

High Pressure Checkball Piston Pumps

Fixed displacement checkball pumps, with bi-directional shaft rotation, provide constant direction of output flow regardless of the direction of drive shaft rotation.

OPERATING ADVANTAGES

Inlet and outlet check valves in each piston pumping chamber give checkball design pumps unique advantages. The positive seating action provides greater volumetric efficiency, especially at higher pressures.

The check valves take the place of a valveplate used in other pump designs. With no metal-to-metal rotating surface, checkball pumps are resistant to wearing and scoring, providing longer life with lower lubricity and contaminated fluids.

TYPICAL APPLICATIONS

Reduced power requirements, as low as 1.0 HP at 10 000 psi (0,75 kW at 700 bar) @ 1500 rpm, make these pumps ideal for use in remote locations with limited power supply.

These compact pumps can be used on portable power packs for high-pressure torque wrenches and other service tools.

PUMP SELECTION

The table shows specifications for standard pressure models and "H" option models for use at pressures higher than 8000 psi (560 bar).

Ordering a PF500 Series pump requires a complete model code specifying drive shaft, seal, and outlet port options.

Refer to *Typical Model Code* on page 6.

Maximum Pressure

The max. pressures listed in the table are the pressures a pump can sustain for occasional, short periods of operation without appreciably reducing life expectancy.

PF500 SERIES
0.16 to 0.68 gpm (0,59 to 2,58 L/min) at 1800 rpm
Rated: 10 000 psi (700 bar), Maximum: 15 000 psi (1040 bar)



Specifications

| Pump Models | Output Flow at 1500 rpm ^① | | Output Flow at 1800 rpm ^① | | Rated Pressure | | Max. Pressure | | Rated Speed | Max. Speed |
|-------------|--------------------------------------|-------|--------------------------------------|-------|----------------|-----|---------------|------|------------------|------------------|
| | U.S. gpm | L/min | U.S. gpm | L/min | psi | bar | psi | bar | rpm ^② | rpm ^③ |
| PF501-20 | 0.13 | 0,49 | 0.16 | 0,61 | 8000 | 560 | 8000 | 560 | 1800 | 3600 |
| PF504-20 | 0.21 | 0,79 | 0.25 | 0,95 | 8000 | 560 | 8000 | 560 | 1800 | 3600 |
| PF507-20 | 0.29 | 1,10 | 0.35 | 1,32 | 8000 | 560 | 8000 | 560 | 1800 | 3600 |
| PF510-20 | 0.42 | 1,59 | 0.51 | 1,93 | 8000 | 560 | 8000 | 560 | 1800 | 3600 |
| PF511-20 | 0.17 | 0,64 | 0.21 | 0,79 | 8000 | 560 | 8000 | 560 | 1800 | 3600 |
| PF514-20 | 0.27 | 1,02 | 0.33 | 1,25 | 8000 | 560 | 8000 | 560 | 1800 | 3600 |
| PF517-20 | 0.38 | 1,44 | 0.46 | 1,74 | 8000 | 560 | 8000 | 560 | 1800 | 3600 |
| PF520-20 | 0.56 | 2,12 | 0.68 | 2,57 | 8000 | 560 | 8000 | 560 | 1800 | 3600 |
| PF501H-20 | 0.12 | 0,45 | 0.15 | 0,57 | 10 000 | 700 | 15 000 | 1040 | 1800 | 3600 |
| PF504H-20 | 0.20 | 0,76 | 0.24 | 0,91 | 10 000 | 700 | 15 000 | 1040 | 1800 | 3600 |
| PF507H-20 | 0.27 | 1,02 | 0.33 | 1,25 | 10 000 | 700 | 15 000 | 1040 | 1800 | 3600 |
| PF510H-20 | 0.42 | 1,59 | 0.50 | 1,89 | 10 000 | 700 | 15 000 | 1040 | 1800 | 3600 |
| PF511H-20 | 0.16 | 0,61 | 0.19 | 0,72 | 10 000 | 700 | 15 000 | 1040 | 1800 | 3600 |
| PF514H-20 | 0.27 | 1,02 | 0.32 | 1,21 | 10 000 | 700 | 15 000 | 1040 | 1800 | 3600 |
| PF517H-20 | 0.37 | 1,40 | 0.45 | 1,70 | 10 000 | 700 | 15 000 | 1040 | 1800 | 3600 |
| PF520H-20 | 0.55 | 2,08 | 0.66 | 2,50 | 10 000 | 700 | 15 000 | 1040 | 1800 | 3600 |

^① Output flow based on typical performance at rated pressure with pressurized inlet where required, as shown in the table on page 2.

