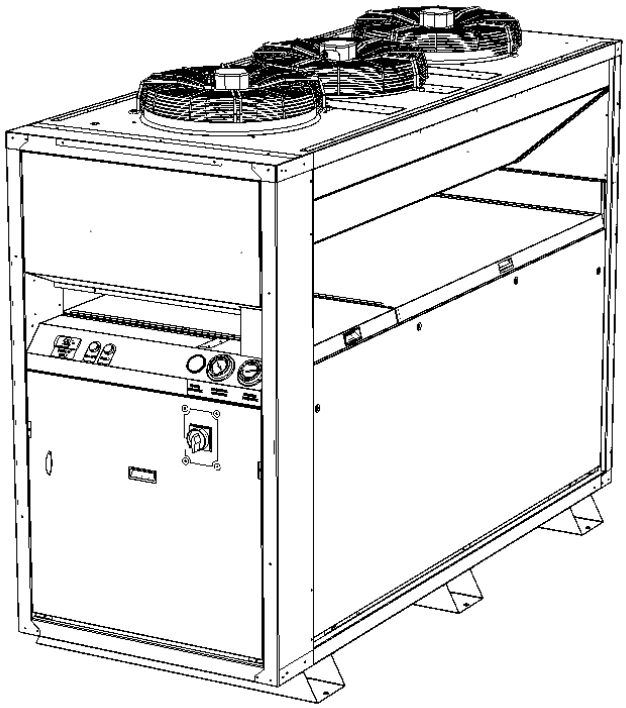
Aqua Cooler Pty Limited

# PRODUCT MANUAL

## RTC and RETC WATER CHILLER
## RTC24 to RTC40
## 001-D132 ISS E



## Terms and Conditions

**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 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 Coolerôs 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 the 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 un-authorised 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

# RTC Manual

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

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

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SAFETY

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 problems with the evaporator icing up and potentially loss of refrigerant

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

First Aid

- Eye Contact. Immediately flush with tepid water or sterile saline solution. Hold eyelids apart for 15 minutes while irrigating. Seek medical attention.
- Inhalation. Remove from area of exposure immediately and if you are assisting a victim avoid being exposed. Breathing apparatus must be worn in the presence of high concentration of refrigerants. If victim is not breathing then apply artificial respiration and seek urgent medical help. Give oxygen is available.
- Skin Contact. Cold Burns. Remove contaminated clothing and gently flush affected area with warm water (30C) for 15 minutes. Apply sterile dressing and treat as for a thermal burn. For large burns immerse in water for 15 minutes. DO NOT apply any form if direct heat. Seek medical attention.
- Ingestion. For advice contact the poisons centre on 131126 in Australia. If swallowed do not induce vomiting. Ingestion is considered unlikely due to product form.
- Advice to Doctor. Use of adrenaline and other catacholamines may be contraindicted due to possible cardiac sensation. Treatment for asphyxia.

R407 HazChem code 2RE

R407 is non ï flammable.

Disposal

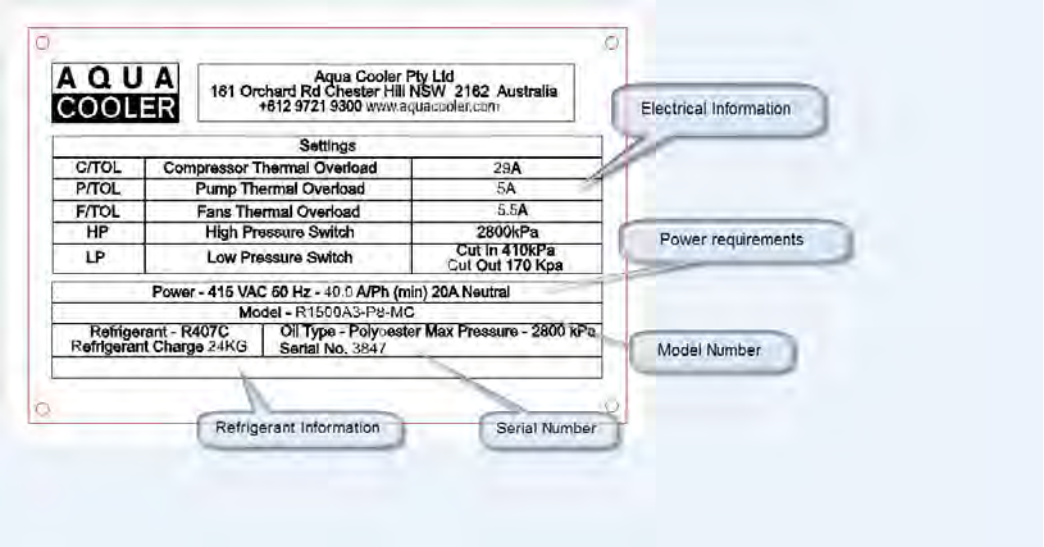
The unit must be disposed of in a proper fashion. The refrigerants in the system must be reclaimed by a qualified refrigeration mechanic and disposed of in accordance with the statutory requirements. The compressor contains oil that must not be dumped.

Manual Handling

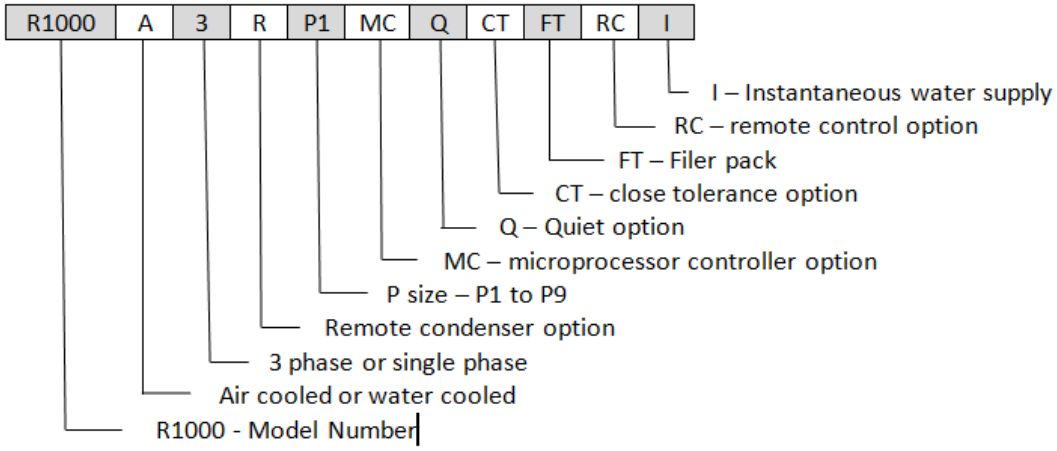
The unit weights approximately 650 kg. Do not try to move the unit manually. The unit can be lifted with a crane (the centre of gravity is towards the front of the unit), a forklift or a pallet jack.

MARKING

The unit will have on it various markings. There is a marking plate on the unit, an example is 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.




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 below outlined the available options




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 ï 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

The chiller is designed to refrigerate and circulate water to a heat developing process to aid in keeping that process cool. The chillers evaporator can either be an immersed copper coil, an immersed plate heat exchanger or a plate heat exchanger mounted external to the buffer tank for closed loop applications. The chiller has an air cooled condenser for heat rejection and two scroll compressor to circulate the refrigerant gas. The chiller has two refrigeration circuits which share the heat load but can also run independently to offer short term redundancy should a fault occur in one circuit. Water is circulated out of the unit via a pump. The chiller has a high end microprocessor controller to control all aspects of the chillers operation and offer an efficient use of the systems embedded in the chiller.

## INTENDED USE

The chiller is design to be installed outdoors and refrigerate water for a heat developing process ï not for drinking or food preparation purposes. Any other use of this water chiller is a not as it is intended.

CHILLED WATER CIRCUIT

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

The chilled water circuit consists of

1. Plate heat exchanger
2. Flow meter
3. One way valve ï if ordered
4. Pump
5. Motorised Ball Valve ï if ordered
6. Expansion tank ï for closed loop systems
7. Pressure relief valve ï feeds to drain in closed loop system
8. Filter pack ï if ordered ï 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

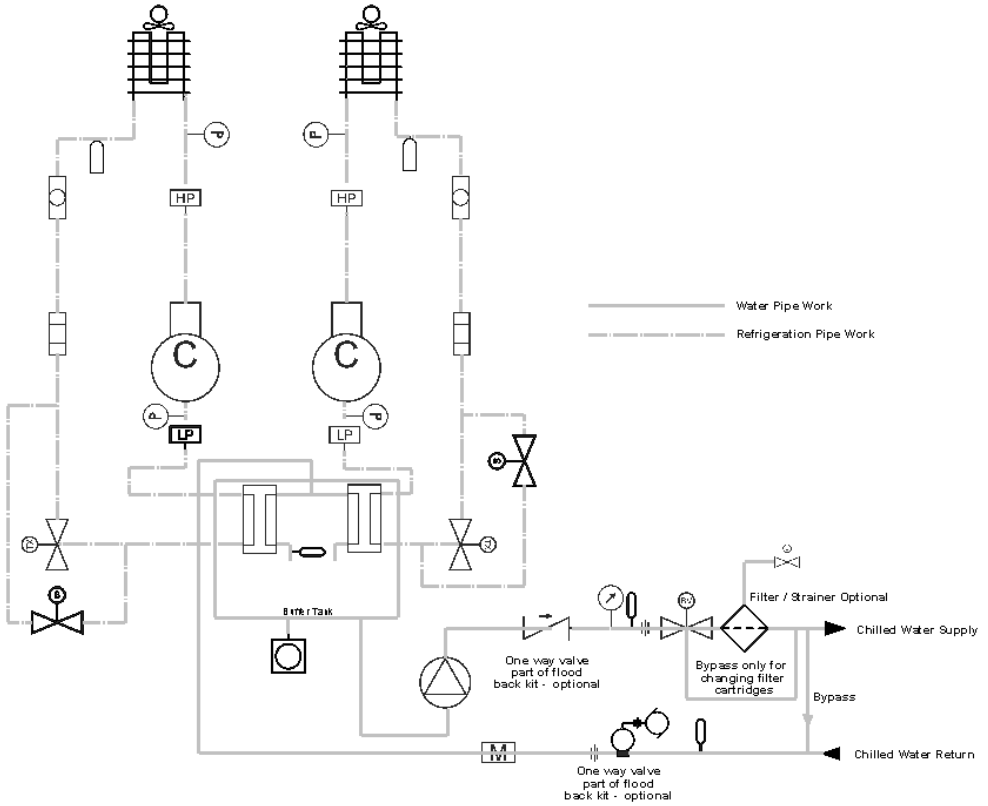
| TECHNICAL DATA | | | | |
|---|---|---|---|---|
| | | RTC24 | RTC26 | RTC40 |
| Compressor horsepower | hp | 2 x 12 | 2 x 13.3 | 2 x 20 |
| Cooling capacity at 5° supply[1] | kW | 35 | 36.4 | 45 |
| Cooling capacity at 10° supply | | 42.4 | 48.8 | 55 |
| Cooling capacity at 15° supply | | 50.4 | 56.8 | N/A |
| Tank holding capacity | L | 300 | | |
| No. Of compressors | | 2 | | |
| Compressor type | | Scroll | | |
| No. of Fans | | 3 | | |
| No. Pumps | | 1 | | |
| Dry weight | kg | 620 | 650 | 700 |
| Power requirements – 3 phase | | 415V 50 Hz 3 phase plus neutral (4A Max) | | |
| Noise Rating | dB @ 1m<br>dB @ 5m | Front 75 Side 76.5<br>Front 74 Side 75.4 | | |
| Maximum current draw – 3 phase | A | 58.5 | | 100 |
| 1. Based on operation within a 45° ambient. Increase cooling capacity by 20% for operation within a 35° ambient | | | | 2. |

