

# MULTISTAGE HIGH-PRESSURE PUMPS

TL/TG

IN BARREL DESIGN  
API 610 / TYPE BB5



- TL as in-line version or TG as „back-to-back“ version
- Highest reliability on critical applications, at high pressure and at high temperature
- Optimum rotor dynamics for safe operation, also at high speeds
- Due to cartridge design very short standstill time during maintenance work

# Range of Application

Based on the excellent hydraulic characteristics, the perfectly optimized performance range and modern structural design, the pumps are suitable for applications such as:

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

## Design

- Horizontal, multistage high pressure centrifugal pump in barrel version, between bearing design
- Barrel pump in-line version **TL** or as a „back-to-back“ version **TG, TGDX** is a special design for high speeds
- 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,

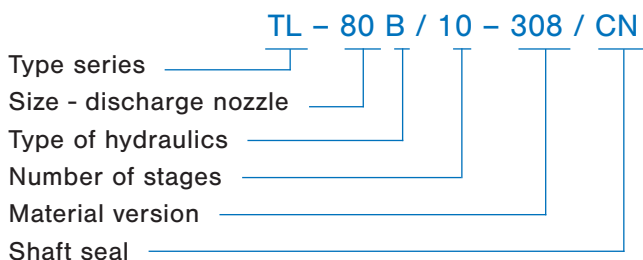
Radial and axial slide bearings with pressure oil lubrication

- Due to cartridge design, very short downtimes during maintenance work. Barrel remains in the pipeline, Pump as cartridge unit can be dismantled and maintained
- 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

	TL	TG/TGDX
Nozzle size (mm)	from 50 to 200	from 50 to 200
Capacity	up to 1800 m <sup>3</sup> /h	up to 1800 m <sup>3</sup> /h
Head	up to 2800 m	up to 4200 m
Design pressure	up to 350 bar	up to 450 bar
Speed	up to 3600 rpm	up to 3600 rpm
Temperature limits	up to 400 °C	up to 420 °C

## Materials

	S-1	S-5	S-6	C-6	A-8	D-1	D-2
Barrel	Carbon steel	Carbon steel	Carbon steel	12 % Chromium steel	316AUS	Duplex	Super duplex
Internal casing parts	Carbon steel	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

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

### Jacket cooling

- effective jacket cooling optionally available

### Wear and split rings

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

### Rotor

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

### Flanges

- ASME or DIN EN; variable position of nozzles

### Shaft

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

### Axial thrust compensation

- „back-to-back“ arrangement of the impellers ensures an axial thrust close to balance
- centerline supported plain bearing and relief sleeve compensate remaining axial thrust
- consistent axial thrust also on worn gaps
- In-line TL Series with balance piston

### Barrel

- as forging or casting
- solid version of centerline casing feet
- for maximum thermal and mechanical stability
- high nozzle loads capacity

### Central bearing

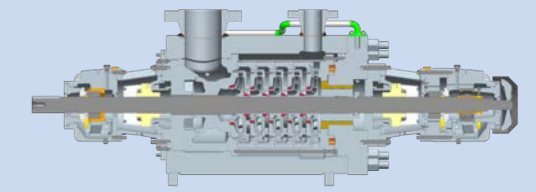
- liquid lubricated, central plain bearing
- best rotor dynamics even at high speeds and large number of stages

### Suction stage

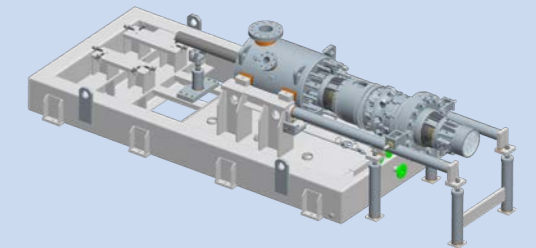
- first stage with NPSH impeller as standard
- optimized inlet geometry for very low NPSH values
- version with double suction impeller available

