APEX DYNAMICS, INC.

Smart Lubrication System

Technical Instruction

Original instruction

Content

Manual name	Manual No.
Smart Lubrication System Technical Instruction	LUG400190529-01

1. Safety Information

1.1 Overview

All personnel must read the entire manual instructions carefully and ensure full understanding the contents before operating, installing and maintaining the SMART Lubrication System. This is to avoid unnecessary danger during smooth operation.

Lubrication System only can be used on pinion or linear guide, it is prohibited for other applications. APEX DYNAMIC can not take the responsibility for the damage under those abnormal usage.

1.2 Maintenance and Storage

- Turn off the power during maintenance and suggest wear gloves and goggles
- Store lubrication system into circulated freely environment
- The grease should be stored in sealed barrel and fix the storage position under room temperature environment
- Avoiding storage in process region, high temperature surface, splashing liquid or on the electrical devices. And consider the suitability for replacement
- Make sure screw the plug on both hand-set and oil cup when lubricator is stop working
- Avoiding inject the prohibitive oil/grease into the lubricator
- Use the funnel or assistant tool when inject the oil into the lubricator to avoid oil leakage to ground or equipment that cause the accident

1.3 Safety Regulation

Please do not ignore Safety Regulation which may cause unnecessary injury or loss of company asset. APEX will not be liable for following situations:

- Incorrect assembly and failure to comply with method of installation, operation, setting-up, maintenance, repair, may result in danger.
- Self-Disassembly of Lubricator
- Self-Modification of Lubricator
- Using Unsuitable Grease
- Using Non-Original Manufacturer Part
- Performing Incorrect method of Trouble shooting error

1.4 Hazard Instruction

The Hazard warning is defined as four types of danger level:

Danger

Danger refer to hazards with a high risk of severe physical injury or immediate fatality

Warning

Warning refers to hazards with moderate risk of severe physical injury or potential fatality.

Caution

Caution refers to hazards with a low risk of moderate physical injury.

Note

Note refers to hazards with a slight risk of moderate physical injury.

1.5 Warning Symbol

All users must pay attention to the symbols of Hazard warnings mentioned in Manual as shown in table:

Symbol	Explanation of Symbols
	Hazards due to general causes
	Hazards due to dangerous electrical voltage
	Hazards due to environment pollution
	Wear personal protective equipment (Gloves)
	Wear personal protective equipment (Goggles)

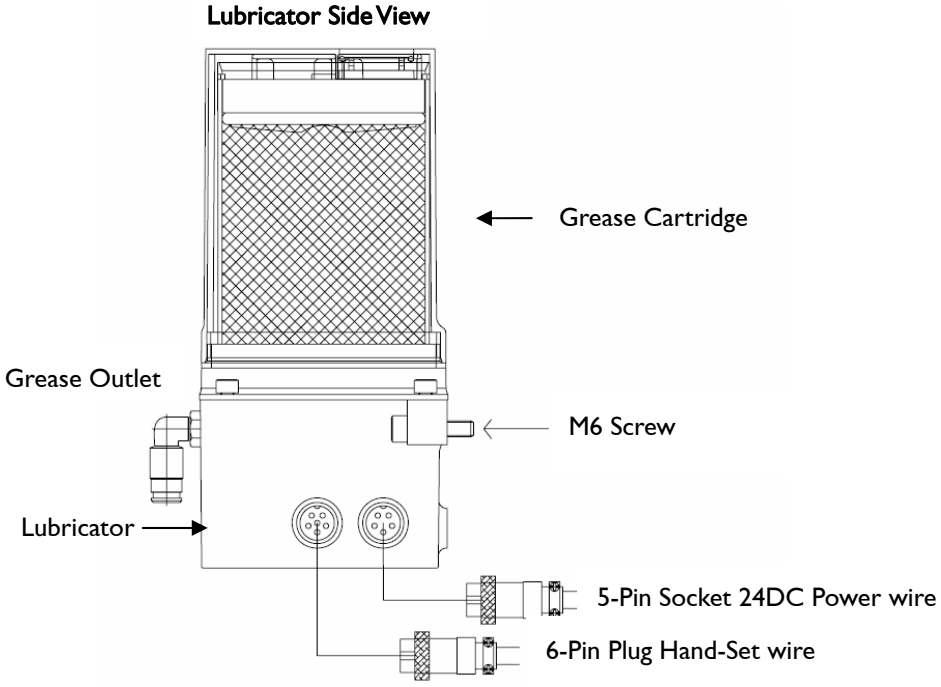
2. Lubrication Specification

2.1 Electrical Specification

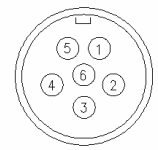
Input Power	DC24V ± 4%
Power Consumption	12W max
Operating Current	I max≦500mA
Output / Input	Status Output 1 Set； Command Input 1Set
Status Output Max. Current	100mA
Command Input Max. Current	50mA
Operating Temperature	-25~70 C
Control mode	PLC mode 0、TIMER mode 1 、PLC mode 2

Note: Herewith mode 0 and mode 2 which can be controlled by PLC, the original setup is PLC mode 0. Request Hand-Set connection if needs to change the mode.

2.2 Power and Hand-Set Connection



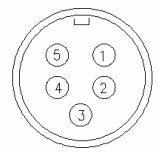
6-Pin Plug (**Hand-Set Wire**)



1.Output DC 24V
2.GND
3.I_BUSY/
4.RS485
5.RS485/

6-Pin Socket on Lubricator

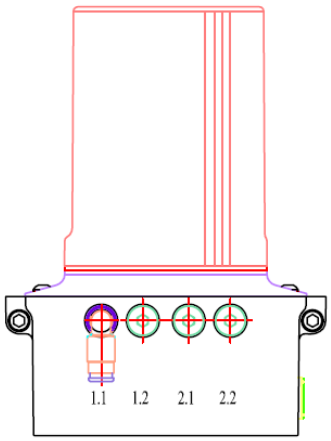
5-Pin Socket (**Power Wire**)



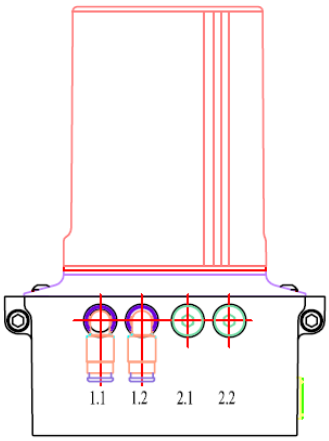
1.Output Signal
2.Input Signal
4.Input DC 24V
5.GND

5-Pin Plug on Lubricator

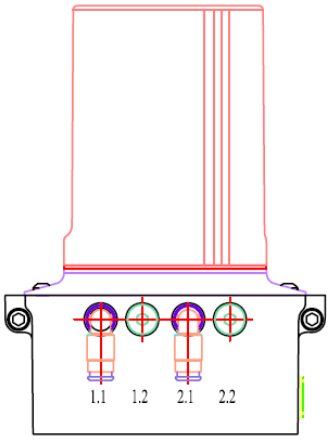
2.3 Outlet Position of Lubricator



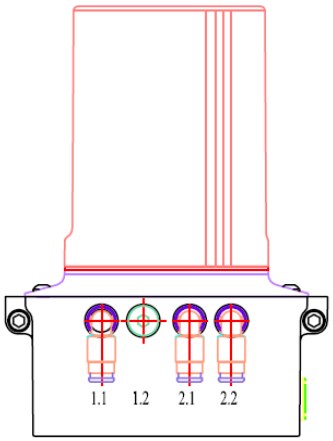
LUG-411



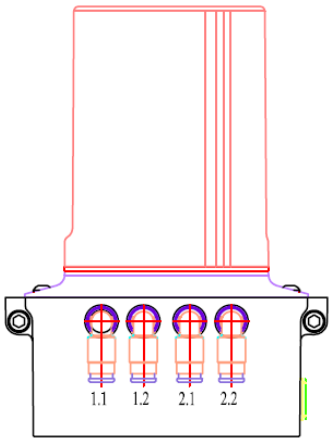
LUG-412



LUG-422



LUG-423



LUG-424

LUG-411:
1.1 Outlet : per stroke 0.15cm^3
Other Oil Outlet is sealed.

LUG-412:
1.1 Outlet : per stroke 0.15cm^3
1.2 Outlet : per stroke 0.15cm^3
Other Oil Outlet is sealed.

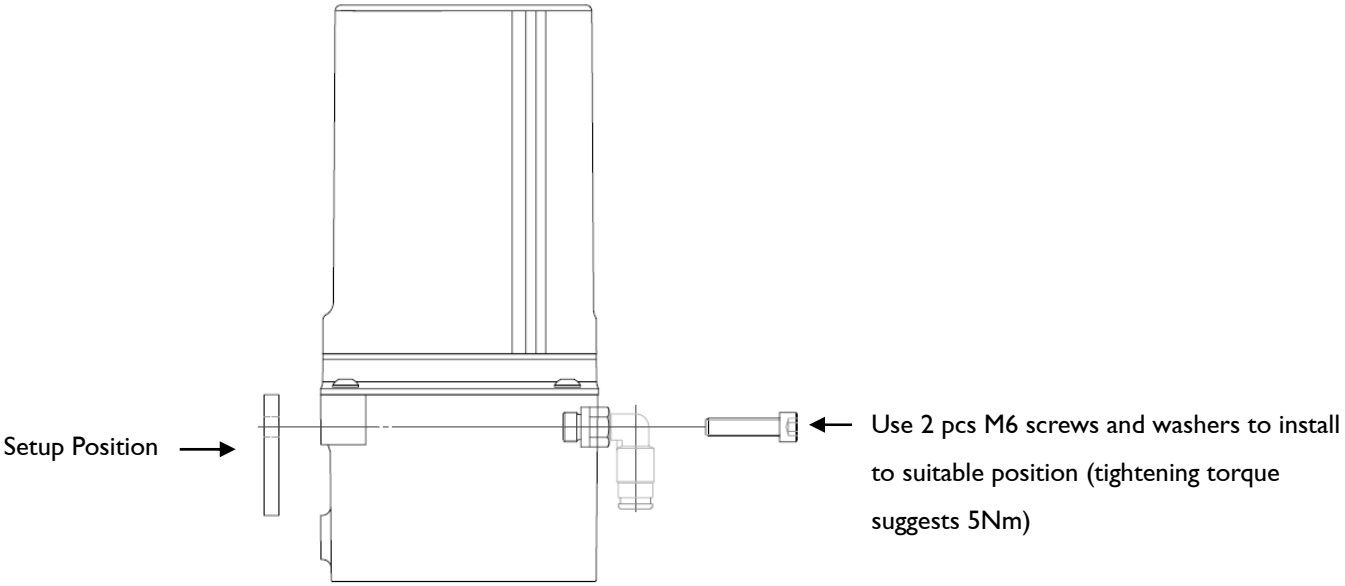
LUG-422:
1.1 Outlet : per stroke 0.15cm^3
1.2 Outlet : Outlet is sealed.
2.1 Outlet : per stroke 0.15cm^3
2.2 Outlet : Outlet is closed.

LUG-423:
1.1 Outlet : per stroke 0.15cm^3
1.2 Outlet : Outlet is sealed.
1.1 Outlet : per stroke 0.15cm^3
1.2 Outlet : per stroke 0.15cm^{33}

LUG-424:
1.1 Outlet : per stroke 0.15cm^3
1.2 Outlet : per stroke 0.15cm^3
1.1 Outlet : per stroke 0.15cm^3
1.2 Outlet : per stroke 0.15cm^3

2.4 Lubrication Setup Introduction

APEX DYNAMIC, INC. provide the 2 pcs M6 screws and 2 pcs washer for installation. Be aware to install the lubricator in sufficient brightness with well circulated freely environment. And avoid to storage in process region, high temperature surface, splashing liquid or on the electrical devices, also consider the suitability for replacement. Moreover, the tube installation should compatible with system and PLC machine safety standard.



3. PLC Control

PLC transfer different output control signals to Lubricator power plug PIN 2, this can control function of lubricator greasing action, delivered grease volume. The control signal of the Lubricator PLC can be divided into 2 molds as mode 0 and mode 2, the Chapter 3 focuses on mode 0, Mode 2 control signals can refer in section 4.6.2.

3.1 Power System Wire (PLC Control)

⚠ Caution

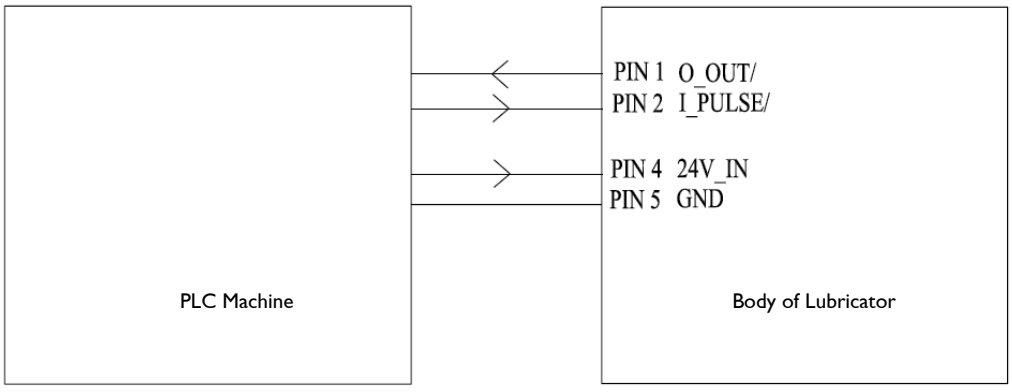
APEX provide the power connector, and the user can use the suitable wire to match the connector bore and application. The current resistance at least 1.5A.

The isolation transformer or power supply can produce output DC 24V under control of PLC machine and provided Lubricator with required power DC 24V.

⚠ Warning

The isolation transformer or power supply should be certificated product, to avoid the risk of electric shock to the user or equipment

Wiring Diagram of Power System



Circuit Protection Switch

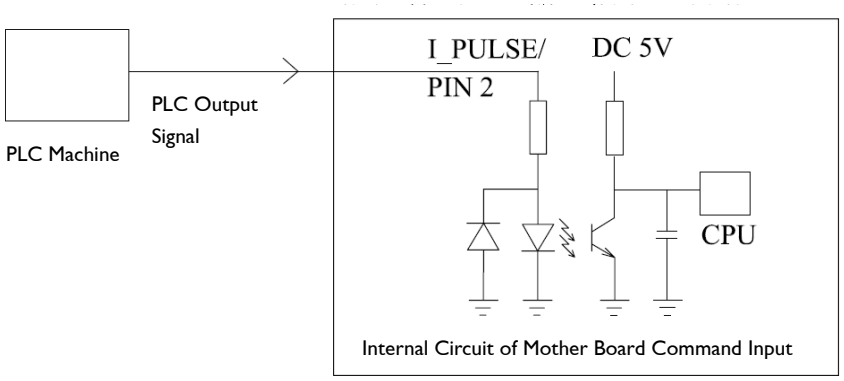
(Fuse), Rated Current = 1.1A

⚠ Caution

When the input voltage of Lubricator is higher than specified voltage, this will cause damage to the lubricator.

3.1.1 Command Input Signal Wiring

PLC signal is conveyed to lubricator.



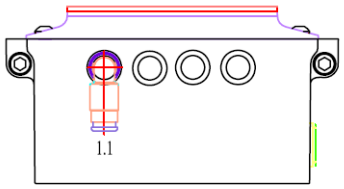
Lubricant Input Electrical Specifications

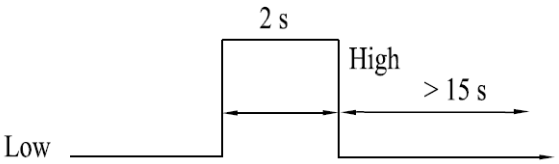
Input
Rated Voltage : DC 24V，
Rated Current : 50mA

3.2 Various Control Signal of PLC model 0

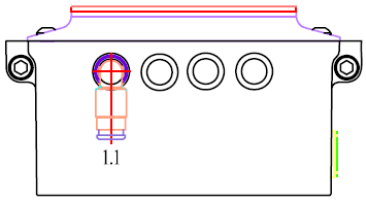
Each Lubrication model has control signal and mechanism as illustrated below, LOW as 0V and high as 24V Signal.

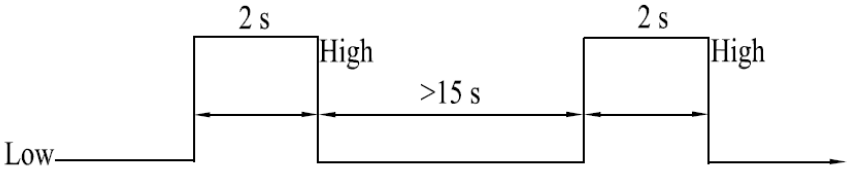
3.2.1 Model LUG-411





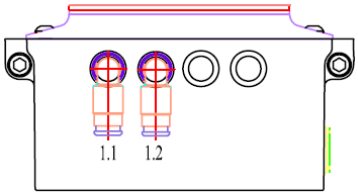
Pump 1 pushed 1 stroke to outlet 1.1 dispensing 0.15cm^3 of grease when Lubricator received one 2s HIGH signal.

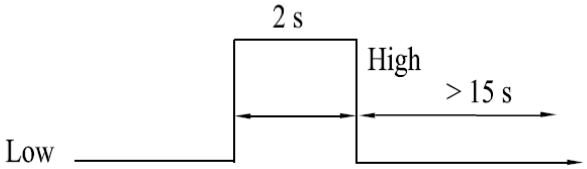




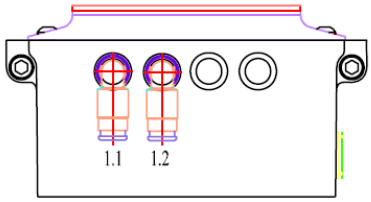
Pump 1 pushed 2 strokes to outlet 1.1 dispensing 2 strokes of 0.15cm^3 of grease (total 0.3cm^3 grease) when Lubricator received two 2s HIGH signal. Ensure cycle intervals of two 2s HIGH signal are 15s.

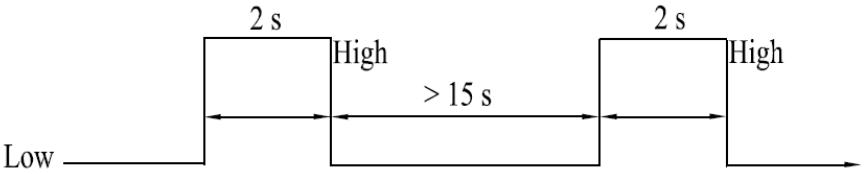
3.2.2 Model LUG-412





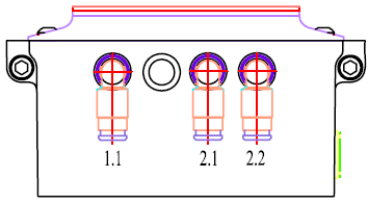
Pump 1 pushed 1 stroke to outlet 1.1 or 1.2 dispensing 0.15cm^3 of grease when Lubricator received one 2s HIGH signal.

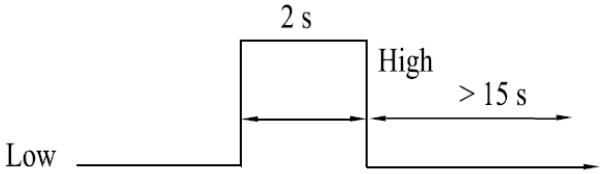




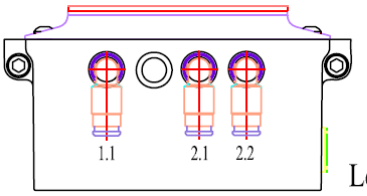
Pump 1 pushed 1 stroke to each outlet 1.1 and 1.2 dispensing 0.15cm^3 of grease when Lubricator received two 2s HIGH signal. Ensure cycle intervals of two 2s HIGH signal are 15s.

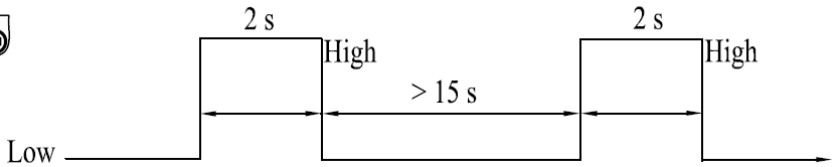
3.2.3 Model LUG-423



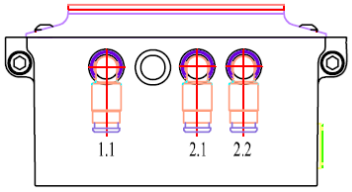


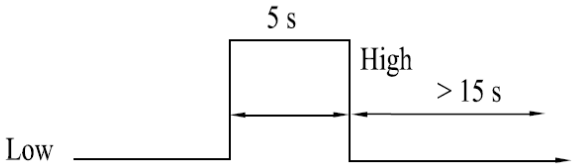
Pump 1 pushed 1 stroke to outlet 1.1 dispensing 0.15cm^3 of grease when Lubricator received one 2s HIGH signal.



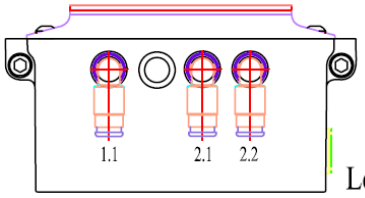


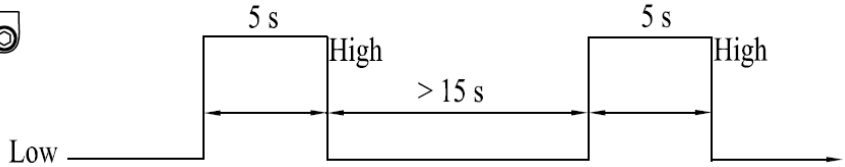
Pump 1 pushed 2 strokes to outlet 1.1 dispensing 2 strokes of 0.15cm^3 of grease (total 0.3cm^3 grease) when Lubricator received two 2s HIGH signal. Ensure cycle intervals of two 2s HIGH signal are 15s.



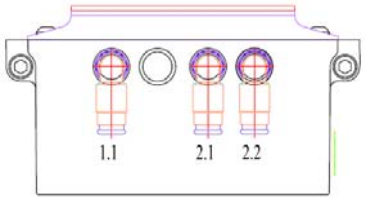


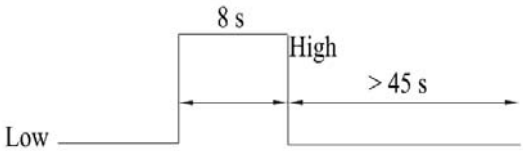
Pump 2 pushed 1 stroke to outlet 2.1 or 2.2 dispensing 0.15cm^3 of grease when Lubricator received one 5s HIGH signal.





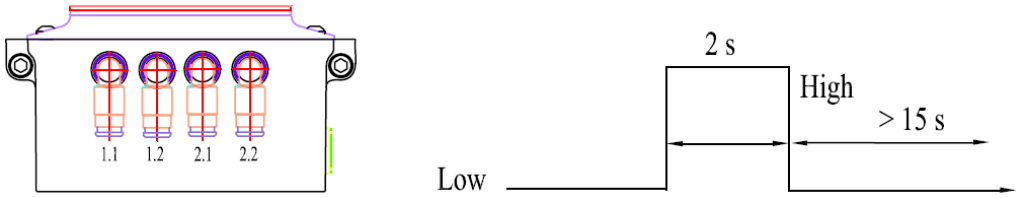
Pump 2 pushed 1 stroke to each outlet 2.1 and 2.2 dispensing 0.15cm^3 of grease when Lubricator received two 5s HIGH signal. Ensure cycle intervals of two 5s HIGH signal are 15s.



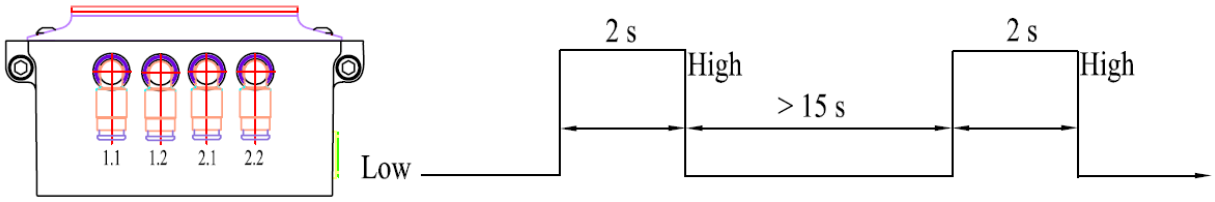


Pump 1 pushed 1 stroke to outlet 1.1, 2.1 and 2.2 dispensing 0.15cm^3 of grease when Lubricator received one 8s HIGH signal.

