

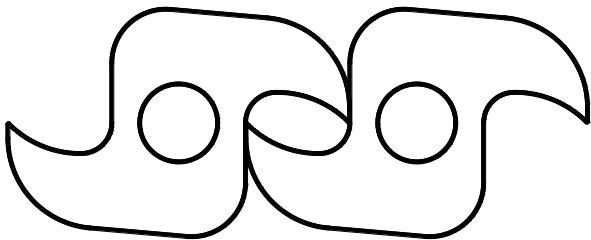


VACUUM CE
TECHNOLOGY

**OPERATING AND MAINTENANCE
INSTRUCTIONS**

(Translation of the original instructions)

CLAWS VACUUM PUMPS



VB 315

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1 INTRODUCTION

1.1 GENERAL INFORMATION

With this manual we aim to provide you with all the important information regarding the safety of those in charge of installation, use, maintenance and dismantling of the V series of the claw vacuum pumps.

This manual, originally written in ITALIAN, is an integral part of the pump and must be preserved with care for the life of the pump itself.

In the event of sale, lease or loaned use of the pump, it must be delivered to the new user along with EC declaration of conformity.

Carrying out any operations on the pump before reading and fully understanding all instructions in this manual is prohibited.

The images contained in this document are examples only and are not binding for the Manufacturer, who reserves the right to make changes to components or parts with the aim of product improvement or for other purposes without updating this manual if said components or parts do not alter the pump operation and safety.

1.2 MANUFACTURER INFORMATION

D.V.P. Vacuum Technology s.p.a.

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40018 - S. Pietro in Casale (BO) - ITALY

Ph +3905118897101

Fx +3905118897170

e-mail: info@dvpt.it

web site: <http://www.dvppumps.com>

Please always include the following information in all communications regarding the pump:

- pump model and serial number
- year of manufacture
- date of purchase
- detailed information regarding problems found

1.3 METHOD OF CONSULTATION

For improved understanding of the information provided in this manual, warnings or instructions considered critical or hazardous are marked with the following symbols:



HAZARD

Failure to comply with these instructions may cause hazards to persons.



WARNING

Failure to comply with these instructions may cause damage to the pump.

1.4 PERSONNEL QUALIFICATIONS



DVP products covered by this manual are intended for PROFESSIONAL use only.

To ensure that all operations performed on the pump are carried out safely, operators must have the qualifications and requirements to carry out its operations.

Operators are classified as follows:



FIRST LEVEL OPERATOR:

Unqualified personnel, having no specific skills, able to perform simple tasks only.



MECHANICAL MAINTENANCE OPERATOR:

Technician qualified to work on mechanical parts to carry out any necessary adjustments, maintenance or repairs. Not qualified to work on electrical systems in the presence of voltage.



ELECTRICAL MAINTENANCE OPERATOR:

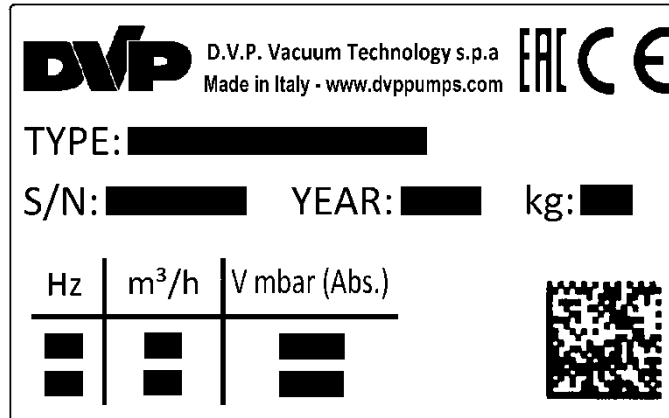
Technician in charge of all operations of an electrical nature. Can operate in the presence of voltage inside cabinets and connector boxes.

1.5 PERSONAL PROTECTION EQUIPMENT

This manual assumes that the pump has been installed in workplaces, which comply with all mandatory safety requirements; in particular, it is mandatory that personnel are equipped with personal protective equipment pertinent to the activities that must be performed.

1.6 INFORMATION PLATE

The pump has an identification plate which shows the Manufacturer's name, address, EC label, construction year and its technical data.



WARNING

Removing or tampering with the identification plate is strictly prohibited.

2 SAFETY

2.1 GENERAL WARNINGS

It is important to read this manual before performing any operation on the pump. Compliance with the safety standards of the country in which the pump is installed and requirements of qualified personnel for various maintenance, use, installation, etc. are recommended throughout the life of the pump.

The main rules of conduct to be observed for operation at a suitable level of security are the following:

- Installation, operation, maintenance, etc. operations should always be performed by qualified, trained personnel.
- Without exception, always wear necessary personal protective equipment.
- Always perform all cleaning, adjustment and maintenance operations with all power equipment disconnected.
- Do not direct water jets toward electrical parts, even if they are protected by enclosures.
- Do not smoke during work or maintenance, especially where solvents or flammable materials are being used.
- Do not damage symbol plaques or pictograms on the pump. If they should accidentally become damaged, immediately replace them with other identification plaques.

D.V.P. Vacuum Technology s.p.a. disclaims any liability for damage to persons or property resulting from improper use of the pump, from tampering with its safety apparatus or failure to observe operational safety standards.

2.2 RESIDUAL RISKS



HAZARD

This pump has been designed to minimise residual risks to personnel. We urge you, however, to take the utmost care and attention in carrying out maintenance operations. The confidence gained with frequent contact with the pump too often leads users to forget or underestimate risks.

Entanglement hazard

There is a permanent impending hazard of entangling or entrapping hair and clothing in the cooler fan inside the protection itself near the fan cover casing on the electric motor.

Tie long hair up and do not wear baggy clothing, long laces or other items that could get caught up.

Hazard generated by the pump seizing.

Failure to comply with the instructions for use set out in this manual could cause the pump to seize. Should you hear an unusual noise that might be the claw pump seizing, move away and turn the machine off immediately.

Hazard generated by a noise created by the pump

During operation the pump could generate sound emissions exceeding 80dB (A). To avoid permanent auditory damage wear ear defenders for prolonged exposure to noise whilst the machine is operating.

High temperature hazard

During normal operation, the pump surfaces could exceed a temperature of 70°C. In this case follow the relevant instructions given in this manual. Install the pump in a protected area that can be accessed only by authorised personnel and that meets the environmental conditions indicated in point 3.3 of this manual. Do not touch the pump surfaces when in operation and only carry out works only when the pump has stopped and cooled down.

