PILOT**SERIES**

O W N E R S M A N U A L

PILOT**5000** | PILOT**3000**

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

BE SURE TO PROPERLY IDENTIFY INTAKE AND EXHAUST BEFORE USING THE PUMP. SEE SECTION 3.15

CAUTION

DO NOT PUMP LIQUIDS WITH THE PUMP.
PUMPING LIQUIDS WILL CAUSE THE PUMP TO STOP WORKING.

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 conform to the SI International system of units of measurement.

The following symbols (with recommendation of IEC 61010) 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

TABLE OF CONTENTS

SECTION **PAGE**

Section 01 - Safety Information

1.10 Caution: to prevent injury 4
1.20 Caution: to reduce risk of electrical shock 4
1.30 Warning: to reduce risk of electrocution 5
1.40 Warning: to reduce risk of explosion or fire 5

Section 02 - Optional Accessories

2.10 Optional Accessories 5

Section 03 - Installation

3.10 Environmental conditions 6
3.11 Introduction 6
3.12 Unpacking 6
3.13 Pump mounting 6
3.14 Pump location 6
3.15 Discharge provisions 6
3.16 Electrical power 7
3.17 Traps 8
3.18 When to Use a liquid Trap 8
3.19 When to Use a cold Trap 8
3.20 The care of a liquid trap 8
3.21 The care of a cold trap 8

Section 04 - Operation

4.10 Starting a PILOT Series Vacuum Pump 9
4.11 Cleanliness 9
4.12 Leak detection 9
4.13 Operating pressure range 9
4.14 Shutdown procedure 9

Section 05 - Maintenance

5.10 General maintenance 10
5.11 Diaphragm replacement 10

Section 06 - Specifications

6.10 Specification 13

Section 07 - Drawing

7.10 Exploded view and kits 14

Section 08 - Warranty

8.10 Warranty 16

SECTION 01 | SAFETY INFORMATION

1.10 Caution: 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 contact your authorized distributor 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. To ensure proper ventilation, keep unit a minimum of one inch from any wall or obstruction. The air openings are for ventilation of the motor inside the housing.

1.14 The pump is thermally protected and can automatically restart when the protector resets. Always disconnect power source before servicing.

1.15 Never drop or insert fingers or any other object into any openings.

1.16 Do not operate this product where oxygen is being administered.

1.17 Wear safety glasses and goggles when operating this product.

1.18 Use only in well ventilated areas. The motor on all pumps are totally enclosed fan cooled

WARNING

DO NOT OPERATE THE PUMPS IN AN ATMOSPHERE CONTAINING FLAMMABLE OR EXPLOSIVE GASES/VAPORS.

1.19 Be sure to properly identify intake and discharge before using pump. Models have one exhaust port on the pump. See Section 3.15.

WARNING

REMOVE PLUG FROM EXHAUST PORT BEFORE USING.

1.20 Caution: 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.

SECTION 01 | SAFETY INFORMATION

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. Unplug immediately.

1.33 Never operate this product outdoors in the rain or in a wet area.

1.40 Danger: 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 use this product near flames.

WARNING

FAILURE TO OBSERVE THE ABOVE SAFETY PRECAUTIONS COULD RESULT IN SEVERE BODILY INJURY, INCLUDING DEATH IN SOME CASES.

SECTION 02 | OPTIONAL ACCESSORIES

2.10 Optional Accessories

CATALOG NUMBER	DESCRIPTION
TLD9100	Inlet / Exhaust separator jar
TLD9200	5 feet of thick walled rubber vacuum hose
TLD9300	Hydrophobic in-line filter, 10 pack, 0.8 micron
TLD9400	Exhaust silencer for PILOT5000
TLD5000K-01	Diaphragm Replacement Parts for PILOT5000
TLD5000K-03	Major Rebuild Parts for PILOT5000
TLD3000K-01	Diaphragm Replacement Parts for PILOT3000
TLD3000K-03	Major Rebuild Parts for PILOT3000

SECTION 03 | INSTALLATION

3.10 ENVIRONMENTAL CONDITIONS

The Pump is rated for indoor use only. Maximum altitude 2000 meters. Operating temperature range 100C to 400C. Maximum relative humidity of 80% for temperatures up to 310C decreasing to 50% at 400C. Rated for +/-10% of supply voltage. Pollution Degree 2, Installation Category II.

3.11 INTRODUCTION

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

3.12 UNPACKING

Carefully remove the Vacuum pump from the shipping case. 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, be sure to include your order numbers for quick identification. Do not return the pump to the factory without obtaining returned goods authorization.

3.13 PUMP MOUNTING

Rubber feet are attached to the pump casing.

