



**BALTIMORE
AIRCOIL COMPANY**



Universal Electric Water Level Control

INSTALLATION, OPERATION & MAINTENANCE MANUAL





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INSTALLATION, OPERATION & MAINTENANCE »
UNIVERSAL ELECTRIC WATER LEVEL CONTROL

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BAC Electric Water Level Controls (EWLC) are state of the art, conductivity actuated, probe type liquid level controls. The hermetically sealed EWLC are engineered and manufactured specifically for use in evaporative cooling systems and are now equipped with a status code L.E.D. which illuminates to indicate status including when the water and/or probes are dirty. They have a universal mounting system designed to fit on any tower.

The EWLC-IM-3 is a three probe control used to maintain the proper operating level when connected to a normally closed (NC) solenoid valve. The EWLC-IM-4 control adds an additional probe for use as a low water cutout for basin heater protection, low water alarm, or high water alarm. The ELWC-IM-5 control adds a fifth probe. The two additional probes can be used for high alarm/low alarm, low alarm/heater cutout or as high alarm/heater cutout. The EWLC-IM-6 is supplied with six probes and the three additional probes are used for high alarm/low alarm/heater cutout.

Parts Checklist

See below for a parts checklist for the following electronic water level control models:

1. EWLC-IM-3, 3 Probe Control
2. EWLC-IM-4, 4 Probe Control
3. EWLC-IM-5, 5 Probe Control
4. EWLC-IM-6, 6 Probe Control

Quantity	Description
1	Stilling Chamber, 2" PVC Pipe
1	2" S x F PVC Coupling
2	Universal Mounting Bolts
2	2" U-Bolt
4	Plastic Wing Nut
1	Tank Fitting for Wiring Cable
8	Self Tapper, 5/16" x 3/4"
8	Seal Washer, 5/16"
8	Bolt 5/16" x 1"
8	Nut, 5/16" – UNC
8	Flat Washer, 5/16"
8	Lock Washer, 5/16"
1	Roll Sealer Tape



NOTE: Parts are provided for universal installation. Not all parts will be required for installation.

Installation

NOTE: Power wiring, disconnects, fusing, and auxiliary control wiring are by others and must comply with all applicable codes and ordinances.