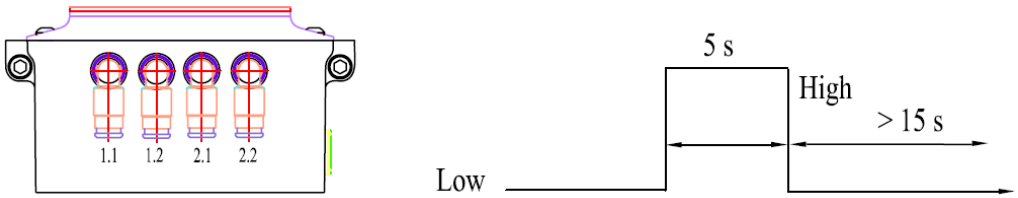
3.2.4 Model LUG-424



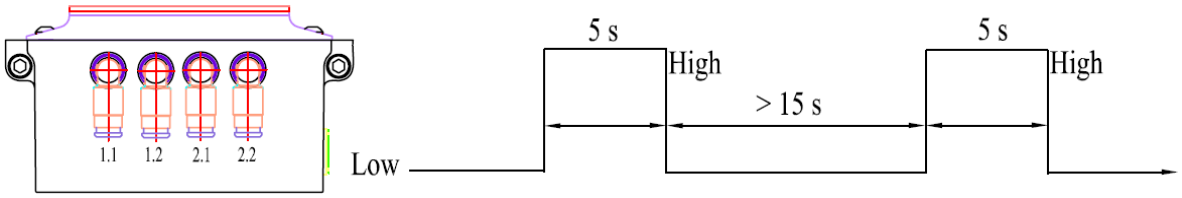
Pump 1 pushed 1 stroke to outlet 1.1 or 1.2 dispensing 0.15cm^3 of grease when Lubricator received one 2s HIGH signal.



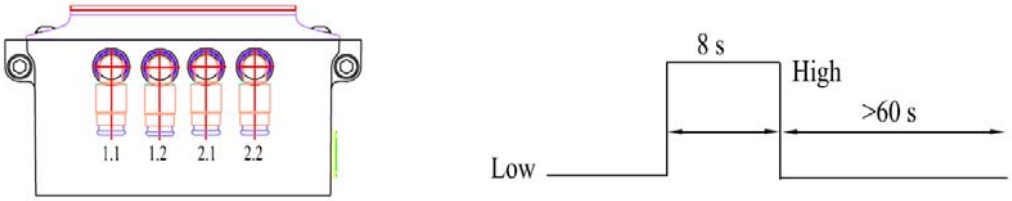
Pump 1 pushed 1 stroke to each outlet 1.1 and 1.2 dispensing 0.15cm^3 of grease when Lubricator received two 2s HIGH signal. Ensure cycle intervals of two 2s HIGH signal are 15s.



Pump 2 pushed 1 stroke to outlet 2.1 or 2.2 dispensing 0.15cm^3 of grease when Lubricator received one 5s HIGH signal.

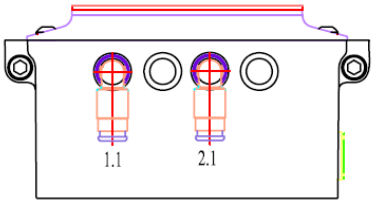


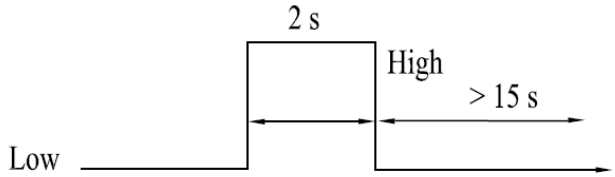
Pump 2 pushed 1 stroke to each outlet 2.1 and 2.2 dispensing 0.15cm^3 of grease when Lubricator received two 5s HIGH signal. Ensure cycle intervals of two 5s HIGH signal is 15s.



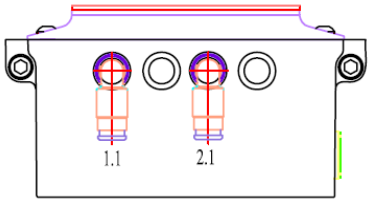
Pump 1 & Pump 2 pushed 1 stroke to each outlet 1.1, 1.2, 2.1 and 2.2 dispensing 0.15cm^3 of grease when Lubricator received one 8s HIGH signal.

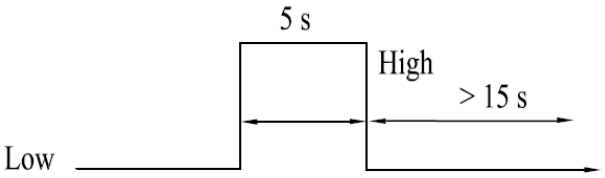
3.2.5 Model LUG-422



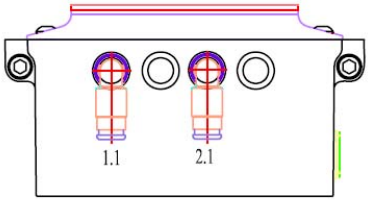


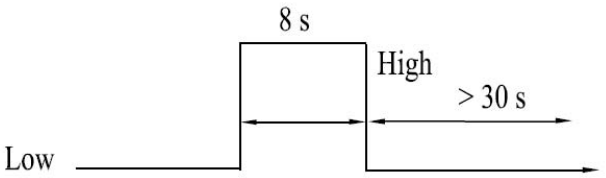
Pump 1 pushed 1 stroke to outlet 1.1 dispensing 0.15cm^3 of grease when Lubricator received one 2s HIGH signal.





Pump 2 pushed 1 stroke to outlet 2.1 dispensing 0.15cm^3 of grease when Lubricator received one 5s HIGH signal.

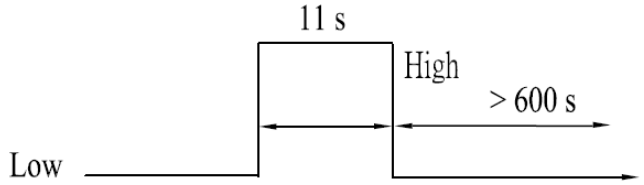




Pump 1 and Pump 2 pushed 1 stroke to each outlet 1.1 and 2.1 dispensing 0.15cm^3 of grease when Lubricator received one 8s HIGH signal.

3.3 Additional Function

3.3.1 Filling of Empty Tube with Grease



May use PLC output 11s HIGH signal after completed installing Lubricator Tube to perform greasing continuously 10 times and user use this function to allow empty tube filled with grease. After receiving the PLC signal of each Lubricator model, volume of grease supply to each outlet as follows:

LUG-411:
1.1 Outlet : 10 x 0.15cm^3 = 1.5cm^3

LUG-412:
1.1 Outlet : 10 x 0.15cm^3 = 1.5cm^3
1.2 Outlet : 10 x 0.15cm^3 = 1.5cm^3

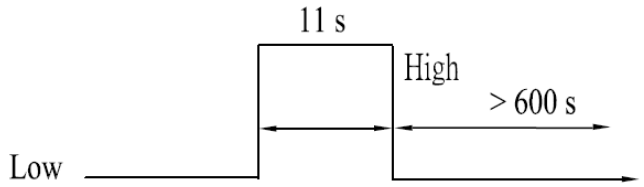
LUG-422:
1.1 Outlet : 10 x 0.15cm ^{3}= 1.5cm^3
2.1 Outlet : 10 x 0.15cm^3 = 1.5cm^3

LUG-423:
1.1 Outlet: 10 x 0.15cm^3 = 1.5m^3
2.1 Outlet: 10 x 0.15cm^3 = 1.5cm^3
2.2 Outlet: 10 x 0.15cm^3 = 1.5cm^3

LUG-424:
1.1 Outlet : 10 x 0.15cm^3 = 1.5cm^3
1.2 Outlet : 10 x 0.15cm^3 = 1.5cm^3
2.1 Outlet : 10 x 0.15cm^3 = 1.5cm^3
2.1 Outlet : 10 x 0.15cm^3 = 1.5cm^3

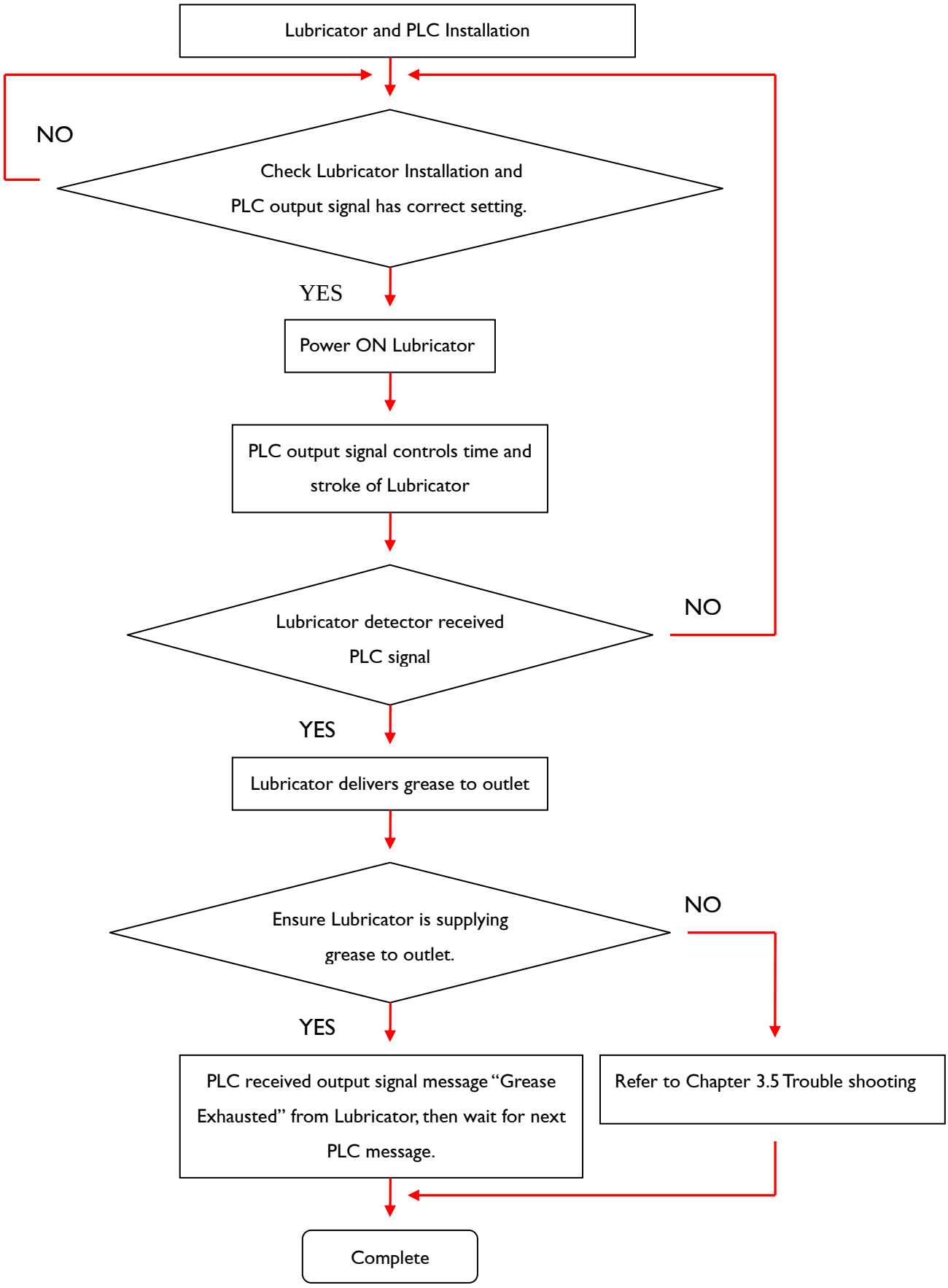
All models have the same oil outlet 10 x 0.15cm^3 = 1.5cm^3

3.3.2 Release Trapped Air



May use PLC output 11s HIGH signal to perform greasing continuously and remove trapped air in internal tube.

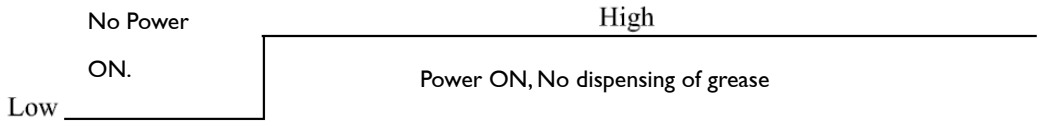
3.4 Lubricator Installation Procedure (PLC Mode 0 Control)



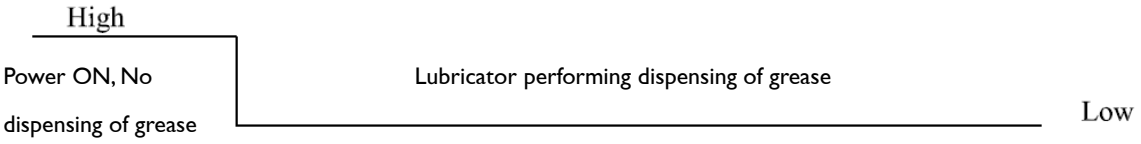
3.5 Lubricator Troubleshooting

PIN 1 of Lubricator power supply connected to PLC machine, the PIN will output different signal to PLC so that PLC knows status of lubricator. Lubricator output signal with the corresponding information as follows Displaying 0V signal as LOW, 24V signal as HIGH.

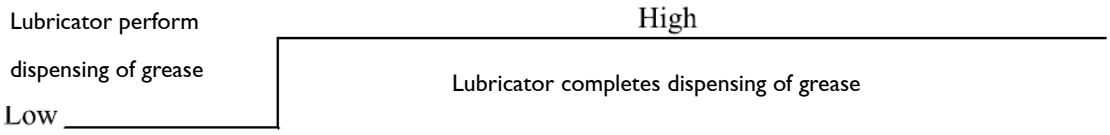
3.5.1 Waveform of Grease Dispensing



Power ON Lubricator, PIN 1 output signal as HIGH, at this time Lubricator then will receive the PLC command.

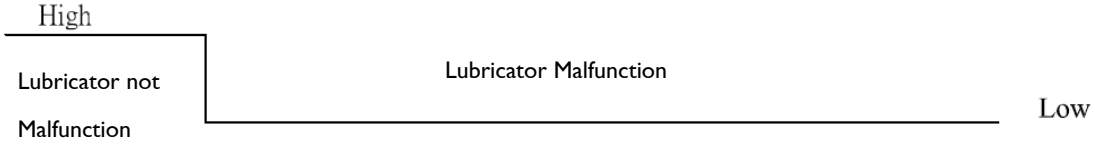


When Pin 1 output signal changed from HIGH to LOW, this means PLC knows Lubricator is performing dispensing of grease to outlet and at this moment Lubricator will ignore PLC command.



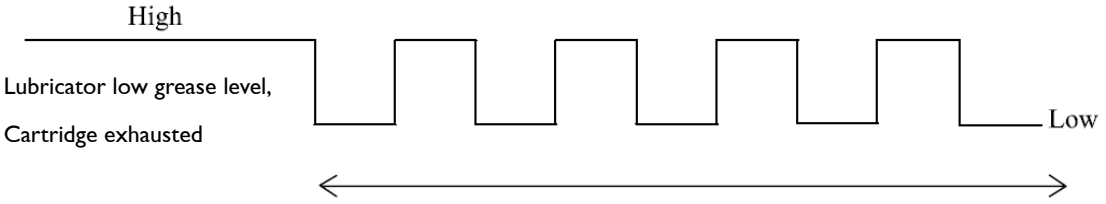
When Pin 1 output signal change from LOW to HIGH, this means PLC knows Lubricator completes dispensing of grease to outlet.

3.5.2 Waveform Pattern of Malfunction



Lubricator malfunction, PIN 1 will continue to output LOW signal, at this time please follow the table for Lubricator troubleshooting.

Malfunction	Reason	Remedy
Lubricator cannot dispense grease	PA tube filled with grease contains trapped air	Refer 3.3 for trouble shooting
	Lubricator PA tube blocked	Inspect PA tube for foreign particle blockage or tube length is too long.
	Lubricator motor idling	Contact Manufacturer



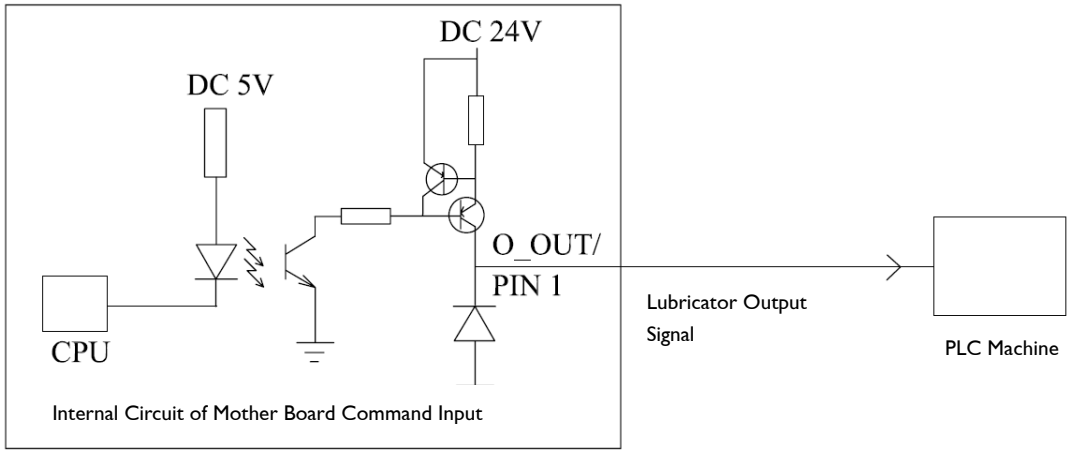
Lubricator Output signal 0.5Hz when Cartridge exhausted

When the lubricator is running out of the lubricant, the magnet of the cartridge will be detected by internal sensor. Then PIN1 will output 0.5HZ signal continuously, and it will stops outlet oil. The lubricator requests to refill lubricant, then back to start outlet oil. The PLC cannot give commands to the lubricator before replenishing oil.

Malfunction	Reason	Solution
Lubricator cannot dispense grease	Black Sensor plate reaches low grease level detection zone, Cartridge exhausted	Refer to APPENDIX B for replacement of a new grease Cartridge.

3.5.3 Lubricator PLC Control Output Wiring Instruction

Wiring of Lubricator Output signal to the PLC machine.



Lubricator Output Electrical Specification

Rated Voltage : DC 24V
Maximum Output Current : 100mA

4. Hand-Set

APEX developed the Lubricator Hand-Set controller to perform regular routine grease supply function and real-time feedback to Hand-Set informing user Lubricator current status so no need to go through PLC transfer signal to achieve target.

4.1 Power System Wiring (TIMER Control)

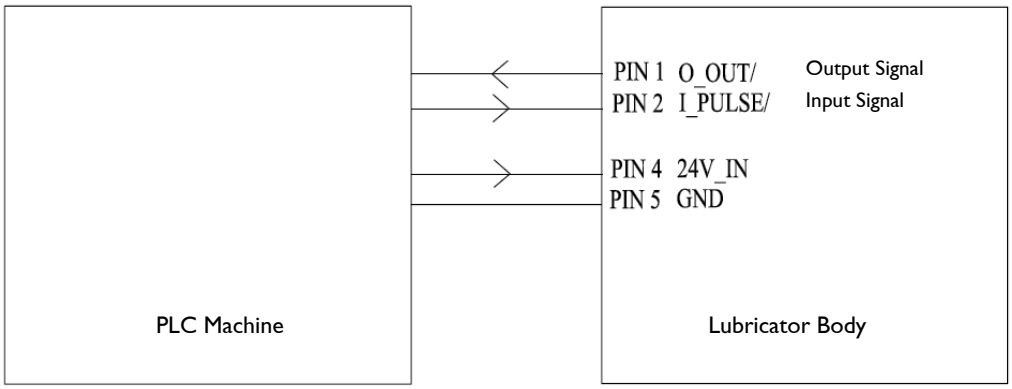
Hand-Set of Lubricator requires DC24V power from PLC machine or independent power source.

⚠ Caution

APEX provide the power connector, and the user can use the suitable wire to match the connector bore and application. The current resistance at least 1.5A.

4.1.1 PLC Machine Power Supply

Power supply system Wiring diagram

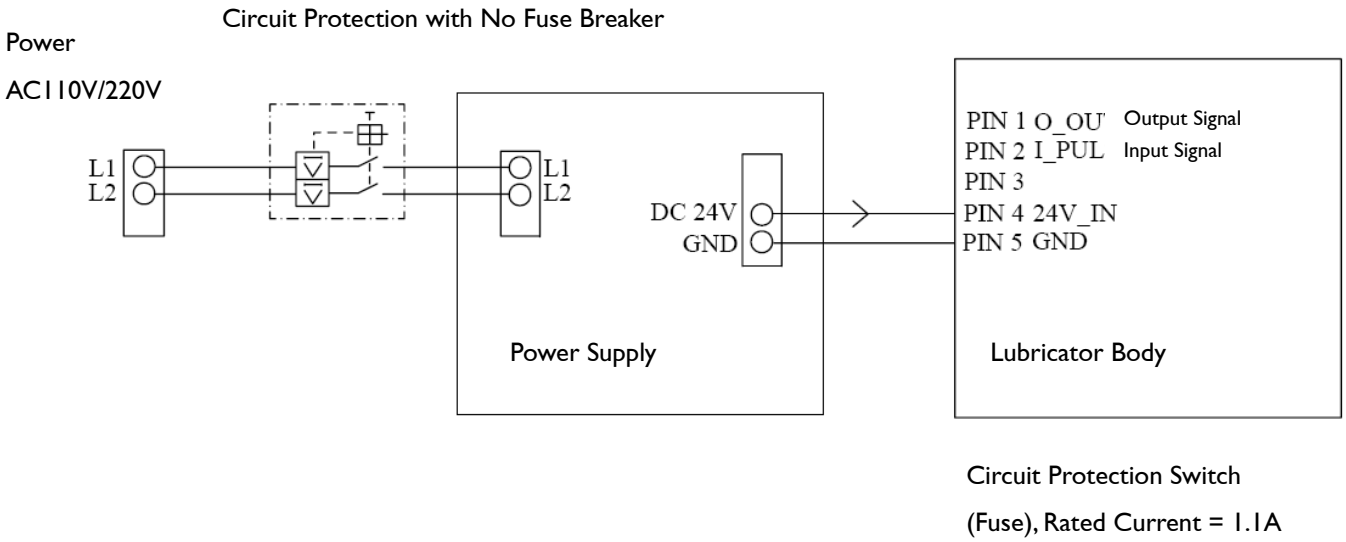


Circuit Protection Switch
(Fuse). Rated Current = 1.1A

4.1.2 Independent Voltage Supply

Lubricator can use PLC machine and also install an independent voltage source for power supply. The independent voltage source can be a power supply device, converting Single-Phase AC 110V / 220V, 50 / 60Hz to DC 24V. During the installation, the input side of power supply should include a circuit protection with no fuse breaker, and selection of non-fuse switch must meet the specifications of the power supply, otherwise it will not be able to protect the circuit.

Power System Wiring diagram



Warning

When the input voltage of Lubricator is higher than specified voltage, this will cause damage to the lubricator.

4.2 Instruction of Hand-Set

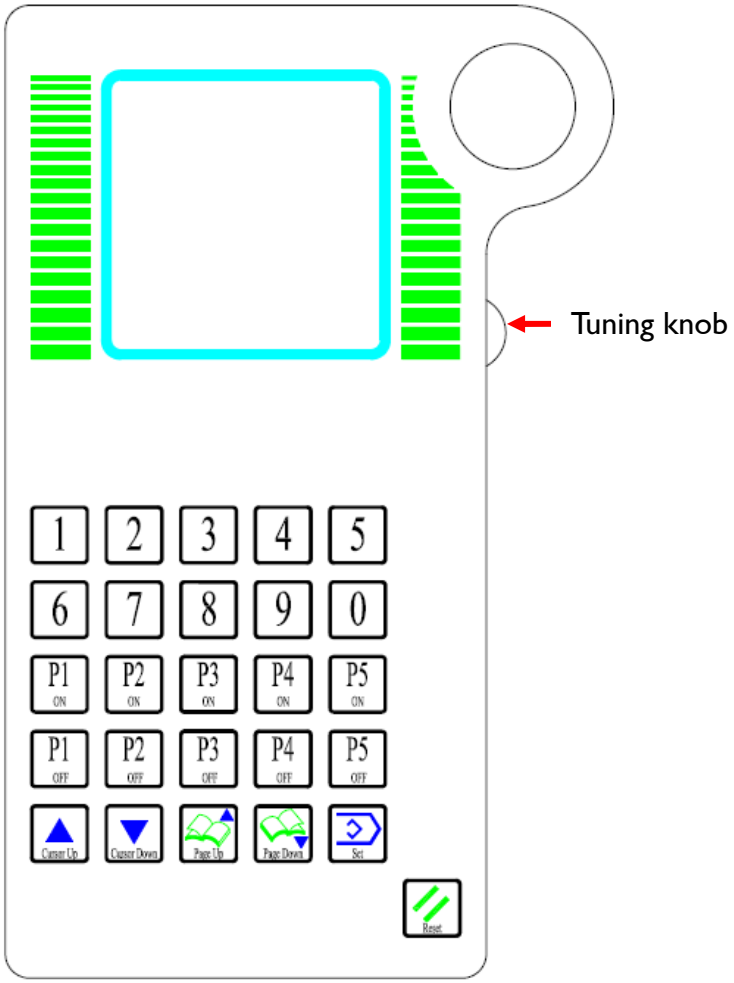
Lubricator Hand-Set has a User-Friendly Interface Design, and simple features to allow user to quickly install, operate, and edit functions according to user needs, a brief overview are as follows:

- Setting of Lubricator timing and greasing frequency
- Both display screen symbol & Key pad are same.
- Self-Monitoring system (While operating, fault / error can be detected anytime to avoid damage.)
- All parameters stored in EEPROM (No loss of stored data when power is OFF)

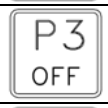
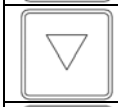
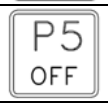
Note

For Hand-Set setting,APEX defined Pump P1 Grease supply outlets as 1.1 and 1.2; Pump P2 Grease supply outlets as 2.1 and 2.2.

