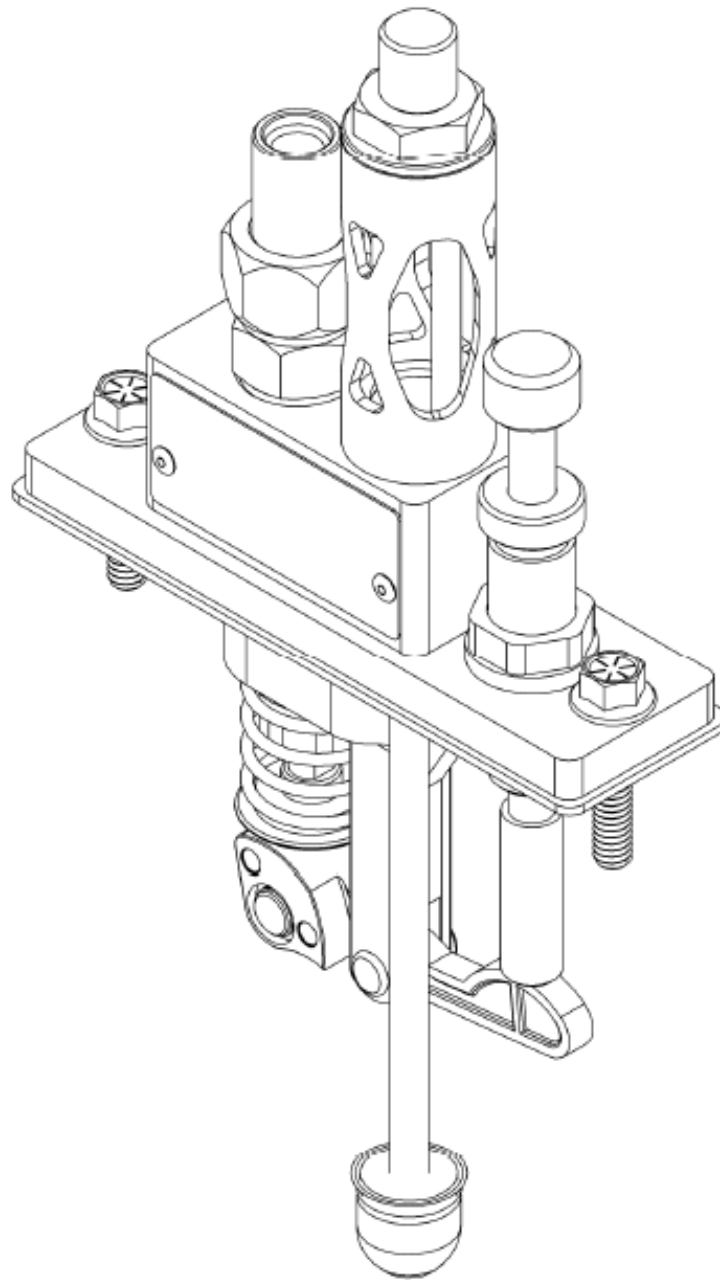




Instruction & Operation Manual

6501500094573EN_B

Model P55 Pumps



Proven Solutions for the Global Compression Industry™

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1. CPI Model P55 Pump

The CPI Model P55 Pump series features heavy duty metering, precision, and self-lubricating pumps capable of pumping small amounts of mineral or synthetic oil to machinery injection points at pressures up to 7500 psi. For Professional use only.

Styles

Vacuum
Pressure
Gravity

Maximum Working Pressures

3/16" Models: 7500 psi (51.7 MPa, 517 bar)
1/4" Models: 6500 psi (44.8 MPa, 448 bar)
3/8" Models: 3500 psi (24.1 MPa, 241 bar)

Certifications






Features

- ATEX Zone 1 certified
- Corrosion resistant finish for long term environmental exposure
- Precision check valves for consistent, long life performance
- Improved mating between the cylinder assembly and rocker arm extends life and ensures consistent output
- Precision cylinder assembly with improved materials and precision clearances
- Purge port to aid air bleeding and ease of start-up
- Single piece sight glass eliminates vacuum leaks and incorrect adjustments
- Enhanced sealing of output regulator shaft eliminates water ingress and minimizes sunlight and environmental degradation
- Output regulator locknut and pump mounting bolts have integrated seals to eliminate water ingress and oil leakage
- Output regulator locknut maintains pump stroke adjustment and does not loosen
- CPI 1/8 ORB port eliminates the need for sealant when used with CPI ORB fittings (1/8 NPT compatible)
- Upgraded gasket seal to award-winning MULTI-SWELL™ Style 3760, which optimizes compression set and reduces loss of bolt torque
- Serviceable piston and cylinder assembly

MULTI-SWELL™ is a trademark of Garlock Sealing Technologies, an EnPro Industries Company

2. Warnings

The following warnings are for the setup, use, grounding, maintenance, and repair of this equipment. The exclamation point symbol alerts you to a general warning and the hazard symbols refer to procedure-specific risks. When these symbols appear in the body of this manual, refer back to these Warnings. Product-specific hazard symbols and warnings not covered in this section may appear throughout the body of this manual where applicable.

