Rodelta HZC

The pump type HZC (OH2) is a series of horizontal overhung centerline mounted, single stage, single suction heavy duty centrifugal pumps with diffuser and volute design casings. The design of HZC complies with the latest edition of the American Petroleum Institute standard 'Centrifugal Pumps For General Refinery Services', also known as API 610/ ISO13709. Satisfying this standard, the HZC meets the high level performance requested by refineries and petrochemical industries.

Features:

- Single stage overhung design pump – API610 (OH2)
- Heavy duty, centerline mounted, radially split casing
- Back-pull out unit design. Pump internals can be taken out without disconnecting suction / delivery piping or moving driver.
- The casing is self-venting due to the centerline discharge
- The impeller is a closed radial design, dynamically balanced and incorporates a wear ring on either side of the impeller.
- Diffuser design, reduces radial loads, reduces minimum flow requirements, high efficiency at any duty
- Volute design, double to reduce radial loads

Specifications:

- Delivery size up to 300 mm
- Capacity 10m3/hr to 1920m3/hr
- Head up to 380m
- Suitable for liquid Temperature: Up to 425°C
- Sealing Arrangement: mechanical seals
- Flange rating: Cl. 150/300/600
- API material options available NACE & ATEX approvals available on request

Applications:

- Fluid handling in oil refineries and petrochemical industry
- High temperature and high pressure critical applications in chemical and allied industry
- Upstream, pressure booster
- Midstream, process transfer, bottom reflux, propane/ butane/LPG handling, diesel oil/gasoline/naphtha/lube oils etc., sodium carbonate/caustic sour water, MEA/DEA/TEA

Applications:

- Fertilizer, carbamates/lean and semi lean solutions, NH3 feed, other removals
- Power plant, Hot water circulation, condensate transfer, fuel oil
- Onshore/Offshore installations
- FSPO platforms
- Hydrocarbon storage
- Liquid gas plants

Constructional features:

- Suction and discharge flanges are available drilled to either ANSI or DIN-EN standards, flange rating comply with API 610 nozzle load requirements.
- The pump casing, cover and seal cover incorporate a fully confined gasket.
- Mechanical Seals conform to API 682 / ISO21049 and are fitted into the API compliant seal chamber, either single, double or engineered seals can be accommodated that meet the full process requirements. All seals are provided with the relevant API compliant flushing, cooling, heating, quench and buffer fluid systems and associated pipework.
- Heavy duty axial and radial bearings support the pump shaft. Located within the cast steel housing are labyrinth type radial oil seals
- Oil lubrication with oil bath or oil flinger to splash the oil
- Oil level monitoring of the pump by constant level oiler
- Bearing housing with bearing covers having replaceable labyrinth type end seals

Optional: Water-cooled bearing houses (Figure 1), pure mist or purge mist lubricated bearing houses

