



Gladiator - G Series

Owner's Manual

This guide applies to the following models: GA0.6 to GA60(F).



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INTRODUCTION

Thank you 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.


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 evaporator, or plate heat exchanger, or shell&tube evaporator (model dependant), an air-cooled condenser and a rotary or scroll compressor to circulate the refrigerant gas. Water is circulated out of the unit via a pump. The chiller is designed 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 not as it is intended.

Denomination

<h1>GA12(D)-A-CC-HYD</h1>				
				<u>Special Series:</u> None: Standard Unit TTN: Dual Ref Circuits HYD: Dual Water & Ref Circuits CTO: Close Tolerance
				<u>Evaporator Type:</u> CC: Coil in Tank PP: Plate Pack ST: Shell&Tube
				<u>Refrigerant:</u> A: R134A C: R407C 410:R410A
				<u>Compressor Number:</u> None:Single (D): Dual (F): Quad
				<u>Model Number:</u> GA:0.6 to 60
				<u>Chiller Series:</u> GA: Gladiator

Safety



	<p>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. 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>
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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 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 unit is not to be used by the infirmed or children unless they are supervised by responsible persons qualified to carry out the supervision. All panels must be re-installed after carrying out any maintenance work. The unit should be secured to prevent it from toppling over.

Minimum temperature setting is 5°C 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

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.

	<p>WARNING</p> <p>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.</p>
	<p>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.</p>

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.

R134A | R410A | R407C: Hazchem code 2RE and non – flammable.

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 the area of exposure immediately and if you are assisting a victim to 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 (30°C) 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 catecholamines may be contraindicated due to possible cardiac sensation. Treatment for asphyxia.

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 unit has been designed to be lifted with a forklift or a crane. The 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.

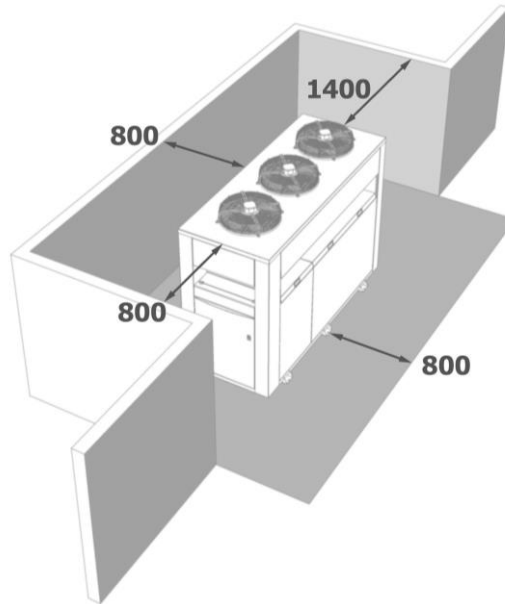
The commissioning section at the end of this manual has a site inspection checklist designed to aid in checking that the site for the chiller installation is suitable. This should be filled out by someone experienced in chiller installation and returned to Aqua Cooler if there are any doubts about the 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.

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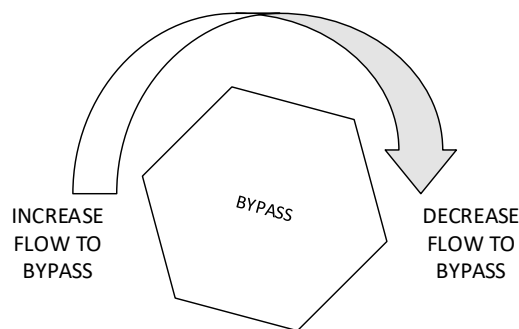
At least 800mm should be left around the unit (Rear: 1400mm) to allow for proper ventilation of the condenser. The unit should not be installed in a closed-off room. Preferably there should be no obstructions above the chiller, with a minimum of 2000mm clearance permitted in other circumstances. In addition 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 to ensure there is no refrigerant leak. 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 there is a leak in the refrigeration circuit, water may be drawn into the refrigeration circuit on startup. 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 water-resistant insulation material to prevent sweating and maximise the efficiency of the chiller.



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 Australian 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 inrush current and the lock rotor amps of the compressor— see the brochure. The circuit breaker must be set no more than 125% of the units rated load current.

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 starting 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 marking plate.
2. Check the pipe and return water pipe are connected properly and the valve is open.
3. Fill the water tank with water or coolant before starting the water pump. (Ensure you are using a suitable coolant 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

1. The power supply voltage and phase should be in accordance with the specifications listed on the chiller's marking place.
2. Check the ventilation of the unit.
3. Check the refrigerant leak through pressure gauge before filling the unit with water
4. Check the bypass in the tank. Make sure it's closed to ensure the water flow to application.
5. Check the power supply according to the requirements

Operating Sequence

1. Open the valve of the supply pipe and return pipe and ensure the waterway is unimpeded.
2. Turn the unit on with the master power switch.
3. Press the run 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.

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.

The compressors have a start delay. Once the compressors have cut in, watch the display to ensure that the water temperature is coming down. Set points and operational parameters are displayed on the screen. Any faults are indicated on the face of the control panel.

