Flow

HYPLEX® PRIME PUMP

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HyPlex Prime Pump

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Introduction

The information in this manual will help you become familiar with your new Flow International (FLOW) equipment. It was compiled from the most current information available at the time of publication and is intended to cover the most common configurations. Your equipment was shipped with other documents and drawings. Refer to these drawings when using the service procedures in this manual.

Safety

All operating personnel and service technicians must read and follow the comprehensive list of safety precautions in all manuals provided with your equipment before installing, operating, or servicing the equipment. This will help avoid creating unsafe conditions or equipment damage.

The high-pressure waterjet system is a powerful cutting tool and must always be treated with respect.

Warnings, cautions, and notes

Before operating the equipment, you must read, understand, and follow all warnings, cautions, and notes in this manual. They are defined as follows:

WARNING
Highlights an operating or service procedure or condition that can result in death or serious injury to personnel.

CAUTION
Highlights an operating or service procedure or condition that can lead to impaired system operation or equipment damage.

Note: Highlights an operating or service procedure or condition that is essential for efficient operation and service.

CHAPTER 1

Equipment Description

The HyPlex Prime pump is a powerful, ultrahigh-pressure waterjet cutting tool designed for minimum maintenance and reliable performance. The pump has an operating pressure of 55,000 psi (3790 bar), and a maximum generated pressure of 60,000 psi (4140 bar).

Base features

- Triplex pump
- Totally-enclosed, fan cooled (TEFC) motor
- Manually adjustable output pressures from 1000–55,000 psi, dual-pressure control optional
- Dual filter system removes particles larger than 0.5 microns absolute
- Available in 30 or 50 hp motor, 60Hz or 50Hz

Basic package

For use with Flow X-Y tables prior to those introduced with B&R controls.

- Motor starter is not included

Standard package

For use with B&R-controlled Flow X-Y tables.

- Motor starter is included

Plus package

For use with B&R-controlled Flow X-Y tables.

- UHP water system pressures are monitored by a pressure transducer and displayed in FlowCUT
- Auto-calibration of UHP pressure control system
- Motor starter is included

Premium package

For use with B&R-controlled Flow X-Y tables.

- UHP water system pressures are monitored by a pressure transducer and displayed in FlowCUT
- Auto-calibration of UHP pressure control system
- Motor starter is included
- FlowSENSE, an early warning system for critical parts

Specifications

Contact FLOW Technical Service for further information. Also see the system drawings in Chapter 5.

Dimensions
(with covers closed) 60 L x 40 W x 41 in. H
.....1524 L x 1016 W x 1042 mm H
(with covers open) 60 L x 40 W x 52 in. H
.....1524 L x 1016 W x 1321 mm H

Nominal crankcase RPM	50Hz	60Hz
30 hp	716	709
50 hp	1154	1114

Operating pressure.....55,000 psi (3790 bar)
Max. generated pressure.....60,000 psi (4140 bar)

Filtration provided.....0.5 micron and 1 micron

Min. required inlet water flow rate
30 hp.....2 gpm @ 57 psi
50 hp.....3 gpm @ 65 psi

Low inlet water pressure switch threshold
.....≤ 15 psi
To ensure proper inlet water pressure, a boost pump may be required.

Req. inlet water temperature range
.....55°F–70°F (12.7°C–21°C)
If plant inlet water temperature is outside of this range, contact Flow Technical Service

Air.....90–120 psi (6.2-8.3 bar)
.....dry and filtered to 10 microns

Drain.....212°F (100°C) water at 0.9 gpm (30 hp)
.....212°F (100°C) water at 1.5 gpm (50 hp)

Max. UHP orifice size
30 hp.....-12 orifice
50 hp.....-16 orifice

Voltage

Nominal system voltage **	Horsepower (hp)	Frequency (Hz)	Phase
200	*	50	*
200	*	60	*
208	*	60	*
230	*	50	*
240	30/50	60	3
380	*	60	*
400	30/50	50	3
480	30/50	60	3
500	*	60	*

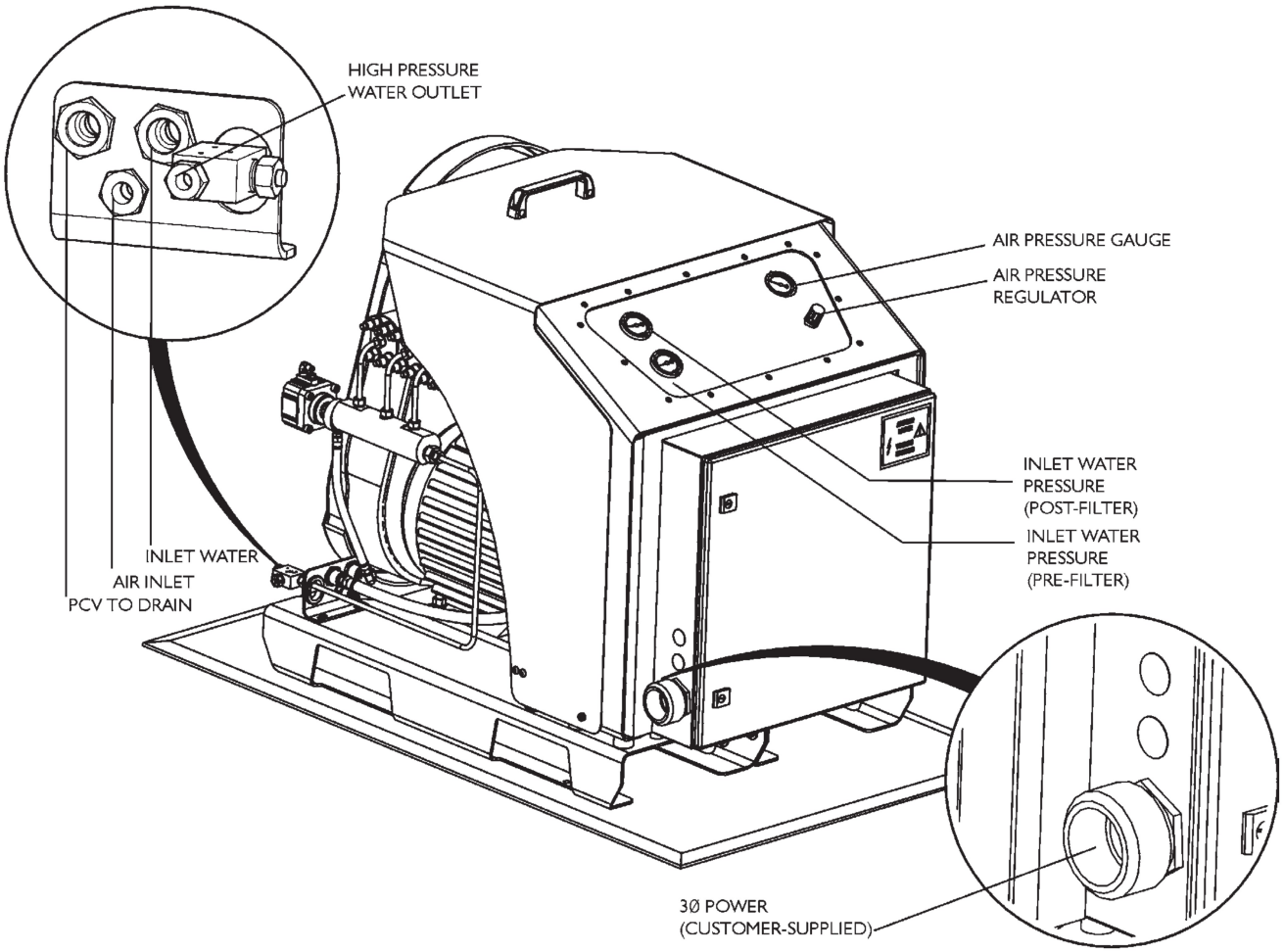
* Not supported.
** Utilization voltage is often referenced, which will be 3-5% lower than the nominal system voltage. Where referenced, the utilization voltage is equivalent to the nameplate voltage of a product.

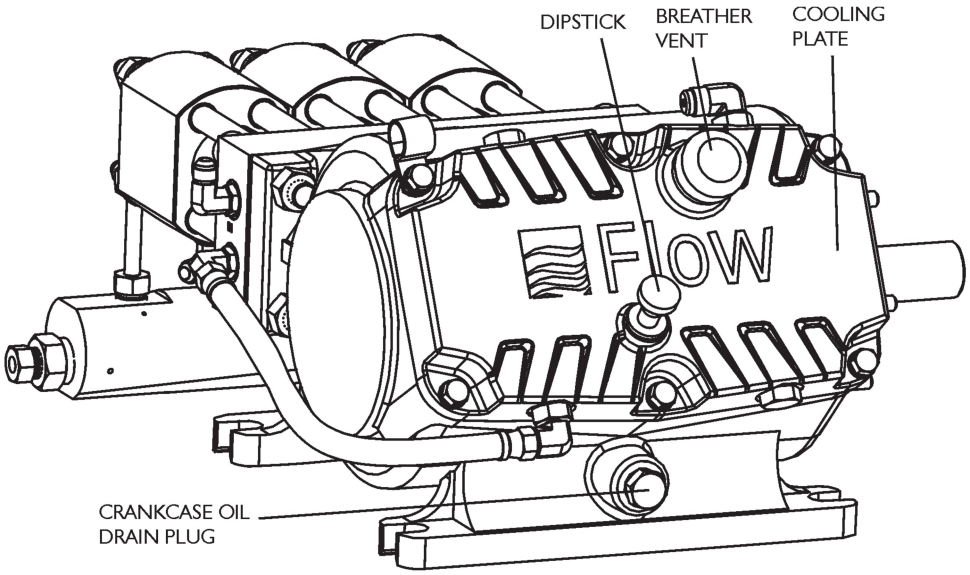
Crankcase oil

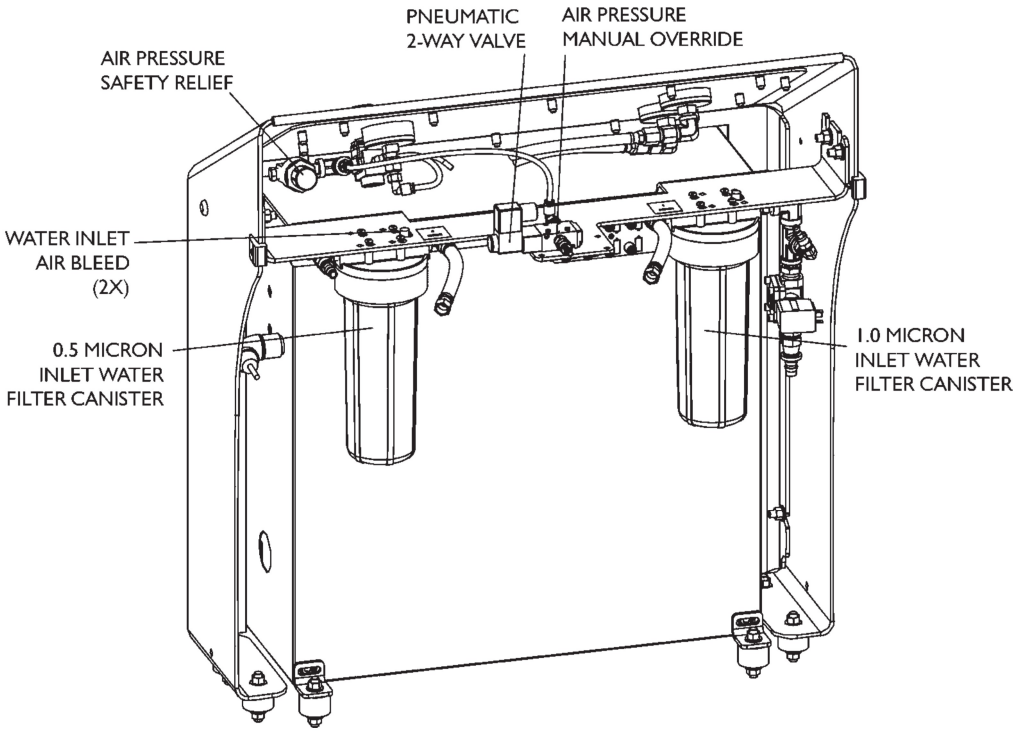
Use of Shell Morlina 100 Hydraulic Oil (ISO 100) is recommended, but other manufacturer's equivalents can be used.

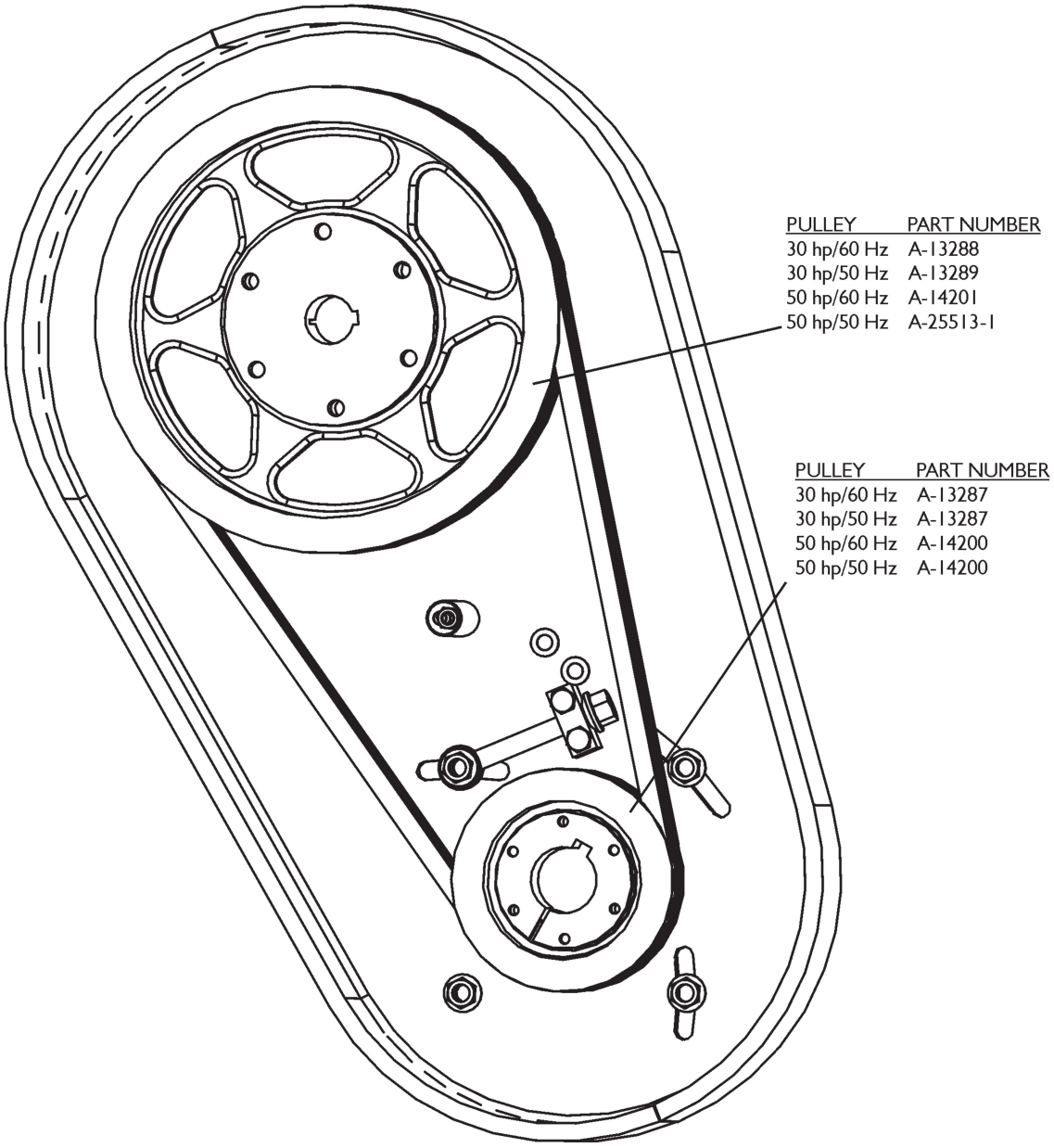
When operating the pump in an environment with an ambient temperature greater than 86°F (30°C), a heavier oil is recommended to be used. Contact Flow Technical Services for additional information.

Reservoir capacity	2.0 qt (1.9 liter) Maintain oil level between the high and low level marks on the dipstick.

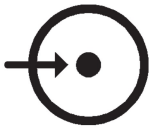
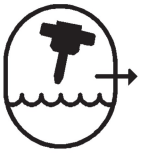

HIGH PRESSURE
WATER OUTLET
AIR PRESSURE GAUGE
AIR PRESSURE
REGULATOR
INLET WATER
PRESSURE
(POST-FILTER)
INLET WATER
PRESSURE
(PRE-FILTER)
INLET WATER
AIR INLET
PCV TO DRAIN
3Ø POWER
(CUSTOMER-SUPPLIED)







Interface labels

	**Inlet water pressure (post filter)** This gauge indicates water pressure after the inlet water has passed through the 0.5 micron and 1.0 micron water filters.
	**Inlet water pressure (pre filter)** This gauge indicates water pressure before the inlet water has passed through the 0.5 micron and 1.0 micron water filters.
	**High air pressure** This gauge indicates the air pressure supplied to the UHP pressure control valve (PCV) as controlled by the regulator below the gauge. On dual-pressure machines: this indicates the maximum air pressure setting.
	**Low air pressure** On dual-pressure machines, this indicates the minimum air pressure setting.
	**Inlet water connection** Connect inlet water at recommended specification.
	**Air inlet connection** Connect inlet air at recommended specifcation.
	**PCV to drain** Connect a drain line directly to an outlet drain at recommended specifications. **CAUTION** **To ensure that the PCV does not suffer damage due to siphoned catcher tank water, connect the PCV drain line directly to an outlet drain, or suspend the line above the catcher tank water level.**
	**High-pressure water outlet** Outlet port for ultrahigh-pressure (UHP) water.

Water requirements

The HyPlex Prime pump requires a single source of water, and one drain line.

Water quality

CAUTION

A high concentration of dissolved solids in the inlet water (especially silicates and calcium) can reduce waterjet nozzle life. If water quality is poor and filtration will not correct it, the customer must add additional water treatment equipment. Contact Flow Technical Service for more information.

Flow recommends the use of a water softener to pre-treat the cutting water. Water quality should be maintained to within the following limits:

- Total disolved solids: 17 ppm
- Water pH: between 6.5 and 9.5

Additional water quality requirements are specified in the *Inlet Water Quality* document provided at pre-installation.

Water flow rate

Systems should be sized for 150% of your pump capacity, and should match your intended maximum duty cycle.

Water temperature

An inlet water temperature of between 55°F and 70°F (12.7°C and 21°C) is recommended for proper pump performance. Premature pump component failure is common if water temperatures are outside this range. Inlet water chillers should be used if the inlet water temperature is above this range.

Water interface connections

Flow recommends the installation of manual shut-off valves in the inlet/cooling water line. Locate valves as close as possible to the pump interface connection to make them easier to service.

Water inlet lines must be non-corrosive pipe or rubber hose. Rubber hose (per SAE Standard 20R1, 30R1, or equivalent) is recommended.

Water inlet lines (from the filtering system to the pump) must be as short as possible and must be PVC, copper, or equivalent. Do not use galvanized iron piping or black iron—it can introduce minerals to the water, which can shorten component life.

- Connect inlet water line to pump bulkhead.
- Connect proper drain line to PCV bulkhead outlet.

CAUTIONS

To ensure that the PCV does not suffer damage due to siphoned catcher tank water, connect the PCV drain line directly to an outlet drain above the water line, or suspend the line above the catcher tank water level.

Water exiting the PCV drain line is hot.

Air requirements

The HyPlex Prime pump requires a source of air between 90 and 120 psi (6.2 and 8.3 bar). The air must be dry and filtered to 10 microns.

On the Basic and Standard versions of the pump, the manual air regulator should be adjusted and set at the point at which 55,000 psi water pressure is achieved with the correct orifice installed and the nozzle open.

Environment requirements

Ambient temperature around the pump must be maintained between 45°F and 104°F (7°C and 40°C) to ensure proper functioning of the pump.

High-pressure tubing

High-pressure tubing certified for continuous operation at 60,000 psi (4140 bar) is used to route high-pressure water from the HyPlex Prime pump to the cutting equipment.

Note: Refer to manual M-127, *Small High-pressure Components* for more information on high-pressure tubing, components, and related service.

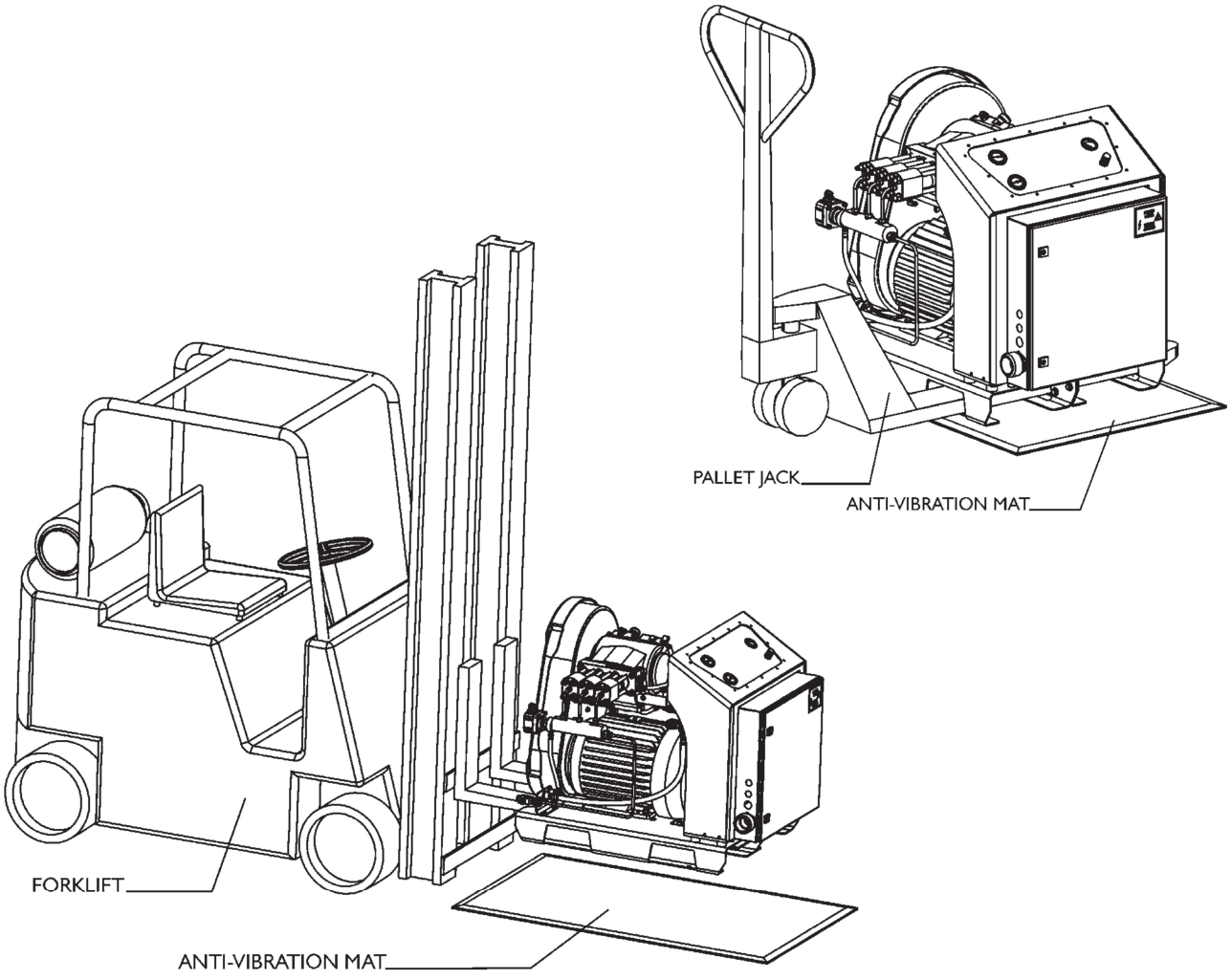
Anti-vibration mat

The anti-vibration mat is essential for the stability of the HyPlex Prime pump and the reduction of pump vibration. The pump should be centered on the mat with no part of the pump touching the floor beneath.

Place the mat flat on the floor and lower the pump onto the center of the mat using a forklift.

A pallet jack may be also used to locate the pump, but the mat should be slid under the pump when suspended with the pallet jack. Pallet jacks loaded with the weight of the pump will not roll on the anti-vibration mat.

Do not trim the mat or bolt the pump to the floor through the mat material.



Startup procedure

Preparing the pump for startup

Follow this procedure to make sure the pump is ready for operation:

- Before the beginning of a shift
- After initial installation
- After installation of one of the HyPlex Prime maintenance kits

1. Flush debris from all water supply hoses before connecting them to the pump.

CAUTION
Debris in the water supply line can cause extensive damage to high-pressure components. Such damage IS NOT covered by warranty.

2. Fill the pump case with a recommended oil (see the list on Page 6). Fill the oil reservoir to the fill mark.

CAUTION
Never operate the pump without oil or with dirty oil—this can cause extensive damage and IS NOT covered by warranty.

3. Make sure water lines, air lines, and drain lines are correctly connected and routed.

CAUTION
Cutting equipment and nozzles must be installed when operating the pump. Operating the pump without proper cutting nozzle will damage high-pressure components.

4. Clear tools, parts, and rags from around the pump. Check in and around the pump for foreign objects and debris.
5. Open any operator-supplied inlet water and air valves; check all connections for leaks.

CAUTION
Operating the pump without an adequate supply of inlet water will cause damage.

Do not tighten any loose or leaking connections while the pump is operating or while the line is pressurized.

6. Make sure the belt guard is attached.
7. Place the main electrical disconnect in the ON position.
8. Release the E-stop button(s).

Starting the Basic and Standard package pumps

These are the steps to be performed at the initial startup of a shift.

1. Check all connections for leaks.
2. Turn the manual air pressure regulator all the way counter-clockwise.
3. Depress the red pressure relief buttons on both of the inlet water filters to release any air.
4. Start FlowCUT and open a part file. Click the **Run Machine** button. The screen will display the pump on/off control.
5. Reduce the air pressure to the PCV to zero.
6. Click on the high-pressure selection in the sidebar.
7. Turn the pump on by clicking the pump ON button. When the pump is spinning at full rpm, turn the manual air pressure regulator clockwise until the pressure display reads 55,000 psi of pressure.

