

Two-Stage Compression Centrifugal Chiller

Model RTGC Series

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



EBARA REFRIGERATION EQUIPMENT & SYSTEMS CO., LTD.

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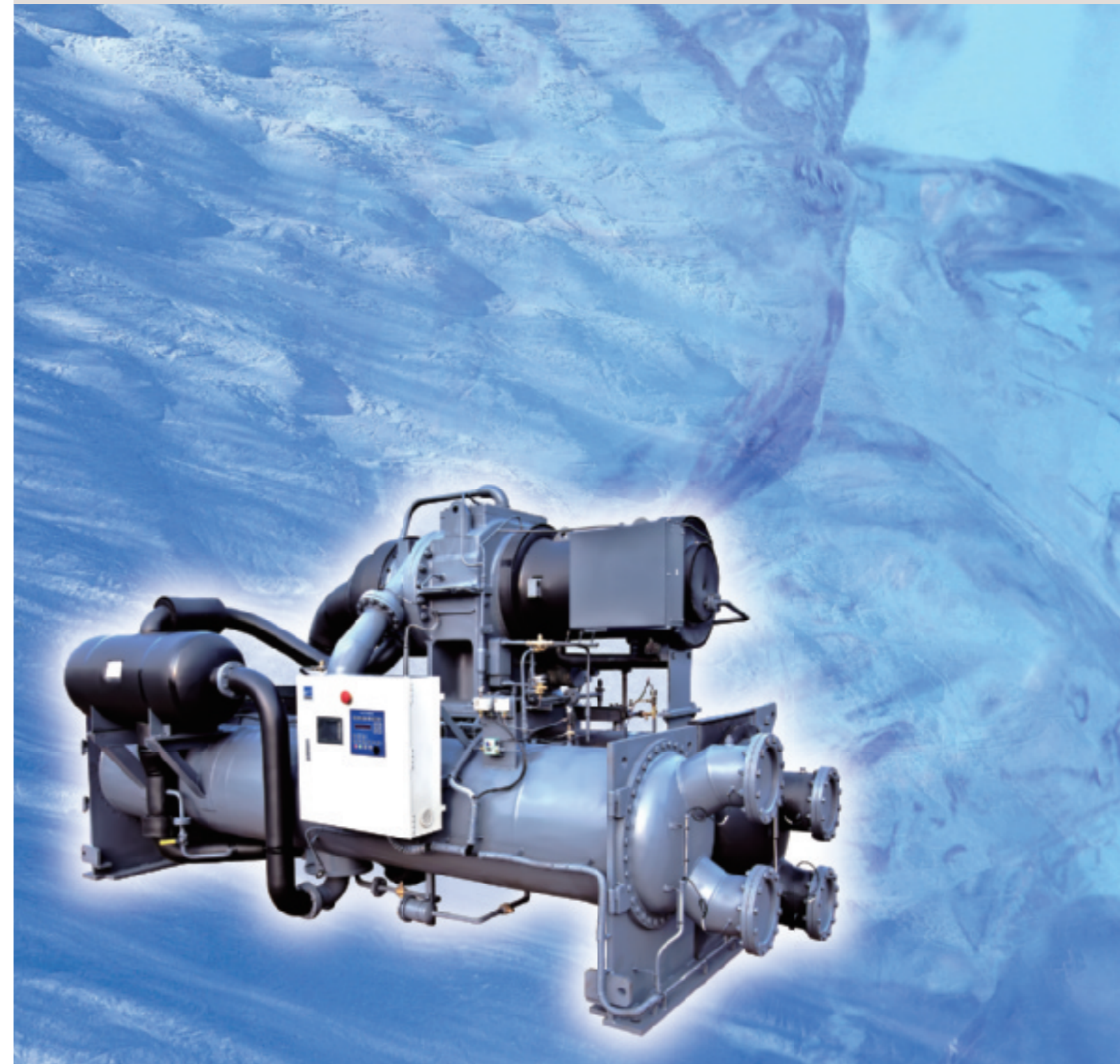
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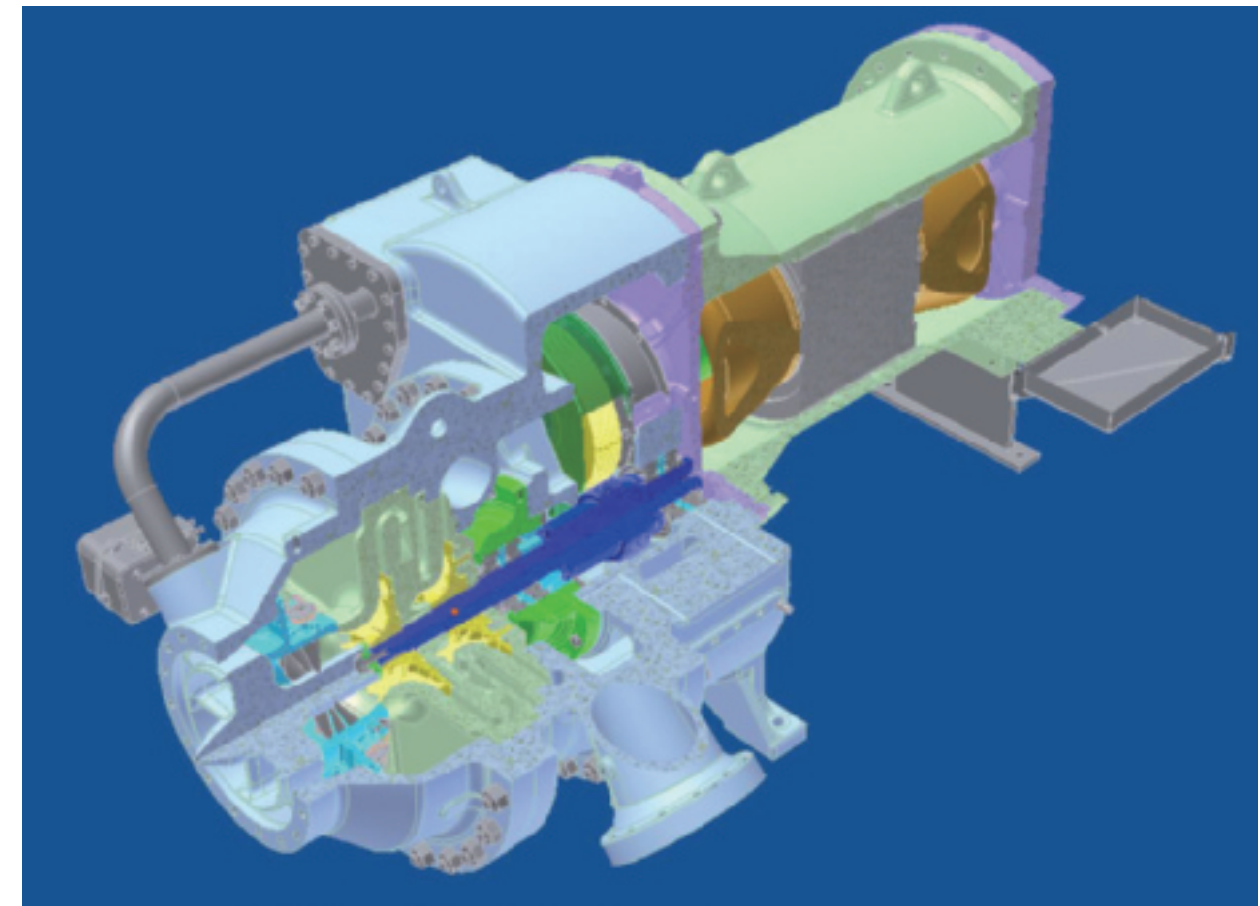
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All specifications are subject to change without notice
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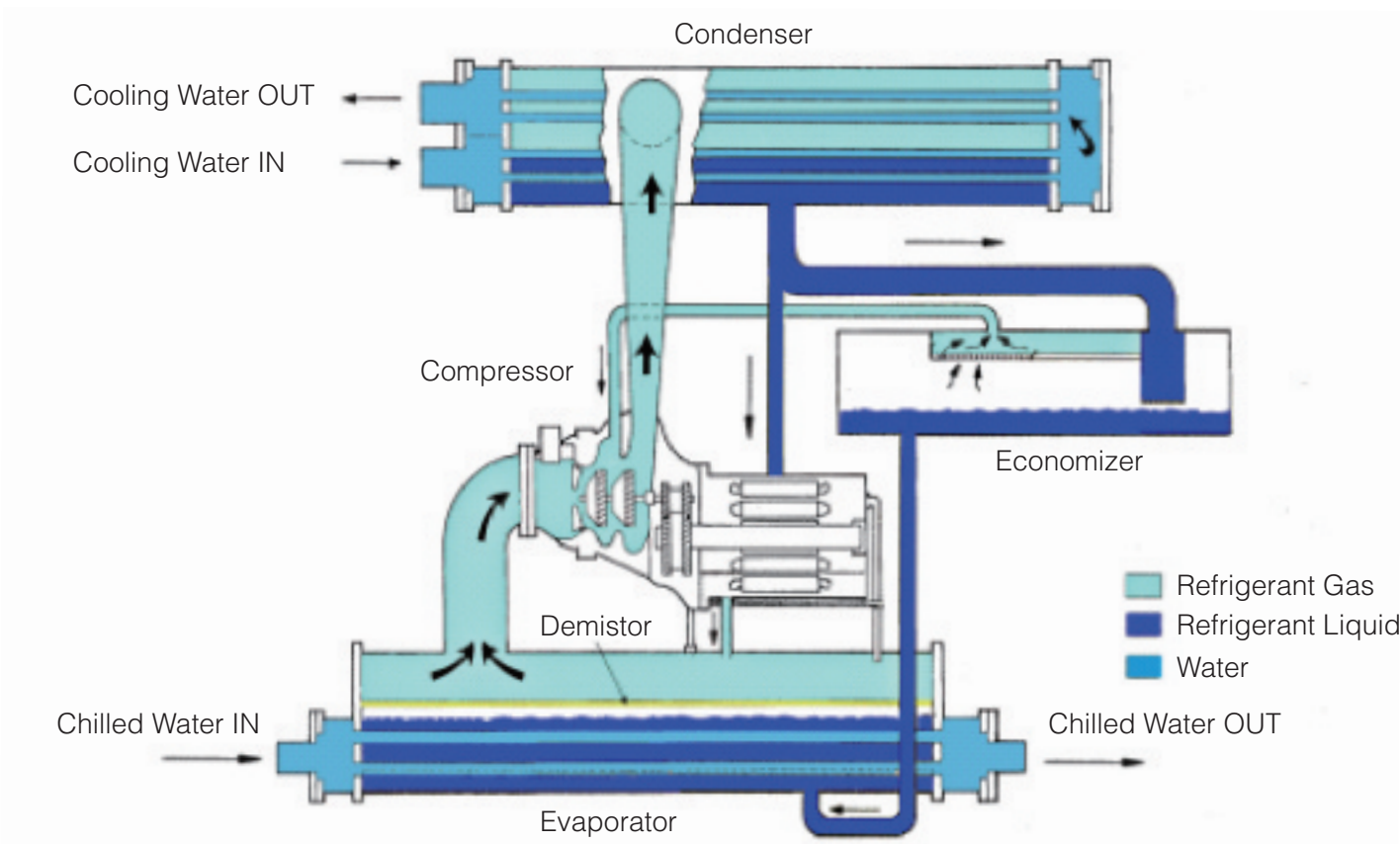


