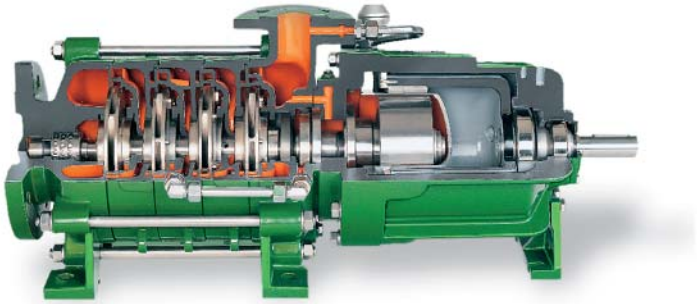
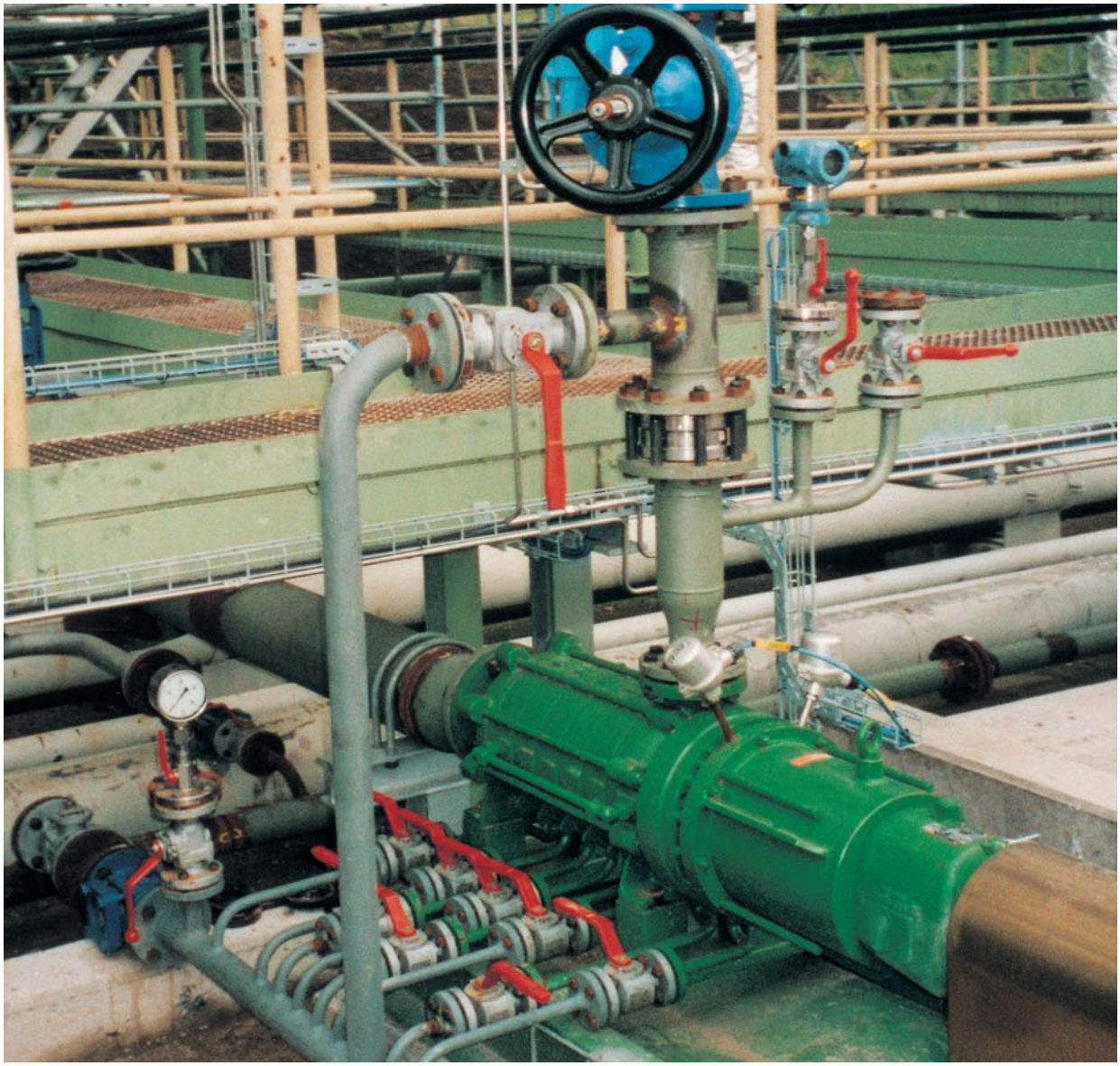
DICKOW PUMPEN





