

Instruction Manual

ValuPump™ Vacuum Pump



096-3000-00 Rev. D

Analyze • Detect • Measure • Control™

Thermo
ELECTRON CORPORATION

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1.0 INTRODUCTION - SCOPE AND DEFINITIONS

This manual provides installation, operation and maintenance instructions for the Thermo ValuPump VLP80, VLP120, VLP200 and VLP285 Rotary Vane Pumps. You must use your pump as specified in this manual. Read this manual before installing and operating your pump.

Important safety information is highlighted as WARNING and CAUTION instructions; you must obey these instructions. The use of WARNINGS and CAUTIONS is defined below.

WARNING

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

CAUTION

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

In accordance with the recommendations of IEC1010, the following warning symbols are on the pump:



Caution - refer to accompanying documents



Caution - risk of electric shock



Caution - hot surface

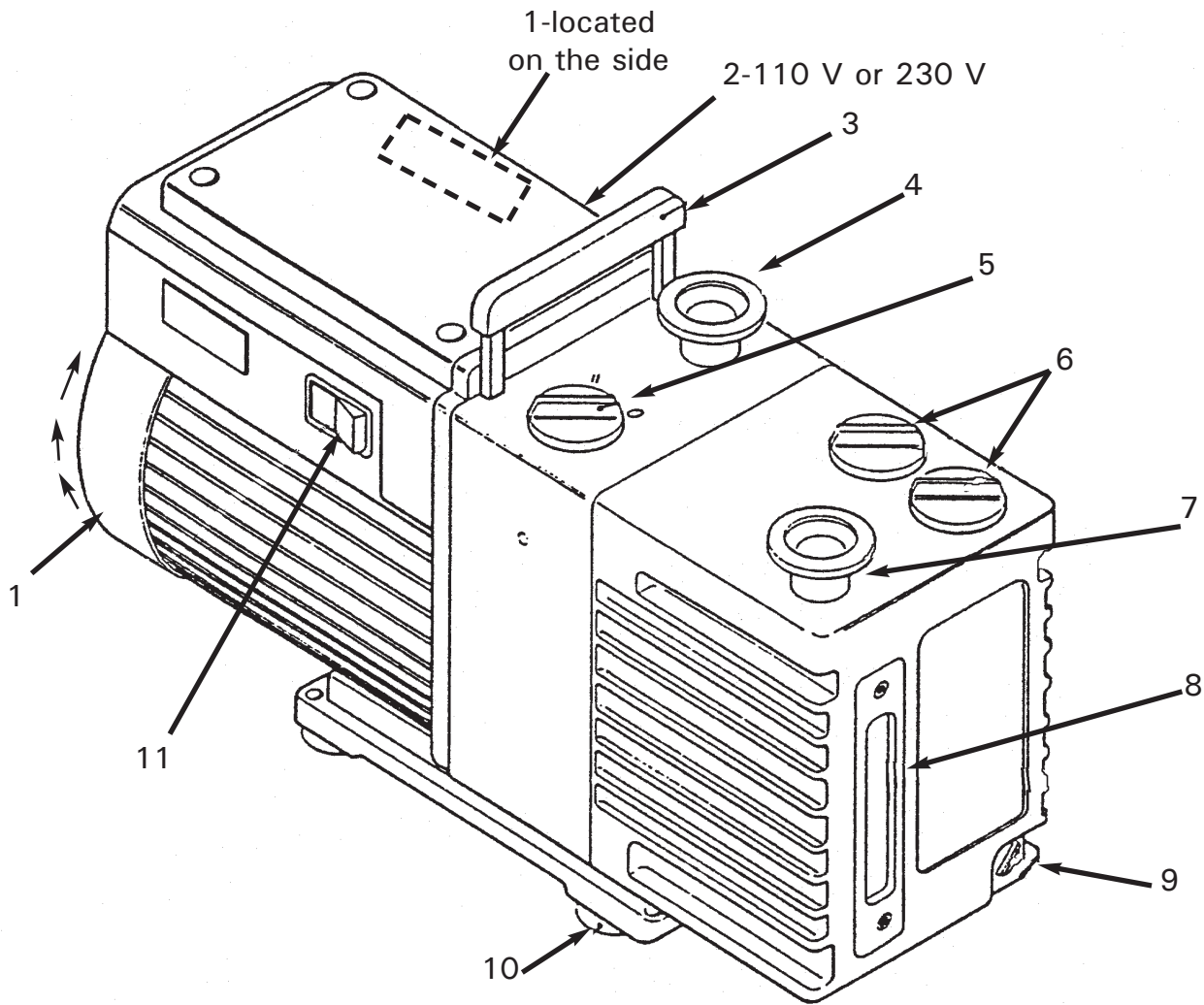


Figure 1 - The Rotary Value VLP Pump

- | | | | | | |
|----|---|----|-----------------------|-----|-------------------------------|
| 1. | Electrical Inlet Connector | 4. | NW25 Inlet Port | 9. | Oil Drain Plug |
| 2. | Voltage Indicator | 5. | Gas Ballast Control | 10. | Rubber Feet (4) |
| 3. | Lifting Handle (Lifting Bracket on VLP200 and VLP285 Pumps) | 6. | Oil Filler Plug | 11. | On/Off Switch |
| | | 7. | NW25 Outlet Port | 12. | Motor Fan Cover |
| | | 8. | Oil Level Sight Glass | 13. | Correct Direction of Rotation |

1.1 DESCRIPTION

The Thermo VLP Pump is shown in Figure 1. Refer to Figure 1 for item numbers in brackets in the following descriptions. The VLP pumps are two-stage, oil-sealed, rotary vane vacuum pumps. The pump has NW25 inlet (4) and outlet (7) ports, and a gas-ballast control (5). When the pump is switched off, an inlet-valve seals the inlet and prevents the suck-back of air and oil into the vacuum system.

The VLP80 and VLP120 pumps have a retractable lifting handle (3). The VLP200 and the VLP285 pumps are fitted with a lifting bracket for use with suitable lifting equipment.

An oil-pump delivers pressurized oil to the vacuum pumping mechanism in the VLP pump. You may inspect the level and condition of the oil in the oil-box through a sight-glass (8). Two oil filler-plugs (6) and an oil drain-plug (9) are provided on the oil-box.

The pump mechanism is driven directly by a single-phase electric motor through a flexible motor-coupling. The motor is totally enclosed and is cooled by the motor cooling-fan which directs air along the motor fins. The pumps are cooled by an additional fan attached to the motor-coupling.

Single-phase motors are fitted with an on/off switch (12) and a thermal overload device. When the motor is too hot, the thermal overload device switches off the pump. The thermal overload device has an automatic reset; when the motor cools down, the device resets.

The pump is mounted on a base plate on rubber feet (10).

1.2 GAS-BALLAST CONTROL

To pump high vapor loads, gas-ballast is delivered into the pump to prevent condensation of the vapor carried by the pumped gases.