Features

- Compact and reliable design apply for high performance and long life semi hermetic type compressor.
- Motor is cooled directly by refrigerant liquid. Therefore motor can be designed compact and quiet operation.
- Eco-friendly refrigerant HFC 134a is applied to RTGC chiller.
- RTGC chiller adopts open type impeller and high speed revolution for compact design compressor.
- Compared with single-stage compression, RTGC chiller adopts economizer cycle for high efficiency and save energy.



Refrigeration Cycle



Inside Features

Compressor

Ball Bearing

Efficiency is increased by applying ball bearing which is minimized mechanical loss.

Volume Adjustment

Prompt adjustment of partial load by suction vane control.

High Efficient Two Impellers

Most suitable impeller design for high efficiency through fluid analysis.

Helical Gear, Gear Axis

Compact design by impeller high revolution with gear speed increase.

Motor

Motor temperature is low during the operation by cooling down with refrigerant.

Economizer

Liquid refrigerant sending evaporator is cooled by evaporated refrigerant from economizer increasing refrigeration effect.

Evaporated refrigerant is induced by second impeller mixed with compressed refrigerant from first stage impeller.

Evaporator

- Apply high efficient heat transfer tube.
- No impeller erosion by demister avoiding refrigerant mist carry over.
- Adopt special refrigerant distribution system for high performance for evaporation.

Condenser

- Apply high efficient heat transfer tube
- Safety Valve is installed in condenser to protect over design pressure.
- To optimize heat transfer efficiency by optimized tube arrangement.



