

Revision 3
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**AQUA
CHILLER**

G Series

Owner's Manual

This guide applies to the following models: R-GAXXX and R-GWXXX.

**AQUA
COOLER**

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INTRODUCTION

Thanks for choosing an Aqua Cooler chiller. In order to use this chiller correctly and efficiently, please read the following instructions in detail.

This manual is designed to explain the installation, operation and the basic maintenance of the product. It is recommended that for service issues Aqua Cooler Pty Ltd be contacted before any work commences.

SAFETY

| | |
|---|---|
|  | <p style="text-align: center;">WARNING</p> <p>The unit is only to be installed, operated, maintained and serviced by qualified persons only. Operation of units such as these can be hazardous and should be serviced by persons with the proper training and qualifications.</p> <p>The unit and the Product Manual has markings, warning and instructions on the safe operation of the unit and they should be adhered to.</p> |
|---|---|

This unit is designed to be safe in the use for which it was planned provided that it is installed, started up and maintained in accordance with the instructions contained in this manual.

The unit contains electrical components that operate at line voltage and contains moving parts. It therefore must be isolated from the electrical supply before being worked on. All maintenance operations that require access to the unit must be carried out by suitably qualified technicians who have a thorough understanding of all necessary precautions associated with refrigeration and electrical machinery.

The liquids to be cooled must be compatible with the materials used in the constructions of this unit. These liquids can be water or mixtures of glycol and water for example. The liquids to be cooled must not be flammable.

All panels must be re-installed after carrying out any maintenance work.

The unit is not to be used by the infirmed or children unless they are supervised by responsible persons qualified to carry out the supervision.

The unit should be secured to prevent it from toppling over.

Always isolate power from the unit when working on it.

Minimum temperature setting is 5 degrees on the unit. Any lower than this may cause problems with the evaporator icing up and potentially loss of refrigerant and potentially expensive service costs



WARNING

All wiring must be performed by qualified electricians. Improperly installed wiring and grounding may result in electrocution and fire hazards

To avoid these hazards all wiring must be installed in accordance with all the local relevant safety standards for wiring



WARNING

The chiller contains refrigerants under high pressure. The system also contains oils under high pressure. Before the refrigeration circuit can be opened, the refrigerant should be reclaimed to reduce pressure in the system. Failure to recover the refrigerant to relieve pressure or the use of refrigerants or refrigerant substitutes that are not specified for the unit may result in system rupture and explosion.

Refrigerants have a narcotic effect when inhaled in high quantities. Should a leak occur of the refrigerants then the room should be vacated and should only be re-entered after suitable ventilation.

Each model is offered with different refrigerant options. This is indicated by the model number containing either a “-A” for R134a or “-C” for R407c . R134a and R407c have different refrigeration properties but both are similar properties from a hazardous materials perspective.

First Aid

Eye Contact. Immediately flush with tepid water or sterile saline solution. Hold eyelids apart for 15 minutes while irrigating. Seek medical attention.

Inhalation. Remove from area of exposure immediately and if you are assisting a victim avoid being exposed. Breathing apparatus must be worn in the presence of high concentration of refrigerants. If victim is not breathing then apply artificial respiration and seek urgent medical help. Give oxygen is available.

Skin Contact. Cold Burns. Remove contaminated clothing and gently flush affected area with warm water (30C) for 15 minutes. Apply sterile dressing and treat as for a thermal burn. For large burns immerse in water for 15 minutes. DO NOT apply any form if direct heat. Seek medical attention.

Ingestion. For advice contact the poisons centre on 131126 in Australia. If swallowed do not induce vomiting. Ingestion is considered unlikely due to product form.

Advice to Doctor. Use of adrenaline and other catcholamines may be contraindicated due to possible cardiac sensation. Treatment for asphyxia.

R407 HazChem code 2RE

R407 is non – flammable.

R134a HazChem code 2RE

R134a is non – flammable.

INSTALLATION REQUIREMENTS

Immediately upon receipt of the chiller, carefully inspect the chiller for any damage that may have occurred in transit. Any such damage must be noted on the carrier's delivery documents. It is the consignee's responsibility to make any subsequent claims upon the carrier or respective insurance company.

Any hidden damage should be reported to Aqua Cooler as soon as possible.

If the unit is to be stored before installation then care must be taken to ensure no foreign matter can get into the water pipes. If the storage is for a prolonged period it is recommended that the water circuit be changed with nitrogen and sealed.

A comprehensive commissioning program carried out by qualified refrigeration mechanics is available through Aqua Cooler. For full details and conditions please contact Aqua Cooler. There is also a site inspection procedure at the end of this manual.

The water fittings on the standard unit are at the rear of the unit – that is the end as the unit away from the electrical box and the unit should be positioned so this end is as close to the process as possible.

At least 1000mm should be left around the unit to allow for proper ventilation of the condensers – see diagram. The unit should not be installed in a closed off room and if it is to be installed under anything then there should be a minimum of 2 metres of clear air above the unit.

The unit has been designed to be lifted with a forklift or a crane. The standard unit is heavier towards the front looking at the chiller side on and care must be taken when lifting with a crane that the strapping does not damage the side panels. The units are also designed to be moved around with a pallet jack, some models also have castor wheels.

The commissioning section at the end of this manual has a site inspection check list designed to aid in checking that the site for the chiller installation is suitable. This should be filled out by someone experienced in chiller installation and returned to Aqua Cooler if there are any doubts about the installation. It is essential to ensure that adequate and safe service access to the chiller is provided. Failure to provide safe access to the chiller may lead to additional charges should servicing be required.

When installing indoors it is important to understand that the chiller will impart a significant heat load into the environment and it is essential to ensure a plentiful, unrestricted supply of ambient temperature air to the chiller. Should you have concerns over the installation site then please contact Aqua Cooler for advice.

Note: Under no circumstances is ducting to be attached to the condenser fan outlet.

This chiller has been designed to draw air from each side and to exhaust vertically through the top of the unit (model dependant). Preferably there should be no obstructions above the chiller, with a minimum of one metre clearance permitted in other circumstances. In addition to ensuring sufficient space around the chiller for free air movement, provision must be made around the chiller for service and regular maintenance. The chiller must be installed on a firm and level foundation, of adequate strength to support the chiller's full operating weight.

Installation of the Water Path

Before connecting the make-up water, check the suction pressure on in the chiller is above 400kPa OR 200 kPa for chillers with R134a refrigerant. A refrigeration mechanic can do this with gauges or if the unit has a smart controller the pressure can be viewed on the display on the controller in the electrical box.

If the pressure is below this then there may be a leak in the refrigeration circuit and water may be drawn into the refrigeration circuit on start up. If the pressure is below this then it is recommended that the chiller be inspected by a qualified refrigeration mechanic before filling the system with water.

All pipe work with refrigerated water running to and from the chiller should be fitted with a water resistant insulation material to prevent sweating and maximise the efficiency of the chiller.