   Pressure is indicated on either the analog gauge (Basic) or on the digital display in FlowMaster (Standard). Operate the pump at this pressure for 5-10 minutes while checking for leaks. Correct as required.

CAUTION
Do not tighten any loose or leaking connections while the pump is operating or while the line is pressurized.

The pump is now ready for use.

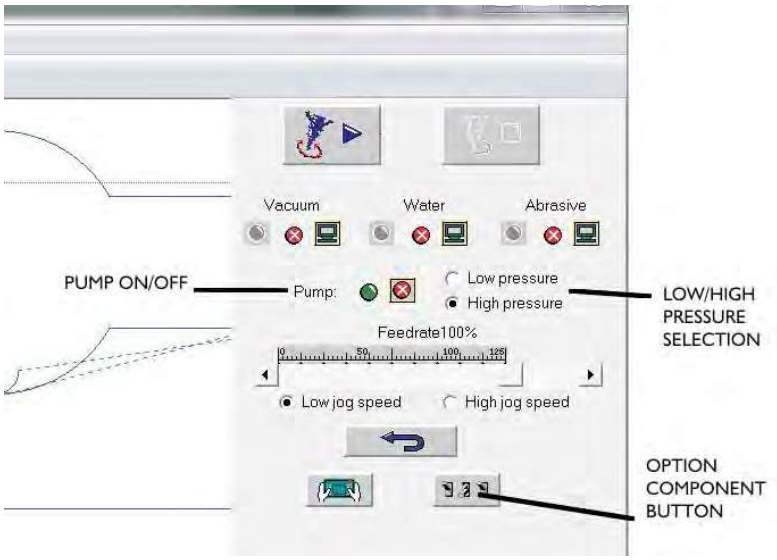
Starting the Plus and Premium package pumps

These are the steps to be performed at the initial startup of a shift.

1. Check all connections for leaks.
2. Depress the red pressure relief buttons on both of the inlet water filters to release any air.
3. Run the *HyPlex Prime pump Temperature Input Offset Adjustment* routine on Page 16.
4. Run the *Calibrating the pump control system* routine on Page 16.
5. Click on the low-pressure selection in the sidebar.
6. Turn the pump on for 5-10 minutes while checking for leaks. Correct as required.

CAUTION
Do not tighten any loose or leaking connections while the pump is operating or while the line is pressurized.

The pump is now ready for use.



HyPlex Prime pump temperature input offset adjustment routine

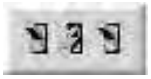
This routine applies to the Plus and Premium packages.

This software routine must be run each time the pump is started at the beginning of a shift, and any time a high-pressure pump component is replaced.

The routine reads the temperature inputs from the three thermistors and calculates the relative value of each to the lowest among the three. These relative values are used in the calculation for continuous monitoring of the cylinder temperature when the pump is running.

1. Make sure the pump is at room temperature. This is important to get a uniform reading from each of the thermistors.
2. Start FlowCUT, open a part file, and go to the *Run Machine* screen.

3. Click on the Option Component button in the sidebar. In the Option Component dialog box that appears, scroll through the selections to find the "Enable Temperature Sensor Offset Adjustment" option.



4. Enable the routine by clicking the numbered button. Click **Close** to close the *Option Component* dialog box.
5. Select low-pressure mode and click the Pump ON button.

   The pump will run at idle for about 45 seconds, then go to low pressure. Pump pressure is indicated in the status bar at the bottom of the FlowCUT *Run Machine* screen.
6. When the pump goes to low pressure, stop the pump, click the Previous Screen button, then click the *Run Machine* button to make the routine adjustments effective.

Calibrating the pump control system

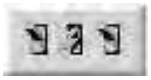
This applies to the Plus and Premium packages.

This software routine must be run each time the PCV poppet is replaced, and whenever the pump output pressure is significantly off the commanded pressure setting.

The routine commands the pump to create pressure at increasing set intervals and then adjusts the controls to match each interval.

1. Start FlowCUT, open a part file, and go to the *Run Machine* screen.

2. Position the cutting head away from any material or tooling.
3. Click on the **Option Component** button in the sidebar. In the Option Component dialog box that appears, scroll through the selections to find the "Pressure Calibration" routine.



4. Enable the routine by clicking the numbered button. Click Close to close the Option Component dialog box.

WARNING
Waterjet nozzle will automatically open when finishing the calibration routine. The cutting head must be positioned away from any material or tooling.

5. Select low-pressure mode and click the Pump ON button.

   The pump will run at idle for about 45 seconds, then go to low pressure (as specified by user settings in Jet Setup). Pump pressure is indicated in the status bar at the bottom of the FlowCUT Run Machine screen.
6. When the pump goes to low pressure, stop the pump, click the Previous Screen button, then click the *Run Machine* button to make the routine adjustments effective.

Preparing the pump for shipping or storage

Whenever a Flow pump is moved, put into storage, or shipped, the following guidelines will help prevent damage caused by movement or environmental conditions. These instructions comply with transportation regulations.

Note: U.S. Department of Transportation regulations require that crankcase oil be transported only in sealed containers. Before shipping, remove all crankcase oil from the reservoir.

Service steps

1. Disconnect power, turn off inlet water, and turn off air.
2. Disconnect main motor lead terminals from the motor starter in the machine power enclosure. DO NOT CUT LEADS. (Motor leads are terminated with eye lugs and bolted to terminals from the motor starter primary conductors.)
3. Disconnect the HP interface at the utilities bulkhead.
4. Remove both filter canisters and empty out any water.
5. Reattach the water filter canisters to the filter heads.
6. Remove the hose from the 1 micron filter outlet.
7. Apply compressed air to the 1 micron filter outlet hose. Expelled water will be visible at the HP interface connection at the utilities bulkhead. This should expel most remaining water from the HP and LP circuits.
8. Reattach the hose to the 1 micron filter outlet.
9. Drain the water from the inlet water pressure gauge lines at the end opposite the gauge. Reattach when all water is expelled.
10. Drain the water from the inlet water line between the utilities bulkhead and the inlet water shut-off solenoid valve. Reattach after draining.

Plug fittings

11. Tie wrap the inlet water, drain, and air lines.

Crating

12. The pump must be shipped on a framed and reinforced wooden pallet designed to isolate and support its weight and load characteristics.
13. Secure the user interface console and motor starter box so it cannot vibrate.
14. Wrap a plastic band around the horizontal circumference of the pump, protecting all corners with cardboard between the strap and the cover corner. Wrap an additional plastic band around the top and under the frame, also protecting corners with cardboard.

Notes

CHAPTER 2

Safety

This chapter contains a comprehensive list of safety precautions that must be followed to ensure safe operation of the equipment. These precautions must be read and understood by everyone operating and maintaining the equipment—before they start working with the equipment. Note that OSHA and state safety agency rules must be complied with in addition to those given in this chapter and elsewhere in this manual. Applicable plant general safety precautions must also be followed.

Safety precautions

FLOW designed your high-pressure waterjet cutting system and related equipment with safety in mind. Throughout the manual, safety precautions and warnings for specific operations are highlighted. Safety precautions are also posted on the equipment. The operator and service personnel shall pay particular attention to these precautions at all times.

Operators of a high-pressure waterjet cutting system must treat the system as they would treat any high-speed cutting tool. Although the waterjet may appear harmless, it is a high-energy cutting tool capable of cutting many non-metallic materials such as composites, plastics, and wood products. Misuse of this equipment or carelessness in its application can be extremely hazardous to operating personnel. Always treat the waterjet cutting system with respect.

Warnings, cautions, and notes

Service procedures in the waterjet manuals include safety warnings, cautions, and notes that must be read, understood, and adhered to. These are specific categories of safety notices, and are defined as follows:

WARNING
An operating condition or service procedure that can result in death or serious injury to personnel.

CAUTION
Highlights an operating condition or service procedure that can lead to impaired system operation or equipment damage.

Note: Highlights an operating or service procedure or condition that is considered essential for efficient operation and service.

Replacement label

- Part number 006317-1
  3.75 x 6 in.
- Part number 009837-1
  1.8 x 3 in.

Safety tips

- Do not allow the waterjet stream to touch any part of your body—it will cause serious injury. Do not point the waterjet at anyone.
- During equipment maintenance, take the system out of service. The controls must be properly locked and marked with a warning sign.
- All personnel required to perform any system operating or service function must pay particular attention to all warning signs and notices posted in the plant and on the equipment.
- All protective guards, shields, and covers must be in place on the equipment at all times.
- First aid facilities shall be provided in convenient locations throughout the plant. These locations must be known by all personnel.
- Always keep the work area around the equipment clean and free of debris. Oil spillage results in slippery floors and must be cleaned up immediately.
- Any unfavorable conditions that may result in injuries shall be reported to the plant supervisor immediately.
- As a general practice, it is recommended that safety shoes, glasses, and hearing protection be worn by all personnel working around the equipment. Do not wear rings, watches, or necklaces when working around any equipment that has moving parts.

Mechanical system

- Don't start the system unless you know how to stop it.
- Never maintain, service, or clean around the equipment while it is operating.
- Do not use incorrect tools—it can cause injury or costly damage to equipment.
- Never climb on or around the equipment on makeshift devices. Use only approved catwalks, ladders, or platforms.
- Do not exceed specified pressure setting limits for pneumatic or hydraulic components. Exceeding these limits may result in serious injury to personnel or damage to the equipment.
- Shield and bundle equipment hoses and cables so they do not obstruct the operator's freedom of movement.
- Always be alert when working around the equipment.
- Clear all tools, parts, and rags from moving parts after servicing the equipment.

Electrical system

- Only a certified electrician shall perform electrical and/or electronic troubleshooting and servicing of electrical devices.
- Always assume that power is ON in all electrical systems. Always check and lock out the main power switches before servicing the equipment. Post a sign, "Maintenance in Progress—Do Not Energize."
- Be aware that live electrical circuits are present in the control console whenever the master disconnect is on, regardless of whether the E-Stop is engaged.
- Disconnect circuit breakers and lock them in the OFF position before servicing the electrical system. If this isn't possible, have someone stand by to prevent someone from powering up the system.
- Take extra precautions when servicing the power system in a damp environment.
- Never alter or bypass protective interlocks or devices unless specifically instructed to do so, and only if all precautions are followed.
- You must give capacitors sufficient time for discharge. If this is not possible, discharging should be done manually and with care.
- Do not use jumper wires across fuses, fuse holders, or breakers.
- Make sure all tools are properly insulated for the job. Use only proper test apparatus; check regularly to make sure it is working correctly. Use caution when connecting a test probe to test points.
- All replacement wires shall conform to the manufacturer's specifications, including color coding, wire numbers, and size.
- Close the control panel doors or junction box covers after servicing.

Waterjet system

- High-pressure water can remain in the system for an extended time after shutting down the water source. Always bleed-down system pressure before servicing any part of the system.
- Do not touch weep holes with your bare hands or try to stop water by plugging the holes.
- Remember that the waterjet stream is a knife. Do not introduce anything into its path that you do not intend to cut.

- Wear a face shield when required by operating instructions.
- Do not remove protective shields from high-pressure tubing. If shields are removed for servicing, they must be replaced before starting the system.
- Torque all fittings to the manufacturer's torque specifications.
- Stepping or leaning on high-pressure tubing can break connections, causing leakage.
- Use only high-pressure fittings, valves, and tubing certified for 60,000 psi (4138 bar) when making alterations or additions to the high-pressure water system.
- Do not alter or eliminate stress relief tubing coils.
- Follow the tubing manufacturer's recommendations for high-pressure tube bending radii.
- Do not exceed specified operating pressures for high-pressure water system components.
- Do not over-torque fittings or bend swivels excessively.
- Follow the manufacturer's recommendations for servicing the equipment, and use only original manufacturer replacement parts.
- Follow the manufacturer's system startup procedure to ensure safe operation.
- Use care when lifting equipment covers during operation.

WARNING
NEVER point a waterjet cutting or cleaning tool at yourself or at any person. Do not aim any waterjet tool at anything you do not want to cut.

Protective clothing

Personnel operating hand-held, high-pressure water cutting or cleaning equipment and those working nearby should wear the protective clothing and safety devices described in this chapter.

FLOW recommends that work-site safety personnel approve all safety equipment and clothing for everyone working around waterjet equipment.

Eye protection

- At a minimum, operators must wear safety glasses with side shields and a visor, or goggles and a visor, to gaurd against spray and flying debris.
- All eye protection shall meet appropriate ANSI requirements for that type of eye protection.
- Some states and countries have their own eye protection rules that must be followed.

Head protection

- Helmets must be worn at all times by all personnel within the work area. Helmet material must withstand mechanical shock to 10 G in 8 ms without fracturing.

Hand protection

- The operator must wear gloves at all times. Leather gloves are preferred.

Foot protection

- Safety footwear with steel toe-caps at least 0.02 in. (5 mm) thick must be worn. The toe cap must cover at least 30% of the footwear length.
- For some applications, footwear must be equipped with metatarsal guards to provide instep protection.

Hearing protection

- Operators and other personnel exposed to noise levels of more than 90 dBa for more than 1 hour must wear suitable ear protection. Ear plugs and muffs are usually adequate.

Body protection

- Waterproof garments only protect the operator from spray and flying debris. They do NOT deflect direct jet impact.

Emergency medical information

Anyone who receives equipment-related injuries while operating high-pressure water equipment should be given immediate hospital attention. It is vital that medical personnel have information about this type of injury. Therefore, all waterjet operating personnel should carry a waterproof emergency medical tag or card that describes their work and the nature of injuries inherent in using waterjet cutting devices. The card illustrated below can be purchased from Flow International (A-8466).

The tag or card should contain the following standard information:

CHAPTER 3

Maintenance & Troubleshooting

Periodic maintenance

Periodic maintenance is service to be performed on the equipment at regular intervals, designed to help minimize unscheduled production down time and premature parts failure. FLOW recommends that you keep detailed service records to help you prepare a maintenance schedule that is compatible with your application and production requirements.

General precautions

Observe the following general precautions at all times. Review the safety information in Chapter 2 before performing any maintenance or service, and pay attention to the safety messages in the maintenance and service procedures. Do not make any unauthorized changes to equipment or components.

Electrical

- Maintain all electrical components, protective guards, and shutdown devices according to approved practices.
- Make sure power cannot be applied to equipment during maintenance work by turning off the main electrical disconnect and locking it out.
- Before servicing, use a volt meter to make sure the system is not energized. Take extra precautions when servicing the electrical system in a damp environment.
- Never use jumper wires across fuses, fuse holders, or breakers.
- Do not use metal rulers, flashlights, pencils, or tools that have exposed conducting material.
- De-energize all equipment before connecting or disconnecting meters or test leads.
- When connecting the volt meter to terminals for measurement, use a range higher than the expected voltage.
- Replacement wires must conform to the manufacturer's specifications, including proper color coding and wire numbers.

Mechanical

- Use only high-pressure fittings, valves, and tubing certified for 60,000 psi (4140 bar) when making changes to the high-pressure water system.
- Immediately repair any leaks in fittings or connections. Torque all fittings to the manufacturer's specifications.
- When pressurizing any new, rebuilt, or recently serviced high-pressure component, clear all personnel from the immediate area until system pressure has been applied for three minutes and cycled on and off at least three times. At first startup, run the pump at low pressure. Then, if no leaks or problems occur, increase the pressure to the full operating pressure and continue.
- Do not touch high-pressure leaks.
- Bleed down the system pressure before servicing any part of the system. Never tighten pressurized fittings.
- Follow the manufacturer's recommendations for servicing the equipment, and use only original manufacturer replacement parts.

- Use cleaning solvents only in well-ventilated areas. Avoid prolonged breathing fumes and contact with skin or eyes.
- Inspect the entire system before operating it. Correct any fault or malfunction.

Tools

- Use only approved test equipment, and check it regularly for correct operation and calibration.
- Use the correct tools—the incorrect tool can result in injury to personnel or costly damage to the equipment.
- Clear all tools and rags from around the machine after service and before starting the equipment.
- Use only approved work platforms. Never climb on or around the equipment using makeshift devices.

Protective clothing

- Do not wear loose clothing or jewelry while working around rotating parts of machinery.
- Pressurized air can drive particles into eyes and skin if handled improperly. To prevent injury, use appropriate protective equipment and clothing and exercise extreme caution.

Torque specifications

Refer to the following table when specific torque requirements are not listed in a service procedure.

CAUTION
Never torque mounting bolts and machine screws beyond the manufacturer's recommended limits.

The torque values for high-pressure water assemblies and fittings are listed in U.S. Customary System foot-pounds (ft-lb) and Systéme International (SI) Newton-meters (N-m).

High-pressure gland nuts	***U.S. ft-lb***	***SI N-m***
¼ in.	15–25	20–34
⅜ in.	35–45	47–60
9⁄16 in.	60–75	80–100

Inspection & maintenance schedules

Flow equipment has been designed for long service life. However, maximizing the life, safety, and efficiency of the equipment depends on daily inspections and regular maintenance. Periodic maintenance can take the form of regularly scheduled preventive maintenance, such as the items listed below. It also includes replacing worn parts that have reached the end of their service life.

In addition, the HyPlex Prime pump has four mandatory maintenance kits that are installed at fixed intervals. These are described in Chapter 4.

Routine daily checks

Before startup

- Inspect pump, high-pressure tubing, connections, and valves for leakage. Correct any problems before starting the pump.
- Check the oil level in the pump.
- Check the main electrical disconnect for "Out of Service" tags and check all around the equipment for indications of maintenance work in process.

After startup

- Listen for unusual sounds as the pump starts and water pressure increases. Inspect for leaks.
- Check the inlet water pressure gauges. If the pressure differential between the pre-filter and post-filter inlet water (shown on the pressure gauges) exceeds 30 psi (2.1 bar) the filters are clogging and the filter elements must be changed.

End of shift

- Inspect and clean machine work area

Mandatory maintenance schedules

At fixed intervals for the life of the pump, you must perform a mandatory maintenance kit installation.

For all HyPlex Prime pumps (except the standalone version), the Service information feature in FlowCUT is factory-set to remind the operator 10 hours before the next required maintenance hour mark (these are listed below).

Maintenance periods by pump hours

Every 500 hours for a 30 hp pump and every 300 hours for a 50 hp pump you must install a maintenance kit.

- Complete kit bills of material are in Chapter 5
- Complete kit installation procedures are in Chapter 4

30 hp HyPlex Prime maintenance schedule

Hourly Interval	Kit	Service procedures					
500	Dynamic Seal	Replace UHP seal & rod seal	Lap inlet check valve components				
1000	Minor Maintenance	Replace UHP seal & rod seal	Lap inlet check valve components	Replace outlet check valve components	Replace filler tube sleeve	Service subplate adapter	Change PCV poppet & seat
1500	Major Maintenance	Replace UHP seal & rod seal	Replace all check valve components	Replace UHP cylinder	Replace UHP seal carrier	Service subplate adapter	Change PCV poppet & seat
2000	Dynamic Seal	Replace UHP seal & rod seal	Lap inlet check valve components				
2500	Minor Maintenance	Replace UHP seal & rod seal	Lap inlet check valve components	Replace outlet check valve components	Replace filler tube sleeve	Service subplate adapter	Change PCV poppet & seat
3000	Major Maintenance	Replace UHP seal & rod seal	Replace all check valve components	Replace UHP cylinder	Replace UHP seal carrier	Service subplate adapter	Change PCV poppet & seat
	PCV	Replace PCV plunger	Replace bearing assembly & seals				
3500	Dynamic Seal	Replace UHP seal & rod seal	Lap inlet check valve components				
4000	Minor Maintenance	Replace UHP seal & rod seal	Lap inlet check valve components	Replace outlet check valve components	Replace filler tube sleeve	Service subplate adapter	Change PCV poppet & seat
4500	Major Maintenance	Replace UHP seal & rod seal	Replace all check valve components	Replace UHP cylinder	Replace UHP seal carrier	Service subplate adapter	Change PCV poppet & seat

At fixed intervals for the life of the pump, you must perform a mandatory maintenance kit installation.

For all HyPlex Prime pumps (except the standalone version), the Service information feature in FlowCUT is factory-set to remind the operator 10 hours before the next required maintenance hour mark.

50 hp HyPlex Prime maintenance schedule

Hourly Interval	Kit	Service procedures					
300	Dynamic Seal	Replace UHP seal & rod seal	Lap inlet check valve components				
600	Minor Maintenance	Replace UHP seal & rod seal	Lap inlet check valve components	Replace outlet check valve components	Replace filler tube sleeve	Service subplate adapter	Change PCV poppet & seat
900	Major Maintenance	Replace UHP seal & rod seal	Replace all check valve components	Replace UHP cylinder	Replace UHP seal carrier	Service subplate adapter	Change PCV poppet & seat
1200	Dynamic Seal	Replace UHP seal & rod seal	Lap inlet check valve components				
1500	Minor Maintenance	Replace UHP seal & rod seal	Lap inlet check valve components	Replace outlet check valve components	Replace filler tube sleeve	Service subplate adapter	Change PCV poppet & seat
1800	Major Maintenance	Replace UHP seal & rod seal	Replace all check valve components	Replace UHP cylinder	Replace UHP seal carrier	Service subplate adapter	Change PCV poppet & seat
	PCV	Replace PCV plunger	Replace bearing assembly & seals				
2100	Dynamic Seal	Replace UHP seal & rod seal	Lap inlet check valve components				
2400	Minor Maintenance	Replace UHP seal & rod seal	Lap inlet check valve components	Replace outlet check valve components	Replace filler tube sleeve	Service subplate adapter	Change PCV poppet & seat
2700	Major Maintenance	Replace UHP seal & rod seal	Replace all check valve components	Replace UHP cylinder	Replace UHP seal carrier	Service subplate adapter	Change PCV poppet & seat

At fixed intervals for the life of the pump, you must perform a mandatory maintenance kit installation.

For all HyPlex Prime pumps (except the standalone version), the Service information feature in FlowCUT is factory-set to remind the operator 10 hours before the next required maintenance hour mark.

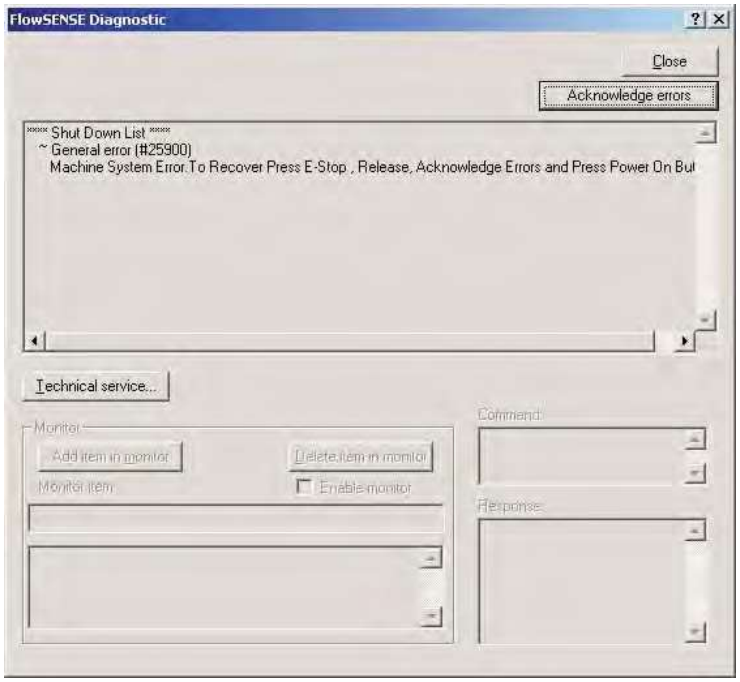
Troubleshooting the HyPlex Prime Premium pump using FlowSENSE

FlowSENSE is only available for the Premium package.

HyPlex Prime Premium pumps are continuously monitored by FlowSENSE, a diagnostic program that monitors a number of system conditions, some of which are specific to pump conditions. Sensors located on the pump enable FlowSENSE to alert the operator of pump conditions that will require attention. To indicate a warning, the positional indicator on the FlowCUT *Run Machine* screen will blink. If a shutdown condition exists, a dialog box will appear on the machine console display.

To investigate the cause for the of the fault, and how it can be corrected, select **Advanced | FlowSENSE diagnostic** in the FlowCUT menu bar. Errors and warnings are indicated in the window.

More information about using the FlowSENSE Diagnostic functionality can be found in FlowCUT integrated help.



FlowSENSE diagnostic codes

FlowSENSE is only available for the Premium package.

The tables below list all shutdown and warning codes for the HyPlex Prime that may appear on the system display (or console display if a standalone pump). Likely causes and possible solutions to those causes are included after each code description.

FlowSENSE shutdown codes

27203 Low inlet water pressure shutdown	
• Water supply valve(s) closed • Inlet water pressure low (< 15 psi [1.03 bar]) • Dirty water filters	Check the water supply cut off, and make sure the water supply valve (when supplied) is in the correct position. Remove and check the water filter cartridges; replace if dirty.
Faulty cable coming from the multi-port box	Inspect the cable assembly at the multi-port box. Replace if necessary.
27206 Motor overload shutdown	
Overload setting is lower than specified in the electrical schematic drawing.	Call Flow Technical Service.
27201 Pump is in E-Stop condition shutdown	
Machine (M4c or M2c) is in E-stop condition	Follow proper E-stop reset procedure (M4c or M2c).
Problem with safety network	Call Flow Technical Service.
27202 Motor starter shutdown	
Main circuit breaker has tripped	Reset circuit breaker.
• Faulty soft starter • Faulty isolation contactor	Call Flow Technical Service.

