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## I. Safety Information

### I.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.

### I.2 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







### 1.3 Hazard Instruction

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

Danger Level	Description
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 high risk of moderate physical injury.
Note	Note refers to hazards with a slight risk of moderate physical injury.

### 1.4 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 ground wiring protection
	Hazards due to environment pollution

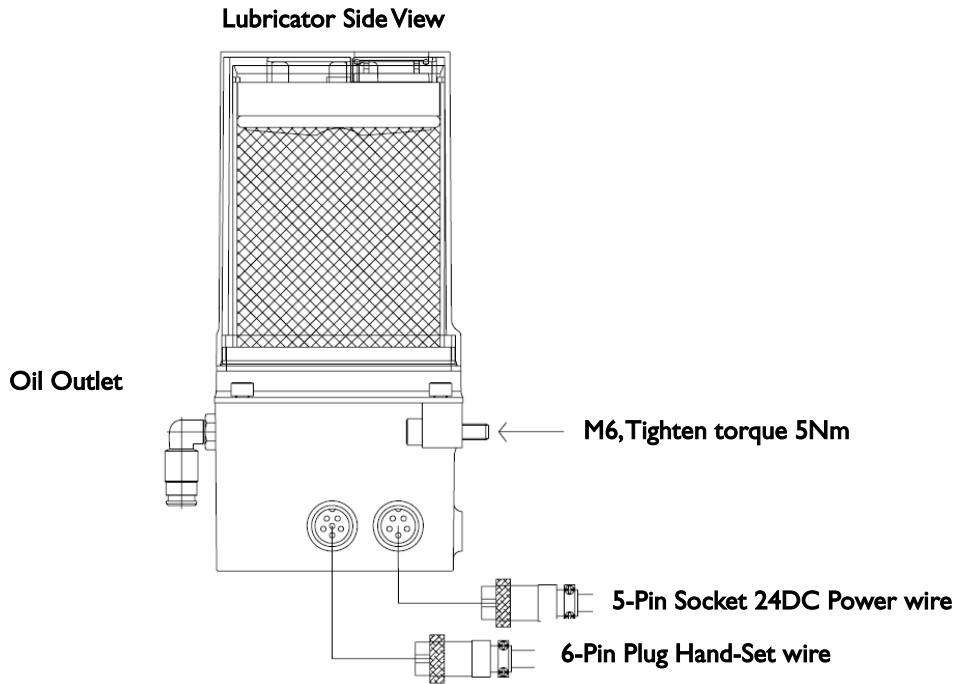


## 2. Lubrication Specification

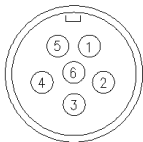
### 2.1 Electrical Specification

Input Power	DC24V ± 10%
Power Consumption	12W max
Operating Current	I max ≤ 500mA
Output / Input	Status Output   Set: Command Input   Set
Status Output Max. Current	100mA
Command Input Max. Current	50mA
Operating Temperature	-25~70 C

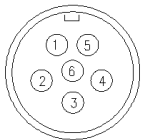
### 2.2 Power and Hand-Set Connection



6-Pin Plug (Hand-Set Wire)



6-Pin Socket on Lubricator

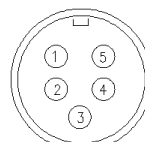


- 1. Output DC 24V
- 2. GND
- 3. I\_BUSY/
- 4. RS485
- 5. RS485/
- 6. PE

5-Pin Socket (Power Wire)



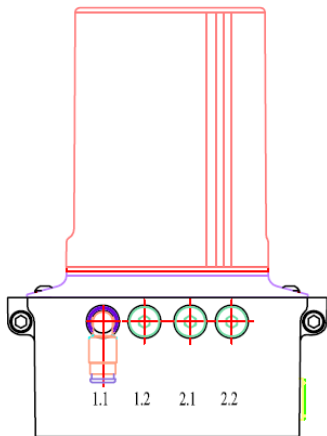
5-Pin Plug on Lubricator



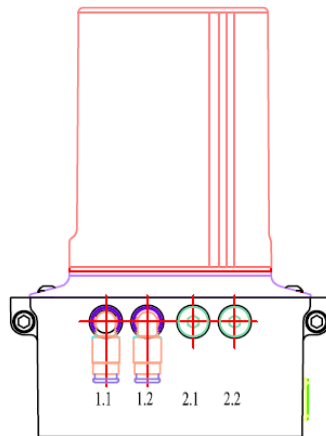
- 1. Output Signal
- 2. Input Signal
- 3. PE
- 4. Input DC 24V
- 5. GND



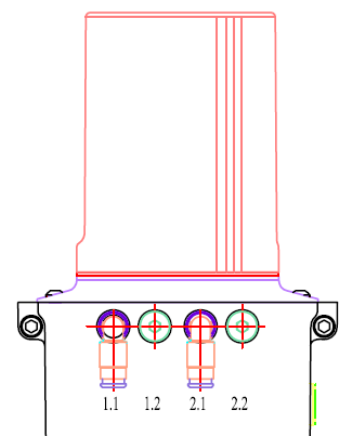
### 2.3 Outlet Position of Lubricator



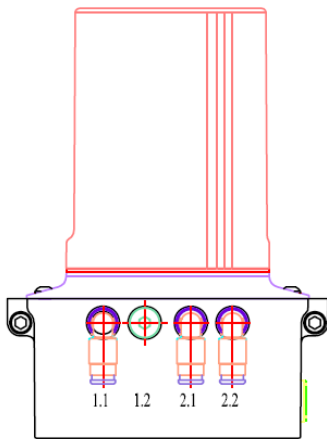
LUG-411



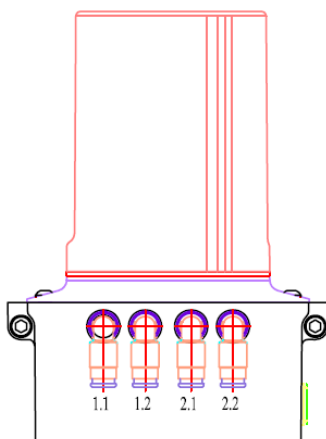
LUG-412



LUG-422



LUG-423



LUG-424

**LUG-411:**

1.1 Outlet : per stroke  $0.15\text{cm}^3$   
Other Oil Outlet is sealed.

**LUG-412:**

1.1 Outlet : per stroke  $0.15\text{cm}^3$   
1.2 Outlet : per stroke  $0.15\text{cm}^3$   
Other Oil Outlet is sealed.

**LUG-422:**

1.1 Outlet : per stroke  $0.15\text{cm}^3$   
1.2 Outlet : Outlet is sealed.  
2.1 Outlet : per stroke  $0.15\text{cm}^3$   
2.2 Outlet : Outlet is closed.

**LUG-423:**

1.1 Outlet : per stroke  $0.15\text{cm}^3$   
1.2 Outlet : Outlet is sealed.  
1.1 Outlet : per stroke  $0.15\text{cm}^3$   
1.2 Outlet : per stroke  $0.15\text{cm}^3$

**LUG-424:**

1.1 Outlet : per stroke  $0.15\text{cm}^3$   
1.2 Outlet : per stroke  $0.15\text{cm}^3$   
1.1 Outlet : per stroke  $0.15\text{cm}^3$   
1.2 Outlet : per stroke  $0.15\text{cm}^3$



### 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.

#### 3.1 Power System Wire (PLC Control)

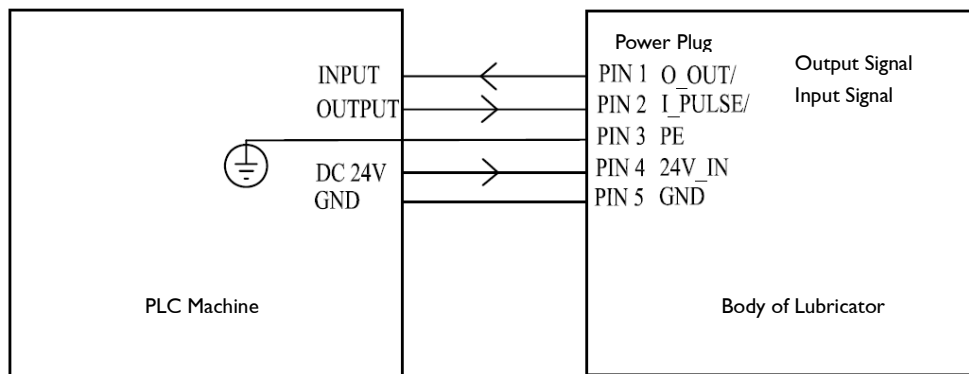
**Caution**



5-PIN Plug wiring connection conforms to diameter  $\phi$  6.3mm and 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.

Wiring Diagram of Power System (PLC control)



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

**Caution**

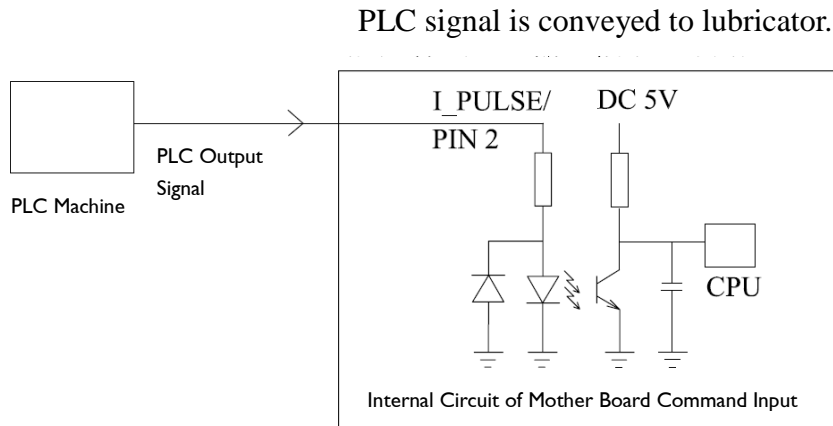


When the Input Voltage of Lubricator is higher than specified voltage, this will cause damage to the lubricator.





### 3.1.1 Command Input Signal Wiring



#### Lubricant Input Electrical Specifications

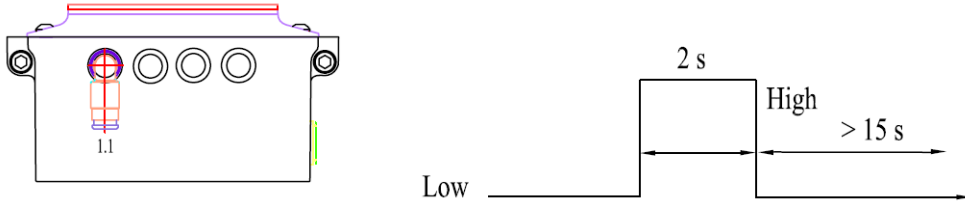
Input
Rated Voltage : DC 24V ,
Rated Current : 50mA



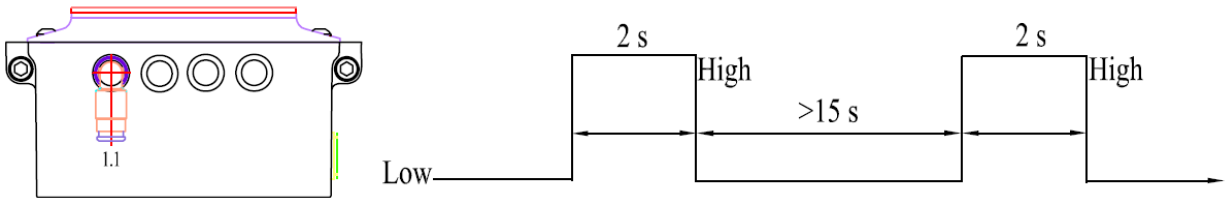
### 3.2 PLC Control Signal

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

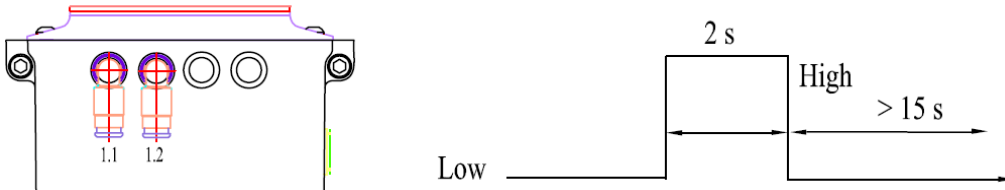


Pump 1 pushed 1 stroke to outlet 1.1 dispensing 0.15cm<sup>3</sup> of grease when Lubricator received one 2s HIGH signal.

