

Checkball Piston Pumps For Water-Based Fluids

Fixed displacement checkball pumps are compatible with a variety of water-based and other low-lubricity fluids. Bi-directional shaft rotation provides constant direction of output flow regardless of drive shaft rotation.

MAINTENANCE-FREE DESIGN

The single-fluid checkball design uses the pumped fluid for internal bearing lubrication. This eliminates the potential for fluid cross-contamination, possible in other designs with isolated lubrication. It also avoids the cost of a lubrication circuit.

RELIABLE HIGH PRESSURE

Individual piston check valves provide long service life and greater volumetric efficiency, especially at high pressures and with low-lubricity fluids.

The check valves take the place of a valveplate in other pump designs. With no rotating sealing surface, checkball pumps are resistant to wearing and scoring.

TYPICAL APPLICATIONS

These pumps are ideal for use in wellhead safety control systems and other subsea applications, providing long life operating at high pressures with water-based fluids.

They are also used on hydroform presses, and other applications requiring environmentally-friendly or fire-resistant fluids.

PUMP SELECTION

The table shows specifications for standard pressure models, and for high pressure "H" option models for maximum pressures to 10 000 psi (700 bar). The "H" option requires high pressure coned and threaded or B.S.P. outlet ports.

Refer to "Typical Model Code" to specify shaft, seal and outlet port options.

PF1300 SERIES
0.31 to 1.42 gpm (1,18 to 5,37 L/min) at 1800 rpm
8000 to 10 000 psi (560 to 700 bar)



Specifications

Pump Models	Output Flow at 1500 rpm ^①		Output Flow at 1800 rpm ^①		Maximum Pressure		Rated Speed rpm
	U.S. gpm	L/min	U.S. gpm	L/min	psi	bar	
PF1301-10	0.26	0,98	0.31	1,18	8000	560	1800
PF1303-10	0.36	1,35	0.43	1,63	8000	560	1800
PF1305-10	0.46	1,73	0.55	2,08	8000	560	1800
PF1308-10	0.60	2,30	0.73	2,76	8000	560	1800
PF1315-10	0.76	2,87	0.91	3,45	8000	560	1800
PF1318-10	1.01	3,82	1.21	4,58	8000	560	1800
PF1320-10	1.18	4,47	1.42	5,37	8000	560	1800
PF1301H-10	0.25	0,95	0.30	1,14	10 000	700	1800
PF1303H-10	0.35	1,31	0.42	1,58	10 000	700	1800
PF1305H-10	0.44	1,70	0.54	2,03	10 000	700	1800
PF1308H-10	0.60	2,26	0.72	2,73	9000	630	1800
PF1315H-10	0.74	2,80	0.89	3,37	10 000	700	1800
PF1318H-10	1.00	3,78	1.20	4,54	9000	630	1800

^① Output flow based on typical performance using 33 SUS (1,9 cSt) water glycol fluid at maximum pressure with flooded inlet.

INSTALLATION AND OPERATING

Refer to separate Bulletin PSI.CB for general installation and operating recommendations.

All dimensions are shown in inches (millimeters in parentheses) and are nominal.

Note that Models PF1301, PF1303, PF1305 and PF1308 have three pistons. Other models have five pistons.

Mounting

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

Shaft

Standard keyed shaft, 0.875 inch (22,20 mm) diameter;

Optional spline shaft, 0.873/0.872 inch diameter standard S.A.E. 13 tooth, 16/32 D.P. 30° involute spline.

Outlet Port Options

Standard pressure models are available with S.A.E. ports. High pressure "H" option models require the use of outlet port option "A" (Autoclave Medium Pressure, Butech M/P or equivalent fittings), or outlet port option "B" (British Standard Pipe fittings).

Hydraulic Fluid Viscosity Guidelines^①

Operating					
Minimum		Maximum		Start-up	
SUS	cSt	SUS	cSt	SUS	cSt
31	1,3	927	200	927	200

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

Inlet Conditions

Pumps using water-based fluids require a flooded inlet up to 1800 rpm rated speed. Higher viscosity fluids may require pressurized inlet conditions.

