



UPP-2200-D / UPP-2200-L Instruction Manual

TABLE OF CONTENTS

Theory Of Operation	3
Installation.....	3
Dry Detergent Plumbing	3
Liquid Detergent Plumbing	3
Rinse / Sanitizer Plumbing.....	4
Detergent Power Connection	4
Rinse Power Connection	4
Using A Pressure Switch	4
Probe Connection	5
Setting The DIP Switches.....	5
Detergent Operation	6
Rinse Operation.....	7
Sanitizer Operation	7
Circuit Board Diagram	7
Troubleshooting.....	8
Wiring Diagram.....	9
Assembly Diagram of UPP-2200-D	10
Assembly Diagram of UPP-2200-L.....	11
Warranty Information.....	12
Knight Locations	12

This manual covers all versions of the UPP-2200 Series, and can be used for UPP-2300. As a result, some optional features and usage variations are shown which may not apply to your particular application.

THEORY OF OPERATION

The Ultra-Pro Plus Series of dispensers was designed to dispense warewashing chemicals to door-type and conveyor dishwashing machines by using microprocessor technology to meter precise amounts of product to the dishwasher.

A single electronic circuit board (UPP-2000) controls all injection of products that are delivered to the washtank via peristaltic pumps and auxiliary dry detergent feeder (D versions only). Injection control is set with DIP switches and easy-to-adjust potentiometers on the UPP-2000 circuit board.

Detergent solution strength is sensed and maintained via a conductivity probe mounted inside the dishwasher. Insufficient detergent feed is determined by the system's alarm feature which tracks how long detergent has been feeding and warns of low product, with a flashing LED and audible tone, when a preset time is surpassed.

Rinse and optional sanitizer are regulated by individual speed control settings. The system is offered with a pressure switch to activate the rinse pump or with dual transformers. Sanitizer injection can be selected to happen with detergent feed or with rinse feed.

INSTALLATION

Before installing the unit, check the installation site for power connection availability, chemical injection points, and a suitable mounting location.

Mount the unit on a wall in a convenient location near the dishwasher and not more than three feet from the final rinse line.

CAUTION: Mounting the dispenser on the side, on the back, or on the vents of the dishwasher may cause thermal overload, or damage, to the dispenser. Do not mount the dispenser in the direct path of steam. This can short circuit and permanently damage the dispenser.

CAUTION: Application of incorrect voltage can permanently damage the dispenser and is not covered under warranty.

CAUTION: Rigid or flexible conduit, installed in accordance with local electrical codes, should be used to ensure safety and reliable operation.

NOTE: An optional mounting bracket is available for mounting the dispenser on top of the dishwasher (request part # 7530335).

DRY DETERGENT PLUMBING

For dry powder or solid detergent applications, an auxiliary feeder, such as the Knight Power-Bowl, is required to dissolve the product and deliver it to the washtank. The solenoid on the UPP-2200-D will be plumbed into the feeder.

- (1) Follow the installation instructions that came with the Power-Bowl.
- (2) Install copper tubing from a water line to input side of the UPP solenoid. Water temperature should never exceed 140° F (60° C).
- (3) Install copper tubing from output side of the UPP solenoid to the Power-Bowl.
- (4) Insert a capsule into the Power-Bowl, or fill the reservoir with detergent, depending on the model of Power-Bowl used.

LIQUID DETERGENT PLUMBING

NOTE: A 7/8" hole is required for installing the detergent injection fitting on the wall of the washtank, preferably above the water line. If the dishwasher does not already have a hole (may have a knock-out plug) create one using a 7/8" punch or hole saw.

If the dishwasher already has a suitable detergent injection fitting (that will accept the poly tubing provided with the dispenser) then a 7/8" hole is not needed and step 1 can be skipped.

- (1) Install the detergent injection fitting on the wall of the washtank. Use the provided gaskets to seal the connection — place one gasket on each side of the washtank.
- (2) Install discharge tubing between the discharge (right) side of the detergent pump and the detergent injection fitting.
- (3) Install suction tubing between suction (left) side of the detergent pump and the pickup tube provided. Be sure to draw tubing through the end of the pickup tube.

