Opco® ChainMaster®
E-Series Manual

PROVEN QUALITY. LEADING TECHNOLOGY.

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1.0 Introduction

The ChainMaster E-Series Conveyor Lubrication System is the most advanced system available today for applying lubricants to powered chain conveyor components. Installation, operation, set-up and basic troubleshooting of the system are described in the manual.

2.0 General Description

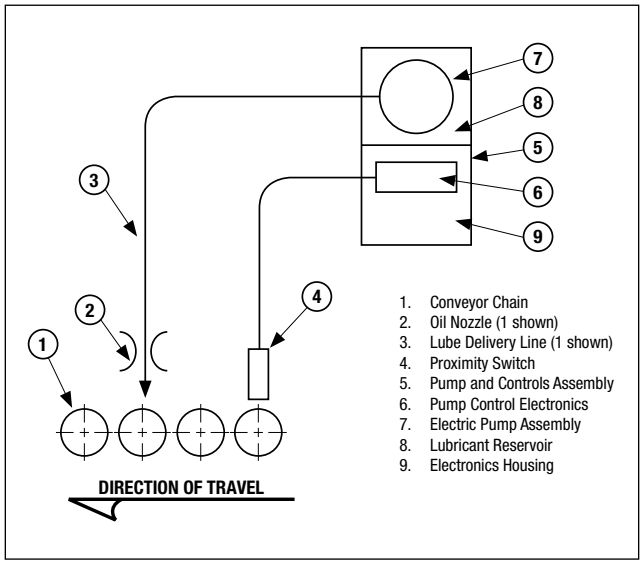
KLS ChainMaster Lubrication Systems are designed to apply lubricant to conveyor wear points.

3.0 General Specifications

Lubricant	150-1500 SUS (30-300 ISO) at operating temperature. Filled oils must be colloidal with solids no greater than 5 microns. Viscosity improves (tactifiers) degrade performance and must be approved by Graco prior to use.
Shot Volume	0.0011-0.0045 in^3 (0.018-0.074 cm^3) per output line
Lubricant Lines	4 mm OD Nylon or Copper
Lubricant Line Length	8 ft (2.5 m) Max
Reservoir Capacity	5 gal (18.9 liters)
Ambient Temperature	40ºF to 110ºF (5ºC to 44ºC)
Input Power Consumption	115 VAC, 50/60 Hz Standard: 1.5 amp 220 VAC, 50/60 Hz Optional: 0.8 amp
Material Compatibility	Non-Metallic parts exposed to lubricant: Buna-N, Nylon, Delrin, Epoxy and Viton Non-Metallic parts exposed to ambient: Lexan, Neoprene, Nylon, SBR and Thermoplastic
Outline Dimensions	27.5 in. (698.5 mm) L x 12 in. (304.8 mm) W x 10.5 in. (266.7 mm) H 80 lb (36.3 kg)

