

**DAIKIN**



# INSTALLATION AND OPERATION MANUAL

## Packaged water-cooled water chillers

EWWD440AAYNNO\*\*  
EWWD600AAYNNO\*\*  
EWWD700AAYNNO\*\*  
EWWD850AAYNNO\*\*  
EWWDC11AAYNNO\*\*



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Thank you for purchasing this Daikin air conditioner.



READ THIS MANUAL ATTENTIVELY BEFORE STARTING UP THE UNIT. DO NOT THROW IT AWAY. KEEP IT IN YOUR FILES FOR FUTURE REFERENCE.

IMPROPER INSTALLATION OR ATTACHMENT OF EQUIPMENT OR ACCESSORIES COULD RESULT IN ELECTRIC SHOCK, SHORT-CIRCUIT, LEAKS, FIRE OR OTHER DAMAGE TO THE EQUIPMENT. BE SURE ONLY TO USE ACCESSORIES MADE BY DAIKIN WHICH ARE SPECIFICALLY DESIGNED FOR USE WITH THE EQUIPMENT AND HAVE THEM INSTALLED BY A PROFESSIONAL.

IF UNSURE OF INSTALLATION PROCEDURES OR USE, ALWAYS CONTACT YOUR DAIKIN DEALER FOR ADVICE AND INFORMATION.

**SAFETY CONSIDERATIONS**

For your safety and that of others, observe the precautions listed here after at all time.

There are two types of precautions:



**WARNING:** When improper handling or operation could result in death or serious injury.



**CAUTION:** When improper handling or operation could result in injury or physical damage. Depending on the circumstances, neglecting could lead to serious consequences.


Both types are extremely important to ensure safety, and must be paid attention to at all time.

**Precautions during installation**

















**WARNING**

- For installation work, be sure to contact your dealer. Improper installation could result in leaks, electric shock or fire.
- Be sure to perform installation work in accordance with the instructions. Improper installation could result in leaks, electric shock or fire.
- Be sure to install the unit in a level place capable of holding its weight and fix it with bolts completely. Incomplete installation or installing in a place that cannot support the weight of the unit could result in leaks or in the unit overturning or falling.
- Take proper measures required for preventing refrigerant leaks. If the unit is installed in places such as engine rooms, countermeasures must be taken against exceeding a certain concentration of leaking refrigerant. If the concentration limit is exceeded, it could result in a lack of oxygen.
- For electrical work, be sure to use a dedicated circuit. Electrical work should be performed by a qualified electrician. Perform the work in accordance with technical standards for electrical equipment and indoor wiring regulations. Insufficient circuit capacity of the power supply or improper electrical work could result in electrical shock or fire.





- Use the prescribed cable for wiring, and make sure that connections are secure.   
Be sure to securely fasten cables to their terminals so that external force on cables has no effect on terminal connections. Incomplete connection or fixing can lead to heat generation or fire.

### CAUTION














- Do not install the unit in a place which could be exposed to leaking of flammable gas.   
If gas were to leak and collect around the unit, the gas could be ignited by the unit.
- Be sure to install an electrical leakage breaker.   
The electrical leakage breaker should conform to technical standards for electrical equipment and indoor wiring regulations. Failure to install an electrical leakage breaker could result in electrical shock.
- Be sure to provide proper drainage.   
Failure to provide proper drainage could result in water leaking inside and could wet other equipment, furniture, etc.
- Apply water-proof to the floor surface where the unit is to be installed.   
Poor water-proof could cause other facility/device to get wet.
- Use chilled (hot) water and condenser water that conforms to the water quality specifications.   
Poor quality water could result in water leaks.
- Do not attempt to run the compressor by pushing the magnetic contactor with your finger.   
Doing so could result in electrical shock or fire.
- Do not mistake the types of refrigerant and lubrication oil.   
Doing so could result in fire or explosion.
- Provide proper grounding for the unit.   
Do not connect the ground wire to gas piping, water piping, lightning rods or telephone ground wire. Improper grounding could result in electrical shock.
- Be sure to provide each unit with a circuit breaker.   
Using a single circuit breaker for more than one unit could result in electrical shock or fire.
- Do not run power supply wiring between units.   
Doing so could result in fire.
- Do not expose the unit to humid environments.   
The unit should not be installed near hot water springs, or near the seashore, nor in areas exposed to oil or corrosive gas atmospheres such as ammonia. Corrosion caused by such elements can result in electrical shock or fire.
- Be sure to dispose of cleansing solutions as stipulated by law.   
Illegal disposal is not only against the law, but can harm health and the environment.
- Do not apply any machining to the unit main body, or do not fit by welding.   
Doing so could result in the poor air-tightness and could result in a lack of oxygen in the latter case.
- Make sure there is enough service space.   
If the space is not enough, maintenance work cannot be carried out safely, and could result in any injuries.







## Precautions when using

### WARNING

- If a malfunction occurs (burning smell, etc.), turn off the power supply and contact your dealer.   
Continuing to operate while the unit is malfunctioning can result in equipment damage, electrical shock or fire.
- Do not use any heating medium other than water for chilled (hot) water and condenser water.   
Doing so could result in fire or explosion.
- Do not turn the unit ON or OFF with the power supply switch or circuit breaker, etc.   
Doing so could result in electrical shock or fire.
- Take countermeasures against refrigerant leaking.   
Take proper countermeasures to prevent refrigerant leaks from exceeding the concentration limit. If the concentration limit is exceeded, it could result in a lack of oxygen.




### CAUTION

- Do not use the unit for any purpose other than for which it is designed.   
The unit should not be used for applications such as preservation of food, plants or animals, high-tech equipment, art, etc. Using the unit for such applications could adversely affect the quality of these goods.
- Do not use fuses other than the ones specified.   
Using wire, etc., instead of a fuse could result in equipment damage or fire.
- Do not attempt to run the compressor by pushing the magnetic contactor with your finger.   
Doing so could result in electrical shock or fire.
- Do not operate the unit with the cabinet or switch box cover open.   
Doing so could result in electrical shock or fire.
- Do not operate the unit with wet hands.   
Doing so could result in electrical shock.
- Do not place any inflammable spray nearby. Do not spray it over the unit.   
Doing so could result in fire.
- Do not attempt to force-operate the unit by short circuiting safety devices.   
Doing so could result in fire.
- Observe the specified power supply.   
If you use a power supply other than specified on the machine rating plate, it could result in fire or electrical shock.
- Do not change settings of safety devices.   
Doing so could result in fire, etc.
- Do not place liquid containers such as flower vases on the unit.   
If the liquid spills out, it could get inside the unit and cause the electrical insulation to deteriorate, resulting in electrical shock.
- Be sure to stop the unit and turn the power supply off before cleaning.   
Failure to do so could result in injury.
- Do not use chilled (hot) water or condenser water for drinking or hot water supply.   
Doing so could be harmful to health.
- Do not mistake the types of refrigerant and lubrication oil.   
Doing so could result in fire or explosion.


- Do not allow water to remain in the water piping during prolonged idle periods.  
For prolonged idle periods you should fill the water pipes with antifreeze or drain all the water from the pipes. Failure to do so could result in leaking. 
- Do not climb or place objects on top of the unit.  
Falling or overturning could result in injury. 
- Make sure the unit base is not damaged by prolonged use.  
If damage is not repaired, the unit could fall and result in injury. 
- Do not wash the unit with water.  
Doing so could result in electrical shock. 
- Use chilled (hot) water and condenser water that conforms to water quality specifications.  
Poor quality water could result in water leaks. 
- Never touch parts which tend to become hot such as compressors and refrigerant piping.  
Doing so could result in skin burning. 

### Precautions when relocating or repairing the unit

#### WARNING

- For repairs, be sure to contact your dealer.  
Improper repair could result in electrical shock or fire. 
- Do not modify the unit in any way.  
Doing so could result in electrical shock or fire. 
- To relocate the unit, be sure to contact your dealer.  
Improper installation could result in electrical shock or fire. 

#### CAUTION

- Pay attention to ventilation when repairing indoors.  
If refrigerant leaks and the room is not sufficiently ventilated, it could result in accidents caused by lack of oxygen. 

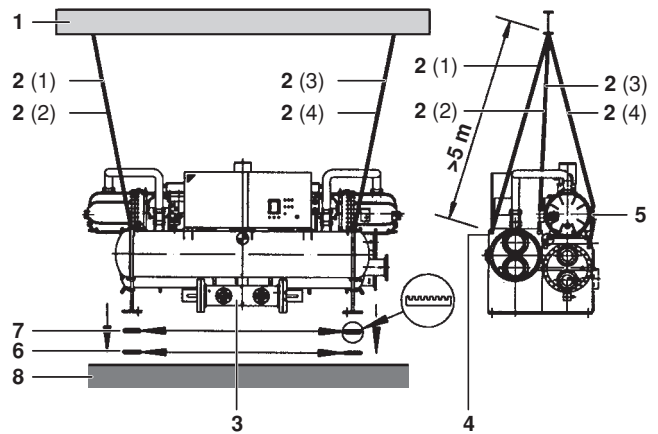
## MOVING AND RIGGING

### Inspecting the unit

At delivery, the unit should be checked and any damage should be reported immediately to the carrier claims agent.

The unit comes with 6 rubber vibration isolator pads and 6 metal anti vibration supports.

### Lifting the unit



- 1 Lifting beam
- 2 Wire rope (L>5 m)
- 3 Collector under condenser
- 4 Lifting hole Ø50
- 5 Protection patches
- 6 Metal anti vibration support (6 pieces delivered with the unit)
- 7 Vibration isolation pad (6 pieces delivered with the unit)
- 8 Foundation

- Refer to the diagram above. Have the lifting beam (1) and 4 wire ropes prepared (2). Make sure that wire ropes are longer than 5 m. Be sure to lift the unit horizontally levelled.
- The unit is shipped with transport stays under it. These have to be removed before installation.  
Pay special attention not to damage the lower collector (3) under the condenser when removing the transport stays.
- The condenser and evaporator have lifting holes (Ø50) at both sides. Use these holes for lifting (4).
- Perform lifting and transfer the unit slowly avoiding brusque movements.  
The unit is shipped from factory with refrigerant charged. Brusque movement may result in unexpected behavior of the product due to inertia force of the liquid refrigerant.
- Select and use equipment for lifting, including the lifting beam (1), with a sufficient safety factor. Take offset load into account that can develop when the product inclines while lifting.
- For preventing any external damage to the product, we request you to protect the product by using protection patches (5) where appropriate.
- Make sure to first put the 6 metal anti vibration supports (6) and 6 rubber vibration isolation pads (7) in place on the foundation (8) before putting the unit in its final position. Refer to "[Sound insulation and vibration isolation work](#)" on page 7.



- Do not hang wire ropes on the piping.  
Damage of piping and drop of unit may result.  
Due to leakage of refrigerant, oxygen deficiency accident or frostbite may result.

Table 1

Model	Machine weight (kg)	Operation weight (kg)
EWWD440	4200	4430
EWWD600	4650	4900
EWWD700	5500	5800
EWWD850	6100	6450
EWWD11	7400	7850

Before lifting, check the lifting weight stated in the delivery specification again.

## Pulling the unit horizontally

- Take care not to bend the unit base of the chiller.
- There are copper pipes at the bottom of the unit. Take care to avoid scrubbing the bottom of the unit. Movement at the slope or uneven surfaces require special attention.

## DESCRIPTION

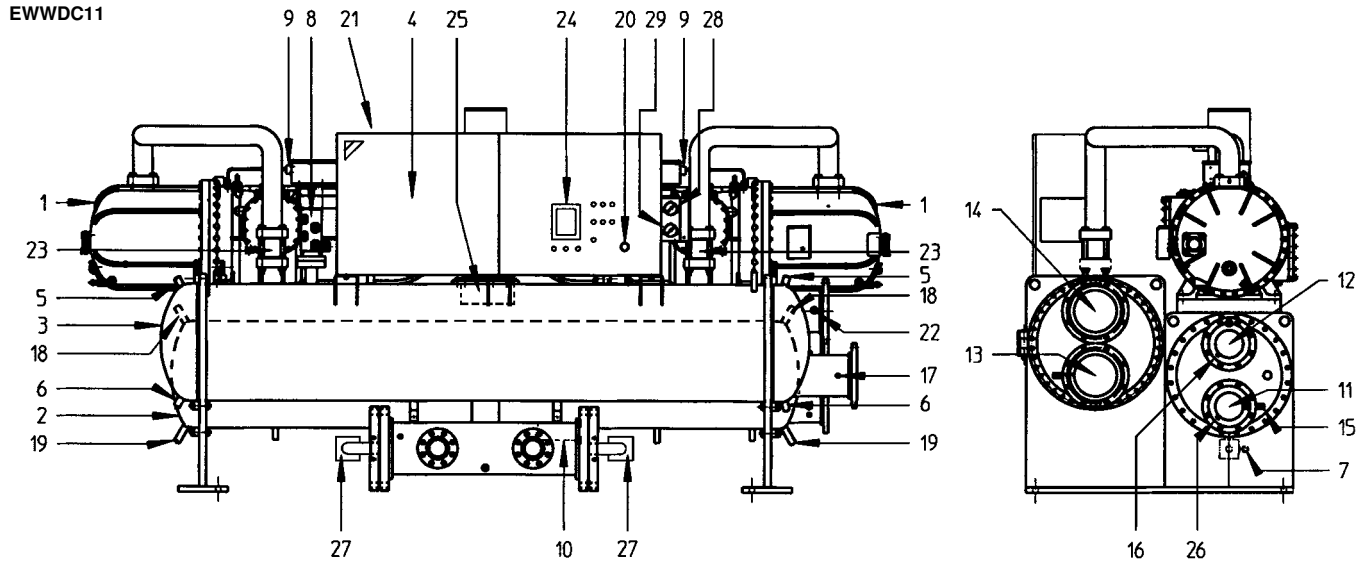


Figure - Main components

1	Compressor	16	Evaporator leaving water temperature sensor
2	Evaporator	17	Condenser entering water temperature sensor
3	Condenser	18	Air purge evaporator
4	Switchbox	19	Water drain evaporator
5	Air purge condenser	20	Emergency stop
6	Water drain condenser	21	Power supply intake and field wiring intake
7	Charge valve	22	Condenser leaving water temperature sensor
8	Safety valve	23	Discharge non-return valve
9	High pressure switches	24	Digital display controller
10	Drier	25	Suction stop valve
11	Chilled water in	26	Evaporator entering water temperature sensor
12	Chilled water out	27	Liquid stop valve
13	Condenser water in	28	High pressure gauge
14	Condenser water out	29	Low pressure gauge
15	Flow switch		

Function of the main components

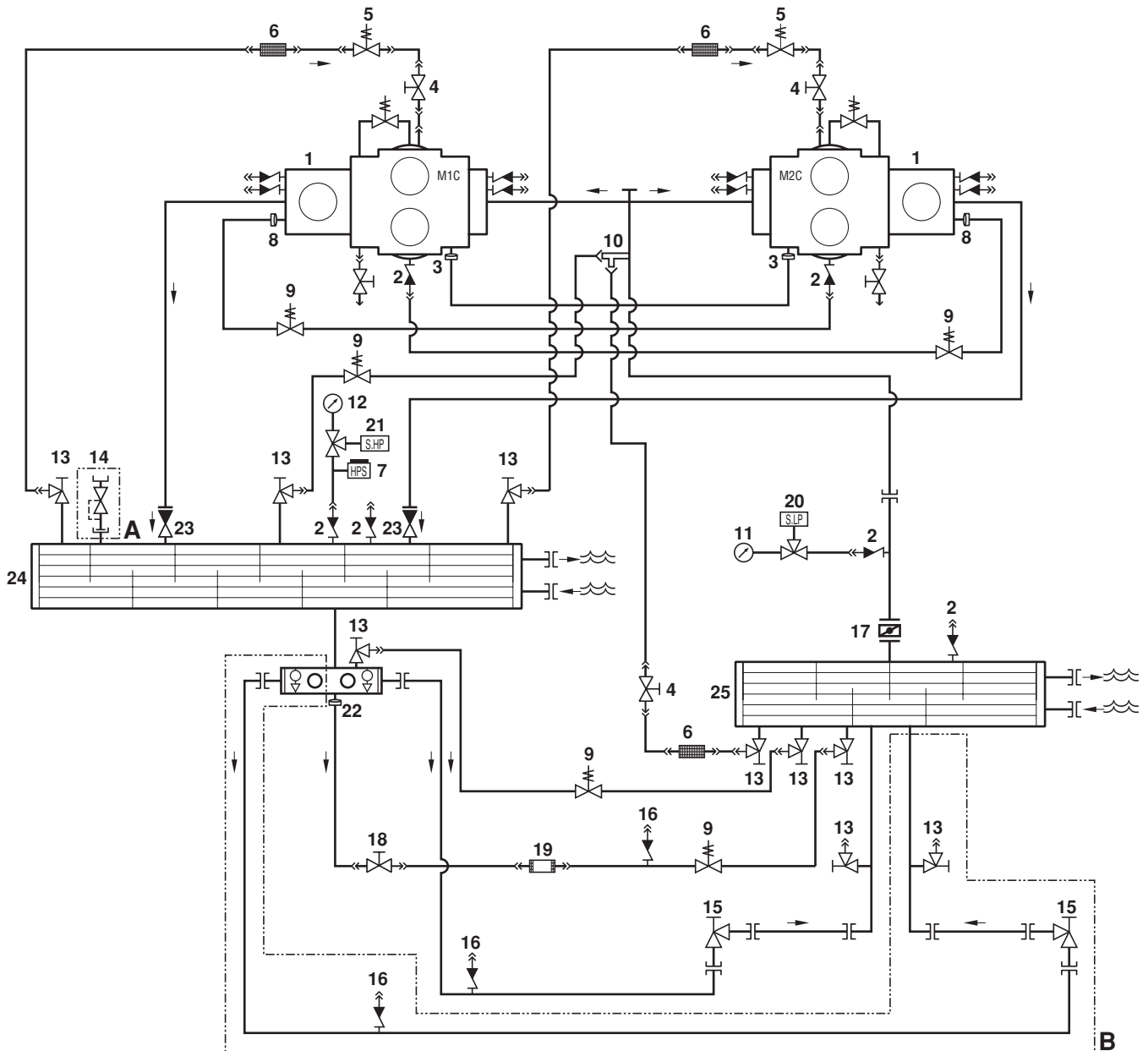


Figure - Functional diagram

- |    |                      |    |                           |
|----|----------------------|----|---------------------------|
| 1  | Compressor           | 18 | Stop valve                |
| 2  | Service valve        | 19 | Filter/drier              |
| 3  | Male connector       | 20 | Low pressure transmitter  |
| 4  | Stop valve           | 21 | High pressure transmitter |
| 5  | Solenoid valve       | 22 | Male connector            |
| 6  | Filter               | 23 | One-way valve             |
| 7  | High pressure switch | 24 | Condenser                 |
| 8  | Male connector       | 25 | Evaporator                |
| 9  | Solenoid valve       | A  | Safety valve              |
| 10 | Ejector              |    |                           |
| 11 | Low pressure gauge   |    |                           |
| 12 | High pressure gauge  |    |                           |
| 13 | Retaining valve      |    |                           |
| 14 | Safety valve         |    |                           |
| 15 | Stop valve           |    |                           |
| 16 | Service valve        |    |                           |
| 17 | Suction stop valve   |    |                           |

**B** Only for EWWD700, 850, C11

EWWD440	2x
EWWD600	3x
EWWD700	3x
EWWD850	4x
EWWD11	5x

As the refrigerant circulates through the unit, changes in its state or condition occur. These changes are caused by the following main components:

- **Compressor**  
The compressor (M<sup>3</sup>C) acts as a pump and circulates the refrigerant in the refrigeration circuit. It compresses the refrigerant vapour coming from the evaporator at the pressure at which it can easily be liquefied in the condenser.
- **Condenser**  
The function of the condenser is to change the state of the refrigerant from gaseous to liquid. The heat gained by the gas in the evaporator is discharged through the condenser to the water, and the vapour condenses to liquid.
- **Filter/drier**  
The filter installed behind the condenser removes small particles from the refrigerant to prevent blockage of the tubes. The drier takes water out of the system.
- **Expansion valve**  
The liquid refrigerant coming from the condenser enters the evaporator via an expansion valve. The expansion valve brings the liquid refrigerant to a pressure at which it can easily be evaporated in the evaporator.
- **Evaporator**  
The main function of the evaporator is to take heat from the water that flows through it. This is done by turning the liquid refrigerant, coming from the condenser, into gaseous refrigerant.
- **Water in/outlet connection**  
The water inlet and outlet connection allow an easy connection of the unit to the water circuit of the air handling unit or industrial equipment.

