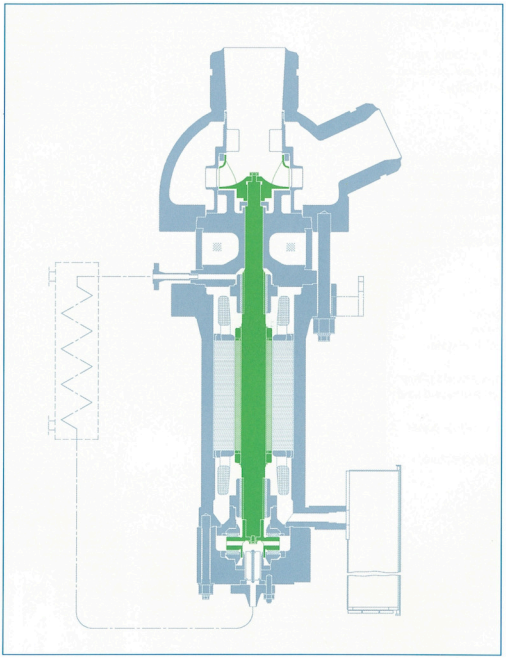
HLV

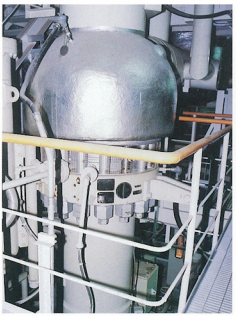
Glandless Boiler Circulating Pumps



TORISHIMA PUMP

General and Application

The HLV are glandless boiler circulating pumps with pump and motor being integrated in a pressure tight casing.
The glandless design(no shaft seal)makes this pump best suited for pumping of high temperature and high pressure liquids without any leakage at all.
The pump is driven by Torishima made high performance three phase induction motor filled with water(wet motor).



Application

This pump is used mainly for circulation of water at high pressures and temperatures for which the use of shaft seals is technically and/or economically inappropriate. Main fields of applications are boilers subject to super critical pressure and sliding pressure operation and others like.

- Forced circulaion boiler
- One through boiler
- Controlled circulation boiler
- Combined circulation boiler
- Waste heat recovery boiler in steel works,etc.
- Heating boiler for various process plants
- Other various boilers for marine and land use
- Main circulation pump in nuclear power plant
- High pressure and high temperature testing facilities

Kansai Electric Power Co.,Ltd. Nanko P/S (600MW), Japan	Pusan Combined Cycle Power Plant (500MW×4units), Korea
Hokkaido Electric Power Co.,Ltd. Tomatou Atsuma P/S (600MW), Japan	

This vertical pump is suspended in a pipe line without any outside supports.
Furthermore, it does not form an anchorage point in the piping system so that any thermal expasion which occurs in the piping is free to work itself out without any distortion.
During overhauls, the pump casing can remain connected with the pipe line. The motor unit, together with the heat barrier and the impeller, can be pulled out of the casing after unscrewing the tiebolts.

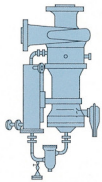
Casing
Pressure-tight motor casing is flanged onto the pump casing. Pump and motor casing are subjected to the system pressure in which they are installed.
Casings are of volute, annular or spherical design, according to the customers' specification and application, and contain single entry impellers.

Bearings
The shaft is guided in two water lubricated plain bearings.
The axial thrust is balanced mainly hydraulically and any residual axial thrust is supported by a water lubricated segmental thrust bearing.

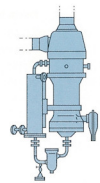
Nozzle orientation
Suction nozzle is arranged axially (end suction) and the discharge nozzle radially. The nozzle can be provided with flanges or welding stub ends.

Driving motor
The driving motor and the pump form an integral unit.
The stator and rotor are surrounded and flushed through by the fluid pumped within controlled temperature limits. The water content of the motor is circulated by an auxiliary impeller in the motor through a heat-exchanger mounted outside the pump. The motor losses are transmitted to a low pressure cooling fluid in this heat-exchanger.

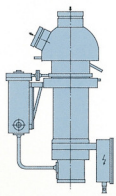
Heat barrier
A hear barrier is provided between the pump and the motor so as to prevent heat transfer from the hot pump to the cold motor, thereby protecting the motor's insulation of windings.