RINSE / SANITIZER PLUMBING

Installation of an injection fitting is required for rinse and (optional) sanitizer. The procedure for installing both fittings is the same. The difference between the fittings is:

- Rinse injection fitting is stainless steel. A plastic fitting can be used as a substitute, but is not as durable as the steel fitting.
- Sanitizer injection fitting is plastic. A stainless steel fitting should not be used for sanitizer because the chlorine can corrode the metal.

Both injection fittings use a Viton duckbill to check off the flow of rinse line pressure to the pumps.

NOTE: Use of a saddle clamp, instead of an injection fitting, may be desired on copper rinse line for better support.

- (1) Drill a 1 1/32" hole into the side or bottom of the dishwasher rinse line between the rinse solenoid valves and the rinse jets.
- (2) Tap the hole to 1/8" NPT.
- (3) Install 1/4" tube x 1/8" NPT injection fitting.
- (4) Install 1/4" O.D. poly tubing between the discharge (right) tube side of the pump and the injection fitting using the 1/4" poly compression nuts.
- (5) Install 1/4" O.D. poly tubing between the suction (left) tube side of the pump and the pickup tube provided. Be sure to draw tubing through the end of the pickup tube.

DETERGENT POWER CONNECTION

- (1) Use a meter to check the dishwasher for a detergent power source for the dispenser. Make sure that it matches an available input voltage of the dispenser (see wiring diagram).

Use a power source that is "on" only during the washcycle, such as the contactor that controls the washpump motor.

Remove power from the dishwasher before continuing on to the next step.

- (2) Connect detergent power leads from the dishwasher to the proper terminals on the wiring barrier inside the dispenser.

RINSE POWER CONNECTION WITHOUT PRESSURE SWITCH

- (1) Use a meter to check the dishwasher for a rinse power source for the dispenser. Make sure that it matches the acceptable signal input voltage range (see wiring diagram).

Use a power source that is "on" only during the final rinse cycle of the dishwasher, such as the rinse solenoid valve, or contactor.

Remove power from the dishwasher before continuing on to the next step.

- (2) Connect rinse power leads from the dishwasher to the proper terminals on the wiring barrier inside the dispenser.

RINSE POWER CONNECTION USING A PRESSURE SWITCH

A pressure switch provides a means for activating the rinse pump when an electrical signal is not available. Some UPP systems have an optional built-in pressure switch just for this application. Otherwise, a pressure switch can be installed in the field as an aftermarket item. Whichever way the pressure switch is installed, power must be supplied from one of the following two methods:

- Single transformer application. Wire the transformer to a power source that will be active during both the wash and rinse cycles.
- Dual transformer application. Wire both transformers to a power source that will be active during both the wash and rinse cycles.

Two sets of "jumpers" are provided for configuring the UPP-2000 circuit board for single or dual transformer application. Systems shipped from the factory with a built-in pressure switch will have the jumpers set properly.

If a pressure switch is added later (i.e. in the field) be sure to set the jumpers according to the transformer application. Then do the following:

- (1) Install a pressure switch on the rinse line of the dishmachine.
- (2) Connect wires from the pressure switch to the appropriate terminals on the UPP-2000 circuit board (see wiring diagram)
- (3) Set the slide switch on the UPP-2000 circuit board (marked PRESS SW) to "enabled".

PROBE CONNECTIONS

CAUTION: Be sure to use a Knight P-120 probe only with this system. Probes from other mfrs. have a different "cell constant" and will affect proper detergent control

NOTE: A 7/8" hole is required for installing the probe in the washtank. If the dishwasher does not already have a hole (may have a knock-out plug) create one using a 7/8" punch or hole saw.

Install probe in the washtank below water level, away from incoming water supplies, near the recirculating pump intake, and 3 to 4 inches from corners, heating elements, or bottom of tank. Use the provided gaskets to seal the probe — place one gasket on each side of the washtank.

The kit containing the probe includes two methods for connecting probe wires:

- Open-end crimp connectors are provided for ease and speed of installation.
- Crimp-on ring terminals and nuts are provided for applications that require a different method of connection (i.e. local electrical codes).

