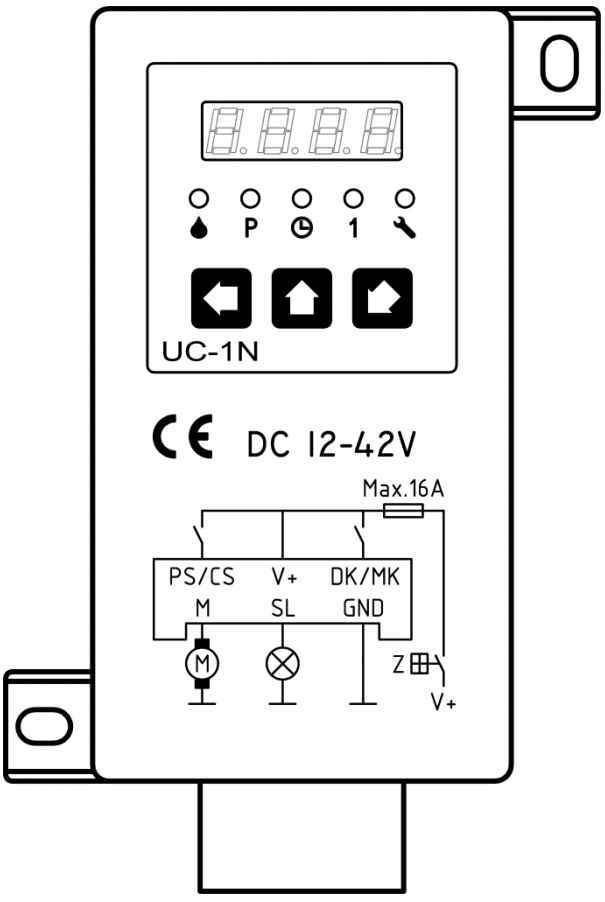
User's Manual

用户操作指导手册

Universal Control Unit UC-1N

UC-1N 通用润滑系统控制器



Suzhou Leetern Industry Control Department

May. 2012

Control Unit UC-1N is designed for controlling and monitoring of centralized lubrication systems of engineering machinery, chassis and lubrication stations. UC-1N stores control modes and parameters in EEPROM, which made UC-1N can store data safely for long period without backup power supply.
The control unit uses LED monitor and LED signal lights to show information. It is easy for operation.

Factory settings on UC-1N are as followings:

Pause mode:	Timer
Pause time:	480 min(8h)
Lube mode:	Timer
Lube time:	120 s (2 min)
System monitoring:	**P**ressure **S**witch
	Cycle **S**witch
	OFF

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Safety Warning!

Universal Control Unit UC-1 is designed and manufactured not only in conformity with the generally engineering standards, industrial safety and accident prevention regulations, but also in accordance with some relevant generally industrial technical acceptance standards.

Although this unit complies with relevant safety technical requirements, the use of the unit may still entail dangers leading to personal injury of the user or third parties or damage to property. Therefore, the unit must be used when it is in perfect technical condition. And the operation must strictly comply with operation manual. Errors that may affect safety must be rectified immediately.

The unit is designed for controlling and monitoring centralized lubrication systems. The user himself shall be liable for any damage caused by improper use.

Potential electrical dangers

This unit must be connected to the power supply only by trained qualified personnel in accordance with the local electric technical regulations. Improper connection may lead to serious personal injury.
This unit is designed to use in battery-powered on-board electric system of chassis, engineering equipment and lubrication station. When it is used for any other purposes, all safety regulations should be complied with.

Qualified personnel

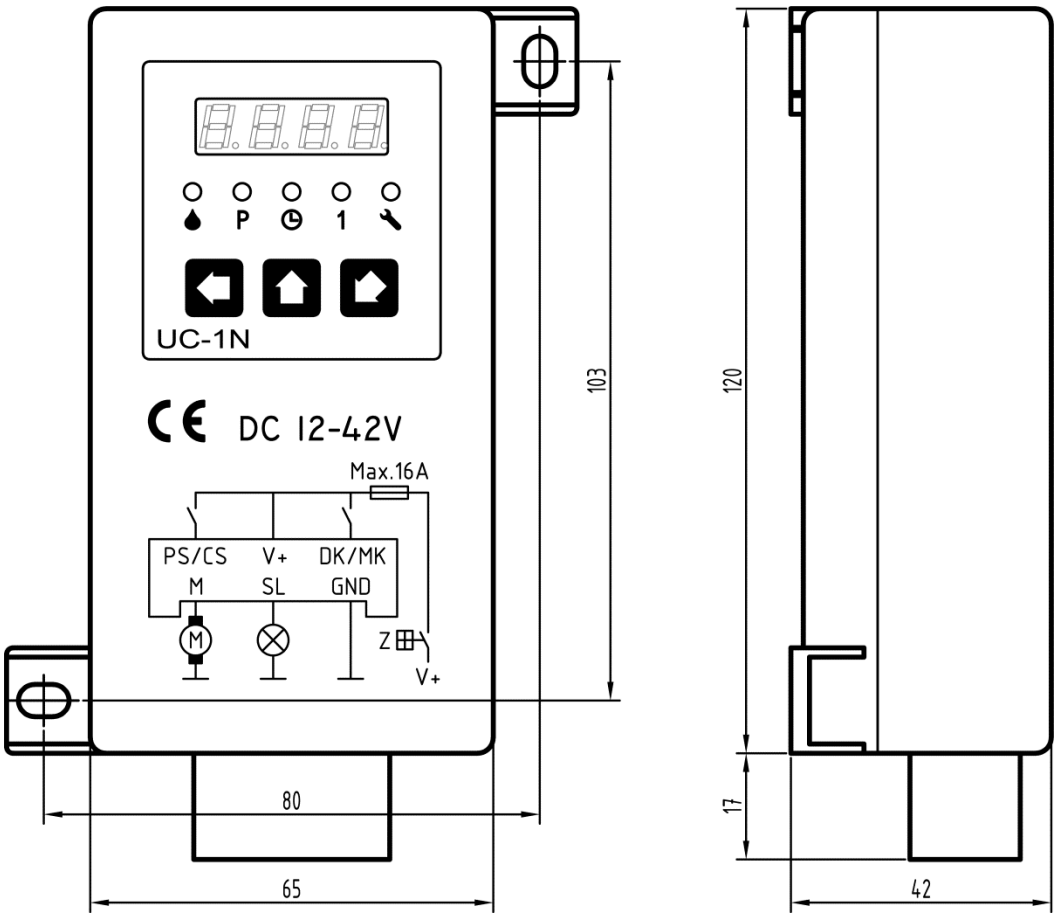
Qualified person means person trained, assigned and instructed by the operator of the equipment concerned. They are familiar with relevant safety rules or regulations and have certain knowledge and skills of safety.
They are entitled to carry out the activities required in a given case and will be able to recognize and avoid possibly existing dangers.

Installation

Universal Control Unit UC-1N is **NOT** designed to work in open-air; it has to be installed in an enclosed compartment to protect it from environmental influences.

If the control unit is installed at an inaccessible position, it is advisable to install additional signal lights and illuminated pushbutton in operation room. So that the operating situation of the control unit can be remote monitored.

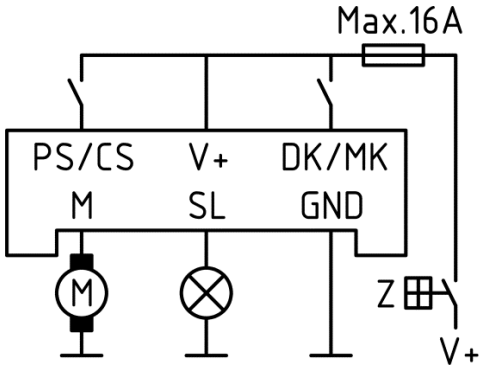
1.1 Installation dimension

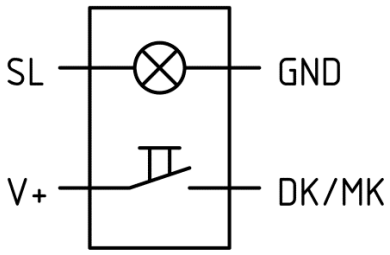


1.2 Electrical connection

PS	External **P**ressure **S**witch
V+	Positive pole of power supply
+M	Pump motor
+SL	External **S**ignal **L**ight
DK / MK	External pushbutton (timer mode operation)
	Counter signal input (counter mode operation)
GND	Ground
Z	Start-switch

External electrical connection:



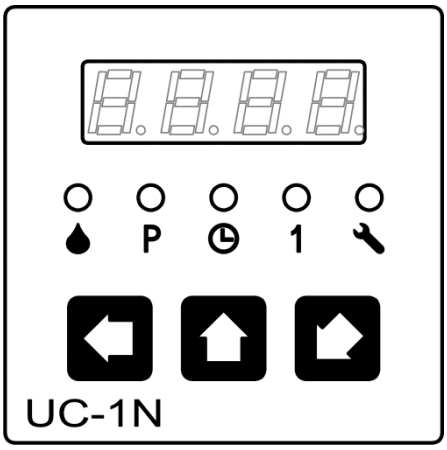


Note:

Please make sure that the system voltage matches the voltage range claimed for UC-1N. The fluctuation of supply voltage should be within the limit of **11V~45V**. Lower or higher than the voltage limit will permanently damage the control unit.

If the lowest required voltage is not guaranteed, please purchase Low Voltage Protector to protect the control unit against low voltage.

2. Display and control panel



Film panel protects UC-1A from humidity and dust.

Please use soft cloth with warm water or neutral detergent to clean the film panel. Organic solvent is prohibited.

Do not use sharp tools/ object to touch the panel.

Please do not peel off the protection film before its final installation.

2.1 LED monitor

LED monitor displays operating status and parameters.

It is deactivated normally. To activate it, press key , LED monitor then start to display current status and programmed parameters. ※

2.2 LED signal light

P PAUSE： Pause signal light.

LED “PAUSE” is on: Power is supplied to pump and control unit. System is in PAUSE status.