### Seal chamber

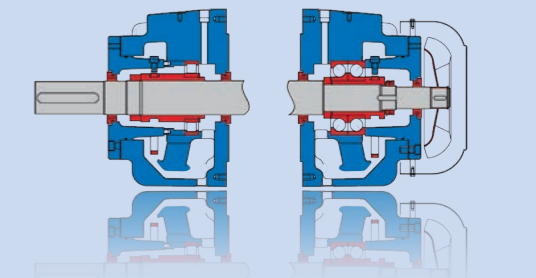
- separate seal chamber according to API 610 / 682
- all the usual variations of sealing and API piping schemes are possible
- equipped with a cartridge mechanical seal as standard



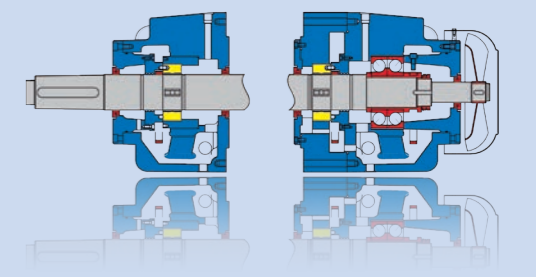
TL - BB5 Barrel pump of in-line type



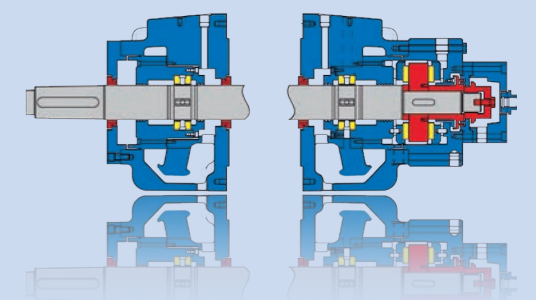
Cartridge assembly with special assembling jig - barrel remains in the piping



