



**EBARA**

CR4127EA

# HIGH EFFICIENCY CENTRIFUGAL CHILLER

**Model RTBF Type Series**

**New Product**

"Model 000 type series" in this catalogue is our model code.



**COP 6.0**

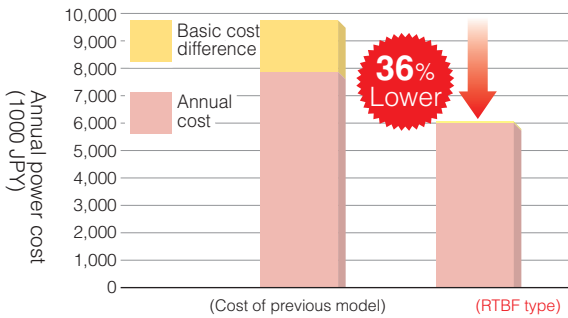
All models' COP are above 6.0 in this series! Welcome to the low-carbon society

# Model RTBF Type Series High Efficiency Centrifugal Chiller

## Lower Operation Expense & CO<sub>2</sub> Emission

Compare to our previous model, the operation expense is 36% lower! And the CO<sub>2</sub> emission is 24% lower

Centrifugal chiller annual power cost estimates  
Commercial facility air conditioning(500USRT annual operation)  
Compare with our Previous model of a decade ago



Centrifugal chiller annual CO<sub>2</sub> emission  
Commercial facility air conditioning(500USRT annual operation)  
Compare with our company 10 years earlier model

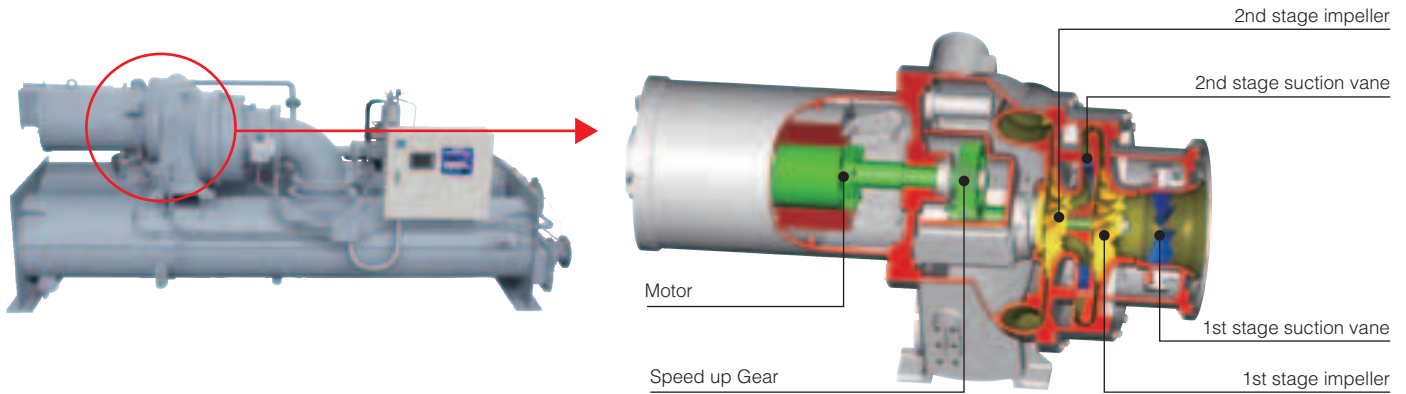


### Calculation conditions

Centrifugal chiller power cost calculation is based on annual operation, 14h/d commercial facility load rate. The power cost calculation is according to the high voltage electricity contract signed with TEPCO at Apr. 2009. The CO<sub>2</sub> emission calculation is based on the unit 0.555kgCO<sub>2</sub>/kWh, which was modified at Mar. 2006.

