

## Checkball Piston Pumps For Water-Based Fluids

### PF1300 SERIES

0.31 to 1.42 gpm (1,17 to 5,37 L/min) at 1800 rpm  
8000 to 15 000 psi (560 to 1040 bar)

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. Maximum pressures to 15 000 psi (1040 bar). The "H" option requires high pressure coned and threaded or BSPP outlet ports.

Refer to *Typical Model Code* on page 4 to specify shaft, seal and outlet port options.



### Specifications

Pump Models	Output Flow at 1500 rpm <sup>①</sup>		Output Flow at 1800 rpm <sup>①</sup>		Max. Pressure		Rated Speed rpm
	U.S. gpm	L/min	U.S. gpm	L/min	psi	bar	
PF1301-11	0.27	1,02	0.32	1,21	8000	560	1800
PF1303-11	0.36	1,36	0.43	1,63	8000	560	1800
PF1305-11	0.46	1,74	0.55	2,08	8000	560	1800
PF1308-11	0.61	2,31	0.73	2,76	8000	560	1800
PF1313-11	0.60	2,27	0.72	2,73	8000	560	1800
PF1315-11	0.77	2,91	0.92	3,48	8000	560	1800
PF1318-11	1.02	3,86	1.22	4,62	8000	560	1800
PF1320-11	1.18	4,47	1.42	5,38	8000	560	1800
PF1301H-11	0.23	0,87	0.27	1,02	15 000	1040	1800
PF1303H-11	0.33	1,25	0.39	1,48	15 000	1040	1800
PF1305H-11	0.44	1,67	0.53	2,01	12 000	830	1800
PF1308H-11	0.60	2,27	0.72	2,73	9000	630	1800
PF1313H-11	0.54	2,04	0.65	2,46	15 000	1040	1800
PF1315H-11	0.73	2,76	0.88	3,33	12 000	830	1800
PF1318H-11	1.01	3,82	1.21	4,58	9000	630	1800

<sup>①</sup> 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 document: *Checkball Pumps Service, Installation and Operating Instructions*.

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

SAE 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 SAE 13 tooth, 16/32 D.P. 30° involute spline.

### Outlet Port Options

Standard pressure models are available with SAE 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 Parallel fittings).

### 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*.

## Hydraulic Fluid Viscosity Guidelines<sup>①</sup>

Operating					
Minimum		Maximum		Start-up	
SUS	cSt	SUS	cSt	SUS	cSt
32	1,5	927	200	927	200

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

### 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* on page 4.

### 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.

### Weight (Mass)

36 lb (16 kg)

## FLUID RECOMMENDATIONS

### Special Fluid Operation

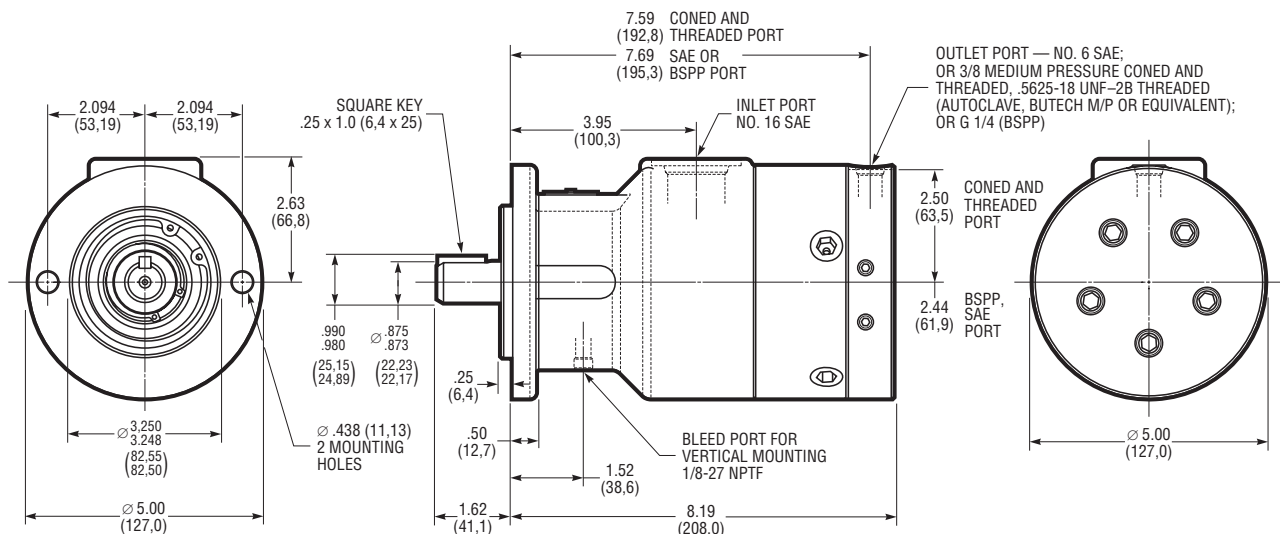
Because of the wide range of water-based fluid characteristics, contact the Sales department for a review of the application requiring non-petroleum based fluid.

