



SCVP Single-vane Concrete Volute Pump

The pump type SCVP (Single-vane Concrete Volute Pump) is a vertical dry pit pump, single stage with volute pump casing of pre-fabricated concrete material. The pull-out unit of the SCVP is equipped with an single vane impeller design. The material of the metal pull-out unit depends on the pump liquid and is available in various materials. The SCVP pump can be used for flood control, drainage, irrigation and sewage applications and are ideally suited in applications where clogging is a problem. These pumps can be delivered in a fish-friendly version.



CONSTRUCTION TYPE

The SCVP is a pump with an single vane impeller, which discharges into a specially designed concrete volute. The fluid flow is optimally guided through the shape of the pull out unit in to the volute. This volute is relatively large. This was done to keep energy losses as low as possible and to minimise possible blockages by the pumped medium. In addition to the advantages of durability and ease of maintenance, the use of concrete also contributes to a solid construction and a low noise level of the pump.

IMPLEMENTATION

The SCVP 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. This construction offers the possibility of adjusting the height of the rotor unit in relation to the impeller seal ring. The combination of the top and lower bearing construction, ensures a stiff and strong rotor unit design.

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 equipped with a hub, which is connected to the impeller by means of dowel pins. On the other side of the shaft is the key for attaching the coupling. The shaft is separated from the flow of the pumped medium by the large, stable cylindrical tube. Because of this, no impurities can attach to the pump shaft.

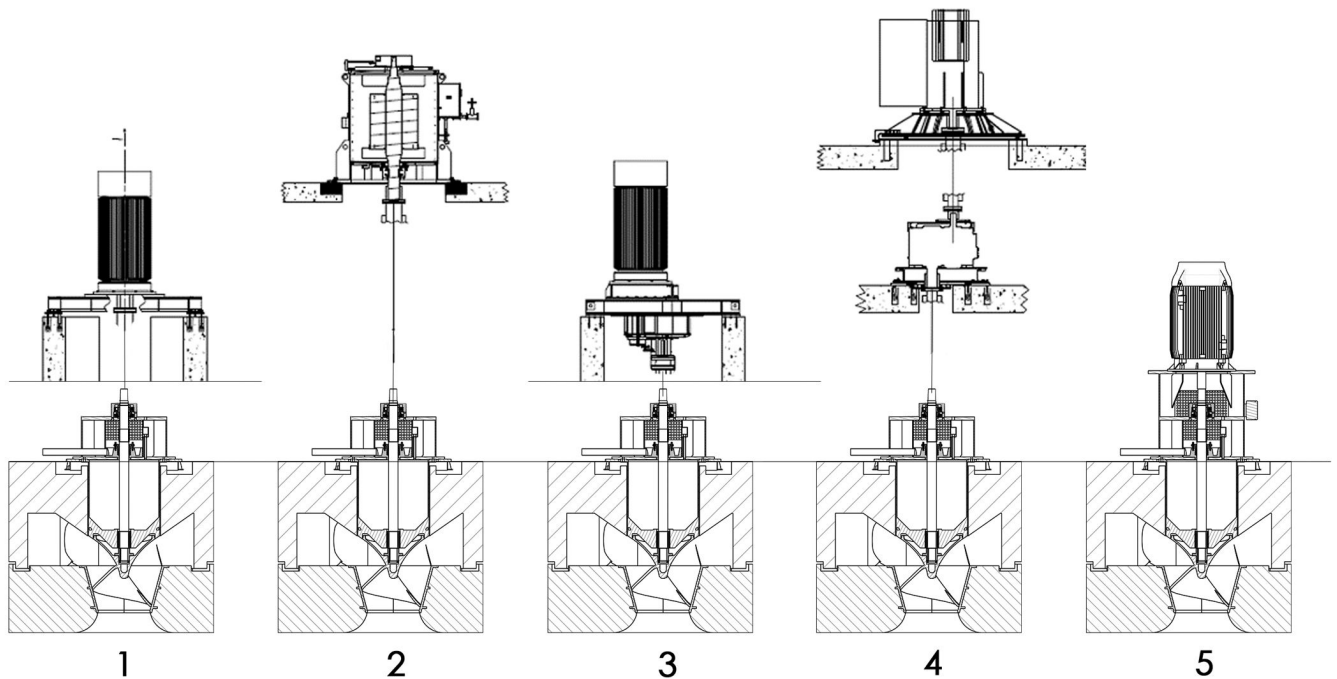
At the locations of the shaft where wear occurs as a result of bearing or sealing, wear bushings have been designed. The advantage of this is that in the event of an overhaul, it is not

necessary to replace the entire shaft. but only replacing the worn out shaft bushings is sufficient.