## Newly Developed High Efficiency Compressor

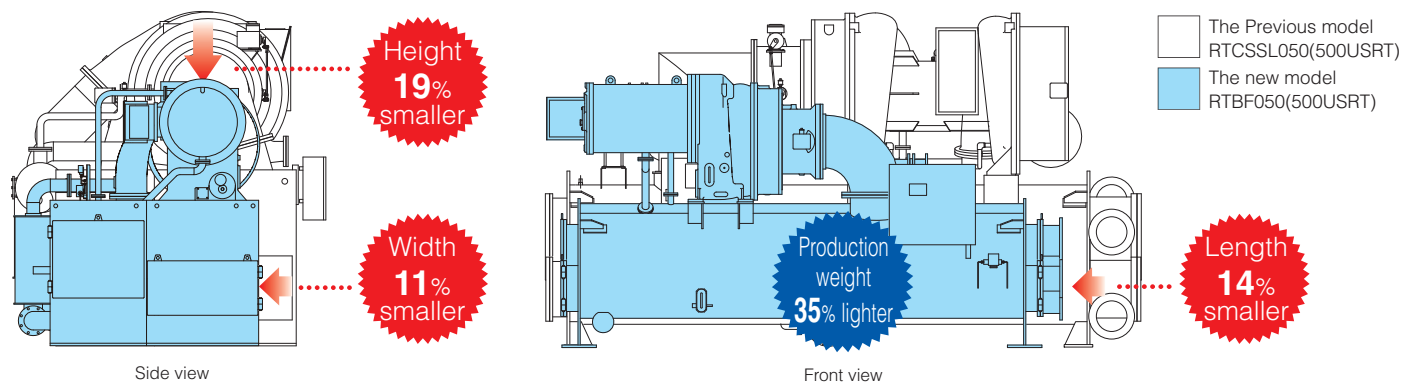
Compressor compact design by using 2-stage compression and speed-up Gear. Using changeable 2-stage suction vanes for better partial load performance. A simple motor structure with few piping for a better quality.



## Very Compact Design Compare to The Previous Model

To achieve a small & light-weight design by doing many tests on shape of parts, material & manufacturing process.

The outline dimension compare to the Previous model



This is our standard model in future.

# The simple structure, compact and high efficiency chiller.

## Using New Refrigerant HFC245fa

### ● Excellent refrigerating cycle performance to make a high efficiency

A smaller theoretical flow rate than HCFC 123

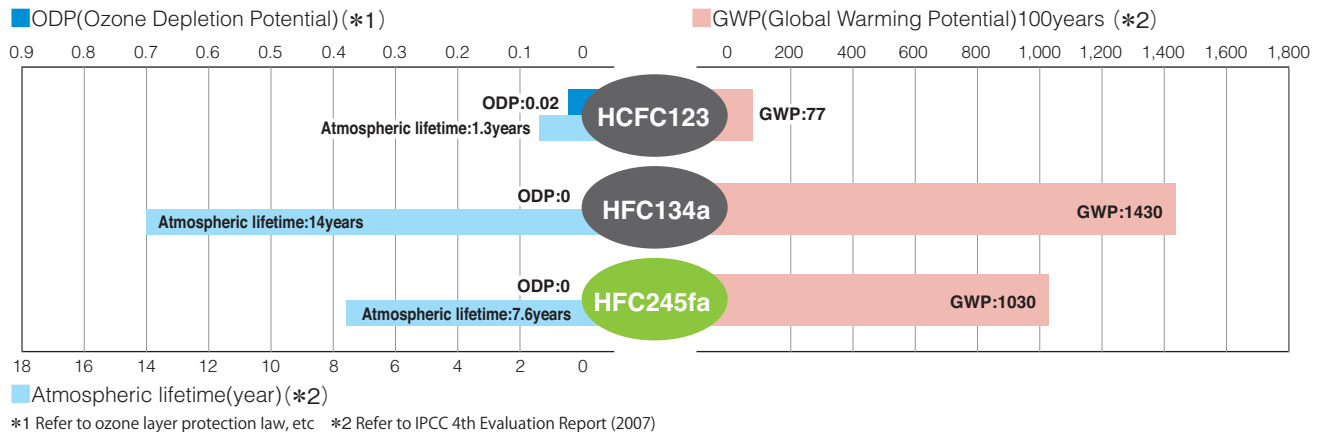
Compare to HCFC123, the required HFC245fa theoretical flow rate is smaller under the same cooling capacity, thus we can make a smaller compressor.

A better performance than HFC134a

Compare to HFC134a, the HFC245fa is a refrigerant that has higher theoretical cycle performance & energy efficiency.

### ● Minor environmental burden

The HFC245fa's ODP(Ozone Depletion Potential) is zero. Moreover, compare to HFC134a, the HFC245fa has smaller GWP(Global Warming Potential), shorter atmospheric lifetime & smaller impact to the environment.



