

Instruction manual

VWR[®] Rotary Vane Pump

European Catalogue Number(s):

VWR RV2.5+	181-0571
VWR RV2.5+ with ACC	181-0572
VWR RV3+	181-0498
VWR RV6+	181-0499
VWR RV6+ with ACC	181-0504
VWR RV8+	181-0503
VWR RV8+ with ACC	181-0574
VWR RV18+	181-0573

P1700021

Version: 1.3

Issued: 23.11.2020



Legal Address of Manufacturer

Europe

VWR International bv
Researchpark Haasrode 2020
Geldenaaksebaan 464
B-3001 Leuven
+ 32 16 385011
<http://be.vwr.com>

Country of origin

China

Table of Contents

Legal Address of Manufacturer.....	2
Country of origin	2
Warning.....	5
1.0 Safety Information.....	5
1.10 General Information.....	6
1.20 To Prevent Injury	6
1.30 To Prevent Risk of Electrical Shock.....	7
1.40 To Prevent Risk of Explosion or Fire	7
1.50 Hazardous Substances	7
1.60 Product Standards, Safety Regulations.....	8
2.0 Package Contents	9
3.0 Unpacking.....	9
4.0 Installation	10
4.10 Pump Location	10
4.20 Pump Mounting	10
4.30 General References	10
4.40 Installation, fill with oil and connecting.....	11
4.50 Electrical Connection.....	12
4.51 Change the Voltage Setting.....	13
4.52 Type of Motor protection.....	13
4.60 Operating oil	13
4.70 Storage.....	14
5.0 Intended use	15
5.10 Use for an Unauthorized Purpose	15
6.0 Symbols and conventions	16
7.0 Technical Specification.....	16
7.10 Intake pressure / Pumping speed – Diagram	16
7.20 Technical Data.....	17
7.30 Dimensions.....	18
8.0 Product Specifications	19
8.10 Overview and Description	19
8.20 Area of Application	20
8.30 Function	21
8.31 Working Principle	21
8.32 Gas ballast	21
9.0 Operation	23
9.10 Starting-up.....	23

9.20	Oil level	23
9.30	Operating temperature	23
9.40	Use of the gas ballast when switching on.....	24
9.50	Operation with gas ballast when drawing off condensable vapours	24
9.60	Gas Ballast Control	25
9.70	Closing down.....	25
10.0	Troubleshooting	26
11.0	Repair and maintenance	27
11.10	Maintenance Performed by the User	27
11.20	Oil Level Control	28
11.30	Oil Colour Check	28
11.40	Oil Change.....	28
11.41	Draining the oil.....	29
11.42	Filling up with oil	29
11.43	Topping up the oil	29
11.44	Flushing	29
11.45	Frequency of oil changes.....	30
11.50	Maintenance by the manufacturer	30
11.60	Servicing.....	30
11.61	Service Kit	30
12.0	Accessoires	34
12.10	Overview and Order numbers for RV2.5+, RV3+, RV6+, RV8+	34
12.11	Overview and Order numbers for RV18+.....	34
12.20	Condenser Inlet	35
12.30	Oil Mist Separator Exhaust.....	36
12.40	Oil Mist Filter 10/16 Exhaust.....	37
12.50	Oil – Technical Data.....	37
13.0	Technical service.....	38
14.0	Warranty.....	38
15.0	Compliance with local laws and regulations	38
16.0	Equipment disposal (WEEE)	39

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.

1.0 Safety Information



CAUTION!

IMPORTANT SAFETY INSTRUCTIONS - SAVE THESE INSTRUCTIONS

To reduce the risks of fire or explosion, electrical shock, and the injury to persons, read and understand all instructions included in this manual. Be familiar with the controls and the proper usage of the equipment.

Measures such as the following are for the safety of the operating personnel

- Built-in motor protection
- Ground connection
- Rupture protected glass components
- Warning notes



CAUTION!

The rotary vane pumps must not be operated without these elements.



WARNING!

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

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

Note: The English version is the original version of the operation manual.

1.10 General Information

- Warning notices must be observed. Disregarding them may lead to damage to health and property.
- The rotary vane pumps must be operated by personnel who can detect impending dangers and take action to prevent them from materializing.
- The rotary vane pumps are intended for indoor use only.
- The manufacturer or authorized workshops will only service or maintain the rotary vane pump if it is accompanied by a fully completed damage report. Precise information about the contamination (also negative information if necessary) and thorough cleaning of the rotary vane pump are legally binding parts of the contract.
- Contaminated rotary vane pumps and their individual parts must be disposed of in accordance with the legal regulations. The local regulations apply in foreign countries.

1.20 To Prevent Injury

- Never operate this product if it has a damaged cord or plug.
- Keep the cord away from heated surfaces. All electrical products generate heat. Do not touch the marked areas.
- Maintain a space of least 20 cm between the pump and adjacent parts in order to enable the pump to cool.
- Always disconnect power source before servicing and secure against switching on again.
- Do not insert any object into the ventilation slots.
- 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 manufacturer or authorized workshops will only service or maintain the rotary vane pumps if it is accompanied by a fully completed damage report. Precise information about the contamination (also negative information if necessary) and thorough cleaning of the pump are legally binding parts of the contract.
- Contaminated pumps and their individual parts must be disposed of in accordance with the legal regulations.
- Only operate the rotary vane pumps with the specified flange-mounting components.
- Hazardous substances must be separated out as far as this is technically possible before they reach the pump.
- External mechanical stresses and vibrations must not be transmitted to the pump. Only use flexible vacuum hoses for connecting rotary vane pumps.
- The pump should not be used to suck up fluids. Lay the exhaust pipe so that it slopes downwards, so allowing condensate to flow out of the pump. Collect the condensate and dispose of it in an environmentally compatible manner.



WARNING!

The rotary vane pump must not be used for extracting explosive gases or vapours. The rotary vane pump must not be operated in rooms which might contain explosive or flammable gases



CAUTION!

Solid particles in the pumping medium impair the pumping action and can lead to damage. Prevent solid particles penetrating into the pump!

**CAUTION!**

In normal use, it is sufficient to switch the vacuum pump off electrically. Additional measures are not required. If condensable media have been pumped, the vacuum pump must be run after pumping with the gas ballast valve open and the intake pipe closed, see chapter 9.50 Operation with gas ballast when drawing off condensable vapours

1.30 To Prevent Risk of Electrical Shock

- The electrical power supply system must have a protective connector according to IEC 60364-4-41 (for CE operation only).
- Do not disassemble. Disassembly or attempted repairs if accomplished incorrectly can create electrical shock hazard. Refer servicing to qualified service agencies only.
- Be sure to connect pumps to a properly installed outlet only.
- Do not use the pumps in areas in which it could come into contact with water.
- Do not reach for the pumps if it has fallen into liquid. Unplug immediately.
- Never operate the pumps outdoors in the rain or in a wet area.

1.40 To Prevent Risk of Explosion or Fire

- The pumps may heat up as a result of the temperature of the gas being pumped and through intrinsic heating. Use suitable devices to prevent the maximum permissible temperatures. The limit value are < 40 °C for the ambient temperature.
- Do not use the pumps in explosive atmospheres.
- Do not use the pumps near open flames.

**WARNING!**

If aggressive or poisonous gases are used or occur, the user must recognize this state of affairs and compensate for them by taking appropriate measures complying with the relevant, currently valid regulations.

1.50 Hazardous Substances**CAUTION!**

The operating company bears the responsibility for the use of the rotary vane pump.

Hazardous substances in the gases to be pumped can cause personal injuries and property damage. Pay attention to the warning notices for handling hazardous substances. The local regulations apply in foreign countries.

Combustible and explosive Gases

Examine before switching on whether that can form gas combustible gas/air mixtures which can be promoted! Consider the regulations of the guideline 1999/92/EC. It is not permitted to pump gases that are combustible or prone to explosion.

Aggressive gases

The rotary vane pumps are not certified according to ATEX directive 2014/34/EU.

Poisonous gases

Use a separator when pumping poisonous or harmful gases. Prevent such substances from leaking out of the appliance or pump. Treat these substances according to the applicable environmental protection regulations. Test the strength and leak-tightness of the connecting lines and the connected apparatus. Prevent environmental poisons, e.g. mercury, getting into the rotary vane pumps.

1.60 Product Standards, Safety Regulations

The rotary vane pumps **VWR RV2.5+**, **VWR RV3+**, **VWR RV6+**, **VWR RV8+**, **VWR RV18+** conforms to the:

2006 / 42 / EC	Directive on machinery
2012 / 19 / EU	Directive on waste electrical and electronic equipment
2011 / 65 / EU	Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment
2014 / 30 / EU	Directive on electromagnetic compatibility

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

The rotary vane pumps **VWR RV2.5**, **VWR RV3+**, **VWR RV6+**, **VWR RV8+**, **VWR RV18+** meets the following product standards:

EN 60204-1	Safety of machinery - Electrical equipment of machines – Part 1: General requirements
EN 1012-2	Compressors and vacuum pumps-Safety requirements-Part 2: Vacuum pumps
EN 61000-6-1	Electromagnetic compatibility (EMC) - Part 6-1: Generic standards - Immunity for residential, commercial and light-industrial environments
EN 61000-6-3	Electromagnetic compatibility (EMC) - Part 6-3: Generic standards - Emission standard for residential, commercial and light-industrial environments
EN 61000-3-2	Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current up to and including 16 A per phase)
EN 61000-3-3	Electromagnetic compatibility (EMC) - Part 3: Limit - Section 3: Limits for voltage fluctuations and flicker for equipment with rated current ≤ 16 A

Observe the standards and regulations applying in your country when you use the rotary vane pump.

2.0 Package Contents

Item	VWR RV2.5+	VWR RV2.5+ with ACC	VWR RV3+	VWR RV6+	VWR RV6+ with ACC	VWR RV8+	VWR RV8+ with ACC	VWR RV18+
	181-0571	181-0572	181-0498	181-0499	181-0504	181-0503	181-0574	181-0573
VWR rotary vane pump without oil filling	RV2.5+	RV2.5+	RV3+	RV6+	RV6+	RV8+	RV8+	RV18+
Rotary vane pump oil 1 l bottle	1	1	2	2	2	2	2	3
CEE plug (EU)	✓	✓	✓	✓	✓	✓	✓	✓
UK plug	✓	✓	✓	✓	✓	✓	✓	✓
Swiss plug	✓	✓	✓	✓	✓	✓	✓	✓
IEC male-female cable	-	✓	-	-	✓	-	✓	-
Adapter flange DN 16 FK / Hose nozzle DN 8/10	✓	✓	✓	✓	✓	✓	✓	-
Adapter flange DN 16 KF / Hose nozzle DN 20	-	✓	-	-	✓	-	✓	-
Adapter flange DN 25 KF / Hose nozzle DN 20	-	-	-	-	-	-	-	✓
Exhaust oil mist separator	-	✓	-	-	✓	-	✓	-
2-Way ball valve DN 16 KF	-	✓	-	-	✓	-	✓	-
KF-Clamping ring DN 16	-	✓	-	-	✓	-	✓	-
KF-Centering ring DN 16 with O-Ring	-	✓	-	-	✓	-	✓	-

3.0 Unpacking

- Carefully remove the pump from the shipping case.
- Preserve all paperwork for later use.
- 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 to order numbers for quick identification.



