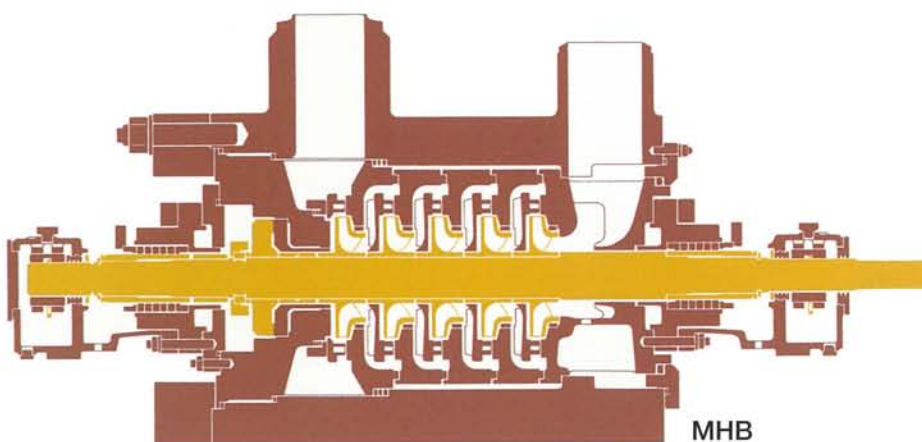
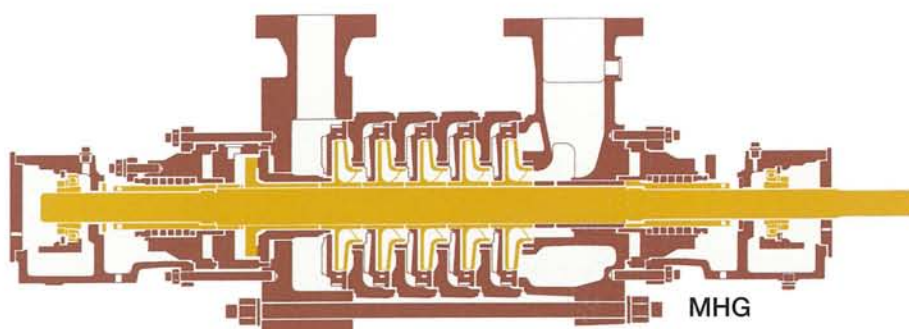


MHG/MHB

ring-section type

barrel type

High Pressure Multi-stage Diffuser pump



TORISHIMA PUMP

Principal fields of MHG segmental ring-section casing and MHB barrel casing pumps are

- handling feed water in boiler plants
- boiler feed and condensate handling in industrial plants and power stations
- descaling plants
- oil-refinery and chemical plants



Features

- MHG can be quickly started without any warming of casings.
- The first stage impeller is single or double suction type.
- Pump rotating parts of MHB can be removed without disconnecting the discharge or suction piping.
- Major wear parts of MHG such as bearings, shaft seals and axial thrust balancing devices are replaced without disconnecting the discharge or the suction piping.
- The rationalized range chart together with our individual development of hydraulics allows computer-aided selection to optimize either :
 - energy consumption
 - initial cost
 - NPSH value
- Rationalized production and stock-keeping system ensures shortest delivery times.

Bearing types

Radial : Ball bearings
Plain bearings
Thrust : Ball bearings
Segmental thrust bearings

Lubrication of bearings

Oil
Pressure fed oil

Axial thrust compensation

Hydraulically compensated by means of balancing devices in discharge casing.

Shaft sealing

Soft-packed gland packings
Mechanical seals
Throttle bush seals

Nozzle connection

Flanged nozzles according to JIS or ANSI standards.
But weld is available for MHB.

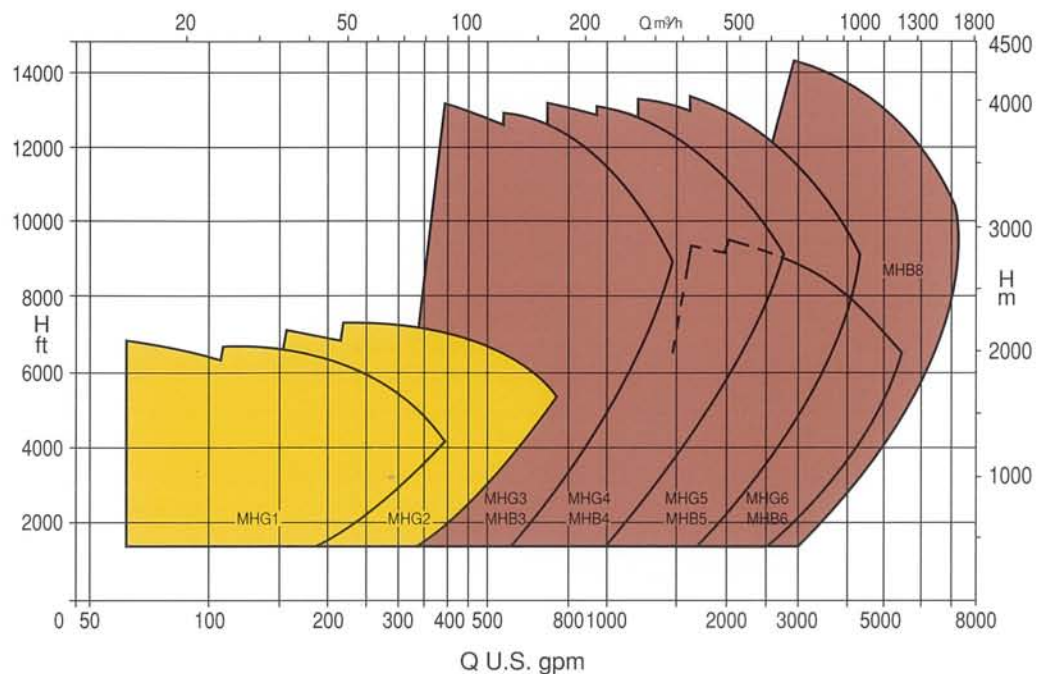
Casing mounting

Centerline supported
(Foot supported only for MHG1)

