

**Water to Water
Centrifugal Heat Pump
Heat Recovery Type**

Supplies hot water at temperatures up to 90°C

ETI-W series
Variable speed

Using HFO-1233zd(E) refrigerant



*The image is a computer-generated rendering.

Providing comprehensive thermal solutions



Heating capacity equivalent to a **1-ton boiler**

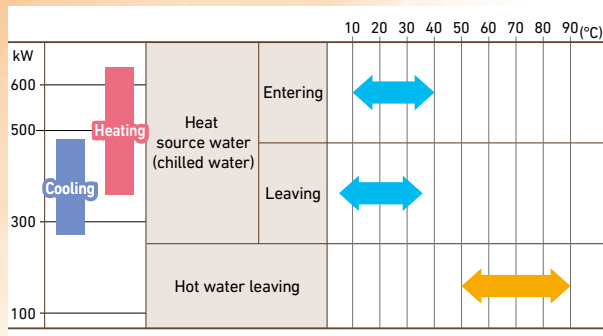
Utilizes heat sources ranging from **10°C to 40°C** to supply hot water at temperatures up to **90°C**

High efficiency

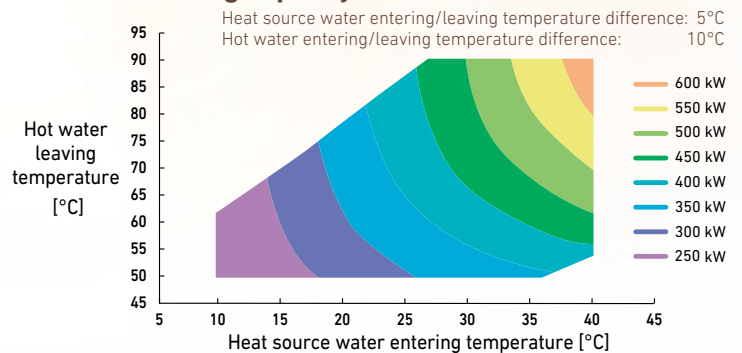
Reduced **CO₂** emissions and running costs

Compared with a once-through boiler, the unit reduces CO₂ emissions by approximately 70% and running costs by approximately 60%

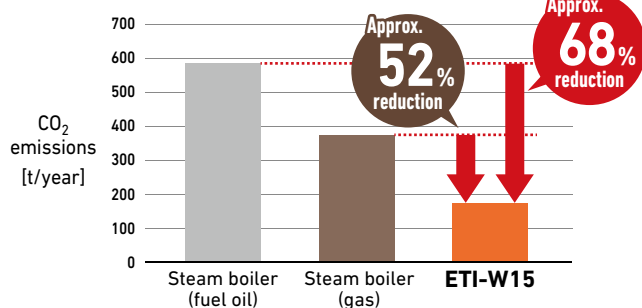
Capacity and temperature ranges



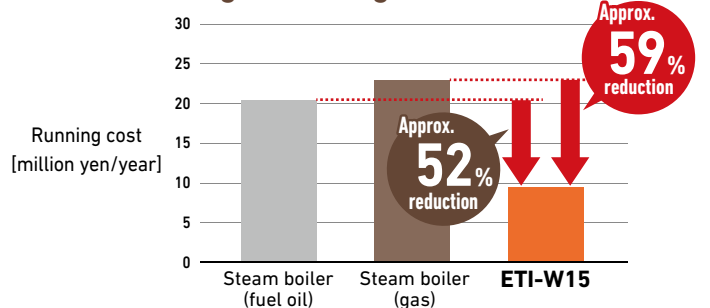
Hot water heating capacity



*The heating capacities shown are approximate values within the operating range indicated above.

Annual reduction in CO₂ emissions

Annual running cost savings



*Maintenance costs are not included.
*The calculations are based on data from Japan.

Make effective use of waste heat with our heat pump

Do you have **waste heat** like this?

