

- Any freezing or icing will damage BPHE and the refrigeration system. The following methods will minimize BPHE from freezing.
- Use Strainer or filter <1mm, 16 mesh before inlet water.
 - Use brine (e.g. glycol) when evaporation temperature is close to the freezing point.
 - Low working pressure will cause low evaporation temperature. If the evaporation temperature is below 0 °C, it will cause water to freeze. Since the bottom portion has the lowest temperature, it is the most likely spot for the BPHE to crack.
 - To start the refrigeration system, always start the water pump for a few minutes and then start the compressor. To stop the system, always stop the compressor first then stop the water pump to avoid pump down operation.
 - (1) **Low Pressure Cut-off Switch (LP)**
A low-pressure cut-off switch should be installed with properly set values. When the actual evaporation pressure is lower than the setting value, the compressor will be cut off automatically.
 - (2) **Low Temperature Thermostat (LT)**
The function of the thermostat is to prevent evaporation temperature going under 0°C. If evaporation temperature is always above 0°C, then water has no chance to freeze and expand.
 - (3) **Water Temperature Sensor**
Installation of an antifreeze temperature sensor near the water outlet is another method to prevent the water from freezing. The suggested setting temperature is at 4°C for buffering purposes.
 - (4) **Water Flow Switch**
Installation of a water flow switch in the water circuit can prevent possible BPHE freezing due to low water flow rate. Usually, low water flow rate may be caused by malfunction of water pump, leaking pipes, pipe blockage due to pipe contamination or dirty filter.

9. Warranty

- Warranty period is **standard 12 months from the date of shipment under normal use. The warranty covers manufacturing defects only.**
This regulation is not applied if you have received an advance notice that KAORI will not provide the product warranty because of the unsuitable working environment.
- Exclusive warranty are:
 - (1) Altered working condition or repaired in a manner affecting the efficiency of performance of the unit.
 - (2) Damages caused by freezing, flood, fire, any natural disaster or accident.
 - (3) Damages caused by incorrectly installed or operated.
 - (4) The BPHE is surrounded by corrosive environment.
 - (5) Claims due to sediment deposits.

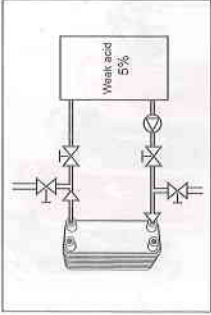
10. Disclaimer

Kaori take every care to assure the accuracy of the information, however, the information is provided as it is for a reference and is not subject to guarantee. The information may be changed or updated without notice. KAORI is not liable for any direct or indirect damages of any kind arising use of the information.

Cleaning and degreasing the surface of copper pipes and BPHE connectors before welding. To avoid oxidation in the copper pipes and BPHE, protect the inside with N2-gas. Place the BPHE on a flat surface and wrap a wet rag around the connectors to protect the BPHE from excessive heating. **Use a 40-45% silver alloy soldering rod to weld the copper pipe into the connector at a maximum temperature of 650°C.** After soldering, clean and dry the connector and BPHE.

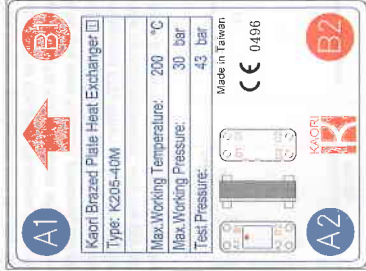
7. Cleaning

While fouling on the plate heat exchangers, back flushing is always possible to remove most of the soft debris that is blocking the inside. Weak acids with concentration less than 5%; for example: citric acid oxalic acid add in a tank. Circulate the cleaning solution. Before restarting the system, flush the plate heat exchanger with large amounts of fresh water to purge any remaining acid solution. If the acidity is too high, the copper and stainless steel inside the BPHE may be etched or corroded.



11. Labeling and Marking

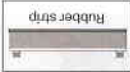
The following nameplate is an example of KAORI BPHE K205 type:



Model name will be shown on the label attached. For tracking purposes, a serial number will be carved on the front cover plate.



