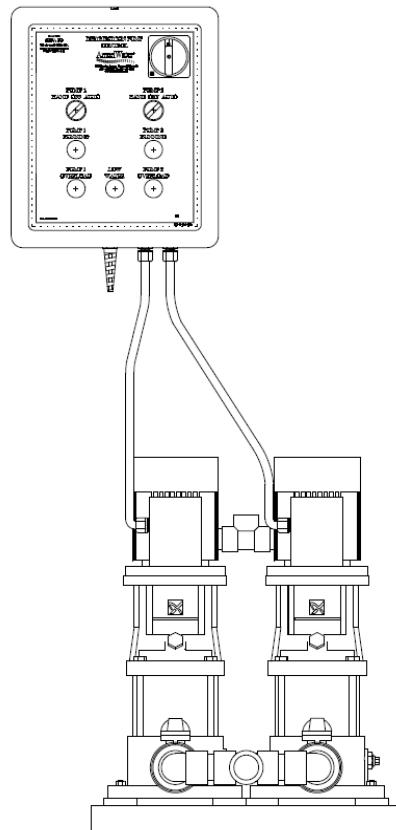




# **DISTRIBUTION PUMP SYSTEM**

## **OPERATION & MAINTENANCE MANUAL**

### **GRUNDFOS CRI PUMPS**



**Manufactured With Pride  
In The USA**

800-535-5585

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AmeriWater • 3345 Stop 8 Rd. • Dayton, OH 45414

**P/N 98-0119**  
**Rev.H**

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# DISTRIBUTION PUMP

## THEORY OF OPERATION

The AmeriWater distribution pump takes the water from the storage tank, pumps it through the distribution loop to the points of use for dialysis and re-circulates water back through the piping to the storage tank. This provides pressurized water to each dialysis wall box in addition to re-circulating the water. Re-circulating the water keeps it "fresh" by minimizing bacteria growth by the constant movement of water.

When the water is at the minimum level (always controlled by the lowest float switch on the storage tank), the distribution pump is not allowed to automatically operate through the distribution controller. When the water level is below the minimum level, the distribution pump will not operate in "AUTO", but may be operated in "HAND" (manual operation). The distribution pump should only be placed in "HAND" to empty the storage tank. It should not be left unattended during this process. Running the distribution pump for an extended period without water will result with overheating and damage to the pump.

The distribution pumps are available as a single pump or a dual pump. All distribution pumps are available in 115V and 220V single phase, 208V 3 phase, 230V 3 phase and 460V 3 phase. The distribution pumps have a capability of running at rated volumes between 60 to 80 PSI.

The distribution pump controllers have either fuses or overloads to protect the pumps and wiring from overload damage.

The controllers for the dual distribution pumps have an alternating feature that will allow the pumps to alternate from #1 pump to #2 pump that is controlled by a timer set at 5 hours.

**WARNING:** Both pumps need to be in auto mode for normal operation. If one pump is taken down, ensure that the second pump is set to manual mode. If this is not done, the controller will attempt to cycle between them. The system should only be run in manual mode for the length of time it will take to bring the second pump back on line.

Another AmeriWater standard feature for the dual distribution pump controller is to have an overload sensor for each pump. If a pump has an overload condition, the controller will automatically switch to the pump that does not have an overload. This will prevent a possible water delivery shutdown during the dialysis procedure. An indicator light is on the front panel of the controller to show which pump has an overload failure.

## INSTALLATION

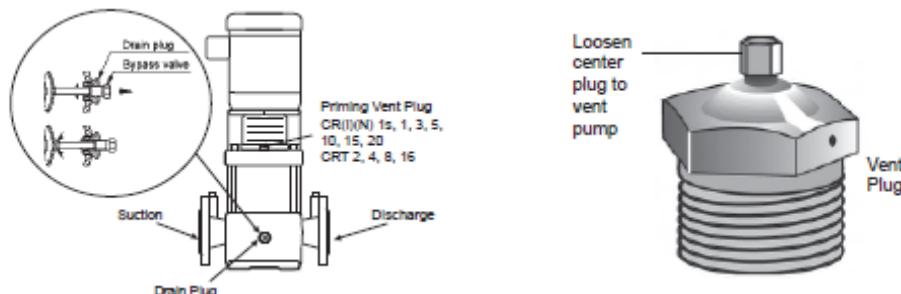
The following guidelines should be met at installation.

1. Customer is to provide properly sized wiring to the distribution pump control enclosure.
2. Place the pump system on firm, level floor and anchor to the floor to prevent movement from vibration or bumping.
3. Inlet piping and / or hoses from the storage tank to the pump system should be equal to or greater in diameter than the inlet piping on the pump system.
4. Outlet piping and / or hoses of the pump system should be equal to or greater in diameter than the outlet piping on the pump system.
5. Locate the pump control on a wall as close to the pump system as possible. When installing a distribution pump along with an AmeriWater Central Water System, refer to the Plumbing and Instrumentation Diagram (P&ID) for the best location and where connections are made.
6. Follow all local plumbing and electrical codes.
7. After guidelines have been met, connect the distribution pump wiring to the motor contactor located in the control panel (refer to the control wiring diagram provided in this manual and with the distribution pump control). Connect the three phase or single phase power source to the Main ON/OFF disconnect switch located inside the control panel.
8. Once the power source has been connected, verify that the voltage on the pump matches what is indicated on the overload of the motor starter.
9. Check the rotation of the pump(s). Turn the disconnect switch to the ON position. Jog the pump(s) by momentarily turning the pump power switch to the HAND position. A second person may be needed to see which way the motor armature is turning just before it coasts to a stop. If the rotation is backwards, switch any two of the three non-ground pump wires on the motor contactor inside the panel.

**WARNING:** When using chlorine for disinfection, AmeriWater recommends a maximum chlorine concentration of 500 ppm (**parts per million**) with a total contact time not to exceed 60 minutes. Chlorine concentrations greater than 500 ppm or contact times longer than 60 minutes may result in chlorides degrading the stainless steel components, potentially resulting in harm to the patient!

