Chemical Duty Diaphragm Vacuum Pump
Type: VP 220

INSTRUCTION MANUAL

Original - Instruction Manual

VP 220

European Catalogue Number

ECN: 181-0310 *incl. CEE Euro, UK, CH plug leads*

Version: **1**

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CE

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Country of origin

United States of America

Introduction

Thank you for choosing a **VWR Chemical Duty Diaphragm Vacuum Pump type VP 220**.

It will take you very little time to get your new Diaphragm Vacuum Pump installed and running. This Instruction Manual is designed to guide you quickly through the process.

We recommend that you read it thoroughly before you begin.

Table of Contents

Warning

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.

Intended Use

The layout of the **Chemical Duty Diaphragm Vacuum Pump VP 220** must be appropriate for the conditions of use. The user bears the sole responsibility for this.

The Diaphragm Vacuum Pump VP 220 may only be operated under the conditions stated in the "Technical Data" chapter, on the type plate and in the technical specification for the order concerned.

Use for an Unauthorized Purpose

It is forbidden to use the pump for applications deviating from the technical data stated on the type plate or the conditions stated in the supply contract, or to operate it with missing or defective protective devices.

Symbols and conventions

These units conform to the SI International system of units of measurement.

The following symbols (with recommendation of IEC1010) of warning will be found on the pump and/or in this manual.

	**This symbol alerts you to a wide range of potential dangers.**
	**This symbol advises danger from electricity or electric shock.**
	**This symbol indicates that a hot surface may be present.**
	**This symbol marks information that is particularly important.**

Read all instructions pertaining to safety, set-up, operation, and maintenance. Proper operation is the user's responsibility.

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

Safety Information

1.10 Warning: To Prevent Injury

- 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 consult manufacturing firm.
- Keep the cord away from heated surfaces. All electrical products generate heat. To avoid serious burns never touch unit during or immediately after operation.
- Never block any air openings or place the pump 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.
- Type VP 220 is thermally protected and can automatically restart when the protector resets. Always disconnect power source before servicing.
- Never drop or insert fingers or any other object into any openings.
- Do not operate this product where oxygen is being administered.
- Wear safety glasses and goggles when operating this product.
- 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.

- Be sure to properly identify intake and discharge before using pump.
  Type VP 220 has one exhaust port on the pump. *See chapter 2.50.*

CAUTION! Remove plug from Exhaust Port before using.

1.20 Caution: To Reduce Risk of Electrical Shock

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

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

1.40 Warning: To Reduce Risk of Explosion or Fire

- Do not use this pump in or near explosive atmospheres or where aerosol (spray) products are being used.
- 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.

The **Chemical Duty Diaphragm Vacuum Pump VP 220** conforms to the:

2006 / 95 / EC	Low Voltage Directive
2006 / 42 / EC	Machinery Directive
2004 / 108 / EC	Electromagnetic Compatibility Directive

The CE sign is located on the rating plate.
Observe the binding national and local regulations when fitting the system into installations.

Product Standards, Safety Regulations

The Diaphragm Vacuum Pumps VP 220 meet the following product standards:

DIN EN ISO 12100-1:2004	Safety of machinery - Basic concepts, general principles for design - Part 1: Basic terminology, methodology
DIN EN ISO 12100-2:2004	Safety of machinery - Basic concepts, general principles for design - Part 2: Technical principles
DIN EN ISO 13857:2008-06	Safety of machinery - Safety distances to prevent hazard zones being reached by upper and lower limbs
DIN EN 1012-2	Compressors and vacuum pumps - Safety requirements - Part 2: Vacuum pumps
DIN EN ISO 2151	Acoustics - Noise test code for compressors and vacuum pumps - Engineering method (grade 2)
DIN EN 60204-1	Safety of machinery - Electrical equipment of machines - Part 1: General requirements
DIN EN 61000-6-2	Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments
DIN EN 61000-6-4	Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments
DIN EN 61010-1	Safety requirements for electrical equipment for measurement, control and laboratory use - Part 1: General requirements
DIN EN 50110-1	Operation of electrical installations
Directive 2002/96/EC	Electrical and electronics - old devices (WEEE)
Directive 2002/95/EC	Dangerous materials in electrical and electronics devices (RoHS)
China - RoHS	Environment protection law - China 2007-03

The following additional safety regulations apply in the FR Germany:

BGV A3	Electrical equipment and operating materials
VBG 5	Power-driven machines
BGR 120	Guidelines for laboratories
BGI 798	Hazard assessment in the laboratory
BGG 919 (VBG 16)	Accident prevention regulations for "compressors"
BGR 189 (BGR 195;192;197)	Use of protective working clothes

Observe the standards and regulations applying in your country when you use the pumps.