| Construction | |
|---|---|
| Chassis Construction: | Power Coated Galvanised Steel Frame with powder coated steel panels |
| Water Connections: | Supply/ Return 1 1/2" Female BSP<br>Make up water – 1/2" female BSP<br>Drain 2" female BSP |

| Power Data | |
|---|---|
| Power Requirements: | 415V 50Hz 3 Phase Plus Neutral (4A Max) |
| P7 Pump power consumption - kW<br>P8 Pump power consumption – kW | 2.2 |
| Fan Power Consumption Each | .79 kW |
| Lock Rotor Amps – Compressor | 175A |

| Refrigerant Charge – Kg – per circuit | | |
|---|---|---|
| Model / Evaporator Type | R407c/ R134a | |
| RTC24 | 13 | |
| RTC26 | 7 | |
| RTC40 | N/A | 12 |
| Note- these are a guide only –re-charging the system should only be carried out by a qualified refrigeration mechanic | | |

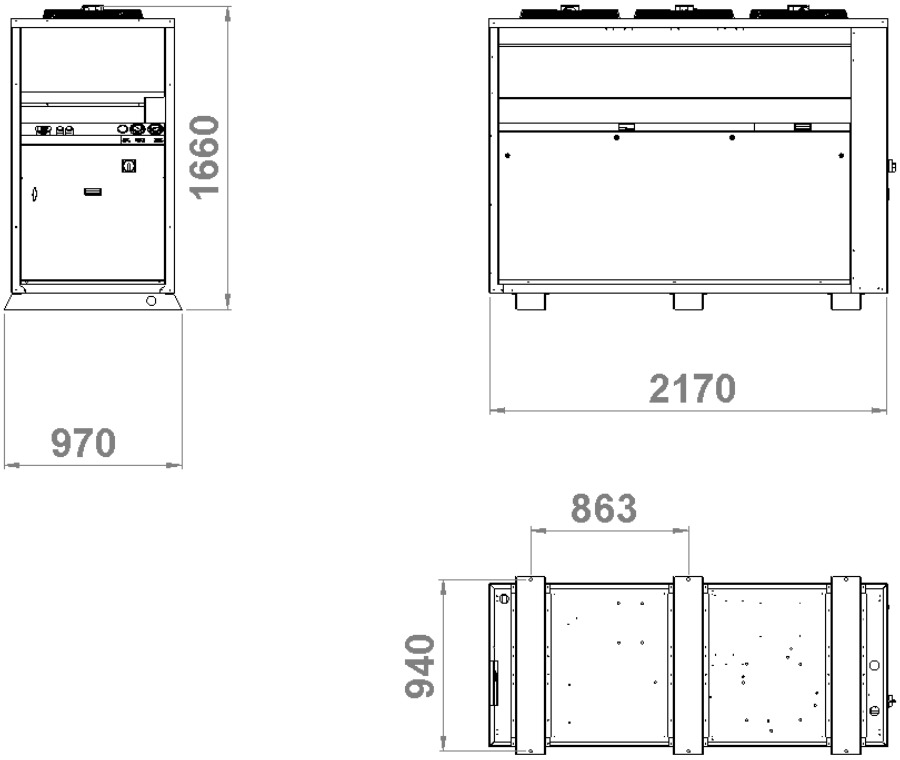
COOLING SYSTEM SCHEMATIC



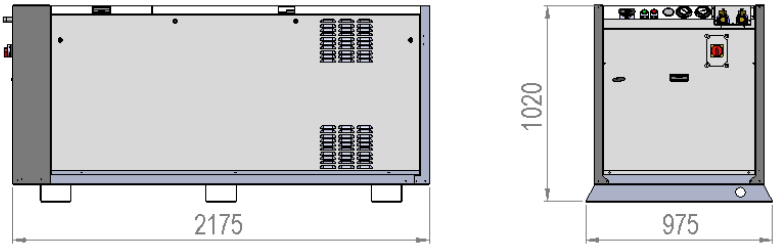

| | | | | | |
|---|---|---|---|---|---|
| | Liquid receiver | | Air Cooled Condenser | | Pressure transducer |
| | Pump | | One way valve | | Ball valve |
| | Compressor | | TX valve | | Flow meter |
| | Sight glass | | Drier | | Pressure gauge |
| | Low pressure switch | | Drain | | Thermowell |
| | 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

Standard Chiller




Remote Condenser Chiller with buffer tank



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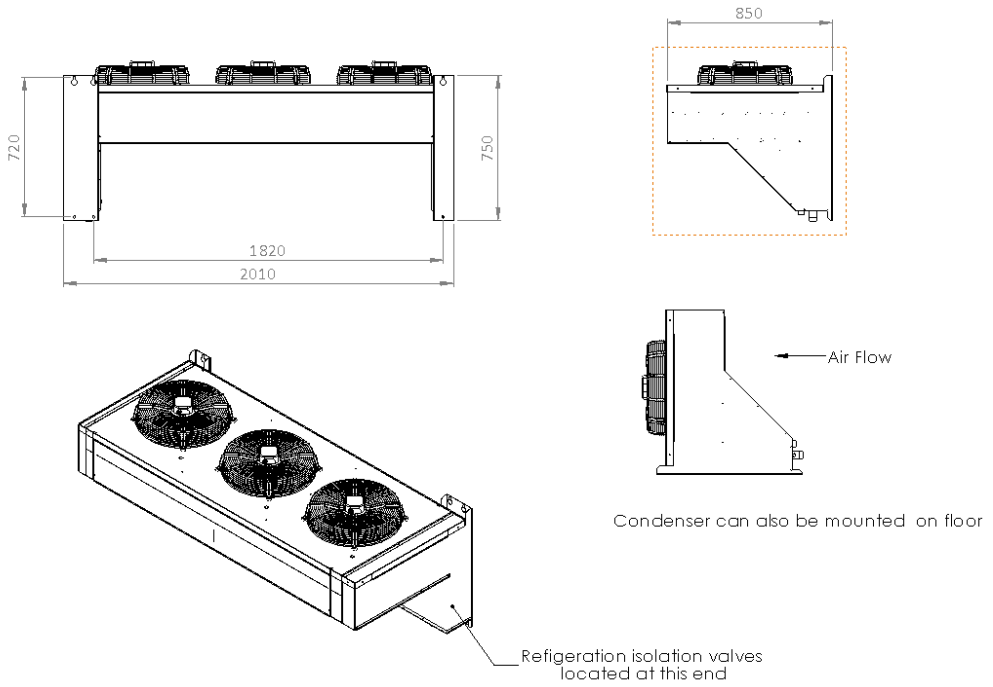
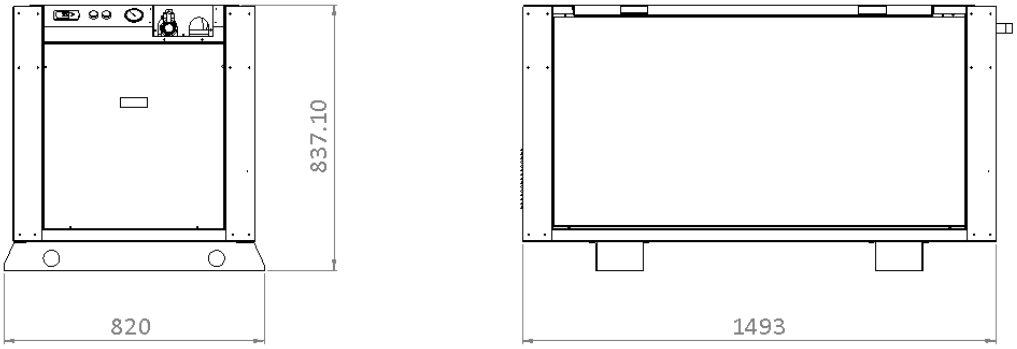