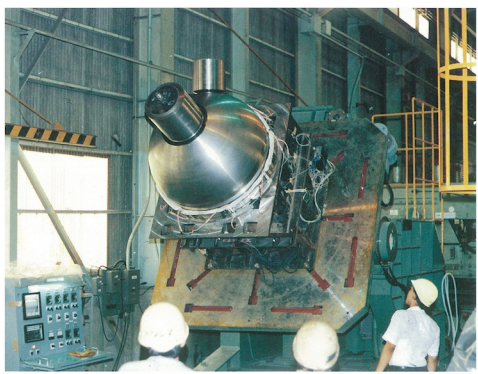
Volute casing



Annular casing



Spherical casing

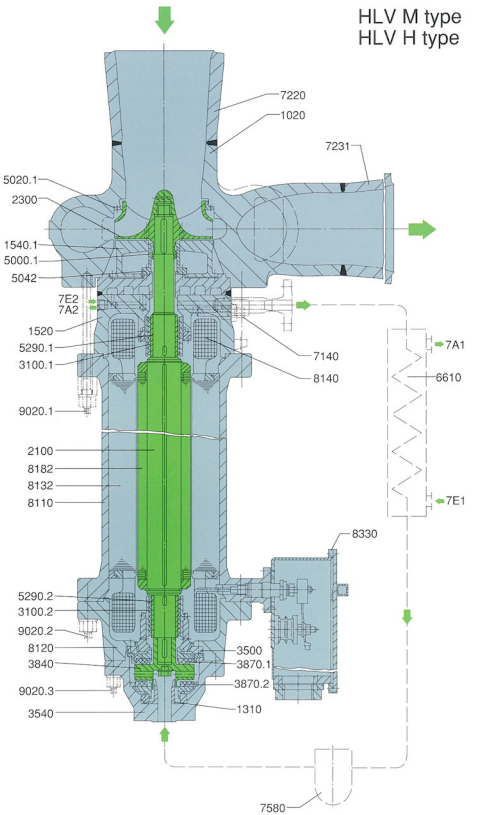


Casing of HLAV boiler circulating pump welded by automatic welding machine.

Sectional Drawing and List of Components

Volute Casing Pump

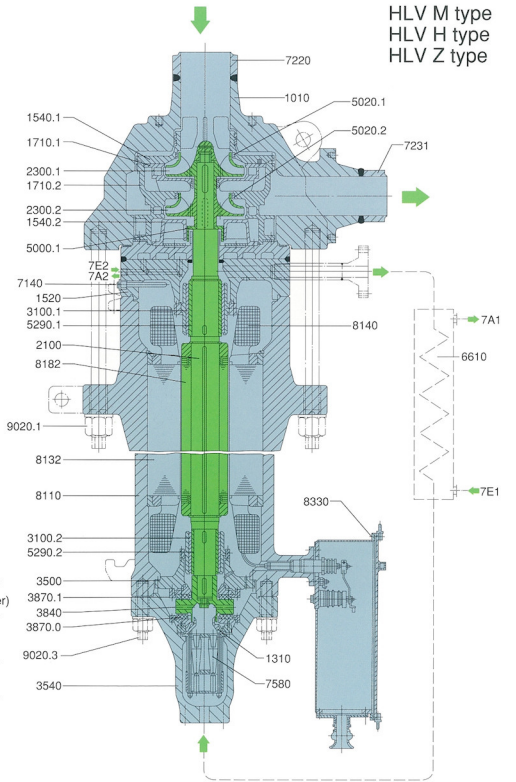
No.	Parts Name
1020	Pump casing
1310	Inlet ring
1520	Heat barrier
1540.1	Intermediate wall
2100	Shaft
2300	Impeller
3100.1	Plain bearing
3100.2	Plain bearing
3500	Bearing housing
3540	Thrust bearing housing
3840	Thrust bearing plate
3870.1	Thrust bearing segment
3870.2	Thrust bearing segment
5000.1	Ring
5020.1	Casing wear ring
5042	Flanged sleeve
5290.1	Bearing sleeve
5290.2	Bearing sleeve
6610	Cooler
7140	Thermo well
7220	Suction nozzle
7231	Discharge nozzle
7580	Cyclone filter
8110	Motor casing
8120	Cover for motor casing
8132	Stator laminations
8140	Stator coil
8182	Rotor laminations
8330	Terminal box
9020.1	Stud
9020.2	Stud
9020.3	Stud
7E1	Low pressure cooling water inlet(for high pressure cooler)
7A1	Low pressure cooling water outlet(for high pressure cooler)
7E2	Low pressure cooling water inlet(for heat barrier)
7A2	Low pressure cooling water outlet(for heat barrier)



Sectional Drawing and List of Components

Annular Casing Pump

No.	Parts Name
1010	Pump casing
1310	Inlet ring
1520	Heat barrier
1540.1	Intermediate wall
1540.2	Intermediate wall
1710.1	Diffuser
1710.2	Diffuser
2100	Shaft
2300.1	Impeller
2300.2	Impeller
3100.1	Plain bearing
3100.2	Plain bearing
3500	Bearing housing
3540	Thrust bearing housing
3840	Thrust bearing plate
3870.1	Thrust bearing segment
3870.2	Thrust bearing segment
5000.1	Ring
5020.1	Casing wear ring
5020.2	Casing wear ring
5290.1	Bearing sleeve
5290.2	Bearing sleeve
6610	Cooler
7140	Thermo well
7220	Suction nozzle
7231	Discharge nozzle
7580	Cyclone filter
8110	Motor casing
8132	Stator laminations
8140	Stator coil
8182	Rotor laminations
8330	Terminal box
9020.1	Stud
9020.2	Stud
7E1	Low pressure cooling water inlet(for high pressure cooler)
7A1	Low pressure cooling water outlet(for high pressure cooler)
7E2	Low pressure cooling water inlet(for heat barrier)
7A2	Low pressure cooling water outlet(for heat barrier)