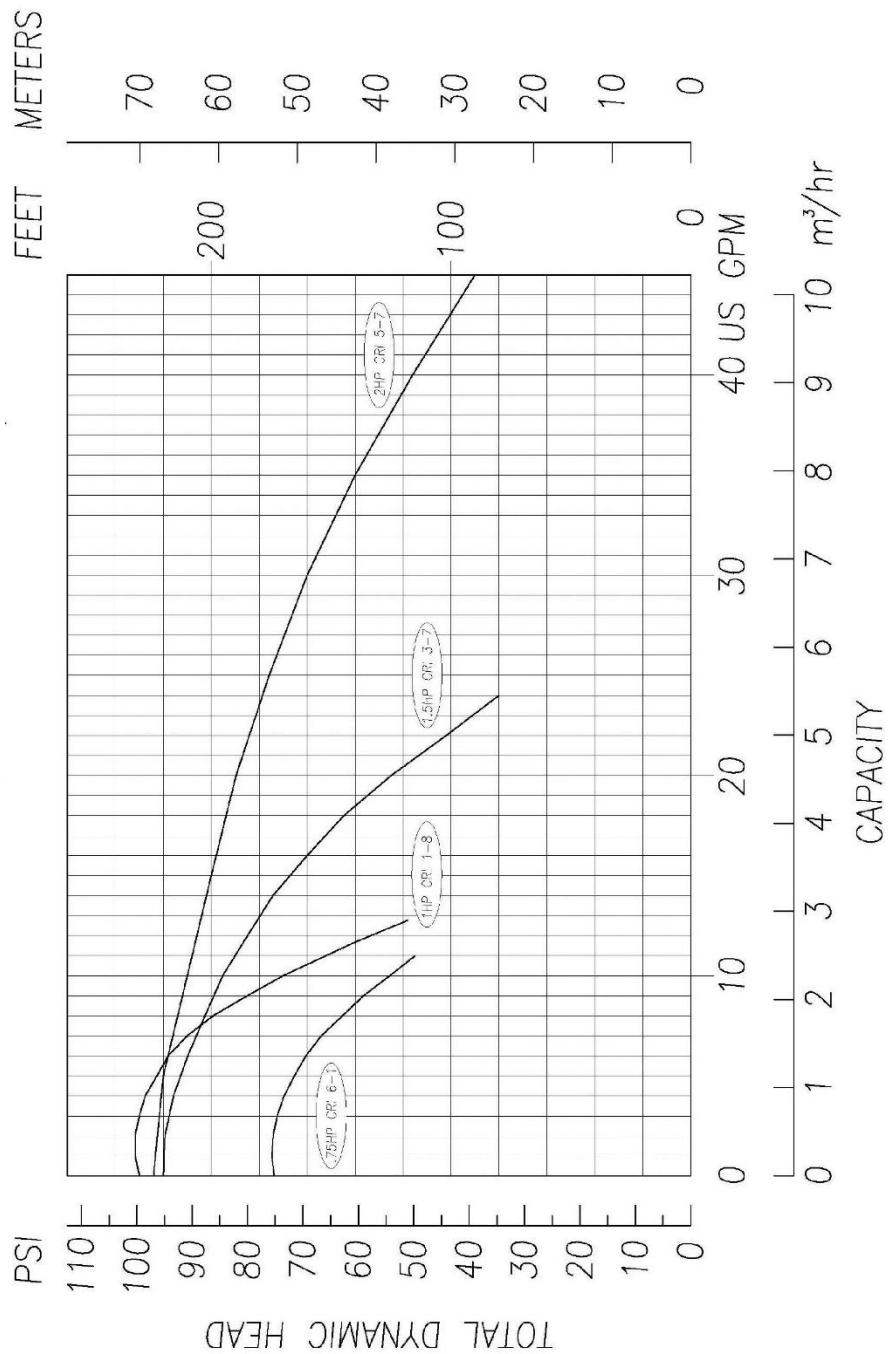
## START-UP

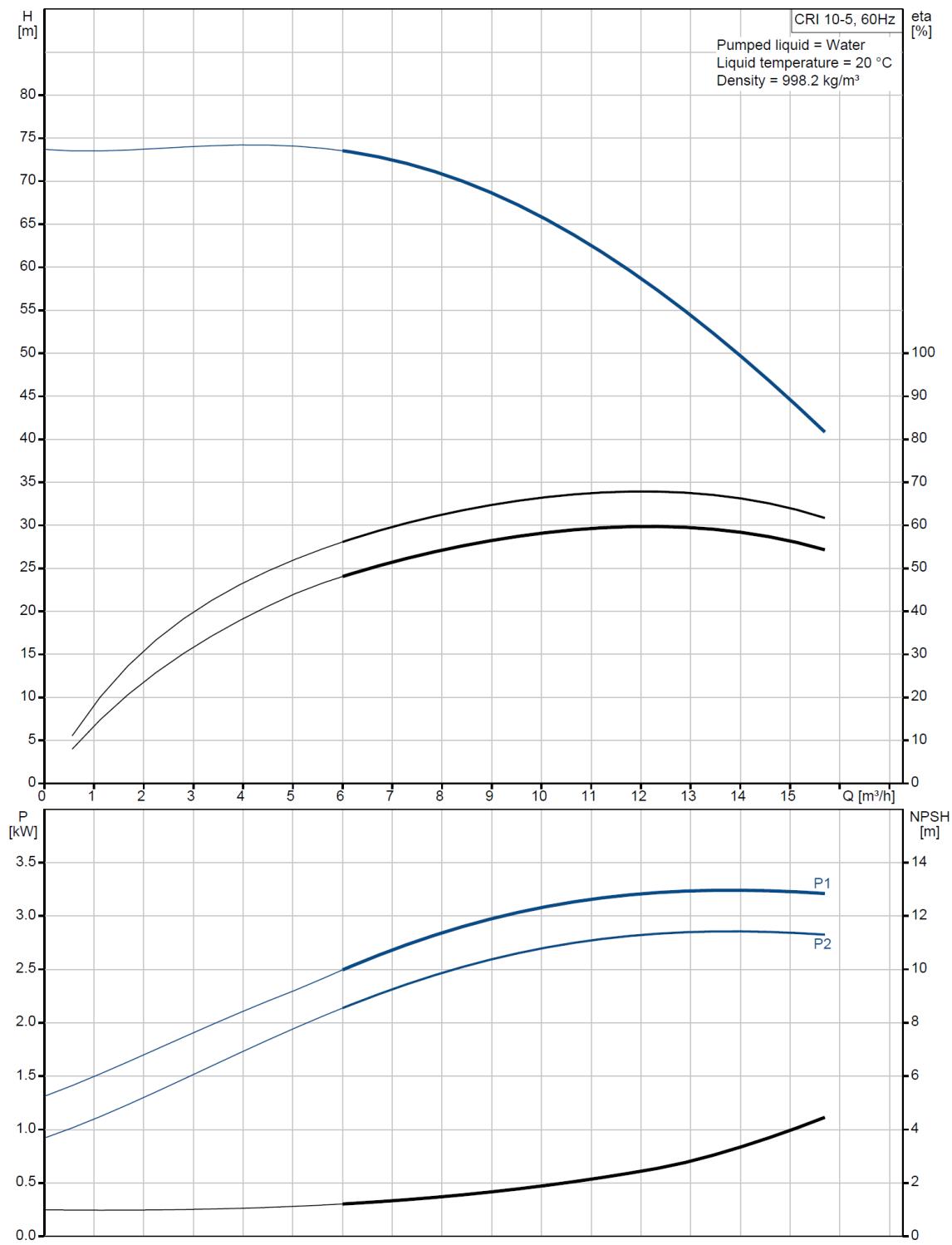
1. Open the inlet and outlet valves to the pump and allow the water in the storage tank to "flood" the inlet of the distribution pump. If the storage tank does not have water in it, fill it to above the lowest float switch before attempting to use the pump.
2. When starting the pump the first time, be sure to open the priming vent plug until a steady stream of airless water runs out of vent, then close.



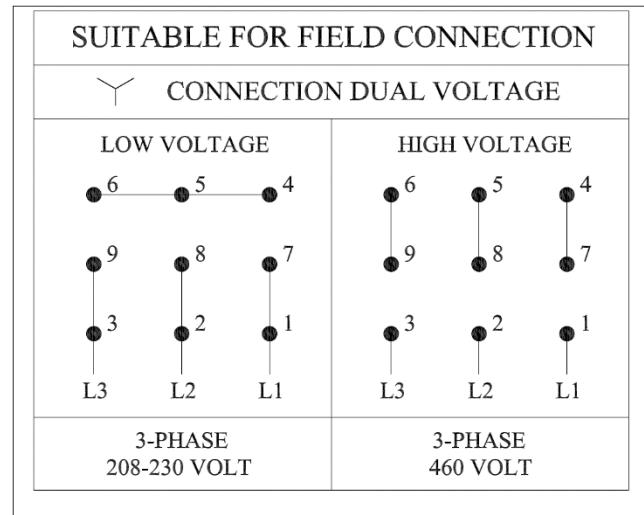
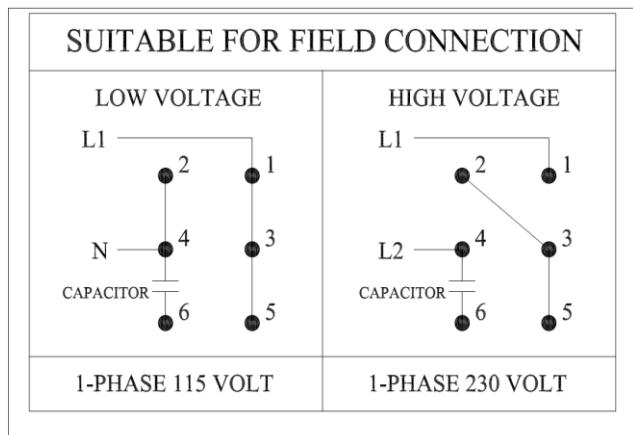
3. Turn the switch on the controller to HAND. Allow water to flow to re-circulate through the loop and back in to the storage tank for a few minutes. Water flow can be verified by observing the flow meter on the return header of the storage tank. If this is a dual pump system, place pump #1 into HAND mode to ensure that there is adequate flow through the system at the holding tank flow meter. Once verified, repeat this for pump #2.
4. Place the system into auto mode to verify that the low level cut off switch operates correctly. For a dual pump system, this will need to be done for each pump.
5. For the dual pump system only, the timer will need to be verified. This is accomplished by setting the timer to its minimum value and ensuring that the system is alternating between the pumps. See page 6 for details on adjusting the set-point.
6. The inlet and outlet valves are provided to allow for isolation of each pump if maintenance is needed. During operation, leave all of the inlet and outlet valves open.
7. When performing a start-up of your distribution pump that is connected to a central system storage tank, adjust the pressure relief valve on the storage tank header so that the pressure gage at the pump is no higher than 80 PSI. Refer to the manual that was provided with your storage tank system for proper adjustments. See pump curves on page 4.

## Pump Curves





## Pump Connections

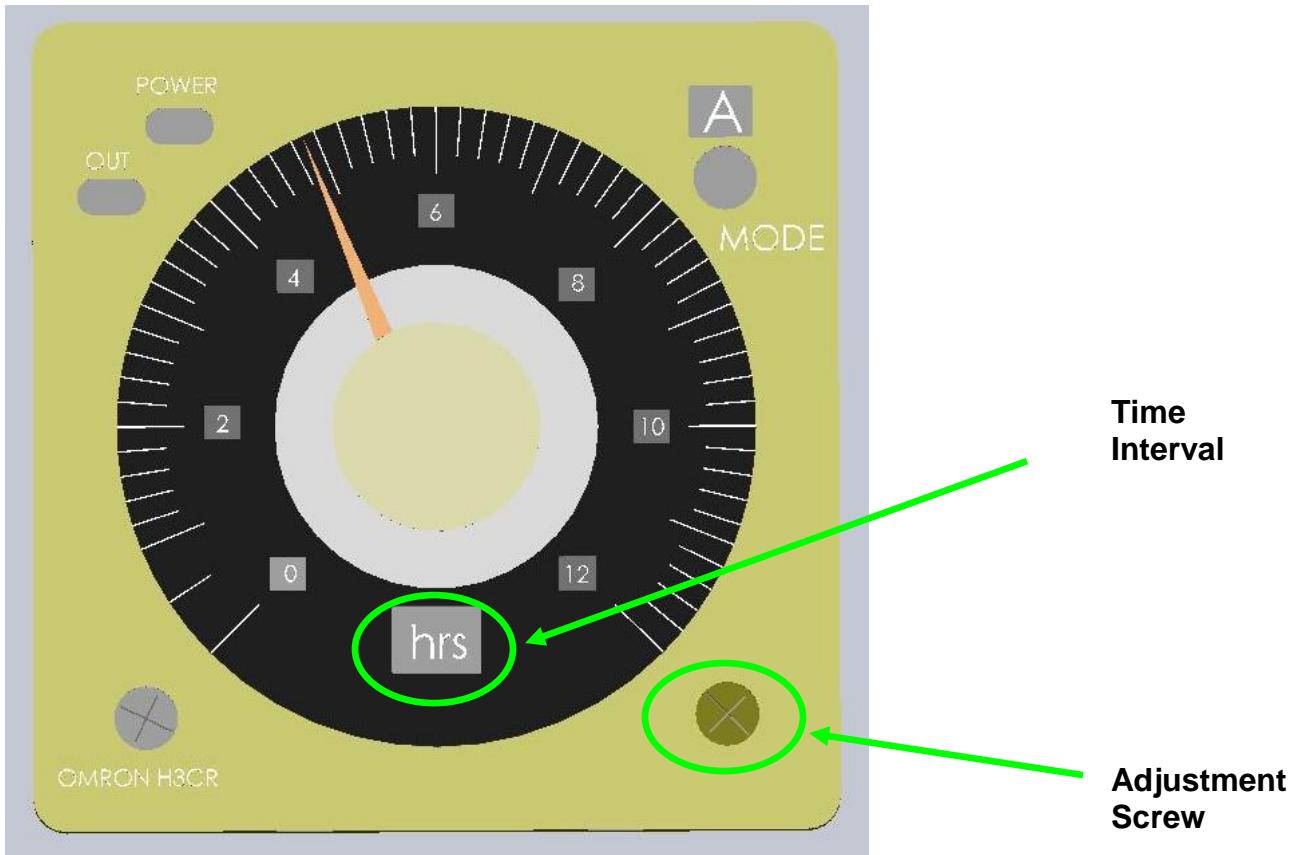


## Rated Current

RATED CURRENT FOR CRI DISTRIBUTION PUMPS						
TYPE	HORSE POWER	Volt/Hz/Ph 115/60/1	Volt/Hz/Ph 220/60/1	Volt/Hz/Ph 208/60/3	Volt/Hz/Ph 230/60/3	Volt/Hz/Ph 460/60/3
CRI 1-6	0.75	9.6 Amps	5.0 Amps	2.4 Amps	2.3 Amps	1.2 Amps
CRI 1-8	1.0	12.0 Amps	6.0 Amps	3.25Amps	3.3 Amps	1.68Amps
CRI 3-7	1.5	17.0 Amps	9.5 Amps	4.7 Amps	4.6 Amps	2.3 Amps
CRI 5-7	2.0	24.0 Amps	11.5 Amps	5.7 Amps	5.4 Amps	2.7 Amps
CRI 10-5	5.0	28.0 Amps	16.0 Amps	13.8 Amps	13.0 Amps	6.5 Amps

## Adjusting the Timer

With the power off and the system properly locked out, open the control panel. In the middle of the box, you will see the timer as shown below. To adjust the timer, simply insert a small screwdriver into the screw lower right hand face of the timer. Rotating this will toggle between time interval modes that are displayed on the face of the timer.