Antifriction bearings with oil-ring lubrication

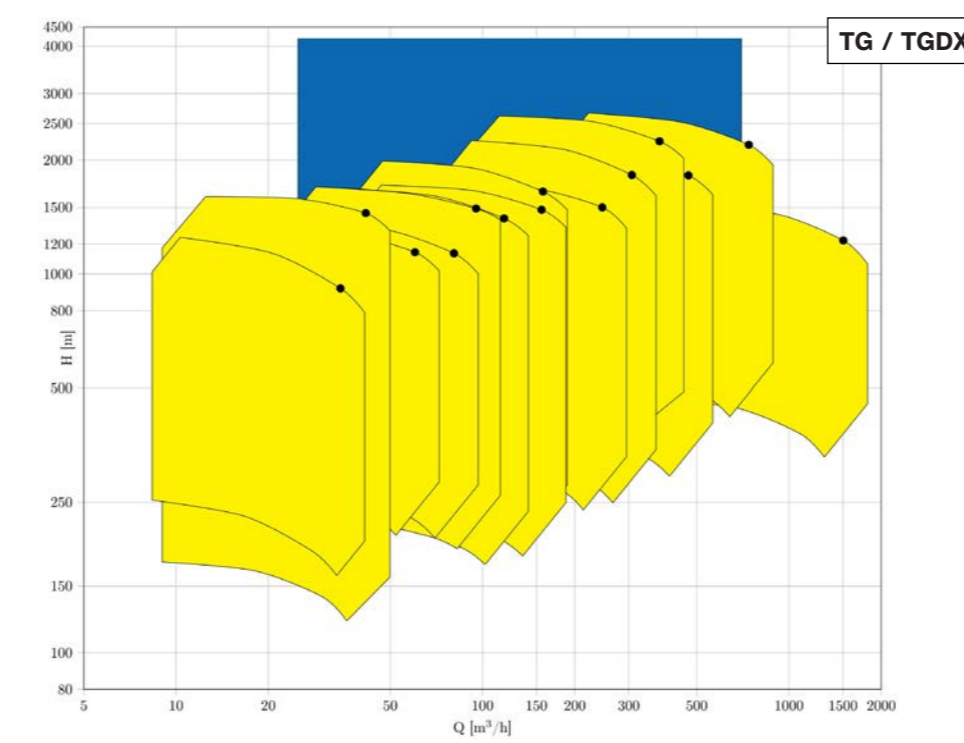
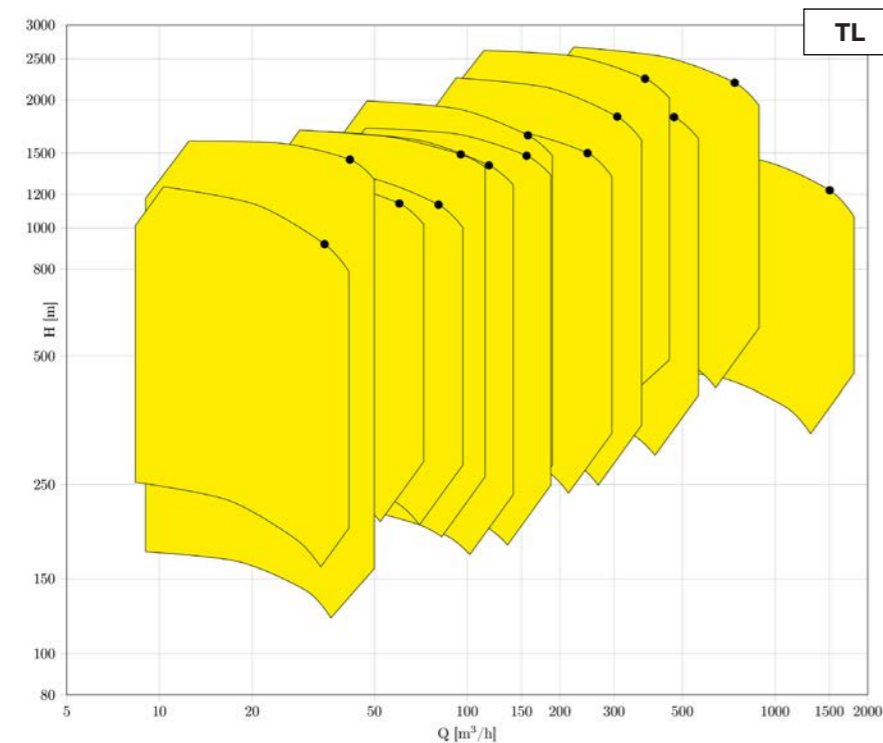


Mixed bearings: radial plain bearings, axial antifriction bearings with oil-ring lubrication



Slide bearings axial, radial with forced oil lubrication

## Performance range

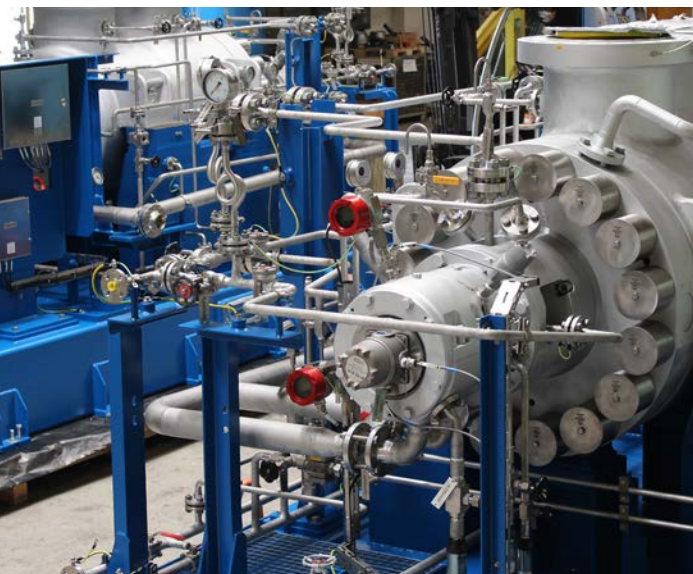






Since more than 100 years APOLLO in Goessnitz has been developing and producing pumps for different applications with most different operating principles.

