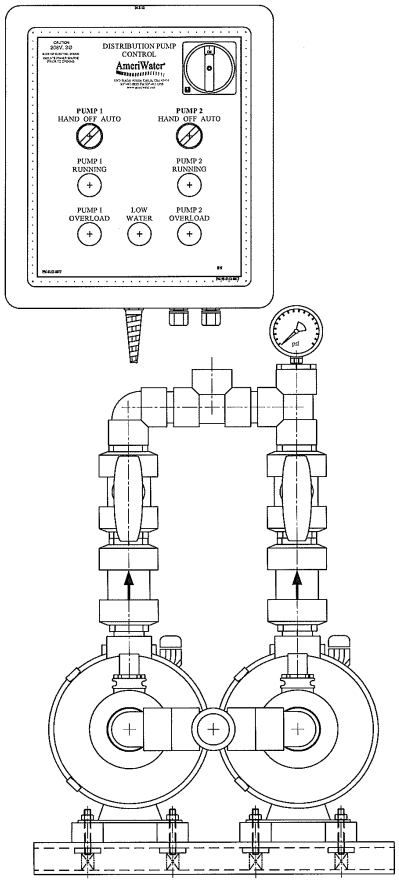
# DISTRIBUTION PUMP SYSTEM
# OPERATION & MAINTENANCE MANUAL
# GRUNDFOS CHI PUMPS




**Manufactured With Pride**
**In The USA**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**P/N 98-0115**
**Rev. A**

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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 volume up to 70 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.

## 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. Verify that the voltage on the pump matches what is indicated on the overload of the motor starter.

3. Once the power source has been connected, check the rotation of the pump. Turn the disconnect to the ON position. Jog each pump 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.

4. After rotation has been verified, turn the switches 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.

5. 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.

6. 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 5 for details on adjusting the set-point.

7. 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.

8. The rated flow for your distribution pump is 70 PSI. 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 70 PSI. Refer to the manual that was provided with your storage tank system for proper adjustments. Pump curves have been provided on page 4.

# General data



## Applications

The CHI and CHIE pumps are primarily designed for industrial applications:

| Typical applications | CHI | CHIE |
|---|---|---|
| Water treatment | ● | O |
| Industrial washing and dish-washing machines | ● | O |
| Pressure boosting of process water | ● | O |
| Heating and cooling in industrial processes | ● | O |
| Air-conditioning | ● | |
| Airwashing, moisturization, humidification (softened water) | ● | O |
| Water supply and pressure boosting (potable water, also slightly chlorinated). | ● | O |
| Fertilizer/dosing systems | ● | |
| Aquafarming | ● | |

In addition, the CHI, CHIE pump is suitable for many specialized applications.
● Recommended
O Applicable

## Pumped liquids

Thin, clean, non-aggressive and non-explosive liquids without solid particles or fibers.

The pumps are able to pump liquids such as demineralised water, softened water, cleaning solutions, light oils and other light chemicals.

When pumping liquids with a density and/or viscosity higher than that of water, motors with correspondingly higher outputs must be used, if required.

Whether a pump is suitable for a particular liquid depends on a number of factors of which the most important are chloride content, pH value, temperature and content of solvents, oils, etc.

## Operating conditions*

| | |
|---|---|
| Liquid temperature: | +5°F to +230°F (–15°C to +110°C) |
| Maximum ambient temperature: | +104°F (+40°C) |
| Maximum operating pressure: | 145 psi (10 bar) |
| Sound pressure level: | <70 dB(A) |

Minimum inlet pressure accoding to the NPSHR curve + a safety margin of two feet of head.

Maximum inlet pressure is limited by maximum operating pressure.

* **CHIE-Plus:**
Maximum liquid temperature: +176°F (80°C)
Maximum operating pressure: 125 psi (8.6 bar)

**Models:**
Maximum liquid temperature: 248° F (120°C)

## Maximum operating pressure and liquid temperature

The actual operating range depends on the operating pressure, the pump type, the type of shaft seal, the pumped liquid and the liquid temperature.

### Shaft seal

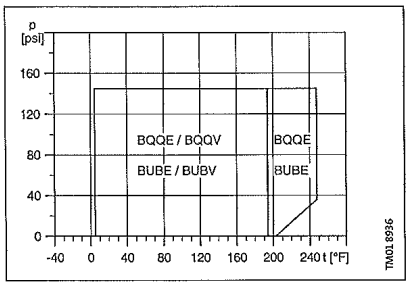
The shaft seal is to be selected on the basis of liquid temperature and type of liquid.

For other liquids than water, the chemical resistance of the materials - incl. seal face, seat and rubber components of the shaft seal - must be taken into account.

The following table shows available shaft seal types.

| Pump type | Shaft seal type | Material | Rubber parts |
|---|---|---|---|
| CHI/CHIE | BQQE<br>BQQV | Silicon carbide (Q)/<br>Silicon carbide (Q) | EPDM (E)<br>FKM (V) |
| | BUBE<br>BUBV | Tungsten carbide (U)/<br>Carbon (B) | |

The following curves apply to clean water and water-containing antifreeze additives.



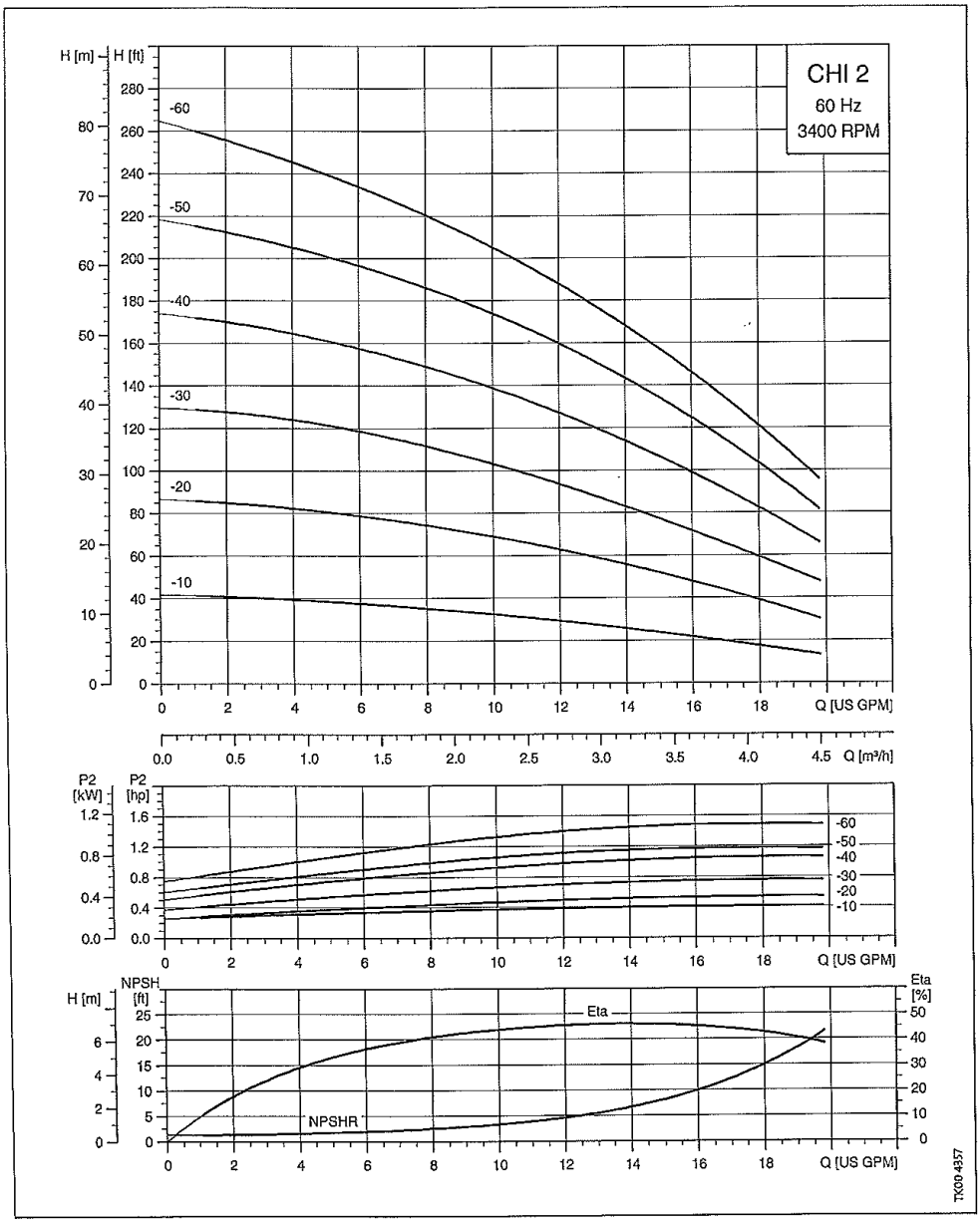

## Approvals

| | | |
|---|---|---|
| | on | 1 x 115/230 V (CHI)<br>1 x 208 - 230 V (CHIE)<br>3 x 208 - 230/460 V (CHI) |
| | on | 3 x 208 - 230/460 V (CHI 12-20)<br>1 x 208 - 230/2800 rpm (CHIE 4-60) |
| | on | 3 x 575 V (CHI) |

Official UL approval has been given for CHI pumps mounted indoors and pumping water only.

# Performance curves





## Pump, CHI

The CHI pump is a non self-priming, compact horizontal multistage centrifugal pump fitted with a Grundfos motor including an extended motor/pump shaft. All parts in contact with the pumped liquid are made of 316 stainless steel. The pump bearings are self lubricated by the pumped liquid.

The pump has a maintenance-free mechanical shaft seal. The seal is a 16mm, unbalanced shaft seal with material options; BQQE, BQQV, BUBE, and BUBV .

