AQUA LOGIC'S MULTI-TEMP® and Titan water-cooled Series chiller and heat pumps 460V 3Ø

INSTALLATION & OPERATING INSTRUCTIONS

Effective 6-8-16

Thank you for purchasing an Aqua logic chiller and or heat pump. It has been designed and built to provide years of reliable, trouble-free service. It provides a precise water temperature control up to +/- 1.0°F (0.7°C) accuracy and features a continuous LCD display of the current fluid temperature.



Models:
MT-4-460-WC thru MT-8-460-WC
HP-33-460-WC thru HP-53-460-WC



Models:
MT-4-460-WCV thru MT-8-460-WCV
MT-9-WC-TS-460 thru MT-20-WC-460
HP-33-460-WCV thru HP-53-460-WCV
HP-6-460-WC thru HP-20-460-WC

BEFORE INSTALLING THE CHILLER

READ BOTH WARRANTY AND INSTALLATION INSTRUCTIONS.

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Important: Unpacking your chiller or heat pump

This chiller was properly packed and accepted by the transportation company for shipment. It is the responsibility of the transportation company to deliver it to you in perfect condition.

APPARENT DAMAGE OR LOSS

If, upon delivery, the shipping container or equipment indicates DAMAGE IN TRANSIT, such damaged goods should not be accepted until the transportation company's agent has noted on the freight bill, which he will give you, the nature and extent of the damage. If any part of this shipment is LOST IN TRANSIT, have the shortage noted on the freight bill by the agent.

CONCEALED DAMAGE

If, when this equipment is unpacked, shipping damage is discovered which was not apparent upon delivery, notify the transportation company IMMEDIATELY to inspect the damaged equipment. The inspector is REQUIRED to provide you with a DAMAGE INSPECTION report.

THIS INSPECTION MUST BE REQUESTED WITHIN FIFTEEN (15) DAYS OF DELIVERY. DO NOT MOVE DAMAGED SHIPMENTS FROM POINT OF DELIVERY. RETAIN ALL CONTAINERS AND PACKING FOR INSPECTION.

Protect yourself. File your claim immediately with the transportation company! Remember, Aqua logic Inc. is not responsible for any damage after the carrier accepts a shipment. Claim for FULL VALUE REIMBURSEMENT should be made by you against the transportation company. Replacement of the damaged equipment should be requested by the purchaser as a new order.

WARNING!!!

THIS DEVICE USES HIGH VOLTAGE ELECTRICAL POWER FOR OPERATION.
SAFETY PRECAUTIONS MUST BE OBSERVED.
CAREFULLY READ AND OBSERVE THE FOLLOWING TO AVOID ELECTRICAL SHOCK OR SEVERE DAMAGE TO THE EQUIPMENT.

- We recommend, as with all electrical equipment used in or around water, that you connect your electrical equipment to a ground-fault interrupt (GFI) protection circuit.
- **ALWAYS** turn the power off for the equipment at the source (circuit breaker) if there is any electrical problem, the electrical equipment or controller has been submerged in water.
- **ALWAYS** make sure that the electrical circuit you connect your electrical equipment to is rated at least 20% higher than the maximum current rating on the equipment.
- **ALWAYS** make sure that you operate the equipment at the correct voltage.
- Do **NOT** attempt to turn off the power at the chiller or controller if a problem occurs. Disconnect unit at the main power panel.
  Do **NOT** attempt to repair equipment. Call Aqua Logic for instructions.

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Very Important!

1. Allow only qualified licensed personnel to supply electric power to chiller or heat pump. Installation must be done in accordance with local and national electrical code. Multi-Temp Chillers and Titan heat pumps need a fusible disconnect installed within five feet. The chiller or heat pump needs a dedicated power supply. **Do not** share the power feed to with any other peripheral devices such as pumps, ultraviolet light sterilizers, or filters. Interlock device prevents the chiller from energizing without the pump being on.

2. Double check electrical specifications on unit's electrical access cover plate making sure of voltage, amperage, phase, and cps before energizing. (**Do not** remove any covers with electrical power on.)

3. Some control packages include timed switches that delay certain functions on initial start-up. Consult Aqua Logic Inc. for exact details before attempting servicing.

4. **Fluid must flow through the chiller or heat pump at all times.** See specification sheet for minimum and maximum flow rates. Flow rates less than specification may result in evaporator freeze-up and cracking PVC plastic evaporator shells and condenser overheating the unit causing premature compressor failure. Aqua Logic Inc. does not warranty evaporator shells operating under low flow conditions.

5. Incoming water pressure to the inlet of the evaporator must not exceed 40 psig. Pressures over 40 psi may cause damage to the evaporator shells not covered under warranty.

6. Incoming water pressure and temperature to the condenser inlet must not exceed 120 psig and 85 °F and below 55 °F (Contact Aqua Logic for water temperatures above 85 °F and below 55 °F)

Safety Precautions

1. Always wear safety eye wear and work gloves when installing equipment.

2. Never assume electrical power is disconnected. Disconnect and check with meter.

3. Keep hands out of electrical box areas when power is connected to equipment.

4. R-410A escaping into the air can cause frost-bite burns.

5. R-410A is toxic when burned.

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Installation Instructions:

Installation must proceed in accordance with national building and electrical codes by qualified technicians only.

For chiller or heat pump specifications see label on outside cover of the unit for particular details concerning model number, voltages, amperage, water flow rates and refrigerant type.

1. Place the chiller or heat pump in a ventilated area. Ambient air temperature must never exceed 110°F sustained.

2. Aqua Logic Inc. recommends the chiller or heat pump to be mounted outdoors with a protective cover. Outdoor covers must be built allowing at least 3 feet from any walls and having access on all five sides.

3. If the chiller must be inside a building with be built allowing at least 3 feet from any walls and having access on all five sides.

4. The PVC evaporator is located horizontal under the condensing unit or vertical next to condensing unit. Both type evaporators have PVC slip NPS water connections on the inlet and outlet. Follow the inlet and outlet flow is as designated.

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Initial Start-up: Read all of the instructions before energizing unit.

Caution: It's important to allow the oil in the compressor(s) to warm-up at least 8 hours before starting up the unit. If the ambient air temperature is below 60˚F, apply power to the unit and set controller so the compressor(s) do not energize or by-pass the heat exchanger water supply so the flow switch will not activate the unit.

Adjust temperature set point to desired water temperature. When the thermostat calls for cooling, a delay timer will start the system after 3 minutes. The chiller will pull the water temperature down to the set point, and shut the unit down. When the water temperature rises above the differential setting, the chiller will repeat the delay cycle and cool down to temperature set point.

1. Target fluid temperature is limited to a range of 40° F to 80° F on all standard MultiTemp Chillers. Without special factory installed equipment, possible damage to the unit can occur when attempting to access fluid temperatures outside this range. Aqua Logic, Inc.'s warranty does not apply to application temperatures under 40°F or above 80° F without special factory modifications.

2. Water going to the chiller or heat pump should be protected by filters to keep debris from collecting in the evaporator shells. Clogged shells lead to heat exchange problems and will void the warranty.