 WARNING	
	<p>SKIN INJECTION HAZARD</p> <p>High-pressure fluid from dispensing device, hose leaks, or ruptured components will pierce skin. This may look like just a cut, but it is a serious injury that can result in amputation. Get immediate surgical treatment.</p> <ul style="list-style-type: none">• Do not point dispensing device at anyone or at any part of the body.• Do not put your hand over the fluid outlet.• Do not stop or deflect leaks with your hands, body, glove, or rag.• Follow the Pressure Relief Procedure when you stop dispensing and before cleaning, checking, or servicing equipment.• Tighten all fluid connections before operating the equipment.• Check hoses and couplings daily. Replace worn or damaged parts immediately.
	<p>FIRE AND EXPLOSION HAZARD</p> <p>When flammable fluids are present in the work area, such as gasoline and windshield wiper fluid, be aware that flammable fumes can ignite or explode. To help prevent fire and explosion:</p> <ul style="list-style-type: none">• Use equipment only in well ventilated areas.• Eliminate all ignition sources, such as cigarettes and portable electric lamps.• Keep work area free of debris, including rags and spilled or open containers of solvent and gasoline.• Do not plug or unplug cords or turn lights on or off when flammable fumes are present.• Ground all equipment in the work area.• Stop operation immediately if static sparking occurs or you feel a shock. Do not use equipment until you identify and correct the problem.• Keep a working fire extinguisher in the work area.



WARNING



EQUIPMENT MISUSE HAZARD

Misuse can cause death or serious injury.

- Do not operate the unit when fatigued or under the influence of drugs or alcohol.
- Do not exceed the maximum working pressure or temperature rating of the lowest rated system component. See **Technical Data** in all equipment manuals.
- Use fluids and solvents that are compatible with equipment wetted parts. See **Technical Data** in all equipment manuals. Read fluid and solvent manufacturer's warnings. For complete information about your material, request the MSDS from the distributor or retailer.
- Turn off all equipment and follow the **Pressure Relief Procedure** when equipment is not in use.
- Check equipment daily. Repair or replace worn or damaged parts immediately with genuine manufacturer's replacement parts only.
- Do not alter or modify equipment. Alterations or modifications may void agency approvals and create safety hazards.
- Make sure all equipment is rated and approved for the environment in which you are using it.
- Use equipment only for its intended purpose. Call your distributor for information.
- Route hose and cables away from traffic areas, sharp edges, moving parts, and hot surfaces.
- Do not kink over or bend hoses or use hoses to pull equipment.
- Keep children and animals away from work area.
- Comply with all applicable safety regulations.







PERSONAL PROTECTIVE EQUIPMENT

Wear appropriate protective equipment when in the work area to help prevent serious injury, including eye injury, hearing loss, inhalation of toxic fumes, and burns. This protective equipment includes but is not limited to:

- Protective eye wear, and hearing protection.
- Respirators, protective clothing, and gloves as recommended by the fluid and solvent manufacturer.

3. Pressure Relief Procedure




				This equipment stays pressurized until pressure is manually relieved. To help prevent serious injury from pressurized fluid, such as skin injection, splashing fluid, and moving parts, follow the Pressure Relief Procedure when you stop pumping and before cleaning, checking, or servicing the equipment.
-----------------------------------------------------------------------------------	-----------------------------------------------------------------------------------	-----------------------------------------------------------------------------------	-----------------------------------------------------------------------------------	----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

Note: This pump is a positive displacement pump with no internal pressure relief device. A pressure relief device (i.e. POPR™, rupture disc, etc.) must be installed downstream from the pump to prevent an over pressure condition and damage to the lubrication system.

1. Shut off motor and ensure lubrication pump has ceased.
2. If installed, close oil supply valve located upstream from pump.
3. If installed, open drain valve located downstream from pump.
4. Slowly crack open fluid line fittings to relieve pressure.
5. Safely remove pump from lubricator box.

4. Pump Installation

Grounding

			This equipment must be grounded to reduce the risk of static sparking. Static sparking can cause fumes to ignite or explode. Grounding provides an escape wire for the electric current.
-------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

Note: Ensure the box is properly grounded as the pump is grounded through the mounting bolts.

Pump Mounting

1. Ensure pump mounting surface on reservoir is clean. Clean as needed.
2. Align pump gasket with reservoir cover opening. Ensure pump gasket holes (A) are aligned with reservoir cover mounting holes (B).
3. Orient pump as to not bend or break suction tube (if applicable) and ensure rocker arm is properly aligned with reservoir cam. If pump is misaligned, remove pump and rotate 180° to mount in opposite direction.
4. Install pump by placing pump into reservoir. Ensure pump mounting holes (C) are aligned with pump gasket holes (A) and reservoir cover mounting holes (B).
5. Install pump mounting bolts (D). Snug both bolts to properly seat the pump and then tighten to specified torque (See **Torque Specifications**).