Type of waste heat source	Industry	Semiconductors and precision equipment	Automotive and machinery	Food and beverage	Chemicals	Pharmaceuticals	Textiles and spinning	Petroleum, pulp and paper, and steel	Hotels, hot spring resorts, and leisure facilities
Chiller cooling water		●	●	●	●	●	●	●	●
Compressor cooling water		●	●	●	●	●	●	●	●
Cooling tower water		●	●	●	●	●	●	●	●
Drying oven exhaust gas		●	●	●	●	●	●	●	●
Desulfurization system wastewater		●	●	●	●	●	●	●	●
Bathing facility wastewater		●	●	●	●	●	●	●	●
Reactor		●	●	●	●	●	●	●	●
Sewage, seawater, and groundwater		●	●	●	●	●	●	●	●

Hot water can be used for these applications

Type of hot water application	Industry	Semiconductors and precision equipment	Automotive and machinery	Food and beverage	Chemicals	Pharmaceuticals	Textiles and spinning	Petroleum, pulp and paper, and steel	Hotels, hot spring resorts, and leisure facilities
Feedwater preheating		●	●	●	●	●	●	●	●
Cleaning equipment		●	●	●	●	●	●	●	●
Purified water production		●	●	●	●	●	●	●	●
Sterilization		●	●	●	●	●	●	●	●
Condensation prevention		●	●	●	●	●	●	●	●
Powder drying		●	●	●	●	●	●	●	●
Painting and plating		●	●	●	●	●	●	●	●
Dyeing processes		●	●	●	●	●	●	●	●
Space heating		●	●	●	●	●	●	●	●

Standard Specifications

Hot water heat pump model		ETI-W15		
Performance	Heating capacity	kW	362	489 640
	Cooling capacity	kW	268	367 483
Condenser	Water-side design pressure	MPa(G)	1.0	
	Hot water entering temperature	°C	60	70 80
	Hot water leaving temperature	°C	70	80 90
	Hot water flow rate	m³/h	31.8	43.1 56.7
	Nozzle size		100A	
	Number of passes		4	4 4
	Pressure drop	kPa	23	38 61
	Bore size of drain and air vent valve		Rc 3/4 / Rc 1/2	
Evaporator	Water-side design pressure	MPa(G)	1.0	
	Heat source water entering temperature	°C	20	30 40
	Heat source water leaving temperature	°C	15	25 35
	Heat source water flow rate	m³/h	46.1	63.1 83.2
	Nozzle size		100A	
	Number of passes		4	2 2
	Pressure drop	kPa	74	21 34
	Bore size of drain and air vent valve		Rc 3/4 / Rc 1/2	

Hot water heat pump model		ETI-W15		
Compressor	Model	MCM-W1		
	Quantity	unit	1	
	Motor output	kW	82.3	109.0 142.1
	Starting method		Soft start by inverter driving	
Weight and other specifications	Shipping weight	kg	3,700	
	Operating weight	kg	4,200	
	Lubricating oil		Diamond Freeze NM100PZ	
	Refrigerant		HFO-1233zd(E)	
	Internal water volume	L	269	

Notes

① The hot water and heat source water temperature requirements are as follows:

- Minimum heat source water entering temperature at startup: **5°C**
- Minimum hot water entering temperature at startup: **10°C (The temperature must be equal to or higher than the heat source water leaving temperature.)**

② The installation environment requirements are as follows:

Indoor installation

- Install the unit in a location not exposed to rain, wind, direct sunlight, salt, or steam.
- Avoid installation in atmospheres containing oil mist, dust, corrosive gases, or flammable gases.

③ The overhaul interval is **50,000 operating hours or 7 years**, whichever comes first.

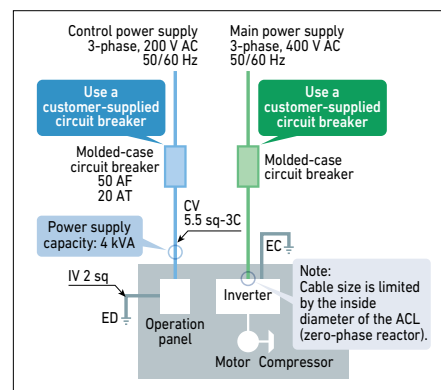
④ The specifications in this table are subject to change without notice due to technical improvements.

