HLV
HLAV

Glandless (Sealless) Pump Motor Unit

TORISHIMA

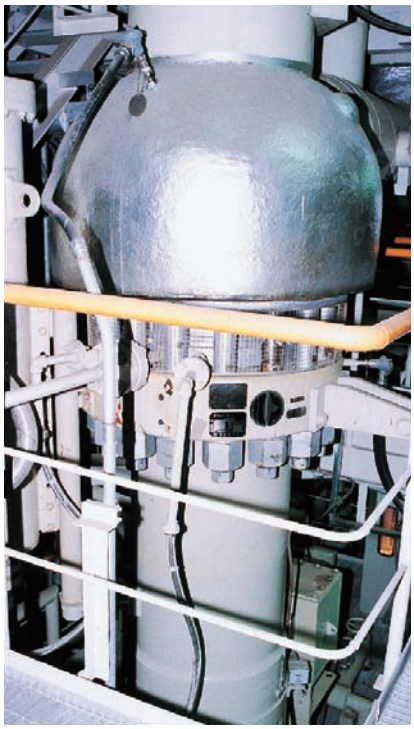
Glandless (Sealless) Pump Motor Unit

The HLV are glandless boiler circulating pumps. The motor and pump are fully integrated into a pressure tight casing. The glandless design (no shaft seal) makes this pump best suited for pumping of high temperature and high pressure liquids at zero leakage to the atmosphere.
The pump is driven by Torishima made high performance wet motor. The motor is three phase induction type filled with water using water tight special winding wire.

Applications

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 designed for super critical pressure and sliding pressure operation and others like.

- Forced circulaion boiler
- Once 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
- High pressure and high temperature testing facilities



Kansai Electric Power Co.,Ltd.
Nanko Power Plant
600MW, Japan

Wardha Power Company Pvt. Ltd.
KSK Thermal Power Plant
6×600MW, India

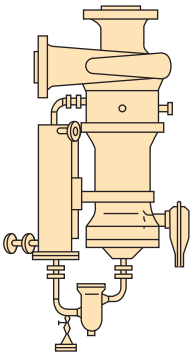
Hokkaido Electric Power Co.,Ltd.
Tomatou Atsuma Power Plant
600MW, Japan

BLCP Power Ltd.
Map Ta Phut Power Plant
2×700MW, Thailand

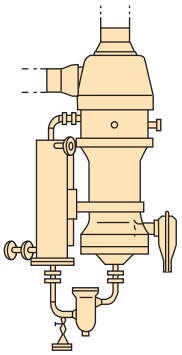
Design

This vertical pump is suspended and integrated into the boiler pipework and needs no external support.
Furthermore, the pump and motor are not anchoraged and allow the pipework to move unristricted during plant thermal transitions without any additional pipework loads or distortions.
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.

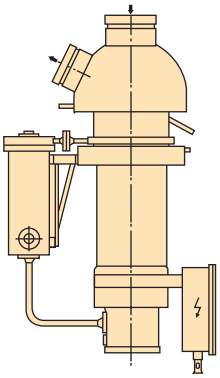
Casing
Pressure-tight motor casing is flanged onto the pump casing. Both the pump and motor casing are designed and munufactured to full system design pressure.
Options of volute, annular or spherical casing designs are available in accordance with the customers' specification and application, and contain single entry impellers.



