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**AQUA  
CHILLER**

Gladiator PLUS Series

# Owner's Manual

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



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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.

## 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.

## SAFETY



### WARNING

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.

- 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 if 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 catecholamines 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 MODELS

<b>Models</b>	<b>GA3 PLUS</b>	<b>GA5 PLUS</b>	<b>GA8 PLUS</b>	<b>GA12 PLUS</b>	<b>GA25 PLUS</b>	<b>GA50 PLUS</b>
		<b>GA6 PLUS</b>	<b>GA10 PLUS</b>	<b>GA15 PLUS</b>	<b>GA30 PLUS</b>	<b>GA60 PLUS</b>
					<b>GA40 PLUS</b>	
Water Out:	1"	1"	1½"	2"	2½"	3"
Water In:	1"	1"	1½"	2"	2½"	3"
Drain:	½"	½"	1"	1"	1"	1"
Overflow:	1"	1"	1"	1"	1"	1"
Water Supply:	½"	½"	½"	½"	½"	½"

(All Male BSPT)

## **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.





SKU	Cooling Capacity (kW)	Input Power (kW)	Power	Current Draw (A)		Refrigerant		Compressor		Condenser		Evaporator		Water Pump Shimless Steel F304		Water Pump Upgrade Shimless Steel F304		Dimensions			Weight (kg)
				OCDF	MCC	Type	Charge (kg)	Control method	Number in Cluster	Power (kW)	Type	Cooling air flow (m³/h)	Type	Tank volume	Inlet/outlet pipe	Avail. Flow Rate (L/h)	Avail. Flow Rate (L/h)	Length (mm)	Width (mm)	Height (mm)	
GA15-C-STRPLUS	44	16.25	28.69	43.04	R407c	10.5kg	1	13.65	15000	Shell in Tube	145	2"	26.5	2.8	41.5	3.08	1900	1200	1680	830	
GA15-C-CCPLUS	44	16.25	28.69	43.04	R407c	10.5kg	1	13.65	15000	Plate Pack	145	2"	26.5	2.8	41.5	3.08	1900	1200	1680	830	
GA20DA-STRPLUS	66	32.56	56.62	84.93	R134a	22kg	2	28	20000	Shell in Tube	170	2"	25	3.36	41.5	3.08	2000	1130	1924	1050	
GA20DA-CCPLUS	66	32.56	56.62	84.93	R134a	22kg	2	28	20000	Plate Pack	170	2"	25	3.36	41.5	3.08	2000	1130	1924	1050	
GA20DA-STRPLUS	66	32.56	56.62	84.93	R134a	22kg	2	28	20000	Shell in Tube	170	2"	25	3.36	41.5	3.08	2000	1130	1924	1050	
GA20DA-CCPLUS	66	32.56	56.62	84.93	R134a	22kg	2	28	20000	Plate Pack	170	2"	25	3.36	41.5	3.08	2000	1130	1924	1050	
GA25DA-STRPLUS	82.2	40	69.5	104.25	R134a	27.5kg	2	35.2	25000	Shell in Tube	170	2-1/2"	22	4.48	45	4.48	2100	1250	1924	960	
GA25DA-CCPLUS	82.2	40	69.5	104.25	R134a	27.5kg	2	35.2	25000	Plate Pack	170	2-1/2"	22	4.48	45	4.48	2100	1250	1924	960	
GA30DA-STRPLUS	104	47.8	83.1	124.65	R134a	33kg	2	42	30000	Shell in Tube	220	2-1/2"	22	4.48	45	4.48	2100	1660	1950	1300	
GA30DA-CCPLUS	104	47.8	83.1	124.65	R134a	33kg	2	42	30000	Plate Pack	220	2-1/2"	22	4.48	45	4.48	2100	1660	1950	1300	
GA35DA-STRPLUS	104	47.8	83.1	124.65	R134a	33kg	2	42	30000	Shell in Tube	220	2-1/2"	22	4.48	45	4.48	2100	1660	1950	1300	
GA35DA-CCPLUS	104	47.8	83.1	124.65	R134a	33kg	2	42	30000	Plate Pack	220	2-1/2"	22	4.48	45	4.48	2100	1660	1950	1300	
GA40DA-STRPLUS	132	62	107.8	161.7	R134a	44kg	4	56	40000	Shell in Tube	240	2-1/2"	25	5.6	40	8.96	2350	1760	1950	1350	
GA40DA-CCPLUS	132	62	107.8	161.7	R134a	44kg	4	56	40000	Plate Pack	240	2-1/2"	25	5.6	40	8.96	2350	1760	1950	1350	
GA45DA-STRPLUS	166.4	78	135.6	203.4	R134a	55kg	4	70.4	50000	Shell in Tube	345	3"	21	8.96	40	8.96	2900	2000	1900	1650	
GA45DA-CCPLUS	166.4	78	135.6	203.4	R134a	55kg	4	70.4	50000	Plate Pack	345	3"	21	8.96	40	8.96	2900	2000	1900	1650	
GA50DA-STRPLUS	166.4	78	135.6	203.4	R134a	55kg	4	70.4	50000	Shell in Tube	345	3"	21	8.96	40	8.96	2900	2000	1900	1650	
GA50DA-CCPLUS	166.4	78	135.6	203.4	R134a	55kg	4	70.4	50000	Plate Pack	345	3"	21	8.96	40	8.96	2900	2000	1900	1650	
GA60DA-STRPLUS	208	91.6	159.2	238.8	R134a	66kg	4	84	60000	Shell in Tube	345	3"	21	8.96	40	8.96	2900	2000	1900	1850	
GA60DA-CCPLUS	208	91.6	159.2	238.8	R134a	66kg	4	84	60000	Plate Pack	345	3"	21	8.96	40	8.96	2900	2000	1900	1850	
GA80DA-STRPLUS	208	91.6	159.2	238.8	R407c	42kg	4	54.6	60000	Shell in Tube	345	3"	27	8.96	40	8.96	2980	2200	1900	1850	
GA80DA-CCPLUS	208	91.6	159.2	238.8	R407c	42kg	4	54.6	60000	Plate Pack	345	3"	27	8.96	40	8.96	2980	2200	1900	1850	

- Operation current draw at design point - measure under evaporating temp: 5°C | Condensing Temp: 50°C | Ambient Temperature: 40°C | Superheat: 5 K

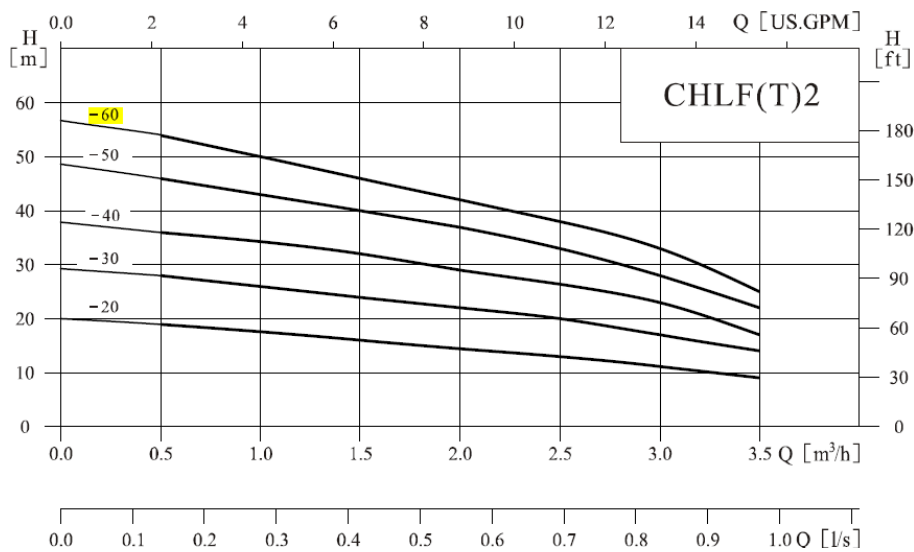
## PUMP MODEL BY CHILLER

Chiller Model/s	Standard Pump Model	Upgrade Pump Model
GA3 PLUS	CHLF2-30	CHLF2-60
GA5 PLUS	CHLF4-30	CHLF4-50
GA6 PLUS	CHLF4-30	CHLF4-50
GA8 PLUS	CHLF4-40	CHLF8-50
GA10 PLUS	CHLF4-40	CHLF8-50
GA12 PLUS	CHLF8-30	CHLF8-50
GA15 PLUS	CHLF8-40	CHLF12-40
GA20 PLUS	CDLF12-3	CHLF12-40
GA25 PLUS	CDLF16-3	CHLF16-40
GA30 PLUS	CDLF16-3	CHLF16-40
GA40 PLUS	CDLF20-2	CDLF32-30
GA50 PLUS	CDLF32-20	CDLF32-30
GA60 PLUS	CDLF32-20	CDLF32-30