Package Contents

No.	VP 220	Quantity
1	VP 220 Chemical Duty Diaphragm Vacuum Pump	1
2	CEE Euro Plug	1
3	UK Plug	1
4	CH Plug	1

Installation

2.10 Environmental Conditions

The Pump is rated for indoor use only. Maximum altitude 2000 meters, Operating temperature range 10℃ to 40℃, Maximum relative humidity of 80 % for temperatures up to 31℃ decreasing to 50% at 40℃, Rated for +/-10% of supply voltage, Pollution Degree 2, Installation Category II.

2.20 Introduction

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

2.30 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; your VWR dealer or manufacturing firm, be sure to include your order numbers for quick identification.
Do not return the pump to the factory without obtaining returned goods authorization.

2.40 Pump Mounting

Rubber feet are attached to the pump casing.

2.50 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.

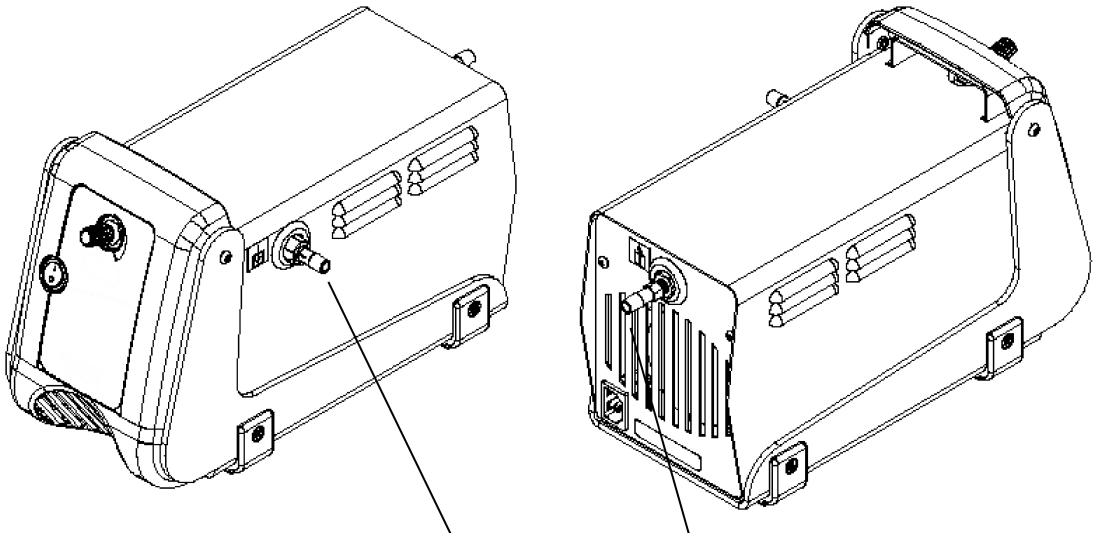
The Diaphragm Vacuum Pump should be located preferably in a clean, dry and well ventilated area. Please be sure not to block the ventilation ports located on the motor housing. The pump should be placed where the surrounding temperature remains between 10℃ and 40℃ (50℉ and 104℉). Always check to insure the location cho sen 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.

2.60 Discharge Provisions

Diaphragm Vacuum Pump VP 220 comes with two hose barbs, one Intake and one Exhaust. All hose barbs and mufflers are supplied loose with the pump. The hose barb used on all models accepts 7 mm I.D. hose. 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.

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.
Remove plug from exhaust port before operating.

Properly identify the intake and exhaust of the pump.



IN *Intake* **EX** *Exhaust*

2.70 Electrical Power

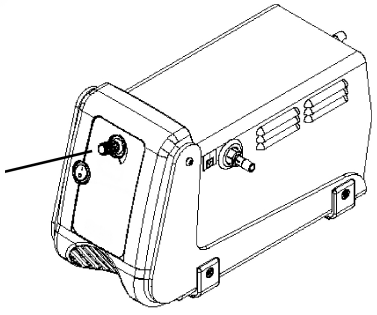
Power Source Review

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. These 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: **O** = **OFF** (POWER)
I = **ON** (POWER)

2.80 Vacuum Adjustment Control

Vacuum Control



Vacuum Adjustment Control is provided for precise setting of vacuum level.