## INSTALLATION

### Selection of installation site and foundation work

- This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.
- **Indoor installation:** This is an indoor-only model  
Do not install this product at places subject to effect of weather and places exposed to water splash.  
Do not install this product at places exposed to direct sunlight.



#### WARNING

##### Install this product indoors

Do not install this product at places exposed to water drop or subject to water splash.  
Electric leak or electric shock may result.

- **Well-ventilated installation sites**  
Set up a ventilation facility so that the leakage of refrigerant does not lead to oxygen deficiency.  
Even in case the capacity of the machine room is big enough to the extent that leakage of refrigerant does not lead to critical concentration in terms of volumes, depending on the density characteristics of the refrigerant gas, places with high concentration may form locally and oxygen deficiency accidents may result.



#### CAUTION

##### Take measures against refrigerant leakage

- Take measures so that the critical concentration is not exceeded when a leakage of refrigerant takes place.
- Exceeding the critical concentration due to leakage of refrigerant may lead to oxygen deficiency accidents.

- An atmosphere with flammable gas is not allowed.  
Because this product is not explosion-proof, do not install this product at places in atmospheres with flammable gas or places with risk of leakage of flammable gas.



#### CAUTION

##### Do not install this product at places with risk of leakage of flammable gas.

Accumulation of flammable gas around the unit due to leakage of flammable gas may lead to ignition.

- Avoid installing this product at high temperature or low temperature places and at places with high humidity.  
Avoid installing this product where the temperature exceeds 35°C or temperature only reaches 0°C or less.  
Avoid installing this product at places with relative humidity of 90% or more.  
Mounting this product at places where the temperature variation per hour exceeds 8°C or more is also inappropriate.  
If you use this product in cold climates, consideration must be given not only to the unit but also to freezing of chilled and cooling water facilities.
- Do not install this product near a flame  
As a rule, install this product in a separate room away from flame facilities including boilers, etc.  
When you install this product in the same room where a boiler is placed, restriction may arise on the installation conditions. Therefore, please consult with the responsible of competent public agencies before doing so.
- Special atmosphere is not allowed  
Do not install the unit in atmospheres that attack metal, electric parts, etc.  
Be careful with the installation site of the cooling tower so that the cooling water does not become highly corrosive.  
If installed in the vicinity of contaminated rivers, seaside, plating plant and chemical plant, or main roads, take care to protect the cooling tower from inhaling harmful gases directly and increase the frequency of water examination.  
Do not install this product near ammonia facilities, exhaust ports of toilets or exhaust ports of operating rooms of hospitals, sewage treatment facilities, etc.  
Gas leakage accident due to corrosion of heat exchanger tubes of the condenser may result.



#### CAUTION

##### Do not install the unit in special atmospheres

Do not install this product in hot spring resorts, seaside areas, oily places or atmosphere with corrosive gases including ammonia. Electric shock or fire due to corrosion may result.

- Avoid installing this product in places where sound or vibration can present problems.  
Select a place where operating sound or vibration does not present possible problems.  
In response to such conditions, take proper measures for vibration isolation and sound insulation.  
Vibration may propagate from the installation and produce sound from floor or wall.  
In living areas, special attention is required when you install the unit in upper stories of a building.
- Fix the unit with bolts on a flat place that bears the weight of the unit sufficiently.  
Set the unit on a solid and level foundation (the levelness should be ≤2 mm/1000 mm).



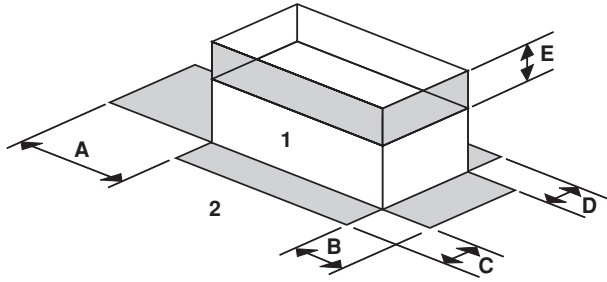
#### WARNING

##### Fix the product correctly with anchor bolts on a flat foundation that bears the weight of the unit.

Insufficient strength of the foundation and insufficient fixing may result in water leakage or a roll-over accident.



- Provide for sufficient service space.



- 1 Unit
- 2 Front side – switch box side
- A From the leftmost end of the equipment
- B From the rightmost end of the equipment
- C From the frontmost of the equipment
- D From the backmost of the equipment
- E From the top of the equipment

Service space dimensions		
A	≥3000	Required in the direction of the length or side to side (space for pulling out tubes)
B	≥500	Required both in the direction of the length and side to side
C	≥1200	Required at front side
D	≥500	Backside maintenance space
E	≥500	Required for maintenance of compressor



**CAUTION**

**Provide for enough service space.**

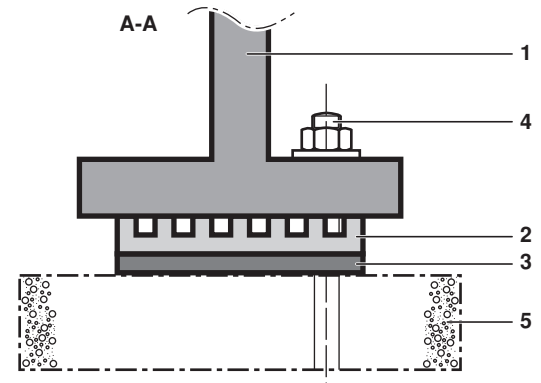
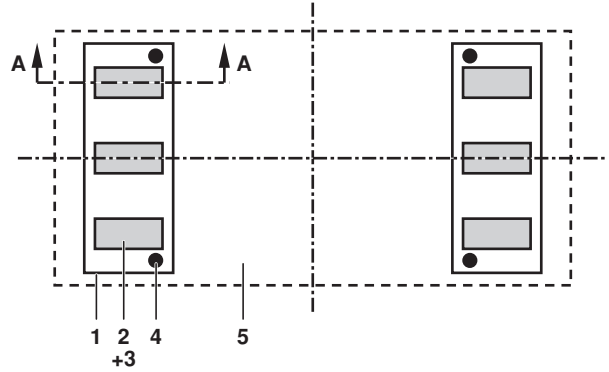
Insufficient space does not allow safe maintenance and may lead to injury.

- Pay attention to the drain  
Make foundation of the unit higher than the surrounding. For machine maintenance, the floor should be treated with water-proofing. The drainage ditch should be provided around the foundation. Equip the drain ditch with drain piping. Avoid installing the unit in a place where overhead flooding or submersion is expected during flood.
- Pay attention to lighting  
For the sake of performing daily maintenance provide for efficient lighting around the unit.  
Unit front (Switch box side): ≥100 lux.  
Surrounding of the unit except for the above: ≥80 lux.
- For further information about foundation dimensions, see the foundation drawing to perform correct work.

**Sound insulation and vibration isolation work**

- Be careful with the reflected sound  
Sound in the machine room may get higher due to the effect of reflected sound and interference with operating sound of other equipment, etc. Take appropriate sound absorption and sound insulation measures.
- Preventing the vibration propagation through piping  
Unit vibration may propagate through chilled water piping, cooling water piping and relief valve discharge pipes. Sound/vibration problems may result in unexpected places. Perform the isolation of vibration by using expansion joints immediately near the unit.

- Perform the vibration isolation in function of the installation site.  
This machine comes with vibration isolation pads and metal anti vibration supports as a standard. Position of vibration isolation pads and metal anti vibration supports as on the foundation drawing results in a sufficient degree of vibration isolation. However, when vibration is critical, like at middle stories of the building, take proper vibration isolation measures with spring vibration isolating devices.  
This machine comes with 6 vibration isolating pads and 6 metal anti vibration supports. Lay them down near foundation bolts and near the center of the unit base. (See the following figure)



- 1 Unit base
- 2 Vibration isolating pad
- 3 Metal anti vibration support
- 4 Foundation anchor bolt
- 5 Foundation

## Water quality specifications

The quality of chilled (hot) water largely affects the performance and life time of this unit. It is therefore very important to check the water quality before using it, and to keep monitoring the quality of water after installing the unit.

Water quality standard values for the water shall be as in the table.

	condenser water			evaporator water		heated water		tendency if out of criteria
	circulating system		once through system	circulating water [-20°C]	supply water	low temperature		
	circulating water	supply water	once through water			circulating water [20°C-60°C]	supply water	
<b>Items to be controlled</b>								
pH at 25°C	6.5~8.2	6.0~8.0	6.8~8.0	6.8~8.0	6.8~8.0	7.0~8.0	7.0~8.0	(C)
Electrical conductivity [mS/m] at 25°C	<80	<30	<40	<40	<30	<30	<30	(C)
Chloride ion [mg Cl <sup>-</sup> /l]	<200	<50	<50	<50	<50	<50	<50	(A)
Sulfate ion [mg SO <sub>4</sub> <sup>2-</sup> /l]	<200	<50	<50	<50	<50	<50	<50	(A)
M-alkalinity (pH 4.8) [mg CaCO <sub>3</sub> /l]	<100	<50	<50	<50	<50	<50	<50	(B)
Total hardness [mg CaCO <sub>3</sub> /l]	<200	<70	<70	<70	<70	<70	<70	(B)
Calcium hardness [mg CaCO <sub>3</sub> /l]	<150	<50	<50	<50	<50	<50	<50	(B)
Silica ion [mg SiO <sub>2</sub> /l]	<50	<30	<30	<30	<30	<30	<30	(B)
<b>Items to be referred to</b>								
Iron [mg Fe/l]	<1.0	<0.3	<1.0	<1.0	<0.3	<1.0	<0.3	(C)
Copper [mg Cu/l]	<0.3	<0.1	<1.0	<1.0	<0.1	<1.0	<0.1	(A)
Sulfide ion [mg S <sup>2-</sup> /l]	not detectable		not detectable	not detectable		not detectable		(A)
Ammonium ion [mg N <sub>4</sub> /l]	<1.0	<0.1	<1.0	<1.0	<0.1	<0.3	<0.1	(A)
Remaining chloride [mg Cl/l]	<0.3	<0.3	<0.3	<0.3	<0.3	<0.25	<0.3	(A)
Free carbide [mg CO <sub>2</sub> /l]	<4.0	<4.0	<4.0	<4.0	<4.0	<0.4	<4.0	(A)
Stability index	6.0~7.0	—	—	—	—	—	—	(C)

(A) corrosion

(B) scale

(C) corrosion+scale



### CAUTION

**Use chilled/hot water and condenser water that complies with water quality specifications.**

Deterioration of water quality may lead to water leakage, etc.

## Piping work



All field piping must be installed by a licensed refrigeration technician and must comply with relevant local and national regulations.

- The units are equipped with a water inlet and water outlet for connection to a chilled water circuit. This circuit must be provided by a licensed technician and must comply with all relevant European and national regulations.
- The evaporator and condenser are foreseen of flanges for the water inlet and outlet (refer to the outlook diagram). Evaporator and condenser water connections are to be made in accordance with the outlook diagram, respecting the water in- and outlet. If air, moisture or dust gets in the water circuit, problems may occur. Therefore, always take into account the following when connecting the water circuit:
  1. Use clean pipes only.
  2. Hold the pipe end downwards when removing burrs.
  3. Cover the pipe end when inserting it through a wall so that no dust and dirt enter.

Before continuing the installation of the unit, check the following points:

1. Measures against vibration
  - Mount the expansion joint near the unit so that operation vibration of the unit does not propagate to the equipment system.
  - Equip the piping with supports at appropriate points.

2. Supplying a proper flow to the unit  
A circulation pump must be provided in such a way that it discharges the water directly into the evaporator.



- Pump interlocks must be installed in the water outlet pipe to prevent the unit from operating at a water flow which is too low. 3 terminals are provided in the switch box for the electrical connection of the pump interlock.
- Improper installation of the pump interlock can result in severe damage of the equipment.



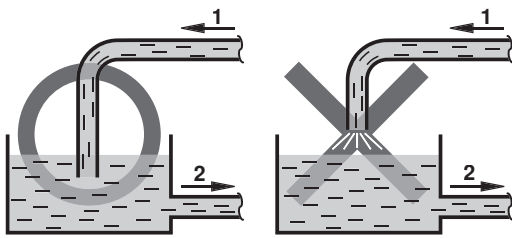
- A wire mesh strainer must be installed at the inlet of the heat exchanger to protect the heat exchanger from foreign matter. Distance between the inlet of the heat exchanger and the wire mesh strainer must be <0.5 m.
- Improper installation of the wire mesh strainer will result in severe damage of the equipment.

3. Removing foreign materials

- Periodic cleaning of the scale adhered to the inside of the unit is required.  
For the sake of facilitating the cleaning, provide the water piping system with stopvalves at both inlet and outlet sides. In addition, for ease of opening the water chamber of the condenser and evaporator, we recommend to use short pipes with flanges at both the water piping side and the unit side.
- For periodic cleaning and maintenance, provide valves for release to atmosphere, drain off valves and valves for chemical cleaning between stopvalves provided in the water piping system and the unit body.  
For drain off valves, lay down the drain piping to the drain ditch.

4. Prevent from getting mixed air into the system

- Install the air purge valves at proper positions so that the air purge of the entire equipment system is possible. Operation of units with air mixed may lead to deterioration in performance, actuation of protective devices, or damage of heat exchanger tubes.
- Pay attention to the flow velocity inside the water system, position of the expansion tank, and to the position of air purges along the piping, so that cavitations do not occur.
- This machine is designed on the precondition that circulating water is used. Use of once-through water may lead to damage of the heat exchanger tubes due to dissolved oxygen or free carbonate in chiller water (hot water) systems.
- When using the unit in a heat recovery application, additional care must be taken that water flow rate does not get excessive. In the same application, a deaeration treatment unit must be installed.
- Do not allow aeration along the cooling water system as shown in the following diagram. Aerating water causes the dissolved oxygen to increase, and pollutants in the atmosphere condensed in the water cause the water to become corrosive.



1 Discharge pipe  
2 Inlet pipe

5. Observing the operation range of the unit

- Observe the maximum operating water pressure of the unit.
- Pay attention so that the cooling water inlet temperature reaches 25°C or more. When you use the unit during intermediate season and winter season, control the cooling water supply water temperature by using a thermostat for the cooling water inlet and a 3-way mixing valve.
- Pull-down time of this machine (time required for cooling from ordinary temperature to reach the recommended operating range) is within 1 hour under no load condition. Make sure to prevent the water flow from becoming too high.
- To assure proper operation of the unit a minimum water volume is required in the system and the water flow through the evaporator must be within the operation range as specified in Table 2.

Table 2: Minimum water volume

Model	Minimum water volume (l)	Water quantity inside the evaporator (l)
EWWD440	2660	105
EWWD600	3710	110
EWWD700	4150	151
EWWD850	5020	157
EWWD11	6530	208

- When it is impossible to secure the minimum holding water quantity, increase of thermo differential value is required. For how to change the differential value, see "Settings screen" on page 14 and "Target temperature and low load stop related settings screen" on page 22.

6. Prevent corrosion of water piping and of the unit interior

- Do not install the earth of the electric equipment to the water piping. Corrosion due to electric corrosion may occur.
- If piping is to be put underground, be extremely careful and take dust preventive measures.
- Avoid execution of piping in such a way that a draft line is formed inside the condenser or evaporator while the unit is operating or stops.
- In case of semi hermetic chilled water system with a thermal storage tank, perform periodic replacement of water and cleaning and inspection of the bottom of the thermal storage tank (once every 1 or 2 years). A new concrete heat storage tank will give off ions, and it is not seldom that pH of the heat storage tank water rises above 10. If pH rises above the standard, the rate at which copper corrodes increases. The water must be changed before the pH reaches that level. If a heat storage tank is used for a prolonged period, springing and leaking of water could occur due to cracks in the heat storage tank. Water leaks pose no serious problem for water quality, but if seawater or dirty underground water springs, it could cause an outbreak of microorganisms in the water of the heat storage tank, thus producing slime in the system. It could also cause calcium carbonate to adhere.
- Make sure to perform periodic water quality inspections, especially as to water quality of the cooling water. Insufficient water quality may result not only in performance deterioration of the unit but also in damage to the heat exchanger tubes.



**CAUTION**

Use chilled (hot) water/cooling water that complies with the water quality standard as in chapter "Water quality specifications" on page 8.

Deterioration of water quality may lead to water leakage and damage to the heat exchanger tubes.

7. Freeze-up protection

- The complete water circuit, inclusive all piping, must be insulated to prevent condensation and reduction of the cooling capacity.
- Protect the water piping against water freezing during winter period (e.g. by using glycol solution or heatertape).



**CAUTION**

Do not confuse the connection of outlet and inlet of the water piping.

- Do not confuse the inlet and outlet of the chilled water and connection position of the condenser water.
- Normal operation may get impossible.
- It may lead to breakdown including freezing fracture of heat exchanger tubes.

8. Preventing excessive increase of chilled water and condenser water temperature



The water pressure should not exceed the maximum working pressure of 10 bar.

