

**AQUA**  
**COOLER**

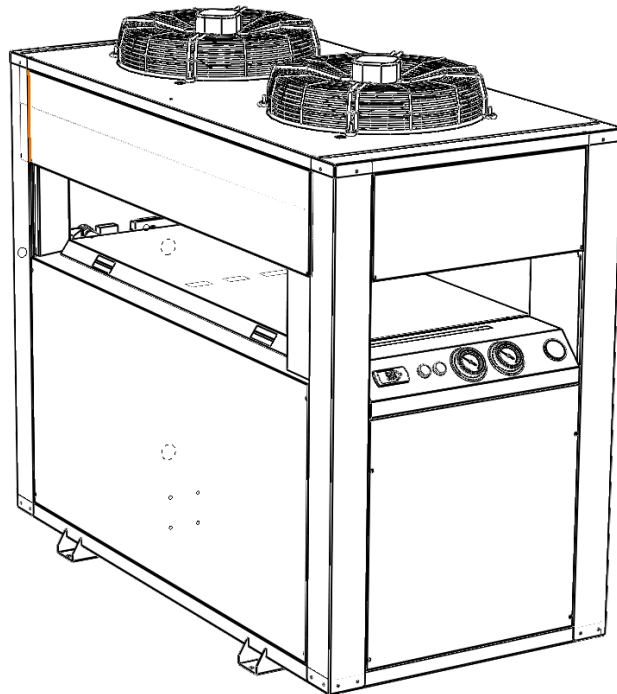
Aqua Cooler Pty Limited

# PRODUCT MANUAL

R Series II WATER CHILLER

R420 to R1300

001-D128 ISS J



**Aqua Coolers General Terms and Conditions of Sale**

Upon receipt of delivery the purchaser shall inspect the chiller to ensure chiller complied with the specification. If, after such examination, the purchaser discovers the chiller does not comply with the unit specified, the purchaser shall promptly inform Aqua Cooler in writing of the non-conformance.

**Listed below are some basic operational and installation conditions that must be adhered to for Aqua Coolers warranty to remain valid and more importantly for trouble free chiller operation**

- If the chiller is supplied without a water pump then the minimum flow rate specified in the manual must be maintained through the units at all times.
- The chiller must be commissioned in accordance with the instruction in the manual and the chiller must be commissioned under normal operating conditions
- The operational settings on the controller must not be altered without first consulting Aqua Cooler
- The temperature cut out set point must never be set below 5°C without first consulting Aqua Cooler
- The water bypass in the chiller must never be fully closed
- The chiller must be installed on level surface
- The chiller must be powered up for at least 4 hours before starting the chiller to allow for the sump heater to warm the compressor oil.
- The pressure in the sealed refrigeration system must be checked by a refrigeration mechanic before starting the chiller to ensure that the pressure on the suction side is at least 400kPa for R407c chillers and 200 kPa for R134a chillers
- For any service work not carried out by Aqua Cooler, Aqua Cooler will only cover costs of refrigerant to the value of the specified charge in the units.
- It is not Aqua Cooler's responsibility to connect the chiller to the BMS unless agreed to before delivery of the chiller
- The chiller must not be installed too close to walls and other chillers with clearances to be at least what is specified in this manual
- The chiller must be installed with proper, neat access to facilitate servicing in a manner that is compliant with safe work practices. Additional charges may apply for site where access to the chiller is unsafe or restricted
- Aqua Cooler will manufacture the chiller to the specification provided to the sales department. If the information supplied is incorrect Aqua Cooler takes no responsibility for wear on the chiller for short cycling in the case where the chiller is over sized for the heat load or the chiller unable to maintain temperature when the chiller is too small for the heat load
- Aqua Cooler takes no responsibility for repairs carried out on the chiller by unauthorized service agents or if parts are installed that are not from Aqua Coolers approved supplier list
- Costs for installations where a crane lift is required to undertake major repairs will not be covered by Aqua Cooler

## FOREWARD

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 and work commences. A comprehensive service manual is available to be down loaded from the website.

## CONTACT DETAILS

Aqua Cooler Pty Ltd  
161 Orchard Road  
Chester Hill NSW 2162  
Australia

Toll Free 1800649233 or +612 9721 9300  
Fax + 612 9721 9344

[www.aquacooler.com.au](http://www.aquacooler.com.au)

**Aqua Cooler Refrigeration Trading Authorisation number is AU12165**

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SAFETY

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THE UNIT IS DESIGNED FOR OUTDOOR USE.

- 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.



- Where the above symbol is shown there are live electrical parts and the utmost care should be taken.
- Electrical installation work should be carried out by qualified electricians only.
- Electrical connection should be in accordance with all the local relevant safety standards for wiring safety.
- 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 a plate heat exchanger rupture and the escape of refrigerants and water

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.

**SAFETY**

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**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.

**Disposal**

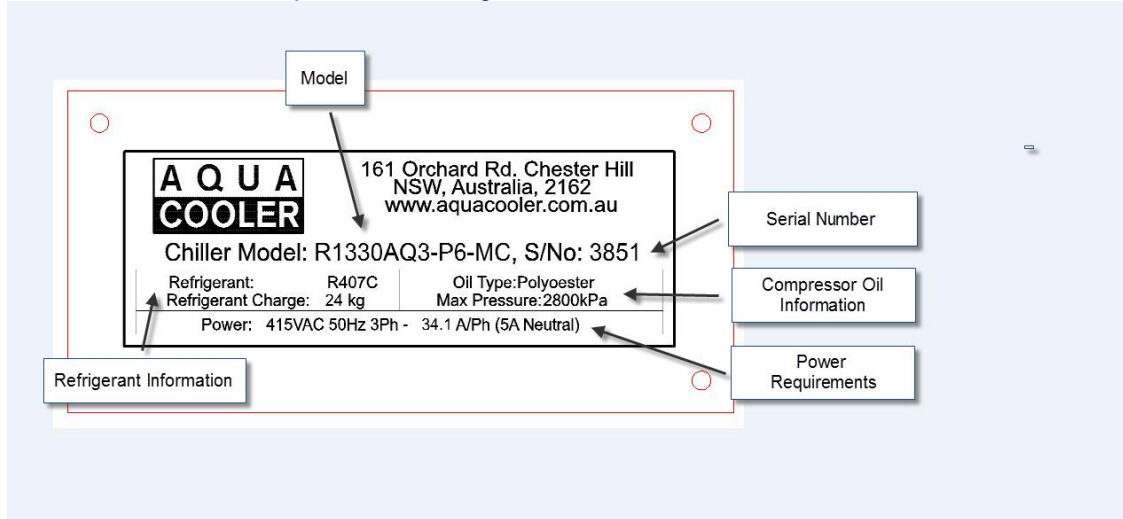
The unit must be disposed of in a proper fashion. The refrigerants in the system must be reclaimed by a qualified refrigeration mechanic and disposed of in accordance with the statutory requirements. The compressor contains oil that must not be dumped.

**Manual Handling**

The unit weights approximately 270 kg. Do not try to move the unit manually. The unit has been designed to be moved using a forklift or a pallet jack. The unit's centre of gravity is slight forward of centre so this should be taken into account when lifting the product.

**MARKING**

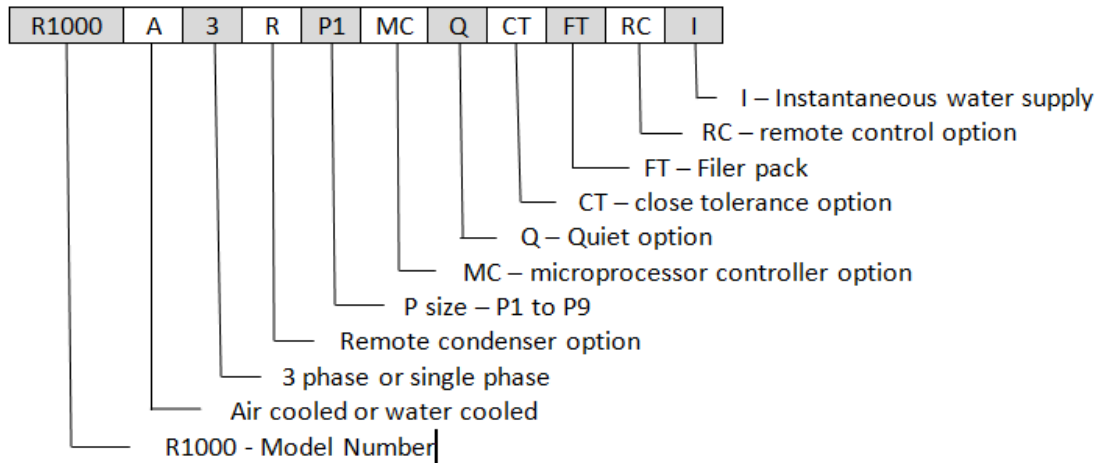
The unit will have on it various markings. There is a marking plate on the unit as shown below giving regulatory requirements. There will be a wiring diagram as shown in the wiring diagram section of this document provided in a larger scale for ease of maintenance.



When contacting Aqua Cooler regarding a service call it is important that the information shown on this marking plate is conveyed to the service team at Aqua Cooler

A four digit serial number sticker will also be placed under the marking plate. With this number Aqua Cooler can trace the date of manufacture of the product and details on the unit.

The wiring diagram will show the model of the unit and the options installed. The designation after the model number follows the code set out below



**MARKING**

This marking plate shows setting for the thermal overload protection devices for all the components in the chiller. It will be located inside the electrical box.

R2 Electrical Settings				
	Comp	Pump	Fan	Total
R420A3-P4	8.7A/Ph	1.6A/Ph	1.9A/Ph	13.0A/Ph
		2.1A/Ph		13.6A/Ph
		2.7A/Ph		14.2A/Ph
R540A3-P4	11.1A/Ph	1.6A/Ph	1.9A/Ph	15.4A/Ph
		2.1A/Ph		16.0A/Ph
		2.7A/Ph		16.6A/Ph
R670A3-P4	14.7A/Ph	1.6A/Ph	1.9A/Ph	19.0A/Ph
		2.1A/Ph		19.6A/Ph
		2.7A/Ph		20.2A/Ph
R830A3-P4	17.4A/Ph	1.6A/Ph	1.9A/Ph	21.7A/Ph
		2.1A/Ph		22.3A/Ph
		2.7A/Ph		22.9A/Ph
R1000A3-P4	22.0A/Ph	1.6A/Ph	1.9A/Ph	26.3A/Ph
		2.1A/Ph		26.9A/Ph
		2.7A/Ph		27.5A/Ph
R1200A3-P4	28.6A/Ph	1.6A/Ph	1.9A/Ph	32.9A/Ph
		2.1A/Ph		33.5A/Ph
		2.7A/Ph		34.1A/Ph
R1330A3-P4	28.6A/Ph	1.6A/Ph	1.9A/Ph	32.9A/Ph
		2.1A/Ph		33.5A/Ph
		2.7A/Ph		34.1A/Ph

**CERTIFICATION**

All the electrical components in the chiller have certification for electrical safety. The electrical box and all the exposed components are rated to IP66 against weather ingress.

**WARRANTY**

Any claim under this warranty must be made within 12 months 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, ABN 13 245 994 351, of 161 Orchard Rd, Chester Hill, NSW 2162 . ph 02 9721 9310.

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.

## GENERAL INFORMATION

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The chiller is designed to refrigerate and circulate water to a heat developing process to aid in keeping that process cool. It has an evaporator, 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 can be ordered with two types of controller. The high end controller is a microprocessor that is programmable to vary the water temperature to customer requirements and to feed back to the user system information via the internet or to a high level interface via SNMP protocols. The basic level controller is a relay based unit that controls temperature and start timing and provides no more feedback than its external display.

## INTENDED USE

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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.

## CHILLED WATER CIRCUIT

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The chiller can be installed to feed a remote buffer tank or be a closed loop system. Whichever installation is required MUST be specified at the time of order.

The chilled water circuit consists of

1. Immersed copper evaporator
2. Flow meter
3. One way valve . if ordered
4. Pump
5. Motorised Ball Valve . if ordered
6. Expansion tank . for closed loop systems
7. Pressure relief valve . feeds to drain in closed loop system
8. Filter pack . if ordered . 0.5 micron

The chilled water path starts with the pump delivering the water through a one way valve and to the process. The return water passes through a flow meter to monitor the flow rate, through the evaporator and back to the pump.

The primary pump will run full time unless the system detects a drop in flow.