Once all validation of your set-up is complete, you must re-set the timer to 5 hours to meet the AAMI standards.

## Spare Parts List

Part #	Description
80-0138	Pump,3/4HP,Single Phase,115/230V
80-0139	Pump,3/4HP,Three Phase,208-230/460V
80-0140	Pump,1HP,Single Phase,115/230V
80-0141	Pump,1HP,Three Phase,208-230/460V
80-0142	Pump,1.5HP,Single Phase,115/230V
80-0143	Pump,1.5HP,Three Phase,208-230/460V
80-0144	Pump,2HP,Single Phase,115/230V
80-0145	Pump,2HP,Three Phase,208-230/460V
80-0149	Pump,2HP,Three Phase,208-230/460V
80-0158	Pump,2HP,Three Phase,208-230/460V
80-0195	Pump,3HP,Three Phase,208-230/460V
80-0196	Pump,3HP,Single Phase,115/230V
80-0249	Pump,5HP,Three Phase,208-230/460V
43-0021	Gauge,0-100,.25,CBM,2.5,LF,SS/SS
55-0026	VAL,CHECK,1.0 FNPT, 2 PSI SPRING, PP
041732001	Ball Valve,1.25",TU,PVC80
041720169	Ball Valve,1",TU,PVC80
63-0009	Fuse 10A FNM
63760133	Fuse, 2A, 250V
64760225	Timer, 8-Pin, 120V
64760108	Base, Timer, 8-Pin
61-0002	Relay, 30 AMP, 300V, SPST, NO, 120V-Coil

## DIAGNOSING SPECIFIC PROBLEMS

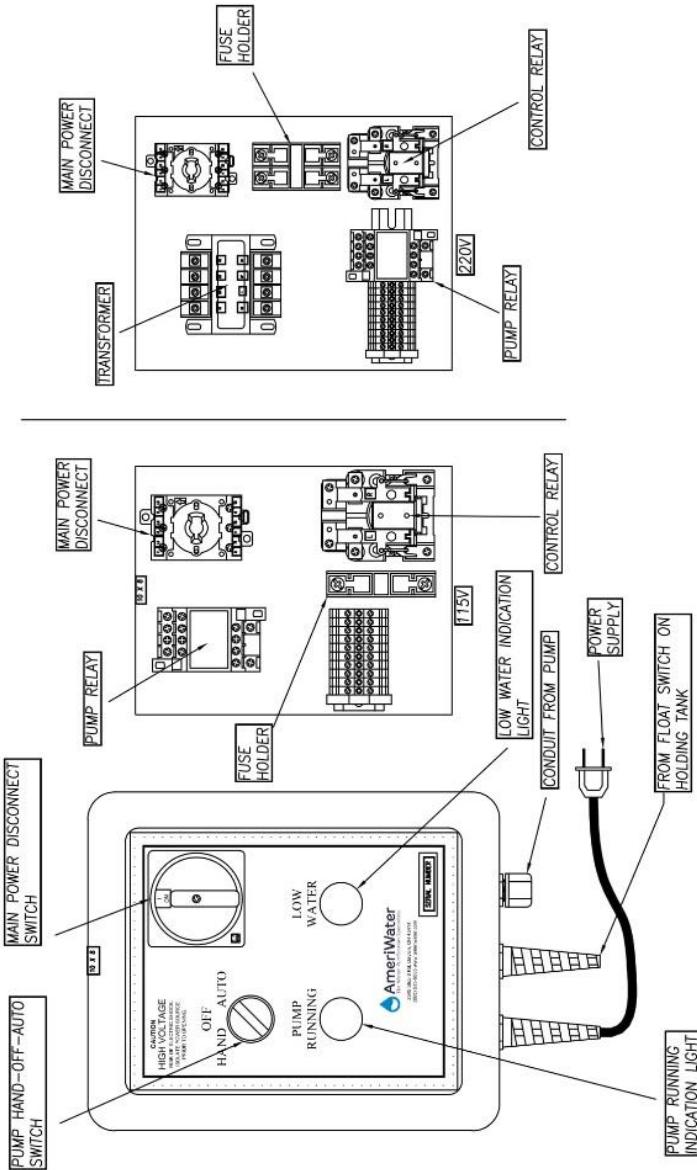
(SOME POSSIBLE CAUSES MAY NOT APPLY TO YOUR SYSTEM)

Problem	Possible cause	Remedy
The pump does not run.	No power at motor.	Check voltage at motor terminal box. If no voltage at motor, check feeder panel for tripped circuits and reset circuit.
	Fuses are blown or circuit breakers are tripped.	Turn off power and remove fuses. Check for continuity with ohmmeter. Replace blown fuses or reset circuit breaker. If new fuses blow or circuit breaker trips, the electrical installation, motor and wires must be checked.
	Motor starter overloads are burned or have tripped out.	Check for voltage on line and load side of starter. Replace burned heaters or reset. Inspect starter for other damage. If heater trips again, check the supply voltage and starter holding coil.
	Starter does not energize.	Energize control circuit and check for voltage at the holding coil. If no voltage, check control circuit fuses. If voltage, check holding coil for shorts. Replace bad coil.
	Defective controls.	Check all safety and pressure switches for operation. Inspect contacts in control devices. Replace worn or defective parts or controls.
	Motor is defective.	Turn off power and disconnect wiring. Measure the lead to lead resistances with ohmmeter (RX-1). Measure lead to ground values with ohmmeter (RX-100K). Record measured values. If an open or grounded winding is found, remove motor and repair or replace.
	Defective capacitor (single-phase motors).	Turn off power and discharge capacitor. Check with ohmmeter (RX-100K). When the meter is connected to the capacitor, the needle should jump towards 0 ohms and slowly drift back to infinity ( $\infty$ ). Replace if defective.
	Pump is bound.	Turn off power and manually rotate pump shaft. If shaft does not rotate easily, check coupling setting and adjust as necessary. If shaft rotation is still tight, remove pump and inspect. Disassemble and repair.
The pump runs but at reduced capacity or does not deliver water.	Wrong rotation.	Check wiring for proper connections. Correct wiring.
	Pump is not primed or is airbound.	Turn pump off, close isolation valve(s), remove priming plug. Check fluid level. Refill the pump, replace plug and start the pump. Long suction lines must be filled before starting the pump.

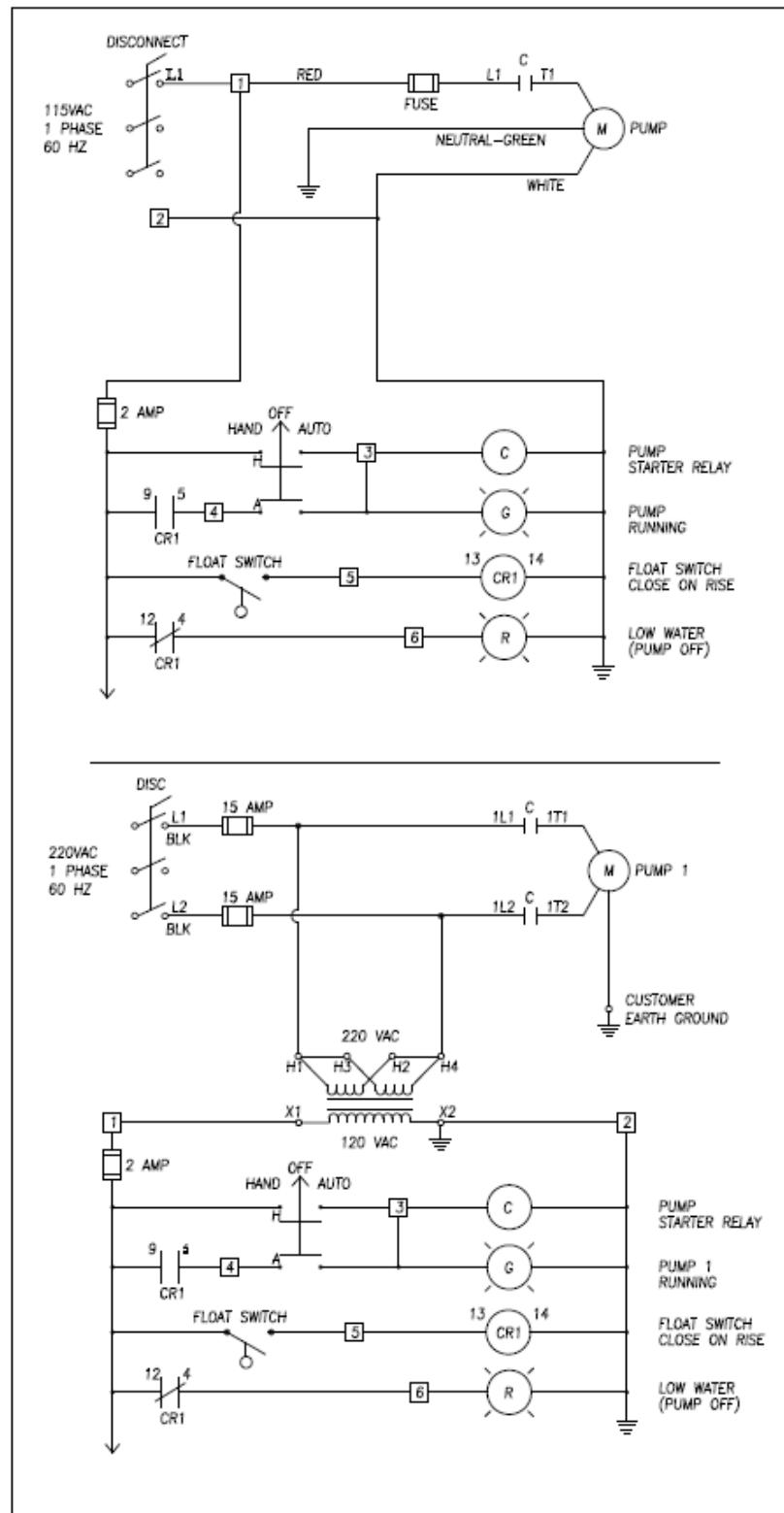
<b>Problem</b>	<b>Possible cause</b>	<b>Remedy</b>
	Strainers, check or foot valves are clogged.	Remove strainer, screen or valve and inspect. Clean and replace. Reprime pump.
	Suction lift too large.	Install compound pressure gauge at the suction side of the pump. Start pump and compare reading to performance data. Reduce suction lift by lowering pump, increase suction line size or removing high friction loss devices.
	Suction and/or discharge piping leaks.	Pump spins backwards when turned off. Air in suction pipe. Suction pipe, valves and fittings must be airtight. Repair any leaks and retighten all loose fittings.
	Pump worn.	Install pressure gauge, start pump, gradually close the discharge valve and read pressure at shutoff. Convert measured pressure (in psi) to head (in feet): (Measured psi x 2.31 ft/psi= ____ ft). Refer to the specific pump curve for shutoff head for that pump model. If head is close to curve, pump is probably OK. If not, remove pump and inspect.
	Pump impeller or guide vane is clogged.	Disassemble and inspect pump passageways. Remove any foreign materials found.
	Incorrect drain plug is installed.	If the proper drain plug is replaced with a standard plug, water will recirculate internally. Replace with proper plug.
	Improper coupling setting.	Check/reset the coupling; see page 18.
Pump cycles too much	Pressure switch is not properly adjusted or is defective.	Check pressure setting on switch and operation. Check voltage across closed contacts. Readjust switch or replace if defective.
	Level control is not properly adjusted or is defective.	Check setting and operation. Readjust setting (refer to level control manufacturer's data). Replace if defective.
	Insufficient air charging or leaking tank or piping.	Pump air into tank or diaphragm chamber. Check diaphragm for leak. Check tank and piping for leaks with soap and water solution. Check air to water volume. Repair as necessary.
	Tank is too small.	Check tank size and air volume in tank. Tank volume should be approximately 10 gallons for each gpm of pump capacity. The normal air volume is 2/3 of the total tank volume at the pump cut-in pressure. Replace tank with one of correct size.
	Pump is oversized.	Install pressure gauges on or near pump suction and discharge ports. Start and run pump under normal conditions, record gauge readings. Convert psi to

