

# P-6100T

## MICROPROCESSOR CONTROLLED MULTI-FUNCTION PERISTALTIC PUMP SYSTEM

Installation and Operating Manual



***Beta***

# PREFACE

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This manual describes how to use the P-6100T.

Material in this manual is subject to change without notice. Manual revisions will be made on an as needed basis. Special circumstances involving important design, operation or application information will be released via Technical Service Bulletins.

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# SPECIFICATIONS

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**Size**                    H                    W                    D  
                              12.75    x    7.75    x    8.0 Inches

**Weight**                14 1/2 pounds

**Cabinet**              Type 304 brushed stainless steel

## **Power Voltage & Current**

24 volts AC (+/- 10%), 50/60 Hz - nominal current = 2.4 Amperes  
115 volts AC (+/- 10%), 50/60 Hz - nominal current = 0.6 Amperes  
208 volts AC (+/- 10%), 50/60 Hz - nominal current = 0.3 Amperes  
230 volts AC (+/- 10%), 50/60 Hz - nominal current = 0.3 Amperes

## **Fuse**

24 volt power            250 volt - 5 Ampere MTH or AGC type  
115 volt power          250 volt - 2 Ampere MTH or AGC type  
208/230 volt power    250 volt - 1 Ampere MTH or AGC type

## **Trigger Signal Voltage & Current**

24 to 240 volts AC, 50/60 Hz, 20 milli-amps required  
24 to 120 volts DC, 20 milli-amps required

## **Pump Type**

Peristaltic  
Dual roller  
Self-priming

## **Pump Displacement**

Based on centipoise of one (water) - viscous/heavy product displacement is less.  
Adjustable from approximately five to 50 ounces per minute

## **Pump Speed & Duty Cycle Rating**

Adjustable from approximately 10 to 100 RPM  
Continuous duty rated

## **Pump Run Time & Delay Time (maximum time may vary from unit to unit)**

Minimum time - 1 second  
Minimum maximum time - 1.5 hours  
Typical maximum time - 2 hours  
Maximum time - 2 hours 10 minutes

**Ambient Operating Temperature**                    36° F to 120° F

# INTRODUCTION

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The P-6100T industrial pump is a versatile design that can handle a wide range of metering and transfer applications. Primary applications include:

Metering cleaning and sanitizing products to bottle washers, pasteurizers, can washers, and Clean In Place (C I P) systems and other cleaning systems in the food processing industry.

Metering of corrosion inhibitors, biocides, and other water treatment products in industrial applications.

Transfer and metering of metal finishing specialties, etchants and phosphate treatments in the metals manufacturing industry.

Since pump run times may be programmed, the pump is ideally suited for laundry applications where a single pump is needed or if an additional pump is needed for an existing system. You may activate the unit directly from the washing machine control circuitry.

## OPERATION OVERVIEW

Operation of the pump is typically initiated and controlled by a valid electrical signal sent to the unit. Signals generated from conductivity controllers, PH controllers, recycle timers and other process controllers are typical examples. For additional flexibility, the speed of the pump can be adjusted on a 10 to one ratio. If viscous and/or heavy liquids are to be pumped, the speed control allows the use of slower, more efficient pump speeds. The P-6100T features four distinct operating modes:

**Relay Mode** - the pump will run for the duration of a valid trigger signal.

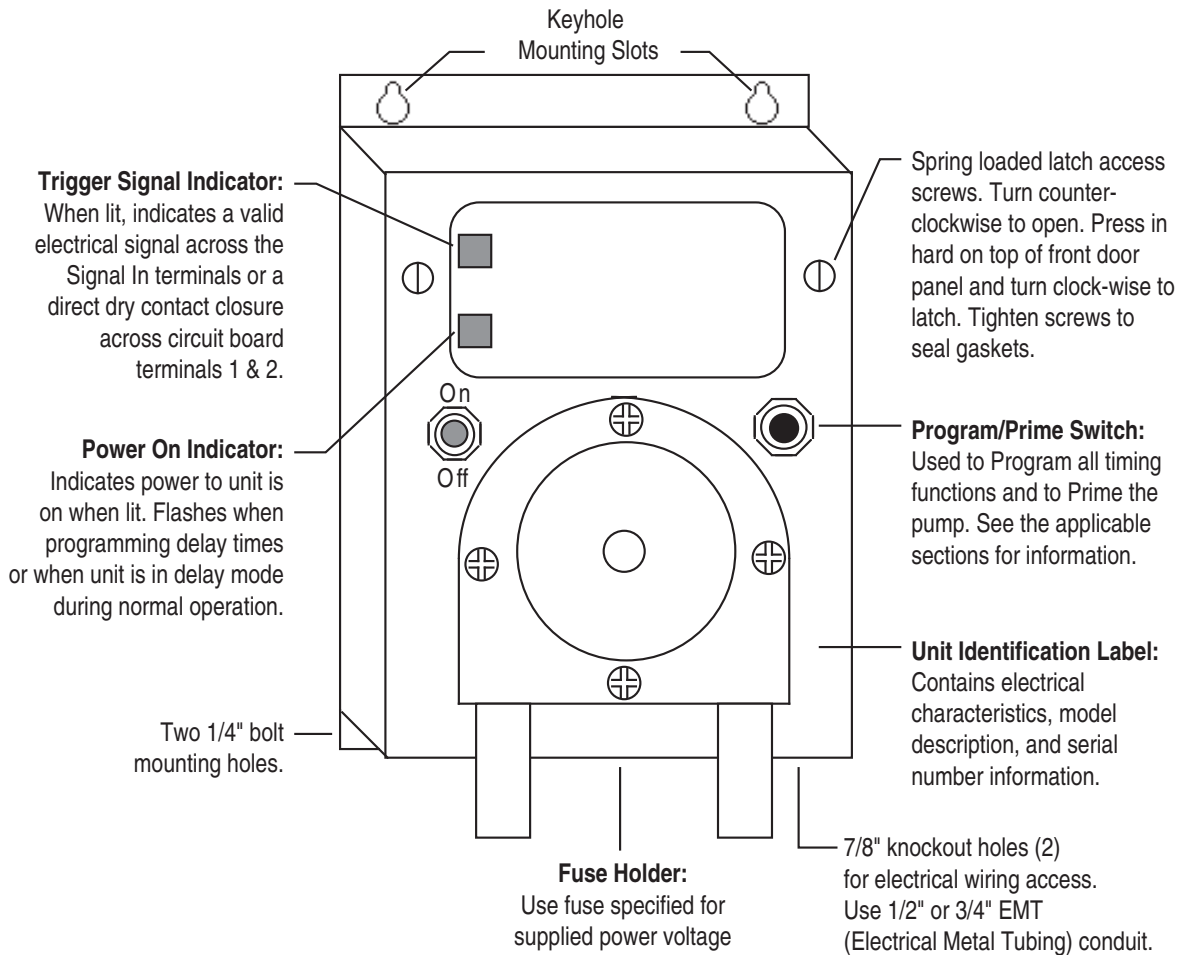
**Recycle Time Mode** - the pump will cycle on and off at the programmed intervals for the duration of a valid trigger signal. This function allows extremely low displacements over long periods of time. For example, programming a five second run time and a one hour delay time would allow injections of approximately four ounces of product every hour for as long as the unit is in operation. Slowing down the pump speed allows even lower displacements.

