1 Purpose of Instructions

These instructions will simplify the installation, operation, maintenance, and troubleshooting of Oilgear's XD5-100 variable piston pump.

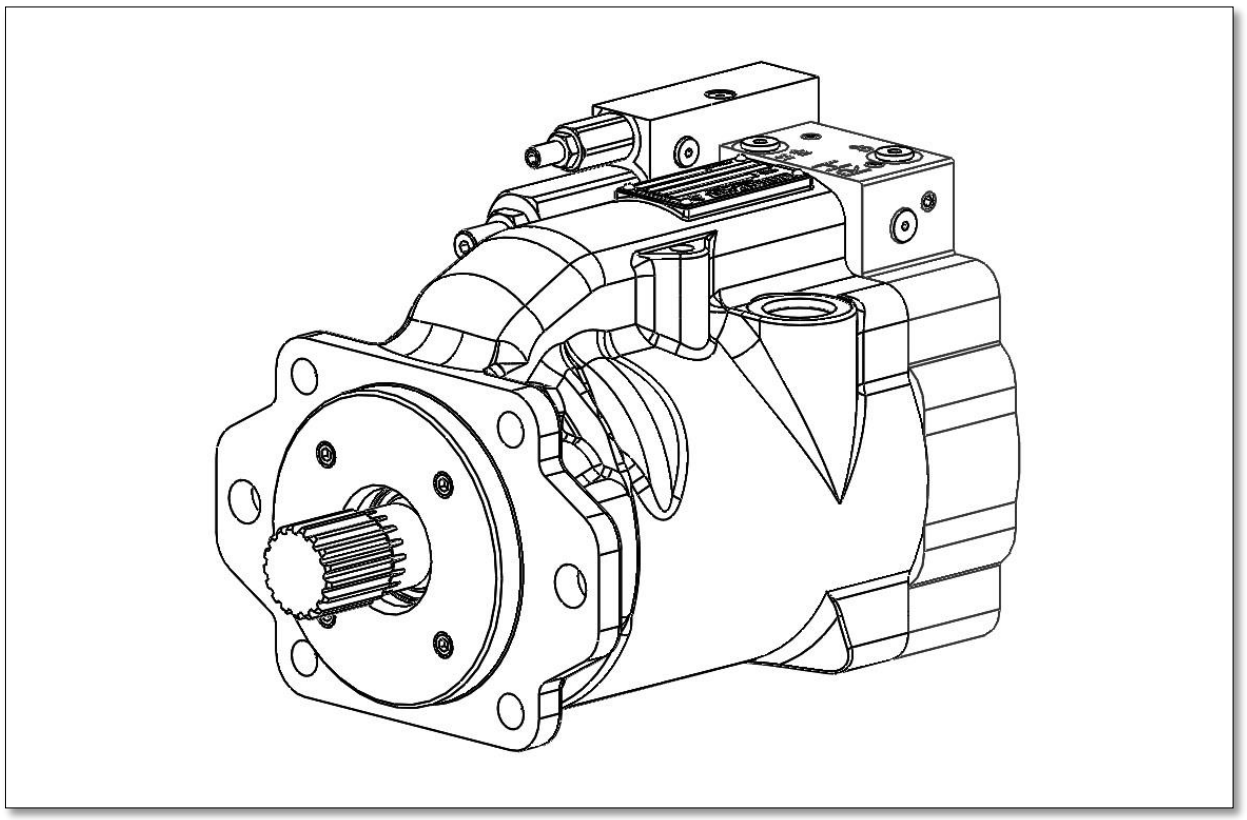


Figure 1 - Oilgear XD5-100

2 Reference Material

2.1 General Reference

Description	Bulletin Number
Oilgear Fluid Recommendation	90000
Oilgear Filtration Recommendation	90007
Oilgear Piping Information	90011
Installation of Vertically Mounted Axial Piston Unit	90014

2.2 XD5-100 Documents

Description	Bulletin Number
Installation Bulletin	910001

3 Table of Contents

4 Safety First

Read and understand this entire instruction sheet before repairing or adjusting your Oilgear product. Those who use and maintain this equipment must be thoroughly trained and familiar with the product. If incorrectly used or maintained, this product and its equipment can cause severe injury.

4.1 Safety Nomenclature

The following signal words are used in this instruction sheet to identify areas of concern where your safety may be involved. Carefully read the text and observe any instructions provided to ensure your safety:

⚠ DANGER ⚠

THIS SIGNAL WORD INDICATES AN IMMINENTLY HAZARDOUS SITUATION WHICH, IF NOT AVOIDED, WILL RESULT IN DEATH OR SERIOUS INJURY.

⚠ WARNING

This signal word indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

This signal word indicates that a potentially hazardous situation exists which, if not avoided, may result in damage to equipment or minor personal injury.

NOTE

While not directly relevant to the topic being discussed, the NOTE is used to emphasize information provided, or provide additional information which may be of benefit.

4.2 Warnings

⚠ WARNING

This service information is designed for the maintenance of your Oilgear product. It contains the information on the correct procedures determined by Oilgear for the safe manner of servicing. Always keep this instruction sheet in a location where it is readily available for the persons who use and maintain the product. Additional copies of this instruction sheet are available through the Oilgear Company. Visit our website: www.oilgear.com. Please contact us if you have any questions regarding the information in this instruction bulletin.

NOTE

The cleanliness of working on this pump or the hydraulic system is extremely important to the safety and reliability of the pump and the system. Always make sure the fittings are clean on the outside before removing them from their connections, are capped and plugged when removed and placed in a clean rag or container until they are reinstalled.

⚠ WARNING

Some service operations may require special tools or equipment. If you require information on these items, please contact Oilgear before attempting these repairs and service operations.

⚠ WARNING

DO NOT attempt to service this machinery in an environment where safety regulations are not established and in place.

⚠ WARNING

DO NOT operate the hydraulic system if a leak is present. Serious injury may result.

⚠ WARNING

Hydraulic systems operate under very high pressure. Hydraulic fluid escaping from a pressurized system can penetrate unprotected body tissue. DO NOT inspect for hydraulic leaks with bare hands or other exposed body parts. As a minimum, wear leather gloves prior to inspecting for leaks and use cardboard or wood. If leaks are present, relieve pressure and allow system to cool prior to servicing. If injured by escaping hydraulic oil, contact a physician immediately. Serious complications may arise if not treated immediately. If you have questions regarding inspecting for hydraulic leaks, please contact Oilgear prior to servicing.

⚠ WARNING

Hydraulic hoses and tubing must be inspected on a daily basis for leaks, cuts, abrasions, damage and improper clearance along any mounting frame for hidden damage before the unit is put into service. Replace damaged hoses or hoses you suspect are damaged before the system is returned to service! Hoses must be replaced every two years. Failure to properly inspect and maintain the system may result in serious injury.

⚠ WARNING

Hydraulic systems are hot. DO NOT TOUCH! Serious personal injury may result from hot oil. When you have completed working on the hydraulic system, thoroughly clean any spilled oil from the equipment. Do not spill any hydraulic fluids on the ground. Clean any hydraulic fluids from your skin as soon as you have completed maintenance and repairs. Dispose of used oil and system filters as required by law.

⚠ WARNING

DO NOT enter under hydraulic supported equipment unless they are fully supported or blocked. Failure to follow this procedure can result in serious injury or death.

⚠ WARNING

Use correct hoses, fittings, and adapters with the correct SAE rating when replacing hoses to prevent possible serious injury. Always replace hoses, fittings, and adapters with replacements that have a proper, suitable, working pressure rating. Replacement hoses must be of the correct length and must comply with the hose manufacturer's and Oilgear's installation guidelines and recommendations.

⚠ WARNING

Hydraulic hoses have the SAE ratings marked on the hose to assist you in selecting the correct hose. The same manufacturer must supply any replacement hydraulic hoses and fitting assemblies. As an example: Brand "X" hose and brand "Y" fitting will not normally be compatible. No "twist" is allowed in the hydraulic hoses. "Twist" may result in premature hose failure. This can cause serious injury. Please contact Oilgear for assistance when required.

⚠ WARNING

Hydraulic cylinders can be holding a function in a certain position when the pump is OFF. An example of this is a function being held in the lift or partial lift position by the cylinders. If a hydraulic line is removed or the hydraulic circuits or controls are being worked on, gravity may allow the function being held in position to drop. All workers and personnel must remain clear of these areas when working on or operating the hydraulic system. Block and secure all devices and functions which apply before beginning work or operation. Failure to comply with this can result in serious injury or death.

⚠ WARNING

Any hydraulic pipe which is replaced must conform to SAE J1065 specifications. If incorrect hydraulic pipe is installed, the hydraulic system may fail, causing serious injury. Damaged or leaking fittings, pipes or hoses must be replaced before the system is returned to service.

⚠ WARNING

DO NOT heat hydraulic pipe. The carbon content of this steel tube is such that if heated for bending, and either water or air quenched, the pipe may lose its ductility and thereby be subject to failure under high pressure conditions. Serious injury can result. Damaged or leaking pipes must be replaced before the system is returned to service. Please contact Oilgear if you require assistance or have questions.

⚠ WARNING

All hydraulic pressure must be relieved from the hydraulic system prior to removing any components from the system. To relieve the hydraulic pressure from the hydraulic system, turn off the motor and operate the control panel with the key in the ON position. Failure to comply can result in serious injury. If you have any questions concerning relieving the hydraulic pressure from the system, please contact Oilgear.

⚠ WARNING

Hydraulic components can be heavy. Use caution while lifting these components. Serious personal injury can be avoided with proper handling of the components.

⚠ WARNING

Please contact Oilgear if you require assistance, when performing hydraulic test procedures, use the proper hydraulic gauges. Installing an incorrect test gauge could result in serious injury if the gauge fails. Use properly rated hydraulic hoses to allow the test gauge to be read away from moving parts and functions.

⚠ WARNING

Increasing hydraulic pressure beyond the recommendations may result in serious damage to the pump and system or serious personal injury and may void the Oilgear Warranty. If you have questions concerning hydraulic pressures or testing procedures, please contact Oilgear before attempting the test procedures or making adjustments.

⚠ WARNING

An Oilgear pump must not be modified in any way without authorization from Oilgear. Modifications may not comply with safety standards, including ANSI safety standards, and may result in serious personal injury. Please contact Oilgear if you require assistance.

⚠ WARNING

Any Oilgear pump safety decals must be replaced anytime they are damaged, missing, or cannot be read clearly. Failure to have proper decals in place can result in serious injury or death. (If you require safety decals, please contact Oilgear for replacement safety decals, at no charge.)

⚠ WARNING

Be sure everyone is clear of the area around the hydraulic system before operating after servicing. Remain attentive at all times when operating to check your work until you are completely sure it is safe to return to service. Failure to heed this warning may result in serious personal injury or death.

⚠ WARNING

Wear the proper protective clothing when operating, servicing or maintaining the hydraulic system or the Oilgear pump. Wear the correct protective gear, safety glasses, gloves, and safety shoes. Serious injury can result without proper protective gear.

⚠ WARNING

Make sure to keep hands and feet and other parts of your body clear of revolving or moving parts. Failure to comply can cause serious injury.

⚠ WARNING

DO NOT wear watches, rings, or jewelry while working with electrical and mechanical equipment. These items can be hazardous and can cause serious and painful injuries if they come into contact with electrical wires, moving parts, or hydraulic equipment.

5 Pump Characteristics

This section concentrates on the characteristics of the main pump – the components contained by the main housing to the pump. For information on the control options for the pump, please refer to **Section 6**.