^② Contact the Dynex Sales department for applications requiring continuous duty operation at speeds higher than 1800 rpm or lower than 900 rpm. See "Typical Performance Curves" on page 5.

^③ Higher than rated speeds may require a pressurized inlet. Refer to "Inlet Conditions" on page 2.

INSTALLATION AND OPERATION

Refer to *Checkball Pumps Service, Installation and Operating Instructions* for general installation and operating recommendations.

Consult the Dynex Sales department for applications that require operating above rated pressures, or at continuous duty above or below speeds shown in the *Typical Performance Curves* on page 5.

Mounting

SAE A-A 2-bolt pattern with 0.25 inch (6,4 mm) pilot engagement.

Shaft Options

Standard keyed shaft, 0.625 inch (15,88 mm) diameter.

Optional spline shaft, 0.623/0.622 inch diameter standard SAE 9 tooth, 16/32 DP 30° involute spline.

Outlet Port Options

Standard pressure models have SAE ports. The high pressure "H" option requires the use of outlet port option "A" (Autoclave Medium Pressure, Butech M/P or equivalent fittings), or outlet port option "B" (British Standard Pipe Parallel fittings).

Inlet Conditions

Pumps may require pressurized inlet conditions at higher speeds. Failure to meet minimum inlet requirements will result in a slight flow reduction. Refer to the table.

Orientation/Drive

Shaft horizontal is preferred with inlet vertically up. Vertical shaft mounting is possible, but requires connecting a line to the vertical bleed port in the pump housing. Refer to the installation drawing on page 3.

Seal Options

Standard seals are Fluorocarbon (Viton® or Fluorel®). Options include EPR seals for use with some phosphate ester fluids, or Fluorocarbon with high pressure shaft seal.

Minimum Filtration Levels

Pump inlet, 150 μ nominal.
Pressure or return line, 25 μ nominal.

Restricting flow to the pump inlet should be avoided. Minimum recommended inlet conditions must be maintained.

Minimum Inlet Pressure^①

| Pump Models | Operating Speed | | | | | | | |
|-------------|-----------------|-----|----------|-----|-----------------|------------------|-----------------|------------------|
| | 1500 rpm | | 1800 rpm | | 2800 rpm | | 3600 rpm | |
| | psi | bar | psi | bar | psi | bar | psi | bar |
| PF501 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 0,4 |
| PF504 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 0,4 |
| PF507 | 0 | 0 | 0 | 0 | 5 | 0,4 | 10 ^② | 0,7 ^② |
| PF510 | 0 | 0 | 0 | 0 | 10 ^② | 0,7 ^② | 15 ^② | 1,0 ^② |
| PF511 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 0,4 |
| PF514 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 0,4 |
| PF517 | 0 | 0 | 0 | 0 | 5 | 0,4 | 10 ^② | 0,7 ^② |
| PF520 | 0 | 0 | 0 | 0 | 10 ^② | 0,7 ^② | 15 ^② | 1,0 ^② |

① Values shown are based on fluid viscosity of 100 SUS (20 cSt).

② Inlet pressures higher than 10 psig (0,7 bar) require a high pressure shaft seal. Refer to "Typical Model Code" on page 6 to specify seals.

Hydraulic Fluid Viscosity Guidelines^①

| Operating | | | | | | | |
|-----------|-----|---------|-----|----------|-----|-----------|----------|
| Minimum | | Maximum | | Start-up | | Optimum | |
| SUS | cSt | SUS | cSt | SUS | cSt | SUS | cSt |
| 52 | 8 | 1911 | 413 | 3706 | 800 | 98 to 324 | 20 to 70 |

① If fluid conditions fall outside of the range shown, contact the Sales department.