**Timed Run Mode** - when triggered, the pump will run for the programmed run time.

**Timed Run Mode (With Delay)** - when triggered, the pump will run for the programmed run time, but only after the programmed delay time has passed.

# EXTERNAL PARTS & CONTROL FUNCTION IDENTIFICATION

For Reference Only - Not to Scale



P61TM01

# PHYSICAL INSTALLATION

For Reference Only - Not to Scale

1. Mount the unit on a vertical surface using the mounting slots and holes shown.
2. Mount in a serviceable location, and only in the horizontal position.
3. Keep away from steam or other moisture
4. Keep away from extreme cold or heat (36 to 120 degrees F is okay).
5. Mount on a vibration free surface.
6. Connect and route suction and discharge supply lines.

Secure bottom mounting flange with appropriate hardware. Mounting holes are 1/4" diameter.

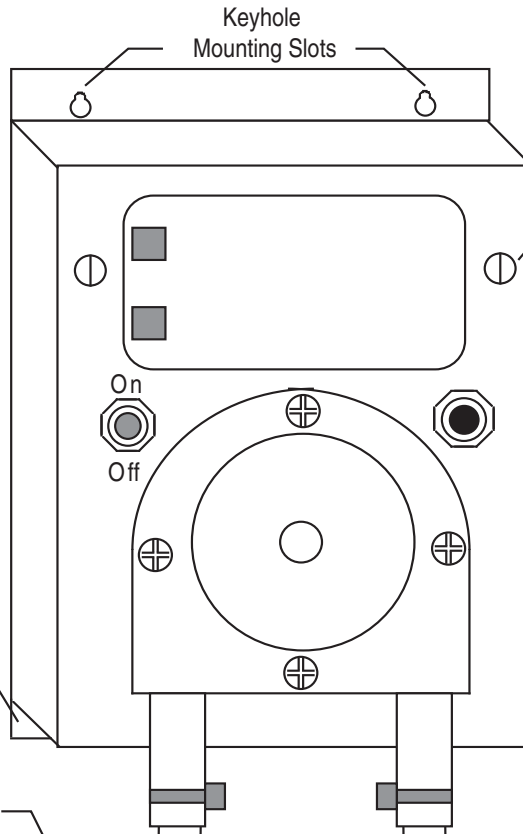
1/2" O.D. (3/8" I.D.) "polyflow" tubing is the recommended supply line tubing for typical installations\*. Insert poly tubing about 1" up inside the pump tube.

Route to liquid supply

Secure connections with tie-wraps or other clamp. Seals must be airtight to avoid leaks and loss of prime

If larger size supply tubing is needed, adapter fittings will be required.

Route to injection point



**Mounting hardware is not typically supplied with this unit**

Spring loaded latch access screws. Turn counter-clockwise to open. Press in hard on top of front door panel and turn clockwise to latch. Tighten screws to seal gaskets.

Operating the pump within the recommended vacuum and pressure specifications will ensure acceptable displacement performance and acceptable pump tube life. If installation does not fit the typical\* information noted below, see next page for further information

\* Typical installation refers to applications where liquids with physical characteristics similar to water (1 cps - 8.33 pounds per gallon) are being pulled less than 25 feet, pushed less than 25 feet, or most pull-push distance combinations totaling less than approximately 50 feet. Liquids less than 75 cps viscosity and weighing less than 8.66 pounds per gallon normally are considered water-like for these purposes. Typical also assumes that the total vertical lift from the bottom of the liquid reservoir to the injection point is less than 10 feet. Typical also assumes that chemical compatibility is appropriate for the pump tube being used. Reference Technical Service Bulletin 86-1012 for compatibility information.

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# PUMP SYSTEM HYDRAULICS

## Pump System Hydraulics (For Reference Only - Not to Scale)

### Pump input information relating to pump performance and pump tube life.

The more viscous and heavy a liquid is, the more vacuum created. The longer the suction line the more vacuum created. If long runs are necessary and/or viscous, heavy products are pulled, increase the size of the line to reduce the vacuum.

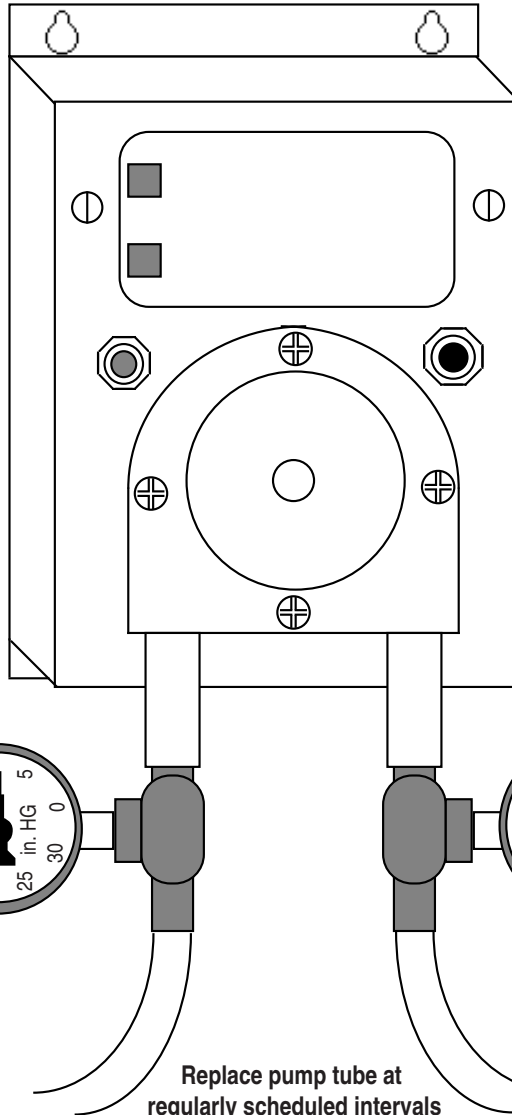
0 - 9 in. HG = best pump performance, specified displacement possible, best pump tube life.