5.1 Specifications

CHARACTERISTIC	UNIT	VALUE
Theoretical Max. Displacement	$^{In^3}/_{rev}$ [$^{cc}/_{rev}$]	6.00 [98.4]
Rated Continuous Pressure	psi [bar]	5,000 [350]
Peak Pressure	psi [bar]	5,800 [400]
Maximum Speed *with a flooded inlet*	RPM	2,600
Outlet Flowrate *1,800 RPM, Rated Continuous Pressure*	GPM [lpm]	43 [163]

Table 1 - Pump Characteristics

5.2 Driveshafts

MODEL CODE DESIGNATION	SHAFT SIZE	ALLOWABLE INPUT TORQUE
K	SAE C Spline 14 Tooth, 12/24 Pitch	7,000 in*lbs. [791 Nm]
S	SAE C-C Spline 17 Tooth, 12/24 Pitch	10,500 in*lbs. [1,186 Nm]

Table 2 - Driveshafts

5.3 Port Sizes

PORT	SIZE	TORQUE
Inlet	2 Inch SAE, Code 61 Flange	100 ft*lbs [136 Nm]
Outlet	1 Inch SAE, Code 62 Flange	61 ft*lbs [83 Nm]
Case Drain	#12 SAE Port	85 ft*lbs [115 Nm]

Table 3 - Port Table

5.4 Performance Chart and Inlet Condition

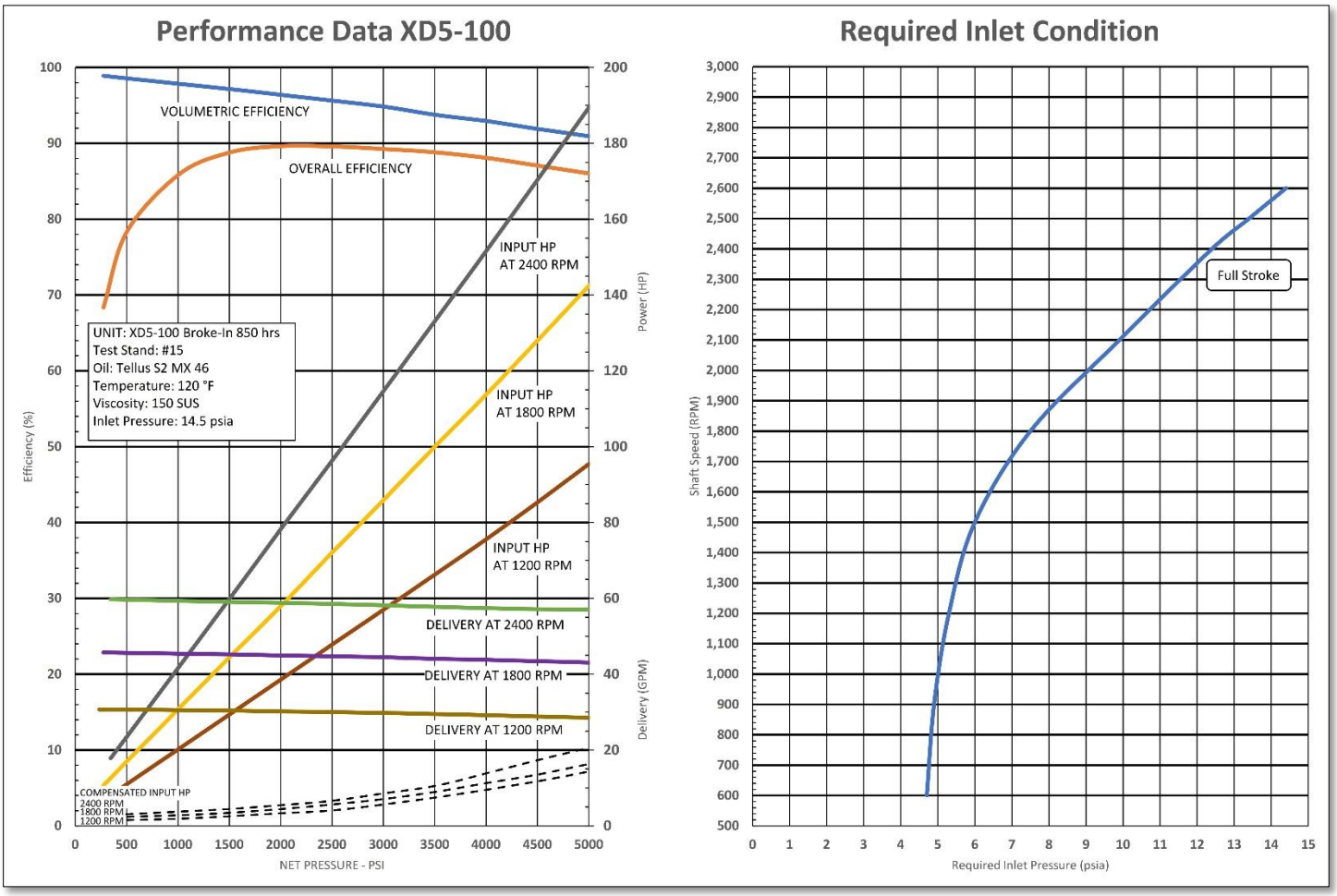


Figure 2 - XD5-100 Performance Chart and Inlet Condition Curve

6 Control Options

XD5's control mechanism consists of a main control piston mounted in the pump housing, and a module called the Control Block, mounted to the Valve Plate. This section discusses options and adjustments related to the Control Block.

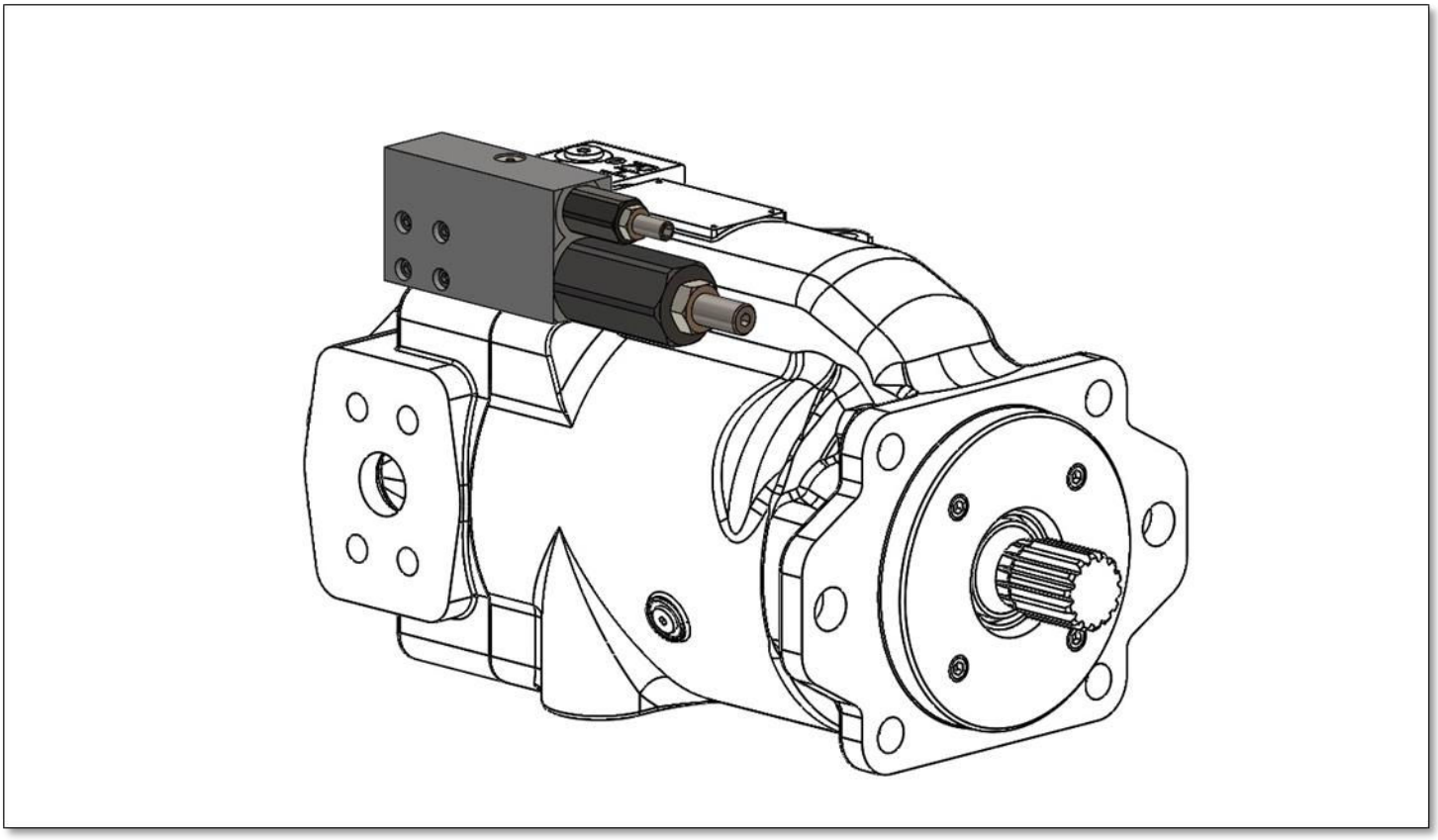


Figure 3 - Control Block, Mounted to the Pump Housing (PC/LS Control Shown)

6.1 Pressure Compensator with Load Sense

XD5's standard Pressure Comp./Load Sense control can be adapted to run in the following ways:

- Pressure Comp. Only
- Pressure Comp. w/Load Sense
- Remote Pressure Comp.
- Remote Pressure Comp. w/Load Sense

This section describes each option and its adjustments, and provides instructions for reconfiguring an existing XD5 PC/LS Control to change between these 4 options.

6.1.1 Pressure Compensator Only, P-1NN

In PC-Only configuration, the compensator acts as a simple limit to the outlet pressure.

6.1.1.1 Function

The system designer chooses a value of P_{comp} and sets that value using the PC Adjuster, shown in **Figure 5**. The Pressure Compensator will bring the pump to full stroke, and hold it there, unless the value of P_o exceeds the value of P_{comp}. If P_o exceeds the value of P_{comp}, the control will de-stroke the pump until $P_{comp} \leq P_o$. Please note that the compensator will de-stroke the pump until $Q_o = 0$, if P_o continues to exceed P_{comp}.

6.1.1.2 How to Adjust

The Pressure Compensator is adjusted using the PC Adjuster, mounted on the Control Block.

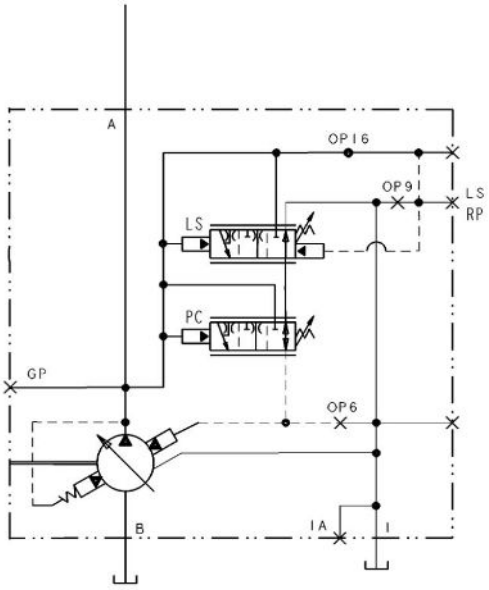
Adjuster:	3/16 in. Internal Hex
Range:	500 – 5,000 psi [13.8 to 345 bar]
Rate:	485 psi [33.4 bar] per turn

6.1.1.3 Response Time

The pressure compensator is tested per SAE J745 @ 1,800 RPM and 5,000 psi deadhead pressure.

Response Time:	35 ms
Recovery Time:	125 ms

6.1.1.4 Circuit Diagram



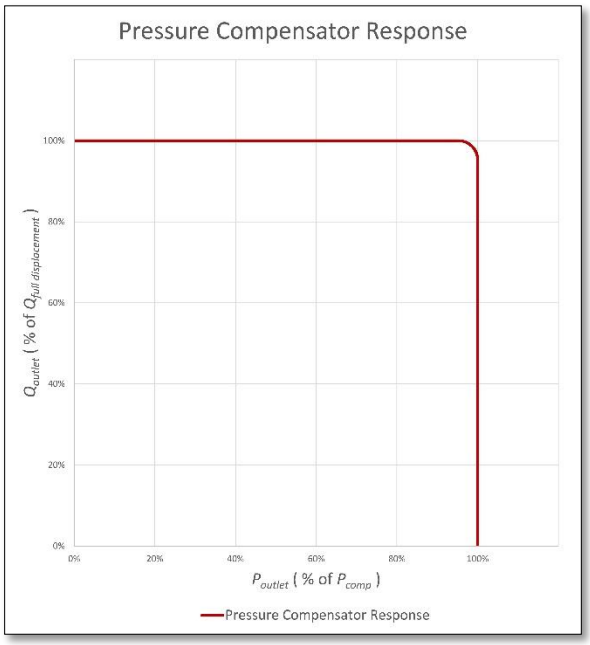


Figure 4 - Pressure Compensator Response

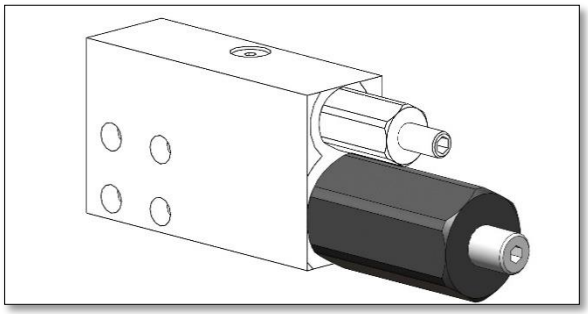


Figure 5 - Pressure Compensator Adjuster

- OP 16 is OPEN.
- OP 9 is PLUGGED.
- OP 6 is PLUGGED.
- The LS/RP Port is PLUGGED.