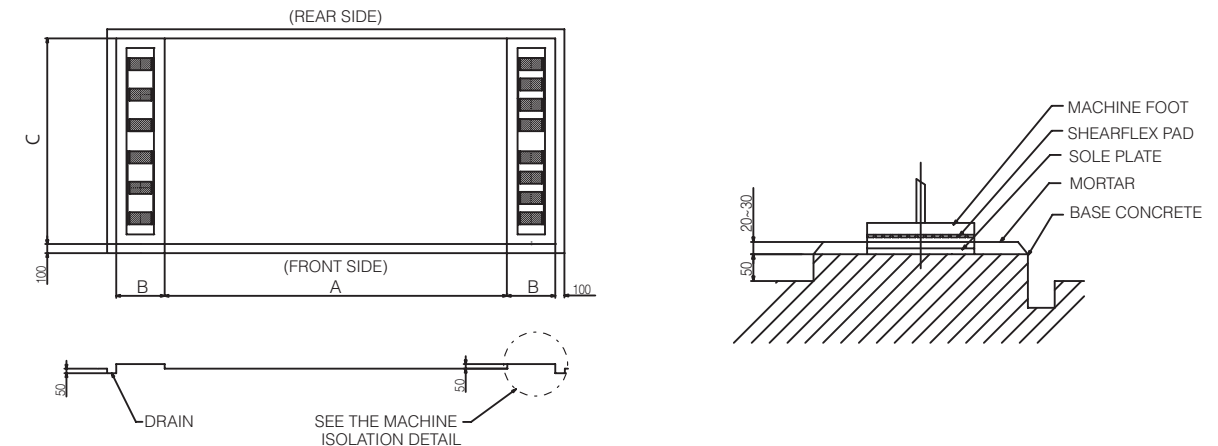
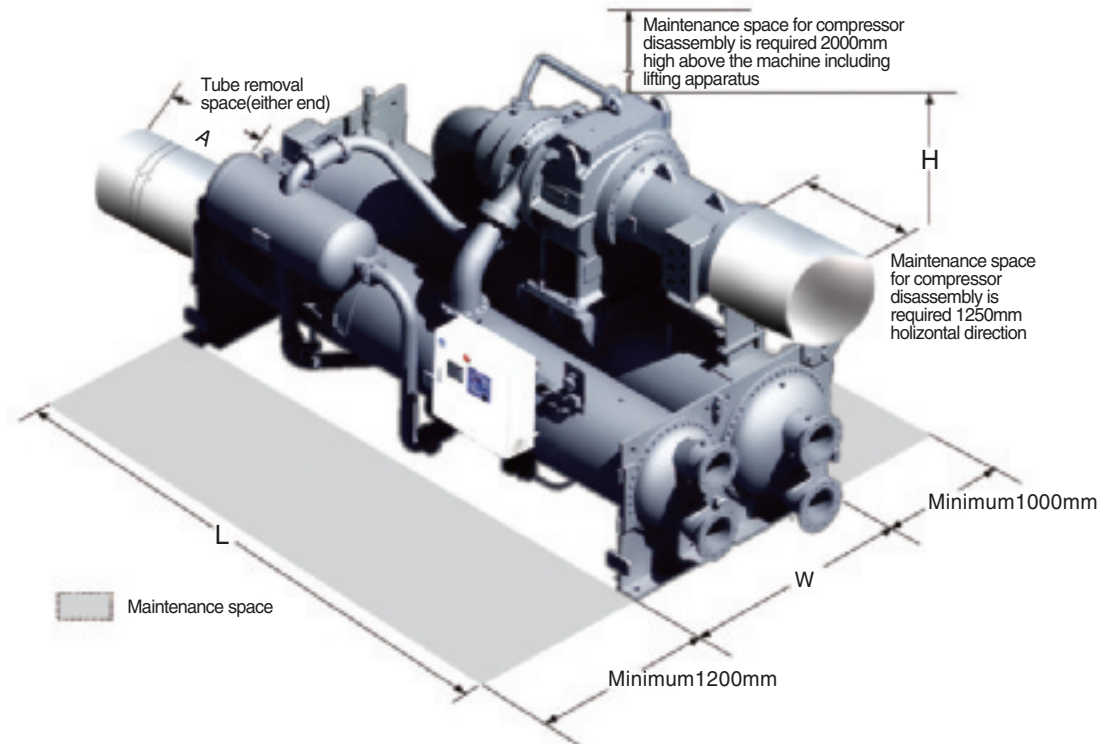
Specification

