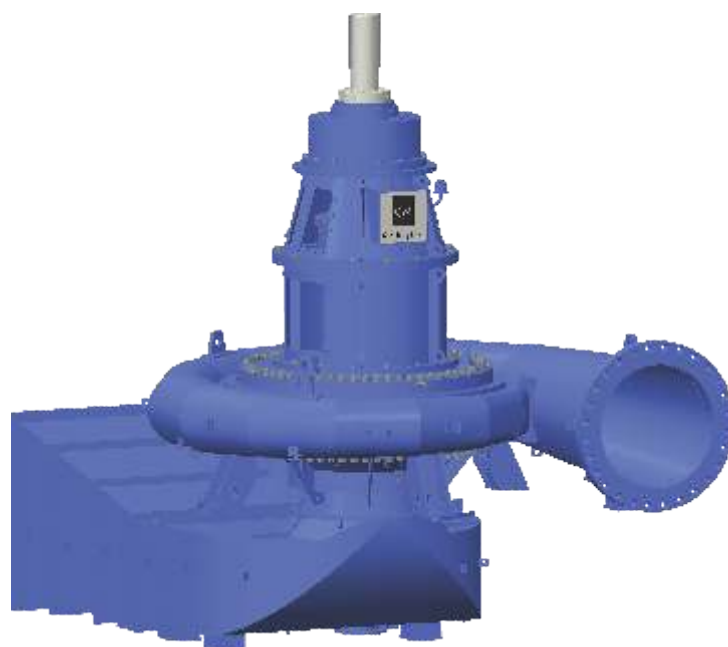




Enriching Lives

Metallic Volute Pump



KIRLOSKAR BROTHERS LIMITED

A Kirloskar Group Company
Established 1888

History of Metallic Volute Pump

The concept of Metallic Volute evolved due to requirements of high flow and high head specifically in the geographical regions where static head is more, eliminating numbers of pumping station in the system.

Metallic Volute Technology

In addition to being India's largest pump manufacturer, exporter and turnkey contractor of pumping machinery, Kirloskar Brothers Limited (KBL) is an undisputed leader and pioneer in the field of fluid handling in India. KBL has been able to achieve this success for more than 100 years because of its pioneering spirit. As a result, KBL has many firsts in India to its credit, such as the first Centrifugal Pump, the first Canned Motor Pump, the first Sodium Pump for Fast Breeder Reactor, the first Concrete Volute Pump and also the Metallic Volute Pump (MVP).

In today's application, pumps are expected to run continuously for prolonged time. Thus, "Operational Reliability" is a crucial factor. As the size of the pump increases, the dimension and the weight of the heaviest parts have a large influence on the selection of construction material used. Therefore, Sheet Metal (fabrication) i.e. welded structure consisting of several segments is the best choice for the pump casing.

The Metallic Volute Pump hence was a revolutionary development in the pump industry. As the casing is constructed in metallic sheets (as a whole or in several pieces depending on size) and is embedded in concrete. Metallic Volute Pump is the most suitable pump option from techno-economical consideration for handling large volume of water at high head. Metallic Volute Pump guarantees strength, rigidity and ensures sound reliability of operation. It also ensures higher and consistent pump efficiencies over a sustained period of operation. Due to simplicity in construction and ease of maintenance; about 99% pump reliability is achieved.

Metallic Volute Pump Constructional Features

These pumps are called as Metallic Volute Pumps because the Spiral Casing and Draft Tube are made up of Sheet metal (Fabrication) and embedded in concrete. The simple mechanical design is the major advantage of Metallic Volute Pump.

Metallic Volute Pump Construction can be grouped into three major sections as follows:

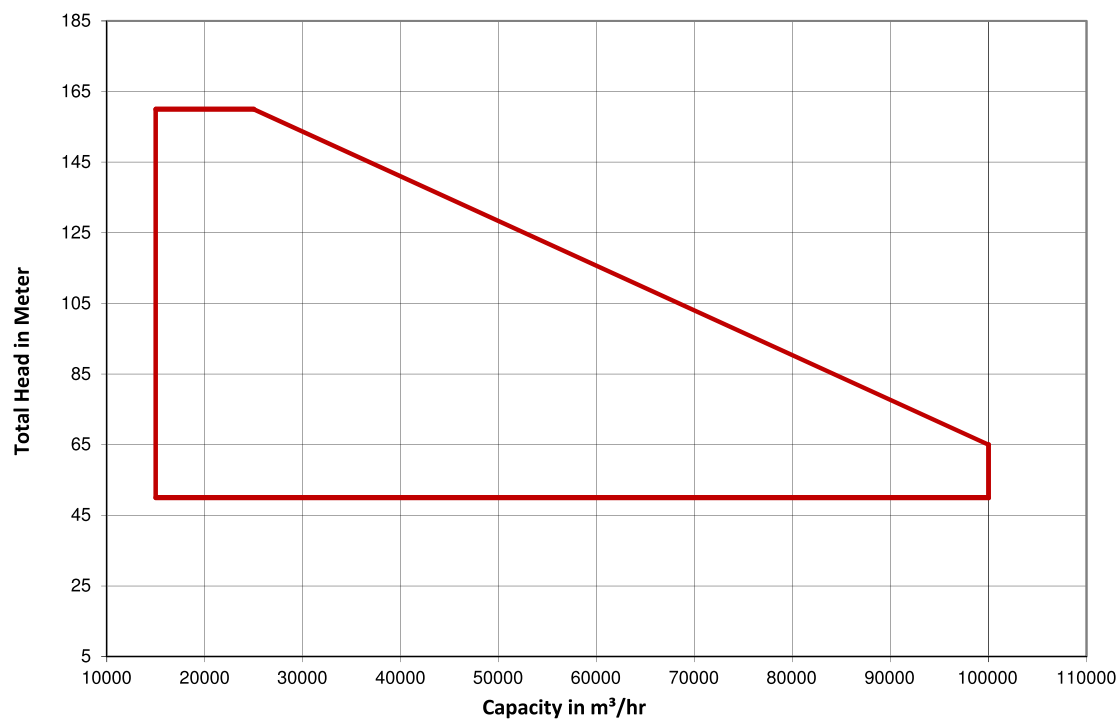
- Metallic Spiral Casing and Draft Tube (Embedded Unit)
- Stationary Assembly
- Rotating Assembly

Applications:

Metallic Volute Pumps are working mainly for high head application.

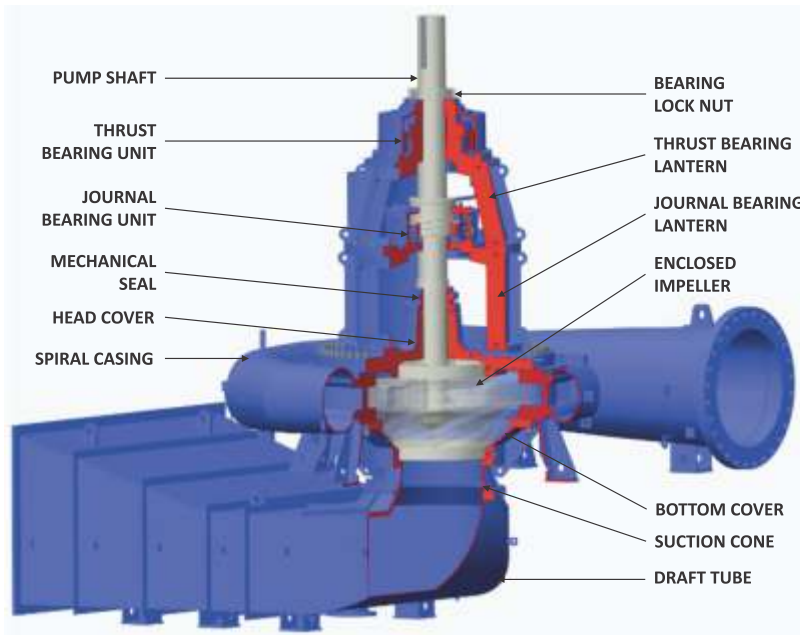
- Circulating / Condenser Cooling Water for Power Plants
- Lift Irrigation
- Water Supply
- Drainage and Flood Control
- Dry Docks
- Desalination

Developed Operating Range



Note: - For any Specific Duty Parameter other than above Range, Refer Product Engineering Department.

