Kirloskar Brothers Limited (KBL) is a world class pump manufacturing company with expertise in engineering and manufacture of systems for fluid management. Established in 1888 and incorporated in 1920, KBL is the flagship company of the $ 2.1 billion Kirloskar Group. KBL, a market leader, provides complete fluid management solutions in the areas of water supply, building & construction, power plants, industry, irrigation, oil & gas and marine & defence. We engineer and manufacture industrial, agriculture domestic pumps, valves and hydro turbines.


KBL has joint venture cooperation with Ebara corporation, Japan since 1988 for the manufacture of API 610 standard pumps & multistage pumps. Kirloskar Corrocoat Private Limited is a joint venture between KBL and Corrocoat, UK since 2006. KBL acquired The Kolhapur Steel Limited in 2007 and Hematic Motors in 2010.

KBL has eight manufacturing facilities in India, viz Kirloskarvadi, Dewas, Kondhapuri, Shirwal, Sanand, Kanjur, Kolhapur and Karad. In addition, KBL has global manufacturing and packaging facilities in Egypt, South Africa, Thailand, The Netherlands, United Arab Emirates, United Kingdom and United States of America. KBL has 12,700 channel partners in India and 80 overseas and is supported by best-in-class network of authorised service centres and authorised refurbishment centres across the country.

All the manufacturing facilities of KBL are certified for ISO 9001, ISO 14001, ISO 50001, BS OHSAS 18001 and SA8000. In addition, the Kirloskarvadi plant is also certified for N & NPT Stamp. KBL’s corporate office in Pune is certified for ISO 9001 & SA8000.

The factories deploy total quality management tools using European Foundation for Quality Management (EFQM) model. The Kirloskarvadi plant of KBL is a state-of-the-art integrated manufacturing facility having Asia’s largest hydraulic research centre with testing facility up to 5000 kW and 50,000 m³/hr.

KBL is the ninth pump manufacturing company in the world to be accredited with the N and NPT certification by American Society of Mechanical Engineers (ASME), for supply of pump & pump components for nuclear installation.
Our Strengths

Comprises one of Asia's largest Hydraulic Research Centers with state-of-the-art testing facilities

- Manufacturer of large split case pumps
- Manufacturer of large vertical turbine pumps
- Manufacturer of concrete volute pumps
- Manufacturer of large size valves
- Sump model testing and actual scaled down model
- Executing large turnkey projects from concept to commissioning
- Service network - 24x7

Design and Engineering Analysis
Software at KBL

- Pro-E Wildfire for Solid modeling
- Pro-Mechanica (for preliminary structural analysis)
- ANSYS Mechanical and Hyper works for structural analysis
- ANSYS CFX and Fluent STARCCM for CFD analysis
- Surge analysis package (SAP)
- Turbo design-1 (for inverse design)
- JMAG software for electromagnetic analysis for electric motor design

Innovation, Research Engineering and Development - a constant process at KBL

Our products and solutions are conceptualised after exhaustive research and undergo a manufacturing process which is world class. We have been awarded 17 patents for innovative solutions including 2 from the United States.

Well-equipped R&D Center

KBL’s R&D facility is recognised by the Department of Science and Industrial Research (DSIR). The applied research work conducted in KBL has resulted in appropriate technology for development of many new series of pumps like horizontal split case, multistage, small end suction, large end suction, mixed flow pumps and many more to come. KBL has introduced India’s first efficient pump to the more recent Solar motor pumps, Concrete volute pumps, metallic volute pumps, sodium pumps and magnetic drive pumps.

CFD analysis of split case pump

Technical analysis performed at KBL

- Torsional analysis
- CFD analysis
- Surge analysis
- Sump model studies
- Structural analysis
- Cavitation studies
- Thermal analysis
- Transient analysis
It is our constant endeavour to upgrade and implement the latest and most advanced technology for smooth functioning of our facilities for uninterrupted production and seamless services.

01 Non-Ferrous Foundry
02 Assembly Shop
03 Foundry - Pattern
04
All the manufacturing facilities at KBL are certified for ISO 9001, ISO 14001, ISO 50001, BS OHSAS 18001 and SA8000. In addition, the Kirloskarvadi plant is also certified for N & NPT Stamp.
Testing Capabilities

Dye penetration test
Ultrasonic test
Magnetic particle test
Inhouse radiography
Non destructive testing facilities
National Accreditation Board for testing and Calibration Laboratories (NABL) Accreditated

One of Asia’s Largest Hydraulic Research Centres (HRCs) for testing pumps at duty conditions up to 5000 kW motor and with discharge up to 50,000 m³/hr

Infrastructure

- One of Asia’s largest Hydraulic Research Centres (HRC) for testing pumps at duty conditions up to 5000 kW (motors of 3.3/6.6/11 kV) and discharge up to 50,000 m³/hr.
- Closed circuit NPSH testing capabilities
- Computerized data acquisition system
- Sump model study system
- Conceptualized and built under the guidance and supervision of British Hydraulic Research Association
- Non-destructive testing facilities comprising dye penetrate testing, magnetic particle testing, ultrasonic testing and radiography capabilities
- Material testing laboratory for conducting transverse compression and sheer hardness test and impact tests, spectrometer for chemical analysis of materials

