Operating Instructions

CE

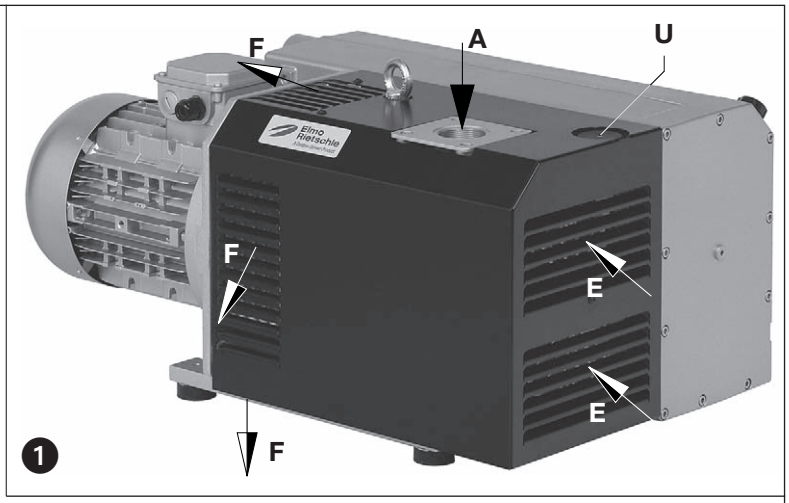
Elmo Rietschle
A Gardner Denver Product

Vacuum pumps

V-VC

V-VC 202
V-VC 303

Pump ranges
These operating instructions apply to the following oil flooded rotary vane vacuum pumps: V-VC 202 and V-VC 303
The nominal vacuum capacities at atmosphere are 200 and 300 m^3/hr operating on 50 cycles. The pumping curves showing capacity against vacuum can be seen in data sheet D 231/20.



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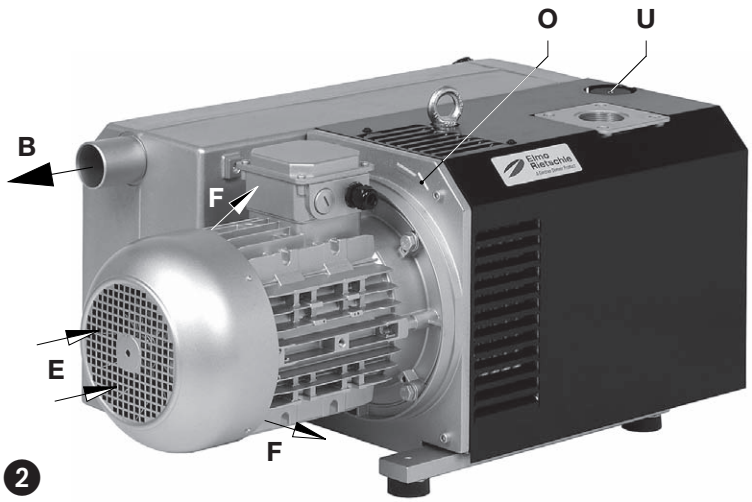
Description
V-VC 202 and V-VC 303 vacuum pumps are fitted with a mesh filter on the pump inlet. The vacuum pump is enclosed in a sound box. On the exhaust side of the pump an oil mist eliminator is fitted which has the function of re-circulating oil back into the circulation system, as well as providing high efficiency separation on the pump exhaust. Situated between the pump housing and the motor, a high efficiency cooling fan pulls cooling air in through the fan cover, which results in the cooling of the re-circulating oil.
A standard built-in non return valve on the inlet of the pump seals the pump from the process when the pump is stopped. When downtimes of over two minutes, the connected pipe should be aerated on atmospheric pressure.
The gas ballast valve (U) which is fitted as standard avoids at its operating temperature any condensation of a small amount of water vapour inside the pump and hence emulsification of the oil. The gas ballast vapour handling capacity can be increased if required to tolerate higher vapour loads than normal.
All the pumps are driven by a direct flanged three phase, standard TEFV motor via a coupling.
Optional extras: The following standard optional extras can be supplied if required: Vacuum regulating valve (ZRV), additional non return valve (ZRK), dust inlet filter (ZFP), high vacuum suction filter (ZVF), motor starter (ZMS), soft starter (ZAD) and various vacuum gauges (ZVM).

