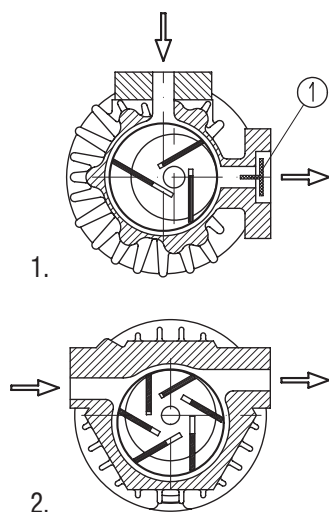


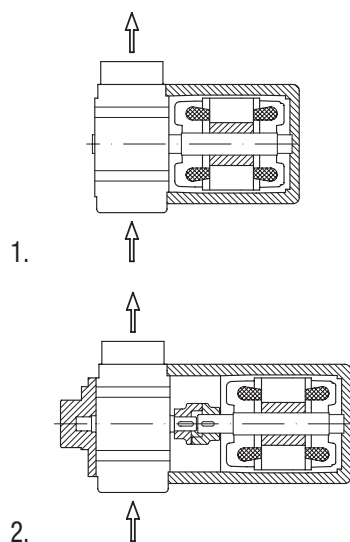
## Operation principle



The rotor rotates eccentrically inside a stator and it has grooves in which the vanes move freely and are pushed against the stator inside wall due to the centrifugal force, thus creating as many chambers as the number of vanes. During rotation, the volume of these chambers varies according to their position with respect to the eccentric axis. The chamber volume increase makes the air inside of them expand, thus creating vacuum (suction phase); the volume reduction, on the other hand, generates air compression (exhaust or delivery phase).

The internal design is the same for both rotating compressors and vacuum pumps.

We have created two different sucked air conveying principles for our pumps. Figure 1 shows a three-vane rotary system with exhaust valve (1). This system is especially used in high vacuum applications. Figure 2 shows a six-vane (therefore with more chambers) rotary system which is mainly used for low vacuum applications.



## Rotor housing

In the smaller and more compact pumps, the rotor is cantilevered-fitted on the motor shaft end (fig.1), while in the high power versions or in those with frequent start-ups, the rotor is supported by bearings on both sides (fig. 2). In the latter case, the pump and the electric motor are two independent units and the two shafts are coupled via an elastic transmission joint.

## Lubrication systems

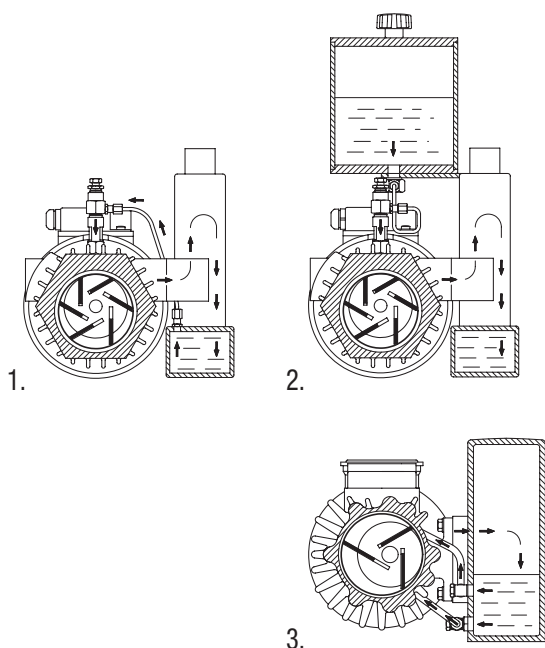
The main lubrication systems we use are by vacuum with oil recycle or disposable oil for vacuum pumps of the VTL series and oil-bath for pumps of the MV series.

As for **oil recycle lubrication** (fig.1), the oil sucked in the working chamber via adjustable oilers that control the flow, is drained together with the sucked air into the recovery tank and it is separated from the air through a special filtre contained in it and put in circulation again.

As for the **disposable oil lubrication** (fig.2), the lubricating oil is contained in a special transparent container controlled by a magnetic level switch, and follows the same path as the one described above, only it is collected in the recovery tank without being put in circulation again. This lubrication system is recommended when the sucked air contains water condensation, solvent vapours or anything else that can effect the oil properties.

As for the **oil-bath lubrication** (fig.3), the oil is sucked in the chamber directly from the recovery tank via calibrated nozzles that control the quantity, and it is kept and separated from the air in the exhaust phase via special microfibre deoiling cartridges located in the tank.

With this lubrication system, the quantity of oil in circulation is much higher than the previous two systems. This results in a better sealing between stator and rotor and lower friction between the rotating parts and the fixed ones, as well as in an increase of the vacuum level, lower heating and less noise.



## ROTARY VANE VACUUM PUMPS – GENERAL DESCRIPTION

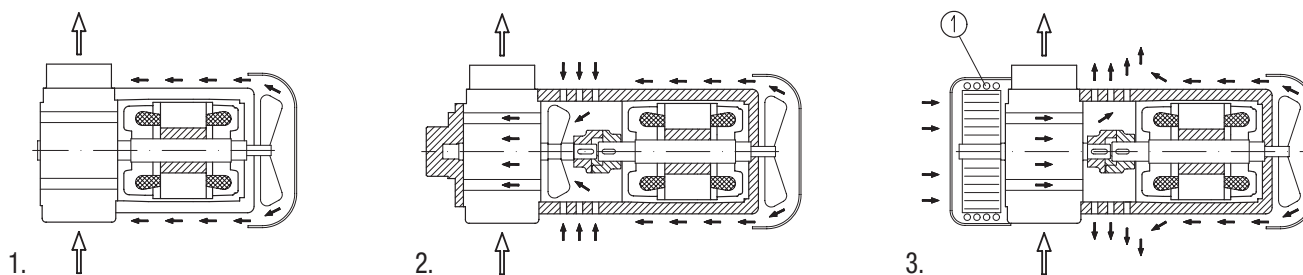
### Dry vacuum pumps

The particular conformation of the chamber and the special graphite with which the vanes and the locking flanges are made, allow these pumps to operate with no need for lubrication.

These pumps are **not recommended** when the fluid to be sucked contains vapours and water or oil condensation.

### Cooling

The pump cooling system we use is by airflow on their surface. The heat developed by the pump is dispersed from the external surface which is specially finned, via the electric motor fan in the smaller pumps, and by a radial fan fitted on the pump shaft while in the larger ones. Pumps with capacities from 100 cum/h upwards, are also equipped with a serpentine radiator (1). In this case, the lubrication oil, which passes through the radiator before entering the chamber, is cooled by the radial fan that sucks the cooling air through the radiator, thus allowing a further reduction of the heat developed by the pump.



### Used materials

The pump stator and flanges are made with spheroidal cast iron, the transmission shaft and the rotor are made with carbon steel, while the vanes are made with carbon or glass fibre for the lubricated pumps and with graphite for the dry ones.

### Electric motors

All vacuum pumps with capacity up to 20 cum/h can be supplied either with three-phase or single-phase electric motor, while those with higher capacity can only be equipped with three-phase electric motors. As a standard, all the pumps are equipped with multi-voltage electric motor, in compliance with CE standards. Upon request, they can be supplied with motors in compliance with UL-CSA and with special voltages and frequencies.

### Certifications

The design and manufacture of our vacuum pumps comply with European Directives on safety. In fact, every identification showing the pump technical data has the CE marking. Moreover, a Declaration of conformity with the 98/37/CE Machinery Directive and subsequent modifications is always annexed to the Use and Maintenance guide.