# Multistage Centrifugal Pumps
# Type HZMR

**General**

DICKOW-pumps of series HZMR are sealless multistage horizontal centrifugal pumps, driven by a synchronous permanent magnetic coupling. The containment shell is sealed by a confined gasket and separates the pumped liquid from the atmosphere. There are no leakage endangered dynamical shaft sealings available.

Due to the fact that 90% of pump failures are caused by leaking shaft seals, the sealless design increases the availability and reduces maintenance costs.

**Field of application**

HZMR-pumps are used in services where no seal leakage can be tolerated, when handling toxic, explosive and pollutive liquids and when the required differential heads are above the application range of single stage volute casing pumps.

The HZMR-pumps operate almost maintenance free, the service life is far longer than that of pumps with conventional mechanical seals.

The performance range covers capacities up to 200 $m^3/h$ (880 USgpm) and differential heads up to 350 mLC (1148 ft). The maximum operating temperature is approx. 200°C (392°F), allowable operating pressure is 40 bar.

**DESIGN FEATURES**

**Magnet Coupling / Containment Shell**

The single elements of the multipolar magnetic coupling are manufactured of a permanent magnet material "Cobalt Samarium – Rare Earth" with unlimited lifetime. The magnets in the internal rotor are completely encapsulated, no contact with liquid occurs.

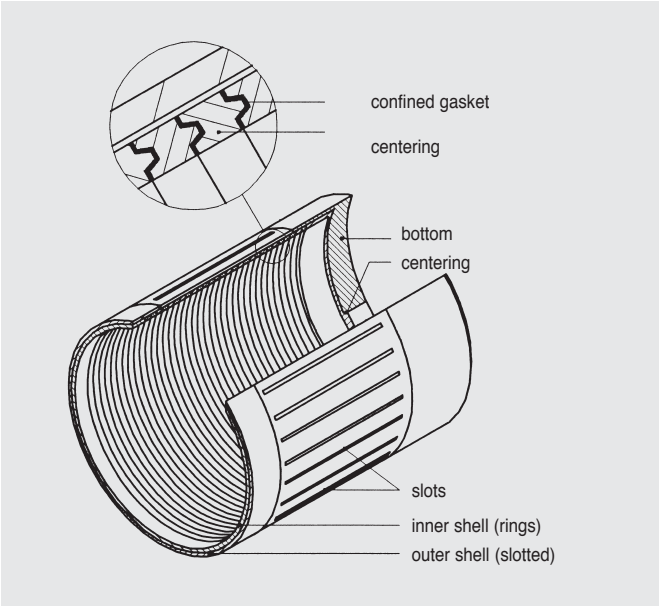
Energy is transmitted to the hermetically sealed liquid end by a bank of external magnets passing motive force through the containment shell to a bank of internal magnets.

Outer and inner magnet, locked together by the magnetic field lines, are working as a synchronous coupling and transmit the required power to the pump shaft.

The rated power of the magnetic coupling is determined such that no overload will occur through the whole performance range. Nominal coupling power and moments of inertia of the rotating components including driver are designed for direct-on-line start.

For reducing the eddy currents and improving the efficiency, a containment shell of "Sandwich design" is available.

The inner pressurized shell consists of several centered rings. These rings are insulated from each other by confined gaskets and prevent occuring eddy currents.




This "low-loss" containment shell is recommended especially for driving power

>75 kW at speeds of 2900 and 3500 rpm.

