RUHRPUMPEN

# Magnetic Drive Pumps

**Patented design features**

## RP's mag drive pumps:

### CRP-M

**Centrifugal Pumps with Magnetic Drive acc. to DIN EN ISO 2858 and 15783**

### SCE-M

**Process Pumps with Permanent Magnetic Drive acc. to API 685, 2$^{nd}$ Edition**

Ruhrpumpen engineering team of industry experts have worked in the development and execution of innovative designs for our sealless magnetic drive pumps. Up to now, 9 patents have been granted to our magnetic driven pump research and development team and incorporated within our mag drive standard pump builds, namely:

- **Internal Flows and Pressures** *(patent granted)*
- **Journal Bearing Design** *(patent granted)*
- **Axial Thrust Balance**
- **Fastening of Zirconium Oxide Containment Shell** *(patent granted)*

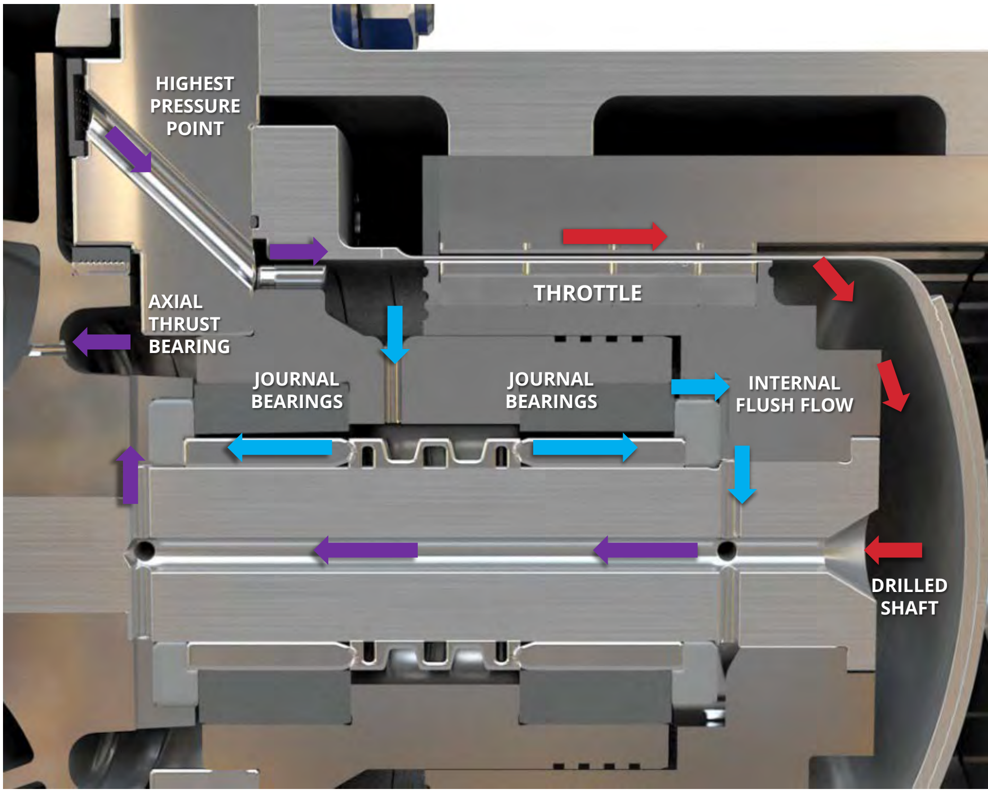
# Internal Flows and Pressures
(patent granted)

A reliable and well-defined pressurization within the flushing system for the magnetic drive and journal bearings guarantees the good operation and integrity of the pump.

A reduction of the impeller sided cross section of the lubrication groove results in a higher pressure in the whole bearing area, and a lower, optimized lubrication flow rate. This also reduces the rise of the fluid temperature caused by the magnetic loss, due to more fluid available for that task.

The labyrinth throttle in the gap between the inner magnet rotor and the outside of the bearing housing reduces the waste of flushing liquid.

Meanwhile, the pressure build-up at the labyrinth throttle stabilizes the rotating unit. By these measurements the vibrations are reduced from 2,1 $^{mm}/_{s}$ to 0,9 $^{mm}/_{s}$ at 2900 rpm and 200 kW power absorbed with the test pump. This also achieves a significant reduction of load—and wear—at the radial journal bearings.