Condition : 7/32 °C Temperature Selection

| Model | RTGC | 055A | 060A | 065A | 070A | 075A | 080A | 085A | 090A | 095A | 100A | 110A | 120A | 130A | 140A | 150A | 160A | |
|--------------------------------------------|---------------|-------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|----------|----------|----------|----------|--------|
| Cooling Capacity | kW | 1934 | 2110 | 2286 | 2462 | 2638 | 2814 | 2990 | 3165 | 3341 | 3517 | 3869 | 4221 | 4572 | 4924 | 5276 | 5627 | |
| | USRT | 550 | 600 | 650 | 700 | 750 | 800 | 850 | 900 | 950 | 1000 | 1100 | 1200 | 1300 | 1400 | 1500 | 1600 | |
| Motor Input | kW | 349 | 379 | 411 | 444 | 480 | 506 | 537 | 568 | 602 | 636 | 712 | 757 | 820 | 884 | 954 | 1054 | |
| Chilled Water | Flow Rate | m ³ /h | 331.9 | 362.1 | 392.3 | 422.4 | 452.6 | 482.8 | 513.5 | 543.1 | 573.3 | 603.5 | 663.8 | 724.2 | 784.5 | 844.9 | 905.2 | 965.6 |
| | Pressure drop | kPa | 98 | 98 | 99 | 100 | 112 | 98 | 99 | 99 | 99 | 100 | 118 | 126 | 127 | 128 | 129 | 161 |
| | Nozzle size | A (mm) | 250 | 250 | 250 | 250 | 250 | 300 | 300 | 300 | 300 | 300 | 300 | 350 | 350 | 350 | 350 | 350 |
| | Pass number | — | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cooling Water | Flow Rate | m ³ /h | 395.7 | 431.2 | 467.3 | 503.4 | 540.1 | 575.1 | 611.0 | 646.7 | 683.1 | 719.4 | 793.6 | 862.4 | 934.2 | 1006.3 | 1079.2 | 1157.6 |
| | Pressure drop | kPa | 83 | 84 | 85 | 85 | 97 | 83 | 84 | 84 | 85 | 86 | 102 | 101 | 101 | 102 | 103 | 131 |
| | Nozzle size | A (mm) | 250 | 250 | 250 | 250 | 250 | 300 | 300 | 300 | 300 | 300 | 300 | 400 | 400 | 400 | 400 | 400 |
| | Pass number | — | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Approx. Dry Rigging Weight (380V/3.6,10KV) | t | 11.4 / 12.1 | 11.6 / 12.2 | 11.7 / 12.4 | 11.9 / 12.5 | 11.9 / 12.6 | 15.0 / 15.3 | 15.2 / 15.5 | 15.3 / 15.6 | 15.5 / 15.6 | 15.6 / 15.9 | 15.7 / 16.0 | 21.4 / 21.5 | - / 21.7 | - / 22.0 | - / 22.1 | - / 22.3 | |
| Approx. Running Weight (380V/3.6,10KV) | t | 13.2 / 13.9 | 13.5 / 14.1 | 13.7 / 14.4 | 14.0 / 14.7 | 14.0 / 14.8 | 17.6 / 17.9 | 17.9 / 18.1 | 18.1 / 18.3 | 18.3 / 18.4 | 18.5 / 18.9 | 18.6 / 19.0 | 25.6 / 25.7 | - / 26.0 | - / 26.3 | - / 26.4 | - / 26.7 | |
| Refrigerant Filler Content | kg | 650 | 700 | 750 | 775 | 800 | 820 | 850 | 880 | 900 | 950 | 1000 | 1250 | 1320 | 1400 | 1450 | 1500 | |
| Maximum Length Dimension (L) | mm | 5075 | 5075 | 5075 | 5075 | 5075 | 5100 | 5100 | 5100 | 5100 | 5100 | 5100 | 5500 | 5500 | 5500 | 5500 | 5500 | |
| Maximum Width Dimension (W) | mm | 2550 | 2550 | 2550 | 2550 | 2550 | 2900 | 2900 | 2900 | 2900 | 2900 | 2900 | 3275 | 3275 | 3275 | 3275 | 3275 | |
| Maximum Height Dimension (H) | mm | 2700 | 2700 | 2700 | 2700 | 2700 | 2850 | 2850 | 2850 | 2850 | 2850 | 2850 | 3285 | 3285 | 3285 | 3285 | 3285 | |
| Tube Removal Space (Either End) (A) | mm | 4300 | 4300 | 4300 | 4300 | 4300 | 4300 | 4300 | 4300 | 4300 | 4300 | 4300 | 4600 | 4600 | 4600 | 4600 | 4600 | |
| Chilled Water Retain | ℓ | 582 | 611 | 641 | 671 | 671 | 839 | 868 | 898 | 928 | 957 | 957 | 1230 | 1284 | 1341 | 1397 | 1397 | |
| Cooling Water Retain | ℓ | 529 | 559 | 593 | 625 | 625 | 762 | 795 | 828 | 862 | 893 | 893 | 1129 | 1194 | 1259 | 1324 | 1324 | |

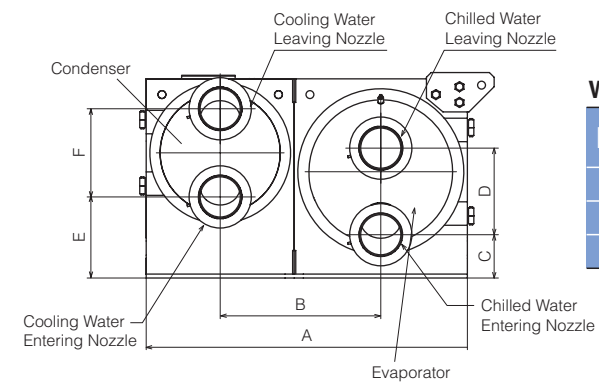
Notes:

- 1) Chilled Water Temperature (IN / OUT) 12/7 °C, Cooling Water Temperature (IN / OUT) 32/37 °C
- 2) Refrigerant R134a
- 3) Water Box Max Working Pressure 1MPa
- 4) Fouling Factor: Chilled Water; 0.018m²K/kW (0.21 / 10000m²h²C/kcal), Cooling Water; 0.044m²K/kW (0.51 / 10000m²h²C/kcal)
- 5) Electric condition Frequency: 50, 60Hz, Voltage: 380V, 3kV, 6kV, 10kV Class



Machine Foundation Dimension

| Model RTGC | 055A | 060A | 065A | 070A | 075A | 080A | 085A | 090A | 095A | 100A | 110A | 120A | 130A | 140A | 150A | 160A |
|------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| A | 4805 | 4805 | 4805 | 4805 | 4805 | 4805 | 4805 | 4805 | 4805 | 4805 | 4805 | 5093 | 5093 | 5093 | 5093 | 5093 |
| B | 530 | 530 | 530 | 530 | 530 | 530 | 530 | 530 | 530 | 530 | 530 | 530 | 530 | 530 | 530 | 530 |
| C | 2250 | 2250 | 2250 | 2250 | 2250 | 2500 | 2500 | 2500 | 2500 | 2500 | 2500 | 2810 | 2810 | 2810 | 2810 | 2810 |



Water Box Nozzle Dimension

| Nozzle Dimensions | A | B | C | D | E | F |
|-------------------|------|------|-----|-----|-----|-----|
| RTGC055A-075A | 2040 | 1020 | 277 | 548 | 505 | 579 |
| RTGC080A-110A | 2290 | 1145 | 365 | 660 | 605 | 700 |
| RTGC120A-160A | 2600 | 1300 | 495 | 830 | 735 | 720 |