## PUMP CURVES

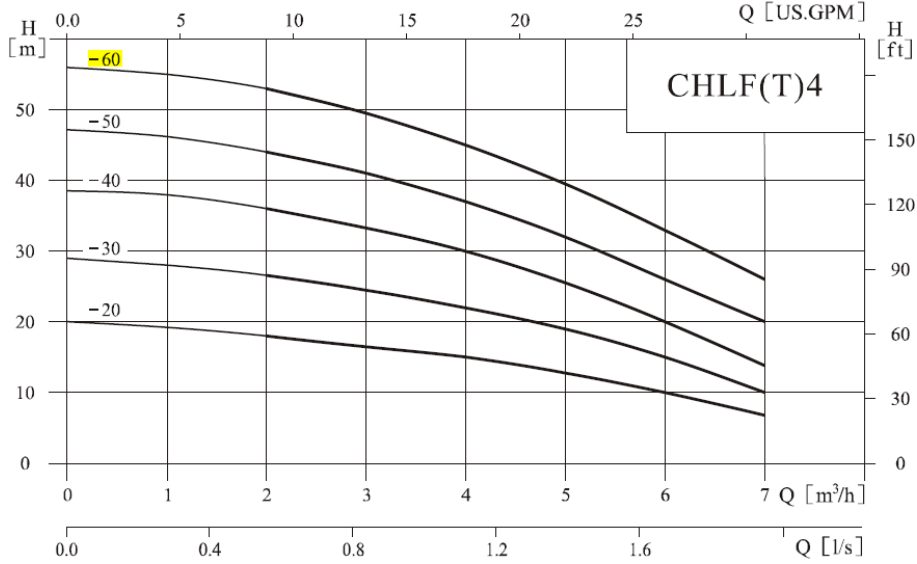
### CHLF2- 60

Model	Driving Motor		Q(m <sup>3</sup> /h)	0.5	1.0	1.5	2.0	2.5	3.0	3.5
	(kW)	(hp)								
CHLF2-60	0.75	1	H(m)	54	50	48	42	38	33	25



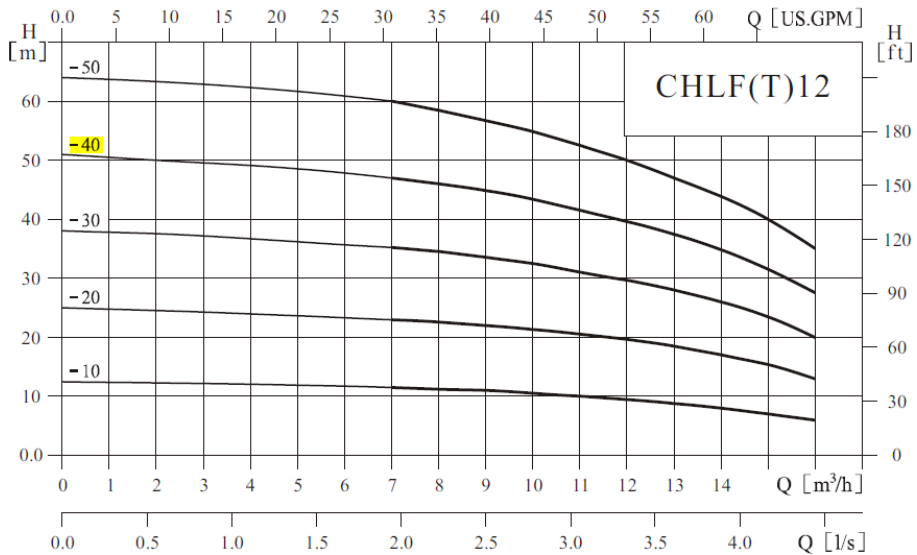
**CHLF4-60**

Model	Driving Motor		Q(m <sup>3</sup> /h)	1	2	3	4	5	6	7
	(kW)	(hp)								
CHLF4-60	1.1	1.5	H(m)	55	53	50	45	37	31	26



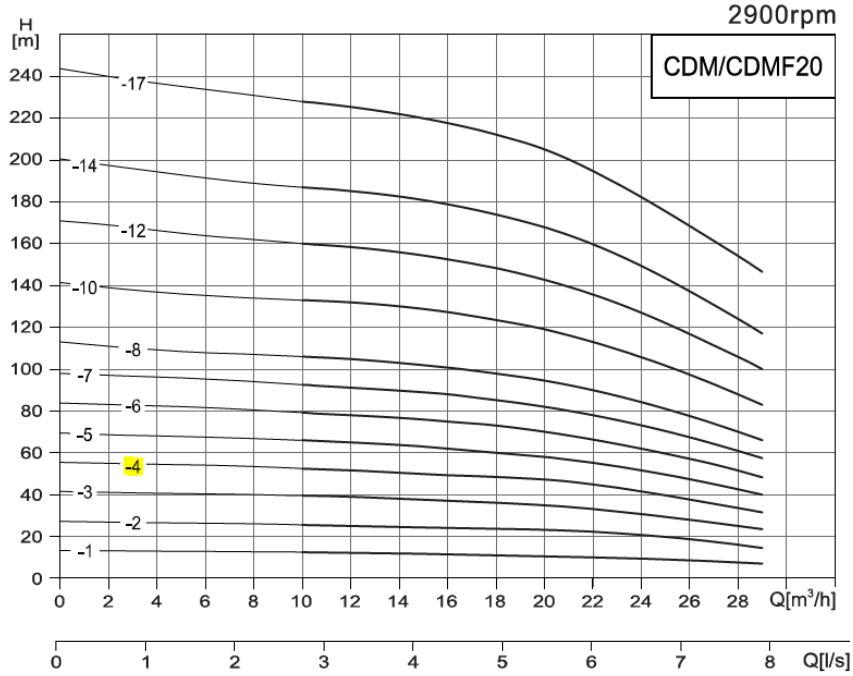
**CHLF12-40**

Model	Driving Motor		Q(m <sup>3</sup> /h)	7	8	9	10	11	12	13	14	15	16
	(kW)	(hp)											
CHLF12-40	2.4	3.3	H(m)	47	46	45	43.5	41.5	39.5	37.5	35	31.5	27.5



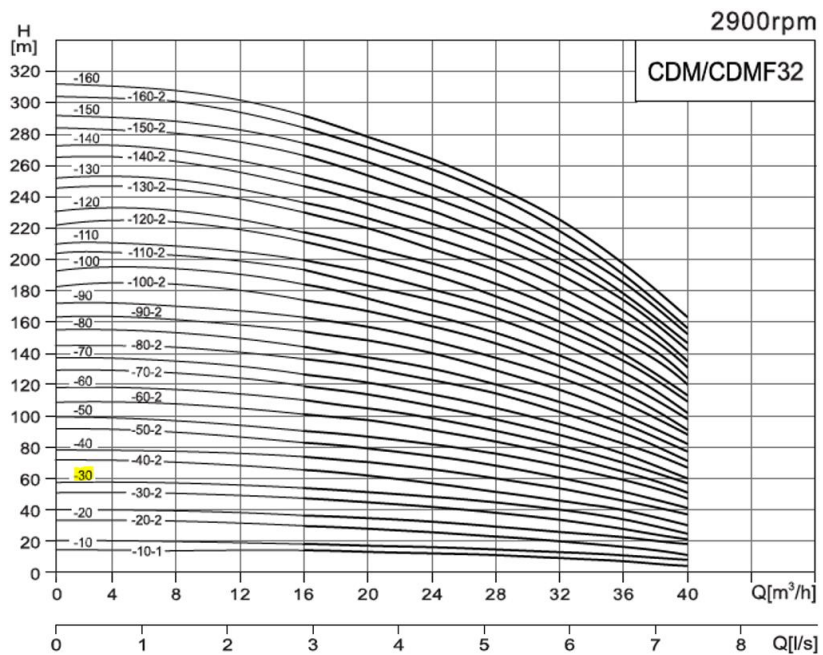
**CDMF20-4**

Model	Driving Motor		Q(m <sup>3</sup> /h)	0	10	12	14	16	18	20	22	24	26	28	29
	(kW)	(hp)													
CHLF12-40	5.5	7.4	H(m)	55.5	52.5	51	50	49	48.5	47	45	41.5	37	33	31.5



**CDMF32-30**

Model	Driving Motor		Q(m <sup>3</sup> /h)	0	16	20	24	28	32	36	40
	(kW)	(hp)									
CHLF32-30	55	7.4	H(m)	57	54	51	48	44	40	35	27



# 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 ventillation
- 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
- That the compressor and the pump are drawing the right amount of amps according to the technical data.

## 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.

## OPERATING SEQUENCE

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.

1. Turn the unit on with the master power switch.
2. Press the power button to start the chiller. The unit will start automatically.

Note – the compressors have a start delay. It is normal for the pump to run first and the compressors to power on afterwards.

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 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.

# AQUA COOLER CONTROLLER

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

Unlocking the keypad on the Aqua Cooler controller

**IMPORTANT NOTES:** The key pad on the smart controller will lock out after 10 minutes of non-use. To unlock the key pad press the ESC, DOWN, UP and ESC keys in sequence



## OPERATIONAL LOGIC OF CONTROLLER

### Start Up

Pump ON, Ball Valve OPEN (if fitted), 10 second delay and then flow readings are taken to check pump is running normally.

After compressor hold time and set point plus hysteresis COMP1 ON

If water temperature reaches set point then compressor OFF. Unit then waits for both the hysteresis and compressor hold time again and then starts compressor.