In programming, PAUSE light on means the current programmed parameters are relate to PAUSE.

“Light on” mentioned in this manual means the indicator light is a steady light. ”Light flashes” means indicator light flashes by a frequency of 0.5s on and 0.5s off.

LUBE： Lubricating signal light

LED “LUBE” on: Power is supplied to pump and UC-1N. System is now in lubrication status (pump motor is running).
In programming, LUBE light on means the current programmed parameter relates to LUBE.

TIMER： Timer mode indicator light

LED “TIMER” on: System is now in TIMER control mode.
In programming, TIMER light flashes means the control mode can be changed.

COUNTER： COUNTER mode indicator light

LED “COUNTER” on: System is now in COUNTER control mode.
In programming, COUTER light flashes means the control mode can be changed.

FAULT： Fault indicator light

LED “FAULT” flashes means fault occurs in the lubrication system.
Press key , fault message will be displayed on LED monitor.

2.3 Keys

UPKEY

Activate monitor.
Increase with key the displayed value at cursor position by 1 in programming state. If the digit is already 9, then it will return to 0.

LEFT / DK key

To move the cursor position when input parameters in programming status. If the cursor is already at the leftmost bit, then press this key, the cursor will return to the rightmost position.

In PAUSE state, to initiate an lubrication by pressing key  once.

In FAULT state, to clearance fault message and get system back to normal lubrication cycle by pressing key  once.

 ENTER KEY

Activate programming mode. Confirm parameters.

NOTE： Programming operation can only be carried out when the system at normal condition. If the system is in FAULT state, then troubleshooting needs to be done first.

2.4 External Signal Light SL

If an external signal light SL has been installed, SL will flash for 3 seconds after the start-switch is started.

Note: Control unit needs a certain time to save the operating parameters at the point of power-down so that the lubrication task could be continued after the break. **The interval of the power-down and the next power-on should not be shorter than 3 seconds. Otherwise, control unit may not start properly, and SL will not flash.**

Whenever the controller is performing the lubrication task, light “SL” will be on, indicating the status of lubricating. If the controller detects any faults during operating process, light “SL” will be flashing to remind user that the lubrication system is in fault.

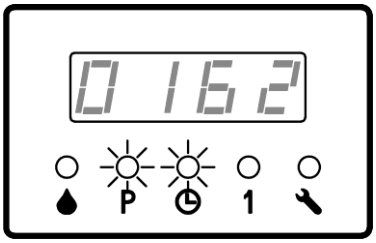
※ Under display mode or programming mode, if there is no key operations for more than 2 minutes, LED turns off automatically and quit current operation.

3. Display

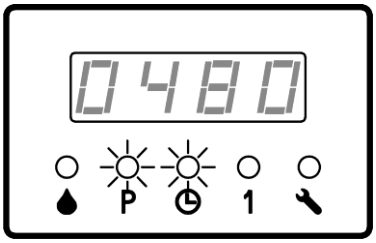
Briefly press key to activate display. The current values and the preset parameters are displayed.
During normal operation, LED signal lights are used to show current status of the control unit.
Press and hold key to activate programming operation. Please refer to chapter 3.2 <Programming operation> for the detailed operation.
If PAUSE is set as TIMER mode, the measurement unit of the figure on LED monitor is minute. If LUBRICATION is set as TIMER mode, then the measurement unit of the figure on LED monitor is second. If LUBRICATION or PAUSE is set as COUNTER mode, the figure on LED monitor is number of times.

3.1 Display operation

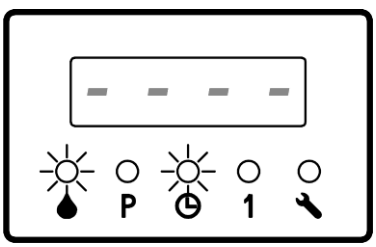
1. Briefly press key to show current states, control modes and remain value.
Example: PAUSE light on means it is now in PAUSE phase, TIMER light on means PAUSE is in TIMER mode. And remaining time is 162 **min**utes.



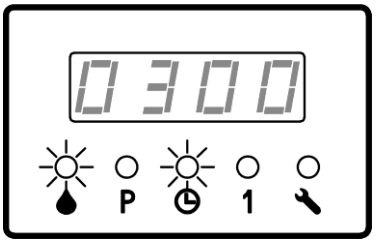
2. Press key , the figure on LED monitor begins flash, this means the figure is preset PAUSE control value.
Example: Preset PAUSE time is 480 **min**utes.



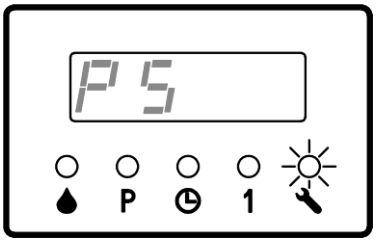
3. Press key to show LUBRICATION control mode and remaining value.
Example: TIMER light on means LUBRICATION is in TIMER mode. Remaining value shows – – – – because it is now in PAUSE phase.



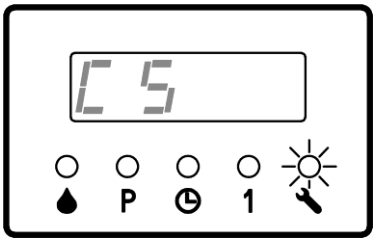
4. Press key , the figure on LED monitor begins flash, this means the figure is preset LUBRICATION value.
Example: Preset LUBRICATION time is 300 **s**econds



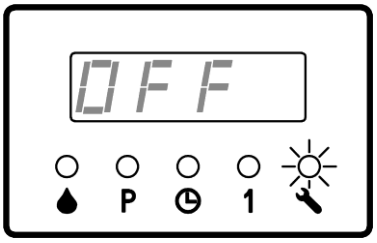
5. Press to display system monitoring setting.
Displayed content may be:
PS
(Monitoring via **P**ressure **S**witch)



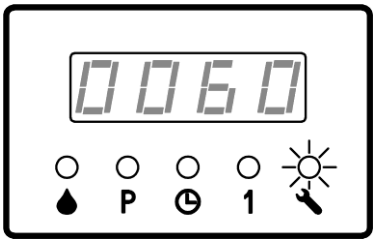
or **CS**
(Monitoring via **C**ycle **S**witch)



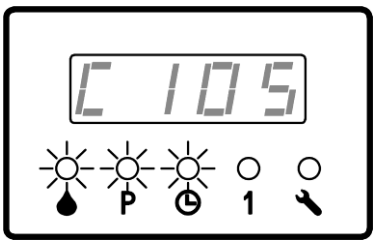
or **OFF**
(Monitoring disabled)



6. Press ,if monitoring function is set as **CS** monitor, then LED displays monitoring time. Otherwise, display skips to next step.
Example: Monitoring time is 60s.

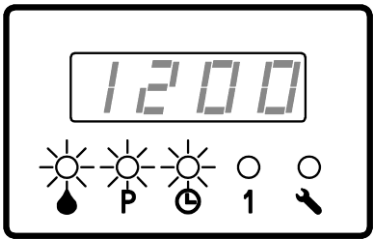


7. Press , LED monitor displays the 3 high-order digits of the total operational time. The first character “C” means the value is accumulated operational time
Example: C105 means the 3 high-order digits are 105.



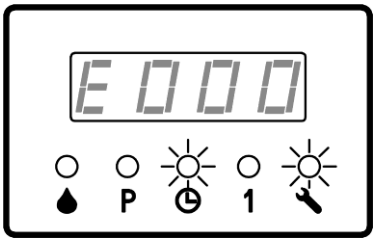
8. Press key , LED monitor displays the 4 low-order digits of the accumulated operational time.

Example: 1200. Compose the two digital segments to get the total operational time 1051200 min.



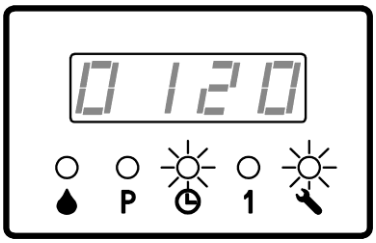
9. Press key , LED monitor displays the 3 high-order digits of the accumulated error time. The first character “E” means the value is accumulated error time.

Example: C000 means the 3 high-order digits of the value is 000.

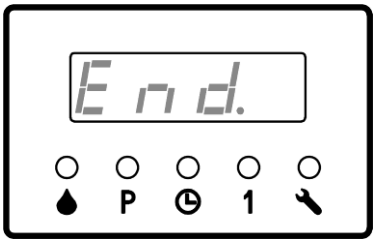


10. Press , LED monitor shows the 4 low-order digits of the error time value

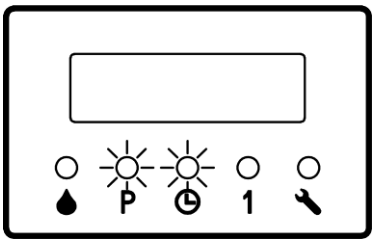
Example: 0120. To compose the two segments to get the accumulated error time is 000120 min.



11. Press key , LED monitor displays “End.**”,** which means no more parameters to be displayed.



12. Press key . LED monitor goes out and quit display operation state.



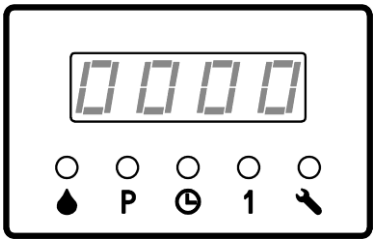
4. Programming operation

Press longer than 2 seconds to activate programming mode. All preset parameters and control modes can be altered under this mode.