Volute casing



Annular casing



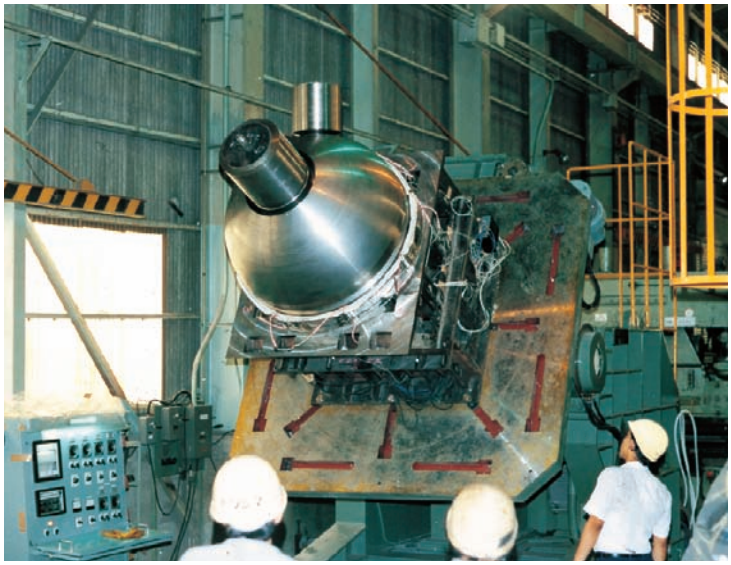
Spherical casing

Bearings
The shaft is guided in two water lubricated plain bearings.
The axial thrust develped within the pump is nominally hydrauliclly balanced with a small residual axial thrust being 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.