3.14 PUMP LOCATION

WARNING

DON'T OPERATE THIS PUMP IN AN ATMOSPHERE CONTAINING FLAMMABLE OR EXPLOSIVE GAS.

WARNING

THE MOTOR IS THERMALLY PROTECTED AND WILL AUTOMATICALLY RESTART UNEXPECTEDLY WHEN THE OVERLOAD DEVICE RESETS.

The 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 100C and 400C (500F and 1040F). Always check to insure the location chosen is protected from direct or indirect moisture contact. The pump should be located as closely to its system in order to utilize it most efficiently.

3.15 DISCHARGE PROVISIONS

The Vacuum Pump comes with an optional 3/8 ID hose barb supplied loose with the pump. By threading the hose barb in the exhaust port of the pump, a vent line can be attached which allows gases and vapors pumped through the pump to be piped from the work area into a hood. Vent lines will muffle noise coming from the vacuum pump.

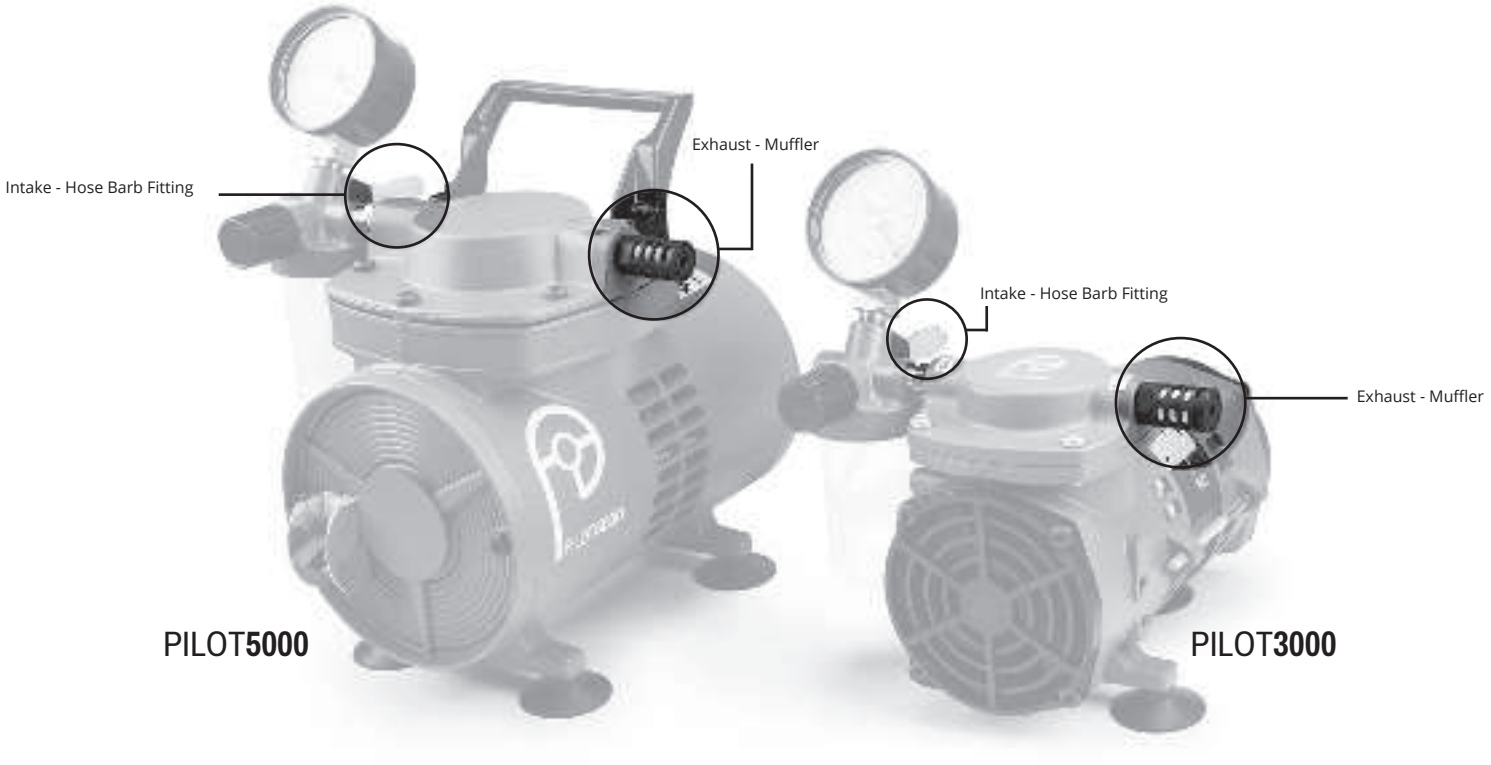
WARNING

NEVER BLOCK THE DISCHARGE PORT. IF THE EXHAUST IS BLOCKED, PRESSURE WILL BUILD-UP IN THE PUMP WHICH CAN LEAD TO THE PUMP HEAD BURSTING CREATING THE POTENTIAL OF SERIOUS INJURY. REMOVE PLUG FROM EXHAUST PORT.