Mineral or phosphate ester fluids may allow for increased maximum pressures on some models.

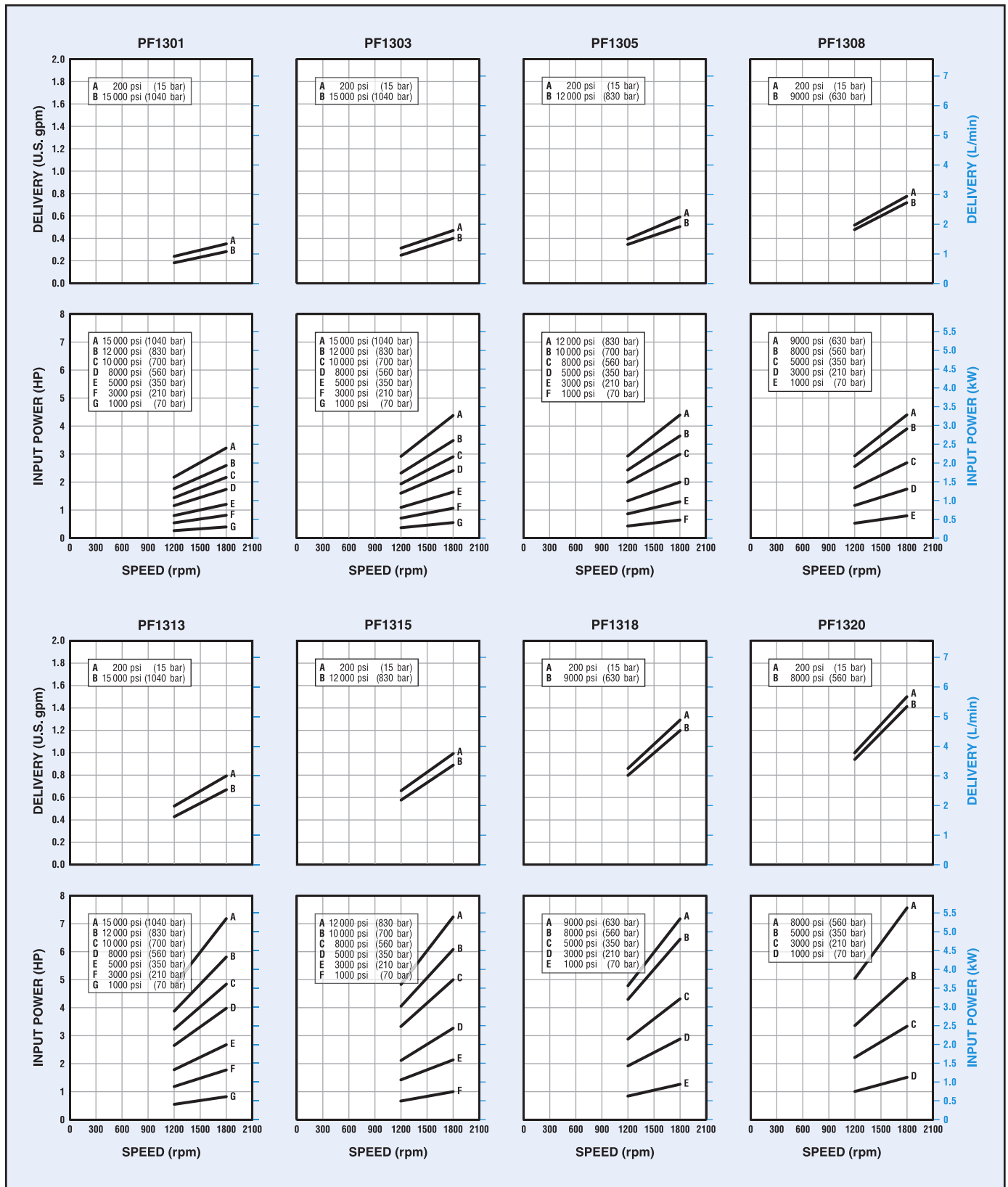
### Fluid Viscosity Specifications

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

Fluid conditions outside the ranges shown in the *Hydraulic Fluid Viscosity Guidelines* table may result in reduced pump output, requiring pressurized inlet conditions. For more information, contact the Sales department.



# 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

1

Pump Type	
PF13	Fixed Displacement Checkball Pump

Output Flow (At 1800 rpm, at Max. Pressure) <sup>①</sup>	
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)
13	Standard: 0.72 (2,72 L/min) "H" option: 0.65 gpm (2,46 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) <sup>③</sup>

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.  
③ Not available with high pressure "H" option.

Operating Pressure	
No Code	Standard Pressure
H	High Pressure <sup>①</sup>

① Requires "A" or "B" port option.

Ports	
No Code	Inlet No. 16 SAE; Outlet No. 6 SAE <sup>①</sup>
A	Inlet No. 16 SAE; Outlet 3/8 Medium Pressure Coned and Threaded, 0.5625-18 UNF-2B Threaded <sup>②</sup>
B	Inlet No. 16 SAE; Outlet G 1/4 (BSPP) <sup>③</sup>

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).

Design Number

Modification Number

Seals	
D	Standard: Buna-N (Nitrile) with Disogrin <sup>®</sup> (Polyurethane) o-rings in the cover
XD	Fluorocarbon (Viton <sup>®</sup> or Fluorel <sup>®</sup> ) with Polyurethane (Disogrin <sup>®</sup> ) o-rings in the cover and High Pressure Shaft Seal
XE	All EPR with High Pressure Shaft Seal <sup>①</sup>