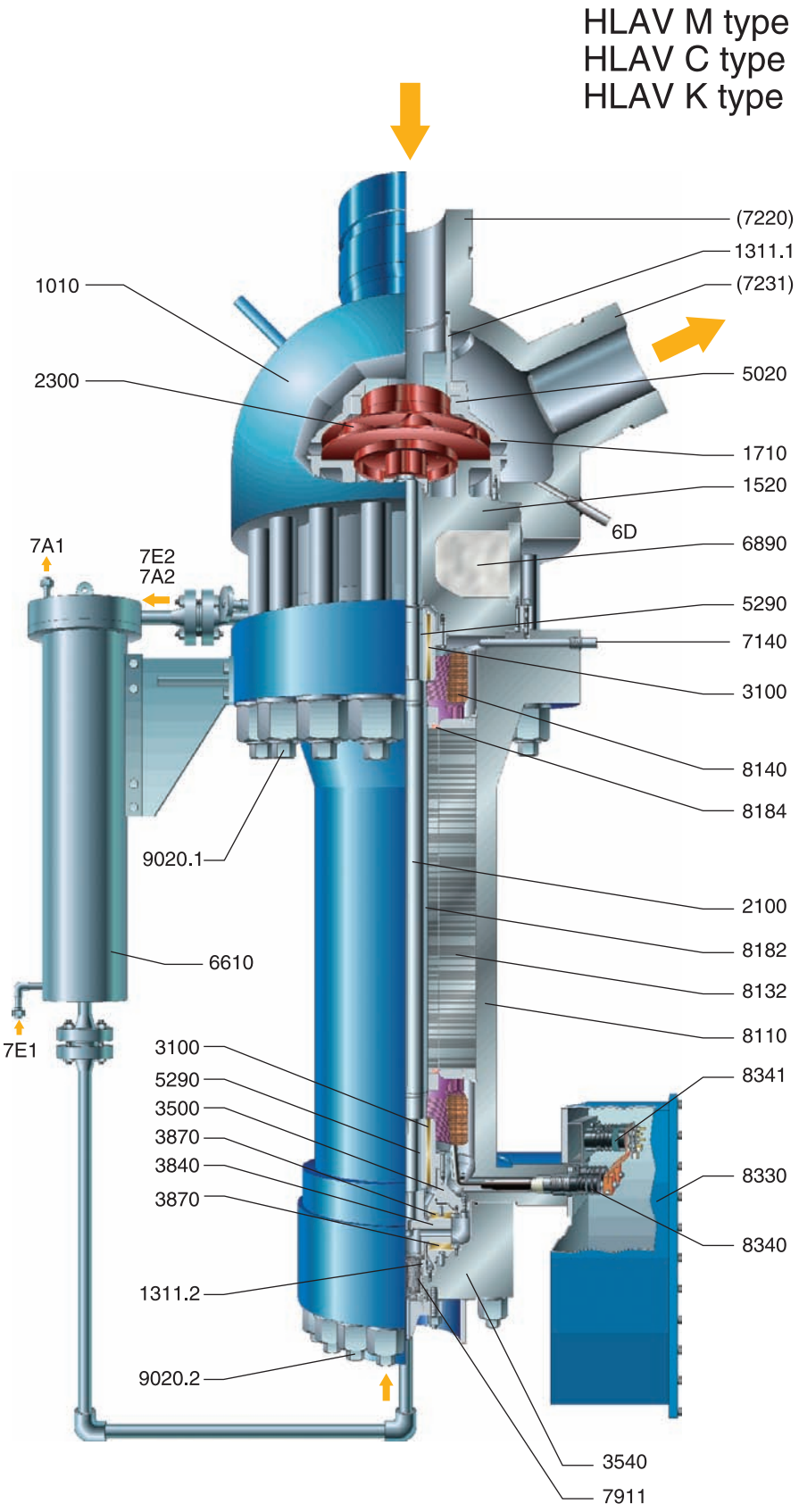


Casing of HLAV boiler circulating pump welded by automatic welding machine.

