# 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

**Lubricator Side View**

Grease Cartridge

Grease Outlet

M6 Screw

Lubricator

5-Pin Socket 24DC Power wire

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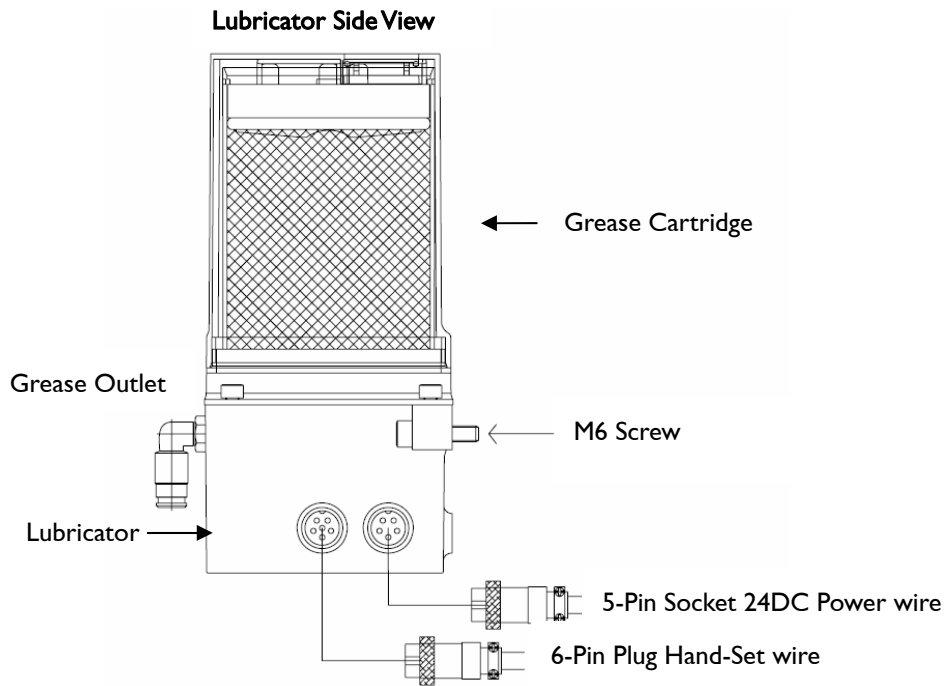
6-Pin Plug (**Hand-Set Wire**)

1.Output DC 24V

2.GND

3.I_BUSY/

4.RS485

5.RS485/

6-Pin Socket on Lubricator

5-Pin Socket (**Power Wire**)
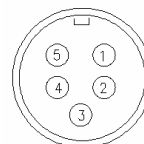
1.Output Signal

2.Input Signal

4.Input DC 24V

5.GND

5-Pin Plug on Lubricator
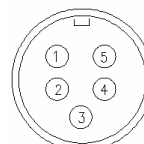
## 2.3 Outlet Position of Lubricator
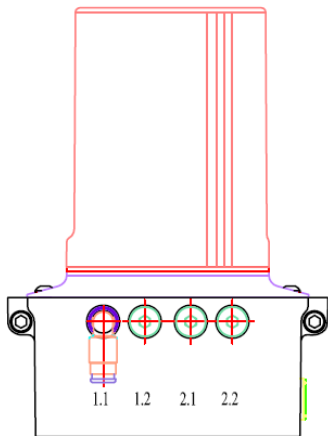


LUG-411
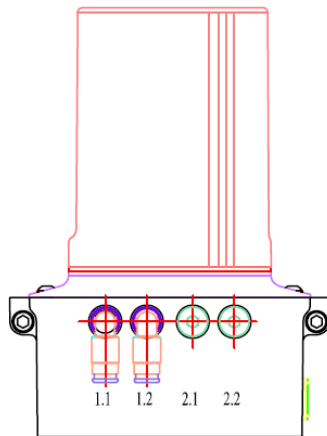


LUG-412
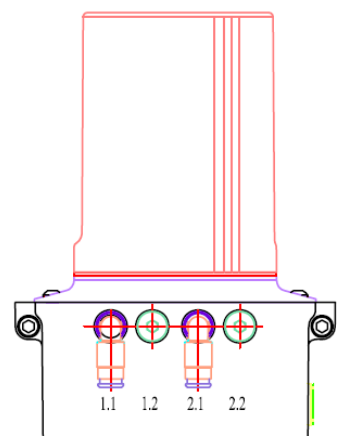


LUG-422
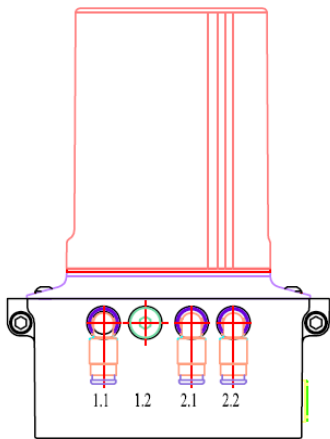


LUG-423
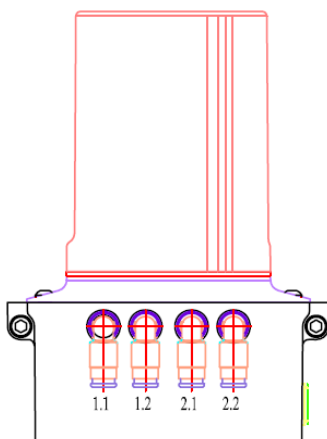


LUG-424

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.

Setup Position →

Use 2 pcs M6 screws and washers to install to suitable position (tightening torque suggests 5Nm)
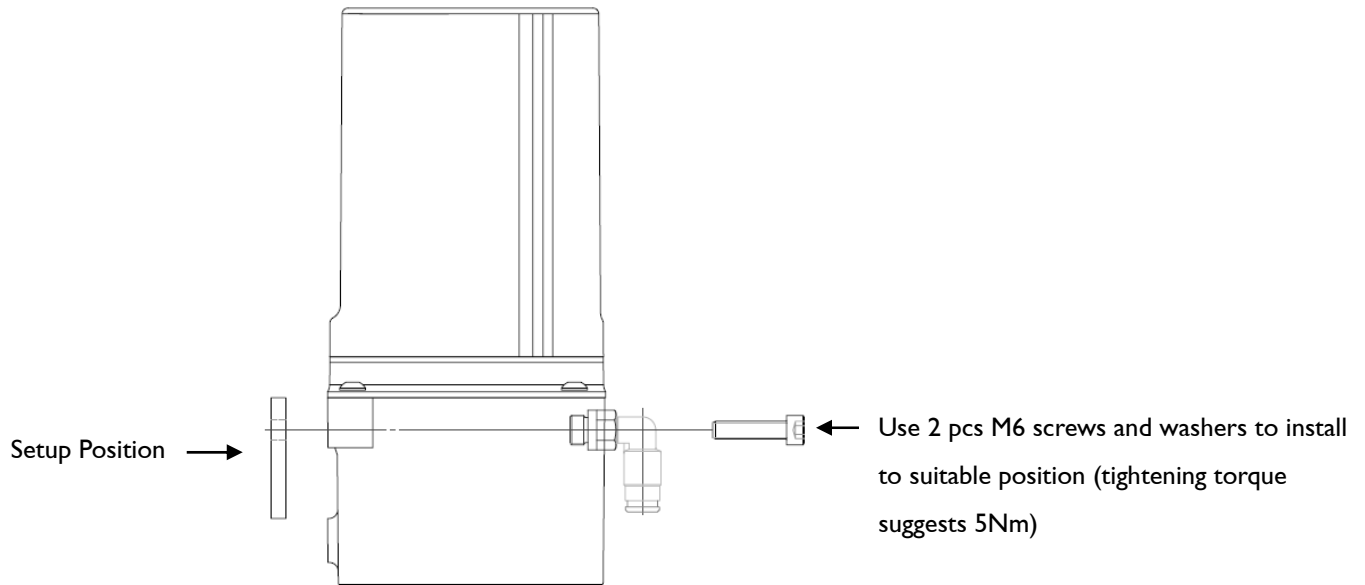
# 3. PLC Control

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

```
┌──────────────────┐                    ┌──────────────────┐
│                  │      ←             │ PIN 1  O_OUT/     │
│                  │      →             │ PIN 2  I_PULSE/   │
│                  │                    │                   │
│                  │      →             │ PIN 4  24V_IN     │
│                  │                    │ PIN 5  GND        │
│                  │                    │                   │
│                  │                    │                   │
│   PLC Machine    │                    │ Body of Lubricator│
│                  │                    │                   │
└──────────────────┘                    └──────────────────┘
```
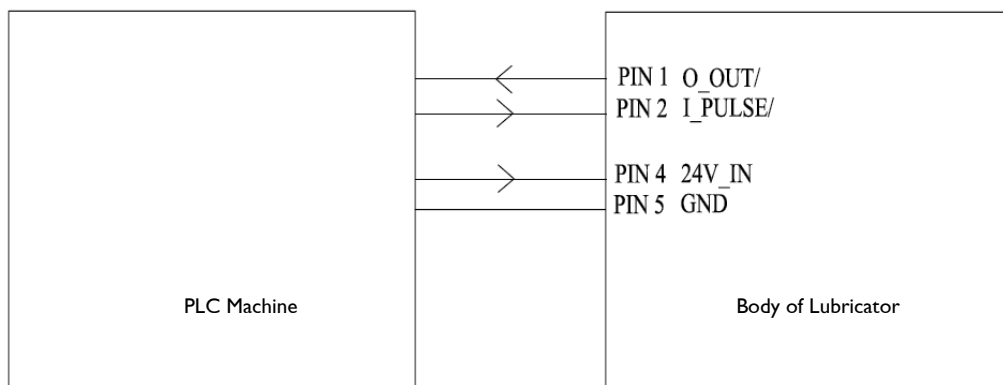
Circuit Protection Switch

(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.



PLC Machine

PLC Output Signal

I_PULSE/
PIN 2

DC 5V

CPU

Internal Circuit of Mother Board Command Input
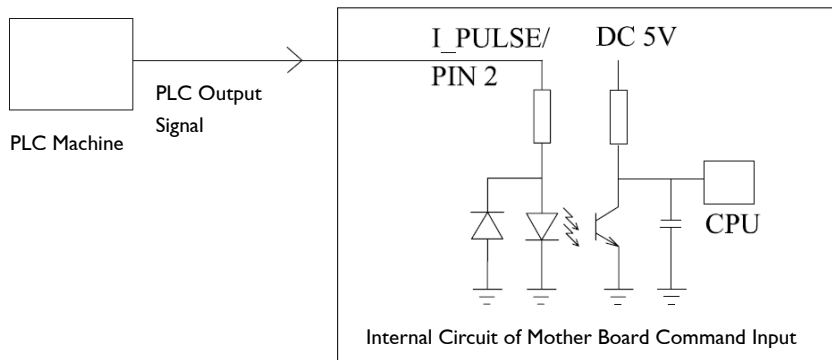
Lubricant Input Electrical Specifications

| 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
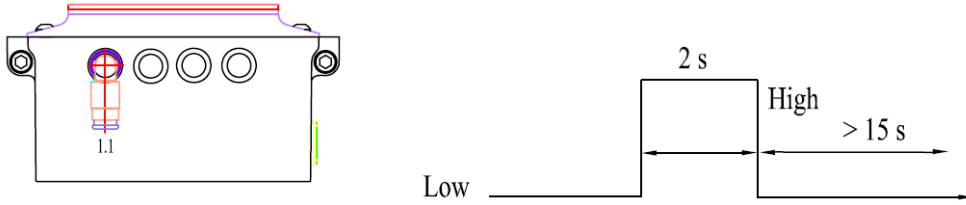


   Pump 1 pushed 1 stroke to outlet 1.1 dispensing 0.15cm$^3$ of grease when Lubricator received one 2s HIGH signal.
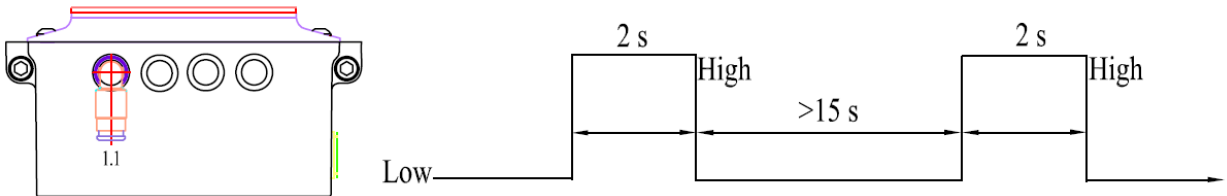


      Pump 1 pushed 2 strokes to outlet 1.1 dispensing 2 strokes of 0.15cm$^3$ of grease (total 0.3cm$^3$ grease) when Lubricator received two 2s HIGH signal. Ensure cycle intervals of two 2s HIGH signal are 15s.

### 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
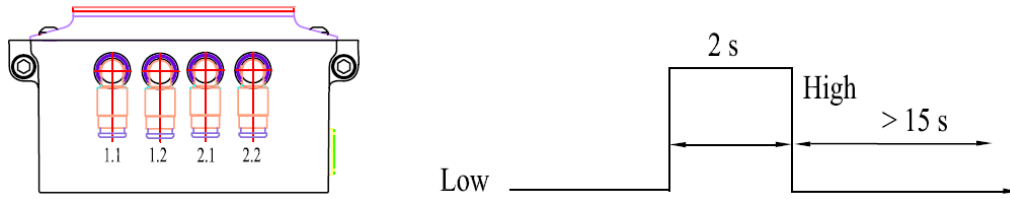


Pump 1 pushed 1 stroke to outlet 1.1 or 1.2 dispensing 0.15cm³ of grease when Lubricator received one 2s HIGH signal.



Pump 1 pushed 1 stroke to each outlet 1.1 and 1.2 dispensing 0.15cm³ of grease when Lubricator received two 2s HIGH signal. Ensure cycle intervals of two 2s HIGH signal are 15s.
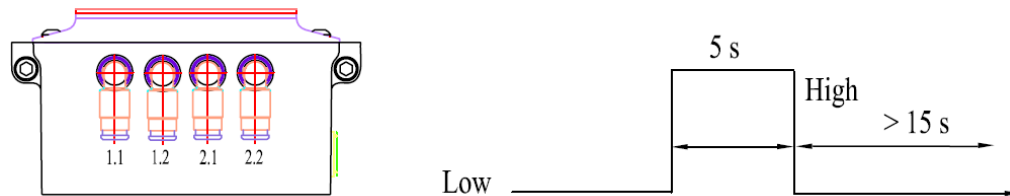


Pump 2 pushed 1 stroke to outlet 2.1 or 2.2 dispensing 0.15cm³ of grease when Lubricator received one 5s HIGH signal.



