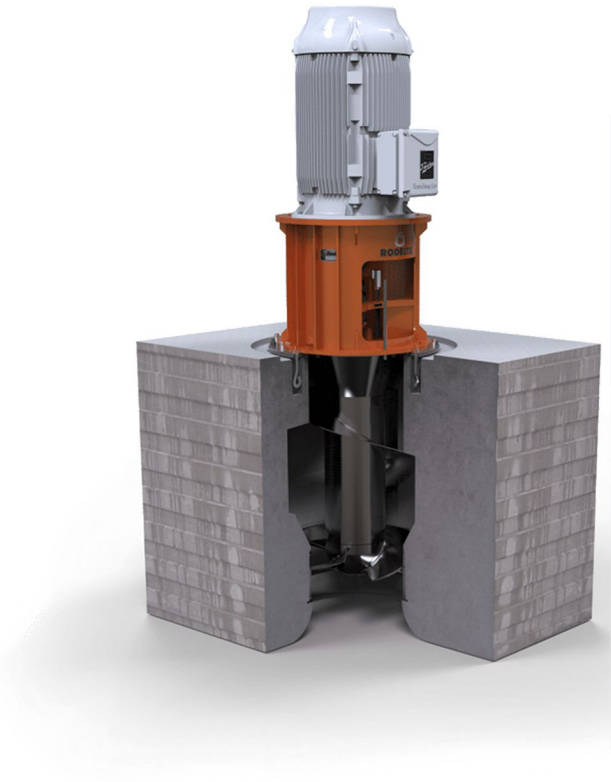


ACVP Axial Concrete Volute Pump

The ACVP is, among other things, designed for water transport and for water level control. This can be in polders or lower lying areas. The pump is also extremely suitable for water replenishment in canals with water locks, or to provide higher areas in times of drought.
It is also possible to equip this pump with the capability to function as a turbine. This means that water can be pumped in times of water shortage and in times of an excess of water, energy can be recovered. By letting surface water flow back through the pump, the rotor is driven and electrical energy can be generated for instance.

The ACVP is designed to pump large capacities at a low head of 0 to 11 meters. Additionally, Rodelta has the CVP in its sales program for the higher pump heads. You can find more information about this on our website, or contact our sales department.

CONSTRUCTION TYPE

The ACVP is a pump with an axial impeller, which discharges into a specially designed elongated concrete volute. The fluid flow is optimally guided through this volute by means of a metal spiral, which is attached to the pull-out unit. This volute is relatively large. This has been chosen in order to keep the energy loss as low as possible and to minimize possible blockages of the pump.
The use of concrete also contributes to a solid construction and a low noise level of the pump in addition to durability and maintenance friendly advantages.

IMPLEMENTATION

The ACVP is equipped with a water lubricated rubber bearing at the bottom. This ensures a narrow impeller gap which allows the pump to achieve optimum efficiency. At the top, the pump is equipped with two grease lubricated ball bearings which, in combination with the lower bearing, ensures a stiff and strong rotor unit. The shaft seal is realized by means of a stuffing box packing. From an environmentally friendly point of view, this packing is executed without grease lubrication so that no grease can get into the surface water. This is possible because of the relatively low rotor speed.