FlowSense warning codes

27255 Inlet water high temperature warning	
• Water inlet above 70°F (21°C) • Dynamic seal(s) may be damaged	Check inlet water temperature to make sure it is below 70°F.
	Install a Minor Maintenance Kit.
Faulty cable coming from the multi-port box	Inspect the cable assembly at the multi-port box. Refer to electrical schematic. Replace if necessary.
27257 Analog input out of range warning	
Thermistor cables disconnected	Make sure the cables are connected.
Faulty thermistor(s)	Run the Temperature Input Offset Adjustment Routine. If warning persists, replace thermistors if suspected.
Faulty analog input module	Call Flow Technical Service.
Faulty pump health board	

27253 Cylinder overtemp warning	
• Dynamic seal starting to fail • Cracked dynamic seal carrier • Damaged plunger • Debris under or failed inlet poppet • Cracked check body • Cracked UHP cylinder	• Check pump hours, and install the appropriate required maintenance kit. • Disassemble pump and inspect all components as per maintenance procedures in this manual. Repair/replace as required.
Temperature sensor offset adjustment routine has not been run on new pump.	Run Temperature Input Offset Adjustment Routine.
Faulty thermistors or poor cable connection.	Inspect sensors and cables. Replace if necessary.
27258 Crankcase overtemp warning	
Low oil level	Add oil to crankcase.
Problems in crankshaft/rotating group	Contact Flow Technical Service.
Faulty cable coming from the multi-port box	Inspect the cable assembly (A-26009-1) at the multi-port box. Replace if necessary.
27251 Overpressure warning	
Debris in PCV poppet seat	Remove PCV and clean poppet/seat to remove debris. Replace poppet/seat if required. **Note:** Debris in the seal can also cause an underpressure problem.
Control air pressure to PCV set too high	Run the Pump Pressure Control System calibration routine. **Note:** Max. pressure for PCV is 70 psi (4.82 bar).
Damaged PCV piston	Repair/replace piston and/or piston seals.
UHP transmitter-related problem	Inspect the UHP sensor cable assembly at the multi-port box. Replace if necessary.
27254 Pump health warning	
One of the high-pressure cylinders is no longer producing pressure	Immediate service is required (dynamic seals and/or check valves).
Debris under or failed outlet poppet/seat in check valve assembly	Disassemble pump and inspect all components, paying special attention to the check valve outlet poppet area. Follow the maintenance procedures in this manual to repair or replace parts as required.
27252 Pressure calbration is in process	
	• Pressure calibration routine has been initiated by operator
27256 Temperature sensor calibration is in process.	
	• Temperature sensor offset adjustment routine has been initiated either by operator • Pump has not been started for more than 2 hours (automatic temp. sensor cal. routine)

Troubleshooting the high-pressure components

You may experience conditions that are explained in the troubleshooting table that begins on the next page. To supplement the table, also refer to the color troubleshooting illustration in this chapter.

Unless otherwise specified, service procedures are located in *Installing the minor maintenance kit* or *Installing the major maintenance kit*, located in this chapter.

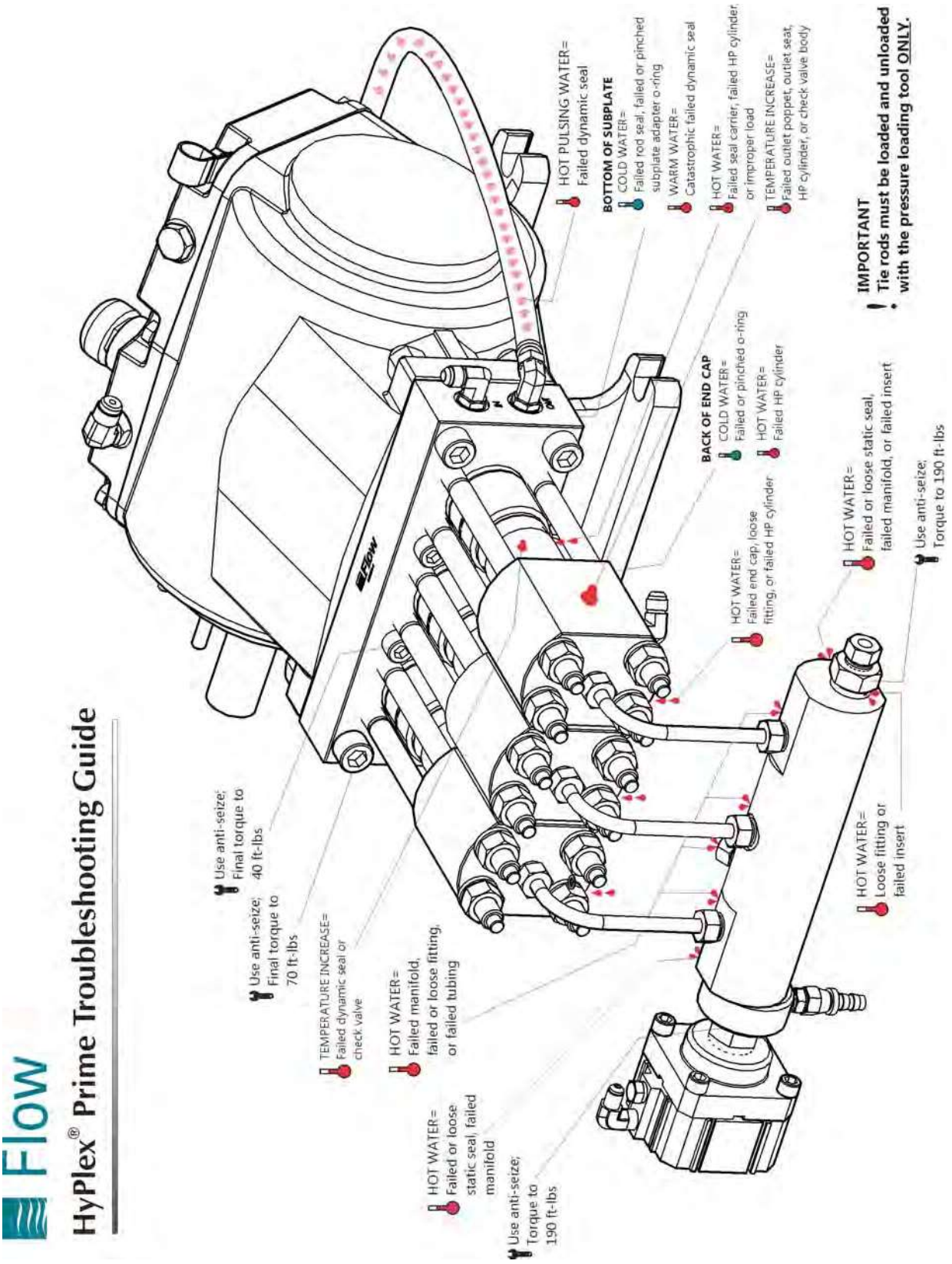
Additional troubleshooting tips

The following tips have been helpful in isolating less common system malfunctions and in correcting problems quickly.

- Listen to the machine and watch it operate. Learn to recognize the normal noises, temperature, and operating conditions. This will increase your ability to notice any unusual machine behavior.
- Keep a record of all service performed on the equipment. This will provide valuable information to help you stock spare parts and schedule maintenance.

Weep holes

Weep holes provide an outlet for high-pressure water in case of seal problems, and thus can help you identify problems with the pump.



Troubleshooting table

Refer to the illustrated HyPlex Prime troubleshooting guide. If you have questions about anything on the troubleshooting table, contact Flow Technical Service.

My pump is leaking oil.		
Note: Some degree of oil leakage is normal. If oil leakage appears to be excessive:		
	Seals are worn and require replacement.	Install a Major Maintenance Kit.
	Seals were installed without proper assembly tools.	
	Piston rod seals are worn.	Replace piston rod seal assembly.
My pump is leaking water.		
CAUTION: Make sure the system is turned off and bled-down before servicing.		
	High-pressure water leaks.	Refer to the illustrated troubleshooting guide located at the beginning of this section.
	Low-pressure water leaks.	Tighten fittings or replace o-rings.
My pump is vibrating and/or noisy.		
By nature, pumps vibrate and make noise. If you think the vibration/noise is excessive, check the following:		
	No anti-vibration mat.	Use or replace anti-vibration mat.
	Improper belt tension or failed belt(s).	Adjust or replace belts to proper tension (see section *Tensioning and aligning the belt drive*).
	UHP seal or check valve failure.	Replace components as necessary.
	Crankcase failure.	Replace crankcase.
	Loss of electrical power leg; or the motor is spinning backwards.	Call a certified electrician.
My pump does not build the pressure I expect.		
My pump does not cut at 60 ksi.	The maximum cutting pressure of the pump is 55,000 psi. The maximum output pressure has the potential to reach 60,000 psi.	
My pump does not produce the pressure requested from FlowMaster.	Belts are slipping or failed (broken/stretched).	• Replace failed set of belts (4) • Check or adjust belt tension using the supplied tension gauge • Check and/or replace pulley • Check torque on pulley bolts
	UHP orifice is incorrectly sized or damaged (or too many orifices of a smaller size are being used).	Replace with correctly-sized orifice(s) (see *Specifications*).
	Insufficient operator-supplied air pressure.	• Check air source (compressor) • Check hoses and fittings for leaks

My pump does not produce the pressure requested from FlowMaster (continued).	Insufficient water pressure or volume from operator supply.	• Check water source (flow rate and pressure; filtration system) • Check hoses and fittings for leaks/kinks
	Failed inlet check valve (damaged surfaces, erosion, debris, etc.).	• Rebuild per service procedure • Replace check valve assembly
	Failed outlet check valve (damaged surfaces, erosion, debris, etc.).	• Rebuild per service procedure • Replace check valve assembly
	Failed check valve body (damaged seating surface, cracked indentations from debris).	Replace check valve body.
	Failed UHP seal.	May be an indication of a failed plunger, improper tie rod loading, elevated inlet water temperature, or lack of cooling water (clogged cooling ports). • Inspect seal carrier and plungers (replace as necessary) • Replace dynamic seal and rod seal
	Leaking UHP cylinder.	• Inspect for cracks • Inspect seal carrier and check valve body contact surfaces for spalling, erosion, or damage. Replace as necessary. • Replace the cylinder
	Failed UHP tubing and connections.	• Check gland for proper torque • Check collar position • Check tubing or fitting for cracks. Replace as necessary. • Check for deformed cone on tubing (may indicate over-torque). Replace tubing as necessary.
	Failed on/off valve.	• Install on/off valve service kit • Replace on/off valve body
	Clogged inlet water filters.	Replace filters (see section *Changing the filter elements*).
	Mis-installed subplate adapter rod seal.	Re-install rod seal properly.
	Loose wiring connection to the air proportional control valve.	Check and tighten connections.
	Failed or loose connection on the UHP transmitter.	
	Failed or improperly calibrated UHP pressure gauge.	Replace gauge or transmitter (the gauge transmitter cannot be re-calibrated).
	Excessive length of tubing between pump and pressure gauge.	Call Flow Technical Service.
	Failed air proportional control valve.	Replace air proportional control valve.

My pump does not produce the pressure requested from FlowMaster (continued).	Failed or improperly set air relief valve.	Replace air relief valve.
	Loose fittings or failed hose for low-pressure water.	Tighten fittings or replace hose.
	Improper pulley ratio for power frequency.	Verify required pulley sizes for input power (see *Interface illustrations* for part numbers).
	Missing 3-phase power leg.	Call a certified electrician.
	Incorrect version of computer code (specifically FlowMaster).	Call Flow Technical Service for correct revision number and install correct version.
	Worn PCV poppet and seat.	Install PCV maintenance kit (see section *Installing the pressure control valve maintenance kit*).
	Debris in PCV poppet and seat.	• Clean or remove debris, check for damage of poppet and seat • Ensure proper plumbing of the PCV drain line
	Incorrect motor rotation.	• Verify and ensure proper rotation • Call a certified electrician to swap polarity on motor
	Inlet water supply valve or solenoid failure (or loose wires).	• Replace valve • Tighten wire fittings • Check breaker inside electrical control box
	2-way air valve failure or loose wiring.	
	2-way air valve override switch is improperly positioned.	Position the override switch to "automatic" mode.
My UHP pressure display is not stable.		
A signal fluctuation greater than 5000 psi indicates:		
Slow movement	PCV poppet/seat damaged.	Install PCV maintenance kit (see section *Installing the pressure control valve maintenance kit*).
Rapid movement	Check valve is damaged or debris is present.	• Rebuild per service procedure • Replace check valve assembly
	Cutting orifice is too large or damaged.	Replace with correctly-sized orifice (see section *Changing the orifice* in your cutting head manual).
	UHP check valve components are damaged or require maintenance.	Install a Minor or Major Maintenance Kit.

My UHP pressure seems to change depending on the state of the on/off valve (whether it's on or off).		
Some degree of pressure change (2000-3000 psi [138-207 bar]) with the switching of the on/off valve is normal.		
My pump does not start.		
	Pump not wired.	• Check that operator-supplied service disconnect is on and all fuses are properly sized and functional • Check that the motor starter disconnect is turned on • Check for loose wiring. Call a certified electrician.
	Tripped circuit breaker in control box.	Call Flow Technical Service.
My pump starts but immediately shuts down.		
	Crankcase oil temperature too high (can be validated through FlowMaster Advanced Diagnostics).	• Ensure proper oil level • Verify electrical sensor is functioning properly and replace if necessary • Replace crankcase if all other options have been exhausted
	Low inlet water pressure.	• Validate proper operation of inlet solenoid, pressure gauges and switches; replace if necessary • Verify adequate operator-supplied water source • Check fuses
	Motor overload shutdown has been tripped.	Check with a certified electrician.
My inlet water gauges are not reading pressure.		
	Operator-supplied water not on, or supply pressure is insufficient.	Turn water on, inspect water supply pressure.
	Failed inlet pressure gauges or gauge snubbing orifices are clogged.	Replace gauges or clean snubbing orifices.
	Inlet solenoid valve not opening.	• Verify that an open signal is sent to the valve • Check wiring and tighten or replace • Check fuses
	Kinked or obstructed gauge line.	Re-position the line or replace if damaged.

My pump's inlet water filters are clogging too quickly.		
	Missing (or clogged) operator-supplied 5 micron inlet water pre-filter.	Install or replace the pre-filter.
	Improper inlet water plumbing material (use of iron or galvanized steel).	Call Flow Technical Service.
	Use of alternate filter vendor (non-Flow).	Flow recommends purchasing components from Flow International Corporation to ensure part quality and safety.
	Recent upstream water supply maintenance or change of municipal supply.	Call Flow Technical Service.
	Filter element order is reversed.	Correct the order of the filters. The correct filter element order is indicated by labels on the pump frame.
My pump seems to be running hotter than previously		
	Failed inlet check valve.	Install a Minor or Major Maintenance Kit.
	Failed outlet check valve.	
	Failed UHP seal.	
	Low oil level in crankcase.	Add or replace oil with correct oil (see *Specifications* section).
	Bad or old oil in crankcase.	
	Blocked or kinked cooling water hose.	Re-position hose or replace if damaged.
	Air temperature is above specified limit.	Call Flow Technical Service.
My pump's UHP tubing is failing quickly		
Note: Tubing failures occur more frequently with age.		
	Use of alternate tubing vendor (non-Flow).	Flow recommends purchasing components from Flow International Corporation to ensure part quality and safety.
	Use of incorrect pressure-rated tubing.	
	Frequency of low-pressure pierces will shorten tubing life.	Call Flow Technical Service.
	UHP tubing length is causing "standing pressure spikes."	

My UHP component life is excessively short.		
CAUTION: It is expected that you have followed all recommended service and maintenance procedures. All parts of kits should be installed at the same time - do not replace components/positions individually.		
It is expected that all utility and installation requirements have been met. **Common causes for prematurely short component life include:** • Poor inlet water quality • Low inlet water pressure • Improperly plumbed PCV drain line • Improperly loaded tie rod		
UHP seal	Worn or damaged UHP plungers.	Install a Minor or Major Maintenance Kit.
	Worn or damaged check valve assembly.	
	Worn or damaged seal carrier.	
	Inlet water temperature too high or too low.	Call Flow Technical Service.
	Incorrect seal installation.	Re-install seals (refer to drawings at the end of the manual).
UHP seal carrier	Worn or damaged UHP plungers.	Install a Minor or Major Maintenance Kit.
	Incorrect seal installation.	
	Cooling ports clogged; insufficient cooling water flow.	Clean cooling ports. Inspect water filters and user-supplied water pressure.
Inlet check valve	Improperly lapped components.	Lap components (see *Lap the inlet face of the inlet check valve*).
	Inlet poppet pinched.	Install a Minor or Major Maintenance Kit.
	Broken spring.	
	Filler tube or sleeve worn out.	
	Improper use of lubricants on check valve surfaces.	Clean and re-install the check valve with the proper amount of lubrication (see section *Assemble the check valve).*
	Debris/dirt between poppet and seat.	Clean out debris; inspect poppet and seat for damage. Install Minor or Major Maintenance Kit if necessary.
Outlet check valve	Broken spring.	Clean out debris; inspect poppet and seat for damage. Install Minor or Major Maintenance Kit if necessary.
	Debris/dirt between poppet and seat.	
UHP plunger	Worn or damaged seal carrier.	Install Major Maintenance Kit.
	Incorrect seal installation (seal reversed).	
	Cooling ports clogged; insufficient cooling water flow in subplate adapter and seal carrier.	Clean cooling ports, inspect water filters and operator-supplied water pressure.

Notes

CHAPTER 4

Service

Servicing the high-pressure pump

The step-by-step instructions and illustrations in the service procedures will help you service the equipment. There are required service procedures that must be done at specific intervals; these and other procedures for replacing parts are located in this chapter.

Service tips & notes

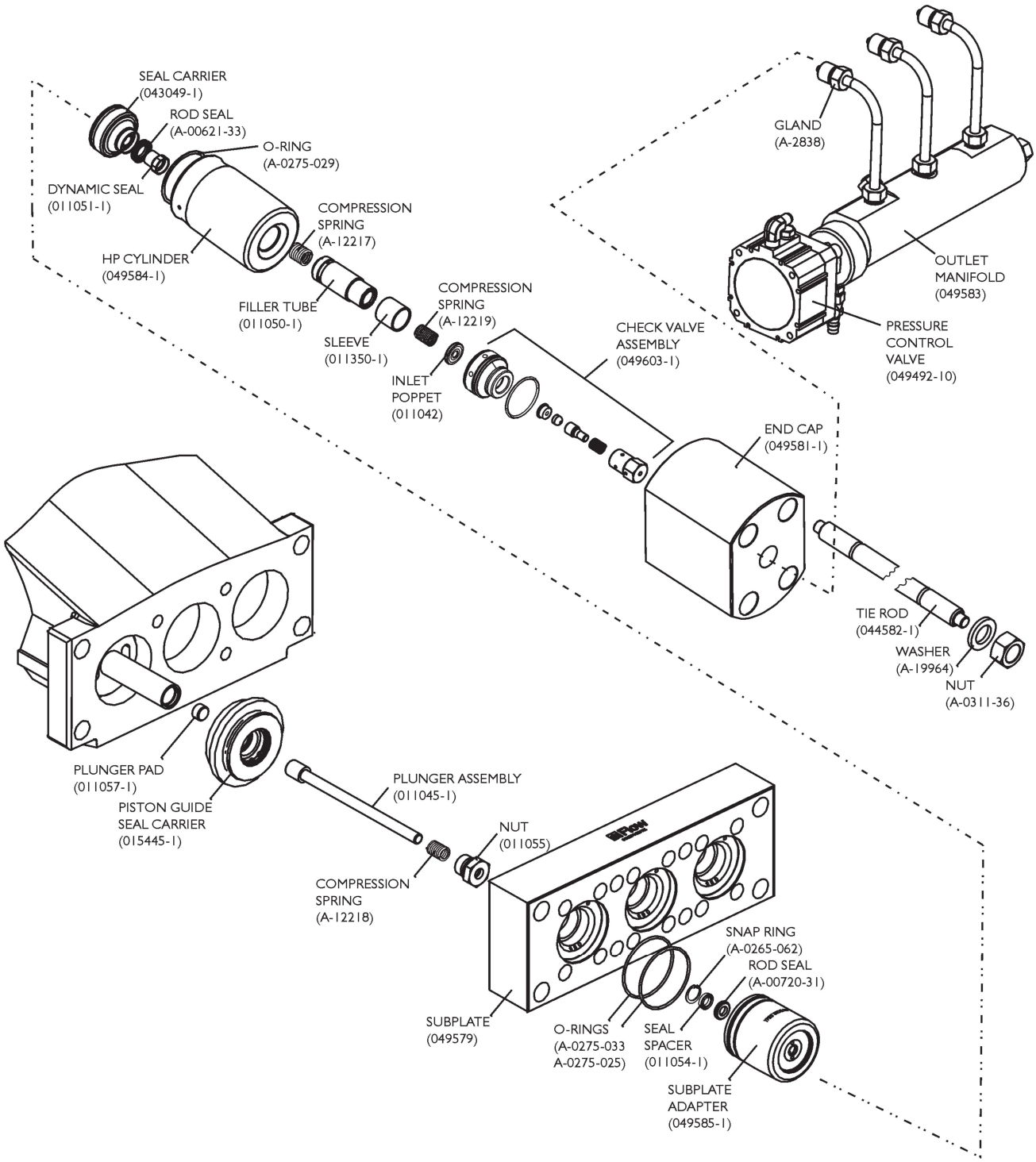
Review the safety precautions in Chapter 2 and the maintenance tips in this chapter before starting any work. If you have questions about any service, contact Flow Technical Service.

- Inspect the equipment every day before operating it.
- Read and thoroughly understand each service procedure before starting the work.
- Maintain records of service performed. This will provide valuable information to help you stock spare parts and avoid suprise repairs.
- Do not use a substitute for the fluids, sealants, and lubricants recommended by FLOW. All threaded high-pressure connections require an even coating of Blue Lubricant (A-2185).
- Routinely check for loose bolts or wire connections.
- Handle critical parts with care and avoid scratching or denting the high-pressure water system components.
- Protect all machined and lapped mating surfaces against nicks, scratches, and burrs.
- Monitor water seepage from end cap weep holes.
- All parts that contain high-pressure water (cylinder, check valve housing, tubing) are susceptible to stress fatigue accelerated by nicks, scratches, or other surface disruptions. Replace the damaged components.
- Life expectancy of high-pressure water seals and other high-pressure parts is related to stress on the parts, and is a function of stroke rate, water pressure, and inlet water temperature. Exceeding pump ratings can lead to increased costs and downtime.

Clean environment

- Keeping components clean is critical. Make every effort to find a clean area to service the components—do not tear down parts in the same area where cleaning is taking place. Airborne dirt and abrasive have serious detrimental effects on part life.
- Carefully clean and blow compressed air on parts being reassembled. Do not use paper towels. Do not create airborne dust.
- Clean all parts with fresh, clean solvent that does not leave a residue, such as Citra-safe® or isopropyl alcohol. FLOW recommends that you set up a dedicated solvent tank for these critical parts. Contamination from other industrial parts will seriously reduce part life.

High-pressure components



Using the pressure loading tool

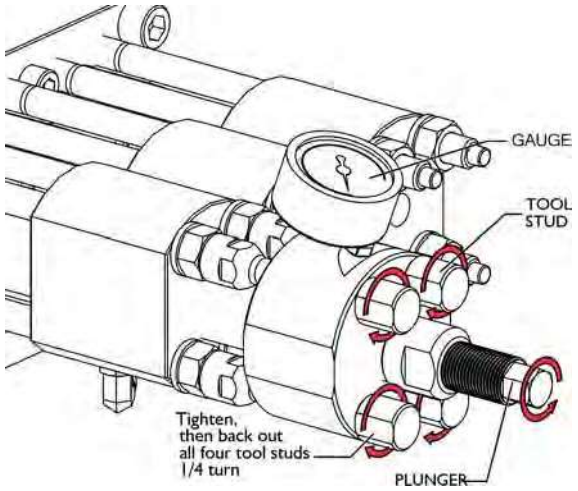
The pressure loading tool is used to accurately load and unload the tie rods on the HyPlex Prime pump. Follow these instructions to prevent damage to the tie rods, high-pressure seals, or cylinders.

CAUTION
Do not use a torque wrench to attempt to tighten the tie rod nuts. No methods other than those described in this section may be used to load the tie rods.

Unloading the tie rods

1. Rotate the threaded pressure loading tool plunger counter-clockwise until it stops to ensure it is fully retracted. Install the pressure loading tool onto the tie rods by running the tool studs onto the exposed threads of the tie rods.

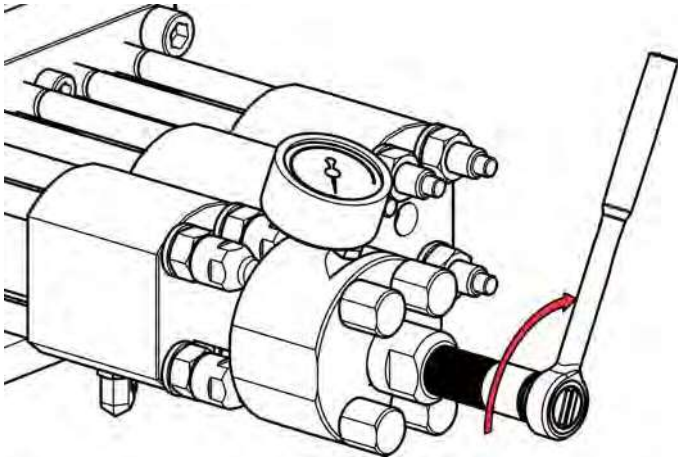
   When tightening, alternate between opposite studs to avoid binding. Tighten the tool studs firmly in order to seat the tool piston fully into the tool body, and against the end cap as shown below.



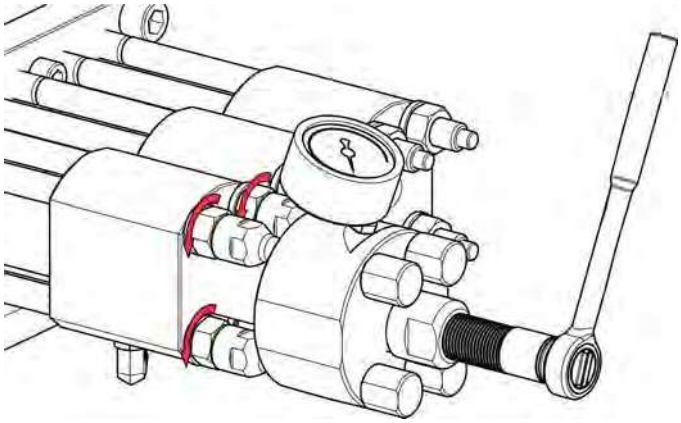
   Note: The threaded plunger of the pressure loading tool must be backed to the stop in order to fully seat the piston within the cylinder.

2. Back out the four tool studs 1/4 turn. This allows for easy removal of the loading tool after unloading is complete.

3. Use a 19 mm (3/4 in.) socket and ratchet to rotate the tool plunger clockwise until a value of 1500 bar gauge pressure is reached.