All internal plugs and orifices use 1/16 NPT plugs and 5/32 internal hex wrenches.

6.1.2 Pressure Compensator and Load Sense, P-1NN/F or P-1NN/B

The Pressure Comp/Load Sense Control allows the system designer to control both the flow and pressure at the outlet to the pump.

6.1.2.1 Function

The system designer provides 2 components for a load sense circuit:

- A flow restriction between the outlet of the pump and the implements, like an orifice or a flow control valve.
- A pressure signal from the circuit, downstream of the restriction and plumbed into the LS/RP Port in **Figure 8**.

For more information, please see the circuit diagram in **Section 6.1.1.4**.

Additionally, 2 values are chosen and adjusted in the Control:

P_{comp} Compensator Pressure, set in the Pres. Comp. Adjuster
P_{ls} Load Sense Pressure, set in the Load Sense Adjuster

The Control will regulate the outlet flow so that the pressure loss across the restriction in the system is always equal to P_{ls}. Flow is proportional to the restriction area size and the pressure differential. If the restriction increases or decreases, the Control will change the stroke of the pump to mirror the change in the restriction. For example, if the control valve in the system is closed slightly, the pump will de-stroke slightly so that the pressure loss across the valve in the system equals the setting of the Load Sense Adjuster.

The pressure compensator is still active. If P_{outlet} rises above P_{comp}, the Control will supersede the Load Sense to de-stroke the pump until $P_{outlet} \leq P_{comp}$.

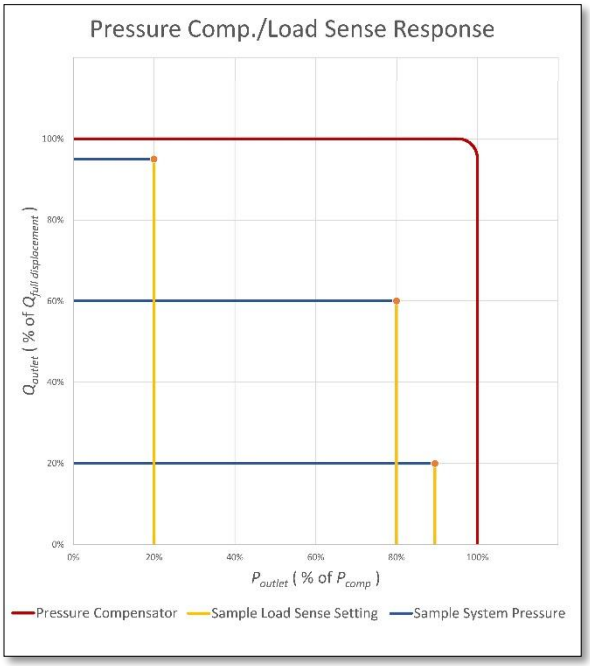


Figure 6 - Pressure Comp/Load Sense Response

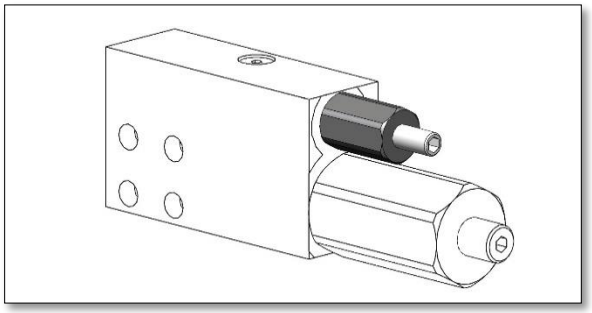


Figure 7 - Load Sense Adjuster

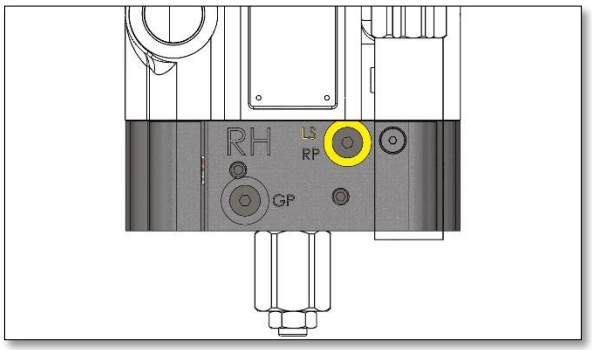


Figure 8 - LS/RP Port Location

6.1.2.2 How to Adjust

The Load Sense is adjusted using the LS Adjuster, mounted on the Control Block. The LS Adjuster appears in **Figure 7**.

Adjuster: 3/16 in. Internal Hex
Range: 200 – 500 psi [13.8 to 34.5 bar]
Rate: 56 psi [3.9 bar] per turn

The Pressure Compensator is adjusted using the PC Adjuster, mounted on the Control Block as shown in **Figure 5**.

Adjuster: 3/16 in. Internal Hex
Range: 500 – 5,000 psi [13.8 to 345 bar]
Rate: 485 psi [33.4 bar] per turn

6.1.2.3 Response Time

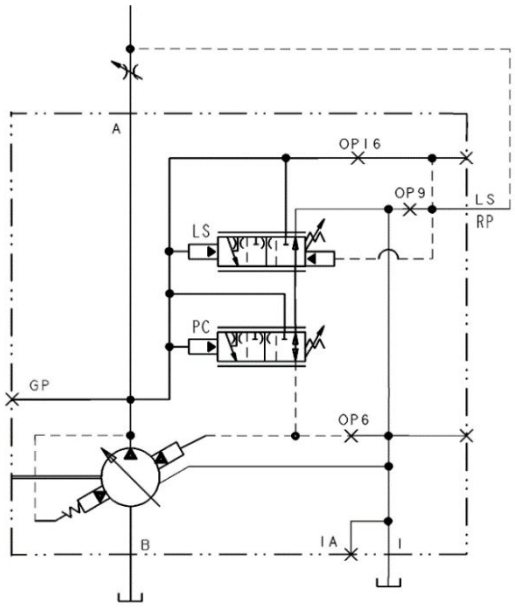
The load sense control is tested per SAE J745 @ 1,800 RPM and P_{ls} = 325 psi.

Response Time: 70 ms
Recovery Time: 80 ms

6.1.2.4 Bleed Down Orifice Option, P-1NN/B Option

An optional bleed orifice can be installed to increase load sense stability. The bleed orifice is installed in OP9, which is under the LS/RP Port, shown in **Figure 8**.

6.1.2.5 Circuit Diagram



- OP 16 is PLUGGED.
- OP 9 is PLUGGED.
- OP 6 is PLUGGED.
- The customer-supplied Load Sense Circuit is plumbed into the LS/RP Port.

All internal plugs and orifices use 1/16 NPT plugs and 5/32 internal hex wrenches.

6.1.3 Remote Pressure Compensator, P-RNN

This control option functions the same as the Pressure Comp. Only option discussed in **Section 6.1.1**, except that the compensator signal comes from a remote system component, supplied by the system designer.

6.1.3.1 Function

Remote pressure compensation adds a compensator set point adjuster for the pump at a remote location. Please note a pressure set point adjuster still remains on the pump, and should be adjusted to a pressure 200 psi higher than the anticipated maximum remote pressure set point.

The system designer provides the following for a remote compensator circuit:

- A remote pressure compensator valve with a flowrate of approximately 0.25 GPM. The inlet port of the remote pressure compensator valve is plumbed to the LS/RP Port on the Valve Plate, as shown in **Figure 8**.

For more information on the circuit, please see the circuit diagram in **Section 6.1.3.5**.

Additionally, 2 values are chosen and adjusted in the circuit:

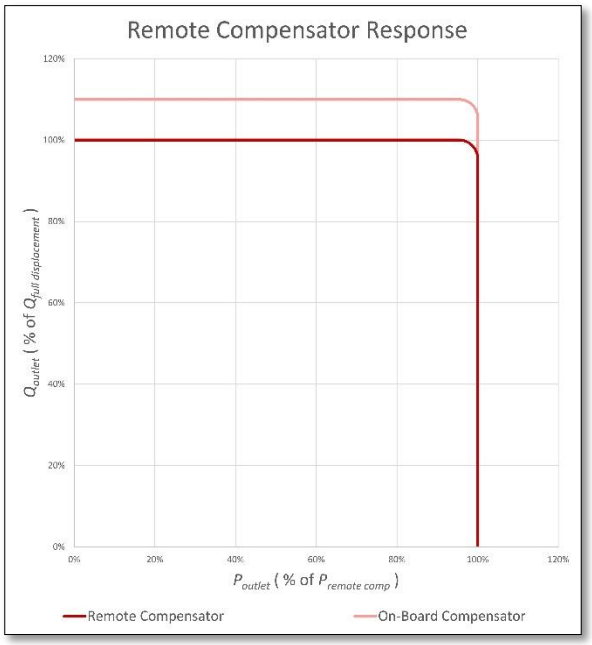


Figure 9 - Remote Compensator Response

$P_{remote\ comp}$ Remote Compensator Pressure, set in the remote compensator valve
P_{comp} Compensator Pressure, set 200 psi above the setting of $P_{remote\ comp}$, in the on-board Pres. Comp. Adjuster

6.1.3.2 How to Adjust

$P_{remote\ comp}$ is adjusted using the instructions for the remote compensator valve, chosen by the system designer.

P_{comp} is adjusted using the PC Adjuster, mounted on the Control Block as shown in **Figure 5**.

Adjuster: 3/16 in. Internal Hex
Range: 500 – 5,000 psi [13.8 to 345 bar]
Rate: 485 psi [33.4 bar] per turn

6.1.3.3 Response Time

The control's response time will be determined by the remote compensator circuit supplied by the system designer.

6.1.3.4 Required Orifice

A pilot orifice is required for proper function of a remote compensator circuit. The pilot orifice is installed in OP16, under the Function Port, as shown in **Figure 10**.

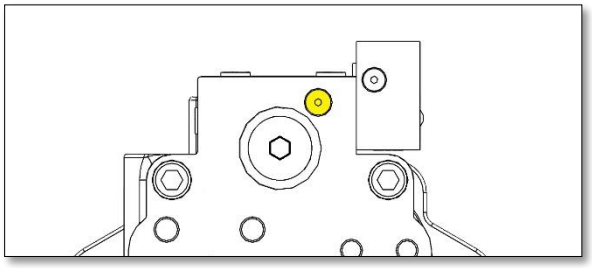
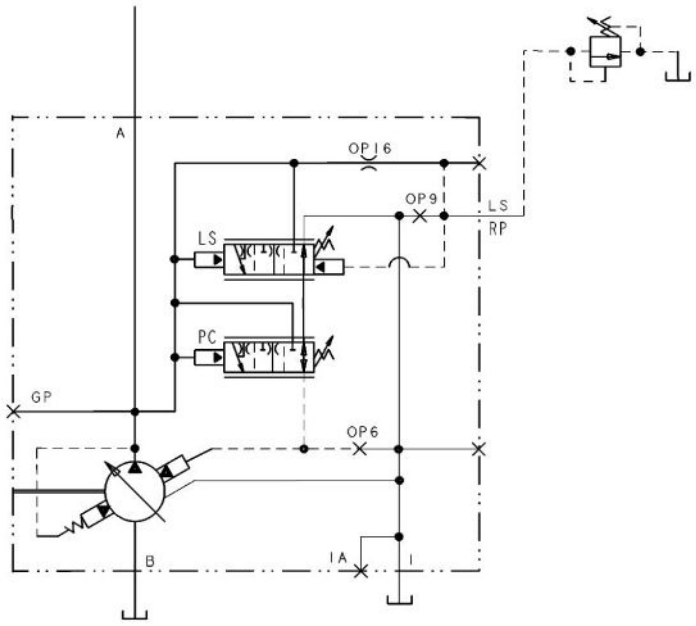


Figure 10 - Function Port and OP16

6.1.3.5 Circuit Diagram



- OP 16 has a Ø 0.031 in ORIFICE.
- OP 9 is PLUGGED.
- OP 6 is PLUGGED.
- The customer-supplied Remote Compensator circuit is plumbed into the LS/RP Port.
- The Remote Compensator requires a flowrate of approximately 0.25 GPM.

All internal plugs and orifices use 1/16 NPT plugs and 5/32 internal hex wrenches.

6.1.4 Remote Pressure Compensator and Load Sense, P-1NN/F

This control option functions the same as the Pressure Comp. with Load Sense option discussed in **Section 6.1.2**, except that the compensator signal is supplied by a remote system component, supplied by the system designer.