Foundry

The Kirloskarvadi foundry is equipped with a centralised pattern shop, mechanised sand processing system, automatic moulding machines and metal pouring system. There are independent units for cast iron, alloy steel and non-ferrous metals. The cast iron foundry is capable of producing a single casting weighing up to 8,000 kg and the steel foundry unit can produce castings of special alloy steels with acid pickling capability tailored to international standards. Total production capacity of foundries is 1,400 tons per month.
Kirloskar Pumps in Process Industry

KBL is a global fluid management company, which thrives on need assessment, innovation and manufacturing excellence. This is the thought, common to each of our manufacturing facilities in India and abroad.

KBL is a driving force in the global industrial marketplace for API and non-API pumps, both for utility and various process applications. Our products and solutions are conceptualised after an exhaustive research and manufactured under standards and benchmarks accepted across the globe. Generations have witnessed the fine balance of engineering & thought in KBL's manufacturing ideology.

Once manufactured, the products undergo a stringent quality control process complying to various international standards. These tests are performed across the value chain in manufacturing pumps. All this is done to ensure that only the best fits into your processes to give you results which exceed expectations. High versatility, durability and reliability of process pumps makes them suitable for majority of the operating conditions and liquids.

Depending on the customer requirement, our pumps can be specially coated with anti-corrosion, anti resilience and hydrophobic coat, making them hydraulically efficient.

Our Innovative Process Pumps

- Canned motor pump - iCM
- Magnetic drive pump - ROMAK
- Process pump - GK(P)
- Air cooled thermic fluid pump - AT
Coal:
- Underground mine dewatering pump
- Open cast mine dewatering pump
- Phase dewatering pump
- High head high discharge mine dewatering pump
- Coal washery pump
- Dumper cleaning pump

Tyre:
- Stock preparation pump extruder pump
- Curing area pump
- HSD pump
- Naphtha pump
- Circulating water pump
- Booster pump

Paper:
- Stock pump
- Fan pump
- Green liquor pump
- Black liquor pump
- Cooking liquor pump
- Blow tank discharge pump
- White liquor-sulphate process pump
- Chlorine water pump
- Hot water/boiler feed pump

Cement:
- Cooling water pump
- GCT spray pump
- Pump for WTP/STP plants
- Limestone mine dewatering pump
- Make-up water pump
- Recirculating pump

Innovative & Reliable Pumping Solutions – for Wide Range of Industrial Applications
Steel:
- High pressure ammonical liquor pump
- Descaling pump
- Booster pump
- Scale-pit pump
- Quenching pump
- Dedusting pump
- Tuyere pump
- Furnace oil pump
- Acid pickling pump
- Filter water pump

Chemical & Pharma:
- Organic and inorganic chemical handling pump
- Acid handling pump
- Air-cooled thermic fluid pump
- Solvent transfer pump
- Sealless canned motor pump
- Dosing pump
- Magnetic drive pump
- Special application vertical sump pump

Food & Beverages:
- Sealless pump for refrigeration
- Hot oil pump
- Solvent extraction pump
- Oil extraction pump
- Liquor handling pump

Sugar:
- Unstrained/strained juice pump
- Weighed juice pump
- Sulphited juice pump
- Injection pump
- Caustic soda & filtrate pump
- Recirculation juice
- Syrup extraction
- Hot & cold water
Case Studies

Pumping of salt water with different densities

APPLICATION:

Earlier, the customers had been using imported sump pump to pump salt water with specific gravity of 1.25 at ambient temperatures. When these pumps were not in operation for eight hours or more, the salt water would crystallise, thus leading to deposition of solids on the pump surface. These crystallites could not be washed or removed from the pump surface when the pumps were restarted. Hence, the pumps had to be opened completely for washing. The only way to remove the deposits was by using pumps with high pressure clean water (5 kg/sq cm). To restore them, the customer had to remove the pumps from installation site and take them to a location 2 km away from the pump house, where low-density clean water was available. Due to the unavailability of adequate clean water, the process of removing the pumps and cleaning them with fresh water used to take 2 to 3 days. This not only delayed the operation but also resulted in wastage of time and money.

SOLUTION:

Considering the property of salt water, KBL recommended end suction pumps with mixed flow impeller design with anti-corrocoat on the impeller and a casing with special Fluiglide coating. This led to improved efficiency and enhance life of coated pump components. The material of the casing and the impeller was 2% NiCl & CF8M recommended, respectively, with Fluiglide coating. This helped in reducing the maintenance time, since no dismantling/transportation of pump was required for cleaning purpose. The MOC (Material of Construction) suggested was 2.5% NiCl casing with CF8M internal and corrocoating. In this way, KBL’s application engineering knowledge duly benefitted the customer.