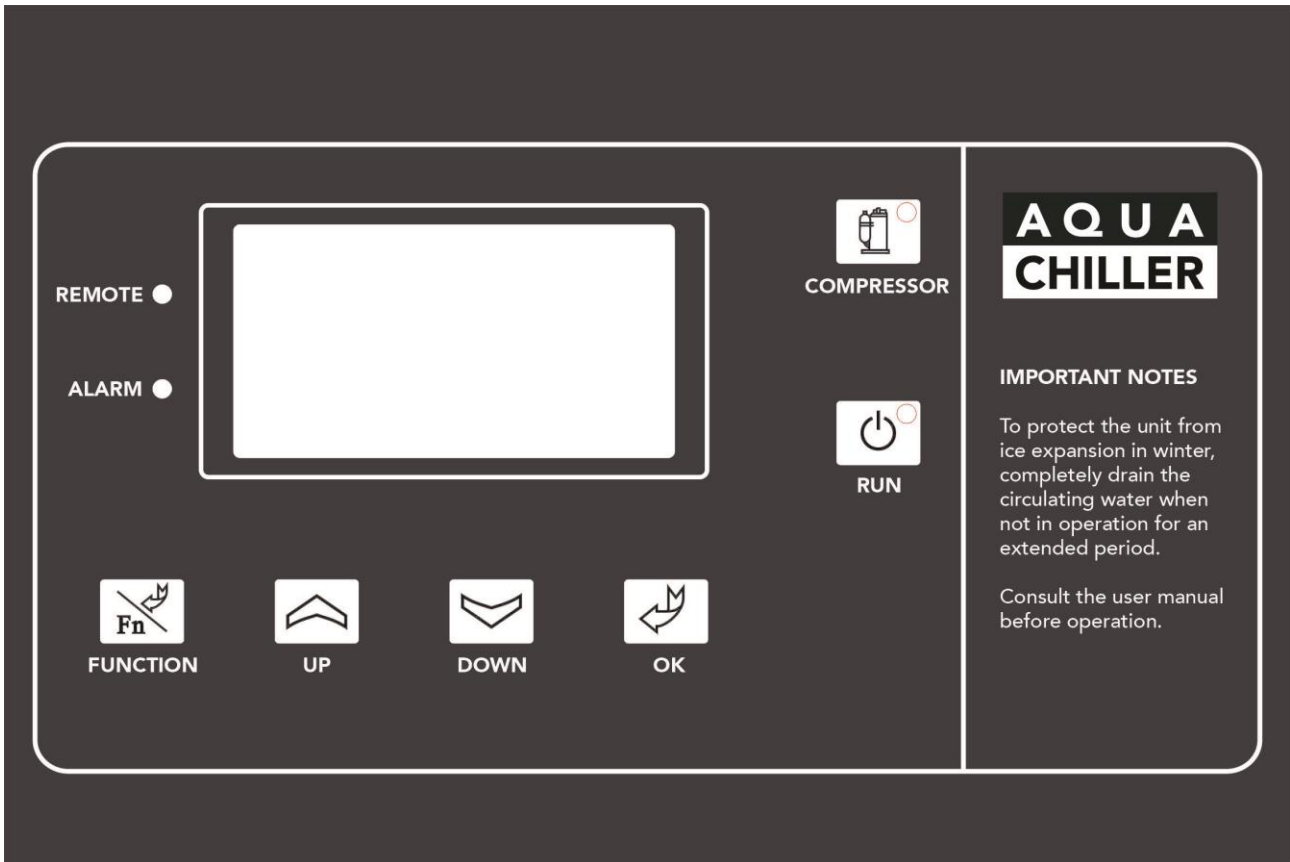
It is a good idea after the unit has been running for 5 minutes check that the water temperature is dropping and check there are no bubbles in the sight glass (if fitted) – if these two things are happening then the unit is running properly. Give the system a final check to ensure that there are no water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

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). The default setting is when the water level is too low, the unit will throw an alarm and the pump will keep operate. However, this function can be changed in controller. Once the function is changed, pump will stop running if water level gets too low. Please make sure the function setting fits the application requirement.
(Manufacturer Parameters – Control Setting – Low water lv. & Lack of water)
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 [OK] 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.

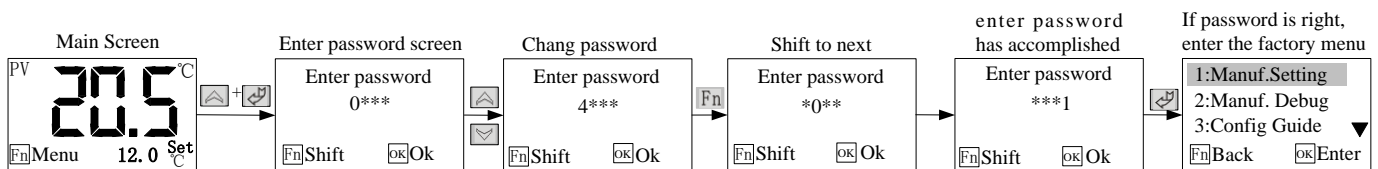
There are 5 sub-menus in the function menu:

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 (default 4561) 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.
3. **Configuration Guide** – This menu provides a configuration wizard for setting up a new unit.

Starting the Chiller

1. Turn on the power to the chiller.
2. After power has been supplied, press the [RUN] button on the operation panel.
3. The cooling pump will start to run and the [RUN] button indicator will illuminate.
4. Press the [COMPRESSOR] button on the operation panel.
5. The [COMPRESSOR] button indicator will begin to blink.
6. 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	-5 – 25 °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 more. Set to zero to disable.
Language	English	English or Chinese	Select display language.

High Pressure and Low Pressure Settings

Gladiator		R134A	R407C	R410A
Pressure switch setting	HP	2000kPa [1500kPa]	2500kPa [2000kPa]	3500kPa [3000kPa]
	LP	100kPa [300kPa]	100kPa [300kPa]	100kPa [300kPa]
Please manual restart the chiller. The chiller can only be restart once pressure is back to a reasonable reset pressure [__ kPa].				

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. Please refer to wiring diagram for accurate wiring input.