Sectional Drawing and List of Components

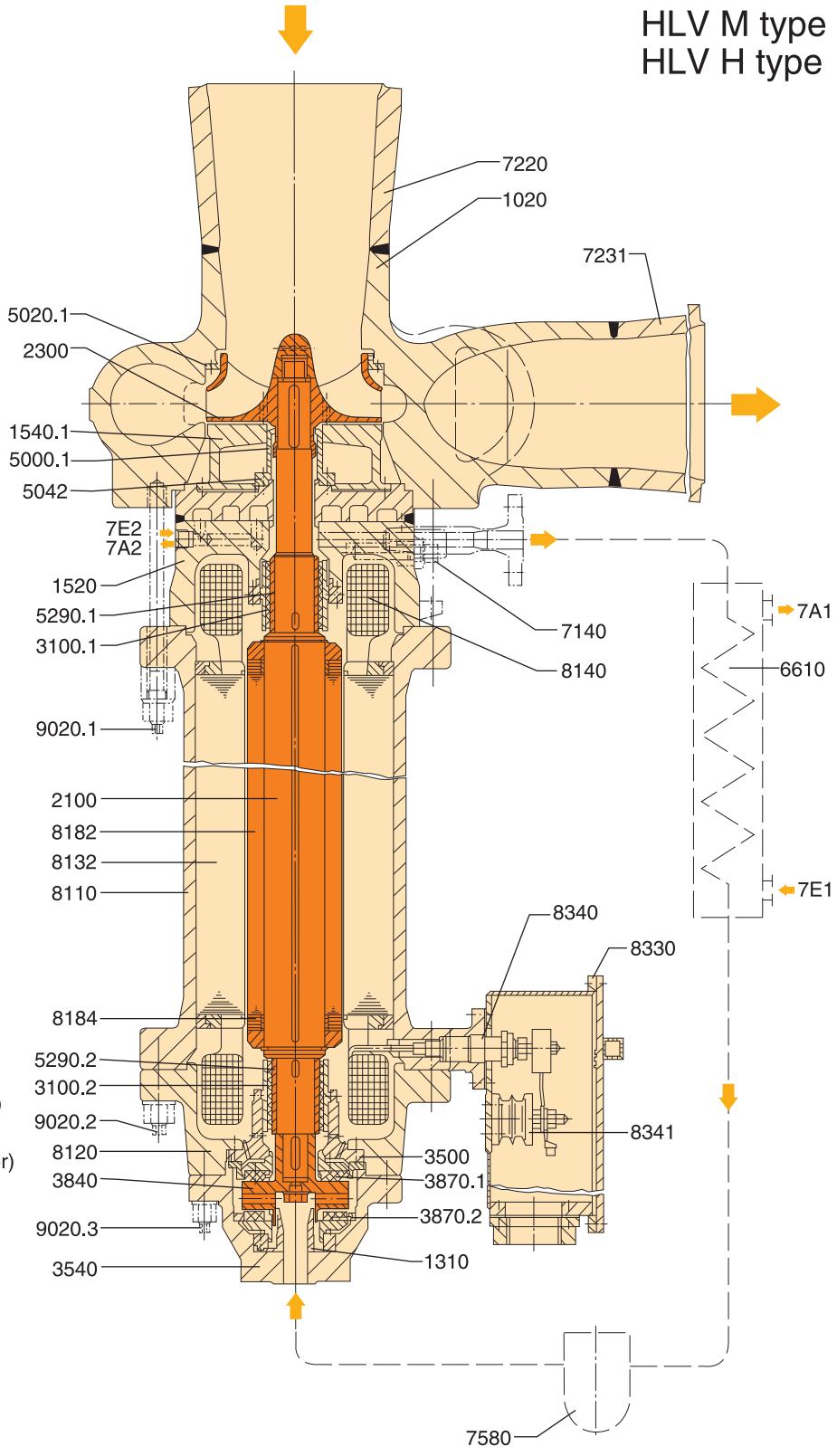
Spherical Casing Pump

No.	Parts Name
1010	Pump casing
(7220)	Suction nuzzle
(7231)	Discharge nozzle
1311.1	Guide ring
1311.2	Guide ring
1520	Heat barrier
1710	Diffuser
2100	Shaft
2300	Impeller
3100	Plain bearing
3500	Bearing bracket
3540	Thrust bearing case
3840	Thrust bearing plate
3870	Thrust bearing segment
5020	Casing wearing
5290	Bearing Sleeve
6610	Cooler
6890	Insulation
7140	Thermo well
7911	Filter
8110	Motor casing
8132	Stator laminations
8140	Stator coil
8182	Rotor core sheet
8184	Rotorbar
8330	Terminal box
9020.1	Stud bolt
9020.2	Stud bolt
6D	Drain
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)
8340	Terminal unit
8341	Insulator