Drive

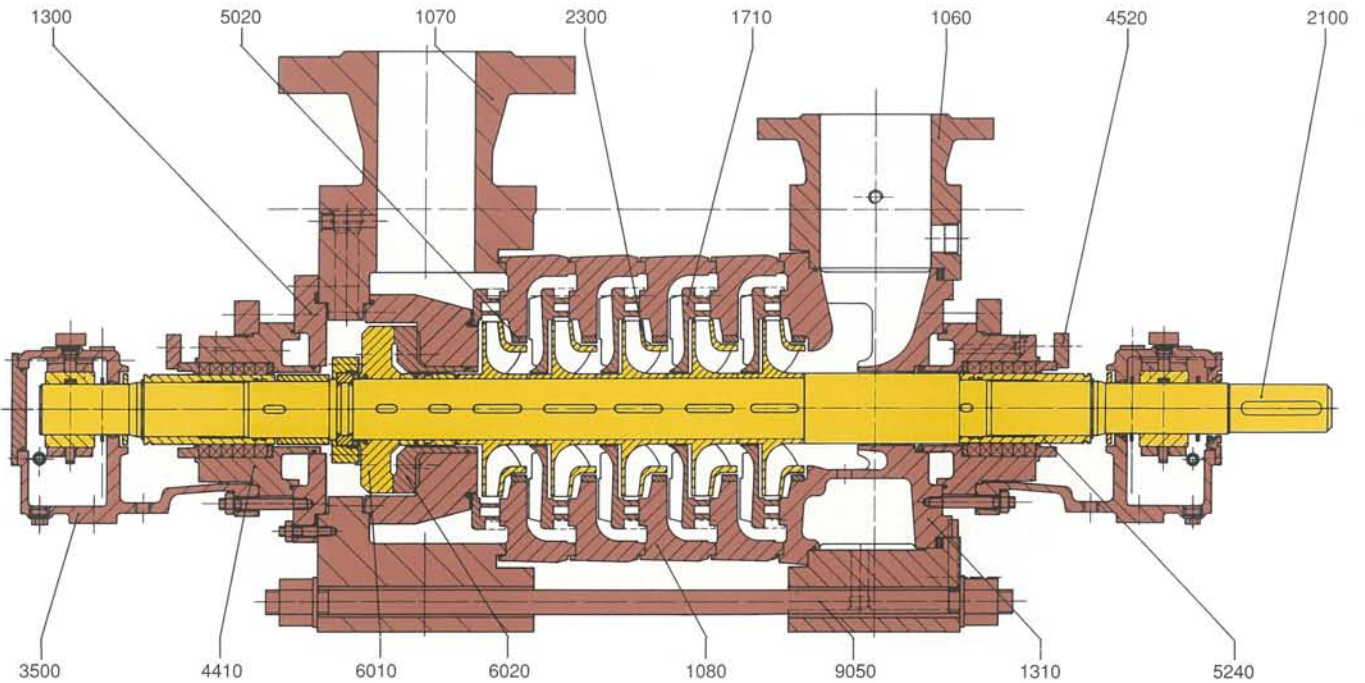
Directly by an electric motor, internal combustion engine or turbine alternatively indirectly via a gearbox or variable speed gearbox. Drive from suction end.

Q	up to 6340 U.S.gpm (up to 1440 m ³ /h)
H	up to 13800 ft (up to 4200 m)
t	up to 392°F (up to 200°C)
Ps	up to 435 psi. (up to 3 MPa)
Pd	up to 6090 psi. (up to 42 MPa)
n	up to 7000 min ⁻¹