3. Improperly installed or out of adjustment rapid sand filters or fluidized beds can put sand into the stream of water flowing into the chiller. This condition is similar to "sand blasting" and may abrade holes in plumbing lines or the titanium coils. Conditions like these would void the Aqua Logic, Inc. warranty.

   40° F to 80° F Fluid Temperature Applications

   Heat exchanger wetted parts contain titanium, PVC plastic, rubber, and polymer. These materials are non-reactive with fresh and salt water. You must consult with Aqua Logic, Inc. if any other fluids are to be pumped through the chiller.

   If humid or wet conditions exist where chiller is to be located, care must be taken to prevent water from getting on electrical components. Condensing unit parts are made from aluminum, steel and are subject to rapid corrosion, especially near sea water.

   The chiller or heat pump operates by virtue of a thermostat that senses water temperature inside the probe well. When the temperature set point is satisfied, the supply of refrigerant to the evaporator is stopped. This initiates the compressor shuts off. When the thermostat calls for cooling or heating, the supply of refrigerant is re-established to the evaporator, but the system has a time delay of approximately 3 or 5 minutes before the compressor goes on again.

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Chiller Control Set-up

Step	Enunciator	Description	Display
1	F or C	Fahrenheit or Celsius	F
2	S1 (Blinking)	Setpoint Temperature	S1 77
3	DIF (Blinking)	Differential Temperature	DIF 1
4	C1 or H1	Cooling or Heating Mode	C1



Liquid Crystal Display (LCD)

The LCD display provides a constant readout of the sensor temperature and indicates if the output relay is energized. When the **S1** enunciator is constantly illuminated during operation, the relay is energized. The display is also used in conjunction with the keypad to allow the user to adjust the set point temperature, differential and heating /cooling modes.

Programming Steps and Display

The control can be programmed in four simple steps using the LCD display and the three keys on the face of the control. (See photo for display and keys.)

1. To start programming, press the **SET** key once to access the Fahrenheit/Celsius mode. The display will show the current status, either **F** for degrees Fahrenheit or **C** for degrees Celsius. Then press either the up ⇧ arrow or down ⇩ arrow key to toggle between the **F** or **C** designation.
2. Press the **SET** key again to access the set point temperature. The LCD will display the current set point temperature and the set point annuciator will be blinking on and off to indicate that the control is in the set point mode. Then press either the up ⇧ key to increase or down ⇩ key to decrease the set point to the desired temperature.
3. Press the SET key again to access the differential. The LCD will display the current differential and the **DIF** annuciator will be blinking on and off to indicate that the control is in the differential mode. Then press either up ⇧ key to increase or the down ⇩ key to decrease the differential to the desired setting (minimum 1°F, maximum 30°F).
4. Press the **SET** key again to access the cooling mode. The LCD will display the current mode, **C1** for chiller mode. Press the **SET** key once more and programming is complete. Controller **MUST** in the **C1** mode for correct operation.

Controller will automatically drop out of "program mode" and return to "operating mode" 30 seconds after last key press.

Troubleshooting Controller Error Messages:

Display Messages

E1 - Appears when the up ⇧ or down ⇩key is pressed when not in the programming mode.
To correct: If the E1 message appears even when no keys are being pressed, replace the control.
E2 - Appears if the control settings are not properly stored in memory.
To correct: Check all settings and correct if necessary.
EP - Appears when the probe and or flow switch is open, shorted or sensing a temperature that is out of range.
To correct: Check to see if the sensed temperature is out of range. If not, check for probe damage by comparing it to a known ambient temperature between -30°F and 220°F. Replace the probe is necessary.
EE - Appears if the EEPROM data has been corrupted.
To correct: This condition cannot be field repaired. Replace the control.
CL - Appears if calibration mode has been entered.
To correct: Remove power to the control for least five seconds. Reapply power. If the **CL** message still appears, replace the control.

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Heat Pump Control Set-up

STEP	ANNUCIATOR	DESCRIPTION	DISPLAY
1	***F* or *C***	Fahrenheit or Celsius Scale	***F***
2	**S1** (blinking)	Stage 1 Setpoint Temperature	**77** **S1**
3	**DIF1** (blinking)	Stage 1 Differential Temperature	**DIF1** **1**
4	***C1/H1***	Stage 1 Heating Mode	**H1**
5	**S2** (blinking)	Stage 2 Setpoint Temperature	**77** **S2**
6	**DIF2** (blinking)	Stage 2 Differential Temperature	**1** **DIF2**
7	***C2/H2***	Stage 2 Cooling Mode	**C2**



Liquid Crystal Display (LCD)

The LCD display provides a constant readout of the sensor temperature and indicates if the output relay is energized. When the **S1 or S2** annuciator is constantly illuminated during operation, the relay is energized. The display is also used in conjunction with the keypad to allow the user to adjust the setpoint temperature, differential and heating /cooling modes.

Programming Steps and Display

The control can be programmed in four simple steps using the LCD display and the three keys on the face of the control. (See photo for display and keys.)

NOTE: <u>Stage 1 must be set for heat mode and Stage 2 for cool mode for correct operation.</u>

1. To start programming, press the **SET** key once to access the Fahrenheit/Celsius mode. The display will show the current status, either **F** for degrees Fahrenheit or **C** for degrees Celsius. Then press either the up ⇧ arrow or down ⇩ arrow key to toggle between the **F** or **C** designation.
2. Press the **SET** key again to access the **heat** mode setpoint temperature. The LCD will display the current setpoint temperature and the **S1** annuciator will be blinking to indicate that the control is in the setpoint mode. Press either the up ⇧ key to increase or down ⇩ key to decrease the setpoint to the desired temperature.
   Note: Heat mode temperature must be set at the same as the cooling mode or below.
3. Press the **SET** key again to access the heating mode differential temperature. The LCD will display the current differential and the **DIF 1** annuciator will be blinking to indicate that the control is in the differential mode. Then press either up ⇧ key to increase or the down ⇩ key to decrease the differential to the desired setting (minimum 1˚F, maximum 30˚F).
4. Press the **SET** key again to select heat mode. The LCD will display the current mode: **C1 or H1.** Then press either up ⇧ key to increase or the down ⇩ key to select the correct Stage 1 mode. Stage 1 **MUST** be in the **H1 heating** mode for correct operation.
5. Press the **SET** key again to access the **cooling** mode setpoint temperature. The LCD will display the current chill setpoint temperature and the **S2** annuciator will be blinking to indicate that the control is in the setpoint mode. Then press either the up ⇧ key to increase or down ⇩ key to decrease the setpoint to the desired temperature. **S2** should be set for the same temperature as the heating mode or higher.
   Note: Cooling mode temperature must be set at the same as the heating mode or higher.
6. Press the SET key again to access the chill mode differential temperature. The LCD will display the current differential and the **DIF 2** annuciator will be blinking to indicate that the control is in the differential mode. Then press either up ⇧ key to increase or the down ⇩ key to decrease the differential to the desired setting (minimum 1°F, maximum 30˚F). **DIF1** and **DIF2** should both be set to the same value for best results.
7. Press the **SET** key again to access the **cooling** mode. The LCD will display the current mode: **C2 or H2**. Stage 2 **MUST** be in the **C2 cooling** mode for correct operation.
8. Press the **SET** key again to exit programming mode. Controller will display current water temperature.

