series					
Housing Code	07	10	12	15	17	20	22	25	27	30	10	12	15	17	20	22	25
Displacement (C.I.R.)	3.07	4.1	5.12	6.15	7.17	8.2	9.22	10.25	11.275	12.3	4.1	5.12	6.15	7.17	8.2	9.22	10.25
Maximum (PSI)	2500	2500	2500	2500	2500	2500	2250	2250	2000	2000	3000	3000	3000	3000	2500	2500	2500
IN	OUT	CW	CCW														
3/4"	-	YN	YQ	YQ	YQ	YQ	YQ	YQ	YQ	YQ	YQ	YQ	YQ	YQ	YQ	YQ	YQ
-	3/4"	YQ	YN	YQ	YQ	YQ	YQ	YQ	YQ	YQ	YQ	YQ	YQ	YQ	YQ	YQ	YQ
3/4"	3/4"	YS	YS														
1"	3/4"	YV	YT	X*	YV*	YV	YV	YV	YV	YV	YV	YV	YV	YV	YV	YV	YV
1"	-	SL	RQ		X	RQ	RQ	RQ/RQ	RQ								
-	1"	RQ	SL		X	RQ	RQ	RQ/RQ	RQ								
1"	1"	MP	MP		2000	X	X										
1 1/4"	1"	IX	VY		2000*	X*	IX*		IX/-	IX							
1 1/4"	-	NJ	UI				UI*										
-	1 1/4"	UI	NJ														
1 1/4"	1 1/4"	PF	PF		2000	2000	X/-	X		-/X						X	X
1 1/2"	1"	VI	HW			X*	VI*	-/VI*						VI*			
1 1/2"	1 1/4"	IS	IQ		2000*	2000*	-/X*										X*
Metric Straight Thread																	
3/4"	-	EN	TQ	TQ	TQ	TQ	TQ	TQ			TQ	TQ	TQ				
-	3/4"	TQ	EN	TQ	TQ	TQ	TQ	TQ			TQ	TQ	TQ				
1"	3/4"	EV	ET	X*		EV	EV				EV*	EV					
1"	-	NL	ER								ER*	ER					
-	1"	ER	NL			ER	ER				2500	ER					
1"	1"	CM	CM		2000	X	X				2500	X					
Metric Split Flange Porting																	
3/4"	-	VN	VQ	VQ	VQ	VQ	VQ	VQ									
-	3/4"	VQ	VN	VQ	VQ	VQ	VQ	VQ									
1"	3/4"	RV	VT	X	X	RV	RV	RV	RV/-		X						
1"	-	UL	UR		UR	UR	UR	UR	UR/-								
-	1"	UR	UL		UR	UR	UR	UR	UR/-								
1"	1"	UM	UM		X	X	X	X	X/X		X	X	X	X			
1 1/4"	1"	UX	VU		X*	X	UX	UX	UX/-	UX	UX						
1 1/2"	1"	VO	HO			X*	X*				X*	X*					
1 1/4"	-	NO	UO			UO	UO	UO	UO/-	UO	UO						
-	1 1/4"	UO	NO			UO	UO	UO	UO/-	UO	UO						
1 1/4"	1 1/4"	PO	PO		X	X	X	X/X	X	X	X/X	X/X	2500	X	X	X	X
1 1/2"	1 1/4"	SO	QO			X*	X*	X/X	X	SO	SO	SO	2500*	X*	X*		
1 1/2"	-	UY	TO					X/X	X	X	TO	TO			X*	X	
-	1 1/2"	TO	UY					X/X	X	X	TO	TO					X
1 1/2"	1 1/2"	SV	SV			2000	X/X	X	X	X/X	X/X					X	X
2"	1 1/4"	JM	JR			X*	X*/X*	X*	X*	-/X*	-/X*			X*	X*	X*	
2"	1 1/2"	JQ	JN			2000*	X*/X*	X*	X*	X/X	X/X				X*	X*	
2"	2"	JS	JS							-/X	X/X						
2 1/2"	1 1/2"	LJ	JX							X*/X*	X*/X*						X*

* This porting is acceptable for low pressure inlet port only.

NOTES

1. Shaded cells are acceptable for motor codes.
2. "X" Means both codes are available.
3. "2000" or "2500" indicates maximum pressure rating on port.



Box 7 Gear Width

075 Series				
	Gear Width	in. ³ /rev.	cm ³ /rev.	Max Pressure
07	¾"	3.08	50.4	2500 psi (172 bar)
10	1"	4.10	67.2	2500 psi (172 bar)
12	1 ¼"	5.13	84.0	2500 psi (172 bar)
15	1 ½"	6.15	100.8	2500 psi (172 bar)
17	1 ¾"	7.18	117.6	2500 psi (172 bar)
20	2"	8.20	134.4	2500 psi (172 bar)
22	2 ¼"	9.23	151.2	2250 psi (155 bar)
25	2 ½"	10.25	168.0	2250 psi (155 bar)
27	2 ¾"	11.28	184.8	2000 psi (138 bar)
30	3"	12.30	201.6	2000 psi (138 bar)

076 Series				
	Gear Width	in. ³ /rev.	cm ³ /rev.	Max Pressure
07	¾"	3.08	50.4	3000 psi (207 bar)
10	1"	4.10	67.2	3000 psi (207 bar)
12	1 ¼"	5.13	84.0	3000 psi (207 bar)
15	1 ½"	6.15	100.8	3000 psi (207 bar)
17	1 ¾"	7.18	117.6	3000 psi (207 bar)
20	2"	8.20	134.4	2500 psi (172 bar)
22	2 ¼"	9.23	151.2	2500 psi (172 bar)
25	2 ½"	10.25	168.0	2500 psi (172 bar)
27	2 ¾"	11.28	184.8	2000 psi (138 bar)
30	3"	12.30	201.6	2000 psi (138 bar)

Box 8 Shaft Type

For single, tandem, or two-piece shaft unless noted.

07	SAE "C" 14 tooth spline 1.25" dia., ANSI 32-4
11	SAE "C" keyed 1.25" dia., 5/16"X15/32"X1 ½" key, ANSI 32-1

Box 9 Bearing Carriers (Pump Only)

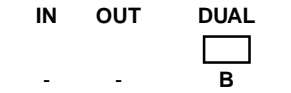
Common Inlet Passage



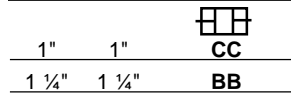
* 076 Series only. Used when only one adjacent gear housing has an inlet port.

Box 9 Bearing Carriers (Motor Only)

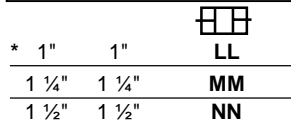
No Ports



ODT Porting

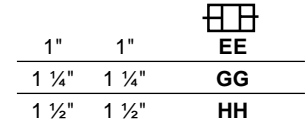


Split Flange Porting

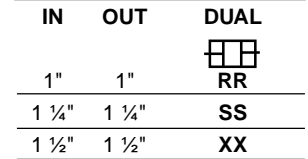


* 076 Series only.

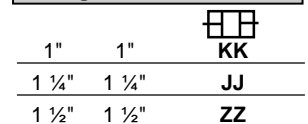
BSPB Porting



Metric Split Flange Porting



Metric Straight Thread Porting



Box 10 Connecting Shaft

For connecting tandem units.

1	Connecting Shaft - Multiple Units
23	Piggyback Pump Connecting Shaft for 075 to 075

NOTE

Split flange thread depths may be more shallow than S.A.E. standard. Contact Product Support Department for actual dimensions.

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Parker Hannifin Corporation

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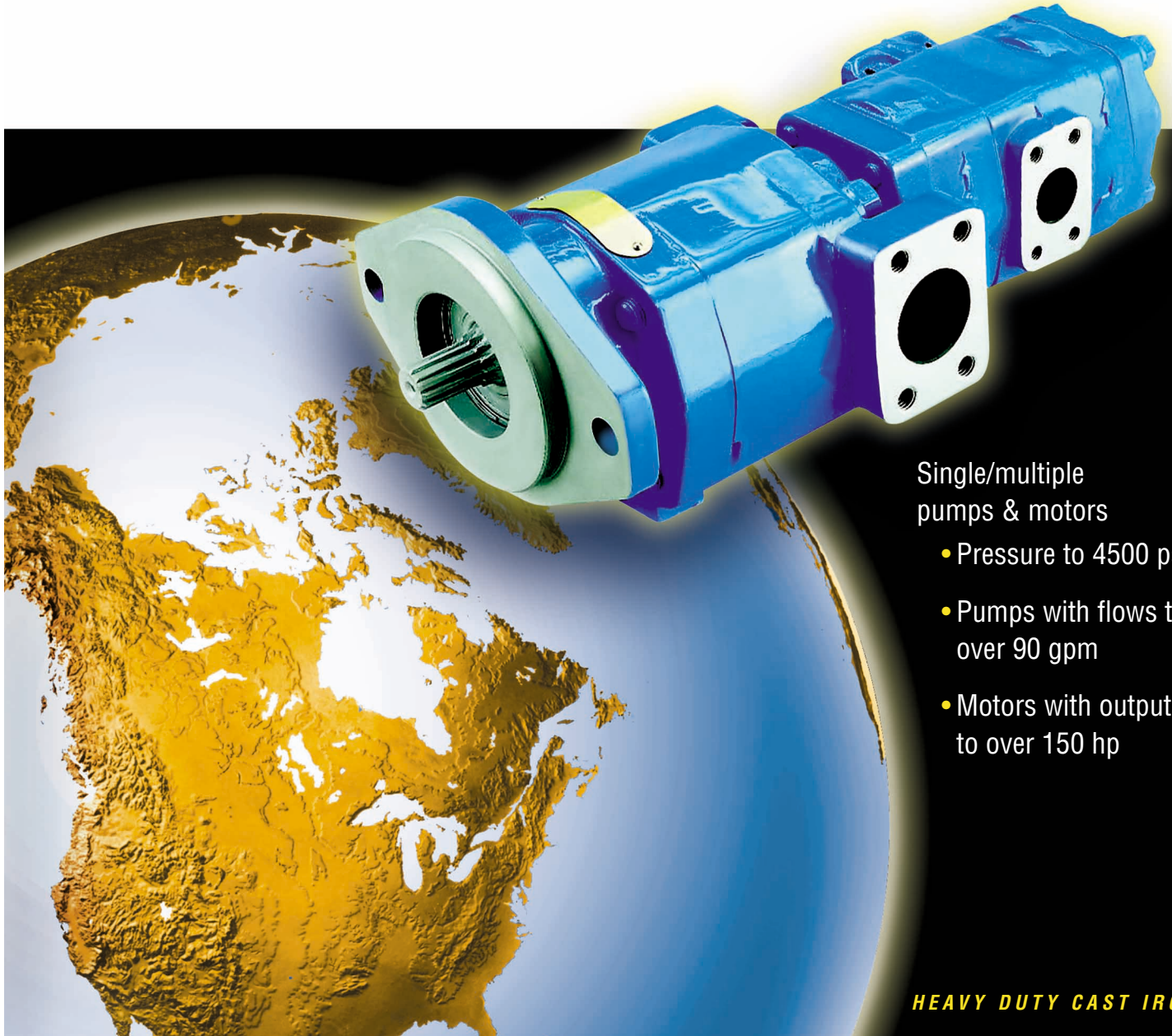
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Catalog HY09-030/US,
5M, 01/03, T&M

PGP/PGM Bushing Design

300/400 Series

Catalog HY09-0300/US



Single/multiple
pumps & motors

- Pressure to 4500 psi
- Pumps with flows to over 90 gpm
- Motors with outputs to over 150 hp

HEAVY DUTY CAST IRON

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General Information

300 Series Pumps & Motors

- Three-piece cast iron construction
- Low friction bushing design
- Heavy-duty application
- Single, multiple, piggyback and thru-drive assemblies

The 300 Series pumps and motors set the standard for superior performance and reliability in heavy-duty hydraulic application. The three-piece cast iron construction with large area, low-friction bushings provide strength, high efficiency, and long life in severe operating environments. The design includes an advanced thrust plate and seal configuration, which optimizes performance even in high temperature and low viscosity conditions.

300 Series pumps are available in single, multiple, piggyback, and thru-drive assemblies. Multiple pumps reduce mounting costs, allow for a small package size and common inlet capabilities. Assemblies up to six pumping sections are available. Piggyback pumps allow the combination of pump sections of different frame size to use a common inlet in tandem configuration. The thru-drive feature allows an independent piston or gear pump to be mounted to a rear SAE drive pad. Multiple section motors are also available providing enhanced torque and speed control as well as smooth torque ripple.

Relief valve, priority valve, load-sense unloading, and other integrated or bolt-on valve options are also available.

Model P = Pump M = Motor Options D = Stealth	Theoretical Displacement in ³ /r - cm ³ /r		Mineral Oil Maximum Pressure			
			Continuous psi - bar		Intermittent psi - bar	
P315 M315	.620	10.2	3500	245	4000	275
	.775	12.7	3500	245	4000	275
	.930	15.2	3500	245	4000	275
	1.09	17.8	3500	245	4000	275
	1.24	20.3	3500	245	4000	275
	1.40	22.9	3500	245	4000	275
	1.55	25.9	3500	245	3850	265
	1.71	27.9	3500	245	3700	255
	1.86	30.5	3300	225	3500	245
	2.02	33.0	3100	215	3350	230
	2.17	35.6	2900	200	3100	215
	2.33	38.1	2700	190	2950	205
2.48	40.6	2500	175	2750	190	
P330 M330	.985	16.1	3500	245	4000	275
	1.47	24.2	3500	245	4000	275
	1.97	32.3	3500	245	4000	275
	2.46	40.4	3500	245	4000	275
	2.95	48.4	3500	245	3850	265
	3.44	56.5	3250	225	3500	245
P350 M350	3.94	64.6	3000	210	3300	225
	1.28	20.9	3500	245	4000	275
	1.91	31.3	3500	245	4000	275
	2.55	41.8	3500	245	4000	275
	3.19	52.2	3500	245	4000	275
	3.82	62.7	3500	245	3850	265
	4.46	73.1	3250	225	3500	245
	5.10	83.6	3000	210	3300	225
P365 M365	5.73	94.0	2750	190	3000	210
	6.38	104.5	2500	175	2750	190
	2.70	44.3	3500	245	4000	275
	3.60	59.0	3500	245	4000	275
	4.50	73.8	3500	245	4000	275
	5.40	88.5	3500	245	4000	275
	6.30	103.3	3500	245	4000	275
	7.20	118.0	3500	245	3850	265
	8.10	132.8	3250	225	3500	245
	9.00	147.5	3000	210	3300	225

PL Factor

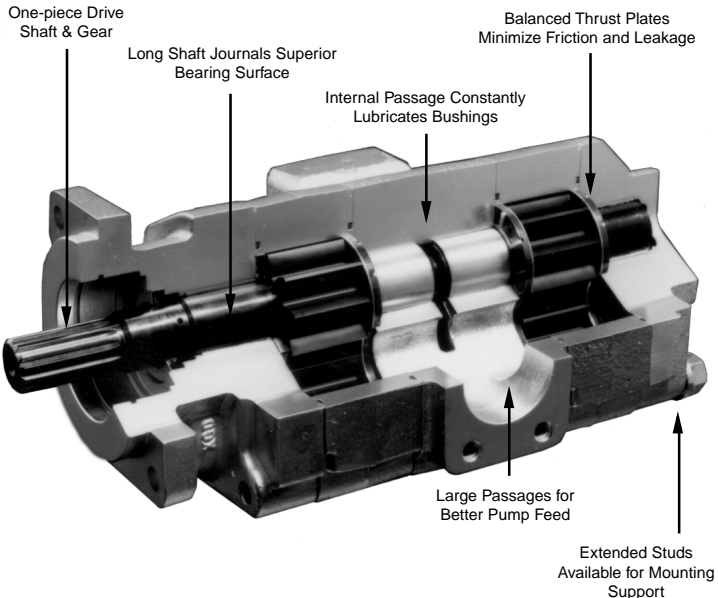
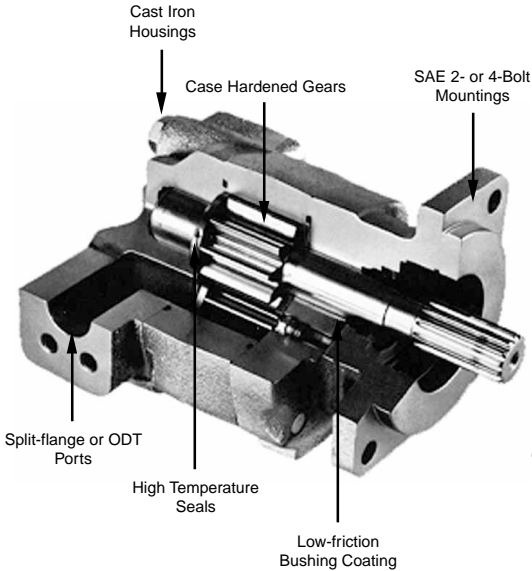
Each section of a multiple pump or motor should be regarded as a single unit with corresponding delivery and power input requirements. Since the entire input horsepower is fed through a common drive shaft, the power delivered to or from the unit is limited by the physical strength of the shaft. This limit is defined as a "PL" factor; "P" being the operating pressure and "L" the summation of gear widths.

In multiple units the "PL" must be calculated for the first connecting shaft as well as the drive shaft. Each style or type of shaft has a unique "PL" factor as noted in the table to the right.

Pressure X Total Gear Width = PL

PL MUST NOT EXCEED NUMBER SHOWN IN CHART FOR APPROPRIATE SHAFT.

PL Chart		
Shaft Style	Integral Shaft & Gear	Two-Piece Style
315		
SAE "A" Spline <i>(up to 1.25" GW)</i>	4,450	--
SAE "A" Key	3,600	--
SAE "B" Spline	13,400	--
SAE "B" Key	9,900	--
Connecting Shaft	--	5,550
330		
SAE "B" Spline	8,450	6,250
SAE "B" Key	6,250	6,250
SAE "B-B" Spline	13,000	6,250
SAE "B-B" Key	9,300	6,250
SAE "C" Spline	--	6,250
SAE "C" Key	--	6,250
Connecting Shaft	--	6,250
350		
SAE "B" Spline	6,450	4,500
SAE "B" Key	4,750	4,750
SAE "B-B" Spline	9,900	9,000
SAE "B-B" Key	7,100	7,100
SAE "C" Spline	19,100	9,000
SAE "C" Key	13,900	9,000
Connecting Shaft	--	9,000
365		
SAE "B" Spline	5,050	3,500
SAE "B" Key	3,700	3,700
SAE "B-B" Spline	7,750	5,350
SAE "B-B" Key	5,550	5,550
SAE "C" Spline	14,900	11,950
SAE "C" Key	10,800	10,800
Connecting Shaft	--	11,950



General Data

Pump Type

Heavy duty, cast iron, external gear pump

Mounting

SAE standard flanges, ZF, others

Porting

SAE split flanges and other types of threaded ports (see table page 7)

Shaft Style

SAE splined, keyed, and others (see table page 7)

Drive

Clockwise, counterclockwise, double. Direct drive with flexible coupling is recommended. Pumps subject to radial loads must be specified with an outboard bearing. Axial loading is not allowed.

Speed

From 400 to 3000 rev/min

Theoretical displacements

(See table page 4)

Maximum radial loads with outboard bearing

315 3200 N (only SEC - 90)
330 3500 N
350 5000 N
365 6500 N

Inlet pressure

30 psi/0,8 to 2,0 bar absolute at operating temperature

Outlet pressure

(See table page 4)

Hydraulic fluids

Mineral oil, fire resistant fluids:

- water-oil emulsions 60/40, HFB
- water-glycol, HFC
- phosphate-esters, HFD

Fluid temperature

Mineral oil with standard seals:

0° to 180° F (-20° C to +80° C)

Fire resistant fluids HFB, HFC

0° to 150° F (-20° C to +65° C)

Fluid velocity

From 7.5 to 1600 cSt (50 to 7500 sus)

Recommended 15 to 75 cSt

Filtration

ISO 4406 code:

- 19/16 at 2000 psi/ 140 bar
- 17/14 at 3000 psi/ 210 bar
- 15/12 at 4000 psi/ 275 bar

Flow velocity

Mineral oil and HFD:

- Inlet up to 8 fps/ 2.5 m/s
 - Outlet up to 18 fps/ 6,0 m/s
- Fire resistant fluids HFB, HFC
- Inlet up to 5 fps/ 1.5 m/s
 - Outlet up to 13 fps/ 4.0 m/s

Multiple pump assemblies

Up to 6 gear sections of the same model, even with different gear widths

Piggyback assemblies

Several models can be mounted together, one at the rear of the other. Fluids will intermix even with separate reservoirs: 300/315, 350/315, 365/330, 365/330/315

Add-a-pump assemblies

Similar to piggyback, but fluids are not intermixed. 330/AI (AI: aluminum pumps)
350/AI, 350/330, 350/350, 365/AI, 365/330, 365/350

Pumps with priority outlet

Available for models 315, 330, 350

- For operation outside given parameters, please consult the representative in your area.
- The smallest gear width of each model is not recommended for single units at the maximum rated pressure
- Theoretical displacement is equal to the theoretical flow at 1000 rev/min.

Porting

SAE Flanged Ports Metric Thread (SSM)

Port Size		A mm	B mm	C mm	D mm
inch	mm				
0.50	12.7	17.5	38.1	M 8x1.25	23.9
0.75	19.1	22.2	47.6	M 10x1.50	22.4
1.00	25.4	26.2	52.2	M 10x1.50	22.4
1.25	31.8	30.2	58.7	M 10x1.50	28.4
1.50	36.1	35.7	69.9	M 12x1.75	26.9
2.00	50.8	42.9	77.8	M 12x1.75	26.9
2.50	63.5	50.8	88.9	M 12x1.75	30.2

SAE Flanged Ports UNC Thread (SSS)

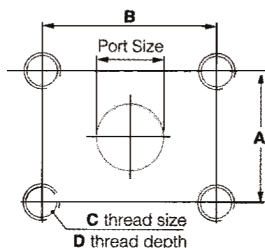
Port Size		B mm	C mm	D mm
inch	mm			
0.50	12.7	17.5	5/16"-18	23.9
0.75	19.1	22.2	3/8"-16	22.4
1.00	25.4	26.2	3/8"-16	22.4
1.25	31.8	30.2	7/16"-14	28.4
1.50	36.1	35.7	1/2"-13	26.9
2.00	50.8	42.9	1/2"-13	26.9
2.50	63.5	50.8	1/2"-13	30.2

British Standard Pipe Parallel (BSPP)

BSPP	A mm	B mm	C mm	D mm
0.50"-14	19.00	34.0	2.5	14.0
0.75"-14	24.50	40.0	2.5	16.0
1.00"-11	30.75	50.0	2.5	18.0
1.25"-11	39.50	58.0	2.5	20.0
1.50"-11	45.25	64.0	2.5	22.0
2.00"-11	56.25	78.0	3.0	24.0

SAE Straight Thread (ODT)

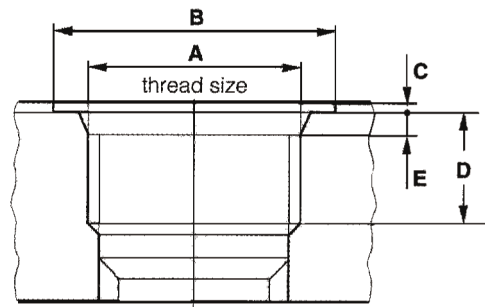
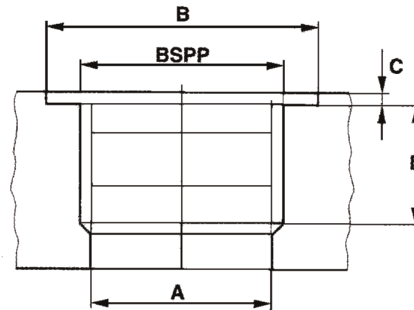
ODT	A UNF	B mm	C mm	D mm	E mm
1/2"	3/4"-16	14.3	30.2	2.4	2.55
5/8"	7/8"-14	16.7	34.1	2.4	2.55
3/4"	1-1/16"-12	19.1	41.3	2.4	3.30
7/8"	1-3/16"-12	19.1	44.8	2.4	3.30
1"	1-5/16"-12	19.1	48.5	2.4	3.30
1-1/4"	1-5/8"-12	19.1	57.7	2.4	3.35
1-1/2"	1-7/8"-12	19.1	65.0	2.4	3.35
2"	2-1/2"-12	19.1	88.4	2.4	3.35



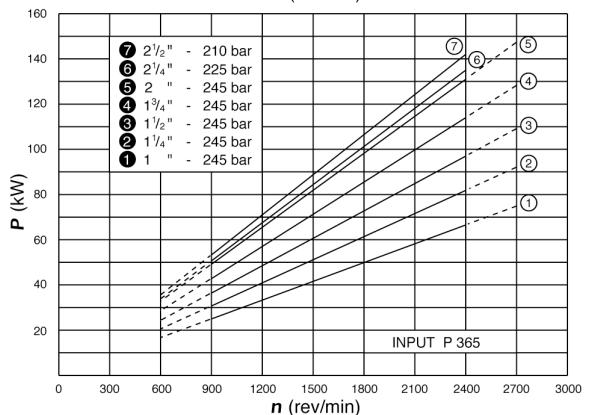
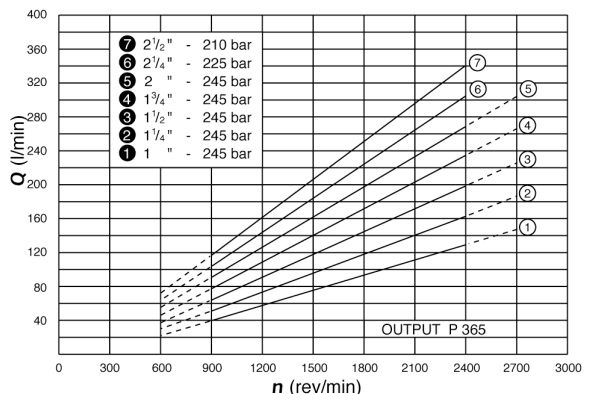
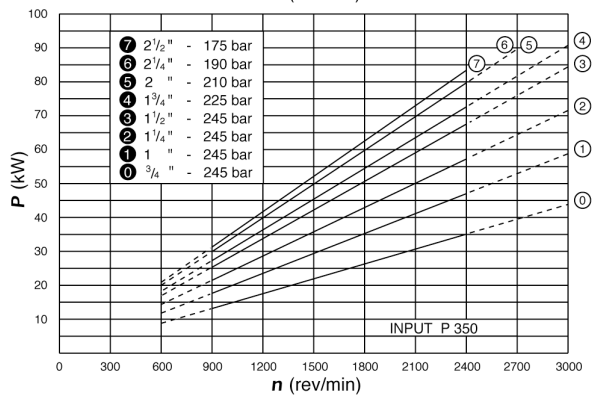
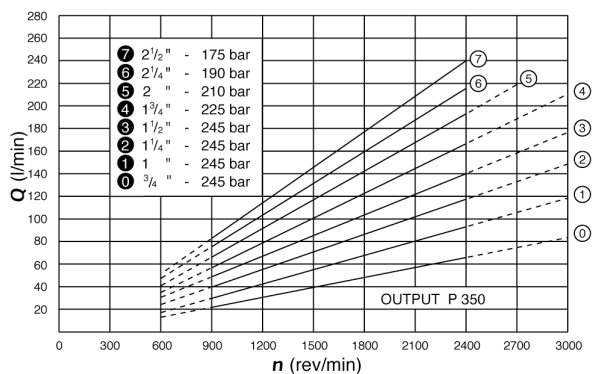
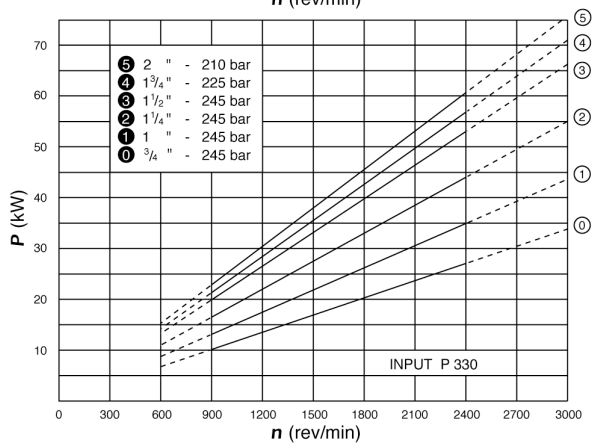
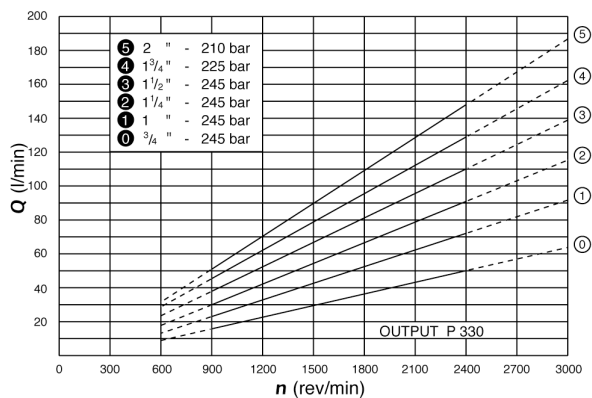
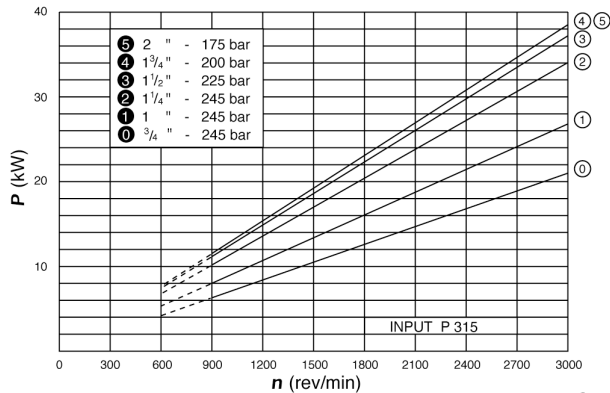
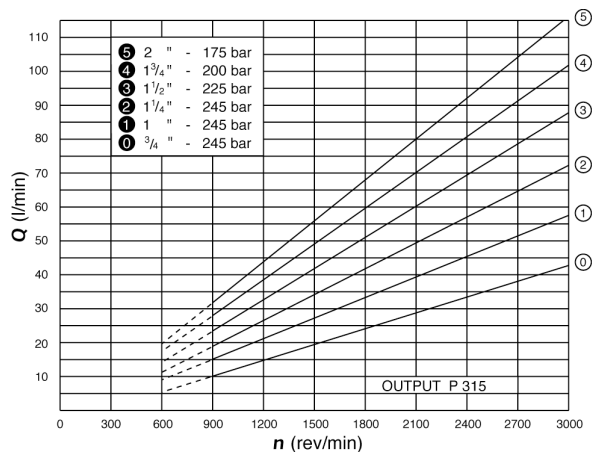
Drive Shaft

Maximum Input Torque

Shaft Style	• integral ; • 2 pieces: 2	315	330	350	365
		lb-ft Nm	lb-ft Nm	lb-ft Nm	lb-ft Nm
SAE A	splined - 9 teeth	80 109	-	-	-
	keyed	62 84	-	-	-
SAE B	splined - 13 teeth	242 328	242 328	242 328	242 328
	keyed	167 226	167 226	167 226	167 226
SAE BB	splined - 15 teeth	-	371 503	371 503	371 503
	keyed	-	250 339	250 339	250 339
SAE C	splined - 14 teeth	-	-	708 960	708 960
	keyed	-	-	500 678	500 678
DIN 5462 B8 x 32 x 36		2	-	159 215	300 407
DIN 254 taper 1:5		;	55 74	-	-
Connecting Shaft			90 122	159 215	300 407



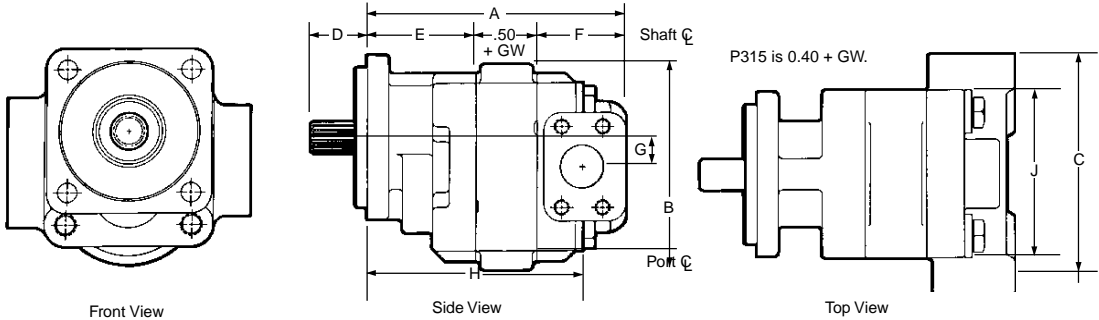
Performance Curves 315 - 330 - 350 - 365



Dimensional Data

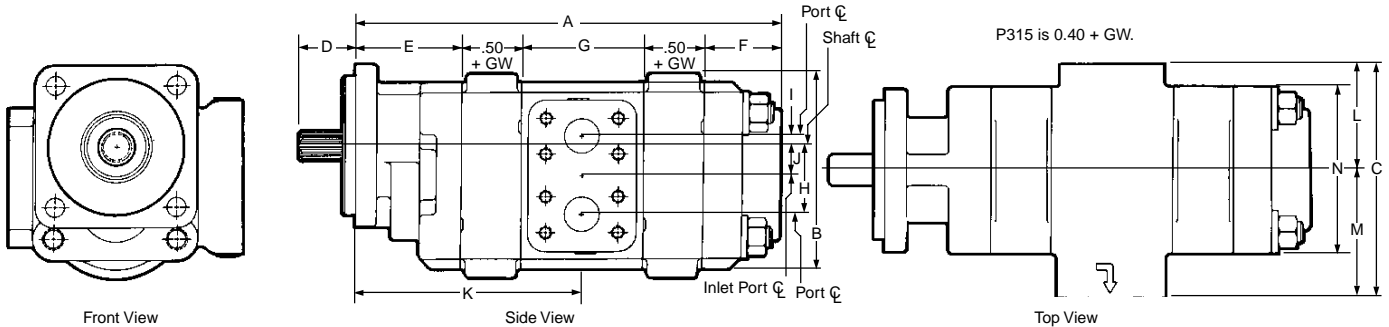
Single Pumps & Motors

Model	Dimensions Inches/mm									
	A	B	C**	D*	E	F	G	H	J(P)	J(M)
315	4.27+GW	4.75	4.25	1.62	1.88	2.00	.75	3.27+GW	4.0	4.19
	108.5+GW	120.7	108.0	41.1	47.8	50.8	19.1	83.1+GW	101.6	106.4
330	6.19+GW	5.88	6.88	1.62	3.12	2.56	.88	4.94+GW	4.81	5.00
	157.2+GW	149.4	174.8	41.1	79.2	65.0	22.2	125.5+GW	122.2	127.0
350	7.06+GW	6.00	7.12	2.19	3.50	3.06	1.00	5.56+GW	5.75	5.75
	179.3+GW	152.4	108.8	55.6	88.9	77.7	25.4	141.2+GW	146.1	146.1
365	7.31+GW	7.25	7.38	2.19	3.75	3.06	1.12	5.81+GW	6.25	6.25
	185.7+GW	184.2	187.5	55.6	95.3	77.7	28.6	147.6+GW	158.8	158.8



Tandem Pumps & Motors

Model	Dimensions Inches/mm														
	A	B	C**	D*	E	F	G	H	I	J	K	L**	M**	N(P)	N(M)
315	7.05+T.GW	4.75	5.00	1.62	1.88	1.75	2.62	1.84	.34	.75	3.59+GW	2.25	2.75	4.0	4.19
	179.1+T.GW	120.7	127.0	41.1	47.8	44.5	66.5	46.7	8.6	19.1	91.2+GW	57.2	69.9	101.6	106.4
330	9.88+T.GW	5.88	6.78	1.62	3.12	2.25	3.50	2.38	.62	.88	5.38+GW	3.09	3.69	4.81	5.00
	250.9+T.GW	149.4	172.2	41.1	79.2	57.2	88.9	60.5	15.7	22.2	136.7+GW	78.5	93.7	122.2	127.0
350	10.25+T.GW	6.00	7.69	2.19	3.50	2.25	3.50	2.50	.50	1.00	5.75+GW	3.56	4.12	5.75	5.75
	260.4+T.GW	152.4	195.3	55.6	88.9	57.2	88.9	63.5	12.7	25.4	146.1+GW	90.4	104.6	146.1	146.1
365	11.38+T.GW	7.25	8.38	2.19	3.75	2.62	4.00	2.88	.62	1.12	6.25+GW	3.69	4.69	6.25	6.25
	289.1+T.GW	184.2	212.9	55.6	95.3	66.5	101.6	73.3	15.7	28.6	158.8+GW	93.7	119.1	158.8	158.8



* This dimension will vary with type of drive shaft. ** This dimension will vary with type of ports. T=Total.

Weights

The following are the approximate weights of a single 1" gear section in each frame size:

- | | | | |
|-----------|---------|-----------|---------|
| 315 | 18 lbs. | 330 | 36 lbs. |
| 350 | 51 lbs. | 365 | 56 lbs. |
- For each additional 1/4" of gear width add:
- | | | | |
|-----------|------------|-----------|-------------|
| 315 | 1 lb. | 330 | 1- 1/4 lbs. |
| 350 | 1-1/2 lbs. | 365 | 2-1/2 lbs. |

To find the approximate weight of a multiple section assembly, add the weight of each section as a single. For the 330 frame size subtract 10% from this figure.

315 Pump Performance Data

speed rpm	output flow input power	Gear Widths						
		1/2"	3/4"	1"	1-1/4"	1-1/2"	1-3/4"	2"
900	GPM	2.0	3.2	4.4	5.5	6.7	7.9	9.0
	LPM	8	12	17	21	26	30	34
	HP	5	8	11	13	15	15	15
	kW	4	6	8	10	11	11	11
1200	GPM	2.8	4.4	6.0	7.6	9.2	10.7	12.2
	LPM	11	17	23	29	35	40	46
	HP	7	11	14	18	20	21	20
	kW	5	8	11	13	15	15	15
1500	GPM	3.6	5.6	7.7	9.6	11.6	13.5	15.4
	LPM	14	21	29	36	44	51	58
	HP	9	13	18	22	25	26	25
	kW	7	10	13	16	19	19	19
1800	GPM	4.4	6.8	9.3	11.6	14.0	16.3	18.6
	LPM	17	26	35	44	53	62	70
	HP	11	16	21	27	30	31	30
	kW	8	12	16	20	22	23	23
2100	GPM	5.2	8.1	10.9	13.6	16.4	19.1	21.8
	LPM	20	30	41	51	62	72	83
	HP	12	19	25	31	35	36	35
	kW	9	14	18	23	26	27	26
2400	GPM	6.0	9.3	12.5	15.6	18.8	21.9	25.1
	LPM	23	35	47	59	71	83	95
	HP	14	21	28	35	40	41	40
	kW	11	16	21	26	30	31	30
3000	GPM	7.7	11.7	15.7	19.6	23.7	27.6	31.5
	LPM	29	44	59	74	90	104	119
	HP	18	27	35	44	50	51	51
	kW	13	20	26	33	37	38	38

Performance data shown are the average results based on a series of laboratory tests of production units and are not necessarily representative of any one unit. Tests were run with the oil reservoir temperature at 120°F and viscosity 150 SUS at 100°F.

Note: Pump output flow is at the maximum rated pressure (see page 15).