SETTING THE DIP SWITCHES

An 8-position DIP switch located on the UPP-2000 circuit board configures the system's chemical feed operation. Choose the appropriate settings.

- SWITCH 1:** Dishwasher Type
ON: Door
OFF: Conveyor

This switch is used in conjunction with switch 6 to set a time limit for detergent feed to reach the concentration setpoint. If the setpoint is not reached within the time limit, the low chemical level alarm will activate (by flashing a red light on the front of dispenser, and sounding a beeper).

If switch 1 is set to DOOR:

When switch 6 is OFF, alarm sound is intermittent after 25 seconds, then constant after 50 seconds, of continuous feed. When switch 6 is ON, alarm sound is intermittent after 50 seconds, then constant after 100 seconds, of continuous feed.

If switch 1 is set to CONVEYOR:

When switch 6 is OFF, alarm sound is intermittent after 84 seconds, then constant after 168 seconds, of continuous feed. When switch 6 is ON, alarm sound is intermittent after 168 seconds, then constant after 336 seconds, of continuous feed.

- SWITCH 2:** Concentration Range
ON: Low (1 to 16 drops titration)
OFF: High (11 to 26 drops titration)

Sets the range of control for the system. Drop range shown was derived using a Knight Titration Test Kit with .4 normal hydrochloric acid.

- SWITCH 3:** Feed Limit
ON: Detergent Feed Limit
OFF: Over-ride Feed Limit

When switch is ON, detergent feed will stop when alarm sound is constant (switches 1 & 6). When switch is OFF, detergent feed will not stop until concentration setpoint is reached, or power is off.

- SWITCH 4:** Alarm Volume
ON: High
OFF: Low

Alarm volume can be further reduced by placing a piece of electrical tape over the alarm opening.

- SWITCH 5:** Pulse Rate
ON: Liquid
OFF: Dry

This switch sets the optimum pulse feed rate for detergent to quickly achieve and accurately maintain the concentration setpoint. When switch is ON, detergent will feed for 4 seconds, then pause for 1 second, when concentration is close to the setpoint. When switch is OFF, detergent will feed for 1/2 a second, then pause for 2 seconds, when concentration is close to the setpoint.

- SWITCH 6:** Feed Time Limit
ON: Long
OFF: Short

See details for switch 1.

- SWITCH 7:** Sanitizer
ON: With Detergent
OFF: With Rinse

This switch sets the (optional) sanitizer pump to activate with detergent feed, or with rinse feed.

- SWITCH 8:** Rinse Feed Limit
ON: Rinse Feed Limit
OFF: Over-ride Rinse Feed Limit

Setting this switch ON limits the rinse feed time to 16 seconds. Setting this switch OFF allows the rinse pump to run for as long as its activated.

DETERGENT OPERATION

After setting the DIP switches according to your application, the system should then be calibrated for the detergent concentration setpoint.

Before calibrating, remove the pickup tube from the container of chemical (for dry chemical, shut off water source that connects to dry chemical feeder). This prevents chemical from injecting inadvertently during the setup operation.

- (1) Ensuring the dishwasher is off, turn the concentration control adjustment on the circuit board fully counter-clockwise. Set the concentration range to LOW (SWITCH-2 on the 8-position DIP switch in the ON position).
- (2) Determine the degree of water hardness and capacity of wash tank, then fill wash tank with water. Put a pre-determined amount of chemical into wash tank to give proper solution strength for tank capacity, water hardness, soil load, etc. This is the concentration setpoint. Verify the concentration with a titration test kit. Manually add chemical as needed to meet concentration.
- (3) Start the dishwasher's recirculating pump when water reaches operating temperature. The detergent FEED light on the UPP circuit board should be OFF.
- (4) Adjust the concentration control adjustment slowly clockwise until the detergent FEED light starts to blink. If you are able to turn the adjustment to full clockwise without the FEED light blinking, turn the adjustment back to full counter-clockwise. Set the concentration range to HIGH (switch-2 on the DIP switch to the OFF position) and begin turning the adjustment clockwise again until the FEED light blinks.