Controller will automatically drop out of "program mode" and return to "operating mode" 30 seconds after last key press.

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Chiller or Heat Pump Maintenance

Heat Exchanger Cleaning:

The heat exchanger should be cleaned approximately every 12 months or as needed to allow proper performance. On some models this process may be done without removal of the heat exchanger shell. (i.e., water flushing system)

WARNING:

When using bleach and acid special care should be observed.
Always wear hand, eye and body protection. Use rubber gloves.

DO pour acid or bleach into the water. **DO NOT** pour water into acid or bleach solution. **DO NOT** perform acid and bleach flushing at the same time. The gas generated by the mixture is poisonous and can result in serious injury or death.

To remove organic deposits from titanium tube bundle without removing the shell:

1. Isolate the heat exchanger. (see drawing next page)
2. Mix 1 part bleach to 3 parts distilled water in 20 gallon tank or larger container.
3. Circulate via pump the solution through heat exchanger for approximately one to two hours or as needed.
4. Thoroughly rinse heat exchanger with clean water.

To remove mineral deposits from titanium tube bundle:
Use the same steps as above, but use muriatic acid instead of bleach. Be sure to follow the muriatic acid manufacturer's instructions for use and safety.



Water-cooled Condenser Cleaning:

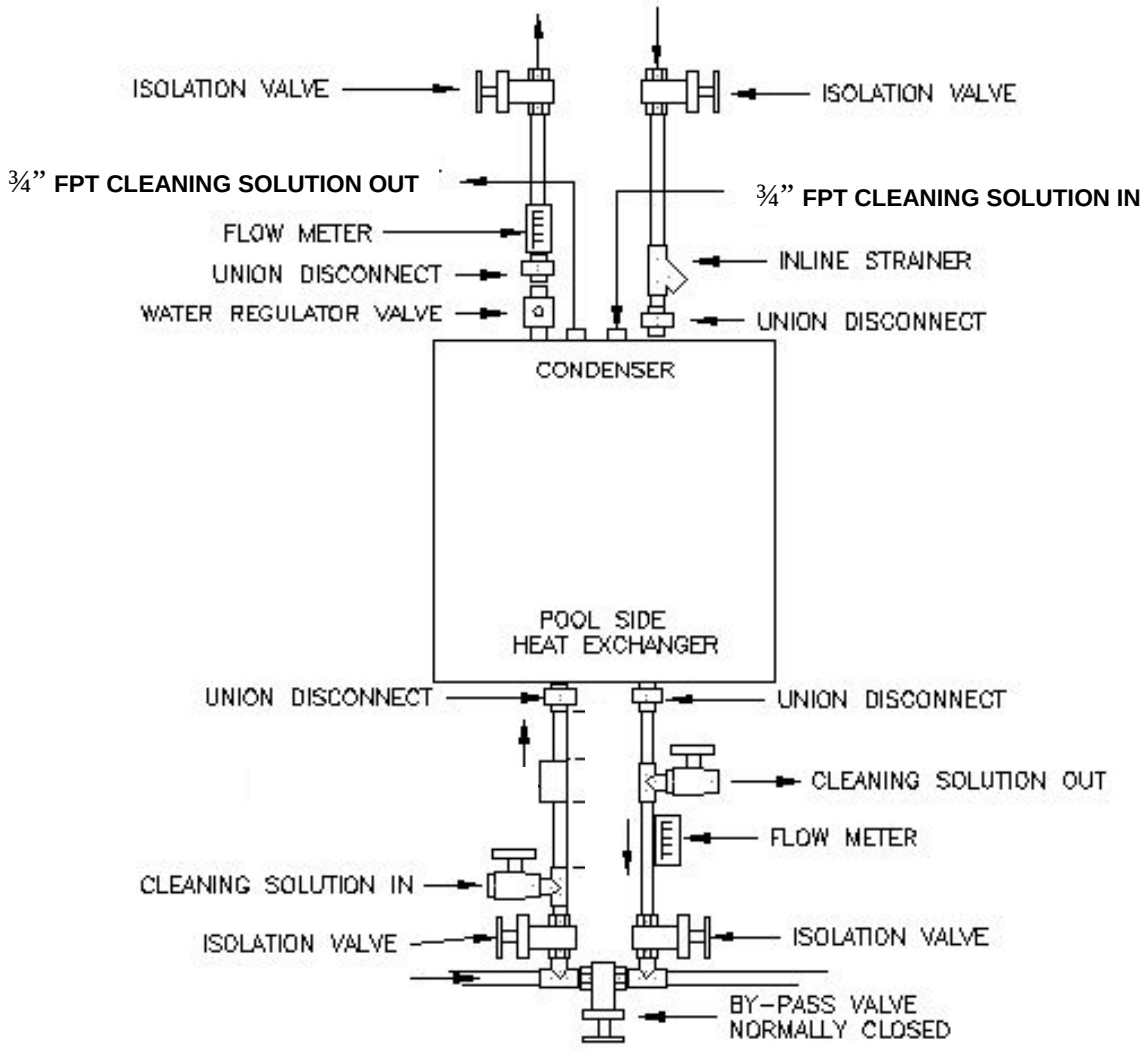
The condenser should be cleaned approximately every 12 months or as needed to allow proper performance.

Use mix of 1 part acid to 3 parts distilled water.
To remove mineral deposits:

1. Isolate condenser from water supply.
2. Remove threaded brass pipe plugs.
3. Connect recirculation flushing system to chiller / heat pump. (see drawing next page)
4. Circulate the cleaning solution for at least one hour
5. Flush condenser with clean water.
6. Install brass pipe fittings and check for water leaks.

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Chiller or Heat pump by-pass plumbing



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Troubleshooting Your Chiller

While your Aqua Logic chiller or heat pump has been designed and manufactured to provide years of reliable service, there may be an occasion where the unit does not operate correctly. The following chart provides guidelines to restore the unit to service or to provide information in helping us to diagnose and repair the chiller.

Items marked with an asterisk (*) should be performed only by Aqua Logic or a qualified electrical or refrigeration technician upon authorization from Aqua Logic. Call Aqua Logic **BEFORE** calling in a technician (See notes on the next page).

Chiller or Heat pump doesn't run.

Possible Cause	Possible Solution
Chiller is not connected to power.	Connect chiller to electrical supply.
There is no power to the chiller.	Reset circuit breaker or replace fuse.
Compressor does not operate.	Repair any loose wiring in chiller.*
Possible controller failure.	Replace controller

Chiller or heat pump runs but doesn't shut off and water temperature drops below setpoint.

Sensor not properly sensing the water temperature.	Check sensor position in dry sensor well. May be sensing air/ water mixture.
Controller not properly programmed	Program controller according to controller instructions.
Defective controller or sensor	Troubleshoot controller using controller instructions.

Chiller or heat pump appears to be running properly but water is not chilling or heating adequately.