Pumps with defined metallurgy for spin bath application

APPLICATION:

The spin bath in textile industries is very corrosive. The liquid contains sulphuric acid, zinc sulphate, sodium sulphate and water. This combination of different chemicals leads to rapid material erosion, thereby leading to shorter life span of pumps.

SOLUTION:

KBL’s latest technology and in-house foundry capabilities have enabled it to create benchmarks in offering special application process pumps with precise metallurgical composition, which suits all kinds of special and customised requirement of various customer. This includes materials like R55, Super Duplex, Alloy 20/CN7M, Hastalloy C, CD4MCu, etc. KBL successfully maintains the metallurgical composition within the specified range and supplies pumps having combination of R55 and K-Monel metallurgy for many of its premium customers in textile industries.
End suction process pump - KPD/KPDQF/KPDJ
EN 22858 (DIN 24256) and ISO 2858

Features
- Horizontal, single stage and end suction
- Top centre line delivery
- Back pull out design
- Oil lubricated bearings
- Gland packing or with mechanical seal
- API flushing plan

Applications
- Process Industries, Petro-chemical, Nuclear, Refinery, Fertilizer, Paper, Sugar, etc.
- Pumps suitable for handling corrosive acids, alkalies, salt solutions, caustics, hydrocarbons, oils, thermic fluids, liquefied gases, condensates, viscous liquids, etc.

Material of Construction
- Cast steel, CF8, CF8M, Alloy 20, R55, CN7MS, MONEL, CD4MCu, Hastalloy C, etc.

End Suction Process Pump KPD

Features
- Back pull out design
- Oil lubricated bearing
- Top centre line delivery

Operating Range
- Delivery size: up to 350 mm
- Capacity: up to 1550 m³/hr
- Head: up to 225 meters
- Working pressure: 16 - 25 bar
- Temperature: (-) 50°C to 180°C

End Suction Process Pump KPDQF

Features
- Semi-open impeller
- Suitable for liquid with solid particles
- Stuffing box cooling (optional)
- Steam jacket (optional)

Operating Range
- Capacity: up to 580 m³/hr
- Head: up to 200 metres
- Working pressure: 16 - 25 bar
- Temperature: (-) 50°C to + 300°C

End Suction Jacketed Pump KPDJ

Features
- Suitable for handling congealing liquids, fatty acids and viscous liquids
- MS/SS 316 heating jacket

Operating Range
- Capacity: up to 1550 m³/hr
- Head: up to 225 metres
- Working pressure: 16 - 25 bar
- Temperature: (-) 50°C to + 300°C
Water cooled thermic fluid pump - KPDT
EN 22858 (DIN 24256) and ISO 2858

Features
- Back pull out design
- Centre line mounted
- Stuffing box cooling
- Bearing and pad cooling

Applications
- KPDT pumps are designed for handling thermic fluids, synthetic oil, hot oil, etc.

Operating Range
<table>
<thead>
<tr>
<th>Feature</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delivery size</td>
<td>up to 200 mm</td>
</tr>
<tr>
<td>Capacity</td>
<td>up to 900 m/hr</td>
</tr>
<tr>
<td>Head</td>
<td>up to 200 metres</td>
</tr>
<tr>
<td>Working pressure</td>
<td>16 - 25 bar</td>
</tr>
<tr>
<td>Temperature</td>
<td>Up to +350°C</td>
</tr>
</tbody>
</table>

Air cooled thermic fluid pump - AT
EN 22858 (DIN 24256)

Features
- The pump is integral foot mounted for a given temperature range
- More reliable for thermal isolation of volute casing
- Balanced or unbalanced maintenance free standard mechanical seal
- No additional cooling required (air cooled)
- Pump with grafoil packing at stuffing box cavity and sintered bearing

Applications
- Thermic fluid
- Synthetic oil
- Hot oil

Operating Range
<table>
<thead>
<tr>
<th>Feature</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delivery size</td>
<td>32 to 80 mm</td>
</tr>
<tr>
<td>Capacity</td>
<td>up to 250 m/hr</td>
</tr>
<tr>
<td>Head</td>
<td>up to 100 metres</td>
</tr>
<tr>
<td>Working pressure</td>
<td>16 bar</td>
</tr>
<tr>
<td>Temperature</td>
<td>Up to +350°C</td>
</tr>
</tbody>
</table>

Process pump - GK(P)
ISO 2858 / DIN EN 22858 / ISO 5199

Features
- End suction centrifugal process pump
- Back pull out design
- Top centerline discharge with foot mounted as well as centerline volute casing
- Availability of cooling jackets to cool stuffing box for liquids having temperature more than 105°C

Applications
- Acids / alkalies
- Hydrocarbons, oils
- Various process chemicals
- Food processing units

Operating Range
<table>
<thead>
<tr>
<th>Feature</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delivery size</td>
<td>Up to 150 mm</td>
</tr>
<tr>
<td>Capacity</td>
<td>up to 500 m/h</td>
</tr>
<tr>
<td>Head</td>
<td>up to 150 metres</td>
</tr>
<tr>
<td>Working pressure</td>
<td>16 - 25 bar</td>
</tr>
<tr>
<td>Temperature</td>
<td>Up to 180°C</td>
</tr>
</tbody>
</table>
Solid handling pump - SHM
IS 5600