Assembly of Metallic Volute Pump



Technical Specifications

- Discharge Capacity (Q): 100,000 m³/hr
- Delivery Head (H): Above 50 meter
- Available Nominal Speed (N): 300 to 740 rpm
- Maximum Operating Pressure (P): 160 meter
- Maximum Suction Pressure (Ps): 50 meter
- Delivery Size: 3000 mm

Why Kirloskar Metallic Volute pumps prove to be better choice?

High Reliability

High Reliability up to 99%, eliminates the need of stand by pump.

Design Simplicity

Fewer main parts are associated in construction of Metallic Volute Pump.

Superior Operating Performance

For given parameters Metallic Volute Pump offer 1-2% higher efficiency compared to other pumps due to special hydraulic design. Lowest Life-cycle cost.

Vibration Free Equipment

- Low rotating speed
- Impeller and rotating assembly dynamically balanced
- Mass spiral casing in concrete provides excellent inertia
- Owing to spiral casing with diffuser type design, radial load on bearing is minimal.

Lowest Maintenance Cost

- Simple preventive maintenance on yearly schedule.
- Recommended inspection after every 40,000 hours only.
- Main pump parts can be checked in-situ and without dismantling of the pump.

Other Technical Advantages

- Lower Crane height and lifting capacity requirement.
- Full accessibility - Easy internal inspection without dismantling of pump
- Impeller can be examined from delivery pipe as well as from suction side.

Grouting of draft tube, suction cone, bottom cover and spiral casing (Embedded Unit) can be carried out by civil construction team on site.

Metallic Volute Pump an Economical Concept

Investment Cost

Overall expenditures for the complete pumping system are substantially lower than other solutions.

Installation Cost

- Spiral Casing, Bottom Cover, Suction Cone and Draft Tube are fabricated and are separately erected and grouted in concrete.
- As fewer number of parts, installation and maintenance is very simple task.

Operating Costs

- Excellent efficiency and reliability.
- Low Maintenance of the equipment and less manpower required.
- Few spare parts to be kept as an inventory.

Pump Model Test facility

Due to large size, shop test of prototype pump is not feasible, So Pump model test is conducted to ensure validation of hydraulic design of the pump:

- Model Test are carried as per JIS B 8327, IEC 60193 or HIS 14.6 Standards
- Test performed are Performance test, NPSHr and Cavitation Test



Stages of Construction of Metallic Volute Pump

The construction of typical Metallic Volute Pump proceeds in the following stages



1
Placement of Suction Draft Tube, anchoring and concreting



2
Placement of Spiral Casing, Suction Cone and Bottom Cover. Anchoring and Concreting



3
Placement of Motor Base Plate on motor floor level for motor or gear box or motor stool and grout it.



4
Placement of Rotating Unit Sub-Assembly in spiral casing



5
Placement of Head Cover Sub-Assembly on Spiral Casing



6
Placement of Journal Bearing Unit and thrust Bearing Unit on Head Cover



7
Assembly of Coupling Hub with Pump Shaft and Motor Shaft



8
Assembly of Transmission shaft with Pump Coupling Hub



9
Placement of Motor on Motor Base Plate / Motor Stool

Types of Metallic Volute Pump

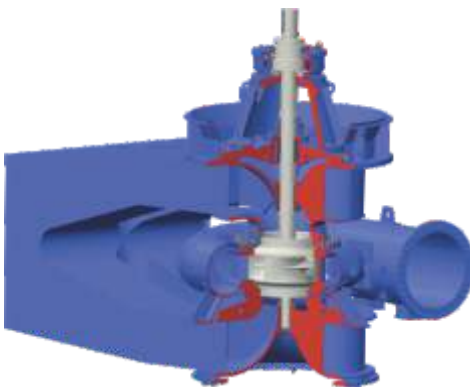
1. Single Suction Metallic Volute Pump



In Metallic Volute Pump, the volute casing is manufactured as fabricated metal volute. The volute casing is a welded structure consisting of several segments and is embedded in concrete. Depending on transportation limitation, Volute casing is manufactured as a whole unit or in several segmental pieces which are welded at site and hydro tested.

Optimum head and flow are achieved in the volute casing due to its shape, thus achieving a high level of efficiency. Metallic Volute Pump is used for higher delivery heads and higher flow with single stage single suction impeller, if solution with other conventional pumps is no longer feasible.

2. Double Suction Metallic Volute Pump



Metallic volute pumps are developed for high head and high flow application with single stage single suction impeller. But, due to such requirement, NPSHr and Minimum Submergence required for Pump is high due to high suction specific speed of pump.