6.1.4.1 Function

A load sense control maintains a constant set pressure differential between the pump outlet and a point downstream of a restrictor or flow control valve in the system. Flow is proportional to restrictor area size and pressure differential. Load sense control will adjust pump stroke to maintain a constant pressure differential and flow with changes in system pressure and pump speed.

Opening or closing flow control valve (changing restrictor area size) will change stroke of pump to maintain pressure differential. Flow will be proportional to restrictor area size.

The system designer provides the following for a remote compensator with load sense circuit:

- A flow restriction between the outlet of the pump and the implements, like an orifice or a flow control valve.
- A pressure signal from the circuit, downstream of the restriction and plumbed into the LS/RP Port shown in **Figure 8**.
- A remote pressure compensator valve with a flowrate of approximately 0.25 GPM.

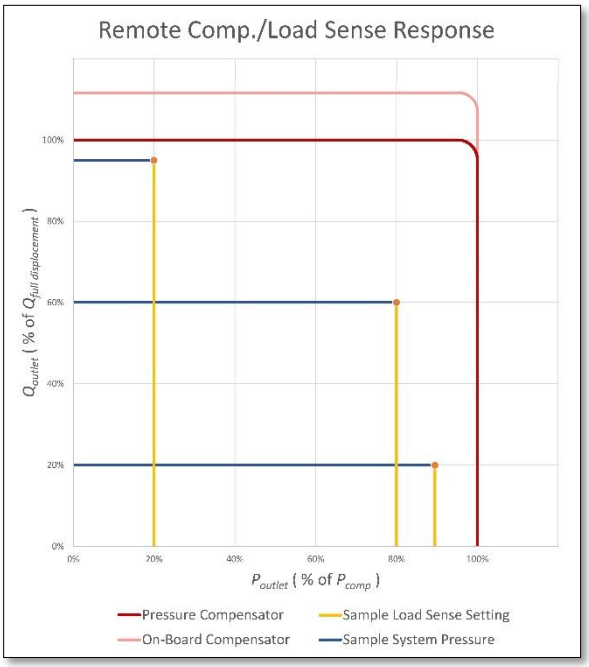


Figure 11 - Remote Compensator with Load Sense Response

Additionally, 3 values are chosen and adjusted in the Control and circuit:

$P_{remote\ comp}$	Remote Compensator Pressure, set in the remote compensator valve
P_{comp}	Compensator Pressure, set in the Pres. Comp. Adjuster
P_{ls}	Load Sense Pressure, set in the Load Sense Adjuster

6.1.4.2 How to Adjust

$P_{remote\ comp}$ is adjusted using the instructions for the remote compensator valve, chosen by the system designer.

P_{comp} is adjusted using the PC Adjuster, mounted on the Control Block as shown in **Figure 5**.

Adjuster:	3/16 in. Internal Hex
Range:	500 – 5,000 psi [13.8 to 345 bar]
Rate:	485 psi [33.4 bar] per turn

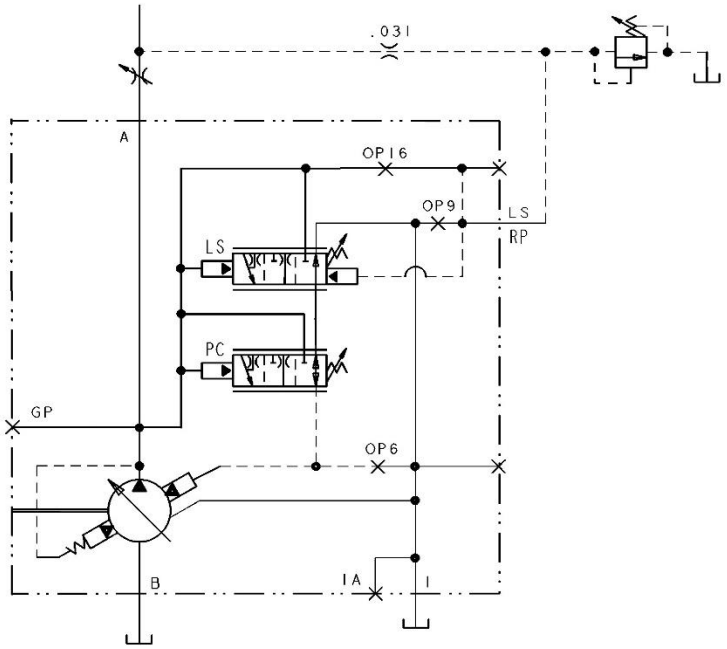
P_{ls} is adjusted using the LS Adjuster, mounted on the Control Block. The LS Adjuster appears in **Figure 7**.

Adjuster:	3/16 in. Internal Hex
Range:	200 – 500 psi [13.8 to 34.5 bar]
Rate:	56 psi [3.9 bar] per turn

6.1.4.3 Response Time

The control's response time will be determined by the remote compensator/load sense circuit supplied by the system designer.

6.1.4.4 Circuit Diagram



- OP 16 PLUGGED
- OP 9 PLUGGED
- OP 6 PLUGGED
- The customer-supplied Remote Compensator/Load Sense circuit is plumbed into the LS/RP Port, with the Load Sense Signal. The circuit requires a Ø 0.031 in. orifice between the Remote Compensator and Load Sense components.
- The Remote Compensator requires a flowrate of approximately 0.25 GPM.

All internal plugs and orifices use 1/16 NPT plugs and 5/32 internal hex wrenches.

6.1.5 Reconfiguring the Pressure Comp./Load Sense Control

A PC/LS Control on an existing XD5 pump can be reconfigured between its 4 options by adding or removing plugs and orifices from ports in the Valve Plate. The location of the ports is shown in **Figure 12**. The combination of orifices and plugs required for each configuration is given in the preceding subsections of **Section 6.1**.

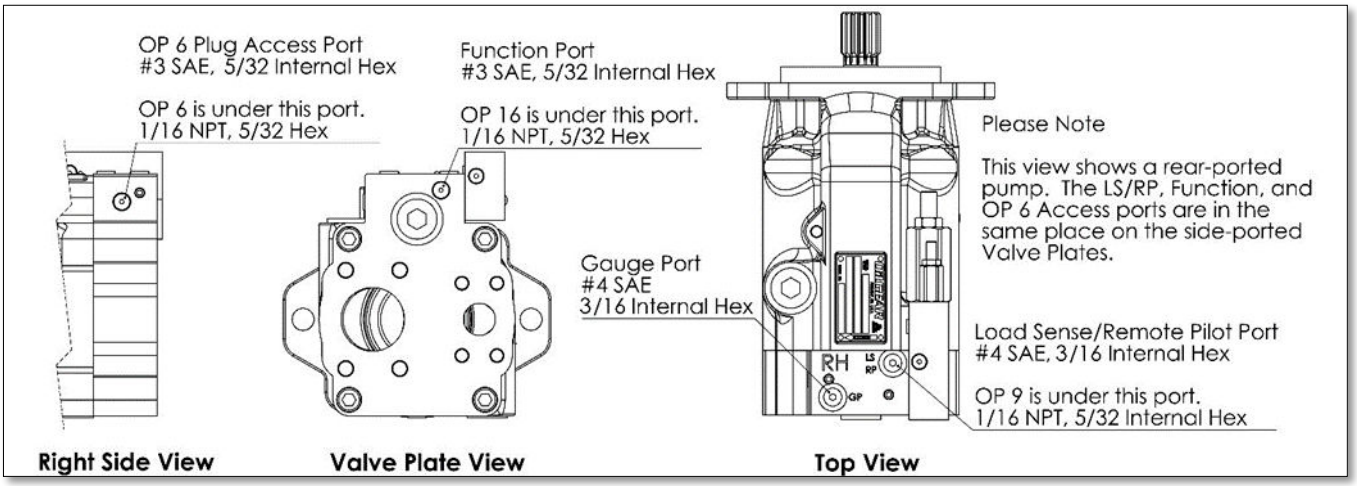


Figure 12 - Control Port Locations

6.2 Maximum Volume Stop

The Maximum Volume Stop (MVS) is an optional accessory to XD5. The MVS limits the maximum displacement of the pump by limiting the maximum stroke from the Control Piston.

6.2.1 How to Adjust

If an XD5 unit includes the MVS option, it will be visible on the Valve Plate, as illustrated in **Figure 13**. If a pump does not include the MVS option, this port will simply be plugged.

To change the maximum displacement of the pump, loosen the locknut, and turn the adjuster in or out to reach the desired maximum displacement. Turning the adjuster in (clockwise) will decrease maximum flow, and turning it out (counter-clockwise) will increase maximum flow.

Adjuster:	3/8 in. External Hex, w/ 3/4 in. Lock Nut
Range:	60 to 98.4 cc [3.6 to 6.0 in^3]
Rate:	4.1 cc [0.25 in^3] per turn

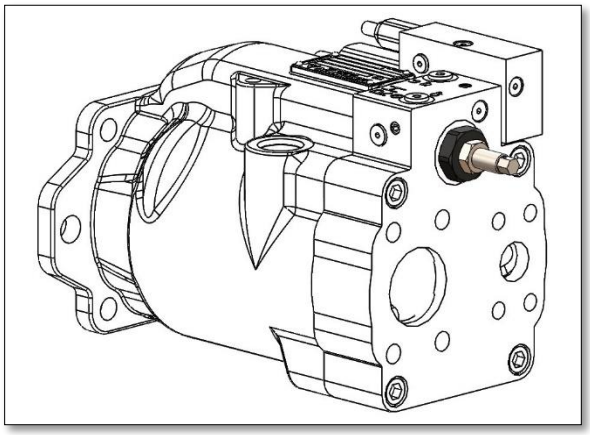


Figure 13 - Maximum Volume Stop

NOTE

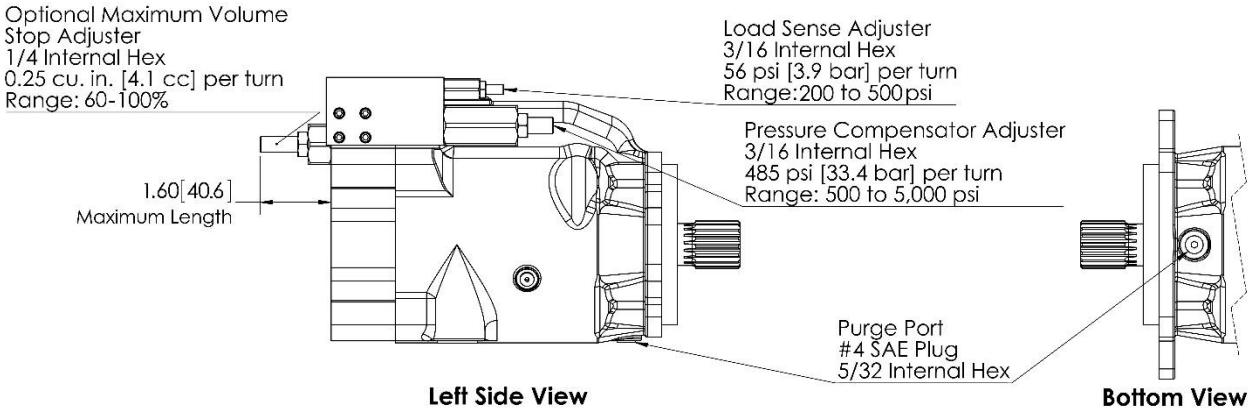
A locknut is provided to lock the MVS Adjuster at the desired displacement. Machine vibrations can cause rotation in the adjuster, which will change the displacement setting. Remember to tighten the locknut to preserve the desired setting.

