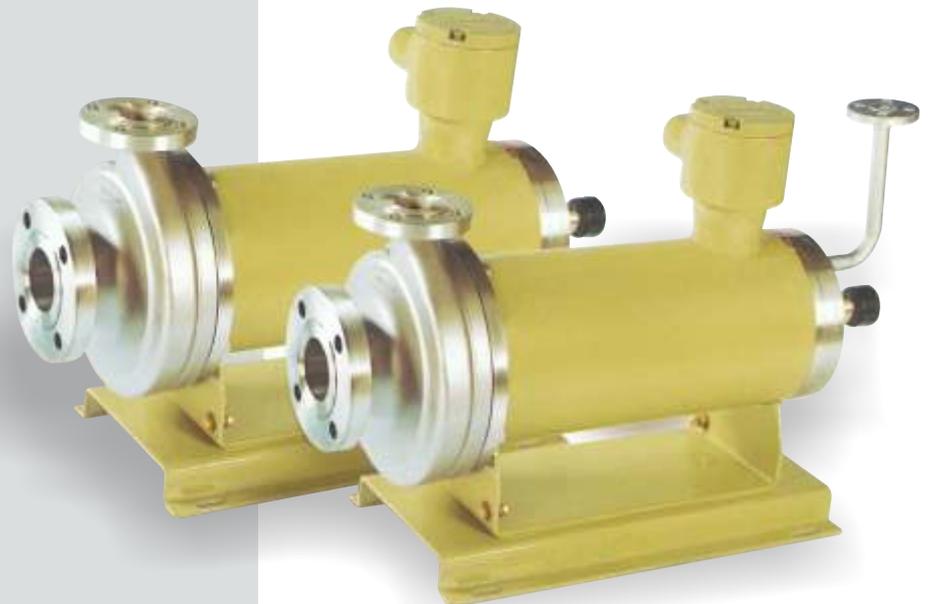




**Daybreak**  
Liquid Engineering Solutions

# DAYBREAK

*CANNED MOTOR PUMPS*



*Your Partner in Emission Control.....*

## PUMP RELIABILITY

With the increasingly stringent demands on environmental protection, industries are seeking totally reliable ZERO EMISSION PUMPS.

## PROBLEMS

Reliability of pumping operations is of supreme importance in handling critical services. In the case of conventional centrifugal pumps the integrity is always in question. The mechanical seal has forever been the weak point of these pumps. The pumps are never 100% leak free and require regular maintenance and constant monitoring of the shaft seals, antifriction bearings and the flushing plan systems. The availability and the life of the pump is affected by the vulnerability of these components.

It would be worthwhile to eliminate the weak spots in centrifugal pumps to achieve total reliability and leak free pumping.

## SOLUTION... CANNED MOTOR PUMPS

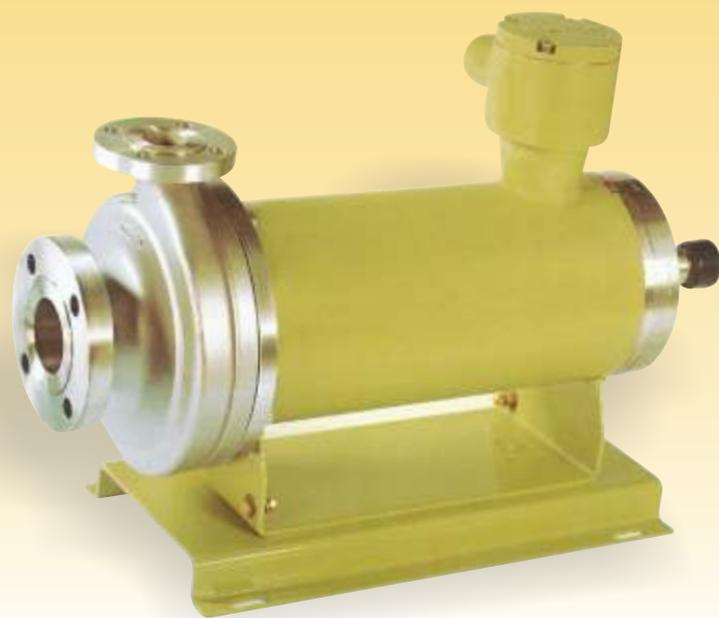
Canned Motor Pumps are indeed the logical solution for safe, zero emission pumping. The canned motor pump, originally designed to meet zero leakage and maximum reliability demands of the nuclear power stations, is now widely used in general industry.

In particular, they excel in applications involving aggressive, inflammable, explosive and toxic liquids because of the important advantages they offer over conventional centrifugal pumps.

The construction of the Daybreak pump is hermetically sealed and provides primary and secondary fluid containment, the process fluid would need to breach two separate physical barriers before any leakage from the pump/motor unit can occur.

Also, as there is no external shaft in a canned motor pump, there is no need for any costly and troublesome on-site shaft alignment, unlike conventionally sealed or long-coupled mag-drive pumps where alignment between the pump shaft and motor seal is required.

## DAYBREAK CANNED MOTOR PUMPS



As the pump and motor are combined in a canned motor pump, the number of wearing parts is reduced, thereby reducing the stock of spare parts required.

