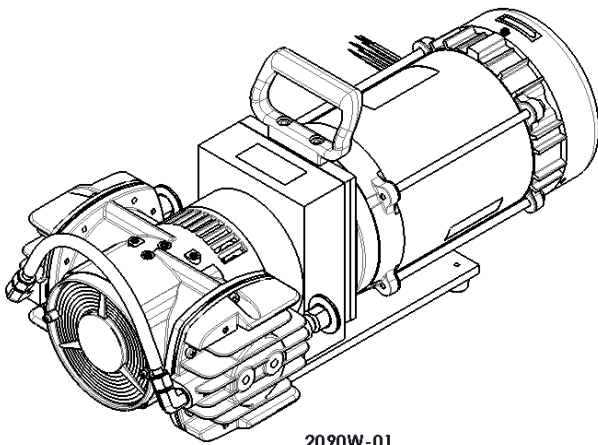




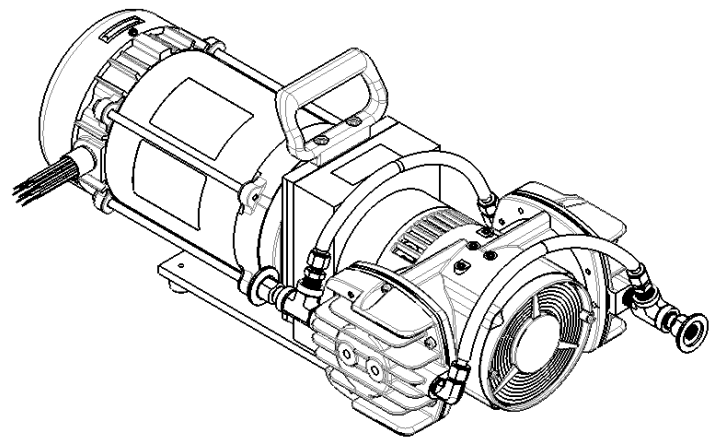
# **WELCH**

by Gardner Denver

## **OWNER'S MANUAL FOR DRY VACUUM PUMPS MODELS 2090W-01 and 2085W-01**



2090W-01



2085W-01



### **WARNING**

**Be sure to properly identify intake and discharge  
before using pump. See Section 2.5.**

**Part No. 642978  
Printed in the U.S.A.**

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## **Section 1: SAFETY INFORMATION**

**Read and understand the following information and instructions included with your Welch Dry Vacuum Pumps before using. This information is for your safety and to prevent damage to the pumps.**

### **1.1 CAUTION: To Prevent Injury...**

**1.1a** Never operate this product 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.

**1.1b** Keep the cord away from heated surfaces.

**1.1c** 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.

**1.1d** Never drop or insert fingers or any other object into any openings.

**1.1e** This pump is thermally protected and can automatically restart when the protector resets. Always disconnect power source before servicing.

**1.1f** Wear safety glasses or goggles when operating this product.

**1.1g** Use only in well ventilated areas.

**1.1h** All electrical products generate heat. To avoid serious burns never touch unit during or immediately after operation.

**1.1i** Be sure to properly identify intake and discharge before using pump. See Section 2.5.

### **1.2 CAUTION: To Reduce Risk Of Electrical Shock...**

**1.2a** Do not disassemble. Disassembly or attempted repairs if accomplished incorrectly can create electrical shock hazard. Refer servicing to qualified service agencies only.

**1.2B** Be sure to connect pump to a properly grounded outlet only.

### **1.3 WARNING: To Reduce Risk Of Electrocutation...**

**1.3a** Do not use this product in or near area where it can fall or be pulled into water or other liquids.

**1.3b** Do not reach for this product if it has fallen into liquid. De-energize immediately.

**1.3c** Never operate this product outdoors in the rain or in a wet area.



**WARNING**

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

## Section 2: INSTALLATION

### 2.1 Introduction

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

### 2.2 Unpacking

Carefully remove the Dry 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.

### 2.3 Pump Mounting

Rubber feet are attached to the pump. Rubber feet are excellent for applications involving a semi-flexible surface such as bench tops; they help to isolate noise and eliminate creeping. The 2090/2085 vacuum pumps should be mounted in a horizontal plane.

### 2.4 Pump Location

The pressure/vacuum pump should be located preferably in a clean, dry and well ventilated area. Please be sure not to block the ventilation ports 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 chose 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.**

### 2.5 Intake and Discharge Provisions

The intake/exhaust connections are NW25 ISO vacuum flange with a 3/8"-18 NPT threaded I.D.