4.0 Sequence of Operation

4.1 Lubrication Sequence



Lube System Diagram

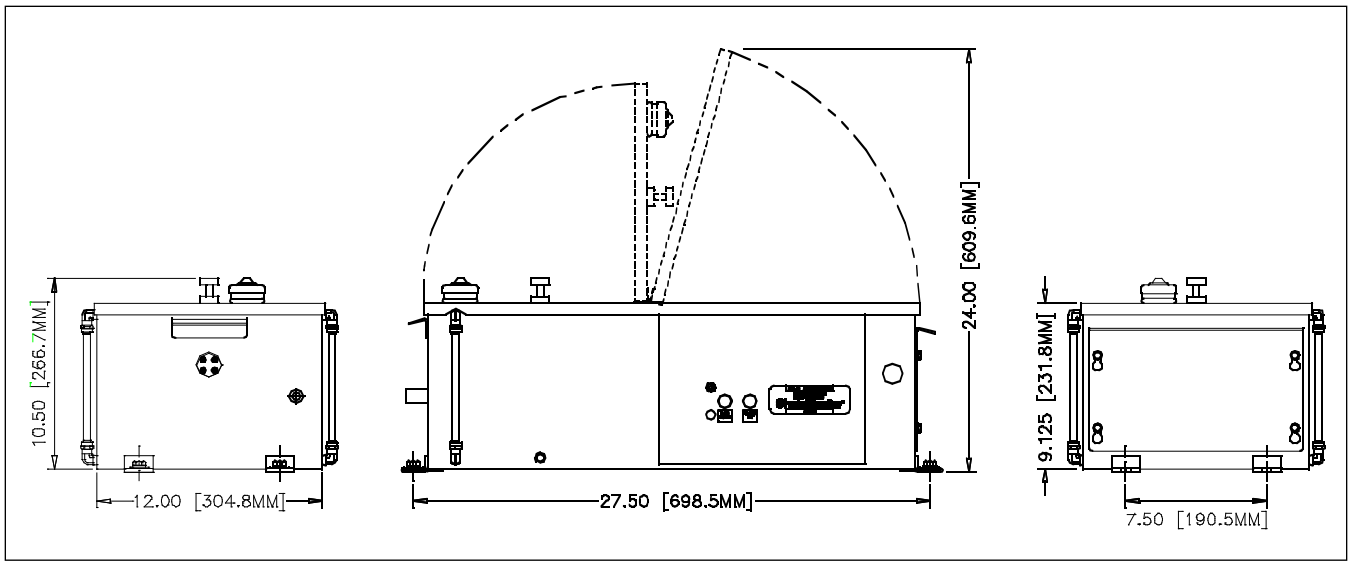
The lubrication process starts after the reservoir is filled and the Controller is set. The proximity switch senses motion of the moving target and is activated at passing of each target. The proximity switch closure is sensed by the pump control electronics and converted to a fixed duration power pulse, which activates the pump solenoid. The pump is "ON" for a fraction of a second for each target, even if the target stops with the proximity switch "ON" continuously. This prevents overheating the pump solenoid. The positive displacement pump discharges lubricant into the distribution lines. The solenoid is then de-energized and the pump pistons return to home position. This cycle continues until the programmed (or timed) lube points ends, the reservoir is emptied, or power shuts down.

4.2 Low Level Inhabit

The float switch inside the reservoir stops the lubrication cycle if the lubricant level drops too low. The red light on the Control Panel turns on. As soon as more lubricant is added, the light goes off and the lubricant cycle resumes.

4.3 Remote-Fill Valve

The E-Series lubricator can be equipped with a remote-fill valve option to permit automatic replenishment from a central-fill device.



Unit Dimensions

5.0 Installation

Before installing the E-Series Lubricator System, check the following:

- Chain is stable and tight
- There is a minimum of 2 ft (0.61 m) clearance above the lubricator
- Clear, safe access is available to allow for inspection

5.1 Conveyor Inspection

WARNING: Be sure conveyor is turned off before inspection or repair.

CAUTION: Do not expose lubricator to dust, dirt, water spray or high temperature. Use a protective cover if operating in these conditions.

1. Remove any debris from conveyor chain.
2. Inspect conveyor for damage parts. Repair or replace all damaged parts.
3. Turn conveyor on and allow one complete conveyor pass. Check for any interference between the lubricator and the conveyor.

4.

5.2 Handling

Move lubricator carefully to avoid damage to controls.

5.3 Mechanical Installation

1. Install the lubricator at its designed position on the conveyor. If the unit is pre-mounted, make sure the arrows on the lubricator point in the direction of conveyor travel.
2. Shim the feet of the Pump and Controls Assembly as necessary to level the reservoir.
3. Fill the reservoir with clean lubricant. Keep the level below the top of the sight glass (approximately 2 in. from the top cover).

5.4 Electrical Installation

Connect power to the unit as noted on Wiring Diagram shown in back of manual.

5.5 Priming Oil Lines

Prime the oil delivery lines before making final nozzle adjustments. Turn on power to the lubricator; activate the sensor manually about once per second. Continue this process until all lines are delivering clean shots. Each foot of lubricant line will need approximately 25 shots (i.e. for 8 ft lines, 200 shots are needed and these will be delivered in 3.3 minutes).