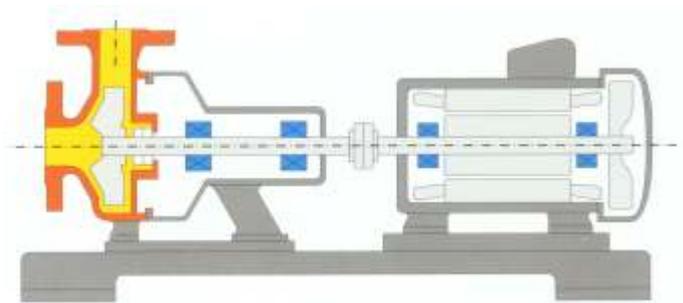
## BENEFITS

- No seals to replace
- Emissions free
- No product loss
- Flame proof/explosion proof
- No external lubrication
- No coupling
- No vibration
- No misalignment on thermal shock
- Negligible maintenance
- No rigid foundation
- Compact - saves 50% space
- Safe Operation

## COMPARISONS

### Conventional Centrifugal Pumps with Double Mechanical Seals.

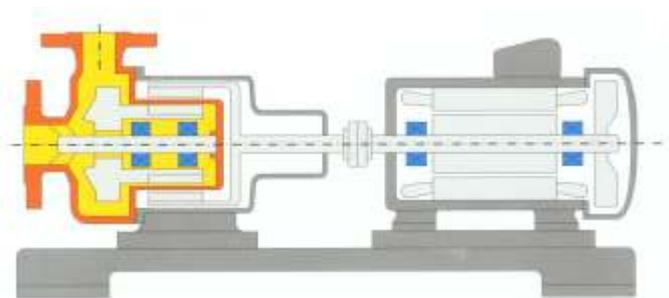
- ❑ Separate motor and coupling required. These are susceptible to environmental deterioration.
- ❑ Double mechanical seals wear out and call for replacement time to time. Seals and buffer fluid systems to be monitored continuously. Periodical maintenance and downtime are unavoidable.
- ❑ Coupling misalignment may lead to seal and bearing failures.
- ❑ No provision for secondary containment in case of fluid leakage. Leakages can prove expensive, hazardous or catastrophic.
- ❑ Multiple bearings and gaskets cause frequent maintenance.



- ❑ Large, heavy base plate and rigid foundation required to dampen vibrations which may cause seal and bearing failure.
- ❑ Large space requirement to accommodate pump and the auxiliary system, piping etc.

### Magnetically Driven Pumps

- ❑ Separate motor and coupling susceptible to environmental deterioration. Coupling misalignment may lead to total system failure.
- ❑ No secondary leak containment. Leakages into atmosphere cannot be avoided on pump failure.
- ❑ Single containment shell vulnerable to rubbing and gall through both internal and external magnets. When containment shell ruptures outer magnet can be flung away.
- ❑ Magnet slip can cause severe vibration and mechanical damage on every part.
- ❑ The pumps have pressure limitations.
- ❑ External lubrication is required.
- ❑ No arrangement for detection of bearing wear.
- ❑ Large base plate and rigid foundation required.



- ❑ For field repair, almost all the pump parts including the driven magnet must be kept in stock. The magnet may be demagnetized while in warehouse.
- ❑ Virtually impossible to disassemble and/or reassemble the drive and driven magnets at site, or even in a plant repair shop. Special tools and skills are needed for maintenance.
- ❑ Strong magnetic field influence other instruments nearby either at installation site or in the ware house.

## ADVANTAGES OF CANNED MOTOR PUMPS

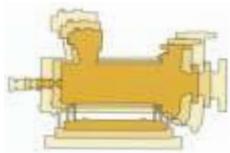
### ZERO EMISSION

Handles toxic, explosive, expensive, hazardous, Cryogenic and corrosive fluids without any possibility of emissions into the environment.



### COMPACT DESIGN

Motor and pump form a single unit. No alignment, hot or cold, no grouting or elaborate foundation is needed. Canned Motor pumps need only 1/3 the space required for the same model of conventional pump.



### VACCUMTIGHT

Ideal for vacuum services or for fluids that react to contact with the atmosphere.



### QUIET OPERATION

Low noise level since no fan is used to cool the motor. All rotating parts are contained within a thick shell that further dampens noise.



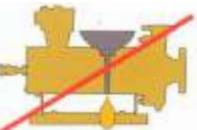
### NO DYNAMIC SHAFT SEAL

No mechanical seal or gland packing. No leak path. Significantly reduced number of parts.



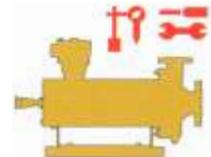
### NO EXTERNAL LUBRICATION

Pumped fluid provides cooling and lubrication of motor and bearings. No lubrication levels to check or maintain.



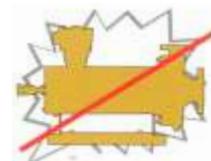
### FIELD REPAIRABLE

All wear parts are easily changed and enhanced with back pullout design.



### EXPLOSION PROOF

All canned motors are provided special protection and flameproof enclosure in accordance with VDE 0530 and 0171, Encl. (Ex) ds 3n G5-G1. All Daybreak canned pump motors are flameproof/explosion proof, CMRI certified EEx-D IIB T4 (Ex) ds.



### ALL PUMPS PERFORMANCE TESTED

Every component of each pump is manufactured by Daybreak adhering to strict statistical quality control tolerances. Every Daybreak pump and motor are 100% performance-tested before shipment with special testing capabilities available to all customers.

## BEARINGS

These are extremely robust, long lived bush bearings which are lubricated by the pump fluid itself without resource to external lubrication. Automatic 'Thrust Balancing' eliminates load on the bearings, while the pump is running. Bearings are designed for life in excess of three years but most often last very much longer. Bearing material options are available in Carbon Graphite, Silicon Carbide or Tungsten Carbide to ensure compatibility with the process fluid including special hard materials, which when combined with hardened shaft journal ensure increased life and enable the pump to cope with abrasive by-products or other adverse conditions.