Compact Chiller ï no buffer tank ï Model RTDPC25



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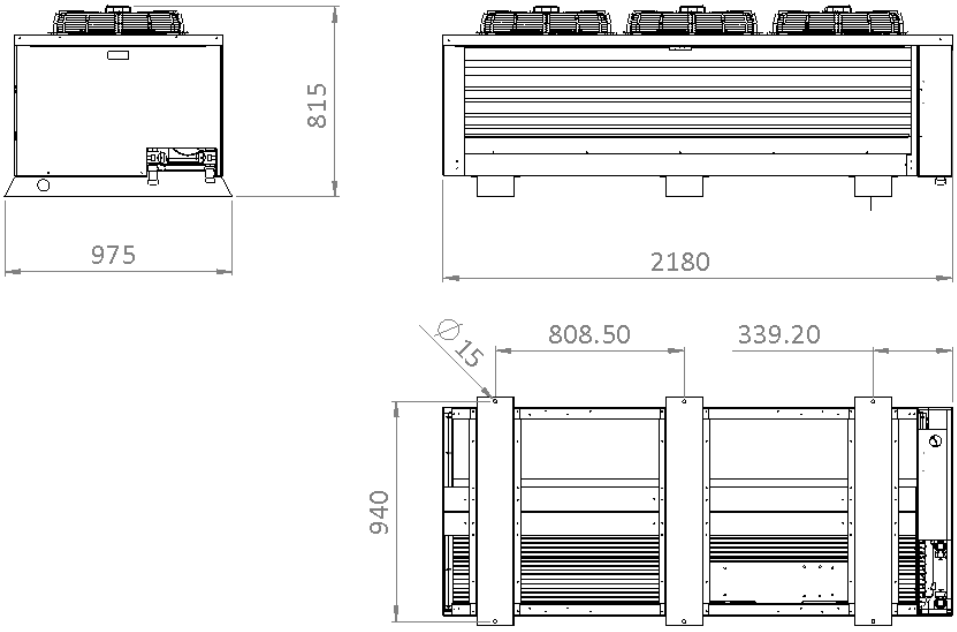



TRANSPORT AND STORAGE

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 carrierôs delivery documents. It is the consigneeôs 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.

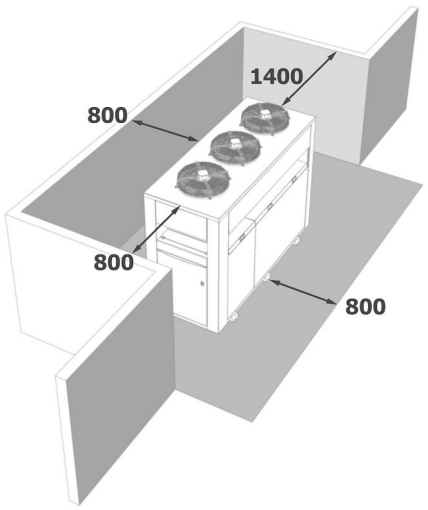
The unit has been designed to be lifted with a forklift or a crane. The standard unit is heavier towards the front looking at the chiller side on and care must be taken when lifting with a crane that the strapping does not damage the side panels. The remote condenser unit can be lifted along its centre line in both directions. The units are also designed to be moved around with a pallet jack.

INSTALLATION

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.

The water fittings are on the standard unit are at the rear of the unit ï 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.

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




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

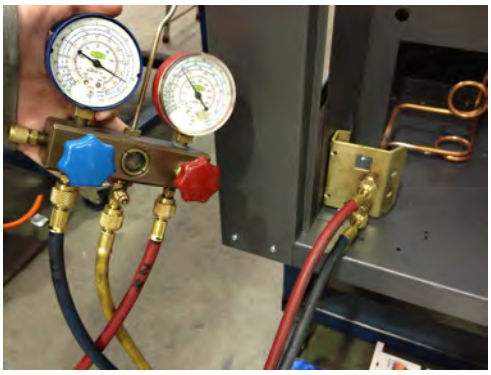
When installing indoors it is important to understand that the chiller will impart a significant heat load into the environment and it is essential to ensure a plentiful, unrestricted supply of ambient temperature air to the chiller. Should you have concerns over the installation site then please contact Aqua Cooler for advice.
Note: Under no circumstances is ducting to be attached to the condenser fan outlet.

This chiller has been designed to draw air from each side and to exhaust vertically through the top of the unit. 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 chillerôs full operating weight.

**Installation of the Water Path**

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

**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.**

On the rear of the standard and the remote unit with the buffer tank 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 fitting are 1 ½ò 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 also mounted on this bracket and is designed to be used with ½ò female BSP. 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.

**Electrical Installation**

**The electrical supply to the chiller must only be installed by a qualified electrician.**

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

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

INSTALLATION

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

A suitable isolating switch should be mounted close to and within direct line of sight of the chiller into which the power cable can be terminated. Ensure that the isolating switch is easily accessible once the chiller is in place. Ensure that the cable run does not exceed 7 metres. 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 and the compressor rely on correct phase rotation.

The cable will need to be run through the marked access point in the base of the chiller and into the electrical box through the gland in the base of the box. In the electrical box terminals will be provided to wire in the power cable.

The power supply cable can be fed through the marked access hole at the rear of the chiller or through the marked access hole in the base of the chiller under the electrical box and into the electrical enclosure through the gland provided. Ensure the phases are match with the cables installed. The holes in the chillers feet are designed to aid in cable management.


After installation the electrical box should be shut properly to ensure the water ingress rating are maintained. Ensure that the cable is free of hot spots and sharp edges.

Ensure all electrical connections are tight prior to start up.

Power should be provided to the unit for as long as possible ï minimum of three hours ï 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.

**Remote Monitoring and Control Panel – only available with MC models only**

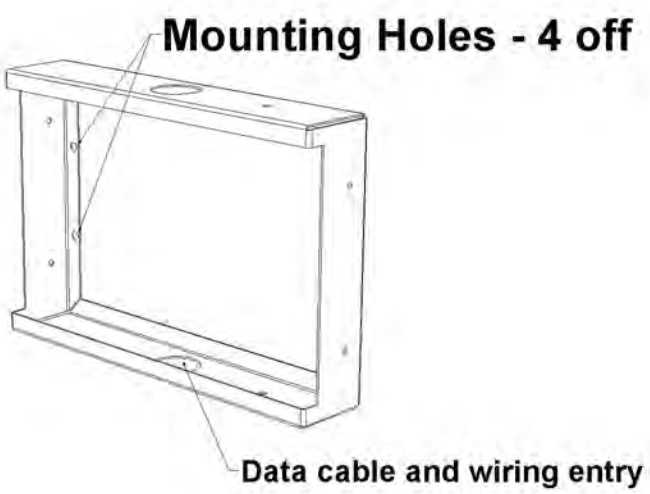
The chiller can be supplied with a remote panel designed to be mounted in the area near the process to monitor the operation of the chiller. There are two styles ï a higher level display with a LCD screen to show chiller function or a low level display with a run and a fault light only. Some details 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 10/11 and the terminals for the master run light are 12/13 ï both will be marked on the wiring diagram.

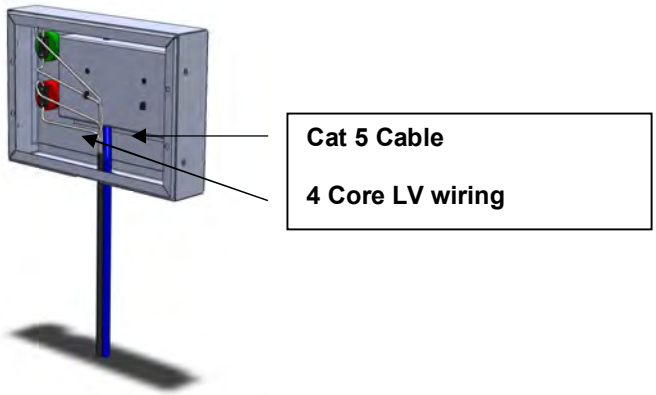
Both can also be installed with an ON/OFF switch and the wiring diagram will show the wiring location for this as well. This must be specified at time of order.

**Installing the Display Panel with LCD System Status Readout – only available with smart controller**

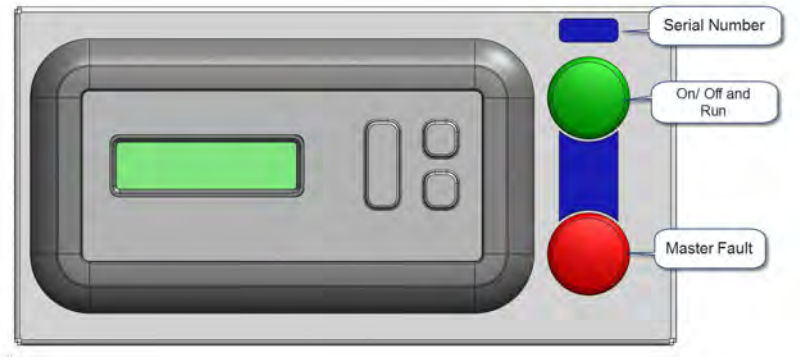
A CAT5 cable will need to be run from the chiller to the room with the process. The remote display comes in two halves and the rear plate will need to be mounted to the wall via the 4 mounting holes shown on the diagram.




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 ï 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.




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.


**Customising the High Level – Web Based – Interface – only available with smart (MC Models) controller**

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 other wise 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.

INSTALLATION

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
- Open a browser and enter http://10.1.1.130:8076
- Go to the ñStatusò page and log in using ñtechcoolerò as user name and ñtechwaterò 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 ñAdvancedò tab on the home page and then ñNetworkò tab on the left hand side. Put ñaquaipconfigò into the password page and un-tick the ñDHCPò enable tab. This will allow the loading of the site specific IP address.
- To load in email addresses go to the ñEmailò tab on the left hand side and use the password ñaquaemailò 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 ñcontrolò page and have the controller send an email ï see below
- Some of the systems settings can be changed remotely. Go the ñControlò tab and enter the password òaquachillerò 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 ñaquasnmpò 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 ñtechwaterò ï update with specific details and update.
- To update the customer name, address etc go to the customer tab and enter ñaquacustomerò 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 with the BMS**

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 P251_56_EB01_014 or higher.**

The AquaCooler P251 Pump and Transfer Control Unit 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 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.

