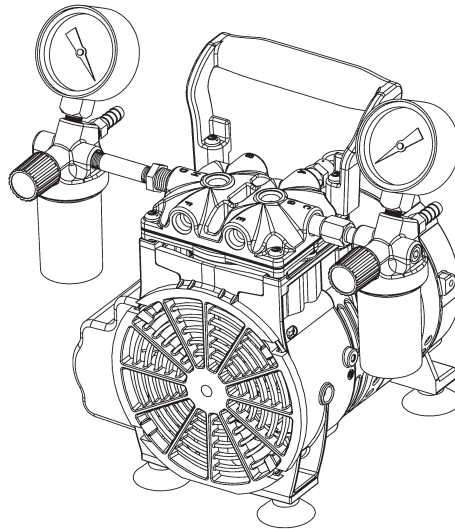


# WELCH-ILMVAC

## OWNER'S MANUAL FOR WOB•L® PISTON PRESSURE/VACUUM PUMPS MODELS:

**2522C-05, 2534C-01, 2534C-02, 2546B-01, 2546C-01, 2546C-02,  
& 2546C-10**



**Warning**  
Not recommended for pumping acid, base or organic vapors or gases.



**Warning**  
Be sure to properly identify intake and discharge before using pump.  
See Section 2.50

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For outside of U.S. and Canada, contact your local Gardner Denver sales office.

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Part No. 642517G

**INSTRUCTION  
WARNING AND CAUTION  
PLEASE READ BEFORE OPERATION**

While reading your manual, please pay close attention to areas labeled:

**WARNING AND CAUTION**

The description of each is found below.

**WARNING**

**Warnings are given where failure to observe instruction could result in injury or death to people.**

**CAUTION**

**Cautions are found where failure to observe the instruction could result in damage to the equipment, associated equipment and process.**

These units confirm to the (SI) International system of units of measurement.

The following symbols (with recommendation of IEC61010) of warning will be found on the pump.



Caution - refer to accompanying documents



Caution - risk of electrical shock



Caution - hot surface

**WARNING**

**Motor includes a self resetting thermal cutout and the pump could restart without actuation under fault condition.**

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## Section 1: SAFETY INFORMATION

### 1.10 **WARNING: TO PREVENT INJURY...**

- 1.11 Never operate this product if it has a damaged cord or plug. If it is not working properly, has been dropped, damaged or has fallen into water, please return the product to a Welch service center for examination and repair.
- 1.12 Keep the cord away from heated surfaces. All electrical products generate heat. To avoid serious burns never touch unit during or immediately after operation.
- 1.13 Never block any air openings or place it on a soft surface where the openings may be blocked. The air openings are for ventilation of the motor inside the housing. Keep all air openings free of lint, dirt and other foreign objects.
- 1.14 Never drop or insert fingers or any other object into any openings.
- 1.15 Do not operate this product where oxygen is being administered.
- 1.16 This pump is thermally protected and can automatically restart when the protector resets. Always disconnect power source before servicing.
- 1.17 Wear safety glasses and goggles when operating this product. Never point any air nozzle or air sprayer toward another person or any part of the body.
- 1.18 Use only in well ventilated areas. The motor on all pumps are totally enclosed fan cooled
- 1.19 Do not use any tools or attachments without first determining maximum air pressure for that tool or attachment. Be sure to properly identify intake and discharge before using pump. See Section 2.50

### 1.20 **WARNING: TO REDUCE RISK OF ELECTRICAL SHOCK...**

- 1.21 Do not disassemble. Disassembly or attempted repairs if accomplished incorrectly can create electrical shock hazard. Refer servicing to qualified service agencies only.
- 1.22 Unit is supplied with a three pronged plug. Be sure to connect pump to a properly grounded outlet only.

### 1.30 **WARNING: TO REDUCE RISK OF ELECTROCUTION...**

- 1.31 Do not use this product in or near area where it can fall or be pulled into water or other liquids.
- 1.32 Do not reach for this product if it has fallen into liquid.
- 1.33 Never operate this product outdoors in the rain or in a wet area.

### 1.40 **WARNING: TO REDUCE RISK OF EXPLOSION OR FIRE...**

- 1.41 Do not use this pump in or near explosive atmospheres or where aerosol (spray) products are being used.
- 1.42 Do not pump anything other than atmospheric air.
- 1.43 Do not pump combustible liquids or vapors with this product or use in or near an area where flammable or explosive liquids or vapors may exist.
- 1.44 Do not use this product near flames.



