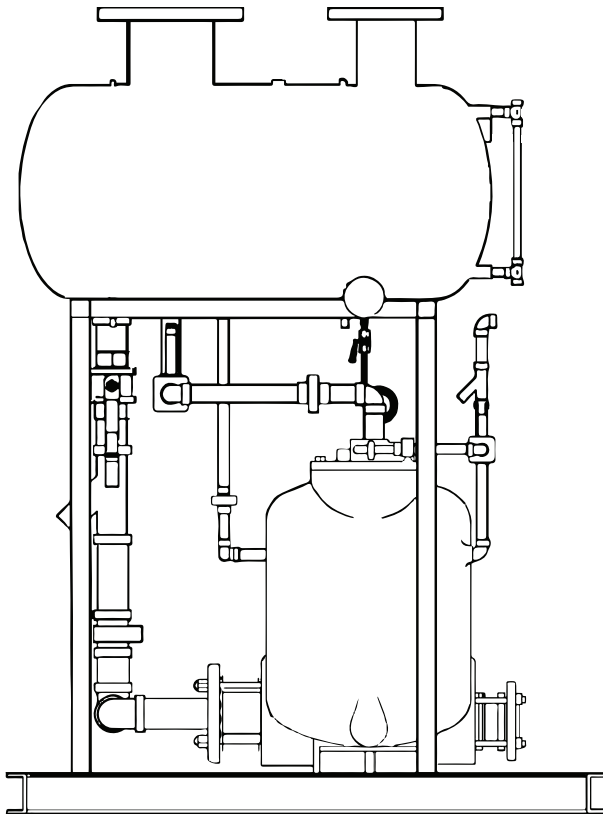


Standard Pressure Powered Pump Packaged Units up to Size 3" x 2" Type PPEC, PTC & PTF with vented and ASME coded receivers Installation and Maintenance Instructions



Contents

1. Safety Information
2. Unit Configuration
3. Scope of Supply
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1. Safety information

Safe operation of these products can only be guaranteed if they are properly installed, commissioned, used and maintained by qualified personnel (see Section 1.11) in compliance with the operating instructions. General installation and safety instructions for pipeline and plant construction, as well as the proper use of tools and safety equipment must also be complied with.

1.1 Intended use

Referring to the Installation and Maintenance Instructions, name-plate and Technical Information Sheet, check that the product is suitable for the intended use / application.

- i) The products have been specifically designed for use on steam, air or water/condensate. The products' use on other fluids may be possible but, if this is contemplated, Spirax Sarco should be contacted to confirm the suitability of the product for the application being considered.
- ii) Check material suitability, pressure and temperature and their maximum and minimum values. If the maximum operating limits of the product are lower than those of the system in which it is being fitted, or if malfunction of the product could result in a dangerous overpressure or overtemperature occurrence, ensure a safety device is included in the system to prevent such over-limit situations.
- iii) Determine the correct installation situation and direction of fluid flow.
- iv) Spirax Sarco products are not intended to withstand external stresses that may be induced by any system to which they are fitted. It is the responsibility of the installer to consider these stresses and take adequate precautions to minimise them.
- v) Remove protection covers from all connections and protective film from all name-plates, where appropriate, before installation on steam or other high temperature applications.

1.2 Access

Ensure safe access and if necessary a safe working platform (suitably guarded) before attempting to work on the product. Arrange suitable lifting gear if required.

1.3 Lighting

Ensure adequate lighting, particularly where detailed or intricate work is required.

1.4 Hazardous liquids or gases in the pipeline

Consider what is in the pipeline or what may have been in the pipeline at some previous time. Consider: flammable materials, substances hazardous to health, extremes of temperature.

1.5 Hazardous environment around the product

Consider: explosion risk areas, lack of oxygen (e.g. tanks, pits), dangerous gases, extremes of temperature, hot surfaces, fire hazard (e.g. during welding), excessive noise, moving machinery.

1.6 The system

Consider the effect on the complete system of the work proposed. Will any proposed action (e.g. closing isolation valves, electrical isolation) put any other part of the system or any personnel at risk?

Dangers might include isolation of vents or protective devices or the rendering ineffective of controls or alarms. Ensure isolation valves are turned on and off in a gradual way to avoid system shocks.

1.7 Pressure systems

Ensure that any pressure is isolated and safely vented to atmospheric pressure. Consider double isolation (double block and bleed) and the locking or labelling of closed valves. Do not assume that the system has depressurised even when the pressure gauge indicates zero.

1.8 Temperature

Allow time for temperature to normalise after isolation to avoid danger of burns.

1.9 Tools and consumables

Before starting work ensure that you have suitable tools and / or consumables available. Use only genuine Spirax Sarco replacement parts.

1.10 Protective clothing

Consider whether you and / or others in the vicinity require any protective clothing to protect against the hazards of, for example, chemicals, high / low temperature, radiation, noise, falling objects, and dangers to eyes and face.

1.11 Permits to work

All work must be carried out or be supervised by a suitably competent person. Installation and operating personnel should be trained in the correct use of the product according to the Installation and Maintenance Instructions.

Where a formal 'permit to work' system is in force it must be complied with. Where there is no such system, it is recommended that a responsible person should know what work is going on and, where necessary, arrange to have an assistant whose primary responsibility is safety.

Post 'warning notices' if necessary.

1.12 Handling

Manual handling of large and/or heavy products may present a risk of injury. Lifting, pushing, pulling, carrying or supporting a load by bodily force can cause injury particularly to the back. You are advised to assess the risks taking into account the task, the individual, the load and the working environment and use the appropriate handling method depending on the circumstances of the work being done.

1.13 Residual hazards

In normal use the external surface of the product may be very hot. If used at the maximum permitted operating conditions the surface temperature of some products may reach temperatures in excess of 300 °C (572 °F).

Many products are not self-draining. Take due care when dismantling or removing the product from an installation (refer to 'Maintenance instructions').

1.14 Freezing

Provision must be made to protect products which are not self-draining against frost damage in environments where they may be exposed to temperatures below freezing point.

1.15 Disposal

Unless otherwise stated in the Installation and Maintenance Instructions, this product is recyclable and no ecological hazard is anticipated with its disposal providing due care is taken.

1.16 Returning products

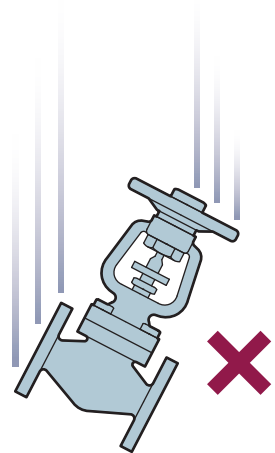
Customers and stockists are reminded that under EC Health, Safety and Environment Law, when returning products to Spirax Sarco they must provide information on any hazards and the precautions to be taken due to contamination residues or mechanical damage which may present a health, safety or environmental risk. This information must be provided in writing including Health and Safety data sheets relating to any substances identified as hazardous or potentially hazardous.

1.17 Working safely with cast iron products on steam

Cast iron products are commonly found on steam and condensate systems. If installed correctly using good steam engineering practices, it is perfectly safe. However, because of its mechanical properties, it is less forgiving compared to other materials such as SG iron or carbon steel. The following are the good engineering practices required to prevent waterhammer and ensure safe working conditions on a steam system.

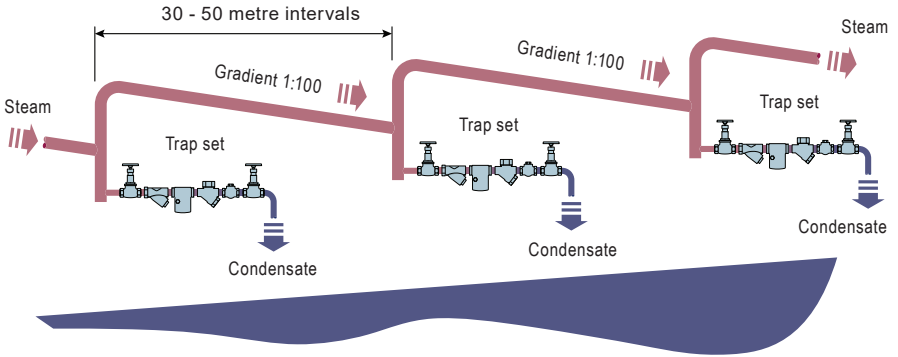
Safe Handling

Cast Iron is a brittle material. If the product is dropped during installation and there is any risk of damage the product should not be used unless it is fully inspected and pressure tested by the manufacturer.