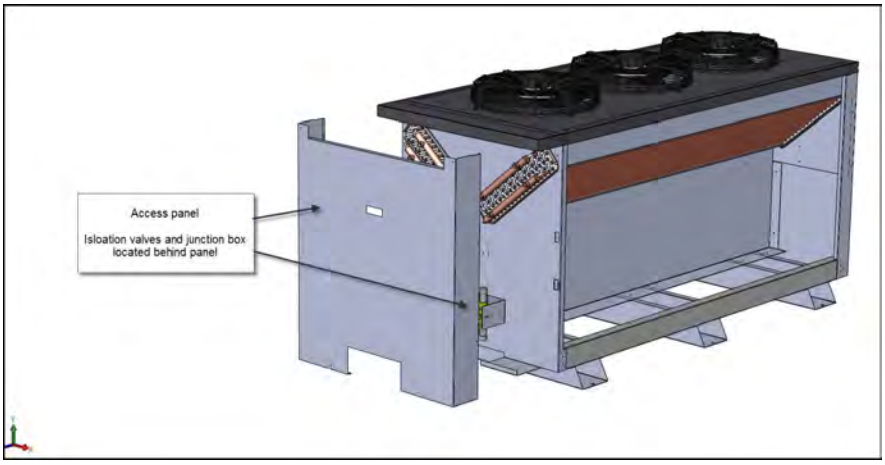
Local Register numbers 2001 to 2999 are Analog Value Objects mostly comprising set-points that allow the BMS to adjust operating points of the Pump and Transfer unit as necessary. To be able to change these values SNMP data point 1.3.6.1.4.1.33888.1.6.2.3.0 - 'P264ControlSetSetparenable' must be set 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.

**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.



INSTALLATION

Recommended pipe sizing for extended pipe runs

There are indications only. Final pipe sizing should be site specific and installed by qualified refrigeration mechanic.

| Pipe Run - m | 7.5 | 15 | 30 | 45 |
|---|---|---|---|---|
| Discharge Line | 1 3/8ò | 1 5/8ò | 2 1/8ò | 2 1/8ò |
| Liquid Return Line | 1 3/8ò | 1 5/8ò | 1 5/8ò | 2 1/8ò |
| Electrical Connection | 4 core + E 1mm | | | |

For pipe runs longer than 20 meters an oil separator or trap may have to be installed ï please contact Aqua Cooler for recommendation on installation on pipe runs longer than this.

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.

***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.***

Unit with interal buffer tank


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 the lines should be evacuated. This can be performed at either the condenser or the chiller by attaching leads to the appropriate scrhader 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.

Remove the access panel to gain access to the junction box and the isolation valves.

INSTALLATION

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 it is necessary to 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.

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.
- In a tandem installation ensure that the master chiller and the slave chiller are wired the correct way around. See wiring diagram.
- The chiller is supplied with a bypass on the water circuit to allow the water supply pressure and flow to be balanced with the system requirements ï this bypass will be marked and must never be fully closed

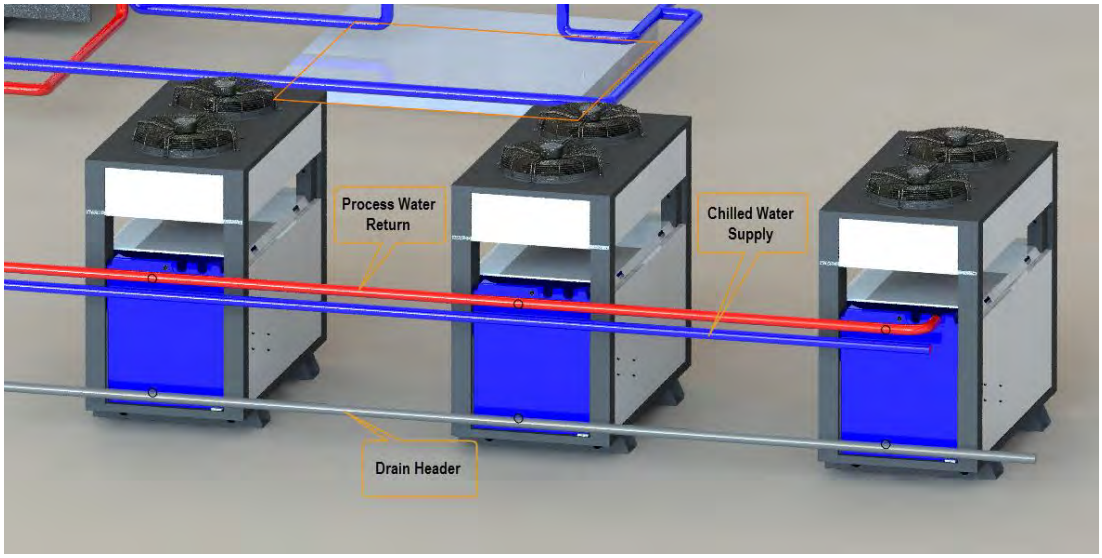
**Multiple Chiller Installations**

Aqua Coolers chiller can be installed in multiple installations for redundancy or to allow scaling as process application increases in size ï 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 ï 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 chilles 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 ï 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 gauge on the front of the chiller 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 tank with water.**

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

The water bypass on the chiller will be supplied fully open. There is a meter-cock controlled bypass between the supply and return pipes ï it is left fully open when it leaves the factory. This will be marked. This can be adjusted to balance the flow and pressure supplied to the process.

**HOWEVER THE BYPASS MUST NEVER BE FULLY CLOSED – DOING SO MAY CAUSE THE REFIGERATION SYSTEM TO FREEZE UP AND REQUIRE A REPAIR NOT COVERED UNDER WARRANTY**

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

Operational parameters than are displayed on the screen

- Water temperature T1, Return Water Temp T2, Ambient temperature T9
- Primary water flow
- Heat load
- Compressor run time

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

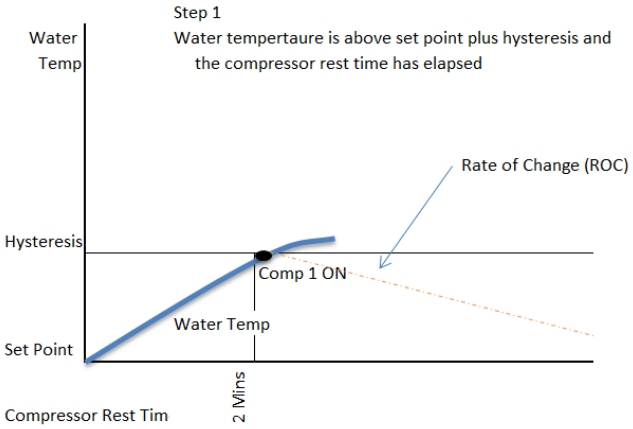
It is a good idea after the unit has been running for 5 minutes check that the water temperature is dropping and check there are no bubbles in the sight glass ï if these two things are happening then the unit is running properly. Give the system a final check to ensure that there are no water leaks. An amp meter can also be run over the wires into the contactors to ensure that the compressor and the pump are drawing the right amount of amps according to the technical data. Close the guard over the ON/OFF switch and screw into place to prevent passersby shutting down the chiller.

CONTROL

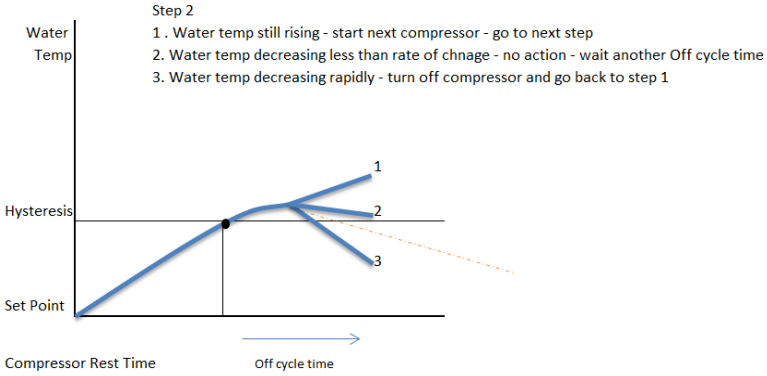
Operational logic is as follows

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

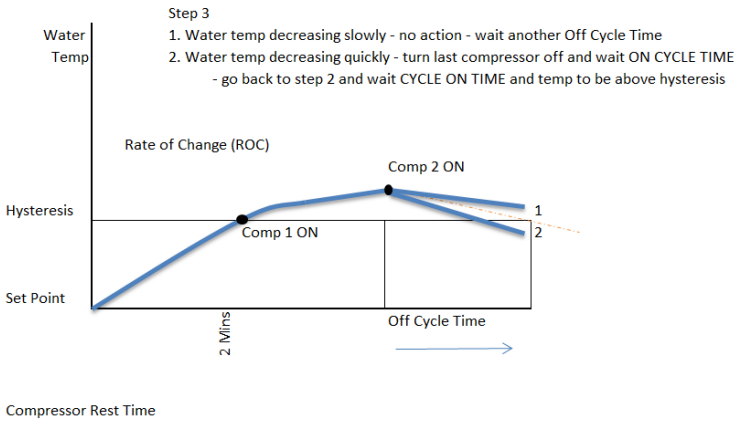
After compressor hold time and set point plus hysteresis COMP1 ON



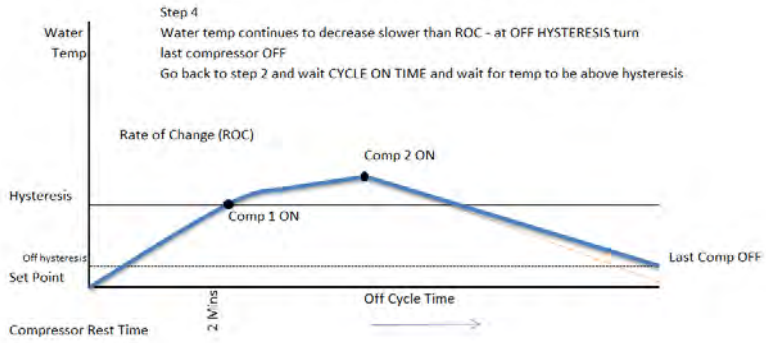

Step 2 is the program then waits OFF CYCLE TIME and does one of three things.




