

## INTRODUCTION

Chemical feed applications for the Food and Beverage Sanitation Market require a robust pumping system that can dispense a variety of corrosive and non-corrosive chemicals with accuracy and repeatability. The Knight Liquidtrol Series of pumps and controls merge the proven technology of air operated double diaphragm pumps with modern microprocessor controls.

These new systems are designed for accurate point of use dispensing from 55 gallon drums, 330 gallon tote tanks or bulk tanks. Liquidtrol Air Pump Timer Controls include a water tight injection molded case with built-in air solenoid valve, pressure regulator, filter and fittings. Three types of controls suited to a variety of chemical feed requirements are available.

## THEORY OF OPERATION

The Liquidtrol Series Air Pump Timer Controls offer three control options for starting, stopping and cycling an air pump. All systems have a power cord and include a built-in step down transformer.

**ATC-500** — This air pump “Limit Timer” control is designed to control the run time of a pump with the press of a button or input of a signal from a powered switch or remote controller. The water proof control cabinet is normally mounted near the delivery point for the chemical, convenient for operators. Typical delivery points include Gerry cans, buckets, floor scrubbers, portable foamers or other receptacles. For applications where remote triggers such as a CIP or Conductivity control signal are used, the controller can be installed close to the signal source. Since the pressure regulator and air solenoid are mounted with the control only air tubing is required between the control and the chemical pump. This allows installation of the air pump far away from the controller. The signal-input circuit accepts input voltages from 14-240 VAC.

**ATC-200** — This air pump “Cycle Timer” triggers a continuous On-Off feed cycle anytime power is applied to the power input. For continuous chemical applications such as conveyor or track lubrication, the ATC-200 Cycle Timer will feed from 0-2 minutes of ON time, with an OFF time from 0-90 minutes.

**ATC-300** — This microprocessor based air pump control features a programmable “Event Timer” capable of 20 individual feed events per day. A built in 24 Hour Clock with real time battery back up keeps the event time on schedule for every programmed feed event.



ATC-500



ATC-200



ATC-300



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



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



**CAUTION:** When installing any equipment, ensure that all national and local safety, electrical, and plumbing codes are met.

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## **INSTALLATION OF AIR TIMER CONTROL**

*See diagram on the following page for illustration of the steps below.*

- (1) Mount the unit in a location that is convenient for programming, adjusting air pressure, and normal operation.
- (2) Connect incoming air source to the inlet fitting using 3/8" poly tubing. Max recommended pressure is 150 PSI.
- (3) Connect the outlet fitting from the air solenoid valve to the air pump inlet port using 3/8" poly tubing.
- (4) Use of an air-operated 2-way valve is recommended for installations where siphoning can occur. An example is shown on the following page.
- (5) Plug the power cord into a 115 VAC wall outlet — if necessary, the input voltage configuration can be changed by moving the lead on the power cord from the 115 connection to either 208 or 230. You will also need to use an adapter for the plug, or cut off the plug and hard wire to the power source.