7 Installation and Dimensions

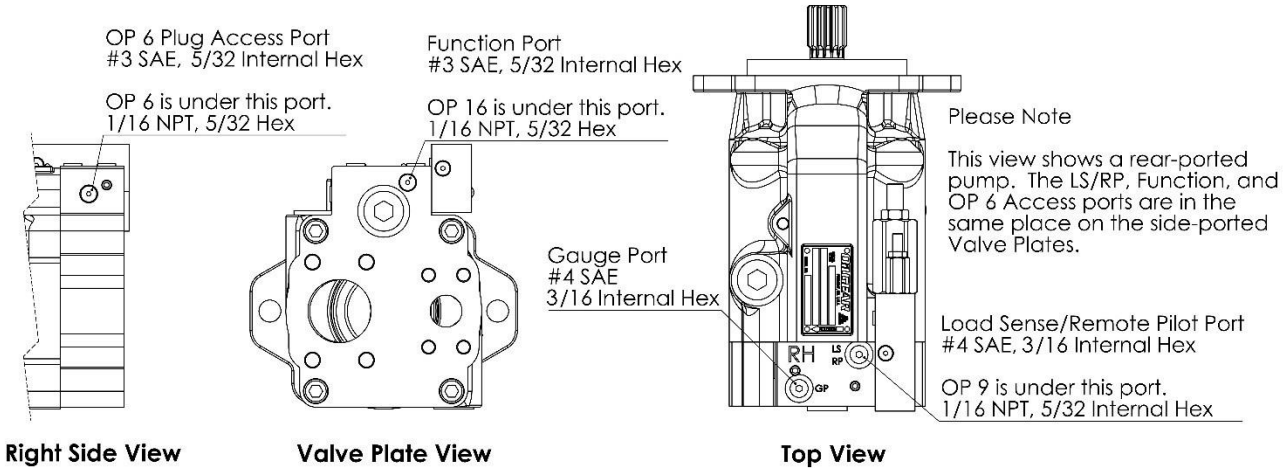
7.1 Vertical Mounting

Axial piston hydraulic pumps need have their cases full of hydraulic fluid during operation. If a pump is installed with its driveshaft oriented vertically and its mounting flange pointing up, an air bubble can be trapped inside case, near the mounting flange. Please refer to Oilgear document 90014 for guidance on using the Purge Port to remove air from the case. Please note the location of the Purge Port in **Section 7.2**.

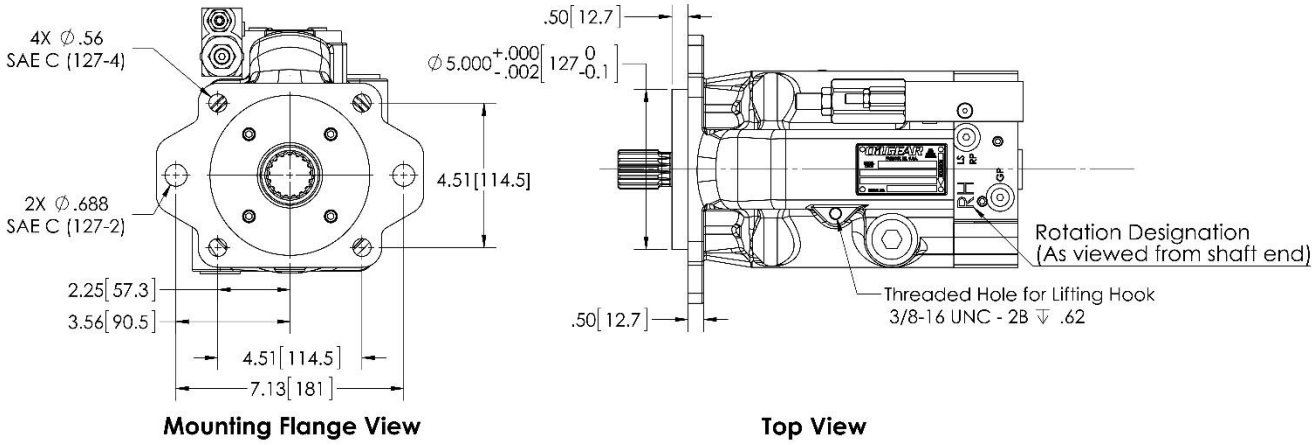
7.2 Adjuster and Purge Port Locations



7.3 Control Port Locations

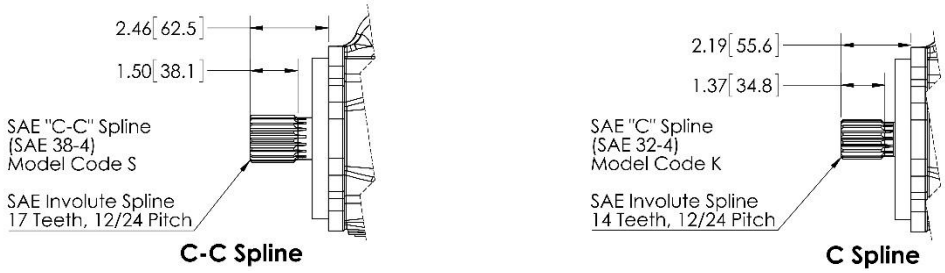


7.4 Mounting Flange, Lifting Hook, and Rotation Designation



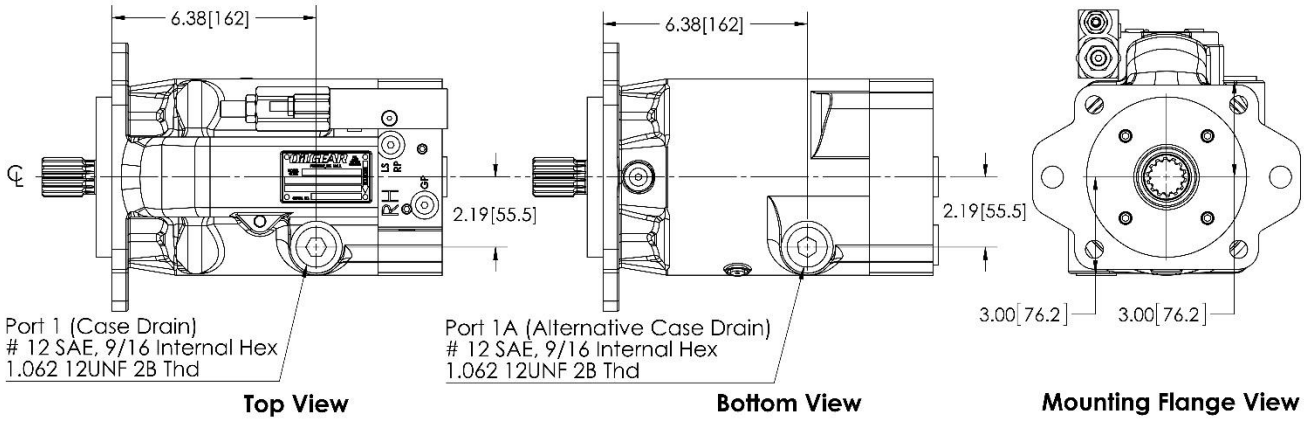
Mounting Flange View **Top View**

7.5 Driveshafts



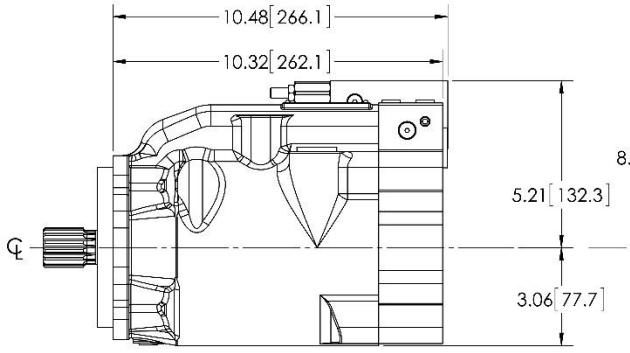
C-C Spline **C Spline**

7.6 Case Drain Locations

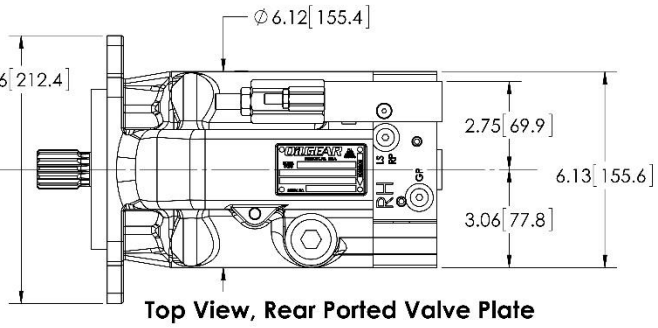


Top View **Bottom View** **Mounting Flange View**

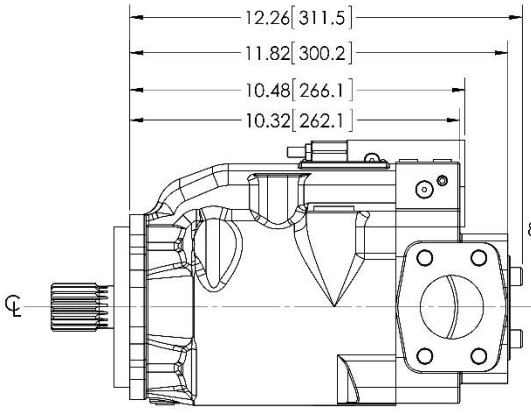
7.7 Clearance Dimensions



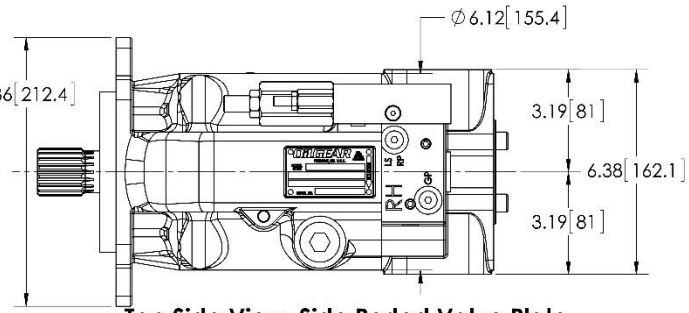
Right Side View, Rear Ported Valve Plate



Top View, Rear Ported Valve Plate

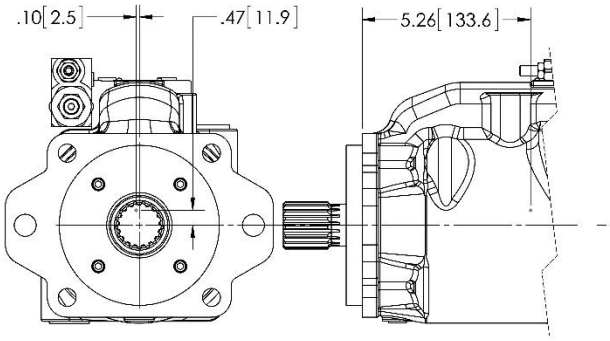


Right Side View, Side Ported Valve Plate

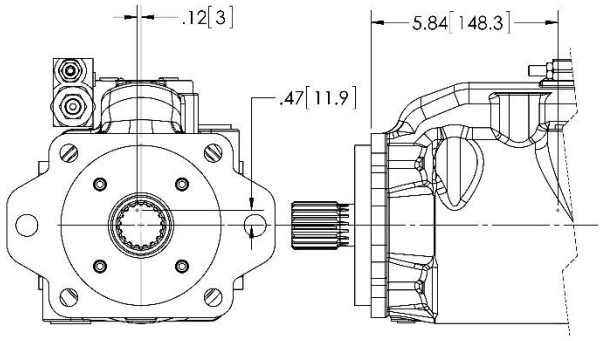


Top Side View, Side Ported Valve Plate

7.8 Center of Gravity and Dry Weight



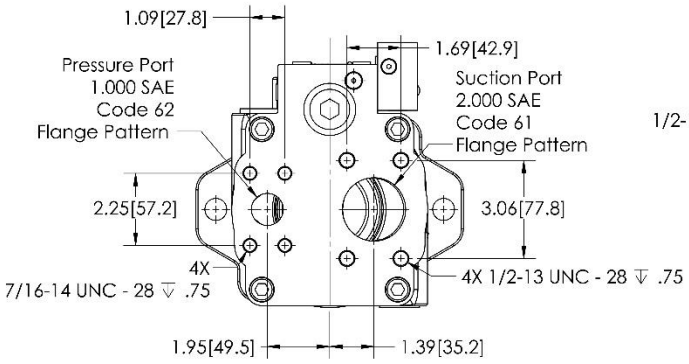
Rear Port Valve Plate - 73 lbs [33.1 kg]



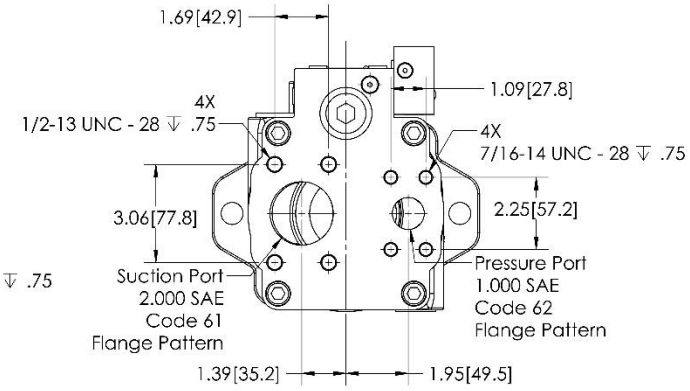
Side Port Valve Plate - 83 lbs [37.6 kg]