Excessive mineral accumulation in condenser coil.	Remove accumulated minerals using procedure on page 8.
Inadequate water flow.	Make sure any filters ahead of chiller or heat pump are clean. Make sure pump is rated to provide proper flow. Make sure there are no kinks in the flexible hoses. Make sure there are no obstructions in the plumbing. Make sure that ice hasn't built up in heat exchanger or coil.
Excessive organic (slime) accumulation in heat exchanger or coil.	Remove accumulated organics using procedure on page 8.
Excessive mineral accumulation in heat exchanger or coil.	Remove accumulated minerals using procedure on page 8.
Refrigerant levels may be low.	Have refrigeration technician take pressure readings and inspect for leaks and recharge system in necessary.*
Other	Call Aqua Logic, Inc. for assistance.*

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Chiller or heat pump runs for a few minutes and shuts off (short cycles).

Controller indicator shows that controller is cycling chiller on and off.	Make sure controller sensor is installed fully in the sensor well in the heat exchanger. This can cause a false temperature reading.
Low or no water flow to condenser	

Controller indicates chiller or heat pump is "ON" but chiller or heat pump is shutting off (short cycles)**.**

Water temperature too high. (Heat exchanger)	Lower water temperature within normal range.
Defective compressor overload relay.	Replace compressor high-temp overload relay.*
Compressor doesn't run.	Replace defective compressor.*
Refrigerant levels may be low or gone.	Have refrigeration technician take pressure readings and inspect for leaks and recharge system in necessary.*
Compressor very noisy.	Have technician inspect for correct refrigerant pressures.*

Controller indicates chiller or heat pump is "ON" but chiller or heat pump is off.

Three phase monitor has fault displayed.(If equipped)	See instructions for fault explanation.
High pressure cutout trip.	Low or no water flow to condenser. Check water flow and reset pressure switch. (see picture below)
Heat exchanger flow switch trip. Water flow to heat exchanger low or off.	Make sure any filters ahead of chiller or heat pump are clean. Make sure pump is rated to provide proper flow. Make sure there are no kinks in the flexible hoses. Make sure there are no obstructions in the plumbing. Make sure that ice hasn't built up in heat exchanger or coil.
Low pressure cutout trip. Refrigerant levels may be low or gone.	High/low pressure cutout has disconnected the power. Have refrigeration technician take pressure readings and inspect for leaks and recharge system as necessary.*

Notes:

We recommend that you call Aqua Logic **(858) 292-4773** for technical assistance **BEFORE** attempting any repairs on your chiller.

In accordance with our published warranty, Aqua Logic will not pay for repairs or service on any of our chillers (in or out of warranty) without prior approval in writing or a verbal Repair Authorization (RA) issued by Aqua Logic, Inc.



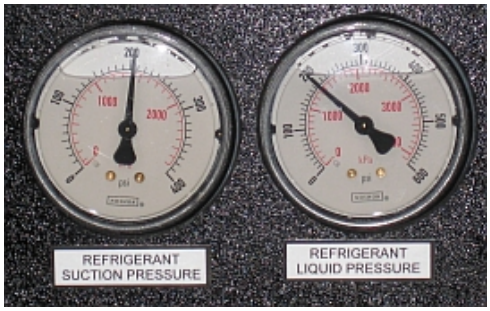
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Hi / Low refrigerant pressure cutout switch

The pressure switch serves a both a high and low refrigerant safety cutout to protect the chiller. If there is no water or low water flow through the condenser the pressure will build-up and cause the switch to trip off. Also, when there a refrigerant leak, the switch will protect the chiller from functioning.

To reset the switch:

1. Check liquid and suction refrigerant gauges to see which one is causing the pressure switch to cutout.
2. Locate the hole on the clear cover.
3. Insert finger in the hole and press the brass button. (See Chiller Trouble Shooting Chart Page 11)





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TROUBLE SHOOT INDICATORS (4 LIGHT SYSTEM)

● HI / Low Pressure ● Flow switch ● Cycle ● Power	Check for main power disconnect or power switch on the side of unit.
● HI / Low Pressure ● Evaporator Flow ● Cycle ☼ Power	Check voltage monitor for faults or settings. Check HI / LOW Refrigerant pressure cutout switch. Maybe low on refrigerate or high condenser water temperature. Check pressure gauges for low refrigerant charge. Once problem is fixed, push the reset button on the front of switch
☼ HI / Low Pressure ● Evaporator Flow ● Cycle ☼ Power	Check heat exchanger (evaporator) for water flow.
☼ HI / Low Pressure ☼ Evaporator Flow ☼ Cycle ☼ Power	Unit is functioning correctly. The green CYCLE light will go on and off when compressor is cycling on and off. Note: The unit has a 3 to 5 minute time delay.



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TROUBLE SHOOT INDICATORS (5 LIGHT SYSTEM)

● Voltage Monitor ● HI / Low Pressure ● Pool Flow switch ● Cycle ● Power	Check for main power disconnect or power switch.
● Voltage Monitor ● HI / Low Pressure ● Pool Flow Switch ● Cycle ☼ Power	Check voltage monitor for faults or settings.
☼ Voltage Monitor ● HI / Low Pressure ● Pool Flow Switch ● Cycle ☼ Power	Check HI / LOW Refrigerant pressure cutout switch. Maybe low on refrigerate or high condenser water temperature or no water flow. Check pressure gauges for low refrigerant charge. Once problem is fixed, push the reset button on the front of the switch.
☼ Voltage Monitor ☼ HI / Low Pressure ● Pool Flow Switch ● Cycle ☼ Power	Check for the required pool water flow rate through unit. If the water rate is below the rating required the flow will turn the unit off.
☼ Voltage Monitor ☼ HI / Low Pressure ☼ Pool Flow Switch ● Cycle ☼ Power	Unit is functioning correctly. The green CYCLE light will go on and off when compressor is cycling on and off. Check temperature controller to see if the S1 is in the upper left corner of the display. **Note: The unit has a 3 to 5 minute time delay before the unit will turn on between on /off cycles.**



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CHILLER AND HEAT PUMP
LIMITED WARRANTY TERMS
(PLEASE READ CAREFULLY)**:**

All Aqua Logic Multi-temp Water-cooled Chillers and Titan Water-cooled Heat Pumps are warranted against defects and workmanship for a period of one (1) year from the date of original end-user purchase. The limited one year warranty covers only the parts and labor based upon Aqua Logic service cost and Aqua Logic is not liable for field repair work without prior written or verbal agreement with Repair Authorization (RA) number with a fixed maximum charge.

On split chiller and heat pump installations, Aqua Logic will not warranty refrigerate components and copper lines between condenser and heat exchanger.

The warranty applies only to the original purchaser and is not transferable.

The warranty covers only the repair or replacement of Aqua Logic products and is limited to Aqua Logic's cost of defective parts.

Once Aqua Logic determines that the defect is due to parts or workmanship and that the product is under warranty, Aqua logic will repair or replace the product solely at their discretion.

Our warranty does not include the following:

- Damage caused by freezing, inadequate or no water flow.
- Damage caused by improper installation or maintenance by user or their agent.
- Damage caused due to misapplication of the product.
- Damage caused by corrosion, abuse, accident, alteration or improper use.
- Damage caused by flood, fire, earthquake, tornado or other acts of God.
- Damage caused by electrical spikes, surges, brownouts or improper voltage or amperage.
- Damage caused by failure of any third party equipment (ie., controller, pump, etc.)
- Incidental damage to other equipment, property or livestock.
- Damage caused by a refrigeration technician in the field with poor installation technique ie., incorrect refrigerant copper line size between condensing unit and heat exchanger, bad brazed copper joints and dirty copper lines.