XV	All Fluorocarbon (Viton <sup>®</sup> or Fluorel <sup>®</sup> ) with High Pressure Shaft Seal

① Contact the Sales department for recommended operating conditions with EPR seals.

Drive Shaft	
No Code	Keyed, .875 inch (22,23 mm) diameter
S	SAE Spline, .875 inch (22,23 mm) diameter

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.

[www.dynexhydraulics.com](http://www.dynexhydraulics.com)

**USA Headquarters**  
770 Capitol Drive  
Pewaukee, WI 53072  
Tel: +1 (262) 691-2222  
FAX: +1 (262) 691-0312  
sales@dynexhydraulics.com

**Power Units & Systems**  
54 Nickerson Road  
Ashland, MA 01721  
Tel: +1 (508) 881-5110  
FAX: +1 (508) 881-6849  
sales@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) 1480 405662  
sales@dynexhydraulics.co.uk



## WATER-BASED FLUID RECOMMENDATIONS

PF1300 & PF4300 Series pumps are compatible with a variety of water-based fluids. These models are specifically designed for use with subsea production control fluids.

Some pump models may require reduced operating pressures depending on the type of fluid specified.

To best assure compatibility under your specific system parameters, complete a *Pump Application Worksheet* on the Dynex website.

## OPTIMUM INLET CONDITIONS

Pump inlet strainer: 150 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.

## Hydraulic Fluid Viscosity<sup>①</sup>

Pump Models	Operating					
	Minimum		Maximum		Start-up	
	SUS	cSt	SUS	cSt	SUS	cSt
PF1300-11	31	1,3	927	200	927	200
PF4300-22	32	1,5	927	200	927	200

<sup>①</sup> Variations of system conditions such as temperature, speed, dehydration, etc. can result in reduced output and/or greater inlet pressure requirements. Contact the Sales department.