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.

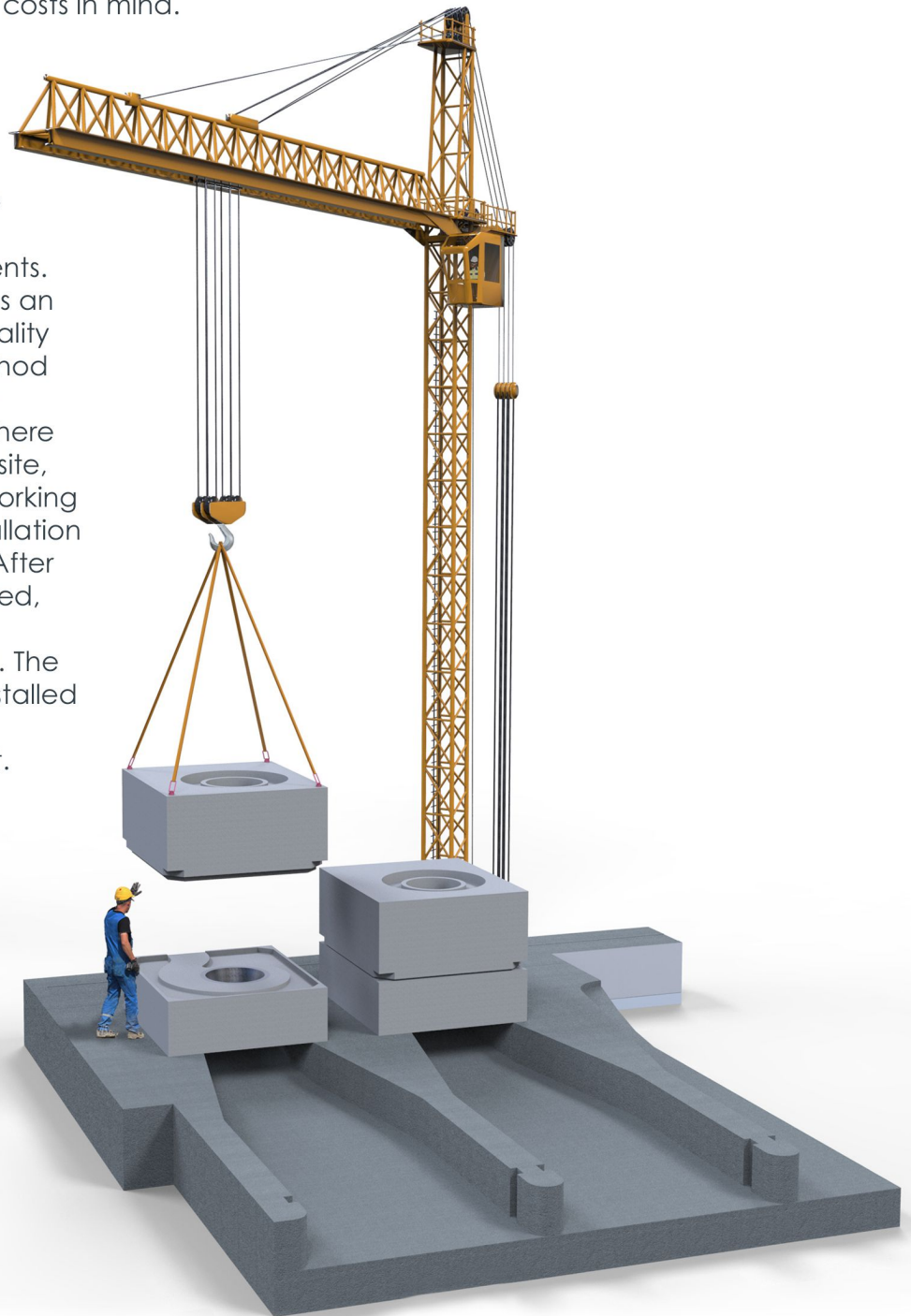
Below are a few other configurations with regard to the driver



- 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

Depending on the height differences between the different suction levels, it may be possible to remove the pump without damming up the suction. This design choice has also been made with limited operational costs in mind.