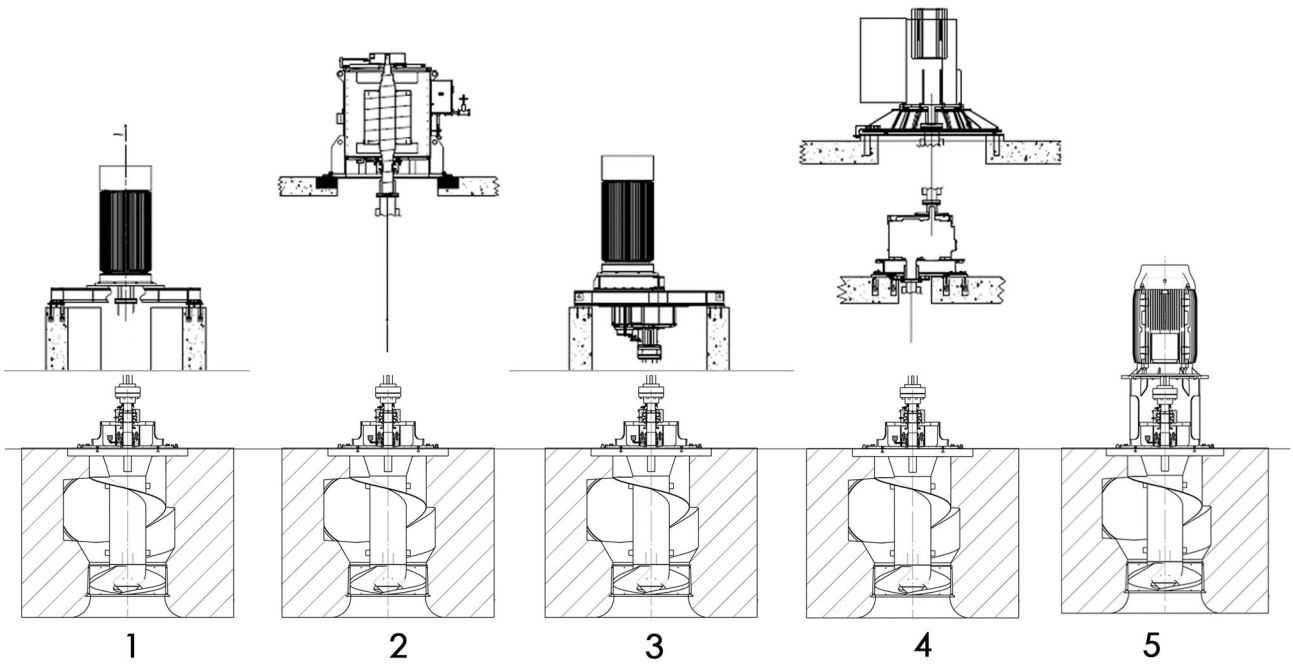
The pump shaft is provided with key ways for attaching the impeller to the shaft. On the other side of the shaft is the key for attaching the coupling. By means of the cylindrical pipe to which the flow guiding spiral is attached, the shaft is separated from the medium to be pumped.

Because of this, no impurities can attach to the pump shaft. At the locations of the shaft where wear occurs as a result of bearing or sealing, wear bushings have been designed so that the entire shaft does not have to be replaced during overhaul work.

The complete electric motor is located entirely above the highest water level. Driving the pump is usually done by means of a vertical, directly driven electric motor in combination with a frequency converter. This offers the customer the possibility to control the pump output within a certain envelope. Of course, other drive options are also possible, such as toothed belt or a gearbox.

It is also possible to disconnect the drive from the pump rotor unit. In this way, the motor is placed on a second higher floor and the transmission to the pump unit is done by means of coupling shafts.

Below are a few other configurations with regard to the driver



1 Directly driven electric motor with frequency converter on walls above pump
2 Directly driven electric motor with frequency converter on higher floor.
3 Gearbox transmission driven by Electric motor placed on walls above pump.
4 Gearbox transmission driven by Electric motor and placed on two separate floors.
5 Electric motor directly on rotor unit

The rotor unit is removable from the pump block. This can be done without draining the pump. The pump can be inspected in this way. This design choice has also been made with limited operational costs in mind.

The volute is completely made of concrete. This can be prefabricated but can also be poured on site. With the prefab method the entire pump block can be placed in the building at once. This offers advantages in terms of lead time. When pouring the concrete on site, the process will take place under the supervision of a Rodelta expert.

At the location of the impeller, a wear ring is poured into the concrete pump block. This wear ring is designed in such a way that the impeller tip rotates behind an edge. This prevents damage to fish or the collection of dirt or contamination behind the impeller tip.

At the exit of the concrete pump block, a nozzle with connection flange is poured in. This flange serves as a connection for the downstream piping in which valves can be mounted for instance.