- Clockwise revolution increases the vacuum level
- Counter-Clockwise revolution decreases the vacuum level

2.90 Accessories Kits

for installation at Diaphragm Vacuum Pump VP 220

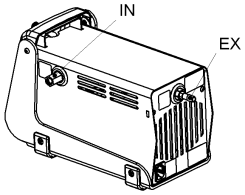
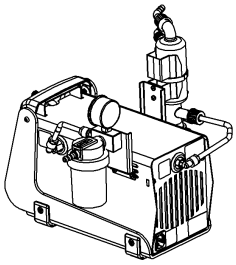
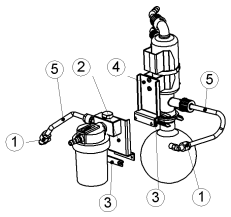
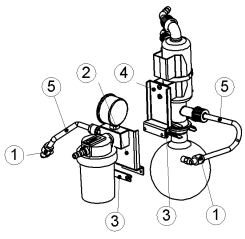
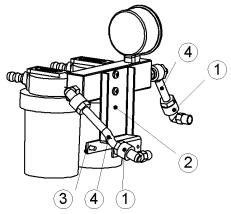
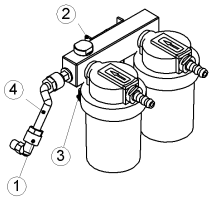
	← **Initial condition** **IN** = Intake connection **EX** = Exhaust connection **Final condition** →	 *(Example: 181-0318)*

Figure / Order no. / IN/EX-Connection		Installation procedure
	**181-0317** **IN: Separator / EX: Condenser**	• Remove the pressure side hose nozzle **EX** • Connect the first hose nozzle **(1)** to the pump on the suction side. • Connect the second hose nozzle **(1)** to the pump on the pressure side. • Mount the separator block to the retaining plate **(2)** in the middle of the rear pump venting slot on suction side. • Screw the first pressure plate **(3)** from outside with fillister head screws. • Mount the condenser block to the retaining plate **(4)** in the middle of the rear pump venting slot on the pressure side. • Screw the second pressure plate **(3)** from outside with fillister head screws. • Use vacuum hose **(5)** to establish the connection between the suction-side hose nozzle **(1)** and the separator block as well as between the pressure side hose nozzle **(1)** and the condenser block
	**181-0318** **IN: Separator + Dial Gauge / EX: Condenser**	• Remove the pressure side hose nozzle **EX** • Connect the first hose nozzle **(1)** to the pump on the suction side. • Connect the second hose nozzle **(1)** to the pump on the pressure side. • Mount the separator-dial gauge block to the retaining plate **(2)** in the middle of the rear pump venting slot on suction side. • Screw the first pressure plate **(3)** from outside with fillister head screws. • Mount the condenser block to the retaining plate **(4)** in the middle of the rear pump venting slot on the pressure side. • Screw the second pressure plate **(3)** from outside with fillister head screws. • Use vacuum hose **(5)** to establish the connection between the suction-side hose nozzle **(1)** and the separator-dial gauge block as well as between the pressure side hose nozzle **(1)** and the condenser block.

	**181-0319** **IN: Separator + Dial Gauge / EX: Separator**	• Remove the pressure side hose nozzle **EX** • Connect the first hose nozzle **(1)** to the pump on the suction side. • Connect the second hose nozzle **(1)** to the pump on the pressure side. • Mount the separator-dial gauge block to the retaining plate **(2)** in the middle of the rear pump venting slot on suction side. • Screw the pressure plate **(3)** from outside with fillister head screws. • Use vacuum hose **(4)** to establish the connection between the suction-side hose nozzle **(1)** and the separator-dial gauge block as well as between the pressure side hose nozzle **(1)** and the separator block.
	**181-0320** **IN: 2x Separator**	• Connect the threaded elbow joint **(1)** to the pump on suction side. • Mount the separator block to the retaining plate **(2)** in the middle of the rear pump venting slot. • Screw the pressure plate **(3)** from outside with fillister head screws. • Use vacuum hose **(4)** to establish the connection between the suction-side male threaded elbow joint **(1)** and the male coupling at the fastened separator block.