Step 3



Step 4




This last setting is designed to prevent all compressors turning off at the same time and to control water temperature as closely as possible

Rate of change default is 1 Fahrenheit/ min (.6 dgc/min). If the temperature gets too high ï say on start up ï and is 2 times the hysteresis then the compressors all run regardless of the rate of change.

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

**Temperature Control – Set Point**

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

**Temperature Control - Max and Min Set Point**

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

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

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

**Fan Speed Control**

The controller monitors the discharge pressure of each of the refrigeration circuits and makes decisions for fan speed based on this value. In the menu these is a valve for minimum run (default 1500 kPa) which when reached will start the fans and run them at 20% speed. There is a fan full speed setting (default 2200 kPa ) that will run the fans at full speed. The fan speed will then run proportionally between these two values. These values will be lower if the unit is running R134a refrigerant.

If the pressure is lower than the set point in the case of a cold day, the fan will shut down to prevent over condensing, even though the compressor may still be running.

**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 ï that is with another chiller in tandem or with multiple chillers and controlled by a BMS or the Aqua Cooler central control system, this feature will de-activated.

**Water Flow Control**

The system monitors flow rates and will send a warning if a flow rate is breached and shut the chiller down if the flow alarm point is breached. Zeroing the flow alarm turns it off. It is recommended that the flow alarm is not turned off.

**Compressor Hold Time**

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

**Alarm Acknowledge Delay**

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

**Pump Delay Time**

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

**High Ambient Control**

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

**Tandem Control**

One chiller will need to be assigned a master chiller and the other a slave chiller ï 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 ï 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 ï 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 ï 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

**Variable Speed Compressor Control – not on all models**

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

For the compressor installed the full speed is 60Hz.

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

When the first compressor is running full speed and the water temperature has reached set point plus hysteresis the second compressor will start and become the base load compressor. The lead compressor will slow to minimum speed and then start to ramp up as to control water supply temperature.

**Putting the unit in standby mode**

| | |
|---|---|
| Using the key pad the unit can be put into standby mode if there is a reason to shut the unit down for a short amount of time. | • Scroll through the menu to find ñKEYPAD STANDBYò<br>• Press ñOKò and then ñOK TO CONFIRMò The unit will stop running<br>• The screen will be showing ñOK TO RE-STARTò and ñKEYPAD STANDBY MODEò will be flashing<br>• Press ñOKò and the chiller will go through its normal start up procedure |

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

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.

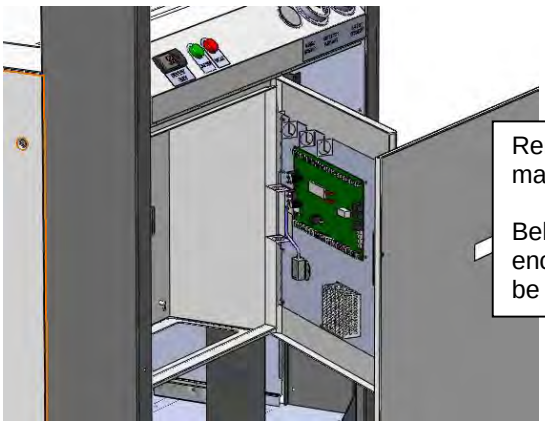
These units have been designed for the minimum of maintenance. However to ensure optimum performance qualified personnel should carry out regular maintenance. A comprehensive preventative maintenance program is available through Aqua Cooler carried out by qualified refrigeration mechanics.

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 |

**Accessing the electrical box – standard chiller**



Remove the bottom panel ï it will be marked

Behind this panel is the electrical enclosure. The key for the enclosure will be attached to the chiller with wire

**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 ï 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 ï 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 ñLog DLOAD RS232òThen 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.

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

1. Go to ñLOG DOWNLOADòin the parameter menu and press OK
2. Scroll to ñTime Log to USBòand 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 ñAQUAòand inside this will be a excel data file. The excel file will have labels for all the data that has been logged ï 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 – smart controller 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 ï 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 if 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 – smart controller**

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

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

**Updating Software**

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

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/mpfsupload 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 ñSite Main Pageò 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. ALTERERING 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 ï Temperature that the refrigeration system with cut out | • Scroll to the parameters menu then to the set points sub menu<br>• Scroll through the menu until ñSETPT WATER TEMPòshows<br>• Press ñOKò and ñSET WATER TEMPò will show and the water temperature will flash<br>• Use scroll keys to adjust up or down and press ñOKòagain and ñNEW WATER TEMPòwill show<br>Press the escape key to revert to home page |

| Temperature Hysteresis ï | |
|---|---|
| Temperature between refrigeration circuit cut out and cut in<br><br>Range 2 to 5 degrees | • Scroll to the PARAMETERS MENU then to the SET POINTS sub menu<br>• Use scroll keys to find ñTEMP HYSTERESIS<br>• Default is 2 degrees ï press ñOKò and SET TEMP HYSTERò will show<br>• Use scroll keys to change value and press ñOKò<br>• ñNEW TEMP HYSTERòwill show<br>• Press escape keys to return to home page<br>• NOTE ï hysteresis cannot be set below 2 degrees to prevent compressor short cycling |

| Compressor Hold Time ï | |
|---|---|
| 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.<br><br>Range 5- 180 seconds | • Scroll to ñPARAMETER MENUò and then to the DELAY sub menu<br>• Scroll to ñCOMP HOLD TIMEòand press ñOKò<br>• Value will flash and can be set to minimum of 5 seconds and maximum of 3 minutes ï IT IS RECOMMENDED THAT THIS VALUE IS NOT ALTERED TO BELOW THE DEFAULT 2 MINUTES<br>• Press ñOKòand screen will confirm choice<br>Press the escape key to revert to home page |

| Maximum and Minimum Temperature Limits | |
|---|---|
| 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.<br><br>Range -5 to 20 Min<br>10 to 30 Max | • Scroll to the PARAMETERS MENU then to the SET POINTS sub menu<br>• Scroll to ñMIN TEMP LIMITòor ñMAX TEMP LIMITò<br>• Press ñOKòand ñSET MAX LIMITòwill show will value flashing<br>• Select choice and press ñOKòand the screen will confirm choice<br>• Press the escape key to revert to home page |

| High and Low Temperature Stop | |
|---|---|
| High and low temperature alarm cut out ï 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 ñOKòbutton<br><br>Range<br>Yes and No | • Scroll to ñPARAMETER MENUòthen to the SYSTEM sub menu<br>• Scroll to ñHIGH TEMP STOPò and ñLOW TEMP STOPò and press ñOKò<br>• ñSET HI TEMP STOPòwill show with ñYESòand ñNOòmanu choices<br>• Change as desired, press ñOKòand ñSTOP ON HI TEMPòwill show confirming choice<br>• Do same to change low temperature standby<br>• Press the escape key to revert to home page |

| High and Low Temperature Alarm | |
|---|---|
| High and low temperature alarm cut out ï 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 ñOKòbutton<br><br>Range<br>Low -5 to 10<br>High 10 to 40 | • Scroll to ñPARAMETER MENUòand to the SET POINTS sub menu<br>• Scroll to ñHIGH TEMP ALARMòand ñLOW TEMP ALARMòand press ñOKò<br>• ñSET HI TEMP ALARMòwill show temperature choices<br>• Change as desired, press ñOKòand ñNEW HI TEMP ALMòwill show confirming choice<br>• Do same to change low temperature alarm<br>• Press the escape key to revert to home page |

| Setting water flow alarms | |
|---|---|
| Setting the alarm for the chilled water and condenser water flow ï this setting when breached will place the unit into standby<br><br>Range 0-5 l/s | • Scroll to ñPARAMETER MENUò and to the SET POINTS sub menu<br>• Scroll to ñFLOW ALARM 1ò for chilled water supply and ñFLOW ALARM 2ò for condenser water flow<br>• Press ñOKò and ñCONFIG FL ALM1ò will show with the value flashing<br>• Change the value to where the warning needs to be and press ñOKò ï the alarm rate should be below the value of the warning<br>• The screen will confirm your choice<br>• Press the escape key to revert to home page |
| Setting the waring for chilled water and condenser water flow. This setting will simply give a warning that the flow rate is dropping ï the chiller will still run.<br><br>Range 0-5 l/s | • Scroll to ñPARAMETER MENUò and press ñOKò<br>• Scroll to ñFLOW WARNING 1ò for chilled water supply and ñFLOW WARNING 2ò for condenser water flow<br>• Press ñOKò and ñCONFIG FL WARN1ò will show with the value flashing ï as a rough guide the flow rates for the condenser water and the chilled water should be around 1.4 l/s<br>• Change the value to where the warning needs to be and press ñOKò<br>• The screen will confirm your choice<br>• Press the escape key to revert to home page |

| Setting high pressure (HP) alarms and warnings | |
|---|---|
| Controller will send out and warning at warning pressure and shut unit down at alarm pressure<br><br>Range 2000 ï 4000 kPa for both | • Scroll to ñPARAMETER MENUò and to the SET POINTS sub menu<br>• Scroll to ñHP Warn Pressò<br>• Press ñOKò and choices will be shown<br>• Select choice and press ñOKò and the screen will confirm choice<br>• Press the escape key to revert to home page<br><br>• Scroll to ñPARAMETER MENUò and press ñOKò<br>• Scroll to ñHP ALM Pressò<br>• Press ñOKò and choices will be shown<br>• Select choice and press ñOKò and the screen will confirm choice<br>• Press the escape key to revert to home page |

| Setting fan speed control | |
|---|---|
| If fan speed controllers are installed the minimum run speed (20%) and max run speed (100%) can be set again corresponding discharge pressures.<br><br>The fan speed can also be set so that the fans cut on very low ambient temperatures and prevent over condensing | **Setting the fans operation mode**<br><br>• Scroll to ñPARAMETER MENUò and press ñOKò<br>• Scroll to ñDICH PR FAN SPò or discharge pressure fan speed<br>• Press ñOKò and change to one of three settings<br>• One ï ñON ZERO FULLò ï this setting will start the fans when the minimum pressure is reached. However if the pressure in the system drops below the minimum fan pressure set point ï less 10% - then the fans will stop. The contactors will remain engaged in the electrical box. The fans will start again when the pressure reaches the minimum set point<br>• Two ï ñON LOW FULLò ï this setting will start the fans when minimum pressure set point is reached and run them proportionally between minimum and maximum set point but no matter how low the discharge pressure in the system get the fans will run at a minimum speed of 20%<br>• Three ï ñOFF FULL SP ONLYò ï this setting will run the fans at full speed whenever the compressor is on.<br>• Press the escape key to revert to home page<br><br>Setting the fans minimum and maximum run speed pressures.<br><br>• Scroll to ñPARAMETER MENUò and press OK<br>• Scroll to SET POINTS sub menu and press OK<br>• Scroll to MIN FAN SPEED PRESSURE and press OK ï the value will start flashing and can then be adjusted. **This setting is factory pre-set and should not be adjusted unless changing refrigerant in the system or without contacting Aqua Cooler.**<br>• The same procedure is followed to set ñFan Max SP pressureò<br><br>Note ï of fan speed controller are being retrofitted to a unit then the fan speed option will have to be activated in the parameters menu. |