Contact the sales department for applications requiring continuous duty operation at speeds higher or lower than shown in the "Typical Performance Curves".

Orientation/Drive

Shaft horizontal with inlet vertically up is preferred. Vertical shaft mounting is possible, but requires connecting a line to the bleed port to remove air from the pump housing.

Seal Options

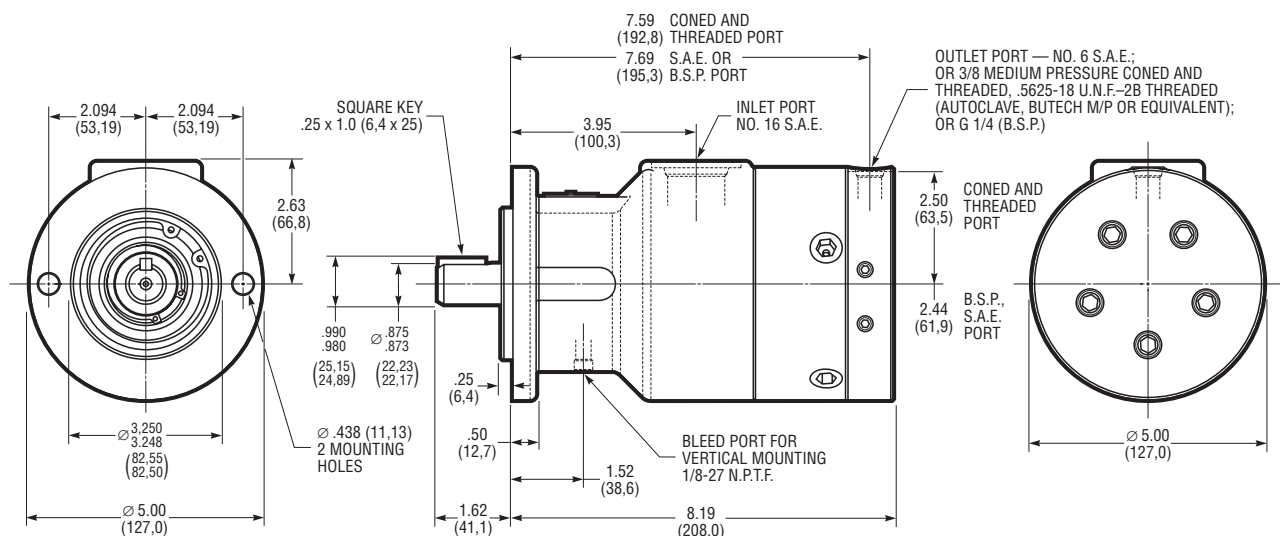
Standard seals are Buna-N (Nitrile) with Polyurethane (Disogrin®) o-rings in the cover. Options include Fluorocarbon (Viton® or Fluorel®) with Polyurethane (Disogrin®) o-rings in the cover, all Fluorocarbon with high pressure shaft seal, or EPR seals for use with some phosphate ester fluids. Refer to "Typical Model Code".

Weight (Mass)