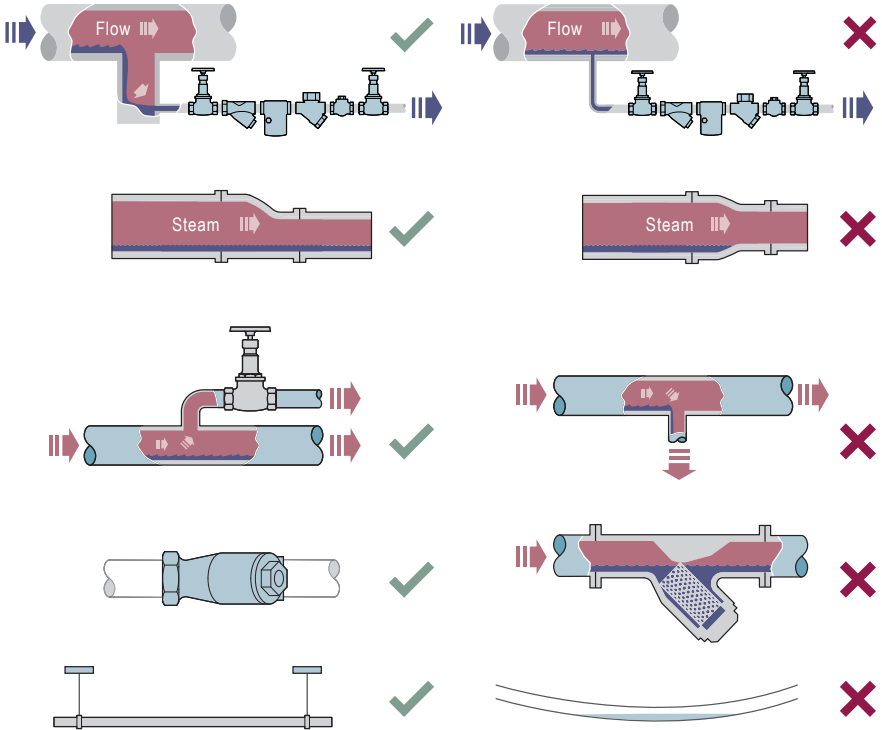


Prevention of waterhammer

Steam trapping on steam mains:



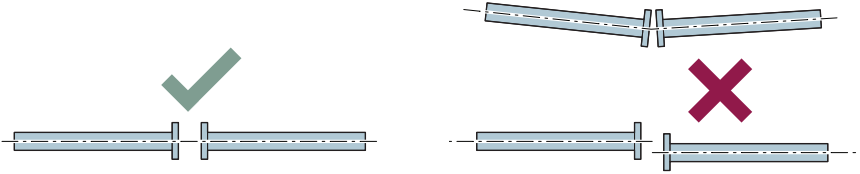
Steam Mains - Do's and Don'ts:



Standard Pressure Powered Pump Packaged Units up to Size 3" x 2"

Prevention of tensile stressing

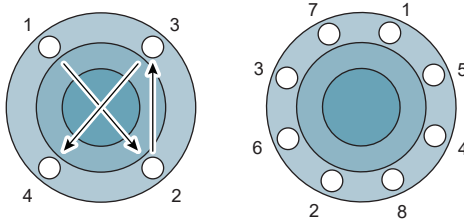
Pipe misalignment:



Installing products or re-assembling after maintenance:

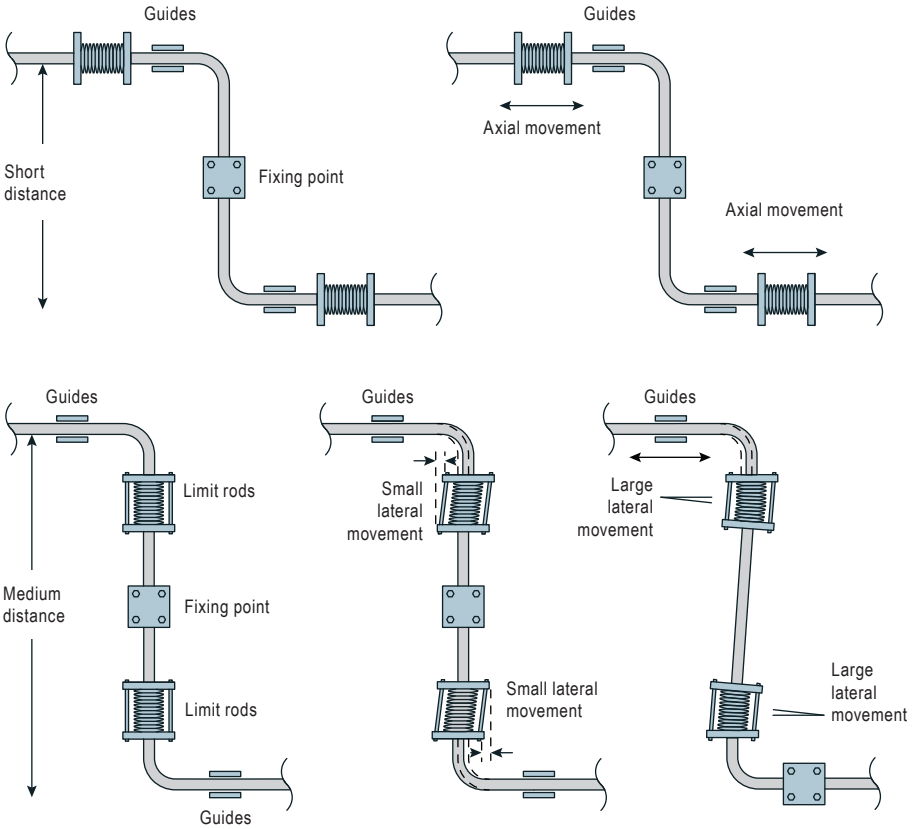


Do not over tighten.
Use correct torque figures.



Flange bolts should be gradually tightened across diameters to ensure even load and alignment.

Thermal expansion:



Standard Pressure Powered Pump Packaged Units up to Size 3" x 2"

2. Unit Configuration

Spirax Sarco Packaged Pressure Powered Pump units consist of an integral pump and receiver assembly, prepiped to form an easily installed, readily serviceable pumping station. The Pump/Receiver packages allow separation of the liquid condensate from flash steam and any noncondensable gas. The receiver also provides a reservoir for condensate discharged from the traps during the discharge portion of the pump cycle when the pump inlet check valve is closed.

Type PTC vented receiver packaged units are used where the flash steam is discharged to atmosphere along with any noncondensables. The PTC package contains an iron pump body and fabricated steel receiver which must be properly vented.

The receiver may be purchased with an ASME code stamped receiver. This must be used when the packaged unit is to be used for flash steam recovery in a closed loop return system. Commonly a PTF, an ASME code stamped pump, will also be used for an ASME coded package unit.

All Standard PPEC and Pivotrol standard pump packages are available with either one (simplex) or two (duplex) Pressure Powered Pumps with the PTF and PTC variants available with up to four (quadraplex) pumps.

For applications with a specific gravity lower than 0.9, please contact Spirax Sarco for a custom quote.

All pressure powered pumps™ used on packaged units operate using steam, air or other compressed gas from 5 to 200 psi g (5 to 125 psi g for PPEC) as the motive force. For information on pump operation and service, Installation and Maintenance Instructions, IM-5-200 or IM-5-201, are enclosed with each pump. These should be reviewed prior to installation of any packaged unit.

3. Scope of Supply

As a standard this module includes the Spirax Sarco Pressure Powered Pump(s) with condensate inlet and outlet check valves.

Also included with each standard package is a vented condensate receiver, pre-piped to each pump with an inlet isolation valve and inline strainer fitted to the inlet of the pump along with pre-piped and trapped motive and exhaust piping with a motive pressure gauge.

Other items that may be included as an option are as follows:

1. Pump Insulation Blanket(s)
2. Receiver Insulation Blanket
3. Receiver Gauge Glass¹
4. Overflow Piping¹
5. Pump Discharge Gate Valve(s)
6. Pump Drain Valve(s)
7. Discharge Manifold²
8. Other Custom Options available upon request

¹ - Items 3 and 4 will ship loose for field installation

² - Discharge Manifold does not include the discharge isolation valves and is only available with two or more pumps.

Spare parts for component products are available in section 8. For full details and fitting/maintenance instructions, see separate relevant Installation and Maintenance Instructions.

4. Connections

4.1 Receiver Connections

Condensate Inlets

Each packaged unit is fitted with a condensate inlet on top of the receiver. Refer to the Sales Drawing for connection size and location.

Vent/Low Pressure Steam Delivery

Each packaged unit contains a connection on the top to be used for an atmospheric vent; or on the packages with ASME coded vessels and pumps, it may be used as a steam delivery connection to a low pressure main or process. The receiver vent, unless ASME coded, must be piped unreduced and unrestricted to atmosphere. The vent line should be vertical. If a horizontal run is required the line must be pitched so that it is self draining to the reservoir.

Receiver Drain

All receivers contain a drain connection on the tank bottom. Each pump also has a drain connection with an optional isolation drain valve.

Auxiliary Connections

All receivers contain three (3) ancillary connections which have been included as standard for the addition of: receiver gauge glass, motive steam trap station return, pressure gauge, pump exhaust connection to the vent, overflow connection for the addition of an overflow pipe required on all vented packaged systems.