**NOTE**



Provide adequate safeguards in the water circuit to make sure that the water pressure will never exceed the maximum allowable working pressure.

## Power supply work



All field wiring and components must be installed by a licensed electrician and must comply with relevant European and national regulations.

The field wiring must be carried out in accordance with the wiring diagram supplied with the unit and the instructions given below.

Be sure to use a dedicated power circuit. Never use a power supply shared by another appliance.

## Internal wiring - Parts table

Refer to the internal wiring diagram supplied with the unit. The abbreviations used are listed below:

20R3, 20R4	.....Oil return solenoid valve circuit 1, circuit 2
20R8	.....Dryer line solenoid valve
20R1, 20R2	.....Forcely closed solenoid valve circuit 1, circuit 2
20R5, 20R6	.....Equalizing oil level solenoid valve circuit 1, circuit 2
20R7	.....Float chamber gas purging solenoid valve
20R9	.....Ejecter solenoid valve
26WE	.....Chilled water overcooling sensor
2-88X	.....Auxiliary relay run/stop monitor
42-1, 42-2	.....Deltacontactor for circuit 1, circuit 2
49C1, 49C2	.....Thermal protector compressor motor circuit 1, circuit 2
51C1, 51C2	.....Overcurrent relay for circuit 1, circuit 2
52-1, 52-2	.....Linecontactor for circuit 1, circuit 2
52X-1, 52X-2	.....Auxiliary relay for circuit 1, circuit 2
5X-1, 5X-2	.....Compressor circuit error relay for circuit 1, circuit 2
5X-3	.....Common error relay
6-1, 6-2	.....Starcontactor for circuit 1, circuit 2
63CH-1~4	.....High discharge pressure sensor
63WEL	.....Chilled water interruption sensor
88CH	.....High discharge pressure relay
88CHX	.....High discharge pressure auxiliary relay
88WCX	.....condenser water pump run/stop relay
88WE	.....Chilled water overcooling relay
88WEX	.....Chilled water pump run/stop relay
AXP1, AXP2... #	.....Pumpinterlock
BS	.....PCB-controller
BS1	.....Local stop push button
BS2	.....Local run push button
CH1, CH2	.....Oil heater for circuit 1, circuit 2
CT1, CT2	.....Current transfo
CT-T1, CT-T2	.....Current transducer 5 A/5 V; 24 V DC
F11U~F13U... #	.....Main fuses
F21U~F23U... #	.....Main fuses
F10S, F11S	.....Circuit breakers with fuses for circuit 1, circuit 2
GL1	.....Indication lamp: unit stop
GP	.....Display
H1P, H2P	..... * .....Indication lamp: run/stop remote display
H3P	..... * .....Indication lamp: common error remote display
H4P, H5P	..... * .....Indication lamp: compressor error 1, 2 remote display

H6P	..... * ..... Indication lamp: condenser water pump run/stop
H7P	..... * ..... Indication lamp: chiller water pump run/stop
HF1-2	..... Fuse for primary of TR1
HF3.1, 3.2	..... Fuse for reverse phase protector
KP1, KP2	..... Compressor slide valve position sensor for circuit 1, circuit 2
M1C, M2C	..... Compressor motors circuit 1, circuit 2
MCCB1	..... Automate fuse for secondary of TR1
NF1	..... EMC-filter for power supply PCB
NF2~NF4	..... Ferrite
ÖL	..... Indication lamp: error
PBS	..... Common error reset push button
PE	..... Main earth terminal
R2-1, R2-2	..... Auxiliary relay: error compressor motor overload / error compressor motor phase sequence
RL1	..... Indication lamp: unit running
RL2, RL3	..... Indication lamp: compressor running for circuit 1, circuit 2
RL4	..... Indication lamp: remote operation
RPP.1, RPP.2	..... Reverse phase protector for circuit 1, circuit 2
S5E	..... Emergency stop
S6S	..... * ..... Switch: remote start/stop
S10S	..... * ..... Switch: demand control ON/OFF
S12S, S14S	..... * ..... Push button: remote run, remote stop
S13S	..... # ..... Main isolator switch
Sen H	..... Discharge pressure sensor
Sen L	..... Suction pressure sensor
T2	..... Time relay; time delay / 0.5 s
Th1, Th2	..... Compressor discharge gas temperature for circuit 1, circuit 2
Th3	..... Discharge gas temperature sensor
Th4	..... Chilled water inlet temperature sensor
Th5	..... Chilled water outlet temperature sensor
Th6	..... Condenser water inlet temperature sensor
Th7	..... Condenser water outlet temperature sensor
TR1	..... Transfo control circuit
WL	..... Indication lamp: power supply

	Not included with standard unit
	Not possible as option
Obligatory	#
Not obligatory	*

## Power circuit and cable requirements

- 1 The electrical power supply to the unit should be arranged so that it can be switched on or off independently of the electrical supply to other items of the plant and equipment in general.
- 2 A power circuit must be provided for connection of the unit. This circuit must be protected with the required safety devices, i.e. a circuit breaker, a slow blow fuse on each phase and an earth leak detector. Recommended fuses are mentioned on the wiring diagram supplied with the unit.



Switch off the main isolator switch before making any connections (switch off the circuit breaker, remove or switch off the fuses).

---

## Connection of the watercooled water unit power supply

- 1 Using the appropriate cable, connect the power circuit to the L1, L2 and L3 terminals of the unit.
- 2 Connect the earth conductor (yellow/green) to the earthing terminal PE.

## Interconnection cables



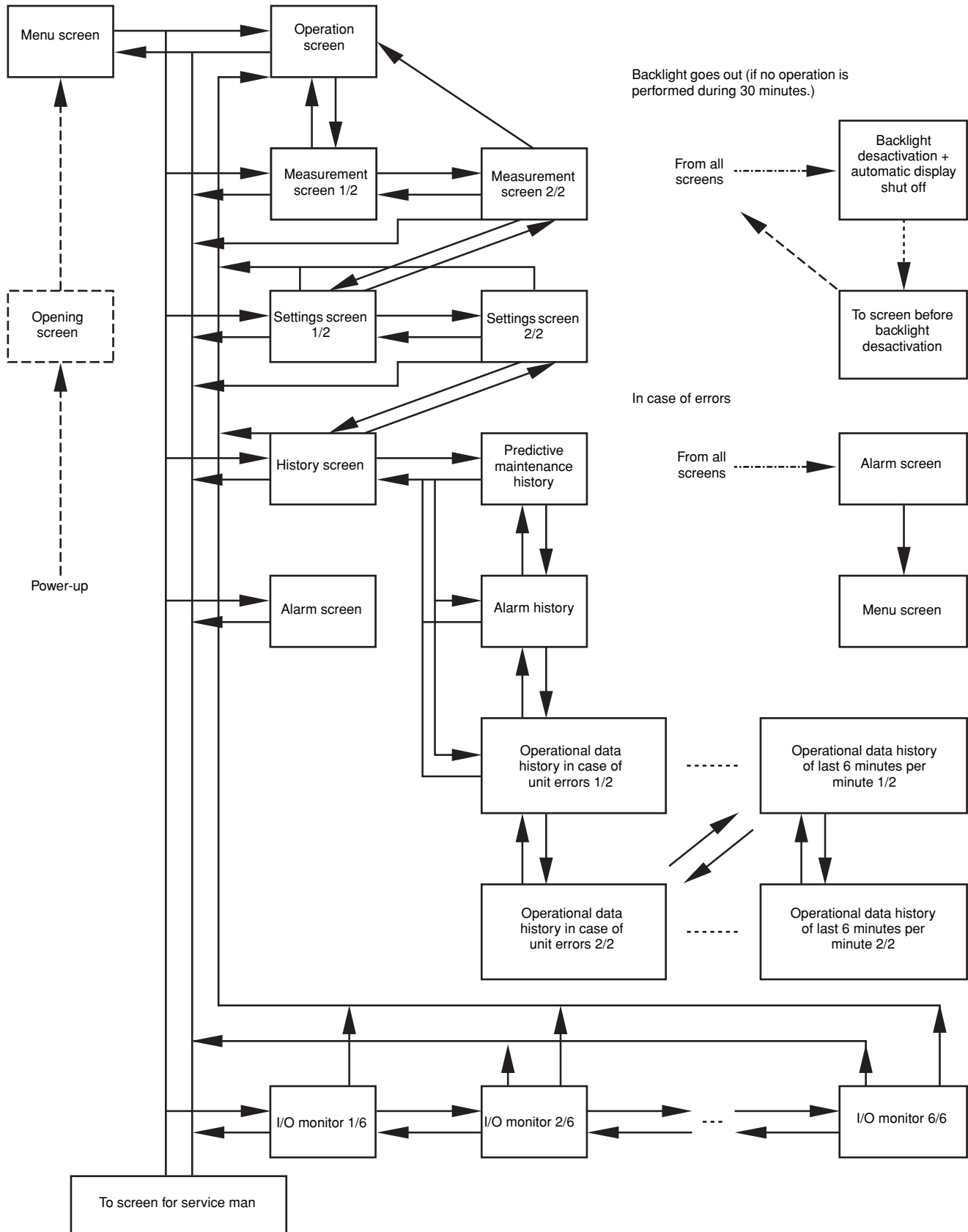
- In addition to the power supply cable, a cable must be provided for the connection of the pump interlock.  
Be sure to interlock so, that the compressor will not come into operation unless the waterpump is operated. For this purpose 3 spare terminals are provided in the switch box. Refer to the wiring diagram supplied with the unit.
  - Improper installation of this interlock can result in severe damage of the equipment.
- 

- Voltage free contacts  
The controller is provided with some voltage free contacts to indicate the status of the unit. These voltage free contacts can be wired as described on the wiring diagram. The maximum allowable current is 3 A.
- Remote inputs  
Besides the voltage free contacts, there are also possibilities to install remote inputs. They can be installed as shown on the wiring diagram.

# OPERATING THE GRAPHIC PANEL DISPLAY

This chapter explains the graphic panel display and how to change various settings.

## ■ Screen structure



- ← Direct button operation while touching **Menu**, **△**, and **▽** buttons.
- ← - - - Touching the panel will display the reset screen after shut-off of the touch panel, enabling you to return to the last screen before backlight desactivation.
- ← ····· Interrupted display (after alarm)

## Explanation common to respective screens

Buttons and indications that appear at the top/bottom of the screen

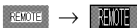
HIST MENU	OLD	NEW	▲	▼
12/12/12 12:12 (1/2)				
MOTOR1 CURRENT	123.4	A		
MOTOR2 CURRENT	123.4	A		
DISCHARGE PRES.	-1.23	MPa		
SUCTION PRES.	-1.23	MPa		
CAPACITY 1	123	%		
CAPACITY 2	123	%		
CHILLED IN TEMP.	-123.4	°C		
CHILLED OUT TEMP.	-123.4	°C		
COOL WATER IN	-123.4	°C		
COOL WATER OUT	-123.4	°C		
DISCHARGE TEMP.	-123.4	°C		
DSCH SUPERHEAT	-123.4	°C		

OPER	MEASURE (2/2)	HH:MM
DISCHARGE TEMP.1	-123.4	°C
DISCHARGE TEMP.2	-123.4	°C
M1 ON-OFF REM	123	s
M2 ON-OFF REM	123	s
OPERATING TIME1	123456	H
OPERATING TIME2	123456	H
ON-OFF COUNT1	123456	
ON-OFF COUNT2	123456	
THERMO OFF ON-OFF 1 ON-OFF 2		

- With the touch of **OPER**, the screen shifts to the operation screen.
- With the touch of **MENU**, the menu screen returns.
- With the touch of **▲**, the screen shifts to the previous screen.
- With the touch of **▼**, the screen shifts to the next screen.
- With the touch of **HIST MENU**, the screen shifts to the history menu.
- THERMO OFF** is indicated while the unit falls at low load stop (Thermo OFF).
- ON-OFF 1** is indicated while No. 1 (left) compressor is under ON-OFF limiting.
- ON-OFF 2** is indicated while No. 2 (right) compressor is under ON-OFF limiting.

### Setting selection indication of each button

In the field on which setting selection was made (touched), letters are displayed in reverse video.



### Initial screen and reset screen after shut-off of touch panel



Screen that appears immediately after powering up the control circuit.



With the touch of any part of the screen during touch panel shut-off, the screen shifts to this screen. With the touch of "LIGHT OUT SC", the screen returns to the screen before the screen was shut off.

#### NOTE



During 30 seconds immediately after powering up the control circuit, communication connection check between PLC (Programmable Logic Controller) and graphic panel display is made.

Therefore, any actions on the graphic panel display during this period, including screen change or changing of operating parameters, are not accepted.

#### NOTE



For reducing the replacement frequency of the graphic panel display, the graphic panel display shuts off automatically if no operation is made to the graphic panel display since 30 minutes.

Touching any part of the screen while the graphic panel display is shut off makes the screen shift to the right hand side screen indication as indicated in "Initial screen and reset screen after shut-off of touch panel" on page 13.

Lifetime of the backlight (time required for backlight to reduce its intensity to one half) varies depending on the ambient condition, and is about 30,000 hours.



### CAUTION

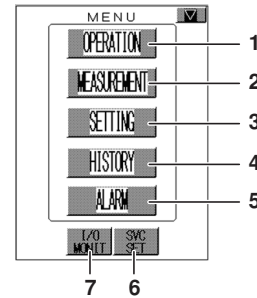
**Do not touch the graphic panel display with strong force or hard objects.**

It may result in injuries due to cracking of the display.

### Menu screen

Respective screens of this graphic panel display have buttons that allow the screen to shift to respective screens directly.

After powering up the control circuit, the initial screen shifts to this screen.



- With this screen you can select remote operation/local operation for running and stopping the unit. In case of models with 2 temperature setting option, selection of the operation mode during on the unit operation is also available.
- The "MEASUREMENT" screen indicates the various operation data of the unit. Indications appear whether the unit is running or has stopped.
- Through this settings screen you can make various settings including the chilled water outlet target temperature.
- Through this menu you can refer to the alarm history and predictive maintenance history. History of details as in the "MEASUREMENT" screen of the last 6 minutes is available (per minute).
- The alarm screen indicates the details of errors in case of abnormal stops. Reset of abnormal stop conditions is performed with this screen.
- This is a screen to make important settings in terms of unit operation including protective function settings, factory-shipped configuration, etc. Only service persons are allowed to make setting changes (password is required).
- This screen indicates I/O condition of the PLC and readouts of various analog data (for service persons only).



### CAUTION

**Do not attempt to change the settings within "SVC SET" yourself.**

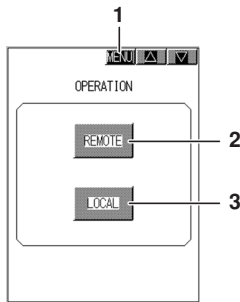
Service settings include extremely important setting items.

Erroneous settings may lead to equipment damage.

## Operation screen

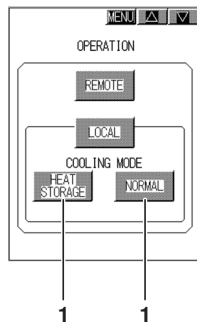
With this screen you can select remote operation/local operation for running and stopping the unit. In case of models with 2 temperature setting option, selection of the operation mode during on the unit operation, is also available.

### Standard model



- 1 With the touch of this button you shift to the menu screen.
- 2 When you want to perform ON-OFF of the unit by means of an external signal, select this button in advance.
- 3 When you want to perform ON-OFF of the unit by means of operation and stop buttons on the door of the switch box, select this button.

### Models with 2-temperature setting option



- 1 When "LOCAL" is selected, select the operation mode with these buttons. (Buttons are disabled when "REMOTE" is selected.)

#### NOTE



#### For both the standard model and the 2-temperature setting model

If you stop the unit with the stop button on the door of the switch box during Run/Stop of the unit by means of an external signal, the operation mode switches from "REMOTE" to "LOCAL" automatically. If you want to continue Run/Stop by means of an external signal, you need to select "REMOTE" again on this screen.

## Measurement screen

This screen indicates various operation data of the unit.

Indications appear, whether the unit is running or has stopped.

### "MEASUREMENT" screen (1/2)

OPER	MENU	▲	▼
MEASURE (1/2) HH:MM			
MOTOR1 CURRENT	123.4	A	
MOTOR2 CURRENT	123.4	A	
DISCHARGE PRES.	-1.23	MPa	
SUCTION PRES.	-1.23	MPa	
CAPACITY 1	123	%	
CAPACITY 2	123	%	
CHILLED IN TEMP.	-123.4	°C	
CHILLED OUT TEMP.	-123.4	°C	
COOL WATER IN	-123.4	°C	
COOL WATER OUT	-123.4	°C	
DISCHARGE TEMP.	-123.4	°C	
DSCH SUPERHEAT	-123.4	°C	

### "MEASUREMENT" screen (2/2)

OPER	MENU	▲	▼
MEASURE (2/2) HH:MM			
DISCHARGE TEMP. 1	-123.4	°C	
DISCHARGE TEMP. 2	-123.4	°C	
M1 ON-OFF REM	123	s	
M2 ON-OFF REM	123	s	
OPERATING TIME1	123456	H	
OPERATING TIME2	123456	H	
ON-OFF COUNT1	123456		
ON-OFF COUNT2	123456		

Compressor operating time and ON-OFF count of the compressor is indicated individually for No. 1 (Left) and No. 2 (Right).

#### NOTE



- The items in the figure with "1" at the end of the left column is data for the left compressor.
- The items in the figure with "2" at the end of the left column is data for the right compressor.

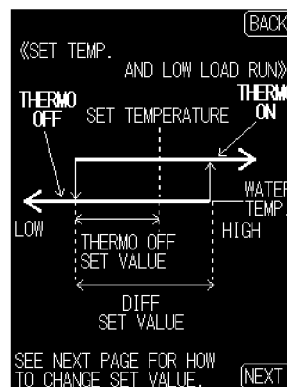
## Settings screen

Through this screen you can make various settings including the chilled water outlet target temperature.

### Standard model "SETTING" screen (1/2)

OPER	MENU	▲	▼
SETTING (1/2)			
SET TEMPERATURE	-12.3	°C	1
LOW LOAD RUN	THERMO OFF	12.3	°C 2
	DIFF	12.3	°C 2
CHILLED WTR PUMP REMAIN TO RUN	123	s	3
DEMAND	123	%	4

- 1 Set the target value of the chilled water outlet temperature.
- 2 Make settings related to the low load stop.
- 3 Make setting of the remaining operating time of the pump. The setting value shall be 360 seconds or more.
- 4 Make setting of the current demand control.



«PUMP REMAIN TO RUN»  
WHEN CHILLER STOPS ONLY PUMP CONTINUES TO RUN FOR THE SET TIME.