Please note: Programming operation always starts with steps 1-3 (input password)

4.1 Activate programming mode

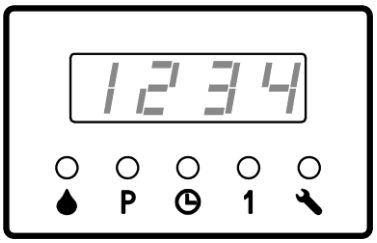
1.Press longer than 2s, all pilot lights on the panel off, LED monitor shows “0000” to remind user to input password



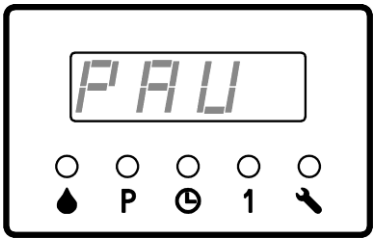
2. Input 4-digit password with key

Example: 1234

Factory setting is "0000"

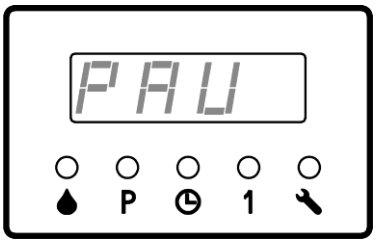


3. Press key to confirm the input password. If the password is correct, LED display switches to operation item. Otherwise, controller quit programming mode.

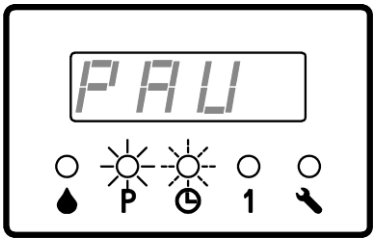


4.2 **Alters PAUSE and LUBE values** (Carry out steps 1-3 first)

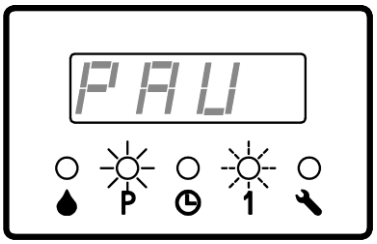
4. Repeatedly press key till LED display shows PAU.



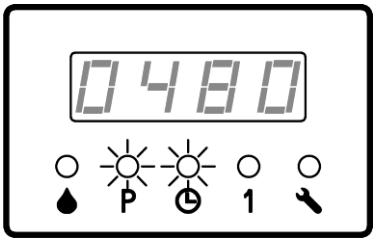
5. Press key ,light PAUSE on, user may change PAUSE control mode now. Pilot light on display panel indicate present control mode.
Example: Timer mode



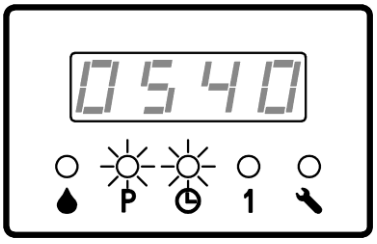
6. Press key ,to switch the control mode between TIMER and COUNTER, relative lights on panel will flash accordingly to show user's setting.
Example: New setting is counter mode.



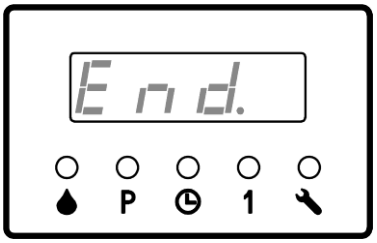
7: Press key to confirm the new setting of PAUSE control mode, pilots lights on panel then stop flashing, LED monitor displays current control parameter of PAUSE.
Example: 480min



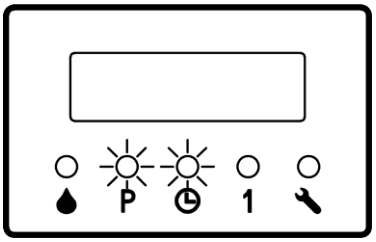
8. User may use keys to change PAUSE value.
Example: change to 540 min



9：Press key to confirm the new parameter. LED monitor displays ‘End.’, which means new control mode and parameters are saved till next change via programming.

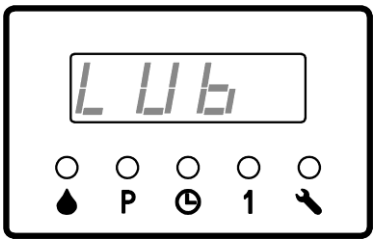


10. Press key to exit programming mode; or press key to program other items.



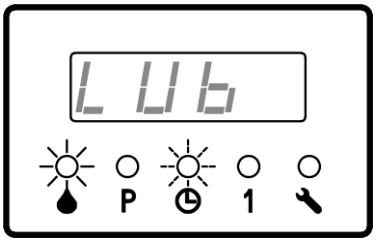
4.3 Change LUBE mode and parameters (carry out step 1-3 first)

4. Repeatedly press key  until LED monitor displays ‘LUb’.



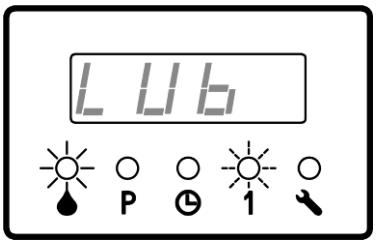
5. Press key  , light LUBE on, user can change LUBE control mode now. Pilot light on panel shows present LUBE control mode.

Example: present LUBE mode is TIMER.



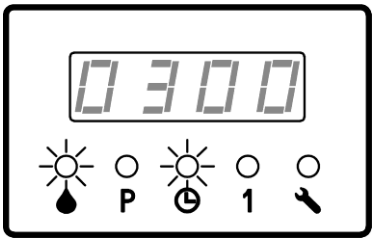
6. Use key  to change LUBE control mode. Following the change, relative lights TIMER or COUNTER will be flashing accordingly.

Example：Change to COUNTER mode.



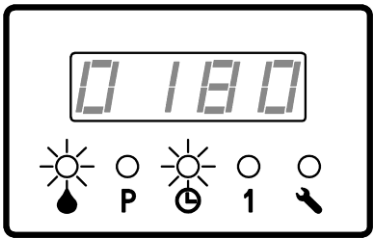
7. Press key  to confirm the new LUBE control mode. Pilot light on panel stop flashing and LED monitor then shows preset LUBE control value.

Example：300 s

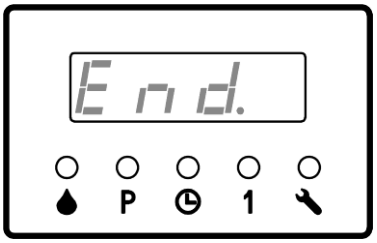


8. use keys  to change LUBE parameter.

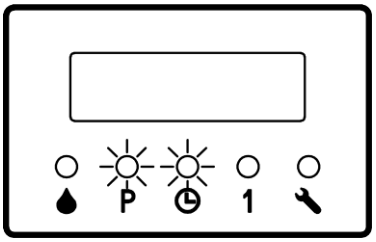
Example: change to 180 s



9. Press key to confirm the new parameter. LED monitor displays ‘End’, which means new control mode and parameters are saved until next change via programming.

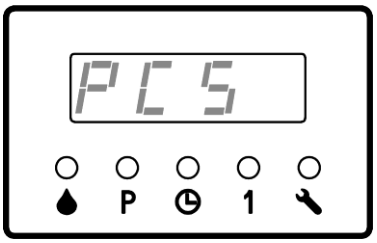


10. Press key to exit programming mode; or press key to program other items.

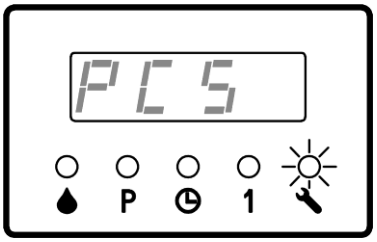


4.4 **Program monitoring setting** (Please carry out step 1-3 first.)

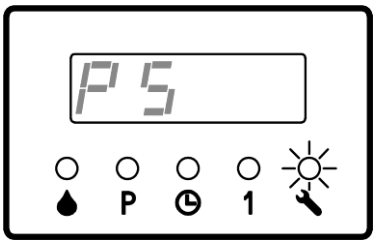
4. Repeatedly press key until LED monitor displays ‘PCS’.



5. Press key , light FAULT on, user can change monitoring setting.

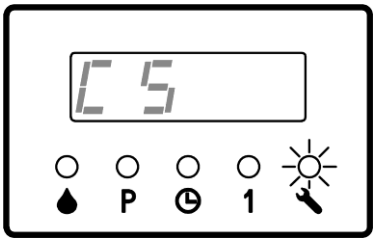


6. LED displays present monitoring setting and the content of the setting is flashing.

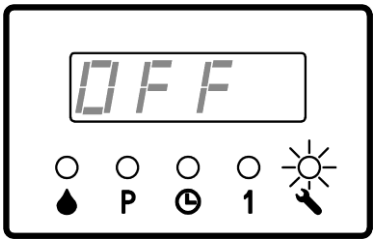


7. Use key to change monitoring mode.

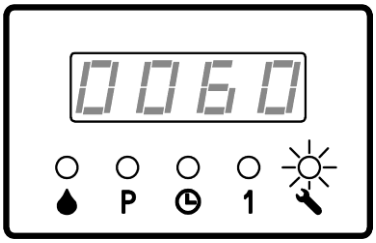
Example： Change to **CS** – **C**ycle **S**witch monitoring



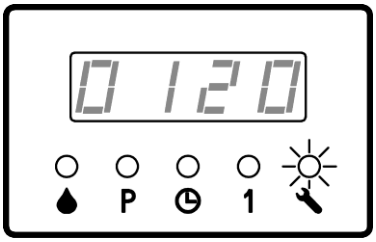
Or **OFF** – monitoring disabled



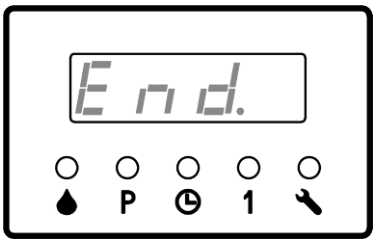
8. Press key to confirm the new monitoring mode. If CS is set, then LED displays monitoring time. If other mode is set, then program skips to step 10.