### ● A low pressure refrigerant, easy operation & management.

HFC245fa is a refrigerant that no need to apply the high pressure gas regulation.

| Item  | Remarks  | Specified material                | Substitute |  | HFC245fa |
|---|--|-----------------------------------|------------|--|----------|
|   |  |                                   | HCFC123    | HFC134a                                |          |
| High pressure gas safety regulation         | applicable liquid gas  | -                                 | -          | ●<br>combination type specified equip. | -        |
| Operation certificate                       | operation certified person   | -                                 | -          | -                                      | -        |
| Installation                                | Install license  | -                                 | ●          | ●                                      | -        |
|   | Install declare  | apply & declare by customer       | -          | ●                                      | -        |
| Operation management                        | check  | factory check                     | -          | ●                                      | -        |
|   | maintenance check  | check by government every 3 years | -          | ●                                      | -        |
|   | self check   | every year                        | -          | ●                                      | -        |
| Declaration of hazard prevention regulation |  |                                   | -          | ●                                      | -        |
| Standard of the machine room                | ventilation, safety valve exhaust pipe are required. safety distance | - (*3)                            | ●          | ●                                      | - (*3)   |

Legend: [●]=Need [-]=No need

\*3 Appropriate settings are made by following the Guideline on Centrifugal Chillers issued by the Japan Refrigeration and Air Conditioning Industry Association (JRAIA).

### ● High safety

HFC245fa is noncombustible.  
And low toxic, the admissible concentration is 300ppm.

Minor environment burden & easy to use, it's the refrigerant HFC245fa.