5.6 Shot Volume Adjustment

A standard oil shot is 0.0045 cu.in.; however, the quantity of oil delivered can be adjusted over the range 0.0011 to 0.0045 cu.in.

To set the shot volume, loosen jam nut on top of reservoir cover and turn adjusting knob clockwise until it is finger-tight. Turn the adjusting knob counter-clockwise until the desired volume is set.

5.7 Shot Velocity Adjustment

The location of the shot velocity knob is in the electronics section. Adjustment is made by turning the shaft on the Pump Control Electronics. Turning clockwise increases the velocity.

NOTE: Be careful not to set the velocity adjustment so low that the pump will not complete a full stroke.

5.8 Nozzle Adjustment

The nozzles on each unit are factory adjusted. If adjustment is required, direct the oil shot into the area of wear points to be lubricated.

5.9 Proximity Switch Adjustment

The positions of the proximity switches are factory per-set and should not need readjustment. Should it be necessary to make final adjustments, loosen the proximity switch hold down nut and adjust as required to properly time lubricant shots to the target.

5.10 Initial Break-In

It is advisable to check lubricator performance after one or two weeks of operation to confirm that equipment was properly installed.

WARNING: Conveyors can cause **serious personal injuries** if limbs or clothing get caught in moving components. Nozzle adjustments that require a moving conveyor should only be performed by **factory trained service technicians**.

To avoid injury, do not wear loose clothing near moving conveyor. Exercise extreme caution when making nozzle adjustments on a moving conveyor, and always use hand tools to avoid any direct contact with the moving conveyor.

6.0 Controls

The ChainMaster CTR controller is designed primarily to count the number of lube targets in one revolution of the conveyor, the number of chain revolutions between lubrication cycles. It counts well-defined points on the conveyor such as pins, rollers, or center links. A proximity switch mounted on the conveyor senses these points (referred to as links).

6.1 Specifications

Input Power	115 VAC, 50/60 Hz Standard: 1.5 amp 200 VAC, 50/60 Hz Optional: 0.8 amp
Max Count, Links & Passes	9999
Shot Dispense Time	0005 to 9000 ms
Shot Dispense Rate*	3 shots/second, max
Sensor Type	Photo or Inductive Proximity Switch
Programming Method	Keypad Programmable
Display	4 digit

*Calculated by the following equation:

$$\text{Shot Rate} = \frac{(0.2)(\text{Conveyor Speed, fpm})}{\text{Conveyor Pitch, inches}}$$

6.2 Programming

Consult Controller Manual. Position the power switch in the “ON” position. Wait about ten seconds for the completion of the controller self checks. At this point, the four digit display will read: 0 - 0 - 0 - 0

6.2.1 Program Link Count (Chain pins)

1. Press PROGRAM PRESET VALVE
2. Press LINK COUNTER
3. Press the ↑ keys to increment the display to the desired value
4. Press ENTER
5. The LEDs will display P - P - P - P if the program was accepted
6. Press CANCEL COMMAND