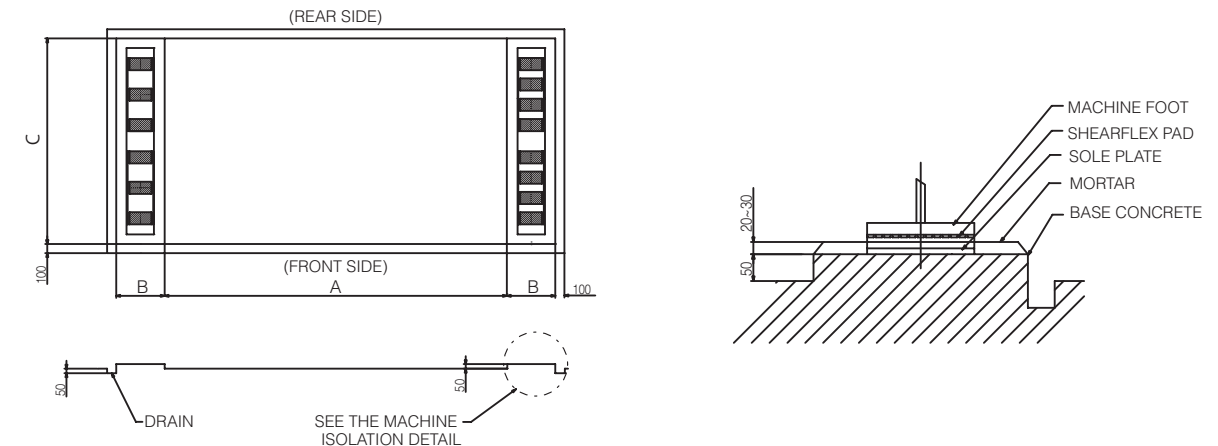
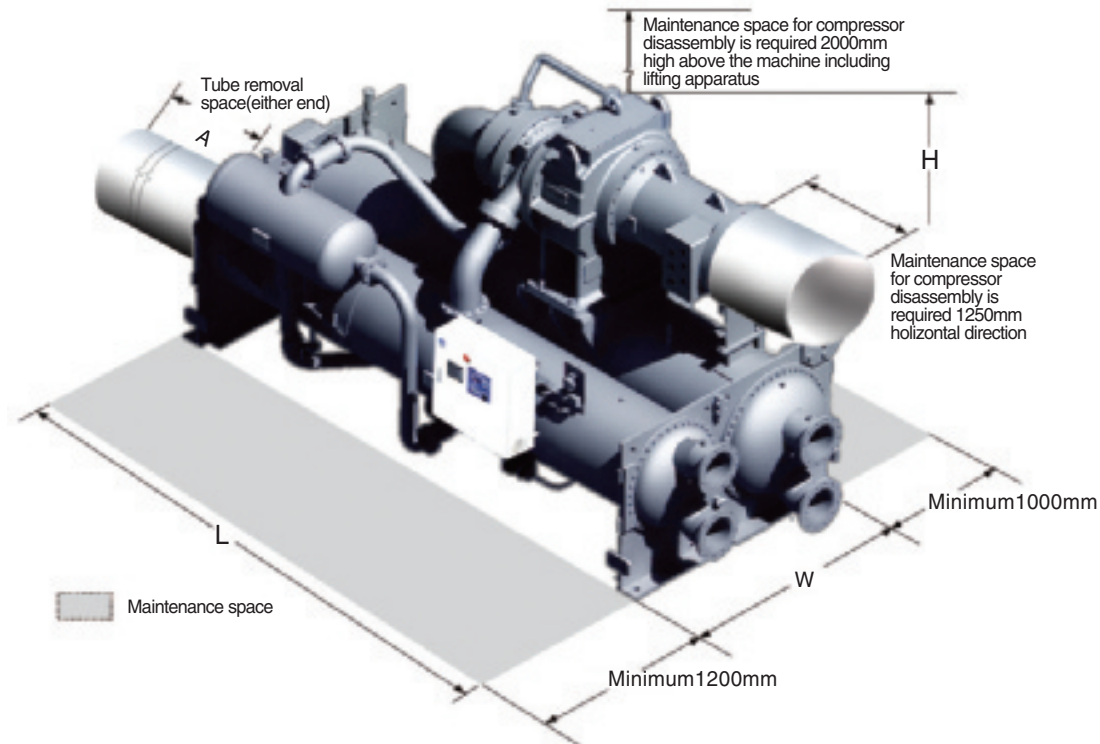
Specification

Condition : AHRI Temperature Selection

| Model | RTGC | 055A | 060A | 065A | 070A | 075A | 080A | 085A | 090A | 095A | 100A | 110A | 120A | 130A | 140A | 150A | 160A | |
|--------------------------------------------|---------------|-------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|----------|----------|----------|----------|--------|
| Cooling Capacity | kW | 1934 | 2110 | 2286 | 2462 | 2638 | 2814 | 2990 | 3165 | 3341 | 3,517 | 3869 | 4221 | 4572 | 4924 | 5276 | 5627 | |
| | USRT | 550 | 600 | 650 | 700 | 750 | 800 | 850 | 900 | 950 | 1000 | 1100 | 1200 | 1300 | 1400 | 1500 | 1600 | |
| Motor Input | kW | 326 | 354 | 383 | 411 | 445 | 467 | 495 | 524 | 554 | 585 | 657 | 701 | 758 | 818 | 881 | 967 | |
| Chilled Water | Flow Rate | m ³ /h | 298.5 | 325.6 | 352.8 | 379.9 | 407.0 | 434.2 | 461.3 | 488.4 | 515.6 | 542.7 | 597.0 | 651.2 | 705.5 | 759.8 | 814.1 | 868.3 |
| | Pressure drop | kPa | 82 | 82 | 82 | 83 | 93 | 82 | 82 | 82 | 83 | 83 | 98 | 105 | 106 | 106 | 107 | 134 |
| | Nozzle size | A (mm) | 250 | 250 | 250 | 250 | 250 | 300 | 300 | 300 | 300 | 300 | 300 | 350 | 350 | 350 | 350 | 350 |
| | Pass number | — | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Cooling Water | Flow Rate | m ³ /h | 378.4 | 412.5 | 446.7 | 480.9 | 516.1 | 549.1 | 583.4 | 617.6 | 652.0 | 686.7 | 757.6 | 823.9 | 892.4 | 961.1 | 1030.6 | 1103.9 |
| | Pressure drop | kPa | 78 | 78 | 79 | 80 | 90 | 78 | 78 | 79 | 79 | 80 | 95 | 94 | 95 | 95 | 96 | 122 |
| | Nozzle size | A (mm) | 250 | 250 | 250 | 250 | 250 | 300 | 300 | 300 | 300 | 300 | 300 | 400 | 400 | 400 | 400 | 400 |
| | Pass number | — | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Approx. Dry Rigging Weight (380V/3.6,10KV) | t | 11.4 / 12.1 | 11.6 / 12.2 | 11.7 / 12.4 | 11.9 / 12.5 | 11.9 / 12.6 | 15.0 / 15.3 | 15.2 / 15.5 | 15.3 / 15.6 | 15.5 / 15.6 | 15.6 / 15.9 | 15.7 / 16.0 | 21.4 / 21.5 | - / 21.7 | - / 22.0 | - / 22.1 | - / 22.3 | |
| Approx. Running Weight (380V/3.6,10KV) | t | 13.2 / 13.9 | 13.5 / 14.1 | 13.7 / 14.4 | 14.0 / 14.7 | 14.0 / 14.8 | 17.6 / 17.9 | 17.9 / 18.1 | 18.1 / 18.3 | 18.3 / 18.4 | 18.5 / 18.9 | 18.6 / 19.0 | 25.6 / 25.7 | - / 26.0 | - / 26.3 | - / 26.4 | - / 26.7 | |
| Refrigerant Filler Content | kg | 650 | 700 | 750 | 775 | 800 | 820 | 850 | 880 | 900 | 950 | 1000 | 1250 | 1320 | 1400 | 1450 | 1500 | |
| Maximum Length Dimension (L) | mm | 5075 | 5075 | 5075 | 5075 | 5075 | 5100 | 5100 | 5100 | 5100 | 5100 | 5100 | 5500 | 5500 | 5500 | 5500 | 5500 | |
| Maximum Width Dimension (W) | mm | 2550 | 2550 | 2550 | 2550 | 2550 | 2900 | 2900 | 2900 | 2900 | 2900 | 2900 | 3275 | 3275 | 3275 | 3275 | 3275 | |
| Maximum Height Dimension (H) | mm | 2700 | 2700 | 2700 | 2700 | 2700 | 2850 | 2850 | 2850 | 2850 | 2850 | 2850 | 3285 | 3285 | 3285 | 3285 | 3285 | |
| Tube Removal Space (Either End) (A) | mm | 4300 | 4300 | 4300 | 4300 | 4300 | 4300 | 4300 | 4300 | 4300 | 4300 | 4300 | 4600 | 4600 | 4600 | 4600 | 4600 | |
| Chilled Water Retain | ℓ | 582 | 611 | 641 | 671 | 671 | 839 | 868 | 898 | 928 | 957 | 957 | 1230 | 1284 | 1341 | 1397 | 1397 | |
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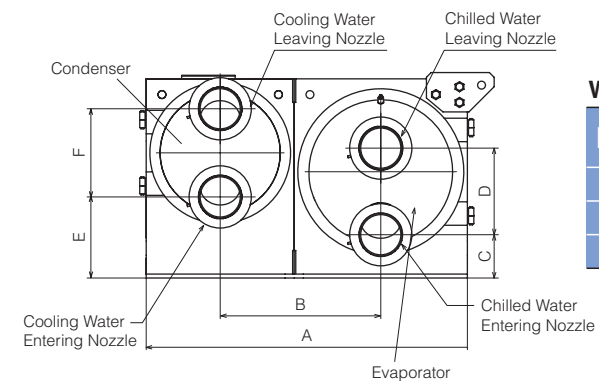
Notes:

- 1) Chilled Water Temperature (IN / OUT) 12.3/6.7°C, Cooling Water Temperature (IN / OUT) 29.4/34.6°C
- 2) Refrigerant R134a
- 3) Water Box Max Working Pressure 1MPa
- 4) Fouling Factor: Chilled Water; 0.018m²K/kW (0.21/10000m²h°C/kcal), Cooling Water; 0.044m²K/kW (0.51/10000m²h°C/kcal)
- 5) Electric condition Frequency: 50, 60Hz, Voltage: 380V, 3kV, 6kV, 10kV Class



Machine Foundation Dimension

| Model RTGC | 055A | 060A | 065A | 070A | 075A | 080A | 085A | 090A | 095A | 100A | 110A | 120A | 130A | 140A | 150A | 160A |
|------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| A | 4805 | 4805 | 4805 | 4805 | 4805 | 4805 | 4805 | 4805 | 4805 | 4805 | 4805 | 5093 | 5093 | 5093 | 5093 | 5093 |
| B | 530 | 530 | 530 | 530 | 530 | 530 | 530 | 530 | 530 | 530 | 530 | 530 | 530 | 530 | 530 | 530 |
| C | 2250 | 2250 | 2250 | 2250 | 2250 | 2500 | 2500 | 2500 | 2500 | 2500 | 2500 | 2810 | 2810 | 2810 | 2810 | 2810 |



Water Box Nozzle Dimension

| Nozzle Dimensions | A | B | C | D | E | F |
|-------------------|------|------|-----|-----|-----|-----|
| RTGC055A-075A | 2040 | 1020 | 277 | 548 | 505 | 579 |
| RTGC080A-110A | 2290 | 1145 | 365 | 660 | 605 | 700 |
| RTGC120A-160A | 2600 | 1300 | 495 | 830 | 735 | 720 |