Suitability
⚠ **The units V-VC are suitable for the use in the industrial field i.e. the protection equipments corresponds to DIN EN 294 table 4, for people aged 14 and above.**
These models can be used for the evacuation of a closed system or for a permanent vacuum from: 0.5 to 500 mbar (abs.)
When these pumps are operated permanently outside the ranges listed above there may be oil seepage at the exhaust port. For evacuation of closed systems the volume to be evacuated must not exceed 2% of the nominal capacity of the vacuum pump.
For continuous operation > 100 mbar (abs.) we recommend the bigger motor size.
⚠ **Amounts of water vapour may be handled. Water, other liquids, aggressive or inflammable gases and vapours may not be handled. For water vapour tolerance, see information I 200.**
Handling of inflammable or aggressive gases and vapours is only possible with special versions, if the safety instructions XE 2 are noted.
⚠ **The ambient and suction temperatures must be between 12 and 40°C. For temperatures outside this range please contact your supplier.**
The standard versions may not be used in hazardous areas.
The back pressure on the exhaust port must not exceed + 0.1 bar.

⚠ **All applications where an unplanned shut down of the vacuum pump could possibly cause harm to persons or installations, then the corresponding safety backup system must be installed.**



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BE 232/20

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Handling and Setting up (pictures ❶, ❷ and ❸)

Pumps that have reached operating temperature may have a surface temperature at position (Q) of over 70°C.

WARNING! Do Not Touch.

Suction flange (D), oil filler port (H), oil sight glass (I), oil drain plugs (K), gas ballast (U) and oil separator housing (T) must all be easily accessible. The cooling air entries (E) and the cooling air exits (F) must be a minimum distance of 20 cm from any obstruction. The discharged cooling air must not be re-circulated. For maintenance purposes we recommend a space of 0.5 m.

The V-VC pumps can only be operated reliably if they are installed horizontally.

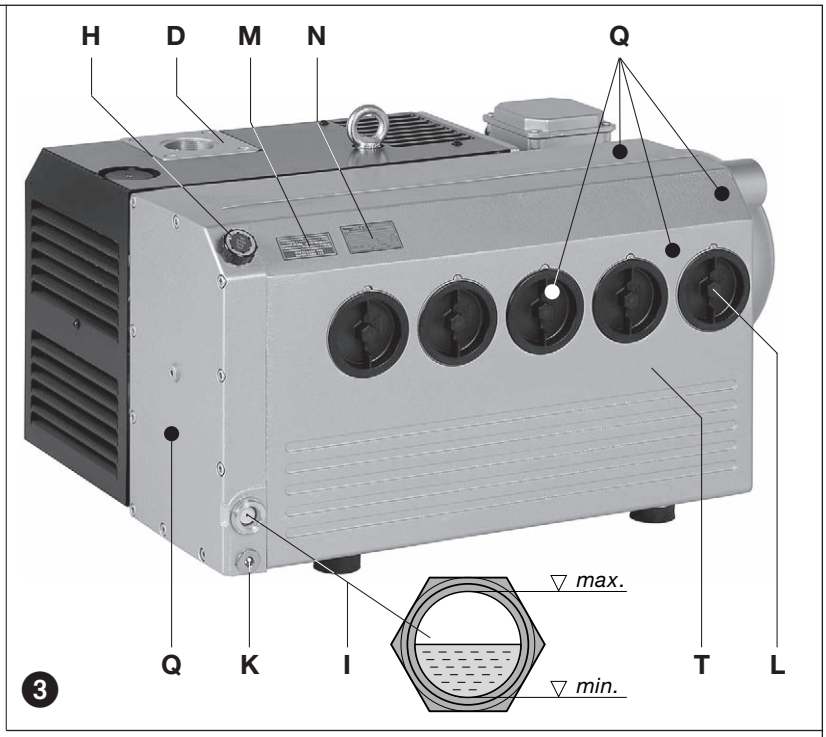
For installations that are higher than 1000 m above sea level there will be a loss in capacity. For further advice please contact your supplier.

Installation (pictures ❶, ❷ and ❸)

For operating and installation follow any relevant national standards that are in operation.

1. The vacuum connection (A) is situated on the suction flange (D).
   The air handled can be emitted into the atmosphere through the exhaust port (B) or by utilising an exhaust pipe.

Long and/or small bore pipework should be avoided as this tends to reduce the capacity of the pump. The exhaust port (B) must not be obstructed or partly obscured.



2. The lubricating oil (for recommended brands see under servicing) must be put into the pump at the oil filler port (H) of the oil separator housing, until the oil level shows at the top level of the oil sight glass (I). After filling, make sure the oil filler port is closed.
3. The electrical data can be found on the data plate (N) or the motor data plate. The motors correspond to DIN EN 60034 and have IP 54 protection and insulation class F. The connection diagram can be found in the terminal box on the motor (unless a special plug connection is fitted). Check the electrical data of the motor for compatibility with your available supply (voltage, frequency, permissible current etc.).
4. Connect the motor via a motor starter. It is advisable to use thermal overload motor starters to protect the motor and wiring. All cabling used on starters should be secured with good quality cable clamps.
   We recommend that motor starters should be used that are fitted with a time delayed trip resulting from running beyond the amperage setting. When the unit is started cold, overamperage may occur for a short time.
5. For easier starting, and particularly if 10 or more starts per hour, we recommend the soft starter (ZAD).