6.2.2 Program Pass Count (Conveyor revolutions)

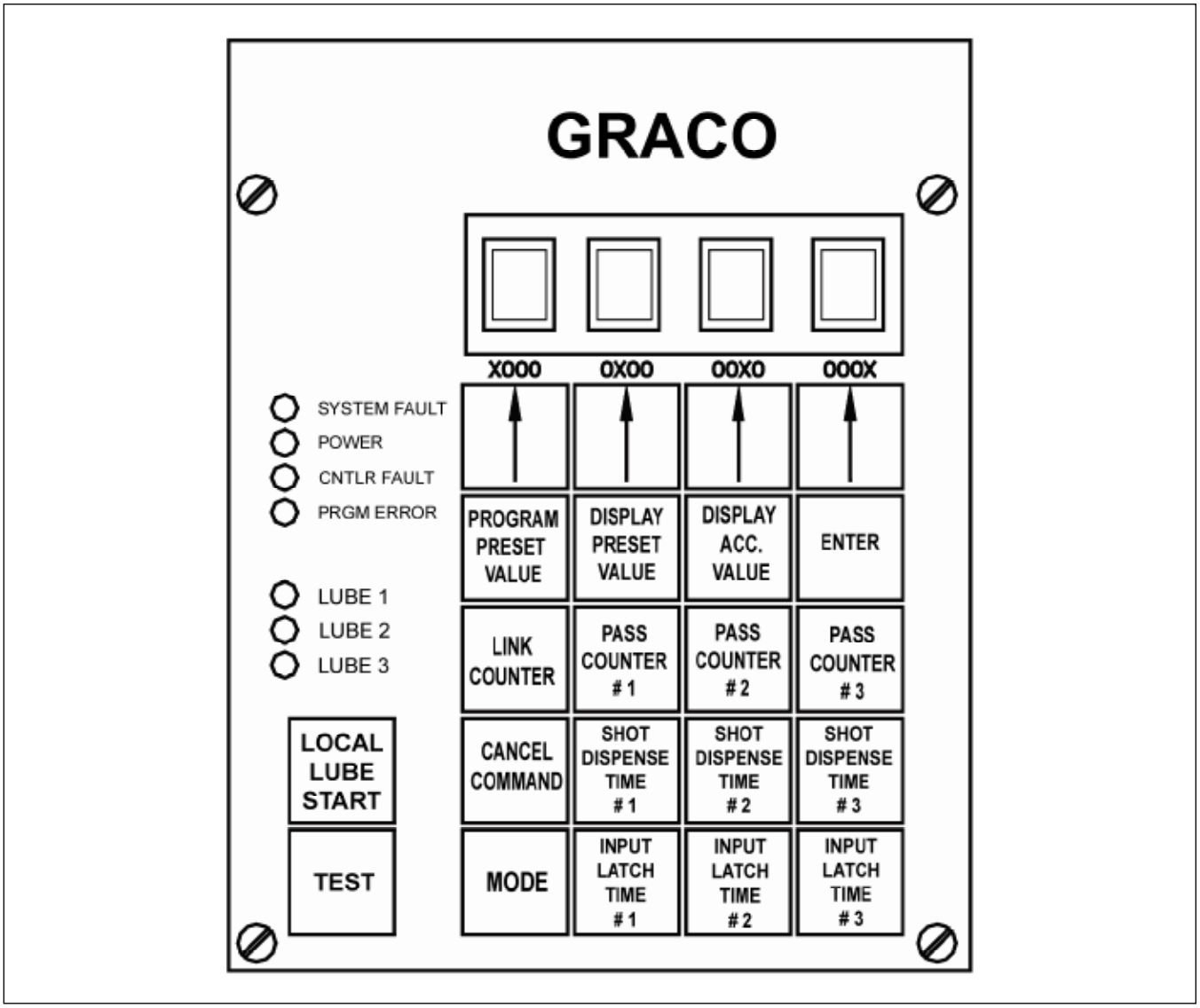
1. Press PROGRAM PRESET VALUE
2. Press PASS COUNTER #1 (see note)
3. Press the ↑ keys to increment the display to the desired value
4. Press ENTER
5. The LEDs will display P - P - P - P if the program was accepted
6. Press CANCEL COMMAND

NOTE: For applications that require the use of outputs #2 and/or #3, repeat the previous steps.

6.2.3 Program Shot Dispense Time

1. Press PROGRAM PRESET VALUE
2. Press SHOT DISPENSE TIME #1 (see note)
3. Press the □ keys to increment the display to the desired value. Set E-Series at 25 ms
4. Press ENTER
5. The LEDs will display P - P - P - P if the program was accepted
6. Press CANCEL COMMAND

NOTE: For applications that require the use of outputs #2 and/or #3, repeat the previous steps.