Hazard generated by low pressure

Avoid contact with pump intake while it is operating. Only use fittings and connecting parts to the system's piping that can sufficiently resist the vacuum that arises. Let air into the intake circuit before any intervention. Contact with vacuum points can result in accidents due to hair and/or clothing being sucked in.

Hazard from the emission of harmful substances

Place abatement systems in front of the pump when air containing hazardous substances is sucked in (i.e. biological or microbiological agents).

Slip and fall hazards

The claw pumps use oil to lubricate the motion transmission rotating parts. Maintenance performed or use of the pump which does not conform to the instructions in this manual may cause damage to the gaskets of the compartment which contains the lubricating oil allowing spillage thus causing a risk to personnel of slippage or fall.

Electrical hazard

Electrical equipment in the pump contains live parts which, upon contact, can cause serious damage to persons and property. Any kind of repair work on the electrical system should only be done by specialised personnel and only after insulating the pump from the mains power supply.

Fire hazard

Lack of proper maintenance or use of the pump, unforeseen or prohibited by this manual, can cause malfunction with the risk of overheating and fire.

In case of fire, do not use water to extinguish the flames, but use a dry extinguisher or CO₂ or other means compatible with the presence of electrical equipment.

Hazard generated by the projection of parts or part of them

Arrange the installation of the pump in order to avoid those in charge of works being directly hit by parts or bits of parts flying through the fan cover casing due to the cooling fan breaking.

2.3 PICTOGRAMS

Pictographs with the warning symbols and safety symbols for operators have been applied to the pump. Read carefully and take note of the symbols and their messages before using the pump.

**ELECTRICAL HAZARD**

The pump is near electrical connections (protected) but where accidental contact can cause electric shock and death.

**HOT SURFACE HAZARD**

The pump is close to surfaces with temperatures exceeding 70°C which may lead to burns of medium severity.

**REFER TO INSTRUCTION MANUAL/BOOKLET**

Before use read the instructions in the operating manual.

D.V.P. Vacuum Technology s.p.a. disclaims any liability for damage to persons or property due to non-compliance with instructions indicated in pictograms or their imperfect preservation.

3 DESCRIPTION

Claw pumps create volume and transfer air through the intake manifold to the outlet manifold by the rotation of two specially shaped rotors within a specifically shaped chamber.

The contactless rotation of the rotors is synchronised by gears in a dry environment without lubrication and without residue generated from brushing or contact during rotation.

The toothed gear wheels that allow the rotors and their bearings to rotate are lubricated with oil inside a compartment (separated from the rotor rotation chamber by gaskets and dynamic labyrinth seals) which acts as an oil reservoir at atmospheric pressure during operation.

The pump is cooled by a spinning fan inside the connecting casing of the motor and by the pump casing which is specially designed to take in fresh air and channel it inside to cool the components and then be released outside of the casing.

The movement of the motor is transferred to the pump by a flexible coupling.

A calibrated vacuum regulating valve controls and limits the vacuum attainable by the pump.

3.1 INTENDED USE AND CONTRAINDICATIONS

3.1.1 INTENDED USE



DVP products covered by this manual are intended for PROFESSIONAL use only.

The claw pumps described in this manual are intended to be used with dry air, clean and inert gas whose temperature at the intake opening should be between 0°C and +40°C.

Any other use is prohibited. The Manufacturer is not liable for any damage to persons and/or property caused by improper use of the pump.

3.1.2 CONTRAINDICATIONS



Any use other than that for which the pump was manufactured is to be considered an abnormal condition and therefore can cause damage to the pump and pose a serious danger to the operator.

Below is a series of operations involving improper use of the pump, which **are not permitted** under any circumstance.

- Do not use the pump in non-industrial installations unless all necessary precautions and protective measures have been taken (e.g. protection against contact for child safety);
- Do not use the pump in conditions other than those indicated in the tables shown in point 3.3 of this manual;
- Do not use the pump in an explosive or harsh atmosphere or in an atmosphere with a high concentration of dust or oily substances and do not use it to pump water vapour, liquid, solid, explosive, flammable or corrosive gases or gases that form particles. The pumps in the standard version are not suitable for evacuating oxygen at higher concentrations than that of atmospheric concentrations. Using the pump in these atmospheres and with these types of gases can cause injury, explosion, fire or seriously damage the pump;
- Do not use the pump without installing an intake filter suitable for the applications for which it has been intended;
- Do not change or transform the pump, carry out repair or maintenance work of your own initiative. Maintenance work can only be carried out in compliance with point 6 of this manual.
- Only use original spare parts or parts provided by the Manufacturer;
- Do not use the pump to pump solid materials, chemicals, powders, solvents or other substances differing from those permitted. These kinds of materials may damage the unit, limit its performance or reduce its lifespan;
- Do not expose the pump to rain, steam, excessive humidity or direct sunlight;
- Do not install the pump in places subject to possible flooding;
- Do not place or store near flammable or combustible materials or substances;
- Do not open oil fill or drain plug while pump is working.

3.2 NOISE EMISSIONS

The claw pumps described in this manual were designed and built in order to reduce noise level at source.

