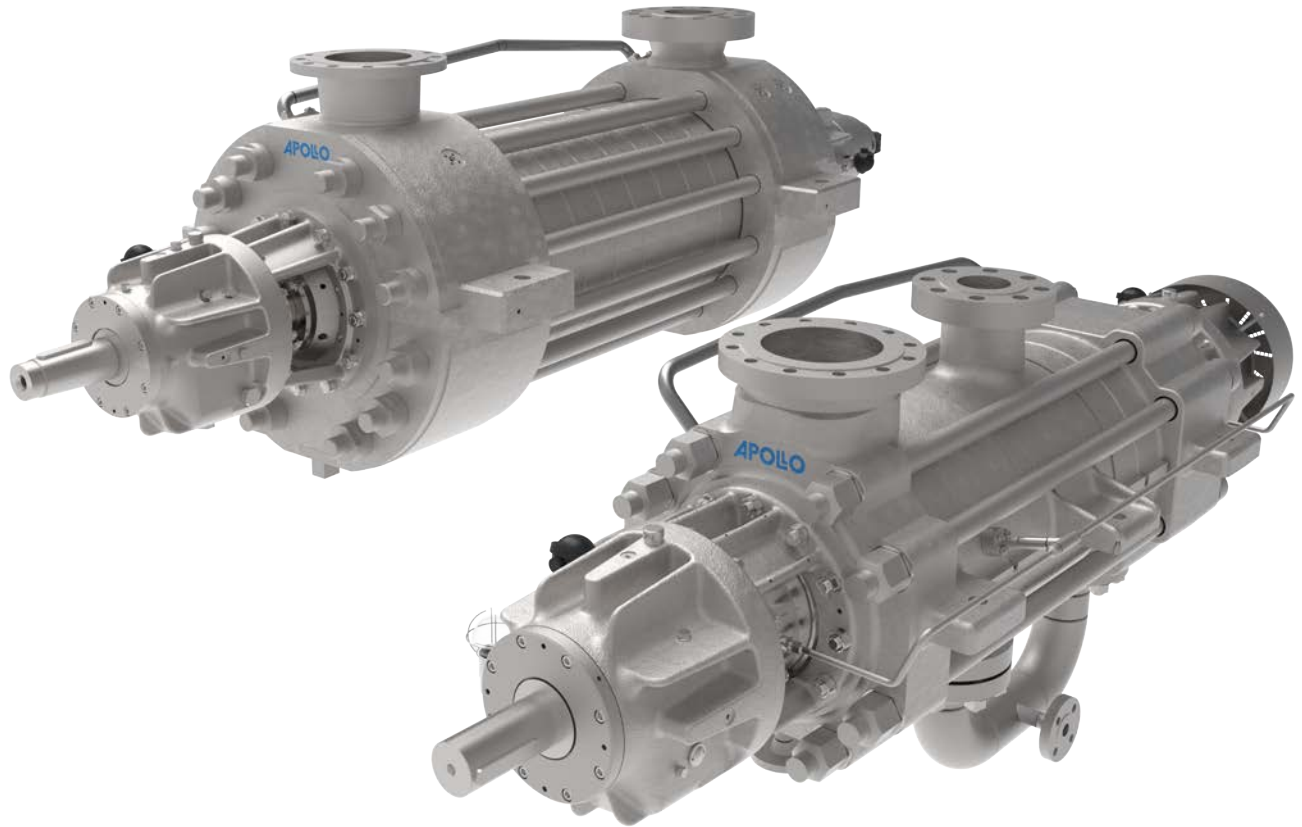


MULTISTAGE HIGH-PRESSURE PUMPS

HP/GP

RING-SECTION DESIGN
API 610 / TYPE BB4



- As in-line or as „back-to-back“ version
- Hydraulically balanced concept regarding application area, efficiency and rotor dynamics
- Best NPSH values by optimally designed suction impellers
- Modular design for optimum adaptation to customer needs and low operating costs

Range of Application

Based on the excellent hydraulic characteristics, the perfectly optimized performance field and modern structural design according to API 610 latest edition, the pumps are suitable for applications such as:

- boiler feed water applications
- booster application in all industrial branches
- water injection onshore and offshore
- applications in oil and gas industry
- applications in refineries

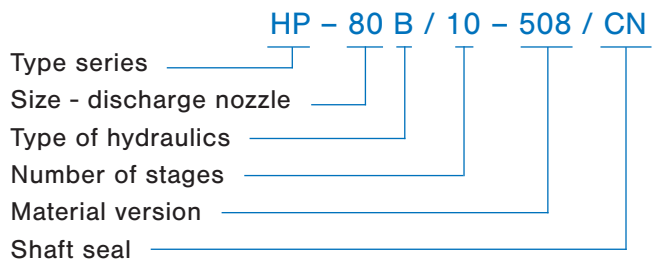
Design

- Horizontal, multistage ring-section high-pressure pump, between bearings design
- Pump in-line version **HP** or as a „back-to-back“ version **GP**
- Centerline casing support for max. reliability at high temperatures and high nozzle loads
- Bearing types: antifriction bearings with ring oil lubrication,
Mixed bearings: radial slide bearings, axial antifriction bearings with ring oil lubrication,
Radial and axial slide bearings with pressure oil lubrication
- For HP series axial thrust compensation by balancing piston or double piston
For GP Series axial thrust compensation by „back-to-back“ arrangement
- 1st stage with NPSH impeller as standard
- Flanges according to ASME or DIN EN in different pressure ratings
- Single impeller support and shrink fit impellers in reference to the application

Shaft Seal

Separate seal chamber, suitable for a variety of mechanical seals – from single and double mechanical seals up to cartridge mechanical seals and gland packing – all variants are available. Pumps of this have a standard design with cartridge mechanical seal. Assembly space according to API 610/682.

Designation



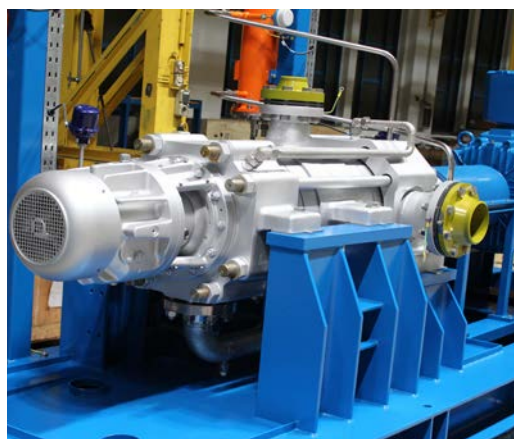
Operating data

	HP	GP
Nozzle size (mm)	from 50 to 350	from 50 to 350
Capacity	up to 1800 m ³ /h	up to 600 m ³ /h
Head	up to 2800 m	up to 2500 m
Design pressure	up to 300 bar	up to 250 bar
Speed	up to 3600 rpm	up to 3600 rpm
Temperature limits	up to 200 °C	up to 180 °C

Materials

	S-1	S-5	S-6	C-6	A-8	D-1	D-2
Discharge casing	Carbon steel	Carbon steel	Carbon steel	12 % Chromium steel	316AUS	Duplex	Super duplex
Internal casing parts	Cast iron	Carbon steel	12 % Chromium steel	12 % Chromium steel	316AUS	Duplex	Super duplex
Shaft	12 % Chromium steel	12 % Chromium steel	12 % Chromium steel	12 % Chromium steel	Duplex	Duplex	Super duplex
Bearing housing	Carbon steel	Carbon steel	Carbon steel	Carbon steel	Carbon steel	Carbon steel	Carbon steel
Impeller	Cast iron	12 % Chromium steel	12 % Chromium steel	12 % Chromium steel	316AUS	Duplex	Super duplex
Suction impeller	12 % Chromium steel	12 % Chromium steel	12 % Chromium steel	12 % Chromium steel	316AUS	Duplex	Super duplex

Materials according to API, NORSOK, NACE and special alloys are available.