The compact pump unit has small physical dimensions and an end suction type axial suction port and radial discharge port. The pump sleeve is drawn of 316 stainless steel sheet and has a threaded hole (G 3/8) with priming plug at the top and a threaded hole (G 3/8) with drain plug at the bottom.

| Connections | CHI 2 | CHI 4 | CHI 8 | CHI 12 |
|---|---|---|---|---|
| Axial suction port | 1" NPT | 1 1/4" NPT | 1 1/2" NPT | 1 1/2" NPT |
| Radial discharge port | 1" NPT | 1 1/4" NPT | 1 1/2" NPT | 1 1/2" NPT |

## Motor, CHI

The pump is coupled with a totally enclosed, fan-cooled Grundfos squirrel-cage motor.

Enclosure class: TEFC
Insulation class: F
Standard voltages: 1 x 115/230 V, 60 Hz
3 x 208-230/460 V, 60 Hz
3 x 575 V, 60 Hz
Sound-pressure level: ≤ 64 dB(A)

Single-phase motors do not have built-in thermal overload protection and therefore require external motor protection.

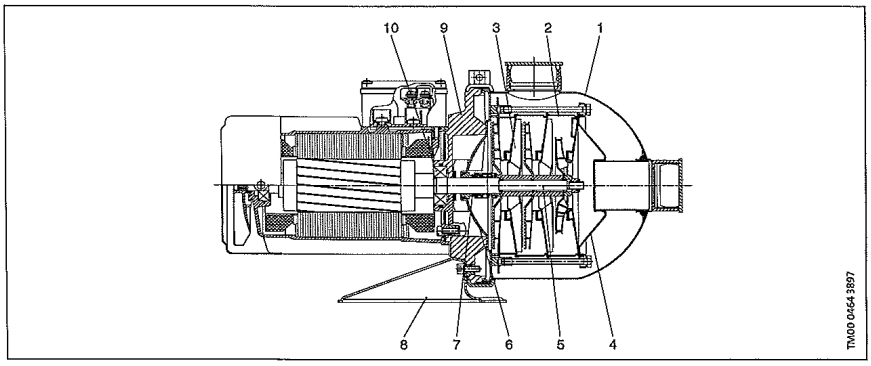
Three-phase motors must be connected to a motor starter in accordance with local regulations.

CHI single-phase are also available with variable speed motors, type MLE. See CHIE section.

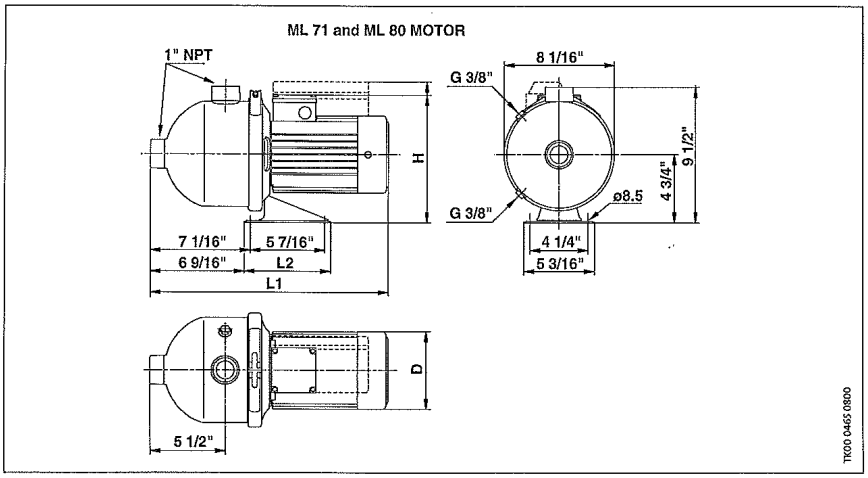
## Materials, CHI

| Pos. | Description | Materials | AISI, ASTM |
|---|---|---|---|
| 1 | Pump sleeve | Stainless steel | 316 |
| 2 | Intermediate chamber/ guide vanes | Stainless steel | 316 |
| 3 | Impeller | Stainless steel | 316 |
| 4 | Suction interconnector | Stainless steel | 316 |
| 5 | Spline shaft | Stainless steel | 316 |
| 6 | Cover plate | Stainless steel | 316 |
| 7 | Shaft seal faces | BQQE, BQQV, BUBE, and BUBV | |
| 8 | Base plate | Painted steel plate | |
| 9 | Motor flange | Cast iron | |
| | | Silumin | |
| 10 | Ball bearing | | |
| | O-rings | EPDM or FKM | D1418 |