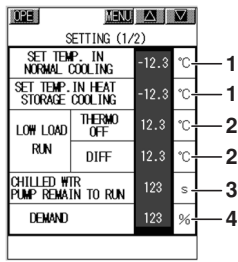
«DEMAND»  
CONTROLS THE MOTOR CURRENT UPPER LIMIT FOR EACH COMPRESSOR SO AS NOT TO EXCEED THE SET VALUE ONLY WHEN EXTERNAL DEMAND SIGNAL IS INPUT.  
FOR EXAMPLE, WHEN 80% IS SET EACH MOTOR CURRENT IS LIMITED TO A MAX. OF 80%.

SEE NEXT PAGE FOR HOW TO CHANGE SET VALUE. (NEXT)

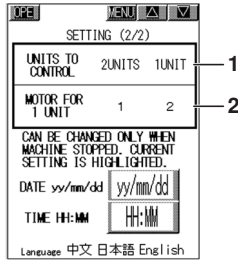


**NOTE** Touching any of the items will display a brief explanation on the item.

**“SETTING” screen (1/2) for models with 2-temperature setting option**

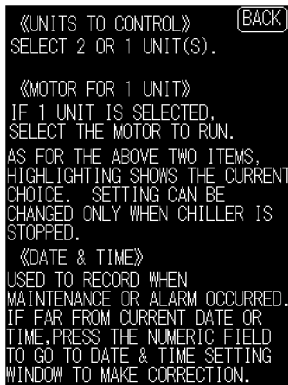


**“SETTING” screen (2/2)**



- 1 This is a setting on number of compressors in operation during full load operation. Normally select "2UNITS".
- 2 In this field you need to set the compressor that starts first after power-up of the unit. "1" is left side viewed compressor from the front of the switch box. "2" is right side viewed compressor from the front of the switch box. If "UNITS TO CONTROL" is set to "1UNIT", only the compressor selected in this setting operates.

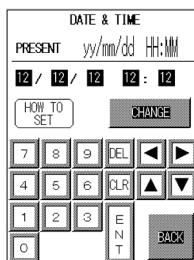
**NOTE**



Touching any of the items will display a brief explanation on the item.

**How to change settings of “DATE” and “TIME”**

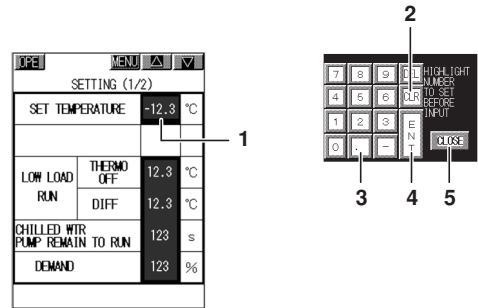
- 1 Touch the time setting. The following screen appears.



- 2 Scroll through fields in reverse video using the arrow keys.
- 3 Touch the "CLR" button to erase the current setting. Input the correct value using the keypad.

- 4 Touch the "ENT" button to finally confirm that the correct value has been input.
- 5 Touch the "CHANGE" button to enter your modifications into memory.
- 6 Touch the "BACK" button to exit the date and time settings screen.

**How to change settings in the touch panel**



Example: You want to set the target temperature to 7.0°C.

- 1 Touch the target "SET TEMPERATURE" setting → the keypad appears.
- 2 Touch the "CLR" button to erase the current set point (The set point indication becomes 0.0).
- 3 Enter e.g. "7.0". If an error is committed during input, clear the figures one by one using the "DEL" button to input the correct value.
- 4 To confirm the correct input, touch the "ENT" button. (\* Touching the "ENT" button results in confirmation of the setting change. Be sure that the input is correct before touching the "ENT" button.
- 5 Touch the "CLOSE" button to close the keypad.

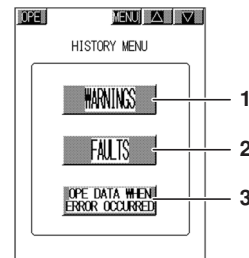
Repeat steps 1~5 to change other settings.

**History screen**

In this screen you can consult the alarm history and predictive maintenance history.

History of details as in the "MEASUREMENT" screen of the last 6 minutes is available (per minute).

**History menu screen**



- 1 To consult the history of predictive maintenance.
- 2 To consult the alarm history.
- 3 This screen stores the operational data history in case of abnormalities.

**■ Predictive maintenance history (“WARNINGS”)**

If harmful operating conditions occur, information about such conditions is listed in the predictive maintenance history which pops up. Indications on predictive maintenance do not lead to unit stop, but must be looked after carefully.

## ■ Alarm history ("FAULTS")

If the unit suffers abnormal stops, the alarm history pops up. Both unit errors and compressor only errors are stored in the history.

## ■ Unit error

Unit errors indicate a critical malfunction such as a discharge high-pressure error or a chilled water overcool error that has effect on the entire unit. Both compressors stop.

## ■ Individual compressor error

Individual compressor errors indicate the error of an individual compressor such as a motor overload.

The alarm is indicated and the error-side compressor stops. The compressor of the side where the error does not occur continues to operate.

### NOTE

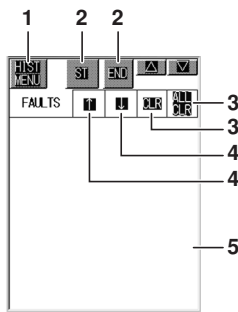


- In case of a unit error, history of details on operational data of the last 6 minutes is stored per minute in "OPE DATA WHEN ERROR OCCURED". These details are kept in memory until completion of the error reset.

**Record all details of the last 6 minutes before resetting the error.**

- In case of an individual compressor error, history on operational data is not recorded, as the unit keeps running.
- It is always possible to consult the last 6 minutes operational data per minute during normal operation through this screen.

## "FAULTS" screen (identical to the "WARNINGS" screen)



- 1 This is the button for jumping to the history menu.
- 2 Use these buttons when you want to see older data that does not appear on the the screen or when you erase data.
- 3 Use these buttons when you erase the data.
- 4 Use these buttons to scroll the data.
- 5 Indications of date and time when the error occurred and details of the error. History of 128 events in order of occurrence is kept in memory.  
(\* Permanent power off for prolonged periods may result in memory to be cleared. (New models: 60 days, when lifetime of the graphic panel display battery expires: 6 days).

## How to clear everything (total clear)

- 1 Touch the "ST" button.  
A frame appears as if it encloses the uppermost message.
- 2 Touch the "ALL CLR" button to clear all events.
- 3 Touch the "END" button.

## How to clear an individual event

- 1 Touch the "ST" button.  
A frame appears as if it encloses the uppermost message.
- 2 Move the frame to the desired message using the "↑" and "↓" buttons.
- 3 Touch the "CLR" button to erase the selected event.
- 4 Touch the "END" button.

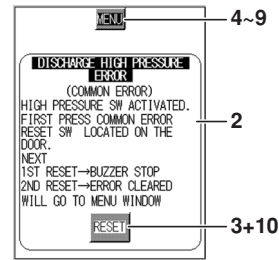
## Error resetting method

This chapter explains about how to reset errors in case the unit was stopped.

As how to reset actions are listed in the graphic panel display, resetting the error can be executed by doing as indicated.

For ensuring a proper error cause investigation however, we recommend you to perform reset step by step as described below.

- 1 Solve the cause of error.  
(If the solution is not performed correctly, "RESET" may not be possible.)
- 2 In case of a unit error, push the unit error reset button on the door of the switch box.

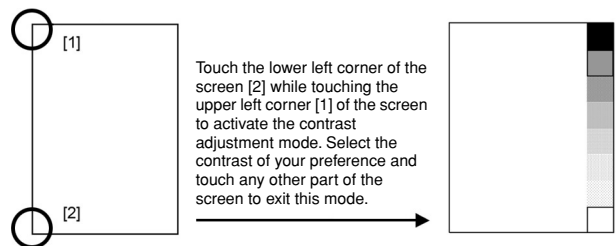


- 3 Touch the "RESET" button on the graphic display panel once.  
The alarm buzzer stops.
- 4 Select the "HISTORY" screen through the "MENU" screen.
- 5 Select "OPE DATA WHEN ERROR OCCURRED" from the "HISTORY" screen.
- 6 Record the listed 6 minutes data.
- 7 Return to the "MENU" screen.
- 8 Select the "ALARM" screen from the "MENU" screen.
- 9 Return to the above error occurrence screen.
- 10 Touch the "RESET" button once again to reset the error.

## Adjusting the contrast and brightness of the screen

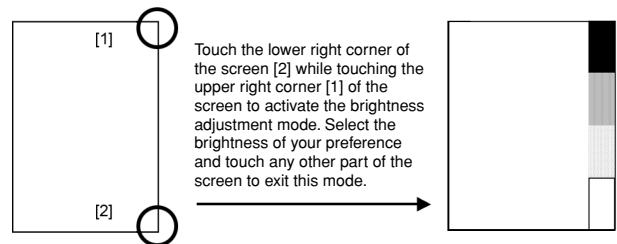
Adjustment of the contrast and brightness of the screen can be performed as follows.

### ■ Adjustment of the contrast



Touch the lower left corner of the screen [2] while touching the upper left corner [1] of the screen to activate the contrast adjustment mode. Select the contrast of your preference and touch any other part of the screen to exit this mode.

### ■ Adjustment of the brightness



Touch the lower right corner of the screen [2] while touching the upper right corner [1] of the screen to activate the brightness adjustment mode. Select the brightness of your preference and touch any other part of the screen to exit this mode.

**WARNING****Do not dismantle or modify the touch panel.**

Electric shock or fire may result.

**Do not replace the built-in lithium battery by yourself.**

Incorrect replacement methods may result in explosion of the battery.

**CAUTION****Do not expose the graphic panel display to direct sunlight.**

Liquid crystal inside the graphic panel display deteriorates by ultraviolet light in sunlight.

**Do not expose the graphic panel display to high/low temperature.**

Exposure to temperatures  $\leq -20^{\circ}\text{C}$  may result in breaking of the panel due to coagulation of liquid crystals.

Exposure to temperature of  $\geq 60^{\circ}\text{C}$  can cause the liquid crystal not to return to original isotropic liquid.

**Do not wipe the graphic panel display with thinner or organic solvent.**

This may result in damage to the product.

**BEFORE TEST RUN**

For your safety and to ensure the lifetime of the unit, make sure to check before test run what follows.

Refer to "Safety considerations" on page 1 as well.

If any imperfection is found during this check, do not perform test run and consult your dealer.

**Checking the electric circuit (Check the following before power-up)**

- Sufficient insulation resistance of the circuit  
Before power-up, be sure to confirm the insulation resistance between ground and each phase and between respective phases.  
Use a 500 V DC insulation-resistance tester. Reference value is  $\geq 10\text{ M}\Omega$ .
- Correct connection of power supply  
Make sure that there is no reverse phase or phase interruption. Check the power connection section (terminal block) for looseness.

**WARNING****Use prescribed cables for wiring, and make sure that connections are secure.**

Fix the wiring correctly.

It must be impossible that external force on cables has influence on terminal connections.

Incomplete connection or fixing can lead to heat generation or fire.

- Earthing work  
Make sure that earthing work has been performed according to the wiring diagram supplied with the unit.

**CAUTION****Provide proper grounding for the unit.**

Do not connect the earth wire to gas piping, water piping, lightning rod, earth wire of telephones, etc.

Incomplete earthing may result in electric shock.

- Cleaning inside the switch box  
Remove wire scrap, chips, etc. produced during installation work and power supply work before powering up the unit.

**CAUTION****Do not leave unnecessary objects inside the switch box.**

Remove wire scrap, chips, tools, etc. before powering up the unit. It may result in electric shock or fire.

**Checking the bridge wiring**

- Interlock circuit of the pump is connected  
Make sure that the interlock signal of the pump is connected. This contact is one of the protective devices of the unit and very important.

**CAUTION****Do not perform any forced operation by short-circuiting protective devices.**

Do not perform operation with interlock circuit of the pump short-circuited. It may result in explosion or damage to the equipment.

- Contact specification is correct  
Check that the voltage circuit is connected to the voltage free Run/Stop circuit.  
Recheck that contact capacity is correct.
- Connection of bridge wiring  
Make sure that there is no cross connection or omission of connection, etc.
- No looseness in terminal connection  
Make sure that there are no loose terminal connections. Looseness may present problem in exchange of I/O signals and further lead to fire.

**Check at first electrification**

- Correct power supply specification  
Make sure that the voltage is within  $\pm 10\%$  of the value stated in machine label.  
Make sure that the frequency is within  $\pm 2\%$  of the value stated in machine label.  
The voltage imbalance level among 3 phases must be within  $\pm 2\%$  of the rated voltage.

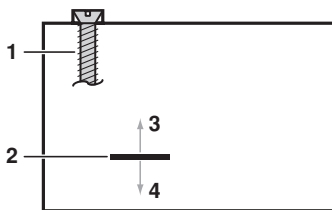
**CAUTION****Observe the specified power source.**

If you use a power supply other than specified on the machine rating plate, it could result in fire or electrical shock.

- In order to avoid compressor damage, it is necessary to switch on the crankcase heater for **at least 6 hours** before starting the compressor.

## Checking the water system

- Pump is filled with water  
Fill the water piping, taking into account the minimum water volume required by the unit. Refer to "Table 2: Minimum water volume" on page 9.  
Perform an air purge at the same time. Purging air is possible by opening the airpurge valves on top of the condenser and evaporator.  
Operation with insufficient air purge can lead to drop of performance.
- Water pressure is less than the specified value  
Check the chilled water side and condenser water side water pressure.  
Check the water pressure not only during normal flow, but also at pump start.  
If water pressure is over the maximum operating water pressure, it may damage the machine.  
In case of a standard model, the maximum operating water pressure is 1.0 MPa both at chiller water side and condenser water side.
- No water leakage  
Make sure that there is no water leakage from flanges or shells.
- No mixing of air  
Sound like "gobo gobo" while the water flows, or pressure gauges attached to the equipment oscillate, or while the pump operating current is unstable, means that air got mixed into the water system.  
Perform an air purge again.  
Mixing of air not only makes the unit performance drop, but also leads to damage of heat exchanger tubes inside the condenser and evaporator.
- Flow rate adjustment has been made  
Adjust the flow rate to a proper rate using a flow meter and adjust the rate in function of the pump characteristics chart.  
Too low flow rate not only makes the unit performance drop, but also leads to damage due to acceleration in adhesion of contaminant and foreign matters to the heat exchanger tubes.  
Excessive flow rate may lead to damage due to corrosion of heat exchanger tubes.
- Make adjustment of water interruption relay (Protective device)  
Be sure to make this adjustment. You can adjust the water interruption relay on the unit by turning the adjusting screw on top of the protective device.



- 1 Adjusting screw
- 2 Metal piece contact
- 3 When water flows
- 4 During water flow failure

Remove the cover of the water interruption relay to observe the movement of the internal metal piece contact. **Check that the metal piece contact moves upward when the water flows and moves downward during water flow failure.** If the contact has already moved upward during water flow failure, turn the adjusting screw clockwise by means of a screwdriver so that the contact moves as indicated in the drawing. If the contact does not move upward while water flows, adjust it by turning the adjusting screw counterclockwise.

## Checking the unit body

- Open all shut-off valves indicated by a red label: "OPEN THIS VALVE BEFORE OPERATION".  
**All stopvalves, except those for charging of refrigerant or oil, must be opened prior to start of the unit. Be sure to check that they stay opened.**

Stopvalves given below are installed.

Installation position	Stopvalve shape	Comment
Suction piping	Suction stop valve	Important
Liquid piping (Bottom)	Copper pipe stopvalve	Important EWW440/600: 1 point EWW850: 2 points
Condenser top (Right and left)	Copper pipe stopvalve (3/8")	2 points, right and left
Condenser top (Center)	Copper pipe stopvalve (3/8")	—
Copper pipe from condenser to compressor	Packless valve (3/8")	2 points, right and left
Compressor discharge chamber (Oil discharge valve)	Copper pipe stopvalve (3/8")	2 points, right and left Use at normally closed condition.
Float chamber top	Copper pipe stopvalve (3/8")	—
Float chamber	Packless valve (5/8")	—
Evaporator bottom	Copper pipe stopvalve (3/8")	3 points, right and left
Liquid pipe (Refrigerant charge valve)	Copper pipe stopvalve (3/8")	EWW440/600: 1 point EWW850: 2 points Use at normally closed condition.
Copper pipe from evaporator to suction pipe	Copper pipe stopvalve (3/8")	—
Pressure gauge valve	3-way stopvalve for copper pipe (3/8")	2 points, Be sure to use at intermediate opening

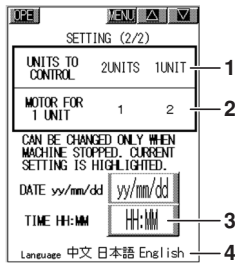
- Oil charge valve and refrigerant charge valve are used under normally closed condition.
- The pressure gauge valve (discharge pressure/suction pressure) is designed as a 3-way valve enabling maintenance of either the pressure sensors or the pressure gauge itself. **Do not fully open these valves but keep them at an intermediate opening.**
- Valves other than described in the 2 points above, are used under normally opened condition.

## Checking the settings on the controller

- Prior to putting the unit into operation, change the settings of the graphic panel display to the details that meet your configuration. Refer to "Operating the graphic panel display" on page 12 and to "Functions of this model" on page 21.
- The "SETTING (1/2)" screen represented below is the one of a model with 2-temperature setting option. In case of the standard model, the target temperature to be set will be represented with "SET TEMPERATURE".

ITEM	SETTING (1/2)	UNIT	NO.
SET TEMP. IN NORMAL COOLING	-12.3	°C	1
SET TEMP. IN HEAT STORAGE COOLING	-12.3	°C	1
LOW LOAD THERMO OFF	12.3	°C	2
RUN DIFF	12.3	°C	2
CHILLED WTR PUMP REMAIN TO RUN	123	s	3
DEMAND	123	%	4

- 1 Set the chilled water outlet temperature target value. The standard model is an outlet temperature control-only model.
- 2 Make settings for the low load stop function.
- 3 Set the remaining operating time of the pump. In case of models with 2-temperature setting option, also the cooling water pump uses this setting. The setting value shall be 360 seconds or more.
- 4 Make setting of the current demand control.



- 1 This is a setting on number of compressors in operation during full load operation. Normally select "2UNITS".
- 2 In this field you need to set the compressor that starts first after power-up of the unit. "1" is the left side viewed compressor from the front of the switch box. "2" is the right side viewed compressor from the front of the switch box. If "UNITS TO CONTROL" is set to "1UNIT", only the compressor selected in this setting operates.
- 3 Set the year, month, day and time.
- 4 Set the display language. (English, Chinese and Japanese are available.)

## INSTRUCTIONS BEFORE OPERATION

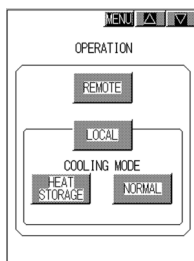
### First operation (Very important)

Before full-scale operation of the unit and at first operation after longer periods of standstill (6 months), be sure to perform and check the items described below while witnessing the first operation.