Water Connection Fittings by Model (Male BSPT)

| Models | GA0.6 GA1 GA2 | GA3 | GA5 GA6 | GA8 GA10 | GA12 GA15 | GA25 GA30 GA40 | GA50 GA60 |
|--------|---------------------|-----|------------|-------------|--------------|----------------------|--------------|
|--------|---------------------|-----|------------|-------------|--------------|----------------------|--------------|

| | | | | | | | |
|---------------|----|----|----|-----|----|-----|----|
| Water Out: | ½" | 1" | 1" | 1½" | 2" | 2½" | 3" |
| Water In: | ½" | 1" | 1" | 1½" | 2" | 2½" | 3" |
| Drain: | ½" | ½" | ½" | 1" | 1" | 1" | 1" |
| Overflow: | | 1" | 1" | 1" | 1" | 1" | 1" |
| Water Supply: | | ½" | ½" | ½" | ½" | ½" | ½" |

Electrical Installation

The chiller draws a large amount of current and it is important that the connection of the unit to the power supply must be carried out in accordance with the local standards and only by a licensed electrician.

The power supply system on site and the circuit protection must be designed for the total current of the unit taking into account the in rush current and the lock rotor amps of the compressor– see Technical Data. The circuit breaker must be set no more than 125% of the units rated load current.

The power supply system on site and the fuses must be designed for the total current of the unit – see technical data.

Mains supply cables must be sized to ensure adequate voltage at the chiller under all load conditions. Three phase power must be symmetrical, ensuring equal effective voltage and equal phase angle between consecutive phases. The pump and the compressor rely on correct phase rotation. Ensure all electrical connections are tight prior to start up.

PREPARATIONS FOR STARTING THE CHILLER

For the initial operation of the chiller, please confirm the following:

1. The power supply voltage and phase should be in accordance with the specifications listed on the chiller's name plate.
2. Check that the refrigerated pipe and the cooling pipe are connected properly and the valve is open. (Please refer to the installation diagram for details)
3. Fill the refrigerate water tank with water or other secondary refrigerant before starting the water pump. (Ensure you are using a suitable secondary refrigerant according to your requirements)
4. For water-cooled units, please pay attention to the moving direction of the water pump and confirm the tower fans are not moving in the opposite direction. If the pump is three-phase, change any two relative phase lines to reverse its direction. Then close the switch after connections have been made.

Before starting up the chiller have the following installation requirements been carried out

- The power supply voltage and phase should be in accordance with the specifications listed on the chiller's name plate.
- Has the unit got proper ventilation
- Was the pressure on the suction gauge above 300kPa before filling the unit with water
- Is the bypass in the tank left open
- Is the power supplied to the unit in accordance with the requirements
- Has air been bled from the water path

Operating sequence

1. Open the valve of refrigerated pipe and cooling pipe and ensure the water way is unimpeded.
2. Turn the unit on with the master power switch.
3. Press the power button on the interface panel to start the controller.
4. Press the compressor start button on the interface panel to start the compressor.
5. Pressing the power button while the unit is running will power off the unit.

Before starting the chiller, ensure that the pressure on the suction pressure gauge on the front of the chiller is above 400kPa OR 200 kPa for chillers with R134a refrigerant. If the pressure is below this then there may be a leak in the refrigeration circuit and water may be drawn into the refrigeration circuit on start up. If the pressure is below this then it is recommended that the chiller be inspected before filling the tank with water.

The unit is ready to be started up. Once power is provided to the chiller, open the clear plastic guard over the ON/OFF switch and turn the unit on and the unit will start automatically. The pump will start immediately and the controller will start measuring the flow rate to check that the pump is running normally.

The water bypass on the chiller will be supplied fully open.

The compressors have a start delay. Once the compressors have cut in the watch the display to ensure that the water temperature is coming down.

Operational parameters than are displayed on the screen. Any faults are indicated on the face of the control panel.

It is a good idea after the unit has been running for 5 minutes check that the water temperature is dropping and check there are no bubbles in the sight glass (if fitted) – if these two things are happening then the unit is running properly.

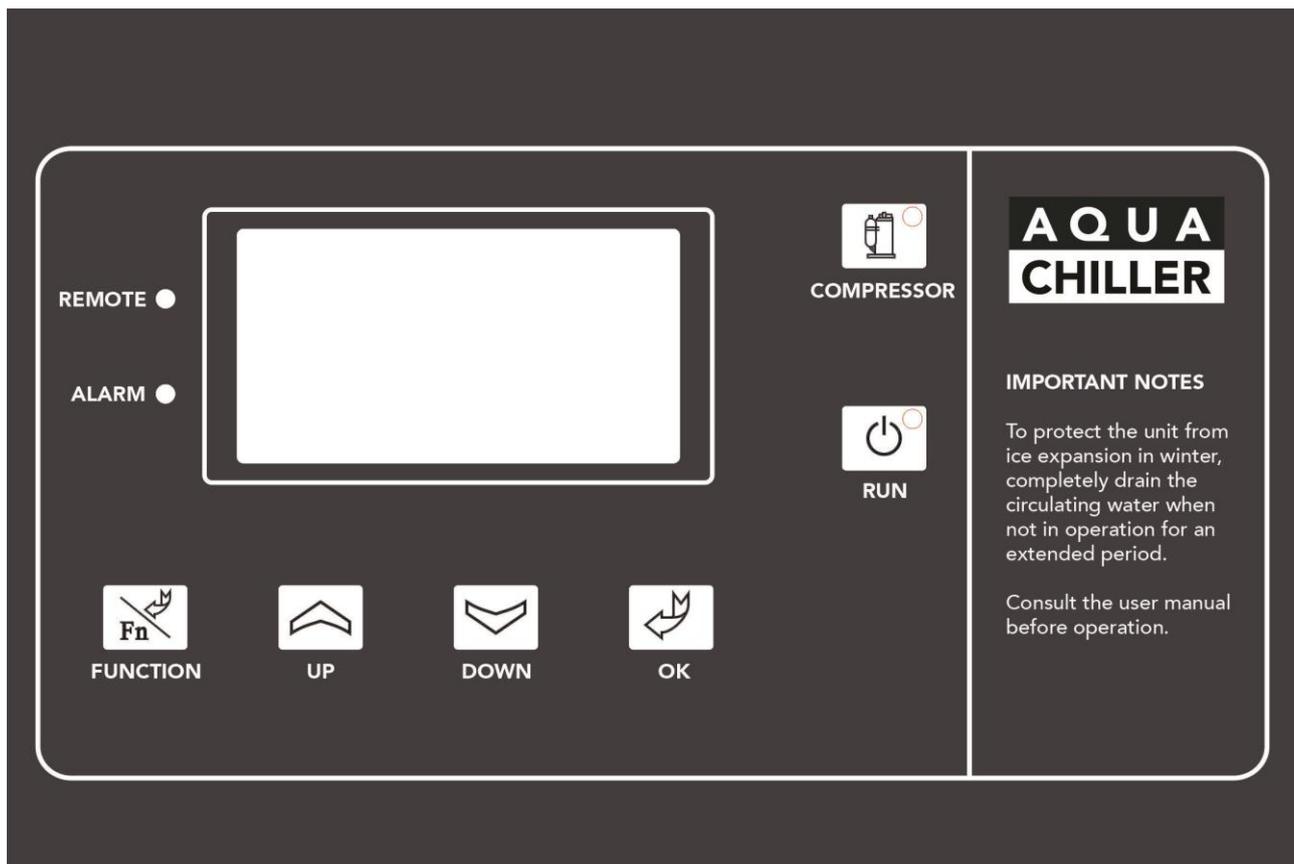
Give the system a final check to ensure that there are no water leaks. An amp meter can also be run over the wires into the contactors to ensure that the compressor and the pump are drawing the right amount of amps according to the technical data. Close the guard over the ON/OFF switch and screw into place to prevent passers by shutting down the chiller.