Overview Connection

Overflow piping must be used on a vented system. The overflow piping must be a 'U' bend water seal which has a 12" minimum depth. Once primed on start-up the water seal is self-filling and should be piped to a suitable drain. The addition of the overflow provides a safety mechanism ensuring the pressure within the receiver does not increase. The overflow is also a tool to diagnose system problems. In the event of the overflow spilling fluid the operator is immediately made aware of a system problem. This could include failed traps feeding the package, failed pump, and changes in system loads and overloaded receiver.

4.2 Pressure Powered Pump Connections:

Motive Pressure Supply

Each standard package will ship pre-piped with motive piping, including a pressure gauge, trap, and strainer. Please refer to the sales drawing for the connection size and location.

Exhaust

All standard packages with ship pre-piped with exhaust piping into the vented receiver. Take care to ensure the exhaust line isolation valve is open prior to commissioning the pump package.

5. Installation and Startup Procedure

5.1 Vented Receiver Installation: (See Fig. 1)

Preparation of Installation

Pipe line cleaning

To perform the efficient operation and to prevent any damage, the condensate return line from the process to the condensate receiver and the motive steam line must be cleaned to remove all dirt, slag and debris. Failure to clean the pipe may result in damage to the package components.

Foundation

The foundation to which the skid is to be installed must be sound and level. The skid base should be set in non-shrink grout to support all surfaces of the structural base. Four (4) anchor bolt holes provided at the base frame (see drawing for location) to protect the skid movement by any possible external force.

Caution:

Before installation or any maintenance is performed, ensure that all steam, air or gas lines are closed to prevent personnel injury. Allow internal, pressurized piping/equipment to depressurize prior to commissioning and allow surfaces to cool to room temperature before removal of components or disassembly.

1. Locate Packaged unit physically below equipment to be drained. Four (4) 5/8" dia. mounting holes are provided in the base for stud mounting.
2. Connect condensate inlet line to receiver connections. The included inline strainer will protect the pump(s) and check valves against rust and debris. During initial start-up, it is advised to blow down the strainer to allow any accumulated debris to clear the system.
3. Pipe the atmospheric vent line to the connection shown in Fig. 1. To ensure full venting of the receiver the vent diameter should not be reduced between the receiver and the atmosphere. Reduction in the vent diameter will reduce the amount of flash vented and can increase the pressure in the receiver.

Note:

Receiver vent connections are sized to keep flash steam within reasonable vent piping velocities. When noise is a consideration, a velocity of 0 to 50 ft/sec. is recommended and heavily loaded larger pumps may require larger size vent piping.

4. Connect the operating medium (Steam, Air or Gas) supply as shown in Fig. 1 below to the motive strainer connection. When condensate is pumped using compressed air, a check valve and liquid drain trap need to be installed in place of the provided steam trap.

Note:

When the available steam or air pressure exceeds 200 psi g (125 psi g for PPEC), a pressure reducing valve is required to reduce the motive pressure supply to the pump. For best operation, motive pressure should be reduced to the minimum amount required to overcome back pressure maintain pumping capacity, this is usually between 15 and 20 psi g above the back pressure. The P.R.V. (if fitted) should be located as far from the pump as possible and consideration should be taken for the pipe volume between the PRV and pump. When required, fit a volume expansion vessel or bottle to prevent rapid loss of motive pressure upon cycling.

5. Connect pump outlet to the condensate return main. It is recommended that a union, a pressure gauge connection, and fully ported shutoff valve be installed after the pump to facilitate maintenance and monitoring of the unit.

6. The receiver overflow piping must be used on a vented system. The overflow piping should be provided and piped to a suitable drain. The addition of the overflow provides a safety mechanism ensuring the pressure within the receiver does not increase. In addition the overflow is a tool to diagnose system problems. In the event of the overflow spilling fluid the operator is immediately made aware of a system problem This could include failed traps upstream feeding the package, failed pump, changes in system requirements overloading the package.
7. Prior to start-up, carefully check the receiver and pump and plug any unused connections. Installation of a thermometer and pressure gauge after the pump will be useful to check systems operation.

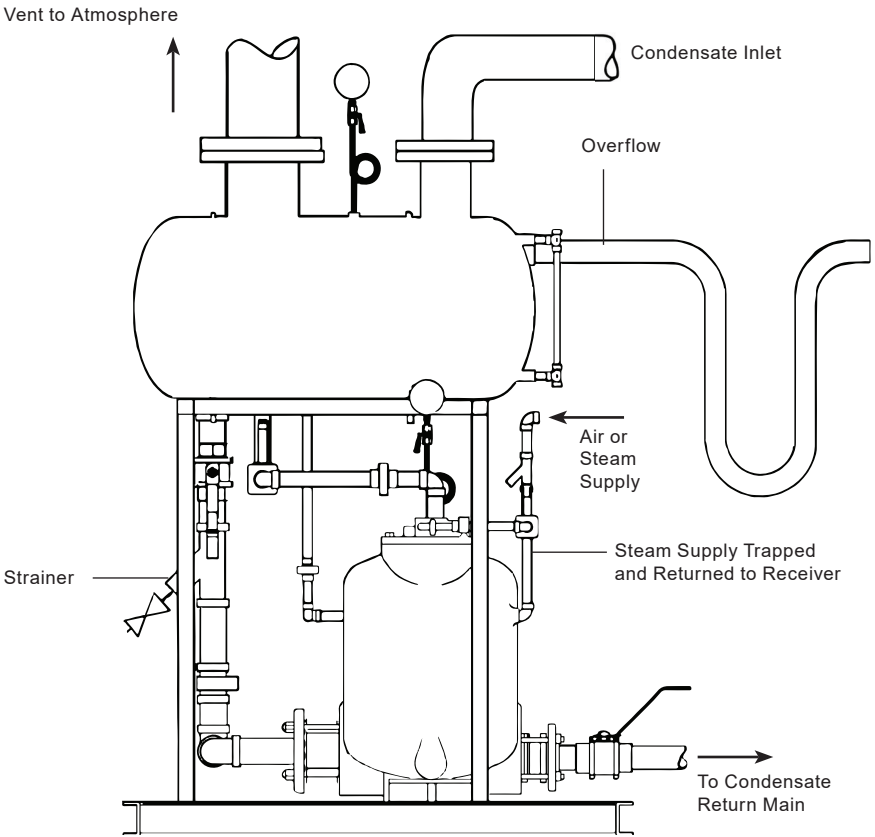


Fig. 1
Packaged Pressure Powered Pump Unit Venting Flash Steam to Atmosphere

Standard Pressure Powered Pump Packaged Units up to Size 3" x 2"

Vented Unit Start-up Procedure:

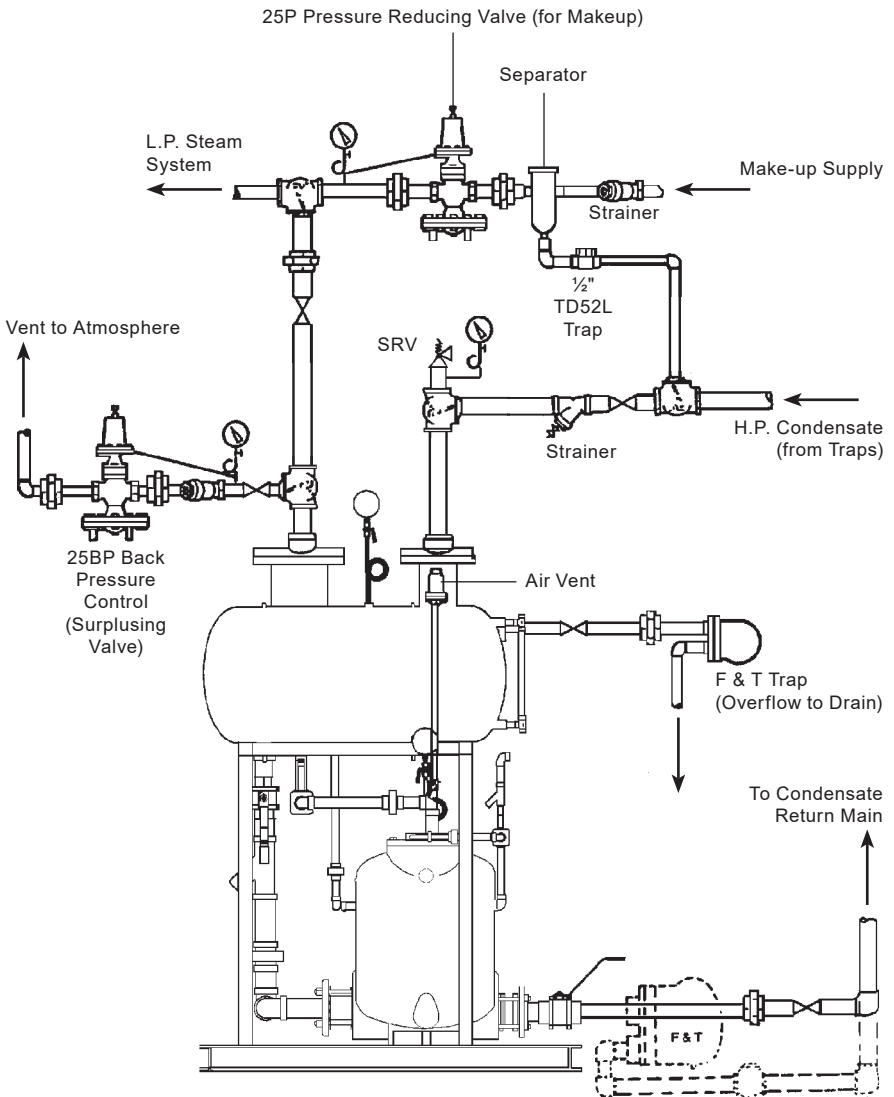
1. Slowly open supply (steam, air or gas) to provide pressure at the P.P. pump inlet valve. Check that the motive drip trap is operational.
2. Open gate valves in the P.P. pump inlet and discharge lines.
3. Open valve(s) ahead of the unit allowing condensate to enter the receiver and fill the pressure power pump™ body. Pump will discharge when full.
4. Observe operation for any abnormalities. Pressure powered pump(s)™ should cycle periodically with an audible exhaust at the end of the pumping cycle. If any irregularities are observed, recheck installation instructions for proper hook-up. Consult pump IM if necessary (IM-5-200 or IM-5-201)".
5. Check that flash steam and pump exhaust are freely vented from the receiver vent piping and ensure that all exhaust isolation valves, both internal to the package and between the receiver and vent discharge, are open. If quantity of flash suddenly increases, check condensate system for leaking bypass valves, steam traps or other similar problems requiring maintenance.
6. The overflow requires a water seal, 12 inches minimum, to prevent any steam from being vented in normal operation. Prime piping as necessary.