315 Motor Performance Data

Speed RPM	Gear Widths									
	1" 3500 psi		1-1/4" 3500 psi		1-1/2" 3300 psi		1-3/4" 2900 psi		2" 2500 psi	
	A	B	A	B	A	B	A	B	A	B
900	7.1	665	8.3	830	9.6	940	10.9	965	12.2	950
	27	75.1	32	93.8	37	106.2	41	109.0	46	107.3
1200	8.8	665	10.5	830	12.2	940	13.8	965	15.5	950
	33	75.1	40	93.8	46	106.2	52	109.0	59	107.3
1500	10.6	660	12.6	825	14.7	935	16.7	955	18.8	945
	40	74.6	48	93.2	56	105.6	63	107.9	71	106.8
1800	12.3	655	14.7	820	17.2	930	19.6	950	22.1	940
	46	74.0	56	92.6	65	105.1	74	107.3	84	106.2
2100	14.0	655	16.8	820	19.7	930	22.5	950	25.4	940
	53	74.0	64	92.6	75	105.1	85	107.3	96	106.2
2400	15.7	640	18.9	800	22.2	910	25.4	930	28.8	920
	59	72.3	72	90.4	84	102.8	96	105.1	109	103.9
3000	19.0	640	23.0	800	27.2	905	31.2	925	35.3	915
	72	72.3	87	90.4	103	102.3	118	104.5	134	103.4

A: Input Flow GPM/LPM; B: Output Torque IN/LBS/Nm

Note: In accordance with our policy of continuing product development, we reserve the right to change specifications shown in this catalog without notice.

330 Pump Performance Data

speed rpm	output flow input power	Gear Widths						
		1/2"	3/4"	1"	1-1/4"	1-1/2"	1-3/4"	2"
900	GPM	3.2	5.1	7.0	8.8	10.6	12.4	14.3
	LPM	12	19	26	33	40	47	54
	HP	9	13	17	21	26	28	29
	kW	6	10	13	16	19	21	22
1200	GPM	4.5	7.0	9.5	12.0	14.5	16.9	19.4
	LPM	17	26	36	45	55	64	73
	HP	11	17	23	28	34	37	39
	kW	8	13	17	21	25	28	29
1500	GPM	5.8	8.9	12.1	15.2	18.3	21.4	24.5
	LPM	22	34	46	57	69	81	93
	HP	14	21	28	35	43	46	49
	kW	11	16	21	26	32	34	36
1800	GPM	7.1	10.8	14.7	18.4	22.1	25.9	29.6
	LPM	27	41	55	70	84	98	112
	HP	17	26	34	43	51	55	58
	kW	13	19	25	32	38	41	44
2100	GPM	8.4	12.7	17.2	21.6	26.0	30.3	34.7
	LPM	32	48	65	82	98	115	131
	HP	20	30	40	50	60	65	68
	kW	15	22	30	37	44	48	51
2400	GPM	9.6	14.7	19.8	24.8	29.8	34.8	39.8
	LPM	36	55	75	94	113	132	151
	HP	23	34	45	57	68	74	78
	kW	17	25	34	42	51	55	58
3000	GPM	12.2	18.5	24.9	31.2	37.5	43.8	50.1
	LPM	46	70	94	118	142	166	190
	HP	28	43	57	71	85	92	97
	kW	21	32	42	53	64	69	73

Performance data shown are the average results based on a series of laboratory tests of production units and are not necessarily representative of any one unit. Tests were run with the oil reservoir temperature at 120°F and viscosity 150 SUS at 100°F.

Note: Pump output flow is at the maximum rated pressure (see page 16).

330 Motor Performance Data

Speed RPM	Gear Widths									
	1" 3500 psi		1-1/4" 3500 psi		1-1/2" 3500 psi		1-3/4" 3250 psi		2" 3000 psi	
	A	B	A	B	A	B	A	B	A	B
900	10.1	1010	12.3	1270	14.5	1530	16.7	1665	19.0	1770
	38	114.1	47	143.5	55	172.9	63	188.1	72	200.0
1200	12.8	1005	15.7	1265	18.6	1525	21.4	1660	24.3	1760
	49	113.6	59	142.9	70	172.3	81	187.6	92	198.9
1500	15.6	1000	19.1	1255	22.6	1515	26.1	1650	29.6	1750
	59	113.0	72	141.8	85	171.2	99	186.4	112	197.7
1800	18.4	995	22.5	1250	26.6	1505	30.8	1640	34.9	1740
	69	112.4	85	141.2	101	170.0	116	185.3	132	196.6
2100	21.1	990	25.9	1240	30.7	1495	35.4	1625	40.2	1720
	80	111.9	98	140.1	116	168.9	134	183.6	152	194.3
2400	23.9	985	29.3	1235	34.7	1480	40.1	1605	45.5	1695
	90	111.3	111	139.5	131	167.2	152	181.3	172	191.5
3000	29.2	980	35.9	1230	42.6	1475	49.3	1595	56.0	1685
	110	110.7	136	139.0	161	166.7	186	180.2	212	190.4

A: Input Flow GPM/LPM; B: Output Torque IN/LBS/Nm

Note: In accordance with our policy of continuing product development, we reserve the right to change specifications shown in this catalog without notice.

350 Pump Performance Data

speed rpm	output flow input power	Gear Widths								
		1/2"	3/4"	1"	1-1/4"	1-1/2"	1-3/4"	2"	2-1/4"	2-1/2"
900	GPM	4.0	6.4	8.8	11.2	13.7	16.1	18.6	21.0	23.4
	LPM	15	24	33	42	52	61	70	79	89
	HP	11	17	22	28	33	36	38	39	40
	kW	8	12	17	21	25	27	28	29	30
1200	GPM	5.6	8.8	12.1	15.4	18.7	21.9	25.2	28.4	31.7
	LPM	21	33	46	58	71	83	95	108	120
	HP	15	22	30	37	44	48	51	52	53
	kW	11	17	22	28	33	36	38	39	39
1500	GPM	7.3	11.3	15.5	19.5	23.6	27.7	31.8	35.9	40.0
	LPM	28	43	59	74	89	105	120	136	151
	HP	18	28	37	46	55	60	63	65	66
	kW	14	21	28	34	41	45	47	49	49
1800	GPM	8.9	13.8	18.8	23.6	28.6	33.5	38.4	43.3	48.3
	LPM	34	52	71	89	108	127	145	164	183
	HP	22	33	44	55	67	72	76	78	79
	kW	17	25	33	41	50	54	57	58	59
2100	GPM	10.6	16.3	22.1	27.8	33.6	39.3	45.1	50.8	56.6
	LPM	40	62	84	105	127	149	171	192	214
	HP	26	39	52	65	78	84	89	91	92
	kW	19	29	39	48	58	63	66	68	69
2400	GPM	12.2	18.8	25.4	31.9	38.5	45.1	51.7	58.2	64.8
	LPM	46	71	96	121	146	171	196	220	245
	HP	30	44	59	74	89	96	101	105	106
	kW	22	33	44	55	66	72	76	78	79

Performance data shown are the average results based on a series of laboratory tests of production units and are not necessarily representative of any one unit. Tests were run with the oil reservoir temperature at 120°F and viscosity 150 SUS at 100°F.

Note: Pump output flow is at the maximum rated pressure (see page 18).

350 Motor Performance Data

Speed RPM	Gear Widths													
	1"		1-1/4"		1-1/2"		1-3/4"		2"		2-1/4"		2-1/2"	
	3500 psi A	3500 psi B	3500 psi A	3500 psi B	3500 psi A	3500 psi B	3250 psi A	3250 psi B	3000 psi A	3000 psi B	2750 psi A	2750 psi B	2500 psi A	2500 psi B
900	13.4	1320	16.0	1670	18.6	2025	21.2	2225	23.8	2350	26.4	2425	28.9	2450
	51	149.1	61	188.7	70	228.8	80	251.4	90	265.5	100	274.0	110	276.8
1200	16.9	1315	20.4	1660	23.8	2015	27.2	2215	30.6	2340	34.0	2410	37.4	2435
	64	148.6	77	187.6	90	227.7	103	250.3	116	264.4	129	272.3	142	275.1
1500	20.5	1300	24.7	1640	28.9	1990	33.2	2195	37.4	2315	41.7	2385	45.9	2410
	77	146.9	93	185.3	110	224.8	126	248.0	142	261.6	158	269.5	174	272.3
1800	24.0	1295	29.0	1635	34.1	1980	39.2	2180	44.2	2300	49.3	2375	54.4	2395
	91	146.3	110	184.7	129	223.7	148	246.3	167	259.9	187	268.3	206	270.6
2100	27.5	1285	33.4	1620	39.3	1965	45.2	2165	51.1	2285	57.0	2355	62.9	2380
	104	145.2	126	183.0	149	222.0	171	244.6	193	258.2	216	266.1	238	268.9
2400	31.0	1265	37.7	1600	44.4	1940	51.2	2135	57.9	2255	64.6	2325	71.3	2350
	117	142.9	143	180.8	168	219.2	194	241.2	219	254.8	245	262.7	270	265.5

A: Input Flow GPM/LPM; B: Output Torque IN/LBS/Nm

Note: In accordance with our policy of continuing product development, we reserve the right to change specifications shown in this catalog without notice.

365 Pump Performance Data

speed rpm	output input	Gear Widths							
		3/4"	1"	1-1/4"	1-1/2"	1-3/4"	2"	2-1/4"	2-1/2"
900	GPM	8.0	11.5	14.9	18.4	21.8	25.4	28.8	32.3
	LPM	30	44	57	70	83	96	109	122
	HP	24	31	39	47	55	63	66	67
	kW	18	23	29	35	41	47	49	50
1200	GPM	11.5	16.2	20.8	25.5	30.0	34.7	39.3	44.0
	LPM	44	61	79	96	114	131	149	166
	HP	31	42	52	63	73	84	88	90
	kW	23	31	39	47	55	63	65	67
1500	GPM	15.0	20.9	26.6	32.5	38.2	44.1	49.8	55.6
	LPM	57	79	101	123	145	167	188	211
	HP	39	52	66	79	92	105	110	112
	kW	29	39	49	59	68	78	82	84
1800	GPM	18.5	25.6	32.5	39.5	46.4	53.4	60.3	67.3
	LPM	70	97	123	149	176	202	228	255
	HP	47	63	79	94	110	126	131	135
	kW	35	47	59	70	82	94	98	101
2100	GPM	22.0	30.2	38.3	46.5	54.6	62.8	70.8	79.0
	LPM	83	114	145	176	207	238	268	299
	HP	55	73	92	110	128	147	153	157
	kW	41	55	68	82	96	110	114	117
2400	GPM	25.6	34.9	44.2	53.5	62.8	72.1	81.4	90.7
	LPM	97	132	167	203	238	273	308	343
	HP	63	84	105	126	147	168	175	180
	kW	47	63	78	94	110	125	131	134

Performance data shown are the average results based on a series of laboratory tests of production units and are not necessarily representative of any one unit. Tests were run with the oil reservoir temperature at 120°F and viscosity 150 SUS at 100°F.

Note: Pump output flow is at the maximum rated pressure (see page 20).

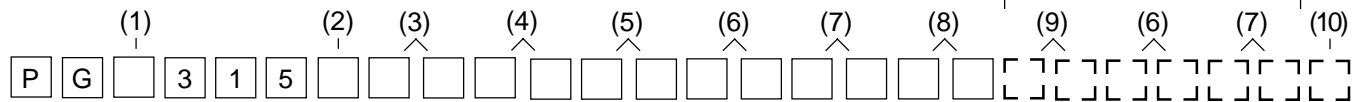
365 Motor Performance Data

Speed RPM	Gear Widths													
	1"		1-1/4"		1-1/2"		1-3/4"		2"		2-1/4"		2-1/2"	
	3500 psi A	3500 psi B	3500 psi A	3500 psi B	3500 psi A	3500 psi B	3500 psi A	3500 psi B	3500 psi A	3500 psi B	3250 psi A	3250 psi B	3000 psi A	3000 psi B
900	18.4	1865	22.0	2355	25.6	2860	29.2	3370	32.9	3850	36.5	4020	40.1	4125
	70	210.7	83	266.1	97	323.1	111	380.8	124	435.0	138	454.2	152	466.1
1200	23.3	1845	28.1	2330	32.9	2830	37.6	3335	42.4	3810	47.2	3980	52.0	4080
	88	208.5	106	263.3	124	319.7	142	376.8	160	430.5	179	449.7	197	461.0
1500	28.2	1815	34.1	2295	40.1	2780	46.0	3280	52.0	3750	57.9	3915	63.8	4020
	107	205.1	129	259.3	152	314.1	174	370.6	197	423.7	219	442.3	242	454.2
1800	33.1	1805	40.2	2280	47.3	2765	54.4	3265	61.5	3730	68.6	3895	75.7	3995
	125	203.9	152	257.6	179	312.4	206	368.9	233	421.4	260	440.1	287	451.4
2100	37.9	1755	46.2	2220	54.4	2690	62.8	3160	71.1	3610	79.3	3770	87.6	3865
	144	198.3	175	250.8	206	303.9	238	357.0	269	407.9	300	426.0	332	436.7
2400	42.8	1705	52.3	2155	61.7	2615	71.2	3055	80.6	3490	90.1	3645	99.5	3740
	162	192.6	198	243.5	234	295.5	269	345.2	305	394.3	341	411.8	377	422.6

A: Input Flow GPM/LPM; B: Output Torque IN/LBS/Nm

Note: In accordance with our policy of continuing product development, we reserve the right to change specifications shown in this catalog without notice.

315 Series Coding



Pump/Motor (1)

P	Pump
M	Motor (no tandem motors available)

Unit (2)

A	Single Unit
B	Tandem Unit (flush studs)
L	Unit with Extended Studs

Shaft End Cover (3)

1	Pump, cw w/o O.B. bearing
2	Pump, ccw w/o O.B. bearing
4	Pump, cw with O.B. bearing (Code 490 Only)
5	Pump, ccw with O.B. bearing (Code 590 Only)
9	Motor, bi-rot w/o O.B. bearing + 1/4" ODT drain

Shaft End Cover (4)

90	4 bolt 72x100mm 80mm pilot
93	SAE "A" 2 bolt
95	Pad Mount for Clutch
96	SAE "B" 2 bolt

Port End Cover (5) (Side Ported)

IN	OUT	CW	CCW	IN	OUT	CW	CCW
•	•	•	•	•	•	•	•
SAE Split Flange (pump)				OD Tube Porting (pump)			
1"	3/4"	EJ	JE	1-1/4"	1"	FB	BF
1"	1/2"	EK	KE	1-1/4"	7/8"	FC	CF
3/4"	3/4"	EL	LE	1-1/4"	3/4"	FG	GF
3/4"	1/2"	EM	ME	1-1/4"	5/8"	FJ	JF
1"	-	OE	EO	1"	1"	FL	LF
3/4"	-	OF	FO	1"	7/8"	FV	VF
-	3/4"	OJ	JO	1"	3/4"	FW	WF
-	1/2"	OL	LO	1"	5/8"	FX	XF
				7/8"	7/8"	FY	YF
				7/8"	3/4"	FZ	ZF
				7/8"	5/8"	BC	CB
				7/8"	1/2"	BG	GB
				3/4"	3/4"	BJ	JB
				3/4"	5/8"	BL	LB
				3/4"	1/2"	BN	NB
				1 1/4"	-	BV	VB
				1"	-	BW	WB
				7/8"	-	BX	XB
				3/4"	-	BY	YB
				-	1"	BZ	ZB
				-	7/8"	PD	DP
				-	3/4"	PE	EP
				-	5/8"	PM	MP
				-	1/2"	PN	NP

SAE Split Flange (motor)

1"	1"	DR -Double
3/4"	3/4"	DS -Double

National Pipe Thread (pump)

1-1/4"	1"	AJ	JA
1-1/4"	3/4"	AK	KA
1"	1"	AL	LA
1"	3/4"	AM	MA
3/4"	3/4"	AR	RA

National Pipe Thread (motor)

1"	1"	DM -Double
3/4"	3/4"	DN -Double
1/2"	1/2"	DQ -Double

Unported (pump)

BI	Unported
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OD Tube Porting (motor)

1"	1"	VN -Double
3/4"	3/4"	VR -Double
1/2"	1/2"	VQ -Double

(Side Ported) continued

IN	OUT	CW	CCW
•	•	•	•
BSPP Porting (pump)			
1-1/4"	1"	FN	NF
1-1/4"	7/8"	FP	PF
1-1/4"	3/4"	FR	RF
1"	1"	FS	SF
1"	7/8"	FT	TF
1"	3/4"	BP	PB
7/8"	7/8"	BQ	QB
7/8"	3/4"	BR	RB
7/8"	1/2"	BT	TB
3/4"	3/4"	BU	UB
3/4"	1/2"	PQ	QP
1-1/4"	-	PR	RP
1"	-	PS	SP
7/8"	-	PT	TP
3/4"	-	PV	VP
-	1"	PW	WP
-	7/8"	PX	XP
-	3/4"	PY	YP
-	1/2"	PZ	ZP

IN OUT CW CCW

IN	OUT	CW	CCW
•	•	•	•
BSPP Porting (motor)			
1"	1"	VY -Double	
3/4"	3/4"	VZ -Double	
1/2"	1/2"	VV -Double	
Metric Split Flange (pump)			
1"	3/4"	EV	VE
1"	1/2"	EW	WE
3/4"	3/4"	EX	XE
3/4"	1/2"	EY	YE
1"	0"	OP	PO
3/4"	0"	OR	RO
0"	3/4"	OT	TO
0"	1/2"	OV	VO
Metric Split Flange (motor)			
1"	1"	DV -Double	
3/4"	3/4"	DW -Double	

(Rear Ported)

IN	OUT	CW	CCW
•	•	•	•
OD Tube Porting (pump)			
1-1/4"	1"	UC	CU
1-1/4"	7/8"	UF	FU
1-1/4"	3/4"	UN	NU
1"	1"	UD	DU
1"	7/8"	UP	PU
1"	3/4"	UQ	QU
1"	5/8"	UR	RU
7/8"	7/8"	LN	NL
7/8"	3/4"	LP	PL
7/8"	5/8"	LQ	QL
3/4"	3/4"	LR	RL
3/4"	5/8"	LS	SL
3/4"	1/2"	LT	TL

OD Tube Porting (motor)

1"	1"	RN -Double
3/4"	3/4"	RQ -Double
1/2"	1/2"	RS -Double

Gear Housing (6)

AB	Pump
EB	Motor

Gear Width (7)				
	Gear Width	in. ³ /rev.	cm ³ /rev.	Max Pressure
03	3/8"	.47	7.6	3500psi (241 bar)
05	1/2"	.62	10.2	3500psi (241 bar)
06	5/8"	.78	12.7	3500psi (241 bar)
07	3/4"	.93	15.2	3500psi (241 bar)
08	7/8"	1.09	17.8	3500psi (241 bar)
10	1"	1.24	20.3	3500psi (241 bar)
11	1-1/8"	1.40	22.9	3500psi (241 bar)
12	1-1/4"	1.55	25.4	3500psi (241 bar)
13	1-3/8"	1.71	27.9	3500psi (241 bar)
15	1-1/2"	1.86	30.5	3300psi (228 bar)
16	1-5/8"	2.02	33.0	3100psi (214 bar)
17	1-3/4"	2.17	35.6	2900psi (200 bar)
18	1-7/8"	2.33	38.1	2700psi (186 bar)
20	2"	2.48	40.6	2500psi (172 bar)

Shaft Type (8)

(For Single or Tandem Units -unless noted)

97	SAE "A" Keyed
96	SAE "A" Splined
66	SAE "B" Keyed
65	SAE "B" Splined
60	Tapered, M12 x 1.5 thd. 3x5 mm Keyed; 1:5 taper (90 SEC Only)
56	Clutch Pump Tapered, 5/16 - 24 thd. (internal), #6 Woodruff Keyed (single unit only); 1:4 taper

Bearing Carriers (9) (Dual Outlet - Pump Only)

Outlets: for clockwise porting the top port number comes first;
for counter-clockwise porting the bottom port number comes first.

IN	OUT	CW	CCW	IN	OUT	CW	CCW
•	•	•	•	•	•	•	•

SAE Split Flange

1-1/4"	3/4"	3/4"	CA	AC
1-1/4"	3/4"	1/2"	DA	AD
1-1/4"	1/2"	1/2"	EA	AE
1"	3/4"	3/4"	FA	AF
1"	3/4"	1/2"	GA	AG
1"	1/2"	1/2"	HA	AH

OD Tube Porting

1-1/2"	1"	1"	JG	GJ
1-1/2"	1"	7/8"	KG	GK
1-1/2"	7/8"	7/8"	LG	GL
1-1/2"	1"	3/4"	MG	GM
1-1/2"	3/4"	3/4"	NG	GN
1-1/4"	1"	1"	PG	GP
1-1/4"	1"	7/8"	QG	GQ
1-1/4"	7/8"	7/8"	RG	GR
1-1/4"	1"	3/4"	SG	GS
1-1/4"	3/4"	3/4"	TG	GT
1-1/4"	3/4"	5/8"	UG	GU
1-1/4"	3/4"	1/2"	VG	GV
1-1/4"	5/8"	5/8"	WG	GW
1-1/4"	1/2"	1/2"	XG	GX
1"	1"	1"	YG	GY
1"	1"	7/8"	ZG	GZ
1"	7/8"	7/8"	RC	CR
1"	1"	3/4"	SC	CS

OD Tubing (continued)

1"	3/4"	3/4"	TC	CT
1"	3/4"	5/8"	VC	CV
1"	3/4"	1/2"	WC	CW
1"	5/8"	5/8"	XC	CX
1"	1/2"	1/2"	YC	CY

Metric Split Flange

1-1/4"	3/4"	3/4"	BD	DB
1-1/4"	3/4"	1/2"	CD	DC
1-1/4"	1/2"	1/2"	ED	DE
1"	3/4"	3/4"	FD	DF
1"	3/4"	1/2"	GD	DG
1"	1/2"	1/2"	HD	DH

BSPP Porting

1-1/2"	1"	1"	HJ	JH
1-1/2"	1"	7/8"	KJ	JK
1-1/2"	7/8"	7/8"	LJ	JL
1-1/2"	1"	3/4"	MJ	JM
1-1/2"	3/4"	3/4"	NJ	JN
1-1/4"	1"	1"	PJ	JP
1 1/4"	1"	7/8"	QJ	JQ
1-1/4"	7/8"	7/8"	RJ	JR
1-1/4"	1"	3/4"	SJ	JS
1-1/4"	3/4"	3/4"	TJ	JT
1-1/4"	3/4"	1/2"	UJ	JU

(Dual Outlet) continued

IN	OUT	CW	CCW
•	•	•	•

BSPP Porting (continued)

1-1/4"	1/2"	1/2"	VJ	JV
1"	1"	1"	WJ	JW
1"	1"	7/8"	XJ	JX
1"	7/8"	7/8"	YJ	JY
1"	1"	3/4"	ZJ	JZ
1"	3/4"	3/4"	JD	DJ
1"	3/4"	1/2"	KD	DK
1"	1/2"	1/2"	LD	DL

(Single Outlet - Pump Only) Outlet for front section.

IN	OUT	CW	CCW
•	•	•	•

SAE Split Flange

1-1/4"	1-1/4"	CJ	JC
1-1/4"	1"	CL	LC
1-1/4"	3/4"	CM	MC
1-1/4"	1/2"	HB	BH
1"	1"	HC	CH
1"	3/4"	HF	FH
1"	1/2"	HL	LH
3/4"	3/4"	HM	MH
3/4"	1/2"	HN	NH

IN	OUT	CW	CCW
•	•	•	•

Metric Split Flange

1-1/4"	1-1/4"	CN	NC
1-1/4"	1"	CP	PC
1-1/4"	3/4"	CQ	QC
1-1/4"	1/2"	HR	RH
1"	1"	HS	SH
1"	3/4"	HT	TH
1"	1/2"	HU	UH
3/4"	3/4"	HV	VH
3/4"	1/2"	HW	WH

OD Tube Porting

1-1/2"	1-1/2"	KB	BK
1-1/2"	1-1/4"	KC	CK
1-1/2"	1"	KF	FK
1-1/2"	7/8"	KL	LK
1-1/2"	3/4"	KM	MK
1-1/4"	1-1/4"	KN	NK
1-1/4"	1"	KO	OK
1-1/4"	7/8"	KP	PK
1-1/4"	3/4"	KQ	QK
1-1/4"	5/8"	MB	BM
1-1/4"	1/2"	ML	LM
1"	1"	MN	NM
1"	7/8"	MQ	QM
1"	3/4"	MR	RM
1"	5/8"	MS	SM
1"	1/2"	MT	TM
3/4"	3/4"	MU	UM
3/4"	5/8"	MV	VM
3/4"	1/2"	MW	WM

BSPP Porting

1-1/2"	1-1/2"	KR	RK
1-1/2"	1-1/4"	KS	SK
1-1/2"	1"	KT	TK
1 1/2"	7/8"	KU	UK
1-1/2"	3/4"	KV	VK
1-1/4"	1-1/4"	KW	WK
1-1/4"	1"	KX	XK
1-1/4"	7/8"	KY	YK
1-1/4"	3/4"	KZ	ZK
1-1/4"	1/2"	HO	OH
1"	1"	HP	PH
1"	7/8"	HQ	QH
1"	3/4"	HX	XH
1"	1/2"	HY	YH
3/4"	3/4"	HZ	ZH
3/4"	1/2"	MX	XM

Common Inlet Passage

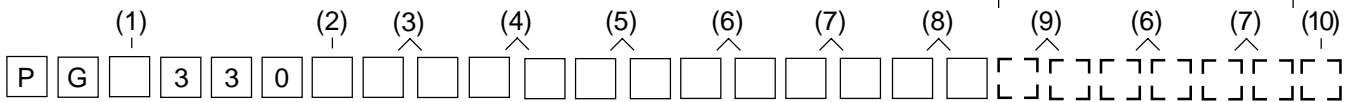
No Ports	C	D
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Connecting Shaft (10)

For connecting tandem units.

1 Connecting Shaft

330 Series Coding



Pump/Motor (1)

- P Pump
- M Motor

Unit (2)

- A Single Unit
- B Tandem Unit (flush studs)
- C Single or Tandem w. two-piece shaft (O.B. bearing required)
- L Unit with Extended Studs

Shaft End Cover (3)

- 1 Pump, cw w/o O.B. bearing
- 2 Pump, ccw w/o O.B. bearing
- 4 Pump, cw with O.B. bearing
- 5 Pump, ccw with O.B. bearing
- 8 Motor, bi-rot w/ O.B. bearing + 1/4" ODT drain
- 9 Motor, bi-rot w/o O.B. bearing + 1/4" ODT drain
- 18 Motor, bi-rot w/ O.B. bearing + 1/4" BSPP drain (78 only)
- 19 Motor, bi-rot w/o O.B. bearing + 1/4" BSPP drain (42 & 78 only)

Shaft End Cover (4)

- 42 SAE 4 bolt "B"
- 78 SAE 4 bolt "C"
- 97 SAE 2 bolt "B"

Port End Cover (5) (Side Ported)

IN	OUT	CW	CCW	IN	OUT	CW	CCW
•	•	•	•	•	•	•	•
SAE Split Flange (pump)				OD Tube Porting (motor)			
1-1/2"1-1/4"	EJ	JE		1 1/4"1 1/4"	VC-Double		
1-1/2" 1"	EK	KE		1" 1"	VN-Double		
1-1/4"1-1/4"	EL	LE		3/4" 3/4"	VR-Double		
1-1/4" 1"	EM	ME					
1" 1"	EN	NE					
1-1/2" -	OF	FO					
1-1/4" -	OG	GO					
1" -	OJ	JO					
- 1-1/4"	OM	MO					
- 1"	ON	NO					

SAE Split Flange (motor)

- 1-1/4"1-1/4" CS-Double
- 1" 1" CT-Double
- 3/4" 3/4" CV-Double

OD Tube Porting (pump)

- 1-1/4" 1" FJ JF
- 1" 1" FL LF
- 1-1/4" - BG GB
- 1" - BJ JB
- 1" BN NB

Unported (pump)

- BI Unported

Unported (motor)

- BA Unported

(Side Ported) continued

IN	OUT	CW	CCW	IN	OUT	CW	CCW
•	•	•	•	•	•	•	•
Metric Split Flange (motor)				BSPP Porting (pump)			
1-1/4"1-1/4"	CX-Double			1-1/4" 1"	FS	SF	
1" 1"	CY-Double			1" 1"	FT	TF	
3/4" 3/4"	CZ-Double			1-1/4" -	BQ	QB	
				1" -	BR	RB	
				- 1"	BU	UB	
Metric Straight Thread (motor)				BSPP Porting (motor)			
1-1/4"1-1/4"	VS-Double			1-1/4"1-1/4"	VX-Double		
1" 1"	VT-Double			1" 1"	VY-Double		
3/4" 3/4"	VW-Double			3/4" 3/4"	VZ-Double		

Gear Housing (6)

- AB Pump
- EB Motor

Gear Width (7)

Gear Width	in. ³ /rev.	cm ³ /rev.	Max Pressure
05 1/2"	.99	16.1	3500psi (241 bar)
07 3/4"	1.48	24.2	3500psi (241 bar)
10 1"	1.97	32.3	3500psi (241 bar)
12 1-1/4"	2.46	40.4	3500psi (241 bar)
15 1-1/2"	2.96	48.4	3500psi (241 bar)
17 1-3/4"	3.45	56.5	3250psi (224 bar)
20 2"	3.94	64.6	3000psi (207 bar)

Shaft Type (8)

(For Single, Tandem or Two-piece Shaft -unless noted)

- 07 SAE "C" Spline (two-piece only)
- 25 SAE "B" Spline
- 30 SAE "B" Keyed
- 98 SAE "BB" Splined
- 43 SAE "BB" Keyed

Bearing Carriers (9)
(Dual Outlet - Pump Only)

Outlets: for clockwise porting the top port number comes first;
for counter-clockwise porting the bottom port number comes first.

IN	OUT	CW	CCW	IN	OUT	CW	CCW
SAE Split Flange							
2"	1-1/4"	1-1/4"	AM	MA			
2"	1-1/4"	1"	AN	NA			
2"	1"	1"	AP	PA			
1-1/2"	1-1/4"	1-1/4"	AT	TA			
1-1/2"	1-1/4"	1"	AU	UA			
1-1/2"	1"	1"	AV	VA			
1-1/4"	1-1/4"	1-1/4"	AW	WA			
1-1/4"	1-1/4"	1"	AX	XA			
1-1/4"	1"	1"	AY	YA			
1"	1"	1"	AZ	ZA			
OD Tube Porting							
1-1/2"	1"	1"	GV	VG			
1-1/4"	1"	1"	GY	YG			
1"	1"	1"	GZ	ZG			

IN	OUT	CW	CCW	IN	OUT	CW	CCW
Metric Split Flange							
2"	1-1/4"	1-1/4"	DM	MD			
2"	1-1/4"	1"	DN	ND			
2"	1"	1"	DP	PD			
1-1/2"	1-1/4"	1-1/4"	DT	TD			
1-1/2"	1-1/4"	1"	DU	UD			
1-1/2"	1"	1"	DV	VD			
1-1/4"	1-1/4"	1-1/4"	DW	WD			
1-1/4"	1-1/4"	1"	DX	XD			
1"	1"	1"	DZ	ZD			

(Single Outlet - Pump Only)

Outlet is for front section.

IN	OUT	CW	CCW	IN	OUT	CW	CCW
SAE Split Flange							
2"	1-1/2"	HB	BH				
2"	1-1/4"	HC	CH				
2"	1"	HF	FH				
1-1/2"	1-1/2"	HL	LH				
1-1/2"	1-1/4"	HM	MH				
1-1/2"	1"	HN	NH				
1-1/4"	1-1/4"	HO	OH				
1-1/4"	1"	HP	PH				
1"	1"	HQ	QH				
* 1-1/4"	1"	RS	SR				
Metric Split Flange							
2"	1-1/2"	HR	RH				
2"	1-1/4"	HS	SH				
2"	1"	HT	TH				
1-1/2"	1-1/2"	HU	UH				
1-1/2"	1-1/4"	HV	VH				
1-1/2"	1"	HW	WH				
1-1/4"	1-1/4"	HX	XH				
1-1/4"	1"	HY	YH				
1"	1"	HZ	ZH				

IN	OUT	CW	CCW
OD Tube Porting			
1 1/2"	1 1/4"	-	KM MK
1 1/2"	1"	-	KN NK
1 1/4"	1 1/4"	-	KO OK
1 1/4"	1"	-	KP PK
1"	1"	-	KQ QK

* Outlet port for rear section.

(Combined Outlet)

IN	OUT	CW	CCW
SAE Split Flange (pump)			
2"	1-1/2"	UN	NU
2"	1-1/4"	UO	OU
1-1/2"	1-1/2"	UP	PU
1-1/2"	1-1/4"	UQ	QU
1-1/4"	1-1/4"	UR	RU

SAE Split Flange (motor)

1-1/2"	1-1/2"	BB	Double
1-1/4"	1-1/4"	CC	Double
1"	1"	EE	Double
3/4"	3/4"	FF	Double

OD Tube Porting (pump)

1-1/2"	1-1/4"	PQ	QP
1-1/4"	1-1/4"	PR	RP

OD Tube Porting (motor)

1-1/4"	1-1/4"	NN	Double
1"	1"	QQ	Double
3/4"	3/4"	RR	Double

Common Inlet Passage (pump)

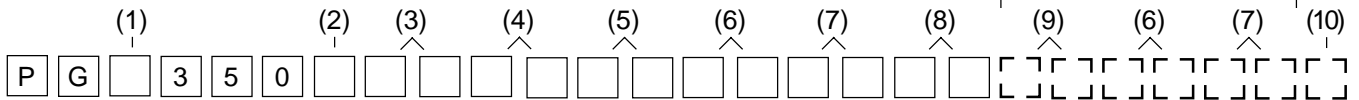
No Ports	C	D
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Connecting Shaft (10)

For connecting tandem units.

1 Connecting Shaft

350 Series Coding



Pump/Motor (1)

P	Pump
M	Motor

Unit (2)

A	Single Unit
B	Tandem Unit (flush studs)
C	Single or Tandem w. two-piece shaft (O.B. bearing required)
L	Unit with Extended Studs

Shaft End Cover (3)

1	Pump, cw w/o O.B. bearing
2	Pump, ccw w/o O.B. bearing
4	Pump, cw with O.B. bearing
5	Pump, ccw with O.B. bearing
8	Motor, bi-rot w/ O.B. bearing + 1/4" ODT drain
9	Motor, bi-rot w/o O.B. bearing + 1/4" ODT drain
18	Motor, bi-rot w/ O.B. bearing + 1/4" BSPP drain (78 Only)
19	Motor, bi-rot w/o O.B. bearing + 1/4" BSPP drain (78 Only)

Shaft End Cover (4)

42	SAE 4 bolt "B"
46	SAE 2/4 bolt "B"
62	"ZF" 4 bolt (462 only) - 80 mm pilot, 80x80 mm
78	SAE 4 bolt "C"
97	SAE 2 bolt "B"
98	SAE 2 bolt "C"

Port End Cover (5) (Side Ported)

	IN	OUT	CW	CCW	
	•	•	•	•	
	IN	OUT	CW	CCW	
	•	•	•	•	
	SAE Split Flange (pump)				OD Tube Porting (pump)
	2" 1-1/2"	EC	CE		1-1/2"1-1/4" FB BF
	2" 1-1/4"	EF	FE		1-1/2" 1" FC CF
	2" 1"	EG	GE		1-1/4"1-1/4" FG GF
	1-1/2"1-1/2"	EH	HE		1-1/4" 1" FJ JF
	1-1/2"1-1/4"	EJ	JE		1" 1" FL LF
	1-1/2" 1"	EK	KE		1-1/2" - BC CB
	1-1/4"1-1/4"	EL	LE		1-1/4" - BG GB
	1-1/4" 1"	EM	ME		1" - BJ JB
	1" 1"	EN	NE		- 1-1/4" BL LB
	2" -	OE	EO		- 1" BN NB
	1-1/2" -	OF	FO		
	1-1/4" -	OG	GO		OD Tube Porting (motor)
	1" -	OJ	JO		1-1/4"1-1/4" VC -Double
	- 1-1/2"	OL	LO		1" 1" VN -Double
	- 1-1/4"	OM	MO		3/4" 3/4" VR -Double
	- 1"	ON	NO		

SAE Split Flange (motor)

1-1/2"1-1/2"	CR-Double
1-1/4"1-1/4"	CS-Double
1" 1"	CT-Double
3/4" 3/4"	CV-Double

Unported (motor)

BA	Unported
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(Side Ported) continued

	IN	OUT	CW	CCW	
	•	•	•	•	
	IN	OUT	CW	CCW	
	•	•	•	•	
	Metric Split Flange (pump)				
	2" 1-1/2"	ER	RE		
	2" 1-1/4"	ES	SE		
	2" 1"	ET	TE		
	1-1/2"1-1/2"	EU	UE		
	1-1/2"1-1/4"	EV	VE		
	1-1/2" 1"	EW	WE		
	1-1/4"1-1/4"	EX	XE		
	1-1/4" 1"	EY	YE		
	1" 1"	EZ	ZE		
	2" -	OP	PO		
	1-1/2" -	OR	RO		
	1-1/4" -	OS	SO		
	1" -	OT	TO		
	- 1-1/2"	OV	VO		
	- 1-1/4"	OW	WO		
	- 1"	OX	XO		

Metric Split Flange (motor)

1-1/2"1-1/2"	CW-Double
1-1/4"1-1/4"	CX-Double
1" 1"	CY-Double
3/4" 3/4"	CZ-Double

	IN	OUT	CW	CCW	
	•	•	•	•	
	IN	OUT	CW	CCW	
	•	•	•	•	

Metric Straight Thread (motor)

1-1/4"1-1/4"	VS-Double
1" 1"	VT-Double
3/4" 3/4"	VW-Double

BSPP Porting (pump)

1-1/2"1-1/4"	FN	NF
1-1/2" 1"	FP	PF
1-1/4"1-1/4"	FR	RF
1-1/4" 1"	FS	SF
1" 1"	FT	TF
1-1/2" -	BP	PB
1-1/4" -	BQ	QB
1" -	BR	RB
- 1-1/4"	BT	TB
- 1"	BU	UB

BSPP Porting (motor)

1-1/4"1-1/4"	VX-Double
1" 1"	VY-Double
3/4" 3/4"	VZ-Double

Gear Housing (6)

AB	Pump
EB	Motor

Gear Width (7)

	Gear Width	in. ³ /rev.	cm ³ /rev.	Max Pressure
05	1/2"	1.28	20.9	3500psi (241 bar)
07	3/4"	1.91	31.3	3500psi (241 bar)
10	1"	2.55	41.8	3500psi (241 bar)
12	1-1/4"	3.19	52.2	3500psi (241 bar)
15	1-1/2"	3.83	62.7	3500psi (241 bar)
17	1-3/4"	4.46	73.1	3250psi (224 bar)
20	2"	5.10	83.6	3000psi (207 bar)
22	2-1/4"	5.74	94.0	2750psi (190 bar)
25	2-1/2"	6.38	104.5	2500psi (172 bar)

Shaft Type (8)

(For Single, Tandem or Two-piece Shaft -unless noted)

06	88X32X36 DIN 5462 Spline (two-piece only)
07	SAE "C" Spline
11	SAE "C" Keyed
25	SAE "B" Spline
43	SAE "BB" Keyed
73	SAE "C" Keyed Long (single and two-piece only)
98	SAE "BB" Splined (tandem only)

**Bearing Carriers (9)
(Dual Outlet - Pump Only)**

Outlets: for clockwise porting the top port number comes first;
for counter-clockwise porting the bottom port number comes first.

IN	OUT	CW	CCW	IN	OUT	CW	CCW
•	•	•	•	•	•	•	•

SAE Split Flange

2-1/2"	1-1/4"	1-1/4"	AF	FA
2-1/2"	1-1/4"	1"	AG	GA
2-1/2"	1"	1"	AH	HA
2"	1-1/4"	1-1/4"	AM	MA
2"	1-1/4"	1"	AN	NA
2"	1"	1"	AP	PA
1-1/2"	1-1/4"	1-1/4"	AT	TA
1-1/2"	1-1/4"	1"	AU	UA
1-1/2"	1"	1"	AV	VA
1-1/4"	1-1/4"	1-1/4"	AW	WA
1-1/4"	1-1/4"	1"	AX	XA
1-1/4"	1"	1"	AY	YA
1"	1"	1"	AZ	ZA

Metric Split Flange

2"	1-1/4"	1-1/4"	DM	MD
2"	1-1/4"	1"	DN	ND
2"	1"	1"	DP	PD
1-1/2"	1-1/4"	1-1/4"	DT	TD
1-1/2"	1-1/4"	1"	DU	UD
1-1/2"	1"	1"	DV	VD
1-1/4"	1-1/4"	1-1/4"	DW	WD
1-1/4"	1-1/4"	1"	DX	XD
1-1/4"	1"	1"	DY	YD
1"	1"	1"	DZ	ZD

(Single Outlet - Pump Only) Outlet for front section.