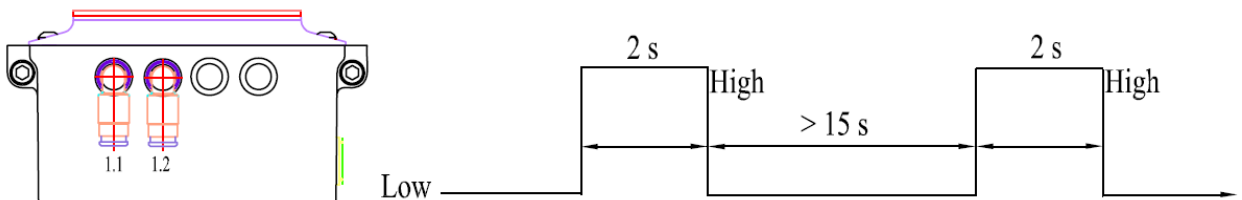


Pump 1 pushed 2 strokes to outlet 1.1 dispensing 2 strokes of 0.15cm<sup>3</sup> of grease (total 0.3cm<sup>3</sup> grease) when Lubricator received two 2s HIGH signal. Ensure cycle intervals of two 2s HIGH signal are 15s.

#### 3.2.2 Model LUG-412



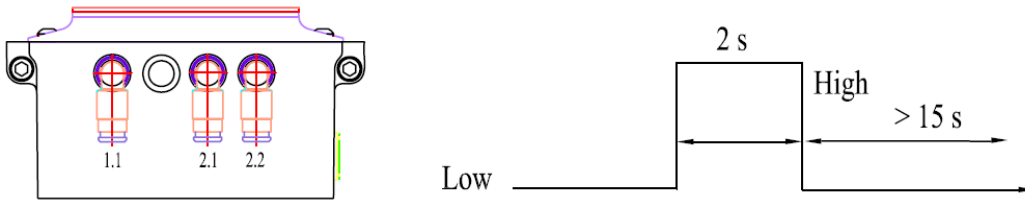
Pump 1 pushed 1 stroke to outlet 1.1 or 1.2 dispensing 0.15cm<sup>3</sup> of grease when Lubricator received one 2s HIGH signal.



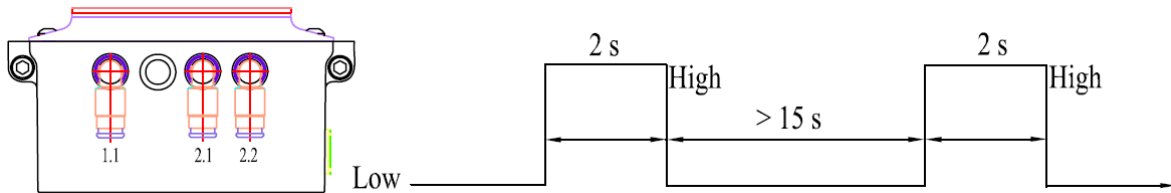
Pump 1 pushed 1 stroke to each outlet 1.1 and 1.2 dispensing 0.15cm<sup>3</sup> of grease when Lubricator received two 2s HIGH signal. Ensure cycle intervals of two 2s HIGH signal are 15s.



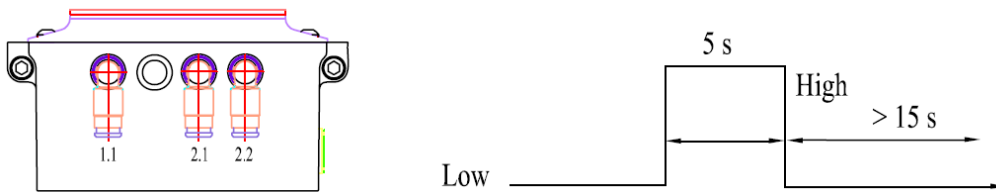
### 3.2.3 Model LUG-423



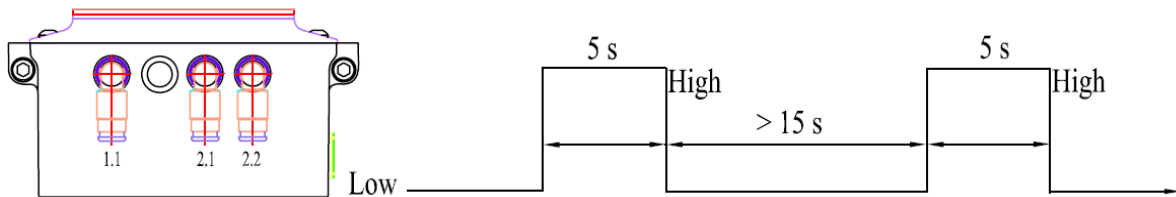
Pump 1 pushed 1 stroke to outlet 1.1 dispensing 0.15cm<sup>3</sup> of grease when Lubricator received one 2s HIGH signal.



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



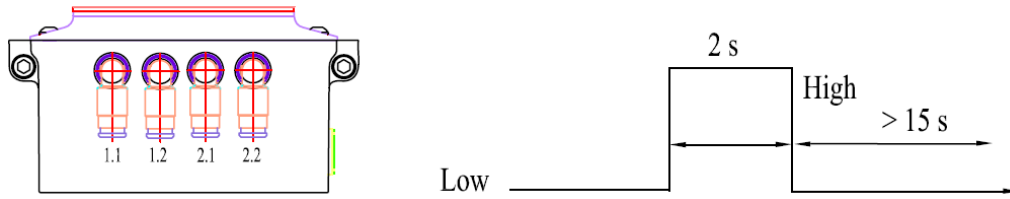
Pump 2 pushed 1 stroke to outlet 2.1 or 2.2 dispensing 0.15cm<sup>3</sup> of grease when Lubricator received one 5s HIGH signal.



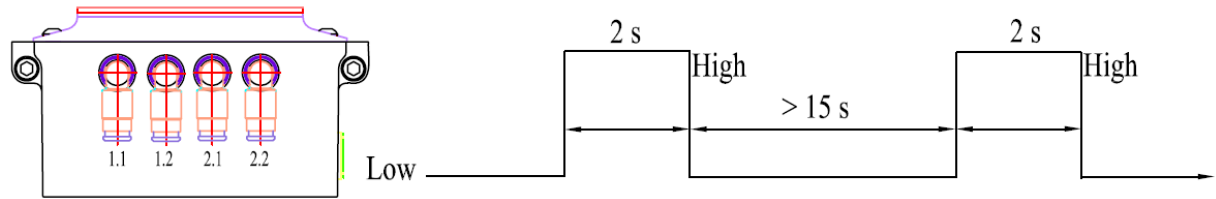
Pump 2 pushed 1 stroke to each outlet 2.1 and 2.2 dispensing 0.15cm<sup>3</sup> of grease when Lubricator received two 5s HIGH signal. Ensure cycle intervals of two 5s HIGH signal are 15s.



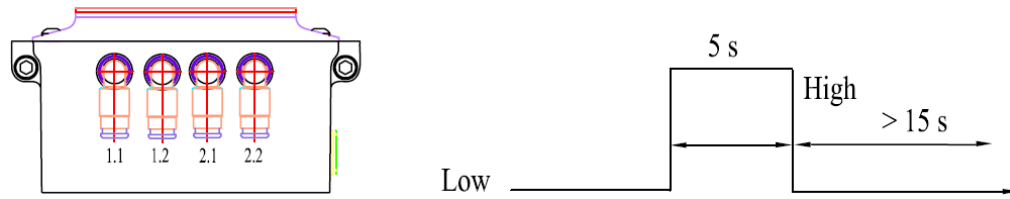
### 3.2.4 Model LUG-424



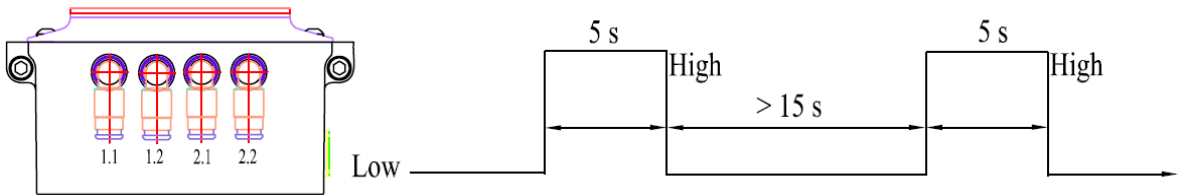
Pump 1 pushed 1 stroke to outlet 1.1 or 1.2 dispensing 0.15cm<sup>3</sup> of grease when Lubricator received one 2s HIGH signal.



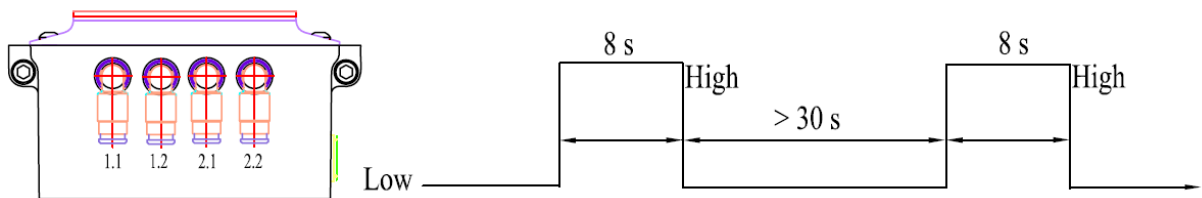
Pump 1 pushed 1 stroke to each outlet 1.1 and 1.2 dispensing 0.15cm<sup>3</sup> of grease when Lubricator received two 2s HIGH signal. Ensure cycle intervals of two 2s HIGH signal are 15s.



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



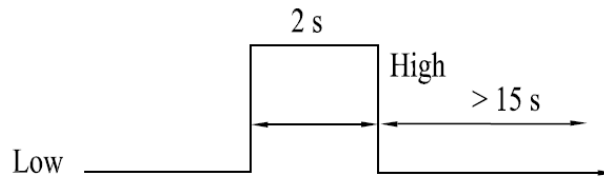
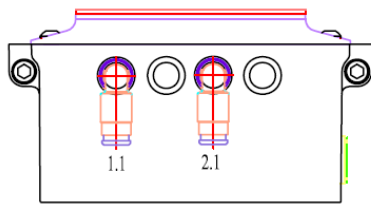
Pump 2 pushed 1 stroke to each outlet 2.1 and 2.2 dispensing 0.15cm<sup>3</sup> of grease when Lubricator received two 5s HIGH signal. Ensure cycle intervals of two 5s HIGH signal is 15s.



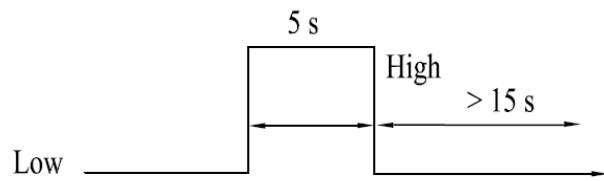
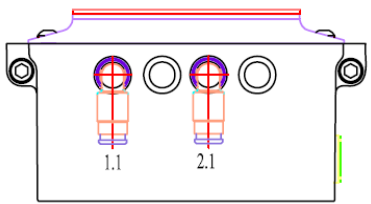
Pump 1 & Pump 2 pushed 1 stroke to each outlet 1.1, 1.2, 2.1 and 2.2 dispensing 0.15cm<sup>3</sup> of grease when Lubricator received two 8s HIGH signal. Ensure cycle intervals of two 8s HIGH signal are 30s.



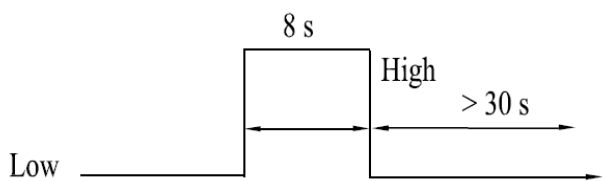
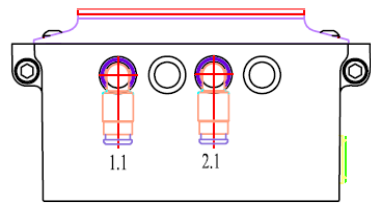
### 3.2.5 Model LUG-422



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



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

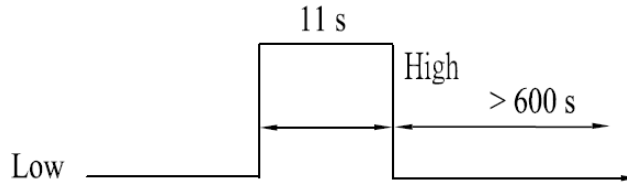


Pump 1 and Pump 2 pushed 1 stroke to each outlet 1.1 and 2.1 dispensing  $0.15\text{cm}^3$  of grease when Lubricator received one 8s HIGH signal.