It is important to ensure that any water treatment is passive to the wetted parts of the system which include

- Stainless Steel
- Copper
- High Density Polyethylene
- Brass
- ABS Plastic
- Nitrile Rubber



**TECHNICAL DATA**

TECHNICAL DATA									
Compressor horsepower	hp	R420	R540	R670	R830	R1000	R1200	R1330	
Cooling capacity at 5° supply <sup>1</sup>	Watts	6100	8100	10300	11700	15600	17500	19200	
Cooling capacity at 10° supply		7500	9700	12500	14200	18800	21200	24400	
Cooling capacity at 15° supply		8900	11600	14900	17100	22300	25200	28400	
Tank holding capacity	L	180							
No. Of compressors		1							
Compressor type		Scroll							
No. of Fans		2							
No. Pumps		1							
Dry weight	kg	270			310				
Dimensions (L x W x H)	mm	1495 x 790 x 1340							
Power requirements – 3 phase		415V 50 Hz 3 phase plus neutral (4A Max)							
Noise Rating	dB @ 1m dB @ 5m	Front 67 Front 64			Side 69 Side 64				
Maximum current draw – 3 phase	A	14.2	16.6	20.2	22.9	27.5	34.1	34.1	
1. Based on operation within a 45° ambient. Increase cooling capacity by 20% for operation within a 35° ambient 2. Rated at 25 water supply whilst operating within a 45° ambient environment and fitted with a option 6 pump									

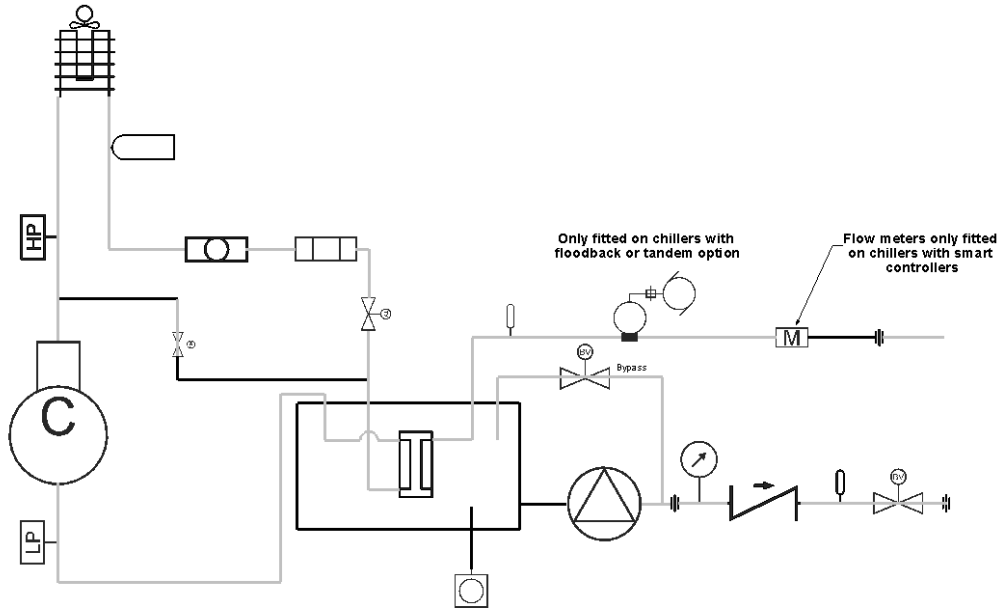
Construction	
Chassis Construction:	Power Coated Galvanised Steel Frame with powder coated steel panels
Water Connections:	Supply/ Return 1" Female BSP Make up water – 3/8" female BSP Drain 1 1/4" female BSP

Power Data	
Power Requirements:	415V 50Hz 3 Phase Plus Neutral (4A Max)
P4 Pump Power Consumption	0.70 kW
P5 Pump Power Consumption	1.10 kW
P6 Pump Power Consumption	1.40 kW
Fan Power Consumption Each	.78 kW
Lock Rotor Amps – Compressor	175A

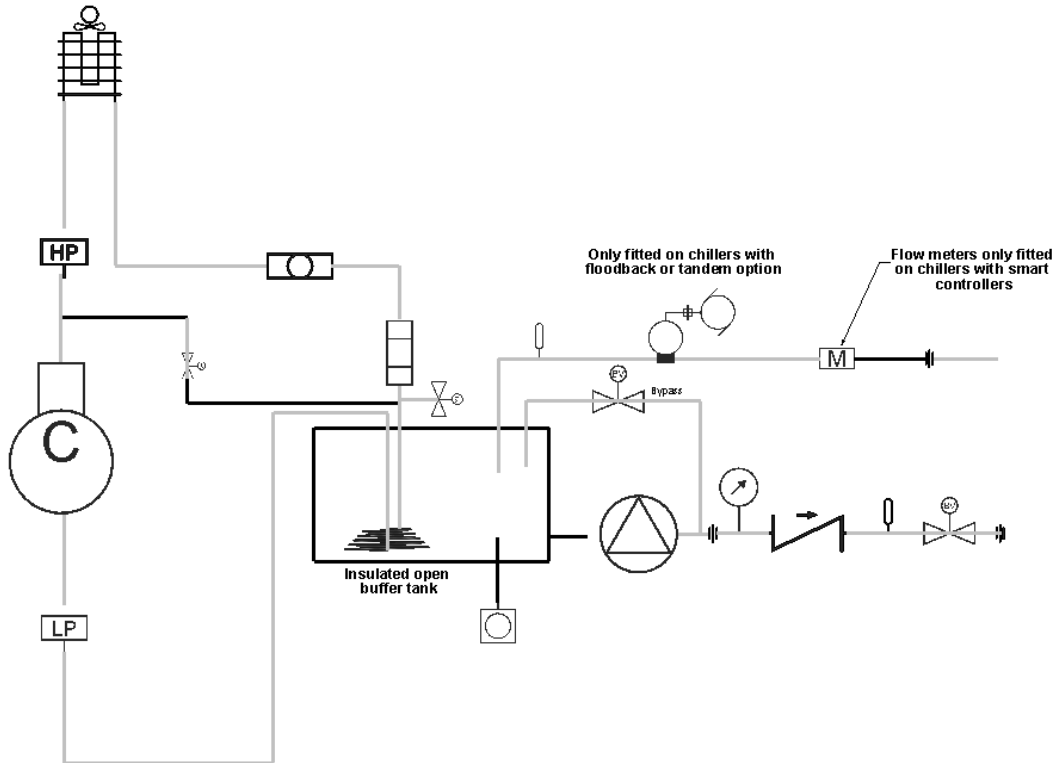
Refrigerant Charge - Kg			
Model / Evaporator Type	Braze Plate – R407c/ R134a		Immersed Coil – R407c/ R134a
R420			
R540	7		9
R670	7.5		10
R830	8.5		12
R1000	13		18
R1200	15		22
R1330		11	24

COOLING SYSTEM SCHEMATIC

Brazed Plate Heat Exchanger Evaporator Model

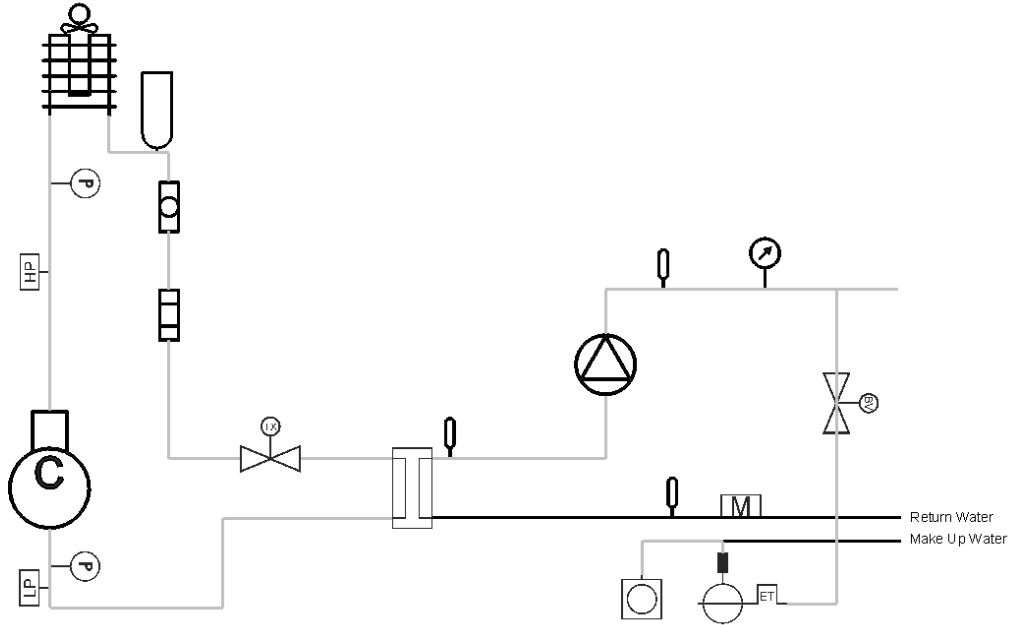


Immersed Copper Coil Evaporator



COOLING SYSTEM SCHEMATIC

Closed Loop Installation

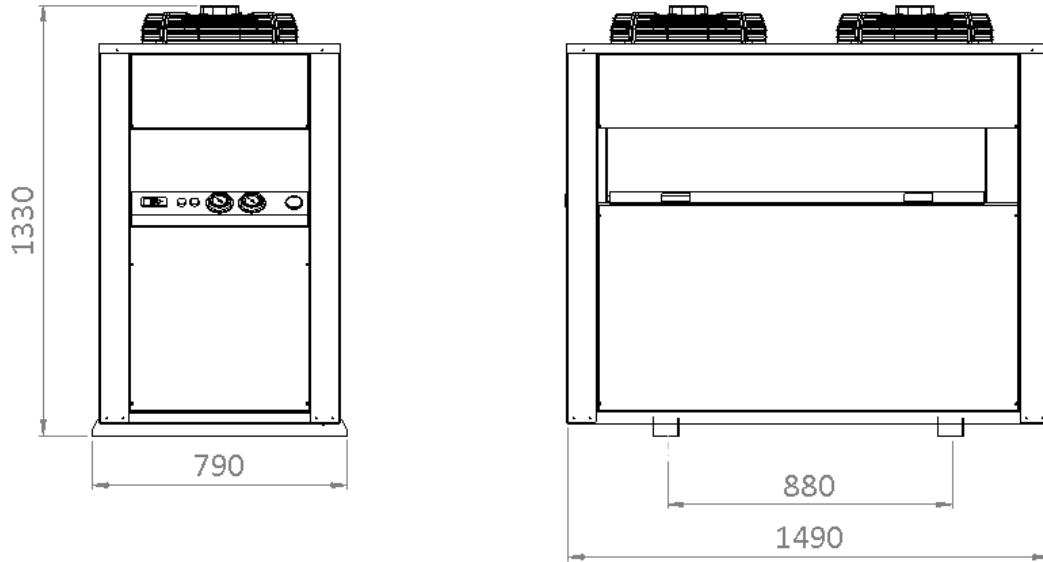


Cooling Schematic Symbols

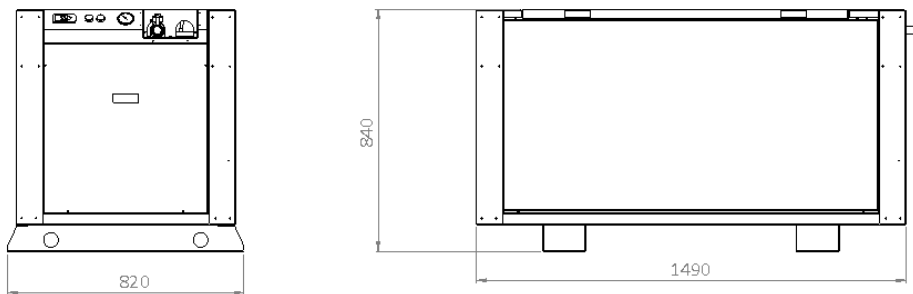
	Liquid receiver		Air Cooled Condenser		Pressure transducer
	Pump		One way valve		Ball valve
	Compressor		TX valve		Flow meter
	Sight glass		Drier		Pressure gauge
	Low pressure switch		Drain		Thermowell
	Motorised ball valve		Expansion tank		Water regulating valve
	Pressure relief valve		Strainer		High pressure switch
	Hot gas bypass valve		Isolation valve		Plate heat exchanger

DIMENSIONS

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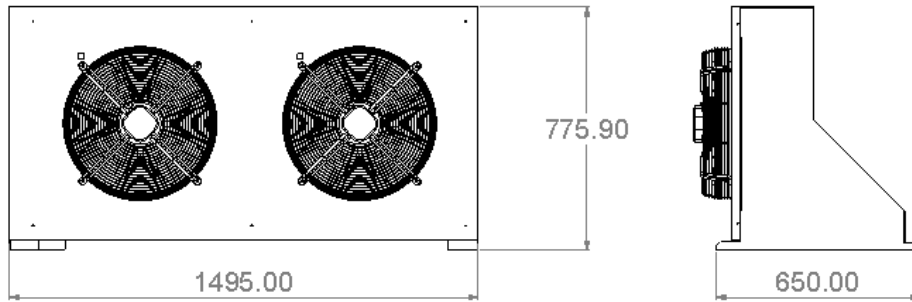
Remote Condenser Chiller Model



COOLING UNIT

DIMENSIONS

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CONDENSING UNIT

TRANSPORT AND STORAGE

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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.