## BEARING MONITOR

The Bearing Monitor signals an indication that the bearing wear is close to breaking point allowing for bearings to be replaced in time, thus preventing excessive damage.

The monitor is a gauge filled with gas and mounted on the rear bearing housing. The probe of the bearing monitor is inserted into the end nut of the shaft. When the bearing wear exceeds the set limit the probe strikes against the end nut and breaks realising the gas and reducing the pressure in the monitor, indicating of an abnormal state on a dial indicator.

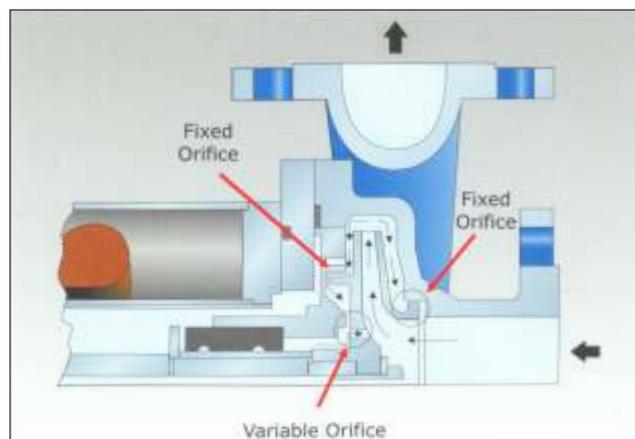
Additionally, the probe being made of the same material as the stator liner, the monitor can also help in detecting stator liner corrosion.



## AUTOMATIC THRUST BALANCE

Automatic thrust balancing mechanism helps to make the impeller self-standing at a certain balanced position through hydrodynamical action of the fixed and the variable orifices at the rear of the impeller.

The automatic thrust balancing mechanism provides for exceptionally long life of the bearings.



# DAYBREAK Canned Motor Pumps

## Type HD

Suitable for a broad range of clean, nonvolatile liquids with moderate temperatures

### BEARING MONITOR

Mechanical type bearing monitor keeps track of normal bearing wear, axial or radial. The monitor signals at the limit of maximum allowable bearing wear. In addition, the monitor is useful in detecting corrosion of the stator liner and the rotor sleeve.



### SHAFT SLEEVES

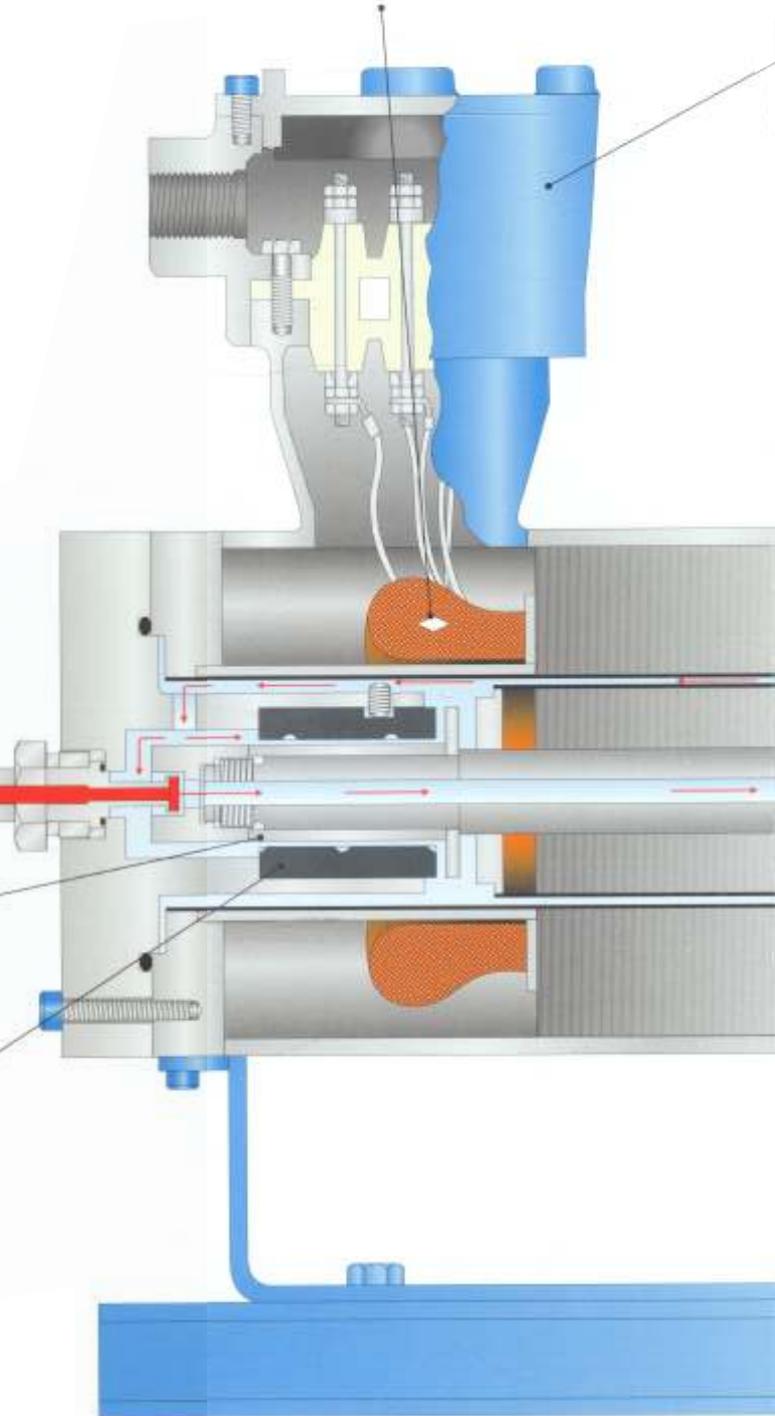
Available in a variety of surface treatments to suit the specific fluid applications. Replaced when bearings are changed for maintaining new wear surface and clearances.