In the event of a defect or failure of the product, immediately contact Aqua logic for assistance. Aqua Logic will at their discretion:

- Provide user-replaceable parts to restore the unit to proper operation.
- Provide a Repair Authorization (RMA) number with a specified dollar limit for a qualified technician to provide a field repair.
- Provide a Return Authorization (RMA) number to return the unit with original packaging to Aqua Logic, Inc., 9558 Camino Ruiz, San Diego, CA 92126 by prepaid freight. You need to include the serial number as well as proof of purchase and /or a copy of the original bill of sale along with the RMA number. COD shipments will be refused

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Chiller / Heat Pump Start-up

Customer / Job Name:			Location / Building / Exhibit				
Service Company Name			Service Tech Name				
			Phone / Cell no.				
			Email:				
Start-Up Date		Time:		Start		Finish	
Model No.			Manufactured Date:				
Serial No.							
Unit Run Volts / phase 1 or 3			L1-L2		L2-L3		L1-L3
Unit Run Amps			L1		L2		L3
Evaporator water flow rate			GPM				
Evaporator entering water temperature			(˚F)		PSIG		
Evaporator leaving water temperature			(˚F)		PSIG		
Condenser water flow rate			GPM				
Condenser entering water			(˚F)		PSIG		
Condenser leaving water			(˚F)		PSIG		
Refrigerant type							
Refrigerant Suction Side			PSIG		(˚F)		
Refrigerant Liquid Side			PSIG		(˚F)		
Superheat ˚F							
Comments:							

Start-up procedure:

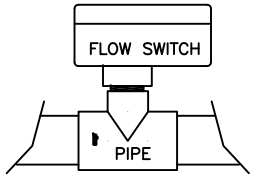
Caution: It's important to allow the oil in the compressor(s) to warm-up at least 24 hours before starting up the unit. If the ambient air temperature is below 60˚F, apply power to the unit and set controller so the compressor(s) do not energize or by-pass the heat exchanger water supply so the flow switch will not activate the unit.

1. Remove the cover of the unit. (If applicable)
2. Attach refrigeration suction and liquid hoses or use the gauges on unit. Attach an Amp / Volt meter to the unit.
3. Turn on water pump to heat exchanger (Evaporator) and the condenser.
   Note: (Make sure water flow rate is within published flow rate of the chiller / heat pump.)
4. Adjust the controller below the indicated water temperature to turn on the unit.
   (After 2-5 minutes the compressor should activate.)
5. Once the compressor(s) are running for approximately 15 minutes, record the information that's listed above.
6. For Heat Pumps, cycle the unit from chilling to heating to make sure the reversing valve is functioning correctly.

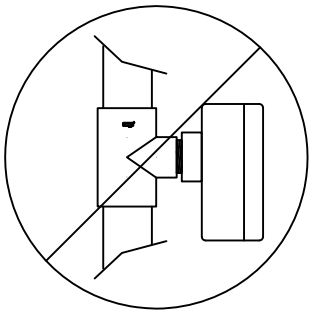
I certify that this unit above is functioning correctly at the time of start-up and is ready for operation.

Service Tech Sign		Customer Sign:		Date:	

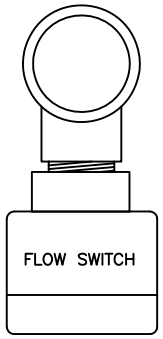
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Tel: (858) 292-4773 • Fax: (858) 279- 0537 • Email: info@aqualogicinc.com • www.aqualogicinc.com



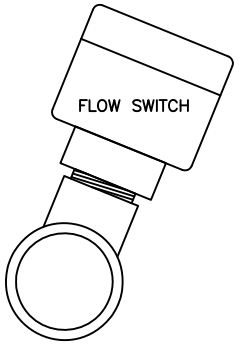
YES



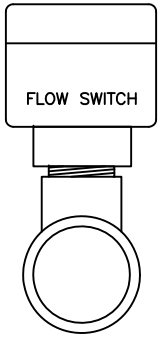
DO NOT MOUNT VERTICALLY



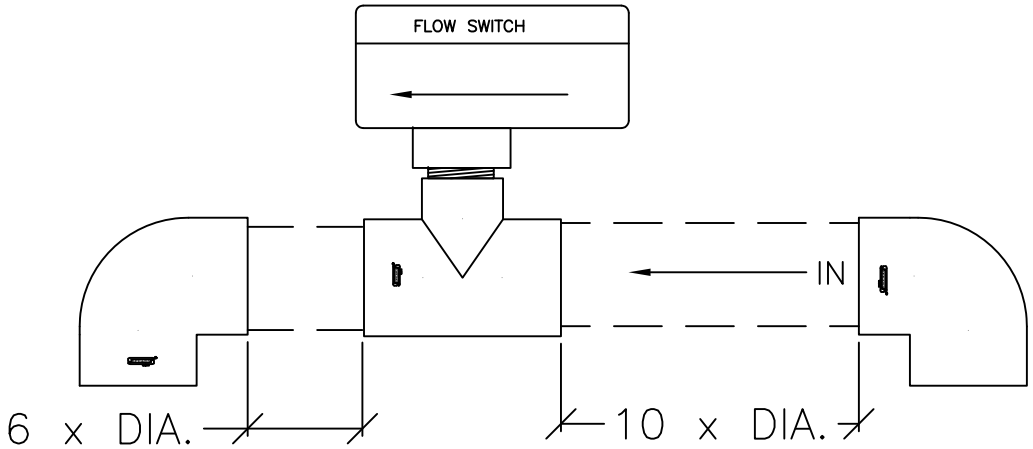
NO



NO



YES



INSTALLATION NOTE:

"FLOW CONTROL" FLOW SWITCH AND TEE FITTING IS FIELD INSTALLED ON TOP OF A HORIZONTAL STRAIGHT PIPE WITH NO LESS THAN 10 TIMES THE DIAMETER OF STRAIGHT ON THE INLET SIDE AND NO LESS THAN 6 TIMES THE DIAMETER ON THE OUTLET SIDE

TITLE	FLOW SWITCH PLUMBING NOTE	PROJECT	FLOW SWITCH	FILE	C:\AutoCad Files\Controls\3in Flow Switch Plumbing Note 4-24-13.dwg	DRAWING NO	FS-01	EDITED	7/1/2015	SCALE	1:1
		CLIENT	AQUA LOGIC INC			DRAWN BY	CEPPS	CREATED	4/24/2013	PAGE	1 of 1

AQUA LOGIC, INC
9558 CAMINO RUIZ,
SAN DIEGO, CA 92126

ICM450

Programmable Three Phase Voltage Monitor with 25-Fault Memory

Protects motors from premature failure and burnouts



Installation, Operation & Application Guide

For more information on our complete range of American-made products – plus wiring diagrams, troubleshooting tips and more, visit us at **www.icmcontrols.com**

Specification

Input
- **Line Voltage:** Universal, 190-630 VAC
- **Frequency:** 50-60 Hz
- **Load Side Monitoring:** Optional
- **Control Voltage:** 18-240 VAC
- **Frequency:** 50-60 Hz