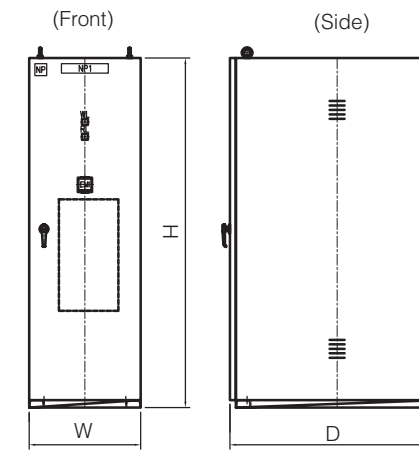


Motor Starting Method

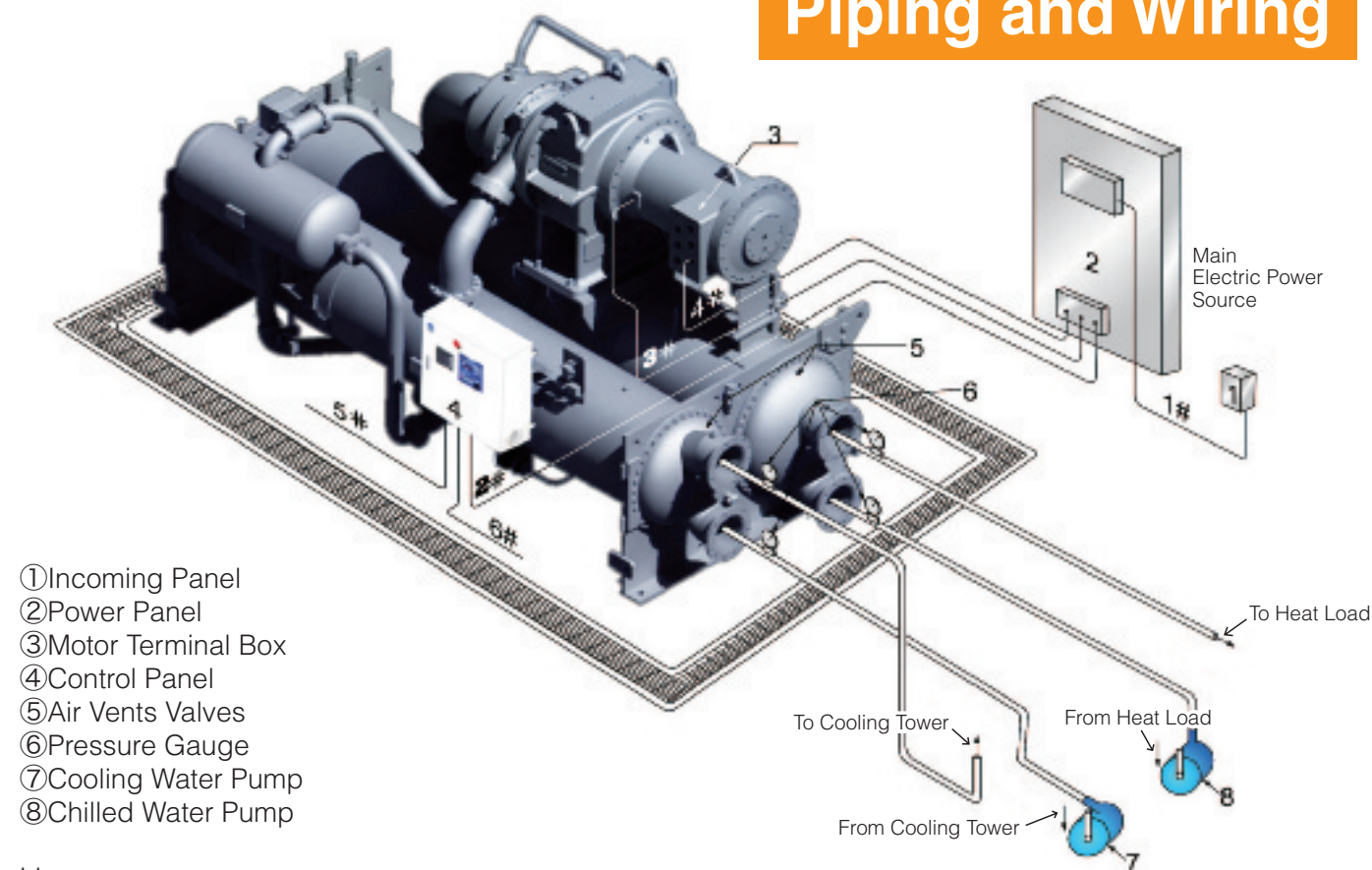
| Motor Output (kW) | 370 | 440 | 520 | 610 | 720 | 760 | 910 | 1080 |
|------------------------------------------|---------------------------------------------------------------|---------------------------------------------------------------------------------------------|----------------------|----------------------|-----------------------|------|----------------------|------|
| Applicable Model RTGC (Rating Condition) | 055A 060A | 065A 070A | 075A 080A 085A | 090A 095A 100A | 110A | 120A | 130A 140A 150A | 160A |
| Motor Voltage | AC380V | | | | Soft Start (Standard) | | None | |
| | Y-Δ Start (Standard), VFD Start (Option), Soft Start (Option) | | | | | | | |
| AC3kV AC6kV AC10kV | | Direct Start (Standard), Reactor Start (Option), Korndorfer Start, Power Condenser (Option) | | | | | | |

Power Panel Outline Drawing

| Voltage | Rated Output (kw) | W (mm) | D (mm) | H (mm) | Weight (kg) | Packing Weight (kg) | Start Method |
|----------|-------------------|--------|--------|--------|-------------|---------------------|--------------|
| 380V | 370 | 1100 | 600 | 2100 | 265 | 325 | Star-Delta |
| | 440 | | | | 275 | | |
| | 520 | | | | 300 | | |
| | 610 | 315 | 385 | | | | |
| | 720 | 1000 | | 1000 | 2200 | 320 | |
| 3,6,10kV | 760 | 800 | 1660 | 2300 | 800 | 900 | Direct Start |
| | 370 | | | | | | |
| | 440 | | | | | | |
| | 520 | | | | | | |
| | 610 | | | | | | |
| | 720 | | | | | | |
| | 760 | | | | | | |
| 910 | | | | | | | |
| 1080 | | | | | | | |



Piping and Wiring

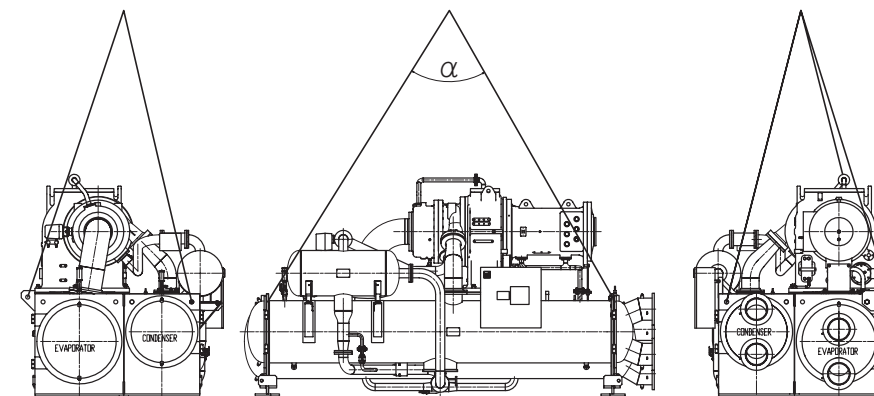


- ① Incoming Panel
- ② Power Panel
- ③ Motor Terminal Box
- ④ Control Panel
- ⑤ Air Vents Valves
- ⑥ Pressure Gauge
- ⑦ Cooling Water Pump
- ⑧ Chilled Water Pump

| Line | Symbol | Usage | Description |
|------|--------|-----------------------------------------------|---------------------------------------------------------------|
| 1# | | Power Supply Wire and Earth Wire | AC Power Source 3 Phase, Neutral Line 1Line, Earth Line 1Line |
| 2# | | From Power Panel to Control Panel | Operational Power Supply Wire and Power Panel Control Wire |
| 3# | | From Power Panel to Main Motor | internal Thermistor Terminal Box |
| 4# | | From Power Panel to Auxiliary Machine Panel | Mechanical Power Wire and Earth Wire |
| 5# | | From Control Panel to Auxiliary Machine Panel | Pump and Cooling Tower start and stop signal Wire |
| 6# | | Communication Protocol Line | |

Electric Wiring Construction Note:
Check safety with extra care when electric works are performed