Pump 2 pushed 1 stroke to each outlet 2.1 and 2.2 dispensing 0.15cm³ of grease when Lubricator received two 5s HIGH signal. Ensure cycle intervals of two 5s HIGH signal is 15s.
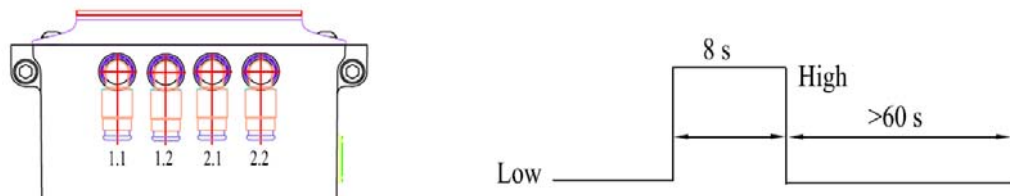


Pump 1 & Pump 2 pushed 1 stroke to each outlet 1.1, 1.2, 2.1 and 2.2 dispensing 0.15cm³ of grease when Lubricator received one 8s HIGH signal.
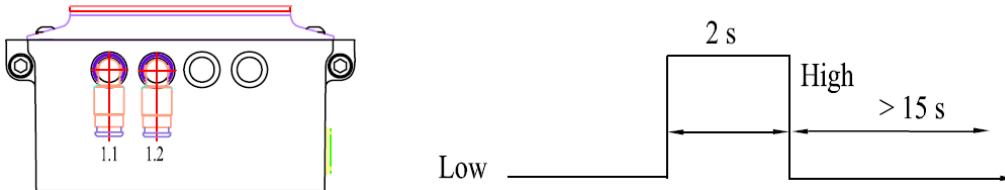
## 3.2.5 Model LUG-422
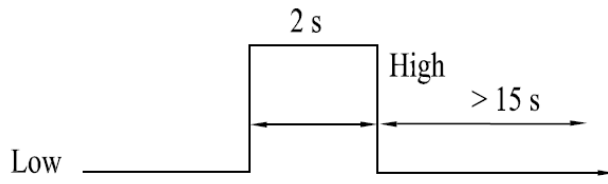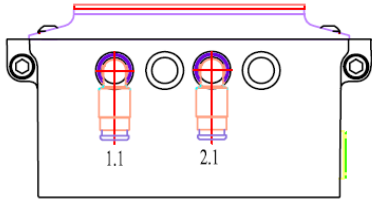


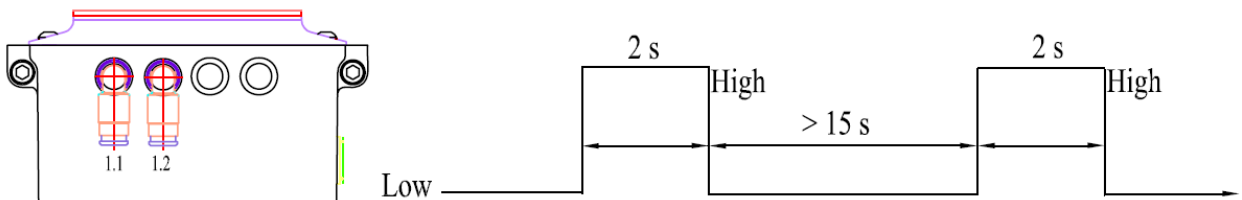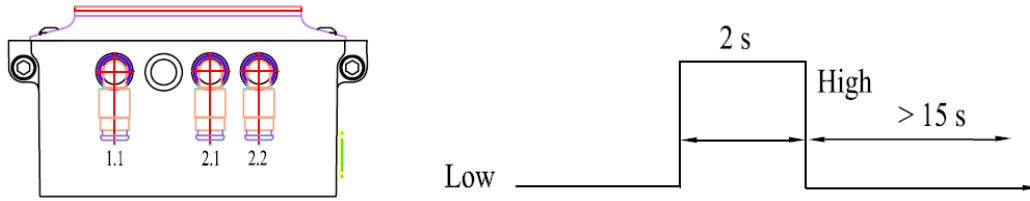Pump 1 pushed 1 stroke to outlet 1.1 dispensing $0.15cm^3$ of grease when Lubricator received one 2s HIGH signal.



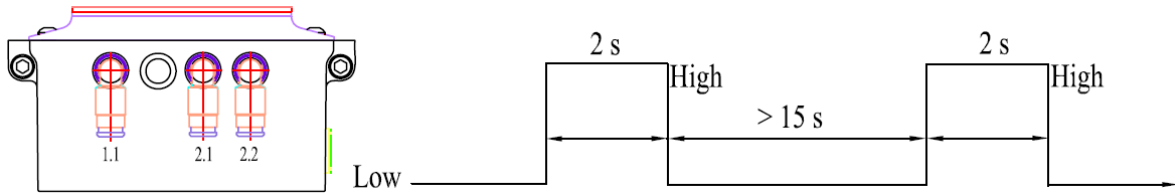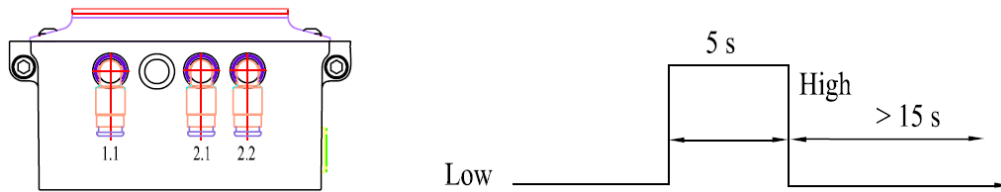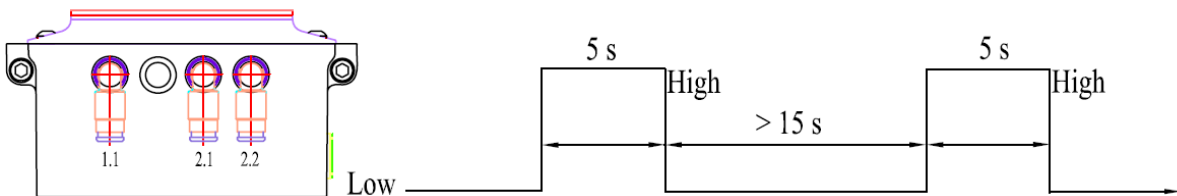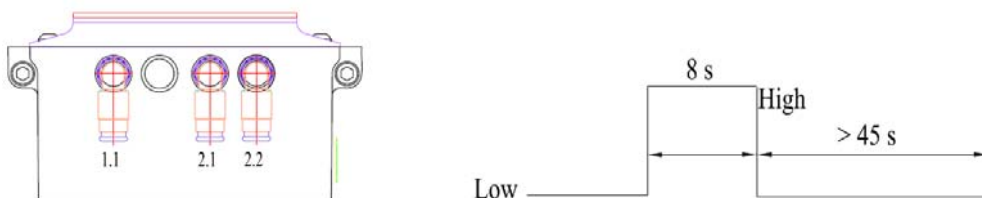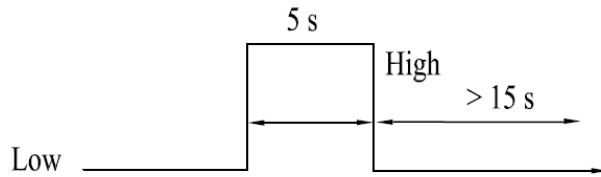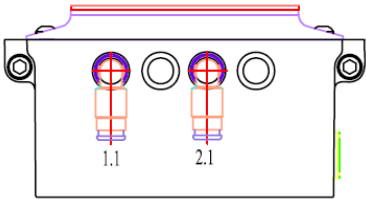Pump 2 pushed 1 stroke to outlet 2.1 dispensing $0.15cm^3$ of grease when Lubricator received one 5s HIGH signal.
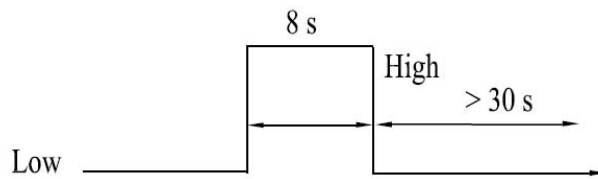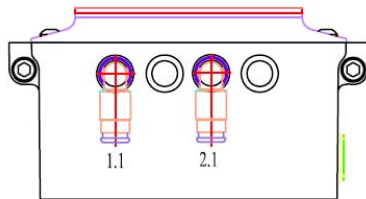


Pump 1 and Pump 2 pushed 1 stroke to each outlet 1.1 and 2.1 dispensing $0.15cm^3$ of grease when Lubricator received one 8s HIGH signal.

## 3.3 Additional Function

### 3.3.1 Filling of Empty Tube with Grease
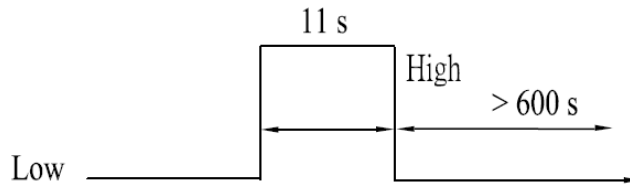


    May use PLC output 11s HIGH signal after completed installing Lubricator Tube to perform greasing continuously and user use this function to allow empty tube filled with grease. After receiving the PLC signal of each Lubricator model, volume of grease supply to each outlet as follows:

LUG-411:
1.1 Outlet : $10 \times 0.15\text{cm}^3 = 1.5\text{cm}^3$

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

LUG-423:
1.1 Outlet: $10 \times 0.15\text{cm}^3 = 1.5\text{m}^3$
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 : $10 \times 0.15\text{cm}^3 = 1.5\text{cm}^3$

All models have the same oil outlet $10 \times 0.15\text{cm}^3 = 1.5\text{cm}^3$

### 3.3.2 Release Trapped Air
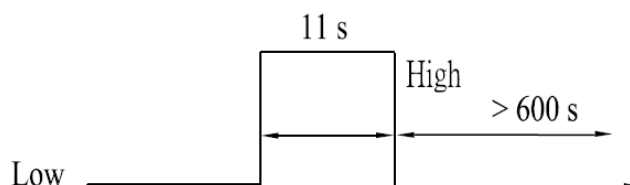


    May use PLC output 11s HIGH signal to perform greasing continuously and remove trapped air in internal tube.

## 3.4 Lubricator Installation Procedure (PLC Mode 0 Control)

```
┌─────────────────────────────────────┐
│     Lubricator and PLC Installation   │
└─────────────────────────────────────┘
```

NO

```
       Check Lubricator Installation and
       PLC output signal has correct setting.
```

YES

```
┌─────────────────────┐
│   Power ON Lubricator │
└─────────────────────┘
```

```
┌──────────────────────────────┐
│  PLC output signal controls time and │
│      stroke of Lubricator      │
└──────────────────────────────┘
```

```
       Lubricator detector received
              PLC signal
```

NO

YES

```
┌──────────────────────────────┐
│  Lubricator delivers grease to outlet │
└──────────────────────────────┘
```

```
       Ensure Lubricator is supplying
            grease to outlet.
```

NO

YES

```
┌──────────────────────────────┐   ┌──────────────────────────────┐
│ PLC received output signal message   │   │ Refer to Chapter 3.5 Trouble shooting │
│ "Grease Exhausted" from Lubricator,  │   └──────────────────────────────┘
│ then wait for next PLC message.      │
└──────────────────────────────┘
```

```
┌─────────────┐
│   Complete   │
└─────────────┘
```

## 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

No Power ON.                                    High

Low _____   Power ON, No dispensing of grease

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

High

Power ON, No dispensing of grease          Lubricator performing dispensing of grease

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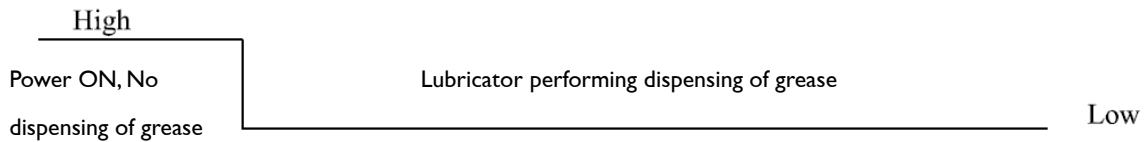
When Pin 1 output signal changed from HIGH to LOW, this means PLC knows Lubricator is performing dispensing of grease to outlet and at this moment Lubricator will ignore PLC command.

Lubricator perform dispensing of grease                            High

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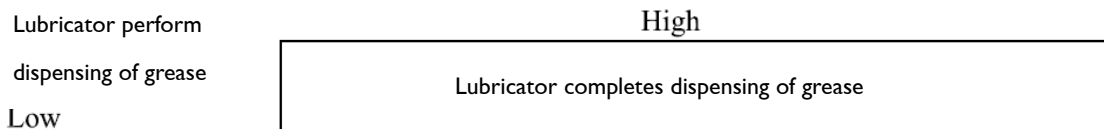
When Pin 1 output signal change from LOW to HIGH, this means PLC knows Lubricator completes dispensing of grease to outlet.