MHG List of Components

Design : Plain bearings, balancing disc, cooled packed gland



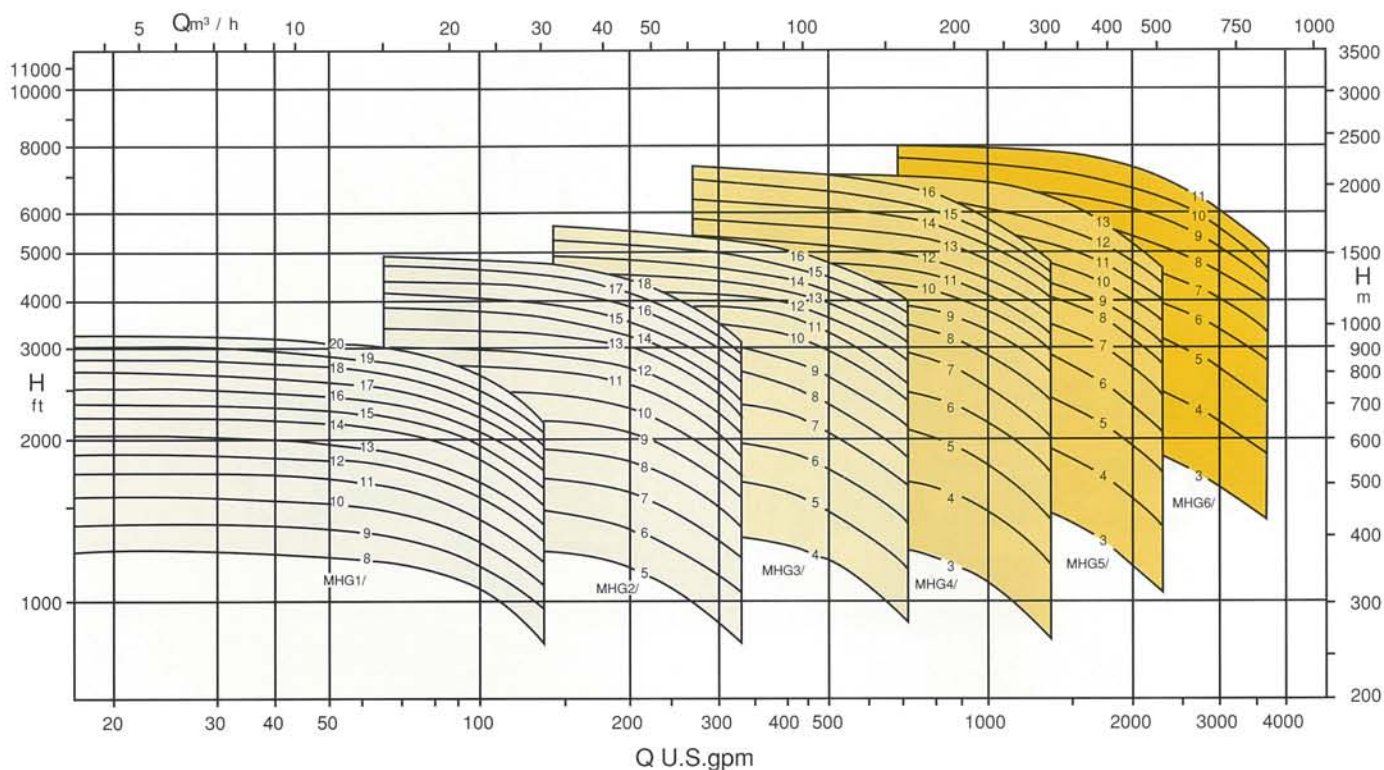
Typical material combination

Part No.	Part designation	Material
1060	Suction casing	Carbon steel*
1070	Discharge casing	Carbon steel*
1080	Stage casing	13% chrome steel
1300	Casing cover	13% chrome steel
1310	Inlet ring	13% chrome steel
1710	Diffuser	13% chrome steel
2100	Shaft	13% chrome steel
2300	Impeller	13% chrome steel
3500	Bearing housing	Cast iron
4410	Stuffing box	13% chrome steel
4520	Gland	Cast iron
5020	Casing wear ring	13% chrome steel
5240	Shaft sleeve	13% chrome steel
6010	Balancing disc	13% chrome steel
6020	Balancing seat	13% chrome steel
9050	Tie bolt	Cr-Mo steel

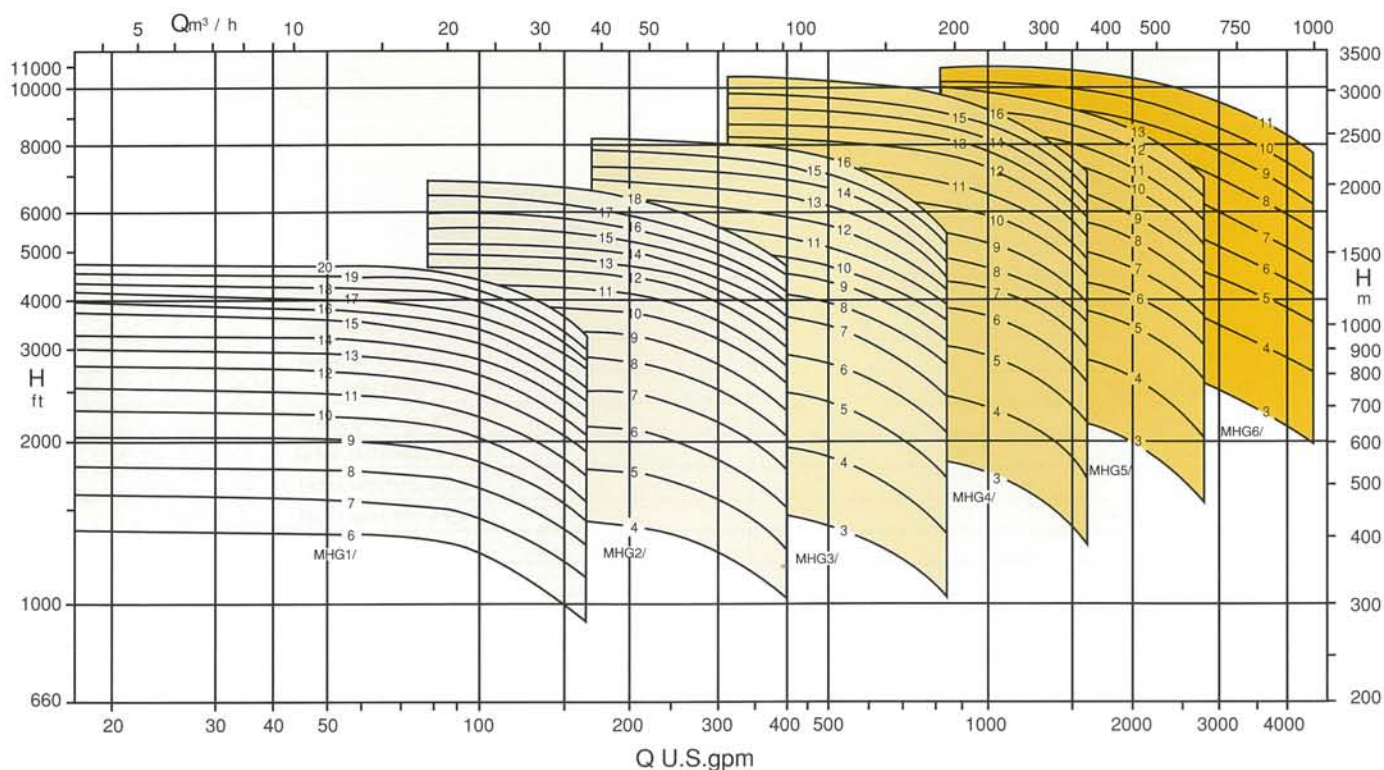
*Stainless steel plate lining on inner surface