IN	OUT	CW	CCW	IN	OUT	CW	CCW
•	•	•	•	•	•	•	•

SAE Split Flange

2"	1-1/2"	HB	BH
2"	1-1/4"	HC	CH
2"	1"	HF	FH
1-1/2"	1-1/2"	HL	LH
1-1/2"	1-1/4"	HM	MH
1-1/2"	1"	HN	NH
1-1/4"	1-1/4"	HO	OH
1-1/4"	1"	HP	PH
* 1"	1"	HQ	QH
1-1/4"	1"	RS	SR

OD Tube Porting

2"	1-1/4"	1-1/4"	GM	MG
2"	1-1/4"	1"	GN	NG
2"	1"	1"	GP	PG
1-1/2"	1-1/4"	1-1/4"	GT	TG
1-1/2"	1-1/4"	1"	GU	UG
1-1/2"	1"	1"	GV	VG
1-1/4"	1-1/4"	1-1/4"	GW	WG
1-1/4"	1-1/4"	1"	GX	XG
1-1/4"	1"	1"	GY	YG
1"	1"	1"	GZ	ZG

OD Tube Porting

2"	1-1/2"	KB	BK
2"	1-1/4"	KC	CK
2"	1"	KF	FK
1-1/2"	1-1/2"	KL	LK
1-1/2"	1-1/4"	KM	MK
1-1/2"	1"	KN	NK
1-1/4"	1-1/4"	KO	OK
1-1/4"	1"	KP	PK
1"	1"	KQ	QK

(Single Outlet)

IN	OUT	CW	CCW
•	•	•	•

BSPP Porting

2"	1-1/2"	KR	RK
2"	1-1/4"	KS	SK
2"	1"	KT	TK
1-1/2"	1-1/2"	KU	UK
1-1/2"	1-1/4"	KV	VK
1-1/2"	1"	KW	WK
1-1/4"	1-1/4"	KX	XK
1-1/4"	1"	KY	YK
1"	1"	KZ	ZK

(Combined Outlet)

IN	OUT	CW	CCW
•	•	•	•

SAE Split Flange (pump)

2"	1-1/2"	UN	NU
2"	1-1/4"	UO	OU
1-1/2"	1-1/2"	UP	PU
1-1/2"	1-1/4"	UQ	QU
1-1/4"	1-1/4"	UR	RU

SAE Split Flange (motor)

2"	2"	AA	Double
1-1/2"	1-1/2"	BB	Double
1-1/4"	1-1/4"	CC	Double
1"	1"	EE	Double
3/4"	3/4"	FF	Double

OD Tube Porting (pump)

2"	1-1/2"	PE	EP
2"	1-1/4"	PM	MP
1-1/2"	1-1/2"	PN	NP
1-1/2"	1-1/4"	PQ	QP
1-1/4"	1-1/4"	PR	RP

OD Tube Porting (motor)

1-1/2"	1-1/2"	MM	Double
1-1/4"	1-1/4"	NN	Double
1"	1"	QQ	Double
3/4"	3/4"	RR	Double

Common Inlet Passage

No Ports	C	D
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Connecting Shaft (10)

For connecting tandem units.

1 Connecting Shaft

IN	OUT
•	•

Metric Split Flange (motor)

2"	2"	GG	Double
1-1/2"	1-1/2"	HH	Double
1-1/4"	1-1/4"	JJ	Double
1"	1"	KK	Double
3/4"	3/4"	LL	Double

BSPP Porting (motor)

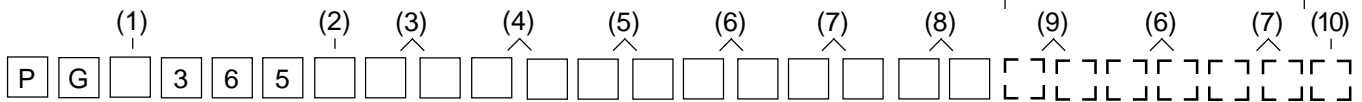
1-1/2"	1-1/2"	WW	Double
1-1/4"	1-1/4"	XX	Double
1"	1"	YY	Double
3/4"	3/4"	ZZ	Double

Metric Straight Thread (motor)

1-1/2"	1-1/2"	SS	Double
1-1/4"	1-1/4"	TT	Double
1"	1"	UU	Double
3/4"	3/4"	VV	Double

* Outlet port for rear section.

365 Series Coding



Pump/Motor (1)

P	Pump
M	Motor

Unit (2)

A	Single Unit
B	Tandem Unit (flush studs)
C	Single or Tandem w. two-piece shaft (O.B. bearing required)
L	Unit Extended Studs

Shaft End Cover (3)

1	Pump, cw w/o O.B. bearing
2	Pump, ccw w/o O.B. bearing
4	Pump, cw with O.B. bearing
5	Pump, ccw with O.B. bearing
8	Motor, bi-rot w/ O.B. bearing + 1/4" ODT drain
9	Motor, bi-rot w/o O.B. bearing + 1/4" ODT drain

Shaft End Cover (4)

42	SAE 4 bolt "B"
78	SAE 4 bolt "C"
97	SAE 2 bolt "B"
98	SAE 2 bolt "C"

Port End Cover (5) (Side Ported)

IN	OUT	CW	CCW
•	•	•	•
SAE Split Flange (pump)			
2"	1-1/2"	EC	CE
2"	1-1/4"	EF	FE
2"	1"	EG	GE
1-1/2"1-1/2"		EH	HE
1-1/2"1-1/4"		EJ	JE
1-1/2" 1"		EK	KE
1-1/4"1-1/4"		EL	LE
1-1/4" 1"		EM	ME
1"	1"	EN	NE
2"	-	OE	EO
1-1/2"	-	OF	FO
1-1/4"	-	OG	GO
1"	-	OJ	JO
-	1-1/2"	OL	LO
-	1-1/4"	OM	MO
-	1"	ON	NO

SAE Split Flange (motor)

1-1/2"1-1/2"	CR-Double
1-1/4"1-1/4"	CS-Double
1"	1" CT-Double
3/4"	3/4" CV-Double

IN	OUT	CW	CCW
•	•	•	•
OD Tube Porting (pump)			
1-1/2"1-1/4"		FB	BF
1-1/2" 1"		FC	CF
1-1/4"1-1/4"		FG	GF
1-1/4" 1"		FJ	JF
1"	1"	FL	LF
1-1/2"	-	BC	CB
1-1/4"	-	BG	GB
1"	-	BJ	JB
-	1-1/4"	BL	LB
-	1"	BN	NB

OD Tube Porting (motor)

1-1/4"1-1/4"	VC-Double
1"	1" VN-Double
3/4"	3/4" VR-Double

Unported (pump)

Unported	BI	IB
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Unported (motor)

BA	Unported
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(Side Ported) continued

IN	OUT	CW	CCW
•	•	•	•
Metric Split Flange (pump)			
2"	1-1/2"	ER	RE
2"	1-1/4"	ES	SE
2"	1"	ET	TE
1-1/2"1-1/2"		EU	UE
1-1/2"1-1/4"		EV	VE
1-1/2" 1"		EW	WE
1-1/4"1-1/4"		EX	XE
1-1/4" 1"		EY	YE
1"	1"	EZ	ZE
2"	-	OP	PO
1-1/2"	-	OR	RO
1-1/4"	-	OS	SO
1"	-	OT	TO
-	1-1/2"	OV	VO
-	1-1/4"	OW	WO
-	1"	OX	XO

Metric Split Flange (motor)

1-1/2"1-1/2"	CW-Double
1-1/4"1-1/4"	CX-Double
1"	1" CY-Double
3/4"	3/4" CZ-Double

Gear Housing (6)

AB	Pump
EB	Motor

Gear Width (7)

	Gear Width	in. ³ /rev.	cm ³ /rev.	Max Pressure
07	3/4"	2.70	44.3	3500psi (241 bar)
10	1"	3.60	59.0	3500psi (241 bar)
12	1-1/4"	4.50	73.8	3500psi (241 bar)
15	1-1/2"	5.40	88.5	3500psi (241 bar)
17	1-3/4"	6.30	103.3	3500psi (241 bar)
20	2"	7.20	118.0	3500psi (241 bar)
22	2-1/4"	8.10	132.8	3250psi (224 bar)
25	2-1/2"	9.00	147.5	3000psi (207 bar)

Tandem: Repeat if Necessary

Shaft Type (8)

(For Single, Tandem or Two-piece Units -unless noted)

07	SAE "C" Spline (single and tandem only)
11	SAE "C" Keyed
25	SAE "B" Spline (single only)

Bearing Carriers (9)
(Dual Outlet - Pump Only)

Outlets: for clockwise porting the top port number comes first;
for counter-clockwise porting the bottom port number comes first.

IN	OUT	CW	CCW	IN	OUT	CW	CCW
SAE Split Flange							
2-1/2"	1-1/2"	1-1/2"	AC	CA	2-1/2"	1-1/2"	1-1/2"
2-1/2"	1-1/2"	1-1/4"	AD	DA	2-1/2"	1-1/2"	1-1/4"
2-1/2"	1-1/2"	1"	AE	EA	2-1/2"	1-1/2"	1"
2-1/2"	1-1/4"	1-1/4"	AF	FA	2-1/2"	1-1/4"	1-1/4"
2-1/2"	1-1/4"	1"	AG	GA	2-1/2"	1-1/4"	1"
2-1/2"	1"	1"	AH	HA	2-1/2"	1"	1"
2"	1-1/2"	1-1/2"	AJ	JA	2"	1-1/2"	1-1/2"
2"	1-1/2"	1-1/4"	AK	KA	2"	1-1/2"	1-1/4"
2"	1-1/2"	1"	AL	LA	2"	1-1/2"	1"
2"	1-1/4"	1-1/4"	AM	MA	2"	1-1/4"	1-1/4"
2"	1-1/4"	1"	AN	NA	2"	1-1/4"	1"
2"	1"	1"	AP	PA	2"	1"	1"
1-1/2"	1-1/2"	1-1/2"	AQ	QA	1-1/2"	1-1/2"	1-1/2"
1-1/2"	1-1/2"	1-1/4"	AR	RA	1-1/2"	1-1/2"	1-1/4"
1-1/2"	1-1/2"	1"	AS	SA	1-1/2"	1-1/2"	1"
1-1/2"	1-1/4"	1-1/4"	AT	TA	1-1/2"	1-1/4"	1-1/4"
1-1/2"	1-1/4"	1"	AU	UA	1-1/2"	1-1/4"	1"
1-1/2"	1"	1"	AV	VA	1-1/2"	1"	1"
1-1/4"	1-1/4"	1-1/4"	AW	WA	1-1/4"	1-1/4"	1-1/4"
1-1/4"	1-1/4"	1"	AX	XA	1-1/4"	1-1/4"	1"
1-1/4"	1"	1"	AY	YA	1-1/4"	1"	1"
1"	1"	1"	AZ	ZA	1"	1"	1"
Metric Split Flange							
2-1/2"	1-1/2"	1-1/2"	DB	BD	2-1/2"	1-1/2"	1-1/2"
2-1/2"	1-1/2"	1-1/4"	DC	CD	2-1/2"	1-1/2"	1-1/4"
2-1/2"	1-1/2"	1"	DE	ED	2-1/2"	1-1/2"	1"
2-1/2"	1-1/4"	1-1/4"	DF	FD	2-1/2"	1-1/4"	1-1/4"
2-1/2"	1-1/4"	1"	DG	GD	2-1/2"	1-1/4"	1"
2-1/2"	1"	1"	DH	HD	2-1/2"	1"	1"
2"	1-1/2"	1-1/2"	DJ	JD	2"	1-1/2"	1-1/2"
2"	1-1/2"	1-1/4"	DK	KD	2"	1-1/2"	1-1/4"
2"	1-1/2"	1"	DL	LD	2"	1-1/2"	1"
2"	1-1/4"	1-1/4"	DM	MD	2"	1-1/4"	1-1/4"
2"	1-1/4"	1"	DN	ND	2"	1-1/4"	1"
2"	1"	1"	DP	PD	2"	1"	1"
1-1/2"	1-1/2"	1-1/2"	DQ	QD	1-1/2"	1-1/2"	1-1/2"
1-1/2"	1-1/2"	1-1/4"	DR	RD	1-1/2"	1-1/2"	1-1/4"
1-1/2"	1-1/2"	1"	DS	SD	1-1/2"	1-1/2"	1"
1-1/2"	1-1/4"	1-1/4"	DT	TD	1-1/2"	1-1/4"	1-1/4"
1-1/2"	1-1/4"	1"	DU	UD	1-1/2"	1-1/4"	1"
1-1/2"	1"	1"	DV	VD	1-1/2"	1"	1"
1-1/4"	1-1/4"	1-1/4"	DW	WD	1-1/4"	1-1/4"	1-1/4"
1-1/4"	1-1/4"	1"	DX	XD	1-1/4"	1-1/4"	1"
1-1/4"	1"	1"	DY	YD	1-1/4"	1"	1"
1"	1"	1"	DZ	ZD	1"	1"	1"
OD Tube Porting							
2"	1-1/2"	1 1/2"	GJ	JG	2"	1-1/2"	1 1/2"
2"	1-1/2"	1 1/4"	GK	KG	2"	1-1/2"	1 1/4"
2"	1-1/2"	1"	GL	LG	2"	1-1/2"	1"
2"	1-1/4"	1 1/4"	GM	MG	2"	1-1/4"	1 1/4"
2"	1-1/4"	1"	GN	NG	2"	1-1/4"	1"
2"	1"	1"	GP	PG	2"	1"	1"
1-1/2"	1-1/2"	1 1/2"	GQ	QG	1-1/2"	1-1/2"	1 1/2"
1-1/2"	1-1/2"	1 1/4"	GR	RG	1-1/2"	1-1/2"	1 1/4"
1-1/2"	1-1/2"	1"	GS	SG	1-1/2"	1-1/2"	1"
1-1/2"	1-1/4"	1 1/4"	GT	TG	1-1/2"	1-1/4"	1 1/4"
1-1/2"	1-1/4"	1"	GU	UG	1-1/2"	1-1/4"	1"
1-1/2"	1"	1"	GV	VG	1-1/2"	1"	1"
1-1/4"	1-1/4"	1 1/4"	GW	WG	1-1/4"	1-1/4"	1 1/4"
1-1/4"	1-1/4"	1"	GX	XG	1-1/4"	1-1/4"	1"
1-1/4"	1"	1"	GY	YG	1-1/4"	1"	1"
1"	1"	1"	GZ	ZG	1"	1"	1"
BSPB Porting							
2"	1-1/2"	1-1/2"	JH	HJ	2"	1-1/2"	1-1/2"
2"	1-1/2"	1-1/4"	JK	KJ	2"	1-1/2"	1-1/4"
2"	1-1/2"	1"	JL	LJ	2"	1-1/2"	1"
2"	1-1/4"	1-1/4"	JM	MJ	2"	1-1/4"	1-1/4"
2"	1-1/4"	1"	JN	NJ	2"	1-1/4"	1"
2"	1"	1"	JP	PJ	2"	1"	1"
1 1/2"	1-1/2"	1-1/2"	JQ	QJ	1 1/2"	1-1/2"	1-1/2"
1 1/2"	1-1/2"	1-1/4"	JR	RJ	1 1/2"	1-1/2"	1-1/4"
1 1/2"	1-1/2"	1"	JS	SJ	1 1/2"	1-1/2"	1"
1 1/2"	1-1/4"	1-1/4"	JT	TJ	1 1/2"	1-1/4"	1-1/4"
1 1/2"	1-1/4"	1"	JU	UJ	1 1/2"	1-1/4"	1"
1 1/2"	1"	1"	JV	VJ	1 1/2"	1"	1"
1 1/4"	1-1/4"	1-1/4"	JW	WJ	1 1/4"	1-1/4"	1-1/4"
1 1/4"	1-1/4"	1"	JX	XJ	1 1/4"	1-1/4"	1"
1 1/4"	1"	1"	JY	YJ	1 1/4"	1"	1"
1"	1"	1"	JZ	ZJ	1"	1"	1"

(Single Outlet - Pump Only) Outlet for front section.

IN	OUT	CW	CCW	IN	OUT	CW	CCW
Metric Split Flange							
2-1/2"	1-1/2"	CN	NC	2"	1"	HF	FH
2-1/2"	1-1/4"	CP	PC	1-1/2"	1-1/2"	HL	LH
2-1/2"	1"	CQ	QC	1-1/2"	1-1/4"	HM	MH
2"	1-1/2"	HR	RH	1-1/2"	1"	HN	NH
2"	1-1/4"	HS	SH	1-1/4"	1-1/4"	HO	OH
2"	1"	HT	TH	1-1/4"	1"	HP	PH
1-1/2"	1-1/2"	HU	UH	1"	1"	HQ	QH
1-1/2"	1-1/4"	HV	VH	2-1/2"	1-1/2"	NR	RN
1-1/2"	1"	HW	WH	1-1/4"	1"	RS	SR
1-1/4"	- 1/4"	HX	XH	OD Tube Porting			
1-1/4"	1"	HY	YH	2"	1-1/2"	KB	BK
1"	1"	HZ	ZH	2"	1-1/4"	KC	CK
SAE Split Flange							
2-1/2"	1-1/2"	CJ	JC	2"	1"	KF	FK
2-1/2"	1-1/4"	CL	LC	1-1/2"	1-1/2"	KL	LK
2-1/2"	1"	CM	MC	1-1/2"	1-1/4"	KM	MK
2"	1-1/2"	HB	BH	1-1/2"	1"	KN	NK
2"	1-1/4"	HC	CH	1-1/4"	1-1/4"	KO	OK
SAE Split Flange (continued)							
2"	1"	HF	FH	1-1/4"	1"	KP	PK
1-1/2"	1-1/2"	HL	LH	1"	1"	KQ	QK
1-1/2"	1-1/4"	HM	MH	OD Tube Porting			
1-1/2"	1"	HN	NH	2"	1-1/2"	KB	BK
1-1/4"	1-1/4"	HO	OH	2"	1-1/4"	KC	CK
1-1/4"	1"	HP	PH	2"	1"	KF	FK
1"	1"	HQ	QH	1-1/2"	1-1/2"	KL	LK
2-1/2"	1-1/2"	NR	RN	1-1/2"	1-1/4"	KM	MK
1-1/4"	1"	RS	SR	1-1/2"	1"	KN	NK
SAE Split Flange							
2-1/2"	1-1/2"	CJ	JC	1-1/4"	1-1/4"	KO	OK
2-1/2"	1-1/4"	CL	LC	1-1/4"	1"	KP	PK
2-1/2"	1"	CM	MC	1"	1"	KQ	QK
2"	1-1/2"	HB	BH				
2"	1-1/4"	HC	CH				

(Combined Outlet)

IN	OUT	CW	CCW	IN	OUT	CW	CCW
SAE Split Flange (motor)							
2-1/2"	1-1/2"	UC	CU	2"	2"	GG	Double
2-1/2"	1-1/4"	UF	FU	1-1/2"	1-1/2"	HH	Double
2"	1-1/2"	UN	NU	1-1/4"	1-1/4"	JJ	Double
2"	1-1/4"	UO	OU	1"	1"	KK	Double
1-1/2"	1-1/2"	UP	PU	3/4"	3/4"	LL	Double
1-1/2"	1-1/4"	UQ	QU	BSPB Porting (motor)			
1-1/4"	1-1/4"	UR	RU	1-1/2"	1-1/2"	WW	Double
SAE Split Flange (motor)							
2"	2"	AA	Double	1-1/4"	1-1/4"	XX	Double
1-1/2"	1-1/2"	BB	Double	1"	1"	YY	Double
1-1/4"	1-1/4"	CC	Double	3/4"	3/4"	ZZ	Double
1"	1"	EE	Double	Metric Straight Thread (motor)			
3/4"	3/4"	FF	Double	1-1/2"	1-1/2"	SS	Double
OD Tube Porting (pump)							
2"	1-1/2"	PE	EP	1-1/4"	1-1/4"	TT	Double
2"	1-1/4"	PM	MP	1"	1"	UU	Double
1-1/2"	1-1/2"	PN	NP	3/4"	3/4"	VV	Double
1-1/2"	1-1/4"	PQ	QP	Common Inlet Passage			
1-1/4"	1-1/4"	PR	RP	No Ports	C	D	
OD Tube Porting (motor)							
1-1/2"	1-1/2"	MM	Double	Connecting Shaft (10)			
1-1/4"	1-1/4"	NN	Double	For connecting tandem units.			
1"	1"	QQ	Double	1 Connecting Shaft			
3/4"	3/4"	RR	Double				

* Outlet port for rear section.

400 Series Pumps

The P400 series of high pressure, fixed displacement gear pumps are available in single and multiple assemblies. These units are rated for service up to 4500 psi. They're available in three models offering you a displacement range from 1.5 to 5.5 CIR.

These units are cast from high-strength iron which provides the structural integrity needed at high pressures. Gear widths have been selected to keep shaft deflections and bearing loads within acceptable design limits. Body seals have been strengthened and the fastener pre-load increased to assure reliability under high pressure conditions.

A wide variety of SAE B and C mounting flanges and drive shaft configurations are available. Porting is through SAE split flange or "O" ring fitting. Special hardened steel alloy gears with integral drive shaft run between pressure-balanced, bronze wear plates to make these rugged pumps highly efficient. Long shaft journals provide superior bearing surfaces and add to long service life.

Pumps can be assembled for rotation in either direction.

Displacement per inch of gear

430	1.97 CIR
450	2.55 CIR
465	3.60 CIR

Performance Data

The performance data shown on the adjacent page are the average results based on a series of laboratory tests of production units and are not necessarily representative of any one unit. Tests were run at 4500 psi with the oil reservoir temperature at 180° F and viscosity of 150 SUS @ 100.

Oil Recommendations

The pumps work well on most good hydraulic oils as well as synthetic and fire resistant fluids. Please check with our product support department before using any fire resistant or non-petroleum based fluid. Some of these products require special seals.

Viscosity – 50 SUS min. @ operating temperature
7500 SUS max. @ starting temperature

Viscosity index – 90 minimum

Aniline point – 175 minimum

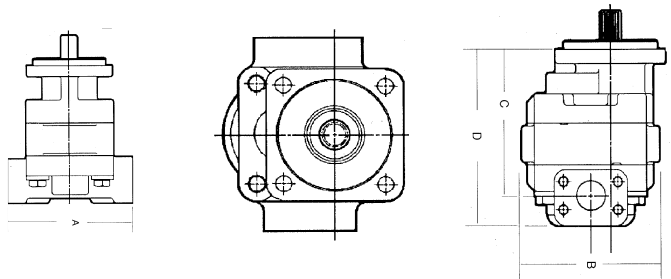
Additives – Foam depressant
Rust inhibitors

Maximum recommended system operating temperature is 180° F or 83° C.

Dimensional Data

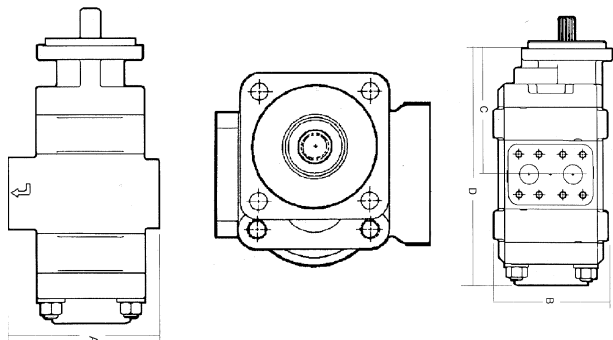
Single Units

Model	A	B	C	D	
430	6.88	5.88	4.94 + GW	6.19 + GW	Inches
	174.7	149.3	125.5 + GW	157.2 + GW	MM
450	7.12	6.00	5.56 + GW	7.06 + GW	Inches
	108.8	152.4	141.2 + GW	179.3 + GW	MM
465	7.38	7.25	5.81 + GW	7.31 + GW	Inches
	187.4	184.1	147.6 + GW	185.7 + GW	MM

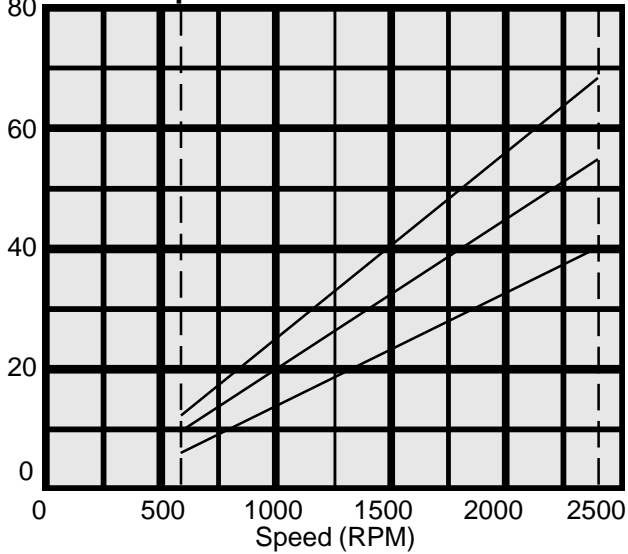


Multiple Units

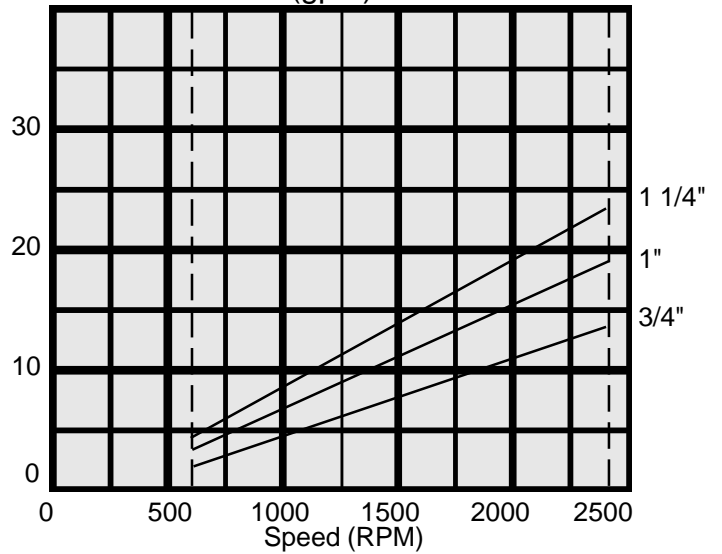
Model	A	B	C	D	
430	6.78	5.88	5.38 + GW	9.88 + GW	Inches
	172.2	149.3	136.7 + GW	250.9 + GW	MM
450	7.68	6.00	5.75 + GW	10.25 + GW	Inches
	195.1	152.4	146.8 + GW	254.6 + GW	MM
465	8.38	7.25	6.25 + GW	11.38 + GW	Inches
	212.8	184.1	158.7 + GW	289.0 + GW	MM



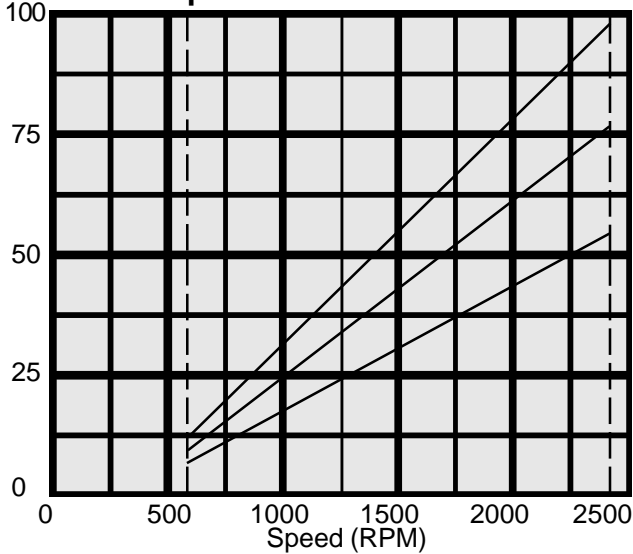
430 Pumps



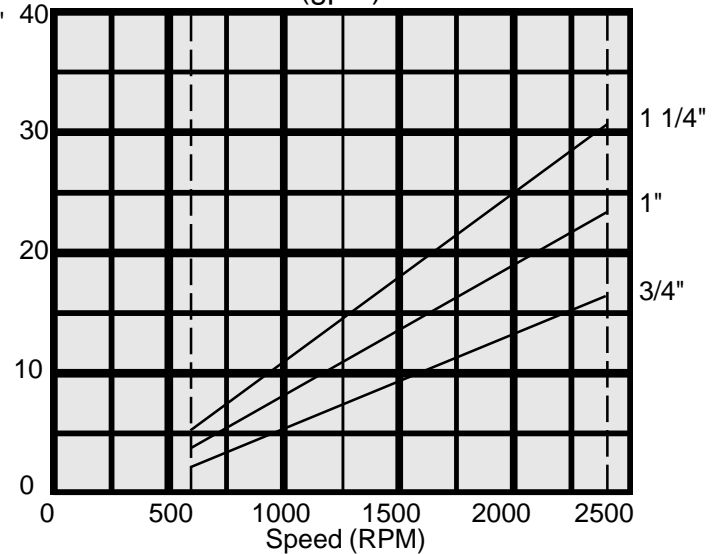
OUTPUT FLOW (gpm)



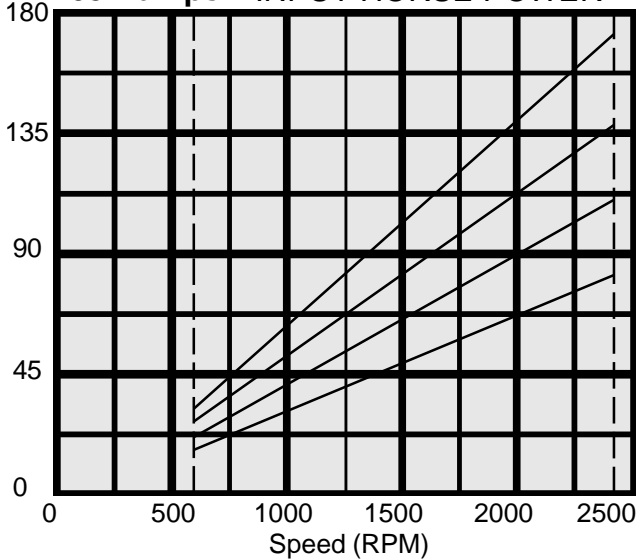
450 Pumps INPUT HORSE POWER



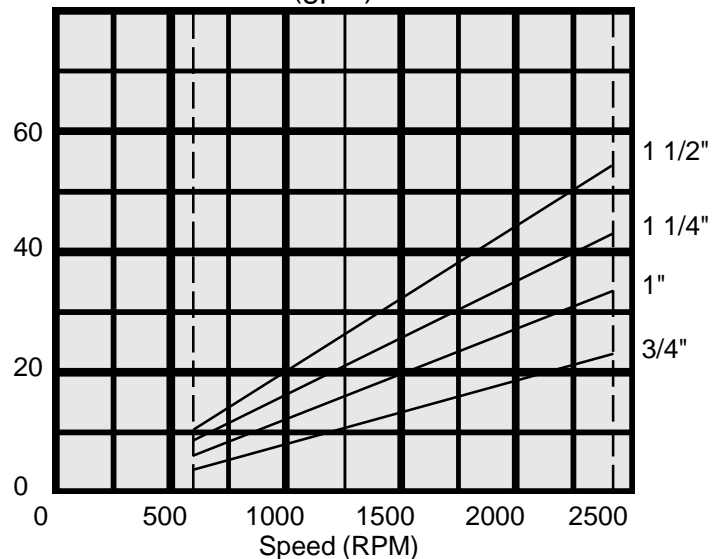
OUTPUT FLOW (gpm)



465 Pumps INPUT HORSE POWER



OUTPUT FLOW (gpm)



Special Assemblies for Gear Pumps and Motors

Contact Product Support for more information.

We became the market leading manufacturer of hydraulic gear pumps for mobile equipment by anticipating customer needs and developing engineering solutions to meet them. While we offer a broad range of standard gear pumps and motors for most applications, we recognize that standard equipment may not always be the best solution. We are always ready and able to discuss special applications and provide practical, cost-effective, well-engineered solutions to your special hydraulic system needs. Here are a few examples of our engineering and manufacturing skills.

315 Series - Special Assemblies

- P315/M315 gears with various drive shafts
- P315 port end cover with built-in relief valve
Tandem use only - no inlet port available
- P315 port end cover with side ports
up to 1-1/2" S.F. inlet
- P315 port end cover with integral priority valve
Built-in relief valve on primary circuit
- Clutch pump mount model available

330 Series - Special Assemblies

- P330 dual outlet pump bearing carrier that will accept a 2-1/2" S.F. inlet port
- P330/M330 gears with optional number of gear teeth (10 tooth gears are standard; 13 tooth gears are optional)
- P330/M330 gears with various drive shafts and gear widths
- P330/315 piggyback
- P330 port end cover with side ports
up to 2" S.F. inlet
- Narrow P330 dual rotation port end cover that accepts side and/or rear ports
- Narrow P330 port end cover that accepts side and/or rear ports
- P330 port end cover that accepts rear threaded ports
- P330 port end cover with integral priority valve
No relief valve on primary circuit
- P330 pad mount shaft end cover with two drive shafts
- P330 SAE "B" 2 bolt short shaft end cover
- FD330 flow divider assemblies

350 Series - Special Assemblies

- P350/M350 gears with optional number of gear teeth (10 tooth gears are standard; 13 tooth gears are optional)
- P350/M350 gears with various drive shafts and gear widths
- P350/315 piggyback
- P350 add-a-pump port end cover with the ability to mount any pump that has an SAE "A" or "B" 2 bolt mounting flange and SAE "A" or "B" splined drive shaft
- P350 port end cover that is shorter and narrower than standard P350 PEC. Accepts 1-1/2" diameter beaded inlet tube
- P350/M350 SAE "C" 4 bolt, ductile iron shaft end cover
- P350/M350 SAE "B" 2 bolt short shaft end cover
- FD350 flow divider assemblies

365 Series - Special Assemblies

- P365 bearing carriers with special porting arrangements accept 3" S.F. inlet ports
- P365/M365 gears with various drive shafts and gear widths
- P365/330 piggyback
- P365 add-a-pump port end cover with the ability to mount any pump that has an SAE "A" or "B" 2 bolt mounting flange and SAE "A" or "B" splined drive shaft
- M365 SAE "C" 4 bolt, compacted graphite shaft end cover
- FD365 flow divider assemblies

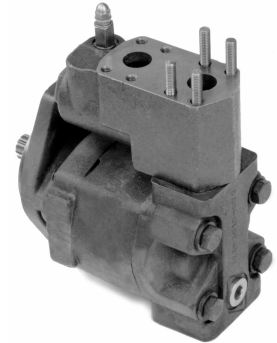
315 Tandem Pump with Integral Port End Priority Valve



By incorporating the priority flow valve and relief valve in the port end housing, this design puts the added flow of a tandem to good use without requiring excessive mounting space for a bolt-on valve. The integral priority flow valve provides primary and secondary flow ports. Flow in excess of that required by the priority circuit may be routed to a power beyond function. These units may be used to provide power steering or braking requirements.

Load-sense Unloaders

These valves may be bolted to any standard pump outlet or used in-line between the pump and a load-sense control valve. Two sizes handle flows from 0-30 gpm and 30- 60 gpm at pressures to 3500 psi. The unloader effectively modulates pump output relative to function pressure and flow requirements.



Charge/Lube Pump



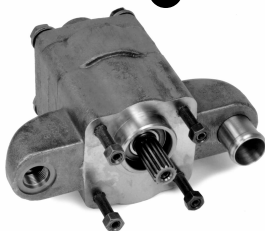
The design of this unit takes advantage of relatively low pressure operating requirements (450 psi.) to reduce the number of cast iron components required for its two pump sections from five pieces to three. Relief valves for both sections are built into the pump body. The common journal carrier, one-piece steel drive shaft, and powdered metal driven gears contribute to the overall compactness of the design while providing charge and transmission lubrication flows.

Through Shaft Pump

An innovative design, this piggyback unit is driven by a common shaft that is actually the drive shaft of the machine to which it supplies two separate flows. The through shaft eliminates the need for a PTO, reduces the number of component parts and contributes to a lighter more compact machine design.



Pump with Shaft End Cover Ports



This unusually-shaped shaft end housing allows it to fit tight mounting spaces while maintaining smooth hydraulic line functions. The housing features integral port lobes that allow straight hydraulic line connections without line kinks or space robbing line loops. Overall length of the pump is reduced by eliminating typical gear housing ports.

Add-A-Pump

This special port end housing for 350 and 365 pumps allows a separate pump to be mounted to the rear of the unit as needed for optional machine functions or to provide flow from a separate reservoir. With bearing, lip seal and drain already in place, this special port end housing can accommodate any add-on pump with SAE A or B two-bolt mounting pattern 1 and splined drive shaft.



Offer of Sale

The items described in this document and other documents or descriptions provided by The Company, its subsidiaries and its authorized distributors are hereby offered for sale at prices to be established by The Company, its subsidiaries and its authorized distributors. This offer and its acceptance by any customer ("Buyer") shall be governed by all of the following Terms and Conditions. Buyer's order for any such items, when communicated to The Company, its subsidiary or an authorized distributor ("Seller") verbally or in writing, shall constitute acceptance of this offer.

1. Terms and Conditions of Sale: All descriptions, quotations, proposals, offers, acknowledgments, acceptances and sales of Seller's products are subject to and shall be governed exclusively by the terms and conditions stated herein. Buyer's acceptance of any offer to sell is limited to these terms and conditions. Any terms or conditions in addition to, or inconsistent with those stated herein, proposed by Buyer in any acceptance of an offer by Seller, are hereby objected to. No such additional, different or inconsistent terms and conditions shall become part of the contract between Buyer and Seller unless expressly accepted in writing by Seller. Seller's acceptance of any offer to purchase by Buyer is expressly conditional upon Buyer's assent to all the terms and conditions stated herein, including any terms in addition to, or inconsistent with those contained in Buyer's offer. Acceptance of Seller's products shall in all events constitute such assent.

2. Payment: Payment shall be made by Buyer net 30 days from the date of delivery of the items purchased hereunder. Amounts not timely paid shall bear interest at the maximum rate permitted by law for each month or portion thereof that the Buyer is late in making payment. Any claims by Buyer for omissions or shortages in a shipment shall be waived unless Seller receives notice thereof within 30 days after Buyer's receipt of the shipment.

3. Delivery: Unless otherwise provided on the face hereof, delivery shall be made F.O.B. Seller's plant. Regardless of the method of delivery, however, risk of loss shall pass to Buyer upon Seller's delivery to a carrier. Any delivery dates shown are approximate only and Seller shall have no liability for any delays in delivery.

4. Warranty: Seller warrants that the items sold hereunder shall be free from defects in material or workmanship for a period of 18 months from date of shipment from The Company. **THIS WARRANTY COMPRISES THE SOLE AND ENTIRE WARRANTY PERTAINING TO ITEMS PROVIDED HEREUNDER. SELLER MAKES NO OTHER WARRANTY, GUARANTEE, OR REPRESENTATION OF ANY KIND WHATSOEVER. ALL OTHER WARRANTIES, INCLUDING BUT NOT LIMITED TO, MERCHANTABILITY AND FITNESS FOR PURPOSE, WHETHER EXPRESS, IMPLIED, OR ARISING BY OPERATION OF LAW, TRADE USAGE, OR COURSE OF DEALING ARE HEREBY DISCLAIMED. NOTWITHSTANDING THE FOREGOING, THERE ARE NO WARRANTIES WHATSOEVER ON ITEMS BUILT OR ACQUIRED WHOLLY OR PARTIALLY, TO BUYER'S DESIGNS OR SPECIFICATIONS.**

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6. Changes, Reschedules and Cancellations: Buyer may request to modify the designs or specifications for the items sold hereunder as well as the quantities and delivery dates thereof, or may request to cancel all or part of this order, however, no such requested modification or cancellation shall become part of the contract between Buyer and Seller unless accepted by Seller in a written amendment to this Agreement. Acceptance of any such requested modification or cancellation shall be at Seller's discretion, and shall be upon such terms and conditions as Seller may require.

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12. Entire Agreement/Governing Law: The terms and conditions set forth herein, together with any amendments, modifications and any different terms or conditions expressly accepted by Seller in writing, shall constitute the entire Agreement concerning the items sold, and there are no oral or other representations or agreements which pertain thereto. This Agreement shall be governed in all respects by the law of the State of Ohio. No actions arising out of the sale of the items sold hereunder or this Agreement may be brought by either party more than two (2) years after the cause of action accrues.