Problem	Possible cause	Remedy
		feet (Measured psi x 2.31 ft/psi = ____ ft) Refer to the specific pump curve for that model, ensure that total head is sufficient to limit pump delivery within its design flow range. Throttle pump discharge flow if necessary.
Fuses blow or circuit breakers or overload relays trip	Tank is too small.	Check voltage at starter panel and motor. If voltage varies more than -10 % / + 10 %, contact power company. Check wire sizing.
	Motor overloads are set too low.	Cycle pump and measure amperage. Increase heater size or adjust trip setting to a maximum of motor nameplate (full load) current.
	Three-phased current is imbalanced.	Check current draw on each lead to the motor. Must be within -5% / +5 %. If not, check motor and wiring. Rotating all leads may eliminate this problem.
	Motor is shorted or grounded.	Turn off power and disconnect wiring. Measure the lead-to-lead resistance with an ohmmeter (RX-1). Measure lead-to-ground values with an ohmmeter (RX-100K) or a megaohm meter. Record values. If an open or grounded winding is found, remove the motor, repair and/or replace.
	Wiring or connections are faulty.	Check proper wiring and loose terminals. Tighten loose terminals. Replace damaged wire.
	Pump is bound.	Turn off power and manually rotate pump shaft. If shaft does not rotate easily, check coupling setting and adjust as necessary. If shaft rotation is still tight, remove pump and inspect. Disassemble and repair.
	Defective capacitor (single-phase motors).	Turn off power and discharge capacitor. Check with ohmmeter (RX-100K). When the meter is connected to the capacitor, the needle should jump towards 0 ohms and slowly drift back to infinity ( $\infty$ ). Replace if defective.
	Motor overloads at higher ambient temperature than motor.	Use a thermometer to check the ambient temperature near the overloads and motor. Record these values. If ambient temperature at motor is lower than at overloads, especially where temperature at overloads is above +104 °F (+40 °C), ambient-compensated heaters should replace standard heaters.

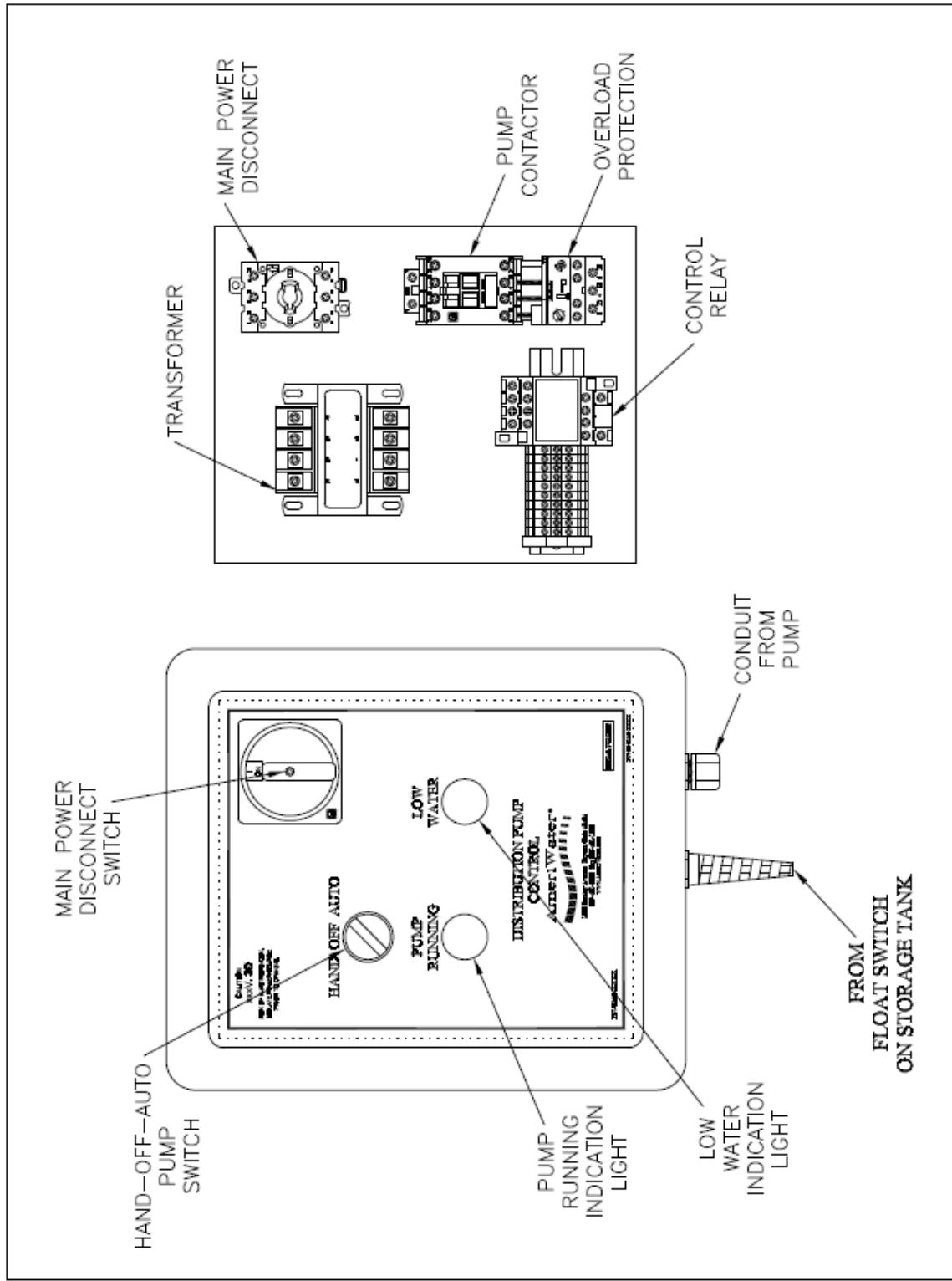
## Single Distribution Single Phase Controller



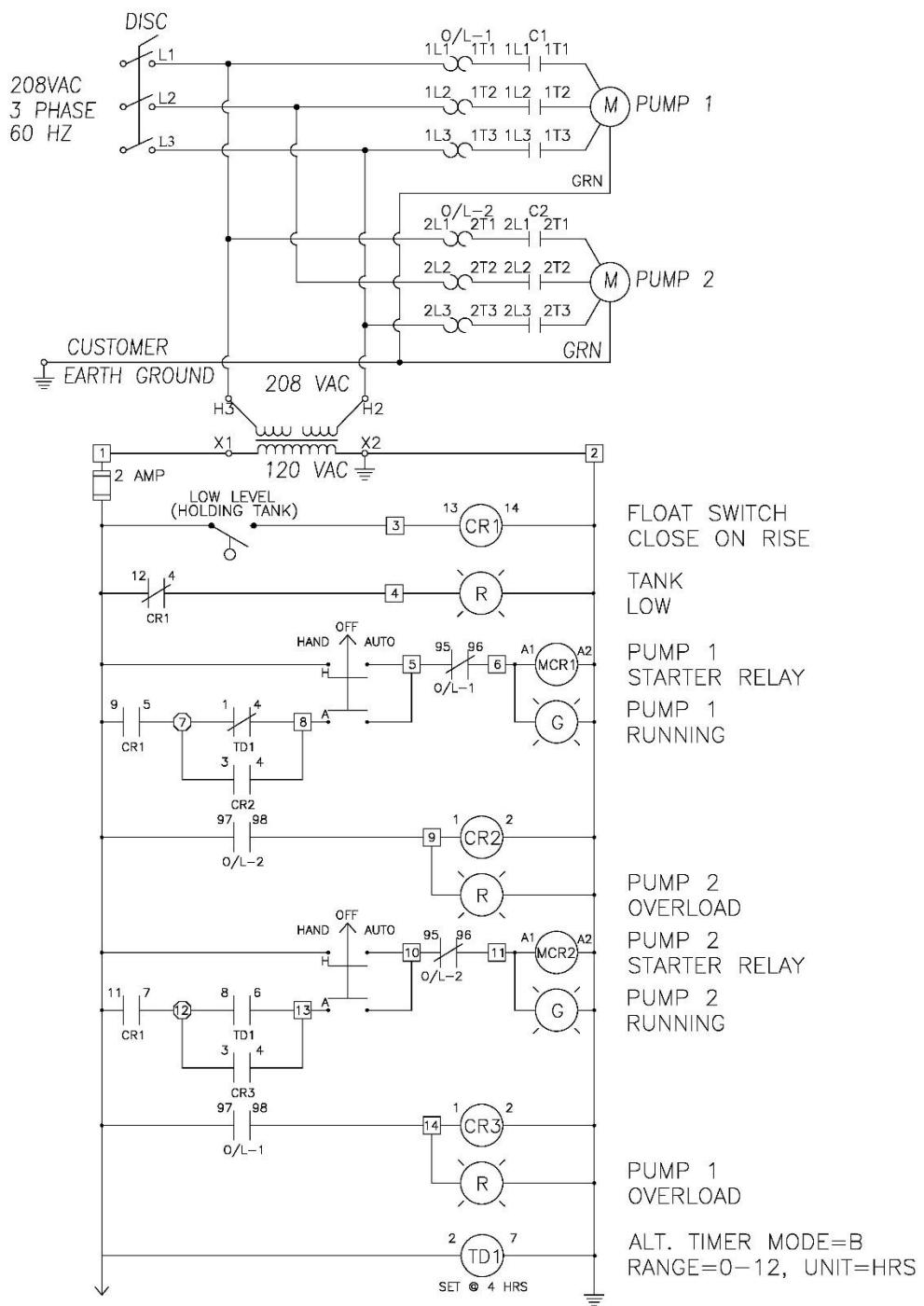
## Single Distribution 115 & 220V Single Phase Controller Schematic