## Sectional drawing, CHI



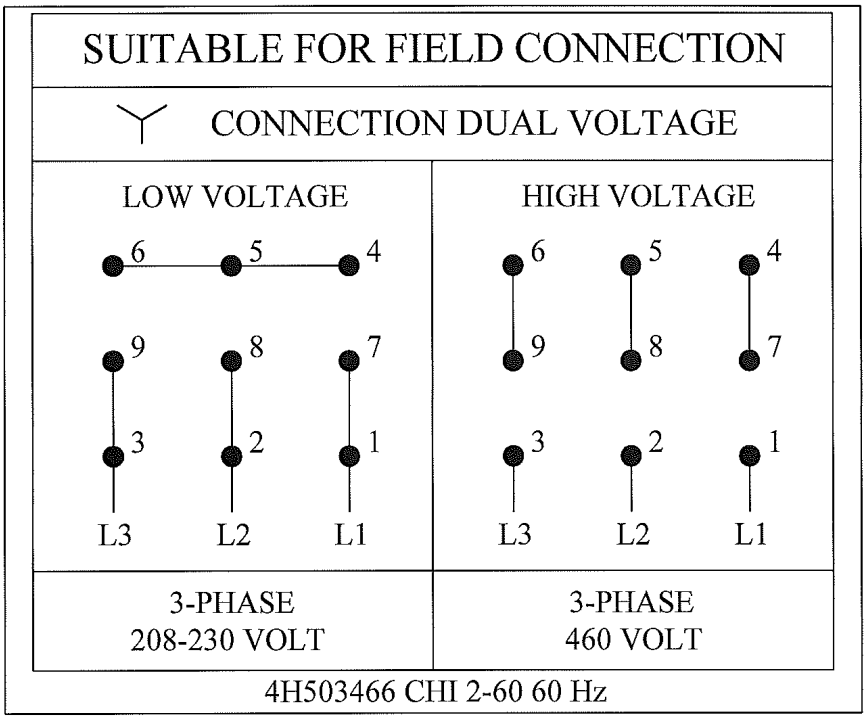
## Dimensional sketch

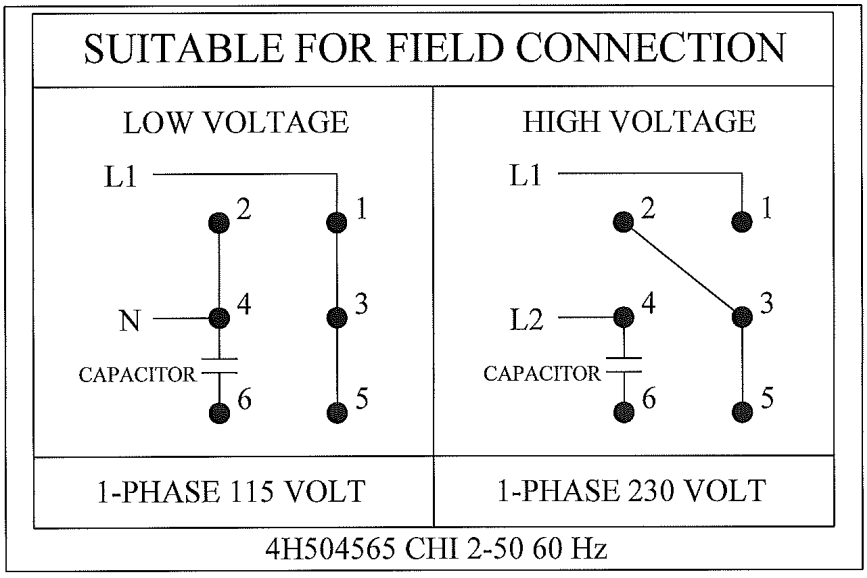



## Dimensions/weights/electrical data

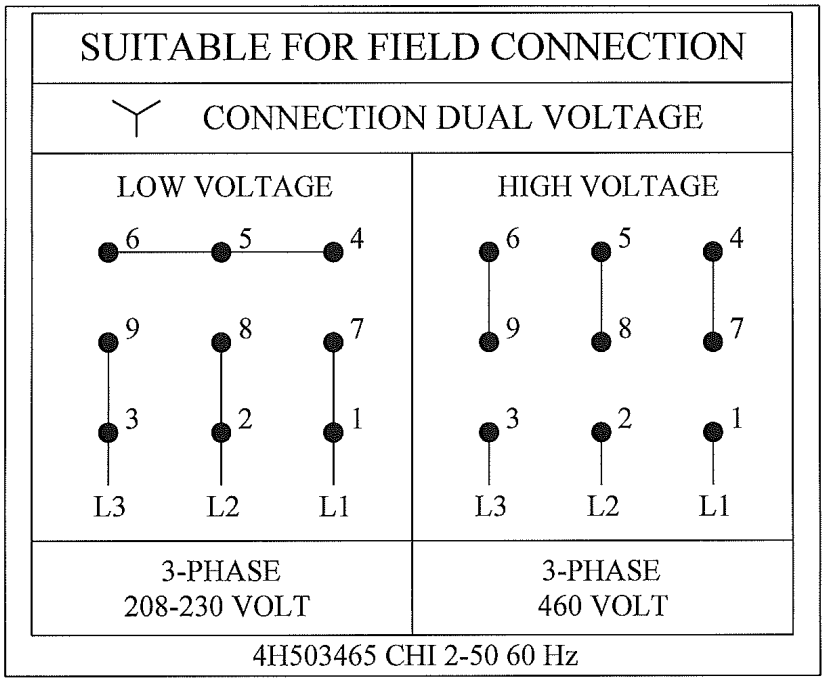
| Pump Type | Electrical Data | | | | | | Dimensions [in.] | | | | Motor type | Ship Wt. [lbs.] | Ship Vol. [ft³] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Hp | Ph | Voltage | Service Factor | Rated Current [A] | Maximum Current [A] | L1 | L2 | H | D | | | |
| CHI 2-10 | 1/2 | 1 | 115/230 | 1.6 | 4.8/2.5 | 9.0/4.5 | 15 5/8 | 6 3/8 | 10 | 5 5/8 | ML 71 | 26 | 1.4 |
| | 1/3 | 3 | 208-230/460 | 1.5 | 1.0/0.5 | 1.55/0.75 | 15 5/8 | 6 3/8 | 9 1/16 | 5 5/8 | ML 71 | | |
| | 1/3 | 3 | 575 | 1.7 | 0.4 | 0.68 | 15 5/8 | 6 3/8 | 9 1/16 | 5 5/8 | ML 71 | | |
| CHI 2-20 | 1/2 | 1 | 115/230 | 1.6 | 5.8/3.0 | 9.0/4.5 | 15 5/8 | 6 3/8 | 10 | 5 5/8 | ML 71 | 27 | 1.4 |
| | 1/2 | 3 | 208-230/460 | 1.7 | 1.8/0.9 | 2.9/1.45 | 15 5/8 | 6 3/8 | 9 1/16 | 5 5/8 | ML 71 | | |
| | 1/2 | 3 | 575 | 1.7 | 0.72 | 1.22 | 15 5/8 | 6 3/8 | 9 1/16 | 5 5/8 | ML 71 | | |
| CHI 2-30 | 1/2 | 1 | 115/230 | 1.5 | 7.0/3.6 | 9.0/4.5 | 15 5/8 | 6 3/8 | 10 | 5 5/8 | ML 71 | 28 | 1.4 |
| | 1/2 | 3 | 208-230/460 | 1.7 | 2.3/1.2 | 2.9/1.45 | 15 5/8 | 6 3/8 | 9 1/16 | 5 5/8 | ML 71 | | |
| | 1/2 | 3 | 575 | 1.7 | 0.96 | 1.63 | 15 5/8 | 6 3/8 | 9 1/16 | 5 5/8 | ML 71 | | |
| CHI 2-40 | 3/4 | 1 | 115/230 | 1.5 | 9.4/4.7 | 11.5/5.7 | 17 1/4 | 6 3/8 | 10 | 5 5/8 | ML 80 | 31 | 1.4 |
| | 3/4 | 3 | 208-230/460 | 1.7 | 3.1/1.5 | 4.0/2.1 | 15 5/8 | 6 3/8 | 9 1/16 | 5 5/8 | ML 71 | | |
| | 3/4 | 3 | 575 | 1.7 | 1.5 | 2.04 | 15 5/8 | 6 3/8 | 9 1/16 | 5 5/8 | ML 71 | | |
| CHI 2-50 | 3/4 | 1 | 115/230 | 1.5 | 10.8/5.4 | 11.5/5.7 | 17 1/4 | 6 3/8 | 10 | 5 5/8 | ML 80 | 32 | 1.4 |
| | 3/4 | 3 | 208-230/460 | 1.7 | 3.6/1.8 | 4.0/2.1 | 15 5/8 | 6 3/8 | 9 1/16 | 5 5/8 | ML 71 | | |
| | 3/4 | 3 | 575 | 1.7 | 1.44 | 2.45 | 15 5/8 | 6 3/8 | 9 1/16 | 5 5/8 | ML 71 | | |
| CHI 2-60 | 1 | 1 | 115/230 | 1.5 | 13.0/6.5 | 15.0/7.5 | 17 1/4 | 6 3/8 | 10 | 5 5/8 | ML 80 | 36 | 1.4 |
| | 1 | 3 | 208-230/460 | 1.6 | 4.5/2.3 | 5.2/2.6 | 17 1/4 | 6 3/8 | 9 1/16 | 5 5/8 | ML 80 | | |
| | 1 | 3 | 575 | 1.6 | 1.84 | 2.94 | 17 1/4 | 6 3/8 | 9 1/16 | 5 5/8 | ML 80 | | |

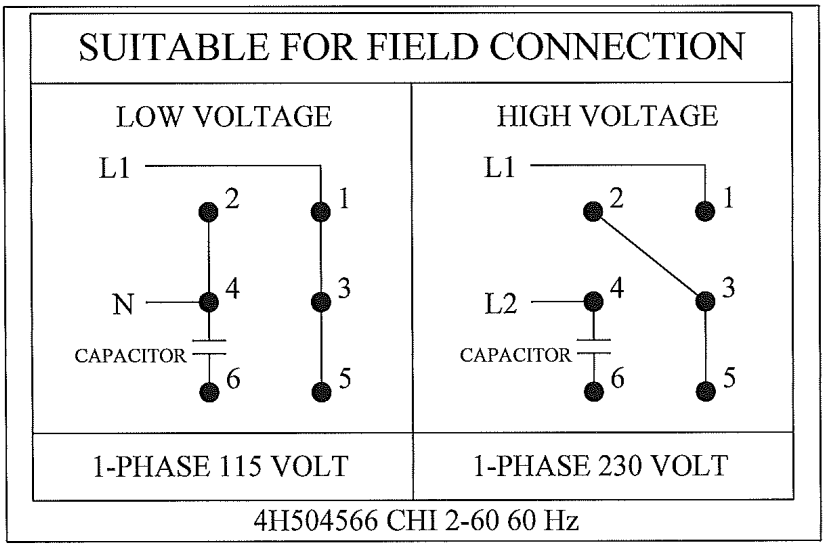
## Pump Connections



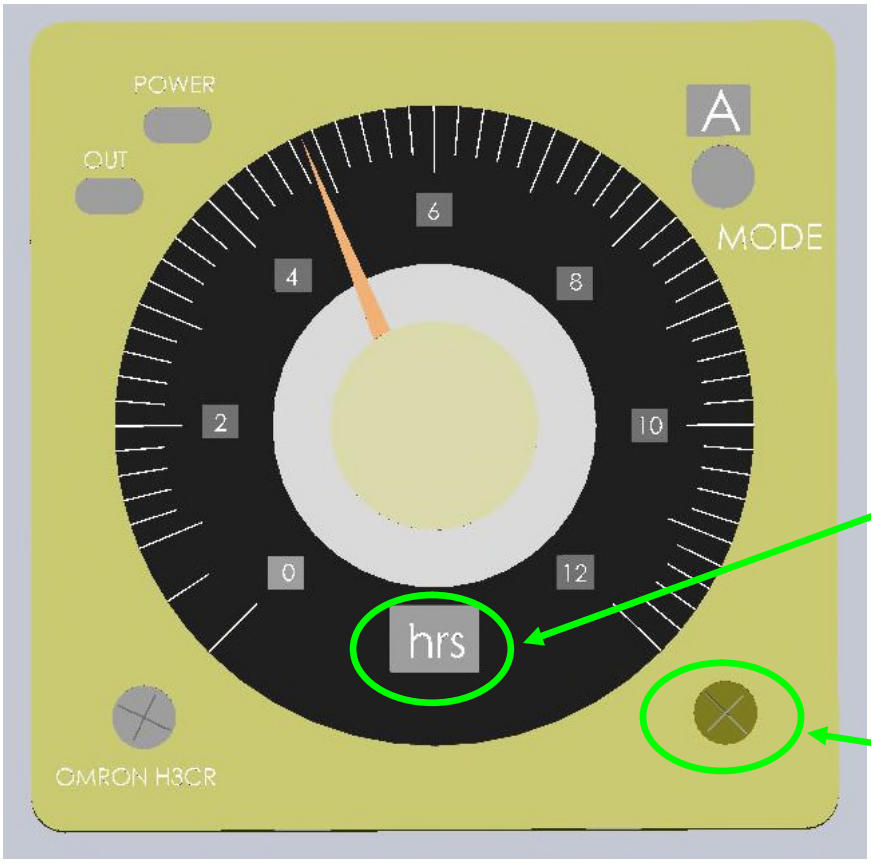
## Pump Connections



## 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 OMRON 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 the time interval modes which are displayed on the face of the timer.