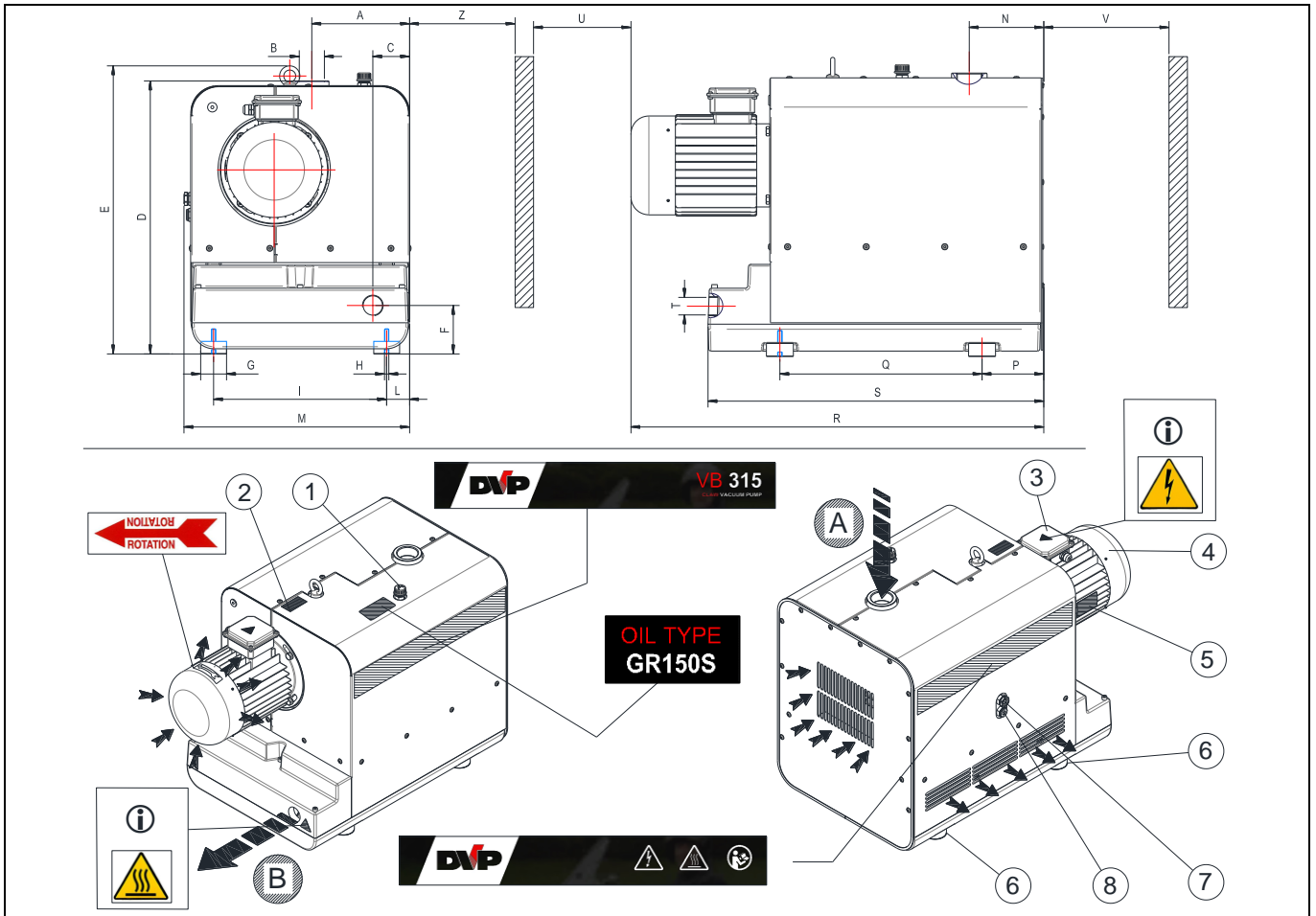
The sound pressure levels contained in the table of technical specifications were measured at maximum vacuum and outlet conveyed according to UNI EN 2151.

The user is responsible for using appropriate sound reduction devices to observe the legislative provisions in force in the Country of use of the user system.

If these devices are not enough to ensure a suitable sound level if there are personnel close by while the machine is working it is necessary to use adequate personal protective equipment.

3.3 DIMENSIONS AND CHARACTERISTICS

3.3.1 Model: VB 315



A	Intake
B	Outlet
1	Oil filler plug
2	Identification plate
3	Terminal board
4	Motor fan guard

5	Motor rating plate
6	Fixing point
7	Oil sight glass
8	Oil drain plug
i	Only present on special versions

MODEL	A	B	C	D	E	F	G	H	I	L	M	N	P	Q	R	S	T	U	V	Z
VB 315	226	2"G	88	631	666	112	60	M10	400	56	525	165	136	450	918	746	1-1/2"G	>300	>500	>500

TECHNICAL SPECIFICATIONS

		VB 315	
		50 Hz	60 Hz
Nominal capacity	m ³ /h	315	380
Final Pressure (Abs.)	mbar – hPa	150	
Motor power	kW (3~)	5,5	6,6
Nominal r.p.m.	n/min	2800	3300
Noise level (UNI EN ISO 2151) (K 3dB)	dB(A)	71	74
Weight	kg	305	
Type of oil		GR150S	
Oil quantity	dm ³	1	
Pump intake / outlet	"G	2 / 1-1/2	
Required room temp. for place of installation	°C	12 ÷ 40	
Temperature of the worked fluid, gas or vapour	°C	0 ÷ 40	
Ambient temperature for storage/transport	°C	-20 ÷ 50	
MAX humidity / altitude		80% / 1000m s.l.m. *	

(*) Please contact the Manufacturer if environmental conditions are different from those prescribed.

4 INSTALLATION

4.1 RECEIPT AND CONTENT VERIFICATION

Upon receipt of the pump, verify that the packaging is intact. If everything is intact, unpack the contents and check the pump.

If packaging shows signs of damage due to transport or storage conditions, immediately notify the shipping agent and the Supplier.

Check that the material received corresponds to its accompanying document.

Packages should be opened taking all precautions to avoid harm to people and the contents thereof.

4.2 PACKAGING

Depending on the transportation method, the pump can be packed in the following modes:

- On wooden platform with a cardboard or wooden cover;
- In wooden cage;

The wood of the platform covers and cage can be reused or recycled in compliance with the current legislation in the country where the pump is being installed. Other materials such as cardboard, plastic or protective film must be disposed of in accordance with local regulations.

Do not burn or discard packaging parts in the environment.

4.3 TRANSPORT AND HANDLING

HAZARD



All transportation, lifting and handling operations must be performed by experienced personnel; Should the packaging or pump overturn or fall, it can cause serious harm to personnel. Never stand under suspended loads and keep at a safe distance. It is strictly forbidden to lift the turbine in any way other than that foreseen.



HAZARD

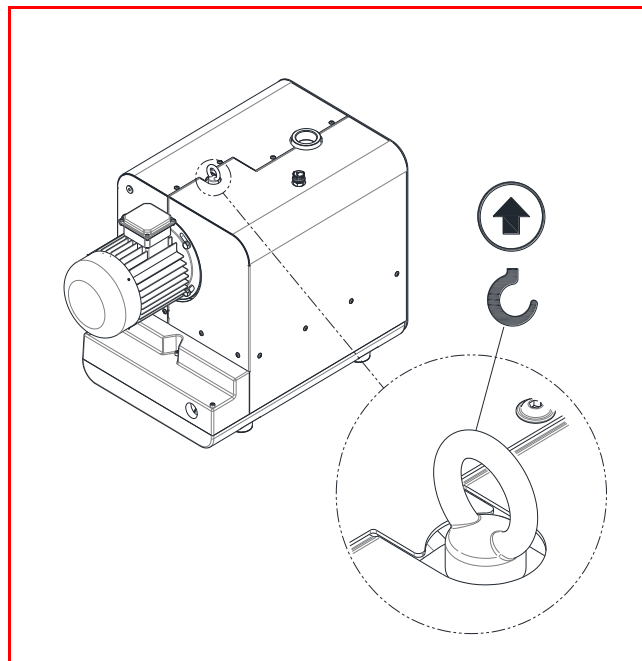
It is strictly FORBIDDEN to manually lift and handle the pumps.



