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**KNIGHT**  
**IDEX**  
IDEX CORPORATION



**UP-1200-D / UP-1200-L**  
**Instruction Manual**

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**CAUTION:** Wear protective clothing and eyewear when dispensing chemicals or other materials. Observe safety handling instructions (MSDS) of chemical manufacturers.



**CAUTION:** To avoid severe or fatal shock, always disconnect main power when servicing the unit.

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## THEORY OF OPERATION

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

Independent electronic circuit boards control 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 circuit boards.

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 is regulated by an individual speed control setting. The system is offered with a pressure switch to activate the rinse pump or with dual transformers.

## 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).

**NOTE:** When installing any electrical equipment ensure that all state and local safety codes are met.

## 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 UP-1200-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 UP solenoid. Water temperature should never exceed 140° F (60° C).
- (3) Install copper tubing from output side of the UP 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.

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## RINSE PLUMBING

Installation of an injection fitting is required for rinse product. The rinse injection fitting is stainless steel and uses a Viton duckbill to check off the flow of rinse line pressure to the pump. A plastic fitting can be used as a substitute, but is not as durable as the steel fitting.

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 UP 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.

If a pressure switch is added later (i.e. in the field):

- (1) Install the pressure switch on the rinse line of the dishmachine.
- (2) Connect wires from the pressure switch to the appropriate points (see wiring diagram).

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## PROBE CONNECTIONS

CAUTION: Be sure to use a Knight 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 6-position DIP switch located on the UP-1000 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:** High (11 to 26 drops titration)  
**OFF:** Low (1 to 16 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.

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## 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 6-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 UP-1000 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 UP 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.

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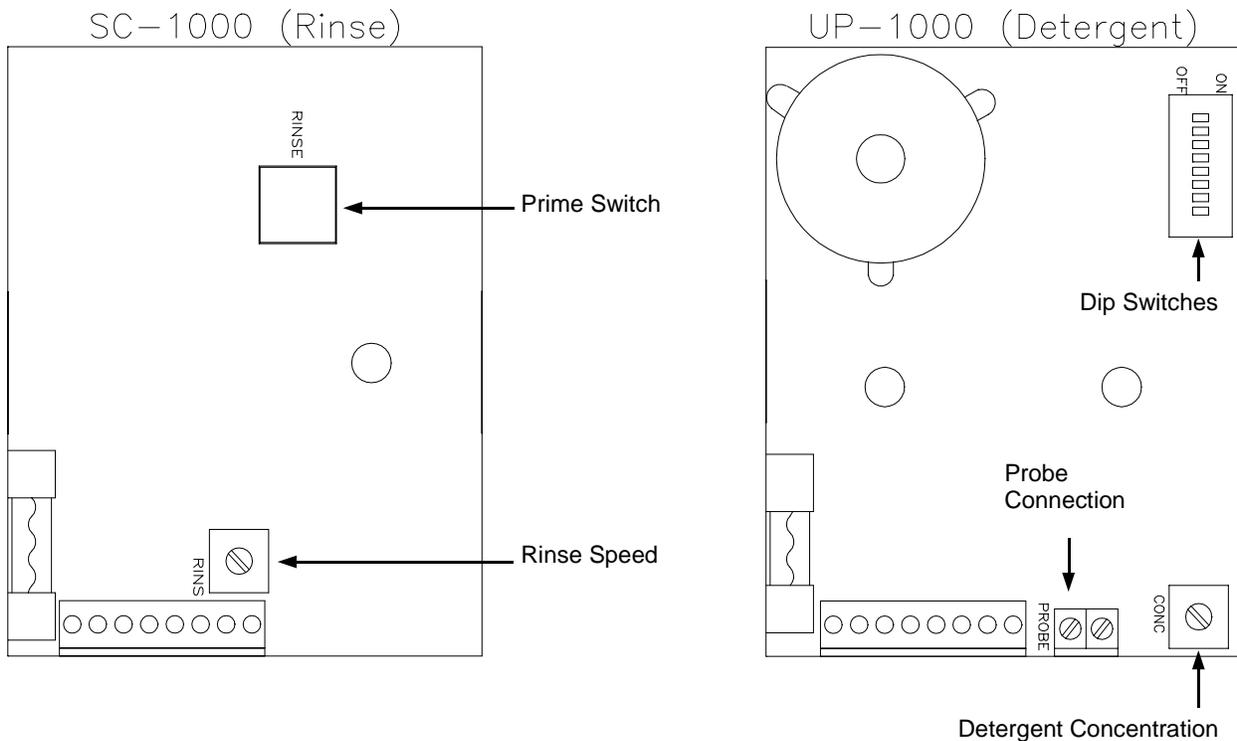
## RINSE OPERATION

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.