9/91-P



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Parker Hannifin Corporation

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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 electromechanical 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.

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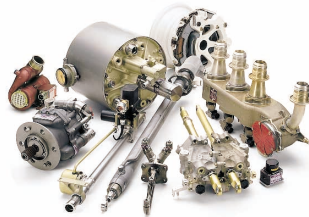
To be a leading worldwide manufacturer of components and systems for the builders and users of durable goods. More specifically, we will design, market and manufacture products controlling motion, flow and pressure. We will achieve profitable growth through premier customer service.

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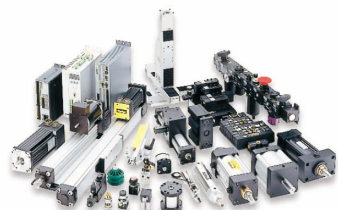
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Catalog HY09-0300/US
02/01 T&M 5M

PGP 500 Series PGM 500 Series

Single or Multiple Aluminum Pumps and Motors

Catalog HY09-0500/US



- Single or Multiple Pumps and Motors
- Continuous Pressures to 4000 psi
- Pump Flows to 37 gpm
- Motors with outputs to over 60 Hp
- Displacement range: 2 - 52cc (.12 - 3.17 cir)

Heavy-Duty Aluminum Pumps and Motors

PGP/PGM 500 Series

The Parker Hannifin Gear Pump Division Assures:

- Consistent quality
- Technical innovation
- Premier customer service

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The Gear Pump Division's ability to engineer specialty products for unique applications has kept us at the forefront of technology, and ensured our position as the industry leader. Our success has come from providing a quality product with excellent sales and service support.

We manufacture hydraulic components for a wide range of industries including:

- Material Handling
- Construction
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- Agriculture
- Industrial



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This document and other information from Parker Hannifin Corporation, its subsidiaries and authorized distributors provide product and/or system options for further investigation by users having technical expertise. It is important that you analyze all aspects of your application and review the information concerning the product or system in the current product catalog. Due to the variety of operating conditions and applications for these products or systems, the user, through its own analysis and testing, is solely responsible for making the final selection of the products and systems and assuring that all performance, safety and warning requirements of the application are met.

The products described herein, including without limitation, product features, specifications, designs, availability and pricing, are subject to change by Parker Hannifin Corporation and its subsidiaries at any time without notice.

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Pump/Motor Products

PGP/PGM 505

- Flows to 8 gpm
- Continuous pressures to 4000 psi
- Speeds to 4000 rpm
- Wide variety of integral valve options
- Single and bi-rotational motors
- Flow dividers

PGP/PGM 511

- Flows to 19 gpm
- Continuous pressures to 4000 psi
- Speeds to 4000 rpm
- Wide variety of integral valve options
- Single and bi-rotational motors
- Flow dividers

PGP/PGM 517

- Flows to 37 gpm
- Continuous pressures to 3600 psi
- Speeds to 3400 rpm
- Wide variety of integral valve options
- Single and bi-rotational motors
- Flow dividers

Heavy-Duty Aluminum Pumps and Motors

PGP/PGM 500 Series

PGP/PGM 500 Series

- **High Performance**
- **High Efficiency**
- **High Pressure Operation**

PGP/PGM 500 series gear pumps/motors are an advanced performance version of the international “bushing block” style pumps. PGP/PGM 500 series pumps/motors offer superior performance, high efficiency and low noise operation at high operating pressures. They are produced in three frame sizes (PGP/PGM 505, PGP/PGM 511, PGP/PGM 517) with displacements ranging from 2 to 52 cm³ (.12 to 3.17 in³/rev). A wide variety of standard options are available to meet specific application requirements worldwide.



PGP 500

Advantages

- **Up to 275 bar (4000 psi) continuous operation**
High strength materials and large journal diameters provide low bearing loads for high pressure operation.
- **Low noise**
PGP/PGM 505 and 517 - 13 tooth gear profile, PGP/PGM 511 – 12 tooth gear profile and optimized flow metering provide reduced pressure pulsation and exceptionally quiet operation.
- **High efficiency**
Pressure balanced bearing blocks assure maximum efficiency under all operating conditions.
- **Application flexibility**
International mounts and connections, integrated valve capabilities and common inlet multiple pump configurations provide unmatched design and application versatility.

Characteristics

Product Features	Description
Pump Type	Heavy-duty, aluminum, external gear
Mounting	SAE, rectangular, thru-bolt, and application specific
Ports	SAE/metric split flange, metric and others
Shaft Style	SAE splined, keyed, tapered, tang and specials.
Speed	500 - 4000 rpm, see tables on pages 5, 11 and 20.
Theoretical Displ.	See tables on pages 5, 11 and 20.
Drive	Drive direct with flexible coupling is recommended.
Axial / Radial Load	Units subject to axial or radial loads should be specified with an outboard bearing. Please contact Product Support for assistance.
Inlet Pressure	Operating range - 0.8 to 2 bar (12-29 psi). Minimum inlet pressure 0.5 bar (7.25 psi).
Outlet Pressure	See tables on pages 5, 11 and 20.
Fluids	Mineral oil, fire resistant fluids: - water-oil emulsions 60/40, HFB - water-glycol, HFC - phosphate-esters, HFD
Fluid Temperature	Range of operating temperature -15 to +80°C (5 to 176° F). Max. permissible operating pressure dependent on fluid temperature. Temperature for cold start -20 to -15°C (-4 to 5° F) at speed ≤ 1500 rpm Max. permissible operating pressure dependent on fluid temperature.

Product Features	Description
Fluid Viscosity	Range of operating viscosity 8 to 1000 mm ² /s max. Permissible operating pressure dependent on viscosity. Viscosity range for cold start 1000 to 2000 centistokes at operating pressure ≤10 bar (145 psi) and speed ≤1500 rpm.
Range of Ambient Temperature	-40°C to +70°C (-40°F to 158°F)
Filtration	According to ISO 4406 Cl. 16/13
Flow Velocity	See table on page 28.
Direction of Rotation (looking at the driveshaft)	Clockwise, counter-clockwise or birotational. Note: Drive pump or motor only in indicated direction of rotation.
Multiple Pump Assemblies	- Available in two, three or four section configurations. - Max. shaft loading must conform to the limitations shown in the shaft loading rating tables on pages 8,15 and 24 in this catalog. - Max. load is determined by adding the torque values for each pumping section that will be simultaneously loaded.
Separate or Common Inlet Capability	Separate inlet configuration: - Each gear housing has individual inlet and outlet ports. Common inlet configuration: - Two gear sets share a common inlet. - Inlet port can be in either section.

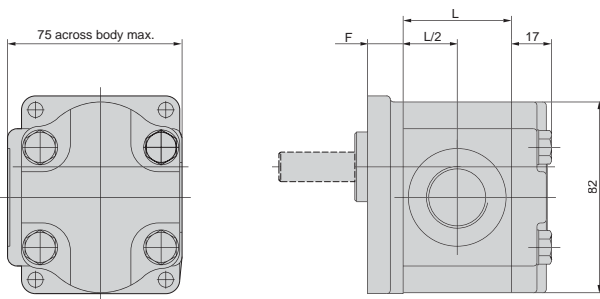
PGP/PGM 505 Specifications

Description	Code	0020	0030	0040	0050	0060	0070	0080	0090	0100	0110	0120
Displacements	cm ³ /rev	2	3	4	5	6	7	8	9	10	11	12
	in ³ /rev	0.12	0.18	0.24	0.31	0.37	0.43	0.49	0.55	0.61	0.67	0.73
Continuous Pressure	bar	275	275	275	275	275	275	275	250	250	250	220
	psi	3988	3988	3988	3988	3988	3988	3988	3625	3625	3625	3190
Intermittent Pressure	bar	300	300	300	300	300	300	300	275	275	275	220
	psi	4350	4350	4350	4350	4350	4350	4350	3988	3988	3988	3190
Minimum Speed @ Max. Outlet Pressure	rpm	500	500	500	500	500	500	500	500	500	500	500
Maximum Speed @ 0 Inlet & Max. Outlet Pressure	rpm	4000	4000	4000	4000	3600	3300	3000	2900	2800	2400	2400
Pump Input Power @ Max. Pressure and 1500 rpm	kW	2	2.3	3	3.8	4.5	5.3	6	6.5	6.9	7.6	8.4
	HP	2.68	3.08	4.02	5.10	6.03	7.11	8.05	8.72	9.25	10.19	11.26
Dimension "L"	mm	38.4	41.1	43.8	46.5	49.1	51.8	54.5	57	59.8	62.5	65.2
	in	1.51	1.62	1.72	1.83	1.93	2.04	2.15	2.24	2.35	2.46	2.57
Approximate Weight ¹⁾	kg	1.72	2.22	2.27	2.32	2.38	2.43	2.48	2.53	2.58	2.63	2.68
	LB	3.80	4.91	5.02	5.13	5.26	5.37	5.48	5.59	5.70	5.81	5.92

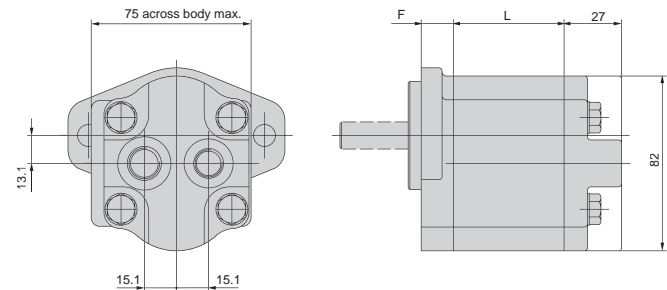
¹⁾ Single pump with Shaft End Cover D3 and non ported Port End Cover.

PGP/PGM 505 Dimensions

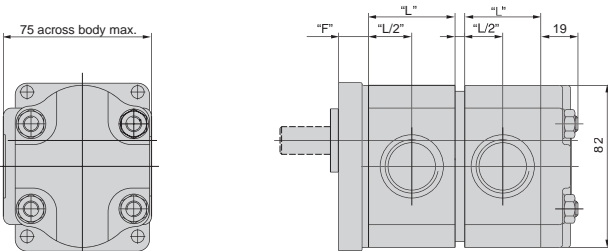
Single Unit PGP/PGM 505



Single Unit PGP/PGM 505 with rear ports



Tandem Unit PGP/PGM 505



NOTE:

Dimension "F" see shaft end covers on page 6
Dimension "L" see table above

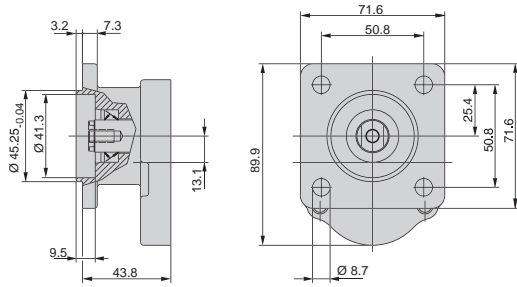
- Notes: 1. Dimensions are in millimeters.
 2. Dimensions are nominal except where noted.
 3. Subscript and/or superscript numbers are tolerances.
 4. To convert from millimeters to inches, divide millimeters by 25.4.

Heavy-Duty Aluminum Pumps and Motors

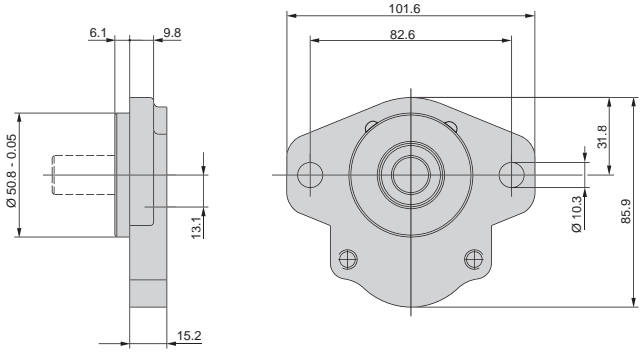
PGP/PGM 500 Series

PGP/PGM 505 Shaft End Covers

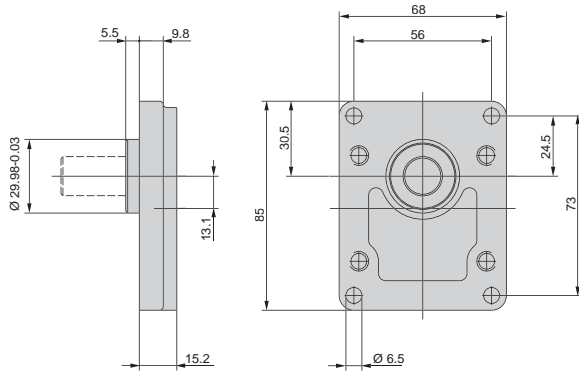
Code A1



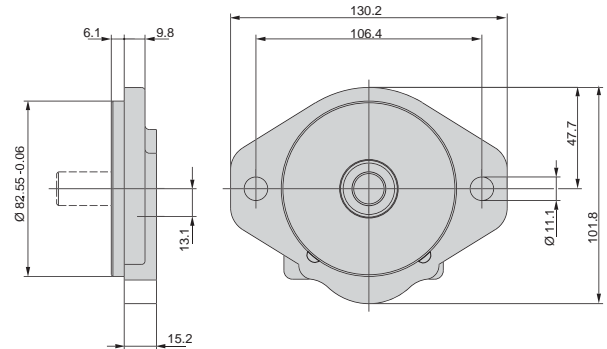
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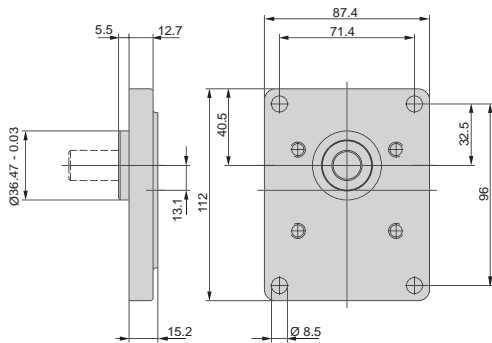
Code D2



Code H2



Code D3



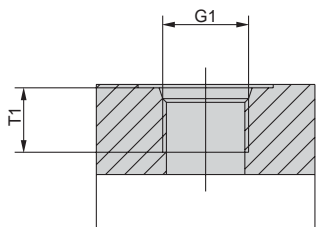
- Notes:
1. Dimensions are in millimeters.
 2. Dimensions are nominal except where noted.
 3. Subscript and/or superscript numbers are tolerances.
 4. To convert from millimeters to inches, divide millimeters by 25.4.

PGP/PGM 505 Porting

Code D

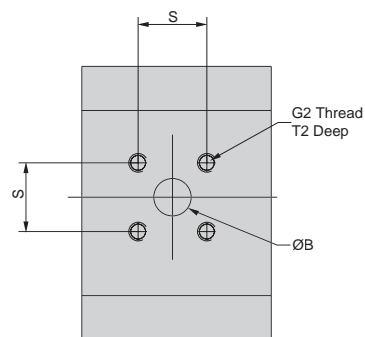
SAE straight thread

See table below for specific port dimensions.



Code K5

4-Bolt flange



- Notes:
1. Dimensions are in millimeters.
 2. Dimensions are nominal except where noted.
 3. Subscript and/or superscript numbers are tolerances.
 4. To convert from millimeters to inches, divide millimeters by 25.4.

PGP/PGM 505

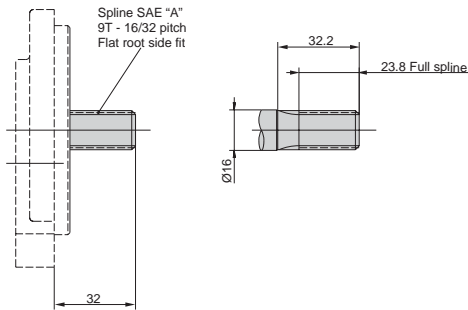
Code	G1	G2	T1	Ø D	S	Ø B	T2
Thread	Thread		Dimensions				
D2	9/16"-18 UNF		12.7				
D3	3/4"-16 UNF		14.3				
D4	7/8"-14 UNF		16.7				
D5	1 1/16"-12 UN		19.0				
K5		1/4"-20 UNC			25.15	14.2	13.0

Heavy-Duty Aluminum Pumps and Motors

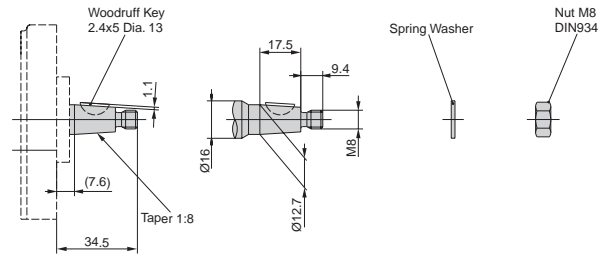
PGP/PGM 500 Series

PGP/PGM 505 Drive Shaft

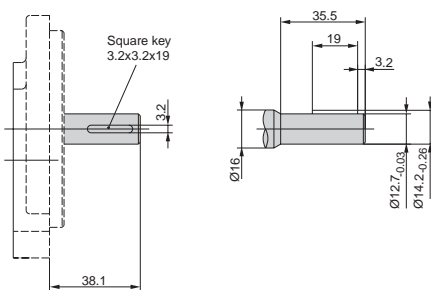
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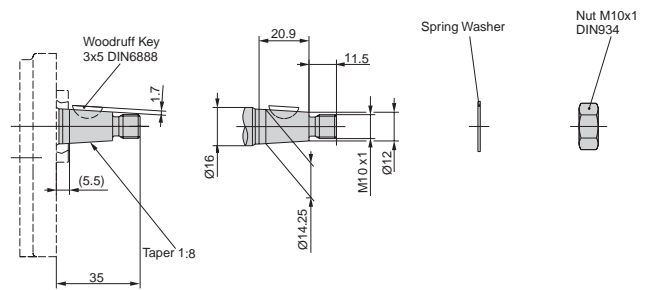
Code Q1



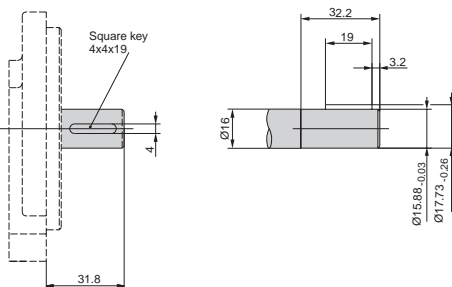
Code J1



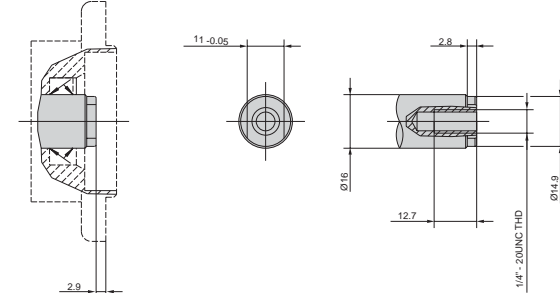
Code Q2



Code K1



Code V4



- Notes: 1. Dimensions are in millimeters.
 2. Dimensions are nominal except where noted.
 3. Subscript and/or superscript numbers are tolerances.
 4. To convert from millimeters to inches, divide millimeters by 25.4.

PGP/PGM 505 - Shaft Load Capacity

Code	Description	Style	Torque Rating
A1	9T, 16/32 Pitch, SAE "A"	Spline	108Nm/954 in-lb
J1	Ø 12.7, 3.2 Key, No thread, 38L	Parallel	43Nm/380in-lb
K1	Ø 15.88, 4.0 Key. No Thread, 32L, SAE "A"	Parallel	85Nm/751in-lb
Q1	Ø 12.70, 2.4 Key, M 8x1.25, 7.6L	1:8 Taper	43Nm/380in-lb
Q2	Ø 14.25, 3.0 Key, M 10x1, 5.5L	1:8 Taper	68Nm/600in-lb
V4	11x2.8, 1/4UNF	Tang	44Nm/389in-lb
	Tandem Pump/Connecting Shaft	Spline	36Nm/318in-lb

When applying a multiple section pump, the maximum drive shaft load is determined by adding the torque values for each pumping section that will be simultaneously loaded.

$$\text{Torque [in-lb]} = \frac{\text{Displacement [in}^3\text{/rev]} \times \text{Pressure [psi]}}{5.72} \quad \text{Torque [Nm]} = \frac{\text{Displacement [cc/rev]} \times \text{Pressure [bar]}}{57.2}$$

Heavy-Duty Aluminum Pumps and Motors

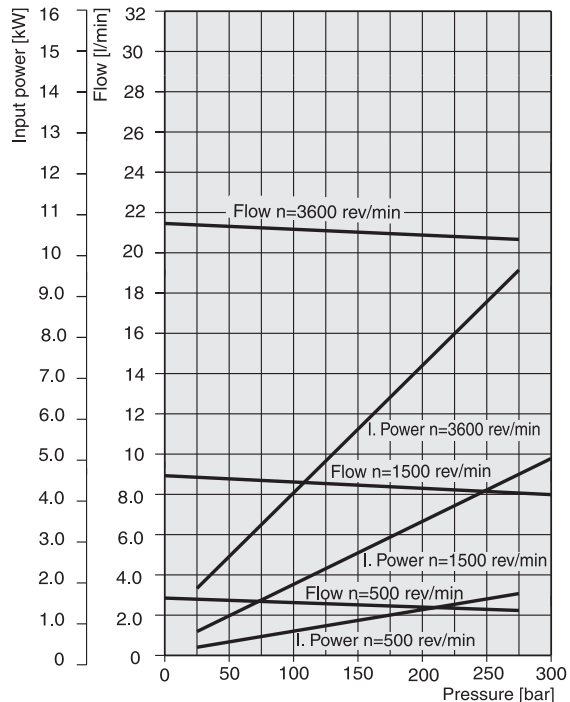
PGP/PGM 500 Series

PGP/PGM 505 - 3.0CC

Fluid Temperature = $45 \pm 2^\circ\text{C}$

Viscosity = $36\text{mm}^2/\text{s}$

Inlet Pressure = $0.9 + 0.1$ bar absolute

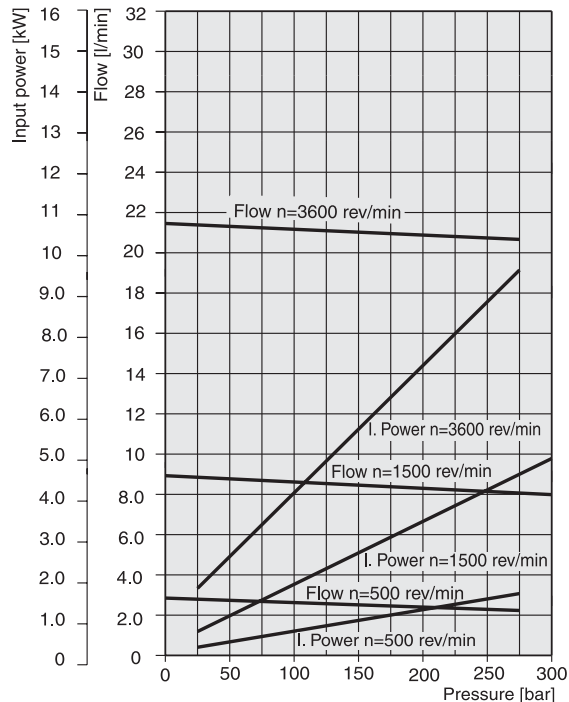


PGP/PGM 505 - 6.0 CC

Fluid Temperature = $45 \pm 2^\circ\text{C}$

Viscosity = $36\text{mm}^2/\text{s}$

Inlet Pressure = $0.9 + 0.1$ bar absolute

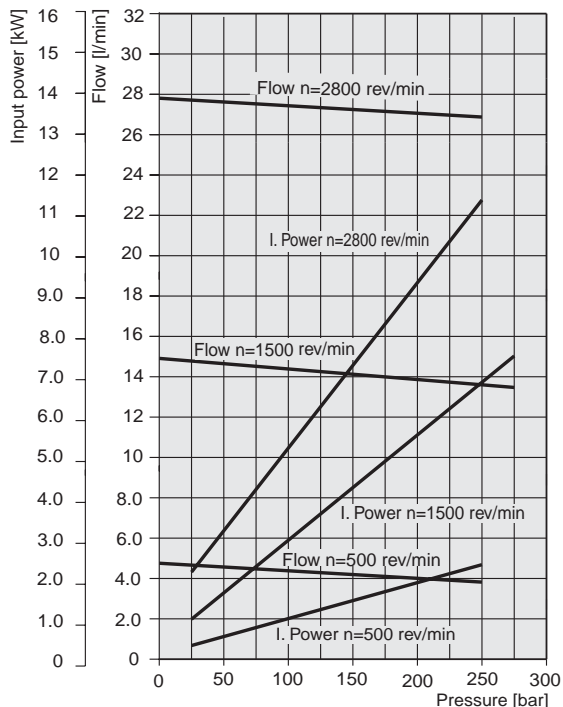


PGP/PGM 505 - 10.0 CC

Fluid Temperature = $45 \pm 2^\circ\text{C}$

Viscosity = $36\text{mm}^2/\text{s}$

Inlet Pressure = $0.9 + 0.1$ bar absolute

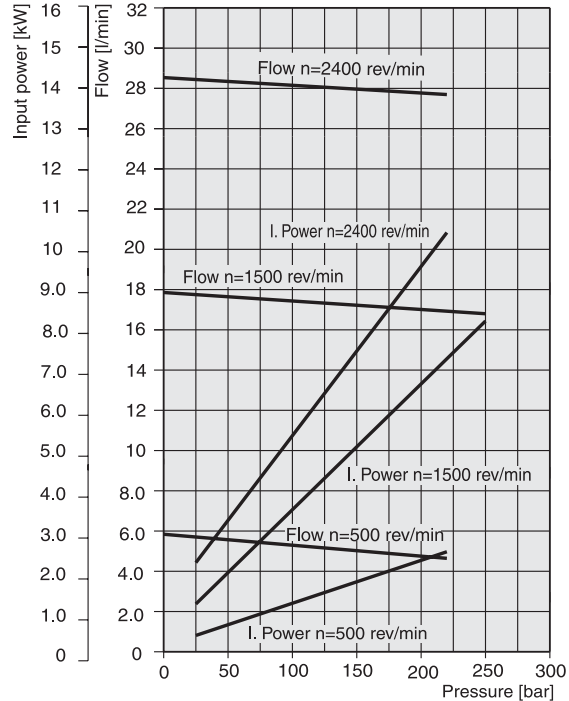


PGP/PGM 505 - 12.0 CC

Fluid Temperature = $45 \pm 2^\circ\text{C}$

Viscosity = $36\text{mm}^2/\text{s}$

Inlet Pressure = $0.9 + 0.1$ bar absolute

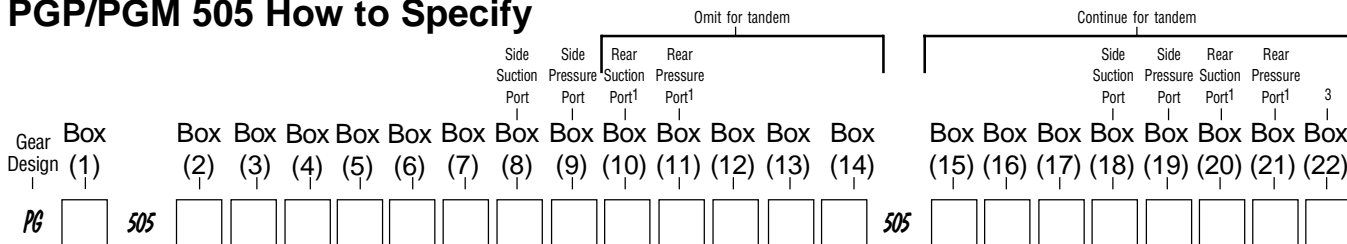


Performance data shown is based upon a series of laboratory tests and is not representative of any one unit.

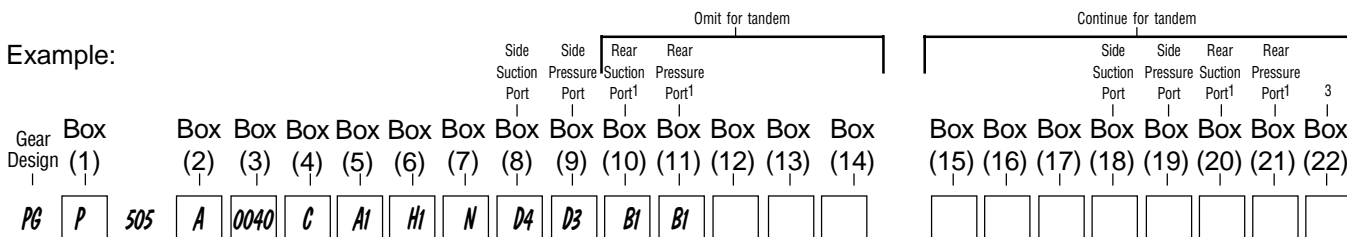
Heavy-Duty Aluminum Pumps and Motors

PGP/PGM 500 Series

PGP/PGM 505 How to Specify



Example:



Box 1 Pump/Motor	
P	Pump
M	Motor

Boxes 2,15 Unit		
	Pump	Motor
A	Single unit	Standard Motor w/o checks
B	Multiple unit	Standard Motor w/ two checks
C	—	Standard Motor w/one anti cavitation check (ACC)
M	Single distributor unit	—
N	Multiple distributor unit	—

Boxes 3,16 Displacement	
0020	2.0 ccm
0030	3.0 ccm
0040	4.0 ccm
0050	5.0 ccm
0060	6.0 ccm
0070	7.0 ccm
0080	8.0 ccm
0100	10.0 ccm
0110	11.0 ccm
0120	12.0 ccm

Boxes 4 Rotation	
C	Clockwise
A	Counter clockwise
B	Bi-directional

Box 5 Shaft	
A1	9T, 16/32 Pitch, 32L, SAE "A" spline
A2	9T, 20/40 Pitch, 27L, SAE "AA" spline
J1	Ø12.7, 3.2 Key, no thread, 38L, parallel
K1	Ø15.88, 4.0 Key, no thread, 32L, SAE "A", parallel
Q1	Ø12.7, 7.6L, 2.4 Key, M8x1.25, taper 1:8
Q2	Ø14.25, 5.5L, 3.0 Key, M10x1, taper 1:8
V4	11x2.8, 1/4UNF for flange code A1, tang drive

Box 6 Shaft End Covers	
A1	50.8x50.8 - Ø45.25 4bolt square flange
D2	56.0x73.0 - Ø30.0 rectangular
D3	71.4x96.0 - Ø36.47 rectangular
H1	82.5 - Ø50.8 SAE "A-A" 2bolt flange
H2	106.4 - Ø82.55 SAE "A" 2bolt flange

Boxes 7,17 Shaft Seal	
X	No seal
N	NBR
V	FPM, FKM
M	Double NBR
W	Double FPM

Boxes 8,9,10,11,18,19,20,21 Port Options	
B1	No ports
D2	9/16" - 18 UNF thread
D3	3/4" - 16 UNF thread
D4*	7/8" - 14 UNF thread
D5*	1 1/16" - 12UN thread
K5*	14.2mm, 25.15, 1/4" - 20UNC, square flange

*Not usable for rear ports

Box 12 Motor Drain Option ²	
B1	No drain
A	7/16"-20 UNF thread
C	9/16"-18 UNF thread

Box 13 Drain Position ²	
2	Drain on bottom
3	Drain on top
4	Rear drain

Box 14 Section Connection	
S	Separate inlets
C	Common inlets

NOTES:

- 1 Only coded for the last section.
- 2 Only for motors
- 3 For further "B" triple unit repeat displacement, shaft seal between sections, side suction port, side pressure port, rear suction port, rear pressure port.
4. Dimensions are in millimeters except where noted.

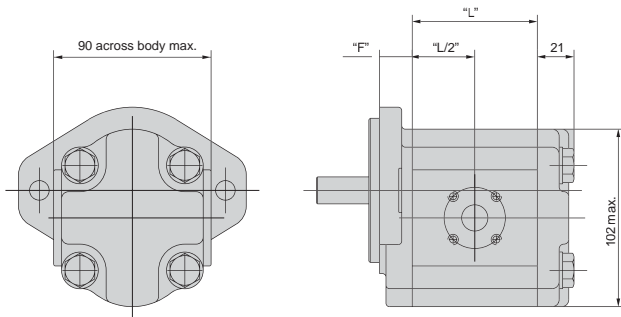
PGP/PGM 511 Specifications

Description	Code	0060	0070	0080	0100	0110	0140	0160	0180	0190	0210	0230	0270	0280	0310
Displacements	cm ³ /rev	6	7	8	10	11	14	16	18	19	21	23	27	28	31
	in ³ /rev	0.37	0.43	0.49	0.61	0.67	0.85	0.98	1.10	1.16	1.28	1.40	1.65	1.71	1.89
Continuous Pressure	bar	275	275	275	275	275	275	275	275	275	235	235	190	185	165
	psi	3988	3988	3988	3988	3988	3988	3988	3988	3988	3408	3408	2755	2683	2393
Intermittent Pressure	bar	300	300	300	300	300	300	300	300	300	255	255	210	200	180
	psi	4350	4350	4350	4350	4350	4350	4350	4350	4350	3698	3698	3045	2900	2610
Minimum Speed @ Max. Outlet Pressure	rpm	500	500	500	500	500	500	500	500	500	500	500	500	500	500
Maximum Speed @ 0 Inlet & Max. Outlet Pressure	rpm	4000	4000	4000	3600	3600	3300	3000	3000	3000	2800	2800	2400	2300	2300
Pump Input Power @ Max. Pressure and 1500 rpm	kW	4.5	5.25	6	7.5	8.3	10.5	12	13.5	14.3	14.4	14.7	14.9	15.8	16.7
	HP	6.03	7.04	8.05	10.06	11.1	14.0	16.0	18.1	19.1	19.3	19.7	19.9	21.1	22.4
Dimension "L"	mm	51.8	53.3	54.9	57.9	59.4	64	67	70.1	71.6	76.6	77.6	83.7	84.2	89.8
	in	2.04	2.10	2.16	2.28	2.34	2.52	2.64	2.76	2.82	3.02	3.06	3.30	3.31	3.54
Approximate Weight ¹⁾	kg	3.4	3.44	3.47	3.55	3.57	3.71	3.79	3.89	3.91	3.95	4.06	4.21	4.23	4.37
	LB	7.51	7.60	7.67	7.85	7.89	8.20	8.38	8.60	8.64	8.73	8.97	9.30	9.35	9.66

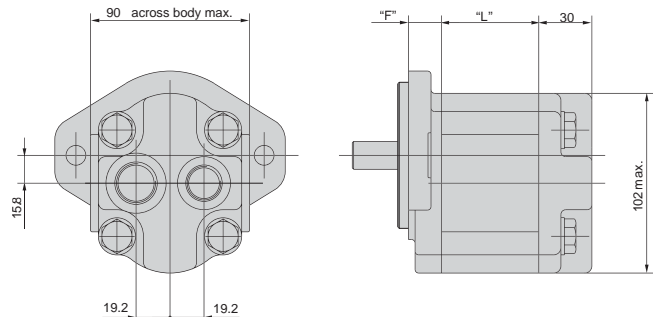
¹⁾ Single pump with Shaft End Cover Q1 and non ported Port End Cover.

PGP/PGM 511 Dimensions

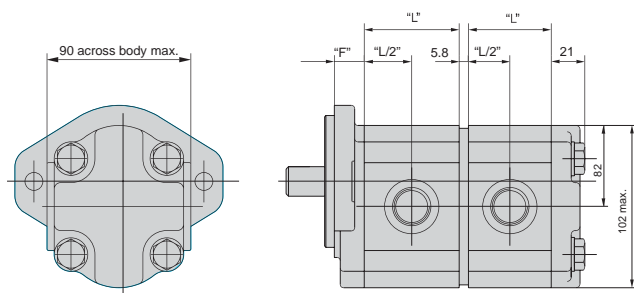
Single Unit PGP/PGM 511



Single Unit PGP/PGM 511 with rear ports



Tandem Unit PGP/PGM 511



NOTE:

Dimension "F" see shaft end covers on page 12
Dimension "L" see table above

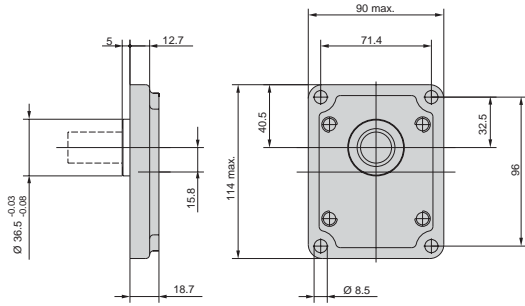
- Notes: 1. Dimensions are in millimeters.
 2. Dimensions are nominal except where noted.
 3. Subscript and/or superscript numbers are tolerances.
 4. To convert from millimeters to inches, divide millimeters by 25.4.

Heavy-Duty Aluminum Pumps and Motors

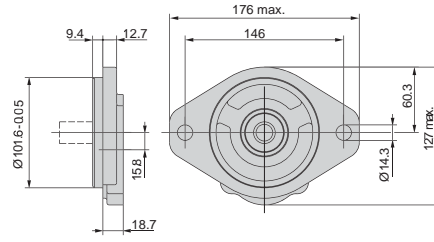
PGP/PGM 500 Series

PGP/PGM 511 Shaft End Covers

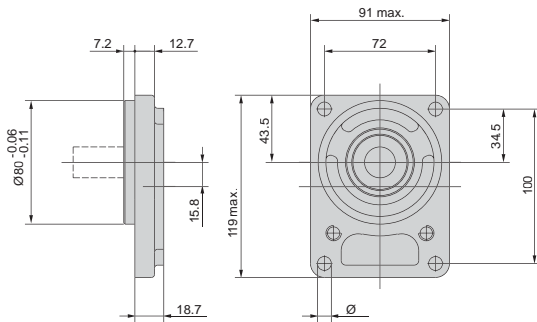
Code D3



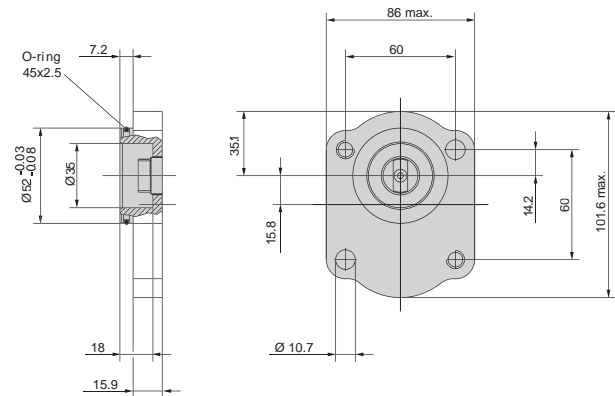
Code H3



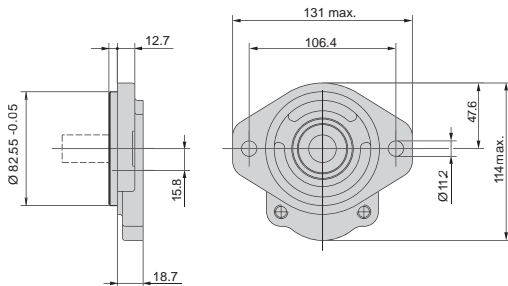
Code D4



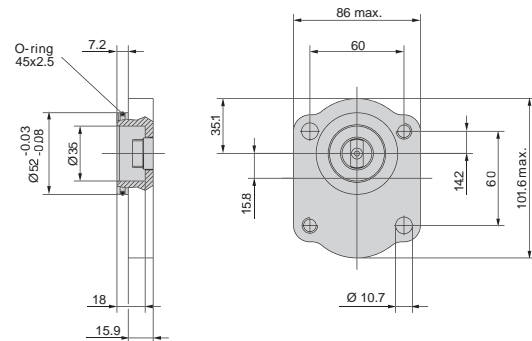
Code Q1



Code H2



Code Q3



- Notes: 1. Dimensions are in millimeters.
 2. Dimensions are nominal except where noted.
 3. Subscript and/or superscript numbers are tolerances.
 4. To convert from millimeters to inches, divide millimeters by 25.4.