10 - 15 in. HG = good performance, noticeable drop in displacement, fair pump tube life.

**Vacuum gauge shown for reference. in. HG = inches of mercury**

16 - 20 in. HG = less efficient pump performance, significant drop in displacement, poor pump tube life.

Do not exceed 20 in. HG. Pump tube is subject to extreme wear and may collapse.



### Pump output information relating to pump performance and pump tube life.

The more viscous and heavy a liquid is, the more pressure created. The longer the output line the more pressure created. If long runs are necessary and/or viscous, heavy products are pushed, increase the size of the line to reduce the pressure.

0 - 7 psi = best pump performance, specified displacement possible, and best pump tube life.

8 - 12 psi = good pump performance, noticeable drop in displacement, fair pump tube life.

**Pressure gauge shown for reference. psi = pounds per square inch.**

13 - 18 psi = less efficient pump performance, significant drop in displacement. Fair to poor pump tube life. Not recommended, but serviceable. Over 18 psi is not recommended.

**Do not exceed 20 psi. Pump tube subject to extreme wear and pressure induced tearing.**

**Replace pump tube at regularly scheduled intervals to eliminate failed tube emergency service calls and to ensure accurate product displacement.**

### Viscosity Reference Liquids at 70 degrees fahrenheit

cps = centipoise

Hydraulic Oil = 43.2 cps

SAE 10 Oil = 110 cps

SAE 10 Oil = 220 cps

Molasses = 10,800 cps

SAE 30 Oil = 440 cps

SAE 50 Oil = 1,080 cps

SAE 60 Oil = 2,160 cps

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# ELECTRICAL INSTALLATION



Install in accordance with all applicable electrical codes. Refer electrical installation and servicing to qualified personnel only.

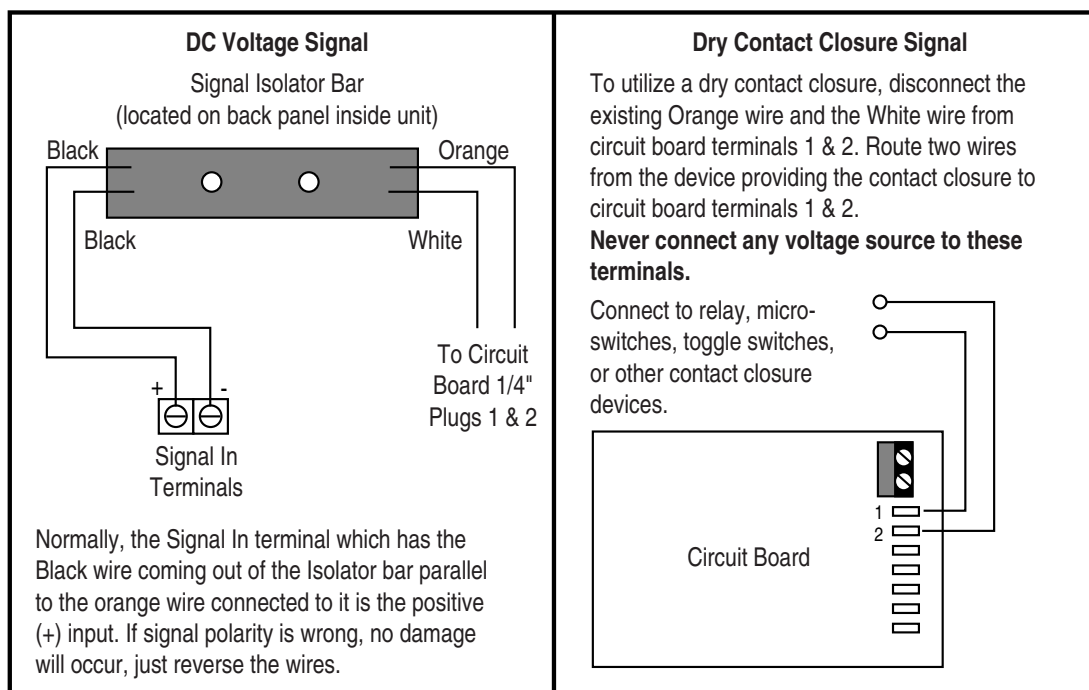
## MAIN POWER WIRING

The power transformer inside the unit is capable of accepting various voltages. Refer to the Specifications Section and the Power Wiring Diagram label inside the unit underneath the Power In wiring terminals for information. Before applying power:

- A. Verify that the Power In terminal wiring is configured to accept the line voltage supplied.
- B. Verify that the fuse is properly rated for the line voltage supplied.
- C. Verify that the power source can provide the specified current.

## TRIGGER SIGNAL WIRING & OPERATING INFORMATION

Refer to the Specifications Section for electrical information. Connect your AC voltage signal to the two Signal In wiring terminals inside the unit. For DC voltage or dry contact closure signals, see diagrams below. In Relay Mode and Recycle Timing Mode, the trigger signal must be present for the duration of the operation. In the Timed Run Modes, the trigger signal only needs to be present for about three seconds to initiate operation. Note that in all four operating modes, a signal must be induced for about three seconds (2 seconds if signal is DC) before any function is initiated. Likewise, you must wait for about three seconds (2 seconds if signal is DC) after the completion of a pumping function before inducing another signal. Any signals induced during any phase (i.e. during pump delay or pump feed) of any operation are ignored.