CAUTION!

Do not return the pump to the factory without obtaining returned goods authorization.

4.0 Installation

4.10 Pump Location



WARNING!

Don't operate this pump in an atmosphere containing flammable or explosive gas.

The pump should be located in a clean and well-ventilated area and adequate space should be provided wherever possible for routine maintenance such as oil changes. For best performance, the pump should be located as closely as possible to its system. Determining factors for pump location should include length and size of connections, the number of bends, and the type of exhaust connections.

4.20 Pump Mounting

For more rigid mounting requirements the pump base can be bolted directly to a surface using the 2 mounting holes and 2 slots featured on the base.

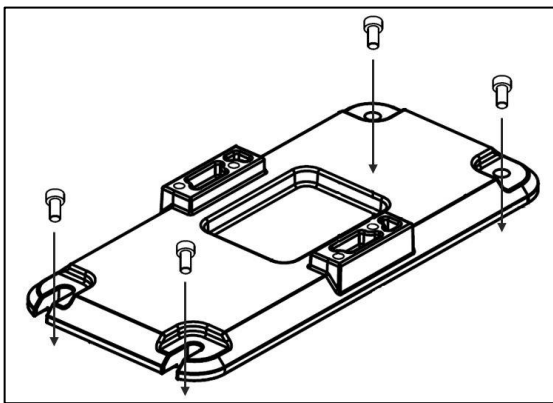


Fig. 1: Pump mounting

4.30 General References



CAUTION!

On continuous operation it's recommended to run the pump below 10 mbar maximum vacuum pressure.

According to its intended use the capacity of the vacuum pump depends on:

- the kind of assembly
- accessories
- the oil used
- additional connections
- vacuum piping system

In addition, fail-safe operation is determined by the mode of maintenance. Elements such as valves, filters, condensers a.s.o. should be provided as early as in the conception. The materials of the vacuum piping should be selected in such a way that they will be resistant to the media to be delivered!

- Regularly check and clean the air inlet of the motor ventilator.
- The structural elements used on the inlet and outlet sides must be resistant to the media to the pumped. The pressure on the outlet side must not exceed 1 bar!
- A pressure that is slightly below the air pressure helps to avoid pollution of gases, and reduces corrosion.

4.40 Installation, fill with oil and connecting

Set the rotary vane pump on a flat and horizontal surface. If more rigid mounting is required, bolt the pump base to the surface. See chapter 4.20 Pump Mounting.



CAUTION!

To avoid a leakage during the transport, the rotary vane pump are delivered without any oil filling. Therefore we enclose two separate bottle (one liter each) of our pumping oil for rotary vane pumps which you need to fill into the pump before using it.

Filling up with oil – Procedure

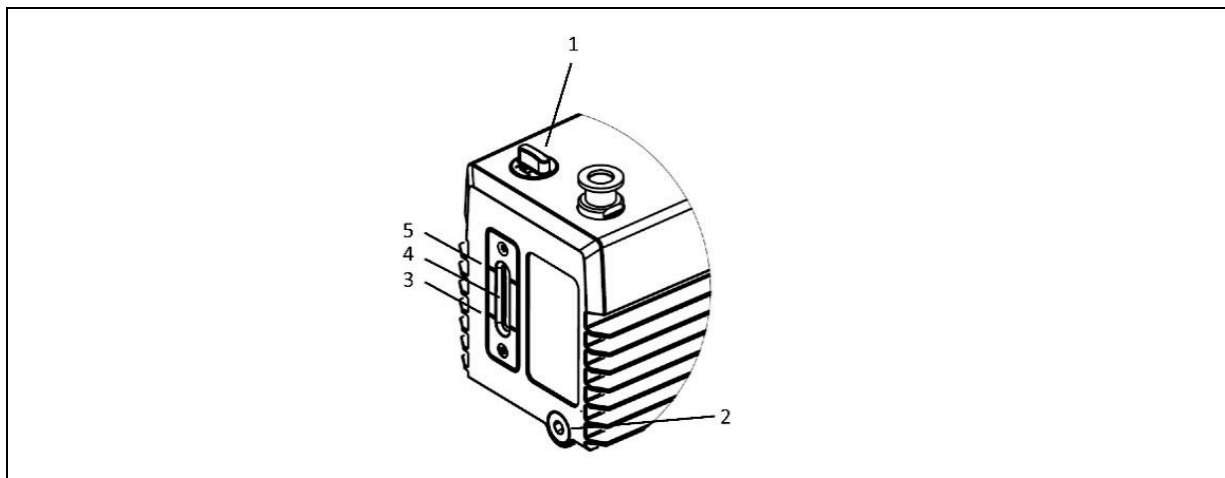


Fig. 2: Filling up with oil

1	Oil fill plug	4	Oil sight glass
2	Oil drain plug	5	Upper marking FULL
3	Lower marking MIN		

1. Remove the oil filler plug with seal (1)
2. Pour in the oil with the funnel until it reaches the upper mark (5)
3. Screw in the oil filling plug (1) inclusive seal once again

Connecting – Procedure

1. Remove the protective caps on the suction- and the pressure plug.
2. Connect it to the vacuum apparatus by means of the small flange DN 16 KF.
3. Connect the pressure port to the central laboratory air evacuation duct. Ensure that the substances fed in are absolutely safe and harmless.
4. Check that the connections are properly seated.
5. Check the voltage setting on the terminal box. If necessary the voltage setting can be changed. How to switch the mode is described in chapter 2.52 Change the Voltage Setting.
6. Check the AC power outlet to be sure that it is the same voltage and phase as the pump motor.
7. Recheck the oil level. If needed refill oil – see chapter 7.42 Filling up with oil. Please note that the pump are delivered without oil filling. Initial oil filling has to be done by the user.
8. Connect the rotary vane pump to the electrical supply. Please note the explanations on chapter 2.50 Electrical Connection.

How to operate the pump see chapter Operation.

**WARNING!**

Never block or impede air flow from the exhaust port. High pressure can build up within the oil reservoir if the exhaust port is blocked. Check frequently, especially if exhaust is piped out of the building.

**CAUTION!**

Consider the warning reference on the terminal box of the motor!

The suction and pressure ports must not be connected the wrong way round by mistake!

4.50 Electrical Connection

The rotary vane pumps are supplied with complete electrical wiring. It is connected via an appliance cable and a power supply plug. If the supply cord is damaged, it must be replaced by the manufacturer, its service agent or similarly qualified persons in order to avoid a hazard.

**WARNING!**

Should the user change the electrical connection, for example for fitting into a system, then this may only be performed by a electrical specialist under observance of the accident prevention regulations.

**CAUTION!**

Change the mode switch to current mains voltage! Mode switch is on the terminal box.
Consider the warning reference on the terminal box of the motor!

- It is generally suggested to protect the motor by 120 per cent of its rated power in consideration of the starting and switch-on response.
- Device connection cables and plugs must comply with the requirements of the line disconnection devices (current, output).
- The customer/user shall install the main and emergency stop switches.
- Set the switch in according with the rating on the motor nameplate.
- After connecting the motor and after every time you alter the wiring, check the direction of rotation. To do so, briefly switch on the power and check whether a suitable cover (e.g. a blank flange) is sucked on at the intake port. If not, interchange two phases of the connection. Observe the direction arrow on the motor adapter.

4.51 Change the Voltage Setting

The pumps are factory wired for high voltage (HV) 230V / 60Hz. If necessary, the voltage setting can be changed as followed. Note that the VWR RV18+ is not switchable.

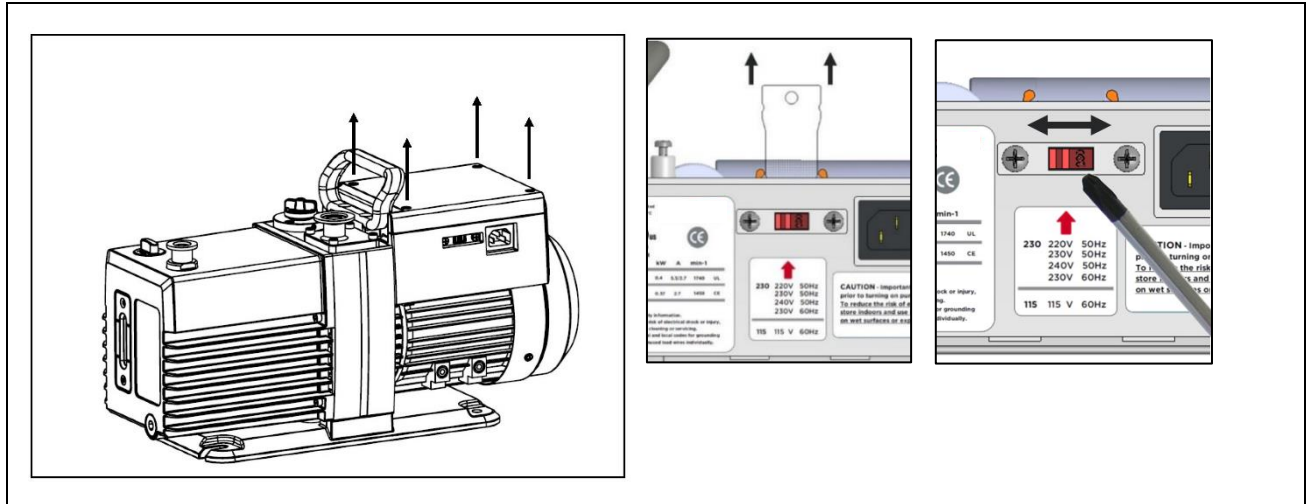


Fig. 3: Change the voltage setting

1. Loosen the four screws on top of the terminal box.
2. Lift the cover and remove it.
3. Take off the voltage selector switch cover. Do not unscrew the screws of the voltage switch.
4. Switch the voltage to 220/230/240V or 115V. Use a standard slot screwdriver.
5. Put the voltage selector switch cover to its original position.
6. Put the cover on the terminal box and tighten with the four screws.