PGP/PGM 511 Porting

Code D

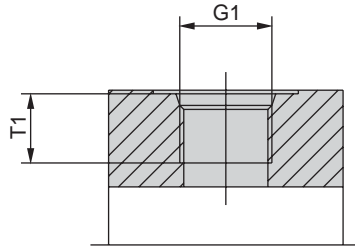
SAE straight thread

See table at right for specific port dimensions.

Code H

ISO metric straight

See table at right for specific port dimensions.



Code	G1 Thread	T1 Dimensions
D2	9/16"-18 UNF	12.7
D3	3/4"-16 UNF	14.3
D4	7/8"-14 UNF	16.7
D5	1 1/16"-12 UN	19.0
D6	1 5/16"-12 UN	19.0
D7	1 5/8"-12 UN	19.0
D8	1 7/8"-12 UN	19.0
H1	M 14x1.5	11.5
H2	M 16x1.5	13.0
H3	M 18x1.5	14.5
H4	M 22x1.5	15.5
H6	M 27x2	19.0
H8	M 33x2	19.0

Code N

SAE Split flange

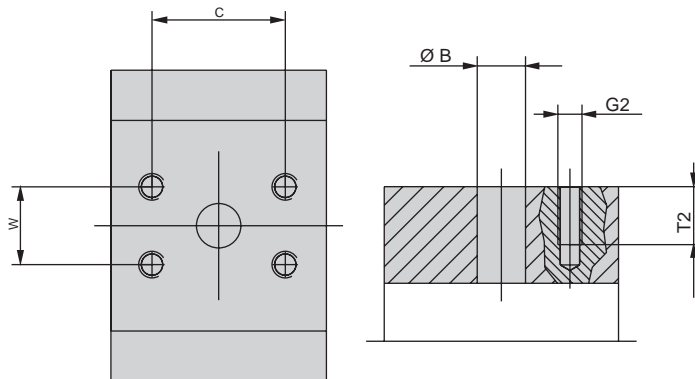
See table at right for specific port dimensions.

Code P

SAE Split flange

metric thread

See table at right for specific port dimensions.



Code	G2 Thread	Dimensions			
		Ø B	C	W	T2
N1	5/16"-18 UNC	12.7	38.10	17.48	15.0
N2	3/8"-16 UNC	19.0	47.63	22.23	14.0
N3	3/8"-16 UNC	25.4	52.37	26.19	20.6
N4	7/16"-14 UNC	31.8	58.72	30.17	20.6
P1	M 8x1.25	12.7	38.10	17.48	15.0
P2	M 10x1.50	19.0	47.63	22.23	20.6
P3	M 10x1.50	25.4	52.37	26.19	21.4
P4	M 10x1.50	31.8	58.72	30.17	20.6
P5	M 12x1.75	38.1	69.82	35.71	20.6

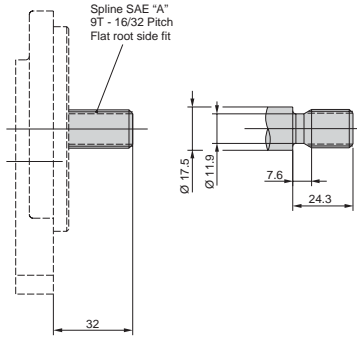
- Notes:
1. Dimensions are in millimeters.
 2. Dimensions are nominal except where noted.
 3. Subscript and/or superscript numbers are tolerances.
 4. To convert from millimeters to inches, divide millimeters by 25.4.

Heavy-Duty Aluminum Pumps and Motors

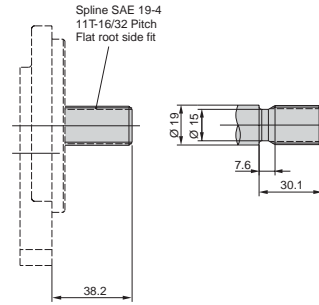
PGP/PGM 500 Series

PGP/PGM 511 Drive Shaft

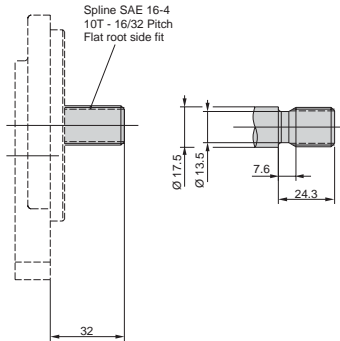
Code A1



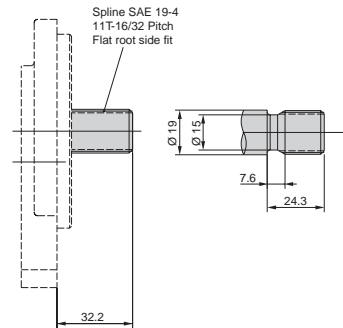
Code C1



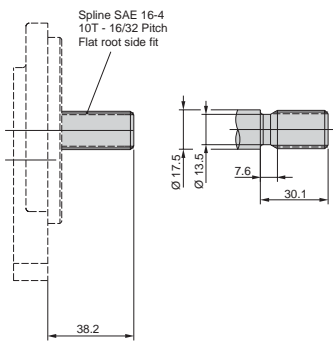
Code B1



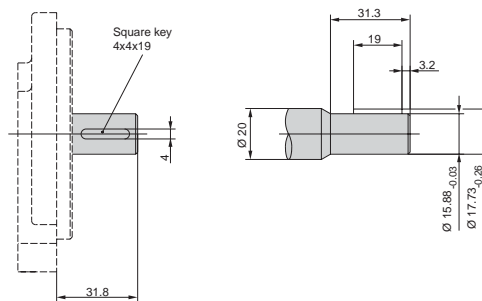
Code C2



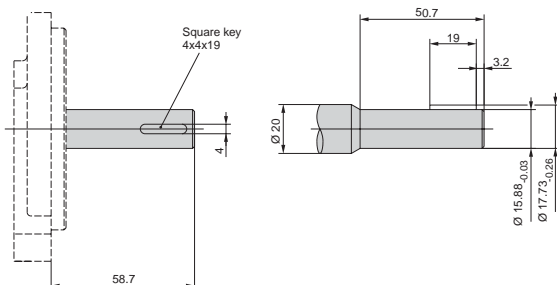
Code B2



Code K1



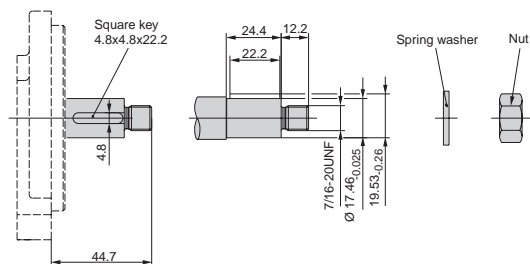
Code K4



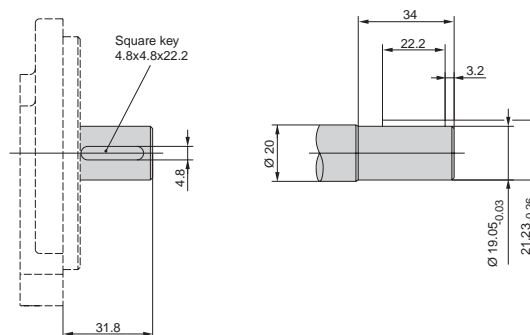
- Notes: 1. Dimensions are in millimeters.
2. Dimensions are nominal except where noted.
3. Subscript and/or superscript numbers are tolerances.
4. To convert from millimeters to inches, divide millimeters by 25.4.

PGP/PGM 511 Drive Shaft

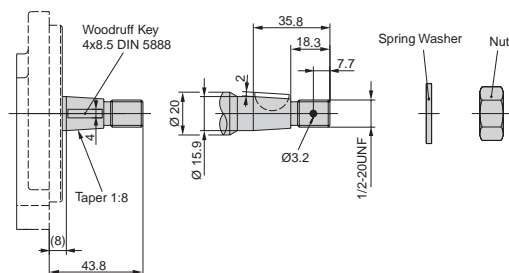
Code L1



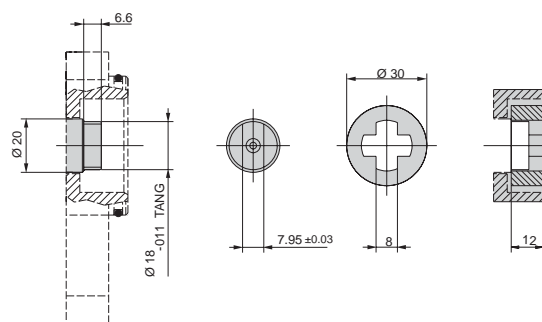
Code L6



Code R1



Code V5



- Notes: 1. Dimensions are in millimeters.
 2. Dimensions are nominal except where noted.
 3. Subscript and/or superscript numbers are tolerances.
 4. To convert from millimeters to inches, divide millimeters by 25.4.

PGP/PGM 511 - Shaft Load Capacity

Code	Description	Style	Torque Rating
A1	9T, 16/32 Pitch, 32L, SAE "A"	Spline	86Nm/759in-lb
B1	10T, 16/32 Pitch, 32L, SAE "A"	Spline	124Nm/1095in-lb
B2	10T, 16/32 Pitch, 38.2L, SAE "A"	Spline	124Nm/1095in-lb
C1	11T, 16/32 Pitch, 38.2L, SAE 19-4	Spline	184Nm/1625in-lb
C2	11T, 16/32 Pitch, 38.2L, SAE 19-4	Spline	184Nm/1625in-lb
K1	Ø 15.88 4.0 Key, no thread, 32L, SAE "A"	Parallel	75Nm/662in-lb
K4	Ø 15.88, 3.95 Key, no thread, 58.7L	Parallel	75Nm/662in-lb
L1	Ø 17.46, 4.8 Key, 7/16UNF ext., 44.2L	Parallel	112Nm/989in-lb
L6	Ø 19.05, 4.8 Key, no thread, 32L, SAE 19-1	Parallel	145Nm/1280in-lb
R1	Ø 15.9, 43.8L, 4.0 Key, ½UNF, SAE "A"	1:8 Taper	156Nm/1377in-lb
V5	8x6.6 Short Shaft	Tang Drive	60Nm/530in-lb
	Tandem pump Connecting Shaft	Spline	110Nm/971in-lb

When applying a multiple section pump, the maximum drive shaft load is determined by adding the torque values for each pumping section that will be simultaneously loaded.

$$\text{Torque [in-lb]} = \frac{\text{Displacement [in}^3\text{/rev]} \times \text{Pressure [psi]}}{5.72}$$

$$\text{Torque [Nm]} = \frac{\text{Displacement [cc/rev]} \times \text{Pressure [bar]}}{57.2}$$

Heavy-Duty Aluminum Pumps and Motors

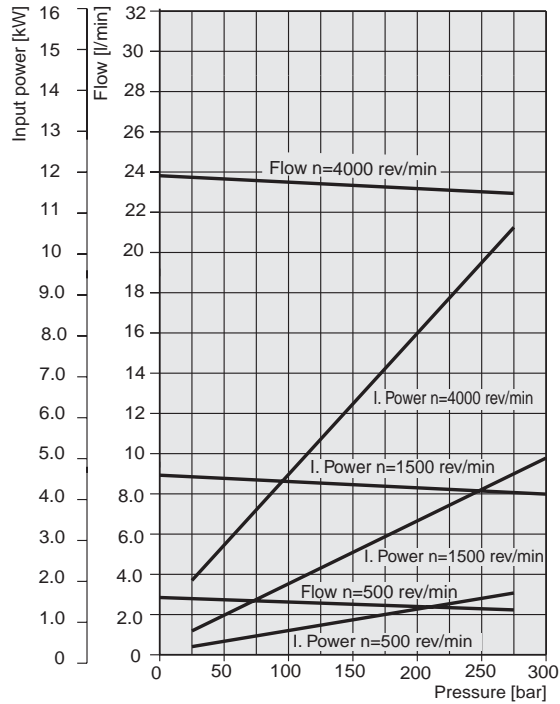
PGP/PGM 500 Series

PGP/PGM 511 - 6.0 CC

Fluid Temperature = $45 \pm 2^\circ\text{C}$

Viscosity = $36\text{mm}^2/\text{s}$

Inlet Pressure = $0.9 + 0.1$ bar absolute

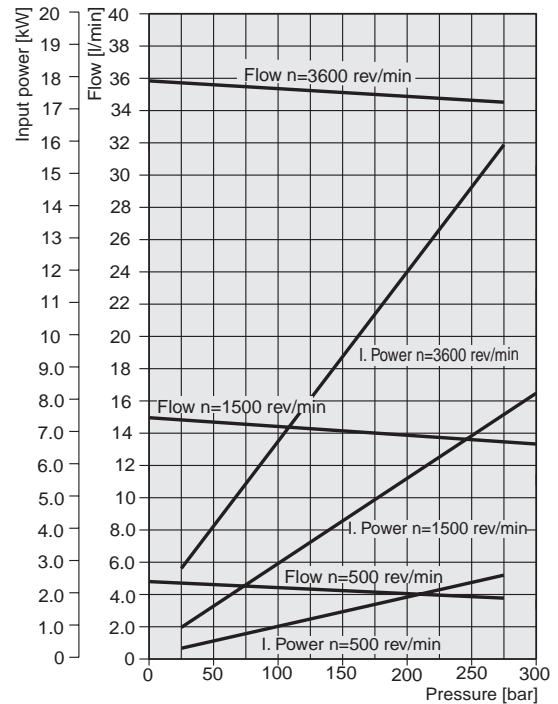


PGP/PGM 511 - 10.0 CC

Fluid Temperature = $45 \pm 2^\circ\text{C}$

Viscosity = $36\text{mm}^2/\text{s}$

Inlet Pressure = $0.9 + 0.1$ bar absolute

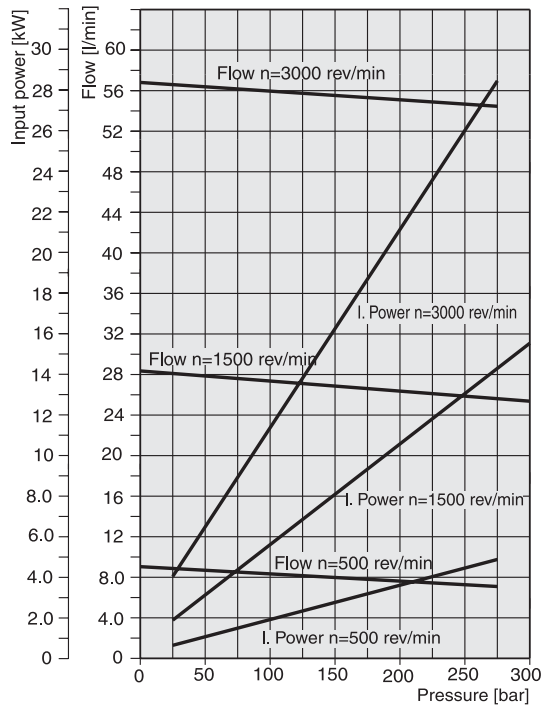


PGP/PGM 511 - 19.0 CC

Fluid Temperature = $45 \pm 2^\circ\text{C}$

Viscosity = $36\text{mm}^2/\text{s}$

Inlet Pressure = $0.9 + 0.1$ bar absolute

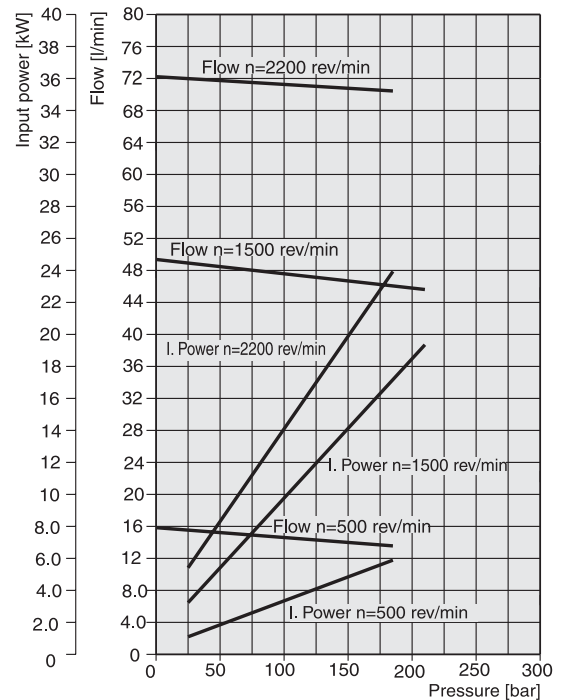


PGP/PGM 511 - 33.0 CC

Fluid Temperature = $45 \pm 2^\circ\text{C}$

Viscosity = $36\text{mm}^2/\text{s}$

Inlet Pressure = $0.9 + 0.1$ bar absolute

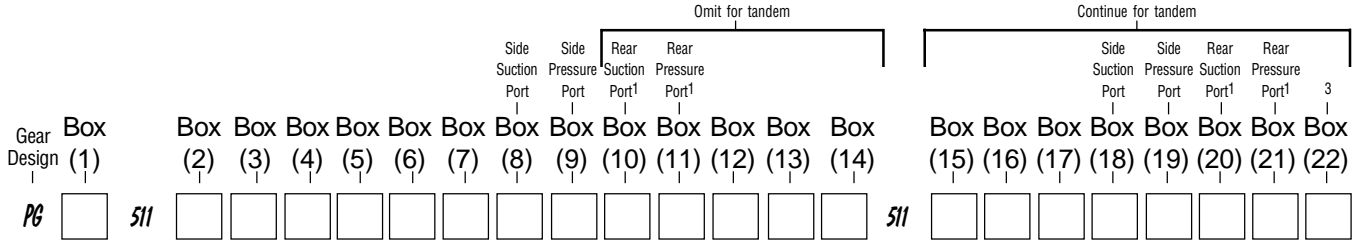


Performance data shown is based upon a series of laboratory tests and is not representative of any one unit.

Heavy-Duty Aluminum Pumps and Motors

PGP/PGM 500 Series

PGP/PGM 511 How to Specify



Box 1 Pump/Motor	
P	Pump
M	Motor
F	Flow divider

Boxes 3,16 Displacement	
0060	6.0 ccm
0070	7.0 ccm
0080	8.0 ccm
0100	10.0 ccm
0110	11.0 ccm
0140	14.0 ccm
0160	16.0 ccm
0180	18.0 ccm
0190	19.0 ccm
0210	21.0 ccm
0230	23.0 ccm
0270	27.0 ccm
0280	28.0 ccm
0310	31.0 ccm

Box 4 Rotation	
C	Clockwise
A	Counter clockwise
B	Bi-directional

Boxes 2,15 Unit		
	Pump	Motor
A	Single unit	Standard Motor w/o checks
B	Multiple unit	Standard Motor w/ two checks
C	—	Standard Motor w/one anti cavitation check (ACC)
D	—	Standard Motor w. one ACC + restrictor
M	Single distributor unit	—
N	Multiple distributor unit	—
S *	Single split gear unit	—
T *	Multiple split gear unit	—

Box 5 Shaft	
A1	9T, 16/32 Pitch, 32L, SAE "A" spline
B1	10T, 16/32 Pitch, 32L spline
B2	10T, 16/32 Pitch, 38.2L spline
C1	11T, 16/32 Pitch, 38.2L, SAE 19-4 spline
C2	11T, 16/32 Pitch, 32.2L, SAE 19-4 spline
K1	Ø15.88, 4.0 Key, no thread, 32L, SAE "A", parallel
K4	Ø15.88, 4.0 Key, no thread, 58.7L, parallel
L1	Ø17.46, 4.8 Key, 7/16" UNF ext., 44.7L, parallel
L6	Ø19.05, 4.8 Key, no thread, 32L, parallel
R1	Ø15.9, 8.0L, 4.0 Key, 1/2" UNF, SAE "A", taper 1:8
V5	8x6.5 short shaft, tang drive

* Only for displacement codes 0060 to 0280

NOTES:

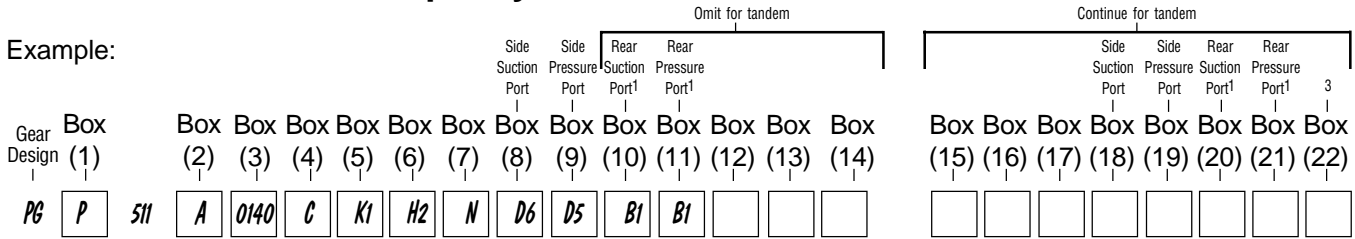
- 1 Only coded for the last section.
- 2 Only for motors
- 3 For further "B" triple unit repeat displacement, shaft seal between sections, side suction port, side pressure port, rear suction port, rear pressure port.

Heavy-Duty Aluminum Pumps and Motors

PGP/PGM 500 Series

PGP/PGM 511 How to Specify

Example:



Box 6 Shaft End Covers	
D3	71.4x96.0 - Ø36.47 rectangular
D4	72.0x100.0 - Ø80 rectangular
H2	106.4 - Ø82.55 SAE "A" 2bolt flange
H3	146.1 - Ø101.6 SAE "B" 2bolt flange
Q1	60.0x60.0 - Ø52.0 w/o seal , O' thrubolt flange
Q2	60.0x60.0 - Ø50.0 w. seal , O' thrubolt flange
Q3	60.0x60.0 - Ø52.0 w/o seal , O' thrubolt flange
Q4	60.0x60.0 - Ø50.0 w. seal , O',thrubolt flange
J5	H2 with slots, spec 2bolt
F3	71.4x96.0 - Ø36.47 rect., w. OBB and cont. drive shaft
F4	72.0x100.0 - Ø80.0 rect., w. OBB and cont. drive shaft
L2	106.4 - Ø82.55 SAE "A" 2bolt, w. OBB + cont. drive shaft
L3	146.1 - Ø101.6 SAE "B" 2bolt, w. OBB + cont. drive shaft
L5	106.4 - Ø82.55 SAE "A" 2bolt, w. OBB + int. drive shaft
L6	146.1 - Ø101.6 SAE "B" 2bolt, w. OBB + int. drive shaft

Boxes 8,9,10,11,18,19,20,21 Port Options	
B1	No ports
D2	9/16" - 18 UNF thread
D3	3/4" - 16 UNF thread
D4	7/8" - 14 UNF thread
D5	1 1/16" - 12UN thread
D6*	1 5/16" - 12 UN thread
D7*	1 5/8" - 12 UN thread
D8*	1 7/8" - 12 UN thread
H1	M 14x1.5 thread
H2	M 16x1.5 thread
H3	M 18x1.5 thread
H4	M 22x1.5 thread
H6*	M 27x2 thread
H8*	M 33x2 thread
N1*	1/2"-5/16"-18UNC SAE Split Flange
N2*	3/4"-3/8"-16UNC SAE Split Flange
N3*	1 3/8"-16UNC SAE Split Flange
N4*	1 1/4"-7/16-14UNC SAE Split Flange
P1*	12.7mm - M8 Metric Split Flange
P2*	19.0mm - M10 Metric Split Flange
P3*	25.4mm - M10 Metric Split Flange
P4*	31.8mm - M10 Metric Split Flange
P5*	38.1mm - M12 Metric Split Flange

*Not usable for rear ports.

Box 12 Motor Drain Option ²	
B1	No drain
C	9/16-18 UNF thread

Box 13 Drain Position ²	
2	Drain on bottom
3	Drain on top
4	Rear drain
5	Drain right view on drive shaft
6	Drain left view on drive shaft

Box 14 Section Connection	
S	Separate inlets
C	Common inlets

Boxes 7,17 Shaft Seal	
X	No seal
N	NBR
V	FPM, FKM
M	Double NBR
W	Double FPM

NOTES:

- 1 Only coded for the last section.
- 2 Only for motors
- 3 For further "B" triple unit repeat displacement, shaft seal between sections, side suction port, side pressure port, rear suction port, rear pressure port.

Heavy-Duty Aluminum Pumps and Motors

PGP/PGM 500 Series

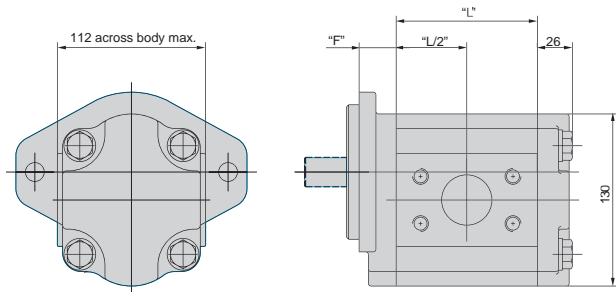
PGP/PGM 517 Specifications

Description	Code	0140	0160	0190	0230	0250	0280	0330	0360	0380	0440	0520
Displacements	cm ³ /rev	14	16	19	23	25	28	33	36	38	44	52
	in ³ /rev	0.85	0.98	1.16	1.40	1.53	1.71	2.01	2.20	2.32	2.68	3.17
Continuous Pressure	bar	250	250	250	250	250	250	250	250	250	220	200
	psi	3625	3625	3625	3625	3625	3625	3625	3625	3625	3190	2900
Intermittent Pressure	bar	275	275	275	275	275	275	275	275	255	220	215
	psi	3988	3988	3988	3988	3988	3988	3988	3988	3698	3190	3118
Minimum Speed @Max. Outlet Pressure	rpm	500	500	500	500	500	500	500	500	500	500	500
Maximum Speed @ 0 Inlet & Max. Outlet Pressure	rpm	3400	3400	3300	3300	3100	3100	3100	3000	3000	2800	2600
Pump Input Power @ Max. Pressure and 1500 rpm	kW	9.6	11	13.1	15.8	17.2	19.3	22.7	24.6	26.1	27	28.6
	HP	12.87	14.75	17.57	21.19	23.07	25.88	30.44	32.99	35.00	36.21	38.35
Dimension "L"	mm	68.3	70.3	73.3	77.4	79.4	82.4	87.5	90.5	92.5	98.6	106.7
	in	2.69	2.77	2.89	3.05	3.13	3.24	3.44	3.56	3.64	3.88	4.20
Approximate Weight *	kg	7.92	8	8.12	8.29	8.37	8.5	8.7	8.83	8.91	9.16	9.49
	LB	17.50	17.68	17.95	18.32	18.50	18.79	19.23	19.51	19.69	20.24	20.97

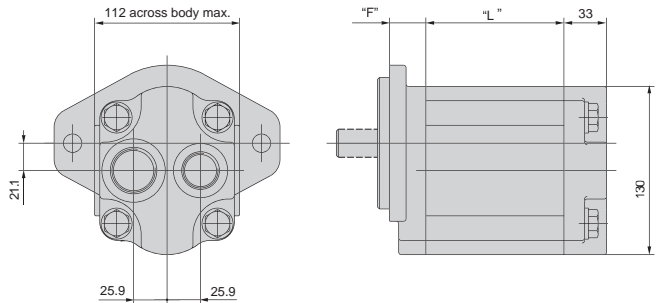
*Single pump with Shaft End Cover H3 and non ported Port End Cover.

PGP/PGM 517 Dimensions

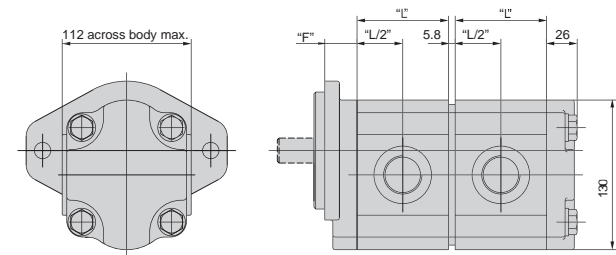
Single Unit PGP/PGM 517



Single Unit PGP/PGM 517 with rear ports



Tandem Unit PGP/PGM 517



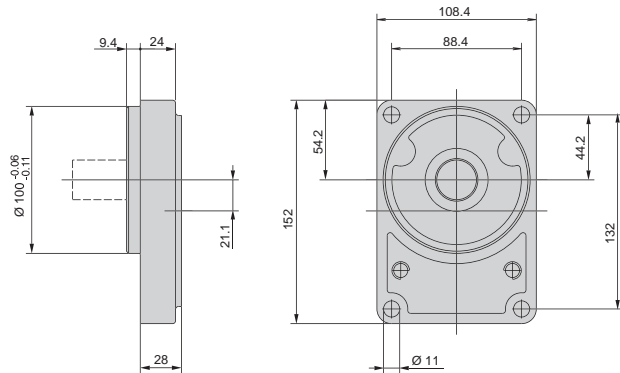
NOTE:

Dimension "F" see shaft end covers on page 21
Dimension "L" see table above

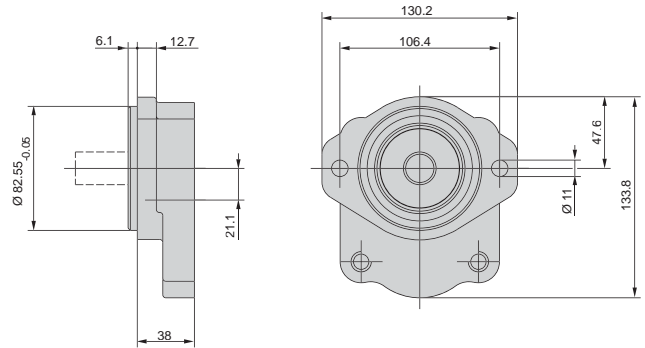
- Notes: 1. Dimensions are in millimeters.
2. Dimensions are nominal except where noted.
3. Subscript and/or superscript numbers are tolerances.
4. To convert from millimeters to inches, divide millimeters by 25.4.

PGP/PGM 517 Shaft End Covers

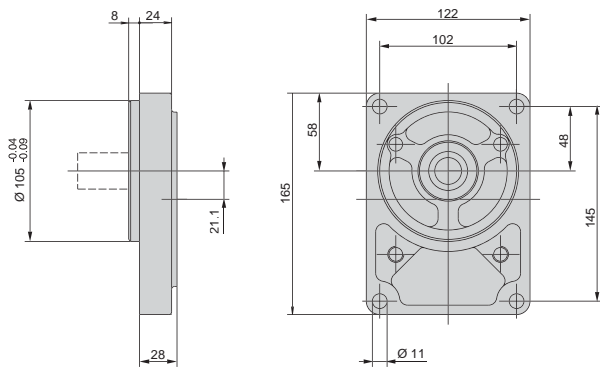
Code D5



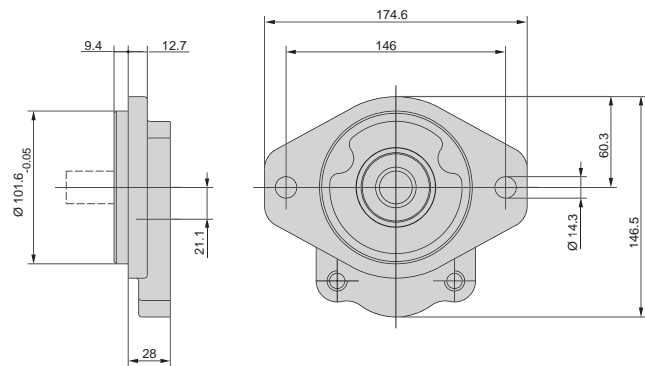
Code H2/L2



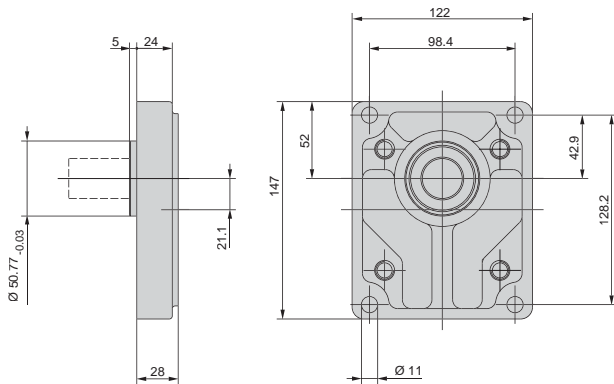
Code D6



Code H3



Code D7



- Notes:
1. Dimensions are in millimeters.
 2. Dimensions are nominal except where noted.
 3. Subscript and/or superscript numbers are tolerances.
 4. To convert from millimeters to inches, divide millimeters by 25.4.

Heavy-Duty Aluminum Pumps and Motors

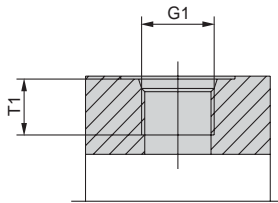
PGP/PGM 500 Series

PGP/PGM 517 Porting

Code D

SAE straight thread

See table below for specific port dimensions.



PGP/PGM 517

Code	G1	T1
Thread	Dimensions	
D2	9/16"-18 UNF	12.7
D3	3/4"-16 UNF	14.3
D4	7/8"-14 UNF	16.7
D5	1 1/16"-12 UN	19.0
D6	1 5/16"-12 UN	19.0
D7	1 5/8"-12 UN	19.0
D8	1 7/8"-12 UN	19.0

Code N

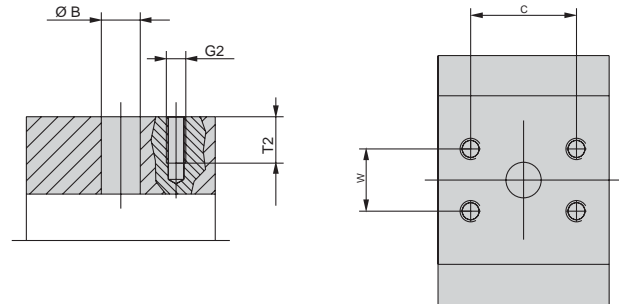
SAE split flange

See table below for specific port dimensions.

Code P

SAE split flange metric thread

See table below for specific port dimensions.



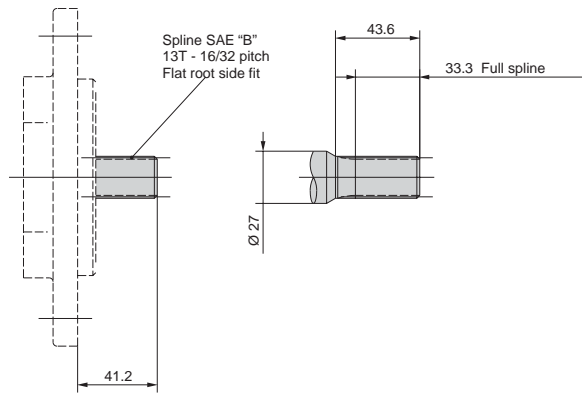
PGP/PGM 517

Code	G2 Thread	Ø B	C	W	T2
N1	5/16"-18 UNC	12.7	38.10	17.48	15.0
N2	3/8"-16 UNC	19.0	47.63	22.23	14.0
N3	3/8"-16 UNC	25.4	52.37	26.19	20.6
N4	7/16"-14 UNC	31.8	58.72	30.17	20.6
N5	1/2"-13 UNC	38.1	69.82	35.71	20.6
P1	M 8x1.25	12.7	38.10	17.48	15.0
P2	M 10x1.50	19.0	47.63	22.23	20.6
P3	M 10x1.50	25.4	52.37	26.19	21.4
P4	M 10x1.50	31.8	58.72	30.17	20.6
P5	M 12x1.75	38.1	69.82	35.71	20.6

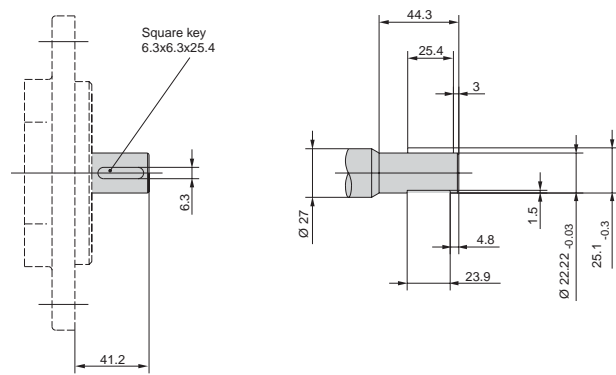
- Notes: 1. Dimensions are in millimeters.
 2. Dimensions are nominal except where noted.
 3. Subscript and/or superscript numbers are tolerances.
 4. To convert from millimeters to inches, divide millimeters by 25.4.

PGP/PGM 517 Drive Shaft

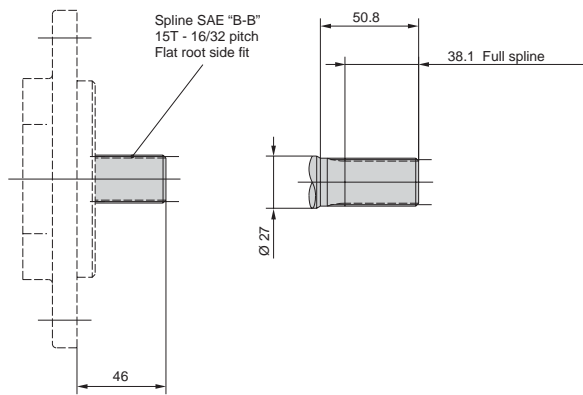
Code D1



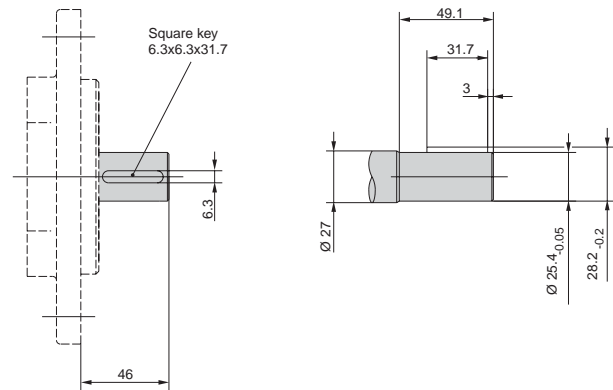
Code M1



Code E1



Code M2



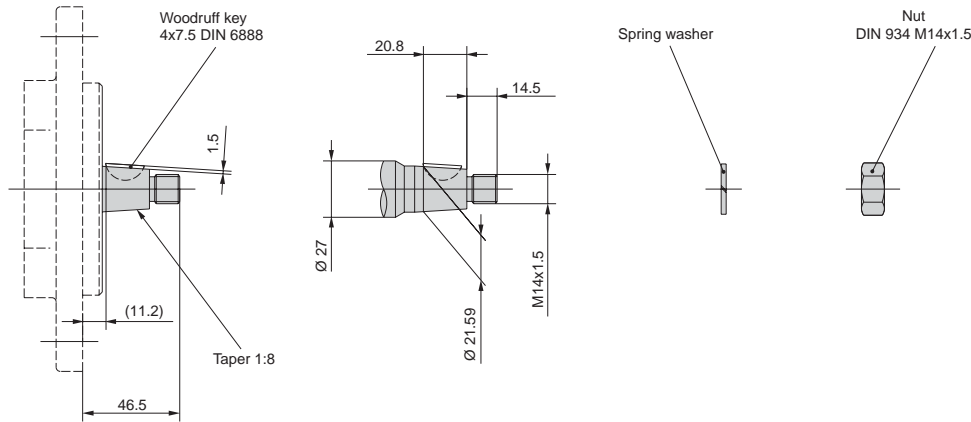
- Notes:
1. Dimensions are in millimeters.
 2. Dimensions are nominal except where noted.
 3. Subscript and/or superscript numbers are tolerances.
 4. To convert from millimeters to inches, divide millimeters by 25.4.

Heavy-Duty Aluminum Pumps and Motors

PGP/PGM 500 Series

PGP/PGM 517 Drive Shaft

Code T1



- Notes: 1. Dimensions are in millimeters.
 2. Dimensions are nominal except where noted.
 3. Subscript and/or superscript numbers are tolerances.
 4. To convert from millimeters to inches, divide millimeters by 25.4.