### 3.5.2 Waveform Pattern of Malfunction

High

Lubricator not Malfunction          Lubricator Malfunction

                                                                    Low

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 |

High

Lubricator low grease level,
Cartridge exhausted

Low

Lubricator Output signal 0.5Hz when Cartridge exhausted
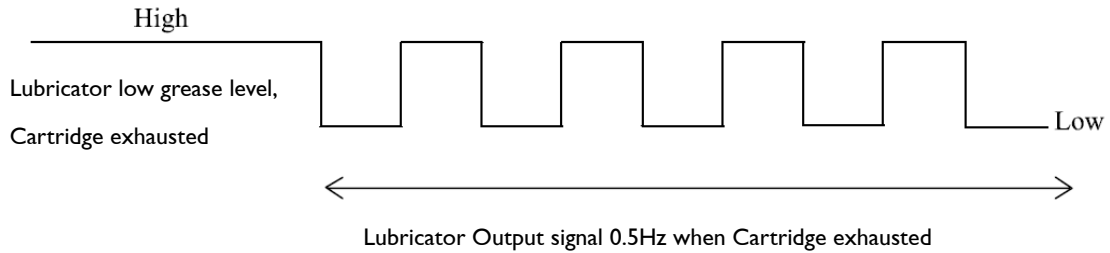
When the lubricator is running out of the lubricant, the magnet of the cartridge will be detected by internal sensor. Then PIN1 will output 0.5HZ signal continuously, and it will stops outlet oil. The lubricator requests to refill lubricant, then back to start outlet oil.

| 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.
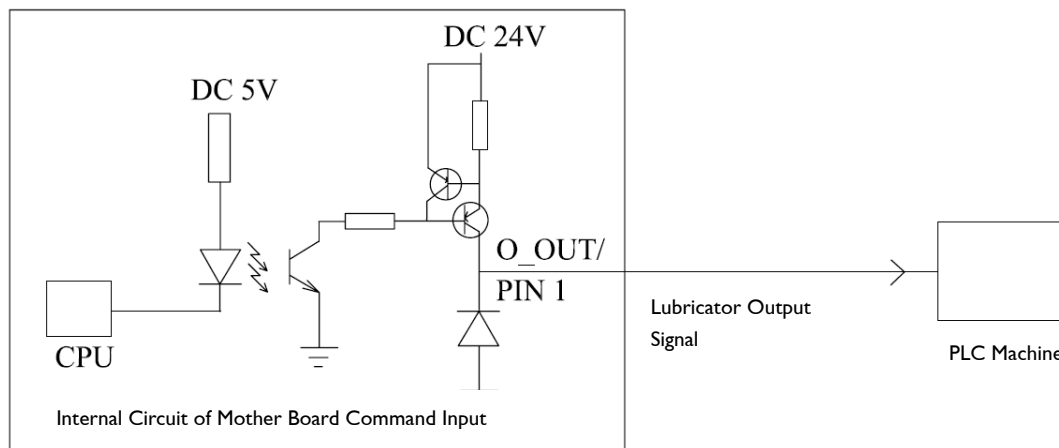
DC 24V

DC 5V

O_OUT/
PIN 1

Lubricator Output
Signal

CPU

PLC Machine

Internal Circuit of Mother Board Command Input

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

PIN 1  O_OUT/        Output Signal
PIN 2  I_PULSE/      Input Signal

PIN 4  24V_IN
PIN 5  GND

PLC Machine
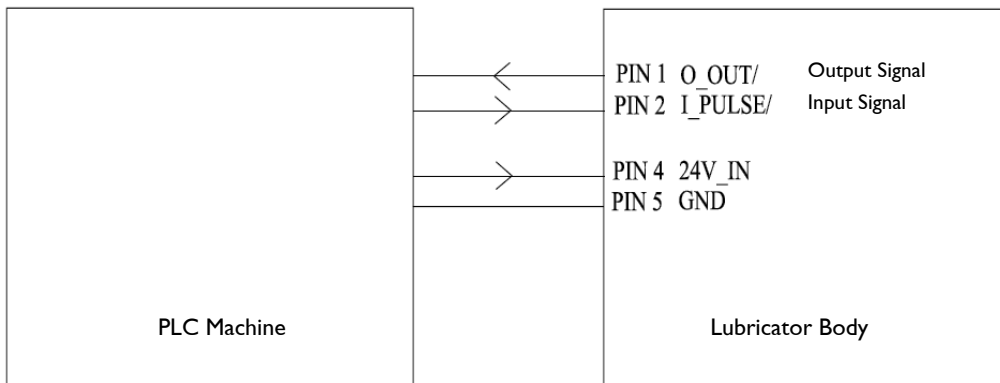
Lubricator Body

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

Power System Wiring diagram

Circuit Protection with No Fuse Breaker

Power

AC110V/220V



L1
L2

L1
L2

DC 24V
GND

PIN 1 O_OU'  Output Signal
PIN 2 I_PUL  Input Signal
PIN 3
PIN 4 24V_IN
PIN 5 GND

Power Supply

Lubricator Body

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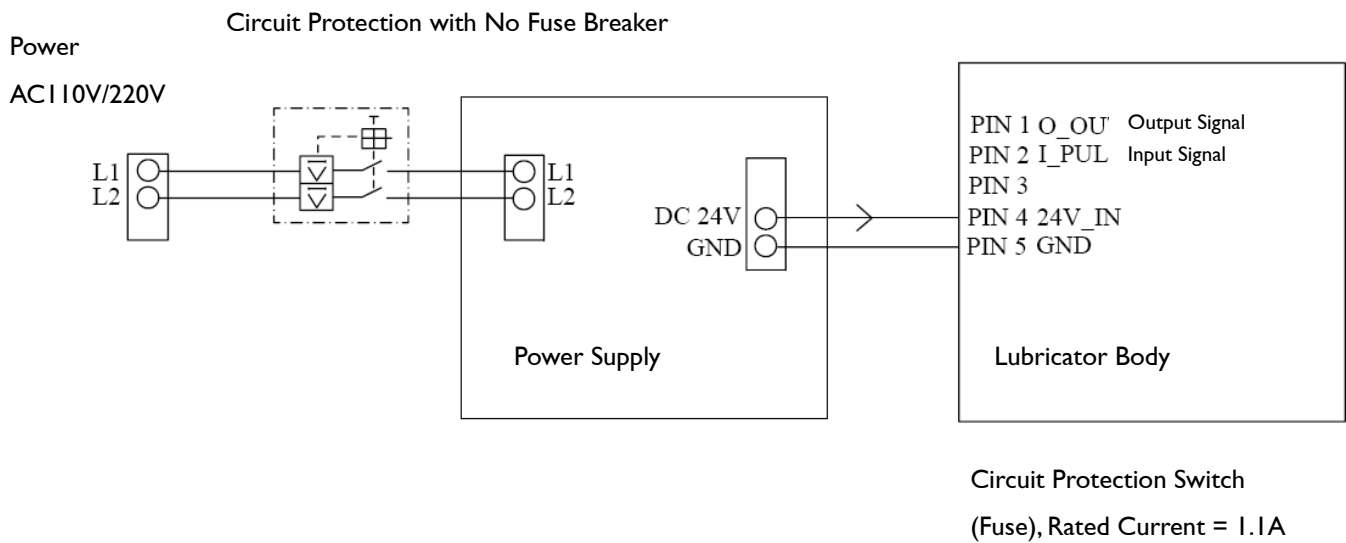
⚠ Warning

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



← Tuning knob
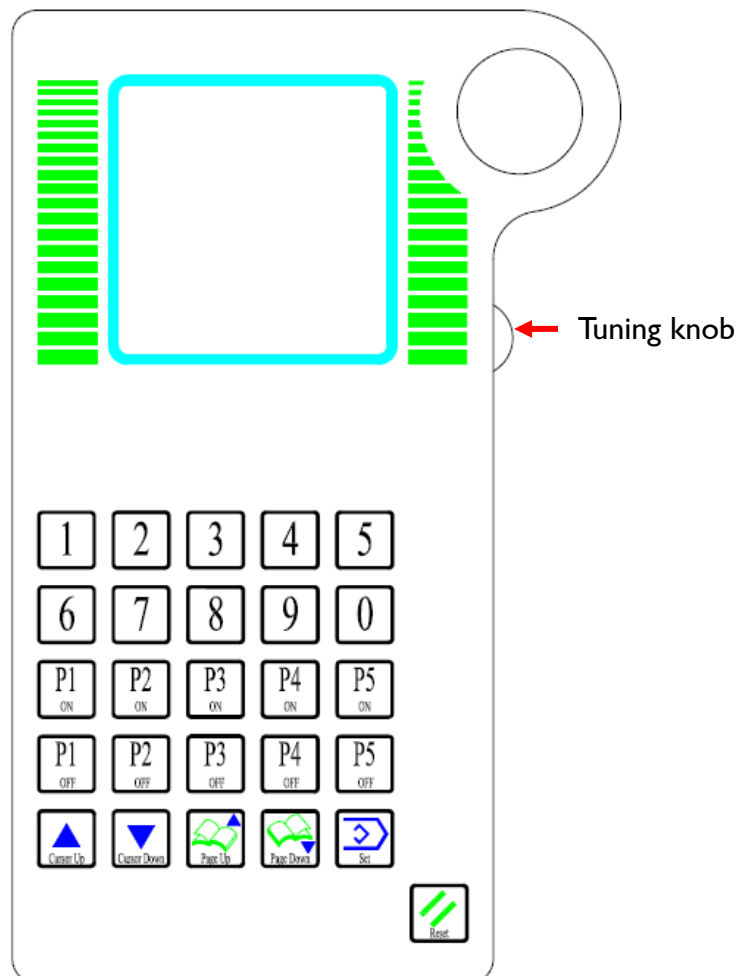
## 4.3 Function of Hand-Set

| | | | |
|---|---|---|---|
| 1 | Numerical Key1 | Set | Set |
| 2 | Numerical Key2 | System Reset | System Reset |
| 3 | Numerical Key3 | P1 ON | Pump 1 continuous dispensing |
| 4 | Numerical Key4 | P2 ON | Pump 2 continuous dispensing |
| 5 | Numerical Key5 | P3 ON | Pump 3 function only LUG-2000 |
| 6 | Numerical Key6 | P4 ON | Pump 3 function only LUG-2000 |
| 7 | Numerical Key7 | P5 ON | Pump 3 function only LUG-2000 |
| 8 | Numerical Key8 | P1 OFF | Pump 1 stop dispensing |
| 9 | Numerical Key9 | P2 OFF | Pump 2 stop dispensing |
| 0 | Numerical Key0 | P3 OFF | Pump 3 function only LUG-2000 |
| △ | Cursor Up | P4 OFF | Pump 4 function only LUG-2000 |
| ▽ | Cursor Down | P5 OFF | 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.<br>Key in password：<br><br>‖ **** ‖<br><br>M:1.00　　T:1.00<br>Press ⟩ to confirm | Clear motor timer: 0<br>Operating code use: 0<br>Operating code: 1234<br><br><br><br>◁page up▷page down | P1 ADC parameter: 00<br>P2 ADC parameter: 00<br><br><br><br>Unauthorized setting<br>prohibition |
| **S2** | **S6** | **S10** |
| Mode Selection： 0<br>0 : PLC　　1 :TIMER　　2: : PLC<br>P1 cycle： 000 days<br>　00 hours 00 minutes<br>P1 motion： 01 times<br>P2 cycle： 000 days<br>　00 hours 00 minutes<br>P2 motion： 01 times<br><br>◁page up▷page down | Error message 1-5<br><br><br><br><br><br>◁page up▷page down | Power voltage: 24.0<br>P1 cycle and timer：<br>cycle: 000001<br>Timer: 0000001<br>P2 cycle and timer：<br>cycle: 000001<br>Timer: 0000001<br><br>1.1 operating<br>◁page up▷page down |
| **S3** | **S7** | **S11** |
| Power voltage: 24.0<br>P1 cycle and timer：<br>cycle: 000001<br>Timer: 0000001<br>P2 cycle and timer：<br>cycle: 000001<br>Timer: 0000001<br><br><br>◁page up▷page down | Error message 6-10<br><br><br><br><br><br>◁page up▷page down | Power voltage: 24.0<br>P1 cycle and timer：<br>cycle: 000001<br>Timer: 0000001<br>P2 cycle and timer：<br>cycle: 000001<br>Timer: 0000001<br><br>1.2 operating<br>◁page up▷page down |
| **S4** | **S8** | **S12** |
| Language Display(語<br>文版本)：1<br>0:English(英文)<br>1:Chinese(中文)<br><br><br><br>◁page up▷page down | utput signal mode: 0<br>Clear memory： 0<br>Error detective： 0<br>Error counter： 01<br>Operating mode： 00<br><br>◁page up▷page down | Power voltage: 24.0<br>P1 cycle and timer：<br>cycle: 000001<br>Timer: 0000001<br>P2 cycle and timer：<br>cycle: 000001<br>Timer: 0000001<br><br>2.1 operating<br>◁page up▷page down |

| S13 | S17 | S21 |
|---|---|---|
| Power voltage:  24.0<br>P1 cycle and timer：<br>cycle: 000001<br>Timer: 0000001<br>P2 cycle and timer：<br>cycle: 000001<br>Timer: 0000001<br><br><br>2.2 operating<br><br>⊡page up⊡page down | Power voltage:  24.0<br>P1 cycle and timer：<br>cycle: 000001<br>Timer: 0000001<br>P2 cycle and timer：<br>cycle: 000001<br>Timer: 0000001<br><br><br>Motor2 or pipe block<br><br>⊡page up⊡page down | Power voltage:  24.0<br>P1 cycle and timer：<br>cycle: 000001<br>Timer: 0000001<br>P2 cycle and timer：<br>cycle: 000001<br>Timer: 0000001<br><br><br>INVALID COMMAND<br><br>⊡page up⊡page down |

| S14 | S18 | S22 |
|---|---|---|
| Power voltage:  24.0<br>P1 cycle and timer：<br>cycle: 000001<br>Timer: 0000001<br>P2 cycle and timer：<br>cycle: 000001<br>Timer: 0000001<br><br><br>P1 motor idling<br><br>⊡page up⊡page down | Power voltage:  24.0<br>P1 cycle and timer：<br>cycle: 000001<br>Timer: 0000001<br>P2 cycle and timer：<br>cycle: 000001<br>Timer: 0000001<br><br><br>Grease exhausted<br><br>⊡page up⊡page down | Power voltage:  24.0<br>P1 cycle and timer：<br>cycle: 000001<br>Timer: 0000001<br>P2 cycle and timer：<br>cycle: 000001<br>Timer: 0000001<br><br><br>Use in timer mode<br><br>⊡page up⊡page down |

| S15 | S19 | S23 |
|---|---|---|
| Power voltage:  24.0<br>P1 cycle and timer：<br>cycle: 000001<br>Timer: 0000001<br>P2 cycle and timer：<br>cycle: 000001<br>Timer: 0000001<br><br><br>P2 motor idling<br><br>⊡page up⊡page down | Power voltage:  24.0<br>P1 cycle and timer：<br>cycle: 000001<br>Timer: 0000001<br>P2 cycle and timer：<br>cycle: 000001<br>Timer: 0000001<br><br><br>Memory reading error<br><br>⊡page up⊡page down | Mode Selection：  0<br>0：PLC    1：TIMER    2：：PLC<br>P1 cycle：  00  days<br>  00  hours 00 minutes<br>P1 motion：  01 times<br>P2 cycle：  00  days<br>  00  hours 00 minutes<br>P2 motion：  01 times<br><br>RANGE 1~99<br><br>⊡page up⊡page down |

| S16 | S20 |  |
|---|---|---|
| Power voltage:  24.0<br>P1 cycle and timer：<br>cycle: 000001<br>Timer: 0000001<br>P2 cycle and timer：<br>cycle: 000001<br>Timer: 0000001<br><br><br>Motor1 or pipe block<br><br>⊡page up⊡page down | Power voltage:  24.0<br>P1 cycle and timer：<br>cycle: 000001<br>Timer: 0000001<br>P2 cycle and timer：<br>cycle: 000001<br>Timer: 0000001<br><br><br>Memory writing error<br><br>⊡page up⊡page down |  |

## 4.5 Procedure of Set-Up

S1

```
      ☆☆☆
    ☆ ⭐ ☆
   ☆      ☆
    ☆☆ ☆

 APEX DYNAMICS, INC.
   Key in password：

    ‖ **** ‖

   M:1.00  T:1.00
  Press ⊃ to confirm
```