## COMPATIBLE FLUIDS

Dynex pumps for water-based fluids have operated successfully with many fluids. Because of the wide range of fluid characteristics, contact the Sales department for a review of your application. Below is list of fluids that have proven to be compatible with these pumps:

- **Castrol** – Transaqua HC 10, HT, HT2
- **Houghton** – Aqualink HT804F, 300F
- **McDermid** – Oceanic HW443, HW540, HW740

## FLUID CLEANLINESS

Minimum: NAS 1638 Class 9  
ISO 4406 20/18/15

Optimal: NAS 1638 Class 6  
ISO 4406 19/15/12

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

That document 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.

## Minimum Inlet Pressure<sup>①②</sup>

Pump Models	Operating Speed					
	1200 rpm		1500 rpm		1800 rpm	
	psi	bar	psi	bar	psi	bar
All PF1300 Models	0	0	0	0	0	0
PF4303, PF4305, and PF4306	0	0	0	0	0	0
PF4304 and PF4308	0	0	0	0	5 (.5)	0,4 (0,03)
PF4309	0	0	5 (0)	0,4 (0)	10 (1)	0,7 (0,07)
PF4310 and PF4312	0	0	5 (0)	0,4 (0)	15 (2)	1,0 (0,14)

<sup>①</sup> Values shown are based on fluid viscosity of 33 SUS (1,9 cSt) and related to 1 atmosphere (29.92" Hg).

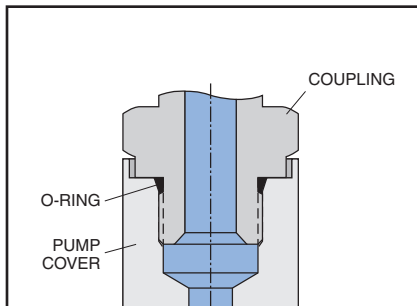
<sup>②</sup> Values in parentheses are for "Q" option.

## 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.

### SAE Straight Thread Ports



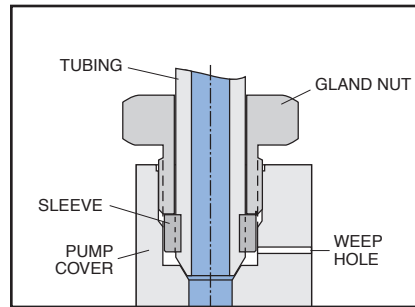
*Typical SAE Straight Thread port connection*

The Straight Thread connection (SAE J1926/1) is sometimes referred to as an SAE 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.

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

### Coned and Threaded Ports



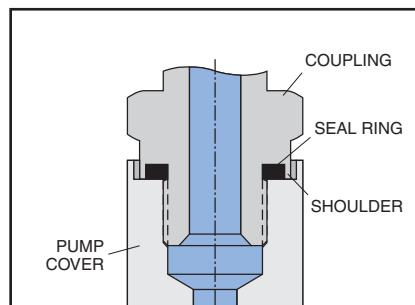
*Typical Coned and Threaded port connection*

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).

### British Standard Pipe Parallel Ports



*Typical British Standard Pipe (Parallel) port connection*

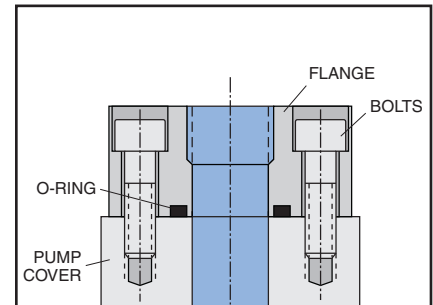
High-pressure pumps are available with flat face ports with British Standard Pipe Parallel (BSPP) threads (BS 2779 or ISO 228), ideal for use on some European applications.

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, "Elastic" Seal; or equivalent).

BSPP 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.

### SAE 4-Bolt Flange Ports



*Typical SAE 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 (SAE J518).

A typical fitting consists of a flanged block 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.