Features
- Back pull-out design
- Gland packed/mechanical seal
- Available in vertical execution

Applications
- Sludge & paper pulp
- Sewage & waste water
- Viscous liquids/fibrous material
- Contaminated process liquids
- Bagasse
- Strained/unstrained juice

Operating Range
- Delivery size: 200 mm
- Capacity: up to 800 m³/hr
- Head: up to 90 metres
- Working pressure: 16 bar
- Temperature: (-) 10 °C to 140 °C

Solid handling sump pump - SHS

Features
- Vertical submerged, single stage, single suction pump
- Vertical shaft arrangement
- Side discharge pump with space saving installations

Applications
- Liquids with solids in suspension
- Sludge & pulpy material
- Industrial waste handling
- Liquid containing fibrous & powdered material
- Coal tar

Operating Range
- Delivery size: up to 300 mm
- Capacity: up to 1500 m³/hr
- Head: up to 90 metres
- Working pressure: 16 bar
- Temperature: (-) 10 °C to 90 °C

Sump pump - KPDS

Features
- Vertical submerged, single stage, single suction pump
- Vertical shaft arrangement
- Side discharge pump with space saving installations

Applications
- Petrochemicals, refinery, fertilizer and power industries.
- Transfer and circulation of acids, alkalis, solvent oil etc.
- Highly alkaline and highly acidic liquids (with enclosed impeller).
- Crystallizing liquids, liquids containing suspended solids, industrial clear effluent, molten sulphur.
- Water, D.M. water, waste water and food processing units.

Operating Range
- Delivery size: 20 mm to 150 mm
- Capacity: 0.5 to 560 m³/hr.
- Head: up to 150 metres
- Working pressure: 16 - 25 bar
- Temperature: up to 90° C
Condensate extraction pump - RKB-CV / BHRC

Features
- Vertical can (barrel)-type ring-section pump.
- Suction / stage impellers are of radial flow type design.
- Pump can be single or multistage
- Pump can either be with single or with double suction to have lower NPSHR

Applications
- Handling steam condensate in industrial / power plant

Operating Range
<table>
<thead>
<tr>
<th>Feature</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delivery size</td>
<td>up to 500 mm</td>
</tr>
<tr>
<td>Capacity</td>
<td>up to 2200 m³/hr</td>
</tr>
<tr>
<td>Head</td>
<td>up to 350 meters</td>
</tr>
<tr>
<td>Temperature</td>
<td>up to 120 °C</td>
</tr>
</tbody>
</table>

Mixed flow pump - MF

Features
- Pump casing: Horizontal/vertical end suction high efficiency volute type with top/side/45 degrees orientations. Delivery flange and supporting feet are cast integral with the casing.
- Impeller: Non clog - semi open / enclosed type are balanced dynamically
- Bearing: Deep groove ball bearing and thrust bearing. Standard lubrication - oil (except MF 200 pump with grease lubrication)

Applications
- In industry for circulation of hot or cold water. In air conditioning plants, power stations, textile mills and for sewage handling.
- Fan pump application in the paper industry
- Spin bath application and in acid/alkalies

Operating Range
<table>
<thead>
<tr>
<th>Feature</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delivery size</td>
<td>650 mm</td>
</tr>
<tr>
<td>Capacity</td>
<td>up to 7000 m³/hr</td>
</tr>
<tr>
<td>Head</td>
<td>up to 30 metres</td>
</tr>
<tr>
<td>Working pressure</td>
<td>16 bar</td>
</tr>
<tr>
<td>Temperature</td>
<td>(-) 10°C to 140°C</td>
</tr>
</tbody>
</table>

Multi stage pump - RKB-Horizontal Multistage

Features
- Ring section diffuser casings
- Stuffing box cooling for high temperature application
- Available in vertical configuration
- Available with double suction impeller for first stage
- Optional orientation available for suction branch
- Hydraulic balancing by balancing holes
- Multi-outlet feature enables usage of the pump for various delivery pressure

Applications
- Mine dewatering
- Descaling
- High pressure ammonia liquor aspiration system
- Condensate extraction
- Boiler feed

Operating Range
<table>
<thead>
<tr>
<th>Feature</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delivery size</td>
<td>250 mm</td>
</tr>
<tr>
<td>Capacity</td>
<td>up to 850 m³/hr</td>
</tr>
<tr>
<td>Head</td>
<td>up to 850 meters</td>
</tr>
<tr>
<td>Working pressure</td>
<td>40-64 bar</td>
</tr>
<tr>
<td>Temperature</td>
<td>(-) 30°C to 140°C</td>
</tr>
</tbody>
</table>
Canned Motor Pump - i-CM

**Features**
- i-CM pump is end suction type sealless, glandless and emission-free canned motor pump, having integral motor design due to which it is compact in construction and light in weight.
- Sealless and glandless pump
- Integrated motor design, due to which it is compact in construction and light in weight

**Applications**
- Liquefied gases (e.g. ammonia, freons, carbon dioxide, amines, vinyl chloride, ethylene oxide, phosgene (>90°C), etc.)
- Aggressive / toxic / explosive / hazardous / flammable chemicals (sulphuric acid, nitric acid, hydrofluoric acid, hydrocyanic acid, ethanoic acid, formic acid, etc.)