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# SETUP, PROGRAMMING & OPERATION

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## PRIMING OR MANUALLY OPERATING THE PUMP

With main power on, press the Program/Prime Switch on the front panel or on the circuit board. If the unit is in the Relay Mode or Recycle Timing Mode, the pump will run until you release the switch. If the unit is in the Timed Run Mode or the Timed Run With Delay Mode, the pump will run for the programmed run time. If a delay time is programmed, it will be ignored when the pump is activated via the Program/Prime Switch. If the unit is in one of the two timed run modes, you may stop the pump by pressing the switch again. Depending on where you intend to calibrate your displacement, run the pump until the liquid is pulled into the pump housing or until the liquid reaches the injection point.



*It is necessary to access the cabinet interior to perform the following functions. Access as described on page 3 and 4. Use caution as dangerous voltages may be present inside the cabinet when the main power is on regardless of whether the front panel power switch is on or off. The voltages present on the circuit board where the function controls are located are low voltage and safe.*

## SPEED CONTROL APPLICATION INFORMATION

If the liquid being pumped is water-like, maximum speed is recommended. If viscous or heavy liquids are pumped, slower speeds are recommended to ensure that the pump squeeze tube can recover between flexes and provide efficient performance. While the pump is running, adjust the Speed Control potentiometer on the circuit board to the desired speed. Pumping viscous, heavy liquids at high speeds may cause the pump to displace less liquid than if run at a slower speed, or in extreme cases, may cause the pump squeeze tube to collapse.

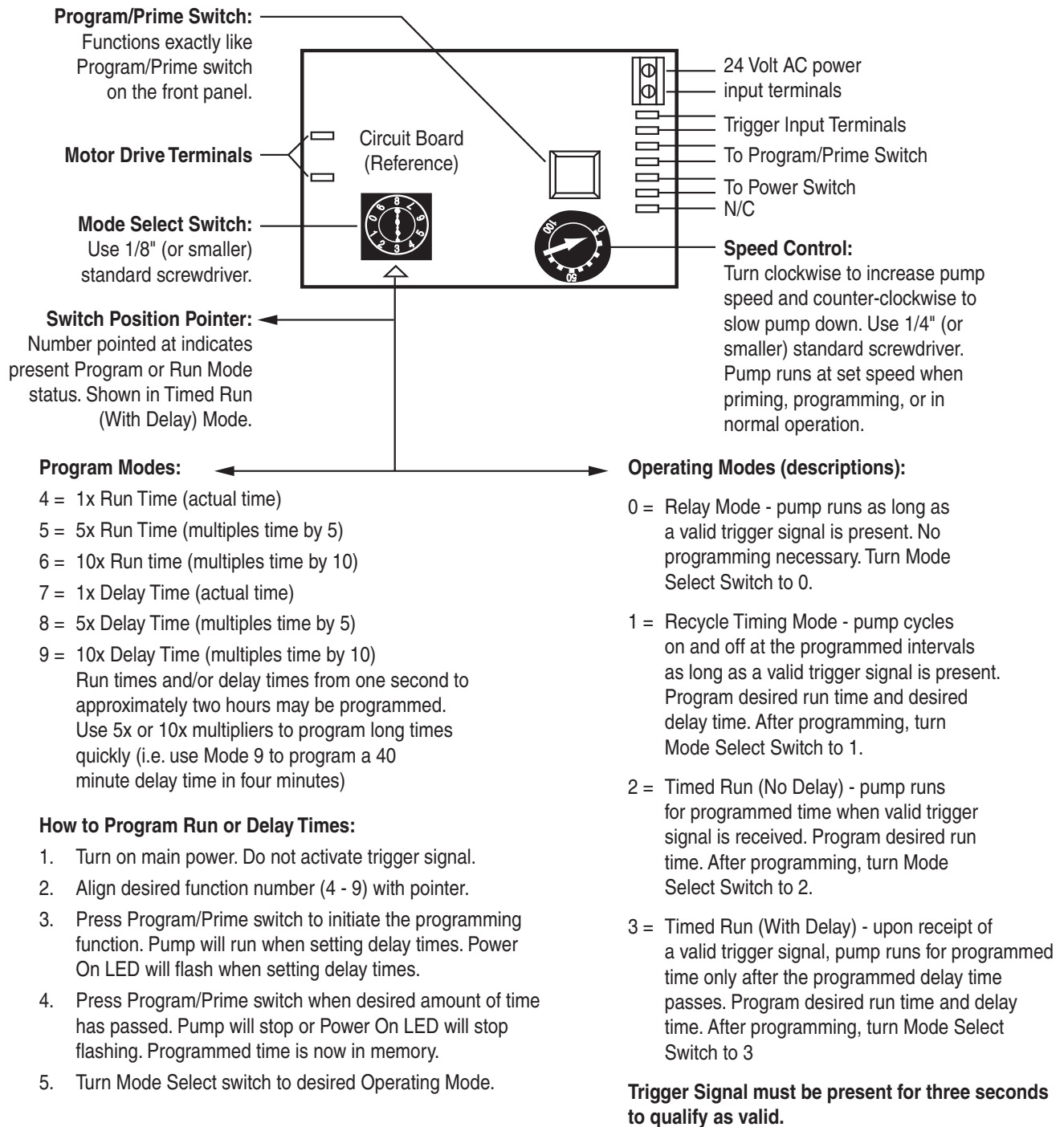
## CALIBRATING THE PUMP DISPLACEMENT (APPLICABLE TO TIMED RUN MODES)

Turn the main power on and set the pump speed as desired. Hold a calibrated measuring container at the output of the pump or at the end of the output line. Program the pump run time as described on the following page and as related to the measured amount of product desired.

## IMPORTANT PROGRAMMING & OPERATING NOTES

- A. When in any of the six programming modes, all incoming trigger signals are ignored.
- B. After programming a run time or delay time, repeating the procedure will erase the previous time and enter the new time.
- C. If the Mode Select Switch is turned to one of the six program modes and the Program/Prime Switch is not pressed, the previously programmed time will remain in memory.
- D. If you attempt to program run times or delay times in excess of the maximum allowable time (approximately two hours), the pump will stop (or the Power On Indicator will stop flashing if programming delays) and the maximum time will be entered into memory.
- E. In the two timed run modes, initiate trigger signals only after the unit power is on. If the control trigger signal is on when the unit power is applied, or is applied simultaneously, no functions will occur. Turn the signal off for about three seconds and then back on to initiate.
- F. In Recycle Timing Mode, inducing the control trigger signal always starts the cycle by running the pump for the programmed run time.
- G. Programmed times are retained indefinitely (10 years plus) when the unit is powered down.
- H. Run time and delay time repeatability accuracy is plus or minus three percent.

