



TM.P. S.p.A. Termomeccanica Pompe

# Heavy Duty Process Pumps

## API 610 / ISO 13709

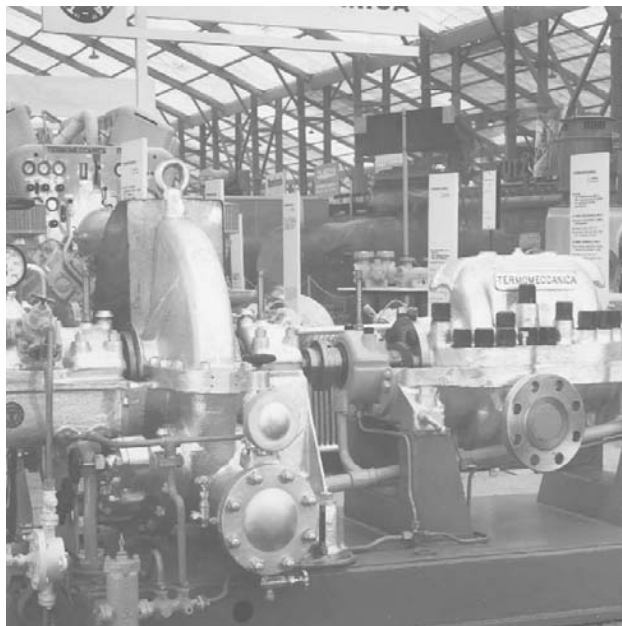


*Oil & Gas*



*Hydrocarbon  
Processing*





## COMPANY PROFILE

**TM.P. S.p.A - Termomeccanica Pompe** belongs to Termomeccanica S.p.A, a holding company involved in various business activities such as the design & manufacturing of centrifugal pumps & compressors along with screw compressors and the design, engineering and construction of turnkey plants for the Power Generation (Waste to Energy & Renewable Energies) and Water Treatment fields.

Termomeccanica was originally established in 1912 in the city of La Spezia (Liguria, Italy). From its creation, the Company was specifically dedicated to the design and manufacture of centrifugal pumps and compressors for both industrial and marine applications and achieved a key position in different reference markets.

More specifically, the production of centrifugal pumps for the Petrochemical and Oil & Gas Industries has always represented an important share of Termomeccanica Pompe's business and, through the years, the Company has built a remarkable reputation in such fields. Important resources have recently been deployed to renew and enhance the production program of the Company. In particular, through the latest innovative studies carried out by the

R&D Department, Termomeccanica Pompe is able today to supply a wide range of API 610 centrifugal pumps for the most demanding services including oil pipeline, liquefied natural gas, water injection and off-shore.

It is important to underline that the Quality Assurance Program of TM.P S.p.A Termomeccanica Pompe has been certified UNI EN ISO 9001 by the Lloyd's Register Quality Assurance since 1996. Furthermore, in 2008, the company also obtained the UNI EN ISO 14001 certification from Lloyd's Register Quality Assurance for its Environmental Management System.

The implementation of such effective quality procedures together with the above-mentioned advanced process technologies allow TM.P S.p.A Termomeccanica Pompe to meet the most stringent market requirements.

Finally, the Company also benefits from a well-structured Global Service Organization, supported locally by majority-owned subsidiaries equipped with workshops, that ensures a responsive and all-encompassing assistance to end-users ranging from installation, commissioning, maintenance, refitting and revamping to emergency interventions.



## MESB

### Horizontal between bearings, double-casing radially split multistage pumps (barrel pumps) API 610 / ISO 13709 (BB5)

MESB (single entry impellers) and MESBD (double entry first stage impeller) are full cartridge pull out pumps, diffuser type, designed according to API 610 Std., latest edition.

The cartridge includes rotor, diffusers, intermediate casing, coverheads, mechanical seals, bearing housings.

The cartridge can be easily withdrawn without disconnecting the pipe flanges and without moving the driver.

The barrel casing can be forged or cast solution, center-line or foot mounted depending on application. Nozzles are normally top – top configured but other solutions are also possible.

On the discharge side, the barrel is closed either by the traditional cover with stud bolts or by shear ring, the latter solution being limited

to 300 bar and 250°C operating conditions. The share ring design reduces maintenance downtime.

Generally, the pumps are provided with tandem impeller arrangement, and the residual axial thrust is compensated by the balancing drum or balancing disk.

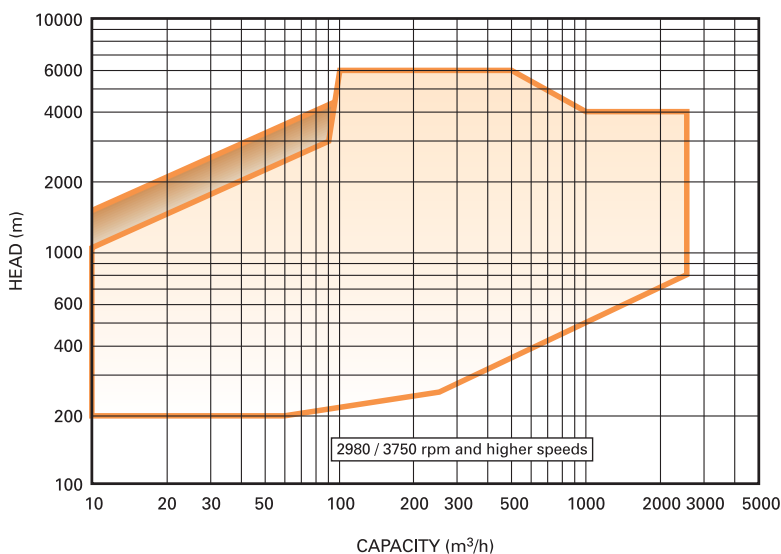
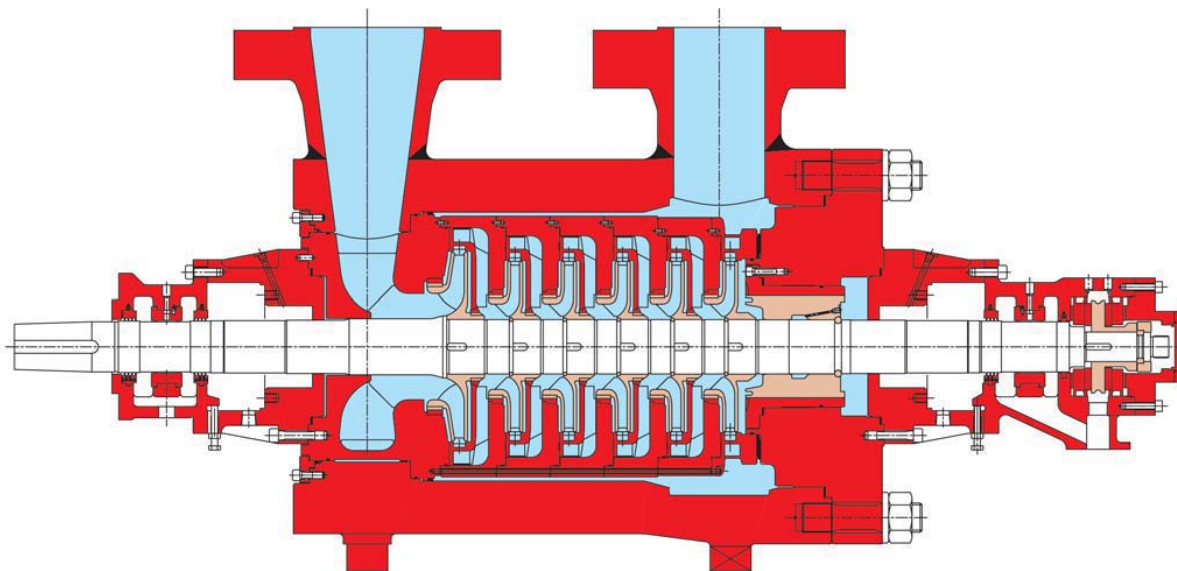
When the pumped liquid specific gravity is low and the number of stages is very high, a back-to-back impellers assembly is used, in order to ensure better rotor dynamic behavior of the pump and to minimize the residual axial thrust.