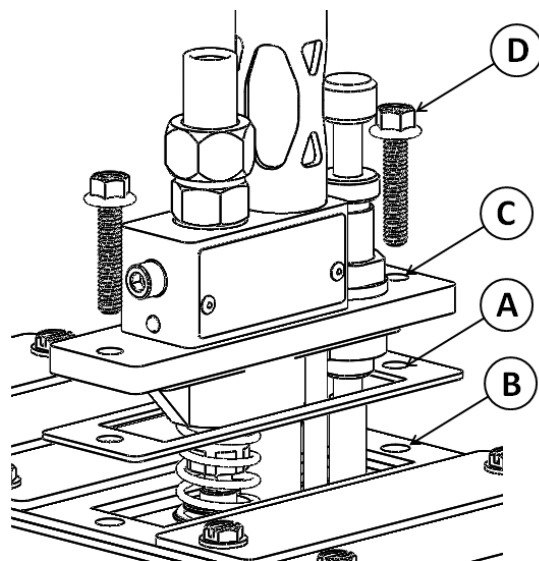


Fig. 1

5. Pump Priming

Vacuum Models

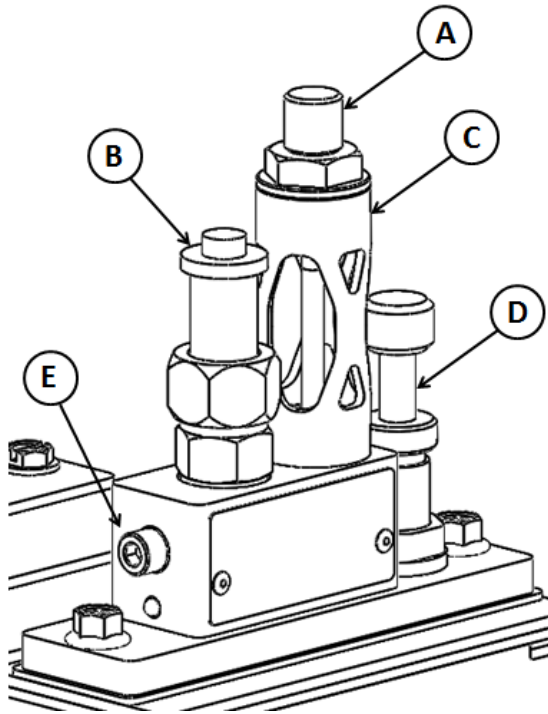


Fig. 2

1. Fill lubricator with appropriately filtered oil.
2. Remove vent screw (A) and outlet plug (B). Discard outlet plug (B).
3. Fill sight glass (C) to top with appropriately filtered oil.
4. Connect lube line and fitting to pump outlet. CPI recommends using a CPI ORB fitting (i.e. Part Number: 65005000042MCOR, 65005000042TAOR, etc.)
5. Loosen purge screw (E).
6. Open lube line at injection point, or applicable downstream location, to allow lube line bleeding.
7. Manually pump output regulator (D) until oil expelled from purge port is free of air.
Note: The output regulator can be depressed by hand to generate approximately 500 psi. DO NOT apply excessive force or impact to the output regulator with a tool to build hydraulic pressure. This will potentially damage the rocker arm, piston, and output regulator. Use a CPI Purge Gun (Part Number: 650050000382510) to connect to the applicable lubrication system port and prime the lube system.
8. Maintain oil in the sight glass (C) to prevent pulling air into the pump cylinder.
9. Tighten purge screw (E) to specified torque (See **Torque Specifications**).
10. Manually pump output regulator (D) until oil expelled from injection point, or applicable downstream location, is free of air.
11. Close lube line at injection point or applicable downstream location.
12. Fill sight glass (C) to middle of window. Reinstall vent screw (A) and finger tighten. The oil level in the sight glass will drop slightly while the pump generates a vacuum.
13. Clean excess oil on pump.
14. Pump is ready for operation and output adjustment.
15. Periodic re-filing of oil in the sight glass may be required depending on oil type and operating conditions.