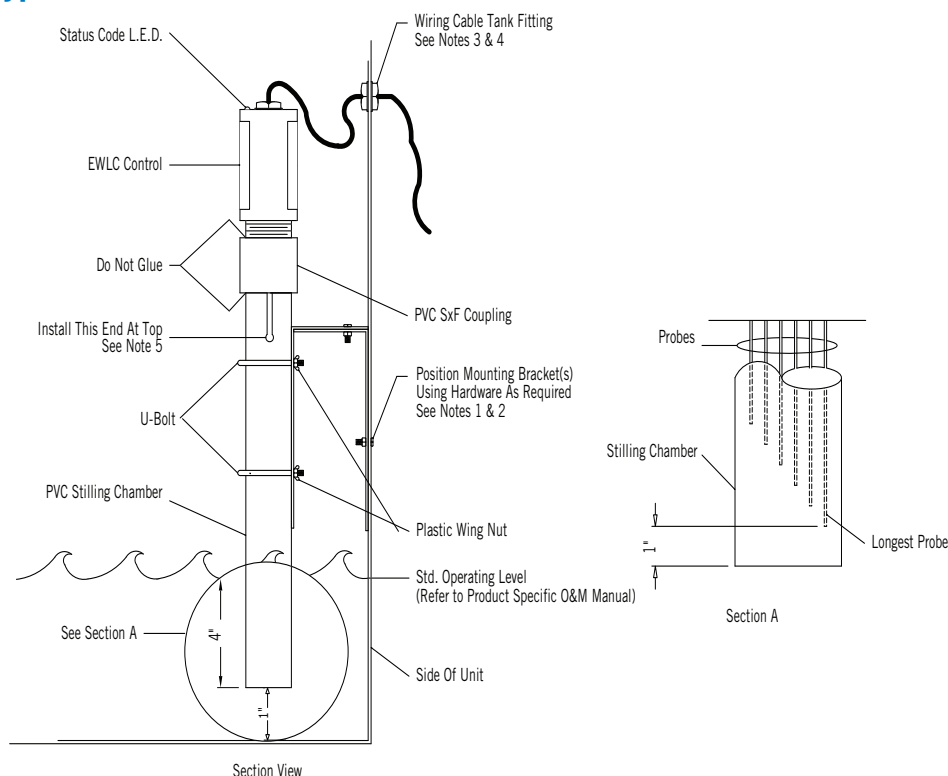


1. Select a suitable mounting location in the tower. Mount near a door or access way for easy adjustment or cleaning.
2. Use mounting brackets and hardware as needed for installation.
3. Attach the stilling chamber, 2" S x F PVC Coupling, and probe assembly to the mounting bracket with 2 U-bolts and plastic wing nuts (see Typical Installation below). **Do not glue** any of these parts together. They are designed to be taken apart for easy, routine maintenance.
4. Set operating level. The water level set point (valve open) is 4" above the bottom of the stilling chamber. Check the unit Operation and Maintenance Manual for the proper operating level.
5. Drill a 7/8" hole in the tower casing to pass the wiring cable to the outside of the unit. Attach the water tight, "through-the-wall", tank fitting. Leave adequate slack in the wiring inside the tower to allow the control assembly to be removed from the stilling chamber for cleaning.
6. Wire the control per the proper diagrams as shown on **pages 3** through **7**.
7. A normally closed (NC), 120 VAC slow closing, solenoid valve is required on the make-up line. Refer to the chart (**page 9**) for suggested valve sizing. These valves are available as an accessory from your local BAC Representative.
8. Hand fill the cooling tower until the water level is 1/2" below the overflow connection.
9. Energize the system.
10. Check the tower periodically during the first few hours of operation to ensure the control is working properly and the water level is set properly.
11. The water level may be adjusted by simply loosening the U-bolts and repositioning the control assembly.

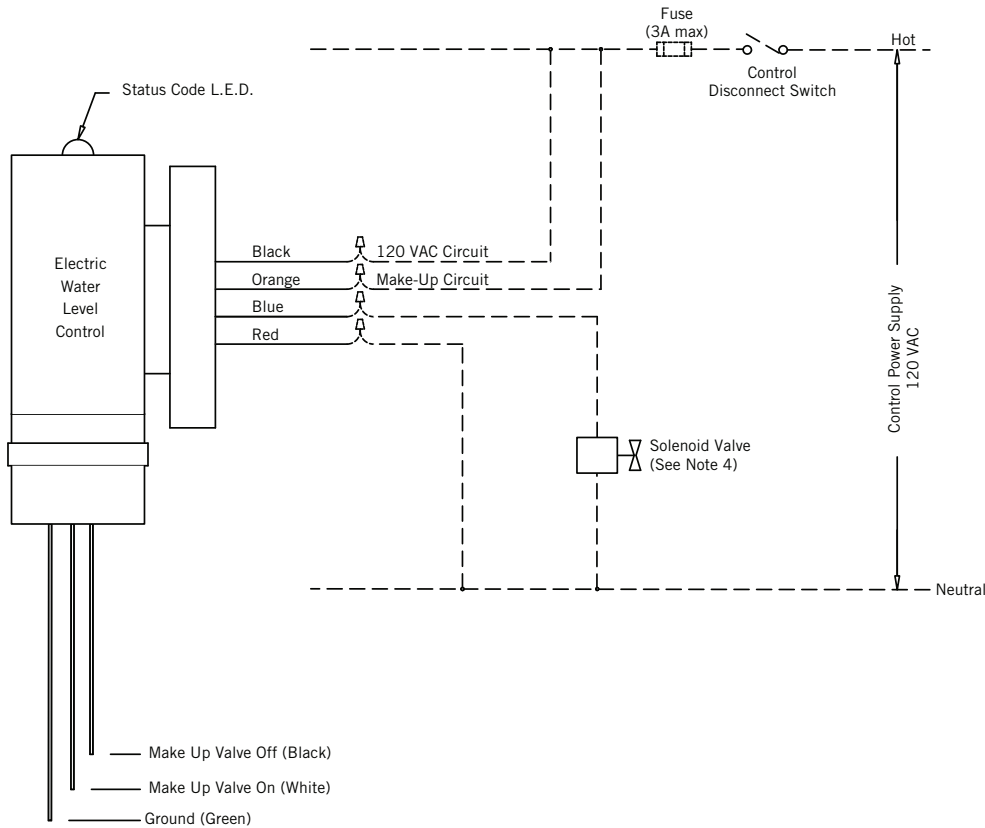
Typical Installation

NOTES:

1. Drill 1/4" hole for tappers.
2. Drill 11/32" pilot for bolts.
3. Drill 7/8" hole for cable tank fitting.
4. Leave adequate slack in wiring cable to allow the control head to be lifted from the stilling chamber for inspection and cleaning.
5. Do not cut this end. The purpose of the slot at this end is to vent air.