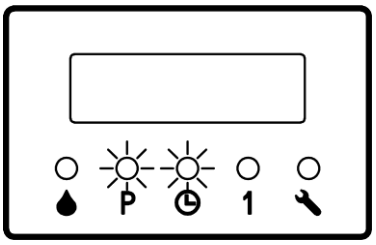
9. LED displays present monitoring time setting, user can use key to change the setting.
Example: Change to 2 min



10. Press key to confirm the new parameter. LED monitor displays ‘End.’, which means new control mode and parameters are saved until next change via programming.

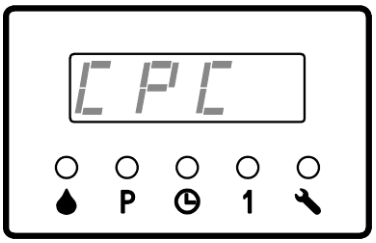


11. Press key to exit programming mode; or press key to program other items.

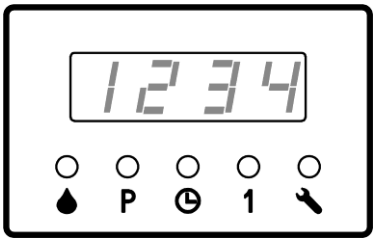


4.5 Change password (Carry out steps 1-3 first.)

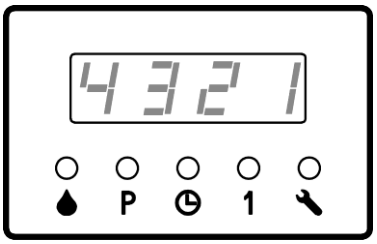
4. Repeatedly press key until LED displays 'CPC'.
Then press key to get into password change mode.



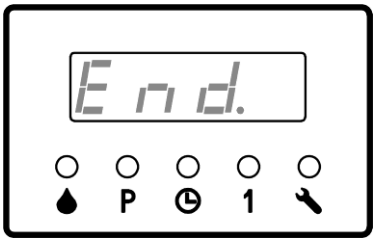
5. Press key , LED displays current password.
Example: 1234



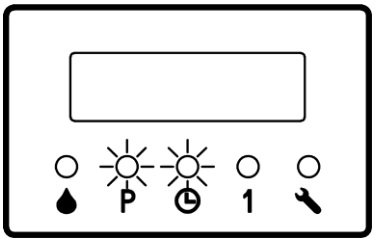
6. Use key to change password.
Example: Change to 4321



7. Press key to confirm the new password. LED monitor displays 'End.', which means new password is saved until next change via programming.



8. Press key to exit programming mode; or press key to program other items.



5. Operation modes

5.1 Timer operation

Set “TIMER” for PAUSE and LUBRICATION.
The control of the lubrication cycle takes place based on the values preset for PAUSE and LUBE times. It carries out the operation cycle of “PAUSE - LUBE”. Press key  or external DK button can insert a lubrication or clear fault message. External DK button can be connected to the terminal DK/MK.

5.2 Counter mode operation (Pause depends on impulses)

Set “Counter” for PAUSE and “Timer” for LUBE.
Connect an external impulse transmitter to the terminal DK/MK.
PAUSE: Display and program values in impulses.
LUBE: Display and program values in seconds.

5.3 Combination operation (Pump running is controlled by external impulse)

PAUSE: Display and program values in impulses or time.
LUBE： Display and program values in impulses.
Users may combine “COUNTER MODE” of pause with “COUNTER MODE” of lube, or “TIMER MODE” of pause with “COUNTER MODE” of lube.

When combination operation is in service, lubrication system may control the pump by the method of counting the action times of CS.In order to guarantee the lubrication system reliable operates, we suggest user to activate CS monitoring function and set a proper CS monitoring time.

5.4 Forced service

Briefly press key  on the panel, controller will carry out a LUBE process once.
Press and hold key  , controller will force the pump to operate until release the key. During this process, controller does not carry out any monitoring function.

5.5 System Monitoring

Controller can be set as **P**ressure **S**witch monitoring, to monitor the pressure build up situation in main pipe. If pressure switch does not detect proper pressure during lubrication period, fault will be automatically detected and displayed.

Controller also can be set as **C**ycle **S**witch monitoring, to monitor the movement of progressive distributor's plunger. If Cycle Switch does not detect movement of the plunger during lubrication period, fault will be automatically detected and displayed.

If lubrication system does not need monitoring, please set monitoring as OFF. Under this situation, lubrication circle only carries out lubrication by PAUSE and LUBE control parameters and does not do fault monitoring.

5.6 Power down protection function

The control unit has power down protection function. When power is cut off, the control unit auto stores operating status, remaining values and relative system data at the point of power-off. When next electrify starts, the control unit will continue carrying out operation from last point of power off.
The control unit stores operating status and values in EEPROM. The data can reliable be stored for 10 years.

6. Faults

When control unit detects system faults, LED “FAULT” on the panel will be flashing quickly. If an external **S**ignal **L**ight has been installed, light “SL” will be also flashing to remind user the lubrication system is in fault. Meanwhile, the control unit stops normal operation and wait for user to handle the faults. User may check the detailed reason of the fault through LED monitor.

6.1 Display faults

Briefly press , fault information will be displayed on LED monitor. The meaning of the displayed information are:


No signal is received from Pressure switch during pump running time.


No signal is received from Cycle switch during pump running time.


Control unit detects error from Level switch.


Control unit itself has error inside. If such situation occurs, get the control unit power off, then get it power on 1 minute

6.2 Clear fault messages

Press or external DK button to clear fault messages（on the condition that one state is set as COUNTER mode）, and to start a normal lubrication cycle.

Please note: and external DK button **must** be used after determining and correcting the faults. The user himself is liable for any damages caused by operating the equipment without (lack of) lubrication.

6.3 Operation with Pressure Switch monitoring

If external Pressure Switch has installed, system will stop once no signal is received from pressure switch during pump running time. Controller then gives alarm signal. FAULT light on the panel flash, Press key , LED displays “EP”.

6.4 Operation with Cycle Switch monitoring

If external Cycle Switch is used to monitor the movement of the progressive distributor, system will stop once no signal is received from cycle switch during pump running time. Controller then gives alarm signal.

The role of CS monitoring time is:
Each CS (Cycle Switch) corresponding matches an internal timer Tc. When lubrication starts, Tc begins to countdown. If CS signal is received during the countdown, Tc clears and re-start countdown. If no CS signal received until the Tc countdown to the preset monitoring time, this means CS error occur. controller will give alarm signal and system then gets into CS error state.

6.5 Block operation

If CS (**C**ycle **S**witch) monitoring is programmed, a block operation will be automatically activated when no signal from the cycle switch is received during the pump running time. To test Cycle Switch:

① When no signal from CS is received during the pump running period, the normal lubrication operation will be aborted, then a 15 min interval block operation begins.

② When the 1st 15 min block interval ends, controller drives the pump. If signal from CS is received, the block operation will be ended. System goes back to normal lubrication cycle. If still there is no signal from CS, then another block operation begins.

③ If signal from CS is received during the 2nd 15 min interval, the block operation is aborted and the system will go back to normal operation. If there is no signal from CS, then the 3rd block operation begins

④ If the system receives signals from CS during the 3rd 15 min interval, then it will go back to normal lubrication cycle. If there is still no signal received, then the block operation is aborted and a fault message will be displayed.

If the preset PAUSE time is shorter than 15 min, the block pause will correspond to the preset value.

During block operation, relevant LED light on the control panel will be flashing to indicate that the control unit is now performing block operation. Light PAUSE flashes means block operation is now in PAUSE state. Press key , LED monitor shows “bP”, light LUBE flashes, which means block operation is now in LUBE phase. Press key at this time, LED monitor shows “bC”.

User may use key to exit block operation earlier and get the system back to LUBE phase.

Setting function is temporary deactivated during block operation period.

6.6 Level switch detection

If an external level switch is installed to monitor level situation, once controller detects the level switch is closed, controller automatically stops the system and gives alarm immediately. At the same time, Light fault on the control panel will flash. Press key , LED monitor displays ‘EL’ (means level switch error).

※ Level switch detection function is an optional function.

7. Technical Data

Voltage of power supply:	12V~42V
Type of protection:	IP40
Max. Load output M:	16A
SL output:	5A
Data storage:	No limitation
Operation temperature:	-30℃~75℃
Storage temperature:	-45℃~85℃
Recommended fuse specification:	10A
Installation dimensions L×W×H:	137mm×92mm×42mm
Programmable LUBE time range	1s~9999s
Programmable PAUSE time range:	1min~9999min
Programmable counting impulses range:	1~9999

UC-1N 通用润滑系统控制器是专门为集中润滑控制设计的控制器，适用于工程机械、底盘集中润滑和润滑站的控制。控制器的控制方式和控制参数保存在 EEPROM 内，不需要后备电源支持就可以长期可靠存储。