Power Supply Installation Requirements

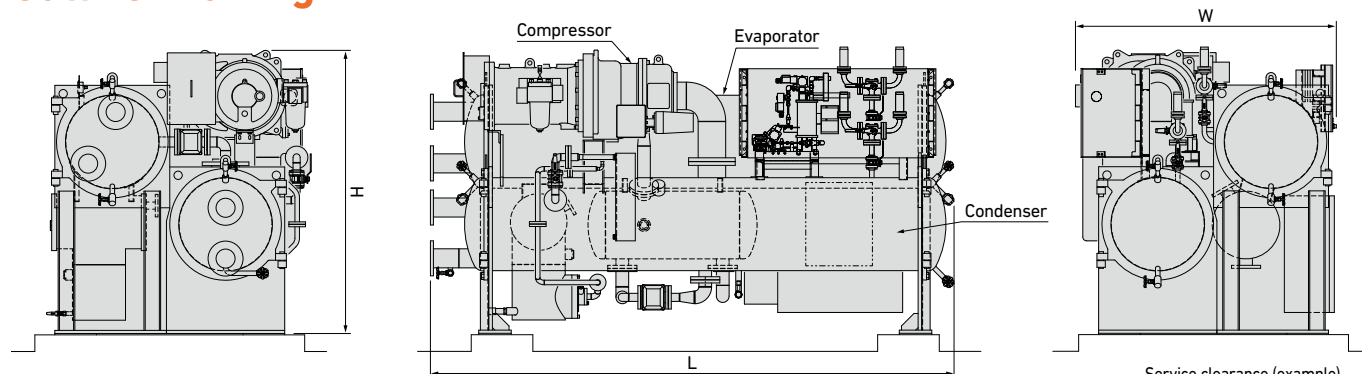
The customer must provide two power supplies: a main power supply (400 V class) and a control power supply (200 V class).

Be sure to install a molded-case circuit breaker (supplied by the customer) for the main power circuit in the customer's power distribution panel.

Power supply	Required power supply capacity	Molded-case circuit breaker rated current [A]	Grounding conductor
Main power supply	238 kVA or higher	400 AF / 350 AT	22 sq or larger
Control power supply	4 kVA or higher	50 AF / 20 AT	3.5 sq or larger

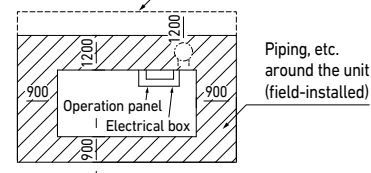


Outline Drawing



1. Provide service clearances of approximately 1,200 mm on the condenser side and approximately 900 mm on the left and right sides, on the evaporator side, and above the unit.
2. Provide sufficient tube-pull clearance on either side of the unit.
3. When connecting the heat source water and hot water piping to the unit, install adequate pipe supports so that the weight of the piping is not imposed on the unit.
4. JIS 10K flanges shall be used for the heat source water and hot water piping connections.
5. Thermometers for the heat source water and hot water piping shall be supplied and installed by the customer.
6. Provide lifting hooks for the compressor and motor assembly. (The weight of the compressor and motor assembly is 750 kg.)
7. When planning the equipment access opening, allow sufficient clearance based on the specified length, width, and height. (The dimensions shown above do not include thermal insulation. Please note that the overall dimensions will increase by the insulation thickness after the insulation is installed.)
8. The anti-vibration rubber pads and rubber bushings are supplied by us. Refer to the specifications for the chemical anchor bolts, including the resin capsules, washers, and nuts. Installation of the chemical anchors is within the customer's scope of work.

Dimensions			
Length (L)	m	3.2	
Width (W)	m	1.65	
Height (H)	m	1.8	



9. The customer shall install relief piping from the safety valve outlet to a safe location where the discharge can be vented to the atmosphere. Be sure to use a flexible joint between the safety valve and the relief piping, and provide adequate supports for the relief piping.
10. Install the chemical anchors before the unit is brought into the installation area, in accordance with the recorded anchor location dimensions.
11. Allow approximately 600 mm of cable-entry clearance on the condenser side and approximately 600 mm in front of the electrical box door.
12. When routing cables to the electrical box, provide sufficient cable slack to allow the electrical box to be moved during unit maintenance.
13. Provide sufficient clearance to allow access to the terminal box during unit maintenance.
14. Route the power cables so that sufficient maintenance clearance is provided for the vane motor.