The volute and suction bell are manufactured entirely from prefabricated concrete elements. This prefab method guarantees an exact shape and concrete quality of the hydraulic parts. This method also ensures a better planable progress on site. In situations where several parties are working on site, this often leads to delays. By working with prefab elements, the installation time is limited to a single day. After the prefab elements are installed, the civil contractor can simply continue with his building work. The prefabricated elements are installed and finished by or 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 for instance as a connection for the downstream piping in which valves can be mounted.

A concrete volute was deliberately chosen for the SCVP, 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.



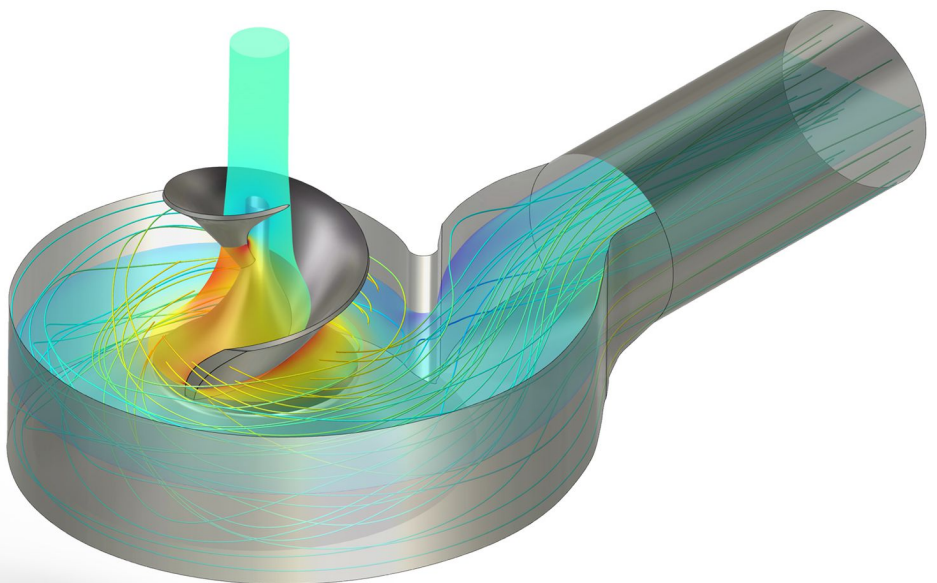
*Concrete volute construction 1932
Pumping station Gewende..
Photo: the Memory / Stork photo collection*

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 SCVP, which is the optimum between the highest fish passability and maximum efficiency.