#### **WARNING**

**Failure to observe the above safety precautions could result in severe bodily injury, including death in extreme cases.**

## Section 2: INSTALLATION

### 2.10 INTRODUCTION

**2.11** This manual has been compiled not only for the care and maintenance of the Welch Dry Dual Function Pressure/Vacuum pump now in your possession, but as a helpful reference and guide to prevent many problems which can occur if used improperly.

### 2.20 UNPACKING

**2.21** Carefully remove the Pressure/Vacuum pump from the shipping case and unfasten and remove the wooden skid. Preserve all paperwork for future reference. If damage has occurred from shipment a claim must be filed with the carrier immediately; preserve the shipping carton for inspection by the carrier. If you are required to communicate with your dealer or Welch Vacuum, be sure to include your order numbers for quick identification. Do not return the pump to the factory without first calling for a returned goods number.

### 2.30 PUMP MOUNTING

**2.31** Rubber feet are attached to the pump. Rubber feet are excellent for applications involving a semi-flexible surface such as a bench top; they help to isolate noise and eliminate creeping.

### 2.40 PUMP LOCATION

**2.41** The pressure/vacuum pump should be located preferably in a clean, dry, and well ventilated area. Please be sure not to block the ventilation holes located on the motor housing. The pump should be placed where the surrounding temperature remains between 10°C and 40°C (50°F and 104°F). Always check to insure the location chosen is protected from direct or indirect moisture contact. Welch recommends that the pump be installed at the highest point within the system to prevent possible water condensate from entering the pump. The pump should be located as closely to its system in order to utilize it most efficiently.



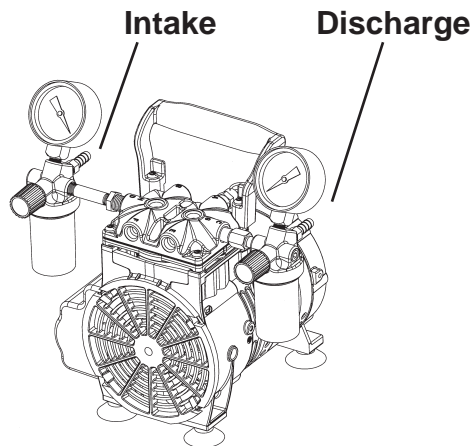
#### **WARNING**

**The motor is thermally protected and will automatically restart unexpectedly when the overload device resets. Don't pump flammable or explosive gases or vapors or operate this pump in an atmosphere containing flammable or explosive gases or vapors.**

## 2.50 INTAKE AND DISCHARGE PROVISIONS

**2.51** The Two regulators and two gauges make it easy to meet your vacuum and pressure requirements. The vacuum regulator and vacuum dial gauge is attached to the intake port. The vacuum regulator allows the vacuum level to be set between roughly atmospheric pressure and the maximum vacuum allowed for the pump model. A moisture trap keeps water from accidentally being drawn into the unit. The pressure regulator and pressure dial gauges are attached to the discharge port. The pressure regulator allows discharge pressure to be set between atmospheric and the maximum possible for the pump model. Discharge air is filtered and noise is muffled with a filter.

### PROPERLY IDENTIFY THE INTAKE AND DISCHARGE OF THE PUMP



**Pressure/Vacuum Pump**



#### **Warning**

**Never Block The Discharge Port. If the exhaust is blocked, pressure will build- up in the pump above its rated operating pressure. Be sure to call Welch technical service prior to start-up at (847) 676-8800 if you have any questions.**

## 2.60 VACUUM CONNECTIONS

All pressure/vacuum pumps come with intake and discharge hose barbs which accept 1/4" ID rubber pressure/vacuum hose. Hose clamps should be used to hold the hose in place. Since all three models operate in the viscous flow regime, the small diameter of the hose will generate minimal conductance loss. For best results, Welch recommends the length of the tubing between the pump and the chamber be kept as small as possible.

## 2.70 VACUUM AND PRESSURE GAUGES

All models of pressure/vacuum pumps come with dial gauges mounted on the regulator assemblies. The vacuum gauge gives negative pressure - that is pressure below atmospheric. The reference point for the vacuum gauge is atmospheric pressure. The pressure gauge gives pressure above atmospheric. The reference point for the pressure gauge is atmospheric pressure. Please keep in mind that atmospheric pressure tends to vary from day to day. As a result of this variability, the dial vacuum gauge will indicate slightly different maximum vacuum readings from day to day.