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

⬇ Press Set

S2

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




□page up□page down
```
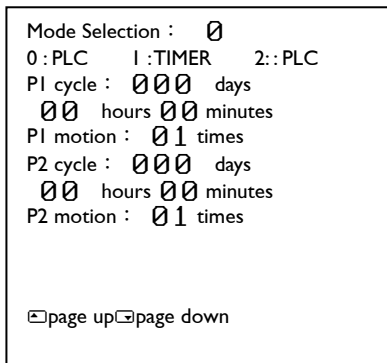
1.  Select Mode: Setting the lubricator control mode, 0 is the PLC mode 0 control. For details, please refer to Chapter 3: 1 is TIMER mode 1 control. detailed description refer to "Section 4.6.1". 2 is PLC mode 2 control, detailed description refer "Section 4.6.2". When setting mode 0 or mode 2, P1, 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

⬇ Press Page down

S3

```
Power voltage:  24.0
P1 cycle and timer：
cycle: 0 0 0 0 0 1
Timer: 0 0 0 0 0 0 1
P2 cycle and timer：
cycle: 0 0 0 0 0 1
Timer: 0 0 0 0 0 0 1




□page up□page down
```
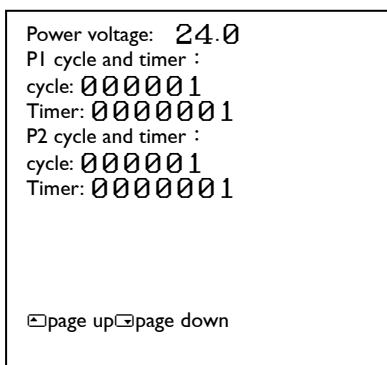
1.  Input Voltage: Displays 24V direct current supply to Lubricator

2.  P 1 Cycle: Displays total no. of strokes for P1 current 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.

⬇ Press Page down

S4

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



 ◁page up▷page down
```
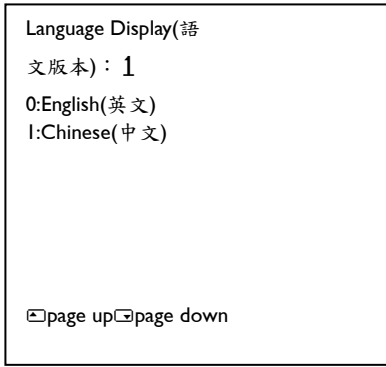
Hand-Set Language display setting key 0 for English or 1 for Chinese then press SET.

S5

```
Clear motor timer: 0
Operating code use: 0
Operating code: 1234




 ◁page up▷page down
```
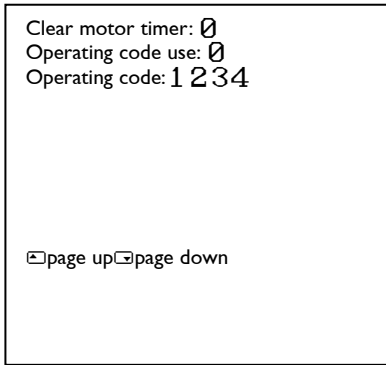
1. Clear motor timer records:

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 Set 1 to modify the password.

Press Page down

S6

```
Error message 1-5





 ◁page up▷page down
```
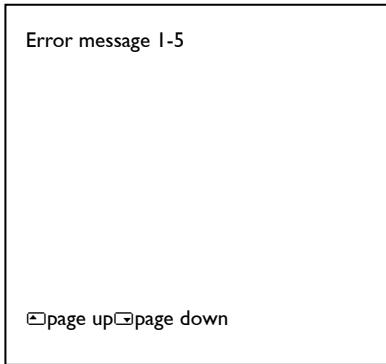
Frequent Error message history records from Items 1 to 5.

Press Page down

S7

```
┌─────────────────────────────┐
│                             │
│  Error message 6-10         │
│                             │
│                             │
│                             │
│                             │
│                             │
│                             │
│  ▱page up▱page down         │
│                             │
└─────────────────────────────┘
```

Press Page down

S8

```
┌─────────────────────────────┐
│  Output signal mode: 0      │
│  Clear memory：  0          │
│  Error   detective： 0      │
│  Error   counter： 0 1      │
│  Operating mode： 0 0       │
│                             │
│                             │
│                             │
│                             │
│                             │
│  ▱page up▱page down         │
│                             │
└─────────────────────────────┘
```
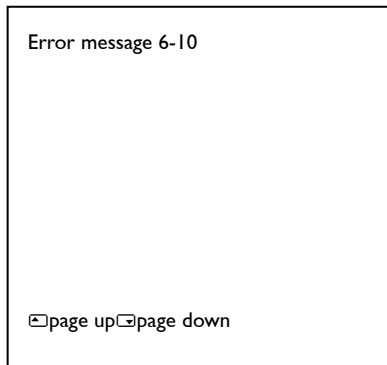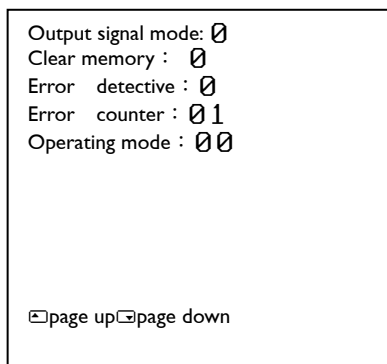
Press correct password on S1 display screen will go to S8 setting screen.
Password is 7890.

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.

## 4.6.1.1 Model LUG-411

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



⊡page up⊟page down
```

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$^3$

↓ Press Page down

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



⊡page up⊟page down
```



P1

↓ Press Page down

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



⊡page up⊟page down
```

Time elapsed 8 minutes

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



1.1 operating

□page up□page down
```

Timer countdown finishes, system restarts countdown again.

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

```
Power voltage:  24.0
P1 cycle and timer：
cycle: 000001
Timer: 0000240
P2 cycle and timer：
cycle: 0000000
Timer: 0000000



1.2 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$^3$ grease.

```
Power voltage:  24.0
P1 cycle and timer：
cycle: 000002
Timer: 0000240
P2 cycle and timer：
cycle: 000000
Timer: 0000000




□page up□page down
```

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

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



▢page up▢page down
```

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.

Press Page down

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



▢page up▢page down
```



P1

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



▢page up▢page down
```

Time elapsed 8 minutes

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


1.1 operating

⊟page up⊡page down
```

Timer countdown finishes, system restarts countdown again.

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

```
Power voltage:  24.0
P1 cycle and timer：
cycle: 000001
Timer: 0000240
P2 cycle and timer：
cycle: 0000000
Timer: 0000000


1.2operating

⊟page up⊡page down
```

P1 cycle records 1 cycle as total no. of stroke

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

```
Power voltage:  24.0
P1 cycle and timer：
cycle: 000002
Timer: 0000240
P2 cycle and timer：
cycle: 000000
Timer: 0000000




⊟page up⊡page down
```

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.

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



⊡page up⊟page down
```

Press Page down

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



⊡page up⊟page down
```

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



⊡page up⊟page down
```

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$^3$

P1

Time elapsed 8 minutes

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


1.1 operating

▱page up▱page down
```

Timer countdown finishes, system restarts countdown again.

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

```
Power voltage:   24.0
P1 cycle and timer：
cycle: 000001
Timer: 0000240
P2 cycle and timer：
cycle: 0000000
Timer: 0000000


1.2 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$^3$ grease.

```
Power voltage:   24.0
P1 cycle and timer：
cycle: 000002
Timer: 0000240
P2 cycle and timer：
cycle: 000000
Timer: 0000000




▱page up▱page down
```

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.

```
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
```

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$^3$

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
```



P2

Press 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

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

2.1 operating

◁page up▷page down
```

Timer countdown finishes, system restarts countdown again.

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

```
Power voltage:  24.0
P1 cycle and timer：
cycle: 000000
Timer: 0000000
P2 cycle and timer：
cycle: 000001
Timer: 0000240

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$^3$ grease.

```
Power voltage:  24.0
P1 cycle and timer：
cycle: 000000
Timer: 0000000
P2 cycle and timer：
cycle: 000002
Timer: 0000240




◁page up▷page down
```

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.

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



    page up  page down
```

Press Page down

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$^3$

```
Power voltage:  24.0
P1 cycle and timer：
cycle: ０００００
Timer: ０００２４０
P2 cycle and timer：
cycle: ０００００
Timer: ０００００



    page up  page down
```

Press Page down



P1

```
Power voltage:  24.0
P1 cycle and timer：
cycle: ０００００
Timer: ０００２３２
P2 cycle and timer：
cycle: ０００００
Timer: ０００００



    page up  page down
```

Time elapsed 8 minutes

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


1.1 operating


⊡page up⊡page down
```
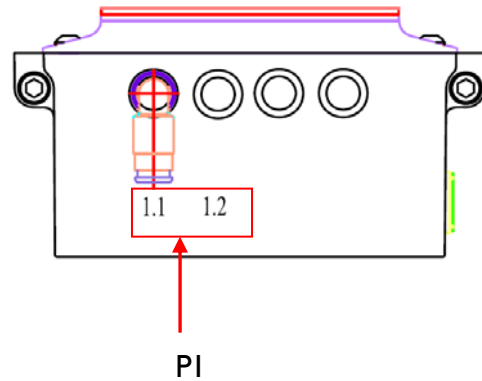
Timer countdown finishes, system restarts

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

```
Power voltage:   24.0
P1 cycle and timer：
cycle: 000001
Timer: 0000240
P2 cycle and timer：
cycle: 0000000
Timer: 0000000


1.2 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$^3$ grease.

```
Power voltage:   24.0
P1 cycle and timer：
cycle: 000002
Timer: 0000240
P2 cycle and timer：
cycle: 000000
Timer: 0000000




⊡page up⊡page down
```

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.

```
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

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 $2^{nd}$ stroke 0.15 cm$^3$

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



⏴page up⏵page down
```
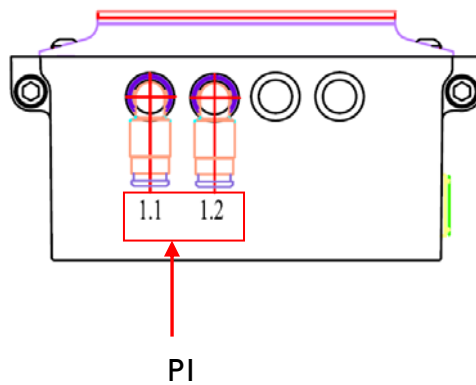
P2

```
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

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

2.1 operating

□page up□page down
```

Timer countdown finishes, system restarts countdown again.

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

```
Power voltage:  24.0
P1 cycle and timer：
cycle: 000000
Timer: 0000000
P2 cycle and timer：
cycle: 000001
Timer: 0000240

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$^3$ at Outlet 2.1.

```
Power voltage:  24.0
P1 cycle and timer：
cycle: 000000
Timer: 0000000
P2 cycle and timer：
cycle: 000002
Timer: 0000240



□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$^3$ total grease 0.3cm$^3$

## 4.6.1.5 Model LUG-424

Set P1 Outlet 1.1 & 1.2 to perform greasing.

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



 page up page down
```

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 1.1and then outlet 1.2 with 2nd stroke 0.15 cm$^3$
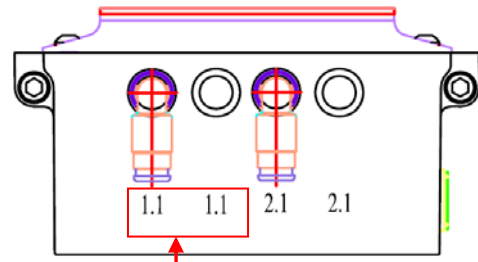
Press Page down

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



 page up page down
```



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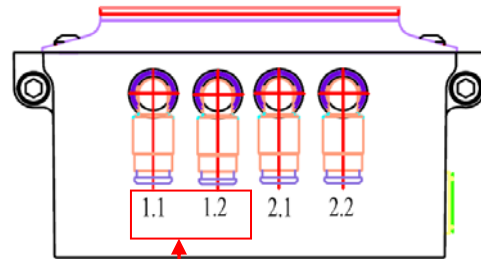
```
Power voltage:   24.0
P1 cycle and timer：
cycle: 000000
Timer: 0000232
P2 cycle and timer：
cycle: 000000
Timer: 0000000



 page up page down
```

Time has elapsed 8 minutes

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


1.1 operating


◻page up◻page down
```

Timer countdown finishes, system restarts countdown again.

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

```
Power voltage:  24.0
P1 cycle and timer：
cycle: 000001
Timer: 0000240
P2 cycle and timer：
cycle: 0000000
Timer: 0000000


1.2 operating


◻page up◻page down
```

P1 cycle records 1 cycle as total no. of stroke

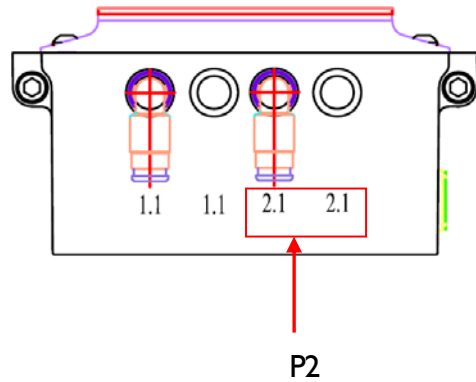Pump 1 begins dispensing grease 0.15 cm$^3$ at Outlet 1.2.