Operation

	**WARNING! Vacuum pump aerate before start!**

3.10 Starting the Diaphragm 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 chapter 2.60*. We recommend 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.

3.11 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 intake separator can be made out of readily available material for protecting the pump. The separator would consist of a filtering flask placed between the pump and the vacuum chamber.

3.20 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.

3.30 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 page 12 of this manual for the ratings for your specific model.

3.40 The Effects of Unwanted Vapor

Systems which contain undesirable vapors cause difficulty both from the standpoint of attaining desirable ultimate pressures. A vapor is defined as the gaseous form of any substance which is usually a liquid or a solid. Water, oil, and mercury vapors are three of the more common vapors encountered in typical vacuum systems. When such vapors exist in a system, the vapors or mixtures of gas and vapors are subject to condensation within the pump; the precipitated liquid may thus ultimately solidify on the PTFE heads and diaphragm causing corrosion.

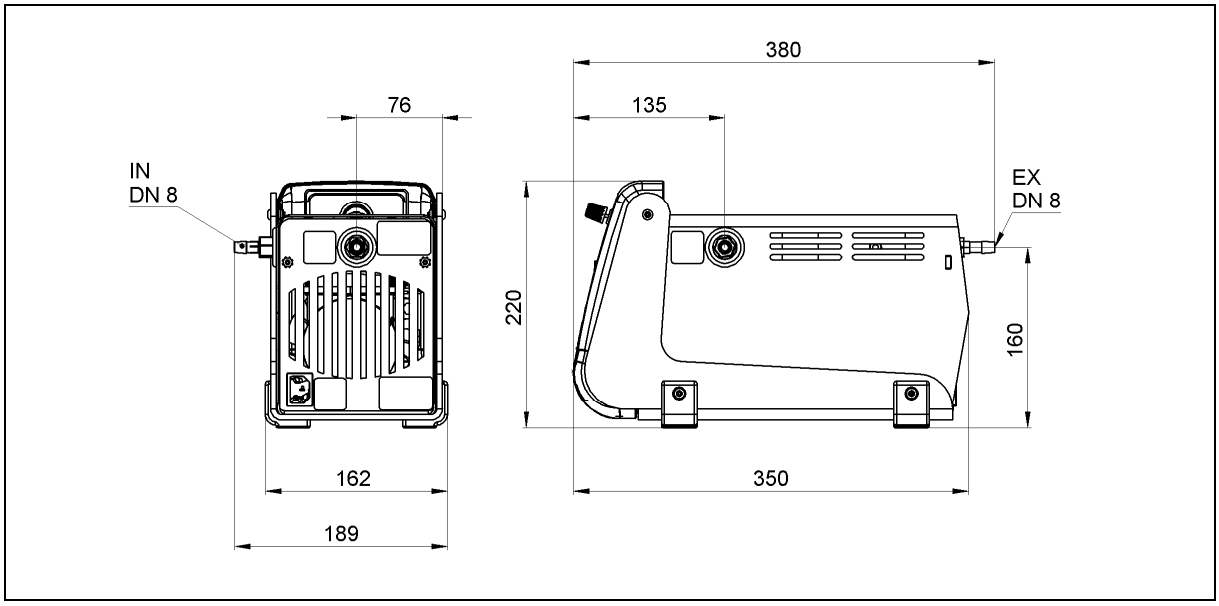
3.50 Shutdown Procedures

After use, we recommend 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.

Specification

Parameter	Unit	Data
Pumping speed 50 Hz	m^3/hr (l/min)	1.25 (21)
Ultimate pressure	mbar (Torr)	2 (1.5)
IN / EX Hose connector	mm	DN 8
Weight	kg	9.6
Dimensions (W/D/H) without hose connectors	mm	162 / 350 / 220
Motor Voltage	V	230
Motor Frequency	Hz	50/60
Motor Power	W	150
Order No.	ECN	181 - 0310

Dimensional Drawing



Maintenance

4.10 General Maintenance

Vacuum units are 100% oil-free. The pump employs a diaphragm with an uninterrupted coating. 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.

4.11 Storage

The pumps are to be stored in a low-dust, interior room within the temperature range from + 5 to + 40 ℃ and at a relative air humidity < 90% .