OPERATING PRECAUTIONS

1. Chilled water pump cannot be started without water in the water tank.
 - a. All standard models are equipped with water level protection in the water tank (except for closed water tanks). When the water level is too low, the unit will throw an alarm and the pump will not operate.
2. Switching the operating switches frequently should be avoided.
3. When the refrigerated-water temperature reaches the set temperature, the compressor will stop.
4. In order to prevent the evaporator freezing, do not set temperature below 5 °C (Except for sub-zero models)
5. When the unit is not in use for long periods of time, drain the tank
6. To ensure the most efficient operation, please clean the condenser, evaporator, and the water filter (if fitted) regularly.

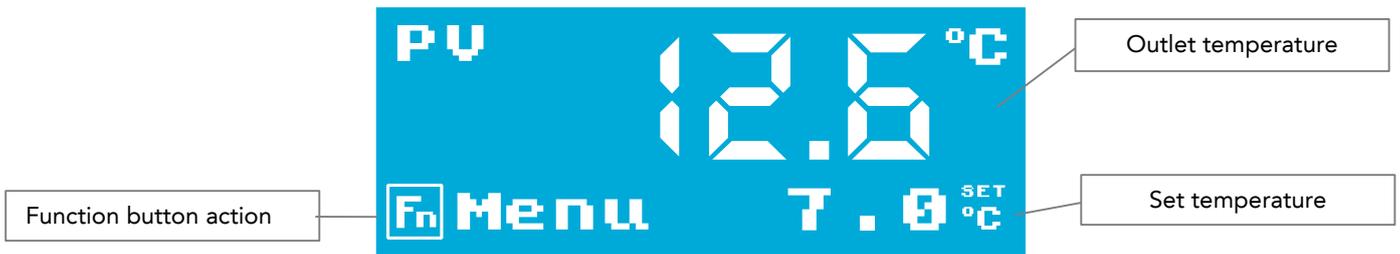
OPERATION PANEL

The chiller unit features an interface panel with an LCD display and input buttons to configure certain functions of the unit. Below is a sketch of the interface panel.



Commonly Used Interfaces

Main Interface



When the [Fn] or [OK] icon is shown on the display, pressing the FUNCTION or OK button respectively will perform the action shown alongside the icon.

Alarm Interface

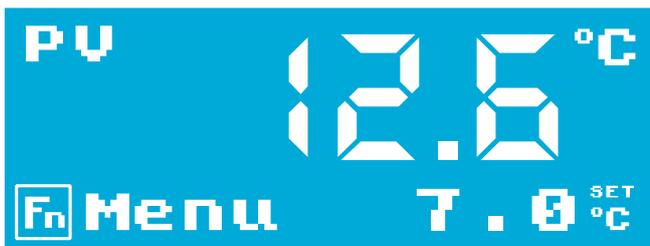
When an alarm occurs, the interface will show a notification similar to the below diagram. To view the alarm details, press the FUNCTION button.



The screen will then show the alarm details.



After the conditions which caused the fault have been corrected, you can reset the alarm by pressing the OK button. The interface will then return to the main display and the unit operate normally.



Function Menu

When on the main screen, pressing the FUNCTION button will open the function menu.



From the function menu, you can navigate with the UP and DOWN button, return to previous page with the BACK button, and enter the selected item with the OK button.

There are 5 sub-menus in the function menu:

1. **User setting** – This menu contains user-configurable settings. Please refer to the Chiller Settings section of this manual for more information.
2. **Unit status** – This menu provides information about the current state of the unit.
3. **History list** – This menu provides a list of past alarms.
4. **Equipment efficiency** – This menu provides information about the units total run time.
5. **Version information** – This menu provides the unit's model number and software version.

Manufacturer Menu

Manufacturer settings should only be modified by trained personnel and any unauthorised modification to these settings may result in damage to the unit and void of warranty.

1. While on the main screen of the operation panel, press the UP and OK button at the same time.
2. Enter the password by pressing the UP, DOWN, and FUNCTION buttons.
3. Press the OK button

The manufacturer menu contains 3 sub-menus:

1. **Manufacturer settings** – This menu contains manufacturer-configurable settings. Please refer to the Chiller Settings section of this manual for more information.
2. **Manufacturer debug** – This menu contains troubleshooting tools for technicians such as three-phase test tool.
3. **Configuration Guide** – This menu provides a configuration wizard for setting up a new unit.

Starting the Chiller

1. Turn on the air switch inside the electric tank of the chiller.
2. Turn on the power to the chiller.
3. After power has been supplied, press the RUN button on the operation panel.
4. The cooling pump will start to run and the RUN button indicator will illuminate.
5. Press the COMPRESSOR button on the operation panel.
6. The COMPRESSOR button indicator will begin to blink.
7. When the conditions are present for the compressor to run, the COMRESSOR button indicator will turn solid.

Setting the Temperature

1. Press the UP and DOWN buttons on the operation panel to adjust the set point temperature.
2. Press the OK button to confirm the new set point temperature.

Shut Down the Chiller

1. Press the RUN button on the operation panel.
2. The RUN button indicator will blink to indicate the shutdown command is being performed.
3. Once the chiller has performed the proper shutdown sequence (this can take up to a minute), the RUN button indicator will be quenched.

CHILLER SETTINGS

Please refer to the Operation Panel section of this manual for information on how to modify these parameters.

User Settings

User settings are modifiable through the "User setting" function sub-menu.

| Parameter Name | Default | Setting Range | Remark |
|---------------------|---------|--------------------|--|
| Lock Temperature | No | Yes or No | When set to yes, the temperature setting function will be disabled. |
| Setting Temperature | 12.0 °C | -30 – 99.9 °C | The temperature set point. |
| Adjust the Contrast | 32 | 20 – 44 | Adjust the LCD screen contrast. |
| Start and Stop | Local | Local or Remote | Set to remote to allow a remote signal to start the unit. See block diagram for details. |
| Screen Saver Time | 0 | 0 – 255 mins | Time until screen goes into screen saver mode. Set to zero to disable. |
| Language | English | English or Chinese | Select display language. |

Manufacturer Settings

Manufacturer settings should only be modified by trained personnel and any unauthorised modification to these settings may result in damage to the unit and void of warranty.