# CIRCUIT BOARD CONTROL FUNCTIONS & IDENTIFICATION



P61TM05

# MAINTENANCE

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## General Cleaning

Keep the unit wiped clean of any residual chemical buildup that might corrode the stainless steel cabinet.

## Pump Squeeze Tube Replacement Schedule

Due to the many variables involved (i.e. chemical compatibility, quantity of product pumped, vacuum and pressure considerations) we cannot specify a set time to replace the squeeze tubes. We recommend closely monitoring the time it takes for the original tube to reach the end of its flex life and then establishing a routine replacement schedule.

## How To Lubricate And Replace Tubes

- A. Remove the 4 bolts that secure the front pump housing to the rear pump housing. The front housing may then be easily removed by hand.
- B. Remove the old tube and clean the inside of both housing halves to remove any residue.
- C. Apply a light coating (a finger tip dose is fine) of lubricant to a new piece of tubing before inserting it into the pump housing. Only the portion (inside radius) of the tubing that will make contact with the rollers needs to be lubricated. Occasional lubrication during the expected life of the tube may help extend tubing life.



*Use vaseline to lubricate Silicone and Viton tubes. Use a silicone lubricant such as Dow Corning 111 to lubricate Nordel and BetaTube tubes. C-FLEX tubes do not require lubrication. Too large an application of lubricant or using an incompatible lubricant may cause premature squeeze tube wear.*

- D. Carefully insert the new tube so that it fits tightly against the rear pump housing half. To ensure proper tube placement, rotate the “roller” assembly once or twice while holding the tube in place. Then, press the front housing against the rear housing so that the bolt holes mate up and screw in the 4 bolts. Only 6 to 8 inch pounds of torque are required to tighten the pump housing. Overtightening may cause the pump housing to crack.

## Caring for the Roller Assembly

Whenever you change a squeeze tube, use a standard 1/8” “hex” driver to make sure that the roller is tight on the motor shaft. Use a few drops of “3 in 1” oil to lubricate the roller sleeves and the roller pins. Remove the roller assembly before lubricating and wipe off any excess oil because it may attack the tubing and cause premature wear.

# TROUBLESHOOTING

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See the exploded assembly drawings and parts lists and the complete unit wiring diagram in the back of the manual. To order parts from the drawings, find the part on the drawing, locate it in the parts list using the item number, and order using the part number listed in the part number column. Always verify part numbers when ordering.

## Properly Rated Fuse Blows Repeatedly (or other no power situations)

- A. Verify that transformer primary wires are properly configured to accept the input voltage and verify correct main power voltage.
- B. Disconnect the two red wires from the 24 volt power terminals on the circuit board. Replace the fuse and apply power. If fuse does not blow and the voltage across the secondary wires (two red wires) of the transformer is between 21.6 volts and 26.4 volts, the transformer is good, go to step C.
- C. Unplug the motor wires from terminals eight and nine on the circuit board. Reconnect the 24 volt power wires to the circuit board. Turn on the power. If the fuse does not blow and the Power On indicator is lit, replace the motor/gearbox after checking for mechanical problems (i.e. jammed roller assembly or tubing). If the fuse blows, replace the circuit board.

## Pump Runs From Program/Prime Switch But Not When Signaled

- A. If the Trigger Signal indicator is not lit, go to step B. If the Trigger Signal indicator is lit, replace the circuit board.
- B. Verify that a valid signal voltage is present across the Signal In terminals inside the cabinet. If not, check your signal source and the wiring to the Signal In terminals. If the Signal In voltage is present then the Signal Isolator Module has probably failed. To check for a bad module, short across the plug-in terminals marked 1 and 2 (located on the circuit board). If the pump runs (or delay function begins if applicable), replace the module. If the pump does not run, or the delay function does not begin, replace the circuit board.

## Pump Runs When Signaled But Not From Program/Prime Switch

- A. It is possible that one of the two switches may operate, so verify that both Program/Prime switches are inoperable.
- B. If the board mounted switch works and not the front panel mounted switch, check continuity of the front panel switch and the two wires that connect the switch to terminals P3 and P4 on the circuit board. If the wires and the switch are good, replace the circuit board.
- C. If the front panel switch works and the circuit board switch does not, replace the circuit board.

## Pump Runs Continuously Without Being Signaled (or manually activated)



*This section assumes the unit is being operated in the Relay Mode or the Recycle Timing Mode.*

- A. Unplug the orange wire from the P1 terminal on the circuit board.
- B. If the pump stops, replace the Signal Isolator Module. If the pump continues to run, go to step C.
- C. Disconnect the front panel Program/Prime switch.
- D. If the pump stops, replace the switch. If not, replace the circuit board.

## Pump Will Not Run At All (Assumes Properly Rated Fuse Flows Repeatedly steps A & B are verified)

- A. Unplug the two motor wires from the circuit board.
- B. Connect a DC voltmeter to terminals 8 and 9 on the circuit board (8 = pos, 9 = neg).
- C. Activate pump by signaling or by either Program/Prime switch. Measured voltage should vary depending on speed control setting (from zero to a few volts DC on minimum to 17 or 18 volts DC on maximum).

- D. If voltage is present and varies properly when the speed control is adjusted, replace the motor/gearbox assembly. If not, replace the circuit board.

### **Unit Will Not Accept Run Time Or Delay Time Programming**

- A. Replace the circuit board.

### **Unit Accepts Programming But Will Not Operate**

- A. Replace the circuit board.