The rapid blinking light indicates that the unit is in Pulse Feed Mode, and that you are within 15% of the concentration setpoint. Now slowly adjust the concentration adjustment back, counter-clockwise, until the FEED light is OFF. This is your exact concentration setpoint.

NOTE: When the FEED light is OFF, concentration has been achieved. When the FEED light blinks rapidly, the unit is in Pulse Feed Mode, and within 15% of the concentration setpoint. When the FEED light blinks slowly, the unit is in Constant Feed

Mode and well below the concentration setpoint.

- (5) Insert chemical pickup tube back in appropriate chemical container (or turn the water supply back on). The unit is now ready to feed chemical.

Alternative Concentration Setup Procedure:

- (1) Turn the concentration control adjustment clockwise to a setting estimated to be just below your desired concentration setpoint.
- (2) Turn on the dishwasher and let the UPP unit feed chemical until the FEED light is OFF.
- (3) Check chemical concentration with a titration test kit.
- (4) Adjust the concentration adjustment clockwise until the appropriate titration is achieved. Only take titration readings when the FEED light is OFF and the unit is not feeding chemical.

RINSE OPERATION

The rinse will activate when a pressure switch closes or when an electrical signal is received from a rinse signal source on the dishwasher.

To adjust the speed of the rinse pump, turn the speed control clockwise to increase speed and counter-clockwise to decrease speed. The speed of the pump should be adjusted so that the best sheeting action is obtained.

The circuit board has a momentary prime switch for priming the rinse pump. When the prime switch is pressed and held, the pump will run at its maximum speed. When the switch is released the pump will stop running. Press the switch long enough to draw chemical into the line. Power must be present at the rinse transformer (or present at single transformer if using a pressure switch) for the prime switch to operate.

SANITIZER OPERATION

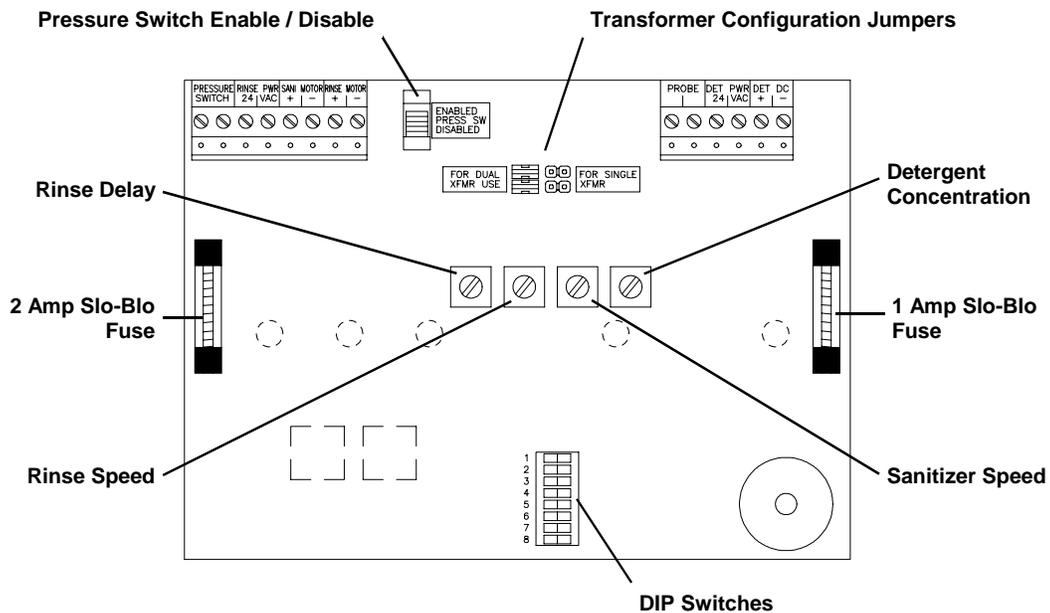
A sanitizer pump is optional on 2200 systems and standard on 2300 systems. If a sanitizer pump is added as an aftermarket item, ensure that it is wired to the UPP circuit board according to the wiring diagram in this manual.