Weight (Mass):

11.9 lb (5,4 kg).

Split-Flow® Options

Refer to *Split Flow® Models* on page 4 for optional piston flow splits for this pump. Contact the Dynex Sales department for availability.

Reduced Output Option

Pump output can be reduced by one-half by deactivating two pistons (PF511, PF514, PF517, PF520 models only).

This can be an advantage in applications where available input power is limited. Refer to *Typical Model Code* on page 6.

FLUID RECOMMENDATIONS

Mineral Oil

A high-grade premium petroleum-based fluid should be used to assure long component and system life.

The fluid should have a combination of anti-wear, demulsibility, rust protection, oxidation-resistant, and foam-resistant properties.

Special Fluids

Some pump models may require reduced operating pressures when using low-lubricity fluids.

Because of the wide range of fluid characteristics, contact the Dynex Sales department for a review of any application using non-petroleum based fluids.

Viscosity Specifications

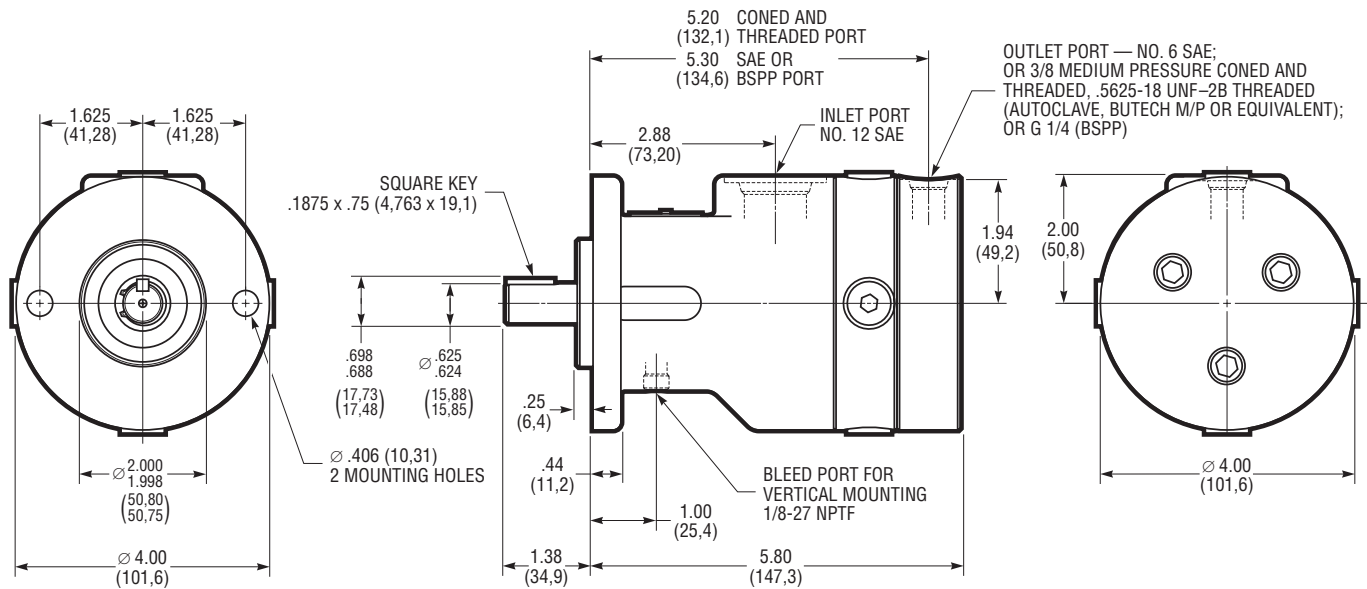
Using fluid with the correct viscosity range is critical to achieving long component life.

Fluid conditions outside the "Optimum" range shown in the table may result in reduced pump output, requiring pressurized inlet conditions. For more information, contact the Dynex Sales department.