## INSTALLATION

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A comprehensive commissioning program carried out by qualified refrigeration mechanics is available through Aqua Cooler. Benefits of this service include extended warranty. For full details and conditions please contact Aqua Cooler. There is also a site inspection procedure at the end of this manual. It is strongly recommended that Aqua Cooler or one of its agents carry out a site inspection to confirm that the installation site will not compromise the chillers performance.

Vibration isolation, such as rubber waffle pads, should be installed between the chiller and the supporting structure. The chiller is not supplied with anti-vibration pads however the chiller will sit on the four mounting points in the feet of the base.

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.

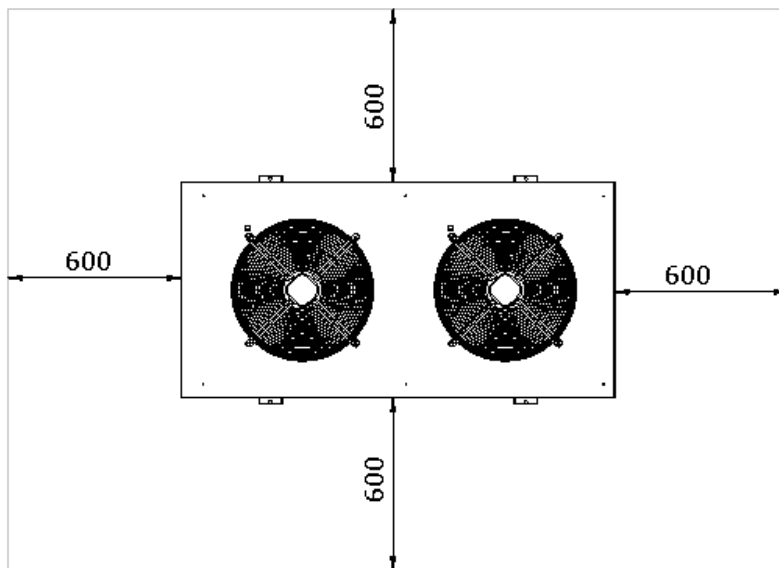
This chiller has been designed to draw air from each side and to exhaust vertically through the top of the unit. Preferably there should be no obstructions above the chiller, with a minimum of one metre clearance permitted in other circumstances. In addition to ensuring sufficient space around the chiller 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 chillers full operating weight.

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. The remote condenser unit has the water fittings marked on the front of the module.

The chiller should not be located where it is subjected to roof drainage and must be located above ground level in areas that are prone to stormwater flooding.

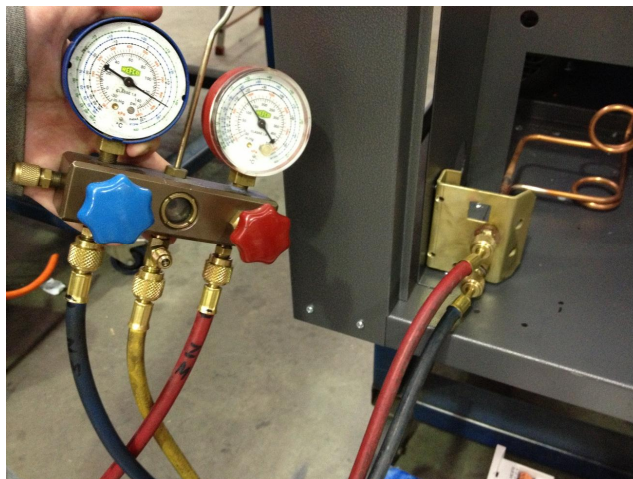
At least 800mm should be left around the unit to allow for proper ventilation of the condensers . see diagram. The unit should not be installed in a closed off room and if it is to be installed under anything then there should be a minimum of 2 metres of clear air above the unit.

## INSTALLATION

**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.

By removing the lower front panel a set of access point can be seen under the electrical box. They will be marked by the high side (discharge) is the higher of the two points and the low side (suction) is the lower of the two.



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.

**INSTALLATION**

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On the rear of the standard unit and on the front of the refrigeration module of the remote condenser version, the supply and return water will be marked next to the water fittings. The water fittings are 1+female BSP. The supply water is to the chilled water to the process and the return water is the water from the process with the heat load. The make-up water is a 3/8+female BSP and connects to a ball valve that automatically controls the level of water in the tank. If the make-up water pressure is greater than 700kPa then a pressure limiting valve must be fitted.

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.

Once all the pipe work is completed and the make-up water connected check the system for leaks. If this all looks OK open up the make-up water. There is a float valve in the tank that will automatically shut off when the proper tank level is reached.

**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 inrush 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.

A suitable isolating switch must be mounted as close to the chiller as possible and must be in line of sight of the chiller where the cable can be terminated. Ensure that the isolating switch is easily accessible once the chiller is in place.

Power cables should be adequately protected against mechanical damage.

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, fans and the compressors rely on correct phase rotation.

Ensure all electrical connections are tight prior to start up.

Power should be provided to the unit for as long as possible. Minimum of three hours. Before start up to ensure that the sump heater will boil off refrigerant from the sump oil. The unit is now ready to be started up.

The chiller can be ordered with a high level microprocessor based controller (smart controller) or with a low level mechanical switching electrical control. The smart controller offers web based monitoring, flow monitoring, higher level fault reporting, tandem set up capabilities and remote display panel for monitoring chiller functionality.



**INSTALLATION****Remote Monitoring and Control Panel – Smart Controller (MC models) Only**

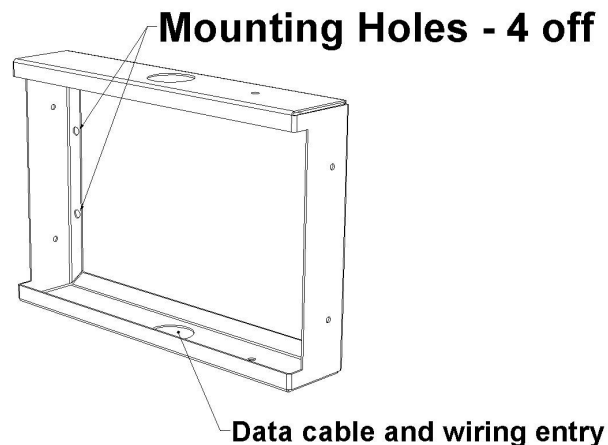
The chiller can be supplied with a remote panel designed to be mounted in the area near the process to monitor the operation of the chiller. There are two styles . a higher level display with a LCD screen to show chiller function or a low level display with a run and a fault light only. Some details on these displays will help with chiller identification should it be required in the event of a fault such as serial number and chiller model.

For both models of display there is a 24VDC master run light (green) and a fault light (red). Both will need to be wired back to the electrical box using 2 wires for each light. The terminals for the fault light are 43A/44N and the terminals for the master run light are 45A/46N . both will be marked on the wiring diagram.

Both can also be installed with an ON/OFF switch and the wiring diagram will show the wiring location for this as well. This must be specified at time of order.

**Installing the Display Panel with LCD System Status Readout**

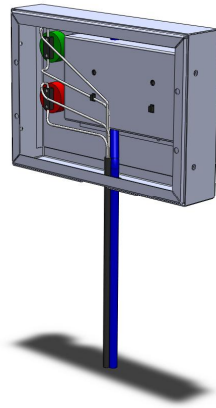
A CAT5 cable will need to be run from the chiller to the room with the process. The remote display comes in two halves and the rear plate will need to be mounted to the wall via the 4 mounting holes shown on the diagram.



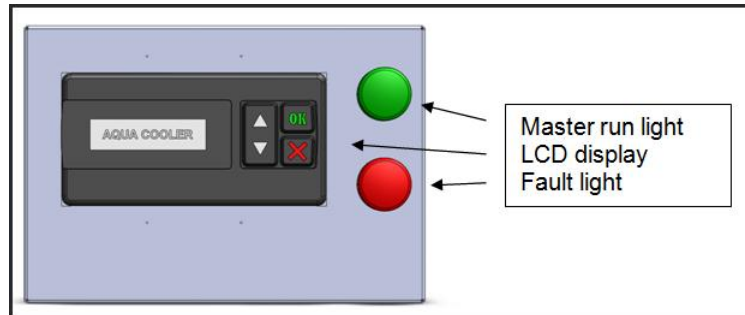
Once this secure then feed the CAT5 cable from the chiller and clip it into the underside of the display as shown in the diagram . there is a cut out in the bottom of the plastic moulding. Once the CAT5 cable and the low voltage wiring is installed press the front part of the assembly over the plate mounted to the wall and screw into place with the self tapping screws provided.

**INSTALLATION**

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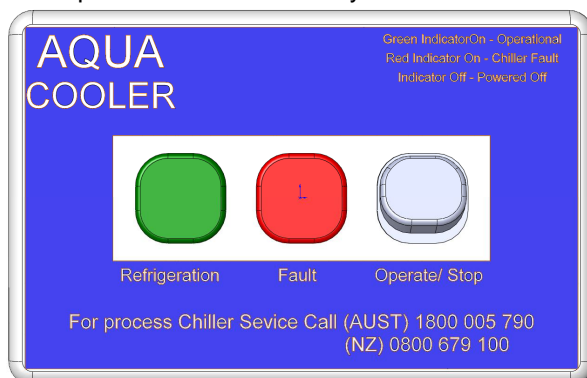
The LCD display will give the water temperature, flow rates, faults and the performance parameters of the chiller.



Noting what these faults are will aid in diagnosing problems when speaking to the service department.

**Installing the Display Panel with Basic System Status**

Again the display comes in two halves. There is a body that will need to be mounted to a wall and then the facia with the light is pressed onto the base. A blanking plug is also supplied should the stop/switch be unnecessary.



**INSTALLATION****Customising the High Level – Web Based – Interface**

The chiller has programming to allow it to be connected to the internet for monitoring or to be monitored via high level SNMP interface. Aqua Cooler can install customer IP address prior to the unit being dispatched otherwise see the service section of this document for instructions on changing the system settings. The system can also communicate via BACNet and Modbus protocols but they must be specified at the time of order.

To connect the chiller to your network or use a laptop on site

- Connect a CAT5 cable to the Ethernet port on the circuit board . it is on the bottom left hand side of the board it is silver
- Configure computer network settings to be able to connect to the PCB controller. For example IP 130.130.130.75, subnet mask 255.255.255.0 and gateway 10.1.1.130
- Open a browser and enter <http://10.1.1.130:8076>
- Go to the %Status+page and log in using %techcooler+as user name and %techwater+as the password. This means you are now logged in as Administrator. The webpage should appear showing the status of the chiller
- To change the chillers IP address go to the %Advanced+tab on the home page and then %Network+tab on the left hand side. Put %aquaipconfig+into the password page and un-tick the %DHCP+enable tab. This will allow the loading of the site specific IP address.
- To load in email addresses go to the %Email+ tab on the left hand side and use the password %aquaemail+The chiller will now send an email on fault. If at any time you wish to have a data log file sent go to the %control+page and have the controller send an email . see below
- Some of the systems settings can be changed remotely. Go the %Control+tab and enter the password %aquachiller+and this will allow the user to send commands to the chiller.
- To change or set up the SNMP setting of the chiller go to the SNMP tab and log in using %aquasntp+and follow the instructions that appear on that page
- To change the passwords on the system to your own go to the access tab and log in using %techwater+. update with specific details and update.
- To update the customer name, address etc go to the customer tab and enter %aquacustomer+ as the password. The system will now allow you to update the site specific details

At anytime if passwords or IP addresses are lost then hold down the down button, the ESC and reset button at the same time and then release the reset button until the green LED next to the OK button comes on (about 4 seconds) will restore all the factory settings.