4.52 Type of Motor protection

The A.C. motors are provided with a thermal overload protection ex works, protecting the motor and vacuum pump from damage or destruction, respectively. The motor manufacturer makes motor thermal overload protection available as an aid to minimize motor failure. Overload protection is a standard feature on the single-phase motor. The motor have overload protection plus manual reset after cool down. Once the thermal protector operated, the user must turn off the pump and restart manually after cool down.



CAUTION!

The motor has thermal overload protection plus manual reset after cool down. Once the thermal protector operated, the user must turn off the pump and restart manually after cool down.

4.60 Operating oil



WARNING!

Vacuum pump is shipped without oil inside to prevent possible spillage during shipment. Oil must be added prior to use!

The vacuum pump is delivered with **VWR RV+ Oil** and can therefore be used for pumping out neutral gases and vapours.

The oil fulfills the following functions in the vacuum pump:

- lubricating the sliding parts, such as rotor, vane, radial shaft seals
- sealing the moving parts against the stator wall to reduce leaks
- conducting the heat of compression to the metal walls (cooling)

The oil transports the polluted particles and corrosive media and thus effects continuous cleaning of the internal surfaces.

Oil for Drawing off oxygen

For drawing off oxygen containing mixtures or pure oxygen the following must be taken into consideration:

- Mineral oils are flammable and not suitable for oxygen contents above 30%.
- The more they oxidise, the quicker they loose their properties.
- For this reason they only can be used up to an oxygen percentage of maximum 30 per cent in the medium to be delivered.
- For higher oxygen contents synthetic oils have to be used, i.e., LABOVAC 13 (PFPE).

In order to prevent any accumulation of oxygen in the discharge space, neutral gas such as nitrogen may be let in through a special inlet assembly. The percentage of oxygen is being reduced. The added amount of gas should be 5 times as much as the percentage of oxygen.



WARNING!

There is a risk of explosion when pumping oxygen at a concentration above 30 percent.



WARNING!

Pump should be not used for oxygen service! Oxygen at atmospheric pressure is exceptionally dangerous!

4.70 Storage

The pumps are to be stored in a low-dust, interior room within the temperature range from + 5 to + 40 °C and at a relative air humidity < 90%. Leave the protective elements on the suction and pressure ports. Another equally good protection may be used. If the pump oil is contaminated and the pump is going to be stored for a prolonged period, the oil should be changed before the pump is stored. Even if a pump is stored for a long period with oil initially in good condition, check the oil when the pump is restarted, and change the oil if necessary.

5.0 Intended use

The rotary vane pumps can pump out biological, toxic and radioactive gases and vapours, and evacuate containers or vacuum installations up into the high vacuum range. The design criteria of the rotary vane pumps must be appropriate for the conditions of use. The user bears the sole responsibility for this. The rotary vane pumps may only be operated under the conditions stated on the type plate and in the technical specification for the order concerned.



WARNING!

- Do not use the pump or any system parts on humans or animals.
- Ensure that individual components are only connected and operated according to their design and as indicated in the instructions for use.
- Comply with all notes on correct vacuum and electrical connections, *4.40 Installation, fill with oil and connecting / 4.50 Electrical Connection*
- Do not use the pump to generate pressure.
- The pumps are designed for ambient temperatures during operation between + 10 and + 40 °C. Periodically check maximum temperatures if installing the pump in a cabinet or a housing. Make sure ventilation is adequate to maintain recommended operating temperature. Install an external automatic ventilation system if necessary. If pumping hot process gases, make sure that the maximum permitted gas inlet temperature is not exceeded. The maximum permitted gas inlet temperature depends on several parameters like inlet pressure and ambient temperature.
- Solid particles in the pumping medium impair the pumping action and can lead to damage. Prevent their penetrating into the pump.
- Do not pump liquids.
- For cooling purposes, maintain an air gap of about 5 cm between the pump and surrounding surfaces.



WARNING!

Ensure that the pump is chemically resistant to the pumped substances prior to operation.



CAUTION!

Use equipment only as intended, that is, for generation of vacuum in vessels designed for that purpose. Any other use will automatically invalidate all warranty and liability claims. Remain aware of safety and risks.

5.10 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. The rotary vane pumps **VWR RV2.5+**, **VWR RV3+**, **VWR RV6+**, **VWR RV8+**, **VWR RV18+** are not suited for pumping liquids.

6.0 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. Hazard which may lead to serious injuries or material damage.
	This symbol advises danger from electricity or electric shock.
	This symbol indicates that a hot surface may be present. Hot surface can lead to serious injuries or material damage.
	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.

7.0 Technical Specification

7.10 Intake pressure / Pumping speed – Diagram

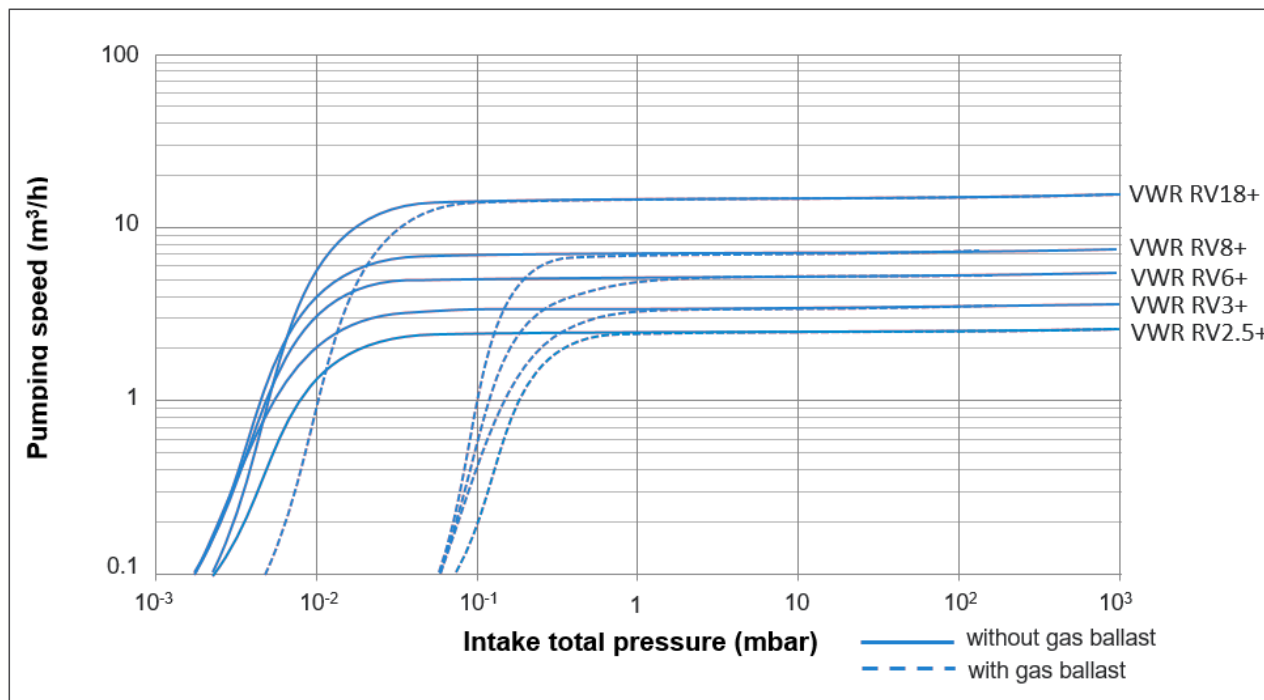


Fig. 4: Intake Pressure / Pumping Speed – Diagram VWR RV2.5+/RV3+/RV6+/RV8+/RV18+

7.20 Technical Data

Parameter	Unit	VWR RV2.5+	VWR RV2.5+ ACC	VWR RV3+	VWR RV6+	VWR RV6+ ACC	VWR RV8+	VWR RV8+ ACC	VWR RV18+
Pumping speed 50/60 Hz	m³ / h- 1	2.3 / 2.8		3.8 / 4.6	5.1 / 6.3		7.3 / 8.7		16.8 / 20.2
	l / min	38 / 47		63 / 77	85 / 105		122 / 143		280 / 336
Ultimate pressure (ISO21360)									
- without gas ballast partial	mbar	3 x 10 ⁻⁴		5 x 10 ⁻⁴					3 x 10 ⁻⁴
- without gas ballast total		3 x 10 ⁻³		2 x 10 ⁻³					3 x 10 ⁻³
- with gas ballast total		9 x 10 ⁻²		7 x 10 ⁻²					6 x 10 ⁻³
Max. inlet pressure	bar	1							
Max. outlet pressure		1							
Vacuum Connection, suction side	-	DN 16 KF + DN 8 / 10	DN 16 KF + DN 8 / 10 / 20	DN 16 KF + DN 8 / 10	DN 16 KF + DN 8 / 10 / 20	DN 16 KF + DN 8 / 10	DN 16 KF + DN 8 / 10 / 20	DN 16 KF + DN 8 / 10 / 20	DN 25 KF + DN 20
Vacuum Connection, pressure side	-	DN 16 KF							DN 25 KF
Ambient temperature	°C	+10 to +40							
Noise level	dB (A)	50							55
Oil filling	ml	450		1150			1000		2400
Weight	kg	15	17	21	22	24	22.5	24.5	37
Order numbers:									
Rotary vane pump <i>inclusive:</i> Mains connection cable IEC with Plug CEE, UK, CH; Vacuum Pump Oil; Adapter- Hose nozzle;	ECN	181- 0571	-	181- 0498	181- 0499	-	181- 0503	-	181- 0573
Rotary vane pump <i>inclusive:</i> Mains connection cable IEC with Plug CEE, UK, CH; Vacuum Pump Oil; Oil Mist Separator; Ball valve; Adapter-Hose nozzles; Clamping ring; Centering ring; IEC male-female cable		-	181- 0572	-	-	181- 0504	-	181- 0574	-

Parameter	VWR RV2.5+		VWR RV3+, VWR RV6+, VWR RV8+		VWR RV18+	
Frequency	50 Hz 	60 Hz	50 Hz 	60 Hz	50 Hz 	60 Hz
Voltage	220-240 V	115 / 230 V	220-240 V	115 / 230 V	220-240 V	230 V
	(switchable)					
Motor power	0.29 kW	0.27/0.3 kW	0.37 kW	0.4 kW	0.7 kW	0.85 kW
Nominal current	1.5 A	3.0 / 1.5 A	2.1 A	4.3 / 2.1 A	4.8 A	4.2 A
Motor speed 50/60 Hz	1440 rpm	1720 rpm	1450 rpm	1740 rpm	1450 rpm	1750 rpm
Type of protection	IP54					