Volute Casing Pump

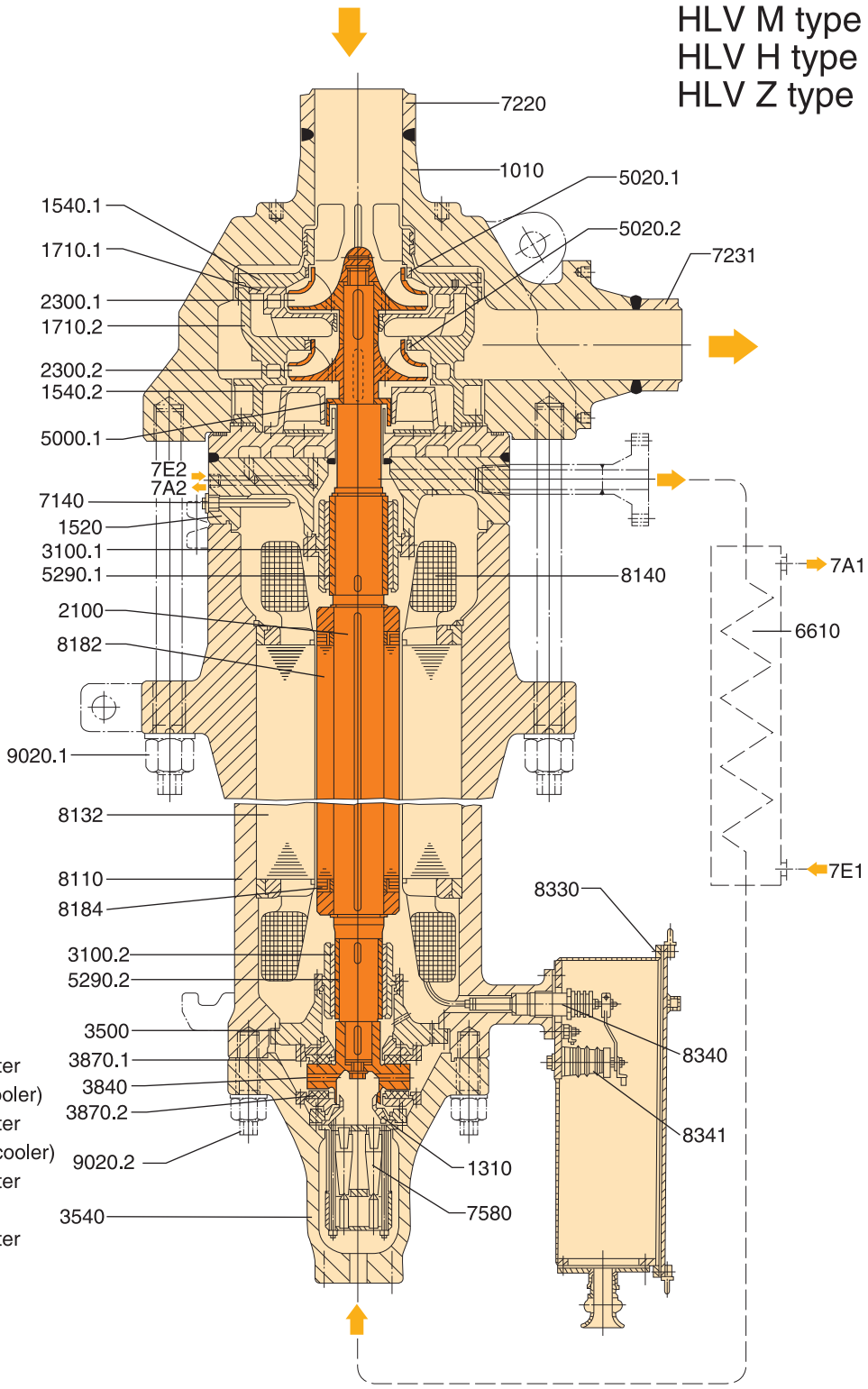
No.	Parts Name
1020	Pump casing
1310	Inlet ring
1520	Heat barrier
1540.1	Intermediate wall
2100	Shaft
2300	Impeller
3100.1	Plain bearing
3100.2	Plain bearing
3500	Bearing housing
3540	Thrust bearing housing
3840	Thrust bearing plate
3870.1	Thrust bearing segment
3870.2	Thrust bearing segment
5000.1	Ring
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
8184	Rotor bar
8330	Terminal box
8340	Terminal unit
8341	Insulaor
9020.1	Stud bolt
9020.2	Stud bolt
9020.3	Stud bolt
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
8184	Rotor bar
8330	Terminal box
9020.1	Stud bolt
9020.2	Stud bolt
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)
8340	Terminal unit
8341	Insulator



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 (~11kV) 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.

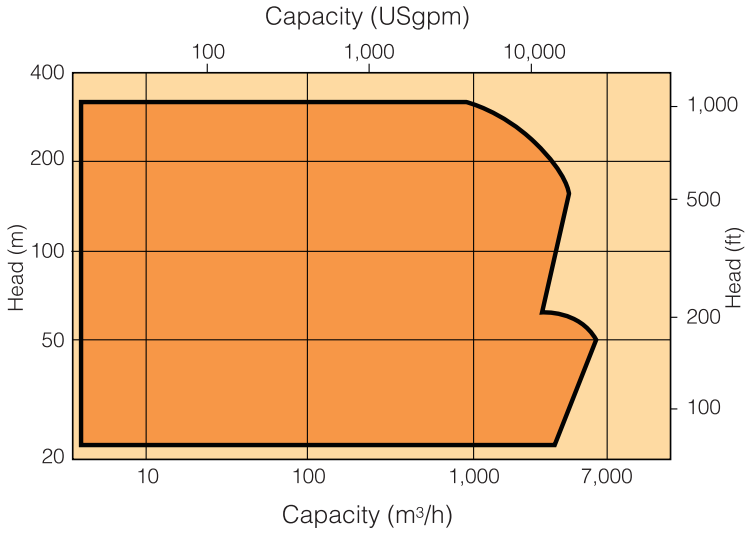
Many pumps with high heads for one through boilers have been delivered throughout many years.