Bearing housing

- prepared for all required connections for measuring and monitoring equipment
- application of high-grade metallic bearing isolators
- cooling fans standard
- water cooling as option
- 360° mounting

Flanges

- ASME or DIN EN

Wear and split rings

- replaceable wear and split rings
- different material options and coatings available
- PEEK version with reduced clearance

Suction stage

- first stage as standard design with NPSH impeller
- optimized intake geometry for lowest NPSH values
- version with double-flow suction impeller available

Seal chamber

- separate seal chamber according to API 610 / 682
- all the usual variations of sealing and API piping schemes are possible
- equipped as standard with a cartridge mechanical seal

Shaft

- rotor-dynamically optimized solid shafts
- cylindrical or conical shaft end

Bearing

- antifriction bearings radial, axial
- mixed bearings
- sliding bearings
- ring oil lubrication or forced lubrication
- bearing selection, in dependence on customer specification, speed and API requirements

Axial thrust compensation

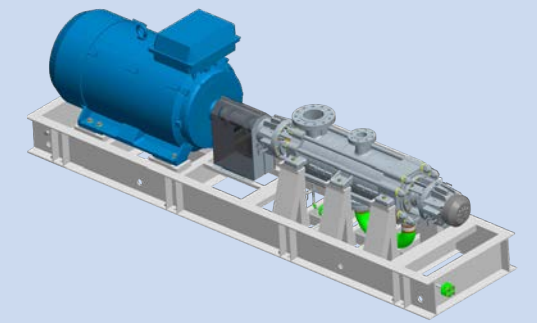
- compensation by balancing piston or double piston
- „back-to-back“ arrangement of impeller packages with GP version

Rotor

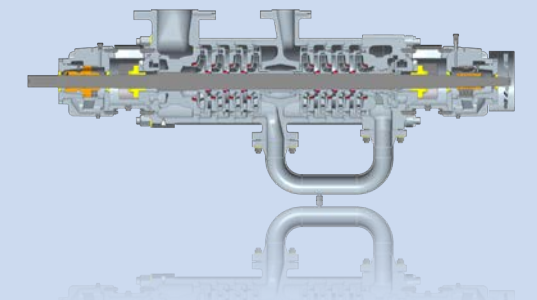
- shrink fit impellers and single-impeller support
- shaft with stepped diameters
- rotor with impeller seat via slip fit available

Hydraulics

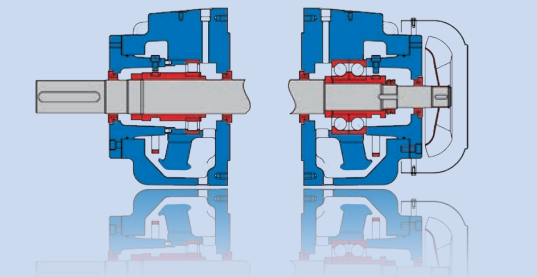
- various hydraulics per type size
- ensuring the best adaptation to customer needs and high efficiency