3-Probe



Installation, Operation and Maintenance

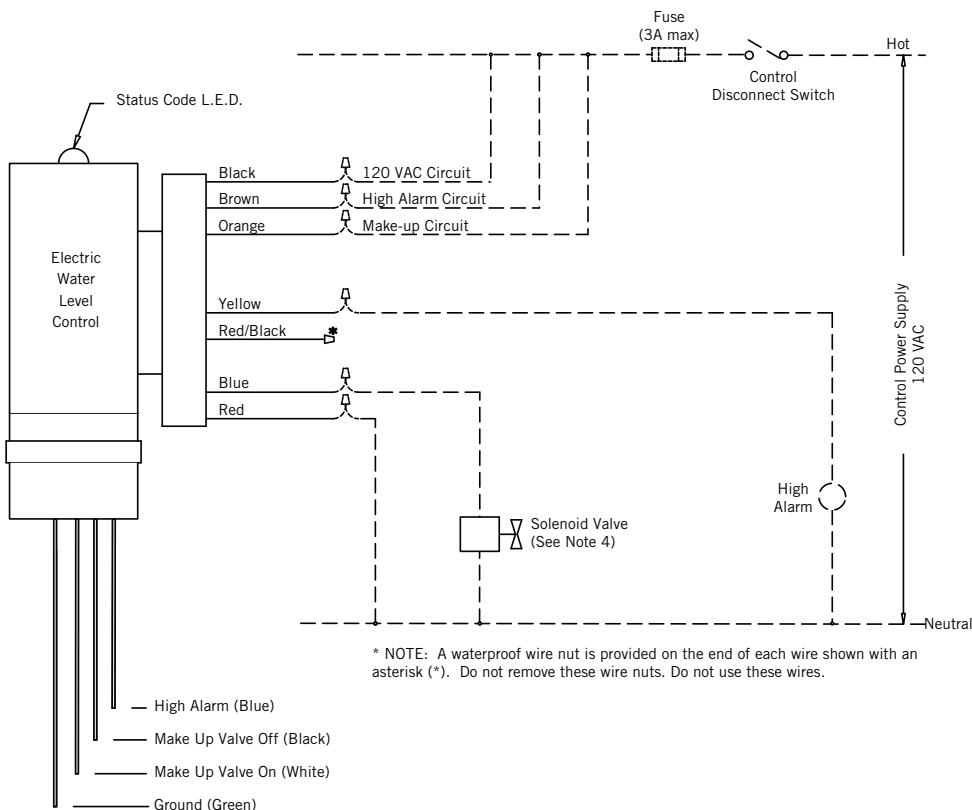
Installation

- Typical Installation
- 3-Probe
- 4-Probe, High Alarm



NOTE: Reference notes on **page 8**.

4-Probe, High Alarm



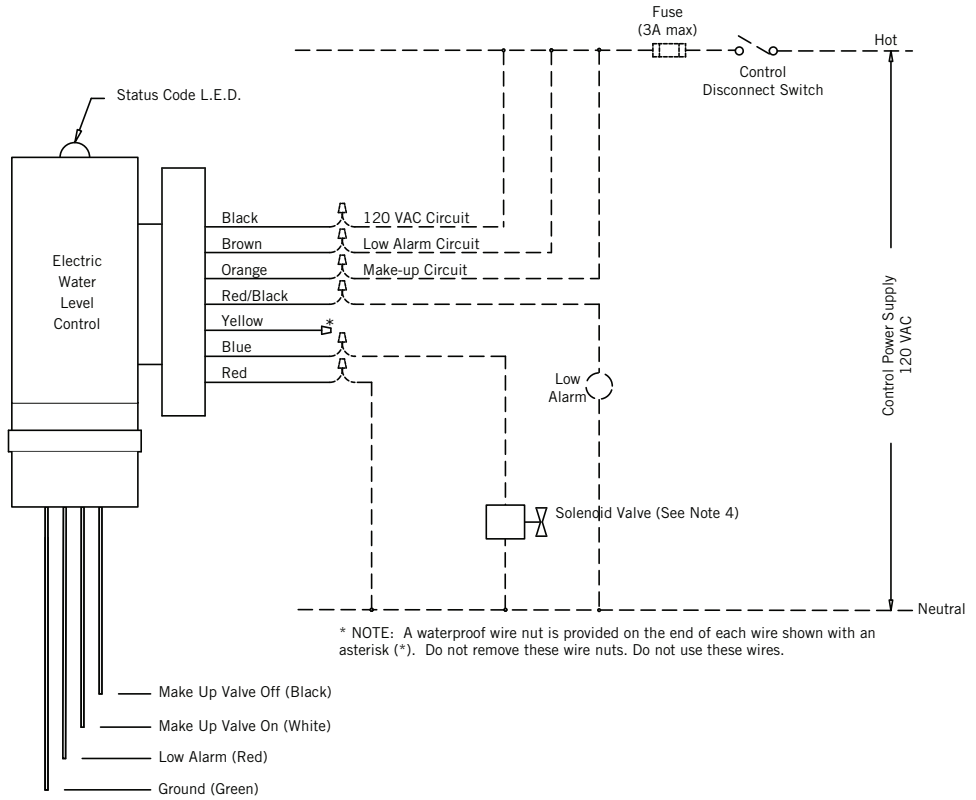
* NOTE: A waterproof wire nut is provided on the end of each wire shown with an asterisk (*). Do not remove these wire nuts. Do not use these wires.