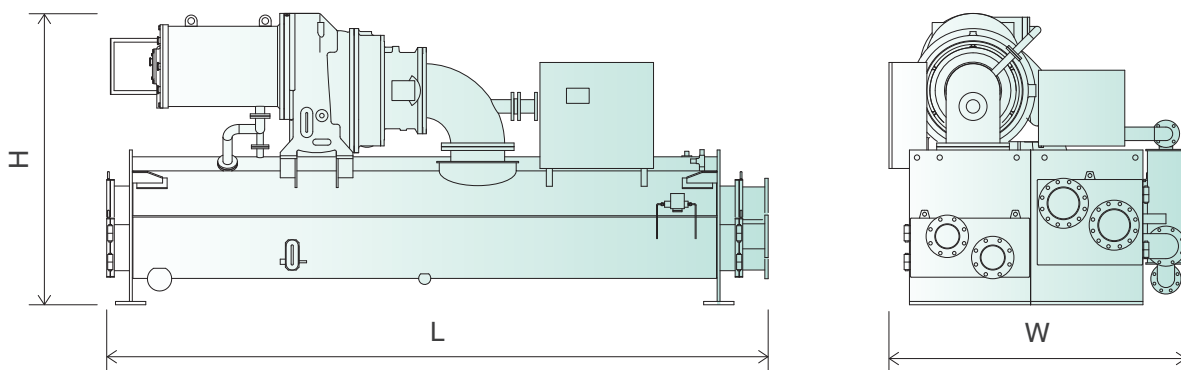
## Specifications

■ Chilled Water 12-7 degC Cooling Water 32-37 degC

| Model                |                      | —       | RTBF022          | RTBF025 | RTBF027 | RTBF030 | RTBF036 | RTBF040 | RTBF044 | RTBF050 |
|----------------------|----------------------|---------|------------------|---------|---------|---------|---------|---------|---------|---------|
| Cooling Capacity     | kW                   | —       | 774              | 879     | 949     | 1,055   | 1,266   | 1,407   | 1,547   | 1,758   |
|                      | {USRT}               | —       | 220              | 250     | 270     | 300     | 360     | 400     | 440     | 500     |
| COP                  |                      | —       | 6.0              | 6.0     | 6.0     | 6.1     | 6.0     | 6.1     | 6.2     | 6.2     |
| Chilled Water        | Flow Rate            | ℓ / min | 2,210            | 2,520   | 2,720   | 3,020   | 3,620   | 4,030   | 4,430   | 5,040   |
|                      | Pressure Drop        | kPa     | 50               | 51      | 54      | 56      | 47      | 49      | 50      | 53      |
|                      | Pipe Connection Size | A       | 150              | 150     | 150     | 150     | 200     | 200     | 200     | 200     |
|                      | No. of Pass          | —       | 2                | 2       | 2       | 2       | 2       | 2       | 2       | 2       |
| Cooling Water        | Flow Rate            | ℓ / min | 2,610            | 2,960   | 3,200   | 3,550   | 4,260   | 4,730   | 5,190   | 5,900   |
|                      | Pressure Drop        | kPa     | 64               | 64      | 64      | 64      | 66      | 67      | 67      | 67      |
|                      | Pipe Connection Size | A       | 200              | 200     | 200     | 200     | 250     | 250     | 250     | 250     |
|                      | No. of Pass          | —       | 2                | 2       | 2       | 2       | 2       | 2       | 2       | 2       |
| Motor                | Rated Output         | kW      | 120              | 135     | 145     | 160     | 190     | 210     | 225     | 260     |
|                      | Voltage              | V       | 400V•3000V•6000V |         |         |         |         |         |         |         |
|                      | Start method         | —       | 400V•3000V•6000V |         |         |         |         |         |         |         |
| Control & Aux. Powe  | Voltage              | V       | 200V             |         |         |         |         |         |         |         |
|                      | Power Capacity       | kVA     | 5.5              | 5.5     | 5.5     | 5.5     | 6.0     | 6.0     | 6.0     | 6.0     |
|                      | Oil pump             | kW      | 0.2              | 0.2     | 0.2     | 0.2     | 0.2     | 0.2     | 0.2     | 0.2     |
|                      | Ref. Pump            | kW      | 0.2              | 0.2     | 0.2     | 0.2     | 0.4     | 0.4     | 0.4     | 0.4     |
|                      | Oil heater           | kW      | 1.8              | 1.8     | 1.8     | 1.8     | 1.8     | 1.8     | 1.8     | 1.8     |
| Dimension            | Length               | mm      | 4,380            | 4,380   | 4,380   | 4,380   | 4,500   | 4,500   | 4,500   | 4,500   |
|                      | Width                | mm      | 1,970            | 1,970   | 1,970   | 1,970   | 2,450   | 2,450   | 2,450   | 2,450   |
|                      | Height               | mm      | 1,930            | 1,930   | 1,930   | 1,930   | 2,380   | 2,380   | 2,380   | 2,380   |
| Mass                 | Running Mass         | t       | 6.9              | 7.1     | 7.2     | 7.4     | 11.2    | 11.4    | 11.6    | 12.0    |
|                      | Shipping Mass        | t       | 5.9              | 6.0     | 6.1     | 6.2     | 9.5     | 9.6     | 9.8     | 10.0    |
| Chilled Water Retain | ℓ                    | 250     | 280              | 293     | 322     | 425     | 460     | 497     | 552     |         |
| Cooling Water Retain | ℓ                    | 280     | 306              | 323     | 347     | 450     | 473     | 506     | 554     |         |

Notes: 1) Indoor and non-hazard area application. 2) Chilled water and cooling water are in accordance with the water Quality Guide lines.(JRA-GL-02-1994) 3) Capacity control range is 20~100%  
4) The fouling factor of both chilled water and cooling water is 0.000086m<sup>2</sup>/K/W 5) The max. operation pressure is 0.69MPa