Technical Data

Size	: 40 to 400mm (1 2/3 to 16in)
Capacity	: up to 6,840m³/h (30,110USgpm)
Total Head	: up to 320m (1,000ft)
Operating Pres.	: up to 33MPa (4,790psi)
Operating Temp.	: up to 420℃ (up to 788˚F)
Speed	: 2,900 / 1,450 / 3,500 / 1,750min^{-1}
Motor Rating	: up to 2,500kW
Voltage	: up to 11kV

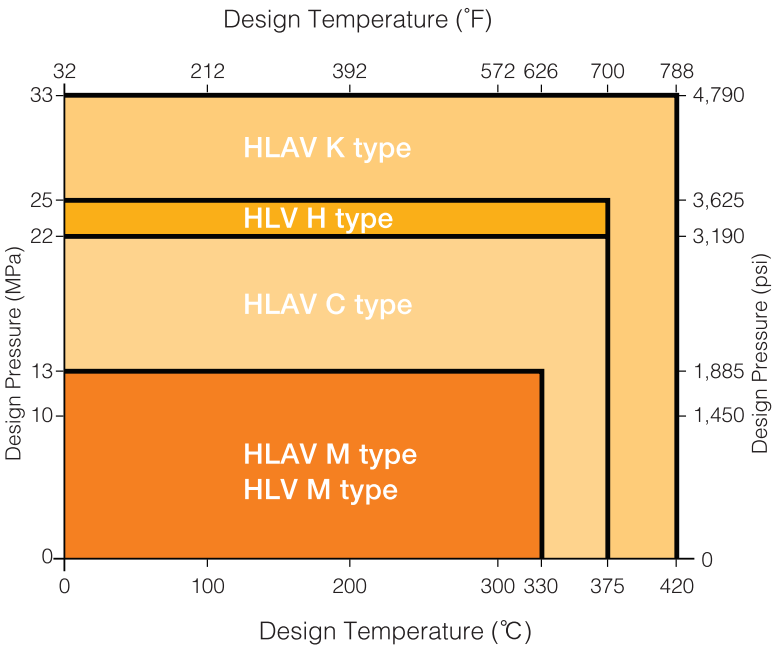
Performance Range

Pumps beyond the above range are also available.



Design Pressure & Temperature

Pumps beyond the above range are also available.



Torishima Pump Global Network

JAPAN

❶ Torishima Pump Mfg. Co., Ltd.

1-1-8 Miyata-cho, Takatsuki-city, Osaka 569-8660 Japan
Tel : +81-72-690-2308 / Fax : +81-72-690-2329

❷ Kyushu Torishima Co., Ltd.

9857-13, Ohaza Kawako, Wakagi-cho, Takeo-city,
Saga 840-0813 Japan
Tel : +81-954-26-3081 / Fax : +81-954-26-3080

CHINA

❸ Torishima Pump Mfg. Co., Ltd. Beijing Office

Rm707, Building 1, KUNSHA CENTER,
No.16 Xinyuanli, Chaoyang District,
Beijing, P.R.China PC:100027
Tel : +86-10-84682891 / Fax : +86-10-84682890

❹ Torishima Pump (Tianjin) Co., Ltd.

No.9 Gaoxin Road, Wuqing Development Zone,
Tianjin, China P. R.
Tel : +86-22-59695601 / Fax : +86-22-59695609

HONG KONG

❺ Torishima (Hong Kong) Ltd.

Unit A, 21/F., Tower A, Billion Centre, 1 Wang Kwong
Road, Kowloon Bay, Kowloon, Hong Kong
Tel : +852-2795-1838 / Fax : +852-2754-3293

VIETNAM

❻ Torishima (Hong Kong) Ltd. Vietnam Office

No.76 Bui Thi Xuan Street, Hai Ba Trung District,
Hanoi, Socialist Republic of Vietnam
Tel : +84-4-943-7880 / Fax : +84-4-943-7876

SINGAPORE

❼ Torishima Pump Mfg. Co., Ltd. Singapore Office

30 Ubi Crescent #01-02 Ubi Techpark,
Singapore 408566
Tel : +65-6779-0123 / Fax : +65-6779-6900

❽ Torishima Service Solutions Asia Pte. Ltd.