## **OPERATION / START-UP**

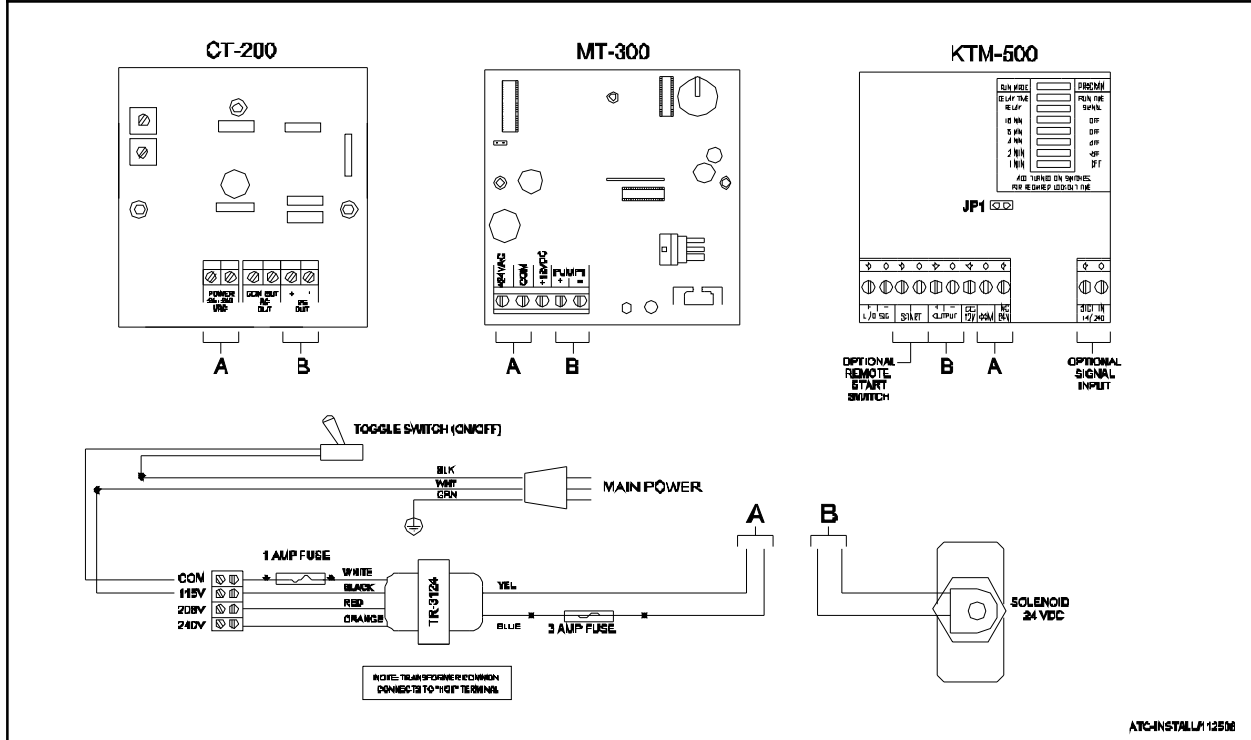
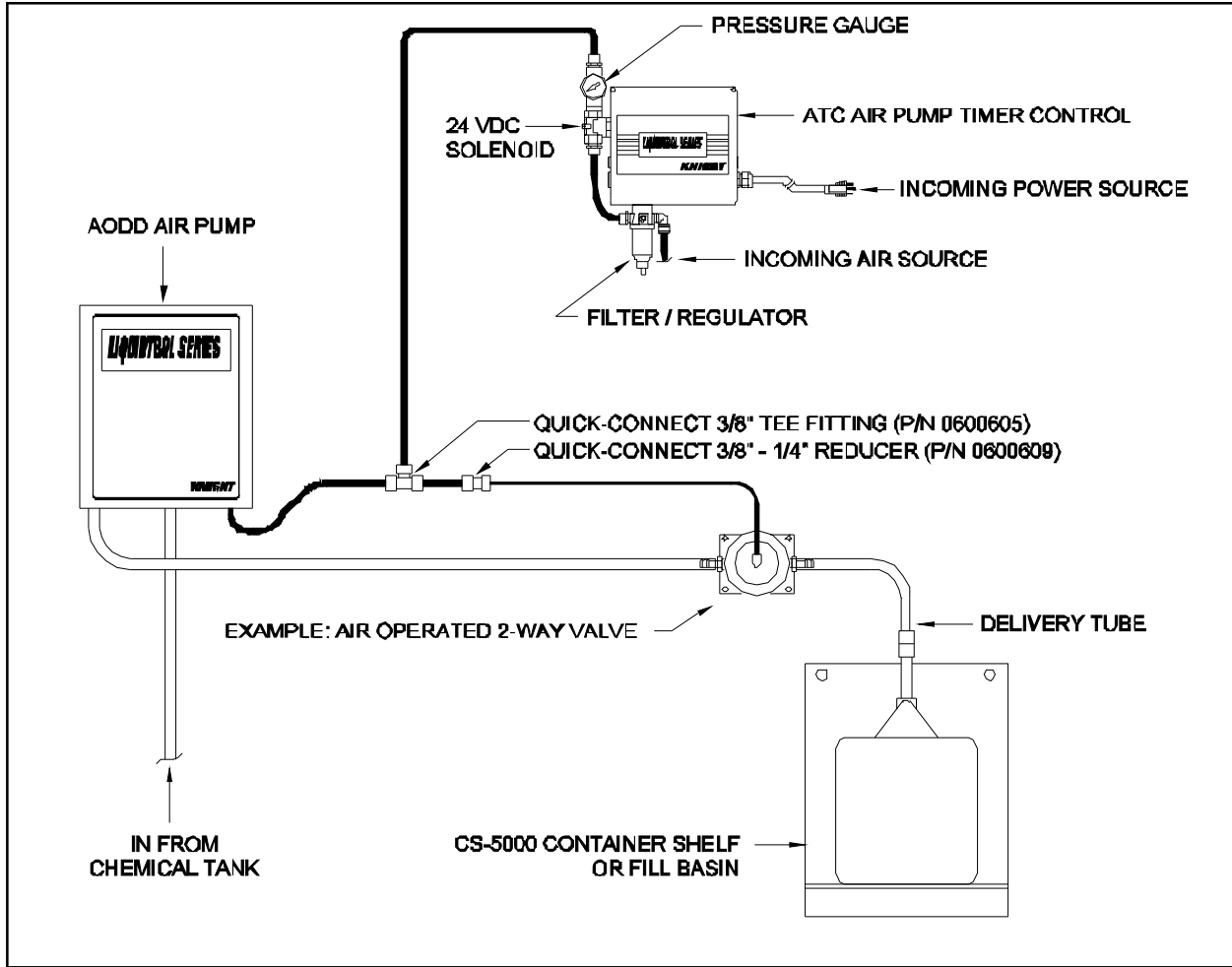
*Consult Air Pump operation manual for mfr's operating specifications.*