| Setting Menu | Parameter Name | Default | Setting Range | Remark |
|------------------|---------------------|-----------------|---|--|
| Control Settings | One-Button Start | Off | On or Off | When enabled, the unit will start up by pressing the RUN button only. The COMPRESSOR button will be ignored. |
| | Power On Auto-Start | Off | On or Off | When enabled, the unit will remember its on/off status after a power failure and will return to this state when power is resupplied. |
| | Alarm Output Mode | Fault On Output | Fault Output or Do Not Output After Noise Erasure | Fault Output: faults will be output by the relay. Do Not Output After Noise Erasure: faults will not be output after noise erasure. |

| Setting Menu | Parameter Name | Default | Setting Range | Remark |
|----------------------|-----------------------------------|--------------------|---|---|
| | Water Level Low Stop Pump | Stop | Stop or Do Not Stop | Stop: when there is a low water level fault, the pump will stop. Do Not Stop: the pump will not stop on a low water fault. |
| | Current Detection | Off | On or Off | Whether the unit features a current detection module or not. |
| | Compressor Rated Current | 0.3 A | 0 – 35.0 A | Used in conjunction with the Current Detection parameter. Not shown if Current Detection module is not installed. |
| | Frozen Rated Current | 0.3 A | 0 – 25.0 A | |
| | Cooling Rated Current | 0.3 A | 0 – 25.0 A | |
| | Three-Phase Power Test | Off | On or Off | When enabled, the unit will detect power phase lacking and anti-phase fault. |
| | Anti-Freeze / Cooling Over Load | Cooling Overload | Anti-Freeze or Cooling Over Load | Input function selection for switch DI1 |
| | Compressor Number | 2 | 1 – 2 | Number of compressors in this unit |
| | Type Selection | Water Cooled Water | Water Cooled Air, Water Cooled Water, Air Cooled Water, or Air Cooled Air | Chiller type selection. |
| Temperature Settings | Loading Deviation | 1.0 °C | 0 – 10.0 °C | Temperature deviation of open compressor. |
| | Unloading Deviation | 1.0 °C | 0 – 10.0 °C | Temperature deviation of closed compressor. |
| | Temperature Set Point Upper Limit | 50.0 °C | 12.0 – 100.0 °C | The upper limit of the set point temperature. |
| | Temperature Set Point Lower Limit | 5.0 °C | -30.0 – 12.0 °C | The lower limit of the set point temperature. |
| | Temperature Compensation | 0.0 °C | -9.9 – 9.9 °C | Compensation value for the outlet water temperature. |
| | Low Temperature Protection | 3.0 °C | -30.0 – 99.9 °C | The outlet water temperature at which a low temperature warning will be thrown. |

| Setting Menu | Parameter Name | Default | Setting Range | Remark |
|---------------|---|---------|---------------|--|
| | Over Temperature Warning | 50.0 °C | 0 – 99.9 °C | The outlet water temperature at which an over temperature alarm will be thrown. |
| | Over Temperature Alarm | 60.0 °C | 0 – 99.9 °C | The outlet water temperature at which a shutdown over temperature alarm will be thrown. |
| | Over Temperature Reset Temperature Difference | 5.0 °C | 0 – 99.9 °C | The difference in outlet water temperature at which the over temperature warning will be reset. |
| Time Settings | Delay of Frozen Start | 10 s | 0 – 255 s | Frozen pump delay for when the unit is shutting down. |
| | Delay of Cooling Start | 10 s | 0 – 255 s | Cooling delay for when the unit is shutting down. |
| | Energy Regulation Cycle | 5 s | 0 – 255 s | Energy regulation cycle. |
| | Compressor Protect | 60 s | 0 – 255 s | The delay time between compressor start and stop commands. Used to protect the compressor from frequent cycling. |
| | General Failure Disappears Shake | 2 s | 0 – 255 s | Time for a condition to be present before considering it a fault. |
| | Water Shortage Disappears Shake | 10 s | 0 – 255 s | Time for water shortage to be present before throwing a fault. |
| | Water Level Disappears Shake | 10 s | 0 – 255 s | Time for water level to be at fault level before throwing a fault. |
| | Low Pressure Testing Delay | 60 s | 0 – 255 s | Time delay between compressor running and checking for low pressure fault. |
| | Low Pressure Disappears Shake | 5 s | 0 -255 s | Time for pressure to be at low fault level before throwing a fault. |
| | Compressor Use Time | 0 h | 0 – 9999 h | The unit will not start when compressor accumulated running time is larger than this value. |
| | Compressor Switching Time | | | |
| | #1 Compressor Start Time | | | |
| | #2 Compressor Start Time | | | |

| Setting Menu | Parameter Name | Default | Setting Range | Remark |
|----------------------|---------------------------|-----------------|----------------------------------|--|
| Open & Close Setting | Compressor High Pressure | Normally Closed | Normally Closed or Normally Open | Whether the fault signals are normally open or closed. |
| | Compressor Low Pressure | | | |
| | Compressor Overload | | | |
| | Water Level Switch | | | |
| | Water Flow Switch | | | |
| | Freezing Overload | | | |
| | Cooling Overload | | | |
| | Loading Range Control | | | |
| | Three-Phase Power Failure | | | |

FAULT DETAILS

| Fault Name | Consequences | Remark |
|-----------------------------|---|--|
| #1 Compressor High Pressure | Alarm. Compressor 1 stop. Delay stop cooling. | Check whether the input switch value is set correctly. |
| #1 Compressor Low Pressure | | |
| #1 Compressor Overload | | |
| #1 Compressor High Current | | Check whether the compressor rated current setting is reasonable. |
| #1 Compressor Low Current | | Check whether the compressor circuit wiring is normal. |
| #2 Compressor High Pressure | Alarm. Compressor 2 stop. Delay stop cooling. | Check whether the input switch value is set correctly. |
| #2 Compressor Low Pressure | | |
| #2 Compressor Overload | | |
| #2 Compressor High Current | | Check whether the compressor rated current setting is reasonable. |
| #2 Compressor Low Current | | Check whether the compressor circuit wiring is normal. |
| Temperature Too Low | Alarm. Compressor stop. | These faults are raised when the relevant value is outside the range allowed for in the Manufacturer Settings section. Check to make sure these values are set appropriately. |
| Over Temperature Alarm | Alarm. Compressor stop. | |
| Over Temperature Warning | Alarm only. | |
| Cooling Current Too Low | Alarm. Compressor stop. | |
| Frozen Pump High Current | Stop unit. | |
| Frozen Pump Low Current | | |
| Frozen Pump Overload | | |
| Power Failure | Stop unit | |
| Current Fault | Stop unit. | Check that the Normally Open or Normally Closed value is set correction in the Manufacturer Settings section. |
| Water Level Fault | Stop unit. | |
| Unit Needs Maintenance | Unit will not start. | Compressor accumulative total run time is higher than the allowed value. |
| Parameter Abnormal | Unit will not start. | Check for an invalid parameter setting. |