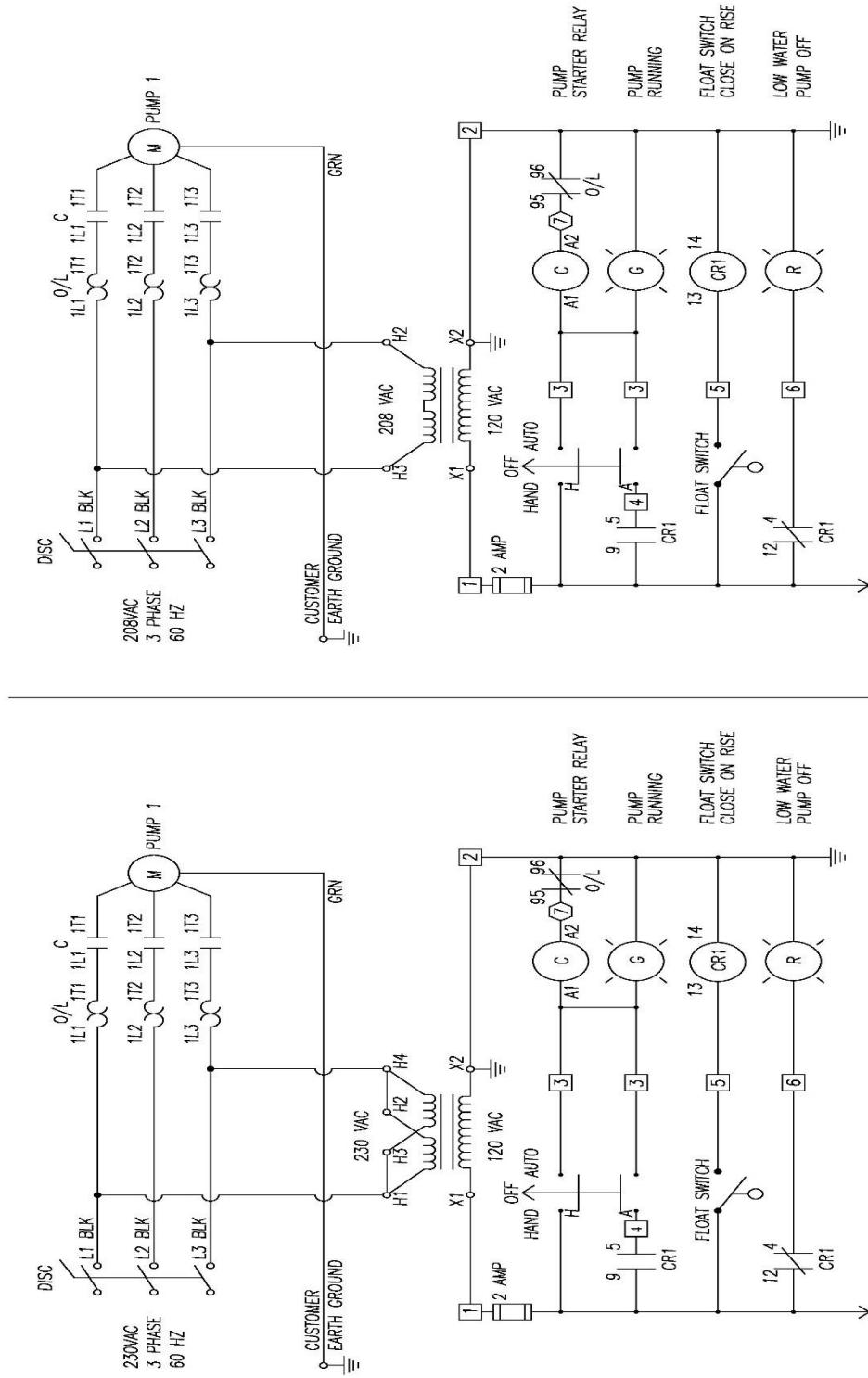
## Single Distribution Three Phase Controller



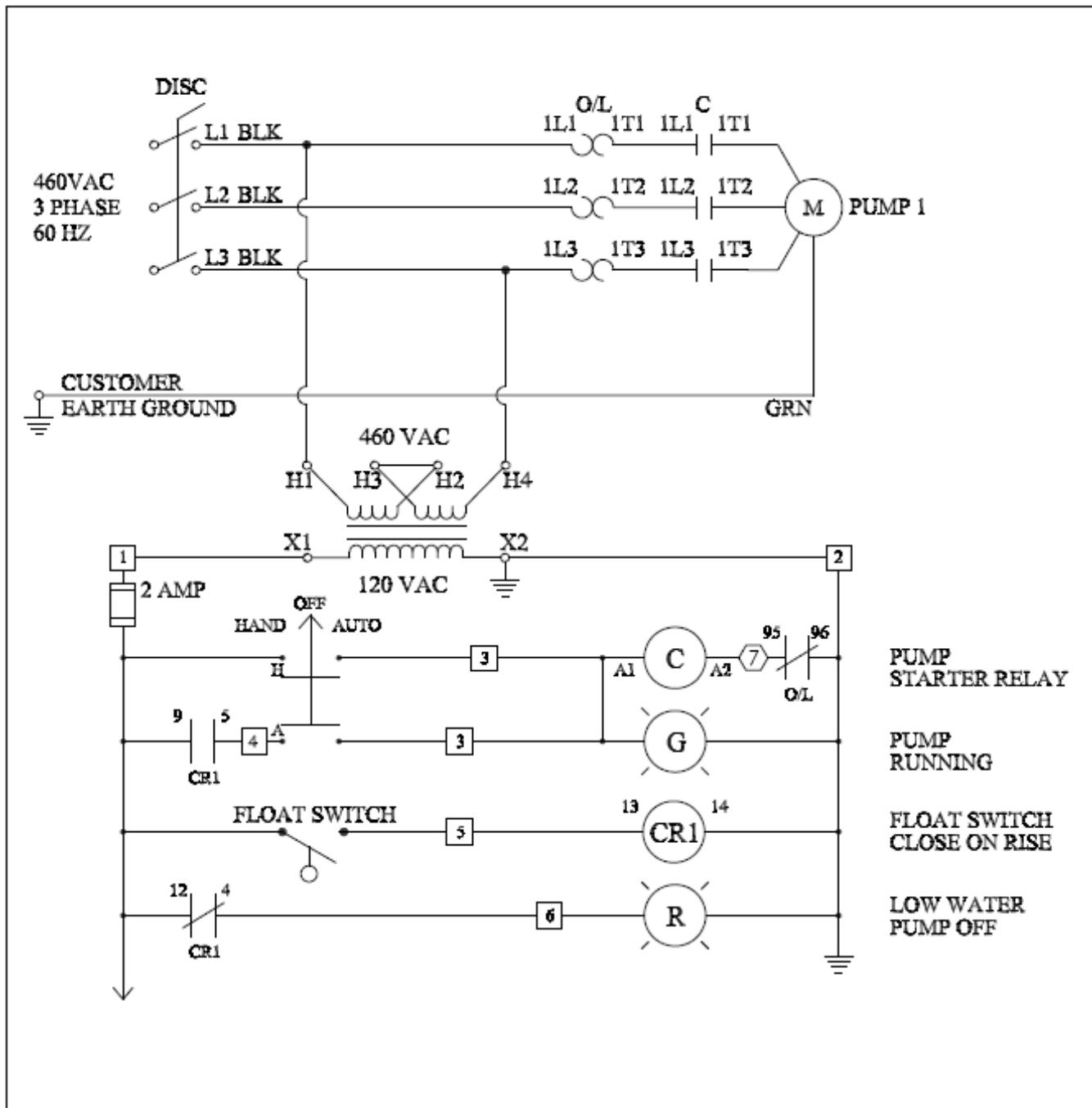
## Dual Distribution 208V Three Phase Controller Schematic