The sanitizer pump will activate in conjunction with the detergent or rinse feed, depending on what setting you choose with the DIP switch.

To adjust the speed of the sanitizer pump, turn the speed control clockwise to increase speed and counter-clockwise to decrease speed. The speed of the pump should be adjusted to get the desired amount of product.

The circuit board has a momentary prime switch for priming the sanitizer pump. When the prime switch is pressed and held, the pump will run at its maximum speed. When the switch is released the pump will stop running. Press the switch long enough to draw chemical into the line. Power must be present at the rinse transformer (or present at single transformer if using a pressure switch) for the prime switch to operate.

UPP-2000 CIRCUIT BOARD DIAGRAM



TROUBLESHOOTING

❑ *Power light does not illuminate:*

Check the voltage from the dishwasher. Ensure it is occurring during the correct cycle of operation.

Check the in-line fuses from the dishwasher to the power transformers.

Check the voltage at the transformers. The connection from the dishwasher should match the input voltage connections for the transformers.

Check fuses on the circuit boards.

Check input terminals on board for correct input voltage. Ultra-Pro Plus circuit boards operate properly when 24 VAC is applied, refer to the wiring diagram for voltage input terminals.

❑ *Pump(s) or solenoid will not activate:*

Check pump output terminals for loose screws and disconnected wires.

Check for proper voltage across motor windings (or solenoid contacts).

Check for obstruction in pump head (or solenoid).

❑ *Too much detergent:*

Check the voltage to the system.

Check the concentration adjustment(s) on the control board for the proper setting.

Check the probe in the wash tank for corrosion or foreign particles.

Check for open wires between the probe and the connections to the circuit board barrier.

❑ *Too little detergent:*

Check the voltage to the system.

Check the concentration adjustment(s) on the control board for the proper setting.

Check the probe in the wash tank for corrosion or foreign particles.

Check pump operation for proper speed (or check bowl feeder for obstructions).

❑ *Pump runs too slowly:*

Check roller block for binding.

Check for proper input voltage (24 VDC applied to the pump motor terminals will result in the highest speeds).

Check for lubrication on squeeze tube.

❑ *Rinse/Sanitizer light does not illuminate:*

Check the voltage from the dishwasher. Insure it is occurring during the correct cycle of operation.

Check the in-line fuses from the dishwasher to the power transformers.

Check the voltage at the transformers. The connection from the dishwasher should match the input voltage connections for the transformers.

Check the in-line fuses from the transformers to the circuit boards.

Check input terminals on board for correct input voltage. Ultra-Pro series circuit boards operate properly when 24 VAC is applied, refer to the wiring diagram for voltage input terminals.

For those units using a pressure switch, insure that the switch is closing, and that there is no obstruction in the line from the fill valve to the pressure switch.

❑ *Rinse/Sanitizer pump(s) won't turn:*

Check pump output terminals for loose screws and disconnected wires.

Check for proper voltage across motor windings (or solenoid contacts).

Check for obstruction in pump head (or solenoid).