WARNING

REMOVE PLUG FROM EXHAUST PORT BEFORE OPERATING.

PROPERLY IDENTIFY THE INTAKE AND EXHAUST OF THE PUMP



3.16 ELECTRICAL POWER

3.16.1 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 PILOT 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 an outlet properly grounded. Consult your local electrical codes if you have doubts.

IDENTIFICATION SYMBOLS

POWER ON

POWER OFF

3.17 TRAPS

3.18 WHEN TO USE A LIQUID TRAP

When pumping gases or low vapor loads, a trap is not necessary unless you want to capture vapors evolved from the process. When a heavy load of water or organic vapor is evolved from the vacuum process, condensation of vapor in the pump mechanism may occur. The reason is the pump is compressing the vapor as it passes through the pump. If the vapor is dense enough, the compression will cause condensation of the vapor in the pump mechanism. The valve system in the pump mechanism is designed to pass the small quantity of liquefied vapor formed when pumping heavy vapor loads. The liquid formed will be ejected from the exhaust port. The ejected liquid from the exhaust port can either be collected in a liquid trap attached to the exhaust port or the vapor trapped in a cold trap placed in-line between the pump and the vacuum chamber. A simple, inexpensive liquid trap can be made from a filtering fl ask. The filtering flask is connected by 3/8”ID hose to the exhaust port by using the loose hose barb provided.

3.19 WHEN TO USE A COLD TRAP

The use of a cold trap when pumping heavy vapor loads will eliminate the need for a liquid trap attached to the exhaust port. The cold trap is installed between the pump and the vacuum chamber. The water or organic vapors evolved from the vacuum process will upon entering the cold trap will come in contact with the surfaces of the trap and condense. Commonly used refrigerants are liquid nitrogen or dry ice with alcohol slurry. Dry ice provides sufficient cooling to freeze out most heavy water vapor loads. A variety of cold traps are available from your authorized distributor. For additional information, contact your distributor directly.

3.20 THE CARE OF A LIQUID TRAP

A liquid trap needs no refrigerant. The key maintenance issue when pumping high vapor loads is to regularly drain the trap of liquid ejected from the dry vacuum pump.

3.21 THE CARE OF A COLD 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. If a liquid nitrogen trap is used, the refrigerant add tube on the liquid nitrogen trap should not be obstructed as the refrigerant boil-off can produce dangerously high pressures.

SECTION 04 | OPERATION

4.10 STARTING A PILOT SERIES 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 3.16. The manufacturer recommends running the pump for a few minutes to warm it up before use. The warm-up improves the pumps ability to pass water and organic vapor. A warm pump will handle more vapor without liquefying it than a cold pump.

4.11 CLEANLINESS

Take every precaution to prevent foreign particulates or liquid from entering the pump. Particulates will damage the pump's performance. If you find that particulates or liquid will come off during the process of evacuation, a simple liquid trap can be made out of readily available material for protecting the pump. The trap would consist of a filtering flask placed between the pump and the vacuum chamber.

4.12 LEAK DETECTION

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

4.13 OPERATING PRESSURE RANGE

Vacuum pumps are designed to be run from slightly below 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.

4.14 SHUTDOWN PROCEDURES

After use, the manufacturer recommends the pump be run for about 2 minutes disconnected from the vacuum process. The air pumped through the mechanism will purge out water vapor or droplets of condensate that may have formed on the inside of the pump. This purge of the pump mechanism helps prevent build up of solute crystals inside of the pump head. Over time, these crystals will shorten pump lifetime.

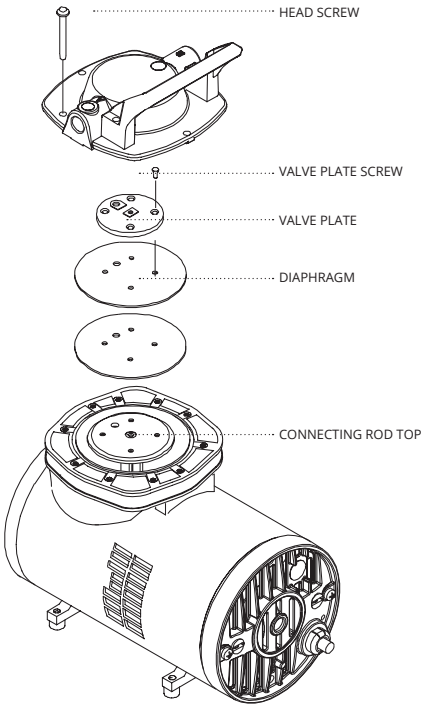
5.10 GENERAL MAINTENANCE

PILOT series Vacuum units are 100% oil-free. All bearings are sealed and permanently lubricated. Lubrication should not be attempted. The units are built for duty operation just like a water aspirator, but with the quietness, performance and durability of a diaphragm.