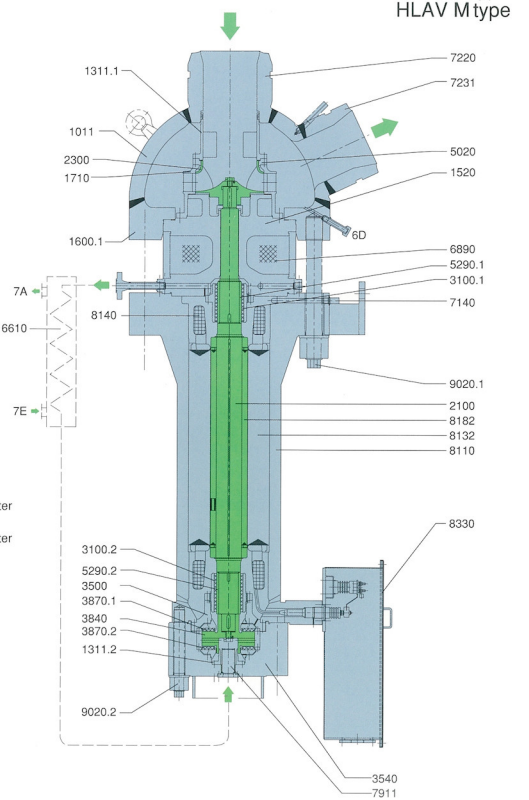


Sectional Drawing and List of Components

Spherical Casing Pump

No.	Parts Name
1011	Pump casing
1311.1	Guide ring
1311.2	Guide ring
1520	Heat barrier
1600.1	Cover
1710	Diffuser
2100	Shaft
2300	Impeller
3100.1	Plain bearing
3100.2	Plain bearing
3500	Bearing bracket
3540	Thrust bearing case
3840	Thrust bearing plate
3870.1	Thrust bearing segment
3870.2	Thrust bearing segment
5020	Casing wearing
5290.1	Bearing sleeve
5290.2	Bearing sleeve
6610	Cooler
6890	Insulation
7140	Thermo well
7220	Suction nozzle
7231	Discharge nozzle
7911	Filter
8110	Motor casing
8132	Stator laminations
8140	Stator coil
8182	Rotor core sheet
8330	Terminal box
9020.1	Stud bolt
9020.2	Stud bolt
6D	Drain
7E	Low pressure cooling water inlet(for motor cooler)
7A	Low pressure cooling water outlet(for motor cooler)

HLAV C type
HLAV K type
HLAV M type



Technical Features

Glandless design eliminates leakage completely.

The use of high durability water-lubricated bearings eliminates the need for other lubricants.

By adopting an effective motor cooling circuit no injection of high pressure water from outside is required. (Only cooling water of low pressure is needed)

Wetted coil motor ensures higher efficiency and reliability, compared with conventional canned motor.

Maintenance free and highly reliable design of simple mechanism.

Pull-out system facilitates installation, overhaul,and inspection.

Direct connection of the pump to the pipeline makes a foundation unnecessary and facilitates installations.

In addition, the pump can follow freely the thermal expansion of pipe line.

Extremely easy starting and shutting down operation.

Vertical suspension type saves plant space.

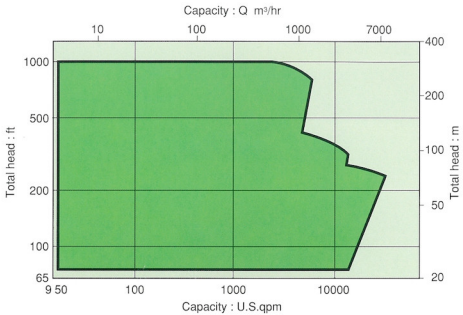
Optimised heat barrier design and compactness of the unit assure smooth running.

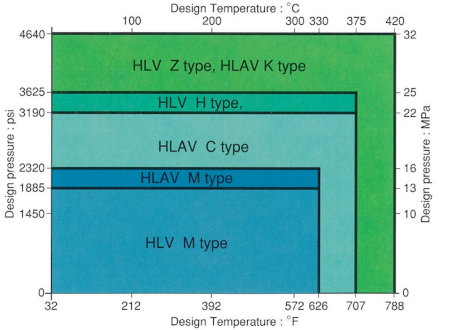
High voltage motor (~10kV)with ample past delivery records saves cost of the power supply system, thus contributing to the whole plant economy.

For large flow rates, spherical casings are used permitting high temperature change speeds and cyclic load changes thus contributing to high performance of the plant.

Many pumps with high heads for one through boilers have been delivered throughout many years.

Technical Data and Operating Range





Operating pressure	up to 4640psi(320bar)
Total head	up to 1115ft(340m)
Capacity	up to 26,420 U.S.gpm(6,000m³/hr)
Operating temperature	up to 788°F(420°C)
Sizes	$1\frac{1}{2}$ to8in(40 to 200mm)
Speed	2900, 1450, 3500, 1750min⁻¹
Motor rating	up to 2,500kW(3,350HP)
Voltage	up to 10kV

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