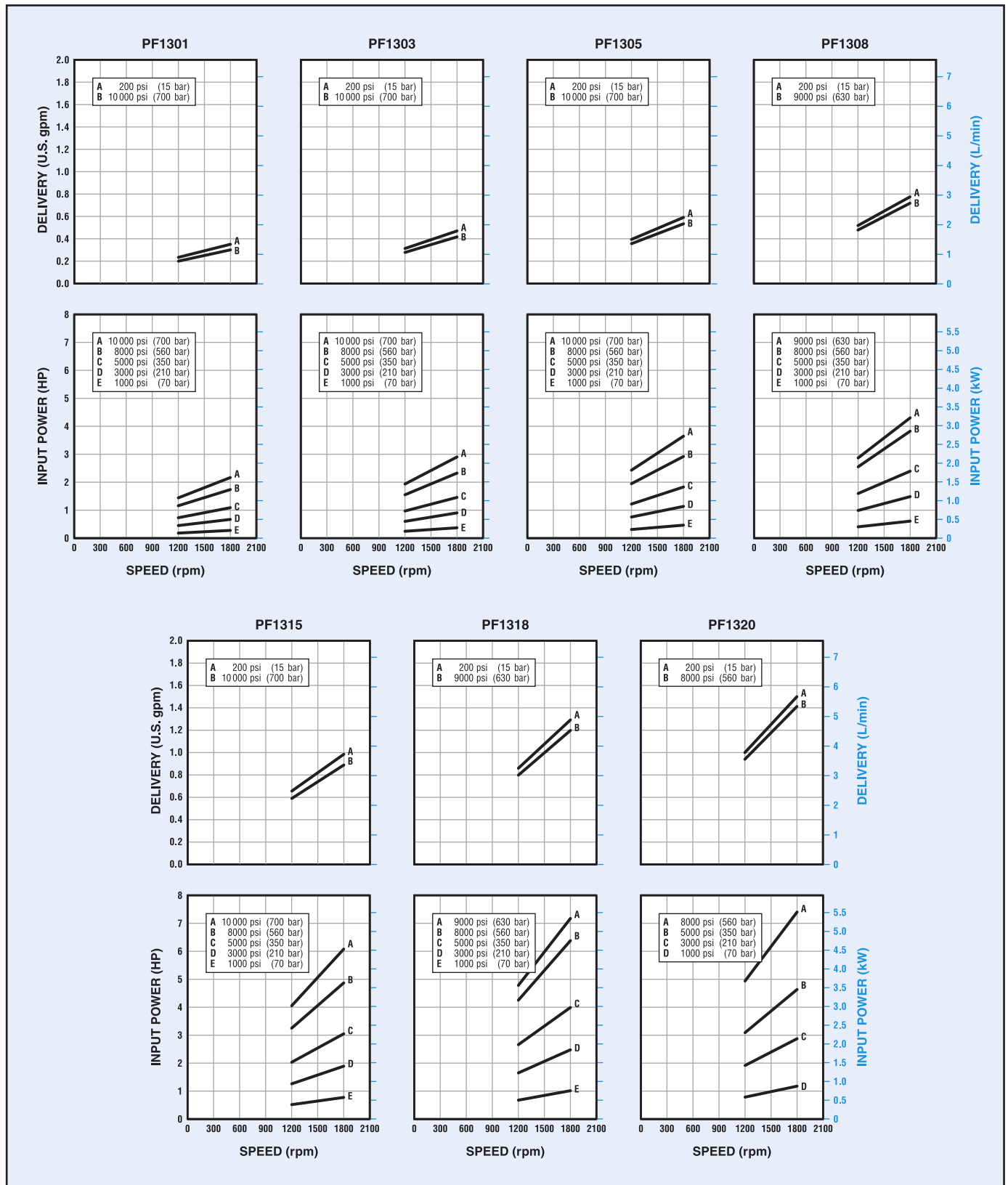
36 lb (16 kg)

FLUID RECOMMENDATIONS

For information on fluid recommendations and minimum filtration levels, see page 5.



Typical Performance Curves



Typical performance curves are based on 33 SUS (1,9 cSt) water glycol fluid with flooded inlet. Contact the sales department for applications requiring continuous duty operation at speeds higher or lower than shown.

TYPICAL MODEL CODE

PF13		01	H – S		D	A		–	1	0
Pump Type		Output Flow (At 1800 rpm, at maximum pressure) ^①		Ports		Design Number		Modification Number		
PF13	Fixed Displacement Checkball Pump									
01	Standard: 0.31 (1,18 L/min) “H” Option: 0.30 gpm (1,14 L/min)									
03	Standard: 0.43 (1,63 L/min) “H” Option: 0.42 gpm (1,58 L/min)									
05	Standard: 0.55 (2,08 L/min) “H” Option: 0.54 gpm (2,03 L/min)									
08	Standard: 0.73 (2,76 L/min) “H” Option: 0.72 gpm (2,73 L/min)									
15	Standard: 0.91 (3,45 L/min) “H” Option: 0.89 gpm (3,37 L/min)									
18	Standard: 1.21 (4,58 L/min) “H” Option: 1.20 gpm (4,54 L/min)									
20	Standard: 1.42 (5,37 L/min)									
① Output flows based on typical performance at maximum pressure. Refer to performance curves for flows at lower pressure.										
② Models PF1301, PF1303, PF1305 and PF1308 have three pistons. Other models have five pistons.										
Operating Pressure										
No Code	Standard Pressure									
H	High Pressure ^①									
① Requires “A” or “B” port option.										