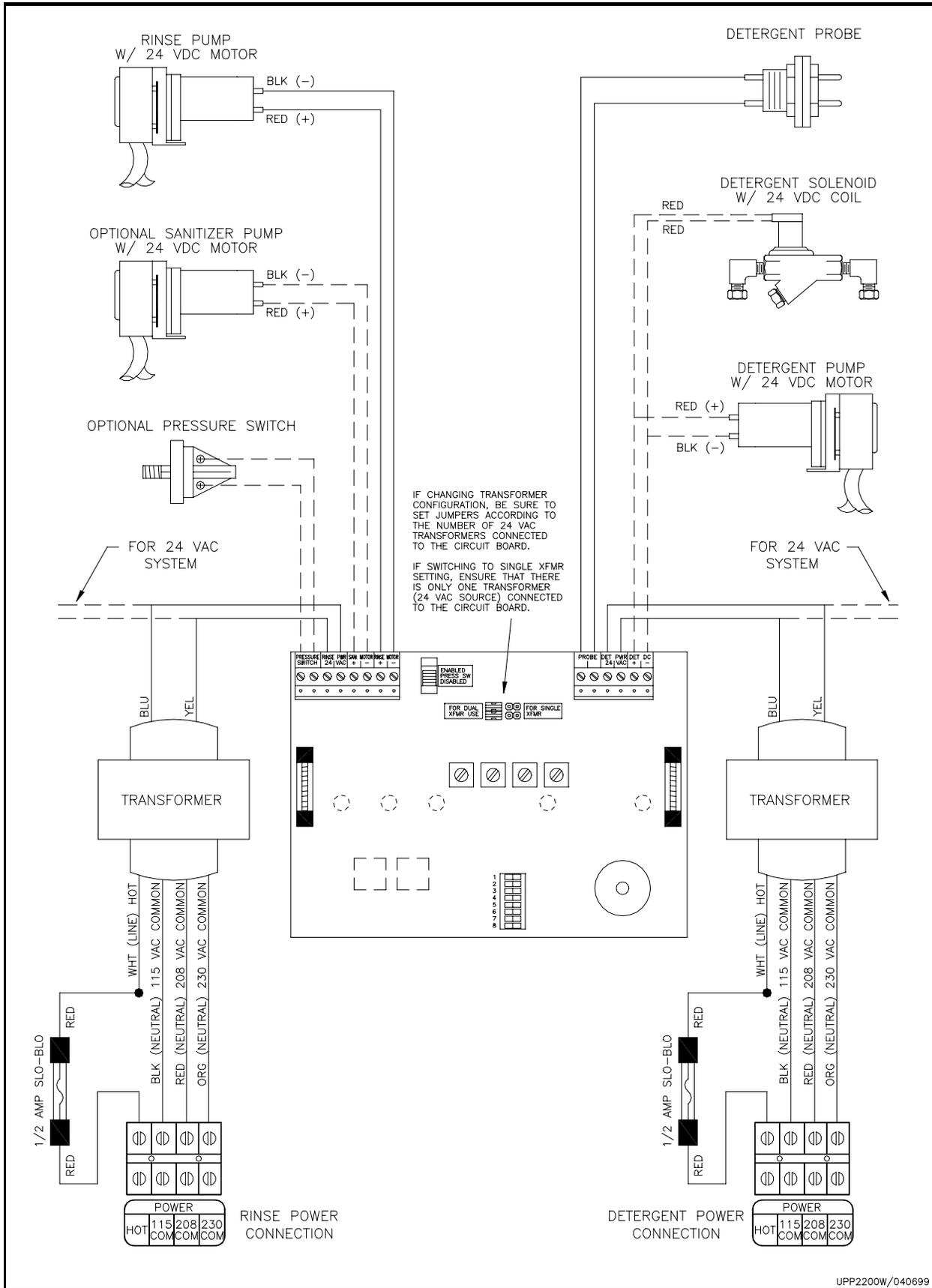
❑ *Loss of rinse/sanitizer pump prime:*

Check pickup line for any holes or air leaks.