WARNING

During the handling phases keep the load as near to the ground as possible.

The pump can be lifted and handled using a fork-lift truck and hoist (e.g. ropes, hooks, etc.) suitably sized for its weight (indicated in the technical data table and on the rating plate) and attached as indicated in the following diagram to obtain the best harness in terms of safety and centre of gravity.



WARNING

In order to transport the pump, we recommend you prepare it as shown in the following paragraph.

4.4 STORAGE

Drain the oil from inside pump and close the intake and outlet with the appropriate protections.

The pumps are to be stored in their packaging and stored in covered, dry, protected places that are not exposed to bright sunlight, with temperatures in the range indicated in the table of technical specifications.

In case of long periods of inactivity inside the warehouse or out of production in storage, the location should meet the specifications described in point 3.3 of this manual.

In order to keep rubber parts and lip seals efficient and properly working, we recommend that the pump is operated for at least 30 minutes every 6 months with the intake closed, following the instructions and provisions described in this manual, paying particular attention to those in point 5.

The non-observance of the provisions could cause the rubber parts to degrade leading to oil leakages during operation.

4.5 ENVIRONMENTAL CONDITIONS

The pump must be installed and used in a covered and adequately lit location.

The installation area must meet all requirements of height, air circulation and meet the requirements imposed by existing legislation.

Temperature, Humidity and altitude

The corresponding limit values are shown in the table of the technical specifications (point 3.3 of this manual). Please contact the Manufacturer if environmental conditions are different from those prescribed.

Lighting

All areas must be illuminated evenly and sufficiently to ensure all operations included in this manual and must be without shadows, reflections, or glare to avoid eyestrain.

4.6 PUMP INSTALLATION



To ensure safe and optimum and safe running of the pump, site it according to the following guidelines:

- Leave sufficient space around the pump and make sure you keep the side with the motor fan free following the indications in point 3.3 of this manual.
- Make sure the free space adjacent to the pump allows easy access to components for inspection or maintenance and also allows access for suitable lifting equipment.
- Install the pump on a structure or system that does not transmit or amplify vibrations or sound emissions; we recommend the use of anti-vibration systems.
- The pump has fixation points; to avoid the risk of overturning if the user system is moved, the pump must be locked in place on a horizontal and solid platform.
- Ensure there is ventilation in the room or inside the machine housing the pump to prevent air coming from the outlet, the motor and pump cooling fans from stagnating in the room, changing the environmental conditions or causing discomfort to personnel.



HAZARD

Use an intake filter to protect the pump from dust, sand, masonry debris, cutting filaments and threadings, drops and welding dirt and sealant residue produced when connecting the pipes that could damage rotor lobes causing seizure.



HAZARD

Position the pump and relative its control systems so they are visible during any operation in order to prevent the machine from starting up while personnel are still carrying out work on it. Failure to comply with these points could cause serious injury.



WARNING

Do not install the pump in an area with dust or other materials that could clog and/or quickly cover the motor fan or turbine's cooling surfaces.

4.7 MOTOR INSTALLATION

It is possible to install any type of electric or hydraulic motor that has the features described in the table of technical data, with flange and shaft corresponding to:

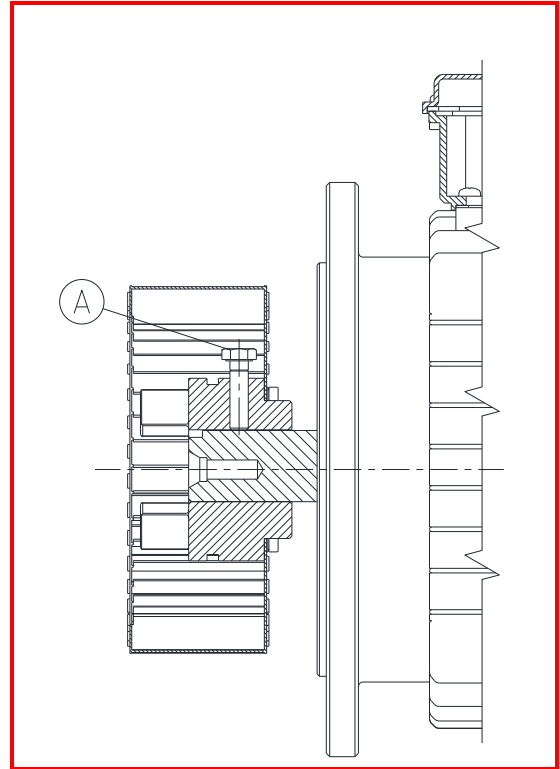
VB 315 → M112/2 - B5 size as per standard IEC-72, 5,5-6,6kW 50-60Hz.

WARNING



Install fan/coupling assembly on the motor following the instructions and measurements indicated below. Too much clearance in the coupling and flexible couplings causes damage to the pump that is not covered by the warranty.

- Remove the fixing clamp from the connecting joint on the pump;
- Insert the joint/fan assembly onto the crankshaft, aligning it with the end of the shaft as shown in the Figure ;
- Tighten screw “A” to firmly fix the assembly to the shaft.



4.8 USER SYSTEM

Make sure that no harmful substances contaminate the user system during installation.

If you wish the system to maintain vacuum even when the pump is stopped, install a cutoff valve between the pump and the system.

Make sure that no vibrations or stresses are transmitted to the pump connection.

4.9 CONNECTION



HAZARD

Pump connections should be performed by skilled and trained personnel only.

4.9.1 INTAKE AND OUTLET CONNECTIONS

All the pump's openings are protected in order to prevent foreign bodies entering it.

Only remove these protections positioned on the intake and outlet points immediately before connecting to the user system.

User system connections (both intake and outlet) must be made with pipes with a diameter equal to or greater than the pump suction inlet. The weight of pipes or any extensions must not burden the pump.