**Operating Range**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delivery size</td>
<td>32 to 50 mm</td>
</tr>
<tr>
<td>Capacity</td>
<td>4 to 80 m³/hr.</td>
</tr>
<tr>
<td>Head</td>
<td>up to 60 metres</td>
</tr>
<tr>
<td>Working pressure</td>
<td>16 bar</td>
</tr>
<tr>
<td>Temperature</td>
<td>Up to 90°C</td>
</tr>
</tbody>
</table>

Magnetic drive pump - ROMAK
ISO 2858 / DIN EN 22858 / ISO 5199

**Features**
- Sealless and glandless pump
- End suction pump comprises permanent magnet

**Applications**
- Chemicals - Paints, solvents, intermediaries, resin, polymers, other Acidic and basic chemicals
- Pharmaceuticals
- Petrochemicals
- Suitable for various process industries for clean/clear liquids without any suspended particles

**Operating Range**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delivery size</td>
<td>Up to 100 mm</td>
</tr>
<tr>
<td>Capacity</td>
<td>Up to 300 m³/hr.</td>
</tr>
<tr>
<td>Head</td>
<td>up to 150 meters</td>
</tr>
<tr>
<td>Working pressure</td>
<td>16 bar</td>
</tr>
<tr>
<td>Temperature</td>
<td>(-) 50°C to 180°C</td>
</tr>
</tbody>
</table>

Process pump - i-CP
ISO 2858

**Features**
- Pump without mechanical seal & without gland packing arrangement
- Self venting design
- Pump with back pull out design
- Shaft is fully protected from liquid
- Widely interchangeable components

**Applications**
- Light chemicals like caustic soda, weak acids, etc.
- Food & beverage industries (sugar, vegetable oils, etc.)
- Hot water, brine, DM water, lime water, etc.

**Operating Range**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity</td>
<td>up to 180 m³/hr</td>
</tr>
<tr>
<td>Head</td>
<td>up to 55 metres</td>
</tr>
<tr>
<td>Temperature</td>
<td>Up to 95°C</td>
</tr>
</tbody>
</table>
Side channel flow pump - CF

Features
- CF pumps are self priming type owing to their regenerative type impellers design.
- CF pumps are capable of handling liquid and gas mixture.
- Low NPSHR values permit high suction lift or operation close to evaporation temperature.

Applications
- Chemical and process industry
- Booster service
- Air conditioning and refrigeration installations
- Boiler feed duties
- LPG and other petroleum products

Operating Range

<table>
<thead>
<tr>
<th>Feature</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delivery size</td>
<td>up to 50 mm</td>
</tr>
<tr>
<td>Capacity</td>
<td>up to 20 m³/.hr</td>
</tr>
<tr>
<td>Head</td>
<td>up to 315 metres</td>
</tr>
<tr>
<td>Working pressure</td>
<td>40 bar</td>
</tr>
<tr>
<td>Temperature</td>
<td>-40°C to 90°C (with Stuffing Box Cooling)</td>
</tr>
</tbody>
</table>

Medium Consistency Pump – ES Series (Rodelta Pumps International B.V)

Features
- High efficiency generally in excess of 80%
- Dry state and air indications up to 6%
- Special open impeller for solid densities of up to 10%
- Consistency up to 8% in the paper and pulp industry

Applications
- Viscous and fibrous fluids in pulp and paper
- Light/Medium slurries
- Light/Medium Hydrocarbons
- Fibres and solids in suspensions
- Pre Treatment & Electro Coat paint
- Primary & Secondary sludge
- Starch industry

Operating Range

<table>
<thead>
<tr>
<th>Feature</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delivery size</td>
<td>80 to 300 mm</td>
</tr>
<tr>
<td>Capacity</td>
<td>up to 2500 m³/ hr</td>
</tr>
<tr>
<td>Head</td>
<td>up to 80 meters</td>
</tr>
<tr>
<td>Working pressure</td>
<td>10 bar</td>
</tr>
<tr>
<td>Temperature</td>
<td>Up to 100°C</td>
</tr>
</tbody>
</table>

Vortex Pump – FN series (Rodelta Pumps International B.V)

Features
- Single stage with a vortex impeller
- Gentle pumping action (less than 20% of pumped liquid in contact with impeller)
- Practically no change to the products contained in liquid
- Fully recessed impeller
- Impeller mounted in centre of casing (circular casing), therefore, radial loads are very low at all operating points on the performance curve
- Back pull out
- Low attrition to solids

Applications
- Fibrous, textile, leather & rubber shreds
- Light/medium hydrocarbons/low shear applications
- Waste paper pulp, juices, starch.
- Sand, gravel coal & cement slurries