Air can be introduced to the low vacuum stage through the gas-ballast valve. Alternatively, an inert gas such as nitrogen can be supplied through a suitable external valve.

The gas-ballast control has three positions:

- * Closed (position 'O')
- * Low flow (position 'I')
- * High flow (position 'II')

1.3 CONSTRUCTION

The pump-shafts and rotors are made of high-grade cast-iron. The pump-body and oil-box are made from cast-aluminum. All surfaces of the pump which are exposed to the pumped gases are free from copper, zinc and cadmium.

Other materials used in construction include fluorocarbon elastomer, nitrile, silicon, chemically-resistant polymers, nickel and stainless steel.

2.0 TECHNICAL DATA

SPECIFICATIONS

	VLP80	VLP120	VLP200	VLP285
Displacement (Swept Volume) Liters/min:				
60Hz	76 (2.7 cfm)	116 (4.1 cfm)	195 (6.9 cfm)	283 10.0 cfm)
50Hz	62 (2.2 cfm)	96 (3.4 cfm)	161 (5.7 cfm)	238 (8.4 cfm)
Ultimate Vacuum (Total Pressure):				
Gas Ballast Closed, O (torr)	1.5×10^{-3}	1.5×10^{-3}	1.5×10^{-3}	1.5×10^{-3}
Low Gas Ballast, I (torr)	2.3×10^{-2}	2.3×10^{-2}	2.3×10^{-2}	2.3×10^{-2}
High Gas Ballast, II (torr)	9.0×10^{-2}	7.5×10^{-2}	4.5×10^{-2}	4.5×10^{-2}
Oil Capacity, Maximum: (liters)	.07	.07	.075	1.0
Dimensions (L x W x H):				
in	16.9 x 6.2 x 8.8	16.9 x 6.2 x 8.8	18.5 x 6.2 x 10.5*	18.5 x 6.2 x 10.5*
(cm)	(42.9 x 15.8 x 22.5)	(42.9 x 15.8 x 22.5)	(47.1 x 15.8 x 26.1)*	48.9 x 15.8 x 26.1*
Weight (without oil):				
Lbs	47.6	47.4	57.3	58.0
kg	21.6	21.5	26.0	26.3
Motor Power:				
120V, 60 Hz (Watts)	300	300	550	550
Start-up Current (Amps)	31.5	31.5	34.0	34.0
Fuse Rating, (Amps)	20	20	25	25
230V, 50 Hz (Watts)	250	250	450	450
Start-Up Current (Amps)	15.6	15.6	18.0	18.0
Fuse Rating, (Amps)	10	10	13	13
Noise (at 50Hz) (dBA):	48	48	48	48
Vacuum Inlet Fitting, OD (in./cm.):	0.5/1.27	0.5/1.27	0.5/1.27	0.5/1.27

2.0 TECHNICAL DATA (cont'd)

All VLP pumps come filled with vacuum pump oil, and are shipped complete with Oil Mist Eliminator (OME190), Mist Filter (MF190), and Oil Drain Kit (DK110). Pumps conform to standards IEC1010, IP44, CSA, CE; manufactured under an ISO9001 certified quality system.

*Includes height of lifting bracket.

3.0 INSTALLATION (ELECTRICAL) VOLTAGE CONFIGURATION

CAUTION

If the motor is configured for 110 V operation and you operate the pump with a 240 V electrical supply, you will damage the motor.

Refer to Figure 4 for the item numbers in parentheses.

Ensure that the voltage shown on the voltage indicator (4) in the motor-cover corresponds with your electrical supply voltage. If it does not, you must change the configuration of the pump-motor to match your electrical supply voltage; use the procedure below.

1. Undo the four screws, remove the cover-plate (1) and lift out the voltage indicator molding (4).
2. Press the voltage selector switch (3) to select the alternative position.

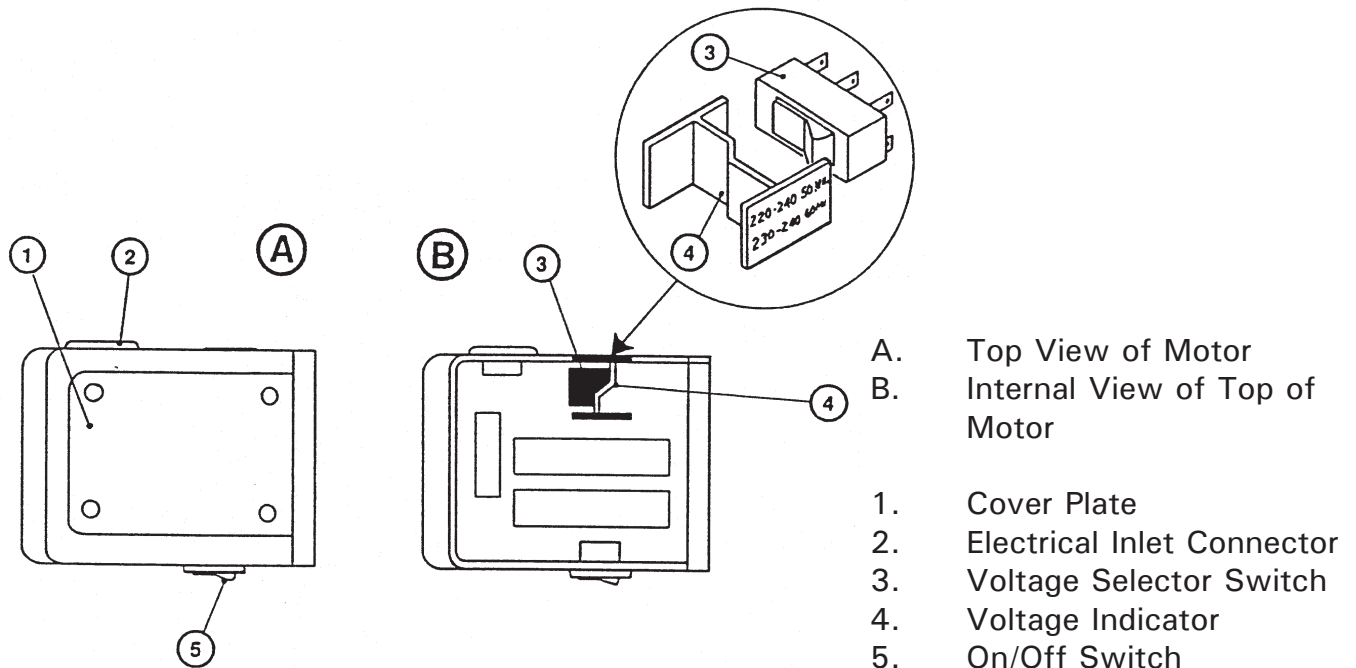


Figure 2 - Motor Voltage Configuration

3.0 INSTALLATION (ELECTRICAL) -cont'd

3. Turn the voltage indicator molding over so that the outer panel shows the required voltage. Refit the molding.
4. Refit the cover-plate and secure it with the four screws.