## Section 3: ELECTRICAL POWER

### 3.10 POWER SOURCE REVIEW

Review the power source and the motor rating to be sure they agree in voltage, phase, and frequency. Serious damage may occur to the motor if it is connected to an improper voltage. All Welch pumps must be grounded. Grounding reduces the risk of electric shock in the event of an electrical short circuit. The plug must be plugged into a properly grounded outlet. Consult your local electrical codes if you have doubts.

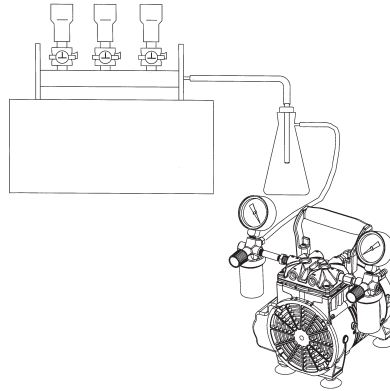
### 3.20 OVERLOAD PROTECTION

Motor thermal overload protection is made available by the motor manufacturer as an aid to minimize motor failure. Overload protection is a standard feature on both 50 and 60 Hz single-phase-motors. The motors have automatic overload protection. Automatic reset protection is designed to reset itself after a predetermined cooling period. If the fault to the drive remains unaltered, the motor will cycle on and off until the fault is corrected.

## Section 4: TRAPS

### 4.10 THE NEED OF A TRAP

The pumps will handle humid air. All wetted aluminum parts are treated for corrosion protection from moisture. All other wetted parts are stainless steel. A plastic trap with a ball check valve is attached to the regulator assembly to prevent water condensate from accidentally being ingested into the pump. If there is a chance liquid may be drawn from the process under evacuation, Welch recommends a liquid trap be placed between the process and the pump. A simple liquid trap is a filtering flask. See figure below.



When a heavy load of water vapor is evolved from the vacuum process, a cold trap is recommended to help prevent damage to the pump mechanism. The cold trap, immersed in a suitable Dewar flask, is installed so that the water vapors may come in contact with the surfaces of the trap and condense. Commonly used refrigerants are liquid nitrogen or dry ice and acetone or alcohol. Dry ice provides sufficient cooling to freeze out most heavy water vapor loads.

A variety of cold traps are available from Welch. Please call our customer service department for additional information at (847) 676-8800.

**The pump is not recommended for pumping acid, base or organic vapors or gases. Serious damage to the pump will shorten the pump's service life. In addition, pumping flammable vapors or gases can lead to serious safety hazard leading to fire or explosion.**



#### **4.20 THE CARE OF A TRAP**

When using a cold trap the refrigerant should be maintained at a high level in the flask to keep the trap at a uniformly low temperature. If the trap is rewarmed it may allow re-evaporation of the condensate. The refrigerant add tube on the liquid nitrogen trap should not be obstructed as the refrigerant boil-off can produce dangerously high pressures. If the trap becomes saturated it should be disconnected from the system, drained, and cleaned. An increase in pressure in the vacuum system will normally indicate that the trap has become saturated. To clean the trap, remove the trap from the system and allow the trap to warm up and rinse off the condensate with a suitable solvent in a fume hood. Thoroughly clean and dry the trap before reinstalling into the system.

### **Section 5: OPERATION**

#### **5.10 STARTING A WELCH PRESSURE / VACUUM PUMP**

Before attaching the pump to a system, familiarize yourself with the function and action of the pressure/vacuum pump that you have acquired. Review the power requirements as described in Section 3.10. Welch recommends running the pump for a few minutes to warm it up, before use. The warm-up improves the pumps ability to handle humid air.

#### **5.20 CLEANLINESS**

Take every precaution to prevent foreign particulates from entering the pump. Particulates will damage the pump's performance. If you find that particulates come off the process during evacuation, a particulate trap in the fore line will work. A simple, inexpensive trap may be made by placing glass wool in a glass or plastic tube. Screens must be inserted to hold the glass wool in place.

#### **5.30 LEAK DETECTION**

The importance of eliminating all leaks in a vacuum system is obvious. The pump must remove this added volume of leaked gas to maintain the desired vacuum. Leaks for these pump can be located by slightly pressuring the system and painting the suspected area with a thick soap solution. Escaping air will produce soap bubbles.