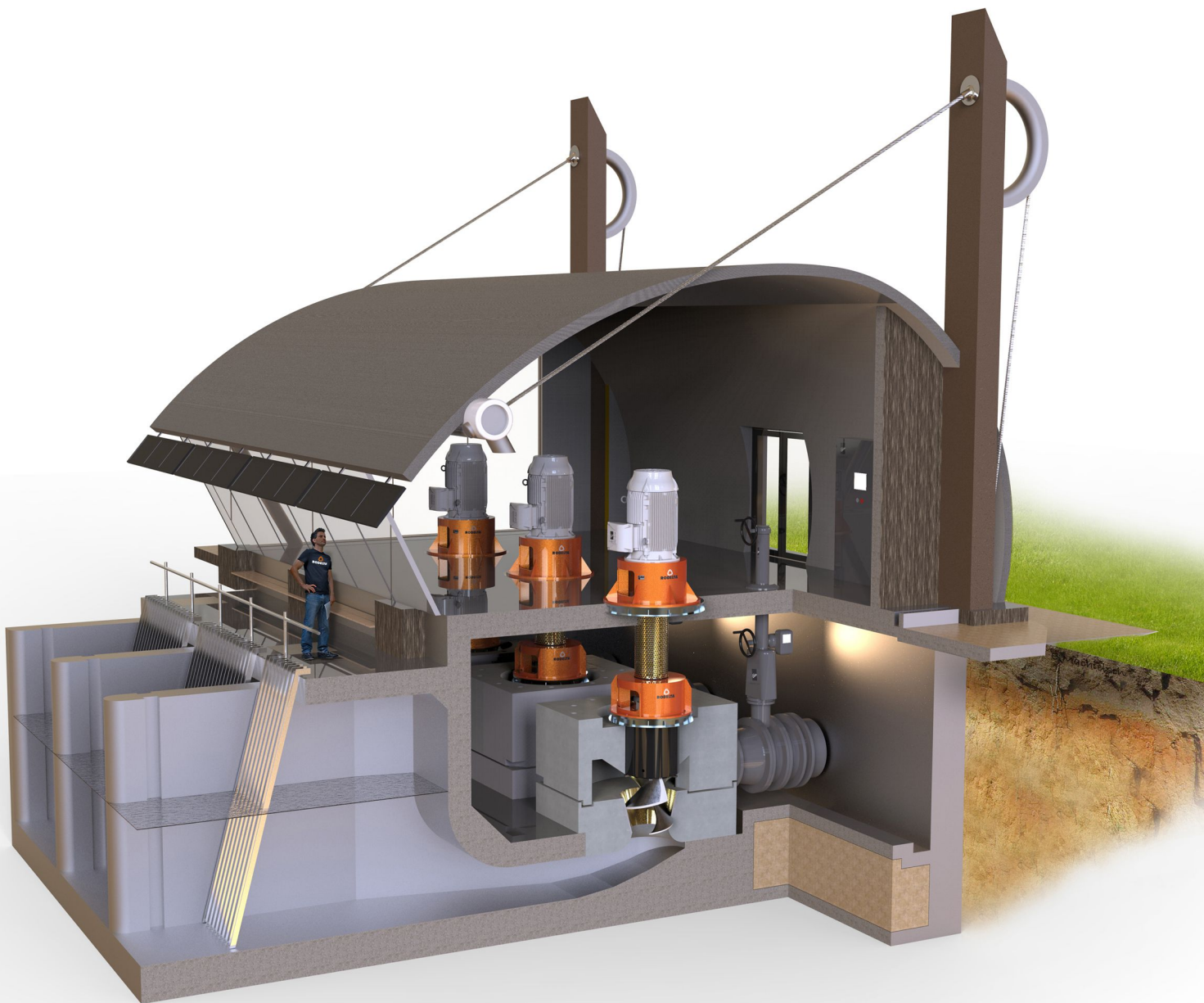
Single vane impeller SCVP



*CFD calculation of interaction
between impeller and casing SCVP*

COMPACT DESIGN

Due to its mixed flow concept, the SCVP has a low installation height. The volute shape is designed to be very compact for a centrifugal design, Which resulted in a small footprint and offers advantages in terms of building costs. The volute tongue can be equipped with a steel liner, which prevents the leaching of concrete at high flow rates. However, in many cases the velocities are low and this option is not necessary. The compact suction box on the inlet side of the pump is fitted with an anti-rotation baffle. This ensures a nice uniform inflow into the impeller which contributes to a quiet behaviour of the pump in operation. The SCVP is also a very low-noise design due to its concrete design concept.





RODELTA®

Features: Single-vane 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. The tongue of the volute is extra large and stands relatively far away from the impeller.
- All electrical, under voltage parts set up above water level
- SCVP 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 extremely large volute passage
- Different motor drive versions possible
- The SCVP 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.
- Rodelta attaches great importance to the ecological footprint. Therefore Rodelta offers the option of using geopolymer concrete for their prefab concrete parts. This will result in a reduction of at least 80% in CO² emissions.

Specifications:

- Delivery size up to 1600mm
- Capacity up to 54,000m³/hr
- Head up to 12m
- Suitable for liquid Temperature: Up to 50°C
- Sealing Arrangement: Packed gland

Applications:

- Flood control
- Drainage- or irrigation pumps
- Sewage

Constructional features:

Pumpcasing

- The volute pump casing and suction are made of pre-fabricated concrete material and supplied by the pump supplier. Rodelta offers the option of using geopolymer concrete for their prefab concrete components. (80% reduction in the concrete CO² emissions.)

Impeller & shaft

- The impeller is mixed flow type mounted by a hub on the pump shaft

Thrust bearing assembly

- The axially adjustable thrust bearing combination is equipped with radial roller and ball bearings or spherical thrust bearings.