### Temperature Control – Set Point

Compressors will turn compressors off when the set point is breached. Compressors will be turned on again at temperature plus hysteresis

### Temperature Control - Max and Min Set Point

This prevents casual operator from setting supply temperatures too high or too low

### Temperature Control - High and Low Temperature Alarm Stop

High and low temperature limits can be set in order that if they are breached then the chiller will shut down. In very rare instances a component may fail without triggering any of its internal fault indicators. The chiller may think it is running normally yet not refrigerating. It is recommended that high and low temperature stop is set to yes to prevent this happening.

### Fan Speed Control - Optional

The controller monitors the discharge pressure of each of the refrigeration circuits and makes decisions for fan speed based on this value. There are 3 ways to control the fans and the settings can be changed in the controller.

- **ON ZERO FULL** – The fans can be set to shut down while the compressor is running. If the pressure drops below the minimum set point – say on a cold day – then the fans will shut down to prevent over condensing even though the compressor may still be running.
- **ON LOW FULL** - In the menu there is a valve for minimum run (default 1500 kPa) which when reached will start the fans and run them at 20% speed. There is a fan full speed setting (default 2200 kPa) that will run the fans at full speed. The fan speed will then run proportionally between these two values. These operational pressures will be different for units supplied with R134a – see the setting section of the manual
- **OFF FULL SP ONLY** - this will have the fans off when the compressor is off and full speed when the compressor is on. The default will be the ON LOW FULL option

## High Pressure Control

The system will monitor the discharge pressure of each of the refrigeration circuits and will send a warning when the pressure starts to get too high. If the alarm pressure is breached then it will shut the unit down. It will do this 3 times in a 24 hour period before shutting the chiller down permanently. There compressor wiring circuit has an automatically re-setting high pressure safety switch installed and set at 2800 kPa for R407 gas and 2200 Kpa for R134a. But setting the controllers alarm above these settings the automatically resetting HP safety switch will allow the chiller to keep re-starting until something fails in the chiller.

If the chiller is to be installed in redundancy – that is with another chiller in tandem or with multiple chillers and controlled by a BMS or the Aqua Cooler central control system, this feature will de-activated.

## Water Flow/ Pump Control

The system monitors flow rates and will send a warning if a flow rate is breached and shut the chiller down if the flow alarm point is breached. Zeroing the flow alarm turns it off. It is recommended that the flow alarm is not turned off. The pump can be set to run if the chiller develops a fault – by turning this feature ON in the program will keep water to the process. This water will of course get warm but it is designed to keep the process cool long enough for system shut down

If the unit is supplied with a redundant pump the controller will shut the pump down when it detects a problem with the flow. The pump sitting in redundancy will be started. If there is a problem with the flow on this pump it will be shut down and the original pump started. This process will happen 3 times in 24 hours before the unit is shut down permanently. Every week the pumps are duty cycled to share the wear and tear on the units

## Compressor Hold Time

The controller will wait 120 before starting compressors up after shut down to prevent too many start-ups.

## Alarm Acknowledge Delay

This delay is the time that the program waits before flagging an alarm. This may be useful in the event of a tandem switch over to a tank of very warm water for example. If the water is too warm then the high water temperature alarm may be triggered. If there is a delay then it will give the newly activated chiller time to pull the water temperature down.

## Pump Delay Time

The controller will wait this time before taking flow reading – it is designed to give the ball valve time to open before indicating flow problems

## High Ambient Control

If the high ambient water spray kit is fitted then the system will spray the condensers with water once air on temperature is breached AND the fans are running. The water spray will turn off once the ambient temperature has dropped or the fans have stopped running.

## Tandem Control

One chiller will need to be assigned a master chiller and the other a slave chiller – see the service section for instructions on doing this. The master chiller will do all the controlling and timing. Output 16 (status) on the control board will be energised while it is running closing the indicated input (enable) on the standby chiller not allowing it to run. After a week the output will de-energise and the standby chiller will run – its output 16 energising closing the input on the now standby chiller.

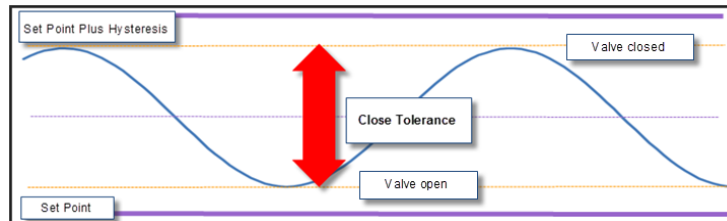
**The rest of the control settings and the default setting for the parameters outlined above are outlined below – it is recommended that they are not altered without consulting Aqua Cooler.**

**The settings below are the only ones that should be altered by the operator – the rest of the menu are for setting up the chiller and should not be altered. The controller also has some options not relating to this model of chiller.**



## Close Tolerance

If the unit has been manufactured for close tolerance then the controller will attempt to keep the water temperature within the close tolerance number around the midpoint between the set point and the hysteresis. For example if the set point is 10 degrees, the hysteresis 2 and the close tolerance 1 degree then the controller will attempt to keep the temperature between 10.5 and 11.5 degrees.



The ability of the chiller to keep the temperature as close to the set point will vary depending on heat load. The closer the heat load is to the chillers rated capacity the more accurate the chiller can maintain the close tolerance. Under low loads the chiller will be unable to maintain less than 1°C close tolerance

## Variable Speed Compressor Control – If fitted

At set point plus approximately 1 degree the compressor will run at 50% and at approximately 2 degrees above this, as decided by the PID algorithm; the compressor will run at 100%. In between these points the system will run a fully integrated PID loop to maintain temperature control – it will be taking temperature measurements every 0.5 seconds and controlling speed accordingly. For the compressor installed the full speed is 75Hz.

NOTE – the close tolerance function and the compressor load share options should be switched off if a VSD is fitted to the compressor.

## Low Load Control

This is an optional feature and can be turned on and off. The controller will be monitoring the amount of start-ups the compressor is going through. If there are too many then the controller will temporarily widen the hysteresis. The compressor should not go through more than 10 start ups per hour. By widening the hysteresis then the start up will reduce and this will prolong compressor life. If the system is going to be lightly loaded it is recommended that this option be turned on.

## PUTTING THE UNIT IN STANDBY MODE

Using the key pad the unit can be put into standby mode if there is a reason to shut the unit down for a short amount of time.

- Scroll through the menu to find “KEYPAD STANDBY”
- Press “OK” and then “OK TO CONFIRM” The unit will stop running
- The screen will be showing “OK TO RE-START” and “KEYPAD STANDBY MODE” will be flashing
- Press “OK” and the chiller will go through its normal start up procedure

**THIS DOES NOT TURN THE UNIT OFF AND THE ELECTRICAL CIRCUITRY INSIDE THE ELECTRICAL BOX WILL STILL BE LIVE**

# CHANGING THE CONTROLLERS PARAMETERS

By opening the electrical box the programmable circuit board controller can be seen mounted on the door. The four small red buttons next to the display are the buttons used for changing the parameters in the programming. The two buttons on the left are the up and down scroll buttons. The button top right is the OK button and the last button is the ESC.

<b>Water Supply Temperature</b>	
<p>Setting the water supply temperature – Temperature that the refrigeration system with cut out</p>	<ul style="list-style-type: none"> <li>• Scroll to the parameters menu then to the set points sub menu</li> <li>• Scroll through the menu until “SETPT WATER TEMP” shows</li> <li>• Press “OK” and “SET WATER TEMP” will show and the water temperature will flash</li> <li>• Use scroll keys to adjust up or down and press “OK” again and “NEW WATER TEMP” will show</li> <li>• Press the escape key to revert to home page</li> </ul>

<b>Temperature Hysteresis</b>	
<p>Temperature between refrigeration circuit cut out and cut in Range: 2 to 5 degrees</p>	<ul style="list-style-type: none"> <li>• Scroll to the PARAMETERS MENU then to the SET POINTS sub menu</li> <li>• Use scroll keys to find “TEMP HYSTERESIS</li> <li>• Default is 2 degrees – press “OK” and SET TEMP HYSTER” will show</li> <li>• Use scroll keys to change value and press “OK”</li> <li>• “NEW TEMP HYSTER” will show</li> <li>• Press escape keys to return to home page</li> <li>• NOTE – hysteresis cannot be set below 2 degrees to prevent compressor short cycling.</li> </ul>

<b>Compressor Hold Time</b>	
<p>After the cooler has reached cut out temperature and the compressor will turn off. In order to minimise compressor starts there is a rest time. Range: 5- 180 seconds</p>	<ul style="list-style-type: none"> <li>• Scroll to “PARAMETER MENU” and then to the DELAY sub menu</li> <li>• Scroll to “COMP HOLD TIME” and press “OK”</li> <li>• Value will flash and can be set to minimum of 5 seconds and maximum of 3 minutes – IT IS RECOMMENDED THAT THIS VALUE IS NOT ALTERED TO BELOW THE DEFAULT 2 MINUTES</li> <li>• Press “OK” and screen will confirm choice</li> <li>• Press the escape key to revert to home page</li> </ul>