- (1) Make sure power and air supply are both ON.
- (2) Manually activate the air pump using the prime button (or "start" button, depending on the model) on the front cover of the ATC unit. Priming a "dry" pump may require you flood the pump suction with water. Suction line should be no longer than 10 feet (3 meters).
- (3) The air pump will typically be easier to prime when running at a slower speed. The speed and volume delivery of the pump can be controlled by turning the regulator clockwise to increase pressure and counter-clockwise to decrease pressure.
- (4) Once the pump is primed, adjust the air pressure as needed to achieve the desired feed rate.

## **PROGRAMMING AND CALIBRATING THE AIR PUMP TIMER CONTROL**

Pages 4 – 6 of this manual define the programming and operation of the various ATC models. See the page that pertains to the model of ATC you have.

# INSTALLATION & WIRING DIAGRAM



ATC-INSTALL/12506

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## ATC-500 MODELS

**Pump Run Time:** (max run time is 12 minutes and 42 seconds)

- (1) Locate the dip-switch pack on the circuit board — set switch #6 to SIGNAL, set switch #7 to RUN TIME and set switch #8 to PROGRAM MODE.
- (2) Using a measuring cup or beaker, press Start switch and release when pump starts. Let the pump run until desired amount of chemical is dispensed then press Start switch again to stop. The run time is now programmed. Repeat step if new volume is required.
- (3) Set mode switch #8 to RUN MODE.

**Delay Time:** (max delay time is 12 minutes and 42 seconds)

- (1) Locate the dip-switch pack on the circuit board — set switch #6 to SIGNAL, set switch #7 to DELAY TIME and set switch #8 to PROGRAM MODE.
- (2) Press Start switch and release when the LED begins flashing. When the desired delay time has passed, press the Start switch again. The delay time is now programmed. Repeat step if new delay time is required.
- (3) Set mode switch #8 to RUN MODE.

**Lock-Out Time:** (max lock-out time is 31 minutes)

This feature defeats consecutive dispensing of product for a pre-determined interval. Select a combination of switches 1 – 5 to program total lock-out time.

Example: For 10 minute lock-out, set switches #2 and #4 to ON with all other switches OFF.

For maximum lock-out (31 min) set all switches ON.

For no lock-out, set all switches OFF.

## OPERATION

**Manual activation:** Press the Start button on the cover or on the remote switch box for 1 full second. The unit will begin counting down the delay time (if used) and will then run the pump for the amount of time programmed. Once the lock-out time expires (if used) the pump will be ready to restart.

**Signal activation:** When the signal input on the circuit board receives a 14-240VAC trigger signal for at least 1 full second, the delay time (if used) will begin counting down. Then the pump will run for the amount of time programmed. Once the lock-out time expires (if used) the pump will be ready to restart.

**Relay Mode:** Set switch #6 to RELAY. The pump will activate for as long as an external trigger signal is present, or for as long as the manual button is depressed. All other board functions (such as delay time and lock-out time) are by-passed in relay mode.

## DISABLING THE START BUTTON

There is a jumper marked “JP1” on the circuit board that can be used to prevent manual activation in certain applications, or to allow manual activation by remote push-button only. This jumper only affects the on-board start button. A remote start button, or trigger signal, can always be used to activate the pump.

- When the jumper is ON, the on-board start button is functional.
- When the jumper OFF, the on-board start button is disabled.