5.11 DIAPHRAGM REPLACEMENT FOR PILOT5000

WARNING

DO NOT REMOVE THE DIAPHRAGM UNLESS YOU ARE WEARING HAND PROTECTION. THE STEEL DISC INSIDE THE DIAPHRAGM MAY CAUSE HARMFUL INJURY.



Component parts required

1. Diaphragm and diaphragm liner.
2. Four screws for intake valve plate.

Disassembling the diaphragm and liner

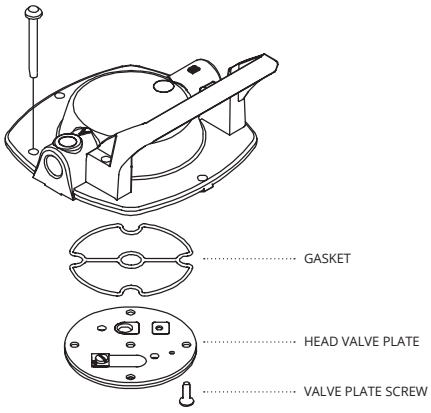
1. Disconnect power.
2. Disconnect air lines and remove pump from enclosure.
3. Observe the position of the air intake and exhaust ports before disassembly.
4. Remove six screws from head, remove head, set head with screws aside for assembly.
5. Remove four screws from valve plate. Remove valve plate and set aside for reassembly.
6. Remove diaphragm and liner and discard.

Reassembling the diaphragm and liner

1. Wipe top of connecting rod clean with a soft clean cloth.
2. Place new diaphragm and liner on top of connecting rod. Line up the holes in the diaphragm and liner with the screw holes in connecting rod. Replace valve plate and line up holes.
3. Torque valve plate screws to 20 inch-pounds using crisscross pattern.

CAUTION

TO PREVENT DAMAGE TO THE PUMP, NEVER APPLY ANY SEALANT OR LUBRICATION TO THE GASKET.



Head valve plate replacement

1. Wipe inside of head clean. Install new gasket if needed, be sure to remove any excess gasket.
2. Replace valve plate in head. Chamfer side of valve plate should face you. Insert four new screws. Torque valve plate screws to 22 inch-pounds.

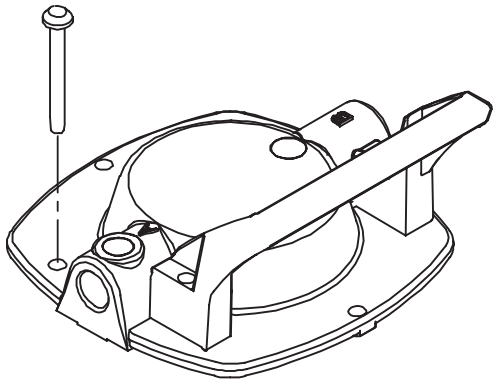
Reassembling the pump

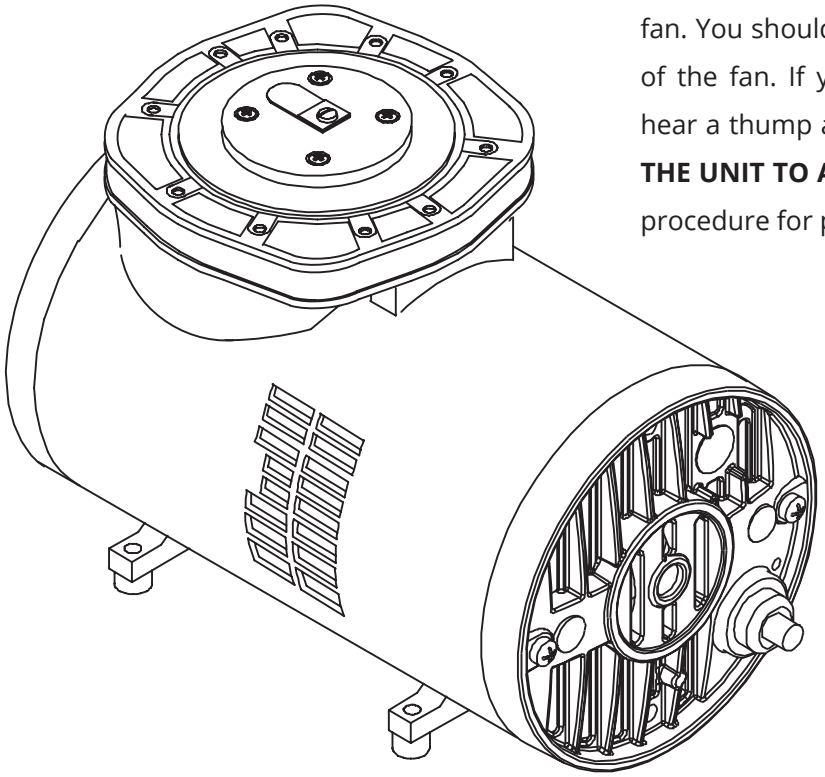
1. Place the head assembly on the housing, observing the position of the air intake and exhaust ports.