控制器采用 LED 数码显示器和 LED 指示灯显示信息，方便用户操作使用。

UC-1N 通用润滑系统控制器出厂设置如下：

间歇控制方式：	定时器控制
间歇时间：	480 分钟(8 小时)
润滑控制方式：	定时器控制
润滑时间：	120 秒(2 分钟)
系统监控方式：	压力开关监控

产品制造商： 苏州力天工业控制事业部

办公地址： 苏州市小施家弄 22 号 8 号楼 102 室

技术支援电话：0512-68661838

技术支援邮箱：support@leetern.com

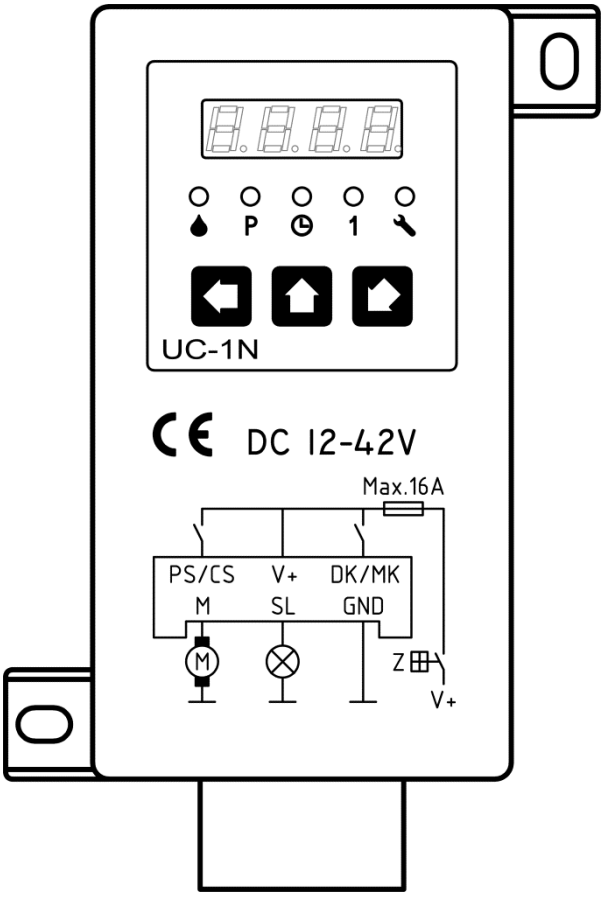
互联网网站： http://www.leetern.com

Universal Control Unit UC-1N

UC-1N 通用润滑系统控制器

User's Manual

用户操作指导手册



Suzhou Leetern Industry Control Department

May. 2012

UC-1N 通用润滑系统控制器是专门为集中润滑控制设计的控制器，适用于工程机械、底盘集中润滑和润滑站的控制。控制器的控制方式和控制参数保存在 EEPROM 内，不需要后备电源支持就可以长期可靠存储。

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系统监控方式：	压力开关监控

产品制造商： 苏州力天工业控制事业部
办公地址： 苏州市小施家弄 22 号 8 号楼 102 室
技术支援电话：0512-68661838
技术支援邮箱：support@leetern.com
互联网网站： http://www.leetern.com

目　　录

安全警告！

UC-1N 通用润滑控制器(以下简称本产品)按照通用工程技术标准设计和制造。在符合相应的工业安全和事故防范条例的同时，还符合相应的一般工业技术验收标准。

虽然本产品符合相应的安全技术条件，但使用中仍然可能会伤害到使用者或第三者或危及其他器材。因此只能安装使用技术状态完全正常的产品并严格遵守操作说明，任何影响安全的故障应立即纠正。

本产品只能用于集中润滑系统的控制与监控。如被用于任何不恰当之处而造成的损害，由当事人自己负责。

潜在的电气危险

本产品只能由经过培训的合格人员，按照国家电气技术规范规定接入电源。不正确的连接将导致人员的重大伤害。

本产品适用于底盘、工程机械及润滑站上，以蓄电池或类似直流电源供电的电气系统。当作其他用途时，必须遵守相应的安全规定。

合格人员

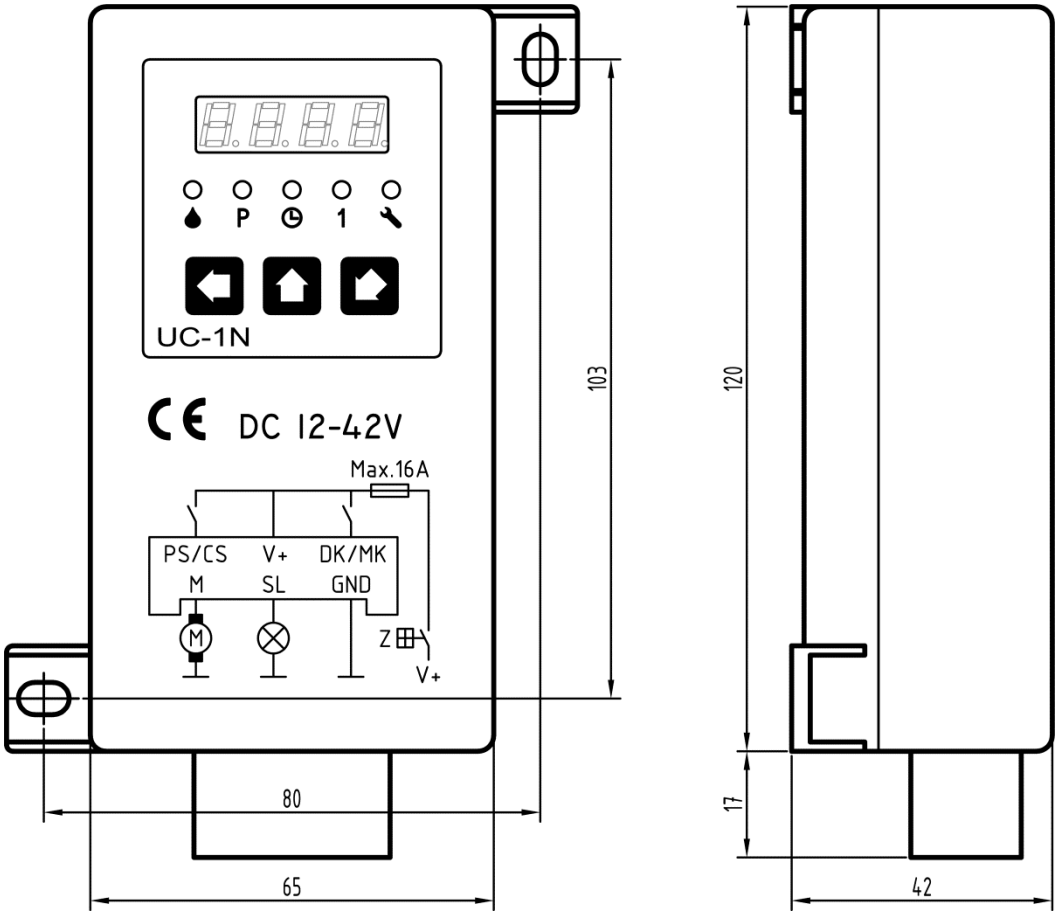
本手册所称合格人员，是指接受过本产品相关培训的人员。他们要熟悉相关的安全标准、规定，具备相应的安全知识和技能。他们能在已知情况下被授予完成需要做的工作，还要能够识别并阻止可能发生的危险。

1. 安装

UC-1N 通用润滑系统控制器**不是**为露天使用设计的，控制器必须安装在封闭隔仓内，以保护控制器不受环境影响。

如果控制器被安装在难于接近的地方，可以在操作室安装指示灯和按钮组合开关，以便远程监控控制器的运转。

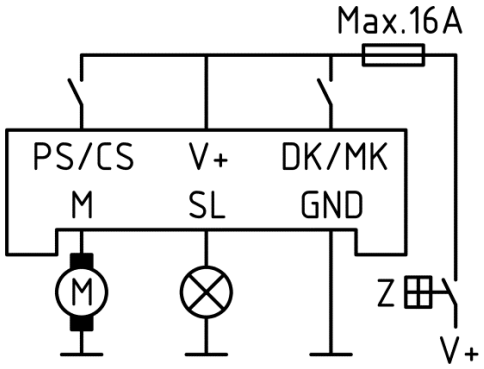
1.1 外形尺寸



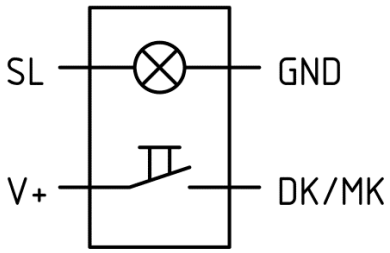
1.2 电气接线

PS	外接压力开关
V+	控制器供电正极
+M	泵电机
+SL	外接指示灯
DK / MK	外接按钮开关(定时器控制方式)
	计数信号输入(计数器控制方式)
GND	接地
Z	启动开关

外部接线图如下



电气连接器接线图

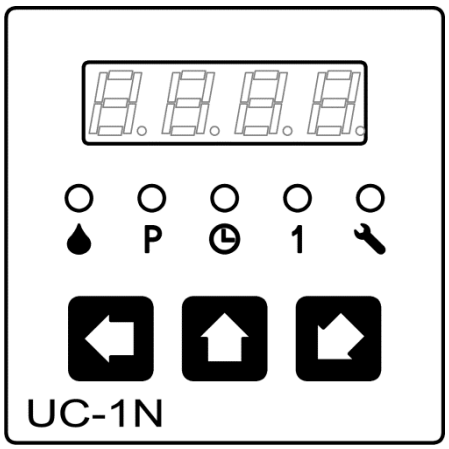


DK 开关和 SL 灯组件接线图

请注意:

安装和使用控制器时，必须保证电源电压与 UC-1N 控制器技术规格书所标称电压一致。工作时候，电源电压波动不能超过 **11V~45V**，长期低于或者高过这个电压范围，都可能给控制器造成永久性的损害。