```
Power voltage:  24.0
P1 cycle and timer：
cycle: 000002
Timer: 0000240
P2 cycle and timer：
cycle: 000000
Timer: 0000000




◻page up◻page down
```

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
```

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 2.1and then outlet 2.2 with 2$^{nd}$ stroke 0.15 cm$^3$

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
```



P2

```
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

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

2.1 operating

⊡page up⊡page down
```

Timer countdown finishes, system restarts countdown again.

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

```
Power voltage:  24.0
P1 cycle and timer：
cycle: 000000
Timer: 0000000
P2 cycle and timer：
cycle: 000001
Timer: 0000240

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$^3$ at Outlet 2.2.

```
Power voltage:  24.0
P1 cycle and timer：
cycle: 000000
Timer: 0000000
P2 cycle and timer：
cycle: 000002
Timer: 0000240

⊡page up⊡page down
```
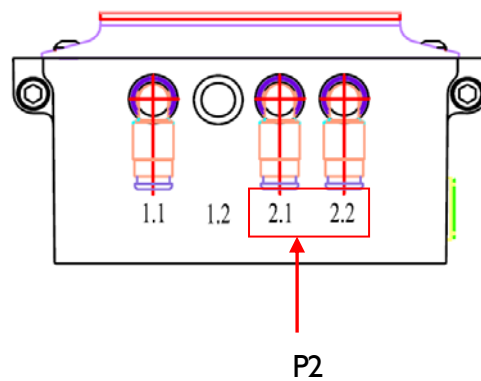
P2 cycle records 2 cycles as total no. of stroke per outlet 2.1 & 2.2 dispensing 0.15 cm$^3$ total grease 0.3cm$^3$

## 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:
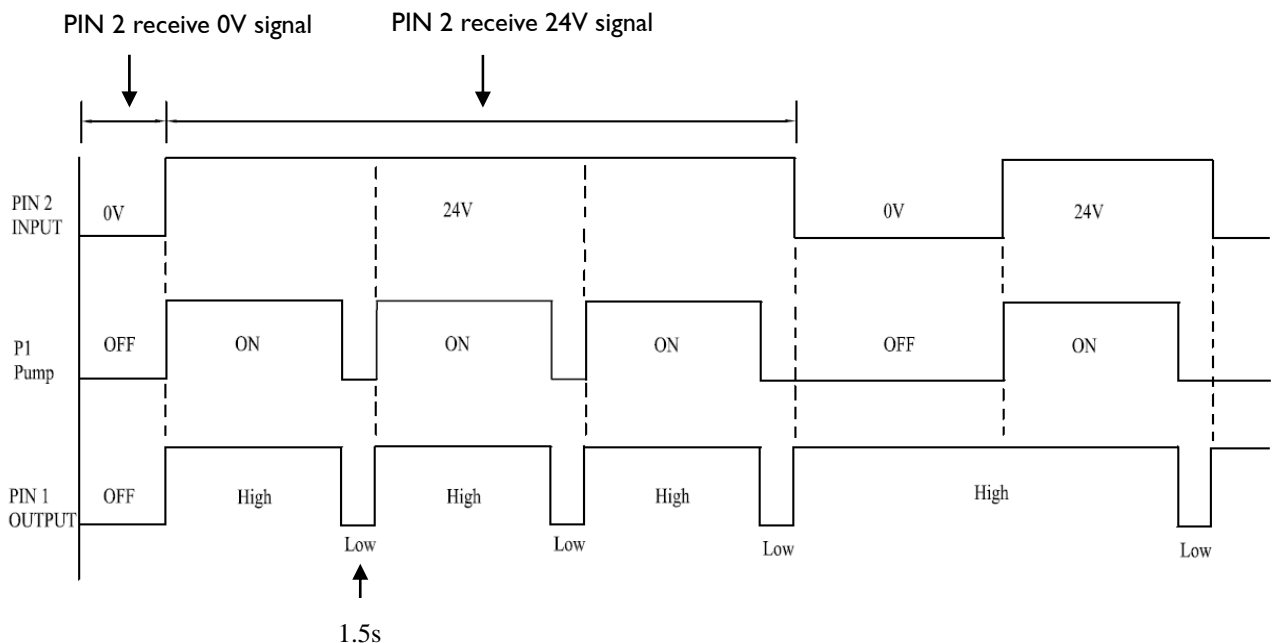


(1) Lubricator power ON, pump P1 outlet to dispense oil continuously when the PIN 2 receiving 24V signal. One stroke per outlet will dispense oil $0.15cm^3$.

(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:

PIN 2 receive 0V signal          PIN 2 receive 24 V signal

| | | | |
|---|---|---|---|
| PIN 2 INPUT | 0V | 24V | 0V | 24V |
| P1 Pump | OFF | ON | OFF | ON |
| PIN 1 OUTPUT | OFF | High | Low | High |

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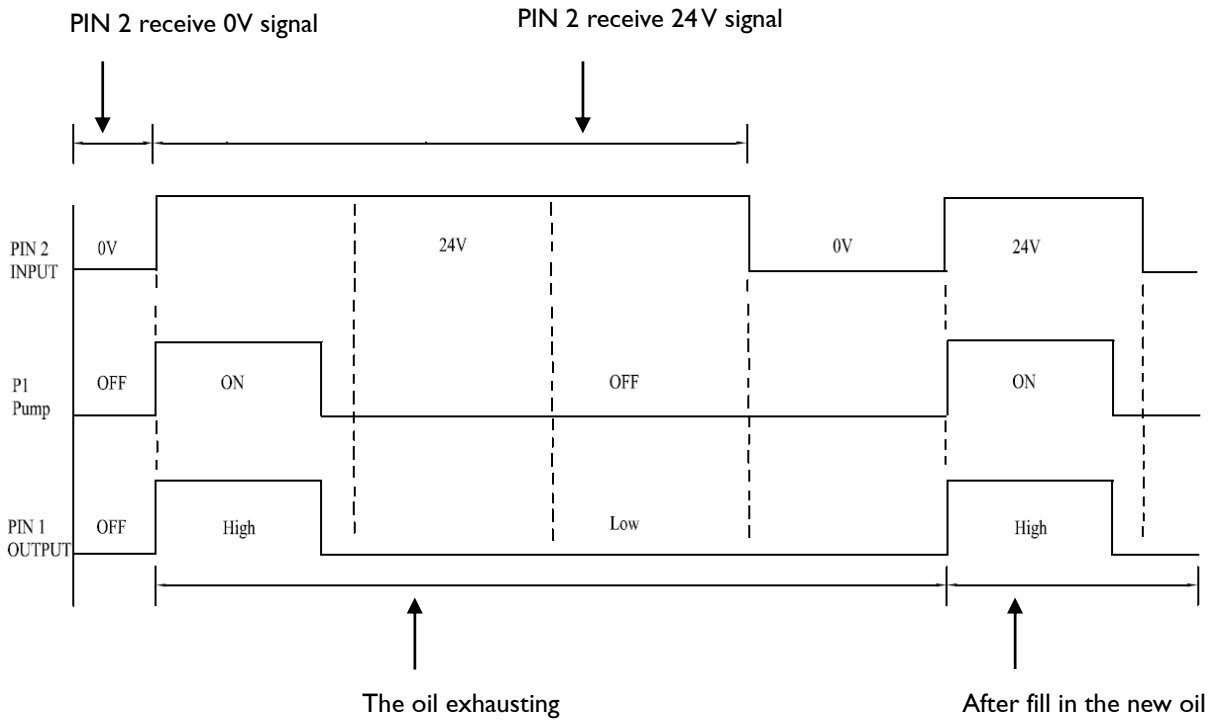
(1) When lubricator detect the exhausting oil, and it will stops outlet oil, then PIN 1 will output the signal from HIGH to LOW which inform the user to replenish the oil. During this duration, the pump 1 can not be dispensed.

(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)

PIN 2 receive 0V signal                      PIN 2 receive 24 V signal



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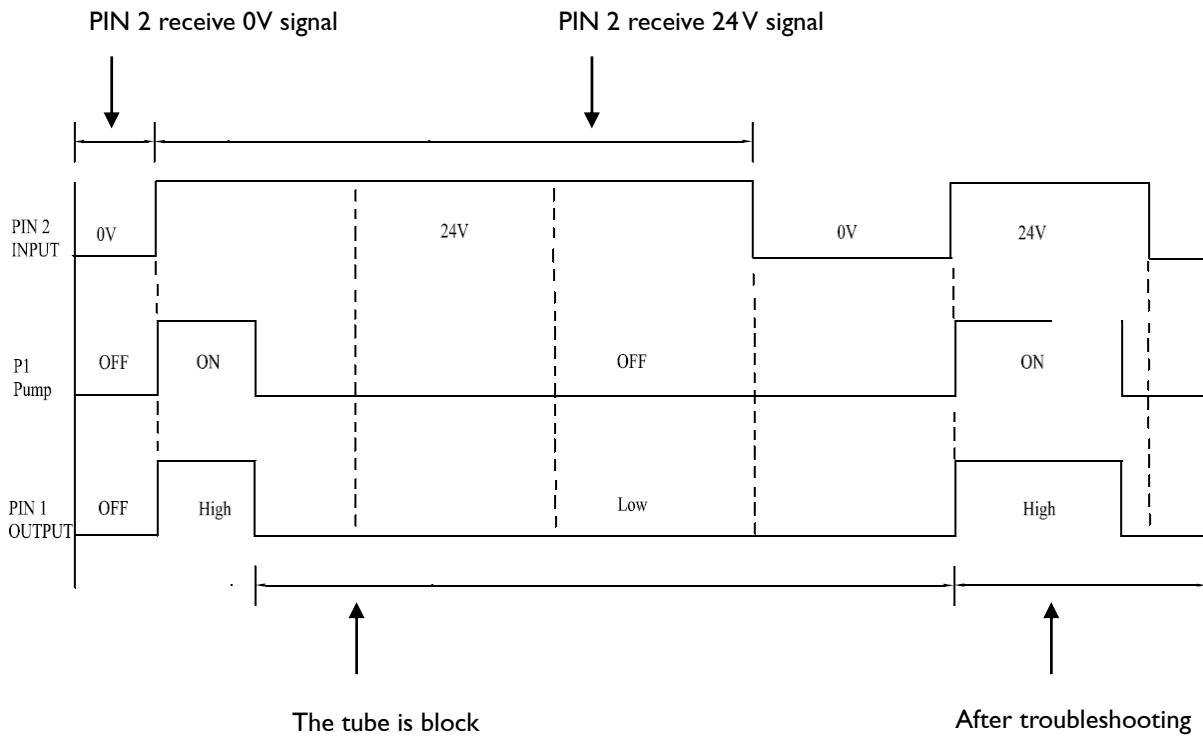
(1) When lubricator detect the malfunction (ex: the tube is block), PIN 1 will change the signal from HIGH to LOW, and stop dispense the oil.

(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:
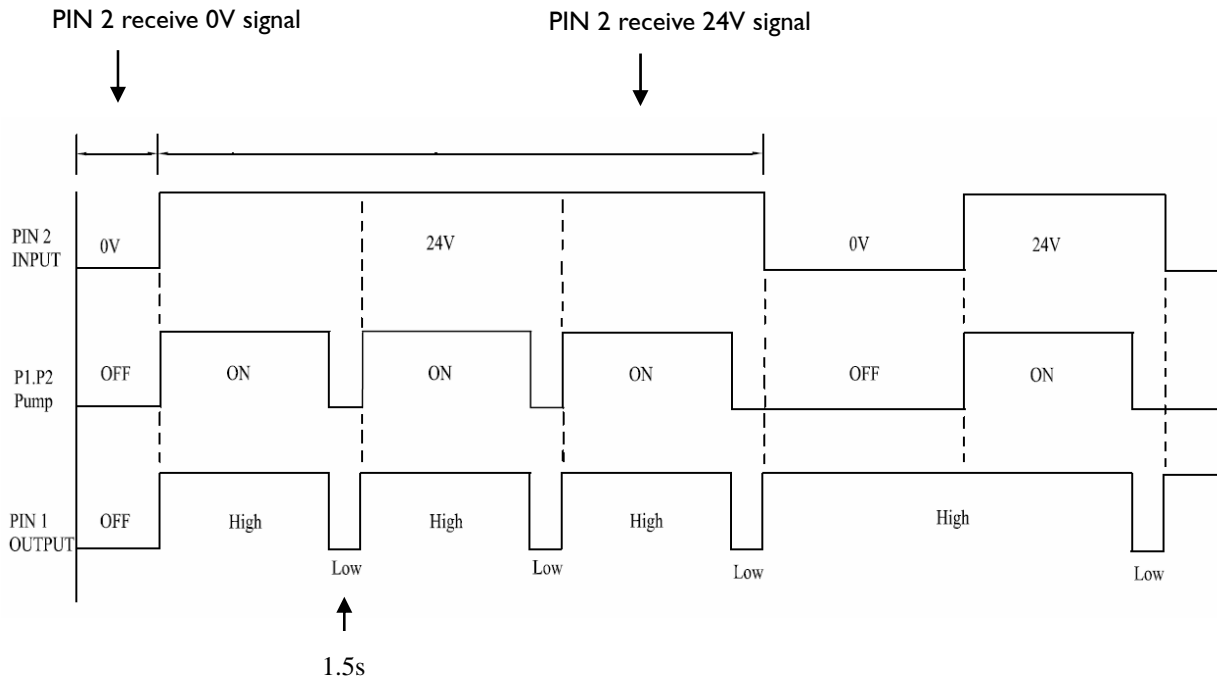


(1) Lubricator power ON, pump P1and P2 outlet to dispense oil continuously when the PIN 2 receiving 24V signal. One stroke per outlet will dispense oil $0.15cm^3$

(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:

PIN 2 receive 0V signal              PIN 2 receive 24V signal

| PIN 2 INPUT | 0V | | 24V | | 0V | 24V | |
| PIN 2<br>INPUT | 0V | 24V | | | 0V | 24V | |
| P1.P2<br>Pump | OFF | ON | OFF | | | ON | |
| PIN 1<br>OUTPUT | OFF | High | Low | | | High | |

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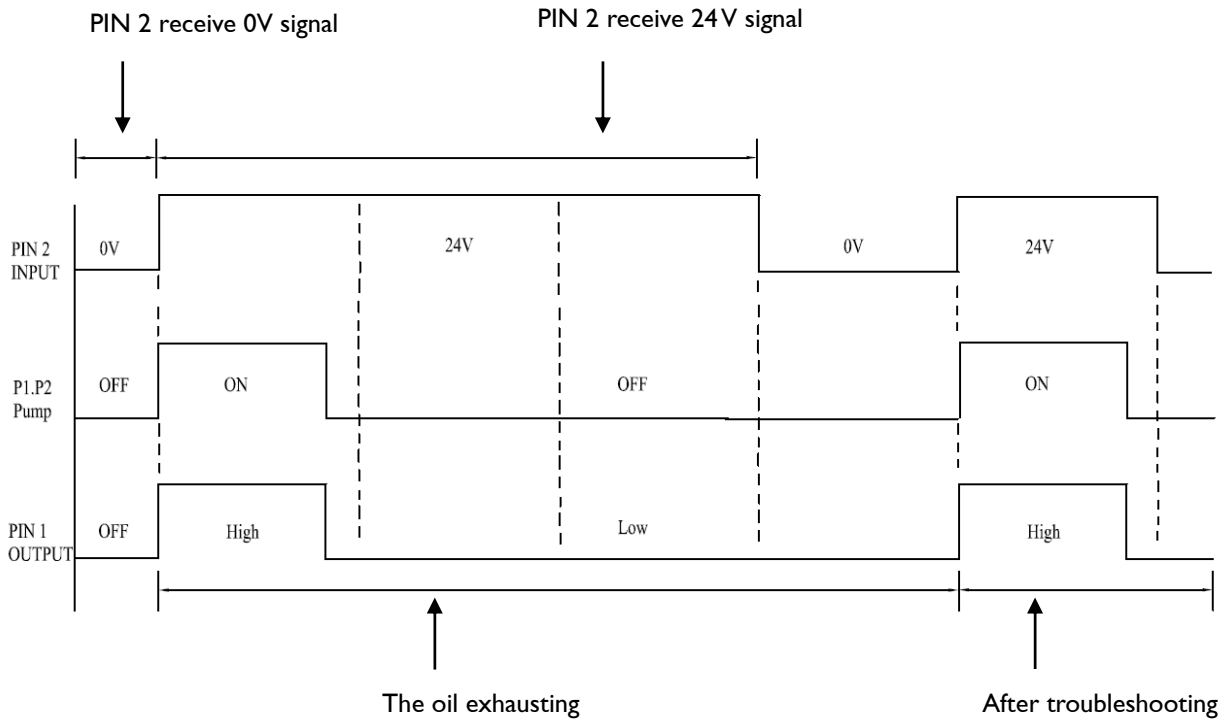
(1) When lubricator detect the exhausting oil, and it will stops outlet oil, PIN 1 will output the signal from HIGH to LOW which inform the user to replenish the oil. During this duration, the pump P1 and P2 can not be dispensed.