### 3.3 Additional Function

#### 3.3.1 Filling of Empty Tube with Grease



May use PLC output I Is HIGH signal after completed installing Lubricator Tube to perform greasing continuously 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 :  $20 \times 0.15\text{cm}^3 = 3.0\text{cm}^3$

LUG-412:

1.1 Outlet :  $10 \times 0.15\text{cm}^3 = 1.5\text{cm}^3$

1.2 Outlet :  $10 \times 0.15\text{cm}^3 = 1.5\text{cm}^3$

LUG-422:

1.1 Outlet :  $20 \times 0.15\text{cm}^3 = 3.0\text{cm}^3$

2.1 Outlet :  $20 \times 0.15\text{cm}^3 = 3.0\text{cm}^3$

LUG-423:

1.1 Outlet:  $20 \times 0.15\text{cm}^3 = 3.0\text{cm}^3$

2.1 Outlet:  $10 \times 0.15\text{cm}^3 = 1.5\text{cm}^3$

2.2 Outlet:  $10 \times 0.15\text{cm}^3 = 1.5\text{cm}^3$

LUG-424:

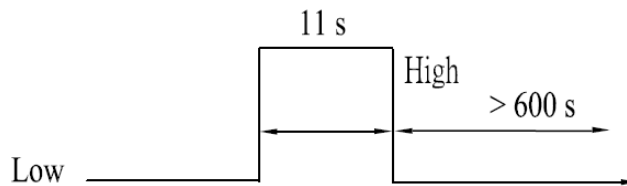
1.1 Outlet :  $10 \times 0.15\text{cm}^3 = 1.5\text{cm}^3$

1.2 Outlet :  $10 \times 0.15\text{cm}^3 = 1.5\text{cm}^3$

2.1 Outlet :  $10 \times 0.15\text{cm}^3 = 1.5\text{cm}^3$

2.1 Outlet :  $10 \times 0.15\text{cm}^3 = 1.5\text{cm}^3$

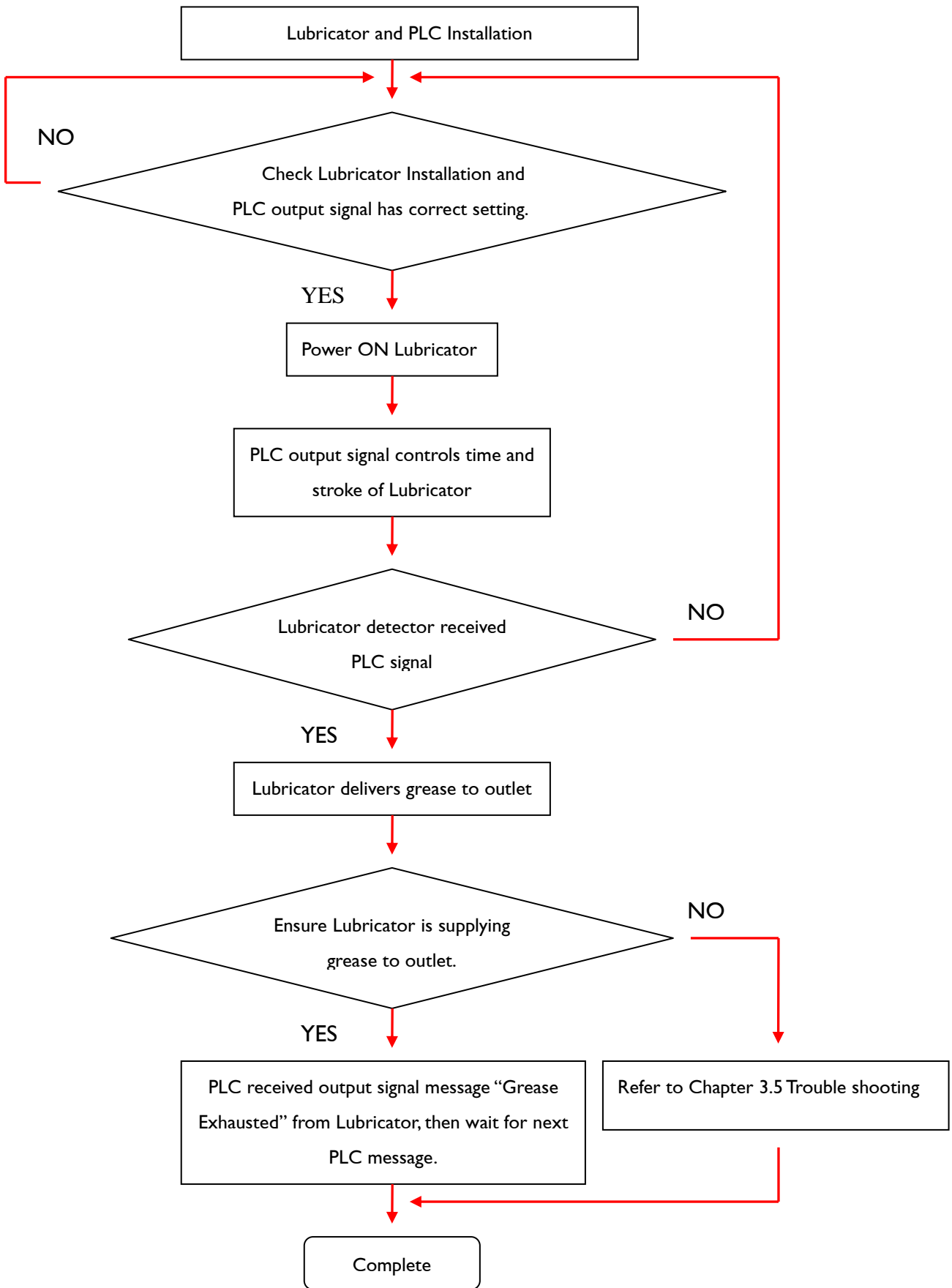
#### 3.3.2 Release Trapped Air



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



### 3.4 Lubricator Installation Procedure (PLC Control)

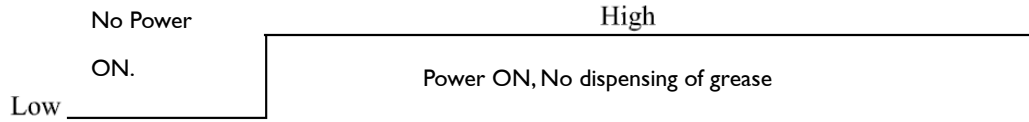




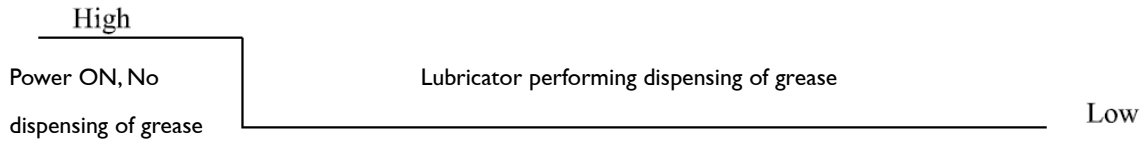
### 3.5 Lubricator Troubleshooting

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.

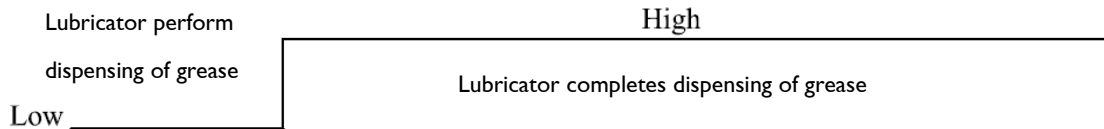
#### 3.5.1 Waveform of Grease Dispensing



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

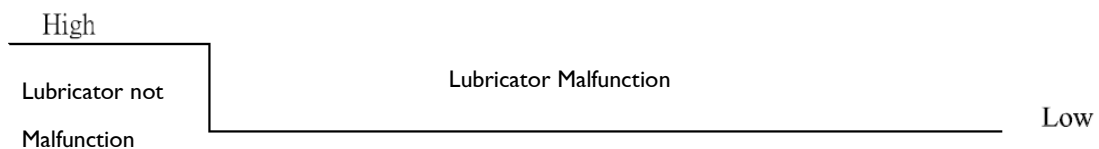


When Pin 1 output signal changed from HIGH to LOW, this means PLC knows Lubricator is performing dispensing of grease to outlet and at this moment Lubricator will ignore PLC command.



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

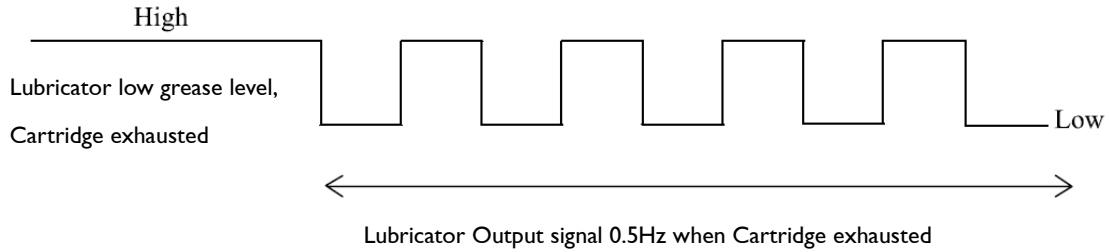


Lubricator malfunction, PIN 1 will continue to output LOW signal, at this time please follow the table for Lubricator troubleshooting.





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

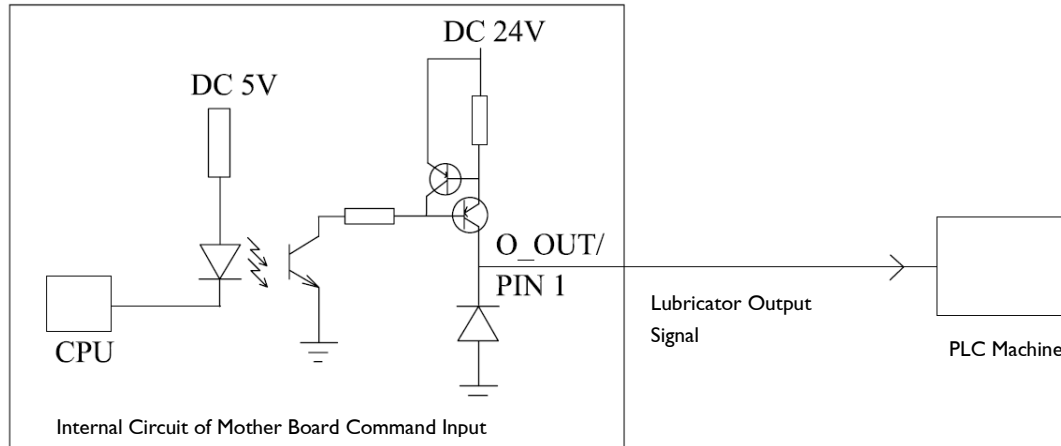


Please follow the table for troubleshooting when Lubricator cartridge is exhausted, PIN 1 will send output 0.5Hz signal.

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 Control

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 Wire (Hand-Set Control)

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

#### Caution



Lubricator power supply connector wire is recommended to use Diameter 6.3mm with 5 Core Cables and 1.5A current resistance.

#### Caution



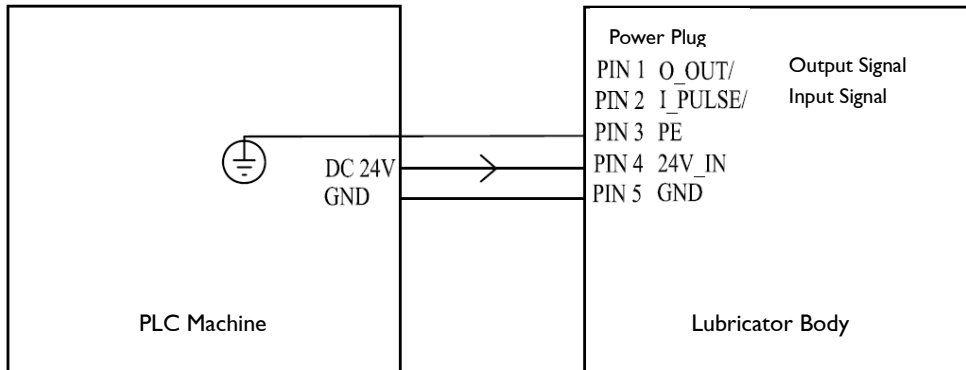
When Input Voltage of Lubricator is higher than specified voltage may damage the lubricator.



### 4.1.1 PLC Machine Power Supply

PLC machine controls output of DC 24V which is generated from transformer or power supply device, supplying power DC 24V to Lubricator.

Power supply system Wiring diagram (Handset Controller)



Circuit Protection Switch

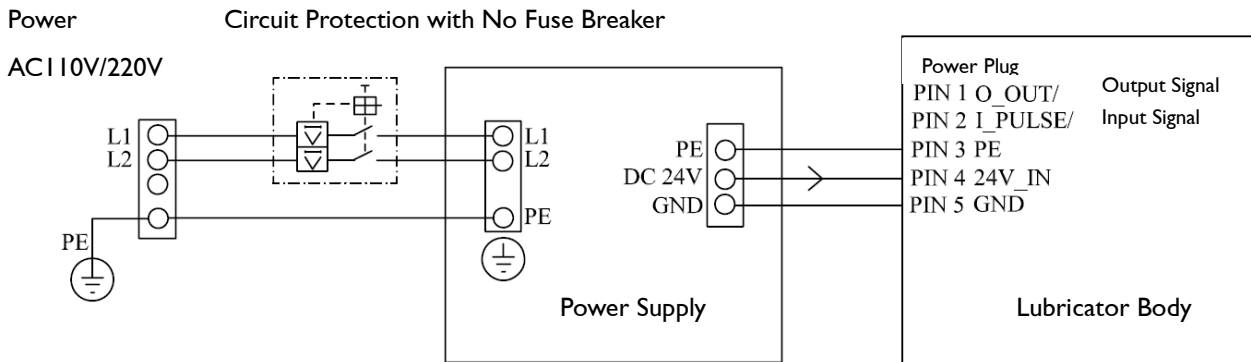
(Fuse), Rated Current = 1.1A

### 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 Installation process, the input electrical terminal of power supply device includes a electrical protection with no fuse breaker, PE terminal requires to connect to factory ground system.