The system is now configured to the sites specific requirements.

**BacNet and Modbus Communication**

If the unit is to communicate to the high level BMS using BACnet or Modbus then it will be supplied with an XML mapping file with the relevant OID points. **The installed firmware must be version P264\_64\_EB0\_011 or higher.**

## INSTALLATION

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The AquaCooler P264 Chiller Controller runs the following Building Management System interface firmware:

- **SNMP V1 and V2C Agent (UDP port 161, Agent ID 33888, Read/ Write Community "public"),**
- BACnet IP Server (Optional), (UDP port 47808, Vendor ID 566, Initial Device Number 2012)
- Modbus TCP Server (Optional). (TCP port 502)

A single set of data points is accessed by all of these interfaces. The current set of data points comprises 32 read value (eg temperature inputs), 47 read/write value (eg set-points), 85 read binary (eg alarms), 5 read/write binary (eg BMS on/off), 2 write binary (eg clear all alarms). An xls spreadsheet mapping file documents the SNMP OIDs, BACnet objects and Modbus Holding Register cross connection. Using the SNMP OIDs as a basis, this cross connection is programmed into the Pump and Transfer controller via the uploading of a text based xml file derived from the mapping file.

Without a valid xml mapping file uploaded into the controller, only the SNMP Agent will be operational. All SNMP OIDs have remained unchanged from previous Pump and Transfer firmware releases so that firmware containing the latest BACnet and Modbus interfaces will still be able to be accessed by an alternative external SNMP to BACnet and Modbus gateway such as the Babel Buster.

To enable the BACnet IP and Modbus TCP local servers:

1. Obtain the relevant xml mapping file from AquaCooler.
2. Log onto the control unit local web server as 'admin'.
3. Navigate to 'advanced' 'upload' page.
4. Browse your connected PC for the correct xml mapping file.
5. Enter the upload password "aquaupload".
6. Press the 'Upload New File' button and wait for the acknowledgement screen.

The 'Upload has been Successful' page should then appear. This indicates that the correct file had been checked and saved on the control unit. If the upload was not successful then the file chosen may not be the correct format or type. In this case please refer to AquaCooler technical support for assistance. Following the successful upload of the mapping file, the file is automatically saved in non-volatile memory and all data points should then be available to the external BMS via SNMP, BACnet IP or Modbus TCP

The SNMP, BACnet IP and Modbus TCP interfaces provide full control, monitoring and configuration of the Pump and Transfer Unit via the mapped data points. All of the interfaces are IP based and share a single 10/100Base-T ethernet physical layer which is also shared with the local HTTP web server. As such, an SNMP, BACnet IP or Modbus TCP client that is running on an external BMS will need to 'point to' the Pump and Transfer Current Local IP address. This IP address can be found by pressing the 'up' key once on the control unit from the home screen. IP ports for connection are standard for each service (shown above).

Connection to the SNMP V2C agent requires correct community names (shown above). Connection to BACnet IP requires a correct device number (instance) also shown above. This device number can be changed by going to the local web server 'Chiller ID' page and changing the BACnet device number shown.

All data points can be accessed via BACnet 'Objects'. Analog Inputs, Analog Outputs and Analog Values and Binary Inputs, Binary Outputs and Binary Values only are implemented. Object numbers begin at 1 and the maximum number of each data point is shown in notes on the Web

**INSTALLATION**

Server 'Upload' page. In general the standard BACnet Read property and Write Property services are available on Analog Output, Analog Value, Binary Output and Binary Value objects. BACnet Read Property services are available on Analog Input and Binary Input objects. BACnet Read Object Name is also available on all objects. Mandatory object properties are implemented but most optional object properties are not. Present value priority arrays are not implemented for Analog Values or Binary Values. Other optional object properties and some BACnet services may not be available from the local server. Unimplemented properties will respond with a BACnet 'Unknown Property' error message and unimplemented services will respond with a BACnet 'Service Unavailable' error message.

All data points can also be accessed via Modbus 'Holding Registers'. Register numbers for Analog objects can be calculated by multiplying the hundreds, tens and units portion of the localreg number by two, subtracting one then adding 40,000 and the thousands portion of the localreg numbers on the xml mapping file (for example, an analog value object localreg number 2003 would be Modbus holding register  $2*3 - 1 + 2000 + 40,000 = 42,005$ ). Register numbers for Binary objects can be calculated by adding 40,000 to the localreg numbers on the xml mapping file. Registers are 16 bits long and so 32 bit real (Analog 32 bit floating point) values are transmitted as two successive 16 bit registers in 'big endian' format. Should 32 bit analog real values received from the Pump and Transfer Modbus TCP interface be unintelligible on an external BMS then the external BMS may be attempting to send/ receive 32 bit real values with the registers in reverse order. In this case a 'Modbus Register Swap' tick box can be set by going to the 'Network' page of the Pump and Transfer control unit local web server and following the 'Save Network Config' procedure.

Local Register numbers 2001 to 2999 are Analog Value Objects mostly comprising set-points that allow the BMS to adjust operating points of the Pump and Transfer unit as necessary. To be able to change these values SNMP data point 1.3.6.1.4.1.33888.1.6.2.3.0 - 'P264ControlSetSetparenable' must be set to 1 if the 'Network' page 'Set-Point Enable Restrict' tick box is checked. If the 'Network' page 'Set-Point Enable Restrict' tick box is unchecked, full backward compatibility is maintained with existing Babel Buster interfaces that may simply write any value to 'P264ControlSetSetparenable' to give a 5 minute window for set-point edits.

The 'Network' page 'Set-Point Enable Restrict' tick box also affects 1.3.6.1.4.1.33888.1.6.1.1.0 - 'P264ControlResetRemalmreset' and 1.3.6.1.4.1.33888.1.6.1.2.0 - 'P264ControlResetRemsysreset' in a similar way.

**Before start up ensure that;**

- The water circuit is complete to and from the process and that it has been properly leaked checked and bled of any air in the system.
- Check that power has been supplied to the chiller in order that the sump heaters have had enough time to warm the sump oil . minimum of 3 hours
- In a tandem installation ensure that the master chiller and the slave chiller are wired the correct way around. See wiring diagram and make sure the settings are right in the chiller programming.

INSTALLATION

**Remote Condenser Installation**

R Series Chillers can be ordered in configurations featuring the ability to remotely mount the condenser in order to permit maximum installation flexibility. When ordered with a remote condenser configuration we deliver the condenser and the chilling unit separately. Both the chiller and the condenser are *pre-charged* with refrigerant and fitted with isolation valves.

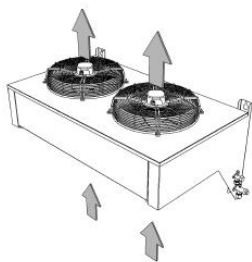
The distance from the chiller to the condenser should be kept as small as possible. Excessive distance lead to high refrigerant pressure drops which in turns leads to loss in chiller capacity. We recommend that the condenser should be located no more than 9m vertically from the chiller, and the total refrigerant piping should be kept less than 20metres. However for long refrigerant pipe runs between chiller and condenser pipe size can be increased to compensate for losses.

Connection Requirements

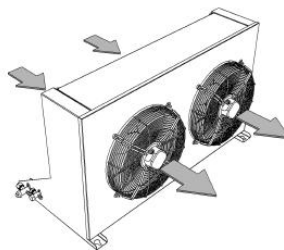
	<b>R420AR-R670AR</b>	<b>R830AR-R1200AR</b>
Discharge Line	3/4"	3/4"
Liquid Return Line	1/2"	5/8"
Electrical Connection	2 * 3 Core + E 1mm <sup>2</sup> or 1 * 6 Core + E 1mm <sup>2</sup>	

The condenser can be installed in either a vertical discharge orientation or a horizontal discharge orientation. Care must be taken to ensure that air flow is not restricted around the condenser in order to prevent re-circulation of air through the condenser. The condenser should not be located where it is subjected to roof drainage and must be located above ground level in areas that are prone to stormwater damage.

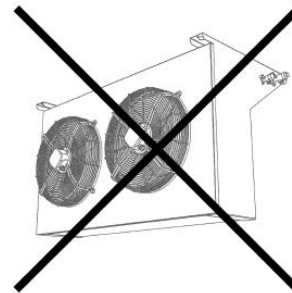
***Under no circumstances is ducting to be attached to the condenser fan outlets. When installing beneath a ceiling do not mount the condenser upside down, instead use brooker rods or similar to support the condenser.***



*Vertical Discharge Configuration*



*Horizontal Discharge Configuration*



*Incorrect Horizontal Discharge Configuration*

The condenser is fitted with a junction box switch into which the electrical supply from the chiller must be connected. Both the chiller and the condenser are fitted with refrigerant isolation valves with flare connections.

## INSTALLATION

***It is essential to provide suitable protection preventing inadvertent contact with the discharge and liquid return lines. Both these lines can get extremely hot and direct contact may cause burns. Aqua Cooler accepts no responsibility for any injuries resulting from the refrigerant connection pipes.***

***It is essential that a suitably qualified refrigeration mechanic connects the refrigerant piping between the chiller and the condenser.***

Once the refrigerant lines have been connected between the condenser and the chiller it is essential to pressurise the lines with nitrogen and check for leaks. Once cleared of leaks the lines should be evacuated. This can be performed at either the condenser or the chiller by attaching leads to the appropriate schrader valve on the refrigerant isolation valves. There should be no need to add additional refrigerant to the lines as long as the lines do not exceed 9m in total length. Once evacuated and charged (if necessary) the shut off valves can be opened.

There are two major stages in commissioning the electrical circuit. First is to ensure that the supply phase sequence is correct at the chiller. The second is to ensure that the subsequent connection between chiller and condenser does not reverse the phase sequence.

To confirm the phase sequence at the chiller use a phase rotation meter or check the direction that the pump motor turns. A directional arrow is shown on the rear of the pump motor to assist in this task. Ensure that there is water in the system and turn the pump on. If the pump turns in the wrong direction then correct the phase sequence at the supply isolation switch and not within the chillers electrical enclosure.

Once this task has been completed the fan direction should be checked. It will be necessary to organize somebody to view the operation of the fans at the condenser. Gain access to the electrical enclosure by removing the panel above the water fitting on the refrigeration module.

Press and hold down each of the fan contactors and confirm that the fans are sucking air through the condenser and exhausting it off the fans themselves as shown by the arrows in previous images. If incorrect then rectify the sequence at the isolating switches on the condenser.

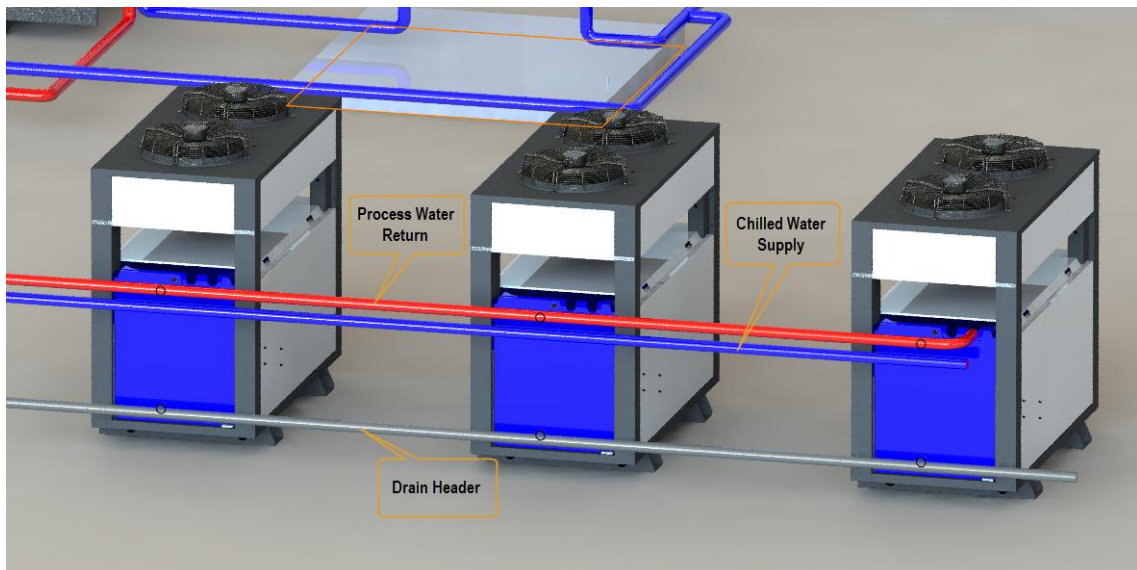
**INSTALLATION****Multiple Chiller Installations**

Aqua Coolers chiller can be installed in multiple installations for redundancy or to allow scaling as process application increases in size . for example adding power to a data centre.