Setting Item	Name of Parameter	Factory Default	Setting Range	Remark
Function Settings	*One-Key start	Forbid	Forbid ~ Use	Forbid: the compressor is allowed to ON only when press the compressor button; Used: the compressor allows ON when press the pump button.
	Auto start up	Forbid	Forbid ~ Use	Use: the unit starts automatically when powered on; Forbid: the unit doesn't start automatically when powered on; When the user parameter [On/Off type] is set to be "Remote", the electrical auto start is invalid.
	DO1 fuction (SF306000A does not have this option)	Alarm signal	Alarm signal; Run signal	
	Alarm output	Keep when mute	Keep when mute; Stop when mute	Keep when mute: press the "alarm output" parameter to take action once a fault occurs; Stop when mute: press the "alarm output" parameter to take action in case of no fault after silencing.
	Alarm type	N.O	N.O~N.C	N.O: the alarm relay is ON in case of faults; N.C: the alarm relay is OFF in case of faults.
	DI5 fuction (GW531B does not have this option)	Water switch	Water switch; Vent1 temp	Water switch: DI5 input for water level detection. Vent1 temp: DI5 input for Vent1 temperature detection.
	DI9fuction (GW531B does not have this option)	Phase swtich	Phase swtich; Vent2 temp; Cool W.flow	Phase swtich: DI9 input for phase sequence detection. Vent2 temp: DI9 input for Vent2 temperature detection. Cool W.flow: DI9 input for cool water flow detection.
	*Low water lv.	Pump keep	Pump stop ~ Pump keep	Pump stop: stop the cold pump in case of low water level fault; Pump keep: do not stop the cold pump in case of low water level fault.
	*Lack of water	Pump keep	Pump stop ~ Pump keep	Pump stop: stop the cold pump in case of cold water flow fault; Pump keep: do not stop the cold pump in case of cold water flow fault.
	*Current detect	Use	Forbid ~ Use	Use: there is a current detection module; Forbid: no current detection module.
*1#Comp.I rating	>0A	0~35.0A	0A: do not detect the current fault.	

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	*2#Comp.I rating(GW531B does not have this option)	>0A	0~35.0A	When [Current detect] is set "Forbid", those parameter is not displayed. The current value is set according to the actual calculation.
	*Pump. I rating	>0A	0~35.0A	
	*Cool. I rating	>0A	0~35.0A	
	*Phase monitor	IO_input	On_board; Forbid; IO_input	Onboard: use the controller's own three-phase power protection; Switch input: use an external three-phase power protection. (The external three-phase power protection can only be used when [DI9 function] is set "Phase switch".) Forbid: do not use three-phase power detection function.
	DI1 input opt	Cool overload	Cool overload; Anti-freezing	Selection of switch DI1 input function.
	DI6 input opt(SF306000A does not have this option)	Comp overload	Comp overload; Cool W.flow	Comp overload: DI6 input for Comp overload detection. Cool W.flow: DI9 input for cool water flow detection.
	*Comp number(GW531B does not have this option)	2	1~2	Selection of the number of compressor.
	*Machine type(GW531B does not have this option)	AIR-WATER	4 machine models in total	Four models: fan-cooled water chiller, water-cooled water chiller, fan-cooled fan cooler and water-cooled fan cooler.
	Temp.high AL (SF306000A does not have this option)	Pump keep	Pump stop ~ Pump keep	Pump stop: stop the cold pump in case of Temp.high fault; Pump keep: do not stop the cold pump in case of Temp. high fault.
	DI3 input opt (SF306000A does not have this option)	Phase switch	Cold overload~ Phase switch	Selection of switch DI3 input function.
	communication function choice (GW531B does not have this option)	Use	Forbid; Use	Use: the communication function of RS485 is used. Forbid: the communication function of RS485 is not used.
Temperature Settings	Load offset	2.0°C	0~10.0°C	Temperature deviation of load the compressor.(Comp. starts when SetPoint + LoadOffset)
	Unload offset	2.0°C	0~10.0°C	Temperature deviation of unload the compressor. (Comp. stops when SetPoint – UnloadOffset)
	T.setpoint max	40.0°C	-38.0~99.9°C	To limit the temperature of user set.
	T.setpoint min	5.0°C	-38.0~99.9°C	
	T.bias	0.0°C	-9.9~9.9°C	Compensation for the liquid temperature.

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	T.low protect	2.0°C	-40.0~99.9°C	Fault of “Temp.low AL” warning is reported when the liquid temperature is lower than the set value.
	T.high warn	50.0°C	0~99.9°C	Fault of “Temp.high warn” warning is reported when the liquid temperature is higher than the set value.
	T.high alarm	60.0°C	0~99.9°C	Fault of “Temp.high AL” warning is reported when the liquid temperature is higher than the set value. And Stop the compressor and delay to stop the cool pump.
	T.high reset	5.0°C	0~99.9°C	If liquid temperature < [T.high alarm]– [T.high reset], manual reset of “Temp.high AL” fault is allowed; If liquid temperature < [T.high warn] – [T.high reset], the “Temp.high warn” fault is automatically reset.

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Time Settings	Pump on delay	3 S	1~255 S	Delay after cold pump startup.
	Cool on delay (Cond. Pump)	10 S	1~255 S	Delay after cool pump startup.
	Capacity ctrl.	5 S	0~255 S	Control the compressor ON/OFF every [Capacity ctrl.] interval time; For double-compressor control, if the conditions of two compressors ON are satisfied, one of the compressors will turn ON first and then the other compressor will turn ON after the time of [Capacity ctrl.].
	Comp protect	120 S	0~255 S	To avoid frequent ON/OFF the compressor, the interval between the start of two compressors must be greater than the set value.
	Input stable	3 S	0~255 S	The time General fault stable.
	W.flow stab.	10 S	0~255 S	It is considered to be valid only when the water flow alarm continue for the time. (flow alarm delay time)
	LP detect dly	180 S	0~255 S	Compressor low-pressure fault input is allowed only when the compressor has run for the set time.
	LP stable	3 S	0~255 S	Low-pressure fault stable time
	LP stop pump	3 S	0~300 S	0: the parameter has no effect. Non-0: in case of low pressure fault of the compressor, immediately stop all compressors and cool pump, delay the [LP stop pump] and stop the cold pump.
	Comp operation	0 H	0~9999 H	0: this parameter has no effect. Non-0: the compressor cannot start when the accumulative operation time is greater than the set value.
	Comp shift(GW531B does not have this option)	2 H	0~255 H	0: the parameter has no effect ; Non-0: a compressor will automatically switch to another after it has run continuously for that time.
	1#Comp.I avoid	3 S	1~255 S	The current fault of 1#compressor can only be detected after 1# compressor has started for the set time. (When the [Current detect] is set "forbid", the parameter is not displayed.)
	2#Comp.I avoid (GW531B does not have this option)	3 S	1~255 S	The current fault of 2#compressor can only be detected after 2# compressor has started for the set time. (When the [Current detect] is set "forbid", the parameter is not displayed.)
	Pump. I avoid (Evap. Pump)	3 S	1~255 S	The current fault of cold pump can only be detected after it has started for the set time.