<b>Maximum and Minimum Temperature Limits</b>	
<p>This set a minimum and maximum temperature limit for the chiller and is there to prevent casual operators setting the supply temperature above or below recommended set points. Range: Min:-5- 20, Max:10- 30</p>	<ul style="list-style-type: none"> <li>• Scroll to the PARAMETERS MENU then to the SET POINTS sub menu</li> <li>• Scroll to “MIN TEMP LIMIT” or “MAX TEMP LIMIT”</li> <li>• Press “OK” and “SET MAX LIMIT” will show will value flashing</li> <li>• Select choice and press “OK” and the screen will confirm choice</li> <li>• Press the escape key to revert to home page</li> </ul>

<b>High and Low Temperature Stop</b>	
<p>High and low temperature alarm cut out – the unit can be set to go into standby if the high and low temperature alarms are breached and they will stay in standby until the fault is cleared by pressing the “OK” button</p> <p>Range: Yes and No</p>	<ul style="list-style-type: none"> <li>• Scroll to “PARAMETER MENU” then to the SYSTEM sub menu</li> <li>• Scroll to “HIGH TEMP STOP” and “LOW TEMP STOP” and press “OK”</li> <li>• “SET HI TEMP STOP” will show with “YES” and “NO” menu choices</li> <li>• Change as desired, press “OK” and “STOP ON HI TEMP” will show confirming choice</li> <li>• Do same to change low temperature standby</li> <li>• Press the escape key to revert to home page</li> </ul>

<b>High and Low Temperature Alarm</b>	
<p>High and low temperature alarm cut out – the unit can be set to go into standby if the high and low temperature alarms are breached and they will stay in standby until the fault is cleared by pressing the “OK” button</p> <p>Range: Low -5 to 10 High 10 to 40</p>	<ul style="list-style-type: none"> <li>• Scroll to “PARAMETER MENU” and to the SET POINTS sub menu</li> <li>• Scroll to “HIGH TEMP ALARM” and “LOW TEMP ALARM” and press “OK”</li> <li>• “SET HI TEMP ALARM” will show temperature choices</li> <li>• Change as desired, press “OK” and “NEW HI TEMP ALM” will show confirming choice</li> <li>• Do same to change low temperature alarm</li> <li>• Press the escape key to revert to home page</li> </ul>

<b>Setting water flow alarms</b>	
<p>Setting the alarm for the chilled water and condenser water flow – this setting when breached will place the unit into standby</p> <p>Range: 0- 5 l/s</p>	<ul style="list-style-type: none"> <li>• Scroll to “PARAMETER MENU” and to the SET POINTS sub menu</li> <li>• Scroll to “FLOW ALARM 1” for chilled water supply and “FLOW ALARM 2” for condenser water flow</li> <li>• Press “OK” and “CONFIG FL ALM1” will show with the value flashing</li> <li>• Change the value to where the warning needs to be and press “OK” – the alarm rate should be below the value of the warning</li> <li>• The screen will confirm your choice</li> <li>• Press the escape key to revert to home page</li> </ul>
<p>Setting the warning for chilled water and condenser water flow. This setting will simply give a warning that the flow rate is dropping – the chiller will still run.</p> <p>Range: 0- 5 l/s</p>	<ul style="list-style-type: none"> <li>• Scroll to “PARAMETER MENU” and press “OK”</li> <li>• Scroll to “FLOW WARNING 1” for chilled water supply and “FLOW WARNING 2” for condenser water flow</li> <li>• Press “OK” and “CONFIG FL WARN1” will show with the value flashing – as a rough guide the flow rates for the condenser water and the chilled water should be around 1.4 l/s</li> <li>• Change the value to where the warning needs to be and press “OK”</li> <li>• The screen will confirm your choice</li> <li>• Press the escape key to revert to home page</li> </ul>

### Setting high pressure (HP) alarms and warnings

Controller will send out and warning at warning pressure and shut unit down at alarm pressure

Range: 2000 – 4000 kPa for both

- Scroll to “PARAMETER MENU” and to the SET POINTS sub menu
- Scroll to “HP Warn Press”
- Press “OK” and choices will be shown
- Select choice and press “OK” and the screen will confirm choice
- Press the escape key to revert to home page
- Scroll to “PARAMETER MENU” and press “OK”
- Scroll to “HP ALM Press”
- Press “OK” and choices will be shown
- Select choice and press “OK” and the screen will confirm choice
- Press the escape key to revert to home page

### Setting fan speed control

If fan speed controllers are installed the minimum run speed (20%) and max run speed (100%) can be set again corresponding discharge pressures

- Scroll to “PARAMETER MENU” and to the SET POINTS sub menu
- Scroll to “Fan Min SP Pressure”
- Press “OK” and change required pressure
- Select choice and press “OK” and the screen will confirm choice
- Press the escape key to revert to home page
- The same procedure is followed to set “Fan Max SP pressure”
- Note – of fan speed controller are being retrofitted to a unit then the fan speed option will have to be activated in the parameter’s menu.

### Setting alarm acknowledge delay

Range 0-120 Minutes

- Scroll to “PARAMETER MENU” and press “OK”
- Scroll to “ALM ACK DELAY”
- Press “OK” and change to setting
- Select choice and press “OK” and the screen will confirm choice
- Press the escape key to revert to home page
- It is recommended that the setting is not greater than 1 or 2 minutes

<b>Tandem Installation</b>	
Assigning the chillers into a single or tandem set installation	<ul style="list-style-type: none"> <li>• Scroll to “PARAMETER MENU” and then to the SYSTEM sub menu</li> <li>• Scroll to “SINGLE/DUAL AUTO” and press “OK”</li> <li>• Change set up to “DUAL AUTO OPER’N” and press “OK”</li> <li>• The screen will confirm your choice</li> <li>• Press the escape key to revert to home page</li> <li>• NB – This only need be done on the master chiller</li> </ul>
Assigning chiller role – Master or Slave	<ul style="list-style-type: none"> <li>• Scroll to “PARAMETER MENU” and then to the SYSTEM sub menu</li> <li>• Scroll to “MASTER/ SLAVE” and assign one chiller the master chiller and one chiller the slave chiller</li> <li>• Screen will show “SET MASTER/ SLAVE” and change to whichever one is which and press “OK”</li> <li>• The screen will confirm your choice</li> <li>• Press the escape key to revert to home page</li> </ul>
Duty Cycle Time	<ul style="list-style-type: none"> <li>• Scroll to “PARAMETER MENU” and then to the SYSTEM sub menu</li> <li>• Scroll to “CYCLE CHANGEOVER” and press “OK”</li> <li>• ‘SET CYCLE PERIOD’ will show and the choices are “OFF” where there will be no duty cycling at all but the chillers will still in tandem – i.e. if one develops a fault it will start the other up. “10 MIN CYCLE TEST” which will duty cycle chiller every ten minutes – this is more for installation testing and will revert to a weekly cycle after 2 hours and “WEEKLY CYCLE” which will duty cycle the chillers weekly. Note that if chillers are to switch at a set time every week then the timer will need to be set as mentioned above</li> <li>• Press the escape key to revert to home page</li> </ul>
Weekly Timer Reset	<ul style="list-style-type: none"> <li>• Scroll to “CYCLE TIMR RESET” on the home screen</li> <li>• Press “OK” and “ZERO CYCLE TIMR” and “PRESS OK”</li> <li>• “NEW CYCLE STARTED” will show and the clock will reset</li> <li>• At any time during the week the timer can be viewed to see how long to changeover</li> </ul>

# FULL SETTING LIST

Some of the settings are not for this model of chiller and it is recommended that THEY ARE NOT altered without a full understanding of the chillers programming or without checking with Aqua Cooler first. The settings reflect Aqua Cooler recommended setting for the installation ordered. If later another chiller is installed in tandem or the chiller is added to a multiple chiller set then some of the setting may change.