Rotational Moment of Inertia: 0.31 lb*ft^2 [0.0131 kg*m^2]

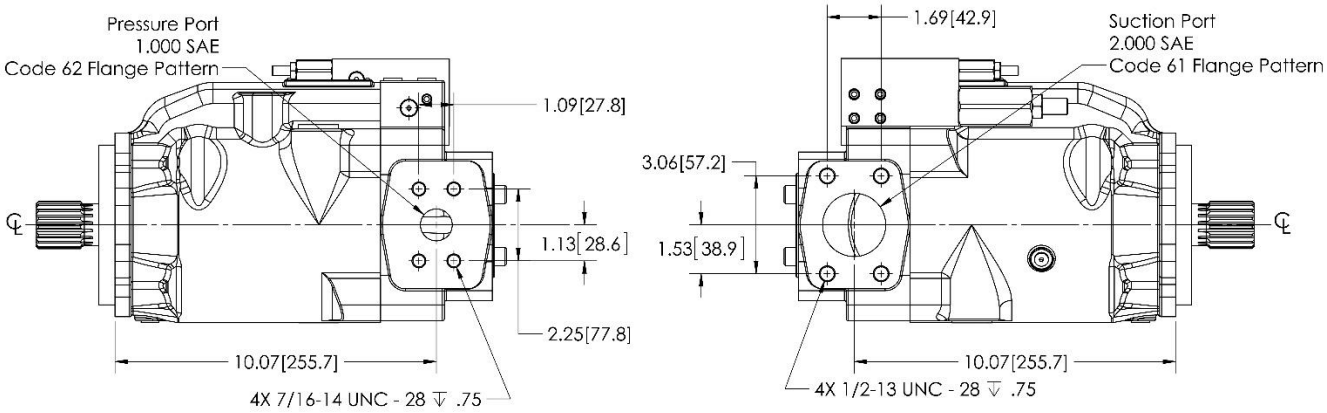
7.9 Valve Plate Views



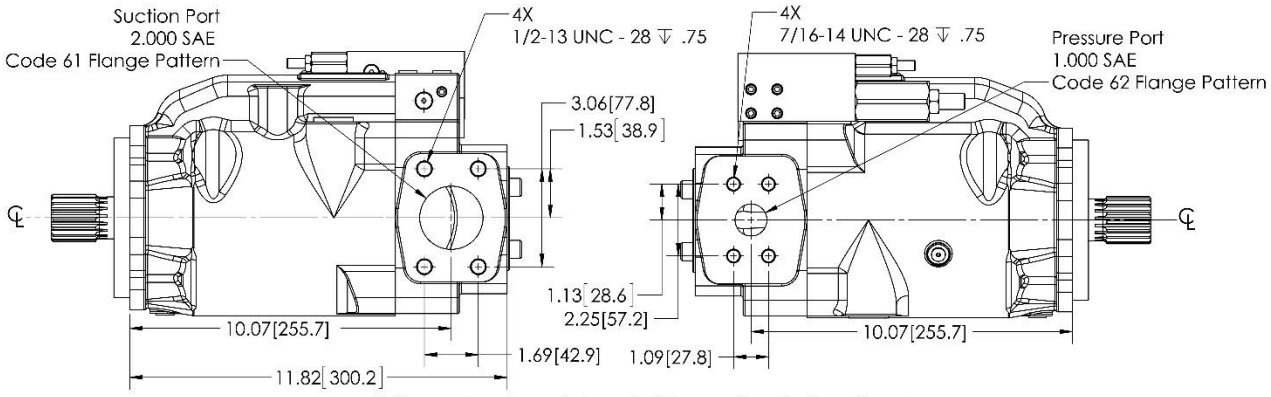
Rear Port Valve Plate, Left Hand Rotation (CCW)



Rear Port Valve Plate, Right Hand Rotation (CW)

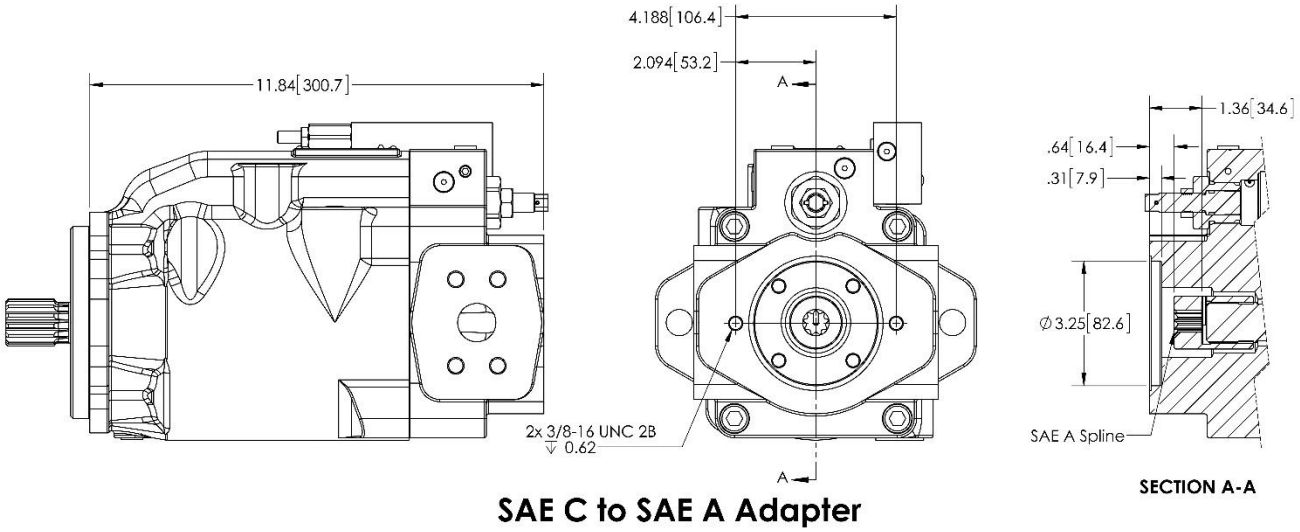


Side Port Valve Plate, Left Hand Rotation (CCW)

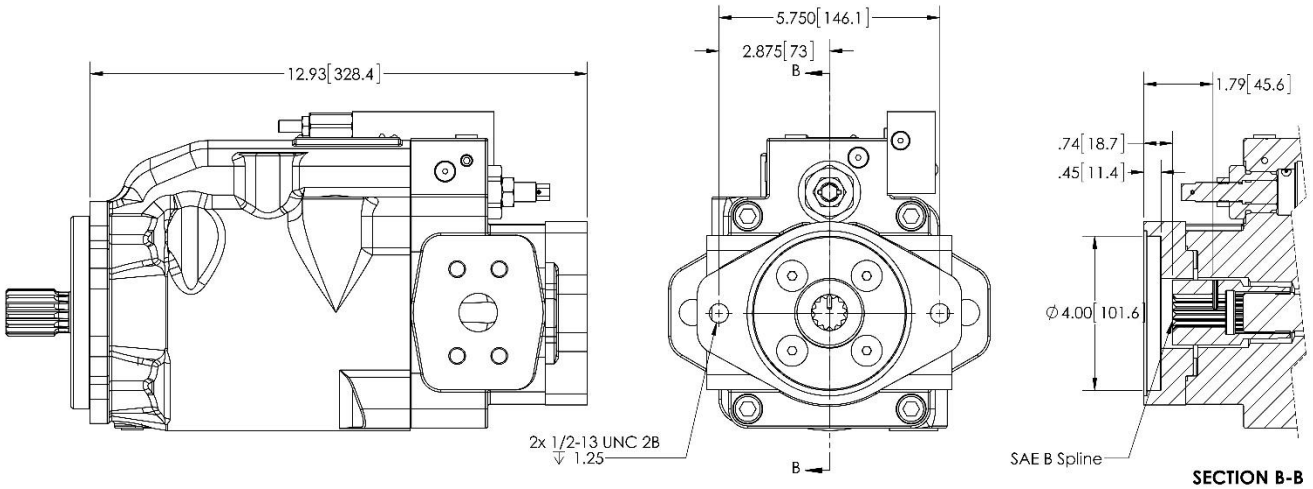


Side Port Valve Plate, Right Hand Rotation (CW)

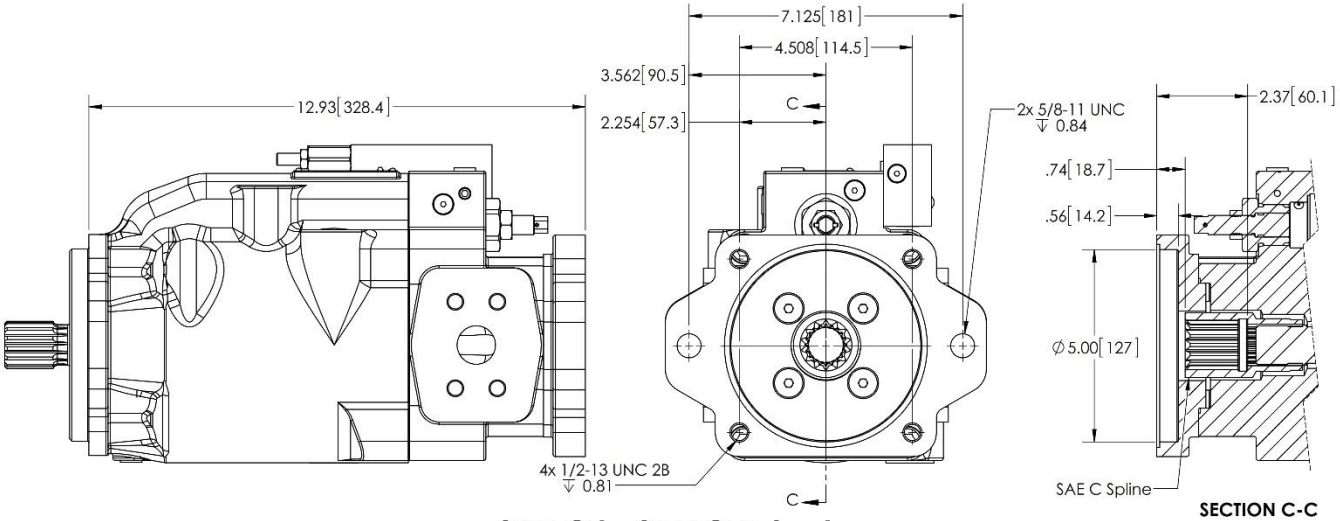
7.10 Tandem Mount Adapters



SAE C to SAE A Adapter



SAE C to SAE B Adapter



SAE C to SAE C Adapter

8 Troubleshooting

Problem	Causes	Remedy
Unresponsive or Sluggish Control	The Saddle Bearings are worn or damaged	Refer to referenced control instruction material.
		Inspect bearings, replace if necessary.
Insufficient Pump Volume	The delivery limited by a faulty control.	Refer to referenced control instruction material.
	Obstructed suction circuit or insufficient supercharge volume.	Inspect for obstruction and verify supercharge.
	Insufficient drive motor speed.	Refer to appropriate power material.
	Worn or grooved cylinder barrel and/or valve plate mating surfaces.	Inspect components. Replace as necessary.
	Worn piston/shoe assemblies or piston bores in cylinder.	
	Worn or damaged piston shoe or swashblock.	
Irregular or Unsteady Operation	Faulty control.	Inspect components. Replace as necessary. Refer to referenced pump instruction materials.
	Fluid level in reservoir is low or supercharge is insufficient.	Verify fluid level and/or supercharge.
	Air entering hydraulic system.	Inspect system for leak.
	Worn axial piston pump.	Inspect components. Replace.
	Faulty output circuit components (cylinder, motors, valves or other related components).	Inspect components. Replace.
Loss of Pressure	Worn piston pump.	Inspect components. Replace.
	Worn or grooved cylinder barrel and/or valve plate mating surfaces.	
	Worn piston/shoe assemblies or piston bores in cylinder.	
	Faulty output circuit components.	
Excessive or High Peak Pressure	Faulty output circuit components.	Check the relief valve.
Excessive Noise	Pump stopped or started incorrectly under load.	Verify operation procedure of pump.
	Low fluid level in reservoir or insufficient supercharge causing cavitation.	Verify fluid level and/or supercharge.
	Air entering hydraulic system.	Inspect system for leak.
	Fluid too cold or viscosity too high.	Verify fluid temperature and/or type.
	Suction line problem i.e.; obstructions in line, line too long, line diameter too small or too many bends and/or loops in line.	Inspect line for obstruction.
	Broken or worn piston/shoe assembly.	Inspect components. Replace.
	Pump rotating in wrong direction.	Inspect operation direction of pump.
Excessive Heating	Operating pump above rated or peak pressure.	Verify pump limitations.
	Low fluid level in reservoir or insufficient supercharge.	Verify fluid level and/or supercharge.
	Air entering hydraulic system.	Inspect system for leak.
	Worn piston pump.	Inspect components. Replace.
	Worn or grooved cylinder barrel and/or valve plate mating surfaces.	
	Faulty output circuit components (continuous blowing relief valves or "slip" through valves, cylinder or other components).	
	Insufficient cooling provision or clogged coolers.	Inspect for obstruction.