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

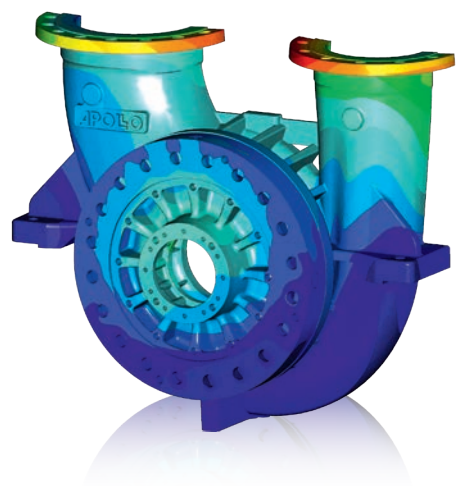


20 years ago, the business Division „System Engineering & System Technology“ was founded. With this division we can offer our Customers complete solutions from a single source. Apollo has high-skilled Personnel for Pumps and Pumping Systems up to Specialists for Electrical and Control Engineering. By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

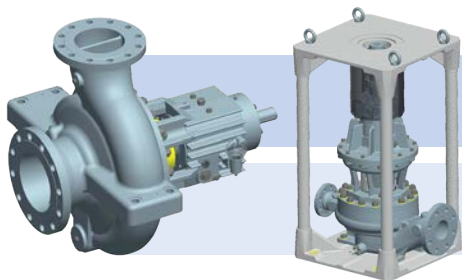
and of high Flexibility of our company, we provide our Customers with best support in solving their problems and tasks worldwide.

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.

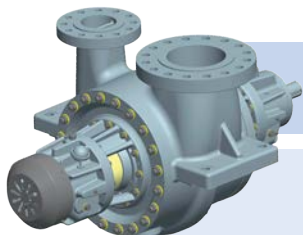


# PROCESS PUMPS | API 610



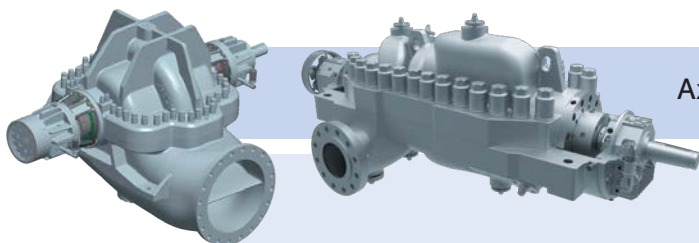
Single stage pumps: **OH1, OH2, OH3**

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



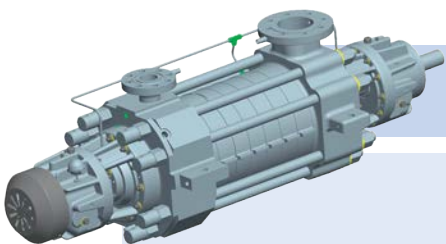
Single and two-stage between bearings pumps: **BB2**

■ ZPR ■ ZPRA ■ KGR / KGRD



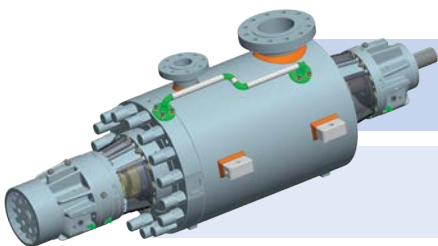
Axial split between bearings pumps: **BB1, BB3**

■ ZMK ■ ZMKV ■ AMG



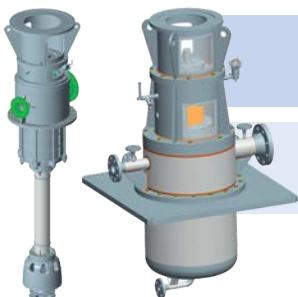
Multistage high-pressure pumps, ring sections type: **BB4**

■ 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