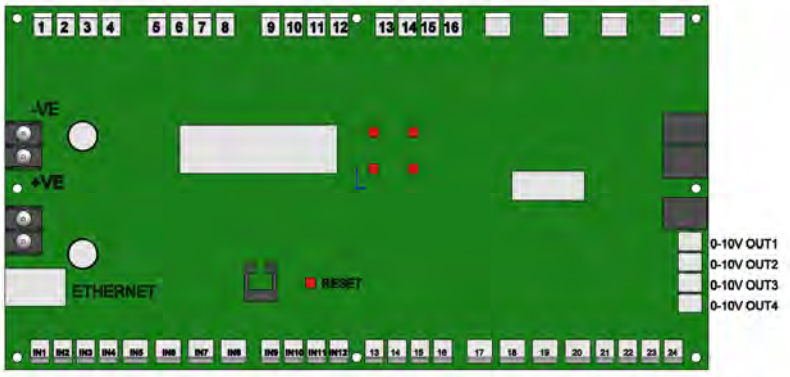
| Setting alarm acknowledge delay | |
|---|---|
| Inputs 17 and 18 can be used as auxiliary fault inputs<br><br>Range 0-120 Minutes | • Scroll to ñPARAMETER MENUò and press ñOKò<br>• Scroll to ñALM ACK DELAYò<br>• Press ñOKò and change to setting<br>• Select choice and press ñOKò and the screen will confirm choice<br>• Press the escape key to revert to home page<br><br>It is recommended that the setting is not greater than 1 or 2 minutes |

| Tandem Installation | |
|---|---|
| Assigning the chillers into a single or tandem set installation | • Scroll to ñPARAMETER MENUò and then to the SYSTEM sub menu<br>• Scroll to ñSINGLE/DUAL AUTOò and press ñOKò<br>• Change set up to ñDUAL AUTO OPERÔNò and press ñOKò<br>• The screen will confirm your choice<br>• Press the escape key to revert to home page<br>NB ï This only need be done on the master chiller |
| Assigning chiller role ï Master or Slave | • Scroll to ñPARAMETER MENUò and then to the SYSTEM sub menu<br>• Scroll to ñMASTER/ SLAVEò and assign one chiller the master chiller and one chiller the slave chiller<br>• Screen will show ñSET MASTER/ SLAVEò and change to whichever one is which and press ñOKò<br>• The screen will confirm your choice<br>• Press the escape key to revert to home page |
| Duty Cycle Time | • Scroll to ñPARAMETER MENUò and then to the SYSTEM sub menu<br>• Scroll to ñCYCLE CHANGEOVERò and press ñOKò<br>• ñSET CYCLE PERIODò will show and the choices are ñOFFò where there will be no duty cycling at all but the chillers will still a ct in tandem ï ie of one develops a fault it will start the other up. ñ10 MIN CYCLE TESTò which will duty cycle chiller every ten minutes ï this is more for installation testing and will revert to a weekly cycle after to 2 hours and ñWEEKLY CYCLEò 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<br>• Press the escape key to revert to home page |
| Weekly Timer Reset | • Scroll to ñCYCLE TIMR RESETò on the home screen<br>• Press ñOKò and ñZERO CYCLE TIMRò and ñPRESS OKò<br>• ñNEW CYCLE STARTEDò will show and the clock will reset<br>• At any time during the week the timer can be viewed to see how long to changeover |

**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 |
| SYSTEM MENU | | | |
| FULL POWER NETWORK FAIL | NO | AUX INPUTS | N/O |
| SINGLE DUAL/OPN | Single | SNMP DATA | FRACTIONAL |
| MASTER /SLAVE | MASTER | SPRAY COOL | OFF |
| CYCLE CHANGEOVER | ON<br>OFF for VSD option | CLOSE TOLERANCE | OFF |
| STOP ON COMP FAIL | NO | HIGH TEMP STOP | YES |
| COMPRESSOR LOAD SHARE | ON<br>OFF for VSD option | LOW TEMP STOP | YES |
| NO. COMPRESSORS | 2 | VAR SPEED FUNCTION | OFF<br>ON for VSD Option |
| NO. SUPPLY PUMPS | 1 | FAN SPEED CONTROL | YES |
| NO FAN BANKS | 2 | NETWORK CONTROL | OFF |
| NO HE SENSORS | 1 | TEMPERATURE STAGING | ON |
| EMAIL LOG MENU | | | |
| EMAIL ALARM ON/OFF | OFF | MANAGE DATA LOG | OFF |
| DATA LOG PERIOD | 1 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 | 0 | COMPRESSOR HOLD TIME | 120 SECONDS |
| UNLOAD HOLD TIME | 15 | PUMP DELAY TIME | 10 |
| SET POINT MENU | | | |
| PULL DOWN PER MIN | 0.6 | FAN MIN SP PRESSURE | 1500<br>900 for R134a |
| TEMPERATYRE HYSTERESIS | 2 | LP ALARM PRESSURE | 200<br>50 for R134a |
| CLOSE TOLERANCE TEMP | 2 | LP HYSTERESIS PRESSURE | 200 |
| HIGH TEMPERATURE ALARM | 30 | FAN MAX SPEED PRESSURE | 2200<br>1600 for R134a |
| LOW TEMPERATURE ALARM | 0 | HP ALARM PRESSURE | 2750<br>2200 for R134a |
| HIGH RETURN ALARM | 30 | HP WARN PRESSURE | 2600<br>1800 for R134a |
| LOW RETURN ALARM | 0 | LP WARNING PRESSURE | 300<br>100 for R134a |
| MIN TEMP LIMIT | 5 | SUPPLY FLOW ALARM 1 | 1 l/s |
| MAX TEMP LIMIT | 20 | SUPPLY FLOW WARNING 1 | 1.5 l/s |
| SET PT AMB OTEMP | 45 | SET POINT TEMP | CUSTOMER SPECIFIC |
| SENSOR MENU | | | |
| CCT1 SUCT PR SIZE | -.5 -7 BAR | SECONDARY SUPPLY CAL | SEE PROCEDURE |
| CCT1 DIS PR DISCH PR SIZE | 0-30 BAR | AMBIENT CAL | SEE PROCEDURE |
| SUPPLY FLOW PIPE | DN 32 | SECONDARY RETURN CAL | SEE PROCEDURE |

Controller Input and Outputs Schematic



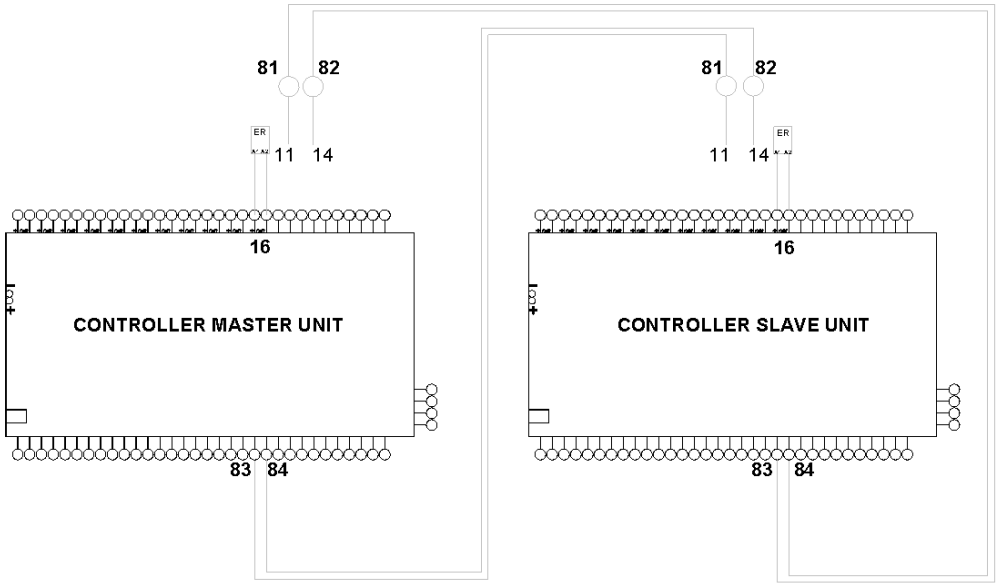

| Connector | Type | Control |
|---|---|---|
| **Outputs** ï 1 to 16 across the top of the board | 24VDC | 1 and 2 Compressors<br>5 Pump<br>7 Unloading valve compressor 1<br>8 Ball valve<br>9 and 10 Fans<br>11 Water Spray<br>12 Unloading valve compressor 2<br>13 Master Fault<br>14 Master run output<br>15 BMS AUX Output<br>16 Tandem link enable/ Status |
| 0-10V Output 2 | 0-10 Volt out put | Variable speed drive output |
| 0-10V Output 3 | 0-10 Volt out put | Fan speed control ï fan bank 1 |
| 0-10V Output 4 | 0-10 Volt out put | Fan speed control ï fan bank 2 |
| **Inputs** ï 1- 24 across the bottom of the board | | |
| IN1 | 0-10V Input | Supply Pump Flow Meter |
| IN2 | 0-10V Input | Circulating Pump flow meter |
| IN5 | 0-10V NC Input | Compressor 1 fault input |
| IN6 | 0-10V NC Input | Compressor 2 fault input |
| IN9 | 0-10V NC Input | ON/OFF Switch |
| IN10 | NTC Thermistor | Ambient temp |
| IN11 | NTC Thermistor | Chilled water supply temp |
| IN12 | NTC Thermistor | Chilled water return temperature |
| IN13 | NTC Thermistor | Plate pack safety sensor 1 |
| IN16 | 4-20mA Input | Humidity sensor |
| IN17 | 0-10V N/O AUX Fault Input | Auxiliary fault input 1 |
| IN18 | 0-10V N/O AUX Fault Input | Auxiliary fault input 2 |
| IN19 | 0-10V N/O Input | Switch to allow half chiller to run on full power ï 2 compressor models only |
| IN20 | 0-10V N/O Input | Tandem link input |
| IN21 | 4-20mA input | Suction pressure sensor ï circuit 1 |
| IN22 | 4-20mA input | Suction pressure sensor ï circuit 2 |
| IN23 | 4-20mA input | Discharge pressure sensor ï circuit1 |
| IN24 | 4-20mA input | Discharge pressure sensor ï circuit 2 |