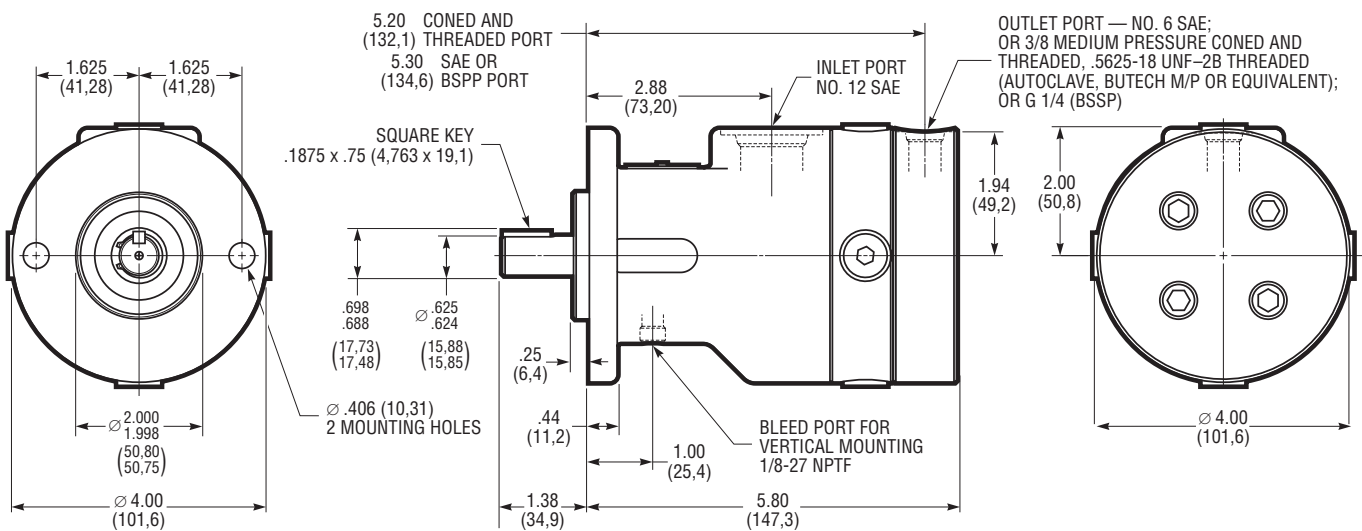
INSTALLATION

All dimensions are shown in inches (millimeters in parentheses) and are nominal. The drawing shows dimensions common to all PF500 models. See *Shaft Options* on page 2 for spline shaft data.

Note that the location of the outlet port varies as shown, dependent on the type of port. Refer to *Typical Model Code* on page 6 to specify the drive shaft, outlet port and seals.



Three piston models: PF501, PF504, PF507, PF510, (PF501H, PF504H, PF507H, PF510H)

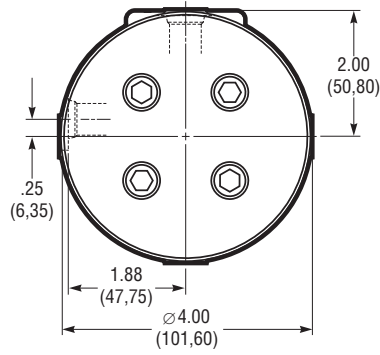
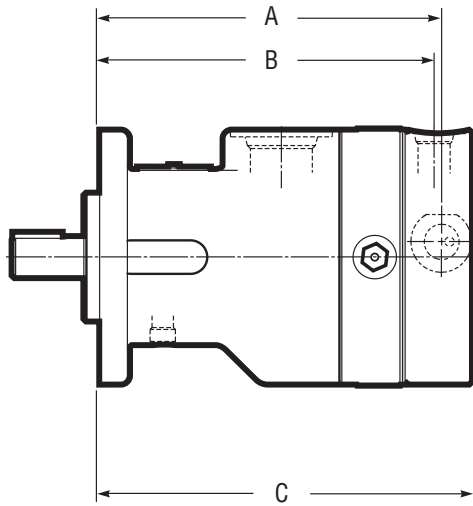