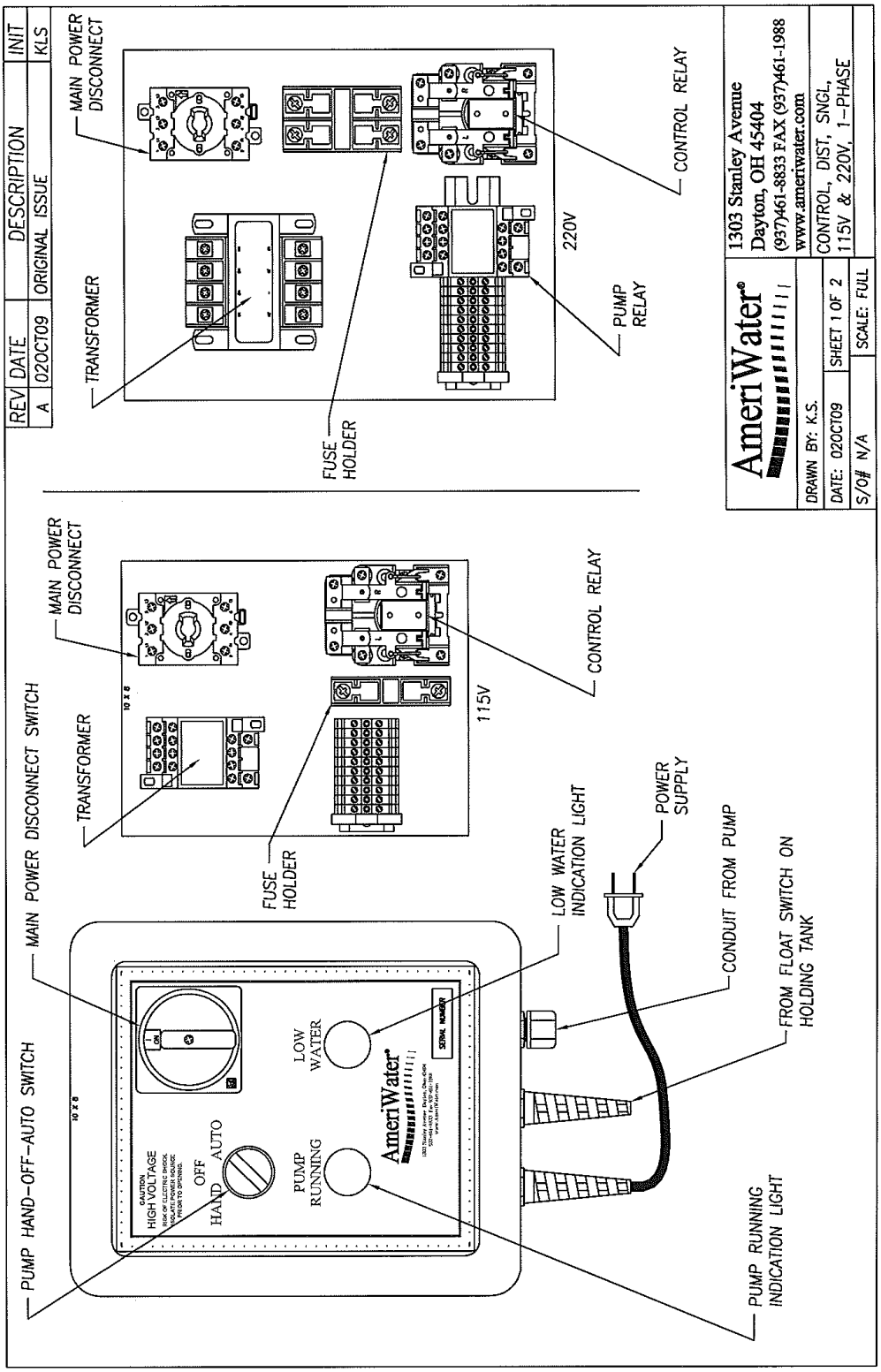



Once all validation of your set-up is complete, you must re-set the timer to 5 hours to meet the AAMI standards.

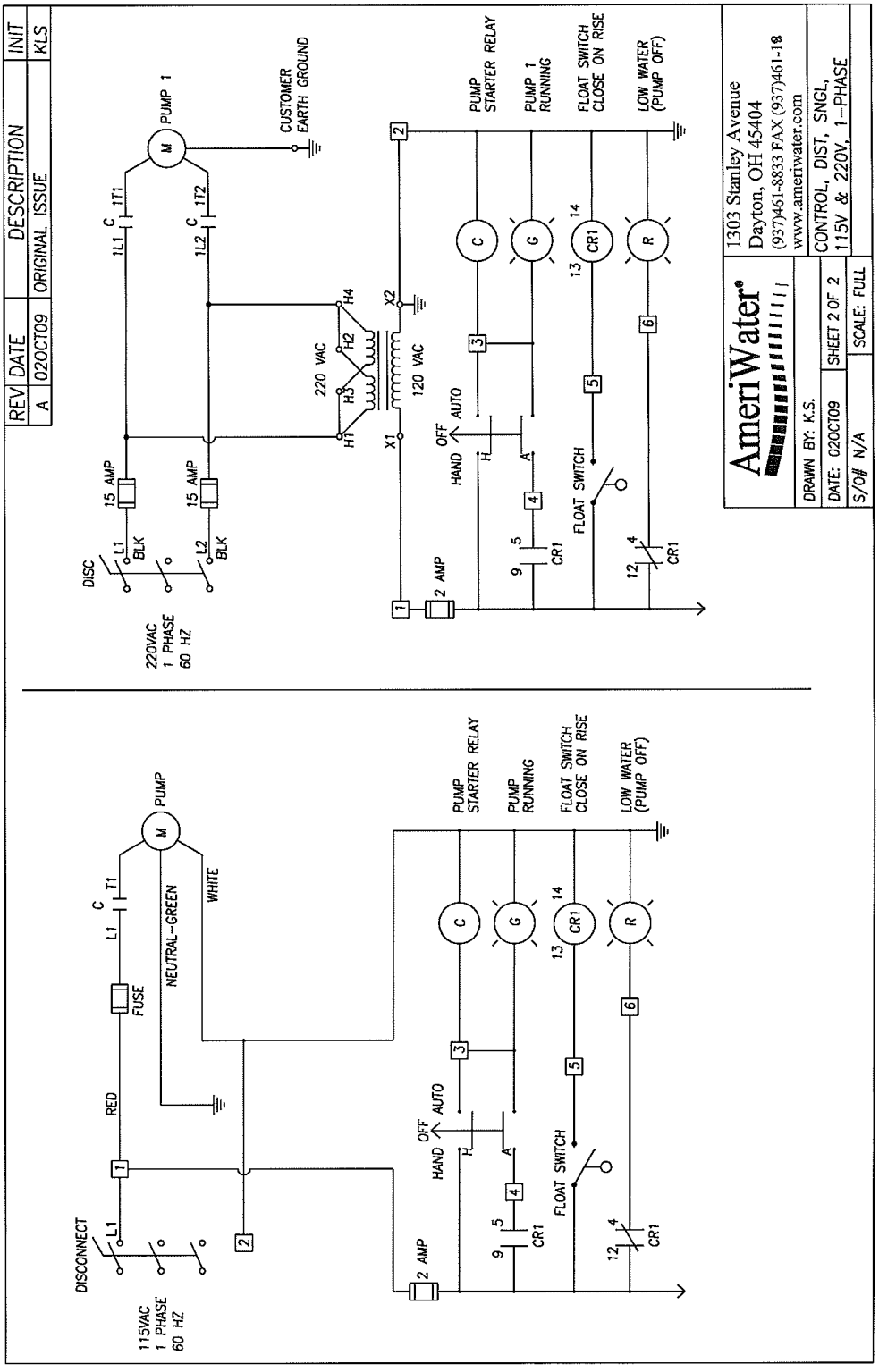
## Spare Parts List

| Part # | Description |
|---|---|
| 80-0128 | Pump, 3/4HP, Single Phase,115/230V |
| 80-0129 | Pump, 1HP, Three Phase, 208-230/460V |
| 80-0134 | Pump, 3/4HP, Three Phase, 208-230/460V |
| 80-0135 | Pump, 1HP, Single Phase,115/230V |
| 041-0033 | Check Valve, Ball Spring Loaded |
| 43530710 | Stainless Steel Pressure Gauge 0-100psi |
| 61670245 | Contactor, AB, 9 AMP, 3 Pole, 120V Coil |
| 61760226 | Motor Contactor/Overload 12 AMP Maximum |
| 63760186 | Fuse 15A FNW |
| 63760133 | Fuse, 2A, 250V |
| 64760225 | Timer, 8-Pin, 120V |
| 64760108 | Base, Timer, 8-Pin |
| 61-0002 | Relay, 30 AMP, 300V, SPST, NO, 120V-Coil |

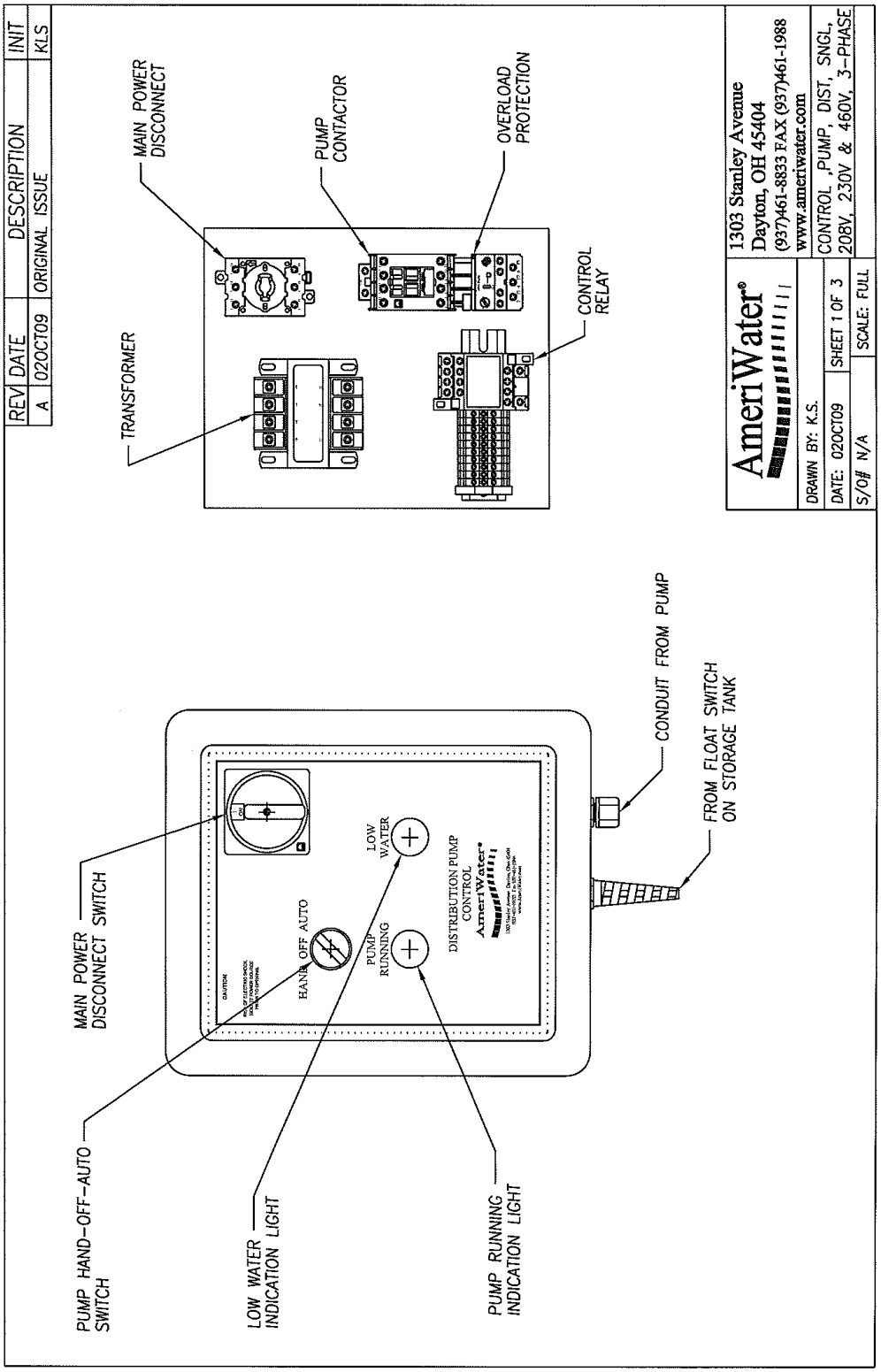
# Single Distribution Single Phase Controller