7.30 Dimensions

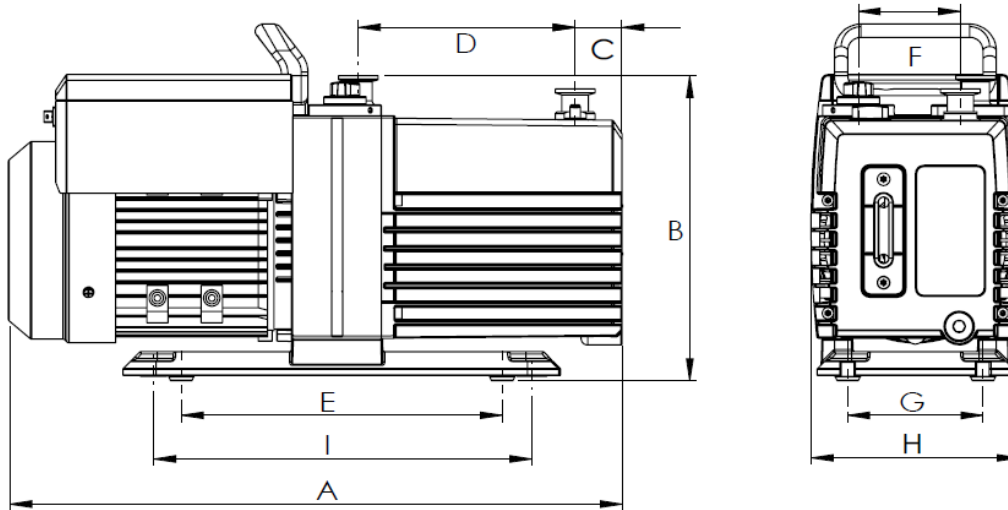


Fig. 5: Dimensions

Pump models	Order no.	A	B	C	D	E	F	G	H	I
		(in mm)								
VWR RV2.5+	181-0571	384	183	30	135.5	184	60.5	90	138	224
VWR RV2.5+ with ACC	181-0572	384	183	30	135.5	184	60.5	90	138	224
VWR RV3+	181-0492	463	230	35.5	163.5	242	88.5	102	157	284
VWR RV6+	181-0493	463	230	35.5	163.5	242	88.5	102	157	284
VWR RV6+ with ACC	181-0504	463	230	35.5	163.5	242	88.5	102	157	284
VWR RV8+	181-0494	463	230	35.5	163.5	242	88.5	102	157	284
VWR RV8+ with ACC	181-0494	463	230	35.5	163.5	242	88.5	102	157	284
VWR RV18+	181-0573	569	281	50	225	286	118	150	206	330

8.0 Product Specifications

8.10 Overview and Description

The rotary vane pumps **VWR RV2.5+**, **VWR RV3+**, **VWR RV6+**, **VWR RV8+**, **VWR RV18+**, are oil-sealed, two-stage rotary vane vacuum pumps. The drive motor is directly flange-mounted onto the motor cover of the pump holder. The pump shaft and the motor shaft are connected to each other by an elastic coupling. The bearings of the interior pump body are force-fed lubricated sliding bearings.

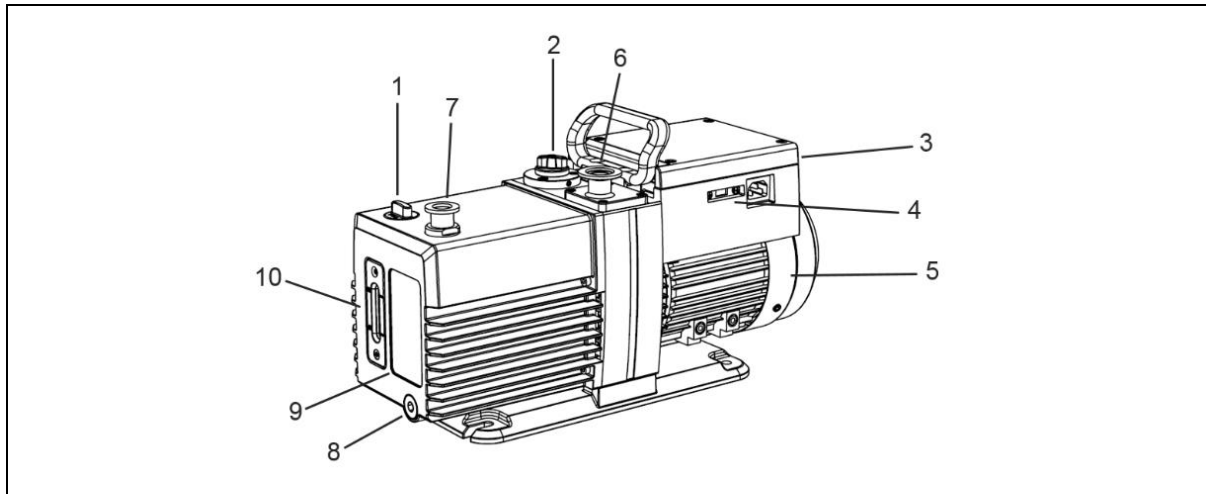


Fig. 6: Design VWR RV2.5+/RV3+/RV6+/RV8+

1	Screw-plug for oil filling	6	Suction port
2	Rotary knob for setting the gas ballast valve; direction of rotation: to the left = open to the right = closed	7	Exhaust port
3	On / Off switch	8	Oil drain screw-plug
4	Voltage selector switch	9	Type plate
5	Drive motor	10	Oil inspection glass

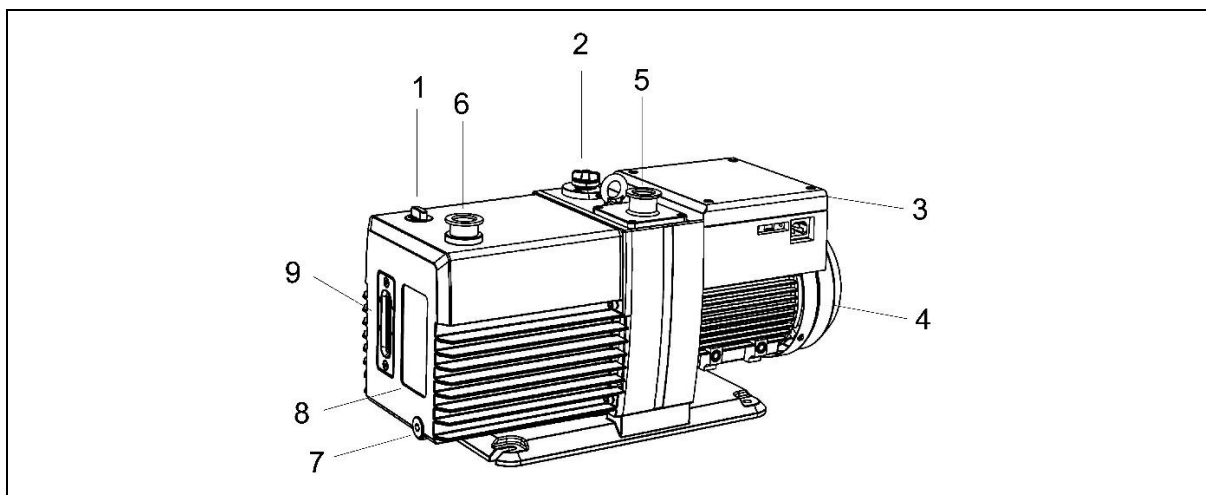


Fig. 7: Design VWR RV18+

1	Screw-plug for oil filling	6	Exhaust port
2	Rotary knob for setting the gas ballast valve; direction of rotation: to the left = open to the right = closed	7	Oil drain screw-plug
3	On / Off switch	8	Type plate
4	Drive motor	9	Oil inspection glass
5	Suction port		

8.20 Area of Application

The range of application of our oil-sealed rotary vane pumps encompasses the entire field of vacuum technology, both for use in the laboratory and in industry.

The task is to create end pressures (partial) down to around 10^{-4} mbar

- as a one pump
- as a fore-pump for oil diffusion pumps or as turbo-molecular pumps

The rotary vane pump can pump out biological, toxic and radioactive gases and vapours, and evacuate containers or vacuum installations up into the high vacuum range.



WARNING!

The rotary vane pumps must not be used for extracting explosive gases or vapours. The rotary vane pumps must not be operated in rooms which might contain explosive gases.

8.30 Function

8.31 Working Principle

Two pump stages (fore-stage and high-stage) are arranged in series in order to improve the end pressure and the pumping speed at lower pressures. The intake takes place in the first stage (high-stage), the compression and the outlet in the second stage (fore-stage).

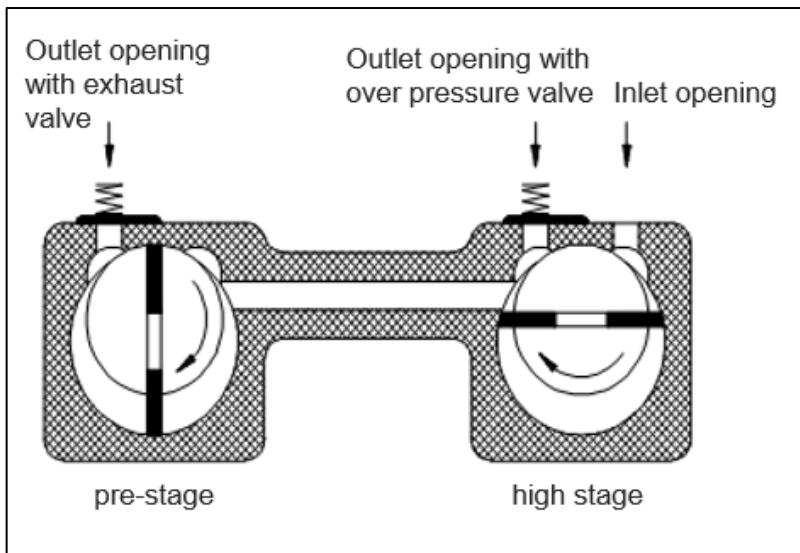


Fig. 8: Pre-stage / high-stage

The pump body is subdivided into several chambers by the eccentrically arranged rotor which has two radically sliding vanes. The volume of each chamber changes cyclically as the rotor turns. This sucks the gas into the intake opening. The gas flows through the dirt filter, which is connected to the centring ring, into the pump body. After the intake opening is closed by the vane, the gas is transported onwards and compressed.

A dosed quantity of air (gas ballast) can be let into the pump body during the compression by opening the gas ballast valve. This prevents vapours condensing in the vacuum pump. Oil is injected into the pump body for sealing and lubrication. An oil pump pumps oil out of the oil reservoir into a pressure oil lubrication system that feeds all the bearings. The low-mounted oil suction pipe achieves a large usable oil reserve.

At the outlet valve, the compressed gas is pumped out of the pump body through the exhaust port. The oil carried along with the gas is separated out by a filter (accessory).

8.32 Gas ballast



WARNING!