Selection between remote operation ("REMOTE") or local operation ("LOCAL") for the unit to run or to stop, is set on the graphic panel display.

["MENU" → "OPERATION"]

- 1 In order to avoid compressor damage, it is necessary to switch on the crankcase heater for at least 6 hours before starting the compressor.
- 2 Select "LOCAL"

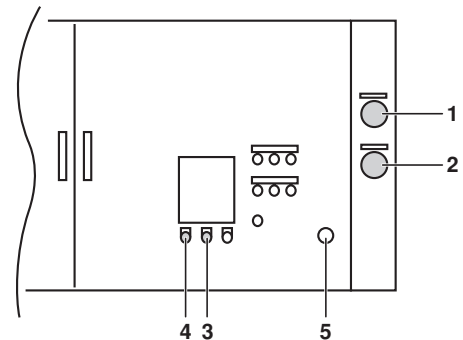


**NOTE** This is the screen of models with 2-temperature setting option. In the screen for standard models, the field for cooling mode selection does not appear.

- Never attempt to perform a first time check of the unit running or stopping by means of a remote signal.
- For the first time check, it is required to perform a witness operation to stop the unit immediately in case of emergency.

- 3 Perform inching of the compressor by starting the unit and stopping the unit after 2 to 3 seconds of operation

### Task to check: Direction of rotation of the compressor



- 1 Discharge pressure gauge
- 2 Suction pressure gauge
- 3 Start button (green)
- 4 Stop button (red)
- 5 Emergency stop button (red)

**Judgment: Pressure indicated by the discharge pressure gauge shall exceed the pressure indicated by the suction pressure gauge.**

If the discharge pressure increases due to operation of the compressor, the compressor rotates in the correct direction.



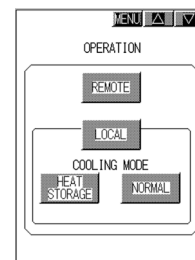
- Perform this check on both compressors.
- For performing this check efficiently, it is recommended to first read the paragraph "SETTING screen (2/2)" on page 15 and to set starting sequence of compressors in function of your witness test.

### Local operation on the unit "LOCAL"

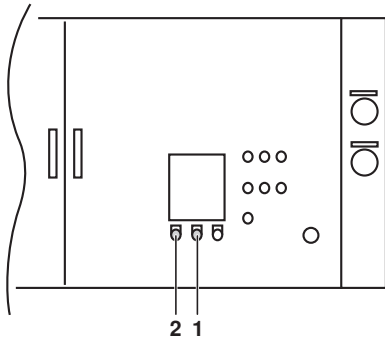
Selection between remote operation ("REMOTE") or local operation ("LOCAL") for the unit to run or to stop, is set on the graphic panel display.

["MENU" → "OPERATION"]

- 1 Select "LOCAL"



- NOTE** This is the screen of models with 2-temperature setting option. In the screen for standard models, the field for cooling mode selection does not appear.
- Selection must be made while the unit is stopped. Switching between "REMOTE" and "LOCAL" while the unit is operating (even when thermostat is OFF) causes the unit to stop.



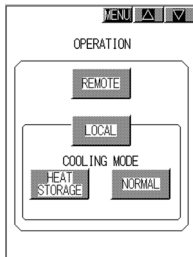
- 1 Push the start button (green)  
If "REMOTE" is selected on the touch panel control screen, this button is disabled.
- 2 Push the stop button (red)  
This button always takes effect irrespective of the "LOCAL" or "REMOTE" setting on the display panel.

**!** The stop button on the switch box door always takes effect irrespective of the "LOCAL" or "REMOTE" setting on the display panel. However, if you stop the unit with the stop button while "REMOTE" is selected, the "REMOTE" selection shifts to "LOCAL" automatically.

### Remote operation "REMOTE"

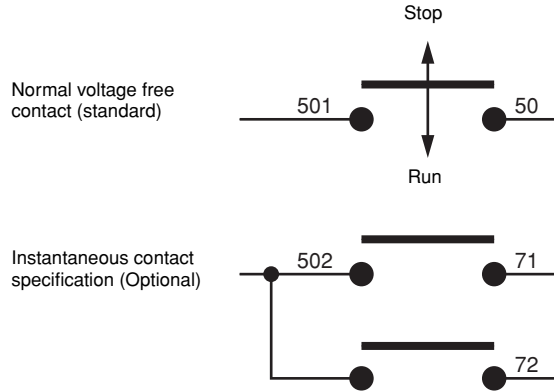
Selection between remote operation ("REMOTE") or local operation ("LOCAL") for the unit to run or to stop, is set on the graphic panel display.  
["MENU" → "OPERATION"]

- 1 Select "REMOTE" in advance



- NOTE**
- This is the screen of models with 2-temperature setting option. In the screen for standard models, the field for cooling mode selection does not appear.
  - Selection must be made while the unit is stopped. Switching between "REMOTE" and "LOCAL" while the unit is operating (even when thermostat is OFF) causes the unit to stop.

- 2 Input the run/stop signal remotely.



**!** **CAUTION**  
**Do not apply voltage in case of the voltage free configuration.**

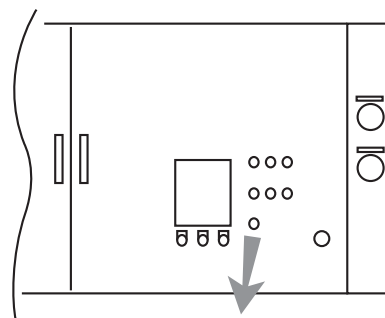
It may lead to damage of the PLC.

- Refer to the wiring diagram delivered with the unit.
- In case of instantaneous contact input specification, a pulse width of 200 msec or more is required.
- The stop button on the switch box door always takes effect irrespective of the "LOCAL" or "REMOTE" setting on the display panel. However, if you stop the unit with the stop button while "REMOTE" is selected, the "REMOTE" selection shifts up to "LOCAL" automatically.
- If you want to operate the unit remotely continuously, you need to reselect the "REMOTE" setting in the graphic panel display again before operation.

### Confirming the ON/OFF condition

#### On the unit

Several operational conditions can be read from the state of the lamps on the switch box door of the unit.



- Power ON/OFF
- Error
- Remote operation
- Chiller ON
- Compressor 1 ON
- Compressor 2 ON
- Chiller OFF

Lamp name	Color	Lighting condition	Remarks
Power ON/OFF	White	When the unit is powered-up	Standard
Error	Red	In case of error	
Chiller ON	Green	When the unit accepts the operation request	
Compressor 1 ON	Green	When the left compressor viewed from the front operates	
Compressor 2 ON	Green	When the right compressor viewed from the front operates	
Chiller OFF	Red	When the unit stops (Exclusive of thermo OFF)	
Remote operation	Green	When the remote Run/Stop operation is selected	

### By remote signal

Several operational conditions can be followed remotely in case of appropriate bridge wiring connections.

- Unit is running or is stopped.
- Signal for unit error and for individual compressor error
- Selected operation mode (for models with the 2-temperature setting option only)



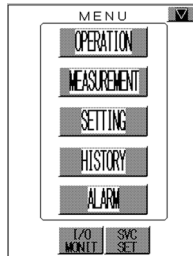
- Output contact specification of voltage-free contacts are all normal open contacts.
- Contact capacity shall be 10 mA to 3 A per contact.

### Consulting operational data

Various operation data of the unit can be read on the graphic panel display.

["MENU" → "MEASUREMENT"]

- 1 Select "MEASUREMENT" from the "MENU" screen.



#### NOTE



- The next screen is for standard models with chilled water specification.
- In case of models with heat recovery specification, indication of hot water temperature appears (Inlet/Outlet).

OFF	MEASURE (1/2)	HH:MM
	MOTOR1 CURRENT	123.4 A
	MOTOR2 CURRENT	123.4 A
	DISCHARGE PRES.	-1.23 MPa
	SUCTION PRES.	-1.23 MPa
	CAPACITY 1	123 %
	CAPACITY 2	123 %
	CHILLED IN TEMP.	-123.4 °C
	CHILLED OUT TEMP.	-123.4 °C
	COOL WATER IN	-123.4 °C
	COOL WATER OUT	-123.4 °C
	DISCHARGE TEMP.	-123.4 °C
	DSCH SUPERHEAT	-123.4 °C

OFF	MEASURE (2/2)	HH:MM
	DISCHARGE TEMP. 1	-123.4 °C
	DISCHARGE TEMP. 2	-123.4 °C
	M1 ON-OFF REM	123 s
	M2 ON-OFF REM	123 s
	OPERATING TIME1	123456 H
	OPERATING TIME2	123456 H
	ON-OFF COUNT1	123456
	ON-OFF COUNT2	123456
	HERMO OFF	ON-OFF 1 ON-OFF 2



- The items in the figure with "1" at the end of the left column is data for the left compressor.
- The items in the figure with "2" at the end of the left column is data for the right compressor.

## FUNCTIONS OF THIS MODEL

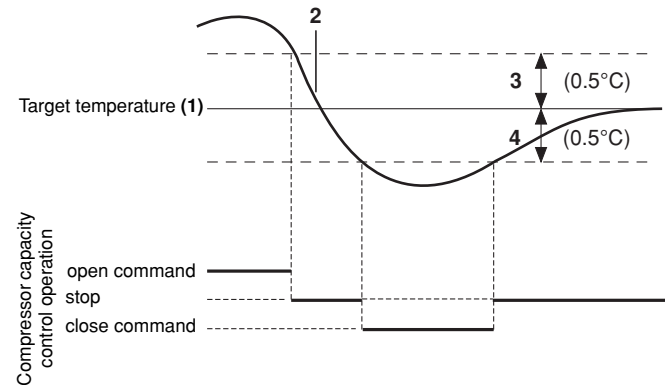
### Automatic water temperature control

This unit has a function that performs automatic control by bringing the chilled water to the target temperature.

The capacity control mechanism inside the compressor (slide valve) stabilizes the chilled water outlet temperature in function of variations in cooling load.

Set the target temperature on the graphic panel display.  
["MENU" → "SETTING" → "SETTING (1/2)"]

See "Target temperature and low load stop related settings screen" on page 22.



**Figure:** Chilled water outlet temperature diagram in case of load variation.

- 1 Target temperature (to be set on the touch panel)
- 2 Chilled water outlet temperature
- 3 Plus side dead zone
- 4 Negative side dead zone

### Low load stop (Thermo off)

When the cooling load decreases beyond the capacity control range of the unit, the chilled water outlet temperature continues to decrease gradually in function of the target temperature.

This unit has a function that allows the compressor to suspend its operation automatically when the chiller water outlet temperature has lowered beyond a certain limit. When the chiller water temperature rises, the operation of the compressor restarts. (Restart is not available when ON-OFF limiting time of the compressor is activated.)

Set the thermo OFF temperature and differential temperature on the graphic panel display.

["MENU" → "SETTING" → "SETTING (1/2)"]

See "Target temperature and low load stop related settings screen" on page 22.



Thermo OFF temperature and differential temperature in case of models with the 2-temperature setting option have influence on several operation modes.

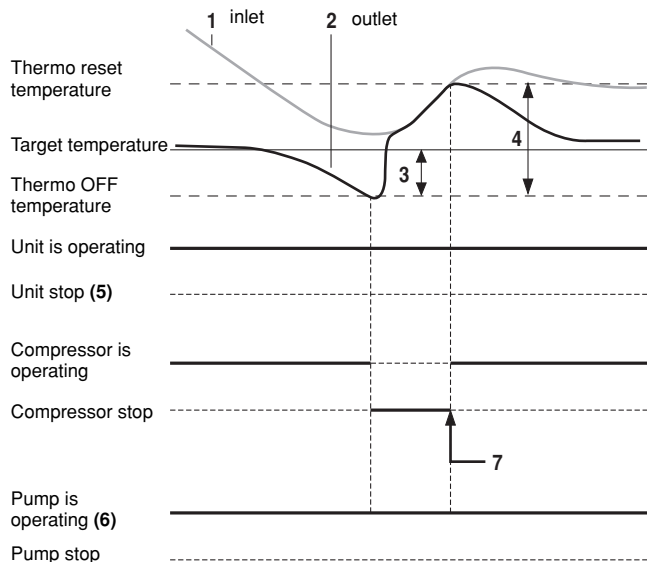


Figure: Unit operation between thermo OFF and thermo reset.

- 1 Chilled water inlet temperature
- 2 Chilled water outlet temperature
- 3 Thermo OFF temperature default setting=1.0°C
- 4 Thermostat differential (default setting=3.0°C)
- 5 Unit stop [OPERATE/STOP monitor 2-88X]
- 6 Pump is operating  
[Chilled water pump operation command 88WEX  
Cooling water pump operation command 88WCX]
- 7 Operation restarts after timer count-up in case the ON-OFF limiting timer was activated

### Target temperature and low load stop related settings screen

See "How to change settings in the touch panel" on page 15 to change the settings.

ITEM	SETTING (1/2)	UNIT	VALUE
1	SET TEMP. IN NORMAL COOLING	°C	-12.3
1	SET TEMP. IN HEAT STORAGE COOLING	°C	-12.3
2	LOW LOAD THERMO OFF	°C	12.3
3	RUN DIFF	°C	12.3
	CHILLED WTR PUMP REMAIN TO RUN	s	123
	DEMAND	%	123

- 1 Set the target temperature for chilled water outlet temperature.
- 2 Set the Thermo OFF temperature (default setting=1.0°C).
- 3 Set the thermostat differential temperature (default=3.0°C).

### NOTE



- This is the screen of models with the 2-temperature setting option. For standard models, the target temperature is represented by one line only.
- Touching any of the items will display a brief explanation on the item (except for the target temperature).

Please check the following first in case the unit repeats low load stops frequently

1. **Cooling load is lower than the capacity control range of the unit.**  
Capacity control range is up to 25% of the full load capacity condition as stated in the catalog.  
This does not mean that the capacity control opening of the compressor is 25%. However, in some cases, we take a liberty of setting the minimum capacity control range to 25% or higher, depending on the service conditions of the customer.  
For further information, check the delivery specification.
2. **The holding water quantity is correct.**  
If the thermo differential setting in function of the holding water quantity is extremely small, this may lead to the repetition of frequent ON-OFF.  
Possible solution is to increase the thermo differential setting value on the graphic panel display "SETTING (1/2)" screen.  
Further, if the holding water quantity is extremely low, frequent ON-OFF of the unit is inevitable even though the adjustment of settings has been done. This may largely affect the airconditioning or cooling system process.  
Check the minimum holding water quantity of this unit and make sure that the system has a sufficiently important margin.  
In case the system is equipped with a by-pass circuit, make sure to add volume of the by-pass circuit to the minimum water volume of the unit. For minimum holding water volume, see Table 2: Minimum water volume on page 9.

### ON-OFF limiting function

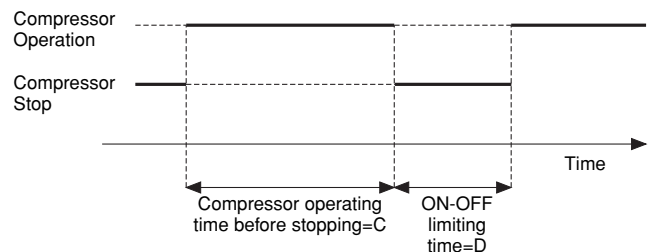
Cooling of the compressor motor is performed by suction refrigerant gas.

However, if the compressor repeats Run/Stop frequently, the cooling effect of the suction refrigerant gas decreases and the motor coil temperature of the compressor may increase excessively.

This function is set up to prevent the excessive increase of motor coil temperature due to frequent Run/Stop of the compressor.

During ON-OFF limiting time, the compressor does not start. If the compressor is requested to start during this period, the compressor starts after count-up of the ON-OFF limiting time only.

ON-OFF limiting time is counted for each compressor individually.



Maximum ON-OFF limiting time: 600 seconds=A  
Minimum ON-OFF limiting time: 180 seconds=B

Figure: How ON-OFF limiting time is decided.

### Relationship between A, B, C and D

- if  $A - C \geq B \Rightarrow D = A - C$
- if  $A - C < B \Rightarrow D = B$



Namely,

1. If the operating time of the compressor immediately before stop is 420 seconds or more: ON-OFF limiting time is 180 seconds.
  2. If the operating time of the compressor immediately before stop is less than 420 seconds: ON-OFF limiting time becomes [600–operating time of the compressor immediately before stop] seconds.
- ON-OFF limiting time immediately after power-up to the control circuit of the unit becomes 180 seconds.
  - Do not try to shorten the ON-OFF limiting time by turning the circuit breaker of the control circuit ON and OFF after stop of the unit.



**CAUTION**

**Do not try to shorten the ON-OFF limiting time by turning the circuit breaker of the control circuit ON and OFF.**

It may lead to abnormal stops due to overheat of the motor.

**Current limiting function**

When the condenser water temperature is high or adhesion of contamination to the inside of the condenser heat exchanger tubes is large, the operating current of the unit increases.

This function is for optimization of the cooling capacity in relation to protection of electrical components such as the compressor motor, even under conditions of high current values.

If the operating current of the individual compressor exceeds the Maximum Load Amps, this function forcedly performs the capacity control of the compressor until the operating current reaches the Maximum Load Amps or less.

If only one compressor out of 2 exceeds the Maximum Load Amps, the capacity control is performed on the compressor that exceeds the Maximum Load Amps only.

Because the unit shifts to partial load operation due to working of this function, the cooling capacity reduces. Abnormal stops however, due to activation of safety devices such as overcurrent relays, do not occur and continuous operation of the unit is available. See "Figure: Current limiting function/Current demand function" on page 23.

**Current demand function**

For sites where you want to benefit from the capacity of an entire system (=with several units), it is possible to limit and to control the operation current of each unit individually.

For automatic capacity control of the entire system, this function enables you to set the upper limit value of the compressor operation current to a predetermined current value, instead of to the Maximum Load Amps of the compressors.

Set the demand value (% relative to the reference current value) on the graphic panel display

["MENU" → "SETTING" → "SETTING (1/2)"]

This function takes effect only when the remote signal for current demand stays ON. See "Figure: Current limiting function/Current demand function" on page 23.