A first stage double suction impeller is used for low NPSH conditions. Intermediate take-off stage solution is available.

Radial and thrust bearings can be of either antifriction or hydrodynamic type, depending on operating conditions or customer requirement. Forced lubrication, oil ring or oil mist lubrication systems are possible.

Upon request, bearing housings can be sealed by bearing isolators.

Nearly all API 610 material classes can be used, D1 and D2 included.



#### OPERATING RANGE

- Capacities up to 2500 m³/h
- Heads up to 6000 m
- Pressures up to 650 bar
- Temperatures from - 30 °C to + 420 °C
- Speeds up to 7500 rpm

#### MAIN APPLICATIONS

- Water injection
- Oil pipelines
- Boiler feed
- Lean solution
- Ethylene feed
- Hydrocarbon charge



## MES

### Horizontal between bearings, single-casing radially split multistage pumps (ring section pumps) API 610 / ISO 13709 (BB4)

Suction and discharge covers are provided with centreline foot to withstand high pump nozzle loads and to compensate thermal deformations.

Intermediate stage casings, suction and discharge covers are held together by external tie rods. A proved design with confined o-ring seals amongst the stages guarantees no leakages during the most severe thermal transient conditions (daily start-and-stop operation).

An ample diameter shaft minimizes the rotor deflection and increases

the wear ring, bearing and mechanical seal life.

For applications with low NPSH, a double suction first-stage impeller can be installed. In this case, the pumps are named MESD.

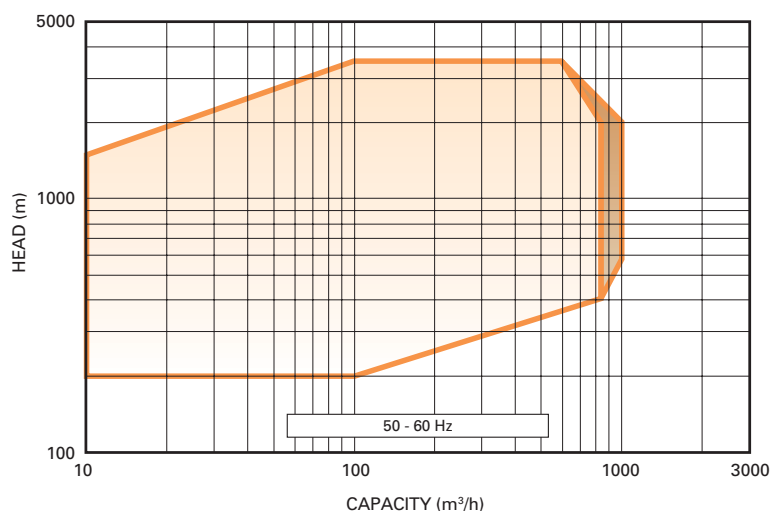
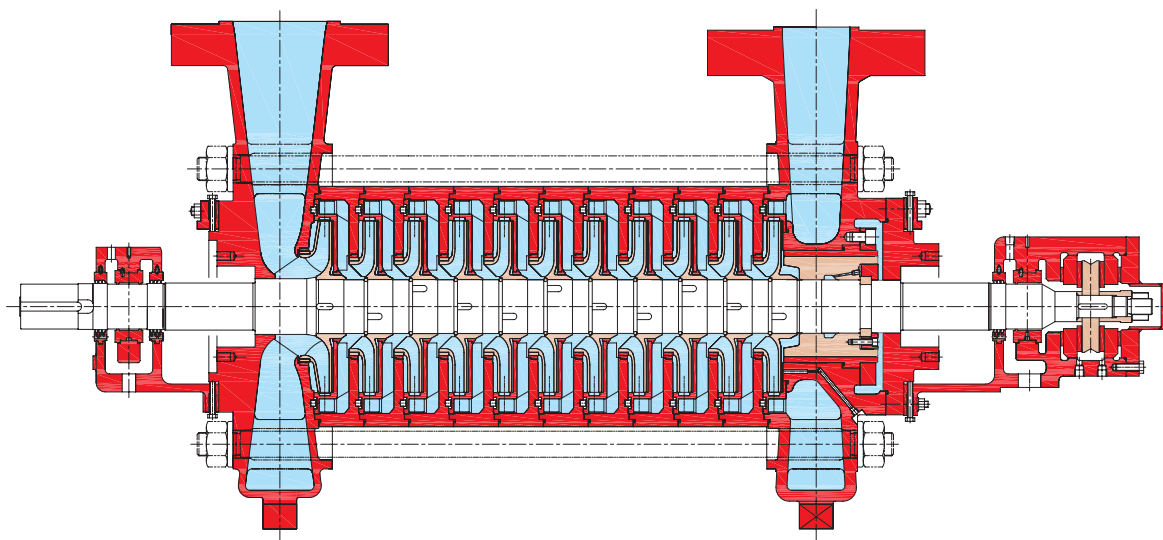
Intermediate take-off stage solution is also available.

The hydraulic axial thrust can be compensated by a balancing drum or balancing disc.

Radial and thrust bearings can either be antifriction or hydrodynamic type depending on operating conditions or customer requirement.

Forced lubrication, ring oil or oil mist lubrication systems are possible.

The bearing housings are designed in order to ensure proper air cooling in most of the applications. Whenever necessary, provisions for water cooling are available.



#### OPERATING DATA

- Capacities up to 1.000 m³/h
- Heads up to 3.450 m
- Pressures up to 350 bar
- Temperatures up to 220 °C
- Speeds up to 7.500 rpm

#### MAIN APPLICATIONS

- Boiler feed
- Auxiliary water services in Refineries



## PF

### Horizontal between bearings, axially split, multistage pumps. API 610 / ISO 13709 (BB3)

Heavy duty, double volute casing pumps, near centreline-mounted, fully in compliance with API 610 Std, latest edition.

Three- and four-stage arrangements are available, with external cross-over pipes accurately shaped to minimize friction losses.

First stage impeller can be either single or double entry type.

On three-stage single entry design, the second- and third-stage impellers are back-to-back mounted, and the first stage impeller, if single entry type, is axially balanced through balancing holes and back-side wear ring.

On four-stage single entry impellers, a back-to-back arrangement is used; when double entry impeller is necessary for low NPSH, the

second stage impeller is balanced through balancing holes and back-side wear ring; third- and fourth-stage impellers are back-to-back mounted.