5.2 Type PTF Pressurized Receiver Installation (Non-standard, closed-loop): (See Fig 2a)

Caution:

Before installation or any maintenance is performed, ensure that all steam, air or gas lines are closed to prevent personnel injury.

1. Locate unit physically below equipment to be drained. Four (4) 5/8" dia. mounting holes are provided in the base for stud mounting.
2. Connect condensate inlet line to receiver connections. The included inline strainer will protect the pump(s) and check valves against rust and debris. During initial start-up, it is advised to blow down the strainer to allow any accumulated debris to clear the system.
3. Connect the low pressure flash steam system to the appropriate top connection using an isolating valve as shown in Fig. 2. Depending upon the quantity of flash steam produced and how it is utilized, additional equipment may be required to control the low pressure.
4. **Auxiliary Low Pressure Systems Controls.**
When low pressure steam is always required and at times insufficient flash steam is produced, a Spirax Sarco 25P pressure reducing valve is needed to supply makeup steam from the high pressure system.
This valve should be set to open when the desired L.P. (flash) supply drops 2 psi g or more.
When the quantity of flash steam produced at times exceeds the demand load, a Spirax Sarco 25BP back pressure control is recommended. The 25BP acts as a surplusing valve, venting only any excess steam from the receiver to atmosphere.



Note:

Type PTF pump and receiver are ASME code stamped for 200 psig service. Return main back pressure must always exceed receiver pressure or a combination pump/ trap is required as shown in dashed lines.

Fig. 2a
Type PTF Packaged Unit Pressurized for Flash Steam Recovery

Standard Pressure Powered Pump Packaged Units up to Size 3" x 2"

5. A suitably sized safety relief valve should be installed as shown in Fig 2b.

Note:

A 25BP back pressure control is not a safety valve and should never be used for this purpose.

6. Connect the operating motive supply to the motive inlet strainer, refer to the sales drawing for connection size and location. For pressurized condensate systems, only steam is recommended. The supply main should have a strainer and be dripped with a steam trap ahead of the pump(s) inlet.

Note:

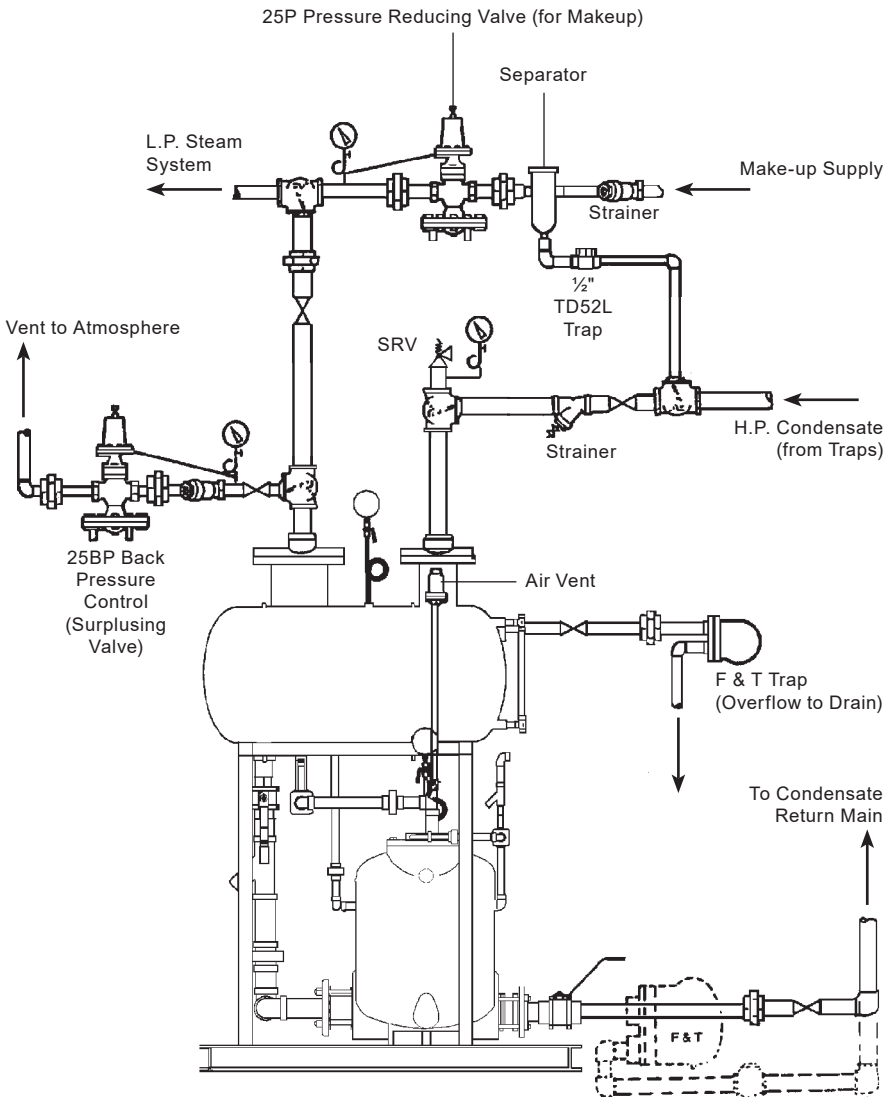
When available steam or air pressure exceeds 200 psi g (125 psi g for PPEC), a pressure reducing valve is required to reduce the motive pressure supply to the pump. For best operation and to increase longevity of the pump, the motive pressure should be reduced to the minimum amount required to overcome the back pressure and maintain pumping capacity, this is usually between 15 and 20 psi g above the back pressure. The P.R.V. (if fitted) should be located as far from the pump as possible and consideration should be taken for the pipe volume between the PRV and pump. When required, fit a volume expansion vessel or bottle to prevent rapid loss of motive pressure upon cycling.

7. Connect the exhaust/equalizer line from the pump(s) back to the receiver top with a thermostatic air vent installed at a high point above the receiver as shown in Fig 2b. These lines will equalize the pressure between the receiver and pump body.
8. Connect pump discharge outlet to the condensate return main. A union and a fully ported shutoff valve facilitate safe servicing and maintenance of the unit.

Note:

If a condition could ever occur whereby the receiver tank pressure could exceed the static pressure in the condensate return piping, a suitably sized float and thermostatic trap should be fitted before the pump outlet check valve (see Fig. 2b, dashed lines). The trap will prevent steam blow-by into the return main. For further information on pump/trap combinations, please consult the factory.

9. When it is desired to protect the unit from flooding due to pump malfunction, install a steam trap on the receiver side condensate overflow connection, or from a takeoff above the receiver at the maximum allowable water level. Pipe to a drain where any discharge will be noticed and the fault quickly corrected.
10. Prior to start-up, carefully inspect the receiver and pump, and plug any unused connections. Installation of thermometers and pressure gauges throughout the system will be useful to check operation.



Note:

Type PTF pump and receiver are ASME code stamped for 200 psig service. Return main back pressure must always exceed receiver pressure or a combination pump/ trap is required as shown in dashed lines.

Fig. 2b
Type PTF Packaged Unit Pressurized for Flash Steam Recovery

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5.3 Pressurized Receiver Start-up Procedure:

1. Slowly open operating (steam) supply valve to provide motive pressure to the P.P. pump.
2. Open all gate valves in the P.P. pump condensate inlet and discharge lines.
3. Slowly open valve(s) allowing condensate and flash steam from high pressure system to enter the receiver. At start-up, air will be vented and flash steam will gradually pressurize the receiver. Liquid condensate falls to the P.P. pump and will be discharged when liquid level trips the float mechanism.
4. If a back pressure surplusing valve is fitted, it should now be pressurized and set to begin opening when the maximum desired receiver pressure is reached. This pressure should be determined with forethought.