3.1 CONNECT THE PUMP TO YOUR ELECTRICAL SUPPLY

Your VLP pump has been supplied with an electrical supply cable, the cable is fitted with a molded IEC connector at one end. The other end of the cable has been fitted with a plug suitable for your local electrical supply.

1. Ensure that the on/off switch on the motor (Figure 2, item 5) is in the 'off' position.
2. Insert the molded IEC connector at the end of the cable into the electrical inlet-connector on the motor (Figure 2, item 2).
3. Connect the plug (if fitted) at the other end of the cable to your electrical supply. If a plug is not fitted, connect the wires in the cable to the correct terminals of your electrical supply.

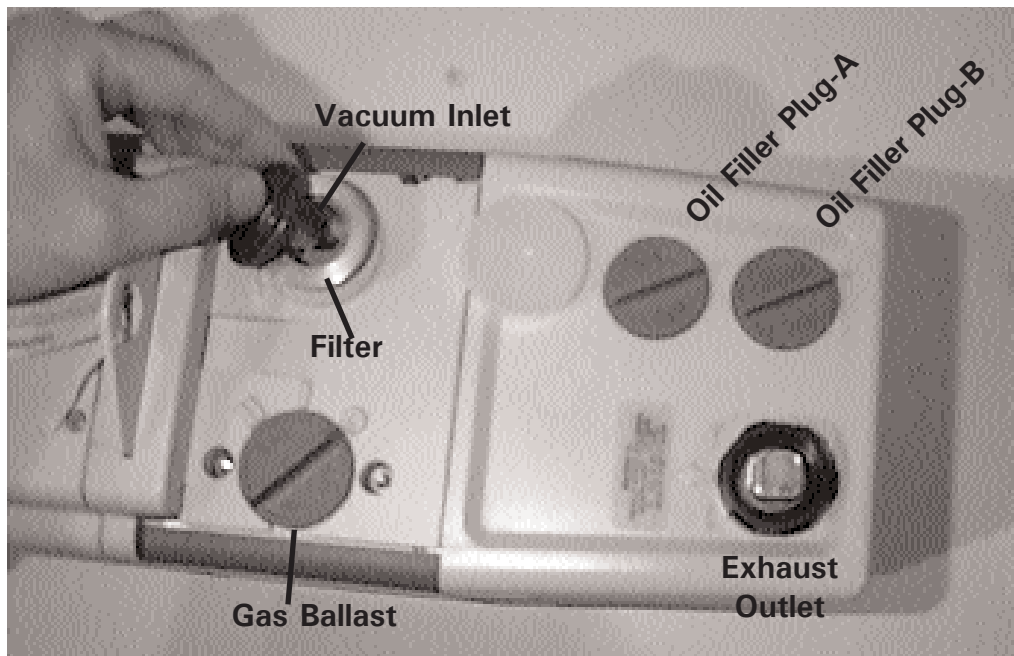
3.2 ATTACHMENTS, INLET AND OUTLET CONNECTIONS

To Attach the Quick-Fit Drain Kit

Carefully place the pump up on end with the oil-drain plug facing up. [Do not slam or drop pump on end]. Unscrew and remove the oil drain plug and attach one end of the quick drain tubing. Return pump to its normal horizontal position while keeping the loose end of the drain kit tubing upright to prevent oil from spilling out. Attach the other end of the drain kit tubing to the oil filler port by screwing on the fitting (it is recommended to use port B, see picture). Add oil as needed to reach proper operating levels.

To quickly disconnect the tubing for draining, press on the metal tab to release the tubing from the fitting.

Remove the 0.5" pipe plug from the exhaust outlet (see picture below) and install the Oil Mist Eliminator (OME190). The mist filter (MF190) should be properly installed inside the OME190.



4.0 OPERATION

Gas-ballast control

You can use the gas ballast control to optimize the performance of the ValuPump in your application.

Use the gas-ballast control to change the amount of air (or inert gas) introduced into the low vacuum stage of the pump. Use of gas-ballast will prevent the condensation of vapors in the pump; the condensates would contaminate the oil. Turn the gas-ballast control to select one of three positions, as follows:

To select gas-ballast closed, turn the control to position 'O'.

Use this setting:

- * To achieve ultimate vacuum
- * To pump dry gases

To select low flow gas-ballast, turn the control to position 'I'.

Use this setting:

- * To pump low concentrations of condensable vapors
- * To decontaminate the oil.

To select high flow gas-ballast, turn the control position 'II'.

Use this setting:

- * To pump high concentrations of condensable vapors.

When using either low flow or high flow gas-ballast, there will be an increased rate of oil loss from the pump. Where possible, we recommend selecting low flow gas-ballast (position 'I' rather than high flow gas-ballast (position 'II') to minimize the loss of oil.

4.1 START-UP PROCEDURE

If the oil is contaminated, or if the pump temperature is below 12 °C, or if the electrical supply voltage is more than 10% below the lowest voltage specified on the voltage indicator (Figure 4, item 4), the pump may operate at a reduced speed for a few minutes. On single-phase pumps, if the pump continues to operate at reduced speed, the motor thermal overload device will open and stop the pump. When the motor has cooled, the thermal overload device will reset automatically and the pump will restart.

1. Check that the pump oil-level is between the MAX and MIN marks on the bezel of the oil-level sight-glass; if not, refer to Section 5.3.
2. Turn the gas-ballast control to position 'O', 'I', or 'II', as required (refer to Section 4.0).
3. Switch on the electrical supply to the pump.
On single-phase pumps, use the on/off switch.
4. Refer to sections as follows:
 - to achieve ultimate vacuum, see Section 4.2
 - to pump condensable vapors, see Section 4.3
 - to decontaminate the pump oil, see Section 4.4

4.2 TO ACHIEVE ULTIMATE VACUUM

If the pump does not achieve the performance specified in Section 2, check the system design before contacting your supplier or Thermo for advice. In particular, the vapor pressure of all materials used in your vacuum system (including pump oil, see below) must be much lower than the specified ultimate vacuum of the pump. The most common causes for failure to achieve the specific performance are:

- * Pressure measurement technique or gauge head is unsuitable, or the gauge head is faulty.
- * You have used an oil other than the recommended oil, and the vapor pressure of the oil is higher than the specified ultimate vacuum of the pump.

Use the following procedure to achieve ultimate vacuum:

1. Isolate the VLP pump from your vacuum system.
2. Set the gas-ballast control to low flow (position 'I') and operate the pump for at least 1 hour (or overnight) to thoroughly purge the oil of contaminants.
3. Close the gas-ballast control (that is, set it to position 'O').
4. Open the vacuum system isolation-valve and pump down to ultimate vacuum.

4.3 TO PUMP CONDENSABLE VAPORS

Use gas-ballast (gas-ballast control in position 'I' or 'II') when there is a high proportion of condensable vapor in the process gases.