To maintain this minimum submergence below low water level, additional excavation is required, which increases civil cost of pump house as well as length of transmission shaft. Increase in length of transmission shaft length sometimes may call for an intermediate floor in Civil Construction.

In order to reduce this costing, KBL has developed a patented pump with double suction impeller which needs lower submergence, lower size of thrust bearing and lower length of transmission shaft.

3. Francis Turbine Type Metallic Volute Pump (FTP)

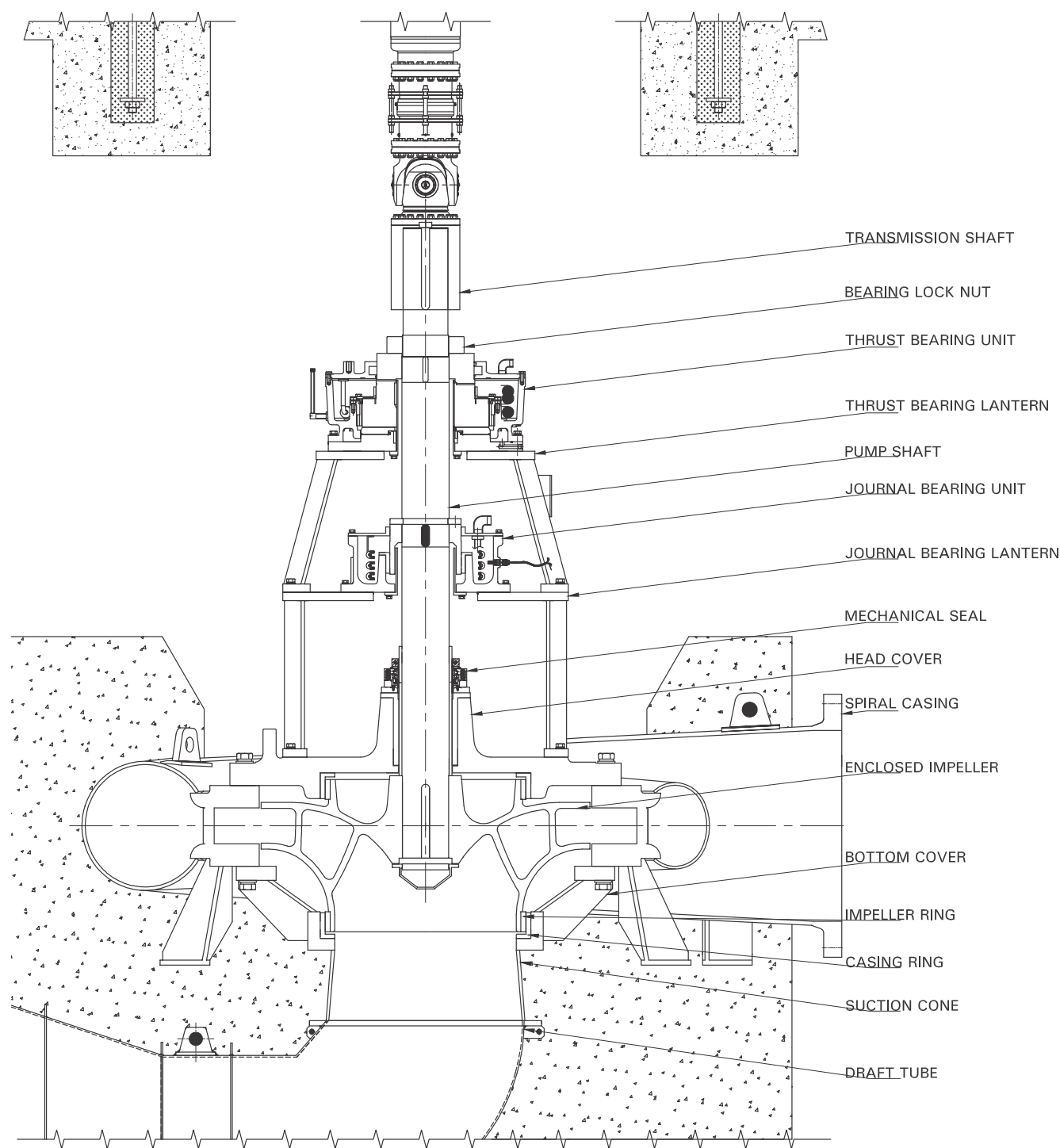


Every centrifugal pump operates according to system resistance. In case of Metallic Volute Pump, it will operate according to water variation on suction side. For higher variation of water level, pump head will also vary accordingly. At high water level, pump will operate with lowest head-on right-hand side of best efficiency point and at low water level pump will operate at near to best efficiency point. In this way pump will operate within the head range with respect to low and high-water level.