Four piston models: PF511, PF514, PF517, PF520, (PF511H, PF514H, PF517H, PF520H)

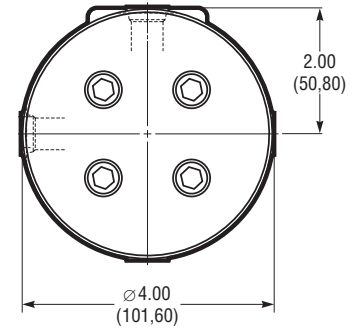
SPLIT-FLOW® MODELS

Split-Flow® provides multiple outlets from a single pump. Models with Split-Flow® covers efficiently supply two or more flows for multiple function circuits. Multiple outlet pumps can be used for synchronized actuator movement.

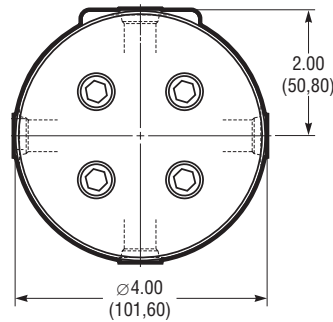
Piston outputs are grouped together in the cover with various piston flow splits available depending on whether it's a four-piston pump or a three-piston pump.



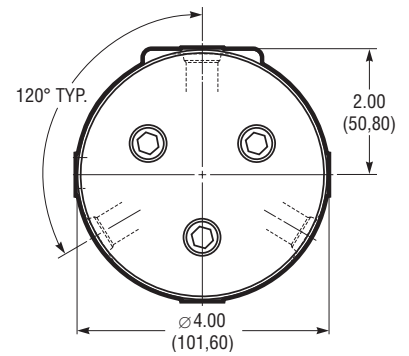
Two-piston output + two-piston output



Three-piston output + one-piston output



Four ports, each with one-piston output



Three ports, each with one-piston output

VARIABLE DIMENSIONS AND PORT LOCATIONS^{①②}

| DIM | 2x2 | | | 3+1 | | | 4X | | | 3X | | |
|-----|------|------|------|------|------|------|------|------|------|------|------|------|
| | SAE | MP | BSPP | SAE | MP | BSPP | SAE | MP | BSPP | SAE | MP | BSPP |
| A | 5.43 | 5.55 | 5.43 | 5.30 | 5.20 | 5.30 | 5.30 | 5.20 | 5.30 | 5.30 | 5.20 | 5.30 |
| B | 5.30 | 5.20 | 5.30 | 5.30 | 5.20 | 5.30 | 5.30 | 5.20 | 5.30 | 5.30 | 5.20 | 5.30 |
| C | 5.93 | 5.93 | 5.93 | 5.80 | 5.80 | 5.80 | 5.80 | 5.80 | 5.80 | 5.80 | 5.80 | 5.80 |