Operating Range

<table>
<thead>
<tr>
<th>Feature</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delivery size</td>
<td>50 to 125 mm</td>
</tr>
<tr>
<td>Capacity</td>
<td>up to 450 m³/ hr</td>
</tr>
<tr>
<td>Head</td>
<td>up to 70 meters</td>
</tr>
<tr>
<td>Temperature</td>
<td>(-) 20°C to 170°C</td>
</tr>
</tbody>
</table>
TAZN TYPE PUMP – VS4 Pump (Rodelta Pumps International B.V)

Features
- Pump can be supplied to lengths up to approx. 8m depending upon pump size
- Utilises HZC hydraulics

Applications
- Steel mills
- Chemical & petrochemical plants
- Oil & gas
- Paper mills
- Power plants

Operating Range

<table>
<thead>
<tr>
<th>Feature</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity</td>
<td>up to 300 m³/hr</td>
</tr>
<tr>
<td>Head</td>
<td>up to 250 metres</td>
</tr>
<tr>
<td>Working pressure</td>
<td>16 bar</td>
</tr>
<tr>
<td>Temperature</td>
<td>up to 250°C</td>
</tr>
</tbody>
</table>

TC series API-VS-5 (Rodelta Pumps International B.V)

Features
- Vertically suspended (VS 5)
- Cantilever with no shaft support below cover plate
- Dry running capability

Applications
- All kinds of sump duties
- Refineries
- Petrochemical plants
- Chemical plants
- Silicon wafer cutting

Operating Range

<table>
<thead>
<tr>
<th>Feature</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity</td>
<td>up to 800 m³/hr</td>
</tr>
<tr>
<td>Head</td>
<td>up to 80 meters</td>
</tr>
<tr>
<td>Working pressure</td>
<td>10 bar</td>
</tr>
<tr>
<td>Temperature</td>
<td>Up to 200°C</td>
</tr>
</tbody>
</table>

TA series Non-API VS-4 (Rodelta Pumps International B.V)

Features
- Vertically-suspended single casing volute line shaft driven pumps
- Impeller: Closed/open/vortex
- Double/ single radial spiral casing

Applications
- Steel mills
- Chemical & petrochemical plants
- Oil & gas
- Paper mills
- Power plants
- All kinds of sump duties

Operating Range

<table>
<thead>
<tr>
<th>Feature</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity</td>
<td>up to 2500 m³/hr</td>
</tr>
<tr>
<td>Head</td>
<td>up to 120 meters</td>
</tr>
<tr>
<td>Working pressure</td>
<td>10 bar</td>
</tr>
<tr>
<td>Temperature</td>
<td>Up to 200°C</td>
</tr>
</tbody>
</table>
Boiler Feed Pumps - MSS / MSSH

Features
- Design and manufacture as per company standard
- Multistage pump with ring section diffuser casing design, with foot mounted casing suitable for low pressure requirements
- Easy inspection and repair maintenance of bearings and mechanical seal after removal of coupling spacer only

Applications
- **MSS**
  - Low pressure boiler feed applications
  - Low pressure applications in light chemical plants
- **MSSH**
  - Medium pressure boiler feed applications
  - Medium pressure applications in light chemical plants

Operating Range

<table>
<thead>
<tr>
<th>Feature</th>
<th>MSS</th>
<th>MSSH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity</td>
<td>Up to 220 m³/hr - MSS</td>
<td>Up to 550 m³/hr - MSSH</td>
</tr>
<tr>
<td>Head</td>
<td>Up to 250 m/bar - MSS</td>
<td>Up to 450 m/bar - MSSH</td>
</tr>
<tr>
<td>Working pressure</td>
<td>Up to 11 bar</td>
<td>Up to 17 bar</td>
</tr>
<tr>
<td>Temperature</td>
<td>(°) 5 to 165°C</td>
<td>(°) 5 to 200°C</td>
</tr>
<tr>
<td>Nozzle orientation</td>
<td>TOP/TOP &amp; side-TOP</td>
<td>Top-Top &amp; Side-Top</td>
</tr>
<tr>
<td>Flange rating</td>
<td>Cl. 150/600</td>
<td>Cl. 300/600/900/1500/2500</td>
</tr>
</tbody>
</table>

Boiler Feed Pumps - SS/SSD

Features
- Design and manufacture as per company standard, however, can meet API 610 requirements
- Multistage pump with ring section diffuser casing design with centerline support to meet high temperature and high pressure application especially in BFW application
- First stage impeller with double suction is provided in SSD models to improve NPSHR performance

Applications
- High pressure boiler feed water applications.
- High pressure mine drainage applications
- High pressure applications in water treatment plant

Operating Range

<table>
<thead>
<tr>
<th>Feature</th>
<th>SS/SSD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity</td>
<td>Up to 650 m³/hr</td>
</tr>
<tr>
<td>Head</td>
<td>Up to 2500 m</td>
</tr>
<tr>
<td>Working pressure</td>
<td>Up to 17 bar</td>
</tr>
<tr>
<td>Temperature</td>
<td>(°) 5 to 200°C</td>
</tr>
<tr>
<td>Nozzle orientation</td>
<td>Top-Top &amp; Side-Top</td>
</tr>
<tr>
<td>Flange rating</td>
<td>Cl. 300/600/900/1500/2500</td>
</tr>
</tbody>
</table>

Pressure Boosting (HYPN) System

The pressure boosting (HYPN) system keeps desired pressure in the pipeline at par with the demand from multiple loads. These kind of systems are useful in case of varying water requirements. The total water requirement is divided by multiple pumps, which run in parallel with variable speed drives. As per demand, number of pumps as well as speed will vary for facilitating optimisation of energy.