1. Close the vacuum system isolation-valve.
2. Turn the gas-ballast control to high flow (position 'II') and operate the pump for 30 minutes to warm the oil; this will help to prevent vapor condensation in the pump.
3. Set the gas-ballast control to the position required for your application (refer to Section 4.1 and the data in Tables 1 and 2).
4. Open the vacuum system isolation-valve.

After you have pumped condensable vapors, you may (if necessary) decontaminate the oil (section 4.4).

4.4 TO DECONTAMINATE THE OIL

The oil in the pump should be clear; if the oil is cloudy or discolored, it is contaminated with process vapors.

1. Look at the condition of the oil in the oil-level sight-glass (Figure 1, item 8). If the oil is cloudy or discolored, continue with the procedure at Step 2 below.
2. Close the vacuum system isolation-valve.
3. Set the gas-ballast control to low flow (position 'I').
4. Operate the pump until the oil is clear

4.5 SHUT-DOWN

We recommend, as described in the procedure below, decontaminating the oil before shutting down the pump; this will prevent damage to the pump by the contaminants in the oil.

1. Refer to Section 4.4 and decontaminate the oil as required.
2. Close the vacuum system isolation-valve (if not already closed).
3. Close gas-ballast (that is, set the gas-ballast control to position 'O').
4. On single-phase pumps, use the on/off switch to switch off the pump.
5. Switch off the electrical supply to the pump.

5.0 MAINTENANCE

The plan shown in Table 1 details the routine maintenance operations necessary to maintain ValuPumps in normal use. Instructions for each operation are given in the section shown.

Operation	Frequency	Refer to Section
Check the oil-level	Weekly	5.3
Replace the oil	After initial 100 hours running then on a monthly basis	5.4
Inspect and clean the inlet-filter	Yearly	5.5
Inspect and clean the Gas-ballast control	Yearly	5.6
Clean the oil-level sight glass	Yearly	5.7
Clean the motor fan-cover	Yearly	5.8
Clean and overhaul the pump	Every 15000 hours	5.9
Fit new blades	Every 30000 hours	5.10
Test the motor condition	Every 15000 hours	5.11

Table 1 - Maintenance plan

More frequent maintenance may be required if the pump is used to pump corrosive or abrasive gases and vapors, such as solvents, organic substances, and acids. In these circumstances, we recommend replacing the pump seals every year. If necessary, adjust the maintenance plan according to your experience.

5.1 CHECK THE OIL-LEVEL

Note: If required, you may check the oil-level while the pump is operating, however you must first switch off the pump and isolate the pump and other pumping system components in from the electrical supply before pouring oil into the pump.

Refer to figure 1 for the items in brackets.

1. Check that the oil-level in the sight-glass (8) is between the MAX and MIN level marks on the bezel of the sight-glass.
2. If the oil-level is near to or below the MIN level mark, remove one of the filler-plugs (6) and pour more oil into the reservoir until the oil reaches the MAX level mark. If the oil-level goes above the MAX mark, remove the drain-plug (9) and drain the excess oil from the pump. Refit the filler-plug.
3. If the oil is contaminated, drain and refill the pump with clean oil as described in Section 5.2.

5.2 REPLACE THE OIL

1. Refer to Figure 1. Operate the pump for approximately ten minutes to warm the oil, then switch off the pump (this lowers the viscosity of the oil and enables it to be drained from the pump more easily).
2. Isolate the pump from your electrical supply and disconnect it from your vacuum system.
3. Remove one of the oil filler-plugs (6).
4. Place a suitable block under the pump-motor to tilt the pump and place a suitable container under the drain-plug (9). Remove the drain-plug and allow the oil to drain into the container.
5. If the oil drained from the pump is contaminated, pour clean oil into the filler-hole and allow it to drain out of the pump. Repeat this step until the oil reservoir in the pump has been thoroughly cleaned.
6. Refit the drain-plug, remove the block and reconnect the pump to your vacuum system.
7. Fill a suitable container with clean oil and pour the oil into the filler hole until the oil-level reaches the MAX level mark on the bezel of the sight-glass (8).
8. Allow a few minutes for the oil to drain into the pump. If necessary, add more oil. Refit the filler-plug.

5.3 INSPECT AND CLEAN THE INLET-FILLER

1. Refer to Figure 3. Disconnect your vacuum system from the pump inlet-port (3) and remove the centering-ring and filter assembly (1) and the 'O' (2). Inspect the centering-ring and the 'O' ring. If they are clean, continue at Step 5. If they are not clean, continue at Step 2.
2. Remove the 'O' ring (2) from the centering-ring and filter assembly (1). Do not allow the 'O' ring to come into contact with the cleaning solution.
3. Wash the centering-ring and filter in a suitable cleaning solution and allow it to dry.
4. If necessary, wipe the 'O' ring with a clean, dry, lint-free cloth.
5. Refit the centering-ring and filter assembly and the 'O' ring to the inlet-port. Refit your vacuum system to the pump inlet-port.

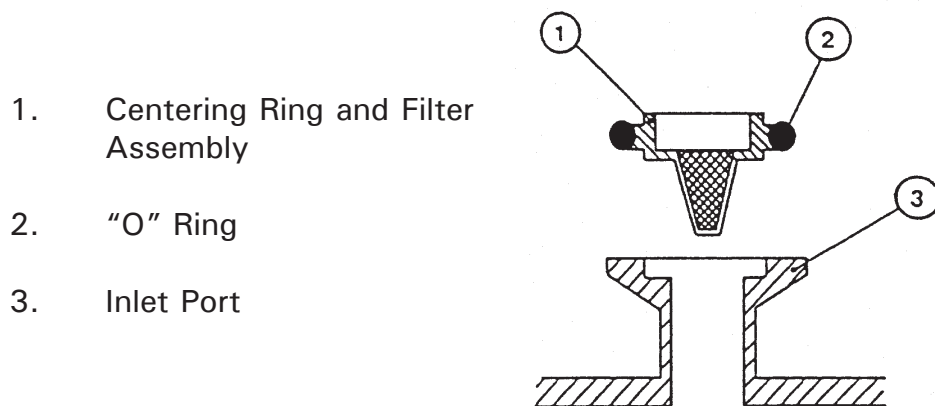


Figure 3 - Inlet Filter Assembly

5.4 INSPECT AND CLEAN THE GAS-BALLAST CONTROL

Note: The gas-ballast filter element (Figure 4, item 7) is retained in its seating with adhesive; do not try to remove it.

1. Refer to Figure 4. Turn the gas-ballast control (1) to the high flow position (position 'II').
2. Push the control down against the compression spring (6) as far as it will go, then turn the control counter-clockwise slightly to release the bayonet-lugs (5) and remove the control.
3. If necessary, wipe the control with a clean, dry, lint-free cloth and check that the air-hole (3) is not blocked.
4. Refit the control into the gas-ballast inlet and ensure that the compression spring locates correctly between the bayonet-lugs.
5. Push the control down as far as it will go and then turn the control clockwise slightly until the bayonet-lugs engage correctly.
6. Reset the gas-ballast control to the required position.