Power System Wire diagram (Hand-Set Control)



Circuit Protection Switch

(Fuse), Rated Current = 1.1A

**Warning**



PE Terminal of Independent Voltage Source must connect to ground wire system of factory.



## 4.2 Instruction of Hand-Set

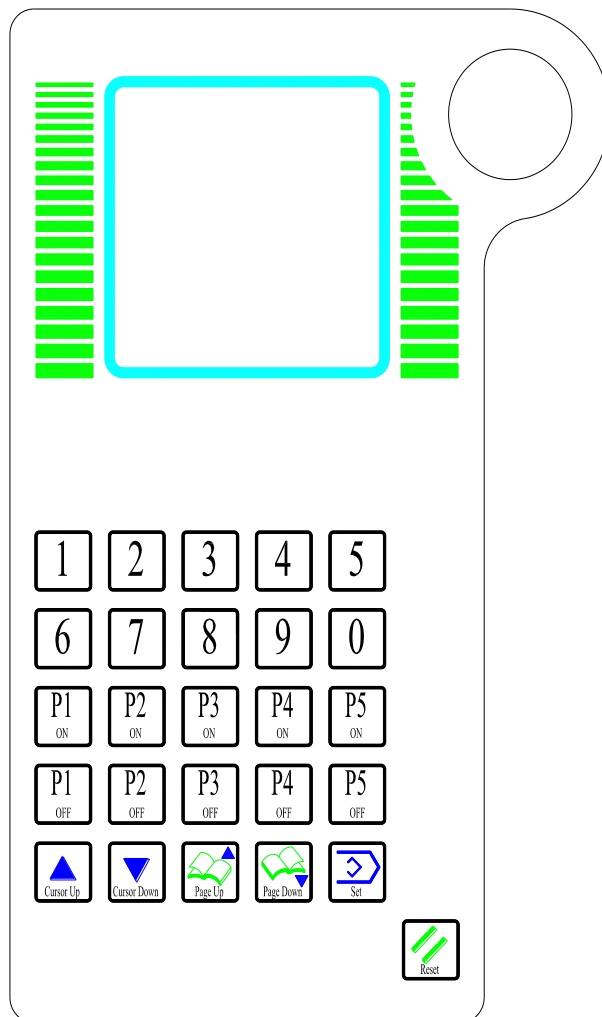
Lubricator Hand-Set has a User-Friendly Interface Design, and simple features to allow user to quickly install, operate, and edit functions according to user needs, a brief overview are as follows:

- 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)

### Attention





























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.






## 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		
	Page Down		



### 4.4 Display Screen of Hand-Set

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



<p style="text-align: center;"><b>S13</b></p> <div style="border: 1px solid black; padding: 5px;"> <p>Power voltage: .  P1 cycle and timer :  cycle:  Timer:  P2 cycle and timer :  cycle:  Timer:</p> <p><b>2.2 operating</b></p> <p>page up page down</p> </div>	<p style="text-align: center;"><b>S17</b></p> <div style="border: 1px solid black; padding: 5px;"> <p>Power voltage: .  P1 cycle and timer :  cycle:  Timer:  P2 cycle and timer :  cycle:  Timer:</p> <p><b>Motor2 or pipe block</b></p> <p>page up page down</p> </div>	<p style="text-align: center;"><b>S21</b></p> <div style="border: 1px solid black; padding: 5px;"> <p>Power voltage: .  P1 cycle and timer :  cycle:  Timer:  P2 cycle and timer :  cycle:  Timer:</p> <p><b>INVALID COMMAND</b></p> <p>page up page down</p> </div>
<p style="text-align: center;"><b>S14</b></p> <div style="border: 1px solid black; padding: 5px;"> <p>Power voltage: .  P1 cycle and timer :  cycle:  Timer:  P2 cycle and timer :  cycle:  Timer:</p> <p><b>P1 motor idling</b></p> <p>page up page down</p> </div>	<p style="text-align: center;"><b>S18</b></p> <div style="border: 1px solid black; padding: 5px;"> <p>Power voltage: .  P1 cycle and timer :  cycle:  Timer:  P2 cycle and timer :  cycle:  Timer:</p> <p><b>Grease exhausted</b></p> <p>page up page down</p> </div>	<p style="text-align: center;"><b>S22</b></p> <div style="border: 1px solid black; padding: 5px;"> <p>Power voltage: .  P1 cycle and timer :  cycle:  Timer:  P2 cycle and timer :  cycle:  Timer:</p> <p><b>Use in timer mode</b></p> <p>page up page down</p> </div>
<p style="text-align: center;"><b>S15</b></p> <div style="border: 1px solid black; padding: 5px;"> <p>Power voltage: .  P1 cycle and timer :  cycle:  Timer:  P2 cycle and timer :  cycle:  Timer:</p> <p><b>P2 motor idling</b></p> <p>page up page down</p> </div>	<p style="text-align: center;"><b>S19</b></p> <div style="border: 1px solid black; padding: 5px;"> <p>Power voltage: .  P1 cycle and timer :  cycle:  Timer:  P2 cycle and timer :  cycle:  Timer:</p> <p><b>Memory reading error</b></p> <p>page up page down</p> </div>	<p style="text-align: center;"><b>S23</b></p> <div style="border: 1px solid black; padding: 5px;"> <p>Mode Selection :  0 :PLC    1 :TIMER    2::PLC I  P1 cycle :            days                    hours        minutes  P1 motion :            times  P2 cycle :            days                    hours        minutes  P2 motion :            times</p> <p><b>RANGE I~99</b></p> <p>page up page down</p> </div>
<p style="text-align: center;"><b>S16</b></p> <div style="border: 1px solid black; padding: 5px;"> <p>Power voltage: .  P1 cycle and timer :  cycle:  Timer:  P2 cycle and timer :  cycle:  Timer:</p> <p><b>Motor I or pipe block</b></p> <p>page up page down</p> </div>	<p style="text-align: center;"><b>S20</b></p> <div style="border: 1px solid black; padding: 5px;"> <p>Power voltage: .  P1 cycle and timer :  cycle:  Timer:  P2 cycle and timer :  cycle:  Timer:</p> <p><b>Memory writing error</b></p> <p>page up page down</p> </div>	



### 4.5 Procedure of Set-Up

S1

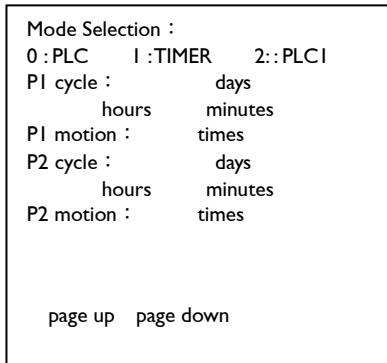


S1 screen will display on Hand-Set when connected to power of lubricator; enter password to go to next setting.



Press Set

S2



1. Select Mode: Setting of Lubricator; “0” is PLC mode, P1 & P2 motion, cycle and parameter cannot be set, refer to chapter 3; “1” is Timer Mode, refer to chapter 4.6.1.; “2” is PLC I mode, refer to chapter 4.6.2

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<sup>3</sup> after countdown of P1 cycle time.

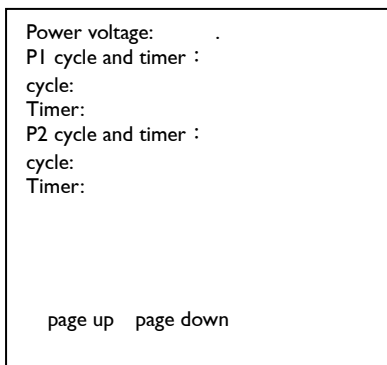
4. P2 Cycle: Set P2 Cycle Time to begin supply Grease at Outlet. 2.1 or 2.2

5. P2 Motion: Set P2 motion 1 stroke per outlet dispenses 0.15cm<sup>3</sup> after countdown of P2 cycle time.



Press Page down

S3



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

2. P1 Cycle: Displays total no. of strokes for P1 current Greasing status.

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

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

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



Press Page down





S4

Language Display(語  
文版本):  
0:English(英文)  
1:Chinese(中文)

page up page down

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



S5

Clear motor timer:  
Operating code use:  
Operating code:

page up page down

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 Page down

S6

Error message 1-5

page up page down

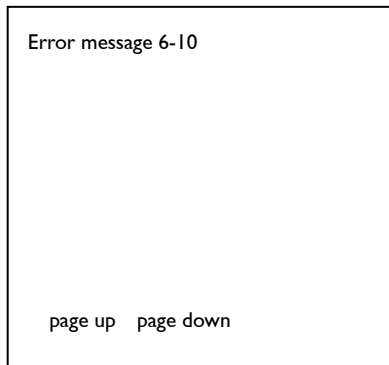
Frequent Error message history records from Items 1 to 5.



Press Page down

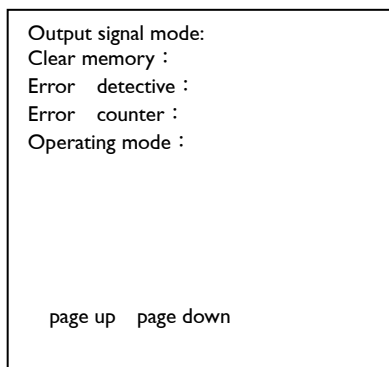


S7



Press Page down

S8



Frequent Error message history records from Items 6 to 10.

1. Output signal mode:

Press "0" is PLC mode ; Press "1" is Timer Mode with alarm ◦

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.

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



## 4.6 Instruction of System Mode

### 4.6.1 Instruction of TIMER Mode

After selecting TIMER Mode, use Hand-Set to set greasing frequency interval and timing. Below are operating examples of each model.

#### 4.6.1.1 Model LUG-411

```

Mode Selection :
0 : PLC      1 : TIMER  2 : PLC1
PI cycle :      days
             hours   minutes
PI motion :      times
P2 cycle :      days
             hours   minutes
P2 motion :      times

page up  page down

```



Press Page down

```

Power voltage: .
PI cycle and timer :
cycle:
Timer:
P2 cycle and timer :
cycle:
Timer:

page up  page down

```



Press Page down

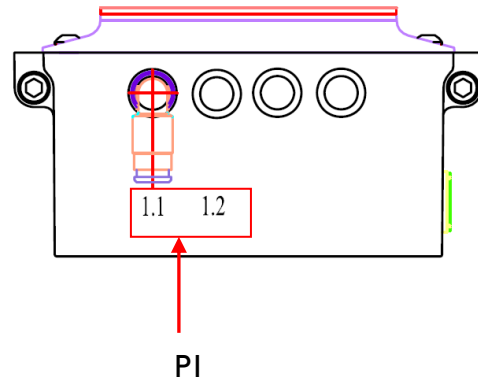
```

Power voltage: .
PI cycle and timer :
cycle:
Timer:
P2 cycle and timer :
cycle:
Timer:

page up  page down

```

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



Time elapsed 8 minutes



Power voltage: .  
 P1 cycle and timer :  
 cycle:  
 Timer:  
 P2 cycle and timer :  
 cycle:  
 Timer:  
 I.1 operating  
 page up page down

Timer countdown finishes, system restarts countdown again.

Pump 1 begins dispensing grease 0.15 cm<sup>3</sup> at Outlet 1.1.



Power voltage: .  
 P1 cycle and timer :  
 cycle:  
 Timer:  
 P2 cycle and timer :  
 cycle:  
 Timer:  
 I.1 operating  
 page up page down

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<sup>3</sup> grease.



Power voltage: .  
 P1 cycle and timer :  
 cycle:  
 Timer:  
 P2 cycle and timer :  
 cycle:  
 Timer:  
 page up page down

P1 cycle records 2 cycles as total no. of stroke in outlet 1.1 with total grease 0.3cm<sup>3</sup>.