MHG Selection Charts

50 Hz
n=2900 1/min

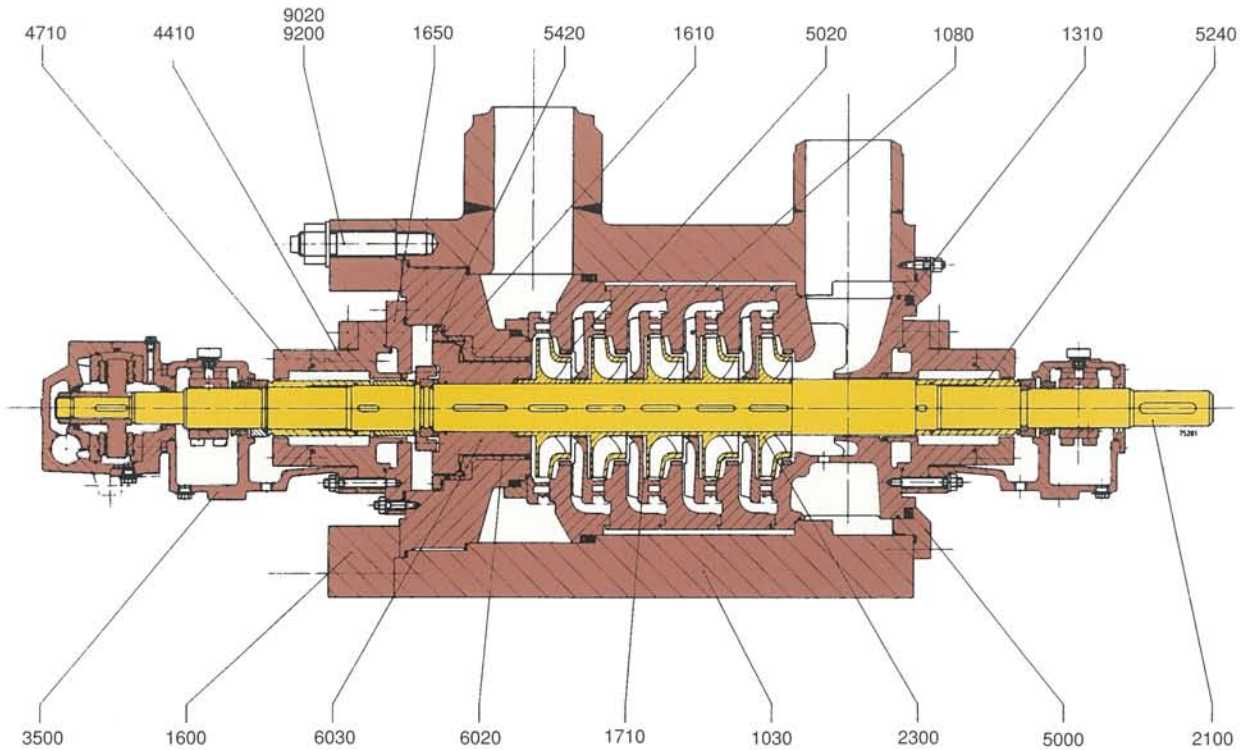


60 Hz
n=3500 1/min



MHB List of Components

Design : Balancing piston,segmental pad bearing,plain bearing,cooled mechanical seal