1. Gas Ballast Control
2. "O" Ring
3. Air Hole
4. "O" Ring
5. Bayonet Lugs
6. Compression Spring
7. Filter Element

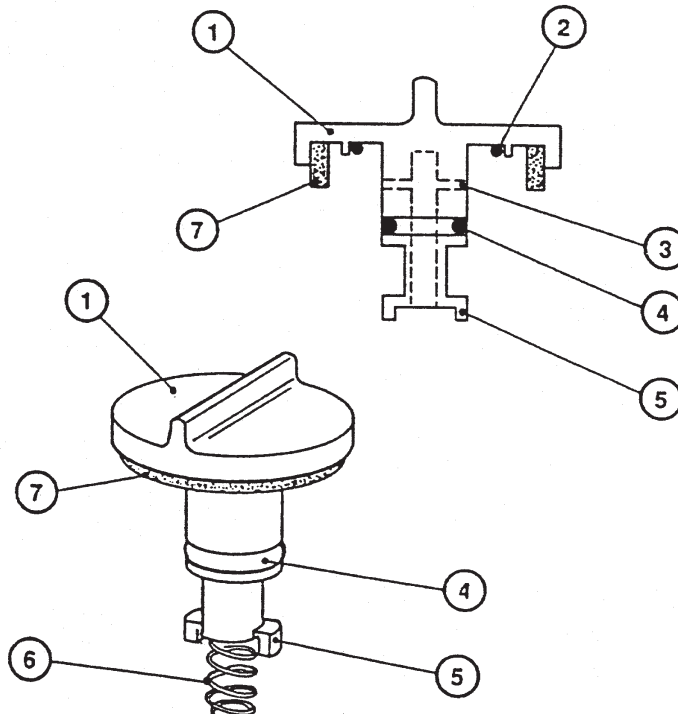


Figure 4 - Gas Ballast Control Assembly

5.5 CLEAN THE OIL-LEVEL SIGHT GLASS

Refer to Figure 5 for the item numbers in brackets.

1. Drain the oil as described in Section 5.4.
2. Undo the two screws (1) and remove the bezel (2), the sight-glass (3) and the 'O' ring (4) from the oil-box (5).
3. Clean the screws, bezel and sight-glass with a suitable cleaning solution.
4. Wipe the 'O' ring with a clean, dry, lint-free cloth.
5. Wipe the sight-glass recess in the oil-box with the cloth.
6. Refit the 'O' ring, sight-glass and bezel and secure with the two screws.
7. Refill the pump with oil as described in Section 5.4.
8. Check that the sight-glass does not leak.

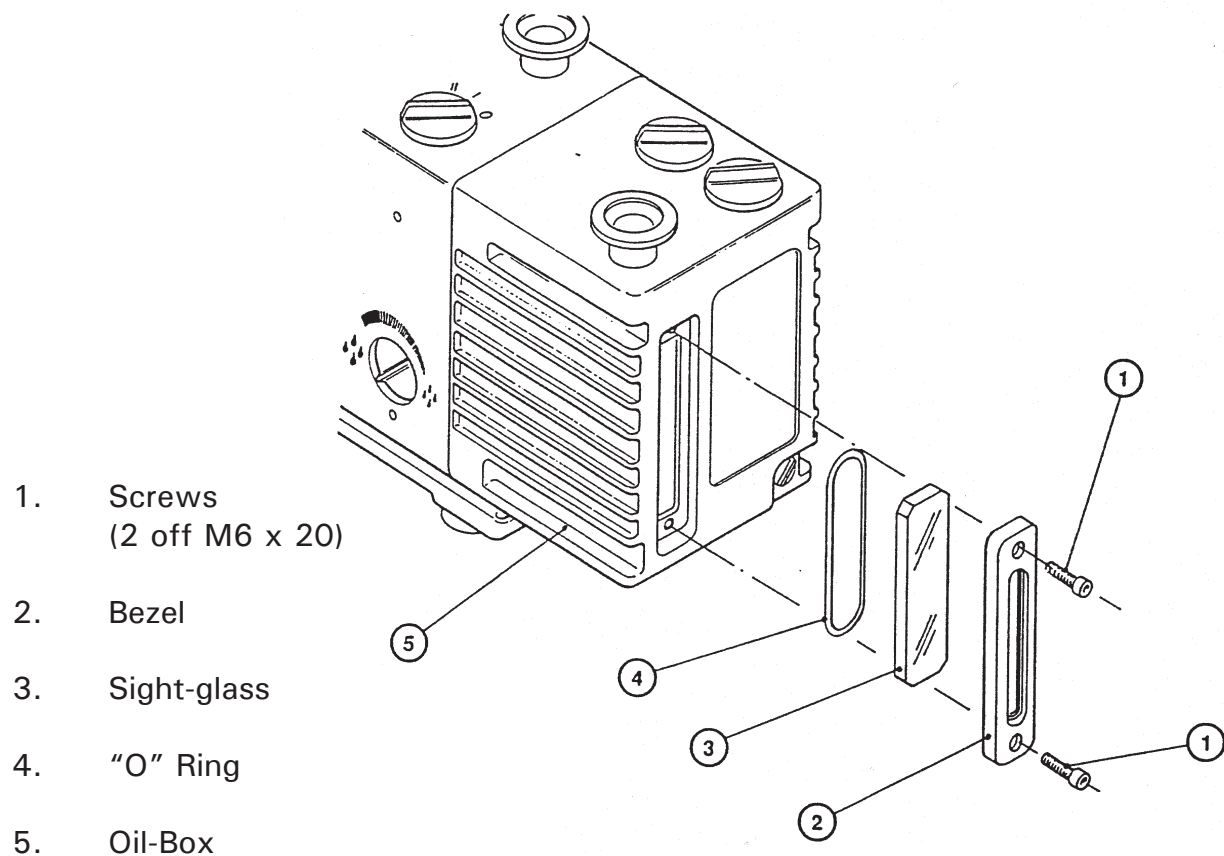


Figure 5 - Sight Glass Assembly

5.6 CLEAN THE MOTOR FAN-COVER

Note: If the motor fan-cover is not kept clean, the air-flow over the motor can be restricted and the pump may overheat.

1. Switch off the pump and disconnect it from the electrical supply.
2. Use a dry cloth and a brush to remove dirt and deposits from the fan-cover.

PUMP MAINTENANCE SECTION

5.7 CLEAN AND OVERHAUL THE PUMP

Clean and overhaul the pump as described in the instructions supplied with the clean and overhaul kit, (Part Number is M90-0283-03).

5.8 FIT NEW BLADES

Fit new blades to the pump as described in the instructions supplied with the blade kit, (Part Number is VLP80: M90-0283-02, VLP120: M90-0283-04, VLP200: M90-0283-05, VLP285: M90-0283-06).