Pressure Models

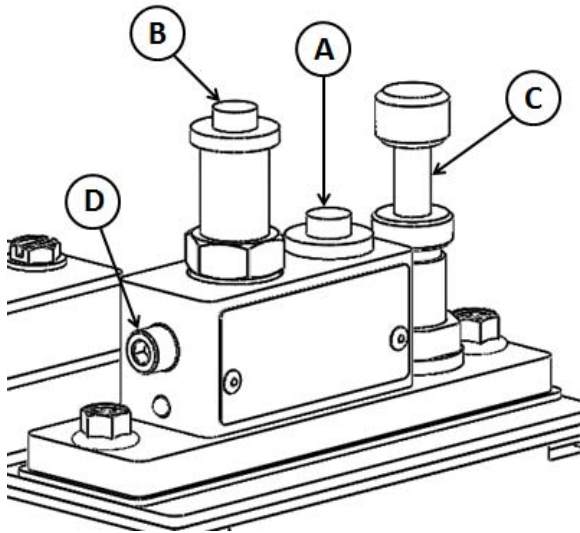


Fig. 3

1. Fill lubricator with appropriately filtered oil.
2. Remove and discard inlet plug (A) and outlet plug (B).
3. If the pump is equipped with a removable filter screen, this screen can come out of the installed position during shipping. The screen is installed in a pocket in the inlet passage under plug (A). Confirm that the filter screen is seated correctly in the pocket before installing the inlet fitting. The filter screen will stay in the pocket during normal operation.
4. Connect lube lines and fittings to pump inlet and outlet. CPI recommends using CPI ORB fittings (i.e. Part Number: 65005000042MCOR, 65005000042TAOR, etc.)
5. Supply oil to the pump inlet. If the oil supply is provided by operating the compressor, do not operate the compressor prior to filling and bleeding all lubrication lines. Use a CPI Purge Gun (Part Number: 650050000382510) to connect to the applicable lubrication system port and prime the lube system.
Note: See **Pump Specifications** for maximum inlet pressure.
6. Open lube line at injection point, or applicable downstream location, to allow lube line bleeding.
7. Loosen purge screw (D).
8. Manually pump output regulator (D) until oil expelled from purge port is free of air.
Note: The output regulator can be depressed by hand to generate approximately 500 psi. **DO NOT** apply excessive force or impact to the output regulator with a tool to build hydraulic pressure. This will potentially damage the rocker arm, piston, and output regulator. Use a CPI Purge Gun (Part Number: 650050000382510) to connect to the applicable lubrication system port and prime the lube system.
9. Tighten purge screw (D) to specified torque (See **Torque Specifications**).
10. Manually pump output regulator (C) until oil expelled from injection point, or applicable downstream location, is free of air.
11. Close lube line at injection point or applicable downstream location.
12. Clean excess oil on pump.
13. Pump is ready for operation and output adjustment.

Gravity Models

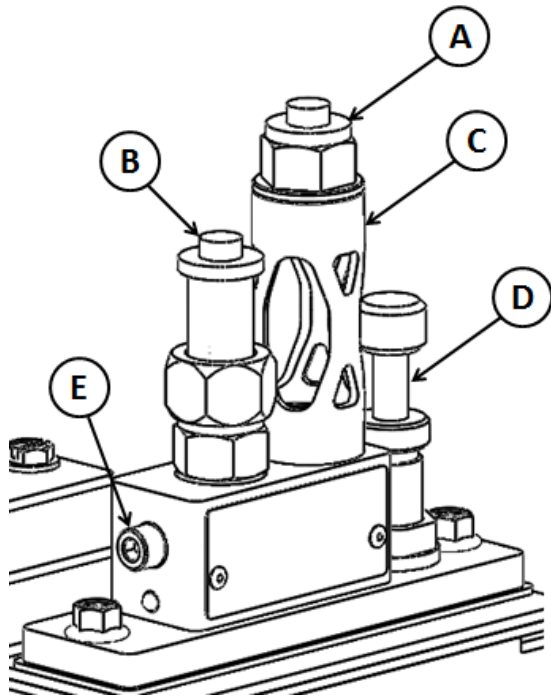


Fig. 4

1. Fill lubricator with appropriately filtered oil.
2. Remove and discard inlet plug (A) and outlet plug (B).
3. Fill sight glass (C) to 1/3 full with appropriately filtered oil.
4. Connect lube line and fitting to sight glass inlet. If installed, open oil supply valve and allow oil to flow into sight glass. The oil level will rise until the pressure stabilizes. The oil level must be below the drip point in order to count drops.

Note: See **Pump Specifications** for maximum inlet pressure.

5. Connect lube line and fitting to pump outlet. CPI recommends using a CPI ORB fitting (i.e. Part Number: 65005000042MCOR, 65005000042TAOR, etc.)
6. Loosen purge screw (E).
7. Open lube line at injection point, or applicable downstream location, to allow lube line bleeding.
8. Manually pump output regulator (D) until oil expelled from purge port is free of air.

Note: The output regulator can be depressed by hand to generate approximately 500 psi. **DO NOT** apply excessive force or impact to the output regulator with a tool to build hydraulic pressure. This will potentially damage the rocker arm, piston, and output regulator. Use a CPI Purge Gun (Part Number: 650050000382510) to connect to the applicable lubrication system port and prime the lube system.

9. Tighten purge screw (E) to specified torque (See **Torque Specifications**).
10. Manually pump output regulator (D) until oil expelled from injection point, or applicable downstream location, is free of air.
11. Close lube line at injection point or applicable downstream location.
12. Clean excess oil on pump.
13. Pump is ready for operation and output adjustment.
14. Periodic adjustment of oil in the sight glass may be required depending on oil type and operating conditions. The oil level will rise over time until the drip tube is covered and drops can no longer be counted. Close the oil supply valve and open a vent in the pump oil supply line to allow the oil level in the sight glass to drop while operating. When the desired oil level is reached, close the vent and open the oil supply valve.