## M/C Outline Drawing

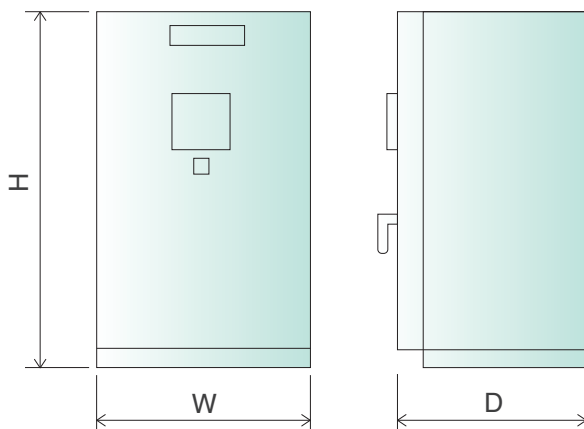


Chilled Water 12-7 degC Cooling Water 32-37 degC

| Model                |                      | —       | RTBF053          | RTBF060 | RTBF065 | RTBF070 | RTBF075 | RTBF080 | RTBF085     | RTBF090 |  |
|----------------------|----------------------|---------|------------------|---------|---------|---------|---------|---------|-------------|---------|--|
| Cooling Capacity     | kW                   |         | 1,864            | 2,110   | 2,286   | 2,461   | 2,637   | 2,813   | 2,989       | 3,165   |  |
|                      | {USRT}               |         | 530              | 600     | 650     | 700     | 750     | 800     | 850         | 900     |  |
| COP                  |                      | —       | 6.1              | 6.1     | 6.2     | 6.2     | 6.2     | 6.3     | 6.3         | 6.3     |  |
| Chilled Water        | Flow Rate            | ℓ / min | 5,340            | 6,040   | 6,550   | 7,050   | 7,560   | 8,060   | 8,560       | 9,070   |  |
|                      | Pressure Drop        | kPa     | 55               | 55      | 55      | 55      | 55      | 55      | 75          | 75      |  |
|                      | Pipe Connection Size | A       | 200              | 300     | 300     | 300     | 300     | 300     | 300         | 300     |  |
|                      | No. of Pass          | —       | 2                | 2       | 2       | 2       | 2       | 2       | 2           | 2       |  |
| Cooling Water        | Flow Rate            | ℓ / min | 6,260            | 7,090   | 7,660   | 8,250   | 8,840   | 9,410   | 9,990       | 10,580  |  |
|                      | Pressure Drop        | kPa     | 69               | 75      | 75      | 75      | 75      | 75      | 98          | 98      |  |
|                      | Pipe Connection Size | A       | 250              | 300     | 300     | 300     | 300     | 300     | 300         | 300     |  |
|                      | No. of Pass          | —       | 2                | 2       | 2       | 2       | 2       | 2       | 2           | 2       |  |
| Motor                | Rated Output         | kW      | 280              | 315     | 335     | 360     | 385     | 405     | 430         | 455     |  |
|                      | Voltage              | V       | 400V•3000V•6000V |         |         |         |         |         | 3000V•6000V |         |  |
|                      | Start method         | —       | 400V•3000V•6000V |         |         |         |         |         | 3000V•6000V |         |  |
| Control & Aux. Powe  | Voltage              | V       | 200V             |         |         |         |         |         |             |         |  |
|                      | Power Capacity       | kVA     | 6.8              | 7.5     | 7.5     | 7.5     | 7.5     | 7.5     | 7.5         | 7.5     |  |
|                      | Oil pump             | kW      | 0.2              | 1.1     | 1.1     | 1.1     | 1.1     | 1.1     | 1.1         | 1.1     |  |
|                      | Ref. Pump            | kW      | 0.4              | 0.75    | 0.75    | 0.75    | 0.75    | 0.75    | 0.75        | 0.75    |  |
|                      | Oil heater           | kW      | 1.8              | 2.0     | 2.0     | 2.0     | 2.0     | 2.0     | 2.0         | 2.0     |  |
| Dimension            | Length               | mm      | 4,540            | 4,865   | 4,865   | 4,865   | 4,865   | 4,865   | 5,200       | 5,200   |  |
|                      | Width                | mm      | 2,595            | 2,930   | 2,930   | 2,930   | 2,930   | 2,930   | 2,930       | 2,930   |  |
|                      | Height               | mm      | 2,435            | 2,765   | 2,765   | 2,765   | 2,765   | 2,765   | 2,765       | 2,765   |  |
| Mass                 | Running Mass         | t       | 12.3             | 15.2    | 15.4    | 15.7    | 16.0    | 16.3    | 18.1        | 18.4    |  |
|                      | Shipping Mass        | t       | 9.9              | 12.7    | 12.9    | 13.1    | 13.3    | 13.5    | 14.9        | 15.1    |  |
| Chilled Water Retain | ℓ                    |         | 606              | 741     | 784     | 828     | 872     | 916     | 986         | 1,038   |  |
| Cooling Water Retain | ℓ                    |         | 590              | 716     | 751     | 786     | 822     | 857     | 924         | 964     |  |

Notes: 1) Indoor and non-hazard area application. 2) Chilled water and cooling water are in accordance with the water Quality Guide lines.(JRA-GL-02-1994) 3) Capacity control range is 20~100%  
 4) The fouling factor of both chilled water and cooling water is 0.000086m<sup>2</sup>/K/W 5) The max. operation pressure is 0.69MPa