5.9 TEST THE MOTOR CONDITION

Test the earth continuity and the insulation resistance of the pump-motor, in accordance with local regulations for periodic testing of electrical equipment.

The motor for single-phase VLP pumps complies with IEC 1010-1. We recommend that, to maintain compliance with IEC 1010-1, the earth continuity is less than 0.1 W and the insulation resistance is greater than 10MW.

If the motor fails these tests, you must replace the motor.

6.0 MAINTENANCE KITS-DESCRIPTION

Three kits provided for the maintenance of the pump are described as follows:

Clean and Overhaul kit -

to replace the springs, seals and elastomer components in pump. (Part Number is M90-0283-03)

Blade Kit and Clean and Overhaul Kits -

to replace the blades in the pump.

(Part Number is VLP80: M90-0283-02

VLP120: M90-0283-04

VLP200: M90-0283-05

VLP285: M90-0283-06

Inlet Valve Kit -

to replace the inlet valve assembly in the pump.

(Part Number M90-0283-08)

Qty	Description	Figures 1-3 Reference	Check (3)
1	Oil-pump blade	115	p
2	H.V. blade	116	p
3	L.V. blade	117	p

Table 2 - Checklist of Blade Kit Components

Qty	Description	Figure 1-3 Reference	Check (3)
1	Inlet-valve assembly (assembled); this comprises the following Components (shown in Figure 3):	202	p
	Valve cover	202-1	p
	Piston	202-2	p
	Valve pad	202-3	p
	Bush	202-4	p
	'U' seal	202-5	p
	'O' ring: 49.5 x 3.0, nitrile	202-6	p
	'O' ring: 7.6 x 2.4, viton	202-7	p
	'O' ring: 32.5 x 3.0, nitrile	202.8	p
1	Spring (inlet-valve)	213	p
1	Printed gasket (top plate)	216	p

Table 3 - Checklist of Inlet-Valve Kit Components

6.0 MAINTENANCE KITS-DESCRIPTION (cont'd)

Bag label ()	Qty	Description	Figures 1-3	Check
			Reference	
Bag 1	1	Shaft-seal spacer	C	p
	1	Reed valve	111	p
	1	Printed gasket (seal carrier)	120	p
	1	Shaft-seal (inner)	123	p
	1	Shaft-seal (outer)	124	p
	1	Gas ballast check-valve	210	p
	2	Spring (dump valve & gas ballast check -valve)	211	p
	1	Printed gasket (cartridge)	215	p
	1	Dump Valve	217	p
	1	Oil pressure valve	209	p
	1	'O' ring: 57.6 x 2.4, nitrile (cartridge/adapter)	219	p
	1	Coupling element	312	p
	1	Inlet-valve 'U' seal	202.5	p
Bag 2	1	'O' ring: 49.5 x 3.0, nitrile (inlet-valve)	202.6	p
	1	'O' ring: 7.6 x 2.4, viton (inlet-valve)	202.7	p
	1	'O' ring: 32.5 x 3.0, nitrile (inlet-valve)	202.8	p
	1	Spring (inlet-valve)	213	p
	1	Printed gasket (top-plate)	216	p
	1	'O' ring: 42.5 x 3.0, nitrile (inlet connection) *	005	p
	1	'O' ring: 14.6 x 2.4, nitrile (gas ballast control)	203.3	p
Bag 3	1	'O' ring: 9.6 x 2.4, viton (mode selector)	204.3	p
	1	Spring (gas ballast control)	212	p
	2	'O' rings: 2105 x 3.0, nitrile (gas-ballast insert * selector)	220	p
	1	Exhaust diaphragm	301.3	p
	1	Printed gasket (oil-box)	314	p
	3	'O' rings: 28.2 x 3.53, nitrile (oil filler-plugs & exhaust-flange)		
	1	'O' ring: 69.5 x 3.0, nitrile (sight-glass)	321	p
	1	'O' ring: 15.6 x 2.4, nitrile (oil drain-plug)	416	p
	1	'O' ring: 21.5 x 3.0, nitrile (gas ballast control)	203.4	p
1	Shoulder washer	222	p	
*If required				

Table 4 - Checklist of Clean and Overhaul Kit components

- A Oil pressure/dump valve assembly
- B Cartridge: see Figure 2
- C Gas ballast check valve assembly

- 201 Air bleed assembly
- 202 Inlet-valve assembly:
see Figure 3
- 208 Top-plate
- 226 Restrictor
- 305 Oil-box
- 327 Bolt
- 408 Side panel
- 412 Side panel
- 421 Bolt

- * Included in the Clean and Overhaul Kit: see Table 3
- † Included in the Blade Kit: see Table 1
- ◆ Included in the Inlet-Valve Kit: see Table 2
- Included for reference only: see key →