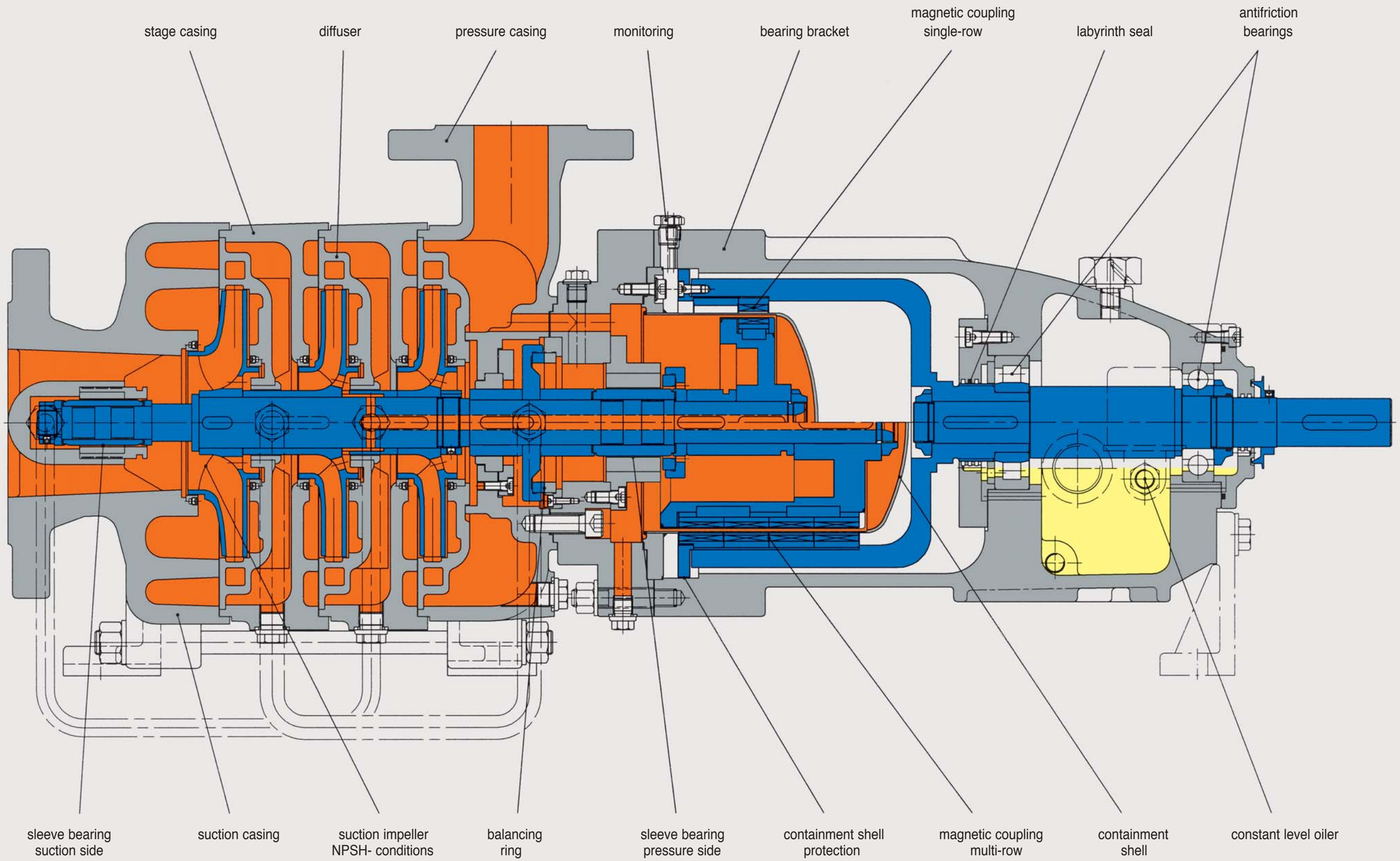
**Sleeve bearing**

The pump shaft is held in sleeve bearings. Bearing material is pure alphagrade Silicon Carbide. Pure SiC is suitable for general purposes, respectively for all kinds of liquids. An additional diamond layer also tolerates short-term dry running. The SiC-parts are shrink-fitted or elastically beared and thus, protected against strike and thermal stress. Design temperature is 250°C (482°F).

**Internal cooling flow**

When the pump is in operation, eddy currents are developed inside the metallic containment shells and converted into heat in the magnet area.

In order to avoid inadmissible temperature rise of the pumped fluid, this heat is dissipated through an internal cooling flow.


stage casing
diffuser
pressure casing
monitoring
bearing bracket
magnetic coupling
single-row
labyrinth seal
antifriction
bearings
sleeve bearing
suction side
suction casing
suction impeller
NPSH- conditions
balancing
ring
sleeve bearing
pressure side
containment shell
protection
magnetic coupling
multi-row
containment
shell
constant level oiler

### Suction- and Discharge casing

Suction and discharge casings are provided with sturdy cast feet for mounting on baseplates. HZMR-pumps have end suction and top discharge flanges.