2. 显示控制面板及其操作



UC-1N 通用润滑系统控制器采用薄膜面板保护控制器不受潮气和污物侵入。

薄膜面板不能用有机溶剂来擦洗。如果想清洁面板，可以用软布蘸中性洗涤剂擦拭。

不能用尖锐的物体刺薄膜面板，以免损坏薄膜面板。控制器在最终安装到安装位置前，请勿揭下保护膜。

2.1 LED 数码显示器

 LED 显示器用来显示工作数据和状态

LED 显示器平时是关闭的。要启动显示，只要按下 键，显示器即开始显示当前状态和设定的工作参数。※

2.2 LED 指示灯

 PAUSE：间歇指示灯

PAUSE 灯常亮表示：控制器和泵已经接通电源，系统处于间歇状态。

在编程设定时，PAUSE 灯亮表示当前设定项目为间歇相关内容。

本手册中所提到的指示灯常亮，是指指示灯稳定地点亮；指示灯闪亮，是指指示灯以 0.5s 点亮、0.5s 熄灭的频率闪动。

 CONTACT：润滑指示灯

CONTACT 灯常亮表示:控制器和泵已经接通电源,系统处于润滑状态。(泵电机在运转)。

在编程设定时，CONTACT 灯亮表示当前设定项目为润滑相关内容。

TIMER：定时器方式指示灯

TIMER 灯常亮表示：系统当前采用定时器方式控制。

在编程设定时，TIMER 灯闪亮表示：当前可以更改控制方式。

COUNTER：计数器方式指示灯

COUNTER 灯常亮表示：系统当前状态采用计数器方式控制。

在编程设定时，COUNTER 灯闪亮表示：当前可以更改控制方式。

FAULT：故障指示灯

FAULT 灯闪烁表示：润滑系统发生了故障。

按动  键后，故障信息就显示在 LED 显示器上。

2.3 薄膜按键

向上滚动键 - UPKEY

在显示操作时，启动控制器进入显示操作。

在编程操作时，按动一次  令光标位(即数字闪烁位)数字加 1。如果数字已经为 9，则数字回归为 0。

向左滚动 / DK 键 - LEFTKEY

在编程操作时，用于向左移动 LED 数码光标。如果光标已经在最左位，

则光标回归到最右位。

在间歇状态下，按一次  ，将启动一次中间润滑；

在故障状态下，按一次  ，清除故障信号并使系统重新进入正常的润滑周期循环。

 设置键 - SETKEY

启动控制器进入编程设定操作， 确认选项或者参数。

请注意：控制器只能在润滑系统处于非故障状态下进入编程操作。如果润滑系统在故障状态，必须先排除故障。

2.5 外接指示灯 SL

如果外接了 SL 指示灯，在启动电源开关后，SL 指示灯将闪亮 3 次，表示控制器自检完毕，进入工作状态。

请注意：控制器断电时需要一定时间保存断电时刻工作参数，以便下次上电时从中断处继续执行润滑任务。因此用户在使用控制器时候，控制器断电与再次上电的时间间隔不能小于 5 秒钟。否则，控制器可能不能正常启动，SL 指示灯就不会闪亮。

当控制器正在执行润滑任务时候，SL 指示灯将被点亮，以指示控制器的润滑状态；如果在工作过程中控制器检测到了故障，SL 指示灯持续闪亮，以提醒用户：润滑系统发生了故障。

※ 在显示操作或者编程操作时，如果 2 分钟内没有有效的按键动作，LED 显示器将自动关闭，并退出当前操作。

3. 显示模式

短暂按 键，控制器就启动了显示操作，LED 显示器开始显示系统的设定参数和工作数据。LED 指示灯用来在平时显示控制器的状态。

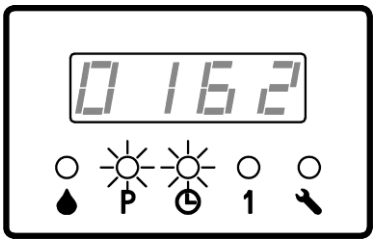
编程操作用长按 键来启动，具体请见《4. 编程模式》。

如果间歇的控制方式为定时器控制，显示器上所显示数字的单位隐含为分钟；如果润滑的控制方式为定时器控制，显示器上所显示数字的单位隐含为秒。如果润滑控制方式或间歇控制方式为计数器控制，显示器上所显示数字的单位为隐含为次数。

3.1 显示操作

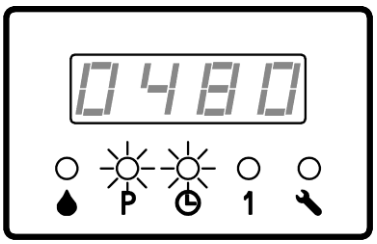
第 1 步：短暂按 键，开始显示控制器的当前状态、控制方式和剩余数值

例如：PAUSE 灯亮-当前为间歇状态，TIME 灯亮-间歇采用定时器控制，剩余 162 分钟



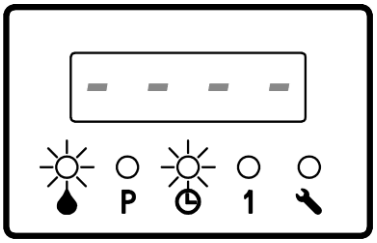
第 2 步：按 键，LED 显示器显示的数字开始闪烁，表示这是预设的间歇参数

例如：预设的间歇时间为 480 分钟



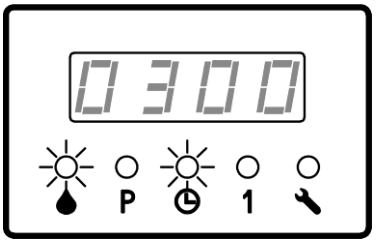
第 3 步：按 键，显示控制器另一个状态的控制方式和剩余数值

例如：TIME 灯亮，表示润滑采用定时器控制；剩余数值为 －－－－，表示无效



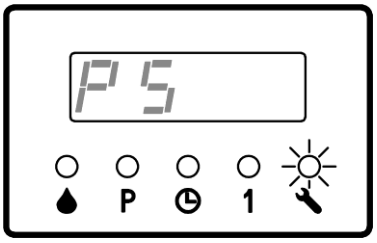
第 4 步：按 键，LED 显示器显示的数字开始闪烁，表示这是预设的另一状态（ 润滑 ）的控制参数

例如：预设的润滑时间为 300 秒

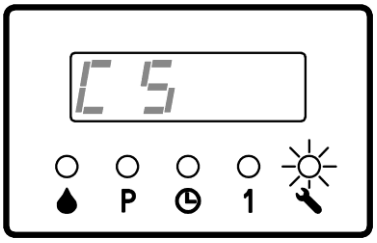


第 5 步：按 键， LED 显示器润滑系统的监控设定。可能显示的内容是

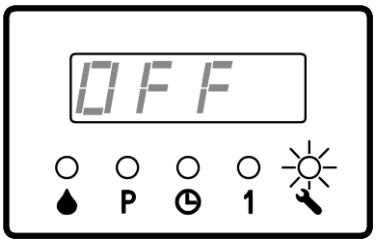
PS – 压力开关监控



或者 CS - 循环开关监控

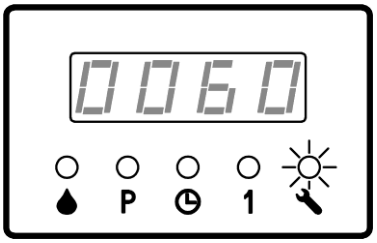


或者 OFF – 监控关闭



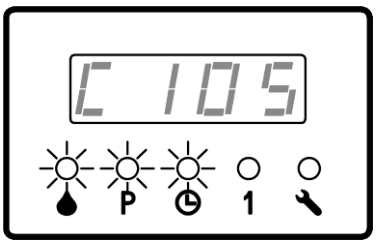
第 6 步：按 键，如果监控设定为 CS，开始显示监控时间。否则跳过这一步

例如：监控时间为 60 秒



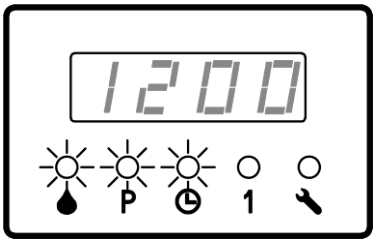
第 7 步：按 键，LED 显示器开始显示累计工作时间的高 3 位。首字符 **“C”** 表示显示的是累计工作时间

例如：C105 表示高 3 位为 105



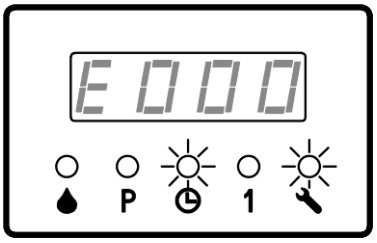
第 8 步：按 键，LED 显示器显示累计工作时间的低 4 位

例如：1200。与高 3 位的 105 合并，累计工作时间为 1051200 分钟



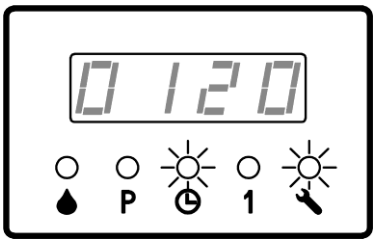
第 9 步：按 键，LED 显示器开始显示累计工作时间的高 3 位。首字符 **“E”** 表示显示的是累计故障时间

例如：E000 表示高 3 位为 000

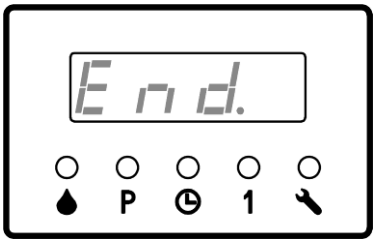


第 10 步：按 键，LED 显示器开始显示累计故障时间的低 4 位

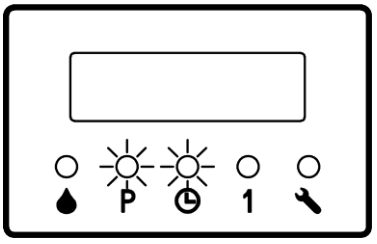
例如：0120。与高 3 位的 000 合并，累计故障时间为 120 分钟



第 11 步：按 键，LED 显示器 **“End.”** 表示所有显示项目显示完毕



第 12 步：按 键， LED 显示器关闭，退出显示操作状态



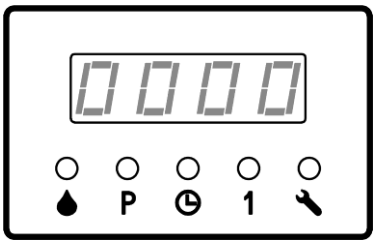
4. 编程模式

持续按下 键超过 2 秒，控制器就进入编程模式，可以更改各个设置参数或者控制方式。

请注意：所有的编程操作都要从第 1-3 步(输入保护密码)开始。

4.1 启动编程模式

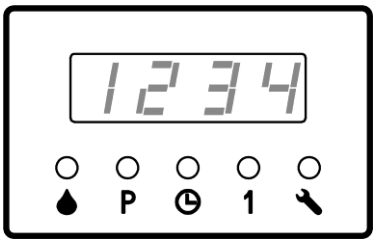
第 1 步：按下 键超过 2 秒，所有指示灯熄灭，LED 显示器显示 **“0000”**，提示输入保护密码