NOTE: Reference notes on **page 8**.

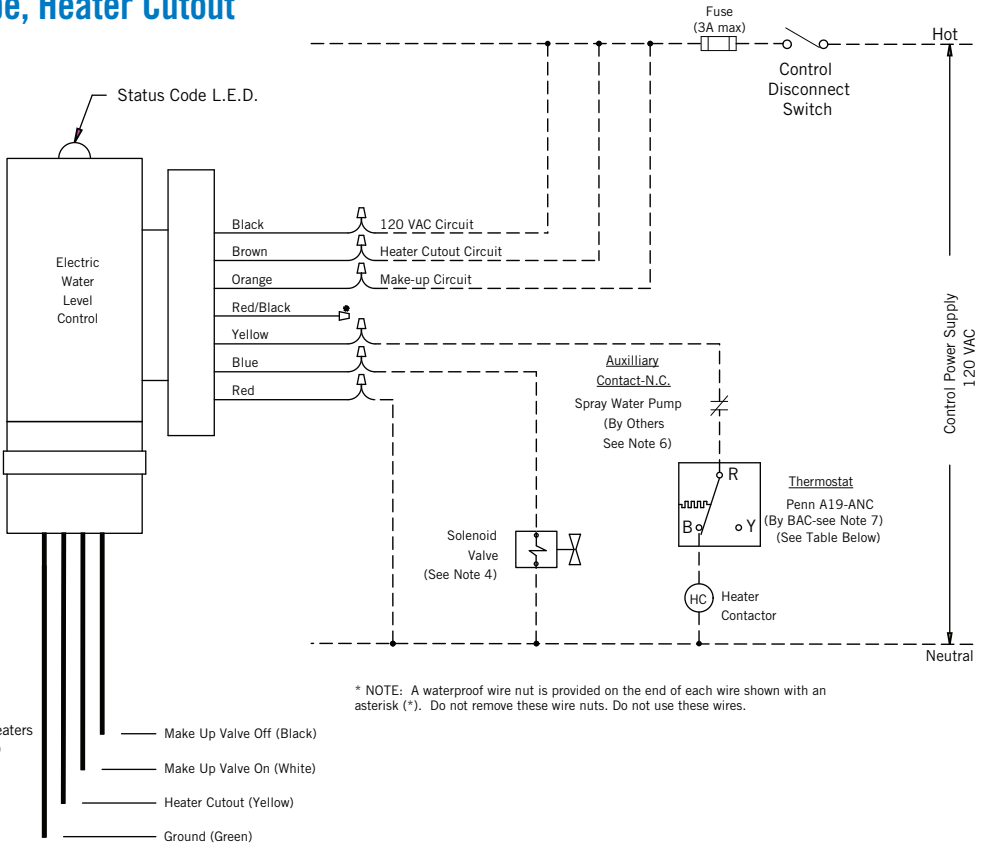
4-Probe, Low Alarm

NOTE: Reference notes on page 8.

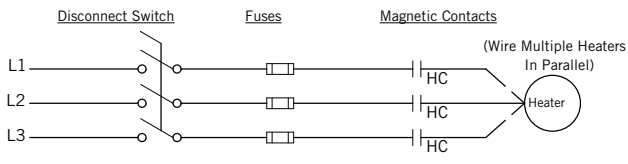


4-Probe, Heater Cutout

NOTE: Reference notes on page 8.