TROUBLESHOOTING

| Problem | Possible Causes | Possible Solution |
|---|---|---|
| Power supply is normal but the unit will not start. | Temperature controller is faulty | Change the temperature controller. |
| The unit trips when attempting to power on. | Short circuit | Locate and correct the short circuit |
| | Main circuit overload | Check each load and find the cause of the overload. Eliminate the overload. If it is because of small rated current of the broken circuit, change the broken circuit. |
| | Faulty breaker | Replace the faulty breaker |
| Three-phase power failure | Reverse phase | Swap any two phases of the power supply to reverse the pump direction. |
| | Missing phase | Test the three-phase source with a multimeter to determine if the power supply is in good condition. |
| High Pressure Alarm | Poor heat dissipation | Refer to "Poor Heat Dissipation" section. |
| | Damaged high pressure switch | Replace with working switch. |
| | Input line fault | Check the input line and remove the fault. |
| Low Pressure Alarm | Refrigerant low | Refer to "Low Refrigerant Level" section. |
| | Outlet water temperature and evaporator temperature too low | Check whether there is a lack of water in the water tank and whether the circulating pump is running well. If those are normal, reset the low pressure switch or restart the unit. If the evaporator is frozen, input warm water to melt the ice. Do not attempt to break the ice off with force. |
| | Input circuit fault | Check the input circuit and remove the fault. |
| Overload Alarm | The voltage is incorrect | Check the three-phase source to determine if the power supply is in good condition. |
| | Bad cooling | Refer to "Poor Heat Dissipation" section. |
| | Water pump flow or pressure too high | Check the water way and adjust the water flow to within the water pump's rated flow rate. |
| | The bearings of the compressor, motor, or pump are damaged | Replace the damaged bearing. |

| | | |
|--|--|---|
| | The overload relay is too small or its regulating value is too low | Replace the overload relay with a higher rated one. |
| | The joint of the circuit is not good | Lock the line contact. |
| The fault indicator is not on, but the compressor will not run. | The unit has disabled compressor start up as a precaution | Refer to "Compressor Not Starting" section. |
| Water in the tank is not cooled, or the low pressure switch is shut off by itself. | The cooling capacity is not great enough | Expand the capacity of the unit. |
| | Refrigerant low | Refer to "Low Refrigerant Level" section. |
| | The water tank is choked by the refrigeration medium | Replace the choked part such as drier or expansion valve and fill refrigerating medium in the vacuum state. |
| | The valve is broken | Change the compressor. |
| | The temperature is set too high | Adjust the temperature set point. |
| | The temperature switch is faulty | Replace the faulty switch. |
| | Poor heat dissipation | Refer to "Poor Heat Dissipation" section. |
| Lacking water and the water flow is not enough. | The sensor is faulty | Replace the faulty sensor. |
| | Not enough water in the water tank | Add more water to the water tank. |
| | Pipe line water flow is too low | Check that each valve is fully open. |

Poor Heat Dissipation

While the condenser heat dissipation is poor, the compressor will be inefficient and the operating current will be increased. When the chiller reaches the high pressure value (set depending on the chiller type and refrigerant used), the high pressure switch will trip an alarm and the unit will stop working. This can be caused by poor heat dissipation. For water cooled units, check whether water in the cooling tower is circulating well, the temperature of the cooling water is too high, the fan of the cooling tower and the water pump are running, and that the cooling water valve is fully open. For air-cooled chillers, confirm that the condenser is not dirty or choked. Once the above conditions are checked to be in normal condition, clear the alarm. If the high pressure alarm is frequently occurring, clean the condenser as soon as possible.

Low Refrigerant Level

If the water temperature is over 5 °C and the pressure is below 200kpa, it may indicate a shortage of refrigerant. Any leaks should be filled, the dryer filter should be changed, and it should be drawing a vacuum again. Refill the refrigerant after the above has been performed.

If the leaking part is within water, stop the chiller immediately and discharge the water in the water tank quickly. The compressor can be damaged badly if it sucks in water.

Normal Low and High Pressure

While the compressor is running, if the difference between high pressure and low pressure is small, it may indicate the valve of the compressor is damaged. If this is detected, the unit should be stopped immediately. It is normal for the pressures to be similar if the compressor is not running.

Compressor Not Starting

If the fault indicator and the protection switch are normal, but the compressor will not start, please check the following:

1. The set temperature is too high or the temperature switch is damaged
2. The selector switch is damaged
3. The anti-freezing switch is damaged
4. The pressure switch is damaged
5. The overload protector of the compressor is damaged
6. The electromagnetic relay is damaged or the overload protector is damaged
7. The water level is too low
8. The refrigerating water protecting switch is damaged

MAINTENANCE

Warning: Always isolate the power from the chiller prior to working on the unit.

Warning: Always ensure that personnel have read and understood the SAFETY section of this manual prior to working on the chiller.

Warning: When the mains controller is de-energised the power contactors are live, even if the components are not operating. All maintenance must be carried out by qualified refrigeration mechanics.

These units have been designed for the minimum of maintenance. However to ensure optimum performance qualified personnel should carry out regular maintenance. A comprehensive preventative maintenance program is available through Aqua Cooler carried out by qualified refrigeration mechanics.

Should any faults be identified then please call Aqua Cooler to arrange a service call.

Recommended preventative maintenance program

| Operation | Frequency |
|----------------------------------|------------|
| Refrigerant Charge | 6 Monthly |
| Electrical connections are tight | 6 Monthly |
| Compressor amp draw | 12 Monthly |
| Pump amp draw | 12 Monthly |
| Condenser strainer cleaned | 6 Monthly |

A comprehensive preventative maintenance section is included in the back of this manual

WARRANTY

Any claim under this warranty must be made within the discussed time period of the date of purchase of the product. To make a claim under the warranty, return the product (with proof of purchase) to the supplier where you purchased the product or contact Aqua Cooler regarding warranty conditions.

Aqua Cooler will pay your reasonable, direct expenses of claiming under this warranty. You may submit details and proof of your expense claim to Aqua Cooler Pty Ltd for consideration.

This warranty is given by Aqua Cooler Pty Ltd, U14, 2-12 Knobel Court Shailer Park 4128 QLD.