   Note: Make sure the diaphragm is seated properly in the well of the housing and head. Do not pinch the diaphragm or liner.

2. Insert the head screws and tighten each screw until it is snug in a criss cross pattern. Do not completely tighten the screws yet.

3. Using a torque wrench with the T-25 Hex attachment, tighten each head screw to 45 inch-pounds, in a criss cross pattern.





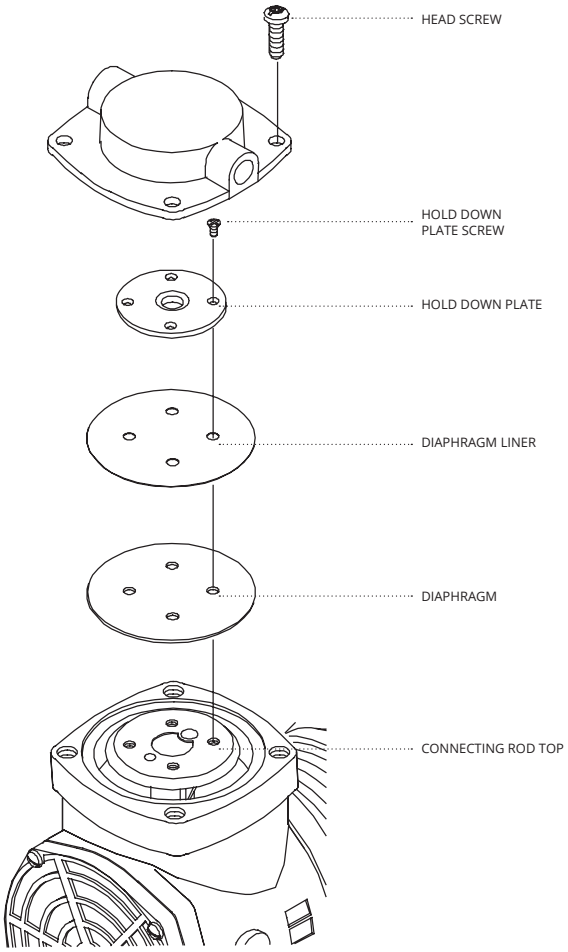
CAUTION

To avoid property damage or personal injury, always try rotating the fan by **HAND**, prior to connecting the unit to the power source. Check for suction at the air inlet port by placing your finger over the port as you turn the fan. You should feel a slight suction with each rotation of the fan. If you don't feel suction, or if you feel or hear a thump as you turn the fan, **DO NOT CONNECT THE UNIT TO A POWER SOURCE**; review the assembly procedure for possible error.

5.12 DIAPHRAGM REPLACEMENT FOR PILOT3000

WARNING

DO NOT REMOVE THE DIAPHRAGM UNLESS YOU ARE WEARING HAND PROTECTION. THE STEEL DISC INSIDE THE DIAPHRAGM MAY CAUSE HARMFUL INJURY.



Disassembling the diaphragm and liner

1. Disconnect power.
2. Disconnect air lines.
3. Observe the position of the air intake and exhaust ports before disassembly.
4. Remove four screws from head, remove head, set head with screws aside for assembly.
5. Remove four screws from hold down plate. Remove hold down plate and set aside for reassembly.
6. Remove diaphragm and liner and discard.

Reassembling the diaphragm and liner

1. Wipe top of connecting rod clean with a soft clean cloth.
2. Place new diaphragm and liner on top of connecting rod. Line up the holes in the diaphragm & liner with the screw holes in connecting rod. Replace valve plate and line up holes.
3. Torque valve plate screws to 20 inch-pounds using crisscross pattern.

CAUTION

TO PREVENT DAMAGE TO THE PUMP, NEVER APPLY ANY SEALANT OR LUBRICATION TO THE GASKET.

Reassembling the pump.