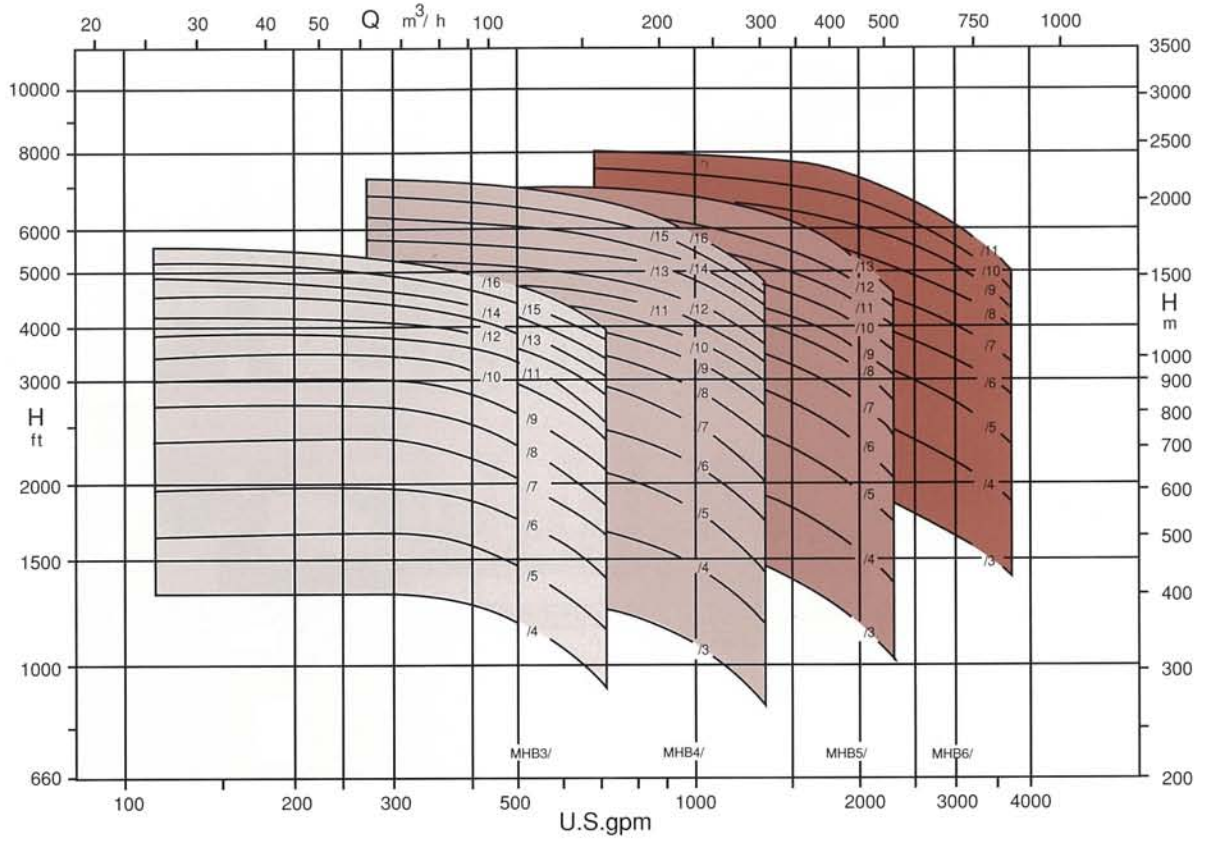


Typical material combination

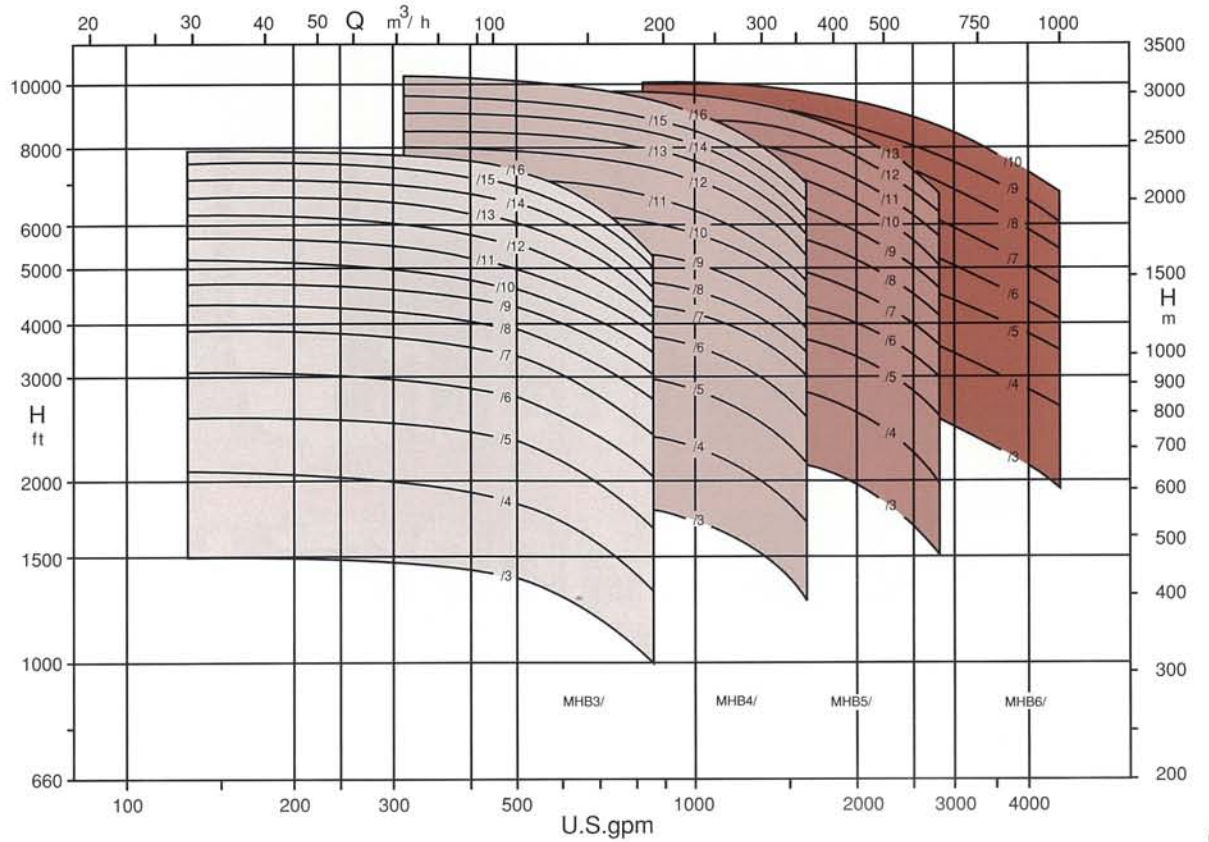
Part No.	Part designation	Material
1030	Barrel casing	13% chrome steel
1080	Stage casing	13% chrome steel
1310	Inlet ring	13% chrome steel
1600	End cover	13% chrome steel
1610	Casing cover	13% chrome steel
1650	Cooling cover	13% chrome steel
1710	Diffuser	13% chrome steel
2100	Shaft	13% chrome steel
2300	Impeller	13% chrome steel
3500	Bearing housing	Cast iron
4410	Seal casing	13% chrome steel
4710	Seal cover	304 stainless steel
5000	Ring	13% chrome steel
5020	Casing wear ring	13% chrome steel
5240	Shaft sleeve	13% chrome steel
5420	Throttling bush	13% chrome steel
6020	Balancing counter disc	13% chrome steel
6030	Balancing piston	13% chrome steel
9020	Stud	Cr-Mo steel
9200	Nut	Cr-Mo steel