Condensable vapours may only be extracted when the gas ballast valve is open, when the vacuum pump is at operating temperature and within the limits of the maximum tolerance of water vapour pressure! Condensation occurs if the maximum water vapour pressure tolerance is exceeded.

When pumping condensable vapours, they may be compressed during the compression phase above the saturated vapour pressure and condense.

This causes considerable deterioration in the vacuum pump's performance:

- ultimate pressure is not achieved
- corrosion occurs
- heavy oil contamination and formation of emulsions

When the gas ballast valve opens (to the left) air flows into the compression space. The air flowing in keeps the partial pressure of the condensable medium so low that the pressure needed to open the outlet valve is reached before the medium condenses.

**CAUTION!**

Operating with gas ballast increases the operating temperature of the vacuum pump by 5 – 10 K.

Should condensate form despite actuation of the gas ballast device, the suction port must be closed and the pump operated with gas ballast for a lengthy period (about 2 hours).

The gas ballast valve can increase the pump's water vapour tolerance. In many vacuum pump applications the gases being pumped from a system are a combination of permanent gases and undesirable vapours such as water vapour. Under some conditions, the vapours condense in the second stage of the pump and contaminate the oil. The gas ballast valve reduces oil contamination by decreasing or eliminating vapour condensation.

Vapour condensation is most likely to take place when the gas compression ratio is high, i.e. when the pump compresses a relatively large volume of gas to a small volume. Whether or not condensation takes place is dependent upon several factors, including the proportion of permanent gases to vapours at the pump intake. If the gases being pumped consist entirely of vapours, condensation will definitely occur unless the gas ballast valve is opened. The gas ballast valve adds a small amount of air at atmospheric pressure to the gas being compressed in the second stage. This reduces the compression required to push the gas out past the exhaust valve (less reduction in volume is required), and therefore reduces or eliminates condensation.

When the gas ballast valve is open, the pump has to work a little harder, resulting in a slight increase in operating temperature. The increase in temperature is small, however, and is not harmful to the pump. Also, the pump is slightly noisier, and the pump's ultimate pressure is somewhat reduced. Therefore, the gas ballast valve should be kept closed when it is not needed. Note that the gas ballast is not equally effective on all different types of chemical vapours, so it may not always eliminate condensation completely.

Should condensate form despite actuation of the gas ballast device, the suction port must be closed and the pump operated with gas ballast for a lengthy period (about 2 hours).

9.0 Operation



CAUTION!

Observe the basic safety instructions when using the pump.

9.10 Starting-up

Observe the basic safety instructions when using the pump.

Before using the pump for the first time, it is recommended to spend a few minutes inspecting the pump and its electrical and vacuum connections. Please notice the information which are listed in chapter 4.0 Installation and 9.0 Operation.

1. Connect the power cord to the power outlet.
2. Recheck the oil level and add or remove oil as needed. How to do this see chapter 11.20 Oil Level Control.
3. Close off the pump intake and the gas ballast valve, and run the pump at blankoff for a few minutes. The gurgling noise should go away after a few minutes of running; it is caused by the high volume of air that flows through the pump when the pump is first turned on. If the gurgling noise does not stop, check the oil level again to see if it is low. Also check the pump intake fitting to be sure that it is tight.
4. Once proper pump operation has been verified, the pump intake can be opened to the vacuum system.
5. After running the pump for a few minutes, check the oil level again. If the level is too high or too low, stop the pump, vent it to the atmosphere and add or remove oil as needed – see chapter 11.40 Oil Change.
6. Before starting the pump when connection to the vacuum system, check all vacuum connections.



CAUTION!

Check the oil level and oil temperature prior to switching on the rotary vane pump!

9.20 Oil level

The oil level must at all times between the upper and lower markings of the oil level indicator. The oil must be topped up if the oil level falls to the lower mark.

9.30 Operating temperature

The function of the vacuum pump filled with **VWR RV+ Oil** is guaranteed between ambient temperatures of 10 °C and 40 °C.

The lowest starting temperature is 12 °C. The pump must be vented on the suction-side (suction port open).



WARNING!

In dependence on the operation mode, the casing temperature can reach 90 °C. Make sure that the vacuum pump has not been installed in an accessible area, and make provision for a guard against contacts!

9.40 Use of the gas ballast when switching on

The principle of the gas ballast is described in chapter 8.32 Gas ballast.

Condensates could have collected in the vacuum pump if

- the vacuum pump is new
- it has not been used for long periods
- the oil has been changed
- the pump's maximum tolerance of water vapour pressure has been exceeded

9.50 Operation with gas ballast when drawing off condensable vapours

Do not start pumping out condensable vapours until the pump has reached operating temperature, the gas ballast valve must be open and the maximum tolerance of water vapour pressure must not be exceeded.

We suggest operation with the gas ballast valve open, provided that the composition of gas in the vacuum pump to be drawn off is not known and cannot be ruled out.

If condensable gas and vapours are to be delivered, the latter or their condensates will mix with the oil. As a result of this, the technical parameters of the vacuum pump will be deteriorated.

In order to emit the condensable matter, proceed as follows:

- Let the vacuum pump run hot for about 30 minutes, the suction port being closed and the gas ballast valve open,
- After the operating temperature of 70 °C to 80 °C (at an ambient temperature of about 20 °C) has been reached, let the vacuum pump operate for another half an hour in dependence on the degree of oil contamination,
- Close the gas ballast valve,
- Check the ultimate pressure (total) of 9×10^{-2} mbar, repeat the gas ballast operation if this is not achieved
- Prevent any build-up of overpressure through the outlet, hence:
 - o use a condensate separator instead of an oil mist filter
 - o avoid laying the pipes vertically as condensate collects there, and can flow back into the vacuum pump if there is not an upstream condensate separator
 - o install the outlet pipe
- Ensure that the gas ballast valve is open, and note that the vacuum pump must run up to operating temperature with the suction pipe closed for about 30 minutes.
- Check the oil level during pumping. It may rise if the condensate is not discharged.
- After completing the work, the vacuum pump must run for another 30 to 60 minutes with the intake side closed and the gas ballast open in order for the oil to regenerate.
- After switching off the vacuum pump, inspect the oil for condensate. Inspection is through the oil sight glass or immediately with a low, drained amount of oil. If the oil is clean, check the level and top up fresh oil.

Gas purging process

The harmful action of aggressive gases and vapours can be reduced by gas purging the pump and the oil. Nitrogen or another inert gas should be used as the purging gas. Dried air may also be used if the oxygen in the air is compatible with the aggressive pumping gas. The rinsing process must be made via the gas ballast valve.

If the vacuum pump does not regain its former characteristics, this means that the oil is totally contaminated. In this case, the only remedy is complete cleaning followed by rinsing and filling with new oil, 7.40 Oil Change.

9.60 Gas Ballast Control

The principle of the gas ballast is described in chapter 8.32 Gas ballast. To open or close the gas ballast turn the gas ballast switch to the position open or close.

Operation with gas ballast when drawing off condensable vapours

We suggest operation with the gas ballast valve open, provided that the composition of gas in the vacuum pump to be drawn off is not known and cannot be ruled out. If condensable gas and vapours are to be delivered, the latter or their condensates will mix with the oil. As a result of this, the pump performance will degrade.

9.70 Closing down

A few simple precautions are necessary before performing a pump shutdown.

- If a gauge is connected to the system, first isolate the gauge, then turn off the power to the pump and open the system to the atmosphere.
- If condensable media have been pumped, the vacuum pump must be run after pumping with the gas ballast valve open and the intake pipe closed.
- If the vacuum pump is not going to be used for a sometime after pumping aggressive or corrosive media, or if it not going to be used for a long time, then proceed as follows:
 - o If the pump oil is contaminated and the pump is going to be stored for a prolonged period, the oil should be changed before the pump is stored. Even if a pump is stored for a long period with oil initially in good condition, check the oil when the pump is restarted, and change the oil if necessary.
 - o Close connecting ports with a rubber stopper or other suitable cover to protect the pump against contamination. An intake screen is furnished to prevent loose particles from entering.



WARNING!

Take appropriate safety measures in case of having delivered dangerous media!

10.0 Troubleshooting

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

Trouble	Cause	Remedy	
		by:	with:
Vacuum pump does not start	No power supply	Qualified electrician	Check electrical installation
	Motor defective	Service workshop	Exchange
	Coupling defective		Repair and/or exchange
	Starting temperature too low	User	Put vacuum pump in a warm place corresponding to the starting temperature
	Oil is resinous after too long storage	User or Service workshop	General maintenance / cleaning
Vacuum pump does not generate a vacuum	Ultimate pressure few mbar or atmospheric pressure, oil shortage	User	Top-up oil
	Oil is dirty		Operate with gas ballast, or perform oil change with flushing
	Oil supply to pump unit interrupted or reduced	User	Check that the oil circulation is functioning, measure the oil pressure at operating temperature, 1 – 1.2 bar overpressure, check that the pipes are clear and have no leaks
	Gas ballast valve open	User	Close the gas ballast valve
	Shaft seals defective	User or Service workshop	Exchange
	Work or pressure control valve defective		Exchange
	Intake valve defective		Repair
	Oil supply to pump aggregate reduced Oil superimposition interrupted by work valve		Repair
Vacuum pump runs very loudly	Built-up pressure in the oil casing too high because of exhaust gas pipe or oil mist filter	User or Service workshop	Check exhaust pipe, change filter insert
	Motor, rotary vanes and/or shaft seal rings defective, rotary vane spring broken		Repair and/or exchange
Vacuum pump	Vacuum pump oil supply interrupted	User or Service workshop	Check that the oil circulation is functioning, measure the oil pressure

runs hot			at operating temperature, 1 – 1.2 bar overpressure, check that the pipes are clear and have no leaks
	Oil with too low a viscosity used		Oil change
	Ambient temperature round vacuum pump too high	User	Change location
	Motor defective	User or Service workshop	Exchange
	Built-up pressure in the oil casing too high (> 0.5 bar)		Check exhaust pipe change filter insert
Heavy loss of oil	Through oil mist emission: work or pressure control valve defective		Exchange
	Because of leak from oil casing: shaft seal defective, oil casing seals defective		Repair and/or exchange
Vacuum pump is not vacuum-tight when switched off - possible rise in oil pressure	Intake valve defective		Repair and/or exchange
	Shaft seal ring on the drive side or oil pump defective		Repair and/or exchange
	Opened gas ballast valve	User	Close the gas ballast valve
Cable(s)	Defective and/or brittle	Qualified electrician	Exchange of the cable(s)

11.0 Repair and maintenance

11.10 Maintenance Performed by the User

Under normal operating conditions the maintenance of the rotary vane pump is limited to:

- external cleaning
- checking running noises
- checking the level and quality of the oil
- regular oil changes

These maintenance intervals must be specified according to the prevailing operating conditions and adhered to. We recommend performing maintenance after every 1.000 hours. The bearings of the drive motors are life-long lubricated and so maintenance-free.