Water-cooled bearing house

1 *Finbraze 1/2" tube OD, 3/16" fin height, 10 fins/inch*
Mat: SS 316

2 *Reducer 1" NPT to 1/2" NPT*
Mat: SS 316

3 *Thermocouple connector 1/2" A-lok – 1/2" NPT*
Mat: SS316

4 *Flange 1/2" A-lok to ANSI 150#*
Mat: SS316

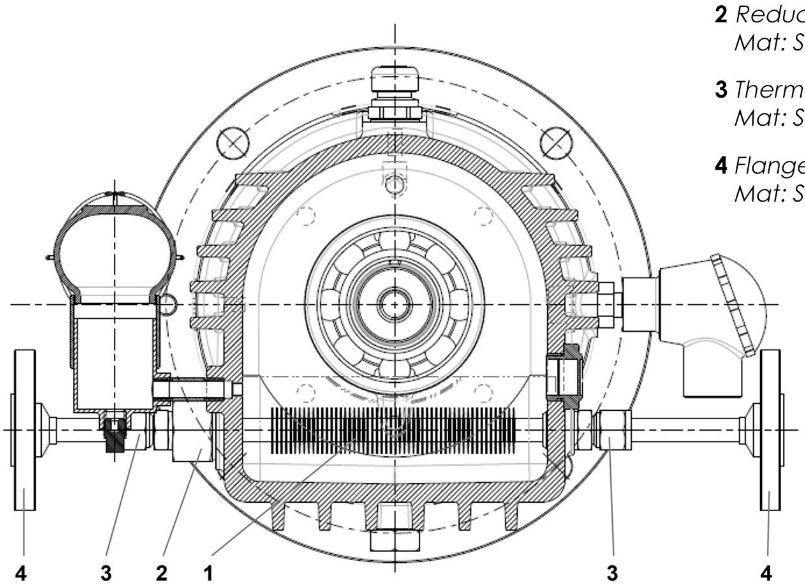
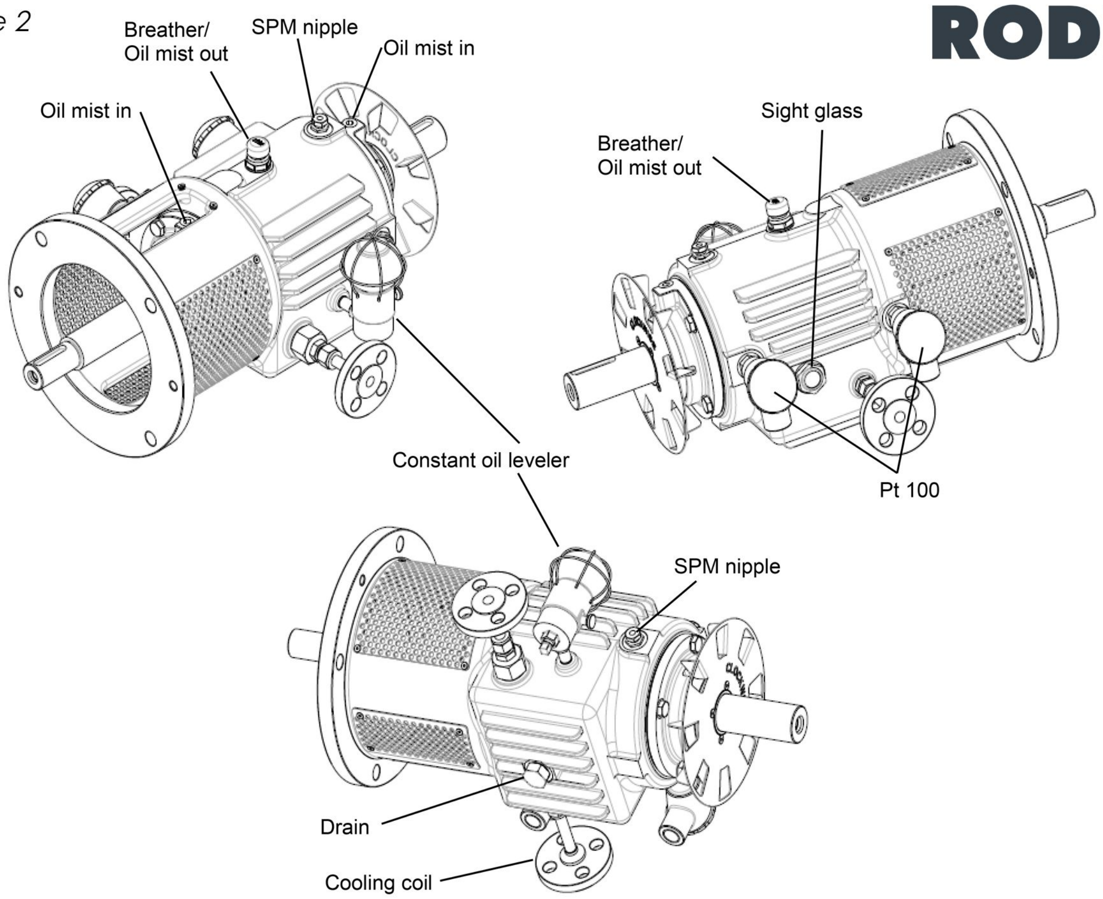


Figure 1

Monitoring features

Monitoring features like SPM vibration nipples and PT 100 temperature measurement provisions are optional. See figure 2