### **Pump Will Not Pull The Chemical Out Of The Drum**



*There are 3 basic reasons why the pump would not be able to pull product.*

- A. Too much vacuum created - This is easily recognized by the fact that the tubing will completely flatten out (collapse) inside the pump housing when the pump starts to run. It may be caused by the following conditions:
  1. Supply line in the chemical drum sucking up against the side or bottom of the drum.
  2. A crimp in the intake supply line.
  3. Pulling a viscous product too far a distance or against too high a head (vertical rise).
- B. An air leak somewhere along the input supply run. Most often this is caused by inadequate sealing of the supply line into the squeeze tube.
- C. Pump tube flex life has ended and the rollers can no longer squeeze the tube properly. Replace the pump tube.

### **Technical Assistance**

If you require additional information or assistance in troubleshooting your P-6100T unit, please contact the Technical Service Department. Phone numbers are located on the **Preface** page.

### **Returning Equipment For Repair**

If you need to send an item back to be repaired, please call or write to obtain a Returned Product Report (RPR number) before sending it back. When you call, simply ask for the Repair Department and they will provide you with a number. Please write the RPR number on the outside of the box before sending it back. It is also very helpful to our repair department if you include a note inside the box explaining the nature of the problem. Failure to obtain an authorization number before sending an item in for repair or replacement may delay the return of your equipment.

### **Warranty**

This Beta Technology Inc. unit is warranted against defects in materials and workmanship. This warranty applies for one year from the date of delivery and covers all parts of the unit except the pump squeeze tubing. Units which are proven to be defective during the warranty period will be repaired or replaced provided they are returned to Beta Technology, Inc. No other warranty is expressed or implied. Warranty does not cover equipment abuse or misuse, nor does it cover any consequential liability resulting from performance of the equipment.

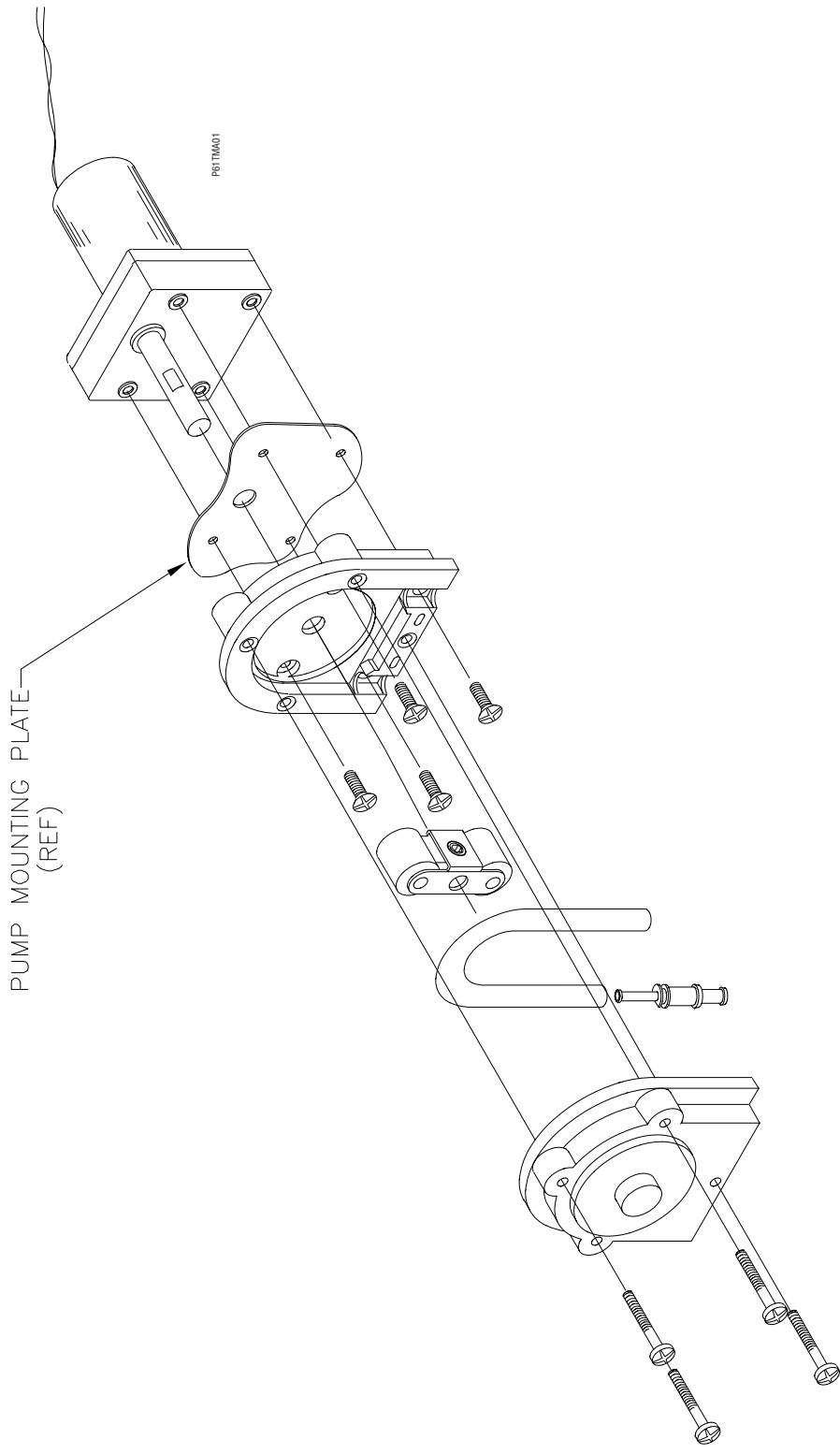
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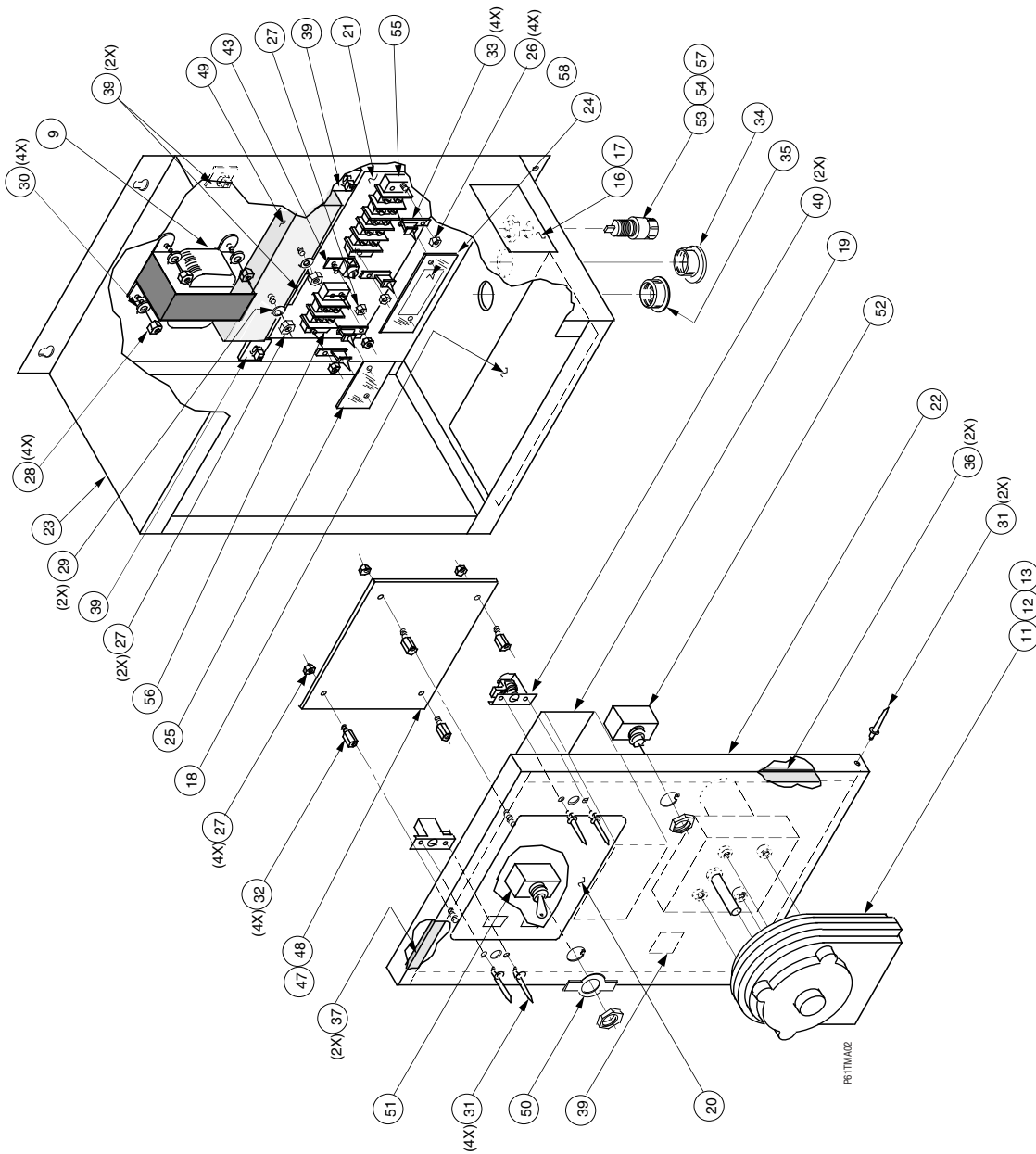
# PARTS LIST