4. Loosen the four primary hex nuts two full turns. Use a 24 mm (15/16 in.) combination wrench if needed.



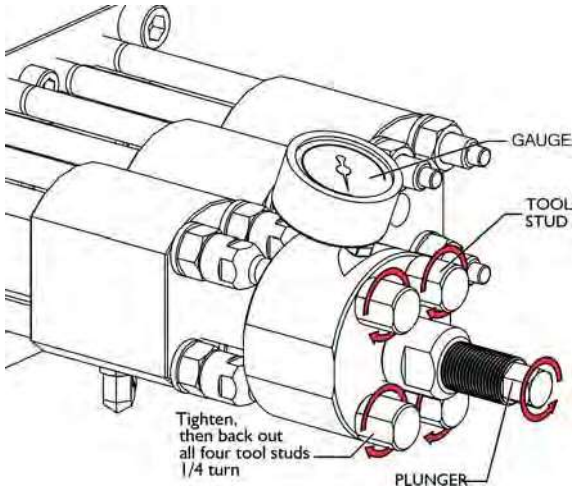
5. Use a 19 mm (3/4 in.) socket and ratchet to rotate the tool plunger counter-clockwise until the gauge pressure reads 0 bar. Rotate the threaded tool plunger until it is fully retracted.
6. Back out all four of the tool studs to remove the tool from the tie rods.

   Note: Alternate between opposite studs to avoid binding. Use a 22 mm (7/8 in.) combination wrench if needed.
7. Repeat Steps 1–6 for the remaining pump positions.

Loading the tie rods

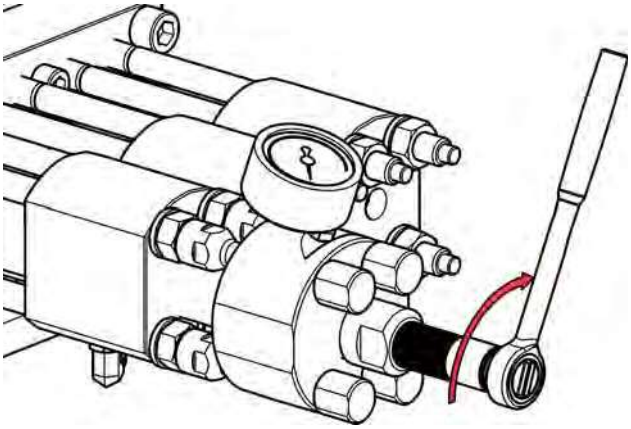
1. Rotate the threaded pressure loading tool plunger counter-clockwise until it stops to ensure it is fully retracted. Install the pressure loading tool onto the tie rods by running down the tool studs onto the exposed threads of the tie rods.

   When tightening, alternate between opposite studs to avoid binding. Tighten the tool studs firmly in order to seat the tool piston fully into the tool body, and against the end cap as shown below.

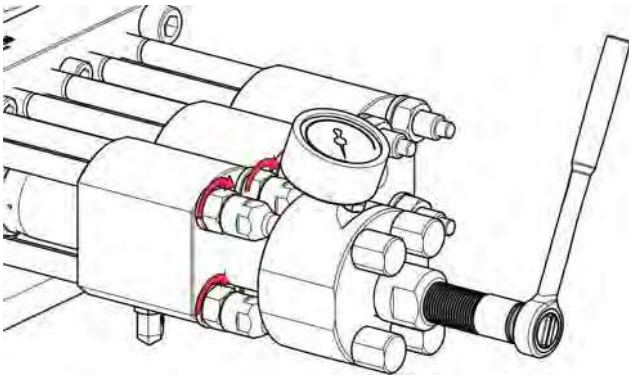


   Note: The plunger of the pressure loading tool must be backed to the stop in order to fully seat the piston within the cylinder.

2. Use a 19 mm (3/4 in.) socket and ratchet to rotate the tool plunger clockwise until a value of 1500 bar gauge pressure is reached.



3. Run the primary nuts of the pump down by hand until firmly seated against the end caps. These nuts must be fully bottomed-out against the washers/end caps.



   Note: Do not use wrenches when running the primary nuts down.

4. Use the socket wrench to remove pressure from the tool. The gauge will read 0 bar when pressure has been removed.
5. Back out all four of the tool studs to remove the tool from the tie rods.

   Note: When loosening, alternate between opposite studs to avoid binding.

6. Repeat steps 1 through 5 for the remaining pump positions.

Installing the Dynamic Seal Maintenance kit

Use this procedure when installing the Dynamic Seal Maintenance kit on your HyPlex Prime pump.

Tools

- Pressure loading tool assembly, 049512-1
- Combination wrenches (14–32 mm)
- ½ in. drive socket set (14–32 mm)
- ½ in. torque wrench (0–100 ft-lb)
- Screwdriver set

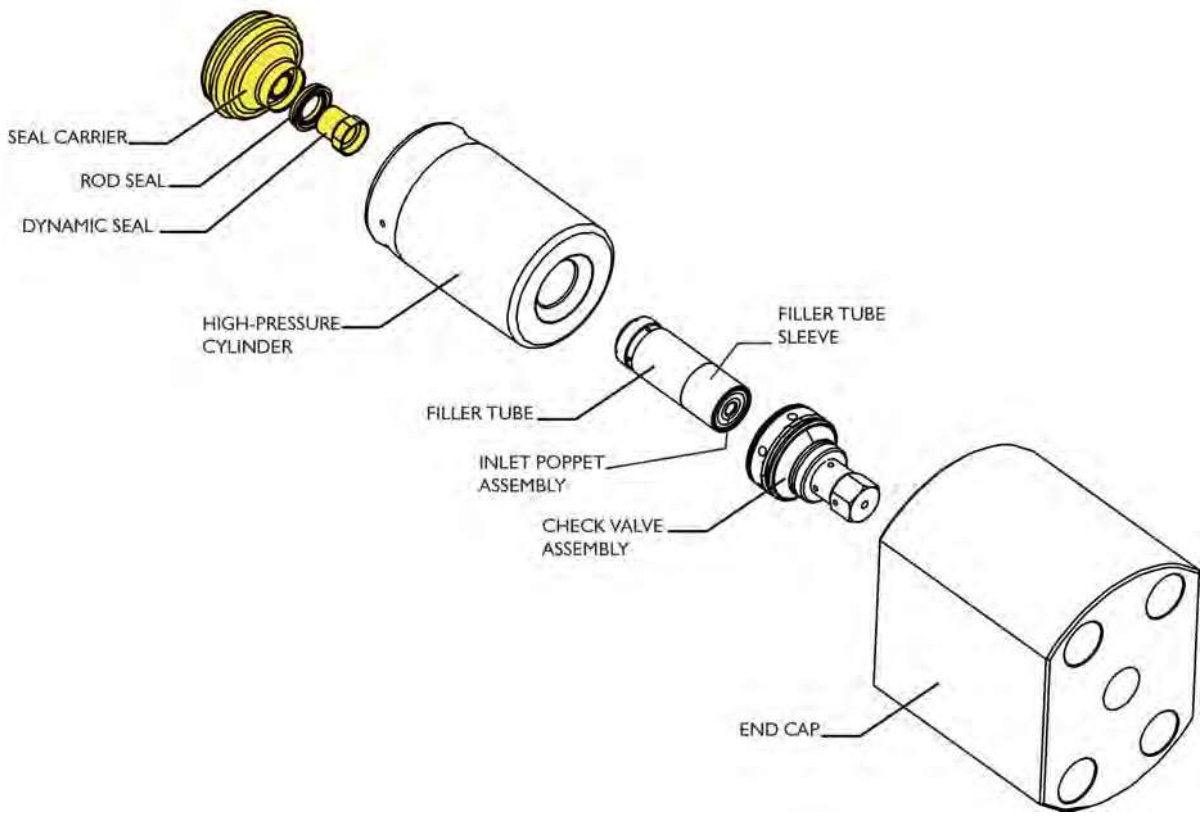
Maintenance kit

- Dynamic Seal Maintenance kit, 050626-1

Service notes

- All parts of the kit should be installed at the same time - do not replace components individually.
- All components should be clean and free of debris prior to assembly. Keeping the work area clean is important while working on the equipment.
- Read the entire procedure before beginning service, paying particular attention to safety instructions.

CAUTION
Failure to follow these step-by-step instructions and the procedures in your service manual could result in premature failure or damage to the equipment.



Disassembly

1. Push in the E-stop.

WARNING
Place the main electrical disconnect OFF and bleed down all high-pressure lines. Place an "Out of Service" tag on the main electrical disconnect and lock it out. Failure to do so may result in equipment damage or injury to personnel.

2. Disconnect all high-pressure and low-pressure interface connections to access the tie rods. Place the manifold and PCV assembly combination aside.
3. Use the pressure loading tool to unload the tie rods (see *Unloading the tie rods* on Page 43).

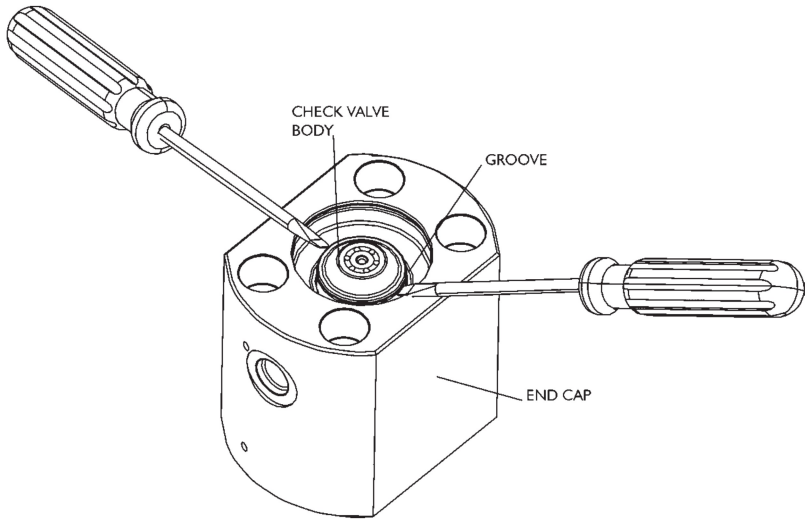
For each of the three high-pressure cylinders

4. Remove the end cap, high-pressure cylinder, inlet poppet, springs, filler tube, and sleeve.
5. Slide the dynamic seal carrier off the plunger if it did not come out with the high-pressure cylinder. Remove and discard the dynamic seal and rod seal.

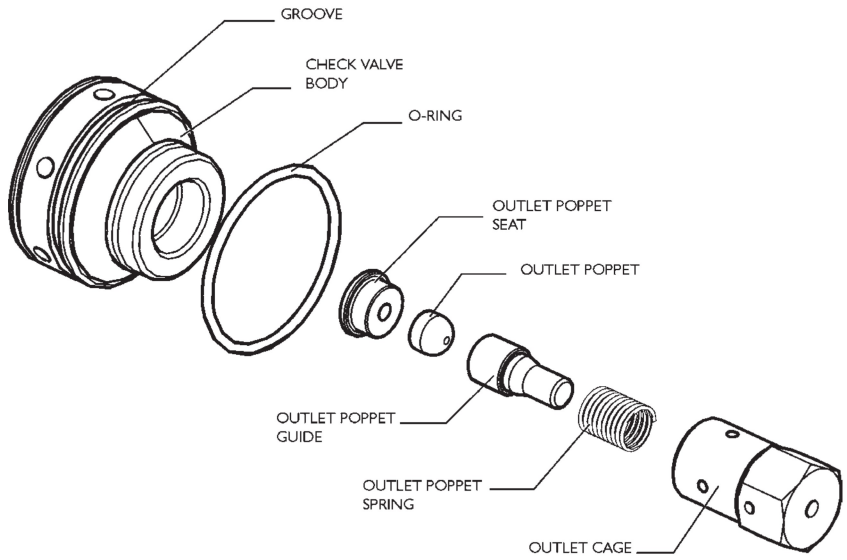
CAUTION
Use care when removing the dynamic seal and rod seal. Do not scratch or nick the seal carrier bores.

6. Place the end cap vertically on a work bench with the check valve end up.
7. Remove the check valve assembly from the end caps by using two flat screwdrivers in the circumferential groove in the OD of the check valve body. Take care not to damage the body or end cap. Remove the o-ring from the check valve assembly.
8. Place the check valve body in the provided rebuild clamp.

   Note: Do not cover the holes on the outer circumference of the check valve body to prevent metal from being introduced into the opening.



9. Loosen and remove the outlet cage.
10. Remove the outlet poppet, outlet poppet spring, outlet poppet guide, and outlet poppet seat. Place these items to the side.



Note: It is important to lap the check valve body with the outlet poppet and seat removed to prevent contamination when lapping.

Lap inlet face of check valve body and inlet poppet

11. Use the glass lapping plate from the tool kit and 320 grit lapping paper from the repair kit.
12. Lightly wet the paper with water. Place the inlet face of the check valve body against the lapping paper. With a light downward pressure, lap the body in a figure 8 pattern.

CAUTION
Be very careful not to rock the check valve body while lapping the surface—flatness is very critical.

After 10-12 laps, rotate the check valve body 45° and repeat until the surface has a smooth matte finish free of deformation from the inlet poppet.

13. Lap the inlet check valve poppet in same method.
14. Thoroughly clean the check valve body openings and inlet poppet to remove particles from the lapping process.

Installation and reassembly

Assemble the check valve

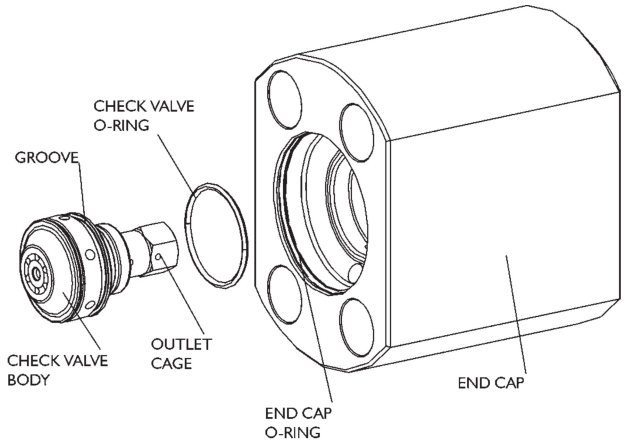
1. Insert the new outlet poppet into the new outlet poppet guide.

   Note: Install poppet into the outlet poppet guide as shown, with the radiused back of the outlet poppet going in first. The counterbore in the outlet poppet is visible after installation

2. Place the new outlet poppet spring around the guide. The spring should be loose on the guide.
3. Place the assembly into the outlet cage along with the outlet poppet seat.
4. Hold the outlet cage assembly (threaded end of the outlet cage facing up), so that the installed components will not fall out. Apply a thin film of Blue Lubricant to the threads of the outlet cage.
5. Carefully thread the check valve body onto the outlet cage assembly.
6. Secure the check valve body in the rebuild clamp with the inlet face downward.
7. Secure the rebuild clamp in a vise. Torque the outlet cage to 30 ft-lb (41 N-m).

Repeat Steps 1–7 for the remaining check valves.

Assemble the end cap



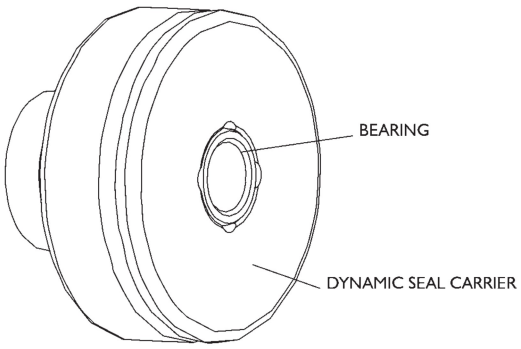
1. Lightly lubricate the check valve o-ring with o-ring lube and install it into the groove on the check valve body
2. Lightly lubricate the end cap o-ring with o-ring lube and install it into the groove on the inner diameter of the end cap.
3. With the outlet cage facing the end cap, insert the check valve body into the end cap.

Repeat for the remaining end caps.

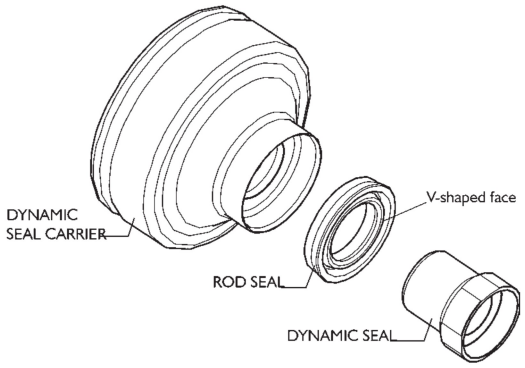
Assemble and install the dynamic seal carrier

1. Inspect the dynamic seal carrier for cleanliness. Make sure the guide bearing of the seal carrier is flush with the face of the carrier and is in good condition (the presence of cracked or loose pieces is reason for replacement).

   Replace the dynamic seal carrier if necessary. Clean as necessary.



2. Install the new rod seal as shown, with the v-shape groove facing up, away from the dynamic seal carrier.



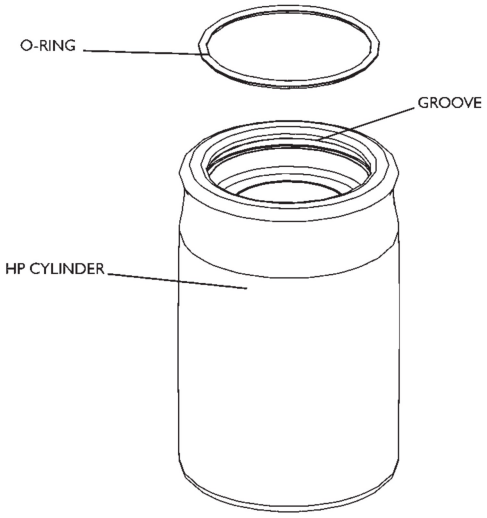
3. Install the new dynamic seal into the inner diameter of the rod seal, making sure the dynamic seal is fully seated against the dynamic seal carrier.

   Note: Make sure the plungers are clean and free of any damage or scratches before installing the dynamic seal carriers. The subplate adapter/seal carrier interface must be clean and free of debris.

4. Slide the dynamic seal carrier onto the plungers until seated against the register of the subplate adapter.

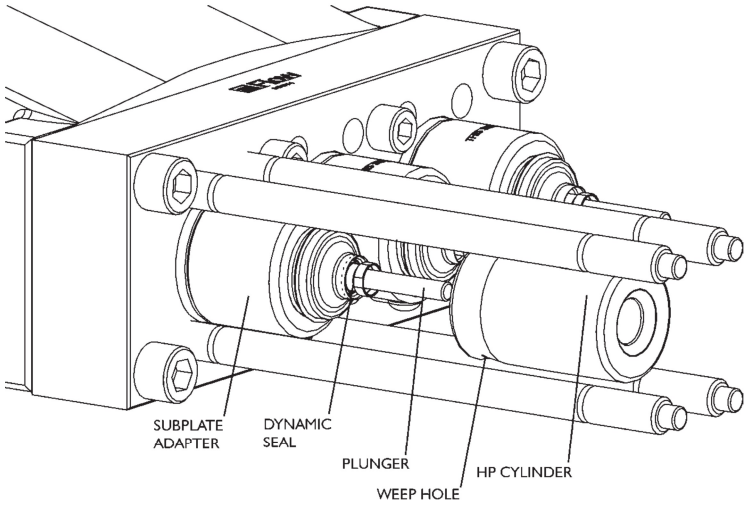
Install the high-pressure cylinder

1. Lubricate the o-ring with o-ring lube and place it in the groove of the high-pressure cylinder.



2. Slide the high-pressure cylinder over the plunger assembly and seat it against the seal carrier. Position the cylinders with weep holes facing downward.

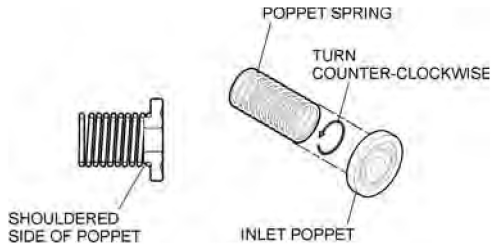
   Note: A small amount of force may be needed to seat the cylinder against the seal carrier.



Repeat for the remaining high-pressure cylinders.

Assemble the inlet poppet

1. Place the inlet poppet spring over the shouldered side of the inlet poppet.



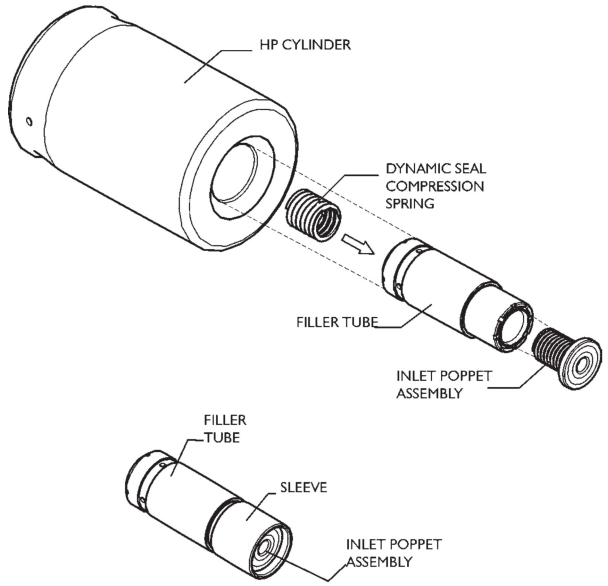
2. Apply pressure to the spring and rotate counter-clockwise until it snaps into place. Be sure the spring is firmly attached.

Repeat for remaining inlet poppets.

Assemble the filler tube

1. Place the dynamic seal compression spring into the tapered end of the filler tube.
2. Insert the inlet poppet assembly into the filler tube, spring end first.
3. Partially install the filler tube sleeve so that it surrounds the inlet poppet and spring.

   Note: The filler tube sleeve helps align the poppet with the check valve body and prevents pinching of the poppet between the check valve and the filler tube during assembly.



4. Insert the filler tube, spring end first, into the high-pressure cylinder, making sure to engage the spring into the dynamic seal.

Repeat for the remaining filler tubes.

Install the end cap

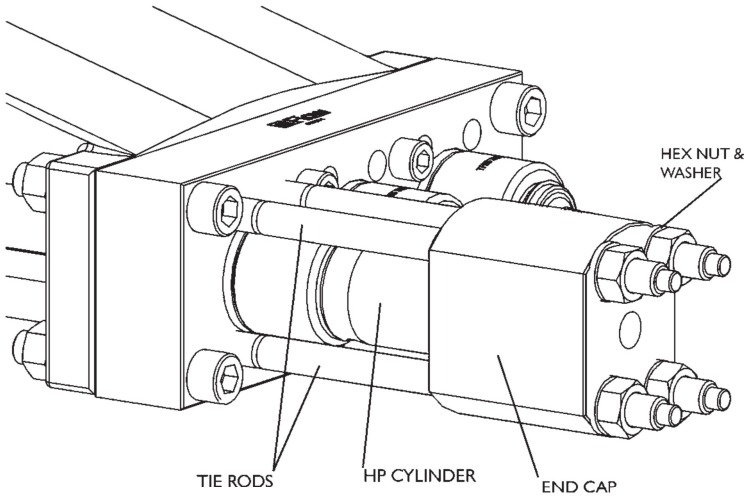
CAUTION

It is important to install the end cap in one fluid motion towards the crankcase. Do not let the end cap move away from the high-pressure cylinder while installing. If it does, the inlet poppet can be pinched, causing damage.

1. Align the end cap so it will slide over the tie rods, then carefully slide the end cap towards the crankcase until the check valve makes contact with the inlet poppet.
2. Slide the end cap towards the crankcase until the high-pressure cylinder engages the o-ring against the high-pressure cylinder.
3. Install one of the hex nuts, hand tight, to prevent the end cap from springing back from the HP cylinder.

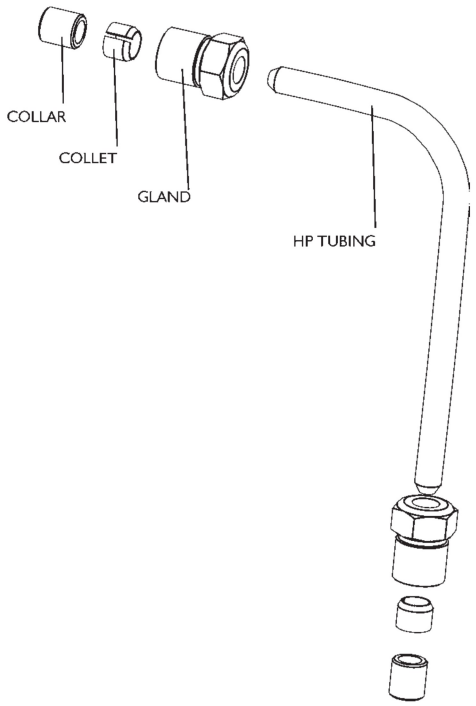
Follow Steps 1–3 to install the other two end caps in the same way, then continue with Step 4.

4. Apply anti-seize compound to both sides of the washers and to the tie rod threads.
5. Install washers and hex nuts hand tight.
6. Remove the temporarily installed hex nuts. Apply anti-seize to both sides of the washers and threads, then reinstall the nuts.
7. Use the pressure loading tool to load the tie rods (see *Loading the tie rods* on Page 44).

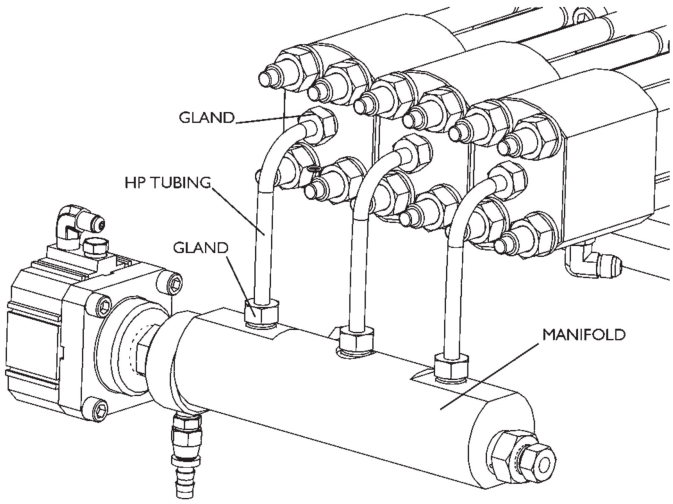


Install the manifold assembly

1. Apply a thin coat of Blue Lubricant to each of the threads on the 3/8 in. high-pressure glands.
2. Slide tube shielding over the tube length.
3. On each end of the tube: slide a gland on to the tube, then thread a collet and a collar on the threaded end of the tube.