(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)

PIN 2 receive 0V signal                    PIN 2 receive 24 V signal

| | | | | |
|---|---|---|---|---|
| PIN 2 INPUT | 0V | 24V | 0V | 24V |
| P1.P2 Pump | OFF | ON | OFF | ON |
| PIN 1 OUTPUT | OFF | High | Low | High |

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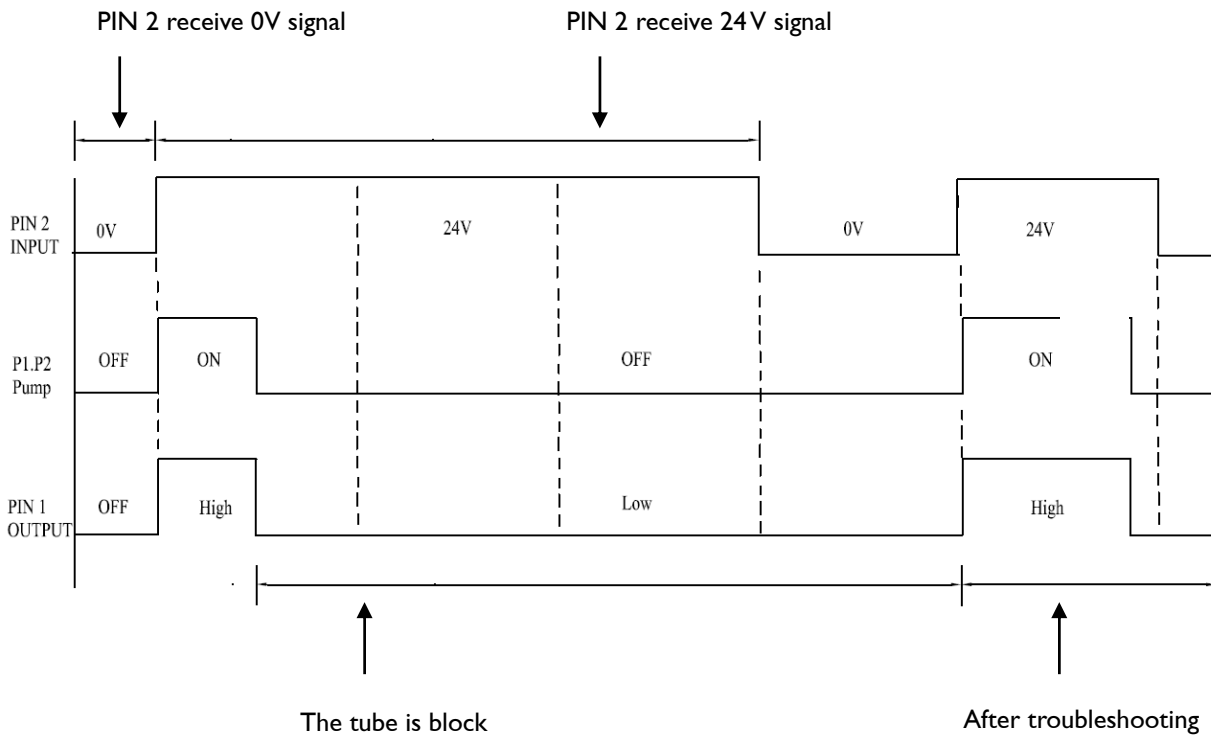
(1) When lubricator detect the malfunction (ex: the tube is block), pump P1 and P2 stop dispense the oil immediately. Meanwhile, PIN 1 will change the signal from HIGH to LOW for inform the malfunction message to user.

(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.

```
Clear motor timer: 1      ◄──────────────
Operating code use: 0
Operating code: 1 2 3 4




⊡page up⊡page down
```

Key "Clear motor timer" as 1.

⇩ Press Page up again

```
Power voltage:   24.0
P1 cycle and timer :
cycle: 0 0 0 0 0 1        ◄─────────
Timer: 0 0 0 0 0 0 1
P2 cycle and timer :
cycle: 0 0 0 0 0 1        ◄─────────
Timer: 0 0 0 0 0 0 1



⊡page up⊡page down
```
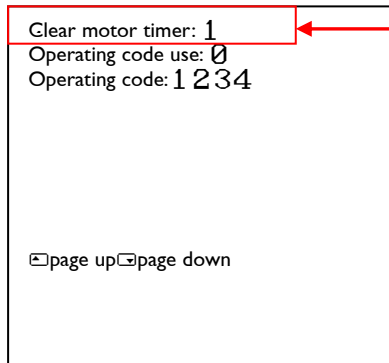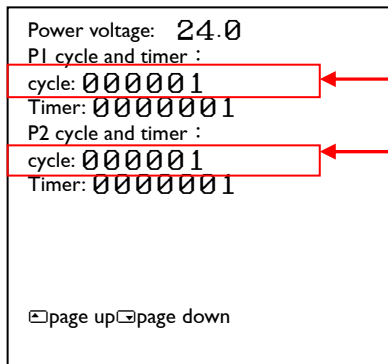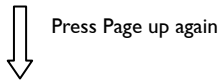
Previous records of total no. of strokes / cycles for Pump 1 & 2.

⇩

```
Power voltage:   24.0
P1 cycle and timer :
cycle: 0 0 0 0 0 0        ◄─────────
Timer: 0 0 0 0 0 0 1
P2 cycle and timer :
cycle: 0 0 0 0 0 0        ◄─────────
Timer: 0 0 0 0 0 0 1



⊡page up⊡page down
```
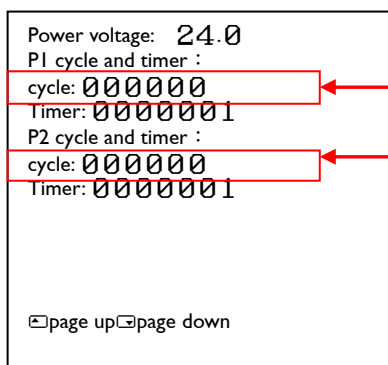
P1 & P2 records total no. of strokes / cycles will be erased.

## (2) Password Setting

```
Clear motor timer: 1
Operating code use: 0
Operating code: 1 2 3 4




◁page up▷page down
```
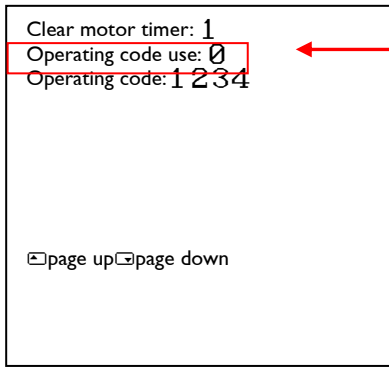
Set 0 "Operating code use" (No need to enter password), Press "SET" in S1 display and enter S2 screen.

**S1**

Press Reset

**S2**

```
APEX DYNAMICS, INC.
   Key in password：

   ‖ **** ‖

   M:1.00   T:1.00
  Press▷to confirm
```

Press Set

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


◁page up▷page down
```

```
Clear motor timer: 1
Operating code use: 1
Operating code: 1 2 3 4




◁page up▷page down
```
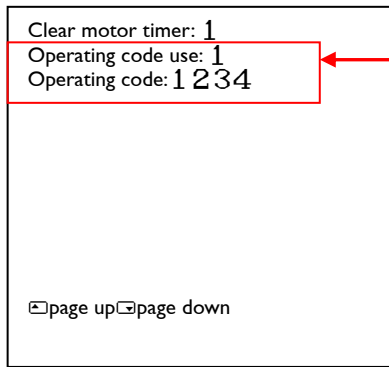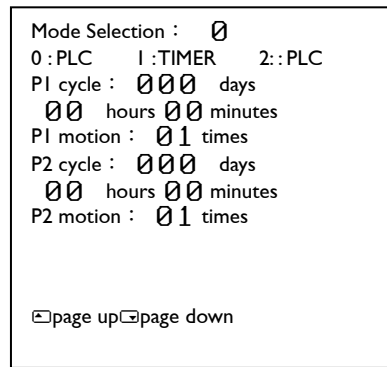
Set "Operating code use" as 1 and Set "Operating Code" as 1234, at this moment S1 screen require password. Enter "1234" to go S2 screen.

**S1**

Press Reset

**S2**

```
APEX DYNAMICS, INC.
   Key in password：

   ‖ **** ‖

   M:1.00   T:1.00
  Press▷to confirm
```

Key password 1234, and press Set

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


◁page up▷page down
```
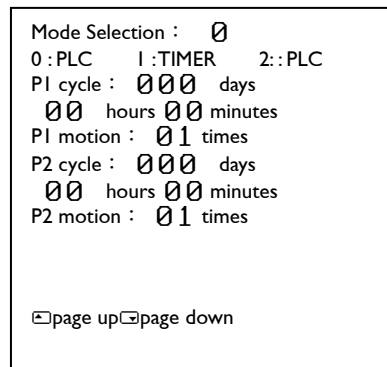
## 4.6.4 Description of Error Message

```
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
```
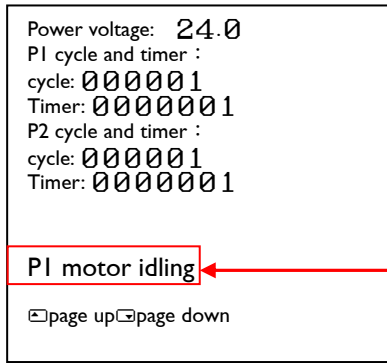
Error message appears on screen for example P1 motor idling.

S6

```
Error message 1-5

P2 motor idling

Grease exhausted




▱page up▱page down
```
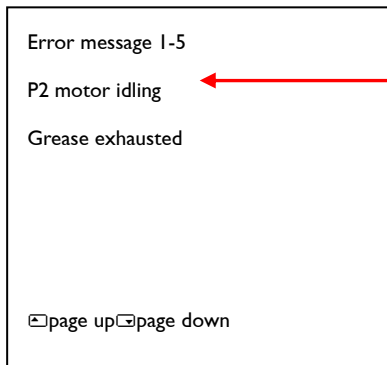
"P1 Motor idling" display in system "Error Message Record", new message is displayed in S6 screen and total 5 error messages and then $6^{th}$ message will be saved in S7screen.

S7

```
Error message 6-10







▱page up▱page down
```
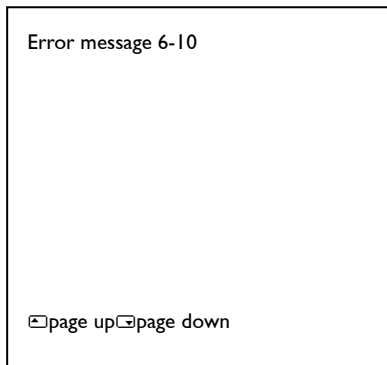
Error message description:

| 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, | Input voltage 1.24V not reached standard | 1.Check Input Voltage 24V |
| Memory writing error | 2.Lubricator PCB board malfunction | 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:

```
Output signal mode: 0
Clear memory：0
Error    detective：0
Error    counter：01
Operating mode：00




◁page up▷page down
```
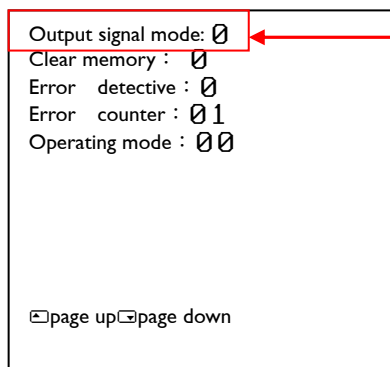
Set "Output Signal Mode" 0 for PLC control Mode 0 and PLC control Mode 2. Refer to Chapter 3.5 for PLC control Mode 0 illustration. And refer 4.6.2 chapter for PLC Mode 2.

```
Output signal mode: 1
Clear memory：0
Error    detective：0
Error    counter：01
Operating mode：00




◁page up▷page down
```
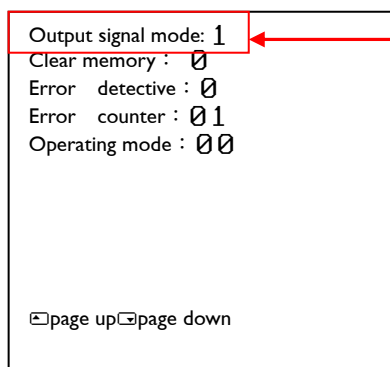
Output Signal Mode, Set 1 as "Timer Mode 1 control".