9 System Requirements and Installation

Mounting

The pump can be mounted in any position, but the recommended mounting position is with the drive shaft on a horizontal plane and the LS/RP Port facing upward. Secure the pump to a rigid mounting surface. Refer to the referenced Oilgear Piping Information Bulletin 90011.

These pumps are usually fully piped and equipped. It may be necessary to connect to a super-charge circuit when used. Mount reservoir on level foundation with the reservoir bottom at least six inches above floor level to facilitate fluid changes.

Piping and Fitting

Refer to the referenced Oilgear Piping Information Bulletin 90011 and individual circuit diagram before connecting the pump to the system. Inlet velocity must not exceed 5 fps (1,5 mps). Inlet should be unrestricted and have a minimum of fittings.

DO NOT use an inlet strainer.

Arrange line from “case drain” so the case remains full of fluid (non-siphoning). Case pressure must be less than 25 psi (1,7 bar). For higher case pressures, special shaft seals are required; contact our Customer Service. Each drain line must be a separate line, unrestricted, full sized and connected directly to the reservoir below the lowest fluid level. Make provisions for opening this line without draining (siphoning) reservoir.

Power

Power is required in proportion to volume and pressure used. Motor size recommendations for specific applications can be obtained from The Oilgear Company. Standard low starting torque motors are suitable for most applications.

CAUTION

DO NOT start or stop unit under load unless system is approved by Oilgear. It may be necessary to provide delivery bypass in some circuits.

Drive

Verify the rotation direction by checking the plate on the pump's housing. *Please see the Installation Bulletin for the location of the rotation designation on the housing.* Clockwise pumps *must* be driven clockwise and counterclockwise pumps *must* be driven counterclockwise. Use direct drive coupling. Size and install coupling per manufacturer's instructions.

CAUTION

DO NOT drive the coupling onto the pump drive shaft. Refer to manufacturer's instructions.

Misalignment of pump shaft to driver's shaft should not exceed 0.005 inches (0,13 mm) Total Indicator Readout (TIR) in any plane.

Filtration

Keep the fluid clean at all times to ensure long life from your hydraulic system. Refer to the referenced Oilgear Filtration Recommendations bulletin 90007. Oilgear recommends use of a filter in the pressure or return line. Replace filter element(s) when the filter condition indicator reaches change area at normal fluid temperature. Drain and thoroughly clean filter case. Use replacement element(s) of same beta 10 ratio (normally a ratio of 4 with hydraulic oils).

Fluid Cooling

When the pump is operated continuously at the rated pressure or frequently at peak load, auxiliary cooling of the fluid may be necessary. Fluid temperature should not exceed limits specified in the referenced Oilgear Fluid Recommendations Bulletin 90000.

Air Breather

On most installations, an air breather is mounted on top of fluid reservoir. It is important for the breather to be the adequate size to allow air flow in and out of reservoir as fluid level changes. Keep the breather case filled to the "fluid level" mark. About once every six months, remove cover, wash screen in solvent and allow screen to dry, clean and refill case to level mark and install screen. Refer to the manufacturer's recommendations.

Fluid: Filling and Starting Recommendations

Refer to instruction plate on the unit, reservoir, machine and/or reference, Fluid Recommendations bulletin. Fire resistant fluids and phosphate ester fluids can be used in accordance with fluid manufacturer's recommendations.

1. Pump all fluid into reservoir through a clean (beta 10 ratio of 4 or more) filter. Fill reservoir to, but not above, "high level" mark on the sight gauge.
2. **Remove case drain line and fill the pump case with hydraulic fluid.**
3. Turn drive shaft a few times by hand with a spanner wrench to make sure parts rotate. Torque to turn drive shaft should be 9 to 24 ft*lbs. (12 to 32 N*m)

With pump under minimum load:

4. Turn drive unit ON and OFF several times before allowing pump to reach full speed. The system can usually be filled by running the pump and operating the control.

The fluid level in the reservoir should decrease. Stop the pump. DO NOT allow the fluid level to go beyond the "low level." If the level reaches "low level" mark, add fluid and repeat step.

NOTE

With differential (cylinder) systems, the fluid must not be above "high level" when the ram is retracted or below "low level" when extended. Bleed air from the system by loosening connections or opening petcocks at the highest point in the system. Close connections or petcocks tightly when solid stream of fluid appears.

10 Replacement Parts

10.1 Pump and Control Seals Kit

Item No.	Description	AS568 O-Ring Number	Quantity
008	Shaft Seal		2
011	O-Ring, Saddle	-243	1
013	Hydrobearing Plug O-Ring	-902	1
014	O-Ring for #4 Hollow Hex Plug	-904	1
015	O-Ring for #12 Hollow Hex Plug	-912	2
404	Valve Plate Gasket		1
411	O-Ring for #3 Hollow Hex Plug	-903	2
412	O-Ring for #4 Hollow Hex Plug	-904	2
505	O-Ring, TS Adapter to Coverplate, TS Pump with Coverplate	-135	1
505	O-Ring, Tandem Pump Adapter, Valve Plate to Flange	-042	1
506	O-Ring, Tandem Pump Adapter “-B2”, Adapter to Pump Flange	-155	1
506	O-Ring, Tandem Pump Adapter “-C2” or “-C4”, Adapter to Pump Flange	-159	1
705	O-Ring, MVS Bonnet	-912	1
706	O-Ring , MVS Stem	-014	1
707	Back-Up Ring, MVS Stem	-014	1
802	O-Ring for #2 Hollow Hex Plug	-902	3
808	O-Ring, Compensator Bonnet	-912	1
810	O-Ring, Compensator Stem	-017	1
816	O-Ring, Load Sense Bonnet	-906	1
818	O-Ring, Load Sense Stem and Control Block/Valve Plate Ports	-010	5
819	Back-Up Ring, Load Sense Stem	-010	1

Please note the material – Viton, Buna, or EPR – when ordering Seal Kits.

10.2 Maximum Volume Stop Kit

Item No.	Description	AS568 O-Ring Number	Quantity
701	MVS Bonnet		1
702	MVS Stem		1
703	Jam Nut		1
704	Rolled Pin		1
705	O-Ring, Bonnet	-912	1
706	O-Ring, Stem	-014	1
707	Back-Up Ring, Stem	-014	1

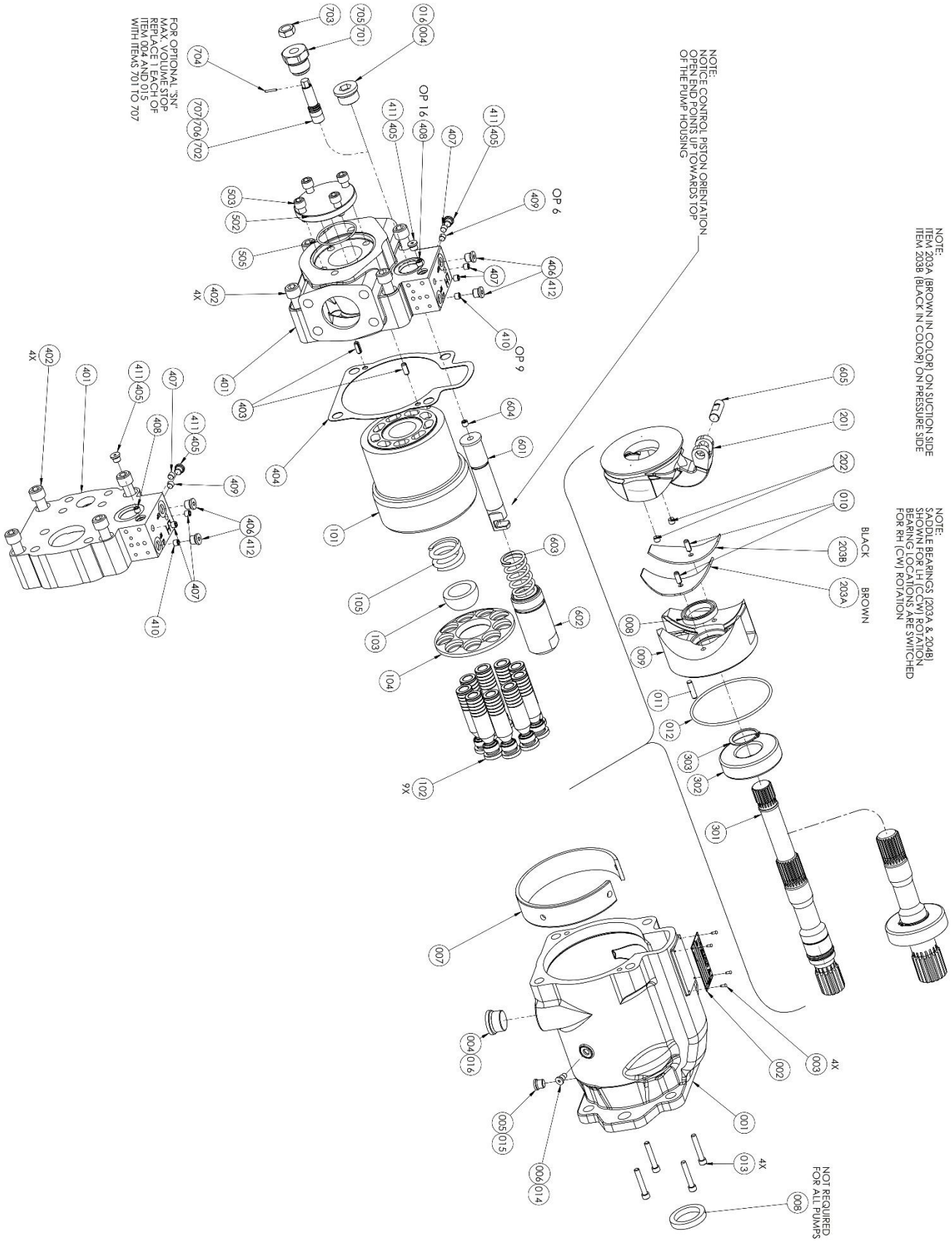
Please note the material – Viton, Buna, or EPR – when ordering kits.

10.3 Control Block Kit

Item No.	Description	AS568 O-Ring Number	Quantity
801	Control Block		1
802	#2 SAE Hollow Hex Plug		3
803	Koenig Plug		3
804	Control Spool		2
805	Compensator Seat		1
806	Compensator Spring		1
807	Compensator Bonnet		1
808	O-Ring, Compensator Bonnet	-912	1
809	Compensator Stem		1
810	O-Ring, Compensator Stem	-017	1
811	Jam Nut, Compensator Stem		1
812	Push Nut		1
813	Load Sense Seat		1
814	Load Sense Spring		1
815	Load Sense Bonnet		1
816	O-Ring, Load Sense Bonnet	-906	1
817	Load Sense Stem		1
818	O-Ring, Load Sense Stem and Valve Plate Ports	-010	5
819	Back-Up O-Ring, Load Sense Stem	-010	1
820	Jam Nut, Load Sense Stem		1
821	Control Block Screws		4

Please note the material – Viton, Buna, or EPR – when ordering kits.

