



**DICKOW
PUMPEN**



Sealless Magnetic Coupled Centrifugal Pumps acc. to EN 22858

Type NMR

(Design with heavy duty oil lubricated bearing bracket)

*our
contribution
for
environmental
protection*

General

Magnetic coupled DICKOW-pumps of the series NMR are sealless pumps. The static containment shell forms a closed system with hermetically sealed liquid end.

Applications

Magnetic coupled NMR-pumps are designed to improve plant and personnel safety, especially when handling toxic, explosive or other dangerous liquids which react on contact with the atmosphere. For all these services the containment shell replaces the double acting mechanical seal with external fluid reservoirs and the necessary control equipment. NMR-pumps therefore offer exceptional benefits to the chemical, petrochemical and allied industries, and protect the environment.

Max. capacity and differential head:
50 Hz - appr. 900 m³/h and appr. 150 m
60 Hz - appr. 1000 m³/h and appr. 220 m
(appr. 4400 gpm and 720 ft)

The maximum operating temperature is 270°C. Higher operating temperatures are available on request.

Hazardous area

Together with the required Ex-drive motors, the NMR-pumps can be applied in hazardous area Group II, Category 2. The pumps meet the basic safety and health requirements of Explosion-proof Directive 94/9 EC and are suitable for plants with increased safety requirement.

Design / Casing

NMR-pumps are single stage volute casing pumps with closed impellers, back-pull-out design, with end suction and top discharge flange. Sturdy feet are provided as standard for mounting on the base plate. Centerline mounted design is available on request.

Capacity and outer casing dimensions comply with DIN EN 22858.

Containment shell

The containment shell is designed as a pressurized vessel to separate the handled liquid from the atmosphere.

The containment shell is not used as an additional bearing holder. No dynamic stress occurs.

The containment shell is bolted to the bearing housing in a manner that allows removal of the bearing bracket together with the drive rotor without draining the pump.

Magnetic coupling

The single elements of the multipolar magnetic coupling are manufactured of permanent magnet material "Cobalt Samarium" with unlimited lifetime. The magnets in the driven rotor are completely encapsulated, not in contact with liquid. Power is transmitted to the hermetically sealed liquid end by a bank of external magnets. Inner and outer magnet rings are locked together by magnetic forces and work as a synchronous coupling. The inner magnet ring transmits the required torque direct to the impeller. Overload of the magnetic coupling and slipping will not cause demagnetization if temperature monitoring is available. The magnetic couplings are designed for electric motors, direct on line starting. Should a subsequent increase of motor power be required, i.e. when installing a larger impeller, the nominal power of coupling can be increased with additional magnets.

The maximum drive power of NMR-pumps is approximately 161 kW @ 50 Hz (260 HP @ 60 Hz).

Internal clearances

The internal clearance between rotor and containment shell is appr. 1,0 mm for standard containment shells. This allows - together with the wear resistant SiC sleeve bearings - handling of solid containing fluids.

For application with solids internal circulation with auxiliary impeller is recommended (frame I, II, III, IV).

Containment shell protection

The clearances between drive rotor and bearing bracket respectively between bearing bracket and containment shell are arranged such that rubbing of the magnets on the containment shell will be avoided, even in the case of worn out ball bearings.

Casing drain

Complete drainage of casing and magnet end is possible through casing drain. No additional drain required.

Outer ball bearings

The drive shaft is carried by generously dimensioned oil lubricated antifriction bearings, rated for 25000 operating hours. The oil bath is protected against the atmosphere by a labyrinth seal. Oil level is controlled by a constant level oiler and an additional sight glass. The oil chamber is sealed against the magnetic coupling also by a labyrinth seal.

Double sleeve bearings

The pump shaft is carried by wetted sleeve bearings. Standard material is pure Silicon Carbide with diamond layer, providing limited dry-run capability. SiC is highly resistant to corrosion and wear and can be used for all kind of liquids, also for solid containing products. The SiC-components are shrinkfitted or elastically beared by tolerance rings and therefore protected against shock and thermal stress. Both sleeve bearings are bolted in one common bearing housing to grant a correct alignment.

NPSH-conditions

Due to the internal circulation from discharge to discharge, there is no temperature elevation in the impeller eye. Handling of boiling liquids is therefore possible and there is no increase of NPSH-required.