SERVICE and MAINTENANCE

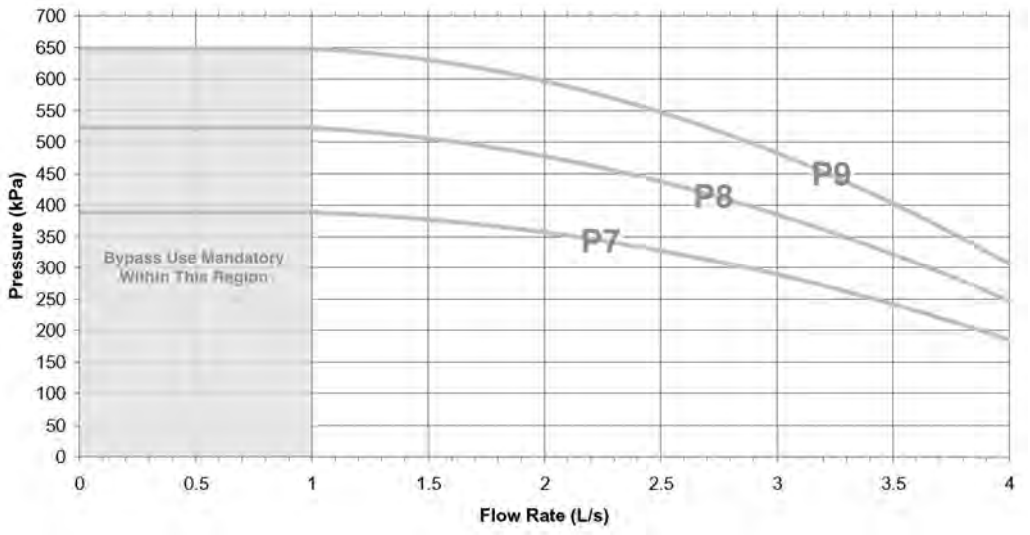
**Changing the filter cartridges**

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

WIRING DIAGRAM ï TANDEM INSTALLATION




PUMP CURVES



CRITICAL SPARE PARTS

Electrical spare parts are listed on the wiring diagram

| Component | AC Part No |
|---|---|
| Compressor ï<br>Sump Heater | z-9016<br>z-9020 |
| Flow meter | z-9612 head<br>z-9607 1 ½ò body |
| Drier | z-9117 |
| Sight Glass | z-9123 |
| TX Valve ï | z-9090 |
| Evaporator ï Plate heat exchanger | z-9749 |
| Fan 500 | z-9754 |
| Low pressure safety switch | z-9181 |
| Condenser | z-8802 |
| High pressure safety switch | z-9183 |
| Pump | z-9739 |
| One way check valve ï water circuit | z-9502 |
| Pressure gauge ï water circuit | z-9750 |
| Filter cartridges ï water circuit | z-9945 |
| Motorised ball valve ï water circuit | z-9592 |
| Threaded union 1 ½ò | z-9559 |
| Printed circuit board controller | z-7515 |
| Thermistors | z-8704 |
| Pressure transducers -.5 to 7 Bar<br>Pressure transducer ï 0-30 Bar | z-8713<br>z-8714 |

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

Plate heat exchanger

http://www.swep.net/index.php?tpl=productsheets&lang=en&id=361&Type=V&Size=120T&Material=SC&Pressure=M

TROUBLE SHOOTING

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

| Symptom | Possible Causes/ Solutions |
|---|---|
| Low Flow Alarm and pump fail | Faulty Pump<br><br>Replace Pump ensuring new pump has been leak tested, phase wiring is around the right way<br>See below for installation<br>http://www.lowara.com/lowdata/doc/ml/surface-im-xx.pdf<br>See below for technical data |
| | Blocked plate heat exchanger<br>Isolate the chiller and attempt to back flow through the plate pack<br>Replace if the plate pack has become chronically blocked<br>See below for data sheet<br>Faulty electrical contactors ï check operation and replace if necessary |
| | Faulty flow meter ï remove the head of the flow meter and check that the paddle wheel has not become blocked |
| | Work Around ï 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. |

## TROUBLE SHOOTING

| | |
|---|---|
| High Pressure alarm | Check head pressures when the unit is running. Possible causes blocked condenser ï check for dust or debris build up and clean |
| | Dead or dying fan ï 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 ï 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 |

| | |
|---|---|
| Compressor Fault | Low pressure alarm may have tripped<br>• Flow rate from pump may be too low ï check pump settings and requirements<br>• System may have lost refrigerant gas<br>• TX valve may have seized<br><br>Motor protection module in compressor tripped<br>• Motor running too hot ï return water may be too high ï in-rush of heat load<br><br>Motor protection module tripped<br>• Compressor drawing too much current |

| | |
|---|---|
| HEX Under Temp | This the plate heat exchanger back up temperature probe reaching 3 degrees while the refrigeration circuit is running<br>• Primary temperature (supply) probe has failed<br>• Load has suddenly dropped off chiller |

## WIRING DIAGRAM

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

## RELEASE NOTES

| Revision Notes ï Hardware | | | |
|---|---|---|---|
| Date | Revision | Description | Notes |
| 15/08/10 | A | Information updated for new circuit board | |
| 28/05/12 | B | Schneider pressure transducers added | |
| 23/10/12 | C | RTC40 Added | |

| Revision Notes - Software | | | |
|---|---|---|---|
| Date | Revision | Description | Notes |
| 22/3/12 | A | **Software to version P243_32_EB0_141**<br>- BACnet and Modbus stacks added<br>- Added on and off cycle time adjust<br>- Added Off hysteresis<br>- Added Pump run-on timer (default to zero)<br>- Option to leave or clear warnings on stop<br>- OK key to alarm clear now also clears fault timers<br>- SNMP Alive data point can now be written and read back from Babel Buster. This requires BMS to write alternate 1 or 0 and then read back. If after a delay to allow Babel Buster to poll Pump and Transfer, value is not as written then the Pump and Transfer Network is down.<br>- Option to keep secondary pumps running for single chiller<br>- Option to flash or steady fault output<br>- Add pump delay time for alarm low flow before pump switch off<br>- Fixed discharge pressure #1 reading<br>- Pump Run-on except for ON/Off manual control<br>- XML reminder only for updates, not new installs<br>- Fixed compressor fault timer wrap issue | Not released |
| 28/5/12 | B | **Software to version P243_32_EB0_142**<br>- New Stack V5.41<br>- Corrected LOCAL_RUN_OID ALL_OFF state<br>- No PumpToggle() for 1 pump systems<br>- MAX_PDCON from 10 to 60<br>- Email Trigger on Log Time<br>- CompSequence() common heat & cool<br>- SPIFlash() driver test for ID - new 32MBit chips compatible<br>- Ramp-up VSD stop Comp2 ON until Comp1 95%<br>- CalcCompSpeedPID() changed calc constants for greater Integral weighting<br>- Zero PID variables when COMPRESSOR==0<br>- Time corrected 1 day error<br>- Added slow warnings on LCD<br>- Compressor ramp up and down min cycle reduced to 5 seconds<br>- Chill_Temp() and Rolling Av initialisation improvements.<br>- Compressor ON messages only after physical output turns on<br>- Last compressor to stay on until reaches set-pt<br>- Fixed screen display of Lead, on and off compressors | |
| 08/01/13 | C | **Software to version P243_32_EB0_143**<br>- Fan speed control changed to prevent over condensing | |
| 07/02/13 | D | **Software to version P243_56_EB0_1.46**<br><br>- Removed 12% error on 4-20mA inputs<br>- Fast pull down last compressor temp + HYST/2<br>- Light load adapt only high side and always ON | |

| | | |
|---|---|---|
| 03/06/13 | E | **Software to version P243_56_EB4_201**<br><br>- Off Cycle Time now in sequencing loop<br>- Pump Run on Stop now single or dual auto operation<br>- Added Log and Config File DownLoad via web page<br>- Added Config File UpLoad via web page<br>- Added Web Page SSL access via port 443 and self-signed certificate<br>- Flow added DN6<br>- Fan speed to discharge pressure changed zero setting to zero fan speed with fan contactors ON<br>- Email Alert now 3 options for alarm trigger: alarm + warning + alert, alarm + warning and alarm only<br>- Email Alert options added to web control page<br>- New TCPIP Stack V5.42<br>- New Compiler XC32 V1.2 |

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

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

COMMISSIONING

Water Connection

| | | |
|---|---|---|
| Was the pressure on the suction gauge checked before the unit was filled with water ï see Installation | | |
| Open the mains make up water to the chiller ï 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<br>Pump < 6 amps<br>Compressors < 28 amps<br>Fans < 8 amps | | |
| Note down the water flow reading<br>Should be ~ 2 l/s | | |
| Note down pump pressure | | |
| Does pump performance fall on the respective pump curve | | |
| 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 glasses | OO | |
| Adjust the bypass valve to suit customer and/ or site needs | | |
| Fit gauges and note down running pressures on the chiller | | |