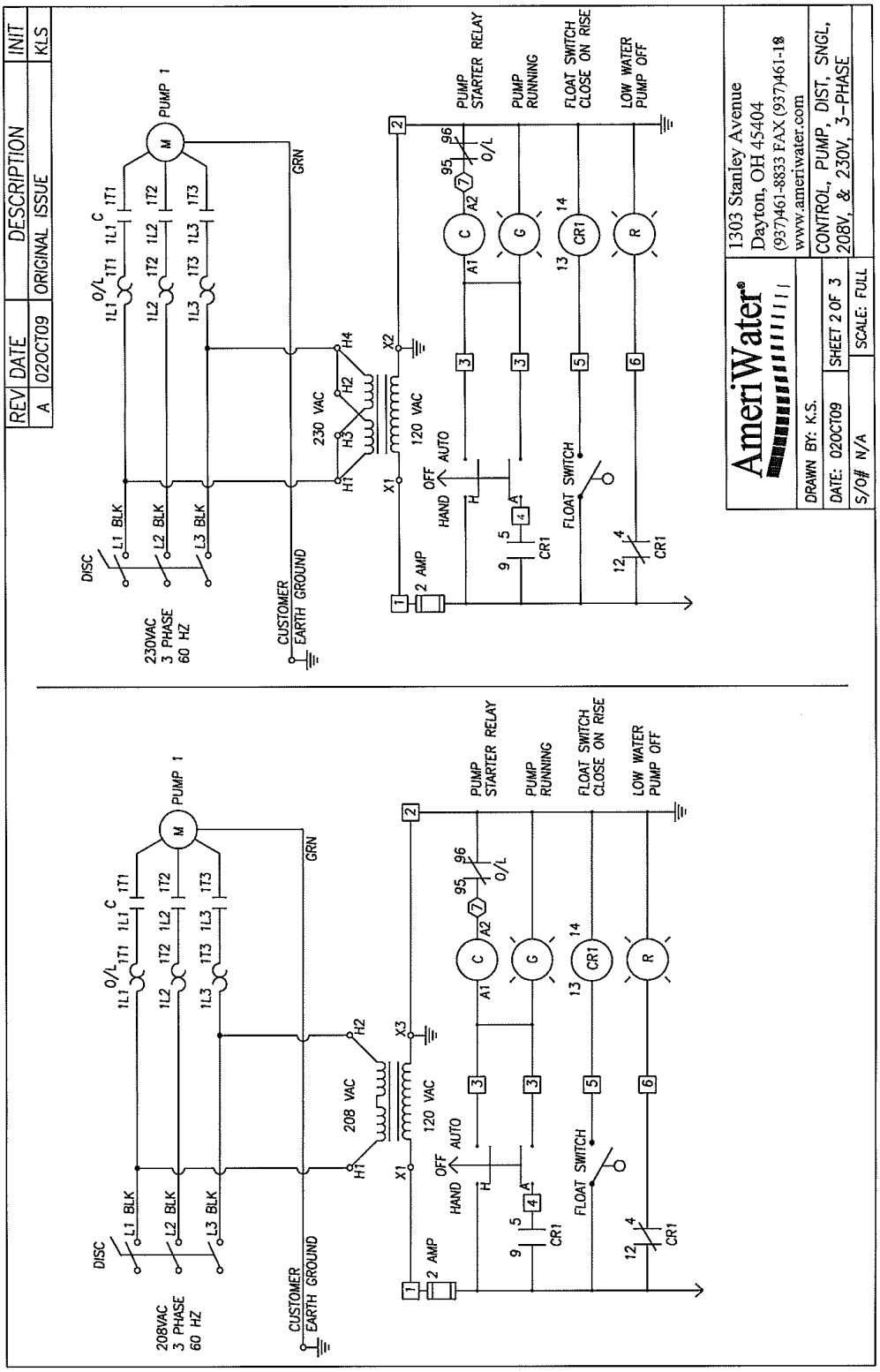
# Single Distribution 115 & 220V
# Single Phase Controller Schematic



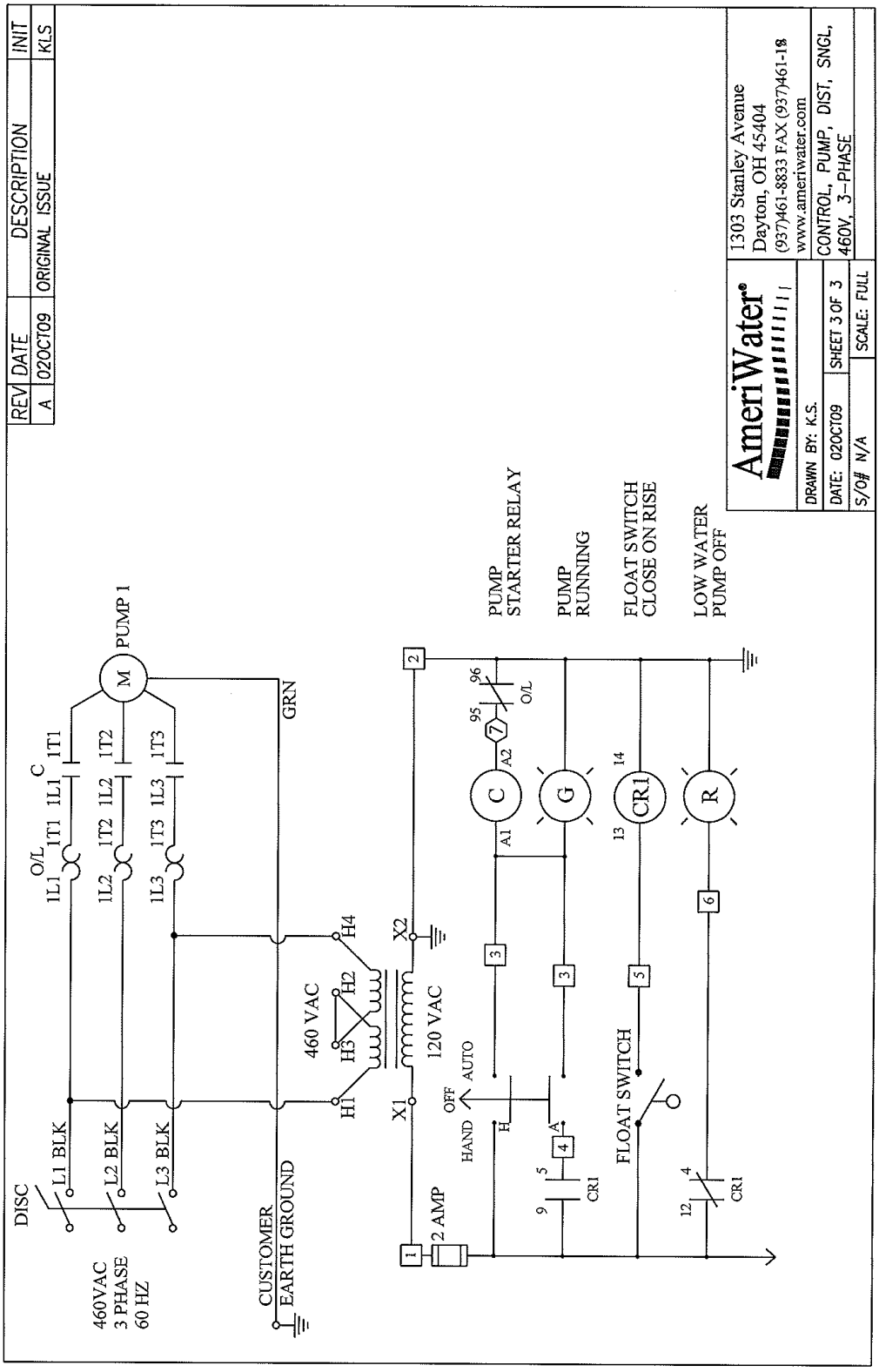
# Single Distribution Three Phase Controller