Applications
- Textile - Providing water (Cold & Hot) to dyeing & washing machines
- Bottling or liquid filling plants - Filling of vessels, vessel cleaning
- Process & pharma plants - Reactor cooling, Eye washer & Body Shower
- Steel plants - Cooling circuits
- Leather industry - Washing application
- Sugar industries - Water injection pumps
- PVC industries - Machine cooling / Mould cooling
Condition monitoring enables a person to view process parameters through internet. The key features of remote condition monitoring of pumpsets include:

- Monitoring of operational behaviour of the pump or pumping system
- Monitoring and analysis of faults
- Suggestions for tentative actions to be taken in case of faults
- SMS alerts and e-mails in case of faults with daily reports through e-mails for record and analysis

The condition monitoring system is very useful in cases where pumps or pumping systems are catering to critical processes or applications. This is done by capturing data from pressure transmitter, flow meter, vibration sensors, bearing RTD and energy meters.

**Web based monitoring can be carried out for the following parameters:**

- Flow
- Pressure
- Vibration
- Bearing temperature
- Voltage
- Current
- Energy consumption

**Benefits of the system**

- Monitoring is possible at anytime by anyone and anywhere
- Alerts via SMS and e-mails can trigger early attention and rectification and result in lesser down time
- Weekly reports enable the user and KBL to analyse the overall health of the pumpsets and, does preventive maintenance can be planned accordingly
- Planning of spares requirement is possible based on these parameters
- Provides immediate knowledge of system performance
- Increases equipment life and does reduces cost of repairs
- Improved process and plant reliability
- Reduces man-hours (labour costs) required for troubleshooting
- Includes web-based user configurable dashboard for live and trend data
- Facilitates integration with existing PLC and automation system
An energy audit is an inspection, survey and analysis done to facilitate energy conservation in order to reduce the amount of energy input into the system without negatively affecting output(s). Industrial energy audits monitor consumption and locate the source(s) of wastage, so that they can be plugged. Even as the industry today strives for more energy there is serious need to reduce energy consumption as it leads to rise in cost of the product as well as pollution. However, this has a larger impact on contribution of organisation and curtailing both can have a make or break impact on any organisation.

KBL’s Audit Approach

Kirloskar Brothers Limited has set up an Energy Audit Cell, a conservation cell, wherein our team of BEE certified energy managers and auditors undertake and evaluates actual performance measurement of pumps and motors. The results are compared against the designed performance level or the industry best practices. The difference between observed performance and “best practice” is the potential for energy and cost savings. Specifically, the audit helps to identify actions for improving energy performance.

Recommendation for suitable pumps & motors and bringing improvements in the pump piping layout are suggested based on the findings. Energy audit also helps to decide on how to budget energy use, plan and practice feasible energy conservation methods that will enhance their energy efficiency, minimise energy wastage and thereby reduce energy costs.

Customer Service & Spares

Our various service offerings enable ease of access, which ensures quicker turnaround time and helps in faster resolution of issues.

- Service capabilities: More than 30 technically competent KBL service engineers and 64 authorised service dealers operate across India for delivering 24x7 reliable services.

- SAP CRM 7.1: CRM 7.1 is a simple and powerful web-based tool, seamlessly integrated with SAP ECC. CRM 7.1 provides a single interface for all our services, right from submitting quotations, issuing orders and quicker delivery of spares to complaint registration for providing faster service. It also provides our customers with regular updates on special offers for spares, service camps, training schedules and other relevant information.

- Our customers help-desk is always prepared to help resolve all customer issues.
Basic Guidelines for Pump Performance

Total Head Calculation Methods

Pump Performance Vs Impeller Diameter

- The performance of a centrifugal pump can be varied by changing the impeller diameter.
- Common rules of affinity apply between the diameter and flow, head and power:

\[
\begin{align*}
Q & \propto D \\
H & \propto D^2 \\
P & \propto D^3
\end{align*}
\]

Changes in Impeller Diameter

\[
\begin{align*}
\frac{Q_2}{Q_1} & = \frac{D_2}{D_1} \\
\frac{H_2}{H_1} & = \left(\frac{D_2}{D_1}\right)^2 \\
\frac{P_2}{P_1} & = \left(\frac{D_2}{D_1}\right)^3
\end{align*}
\]