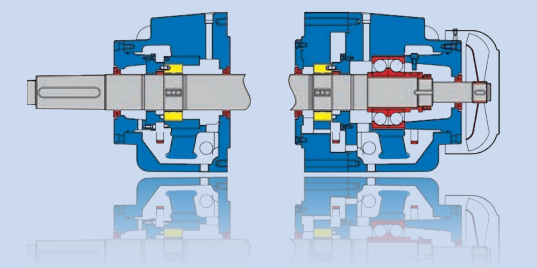
■ BB4 pump unit



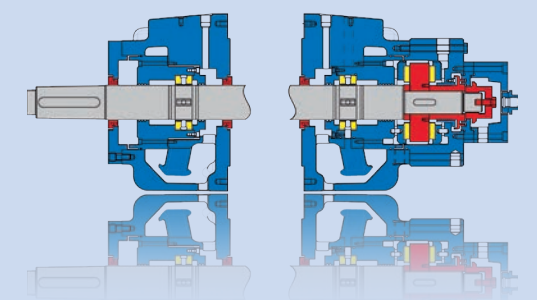
■ Type series GP „back-to-back“ version



■ Antifriction bearings with oil-ring lubrication

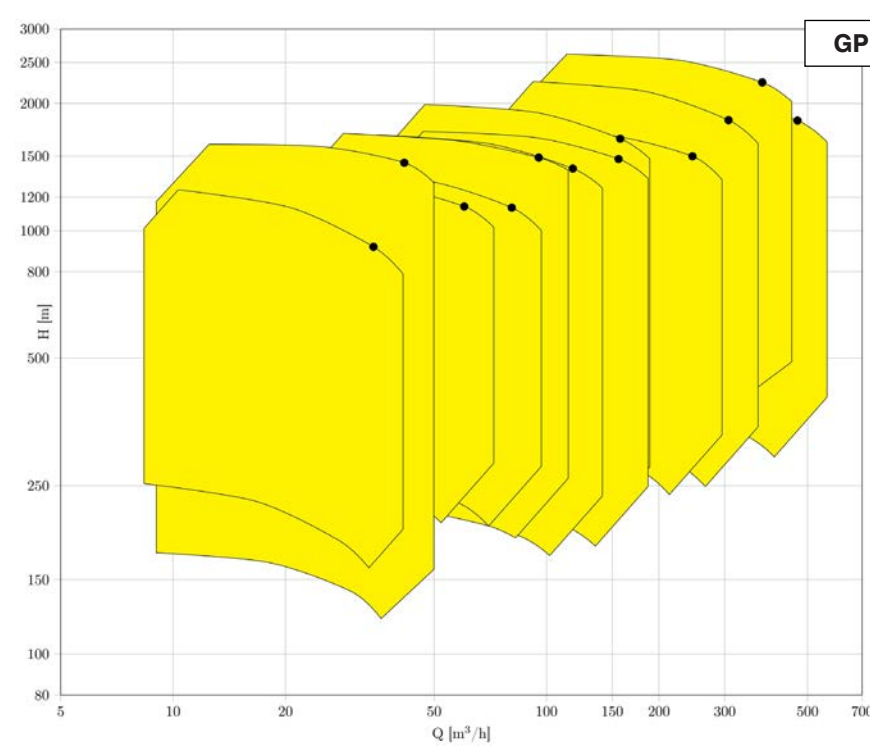
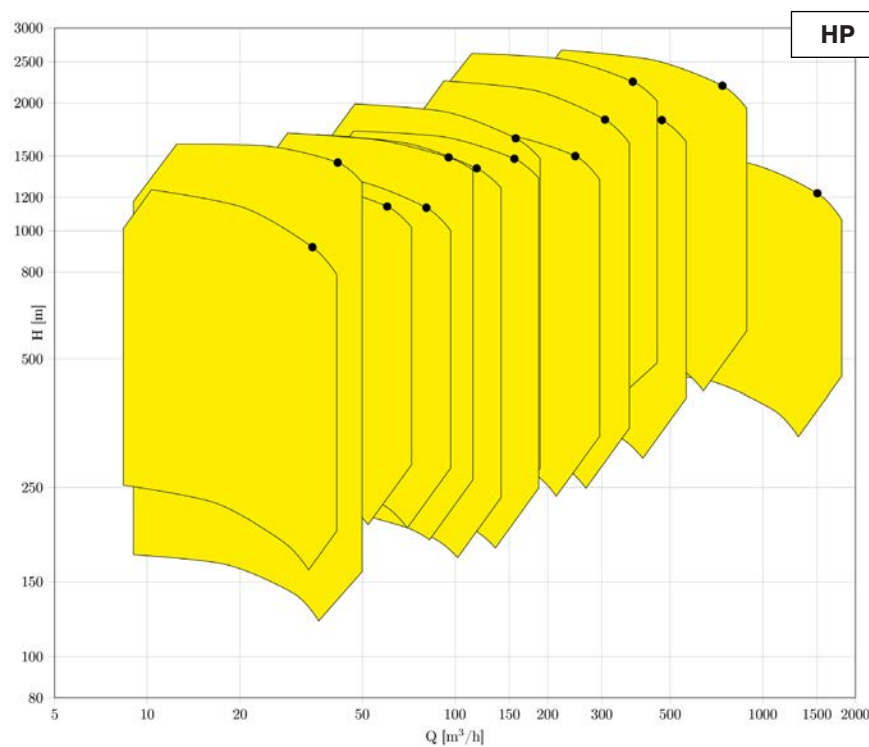