The electrical installation may only be made by a qualified electrician under the observance of EN 60204. The main switch must be provided by the operator.

Initial Operation (pictures ❶ and ❷)

1. Initially switch the pump on (max. two seconds) to check the direction of rotation (see direction arrow (O)). When looking on the motor fan it must rotate clockwise.

Caution – wrong direction of rotation

Operation with wrong direction of rotation causes damages on the vacuum pump!
We recommend checking the direction of rotation with a phase-sequence indicator.

2. Connect the suction pipe at (A).

We recommend fitment of the non-return valve (ZRK) into the suction pipe. The standard built-in non return valve cannot alone be used as seal to the closed system.

3. Run the pump for two minutes using the correct rotation. Stop pump and top up the oil using the oil filler port (H) to the top level (see sight glass (I)). Repeat this process until the oil pipes are completely full.
   On no account open the oil filler port when the pump is operating.
4. Vacuum regulating valve (optional extra):
   The vacuum can be adjusted by turning the regulating valve according to the symbols as indicated on the top of the regulating valve.

Potential risks for operating personnel

1. Noise Emission: The worst noise levels considering direction and intensity measured according to DIN 45635 part 3 (as per 3. GSGV) are shown in the table at the back. When working permanently in the vicinity of an operating pump we recommend wearing ear protection to avoid any damage to hearing.
2. Oil mist in the Exhaust Stream: Even with the high efficiency oil mist eliminator the exhausted air could still contain extremely low amounts of oil mist which can occasionally be detected by smell. Permanent inhalation of these mists may result in health problems, therefore it is extremely important to make sure that the installation area is well ventilated.

Maintenance and Servicing

When maintaining these units and in situations where personnel could be injured by moving parts or by live electrical parts the pump must be isolated by totally disconnecting the electrical supply. It is imperative that the unit cannot be re-started during the maintenance operation.

Pumps that have reached operating temperature may have a surface temperature at position (Q) of over 70°C. WARNING! Do Not Touch.

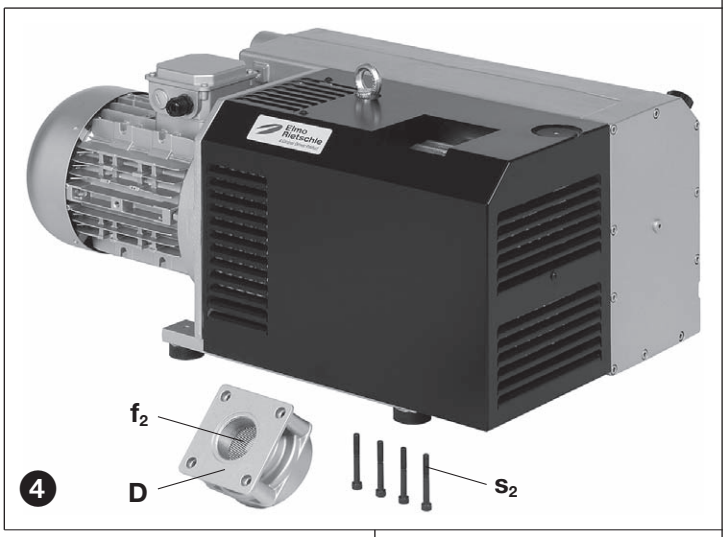
1. Air filtration

The capacity of the pump can become reduced if the air inlet filters are not maintained correctly.

Filters on the suction side (picture 4):
Mesh filter (f_2) must be cleaned regularly depending upon the amount of contamination. Cleaning can be carried out by washing out or by blowing out with compressed air. Replace filters if contaminated completely.
The suction flange (D) can be dismantled by removing screws (s_2). Re-assemble in reverse order.

Filter for Gas ballast (picture 5):
All pumps are equipped with a gas ballast valve (U).
The built in filter cartridge (f_2) must be cleaned regularly depending upon the amount of contamination by blowing out with compressed air. By removing the screw (g_2) and plastic cap (h_2) the filter elements can be removed for cleaning.
Check also the valve seating for impurities.
Re-assemble in reverse order.