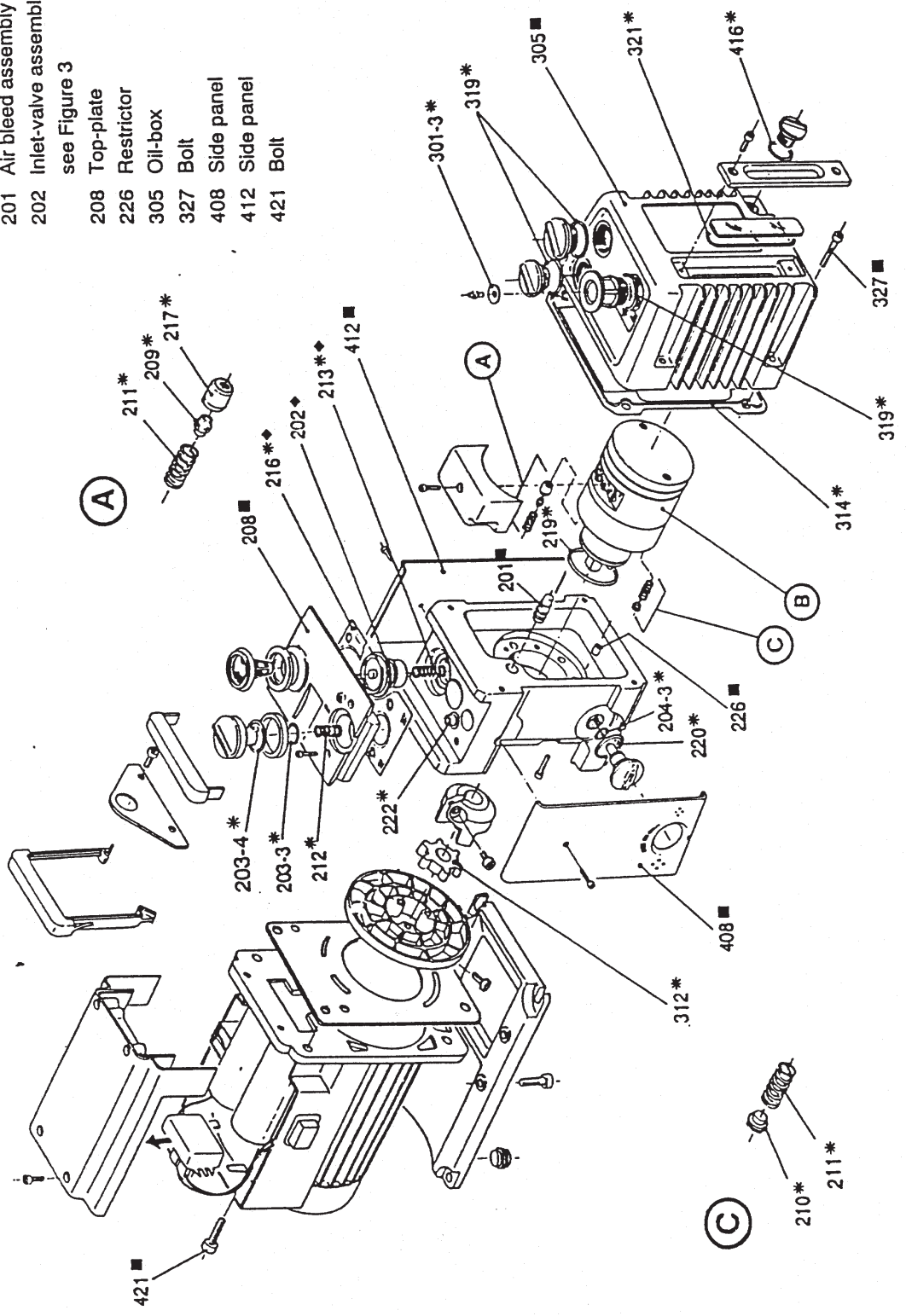


Figure 6 - Exploded View of the VLP Pump

- * Included in the Clean and Overhaul Kit: see Table 3
- † Included in the Blade Kit: see Table 1
- Included for reference only: see key below

- F Shaft-seal spacer
- 101 H.V. stator
- 109 Shaft-seal sleeve
- 110 Shaft-seal carrier

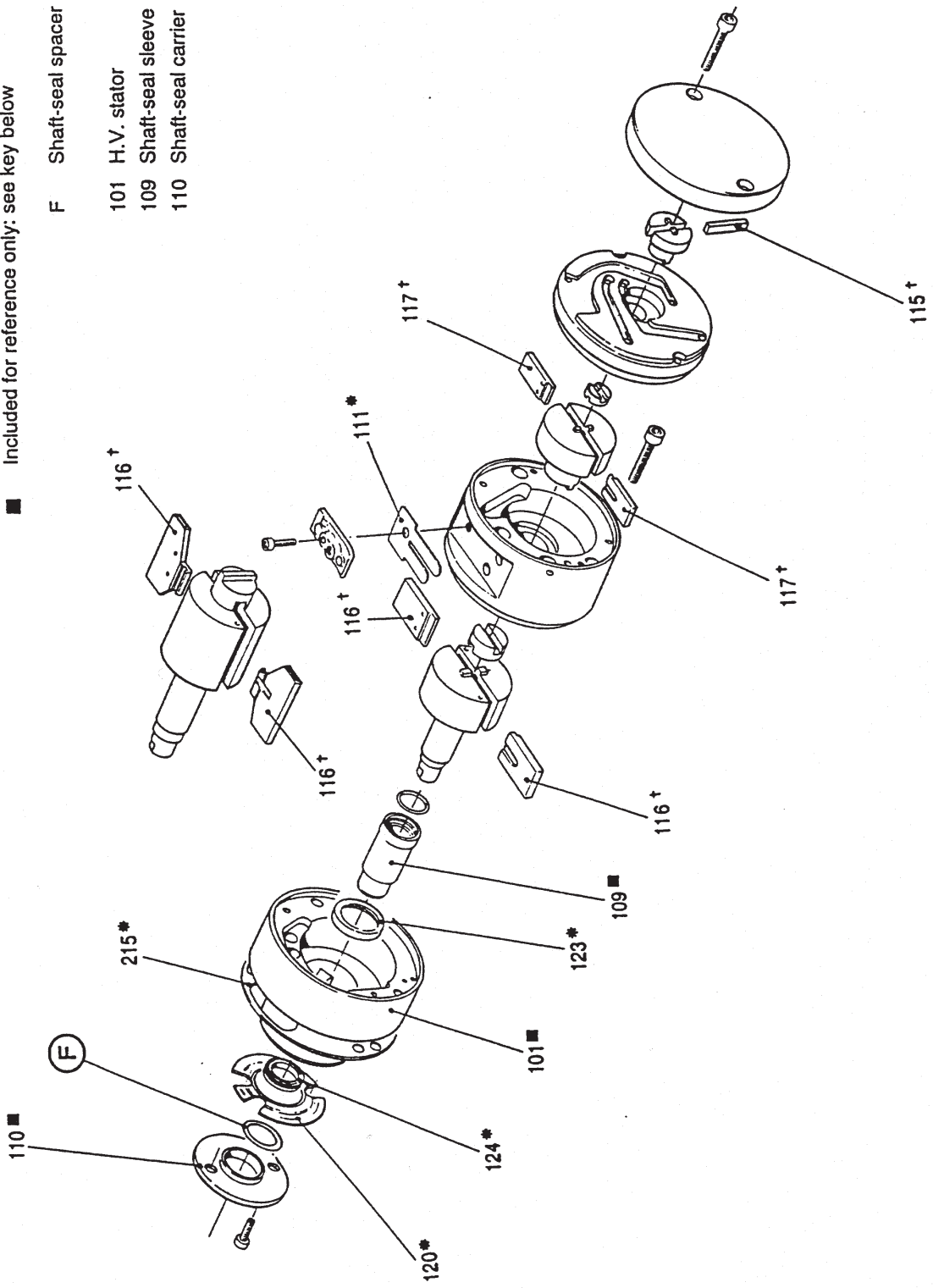
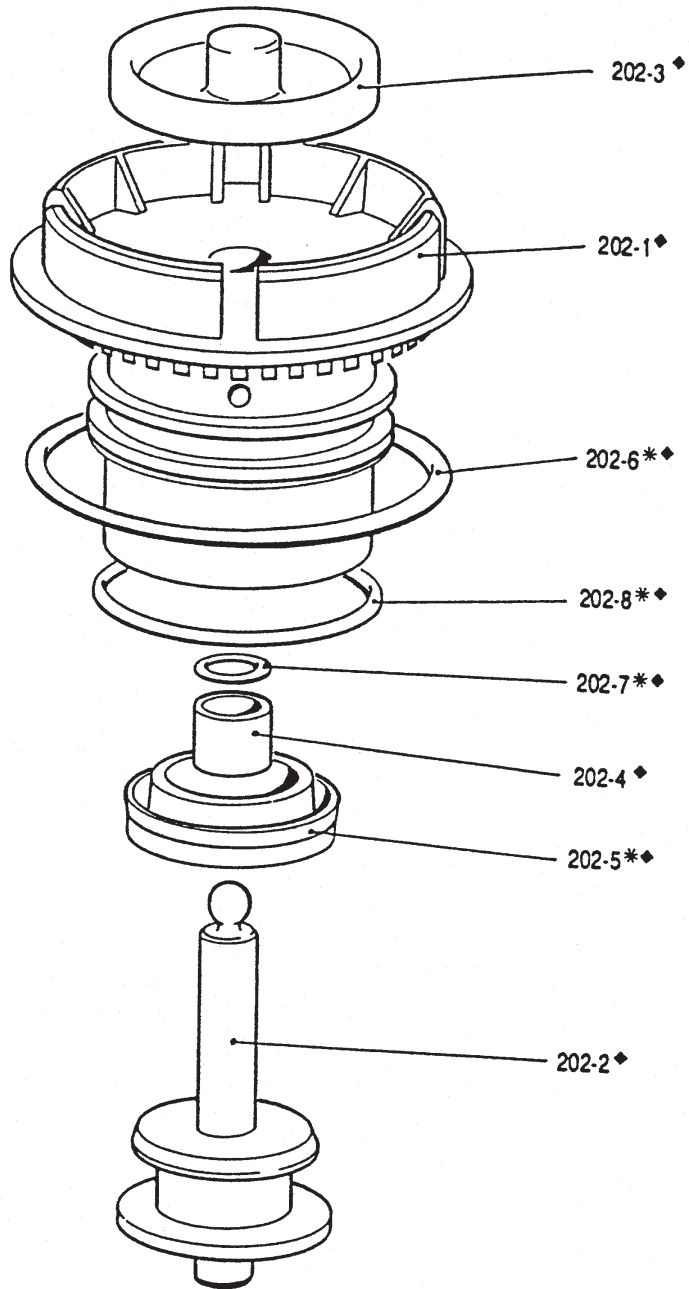