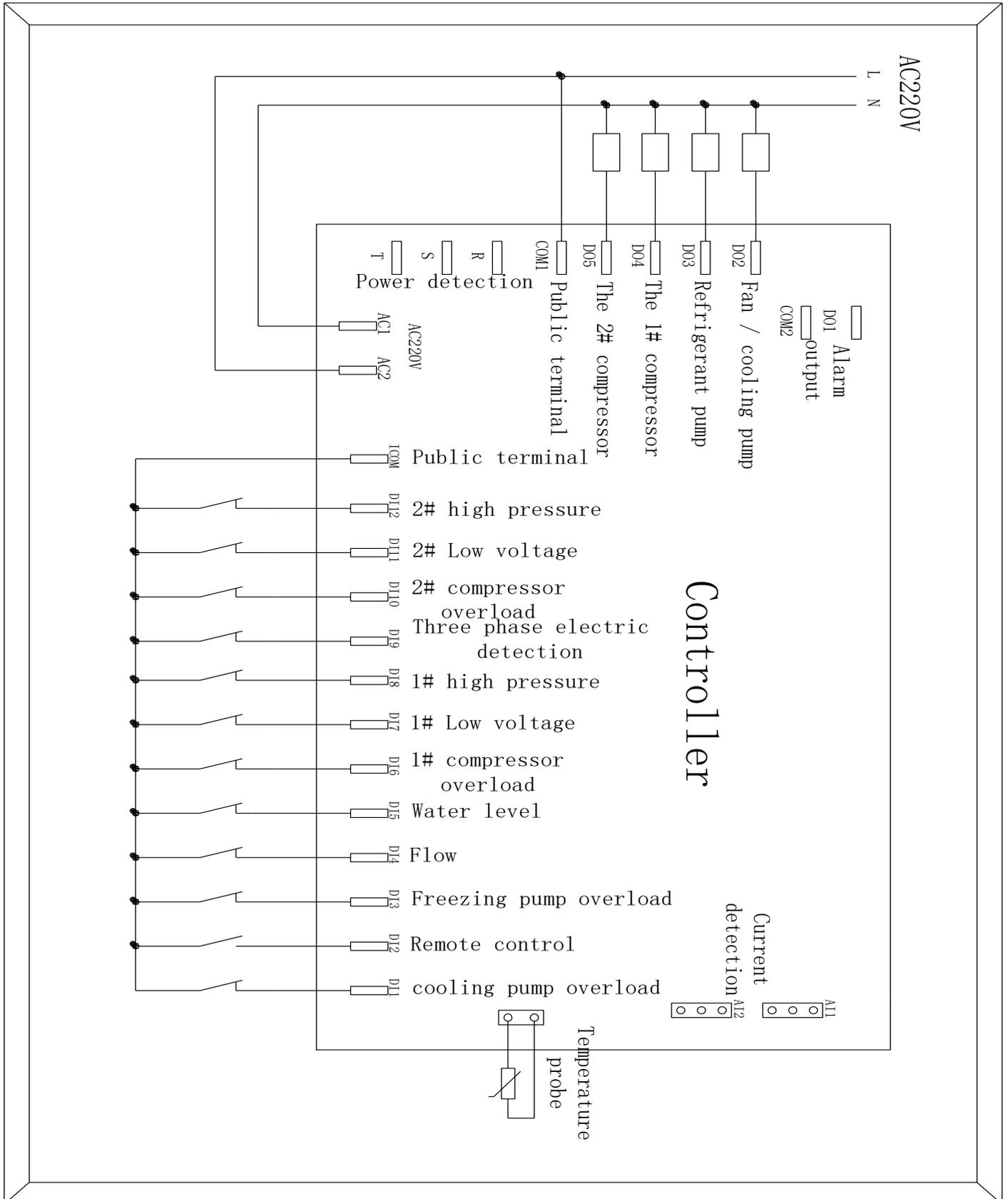
This warranty is provided in addition to other rights and remedies you have under law: Our goods come with guarantees which cannot be excluded under the Australian Consumer Law. You are entitled to replacement or refund for a major failure and to compensation for other reasonably foreseeable loss or damage. You are also entitled to have the goods repaired or replaced if the goods fail to be of acceptable quality and the failure does not amount to a major failure.

Attached to this document is a comprehensive commissioning procedure. This must be carried out in accordance with the procedure and returned to Aqua Cooler at support@aquacooler.com.au. Aqua Cooler offers a commissioning program and can arrange this for you. Failing to follow the commissioning procedure may void this warranty.

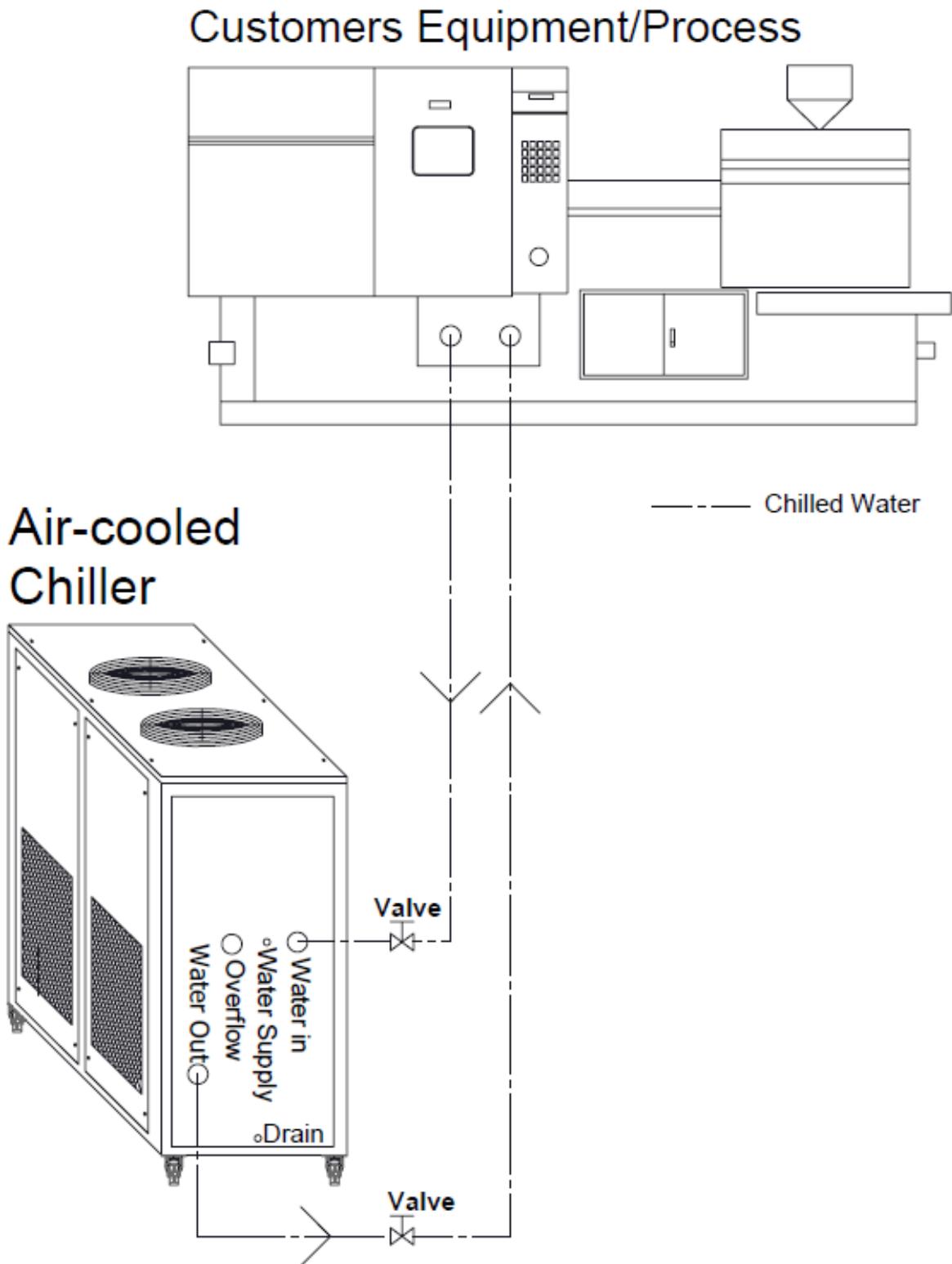
GENERAL INFORMATION

The chiller is designed to refrigerate and circulate water to a heat developing process to aid in keeping that process cool. They are supplied with an immersed coiled copper evaporator, or plate heat exchanger, or shell and tube evaporator (model dependant) an air cooled condenser and a scroll compressor to circulate the refrigerant gas. Water is circulated out of the unit via a pump. The chiller is design to be installed outdoors and refrigerate water for a heat developing process – not for drinking or food preparation purposes. Any other use of this water chiller is a not as it is intended.