#### **5.40 OPERATING PRESSURE RANGE**

Pressure/Vacuum pumps are designed to be run from slightly below atmospheric to their maximum vacuum level on the intake side. The pumps also may be run from atmospheric to their maximum rated pressure rating. Consult the Specification Table (See Section 8, Specifications) for the ratings of your specific model.

#### **5.50 SHUTDOWN PROCEDURES**

After use, Welch recommends the pump be run for about 2 minutes disconnected from the vacuum process.



## Section 6: MAINTENANCE

### 6.10 MAINTENANCE ON A WELCH PRESSURE / VACUUM PUMP

Welch dry pressure/vacuum units are 100% oil-free. The pump employs a non-lube piston and cylinder. No maintenance is necessary for the bearings. All bearings are sealed and permanently lubricated. Lubrication should not be attempted. The units are built for continuous duty operation with the quietness and durability of a diaphragm, but with piston performance.

## Section 7: TROUBLESHOOTING

### 7.10 VACUUM PROBLEMS

Leakage, contamination, and unusual outgassing are the general causes of problems associated with poor vacuum. To operate at maximum efficiency, a system must be thoroughly clean. If the system is completely clean and free from leaks, and unwarranted vacuum problems still exist, the pump should be checked. A simple criterion for the condition of the pump is the determination of its maximum vacuum capability. This can be accomplished by blocking of the intake and reading the vacuum level on the gauge

### 7.20 PRESSURE PROBLEMS

Leakage and contamination are the general causes of problems associated with poor pressure. To operate at maximum efficiency a system must be thoroughly clean. If the system is completely clean and free from leaks, and unwarranted pressure problems still exist, the pump/compressor should be checked by a service technician.

### 7.30 TROUBLESHOOTING GUIDE

Poor Pumping Speed	Poor Pressure	Loud Unit	Possible Cause	Corrective Action
X	X	X	Damaged valves	Replace flapper valves
X	X	X	Debris in valves	Remove debris and check for valve damage
X	X	X	Damaged gasket	Replace gasket
X	X	X	Loose head screw	Tighten head screw
X	X	X	Loose fitting	Tighten fitting

## Section 8: SPECIFICATION

### 8.10 SPECIFICATION TABLE

Welch Model	2534	2546	2522
Free Air Displacement	1.2 CFM (34 L/min) @ 60Hz 1.0 CFM (28 L/min) @ 50Hz	1.6 CFM (45 L/min) @ 60Hz 1.3 CFM (37 L/min) @ 50Hz	1.0 CFM (28 L/min) @ 60Hz 0.8 CFM (23 L/min) @ 50Hz
Maximum Continuous Pressure	100 PSIG	100 PSIG	100 PSIG
Maximum Vacuum	27.2 InHg (690 Torr)	27.6 InHg (700 Torr)	27.2 InHg (690 Torr)
Catalog Number Wired for 115V, 60Hz, 1 Phase with North American 115V Plug	-	2546B-01	-
Catalog Number Wired for 230V, 60Hz, 1 Phase with North American 230V Plug	2534C-01	2546C-01	-
Catalog Number Wired for 220V, 50Hz, 1 Phase with European Schuko Plug	2534C-02	2546C-02	-
Catalog Number Wired for 100V, 50/60Hz, 1 Phase with Japan Plug	-	-	2522C-05
Catalog Number Wired for 230V, 60Hz, 1 Phase with European Schuko Plug	-	2546C-10	-

## **Section 9: WARRANTY**

### **IMPORTANT Please Read Carefully Before Operating This Welch® Vacuum Pump**

#### **UNPACKING**

Inspect the pump carefully. If any damage has occurred, immediately file claim with the carrier immediately. Save the shipping container for carrier to inspect.

#### **OPERATING PUMP**

Refer to the enclosed Instruction/Operation Manual for all information to properly operate and maintain the pump.

#### **WARRANTY**

This Welch Vacuum product is warranted to be free from defects in material and workmanship. The liability of Welch-Ilmvac under this warranty is limited to servicing, adjusting, repairing or replacing any unit or component part which in the judgment of Welch-Ilmvac has not been misused, abused or altered in any way causing impaired performance or rendering it inoperative. No other warranties are expressed or implied. The method of executing this warranty: servicing, adjusting, repairing or replacing shall be at the discretion of Welch-Ilmvac. Vacuum pumps that have been used for any period, however short, will be repaired under this warranty rather than replaced.