Filter Cartridge (Optional Extras):
The filter cartridge of the vacuum tight suction filter (ZVF) or dust separator (ZFP) must be cleaned regularly again depending upon the amount of contamination. Cleaning can be achieved by washing or by blowing out with compressed air. Replace the filter cartridge if necessary. The cartridge can be removed completely by undoing the relevant retaining clips.



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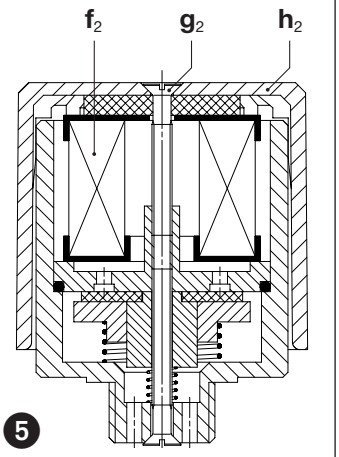
2. Lubrication (picture 3)
The oil level must be checked at least once daily, if necessary put oil into the pump to the top level of the oil sight glass (I). First oil change after 500 operating hours (see oil drain plug (K)). Further changes every 500 - 2000 operating hours. The oil change times should be reduced if the application is dusty.

The oil change should be made with the pump at normal operating temperature and disconnected from the suction pipework. If the pump is not completely drained, the amount of oil required to refill is reduced.

Only oils corresponding to DIN 51 506 group VC/VCL or a synthetic oil (obtainable from Elmo Rietschle) should be used. The viscosity must correspond to ISO-VG 100 according to DIN 51519.
The recommended Elmo Rietschle Oil types are: MULTI-LUBE 100 (mineral oil); SUPER-LUBE 100 (synthetic oil) (see oil type plate (M)).
When the oil is under a high thermal load, e.g. ambient or suction temperatures over 30°C, unfavourable cooling or operating with increased speed etc., the oil change time can be extended by using the recommended synthetic oil.

Old and used oil must be disposed of corresponding with the relevant health, safety and environmental laws.

If the oil brand is changed, the old oil must be drained completely from oil separator housing and the oil cooler.



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3. Oil separation (picture 6, 7 and 8)

Extremely blocked filter elements will result in increased pump temperature and will cause discolouration of the lubricant.

The oil separator elements (5x) may become contaminated after a long period of operation which can result in high pump temperature and motor overload. We therefore recommend changing the filter elements (L) every 2000 operating hours or when the filter back pressure is in excess of 0.7 bar (see back pressure gauge → optional extra, checkup at short-term, atmospheric suction). It is not possible to clean these elements.
To change filters: Remove filter elements (L) with a ring spanner (spanner size 19 mm or $^3/_4$") turning to the left.
Put in new oil separator elements with open lock symbol (see picture 7) at arrow ▼ on insert and fix by turning to the right (up to clicking into place).
Oiling the O-Rings of the oil separator elements makes the screw in easier.

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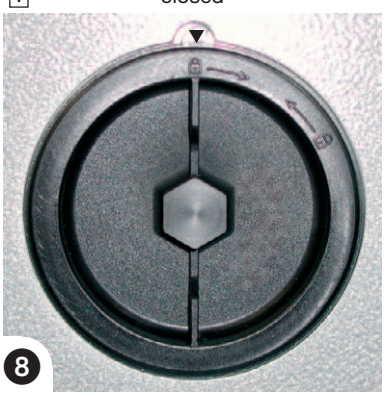

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4. Coupling (picture ❾)

The tooth rim (k) is a wearing part and should be checked regularly, at the same time clean the cooling snake (v_1) by blowing out with compressed air.

! Caution – defected tooth rim

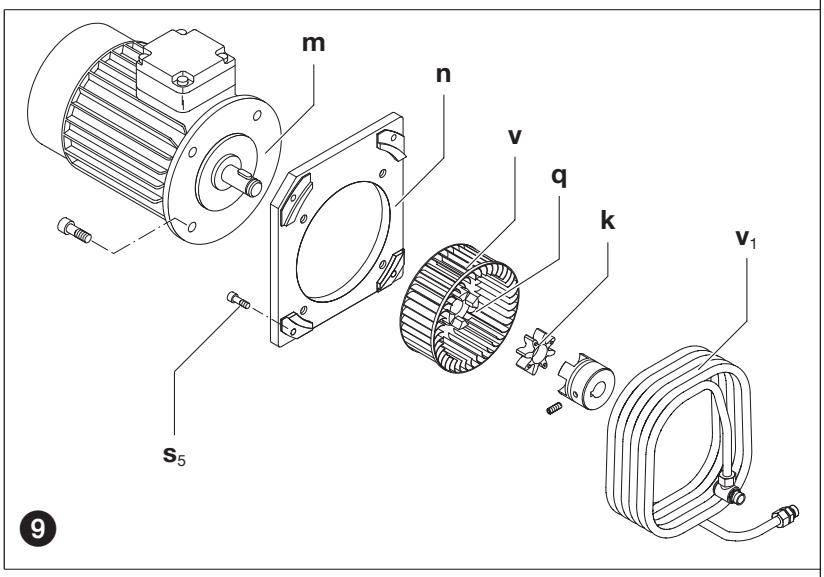
Defected tooth rim can cause extensive damage and even in some extreme cases break the rotor shaft.