Pump Performance Vs Speed

- The performance of a centrifugal pump can be varied by changing the speed.
- Common rules of affinity apply between the speed and flow, head and power:

\[
\begin{align*}
Q & \propto N \\
H & \propto N^2 \\
P & \propto N^3 \\
N & = \text{speed rpm}
\end{align*}
\]

Changes in Pump Speed

\[
\begin{align*}
\frac{Q_2}{Q_1} & = \left(\frac{N_2}{N_1}\right)^{\frac{1}{2}} \\
\frac{H_2}{H_1} & = \left(\frac{N_2}{N_1}\right)^2 \\
\frac{P_2}{P_1} & = \left(\frac{N_2}{N_1}\right)^3
\end{align*}
\]
NPSH calculation for various piping layouts

**NPSHA CALCULATIONS**

1) **CASE No. 1**: PUMP DRAWING LIQUID FROM A SUMP OPEN TO ATMOSPHERE

**DATA:**

a) SUCTION LIFT = 3 meters
b) FRICTION LOSSES IN SUCTION PIPE LINE, FOOT VALVE, STRAINER = 1 meter
c) TEMPERATURE OF WATER = 21° C
d) VAPOUR PRESSURE = 0.25 meters
e) ATMOSPHERIC PRESSURE = 10.00 meters

**TOTAL SUCTION LIFT** = hs = hss - hfs = -3 - 1 = -4 meters

**NPSHA** = ha + hs - hvp = 10 - 4 - 0.25 = 5.75 meters

---

2) **CASE No. 2**: PUMP DRAWING WATER FROM TANK, LOCATED ABOVE PUMP CENTRE AND OPEN TO ATMOSPHERE

**DATA:**

1) HEIGHT OF WATER LEVEL IN SUCTION TANK, ABOVE THE CENTRELINE OF THE PUMP = 4 meters
2) FRICTION LOSSES IN SUCTION PIPE SYSTEM = 1.2 meters (PIPE LINE VALVE & FITTINGS)
3) TEMPERATURE OF LIQUID = 21° C
4) VAPOUR PRESSURE OF THE LIQUID = 0.25 meters
5) ATMOSPHERIC PRESSURE = 9.00 meters

**METHOD:**

SUCTION HEAD, hs = hss - hfs = +4 - 1.2 meters = 2.8 meters OF WATER (SUCTION HEAD)

**NPSHA** = ha + hs - hvp = 9.00 + 2.8 - 0.25 = 11.55 meters
Basic Guidelines for Pump Performance

NPShA Calculations
1) CASE NO. 3: PUMP DRAWING WATER FROM A CLOSED VESSEL UNDER VACUUM

DATA:
1) VACUUM IN VESSEL = 600 mm of mercury
2) LIQUID TEMPERATURE = 40°C
3) LIQUID LEVEL ABOVE PUMP CENTRE = 10.2 meters
4) FRICTION LOSSES IN SUCTION = 1 meter
5) VAPOUR PRESSURE = 0.46 kg/cm²
6) SP. GRAVITY OF LIQUID = 0.72

METHOD:

\[ ha = \frac{10 \times 1}{0.72} = 13.89 \text{ meters of liquid} \]

\[ hvp = \frac{10 \times 0.46}{0.72} = 6.91 \text{ meters of liquid} \]

\[ Ps = \frac{600 \text{ mm of Hg}}{1000} \times 0.72 = 11.33 \text{ meters of liquid} \]

(\because 13.89 is specific gravity of mercury)

\[ hs = hsi - Ps - hfs \]

\[ = 10.2 - 11.33 - 1 \]

\[ = -1.13 \text{ meters of liquid ( suction lift exists) } \]

\[ NPSHA = ha + hs - hvp = 13.89 - 2.13 - 6.91 = 4.95 \text{ meters} \]

NPShA Calculations
2) CASE NO. 4: PUMP DRAWING LIQUID UNDER PRESSURE FROM A CLOSED TANK.

DATA:
1) PRESSURE IN CLOSED VESSEL = 0.5 kg/cm²
2) ATMOSPHERIC PRESSURE AT INSTALLATION = 0.9 kg/cm²
3) LIQUID LEVEL IN A VESSEL ABOVE THE PUMP CENTRE = 0.2 meters
4) FRICTION LOSSES IN SUCTION = 1.5 meters
5) VAPOUR PRESSURE OF LIQUID = 0.45 kg/cm²
6) SP. GRAVITY OF LIQUID = 0.8

METHOD:

\[ ha = \frac{10 \times 0.5}{0.5} = 11.25 \text{ meters of liquid} \]

\[ hvp = \frac{10 \times 0.45}{0.8} = 6.25 \text{ meters of liquid} \]

\[ Ps = \frac{10 \times 0.5}{0.5} = 10.5 \text{ meters of liquid} \]

NOW

\[ hs = hsi + Ps - hfs \]

\[ = 0.2 + 6.25 - 1.5 \]

\[ = 4.95 \text{ meters of liquid ( suction head exists) } \]

\[ NPSHA = ha + hs - hvp = 11.25 + 4.95 - 6.25 \]

\[ = 10.95 \text{ meters} \]

System Head Curve