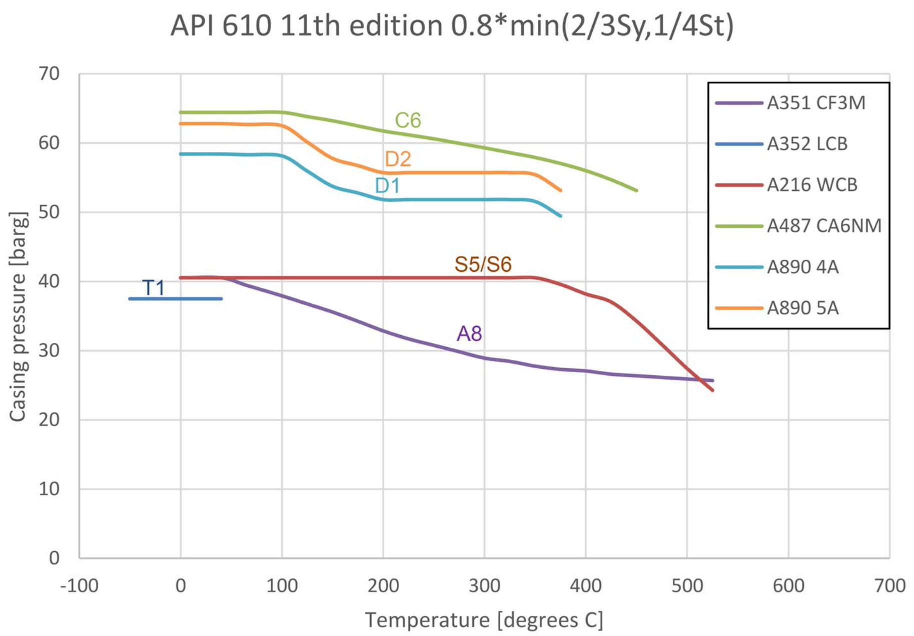
Figure 2



Maximum allowable working pressure (MAWP)

The allowable pressure – temperature ratings for different materials, according to API 610 11th edition, are given in figure 3 It should be noted that the 11th edition is more conservative than the 10th edition because of 1/4St instead of 1/3St. In the ANSYS calculation the pump feet were clamped. In reality the pump pedestal can deform somewhat, which would reduce the stress levels in the pump casing somewhat. Therefore the pump casing of the HZC range are relatively heavy compared to competitors, which in fact would give room for higher allowable working pressures or larger corrosion allowances.

Figure 3



Why using diffuser technology in HZC pumps?

The working principle of centrifugal pumps is based on adding energy to the working medium using a rotating impeller. This process, in addition to increasing the static pressure, also increases the velocity of the fluid. The added energy in the form of velocity (or dynamic pressure) can be partially converted into static pressure by properly slowing down the fluid. This is often done by using a volute which is a spiral-formed casing around the impeller, collecting and guiding the fluid towards the discharge pipe while gradually decreasing its velocity.

A volute pump casing combines two functions: providing the hydraulic flow path and the pressure casing for the fluid. In diffuser pumps, these functions are split into two separate parts. A casing (or collector) is used for creating the pressure boundary, while the velocity-pressure conversion is done by employing a diffuser, which is a ring with multiple diverging channels, placed around the impeller. This provides more guidance for the decelerating flow which can be beneficial from several points of view. Especially for pumps made for operation at relatively low flow rates, diffuser pumps outperform volute pumps efficiency wise. In addition to the higher maximum efficiency, the efficiency does not collapse as fast when operating in part load conditions (See *figure 4*)