## UP-1200 CIRCUIT BOARD DIAGRAMS



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## 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 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 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 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, ensure that the switch is closing, and that there is no obstruction in the line from the fill valve to the pressure switch.

### ❑ **Rinse pump won't turn:**

Check pump output terminals for loose screws and disconnected wires.

Check for proper voltage at the motor.

Check for obstruction in pump head.

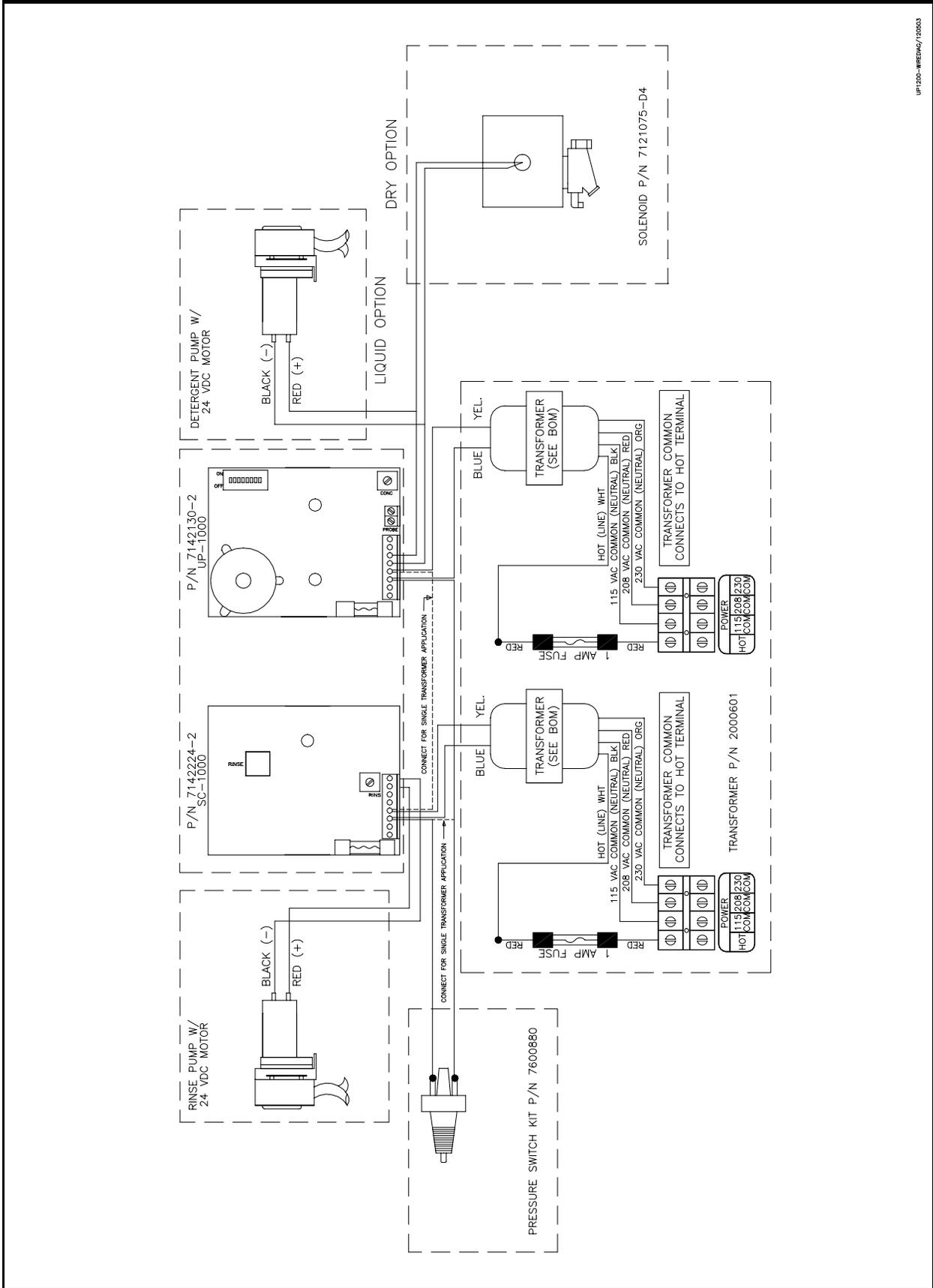
### ❑ **Loss of rinse pump prime:**

Check pickup line for any holes or air leaks.