### 4.6.1.2 Model LUG-412

```

Mode Selection :
0 : PLC   1 : TIMER  2 : PLC1
PI cycle :      days
             hours  minutes
PI motion :     times
P2 cycle :      days
             hours  minutes
P2 motion :     times

page up  page down

```



Press Page down

```

Power voltage:
PI cycle and timer :
cycle:
Timer:
P2 cycle and timer :
cycle:
Timer:

page up  page down

```



```

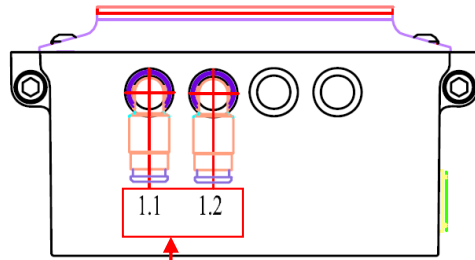
Power voltage:
PI cycle and timer :
cycle:
Timer:
P2 cycle and timer :
cycle:
Timer:

page up  page down

```



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



PI

Time elapsed 8 minutes



Power voltage: .  
 P1 cycle and timer :  
 cycle:  
 Timer:  
 P2 cycle and timer :  
 cycle:  
 Timer:  
 I.1 operating  
 page up page down

Timer countdown finishes, system restarts countdown again.

Pump 1 begins dispensing grease 0.15 cm<sup>3</sup> at Outlet I.1.



Power voltage: .  
 P1 cycle and timer :  
 cycle:  
 Timer:  
 P2 cycle and timer :  
 cycle:  
 Timer:  
 I.2operating  
 page up page down

P1 cycle records 1 cycle as total no. of stroke

Pump 1 begins dispensing grease 0.15 cm<sup>3</sup> at Outlet I.2.



Power voltage: .  
 P1 cycle and timer :  
 cycle:  
 Timer:  
 P2 cycle and timer :  
 cycle:  
 Timer:  
 page up page down

P1 cycle records 2 cycles as total no. of stroke with each outlet I.1 & I.2 dispensing 0.15 cm<sup>3</sup> total grease 0.3cm<sup>3</sup>



### 4.6.1.3 Model LUG-422

Set PI Outlet I.1 to perform greasing.

```

Mode Selection :
0 :PLC   1 :TIMER  2::PLC I
PI cycle :      days
           hours  minutes
PI motion :     times
P2 cycle :      days
           hours  minutes
P2 motion :     times

page up  page down

```

Select I Timer Mode, then set PI cycle time 4hours and PI motion 2 times. This means after 4 hours PI will push 2 strokes at outlet I.1 total grease dispenses 0.3cm<sup>3</sup>



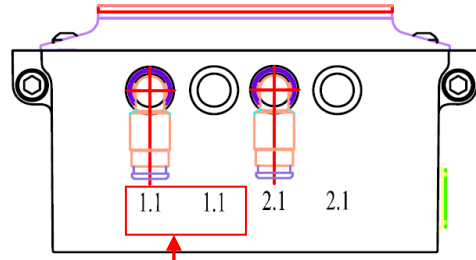
Press Page down

```

Power voltage: .
PI cycle and timer :
cycle:
Timer:
P2 cycle and timer :
cycle:
Timer:

page up  page down

```



P1



```

Power voltage: .
PI cycle and timer :
cycle:
Timer:
P2 cycle and timer :
cycle:
Timer:

page up  page down

```

Time elapsed 8 minutes





Power voltage: .  
 P1 cycle and timer :  
 cycle:  
 Timer:  
 P2 cycle and timer :  
 cycle:  
 Timer:  
 I.1 operating  
 page up page down

Timer countdown finishes, system restarts countdown again.

Pump I begins dispensing grease 0.15 cm<sup>3</sup>at Outlet I.1.



Power voltage: .  
 P1 cycle and timer :  
 cycle:  
 Timer:  
 P2 cycle and timer :  
 cycle:  
 Timer:  
 I.2 operating  
 page up page down

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

Outlet I.2 is completely sealed; therefore outlet I.1 will dispense again 0.15cm<sup>3</sup> grease.



Power voltage: .  
 P1 cycle and timer :  
 cycle:  
 Timer:  
 P2 cycle and timer :  
 cycle:  
 Timer:  
 page up page down

P1 cycle records 2 cycles as total no. of stroke in outlet I.1 with total grease 0.3cm<sup>3</sup>.





Set P2 Outlet 2.1 to perform greasing.

```

Mode Selection :
0 : PLC    1 : TIMER  2 :: PLC I
P1 cycle :      days
             hours   minutes
P1 motion :      times
P2 cycle :      days
             hours   minutes
P2 motion :      times

page up  page down

```



Press Page down

```

Power voltage: .
P1 cycle and timer :
cycle:
Timer:
P2 cycle and timer :
cycle:
Timer:

page up  page down

```



Press Page down

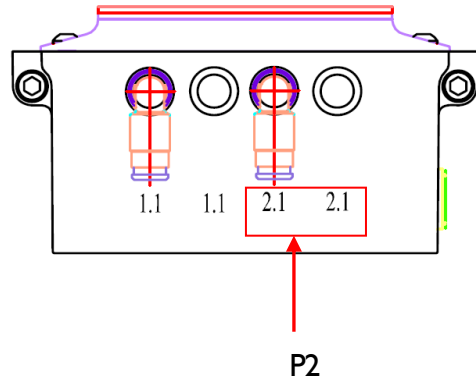
```

Power voltage: .
P1 cycle and timer :
cycle:
Timer:
P2 cycle and timer :
cycle:
Timer:

```



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



Time elapsed 8 minutes



Power voltage: .  
 P1 cycle and timer :  
 cycle:  
 Timer:  
 P2 cycle and timer :  
 cycle:  
 Timer:  
 2.1 operating  
 page up page down

Timer countdown finishes, system restarts countdown again.

Pump 2 begins dispensing grease 0.15 cm<sup>3</sup> at Outlet 2.1.



Power voltage: .  
 P1 cycle and timer :  
 cycle:  
 Timer:  
 P2 cycle and timer :  
 cycle:  
 Timer:  
 2.2 operating  
 page up page down

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<sup>3</sup> grease.



Power voltage: .  
 P1 cycle and timer :  
 cycle:  
 Timer:  
 P2 cycle and timer :  
 cycle:  
 Timer:  
 page up page down

P2 cycle records 2 cycles as total no. of stroke in outlet 2.1 with total grease 0.3cm<sup>3</sup>.



### 4.6.1.4 Model LUG-423

Set PI Outlet I.1 to perform greasing.

```

Mode Selection :
0 : PLC   1 : TIMER  2 : PLC1
PI cycle :      days
             hours   minutes
PI motion :     times
P2 cycle :      days
             hours   minutes
P2 motion :     times

page up  page down

```



Press Page down

```

Power voltage:
PI cycle and timer :
cycle:
Timer:
P2 cycle and timer :
cycle:
Timer:

page up  page down

```



Press Page down

```

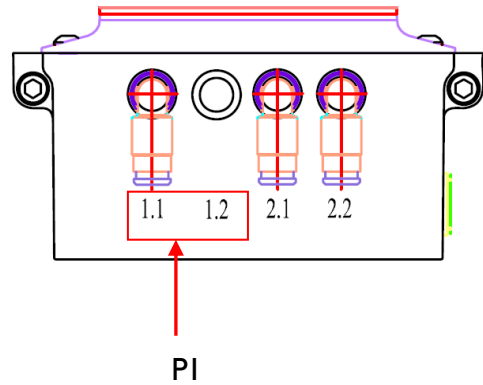
Power voltage:
PI cycle and timer :
cycle:
Timer:
P2 cycle and timer :
cycle:
Timer:

page up  page down

```



Select I Timer Mode, then set PI cycle time 4hours and PI motion 2 times. This means after 4 hours PI will push 2 strokes at outlet I.1 total dispenses 0.3cm<sup>3</sup>



Time elapsed 8 minutes



Power voltage: .  
P1 cycle and timer :  
cycle:  
Timer:  
P2 cycle and timer :  
cycle:  
Timer:  
I.1 operating  
page up page down

Timer countdown finishes, system restarts

Pump 1 begins dispensing grease 0.15 cm<sup>3</sup> at Outlet I.1.



Power voltage: .  
P1 cycle and timer :  
cycle:  
Timer:  
P2 cycle and timer :  
cycle:  
Timer:  
I.2 operating  
page up page down

P1 cycle records 1 cycle as total no. of stroke

Outlet I.2 is completely sealed; therefore outlet I.1 will dispense again 0.15cm<sup>3</sup> grease.



Power voltage: .  
P1 cycle and timer :  
cycle:  
Timer:  
P2 cycle and timer :  
cycle:  
Timer:  
page up page down

P1 cycle records 2 cycles as total no. of stroke in outlet I.1 with total grease 0.3cm<sup>3</sup>.



Set P2 Outlet 2.1 & 2.2 to perform greasing.

```

Mode Selection :
0 : PLC      1 : TIMER  2:: PLC I
P1 cycle :           days
             hours    minutes
P1 motion :           times
P2 cycle :           days
             hours    minutes
P2 motion :           times

page up  page down

```



Press Page down

```

Power voltage: .
P1 cycle and timer :
cycle:
Timer:
P2 cycle and timer :
cycle:
Timer:

page up  page down

```



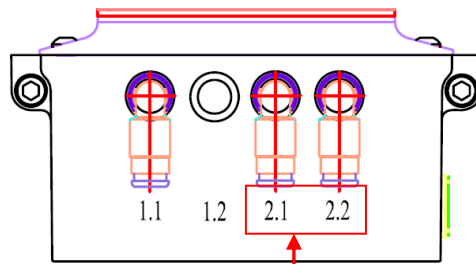
```

Power voltage: .
P1 cycle and timer :
cycle:
Timer:
P2 cycle and timer :
cycle:
Timer:

```



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 2<sup>nd</sup> stroke 0.15 cm<sup>3</sup>



P2

Time elapsed 8 minutes



```

Power voltage:      .
P1 cycle and timer :
cycle:
Timer:
P2 cycle and timer :
cycle:
Timer:
2.1 operating
page up  page down
  
```

Timer countdown finishes, system restarts countdown again.

Pump 2 begins dispensing grease 0.15 cm<sup>3</sup> at Outlet 2.1.



```

Power voltage:      .
P1 cycle and timer :
cycle:
Timer:
P2 cycle and timer :
cycle:
Timer:
2.2 operating
page up  page down
  
```

P2 cycle records 1 cycle as total no. of stroke

Pump 2 begins dispensing grease 0.15 cm<sup>3</sup> at Outlet 2.1.



```

Power voltage:      .
P1 cycle and timer :
cycle:
Timer:
P2 cycle and timer :
cycle:
Timer:
page up  page down
  
```

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



### 4.6.1.5 Model LUG-424

Set PI Outlet 1.1 & 1.2 to perform greasing.

```

Mode Selection :
0 :PLC   1 :TIMER  2::PLCI
PI cycle :      days
           hours   minutes
PI motion :     times
P2 cycle :      days
           hours   minutes
P2 motion :     times

page up  page down

```

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

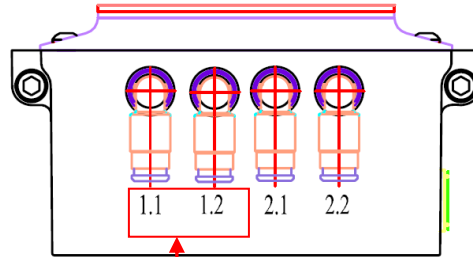
↓ Press Page down

```

Power voltage: .
PI cycle and timer :
cycle:
Timer:
P2 cycle and timer :
cycle:
Timer:

page up  page down

```



PI

↓

```

Power voltage: .
PI cycle and timer :
cycle:
Timer:
P2 cycle and timer :
cycle:
Timer:

page up  page down

```

← Time has elapsed 8 minutes

↓



Power voltage: .  
P1 cycle and timer :  
cycle:  
Timer:  
P2 cycle and timer :  
cycle:  
Timer:  
  
I.1 operating  
  
page up page down

Timer countdown finishes, system restarts countdown again.

Pump I begins dispensing grease 0.15 cm<sup>3</sup> at Outlet I.1.



Power voltage: .  
P1 cycle and timer :  
cycle:  
Timer:  
P2 cycle and timer :  
cycle:  
Timer:  
  
I.2 operating  
  
page up page down

P1 cycle records 1 cycle as total no. of stroke

Pump I begins dispensing grease 0.15 cm<sup>3</sup> at Outlet I.2.