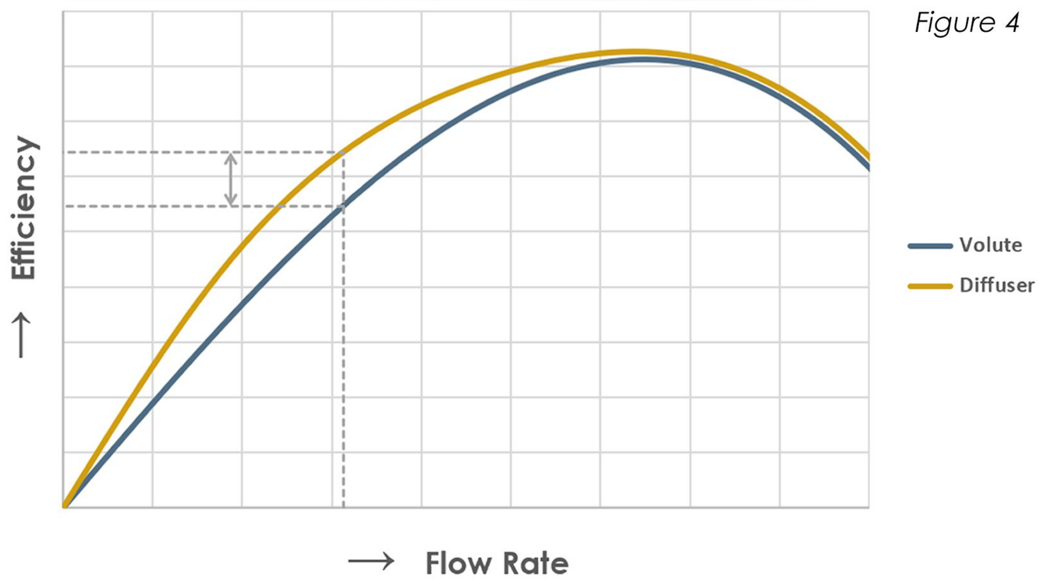
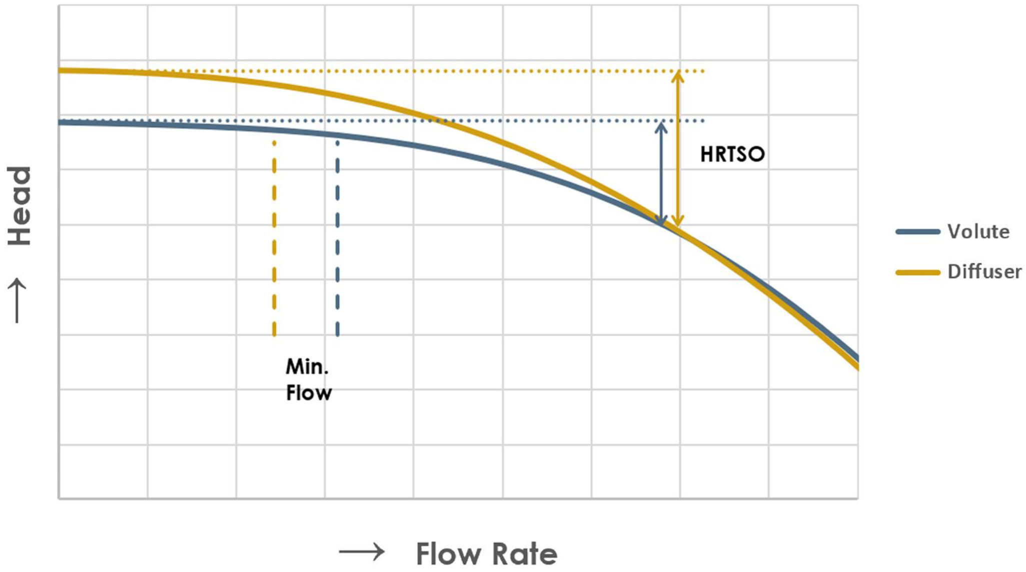


Figure 4

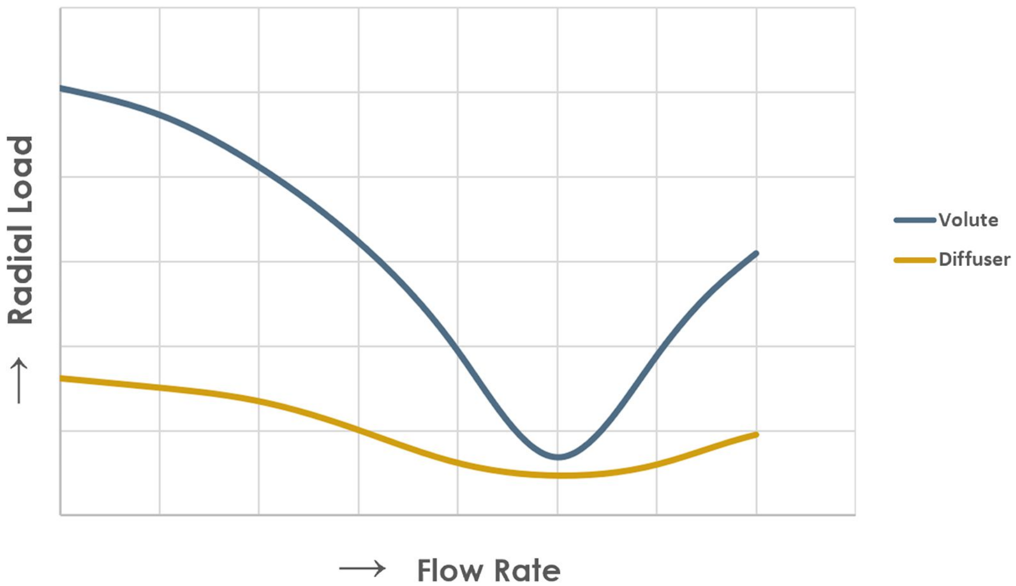
Furthermore, diffuser pumps mostly have higher head rise to shut-off (HRTSO) and greater steepness and stability of the head curve, which is especially required for pumps operating in the API market and for parallel operation (see *figure 5*).