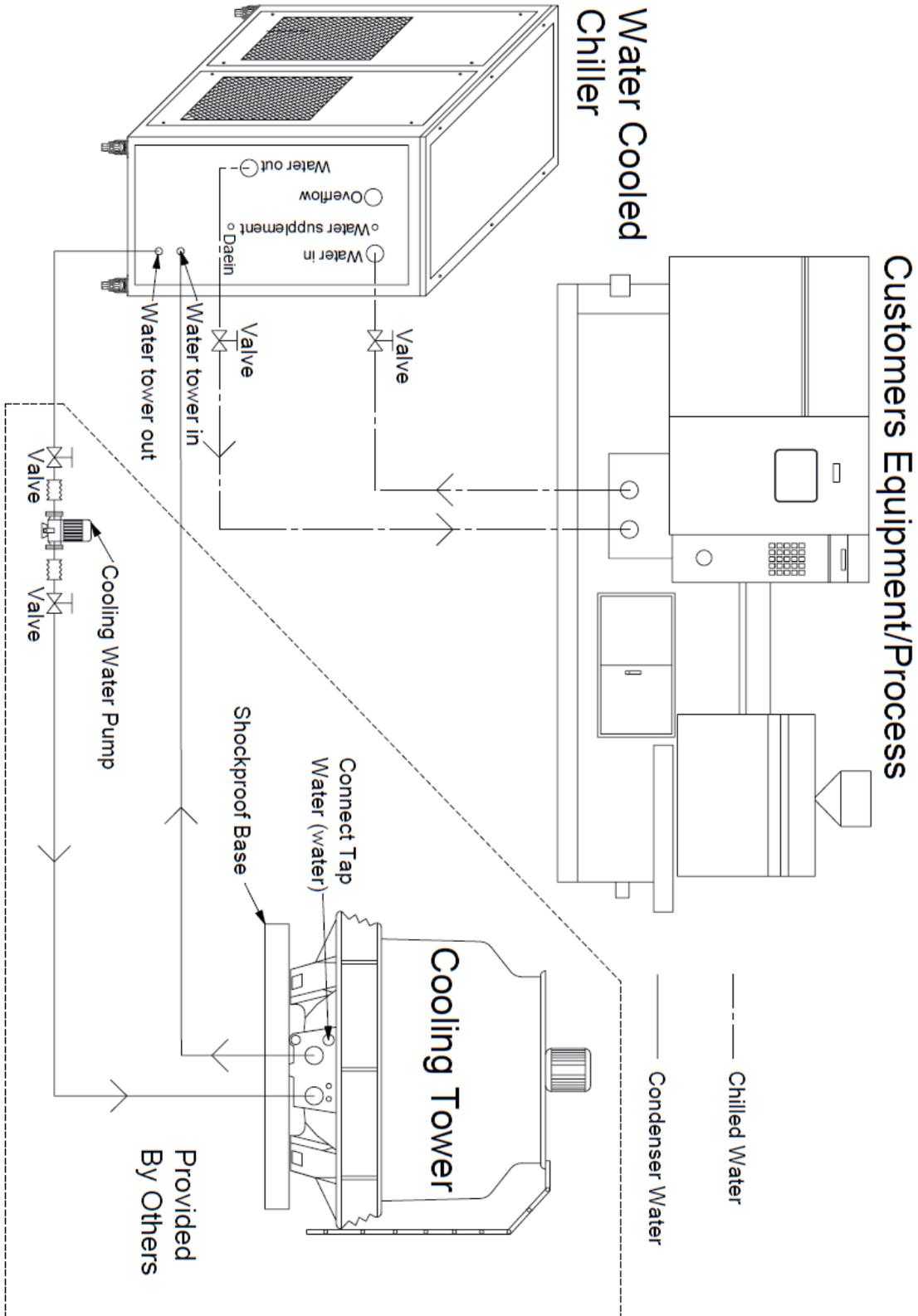
TYPICAL CONTROLLER BLOCK DIAGRAM



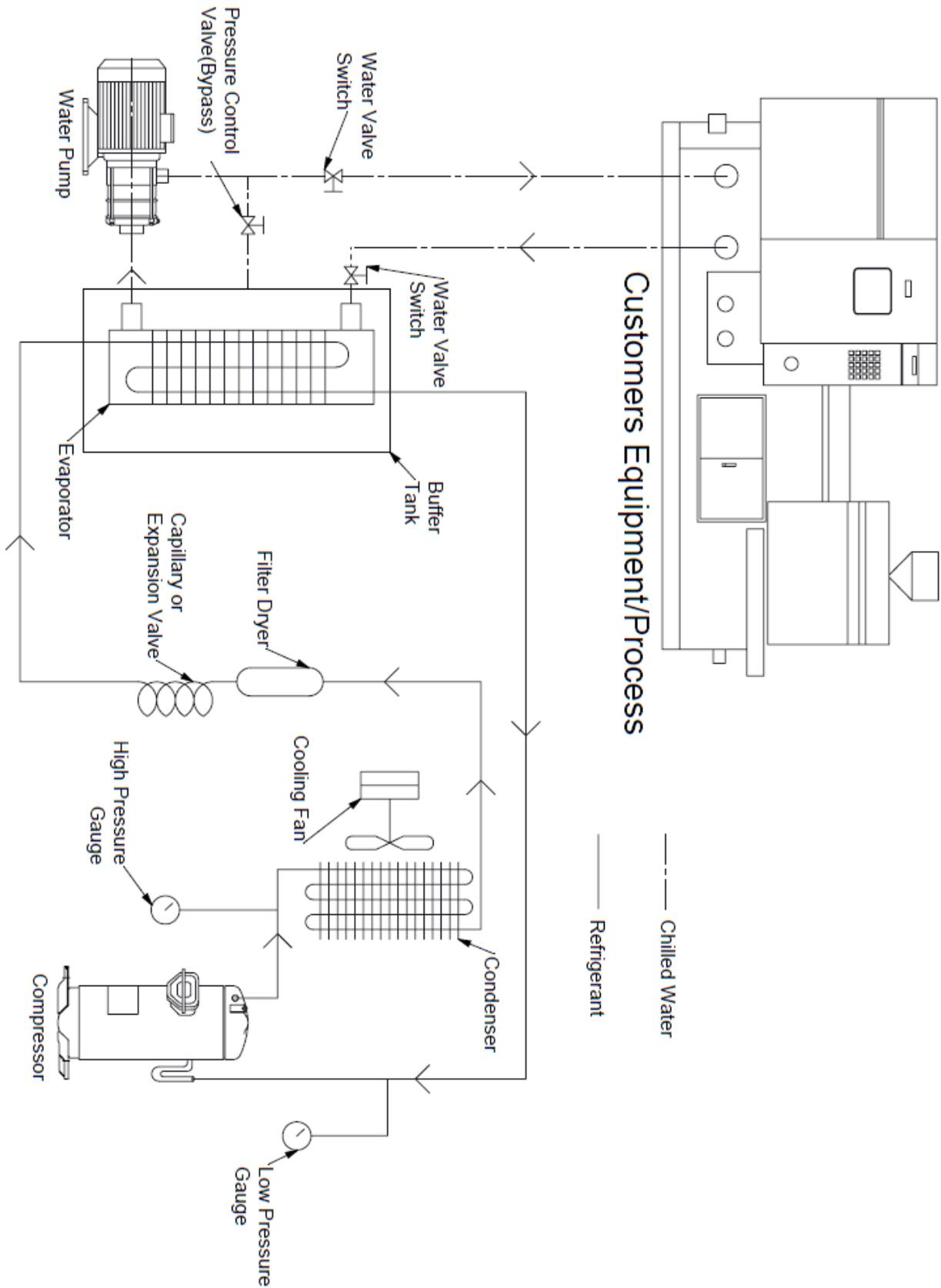
INSTALLATION SKETCH MAP OF AIR COOLED CHILLER