We recommend you carry out the final connection to the pump using flexible pipes or fittings, thus avoiding rigid connections that can induce tensions and cause harmful vibrations.

It is important to tighten all pipes and couplings. Pipes that are too long or which have a diameter that is too small and with tight, regular curves reduces the pump's performance.

Avoid fitting rubber pipes with a diameter that is too small (it must never be less than the diameter of the intake or exhaust), excessively long pipes or those with a lot of bends.

ATTENZIONE



Vacuum line must be placed so that condensation formed on the pipe, to amass itself and to flow-back in the pump (both in aspiration and in discharge); the pipe will have to be descending and curveless.

WARNING



Small amounts of fluid (coming from the container or the piping) are enough to produce impacts on the rotors inside the pump chamber. The impacts can deform the rotors and cause the pump to seize. It may be necessary to take suitable protective measures on the piping of the intake line (e.g. separator, T-fittings, etc..).

**HAZARD**

Make sure that outlet gases are expelled from the workplace. This should be done so that the surrounding workplace and atmosphere are not polluted.

**WARNING**

Do not insert outlet fitting pipes or devices that block or impede the dispersal of outlet gases.

**WARNING**

Use an intake filter, especially if the pump works with unclean air flows.

**WARNING**

Make sure that vibrations or loads are not transmitted to the attachments of the pump.

4.9.2 WIRING**WARNING**

Check that network voltage and frequency correspond to values contained on the motor rating plate.

The connection cable must be adequate for the power drawn by the motor from the pump (the pump's power levels are shown on the electric motor plate) and taking into account the environmental operating conditions. Use the cable clamp openings to pass the power cables into the terminal board.

**HAZARD**

Always earth the pump. Always connect the earth cable to the relevant terminal before connecting to the mains supply and check the resistance rating.

**HAZARD**

Lay the pump power cable in such a way that it cannot cause the risk of tripping or falling or can be damaged.

Always install an electric protection system between the pump and power supply; the pump's absorption levels are shown on the electric motor plate.

The fuses do not protect the motor, but are only a protection against short-circuiting. Select a suitable kind and size of fuses bearing in mind the peak current, especially in the case of direct start-up.

It is essential to protect the motor against overload, loss of timing or large variation in the current to the pump assembly. Adjust the motor cut-off switch to +30% maximum of the motor's power rating.

The pump is normally supplied without an electrical cable and switch. For electrical connection, see the diagram contained within the terminal board or on the motor rating plate.

WARNING

Check that the direction of rotation is correct (indicated in point 3.3 of this manual) before starting the pump for the first time or after resetting the electrical connections.

If the pump is operated in the opposite direction it can cause serious damage to it.

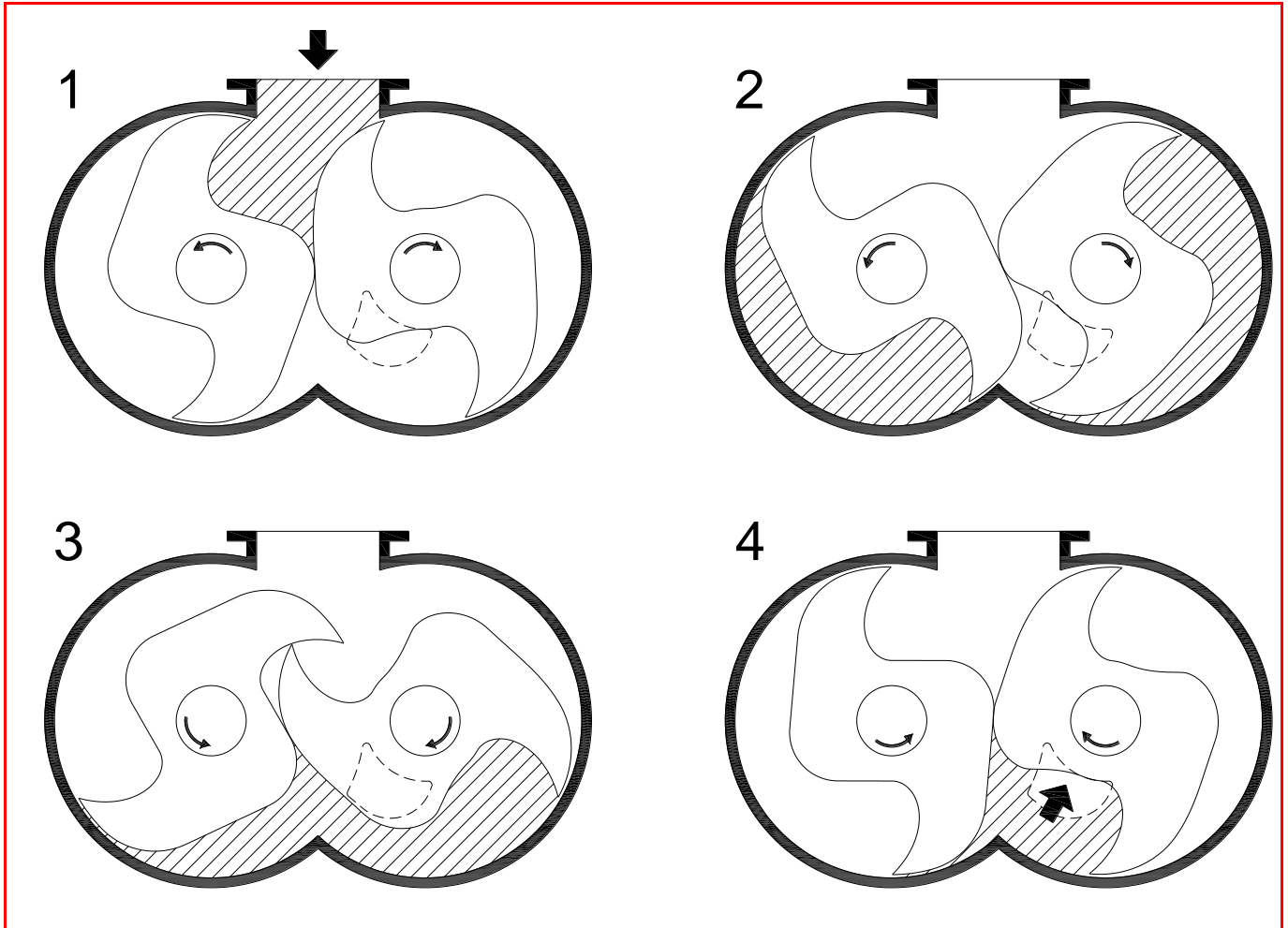
In the event of incorrect rotation direction wait for the pump to come to a complete halt before changing the connection and supplying power again.