Power voltage: .  
P1 cycle and timer :  
cycle:  
Timer:  
P2 cycle and timer :  
cycle:  
Timer:  
  
page up page down

P1 cycle records 2 cycles as total no. of stroke with each outlet I.1 & I.2 dispensing 0.15 cm<sup>3</sup> total grease 0.3cm<sup>3</sup>





Set P2 Outlet 2.1 & 2.2 to perform greasing.

```

Mode Selection :
0 : PLC      1 : TIMER  2 : PLC I
P1 cycle :   days
             hours    minutes
P1 motion :   times
P2 cycle :   days
             hours    minutes
P2 motion :   times

page up  page down

```

Press Page down

```

Power voltage:
P1 cycle and timer :
cycle:
Timer:
P2 cycle and timer :
cycle:
Timer:

page up  page down

```

↓

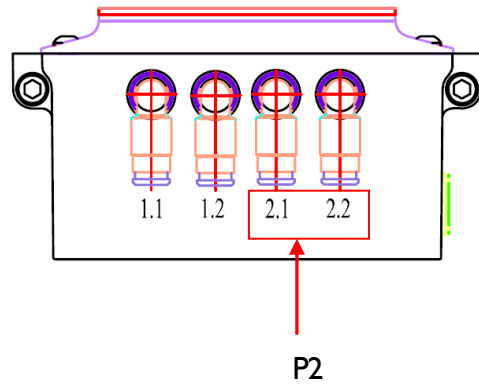
```

Power voltage:
P1 cycle and timer :
cycle:
Timer:
P2 cycle and timer :
cycle:
Timer:

```

↓

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 2<sup>nd</sup> stroke 0.15 cm<sup>3</sup>



Time elapsed 8 minutes



Power voltage: .  
P1 cycle and timer :  
cycle:  
Timer:  
P2 cycle and timer :  
cycle:  
Timer:  
2.1 operating  
page up page down

Timer countdown finishes, system restarts  
countdown again.

Pump 2 begins dispensing grease 0.15 cm<sup>3</sup> at  
Outlet 2.1.



Power voltage: .  
P1 cycle and timer :  
cycle:  
Timer:  
P2 cycle and timer :  
cycle:  
Timer:  
2.2 operating  
page up page down

P2 cycle records 1 cycle as total no. of stroke

Pump 2 begins dispensing grease 0.15 cm<sup>3</sup> at  
Outlet 2.2.



Power voltage: .  
P1 cycle and timer :  
cycle:  
Timer:  
P2 cycle and timer :  
cycle:  
Timer:  
page up page down

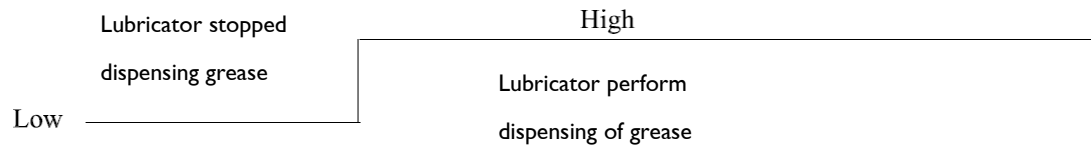
P2 cycle records 2 cycles as total no. of stroke per  
outlet 2.1 & 2.2 dispensing 0.15 cm<sup>3</sup> total grease  
0.3cm<sup>3</sup>



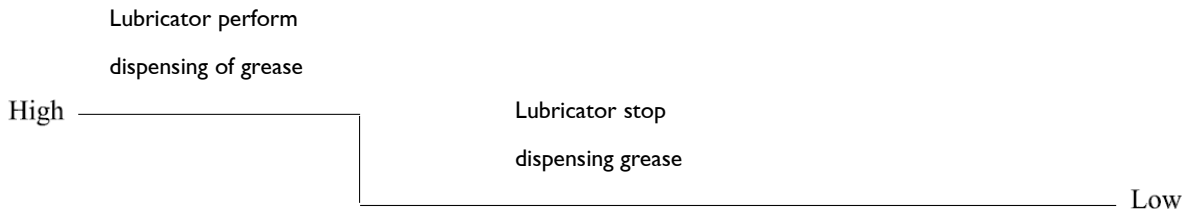
### 4.6.2 Instruction of PLC I

The main function of PLC I control mode is to set input to Lubricator power plug PIN 2 24V signal duration so as to control number of times each outlet will dispense grease. PLC machine received output signal, informing current status of Lubricator. Illustration diagram of PLC I control as below.

Lubricator power plug PIN 2 Input Signal waveform:



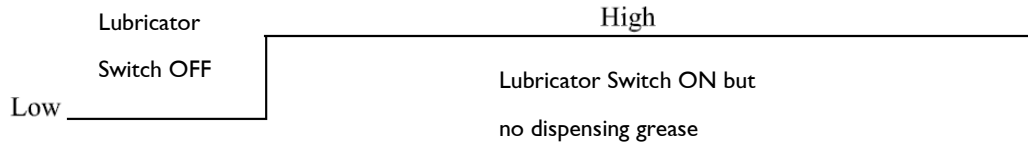
Lubricator PIN 2 keeps on receiving HIGH signal this can control each outlet to dispense grease continuously. Each Model of Lubricator will dispense grease one stroke per outlet as 0.15cm<sup>3</sup>



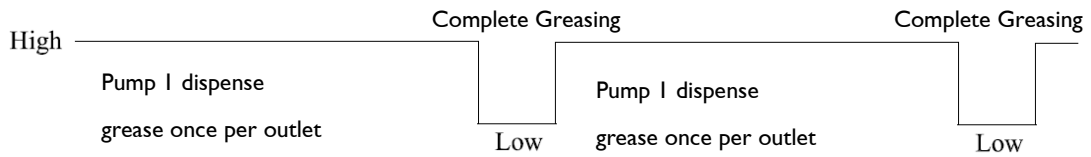
On receiving PIN 2 LOW signal, Lubricator will stop continuous dispensing of grease.



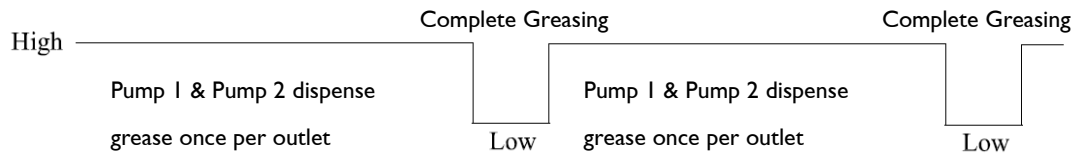
Lubricator power plug PIN I output Signal waveform:



Lubricator power ON, PIN I output Signal as HIGH ◦



Lubricator PI outlet perform dispensing of grease, the output signal remain as HIGH. After outlet completed dispensing grease, output Signal will change from HIGH to LOW lasts for 2 seconds, so that PLC knows PI outlet complete 1 time dispense of grease. This output signal corresponds to Lubricator model LUG-411 and LUG-412.



When Lubricator P1, P2 outlets is dispensing grease output signal remain as HIGH. After outlet completed dispensing grease, output Signal will change from HIGH to LOW lasts for 2 seconds, so that PLC knows P1, P2 outlet complete 1 time dispense of grease. This output signal corresponds to Lubricator model LUG-422 and LUG-423 and LUG-424.



### 4.6.3 Clear Motor Timer Setting

#### (I) Clear Motor Timer

Set I 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.

```

Clear motor timer:
Operating code use:
Operating code:

page up  page down
  
```

Key "Clear motor timer" as I.

↓ Press Page up again

```

Power voltage: .
P1 cycle and timer :
cycle:
Timer:
P2 cycle and timer :
cycle:
Timer:

page up  page down
  
```

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

↓

```

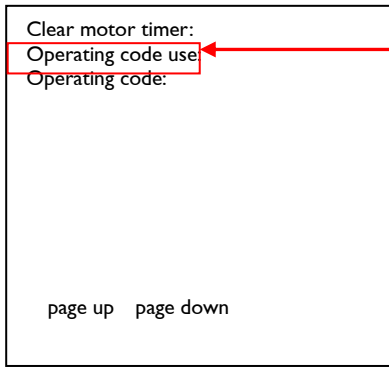
Power voltage: .
P1 cycle and timer :
cycle:
Timer:
P2 cycle and timer :
cycle:
Timer:

page up  page down
  
```

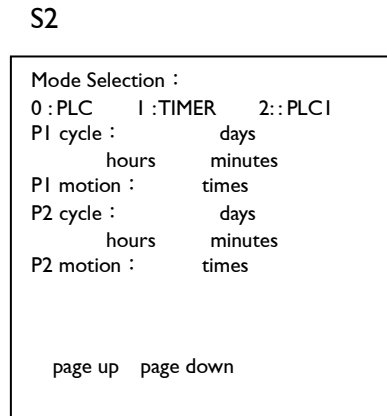
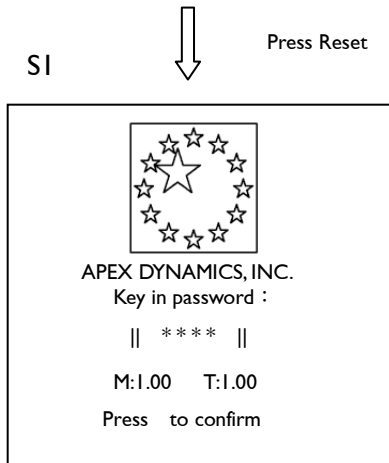
P1 & P2 records total no. of strokes / cycles will be erased.



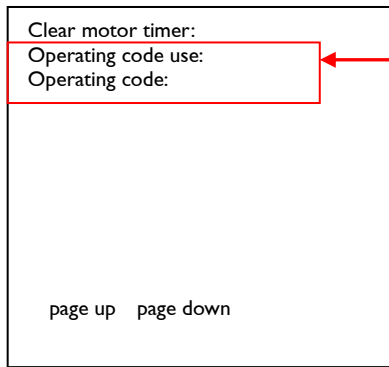
(2) Password Setting



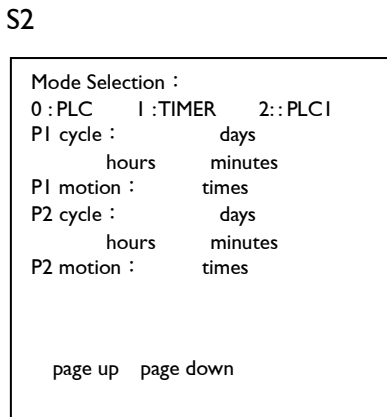
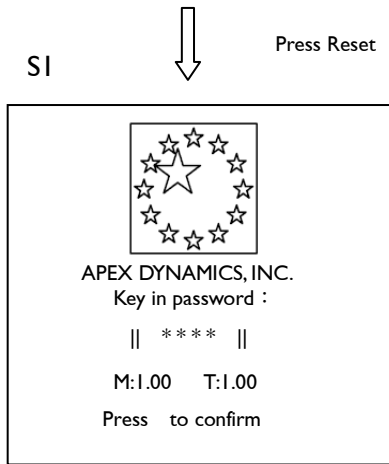
Set 0 "Operating code use" (No need to enter password), Press "SET" in S1 display and enter S2 screen.



Press Set



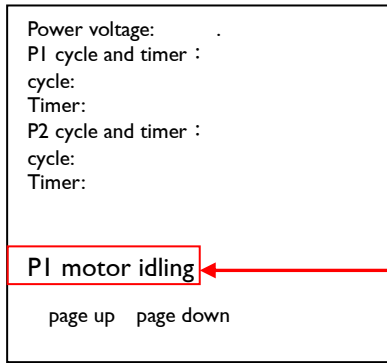
Set "Operating code use" as 1 and Set "Operating Code" as 1234, at this moment S1 screen require password. Enter "1234" to go S2 screen.



Key password 1234, and press Set

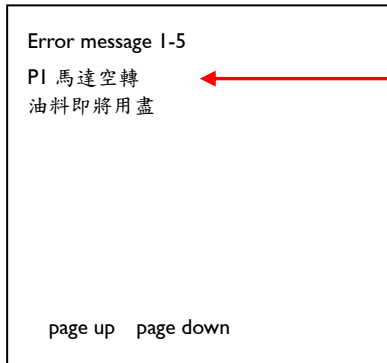


### 4.6.4 Description of Error Message



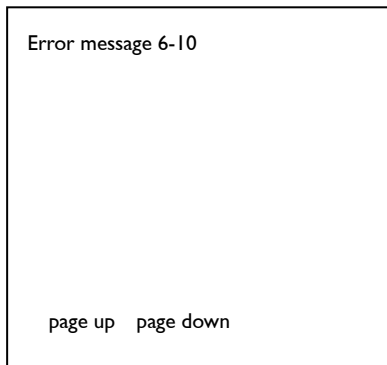
Error message appears on screen for example PI motor idling.

S6



“PI Motor idling” display in system “Error Message Record”, new message is displayed in S6 screen and total 5 error messages and then 6<sup>th</sup> message will be saved in S7screen.