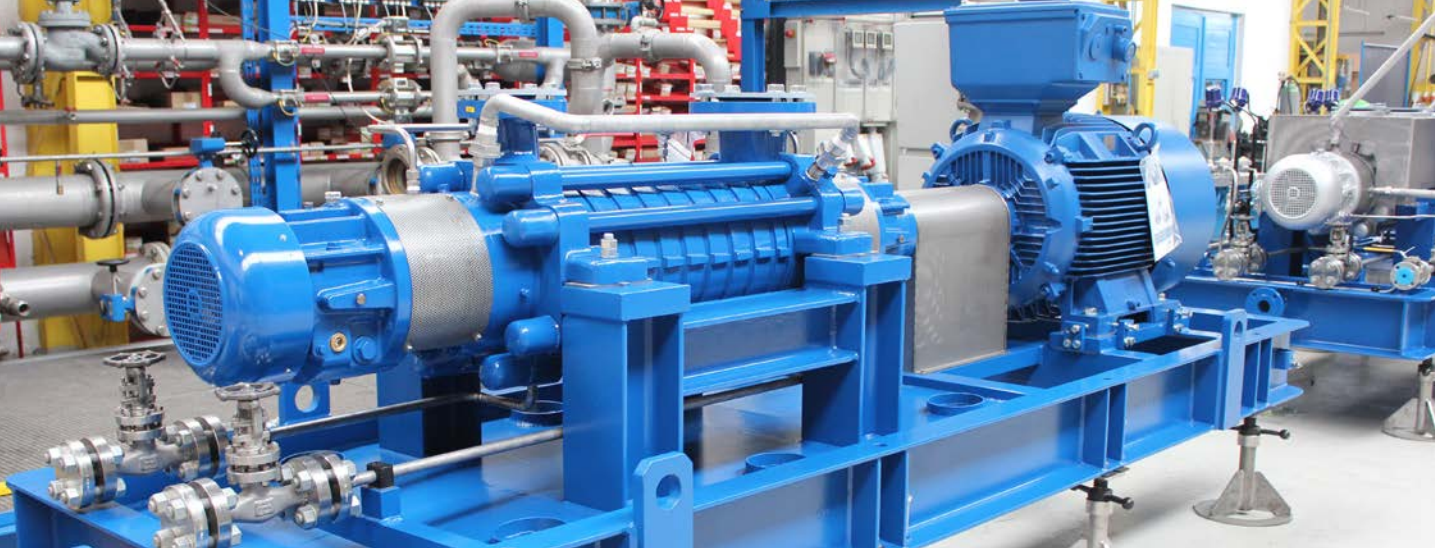
■ Mixed bearings: radial plain bearings, axial antifriction bearings with oil-ring lubrication



■ Plain bearings axial, radial with forced oil lubrication

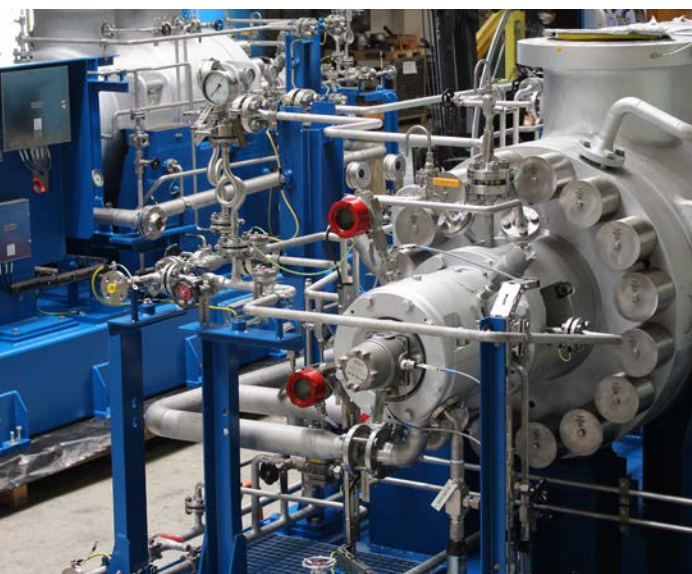
Performance range





Since more than 100 years APOLLO in Goessnitz has been developing and producing pumps for different applications with most different operating principles.