Hand-Set Top View



4.3 Function of Hand-Set

	Numerical Key1		Set
	Numerical Key2		System Reset
	Numerical Key3		Pump 1 continuous dispensing
	Numerical Key4		Pump 2 continuous dispensing
	Numerical Key5		Pump 3 function only LUG-2000
	Numerical Key6		Pump 3 function only LUG-2000
	Numerical Key7		Pump 3 function only LUG-2000
	Numerical Key8		Pump 1 stop dispensing
	Numerical Key9		Pump 2 stop dispensing
	Numerical Key0		Pump 3 function only LUG-2000
	Cursor Up		Pump 4 function only LUG-2000
	Cursor Down		Pump 5 function only LUG-2000
	Page Up	Tuning knob	Adjust the screen brightness
	Page Down		

4.4 Display Screen of Hand-Set

S1	S5	S9
 APEX DYNAMICS, INC. Key in password： || **** || M:1.00 T:1.00 Press to confirm	Clear motor timer: 0 Operating code use: 0 Operating code: 1234 page up page down	P1 ADC parameter: 00 P2 ADC parameter: 00 Unauthorized setting prohibition
S2	**S6**	**S10**
Mode Selection： 0 0 : PLC 1 : TIMER 2: : PLC P1 cycle： 000 days 00 hours 00 minutes P1 motion： 01 times P2 cycle： 000 days 00 hours 00 minutes P2 motion： 01 times page up page down	Error message 1-5 page up page down	Power voltage: 24.0 P1 cycle and timer： cycle: 000001 Timer: 0000001 P2 cycle and timer： cycle: 000001 Timer: 0000001 1.1 operating page up page down
S3	**S7**	**S11**
Power voltage: 24.0 P1 cycle and timer： cycle: 000001 Timer: 0000001 P2 cycle and timer： cycle: 000001 Timer: 0000001 page up page down	Error message 6-10 page up page down	Power voltage: 24.0 P1 cycle and timer： cycle: 000001 Timer: 0000001 P2 cycle and timer： cycle: 000001 Timer: 0000001 1.2 operating page up page down
S4	**S8**	**S12**
Language Display(語 文版本)：1 0:English(英文) 1:Chinese(中文) page up page down	utput signal mode: 0 Clear memory： 0 Error detective：0 Error counter：01 Operating mode：00 page up page down	Power voltage: 24.0 P1 cycle and timer： cycle: 000001 Timer: 0000001 P2 cycle and timer： cycle: 000001 Timer: 0000001 2.1 operating page up page down

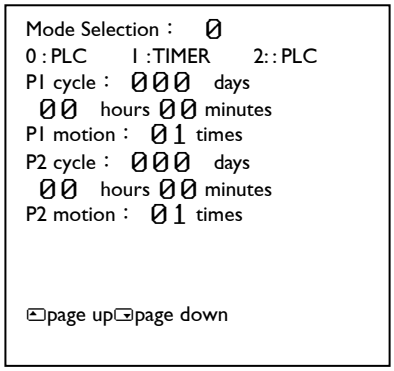
S13	S17	S21
Power voltage: 24.0 P1 cycle and timer： cycle: 000001 Timer: 0000001 P2 cycle and timer： cycle: 000001 Timer: 0000001 2.2 operating page up page down	Power voltage: 24.0 P1 cycle and timer： cycle: 000001 Timer: 0000001 P2 cycle and timer： cycle: 000001 Timer: 0000001 Motor2 or pipe block page up page down	Power voltage: 24.0 P1 cycle and timer： cycle: 000001 Timer: 0000001 P2 cycle and timer： cycle: 000001 Timer: 0000001 INVALID COMMAND page up page down
S14	**S18**	**S22**
Power voltage: 24.0 P1 cycle and timer： cycle: 000001 Timer: 0000001 P2 cycle and timer： cycle: 000001 Timer: 0000001 P1 motor idling page up page down	Power voltage: 24.0 P1 cycle and timer： cycle: 000001 Timer: 0000001 P2 cycle and timer： cycle: 000001 Timer: 0000001 Grease exhausted page up page down	Power voltage: 24.0 P1 cycle and timer： cycle: 000001 Timer: 0000001 P2 cycle and timer： cycle: 000001 Timer: 0000001 Use in timer mode page up page down
S15	**S19**	**S23**
Power voltage: 24.0 P1 cycle and timer： cycle: 000001 Timer: 0000001 P2 cycle and timer： cycle: 000001 Timer: 0000001 P2 motor idling page up page down	Power voltage: 24.0 P1 cycle and timer： cycle: 000001 Timer: 0000001 P2 cycle and timer： cycle: 000001 Timer: 0000001 Memory reading error page up page down	Mode Selection： 0 0：PLC 1：TIMER 2:：PLC P1 cycle： 00 days 00 hours 00 minutes P1 motion： 01 times P2 cycle： 00 days 00 hours 00 minutes P2 motion： 01 times RANGE 1~99 page up page down
S16	**S20**	
Power voltage: 24.0 P1 cycle and timer： cycle: 000001 Timer: 0000001 P2 cycle and timer： cycle: 000001 Timer: 0000001 Motor1 or pipe block page up page down	Power voltage: 24.0 P1 cycle and timer： cycle: 000001 Timer: 0000001 P2 cycle and timer： cycle: 000001 Timer: 0000001 Memory writing error page up page down	

4.5 Procedure of Set-Up

S1

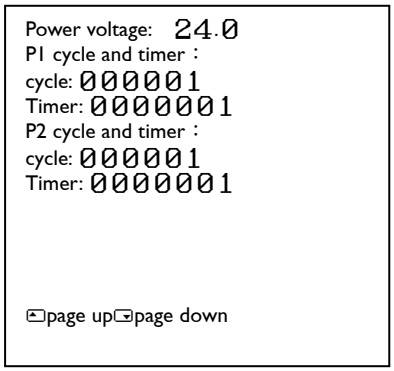
Press Set

S2



Press Page down

S3



Press Page down

S1 screen will display on Hand-Set when connected to power of lubricator, enter password to go to next setting.

1. Select Mode: Setting the lubricator control mode, 0 is the PLC mode 0 control. For details, please refer to Chapter 3: 1 is TIMER mode 1 control. detailed description refer to "Section 4.6.1". 2 is PLC mode 2 control, detailed description refer "Section 4.6.2". When setting mode 0 or mode 2, P1, P2 action override and period, the parameter value cannot be set.

2. P1 Cycle: Set P1 Cycle Time to begin supply Grease at Outlet.1.1 or 1.2

3. P1 Motion: Set P1 motion 1 stroke per outlet dispenses 0.15cm^3 after countdown of P1 cycle time.

4. P2 Cycle: Set P2 Cycle Time to begin supply Grease at Outlet. 2.1 or 2.2

5. P2 Motion: Set P2 motion 1 stroke per outlet dispenses 0.15cm3

1. Input Voltage: Displays 24V direct current supply to Lubricator

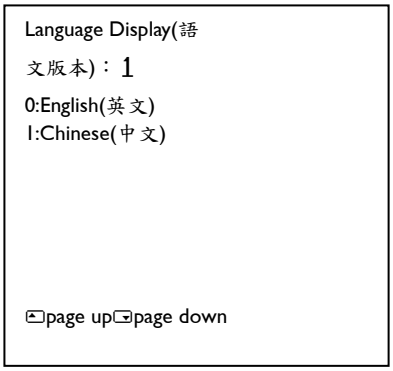
2. P 1 Cycle: Displays total no. of strokes for P1current Greasing status.

3. P 1 Timer: Displays countdown of P1 setting time (minutes) before deliver grease to outlet.

4. P 2 Cycle: Displays total no. of strokes for P2 current Greasing status.

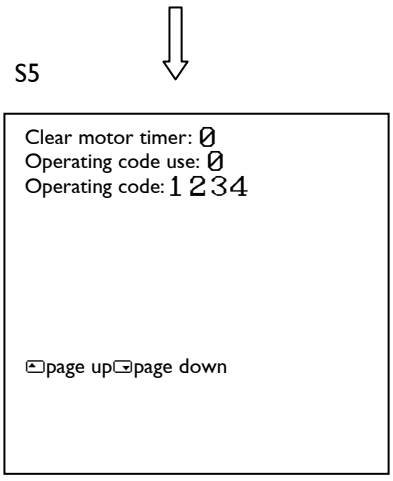
5. P 2 Timer: Displays countdown of P2 setting time (minutes) before deliver grease to outlet.

S4



Hand-Set Language display setting key 0 for English or 1 for Chinese then press SET.

S5



1. Clear motor timer records:

Press Set 1 to display total no. of strokes records for Pump 1 and Pump 2. Set 0 to Clear records.

2. Operating Code:

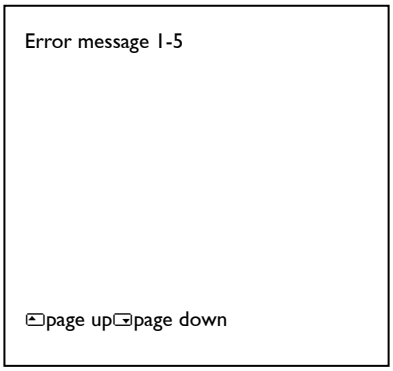
Press Set 1 to activate and 0 as inactive.

3. Modify Code:

Press Set 1 to modify the password.

Press Page down

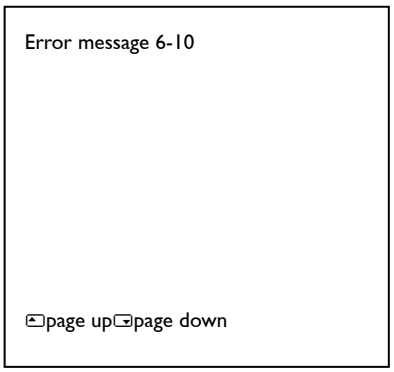
S6



Frequent Error message history records from Items 1 to 5.

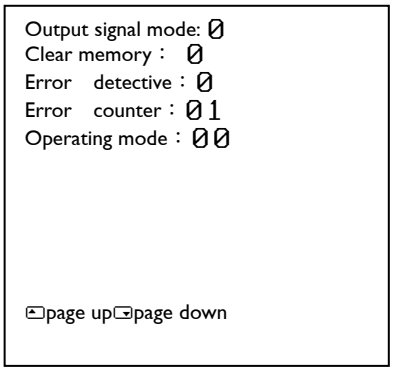
Press Page down

S7



Press Page down

S8



Press correct password on S1 display screen will go to S8 setting screen.
Password is 7890.

Frequent Error message history records from Items 6 to 10.

1. Output signal mode:

Setting up to 0 for PLC mode 0 and PLC mode 2 control: setting up to 1 for TIMER mode 1.

2. Clear Memory:

Press 1 to allow system initialization (Note: all parameter and information will become manufacturer setting) , Press 0 system will not initialize.

3. Error detective:

Press 1 system will monitor motor idling error; Press 0 system will not detect motor idling error.

4. Error counter:

Press 1 to activate function "motor error detection times". When Motor error reached setting "error detection times", System will display error information.

5. Operating mode:

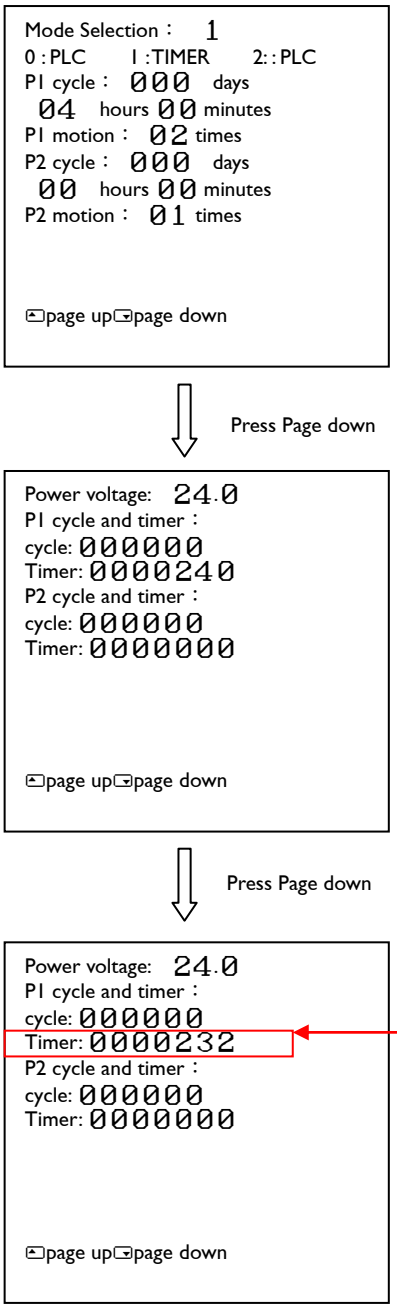
Press 00 for Standard setting. For Customized demand settings.

4.6 Instruction of System Mode

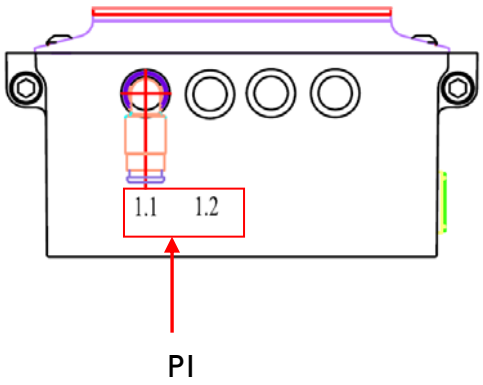
4.6.1 Instruction of TIMER Mode 1

After selecting TIMER Mode 1, use Hand-Set to set greasing frequency interval and timing. Below are operating examples of each model. When the Lubricator is powered off, please note that the counting time of the device will restart.

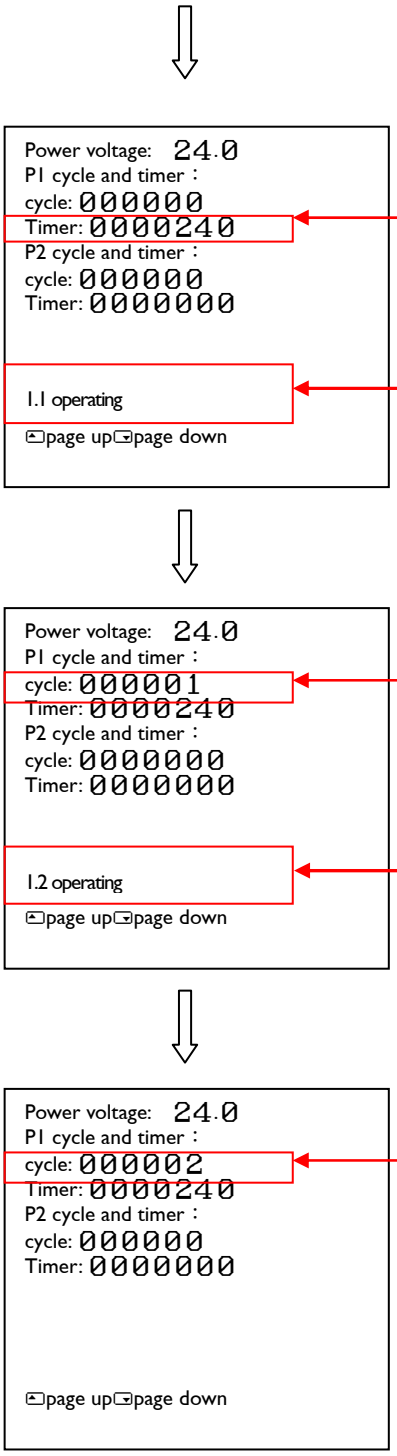
4.6.1.1 Model LUG-411



Select 1 Timer Mode, then set P1 cycle time 4hours and P1 motion 2 times. This means after 4 hours P1 will push 2 strokes at 1.1outlet total dispenses 0.3cm^3



Time elapsed 8 minutes



Timer countdown finishes, system restarts countdown again.

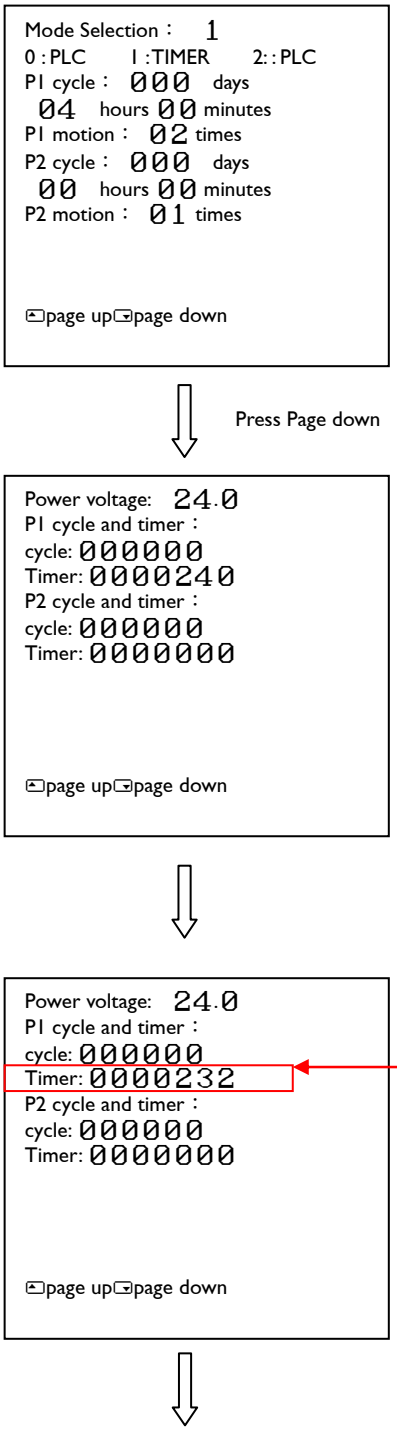
Pump 1 begins dispensing grease 0.15 cm^3at Outlet 1.1.

P1 cycle records 1 cycle as total no. of stroke.

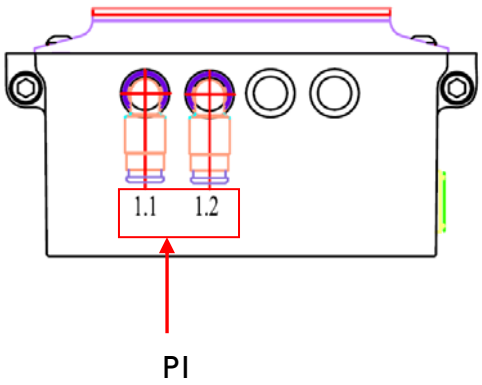
Outlet 1.2 is completely sealed; therefore outlet 1.1 will dispense again 0.15cm^3 grease.

P1 cycle records 2 cycles as total no. of stroke in outlet 1.1 with total grease 0.3cm^3.

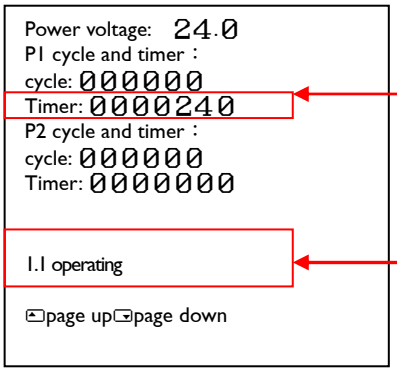
4.6.1.2 Model LUG-412



Select 1 Timer Mode, then set P1 cycle time 4hours and P1 motion 2 times. This means after 4 hours P1 will deliver 1 stroke at outlet 1.1 and then outlet 1.2 with each 0.15 cm^3 of grease.

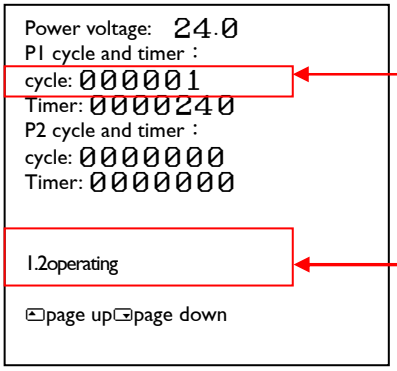


Time elapsed 8 minutes



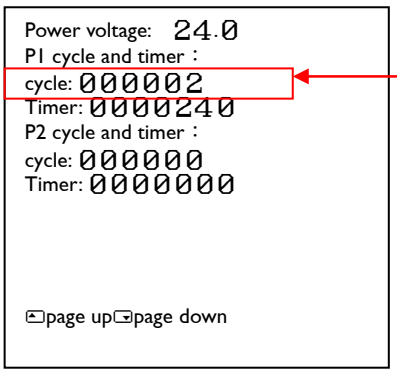
Timer countdown finishes, system restarts countdown again.

Pump 1 begins dispensing grease 0.15 cm^3at Outlet 1.1.



P1 cycle records 1 cycle as total no. of stroke

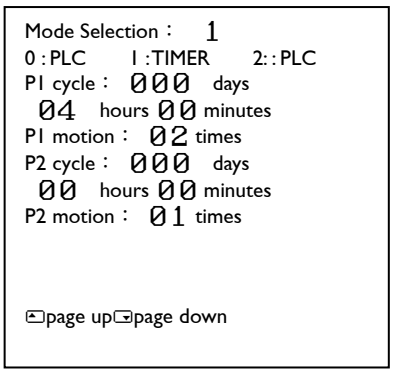
Pump 1 begins dispensing grease 0.15 cm^3at Outlet 1.2.



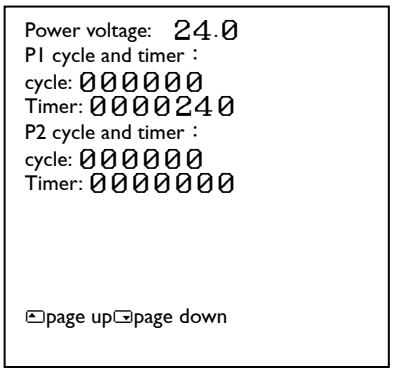
P1 cycle records 2 cycles as total no. of stroke with each outlet 1.1 & 1.2 dispensing 0.15 cm^3 total grease 0.3cm^3

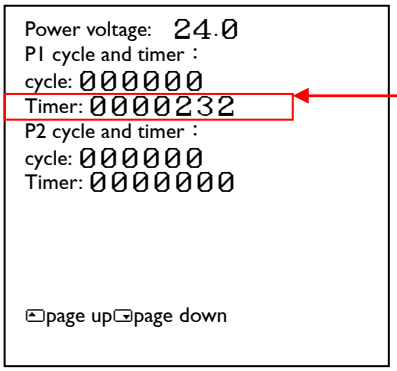
4.6.1.3 Model LUG-422

Set P1 Outlet 1.1 to perform greasing.