Recommended Wiring of Optional Heater Package



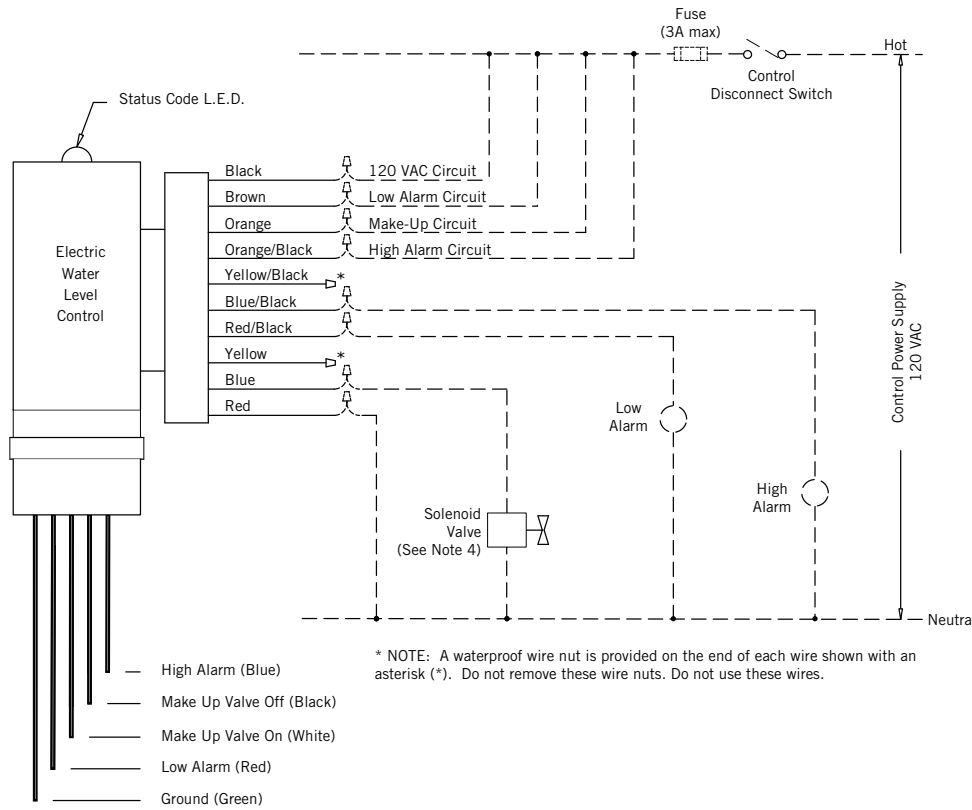
5-Probe, High Alarm, Low Alarm



Installation, Operation and Maintenance

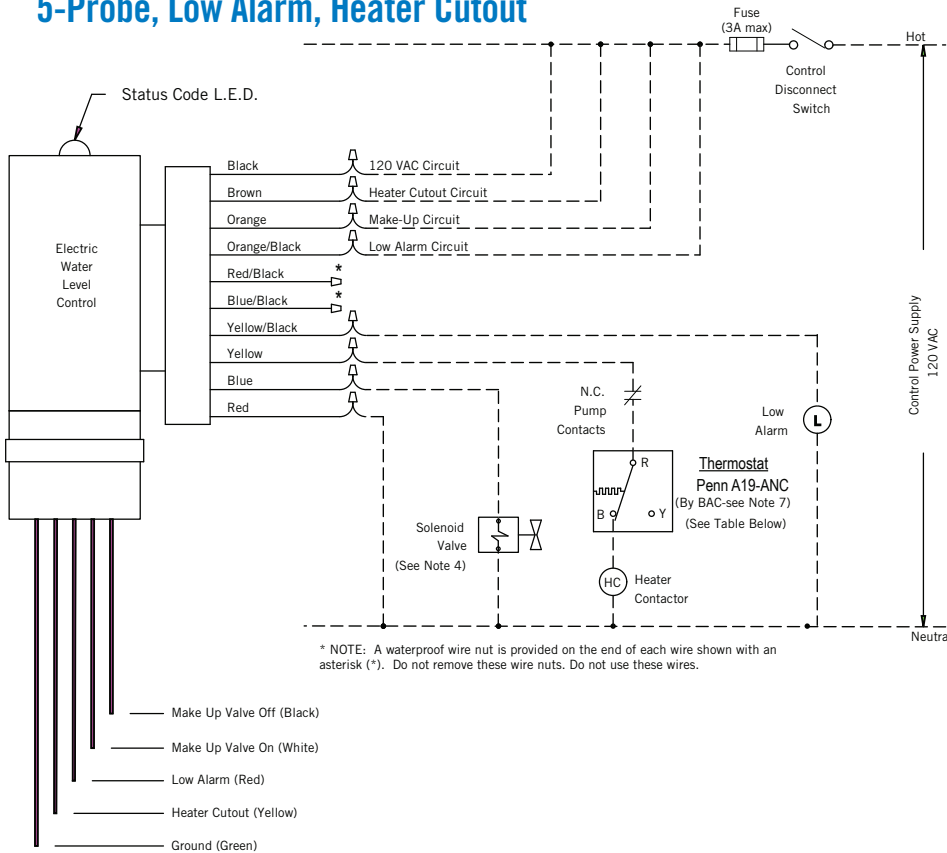
Installation

- 4-Probe, Low Alarm
- 4-Probe, Heater Cutout
- 5-Probe, High Alarm, Low Alarm