1. Place the head assembly on the housing, observing the position of the air intake and exhaust ports.

   Note: Make sure the diaphragm is seated properly in the well of the housing and head. Do not pinch the diaphragm or liner.

2. Insert the head screws and tighten each screw until it is snug in a criss-cross pattern. Do not completely tighten the screws yet.
3. Using a torque wrench with the T-25 Hex attachment, tighten each head screw to 40 inch-pounds, in a crisscross pattern.

PILOT**5000**

Air Flow Rate (lpm)	CFM (L/min) @ 60 Hz 1.3 (37)
Maximum Vacuum, Hg	24"
Ultimate Pressure, Torr (mbar)	150 (200)
Tubing Needed, I.D.	1/4"
Cord Supplies	North American 115V Plug
Motor H.P.	1/5
Usage Hours	15,000
Motor Voltage & Frequency	115V, 60Hz, 1 Phase
Motor Amps	3.5
Overall Pump Dimensions	8.75"L x 5.0"W x 8.75"H
Shipping Dimensions	20" L x 16"W x 14"H
Weight	13 lbs.
Shipping Weight	16 lbs.
Certification	UL Recognized
Warranty	One Year Warranty

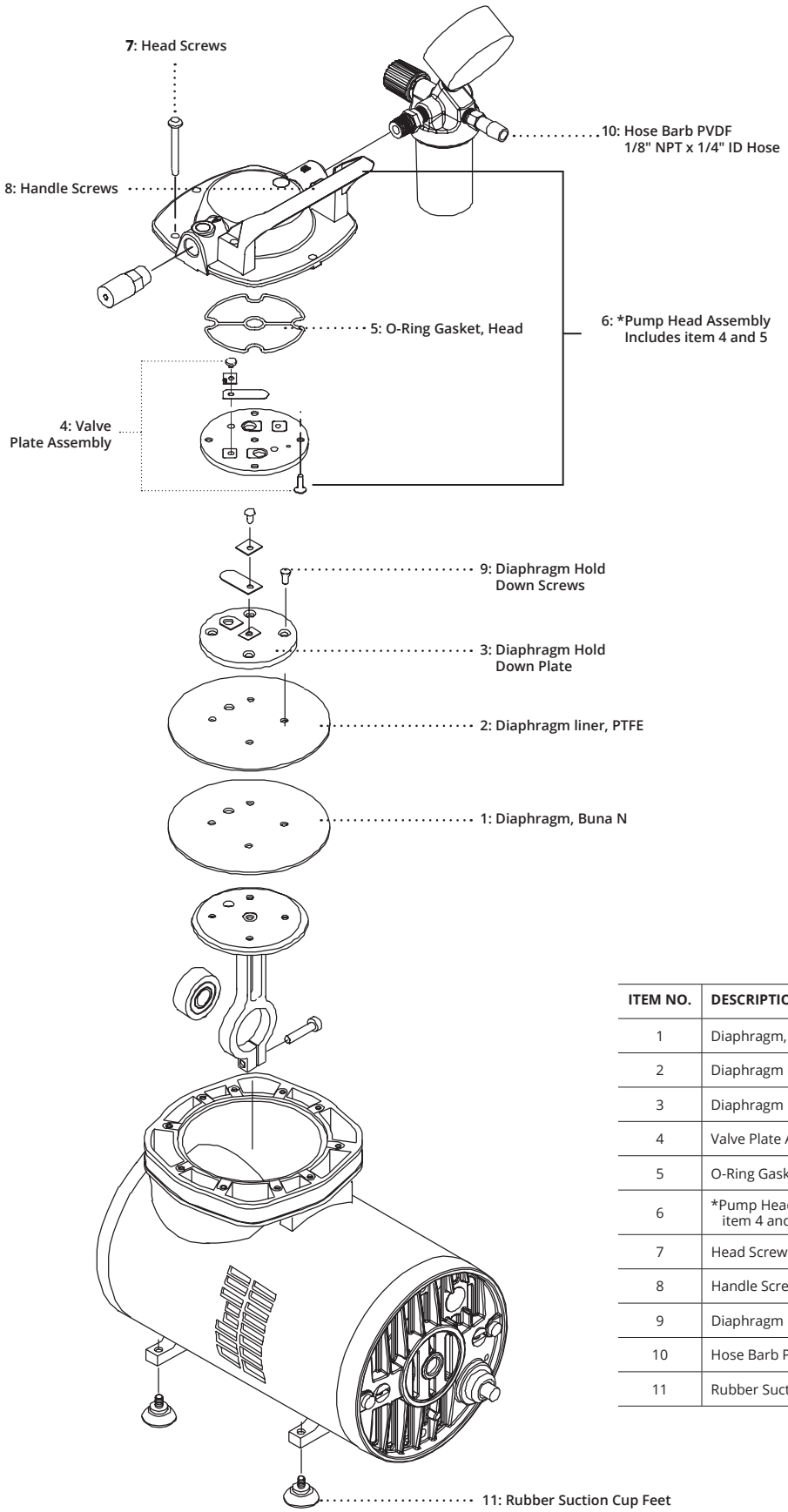
PILOT**5000**C

Motor Voltage & Frequency	230V, 50Hz, 1 Phase
Air Flow Rate (lpm)	CFM (L/min) @ 50 Hz 1.1 (31)
Cord Supplies	North American/European Shuko 230V