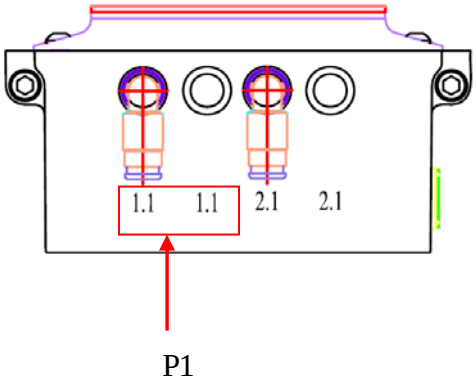
Press Page down

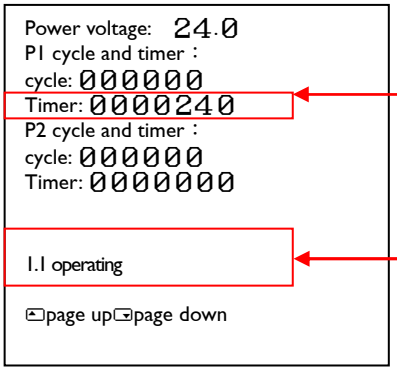




Time elapsed 8 minutes

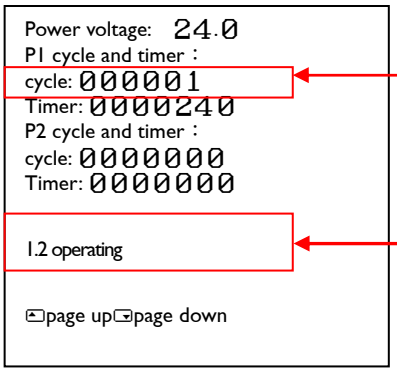
Select 1 Timer Mode, then set P1 cycle time 4hours and P1 motion 2 times. This means after 4 hours P1 will push 2 strokes at outlet 1.1 total grease dispenses 0.3cm^3





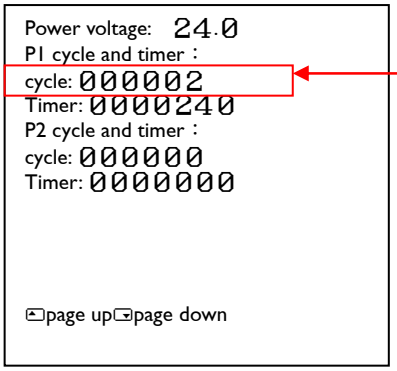
Timer countdown finishes, system restarts countdown again.

Pump 1 begins dispensing grease 0.15 cm^3at Outlet 1.1.



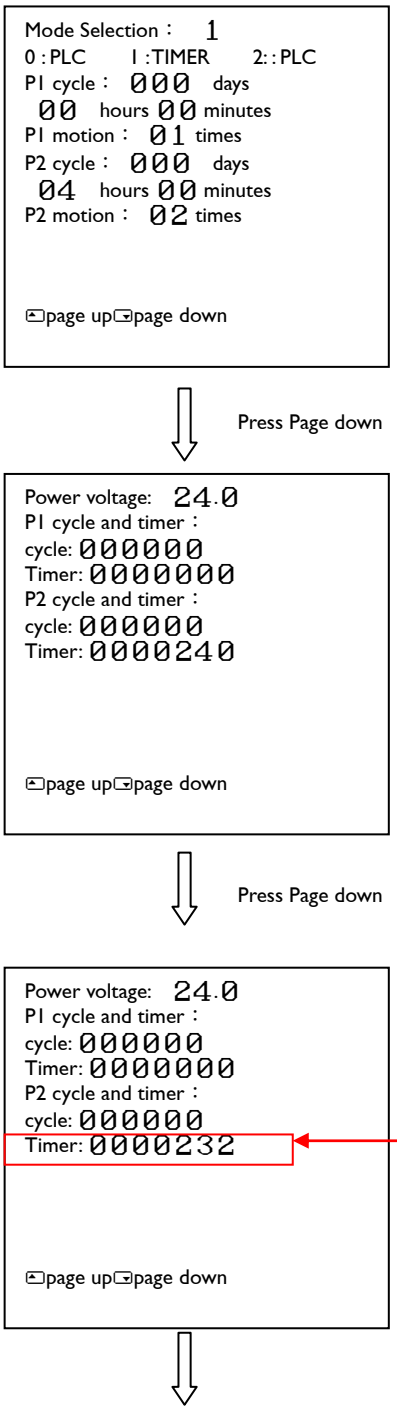
P1 cycle records 1 cycle as total no. of stroke.

Outlet 1.2 is completely sealed; therefore outlet 1.1 will dispense again 0.15cm^3 grease.



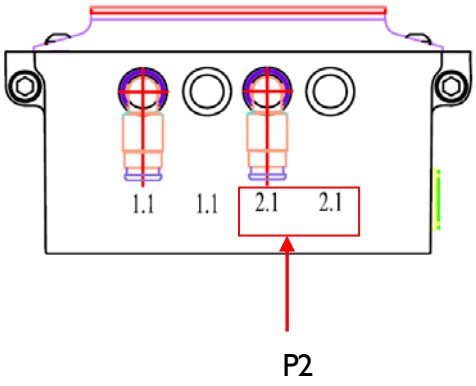
P1 cycle records 2 cycles as total no. of stroke in outlet 1.1 with total grease 0.3cm^3.

Set P2 Outlet 2.1 to perform greasing.

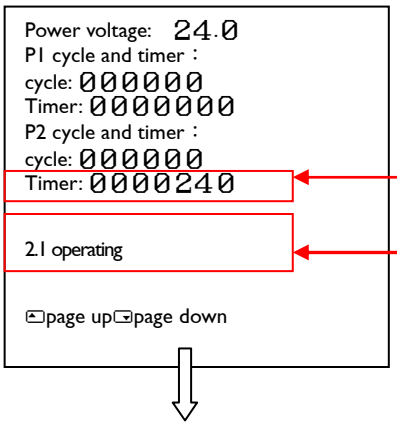


Time elapsed 8 minutes

Select 1 Timer Mode, then set P2 cycle time 4hours and P2 motion 2 times. This means after 4 hours P2 will push 2 strokes at 2.1 outlet total grease dispenses 0.3cm^3

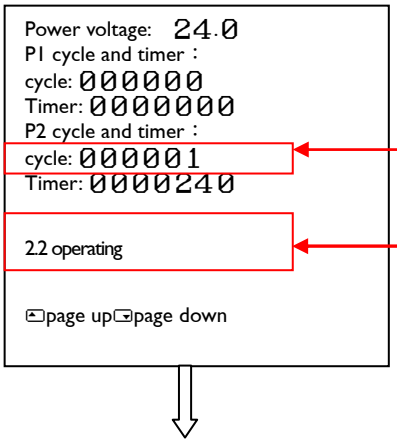


P2



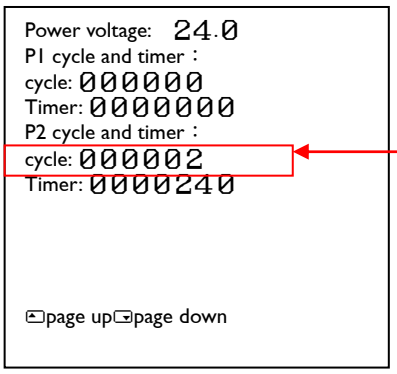
Timer countdown finishes, system restarts countdown again.

Pump 2 begins dispensing grease 0.15 cm^3 at Outlet 2.1.



P2 cycle records 1 cycle as total no. of stroke

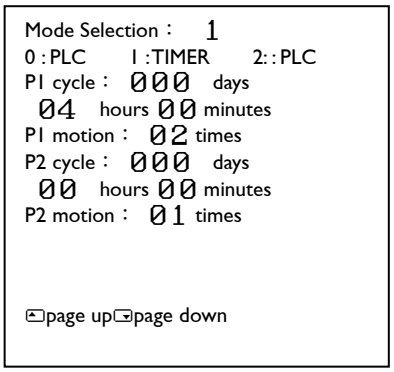
Outlet 2.2 is completely sealed; therefore outlet 2.1 will dispense again 0.15cm^3 grease.



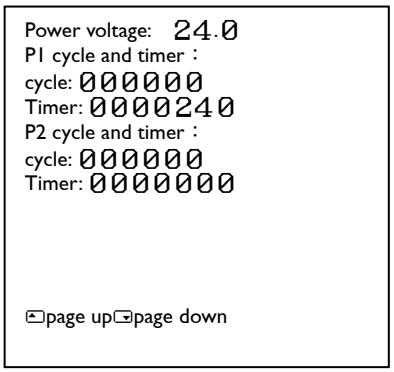
P2 cycle records 2 cycles as total no. of stroke in outlet 2.1 with total grease 0.3cm^3.

4.6.1.4 Model LUG-423

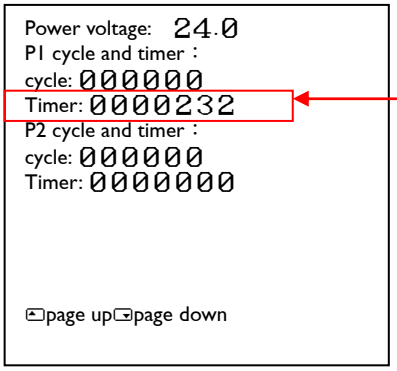
Set P1 Outlet 1.1 to perform greasing.



Press Page down

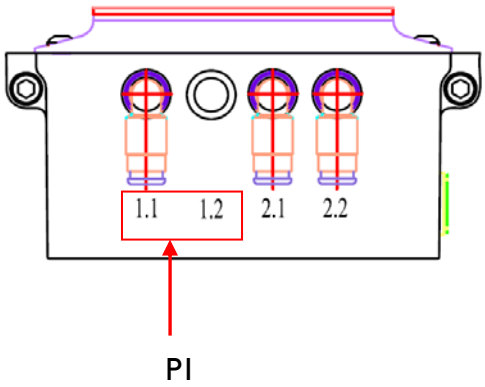


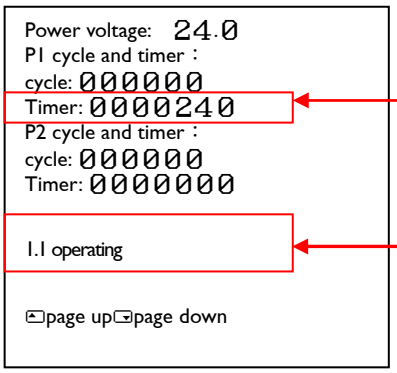
Press Page down



Time elapsed 8 minutes

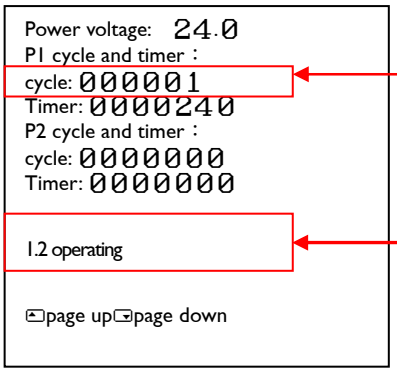
Select 1 Timer Mode, then set P1 cycle time 4hours and P1 motion 2 times. This means after 4 hours P1 will push 2 strokes at outlet 1.1 total dispenses 0.3cm^3





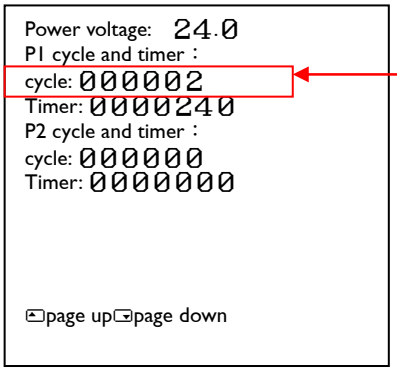
Timer countdown finishes, system restarts

Pump 1 begins dispensing grease 0.15 cm^3 at Outlet 1.1.



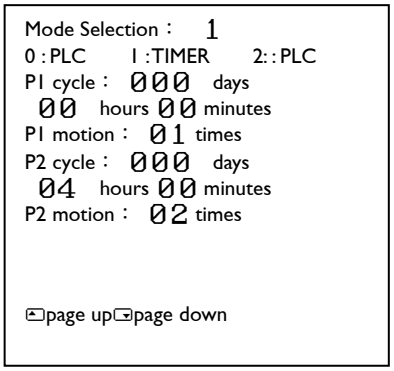
P1 cycle records 1 cycle as total no. of stroke

Outlet 1.2 is completely sealed; therefore outlet 1.1 will dispense again 0.15cm^3 grease.

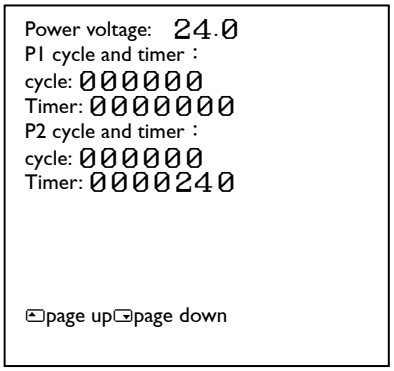


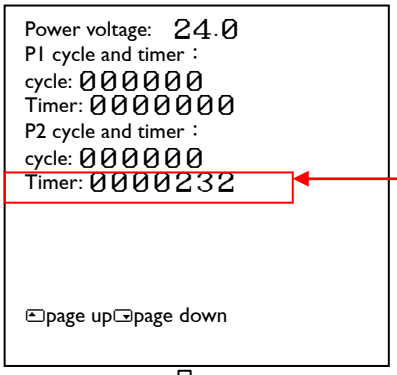
P1 cycle records 2 cycles as total no. of stroke in outlet 1.1 with total grease 0.3cm^3.

Set P2 Outlet 2.1 & 2.2 to perform greasing.



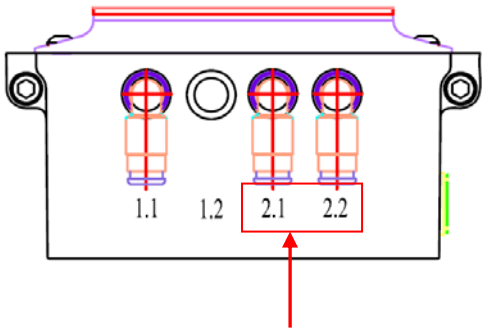
Press Page down

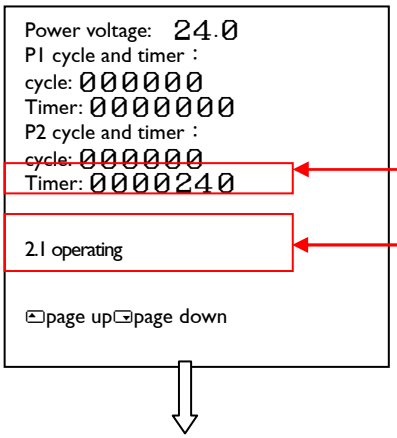




Time elapsed 8 minutes

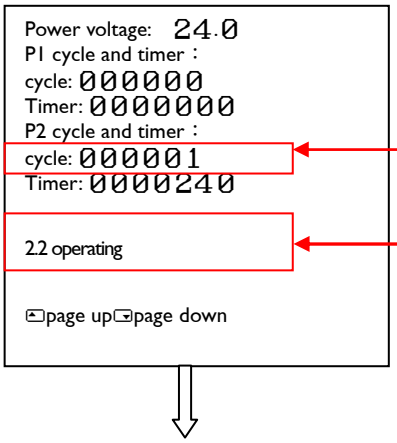
Select 1 Timer Mode, then set P2 cycle time 4hours and P2 motion 2 times. This means after 4 hours P2 will deliver 1st stroke at outlet 2.1 and then outlet 2.2 with 2nd stroke 0.15 cm^3





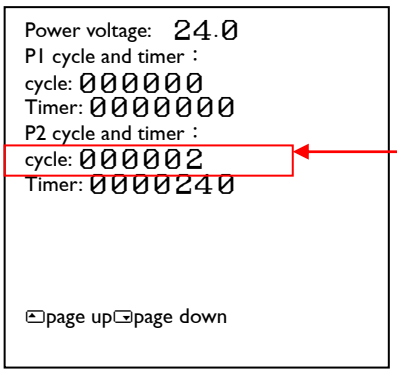
Timer countdown finishes, system restarts countdown again.

Pump 2 begins dispensing grease 0.15 cm^3at Outlet 2.1.



P2 cycle records 1 cycle as total no. of stroke

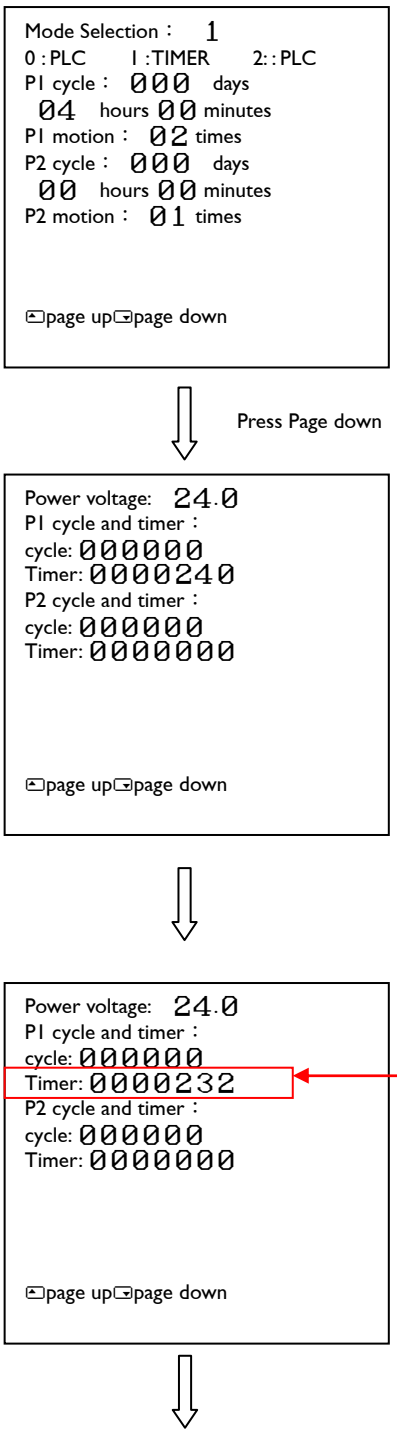
Pump 2 begins dispensing grease 0.15 cm^3at Outlet 2.1.



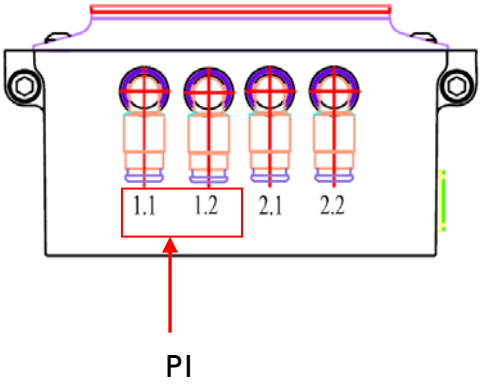
P2 cycle records 2 cycles as total no. of stroke with each outlet 2.1 & 2.2 dispensing 0.15 cm^3 total grease 0.3cm^3

4.6.1.5 Model LUG-424

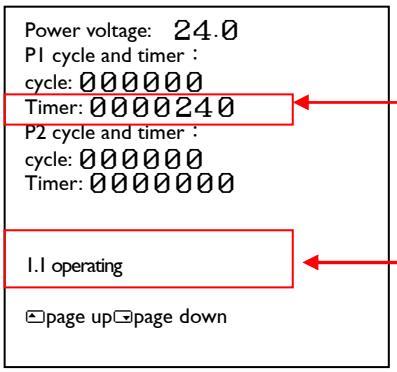
Set P1 Outlet 1.1 & 1.2 to perform greasing.



Select 1 Timer Mode, then set P1 cycle time 4hours and P1 motion 2 times. This means after 4 hours P1 will deliver 1st stroke at outlet 1.1 and then outlet 1.2 with 2nd stroke 0.15 cm^3

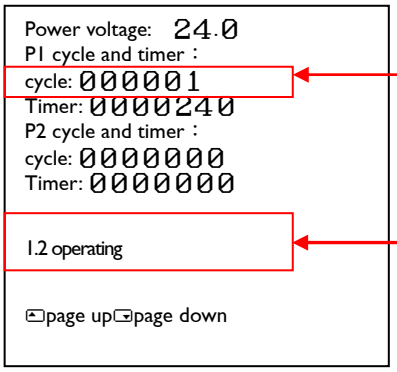


Time has elapsed 8 minutes



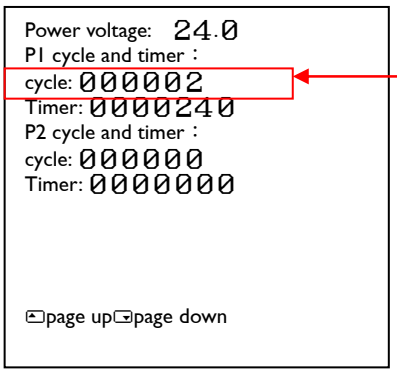
Timer countdown finishes, system restarts countdown again.

Pump 1 begins dispensing grease 0.15 cm^3 at Outlet 1.1.



P1 cycle records 1 cycle as total no. of stroke

Pump 1 begins dispensing grease 0.15 cm^3 at Outlet 1.2.



P1 cycle records 2 cycles as total no. of stroke with each outlet 1.1 & 1.2 dispensing 0.15 cm^3 total grease 0.3cm^3

Set P2 Outlet 2.1 & 2.2 to perform greasing.

Mode Selection : 1
0 : PLC 1 : TIMER 2: : PLC
P1 cycle : 000 days
00 hours 00 minutes
P1 motion : 01 times
P2 cycle : 000 days
04 hours 00 minutes
P2 motion : 02 times

page up page down

Press Page down

Power voltage: 24.0
P1 cycle and timer :
cycle: 000000
Timer: 0000000
P2 cycle and timer :
cycle: 000000
Timer: 0000240

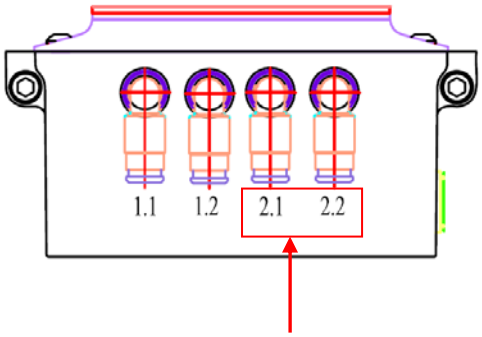
page up page down

Power voltage: 24.0
P1 cycle and timer :
cycle: 000000
Timer: 0000000
P2 cycle and timer :
cycle: 000000
Timer: 0000232

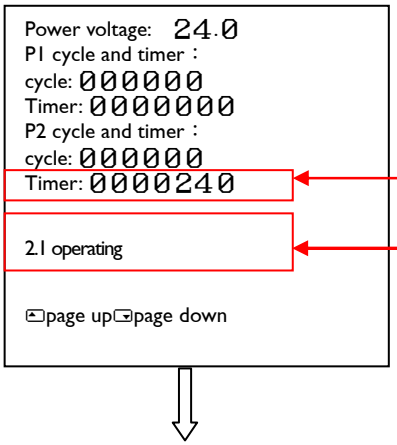
page up page down

Time elapsed 8 minutes

Select 1 Timer Mode, then set P2 cycle time 4hours and P2 motion 2 times. This means after 4 hours P2 will deliver 1st stroke at outlet 2.1 and then outlet 2.2 with 2nd stroke 0.15 cm^3

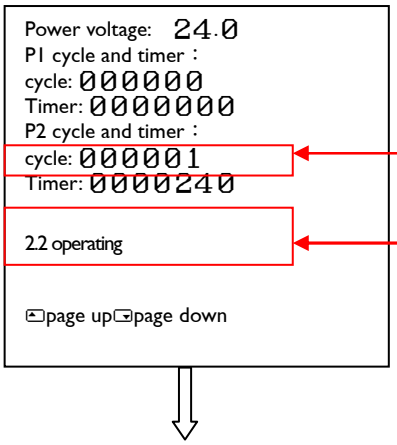


P2



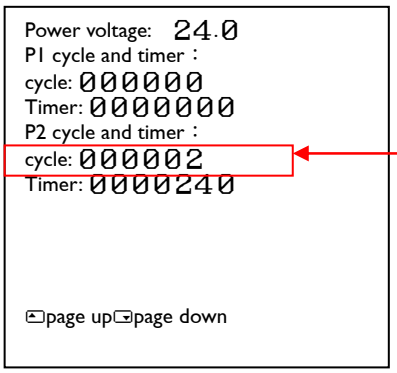
Timer countdown finishes, system restarts countdown again.

Pump 2 begins dispensing grease 0.15 cm^3 at Outlet 2.1.



P2 cycle records 1 cycle as total no. of stroke

Pump 2 begins dispensing grease 0.15 cm^3 at Outlet 2.2.