MHB Selection Charts

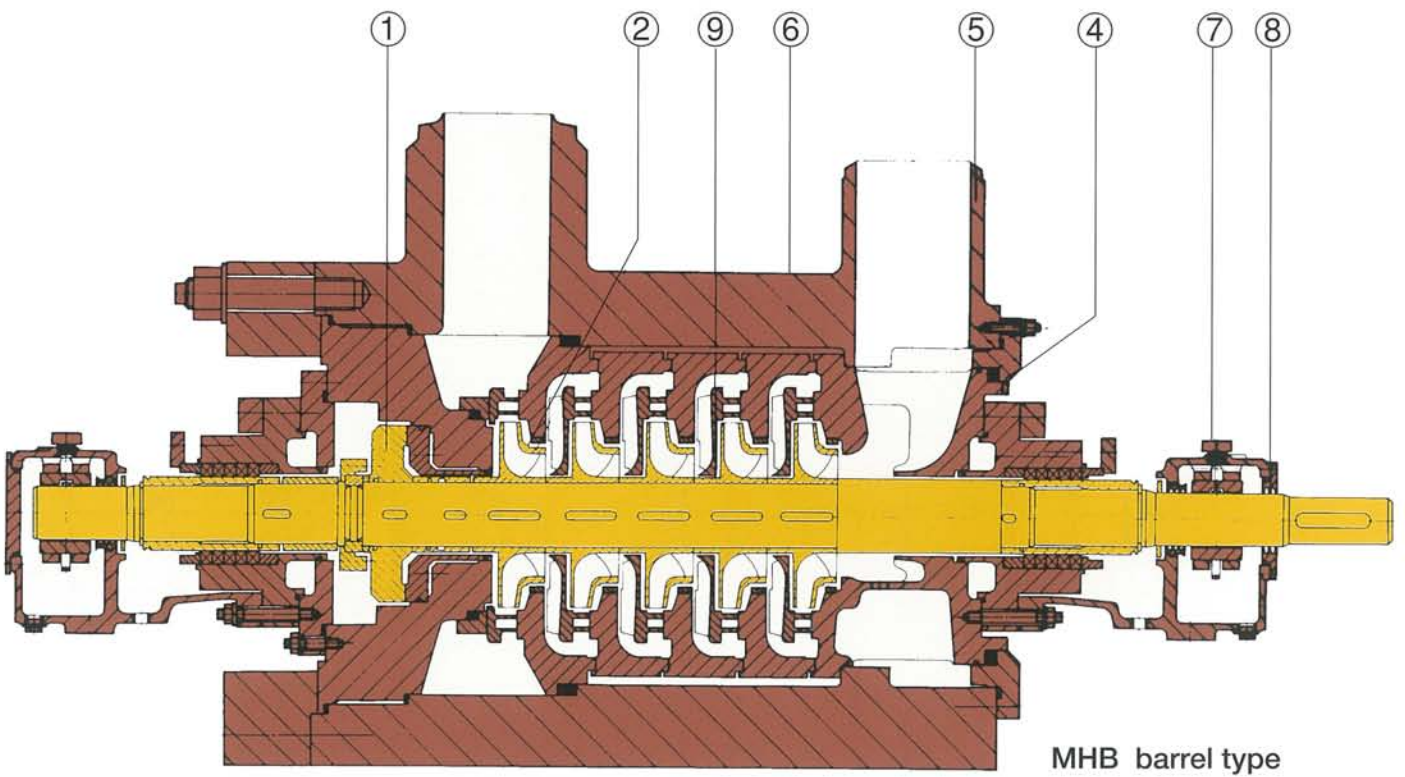
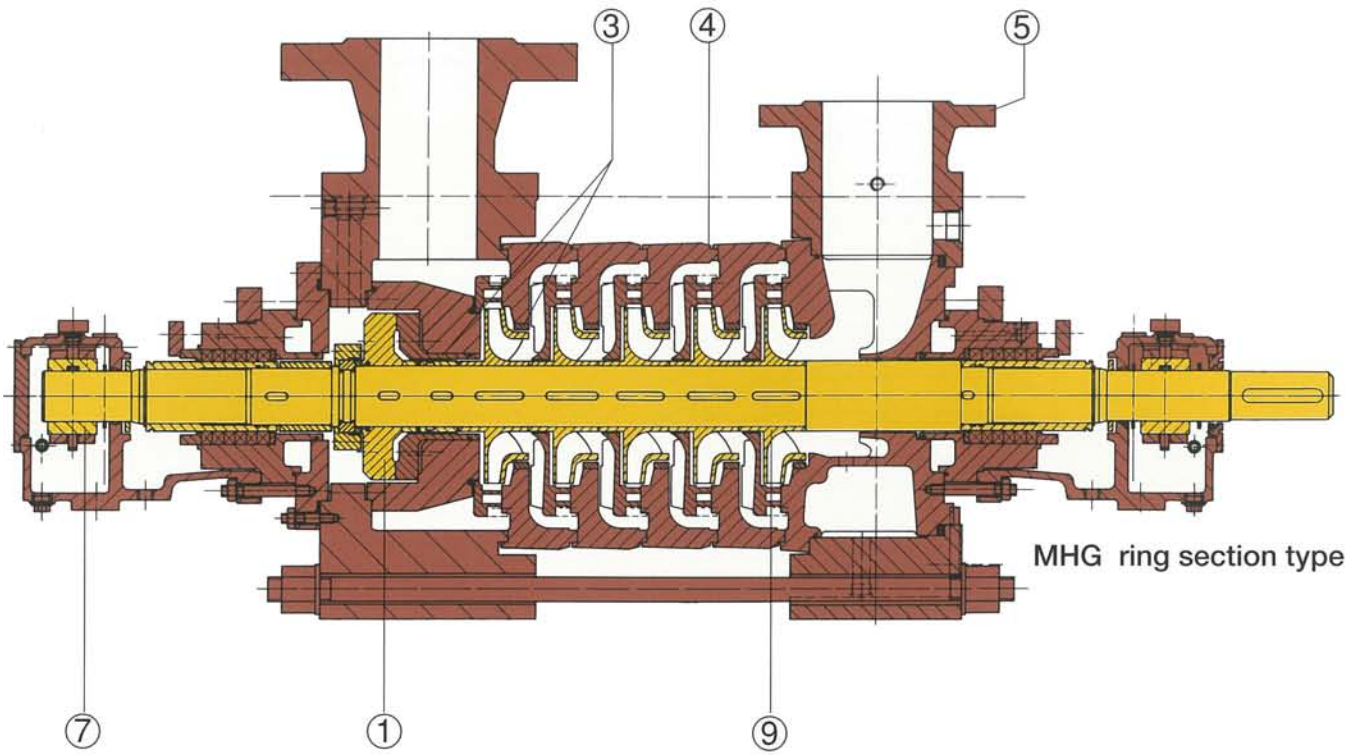
50 Hz
n=2900 1/min