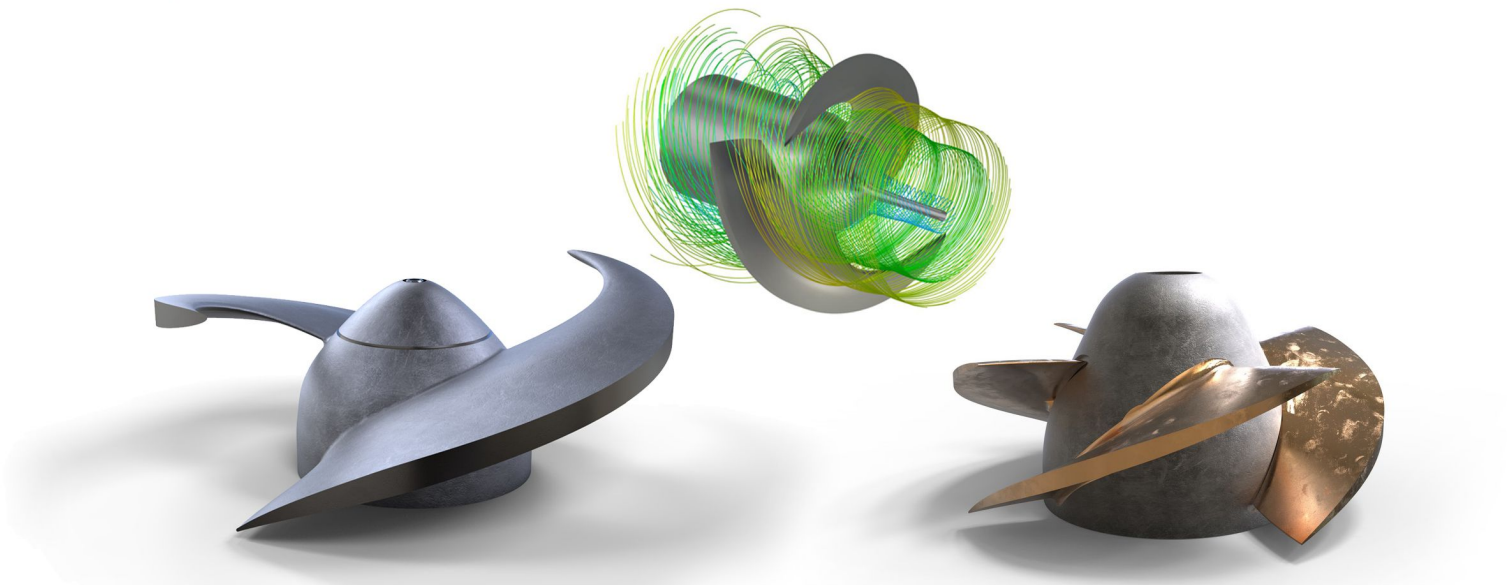
A concrete volute was deliberately chosen for the ACVP, as this reduces maintenance costs to a minimum. This also benefits the lifetime of the pump. Concrete volutes for pump applications have been used in the Netherlands since the 1930s and this construction form has proven to be very maintenance friendly. These concrete volutes are still in perfect condition today. The concrete also provides a solid base for the rotor unit and reduces the noise level of the pump installation.

Concrete volute construction 1932
Pumping station Gewende..
Photo: the Memory / Stork photo collection

FISH PASSABLE EXECUTION

The many years of experience with hydraulic issues in various industry specializations has lead to Rodelta employees regularly assisting large companies in solving hydraulic problems. Likewise, Rodelta employees have been deeply involved with the development of the international standard for determining the fish passability of pumping installations. Based on these guidelines, Rodelta has also developed an optimum impeller shape for the ACVP, which is the optimum between the highest fish passability and maximum efficiency.

The impeller for the pump-turbine can also be executed in an optimal fish passable version by our hydraulic department.



Fish passable axial impeller ACVP

Axial impeller ACVP

SHORT INSTALLATION LENGTH

The ACVP pump has a very short installation length. This refers to the lifting height needed to guide the water from a vertical flow direction to the horizontal discharge. This has a major influence on the pump efficiency, especially in pumps with low heads. The energy required to pump to this height has a direct influence on the pump efficiency. For instance, if you require 0.5 meters of extra head in order to transport the fluid from vertical to horizontal flow optimally, then at a nominally required head of 1 meter, this is already 33% loss of efficiency. Of course, you could compensate for this by using a siphon effect. But in order to achieve this siphon effect you might need to install a more powerful motor, which will lead to extra costs. In addition to the motor, this can also require a more expensive frequency converter or perhaps even installing a more powerful electricity connection. It is also possible that your motor will not run at its optimal operating point after the siphon has been installed. If you make the wrong choices, these costs can haunt you throughout the entire lifespan of the installation.

Another solution might be a combination of several pumps or different pump types. This demonstrates that there are many consideration to take into account when making a good selection for your choice of pump. Rodelta would be happy to guide you in this process. Rodelta is more than just a pump manufacturer. In addition to producing pumps, we also specialise in supplying pump solutions, always starting from the total system of which the pump is a component. Feel free to ask about our possibilities.