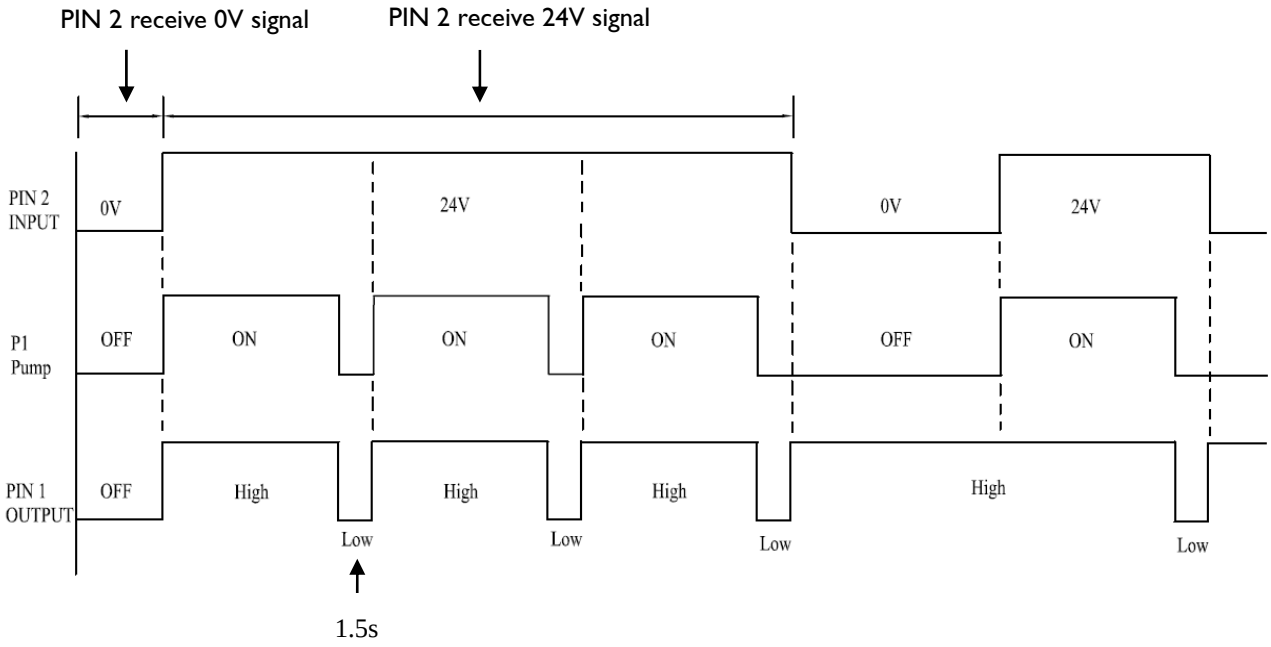
P2 cycle records 2 cycles as total no. of stroke per outlet 2.1 & 2.2 dispensing 0.15 cm^3 total grease 0.3cm^3

4.6.2 Instruction of PLC Mode 2

The main purpose of PLC mode 2 control is to set up and input the duration time of the 24V signal which from PIN2 pin of lubricator power connector, and then can be control each oil outlet for oil dispense, and following the changed by output signal, notify PLC machine current situation of the lubricator, request to set up mode 2 if you need to use it, the following is the PLC mode 2 control schematic.

4.6.2.1 Model LUG-411、LUG-412

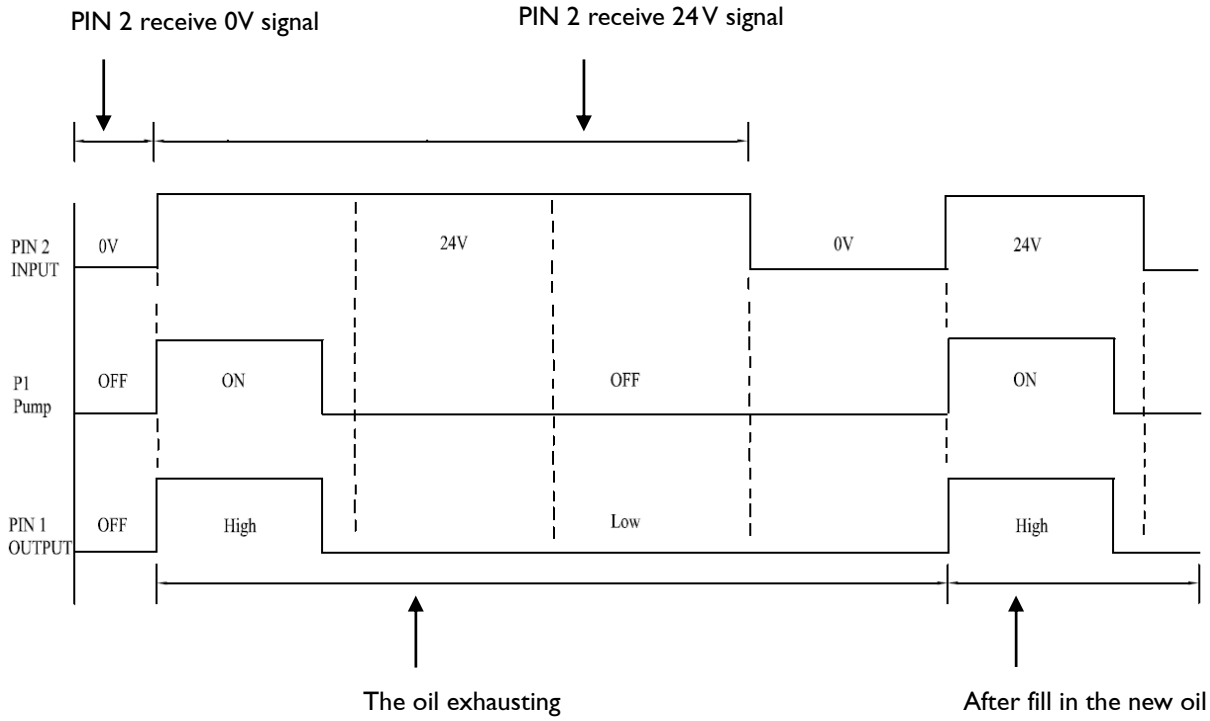
PLC control diagram:



(1) Lubricator power ON, pump P1 outlet to dispense oil continuously when the PIN 2 receiving 24V signal. One stroke per outlet will dispense oil 0.15cm^3.
(2) When the pump P1 complete the dispensing 1 time, PIN 1 output signal changed from HIGH to LOW, the signal duration is 1.5s. This function is applied to inform PLC that the Lubricator has been dispensed 1 time.
(3) When PIN 2 receiving the signal from 24V to 0V, pump 1 will stop dispensing. Meanwhile, PIN 1 output HIGH signal continuously.

It is known from the PLC mode 2 control diagram that the P1 oil outlet has the same oil dispensing time. Therefore, it is only requested to set the duration of the signal input to the PIN2 pin 24V to control the oil discharge times of the P1 oil outlet. The time taken for each dispensing of the outlet is 11S.

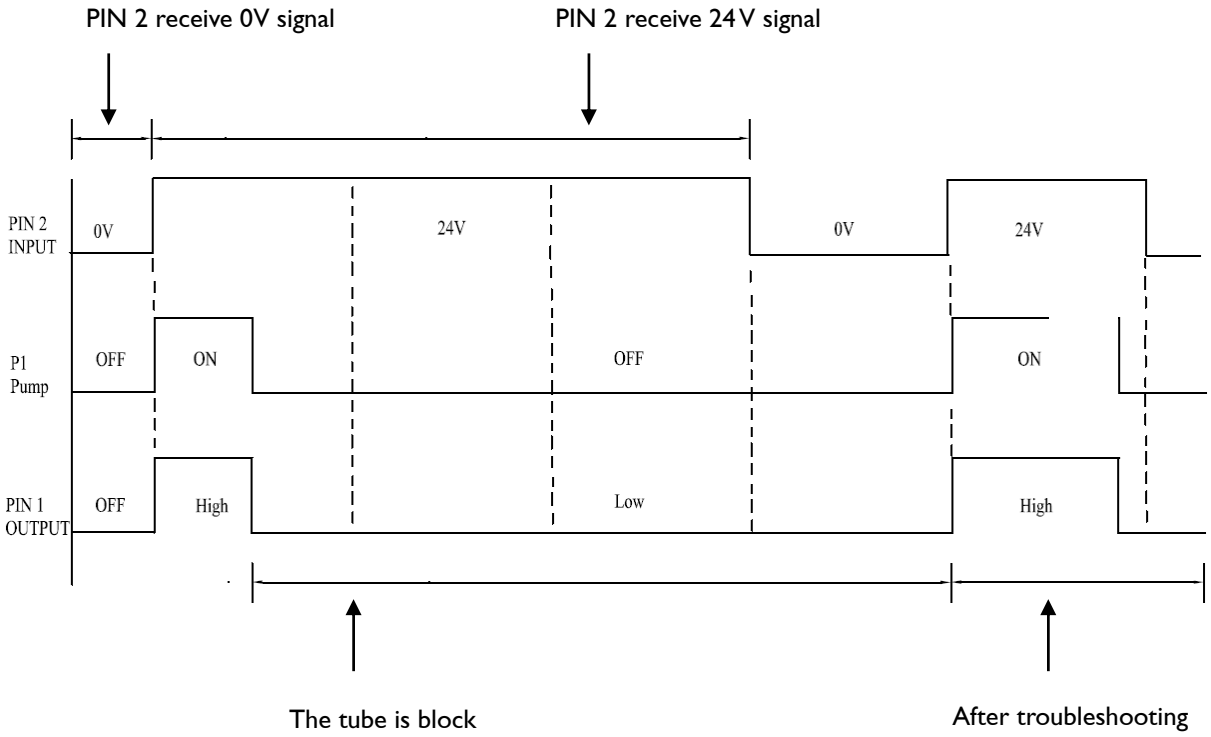
The signal waveform on PIN1 when oil exhausting:



(1) When lubricator detect the exhausting oil, and it will stops outlet oil, then PIN 1 will output the signal from HIGH to LOW which inform the user to replenish the oil. During this duration, the pump 1 can not be dispensed.

(2) After replenish the oil into lubricator, PIN 1 will output the signal from LOW to HIGH, the pump 1 can restart to dispense the oil.

The signal waveform on PIN 1 when lubricator can not dispense (The tube is block)

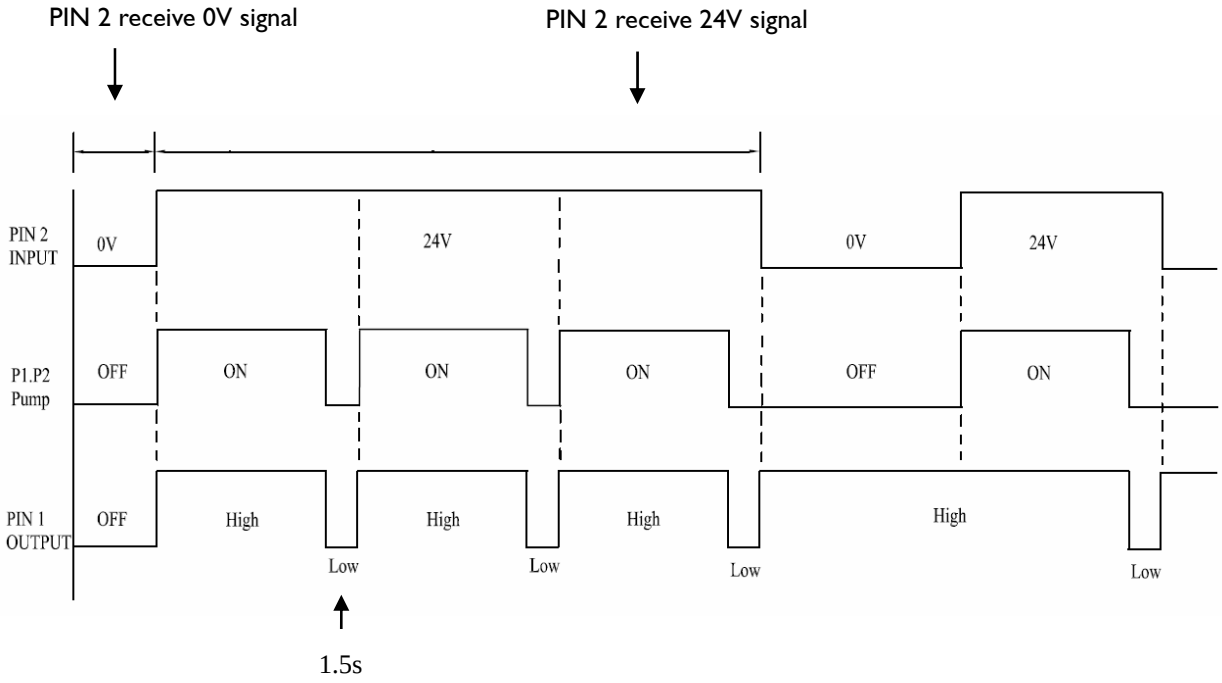


(1) When lubricator detect the malfunction (ex: the tube is block), PIN 1 will change the signal from HIGH to LOW, and stop dispense the oil.

(2) After troubleshooting, PIN 1 will change the signal from LOW to HIGH and restart to dispense the oil. The troubleshooting instruction please refer to page 51.

4.6.2.2 Model LUG-422、LUG-423、LUG-424

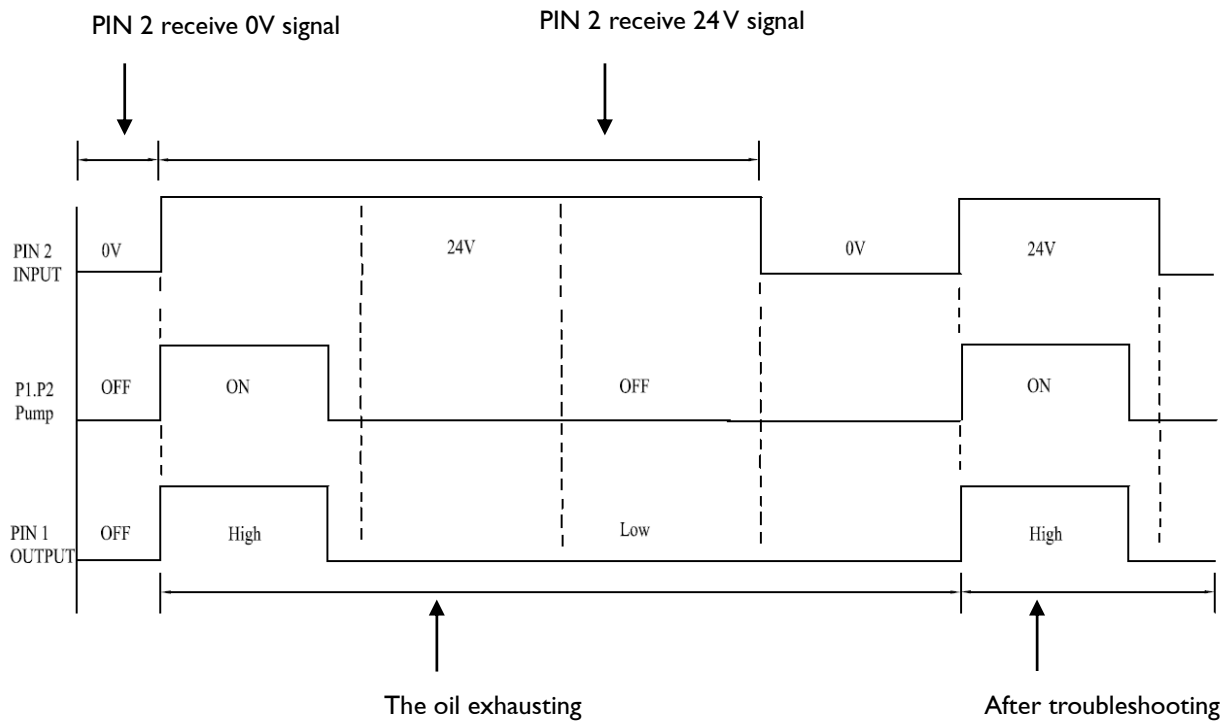
PLC control diagram:



(1) Lubricator power ON, pump P1and P2 outlet to dispense oil continuously when the PIN 2 receiving 24V signal. One stroke per outlet will dispense oil 0.15cm^3
(2) When the pump P1 and P2 complete the dispensing 1 time, PIN 1 output signal changed from HIGH to LOW, the signal duration is 1.5s. This function is applied to inform PLC that the Lubricator has been dispensed 1 time.
(3) When PIN 2 receiving the signal from 24V to 0V, pump P1 and P2 will stop dispensing. Meanwhile, PIN 1 output signal HIGH continuously.

The duration is the same of one stroke per outlet according to the PLC model 2 control diagram. Hence, we can control the stroke times per outlet for pump P1 and P2 by the duration of 24V signal on PIN 2. The duration of both Pump P1 and P2 are 11s for one stroke individually.

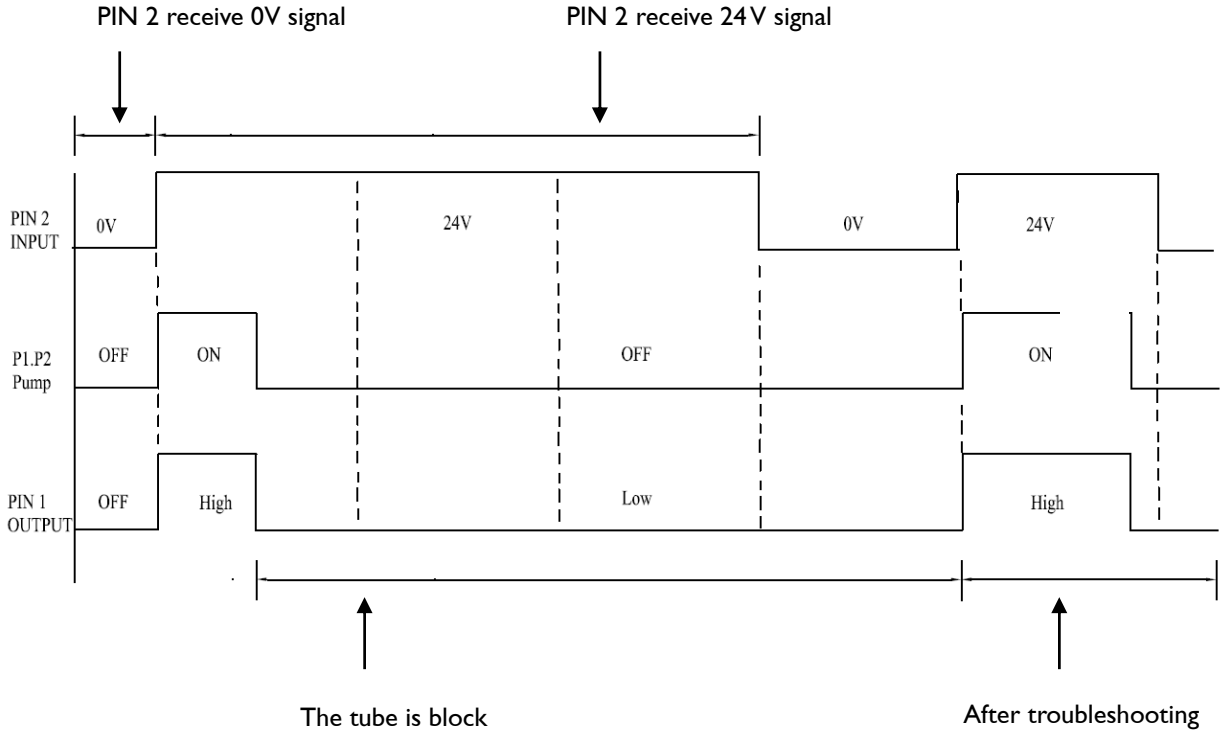
The signal waveform on PIN1 when oil exhausting:



(1) When lubricator detect the exhausting oil, and it will stops outlet oil, PIN 1 will output the signal from HIGH to LOW which inform the user to replenish the oil. During this duration, the pump P1 and P2 can not be dispensed.

(2) After replenish the oil into lubricator, PIN 1 will output the signal from LOW to HIGH. Meanwhile, the pump P1 and P2 can restart to dispense the oil.

The signal waveform on PIN 1 when lubricator can not dispense (The tube is block)



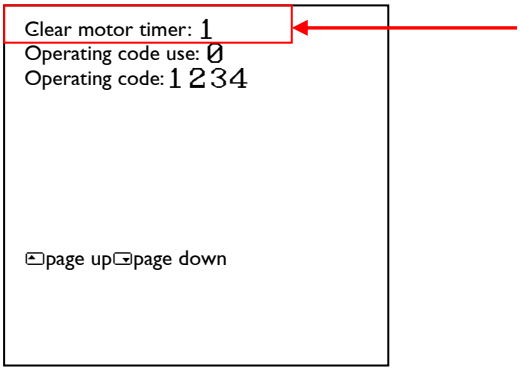
(1) When lubricator detect the malfunction (ex: the tube is block), pump P1 and P2 stop dispense the oil immediately. Meanwhile, PIN 1 will change the signal from HIGH to LOW for inform the malfunction message to user.

(2) After troubleshooting, PIN 1 will change the signal from LOW to HIGH. Meanwhile, pump P1 and P2 restart to dispense the oil. The troubleshooting instruction please refer to page 51.

4.6.3 Clear Motor Timer Setting

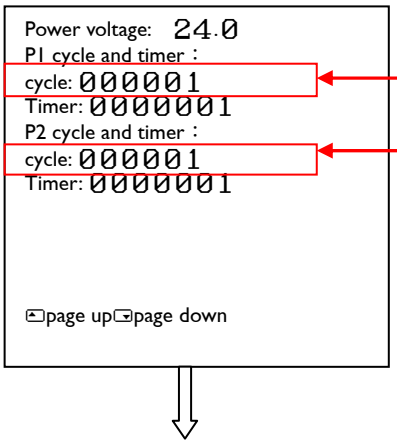
(1) Clear Motor Timer

Set 1 to clear existing motor parameters, the system recorded output P1 and P2 cycles are all erased 0. This function allows users to know lubricator total cycles.

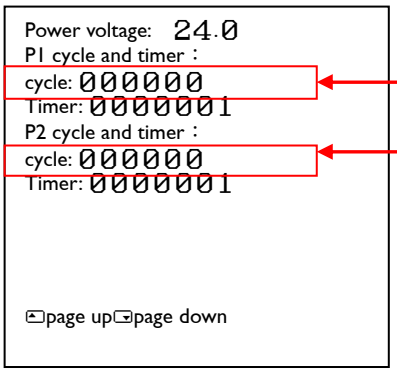


Key "Clear motor timer" as 1.

Press Page up again

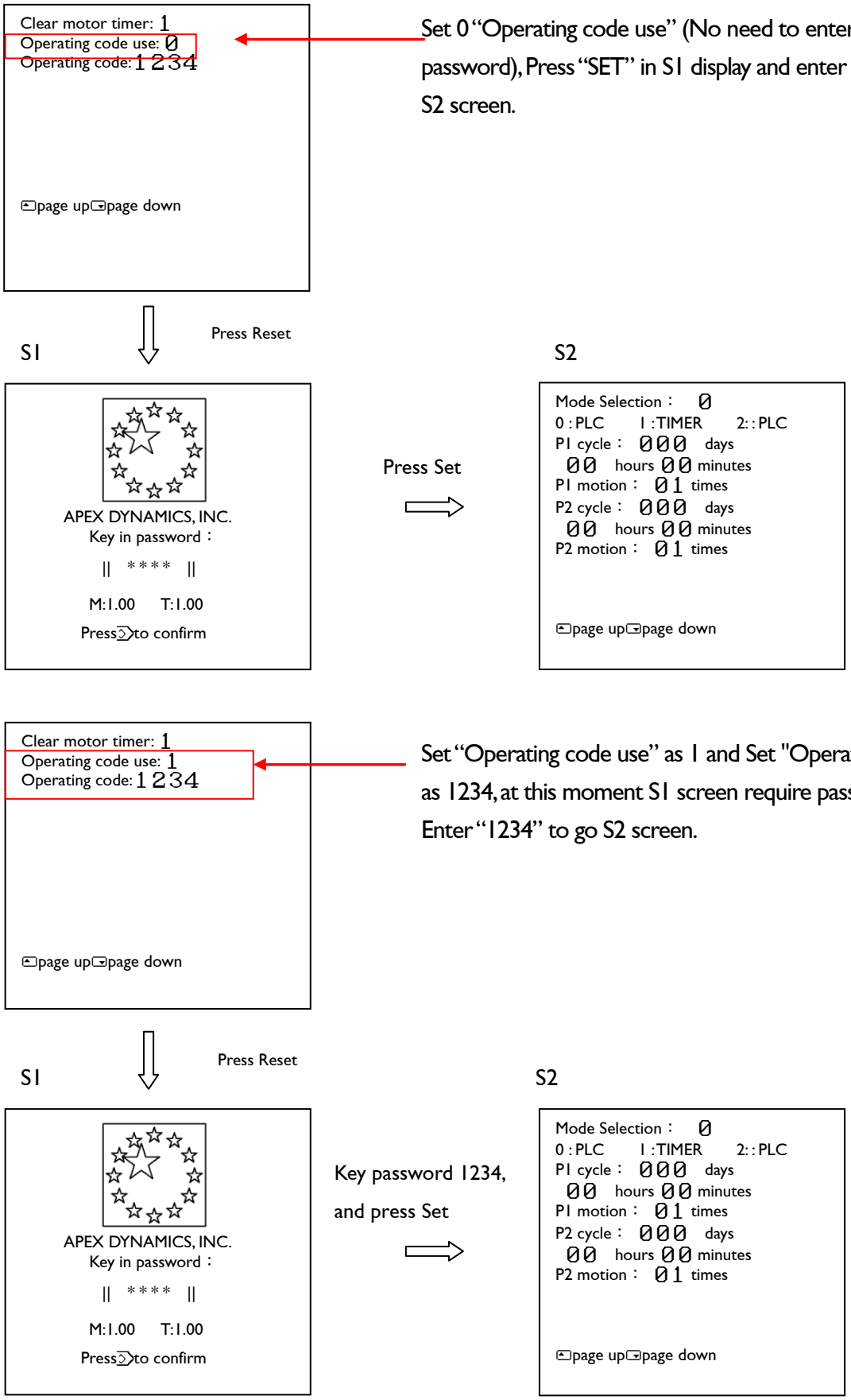


Previous records of total no. of strokes / cycles for Pump 1 & 2.