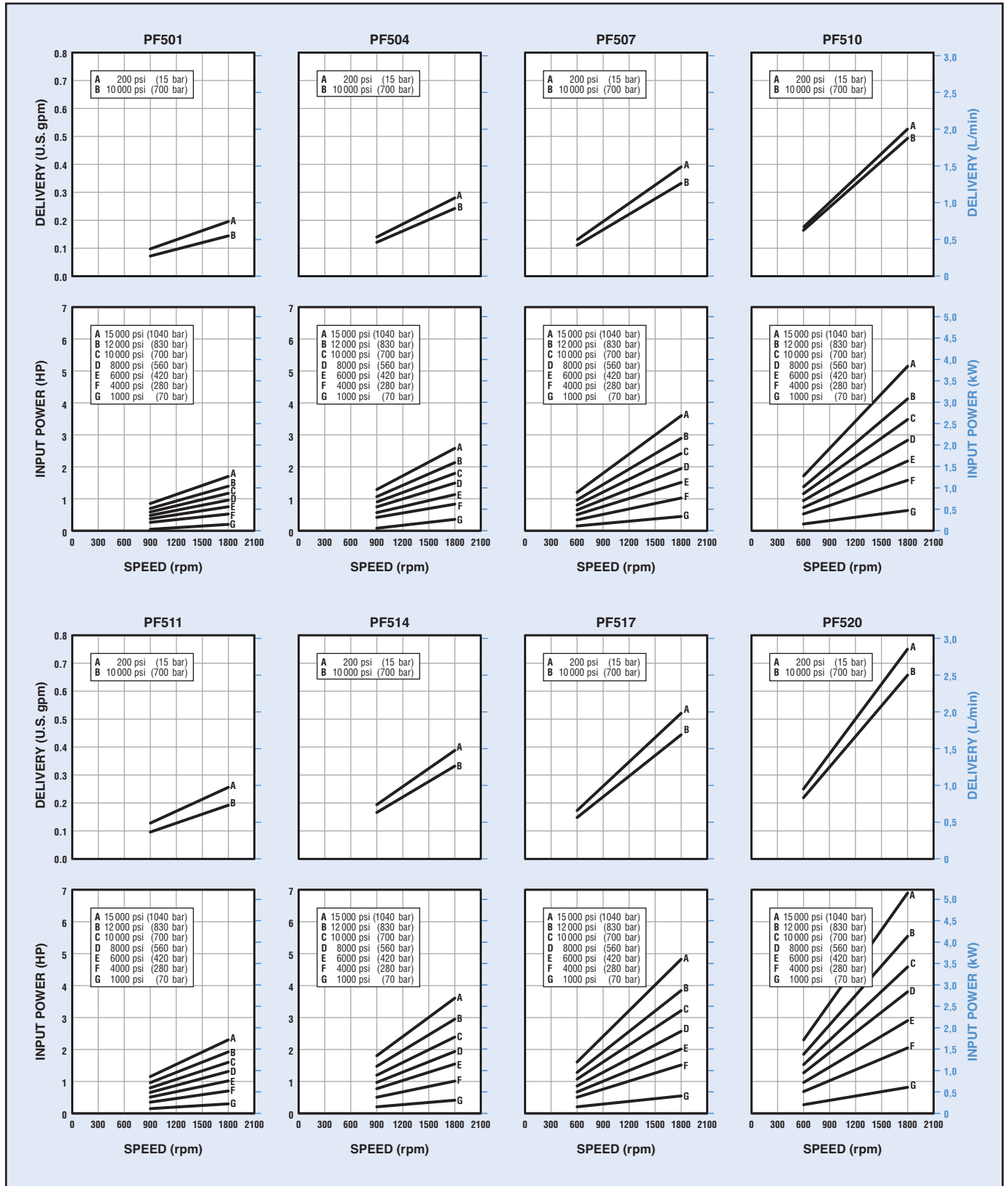
① See "Typical Model Code" on page 6 for port size information.

② SAE – Society of Automotive Engineers.

MP – Medium Pressure, Coned and Threaded, Autoclave, Butech M/P or equivalent fitting.

BSPP – British Standard Pipe Parallel.

TYPICAL PERFORMANCE CURVES



Typical performance curves are based on 100 SUS (20 cSt) mineral oil with pressurized inlet where required. Refer to the "Minimum Inlet Pressure" table on page 2. Contact the Dynex Sales department for applications requiring continuous duty operation at speeds higher or lower than shown.

TYPICAL MODEL CODE

PF5

01

H – S XV

A

–

2 – 2

0

| Pump Type | |
|-----------|-----------------------------------|
| PF5 | Fixed Displacement Checkball Pump |

| Output Flow (At 1800 rpm, at Rated Pressure) ^① | |
|--|--|
| 01 | Standard: 0.16 gpm (0,59 L/min) "H" option: 0.15 gpm (0,55 L/min) |
| 04 | Standard: 0.25 gpm (0,95 L/min) "H" option: 0.24 gpm (0,90 L/min) |
| 07 | Standard: 0.35 gpm (1,31 L/min) "H" option: 0.34 gpm (1,26 L/min) |
| 10 | Standard: 0.51 gpm (1,93 L/min) "H" option: 0.50 gpm (1,88 L/min) |
| 11 | Standard: 0.21 gpm (0,78 L/min) "H" option: 0.19 gpm (0,73 L/min) |
| 14 | Standard: 0.33 gpm (1,26 L/min) "H" option: 0.32 gpm (1,21 L/min) |
| 17 | Standard: 0.46 gpm (1,75 L/min) "H" option: 0.45 gpm (1,68 L/min) |
| 20 | Standard: 0.68 gpm (2,58 L/min) "H" option: 0.66 gpm (2,51 L/min) |