The warranty is effective for one year from the date of original purchase when:

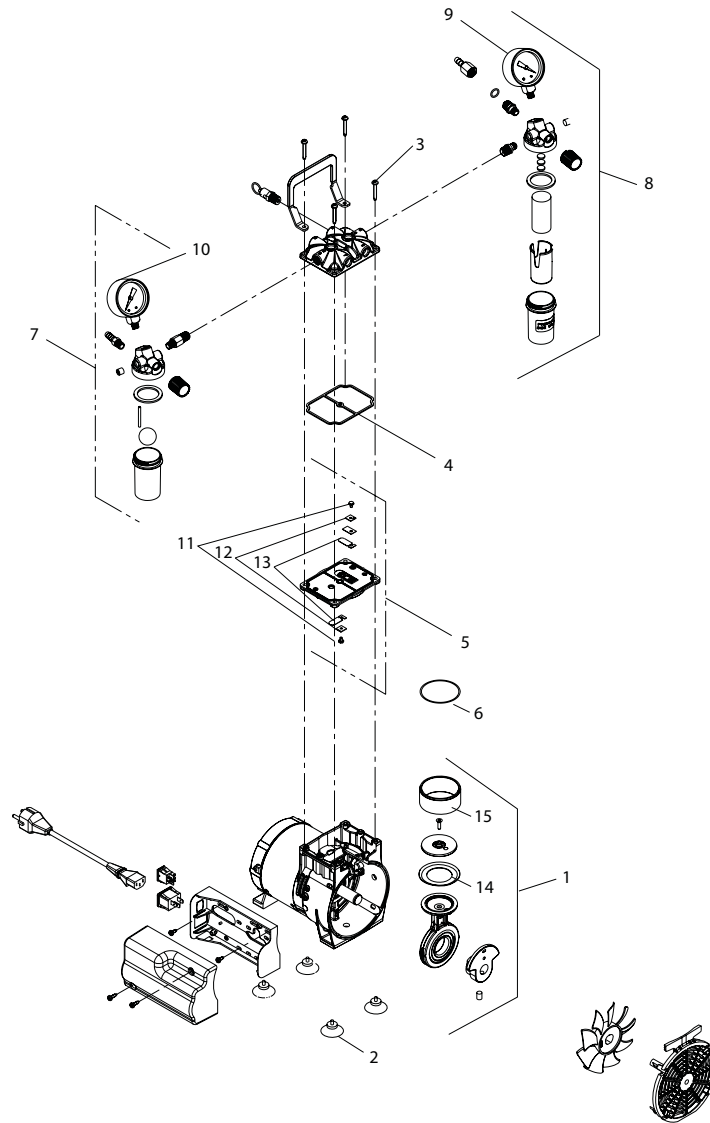
1. The warranty card has been completed and returned.
2. The product is returned to the factory or other designated service centers, freight prepaid.
3. The product in our judgment is defective through no action or fault of the user.

If the product has become defective through misuse, abuse, or alteration, repairs will be billed regardless of the age of the product. In this event, an estimate of the repair costs will be submitted and authorization of these charges will be required before the product is repaired and returned.

To reduce additional charges and delays either within or outside of the warranty period, contact Welch-Ilmvac @ 847-676-8800 for a return authorization number. Products without a return authorization number will be refused by our receiving department. Before shipping, properly pack the pump, insure it against loss or damage, and on the outside of the pump packaging and the packing slip write in the return authorization number. Pumps damaged due to improper packaging are the customer's responsibility.