6. Pump Output Adjustment

Regulating Pump Output

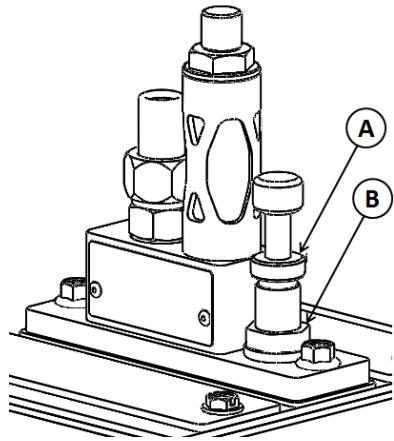


Fig. 5

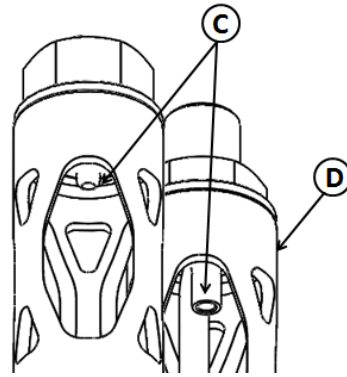


Fig. 6

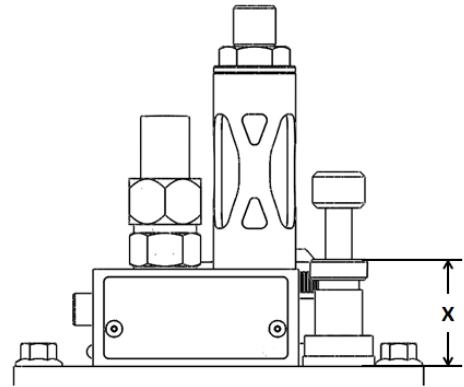


Fig. 7

Pump volume is controlled by the output regulator (A). Turning the output regulator threaded body (A) changes the length of the piston stroke, which changes the pump discharge volume.

1. Loosen output regulator locknut (B).
2. Turn output regulator screw (A):
 - a. Counterclockwise: increases discharge volume
 - b. Clockwise: decreases discharge volume

Adjustment	Dimension X (Fig. 7)
Fully Open	1.75 in. (44.5 mm)
Shut Off	0.75 in. (19.1 mm)

Table 1

3. For Vacuum and Gravity Models:
 - With the lubricator operating, count the drops from the drip tube (C) falling into the sight glass (D) for one minute. See **Calculating Output Capacity** to determine the amount of oil discharged by the pump.
 For Pressure Models:
 - Pressure fed pumps typically feed a divider block system. Adjust the pump for the correct divider block cycle time. Otherwise, the volumetric output must be measured at the applicable lube point.
4. Tighten output regulator locknut (B) to specified torque (See **Torque Specifications**) when desired flow rate is achieved.

Note: The output regulator stem will typically not move up and down during operation. The internal seals will hold the stem in the upmost position. Put light finger pressure on the output regulator stem to follow the rocker arm movement. It is recommended to manually raise the stem to the upmost position when priming is complete to ensure full piston travel, ensure correct pump output adjustment, and maintain optimal sealing performance.

7. Technical Information

Pump Specifications

P55 Pump Technical Data		
Maximum Working Pressure	Imperial Units	Metric Units
3/16" Models	7500 psi	51.7 MPa, 517 bar
1/4" Models	6500 psi	44.8 MPa, 448 bar
3/8" Models	3500 psi	24.1 MPa, 241 bar
Cracking Pressure	10 ± 4.4 psi	69 ± 30 kPa
Maximum Inlet Pressure – Varies by Pump Model		
Gravity Models	60 psi	0.4 MPa, 4 bar
Pressure Models	200 psi	1.4 MPa, 14 bar
Inlet Size – Varies by Pump Model		
Gravity Models	1/4 BSPP	
Pressure Models	CPI 1/8 ORB (1/8 NPT Compatible), SAE 06	
Outlet Size	CPI 1/8 ORB (1/8 NPT Compatible)	
Temperature Rating	-20°F to 190°F	-29°C to 88°C
Camshaft Speed	4 to 30 rpm	
Maximum Cam Lift – Varies by Pump Model		
Roller Rocker Arm	1/2 Inch Maximum	
Dragging Rocker Arm	3/8 Inch Maximum	
Installation Angle Pressure Models	0° to 35°	
Lubricant Type	Mineral and Synthetic Oils	
Lubricant Viscosities	Saybolt Viscosities SUS @ 100°F 90 – 5000 SUS @ 210°F 40 – 250	Kinematic Viscosities cSt @ 40°C 20 – 1000 cSt @ 100°C 4 – 50
Minimum Pump Oil Supply Filtration	125 micron, 100 U.S. mesh	

Table 2

All pumps are factory tested and will contain residual oil inside the pump. Contact CPI for the SDS, if needed.