4. Repeat Steps 1–3 for the remaining high-pressure tubes.
5. Insert one end of the tube into the high-pressure port on the manifold and loosely thread the glands in place. Repeat for the other two high-pressure tubes.
6. Loosely thread the other end of each of the three tubes into the end cap ports.



7. Once in place, tighten all six gland nuts. Torque to 40 ft-lb (54 N-m).
8. Reconnect all high- and low-pressure interface connections.

Complete the kit installation

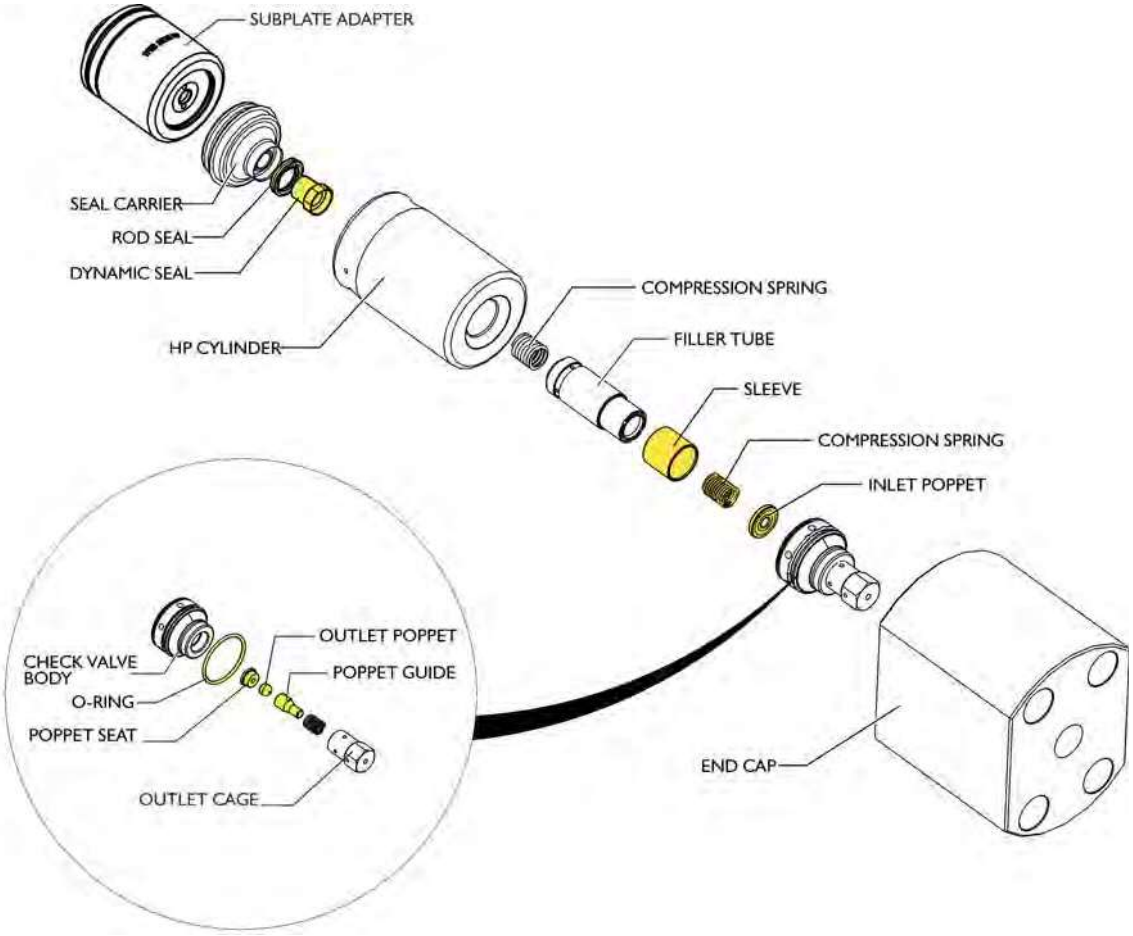
1. Remove the oil temperature sensor (or plug) from the crankcase drain and completely drain the oil.
2. Reinstall the oil temperature sensor (or plug) and fill the crankcase with oil to the level indicated on the dipstick. Recommended oils are listed in Chapter 1.

Return the pump to service

Follow the startup procedure on Page 14 before returning the HyPlex Prime pump to service.

Installing the Minor Maintenance kit

This service is performed at specified intervals for the life of the equipment. The complete service schedule for the minor maintenance kit (and the major maintenance kit) is described on Page 26.



Tools

- Pressure loading tool, 049512-1
- Combination wrenches (14–32 mm)
- ½ in. drive socket set (14–32 mm)
- ½ in. torque wrench (0–100 ft-lb)
- Screwdriver set
- Snap-ring pliers
- Rebuild clamp or 6 in. soft jaw vise

Maintenance kit

- Minor Maintenance Kit, 050624-1

Service notes

- All parts of the kit should be installed at the same time - do not replace components individually.
- All components should be clean and free of debris prior to assembly. Keeping the work area clean is important while working on the equipment.
- Read the entire procedure before beginning service, paying particular attention to safety instructions.

CAUTION
Failure to follow these step-by step instructions could cause premature parts failure and/or damage to the equipment.

Disassembly

1. Push in the E-stop.

WARNING
Place the main electrical disconnect OFF and bleed down all high-pressure lines. Place an "Out of Service" tag on the main electrical disconnect and lock it out. Failure to do so may result in equipment damage or injury to personnel.

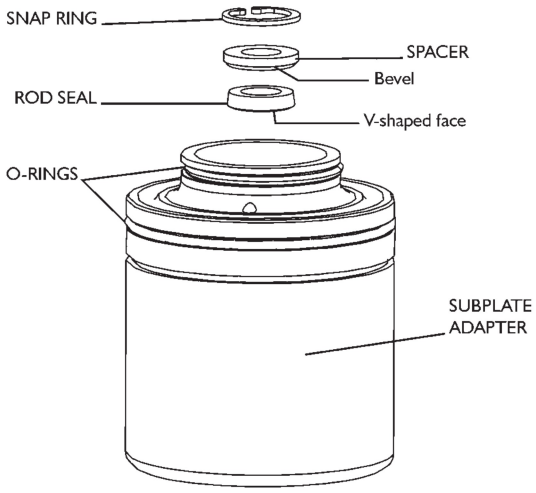
2. Disconnect all high-pressure and low-pressure interface connections to access the tie rods. Place the manifold and PCV assembly combination aside.
3. Use the pressure loading tool to unload the tie rods (see *Unloading the tie rods* on Page 43).

For each of the three high-pressure cylinders

4. Remove the end cap, high-pressure cylinder, inlet poppet, springs, filler tube, and sleeve. Discard the inlet poppet and spring.
5. Remove and discard the o-ring from the ID of the high-pressure cylinder.
6. Slide the dynamic seal carrier off the plunger if it did not come out with the cylinder. Remove and discard dynamic seal and rod seal.

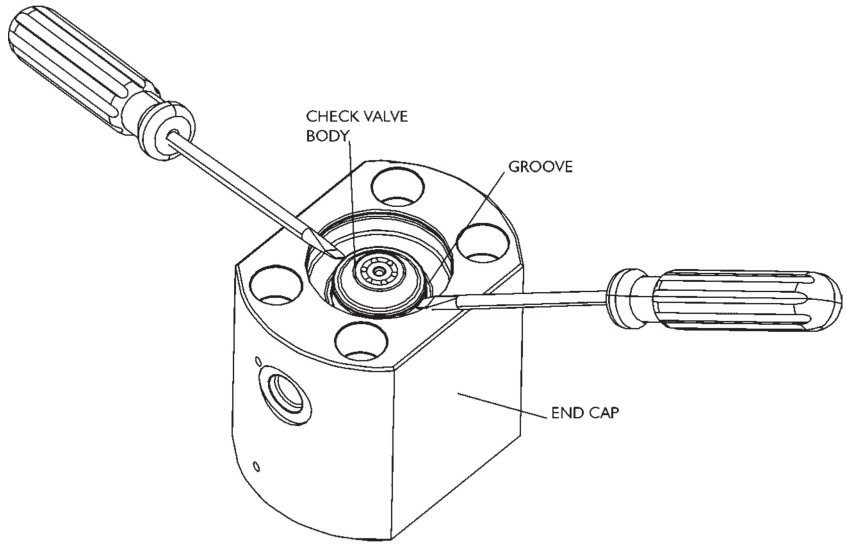
CAUTION
Use care when removing dynamic seal and rod seal. Do not scratch or nick seal carrier bores.

7. Remove the subplate adapter. If necessary, use pry bars or screwdrivers to remove the adapter. Remove the snap ring from the subplate adapter using snap ring pliers. Remove the spacer and seal. Remove the two o-rings from the outer diameter of the adapter.



Discard the seal, o-rings, and snap ring. Keep the spacer for reuse.

8. Place the end cap vertically on a work bench with the check valve end up.
9. Remove the check valve assembly from the end caps by using two screwdrivers in the circumferential groove in the OD of the check valve body. Be careful not to damage the body or the end cap. Remove the o-ring from the check valve assembly.



10. Place the check valve body in the provided rebuild clamp.

    Note: Do not cover the holes on the outer circumference of the check valve body to prevent metal from being introduced into the opening.
11. Loosen the outlet cage.
12. Remove the outlet poppet and guide, outlet poppet spring, and outlet poppet seat. Discard the poppet, seat, guide, and spring.

Lap inlet face of check valve body

13. Use the glass lapping plate from the tool kit and 320 grit lapping paper from the repair kit. Lightly wet the paper with water.
14. Place the check valve body with the inlet face against the lapping paper. With a light downward pressure, lap the body in a figure-8 pattern.

    CAUTION
    Be very careful not to rock the check valve body while lapping the surface—flatness is very critical.

    After 10–12 laps, rotate the check valve body 45° and continue lapping until the surface has a smooth matte finish free of any deep scratches or signs of deformation from the inlet poppet. Re-wet the paper as needed.
15. Thoroughly clean the check valve body openings to remove particles from the lapping process.

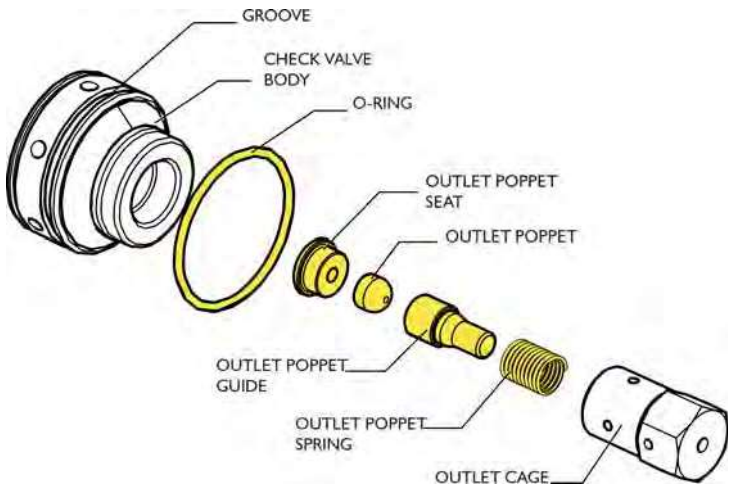
Installation and reassembly

Assemble the check valve

1. Insert the new outlet poppet into the new outlet poppet guide.

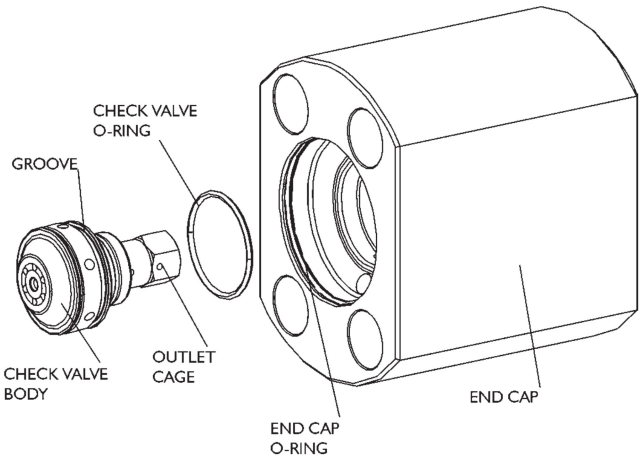
   Note: Install poppet into the outlet poppet guide as shown, with the radiused back of the outlet poppet going in first. The counterbore in the outlet poppet is visible after installation
2. Place the new outlet poppet spring around the guide. The spring should be loose on the guide.
3. Place the assembly into the outlet cage along with the outlet poppet seat.
4. Hold the outlet cage assembly (threaded end of the outlet cage facing up), so that the installed components will not fall out. Apply a thin film of Blue Lubricant to the threads of the outlet cage.
5. Carefully thread the check valve body onto the outlet cage assembly.
6. Secure the check valve body in the rebuild clamp with the inlet face downward.
7. Secure the rebuild clamp in a vise. Torque the outlet cage to 30 ft-lb (41 N-m).

Repeat Steps 1–7 for the remaining check valves.



Assemble the end cap

1. Lightly lubricate the new check valve o-ring with o-ring lube and install it into the grooves on the check valve body.



2. Lightly lubricate the end cap o-ring with o-ring lube and install it in the groove in the inner diameter of the end cap.
3. With the outlet cage facing the end cap, insert the check valve body into the end cap.

Repeat for the remaining end caps.

Check plunger torque

1. Install the plunger nut tool over the plunger and plunger nut. Use a torque wrench to torque the plunger nut to 20 ft-lb (27 N-m).
2. Rotate the pulley to fully extend the next plunger to be checked.

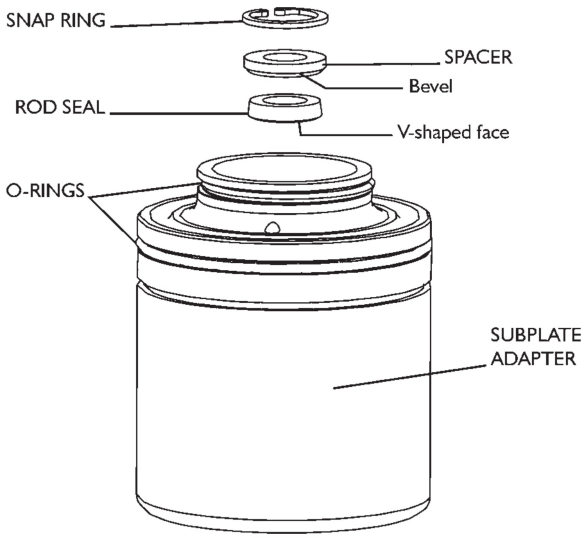
Repeat steps for the remaining plungers. When finished, wipe off dirt and grease from all three plungers.

Rebuild the subplate adapter

1. Make sure the tie rods are firmly seated in the subplate.

   Note: Hand tight is sufficient.

2. With the v-shaped face toward the subplate adapter, install the new rod seal in the counterbore of the subplate adapter.



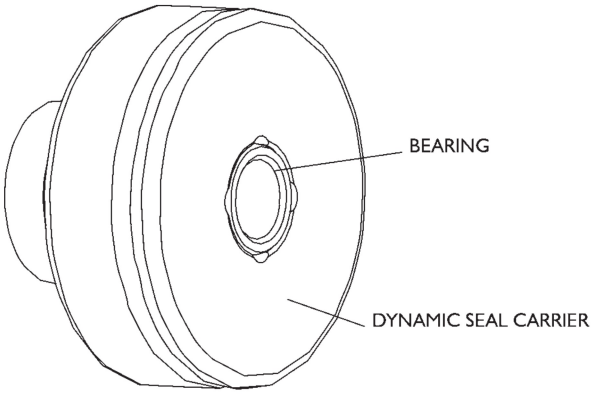
3. Place the new spacer in the counterbore with the chamfered side down (toward the newly-installed seal).
4. Secure the rod seal and spacer with the new snap ring.
5. Lubricate and install the two new o-rings onto the adapter, and slide the adapter over the plunger until it engages the counterbore of the subplate.

Repeat Steps 1–5 for the remaining subplate adapters

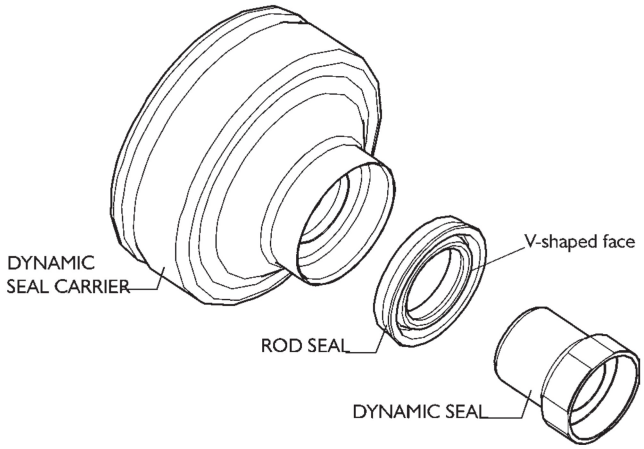
Assemble and install the dynamic seal carrier

1. Inspect the dynamic seal carrier for cleanliness. Make sure the guide bearing of the seal carrier is flush with the face of the carrier and is in good condition (the presence of cracked or loose pieces is reason for replacement).

   Replace the dynamic seal carrier if necessary. Clean as necessary.



2. Install the new rod seal as shown, with the v-shaped face pointing out of the dynamic seal carrier.



3. Install the new dynamic seal into the inner diameter of the rod seal, making sure the dynamic seal is fully seated against the dynamic seal carrier.

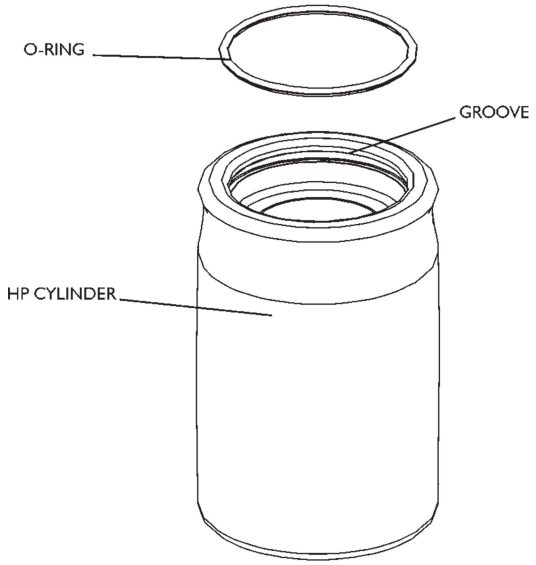
   Note: Make sure the plungers are clean and free of any damage or scratches before installing the dynamic seal carriers. The subplate adapter/seal carrier interface must be clean and free of debris.

4. Slide the dynamic seal carrier into the plungers until seated against the register of the subplate adapter.

Repeat for the remaining dynamic seal carriers.

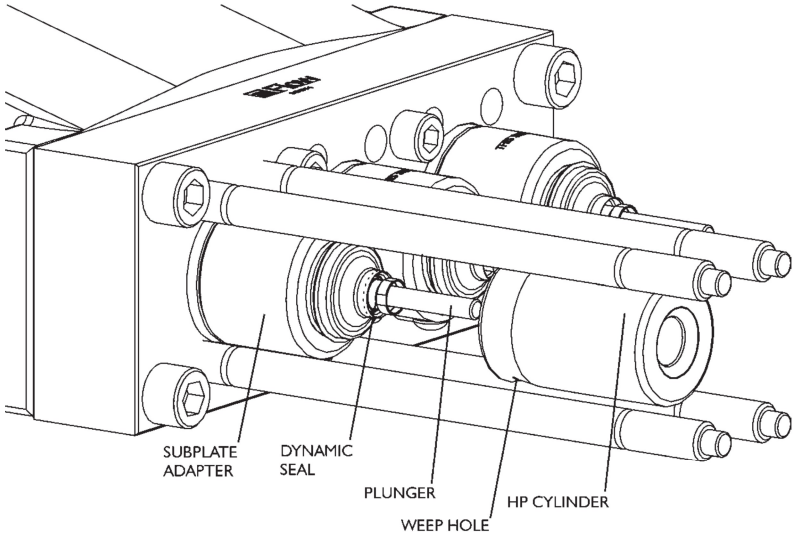
Install the high-pressure cylinder

1. Lubricate the new o-ring with o-ring lube and place it in the groove of the high-pressure cylinder.



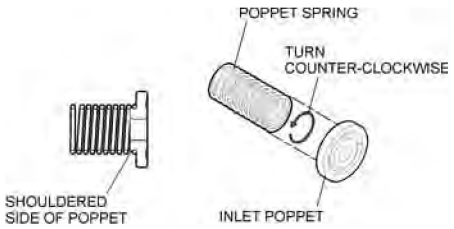
2. Slide the high-pressure cylinder over the plunger assembly and seat it against the seal carrier. Position the cylinders with weep holes facing downward.

   Note: A small amount of force will be needed to seat the cylinder against the seal carrier.



Repeat for the remaining high-pressure cylinders.

Assemble the inlet poppet



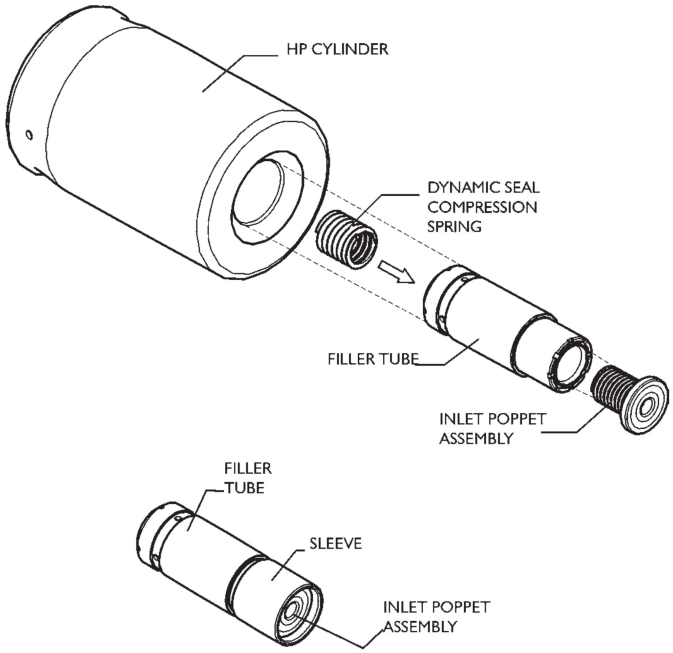
1. Place the new inlet poppet spring over the shouldered side of the new inlet poppet.
2. Apply pressure to the spring and rotate counter-clockwise until it snaps into place. Be sure the spring is firmly attached.

Repeat for the remaining inlet poppets.

Assemble the filler tube assembly

1. Place the dynamic seal compression spring into the tapered end of the filler tube.
2. Insert the inlet poppet assembly into the filler tube, spring end first.
3. Install the filler tube sleeve so that it surrounds the inlet poppet and spring.

   Note: The filler tube sleeve helps align the poppet with the check valve body and prevents pinching of the poppet between the check valve and filler tube during assembly.



4. Insert the filler tube–spring end first–into the high-pressure cylinder, making sure to engage the spring into the dynamic seal.

Repeat for the remaining filler tubes.

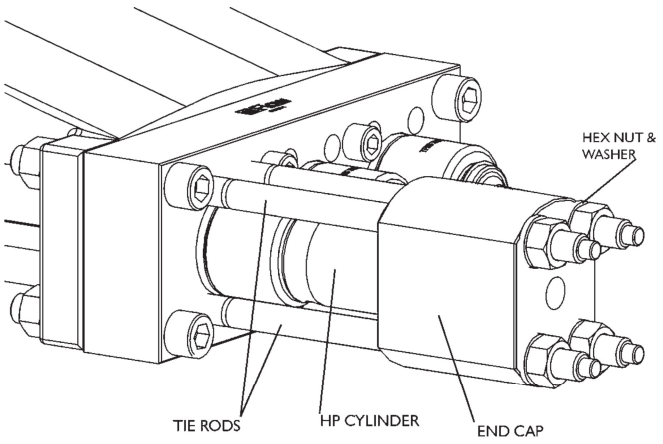
Install the end cap

CAUTION
It is important to install the end cap in one fluid motion toward the crankcase. Do not let the end cap move away from the high-pressure cylinder while installing. If it does, the inlet poppet can be pinched, causing damage.

1. Align the end cap so it will slide over the tie rods, then carefully slide the end cap towards the HP cylinder until the check valve body makes contact with the inlet poppet.
2. Continue to slide the end cap until the high-pressure cylinder engages the o-ring in the end cap and the check valve body seats against the high-pressure cylinder.
3. Temporarily install one of the hex nuts, hand tight, to prevent the end cap from springing back.

Follow Steps 1–3 to install the other two end caps in the same way, then continue with Step 4.

4. Apply a thin coat of anti-seize compound to both sides of the washers and to the tie rod threads.
5. Install washers and hex nuts hand tight.
6. Remove the temporarily installed hex nuts. Apply anti-seize to both sides of the washers and threads, then reinstall the nuts.
7. Use the pressure loading tool to load the tie rods (see *Loading the tie rods* on Page 44).

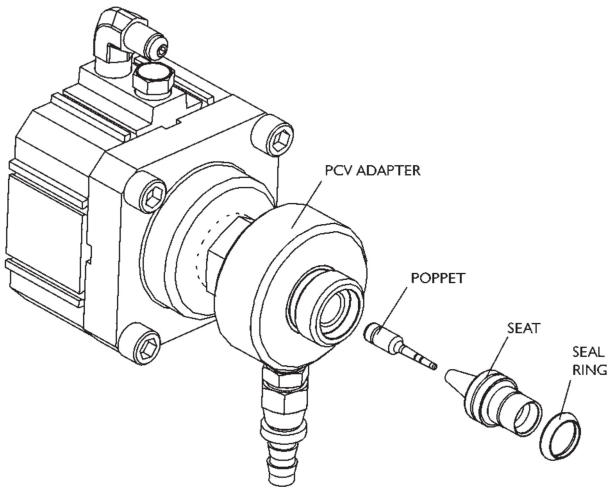


Replace the PCV poppet and seat

1. Remove the air supply line from the PCV actuator, and the drain line from the outlet adapter.
2. Remove all high-pressure lines from the manifold.
3. Place the manifold in a soft-jaw vise
4. Use a 1-1/4 in. wrench to remove the PCV from the manifold. remove the outlet adapter from the PCV body.
5. Remove and discard the poppet, seat, and seal ring from the PCV body.