Power Panel(option) Outline Drawing



Unit:mm

| Voltage | Rated output | W   | D     | H     | Start method    |
|---------|--------------|-----|-------|-------|-----------------|
| 400V    | 90-230kW     | 750 | 1,000 | 2,150 | open star-delta |
|         | 235-460kW    | 900 | 1,100 | 2,350 |                 |
| 3000V   | 90-460kW     | 750 | 1,400 | 2,350 | open star-delta |
|         | 90-460kW     | 750 | 1,400 | 2,350 | reactor(option) |
| 6000V   | 90-460kW     | 750 | 1,400 | 2,350 | reactor         |

## Scope of supply. Option List

### Standard Scope of Supply

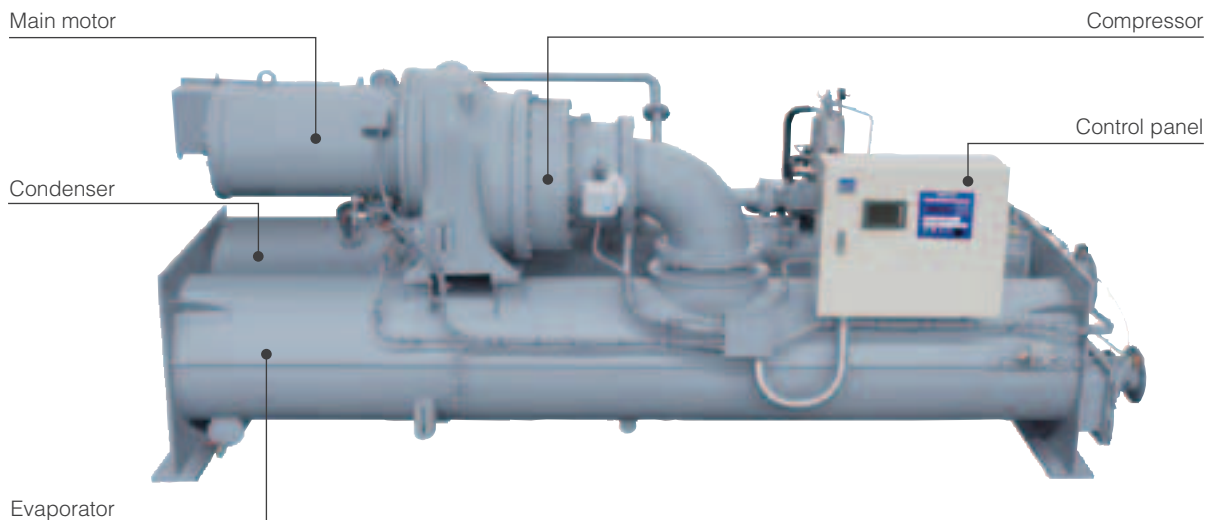
| Model     |  | EBARA | Customer | Remarks  | Model       |   | EBARA | Customer | Remarks  |
|-----------|--|-------|----------|--|-------------|---|-------|----------|--|
| Main body | Evaporator. Condenser                      | ○     | —        |  | Painting    | Main Body                                 | ○     | ○        |  |
|           | Compressor Assembly                        | ○     | —        |  |             | Control Panel                             | ○     | —        |  |
|           | Control Panel                              | ○     | —        |  |             | Motor Power Panel                         | —     | —        | optional   |
|           | Motor Power Panel                          | ○     | —        |  | Subsidiary  | Foundation                                | —     | ○        |  |
|           | Internal Piping. Wiring                    | ○     | —        |  |             | Chilled Water/Cooling Water Piping        | —     | ○        |  |
|           | Refrigerant. Lubricant                     | ○     | —        |  |             | Chilled Water/Cooling Water thermometer   | —     | ○        |  |
| Test      | Factory Performance Test                   | ○     | —        |  |             | Chilled Water/Cooling Water Pressure Gage | —     | ○        |  |
|           | Local Start-up & Commissioning             | —     | —        | To be discussed  |             | Chilled Water/Cooling Water Flow Meter    | —     | ○        |  |
| Transport | From Factory to Seaport                    | ○     | —        |  | Insulation  | —   | ○     |          |  |
|           | From Seaport to Foundation                 | —     | ○        |  | Maintenance | Routine Inspection                        | —     | —        | To be discussed                                  |
|           | Main Body Assembling                       | —     | —        | Including Motor Power Panel<br>Only Supervisor would be send |             | Next Season Spot Inspection               | —     | —        | To sign a Maintenance contract<br>is Recommended |
| Electric  | Power Source                               | —     | ○        | Including Ground Loop<br>*1 Refer to Below                   | Accessories | Indication Lamp/Electric Lamp/Fuse        | ○     | —        |  |
|           | Auxiliary Machinery Interlock wiring       | —     | ○        |  |             | Instruction Manual                        | ○     | —        | 1 piece  |
|           | Wiring Between Motor Power Panel & Chiller | —     | ○        |  | Others      | Local Power Supply/Water etc.             | —     | ○        | xxx  |
|           | Wiring Between Control Panel & Chiller     | ○     | —        |  |             | N <sub>2</sub> for Chiller Keeping        | —     | ○        | For a Long Term storage                          |
|           | Cooling Water Temp. Control                | —     | ○        |  |             | Disposition of Waste Material             | —     | ○        |  |