Figure 5



Diffuser pumps are not just advantageous from an efficiency standpoint. The multi-channel diffuser geometries show more axial symmetry than the asymmetric volute shapes. As this axial symmetry is also present in the pressure distribution of the flow field, most of the radial loads are cancelled out (see *figure 6*)

Figure 6

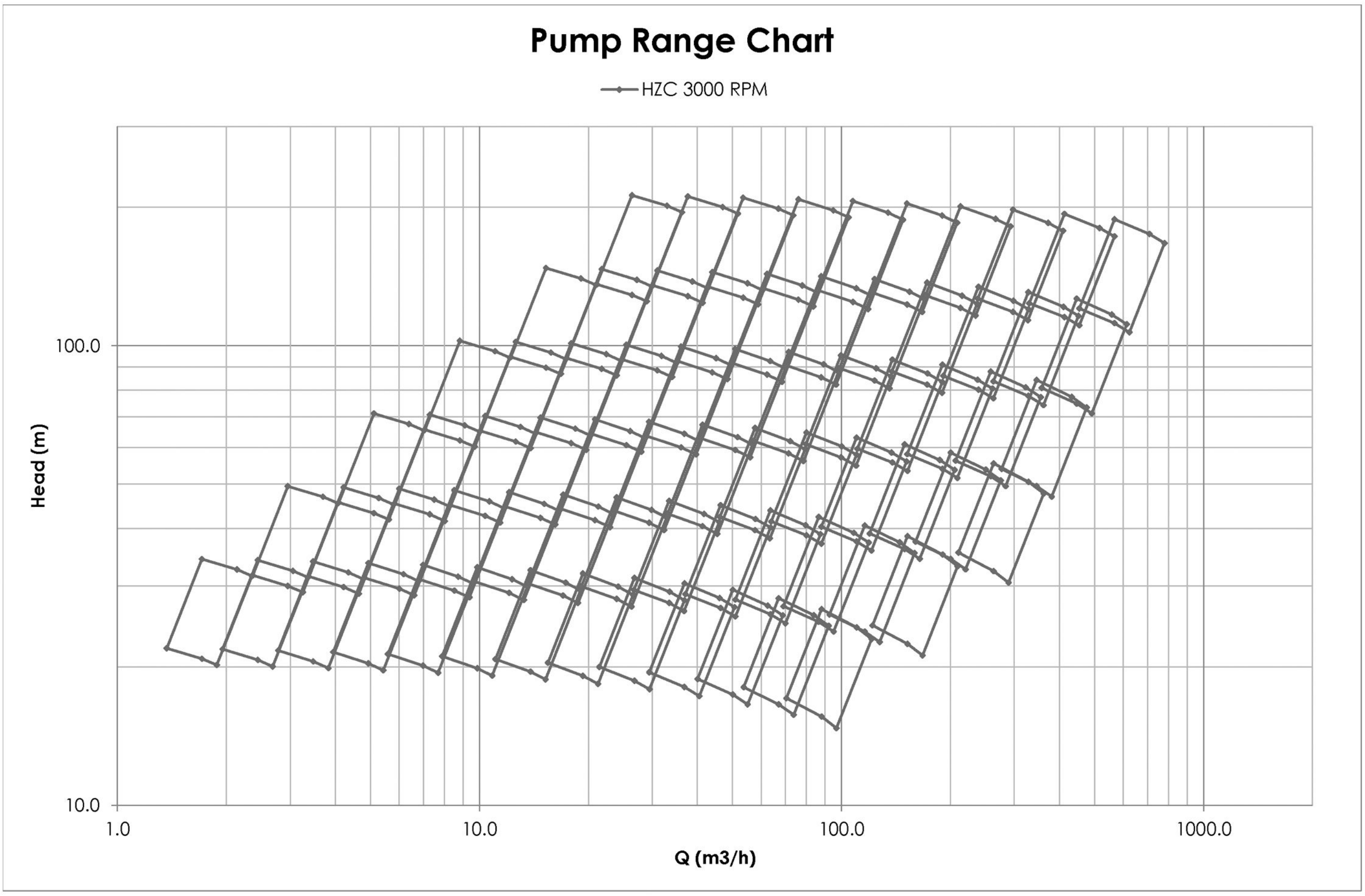


Also, due to a series of diffuser vanes as opposed to a single volute tongue, pulsations from the passing impeller blades and other unsteady flow phenomena are greatly reduced. Lower unsteady behavior means lower vibration and noise levels, which is especially noticeable at off-design operating conditions. The reduced loading and vibrations in turn lead to longer mean time between maintenance, mean time between failure and lower minimum continuous safe flow rates. Although diffuser pumps are generally more expensive than their volute counterparts, the higher investment can be easily returned by the longer life-cycle of the pump, lower spare part cost and the significant reduction in down-time of the entire process.

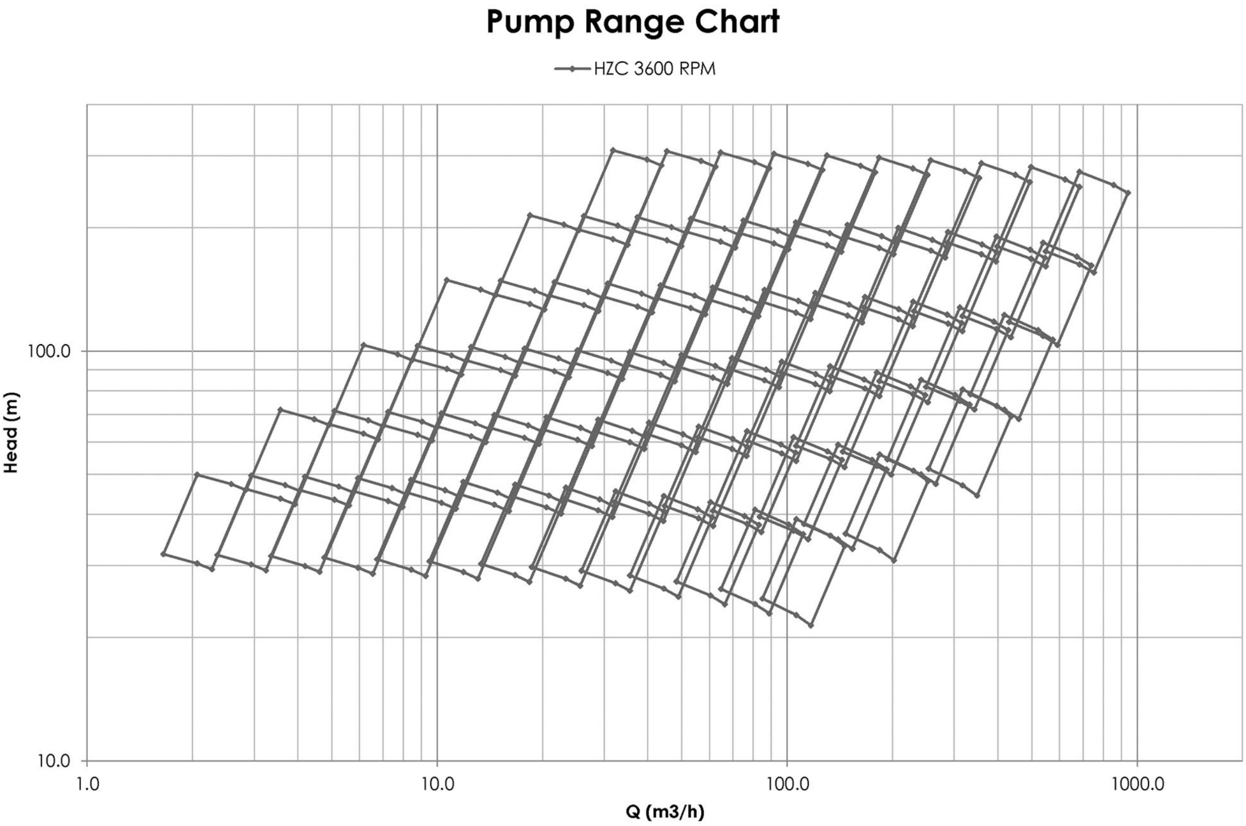
Another advantage arises from the fact that the diffuser is a separate part from the pump (pressure) casing. A lot of design flexibility is introduced because a single casing can fit a wide range of diffuser geometries. As the diffuser channels are machined, they do not suffer from the limitations of a casting process, which is the case for volute casings. This also provides the opportunity to make custom diffusers for every order, which can be done very rapidly. Doing this for a volute would be an almost impossible task, as designing a volute is more complex and casting patterns would have to be made and stored for every single volute. This means that volute pumps will mostly be a compromise: due to the limited number of volute pumps in a range, the customer duty point will deviate from the best efficiency point of the pump. This problem can be circumvented using diffusers. By trimming the impeller diameter and creating a custom diffuser geometry, the required pump performance can be achieved where the best efficiency point is located exactly where the customer needs it. This even provides possibilities for retrofitting existing diffuser pumps with a new impeller and/or diffuser, in order to completely change the duty point of the pump, increasing the life cycle of the pump even further.