10.4 Exploded Drawings



COMMON PARTS

ITEM NO.	QTY.	DESCRIPTION	TORQUE
001	1	PUMP HOUSING	
002	1	SERIAL TAG	
003	4	SCR,DRIVE,ROUND,#2 X 0.250 LG	
004	2	PLUG, HOLLOW HEX #12 SAE	85 FT-LBS
005	1	PLUG, HOLLOW HEX #4 SAE	120 IN-LBS
006	1	PLUG,HYDROBEARING	
007	1	HYDROBEARING	
008	2*	SHAFT SEAL	
009	1	SADDLE	
010	2	PIN, ROLL, .250 OD X .625 LG	
011	1	PIN, DOWEL, .250 OD X 1.00 LG,	
012	1	O-RING 70 DURO	
013	4	SCR, SHC, .250-20UNC-3A X 1.50 LG	120 IN-LBS
014	1	O-RING 90 DURO	
015	1	O-RING 90 DURO	
016	2	O-RING 90 DURO	

ROTARY GROUP

ITEM NO.	QTY.	DESCRIPTION	TORQUE
101	1	CYLINDER BARREL	
102	9	PISTON/SHOE ASS'Y	
103	1	FULCRUM BALL	
104	1	SHOE RETAINER	
105	1	SPRING	

SWASHBLOCK GROUP

ITEM NO.	QTY.	DESCRIPTION	TORQUE
201	1	SWASHBLOCK	
202	2	PLUG, 1/16 NPT, .031 ORIFICE	48 IN-LBS
203A	1	SADDLE BEARING	
203B	1	SADDLE BEARING	

DRIVESHAFT GROUP

ITEM NO.	QTY.	DESCRIPTION	TORQUE
301	1	SHAFT,SAE "C" SPLINE	
	1	SHAFT,SAE "C-C" SPLINE	
	1	SHAFT,T-S,SAE "C" SPLINE	
	1	SHAFT,T-S,SAE "C-C" SPLINE	
302	1	BEARING,SHAFT	
303	1	RETAINING RING,DRIVE SHAFT	

CONTROL GROUP

ITEM NO.	QTY.	DESCRIPTION	TORQUE
601	1	CONTROL PISTON	
602	1	CONTROL SLEEVE	240 FT-LBS
603	1	SPRING,CONTROL	
604	1	PLUG, 1/16 NPT, .021 ORIFICE	48 IN-LBS
605	1	CONTROL PIN	

VOLUME STOP

ITEM NO.	QTY.	DESCRIPTION	TORQUE
701	1	BONNET, MAX. VOLUME STOP	85 FT-LBS
702	1	STEM, MAX. VOLUME STOP	
703	1	NUT, HEX, JAM	
704	1	PIN, ROLL, .094 OD X .625 LG	
705	1	O-RING 90 DURO	
706	1	O-RING 90 DURO	
707	1	RING, BACK-UP, .014 TEFLON	

VALVE PLATE SIDE PORT-THRU

ITEM NO.	QTY.	DESCRIPTION	TORQUE
401	1	VALVE PLATE,SIDE,TS,LH	
	1	VALVE PLATE,SIDE,TS,RH	
402	4	SCR, SHC, .500-13UNC-3A X 2.25 LG, ASTM A574	100 FT-LBS
403	2	PIN, ROLL, .250 OD X .625 LG	
404	1	GASKET, VALVE PLATE	
405	2	PLUG, HOLLOW HEX #3 SAE	45 IN-LBS
406	2	PLUG, HOLLOW HEX #4 SAE	120 IN-LBS
407	3	PLUG, 1/16 NPT	48 IN-LBS
408	1	OP-16	48 IN-LBS
409	1	PLUG, 1/16 NPT	48 IN-LBS
410	1	OP-9	48 IN-LBS
411	2	O-RING 90 DURO	
412	2	O-RING 90 DURO	

VALVE PLATE REAR PORT

ITEM NO.	QTY.	DESCRIPTION	TORQUE
401	1	VALVE PLATE,REAR,LH	
	1	VALVE PLATE,REAR,RH	
402	4	SCR, SHC, .500-13UNC-3A X 2.25 LG, ASTM A574	100 FT-LBS
403	2	PIN, ROLL, .250 OD X .625 LG	
404	1	GASKET, VALVE PLATE	
405	2	PLUG, HOLLOW HEX #3 SAE	45 IN-LBS
406	2	PLUG, HOLLOW HEX #4 SAE	120 IN-LBS
407	3	PLUG, 1/16 NPT	48 IN-LBS
408	1	OP-16	48 IN-LBS
409	1	PLUG, 1/16 NPT	48 IN-LBS
410	1	OP-9	48 IN-LBS
411	2	O-RING 90 DURO	
412	2	O-RING 90 DURO	

*SECOND SHAFT SEAL LOCATED IN PUMP HOUSING IS OPTIONAL

P-1NN CONTROL

ITEM NO.	PART NUMBER	DESCRIPTION
408	OMIT	OMIT
410	403663-001	PLUG,1/16 NPT

P-RNN CONTROL

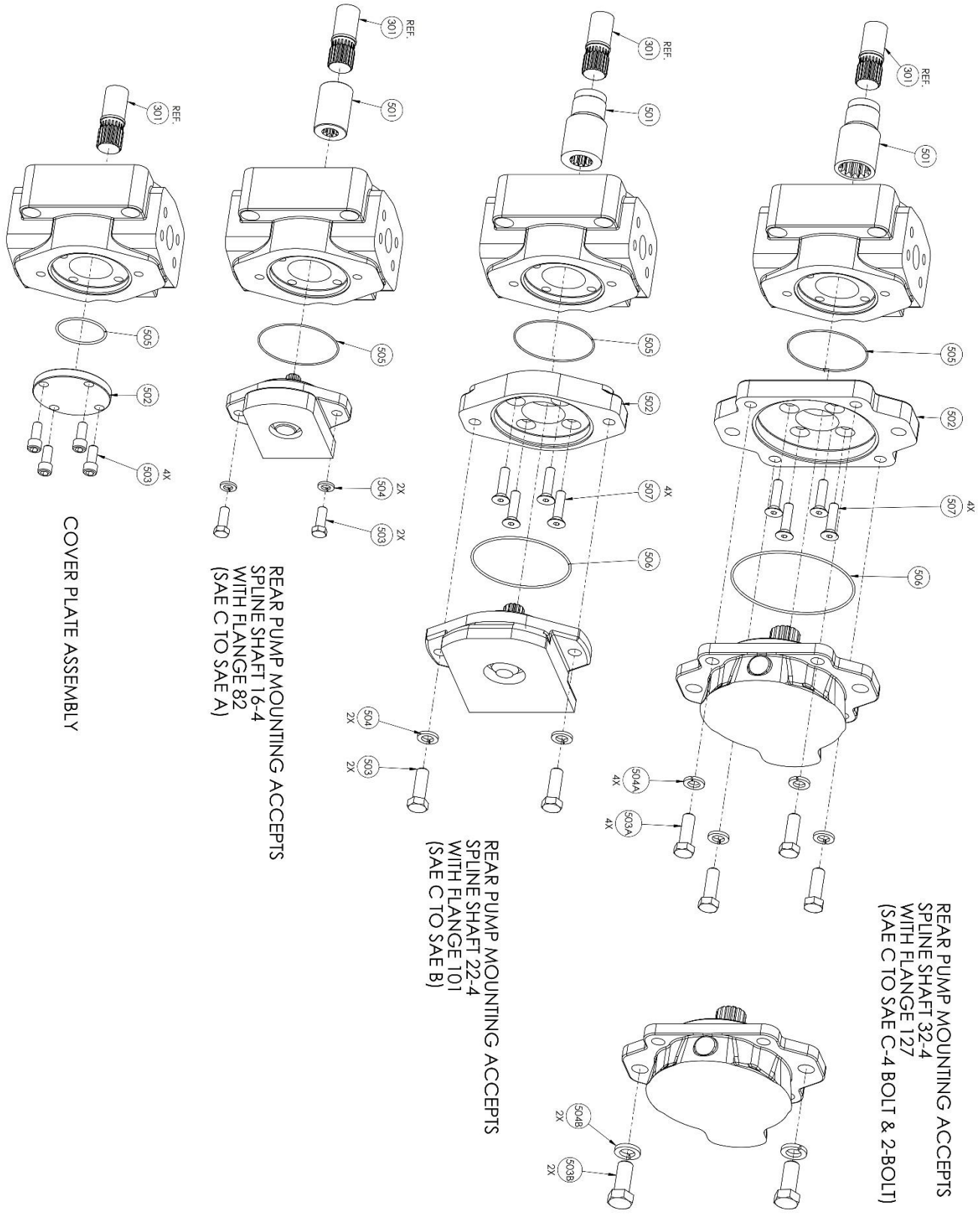
ITEM NO.	PART NUMBER	DESCRIPTION
408	240971-018	.031 1/16 ORIFICE
410	403663-001	PLUG,1/16 NPT

P-1NN/F CONTROL

ITEM NO.	PART NUMBER	DESCRIPTION
408	403663-001	PLUG,1/16NPT
410	403663-001	PLUG,1/16NPT

P-1NN/B CONTROL

ITEM NO.	PART NUMBER	DESCRIPTION
408	403663-001	PLUG,1/16NPT
410	240971-028	.021 1/16 ORIFICE


REF.
301
501
505
502
503
4X
504
2X
507
506
504A
4X
503A
504B
503B
COVER PLATE ASSEMBLY
REAR PUMP MOUNTING ACCEPTS
SPLINE SHAFT 16-4
WITH FLANGE 82
(SAE C TO SAE A)
REAR PUMP MOUNTING ACCEPTS
SPLINE SHAFT 22-4
WITH FLANGE 101
(SAE C TO SAE B)
REAR PUMP MOUNTING ACCEPTS
SPLINE SHAFT 32-4
WITH FLANGE 127
(SAE C TO SAE C-4 BOLT & 2-BOLT)

COVER PLATE

ITEM NO.	QTY.	DESCRIPTION	TORQUE
501			
502	1	COVERPLATE	
503	4	SCR, SHC, .375-16UNC-3A X .875 LG, ASTM A574	45 FT-LBS
504			
505	1	O-RING 70 DURO, -135	
505			
507			

SAE C TO SAE A COUPLING & ADAPTER

ITEM NO.	QTY.	DESCRIPTION	TORQUE
501	1	COUPLING,XD5-100 TO SAE-A	
502			
503	2	SCR, HHC, .375-16UNC-2A 1.00 LG GR.5	15 FT-LBS
504	2	WASHER, LOCK, SPLIT, .375 STEEL	
505	1	O-RING 70 DURO, -042	
506			
507			

SAE C TO SAE B COUPLING & ADAPTER

ITEM NO.	QTY.	DESCRIPTION	TORQUE
501	1	COUPLING,PVG C TO SAE B	
502	1	ADAPTER,SAE-B	
503	2	SCR, HHC, .500-13UNC-2A 1.50 LG GR.5	37 FT-LBS
504	2	WASHER, LOCK, SPLIT, .500 STEEL	
505	1	O-RING 70 DURO, -042	
506	1	O-RING 70 DURO, -155	
507	4	SCR, FHC, .375-16UNC-3A X 1.50 LG, STEEL	28 FT-LBS

SAE C TO SAE C-2 BOLT COUPLING & ADAPTER

ITEM NO.	QTY.	DESCRIPTION	TORQUE
501	1	COUPLING,PVG C TO SAE C	
502	1	ADAPTER,SAE-C	
503B	2	SCR, HHC, .625-11UNC-2A 1.50 LG GR.5	74 FT-LBS
504B	2	WASHER, LOCK, SPLIT, .625 STEEL	
505	1	O-RING 70 DURO, -042	
506	1	O-RING 70 DURO, -159	
507	4	SCR, FHC, .375-16UNC-3A X 1.50 LG, STEEL	28 FT-LBS

SAE C TO SAE C-4 BOLT COUPLING & ADAPTER

ITEM NO.	QTY.	DESCRIPTION	TORQUE
501	1	COUPLING,PVG C TO SAE C	
502	1	ADAPTER,SAE-C	
503A	4	SCR, HHC, .500-13UNC-2A 1.50 LG GR.5	37 FT-LBS
504A	4	WASHER, LOCK, SPLIT, .500 STEEL	
505	1	O-RING 70 DURO, -042	
506	1	O-RING 70 DURO, -159	
507	4	SCR, FHC, .375-16UNC-3A X 1.50 LG, STEEL	28 FT-LBS

ITEM NO.	QTY.	DESCRIPTION	TORQUE
801	1	CONTROL BLOCK	
802	3	PLUG, HOLLOW HEX #2 SAE	45 IN-LBS
803	3	KOENIG PLUG,MB-600-187	
804	2	CONTROL SPOOL	
805	1	SEAT,COMPENSATOR	
806	1	SPRING,COMPENSATER	
807	1	BONNET,COMPENSATER	85 FT-LBS
808	1	O-RING 90 DURO	
809	1	STEM,COMPENSATER	
810	1	O-RING 90 DURO	
811	1	NUT, HEX, JAM, .500-20UNF-2B STEEL	
812	1	PUSHNUT,PALNUT	
813	1	SEAT,LOAD SENSE	
814	1	SPRING,LOAD SENSE	
815	1	BONNET,LOAD SENSE	325 IN-LBS
816	1	O-RING 90 DURO	
817	1	STEM,LOAD SENSE	
818	5	O-RING 90 DURO	
819	1	RING, BACK-UP, -010 TEFLON	
820	1	NUT, HEX, JAM	
821	4	SCR, SHC, #10-24UNC-3A X 1.25 LG	80 IN-LBS
822	3	O-RING 90 DURO