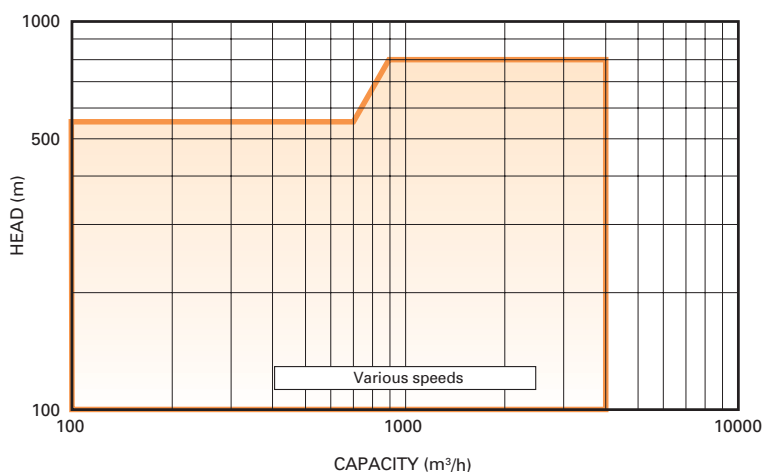
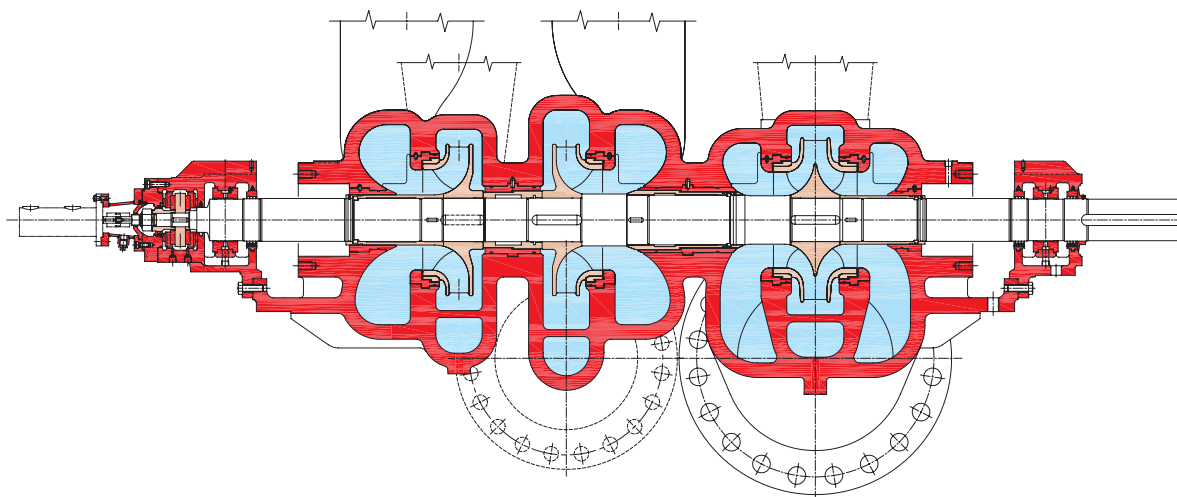
Suction and discharge nozzles are integrally cast with the lower half casing for easy removal of the rotor assembly, without disconnection of the piping.

Flanges meet ASME B16.5 standards and can be supplied in class 300 – 600 – 900, depending on the application.

The deep seal chambers, designed according to API 682 Std., are suitable for any type of mechanical seal.

The following bearing arrangements can be supplied, depending on pump size and operating conditions:

- ring oil lubrication with duplex ball thrust / ball radial bearings;
- ring oil lubrication with duplex ball thrust / sleeve radial bearings;
- forced oil lubrication with tilting pad thrust / sleeve radial bearings.



#### OPERATING DATA

- Capacities up to 4.000 m<sup>3</sup>/h
- Heads up to 800 m
- Pressures up to 150 bar
- Temperatures up to 200°C
- Speeds up to 4.000 rpm

#### MAIN APPLICATIONS

- Oil Pipelines (main and booster)
- Refineries & Petrochemical Plants
- Process Transfer
- Boiler Feed



## D2D

### Horizontal between bearings, axially split, two- stage pumps. API 610 / ISO 13709 (BB1)

Heavy duty volute or diffuser type pumps, near centreline-mounted, designed in full compliance with API 610 latest edition.

Several different arrangements are available:

- two single entry impellers back to back mounted;
- first stage double entry impeller, second stage single entry impeller with balancing holes;
- two double entry impellers;
- first stage two single entry impellers, back to back, side mounted; second stage double entry impeller. Two suction flange design.

The suction and discharge branches are located in the lower part of the casing. Flanges meet ASME B16.5 standards and may be supplied in class 300 - 600 - 900, depending on the application.

All arrangements ensure axial thrust compensation; axially split design allows easy access to the rotor assembly for easy maintenance.

Very robust construction casing withstands high piping loads and guarantees low vibration levels.

Seal chambers comply with API 682 Std. for installation of single, dual pressurized and dual unpressurized mechanical seals with cartridge design. Packing type stuffing boxes may be used.

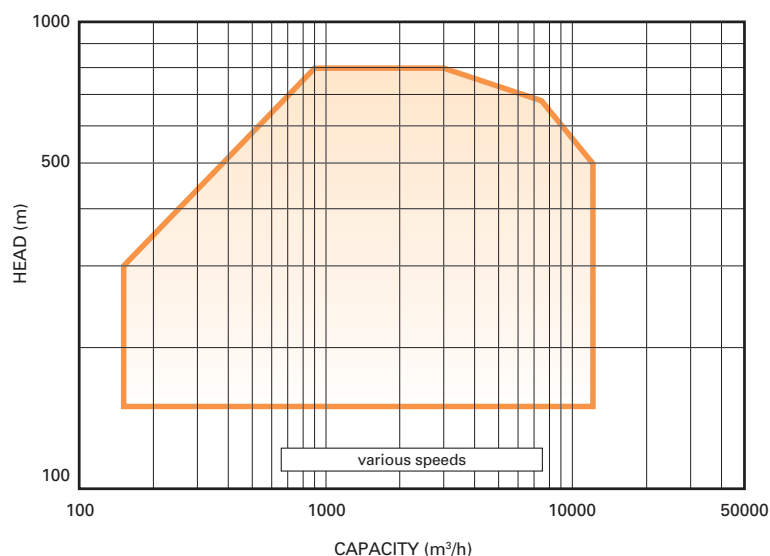
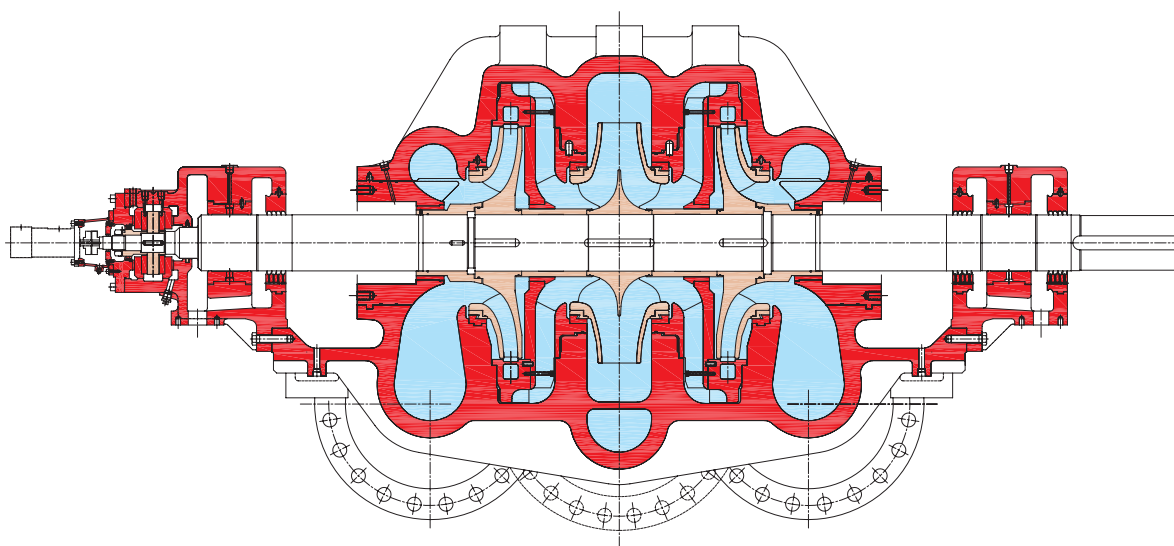
Ample diameter shaft minimizes the rotor deflection and increases the wear ring, bearing and mechanical seal life.

Depending on pump size and working conditions, D2D pumps may be supplied with different bearing types such as rollers, split sleeve radial and ball thrust, split sleeve radial and tilting pad thrust.