Leave the protective elements on the suction and pressure ports. Another equally good protection may be used.

4.20 Diaphragm Removal

WARNING! Disconnect the power supply and ensure that it cannot be switched on again.

WARNING! Do not remove the diaphragm unless you are wearing hand protection. The steel disc inside the diaphragm may cause harmful injury.

- Remove the four M4 x 45 screws and washers from the cover plate. Remove the cover plate and head from the plastic head base.
- Make sure to wear gloves before removing the diaphragm. Grab the diaphragm with both hands and turn counter clockwise to loosen from connecting rod.
- Remove the diaphragm and retaining shims. Use these retaining shims on replacement diaphragm.

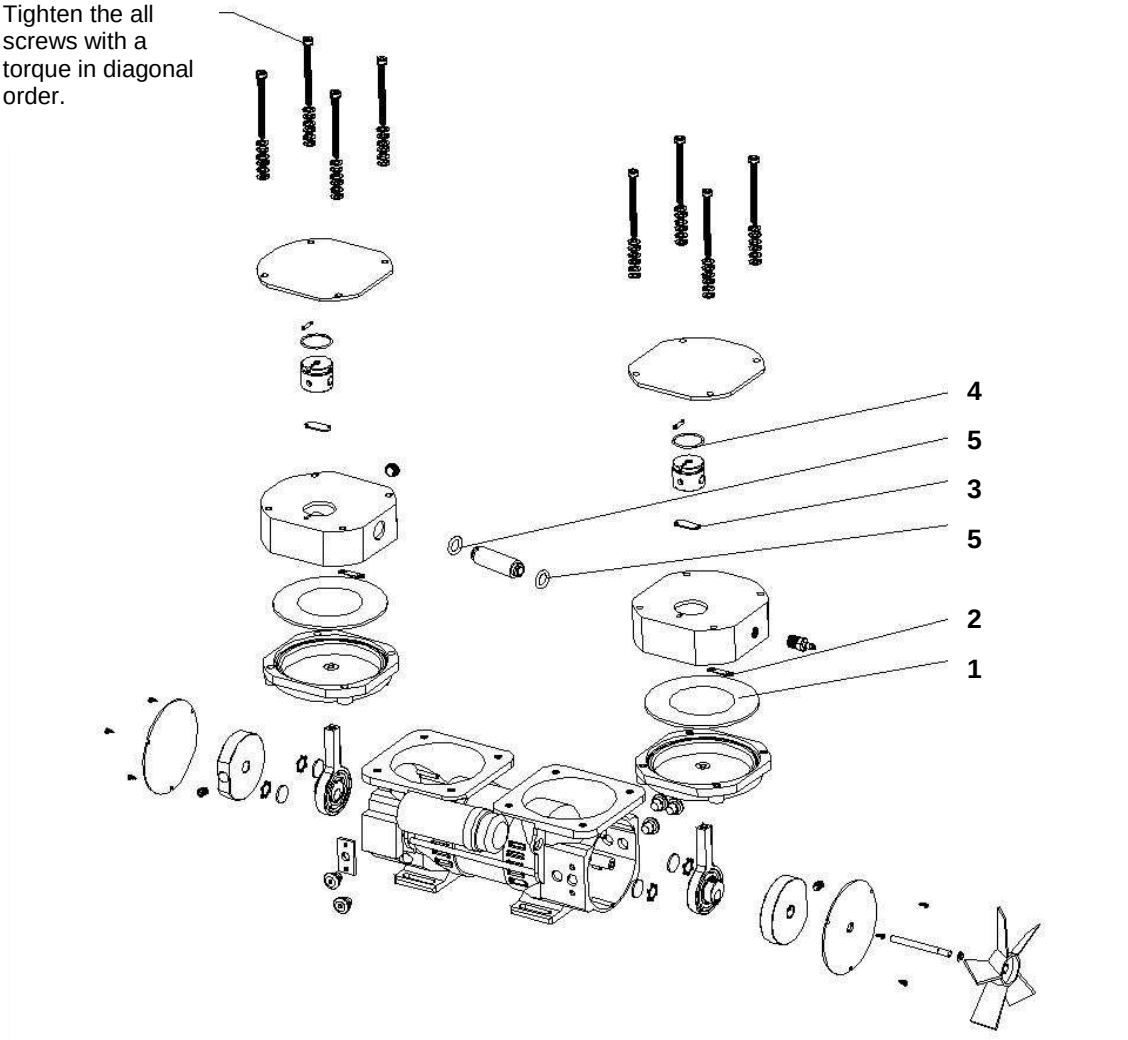
4.30 Installation of New Diaphragm

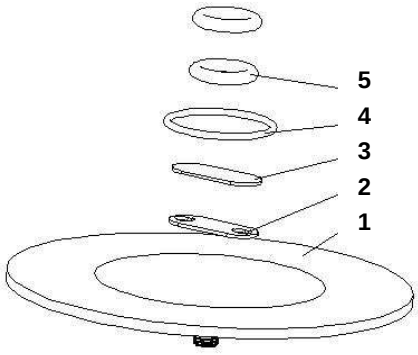
- Apply a minute amount of thread adhesive to threaded diaphragm stud and fasten to connecting rod with shims previously removed.
- Tighten diaphragm with both hands. Tighten eccentric set screw down on to the flat of the motor shaft.
- Place the head and chamber assembly on top, rotate fan so that the peripheral lip of the diaphragm aligns with the groove on the underside of the chamber and base plate.
- Place the cover plate over the head and body using four M4 x 45 screws and washers. Tighten the bolts (no more than 3-4 Nm.) or will deform.
- Let thread adhesive locker cure for minimum 2 hours before resuming operation.

4.40 Service Kit

Order no. 181-0314

Tighten the all screws with a torque in diagonal order.



Service Kit	No.	Part	Quantity
	**1**	Diaphragm Mold	2
	2	Intake Valve	2
	3	Exhaust Valve	2
	4	O-Ring #021 FEP / FKM	2
	5	O-Ring 10.5 x 3.0 FKM	4
	6	Tool	1

Troubleshooting

Review the information in the table below to troubleshoot operating problems.

Problem	Cause	Solution
Vacuum Pump does not start	No power supply	Electrical system to be checked by a qualified electrician.
	Motor defective	Exchange by service shop.
	Pump body defective	Exchange or repair by service shop.
Vacuum Pump does not generate a vacuum or only an inadequate one	Connected apparatus leaks, connecting elements leak	Identify and seal the leak, replace the seals and hoses if necessary.
	Vacuum Pump leaks	Check the hose connections between the pump heads, replace the hoses and fittings if necessary.
	Pump head leaks	Repair by service shop.
	Diaphragm defective	Repair by the service workshop or the user.