^① Output flows based on typical performance at rated pressure. Refer to performance curves for flows at lower pressures.

| Operating Pressure | |
|--------------------|----------------------------|
| No Code | Standard Pressure |
| H | High Pressure ^① |

^① Requires "A" or "B" port option.

| Drive Shaft | |
|-------------|--|
| No Code | Keyed, 0.625 inch (15,88 mm) diameter |
| S | SAE Spline, 0.625 inch (15,88 mm) ^① |

^① Contact the Dynex Sales department for availability.

| Ports | |
|---------|---|
| No Code | Inlet No. 12 SAE; Outlet No. 6 SAE ^① |
| A | Inlet No. 12 SAE; Outlet 3/8 Medium Pressure Coned and Threaded, 0.5625-18 UNF-2B Threaded ^② |
| B | Inlet No. 12 SAE; Outlet G 1/4 (BSPP) ^③ |

^① Not recommended for operation above 8000 psi (560 bar). Contact the fitting manufacturer for the pressure rating of the fitting.
^② High pressure port uses Autoclave Medium Pressure, Butech M/P or equivalent fitting.
^③ Outlet port uses British Standard Pipe Parallel fitting. Not recommended for operation above 10 000 psi (700 bar).

| Cover Options (Split-Flow [®]) | |
|---|---|
| No Code | Full flow from single outlet |
| <i>Reduced Flow Models:</i> | |
| 2 | Two-piston output + two-inactive pistons ^① |
| <i>Split-Flow[®] Cover Models:</i> | |
| 22 | Two-piston output + two-piston output ^① |
| 31 | Three-piston output + one-piston output ^{①②} |
| 4X | Four ports, each with one-piston output ^① |
| 3X | Three ports, each with one-piston output ^③ |

^① Available on models PF511, PF514, PF517, PF520 only.
^② Port for outlet flow designated by first digit is located at the 12 o'clock position (for code "31", three-piston output flow exits the 12 o'clock port).
^③ Available on models PF501, PF504, PF507, PF510 only.

| Seals | |
|---------|---|
| No Code | Fluorocarbon (Viton [®] or Fluorel [®]) Seals with Buna-N (Nitrile) Shaft Seal |
| XE | All EPR with High Pressure Shaft Seal ^① |
| XV | All Fluorocarbon (Viton [®] or Fluorel [®]) with High Pressure Shaft Seal |

^① Not available with high pressure "H" option. Contact the Dynex Sales department for recommended operating conditions.

Design Number

Modification Number



USA Headquarters

770 Capitol Drive
Pewaukee, WI 53072
Tel: +1 (262) 691-0300
Fax: +1 (262) 691-0312
sales@dynexhydraulics.com



Power Units & Systems

54 Nickerson Road
Ashland, MA 01721
Tel: +1 (508) 881-5110
ashland@dynexhydraulics.com



European Sales

Unit C5 Steel Close, Little End Road,
Eaton Socon, St Neots,
Cambs. PE19 8TT United Kingdom
Tel: +44 (0) 1480 213980
Fax: +44 (0) 01480 405662
sales@dynexhydraulics.co.uk



Middle East Sales

JAFZA 1, Tower A, 11th Floor
Jebel Ali Freezone
Dubai, UAE
Tel: +971 547422353
UAEsales@dynexhydraulics.com

Specifications shown were in effect when published. Since errors or omissions are possible, contact your Dynex Sales representative or the Dynex Sales department for the most current specifications before ordering. Dynex reserves the right to discontinue products or change designs at any time without incurring any obligation.

www.dynexhydraulics.com