<b>PARAMETER MENU</b>			
MENU ITEM	SETTING	MENU ITEM	SETTING
<b><u>SYSTEM MENU</u></b>			
SINGLE DUAL/OPN	Single	CLOSE TOLERANCE	OFF On for Close Tolerance Units
MASTER /SLAVE	MASTER SLAVE on chiller in redundancy	HIGH TEMP STOP	NO – set to YES only if warm water will damage process otherwise this will keep chiller running as long as possible.
CYCLE CHANGEOVER	NO in stand-alone installation YES on master chiller in N+1 installation	VAR SPEED FUNCTION	OFF On for chillers fitting with VFD on compressor or the pump
NO HE SENSORS	0	LOW TEMP STOP	YES
AUX INPUTS	N/O	FAN SPEED CONTROL	YES
SNMP DATA	Fractional	NETWORK CONTROL	OFF ON for chillers installed in networked installation
SPRAY COOL	OFF		
<b><u>EMAIL LOG MENU</u></b>			
EMAIL ALARM ON/OFF	OFF	MANAGE DATA LOG	OFF
DATA LOG PERIOD	1 MINS		
<b><u>SET TIME MENU – Set all after install</u></b>			
<b><u>DELAY HOLD MENU</u></b>			
ALARM ACK DELAY	0	COMPRESSOR HOLD TIME	120 SECONDS
UNLOAD HOLD TIME	15	PUMP DELAY TIME	20
<b><u>SET POINT MENU</u></b>			
PULL DOWN PER MIN	0.6	FAN MIN SP PRESSURE	1500 1200 on R134a
TEMPERATYRE HYSTERESIS	2	LP ALARM PRESSURE	150 80 on R134a
CLOSE TOLERANCE TEMP	0.1 if close tolerance function is activated	LP HYSTERESIS PRESSURE	200
HIGH TEMPERATURE ALARM	30	FAN MAX SPEED PRESSURE	2200 2000 on R134a
LOW TEMPERATURE ALARM	0	HP ALARM PRESSURE	2750 3000 on chiller installed with redundancy
HIGH RETURN ALARM	30	HP WARN PRESSURE	2600
LOW RETURN ALARM	0	LP WARNING PRESSURE	300 100 with R134a
MIN TEMP LIMIT	5	SUPPLY FLOW ALARM 1	0.1 l/s
MAX TEMP LIMIT	20	SUPPLY FLOW WARNING 1	Varies with pump supplied
SET PT AMB OTEMP	45	SET POINT TEMP	CUSTOMER SPECIFIC
<b><u>SENSOR MENU</u></b>			
CCT1 SUCT PR SIZE	0-10 BAR	SECONDARY SUPPLY CAL	SEE PROCEDURE
CCT1 DIS PR DISCH PR SIZE	0-30 BAR	AMBIENT CAL	SEE PROCEDURE
SUPPLY FLOW PIPE	DN 32	SECONDARY RETURN CAL	SEE PROCEDURE

# ADVANCED CONTROLLER FUNCTIONS

## DOWNLOADING DATA FROM THE CONTROLLER VIA USB

The chiller is automatically storing data on its operational parameters and performance. In the event that there is a problem with the chiller this data may become useful for diagnosis.

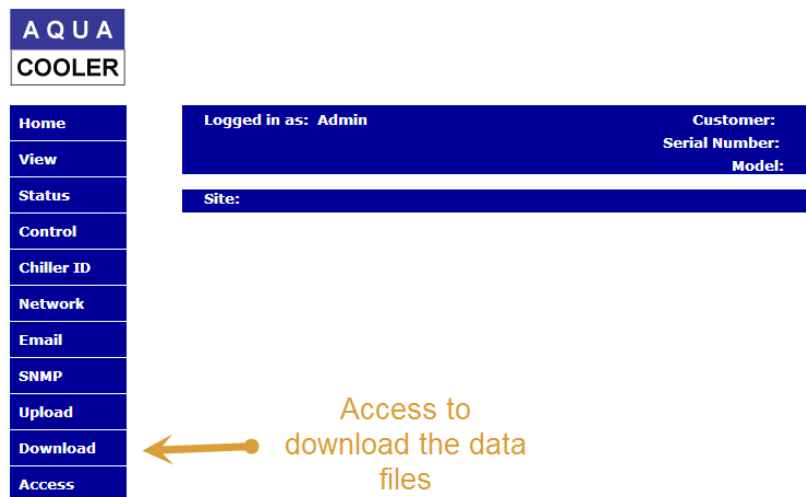
The operational data can be downloaded from the controller by using a USB flash drive. There are two types of files on the system – an event log and a time log. The event log takes reading every time there is an event change, compressor on or off for example. The time log saves data every set time period. The default is every 10 minutes but this can be set as low as every 2 minutes. At 10 minute intervals there is over a week of data saved on the board. The parameters that are logged are the supply, return and ambient temperatures, the suction and discharge pressures and the water flow rate. All changes of state are also logged on the inputs and outputs. Using this data is a good way to check the effective running of the chiller and to help with diagnosis when a service visit is needed.

### TO DOWNLOAD VIA USB

1. Insert a USB key into the USB key on the rear of the circuit board controller.
2. Go to the PARAMETERS MENU and press OK and then scroll to MANAGE LOG DATA sub menu and press OK
3. There are a number of options – the most useful are TIME LOG TO USB and EVENT LOG TO USB. Press OK and the data will start to upload – the screen will confirm when the process is complete.
4. The process has to be done twice – once for each file.
5. Putting the USB into a computer will show the folder labelled “AQUA” and inside this will be an excel data file. The excel file will have labels for all the data that has been logged – the newest data will be at the top.

NOTE: the shorter the time between readings the less history the system can record. 10 mins should give approximately 3 weeks of data logging – 10 second intervals will only give 24 hours of data logging and the logging drops the old files off the end so if the unit has a problem and it takes more than one day to get to site then the relevant data will be gone.

The second way of downloading the data is via the webpage – to the “advanced” tab on the webpage and then to the download tab – the drop down list will then give you the option of downloading the files.



The controller will ask you to save the file somewhere.

## EMAIL ALARMS – AQUA COOLER CONTROLLER

The chiller can also be programmed to send emails in the event of a problem and this data log will be emailed as at the same time – see the installation section on setting this up and it will have to be turned on in the parameters menu of the program.

Inside the electrical box the controller will be mounted on the door. In the middle of the controller, next to the LCD screen, there are four red buttons. These buttons are used to program the chiller. They are marked up, down, OK and esc.

## CALIBRATION OF SENSORS – AQUA COOLER CONTROLLER

The temperature sensors will be calibrated before dispatch but in the even one needs to be replaced then it is a good idea to recalibrate the sensors as they effect the operation of the chiller.

1. Scroll through the controller to parameters menu
2. Scroll down to the Sensor Menu sub- menu
3. Scroll through to the ambient, supply or return calibration
4. Place the sensor and a calibrated thermometer together and allow the temperature to settle
5. Press OK and the value will flash. Use the up and down scroll buttons to calibrate the sensor to the thermostat and press OK again
6. Exit the program

## UPDATING SOFTWARE

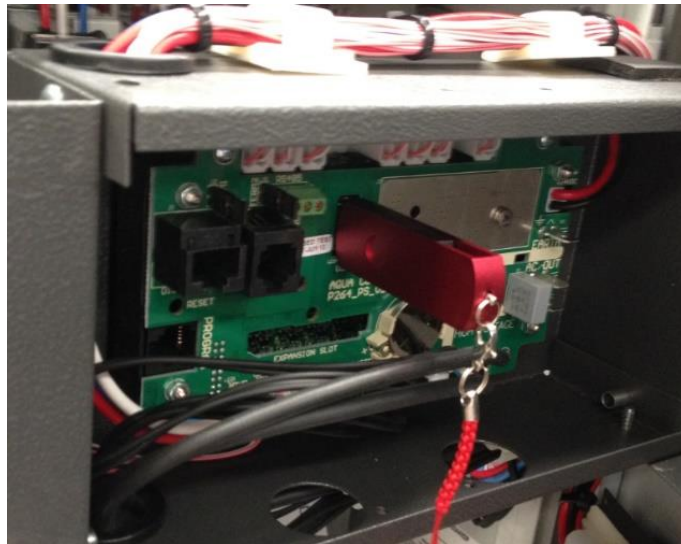
The chiller is dispatched with the latest firmware always installed however should a software upgrade be required then it can be done simply by installing a USB stick into the USB port at the rear or the front of the controller.

The firmware will be emailed and it will have a HEX extension at the end of the file. The file will be U264\_32\_EB4\_XXX.hex.

Upload this file onto the USB stick making sure it is the only HEX file in the root directory of the USB stick.

## SMALL CONTROLLER

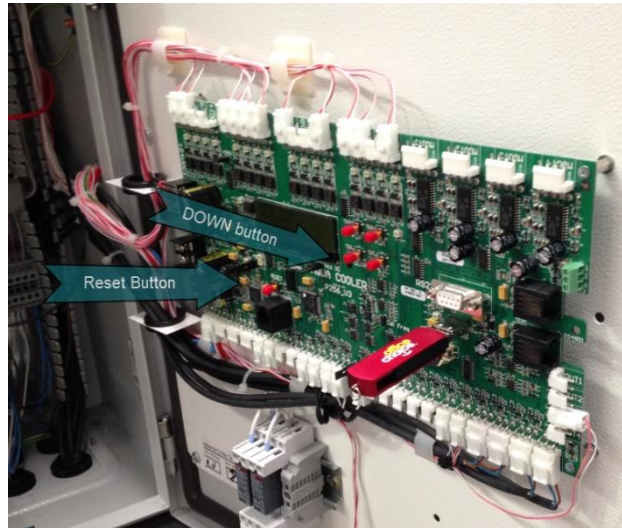
Insert the stick into the USB port on the rear of the Aqua Cooler controller – the controller will look for the file automatically and start the upload. The screen will confirm upload in progress and confirm when it is complete. It should take about 15 seconds. None of the setting in the controller will change except the feature that the upgrade is improving, adding or fixing.





## LARGE CONTROLLER

Insert the stick into the USB port on the rear of the Aqua Cooler controller and press and release the reset button whilst holding down the 'DOWN' button – the controller will look for the file automatically and start the upload. The screen will confirm upload in progress and confirm when it is complete. It should take about 15 seconds. None of the setting in the controller will change except the feature that the upgrade is improving, adding or fixing.