**WARNING**  
**Bursting Hazard – Parts for use on exhaust port should be suitable for pressures not less than 100 PSIG.**

## **2.6 Electrical Power**

### **2.6a 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. Consult your local electrical codes if you have doubts.

### **2.6b Overload Protection.**

Motor thermal overload protection is made available by the motor manufacturer as an aid to minimizing 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 rest 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.

## **2.7 Vacuum Connections**

The 2090/2085 vacuum pumps come with NW25 ISO vacuum flange with a 3/8"-18 NPT threaded I.D. Hinge clamps and centering assemblies should be implemented if using the flange connections. If using the 3/8"-18 NPT threaded connection, a suitable quality liquid/paste thread sealant should be used. Since both 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 process be kept as short as possible. The exhaust plumbing will act to muffle pump noise. The exhaust vent line will allow gases and vapors pumped through the pump to be piped from the work area into a hood. Be sure to safely exhaust the process vapors with consideration to worker health and fire safety.

## **2.8 Traps**

### **2.8a The need for a Trap**

The use of Teflon coated aluminum heads, Teflon liner over diaphragms and stainless valves allows the pumps to handle mildly corrosive solvents, acids and bases. 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.

When a heavy load of vapor is evolved from the vacuum process, a cold trap is recommended to help prevent damage to the pump mechanism.

The symptom of a high vapor load is if you have droplets of liquid coming out of the exhaust port. If you see droplets of water, Welch recommends you use a cold trap to capture the water before entering the pump or dilute the water vapor stream by adding dry nitrogen to the gas flow. Please call our customer service department for additional information at (847) 676-8800.

## **2.8b The Care of a Trap**

When using a cold trap the refrigerant should be maintained at a high level in order to keep the trap at a uniformly low temperature. If the trap is rewarmed it may allow re-evaporation of the condensate. 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 3: OPERATION

### 3.1 Starting Procedures

#### 3.1a Starting a Welch Dry Vacuum Pump.

Before attaching the pump to a system it is well to familiarize yourself with the function and action of the pressure vacuum pump which you have acquired. Review the power requirements as described in Section 2.6. 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.

#### 3.1b Cleanliness

Take every precaution to prevent foreign particulates from entering the pump. Particulates will damage the pump's performance. If you find that particulates will come off the process during evacuation, a particulate trap in the foreline will work.



#### WARNING

**The pump is not recommended for pumping highly corrosive acid or base vapors or gases. Serious damage to the pump will result and will shorten the pump's service life.**

### 3.2 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 water / liquid dish soap solution. Escaping air will produce soap bubbles.

### 3.3 Operating Pressure Range

Models 2090 and 2085 Dry vacuum pumps are designed to be run from atmospheric to their maximum vacuum level on the intake side. Consult the Specification Table in the back of this manual for the ratings for your specific model.

### 3.4 Shutdown Procedures

After use, Welch recommends the pump be run for about 2 minutes disconnected from the vacuum process with air or dry nitrogen passing through the pump. The air or dry nitrogen pumped through the mechanism will purge out water vapor or droplets of water condensate that may have formed on the inside of the pump. Purging of the pump mechanism helps prevent corrosion.

## Section 4: MAINTENANCE

Welch dry diaphragm vacuum pumps are 100% oil-free. No maintenance is necessary for the bearings. All bearings are sealed and permanently lubricated. Lubrication should not be attempted.



## Section 5: TROUBLESHOOTING

### 5.1 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 (See Section 2.8).

### 5.2 Troubleshooting Guide

Poor Pumping Speed	Poor Vacuum	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 Gaskets	Replace gaskets
X	X	X	Loose Head Screws	Tighten head screws
X	X		Loose fittings	Tighten fittings

Others Symptoms:

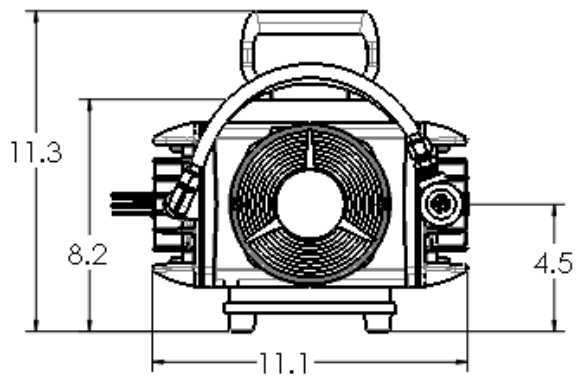
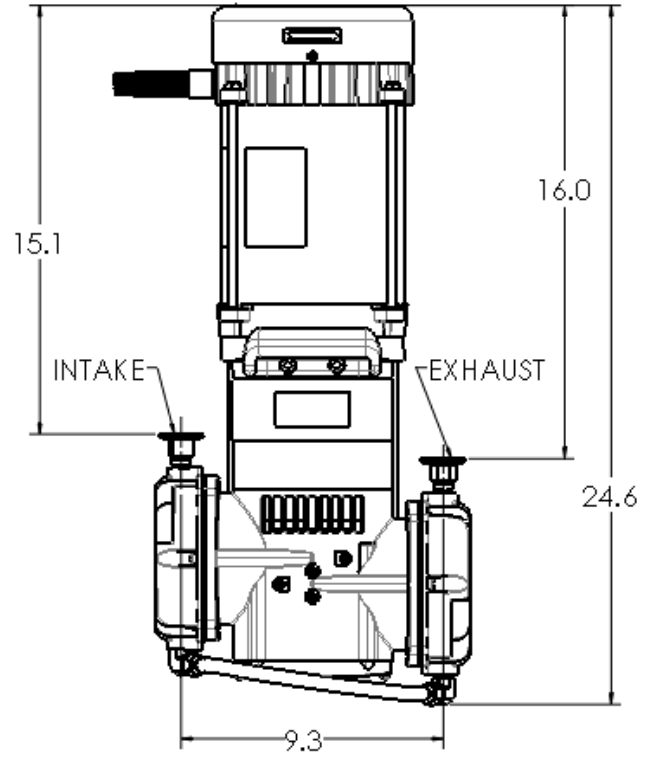
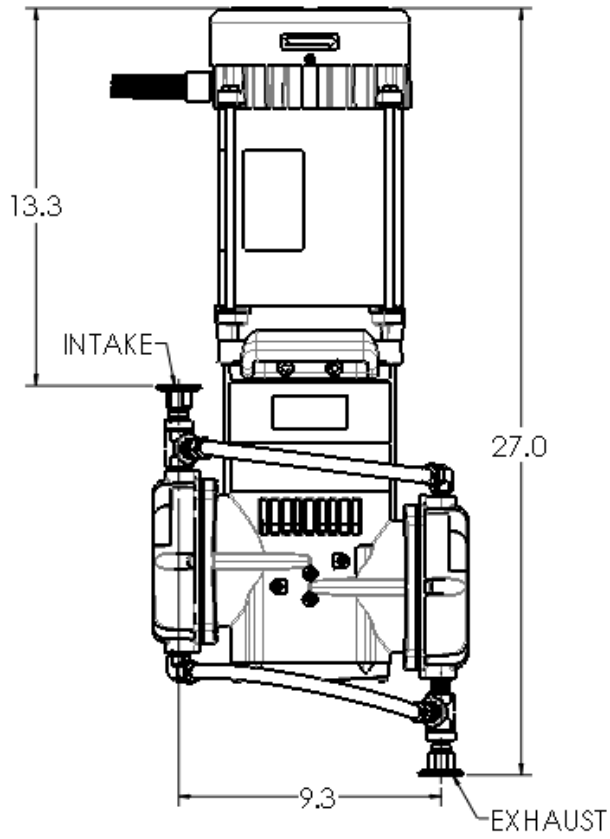
1. Pump does not turn on - Cause: Inlet under vacuum - Corrective Action: Release vacuum at inlet.
2. Pump rocks when turned off - Cause: Inlet under vacuum - Corrective Action: Release vacuum at inlet prior to turning off the pump.

## Section 6: SPECIFICATIONS

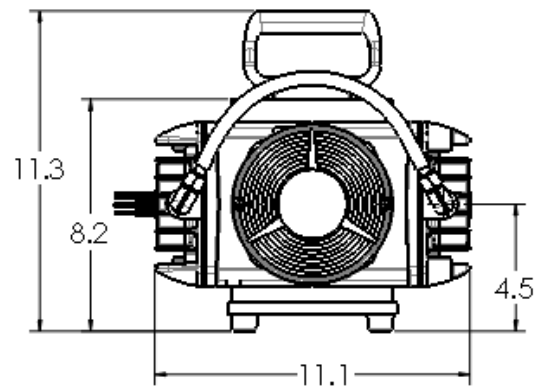
Welch Model	2090	2085
Free Air Displacement CFM (L/min)@60Hz	4.5 (127)	6.9 (176)
Ult. Press., Torr (mbar)	25 (33)	100 (133)
Max Vacuum, in. Hg	29	26
Number of Vacuum Stages	2	1
Motor Horsepower	1/2	1/2
Vacuum Restart	yes	yes
Minimum Tubing Needed, I.D. in.	7/16	7/16
Weight, lbs. (kg)	52 (23.6)	52 (23.6)
Catalog Number	2090W-01	2085W-01
Motor Voltage	115V / 208-230V / 1PH / 60HZ	
Motor Amps	9.8 / 4.9-4.9	
Motor Hazardous Classification	CLASS 1 DIV 1 GROUP C,D CLASS 2 DIV 1 GROUP E,F,G	