Output
- **Type:** Relay, SPDT
- **Voltage Range:** 240VAC @ 10A maximum
- **Frequency:** 50-60 Hz

Control Operating Temperature
- **Operating Temperature:** -40ºF to +167ºF (-40ºC to +75ºC)
- **Storage Temperature:** -40ºF to +185ºF (-40ºC to +80ºC)

LCD Operating Temperature
- **Operating Temperature:** -4ºF to +167ºF (-20ºC to +75ºC)

Mechanical
- **Mounting:** Surface mount using (2) #8 screws
- **Terminations:** Screw terminals
- **Weight:** 12 ounces (341 grams)

Dimensions
- 6 1/2" L, 4 1/4" W, 1 3/8" H (16.5 cm. L, 10.8 cm. W, 3.5 cm. H)

Parameters

Phase Unbalance Protection
- **Voltage Unbalance:** 2-20% adjustable

Over/Under Voltage Protection
- **Under Voltage:** 2-25% adjustable
- **Over Voltage:** 2-25% adjustable

Phase Loss Protection
- **Phase Loss Condition:** Equals 25% of nominal for any given phase; system will shut down and a fault will be recorded should this occur

Delay on Break Timer
- **Control Voltage:** 18-240 VAC
- **Time Delay:** 0 to 10 minutes adjustable

Fault Interrogation Delay
- **Time Delay:** 0 to 15 seconds adjustable
- Provides a delay between fault detection and system shutdown - helps to eliminate nuisance trips or unnecessary shutdowns

Caution

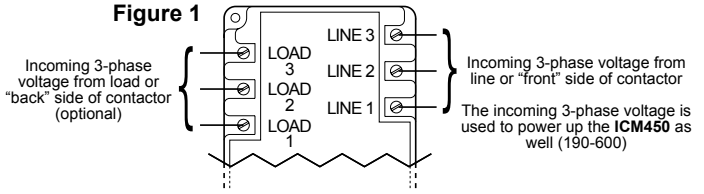
Installation of the ICM450 shall be performed by trained technicians only. Adhere to all local and national electric codes.

Disconnect all power to the system before making any connections.

Installation

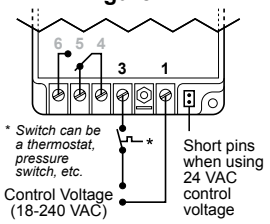
1. Using (2) #8 screws, mount the **ICM450** in a cool, dry, easily accessible location in the control panel.
2. Connect voltage as shown in Figure 1 (below). Leave existing line and load side connections intact on the contactor.
3. Load side monitoring is optional (unit may be used to monitor line side only). Wire the contactor and optional control voltage monitoring as in Figures 2 and 3 (below).
   ⁂ **Note:** *Load/line wire must be rated for 3-phase voltage rating, 20ga minimum.*
4. Upon application of power, the **ICM450** will be on line and will begin to monitor the system.

Figure 1



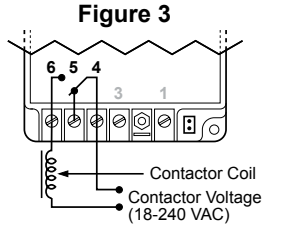
- Terminals 1 and 3 are the control signal input terminals
- "Control Mode" is turned ON or OFF in setup
- With "Control Mode" set to "ON," there must be a voltage present on terminals 1 and 3 for the relay output terminals 4 and 6 to close; this voltage can be supplied from a thermostat, pressure switch, etc.
- When the voltage on these terminals is re-applied, the unit will not re-energize until the delay on break (0-10 minutes) time has elapsed
- Use of terminals 1 and 3 is optional; they will be ignored if the "Control Mode" is set to "OFF"

Figure 2



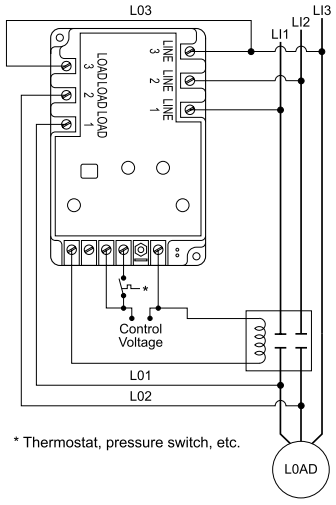
- Terminals 4 and 6 are "dry," normally open contacts
- Terminals 4 and 6 are closed when power is within specifications
- Terminals 4 and 6 open when there is a fault condition
- Terminals 4 and 6 open when there is a loss of the control signal with "Control Mode" set to "ON"

Figure 3

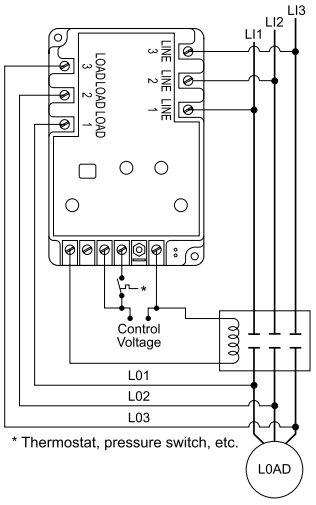


ICM450 Wiring Diagrams

2-Pole Contactor



3-Pole Contactor



Setting the Parameters

1. Press the green SETUP button to enter Setup mode. Setup LED will light.
2. Use the ∨ and ∧ arrows to change user parameters.
3. Scroll through setup by pressing and releasing the SETUP button.
4. When the last parameter has been set, the phase average will be displayed and the Setup LED will automatically turn OFF.

Button Functions

Press arrows to scroll through and select user parameter settings in Setup mode. HOLD down for fast edit.	Press to enter Setup mode and select user parameters.	Hold for voltage display a → b, b → c, a → c (simultaneously).	Press to read faults. Hold for 5 seconds to clear faults and reset memory.

Parameter	Description	Range	Default	Recommended
Line Voltage	Average phase to phase line voltage	190-600	208	Nameplate Voltage
Delay On Break	Amount of time between the load de-energizing and re-energizing	0-10 minutes	.1 minute	4 minutes**
Fault Interrogation	Amount of time before the load de-energizes due to a non-critical fault*	0-15 seconds	15 seconds	7-8 seconds**
% Over/Under Voltage	Maximum/minimum phase to phase average voltage, respectively	2-25%	20%	12-15%**
% Phase Unbalance	Amount of allowable voltage unbalance	2-20%	20%	4-5%**
Reset Mode	AUTO or number of times the load can be re-energized after a load side fault before a manual reset is necessary ⁂ **Note:** *When monitoring line side only, the reset mode will always be AUTO*	AUTO, 0-10	AUTO	AUTO
Control Mode	With control mode set to OFF, the load will energize if no 3- phase fault conditions exist; with control mode ON, the load will energize if no fault conditions exist and control voltage is present at terminals 1 and 3 of the **ICM450**	ON or OFF	ON	Based on wiring

* Non-critical faults are faults such as High/Low Voltage and Phase Unbalance. Critical faults, such as Phase Loss and Phase Reversal, have a fault interrogation of under 2 seconds and it is not user adjustable.