Consequently, ring oil or forced oil lubrication is used.

API 610 material classes can be used.

Different options are available for specific applications and services.



#### OPERATING DATA

- Capacities up to 12.000 m<sup>3</sup>/h
- Heads up to 800 m
- Pressures up to 150 bar
- Temperatures up to 200°C
- Speeds up to 6.000 rpm

#### MAIN APPLICATIONS

- Oil Pipelines (main and booster)
- Refineries & Petrochemical Plants
- Process Transfer



## DD

### Horizontal between bearing, axially split, one stage double entry pumps. API 610 / ISO 13709 (BBI)

Heavy duty double volute casing pumps, designed in full compliance with API 610 Std., latest edition.

Suction and discharge nozzles, on side-side arrangement, are integrally cast with the lower half casing for easy removal of the rotor assembly without disconnecting the piping.

A very wide range of flange ratings, according to ASME B 16.5, are available to meet all running conditions within the operating range of the DD family.

Pump casing design can either be foot mounted or near centreline-mounted depending on the operating temperature and/ or the running speed. When required, vertical position assembly can also be supplied. Seal chambers comply with API 682 Std. for installation of single, dual pressurized and dual unpressurized mechanical seals with cartridge design.

Double entry impeller ensures balancing of hydraulic axial thrust on

the whole operating region, and allows applications at low NPSH conditions.

The pump shaft is of very stiff design with short bearing span in order to ensure first critical speed to be much higher than maximum running speed.

Bearing housings are made of rugged construction so as to reduce pump vibration levels. Labyrinths and deflectors seal the bearing housings against dust and dirt. Provisions for installation of bearing isolators are available.

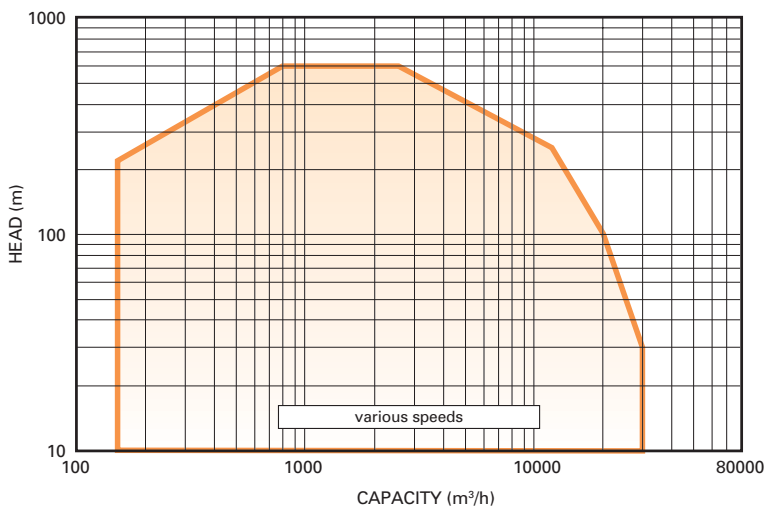
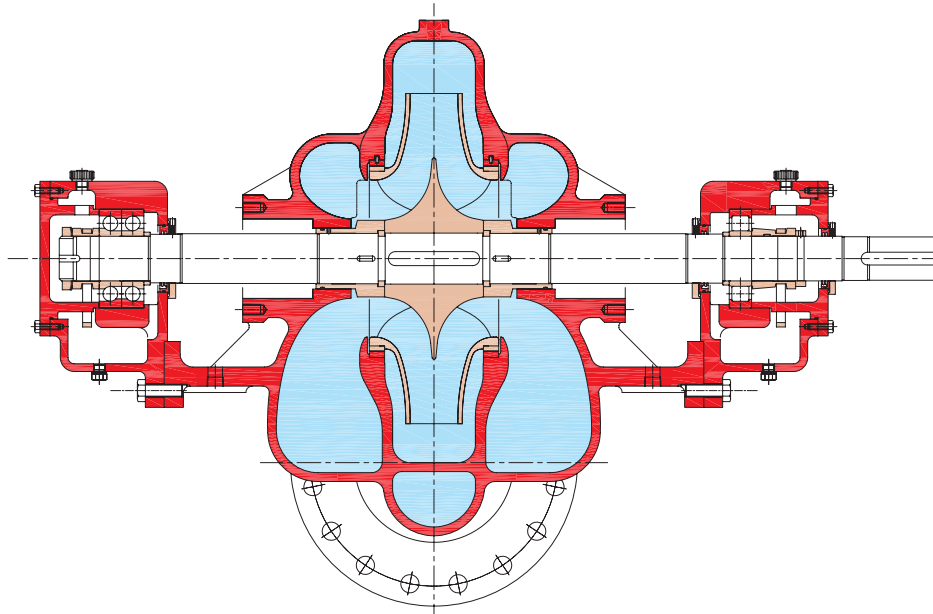
The following bearing solutions are available:

- ring oil lubrication with antifriction radial and thrust bearings;
- ring oil lubrication with sleeve radial bearings and antifriction thrust bearing;
- forced oil lubrication with sleeve radial bearings and tilting pad thrust bearing.

Pure or purge oil mist lubrication systems are also possible.

All API 610 material classes can be used.

Different options are available for specific applications and services.



#### OPERATING DATA

- Capacities up to 30.000 m<sup>3</sup>/h
- Heads up to 600 m
- Pressures up to 150 bar
- Temperatures up to 205 °C
- Speeds up to 6.000 rpm

#### MAIN APPLICATIONS

- Oil Pipelines (main and booster)
- Oil Transfer
- Ship Charge & Discharge
- Water Supply
- Cooling Water



## A2P

### Horizontal between bearings, radially split, two- stage pumps API 610 / ISO 13709 (BB2)

A2P (single entry impellers) and A2PD (double entry first stage impeller) pumps are designed in full compliance with API 610 Std., latest edition.

On A2P pumps, the radial impellers are enclosed type with back-to-back arrangement for hydraulic axial balance.

The cast volute casing is provided with an internal cross over between the two stages. The casing is centreline-mounted for high temperature operation. Single or double volute casings are 180° staggered for highly effective balance of the hydraulic radial thrusts and for minimum shaft deflection. This arrangement together with stiff shaft design ensures first critical rotor speed to be much higher than the maximum running speed. The suction and discharge pump branches are integrally cast with the