Machined diffuser

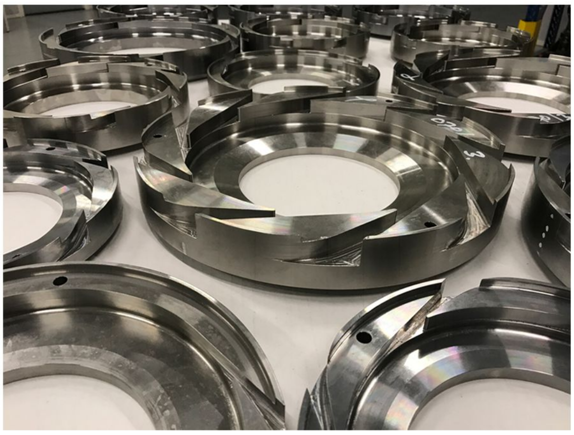
HZC-D performance curves



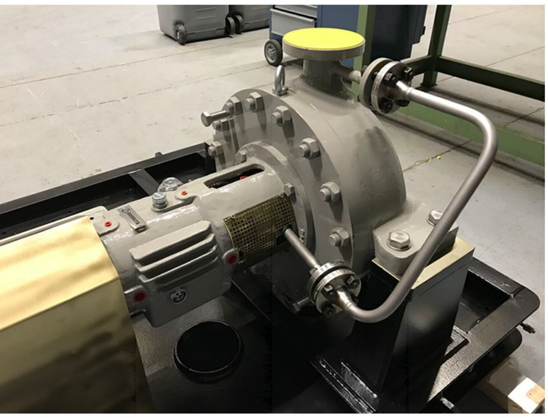
HZC-D performance curves

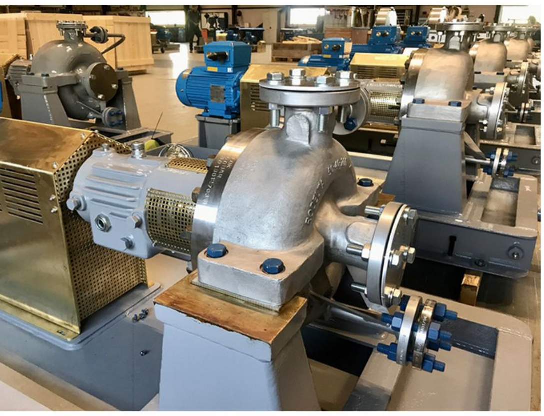


Larger capacities available up to 1920 m3/hr.
Contact Rodelta for details



RODELTA®





RODELTA®

Design standard	ISO 13709
Features	Overhung OH2, center line mounted, single stage pump (API 610)
Capacity @ BEP	Upto 1920 m^3/hr
Head	Upto 380 m
Temperature range	-104 to 425 °C
Discharge pressure	Upto Cl. 600#
Nozzle Orientation (suc/dis)	End-Top(Standard) & Top-Top(on request)
Standard Motor Sync. Speed	1000/1500/3000 rpm
Suction Pressure	Upto 80 Bar
Max. Operating Speed	3600 rpm
Flange ratings(#RF)	Cl. 150/300/600