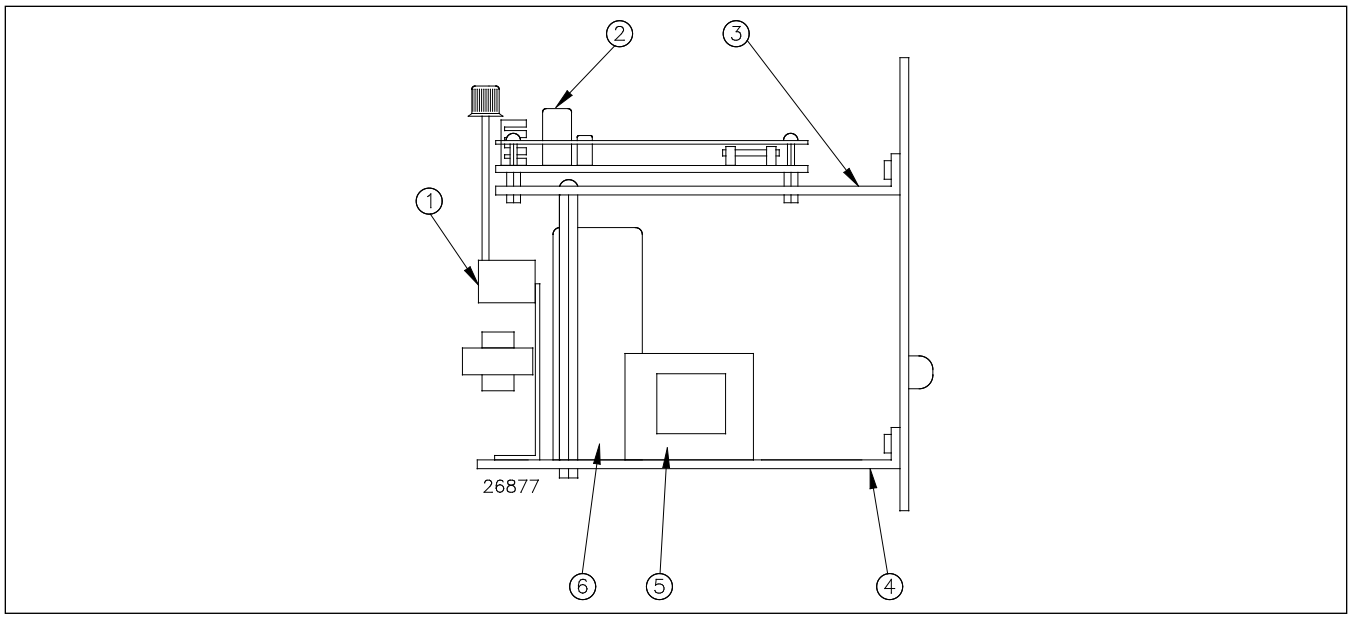
6.3 Local Lube Start

Depress momentarily to initiate a Lube Cycle. To discontinue, press CANCEL COMMAND.

6.4 Test Function

Press TEST BUTTON for 5 seconds. If conveyor is running this is a 2 minute test. If conveyor is off, test lasts 30 seconds at 1 shot/second. To stop test, press CANCEL COMMAND.

6.5 Control Electronics



ChainMaster Counter

Item No.	Description	PC Interface		ChainMaster Counter		12 hour Timer		168 hour Timer	
		Part No.	Old Part No.	Part No.	Old Part No.	Part No.	Old Part No.	Part No.	Old Part No.
1	Pump Control Electronics	258170	094120	258170	094120	258170	094120	258170	094120
2	System Controller	–	–	258195	800941	–	097826	–	093610
3	Top Control Mounting Panel	–	096758	15U336	800637	–	096758	–	097041
4	Bottom Control Mounting Panel	–	096757	15U337	800638	–	096757	–	096757
5a	Transformer (1 or 2 solenoids)	15U340	802386	15U340	802386	15U340	802386	15U340	802386
5b	Transformer (3 or 4 solenoids)	15U120	095351	15U120	095351	15U120	095351	15U120	095351
6	Capacitor	15U303	092847	15U303	092847	15U303	092847	15U303	092847

7.0 Maintenance

Regular cleaning and maintenance prolongs the life and improves the performance of the lubricator.

Be sure loose or bare wires do not touch the screw terminals on the capacitor or electronics module. This may cause failure of the electronics module.