There are some requirements for the installation to prevent issues when the chillers duty cycle or if a chiller develops a fault and the central controller or BMS starts another one.

The requirements are

- The chillers must be ordered with the flood back option . this hydraulically isolated the chiller when it is in standby mode. There is a motorised ball valve on the return water line and a check valve on the water outlet line
- A drain header must be installed between the chillers. This allows the water level in all the chillers to same. Obviously this will not work if the chillers are installed at different levels.
- The controller in the chiller has a high water temperature alarm acknowledge delay. This setting needs to be set to at least 2 minutes. When the chillers duty-cycle the water sitting in the tank of the standby chiller can get warm especially on warmer days and when the chiller starts up the high temperature alarm will activate . this alarm delay will give the chiller time to start cooling the water and allow cold water in the pipe work to stir the tank. See the service and maintenance section of the manual on how to change this setting.



Standard Aqua Cooler chiller can be installed together in pairs and one of the chillers will act as the master and the other the slave and the master will duty cycle the chillers and keep a healthy. If there are more than two chillers Aqua Cooler can supply a central chiller controller to monitor and duty cycle the chillers



## OPERATION

**Before starting the chiller, ensure that the pressure on the suction pressure in the system is above 400kPa. 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 unit with water.**

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

There is a meter-cock controlled bypass between the supply and return water pipes. This will be supplied in the fully open position. This can be adjusted to balance the flow and pressure supplied to the process. ***It must never be fully closed.***

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

On the smart controller units the operational parameters that are displayed on the screen

- Water temperature T2, Return Water Temp T3, Ambient temperature T1
- Primary water flow
- Heat load
- Compressor run time

Any faults are indicated on the face of the control panel.

On the standard controller the temperature is the only thing that is displayed.

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.

**CONTROL**

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Operational logic for compressor control water temperature management is as follows and is the same no matter if the chiller is supplied with the standard controller or the microprocessor controller.

After compressor hold time and chilled water set point plus hysteresis then the compressor is turned ON. The pump runs all the time.

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.

If water temperature is dropping slower than the rate of change value then chiller will run to set point and cut out.

**SMART CONTROLLER – MC Option**

The water temperature management is essentially the same as the process outlined above, however the microprocessor controlled chillers manage a few of the chillers systems differently.

If water temperature is coming down faster than the rate of change setting in the menu AND water temperature is below set point plus hysteresis then the compressor is turned off at set point +33% of hysteresis to prevent temperature over runs.

The controller also monitors systems pressures and flow rates.

**The settings below are in the SET POINTS sub-MENU in the PARAMETERS MENU**

**WATER 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.

If the temperature is dropping faster than the rate of change then the unit will cut out before the set point to prevent temperature overruns

**Max and Min Set Point**

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

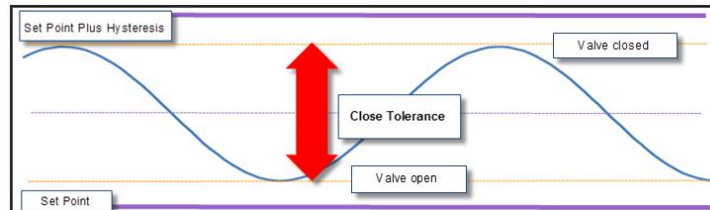
**Temperature Control - High and Low Temperature Alarm Stop**

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.

**CONTROL**

**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

**WATER TEMPERATURE CONTROL**

**Temperature Hysteresis**

This is the temperature off-set from the set point where the compressor is allowed to start. It is designed to give the compressors an operating band to work across and limit compressor start-ups.

**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.

**Low Load Control**

The system has an automated setting that will adjust the temperature hysteresis if the load on the chiller is too low and there are too many compressor start-ups. If the time between start up is less than 3 times the hysteresis then the chiller will widen the hysteresis by half the hysteresis up away from the set point and then recalculate. It will do this to a maximum of 3 times of half the hysteresis if the cycle times remain too short. If the cycle times increase then the system will start to lower up the hysteresis again.

**WATER FLOW CONTROL**

**Flow Control**

The system monitors flow rates and will send a warning if the %warning flow rate+ setting 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.

**CONTROL**

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**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

**Run Pump on Stop**

If this setting is turned on the chiller will run the pump after the chiller has cut out. This is to clear any refrigerant that has pooled in the evaporator and prevent the risk of freeze ups.

**High Return Alarm Acknowledge Delay**

In the case of the chillers being installed in redundancy the water sitting in the redundant chillers buffer tank may have gotten warm. When the chiller starts up this warm water will set off the high temperature alarm. By activating this alarm delay the controller will wait for the chiller to have a change at reducing water temperatures.

**FAN SPEED CONTROL AND REFRIGERANT PRESSURES CONTROL****Fan Speed Control**

The controller monitors the discharge pressure of the refrigeration circuit and makes decisions for fan speed based on this value. 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.

**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.

**Low Pressure Control**

The system will monitor the suction pressure of the refrigeration circuit and will send a warning when the pressure starts to get too low. 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 low pressure safety switch installed and set at 170 kPa for R407 gas for safety back up. The LP also has a hysteresis . that is after shutting down at say 200 kPa and the hysteresis is set at 200 kPa, the unit will not be allowed to start until the suction pressure has risen to 400 kPa.

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, the alarm will de-activated. A warning will still show.

**CONTROL**

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**DELAYS AND OTHER ALARMS****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.

**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.

**CONTROL – STANDARD CONTROLLER****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

**Compressor Rest Time**

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

CONTROL

**Putting the unit in standby mode - MC option only**

<p>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.</p>	<ul style="list-style-type: none"> <li>• Scroll through the menu to find %EYPAD STANDBY+</li> <li>• Press %OK+and then %OK TO CONFIRM+The unit will stop running</li> <li>• The screen will be showing %OK TO RE-START+and %EYPAD STANDBY MODE+will be flashing</li> <li>• Press %OK+and the chiller will go through its normal start up procedure</li> </ul>
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**THIS DOES NOT TURN THE UNIT OFF AND THE ELECTRICAL CIRCUITRY INSIDE THE ELECTRICAL BOX WILL STILL BE LIVE**

SERVICE and MAINTENANCE

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

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

*Warning: When the mains controller is de-energised the power contactors are live, even if the components are not operating.*

All maintenance must be carried out by qualified refrigeration mechanics.

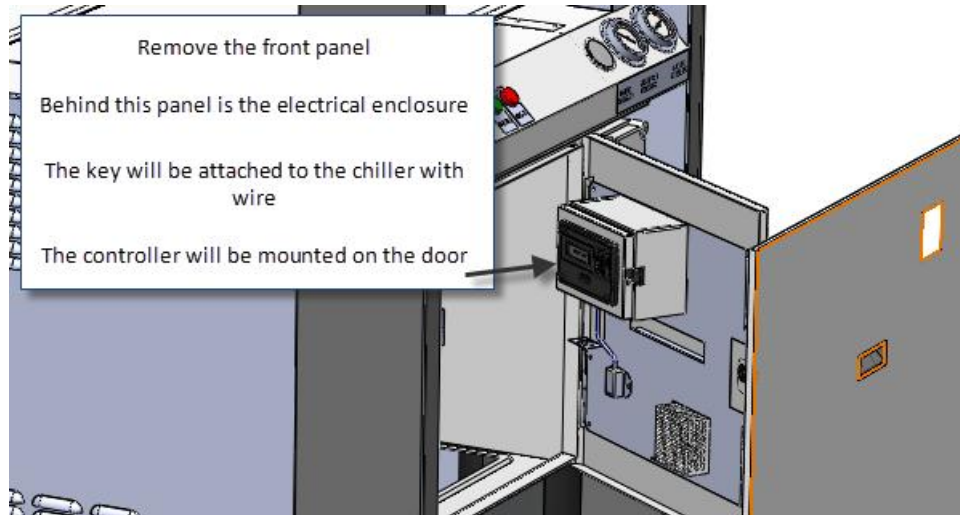
These units have been designed for the minimum of maintenance. However to ensure optimum performance qualified personnel should carry out regular maintenance. A comprehensive preventative maintenance program is available through Aqua Cooler carried out by qualified refrigeration mechanics.

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

**Recommended preventative maintenance program**

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

## SERVICE and MAINTENANCE

**Accessing the electrical box – standard chiller****MC Models - Smart Controller Maintenance****Data Logging**

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.

## Downloading Data from the Controller

The operational data can be downloaded from the controller by either using a USB flash drive or via the hyper link terminal (RS232). There are two types of files on the system . and 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 minutes 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.

Download via hyper link . A laptop with Windows Hyper- terminal installed will be needed to download the files. Connect your laptop via a RS232 cable to the outlet marked RS232 on the printed circuit board controller in the electrical enclosure

1. Find Program, Accessories, HyperTerminal. Run this on your laptop
2. Select Hyper-terminal File Open and choose the P223xxx.HT file attached.
3. Select Hyper-terminal Transfer Capture Text and choose a file name to save the log to
4. GO to the Chiller board Parameter menu and choose %log DLOAD RS232+Then Enter
5. Up arrow to choose one of the 4 download options then Enter. Hyper-terminal should be displaying the data as it is received. This may take up to 20 minutes.
6. Close Hyper-terminal to save the file then repeat steps 7 to 10 for the 3 remaining log downloads.

**SERVICE and MAINTENANCE**

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Download via USB . insert a USB key into the USB key on the right hand side of the circuit board controller.

1. Go to %LOG DOWNLOAD+in the parameter menu and press OK
2. Scroll to %Time Log to USB+and press OK
3. The data will take about 30 seconds to download and the screen will show when the download is complete
4. Putting the USB into a computer will show the folder labelled %AQUA+and inside this will be a 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

**Email Alarms – MC Option only**

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.

**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**

**Calibration of Sensors – MC Option**

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. Remove all the temperature probes except the water supply temperature probe wire number 115 or input 11 on the circuit board controller
2. Put this probe with a thermometer in some cool water and the calibration option in the parameters menu and calibrate the setting to the setting on the thermometer.
3. Put all the other probes back making sure that the probes go in the right places as shown on the wiring diagram and place them with the supply probe together in the water
4. Go back to the calibration option in the parameters menu and calibrate all of the probes to the supply probe
5. Put all the probes back in their respective thermowells

**Updating Software**

From time to time requirements may require a software upgrade of the system and with the right programmer this can be done from a laptop on site. If the chiller is connected to the internet or a high level management system then the upgraded software will also be accompanied by a new BIN file to allow viewing on standard SNMP based systems



SERVICE and MAINTENANCE

Contact Aqua Cooler on the procedure to up load new firmware into the chiller.

The control board will have to be connected to the network, if it is not already on the network, via the TCP Stack shown on the layout on the wiring diagram then using a CAT 5 cable. The BIN file that has been provided will need to be saved to a folder on your computer.

Open a browser with <http://10.1.1.130:8076/mpsfupload> and click on the BROWSE key to retrieve the BIN file saved to your computer. 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.

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. ALTERING THE PARAMETERS NOT RELEVANT TO THE OPERATION OF YOUR CHILLER MAY AFFECT ITS PERFORMANCE AND REQUIRE AN OUT OF WARRANTY SERVICE CALL.**

**Changing the setting on the controller**

If it is installed then the remote panel can be used to program the chiller otherwise remove the front panel of the chiller and open up the electrical box. Take precautions to ensure that none of the electronics or the switching gear can get wet. To change the programming parameters the circuit board will need power so it is recommended that the chiller is switched off using the green ON/OFF button on the front of the chiller.

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.