PILOT**3000**

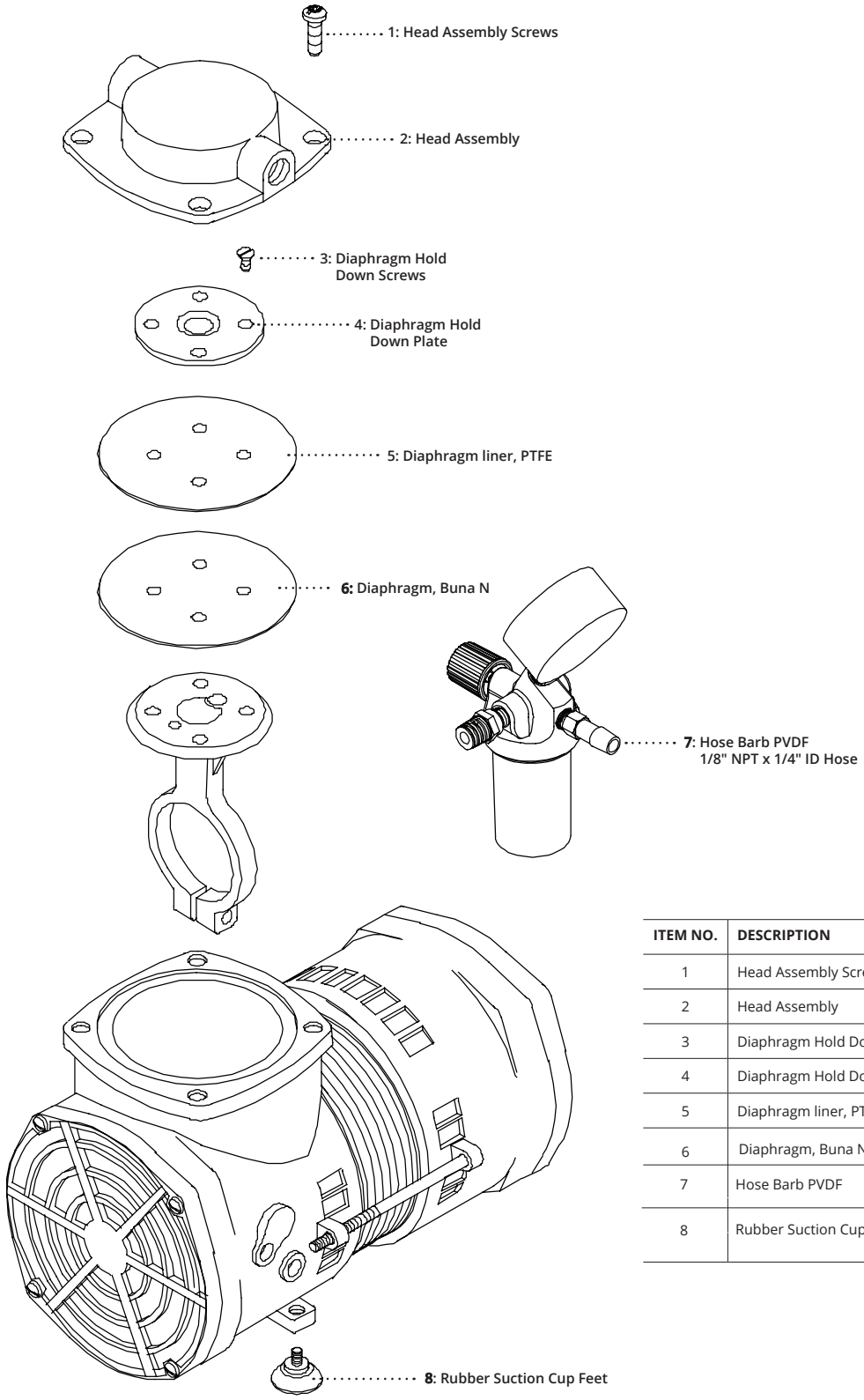
Air Flow Rate (lpm)	CFM (L/min) @ 60 Hz 0.7 (20)
Maximum Vacuum, Hg	22"
Ultimate Pressure, Torr (mbar)	190 (253)
Tubing Needed, I.D.	1/4"
Cord Supplies	North American 115V Plug
Motor H.P.	1/7
Usage Hours	15,000
Motor Voltage & Frequency	115V, 60Hz, 1 Phase
Motor Amps	1.5
Overall Pump Dimensions	6.8"L x 7.3"W x 8.3"H
Shipping Dimensions	14"L x 14"W x 14"H
Weight	7.5 lbs.
Shipping Weight	10 lbs.
Certification	UL Recognized
Warranty	One Year Warranty