Features: Axial Concrete Volute Pump

- Corrosion resistance concrete volute pump casing and few metal parts in contact with pump liquid reducing material cost in corrosive/erosive applications (e.g. seawater)
- Space saving construction (pit depth, hoisting length/building height) compared with vertical pumps
- Less vibration due to robust design with casing of concrete
- Low inspection and maintenance cost
- Fish-friendly design available
- All electrical, undervoltage parts set up above water level
- ACVP designed with a low-maintenance vision in mind, especially for the underwater parts.
- Environmentally friendly design with regard to contamination by lubricants. No lubricant can get into surface water.
- Practically no clogging problems due to large volute passage
- Different motor drive versions possible
- The ACVP can also be executed as a turbine. In times of little water the pumps can deliver water. But in times of too much water the same pump can be used as turbine. This way you can recover energy costs during turbine operation.

Specifications:

- Delivery size up to 2500mm
- Capacity up to 150000m3/hr
- Head up to 11m
- Suitable for liquid Temperature: Up to 50°C
- Sealing Arrangement: Packed gland

Applications:

- Flood control
- Drainage- or irrigation pumps

Constructional features:

Pumpcasing
- The spiral shape volute pump casing and suction are made of pre-fabricated concrete material and supplied by the pump supplier. It is also possible to pour the concrete volute and suction on site.

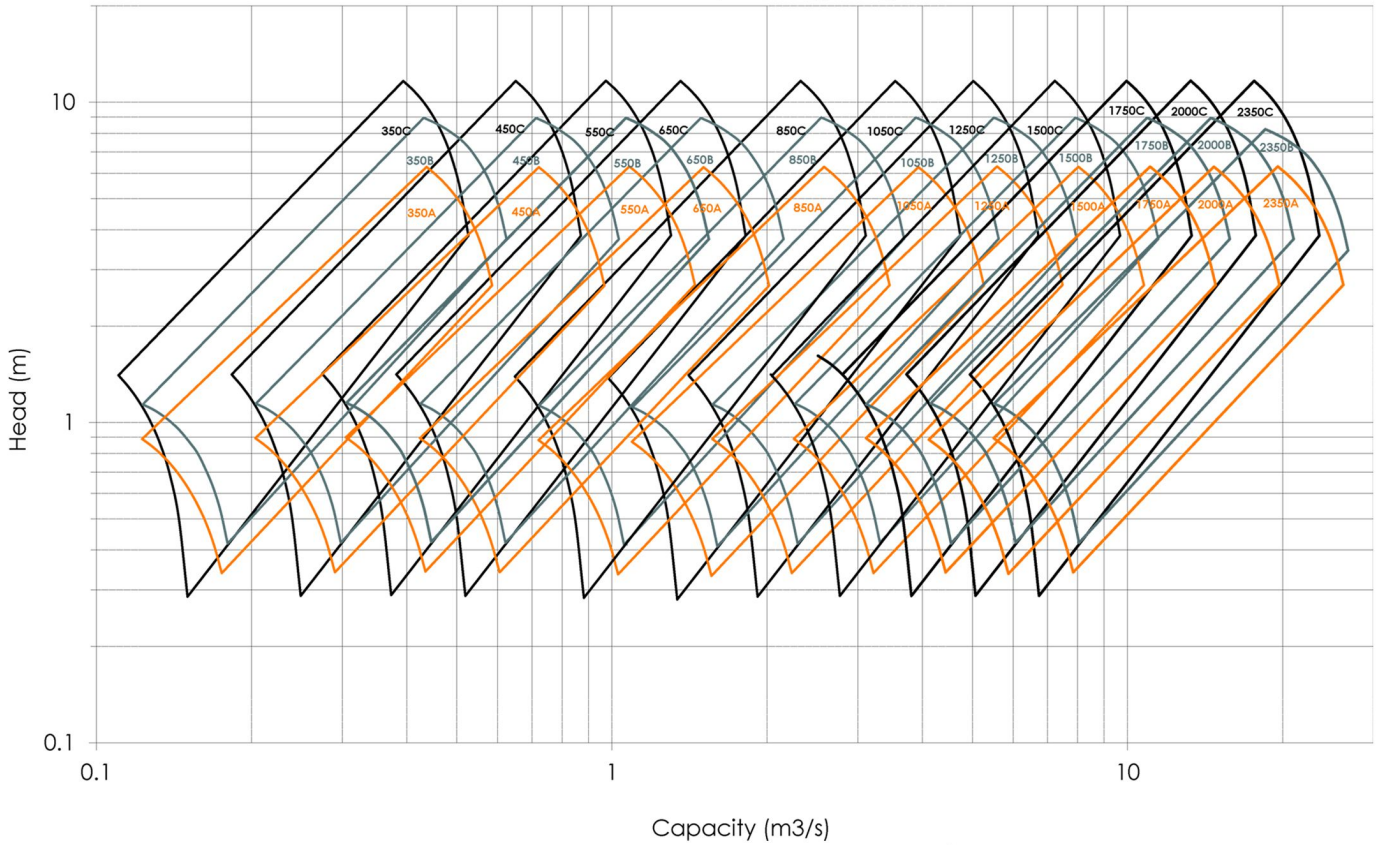
Impeller & shaft
- The impeller is axial (propeller) type mounted to the pump shaft.