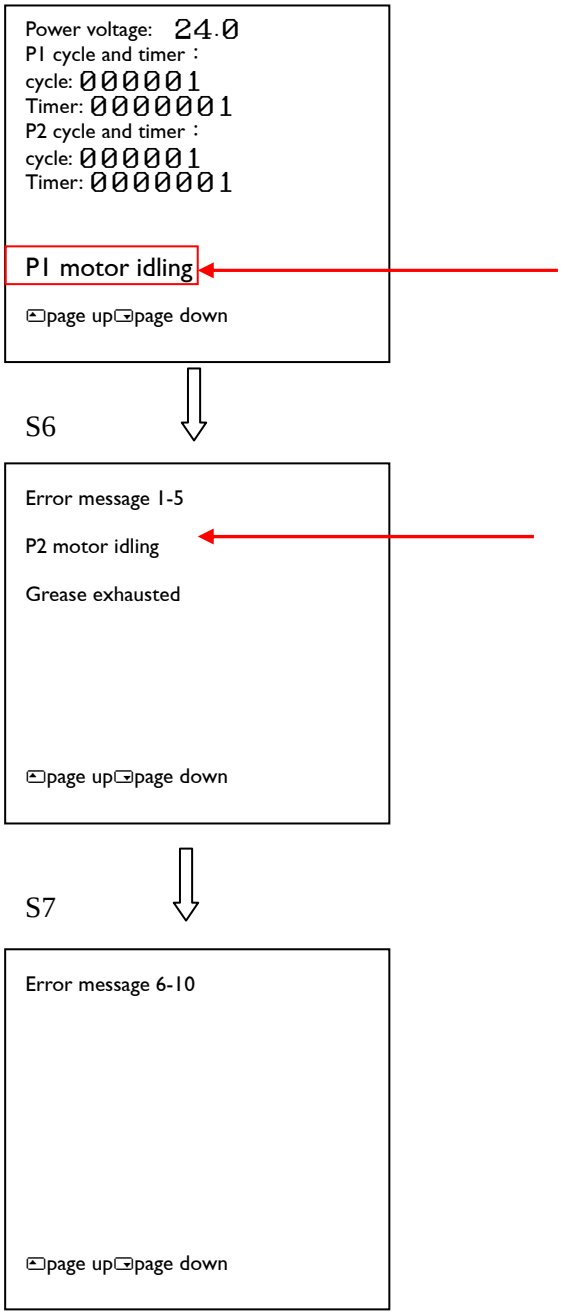


P1 & P2 records total no. of strokes / cycles will be erased.

(2) Password Setting



4.6.4 Description of Error Message



Error message appears on screen for example P1 motor idling.

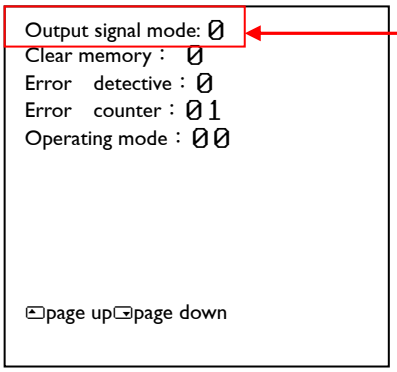
"P1 Motor idling" display in system "Error Message Record" , new message is displayed in S6 screen and total 5 error messages and then 6th message will be saved in S7screen.

Error message description:

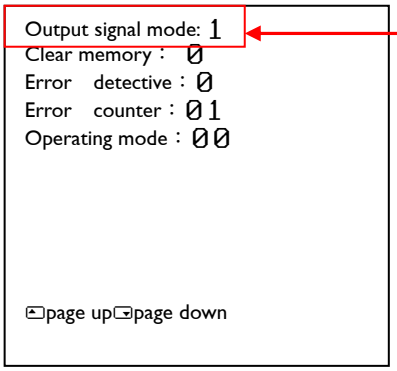
Error message	Description	Remedy
P1 Motor Idle	Lubricator internal P1motor idling.	Please refer Page 51
P2 Motor Idle	Lubricator internal P2motor idling.	Please refer Page 51
P1 motor or pipe block	Lubricator internal P2motor cannot rotate.	Please refer Page 51
P2 motor or pipe block	Lubricator internal P2motor cannot rotate.	Please refer Page 51
Grease exhausted	Grease cartridge is empty.	Please refer Page 51
Memory reading error, Memory writing error	Input voltage 1.24V not reached standard 2.Lubricator PCB board malfunction	1.Check Input Voltage 24V 2.Contact Manufacturer technician

4.6.5 Description of Output Signal Mode

After installing Lubricator Hand-Set, the lubricator output signal can be changed. The Lubricator can be used in PLC control Mode 0 or Timer Mode 1 or PLC Mode 2. Instructions are as follows:



Set "Output Signal Mode" 0 for PLC control Mode 0 and PLC control Mode 2. Refer to Chapter 3.5 for PLC control Mode 0 illustration. And refer 4.6.2 chapter for PLC Mode 2.

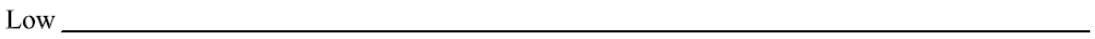


Output Signal Mode, Set 1 as "Timer Mode 1 control" .

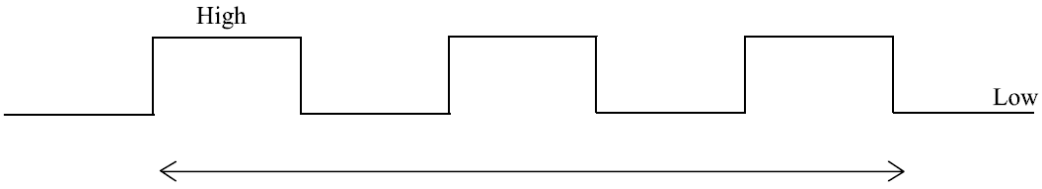
Set "Output Signal Mode" as 1, control mode as TIMER mode 1, power plug PIN 1 output waveform is display below. This function is used to install additional alarm device to inform the user that the lubricator is malfunction and require troubleshooting.

Lubricator Power OFF

Lubricator Power ON no occurrence of malfunction



Lubricator power OFF and power ON no occurrence of malfunction, PIN 1 output signal as LOW.



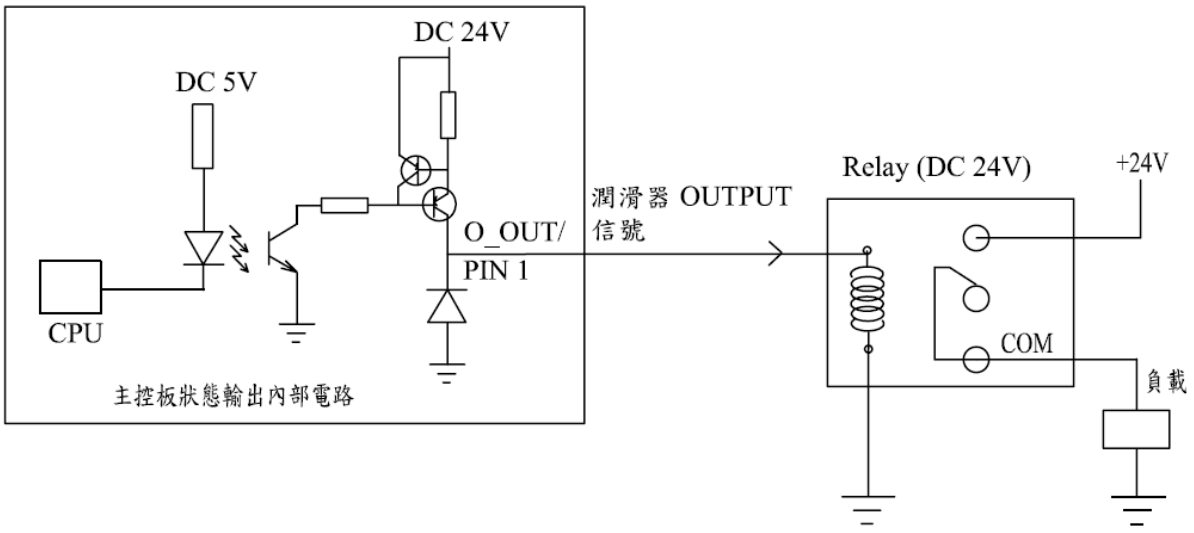
Lubricator Malfunction, output 1 Hz signal

If the Lubricator malfunction, PIN 1 will continue to output 1Hz signal, at this moment please refer to below table below for Lubricator troubleshooting .

Malfunction	Reason	Remedy
Lubricator cannot dispense grease	PA Tube contain trapped air	Refer to chapter 3.8 for troubleshooting.
	Lubricator internal motor blockage, PA Tube Blockage	Check PA Tube for blockage like foreign particles or Outlet PA Tube length is too long.
	Lubricator internal motor idling	Contact Manufacturer
	Black Sensor plate reaches low grease level detection zone means grease exhausted	Refer APPENDIX B for replacement of new grease Cartridge.

4.6.6 TIMER Mode 1 Control Output Wiring Instruction

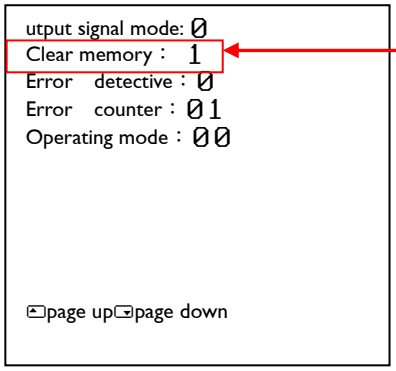
Wiring of Lubricator with alarm device.



Lubricator Output Electrical Specification

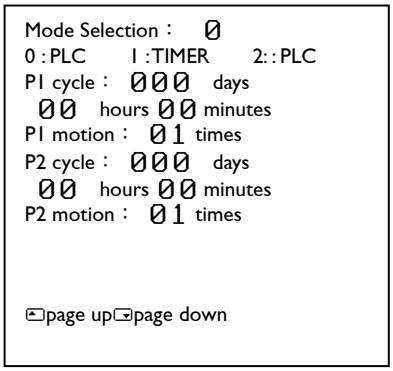
Rated Voltage : DC 24V
Maximum Output Current : 100mA

4.6.7 Clear Memory Illustration

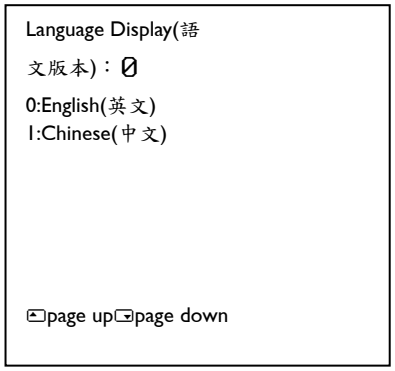


Set "Clear Memory" as 1, system will initialize lubricator parameters returning to its original manufacturer setting as shown below.

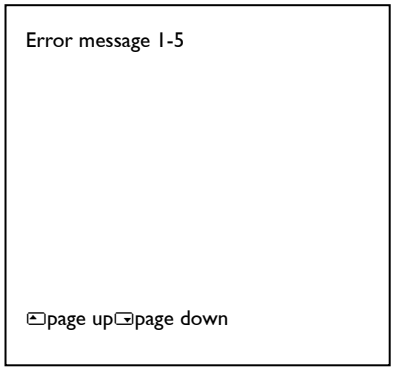
Set "Clear Memory" as 1 , Hand-Set all parameters return to original manufacturer setting.



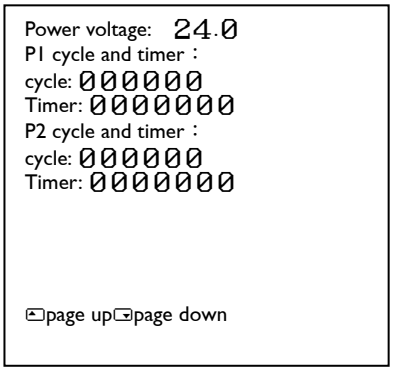
Manufacturer Setting



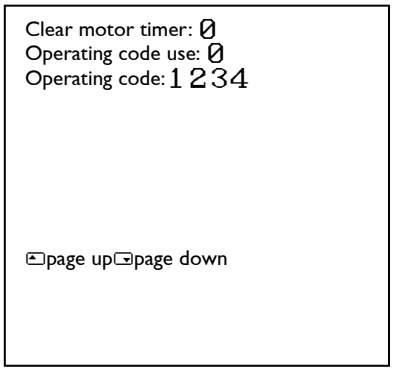
Manufacturer Setting



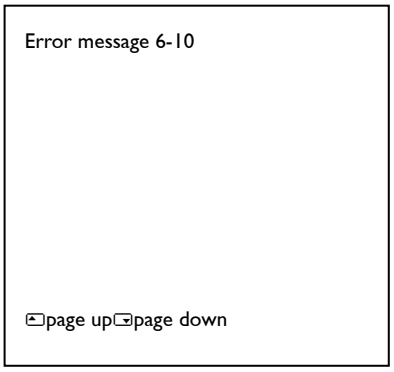
Manufacturer Setting



Manufacturer Setting



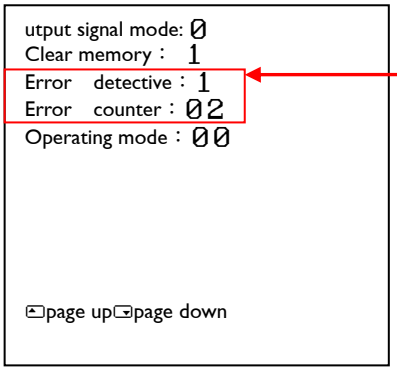
Manufacturer Setting



Manufacturer Setting

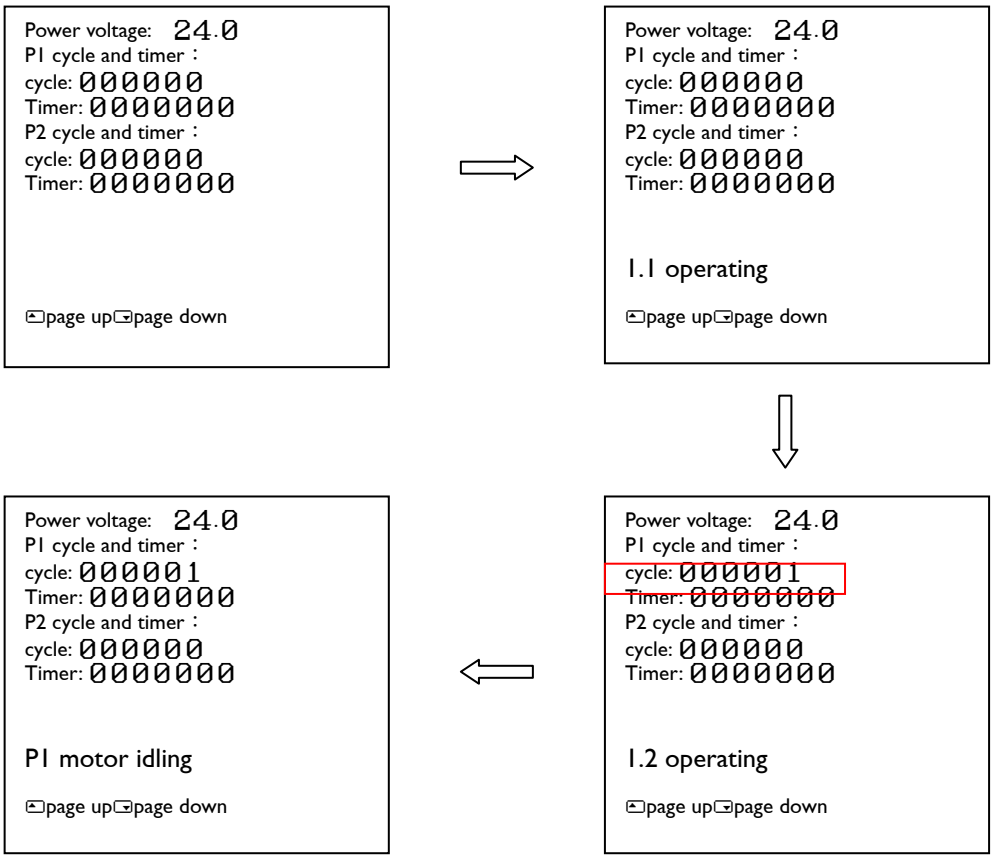
4.6.8 Motor Error Detective and Error Counter

When Lubricator is unable to dispense grease this may due to internal motor gear maybe loosened making motor idling thus causing lubricator to fail to deliver grease. This function can be used to check.



Set "Error Detective" 1, Motor error appears, system will monitor and display on Hand-Set screen. This feature needs to be used together with motor "Error counter".

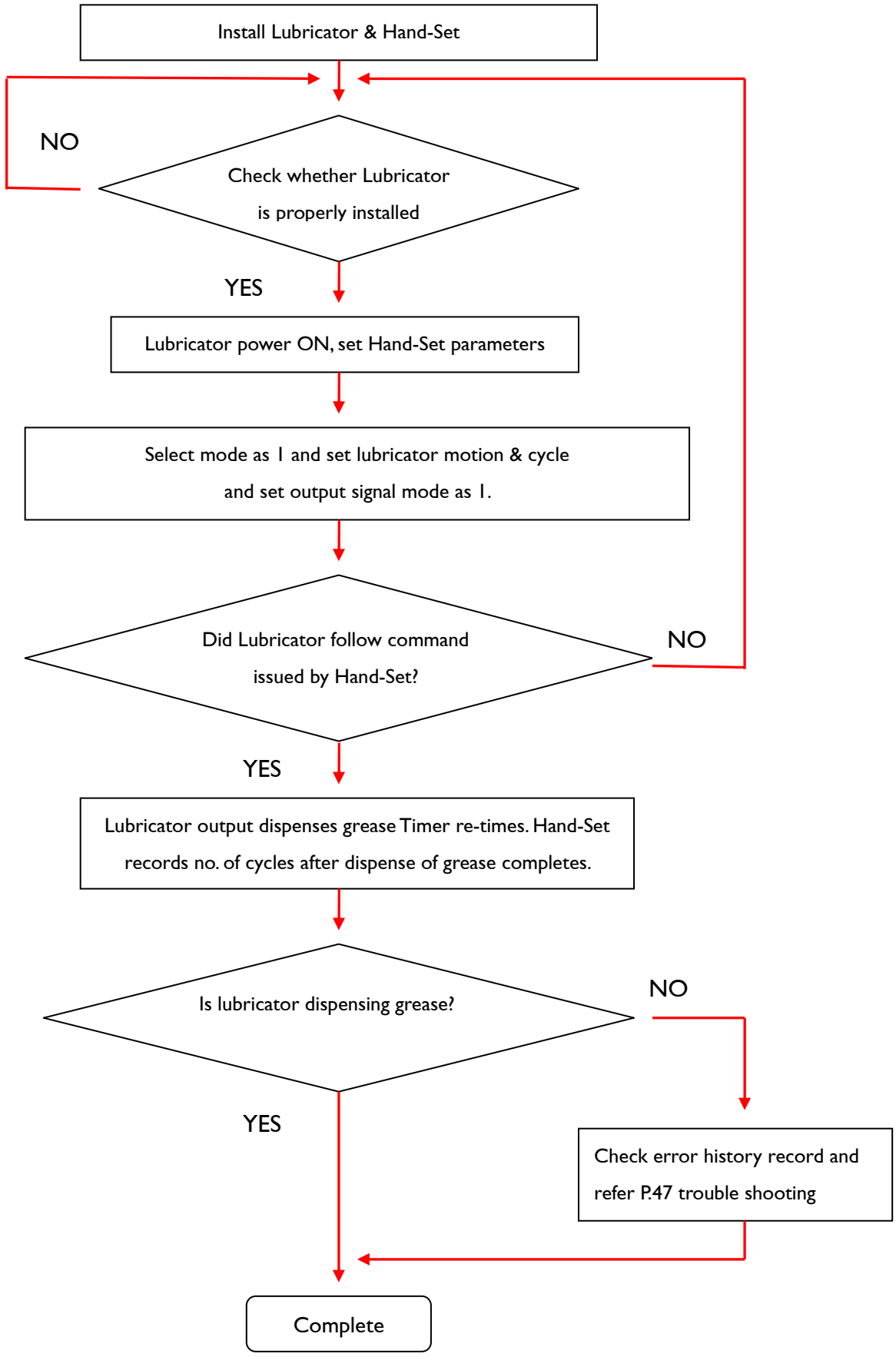
Set motor "error detection" as 2, take P1 motor occurrence error as an example.



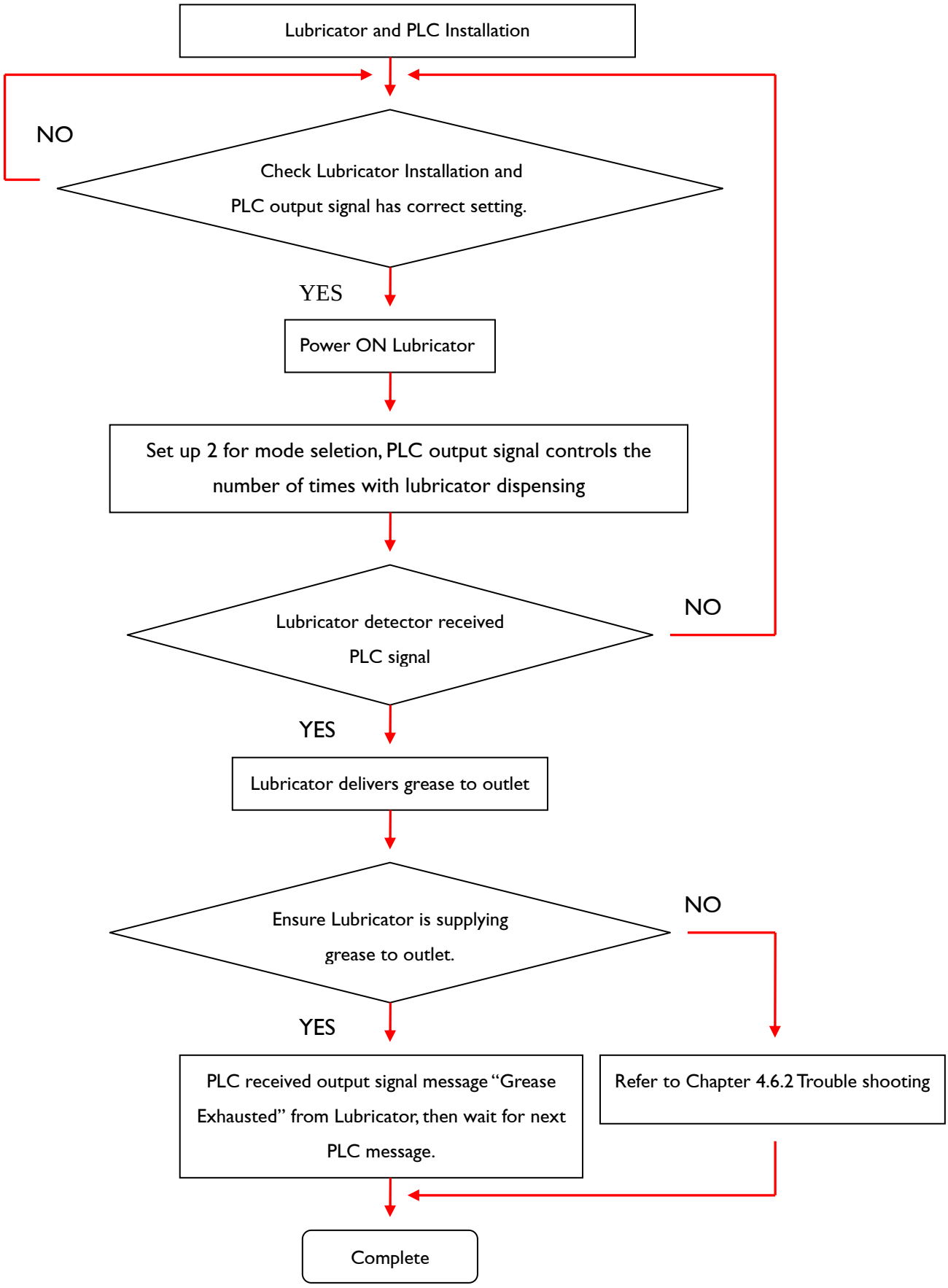
System detected P1 motor idling and no. of motor errors reached 2. Lubricator stopped dispensing grease and system displayed an error message.