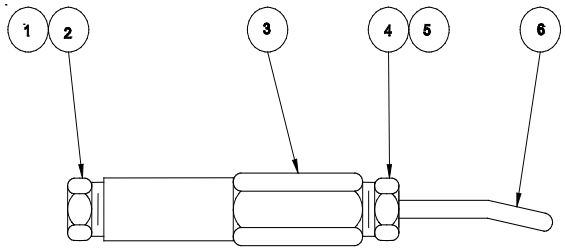
WARNING: To avoid serious injury or death, and damage to equipment, disconnect AC power and discharge capacitor before doing any maintenance.

CAUTION: When cleaning lubricator, keep cloth away from nozzle tips, inside of reservoir and pump parts. Lint can clog ports or cause nozzle capillary leakage.

1. Clean and inspect unit for visible damage. Inspect for lubricant leakage. Replace parts that are missing, broken or malfunctioning.
2. Routinely check lubricant level in reservoir. Keep level above half full. The red light on the unit glows when lubricant level is too low. When red light is on, add more lubricant to the reservoir.
3. Check the accuracy of the lubricant shot regularly to guarantee that nozzles are aligned properly and displacing lubricant.
4. Keep nozzles clean.
5. Be sure lines are clear and unrestricted.

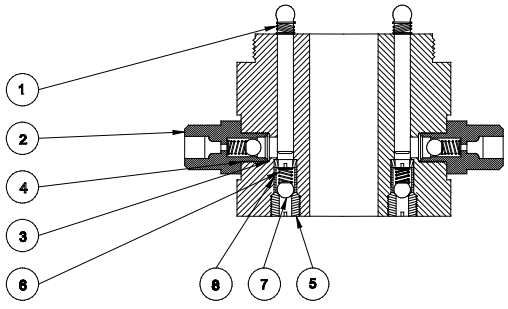
8.0 Replacement Parts

8.1 Nozzle Assembly



Item	Description	Part No.	Old Part No.
1	Compression Nut	561324	092912
2	Ferrule	15M705	092914
3	Union Body	565825	095217
4	Ferrule	15M704	092913
5	Compression Nut	566586	092911
6a	1.0 in. Nozzle Tube	56M692	090447
6b	2.0 in. Nozzle Tube	15M688	090438
6c	2.75 in. Nozzle Tube	15M689	090440
6d	3.0 in. Nozzle Tube	15M696	094286
6e	3.5 in. Nozzle Tube	15M693	093245
6f	4.5 in. Nozzle Tube	15M697	094551
6g	5.0 in. Nozzle Tube	15M695	093460
6h	7.0 in. Nozzle Tube	15M694	093459

8.2 Pump Body Assembly



Item	Description	Part No.	Old Part No.
1	Plunger Spring	15U093	092825
2	Outlet Check Assembly	258239	093938
3	O-Ring	555999	093584
4	O-Ring	558613	091902
5	Inlet Check Plug	15U079	093935
6	Inlet Check Spring	15U080	010468
7	Inlet Check Ball	555366	401-010-030
8	Inlet Check Housing	15U082	800984