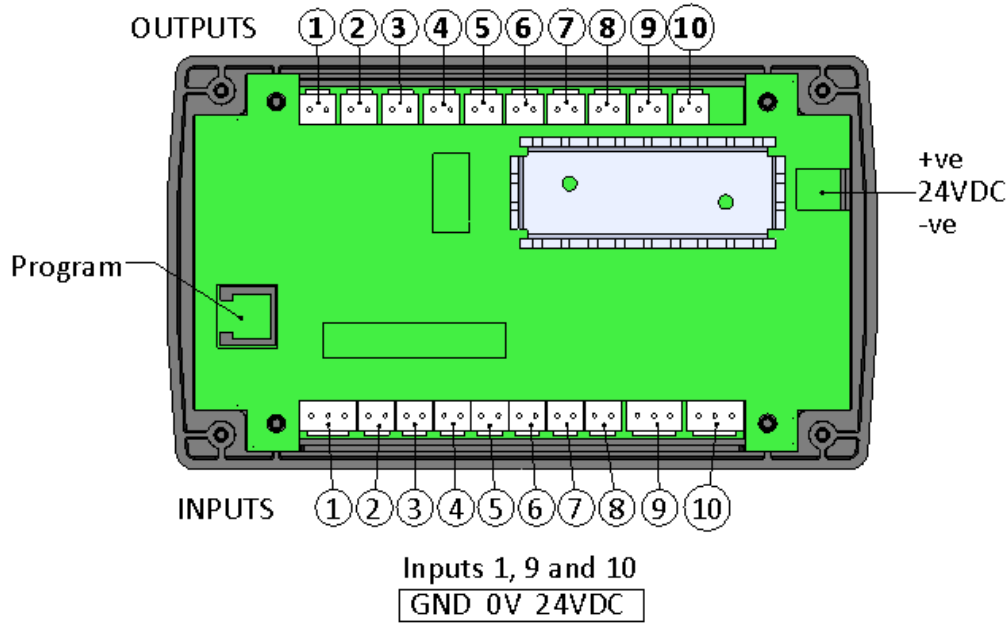


For units that are connected to the internet or to a BMS system the BIN file will need to be updated as well to the corresponding issue number. Using a laptop connect to the Aqua Cooler controller via the Ethernet card in the rear of the controller.

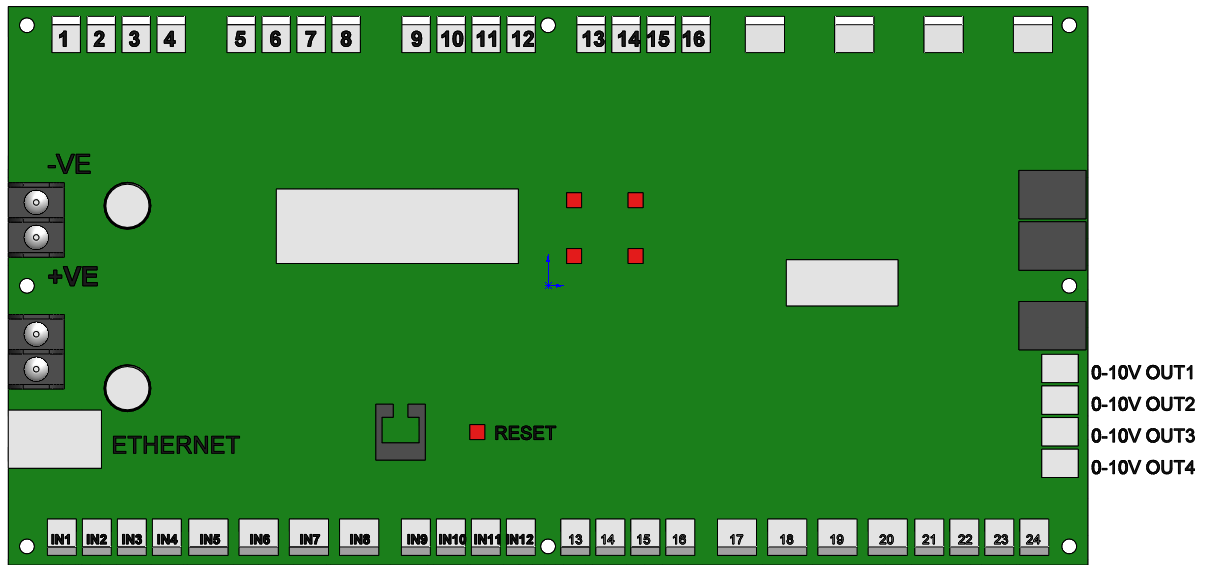
Open a browser with <http://10.1.1.130:8076/mpfsupload> OR if the controller has already been configured to a unique IP address then use this address. Use the BROWSE key to retrieve the BIN file saved to your computer or USB key. Once this is uploaded the page will show a tab with “Site Main Page” on it. Click on this and it will direct you to the main monitoring page for the chiller. The instructions are above for moving further into the control and monitoring of the chiller. The IP address of the unit can be found by scrolling to the INFO menu on the home screen of the controller. In the parameter menu there is time, date and year menu lines that can be set (see the service section for instructions) in order that the data log periods and the email alarms are time relevant.

**THERE ARE OTHER PARAMETERS IN THE PROGRAMMING MENU – SOME ARE USED IN SOME OF THE OTHER OPTIONS – SOME NOT AT ALL. THEY SHOULD NOT BE ALTERED. ALTERERING THE PARAMETERS NOT RELEVANT TO THE OPERATION OF YOUR CHILLER MAY AFFECT ITS PERFORMANCE AND REQUIRE AN OUT OF WARRANTY SERVICE CALL.**

# CONTROLLER INPUT AND OUTPUT



Connector	Type	Control
<b>Outputs</b> – 1 to 8 across the top of the board	24VDC	1 Compressors 2 Hot Gas/ Spray Cool 3 Pump 4 Ball Valve 5 Fan Bank 6 Master Fault 7 Master Run 8 Standby/ Tandem link enable/ Status
0-10V Output 1	0-10 Volt out put	9 Variable Speed Compressor Control
0-10V Output 2	0-10 Volt out put	10 Fan speed control
<b>Inputs</b> – 1- 24 across the bottom of the board		
IN1	0-10V Input	Supply Pump Flow Meter
IN2	0-10V NC Input	Compressor 1 fault input
IN3	0-10V NC Input	ON/OFF Switch
IN4	0-10V/ NTC thermistor	Plate pack safety sensor
IN5	0-10V/ NTC thermistor	Ambient temperature sensor
IN6	0-10V/ NTC thermistor	Chilled water supply temperature sensor
IN7	0-10V/ NTC thermistor	Chilled water return temperature sensor
IN8	0-10V NC input	Standby/ Tandem link
IN9	0-10V Input	Suction pressure
IN10	0-10V input	Discharge pressure



Connector	Type	Control
<b>Outputs</b> – 1 to 16 across the top of the board  0-10V Output 2 0-10V Output 3 0-10V Output 4	24VDC  0-10 Volt out put 0-10 Volt out put 0-10 Volt out put	1 and 2 Compressors  5 Pump  7 Unloading valve compressor 1 8 Ball valve 9 and 10 Fans 11 Water Spray 12 Unloading valve compressor 2 13 Master Fault 14 Master run output 15 BMS AUX Output 16 Tandem link enable/ Status  Variable speed drive output Fan speed control – fan bank 1 Fan speed control – fan bank 2
<b>Inputs</b> – 1- 24 across the bottom of the board  IN1 IN2 IN5 IN6 IN9 IN10 IN11 IN12 IN13	0-10V Input 0-10V Input 0-10V NC Input 0-10V NC Input 0-10V NC Input NTC Thermistor NTC Thermistor NTC Thermistor	Supply Pump Flow Meter Circulating Pump flow meter Compressor 1 fault input Compressor 2 fault input ON/OFF Switch Ambient temp Chilled water supply temp Chilled water return temperature

IN16	NTC Thermistor	Plate pack safety sensor 1
IN17	4-20mA Input	Humidity sensor
IN18	0-10V N/O AUX Fault Input	Auxiliary fault input 1
IN19	0-10V N/O AUX Fault Input	Auxiliary fault input 2
IN20	0-10V N/O Input	Switch to allow half chiller to run on full power – 2 compressor models only
IN21	0-10V N/O Input	Tandem link input
IN22	4-20mA input	Suction pressure sensor – circuit 1
IN23	4-20mA input	Suction pressure sensor – circuit 2
IN24	4-20mA input	Discharge pressure sensor – circuit 1
	4-20mA input	Discharge pressure sensor – circuit 2

## TROUBLESHOOTING

In the event the chiller develops a fault then the fault is displayed on the screen readout on the control board. The faults displayed are comprehensive but not fully descriptive.