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				(When the [Current detect] is set "forbid", the parameter is not displayed.)
	Cool. I avoid (Cond. Pump)	3 S	1~255 S	The current fault of cool pump can only be detected after it has started for the set time. (When the [Current detect] is set "forbid", the parameter is not displayed.)
Switch Settings (Input Settings)	*Freez overload (Evap. Pump)	N.C	N.O ~ N.C	Selection of switch input mode N.O: switch off with no fault; N.C: the switch is closed with no fault.
	*Cold W.flow (Flow switch)	N.O	N.O ~ N.C	
	*W.level switch	N.O	N.O ~ N.C	When [DI5 fuction] is " Vent1 temp", it is the place for N.O and N.C settings of vent1 temperature detection.
	*Comp overload	N.C	N.O ~ N.C	Selection of switch input mode N.O: switch off with no fault; N.C: the switch is closed with no fault.
	*Low pressure	N.C	N.O ~ N.C	
	*High pressure	N.C	N.O ~ N.C	
	*Phase error	N.C	N.O ~ N.C	When [DI9 fuction] is " Cool W.flow", it is the place for N.O and N.C settings of cool water flow switch. When [DI9 fuction] is "Vent1 temperature", it is the place for N.O and N.C settings of vent1 temperature detection.
	*Cool overload (Fans &Anti-Fre &Cond. Pump)	N.O	N.O ~ N.C	When [DI1 input opt] is " Anti-freezing", it is the place for N.O and N.C settings of antifreezing switch. (T.AFR Low)

When using low temperature set-up, please change the following settings. (The following settings are not available in some controllers.)

1. Change: [Temperature Setting] > [T.setpoint min]: Suitable temperature
2. Change: [Temperature Setting] > [T.low protect]: Suitable temperature
3. Change: [Temperature Setting] > [T.Frz Use]: Use
4. Change: [Temperature Setting] > [T.Frz Low]: Suitable temp
5. Check: The low pressure alarm setpoint.

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		

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Frozen Pump Overload		
Power Failure	Stop unit	Check whether the three-phase power is inverse phase or lacking phase.
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
PCB Blank	No control voltage	Check main breaker is on. Check PCB has 24VDC to controller. If power is present, replace PCB.
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.
	Ambient Temperature too High	Ambient temp too high. Condensing temp to be brought down. (spray coils with water)
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.

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	Input circuit fault	Check the input circuit and remove the fault.
	Faulty Tx Valve	Check operation of Tx valve (opening and closing as required)
	Water fouling	Check buffer tank and coil water is clean and coil not coated in mud/debris.
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.

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	The temperature switch is faulty	Replace the faulty switch.
	Poor heat dissipation	Refer to “Poor Heat Dissipation” section.
	The sensor is faulty	Replace the faulty sensor.
Lacking water and the water flow is not enough.	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.
Low or No Flow	Faulty pump	Check pump operation. Replace pump if at fault
	Water blockage	Check water flow is coming back through to chiller. Water line isn’t isolated down the line. Water strainer is clean and clear (if installed in water pipe work. If plate pack evaporator is used check there is flow through the heat exchanger. If blocked replace heat exchanger.
	Low Water	Check water level in tank/water level sensor
	Faulty Flow Switch	Test operation of flow switch on water circuit
High Return/Supply Water temperature	Faulty Probe	Check probe operation/Re-calibrate sensor, replace probe.
	Low refrigerant charge	Check refrigerant system operation, check superheat and sub-cooling are within normal operating range.

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 air-cooled chillers, confirm that the condenser is not dirty or choked and have a good airflow. 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

If the pressure at the gauge is pressure low, 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.

Low and High Pressure Difference

While the compressor is running, if the difference between high pressure and low pressure is small, it may indicate the piston inside 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 sensor is damaged
2. The PCB button 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.
- Always ensure that personnel have read and understood the SAFETY section of this manual prior to working on the chiller.
- 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. If there is any fault or concern during daily operation, please contact Aqua Cooler to arrange a service call.

Recommended Preventative Maintenance Program

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

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

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 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.

A comprehensive commissioning procedure is attached in the end of the manual. This must be carried out in accordance with the procedure and returned to Aqua Cooler at support@aquacooler.com.au.