** For best recommendations, consult manufacturer of equipment.

Fault Conditions

Press and release fault button to scroll through all saved faults.

⁂ **Note:** *For initial setup, press and hold FAULT for 5 seconds to remove any previously stored faults.*

Fault	Problem	Corrective Action
Back Phase Loss	Not all three of the phases on the load side are present	1. Re-energize the contactor. 2. If the fault reappears after the load energizes: a. Turn all power OFF b. Check all load side connections c. Check the contacts of the contactor for debris or excess carbon.
Back Phase Rev	Loads 1, 2, or 3 are not in sequence (not 120º phase shifted)	1. Turn OFF all power. 2. Swap any 2 phases on the load side of the **ICM450** only (example: swap load 1 and load 2) * 3. Re-apply power.
Back Phase Unbalance	A voltage unbalance between the three load phases exceeds the unbalance setpoint	1. Press the **READ** button to observe the present load voltages. Check system for unbalance cause. 2. Increase the fault interrogation time if necessary. 3. Increase the percent unbalance setting if necessary.
Front Over Voltage	Average phase-phase voltage exceeds the maximum percentage	1. Check system for over-voltage cause. 2. Increase the percent over-voltage setting if necessary. 3. Increase the fault interrogation time if necessary.
Front Phase Loss	Not all three of the phases on the line side are present	1. Press and hold the **READ** button on the phase monitor or use an AC voltmeter to carefully measure all three phase-phase line voltages (***example:*** Line 1 ➔ Line 2, Line 2 ➔ Line 3, Line 3 ➔ Line 1). 2. Repair the missing phase.
Front Phase Reversal	Lines 1, 2, or 3 are not in sequence (not 120º phase shifted)	1. Turn OFF all power. 2. Swap any 2 phases on the line side of the **ICM450** (example: swap Line 1 and Line 2)* 3. Re-apply power.
Front Phase Unbalance	A voltage unbalance between the three line phases exceeds the unbalance setpoint	1. Press the **READ** button to observe the present load voltages. Check system for unbalance cause. 2. Increase the fault interrogation time if necessary. 3. Increase the percent unbalance setting if necessary.
Front Under Voltage	Average phase-phase voltage is below the minimum percentage	1. Check system for under-voltage cause. 2. Increase the percent under-voltage setting if necessary. 3. Increase the fault interrogation time if necessary.

* **Only** swap phases during initial setup, **not** after the **ICM450** has been in operation without errors.

Troubleshooting

Problem	LCD Readout	LED Status	Corrective Action
Load will not energize	Phase Avgerage	All LEDs Off	Confirm that the control input (terminals 1 & 3) is properly connected and configured
Load will not energize	Phase Avgerage	Load LED Off, Fault LED blinking	Press **FAULT** once to observe the current fault; correct the condition of the first fault that appears (see Fault Conditions above, for a list of corrective actions)
Fault LED blinks repeatedly while load is energized	Phase Avgerage	Fault LED Blinking, Load LED On	Indicates there are faults saved in the memory, press **FAULT** rapidly to scroll through saved faults; to clear the faults, press and hold **FAULT** for more than 5 seconds
Load will not de-energize when control voltage is OFF	Phase Avgerage	Load LED On, Control LED Off	The control mode setting is OFF; press **SETUP** to get to the control mode. Press ^ to set the control mode ON
Setup LED is on while load is being energized	Anything Other Than Phase Avgerage	Setup LED On, Load LED On	To exit the setup mode, press either **READ** or **FAULT**
Load will not energize	Reset	Fault LED Blinking	Unit in lockout; maximum number of retries in manual reset mode has been reached; to reset unit, press **FAULT** and hold for more than 5 seconds
Load turns ON and OFF repeatedly	Readout is Irrelevant	Fault LED Blinking	Fix load side fault; press **FAULT** to observe condition; the delay on break period may be too short; press **SETUP** to enter the delay on break mode; press ^ to lengthen the delay

ONE-YEAR LIMITED WARRANTY

The Seller warrants its products against defects in material or workmanship for a period of one (1) year from the date of manufacture. The liability of the Seller is limited, at its option, to repair, replace or issue a non-case credit for the purchase prices of the goods which are provided to be defective. The warranty and remedies set forth herein do not apply to any goods or parts thereof which have been subjected to misuse including any use or application in violation of the Seller's instructions, neglect, tampering, improper storage, incorrect installation or servicing not performed by the Seller. In order to permit the Seller to properly administer the warranty, the Buyer shall: 1) Notify the Seller promptly of any claim, submitting date code information or any other pertinent data as requested by the Seller. 2) Permit the Seller to inspect and test the product claimed to be defective. Items claimed to be defective and are determined by Seller to be non-defective are subject to a $30.00 per hour inspection fee. This warranty constitutes the Seller's sole liability hereunder and is in lieu of any other warranty expressed, implied or statutory. Unless otherwise stated in writing, Seller makes no warranty that the goods depicted or described herein are fit for any particular purpose.

ICM CONTROLS™

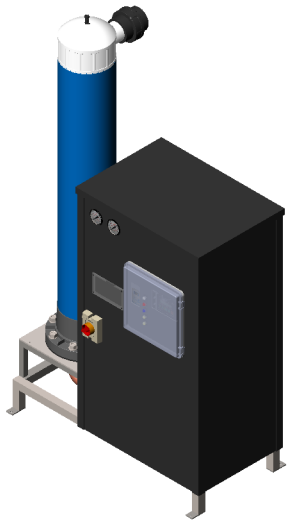
Patent No. 424,953

7313 William Barry Blvd., North Syracuse, NY 13212

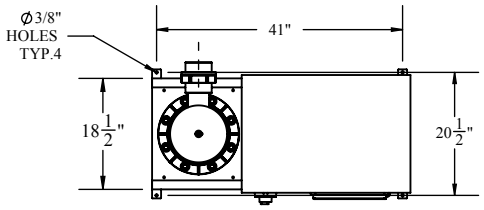
(**Toll Free**) 800-365-5525 (**Phone**) 315-233-5266 (**Fax**) 315-233-5276

www.icmcontrols.com

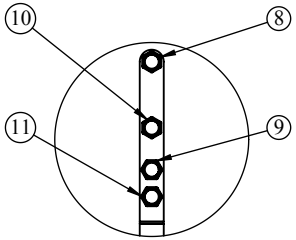
MT-9-WCTS THRU MT-20WCTS WATER COOLED CHILLER