第 2 步：可以用 键输入 4 位密码

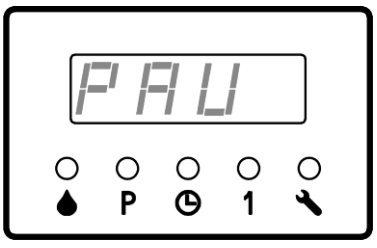
例如：1234

出厂默认密码为 **“0000”**



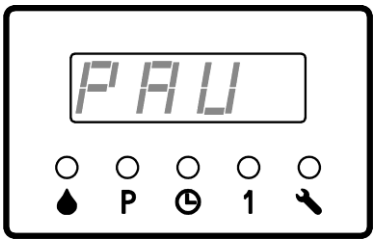
第 3 步：按 键确认输入的保护密码。

如果密码正确，显示切换成操作项目显示；否则自动退出编程模式



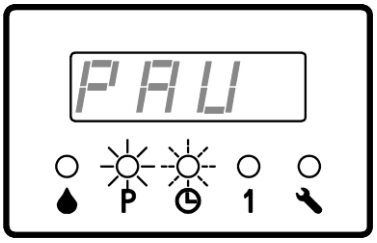
4.2 更改间歇方式和间歇参数(先完成 1-3 步！)

第 4 步：反复按 键，直到 LED 显示器显示 **“PAU”**。



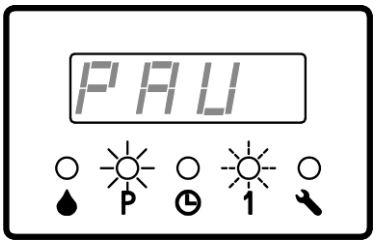
第 5 步：按下 键，PAUSE 灯亮，进入更改间歇控制方式操作，面板指示灯指示当前的间歇控制方式

例如：定时控制方式



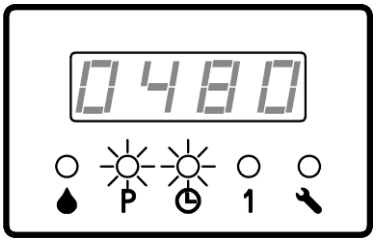
第 6 步：按 键，会令 TIMER（定时）和 COUNTER（计数）灯切换闪烁，表示当前间歇控制方式。

例如：改为计数控制方式



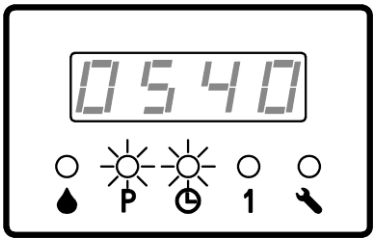
第 7 步：按 键，确认间歇控制方式。间歇控制方式指示灯停止闪烁，LED 显示器显示当前的间歇控制参数

例如：480 分钟

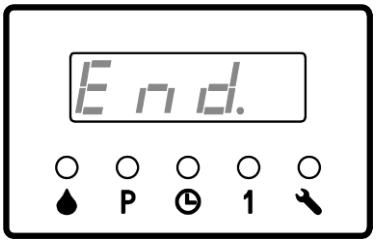


第 8 步：可以用 键修改间歇控制参数。

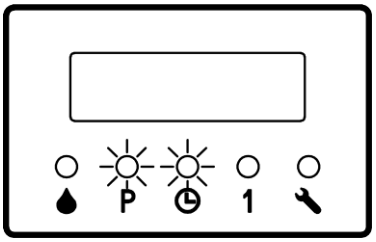
例如：改为 540 分钟



第9步:按 键确认新的间歇控制参数。LED 显示器显示**“End.”**，表示间歇控制方式和间歇控制参数被接受并储存，直到被下一次编程设定改变

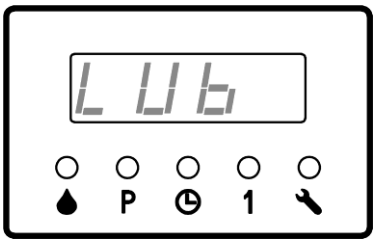


第 10 步：按 键，即退出编程模式；按 键，可进行其他项目编程设定



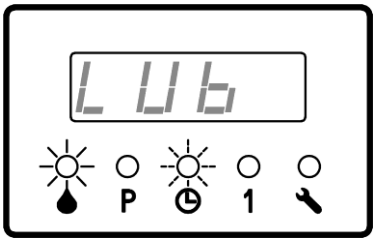
4.3 更改润滑方式和润滑参数(先完成 1-3 步！)

第 4 步：反复按 键，直到 LED 显示器显示 **“LUb”**。



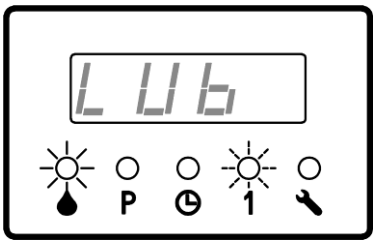
第 5 步：按下 键，CONTACT 灯亮，进入更改润滑控制方式操作，面板指示灯指示当前的润滑控制方式

例如：定时控制方式



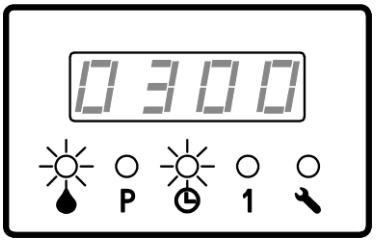
第 6 步：按 键，会令 TIMER（定时）和 COUNTER（计数）灯切换闪烁，表示当前润滑控制方式。

例如：选择计数控制方式



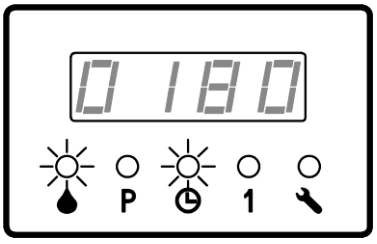
第 7 步：按 键，确认润滑控制方式。润滑控制方式指示灯停止闪烁，LED 显示器显示当前的润滑控制参数

例如：**30**0 秒

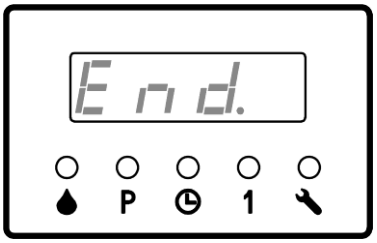


第 8 步：可以用 键修改润滑控制参数。

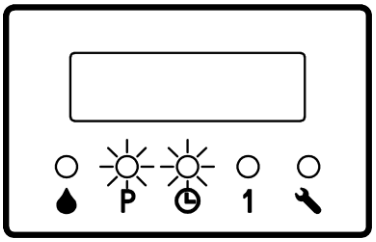
例如：改为 180 秒



第9步:按 键确认新的润滑控制参数。LED 显示器显示**“End.”**，表示润滑控制方式和润滑控制参数被接受并储存，直到被下一次编程设定改变

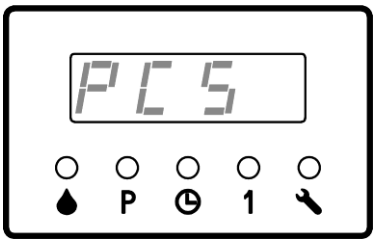


第 10 步：按 键，即退出编程模式；按 键，可进行其他项目编程设定

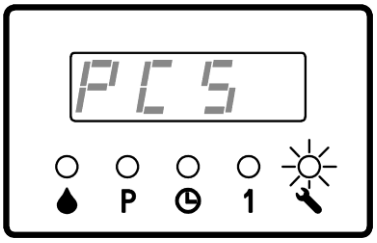


4.4　更改监控设定(先完成 1-3 步！)

第 4 步：反复按 键，直到 LED 显示器显示 **“PCS”**。

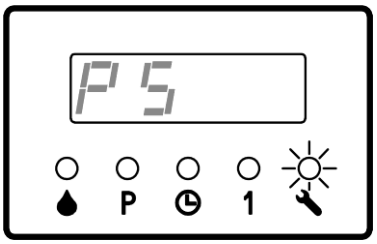


第 5 步：按下 键，FAULT 灯点亮，进入更改监控设定操作。



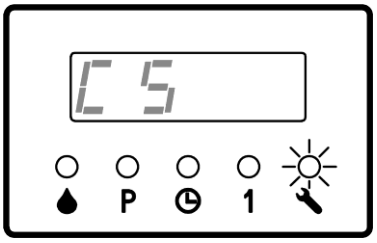
第 6 步：LED 显示器显示当前的监控设定，并且内容闪烁。

例如：当前监控设定为压力开关监控 PS

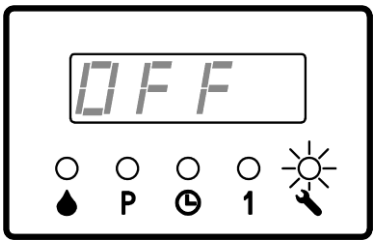


第 7 步：可以用 键来改变监控内容

例如：改为循环开关监控 CS

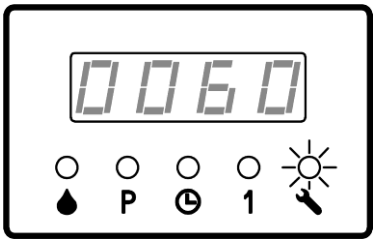


或者，监控关闭 OFF



第 8 步：按 键，确认监控方式。

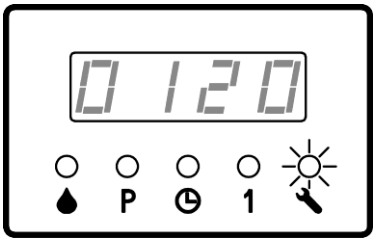
如果设定监控方式为 CS，开始显示监控时间；如果设定监控方式为其他，跳到第 10 步