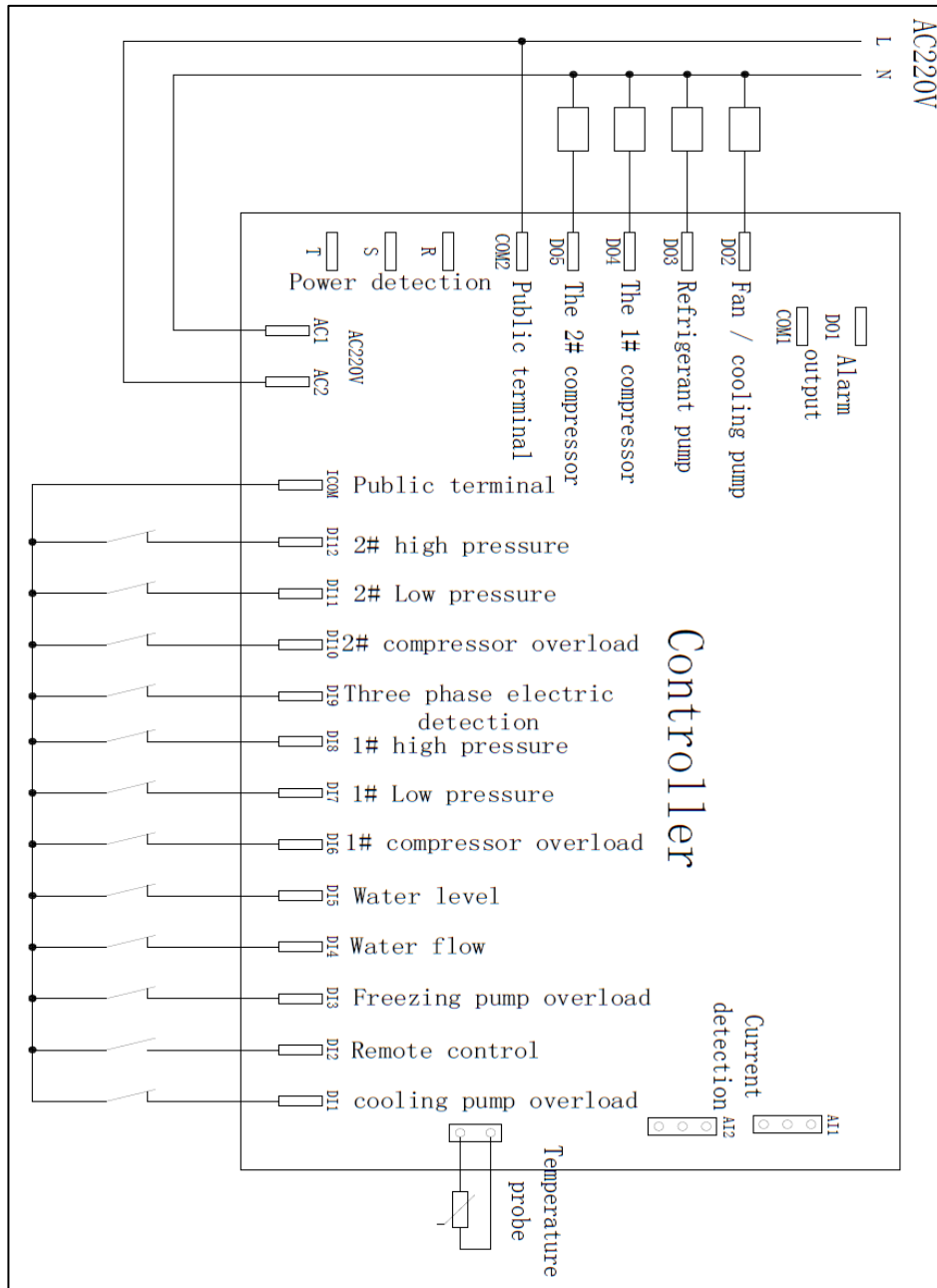
Aqua Cooler offers a commissioning program and can arrange this for you. Failing to follow the commissioning procedure may void this warranty.

GENERAL APPLICATION

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&tube evaporator (model dependant) an air cooled condenser and a rotary or 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.

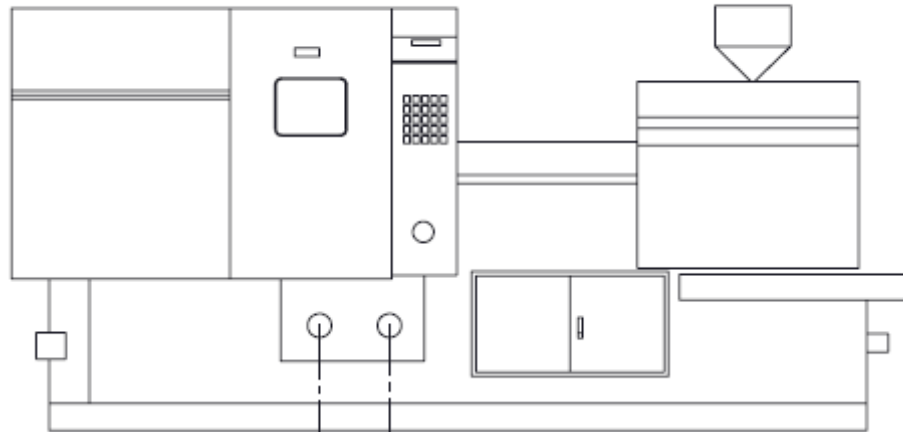
Typical Controller Block Diagram

Please refer to actual wiring diagram attached with unit for your particular application.



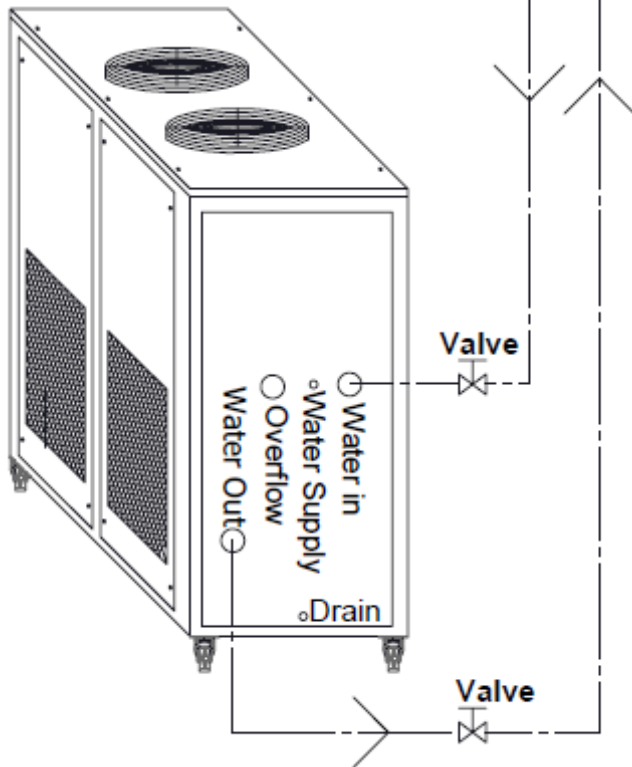
Installation Sketch Map of Air Cooled Chiller