## Section 7: DRAWINGS

### 7.1 Dimensional Drawings

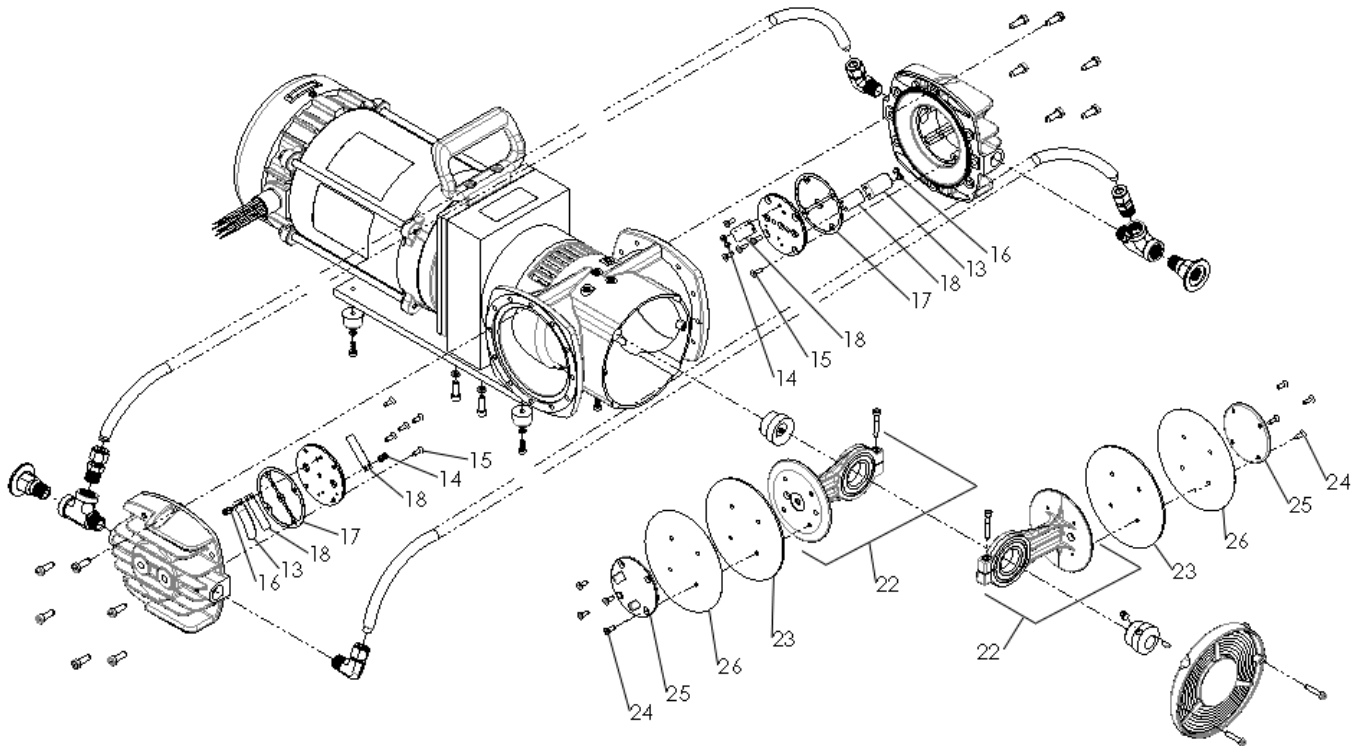


2085W-01



2090W-01

## Exploded View for 2085W-01

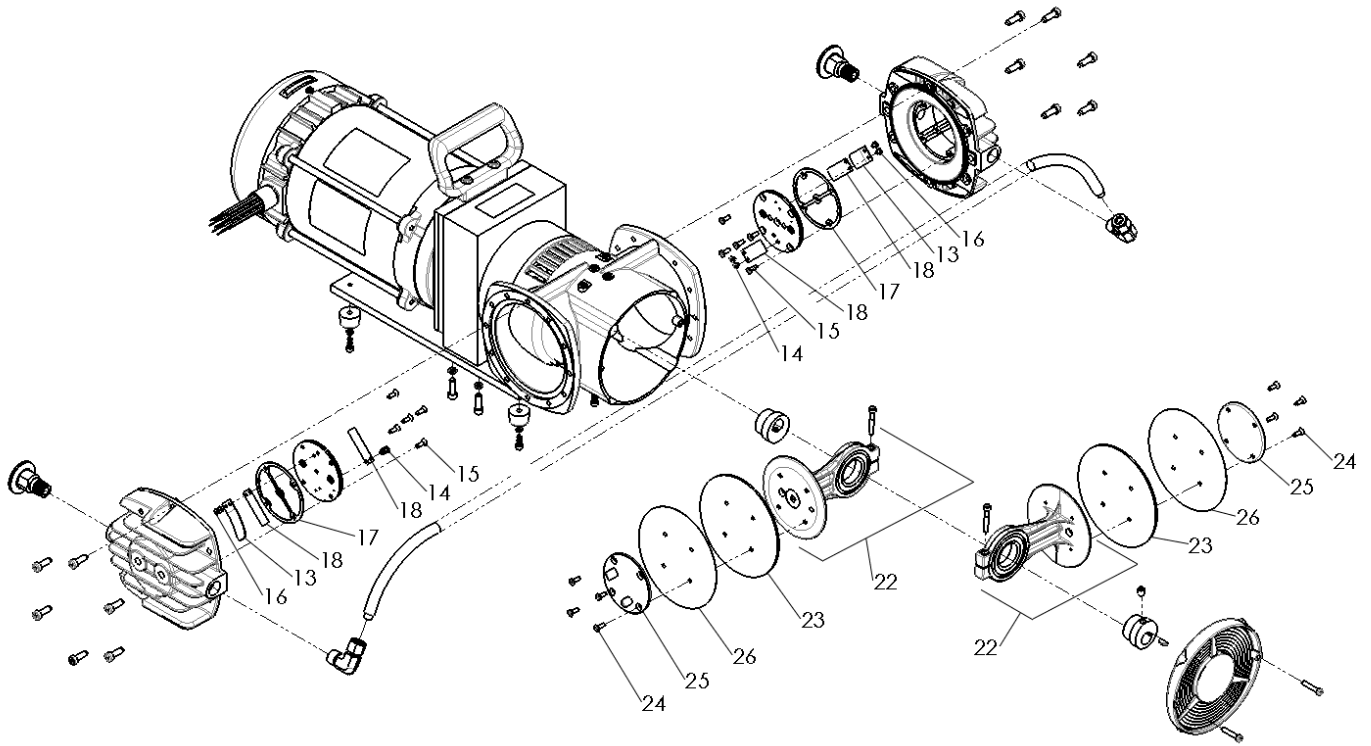


### Parts List for 2085W-01

Item No.	Part No.	Description	Diaphragm Service Kit 2090K-01	Valve Plate Service Kit 2090K-02
13	See Note 1	Valve Keeper	-	2
14	See Note 1	Screw-Valve Flapper-Intake	-	4
15	See Note 1	Screw-Valve Plate	-	10
16	See Note 1	Screw-Valve Flapper-Exhaust	-	4
17	See Note 1	Valve Plate Gasket	-	2
18	See Note 1	Valve Flapper-Intake & Exhaust	-	4
22	-	Connecting Rod	-	-
23	See Note 1	Diaphragm	2	-
24	See Note 1	Screw-Hold Down Plate	8	-
25	See Note 1	Hold Down Plate	2	-
26	See Note 1	PTFE Liner	2	-

**Note 1:** These parts are not available separately, but are supplied within kits.

## Exploded View for 2090W-01



### Parts List for 2090W-01

Item No.	Part No.	Description	Diaphragm Service Kit 2090K-01	Valve Plate Service Kit 2090K-02
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22	-	Connecting Rod	-	-
23	See Note 1	Diaphragm	2	-
24	See Note 1	Screw-Hold Down Plate	8	-
25	See Note 1	Hold Down Plate	2	-
26	See Note 1	PTFE Liner	2	-

**Note 1:** These parts are not available separately, but are supplied within kits.

## Section 9: WARRANTY

### UNPACKING

Inspect the pump carefully. If any damage has occurred, 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 product is warranted to be free from defects in material and workmanship. The liability of Gardner Denver Thomas under this warranty is limited to servicing, adjusting, repairing or replacing any unit or component part which in the judgment of Gardner Denver Thomas 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 Gardner Denver Thomas. 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 at (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.



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