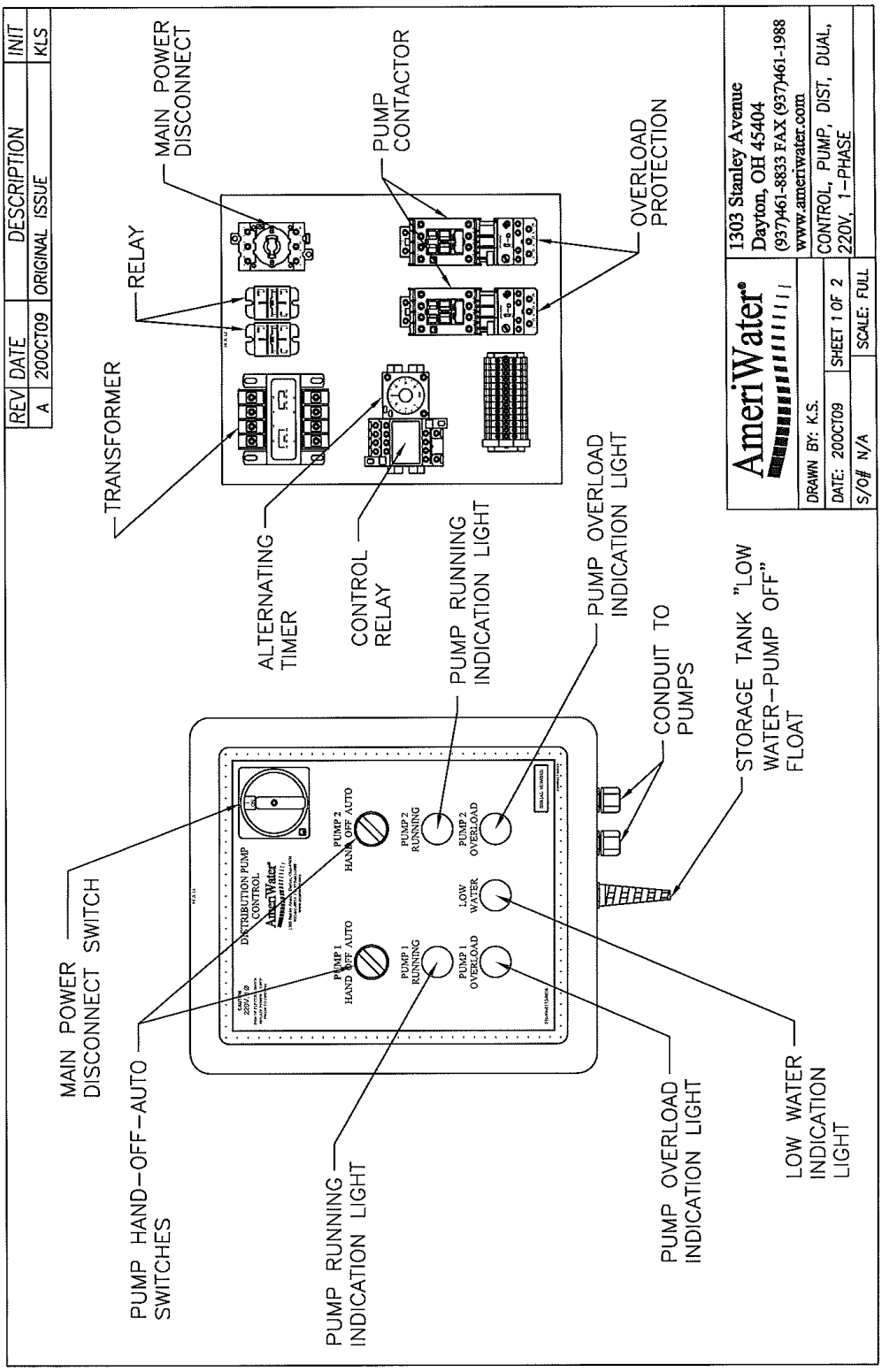
# Single Distribution 208V & 230V
# Three Phase Controller Schematic



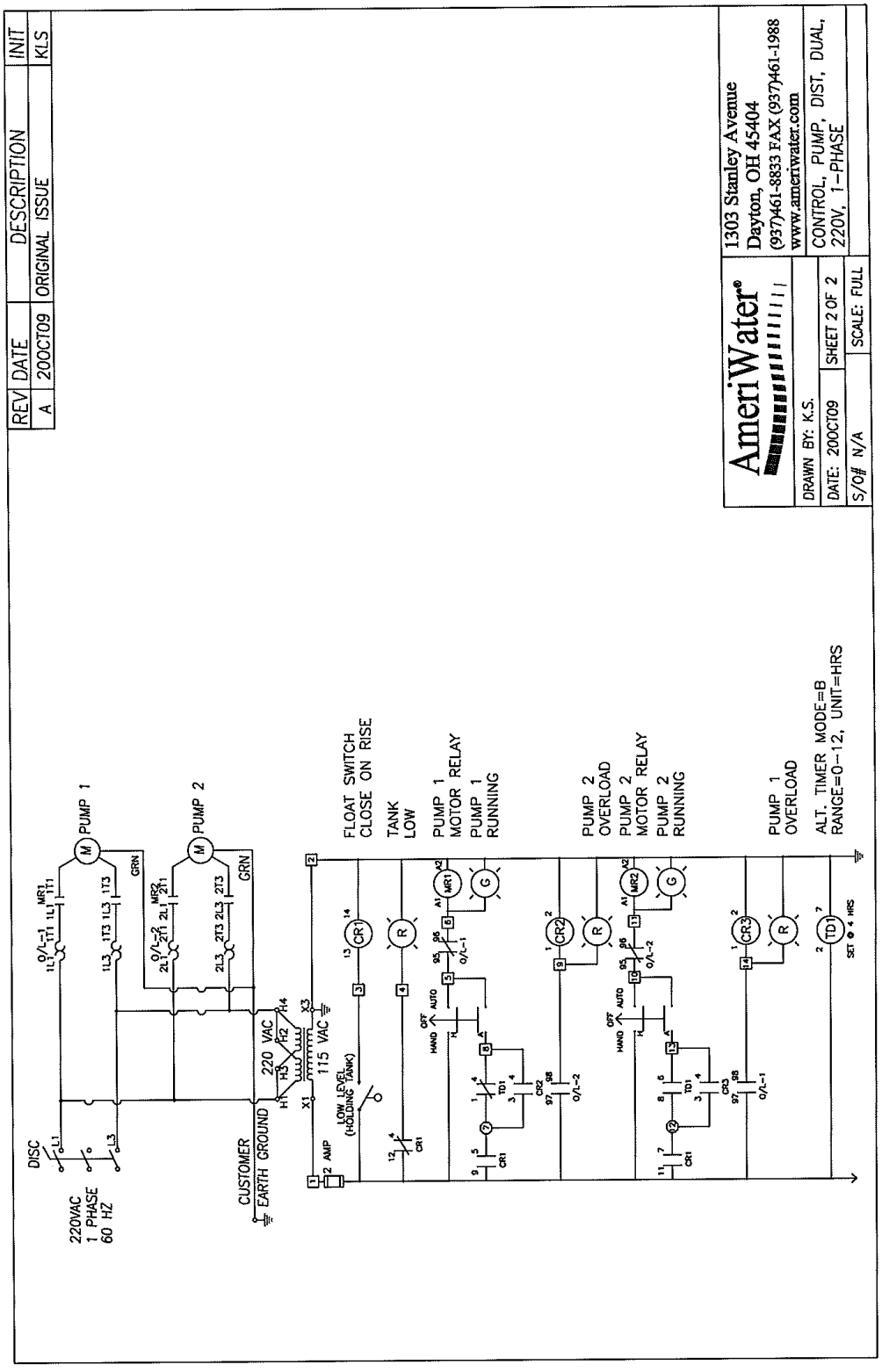
# Single Distribution 460V Three Phase Controller Schematic



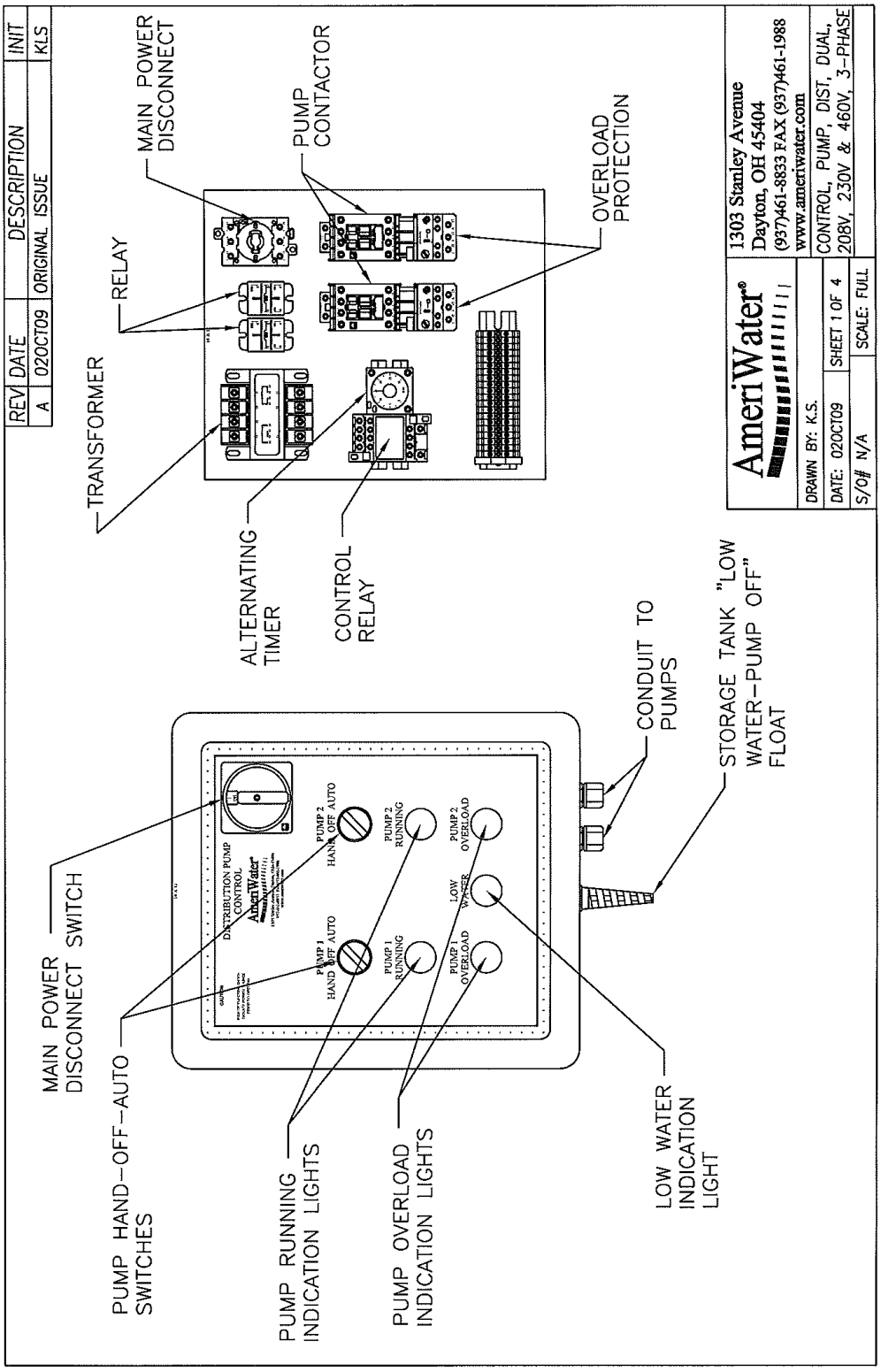
# Dual Distribution Single Phase Controller