System detected P1 motor idling, but no. of motor errors did not reached 2. Lubricator continues dispensing grease and system will not display an error message.

4.7 Lubricator Installation Procedure (TIMER mode 1 Control)



4.8 Lubricator Installation Procedure (PLC mode 2 Control)

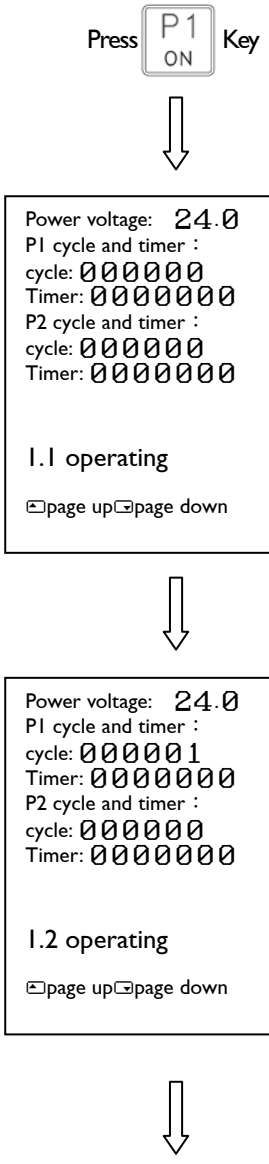


4.9 Instruction of Continuous Grease Dispensing.

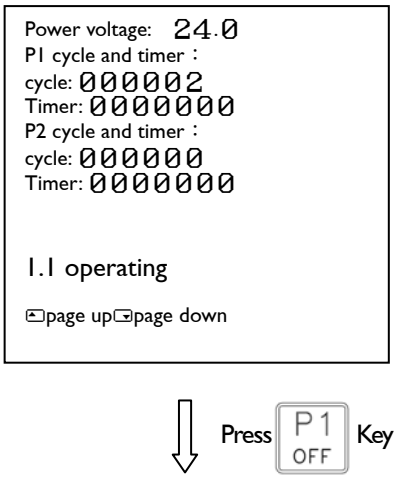
After installing Lubricator PA tubes, user may press "P1 ON" key function to allow lubricator to continuously dispense grease until empty PA tube is completely filled with grease and then press "P1 OFF" key to stop dispensing grease. Lubricator with an excess gas inside PA tubes, user may press "P1 ON" key for continuous grease dispensing so as to discharge excess gas trapped inside tube.

Description of Set-Up Example

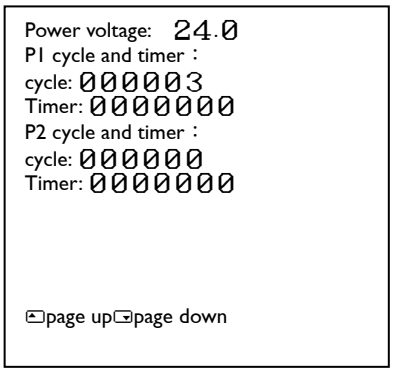
(1) Press P1 on for continuous grease dispensing.



Press "P1 ON" key, P1 Outlet will dispense grease continuously. Delivered volume of Outlet depends on model of Lubricator.



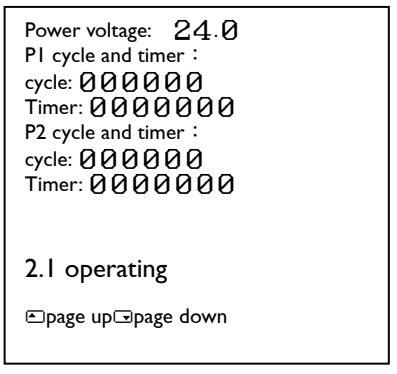
Press P1 OFF Key



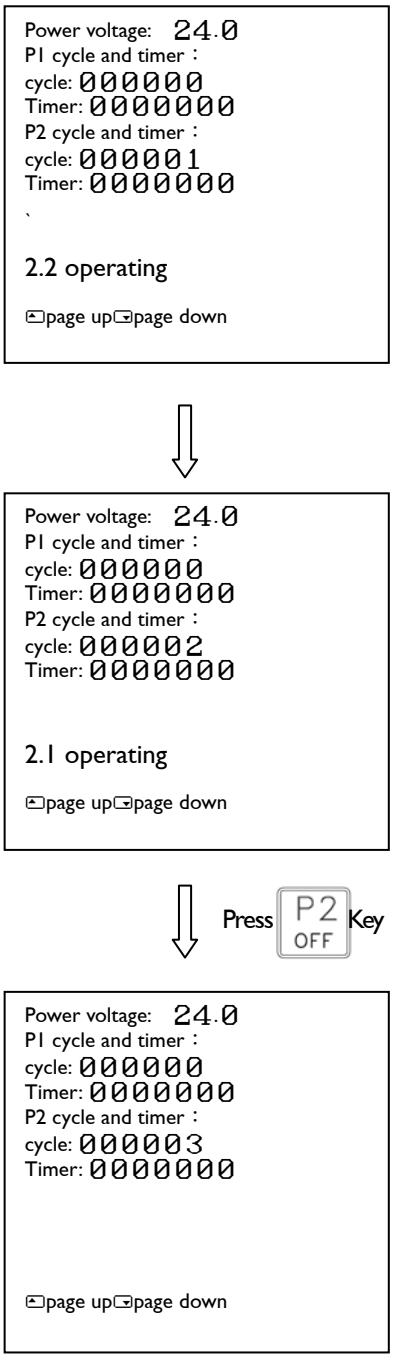
Press "P1 OFF" key, Pump P1 outlet will stop dispensing grease continuously.

(2) Press Pump P2 on for continuous grease dispensing.

Press P2 ON Key



Press "P2 ON" key, Pump P2 Outlet will dispense grease continuously. Delivered volume of Outlet depends on model of Lubricator.



Press "P1 OFF" key, Pump P1 outlet will stop dispensing grease continuously.

Appendix A - Lubrication Setting

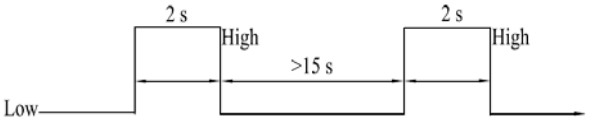
Due to various factors affecting the lubricator grease volume, APEX recommends lubrication volume and each model lubricator setting method for reference. Every lubricator output has single lubrication point.

Module No.	Average Speed	Output grease dispense volume
5	5 m/s	0.3 cm^3 / 24h

AppendixA-1 PLC mode 0 Control

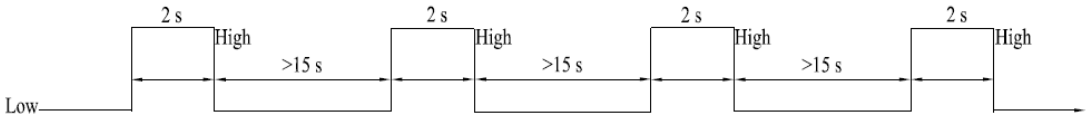
For every 24 hours, PLC sends the correct control signal to lubricator power plug PIN 2, Lubricator will dispense grease 0.3 cm^3 / 24h at output. Each lubricator model's control signal is displayed below:

AppendixA-1-1 Model LUG-411



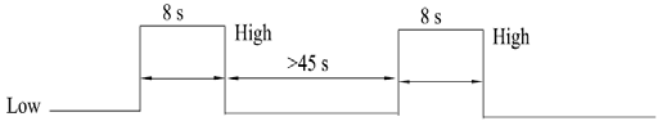
For every 24 hours, Lubricator received the PLC output signal above; outlet 1.1 will dispense two strokes with total grease 0.3cm^3.

AppendixA-1-2 Model LUG-412



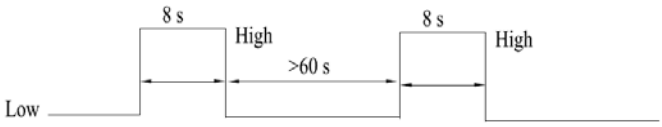
For every 24 hours, Lubricator received the PLC output signal above; outlet 1.1 & 1.2 will dispense two strokes per outlet with total grease 0.3cm^3.

AppendixA-1-3 Model LUG-423



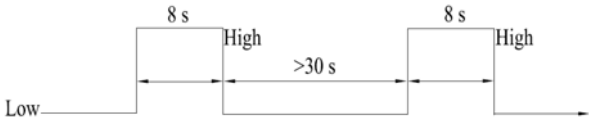
For every 24 hours, Lubricator received the PLC output signal above; outlet 1.1, 2.1 &2.2 will dispense two strokes per outlet with total grease 0.3cm^3.

AppendixA-1-4 Model LUG-424



For every 24 hours, Lubricator received the PLC output signal above; outlet 1.1, 1.2, 2.1 & 2.2 will dispense two strokes per outlet with total grease 0.3cm^3.

AppendixA-1-5 Model LUG-422



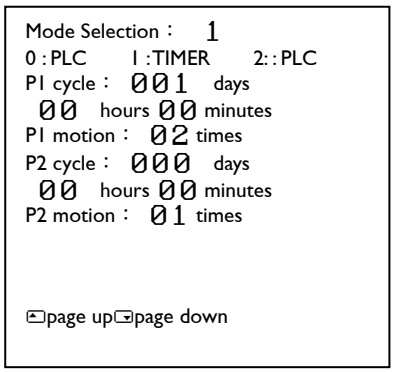
For every 24 hours, Lubricator received the PLC output signal above; outlet 1.1 & 2.1 will dispense two strokes per outlet with total grease 0.3cm^3.

AppendixA-2 TIMER mode 1 Control

Lubricator control mode can be changed from selecting TIMER Mode in Hand-Set.

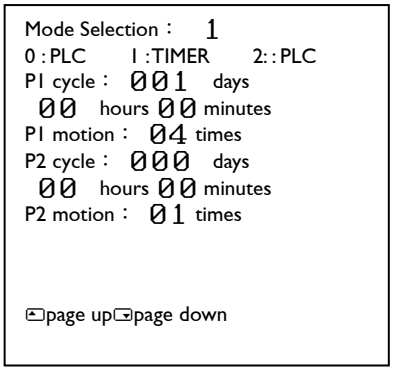
For every 24 hours, Lubricator will dispense grease 0.3 cm^3 / 24h at output. An example illustrated below showing each lubricator model's operation.

AppendixA-2-1 Model LUG-411



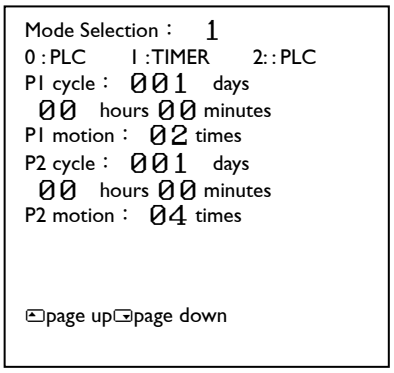
Set 1 in selection mode, Key in P1 cycle 1 day and Key in P1 motion 2 strokes. For every 24 hour, Lubricator outlet 1.1 dispenses 2 strokes with grease 0.3 cm^3.

AppendixA-2-2 Model LUG-412



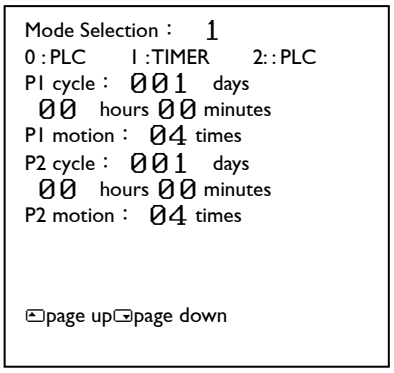
Set 1 in selection mode, Set P1 cycle 1 day and P1 motion 4 strokes. For every 24 hour, Lubricator outlet 1.1 & 1.2 dispenses 2 strokes per outlet with grease 0.3 cm^3.

AppendixA-2-3 Model LUG-423



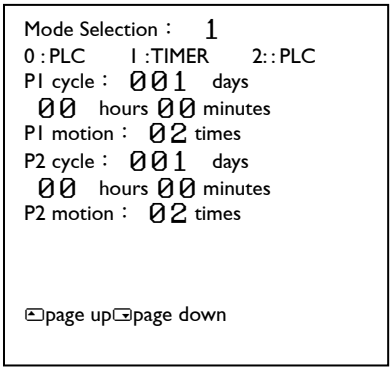
Set 1 in selection mode, Set P1 cycle 1 day and P1 motion 2 strokes, Set P2 cycle 1 day and P2 motion 4 strokes. For every 24 hour, Lubricator outlet 1.1 dispenses 2 strokes with grease 0.3 cm^3 and outlet 2.1 & 2.2 dispenses 2 strokes per outlet with grease 0.3 cm^3.

AppendixA-2-4 Model LUG-424



Set 1 in selection mode, Set P1 cycle 1 day and P1 motion 4 strokes, Set P2 cycle 1 day and P2 motion 4 strokes. For every 24 hour, Lubricator outlet 1.1 & 1.2 dispenses 2 strokes per outlet with grease 0.3 cm^3 and outlet 2.1 & 2.2 dispenses 2 strokes per outlet with grease 0.3 cm^3.

AppendixA-2-5 Model LUG-422

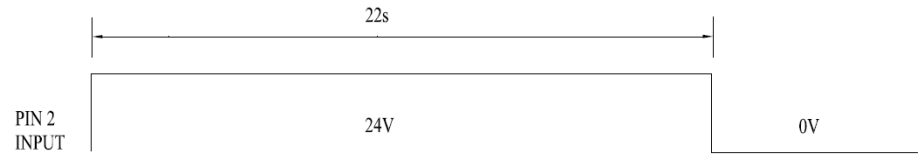


Set 1 in selection mode, Set P1 cycle 1 day and P1 motion 2 strokes, Set P2 cycle 1 day and P2 motion 2 strokes. For every 24 hour, Lubricator outlet 1.1 dispenses 2 strokes with grease 0.3 cm^3 and outlet 2.1 dispenses 2 strokes with grease 0.3 cm^3.

AppendixA-3 PLC mode 2 Control

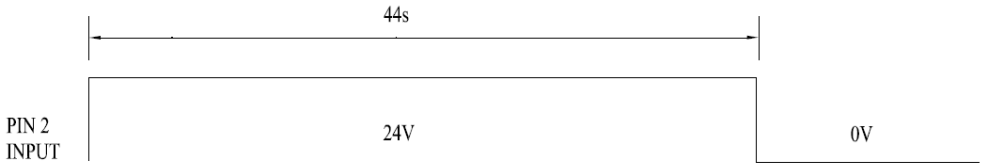
The PLC continuously outputs 24V signal to the lubricator power connector PIN2 pin every 24 hours, and the lubricator can be output the required amount of lubricant 0.3 cm^3 / 24h. The following is the constant input time of the 24V control signal matched with each type of lubricator.

AppendixA-3-1 Model LUG-411



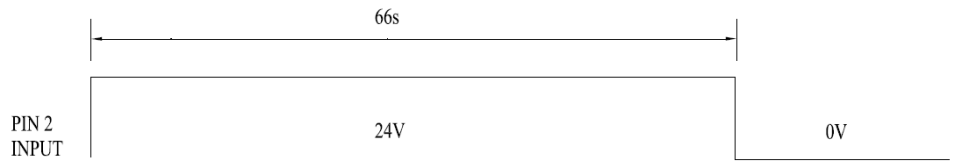
For every 24 hours, Lubricator received the PLC output signal above, the oil outlet of 1.1 will dispenses twice, and each output is 0.3 cm^3.

AppendixA-3-2 Model LUG-412



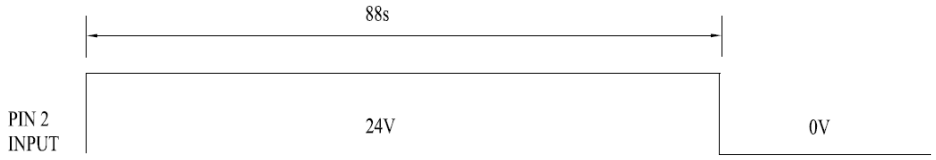
For every 24 hours, Lubricator received the PLC output signal above, the oil outlet of 1.1 and 1.2 will alternate dispenses twice, and each output is 0.3 cm^3.

AppendixA-3-3 Model LUG-423



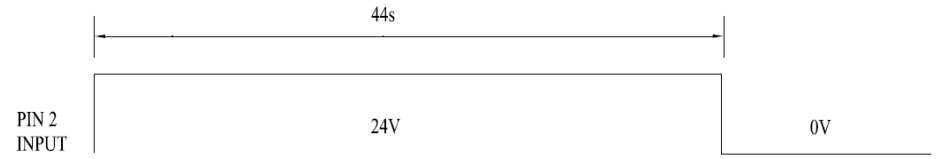
For every 24 hours, Lubricator received the PLC output signal above, the oil outlet of 1.1, 2.1 and 2.2 will alternate dispenses twice, and each output is 0.3 cm^3.

AppendixA-3-4 Model LUG-424



For every 24 hours, Lubricator received the PLC output signal above, the oil outlet of 1.1, 1.2, 2.1 and 2.2 will alternate dispenses twice, and each output is 0.3 cm^3.

AppendixA-3-5 Model LUG-422

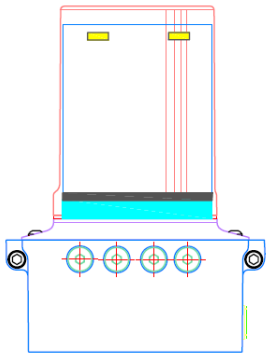


For every 24 hours, Lubricator received the PLC output signal above, the oil outlet of 1.1 and 2.1 will alternate dispenses twice, and each output is 0.3 cm^3.

Appendix B - Replacing New Cartridge

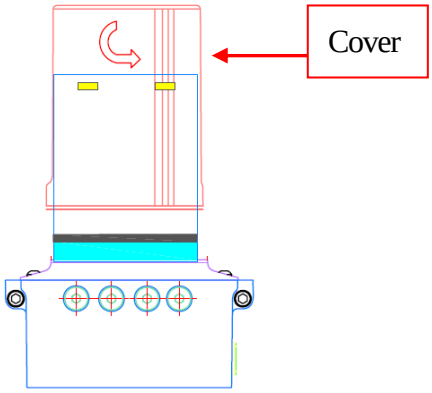
Appendix B-1 New Cartridge Replacing

STEP 1.



Unplug the power connection.

STEP 2.

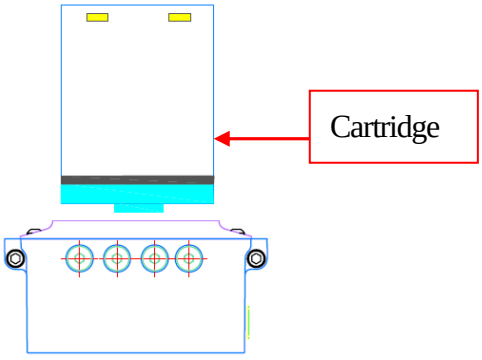


Press the housing and rotate the cover anti-clockwise as arrow and remove black pressure plate & spring.

Caution

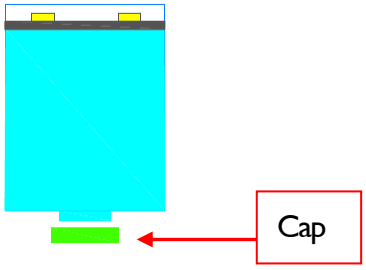
	Be aware the spring bouncing or grease splashing when disassemble the cover on lubricator

STEP 3.



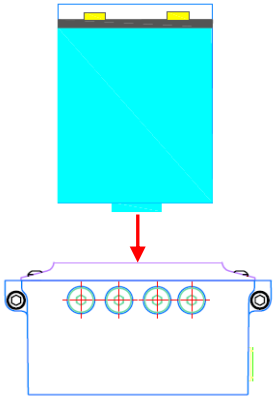
Pull the empty Cartridge upward.

STEP 4.



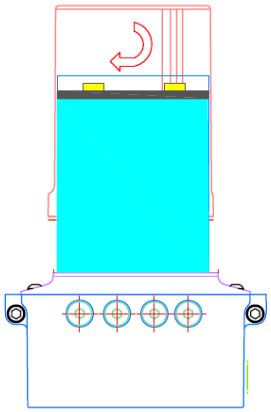
Remove the Cap from the new Cartridge.

STEP 5.



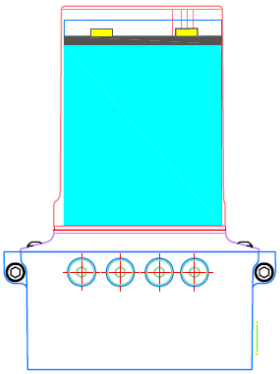
Insert New Cartridge to lubricator

STEP 6.



Place black pressure plate and spring onto Cartridge. Press the housing down and rotate clockwise as arrow so as tighten to lubricator.

STEP 7.



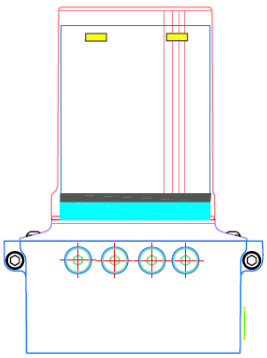
After changing new Cartridge, restart power of Lubricator.

⚠ Caution

Please ensure empty Cartridge is properly recycled and prohibit any disposal.

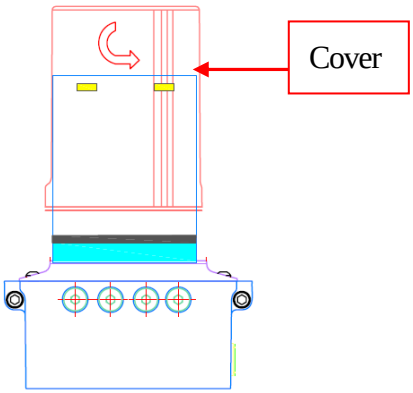
Appendix B-2 Empty cartridge refill oil again.

STEP 1.



Unplug the power connection.

STEP 2.

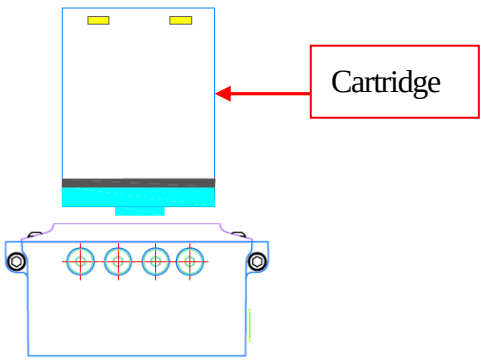


Press the housing and rotate the cover anti-clockwise as arrow and remove black pressure plate & spring.

⚠ Caution

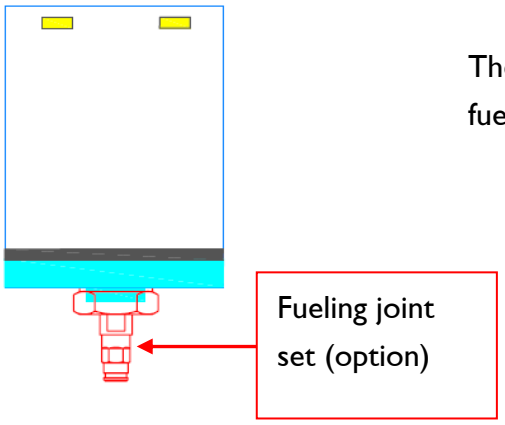
	Be aware the spring bouncing or grease splashing when disassemble the cover on lubricator

STEP 3.



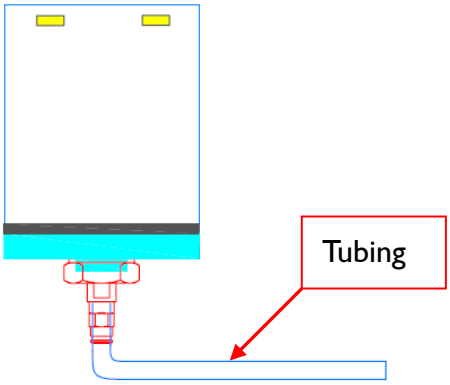
Pull the empty Cartridge upward.

STEP 4.