Torque Specifications

Component	Imperial Units	Metric Units
Pump Mounting Bolts	90 ± 10 in-lbs	10 ± 1 Nm
Purge Screw	90 ± 10 in-lbs	10 ± 1 Nm
Sight Glass Assembly	60 ± 10 in-lbs	7 ± 1 Nm
Sight Glass Vent Screw	Finger Tight	Finger Tight
Output Regulator Locknut	20 ± 5 ft-lbs	27 ± 7 Nm
Discharge Connector	35 ± 5 ft-lbs	47 ± 7 Nm
Discharge Connector Union Nut*	80 ft-lbs Maximum	108 Nm Maximum
CPI ORB Fitting or 1/8 NPT Fitting	12 ± 2 ft-lbs	16 ± 3 Nm
SAE-06 Fitting	22 ± 3 ft-lbs	30 ± 4 Nm
Pump Cylinder	3/16: 30 ± 3 ft-lbs 1/4: 30 ± 3 ft-lbs 3/8: 15 ± 2 ft-lbs	3/16: 40 ± 4 Nm 1/4: 40 ± 4 Nm 3/8: 20 ± 3 Nm

Table 3

* **Note:** Use a backup wrench on the discharge connector when torquing the union nut higher than 40 ft-lbs.

Pump Output Curves

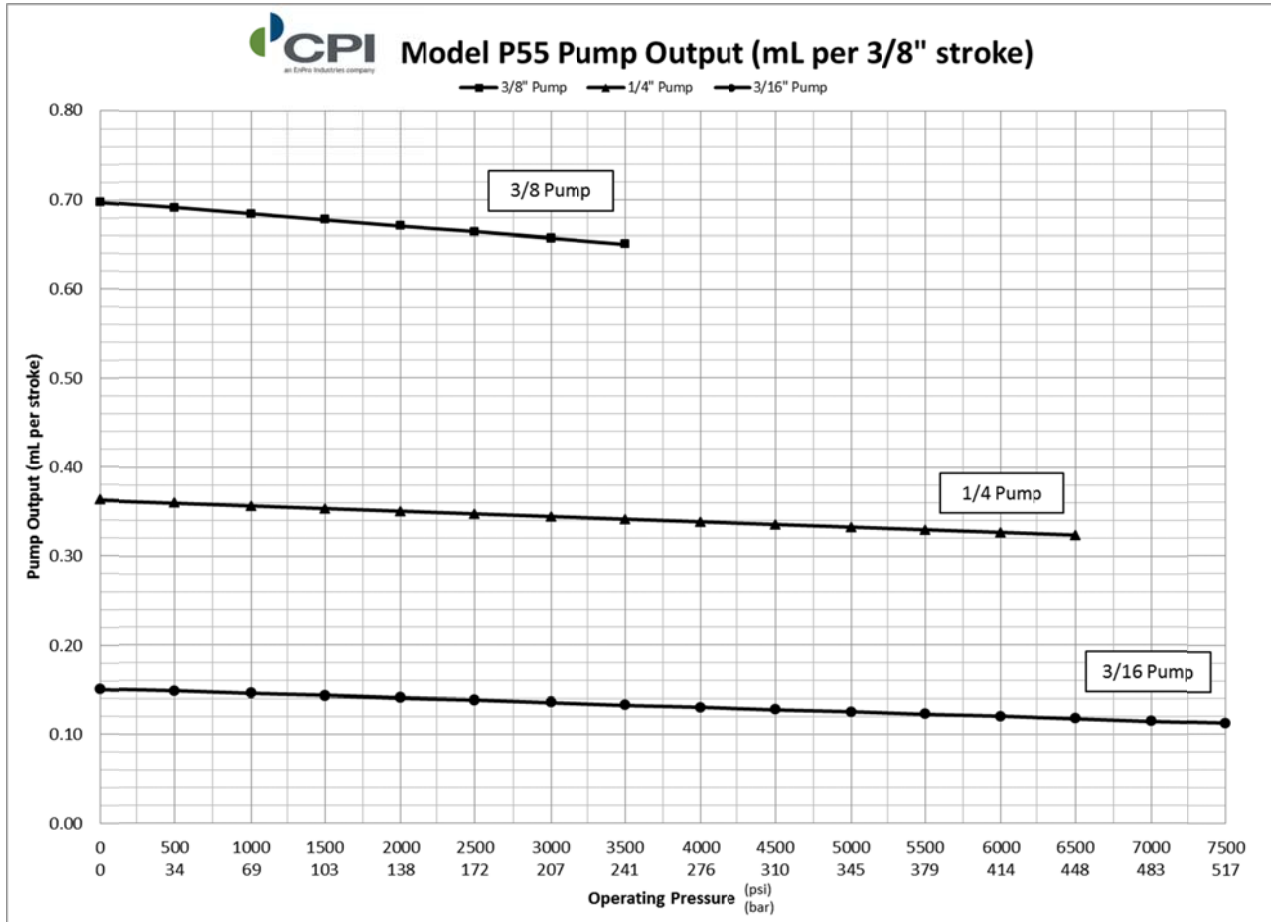


Fig. 8 *Note: Pump output curves apply to pump models with 65018-XXXXXXXXXX part numbers.