Figure 7 - Exploded View of the Cartridge



* Included in the Clean and Overhaul Kit: part number
u Included in the Inlet-Valve Kit: part number

Figure 8 - Exploded View of Inlet Valve Assembly

6.1 HOW TO USE THE CLEAN AND OVERHAUL KIT

Refer to Figures 6 through 8 which show exploded views of the VLP pump and use the following procedure to install the components of the kit. Where necessary, refer to the VLP pump instructional manual.

1. Switch off the pump, disconnect it from the electrical supply, and allow the pump to cool.
2. Drain the oil from the pump. Undo and remove the bolts (327) which secure the oil-box (305), and remove the oil-box from the pump. Remove any debris from the inside of the oil-box, then clean all surfaces of the oil-box with a suitable cleaning solution.
3. Dismantle the pump; we recommend NOT removing the shaft-seal sleeve (109) from the H.V. rotor (101). Use a suitable cleaning solution to clean all of the surfaces of components that you will reuse.
4. If the pump has a detachable stainless steel inlet flange (instead of the integral top-plate (208), remove the inlet flange and replace the 'O' ring (005) with the 'O' ring supplied.
5. Press the outer shaft-seal (124) out of the seal carrier (110). Press through the three mm diameter holes (located around the bearing bore) in the outer surface of the H.V. stator (101) to remove the inner shaft-seal (123).
6. Inspect the shaft-seal sleeve (109) for signs of wear. If the shaft-seal sleeve is worn, place the shaft-seal spacer (C) in the seal carrier (110) before fitting the replacement outer shaft-seal.
7. Use the components supplied in the Clean and Overhaul Kit to replace the corresponding components in the pump. Ensure that the components are clean before fitting them; before fitting elastomer components, wipe them with a clean, lint-free cloth and lightly lubricate them with the oil used in your pump.
8. Remove and inspect the restrictor (226). If necessary, use a suitable cleaning solution to clean restrictor orifice.
9. Remove and inspect the filter (if fitted) from the air bleed assembly (201). If necessary, use a suitable cleaning solution to clean the orifice and the filter.
10. Reassemble the pump. When refitting the side panels (408, 412), be sure not to over-tighten the securing screws. If the side panels are damaged, you must replace them before operating the pump.

6.1 HOW TO USE THE CLEAN AND OVERHAUL KIT (cont'd)

11. Use the oil-box printed gasket (314) supplied in the kit and refit the oil-box (305) to the pump. Fill the pump with the correct quantity of new oil.
12. Fit an oil mist filter to the pump-outlet and connect the outlet of the oil mist filter to a suitable exhaust-extraction system.
13. Connect the pump to the electrical supply, then look at the oil-level in the sight-glass and switch on the pump; check that the oil-level drops by 3 to 5 mm when switching on the pump. If the oil-level does not drop, refer to the pump instruction manual.
14. Refer to the VLP pump instruction manual for normal operation of the pump.
15. Dispose of the old components and used oil safely and in accordance with all local and national safety and environmental requirements.

6.2 HOW TO USE THE BLADES KIT

1. Dismantle the pump, clean the pump components and replace the pump components with the components supplied in the Clean and Overhaul Kit as described in Steps 1 to 9 of Section 3.
2. Dismantle the cartridge (Figure 2): ensure that you take note of the orientation of the Blades (116, 117) in the cartridge.
3. Use a suitable cleaning solution to clean all the surfaces of the components in the Blade Kit and the surfaces of the dismantled cartridge, which you will reuse.
4. Replace the H.V. and L.V. blades in the cartridge (116, 117) with the new blades supplied in the Blade Kit; ensure that you fit the blades in the correct orientation (as noted in Step 2).
5. Replace the oil-pump blade (115) with the new blade supplied in the Blade Kit and reassembled the cartridge.
6. Reassemble and commission the pump as described in Steps 10 to 14 of Section 3.
7. Dispose of the old components and used oil safely in accordance with all local and national safety and environmental requirements.

6.3 HOW TO USE THE INLET VALVE KIT

Refer to Figures 6 and 8, which show exploded views of the VLP pump, and use the following procedure to install the components of the kit. Where necessary, refer to the VLP pump instruction manual.

1. Switch off the pump, disconnect it from the electrical supply, and allow the pump to cool.
2. Remove the side panels (108, 412). On the VLP80 and VLP120 pumps, remove the top-cover from the motor and loosen the motor securing bolts (421).
3. Undo and remove the four screws, which secure the top-plate (208). Remove the top-plate and the top-plate printed gasket (216).
4. Use a suitable tool to firmly grip the rim of the valve cover (202-1), pull out the inlet-valve assembly (A), and remove the spring (213).
5. Fit the new spring and inlet-valve assembly supplied in the kit.
6. Fit the new top-plate printed gasket (216) supplied in the kit; then fit the top-plate (208) and secure it with the four screws removed in Step 3.
7. On the VLP80 and VLP120 pumps, tighten the motor bolts (421) and refit the top-cover on the motor. On all pumps, refit the side panels (408, 412).



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