Note:

The 25BP control setting (receiver maximum operating pressure) may be greater than that normally desired in the L.P. main but must not exceed the pressure rating of the

L.P. equipment being supplied. Also, it is recommended that the setting should not exceed 50% of the high pressure system steam traps. This is most important when H.P. equipment is supplied by modulating control valves. The back pressure control setting should also be at least 2 to 5 psi g below the safety relief valve pressure setting. These recommendations allow maximum recovery of flash steam, and will prevent excessive back pressure from interfering with operation of the H.P. system traps and equipment.

5. In systems with a lower static pressure in the condensate return main, the float-thermostatic trap (Fig. 2, dashed lines) retains the flash steam in the unit.
6. The auxiliary 25P pressure reducing valve used for steam makeup should be set to open when the L.P. system pressure falls below the desired setting. It will then open only when there is not enough flash steam available and the L.P. system pressure tends to drop.
7. When the receiver pressure has been established, slowly open valve allowing flash steam to enter the low pressure main or equipment. Observe operation for any abnormalities. Pump(s) should cycle periodically with an audible exhaust. If any irregularities are observed, recheck installation instructions for proper hookup. Consult factory if necessary.

5.4 Packing and Shipping

- Some components may be shipped loose. These items should be clearly identified and all hardware required for installation on the package is included.
- Skids with base dimensions of 48" x 96" or more than 1500 lbs are to be handled by a crane, (4) Lift lugs are provided at the corners of the skid.
- A suitable spreader bar should be used for proper lift and cables should not be over 25 ° from base. Please note that the center of gravity on each package may be offset from center.
- Be sure load is properly balanced and secure before moving. Do not lift higher than needed to move the unit from point to point.

6. Maintenance

6.1 Inspection

Inspections should be performed on a regular basis to ensure the Pivotrol Pump mechanism is functioning properly. This is especially important when installed in a hazardous pumping application to ensure no potential ignition sources or spares can occur.

Note:

Each mechanism assembly is factory set and tested. No adjustment to the mechanism should be made. If the mechanism assembly does not function correctly the entire mechanism should be returned to the factory for replacement under the warranty terms.

6.2 Replacement

Please reference the individual component IM(s) for disassembly and reassembly procedures.

7. Troubleshooting

If a correctly sized Pressure Powered Pump does not operate properly, an incorrect hookup is suspect in new installations. For existing installations where the pump operates occasionally or not at all, the cause is often a change in the system supply or back pressure conditions beyond the original design parameters. With the system conditions and problem symptoms determined, check the following in turn and correct as necessary.

Caution:

Symptom	Cause	Check and Cure
1. Pump fails to operate on startup.	a) Motive supply closed.	a) Open valve(s) to supply motive pressure to pump.
	b) Condensate inlet line closed.	b) Open all valves to allow condensate to reach pump.
	c) Condensate discharge line closed.	c) Open all valves to allow free discharge from pump to destination.
	d) Motive pressure insufficient to overcome backpressure.	d) Check motive pressure and static backpressure. Adjust motive pressure to 15 - 20 psi g (1.0-1.4 barg) higher than static backpressure.
	e) Verify proper flow direction and correct, if required.	e) Check valves(s) installed in wrong direction.
f) Pump air-locked.	f) On vented system, assure that vent line is unrestricted to atmosphere and self-draining to the pump or receiver. On a closed system, isolate the pump from the pressurized space being drained. (Exhaust tieback line closed.) Break exhaust connection at pump cover. Keep personnel clear of exhaust connection. If pump begins to cycle, air locking has occurred. Recheck that exhaust tie-back is in accordance with the installation instructions. Install a thermostatic air vent at a high point in the exhaust line. Assure that the equalizer line is self-draining.	

Symptom	Cause	Check and Cure
<p>2. Supply line/ equipment flooded, but pump appears to cycle normally (periodic audible exhaust observed).</p> <p>Remove check valve & visually inspect, body and plate faces, hinge and spring.</p>	2. a) Pump undersized.	2. a) Verify rate capacity per TI-5-030-US capacity table. Increase check valve size or install additional pump as required.
	b) Insufficient filling head.	b) Verify required filling head per TI-5-030-US. Lower pump assembly or raise equipment to achieve required filling head.
	c) Insufficient motive pressure to achieve rated capacity.	c) Check motive pressure setting and maximum backpressure during operation. Compare to capacity table of TI-5-030-US. Increase motive pressure as required to meet load conditions.
	d) Restriction in condensate inlet line.	d) Verify that fully ported fittings are used. Blowdown the strainer, if fitted. Check that all valves are fully open.
	e) Inlet check valve stuck open (debris).	e) Isolate inlet check valve and relieve line pressure. Clean seating surfaces and reinstall or replace, if necessary.
<p>3. Supply line/equipment flooded, and pump has stopped cycling (audible periodic exhaust not observed).</p>	a) Discharge line closed or blocked.	a) Check motive pressure and static backpressure (at pump discharge). If equal, a closed or blocked discharge line is suspected. Check all valves downstream of pump to assure an unobstructed discharge.
	b) Discharge check valve stuck closed.	b) After checking per 3(a), isolate discharge check valve and relieve line pressure. Remove check valve & visually inspect body and plate faces, hinge and spring. Clean seating surfaces and reinstall or replace, if necessary.
	c) Insufficient motive pressure.	c) If motive pressure is below static backpressure, increase motive pressure setting to 15 - 20 psi g (1.0 -1.4 barg) above static backpressure. Do not exceed rated pressure limits of equipment.
		For steps 3(d) through 3(g) —With exhaust/ tie-back line isolated from the equipment being drained (close-loop systems), break the exhaust/tie-back connection at the pump cover and—

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Symptom	Cause	Check and Cure
<p>Important Safety Note: For steps (d) through (g) it is necessary to break the exhaust/tie-back line at the pump exhaust connection. On closed loop systems, care should be exercised to assure that the pump is isolated (motive supply, condensate inlet and discharge, and exhaust/tie-back line all closed) and that case pressure is relieved prior to breaking this connection to avoid injury to personnel. Also, under fault conditions, it is possible that hot condensate may run out of the exhaust connection when broken for both closed loop and vented systems. This possibility should be taken into consideration when performing these steps to avoid scalding of personnel or water damage to nearby equipment.</p>	<p>d) Motive inlet valve leaking and/ or worn.</p>	<p>d) Slowly open motive supply line, leaving the condensate inlet and discharge lines closed. Observe the exhaust connection for steam or air leakage. If leakage is observed, an inlet valve problem is indicated. Isolate pump, remove cover and mechanism assembly and visually inspect. Replace inlet valve and seat assembly.</p>
	<p>e) Mechanism Faults</p> <p>i) Broken spring ii) Ruptured float</p>	<p>e) With motive line open, slowly open condensate inlet line to the pump, allowing pump to fill and observe exhaust connection. Keep personnel clear of exhaust! If condensate runs out exhaust connection, a mechanism fault is clearly indicated. Isolate pump by shutting off motive supply and condensate inlet, remove cover and mechanism assembly, and visually inspect. Examine springs and float for obvious defects. Stroke mechanism and check for any source of binding or increased friction. Repair and/ or replace all defects observed.</p>
	<p>f) Exhaust/tie-back causing vapor lock (vented or closed loop).</p>	<p>f) If mechanism is heard to trip and no fluid is observed running out the exhaust connection, slowly open the discharge line from the pump and observe operation. Keep personnel clear of exhaust connection! If pump cycles normally, a fault in the exhaust/tie-back line is suspected. Recheck the exhaust/tie-back piping layout for compliance with the installation instructions. Exhaust/tie-back line must be self-draining to prevent vapor locking the pump.</p>
	<p>g) Inlet check valve stuck closed.</p>	<p>g) If mechanism is not heard to trip and fluid is not observed running from the exhaust connection, it is suspected that the fault lies in the condensate inlet piping. Assure that all valves leading to the pump have been opened. If so, this indicates that the inlet valve is stuck closed. Isolate the pump and check valve and relieve line pressure. Visually inspect the head, seat and stem. Clean seating surfaces and reinstall or replace, if necessary. Reinstall exhaust/ tie-back connection and open line.</p>

Symptom	Cause	Check and Cure
4. Chattering or banging in return main after pump discharges.	4. a) Vacuum created at pump outlet after discharge because of acceleration/deceleration of large water slug in return main (usually results from long horizontal run with multiple rises and drops).	4. a) Install a vacuum breaker at the top of the lift (at high point in return line). For pressurized return systems and air eliminator may be required downstream of the vacuum breaker. (See Fig. 12).
	b) Pump "blow-by".	b) Check condensate inlet pressure and static backpressure at the pump discharge. If the inlet pressure equals or exceeds the static backpressure, a "blow through" problem is suspected. On vented systems, check for leaking traps discharging into the condensate inlet line which would increase inlet line pressure. Replace any faulty traps. On closed loop systems, if condensate inlet pressure can exceed static backpressure under normal operation (i.e. boost in equipment operating pressure via a modulating control valve or significant decrease in static return main pressure), a pump trap combination is required. The pump trap combination will prevent passage of steam into the return main and allow the pump to cycle normally when condensate is present (See Fig. 6)
5. Vent line discharging excessive flash steam (vented applications only).	5. a) Faulty steam traps discharging live steam into condensate inlet line (See also 4(b), Pump "Blow-By").	5. a) Check for leaking traps discharging into condensate return. Repair or replace faulty traps. (See also 4(b), Pump "Blow-By").
	b) Excessive (over 50 lb/hr, 22.7 kg/hr) flash steam being vented through pump.	b) Vent receiver ahead of pump.
	c) Exhaust valve stuck or worn.	c) Isolate pump and remove cover and mechanism assembly. Remove exhaust head and seat assembly. Visually inspect seating surface. Clean and reinstall or replace, if worn.