- 5-Probe, Low Alarm, Heater Cutout



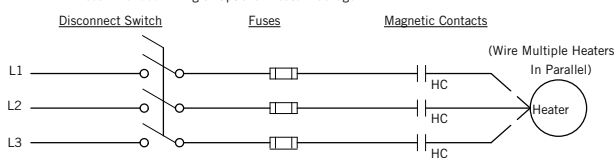
NOTE: Reference notes on page 8.

5-Probe, Low Alarm, Heater Cutout



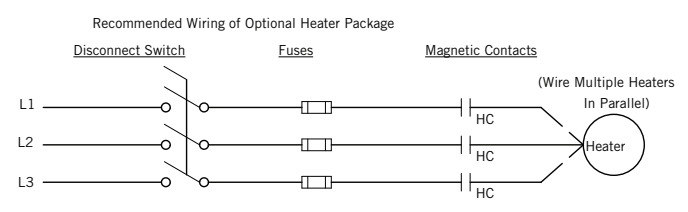
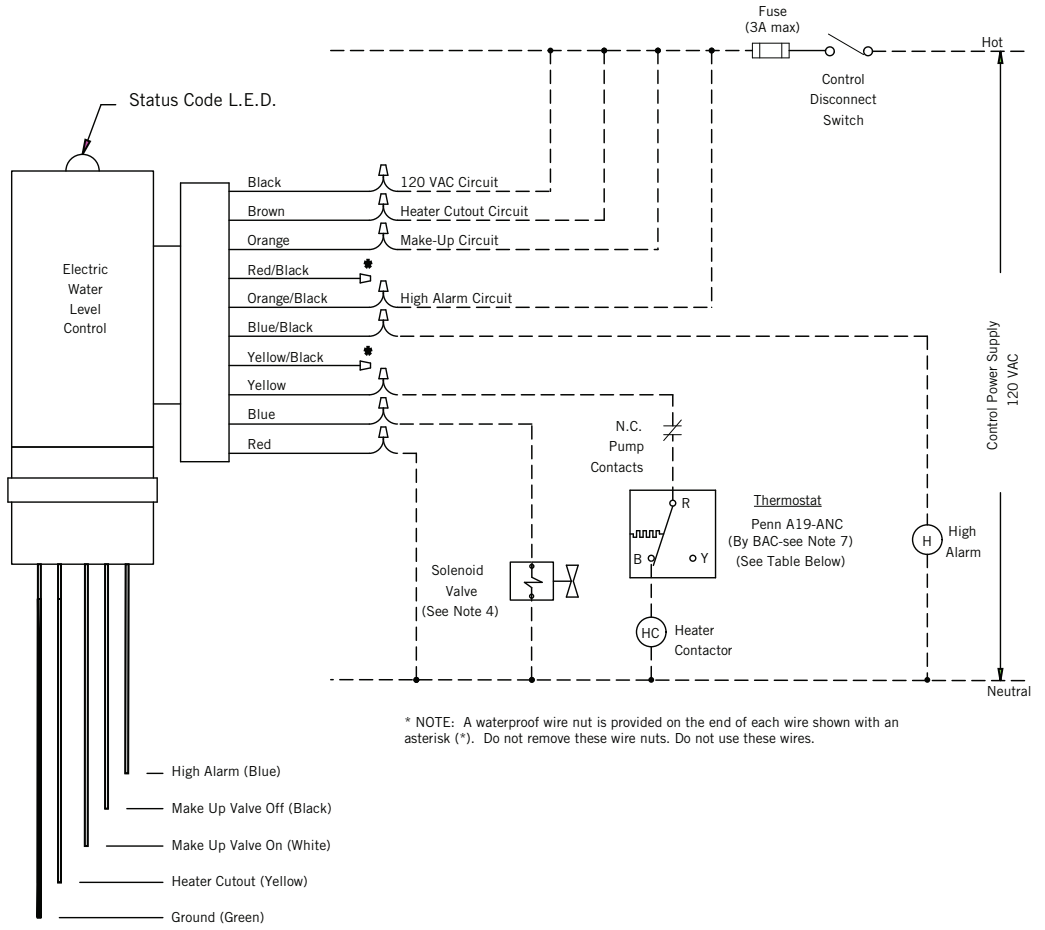
NOTE: Reference notes on page 8.