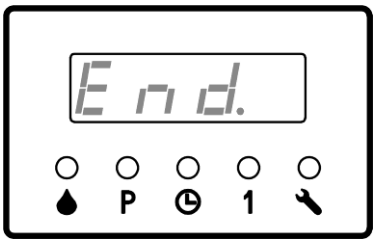
第 9 步：LED 显示器开始显示当前的监控时间。

可以用 键，修改监控时间。

例如：改为 2 分钟

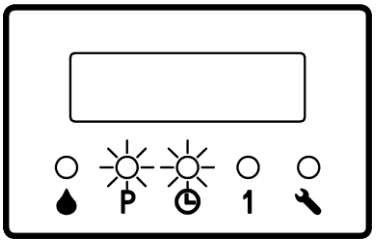


第 10 步：按 键确认新监控设定。LED 显示器显示“End.”表示监控设定内容被接受并储存，直到被下一次编程设定改变



第 11 步：按 键，即退出编程模式；

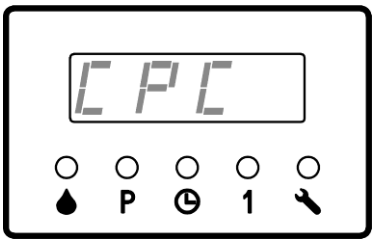
按 键，可进行其他项目编程设定



4.5　更改保护密码(先完成 1-3 步！)

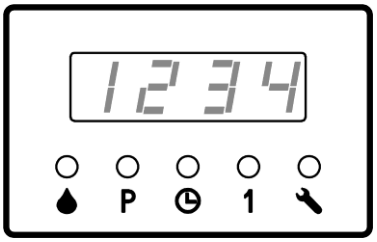
第 4 步：反复按 键，直到 LED 显示器显示 **“CPC”**。

按下 键，进入更改保护密码操作



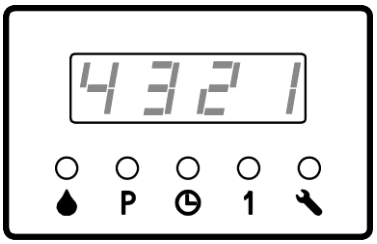
第 5 步：按下 键，进入更改保护密码操作，LED 显示器开始显示当前密码。

例如：当前密码为 1234

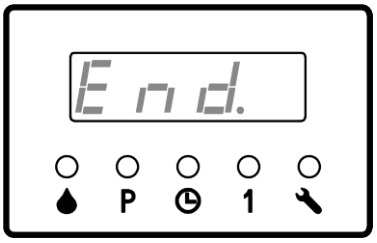


第 5 步：可以用 键修改保护密码

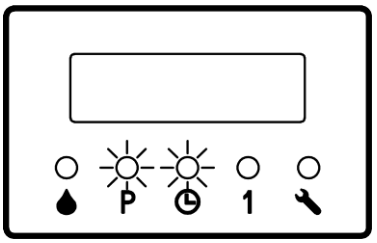
例如：改为 4321



第 6 步：按 键确认新密码。LED 显示器显示 **“End.”** 表示密码被接受并存储，直到被下一次更改保护密码改变



第 7 步：按 键，即退出编程模式；按 键，可进行其他项目编程设定



5. 工作模式

5.1 定时工作方式

设定“间歇定时器控制”和“润滑定时器控制”

润滑以时间为控制基础，按照预先设定的间歇时间和润滑时间，循环实现“间歇”-“润滑”的控制

按下  键或者外接 DK 按钮，可以启动一个中间润滑循环或者消除故障显示。外接 DK 按钮可以接到 DK/MK 输入端

5.2 计数工作方式(间歇以外接脉冲计数控制)

设定“间歇计数器控制”和“润滑定时器控制”

外接脉冲传感器信号接到 DK/MK 输入端

间歇：显示和设置的参数为计数脉冲数

润滑：显示和设置的参数为时间

5.3 组合工作方式(泵的运转以外接脉冲计数控制)

间歇：显示和设置的参数为计数脉冲数或者时间

润滑：显示和设置的参数为计数脉冲数

可以组合成“间歇计数器控制”和“润滑计数器控制”，或者“间歇定时器控制”和“润滑计数器控制”

当使用组合工作方式时候，润滑系统可以采用对 CS 循环开关动作次数计数的方法来控制润滑系统的运转。为保证润滑系统更加可靠运行，建议此时使用 CS 监控并设置适当的 CS 监控时间。

5.4 强制运转

短暂按一下控制器面板上  键，控制器将启动一次完整的润滑过程。

如果按下  键不放，控制器将进入强制运转状态，此时强制启动润滑泵运转，直到放开  键为止。这个过程中，控制器将不执行任何监控功能，

同时面板上只有 CONTACT 灯在闪烁，指示系统现在处于强制运转状态。

强制运转具有最高优先级，无论系统处于何种状态，都可以执行强制运转功能。

这两个功能可用于系统调试和测试，以及排除系统故障。

5.5 系统监控

控制器可以设置压力开关监控，采用压力开关监测主油管内压力的建立。如果润滑期间压力开关没有检测到主油管内压力建立，故障能够被自动检测和显示出来。

控制器也可以设置循环开关监控，采用循环开关监测递进式分配器的柱塞运动。如果润滑期间循环开关没有检测到递进式分配器柱塞的运动，故障能够被自动检测和显示出来。

如果润滑系统不需要监控，可以将控制器设定为监控关闭(OFF)。在这种方式下，润滑循环只能按照设定的间歇和润滑参数控制，而不去执行故障监控。

5.6 断电保护功能

控制器具备断电保护功能。控制器断电时候，能够自动记忆断电时刻工作状态、剩余参数以及系统内部相关数据。当控制器再次上电时候，能够从断电点继续执行原来的润滑任务。

控制器采用 EEPROM 记忆工作状态和参数。记忆的时间是长期的，能可靠存储 10 年以上。

7. 故障监测和处理

当控制器检测到系统故障时候，操作控制面板的 FAULT 指示灯会闪亮；如果外接了 SL 指示灯，SL 指示灯也跟随持续闪亮，以提示用户：润滑系统发生了故障。同时，控制器停止工作，等待用户处理故障。用户可以通过显示控制面板察看具体的故障原因。

6.1 故障显示

短暂按一下  键，故障信息就会显示出来，具体信息含义：

 泵在运转期间没有接收到来自压力开关的信号。

 泵在运转期间没有接收到来自循环开关的信号。

 控制器检测到液位开关故障信号。

 控制器内部发生了错误。遇到这种情况，请切断控制器电源，1 分钟后再接通控制器电源。如果故障仍然不能排除，请联系制造商。

6.2 清除故障信号

短暂按一下  键或者外接 DK 按钮（在没有任何一个状态采用计数驱动的情况下），控制器就可以清除故障信号，重新进入正常润滑周期。

请注意：必须确认并排除故障后才能使用  键或外接 DK 按钮，否则设备将因缺乏润滑而发生损坏！因为缺乏润滑造成用户设备损坏，由用户自行负责。

6.3 压力开关检测

如果外接了压力开关，那么泵在运转期间没有收到压力开关的信号，将自动停止运行，发出故障报警信号。此时控制器面板上 FAULT 灯闪亮，按下  键，LED 显示器显示“EP”字样。

6.4 循环开关检测

如果外接了循环开关用来监视递进式分配器的运动，那么泵在运转期间没有收到循环开关动作的信号，将自动停止运行，发出故障报警信号。

循环开关监控时间的作用如下：

循环开关监控时间对应匹配 1 个内部计时器 Tc。如果设定了 CS 监控，在润滑启动后，Tc 开始计时。如果在计时期间收到了 CS 开关的信号，Tc 清零，重新开始计时。如果一直到 Tc 计时到预定的循环监控时间仍没有收到 CS 开关信号，即发出警报并进入循环开关错误状态。

6.5 子循环测试

如果设定了 CS 监控，那么泵在运转期间没有收到循环开关的信号，将自动进入一个子循环测试过程，测试循环开关：

1、 在润滑泵运转期间，控制器没有收到循环开关发出的信号，正常的润滑工作被中止，开始 15 分钟间隔的子循环测试；

2、 第一个 15 分钟间隔时间到，驱动润滑泵。如果收到循环开关发出的信号，退出子循环测试，重新进入正常的润滑循环过程；如果没有收到循环开关发出的信号，重新设定间隔时间；

3、第二个 15 分钟间隔时间到，驱动润滑泵。如果收到循环开关发出的信号，退出子循环测试，重新进入正常的润滑循环过程；如果没有收到循环开关发出的信号，再重新设定间隔时间；

4、第三个 15 分钟间隔时间到，驱动润滑泵。如果收到循环开关发出的信号，退出子循环测试，重新进入正常的润滑循环过程；如果还没有收到循环开关发出的信号，退出子循环测试，进入故障停机状态并发出故障信号。

如果用户设定的间歇时间小于 15 分钟，则子循环时间间隔按照用户设定的间歇时间工作。

子循环过程中，显示控制面板相应的指示灯闪亮，指示控制器正在执行子循

环测试：PAUSE 灯闪亮，表示处于子循环测试的间隔阶段。此时按下 键，LED 显示器显示“bP” 字样；CONTACT 灯交闪亮，表示处于子循环测试的驱动阶段。此时按下 键，LED 显示器显示“bC”字样。

可以用面板 键来使控制器提前退出子循环过程，进入润滑状态。

在子循环期间，控制器将暂时关闭设定功能。

6.6 液位开关检测

如果外接了液位开关来监控润滑油液位，控制器工作期间检测到了液位开关断开，将自动停止运行，发出故障报警信号。此时控制器面板上 FAULT 灯闪亮，按下 键，LED 显示器显示“EL”字样。

† 液位开关检测功能为选配功能

8. 技术参数

标称供电电压:	12V~42V
防护等级:	IP40
M 最大输出:	16A
SL 输出:	5A
数据存储:	无限制
工作温度:	-30℃~75℃
储存温度:	-45℃~85℃
推荐保险丝规格:	10A
外形尺寸:	137mm(长)×92mm(宽)×42mm(高)
润滑时间设置范围:	1 秒~9999 秒
间歇时间设置范围:	1 分钟~9999 分钟
计数脉冲设置范围:	1~9999

记事栏

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