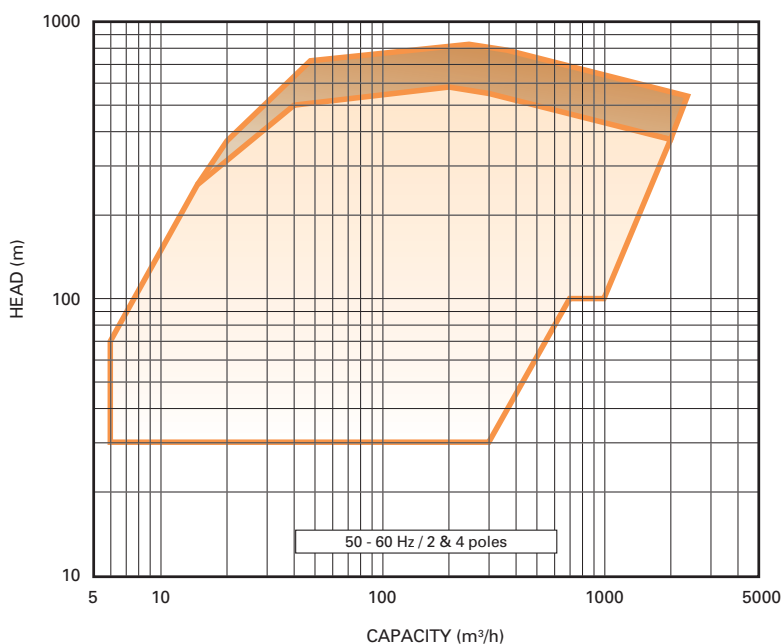
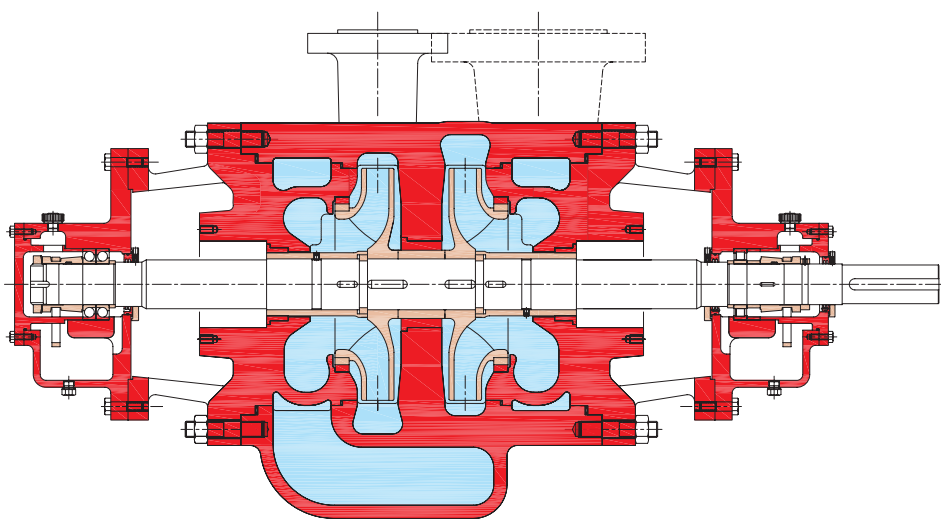
casing and generally have top-top arrangement, but side-top or side-side solutions can be supplied. The suction and discharge flanges are in compliance with ASME B.16.5 Class 600; ratings 300 and 900 are also available. Pump cover is provided with deep seal chambers as per API 682 Std., suitable for any type of mechanical seal. The seal chamber of the second stage is connected to the suction by a balancing line in order not to overload the mechanical seal.

The following bearing solutions are available:

- ring oil lubrication with antifriction radial and thrust bearings
- ring oil lubrication with sleeve radial bearings and antifriction thrust bearing.
- forced oil lubrication with sleeve radial bearings and tilting pad thrust bearing. Pure or purge oil mist lubrication systems are also possible.

All API 610 material classes can be used.

Different options are available for specific applications and services.



#### OPERATING DATA

- Capacities up to 2.400 m<sup>3</sup>/h
- Heads up to 750 m
- Pressures up to 120 bar
- Temperatures up to 450 °C

#### MAIN APPLICATIONS

- Refinery services
- Petrochemical processing
- Liquefied gas industry
- Off-shore installation
- Boiler feed



## DP

### Horizontal between bearings, radially split, one stage double entry pumps API 610 / ISO 13709 (BB2)

Heavy duty process pumps, centreline-mounted for high temperature services, designed in full compliance with API 610 Std., latest edition. Double casing cover construction and symmetrical double volute casing reduces thermal stresses during transient operation and allows easy access for maintenance works. Single casing cover design can also be proposed depending on operating conditions.

Standard design offers top-top arrangement of suction and discharge nozzles, however, side-top and side-side solutions are also available. Suction and discharge flanges are in compliance with ASME B.16.5 Class 300; higher ratings can be provided depending on the operating conditions.

Seal chambers, integrally cast with the pump covers, comply with API 682 Std for installation of single, dual pressurized and dual unpressurized mechanical seals with cartridge design.

A double entry impeller ensures the balancing of the hydraulic axial

thrust on the whole operating region and allows applications at low NPSH conditions.

The pump shaft is of very stiff design with short bearing span in order to ensure first critical speed to be much higher than maximum running speed.

Bearing housings are made of carbon steel and are of rugged construction so as to reduce pump vibration levels.

Labyrinths and deflectors are sealing the bearing housings against dust and dirt. Provisions for installation of bearing isolators are available.

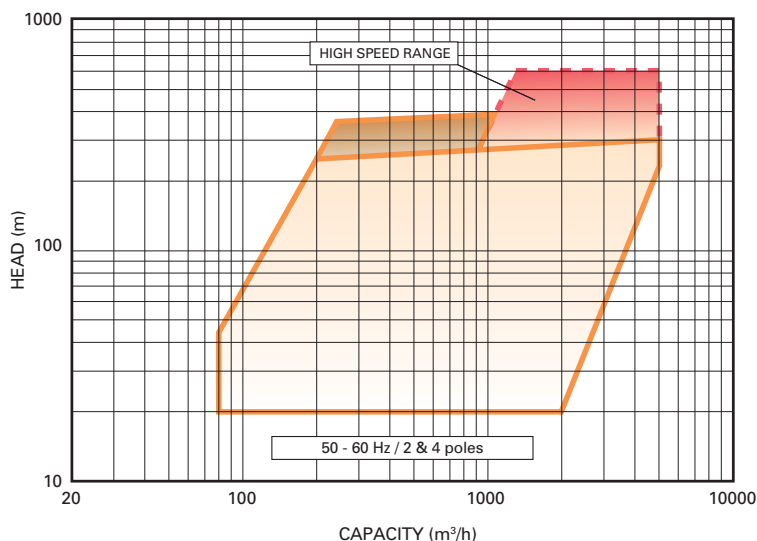
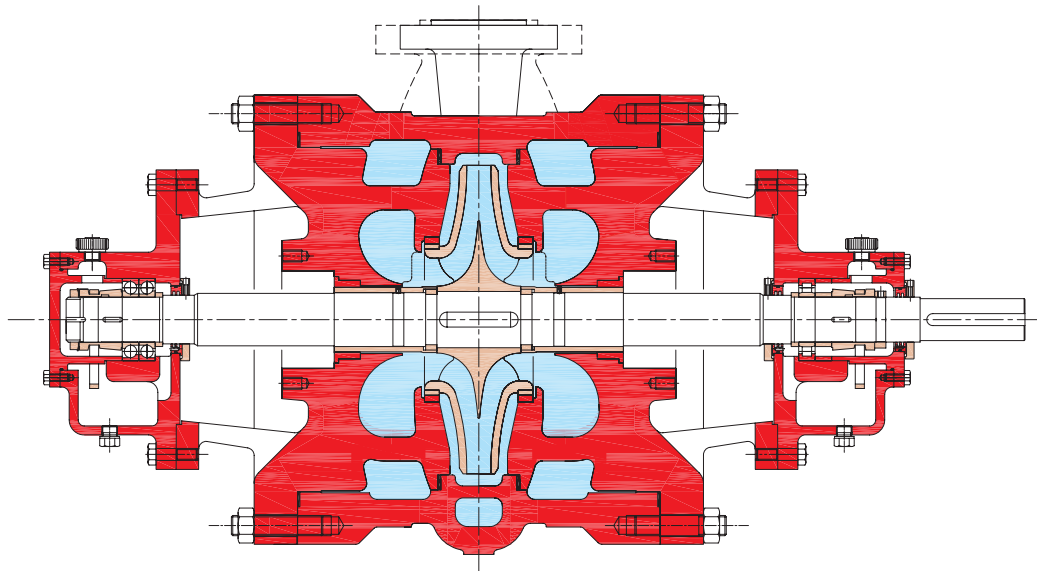
The following bearing solutions are available:

- ring oil lubrication with antifriction radial and thrust bearings;
- ring oil lubrication with sleeve radial bearings and antifriction thrust bearing;
- forced oil lubrication with sleeve radial bearings and tilting pad thrust bearing.

Pure or purge oil mist lubrication systems are also possible.