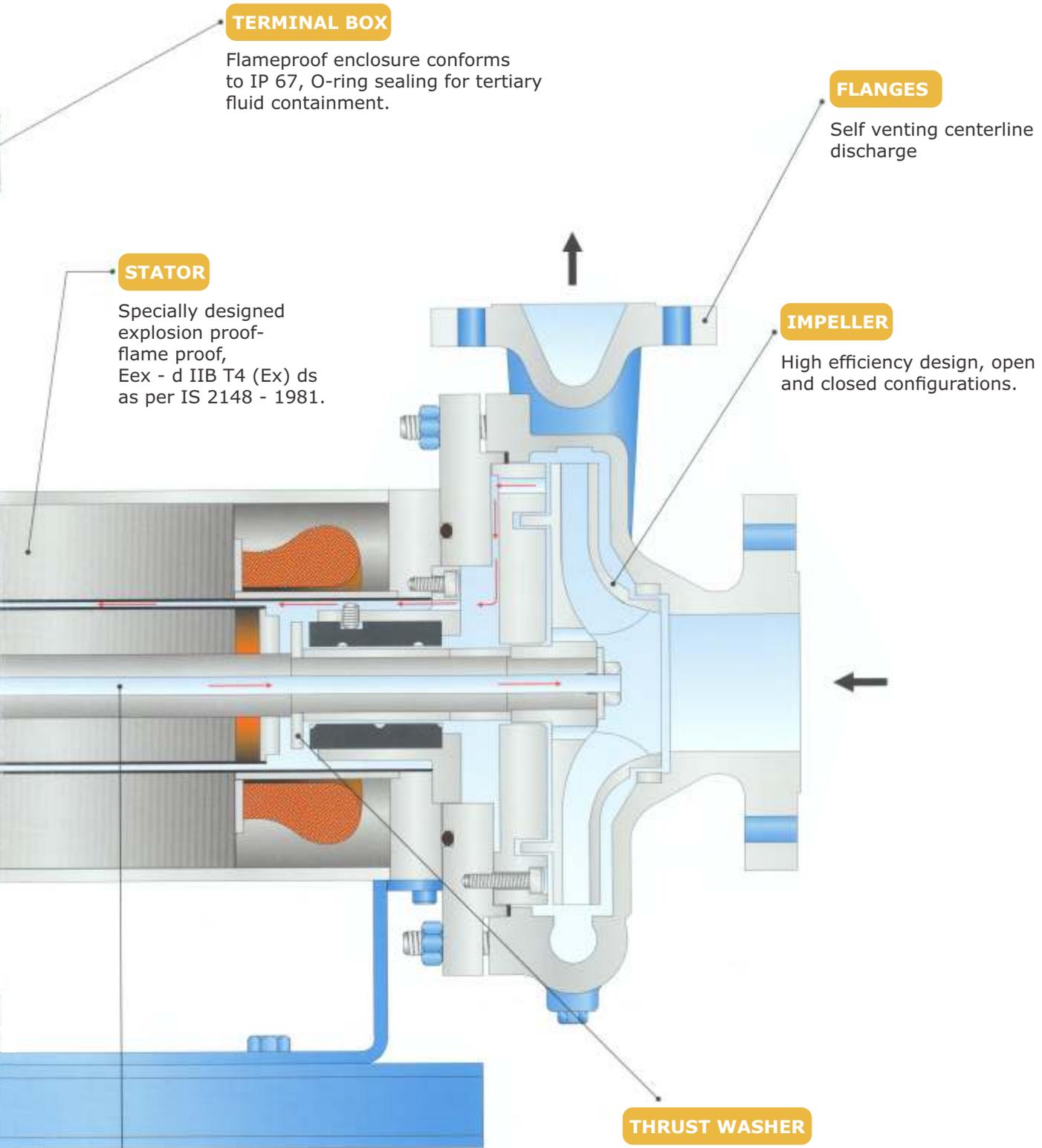
### BEARINGS

Available in a variety of materials to suit the specific fluid applications.

### THERMOSTAT

Embedded in the hot spots of stator winding. Protects winding against overload or overheating.





**TERMINAL BOX**

Flameproof enclosure conforms to IP 67, O-ring sealing for tertiary fluid containment.

**FLANGES**

Self venting centerline discharge

**STATOR**

Specially designed explosion proof-flame proof, Eex - d IIB T4 (Ex) ds as per IS 2148 - 1981.

**IMPELLER**

High efficiency design, open and closed configurations.

**HOLLOW SHAFT**

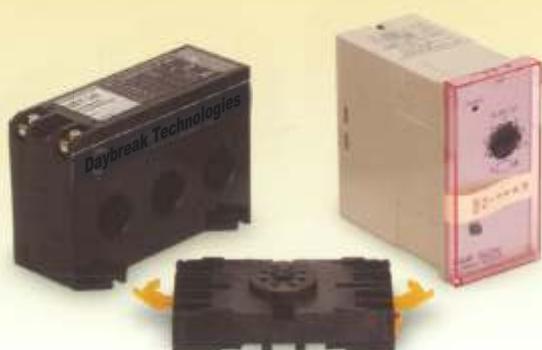
Provides return passage for the motor coolant medium to the suction end of the pump. Prevents vapor collection at the bearing.

**THRUST WASHER**

Absorbs thrust loads during upset conditions and provides back-up to hydraulic thrust balancing.