Water Supply Temperature	
Setting the water supply temperature . Temperature that the refrigeration system with cut out	<ul style="list-style-type: none"> <li>• Scroll through the menu items to PARAMETERS MENU, press OK and then scroll to SET POINTS sub menu and press OK</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> </ul> <p>Press the escape key to revert to home page</p>

Temperature Hysteresis .	
Temperature between refrigeration circuit cut out and cut in  Range 2 to 5 degrees	<ul style="list-style-type: none"> <li>• Scroll through the menu items to PARAMETERS MENU, press OK and then scroll to SET POINTS sub menu and press OK</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>

SERVICE and MAINTENANCE

Compressor Hold Time .	
<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.</p> <p>Range 5- 180 seconds</p>	<ul style="list-style-type: none"> <li>• Scroll through the menu items to PARAMETERS MENU, press OK and then scroll to DEALY/HOLD sub menu and press OK</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> </ul> <p>Press the escape key to revert to home page</p>

Maximum and Minimum Temperature Limits	
<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.</p> <p>Range -5 to 20 Min 10 to 30 Max</p>	<ul style="list-style-type: none"> <li>• Scroll through the menu items to PARAMETERS MENU, press OK and then scroll to SET POINTS sub menu and press OK</li> <li>• Scroll to %PARAMETER MENU+and press %OK+</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>

High and Low Temperature Stop	
<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 through the menu items to PARAMETERS MENU, press OK and then scroll to SYSTEM SETTINGS sub menu and press OK</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+manu 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>

High and Low Temperature Alarm	
<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 through the menu items to PARAMETERS MENU, press OK and then scroll to SET POINTS sub menu and press OK</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>

Setting high pressure (HP) alarms and warnings	
<p>Controller will send out and warning at warning pressure and shut unit down at alarm pressure</p> <p>Range 2000 . 4000 kPa for both</p>	<ul style="list-style-type: none"> <li>• Scroll through the menu items to PARAMETERS MENU, press OK and then scroll to SET POINTS sub menu and press OK</li> <li>• Scroll to %HP Warn Press+</li> <li>• Press %OK+and choices will be shown</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> <li>• Scroll to %PARAMETER MENU+and press %OK+</li> <li>• Scroll to %HP ALM Press+</li> <li>• Press %OK+and choices will be shown</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>

SERVICE and MAINTENANCE

Setting water flow alarms	
<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 through the menu items to PARAMETERS MENU, press OK and then scroll to SET POINTS sub menu and press OK</li> <li>• Scroll to %LOW ALARM 1+for chilled water supply and %LOW 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 %LOW WARNING 1+ for chilled water supply and %LOW 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 auxiliary inputs	
<p>Inputs 17 and 18 can be used as auxiliary fault inputs</p> <p>Option NO and NC</p>	<ul style="list-style-type: none"> <li>• Scroll through the menu items to PARAMETERS MENU, press OK and then scroll to SYSTEM SETTINGS sub menu and press OK</li> <li>• Scroll to %Auxiliary Input N/O latched+</li> <li>• Press %OK+and change to N/O or N/C</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>
Setting fan speed control	
<p>If fan speed controllers are installed the minimum run speed (20%) and max run speed (100%) can be set again corresponding discharge pressures</p>	<ul style="list-style-type: none"> <li>• Scroll through the menu items to PARAMETERS MENU, press OK and then scroll to SET POINTS sub menu and press OK</li> <li>• Scroll to %Fan Min SP Pressure+</li> <li>• Press %OK+and change required pressure</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> <p>The same procedure is followed to set %Fan Max SP pressure+</p> <p>Note . of fan speed controller are being retrofitted to a unit then the fan speed option will have to be activated in the parameters menu.</p>
Setting alarm acknowledge delay	
<p>Inputs 17 and 18 can be used as auxiliary fault inputs</p> <p>Range 0-120 Minutes</p>	<ul style="list-style-type: none"> <li>• Scroll through the menu items to PARAMETERS MENU, press OK and then scroll to DELAY/ HOLD sub menu and press OK</li> <li>• Scroll to %ALM ACK DELAY+</li> <li>• Press %OK+and change to setting</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> <p>It is recommended that the setting is not greater than 1 or 2 minutes</p>

SERVICE and MAINTENANCE

Tandem Installation	
Assigning the chillers into a single or tandem set installation	<ul style="list-style-type: none"> <li>• Scroll through the menu items to PARAMETERS MENU, press OK and then scroll to SYSTEM SETTINGS sub menu and press OK</li> <li>• Scroll to %SINGLE/DUAL AUTO+and press %OK+</li> <li>• Change set up to %DUAL AUTO OPERATION+and press %OK+</li> <li>• The screen will confirm your choice</li> <li>• Press the escape key to revert to home page</li> </ul> <p>NB . This only need be done on the master chiller</p>
Assigning chiller role . Master or Slave	<ul style="list-style-type: none"> <li>• Scroll through the menu items to PARAMETERS MENU, press OK and then scroll to SYSTEM SETTINGS sub menu and press OK</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 press %OK+</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 a ct in tandem . ie 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 to 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+</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>

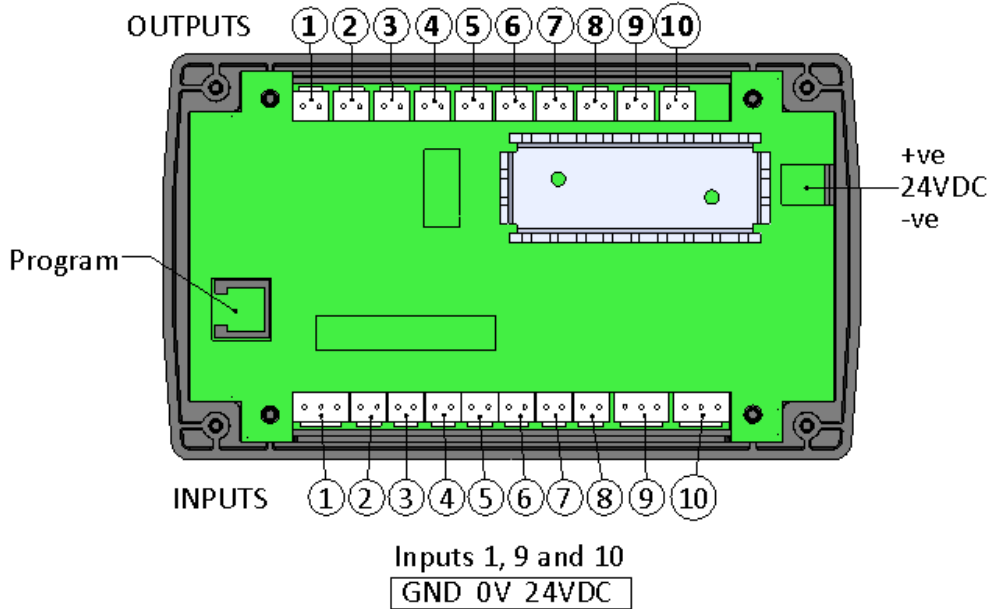
**SERVICE and MAINTENANCE**

**Full Setting List – again 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 at a later time another chiller is installed in tandem or the chiller is added to a multiple chiller set them some of the setting may change.**

PARAMETER MENU			
MENU ITEM	SETTING	MENU ITEM	SETTING
<b>SYSTEM MENU</b>			
SINGLE DUAL/OPN	Single	CLOSE TOLERANCE	OFF
MASTER /SLAVE	MASTER	HIGH TEMP STOP	YES
CYCLE CHANGEOVER	Off	LOW TEMP STOP	YES
NO HE SENSORS	0	VAR SPEED FUNCTION	OFF
AUX INPUTS	N/O	FAN SPEED CONTROL	YES
SNMP DATA	FRACTIONAL	NETWORK CONTROL	OFF
SPRAY COOL	OFF		
<b>EMAIL LOG MENU</b>			
EMAIL ALARM ON/OFF	OFF	MANAGE DATA LOG	OFF
DATA LOG PERIOD	2 MINS		
<b>SET TIME MENU</b>			
TIME ZONE	Set after install	SET DAY OF MONTH	Set after install
SUMMERTIME ON/OFF	Set after install	SET WEEKDAY	Set after install
SET YEAR	Set after install	SET TIME	Set after install
SET MONTH	Set after install		
<b>DELAY HOLD MENU</b>			
ALARM ACK DELAY	30	COMPRESSOR HOLD TIME	120 SECONDS
PUMP DELAY TIME	5 SECS 15 WITH BALL VALVE	COMPRESSOR ON TIME	30
COMPRESSOR OFF TIME	30	HT ACKNOWLEDGE DELAY	30
<b>SET POINT MENU</b>			
PULL DOWN PER MIN	0.6	FAN MIN SP PRESSURE	1500 900 for R134a
TEMPERATYRE HYSTERESIS	2	LP ALARM PRESSURE	200 80 for R134a
CLOSE TOLERANCE TEMP	OFF	LP HYSTERESIS PRESSURE	200 100 for R134a
HIGH TEMPERATURE ALARM	30	FAN MAX SPEED PRESSURE	2200 1600 for R134a
LOW TEMPERATURE ALARM	3	HP ALARM PRESSURE	2750 2200 for R134a
HIGH RETURN ALARM	30	HP WARN PRESSURE	2600 1700 for R134a
LOW RETURN ALARM	3	LP WARNING PRESSURE	300 100 for R134a
MIN TEMP LIMIT	5	FLOW ALARM 1	0.1 l/s
MAX TEMP LIMIT	20	SUPPLY FLOW WARNING 1	0.5 l/s
SET PT AMB OTEMP	45	SET POINT TEMP	CUSTOMER SPECIFIC 5 for testing
<b>SENSOR MENU</b>			
CCT1 SUCT PR SIZE	-5 to 7 BAR Carel 0-10 BAR - Schneider	SUPPLY FLOW PIPE	DN 25
CCT1 DIS PR DISCH PR SIZE	0-30 BAR Carel 0-40 BAR - Schneider	TEMP ALL CAL – 1	SEE PROCEDURE

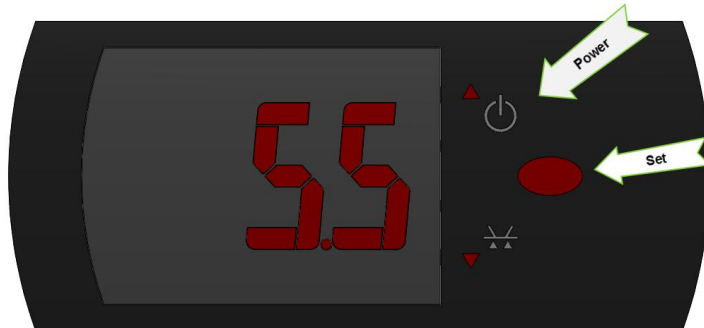
SERVICE and MAINTENANCE

Controller Input and Output Schematic



Connector	Type	Control
<b>Outputs</b> . 1 to 8 across the top of the board  0-10V Output 1 0-10V Output 2	24VDC  0-10 Volt out put 0-10 Volt out put	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 9 Compressor Speed Control 10 Fan speed control
<b>Inputs</b> . 1- 24 across the bottom of the board IN1 IN2 IN3 IN4 IN5 IN6 IN7 IN8 IN9 IN10	0-10V Input 0-10V NC Input 0-10V NC Input 0-10V/ NTC thermistor 0-10V/ NTC thermistor 0-10V/ NTC thermistor 0-10V/ NTC thermistor 0-10V/ NTC thermistor 0-10V NC input 0-10V Inout 0-10V input	Supply Pump Flow Meter Compressor fault input ON/OFF Switch Plate pack safety sensor Ambient temperature sensor Chilled water supply temperature sensor Chilled water return temperature sensor Standby/ Tandem link Suction pressure Discharge pressure

## SERVICE and MAINTENANCE

**Standard Controller Maintenance**

Changing the setting on a standard controller . the standard controller is on the outside of the chiller

1. Hold Power ON/OFF switch for 3 seconds
2. Press Set button for 1 sec to display temp set point
3. Change Set Point (St) to 5 degrees.
4. Hold Set button for 3 seconds to access parameter setting menu
5. To access password parameter (pS) Enter 22
6. Use arrow keys to scroll through parameters.
7. Set Parameters to the values below

r1: Min Set Pt allowed for user : 5°  
r2: Max Set Pt allowed for user: 25°  
r3: Operating Mode: 1 (no defrost)  
rd: set point differential (hysteresis): 2°  
c0: compressor rest time: 2 mins  
d0: defrost setting: 2