To check the rotation direction you just have to briefly start up the motor and immediately turn it off, make sure that the rotation direction of the motor cooling fan is the same as indicated in point 3.3 of this manual. If this is not the case disconnect the network cables and reverse the two phases.

5 OPERATING INSTRUCTIONS

5.1 OPERATION

The claw pumps described in this manual are rotary machines equipped with two claw-shaped rotors, symmetrically arranged and counter rotating, contained inside a specially shaped chamber. The rotor rotation is synchronised by means of a gear transmission which moves the rotors so that they do not touch either each other or the housing. The operating principle is indicated below.



In **STAGE 1** the volume generated by the rotor rotation increases. Then, in **STAGE 2**, two volumes are isolated by the rotors rotation and transferred to the outlet area. Subsequently, in **STAGE 3**, these volumes are combined and compressed. Lastly, in **STAGE 4**, the compressed volumes are exhausted.

Due to the lack of contact within the chamber the claw pump can work at a high speed thus obtaining a high flow rate even from a small pump.



WARNING

Operation without lubricant in the gear compartment will cause serious damage to the pump.



HAZARD

The pump may reach high temperatures when operating. Special precautions should be taken in order to avoid personnel and/or equipment and electric parts nearby coming into contact with it.



WARNING

The pump casing has been designed to maximise soundproofing and the efficiency of the cooling system. Using the pump without the casing will increase noise level and may cause over-heating with the consequent damage to the pump.

5.2 START-UP



HAZARD

The pump should only be started-up after all the instructions, requirements and prohibitions in this manual have been carefully read, understood and complied with.

Checks to be performed before start-up:

- If an excessively long period of time has elapsed before starting up the pump, check its conditions and working state. Remove any dust deposits from the external surfaces and check that the rotors of the pump can turn freely without obstacles.
- The pump is supplied complete with lubricating oil inside the gear casing; Only use the recommended oil or another make which has the same characteristics. Fill the gear chamber with the lubricant according to the instructions in paragraph 6.2.5 of this manual.
- Make sure that the pump's intake and outlet are not blocked by connectors and/or protection devices and/or shut-off valves.
- Check that the adjustment of the motor cut-off switch corresponds with the motor's rated current + 30% as indicated on the relevant plate.
- Check that the room temperature and that of the gas channelled to the intake is within the levels indicated in point 3.3 of this manual.

After carrying out the preliminary controls listed above, the pump can be started up. With the pump working check that the current drawn by the electric motor complies with the values indicated on the motor plate.



WARNING

Check that the direction of rotation of the motor is correct (related at point 3.3 of this manual).



WARNING

To reducing energy consumption and avoid damaging the pump, it is advisable not to start the pump up more than 12 times / hour and that they start-ups are timed equally apart.



HAZARD

The pump may reach high temperatures when operating.

The pump working temperature depends on the characteristics of the processed fluid and the working pressure. High temperature levels can be due to either the room or gas intake temperature being too high, a high or low oil level, installation in a constricted space, exposure to direct sunlight, dust deposits either on the motor's cooling fan or on the fan cover casing.



HAZARD

Full r.p.m. pump operation should be without vibration or unusual noise. If not stop the pump immediately, search for the cause and eliminate it.

5.2.1 VACUUM REGULATING VALVE

The pump is fitted with a safety valve, positioned at the intake connection, to control and limit the vacuum. The vacuum is regulated to the maximum value permitted at atmospheric pressure (as recorded in paragraph 3.3 of this manual) by turning the nut attached to the valve in the direction indicated by the arrow.



WARNING

Only use the pump with the safety and control valve designed for the series. The pump will be damaged if the maximum absolute pressure permitted (see paragraph 3.3) is exceeded.

5.3 STOP

The pump must be stopped by disconnecting the power supply and be isolated from the system by closing the valve provided (described in point 4.8 of this manual)

If the pump is to be powered off, let it run with the intake closed, isolated from the user system, for about 30 minutes first. This will eliminate any moisture inside the intake chamber and avoid oxidation of the internal parts.

5.4 DECOMMISSIONING AND PROLONGED STOPPAGE

If the pump is placed out of order and/or stopped for a prolonged period of time, proceed as follows:

- Stop it following the procedure indicated in paragraph 5.3 of this manual;
- Isolate it from the electrical power supply;
- Isolate it from the user system by cutting off the intake and outlet connection;
- Gradually release the vacuum that may be inside;
- Remove the connections to the system;
- Shut off the intake and outlet using the specific protection devices.

6 MAINTENANCE

6.1 GENERAL WARNINGS

WARNING



It is important and essential that the operating pump is periodically inspected in order to avoid breakages that can directly or indirectly cause damage to the turbine or create hazardous situations for personnel.

For good maintenance:

- Immediately verify the causes of any malfunctions (excessive noise, overheating, etc.);
- Pay particular attention to the efficiency of safety devices;
- Make use of all documentation provided by the Manufacturer (instruction manuals, wiring diagrams, etc.);
- Use only appropriate tools and original spare parts;
- Use suitable individual protective equipment.

If you do not fully understand the information or procedures contained in this chapter, contact D.V.P. Vacuum Technology s.p.a. for clarification before proceeding.



Only trained or authorised personnel have the necessary expertise to perform tasks with the skills appropriate for intervention.



HAZARD

Do not perform any type of operation, modification and/or repair of any kind, except for those listed in this manual.

HAZARD

All maintenance work must be carried out with the pump disconnected from the power supply and measures must be adopted to prevent it being reconnected. Only open the terminal board of the electric motor after ensuring that there is definitely no live current present.



Attach a notice to the pump's system command and control component which states: "DANGER maintenance work on the pump in progress!".

Do not start work on the pump until it has come to a complete halt (i.e. the rotors have stopped) and has not reached a temperature that is not dangerous to the operator.

Make sure that there is not vacuum in the pump and the conductors connected to it and that no fluid can escape either from the unit or the system.



HAZARD

The user is forbidden to carry out repair or maintenance work that requires the replacing of parts that have seized and that may have become deformed to the extent that they are unusable. In these cases, contact the Manufacturer or authorised dealer for assistance.