## Section 10: EXPLODED VIEWS AND PARTS LIST

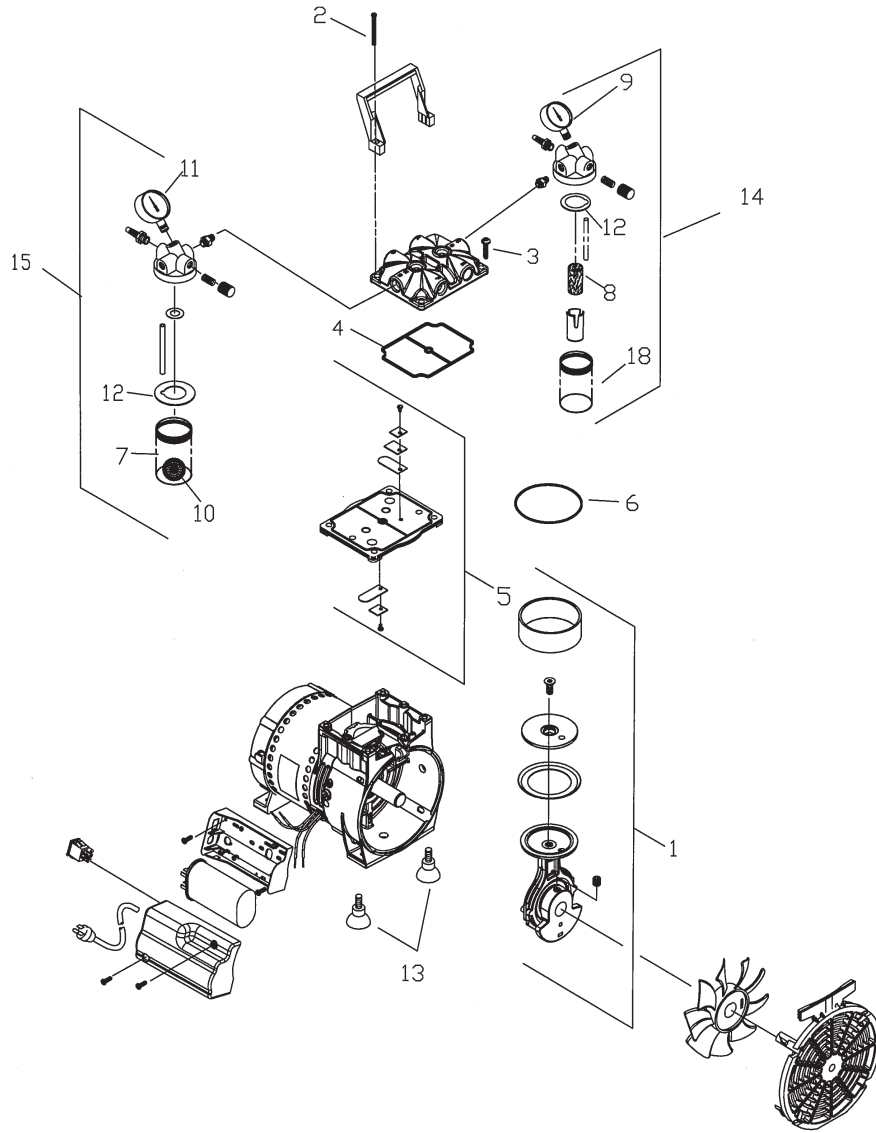
### 10.10 MODELS 2546B-01 2546C-01 2546C-02 2546C-10



Item	Qty.	Part No.	Description	Service Kit 2546-03	Foot Kit 2500K-04
1	1	2546K-01	Connecting Rod Ass'y	1	-
2	4	2500K-04	Rubber Suction Feet	-	4
3	4	*	Screw, Head	4	-
4	1	*	O-ring, Head	1	-
5	1	2567K-02	Valve Plate Ass'y	-	-
6	1	*	O-ring, Cylinder	1	-
7	1	2522K-05	Vacuum Gauge Ass'y	-	-
8	1	2522K-06	Pressure Gauge Ass'y	-	-
9	1	726025	Pressure Gauge	-	-
10	1	726021	Vacuum Gauge	-	-
11	2	*	Valve Flapper Screw	2	-
12	2	*	Valve Keeper	2	-
13	2	*	Valve Flapper	2	-
14	1	*	Piston Cup	1	-
15	1	*	Cylinder Sleeve	1	-

\* These parts are not available separately, but are supplied in service kits.

**10.20 MODELS**  
**2522C-05**  
**2534C-01**  
**2534C-02**



Item	Qty.	Part No.	Description	Service Kit SK668	Foot Kit 2500K-04
1	1	666469	Connecting Rod Ass'y	-	-
2	4	624266	Rubber Suction Feet	-	4
3	4	625175	Screw, Head	4	-
4	1	623143	O-ring, Head	1	-
5	1	621755-502	Valve Plate Ass'y	-	-
6	1	623071	O-ring, Cylinder	1	-
7	1	638816-502	Vacuum Gauge Ass'y	-	-
8	1	638955-502	Pressure Gauge Ass'y	-	-
9	1	638122	Pressure Gauge	-	-
10	1	638792	Vacuum Gauge	-	-
11	2	625094	Valve Flapper Screw	2	-
12	2	617562	Valve Keeper	2	-
13	2	621485	Valve Flapper	2	-
14	1	624396	Piston Cup	1	-
15	1	670031	Cylinder Sleeve	1	-

## Notes

## Notes



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