60 Hz
n=3500 1/min



Rationalized
Design to
High Reliability
and High Efficiency



Shaft seals

①

Compensation of axial thrust by balance disc guarantees

- no residual axial thrust
- negligible disc friction
- small quantity of balance media
- high pump efficiency

②

Minimal radial forces due to a proven impeller and diffuser design combined with use of high quality oil lubricated radial roller bearings guarantee a service life of more than 50,000 operating hours, even under arduous operating conditions.

③

Large effective interstage bushing and wear ring areas further stiffen the pump rotor, thereby achieving

- improved running
- longer shaft seal life
- higher critical speeds

④

Simple and reliable casing sealing by metal to metal contact and confined gaskets and O-rings.

⑤

Flanges according to JIS, ANSI or weld neck ends. Connections possible to customer's specification. High permissible forces and moments.

⑥

Easy accessibility.

With the barrel casing design the pump insert can be removed and fitted in one step without dismantling the bearing brackets and the seals. The barrel can remain in the pipeline.

⑦

Durable, robust oil-lubricated or pressure fed oil-lubricated plain bearings.

⑧

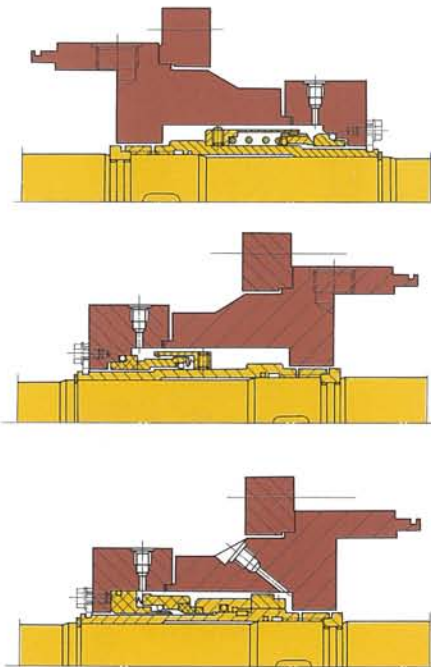
Labyrinth rings prevent the entry of the product, spray water and impurities and the leakage of lubricant.

⑨

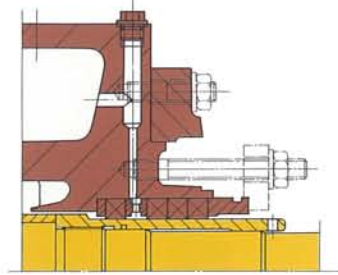
Stable impeller seat is achieved by the long hub design.