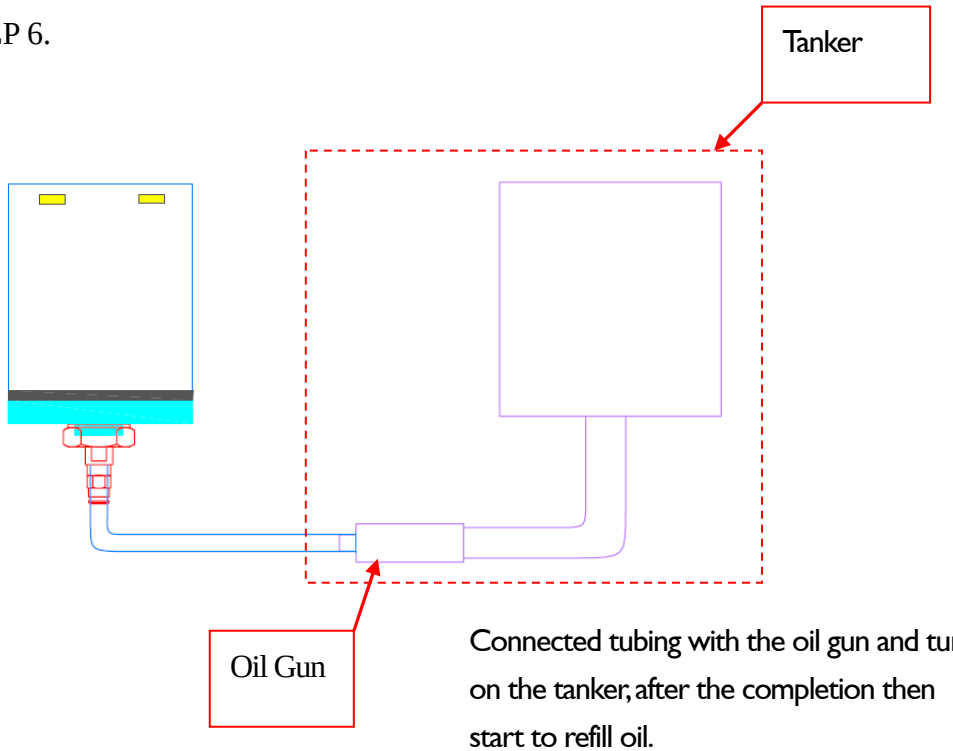
The opening of the cartridge assembly fueling joint set(option)

STEP 5.



The tubing attached to the corresponding dimension installed to fueling joint set.

STEP 6.

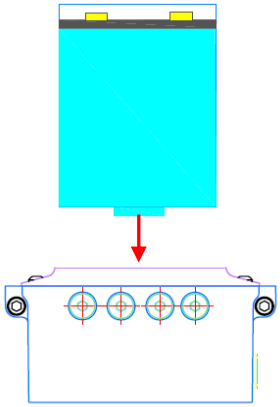


Connected tubing with the oil gun and turn on the tanker, after the completion then start to refill oil.

Caution

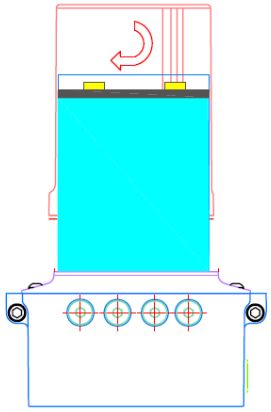
When oil supplement to lubricator, users should pay attention to the tubing and the device has actually complete installed.

STEP 7.



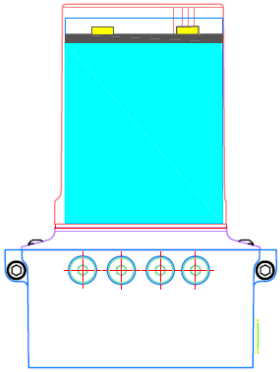
Insert Cartridge to lubricator

STEP 8.



Place black pressure plate and spring onto Cartridge. Press the housing down and rotate clockwise as arrow so as tighten to lubricator.

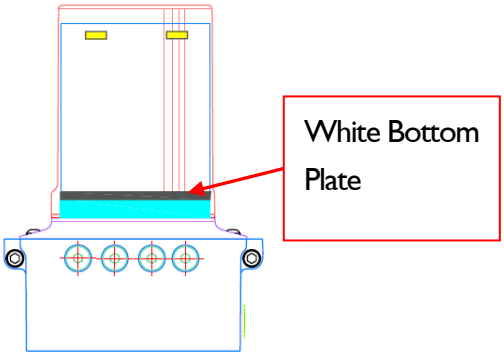
STEP 9.



After changing new Cartridge, restart power of Lubricator.

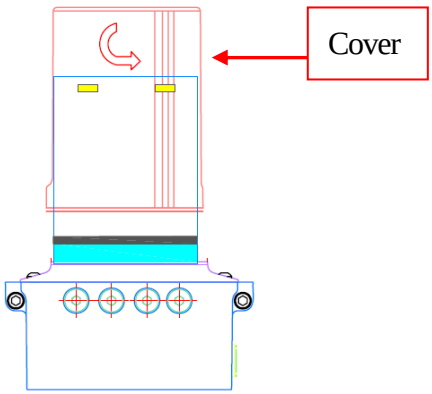
Appendix B-3 Empty cartridge refill oil again. (No Fueling joint set)

STEP 1.



Unplug the power connection.

STEP 2.

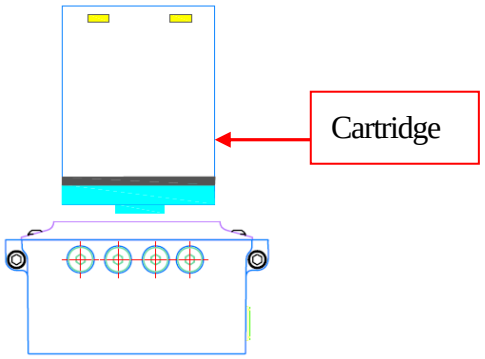


Press the housing and rotate the cover anti-clockwise as arrow and remove black pressure plate & spring.

⚠ Caution

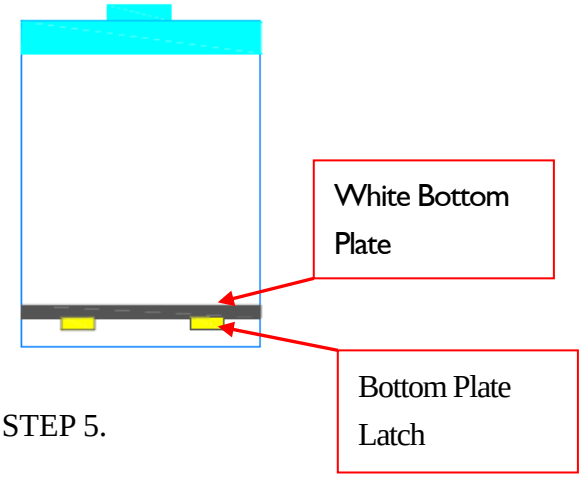
	Be aware the spring bouncing or grease splashing when disassemble the cover on lubricator

STEP 3.



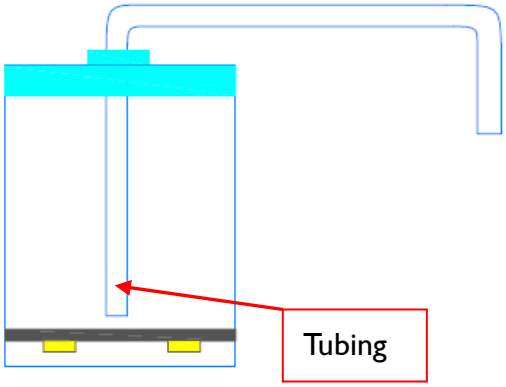
Pull the empty Cartridge upward.

STEP 4.



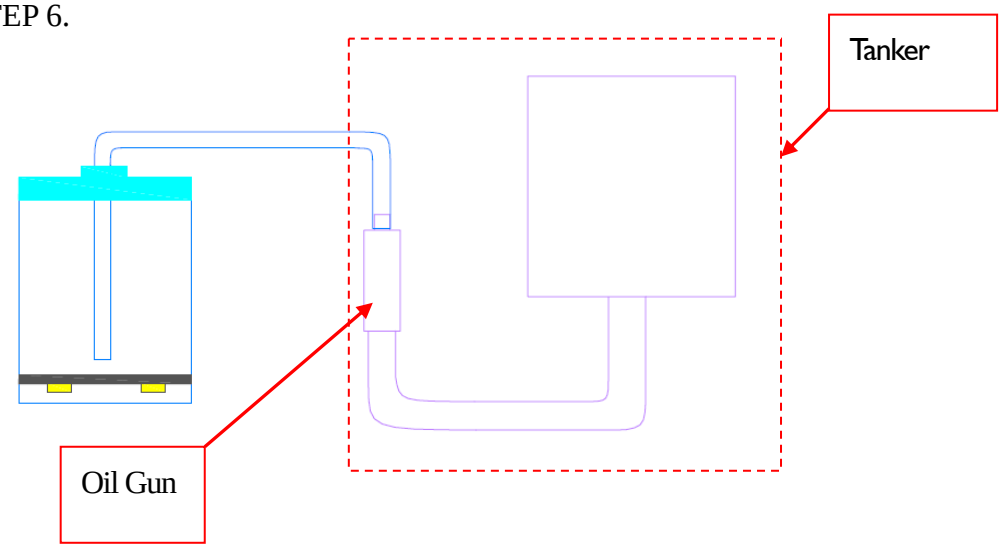
Before process refill the lubricant into cartridge, please check the white bottom plate that from the cartridge have to be on the bottom plate latch.

STEP 5.



Then put the oil pipe into the cartridge and try to make the pipe get close to the white bottom plate.

STEP 6.

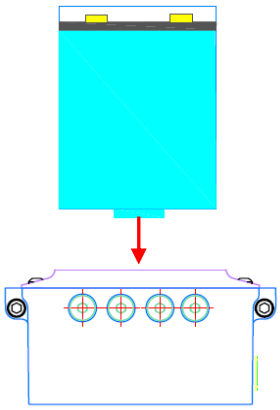


Connect the end of the oil pipe to the oil gun, and turn on the oil dispenser, then start to refill the lubricant. During the refilling process, the lubricant needs to be replenished to the entire cartridge on average. The cartridge can be properly tapped and the bottom plate can be moved to squeeze out the remaining air in the cartridge.

Caution

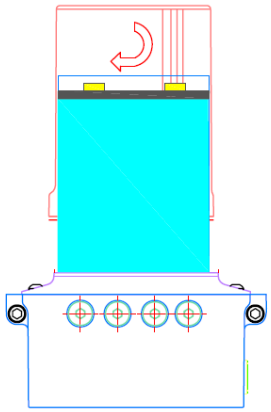
When oil supplement to lubricator, users should pay attention to the tubing and the device has actually complete installed.

STEP 7.



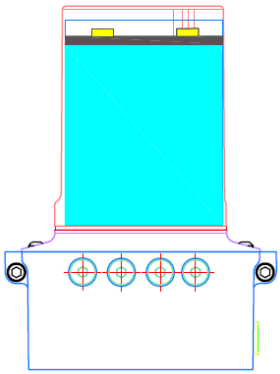
Insert Cartridge to lubricator

STEP 8.



Place black pressure plate and spring onto Cartridge. Press the housing down and rotate clockwise as arrow so as tighten to lubricator.

STEP 9.

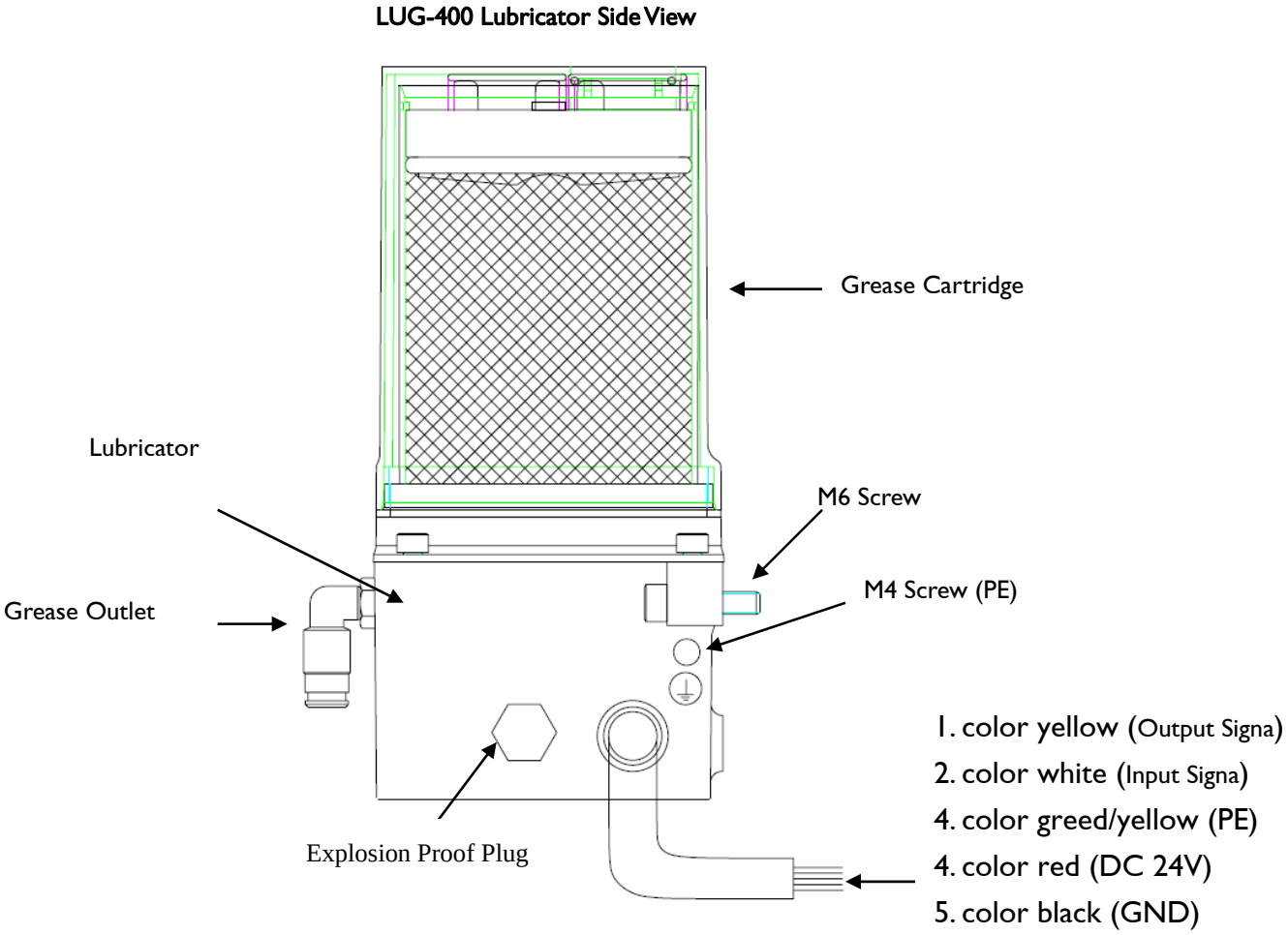


After changing new Cartridge, restart power of Lubricator.

Appendix C- Lubricator Explosion Proof Specification

Lubricator explosion proof is not support to control by manual remote, which from the power cable and mention about all different meaning for each different colored wires. Therefore have to assembly and follow the sequence to process by appendix C-1. Set up for external ground request at least 8 AWG multi cores, to prevent static electricity and appear sparks.

Appendix C-1 side view and power cable wire connect description



Appendix C-2 Maintenance and Storage

- Do not use a dry cloth to clean or maintain the machine body.
- Use extra caution during dry weather. Relative humidity tends to multiply the accumulation of static charges on any surface.
- Use the equipment only for its intended purpose.
- Incorrect or impermissible use or non-compliance with these instructions invalidates explosion protection.
- No changes to the equipment impairing its explosion protection are permitted.
- Excessive tightening of cable glands and stopping plugs can impair the degree of protection.
- Any damage can invalidate the Ex-protection.

Danger

1. WARNING – DO NOT OPEN WHEN AN EXPLOSIVE ATMOSPHERE IS PRESENT.
2. WARNING – POTENTIAL ELECTROSTATIC CHARGING HAZARD – SEE INSTRUCTIONS.
3. WARNING – CABLE GLAND FOR THE CABLES OF POWER CONNECTION OR SYSTEM SETUP SHOULD BE ATEX Ex e tc IP54 CERTIFIED WITH SUITABLE TEMPERATURE RATING.

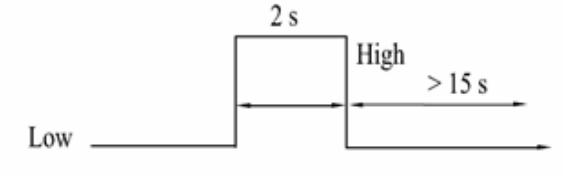
II 3D Ex tc IIIB T80 C Dc IP5X

Appendix D- PLC connection installation and program example instructions

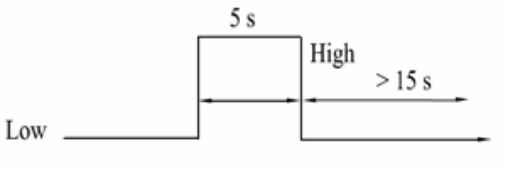
When the customer gets the product, can quickly complete the installation and control between PLC and lubricator of refer to the following examples.

Appendix D-1 Various Control Signal of PLC model 0

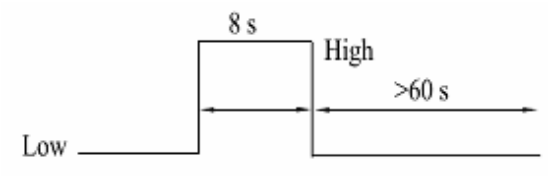
Each Lubrication model has control signal, LOW as 0V Signal and high as 24V Signal.



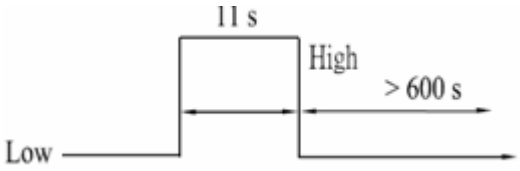
Pushed 1 stroke to outlet 1.1 or 1.2 dispensing 0.15cm^3 of grease when Lubricator received one 2s HIGH signal. If lubricator is selected as LUG-411、LUG-422、LUG-423, therefore 1.2 oil outlet is in non-functional, only 1.1 oil outlet dispensing.



Pushed 1 stroke to outlet 2.1 or 2.2 dispensing 0.15cm^3 of grease when Lubricator received one 5s HIGH signal. If the lubricator is selected as LUG-422, therefore 2.2 oil outlet is in non-functional, only 2.1 oil outlet dispensing. dispensing.

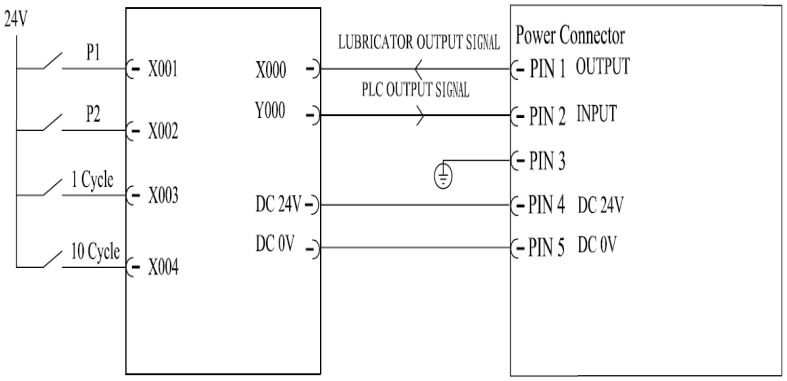


When lubricator receives 8s HIGH signal, each oil outlet will take turns to dispensing oil once, and oil output is 0.15cm^3.



When the lubricator receives 11s HIGH signal, each oil outlet will dispensing oil 10 times continuously, and total output oil of each hole is 1.5cm^3. This mainly function is fill empty oil pipe with lubricating oil.

Appendix D-2 Power System Wire (PLC 0 Control)



Signal explain

X000: Lubricator Output Signal

X001: Control Lubricator P1 dispenses once

X002: Control Lubricator P2 dispenses once

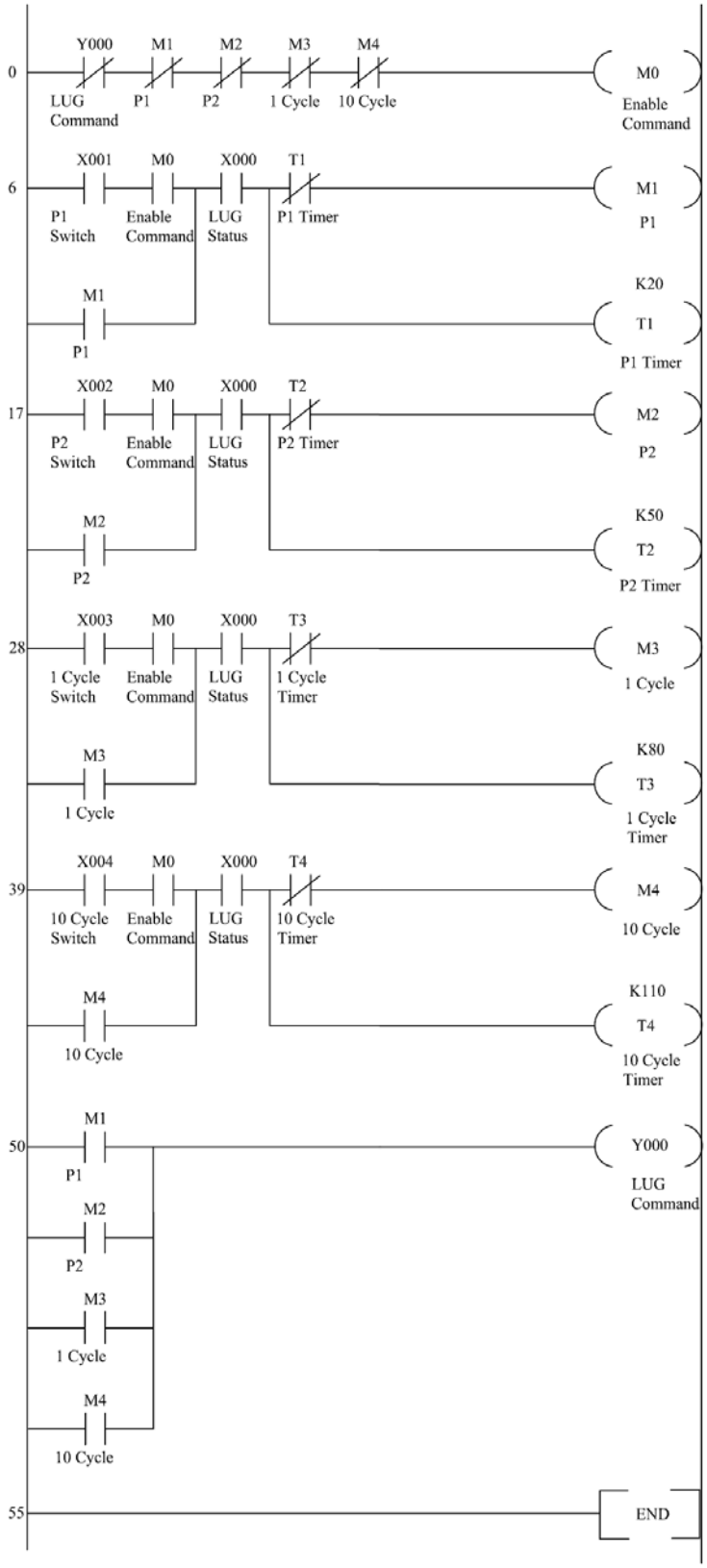
X003: Control Lubricator to circulate dispenses once

X004: Control Lubricator to circulate dispenses 10 times

Y000: PLC Output Signal

Appendix D-3 Compile PLC Program Example

In the program example, P1 dispensing once means that the 1.1 or 1.2 oil outlet will output oil 0.15cm^3, P2 dispensing once means that the 2.1 or 2.2 oil outlet will output oil 0.15cm^3.



Make sure PLC Y000 only sends one kind of oil output signal to the lubricator, to avoid errors from action command signal of lubricator.

When PLC X001 is ON, PLC checks whether the lubricator can receive signals through X000. If yes, PLC Y000 will output a 2s HIGH signal to lubricator. After completion, the P1 oil outlet will dispensing once.

When PLC X002 is ON, PLC checks whether the lubricator can receive signals through X000. If yes, PLC Y000 will output a 5s HIGH signal to lubricator. After completion, the P2 oil outlet will dispensing once.

When PLC X003 is ON, PLC checks whether the lubricator can receive signals through X000. If yes, PLC Y000 will output a 8s HIGH signal to lubricator. After completion, each oil outlet will dispensing once.

When PLC X004 is ON, PLC checks whether the lubricator can receive signals through X000. If yes, PLC Y000 will output a 11s HIGH signal to lubricator. After completion, each oil outlet will circulate dispenses 10 times.

PLC output Y000 is connected with lubricator and which command action signal is controlling dispensing.