S7



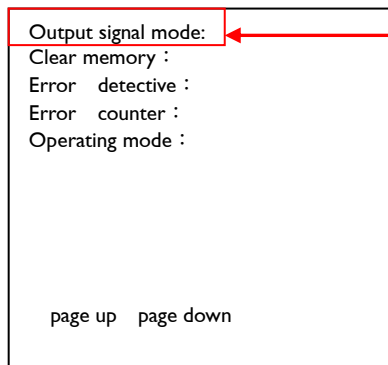


Error message description:

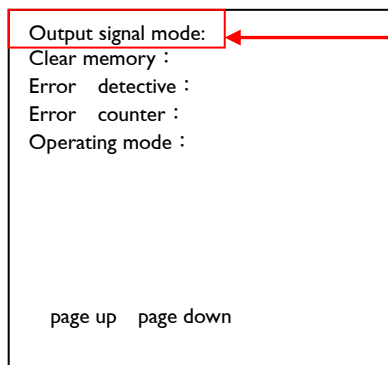
Error message	Description	Remedy
PI Motor Idle	Lubricator internal P1 motor idling.	Please refer Page 50
P2 Motor Idle	Lubricator internal P2 motor idling.	Please refer Page 50
P1 motor or pipe block	Lubricator internal P2 motor cannot rotate.	Please refer Page 50
P2 motor or pipe block	Lubricator internal P2 motor cannot rotate.	Please refer Page 50
Grease exhausted	Grease cartridge is empty.	Please refer Page 50
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 or Timer Mode. Instructions are as follows:



Set "Output Signal Mode" 0 for PLC control mode. Refer to Chapter 3.5 for PLC control mode illustration.



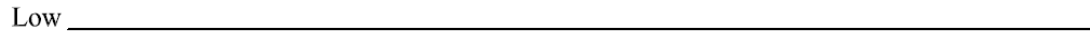
Function of Timer Mode, Set 1 as "Output Signal Mode".





Set “Output Signal Mode” as I, control mode as TIMER mode, power plug PIN I 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.

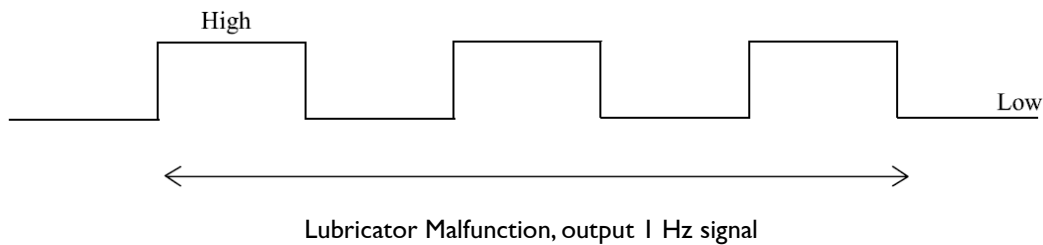
Lubricator Power OFF



Lubricator Power ON no occurrence of malfunction



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



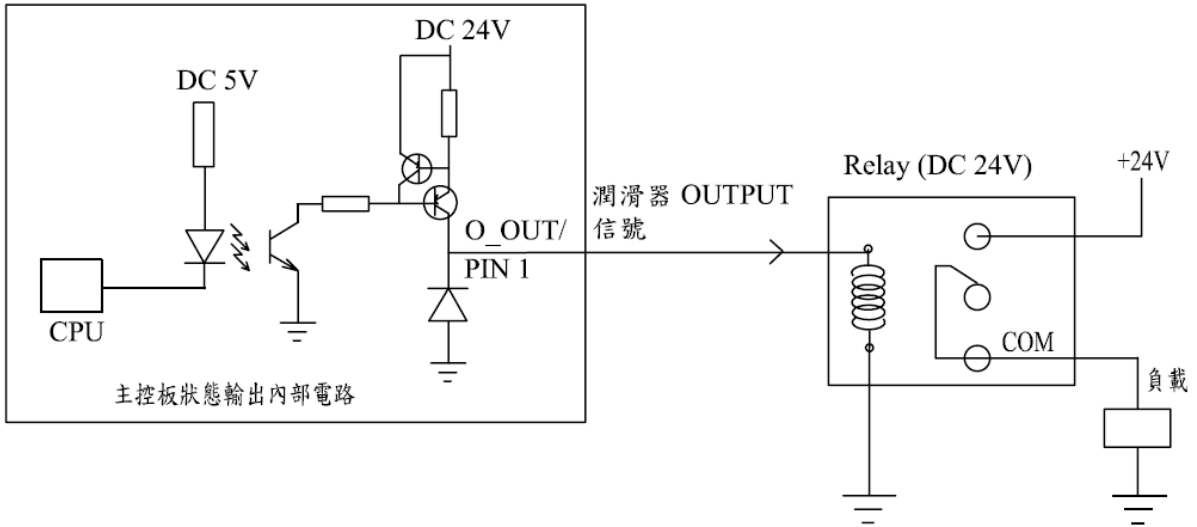
If the Lubricator malfunction, PIN I will continue to output 1 Hz signal, at this moment please refer to below table below for Lubricator troubleshooting .

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 Control Output Wiring Instruction

Wiring of Lubricator with alarm device.



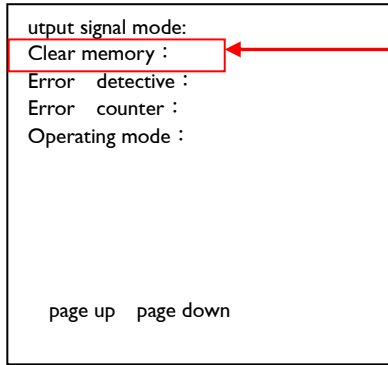
#### Lubricator Output Electrical Specification

Rated Voltage : DC 24V
------------------------

Maximum Output Current : 100mA
--------------------------------

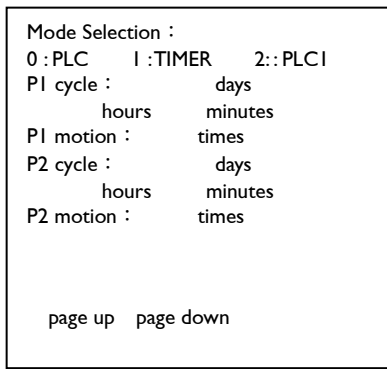


### 4.6.7 Clear Memory Illustration

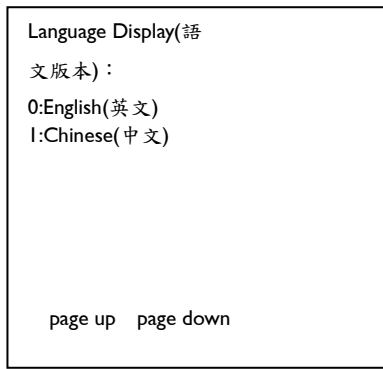


Set “Clear Memory” as 1, system will initialize lubricator parameters returning to its original manufacturer setting as shown below.

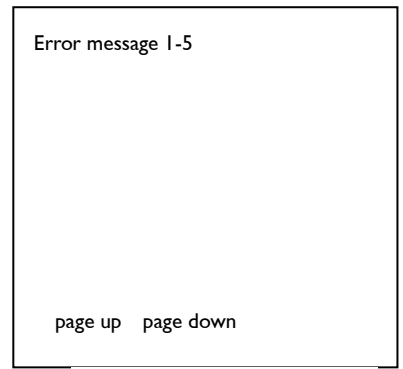
Set “Clear Memory” as 1 , Hand-Set all parameters return to original manufacturer setting.



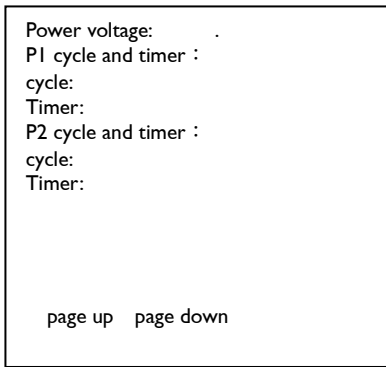
Manufacturer Setting



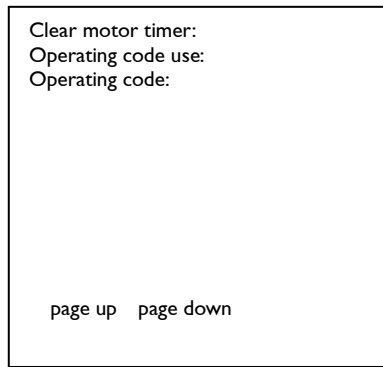
Manufacturer Setting



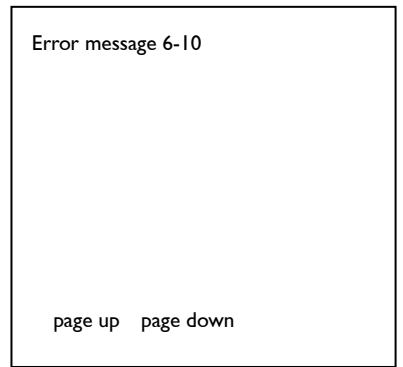
Manufacturer Setting



Manufacturer Setting



Manufacturer Setting

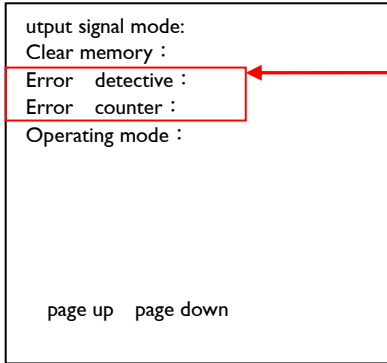


Manufacturer Setting



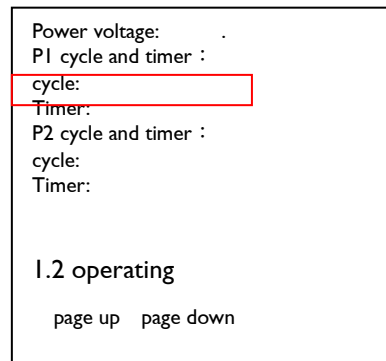
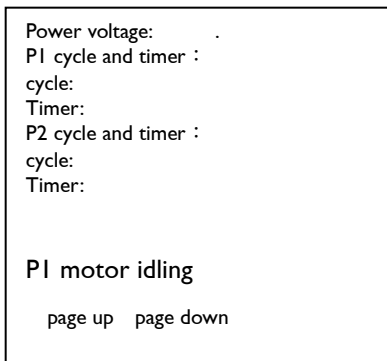
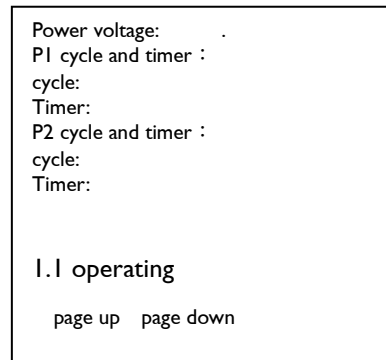
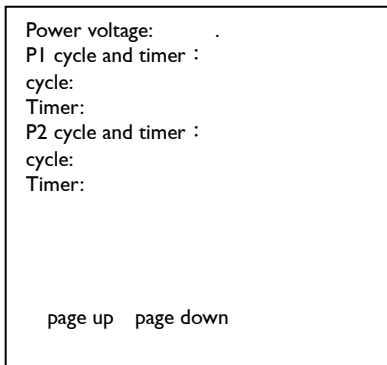
### 4.6.8 Motor Error Detective and Error Counter

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.