## OPTIONS &

## SAFETY FEATURES



## DRY RUN PROTECTION

It is a low current sensing device, to protect the pump from cavitations condition when the suction flow drops to unsafe levels. This protective device automatically trips off the pump avoiding any damages.

The fall in suction flow may be due to the following reasons :

- Choking of strainer.
- Unforeseen closure of suction and discharge valve.
- Suction flow affected by vapour lock and available NPSH at any point of time.

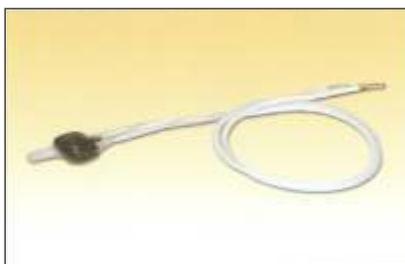
## THERMOSTAT

In the Canned Motor Pump, the motor is cooled by the pumped fluid itself. Therefore suitable insulation class depending on the temperature of the liquid handled is chosen.

Occasionally the motor winding temperature may exceed limits particularly due to some malfunction

of the cooling system. As a precaution from damage of the motor a thermostat is embedded in the hot spot of the winding to protect the motor from over heating. Thermostat is usually of the closed contact type which will open out at the precautionary preset temperature causing the motor protection circuit to trip off the motor.

Thermostats are installed with the motor of Canned Motor Pump, as a standard feature.



## INDUCER

Inducers are axial Impellers, which are installed closely in front of the first impellers of a Centrifugal Pump on the same shaft. The inducers cause an additional static pressure in front of the impeller. They are particularly

used where the NPSHA is not sufficient, in order to reduce the NPSHR value of the pump.



## TEMPERATURE MONITORS

Thermowells / thermocouples are installed in the construction for measurement of fluid temperature. This enables switching of the pump assembly if the temperature crosses acceptable limits, preventing excessive damage to the pump.



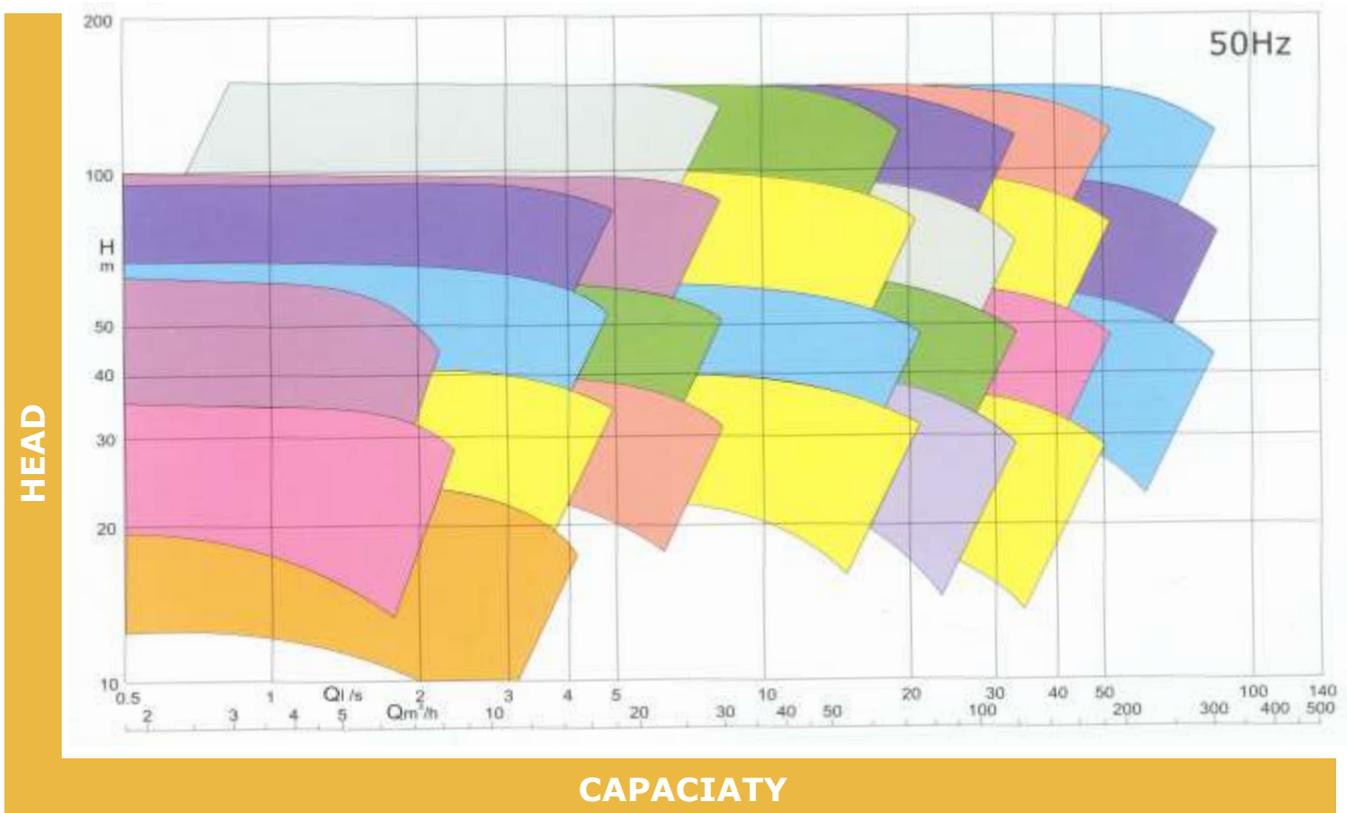
## PERFORMANCE RANGE

	STANDARDISED	UPON REQUEST
Capacity	150 m <sup>3</sup> /hr	150 m <sup>3</sup> /hr
TDH	400 m	600 m
Temperature	-40 to 350	-80 to 450
Viscosity	100 cst	350 cst
Design Pressure	30 bars	400 bars
Motor Kw	120 Kw	200 Kw
Major Materials of Wetted Parts	SS304, SS316, SS316L	Hastelloy, Monel, Alloy 20