Customers Equipment/Process

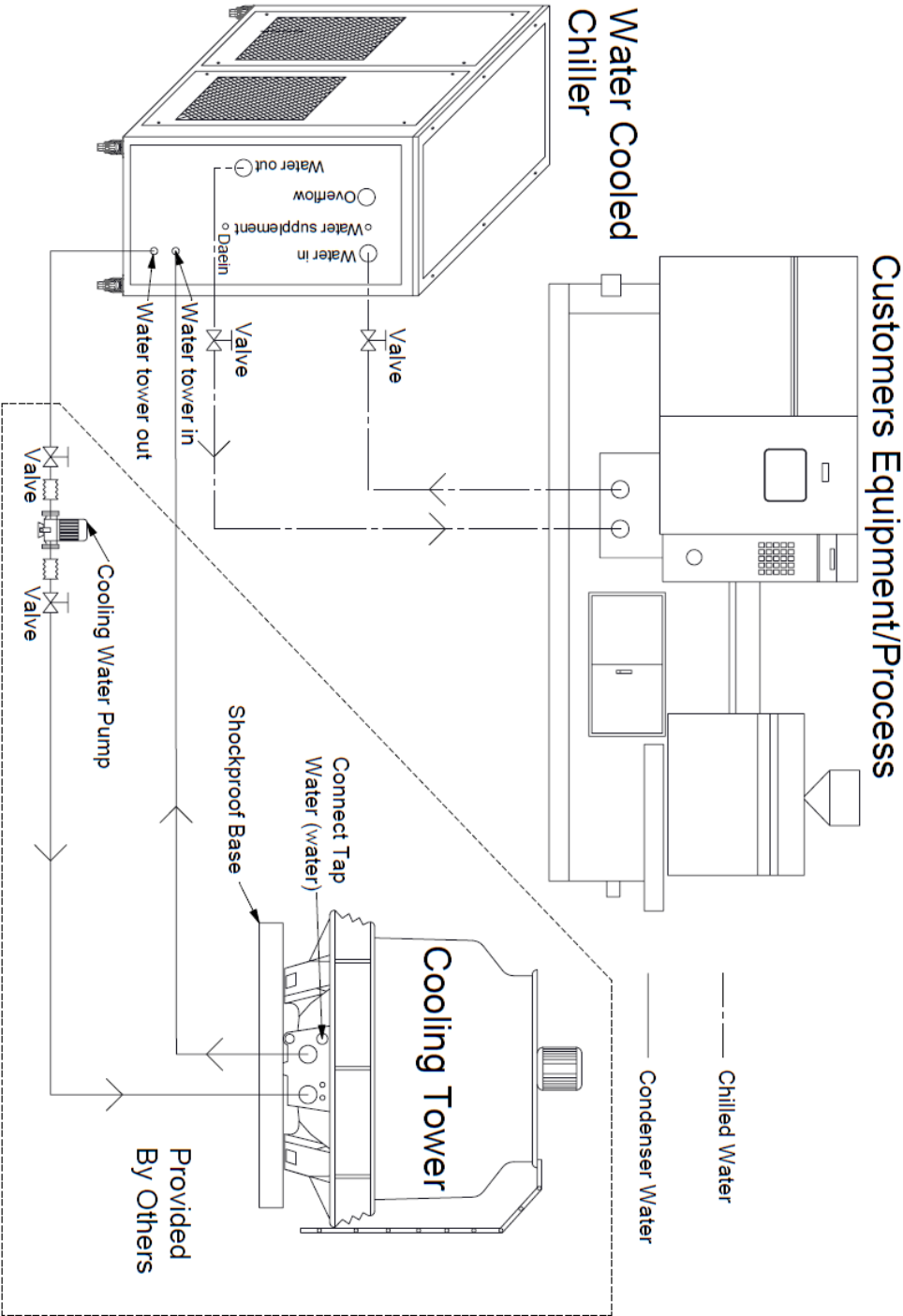


----- Chilled Water

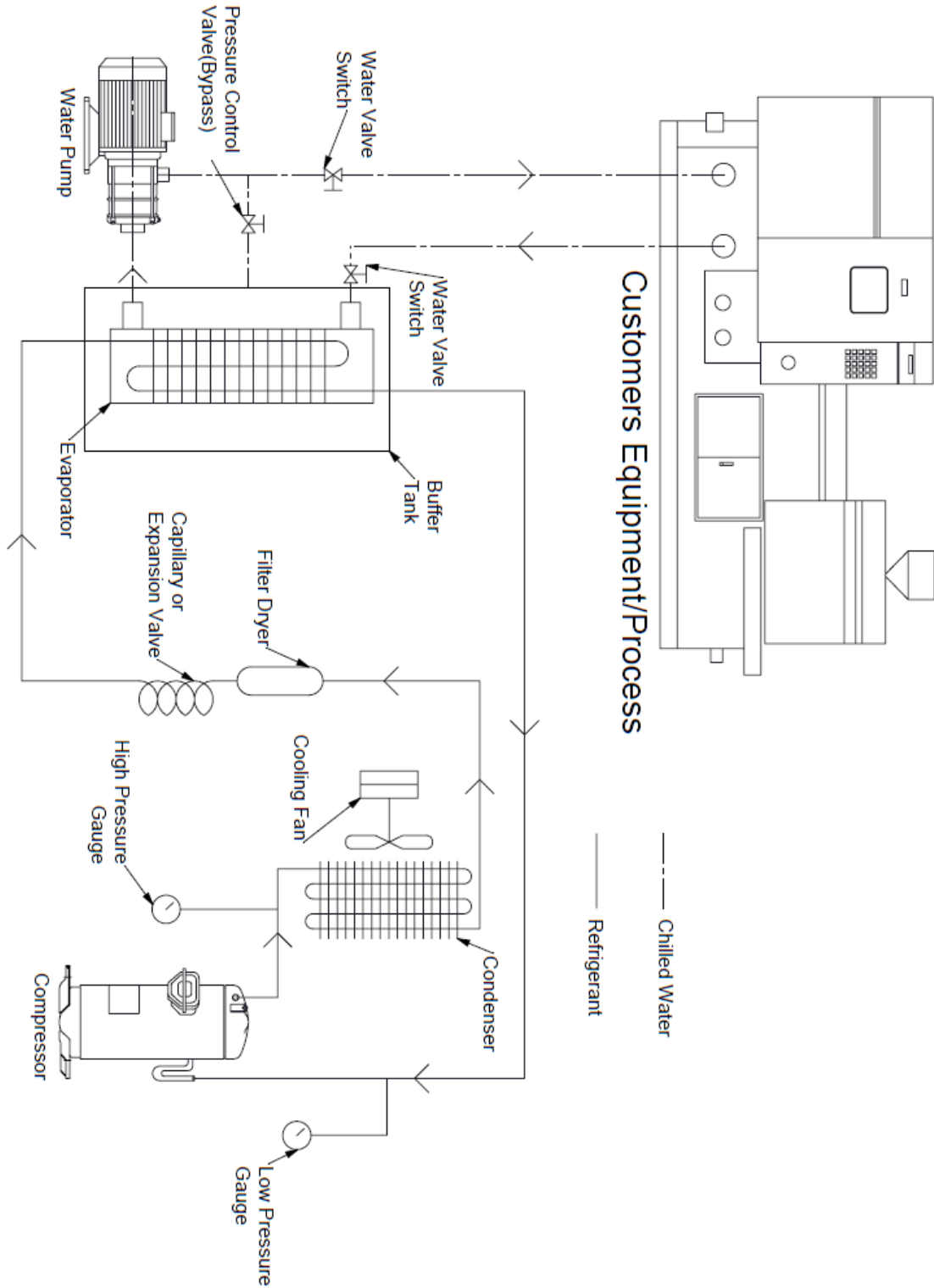
Air-cooled Chiller



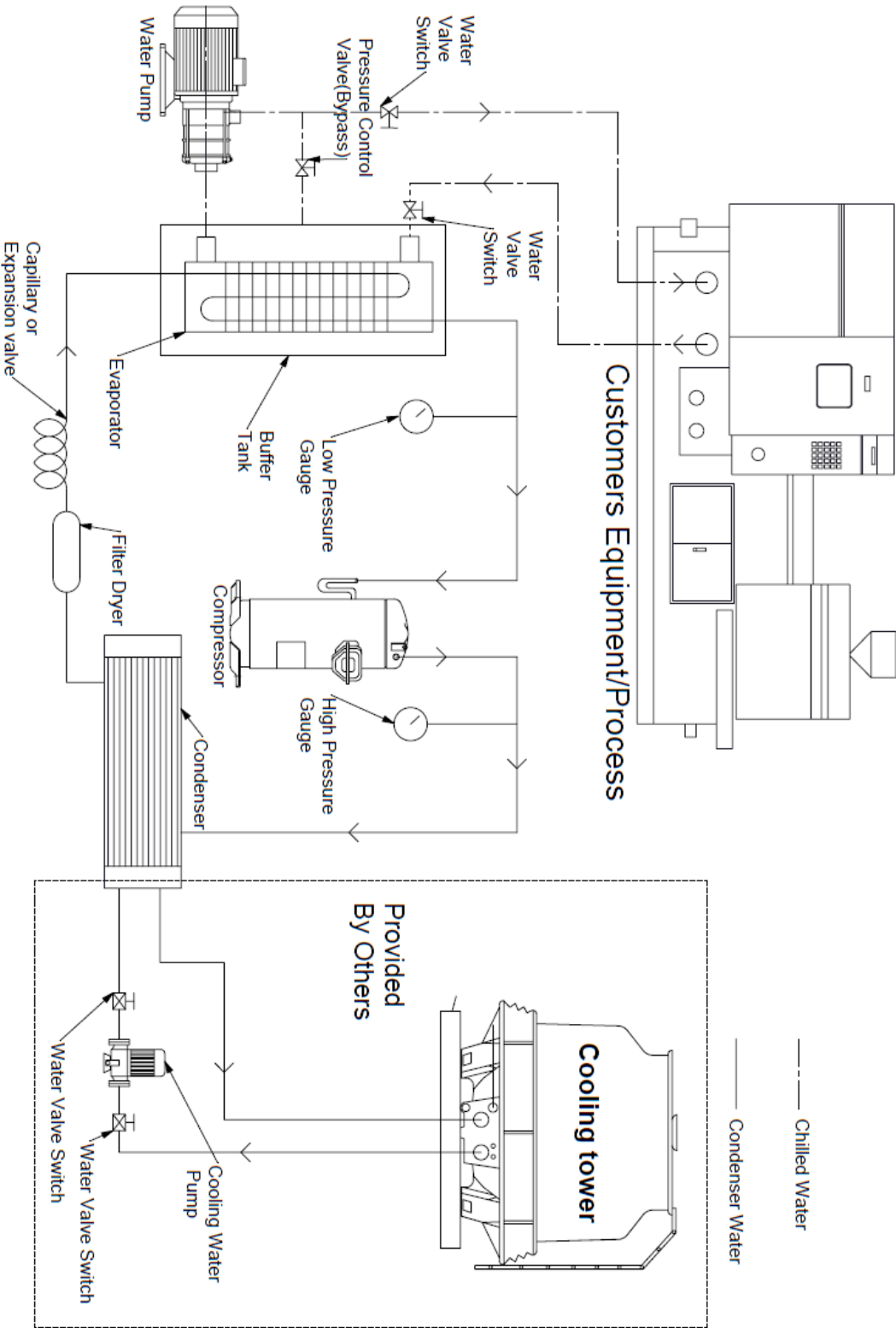
Installation Sketch Map of Water Cooled Chiller



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 in the end of the manual 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 chillers. Please print out the table and check through it one by one. Please take a photo of the completed table and send it back to us.