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

Low _____
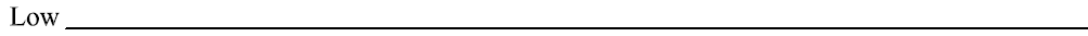
Lubricator Power ON no occurrence of malfunction

Low _____

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



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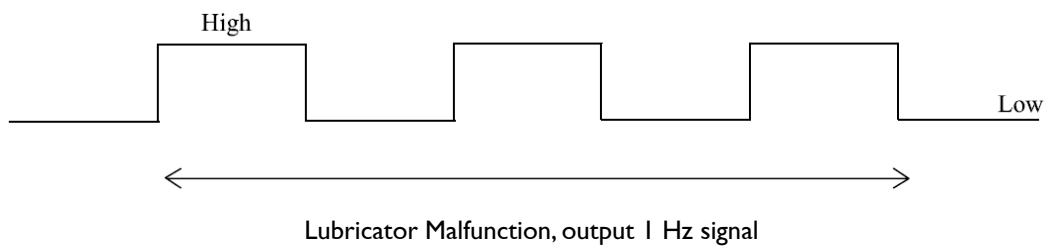
If the Lubricator malfunction, PIN 1 will continue to output 1Hz signal, at this moment please refer to below table below for Lubricator troubleshooting .

| 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.
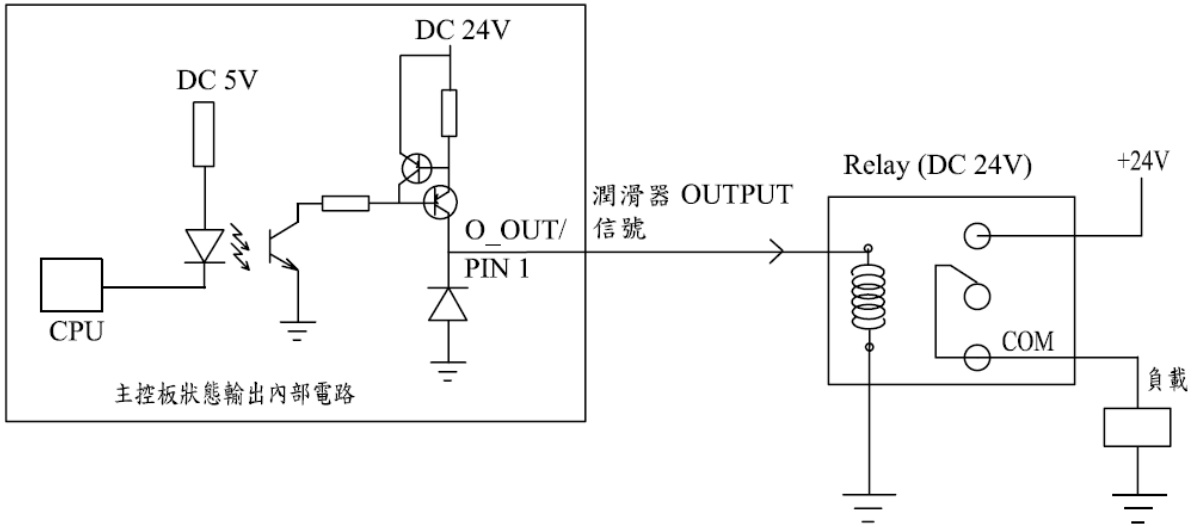


Lubricator Output Electrical Specification

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

## 4.6.7 Clear Memory Illustration

```
utput signal mode: 0
Clear memory : 1
Error  detective : 0
Error  counter : 01
Operating mode : 00




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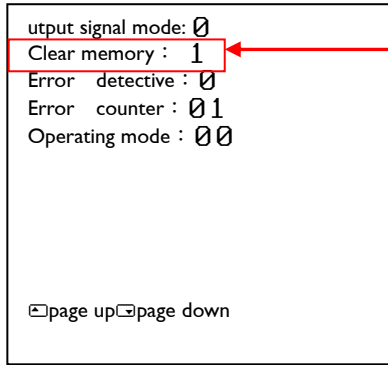
Set"Clear Memory" as 1, system will initialize lubricator parameters returning to its original manufacturer setting as shown below.

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

```
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
```

Manufacturer Setting

```
Language Display(語
文版本)：0

0:English(英文)
1:Chinese(中文)




⊡page up⊡page down
```

Manufacturer Setting

```
Error message 1-5




⊡page up⊡page down
```

Manufacturer Setting

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



⊡page up⊡page down
```

Manufacturer Setting

```
Clear motor timer: 0
Operating code use: 0
Operating code:1234




⊡page up⊡page down
```

Manufacturer Setting

```
Error message 6-10




⊡page up⊡page down
```

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.

```
utput signal mode: 0
Clear memory： 1
Error   detective： 1    ◄──────
Error   counter： 02
Operating mode： 00




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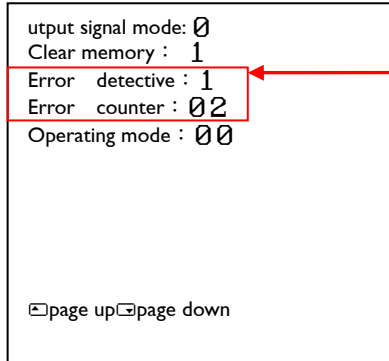
Set "Error Detective" 1, Motor error appears, system will monitor and display on Hand-Set screen. This feature needs to be used together with motor "Error counter".

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

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




 page up page down
```

⟹

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


1.1 operating

 page up page down
```

⟱

```
Power voltage:   24.0
P1 cycle and timer：
cycle: 000001
Timer: 0000000
P2 cycle and timer：
cycle: 000000
Timer: 0000000


P1 motor idling

 page up page down
```

⟸

```
Power voltage:   24.0
P1 cycle and timer：
cycle: 000001
Timer: 0000000
P2 cycle and timer：
cycle: 000000
Timer: 0000000


1.2 operating

 page up page down
```

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)

```
              ┌─────────────────────────────────────┐
              │      Install Lubricator & Hand-Set   │
              └─────────────────────────────────────┘
                              │
        NO            ╱────────────────────╲
                     ╱   Check whether Lubricator  ╲
                     ╲     is properly installed    ╱
                      ╲────────────────────╱
                              │ YES
              ┌─────────────────────────────────────┐
              │ Lubricator power ON, set Hand-Set    │
              │           parameters                 │
              └─────────────────────────────────────┘
                              │
              ┌─────────────────────────────────────┐
              │ Select mode as 1 and set lubricator  │
              │ motion & cycle and set output signal │
              │           mode as 1.                 │
              └─────────────────────────────────────┘
                              │
             ╱──────────────────────────────╲
            ╱   Did Lubricator follow command ╲      NO
            ╲       issued by Hand-Set?        ╱
             ╲──────────────────────────────╱
                              │ YES
              ┌─────────────────────────────────────┐
              │ Lubricator output dispenses grease   │
              │ Timer re-times. Hand-Set records     │
              │ no. of cycles after dispense of      │
              │ grease completes.                    │
              └─────────────────────────────────────┘
                              │
             ╱──────────────────────────────╲    NO
            ╱   Is lubricator dispensing grease? ╲
             ╲──────────────────────────────╱
                      │ YES
                                          ┌──────────────────────────┐
                                          │ Check error history       │
                                          │ record and refer P.47     │
                                          │ trouble shooting          │
                                          └──────────────────────────┘
              ┌──────────────────┐
              │     Complete      │
              └──────────────────┘
```

## 4.8 Lubricator Installation Procedure (PLC mode 2 Control)

```
                    ┌──────────────────────────────────────┐
                    │     Lubricator and PLC Installation   │
                    └──────────────────────────────────────┘
                                      │
                    ◇─────────────────────────────────────◇
         NO         │     Check Lubricator Installation and │
                    │    PLC output signal has correct setting. │
                    ◇─────────────────────────────────────◇
                                      │ YES
                            ┌──────────────────────┐
                            │   Power ON Lubricator │
                            └──────────────────────┘
                                      │
                    ┌──────────────────────────────────────┐
                    │ Set up 2 for mode seletion, PLC output signal controls the │
                    │   number of times with lubricator dispensing │
                    └──────────────────────────────────────┘
                                      │
                    ◇─────────────────────────────────────◇
                    │     Lubricator detector received      │        NO
                    │              PLC signal                │
                    ◇─────────────────────────────────────◇
                                      │ YES
                            ┌──────────────────────────┐
                            │ Lubricator delivers grease to outlet │
                            └──────────────────────────┘
                                      │
                    ◇─────────────────────────────────────◇
                    │     Ensure Lubricator is supplying     │        NO
                    │           grease to outlet.            │
                    ◇─────────────────────────────────────◇
                          │ YES
          ┌──────────────────────────────────┐   ┌─────────────────────────────────┐
          │ PLC received output signal message "Grease │  │ Refer to Chapter 4.6.2 Trouble shooting │
          │ Exhausted" from Lubricator, then wait for next │  └─────────────────────────────────┘
          │           PLC message.            │
          └──────────────────────────────────┘
                          │
                  ┌──────────────────┐
                  │     Complete      │
                  └──────────────────┘
```
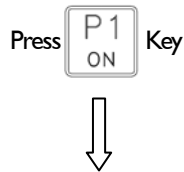
## 4.9 Instruction of Continuous Grease Dispensing.

　　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

⬇

```
Power voltage:   24.0
P1 cycle and timer：
cycle: 0 0 0 0 0 0
Timer: 0 0 0 0 0 0 0
P2 cycle and timer：
cycle: 0 0 0 0 0 0
Timer: 0 0 0 0 0 0 0


1.1 operating

◱page up◲page down
```

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

⬇

```
Power voltage:   24.0
P1 cycle and timer：
cycle: 0 0 0 0 0 1
Timer: 0 0 0 0 0 0 0
P2 cycle and timer：
cycle: 0 0 0 0 0 0
Timer: 0 0 0 0 0 0 0


1.2 operating

◱page up◲page down
```

⬇

```
Power voltage:   24.0
P1 cycle and timer：
cycle: 000002
Timer: 0000000
P2 cycle and timer：
cycle: 000000
Timer: 0000000


1.1 operating

◄page up◄page down
```

Press [P1 OFF] Key

```
Power voltage:   24.0
P1 cycle and timer：
cycle: 000003
Timer: 0000000
P2 cycle and timer：
cycle: 000000
Timer: 0000000




◄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.

Press [P2 ON] Key

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


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:  24.0
P1 cycle and timer：
cycle: 000000
Timer: 0000000
P2 cycle and timer：
cycle: 000001
Timer: 0000000
`

2.2 operating

⬒page up⬓page down
```

```
Power voltage:  24.0
P1 cycle and timer：
cycle: 000000
Timer: 0000000
P2 cycle and timer：
cycle: 000002
Timer: 0000000


2.1 operating

⬒page up⬓page down
```

Press ｜ P2 OFF ｜ Key

```
Power voltage:  24.0
P1 cycle and timer：
cycle: 000000
Timer: 0000000
P2 cycle and timer：
cycle: 000003
Timer: 0000000



⬒page up⬓page down
```

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
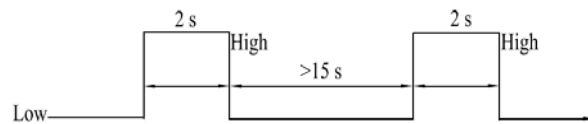


For every 24 hours, Lubricator received the PLC output signal above; outlet 1.1 will dispense two strokes with total grease 0.3cm$^3$.
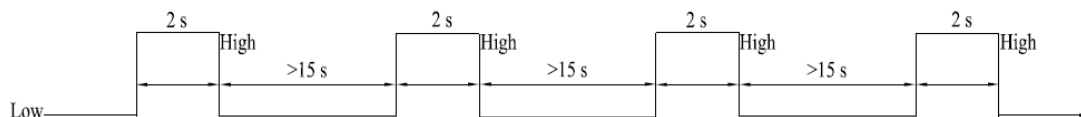
### AppendixA-1-2 Model LUG-412



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
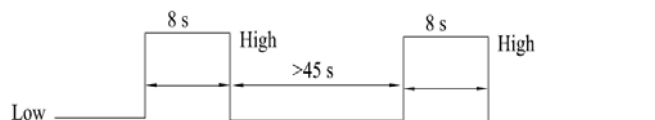


For every 24 hours, Lubricator received the PLC output signal above; outlet 1.1, 2.1 &2.2 will dispense two strokes per outlet with total grease 0.3cm$^3$.
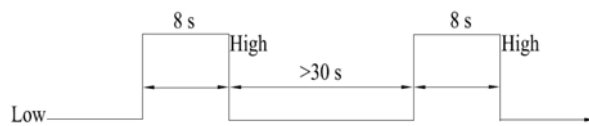
## AppendixA-1-4 Model LUG-424
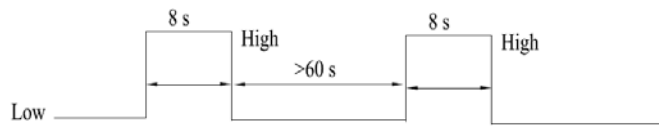


For every 24 hours, Lubricator received the PLC output signal above; outlet 1.1, 1.2, 2.1 & 2.2 will dispense two strokes per outlet with total grease 0.3cm$^3$.

## 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

```
Mode Selection：    1
0 : PLC        1 : TIMER        2 : : PLC
P1 cycle：  001   days
   00   hours 00 minutes
P1 motion：  02 times
P2 cycle：  000   days
   00   hours 00 minutes
P2 motion：  01 times




⊡page up⊡page down
```

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

```
Mode Selection：    1
0 : PLC        1 : TIMER        2 : : PLC
P1 cycle：  001   days
   00   hours 00 minutes
P1 motion：  04 times
P2 cycle：  000   days
   00   hours 00 minutes
P2 motion：  01 times




⊡page up⊡page down
```

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

```
Mode Selection :     1
0 : PLC      1 : TIMER      2: : PLC
P1 cycle :   001   days
   00   hours 00 minutes
P1 motion :   02  times
P2 cycle :   001   days
   00   hours 00 minutes
P2 motion :   04  times



⊟page up⊟page down
```

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

```
Mode Selection :     1
0 : PLC      1 : TIMER      2: : PLC
P1 cycle :   001   days
   00   hours 00 minutes
P1 motion :   04  times
P2 cycle :   001   days
   00   hours 00 minutes
P2 motion :   04  times



⊟page up⊟page down
```

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

```
Mode Selection :     1
0 : PLC      1 : TIMER      2: : PLC
P1 cycle :   001   days
   00   hours 00 minutes
P1 motion :   02 times
P2 cycle :   001   days
   00   hours 00 minutes
P2 motion :   02 times