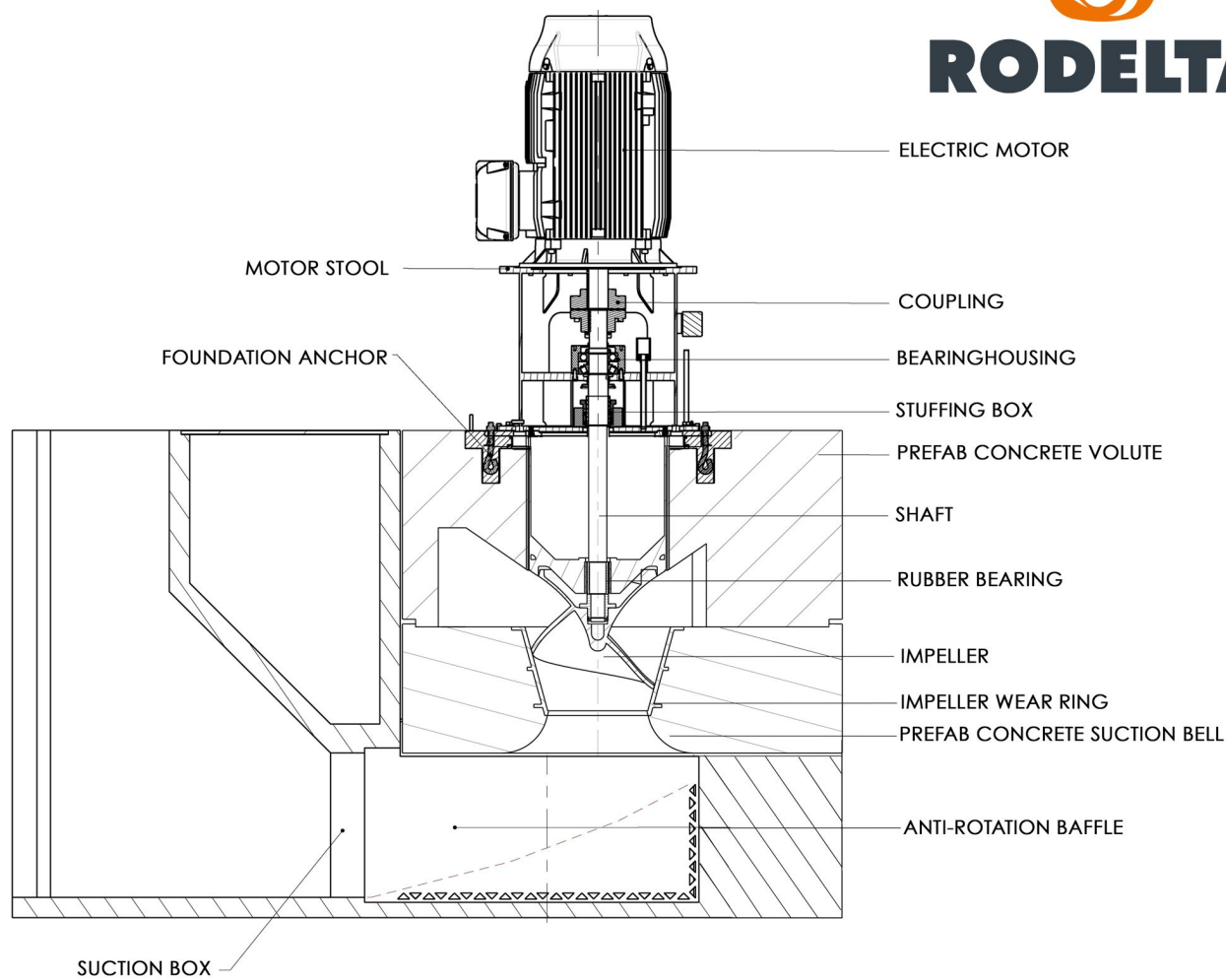
Discharge metal part (optional)

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





RODELTA®



Features	Prefabricated concrete volute, mixed flow impeller design
Capacity @ BEP	Upto 54000 m ³ /hr
Head	Upto 12 m
Temperature range	-10 to 50 °C
Efficiency	Upto 83 %
Material (Casing/Impeller)	Nickel Bronze, SS, Duplex, Super Duplex
Nozzle Orientation (suc/dis)	Formed suction intake and horizontal discharge
Standard Motor Sync. Speed	Depending on the application
Options	Direc drive / Gear box drive
Flange drilling standard	BS EN/DIN/ANSI /AWWA
Max. Operating Speed	600 rpm