Standard Scope of Supply and Installation

Item	Description	Within our scope of work	Outside our scope of work	Remarks
Main unit	Compressor	✓		
	Motor	✓		
	Refrigerant and lubricating oil piping	✓		
	Lubricating oil system	✓		Oil pump, oil cooler, oil filter, and oil tank
	Heat exchangers	✓		Evaporator, condenser, subcooler, and intercooler
Instrumentation and controls	Final assembly	✓		
	Automatic capacity control system	✓		
	Safety devices	✓		
	Operation panel	✓		For indoor installation; mounted on the unit. Provide a three-phase, 200/220 V, 4 kVA control power supply.
	Inverter	✓		For indoor installation; mounted on the unit.
Accessories	Molded-case circuit breaker		✓	
	Refrigerant	✓		One initial charge
	Lubricating oil	✓		One initial charge
	Anti-vibration rubber pads	✓		One set
Factory testing and inspection	Instruction manual	✓		
	Leak test	✓		
	Sequence check	✓		
	Operating performance test	✓		Conducted as an in-house inspection
	Withstand voltage and insulation resistance tests	✓		Electrical box, inverter, and main motor
Delivery, handling, and installation	Transportation from the factory to the site	✓		Transportation is provided from the factory to the site. Delivery is made on-truck at the site.
	From the site delivery point to the equipment foundation		✓	Unloading, lowering, hoisting, horizontal skidding, on-site transportation, temporary assembly, and related work are outside our scope of work.
	Unit installation		✓	Installing the unit on the foundation and installing the foundation bolts are outside our scope of work.
	Storage		✓	Care and custody after delivery are outside our scope of work. For long-term storage, fill the unit with nitrogen (N ₂) gas.
Operation	On-site commissioning and adjustment	✓		One session
	Operator training	✓		One session
Electrical and piping work	Wiring downstream of the electrical box and around the unit	✓		VCT/MVVS cables shall be used, with wiring installed in ducts.
	From the power supply to the circuit breaker panel		✓	The circuit breaker panel is not included in our scope of supply.
	From the circuit breaker panel to the inverter		✓	
	From the power supply to the electrical box		✓	
	From the electrical box to the remote monitoring panel		✓	Applicable when a remote monitoring panel is provided.
	From the inverter to the main motor	✓		
	From the inverter to the electrical box	✓		
	Grounding work		✓	
Painting work	Temperature control system		✓	At startup, maintain the heat source water entering temperature at 5°C or higher but not exceeding 40°C. Maintain the hot water entering temperature at 10°C or higher. During operation, maintain a temperature difference of more than 10°C between the hot water leaving temperature and the heat source water entering temperature.
	Rust-preventive primer coating of the main unit	✓		Rust-preventive coating
Thermal insulation	Painting of inverter and electrical box	✓		Paint color: Munsell 5Y 7/1 (semi-gloss)
			✓	Thermal insulation shall be installed in accordance with our insulation procedure.
Delivery	FOB Kobe, Japan	✓		Alternative delivery terms are available upon request: exwarehouse delivery at the Port of Kobe, Japan (on-truck delivery) or CIF delivery to the port nearest the site.
Shipping configuration	Shipped as a single unit	✓		The unit cannot be shipped in sections.
Ancillary work	Foundation work		✓	
	Foundation bolts (for the main unit)		✓	One set
	Field piping work		✓	Mating flanges, including gaskets, bolts, and nuts, are available as an option for the water piping.
	Thermal insulation work	✓		
Maintenance	Periodic service visits	✓		Two visits during the first operating season
	Off-season service	✓		One visit during the first year
	Start-up service for the following season		✓	We recommend entering into a maintenance agreement.
Other	Freeze protection for water piping		✓	Provide appropriate freeze protection while the unit is shut down during winter.
	Heat source water and hot water quality management		✓	If chemical water treatment is not used, the quality of the heat source water and hot water must be properly controlled in accordance with the Guideline of Water Quality for Refrigeration and Air Conditioning Equipment (JRA-GL-02-1994) issued by the Japan Refrigeration and Air Conditioning Industry Association. If the water is contaminated with microorganisms or if water treatment is to be performed, consult a water-treatment chemical manufacturer or water-treatment consultant.
	Electricity, water, etc. for on-site assembly		✓	To be provided by the customer free of charge.
	Electricity, water, etc. for on-site commissioning		✓	To be provided by the customer free of charge.
	Disposal of shipping packaging materials		✓	