All API 610 material classes can be used.

Different options are available for specific applications and services.



#### OPERATING DATA

- Capacities up to 5.000 m³/h
- Heads up to 600 m
- Pressures up to 150 bar
- Temperatures up to 450 °C
- Speeds up to 6.000 rpm

#### MAIN APPLICATIONS

- Oil Production and Refining
- Petrochemical Processing
- Hydrocarbon Processing
- Gas Industry Service
- Flammable Liquids
- Off-shore
- Oil Pipelines
- Boiler Feed and booster



## AP

### Horizontal centreline-mounted single stage overhung pumps API 610 / ISO 13709 (OH2)

Fully complying with API 610 Std. latest edition.

Back pull out design makes possible the withdrawal of the rotor without disconnecting the pipe flanges and without moving the driver. Single volute pump casing up to 2" discharge nozzles and double volute for higher sizes in order to minimize radial loads and shaft deflection. Rugged casing design ensures maximum allowable nozzle loads much higher than API 610 values. End-top nozzle arrangement is standard design; top-top solution can also be supplied. Suction and discharge flanges are in compliance with ASME B.16.5 Class 300; rating 150 and 600 can be supplied upon request. Impellers are enclosed type for better efficiency. Normally, renewable, front and back wear rings are used together with balancing holes for long bearing life. Whenever balancing holes are not necessary, the back wear ring is eliminated. Semi-open impellers are also available for special duties (high viscosity, suspended solids).

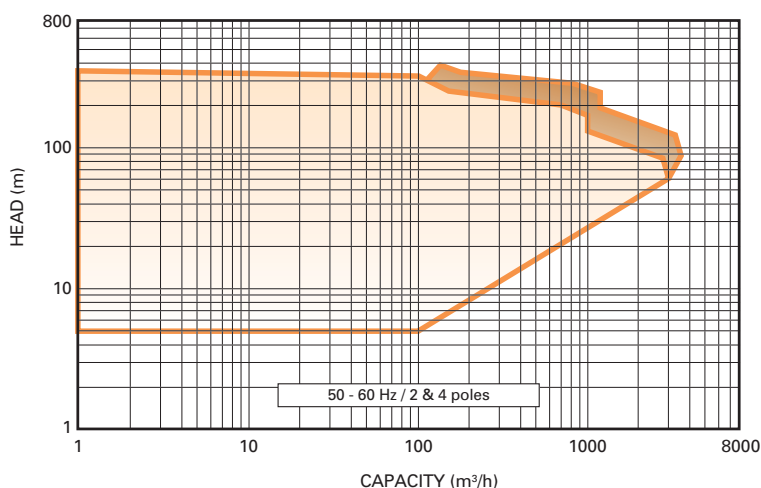
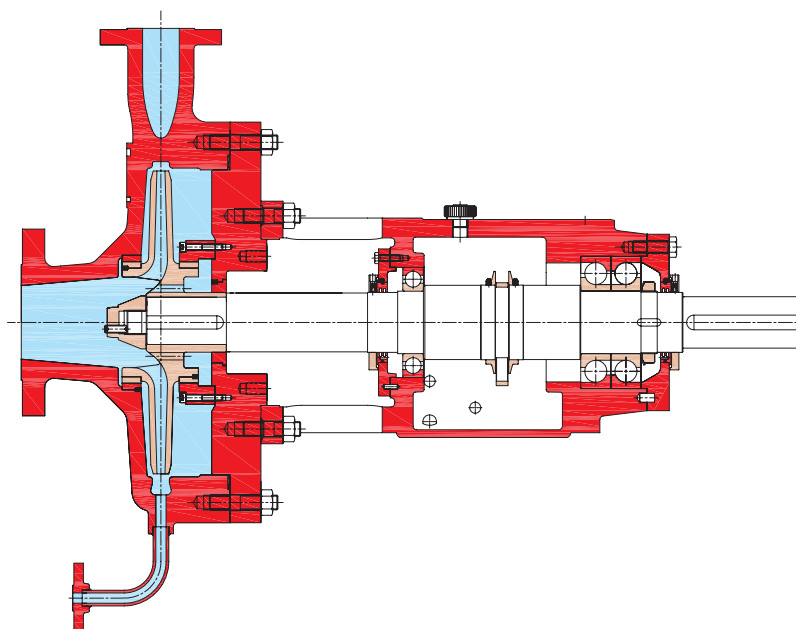
Generous shaft design reduces the deflection well below the API 610 requirements. The seal chamber has dimensions complying with API 682 Std. and can accommodate any type of mechanical seal. The carbon steel bearing housing is provided with specially shaped and distributed cooling fins for very effective heat dissipation. Whenever necessary, oil cooling is possible either by air fan or by water heat exchanger. Bronze labyrinth seals and deflectors protect the lubricating oil chamber from dust and dirt; when required, bearing isolators can be supplied. Single-row deep groove ball radial bearing and paired single-row, as well as 40° angular contact thrust bearing (7000 series) are used on standard design. Triplex bearing design is used for high suction pressure.

Ring oil lubrication is normally supplied; provisions for purge oil mist or pure oil mist systems are also available.

Cooling/ heating jacket can be provided either on the pump casing and/ or the stuffing box.

Modular design of the whole line has minimized the number of different pump components.

All API 610 material classes can be used.



#### OPERATING DATA

- Capacities up to 3.100 m³/h
- Heads up to 430 m
- Pressures up to 100 bar
- Temperatures from -100 °C up to + 450 °C
- Speeds up to 4.000 rpm

#### MAIN APPLICATIONS

- Oil Production and Refining
- Petrochemical Processing
- Hydrocarbon Processing
- Gas Industry Service
- Flammable Liquids
- Off-shore
- Boiler Circulation
- Booster



## CPP-CEX

### Vertically suspended, diffuser and volute design, single and double casing pumps API 610 / ISO 13709 (VS1-VS2 - VS6 - VS7)

Termomeccanica Pompe offers a very large selection range of vertically suspended pumps with a quite remarkable number of configurations, constructions and materials to meet all possible requirements, including design in full compliance with API 610 / ISO 13709 Std.

CPP pumps are single casing type (VS1, VS2) whereas CEX pumps are double casing design (canned pumps VS6 and VS7) for applications where wet pit is not available or NPSHa is very low.

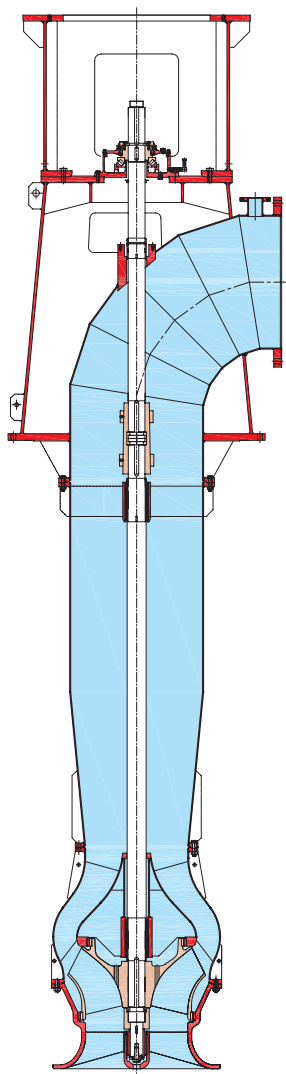
Both CPP and CEX pumps can be offered with diffuser or volute configurations, in single or multistage version.

For diffuser stages, either radial flow or mixed flow impellers are available, the former being used for low-capacity and high-head services, the latter for high capacity and low-head applications; mixed flow impellers can be enclosed or semi-open type.