To check the coupling, stop the motor (m) and isolate. Remove the screws (s_5) on the motor flange (n). Pull off the motor together with the motor side coupling half (q). If the tooth rim (k) is damaged or worn then exchange the rim. The fan (v) should be also checked regularly on demages and if necessary be exchanged.

▶ Note

Frequent start-up and high ambient temperature shorten the lifetime of the tooth rim (k).

Re-assemble in reverse order.



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Trouble Shooting

1. Motor starter cuts out vacuum pump:

1.1 Check that the incoming voltage and frequency corresponds with the motor data plate.
1.2 Check the connections on the motor terminal block.
1.3 Incorrect setting on the motor starter.
1.4 Motor starter trips too fast.
Solution: Use a motor starter with a time delay trip (version as per IEC 947-4).
1.5 The vacuum pump or the lubricating oil is too cold.
1.6 The viscosity of lubricant is too high.
1.7 Oil mist eliminator elements are blocked or contaminated.
1.8 Back pressure on the exhaust pipework is excessive.
1.9 Continuous operation > 100 mbar (abs.) Solution: Use a bigger motor size.

2. Insufficient suction capacity:

2.1 Inlet filters or meshes are obscured.
2.2 Suction pipe work is too long or too small.

3. Vacuum pump does not reach ultimate vacuum:

3.1 Check for leaks on the suction side of the pump or on the system.
3.2 Viscosity of lubricant incorrect.

4. Vacuum pump operates at an abnormally high temperature:

4.1 Ambient or suction temperature too high.
4.2 Cooling air flow is restricted.
4.3 Problem as per 1.6, 1.7 and 1.8.

5. Exhausted air contains visible oil mist:

5.1 Oil separator elements are fitted incorrectly.
5.2 Incorrect oil brand is used.
5.3 Problem as per 1.7, 1.8, 4.1 and 4.2.

6. Unit emits abnormal noise:

Note: A knocking noise from the rotor blades is normal when starting from cold, as long as it disappears within two minutes with increasing operating temperature.
6.1 The pump cylinder is worn.
Solution: send your complete unit off for repair to the supplier or approved service agent.
6.2 The vacuum regulating valve is noisy. Solution: replace valve.
6.3 Blades are damaged.
6.4 Problem as per 1.5 and 1.6.

7. Water in lubricant i.e. Emulsification:

7.1 Pump pulls in water because of the application. Solution: Fit water separators on to the vacuum side.
7.2 Unit handles more water vapour than the gas ballast is designed for.
Solution: Consult supplier for the provision of an increased gas ballast capability.
7.3 Pump operates only for a short time and does not reach normal operating temperature.
Solution: Run the pump with closed suction until the oil has been cleaned.

Appendix:

Repair on Site: For all repairs on site an electrician must disconnect the motor so that an accidental start of the unit cannot happen.
All engineers are recommended to consult the original manufacturer or one of the subsidiaries, agents or service agents. The address of the nearest repair workshop can be obtained from the manufacturer on application.
After a repair or before re-installation, follow the instructions as shown under the headings "Installation and Initial Operation".

Lifting and Transport: To lift and transport the vacuum pump the eye bolts on the pump and motor must be used. If an eye bolt is missing use suitably rated strops. The weight of the pumps is shown in the accompanying table.

Storage: V-VC units must be stored in dry ambient conditions with normal humidity. If a pump needs to be stocked for a period longer than 3 months we would recommend using an anticorrosion oil rather than the normal lubricant.

Disposal: The wearing parts (as listed in the spare parts lists) should be disposed of with due regard to health and safety regulations.

Spare parts lists: E 232/20 → V-VC 202 - V-VC 303

V-VC			202	303
Noise level (max.)	dB(A)	50 Hz	73	73
		60 Hz	76	77
Weight (max.)	kg	50 Hz	174	187
		60 Hz	191	192
Length	mm	50 Hz	835	920
		60 Hz	920	920
Width		mm	523	523
Height	mm	50 Hz	378	398
		60 Hz	407	407
Oil capacity		l	8	8