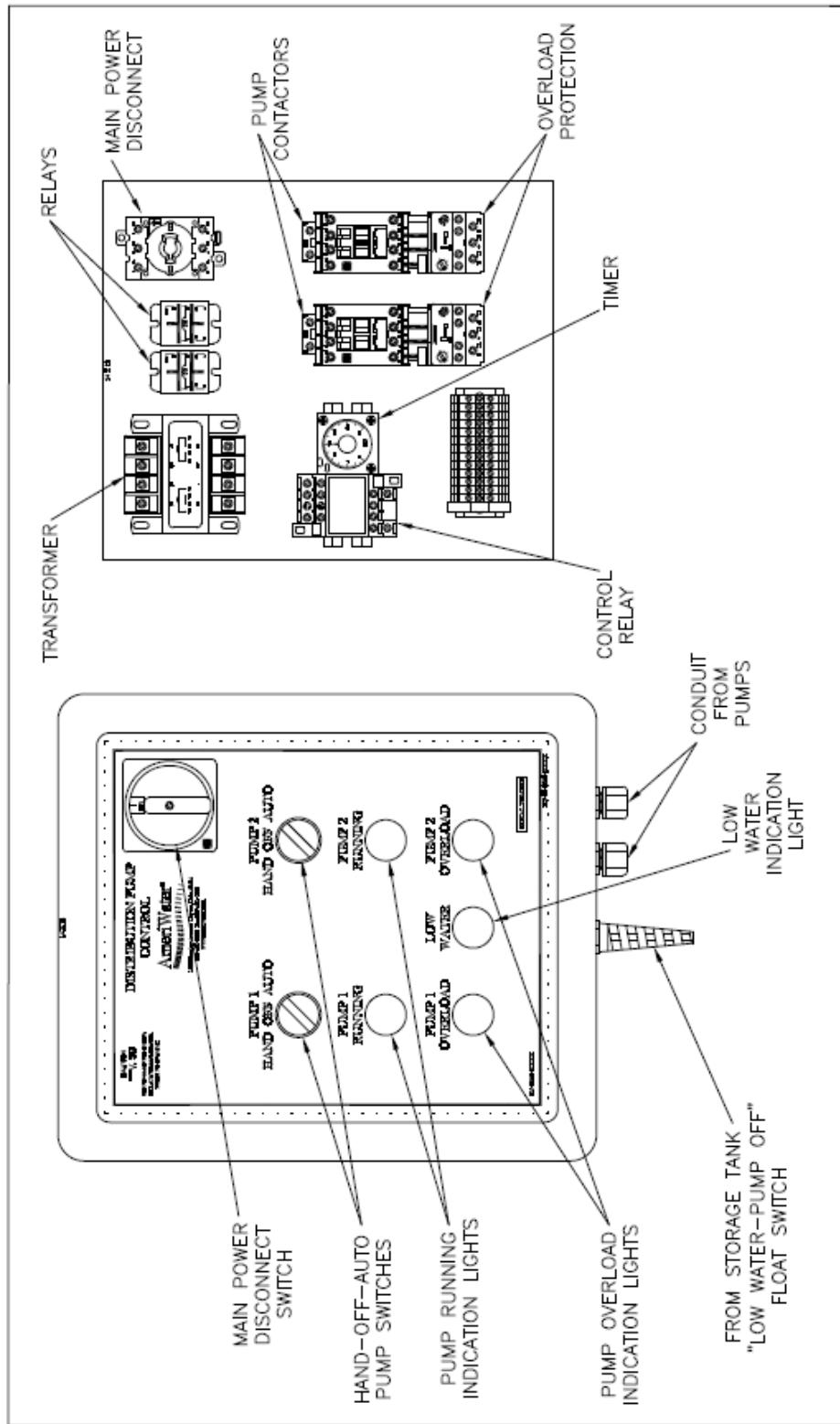
## Single Distribution 208V & 230V Three Phase Controller Schematics



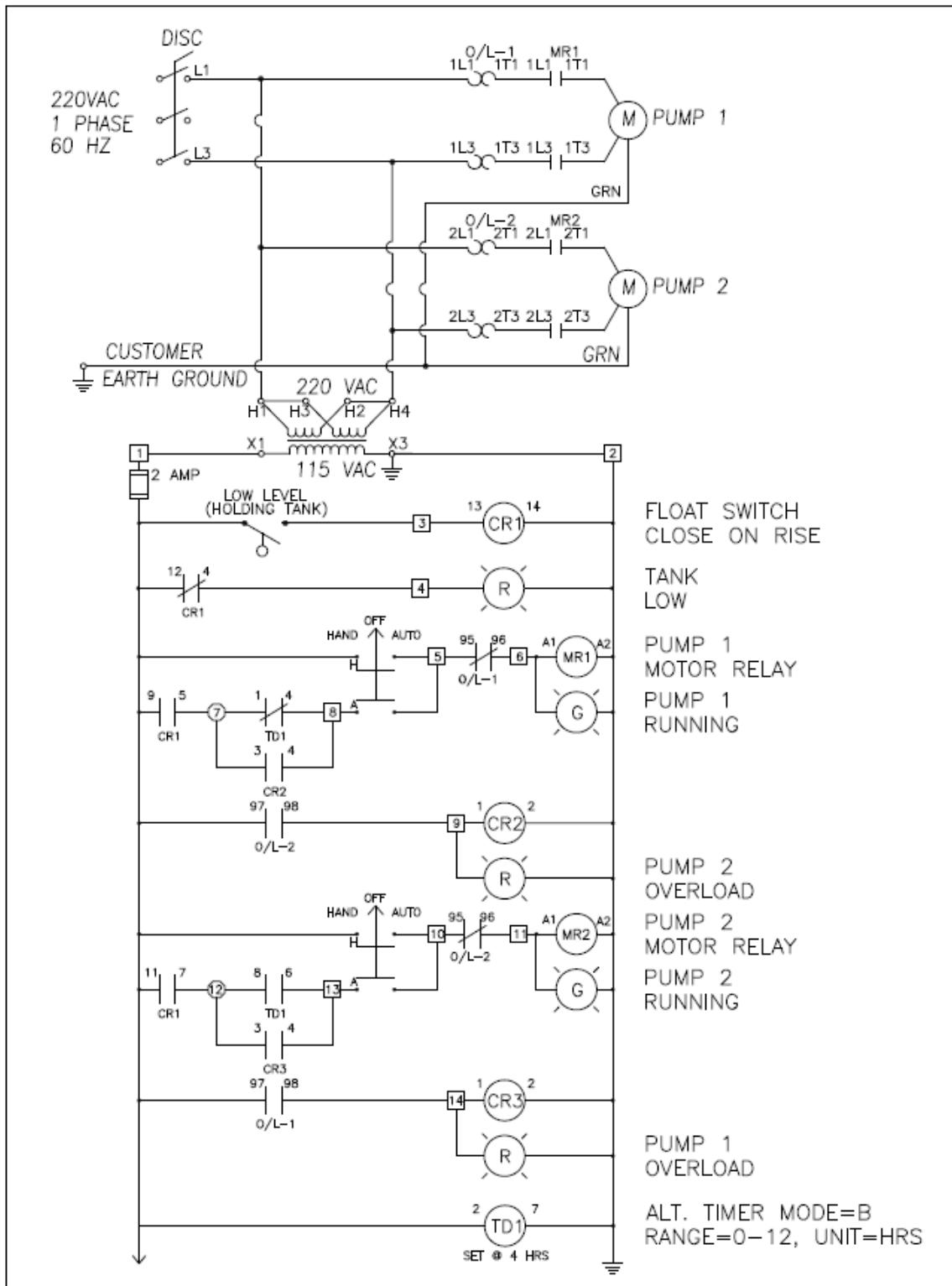
## Single Distribution 460V Three Phase Controller Schematic



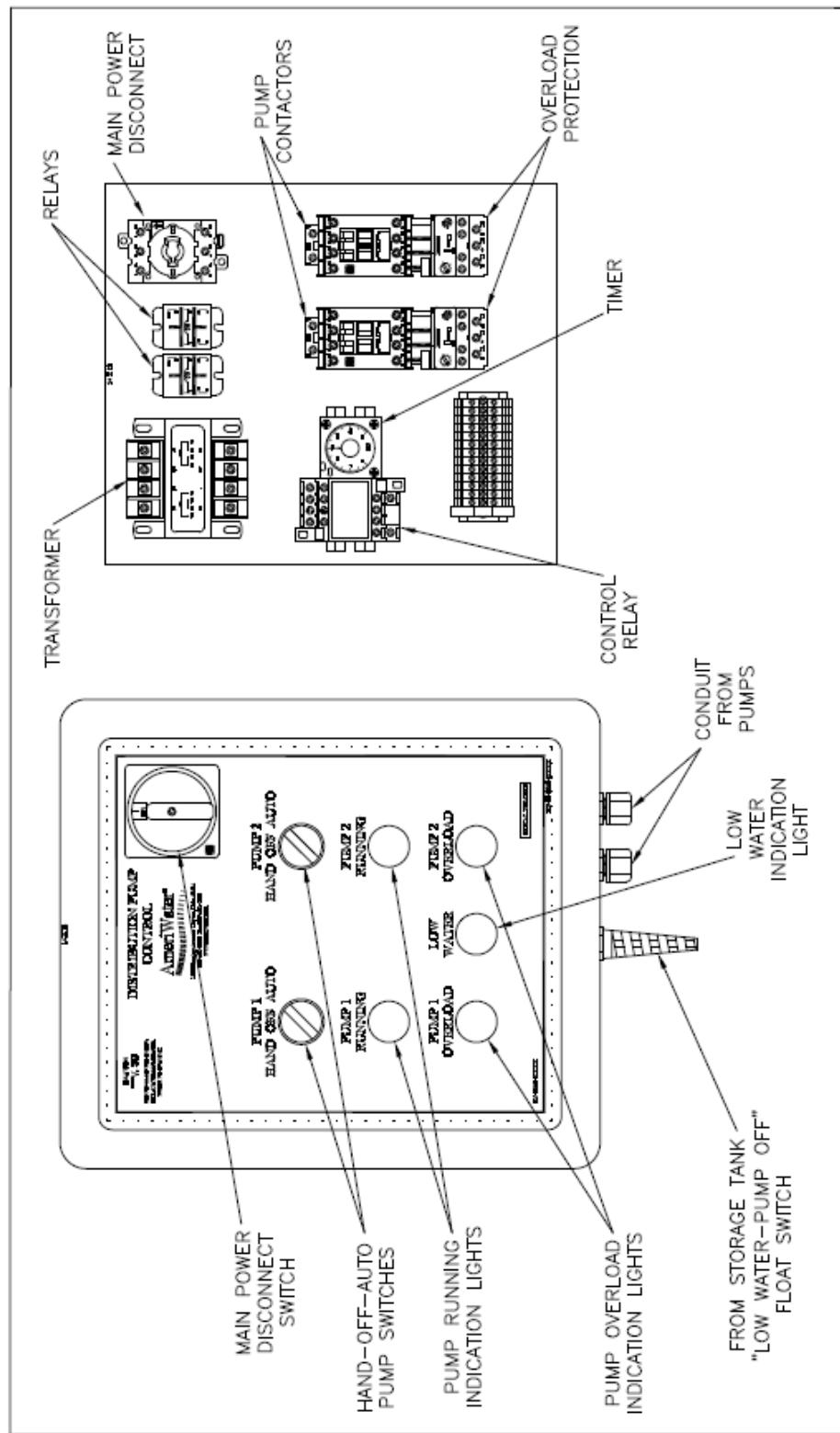
## Dual Distribution Single Phase Controller