8. Spare parts

Table 1. ES003460

Drawing Part Number	Parent Part Number	Spare Part Number	Description
1	72864.3		3" x 2" Pivotrol PTF Pump
		72969.3	PTF Complete Cover and Mechanism Kit (Includes Cover Gasket)
		66105	PTF Pressure Powered Pump Cover Gasket
		72931	2" Pivotrol Outlet Check Valve Kit with Gaskets
		72932	3" Pivotrol Inlet Check Valve Kit with Gaskets
	Please Consult the Specific Pump Instruction Manual for Additional Available Spare Parts		
2	44299F		Pump Gauge Glass
		70899	Gauge Glass Replacement with Packing Set
3	1679396		3" ANSI 150 Fig 34 (1/2" Perf Screen)
		0957217	3" Fig 34 Strainer Cap Gasket (Set of 3)
		1659081	1/2" Perf Strainer Screen
6	60544		1 1/2" SW CT Strainer (60-100 Mesh)
		52065F	1 1/2" CT Strainer Cap Gasket
		53850F	60 Mesh CT Strainer Screen
9	66173C		UTD52L
		55439	UTD52L disc (D)
		66378	Universal Steam Trap Connector Screw & Gasket Set (A B C)
11	73182		1/4" NPT Bronze Gauge Cock; up to 200 psi g
		73182	1/4" NPT Bronze Gauge Cock; up to 200 psi g
12	72190		4" Pressure Gauge; 0-200 psi g, 1/4" NPT
		72190	4" Pressure Gauge; 0-200 psi g, 1/4" NPT
Option A	70076		Pump Insulation Blanket
		70076	Pump Insulation Blanket
Option B	Contact Spirax		Receiver Insulation Blanket
		Contact Spirax	Receiver Insulation Blanket
Option C	Contact Spirax		Receiver Gauge Glass
		Contact Spirax	Gauge Glass Replacement with Packing Set

Reference the applicable sales drawing for associate drawing part number.

Standard Pressure Powered Pump Packaged Units up to Size 3" x 2"

Table 2. ES003440

Drawing Part Number	Parent Part Number	Spare Part Number	Description
1	72862.3		3" x 2" Pivotrol PTC Pump
		72962.3	PTC Complete Cover and Mechanism Kit (Includes Cycle Counter and Cover Gasket)
		66105	PTC Pressure Powered Pump Cover Gasket
		72931	2" Pivotrol Outlet Check Valve Kit with Gaskets
		72932	3" Pivotrol Inlet Check Valve Kit with Gaskets
	Please Consult the Specific Pump Instruction Manual for Additional Available Spare Parts		
2	44299F		Pump Gauge Glass
		70899	Gauge Glass Replacement with Packing Set
3	61007		3" ANSI 125 CI-125 Strainer (20 Mesh)
		60892F	20 Mesh Strainer Screen
		64332F	3" CI-125 Strainer Cap Gasket
5	3397365		1" NPT M10S2FB Ball Valve
		6903042	1" FB M10S Ball Valve R-PTFE Seats & Stem Seals (5 6)
6	60298		1½" NPT IT Strainer (60 Mesh)
		53850F	60 Mesh Strainer Screen
7	3397355		½" NPT M10S2FB Ball Valve
		6903022	½" FB M10S Ball Valve R-PTFE Seats & Stem Seals (5 6)
9	66173C		UTD52L
		55439	UTD52L disc (D)
		66378	Universal Steam Trap Connector Screw & Gasket Set (A B C)
11	73182		¼" NPT Bronze Gauge Cock; up to 200 psi g
		73182	¼" NPT Bronze Gauge Cock; up to 200 psi g
12	72190		4" Pressure Gauge; 0-200 psi g, ¼" NPT
		72190	4" Pressure Gauge; 0-200 psi g, ¼" NPT
Option A	70074		Pump Insulation Blanket
		70074	Pump Insulation Blanket
Option B	Contact Spirax		Receiver Insulation Blanket
		Contact Spirax	Receiver Insulation Blanket
Option C	Contact Spirax		Receiver Gauge Glass
		Contact Spirax	Gauge Glass Replacement with Packing Set
Option F	3397350		Pump Drain Valve
		6903012	¾" FB M10S Ball Valve R-PTFE Seats & Stem Seals (5 6)

Reference the applicable sales drawing for associate drawing part number.

Standard Pressure Powered Pump Packaged Units up to Size 3" x 2"

Table 3. ES003360

Drawing Part Number	Parent Part Number	Spare Part Number	Description
1	72864.3		3" x 2" Pivotrol PTF Pump
		72969.3	PTF Complete Cover and Mechanism Kit (Includes Cover Gasket)
		66105	PTF Pressure Powered Pump Cover Gasket
		72931	2" Pivotrol Outlet Check Valve Kit with Gaskets
		72932	3" Pivotrol Inlet Check Valve Kit with Gaskets
	Please Consult the Specific Pump Instruction Manual for Additional Available Spare Parts		
2	44299F		Pump Gauge Glass
		70899	Gauge Glass Replacement with Packing Set
3	1679396		3" ANSI 150 Fig 34 (1/32" Perf Screen)
		0957217	3" Fig 34 Strainer Cap Gasket (Set of 3)
		1659081	½" Perf Strainer Screen
6	60544		1½" SW CT Strainer (60-100 Mesh)
		52065F	1½" CT Strainer Cap Gasket
		53850F	60 CT Strainer Screen
9	66173C		UTD52L
		55439	UTD52L disc (D)
		66378	Universal Steam Trap Connector Screw & Gasket Set (A B C)
11	73182		¼" NPT Bronze Gauge Cock; up to 200 psi g
		73182	¼" NPT Bronze Gauge Cock; up to 200 psi g
12	72190		4" Pressure Gauge; 0-200 psi g, ¼" NPT
		72190	4" Pressure Gauge; 0-200 psi g, ¼" NPT
Option A	70076		Pump Insulation Blanket
		70076	Pump Insulation Blanket
Option B	Contact Spirax		Receiver Insulation Blanket
		Contact Spirax	Receiver Insulation Blanket
Option C	Contact Spirax		Receiver Gauge Glass
		Contact Spirax	Gauge Glass Replacement with Packing Set

Reference the applicable sales drawing for associate drawing part number.

Standard Pressure Powered Pump Packaged Units up to Size 3" x 2"

Table 4. ES003340

Drawing Part Number	Parent Part Number	Spare Part Number	Description
1	72862.3		3" x 2" Pivotrol PTC Pump
		72962.3	PTC Complete Cover and Mechanism Kit (Includes Cycle Counter and Cover Gasket)
		66105	PTC Pressure Powered Pump Cover Gasket
		72931	2" Pivotrol Outlet Check Valve Kit with Gaskets
		72932	3" Pivotrol Inlet Check Valve Kit with Gaskets
	Please Consult the Specific Pump Instruction Manual for Additional Available Spare Parts		
2	44299F		Pump Gauge Glass
		70899	Gauge Glass Replacement with Packing Set
3	61007		3" ANSI 125 CI-125 Strainer (20 Mesh)
		60892F	20 Mesh Strainer Screen
		64332F	3" CI-125 Strainer Cap Gasket
5	3397365		1" NPT M10S2FB Ball Valve
		6903042	1" FB M10S Ball Valve R-PTFE Seats & Stem Seals (5 6)
6	60298		1½" NPT IT Strainer (60 Mesh)
		53850F	60 Mesh Strainer Screen
7	3397355		½" NPT M10S2FB Ball Valve
		6903022	½" FB M10S Ball Valve R-PTFE Seats & Stem Seals (5 6)
9	66173C		UTD52L
		55439	UTD52L disc (D)
		66378	Universal Steam Trap Connector Screw & Gasket Set (A B C)
11	73182		¼" NPT Bronze Gauge Cock; up to 200 psi g
		73182	¼" NPT Bronze Gauge Cock; up to 200 psi g
12	72190		4" Pressure Gauge; 0-200 psi g, ¼" NPT
		72190	4" Pressure Gauge; 0-200 psi g, ¼" NPT
Option A	70074		Pump Insulation Blanket
		70074	Pump Insulation Blanket
Option B	Contact Spirax		Receiver Insulation Blanket
		Contact Spirax	Receiver Insulation Blanket
Option C	Contact Spirax		Receiver Gauge Glass
		Contact Spirax	Gauge Glass Replacement with Packing Set
Option F	3397350		Pump Drain Valve
		6903012	¾" FB M10S Ball Valve R-PTFE Seats & Stem Seals (5 6)

Reference the applicable sales drawing for associate drawing part number.