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

Various pump models are available for use with water-based fluids, diesel calibration fluids, phosphate ester fluids, machining coolant, brake fluid, various military fluids and other special fluids.

PF4300 Series pumps are compatible with a variety of water-based fluids. Refer to page 23 for specifications for these models, which are specifically rated for use with low-lubricity fluids.

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

Because of the wide range of fluid characteristics, contact the 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 sales department.

Hydraulic Fluid Viscosity^①

Pump Models	Operating				Start-up ^②		Optimum	
	Minimum		Maximum					
	SUS	cSt	SUS	cSt	SUS	cSt	SUS	cSt
<i>Fixed Displacement Pumps:</i>								
PF500-10	52	8	1911	413	3706	800	98 to 324	20 to 70
PF1000-10	59	10	1911	413	3706	800	98 to 324	20 to 70
PF2000	59	10	1911	413	1911	413	98 to 324	20 to 70
PF2000 ^②	34	2,3	1911	413	1911	413	98 to 324	20 to 70
PF3000-10	59	10	1911	413	3706	800	98 to 342	20 to 70
PF4000-30	34	2,3	1911	413	1911	413	98 to 324	20 to 70
PF4200-10	34	2,3	1911	413	1911	413	98 to 324	20 to 70
PF4300-11	31	1,5	927	200	927	200	—	—
PF6000	34	2,3	1911	413	1911	413	98 to 324	20 to 70
<i>Mechanical Variable Delivery Pumps:</i>								
PV4000	34	2,3	1911	413	1911	413	98 to 324	20 to 70
PV6000	34	2,3	1911	413	1911	413	98 to 324	20 to 70
<i>Hydraulic Variable Delivery Pumps:</i>								
PV6000	34	2,3	1911	413	1911	413	98 to 324	20 to 70

① Fluid conditions outside the "Optimum" range may result in reduced output, requiring pressurized inlet conditions. Contact the sales department.

② Models with special mounting.

MINIMUM FILTRATION LEVELS

Pump inlet: 150 µ nominal;

Pressure or return line: 25 µ nominal.

While finer filtration levels than these are desirable and will result in longer component life, restricting flow to the pump inlet should be avoided. Minimum recommended inlet conditions must be maintained.

If a system component fails resulting in fluid contamination, it is important to drain and clean the reservoir, all lines, filter screens and all components. Refill with new fluid.

INSTALLATION AND OPERATION

Refer to separate Bulletin PSI.CB ([dynexpumpservice.pdf](#)) for general installation and operating recommendations.

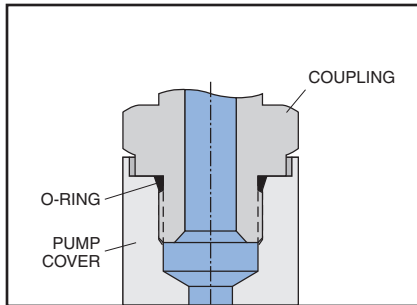
That brochure includes information on mounting, shaft loading, sizing inlet pipe and hose, air bleed procedures and initial start-up. Guidelines for maintenance, repair and trouble-shooting are also included.

OULET PORT CONFIGURATIONS

Dynex pumps are available with outlet ports suitable for use at various pressure ranges. Refer to the appropriate "Specification Table" or "Typical Model Code" to specify the required port.

Contact the fitting manufacturer to ensure the selected fittings are rated for the maximum pump operating pressure.