8. Press and hold Set button for 5 seconds to save settings and close.

**Changing the filter cartridges**

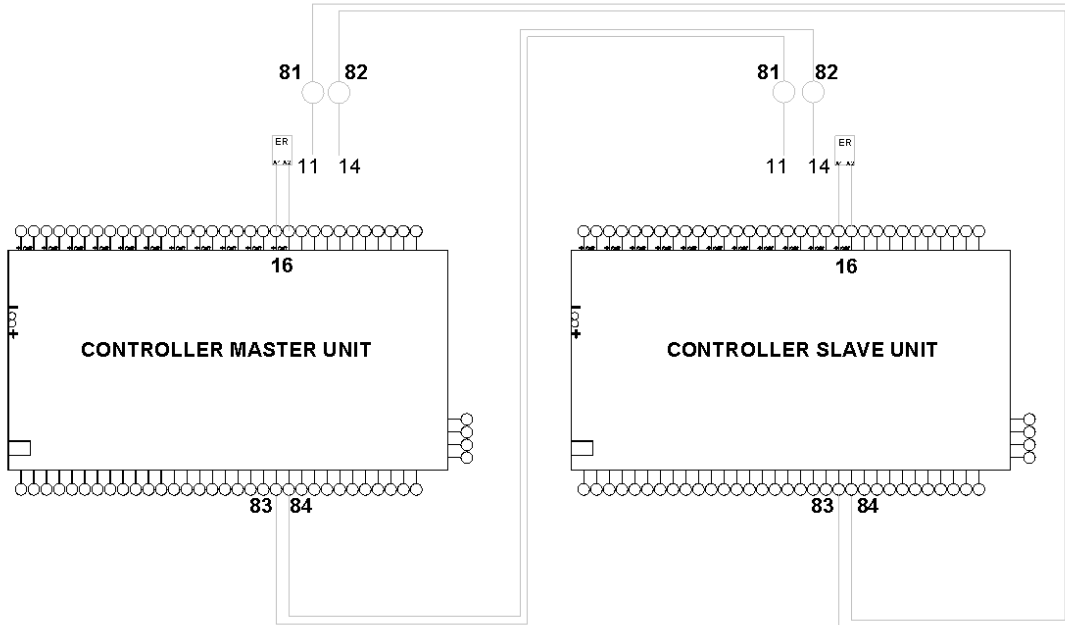
If installed it is recommended that the cartridges be changed every 9 to 12 months.

On the side of the filter there is a two way valve . turn the handle to so it is pointing along the pipe with %FILTER BYPASS+marked on it. Remove the access panel above the filter in the unit lid. In the front of the circlip around the lid of the filter housing there is a button that needs to be depressed before lifting the quick release lever. The lid can now be removed . doing so carefully in case of pressure build up. Lift the old cartridges out through the access hole in the unit lid and replace with new cartridges. Replace the lid on the filter housing and replace the circlip and tighten.

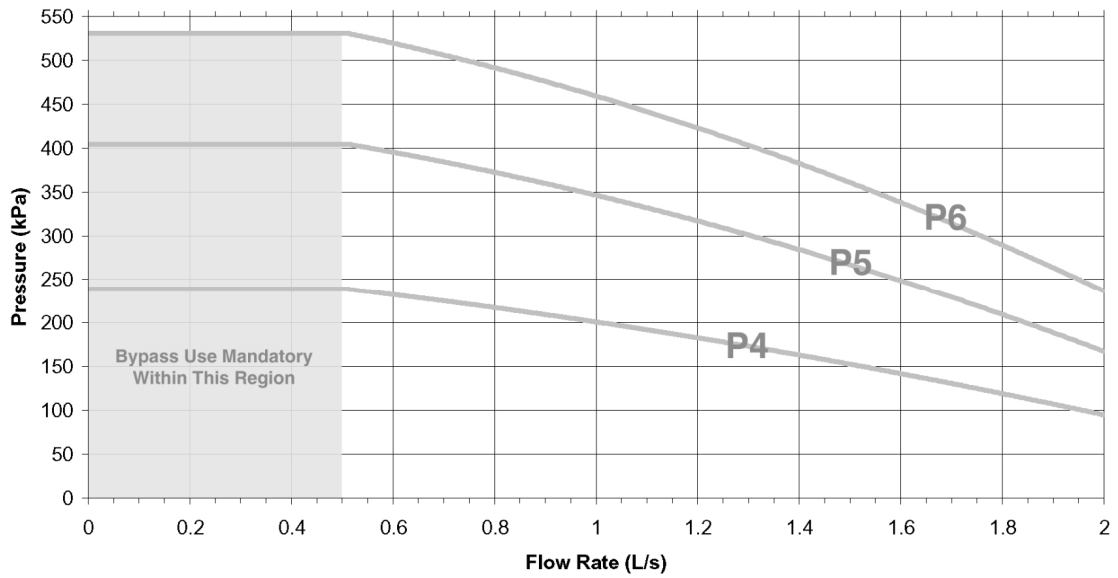
Turn the handle on the bypass ball valve back to the original position and check the system for leaks and check the pressures on the two gauges are similar.

WIRING DIAGRAM . TANDEM INSTALLATION

Available on the MC models only



PUMP CURVES





## CRITICAL SPARE PARTS

Description	Aqua Cooler Part No.
Carel . standard controller - thermostat	z-8705
MC controller P264	C-201
Compressor .	z-9013-1
TX valve	z-9083
Drier	z-9117
Sight glass	z-9122
Contactora 9A	z-9301
Contactora 12 A	z-9302
Thermal overload 1.2 to 1.8A	z-9316
Thermal overload 8-11A	z-9321
Phase failure relay	z-9345
8A Enable relay	z-9346
Fans	z-9752

## DATA SHEETS

## Fan Data Sheet

<http://img.ebmpapst.com/products/datasheets/W6D800GO0101-ENG.pdf>

## Compressor data sheet

<http://doc.3c-e.com/danfoss/odsg/pdf/FRCC-UD-100115-041841.pdf>

## Pump data sheet

<http://www.lowara.com/lowdata/doc/EN/ceaca-td-en.pdf>

## Flow meter data sheet

[http://www.burkert.com.au/products\\_data/datasheets/DSS030-Standard-EU-EN.pdf](http://www.burkert.com.au/products_data/datasheets/DSS030-Standard-EU-EN.pdf)

TROUBLE SHOOTING and WORK METHODS

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 See below for installation <a href="http://www.lowara.com/lowdata/doc/ml/surface-im-xx.pdf">http://www.lowara.com/lowdata/doc/ml/surface-im-xx.pdf</a> See below for technical data
	Blocked plate heat exchanger	Isolate the chiller and attempt to back flow through the plate pack Replace if the plate pack has become chronically blocked See below for data sheet Faulty electrical contactors . 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
		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
	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.
Work Around	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. <ul style="list-style-type: none"> <li>• On the screen go to %PARAMETERS MENU+and press %OK+</li> <li>• Scroll to SWITCH ON FOR NEXT C+. %TIMER+should be showing underneath this. Press %OK+and scroll to %FIXED HEAT LOAD+and press %OK+</li> <li>• The screen should confirm your choice</li> </ul>	

WIRING DIAGRAM

A wiring diagram unique to the chiller will be in the electrical box with this manual . if it has not been provided please contact Aqua Cooler to organise a copy.

<b>Legend for component marking in the electrical box/ wiring diagram</b>			
CTOL	Compressor Thermal Overload	C	Compressor contactor
CER	Compressor enable relay	P	Pump contactor
PER	Pump enable relay	F	Fan contactor
FER	Fan enable relay	FVSD	Fan variable speed drive
HGBV	Hot gas bypass valve relay	PTOL	Pump thermal overload
FTOL	Fan thermal overload	MPM	Motor protection module
FSC	Fan speed controller	CSS	Compressor soft starter
CB	Circuit breaker	TSTAT	Thermostat
FMCB	Fan motor circuit breaker	CMCB	Compressor motor circuit breaker
PF	Phase failure relay	LP	Low pressure switch
HP	High pressure switch	ER	Enable relay
PMCB	Pump motor circuit breaker	PVSD	Pump variable speed drive

**RELEASE NOTES**
**Software Release**

Revision	Date	Description
B	01/01/12	Software to version P264_32-E00_010 Network control improved PID control of VSD on compressor improved Keypad lock added as an option
C	06/03/12	Software to version P264_32_EB0_011 Bacnet and Modbus stacks added to controller
D	25/04/12	Software to version P264_56_E00_012 - Option to keep secondary pumps running for single chiller - Option to flash or steady fault output - Add pump delay time for alarm low flow before pump switch off - Pump Run-on except for ON/Off manual control - XML reminder only for updates, not new installs - Fixed compressor fault timer wrap issue
E	31/05/12	Software to version P264_56_EB0_013 - Upgraded to TCPIP stack V5.41 - LOCAL_RUN_OID corrected - Supply and Return water temp alarm min values to -15 deg - Reset some PSET_xxx default values - Email Trigger on Log Time - SPIFlash() driver test for ID - PIC32 Chip ID in S/W version (EB4 = PIC32MX460F512 and EB6 = PIC32MX695F512)
F	26/10/12	Chiller firmware P264_64_EB4_014 for New P264 Board  - Time corrected 1 day error - Added slow warnings on LCD - Other As per P243 V1.42 - Added PSET_VSD option #3 = SCROLL DGT inverse compressor output 0-10V - Scroll not inverse output - normal 0 - 10V for 0 to 100%
Not released	09/01/13	Chiller firmware P264_64_EB4_015 for New P264 Board  - Added Light Load Adapt - Compressor cycle period < 3 x Rest time then +/- Hyst/2 - - Added FAN early OFF for Discharge pressure < Low set pt -
G	07/02/13	Chiller firmware P264_64_EB4_016 for New P264 Board  - Removed 12% error on 4-20mA inputs  - Fast pull down last compressor temp + HYST/2 - Light load adapt only high side and always ON
H	01/04/13	Chiller firmware P264_64_EB4_017  - Add Spray Cool Temp no Compressor option - Add PSET_RCUE for UART11 connection to and shutdown if remote RCU fails - Add web pump run on time display - Added Remote RCU Dewpoint Difference action from RCU
I	10/09/13	Chiller firmware P264_64_EB04_204  - Add Unloading feature - Add LP Protection via Hot Gas - Add HP protection via Hot Gas - Make Spray Cool Output configurable on output 2 6 7 or 8, - Reduce Min Protection High Pressure to 1400kPa

RELEASE NOTES

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**Hardware Release**

Revision	Date	Description
C	06/03/12	Low voltage switching gear introduced in MC models
F	01/06/12	Lordan coils introduced across the range Schneider pressure transducers introduced
G	10/12/12	Bathtub style condenser mounting introduced with new coil Gauges removed front panel . high and low access added to brass bracket

COMMISSIONING

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

<b>Isolate power to the chiller</b> and access the electrical box and check all wiring is tight.		
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COMMISSIONING


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Water Connection

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

Start Up

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

After adding power to the chiller, change the water temperature setting and all other alarms to customer or site needs		
After chiller has started check and note down the current draw for the compressors, pump and fans Pump < 6 amps Compressors < 28 amps Fans < 8 amps		
Note down the water flow reading Should be ~ 2 l/s		
Note down pump pressure		
Check the sight glass for evidence of bubbles or moisture		
Check that water temperature is dropping		
Note down the oil level on the compressor sight glass		
Adjust the bypass valve to suit customer and/ or site needs		
Fit gauges and note down running pressures on the chiller		

COMMISSIONING

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Tandem Installation Checks

On the master chiller set the cycle time to 10 minute test and after 10 minutes check that the chillers duty cycle.		
Fault the running chiller and check the other chiller starts and vis-a-versa		

Finishing Off

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

**Notes**



SITE INSPECTION

<b>Proposed Chiller Model:</b>		<b>Date Inspected:</b>	
		<b>Inspected By:</b>	
		<b>Company:</b>	
		<b>Contact Number:</b>	

Business Name Of Installation Site:	
Installation Site Street Address:	
Installation Site Phone Number:	
Installation Site Facsimile Number:	
Installation Site Contact Name:	
Installation Site Contact Position:	
Access Limitations: Any issues relating to service access including after hours access, induction course requirements, hot works permits, confined spaces, safety harness requirements	
Equipment Serviced By Chiller:	

SITE INSPECTION

**Chiller Installation – Clearances**

*Mark out any condensing units or other possible heat sources that may effect the operation of the proposed chiller installation  
Highlight any walls/fixtures/items that encroach on the clearances required for the chiller installation.*

Insert Drawing and photo of site here:

<b>Minimum Space Requirements:</b>		
Chiller Model	Actual Foot print	Space Required around chiller.
R Series I	975L x 590W x 1060H	600(E) x 2000(H)
R Series II	975L x 590W x 1060H 1495L x 790W x 1340H	800(E) x 2000(H) 800(E) x 2000(H)
R Series III & T Series	2015L x 860W x 1545H	800(E) x 2000(H)
R3000	2585(L) x 1400(W) x 1830(H)	1000(E) x 2000(H)
R3000 Condensing Unit	2135(L) x 1400(W) x 1680(H)	1000(E) x 2000(H)
R3000 Refrigeration Unit	1200(L) x 970(W) x 1510(H)	600(E) x 2000(H)
H Series	2020(L) x 1610(W) x 1600(H)	1000(E) x 2000(H)
L Series	2010(L) x 1780(W) x 1600(H)	1000(E) x 2000(H)

<b>Chiller Installation - Continued</b>			
Isolation Switch:	YES/NO	Drainage Provided:	YES/NO

SITE INSPECTION

<b>Chiller Water Circuit Requirements</b>			
Notes:			
Pipe Size:		Pipe Insulation:	
Length:		Height Difference:	
Balancing Valve:	YES/NO	Isolation Valves:	YES/NO
Water Treatment:	YES/NO	Make Up Water:	YES/NO
Treatment Used:			
Supply Pressure:		Flow Rate:	
Pressure Tap Points:	YES/NO	In Line Filtration:	YES/NO

<b>Remote Condenser Requirements</b>			
Notes:			
Pipe Size:		Pipe Insulation:	
Length:		Height Difference:	



PREVENTATIVE MAINTENANCE

<b>Model:</b>		<b>Date Serviced:</b>	
<b>Serial Number:</b>		<b>Serviced By:</b>	
		<b>Company:</b>	
		<b>Contact Number:</b>	

Business Name Of Installation Site:	
Installation Site Street Address:	
Installation Site Phone Number:	
Installation Site Facsimile Number:	
Installation Site Contact Name:	
Installation Site Contact Position:	

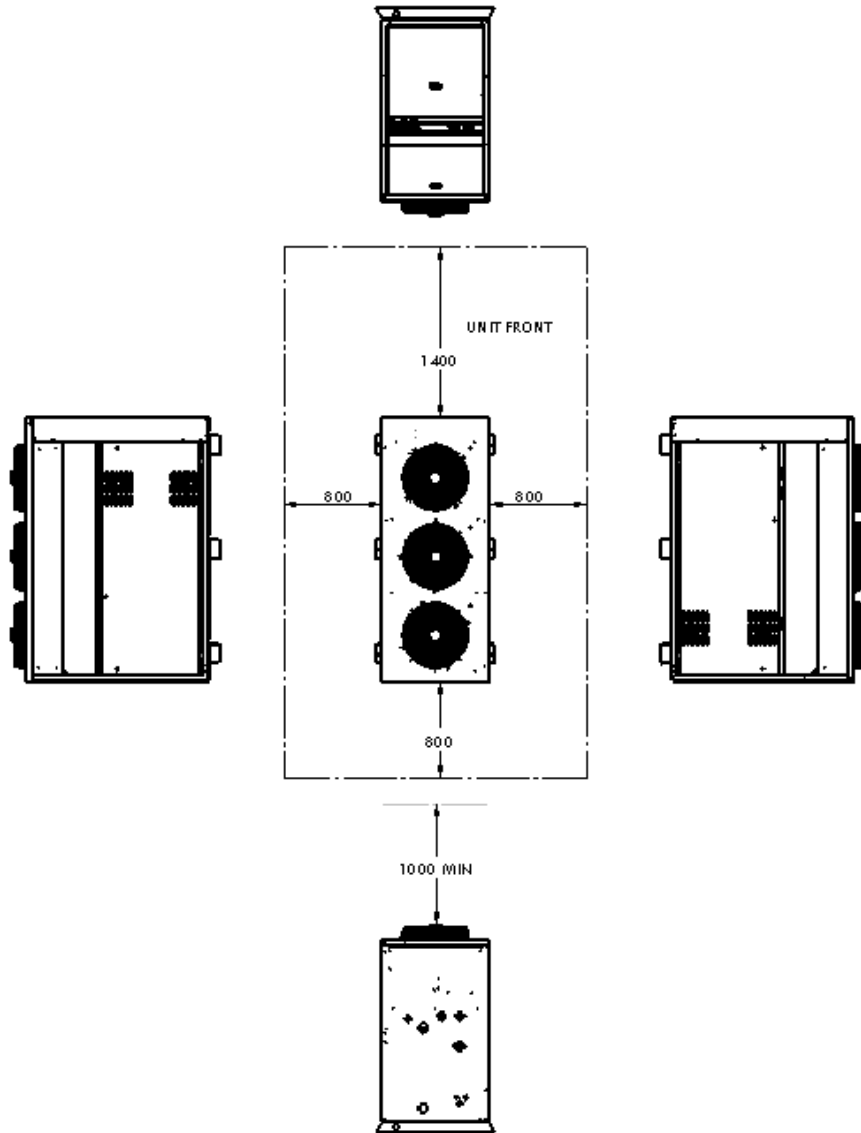
Access Limitations: Any issues relating to service access including after hours access, induction course requirements, hot works permits, confined spaces, safety harness requirements	

Equipment Serviced By Chiller:	

PREVENTATIVE MAINTENANCE

**Chiller Installation - Clearances**

*Mark out any external physical damage, including evidence of rust, on the image below. Highlight any loose or missing screws and identify any walls/fixtures/items that encroach on the clearances detailed.*



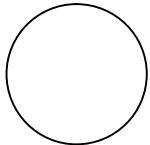
Notes:


PREVENTATIVE MAINTENANCE

<p><b>Chiller Installation – Refrigeration/Water Circuit</b></p> <p><i>Cross out any answers that are inapplicable</i></p>
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<b>Inspect Evaporator/Water Circuit</b>			
Evaporator Leak:	YES/NO	If Yes Where: <i>(Tick where applicable)</i>	<input type="checkbox"/> Distributor <input type="checkbox"/> Distributor Line(s) <input type="checkbox"/> Header <input type="checkbox"/> Coil(s)/ Plate Pack <input type="checkbox"/> Tx Valve <input type="checkbox"/> Other
Evaporator Notes:	<div style="border-bottom: 1px solid black; height: 15px; width: 100%;"></div> <div style="border-bottom: 1px solid black; height: 15px; width: 100%;"></div>		
Float Operation: <i>(Tick where applicable)</i>	<input type="checkbox"/> OK . Shuts Off <input type="checkbox"/> Will Not Shut Off <input type="checkbox"/> Damaged	Water Quality: <i>(Tick where applicable)</i>	<input type="checkbox"/> Clean <input type="checkbox"/> Cloudy/Dirty <input type="checkbox"/> Oil Residue <input type="checkbox"/> Surface Scum
Water Circuit Notes:	<div style="border-bottom: 1px solid black; height: 15px; width: 100%;"></div> <div style="border-bottom: 1px solid black; height: 15px; width: 100%;"></div>		

<i>Check Operational Indicators At Front Of Chiller</i>			
Water Pressure:	kPa	Temp Set Point:	°C
Flow rate:	l/s		

<b>Remove Front Cover And Inspect Refrigeration Circuit</b>			
Oil Residue:	<input type="checkbox"/> None <input type="checkbox"/> Suction Rotolok <input type="checkbox"/> Discharge Rotolok <input type="checkbox"/> Receiver Inlet <input type="checkbox"/> Receiver Outlet <input type="checkbox"/> Other	Oil Level: <i>(Draw Level)</i>	
Refrigeration Notes:	<div style="border-bottom: 1px solid black; height: 15px; width: 100%;"></div> <div style="border-bottom: 1px solid black; height: 15px; width: 100%;"></div>		

PREVENTATIVE MAINTENANCE

**Tighten Electrical Terminals**

*Ensure customer has no objections to the chiller being completely turned off at the isolating switch*

Notes:	

**Refrigeration Operation**

*Ensure water temperature is within 2 °C of the setpoint prior to recording readings*

<b>Connect Pressure Gauges To Suction and Discharge Lines</b>			
Ambient Temp:	°C	Water Temp:	°C
Suction Pressure:	kPa	Discharge Pressure:	kPa
Fans Operational:	Front Only / Both	Sight Glass: (Tick where applicable)	<input type="checkbox"/> Full <input type="checkbox"/> Occasional Bubbles <input type="checkbox"/> Continuous Bubbling <input type="checkbox"/> Dry (Green) <input type="checkbox"/> Wet (Yellow)

<b>Measure Phase Voltages At Circuit Breaker</b>						
Compressor Amps:	(Red)	A	(White)	A	(Blue)	A
Fan Amps:	(Red)	A	(White)	A	(Blue)	A
Pump Amps:	(Red)	A	(White)	A	(Blue)	A
Voltage Levels:	(Red- White)	V	(Red- Blue)	V	(White- Blue)	V



**PREVENTATIVE MAINTENANCE**

PARAMETER MENU					
MENU ITEM	SETTING	ACTUAL	MENU ITEM	SETTING	ACTUAL
SYSTEM MENU					
SINGLE DUAL/OPN	Single		CLOSE TOLERANCE	OFF	
MASTER /SLAVE	MASTER		HIGH TEMP STOP	YES	
CYCLE CHANGEOVER	Off		LOW TEMP STOP	YES	
NO HE SENSORS	0		VAR SPEED FUNCTION	OFF	
AUX INPUTS	N/O		FAN SPEED CONTROL	YES	
SNMP DATA	FRACTION AL		NETWORK CONTROL	OFF	
SPRAY COOL	OFF				
EMAIL LOG MENU					
EMAIL ALARM ON/OFF	OFF		MANAGE DATA LOG	OFF	
DATA LOG PERIOD	2 MINS				
SET TIME MENU					
TIME ZONE	Set after install		SET DAY OF MONTH	Set after install	
SUMMERTIME ON/OFF	Set after install		SET WEEKDAY	Set after install	
SET YEAR	Set after install		SET TIME	Set after install	
SET MONTH	Set after install				
DELAY HOLD MENU					
ALARM ACK DELAY	30		COMPRESSOR HOLD TIME	120 SECS	
PUMP DELAY TIME	5 SECS 15 WITH BALL VALVE		COMPRESSOR ON TIME	30	
COMPRESSOR OFF TIME	30		HT ACKNOWLEDGE DELAY	30	
SET POINT MENU					
PULL DOWN PER MIN	0.6		FAN MIN SP PRESSURE	1500	900 for R134a
TEMPERATYRE HYSTERESIS	2		LP ALARM PRESSURE	200	80 for R134a
CLOSE TOLERANCE TEMP	OFF		LP HYSTERESIS PRESSURE	200	100 for R134a
HIGH TEMPERATURE ALARM	30		FAN MAX SPEED PRESSURE	2200	1600 for R134a
LOW TEMPERATURE ALARM	3		HP ALARM PRESSURE	2750	2200 for R134a
HIGH RETURN ALARM	30		HP WARN PRESSURE	2600	1700 for R134a
LOW RETURN ALARM	3		LP WARNING PRESSURE	300	100 for R134a
MIN TEMP LIMIT	5		FLOW ALARM 1	0.1 l/s	
MAX TEMP LIMIT	20		SUPPLY FLOW WARNING 1	0.5 l/s	
SET PT AMB OTEMP	45		SET POINT TEMP	CUSTOMER SPECIFIC 5 for testing	
SENSOR MENU					
CCT1 SUCT PR SIZE	-.5 to 7 BAR Carel 0-10 BAR - Schneider		SUPPLY FLOW PIPE	DN 25	
CCT1 DIS PR DISCH PR SIZE	0-30 BAR Carel 0-40 BAR - Schneider		TEMP ALL CAL – 1	SEE PROCEDURE	

PREVENTATIVE MAINTENANCE

<p><b>Cleaning</b></p> <p><i>Ensure customer has no objections to the chiller being completely turned off at the isolating switch</i></p>
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<i>Remove Condenser Side Covers – Wear Safety Glasses When Blowing Out Condenser With Compressed Gas</i>	
Notes:	

<p><b>General Notes/Feedback</b></p>

<p><b>Completion</b></p>		
<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>		
Signature Of Service Agent	Print Name	Date
Signature Of Customer Representative	Print Name	Date

<p><b>Filing – Aqua Cooler</b></p>		
Signature	Print Name	Date Of Entry
Specify Follow Up Work Required:		