P55 pumps meet or exceed the published output curves. Operating and application conditions may impact the lubrication system performance and efficiency. Oil cleanliness and conditions may affect pump life and long term pump output. Monitor pump performance to develop a preventative maintenance schedule for optimal lubrication system life. Contact CPI for help with troubleshooting or improving the performance of your lubrication system.

Oil Drop Data

Oil drop size varies based on drip tube size, drip tube shape, oil viscosity, oil temperature, oil flow rate and chamber pressure or vacuum. The CPI pump features a precision drip tube to minimize the variation of drip tube size and shape. The range of oil viscosity, oil temperature and pump oil flow rate (based on camshaft rpm and piston size) provides too many combinations to publish sight glass drops per volumetric output. Table 4 shows the variation of sight glass drops between two oil viscosities and the three pump piston sizes for a fixed camshaft RPM and oil temperature. **When using drop counts to set lubrication rates, the most accurate method is verifying, per the application, the correct dispensed amount of lubricant and the correlating drop count (drops per minute) per pump.** Use Table 5 values for initial calculations. Use the average of multiple pump cycles, when counting drops to set lubrication rates, for a more accurate pump output setting.

Example of Sight Glass Drop Variation for Two Different Oils and Three CPI Pump Sizes
5 RPM Cam Speed, 1000 PSI (69 Bar) Discharge Pressure, 3/8 Cam Lift, Oil Temperature 75°F (24°C)

	Low Viscosity Oil (ISO 100)			Medium Viscosity Oil (ISO 320)		
	3/16 Pump	1/4 Pump	3/8 Pump	3/16 Pump	1/4 Pump	3/8 Pump
Drops Per Piston Stroke	4	9	16	3	8	*NA
Drops Per cc / ml	27	24	22	23	22	*NA
Drops Per Liter	27,000	24,000	22,000	23,000	22,000	*NA
Drops Per Pint (USA)	12,776	11,356	10,410	10,883	10,410	*NA

Table 4 *Note: 3/8 Pump outputs a stream of oil and the drops cannot be distinguished or counted.

Sight Glass Drops – Values for Initial Oil Calculations

Drops Per cc / ml	Drops Per Liter	Drops Per Pint (US)
25	25000	11830

Table 5

Calculating Pump Output Capacity

Refer to **Regulating Pump Output**, **Pump Output Curves**, and **Oil Drop Data**. Then use the following equations to calculate pump output (all Pints reference US Pint volume):

Calculations Using mL per Stroke (Typically Pressure Models)

$$\text{Pints Per Day (PPD)} = (\text{mL per stroke}) \times (\text{pump strokes per minute}) \times 3.043$$

$$\text{Liters Per Hour (LPH)} = (\text{mL per stroke}) \times (\text{pump strokes per minute}) \times 0.06$$

Calculations Using Drop Count (Typically Vacuum and Gravity Models)

$$\text{Pints Per Day (PPD)} = \frac{(\text{drops per minute}) \times 1440}{\text{drops per pint}}$$

$$\text{Liters Per Hour (LPH)} = \frac{(\text{drops per minute}) \times 60}{\text{drops per liter}}$$

Reference Calculations

$$\text{pump strokes per minute} = \frac{\text{motor speed (rpm)}}{\text{gear ratio}}$$

Example Calculation

The following example shows how to calculate PPD for a 1/4" pump operating at 3500 psi with a 1725 rpm electric motor and a 200:1 lubricator gear ratio.

$$\text{Pints Per Day (PPD)} = (\text{mL per stroke}) \times (\text{pump strokes per minute}) \times 3.043$$

$$\text{Pints Per Day (PPD)} = (0.34 \text{ mL per stroke}) \times \left(\frac{1725 \text{ rpm}}{200:1} \right) \times 3.043 = \mathbf{8.92 \text{ PPD}}$$

Pump Dimensions

Dim.	Description	Inches	Millimeters	Reference
A	Pump Body Length	5.00	127.0	Fig. 9
B	Mounting Hole Spacing (Clearance for 1/4-20 Screw)	4.406	111.9	Fig. 9
C	Pump Body Width	1.39	35.3	Fig. 9
D	Inlet to Mounting Hole	Gravity: 2.06 Pressure: 2.03	Gravity: 52.3 Pressure: 51.6	Fig. 9
E	Outlet to Mounting Hole	3.16	80.3	Fig. 9
F	Mounting Surface to Vacuum Inlet	4.75	120.4	Fig. 11
G	Mounting Surface to Vacuum & Gravity Outlet	3.37	85.6	Fig. 11, 12
H	Mounting Surface to Top of Vacuum Pump	4.75	119.9	Fig. 11
J	Mounting Surface to Gravity Inlet	4.39	111.5	Fig. 12
K	Mounting Surface to Pressure Inlet	1.50	38.1	Fig. 13
L	Mounting Surface to Pressure Outlet	2.65	67.3	Fig. 13