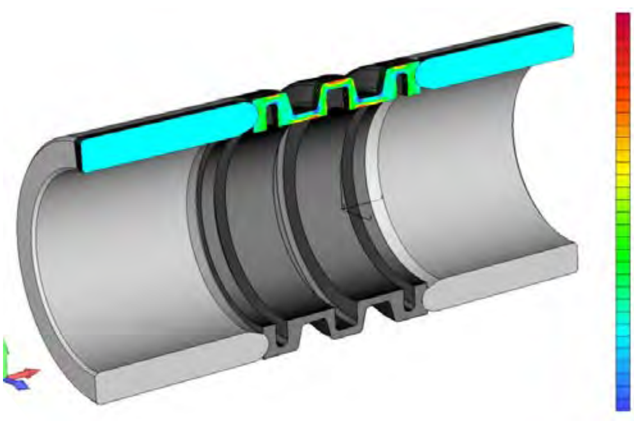

The pressure build-up at the labyrinth throttle, guides the internal flow over the inner magnet rotor. This results in a reduction of the necessary total flow by approximately 30%, while the necessary flow for the heat dissipation remains the same. Therefore achieving an improvement of the overall efficiency of the pump.

- The safe lubrication of the rear axial thrust bearing reduces the friction power by approx. 0.3 kW
- Reliable and well-defined internal flush flow over the complete performance range up to $Q_{opt}$ x 1.5
- 45% of the discharge pressure is available for the pressure overlay at entry of the internal flush into the impeller vanes
- The optimized flushing system prevents the vaporization of the product in the pump

# Journal Bearing Design
(patent granted)

The axial and double radial Journal Bearing made of "pure" Sintered Silicone Carbide (SSiC) in standard design follows the next features:

- Spherical locking sleeve for axial and radial centering
- Bearing sleeves with a sphere for axial and radial centering
- Radial centering of the bearing sleeves in the axial thrust bearings in the same material (SSiC/SSiC) results in the same expansion factor over the complete temperature application range
- Bearing bushes with double interference fit assembly to avoid axial torsion and radial displacement
- No edge loads induced by radial loads at the surface of the bearing sleeves and the bearing bushes



FEM-Calculation Locking Sleeve

The geometry of the locking sleeve has been calculated with help of the finite-element-method (FEM).The exercise was to guarantee the power transmission by the initial load between the rotating parts with different thermal characteristics of the materials (different expansion coefficient between SSIC and stainless steel 1:4), temperatures up to 350°C (662°F).

Due to the geometry of the pre-loaded locking sleeve compensates the differences of the linear expansion caused by the material and thermal between "pure" Sintered Silicone Carbide (SSIC) and the pump shaft made of stainless steel in axial and radial direction. The centering of the rotating bearing parts is always guaranteed.

# Axial Thrust Balance

By optimizing the annular areas within the internal flush system the axial thrust will be minimized over the complete operating range up to $Q_{opt}$ x 1.5. The residual thrust stabilizes the pump rotor axially and is absorbed by the axial thrust bearings.

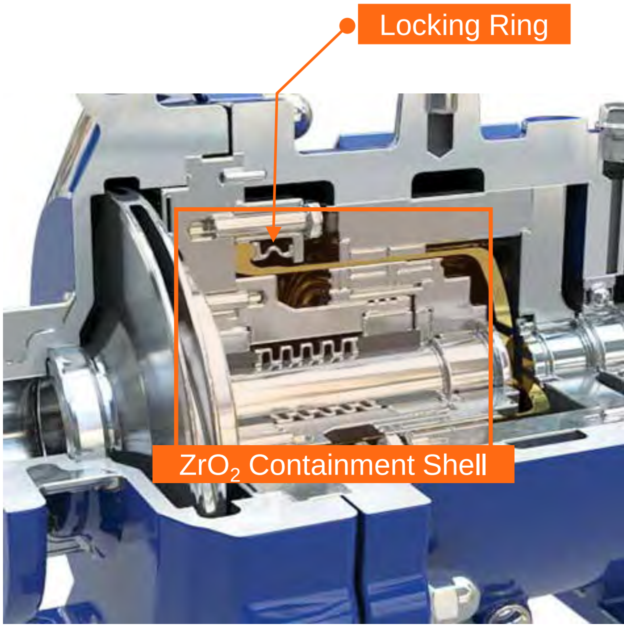
These measures ensure that products close to the vapor pressure can be handled without limitation, without the risk of vaporization at the axial thrust bearings

# Fastening of Zirconium Oxide Containment Shell
(patent granted)

Thanks to the usage of a non-metallic containment shell made of Zirconium Oxide ($ZrO_2$), the magnetic losses are eliminated and the efficiency of the pump significantly increased.

The fastening, via our innovative locking ring, guarantees a trouble-free assembly and disassembly; and ensures that the fastening forces are uniformly distributed over the flange of the $ZrO_2$ Containment Shell. All this achieves great energy savings, especially at high performances.

*Assembly errors with the breaking at the flange connection do not apply.*




## MAKE THE BEST PUMP CHOICE

It is our goal to understand our customers' needs in order to provide the best possible solution. If you're considering using a magnetic drive pump for your application or are interested in learning more about these pump lines, be sure to talk to an experienced engineer first. We will be happy to answer any questions you may have.

***With the magnetic drive pump range, we stay on top of our industry by being experts in yours.***