\*1 The motor power panel is for the overload protection of motor during normal operation, it can not switch off when electric failure(short circuit,grounding etc.)is occurred.  
So please install a breaker before the motor power panel.

### Option List

| Model                               | Standard                                     | Option                                    | Model                             | Standard                 | Option                                  |
|-------------------------------------|--|---|-----------------------------------|--------------------------|---|
| Special Start-up Method             | 400V 3000V Open Start-delta<br>6000V Reactor | 400V 3000V Reactor Available<br>Available | Water Box Direction               | Front nozzle arrangement | Marine Type                             |
|                                     |  |   | Shock-proof Device                | None                     | Available                               |
| Phase Advanced Capacitor Condenser  | None   | Available                                 | Setting up Anchor Bolt            | None                     | Available                               |
| Power Consumption Meter             | None   | Available                                 | Separate Delivery                 | One-piece shipment       | Available                               |
| Zero-Phase Current Transformer(ZCT) | None   | Available                                 | Remote Condition<br>Signal Output | Operation Status Signal  | Available<br>Please Contact for Details |
| Control Panel Power Transformer     | None   | Available                                 |                                   |                          |   |
| Power Fuse                          | None   | Available                                 | Tube Auto Cleaning Device         | None                     | Available                               |
| Hot Gas By-pass Valve               | None   | Available                                 | Refrigerant Gas Density Alarm     | None                     | Available                               |
| Water Box Max. Operation Pressure   | 0.69MPa                                      | Above 0.69MPa Available                   |                                   |                          |   |

## Outline

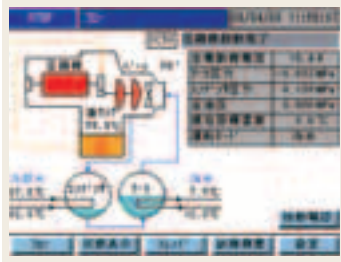




# Multi-function control system to ensure a safety operation

## Touch screen micro control panel - various touch screen display

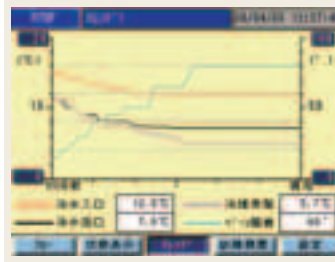
The touch screen display the internal flow chart, operating condition, operation history. And support the daily operation maintenance.



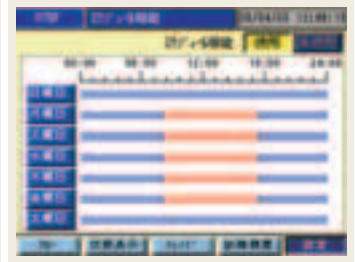
Display the internal flow chart & operating conditions



Condition indication



Trend display



Calendar display

## Failure avoid control to make a high operation reliability

To check the motor current, evap. pressure, cond. pressure, and avoid the stop at failure.

### The risk of stop at failure

- The cooling water temp. rise during the peak time in summer
- The chilled water load and temp. change rapidly
- The main external factors of cause scale in the heat exchanger due to long time change.

! The main motor current exceed rating

! The evap. pressure lower than the limit

! The cond. pressure higher than the limit