SECTION 07 | EXPLODED VIEW AND KITS, PILOT5000



ITEM NO.	DESCRIPTION	TLD5000K-01	TLD5000K-03	2500K-04
1	Diaphragm, Buna N	1	1	
2	Diaphragm liner, PTFE	1	1	
3	Diaphragm Hold Down Plate		1	
4	Valve Plate Assembly		*	
5	O-Ring Gasket, Head	1	*	
6	*Pump Head Assembly Includes item 4 and 5		1	
7	Head Screws		4	
8	Handle Screws		2	
9	Diaphragm Hold Down Screws	4	4	
10	Hose Barb PVDF 1/8" NPT x 1/4" ID Hose		2	
11	Rubber Suction Cup Feet			4

SECTION 07 | EXPLODED VIEW AND KITS, PILOT3000



ITEM NO.	DESCRIPTION	TLD3000K-01	TLD3000K-03	2500K-04
1	Head Assembly Screws	-	1	-
2	Head Assembly	-	1	-
3	Diaphragm Hold Down Screws	4	4	-
4	Diaphragm Hold Down Plate	1	1	-
5	Diaphragm liner, PTFE		1	-
6	Diaphragm, Buna N		4	-
7	Hose Barb PVDF	--	1	-
8	Rubber Suction Cup Feet		3	4

SECTION 08 | WARRANTY

8.10 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 PILOT Vacuum product is warranted to be free from defects in material and workmanship. The liability of the manufacturer under this warranty is limited to servicing, adjusting, repairing or replacing any unit or component part which in the judgment of the manufacturer 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 the manufacturer. 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 obtain a return authorization number, contact the authorized distributor from which you purchased the unit. 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.

OPTIONAL ACCESSORIES

PILOT3000 & 5000

CHEMICAL-RESISTANT DIAPHRAGM VACUUM PUMP ACCESSORIES

SKU	DESCRIPTION
TLD3000K-01	PILOT3000 Service Kit, Diaphragm Replacement Parts
TLD3000K-03	PILOT3000 Service Kit, Major Rebuild Parts
TLD5000K-01	PILOT5000 Service Kit, Diaphragm Replacement Parts
TLD5000K-03	PILOT5000 Service Kit, Major Rebuild Parts
TLD2500K-04	Service Kit, Rubber Suction Cup Feet
TLD3500K-06	Pressure Regulator Kit Assembly
TLD9100	Pre- or Post-Pump Protection, Inlet/Exhaust Separators
TLD9200	5 ft. Red Rubber Vacuum Hose, 1/4" ID & 3/4" OD
TLD9300	Filter Hydrophob In-Line, 0.8 Micron
TLD9400	Post-Pump Protection, Exhaust Silencer, 1/4-18 NPT

PILOT3000 SERVICE KITS

TLD3000K-01 / TLD3000K-03

01 Kit Includes:
- Buna N Diaphragm
- PTFE Diaphragm liner
- Diaphragm Hold Down Screws

03 Kit Also Includes:
- Diaphragm Hold Down Plate
- Pump Head Assembly
- Hose Barb PVDF 1/8” NPT x 1/4” ID Hose
- Head & Handle Screws
- Rubber Suction Cup Feet

PRESSURE REGULATOR KIT ASSEMBLY

TLD3500K-06

Regulator Kit Includes:
- Dial Pressure gauge
- Hand Knob Control
- 1/4" O.D. Hose barb
- 1/8" NPT Exhaust Adapter
- Built in Silencer

PILOT5000 SERVICE KITS

TLD5000K-01 / TLD5000K-03

01 Kit Includes:
- Buna N Diaphragm
- PTFE Diaphragm liner
- O-Ring Gasket, Head
- Diaphragm Hold Down Screws

03 Kit Also Includes:
- Diaphragm Hold Down Plate
- Pump Head Assembly
- Hose Barb PVDF 1/8” NPT x 1/4” ID Hose
- Head & Handle Screws

RUBBER SUCTION CUP FEET

TLD2500K-04

DO YOU HAVE QUESTIONS?

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