Standard Pressure Powered Pump Packaged Units up to Size 3" x 2"

Table 5. ES003260

Drawing Part Number	Parent Part Number	Spare Part Number	Description
1	72864.3		3" x 2" Pivotrol PTF Pump
		72969.3	PTF Complete Cover and Mechanism Kit (Includes Cover Gasket)
		66105	PTF Pressure Powered Pump Cover Gasket
		72931	2" Pivotrol Outlet Check Valve Kit with Gaskets
		72932	3" Pivotrol Inlet Check Valve Kit with Gaskets
	Please Consult the Specific Pump Instruction Manual for Additional Available Spare Parts		
2	44299F		Pump Gauge Glass
		70899	Gauge Glass Replacement with Packing Set
3	1679396		3" ANSI 150 Fig 34 (1/32" Perf Screen)
		0957217	3" Fig 34 Strainer Cap Gasket (Set of 3)
		1659081	½" Perf Strainer Screen
6	60548		1" SW CT Strainer (60-100 Mesh)
		53838F	60 Mesh Strainer Screen
		52063F	1" CT Strainer Cap Gasket
9	66173C		UTD52L
		55439	UTD52L disc (D)
		66378	Universal Steam Trap Connector Screw & Gasket Set (A B C)
11	73182		¼" NPT Bronze Gauge Cock; up to 200 psi g
		73182	¼" NPT Bronze Gauge Cock; up to 200 psi g
12	72190		4" Pressure Gauge; 0-200 psi g, ¼" NPT
		72190	4" Pressure Gauge; 0-200 psi g, ¼" NPT
Option A	70076		Pump Insulation Blanket
		70076	Pump Insulation Blanket
Option B	Contact Spirax		Receiver Insulation Blanket
		Contact Spirax	Receiver Insulation Blanket
Option C	Contact Spirax		Receiver Gauge Glass
		Contact Spirax	Gauge Glass Replacement with Packing Set

Reference the applicable sales drawing for associate drawing part number.

Standard Pressure Powered Pump Packaged Units up to Size 3" x 2"

Table 6. ES003240

Drawing Part Number	Parent Part Number	Spare Part Number	Description
1	72862.3		3" x 2" Pivotrol PTC Pump
		72962.3	PTC Complete Cover and Mechanism Kit (Includes Cycle Counter and Cover Gasket)
		66105	PTC Pressure Powered Pump Cover Gasket
		72931	2" Pivotrol Outlet Check Valve Kit with Gaskets
		72932	3" Pivotrol Inlet Check Valve Kit with Gaskets
	Please Consult the Specific Pump Instruction Manual for Additional Available Spare Parts		
2	44299F		Pump Gauge Glass
		70899	Gauge Glass Replacement with Packing Set
3	61007		3" ANSI 125 CI-125 Strainer (20 Mesh)
		60892F	20 Mesh Strainer Screen
		64332F	3" CI-125 Strainer Cap Gasket
5	3397365		1" NPT M10S2FB Ball Valve
		6903042	1" FB M10S Ball Valve R-PTFE Seats & Stem Seals (5 6)
6	60296		1" NPT IT Strainer (60 Mesh)
		52063F	1" IT Strainer Cap Gasket
		53838F	60 Mesh Strainer Screen
7	3397355		½" NPT M10S2FB Ball Valve
		6903022	½" FB M10S Ball Valve R-PTFE Seats & Stem Seals (5 6)
9	66173C		UTD52L
		55439	UTD52L disc (D)
		66378	Universal Steam Trap Connector Screw & Gasket Set (A B C)
11	73182		¼" NPT Bronze Gauge Cock; up to 200 psi g
		73182	¼" NPT Bronze Gauge Cock; up to 200 psi g
12	72190		4" Pressure Gauge; 0-200 psi g, ¼" NPT
		72190	4" Pressure Gauge; 0-200 psi g, ¼" NPT
Option A	70074		Pump Insulation Blanket
		70074	Pump Insulation Blanket
Option B	Contact Spirax		Receiver Insulation Blanket
		Contact Spirax	Receiver Insulation Blanket
Option C	Contact Spirax		Receiver Gauge Glass
		Contact Spirax	Gauge Glass Replacement with Packing Set
Option F	3397350		Pump Drain Valve
		6903012	¾" FB M10S Ball Valve R-PTFE Seats & Stem Seals (5 6)

Reference the applicable sales drawing for associate drawing part number.

Standard Pressure Powered Pump Packaged Units up to Size 3" x 2"

Table 7. ES003220

Drawing Part Number	Parent Part Number	Spare Part Number	Description
1	70612		1½" x 1½" NPT/NPT CI PPEC
		66160	Complete Cover & Mechanism Assembly, Cast Iron (Includes Cover Gasket)
		66413	PPEC Pump Cover Gasket (1A)
		65873F	1½" Inlet/Outlet Check Valve (One Valve per Kit)
	Please Consult the Specific Pump Instruction Manual for Additional Available Spare Parts		
2	44299F		Pump Gauge Glass
		70899	Gauge Glass Replacement with Packing Set
3	60314		1½" NPT IT Strainer (20 Mesh)
		53852F	20 Mesh Strainer Screen
4	3397375		1½" NPT M10S2FB Ball Valve
		6903062	1½" FB M10S Ball Valve R-PTFE Seats & Stem Seals (5 6)
5	3397360		¾" NPT M10S2FB Ball Valve
		6903032	¾" FB M10S Ball Valve R-PTFE Seats & Stem Seals (5 6)
6	60294		½" NPT IT Strainer (60 Mesh)
		53826F	60 Mesh Strainer Screen
7	3397355		½" NPT M10S2FB Ball Valve
		6903022	½" FB M10S Ball Valve R-PTFE Seats & Stem Seals (5 6)
9	66173C		UTD52L
		55439	UTD52L disc (D)
		66378	Universal Steam Trap Connector Screw & Gasket Set (A B C)
10	72190		4" Pressure Gauge; 0-200 psi g, ¼" NPT
		72190	4" Pressure Gauge; 0-200 psi g, ¼" NPT
11	73182		¼" NPT Bronze Gauge Cock; up to 200 psi g
		73182	¼" NPT Bronze Gauge Cock; up to 200 psi g
Option A	70075		Pump Insulation Blanket
		70075	Pump Insulation Blanket
Option B	Contact Spirax		Receiver Insulation Blanket
		Contact Spirax	Receiver Insulation Blanket
Option C	Contact Spirax		Receiver Gauge Glass
		Contact Spirax	Gauge Glass Replacement with Packing Set
Option E	3397375		Pump Discharge Ball Valve
		6903062	1½" FB M10S Ball Valve R-PTFE Seats & Stem Seals (5 6)
Option F	3397350		Pump Drain Valve
		6903012	¾" FB M10S Ball Valve R-PTFE Seats & Stem Seals (5 6)

Reference the applicable sales drawing for associate drawing part number.

Standard Pressure Powered Pump Packaged Units up to Size 3" x 2"

Table 8. ES003160

Drawing Part Number	Parent Part Number	Spare Part Number	Description
1	72864.3		3" x 2" Pivotrol PTF Pump
		72969.3	PTF Complete Cover and Mechanism Kit (Includes Cover Gasket)
		66105	PTF Pressure Powered Pump Cover Gasket
		72931	2" Pivotrol Outlet Check Valve Kit with Gaskets
		72932	3" Pivotrol Inlet Check Valve Kit with Gaskets
	Please Consult the Specific Pump Instruction Manual for Additional Available Spare Parts		
2	44299F		Pump Gauge Glass
		70899	Gauge Glass Replacement with Packing Set
3	1679396		3" ANSI 150 Fig 34 (1/32" Perf Screen)
		0957217	3" Fig 34 Strainer Cap Gasket (Set of 3)
		1659081	½" Perf Strainer Screen
6	66902		½" SW CT Strainer (60-100 Mesh)
		52061F	½" CT Strainer Cap Gasket
		53826F	60-100 Mesh Strainer Screen
9	66173C		UTD52L
		55439	UTD52L disc (D)
		66378	Universal Steam Trap Connector Screw & Gasket Set (A B C)
10	72190		4" Pressure Gauge; 0-200 psi g, ¼" NPT
		72190	4" Pressure Gauge; 0-200 psi g, ¼" NPT
11	73182		¼" NPT Bronze Gauge Cock; up to 200 psi g
		73182	¼" NPT Bronze Gauge Cock; up to 200 psi g
Option A	70076		PTF Pump Insulation Blanket
		70076	PTF Pump Insulation Blanket
Option B	Contact Spirax		Receiver Insulation Blanket
		Contact Spirax	Receiver Insulation Blanket
Option C	Contact Spirax		Receiver Gauge Glass
		Contact Spirax	Gauge Glass Replacement with Packing Set

Reference the applicable sales drawing for associate drawing part number.