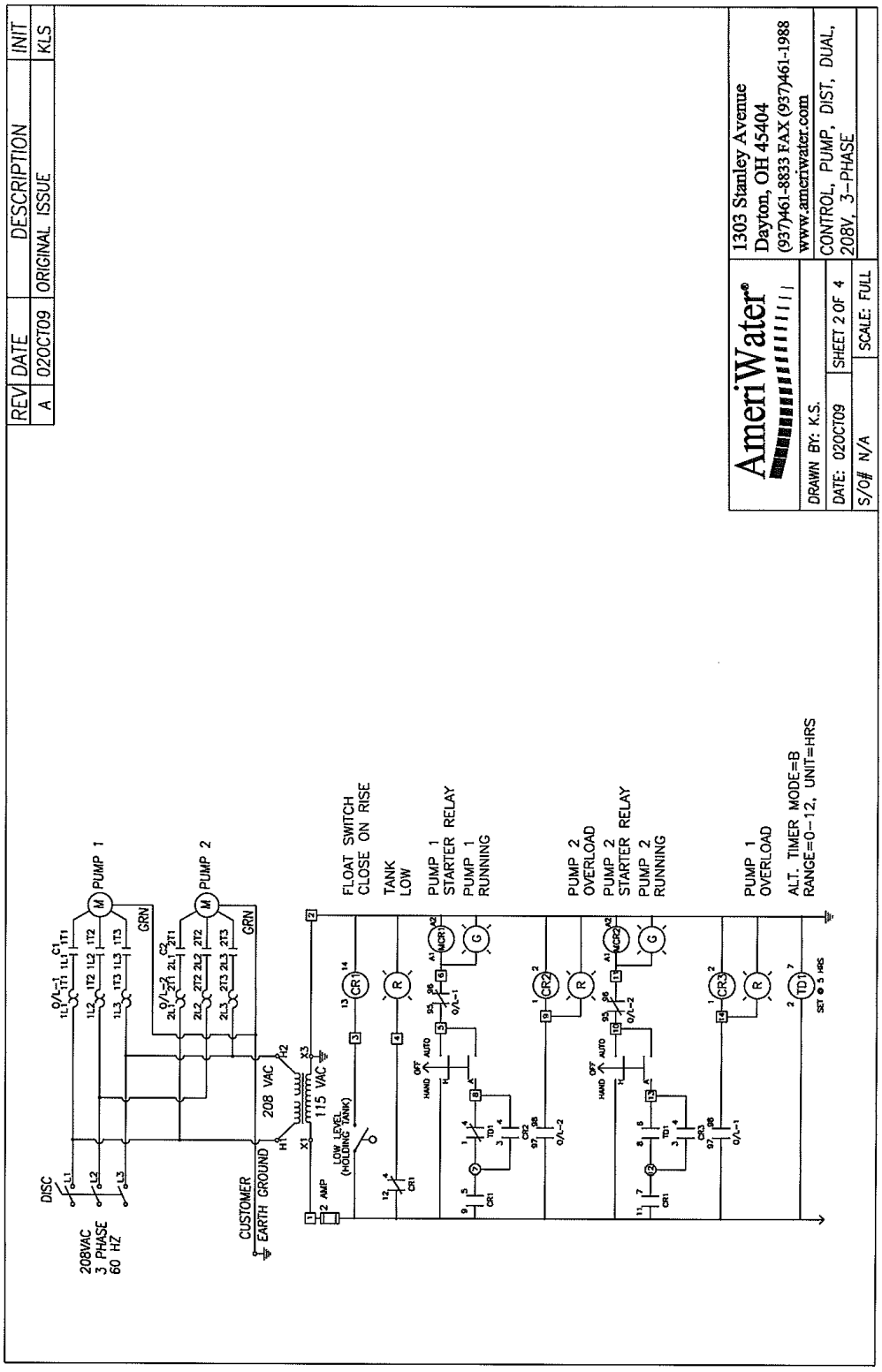
# Dual Distribution 220V Single Phase Controller Schematic



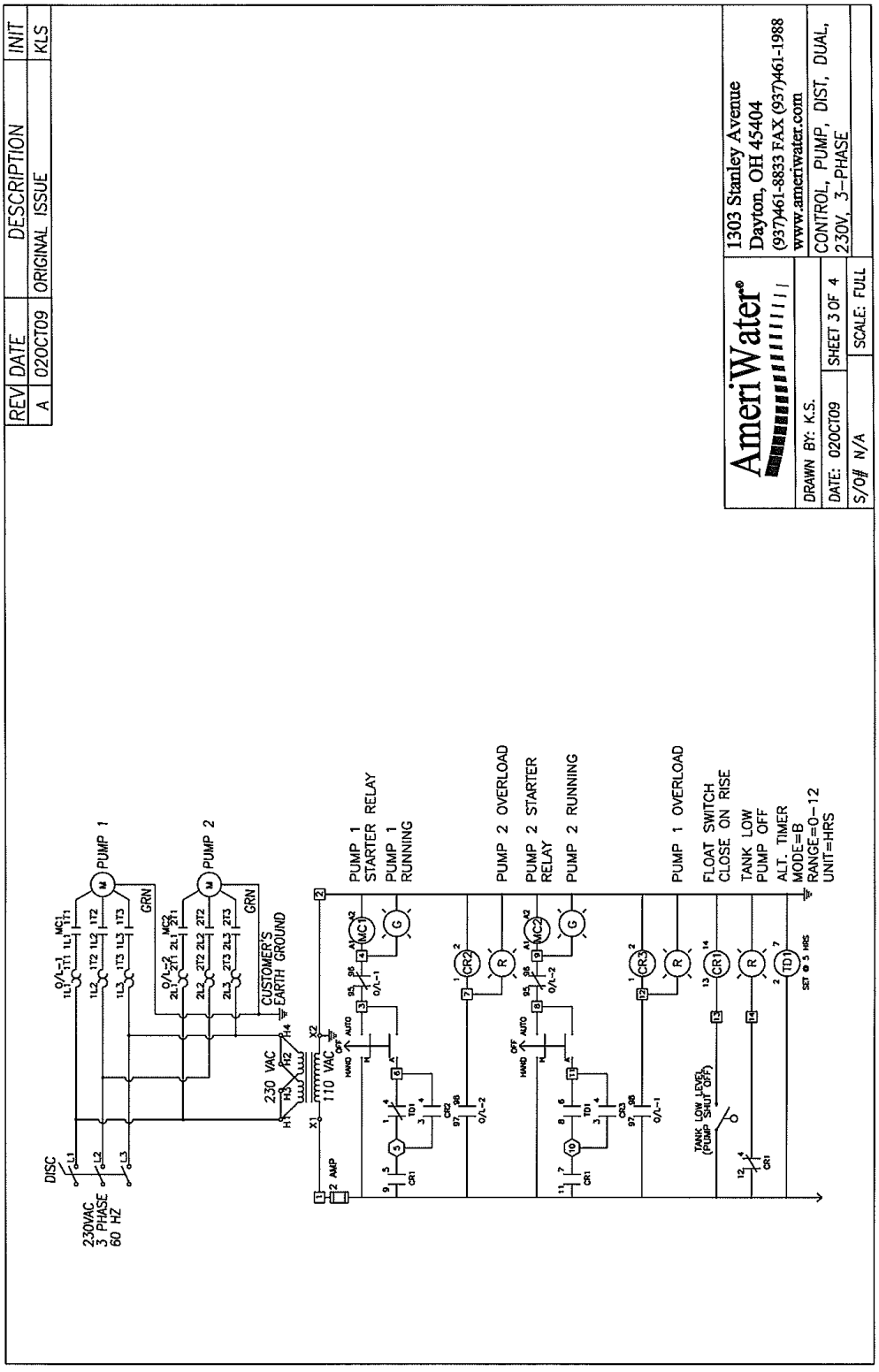
# Dual Distribution Three Phase Controller