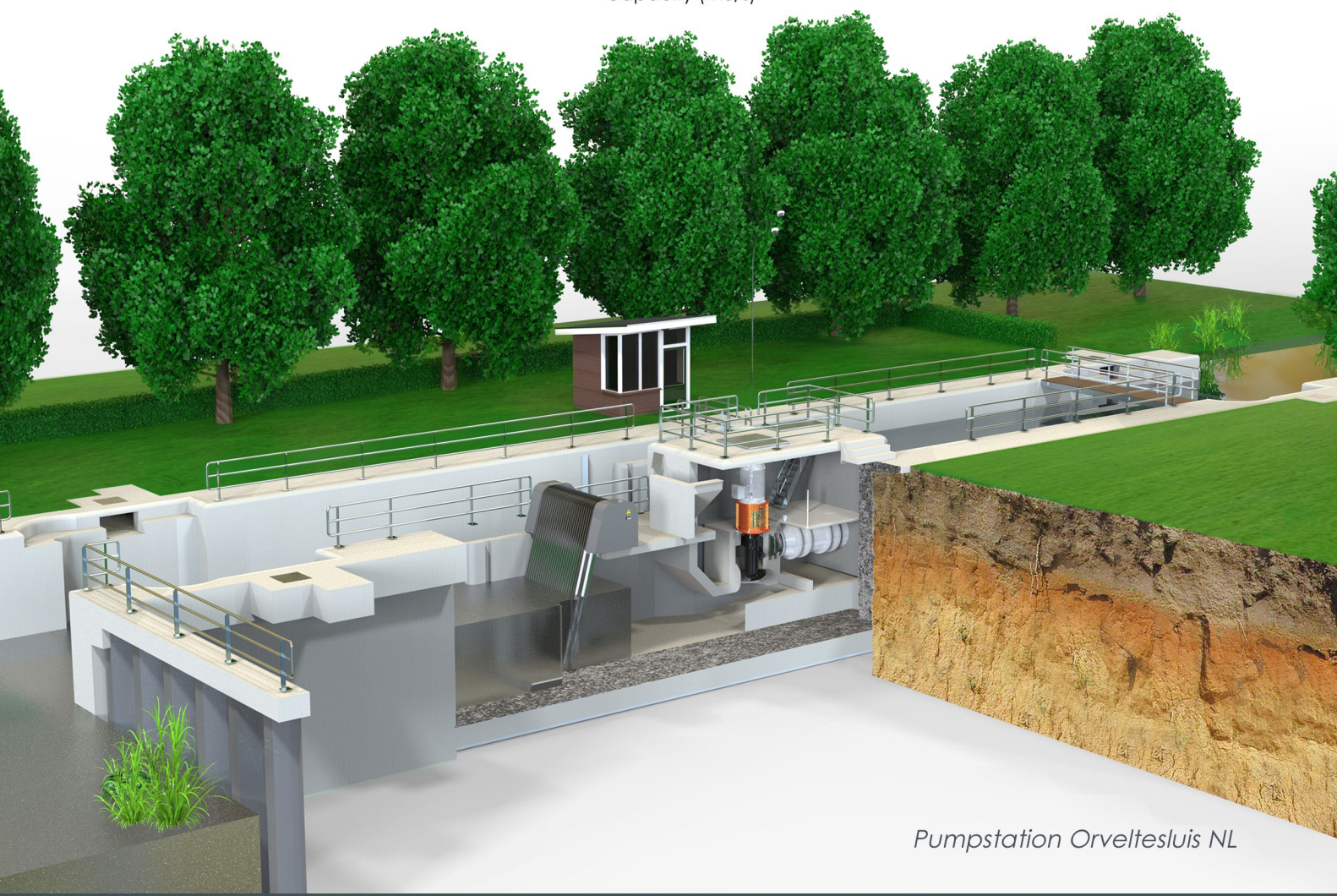
Thrust bearing assembly
- The axial thrust bearing assembly provided with radial roller and ball or spherical thrust bearings.