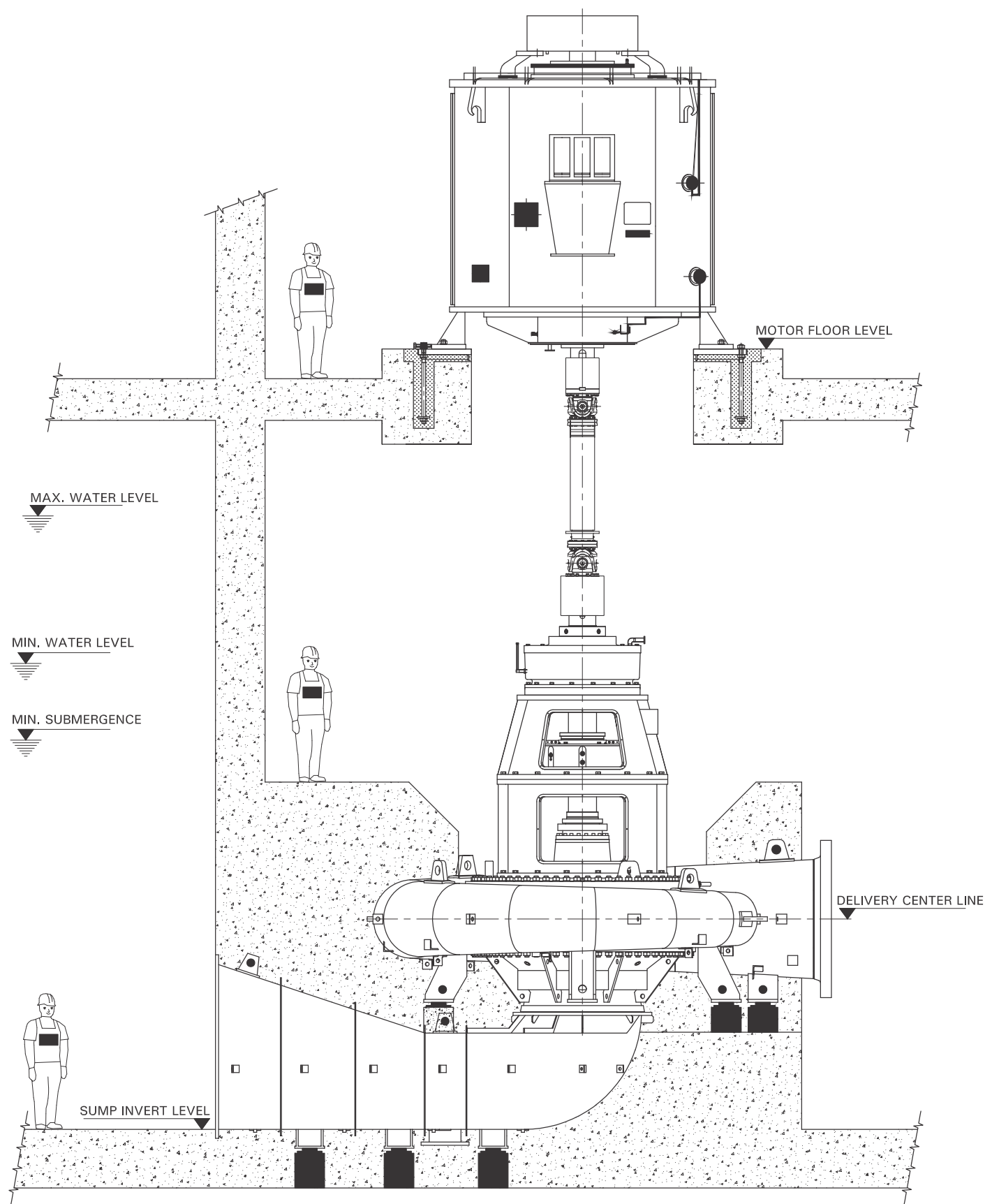
While operating within head range between high and low water level, there are chances that pump may operate off the best efficiency point. In order to optimize pump operating cost, one must always operate pump close to best efficiency point. To achieve this KBL has developed Metallic Volute Pump with movable guide vane mechanism i.e. Francis Turbine Pump (FTP).