## PRIMING

- (1) If a lock-out time has been set, temporarily set it to zero — this will make priming much easier.
- (2) Manually activate the pump until prime is achieved.
- (3) Once prime is achieved reset the lock-out time if required.

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## **ATC-200 MODELS**

- Maximum on time is 2 minutes
- Maximum off time is 90 minutes

### ***Operation***

The CT-200 circuit board is a cycle timer capable of turning “on” the pump for as long as 2 minutes, while the “off” interval between run times can be from 1.5 seconds to 90 minutes. The CT-200 has the option to have the pump operate as soon as power is applied (“on” first) or after the “off” interval has expired (“off” first).

Maximum run times are determined by “ON TIME” and “OFF TIME” potentiometers on the top of the circuit board.

### ***Setting ON & OFF Time***

- (1) The “ON TIME” potentiometer on the CT-200 will adjust the output activation time from 0-2 minutes.
- (2) The “OFF TIME” potentiometer will adjust the idle time of the CT-200 within the range selected by the “MAX MINUTES OFF” jumpers on the circuit board (20, 30, 60, or 90 minutes).
- (3) The cycle of operation of the CT-200 is determined by “MODE SELECT” jumpers on the board. When power is applied, the setting of this jumper will determine whether the board is “off first” or “on first”.

### ***Priming***

Press the PRIME button on the front cover. The pump will run as long as the button is held down.

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## ATC-300 MODELS

- During normal operation, the clock will display briefly when an event run time starts, or while either PRIME button is pressed. PRIME 2 can be used to check the clock without running the pump (as this system only has 1 pump).
- During programming, if a button is not pushed within 2 minutes, the display will disappear and the control will return to normal operation.

### **Button Functions**

- PRGM: Steps you through the setup program.
- PRIME 2 (↑): Manually shows clock when not programming.  
Advances numbers upward when programming.
- PRIME 1 (↓): Manually activates the pump and shows clock when not programming.  
Advances numbers downward when programming.

### **Security Feature — remove jumper JP1 to program**

To prevent unauthorized tampering, the events and time/day setting can be “secured” by placing a jumper on the JP1 pins on the back of the MT-300 circuit board. The jumper acts like a lock and key...when the MT-300 is secured (jumper on) the display will show “SECU” if the PRGM button is pressed. The PRIME buttons are not affected and will still function in their normal manner. Removing the jumper allows the MT-300 to be programmed or to change the time of day clock. Replace jumper when done programming if you wish to secure the system.

### **Programming**

- (1) Press the PRGM button.....set the clock to the current time of day. Use ↑/↓ to set the clock (note AM/PM).
- (2) Press PRGM again.....PE 1 will be displayed. PE stands for Pump Events (“on” times) needed per day. Use ↑/↓ to set the number (from 1 to 20) of pump events per day that are required. The system will activate only the number of pump events indicated by the PE #.
- (3) Press PRGM again.....E 1 will be displayed indicating that you are going to program the first event.
- (4) Press PRGM again.....pump start time will be displayed. Use ↑/↓ to set pump start time (note AM/PM).
- (5) Press PRGM again.....pump run time will be displayed. Use ↑/↓ to set the pump run time (min:sec).
- (6) Press PRGM again.....E 2 will be displayed if you selected more than 1 pump event (PE) per day. Repeat the event programming instructions above to program all pump events. After all pump events are programmed, you will return to the blank display.
- (7) To review your programming, press the PRGM button and slowly step through the program. Make changes as necessary referring to the above instructions.