PGP/PGM 517 - Shaft Load Capacity

Code	Description	Style	Torque Rating
D1	13T, 16/32 Pitch, 41.2L, SAE "B"	Spline	345Nm/3046in-lb
E1	15T, 16/32 Pitch, 46L, SAE "B-B"	Spline	530Nm/4680in-lb
M1	Ø 22.2, 6.3 Key, no thread, 41.2L, SAE "B"	Parallel	251Nm/2216in-lb
M2	Ø 25.4, 6.3 Key, no thread, 46L, SAE "B-B"	Parallel	395Nm/3488in-lb
T1	Ø 21.59, 46.5L, 4.0 Key, M14x1.5	1:8 Taper	250Nm/2207in-lb
	Tandem pump Connecting Shaft	Spline	228Nm/2013in-lb

When applying a multiple section pump, the maximum drive shaft load is determined by adding the torque values for each pumping section that will be simultaneously loaded.

$$\text{Torque [in-lb]} = \frac{\text{Displacement [in}^3\text{/rev]} \times \text{Pressure [psi]}}{5.72} \quad \text{Torque [Nm]} = \frac{\text{Displacement [cc/rev]} \times \text{Pressure [bar]}}{57.2}$$

Heavy-Duty Aluminum Pumps and Motors

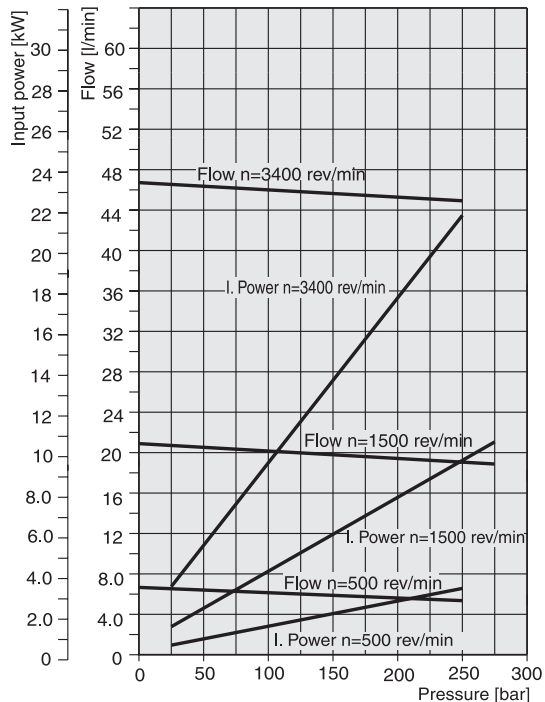
PGP/PGM 500 Series

PGP/PGM 517- 14.0 CC

Fluid Temperature = $45 \pm 2^\circ\text{C}$

Viscosity = $36\text{mm}^2/\text{s}$

Inlet Pressure = $0.9 + 0.1$ bar absolute

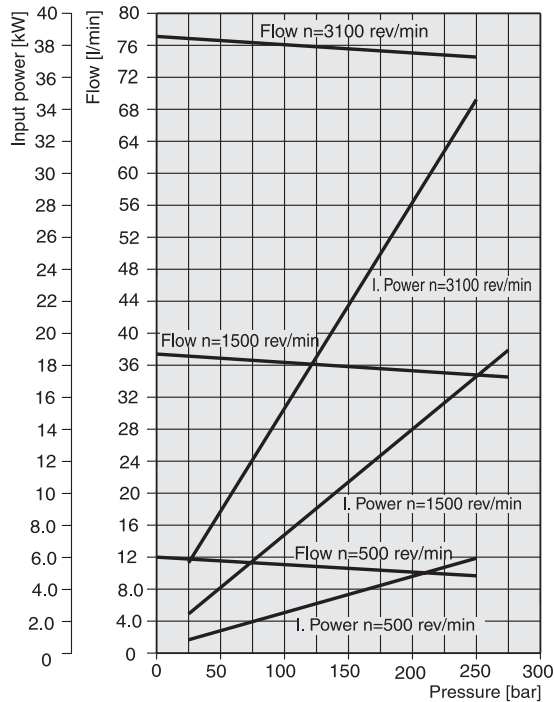


PGP/PGM 517 -25.0 CC

Fluid Temperature = $45 \pm 2^\circ\text{C}$

Viscosity = $36\text{mm}^2/\text{s}$

Inlet Pressure = $0.9 + 0.1$ bar absolute

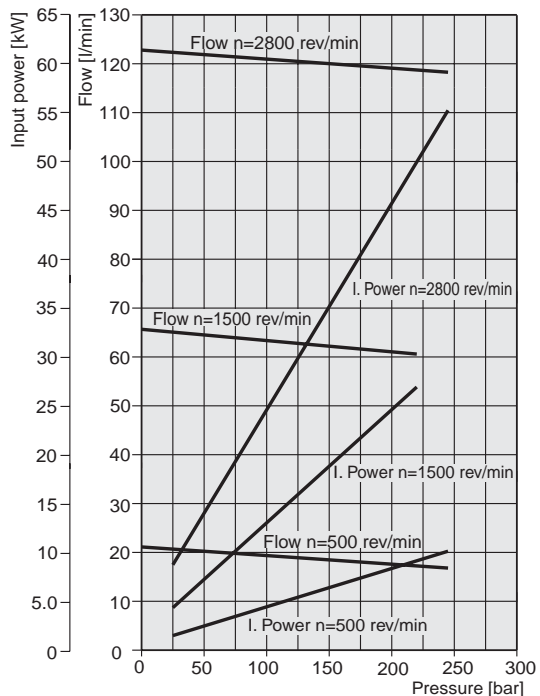


PGP/PGM 517 - 44.0 CC

Fluid Temperature = $45 \pm 2^\circ\text{C}$

Viscosity = $36\text{mm}^2/\text{s}$

Inlet Pressure = $0.9 + 0.1$ bar absolute

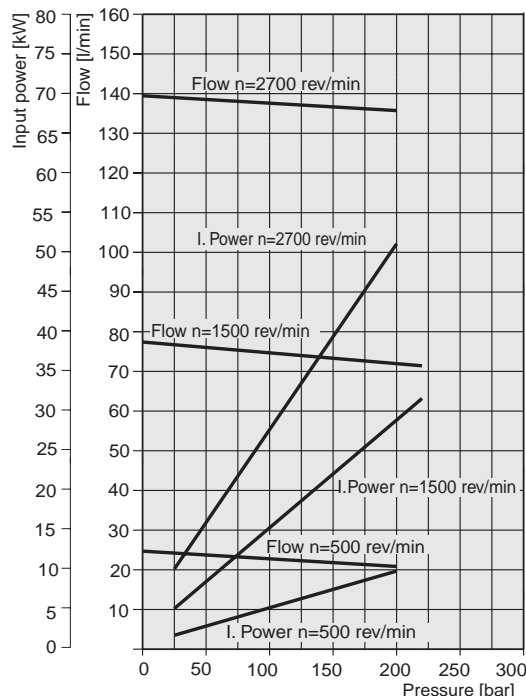


PGP/PGM 517- 52.0 CC

Fluid Temperature = $45 \pm 2^\circ\text{C}$

Viscosity = $36\text{mm}^2/\text{s}$

Inlet Pressure = $0.9 + 0.1$ bar absolute

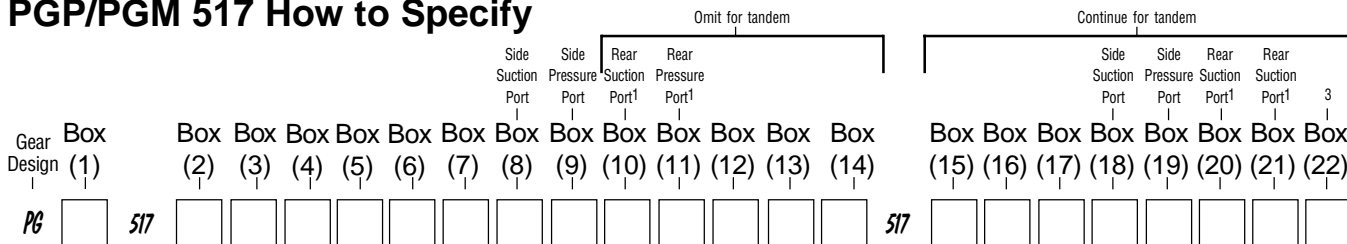


Performance data shown is based upon a series of laboratory tests and is not representative of any one unit.

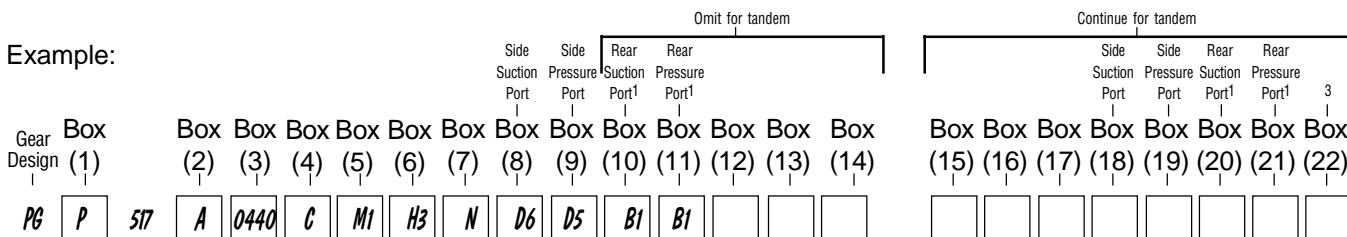
Heavy-Duty Aluminum Pumps and Motors

PGP/PGM 500 Series

PGP/PGM 517 How to Specify



Example:



Box 1 Pump/Motor	
P	Pump
M	Motor
F	Flow divider

Boxes 2,15 Unit		
	Pump	Motor
A	Single unit	Standard Motor w/o checks
B	Multiple unit	Standard Motor w/ two checks
C	—	Standard Motor w/one anti cavitation check (ACC)
M	Single distributor unit	—
N	Multiple distributor unit	—

Boxes 3,16 Displacement	
0140	14 ccm
0160	16 ccm
0190	19 ccm
0230	23 ccm
0250	25 ccm
0280	28 ccm
0330	33 ccm
0360	36 ccm
0380	38 ccm
0440	44 ccm
0520	52 ccm

Box 4 Rotation	
C	Clockwise
A	Counter clockwise
B	Bi-directional

Box 5 Shaft	
D1	13T, 16/32 Pitch, 41.2L, SAE "B" spline
E1	15T, 16/32 Pitch, 46L, SAE "B-B" spline
M1	Ø22.2, 6.3 Key, no thread, 41.2L, SAE "B", parallel
M2	Ø25.4, 6.3 Key, no thread, 46L, SAE "B-B", parallel
T1	Ø21.59, 11.2L, 4.0 Key, M14x1.5, taper 1:8

Box 6 Shaft End Covers	
D5	88.4x132.0 - Ø99.94 rectangular
D6	102.0x145.0 - Ø104.96 rectangular
D7	98.4x128.2 - Ø50.77 rectangular
H2	106.4 - Ø82.55 SAE "A" 2bolt flange
H3	146.1 - Ø101.6 SAE "B" 2bolt flange

Boxes 7,17 Shaft Seal	
X	No seal
N	NBR
V	FPM, FKM
M	Double NBR
W	Double FPM

NOTES:

- 1 Only coded for the last section.
- 2 Only for motors
- 3 For further "B" triple unit repeat displacement, shaft seal between sections, side suction port, side pressure port, rear suction port, rear pressure port.

Boxes 8,9,10,11,18,19,20,21 Port Options	
B1	No ports
D3	3/4" - 16 UNF thread
D4	7/8" - 14 UNF thread
D5	1 1/16" - 12UN thread
D6*	1 5/16" - 12 UN thread
D7*	1 5/8" - 12 UN thread
D8*	1 7/8" - 12 UN thread
N1*	1/2", 5/16" - 18UNC SAE Split Flange
N2*	3/4", 3/8" - 6UNC SAE Split Flange
N3*	1", 3/8" - UNC SAE Split Flange
N4*	1 1/4"-7/16", 14UNC SAE Split Flange
N5*	1 1/2"-7/16", 13UNC SAE Split Flange
P1*	12.7mm - M8 Metric Split Flange
P2*	19.0mm - M10 Metric Split Flange
P3*	25.4mm - M10 Metric Split Flange
P4*	31.8mm - M10 Metric Split Flange
P5*	38.1mm - M12 Metric Split Flange

*Not usable for rear ports

Box 12 Motor Drain Option ²	
B1	No drain
C	9/16-18 UNF thread
P	M12x1.5 metric thread

Box 13 Drain Position ²	
2	Drain on bottom
3	Drain on top
4	Rear drain

Box 14 Section Connection	
S	Separate inlets
C	Common inlets

Integral Valve Options and Market Experience

This appendix provides overviews of the valves currently offered as well as options that are available from the wide range of Parker gear pumps and motors. Many valves are already in production for OEM customers on specific pumps or motors, while others have been supplied for prototype evaluation. A few valves are derivatives of valves already in production and can be produced for OEM customers. Parker's integral valve program was developed in response

to requests from our OEM customers to reduce the number and total cost of components on their machines. We addressed this challenge by integrating the valves required for machine functions into our hydraulic pumps and motors. This integration has reduced the number of purchased components, eliminated many of the hydraulic hoses and associated fittings (and potential leak points), and reduced assembly labor costs on the production line.

Applications:	Implement Pumps (Single)	Implement Pumps (Tandem)	Triple and Quad Pumps	Two Stage Pumps	Power Steering Pumps	Power Steering/Fan Drive Pumps	Fan Drive Pumps	Direct Acting Relief Valves	Pilot Operated Relief Valves	Load Sensing Relief Valves	Solenoid Unloading Relief Valves	Unloaders for Tandem Pumps	Priority Flow Dividers	Load Sense Priority Valves	Single Accumulator Charge Pumps	Dual Accumulator Charge Pumps	Single Accumulator Charge Valves	Dual Accumulator Charge Valves	Load Sense Charge Valves	Modulating Brake Valves	Hydraulic Motors	Motors with Integral Relief Valves	Motors with Cross Port Relief Valves	Motors with Integral By-Pass Valves	Steering & Accumulator Charge Valve (STAC)	Custom Valve Manifolds	Brake Valve	Check Valve & Restrictor
Materials Handling																												
Electric Lift Trucks	•	•		•				•	•				•	•	•		•									•		
I.C. Powered Lift Trucks	•	•		•					•	•			•	•												•		
Rough Terrain Lift Trucks	•	•		•						•			•	•	•	•	•	•	•	•						•		
Turf Care and Grasscutting																												
Reel Commercial Mowers	•	•	•	•	•	•	•	•	•		•		•	•								•	•	•		•		•
Rotary Commercial Mowers	•	•	•	•	•	•	•	•	•		•		•	•								•	•	•		•		•
Heavy Duty Industrial Mowers	•	•	•	•	•	•	•	•	•		•		•	•							•	•	•		•	•	•	
Construction Equipment																												
Road Construction	•	•		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Wheel Loaders		•		•	•	•	•	•	•			•	•	•	•	•	•	•	•	•					•	•		
Backhoe-Loaders		•	•	•	•	•	•	•	•			•	•	•	•	•	•	•	•	•					•	•		
Cranes and Winches	•	•	•	•	•	•	•	•	•		•		•	•						•	•	•	•		•	•		
Haul Trucks			•	•	•									•	•	•	•	•	•	•	•	•	•			•		
Truck, Bus & Rec. Vehicles				•	•	•	•	•					•	•				•	•	•	•	•				•		
Municipal, Street Sweepers	•	•	•	•	•	•	•	•	•		•		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	

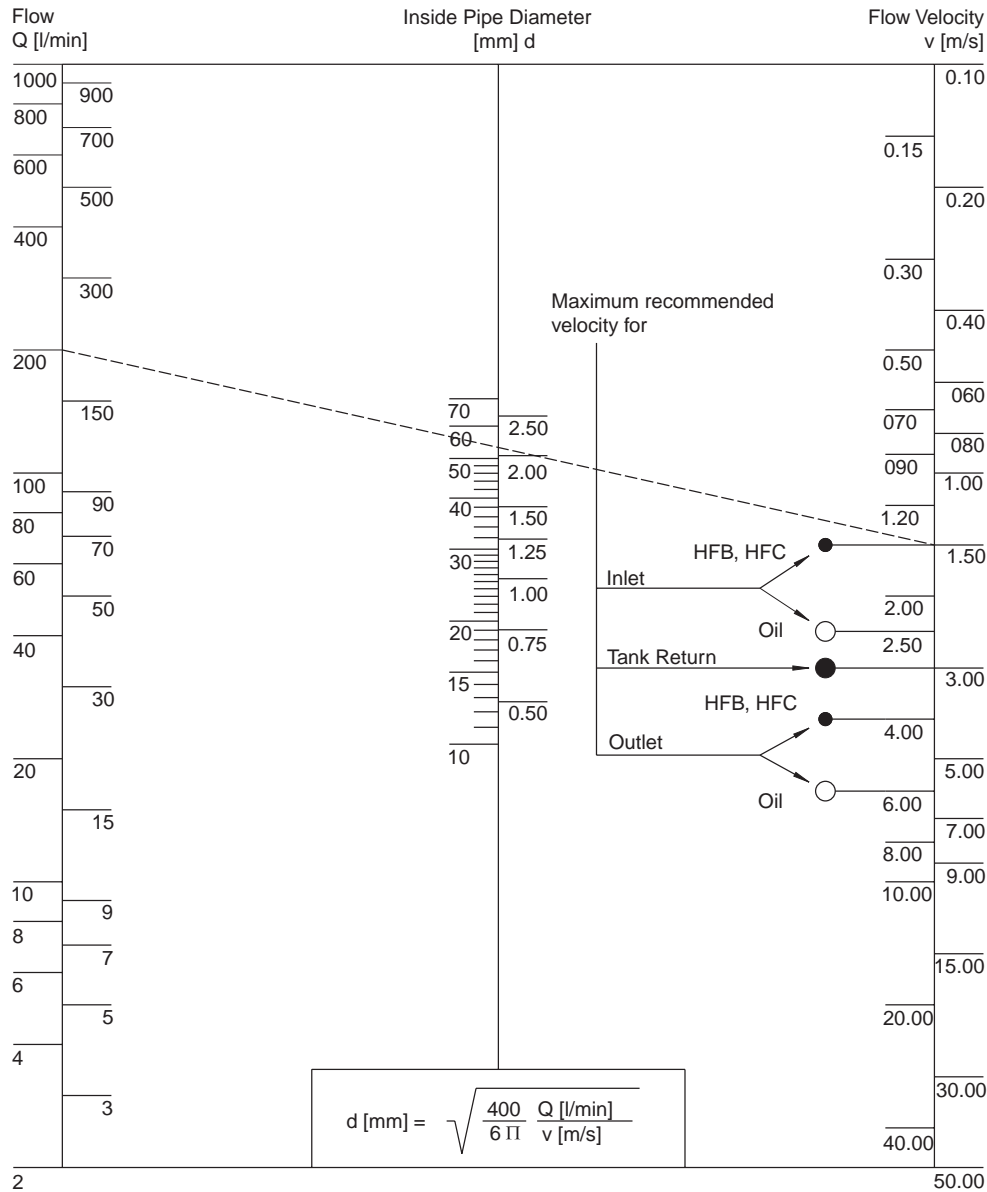
Heavy-Duty Aluminum Pumps and Motors

PGP 500 Series

List of available pump combinations - PGP 505, PGP 511 and PGP 517

First pump	Second pump		
	PGP 505	PGP 511	PGP 517
PGP 505	X		
PGP 511		X	
PGP 517	X	X	X

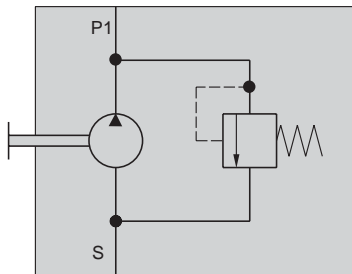
Nomograph for Pipe Velocity



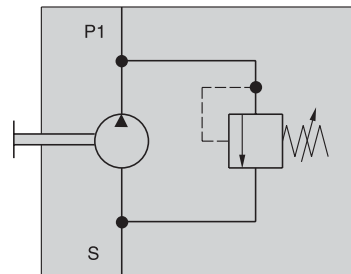
Integral Valve Options - PGP 505, PGP 511 and PGP 517

VALVE TYPE	PGP		
	505	511	517
Pressure Relief Valve	X	X	X
Load Sensing Pressure Relief Valve		X	X
Solenoid Unloading Pressure Relief Valve		X	X
Pressure Unloading Relief Valve (Port Mounted)		X	X
Solenoid Unloading Relief Valve (Port Mounted)		X	X
Priority Flow Divider		X	X
Priority Flow Divider (Port Mounted)		X	X
Load Sensing Priority Valve		X	X
Load Sensing Priority Valve (Port Mounted)		X	X
Two - Stage Pump	X	X	X
Single Accumulator Charge Valve		X	
Dual Accumulator Charge Valve		X	
Steering and Accumulator Charge Valve (STAC)			

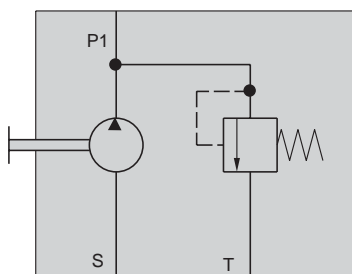
Pressure Relief Valve - PGP 505, PGP 511 and PGP 517



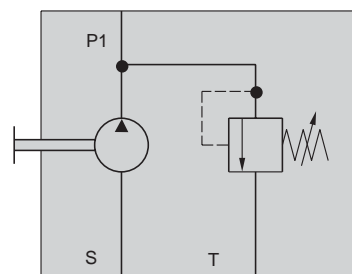
non adjustable, internal vent



adjustable, internal vent



non adjustable, external tank port



adjustable, external tank port

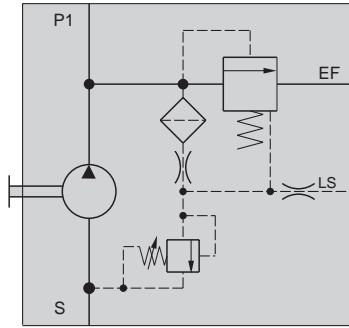
Variations: PGP 505, PGP 511 and PGP 517

- Non adjustable, internal vent
- Non adjustable, external tank port
- Adjustable, internal vent
- Adjustable, external tank port

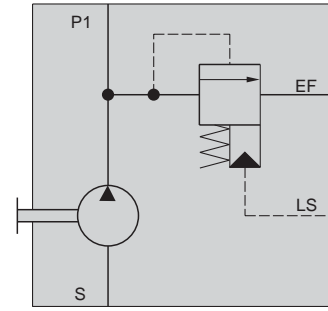
Heavy-Duty Aluminum Pumps and Motors

PGP 500 Series

Load-Sense Pressure-Relief Valve - PGP 511 and PGP 517



Detailed Symbol

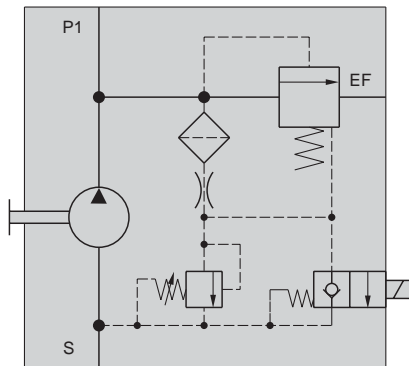


Simplified Symbol

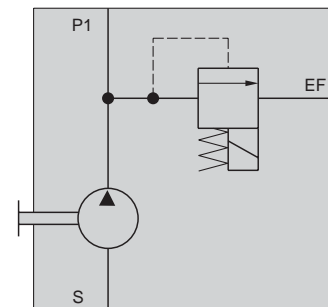
- Variations:**
- | | |
|-------------------------|-----------|
| PGP 511 | |
| Integral with pump | 70 l/min |
| With solenoid unloading | |
| PGP 517 | |
| Integral with pump, | 100 l/min |
| With solenoid unloading | |
- Press. Range:** Stand-by pressure setting 5 bar
 Max. setting 250 bar
- Max. Flow:** **PGP 511** 70 l/min
PGP 517 100 l/min

Comments:
 The Load-Sense feature allows the gear pump and integral valve to be used with load-sense directional valves. This feature also allows remote adjustment of the pump pressure up to the limit set by the internal pilot relief. Conversion to the pilot-operated relief valve is achieved by plugging the Load-Sense (LS) port. The pump body requires an outlet port. This pump and valve assembly can also be used with a small, external, direct-acting relief valve for remote pressure control of the pump.

Solenoid Unloading Pressure Relief Valve - PGP 511 and PGP 517



Normally closed (N/C)



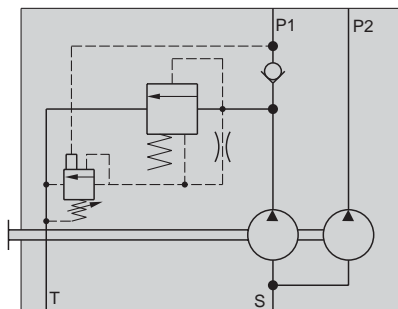
Simplified Symbol

Detailed Symbol  Normally opened (N/O)

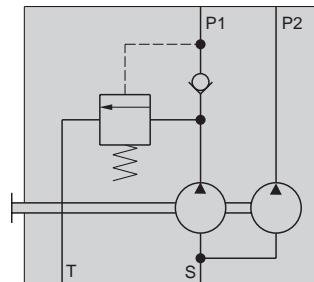
- Variations:** **PGP 511 and PGP 517**
 Specify voltage and whether N/O or NC
- Press. Range:** Stand-by pressure setting 5 bar
 Max. setting 250 bar
- Max. Flow:** **PGP 511** 70 l/min
PGP 517 100 l/min

Comments:
 This valve utilizes the same casting, main spool and pilot relief as the Load-Sense, Pressure-Relief Valve. A small, solenoid-operated, cartridge valve vents the internal pilot flow to the pump inlet to unload the main spool. The outlet port is in the pump body and the excess flow (EF) is connected to the reservoir via the heat exchanger and/or the return-line filter.

Unloading Relief Valve, Pressure-Operated - PGP 511 and PGP 517



Detailed Symbol

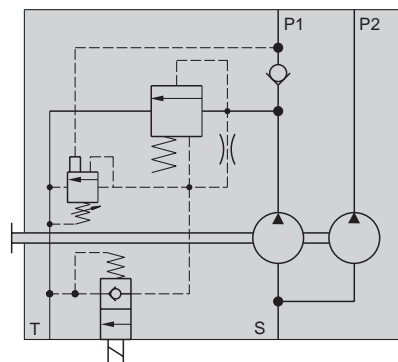


Simplified Symbol

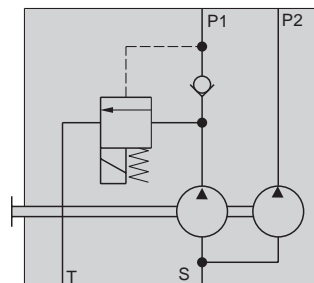
- Variations:** **PGP 511 and PGP 517**
 Port mounted, integral with pump
- Press. Range:** Stand-by pressure setting 5 bar
 Max. setting 250 bar
 Min setting 55 bar
- Max. Flow:** 80 l/min

Comments:
 This valve permits pressure unloading of the first section in the tandem. The valve may also be remote mounted for use with tandem or dual pumps. The flow from port P1 is typically combined with the flow from port P2. This valve is often used on construction machinery, such as backhoe loaders, wheel loaders and cranes. Its purpose is to provide high flow (from both sections of the tandem) at low or medium pressures and high pressure with reduced flow (from the rear section only). This allows maximum productivity of the machine in relation to the power available to the pump.

Unloading Relief Valve, Solenoid-Operated - PGP 511 and PGP 517



Detailed Symbol



Simplified Symbol

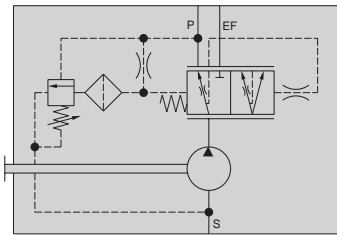
- Variations:** **PGP 511 and PGP 517**
 Port mounted, integral with pump
- Press. Range:** Stand-by pressure setting 5 bar
 Max. setting 250 bar
 Min setting 55 bar
- Max. Flow:** 80 l/min

Comments:
 This valve permits pressure or solenoid unloading of the first section in a tandem. The valve may also be remote mounted for use with tandem or dual pumps. The flow from port P1 is typically combined with the flow from port P2. This valve is often used on construction machinery, such as backhoe loaders, wheel loaders and cranes. Its purpose is to provide high flow (from both sections of the tandem) at low or medium pressures and high pressure with reduced flow (from the rear section only). This allows maximum productivity of the machine in relation to the power available to the pump.

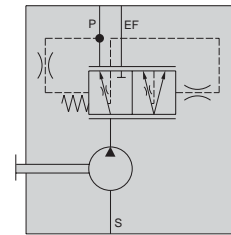
Heavy-Duty Aluminum Pumps and Motors

PGP 500 Series

Priority Flow Divider - PGP511 and PGP517



With Pilot Priority Relief Valve



Without Priority Relief Valve

Variations: **PGP 511 and PGP 517 Rear Mounted Versions:**
 Without priority relief; With full flow priority relief (not shown) With pilot priority relief valve

PGP 511 and PGP 517 Port Mounted Version:
 Without priority relief

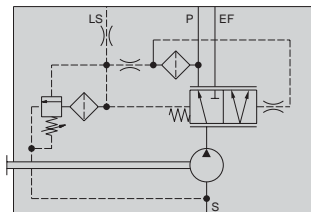
Press. Range: Priority Port Min. setting 35 bar
 Priority Port Max. setting 210 bar
 Extended Flow Max. equal to max. rating of pump

Max. Flow: **Valve for PGP 511 & Port Mounted Version**
 Priority Flow Max. 32 l/min
 Extended Flow Max. 70 l/min
 Max. input flow 70 l/min
PGP 517 Valve
 Priority Flow Max. 45 l/min
 Extended Flow Max. 100 l/min
 Max. input flow 100 l/min

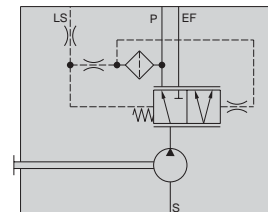
Comments:

The Priority Flow Divider provides constant and specified flow for power steering or other priority functions. The balance of flow produced by the pump is available from the excess flow (EF) port for additional functions, such as open-center, directional-control valves, fan drives, etc.

Load-Sense Priority Valve - PGP 511 and PGP 517



With Priority Relief Valve and for Dynamic LS Signal



Without Priority Relief Valve and for Dynamic LS Signal

Variations: **PGP511 and PGP517 Rear Mounted Versions:**
 Without relief, static LS signal;
 With pilot relief, dynamic LS signal
 Without relief, dynamic LS signal;
 With pilot relief, dynamic LS signal

PGP 511 and PGP 517 Port Mounted Versions:
 Without relief, static LS signal;
 Without relief, dynamic LS signal

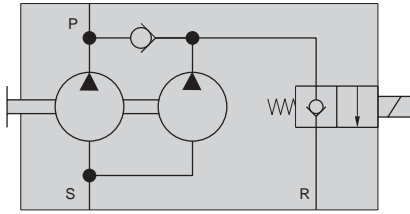
Press. Range: Priority Port Min. setting 35 bar
 Priority Port Max. setting 210 bar
 Extended Flow Max. equal to max. rating of pump

Max. Flow: **PGP 511 Valve & Port Mounted Version**
 Priority Flow Max. 32 l/min
 Extended Flow Max. 70 l/min
 Max. input flow 70 l/min
PGP 517 Valve
 Priority Flow Max. 45 l/min
 Extended Flow Max. 100 l/min
 Max. input flow 100 l/min

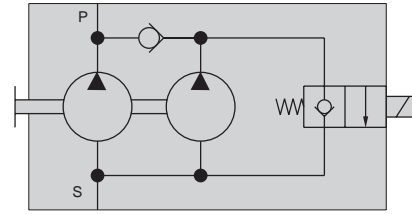
Comments:

The Load-Sense Priority Valve provides priority flow on demand, typically for load-sense power steering. The balance of the flow produced by the pump is available from the excess flow (EF) port for additional functions, such as open-center directional-control valves, fan drives, etc. When the power steering is idle, full pump flow is available for these functions. The selection of the pilot relief and the static or dynamic signal is dependent on the characteristics of the steering unit.

Two - Stage Pump - PGP 505, PGP 511 and PGP 517



With External Tank Port (recommended)



With Internal Vent to Pump Inlet

Variations: **PGP 505, PGP 511 and PGP 517**
 With internal vent to inlet
 With external tank port
 Note: Specify solenoid voltage

Press. Range: To application requirements

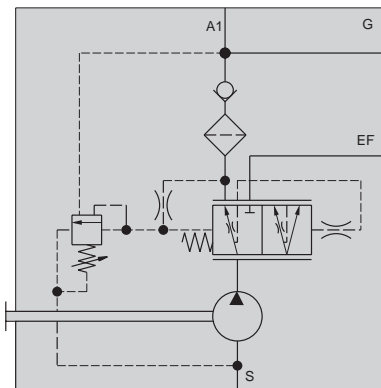
Rated Flow: A variety of solenoid valves are available. Selection of valve size and flow rate is in accord with application requirements.

Comments:

The Parker Two-Stage or High-Low Pump is a tandem unit with equal or dissimilar displacements. A two-position/two-way valve in the rear cover allows for rear pump unloading. This pump is applied when the prime mover (engine or electric motor) has limited power. When high pressure is required, the rear section is unloaded to the pump inlet or the tank. When high flow is required at low or medium pressure, the flow of both sections is combined at the outlet port P. In both cases, the displacements and pressure selected are to be within the power limits of the prime mover.

Note: When the internal vent to the inlet is selected, caution is suggested to prevent extended periods of operation in the unloaded position. The heat generated may lower the fluid viscosity below the minimums required for the pump, which could possibly damage it.

Single Accumulator Charge Valve - PGP 511



Variations: **PGP 511**
 Integral with pump 70 l/min

Press. Range: A1, G Ports Min. setting 35 bar
 A1, G Ports Max. setting 210 bar
 Extended Flow Max. equal to max. rating of pump

Max. Flow: **PGP 511 Valve**
 Charge Flow Max. 32 l/min
 Extended Flow Max. 70 l/min
 Max. Input Flow 70 l/min

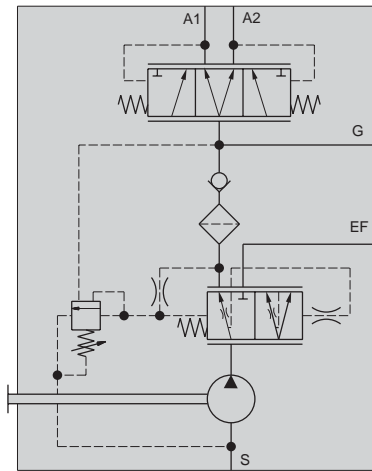
Comments:

The Single Accumulator Charge Valve (SACV) provides priority flow to charge the accumulator for vehicle brakes or any application, which requires stored hydraulic energy. The SACV has an integral, differential, pilot-relief valve to provide a wide variety of cut-in/cut-out pressure ratios. Typical ratios are 80%, 70%, 60% and 50%. Custom ratios are available for OEM applications as are a variety of port locations and sizes. The balance of the pump flow at the excess flow (EF) port is available for an open-circuit, directional-control valve, a fan drive, or other ancillary functions.

Heavy-Duty Aluminum Pumps and Motors

PGP 500 Series

Dual Accumulator Charge Valve - PGP 511



Variations: PGP 511 Integral with pump 70 l/min

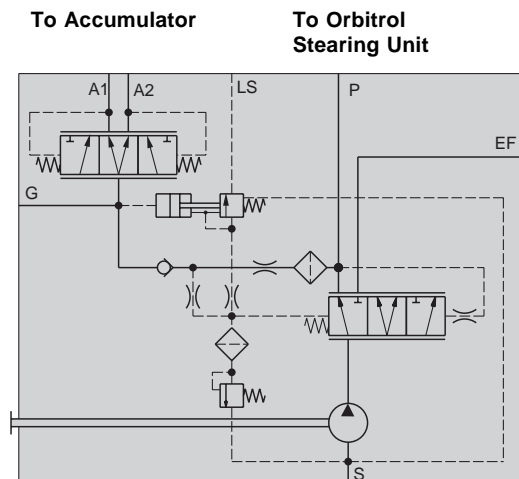
Press. Range: A1, A2, G Ports Min. setting 35 bar
 A1, A2 G Ports Max. setting 210 bar
 Extended Flow Max. equal to max. rating of pump

Max. Flow: PGP 511 Valve
 Charge Flow Max. 32 l/min
 Extended Flow Max. 70 l/min
 Max. Input Flow 70 l/min

Comments:

The Dual Accumulator Charge Valve provides priority flow to charge two accumulators for dual-circuit vehicle brakes or for any application, which requires stored hydraulic energy. This valve has an integral, differential, pilot-relief valve to provide a wide variety of cut-in/cut-out pressure ratios. Typical ratios are 80%, 70%, 60% and 50%. Custom ratios are available for OEM applications. An inverse shuttle spool isolates the two circuits so that pressure and oil volume are maintained in one circuit, should the other experience a break in the hydraulic line. A variety of port locations and sizes are available.

Steering & Accumulator Charge (STAC) Valve



Variations: Stand Alone (Line-mounted)
 Single or dual accumulator charge circuit
 (Dual circuit schematic shown)

Press. Range: A1, A2, Port Min. setting 35 bar
 A1, A2, Port Max. setting 210 bar
 Priority Port Max. setting 210 bar
 Extended Flow Max. equal to max. rating of pump
 Steering stand-by pressure up to 20 bar

Rated Flows: Total Charge Flow up to 60 l/min
 depending on stand-by pressure
 Priority Port 45 l/min
 Extended Flow Max. 100 l/min
 Max. Input Flow 100 l/min

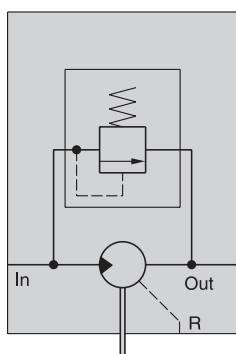
Comments:

The combined LS Priority Valve and Accumulator Charge Valve provide equal priority flow to the load-sense power steering and to charge one or more accumulators for the hydraulic vehicle brakes. Excess pump flow is available from the EF port for the implement hydraulics, fan drives or other services. The accumulator charge function has a differential, pilot-relief valve to provide a wide variety of cut-in/cut-out pressure ratios. Typical ratios are 80%, 70%, 60% and 50%. Custom ratios are available for OEM applications. Steering relief pressure (at port P) must be equal to or greater than maximum charge cut-out pressure. Valve is available with inverse shuttle for dual-circuit braking systems (above schematic) or without inverse shuttle for single-braking systems.

Motors - PGM 505, PGM 511 and PGM 517

Valve type	PGM		
	505	511	517
Single Pressure-Relief Valve	X	X	X
Single Pressure-Relief Valve with Anti-Cavitation		X	X
Cross Port-Pressure Relief Valve		X	
Cross Port-Pressure Relief Valve with Anti-Cavitation		X	
Solenoid Unloading Pressure-Relief Valve for Motors		X	
Brake Valve		X	
Check Valve and Restrictor		X	

Single Pressure-Relief Valve - PGM 505 and PGM 517



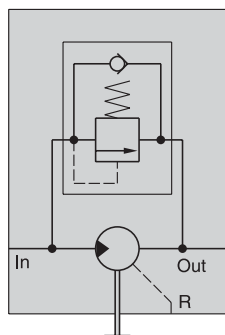
Variations: **PGM 505 and PGM 511 with Integral**
 With internal or external drain
 Adjustable and non adjustable

Press. Range: Min. setting 25 bar
 Max. setting 250 bar

Comments:

This integral relief valve protects the motor from over-pressurization. It can also be used in series with the main system relief valve to limit the pressure differential and output torque of the motor.

Single Pressure-Relief Valve with Anti-Cavitation - PGM 511 and PGM 517



Variations: **PGM 511**
 Non adjustable, with reverse flow check
 With internal or external drain

PGM 517
 Adjustable, with reverse flow check
 With internal or external drain

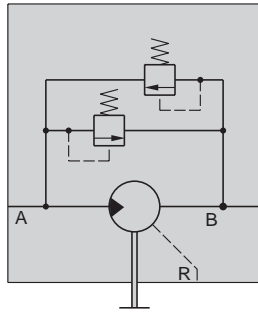
Press. Range: Min. setting 25 bar
 Max. setting 250 bar

Applications: Compressor drives, fan drives, mower blade drives and water pump drives

Comments:

This integral relief valve protects the motor from over-pressurization. It can also be used in series with the main system relief valve to limit the pressure differential and output torque of the motor. The check valve allows the motor and driven load to "spool down" when the fluid supply is shut off or reduced, due to engine speed fluctuations. In series operation, the check valve permits the motor to come to a controlled stop, if the outlet flow is suddenly blocked. This check valve reduces the risk of damaging the motor or blowing a hydraulic line. Motors fitted with this valve are available with side or rear-facing ports.