Customer and On Site Requirement			
Required Capacity:	kW	Rated Ambient Temp:	°C
Rated Supply Temp:	°C	Rated Flow Rate:	L/s
Customer:			
Address:			
Machine Information			
Chiller model:		Chiller Serial Number:	
Program Version:		Power – Voltage	V
Connect Pressure Gauges to Suction and Discharge Lines			
Suction Pressure (LP):	kPa	Discharge Pressure (HP):	kPa
Refrigerant Leak Test:			

Pump (YES/NO)			
Pump Running Check:		Pump Rotation check:	
Water Leaks Check:		In Line Filtration:	
Water Pressure:	kPa	Performances fall on the respective pump curve:	
Water bypass Check:			
Fans (YES/NO)			
Fan Rotation check:		Condenser Fans Current	Amp
Fan speed control:			
Chiller Water Circuit Requirements (YES/NO)			
Pipe Size:	inch	Pipe Insulation:	
Length:	m	Height Difference:	m
Balancing Valve:		Isolation Valves:	

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Water Treatment:		Make Up Water:	
Treatment Used and Others Notes:			

Operation Testing: (YES/NO)			
Ambient Temp:	°C	Water Set Point:	°C
Temp Controller Reading Check:		Fault Buzzer/Light Works:	
Sight Glass Clear:		Unit Handles Heat Load:	
On/Off Button Works:		Check Oil level on the compressor sight glass.	
Operation Testing – Current:			
Chiller Running Current:	Amp	Pump 1 Current	Amp
Compressor 1 Current:	Amp	Pump 2 Current (if fitted)	Amp
Compressor 2 Current (if fitted)	Amp	Redundant pump (if fitted)	Amp
Pump 1 Flow Rate:	L/s	Condenser Fans Current	Amp
Pump 2 Flow Rate: (if fitted)	L/s		

Installation and Build Check (YES/NO)			
Any damage from transport		Adequate clearance around and above	
Electrical isolation switch		Inside chiller clean	
Panels are clean		All settings to factory default	
Pipes to the process		All marking in place	
Panels secure		Electrical wiring is tight	
Electrical box secure		Electrical box tidy	
Water drained from unit		Correct manual sent with chiller	
Water pipe with insulation		Earth connected	

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Ensure power connection between chiller and condenser is secured. (Remote condenser)		Wire routing clear of hot spots, sharp edges and screws
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Commissioning by:			
Inspected by:		Company:	
Contact number:			
Installation site:			
Business name of site:		Site contact name:	
Site contact phone no.:		Sit contact position	
Note regarding to refrigeration cycle:		Note regarding to water cycle and application:	
Completion:			
<p>Aqua Cooler uses the information from this data sheet to confirm that the chiller is installed and operating correctly. Should any problems or issues be raised as a result of this preventative maintenance procedure then Aqua Cooler will take steps to address them with the customer, ensuring that the chiller operates reliably and without compromise to the long service life we expect of our products. We appreciate any feedback given as all data is used to influence our continual product development program.</p>			
Date:		Agent print name:	
		Agent signature:	
Date:		Customer representative print name:	
		Customer representative signature:	
Filing – Aqua Cooler:			
Date:		Print name:	
		Signature:	

PREVENTATIVE MAINTENANCE PROCEDURE

Customer requirements pre-site visit:

- Ensure chiller is accessible and work area is safe.
- Provide details on any site access restrictions including hot works permits, induction course requirements etc.

Pre-check procedure:

- Discuss with the customer any concerns they may have regarding the chiller's operation.
- Check the clearances around the chiller, ensuring they are adequate for service access and for free and unobstructed access for primary air to the chiller.
- Check for any obstructions above the condenser fans that may hamper free air flow or may lead to air re-circulation through the condenser. Clean condenser fins.
- Check that an isolation switch has been provided close to the chiller in a clearly visible location and that power has been supplied to the chiller.
- Check that there is adequate provision of drainage should the tank need to be emptied at any point.

Check chiller operation:

Refrigeration circuit

- Visual inspection of chiller's exterior while running, noting any damage, noise, vibration, or other obvious problems.
- Remove panel work and complete inspection of interior of chiller, noting any damage, noise, vibration, or other obvious problems.
- Clean condenser coil and evaporator as required.
- Connect refrigerant gauges to the chiller and confirm that the refrigerant charge has not been lost.
- Check the refrigerant sight glass for evidence of moisture or excessive bubbling.
- Monitor high- and low-pressure levels and superheat.
- Check oil levels in compressor.
- Check for any indication of a temperature difference across the drier, inspecting drier for blockages.
- Using leak detector search for evidence of gas leaks.

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Electrical system

- Isolate the chiller and check that all terminals within the electrical enclosure are tight.
- Tighten all other electrical connections. Re-apply power.
- Measure line voltages on each phase entering the chiller.
- Measure the current draw on the fans.
- Measure the current draw on all other motors and record readings.

Water circuit

- List down any relevant notes regarding the chilled water circuit, noting any issues that could pose problems including susceptibility to condensation or poor workmanship.
- Check water/fluid quality and level. Drain and clean the tank as required.
- Check and clean filters and strainers as required.
- If running, check the supply pressure and flow rate.
- Check whether the make-up water is directly connected to mains pressure and operating correctly.
- Note whether any water treatment is being used, or if provision has been made for water treatment
- Check whether the customer or the customer's agent has proposed to use water treatment.
- Check the pump current draw and record.

Operational check

- Confirm water temperature is set to the desired set point and chiller is operating as per the customer's requirements.
- Note the ambient temperature.
- As the water temperature approaches the set point, check the current draw on each compressor phase, note discharge and suction pressures then measure the Tx bulb temperature and the liquid line temperature between the drier and the Tx valve.

On completion

- Re-fit and clean all panels.
- Ensure no rubbish is left around the outside of the chiller.
- Discuss results of preventative maintenance with the customer, or the customer's agent. Detail basic operation of the chiller to the customer, or the customer's agent. Detail that any problems with the chiller should be referred directly to Aqua Cooler by calling 1800 278 226 per the service sticker on the chiller and quote the serial number.

NOTES