48, Toh Guan Road East, #02-142,
Enterprise Hub, SIngapore 608586
TEL : +65-6933-8772 / FAX : +65-6933-8777

INDONESIA

❾ P.T. Torishima Guna Engineering

Jalan Rawa Sumur Timur No.1 Pulogadung
Industrial Estate, P.O.Box 1160, Jakarta, Indonesia
Tel : +62-21-460-3963 / Fax : +62-21-460-3937

❿ P.T. Torishima Guna Indonesia

Jalan Rawa Sumur Timur No.1 Pulogadung
Industrial Estate, P.O.Box 1160, Jakarta, Indonesia
Tel : +62-21-460-3963 / Fax : +62-21-460-3937

⓫ P.T. Geteka Founindo

JL Pulo Ayang Kav. AA2 Pulogadung Industrial Estate,
P.O.Box 1160 JAT, Jakarta 13011 Indonesia
Tel : +62-21-460-3963 / Fax : +62-21-460-3937

INDIA

⓬ Torishima Pumps India Pvt. Ltd.

Tower B 1106, Millennium Tower, Sector27
Gurgaon-122002, Haryana, India
Tel : +91-124-4728950 / Fax : +91-124-4728950

AUSTRALIA

⓭ Torishima Australia Pty. Ltd.

52 Reid Street, Murrumbeena, Victoria, Australia 3163
Tel : +61-434-709172

U.A.E.

⓮ Torishima Service Solutions FZCO

Plot of Land TP010501 Techno Park-Jebel Ali,
PO Box. 37603 Dubai, U.A.E.
Tel : +971-4-880-7344 / Fax : +971-4-880-7354

⓯ Torishima Pump Mfg. Co., Ltd. Middle East Office

Office No.901, Deluxe Tower, Delma Street,
Al Nahyan Camp Area, P.O.Box 53567,
Abu Dhabi, U.A.E.
Tel : +971-2-674-3880 / Fax : +971-2-674-3881

QATAR

⓰ Torishima Pump Mfg. Co., Ltd. Qatar Project Office

Office No.11,1st Floor, West Corner Centre,
Salwa Road-Midmac R/A, P.O.Box 37027 Doha, Qatar
Tel : +974-4450-6915 / Fax : +974-4450-6916

U.K.

⓱ Torishima Europe Ltd.

Sunnyside Works, Gartsherrie Rd, Coatbridge,
Scotland ML5 2DJ
Tel : +44-1236-443951 / Fax : +44-1236-702875

⓲ Torishima Service Solutions Europe Ltd.

Sunnyside Works, Gartsherrie Rd, Coatbridge,
Scotland ML5 2DJ
Tel : +44-1236-442390 / Fax : +44-1236-702875

⓳ Torishima Europe Projects Ltd.

Torishima House, Brook Lane, Westbury,
Wiltshire, England BA13 4ES
Tel : +44-1373-858143

SPAIN

⓴ Torishima Europe Ltd. Madrid Office

Avda, Fuente Nueva 12A Edif, Monterrey, 28703
San Sebastian de los Reyes, Madrid, Spain
Tel : +34-91-284-6909 / Fax : +34-91-284-6901

U.S.A.

㉑ Torishima Pump Mfg. Co., Ltd. U.S. Office

100 Grove Street, Suite 217, Worcester
MA 01605-2654 U.S.A.
Tel : +1-508-753-6600 / Fax : +1-508-753-8276

CANADA

㉒ Torishima Services Canada Inc.

Suite 2800, 350-7th Ave S.W.
Calgary, Alberta T2P 3N9, Canada
Tel : +1-403-705-1933

Sales Engineering
Service Manufacturing

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