Table 6

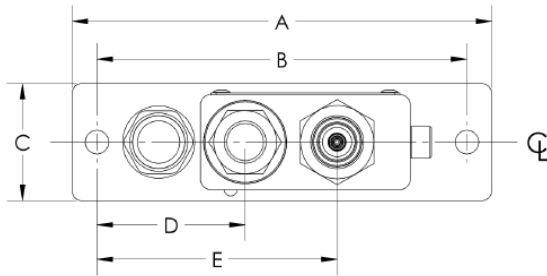


Fig. 9: Pump Top View



Fig. 10: P55 Pump Tag Example

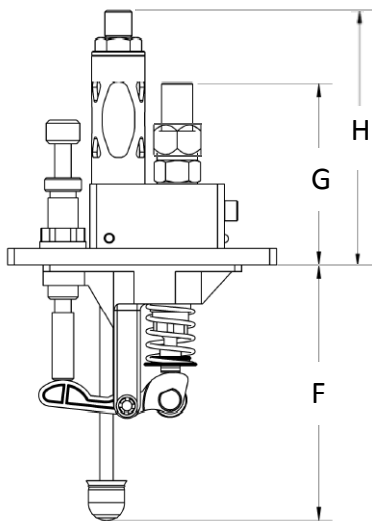


Fig. 11: Vacuum Pump

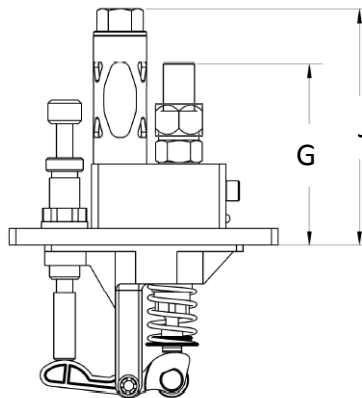


Fig. 12: Gravity Pump

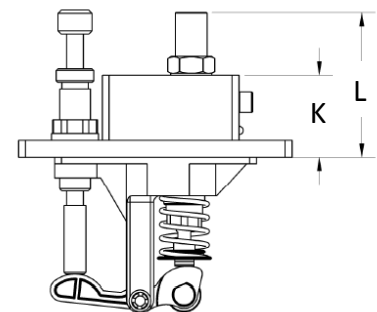


Fig. 13: Pressure Pump

8. Troubleshooting

Problem	Cause	Solution
Pump does not flow or it has low flow	Pump stroke is adjusted to this condition	See Adjusting the Pump . Adjust the pump stroke for desired output.
	Pump is air locked	Bleed trapped air by loosening the purge screw until air free oil flows from purge screw port.
	Oil supply is inadequate	Ensure oil supply is continuous and free of trapped air.
	Oil supply filters or strainers are dirty or clogged	Clean all oil supply filters and screens. If the pump is equipped with a filter screen, check and clean screen.
	Pump internal check valves are clogged with debris	Flush the pump with oil to attempt to dislodge the debris. If the debris cannot be dislodged the pump must be replaced. Install adequate oil supply filters to prevent debris from entering the pump.
	Pump outlet lube line is obstructed	Disconnect pump outlet lube line to ensure that the problem is with the pump itself. If the pump outputs adequate oil, the problem could be downstream from the pump.
	Lubricator is not working correctly	Ensure the lubricator is functioning correctly and the cam is in good condition. Any problem that affects the pump rocker arm and piston travel will impact pump output.
Pump is unable to generate desired output pressure	Pump piston and cylinder have excessive wear	If operating conditions or time in service have impacted the precision clearances between the piston and cylinder, the pump could be leaking oil internally or into the lubricator. The piston and cylinder can be replaced or the pump should be replaced.
	Pump internal check valves are no longer working	Replace pump.
	Issue is related to pump having no flow or low flow	Review all issues related to a pump with no flow or low flow above.
Oil syphons through pump when pump is not operating	Inlet pressure exceeds outlet pressure	Install a check valve downstream of the pump with a cracking pressure higher than the inlet pressure.
Sight glass oil level remains constant and no drops appear from the drip tube	Pump stroke is incorrectly adjusted	See Adjusting the Pump . Adjust the pump stroke for desired output.
	Camshaft speed is too low	See Pump Specifications for the recommended camshaft speeds. Contact CPI if the application is outside the recommended speed range.
	Pump is air locked	Bleed trapped air by loosening the purge screw until air free oil flows from purge screw port.
	Pump internal check valves are no longer working	Replace pump.
Sight glass oil level runs dry	Leak in sight glass seals resulting in loss of vacuum	Replace sight glass or replace pump.
	Restriction in drip tube or suction tube	Clean pump suction tube strainer. Check suction tube and drip tube for blockage and clean as needed.

Table 7



For further technical support please contact:

United Kingdom

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Hungerford,
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