## STANDARD MATERIALS

PART	MATERIALS
Pump Casing	SS 316
Impeller	SS 316
Sealing	CFT / Viton
Bearing Housing	SS 316
Shaft Sleeve	Carbon
Thrust washer	SS 316 + HCR
Motor Casing	Steel
Base Plate	Steel
Stator Liner	Hastelloy
Rotor/Stator End Cover	SS 316

## HCMP - SERIES FAMILY CURVES

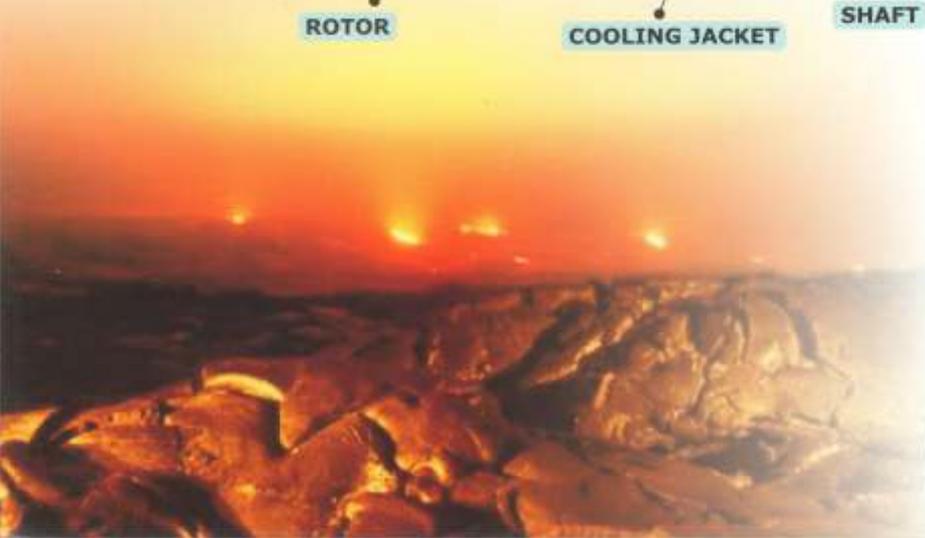
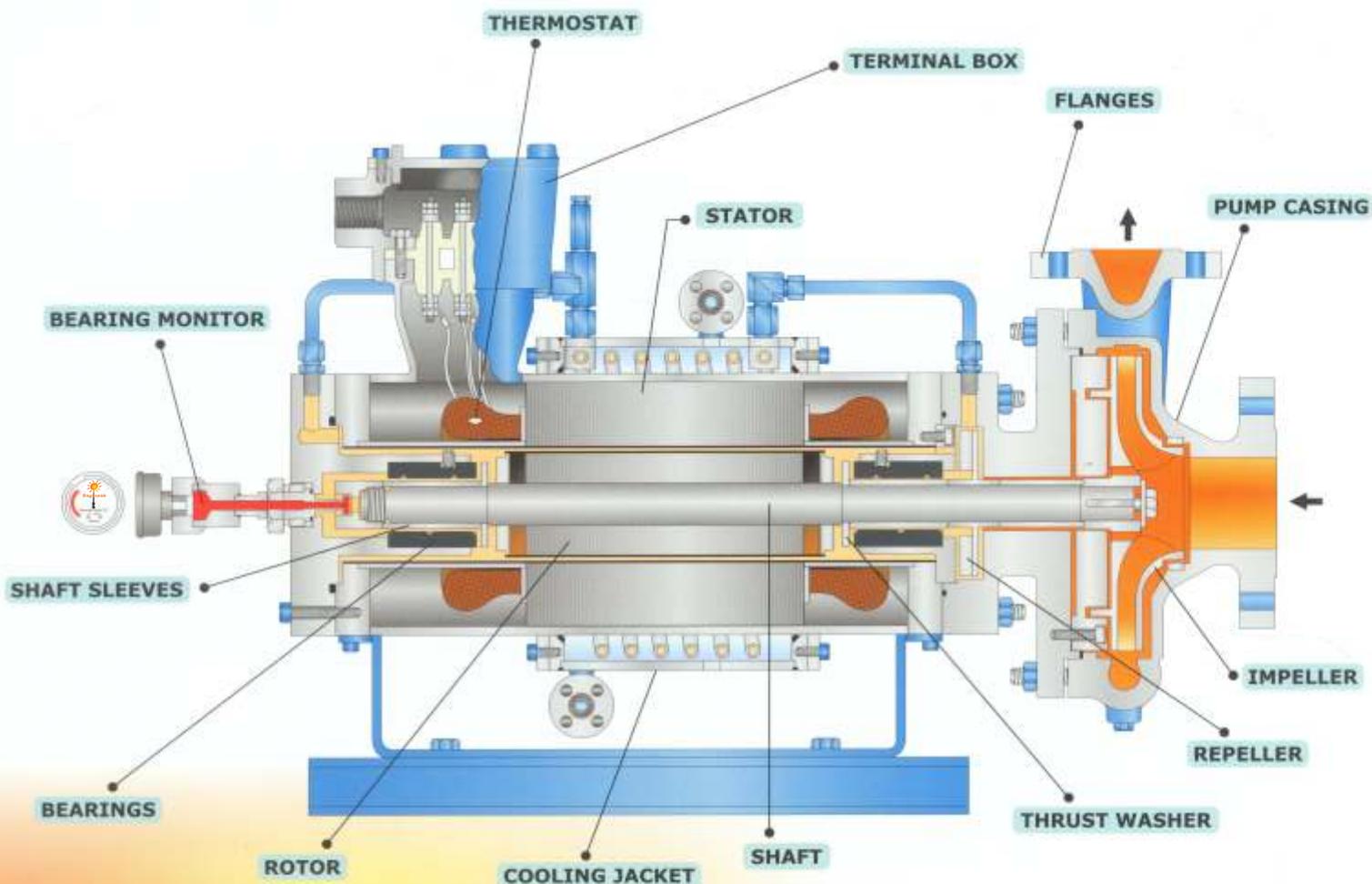