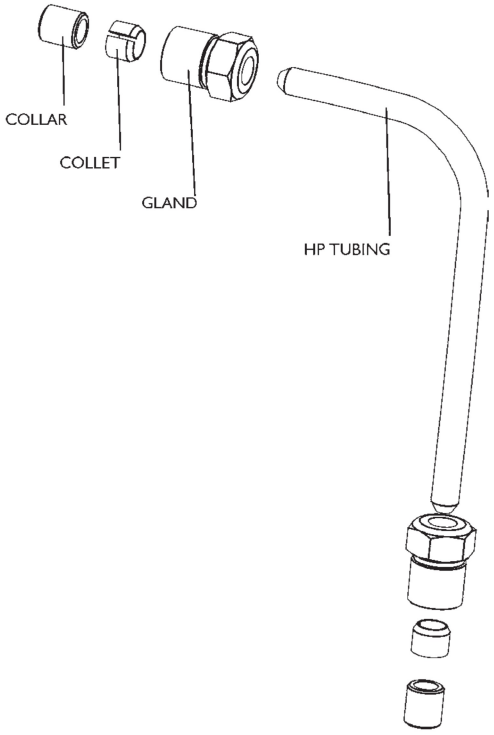
   Note: Needle nose pliers may be needed to remove the poppet from the assembly.
6. Lube the outlet adapter o-rings and slide onto the PCV body.
7. Make sure the static seal ring is installed on the seat and loosely install the new poppet into the seat.
   Note: Do not press poppet into the seat.
8. Place poppet and seat assembly into the end of the valve body.

   Lubricate the PCV body threads with Blue Lube and thread the PCV assembly into the high-pressure manifold. Tighten to 190 ft-lb (258 N-m).
9. Remove the manifold assembly from the vise.

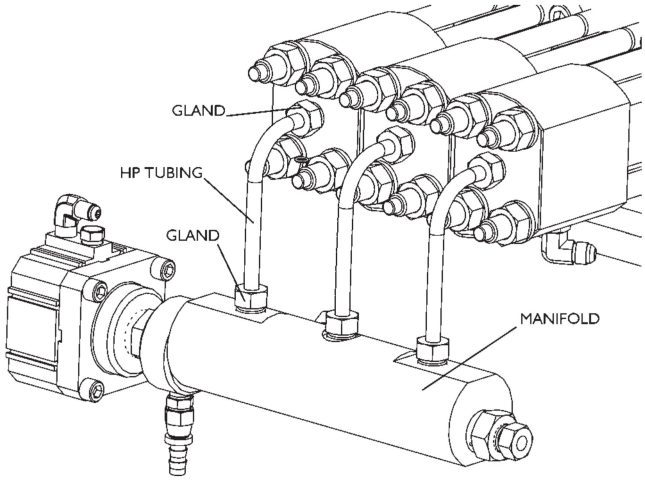


Install the manifold assembly

1. Apply a thin coat of Blue Lubricant to each of the threads on the 3/8 in. high-pressure glands.
2. Slide tube shielding over the tube length.
3. On each end of the tube: slide a gland on to the tube, then thread a collet and a collar on the threaded end of the tube.



4. Repeat Steps 1–3 for the remaining two high-pressure tubes.
5. Insert one end of the tube into the high-pressure port on the manifold and loosely thread the glands in place. Repeat for the other high-pressure tubes.
6. Loosely thread the other end of each of the three tubes into the end cap ports.



7. Once in place, tighten all six gland nuts. Torque to 40 ft-lb (54 N-m).
8. Reconnect all high- and low-pressure interface connections

Complete the kit installation

1. Remove the oil temperature sensor (or plug) from the crankcase drain and completely drain the oil.
2. Reinstall the oil temperature sensor (or plug) and fill the crankcase with oil to the level indicated on the dipstick. Recommended oils are listed in Chapter 1.

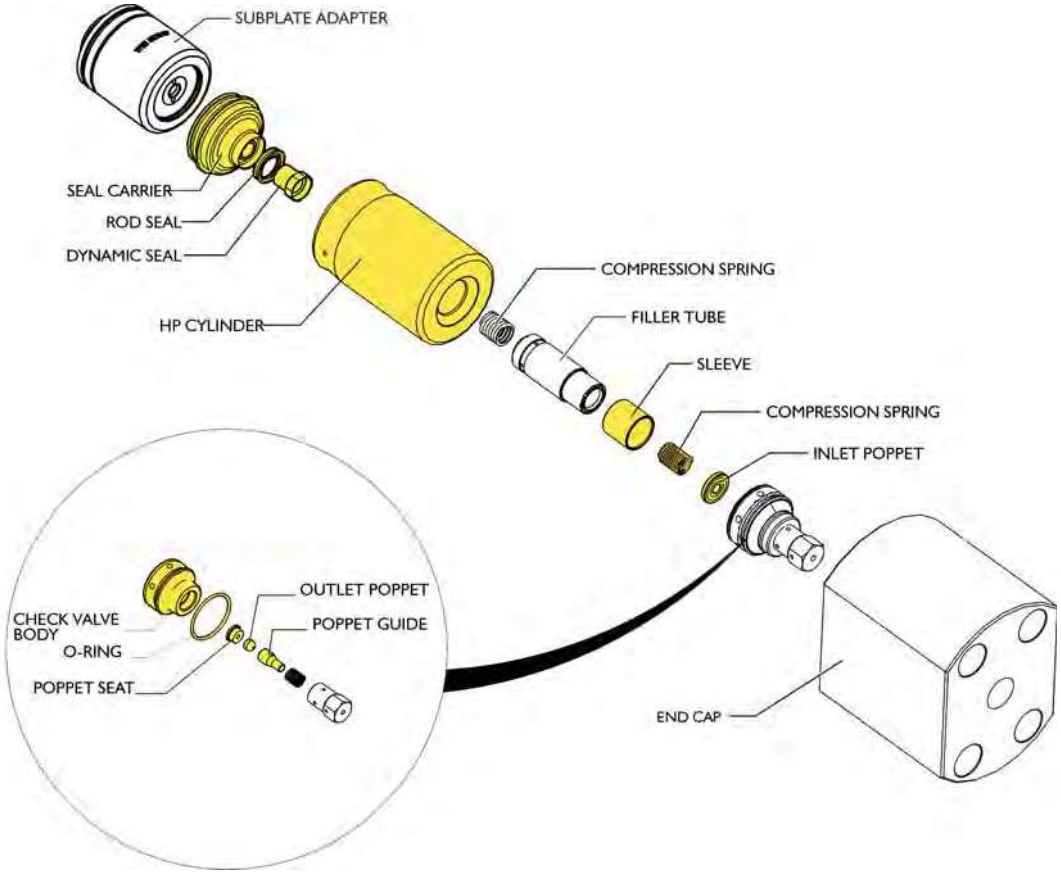
Return the pump to service

Follow the startup procedure on Page 14 before returning the HyPlex Prime pump to service.

Notes

Installing the Major Maintenance kit

Use this procedure when installing the Major Maintenance kit on your HyPlex Prime pump. This service is performed at every required maintenance interval for the life of the equipment. The complete service schedule for the major maintenance kit (and the minor maintenance kit) is described on Page 26.



Tools

- Pressure loading tool, 049512-1
- Combination wrenches (14–32 mm)
- ½ in. drive socket set (14–32 mm)
- ½ in. torque wrench (0–100 ft-lb)
- Feeler gauge set
- Screwdriver set
- Snap-ring pliers
- 3/8 in. hex bit
- ½ in. hex bit
- Rebuild clamp or 6 in. soft jaw vise

Maintenance kit

- Major maintenance kit, 050624-2

Service notes

- All parts of the kit should be installed at the same time - do not replace components individually.
- All components should be clean and free of debris prior to assembly. Keeping the work area clean is important while working on the equipment.
- Read the entire procedure through before beginning service, paying particular attention to safety instructions.

CAUTION
Failure to follow these step-by step instructions could cause premature parts failure and/or damage to the equipment.

Disassembly

1. Push in the E-stop.

WARNING
Place the main electrical disconnect OFF and bleed down all high-pressure lines. Place an "Out of Service" tag on the main electrical disconnect and lock it out. Failure to do so may result in equipment damage or injury to personnel.

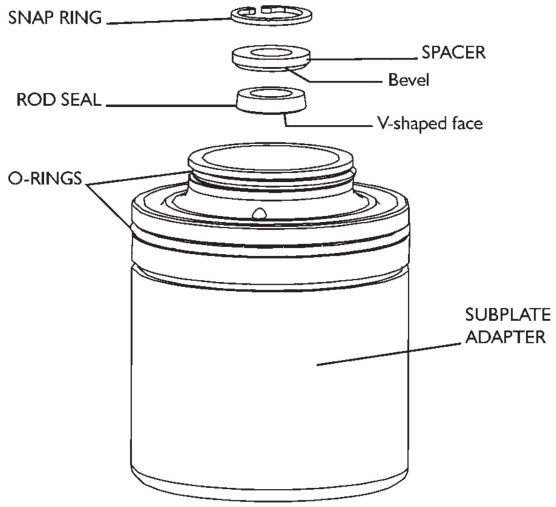
2. Disconnect all high-pressure and low-pressure interface connections to access the tie rods. Place the manifold and PCV assembly combination aside.
3. Use the pressure loading tool to unload the tie rods (see *Unloading the tie rods* on Page 43).

For each of the three high-pressure cylinders

4. Remove the end cap, high-pressure cylinder, inlet poppet, springs, filler tube, and sleeve.
5. Discard the spring and poppet, filler tube sleeve, and high-pressure cylinder.
6. Slide the dynamic seal carrier off the plunger if it did not come out with the cylinder. Remove and discard the dynamic seal and rod seal.

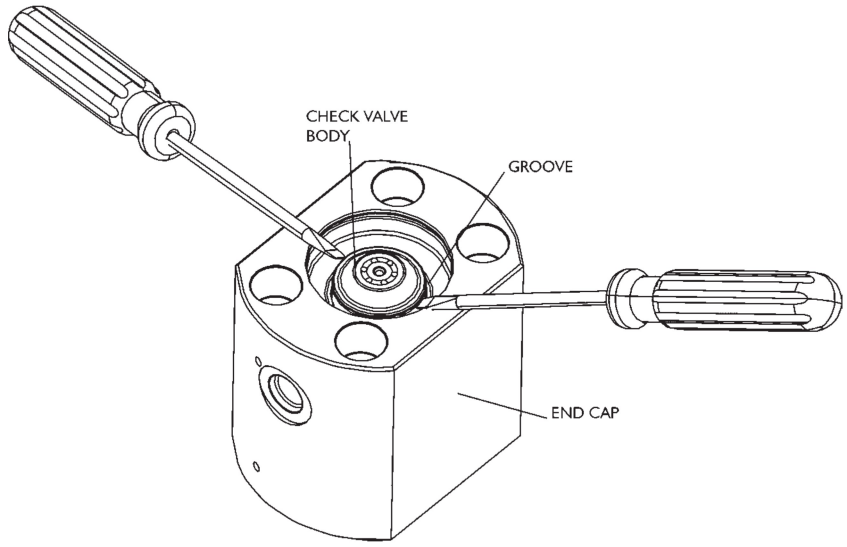
CAUTION
Use care when removing dynamic seal and rod seal. Do not scratch or nick seal carrier bores

7. Remove the subplate adapter. If necessary, use pry bars or screwdrivers to remove the adapter. Remove the snap ring from the subplate adapter using snap ring pliers. Remove the spacer and seal. Remove the two o-rings from the outer diameter of the adapter.



Discard the seal, o-rings, and snap ring. Keep the spacer for reuse.

8. Place the end cap vertically on a work bench with the check valve end up.
9. Remove the check valve assembly from the end cap by using two screwdrivers in the circumferential groove in the OD of the check valve body. Be careful not to damage the body or the end cap. Remove the o-ring from the check valve assembly.



10. Place the check valve body in the provided rebuild clamp.

    Note: Do not cover the holes on the outer circumference of the check valve body to prevent metal from being introduced into the opening.
11. Loosen the outlet cage.
12. Remove the outlet poppet and guide, outlet poppet spring, and outlet poppet seat from the outlet cage. Retain the cage. Discard the outlet poppet and guide, outlet poppet spring, outlet poppet seat, and check valve body.

Installation and reassembly

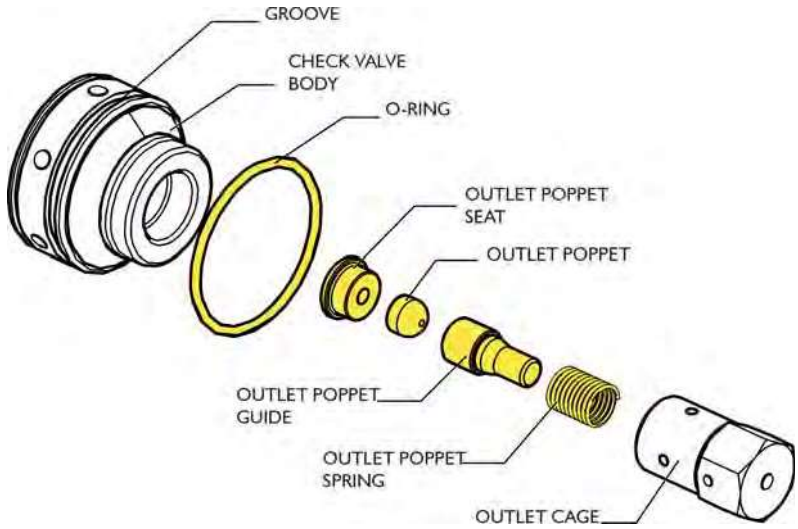
Assemble the check valve

1. Insert the new outlet poppet into the new outlet poppet guide.

   Note: Install poppet into the outlet poppet guide as shown, with the radiused back of the outlet poppet going in first. The counterbore in the outlet poppet is visible after installation.

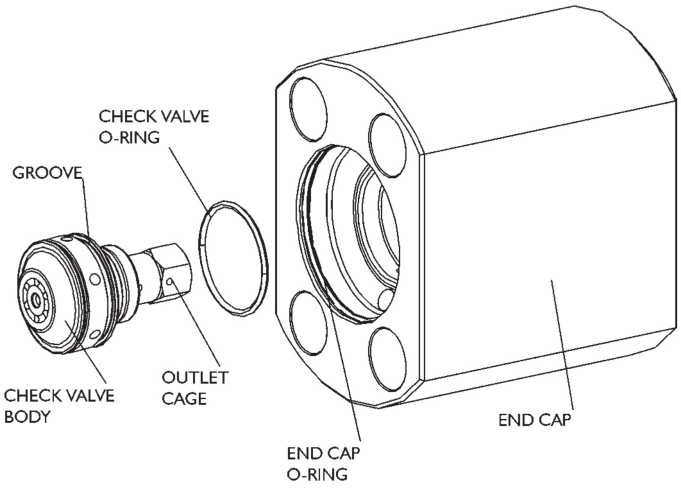
2. Place the new outlet poppet spring around the guide. The spring should be loose on the guide.
3. Place the assembly into the outlet cage along with the outlet poppet seat.
4. Hold the outlet cage assembly upright (threaded end of the outlet cage facing up) so that the installed components will not fall out. Apply a thin film of Blue Lubricant to the threads of the outlet cage.
5. Carefully thread the new check valve body onto the outlet cage assembly.
6. Secure the check valve body in the rebuild clamp with the inlet face downward.
7. Secure the rebuild clamp in a vise. Torque the outlet cage to 30 ft-lb (41 N-m).

Repeat Steps 1–7 for the remaining check valves.



Assemble the end cap

1. Lightly lubricate the new check valve o-ring with o-ring lube and install it into the grooves on the check valve body.



2. Lightly lubricate the end cap o-ring with o-ring lube and install it in the groove in the inner diameter of the end cap.
3. With the outlet cage facing the end cap, insert the check valve body into the end cap.

Repeat for the remaining end caps

Check plunger torque

1. Install the plunger nut tool over the plunger and plunger nut. Use a torque wrench to torque the plunger nut to 20 ft-lb (27 N-m).
2. Rotate the pulley to fully extend the next plunger to be checked.

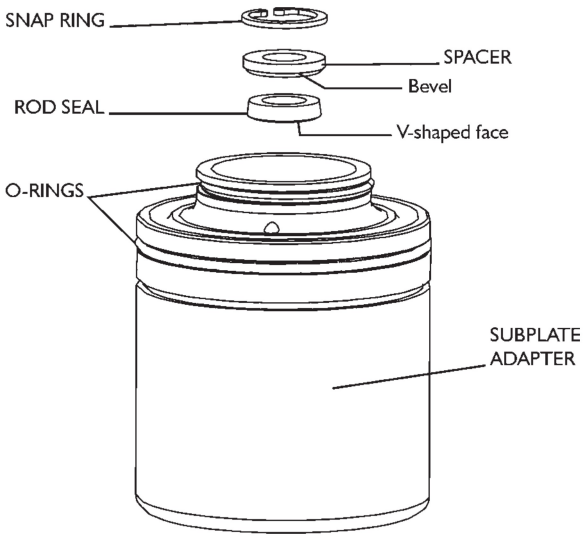
Repeat steps for the remaining plungers. When finished, wipe off dirt and grease from all plungers.

Rebuild the subplate adapter

1. Make sure the tie rods are firmly seated in the subplate.

   Note: Hand tight is sufficient.

2. With the v-shaped face towards the subplate adapter, install the new rod seal in the counterbore of the subplate adapter.



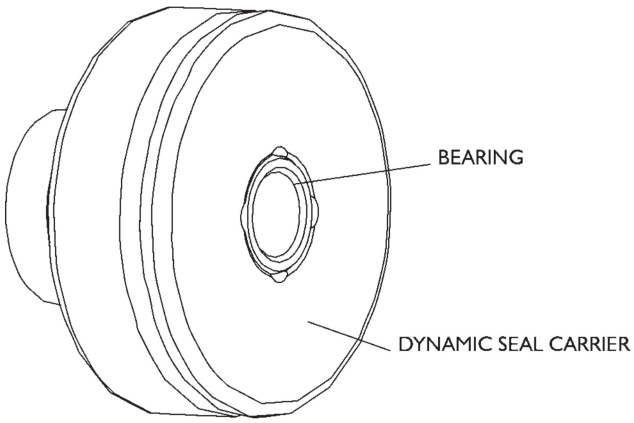
3. Place the new spacer in the counterbore with the chamfered side down (toward the newly-installed seal).
4. Secure the rod seal and spacer with the new snap ring.
5. Lubricate and install the two new o-rings onto the adapter, and slide the adapter over the plunger until it engages the counterbore of the subplate.

Repeat Steps 1–5 for the remaining subplate adapters.

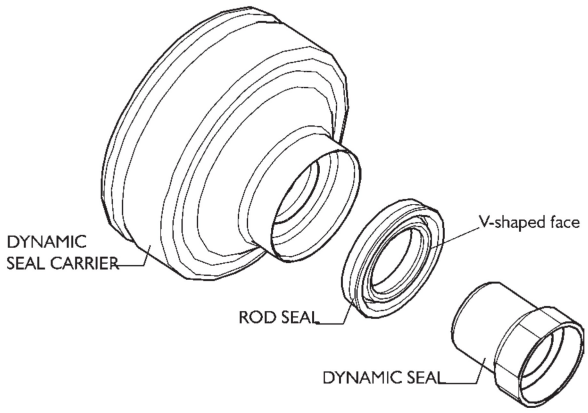
Assemble and install the dynamic seal carrier

1. Inspect the dynamic seal carrier for cleanliness. Make sure the guide bearing of the seal carrier is flush with the face of the carrier and is in good condition (the presence of cracked or loose pieces is reason for replacement).

   Replace the dynamic seal carrier if necessary. Clean as necessary.



2. Install the new rod seal as shown, with the v-shape face pointing out of the dynamic seal carrier.



3. Install the new dynamic seal into the inner diameter of the rod seal, making sure the dynamic seal is fully seated against the dynamic seal carrier.

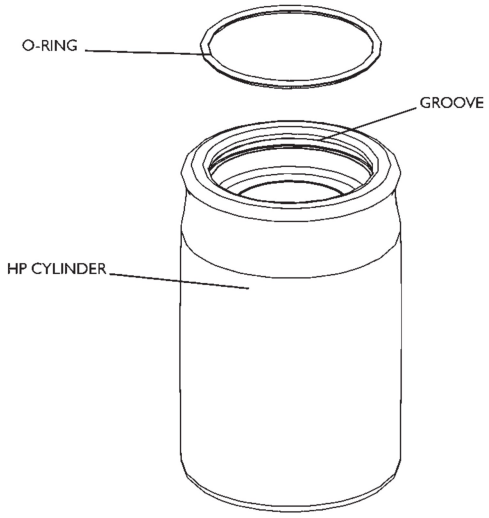
   Note: Make sure the plungers are clean and free of any damage or scratches before installing the dynamic seal carriers. The subplate adapter/seal carrier interface must be clean and free of debris.

4. Slide the dynamic seal carrier onto the plungers until seated against the register of the subplate adapter.

Repeat for the remaining dynamic seal carriers.

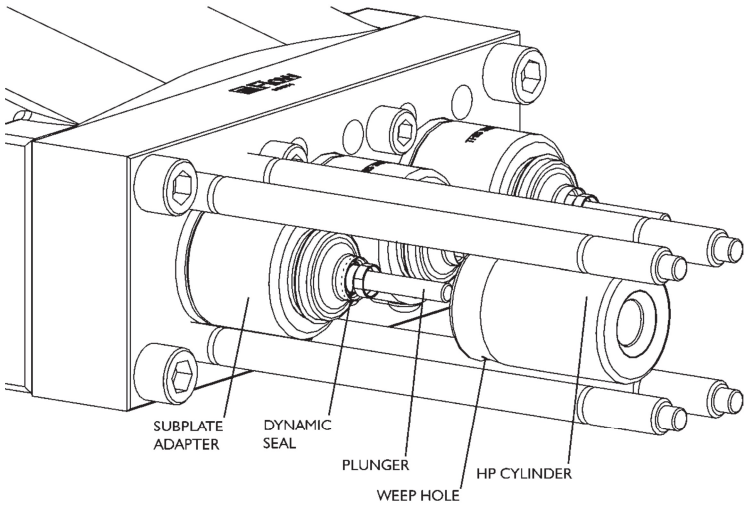
Install the high-pressure cylinder

1. Lubricate the bew o-ring with o-ring lube and place it in the groove of the new high-pressure cylinder.



2. Slide the new high-pressure cylinder over the plunger assembly and seat it against the seal carrier. Position the cylinders with weep holes facing downward.

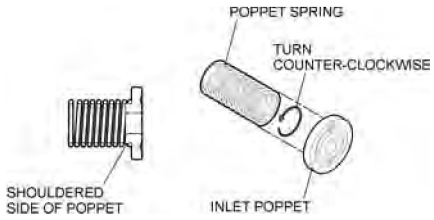
   Note: A small amount of force will be needed to seat the cylinder against the seal carrier.



Repeat for the remaining high-pressure cylinders.

Assemble the inlet poppet

1. Place the new inlet poppet spring over the shouldered side of the new inlet poppet.



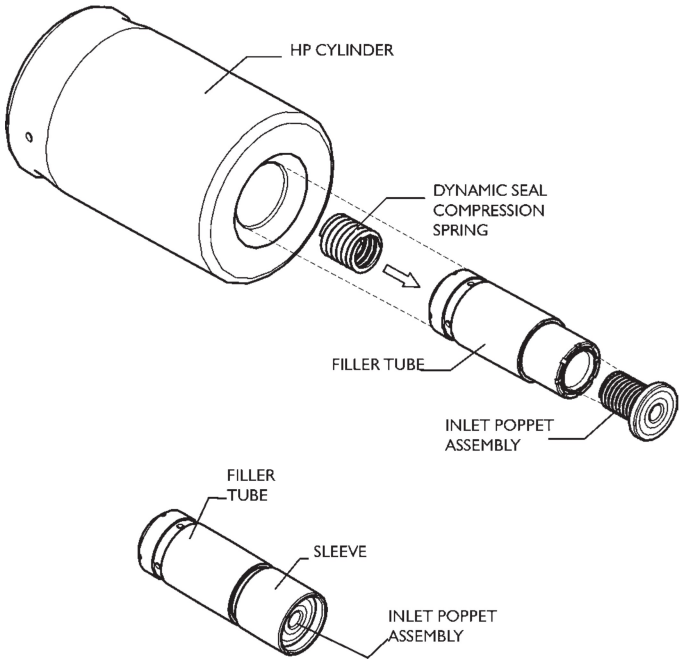
2. Apply pressure to the spring and rotate counter-clockwise until it snaps into place. Be sure the spring is firmly attached.

Repeat for the remaining inlet poppets.

Assemble the filler tube assembly

1. Place the dynamic seal compression spring into the tapered end of the filler tube.
2. Insert the inlet poppet assembly into the filler tube, spring end first.
3. Install the filler tube sleeve so that it surrounds the inlet poppet and spring.

   Note: The filler tube sleeve helps align the poppet with the check valve body and prevents pinching of the poppet between the check valve and filler tube during assembly



.

4. Insert the filler tube – spring end first – into the high-pressure cylinder, making sure to engage the spring into the dynamic seal.

Repeat for the remaining filler tubes.

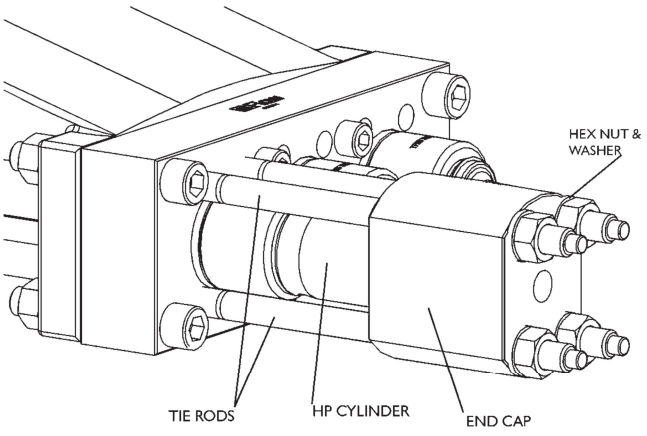
Install the end cap

CAUTION
It is important to install the end cap in one fluid motion towards the crankcase. Do not let the end cap move away from the high-pressure cylinder while installing. If it does, the inlet poppet can be pinched, causing damage.