Cross-Port Pressure-Relief Valve - PGM 511



Variations: PGM 511

Adjustable with shims
With internal or external drain

Press. Range: Max. setting 250 bar

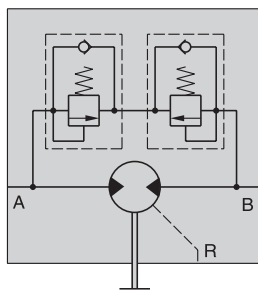
Max. Flow: 30 l/min

Applications: Mower reel drives and all low-medium power reversible drives

Comments:

This valve provides integral, cross-port relief to protect the motor from over-pressurization and to limit torque in both directions of rotation. It can also be used in series with other motors downstream, when using an external drain case. By adding or removing shims it is possible to limit change to the factory-set pressure. In order to minimize overall length of the unit, side ports are standard.

Cross-Port Pressure-Relief Valve with Anti-Cavitation - PGM 511



Variations: PGM 511

Non adjustable, with reverse flow check
With internal or external drain

Press. Range: Min setting 25 bar

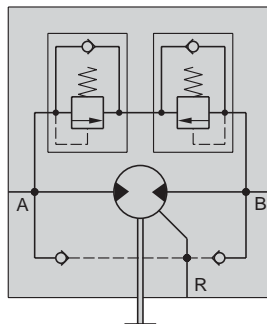
Max. setting 250 bar

Applications: Mower blade drives, water pump drives and reversible hydrostatic transmissions

Comments:

Motors fitted with this relief valve may be applied in series or in a hydrostatic transmission. The relief valve provides a limit to the pressure differential and the output torque. The check valves allow flow to return to the inlet of the motor to prevent cavitation. It is available with side, rear, or a combination of side and rear ports.

Cross-Port Pressure-Relief Valve with Anti-Cavitation - PGM 511



Variations: PGM 511

Non adjustable, with reverse flow check
With internal or external drain

Press. Range: Min setting 25 bar

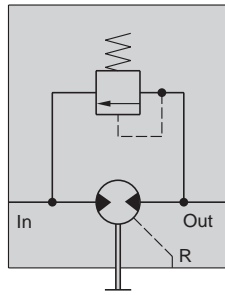
Max. setting 250 bar

Applications: Mower blade drives, water pump drives, reversible hydrostatic transmissions, vibration drives on vibratory rollers and winches

Comments:

This motor has a cross-port relief valve and anti-cavitation check valves in the case drain passages. Motors with this configuration are suitable for open-circuit applications with closed-center valves and hydrostatic transmissions. When the motor and load are limited by the relief valve, the anti-cavitation checks allow internal leakage to be returned to the inlet side of the motor. For winches, make-up flow at low pressure is introduced into the case.

Brake Valve - PGM 511



Variations: **PGM 511**
Adjustable with shims
With internal or external drain

Press. Range: Max. setting 250 bar

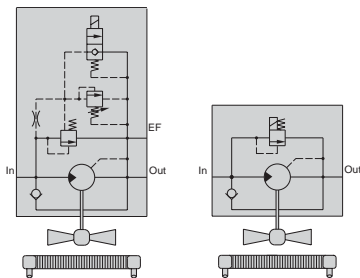
Max. Flow: 30 l/min

Applications: Mower blade drives, winch drives, and blower drives

Comments:

Parker motors are available with brake valves to provide controlled braking of the motor and load. The pressure setting of the valve and the stored energy in the load will jointly determine the time to stop the motor. Brake valves must be used with the appropriate, directional-control valves, which are usually closed-center valves rather than motor spools.

Solenoid Unloading Pressure-Relief Valve for Motors - PGM 511



Variations: **PGM 511**
With internal return for single motor operation
With tank port for series motor operation
Specify solenoid voltage, whether N/O or N/C

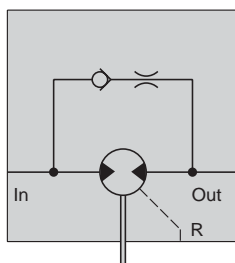
Press. Range: Stand-by pressure differential 5 bar
Max. setting 250 bar

Max. Flow: **PGM 511** 70 l/min

Comments:

A small, solenoid-operated cartridge valve, similar to those used on the PGP511 and PGP517 vents the internal pilot to the motor outlet to unload the main spool. The outlet port is connected to the tank via the filter and the heat exchanger (if installed). The motor control can be set to provide low-speed operation, rather than coming to a full stop. This allows for a quiet fan start from approximately 100 rpm. The solenoid in the valve is available for normally-open or normally-closed operation. The anti-cavitation check valve allows motor spool-down, when the engine is shut down while the fan is running.

Check Valve and Restrictor - PGM 511



Variations: **PGM 511**
Metered flow from motor outlet to inlet

Press. Range: Max. setting 250 bar

Max. Flow: 30 l/min

Applications: Mower blade drives, winch drives, and blower drives

Comments:

The Check Valve and Restrictor are used to control pressure spikes between motors in a series circuit. The check valve allows the motor and driven load to “spool-down” when the fluid supply is shut off or reduced due to engine speed fluctuations. In series operation, the check valve permits the motor to come to a controlled stop, if the outlet flow is suddenly blocked. This check valve reduces the risk of damaging the motor or blowing a hydraulic line. The restrictor permits operation in reverse for cleaning debris or backlapping of the cutters.

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2. Payment: Payment shall be made by Buyer net 30 days from the date of delivery of the items purchased hereunder. Amounts not timely paid shall bear interest at the maximum rate permitted by law for each month or portion thereof that the Buyer is late in making payment. Any claims by Buyer for omissions or shortages in a shipment shall be waived unless Seller receives notice thereof within 30 days after Buyer's receipt of the shipment.

3. Delivery: Unless otherwise provided on the face hereof, delivery shall be made F.O.B. Seller's plant. Regardless of the method of delivery, however, risk of loss shall pass to Buyer upon Seller's delivery to a carrier. Any delivery dates shown are approximate only and Seller shall have no liability for any delays in delivery.

4. Warranty: Seller warrants that the items sold hereunder shall be free from defects in material or workmanship for a period of 18 months from date of shipment from Parker Hannifin Corporation. **THIS WARRANTY COMPRISES THE SOLE AND ENTIRE WARRANTY PERTAINING TO ITEMS PROVIDED HEREUNDER. SELLER MAKES NO OTHER WARRANTY, GUARANTEE, OR REPRESENTATION OF ANY KIND WHATSOEVER. ALL OTHER WARRANTIES, INCLUDING BUT NOT LIMITED TO, MERCHANTABILITY AND FITNESS FOR PURPOSE, WHETHER EXPRESS, IMPLIED, OR ARISING BY OPERATION OF LAW, TRADE USAGE, OR COURSE OF DEALING ARE HEREBY DISCLAIMED. NOTWITHSTANDING THE FOREGOING, THERE ARE NO WARRANTIES WHATSOEVER ON ITEMS BUILT OR ACQUIRED WHOLLY OR PARTIALLY, TO BUYER'S DESIGNS OR SPECIFICATIONS.**

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6. Changes, Reschedules and Cancellations: Buyer may request to modify the designs or specifications for the items sold hereunder as well as the quantities and delivery dates thereof, or may request to cancel all or part of this order, however, no such requested modification or cancellation shall become part of the contract between Buyer and Seller unless accepted by Seller in a written amendment to this Agreement. Acceptance of any such requested modification or cancellation shall be at Seller's discretion, and shall be upon such terms and conditions as Seller may require.

7. Special Tooling: A tooling charge may be imposed for any special tooling, including without limitation, dies, fixtures, molds and patterns, acquired to manufacture items sold pursuant to this contract. Such special tooling shall be and remain Seller's property notwithstanding payment of any charges by Buyer. In no event will Buyer acquire any interest in apparatus belonging to Seller which is utilized in the notwithstanding any charges paid by Buyer. Unless otherwise agreed, Seller shall have the right to alter, discard or otherwise dispose of any special tooling or other property in its sole discretion at any time.

8. Buyer's Property: Any designs, tools, patterns, materials, drawings, confidential information or equipment furnished by Buyer or any other items which become Buyer's property, may be considered obsolete and may be destroyed by Seller after two (2) consecutive years have elapsed without Buyer placing an order for the items which are manufactured using such property. Seller shall not be responsible for any loss or damage to such property while it is in Seller's possession or control.

9. Taxes: Unless otherwise indicated on the face hereof, all prices and charges are exclusive of excise, sales, use, property, occupational or like taxes which may be imposed by any taxing authority upon the manufacture, sale or delivery of the items sold hereunder. If any such taxes must be paid by Seller or if Seller is liable for the collection of such tax, the amount thereof shall be in addition to the amounts for the items sold. Buyer agrees to pay all such taxes or to reimburse Seller therefore upon receipt of its invoice. If Buyer claims exemption from any sales, use or other tax imposed by any taxing authority, Buyer shall save Seller harmless from and against any such tax, together with any interest or penalties thereon which may be assessed if the items are held to be taxable.

10. Indemnity For Infringement of Intellectual Property Rights: Seller shall have no liability for infringement of any patents, trademarks, copyrights, trade dress, trade secrets or similar rights except as provided in this Part 10. Seller will defend and indemnify Buyer against allegations of infringement of U.S. Patents, U.S. Trademarks, copyrights, trade dress and trade secrets (hereinafter 'Intellectual Property Rights'). 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 an allegation that an item sold pursuant to this contract infringes the Intellectual Property Rights of a third party. Seller's obligation to defend and indemnify Buyer is contingent on Buyer notifying Seller within ten (10) days after Buyer becomes aware of such allegations of infringement, and Seller having sole control over the defense of any allegations or actions including all negotiations for settlement or compromise. If an item sold hereunder is subject to a claim that it infringes the Intellectual Property Rights of a third party, Seller may, at its sole expense and option, procure for Buyer the right to continue using said item, replace or modify said item so as to make it noninfringing, or offer to accept return of said item and return the purchase price less a reasonable allowance for depreciation. Notwithstanding the foregoing, Seller shall have no liability for claims of infringement based on information provided by Buyer, or directed to items delivered hereunder for which the designs are specified in whole or part by Buyer, or infringements resulting from the modification, combination or use in a system of any item sold hereunder. The foregoing provisions of this Part 10 shall constitute Seller's sole and exclusive liability and Buyer's sole and exclusive remedy for infringement of Intellectual Property Rights.

If a claim is based on information provided by Buyer or if the design for an item delivered hereunder is specified in whole or in part by Buyer, Buyer shall defend and indemnify Seller for all costs, expenses or judgments resulting from any claim that such item infringes any patent, trademark, copyright, trade dress, trade secret or any similar right.

11. Force Majeure: Seller does not assume the risk of and shall not be liable for delay or failure to perform any of Seller's obligations by reason of circumstances beyond the reasonable control of Seller (hereinafter 'Events of Force Majeure'). Events of Force Majeure shall include without limitation, accidents, acts of God, strikes or labor disputes, acts, laws, rules or regulations of any government or government agency, fires, floods, delays or failures in delivery of carriers or suppliers, shortages of materials and any other cause beyond Seller's control.

12. Entire Agreement/Governing Law: The terms and conditions set forth herein, together with any amendments, modifications and any different terms or conditions expressly accepted by Seller in writing, shall constitute the entire Agreement concerning the items sold, and there are no oral or other representations or agreements which pertain thereto. This Agreement shall be governed in all respects by the law of the State of Ohio. No actions arising out of the sale of the items sold hereunder or this Agreement may be brought by either party more than two (2) years after the cause of action accrues.



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Parker Hannifin Corporation

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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

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Catalog HY09-0500/US
09/01, T&M, 5M



PGP 620 Series **PGM 620 Series**

Single and Multiple Cast-Iron pumps and motors

Catalog HY09-620/US



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WARNING

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Pump/Motor Products

PGP/PGM 620

- 41 gpm @ 3,000 rpm
- Pressures to 275 bar
- Speeds to 3500 RPM



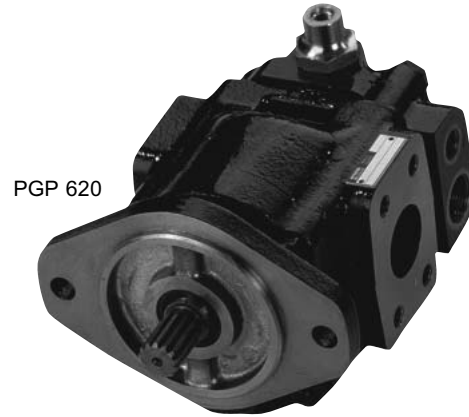
PGP/PGM 620

Parker Hydraulics has supplied gear pumps and motors to worldwide mobile and industrial markets for many years, especially material handling, turf care, 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 a wide range of SAE/DIN/European and other special options being available as standard.

Features of PGP/PGM 620

- Patented, interlocking body design
- 12 tooth gears, bronze thrust plates
- Tandem, triple and cross-frame pumps available
- Common inlets available for tandem and triple pumps
- Continuous operating pressures up to 275 bar
- Production run-in available to suit OEM application conditions and to provide optimized volumetric efficiencies



PGP 620

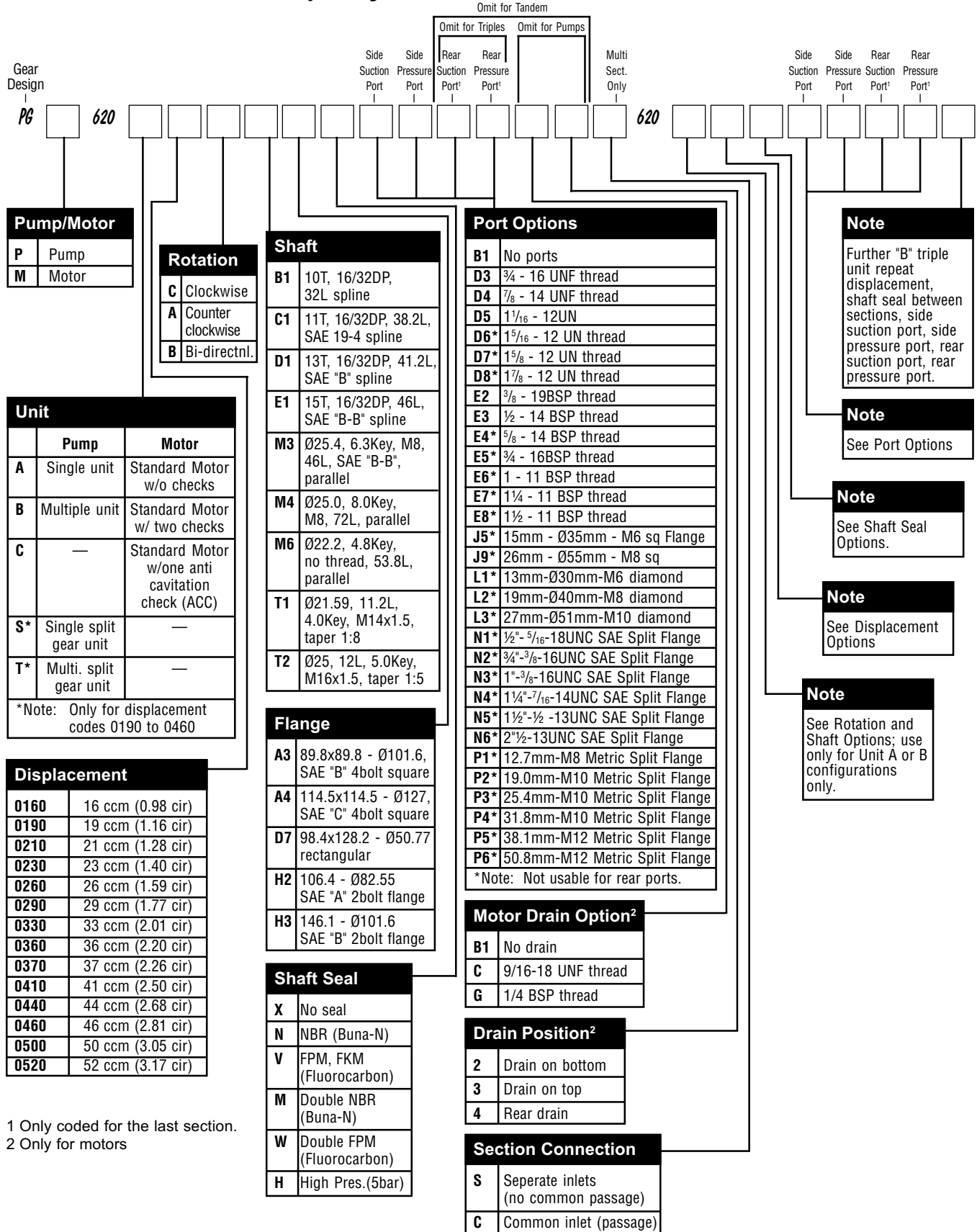
- Pressure balanced design for high efficiency
- Reduced system noise levels compared to earlier models and competitors' pumps
- High power through-drive capability
- Wide range of integral valves for power steering, power brakes, fan drives and implement hydraulics
- Load sense and solenoid-operated unloading valves

Characteristics

Product Features	Description
Pump type	Heavy-duty, cast iron, external gear.
Mounting	SAE, Rectangular. Specials on request.
Ports	SAE and metric split flanges and others.
Shaft style	SAE splined, keyed, tapered, cylindrical. Specials on request.
Speed	500 - 3500 rpm, see tables.
Theor. displacem.	See tables
Drive	Drive direct with flexible coupling is recommended.
Inlet pressure	Operating range absolute pressure 0.8 to 2 bar. Absolute minimum inlet pressure 0.5 bar, short time without load. Consultation is recommended.
Outlet pressure	See tables
Axial / Radial load	Axial or Radial loading is not allowed.
Hydraulic fluids	Mineral oil Fire resistant fluids: - water-oil emulsions 60/40, HFB - water-glycol, HFC - phosphate-esters, HFD Engineering approval is recommended.
Fluid temperature	Range of operating temperature -15 to +80°C. Max. permissible operating pressure dependent on fluid temperature. Temperature for cold start -20 to -15°C at speed ≤ 1500 rpm. Max. permissible operating pressure dependent on fluid temperature.

Product Features	Description
Fluid viscosity	Range of operating viscosity 20 to 100 mm ² /s. Max. operating viscosity should not exceed 1000 mm ² /s. Recommended min. viscosity 8 mm ² /s.
Range of ambient temperature	-40°C - +70°C
Filtration	According to ISO 4406 Cl. 16/13
Flow velocity	See tables.
Direction of rotation	Clockwise, counter-clockwise or double.
Multiple pump assemblies	- Available in two or three section configurations. - Max. shaft loading must conform to the limitations shown in the Shaft Load Rating table in this catalog. - The max. load is determined by adding the torque values for each pumping section that will be simultaneously loaded.
Separate or common inlet capability	Separate Inlet configuration: - Each gear housing has individual inlet and outlet ports. Common Inlet configuration: - Two or more gear sets share a common inlet.

PGP/PGM 620 How to Specify



Gear Design
PG

620

P	Pump
M	Motor

Unit		
	Pump	Motor
A	Single unit	Standard Motor w/o checks
B	Multiple unit	Standard Motor w/ two checks
C	—	Standard Motor w/one anti cavitation check (ACC)
S*	Single split gear unit	—
T*	Multi. split gear unit	—

*Note: Only for displacement codes 0190 to 0460

Displacement	
0160	16 ccm (0.98 cir)
0190	19 ccm (1.16 cir)
0210	21 ccm (1.28 cir)
0230	23 ccm (1.40 cir)
0260	26 ccm (1.59 cir)
0290	29 ccm (1.77 cir)
0330	33 ccm (2.01 cir)
0360	36 ccm (2.20 cir)
0370	37 ccm (2.26 cir)
0410	41 ccm (2.50 cir)
0440	44 ccm (2.68 cir)
0460	46 ccm (2.81 cir)
0500	50 ccm (3.05 cir)
0520	52 ccm (3.17 cir)

Rotation	
C	Clockwise
A	Counter clockwise
B	Bi-directnl.

Shaft	
B1	10T, 16/32DP, 32L spline
C1	11T, 16/32DP, 38.2L, SAE 19-4 spline
D1	13T, 16/32DP, 41.2L, SAE "B" spline
E1	15T, 16/32DP, 46L, SAE "B-B" spline
M3	Ø25.4, 6.3Key, M8, 46L, SAE "B-B", parallel
M4	Ø25.0, 8.0Key, M8, 72L, parallel
M6	Ø22.2, 4.8Key, no thread, 53.8L, parallel
T1	Ø21.59, 11.2L, 4.0Key, M14x1.5, taper 1:8
T2	Ø25, 12L, 5.0Key, M16x1.5, taper 1:5

Flange	
A3	89.8x89.8 - Ø101.6, SAE "B" 4bolt square
A4	114.5x114.5 - Ø127, SAE "C" 4bolt square
D7	98.4x128.2 - Ø50.77 rectangular
H2	106.4 - Ø82.55 SAE "A" 2bolt flange
H3	146.1 - Ø101.6 SAE "B" 2bolt flange

Shaft Seal	
X	No seal
N	NBR (Buna-N)
V	FPM, FKM (Fluorocarbon)
M	Double NBR (Buna-N)
W	Double FPM (Fluorocarbon)
H	High Pres.(5bar)

Port Options	
B1	No ports
D3	3/4 - 16 UNF thread
D4	7/8 - 14 UNF thread
D5	1 1/16 - 12UN
D6*	1 5/16 - 12 UN thread
D7*	1 5/8 - 12 UN thread
D8*	1 7/8 - 12 UN thread
E2	3/8 - 19BSP thread
E3	1/2 - 14 BSP thread
E4*	5/8 - 14 BSP thread
E5*	3/4 - 16BSP thread
E6*	1 - 11 BSP thread
E7*	1 1/4 - 11 BSP thread
E8*	1 1/2 - 11 BSP thread
J5*	15mm - Ø35mm - M6 sq Flange
J9*	26mm - Ø55mm - M8 sq
L1*	13mm-Ø30mm-M6 diamond
L2*	19mm-Ø40mm-M8 diamond
L3*	27mm-Ø51mm-M10 diamond
N1*	1/2"-5/16"-18UNC SAE Split Flange
N2*	3/4"-3/8"-16UNC SAE Split Flange
N3*	1"-3/8"-16UNC SAE Split Flange
N4*	1 1/4"-7/16"-14UNC SAE Split Flange
N5*	1 1/2"-1/2"-13UNC SAE Split Flange
N6*	2 1/2"-13UNC SAE Split Flange
P1*	12.7mm-M8 Metric Split Flange
P2*	19.0mm-M10 Metric Split Flange
P3*	25.4mm-M10 Metric Split Flange
P4*	31.8mm-M10 Metric Split Flange
P5*	38.1mm-M12 Metric Split Flange
P6*	50.8mm-M12 Metric Split Flange

*Note: Not usable for rear ports.

Motor Drain Option ²	
B1	No drain
C	9/16-18 UNF thread
G	1/4 BSP thread

Drain Position ²	
2	Drain on bottom
3	Drain on top
4	Rear drain

Section Connection	
S	Seperate inlets (no common passage)
C	Common inlet (passage)

Note
 Further "B" triple unit repeat displacement, shaft seal between sections, side suction port, side pressure port, rear suction port, rear pressure port.

Note
 See Port Options

Note
 See Shaft Seal Options.

Note
 See Displacement Options

Note
 See Rotation and Shaft Options; use only for Unit A or B configurations only.

1 Only coded for the last section.
 2 Only for motors



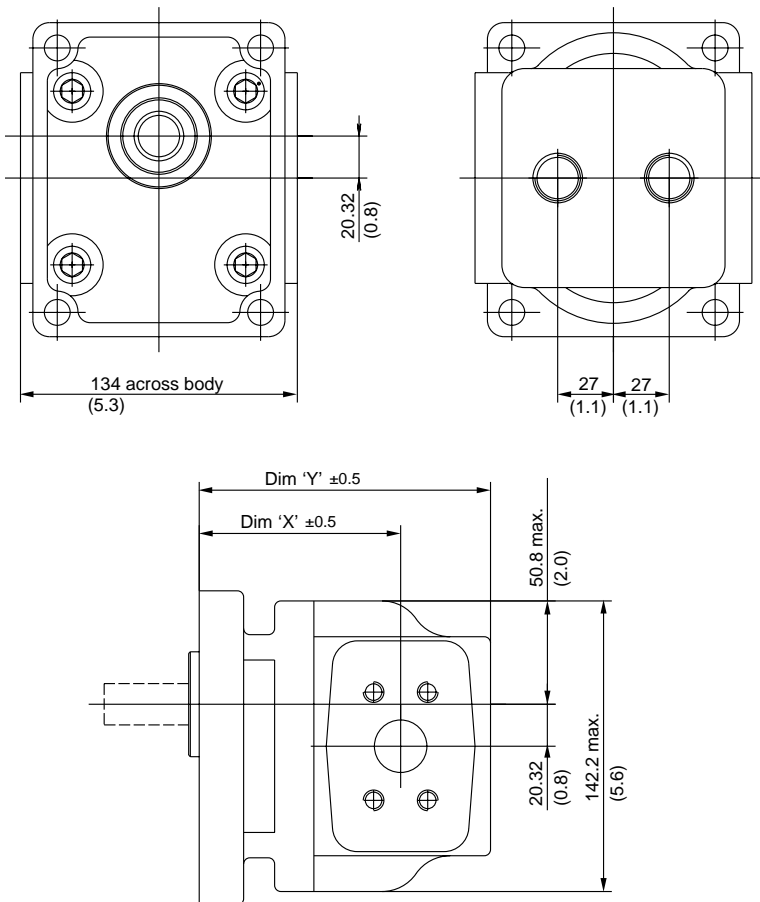
PGP/PGM 620 Dimensions

PGP/PGM 620 Specification - Standard Displacements - Single Unit

Pump Displacement	Code	0160	0190	0210	0230	0260	0290	0330	0360	0370	0410	0440	0460	0500	0520	
		cm ³ /rev	16.0	19.0	21.0	23.0	26.0	29.0	33.0	36.0	37.0	41.0	44.0	46.0	50.0	52.0
		in ³ /rev	.98	1.16	1.28	1.4	1.6	1.8	2.01	2.2	2.3	2.5	2.7	2.8	3.1	3.2
Continuous Press.	bar psi	275	275	275	275	275	275	275	250	250	220	210	210	210	210	210
Intermittent Press.	bar psi	300	300	300	300	300	300	300	275	275	245	230	220	210	210	210
Minimum Speed @ Max. outlet press.	rpm	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500
Maximum Speed @ 0 Inlet & Max. outlet press.	rpm	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3000	3000	3000
Dimension "X"	mm	79.2	82.5	84.7	86.9	90.2	93.5	97.9	101.2	102.3	106.7	110.0	112.2	116.6	118.8	
	in	3.1	3.2	3.3	3.4	3.6	3.7	3.9	4.0	4.0	4.2	4.3	4.4	4.6	4.7	
Dimension "Y"	mm	120.2	123.5	125.7	127.9	131.2	134.5	138.9	142.2	143.3	147.7	151.0	153.2	157.6	159.8	
	in	4.7	4.9	4.9	5.0	5.2	5.3	5.5	5.6	5.6	5.8	5.9	6.0	6.2	6.3	
Approx. Weight	kg	12.0	12.1	12.1	12.2	12.3	12.6	12.7	12.8	12.9	13.0	13.1	13.2	13.3	13.4	
	lb	26.4	26.6	26.6	26.8	27.1	27.7	27.9	28.1	28.4	28.6	28.8	29.04	29.3	29.5	

Single Unit PGP/PGM 620

Inch equivalents for millimeter dimensions are shown in (**).



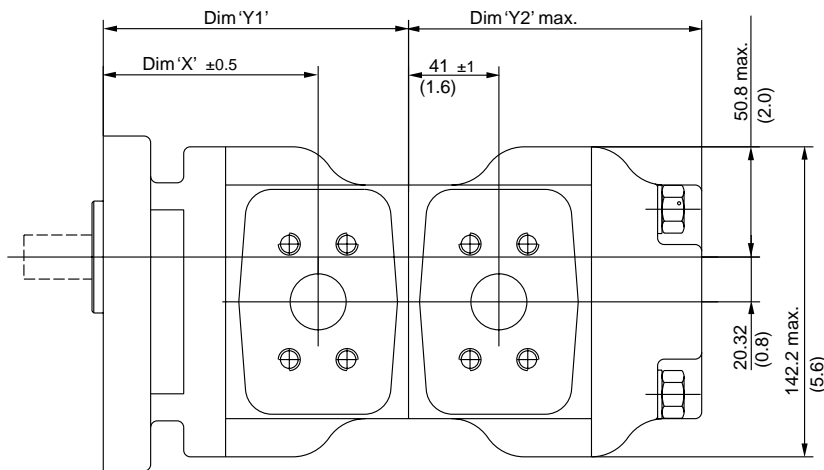
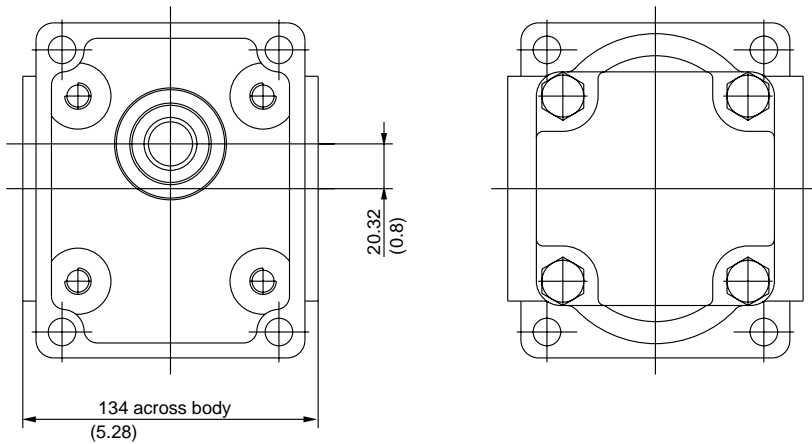
PGP/PGM 620 Dimensions

PGP/PGM 620 Specification - Standard Displacements - Tandem Unit

Pump Displacement	Code	0160	0190	0210	0230	0260	0290	0330	0360	0370	0410	0440	0460	0500	0520	
		cm ³ /rev	16.0	19.0	21.0	23.0	26.0	29.0	33.0	36.0	37.0	41.0	44.0	46.0	50.0	52.0
		in ³ /rev														
Dimension "X"	mm	79.2	82.5	84.7	86.9	90.2	93.5	97.9	101.2	102.3	106.7	110.0	112.2	116.6	118.8	
	in	3.1	3.2	3.3	3.4	3.5	3.7	3.9	4.0	4.0	4.2	4.3	4.4	4.6	4.7	
Dimension "Y1 "	mm	120.2	123.5	125.7	127.9	131.2	134.5	138.9	142.2	143.3	147.7	151.0	153.2	157.6	159.8	
	in	4.7	4.9	4.9	5.0	5.2	5.3	5.5	5.6	5.6	5.8	5.9	6.0	6.2	6.3	
Dimension "Y2" max.	mm	115.2	118.5	120.7	122.9	126.2	129.5	133.9	137.2	138.3	142.7	146.0	148.2	152.6	154.8	
	in	4.5	4.7	4.8	4.8	5.0	5.1	5.3	5.4	5.4	5.6	5.7	5.8	6.0	6.1	
Approximate Weight (front section)	kg	12.0	12.1	12.1	12.2	12.3	12.6	12.7	12.8	12.9	13.0	13.1	13.2	13.3	13.4	
	lb	26.4	26.62	26.62	26.84	27.06	27.72	27.94	28.16	28.38	28.6	28.82	29.04	29.26	29.48	
Approximate Weight (rear section)	kg	10.4	10.5	10.5	10.6	10.7	11.0	11.1	11.2	11.3	11.4	11.5	11.6	11.7	11.8	
	lb	22.88	23.10	23.10	23.32	23.54	24.2	24.42	24.64	24.86	25.08	25.3	25.52	25.74	25.96	

Tandem Unit PGP/PGM 620

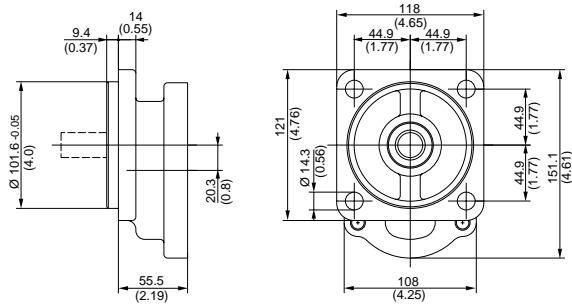
Inch equivalents for millimeter dimensions are shown in (**).



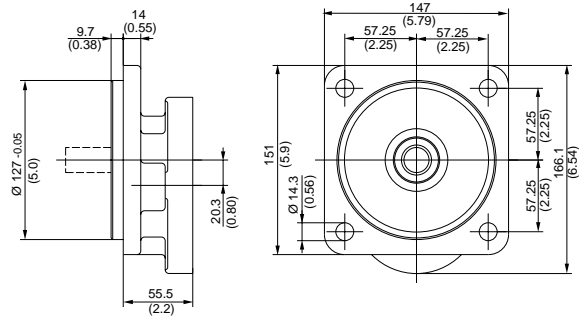
PGP/PGM 620 Mounting Flange

Inch equivalents for millimeter dimensions are shown in (**).

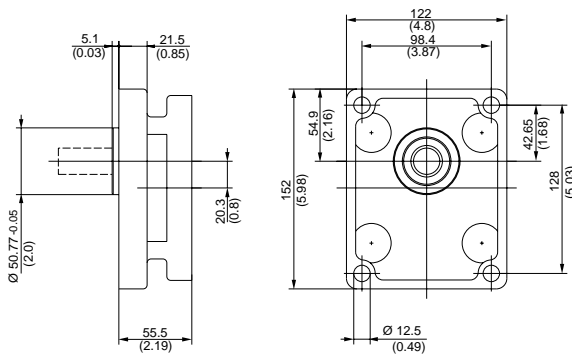
Code A3



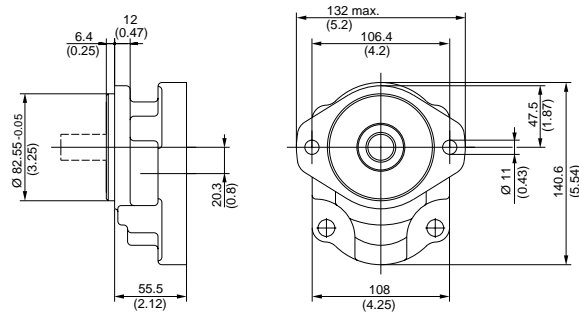
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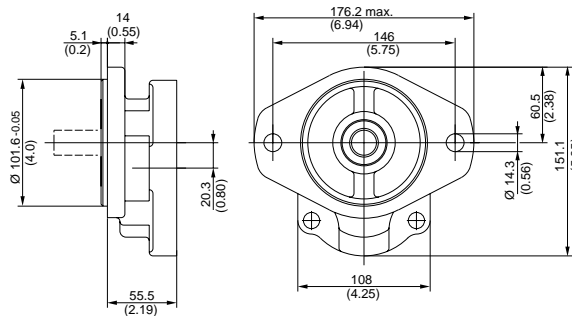
Code D7



Code H2



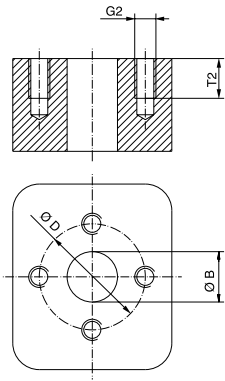
Code H3



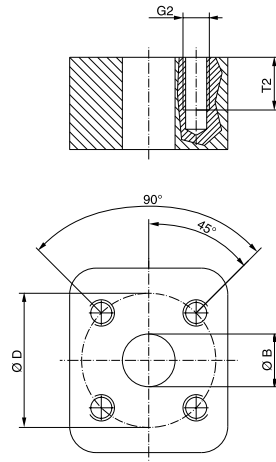
PGP/PGM 620 Porting

Inch equivalents for millimeter dimensions are shown in (**).

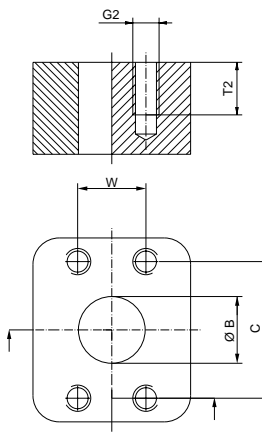
Code L
 4-Bolt flange



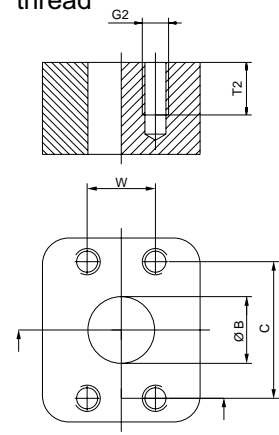
Code J
 European flange



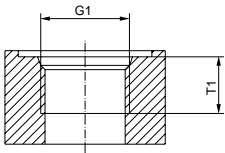
Code N
 SAE split flange



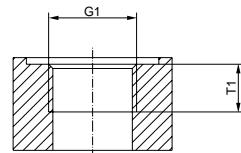
Code P
 SAE split flange metric thread



Code D
 SAE straight thread



Code E
 BSP - thread



PGP/PGM 620

Code	G2	Ø B	Ø D	C	W	T2
	Thread					
J5	M6	15.0 (0.59)	35.0 (1.38)			12.5 (0.49)
J9	M8	26.0 (1.02)	55.0 (2.17)			15.0 (0.59)
L1	M6	13.0 (0.5)	30.0 (1.18)			13.0 (0.5)
L2	M8	19.0 (0.75)	40.0 (1.57)			15.0 (0.59)
L3	M10	27.0 (1.06)	51.0 (2.01)			18.0 (0.71)
N1	5/16-18 UNC	12.7 (0.5)		38.10 (1.5)	17.48 (0.69)	15.0 (0.59)
N2	3/8-16 UNC	19.0 (0.75)		47.63 (1.88)	22.23 (0.88)	14.0 (0.55)
N3	3/8-16 UNC	25.4 (1.0)		52.37 (2.06)	26.19 (1.03)	20.6 (0.81)
N4	7/16-14 UNC	31.8 (1.25)		58.72 (2.31)	30.17 (1.19)	20.6 (0.81)
N5	1/2-13 UNC	38.1 (1.5)		69.82 (2.75)	35.71 (1.4)	20.6 (0.81)
N6	1/2-13 UNC	50.8 (2.0)		77.77 (3.06)	42.88 (1.69)	20.6 (0.81)
P1	M8	12.7 (0.5)		38.10 (1.5)	17.48 (0.69)	15.0 (0.59)
P2	M10	19.0 (0.75)		47.63 (1.88)	22.23 (0.88)	20.6 (0.81)
P3	M10	25.4 (1.0)		52.37 (2.06)	26.19 (1.03)	21.4 (0.84)
P4	M10	31.8 (1.25)		58.72 (2.31)	30.17 (1.19)	20.6 (0.81)
P5	M12	38.1 (1.5)		69.82 (2.75)	35.71 (1.41)	20.6 (0.81)
P6	M12	50.8 (2)		77.77 (3.06)	42.88 (1.69)	20.6 (0.81)

PGP/PGM 620

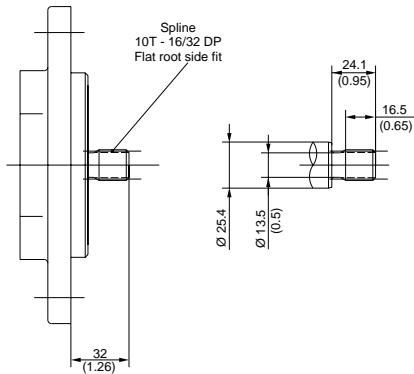
Code	G1	T1
	Thread	Dimensions
D3	3/4-16 UNF	14.3 (0.56)
D4	7/8-14 UNF	16.7 (0.68)
D5	1 1/16-12 UN	19.0 (0.75)
D6	1 5/16-12 UN	19.0 (0.75)
D7	1 5/8-12 UN	19.0 (0.75)
D8	1 7/8-12 UN	19.0 (0.75)
E2	3/8-19 BSP	12.0 (0.47)
E3	1/2-14 BSP	14.0 (0.55)
E4	5/8-14 BSP	16.3 (0.64)
E5	3/4-16 BSP	16.0 (0.63)
E6	1-11 BSP	18.0 (0.71)
E7	1 1/4-11 BSP	20.0 (0.79)
E8	1 1/2-11 BSP	22.0 (0.87)

Inch equivalents for millimeter dimensions are shown in (**).