Hoisting and Installation



Notes

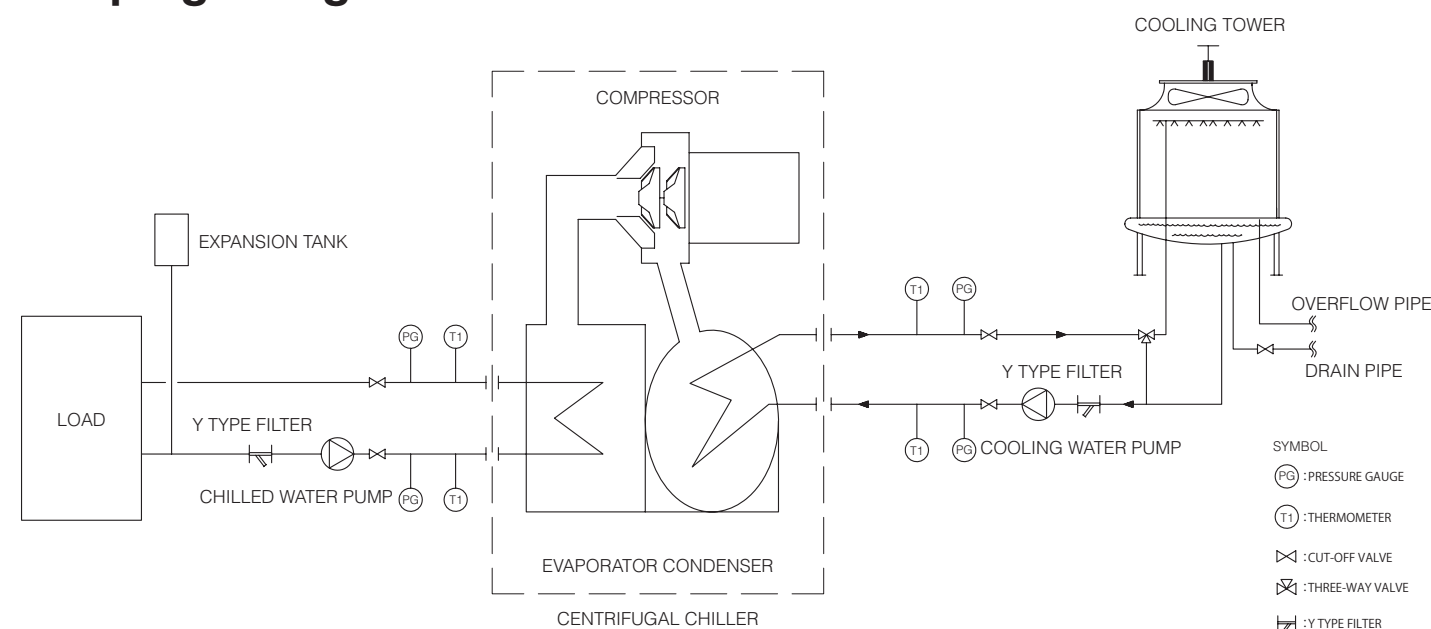
1. Concerning lifting equipment (lifting hook, lifting wire, and shackle), select equipment with suitable strength after checking the weight of the unit per the outline drawing of the unit.
2. α degrees angle $\leq 60^\circ$
3. Temporary plate for machine lifting is rigged when the machine is delivered. It will be removed after the machine is installed.

1. Operating and maintenance space which is 1200mm or more wide around the machine is required. In particular, be careful to the motor, compressor, oil pump, oil filter, refrigerant dryer, filter and instrument apparatus.
2. Perform construction for vibration isolating foundation and perform level adjustment on the upper part of the tube plate and on the compressor base plate with a level to be longer than 600mm. Place vibration-isolating material and plate at four positions as mentioned. Each of four plates with three different types of thickness is shipped. Select plates with thickness suitable to each position in order to adjust the level.
3. Pipe supports are required to prevent piping mass, vibration application to the machine.
4. The pressure test of evaporator and condenser water boxes must be conducted with hydrostatics.

5. The strainer above 10 meshes is required on the entering piping of chilled water and cooling water to protect tube damages. If the strainer is equipped at the upper stream side of the entering piping of chilled water and cooling water, it's unnecessary.
6. If the chilled water (brine) or cooling water has poor quality, scale will be deposited in the heat transmission tubes, affecting the chiller operation and causing trouble such as water leaks due to tube corrosion. Special care should be taken with regard to water quality.
7. No person other than the specialists must not disassemble, repair, or modify the unit. Improper repair may cause the electrical shock or fire. If any accident occurs originated by those attempts, Ebara is not responsible for any of the damage, injury, or other losses.

Facilities Application

Piping Design Plan



1. [] shows the scope of supply.
2. In order to open the evaporator and condenser water box, please set the elbow pipe or single pipe.
3. To protect the heat transfer tube at the chilled water and cooling water entering nozzle, please set filter more than 10 mesh.
4. In order to decrease pipe weight load and vibration applied to the machine, please set the support and flexible hose.
5. In other than summer seasons, the cooling water entrance temperature may affect the machine, please use the three-way valve to control the cooling tower, the leaving temperature difference between cooling water and chilled water above 15°C.
6. Exhaust piping from the safety valve port; Install the piping provided with supports and vibration isolation pads, and lead it to the outdoor safety area. Also the closing area to the chiller on the pipe, flexible joint shall be required to prevent pipe loads to the safety valve.

After-Sales Services

Maintenance

To ensure the long-lasting use of chillers and chiller/heaters, daily operation checks and inspections are essential. After the completion of test runs of newly installed equipment, we offer our customers maintenance contracts, use of our overhaul service, and replacement to new models with higher energy efficiency.



Periodical Maintenance

A yearly maintenance contract is available, covering visiting inspections, as well as servicing and cooling/heating mode changeover before the start of cooling/heating season. Periodical inspections enable preventive and systematic maintenance, contributing to performance retention and cost reduction.

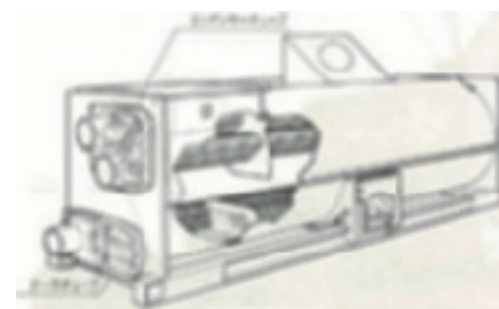
After-Sales Services



Overhaul Maintenance

Overhaul is a physical inspection that opens and disassembles hermetic parts not covered by regular maintenance. Overhaul is a practical preventive maintenance service to provide understanding of the current status of equipment and the appropriate action to ensure reliable operation from now.

Cleaning of Heat Exchanger Tubes



Cleaning evaporator (cooler) and condenser tubes

The adhesion of contaminants to the inner surface of heat exchanger tubes may lower the heat transfer efficiency, resulting in inefficient operation or tube corrosion. To keep the inner surface of the tubes clean, cleaning with a bristle brush is recommended.

By taking into consideration various circumstances, such as clean water passing through the tubes or water treatment to prevent contaminant adhesion or tube corrosion, the suitable timing of cleaning for each facility environment can be determined.

Water treatment for air conditioning use



Chemical control with this equipment contributes to prolonged service life of air conditioning systems as well as improved energy efficiency. Choosing genuine Ebara chemicals most suitable for your heat source system will also contribute to safe operation.