8.3 Electric Pump Assembly

Pump Assembly Part No. (Old Part No.)	Description	Pump Body Assembly Part No. (Old Part No.)	Mtg Plate Part No. (Old Part No.)	Solenoid Part No. (Old Part No.)	Spacer Part No. (Old Part No.)	Piston Drive Plate Part No. (Old Part No.)
(096580)	2 Port,1 Sm Solenoid	258240 (801205)	15U068 (095238)	566705 (095233)	15V715 (095241)	15V716 (095239)
(095236)	2+2 Port, 2 Sm Solenoid Side-by-Side	258240 (801205)	15U068 (095238)	566705 (095233)	15V715 (095241)	15V716 (095239)
(095124)	4 Port,1 Lg Solenoid	258240 (801205)	15U068 (095238)	15U064 (092844)	15U067 (095342)	15U074 (092821)
(098739)	6 Port, 1 Lg Solenoid	– (MFG 6956)	15U068 (095238)	15U064 (092844)	15U067 (095342)	15U074 (092821)
(095125)	8 Port, 1 Lg Solenoid	258241 (801208)	15U068 (095238)	15U064 (092844)	15U067 (095342)	15U074 (092821)
(098742)	3+2 Port, 2 Lg Solenoid Side-by-Side	258240 (801205)	– (098413) 568232 (098414)	15U064 (092844)	15U067 (095342)	15U074 (092821)
(098412)	4+4 Port, 2 Lg Solenoid Side-by-Side	258240 (801205)	– (098413) 568232 (098414)	15U064 (092844)	15U067 (095342)	15U074 (092821)
(098740)	6 Port, 2 Lg Solenoid Stacked	– (MFG 6956)	15U068 (095238)	15U064 (092844)	15U067 (095342)	15U074 (092821)
(801025)	8 Port, 2 Lg Solenoid Stacked	258241 (801208)	15U068 (095238)	15U064 (092844)	15U067 (095342)	15U074 (092821)
(808839)	5 Port, 3 Sm Solenoid	258241 (801208)	– (808840)	566705 (095233)	15V715 (095241)	– (808841)

9.0 General Troubleshooting

9.1 Nominal Voltages

Measure the following voltages at pump control module when unit is operating normally.

Test	Terminals	Condition	Reading
Power	Terminal #1 (+)* Terminal #2 (-)	Power On	105 - 125 VAC
Capacitor Voltage	Terminal #4 (+) Terminal #7 (-)	Power On	160 - 180 VDC
DC Voltage	Terminal #5 (+) Terminal # 7 (-)	Power On	1 - 13 VDC
Sensor Voltage	Terminal #7 (-) Terminal #8 (+)	Sensor Inactive	11 - 13 VDC
Sensor Voltage	Terminal #7 (-) Terminal #8 (+)	Sensor Active	0 - 1.5 VDC
Solenoid Resistance	Disconnect white wire from Terminal #3	Measures resistance across free lead wire and Terminal #4	Large Solenoid (3-3/4 in.) - 35±5 ohms Small Solenoid (1-15/16 in.) - 38±5 ohms

*Symbol in parentheses represent the polarity of the probe used to check the numbered terminal

9.2 General Troubleshooting

Problem	Cause	Correction
Green light not on. Unit does not function.	No power input voltage	Check for correct input voltage
	On/Off switch is off	Turn switch on
	Bulb burned out	Replace bulb
	Main fuse is blown	Replace fuse
Red & Green lights are on. Unit does not work. No detectable pump action.	Low lubricant level	Fill reservoir
Red low level light not on and reservoir empty	Low level bulb burned out	Replace bulb and fill reservoir
Sensor malfunction	Sensor improperly adjusted	Adjust sensor to within 0.125 in. of trip point
	Failure. Verify by shorting electronics module terminals 7 & 8 intermittently. If pump cycles, sensor is not functioning	Replace sensor
Pump solenoid malfunction	Mechanical binding	Turn volume adjustment screw in and back out to free solenoid plunger. If this does not correct problem, remove the cover housing and press the solenoid plunger by hand. If binding occurs, replace solenoid.
	Open circuit	Check resistance of solenoid. Replace solenoid if resistance is not 30-40 ohms
Controller malfunction (counter or timer)	Not properly set/programmed	Set or program properly
	Failed timer or controller	Replace timer of controller
Green light not on and unit still functions	Burned out or missing bulb	Replace bulb
Pump control electronics malfunction	Pump cycles once as power is supplied, but not after	Replace module if resistance between terminals 3 & 7 is less than 10 ohms
Capacitor failure	Check pressure relief plug on top of capacitor. If hole is open, capacitor is defective	Replace capacitor
Green light on, solenoid cycles, but lubricant not ejected	Broken pump spring	Replace pump spring
	Inlet check blocked, unseated or dirty	Clean or replace
Green light on, solenoid attempts to cycle, but appears to bind	Blocked nozzle or crimped delivery line	Clean or replace nozzle and/or crimped line
	Block outlet check	Clean or replace