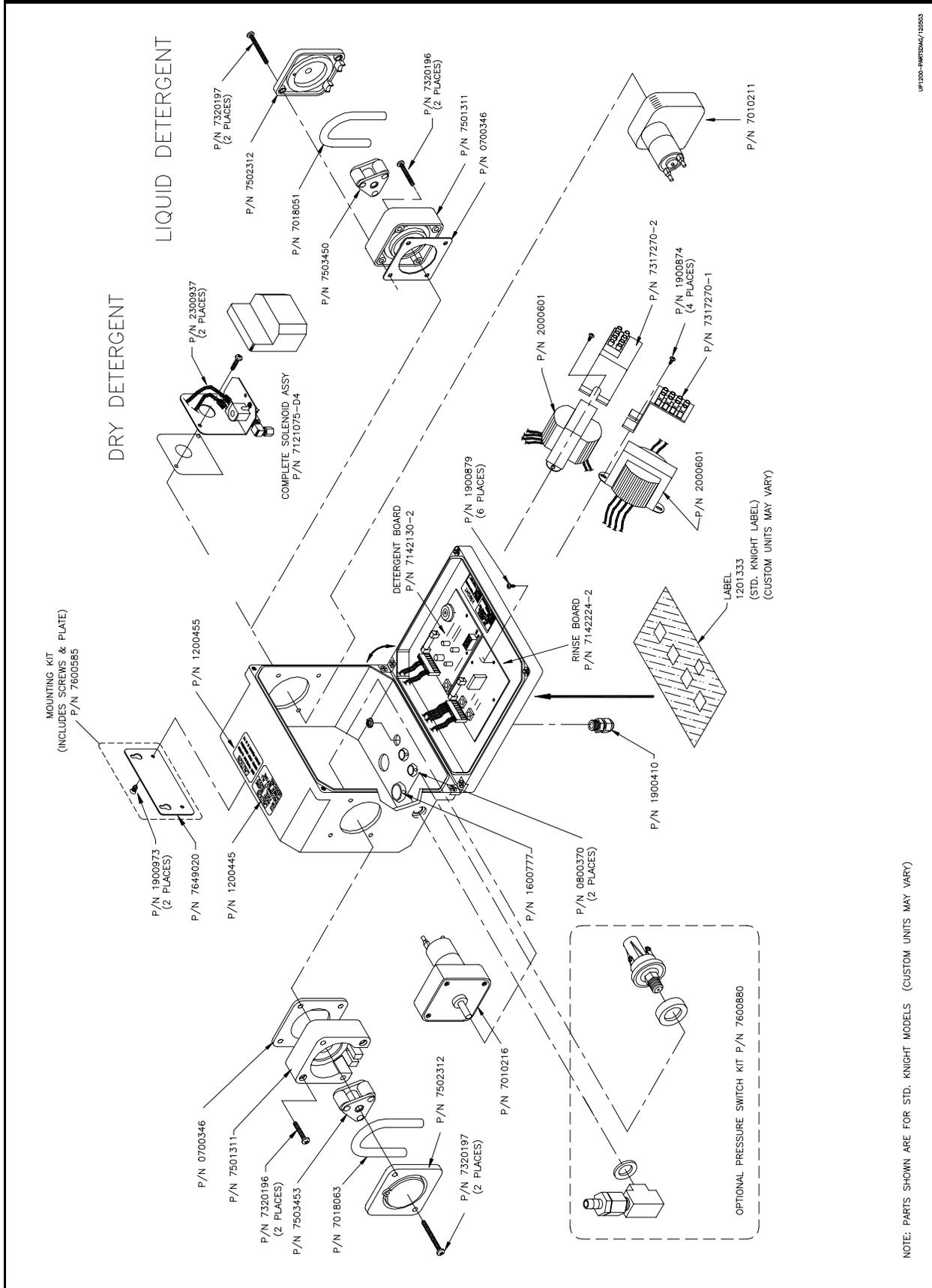
Check squeeze tubing in pump for any cracks or pin holes.

Check tubing for deterioration.

# WIRING DIAGRAM



# PARTS DIAGRAM



UP1200-PARTS02/12553

NOTE: PARTS SHOWN ARE FOR STD. KNIGHT MODELS (CUSTOM UNITS MAY VARY)

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**NOTES**

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## **DISCLAIMER**

Knight LLC 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 LLC. Knight products are not for use in potentially explosive environments. Any use of our equipment in such an environment is at the risk of the user, Knight does not accept any liability in such circumstances.

## **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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