**Tip:** If you hold down any of the buttons while programming, the numbers will scroll much faster.

**Tip:** If you get lost in the program, press PRGM until you return to blank display. Then repeat instructions above.

# PARTS DIAGRAM

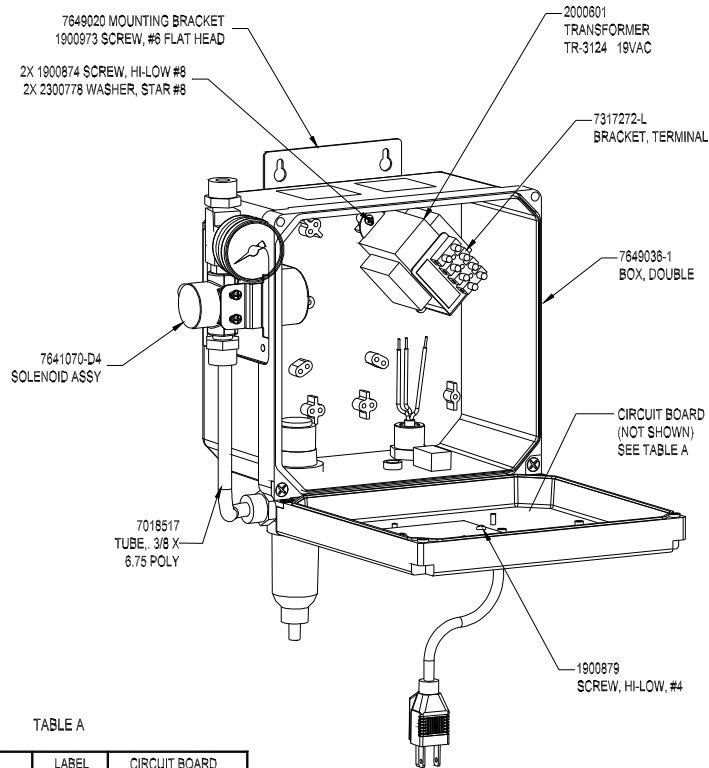
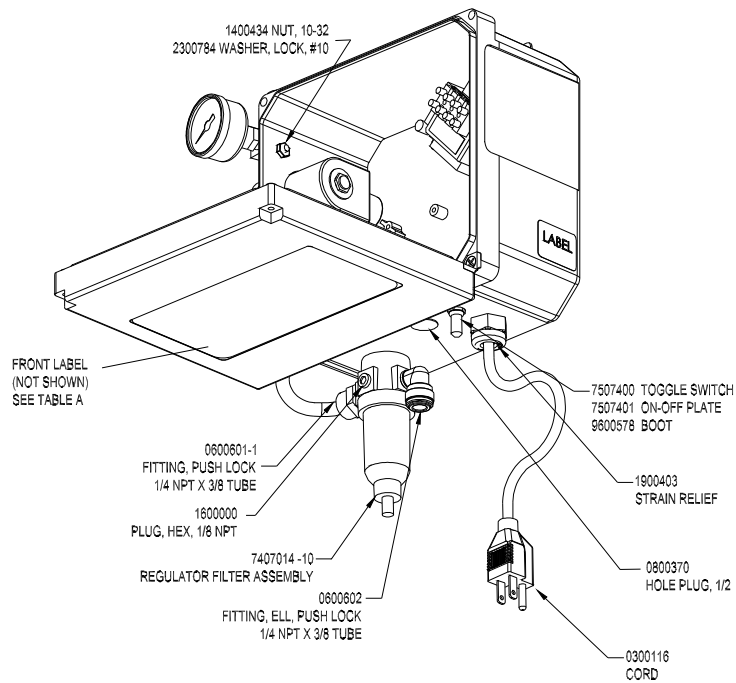


TABLE A

| MODEL   | P/N        | LABEL   | CIRCUIT BOARD       |
|---------|------------|---------|---------------------|
| ATC-200 | 7641072-07 | 1200004 | 7110185-2 / CT-200  |
| ATC-300 | 7641073-07 | 1200005 | 7142218-2 / MT-300  |
| ATC-500 | 7641075-07 | 1200006 | 7142312-2 / KTM-500 |



ATC-PARTS/092104

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## MAINTENANCE

- Check the condition of the air lines and fittings — replace any parts that are leaking air.
- Check for variation in air supply pressure and adjust regulators accordingly.

## 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.

## FOOTNOTE

The information and specifications included in this publication were in effect at the time of approval for printing. Knight, LLC reserves the right, however, to discontinue or change specifications or design at any time without notice and without incurring any obligation whatsoever.

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|  |  |  |  |   |   |   |
|--|--|--|--|---|---|---|
| <b>Knight Headquarters</b><br>Tel: 949.595.4800<br>Fax: 949.595.4801 | <b>USA Toll Free</b><br>Tel: 800.854.3764<br>Fax: 800.752.9518 | <b>Knight Canada</b><br>Tel: 905.542.2333<br>Fax: 905.542.1536 | <b>Knight Europe</b><br>Tel: 44.1293.615.570<br>Fax: 44.1293.615.585 | <b>Knight Australia</b><br>Tel: 61.2.9725.2588<br>Fax: 61.2.9725.2025 | <b>Knight N. Asia</b><br>Tel: 82.2.3481.6683<br>Fax: 82.2.3482.5742 | <b>Knight S. Asia</b><br>Tel: 65.6763.6633<br>Fax: 65.6764.4020 |
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