Symptom	Possible Causes	Solutions
Low Flow Alarm	Faulty Pump	Replace Pump ensuring new pump has been leak tested, phase wiring is around the right way
	Blockage on water circuit of chiller installation	Isolate the chiller and attempt to back flow through the plate pack/evaporator
		Replace if the plate pack has become chronically blocked
		Check water line is not isolated downstream anywhere
	Faulty electrical contactor – check operation and replace if necessary	
	Work Around	If the pump seems like it is functioning and the flow rate is low then zeroing the flow alarm will allow the pump to run until the cause of the alarm can be found.
Compressor Fault	High head pressure – HP alarm tripping	Check head pressures when the unit is running. Possible causes blocked condenser – check for dust or debris build up and clean. Refer to “Poor Heat Dissipation” section.
		Dead or dying fan – check amp draw of fans or air flow. Replace if needed
		Too high a heat load for the rating of the unit. Check install and site specifications
		Bad installation or too high ambient – check that there is no other equipment in the vicinity that may be throwing heat onto the unit or that the unit has not been installed improperly
		Faulty HP transducer or HP switch - replace
	Low pressure – LP alarm tripping	Flow rate from pump may be too low
	TX valve may have seized	

		Unit may have developed a refrigeration leak and lost gas charge – check pressures or run leak detector over the unit.
		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.
Compressor Fault		Motor protection module in compressor tripped Motor running too hot – return water may be too high in-rush of heat load Compressor drawing too much current
	<b>Work Around</b>	For multiple compressor units, Second compressor should still be running and carrying much of the heat load. Once the faulty compressor is fixed then the programming will have to be updated as the program will have defaulted to another setting to keep the unit running.  On the screen go to “PARAMETERS MENU” and press “OK”  Scroll to SWITCH ON FOR NEXT C” – “TIMER” should be showing underneath this. Press “OK” and scroll to “FIXED HEAT LOAD” and press “OK”  The screen should confirm your choice

## 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.

## WARRANTY

Any claim under this warranty must be made within the discussed time period of the date of purchase of the product, by default this is 12 months from date of invoice. 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.

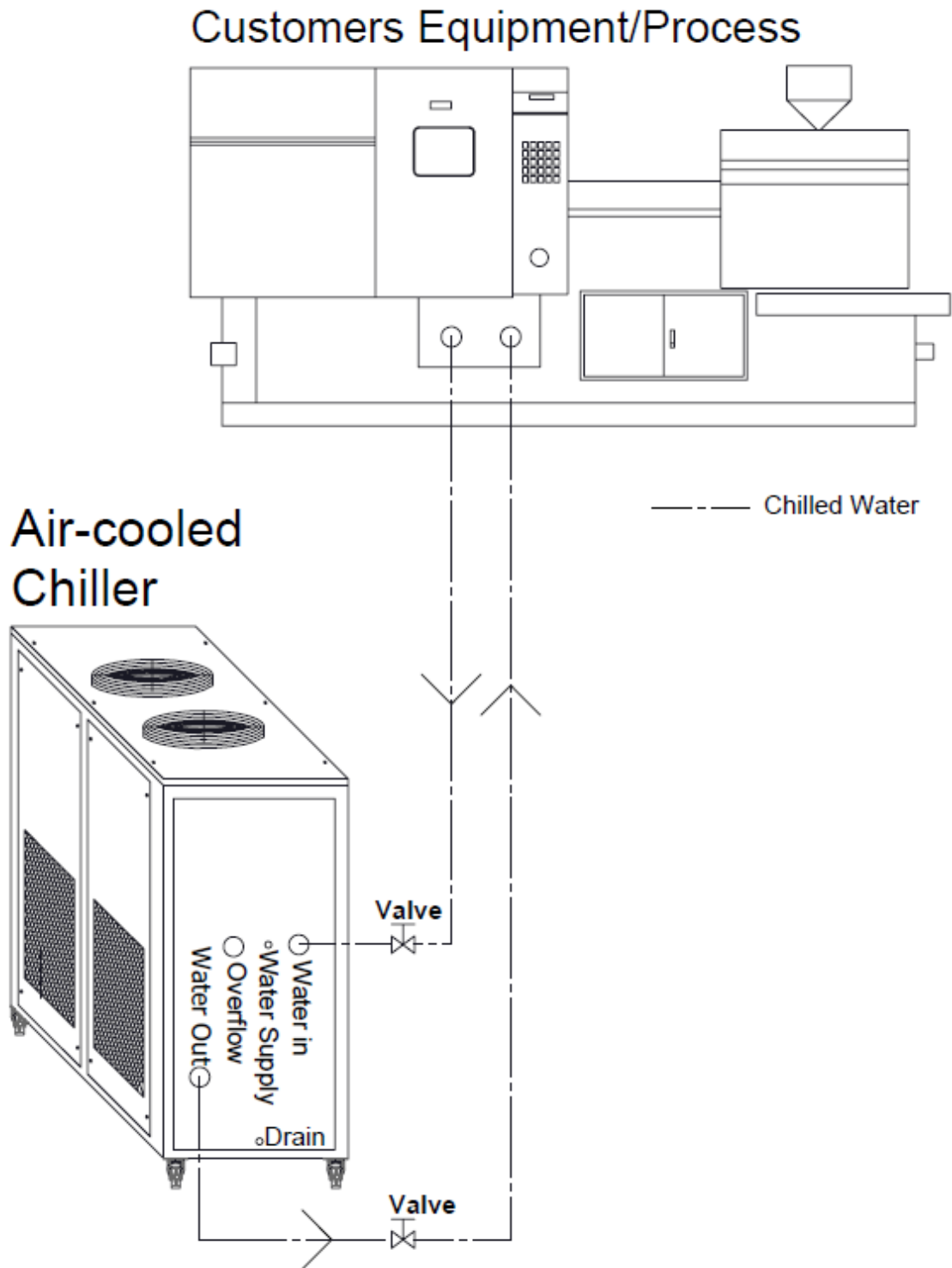
This warranty is given by Aqua Cooler Pty Ltd, U14, 2-12 Knobel Court Shailer Park 4128 QLD.

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.

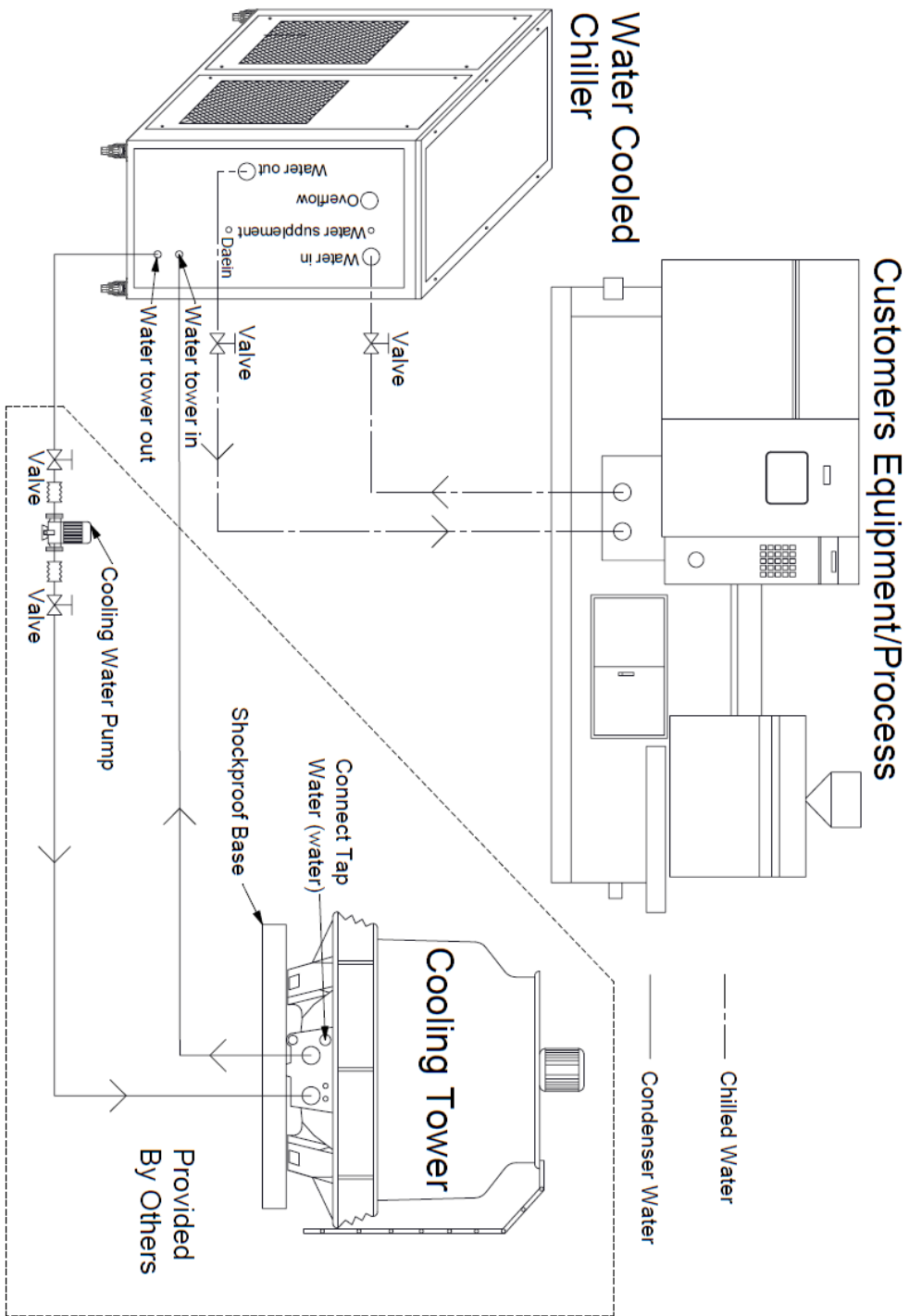
**Attached to this document is a comprehensive commissioning procedure. This must be carried out in accordance with the procedure and returned to Aqua Cooler at [support@aquacooler.com.au](mailto:support@aquacooler.com.au).** Aqua Cooler offers a commissioning program and can arrange this for you. Failing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