COMMISSIONING

Tandem Installation Checks

| | | |
|---|---|---|
| On the master chiller set the cycle time to ñ10 minute testò 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

| | | | |
|---|---|---|---|
| **Proposed Chiller Model:** | | **Date Inspected:** | |
| | | **Inspected By:** | |
| | | **Company:** | |
| | | **Contact Number:** | |

| | |
|---|---|
| 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*<br>*Highlight any walls/fixtures/items that encroach on the clearances required for the chiller installation.* |
| Insert Drawing and photo of site here: |

| Minimum Space Requirements: | | |
|---|---|---|
| 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<br>1495L x 790W x 1340H | 800(E) x 2000(H)<br>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) |

| Chiller Installation - Continued | | | |
|---|---|---|---|
| Isolation Switch: | YES/NO | Drainage Provided: | YES/NO |

| Chiller Water Circuit Requirements | | | |
|---|---|---|---|
| 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 |

| Remote Condenser Requirements | | | |
|---|---|---|---|
| Notes: | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| Pipe Size: | | Pipe Insulation: | |
| Length: | | Height Difference: | |

SITE INSPECTION

| General Notes/Feedback |
|---|
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| Completion | | |
|---|---|---|
| Aqua Cooler uses the information from this site inspection sheet to confirm that the chiller will be installed and operating correctly. Should any problems or issues be raised as a result of the site inspection process 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. | | |
| Signature Of Service Agent | Print Name | Date |
| Signature Of Customer Representative | Print Name | Date |

| Filing – Aqua Cooler | | |
|---|---|---|
| Signature | Print Name | Date Of Entry |
| Specify Follow Up Work Required: | | |
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PREVENTATIVE MAINTENANCE

| | | | |
|---|---|---|---|
| **Model:** | | **Date Serviced:** | |
| **Serial Number:** | | **Serviced By:** | |
| | | **Company:** | |
| | | **Contact Number:** | |

| | |
|---|---|
| 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: | |

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|---|---|
| Access Limitations: Any issues relating to service access including after-hours access, induction course requirements, hot works permits, confined spaces, safety harness requirements | |
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| Equipment Serviced By Chiller: | |
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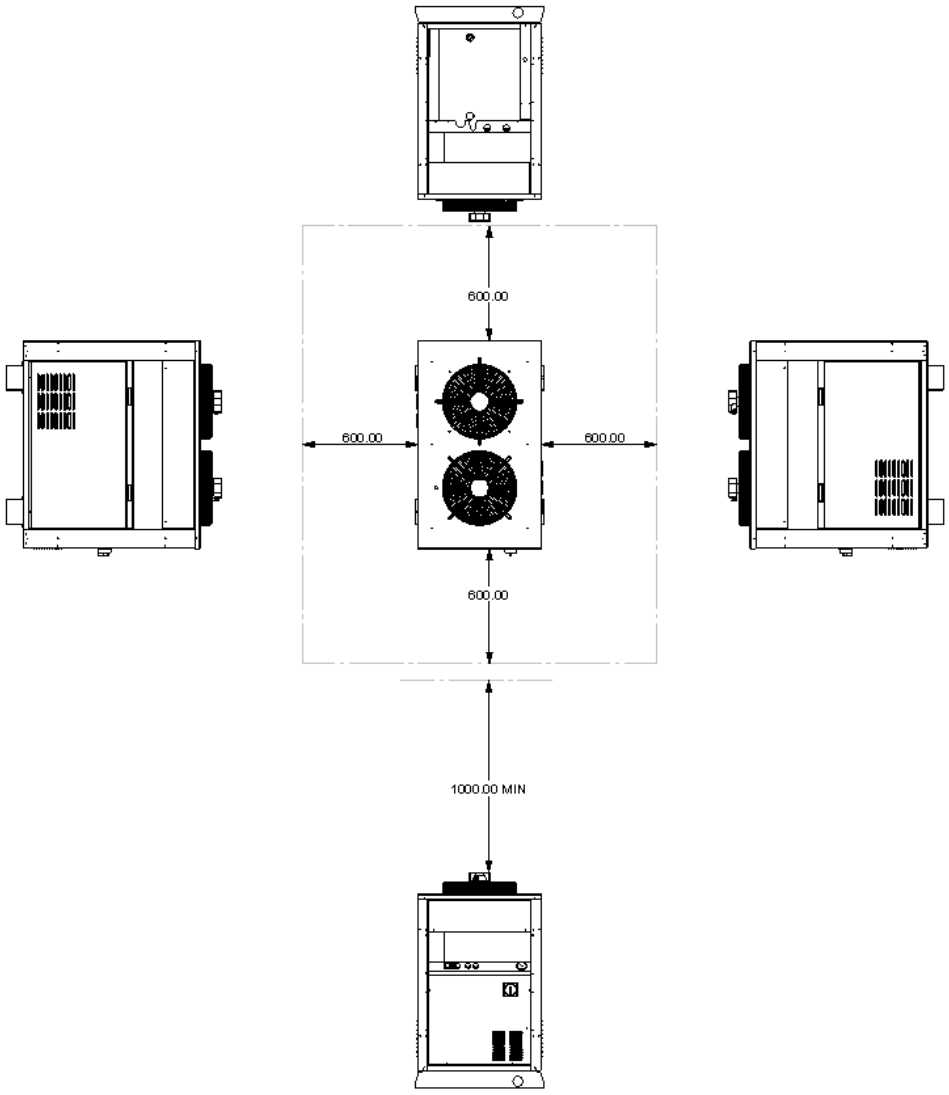
**Chiller Installation - Clearances**

*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: | |
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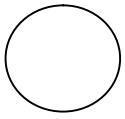
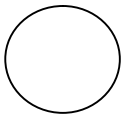
| **Chiller Installation – Refrigeration/Water Circuit**<br>***Cross out any answers that are inapplicable*** |
|---|

| **Inspect Evaporator/Water Circuit** | | | |
|---|---|---|---|
| Evaporator Leak: | YES/NO | If Yes Where: *(Tick where applicable and indicate which circuit.* | □ Distributor<br>□ Distributor Line(s)<br>□ Header<br>□ Coil(s)/ Plate Pack<br>□ Tx Valve<br>□ Other |
| Evaporator Notes: | | | |
| Float Operation: *(Tick where applicable)* | □ OK ï Shuts Off<br>□ Will Not Shut Off<br>□ Damaged | Water Quality: *(Tick where applicable)* | □ Clean<br>□ Cloudy/Dirty<br>□ Oil Residue<br>□ Surface Scum |
| Water Circuit Notes: | | | |

| *Check Operational Indicators At Front Of Chiller* | | | |
|---|---|---|---|
| Water Pressure: | kPa | Temp Set Pointò | °C |
| Flow rate: | l/s | | |

| **Remove Front Cover And Inspect Refrigeration Circuit** | | | | |
|---|---|---|---|---|
| Oil Residue: | □ None<br>□ Suction Rotolok<br>□ Discharge Rotolok<br>□ Receiver Inlet<br>□ Receiver Outlet<br>□ Other | Oil Level: *(Draw Level)* |  |  |
| Refrigeration Notes: | | | | |

**Tighten Electrical Terminals**

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

| Notes: | |
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**Refrigeration Operation**

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

| ***Connect Pressure Gauges To Suction and Discharge Lines*** | | | |
|---|---|---|---|
| Ambient Temp: | °C | Water Temp: | °C |
| Suction Pressure: | kPa | Discharge Pressure: | kPa |

| | | | |
|---|---|---|---|
| Fans Operational: | All three | Sight Glass: *(Tick where applicable)*<br><br>*Both Circuits* | □ Full -<br>□ Occasional Bubbles<br>□ Continuous Bubbling<br>□ Dry (Green)<br>□ Wet (Yellow) |

**Measure Phase Voltages At Circuit Breaker**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Compressor Amps: Both circuits | *(Red)* | A | *(White)* | A | *(Blue)* | A |
| | *(red)* | A | *(White )* | A | *(Blue)* | A |
| Fan Amps: | *(Red)* | A | *(White)* | A | *(Blue)* | A |
| Pump Amps: | *(Red)* | A | *(White)* | A | *(Blue)* | A |
| Redundant pump if fitted | *(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 | FRACTIONAL | | 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<br>15 WITH BALL VALVE | | COMPRESOR ON TIME | 30 | |
| COMPRESSOR OFF TIME | 30 | | HT ACKOWLEDGE DELAY | 30 | |
| SET POINT MENU | | | | | |
| PULL DOWN PER MIN | 0.6 | | FAN MIN SP PRESSURE | 900 | |
| TEMPERATYRE HYSTERESIS | 2 | | LP ALARM PRESSURE | 80 | |
| CLOSE TOLERANCE TEMP | OFF | | LP HYSTERESIS PRESSURE | 100 | |
| HIGH TEMPERATURE ALARM | 30 | | FAN MAX SPEED PRESSURE | 1600 | |
| LOW TEMPERATURE ALARM | 3 | | HP ALARM PRESSURE | 2200 | |
| HIGH RETURN ALARM | 30 | | HP WARN PRESSURE | 1700 | |
| LOW RETURN ALARM | 3 | | LP WARNING PRESSURE | 100 | |
| 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<br>0-10 BAR - Schneider | | SUPPLY FLOW PIPE | DN 32 | |
| CCT1 DIS PR DISCH PR SIZE | 0-30 BAR Carel<br>0-40 BAR - Schneider | | TEMP ALL CAL – 1 | SEE PROCEDURE | |

## Cleaning

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

| *Remove Condenser Side Covers – Wear Safety Glasses When Blowing Out Condenser With Compressed Gas* | |
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| Notes: | |
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## General Notes/Feedback

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## Completion

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.

| | | |
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| Signature Of Service Agent | Print Name | Date |
| Signature Of Customer Representative | Print Name | Date |

## Filing – Aqua Cooler

| | | |
|---|---|---|
| Signature | Print Name | Date Of Entry |
| Specify Follow Up Work Required: | | |
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