Discharge metal part (optional)
- The discharge metal part is optional and connecting the rectangular volute out to the round discharge piping.

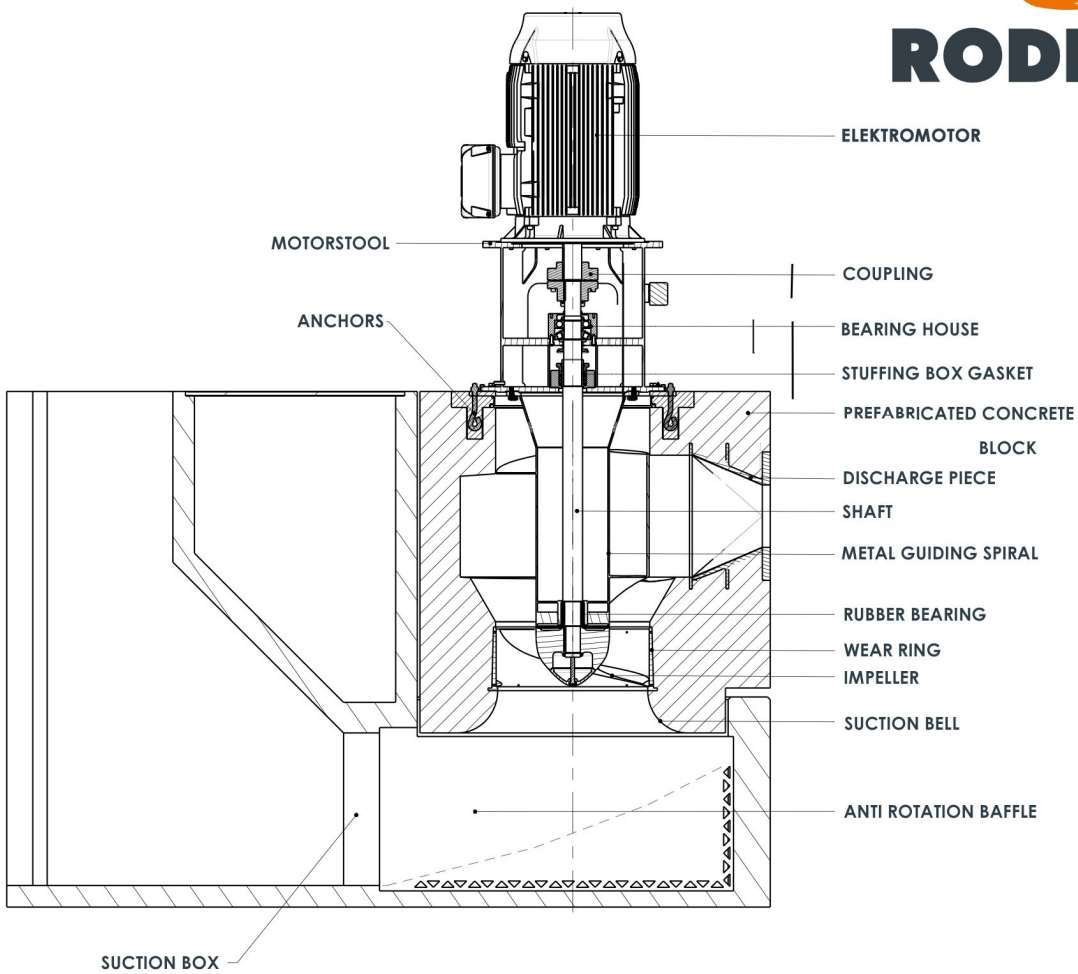
RODELTA®

Rodelta ACVP operating ranges





Pumpstation Orveltesluis NL



Features	Prefabricated concrete volute, axial open impeller design
Capacity @ BEP	Upto 150000 m^3/hr
Head	Upto 11 m
Temperature range	-10 to 50 °C
Efficiency	Upto 82 %
Material (Casing/Impeller)	Nickel Bronze, SS, Duplex, Super Duplex
Nozzle Orientation (suc/dis)	Formed suction intake and horizontal discharge
Standard Motor Sync. Speed	600 rpm
Options	Direc drive / Gear box drive
Flange drilling standard	BS EN/DIN/ANSI /AWWA
Max. Operating Speed	600 rpm