Balanced thrust loads

The thrust loads of the closed impellers are hydraulically balanced by wear rings, balance holes, back vanes and / or auxiliary impeller. The pump shaft connected to the impeller is floating.

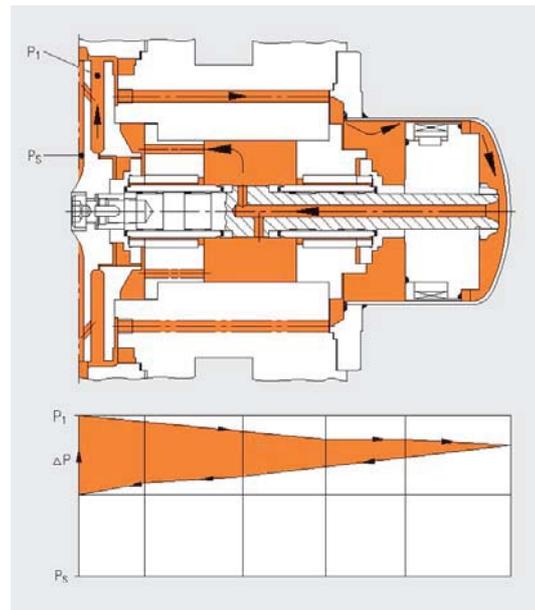
Monitoring

Connection for temperature detection element for containment shell surface temperature is available as standard. Dry running protection and monitoring of ball bearings and containment shell temperature with the patented "mag-safe" system is highly recommended.

Internal circulation, pressurized magnet end

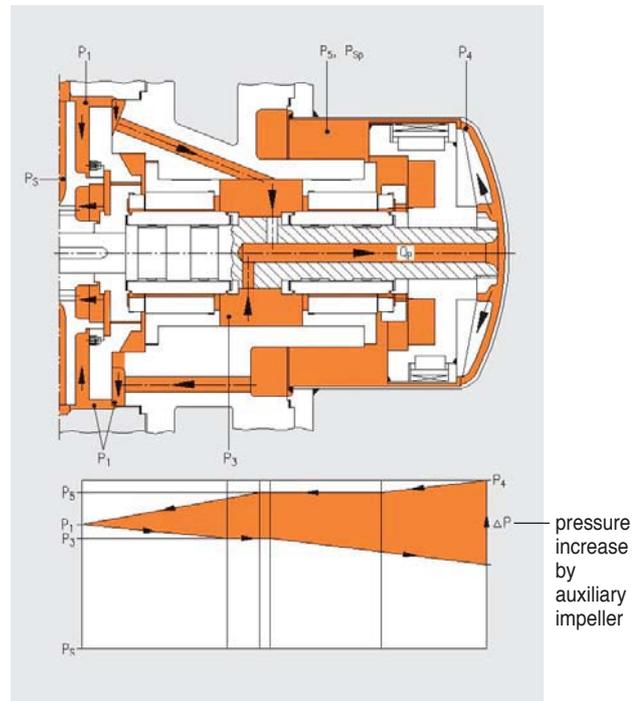
When pump is in operation it generates eddy currents which heat up the containment shell and the pumpage in the magnet area. This heat is dissipated by internal circulation. There are two different internal circulation systems available for different frame sizes.

Internal circulation frame 0:

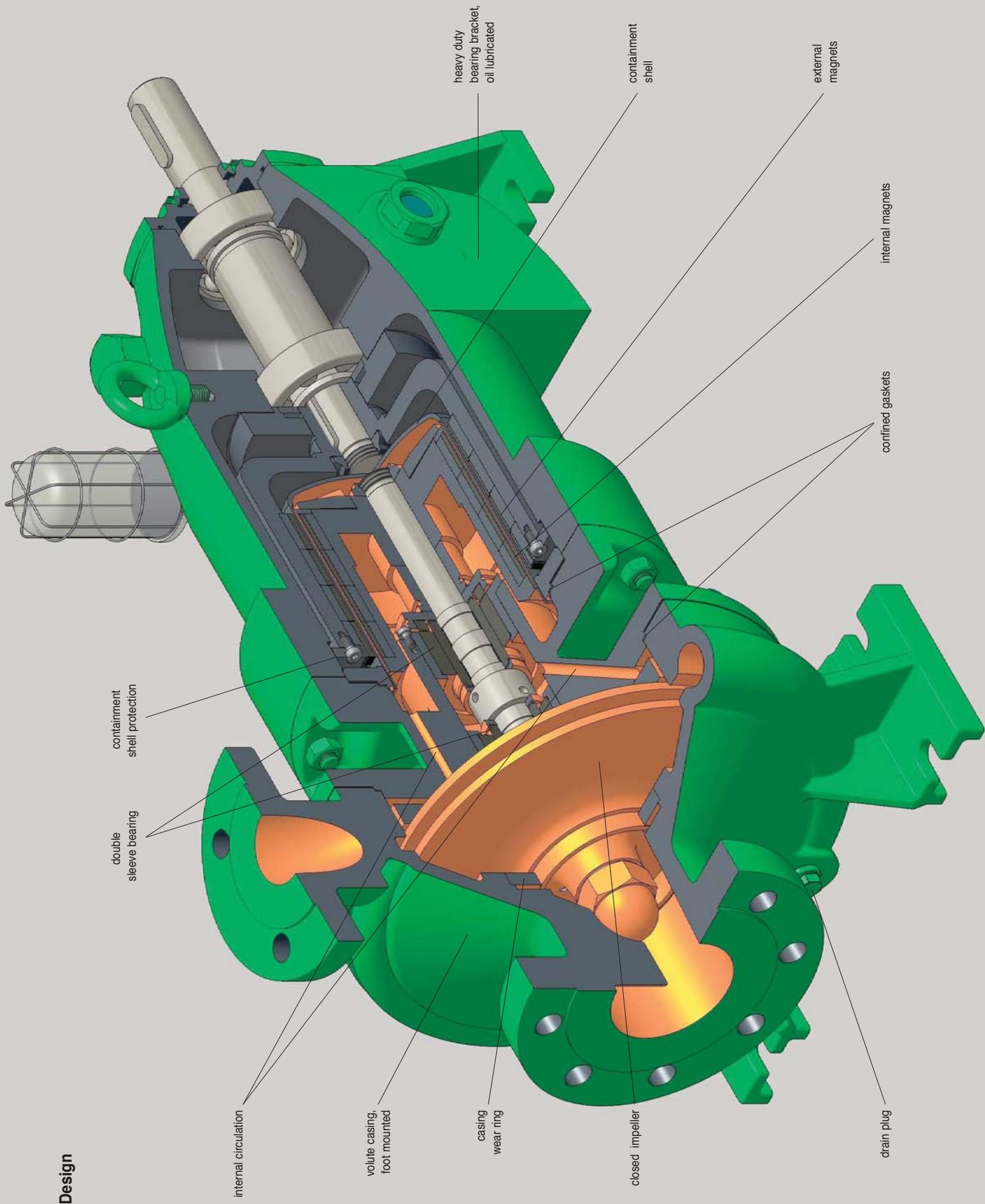


Frame 0 circulation is not recommended for applications with solids.

Internal circulation frame I / II / III / IV with auxiliary impeller:

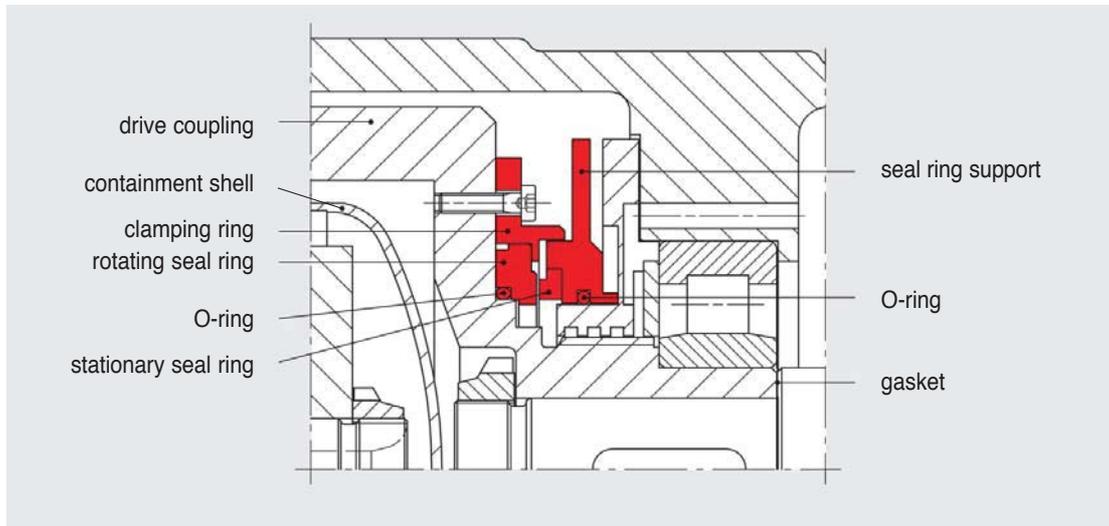


NMR-Design

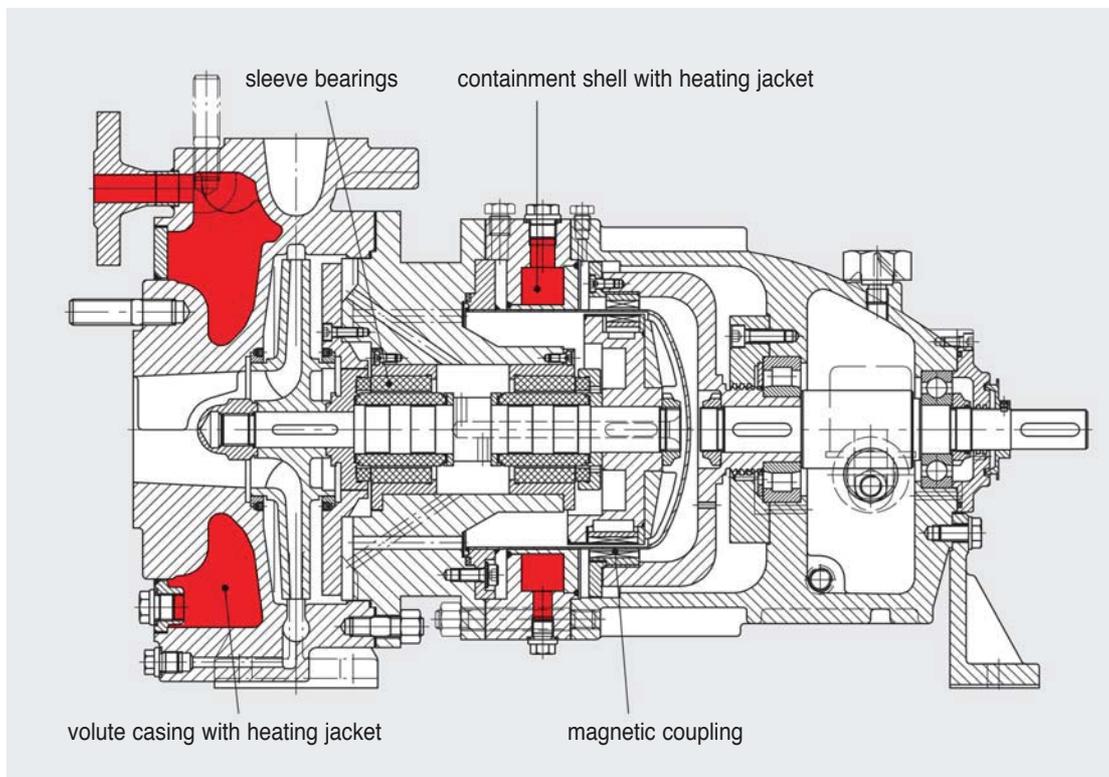


Optional designs, secondary seal

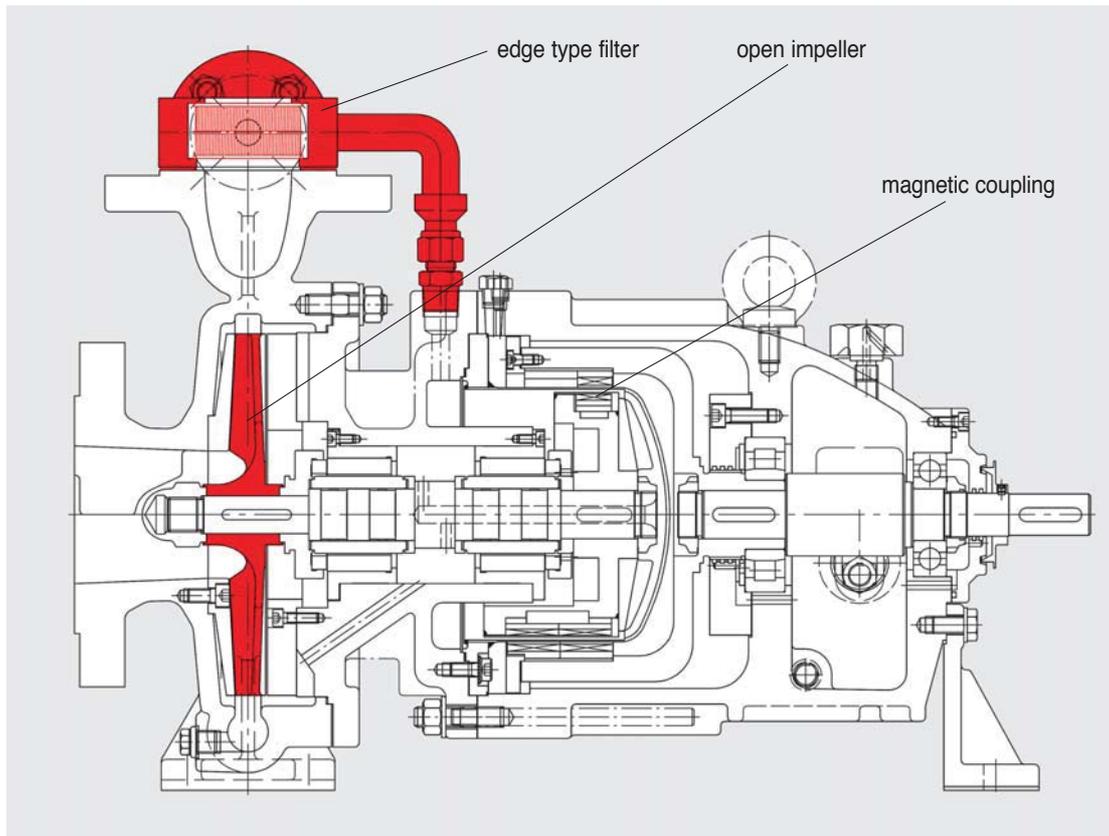
If desired, a mechanical stand-by seal can be supplied in lieu of the inboard labyrinth seal. This mechanical seal separates the magnet area from the oilbath respectively the atmosphere and forms, together with the closed bearing bracket, a secondary containment behind the containment shell. The slide rings of the secondary seal operate without contact and wear free. The seal will be activated only if the containment shell leakage leads to a pressure increase in the bearing bracket.