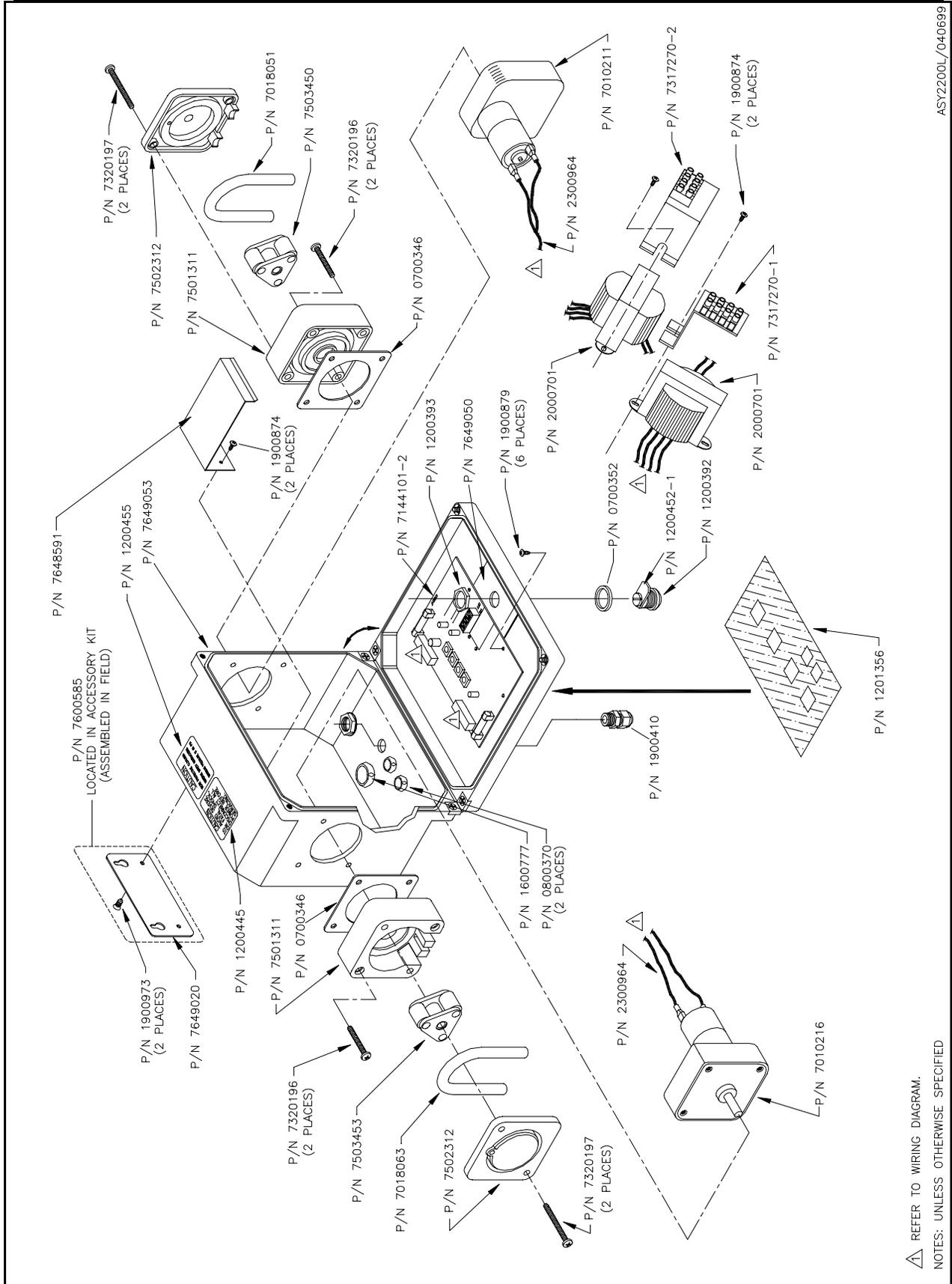
Check squeeze tubing in pump for any cracks or pin holes.

Check tubing for deterioration.

WIRING DIAGRAM



ASSEMBLY DIAGRAM OF UPP-2200-L



ASY2200L/040699

⚠ REFER TO WIRING DIAGRAM.
 NOTES: UNLESS OTHERWISE SPECIFIED

DISCLAIMER

Knight Inc. does not accept responsibility for the mishandling, misuse, or non-performance of the described items when used for purposes other than those specified in the instructions. For hazardous materials information consult label, MSDS, or Knight Inc.

WARRANTY

All Knight controls and pump systems are warranted against defects in material and workmanship for a period of ONE year. All electronic control boards have a TWO year warranty. Warranty applies only to the replacement or repair of such parts when returned to factory with a Knight Return Authorization (KRA) number, freight prepaid, and found to be defective upon factory authorized inspection. Bearings and pump seals or rubber and synthetic rubber parts such as "O" rings, diaphragms, squeeze tubing, and gaskets are considered expendable and are not covered under warranty. Warranty does not cover liability resulting from performance of this equipment nor the labor to replace this equipment. Product abuse or misuse voids warranty.

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