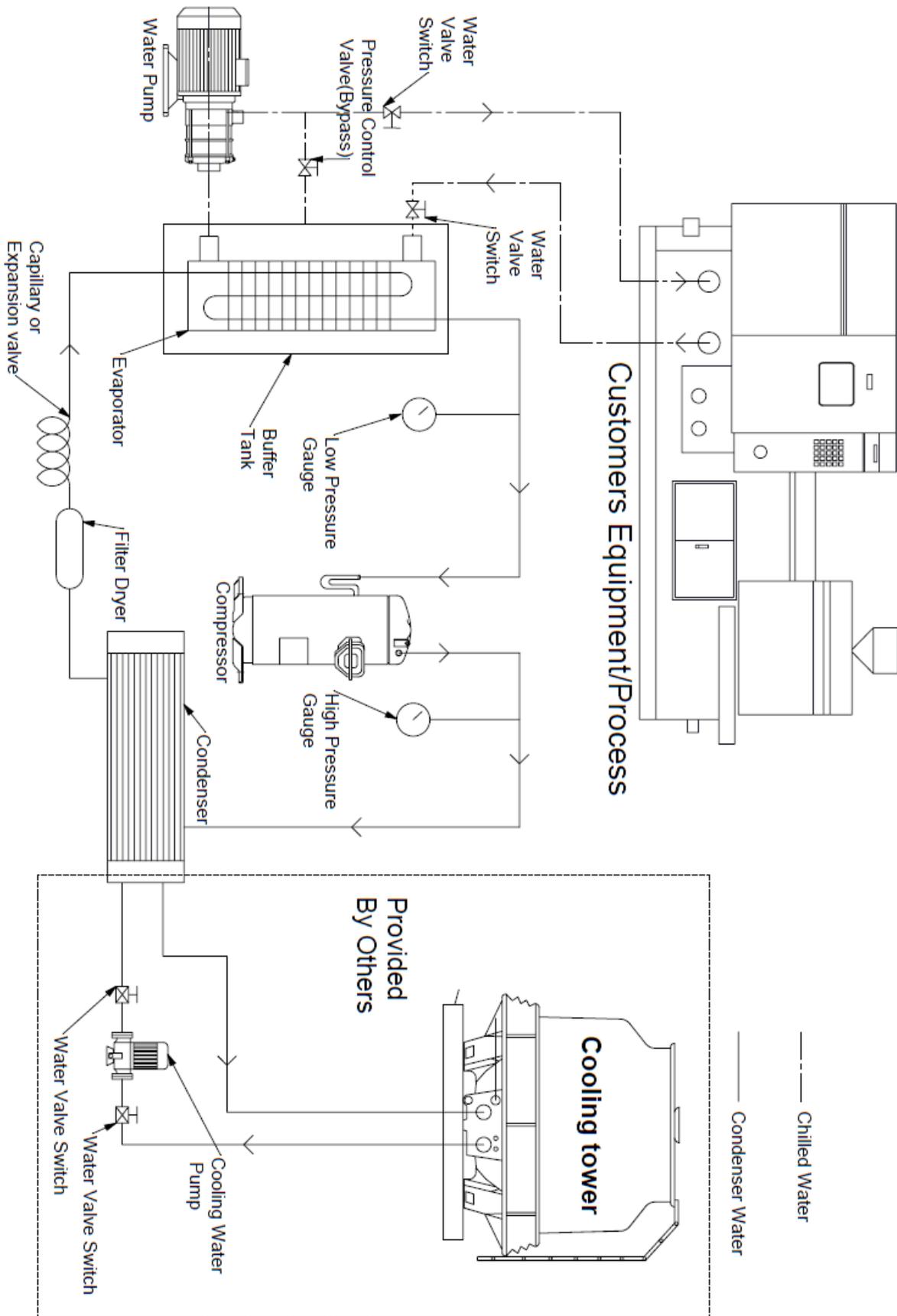
INSTALLATION SKETCH MAP OF WATER COOLED CHILLER



INTERNAL STRUCTURE SKETCH MAP OF AIR COOLED CHILLER



INTERNAL STRUCTURE SKETCH MAP OF WATER COOLED CHILLER



COMMISSIONING SHEET

It is important that the chiller is commissioned in accordance with the guidelines below in order to ensure proper and trouble free operation.

Outlined below is a check list showing all the considerations that must be taken for the proper installation and operation of the chiller.

Pre-start checks

| Procedure | Carried out in accordance with procedure? | Notes |
|--|---|-------|
| Check that there has been no evidence of damage from transport | | |
| Has adequate clearance been left around and above the chiller as per the instructions outlined in the installation section | | |
| Check that the isolation switch has been installed close to the chiller in line of sight | | |
| On standard chillers and remote condenser models ensure that the power connection to the chillers and between the modules is protected | | |
| Note down the pipe run from the chiller to the process. | | |
| Note down the water pipe sizes to and from the chiller | | |
| Has the water pipe work been fitted with insulation | | |
| Check the refrigeration circuit for oil residue and run a leak detector over the refrigeration system. | | |
| On remote condenser model note the distance between the two modules | | |
| On remote condensers note the refrigeration pipe sizes between the two modules. | | |

Electrical Connection

| | | |
|---|--|--|
| Isolate power to the chiller and access the electrical box and check all wiring is tight. | | |
|---|--|--|

Water Connection

| | | |
|--|--|--|
| Was the pressure on the suction gauge checked before the unit was filled with water – see Installation | | |
| Open the mains make up water to the chiller – has all the air been bled from the system | | |
| Check the water path for leaks | | |

Start Up

Press the ON/OFF button on the front of the chiller and the pump will start up

| | | |
|--|--|--|
| After adding power to the chiller, change the water temperature setting and all other alarms to customer or site needs | | |
| After chiller has started check and note down the current draw for the compressors, pump and fans | | |
| Note down the water flow reading | | |
| Note down pump pressure | | |
| Does pump performance fall on the respective pump curve | | |

| | | |
|---|---|--|
| Check the sight glass for evidence of bubbles or moisture (if fitted) | | |
| Check that water temperature is dropping | | |
| Note down the oil level on the compressor sight glass (if fitted) |  | |
| Adjust the bypass valve to suit customer and/ or site needs | | |
| Fit gauges and note down running pressures on the chiller | | |

Finishing Off

| | | |
|--|--|--|
| Is the electrical box closed and door secure | | |
| Are all panels secure | | |
| If the mesh was removed from the side of the chiller has it been replaced | | |
| Are all tools and debris clear of the site | | |
| Are there any site specific feature that may hinder the operation of the chiller in the future | | |

NOTES