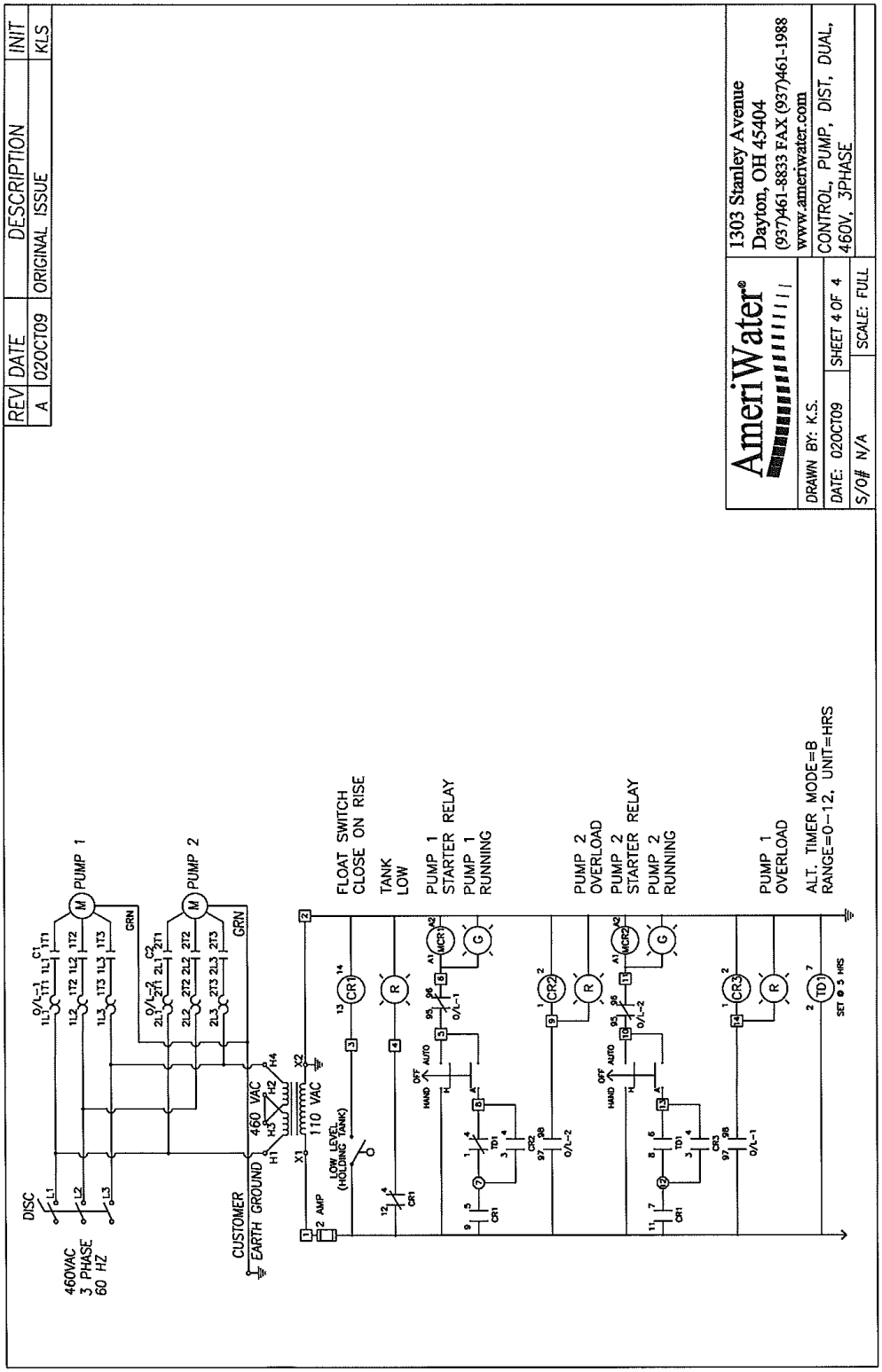
# Dual Distribution 208V Three Phase Controller Schematic



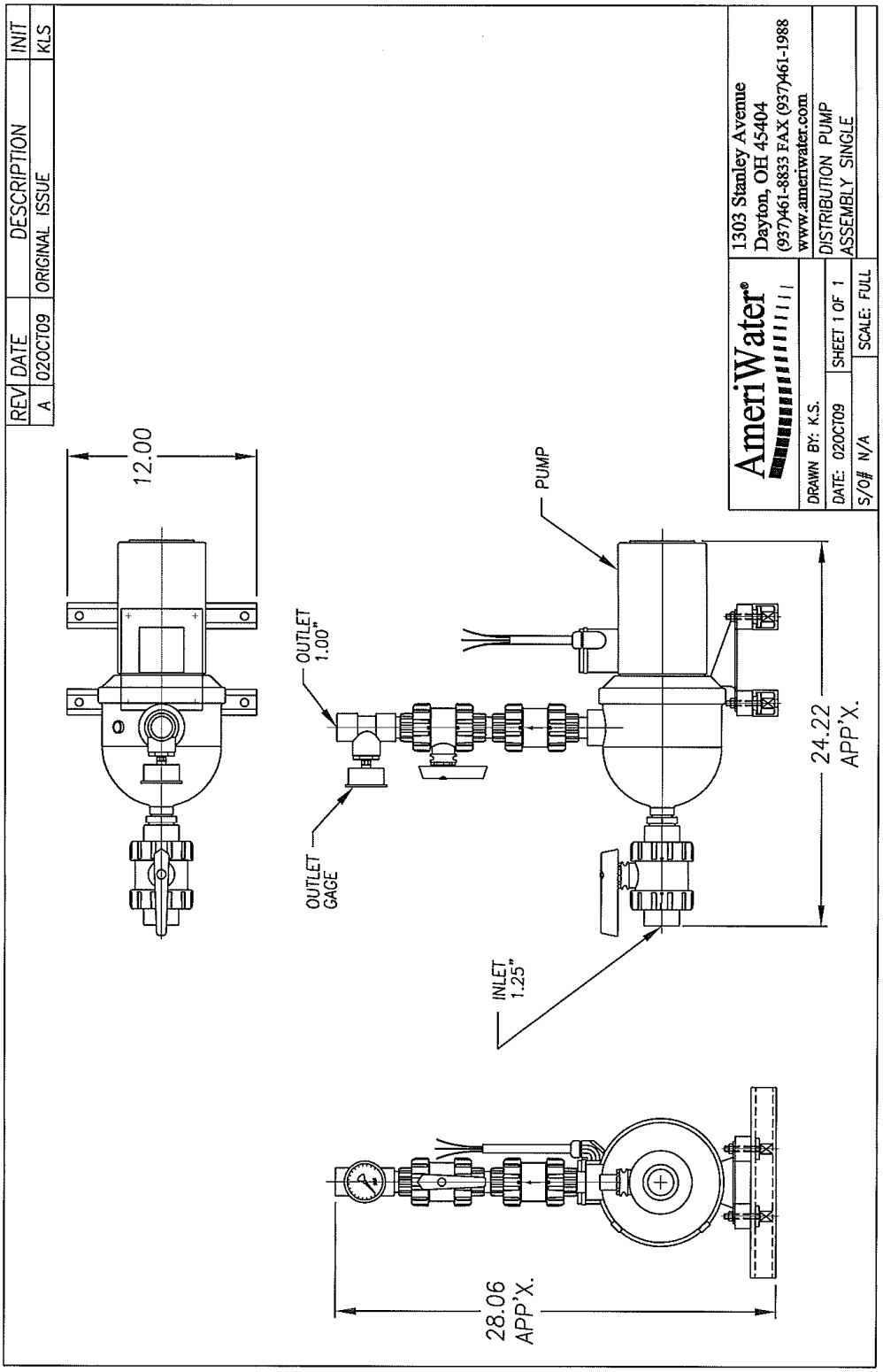
# Dual Distribution 230 Volt Three Phase Controller Schematic



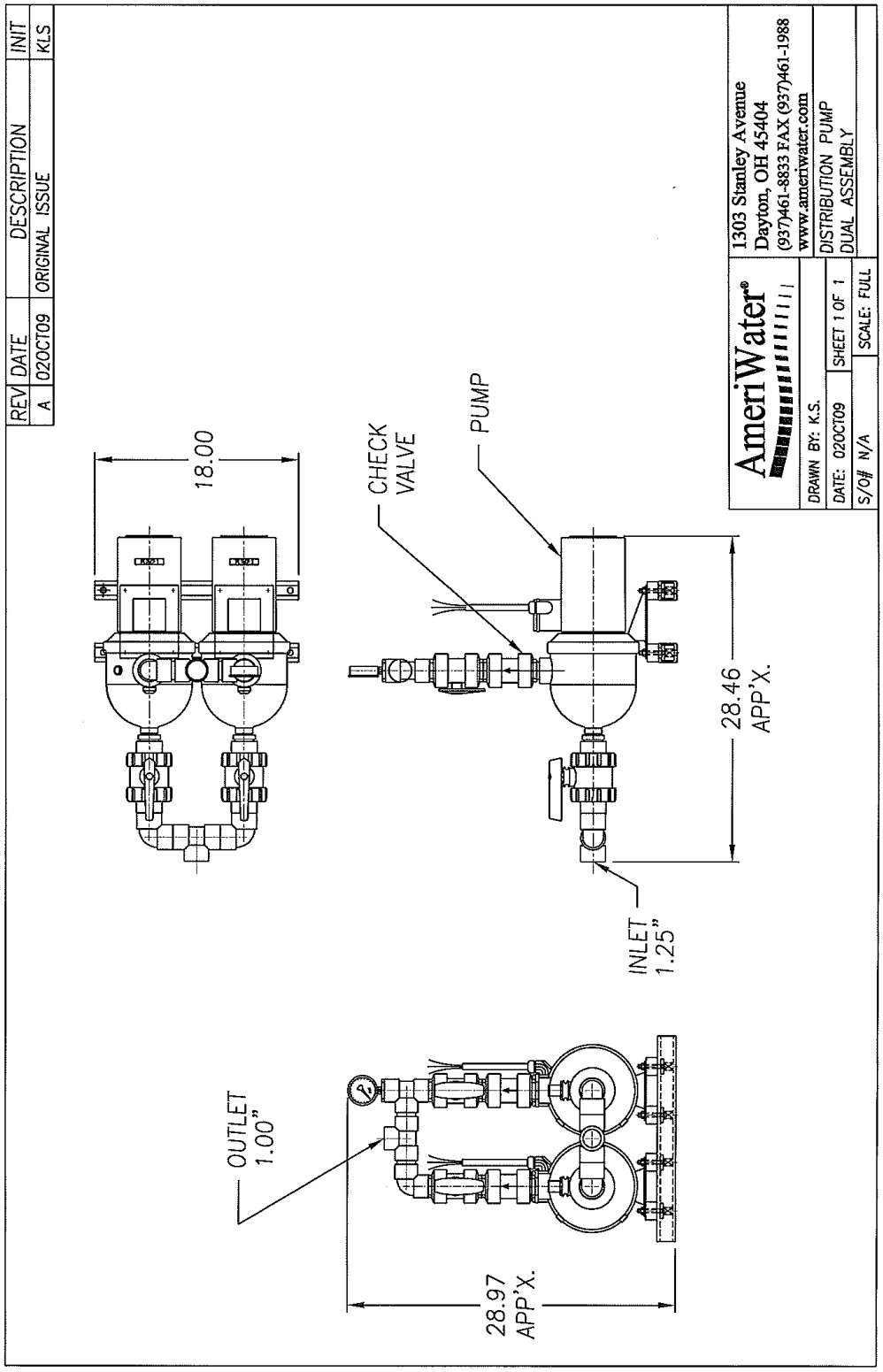
# Dual Distribution 460 Volt Three Phase Controller Schematic



# Single Distribution Pump Assembly



## Dual Distribution Pump Assembly



## ⚠ 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.

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. 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.