**Table 3**

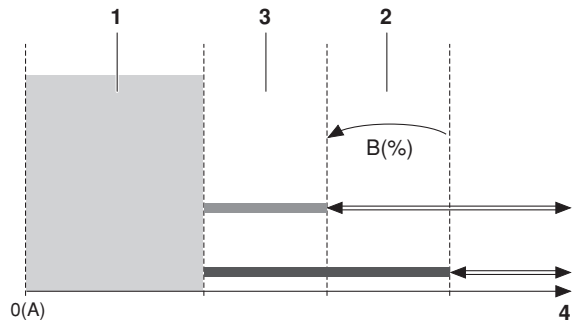
Model	Hz	Reference current value per compressor (A)
		Standard
EWWD440	50	91
EWWD600	50	128
EWWD700	50	133
EWWD850	50	173
EWWD11	50	211

**NOTE**

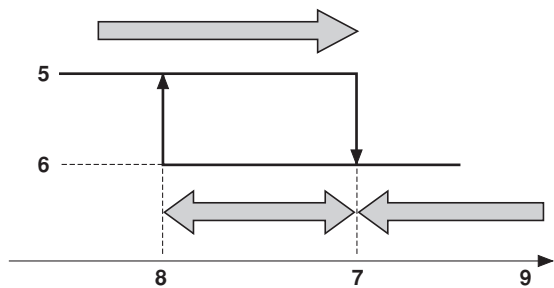


- Standard voltage of this model is 400 V.
- Because this model has 2 compressors, the actual maximum operating current of the unit is the value in table above x2.

**Figure: Current limiting function/Current demand function**



- 1 Forced load up area (to stabilize the motor cooling)
  - 2 Reference current A1
  - 3 Demand current A2=A1xB (current demand setpoint B (%))
  - 4 Operating current
- Automatic capacity control range when current demand function is ON
  - Automatic capacity control range when current demand function is OFF
  - ↔ Current limiting function is active



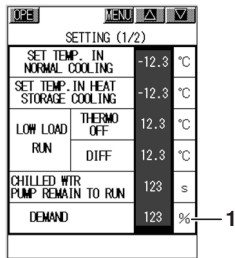
- 5 The operating current of the compressor increases (before activation of the current limiting function or the current demand function)
  - 6 The operating current of the compressor increases (after activation of the current limiting function or the current demand function)
  - 7 Reference current A1 or Demand current A2 (=A1xB)
  - 8 Reference current A1x0.95 or Demand current A2x0.95
  - 9 Operating current per compressor
- ↔ Automatic capacity control (up/down/stop)
  - ↔ Load up not allowed
  - ← Forced load down

**NOTE**



- In the current demand function, setting of the value between 0 and 100% is available.
- For obtaining a state motor cooling, capacity control only starts when a certain operating current of compressors is reached (after forced load up).
- For this reason, it is possible that in case of a too low current demand setpoint B, the actual current value does not decrease to the level of the calculated current demand but remains above A2. Be aware that, depending on the operation condition, the minimum operating current value must be 30 to 40% of the current at full load operation.

## Demand setting screen



- 1 Set the current demand percentage (relative to the reference current value). The default setting=100%.  
If you want to set the upper limit operating current to value C,  $C=2 \times A1 \times B$   
A1=reference current per compressor as in Table 3 on page 23  
B=the current demand setpoint (%)  
See "How to determine the current demand setpoint" on page 24.

### NOTE



- This is the screen of models with the 2-temperature setting option. For standard models, the target temperature is represented by one line only.
- Touching any of the items will display a brief explanation on the item (except for the target temperature).

## How to determine the current demand setpoint

1. Determine the upper operating current limit value you want=C.
2. Calculate the upper operating current limit value per compressor D.  $D=C/2$ .
3. Calculate the current demand setpoint B.  $B=D/A1 \times 100$  where A1 is the reference current per compressor as in Table 3 on page 23.
4. Set the current demand percentage on the touch panel "SETTING (1/2)" screen.

## Units control thermo

This function is designed for preventing inefficient operation due to low partial load. One compressor will be stopped automatically in case the load reduces to a certain level. (Units control thermo OFF)

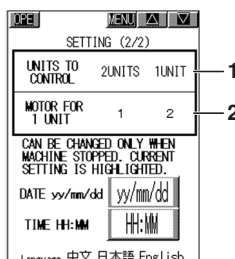
At the moment that the cooling load increases again, the number of compressors in operation returns to 2 units automatically again. (Units control thermo ON)

## Compressor starting order rotation function

For planning the load levelling of the 2 compressors, this unit has a function to switch the starting order of compressors. In case the units control thermo turns OFF, thus requiring one compressor to stop, this function will automatically stop the compressor that started first.

## Settings screen related to units control and to compressor starting order compression

See "How to change settings in the touch panel" on page 15 to change the settings.



- 1 ["MENU" → "SETTING" → "SETTING (2/2)"]  
When "UNITS TO CONTROL" is set to "1UNIT", this control does not work. The default setting is "2UNITS".



**NOTE** Change of this setting is not available while the unit is operating.

- 2 At the first start after power-up, the compressor set in the leftmost field starts first.  
Compressor "1" means the compressor at left side viewed from the door of the switch box and "2" means the compressor at right side.



**NOTE** Change of this setting is not available while the unit is operating.

### NOTE



Touching any of the items will display a brief explanation on the item.

## When "UNITS TO CONTROL" is set to "1UNIT"

In this case, only the compressor selected in "MOTOR FOR 1 UNIT" operates.

This function is useful for energy saving operation when the cooling load is low, like in intermediate season or for emergency operation should one compressor get out of order.

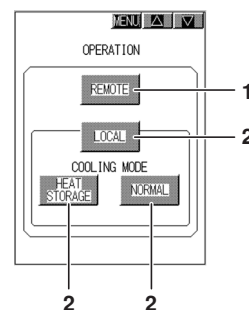
## 2-temperature setting function (Optional)

For this model, setting of 2 target temperatures is available on condition that switching of target temperatures of the unit is available.

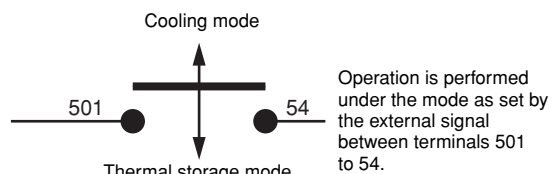
We distinguish target temperature for thermal storage mode and for cooling mode.

The unit performs automatic capacity control in function of the target temperature of the requested mode.

## Screen related to 2-temperature setting



- 1 When "REMOTE" is selected through "MENU" → "OPERATION".



**NOTE** Mode button on the graphic panel display is ineffective.

- 2 When "LOCAL" is selected through "MENU" → "OPERATION", the unit operates under the mode that corresponds to the mode button selection on the touch panel.

ITEM	SETTING (1/2)	UNIT
SET TEMP. IN NORMAL COOLING	-12.3	°C
SET TEMP. IN HEAT STORAGE COOLING	-12.3	°C
LOW LOAD RUN	12.3	°C
THERMO OFF	12.3	°C
DIFF	12.3	°C
CHILLED WTR PUMP REMAIN TO RUN	123	s
DEMAND	123	%

- When cooling mode is selected, the setpoint in "SET TEMP. IN NORMAL COOLING" is the target temperature for chilled water.
- When thermal storage mode is selected, the setpoint in "SET TEMP. IN HEAT STORAGE COOLING" is the target temperature for chilled water.

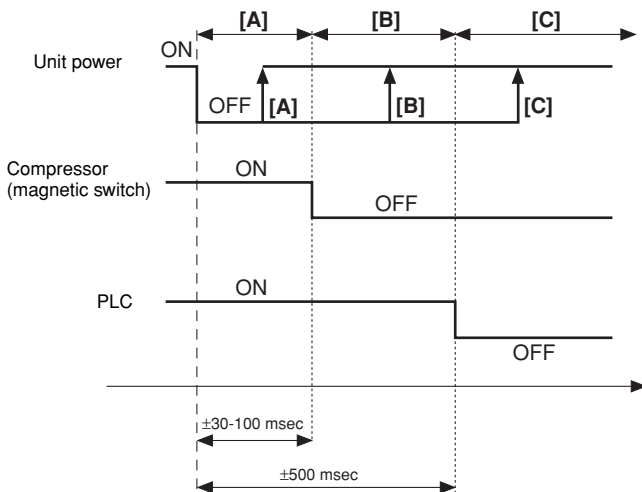
**NOTE**

- Mode change is not available while the unit is operating (nor during thermo OFF operation).
- It takes maximum 1 second from the time when the unit accepts the operation mode to the time when the mode is confirmed. Set the operation signal and mode signal with a time difference.

**NOTE**

- Touching any of the items will display a brief explanation on the item.

### Operation between power failure and power recovery



**Table 4: Time from power failure to power recovery**

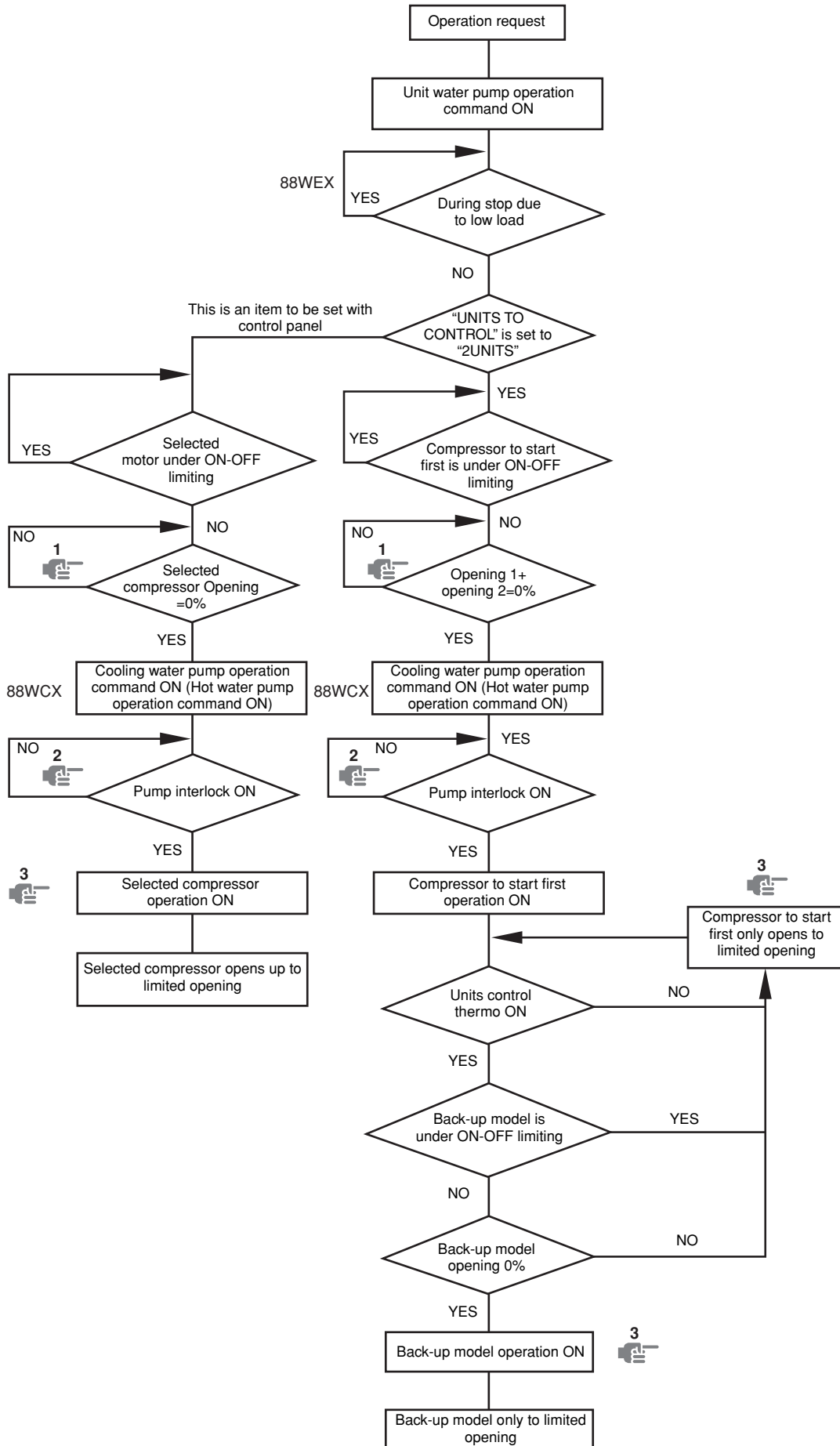
		Compressor condition from power failure to power recovery		
		[A]	[B]	[C]
		Does not perform continuous operation	Stops	Does not stop
ON-OFF limiting of the compressor (At power recovery)		No	Yes	Yes
Automatic start of compressor after power recovery	During on the unit ON-OFF	—	Yes	No
	A normal open contact is used for contact ON at power recovery	—	Yes	Yes
	A normal open contact is used for contact OFF at power recovery	—	Yes	No
	Pulse contact is used	—	Yes	No

- Table 4 shows the standard specification.
- Magnetic switch and PLC have a little individual time difference.
- In case of "Does not stop" in the column of "Automatic start of compressor after power recovery", you are requested to input the operation command to the unit.
- ON-OFF limiting time when the time from power failure to power recovery is [B] depends on normal ON-OFF limiting flow.
- ON-OFF limiting time when the time from power failure to power recovery is [C] becomes the minimum ON-OFF value (180 seconds).
- When input of pump interlock at power recovery stays OFF, the unit may get an abnormal stop.

## Unit start flow

When "REMOTE" is selected in the graphic panel display "OPERATION" screen, the remote signal affects the unit to start.

When "LOCAL" is selected, it is the <Chiller ON> button on the switch box door that makes the unit start.



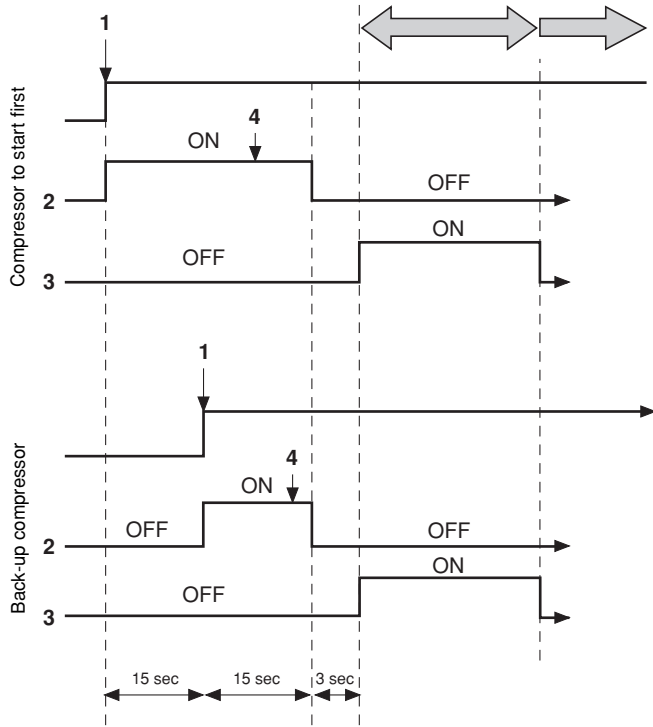
**NOTE**



1. If the compressor load is not 0% at starting, the close command is output to the capacity control motor for 160 seconds maximum. If it is not 0% after 160 seconds, the potentiometer of the target compressor (1 or 2) confirms a full-shut error (compressor individual error).
2. If the interlock contact does not turn ON within 180 seconds after the pump operation command is output from the unit (88WEX, 88WCX), the pump interlock error is confirmed (unit error).
3. For ensuring an early differential pressure for obtaining cooling stability of the compressor motor and oil supply to respective parts of the compressor, the compressor load increases up to 45% forcedly.

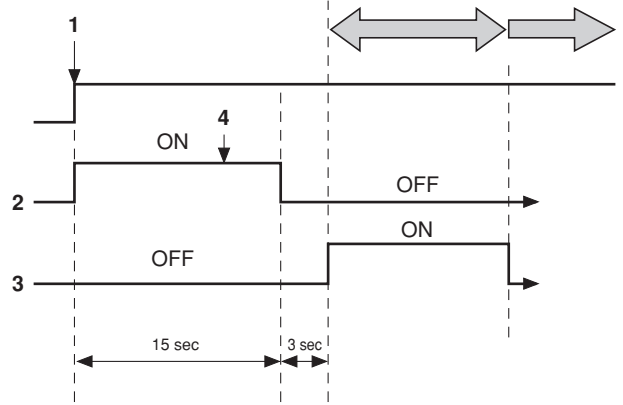
**Starting time chart of the compressor**

“UNITS TO CONTROL” is set to “2UNITS”



- 1 Compressor ON
- 2 Compressor load down
- 3 Compressor load up
- 4 Load down without use of timer (forced load down)
- ↔ Forced load up to the opening limitation without use of timer
- Start of automatic capacity control

“UNITS TO CONTROL” is set to “1UNIT”

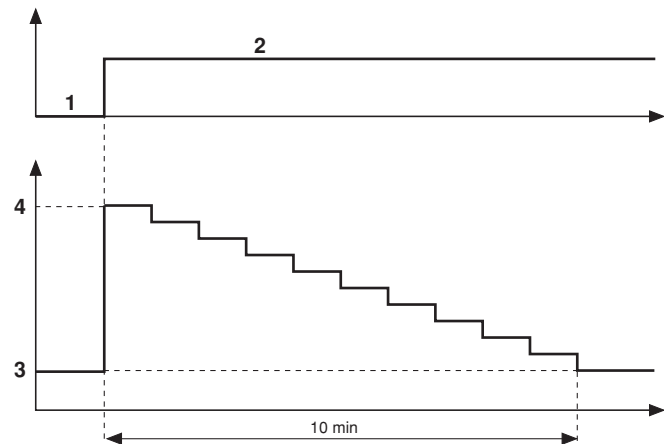


- 1 Compressor ON
- 2 Compressor load down
- 3 Compressor load up
- 4 Load down without use of timer (forced load down)
- ↔ Forced load up to the opening limitation without use of timer
- Start of automatic capacity control

**Water temperature control immediately after unit start**

For preventing to frequent running and stopping of the unit during the first 10 minutes after the unit start (low holding water quantity or low load), the unit performs a step-by-step reading of the target temperature.