## TYPE HT

### HIGH TEMPERATURE PUMP



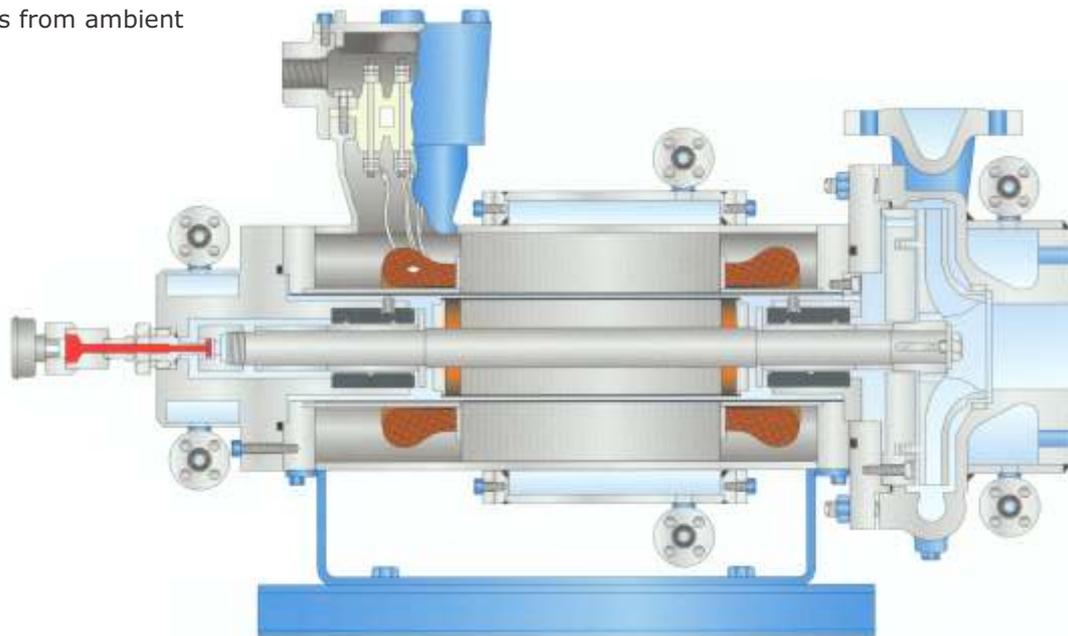
TYPE HT pumps are designed for high temperature fluids up to 400°C. The pump and motor are separated thermally by an adaptor which prevents heat transfer from the pump to motor area. In these pumps an independent circulating system with cooling jacket and heat exchanger is provided. The circulation is achieved with the aid of an auxiliary impeller mounted at the fore end of the motor chamber.



## TYPE HM

### HIGH MELTING POINT LIQUID PUMP

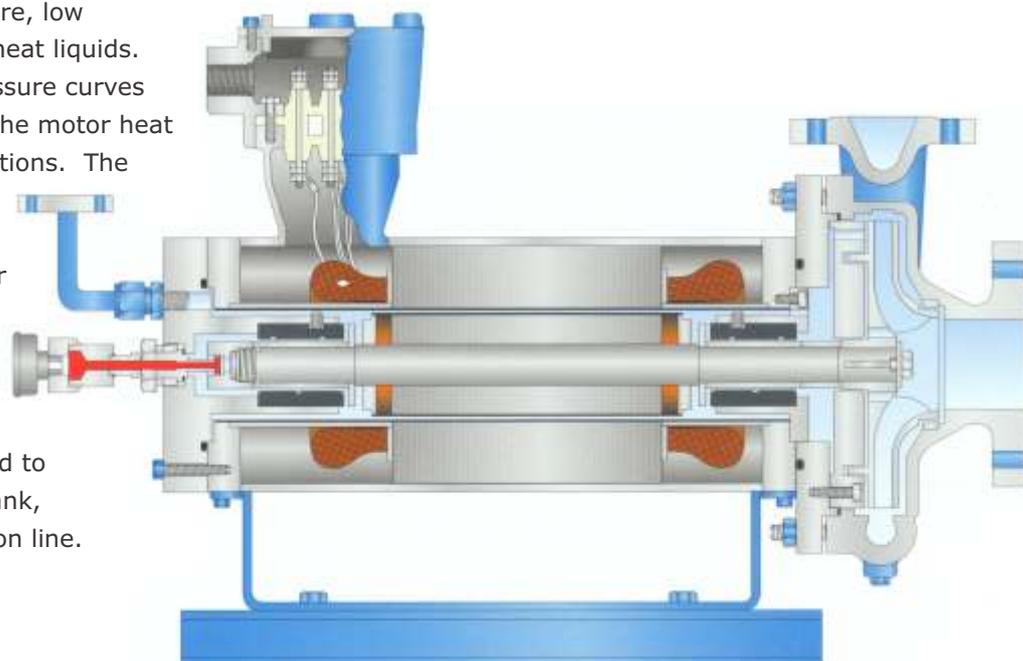
Type HM pumps are suitable for liquids which tends to solidify at lower temperature. These pumps are provided with a heating jacket on the outer body of the pump and motor to prevent liquid from solidifying during pump operation. Suited for fluids with melting points from ambient upto 150° C