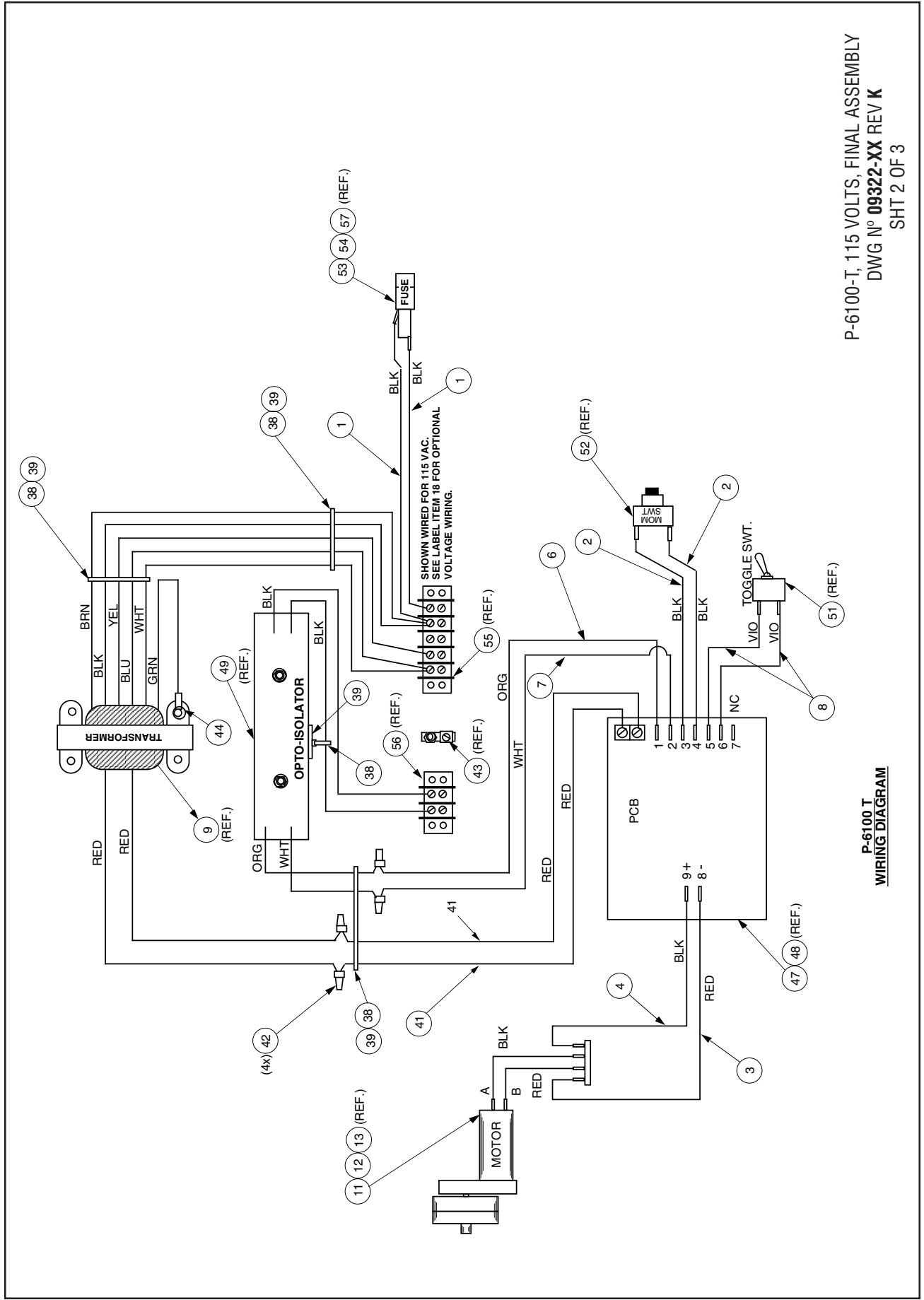
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<b>Seq #</b>	<b>Description</b>	<b>Item #</b>
09	XFMR,PWR,115/240V,24V,100VA	018044
24	TERM BLK,CVR,5 POS,SNAP	040965
25	TERM BLK,CVR, 2 POS,SNAP	040966
26	NUT,KEP,4-40	041087
28	NUT,KEP,8-32	041089
30	WSHR,FL,#8,0.380 X 0.174 X 0.30,SST	041122
33	SPRT,PCB LKG,L-SHAPED	041182
38	TIWRP,0.10 X 4L,NYL,NAT	041318
39	TIWRP,AHR,ADH,RB,3/4",NYL,NAT	041323
41	WIRE,1,18 GA, 23,RED	050675
42	TERM,CRP,20/14 GA,END SPLC	041710
44	TERM,CRP,RNG,#8,18-22,INSUL	050333
55	TERM BLK,0.375,SCR,5 X 2,PNL	043691
57	FUSE,2A,1/4 X 1 1/4,FAST,250V	042882
58	LBL,HZR,WARN,DSCNT PWR,TB,2 X 0.6	040791