⊟page up⊟page down
```

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 cm³ / 24h. The following is the constant input time of the 24V control signal matched with each type of lubricator.
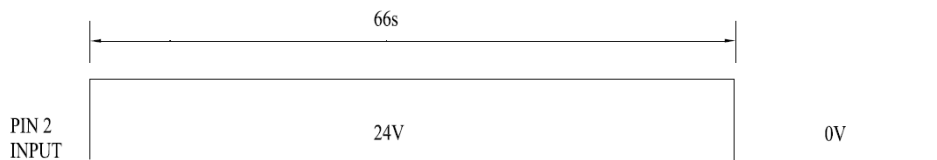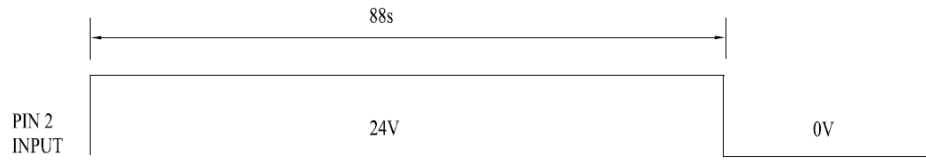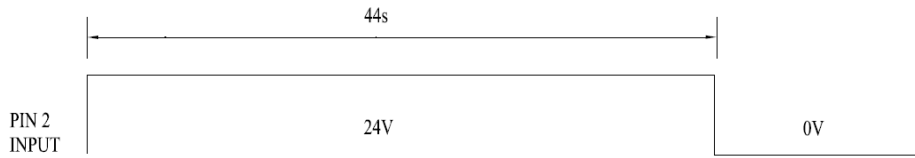
## AppendixA-3-1 Model LUG-411
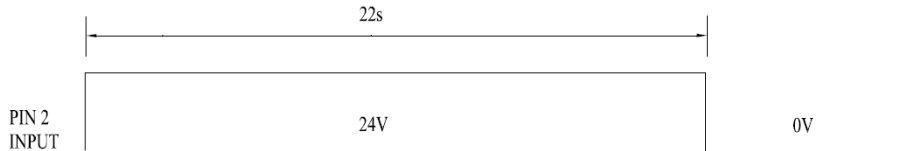


For every 24 hours, Lubricator received the PLC output signal above, the oil outlet of 1.1 will dispenses twice, and each output is 0.3 cm³.

## AppendixA-3-2 Model LUG-412
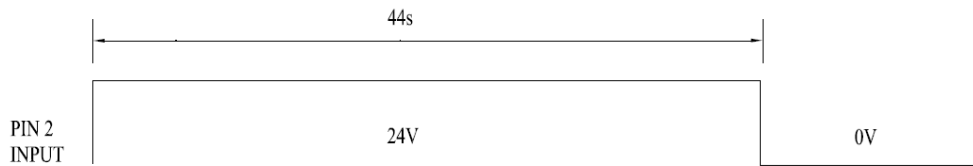


For every 24 hours, Lubricator received the PLC output signal above, the oil outlet of 1.1 and 1.2 will alternate dispenses twice, and each output is 0.3 cm³.

## 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 cm³.

## 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 $cm^3$.
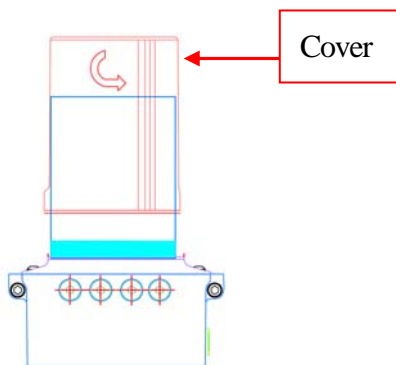
# Appendix B - Replacing New Cartridge

## Appendix B-1 New Cartridge Replacing

STEP 1.
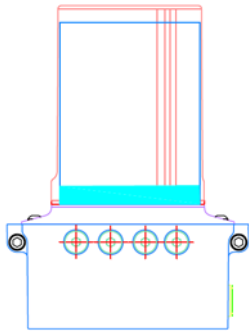
Unplug the power connection.

STEP 2.

Cover

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.
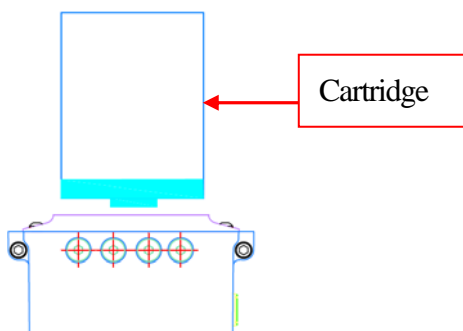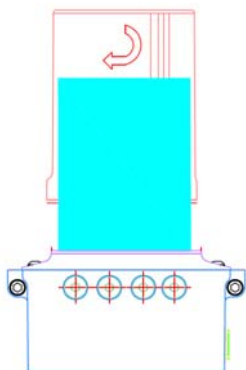
Cartridge

Pull the empty Cartridge upward.

STEP 4.
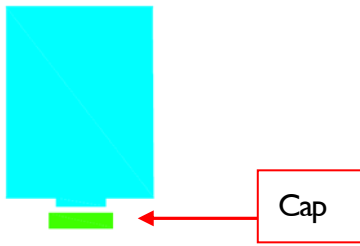
Remove the Cap from the new Cartridge.

Cap

STEP 5.
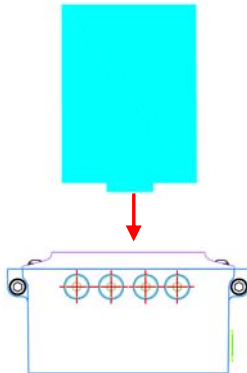
Insert New Cartridge to lubricator

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.
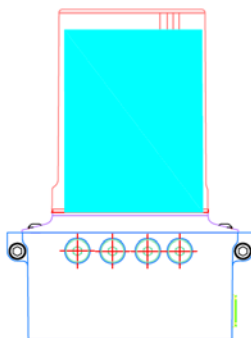
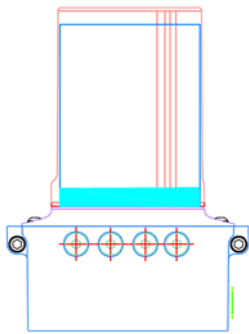After changing new Cartridge, restart power of Lubricator.

⚠ Caution

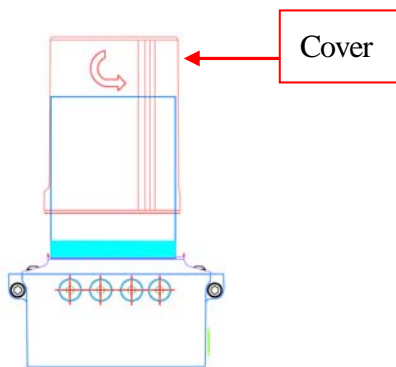Please ensure empty Cartridge is properly recycled and prohibit any disposal.

## Appendix B-2 Empty cartridge refill oil again.
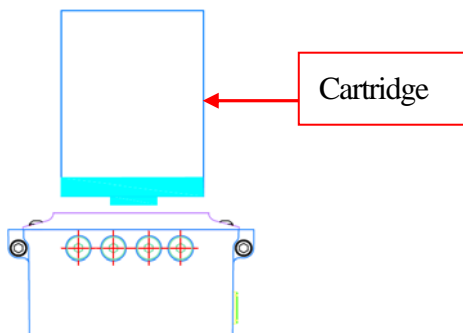
STEP 1.

Unplug the power connection.

STEP 2.

Cover

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

| ⚠ Caution |
|---|

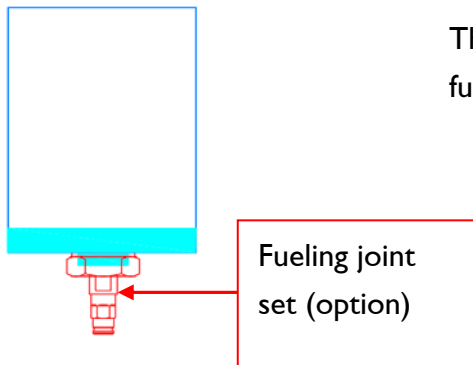| ⚠ | Be aware the spring bouncing or grease splashing when disassemble the cover on lubricator |
|---|---|

STEP 3.

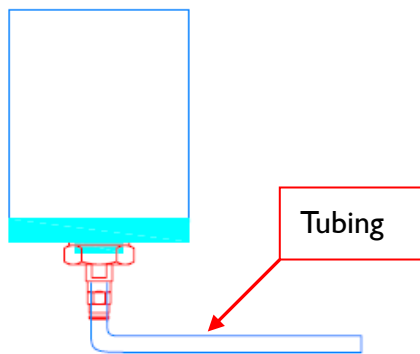Cartridge

Pull the empty Cartridge upward.

STEP 4.

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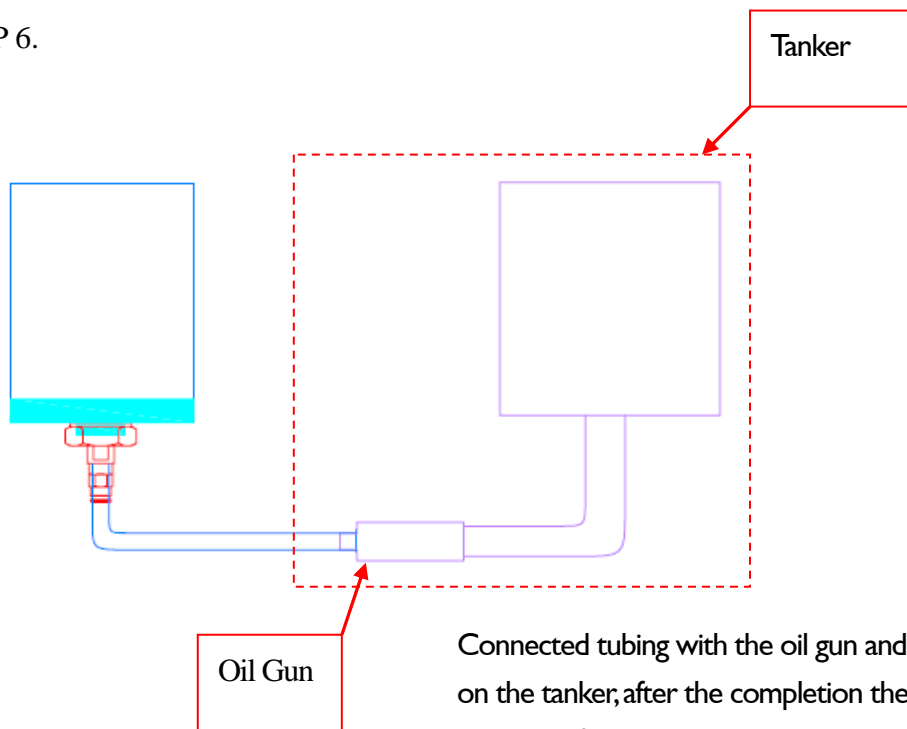
Fueling joint set (option)

STEP 5.

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

Tubing

STEP 6.

Tanker

Oil Gun

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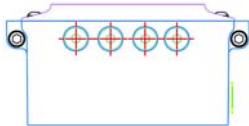
⚠ Caution

When oil supplement to lubricator, users should pay attention to the tubing and the device has actually complete installed.
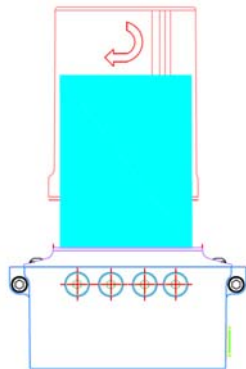
STEP 7.
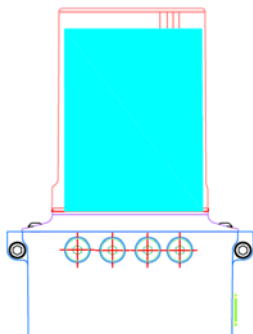
Insert Cartridge to lubricator

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.

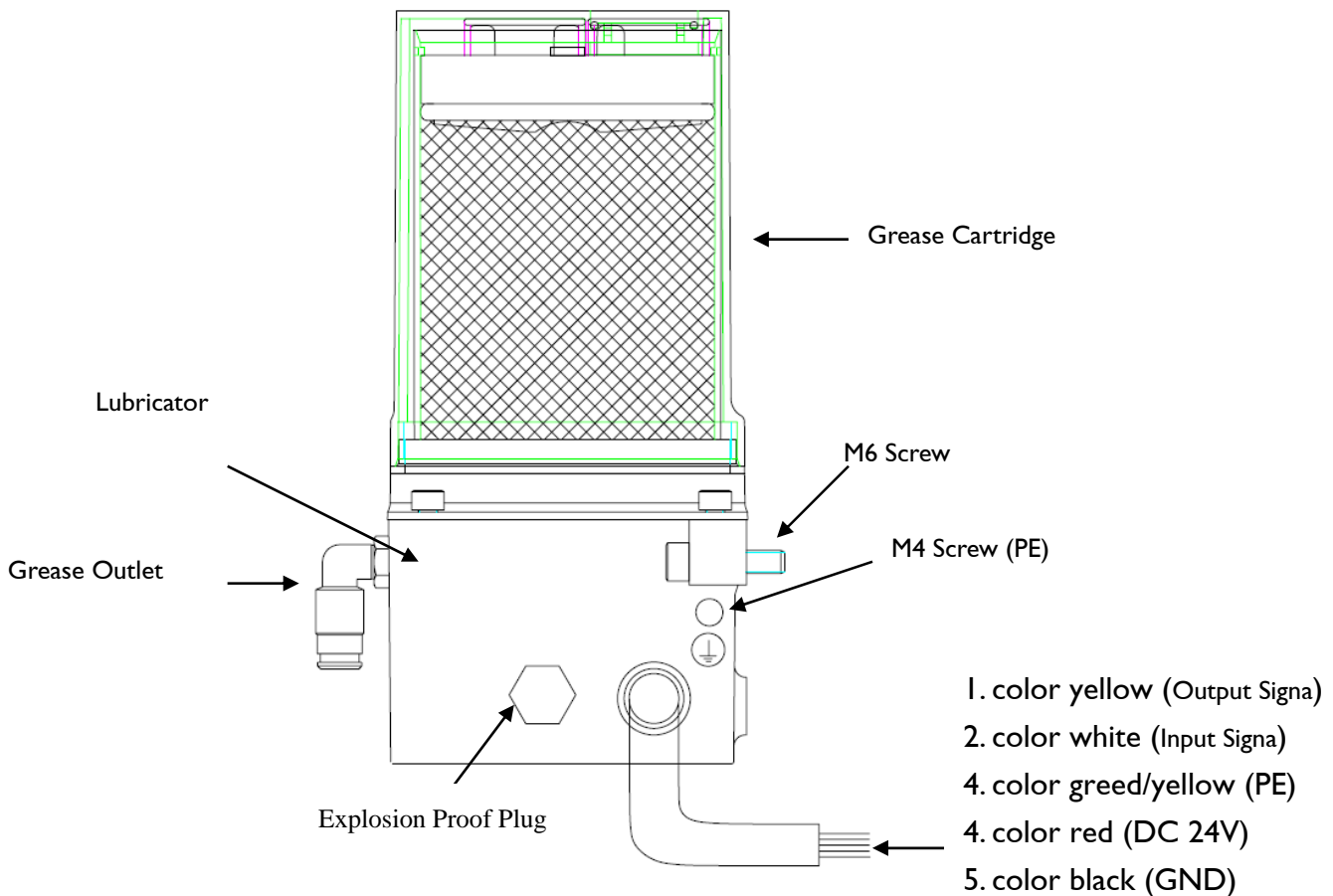After changing new Cartridge, restart power of Lubricator.

# Appendix 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

**LUG-400 Lubricator Side View**



Grease Cartridge

Lubricator

M6 Screw

Grease Outlet

M4 Screw (PE)

Explosion Proof Plug

1. color yellow (Output Signa)
2. color white (Input Signa)
4. color greed/yellow (PE)
4. color red (DC 24V)
5. color black (GND)

## 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.

⟨Ex⟩

II 3D Ex tc IIIB T80 C Dc IP5X