● Mechanical seals

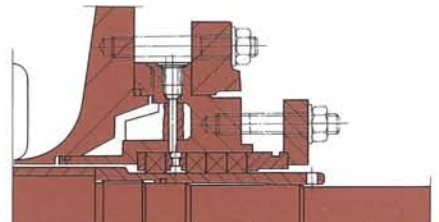
Reliable sealing of the shaft by maintenance-free mechanical seals of recognized seal manufacturers. Highly wear-resistant mechanical seal materials combined with cooling, sealing and flushing systems designed specifically for the operating conditions, guarantee long service life.



● Packed glands



Packed gland, uncooled, sealed by medium handled

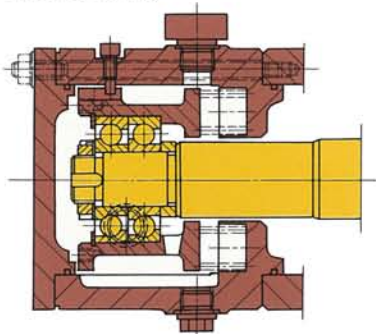


Packed gland, cooled, sealed by external liquid

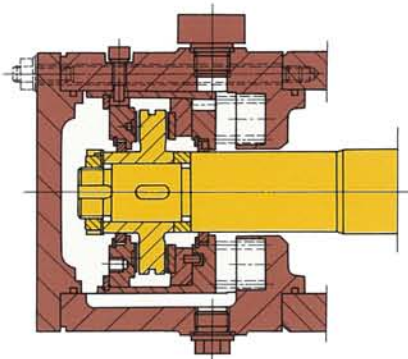
Bearings

Spring-loaded antifriction or tilting pad thrust bearings reliably disconnect the balancing disc from balancing counter disc during

- transient operating conditions
- low speeds
- high switching frequency
- drive by electric motor without its own thrust bearing



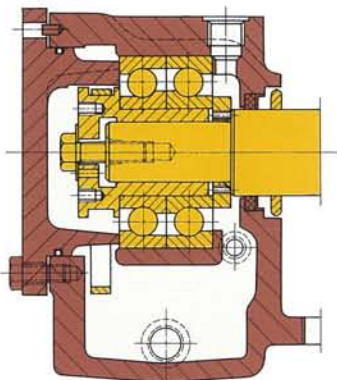
Spring-loaded thrust bearing, antifriction bearing design



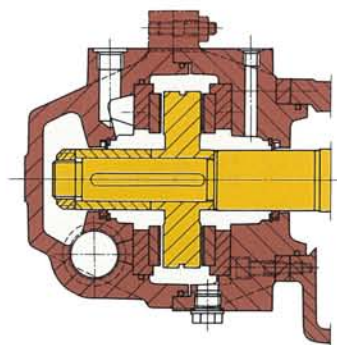
Spring-loaded thrust bearing, tilting pad thrust bearing design

Axial thrust compensation devices

Reliable axial location of the rotor of piston-balanced pumps by means of antifriction bearings or tilting pad thrust bearings.

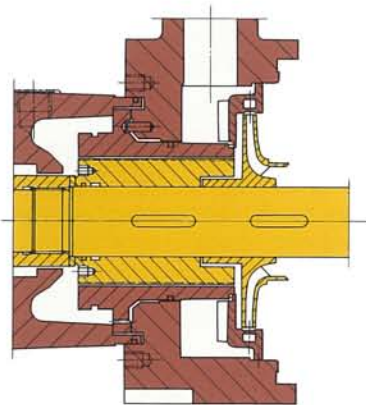


Thrust bearing, antifriction bearing design

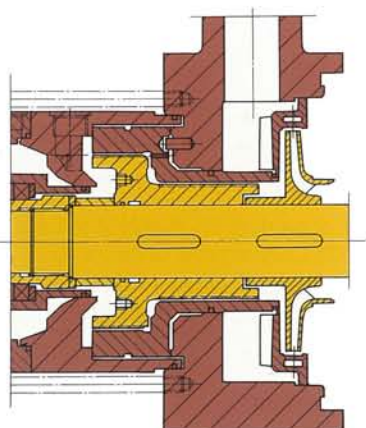


Thrust bearing, tilting pad thrust bearing design

Effective axial thrust compensation by balancing piston during transient operating conditions.



Cylindrical balancing piston



Double piston

Examples of Applications



Barrel casing boiler feed pump
2,925psi-2,980 U.S.gpm-5,610min⁻¹-7,240HP
Petacalco Power Plant(Mexico), 350MW×4units

Segmental ring-section casing boiler feed pump
3,018ft-2,100 U.S.gpm-2,980min⁻¹-2,050HP
Fujairah Power Plant(Abu Dhabi), 660MW



Segmental ring-section boiler feed pump
2,720psi-2,430U.S.gpm
-6,060min⁻¹-5,360HP
Bin Qasim Power Plant(Pakistan)
, 210MW×1units



Barrel casing boiler feed pump
3,130psi-3,030U.S.gpm-6,150min⁻¹
-6,500HP
Dalian No.4 Power Plant(China)
, 350MW×2units

Examples of Applications

Elbistan-B Power Plant(Turkey), 360MW×4units



Segmental ring-section casing
boiler feed pump
9,310ft-3,114 U.S.gpm-5,840min⁻¹-9,650HP

Barrel casing boiler feed pump(100% B.F.P.)
9,110ft-6,230 U.S.gpm-5,330min⁻¹-16,890HP



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