HAZARD

If the pump maintenance has been performed in a manner inconsistent with instructions, with non-original spare parts or otherwise so as to impair its integrity or modify its characteristics, D.V.P. Vacuum Technology s.p.a. will be released from any liability relating to the safety of persons and malfunction of the pump.

6.2 MAINTENANCE TABLE

The following table shows all required periodic operations to maintain pump efficiency.



HAZARD

Wear suitable protection equipment when carrying out maintenance work.

OPERATION TYPE	FREQUENCY	OPERATOR QUALIFICATION
Check lubricant level	500 h	
Clean pump filter disc and filter disc of the regulating vacuum valve	1500 h	
Clean motor fan guard and clean the pump	6000 h	
Check transmission elastic element	6000 h	
Change oil	6000 h	

More frequent maintenance may be necessary depending on the kind of use and environment where the pump is installed (high temperature of intake gases and/or workplace, presence of condensable vapours in the intake gases, very dusty workplace, etc.).

6.2.1 CHECK LUBRICANT LEVEL

Only check the level of the lubricating oil when the pump is stopped.

Check that the lubricating oil level of the gears and bearings fills half of the oil sight glass. Alternatively follow the instructions in points 6.2.5 of this manual.

Check the condition of the oil . If dark or cloudy, oil has been contaminated and must be changed.

If it is necessary to top up the oil frequently it may that the pump internal seals are damaged.

6.2.2 CLEAN PUMP FILTER DISC AND FILTER DISC OF THE REGULATING VACUUM VALVE

There are metal mesh filter discs on the regulating valve and the intake connector. These should be cleaned using compressed air and a dry cloth; do not use liquid or any other substance not listed here.

6.2.3 CLEAN MOTOR FAN GUARD AND CLEAN THE PUMP

Cleaning the motor fan guard and the pump is done in order to remove any dust. This must be done using a puff of compressed air and a dry cloth. Do not use fluids or substances other than those indicated.

6.2.4 CHECK TRANSMISSION ELASTIC ELEMENT

Check the wear status of the elastic element of the motion transmission coupling of the pump/motor and replace it if necessary.

6.2.5 CHANGE OIL

Under ordinary working conditions the oil deteriorates due to the wear of gears and bearings.

To guarantee the life of the bearings and the absence of contaminants, the lubricating oil should be changed periodically as instructed in paragraph 6.2 of this manual.

Change the lubricating oil as follow:

- Run the pump for 10 minutes with the suction inlet closed to make the oil more fluid.
- Stop the pump and disconnect it from the mains;
- Undo the oil filler plug;
- Get a container large enough to hold all the oil and open the oil drain plug;
- Drain out all the oil;
- Close the drain plug and refill with new oil through the filler plug up to the middle on the oil level viewer window;
- Close the oil filler plug and remove any oil spillage from the pump and/or floor;
- Reconnect the mains and verify the correct rotation direction of the pump (indicated in 3.3 of this manual).



WARNING

An oil level which is too low will not lubricate the gear and bearings sufficiently.



WARNING

Only use oil provided by D.V.P. Vacuum Technology s.p.a. having the characteristics listed below or, an alternative, an oil corresponding below.

GR150S	
Classification	ISO 12925-1 (CKC); DIN 51517-3 (CLP); AGMA 9005-D95/E02
Type	Gear synthetic oil
AGMA Number	4EP
Density @ 15°C	0,856 kg/L
ISO-VG	150
Flash point	232°C
Melting point	Pour point -54°C
SHELL	OMALA RL 150
AGIP	BLASIA S 150
KLUBER	Klubersynth GEM 4 -150 N
MOBIL	Mobil SHC GEAR 150

The corresponding oils listed above are synthetic or mineral in nature, depending on the manufacturer. Their different typology does not alter the function or performance of the pump.



HAZARD

Comply with local regulations regarding the collection and disposal of used or polluted oil.

6.3 PAINTING

The machine is originally painted with selected products to allow the maximum heat exchange with the encompassing atmosphere. In case of aesthetic deteriorations that can result in the long run we do not recommend that you touch up the paint unless during a test at **D.V.P. Vacuum Technology s.p.a.**



WARNING

Do not re-paint the pump in order not to compromise the proper heat exchange needed for operation under the most demanding circumstances. Failure to follow this instruction will invalidate the warranty.

6.4 SPARE PARTS

In order to replace the pump parts we recommend the use of **Original Spare Parts**. When purchasing spare parts, always quote the **Serial Number** and pump's **Model** (these can be found on the identification plate) as well as the spare parts code.

DESCRIPTION	VB 315
Gaskets Spare Parts	KG000064

D.V.P. Vacuum Technology s.p.a. disclaims all responsibility for any deterioration of pump performance or for damages caused due to use of non-original spare parts.

7 HOW TO RETURN THE PUMP

The product may only be returned after prior agreement with the Manufacturer, who will provide the authorisation reference number and document that must accompany the material which is being returned and which must be fully completed in its entirety.

8 DISMANTLING



Scrapping of the pump must be performed by authorised technicians.

Metal parts can be disposed of as scrap metal.

All scrap materials must be disposed of according to regulations in the country where the pump is dismantled.



HAZARD

Risks from sharp edges, projected shards, getting caught in moving parts and contact with chemicals exist during disposal operations, therefore, operators should use the appropriate personal protective equipment.



(Note for devices under EEE management, with the label shown on the side as an example)

INFORMATION FOR USERS OF PROFESSIONAL EQUIPMENT
"Implementation of Directive 2012/19/EU on waste electrical and electronic equipment (WEEE)".

Information available at www.dvppumps.com in the WEEE section.