## TYPE HR

### REVERSE CIRCULATION PUMP

Type HR pumps are designed for fluids with relatively high vapour pressure, low specific gravity, low specific heat liquids. Liquids with steep vapor pressure curves may vaporize on picking up the motor heat and result in cavitation conditions. The circulation/pumping fluid is passed from the casing volute chamber into the rotor chamber through the front bearing housing. After being extracted from the outlet of rear bearing housing, the liquid is returned to vapour zone in the suction tank, through the reverse circulation line.

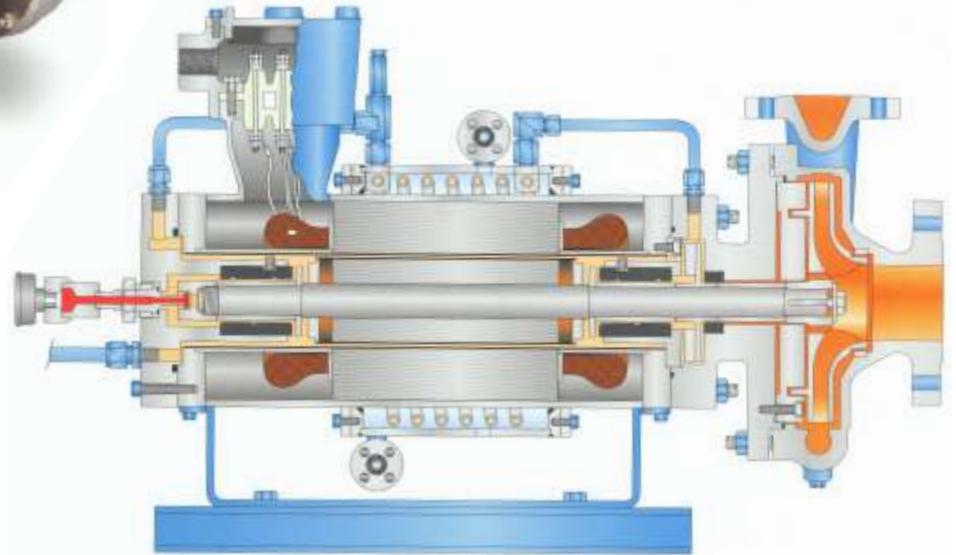


## TYPE HS

### SLURRY PUMP



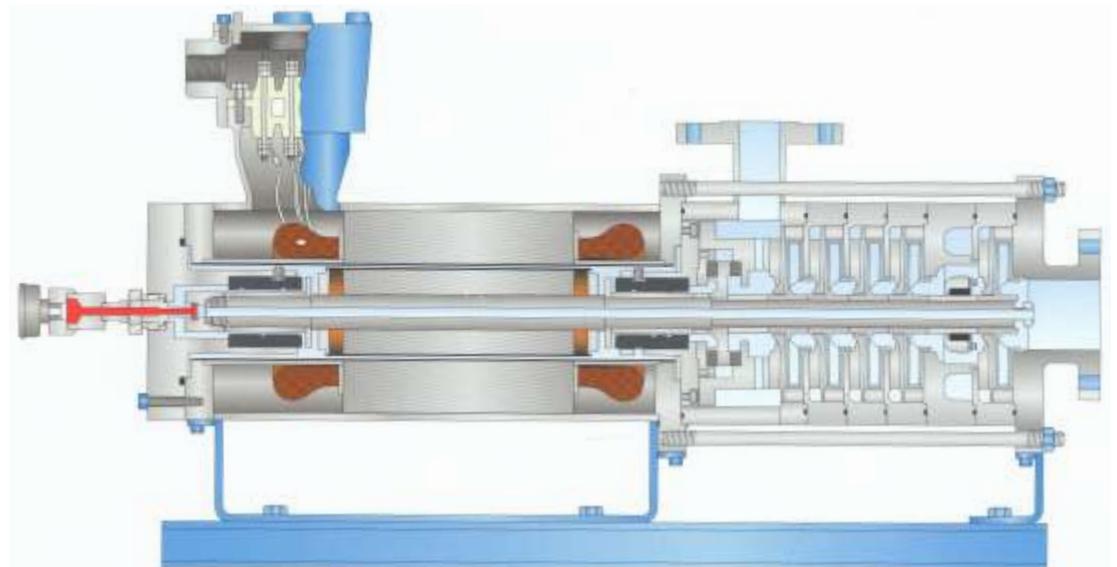
Type HS pumps are designed for slurry services. Clean liquid compatible to system liquid is flushing through the inlet port at the back of the motor to prevent the ingress of slurry into the motor area with back flushing line arrangement. The function of this arrangement is to prevent the slurry entering into the rotor chamber. This also lubricates the bearings. An auxiliary impeller located at fore end of the rotor circulates the flushing fluid through an integral heat exchanger to minimize frictional and electrical loss. The back flushing arrangement enables the pump to operate in process fluids with solid content up to 5%.



## TYPE MT

### MULTI STAGE PUMP

Type MT pumps are designed for high head, low flow duties. Increased heads are achieved by running the fluid from discharge of one impeller to the suction of the succeeding one.



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