CAUTION!

Only perform the work that is described here, and that which is permitted to be done by the user. All other maintenance and service work may only be performed by the manufacturer or a dealer authorized by him. Beware of the pump parts being possibly contaminated by hazardous substances. Wear protective clothing if there is contamination.

11.20 Oil Level Control



CAUTION!

Check the oil level regularly!

The oil consumption varies according to the vacuum pump's operating conditions. In order to keep the vacuum pump at all times in an optimum operating condition, the oil level must be inspected at the oil sight glass. The oil level must at all times be showing between the upper and lower markings on the oil sight glass. The oil must be topped up if the oil level falls to the lower mark. We recommend to operate pump with oil filling at upper marking FULL. This minimize the service needs and allows better dilution of contaminants. When additional oil is required, use only **VWR RV+ Oil**, pump performance is not guaranteed with other brands of oil.

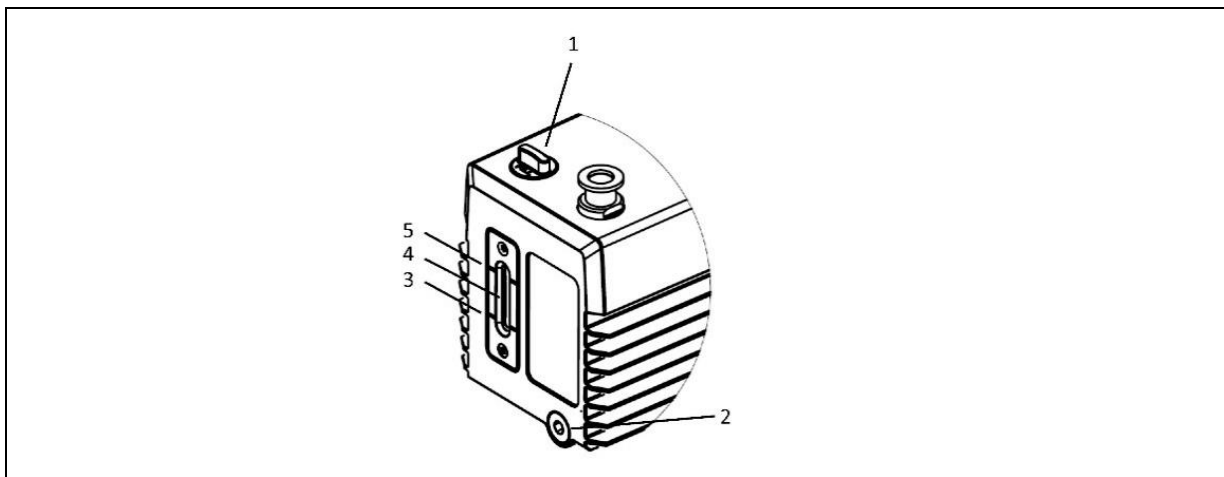


Fig. 9: Oil level control

1	Oil fill plug	4	Oil sight glass
2	Oil drain plug	5	Upper marking FULL
3	Lower marking MIN		

11.30 Oil Colour Check



CAUTION!

The condition and quality of the pump oil have a substantial effect upon the performance and operational readiness of the vacuum pump!

Comparing the colour of a sample of the pump oil with fresh oil provides an indication of the contamination of the pump oil. You obtain the oil needed for testing from the oil drain aperture with the vacuum pump switched off and at operating temperature. If the oil appears slightly cloudy, e.g. because of water droplets, it can be regenerated with the aid of the gas ballast, 9.50 Operation with gas ballast when drawing off condensable vapours.

Brown or black oil or oil smelling as if it has burnt must be removed from the vacuum pump. Flush the vacuum pump and fill up with fresh oil.

11.40 Oil Change



CAUTION!

If the vacuum pump has been used to pump media which are dangerous to health then all measures must be taken to protect the service and operating personnel!

11.41 Draining the oil

1. Block the inlet port and switch on the vacuum pump and let it work for about 10 minutes to warm the oil.
2. Switch off the pump, disconnect from the power outlet and from the vacuum system.
3. Unscrew the oil drain plug from the pump casing while the pump is at operating temperature.
4. Tilt the vacuum pump slightly, catches the oil in a suitable vessel and dispose of it in accordance with the applicable regulations.

11.42 Filling up with oil

1. Switch off the pump, disconnect from the power outlet and from the vacuum system.
2. Remove the oil fill plug
3. Pour in the oil until it reaches the upper mark "FULL".
4. Screw in the oil fill plug together with the seal once again.
5. Block the inlet port and switch on the vacuum pump and let it work for about 2 minutes.
6. Check the oil level when the pump is switched off, repeat if necessary.



WARNING!

Avoid skin contact with the oil! Wash hands thoroughly after handling. Keep out of reach of children. Dispose of the oil in accordance with the valid environmental protection regulations! Do not overfill, excess oil tends to be splashed out the pump exhaust! Use only VWR RV+ Oil.

For best dilution of contaminants, especially on chemical applications, we recommend to keep always oil level at max.

11.43 Topping up the oil

- Remove the oil filler plug
- Pour in the oil until it reaches the upper mark
- Screw in the oil filling plug together with the seal once again
- Switch on the vacuum pump and let it work for about 2 minutes
- Check the oil level when the pump is switched off, repeat if necessary

11.44 Flushing

If the oil is heavily contaminated, the vacuum pump must be flushed, e.g.

- heavy clouding by condensates
- suspended particles such as dust, fibres, abraded particles
- dark coloration of the oil

The flushing liquid should be the type of oil which is currently being used.

Procedure

After the vacuum pump has been filled with fresh oil, allow it to warm up by running it with the suction port closed. If you have established that the old oil, which you have previously drained, was contaminated by condensate (e.g. water) then the gas ballast valve must be open. Drain the flushing oil. If the oil still appears heavily contaminated, the flushing procedure must be repeated.

11.45 Frequency of oil changes

The oil change interval is completely dependent upon the running conditions of temperature, operating pressure, hours of daily operation, and upon the materials pumped. Clean, dry air at pressures below 0.7 mbar (50 mtorr) are the most forgiving conditions. To determine your own oil change interval, visually monitor the pump oil conditions at regular intervals. If you suspect harsh operating conditions, daily visual checks are recommended. When the oil becomes cloudy, dark or includes particles of solids, it is time to change the oil. Be sure to use only VWR RV+ Oil. The ultimate pressure guarantee applies only if this oil is used!

11.50 Maintenance by the manufacturer

Repairs and maintenance going beyond the extent of the work described in chapter 7.10 Maintenance Performed by the User or reconditioning or modification may only be performed by the manufacturer or authorized workshops. Drain the oil before dispatching the pump and dispose of the oil according to the regulations. The prerequisites for a handover are a complete and factually correct damage report, and a clean pump. Clean the pump aggregate and the pump casing after pumping media which are harmful to health and the environment. Fill up with sufficient oil to protect against corrosion during transport!

11.60 Servicing



WARNING!

During repair or maintenance work which could endanger people because of moving or electrically live components, the vacuum pump must be made safe by removing the mains supply plug from the socket or by switching off the main contractor and preventing it from being switched on again!

The vacuum pump must be disassembled if heavily soiled or after an operating fault. This is to be performed by the Service Department of manufacturing firm.

11.61 Service Kit

Service Kit for VWR RV2.5+ :	Order no. 181-0578
Service Kit for VWR RV3+ :	Order no. 181-0505
Service Kit for VWR RV6+ :	Order no. 181-0506
Service Kit for VWR RV8+ :	Order no. 181-0507
Service Kit for VWR RV18+ :	Order no. 181-0579

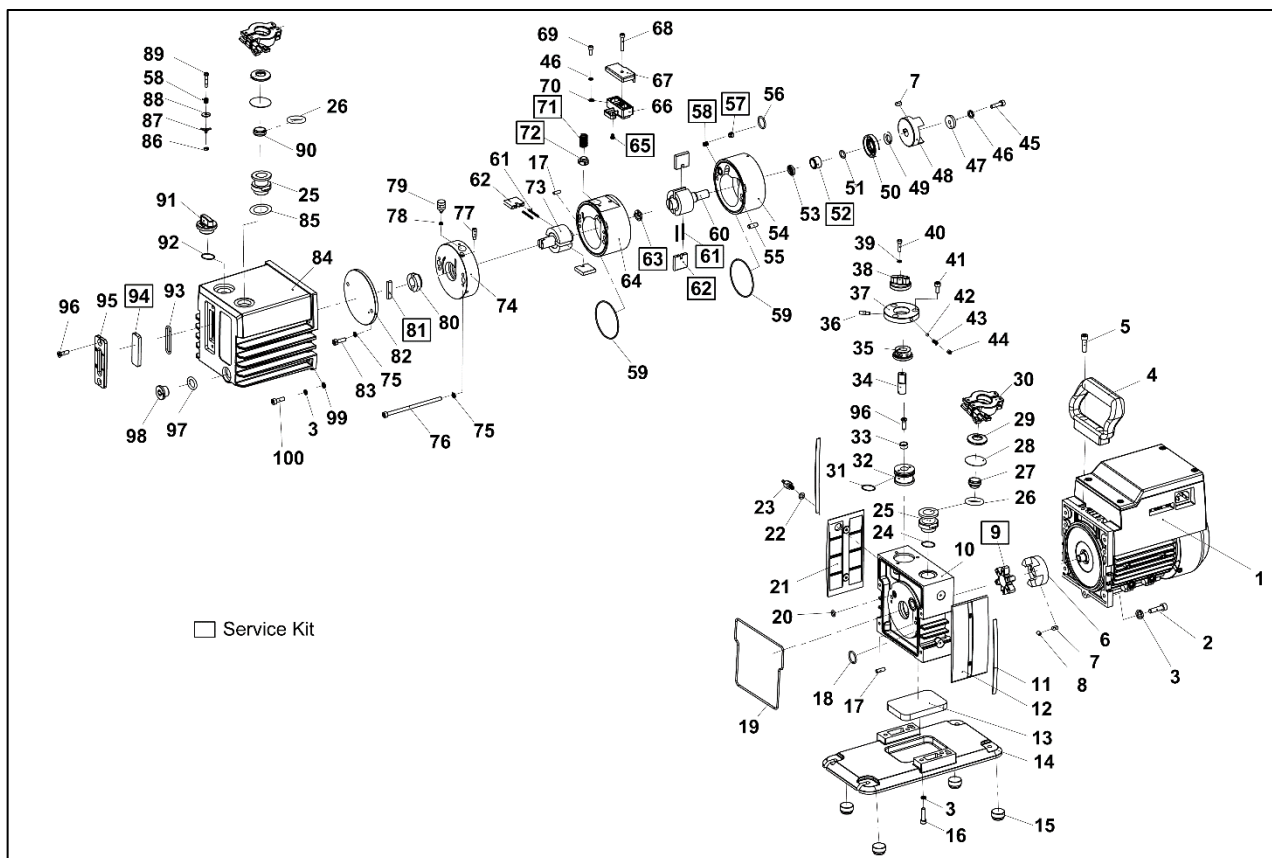


Fig. 10: Explosion view - Rotary vane pump with service kit – positions (RV2.5+)