1. Align the end cap so it will slide over the tie rods, then carefully slide the end cap towards the HP cylinder until the check valve body makes contact with the inlet poppet.
2. Continue sliding the end cap until the high-pressure cylinder engages the o-ring in the end cap and the check valve body seats against the high-pressure cylinder.
3. Temporarily install one of the hex nuts, hand tight, to prevent the end cap from springing back from the HP cylinder.

Follow Steps 1–3 to install the other two end caps, then continue with Step 4.

4. Apply a thin coat of anti-seize compound to both sides of the washers and to the tie rod threads.
5. Install washers and hex nuts hand tight.
6. Remove the temporarily installed hex nuts. Apply anti-seize to both sides of the washers and threads, then reinstall the nuts.
7. Use the pressure loading tool to load the tie rods (see *Loading the tie rods* on page 44).

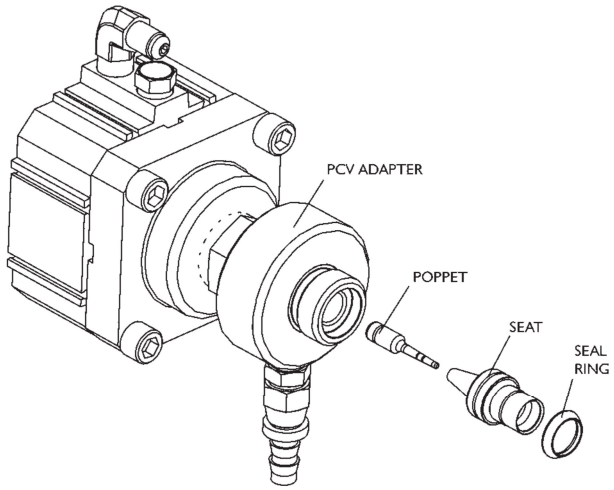


Replace the PCV poppet and seat

1. Remove the air supply line from the PCV actuator, and the drain line from the outlet adapter.
2. Remove all high-pressure lines from the manifold.
3. Place the manifold in a soft-jaw vise
4. Use a 1-1/4 in. wrench to remove the PCV from the manifold. remove the outlet adapter from the PCV body.
5. Remove and discard the poppet, seat, and seal ring from the PCV body.

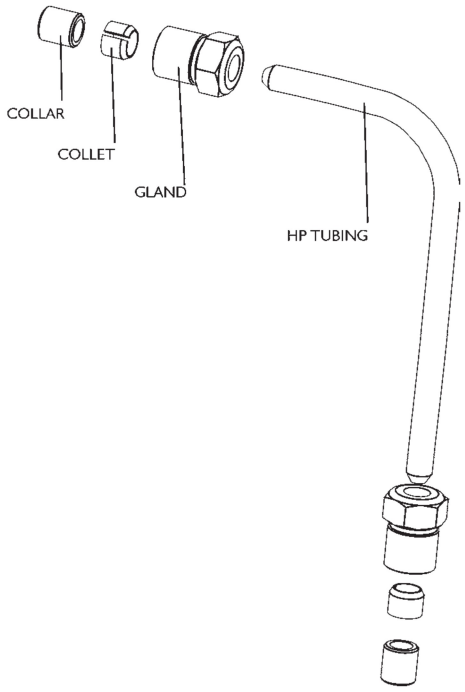
   Note: Needle nose pliers may be needed to remove the poppet from the assembly.
6. Lube the outlet adapter o-rings and slide onto the PCV body.
7. Make sure the static seal ring is installed on the seat and loosely install the new poppet into the seat.
   Note: Do not press poppet into the seat.
8. Place poppet and seat assembly into the end of the valve body.

   Lubricate the PCV body threads with Blue Lube and thread the PCV assembly into the high-pressure manifold. Tighten to 190 ft-lb (258 N-m).
9. Remove the manifold assembly from the vise..

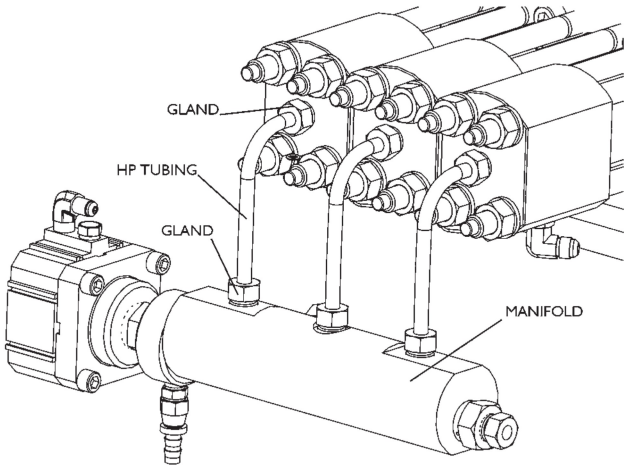


Install the manifold assembly

1. Apply a thin coat of Blue Lubricant to each of the threads on the 3/8 in. high-pressure glands.
2. Slide tube shielding over the tube length.
3. On each end of the tube: slide a gland on to the tube, then thread a collet and a collar on the threaded end of the tube.



4. Repeat Steps 1–3 for the remaining two high-pressure tubes.
5. Insert one end of the tube into the high-pressure port on the manifold and loosely thread the glands in place. Repeat for the other two high-pressure tubes.
6. Loosely thread the other end of each of the three tubes into the end cap ports.



7. Once in place, tighten all six gland nuts. Torque to 40 ft-lb (54 N-m).
8. Reconnect all high- and low-pressure interface connections.

Complete the kit installation

1. Remove the oil temperature sensor (or plug) from the crankcase drain and completely drain the oil.
2. Reinstall the oil temperature sensor (or plug) and fill the crankcase with oil to the level indicated on the dipstick. Recommended oils are listed in Chapter 1.

Return the pump to service

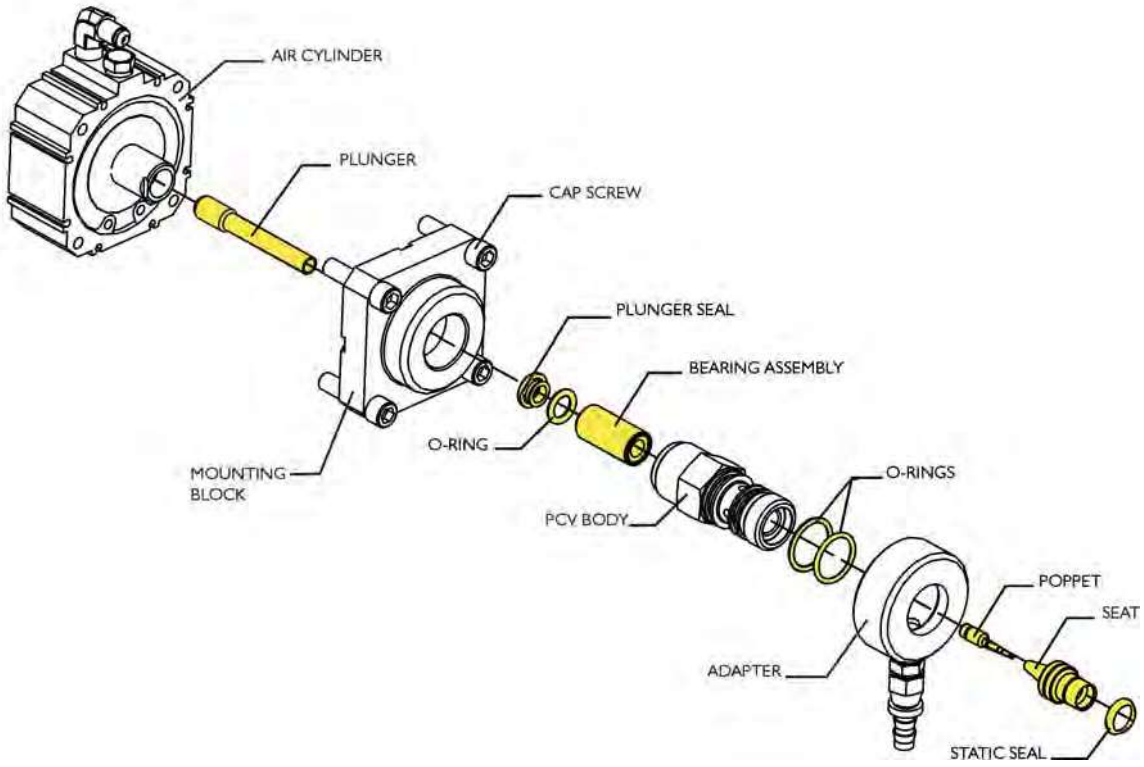
Follow the startup procedure on Page 14 before returning the HyPlex Prime pump to service.

Notes

Installing the pressure control valve (PCV) maintenance kit

Use this procedure when installing the HyPlex Prime pressure control valve maintenance kit. The complete service schedule for the PCV is located on Page 26.

Every other time you install a Major Maintenance kit, you should also install the PCV Maintenance kit. The poppet, seat, and static seal described in this procedure are included in the Major Maintenance kit.



Tools

- Combination wrenches (11–32 mm)
- 1/2-in. torque wrench (0–100 ft-lb)
- Screwdriver set
- Allen wrench set
- Needle nose pliers
- 6 in. soft jaw vise

Maintenance kit

- PCV maintenance kit, 050625-1

Service notes

- All parts of the kit should be installed at the same time - do not replace components individually.
- All components should be clean and free of debris prior to assembly. Keeping the work area clean is important while working on the equipment.
- Read the entire procedure through before beginning service, paying particular attention to safety instructions.

CAUTION
Failure to follow these step-by step instructions could cause premature parts failure or damage to the equipment.

Disassembly

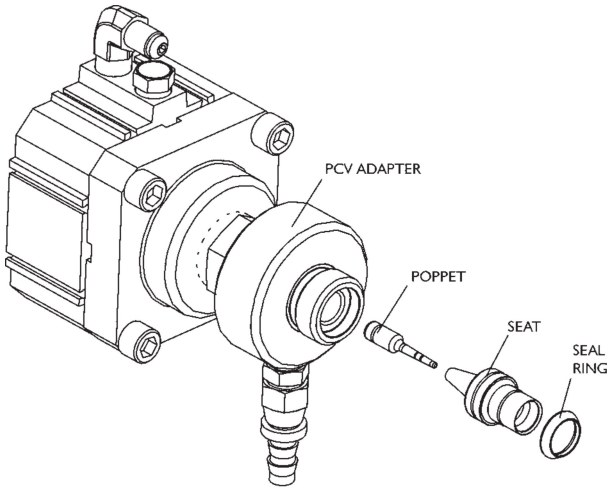
The poppet, seat, seal ring, bearing, plunger, piston seal, plunger seal, and o-rings are replaced in this procedure.

1. Shut down the system.

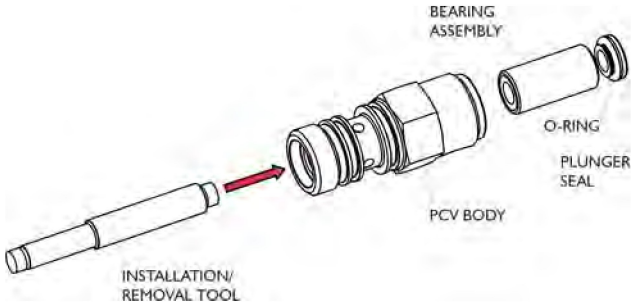
> **WARNING**
> **Place the main electrical disconnect OFF and bleed down all high-pressure lines. Place an "Out of Service" tag on the main electrical disconnect and lock it out. Failure to do so may result in equipment damage or injury to personnel.**

2. Reduce air pressure to 0 psi and remove the air and drain lines from the PCV.
3. Remove the PCV from the manifold.
4. Remove the poppet, seat, and seal ring from the PCV body.

   Note: Needle nose pliers may be needed to remove the poppet from the assembly.

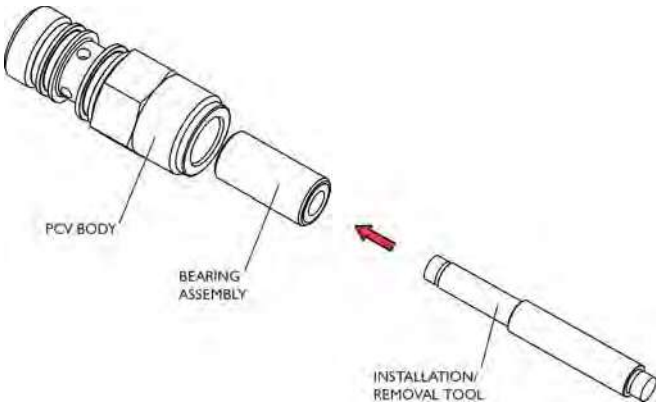


5. Remove the PCV adapter from the valve body. Remove and discard the o-rings from the valve body.
6. Place the air cylinder in a soft jaw vise. Use a 1-1/4 in. (32 mm) combination wrench to remove the PCV body from the air cylinder.
7. Use a hex wrench to remove the four cap screws from the air cylinder. Separate the mounting block to access the plunger. Discard the plunger.
8. Push the bearing from the bore of the PCV body using the bearing removal/installation tool (011172-1). Remove the plunger seal and o-ring. Discard the plunger seal, o-ring, and bearing assembly.

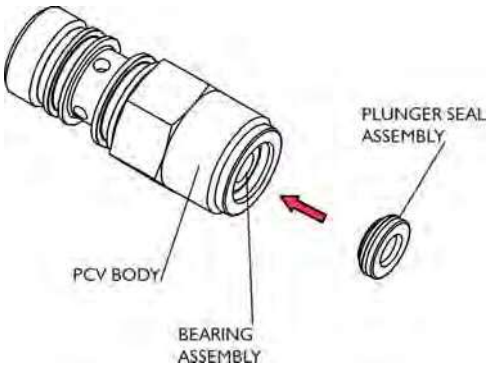


Installation and reassembly

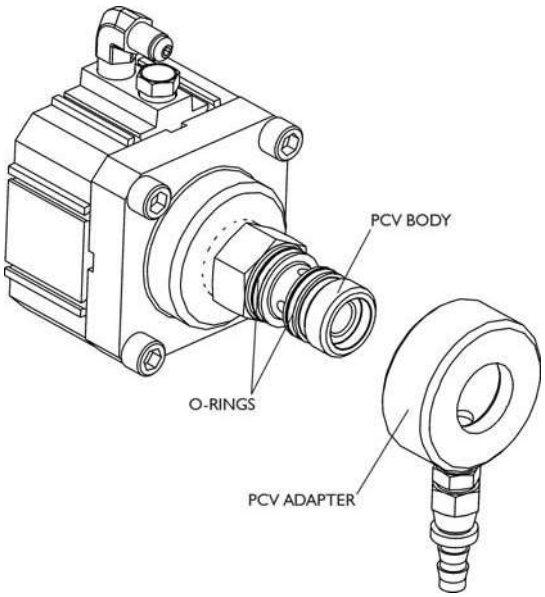
1. Slide the new plunger through the bore of the cylinder mounting block.
2. Reinstall cap onto housing and tighten the four cap screws.
3. Inspect the other non-wear components for any signs of deterioration; repair or replace as necessary.
4. Use the bearing removal/installation tool to push the new bearing assembly into the bore of the PCV body.



5. Lubricate the plunger seal with the provided food-grade grease. Install the o-ring onto the plunger seal. Install the combination–with the o-ring side towards the valve body–into the valve body.



6. With the air cylinder in a soft jaw vise, slide the body over the plunger and thread into the mounting block until the PCV body is firmly seated. No extreme torque is needed.
7. Clean out any debris that remains in the high-pressure port of the manifold.
8. Lubricate the two new o-rings with food-grade grease. Place new o-rings on the outer diameter of the valve body.



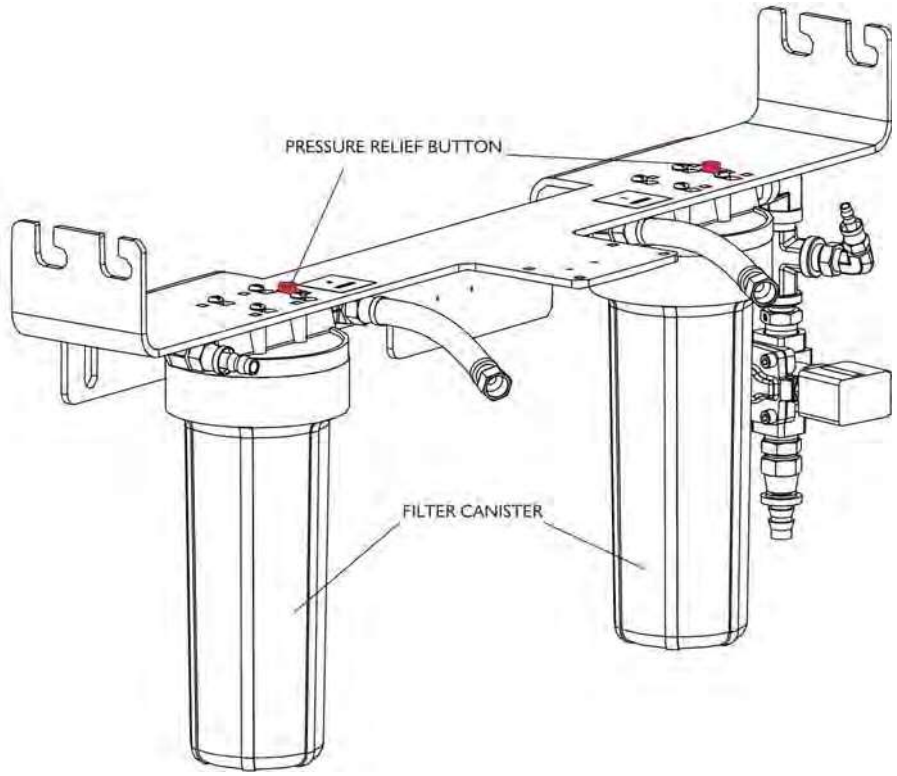
9. Install the PCV adapter on the valve body.
10. Make sure the static seal ring is installed on the seat and loosely install the poppet into the seat.
    Note: Do not press poppet into the seat.
11. Place poppet and seat assembly into the end of the valve body, then thread the PCV assembly into the high-pressure manifold. Tighten to 190 ft-lb (258 N-m).
12. Reconnect the air supply and drain lines.

Follow the startup procedure on Page 14 before returning the HyPlex Prime pump to service.

Notes

Changing the filter elements

Change the filter elements if the post-filter pressure is roughly less than 18 psi when the pump is running. The pump will automatically shut down when pressure is below 15 psi.when the pump is running.



Note: Check filter pressure gauges only when pump is running at full speed and operating at full UHP output pressures. When the pump is stopped, the pressures will increase substantially, even with a dirty filter.

Service steps

1. Shut down the system.
2. Close the water inlet source valve.
3. Remove the filter canisters using a strap wrench.
4. Remove the filters from the canisters and discard.

CAUTION
Using dirty or incorrect filter elements can shorten pump life.

5. Inspect the contents of the canister.

   Note: This inspection can provide early warning of a change in inlet water quality. Filter life and inlet water quality are directly related.
6. Clean the canisters and install new filter cartridges.

CAUTION
The 0.5µ and 1.0µ cartridges must be installed in the correct position as labeled on the pump—failure to do so could shorten pump life.

7. Re-assemble the filter canisters to the filter housing using a strap wrench.
8. Open the water inlet source valve. Check for leaks.

CAUTION
You must open the water inlet source valve before starting the pump—failure to do so could severely damage the pump.

9. When the filter canisters are pressurized, it is necessary to remove air from the system by pressing the red pressure-relief buttons located on top of the filter housings.
10. Enter the date and/or hours of operation from the hour meter into the service log.

Replacing the dynamic seals and plungers

Use this procedure if service is required outside of the preventive maintenance schedule. It is important that you continue to maintain the pump according to the procedures specified in the required maintenance kit instructions.

Remember, different horsepower pumps have different maintenance intervals. See the interval listing on Page 26, and refer to drawing 049656.

In the event of premature failure, you will need to integrate dynamic seal repair with the preventive maintenance described in this manual. FLOW suggests the following strategy.

Premature failure close to the scheduled time

If the dynamic seal fails within 50 hours of a scheduled service, perform a complete service procedure. Record the actual hour meter reading when you install the maintenance kit—the next scheduled maintenance should take place at the specified number of hours from this reading.

For example, suppose you have a 50 hp pump. The Dynamic Seal maintenance interval is every 300 hours. The dynamic seal fails at 250 hours, 50 hours short of a scheduled maintenance period. Install the Dynamic Seal maintenance kit, but the next scheduled maintenance would take place at 550 hours, not 600 hours.

Premature failure midway between scheduled service

If the dynamic seal fails somewhere midway between two scheduled service periods (for example, a dynamic seal on a 50 hp pump that fails at 150 hours since last service), FLOW recommends replacing all components to prevent unexpected down time.

Tools

Plunger nut installation tool, 011153-1

Service steps

1. Push in the E-stop.

WARNING
Place the main electrical disconnect OFF and bleed down all high-pressure lines. Place an "Out of Service" tag on the main electrical disconnect and lock it out.
Failure to do so may result in equipment damage or injury to personnel.

2. Disconnect all high-pressure and low-pressure interface connections to access the tie rods. Place the manifold and PCV assembly combination aside.
3. Use the pressure loading tool to unload the tie rods (see *Unloading the tie rods* on Page 43).

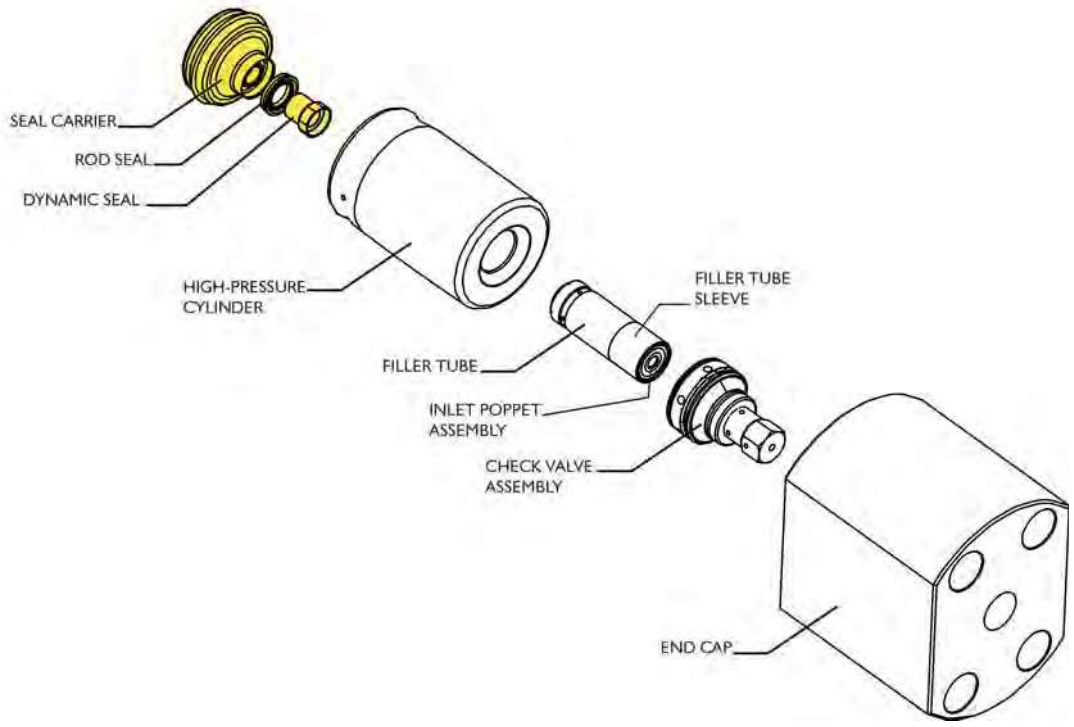
For each of the three cylinders

4. Remove the end cap, high-pressure cylinder, inlet poppet, springs, filler tube, and sleeve.
5. Slide the dynamic seal carrier off the plunger if it did not come out with the high-pressure cylinder. Remove and discard the dynamic seal and rod seal.

CAUTION
Use care when removing the dynamic seal and rod seal. Do not scratch or nick the seal carrier bores.

6. Inspect the seal carrier and plunger for damage. Keep and reuse the seal carrier if undamaged. The plunger should not have touched the bore of the seal carrier.
   - If there are contact marks on either component, replace both components.
   - If both components are OK, skip to Step 3 of *Installation and reassembly* on Page 86.
7. Remove the subplate adapter.

   Note: If the plunger is damaged, replace the rod seal in the subplate adapter by removing the snap ring with snap ring pliers. Discard the rod seal. Keep the snap ring and spacer for reuse.
8. Rotate the crankshaft to place the damaged plunger in its fully extended position. Using the plunger nut tool, remove and retain the plunger nut and spring. Slide the plunger assembly from the crosshead bore and discard.



Installation and reassembly

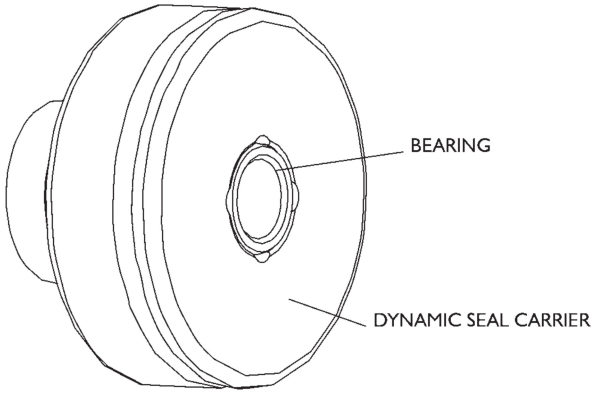
1. With the crosshead in its fully extended position, apply anti-seize to the nut, and place spring into the counterbore of the plunger nut. Slip the nut and spring over the new plunger, engage the threads of the crosshead, and tighten to 20 ft-lb (27 N-m) using the plunger nut tool.
2. With the v-shaped face of the rod seal towards the subplate adapter, install the new seal in the counterbore of the subplate adapter.
3. Place the spacer in the counterbore with the chamfered side down (toward the newly-installed seal).
4. Secure the rod seal and spacer with the snap ring.
5. Lubricate and install the o-rings onto the adapter, and slide over the plunger until it engages the counter-bore of the subplate.

Repeat for the remaining subplate adapters.