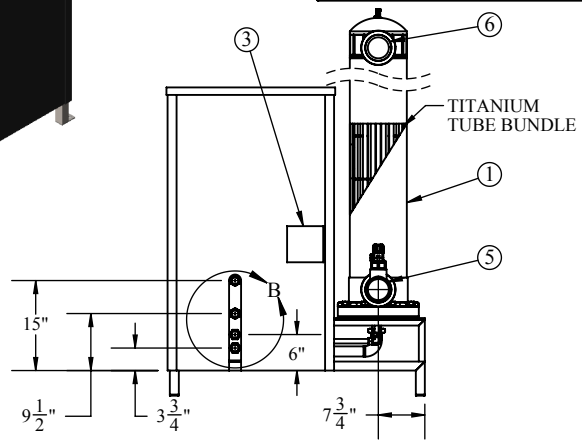
NO.	NAME
1	EVAPORATOR-TITANIUM TUBE / 8" SCH 40 PVC SHELL
2	TEMPERATURE CONTROLLER / NEMA 4X ELECTRICAL CONTROL BOX
3	JUNCTION BOX FOR SUPPLY POWER
4	WATER FLOW SWITCH (SEE NOTE FOR INSTALLATION)
5	3" NPS SLIP UNION EVAPORATOR WATER INLET
6	3" NPS SLIP UNION EVAPORATOR WATER OUTLET
7	LOW / HI REFRIGERANT PRESSURE SAFETY CUTOUT
8	CONDENSER WATER OUTLET
9	CONDENSER WATER INLET
10	CONDENSER WATER CLEAN OUT OUTLET
11	CONDENSER WATER CLEAN OUT INLET
12	REFRIGERANT PRESSURE GAUGES
13	POWER DISCONNECT SWITCH



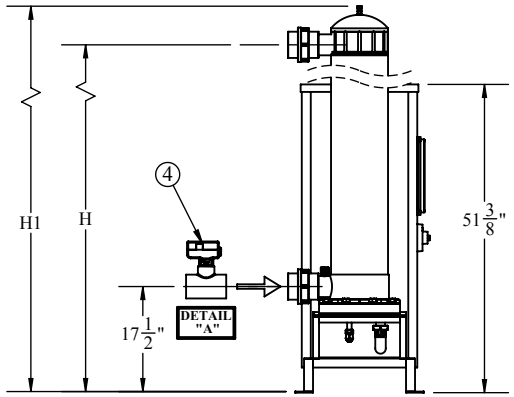
PLAN VIEW



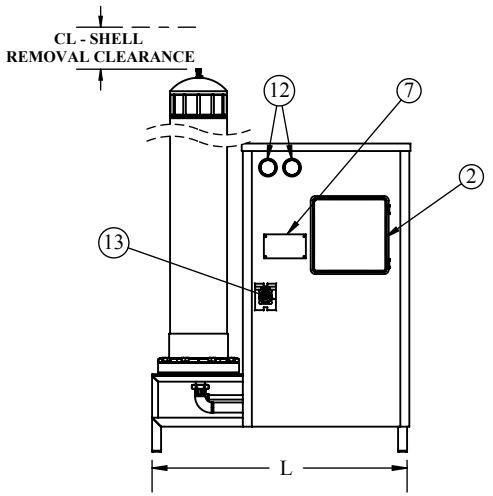
DETAIL B



BACK



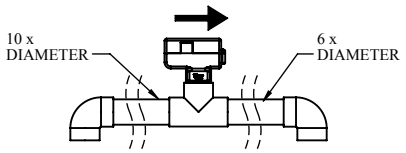
LEFT



FRONT

MULTI-TEMP WATER-COOLED CHILLER

MODEL NO.	NOMINAL TON / BTUH	VOLTZ / PHASE	COMPRESSOR NO. / TONS	AMPERAGE RLA / LRA	EVAPORATOR WATER FLOW MIN / MAX (GPM)	CONDENSER WATER FLOW (GPM) / PSI DROP @ 65°F ENTERING	CONDENSER WATER CONNECTIONS (NFPT)	L	H	H1	CL	SHIPPING DIMENSIONS (IN.)
MT-9-WCTS	7.5 / 90,000	208-240 / 1	1 / 7	25 / 164	120 / 160	5 / 4	3/4"	44"	46"	52"	36"	48 x 28 x 58
MT-9-460-WCTS	7.5 / 90,000	460 / 3	1 / 7.5	10 / 100	120 / 160	5 / 4	3/4"	44"	46"	52"	36"	48 x 28 x 58
MT-10-WCTS	10 / 120,000	208-240 / 3	1 / 10	36 / 240	120 / 160	9 / 4	1"	44"	56"	60"	46"	48 x 28 x 66
MT-10-460-WCTS	10 / 120,000	460 / 3	1 / 10	17 / 114	120 / 160	9 / 4	1"	44"	56"	60"	46"	48 x 28 x 66
MT-15-WC	15 / 180,000	208-240 / 1	2 / 7.5	25 / 164	120 / 180	13 / 4	1"	60"	74"	78"	64"	66 x 28 x 84
MT-15-460-WC	15 / 180,000	460 / 3	2 / 7.5	13 / 100	120 / 180	13 / 4	1"	60"	74"	78"	64"	66 x 28 x 84
MT-20-WC	20 / 240,000	208-240 / 3	2 / 10	36 / 240	120 / 180	17 / 4	1 1/2"	60"	86"	90"	76"	66 x 28 x 95
MT-20-460-WC	20 / 240,000	460 / / 60	2 / 10	17 / 114	120 / 180	17 / 4	1 1/2"	60"	86"	90"	76"	66 x 28 x 95



**** IMPORTANT!**
-DETAIL "A"
-FLOW SWITCH MUST BE FIELD INSTALLED VERTICALY ON A HORIZONTAL STRAIGHT PIPE WITH NO LESS THAN 10 TIMES THE PIPE DIAMETER ON THE INLET SIDE AND NO LESS THAN 6 TIMES THE DIAMETER ON THE OUTLET SIDE.

NOTES
- WHEN THE CHILLER IS IN THE OFF CYCLE,WATER FLOWING THROUGH THE CONDENSER IS STOPPED.
- WATER FLOW RATE THROUGH THE EVAPORATOR NEEDS TO BE MAINTAINED CLOSE TO MAXIMUM GPM WHEN THE WATER TEMPERATURE IS 55 °F AND BELOW.
- ALL UNITS ARE 60 HZ.
- CONDENSER FLOW RATE IS BASED ON A MINIMUM OF 55°F AND MAXIMUM OF 75°F WATER TEMPERATURE. IF OPERATING OUTSIDE THESE PARAMETERS CONTACT AQUA LOGIC TECHNICAL SUPPORT.
- IF MAINTAINING AN EVAPORATOR WATER TEMPERATURE BELOW 55 °F CONSULT AQUA LOGIC TECHNICAL SUPPORT.
- THE SPECIFIED AMPERAGE IS BASED ON UNITS RUNNING WITH A 75°F INFLUENT EVAPORATOR WATER TEMPERATURE.
- NOMINAL AMPERAGE CAN CHANGE WITH ON HEAD PRESSURE.
- ALL DIMENSIONS ARE APPROXIMATE AND CAN CHANGE AT ANY TIME.

OPTIONS:
- SCH 80 PVC SHELL CONSTRUCTION.
- 316 STAINLESS STEEL STAND AND HEX BOLTS.

aqua LOGIC
Aquatic Design, Manufacturing & Integration
9558 Camino Ruiz, San Diego, CA 92126

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DRAWING #	SHEET TITLE
PDF-0097	MT-9 THRU MT-20-WCTS SPECIFICATIONS

DESCRIPTION				
MT-9 THRU MT-20-WCTS WATER COOLED CHILLER.				
DRAWN BY	**DATE**	**REVISION**	**SCALE**	**SHEET #**
Arnaldo Guzman	6/8/2016		1:32	1 OF 1