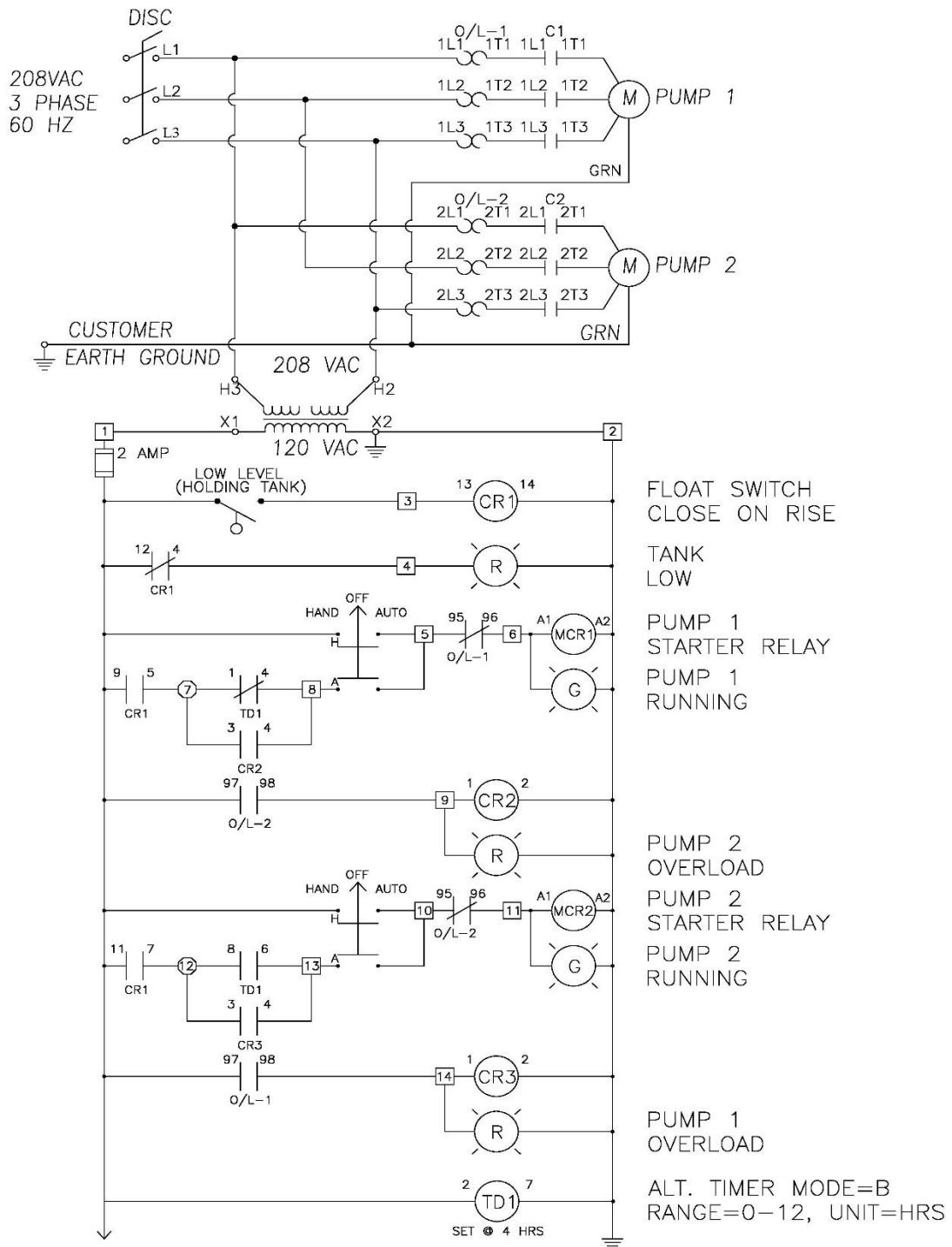
## Dual Distribution 220V Single Phase Controller Schematic



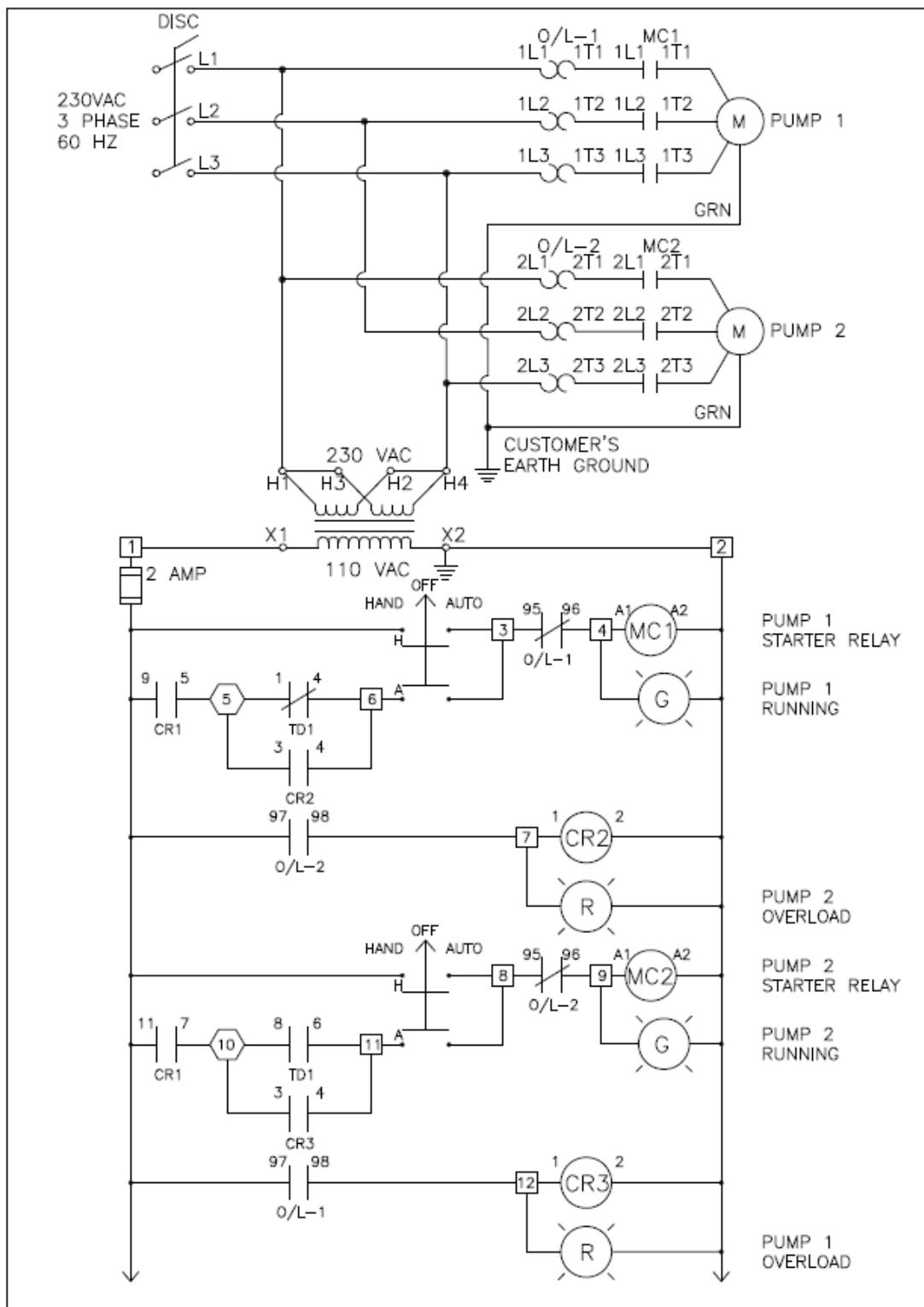
## Dual Distribution Three Phase Controller



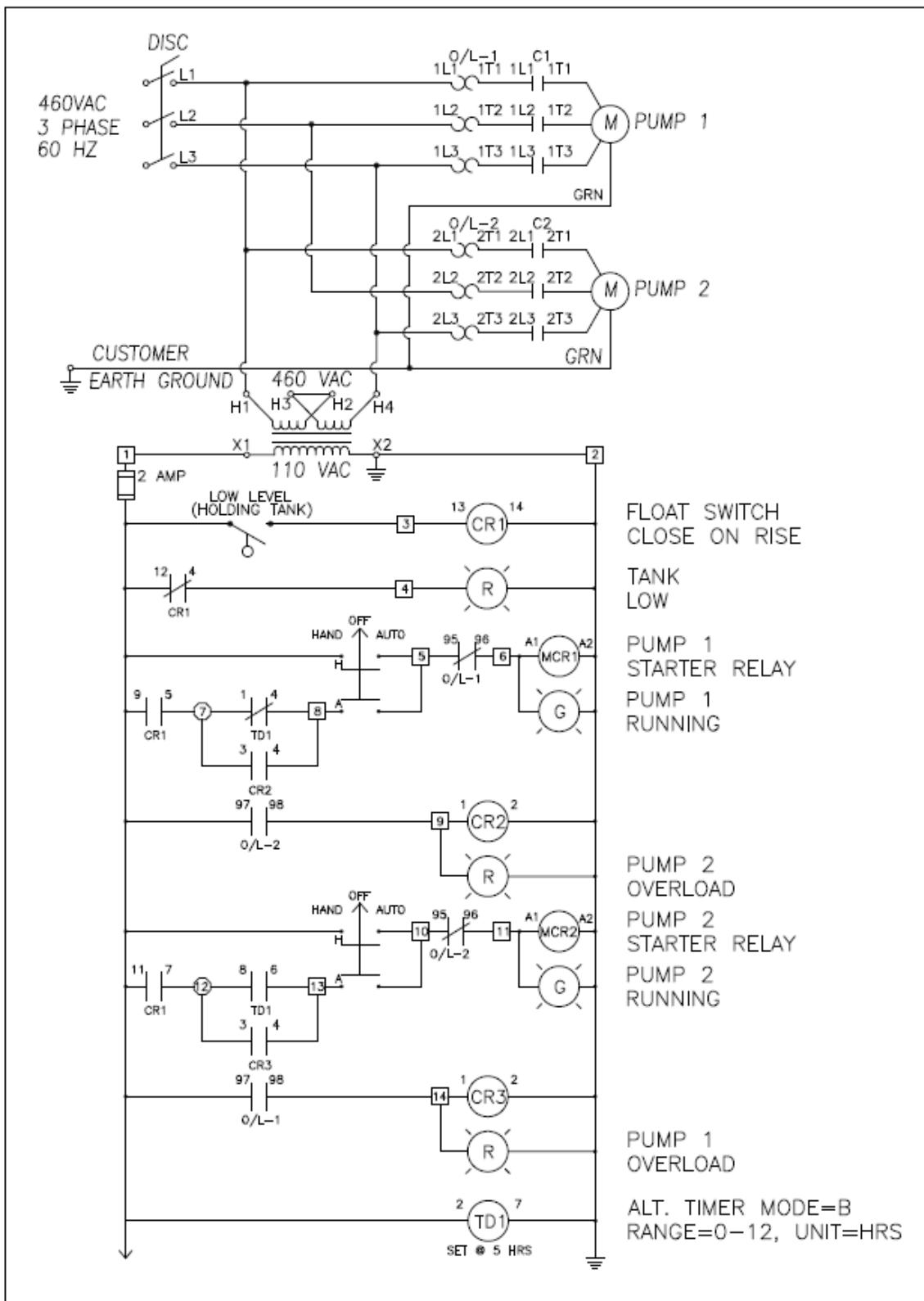
## Dual Distribution 208V Three Phase Controller Schematic