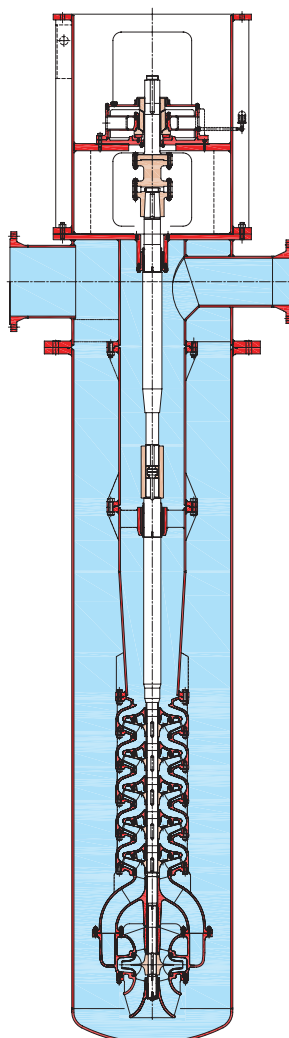
Volute casing design is used at first stage with double suction and radial flow impeller, both in wet pit and canned applications; only double volute casing construction is used so as to reduce hydraulic radial thrust.

The pumps with first stage double entry impeller arrangement are named CPPD (wet pit) or CEXD (canned).

The first stage is associated with diffuser stages on multistage pumps.



CPP



CEX



In wet pit applications, the discharge flange can be located either above or below the ground level. Similar options are available for the can suction flange on double casing design.

On large-size single stage mixed flow pumps, a pull-out solution is recommended for wet pit installations as, for inspection and maintenance, it allows to remove the inner parts only, without disconnecting the main piping.

Discharge column, discharge head and motor support are weld fabricated construction, however, cast solution can be supplied.

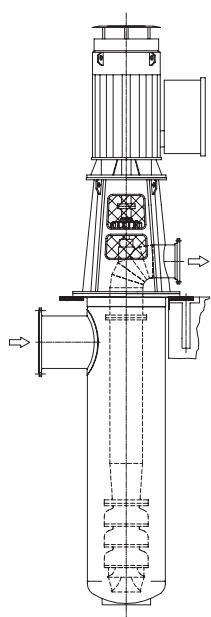
Open or enclosed lineshaft options are available depending on pumped fluid characteristics or customer requirement.

The first stage impeller is always located between bushings and additional bushings are located within each upper stage and along the pump shaft, distributed with minimum span in order to maintain the first critical speed well above the maximum operating speed.

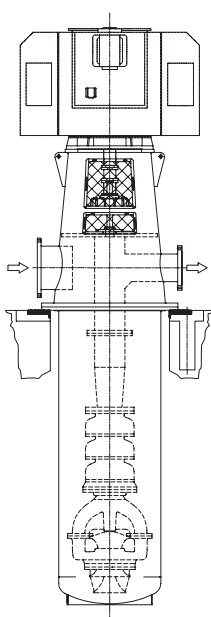
Lubrication of radial sleeve bearings can be by grease, oil, product as well as by external clean source to meet any possible need.

Thrust bearing can be either integral with the driver (rigid coupling connection) or integral with the pump (elastic coupling connection).

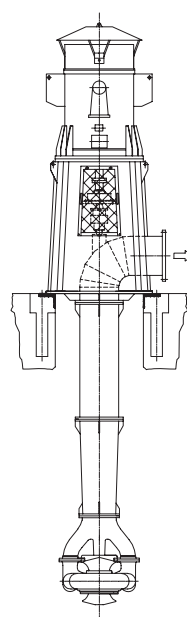
Packing and single or dual mechanical seal arrangements can be supplied. A very wide range of materials can be used to suit all market requirements.



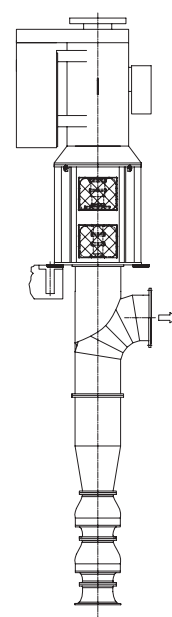
SUCTION NOZZLE  
BELOW GROUND FLOOR



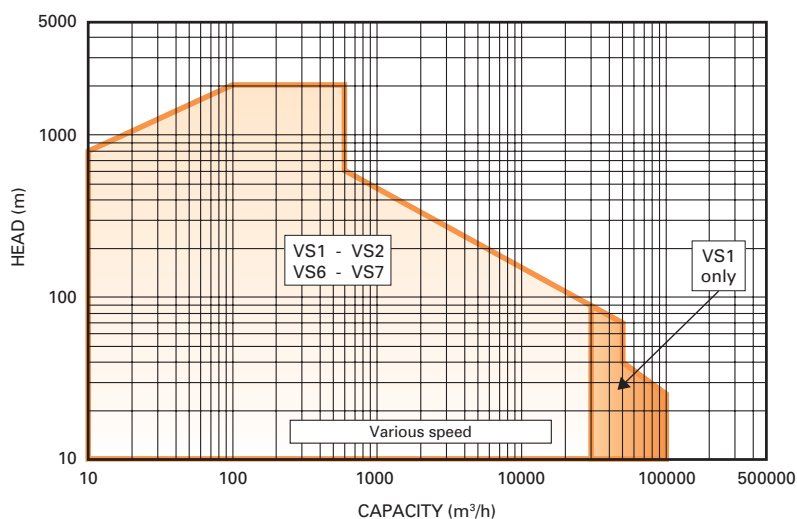
SUCTION NOZZLE  
ABOVE GROUND FLOOR



DISCHARGE NOZZLE  
ABOVE GROUND FLOOR



DISCHARGE NOZZLE  
BELOW GROUND FLOOR



#### OPERATING DATA

- Capacities up to 100.000 m<sup>3</sup>/h
- Heads up to 2.000 m
- Pressures up to 200 bar
- Temperatures from -150 °C up to 400 °C
- Speeds up to 4.000 rpm

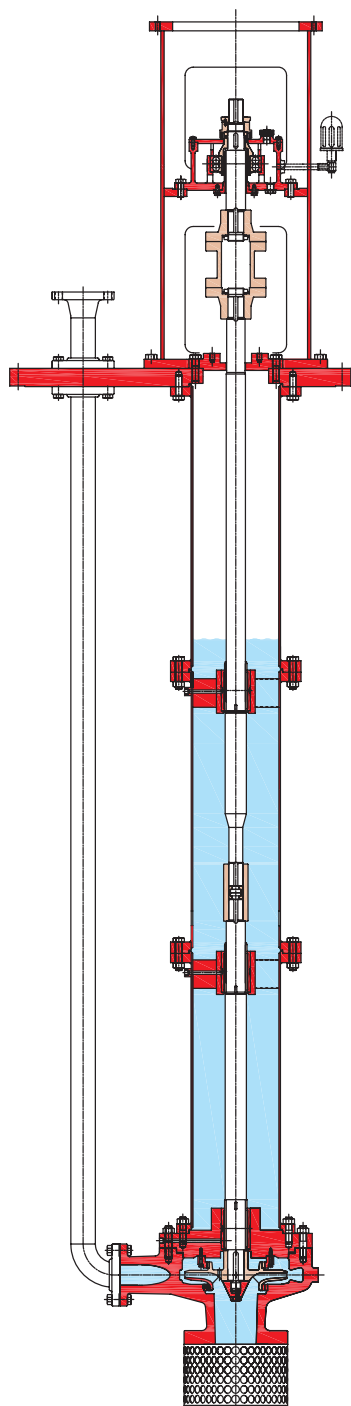
#### MAIN APPLICATIONS

- Hydrocarbon booster and transfer
- Pipeline service
- Sea water lifting
- Off-shore crude oil loading
- Condensate
- Cryogenic service
- Raw water intake
- Cooling water
- Soft water supply and distribution