- Maintain a safe work environment to get a risk free of Personal injury or equipment damage. For example: when lifting 3M separation is recommended.
- Fluid that is explosive, extremely flammable, highly toxic, highly corrosive, or hazardous in nature cannot be used with the BPHE. Examples are nitric acid, sulfuric acid, ammonia (for copper models) etc.
- When the water applied to the BPHE is of unknown quality, filter and strainer <1mm should be placed at the water inlet of BPHE to filter out the dirt or large particles.
- Mesh size of around 16 is suitable for most cases. Blockage of evaporator due to dirt or large particles will reduce the flow rate of water which might cause freezing effect; and consequently damage the integrity of the BPHE.
- Chlorinated water, seawater, etc. are not suitable for BPHE due to their corrosive nature on regular stainless steel and copper. Please refer to the regulations as below chart.
- Ground water with high levels of sulfuric compound, sulfuric acid, or low PH value, may cause gradual copper corrosion and damage the BPHE in a few years.
- Rubber strips should always cover the bottom edge of the BPHE in order to protect the hand and wrist against the sharp metal edges. If the rubber strip is not a required part of your order, be careful of the sharp metal edge.
- When moving the BPHE, always wear gloves and pay attention to the sharp edges around the bottom of BPHE. Our BPHE can come without the rubber protective strip at your request.
- Storage in a dry and heated warehouse between 1°C and 50°C is required.



12. EC Declaration of Conformity

EC DECLARATION OF CONFORMITY

According to the following EC Directive

-Pressure Equipment Directive: 97/23/EC

The undersigned, Vincent Cheng, representing Kaori Heat Treatment Co., Ltd., situated in No. 11, Songjiang N. Road, Jhongli City, Taoyuan County 32062, Taiwan, R.O.C.

(Tel: 386-3-4527005-9 ext.230, Fax: 886-3-462-5079), the manufacturer, declaring that the device described hereafter:

Brazed Plate Heat Exchangers (BPHE)

Type: Pressure Bearing, Material:

- ☐ Steel 304 (ASTM A240 or JIS G304/G305)
☐ Steel 316 (ASTM A240 or JIS G304/G305)

Provided that it is used and maintained in accordance with the generally accepted codes of good practice and the recommendations of the User Manual, this device meets the essential safety and health requirements of the Pressure Equipment Directive.

To prevent the most specific risks of this device, the safety and compliance with the essential requirements of the Directive have been applied.
The design, fabrication, inspection and testing should comply with: ASME Boiler and Pressure Vessel Code Section VIII and EN 1476-1 Pressure equipment for refrigerating system and heat pumps, Part 1: Vessels - General requirement.

Brazing Procedure Reference:
EN 1476-1, Annex I and ASME Section IX
For pressure EC conformity assessment, the manufacturer chooses Module H for the complete design, fabrication and testing of the product, as well as the use of EN 1476-1, Part 1, Vessels - General requirement. Notified Body is DET NORSKE VERITAS Italia S.r.l. and the identification number is 0496.

Date: _____
Signature: Vincent Cheng
Qualification: Vincent Cheng

ITEM	Cooling Water		Cool Water		Possibility
	Close Circuit	Open Circuit	Close Circuit	Open Circuit	
PH(25°C)	6.8-7.2	6.8-7.2	6.8-7.2	6.8-7.2	●
EC(25°C)	≤500	≤300	≤400	≤300	●
(Cl ⁻)	mg/l	≤200	≤50	≤50	●
(SO ₄ ²⁻)	mg/l	≤200	≤50	≤50	●
(Pb+Ba+CaCO ₃)	mg/l	≤100	≤50	≤50	●
Total(CaCO ₃)	mg/l	≤200	≤70	≤70	●
Ca(CaCO ₃)	mg/l	≤150	≤50	≤50	●
SiO ₂	mg/l	≤30	≤30	≤30	●
Fe	mg/l	≤10	≤0.3	≤10	●
Cu	mg/l	≤0.3	≤0.1	≤10	●
S ²⁻	mg/l	NF	NF	NF	●
NH ₄ ⁺	mg/l	≤10	≤0.1	≤10	●
Cl	mg/l	≤0.3	≤0.3	≤0.3	●
CO ₃ ²⁻	mg/l	≤40	≤40	≤40	●
Stability Value	6.0-7.0				●

1. The Water Quality for Heat Exchanger should be applied to above standard.
2. When using De-ionised water, pure water, extra pure water, nickel brazed is recommended.
3. If you are concerning about certain elements which are not listed in this chart, please contact our sales representative at Tel: +886-3-4628958



No.5-2, Chi-Lin North Road, Chung-Li District, Taoyuan City, Taiwan
Tel: +886-3-4628958 Fax: +886-3-4628021
E-Mail: sales@kaori.com.tw
www.kaori-bphe.com

KAORI reserves the right to make changes without prior notice
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