Pump is fitted with movable guide vanes which are operated by servomotor. Thus, Pump operating point can be shifted close to best efficiency point by adjusting opening between guide vanes. This also facilitates the lower starting torque.

Typical Cross Sectional (CS) Drawing



Typical General Arrangement (GA) Drawing



Double Suction Metallic Volute Pump

GENERAL GUIDELINE FOR SELECTION OF MATERIAL OF CONSTRUCTION

Component Name	MOC		
	RIVER WATER	SEA WATER	
Draft Tube	Carbon Steel	Stainless Steel 316L	Duplex Steel / Super Duplex
Bottom Cover / Suction Cone	Carbon Steel	Stainless Steel 316L	Duplex Steel / Super Duplex
Spiral Casing	Carbon Steel	Stainless Steel 316L	Duplex Steel / Super Duplex
Head Cover	S2W / NiCi / Carbon Steel	D2 Ni Resist/Carbon Steel	Duplex Steel / Super Duplex
Impeller / Impeller Nut	Stainless Steel CF8M / CA6NM	Stainless Steel CF3M	Duplex Steel / Super Duplex
Casing / Impeller Wear Ring	Stainless Steel CF8M / CA6NM	Stainless Steel CF3M	Duplex Steel / Super Duplex
Shaft / Shaft Sleeve	Stainless Steel 410	Stainless Steel 316	Duplex Steel / Super Duplex
Bearing Lantern	Carbon Steel	Carbon Steel	Carbon Steel
Motor Base Plate / Motor Stool	Carbon Steel	Carbon Steel	Carbon Steel
Divergent / Discharge Pipe	Carbon Steel	Carbon Steel	Carbon Steel with Corrocoat from inside
Note: For any Specific MOC other than mentioned in above table, Refer Product Engineering Department			

Notes

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About KBL

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 for large infrastructure projects in the areas of water supply, power plants, irrigation, oil & gas and marine & defence. We engineer and manufacture industrial, agriculture and domestic pumps, valves and hydro turbines.

In 2003, KBL acquired SPP Pumps, United Kingdom and established SPP INC, Atlanta, USA, as a wholly owned subsidiary of SPP, UK to expand its international presence. In 2007, Kirloskar Brothers International B.V., The Netherlands and Kirloskar Brothers (Thailand) Ltd., a wholly owned subsidiary in Thailand, were incorporated. In 2008, KBL incorporated Kirloskar Brothers Europe B.V. (Kirloskar Pompen B.V. since June 2014), a joint venture between Kirloskar International B.V. and Industrial Pump Group, The Netherlands. In 2010, KBL further consolidated its global position by acquiring Braybar Pumps, South Africa. SPP MENA was established in Egypt in 2012. In 2014, KBL acquired SyncroFlo Inc., the largest independent fabricator of commercial and municipal domestic water booster pumps.

To further strengthen its global position, in 2015, Kirloskar Pompen B.V. acquired Rodelta Pumps International, The Netherlands.

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

KBL has eight manufacturing facilities in India at Kirloskarvadi, Dewas, Kondhapuri, Shirwal, Sanand, Kaniyur, 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 Centres and Authorised Refurbishment Centres across the country.

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. 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 upto 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).

Pumps | Valves | Hydro Turbines | Turnkey Projects

Water Resource Management | Irrigation | Power | Industry | Oil & Gas | Marine & Defence |
Building & Construction | Distribution (Small Pumps) | Valves | Customer Service & Spares

KIRLOSKAR BROTHERS LIMITED

A Kirloskar Group Company
Established 1888

Registered Office: Udyog Bhavan, Tilak Road, Pune-411002. Tel: +91 (20) 24440770
Global Headquarters: "Yamuna", Survey No. 98/(3.7), Baner, Pune 411045. Tel: +91 (20) 27214444
Email: marketing@kbl.co.in, Website: www.kirloskarpumps.com, CIN No.: L29113PN1920PLC000670

OUR COMPANIES