## CPPL

### Vertically suspended , single casing volute, line- shaft driven sump pumps ISO 13709 /API 610 (VS4)



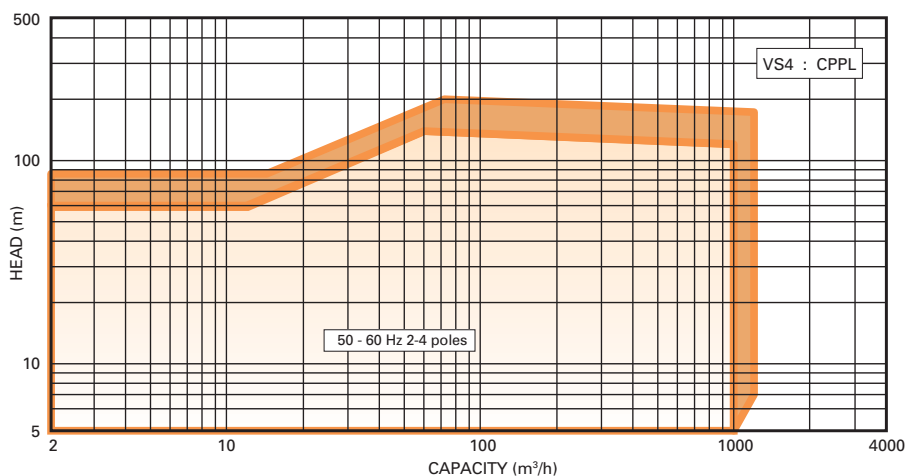
CPPL vertical immersion sump pumps are designed in full compliance with API 610 Std., latest edition, for installation in pit depths up to 6 m. The pump volute casing, of radial split design, is closed by the casing cover through a fully confined gasket. The lower radial bushing is fitted within the casing cover. Impellers are enclosed type. Normally, renewable front and back wear rings are used together with balancing holes for long bearing life. When balancing holes are not necessary the back wear ring is eliminated. Semi-open impellers are also available for special duties (high viscosity, suspended solids). Fabricated column pipe connects the casing cover to the base plate; the column pipe is in one or more sections depending on the pump setting. The motor support is bolted to the pump mounting plate; motor support and column pipe are centered on the pump mounting plate. The seal chamber is bolted to the mounting plate. The upper bearing housing is fitted on the intermediate flange of the motor support; double row radial-thrust bearing is supplied, grease or oil bath lubricated, depending on the operating conditions. With mechanical seal arrangement, a spacer is fitted between the lower and the upper pump shafts for easy maintenance. Electrical motor is connected to the pump shaft through a flexible metallic coupling. The lower pump shaft can be one piece or divided into sections connected by rigid couplings; intermediate radial bushings are fitted on bearing holders which are fixed between the column pipe flanges. Protection sleeves are usually mounted on the shaft. The line radial bearings are lubricated by clean liquids from external source or by the pumped fluid; the lubricating fluid returns to the suction tank through overflow openings in the column; grease lubrication is also possible. The discharge column is external and parallel to the column pipe and connects the discharge branch of the casing to the pump mounting plate.

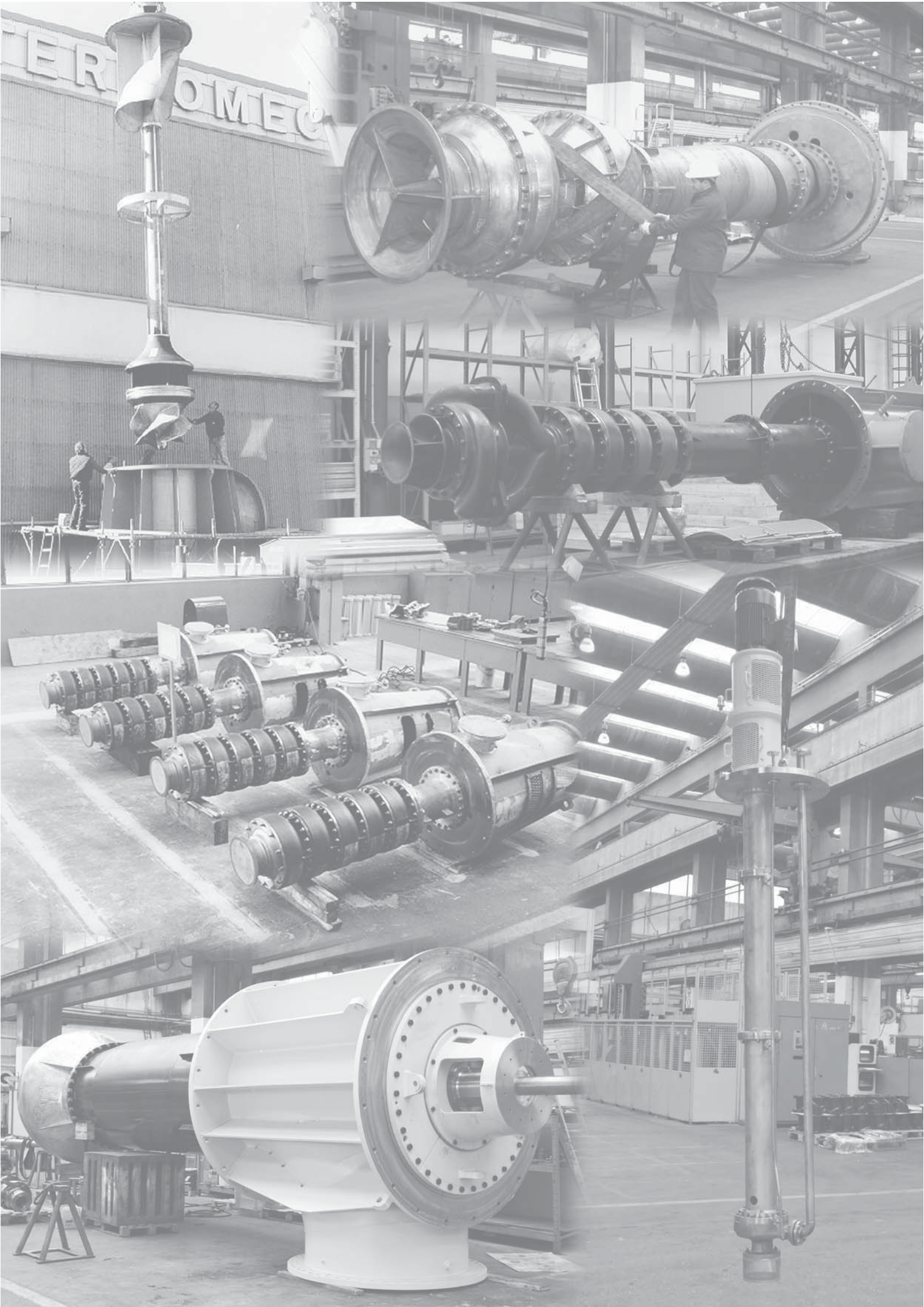
#### OPERATING DATA

- Capacities up to 1.500 m<sup>3</sup>/h
- Heads up to 200 m
- Pressures up to 25 bar
- Temperatures up to 450 °C

#### MAIN APPLICATIONS

- Recovered Oil
- Tank Service
- Storm and Drain Water services
- Chemical Industry
- Melted Sulphur







**TM.P. S.p.A. Termomeccanica Pompe**

TM.P. S.p.A. Termomeccanica Pompe  
Via del Molo, 3 · 19126 La Spezia (Italy)  
Tel. +39 0187 5521 · Fax +39 0187 552506  
e-mail: [pumps@termomeccanica.com](mailto:pumps@termomeccanica.com)  
[www.termomeccanica.com](http://www.termomeccanica.com)

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Bucharest - Tel. +40 21 3117087

Termomeccanica Saudia Co. Ltd.  
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