### Impellers, NPSH-values

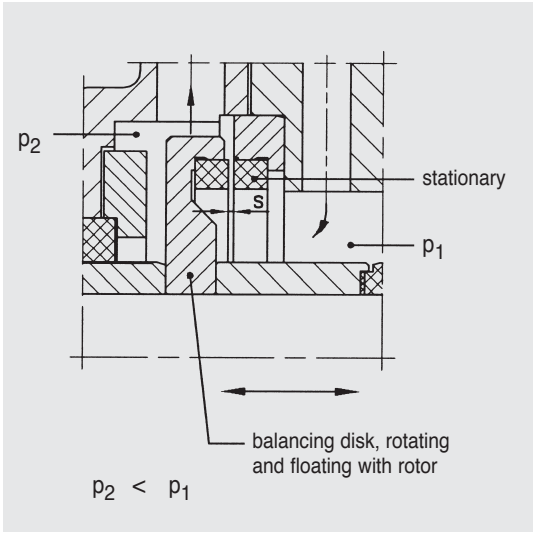
When operating hermetically sealed pumps, cavitation must be avoided by all means. This applies especially for handling hydrocarbons, condensates and other low boiling liquids.

For lowest NPSH-values, the impeller of the first stage is designed as a suction impeller with enlarged impeller eye.

### Balanced thrust loads

The thrust loads of the closed impellers are balanced by throttle gap and relief holes. The balancing of residual loads is effected by the balancing disk on pressure side.

The front side of the balancing disk is pressurized by the pump pressure $p_1$. The rear disk side is



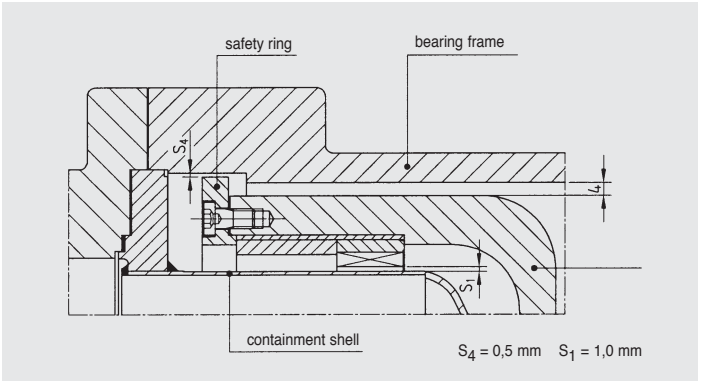

connected with the pressure side of the first pump stage via an external auxiliary pipe. According to the rotor position and the adjusting gap S, a counter force is created by the differential pressure between front and rear side of the balancing disk. This counter force acts against the residual load towards the containment shell such that no thrust loads occur. No thrust bearings are required. The start-up rings keep the pump shaft in position during start-up and shut-off.

### Antifriction bearings

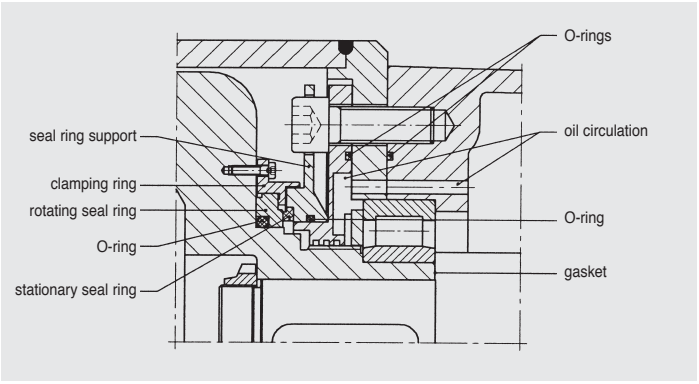
The drive shaft is carried in generously dimensioned oil-lubricated antifriction bearings. The bearings are rated for 25000 operating hours. The oil bath is protected against the atmosphere by a contactless labyrinth seal.

Oil level is controlled by constant level oiler. The oil chamber is sealed from the magnet chamber also by labyrinth seal.

The clearances between outer magnets and bearing bracket respectively containment shell are rated such that containment shell rupture in case of ball bearing failure is prevented.