Service kit item list for RV2.5:

Item no.	Description	Qty.
	Consisting of:	
9	Coupling	1
52	Bush	1
57	Gas Ballast Valve Head	1
58	Spring	1
61	Vane Spring	4
62	Fore Vane	2
63	Shaft Coupling	1
65	Screw	1
71	Spring	1
72	Gas Ballast Valve Head	1
81	Oil Pump Vane	1
94	Glass	1

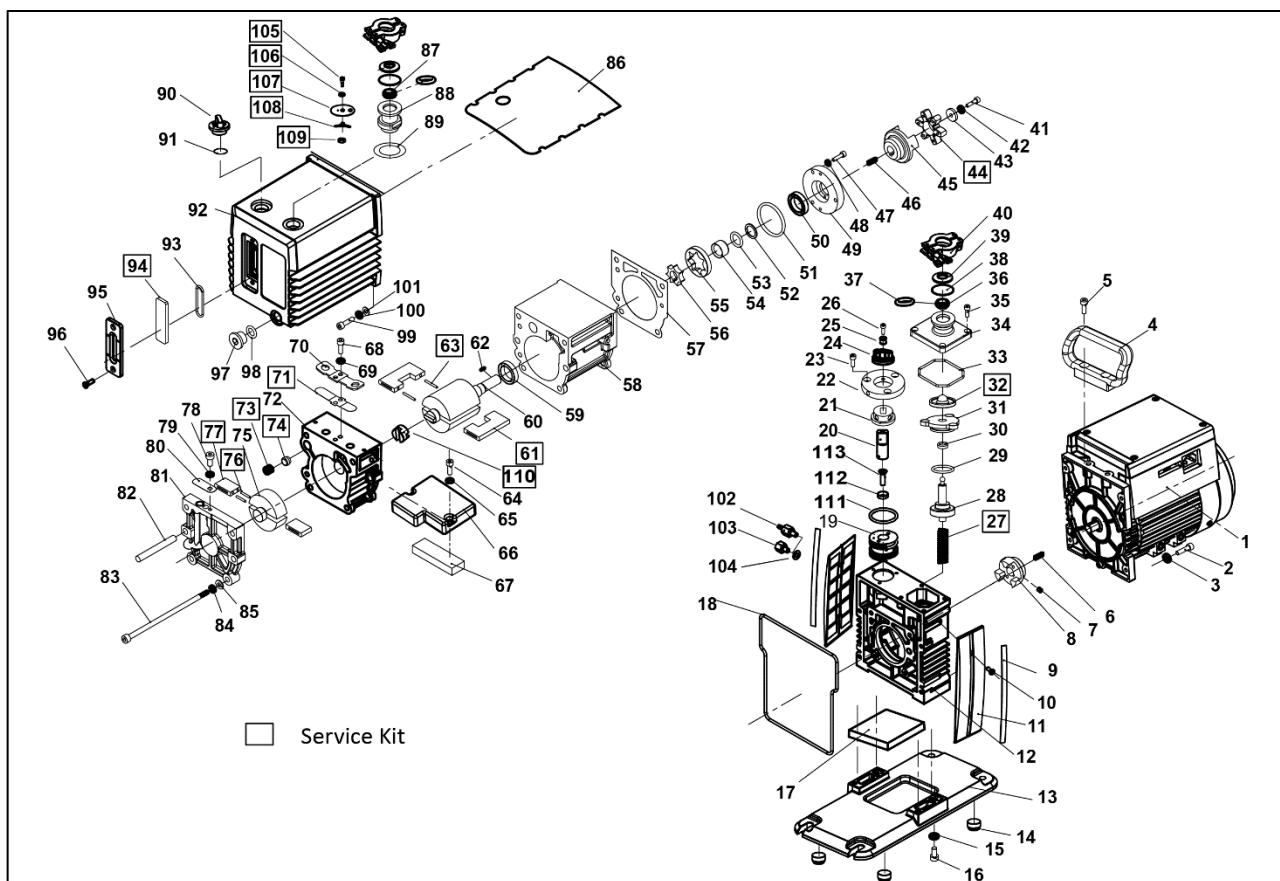


Fig. 11: Explosion view - Rotary vane pump with service kit – positions (RV3+, RV6+, RV8+)

Service kit item list for RV3+, RV6+ and RV8+:

Item no.	Description	Qty.
	Consisting of:	
27	Anti-Suck Back Spring	1
32	Anti-Suck Back Plate	1
44	Coupling Element	1
61	Fore Vane	2
63, 76	Vane Spring	4
71	Exhaust Valve Plate	1
73	Spring	1
74	Gas Ballast Valve Head	1
77	Rear Vane	2
94	Glass	1
105	SS Screw	1
106	Flat Washer	1
107	Exhaust Diaphragm	1
108	Holder	1
109	Nut	1
110	Shaft Coupling	1

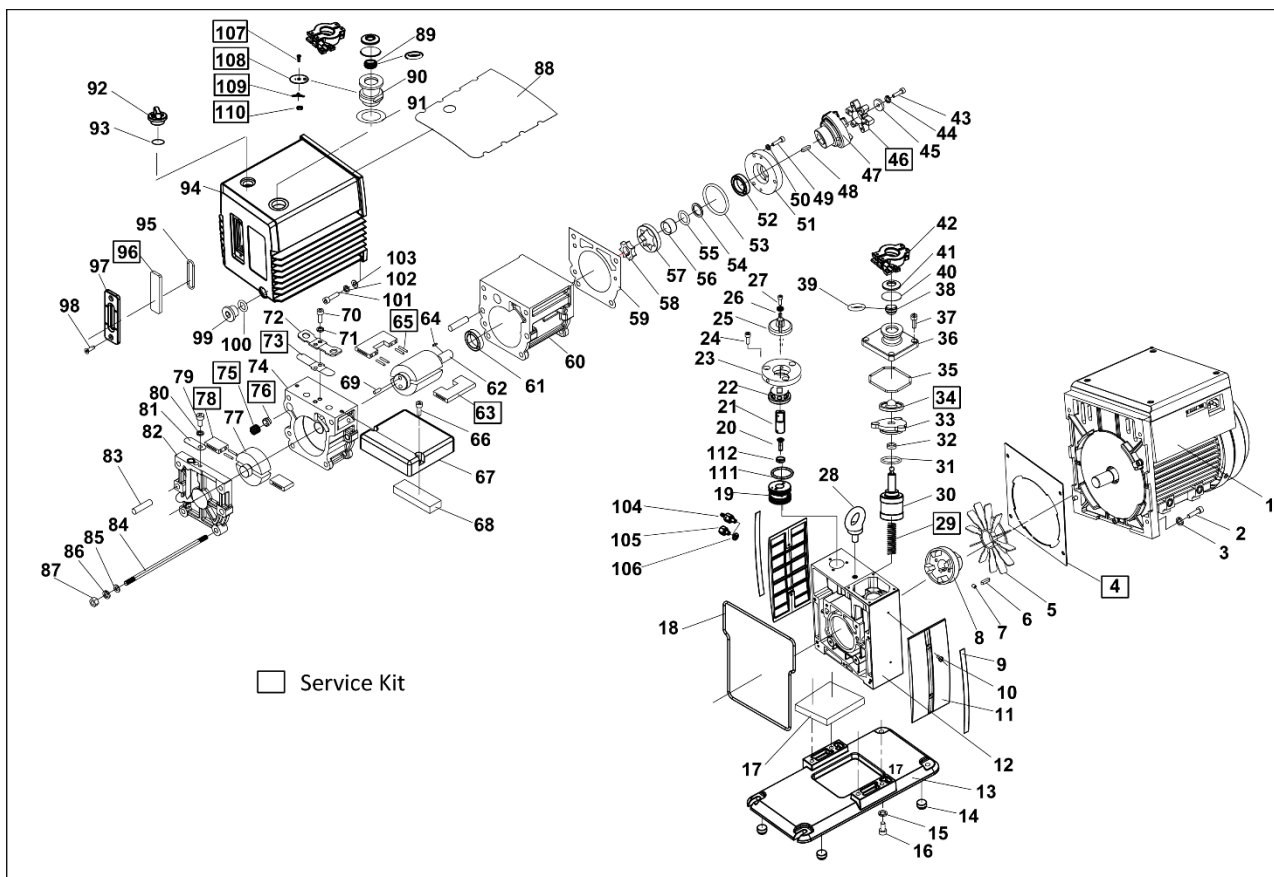


Fig. 12: Explosion view - Rotary vane pump with service kit – positions (RV18+)

Service kit item list for RV18+:

Item no.	Description	Qty.
	Consisting of:	
4	Gasket	1
29	Anti-Suck Back Spring	1
34	Anti-Suck Back Plate	1
46	Coupling Element	1
63	Fore Vane	2
65	Vane Spring	4
73	Exhaust Valve Plate	1
75	Spring	1
76	Gas Ballast Valve Head	1
78	Rear Vane	2
96	Glass	1
107	SS Screw	1
108	Exhaust Diaphragm	1
109	Holder	1
110	Nut	1

12.0 Accessoires

12.10 Overview and Order numbers for RV2.5+, RV3+, RV6+, RV8+

Rotary Vane Pump VWR RV+ Oil		Condenser Inlet	Oil Mist Separator Exhaust	Oil Mist Filter 10/16 Exhaust	Replacement Filter cartridge
1 Litre	5 Litre	DN 16 KF	DN 16 KF	DN 16 KF	
					
Order no.	Order no.	Order no.	Order no.	Order no.	For order numbers 181-7002 181-7007
181-0508	181-0514	181-7003	181-7002	181-7007	



CAUTION!

The full flow oil filter may only be installed when the pump is switched off.