Recommended Wiring of Optional Heater Package

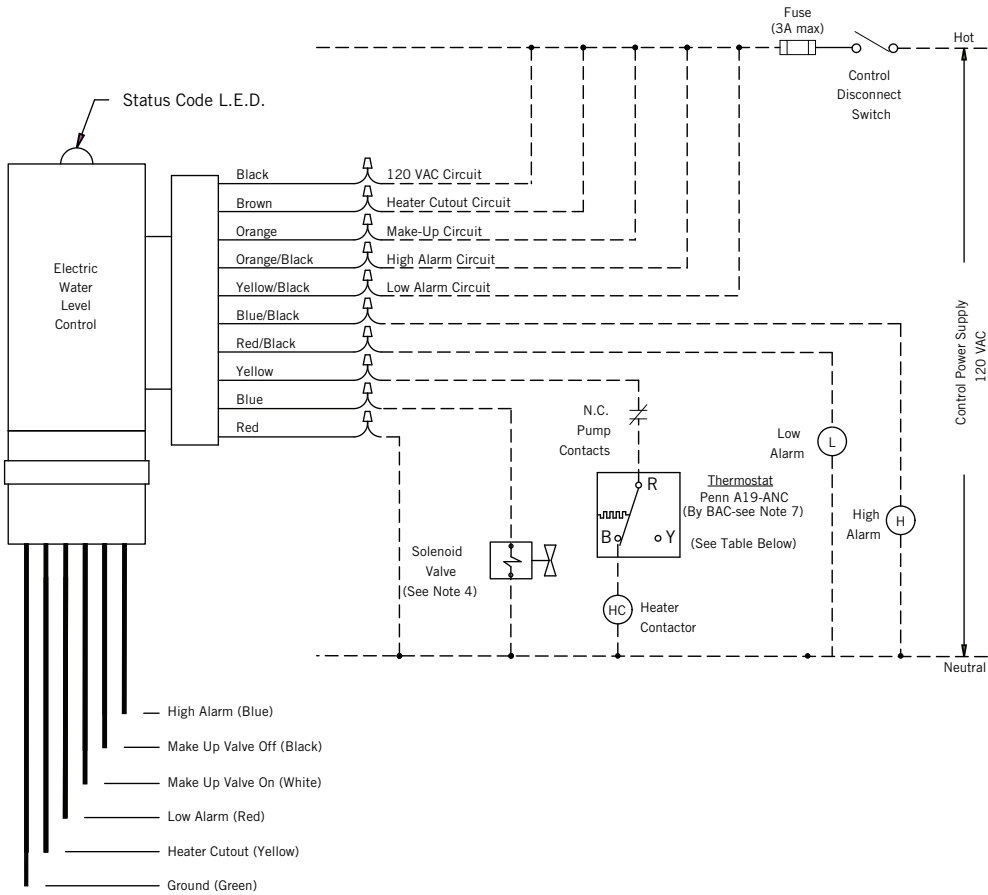


5-Probe, High Alarm, Heater Cutout

NOTE: Reference notes on page 8.

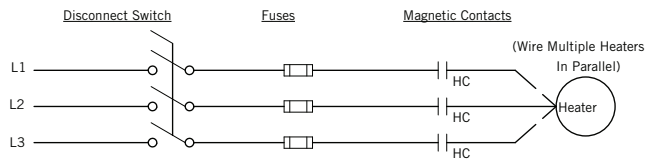


6-Probe, High Alarm, Low Alarm, Heater Cutout



- High Alarm (Blue)
- Make Up Valve Off (Black)
- Make Up Valve On (White)
- Low Alarm (Red)
- Heater Cutout (Yellow)
- Ground (Green)

Recommended Wiring of Optional Heater Package



Installation, Operation and Maintenance

Installation

- 5-Probe, High Alarm, Heater Cutout
- 6-Probe, High Alarm, Low Alarm, Heater Cutout



NOTE: Reference notes on page 8.