Standard Pressure Powered Pump Packaged Units up to Size 3" x 2"

Table 9. ES003140

Drawing Part Number	Parent Part Number	Spare Part Number	Description
1	72862.3		3" x 2" Pivotrol PTC Pump
		72962.3	PTC Complete Cover and Mechanism Kit (Includes Cycle Counter and Cover Gasket)
		66105	PTC Pressure Powered Pump Cover Gasket
		72931	2" Pivotrol Outlet Check Valve Kit with Gaskets
		72932	3" Pivotrol Inlet Check Valve Kit with Gaskets
	Please Consult the Specific Pump Instruction Manual for Additional Available Spare Parts		
2	44299F		Pump Gauge Glass
		70899	Gauge Glass Replacement with Packing Set
4	61007		3" ANSI 125 CI-125 Strainer (20 Mesh)
		60892F	20 Mesh Strainer Screen
		64332F	3" CI-125 Strainer Cap Gasket
5	3397365		1" NPT M10S2FB Ball Valve
		6903042	1" FB M10S Ball Valve R-PTFE Seats & Stem Seals (5 6)
6	60294		½" NPT IT Strainer (60 Mesh)
		53826F	60 Mesh Strainer Screen
7	3397355		½" NPT M10S2FB Ball Valve
		6903022	½" FB M10S Ball Valve R-PTFE Seats & Stem Seals (5 6)
9	66173C		UTD52L
		55439	UTD52L disc (D)
		66378	Universal Steam Trap Connector Screw & Gasket Set (A B C)
10	72190		4" Pressure Gauge; 0-200 psi g, ¼" NPT
		72190	4" Pressure Gauge; 0-200 psi g, ¼" NPT
11	73182		¼" NPT Bronze Gauge Cock; up to 200 psi g
		73182	¼" NPT Bronze Gauge Cock; up to 200 psi g
Option A	70074		PTC Pump Insulation Blanket
		70074	PTC Pump Insulation Blanket
Option B	Contact Spirax		Receiver Insulation Blanket
		Contact Spirax	Receiver Insulation Blanket
Option C	Contact Spirax		Receiver Gauge Glass
		Contact Spirax	Gauge Glass Replacement with Packing Set
Option F	3397350		Pump Drain Valve
		6903012	¾" FB M10S Ball Valve R-PTFE Seats & Stem Seals (5 6)

Reference the applicable sales drawing for associate drawing part number.

Standard Pressure Powered Pump Packaged Units up to Size 3" x 2"

Table 10. ES003120

Drawing Part Number	Parent Part Number	Spare Part Number	Description
1	70612		1½" x 1½" NPT/NPT CI PPEC
		66160	Complete Cover & Mechanism Assembly, Cast Iron (Includes Cover Gasket)
		66413	PPEC Pump Cover Gasket (1A)
		65873F	1½" Inlet/Outlet Check Valve (One Valve per Kit)
	Please Consult the Specific Pump Instruction Manual for Additional Available Spare Parts		
2	44299F		Pump Gauge Glass
		70899	Gauge Glass Replacement with Packing Set
3	60314		1½" NPT IT Strainer (20 Mesh)
		53852F	20 Mesh Strainer Screen
4	3397360		¾" NPT M10S2FB Ball Valve
		6903032	¾" FB M10S Ball Valve R-PTFE Seats & Stem Seals (5 6)
5	60294		½" NPT IT Strainer (60 Mesh)
		53826F	60 Mesh Strainer Screen
6	3397355		½" NPT M10S2FB Ball Valve
		6903022	½" FB M10S Ball Valve R-PTFE Seats & Stem Seals (5 6)
8	66173C		UTD52L
		55439	UTD52L disc (D)
		66378	Universal Steam Trap Connector Screw & Gasket Set (A B C)
9	3397375		1½" NPT M10S2FB Ball Valve
		6903062	1½" FB M10S Ball Valve R-PTFE Seats & Stem Seals (5 6)
10	72190		4" Pressure Gauge; 0-200 psi g, ¼" NPT
		72190	4" Pressure Gauge; 0-200 psi g, ¼" NPT
11	73182		¼" NPT Bronze Gauge Cock; up to 200 psi g
		73182	¼" NPT Bronze Gauge Cock; up to 200 psi g
Option A	70075		PPEC Pump Insulation Blanket
		70075	PPEC Pump Insulation Blanket
Option B	Contact Spirax		Receiver Insulation Blanket
		Contact Spirax	Receiver Insulation Blanket
Option C	Contact Spirax		Receiver Gauge Glass
		Contact Spirax	Gauge Glass Replacement with Packing Set
Option E	3397375		Pump Discharge Ball Valve
		6903062	1½" FB M10S Ball Valve R-PTFE Seats & Stem Seals (5 6)
Option F	3397350		Pump Drain Valve
		6903012	¾" FB M10S Ball Valve R-PTFE Seats & Stem Seals (5 6)

Reference the applicable sales drawing for associate drawing part number.

Standard Pressure Powered Pump Packaged Units up to Size 3" x 2"

Table 11. ES001619

Drawing Part Number	Parent Part Number	Spare Part Number	Description
1	68975		1½" x 1½" ANSI 150/NPT CS PPEC
		69929	Cover & Mechanism Assembly, Cast Steel (includes Cover Gasket)
		66413	PPEC Cover Gasket (1A)
		69900	Inlet/Outlet Check Valve kit with Gaskets (One Valve per Kit)
	Please Consult the Specific Pump Instruction Manual for Additional Available Spare Parts		
2	69698		Pump Gauge Glass
		TBD	Gauge Glass Replacement with Packing Set
4	52085		1½" SW CT Strainer (20 Mesh)
		52065F	1½" CT Strainer Cap Gasket
		53852F	20 Mesh Strainer Screen
5	66902		½" SW CT Strainer (60-100 Mesh)
		52061F	½" CT Strainer Cap Gasket
		53826F	60-100 Mesh Strainer Screen
8	66173C		UTD52L
		55439	UTD52L disc (D)
		66378	Universal Steam Trap Connector Screw & Gasket Set (A B C)
10	72190		4" Pressure Gauge; 0-200 psi g, ¼" NPT
		72190	4" Pressure Gauge; 0-200 psi g, ¼" NPT
11	73182		¼" NPT Bronze Gauge Cock; up to 200 psi g
		73182	¼" NPT Bronze Gauge Cock; up to 200 psi g
Option A	70075		PPEC Pump Insulation Blanket
		70075	PPEC Pump Insulation Blanket
Option B	Contact Spirax		Receiver Insulation Blanket
		Contact Spirax	Receiver Insulation Blanket
Option C	Contact Spirax		Receiver Gauge Glass
		Contact Spirax	Gauge Glass Replacement with Packing Set

Reference the applicable sales drawing for associate drawing part number.

Standard Pressure Powered Pump Packaged Units up to Size 3" x 2"

Table 12. ES001618

Drawing Part Number	Parent Part Number	Spare Part Number	Description
1	68975		1½" x 1½" ANSI 150/NPT CS PPEC
		69929	Cover & Mechanism Assembly, Cast Steel (includes Cover Gasket)
		66413	PPEC Cover Gasket (1A)
		69900	Inlet/Outlet Check Valve kit with Gaskets (One Valve per Kit)
	Please Consult the Specific Pump Instruction Manual for Additional Available Spare Parts		
2	69698		Pump Gauge Glass
		TBD	Gauge Glass Replacement with Packing Set
4	52085		1½" SW CT Strainer (20 Mesh)
		52065F	1½" CT Strainer Cap Gasket
		53852F	20 Mesh Strainer Screen
5	66902		½" SW CT Strainer (60-100 Mesh)
		52061F	½" CT Strainer Cap Gasket
		53826F	60-100 Mesh Strainer Screen
8	66173C		UTD52L
		55439	UTD52L disc (D)
		66378	Universal Steam Trap Connector Screw & Gasket Set (A B C)
10	72190		4" Pressure Gauge; 0-200 psi g, ¼" NPT
		72190	4" Pressure Gauge; 0-200 psi g, ¼" NPT
11	73182		¼" NPT Bronze Gauge Cock; up to 200 psi g
		73182	¼" NPT Bronze Gauge Cock; up to 200 psi g
Option A	70075		PPEC Pump Insulation Blanket
		70075	PPEC Pump Insulation Blanket
Option B	Contact Spirax		Receiver Insulation Blanket
		Contact Spirax	Receiver Insulation Blanket
Option C	Contact Spirax		Receiver Gauge Glass
		Contact Spirax	Gauge Glass Replacement with Packing Set

Reference the applicable sales drawing for associate drawing part number.

Standard Pressure Powered Pump Packaged Units up to Size 3" x 2"