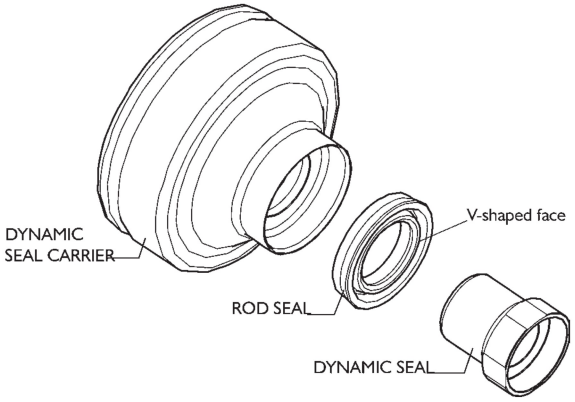
Assemble and install the dynamic seal carrier

1. Inspect the dynamic seal carrier for cleanliness. Make sure the guide bearing of the seal carrier is flush with the face of the carrier and is in good condition (the presence of cracked or loose pieces is reason for replacement).

   Replace the dynamic seal carrier if necessary. Clean as necessary.



2. Install the rod seal as shown with the v-shaped face facing up, away from the dynamic seal carrier.



3. Install the new dynamic seal into the inner diameter of the rod seal, making sure the dynamic seal is fully seated against the dynamic seal carrier.

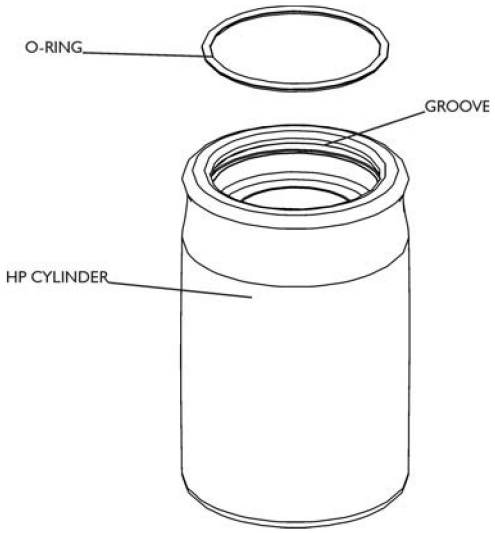
   Note: Make sure the plungers are clean and free of any damage or scratches before installing the dynamic seal carriers. The subplate adapter/seal carrier interface must be clean and free of debris.

4. Slide the seal carrier onto the plunger until seated against the register of the adapter.

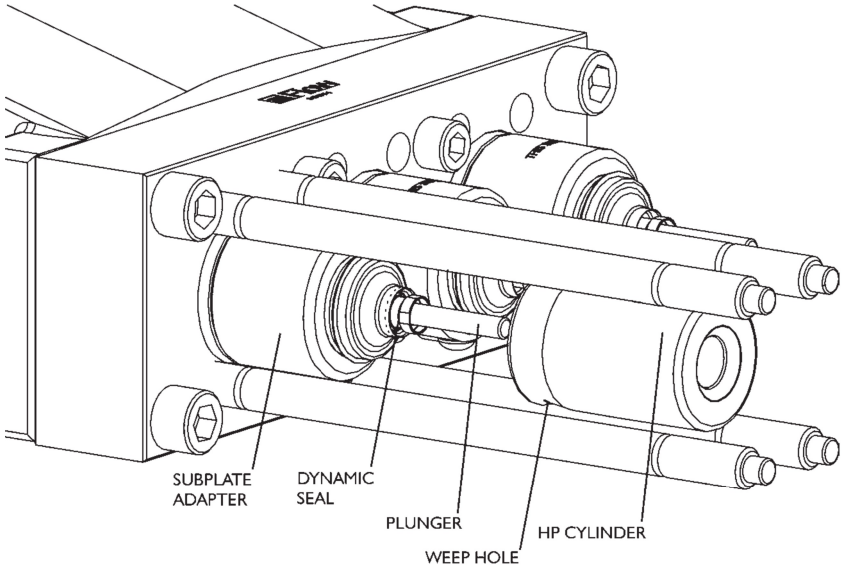
Repeat for the remaining dynamic seal carriers.

Install the high-pressure cylinder

1. Lubricate the o-ring with o-ring lube and place it in the appropriate grooves of the high-pressure cylinder.



2. Slide the high-pressure cylinder over the plunger assembly and seat it against the seal carrier. Position the cylinders with weep holes facing downward.



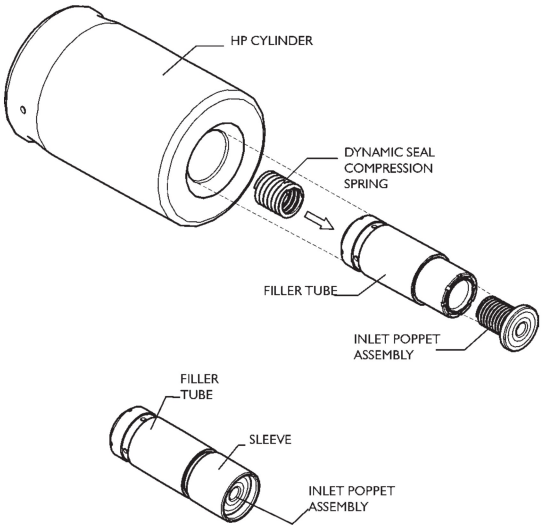
Note: A small amount of force may be needed to seat the cylinder against the seal carrier.

Repeat for the remaining high-pressure cylinders.

Install the filler tube assembly

1. Place the dynamic seal compression spring into the tapered end of the filler tube.
2. Insert the inlet poppet assembly into the filler tube, spring end first.
3. Install the filler tube sleeve so that it surrounds the inlet poppet and spring.

   Note: The filler tube sleeve helps align the poppet with the check valve body and prevents pinching of the poppet between the check valve and filler tube during assembly.



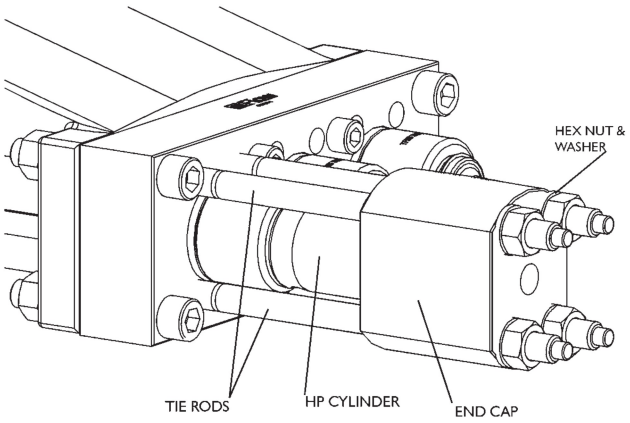
4. Insert the filler tube–spring end first–into the high-pressure cylinder, making sure to engage the spring into the dynamic seal.

Repeat for the remaining filler tubes.

Install the end cap

CAUTION
It is important to install the end cap in one fluid motion toward the crankcase. Do not let the end cap move away from the high-pressure cylinder while installing. If it does, the inlet poppet can be pinched, causing damage.

1. Align the end cap so it will slide over the tie rods. Carefully slide the end cap towards the HP cylinder until the check valve body makes contact with the inlet poppet.
2. Continue to slide the end cap until the high-pressure cylinder engages the o-ring in the end cap and the check valve body seats itself against the high-pressure cylinder.



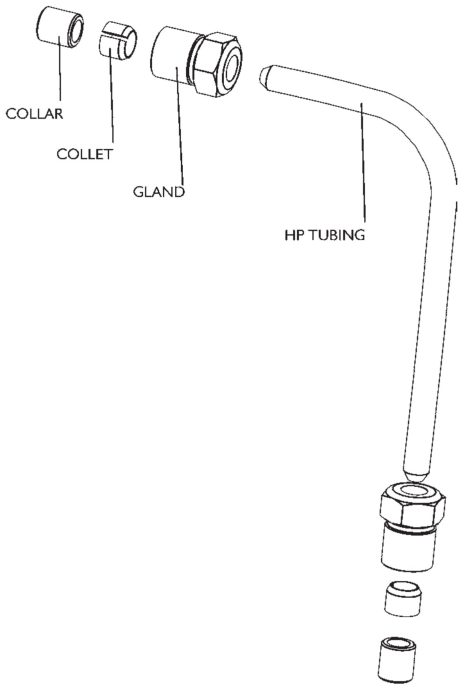
3. Temporarily install one of the hex nuts, hand tight, to prevent the end cap from springing back from the HP cylinder.

Follow Steps 1–3 to install the other two end caps in the same way, then continue with Step 4.

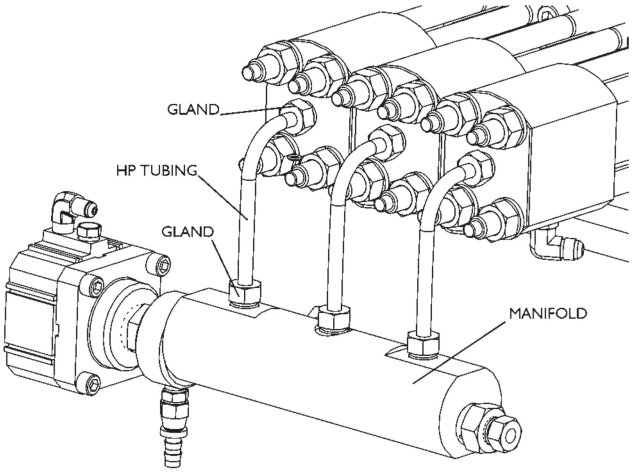
4. Apply a thin coat of anti-seize compound to both sides of the washers and threads of the tie rods.
5. Install washers and hex nuts hand tight.
6. Remove the temporarily installed hex nuts. Apply anti-seize to both sides of the washers and threads, then reinstall the nuts.
7. Use the pressure loading tool to load the tie rods (see *Loading the tie rods* on Page 44).

Install the manifold assembly

1. Apply a thin coat of Blue Lubricant to each of the threads on the 3/8 in. high-pressure glands.
2. Slide tube shielding over the tube length.
3. On each end of the tube: slide a gland on to the tube, then thread a collet and a collar on the threaded ends of the tube.



4. Repeat Steps 1–3 for the remaining two high-pressure tubes.
5. Insert one end of the tube into the high-pressure port on the manifold and loosely thread the glands in place. Repeat for the other two high-pressure tubes.
6. Loosely thread the other end of each of the three tubes into the end cap ports.



7. Once in place, tighten all six gland nuts. Torque to 40 ft-lb (54 N-m).
8. Reconnect all high- and low-pressure interface connections.

Complete the kit installation

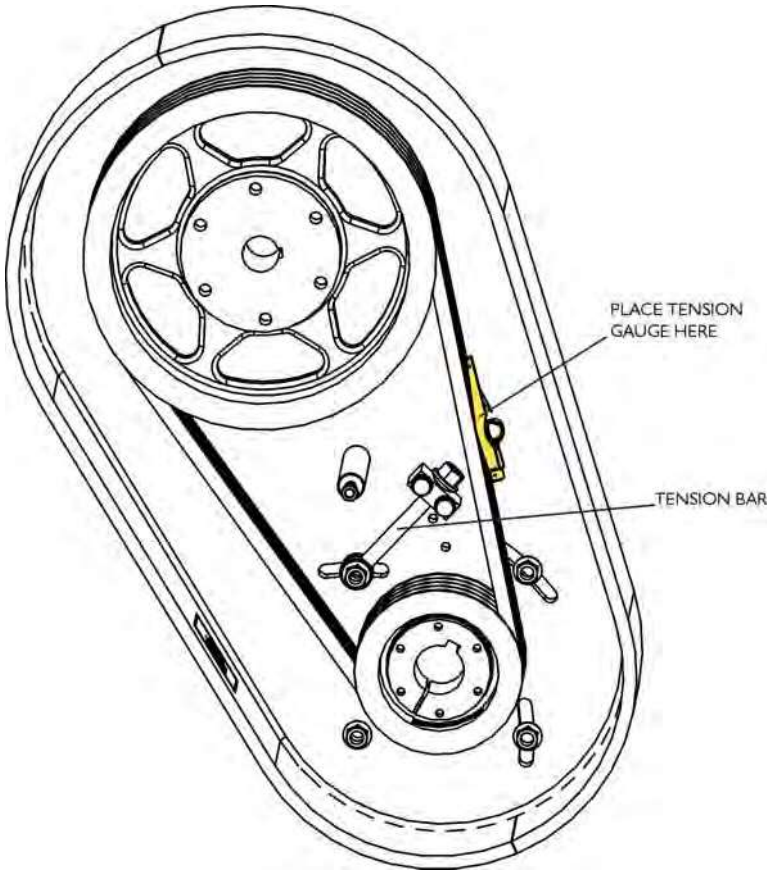
1. Remove the oil temperature sensor (or plug) from the crankcase drain and completely drain the oil.
2. Reinstall the oil temperature sensor (or plug) and fill the crankcase with oil to the level indicated on the dipstick. Recommended oils are listed in Chapter 1.

Return the pump to service

Follow the start-up procedure on Page 14 before returning the HyPlex Prime pump to service.

Tensioning and aligning the belt drive

Service the pulleys and belts during scheduled Major Maintenance service interval or if belts fail.



For optimum belt performance, the V-belt drive must be tensioned and aligned properly. Follow these general rules when tensioning a drive:

- The ideal tension for the belt drive is the lowest tension at which the belt will not slip under the highest load condition.
- Check tension on a new drive belt frequently during the first day of operation and periodically thereafter.
- Excessive tension shortens belt and bearing life.
- Keep the belt and pulleys free from oil, grease, cutting lubricants, or belt dressing—any of these can cause the belt to slip.
- If a V-belt slips, it is not at proper tension and needs to be tightened.
- Do not use subsititute hardware.

Servicing the belts

WARNING
Place the main electrical disconnect in the OFF position and bleed down all high-pressure lines. Place an "Out of Service" tag on the main electrical disconnect and lock it out. Failure to do so can result in equipment damage or injury to personnel.

1. Shut down the system.
2. Remove the belt guard.
3. Loosen the four hex nuts that attach the transmission housing to the electric motor. Turn the nut on the tension bar CCW. This allows the weldment to rotate so you can remove the belts.
4. Install the four new belts.

   Note: It is important to replace all four belts at the same time to maintain consistent performance of the drive system.

5. Turn the nut on the tension bar CW until there is tension on the belts.
6. Use the belt tension gauge to determine correct tension on one of the belts.

   Note: This step is for verifying tension only. Perform this step before loosening any hex nuts.

   a. Place the gauge in the center of the belt midway between pulleys, and align the sides of the gauge parallel to the edges of the belt.

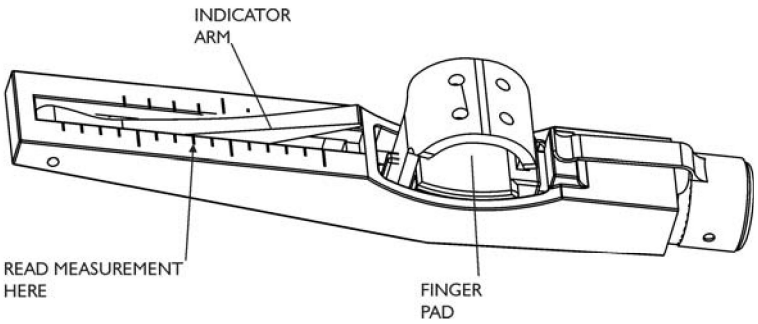
   b. Push slowly on the colored pad with a force perpendicular to the belt to get an accurate reading. When you hear a click, immediately stop pressing and carefully remove the gauge.

      Note: Only the pad of the tool must be touched during measurement.

   c. Turn the gauge sideways to see the exact spot where the top of the indicator arm intersects the scale.

   d. Take more than one reading to assure repeatable measurements.

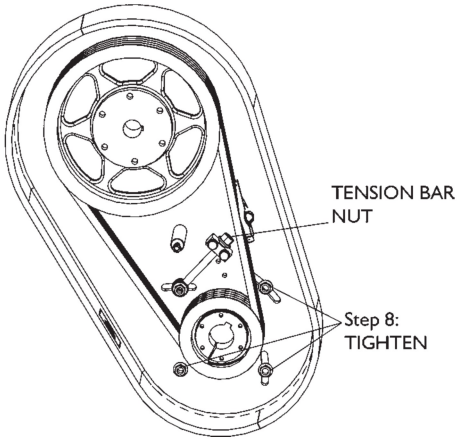
7. Turn the nut on the tension bar CW to increase tension or CCW to decrease tension. Tension should be set between 100 and 110 lbs (445-489 N). Refer to drawing 049785.



When the tension is correct:

8. Use a 3/4 in. socket to torque the three flanged nuts not attached to the tension bar to the appropriate torque value in the table below. Do not tighten the flanged nut that attaches the tension rod end to the housing.

30 hp	*50 hp*
75 ft-lb (102 N-m)	125 ft-lb (170 N-m)



9. Remove tension from the tension bar nut. Torque the final (the fourth) flanged nut to the appropriate torque value.
10. Tighten the nut on the tension bar to 15 ft-lb (20 N-m).
11. Reinstall the belt guard.

Remove the “Out of Service” tag from the main electrical disconnect and make final inspection to remove tools, parts, and rags from the equipment. The pump is ready for operation.

Servicing the crankcase

The only service required for the HyPlex Prime crankcase is to maintain adequate levels of clean oil and to replace worn piston rod seal assemblies.

Rebuilding the crankcase is not recommended.

Lubricating the pump

Use of Shell Morlina 100 Hydraulic Oil (ISO 100) is recommended, but other manufacturer's equivalents can be used.

When operating the pump in an environment with an ambient temperature greater than 86°F (30°C) a heavier oil is recommended to be used. Contact Flow Technical Services for additional information.

Maintain oil level between the high and low level marks on the dipstick inserted through the crankcase cover.

- Check oil levels regularly
- Change the oil every Dynamic Seal kit interval
- Change oil immediately if water droplets are found on the dipstick

Crankcase replacement parts

Part number	Qty.	Description
015445-1	3	Piston rod seal carrier assembly
A-0275-036	3	Seal carrier o-ring
A-12498	1	Gasket

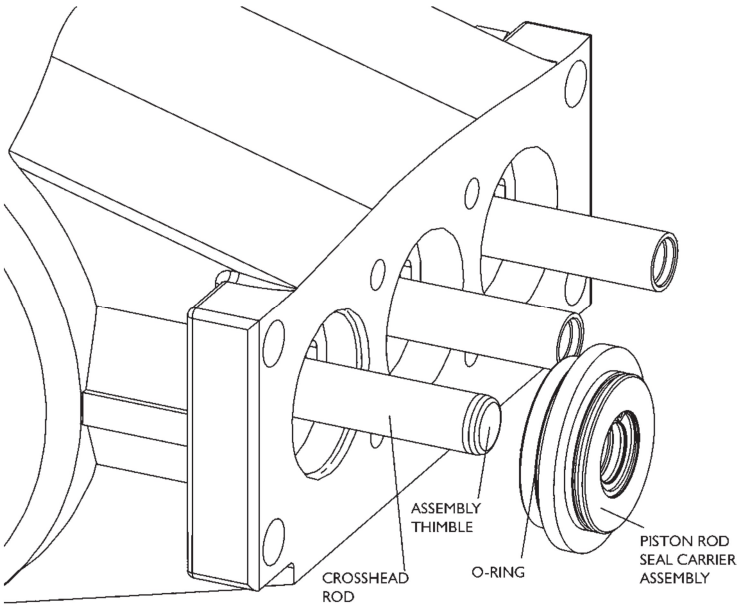
Replacing the piston rod seal assembly

The piston rod seal assembly contains three oil seals installed in seal carrier and an o-ring on the outer diameter. The oil seals cannot be replaced individually; the entire assembly must be replaced.

To access and replace the seal assembly, the subplate must be removed

Use the assembly thimble (015624-1) on the end of the crosshead adapter; this will expand the sealing edge as the housing slides back to engage the crankcase bore. Use care to ensure that the oil seal carrier (044099-1) is oriented correctly with the OD o-ring toward the crankcase).

FLOW recommends replacing all three piston rod seal assemblies at the same time to prevent unexpected down time.



Notes

CHAPTER 5

Engineering Drawings

The following drawings are provided with this manual. Please note that drawings are provided for reference only. Drawings and part numbers can become obsolete as a part of Flow's ongoing product improvement. If part numbers are replaced by new numbers, Flow Customer Service will inform you when you order new parts.

30/50 hp HyPlex Prime

050051-X-X-X-X-X HyPlex Prime

Application package
Cable package
Control package
Hardware kit
Base unit

049785-X Base unit	
-1	30 hp 230V/460V 60Hz
-2	30 hp 380V 50Hz
-6	50 hp 230V/460V 60Hz
-7	50 hp 380V 50Hz

049657-X Hardware kit	
-1	Basic package
-2	Standard package
-3	Basic (dual pressure)
-4	Standard (dual pressure)
-5	Plus package
-6	Premium package

050242-X Application package	
-1	Basic package, no covers
-2	Extended package, covers
-3, -7	With gauge, no covers
-4, -8	With gauge, covers
-5	With transmitter, no covers
-6	With transmitter, covers

Electrical

Elementary electrical drawings are located in the system manual.

049886-X Control package	
-1	No control package
-2	30 hp Standard 460V 60Hz, 380V 50Hz
-3	30 hp Plus, Premium 460V 60Hz, 380V 50Hz
-4	30 hp Standard 230V 60Hz
-5	30 hp Plus, Premium 230V 60Hz
-10	50 hp Standard 460V 60Hz, 380V 50Hz
-11	50 hp Plus, Premium 460V 60Hz, 380V 50Hz
-12	50 hp Standard 230V 60Hz
-13	50 hp Plus, Premium 230V 60Hz
-50	30 hp or 50 hp Plus (non-B&R-controlled)
-51	30 hp or 50 hp Premium (non-B&R-controlled)

049893-X Cable package	
-1	***Basic:*** 30 hp 230V 60Hz, 30 hp 460V 60Hz, 50 hp 460V 60Hz, 50 hp 380V 50Hz 30 hp 380V 50Hz, 30 hp 575V 60Hz, 50 hp 575V 60Hz
-2	***On-board:*** 30 hp 230V 60Hz, 30 hp 460V 60Hz, 50 hp 460V 60Hz, 50 hp 380V 50Hz 30 hp 380V 50Hz, 30 hp 575V 60Hz, 50 hp 575V 60Hz
-3	***Remote:*** 30 hp 230V 60Hz, 30 hp 460V 60Hz, 50 hp 460V 60Hz, 50 hp 380V 50Hz 30 hp 380V 50Hz, 30 hp 575V 60Hz, 50 hp 575V 60Hz
-6	***On-board:*** 50 hp 230V 60Hz
-7	***Remote:*** 50 hp 230V 60Hz

Maintenance kits

050625-1 Rev A
PCV maintenance kit

#	Qty	Part #	Description
1	1	012906-1	Bearing assembly
2	1	049494-1	Plunger
3	1	013033-1	Plunger seal
4	1	A-0275-206	O-ring
5	1	A-0275-119	O-ring
6	1	A-0275-120	O-ring
7	1	A-4689	Food-grade grease
8	1	049492-DWG	PCV drawing
9	1	SB-0260	PCV maintenance bulletin

050626-1 Rev A
Dynamic seal maintenance kit

#	Qty	Part #	Description
1	3	011051-1	Dynamic seal
2	3	A-00621-33	Rod seal
3	1	A-1903	Grinding paper
4	1	049656-DWG	HP assembly drawing
5	2	A-20386-1	Anti-seize lubricant
6	1	SB-0261	Dynamic seal maintenance bulletin

050624-1 Rev. A
Minor maintenance kit
30/50 hp pump

#	Qty	Part #	Description
1	3	011051-1	Dynamic seal
2	3	A-00621-33	Rod seal
3	3	011042-1	Inlet poppet
4	3	011040-1	Outlet poppet guide
5	3	011039-1	Outlet poppet
6	3	011041-1	Outlet poppet seat
8	6	A-0275-033	O-ring
9	3	A-0275-025	O-ring
10	1	A-4689	Food-grade grease
11	3	A-9223	Compression spring
12	3	A-12219	Spring
13	3	011350-1	Filler tube sleeve
14	2	A-20386-1	Anti-seize lubricant
15	3	A-00720-31	Rod seal
16	1	049656-DWG	HP assembly drawing
17	1	A-1903	320 grit paper
27	3	A-0265-062	Internal snap ring
30	1	A-0275-029	HP o-ring
31	1	SB-0258	Minor maintenance bulletin
34	1	042145-2	PCV poppet/seat assembly

050624-2 Rev. A
Major maintenance
30/50 hp pump

#	Qty	Part #	Description
1	3	011051-1	Dynamic seal
2	3	A-00621-33	Rod seal
3	3	011042-1	Inlet poppet
4	3	011040-1	Outlet poppet guide
5	3	011039-1	Outlet poppet
6	3	011041-1	Outlet poppet seat
9	6	A-0275-025	O-ring
10	1	A-4689	Food-grade grease
11	3	A-9223	Compression spring
12	3	A-12219	Compression spring
13	3	011350-1	Filler tube sleeve
14	2	A-20386-1	Anti-seize lubricant
15	3	A-00720-31	Rod seal
16	1	049656-DWG	HP assembly drawing
19	3	044099-1	Seal carrier
21	3	049584-1	High-pressure cylinder
22	3	049578-1	Check valve body
27	3	A-0265-062	Internal snap ring
30	3	A-0275-029	HP o-ring
32	1	SB-0259	Major maintenance bulletin
33	6	A-0275-033	O-ring
34	1	042145-2	PCV poppet/seat assembly

Tools

012068-3 Rev. K
Tool kit

#	Qty	Part #	Description
1	1	011153-1	Plunger nut tool
3	1	A-1904	Glass plate
5	1	012324-1	Rebuild clamp (for check valve body)
8	1	A-8466	Medical alert card
9	1	A-2185	Blue Lubricant
11	1	A-25403-1	Belt tension gauge

049512-1 Rev. A
Pressure loading tool

Recommended spares

These parts are not contained in a spares kit, but FLOW recommends that you keep them on hand.

Water filters

A-25216-1	0.5 micron filter
A-25216-2	1 micron filter

PCV spares

042145-2	PCV poppet/seat assembly

050469-1 Rev. A
Pressure loading tool spares kit

#	Qty	Part #	Description
1	1	049515-1	Oil seal backup ring
2	1	049518-1	Hydraulic oil seal
3	1	A-0275-116	O-ring
4	1	A-0275-033	O-ring
5	1	A-0276-033	Backup ring
6	1	A-0274-3	O-ring

Notes