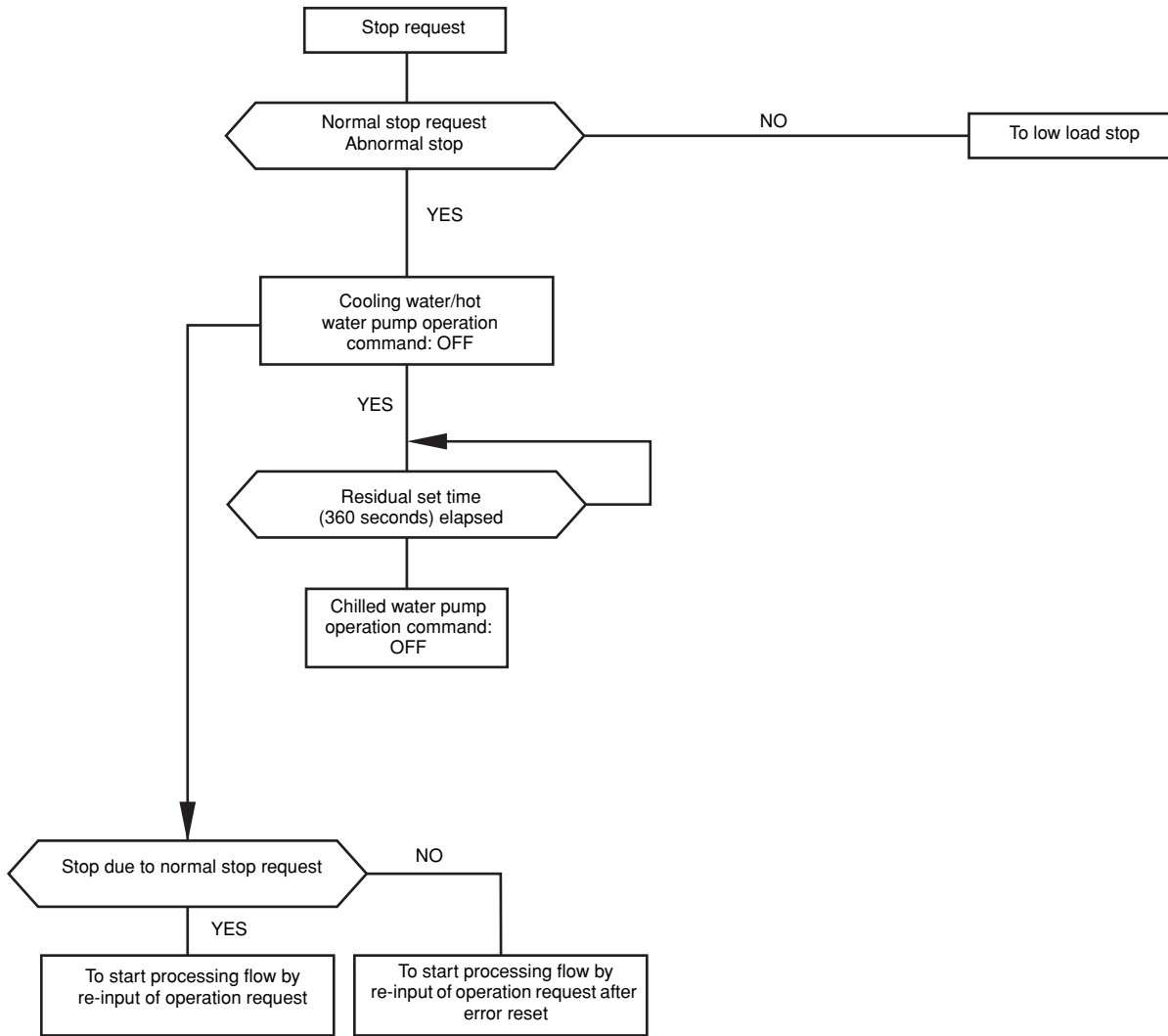
Only after elapse of these 10 minutes, operation shifts to automatic capacity control in function of the set target temperature.



- 1 Unit stop
- 2 Unit operation
- 3 Target temperature as set on the control panel
- 4 Target temperature +2°C

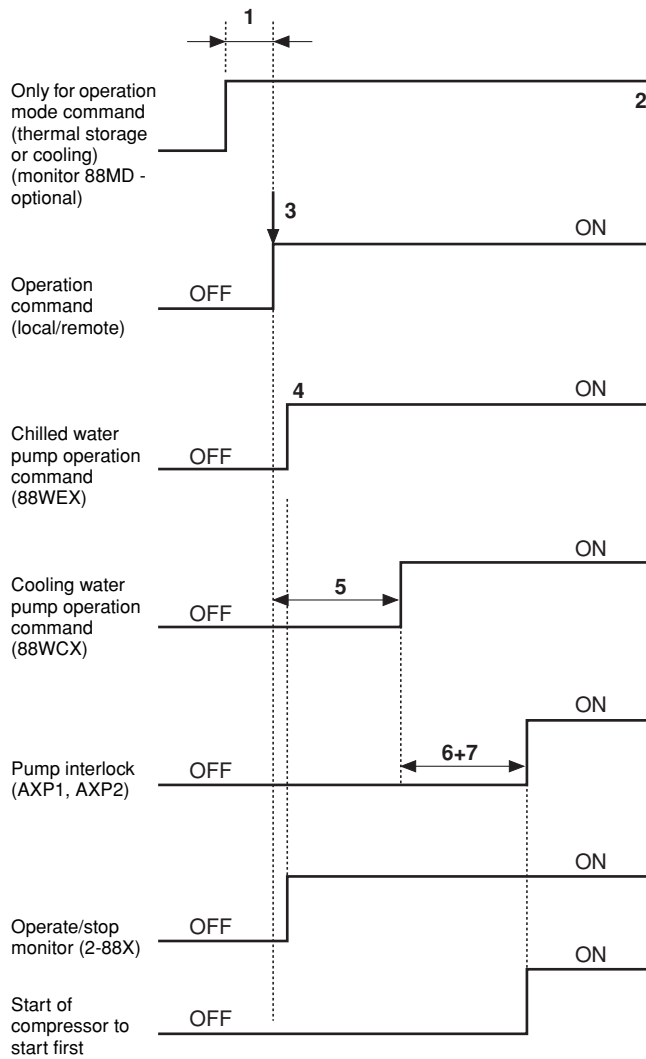
## Unit stop flow

(exclusive of low load stop)



## I/O timing of various contacts

### 1. Start of the unit



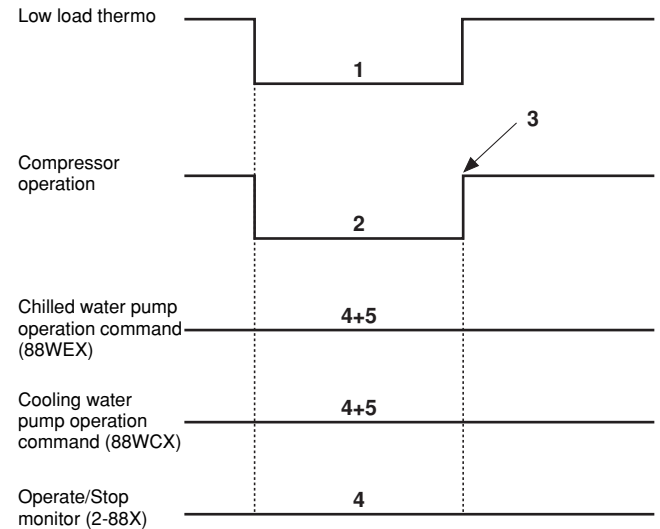
- 1 The signal to switch the operation mode must be input at least 1 second before operation command (ON → OFF, OFF → ON)
- 2 ON: Thermal storage mode  
OFF: Cooling mode
- 3 The unit accepts the operation command
- 4 Signal is transmitted immediately after the unit accepts the operation command. (However, time lag of maximum 1 second may occur).
- 5 Signal is transmitted immediately after low load stop or when ON-OFF limiting ends. (Identical to 88WEX if low load stop or ON-OFF limitation do not prevail).
- 6 Return of all pump interlock signals so that the interlock circuit closes within 180 seconds.
- 7 If the interlock signal does not return within 180 seconds, a unit error is confirmed (5X-3 output) and the operation command is destroyed. If contacts disconnect for 5 seconds in a row, even during normal operation, the same unit error is confirmed.

### NOTE



- When Run/Stop of the unit is performed remotely under instantaneous contact specification, set the pulse signal width to the unit as 200 msec or more.  
The unit may not recognize the narrow signal width.
- Any actions on the graphic panel display or signal input to the unit within 30 seconds immediately after power-up to the unit may not be accepted. During 30 seconds immediately after powering up the control circuit, communication connection check between PLC and graphic panel display is made.

### 2. Low load stop

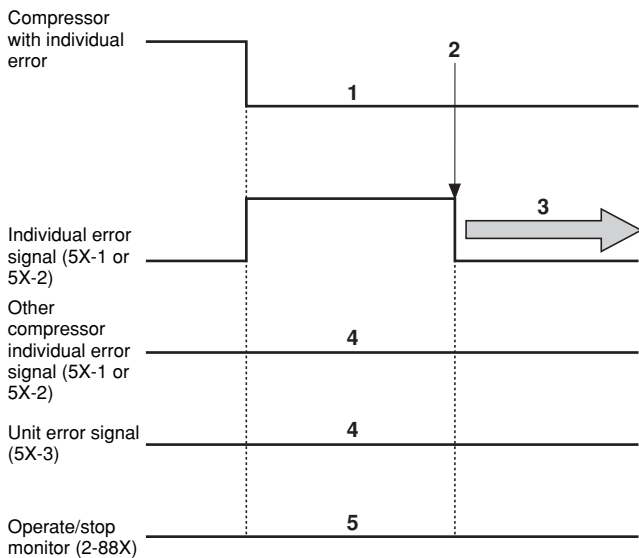


- 1 Low load stop
- 2 Stop
- 3 Restarts after timer count-up in case ON-OFF limitation timer is activated.
- 4 Normally ON
- 5 When the pump interlock contact disconnects for 5 seconds continuously during low load stop, a unit error is confirmed (5X-3 output) and the unit falls into abnormal stop condition.

### 3. Stop caused by an individual compressor error

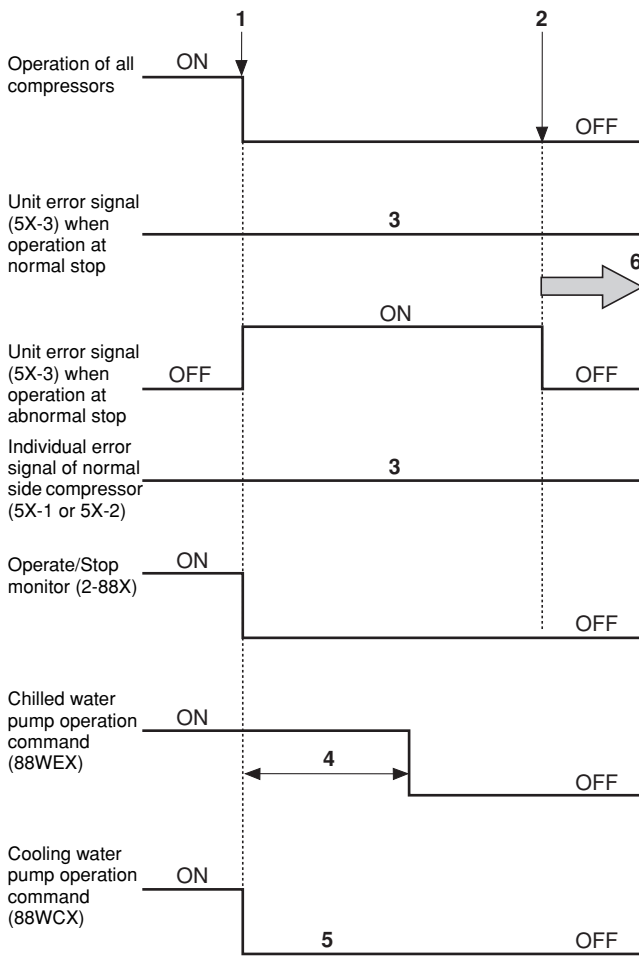
When "2UNITS" is selected in "UNITS TO CONTROL" on the "SETTING" screen of the graphic panel display, the other compressor continues operation.

There is no function to start the other compressor automatically in case "1UNIT" is selected in "UNITS TO CONTROL" on the "SETTING" screen of the graphic panel display when the selected compressor falls into abnormal stop.



- 1 Abnormal stop
- 2 Error reset
- 3 If ON-OFF limitation timer has counted up, restart of the compressor that had an individual error is available.
- 4 Normally OFF
- 5 Normally ON

#### 4. When at normal stop and in case of unit error



- 1 Unit error occurs
- 2 Error reset
- 3 Normally OFF

- 4 Residual operation for 6 minutes
- 5 Chiller is OFF and does not perform residual operation
- 6 Input of the error reset command results in operation based on the starting flow and starting time chart.



**NOTE** When the remote ON-OFF circuit is established by use of normal open contacts, make sure that the ON-OFF signal is turned OFF forcibly in response to contact 5X-3 in case of unit errors.

If the ON-OFF signal stays ON after occurrence of unit errors, the unit can restart simultaneously with input of the error reset command and this may lead to unexpected accidents.

## MAINTENANCE AND INSPECTION



Before carrying out any maintenance or repair activity, always switch off the circuit breaker on the supply panel, remove the fuses or open the protection devices of the unit.

Do never clean the unit with water under pressure.




### Periodic inspection of safety devices

It is necessary to carry out periodic inspection and to report results of these inspections according to applicable laws and regulations.

For checking operation of safety devices, consult your dealer.











#### WARNING



- If a malfunction occurs (burning smell, etc.), turn off the power supply and contact your dealer. Continuing to operate while the unit is malfunctioning may result in equipment damage, electrical shock or fire. 
- For repairs, be sure to contact your dealer. Improper repair could result in electrical shock or fire. 
- Do not turn the unit on or off with the power supply switch or breaker, etc. Doing so could result in electrical shock or fire. 



#### CAUTION

- Before cleaning, be sure to stop operation and to turn off the power supply. Failure to do so could result in injury. 
- Make sure the base of the unit is not damaged by prolonged use. If damage is not repaired, the unit could fall and result in injury. 
- Do not climb or place objects on the top of the unit. Falling or overturning could result in injury. 
- Do not wash the unit. Doing so could result in electrical shock. 
- Do not operate the unit with wet hands. Doing so could result in electrical shock. 
- Be sure to dispose of cleansing solutions as stipulated by law. Illegal disposal is not only against the law, but can harm health and the environment. 
- Never touch parts which tend to become hot such as compressors and refrigerant piping. Doing so could result in skin burning. 
- Do not attempt to run the compressor by pushing the magnetic contactor with your finger. Doing so could result in electrical shock or fire. 



- Do not use fuses other than ones of proper capacity. Using wires, instead of fuses could result in equipment damage or fire. 
- Check the open-closed state of all valves before usage. Check the valves in accordance with instructions given in the operation manual and nameplate. If valves are opened or closed when they should not be, water may leak, and in worse cases, the equipment may catch fire or explode. 

### Before inspecting

- Always inform other persons when maintenance starts.
- Recheck all items in chapter "Safety considerations" on page 1.
- When the unit is being operated from a remote controller, select "LOCAL" on the graphic panel display "OPERATION" screen. Make sure that the unit does not start. Check for possible remote signals in particular.
- Place a "BEING SERVICED NOW" sign on the unit front and on the central remote controller which indicates that maintenance is in progress.

### Periodical inspection

- Check the water.  
Drop some water from the water drainage plug.  
If the water is dirty, replace all water in the system.



#### CAUTION

**Use chilled (hot) water and condenser water that conforms to water quality standards.**

Poor quality water could result in water leaks.

- Inspect the water piping system for mixing of air.  
Even though the air purge is performed at the beginning, mixing of air into the system may occur. Perform an air purge at regular intervals.
- Perform cleaning of the inside of the condenser and evaporator when needed.  
Depending on operation conditions, in case the difference between chilled water outlet temperature and saturated temperature corresponding to the suction pressure and difference between condenser water outlet temperature and saturated temperature corresponding to the discharge pressure exceeds 5 to 6°C, the periodical cleaning of the inside of the heat exchanger tube of the condenser or evaporator must be increased.  
For further information, consult your dealer.
- Make check of the electric system.  
Check the electric system for looseness on terminals and for deterioration/dicoloration of wires.

### Refrigerant and lubrication oil

- Refrigerant and lubrication oil to be used for this unit are as follows:

	Name	Specified quantity
Refrigerant	R134a	Stated in manufacturer's label
Refrigerating machine oil	FVC68D	



#### CAUTION

**Do not mistake type of refrigerant and of lubrication oil.**

It may result in fire or explosion.

It is forbidden to discharge refrigerant into the atmosphere. It is required by law to collect, transport and discard the refrigerant in accordance with "chlorofluorocarbon collection and destruction" law.

## Daily inspection

For continuing normal operation of the unit, perform inspections listed below periodically and keep record of the inspections.

Following criteria indicate the value within normal operating range of this unit. It does not necessarily mean that the unit is operating abnormally in case that measured values deviate from the reference values.

Inspection timing	Inspection item	Inspection method	Criteria	Inspection results
Daily inspection	Discharge pressure	Check with pressure gauge	0.7-1.3 MPa	MPa
	Suction pressure		Standard model 0.22-0.35 MPa	
	Power supply voltage	Check with voltmeter	Rated voltage (Stated in manufacturer's label)±10%	V
	Chilled water outlet temperature	Check with thermometer	5-10°C	°C
	Condenser water inlet temperature		25-40°C	
		Vibration and operating sound	Auscultation/ palpation	There will be no abnormal sound or vibration
○	Refrigerant level	Check evaporator level gauge	Liquid level will be visible	
○	No. 1 compressor oil level	Check with oil level gauge	Oil level will be visible	
○	No. 2 compressor oil level			
Daily inspection through touch panel indication	Motor 1 current		—	A
	Motor 2 current			
	Discharge pressure		0.7-1.3 MPa	MPa
	Suction pressure		Standard model 0.22-0.35 MPa	
	load 1			%
	load 2		—	
	Chilled water inlet temperature			°C
	Chilled water outlet temperature		5-10°C	
	Condenser water inlet temperature		25-45°C	
	Condenser water outlet temperature		30-50°C	
	Discharge temperature		40-90°C	
	Discharge overheat temperature		8-30°C	
	Discharge gas temperature 1		40-90°C	
	Discharge gas temperature 2			
	Operating time 1			Hr
	Operating time 2			
	Number of ON-OFFs 1			Times
Number of ON-OFFs 2				

## Disposal requirements

Dismantling of the unit, treatment of the refrigerant, oil and any other parts, must be done in accordance with the relevant local and national regulations.

## CAUTIONS WHEN STOPPING FOR A LONG TIME

- Turn OFF the power
- Drain off  
After drain off, in addition to the cleaning of the unit for preventing corrosion, dry the unit sufficiently or fill it with clean water (antifreeze in cold climates or areas where outside temperature reaches 0°C or less at night).  
In case you use antifreeze, select antifreeze that does not have deleterious effect on steel, copper and neoprene rubber.



### CAUTION

**When you stop the unit for a long time, do not leave it with water piping filled with water**

Fill the water piping with antifreeze or drain off.

Leaving the water piping filled with water may lead to water leakage or damage of heat exchanger tubes.

- Restart of operation after a long-term stop  
Prior to restart of operation after a long-term stop, check following items:

1. Measure the insulation resistance of the circuit (Use a 500 V DC insulation-resistance tester).  
Make sure that the insulation resistance of the power circuit is 10 MΩ or more and 3 MΩ or more for the control circuit.
2. Electrify the unit at least 6 hours before operation.

In addition, prior to full-scale operation, perform an inching of the compressors. (See "First operation (Very important)" on page 19).