Optional Features

Options

Item	Standard	Option
Communications interface	—	Data can be transmitted to and received from the PLC of a central monitoring system or host equipment via iSCT.
Variable flow operation	Constant flow (The unit trips when the flow rate falls to 80% of the customer-specified flow rate.)	Variable flow operation is available for the hot water and heat source water circuits. • The unit can track changes in the customer-side flow rate. *Please contact us for details on the allowable flow rate range.
Vibration isolation	Anti-vibration rubber pads are supplied.	Spring mounts and OS-type vibration isolators are available. Please contact us regarding other vibration isolation options.
Hot water and heat source water design pressure	1.0 MPa(G)	Please contact us if a design pressure above 1.0 MPa(G) is required.
Individual fault indication	The fault name is displayed on the LCD screen.	Individual fault signals can be output via the communications interface.
Remote start/stop signal	Voltage-free pulse (momentary) signal	Voltage-free maintained contact signal / voltage pulse (momentary) signal / maintained voltage signal
Demand control	—	Controls the heating capacity and power consumption.
External signal outputs (digital)	Signals can be output for "Operation," "Fault," "Remote start/stop selected," "Minor fault," "Inverter operation," and "Low load."	—
External signal outputs (analog)	—	For each of the following pairs, the terminals can be switched to output only one of the two signals: "Condenser pressure" or "Hot water leaving temperature setpoint," "Evaporator pressure" or "Oil tank temperature," "Leaving temperature" or "Oil supply differential pressure," and "Entering temperature" or "Vane opening."
Painting	Standard finish	The main unit is painted and shipped in accordance with our painting specifications. Only the standard finish is available.
Thermal insulation	Included in our scope of work	The unit is insulated and shipped in accordance with our insulation specifications. Only the standard insulation specification is available. (Nitrile rubber insulation is used as standard.)
Provision for installation of a ball cleaning system	—	Available



Mitsubishi Heavy Industries Thermal Systems, Ltd.

Specifications of Existing and Planned Equipment

Please feel free to use this form when making an inquiry.

Company name: _____ Department: _____ Date: ____/____/____

Address: _____ Telephone: _____

E-mail: _____ FAX: _____

Name: _____

1 Waste Heat Recovery and Hot Water Supply Conditions

[Waste heat recovery side]

Temperature: _____ °C

Flow rate: _____ m³/hr

Pressure: _____ MPa

Waste heat source:

- ☐ Treated water
☐ Circulating water
☐ Boiler blowdown water
☐ Other _____

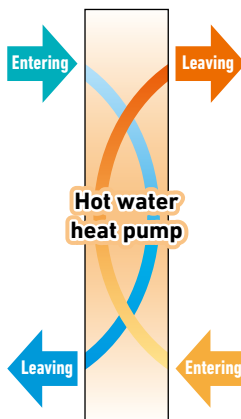
Operation: ☐ Intermittent
☐ Continuous

Water quality: _____

pH: _____

Discharge temperature: _____ °C

Regulatory discharge limit or maximum value: _____



[Hot water supply side]

Supply temperature: _____ °C

Required flow rate: _____ m³/hr

Pressure: _____ MPa

Application: ☐ Process use
☐ Circulation
☐ Boiler feedwater
☐ Other _____

Operation: ☐ Intermittent
☐ Continuous

Entering temperature: _____ °C

Pressure: _____ MPa

Water quality: _____

pH: _____

Water source: ☐ Well water
☐ Municipal water
☐ Industrial water
☐ Other _____

3 Energy Costs

Electricity rate: _____ /kWh

Fuel: ☐ Heavy fuel oil (_____ /L)

☐ LPG (_____ /kg)

☐ LNG (_____ PY/Nm³)

☐ Other (_____)

Operating hours: _____ h/day _____ days/year
 _____ h/year

4 Scope of Quotation

- ☐ Equipment only
☐ Including on-site work (piping, wiring, delivery, and installation)
☐ Auxiliary equipment (pumps and tanks)
☐ Other _____

5 Existing Equipment

- ☐ Hot-water boiler ☐ Absorption chiller
☐ Electric boiler ☐ Other _____
☐ Steam boiler (once-through, fire-tube, or water-tube) with heat exchanger

6 Other Information

Delivery location: _____

Requested delivery date: _____

Application: _____

2 Utilities

Power supply: _____ V, 50/60 Hz, three-phase

Installation location (non-hazardous area): ☐ Indoors ☐ Outdoors

Mitsubishi Heavy Industries Thermal Systems, Ltd.

(Wholly-owned subsidiary of MITSUBISHI HEAVY INDUSTRIES, LTD.)

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<https://www.mhi-mth.co.jp/en/>

Our factories are
 ISO9001 and
 ISO14001 certified.

Certified ISO 9001



Certificate number: JQA-0709



Certified ISO 14001



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