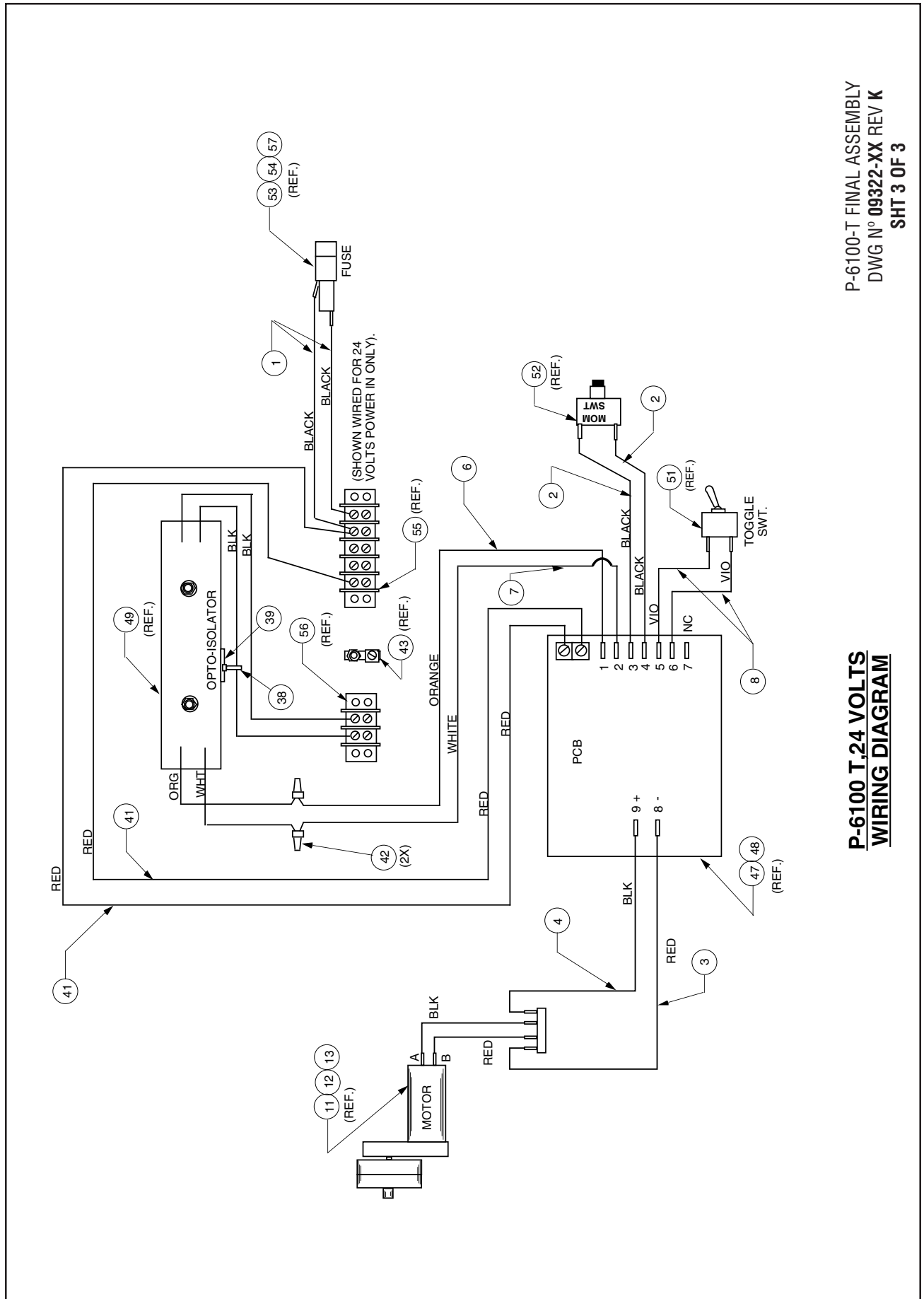
MOTOR, GEARBOX, PUMP, PS/A  
DWG N° 06286-00 REV K  
SHT 1 OF 1





P-6100-T, 115 VOLTS, FINAL ASSEMBLY  
 DWG N° 09322-XX REV K  
 SHT 2 OF 3

P-6100 T  
 WIRING DIAGRAM



P-6100-T FINAL ASSEMBLY  
DWG N° 09322-XX REV K  
SHT 3 OF 3

**P-6100 T.24 VOLTS  
WIRING DIAGRAM**