In continuation of this history Apollo has developed to a Manufacturer of high quality heavy-duty Process Pumps - especially according to API 610 Standard.



20 years ago, the business Division „System Engineering & System Technology“ was founded. With this division we can offer our Customers complete solutions from a single source. Apollo has high-skilled Personnel for Pumps and Pumping Systems up to Specialists for Electrical and Control Engineering. By taking advantage of these synergies, of short lines of communication, of optimized process chains

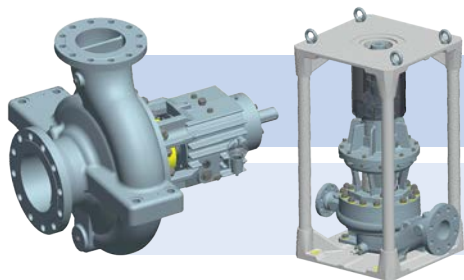
and of high Flexibility of our company, we provide our Customers with best support in solving their problems and tasks worldwide.

Our production methods and systems meet the highest level of quality and allow the implementation of orders according to different standards and regulations. The Quality Assurance in all areas of the company, including suppliers and cooperation partners, is the top priority and is consistently implemented. The most up-to-date test fields provide realistic test conditions.

Today we develop and manufacture with the most modern methods – from the hydraulic design over to 3D CAD design and engineering, FEM calculation to the casting patterns and parts manufacture via CAD-CAM Interfaces.

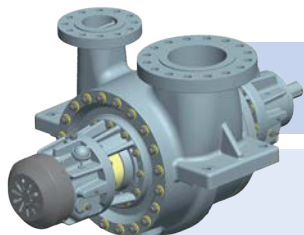


PROCESS PUMPS | API 610



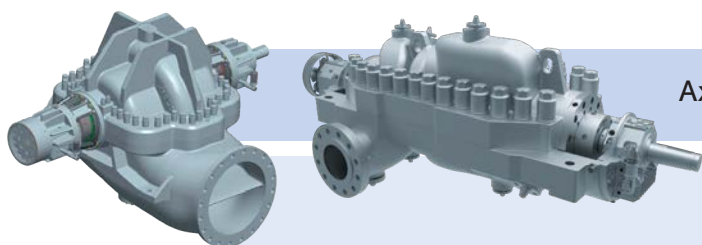
Single stage pumps: **OH1, OH2, OH3**

■ KRH ■ KRHA ■ KRHL / KRPO ■ KRP / KRPH ■ KRI / KRIL



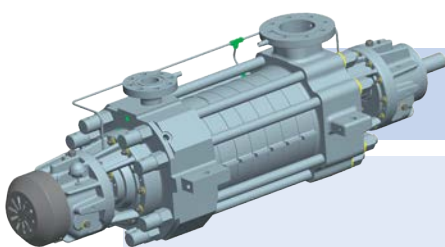
Single and two-stage between bearings pumps: **BB2**

■ ZPR ■ ZPRA ■ KGR / KGRD



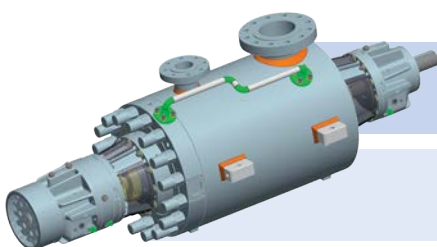
Axial split between bearings pumps: **BB1, BB3**

■ ZMK ■ ZMKV ■ AMG



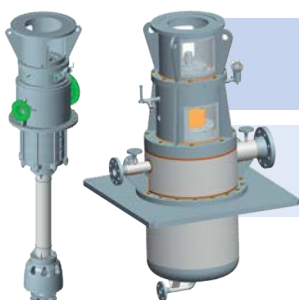
Multistage high-pressure pumps, ring sections type: **BB4**

■ HP ■ GP „back-to-back“ ■ GMHD



Multistage high-pressure barrel pumps: **BB5**

■ TL ■ TG „back-to-back“ ■ TGDX



Single and multistage, vertical pumps: **VS1, VS4, VS6**

■ HPTV ■ HPV ■ HPVX ■ GSTV