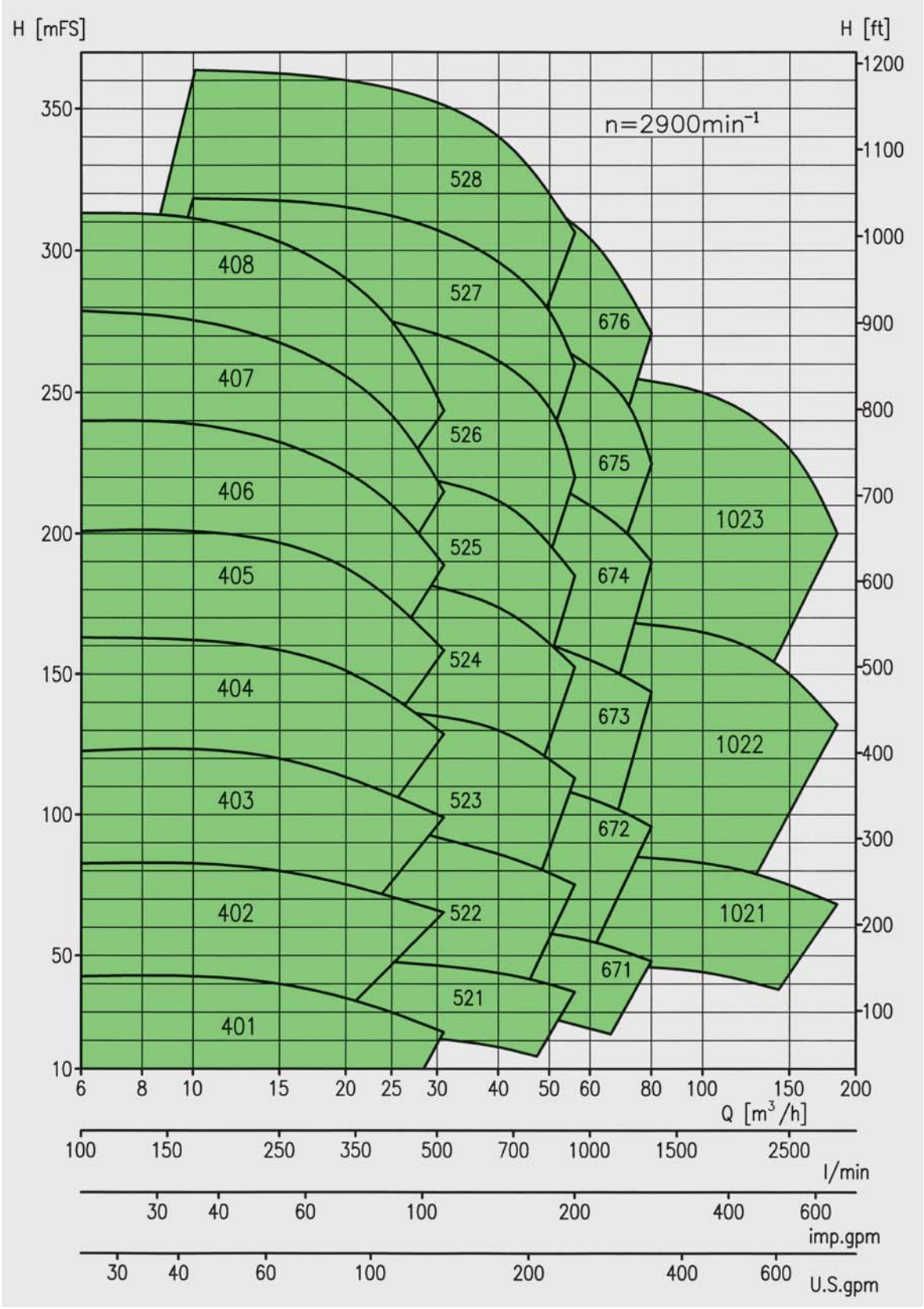

Additional monitoring devices can be provided.




### Secondary containment

If desired, a mechanical stand-by seal can be supplied in lieu of the inboard labyrinth seal. This mechanical seal separates the magnet area from the oil bath respectively from the atmosphere and forms, together with the closed bearing brakket lantern, a secondary containment behind the containment shell.

## Performance range




Performance curves for the different pump sizes are available on request.

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Issue 03.03