9 TROUBLESHOOTING

DAMAGE	CAUSE	REMEDY
(A) The pump does not run	No voltage	Provide power supply
	Wrong motor power supply	Check power supply
	Motor not properly connected	Check and correct
	Motor winding damaged	Contact Service Department
	Thermal switch has tripped (installed by the user)	Identify reason and activate switch
	Room temperature is too low	Restore room temperature to allowed range
	Oil too thick	Change oil
	Intake of substances not allowed	Contact Service Department
	Seized pump: defective rotor, bearing or gears	Contact Service Department
	Blocked pump: intake of solids or oxidation of the internal organs	Contact Service Department
(B) The pump cannot reach stated vacuum	Leaks on the vacuum line system user	Check and correct
	Intake filter discs clogged	Clean filter discs
	Intake filter clogged (if fitted)	Change filter
	Wrong motor power supply	Check power supply
	Clogged outlet	Check and correct
(C) Pump too noisy and/or anomalous sounds	Wrong rotation direction	Check and correct
	Claw rotor friction due to dirt deposits	Clean the rotors chamber
	Friction due to the pump components deformation	Contact Service Department
	Bearings or gears damaged	Turn off the pump immediately Contact Service Department
	The rotors hit the housing	Turn off the pump immediately Contact Service Department
	Motor coupling damaged	Contact Service Department
	Motor fan guard clogged	Contact Service Department
(D) The pump heats up excessively	Clogged outlet	Check and correct
	Wrong motor power supply	Check power supply
	Intake filter discs or intake filter (if fitted) clogged	Clean the filter discs and change the filter
	Poor ventilation inside the machine room	Ventilate the room
	Airflow cooling pump hindered	Check and correct
	High room temperature or insufficient cooling ventilation	Install an auxiliary ventilator
	Motor fan guard clogged	See point 6.2.3
	Motor fan broken	Contact Service Department
	Gas temperature too high	Check and correct
	Claw rotor friction due to dirt deposits	Clean the rotors chamber
	Friction due to the pump components deformation	Contact Service Department
	Dirty bearings from contaminated oil	Change the oil
	Absence of oil	Check and correct
	Oil level too low	Check and correct
	Defective bearings	Contact Service Department
(E) The power drawn by the motor is too high	See point "D"	See point "D"
	Wrong power supply voltage	Check and correct
	Defective motor	Repair or replace motor
	Oil too thick	Change oil Increase the room temperature
(F) Pump leaks oil	Oil drain plug not leak-tight.	Check and correct
	Oil sight glass not leak-tight.	Check and correct
	Gear box gasket not leak-tight	Contact Service Department

DAMAGE	CAUSE	REMEDY
(G) The oil level is getting low	Visible oil leak; gear box gasket damaged	Contact Service Department
	No visible oil leak; shaft seal damaged	Contact Service Department
(H) The oil becomes dark	Oil contaminated	Change oil
	Transmission gears worn	Contact Service Department
	Pump heated up excessively	See point "D" After removing the anomaly, change oil
(I) Oil inside the claw rotor chamber	Oil arrives from the system	Check and correct
	Damaged claw rotors seal rings	Contact Service Department
(L) The pump not reach flow declared	Leaks on the vacuum line user system	Check and correct
	Intake filter discs clogged	Clean the filter discs
	Intake filter clogged (if fitted)	Clean the filter
	Motor not properly connected	Check and correct
	Defective motor	Contact Service Department
	Excessive clearance between the claw rotors	Contact Service Department
	Defective bearings	Contact Service Department
Intake and/or outlet piping undersized	Check and correct	

GENERAL CONDITIONS OF SALE

D.V.P. Vacuum Technology s.p.a. supplies products exclusively for professional clientele, hence, excluding consumers.

PRODUCT WARRANTY TERMS AND CONDITIONS

D.V.P. Vacuum Technology s.p.a. guarantees that the product is free from material or manufacturing defects for a period of 24 months of normal use from the shipping date. This period is of 6 months of normal use for products subject to repair not under warranty.

Normal use means an operating cycle of 8 hours per day for a maximum of 5000 operating hours in the 24 months covered by the warranty.

Warranty means the free replacement or repair at its own assistance network of any components of the product that are found to be faulty from the start due to manufacturing defects.

In the event of repair, D.V.P. Vacuum Technology s.p.a. guarantees, exclusively to its own customer, the identical spare parts for 24 months from the shipping date; once this period has passed, the pieces may no longer be available on the market, therefore the repairs, even under warranty, may require the payment of a difference between the product purchased and that installed during the repair. This price will be indicated to the customer before the repair is carried out, for acknowledgement and acceptance.

D.V.P. Vacuum Technology s.p.a. will do everything reasonable within its power to respect the assistance times and *standard* response (20 working days), which may vary according to the distance and accessibility of the place where the product is located and the availability of the components.

D.V.P. Vacuum Technology s.p.a. will not be held responsible for any direct or indirect losses caused by its failure to respect the assistance times and will not have any responsibility or contractual or civil obligation for product faults or for failure to repair the faults in a reasonable period of time.

In the event of irreparable faults, the product will be replaced. The replacement will cause the original warranty to be extended to the new product, until its expiry date.

The warranty does not cover any parts that appear to be faulty due to negligence and/or carelessness during use (failure to observe the equipment operating instructions, lack of maintenance), incorrect installation and/or maintenance, maintenance carried out by unauthorized staff, damage due to transport, or circumstances which, in any case, cannot be attributed to manufacturing faults on the equipment.

The warranty also excludes all components of the product that have been modified or repaired without prior written authorisation from D.V.P. Vacuum Technology s.p.a.

The warranty also excludes any faults deriving from improper use, normal wear, galvanic and electrostatic currents, chemical corrosion, tampering, replacement or elimination of the registration plate.

The warranty does not cover, in any case, faults generated by external causes, such as accidents and fortuitous events.

D.V.P. Vacuum Technology s.p.a. declines all responsibility to anyone for any damage and, consequence, of any kind and/or reason, that may derive from the use of the product, as well as for any faults that it may present.

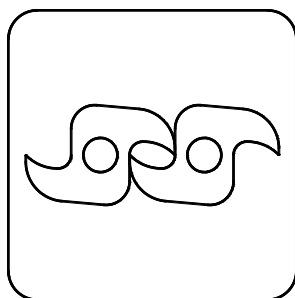
By way of non-limiting example, it declines all responsibility:

- for any damage that could, directly or indirectly, be caused to people, objects and animals, due to failure to observe all the instructions indicated in the relevant use and maintenance manual, especially the indications on the installation, use and maintenance of the equipment;
- for any damage and/or loss caused by faults of deficiencies of products repaired by D.V.P. Vacuum Technology s.p.a.;
- for any indirect or consequential damage such as, by way of non-limiting example, loss of business, profits, salaries, payments etc.;
- losses that could have been avoided by the customer by following the advice and instructions from D.V.P. Vacuum Technology s.p.a..

In any case, the customer waives the right to claim any right and/or demand as well as raising any objection or promoting any action, inherent to the use of the product.

The warranty is not extended to consumable parts, or faults deriving from: filtering cartridges, blades, membranes or sealing rings, as well as third party products that are part of the final product.

The transport, removal and subsequent re-installation costs of the repaired or replaced product are, however, to be entirely borne by the customer.



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