Notes For All BAC Wiring Diagrams

1. Wiring and components indicated by dashed lines are to be supplied by firms other than BAC. All wiring must comply with applicable codes and ordinances.
2. The water level control board is wired in the inverse mode so that the solenoid make-up valve will close if there is a loss of power to the control board. When the water level rises to the bottom of the make-up valve off probe and maintains contact for at least 6 seconds, the control de-energizes the valve. The valve remains de-energized until the water level recedes below the bottom of the make-up valve on probe and remains at that level for at least 6 seconds. The control then energizes the valve.
3. Any incoming power source must have a 3A fuse for component protection. **Using a fuse over 3A will void the BAC warranty.**
4. The solenoid actuated make-up valve is rated at 6.1 watts, 16 VA holding, 30 VA inrush.
5. The normally closed solenoid valve has a slow closing feature which minimizes water hammer and is designed to operate at make-up water line pressures of 10 to 125 PSIG. To further minimize the potential for water hammer, make-up water line pressures at the higher end of the range should be avoided, and make-up piping should be well supported.
6. Interlok immersion heaters with circulating pump to de-energize heaters when pump is running.
7. Control thermostat is to be set for 40°F. Do not set thermostat lower than 40°F.
8. **A strainer is required before the solenoid make-up valve.**

L.E.D. Status Codes

1. **L.E.D. on steady:** Indicates normal operation.
2. **Steady one second flashing:** Indicates dirty probes, reading in the capacitance mode. The unit will still operate but will give the following status code of 1 second on, 1 second off (steady 1 second flashing). This status code will continue until the probes are cleaned and the power has been reset. Note: No other status codes will be displayed until the dirty probes are cleaned.
3. **Two flashes and off for 5 seconds:** Indicates make-up valve ran for more than 1 hour. The unit will continue to fill, with the following status code of 1 second on, 1 second off, 1 second on and then off for 5 seconds before repeating. This status will continue until power has been reset. *Possible causes:* leaking tank, obstructed fill / defective valve or reduced flow rate.
4. **Three flashes and off for 5 seconds:** Indicates shorted probes or high conductive water. The unit will continue to operate but will give the following status code of 1 second on, 1 second off, 1 second on, 1 second off, 1 second on and then off for 5 seconds before repeating. This status will continue until the water is diluted or the short is removed from the probes and power is reset.
5. **Four flashes and off for 5 seconds:** Indicates black probe (P6) reads covered, but White probe (P5) does not read covered (White should also be covered because it is longer than the Black). This will cause the fill solenoid valve to short cycle and lead to premature failure of the fill valve. The unit will short cycle and give the status code of 1 second on, 1 second off, 1 second on, 1 second off, 1 second on, 1 second off, 1 second on and then off for 5 seconds before repeating. The unit will continue short cycle until the condition has been corrected (clean white probe) and reset the power.
6. **L.E.D. does not come on after power up or resetting power:** Indicates unit inoperative.



Make-up Solenoid Valve Selection		
Tower Size Nominal Tons	Valve Size NPT	BAC Part Number
0 – 150	½"	310782
150 – 250	¾"	310783
250 – 650	1"	310784
650 – 1301	1½"	310785

The valve size is the minimum recommended size for a single cell cooling tower of the rated tonnage. Multiple cell cooling towers may require a larger size valve or multiple valves piped in parallel due to greater basin volumes.

Operation and Maintenance

The control/probe head is fully potted and sealed so there are no user serviceable electronic components. The only services that are required are:

1. Clean the stainless steel electrodes periodically to prevent accumulations of scale, corrosion, sludge or biological growth, which could interfere with the electrical circuit.
2. The water level is maintained at the recommended operating level regardless of the system thermal load. Therefore, it is not recommended that the operating level be adjusted.
3. During the start-up of units equipped with the electric water level control package, by-pass the control unit in order to fill the unit to the overflow connection.

Installation

Notes for all BAC Wiring Diagrams

L.E.D. Status Codes

Operation and Maintenance

Controls Specifications

Control Specifications

Control Specifications	
Enclosure	2" PVC Schedule 40 with Extra Long Coupling Spears
Contact Rating	3 AMP. 120 VAC Resistive
Supply voltage	120 VAC, +10%/-15%, 60 Hz
Secondary Circuit	1V-5V, 10kHz-62kHz
Sensitivity	26000 OHM
Temperature	-40°F to +150°F Ambient
Time Delay	6 Seconds
Probes	¼" Diameter Stainless Steel, Protected with a Plastic Sheath (except ground)
Stilling Chamber	2" PVC Pipe
Mounting	Universal Galvanized Bracket Assembly and Hardware



NOTE: Recommended valve type is a slow closing 120 VAC, normally closed solenoid valve, designed to reduce water hammer.

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