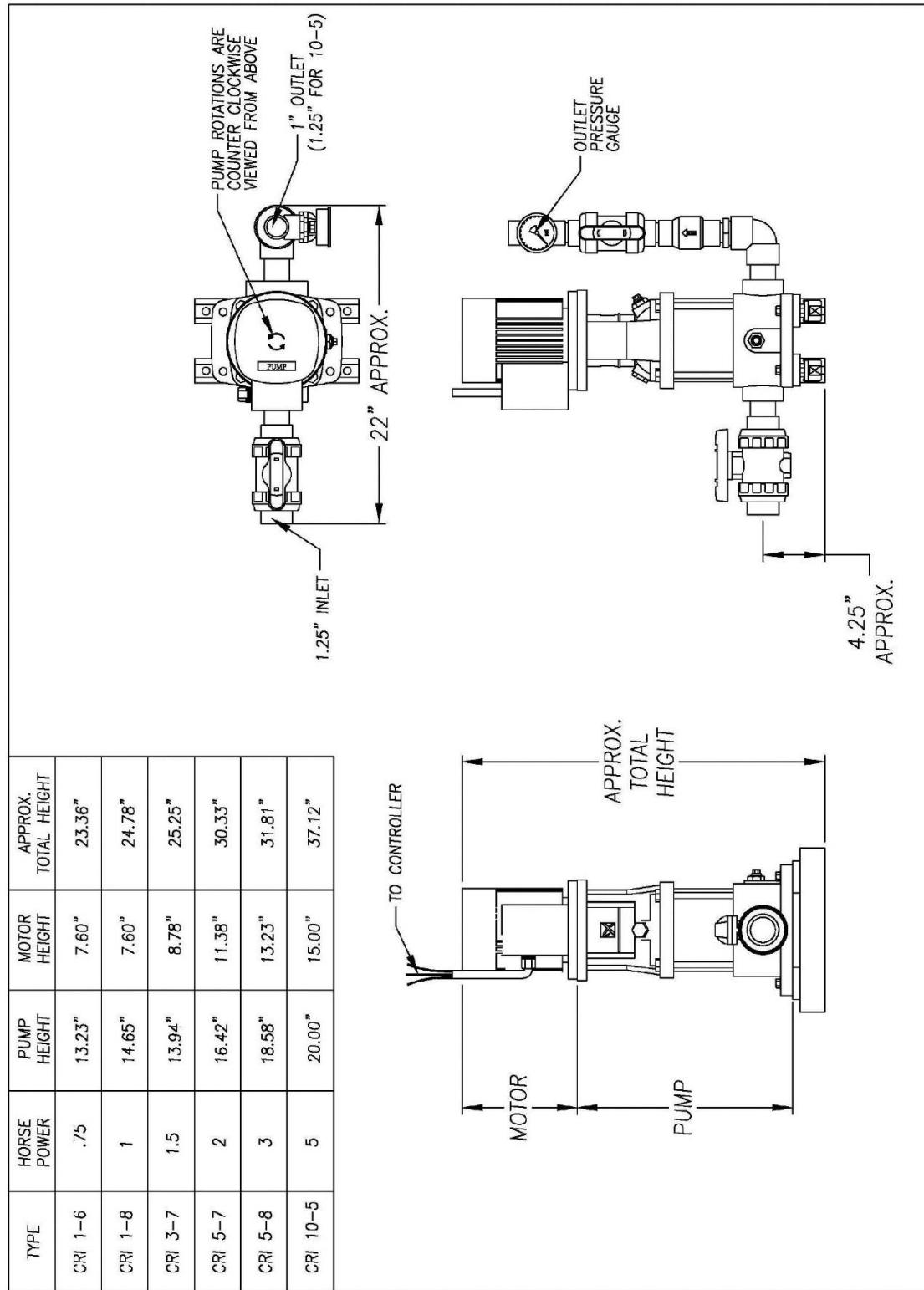
## Dual Distribution 230 Volt Three Phase Controller Schematic



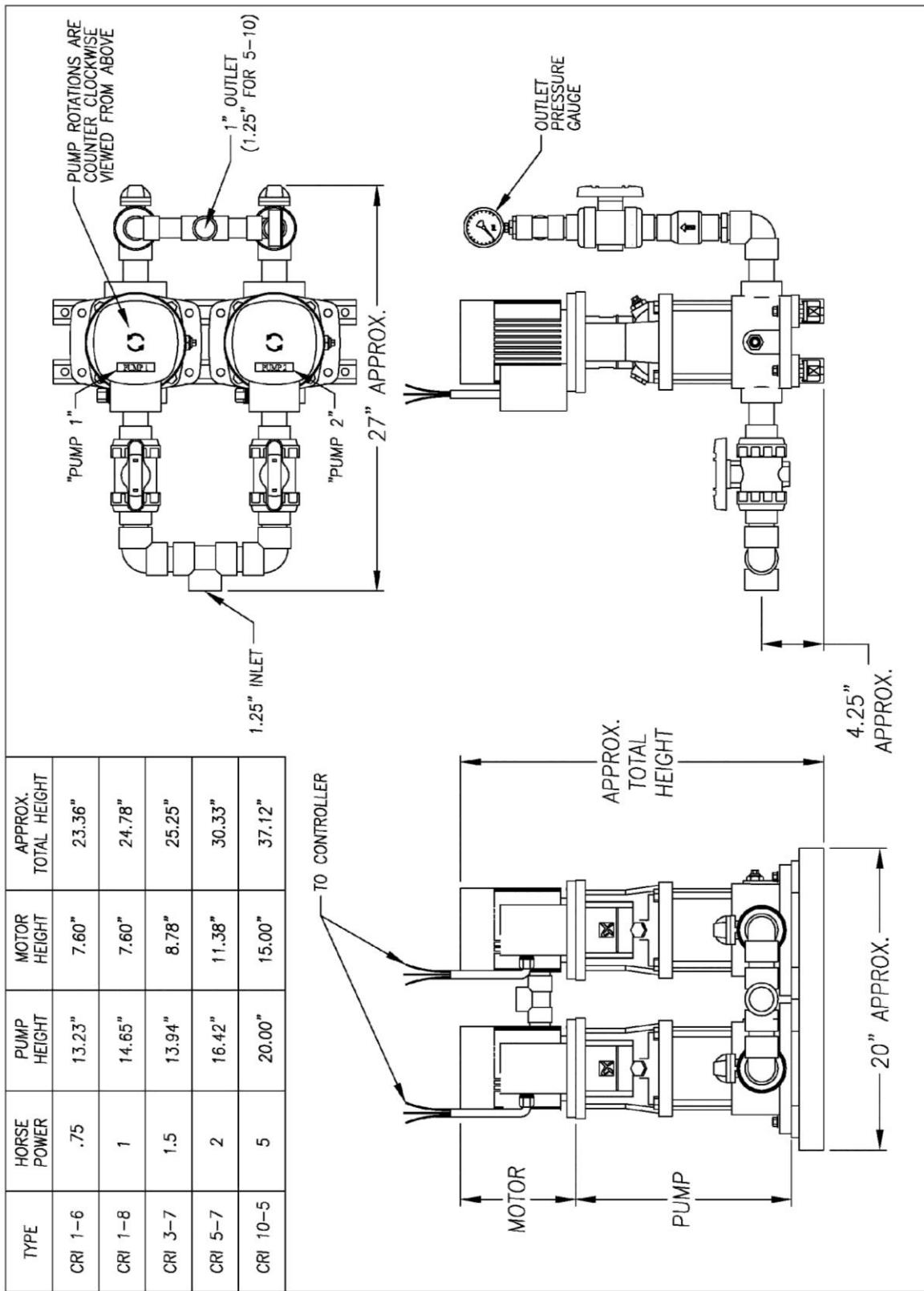
## Dual Distribution 460 Volt Three Phase Controller Schematic



## Single Distribution Pump Assembly



## Dual Distribution Pump Assembly



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**⚠️ WARNING**

This product can expose you to chemicals such as vinyl chloride (used in the production of PVC) or Nickel (used in the production of stainless steel), that are known to the State of California to cause cancer. For more information go to [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov).

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Dear Valued Customer,

California Proposition 65 (Prop 65) is the Safe Water and Toxic Enforcement Act of 1986. The State of California began enforcing amendments to California Prop 65 at the end of August 2018. Prop 65 requires manufacturers to provide a clear and reasonable warning to residents of California about chemicals used in products that they purchase that are included on the Prop 65 Chemical List. The chemicals included on the list are chemicals that are known to the State of California to cause cancer, birth defects, or other reproductive harm. One such chemical is Vinyl Chloride, a compound used to produce Polyvinyl Chloride (PVC). The AmeriWater system you have purchased may contain PVC or stainless steel parts. While warnings are only required in the State of California, AmeriWater has initiated the use of Prop 65 labeling for all products to ensure compliance with California regulations. Please note that the above warning does not necessarily mean that the product that you have purchased is unsafe. Products that have been cleared for market by FDA have been determined to be safe and effective by the United States Food and Drug Administration. The warning is simply a requirement by the State of California. If you wish to obtain additional information, please visit: [p65warnings.ca.gov](http://p65warnings.ca.gov). You may also contact your AmeriWater representative if you have any questions.

Thank you for your understanding and we look forward to continuing to serve you.