	Valves defective	Replace valves Repair by the service workshop or the user.
	Valves are dirty	Clean condensates and foreign objects out of the valves. Cleaning by the service workshop or the user.
	Vacuum Pump is dirty	Cleaning by the service workshop or the user.

Technical Service

Web Resources

Visit the VWR's website at **www.vwr.com** for:

- Complete technical service contact information
- Access to VWR's Online Catalogue, and information about accessories and related products
- Additional product information and special offers

Contact us For information or technical assistance contact your local VWR representative or visit. **www.vwr.com**

Warranty

VWR International warrants that this product will be free from defects in material and workmanship for a period of two (2) years from date of purchase. If a defect is present, VWR will, at its option, repair, replace, or refund the purchase price of this product at no charge to you, provided it is returned during the warranty period. This warranty does not apply if the product has been damaged by accident, abuse, misuse, or misapplication, or from ordinary wear and tear.

For your protection, items being returned must be insured against possible damage or loss. This warranty shall be limited to the replacement of defective products. IT IS EXPRESSLY AGREED THAT THIS WARRANTY WILL BE IN LIEU OF ALL WARRANTIES OF FITNESS AND IN LIEU OF THE WARRANTY OF MERCHANTABILITY.

Equipment Disposal (WEEE)

This equipment is marked with the crossed out wheeled bin symbol to indicate that this equipment must not be disposed of with unsorted waste.
Instead it's your responsibility to correctly dispose of your equipment at lifecycle -end by handling it over to an authorized facility for separate collection and recycling. It's also your responsibility to decontaminate the equipment in case of biological, chemical and/or radiological contamination, so as to protect from health hazards the persons involved in the disposal and recycling of the equipment.
For more information about where you can drop off your waste of equipment, please contact your local dealer from whom you originally purchased this equipment.

By doing so, you will help to conserve natural and environmental resources and you will ensure that your equipment is recycled in a manner that protects human health.

Thank you

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