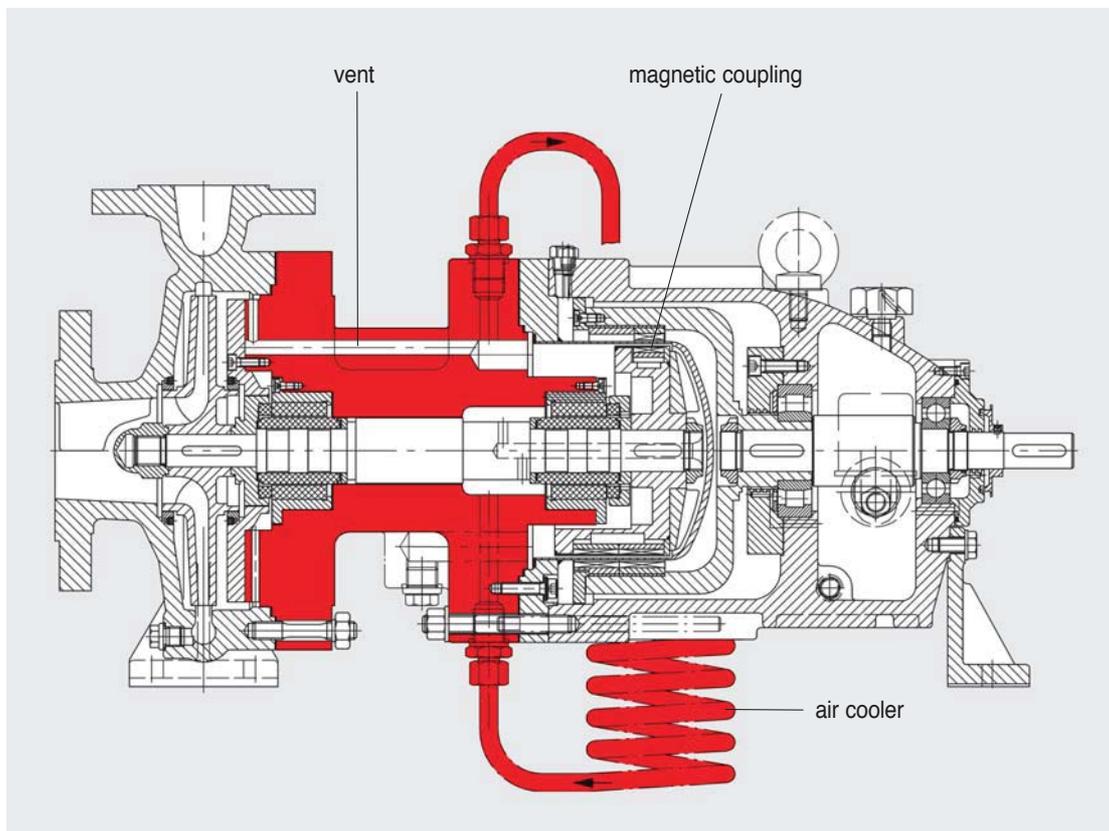
Type NMR b - with heating jacket



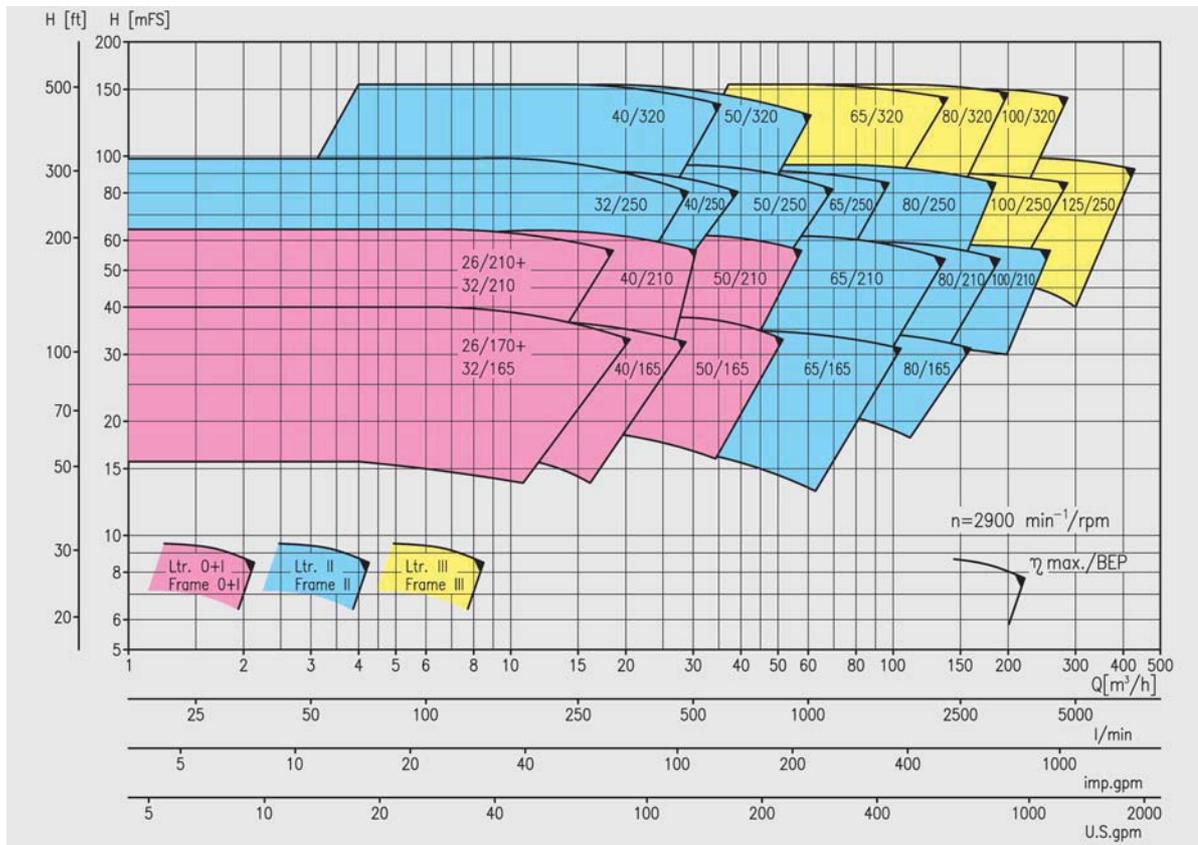
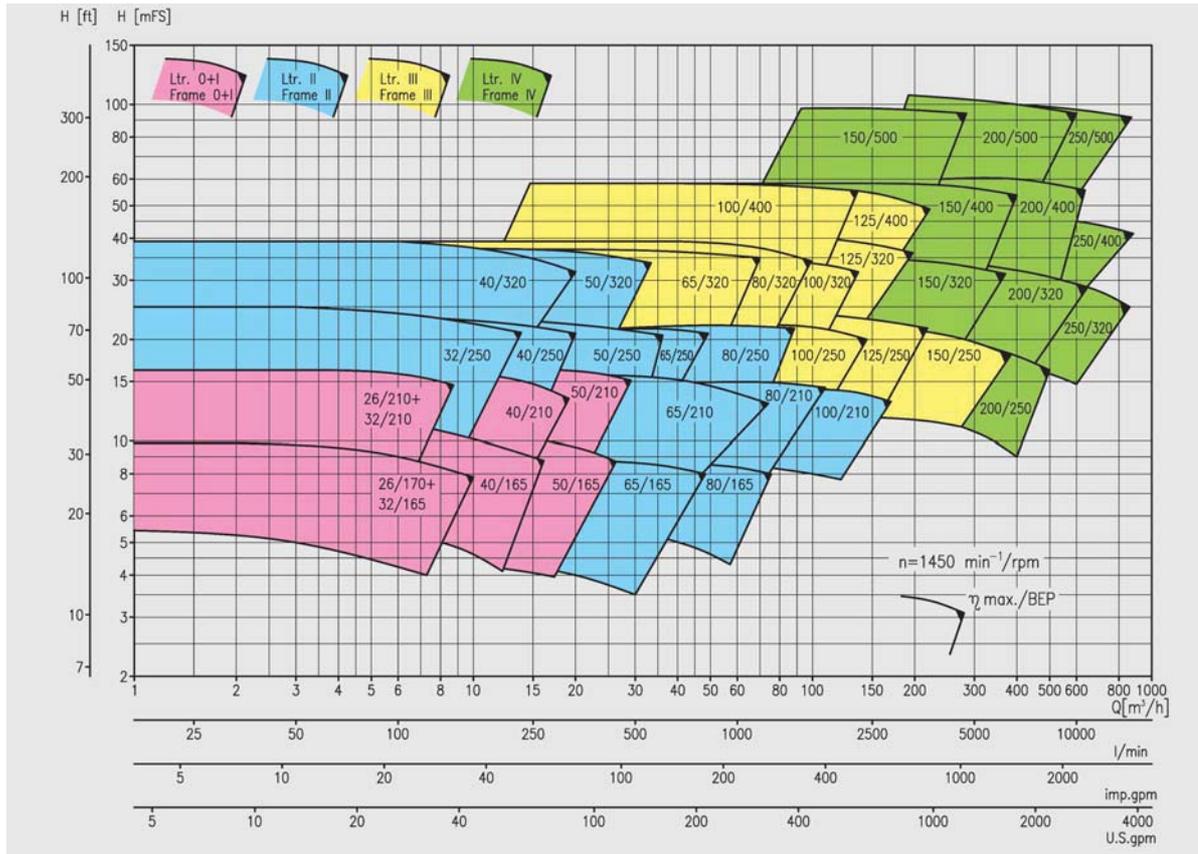
Type NMR o - with open impeller and edge type filter



Type NHMR - hot water design



Performance range



Performance curves for the different pump sizes are available on request, also for 1750 min^{-1} und 3500 min^{-1} .