S.A.E. Straight Thread Ports



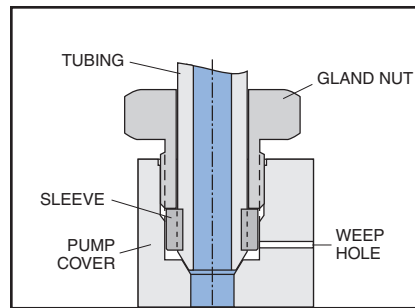
Typical S.A.E. Straight Thread port connection

The Straight Thread connection (S.A.E. J1926/1) is sometimes referred to as an S.A.E. O-ring Boss, or ORB. The port consists of a machined spotface surface, a tapered seal cavity and a straight thread port.

The fitting forms a seal by compressing the o-ring in the seal cavity with the underside of the flanged wrench flat. Some adjustable fittings, such as elbows and tees, use a locknut with a captive backup washer for compression.

S.A.E. Straight Thread ports are not recommended for operation above 8000 psi (560 bar). Also, the maximum pressure of pumps with No. 12 S.A.E. outlet ports may be limited by the pressure rating of the available fitting. Contact the fitting manufacturer for ratings.

Coned and Threaded Ports



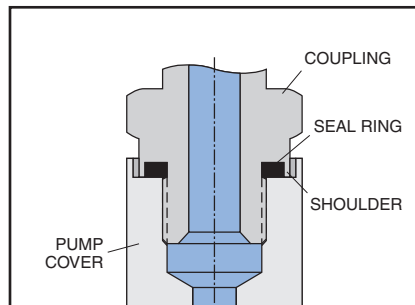
Typical Coned and Threaded port connection

High-pressure pumps are available with coned and threaded outlet ports, which use Autoclave Medium Pressure, Butech M/P, or equivalent fittings.

These fittings provide a metal-to-metal seal with an interference fit, not requiring an o-ring. The gland nut holds the sleeve and tubing against the cone surface.

A weep hole, visible on the outside of the pump cover, acts as an indicator of any abnormal leakage caused by system conditions (i.e., excessive pressure). It allows any fluid which does leak past the sealing surfaces to escape, preventing pressure build-up and possible damage.

British Standard Pipe Ports



Typical port connection with British Standard Pipe (Parallel) fitting with shoulder

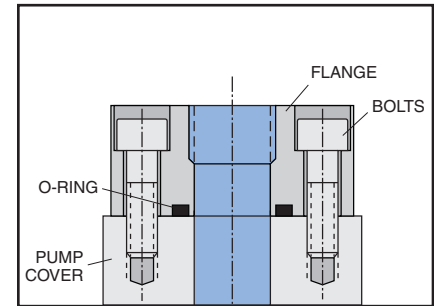
High-pressure pumps are available with flat face ports with British Standard Pipe (B.S.P.) parallel threads (BS 2779 or ISO 228), ideal for use on some European applications.

The fitting forms a seal by compressing a flat elastomer ring on a machined spotface surface. There are several sealing methods for these ports.

The recommended fitting has a recessed seal cavity formed by a shoulder on the underside of the flanged wrench flat (Voss "Peflex", Form B Shoulder Seal; or Parker Type E, "EOlastic" Seal; or equivalent).

B.S.P. ports are not recommended for operation above 10 000 psi (700 bar). Contact the fitting manufacturer, to ensure the selected fittings are rated for the maximum pump operating pressure.

S.A.E. 4-Bolt Flange Ports



Typical S.A.E. 4-Bolt Flange port connection

Flange connections are often used for higher flows requiring larger diameter tubing. The port consists of an unthreaded port with four bolt holes in a rectangular pattern on a machined face around the port (S.A.E. J518).

A typical fitting consists of a flanged head with a welded tube and a captive flange with bolt holes. A seal is formed by an o-ring in the groove on the underside mounting surface of the flange head. As the flange bolts are alternately tightened, the o-ring is compressed between the flange head and the machined face on the pump.

To make mounting easier in tight spaces a two-piece split-flange is often used.

BROCHURE NOTES:

The Intermittent pressures indicated throughout are the maximum pressures a component can sustain for occasional, short periods of operation without appreciably reducing the life expectancy. Contact the Dynex sales department for a review of any application which requires operating above the rated pressures or flows or beyond the specified speed range.

Specifications shown were in effect when printed. Since errors or omissions are possible, contact your sales representative or the 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.

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