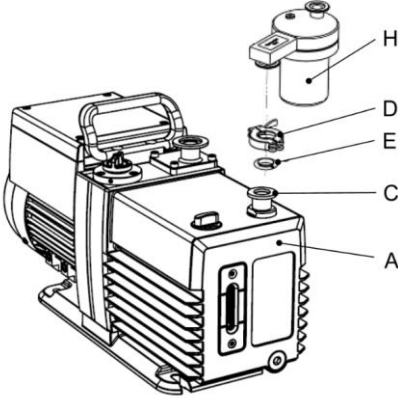
12.11 Overview and Order numbers for RV18+

Rotary Vane Pump VWR RV+ Oil		Oil Mist Filter FOM 25 Exhaust	Replacement Filter cartridge
1 Litre	5 Litre	DN 25 KF	
			
Order no.	Order no.	Order no.	Order no.
181-0508	181-0514	181-0621	181-0623

12.20 Condenser Inlet

Technical Data	Parameter	Data
	Connecting flange	DN 16 KF
	Condenser – basic body	Aluminium
	Collector or condensate vessel	Borosilicate glass
	Seals	FKM
	Max. filling volume	380 ml
	Order no. Condenser Inlet	181-7003
Area of Application	The Condenser Inlet prevents condensates from the vacuum systems penetrating into the rotary vane pump. The horizontal arrangement of the separator alongside the pump prevents fluids running back from the collector or condensate vessel into the pump.	
Maintenance	Maintenance of the Condenser Inlet is limited to simply emptying the collecting vessel.	
Assembly – Condenser Inlet at Rotary Vane Pump	The diagram illustrates the assembly of the Condenser Inlet (G) onto the suction port (B) of the rotary vane pump (A). The assembly components shown are the Condenser Inlet (G), a normal clamping ring (D), a centering ring with wire fabric, and an O-ring (F). The Condenser Inlet is shown being mounted onto the suction port of the pump.	The Condenser Inlet (G) is flanged using a normal clamping ring (D), a centering ring with wire fabric and an O-ring (F) are directly flange-mounted onto the suction port (B) of the rotary vane pump (A). (connecting elements in DN 16 KF - see data for ordering – 8.30 Oil Mist Separator Exhaust)

12.30 Oil Mist Separator Exhaust

Technical Data	Parameter	Data
	Connecting flange	DN 16 KF
	Oil mist separator – basic body	Aluminium
	Collector vessel	Borosilicate glass
	Seals	FKM
	Max. filling volume	270 ml
	Filter cartridge	Optical fibre
	Order no. Oil Mist Separator Exhaust	181-7002
Area of Application	The Oil Mist Separator Exhaust effectively reduces the oil mist emission from the rotary vane pump's pressure port at high intake pressures. The horizontal arrangement of the separator alongside the pump prevents fluids running back from the collector or condensate vessel into the pump.	
Maintenance	Maintenance of the Oil Mist Separator Exhaust is limited to simply emptying the collecting vessel and changing the saturated filter cartridge.	
Assembly –Oil Mist Separator Exhaust at Rotary Vane Pump		The Oil Mist Separator Exhaust (H) is flanged directly to the pressure port (C) of the vane-type rotary pump (A), using a normal clamping ring (D) and a centering ring with an O-ring (E). (connecting elements in DN 16 KF- see data for ordering below)

Connecting elements DN 16 KF:

for	Designation	Order no.
- Condenser Inlet - Oil Mist Separator Exhaust - Oil Mist Filter 10/16 Exhaust	KF Normal Clamping Ring Aluminium DN 10/16	181-0544
- Oil Mist Separator Exhaust - Oil Mist Filter 10/16 Exhaust	KF Centering Ring Aluminium with FKM-O-Ring DN 16	181-0546
- Condenser Inlet	KF Centering Ring with Fine filter Stainless steel with FKM-O-Ring DN 16	181-0622

12.40 Oil Mist Filter 10/16 Exhaust

Technical Data	Parameter	Data
	Connecting flange (suction/pressure)	DN 16 KF
	Max. filling volume	270 ml
	Seals	FKM
	Filter cartridge	Glass fibre
	Transparent housing	for optimal control of the filter cartridge
	Order no. Oil Mist Filter 10/16 Exhaust	181-7007
Area of Application	The Oil Mist Filter 10/16 Exhaust in compact design effectively reduces at intake pressures to 50 mbar the oil mist emission from the rotary vane pump's pressure port. Mounting always in a vertical position.	
Maintenance	Maintenance of the Oil Mist Filter 10/16 Exhaust is limited to changing the saturated filter cartridge.	
Assembly –Oil Mist Filter 10/16 Exhaust at Rotary Vane Pump	The Oil Mist Filter 10/16 Exhaust is flanged directly to the pressure port of the vane-type rotary pump, using a normal clamping ring and a centering ring with an O-Ring. (connecting elements in DN 16 KF - see data for ordering – 8.30 Oil Mist Separator Exhaust)	

12.50 Oil – Technical Data

VWR RV+ Oil is a triple-distilled hydrocarbon oil using severely hydrotreated base stock. The oil is designed to resist breakdown at higher RPMs and operating temperatures of direct-drive vacuum pumps. The hydrotreating virtually eliminates aromatics and sulfur to give good resistance to sludge and varnish formation over time in corrosive environments. **VWR RV+ Oil** enables **VWR RV+** direct-drive vacuum pumps to maintain the highest vacuum performance over time. The oil is light yellow.

CAS No.	64742-65-0
Vapor Pressure (at 25°C)	1×10^{-6} mbar (1×10^{-6} torr)
Viscosity (at 40°C)	65 cSt (305 SUS)
Specific Gravity	0.87



CAUTION!

The technical data and operating characteristics of rotary vane pumps are only guaranteed if original oils are used!

13.0 Technical service

Web Resources

Visit the VWR website at www.vwr.com for:

- Complete technical service contact information
- Access to the VWR 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.

14.0 Warranty

VWR warrants that this product will be free from defects in material and workmanship for a period of two (2) years from date of delivery. If a defect is present, VWR will, at its option and cost, repair, replace, or refund the purchase price of this product to the customer, 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. If the required maintenance and inspection services are not performed according to the manuals and any local regulations, such warranty turns invalid, except to the extent, the defect of the product is not due to such non-performance.

Items being returned must be insured by the customer against possible damage or loss. This warranty shall be limited to the aforementioned remedies. IT IS EXPRESSLY AGREED THAT THIS WARRANTY WILL BE IN LIEU OF ALL WARRANTIES OF FITNESS AND IN LIEU OF THE WARRANTY OF MERCHANTABILITY.

15.0 Compliance with local laws and regulations

The customer is responsible for applying for and obtaining the necessary regulatory approvals or other authorisations necessary to run or use the Product in its local environment. VWR will not be held liable for any related omission or for not obtaining the required approval or authorisation, unless any refusal is due to a defect of the product.

16.0 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

Local VWR offices in Europe and Asia Pacific

Austria

VWR International GmbH
Graumannsgasse 7
1150 Vienna
Tel.: +43 1 97 002 0
Email: info.at@vwr.com

Belgium

VWR International BV
Researchpark Haasrode 2020
Geldenaaksebaan 464
3001 Leuven
Tel.: +32 016 385 011
Email: vwr.be@vwr.com

China

VWR (Shanghai) Co., Ltd
Bld.No.1, No.3728 Jinke Rd,
Pudong New District
Shanghai, 201203- China
Tel.: +400 821 8006
Email: info_china@vwr.com

Czech Republic

VWR International s. r. o.
Veetee Business Park
Pražská 442
CZ - 281 67 Strábrná Skalice
Tel.: +420 321 570 321
Email: info.cz@vwr.com

Denmark

VWR International A/S
Tobaksvejen 21
2860 Søborg
Tel.: +45 43 86 87 88
Email: info.dk@vwr.com

Finland

VWR International Oy
Valimotie 9
00380 Helsinki
Tel.: +358 9 80 45 51
Email: info.fi@vwr.com

France

VWR International S.A.S.
Le Périgares – Bâtiment B
201, rue Carnot
94126 Fontenay-sous-Bois cedex
Tel.: 0 825 02 30 30* (national)
Tel.: +33 (0) 1 45 14 85 00
(international)
Email: info.fr@vwr.com
* 0,18 € TTC/ min + prix appel

Germany

VWR International GmbH
Hilpertstrasse 20a
D - 64295 Darmstadt
Freecall: 0800 702 00 07

Hungary

VWR International Kft.
Simon László u. 4.
4034 Debrecen
Tel.: +36 (52) 521-130
Email: info.hu@vwr.com

India

VWR Lab Products Private Limited
No.139, BDA Industrial Suburb,
6th Main, Tumkur Road,
Peenya Post,
Bangalore, India – 560058
Tel.: +91-80-28078400
Email: vwr_india@vwr.com

Ireland / Northern Ireland

VWR International Ltd / VWR
International (Northern Ireland) Ltd
Orion Business Campus
Northwest Business Park
Ballycoolin
Dublin 15
Tel.: +353 01 88 22 222
Email sales.ie@vwr.com

Italy

VWR International S.r.l.
Via San Giusto 85
20153 Milano (MI)
Tel.: +39 02-3320311/02-487791
Email: info.it@vwr.com

Korea

VWR International ~
17, Daehak 4-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do
Tel.: +82 31 645 7256
saleskorea@avantorsciences.com

Middle East & Africa

VWR International FZ-LLC
DSP Laboratory Complex
125, Floor 01
Dubai, United Arab Emirates
Tel.: +971 4 5573271
info.mea@vwr.com

The Netherlands

VWR International B.V.
Postbus 8198
1005 AD Amsterdam
Tel.: +31 020 4808 400
Email: info.nl@vwr.com

Norway

VWR International AS
Brynsalleen 4
0667 Oslo
Tel.: +47 22 90 00 00
Email: info.no@vwr.com

Poland

VWR International Sp. z o.o.
Limbowa 5
80-175 Gdansk
Tel.: +48 058 32 38 210
Email: info.pl@vwr.com

Portugal

VWR International - Material de
Laboratório, Lda
Centro Empresarial de Alfragide
Rua da Indústria, nº 6
2610-088 Amadora
Tel.: +351 21 3600 770
Email: info.pt@vwr.com

Singapore

VWR Singapore Pte Ltd
18 Gul Drive
Singapore 629468
Tel: +65 6505 0760
Email: sales.sg@vwr.com

Spain

VWR International EuroLab S.L.
C/ Tecnología 5-17
A-7 Llinars Park
08450 - Llinars del Vallès
Barcelona
Tel.: +34 902 222 897
Email: info.es@vwr.com

Sweden

VWR International AB
Fagerstagatan 18a
163 94 Stockholm
Tel.: +46 08 621 34 00
Email: info.se@vwr.com

Switzerland

VWR International GmbH
Lerzenstrasse 16/18
8953 Dietikon
Tel.: +41 044 745 13 13
Email: info.ch@vwr.com

UK

VWR International Ltd
Customer Service Centre
Hunter Boulevard
Magna Park
Lutterworth
Leicestershire
LE17 4XN
Tel.: +44 (0) 800 22 33 44
Email: uksales@vwr.com