When the ambient temperature is low and preliminary electrification time to the unit is short, abnormal sound may occur at first time start of the compressors.

If abnormal sound lasts for 5 seconds or more after starting of compressors, or the sound does not disappear at starting, stop operation of the unit and consult your dealer.

## TROUBLESHOOTING

This section provides useful information for diagnosing and correcting certain troubles which may occur in the unit.

Following cases do not represent an abnormality

SYMPTOM	POSSIBLE CAUSES
While stop, compressor is hot. (Chiller electrified)	Because oil heater is electrified to warm up compressor for the purpose of smoothing starting of unit, this is not abnormality.
When the unit is operating under low load condition, refrigerant passage sound is heard from liquid piping section.	This is because a slight quantity of refrigerant gas flows from the condenser to the evaporator under partial load operation. This is not abnormality.

Before starting the troubleshooting procedure, carry out a thorough visual inspection of the unit and look for obvious defects such as loose connections or defective wiring.

Before contacting your local dealer, read this chapter carefully, it will save you time and money.



When carrying out an inspection on the supply panel or on the switch box of the unit, always make sure that the circuit breaker of the unit is switched off.

When a safety device was activated, stop the unit and find out why the safety device was activated before resetting it. Under no circumstances safety devices may be bridged or changed to a value other than the factory setting. If the cause of the problem cannot be found, call your local dealer.

### Symptom 1: Pump and compressor do not start at all

POSSIBLE CAUSES	CORRECTIVE ACTION
Power failure	For reason of safety, turn OFF power switch once.
Power switch OFF	Turn ON power switch.
Power fuse burned	Replace power fuse.
Defective bridge wiring between unit and pump	Check respective bridge wiring of pump operation command and interlock signal for omission of connection and defective contact.
Defective input of operation command	Check bridge wiring of remote operation command for omission of connection and defective connection. When instantaneous signal is used, arrange pulse width to be 200 msec or more.
"LOCAL"/"REMOTE" of unit Run/ Stop has switched	Make selection "LOCAL" or "REMOTE" in "OPERATION" screen of the graphic panel display. Especially if you cause the unit to stop by "STOP" button on the switch box during remote operation, selection in control screen shifts from "REMOTE" to "LOCAL" automatically, so be careful.

### Symptom 2: Pump starts but water does not circulate

POSSIBLE CAUSES	CORRECTIVE ACTION
Lack of water quantity of makeup water	Pour makeup water sufficiently. (Pumping is not performed unless otherwise pump and suction pipe are filled with water.)
Pump rotates in reverse direction	Correct the direction of rotation of pump. (Make it to clockwise direction viewed from motor side).
Valve in piping does not open sufficiently	Open valve in piping sufficiently.

### Symptom 3: Pump starts but compressor does not start

POSSIBLE CAUSES	CORRECTIVE ACTION
Defective interlock signal	Arrange in a manner that the interlock signal is returned to the unit within 180 seconds after input of operation signal to the unit.
ON-OFF limiting	Compressor starts after ON-OFF limiting time ends. (See "ON-OFF limiting function" on page 22).
Thermo in stop	Compressor starts if thermo is reset. (See "Low load stop (Thermo off)" on page 21).

### Symptom 4: Water outlet temperature is extremely low or high

POSSIBLE CAUSES	CORRECTIVE ACTION
Water quantity regulating valve has not opened	Open water quantity valve moderately.
Input error of target temperature setting	Input correct target temperature (See "Low load stop (Thermo off)" on page 21).
Erroneous input of operation mode (Model with 2-temperature setting option only)	Stop unit once then input correct operation mode (See "Operation screen" on page 14). It takes maximum 1 second from time when unit accepts operation mode signal to time when mode is confirmed. Operation signal and mode signal shall be input with time difference.

### Symptom 5: Compressor stops while operating and does not start automatically

POSSIBLE CAUSES	CORRECTIVE ACTION
Water quantity regulating valve has not opened	Open water quantity regulating valve moderately.
Differential set point between thermo stop and thermo reset is big	Decrease differential set point (See "Low load stop (Thermo off)" on page 21).
Compressor individual error is occurred (Pertinent compressor only stops)	Check indication on details of error on graphic panel display and then contact your dealer.

### Symptom 6: Remote operation is not available

POSSIBLE CAUSES	CORRECTIVE ACTION
Defective input of operation command	Check bridge wiring of remote operation command for omission of connection and defective contact. When you use instantaneous signal, 200 msec or more of pulse width is required.
"LOCAL"/"REMOTE" of unit Run/ Stop has switched	Make selection "LOCAL" or "REMOTE" in "OPERATION" screen of the graphic panel display. Especially if you cause the unit to stop by "STOP" button on the switch box during remote operation, selection in control screen shifts from "REMOTE" to "LOCAL" automatically, so be careful.

### Symptom 7: Although chilled water temperature is high, one side compressor only starts

POSSIBLE CAUSES	CORRECTIVE ACTION
"UNITS TO CONTROL" setting in graphic panel display is set to "1UNIT".	Change setting in the left to "2UNITS". (See "Compressor starting order rotation function" on page 24)

**Symptom 8: Despite chilled water temperature is high, unit does not perform full load operation**

POSSIBLE CAUSES	CORRECTIVE ACTION
Immediately after starting the unit (Of the order of 10 minutes)	Unit operates reading the target temperature differently for preventing sudden drop of unit water temperature, and for preventing thermo stop due to sudden increase of capacity control opening. (See "Water temperature control immediately after unit start" on page 27)
Current limiting function is activated	Adjust capacity control load forcedly so that operating current reaches predetermined amperage or less for the protection of power circuit. (See "Current limiting function" on page 23)
Demand function is activated	Adjust capacity control opening forcedly so that demand function is activated and operating current reaches predetermined value or less. (See "Current limiting function" on page 23)
Operating condition falls outside of recommended operation range	When operating condition falls outside of recommended operation range, in some cases capacity control load may have been adjusted for the protection of unit forcedly.
Discharge superheat level is low	Adjust capacity control load forcedly when discharge superheat temperature is 9°C or less for preservation of the lubrication system.

**Symptom 9: Unit water outlet temperature is unstable**

POSSIBLE CAUSES	CORRECTIVE ACTION
Unit water flow rate is unstable Condenser water flow rate is unstable	Make flow rate stable.
Mixing of air into water system	Perform air purge.
Sudden change of condenser water inlet temperature occurs frequently	Adjust ON-OFF setting of cooling tower and setting of water regulating valve like 3-way valve etc.

**Symptom 10: Frequent ON-OFF of compressor**

POSSIBLE CAUSES	CORRECTIVE ACTION
Low cooling load of the system	Increase set point of thermo reset differential for a try (See "Low load stop (Thermo off)" on page 21).
Excessively low chilled water flow rate	Increase flow rate.
Low equipment holding water quantity	Increase minimum holding water quantity.

If problems persist after checking above items, contact your dealer.



**WARNING**

**Contact your dealer in the event of abnormality (smell of burn, etc).**

Continuing operation with persisting abnormalities may result in breakdown, electric shock or fire.

**Safety devices**

As the unit comes with safety devices, safe operation is guaranteed.

If the safety device is activated, the error pilot lamp lights up when the unit stopped operation (hereafter described as "Abnormal stop"), details of the safety device that was activated is displayed in the graphic panel display.

The fact that unit falls into an abnormal stop condition is signalled to the remote controller too.

Abnormal stops of the unit can be divided into 2 groups:

- **Unit error**  
Unit errors indicate a critical malfunction such as a discharge high-pressure error or a chilled water overcool error that has effect on the entire unit. Both compressors stop.
- **Individual compressor error**  
Individual compressor errors indicate the error of an individual compressor such as a motor overload.  
The entire alarm is indicated and the error-side compressor stops. The compressor of the side where the error does not occur continuous to operate.

Refer to "I/O timing of various contacts" on page 29 for signal output timing to the remote controller in case of errors.

**Safety devices for unit errors**

1. Discharge pressure high error	
POSSIBLE CAUSES	DETAILS OF ACTIVATION
<ul style="list-style-type: none"> <li>Extremely high condenser water temperature</li> <li>Low condenser water quantity</li> <li>Bad contamination condition inside condenser</li> <li>Some valve of the unit closed</li> <li>Excess charging of refrigerant</li> </ul>	High pressure switch is activated
2. Suction low pressure error	
POSSIBLE CAUSES	DETAILS OF ACTIVATION
<ul style="list-style-type: none"> <li>Low unit water flow rate</li> <li>Too low condenser water temperature</li> <li>Bad contamination condition inside evaporator</li> <li>Some valve of the unit closed</li> <li>Refrigerant gas leakage</li> </ul>	Suction pressure falls short of set point continuously for a certain time
3. Antifreeze error	
POSSIBLE CAUSES	DETAILS OF ACTIVATION
<ul style="list-style-type: none"> <li>Low unit water flow rate</li> <li>Fluctuation of flow rate</li> <li>Low target temperature setting</li> <li>Extremely low equipment holding water quantity</li> </ul>	Freeze-up protection thermostat is activated
4. Unit water failure	
POSSIBLE CAUSES	DETAILS OF ACTIVATION
<ul style="list-style-type: none"> <li>Low unit water flow rate</li> <li>Fluctuation of flow rate</li> <li>Mixing of air into system</li> </ul>	Unit water interruption relay turns ON for 5 seconds in a row (The first 15 seconds after starting are ignored)
5. Cooling water interruption error	
POSSIBLE CAUSES	DETAILS OF ACTIVATION
<ul style="list-style-type: none"> <li>Low cooling water flow rate</li> <li>Fluctuation of flow rate</li> <li>Mixing of air into system</li> </ul>	Cooling water interruption relay turns ON for 5 seconds in a row (The first 15 seconds after starting are ignored)

6. Differential pressure error	
POSSIBLE CAUSES	DETAILS OF ACTIVATION
<ul style="list-style-type: none"> <li>Low condenser water temperature</li> <li>High unit water temperature</li> <li>Temperature of chilled water and that of condenser water overturned considerably</li> </ul>	Differential pressure required for lubrication of compressor cannot be secured (Not immediately after starting)
7. Main power lost error (When support by separate installation of starter was done)	
POSSIBLE CAUSES	DETAILS OF ACTIVATION
<ul style="list-style-type: none"> <li>Power failure</li> <li>Voltage drop</li> </ul>	Loss of power of starter
8. Pump interlock error	
POSSIBLE CAUSES	DETAILS OF ACTIVATION
<ul style="list-style-type: none"> <li>Inadequate pump circuit</li> <li>Inadequate interlock circuit</li> </ul>	Pump interlock contact does not return within 180 seconds after the unit accepts operation command
9. Suction pressure sensor error	
POSSIBLE CAUSES	DETAILS OF ACTIVATION
<ul style="list-style-type: none"> <li>Disorder of sensor alone</li> <li>Inadequate insertion of PLC connection connector</li> </ul>	Disconnection or short circuit of suction pressure sensor
10. Discharge pressure sensor error	
POSSIBLE CAUSES	DETAILS OF ACTIVATION
<ul style="list-style-type: none"> <li>Disorder of sensor alone</li> <li>Inadequate insertion of PLC connection connector</li> </ul>	Disconnection or short circuit of discharge pressure sensor
11. Discharge temperature sensor error	
POSSIBLE CAUSES	DETAILS OF ACTIVATION
<ul style="list-style-type: none"> <li>Disorder of sensor alone</li> <li>Inadequate insertion of PLC connection connector</li> </ul>	Disconnection or short circuit of discharge temperature sensor (Attached to the top of condenser)
12. Chilled water outlet temperature sensor error	
POSSIBLE CAUSES	DETAILS OF ACTIVATION
<ul style="list-style-type: none"> <li>Disorder of sensor alone</li> <li>Inadequate insertion of PLC connection connector</li> </ul>	Disconnection or short circuit of chilled water outlet temperature sensor

#### Safety devices for individual compressor errors

1. Discharge gas 1 or 2 high temperature error <sup>(1)</sup>	
POSSIBLE CAUSES	DETAILS OF ACTIVATION
<ul style="list-style-type: none"> <li>Refrigerant gas leakage</li> <li>Low load continuous operation outside recommended operation range</li> <li>Clogging of strainer in refrigerant system</li> </ul>	Discharge gas temperature exceeds set point
2. Potentiometer 1 or 2 full shut error <sup>(1)</sup>	
POSSIBLE CAUSES	DETAILS OF ACTIVATION
<ul style="list-style-type: none"> <li>Disorder of capacity control sensor alone</li> <li>Inadequate insertion of PLC connection connector</li> <li>Malfunction of motor for capacity control</li> </ul>	Capacity control opening has not returned to 0% when compressor starts
3. Motor 1 or 2 overload <sup>(1)</sup>	
POSSIBLE CAUSES	DETAILS OF ACTIVATION
<ul style="list-style-type: none"> <li>Voltage that falls outside of service standard was applied</li> <li>Big voltage imbalance between phases</li> <li>Power open-phase</li> <li>Frequent ON-OFF by shortening ON-OFF limiting timer intentionally</li> <li>Disorder of magnetic switch alone</li> <li>Refrigerant gas leakage</li> <li>Some valve of the unit closed</li> <li>Power phase-reversal</li> </ul>	Either one of following 4 points occurred <ul style="list-style-type: none"> <li>Motor overload</li> <li>Power open-phase</li> <li>High motor coil temperature</li> <li>Power phase-reversal</li> </ul>

4. Potentiometer 1 or 2 sensor error <sup>(1)</sup>	
POSSIBLE CAUSES	DETAILS OF ACTIVATION
<ul style="list-style-type: none"> <li>Disorder of sensor alone</li> <li>Inadequate insertion of PLC connection connector</li> </ul>	Disconnection or short circuit of capacity control opening sensor
5. No. 1 or 2 discharge temperature sensor error <sup>(1)</sup>	
POSSIBLE CAUSES	DETAILS OF ACTIVATION
<ul style="list-style-type: none"> <li>Disorder of sensor alone</li> <li>Inadequate insertion of PLC connection connector</li> </ul>	Disconnection or short circuit of discharge temperature sensor (Attached to discharge pipe)

(1) In the device name, "1" represents left side compressor viewed from the front of switch box and "2" represents right side compressor.



#### WARNING

**Request your dealer to execute necessary repairs.**

Imperfection in repair may result in electric shock or fire.

Inspection or repair in case of abnormalities may be dangerous.

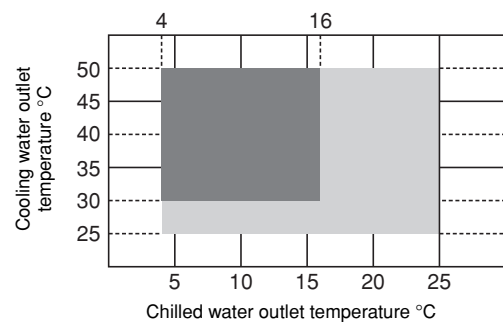
For resetting methods in case of abnormal stops. See "Error resetting method" on page 16.

## OPERATING RANGE

### Operating limit

When you operate the unit, use it within the operating range below:

#### ■ Standard model



■ Operation range during continuous stable operation  
■ Usable range during pull-down operation

#### NOTE



Make sure that the unit operates within the operating range 1 hour after operation start.

### Water flow rate

Use the unit within the following range.

Further, water flow rate is set as a value with the purpose of protecting the unit on condition that water quality of the unit meets the standard.

For maintaining the unit performance, use the unit near the rated water flow rate.

Rate of water quantity can be confirmed with manufacturer's label.

**Table 5: Usable water quantity range**

Model	Chiller water (l/min)	Cooling water (l/min)
EWWD440	710-1990	710-1960
EWWD600	930-2720	1030-3020
EWWD700	1130-3020	1210-3170
EWWD850	1270-3020	1420-4150
EWWD11	1460-4260	1770-4900

## Minimum holding water quantity within the system

For preventing frequent running and stopping of the unit, the chilled water system shall have at least the capacity of the minimum holding water capacity.

For further information, see [Table 2: Minimum water volume on page 9](#).

## Standards for use

Use this product complying with following items.

Item	Details
Power supply voltage	Within $\pm 10\%$ of rated voltage
Phase imbalance	Within $\pm 2\%$ of rated voltage
Power frequency	
Chilled water and condenser water outlet temperature limit	In conformity with operating limit (See <a href="#">"Operating limit" on page 35</a> )
Pull down time	Within 1 hour (at no load)
Start/stop interval of compressor	Compressor shall not start more than 6 times an hour. Start-to-start interval shall be 10 minutes or more. Stop-to-start interval shall be 3 minutes or more.
Water quality	No soluble matters deteriorating copper nor carbon steel shall be included. See <a href="#">"Water quality specifications" on page 8</a> .
Condenser cleaning	This action should be carried out when needed.
Water flow rate	In conformity with <a href="#">"Water flow rate" on page 35</a> .
Water pressure	1.0 MPa maximum (both chilled water and condenser water)
Installation location	Indoors (Ensure that no water drop splashes.)
Water drainage	Provide a drainage ditch around the foundation.

Refer to engineering related documents or data already issued for items not listed above.

- Use of demineralized water is not allowed  
As demineralized water does not contain corrosive factors such as chloride ion and sulfide ion, it does not contain harmful elements for formation of protective film that is contained in normal water.  
Demineralized water does not have a pH buffering ability. Its liquidity is affected significantly by factors that come from outside (e.g., carbonate gas and oxygen in open systems).

## HOW TO CONTINUE

Fill out the brief operation instructions form and fix it visibly near the operating site of the refrigeration system.

## NOTES

# BRIEF OPERATION INSTRUCTIONS

## EWWD-AAYNNO\*\* Packaged water-cooled water chiller

Equipment supplier : .....

Service department : .....

.....  
 .....  
 .....

.....  
 .....  
 .....

Phone : .....

Phone : .....

### EQUIPMENT TECHNICAL DATA

Manufacturer : DAIKIN EUROPE .....

Model : .....

Serial Number : .....

Year of construction : .....

Power supply (V/Ph/Hz/A) : .....

Maximum high pressure : ..... 17 bar

Charging weight (kg) R134a : .....

### START-UP AND SHUT DOWN

- ▶ Start-up by switching on the circuit breaker of the power circuit. The operation of the water chiller is then controlled by the Digital Display Controller.
- ▶ Shut-down by switching off the controller and the circuit breaker of the power circuit.

#### WARNINGS

**Emergency shut down** : Switch off the **circuit breaker** located on .....

.....

.....

**Air inlet and outlet** : Always keep the air inlet and outlet free to obtain the maximum cooling capacity and to prevent damage to the installation.

**Refrigerant charge** : Use refrigerant R134a only.

**First aid** : In case of injuries or accidents immediately inform:



▶ **Company management** : **Phone** .....

▶ **Emergency physician** : **Phone** .....

▶ **Fire service** : **Phone** .....



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