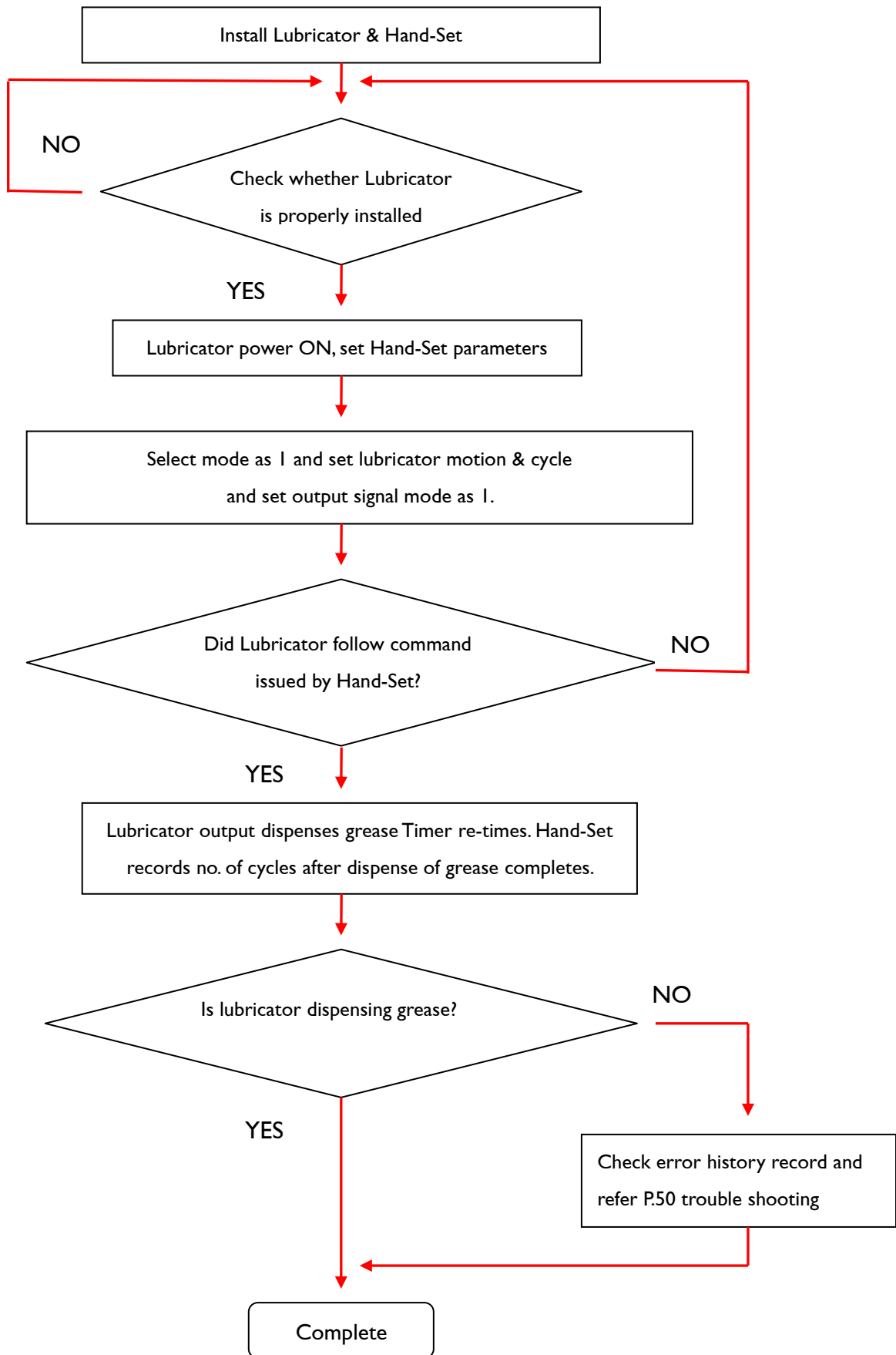


System detected P1 motor idling and no. of motor errors reached 2. Lubricator stopped dispensing grease and system displayed an error message.

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 Control)



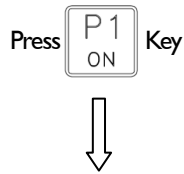


### 4.8 Instruction of Continuous Grease Dispensing.

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

#### Description of Set-Up Example

(I) Press PI on for continuous grease dispensing.



```

Power voltage:      .
P1 cycle and timer :
cycle:
Timer:
P2 cycle and timer :
cycle:
Timer:

I.1 operating

page up  page down
  
```

↓

Press “PI ON” key, PI Outlet will dispense grease continuously. Delivered volume of Outlet depends on model of Lubricator.

```

Power voltage:      .
P1 cycle and timer :
cycle:
Timer:
P2 cycle and timer :
cycle:
Timer:

I.2 operating

page up  page down
  
```

↓



Power voltage: .  
 P1 cycle and timer :  
 cycle:  
 Timer:  
 P2 cycle and timer :  
 cycle:  
 Timer:

**1.1 operating**

page up page down



Power voltage: .  
 P1 cycle and timer :  
 cycle:  
 Timer:  
 P2 cycle and timer :  
 cycle:  
 Timer:

page up page down

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

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



Power voltage: .  
 P1 cycle and timer :  
 cycle:  
 Timer:  
 P2 cycle and timer :  
 cycle:  
 Timer:

**2.1 operating**

page up page down

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





Power voltage: .  
 P1 cycle and timer :  
 cycle:  
 Timer:  
 P2 cycle and timer :  
 cycle:  
 Timer:

**2.2 operating**

page up page down



Power voltage: .  
 P1 cycle and timer :  
 cycle:  
 Timer:  
 P2 cycle and timer :  
 cycle:  
 Timer:

**2.1 operating**

page up page down



Press  Key

Power voltage: .  
 P1 cycle and timer :  
 cycle:  
 Timer:  
 P2 cycle and timer :  
 cycle:  
 Timer:

page up page down

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





## Appendix Lubrication Setting

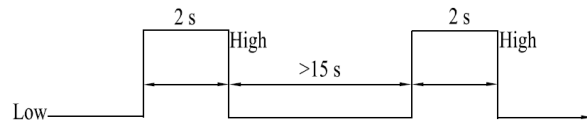
Due to various factors affecting the lubricator grease volume, APEX recommends lubrication volume and each model lubricator setting method for reference. Every lubricator output has single lubrication point.

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

### AppendixA-I PLC Control

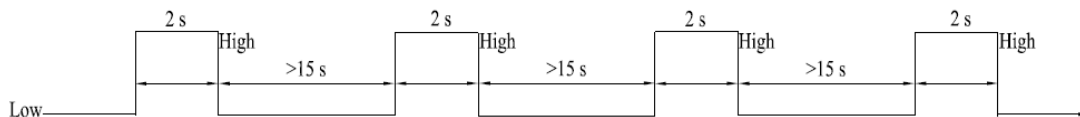
For every 24 hours, PLC sends the correct control signal to lubricator power plug PIN 2, Lubricator will dispense grease 0.3 cm<sup>3</sup> / 24h at output. Each lubricator model's control signal is displayed below:

#### AppendixA-I-1 Model LUG-411



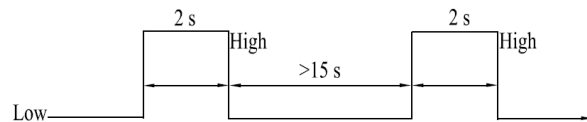
For every 24 hours, Lubricator received the PLC output signal above; outlet I.1 will dispense two strokes with total grease 0.3cm<sup>3</sup>.

#### AppendixA-I-2 Model LUG-412

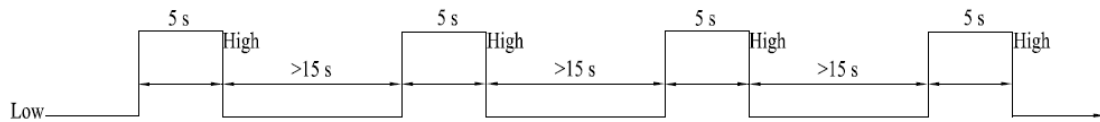


For every 24 hours, Lubricator received the PLC output signal above; outlet I.1 & I.2 will dispense two strokes per outlet with total grease 0.3cm<sup>3</sup>.

#### AppendixA-I-3 Model LUG-423

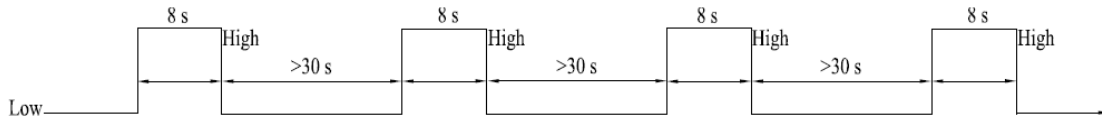


For every 24 hours, Lubricator received the PLC output signal above; outlet I.1 will dispense two strokes with total grease 0.3cm<sup>3</sup>.



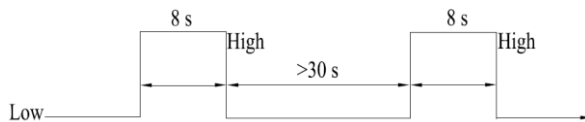
For every 24 hours, Lubricator received the PLC output signal above; outlet 2.1 & 2.2 will dispense two strokes per outlet with total grease 0.3cm<sup>3</sup>.

#### AppendixA-I-4Model 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<sup>3</sup>.

#### AppendixA-I-5Model 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<sup>3</sup>.



## AppendixA-2 TIMER 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<sup>3</sup> / 24h at output. An example illustrated below showing each lubricator model's operation.

### AppendixA-2-1 Model LUG-411

```

Mode Selection :
0 : PLC    1 : TIMER    2 : PLC I
PI cycle :      days
           hours    minutes
PI motion :      times
P2 cycle :      days
           hours    minutes
P2 motion :      times

page up  page down

```

Set 1 in selection mode, Key in PI cycle 1 day and Key in PI motion 2 strokes. For every 24 hour, Lubricator outlet 1.1 dispenses 2 strokes with grease 0.3 cm<sup>3</sup>.

### AppendixA-2-2 Model LUG-412

```

Mode Selection :
0 : PLC    1 : TIMER    2 : PLC I
PI cycle :      days
           hours    minutes
PI motion :      times
P2 cycle :      days
           hours    minutes
P2 motion :      times

page up  page down

```

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



### AppendixA-2-3Model LUG-423

```

Mode Selection :
0 : PLC      1 : TIMER  2 : PLC I
PI cycle :           days
             hours    minutes
PI motion :         times
P2 cycle :           days
             hours    minutes
P2 motion :         times

page up  page down

```

Set 1 in selection mode, Set PI cycle 1 day and PI 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<sup>3</sup> and outlet 2.1 & 2.2 dispenses 2 strokes per outlet with grease 0.3 cm<sup>3</sup>.

### AppendixA-2-4Model LUG-424

```

Mode Selection :
0 : PLC      1 : TIMER  2 : PLC I
PI cycle :           days
             hours    minutes
PI motion :         times
P2 cycle :           days
             hours    minutes
P2 motion :         times

page up  page down

```

Set 1 in selection mode, Set PI cycle 1 day and PI 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<sup>3</sup> and outlet 2.1 & 2.2 dispenses 2 strokes per outlet with grease 0.3 cm<sup>3</sup>.

### AppendixA-2-5Model LUG-422

```

Mode Selection :
0 : PLC      1 : TIMER  2 : PLC I
PI cycle :           days
             hours    minutes
PI motion :         times
P2 cycle :           days
             hours    minutes
P2 motion :         times

page up  page down

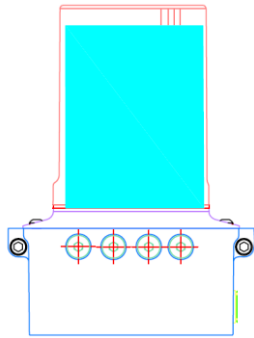
```

Set 1 in selection mode, Set PI cycle 1 day and PI 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<sup>3</sup> and outlet 2.1 dispenses 2 strokes with grease 0.3 cm<sup>3</sup>.



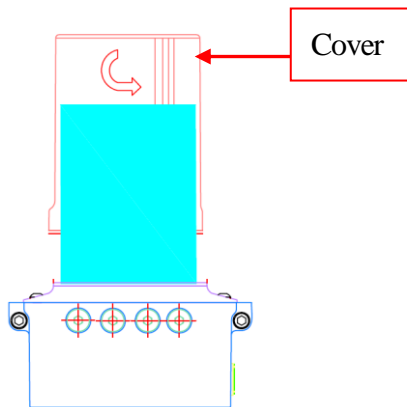
## Appendix B - Replacing New Cartridge

### STEP 1.



Unplug the power connection.

### STEP 2.



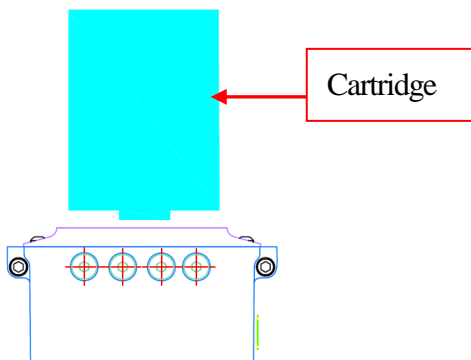
Press the housing and rotate the cover anti-clockwise as arrow and remove black pressure plate & spring.

### Caution



**MUST** pay attention to the lubricant level and also spring inside before opening housing of lubricator.

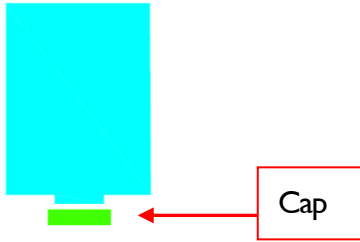
### STEP 3.



Pull the empty Cartridge upward.

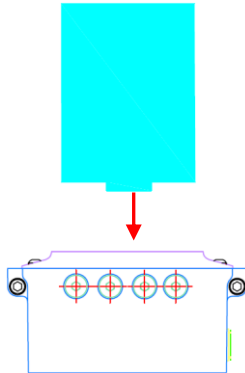


STEP 4.



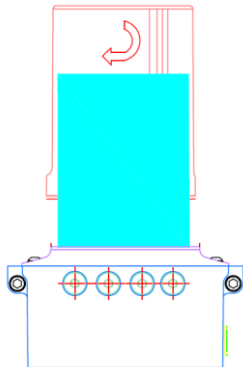
Remove the Cap from the new Cartridge.

STEP 5.



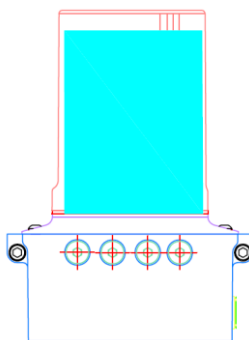
Insert New Cartridge to lubricator

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.