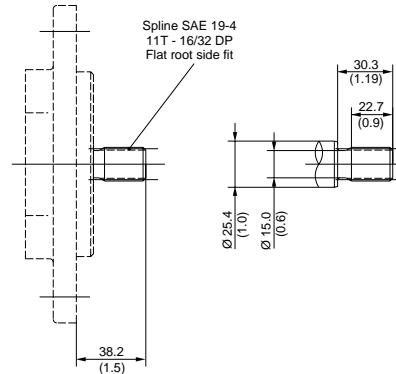
PGP/PGM 620 Drive Shaft

Inch equivalents for millimeter dimensions are shown in (**).

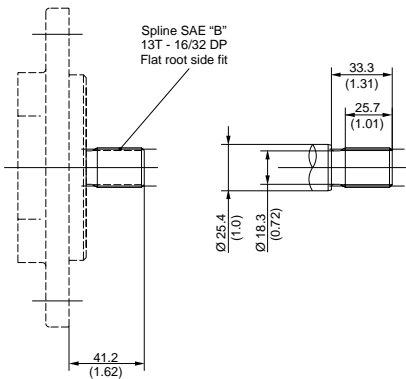
Code B1



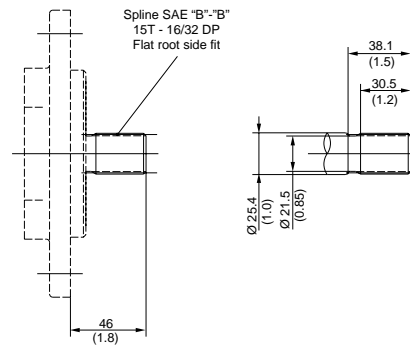
Code C1



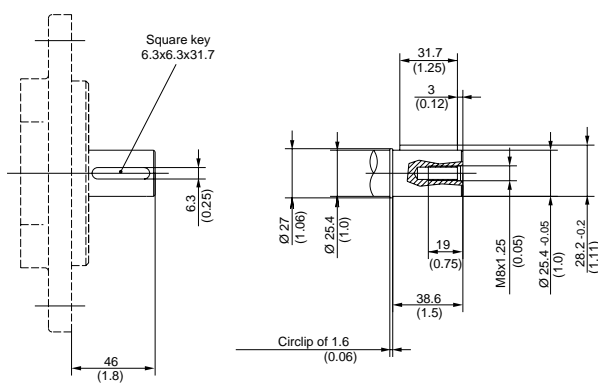
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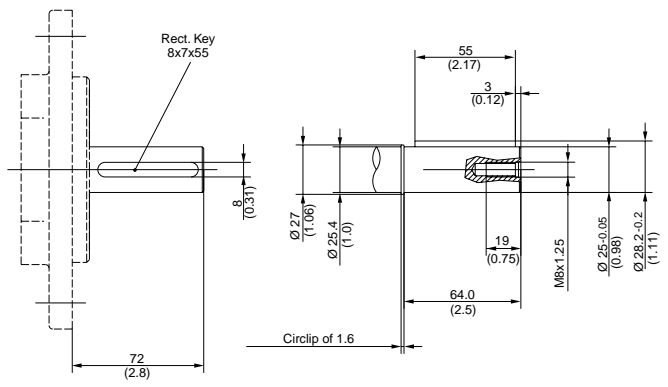
Code E1



Code M3



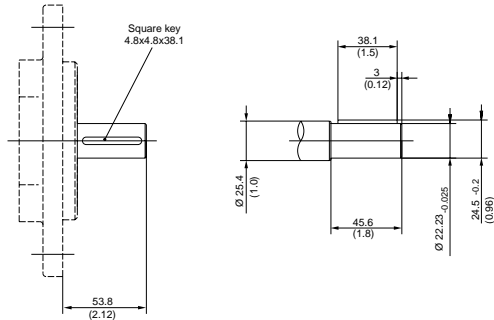
Code M4



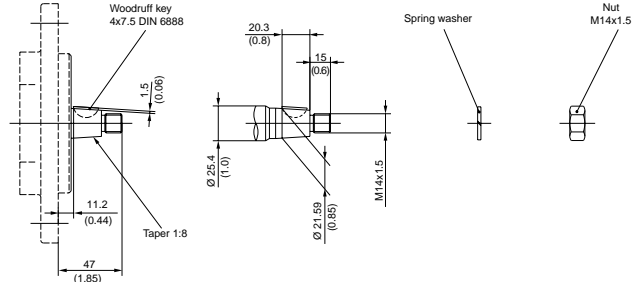
PGP/PGM 620 Drive Shaft

Inch equivalents for millimeter dimensions are shown in (**).

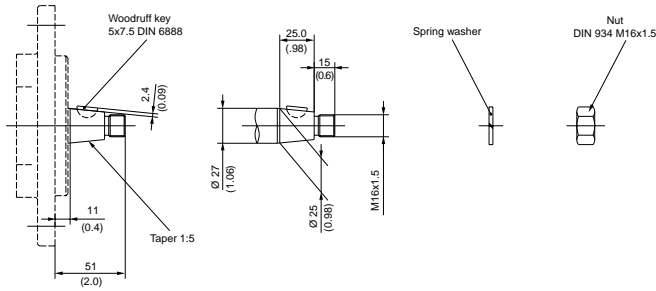
Code M6



Code T1



Code T2



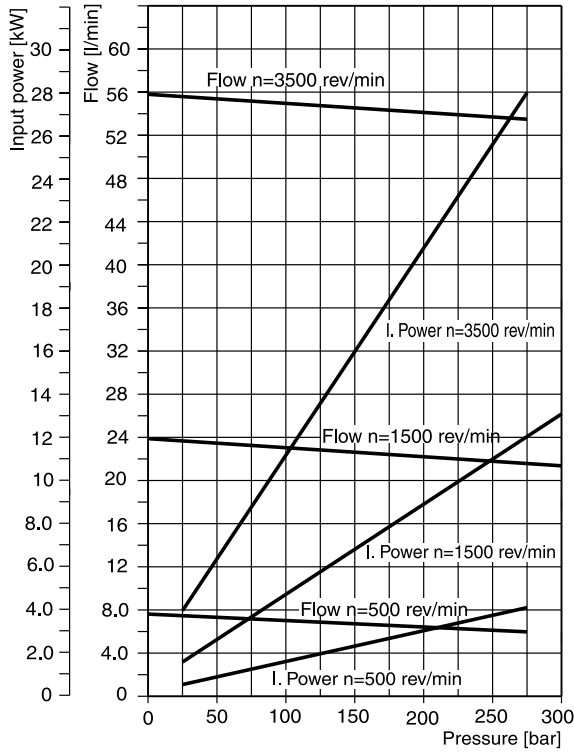
PGP/PGM 620- Shaft Load Capacity

Code	Description	Torque Rating [Nm]
B1 10T,16/32 DP, 32L	spline	124
C1 11T,16/32 DP, 38.2L, SAE 19-4	spline	144
D1 13T,16/32 DP, 41.2L, SAE "B"	spline	272
E1 15T,16/32 DP, 46L, SAE "B-B"	spline	460
M3 Ø25.4,6.3 KEY, M8, 46L, SAE "B-B"	keyed	325
M4 Ø25.0,8.0 KEY, M8, 72L	keyed	325
M6 Ø22.2,4.8 KEY, no thread, 53.8L	keyed	218
T1 Ø21.59,11.2L, 4.0 KEY, M14x1.5	taper 1:8	218
T2 Ø25.0,12.0L, 5.0 KEY, M16x1.5	taper 1:5	301

$$\text{Torque [Nm]} = \frac{\text{Displacement [cm}^3\text{/rev]} \times \text{Pressure [bar]}}{57.2}$$

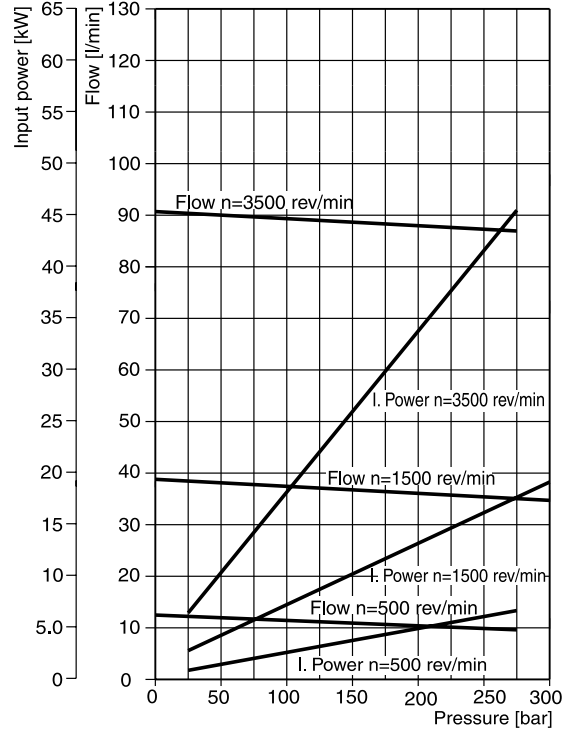
PGP 620 - 16.0 CC

Fluid Temperature
 Viscosity
 Inlet Pressure

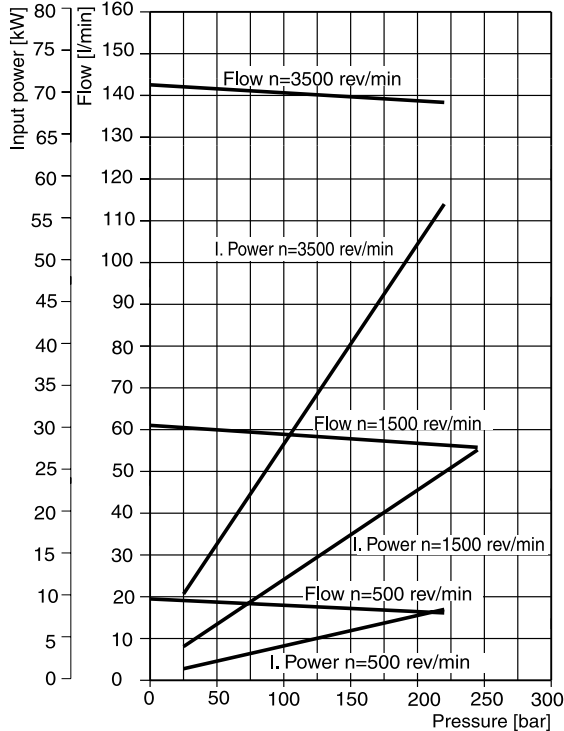


PGP 620 - 26.0 CC

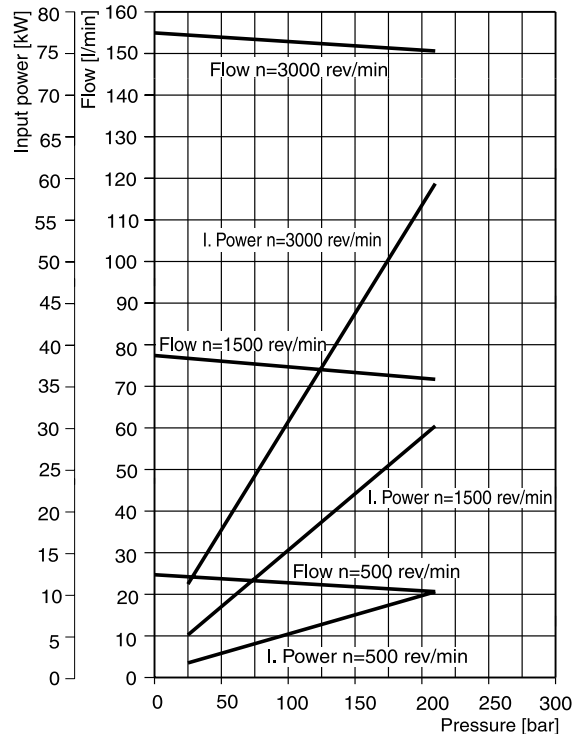
= 45 ± 2 °C
 = 36 mm²/s
 = 0.9 + 0.1 bar absolute



PGP 620 - 41.0 CC



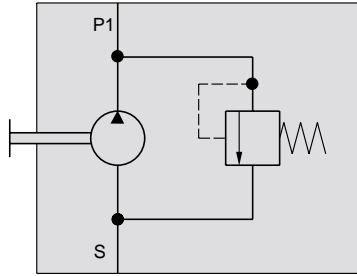
PGP 620 - 52.0 CC



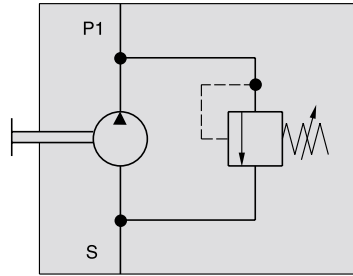
Valve Options

VALVE TYPE	PGP
	620
Pressure Relief Valve	X
Load Sensing Pressure Relief Valve	X
Solenoid Unloading Pressure Relief Valve	X
Pressure Unloading Relief Valve (Port Mounted)	X
Solenoid Unloading Relief Valve (Port Mounted)	X
Priority Flow Divider	X
Priority Flow Divider (Port Mounted)	X
Load Sensing Priority Valve	X
Load Sensing Priority Valve (Port Mounted)	X
Two - Stage Pump	X
Single Accumulator Charge Valve	X
Dual Accumulator Charge Valve	X
Steering and Accumulator Charge Valve (STAC)	X
Composite Priority and Accumulator Charge Valve	X

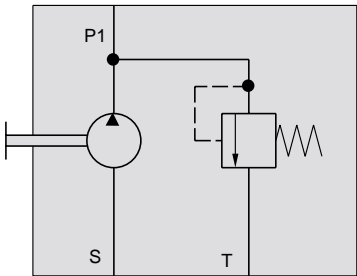
Pressure Relief Valve



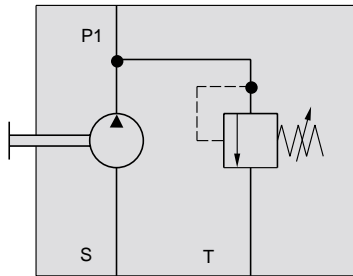
non adjustable, internal vent



adjustable, internal vent



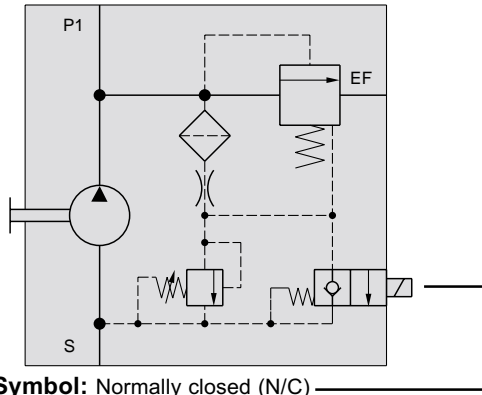
non adjustable, external tank port



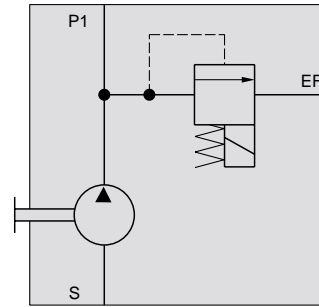
adjustable, external tank port

- Variations:** For PGP620
 Non adjustable, internal vent
 Non adjustable, external tank port
 Adjustable, internal vent
 Adjustable, external tank port


Solenoid Unloading Pressure Relief Valve



Detailed Symbol: Normally closed (N/C)



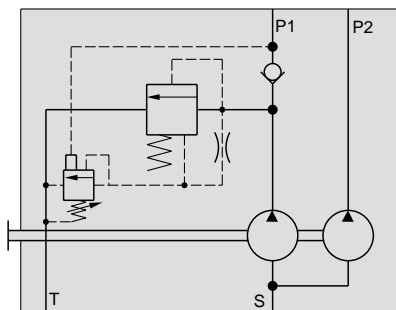
Simplified Symbol

Detailed Symbol  Normally opened (N/O)

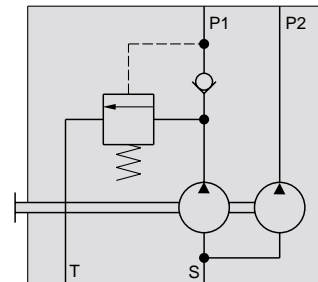
- Variations:** For PGP620
 Specify voltage and whether N/O or N/C
- Press. Range:** Stand-by pressure setting 5 bar
 Max. setting 250 bar
- Max. Flow:** For PGP620 100 l/min

Comments:
 This valve utilizes the same casting, main spool, and pilot relief as the Load Sensing Pressure Relief Valve. A small solenoid operated cartridge valve vents the internal pilot flow to pump inlet to unload the main spool. The outlet port is in the pump body and the EF is connected to the reservoir via heat exchanger and/or return line filter.

Unloading Relief Valve, Pressure Operated



Detailed Symbol

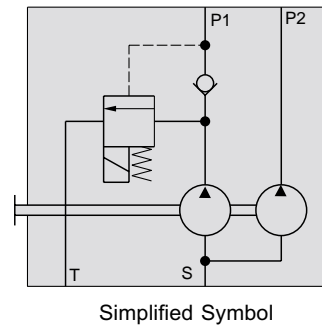
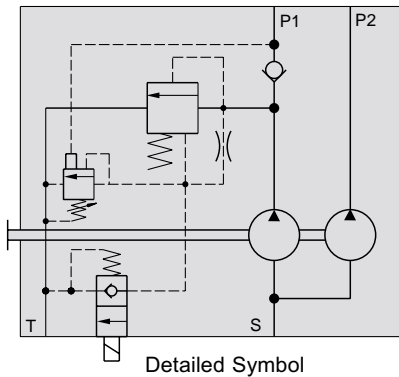


Simplified Symbol

- Variations:** For PGP 620
 Port mounted, integral with pump
- Press. Range:** Stand-by pressure setting 5 bar
 Max. setting 250 bar
 Min setting 55 bar
- Max. Flow:** 80 l/min

Comments:
 This valve permits pressure unloading of the first section in a tandem. The valve may also be remote mounted for use with tandem or dual pumps. The flow from port P1 is typically combined with the flow from port P2. Often used on construction machinery, such as backhoe loaders, wheel loaders and cranes, to provide high flow (from both sections of the tandem) at low or medium pressures and high pressure with reduced flow (from the rear section only). This allows maximum productivity of the machine in accord with the power available to the pump.

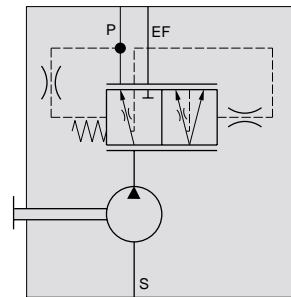
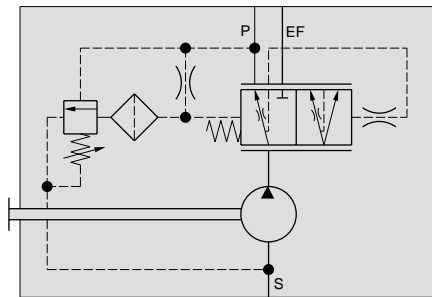
Unloading Relief Valve, Solenoid Operated



- Variations:** For PGP620
 Port mounted, integral with pump
- Press. Range:** Stand-by pressure setting 5 bar
 Max. setting 250 bar
 Min setting 55 bar
- Max. Flow:** 80 l/min

Comments:
 This valve permits pressure or solenoid unloading of the first section in a tandem. The valve may also be remote mounted for use with tandem or dual pumps. The flow from port P1 is typically combined with the flow from port P2. Often used on construction machinery, such as backhoe loaders, wheel loaders and cranes, to provide high flow (from both sections of the tandem) at low or medium pressures and high pressure with reduced flow (from the rear section only). This allows maximum productivity of the machine in accord with the power available to the pump.

Priority Flow Divider



- Variations:** **Rear Mounted Versions:**
 For PGP620
 Without priority relief; With full flow priority relief (not shown)
 With pilot priority relief valve
- Port Mounted Version:**
 For PGP 620
 Without priority relief

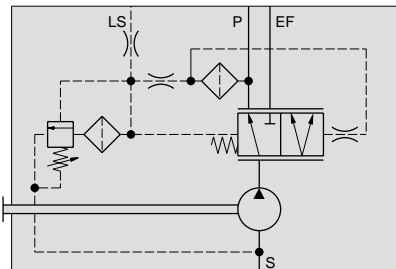
- Press. Range:** Priority Port Min. setting 35 bar
 Priority Port Max. setting 210 bar
 Extended Flow Max. equal to max. rating of pump
- Max. Flow:** Valve for Port Mounted Version
 Priority Flow Max. 32 l/min
 Extended Flow Max. 70 l/min
 Max. input flow 70 l/min
- Valve for PGP 620 - Rear Mounted Version
 Priority Flow Max. 45 l/min
 Extended Flow Max. 100 l/min
 Max. input flow 100 l/min

PGP 620 + Valve

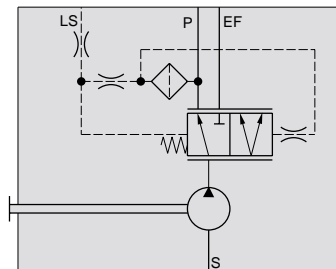


Comments:
 The Priority Flow Divider provides a constant and specified flow for power steering or other priority functions. The balance of the flow produced by the pump is available from the EF port for additional functions such as open center directional control valves, fan drives, etc.

Load Sense Priority Valve



With Priority Relief Valve and for Dynamic LS Signal



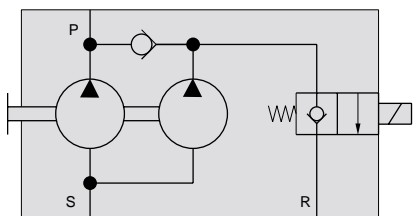
Without Priority Relief Valve and for Dynamic LS Signal

- Variations:**
- Rear Mounted Versions:**
 For PGP620
 Without relief, static LS signal;
 With pilot relief, dynamic LS signal
 Without relief, dynamic LS signal;
 With pilot relief, dynamic LS signal
 - Port Mounted Version:**
 For PGP620
 Without relief, static LS signal;
 Without relief, dynamic LS signal

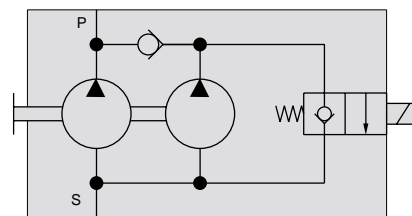
- Press. Range:**
- | | | |
|---|-----|-----|
| Priority Port Min. setting | 35 | bar |
| Priority Port Max. setting | 210 | ba |
| Extended Flow Max. equal to max. rating of pump | | |
- Max. Flow:**
- | | | |
|--------------------------------|-----|-------|
| Valve for Port Mounted Version | | |
| Priority Flow Max. | 32 | l/min |
| Extended Flow Max. | 70 | l/min |
| Max. input flow | 70 | l/min |
| Valve for PGP620 | | |
| Priority Flow Max. | 45 | l/min |
| Extended Flow Max. | 100 | l/min |
| Max. input flow | 100 | l/min |

Comments:
 The Load Sensing Priority Valve provides priority flow on demand, typically for LS power steering. The balance of the flow produced by the pump is available from the EF port for additional functions such as open center directional control valves, fan drives, etc. When the power steering is idle, full pump flow is available for these functions. The selection of pilot relief and static or dynamic signal is dependent on the characteristics of the selected steering unit.

Two - Stage Pump



With External Tank Port (recommended)



With Internal Vent to Pump Inlet

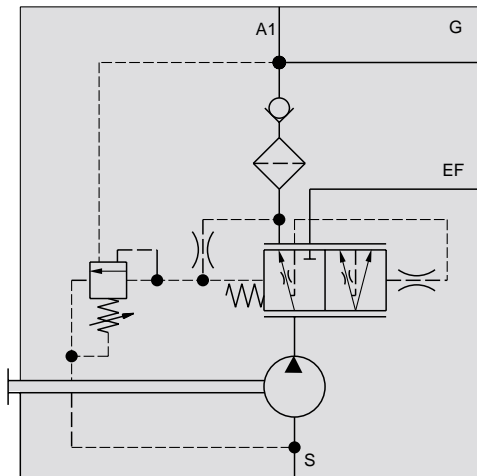
- Variations:**
- For PGP620
 - With internal vent to inlet
 - With external tank port
 - Note: Specify solenoid voltage

- Press. Range:** To application requirements
- Rated Flow:** A variety of solenoid valves are available. Selection of valve size and flow rate is in accordance with application requirements.

Comments:
 The Parker Two-Stage or High-Low pump is a tandem with equal or dissimilar displacements and a two position / two way valve in the rear cover to allow unloading of the rear pump. This pump is applied when the prime mover (engine or electric motor) has limited power. When high pressure is required, the rear section is unloaded to the pump inlet or the tank. When high flow is required at low or medium pressure, the flow of both sections is combined at the outlet port P. In both cases, the displacements and pressures are selected to be within the power limits of the prime mover.

Note: When the internal vent to the inlet is selected, caution is suggested to prevent operating in the unloading condition for extended periods. The heat generated in doing so may lower the fluid viscosity below minimums required for the pump possibly damaging the pump.

Single Accumulator Charge Valve

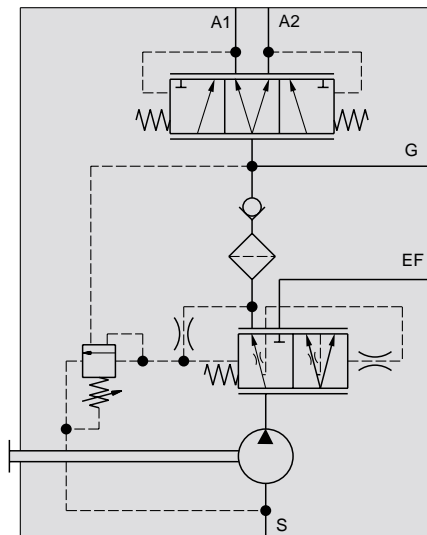


Variations:	For PGP620	
	Integral with pump	100 l/min
Press. Range:	A1, G Ports Min. setting	35 bar
	A1, G Ports Max. setting	210 bar
	Extended Flow Max. equal to	
	max. rating of pump	
Max. Flow:	Valve for PGP620	
	Charge Flow Max.	45 l/min
	Extended Flow Max.	100 l/min
	Max. Input Flow	100 l/min

Comments:

The Single Accumulator Charge Valve (SACV) provides priority flow to charge an accumulator for vehicle brakes or any application requiring stored hydraulic energy. The SACV has an integral differential pilot relief valve to provide a wide variety of cut-in/cut-out pressure ratios. Typical ratios are 80%, 70%, 60% and 50%. Custom ratios are available for OEM applications. A variety of port locations and sizes are available. The balance of the pump flow at the EF port is available for an open circuit directional control valve, fan drive or other ancillary functions.

Dual Accumulator Charge Valve

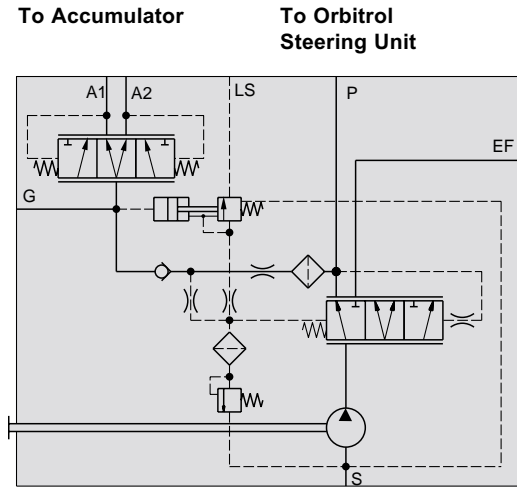


Variations:	For PGP620	
	Integral with pump	100 l/min
Press. Range:	A1, A2, G Ports Min. setting	35 bar
	A1, A2 G Ports Max. setting	210 bar
	Extended Flow Max. equal to	
	max. rating of pump	
Max. Flow:	Valve for PGP620	
	Charge Flow Max.	45 l/min
	Extended Flow Max.	100 l/min
	Max. Input Flow	100 l/min

Comments:

The Dual Accumulator Charge Valve provides priority flow to charge two accumulators for dual circuit vehicle brakes or any application requiring stored hydraulic energy. The Dual Accumulator Charge Valve has an integral differential pilot relief valve to provide a wide variety of cut-in/cut-out pressure ratios. Typical ratios are 80%, 70%, 60% and 50%. Custom ratios are available for OEM applications. An inverse shuttle spool isolates the two circuits so that pressure and oil volume is maintained in one circuit should the other experience a break in the hydraulic line. A variety of port locations and sizes is available.

Steering & Accumulator Charge (STAC) Valve

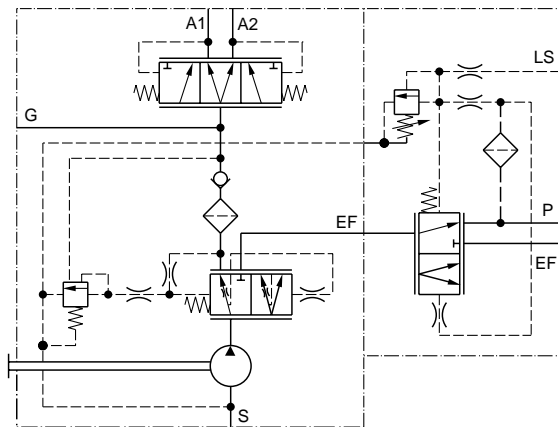


- Variations:** Integral with PGP 620 pump
 Single or dual accumulator charge circuit
 (Dual circuit schematic shown)
- Press. Range:** A1, A2, Port Min. setting 35 bar
 A1, A2, Port Max. setting 210 bar
 Priority Port Max. setting 210 bar
 Extended Flow Max. equal to max. rating of pump
 Steering stand-by pressure up to 20 bar
- Rated Flows:** Total Charge Flow up to 60 l/min
 depending on stand-by pressure
 Priority Port 45 l/min
 Extended Flow Max. 100 l/min
 Max. Input Flow 100 l/min

Comments:

The combined LS Priority Valve and Accumulator Charge Valve provides equal priority flow to load sense power steering and to charge one or more accumulators for hydraulic vehicle brakes. Excess pump flow is available from the EF port for the implement hydraulics, fan drives or other services. The accumulator charge function has an differential pilot relief valve to provide a wide variety of cut-in/cut-out pressure ratios. Typical ratios are 80%, 70%, 60% and 50%. Custom ratios are available for OEM applications. Steering relief pressure (at P port) must be equal to or greater than maximum charge cut-out pressure. Valve is available with inverse shuttle for dual circuit braking systems (above schematic) or without inverse shuttle for single braking systems.

Composite Load Sense Priority and Accumulator Charge Valve



- Variations:** Integral with PGP 620 pump
 Single accumulator charge valve + Load sensing priority valve
 Dual accumulator charge valve + Load sensing priority valve (schematic shown)
 Single accumulator charge valve + Priority flow divider
 Dual accumulator charge valve + Priority flow divider
- Press. Range:** A1, A2, G Port Min. setting 35 bar
 A1, A2, G Port Max. setting 210 bar
 Priority Port Max. setting 210 bar
 Extended Flow Max. equal to max. rating of pump
- Rated Flow:** Charge Max. 45 l/min
 Extended Flow Max. 100 l/min
 Max. Input Flow 100 l/min

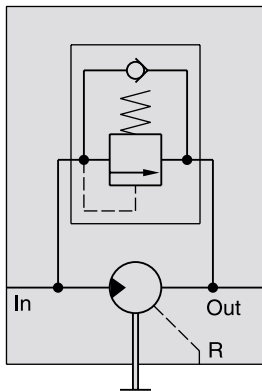
Comments:

The Composite Load Sense Priority and Accumulator Charge Valve provides first priority flow to charge one or two accumulators for vehicle brakes and second priority to power steering. The balance of the pump flow at the EF port is available for an open circuit directional control valve. The accumulator charge valve has an integral differential pilot relief valve to provide a wide variety of cut-in/cut-out pressure ratios. Typical ratios are 80%, 70%, 60% and 50%. Custom ratios are available for OEM applications. The combination is possible with Single and Dual Accumulator Charge Valves or Priority Flow Dividers. The composite Valve is also available for remote mounting.

Motors

Valve type	PGM
	620
Single Pressure Relief Valve	X
Single Pressure Relief Valve with Anti-Cavitation	X
Cross Port Pressure Relief Valve	X
Cross Port Pressure Relief Valve with Anti-Cavitation	X
Solenoid Unloading Pressure Relief Valve for Motors	X
Check Valve and Restrictor	X

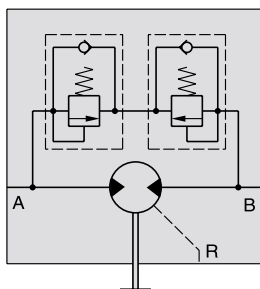
Single Pressure Relief Valve with Anti-Cavitation



- Variations:** For PGM 620
 Reverse flow check
 With internal or external drain
- Press. Range:** Min. setting 25 bar
 Max. setting 250 bar
- Applications:** Compressor drives, fan drives, mower blade drives and water pump drives

Comments:
 Integral relief to protect motor. Motors fitted with this relief valve may be applied in series with the relief valve providing a limit to the pressure differential, and hence, the output torque. The check valve allows the motor and driven load to “spool down” when the fluid supply is shut off or reduced due to engine speed fluctuations. In series operation, the check valve permits the motor to come to a controlled stop should the outlet flow be suddenly blocked. This check valve reduces the risk of damaging the motor or blowing a hydraulic line. Motors fitted with this valve are available with side or rear facing ports.

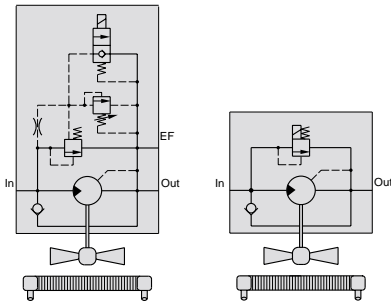
Cross Port Pressure Relief Valve with Anti-Cavitation



- Variations:** For PGM620
 Non adjustable, with reverse flow check
 With internal or external drain
- Press. Range:** Min. setting 25 bar
 Max. setting 250 bar
- Applications:** Mower blade drives, water pump drives and reversible hydrostatic transmissions

Comments:
 Motors fitted with this relief valve may be applied in series or in a hydrostatic transmission with the relief valve providing a limit to the pressure differential, and hence, the output torque. The check valves allow flow to return to the inlet of the motor to prevent cavitation. Available with side, rear, or combination of side and rear ports.

Solenoid Unloading Pressure Relief Valve for Motors



Variations: For PGM620
 With internal return for single motor operation
 With tank port for series motor operation
 Specify solenoid voltage, whether N/O or N/C

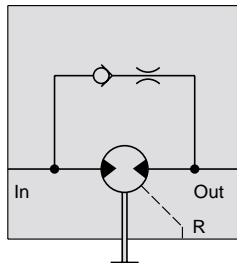
Press. Range: Stand-by pressure differential 5 bar
 Max. setting 250 bar

Max. Flow: For PGM 620 100 l/min

Comments:

This valve is similar to the solenoid unloading relief valve used on PGM 620. A small solenoid operated cartridge valve vents the internal pilot to the motor outlet to unload the main spool. The outlet port is connected to tank via filter and heat exchanger (if installed). The motor control can be set to provide low speed operation rather than coming to a full stop. This allows a quiet start for the fan as it will start from approximately 100 rpm. The solenoid in the valve can be supplied for normally open or normally closed operation. The anti-cavitation check valve allows motor spool-down, when the engine is shut down with the fan running.

Check Valve and Restrictor



Variations: For PGM620
 Metered flow from motor outlet to inlet

Press. Range: Max. setting 250 bar
Max. Flow: 30 l/min

Applications: Mower blade drives, winch drives, and blower drives

Comments:

The Check Valve and Restrictor is used to control pressure spikes between motors in series circuit. The check valve allows the motor and driven load to “spool down” when the fluid supply is shut off, or reduced due to engine speed fluctuations. In series operation, the check valve permits the motor to come to a controlled stop should the outlet flow be suddenly blocked. This check valve reduces the risk of damaging the motor or blowing a hydraulic line. The restrictor valve permits operation in reverse with reduced efficiency for cleaning debris or backlapping of the cutters.

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8. Buyer's Property: Any designs, tools, patterns, materials, drawings, confidential information or equipment furnished by Buyer or any other items which become Buyer's property, may be considered obsolete and may be destroyed by Seller after two (2) consecutive years have elapsed without Buyer placing an order for the items which are manufactured using such property, Seller shall not be responsible for any loss or damage to such property while it is in Seller's possession or control.

9. Taxes: Unless otherwise indicated on the face hereof, all prices and charges are exclusive of excise, sales, use, property, occupational or like taxes which may be imposed by any taxing authority upon the manufacture, sale or delivery of the items sold hereunder. If any such taxes must be paid by Seller or if Seller is liable for the collection of such tax, the amount thereof shall be in addition to the amounts for the items sold. Buyer agrees to pay all such taxes or to reimburse Seller therefore upon receipt of its invoice. If Buyer claims exemption from any sales, use or other tax imposed by any taxing authority, Buyer shall save Seller harmless from and against any such tax, together with any interest or penalties thereon which may be assessed if the items are held to be taxable.

10. Indemnity For Infringement of Intellectual Property Rights: Seller shall have no liability for infringement of any patents, trademarks, copyrights, trade dress, trade secrets or similar rights except as provided in this Part 10. Seller will defend and indemnify Buyer against allegations of infringement of U.S. Patents, U.S. Trademarks, copyrights, trade dress and trade secrets (hereinafter 'Intellectual Property Rights'). 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 an allegation that an item sold pursuant to this contract infringes the Intellectual Property Rights of a third party. Seller's obligation to defend and indemnify Buyer is contingent on Buyer notifying Seller within ten (10) days after Buyer becomes aware of such allegations of infringement, and Seller having sole control over the defense of any allegations or actions including all negotiations for settlement or compromise. If an item sold hereunder is subject to a claim that it infringes the Intellectual Property Rights of a third party, Seller may, at its sole expense and option, procure for Buyer the right to continue using said item, replace or modify said item so as to make it noninfringing, or offer to accept return of said item and return the purchase price less a reasonable allowance for depreciation. Notwithstanding the foregoing, Seller shall have no liability for claims of infringement based on information provided by Buyer, or directed to items delivered hereunder for which the designs are specified in whole or part by Buyer, or infringements resulting from the modification, combination or use in a system of any item sold hereunder. The foregoing provisions of this Part 10 shall constitute Seller's sole and exclusive liability and Buyer's sole and exclusive remedy for infringement of Intellectual Property Rights.

If a claim is based on information provided by Buyer or if the design for an item delivered hereunder is specified in whole or in part by Buyer, Buyer shall defend and indemnify Seller for all costs, expenses or judgments resulting from any claim that such item infringes any patent, trademark, copyright, trade dress, trade secret or any similar right.

11. Force Majeure: Seller does not assume the risk of and shall not be liable for delay or failure to perform any of Seller's obligations by reason of circumstances beyond the reasonable control of Seller (hereinafter 'Events of Force Majeure'). Events of Force Majeure shall include without limitation, accidents, acts of God, strikes or labor disputes, acts, laws, rules or regulations of any government or government agency, fires, floods, delays or failures in delivery of carriers or suppliers, shortages of materials and any other cause beyond Seller's control.

12. Entire Agreement/Governing Law: The terms and conditions set forth herein, together with any amendments, modifications and any different terms or conditions expressly accepted by Seller in writing, shall constitute the entire Agreement concerning the items sold, and there are no oral or other representations or agreements which pertain thereto. This Agreement shall be governed in all respects by the law of the State of Ohio. No actions arising out of the sale of the items sold hereunder or this Agreement may be brought by either party more than two (2) years after the cause of action accrues.

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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 electromechanical 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.

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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.



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



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



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