# SYSTEM SCHEMATIC

## INSTALLATION SKETCH MAP OF AIR COOLED CHILLER

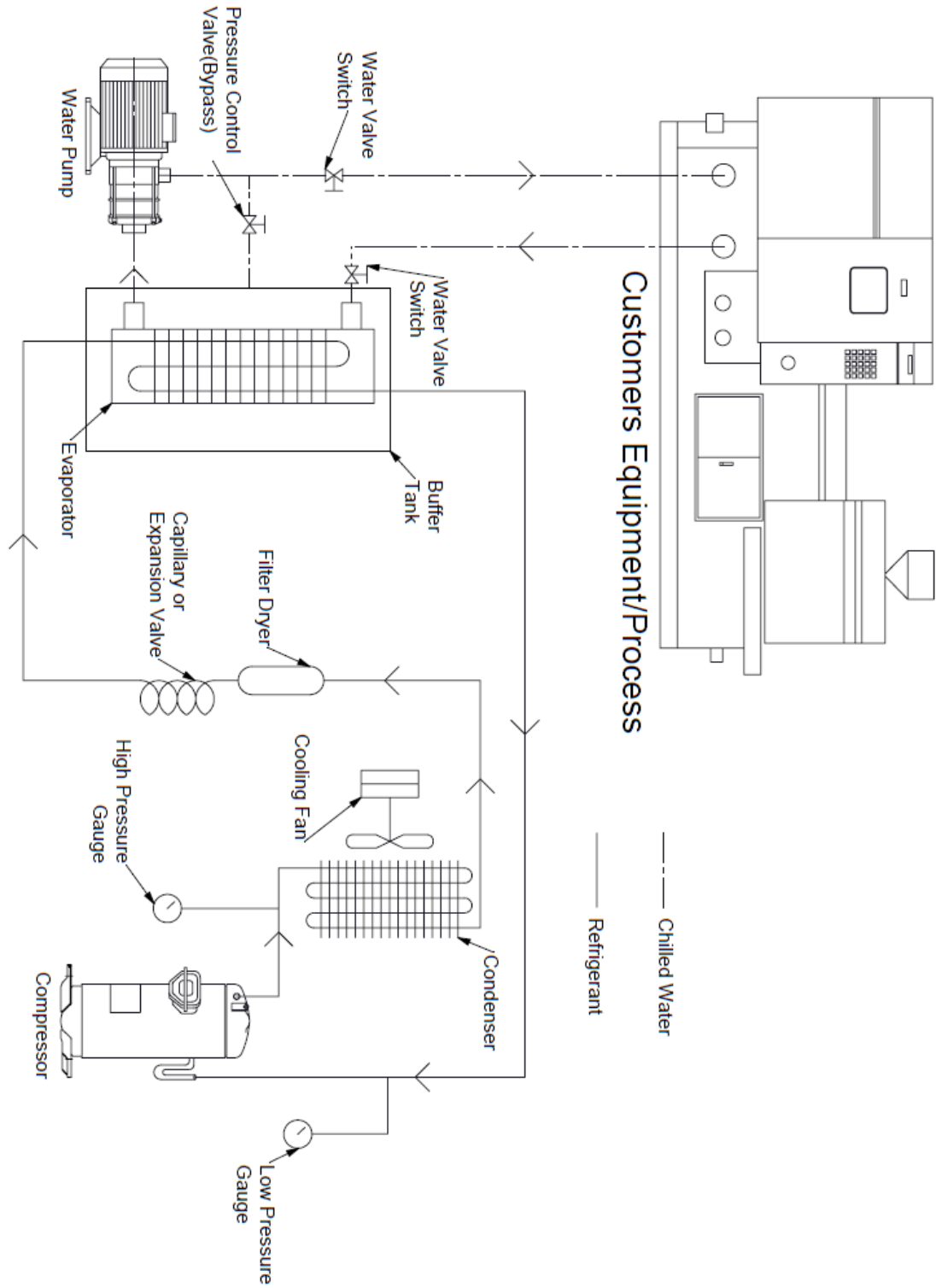


## INSTALLATION SKETCH MAP OF WATER COOLED CHILLER

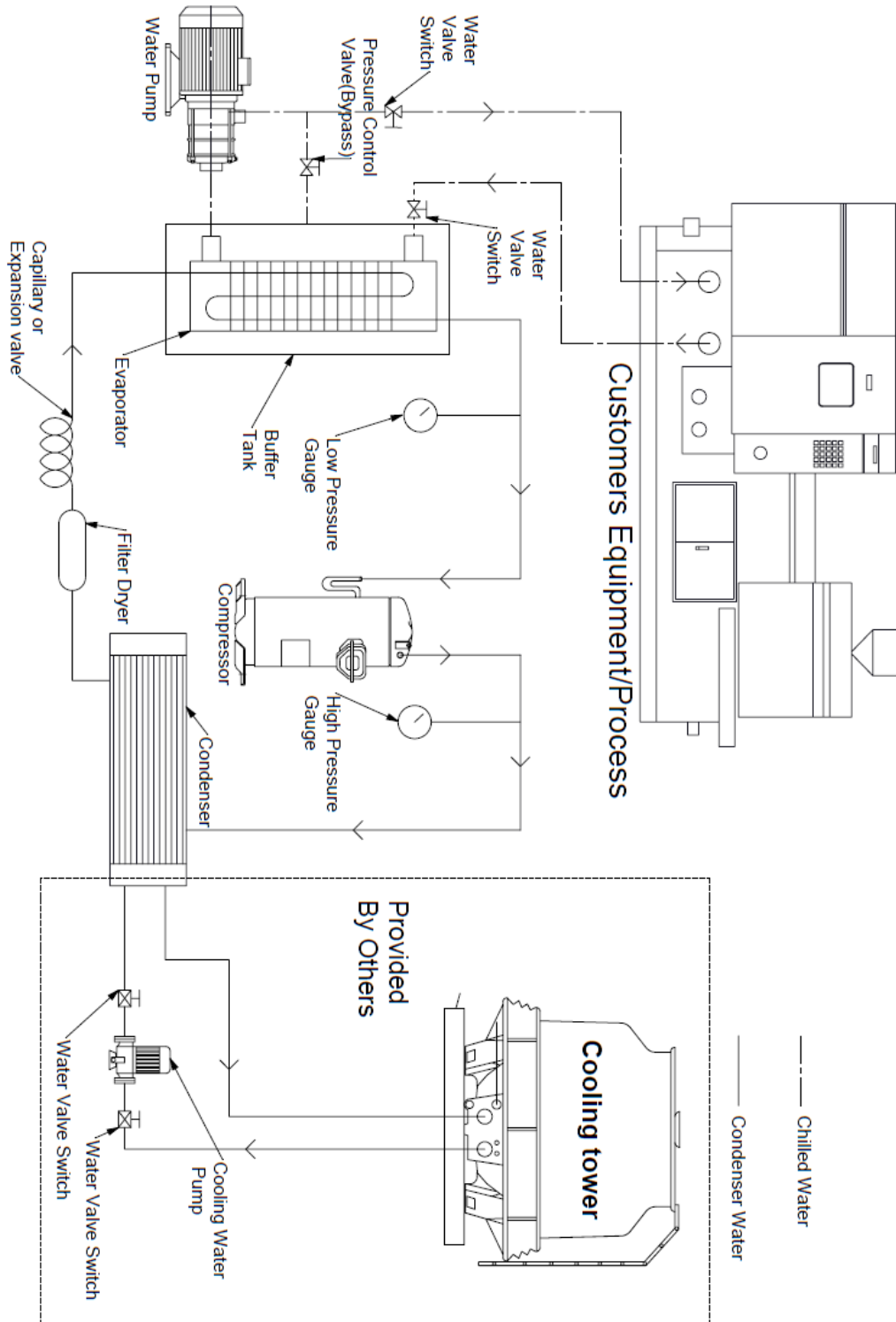




# INTERNAL STRUCTURE SKETCH MAP OF AIR COOLED CHILLER



# 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

<i>Isolate power to the chiller</i> and access the electrical box and check all wiring is tight.		
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## Water Connection

Was the pressure on the suction gauge checked before the unit was filled with water – see Installation		
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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)	O	
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		

## MAINTENANCE INFORMATION

**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 checklist is included below.

# 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 in regards to 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.

### 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.
- Check that the fan cycle control activates the 2nd fan by restricting air flow if necessary.
- 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 makeup 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