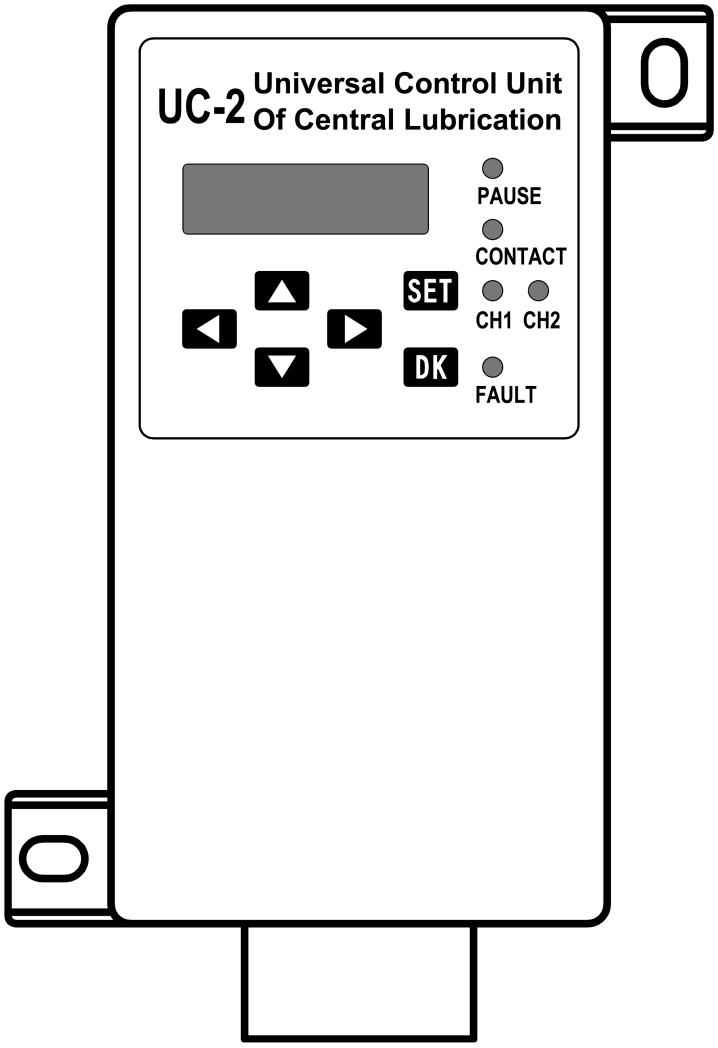
Universal Control Unit UC-2

User's Manual

用户操作指导手册



Suzhou Leentern Industry Control Department

Universal Control Unit UC-2 is designed for controlling and monitoring of centralized Lubrication system. It is suitable for injection lubrication control for machinery and equipment like conveyor belt and escalator etc. UC-2 stores configuration data and parameters in EEPROM, which made UC-2 can store data safely for long period without backup power supply.

The control unit uses LCD to display information in text. There are two language versions of Chinese and English for user to choose from.

UC-2 owns 2 completely independent lubrication control channels, which can separate control two lubrication systems. It is very good for lubrication system that has many lubrication points, and asks for different lubrication requirements.

Factory settings on UC-2 are as followings:

Pause mode:	Timer
Pause time:	1 min
Contact mode:	Counter
Contact impulse:	1impulse
Pump type:	EM pump (**E**lectro**M**agnetic Pump)
Electrifying time:	0.3s
Electrifying cycle:	1s (reserved)
Pitch adjustment:	1:1
Pump's action adjustment:	0s
Initial password:	0000
Oil level monitoring:	Off

Model's instruction

UC-2-C Chinese interface control unit.
UC-2-E English interface control unit.

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Technical Support Email: support@leetern.com
Website: http://www.leetern.com

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Safety Warning!

Universal Control Unit UC-2 (hereinafter called "UC-2") is designed and manufactured not only in conformity with the general engineering standards, industrial safety and accident prevention regulations, but also in accordance with some relevant general industrial technical acceptance standards.

Although UC-2 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.

UC-2 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

UC-2 must be connected to power supply only by trained qualified personnel in accordance with the local electric technical regulations. Improper connection may lead to serious personal injury.
UC-2 is suitable for injection lubrication of machinery and equipment, to control lubrication system that driven by single-phase Industrial-frequency AC. 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.

1. Installation

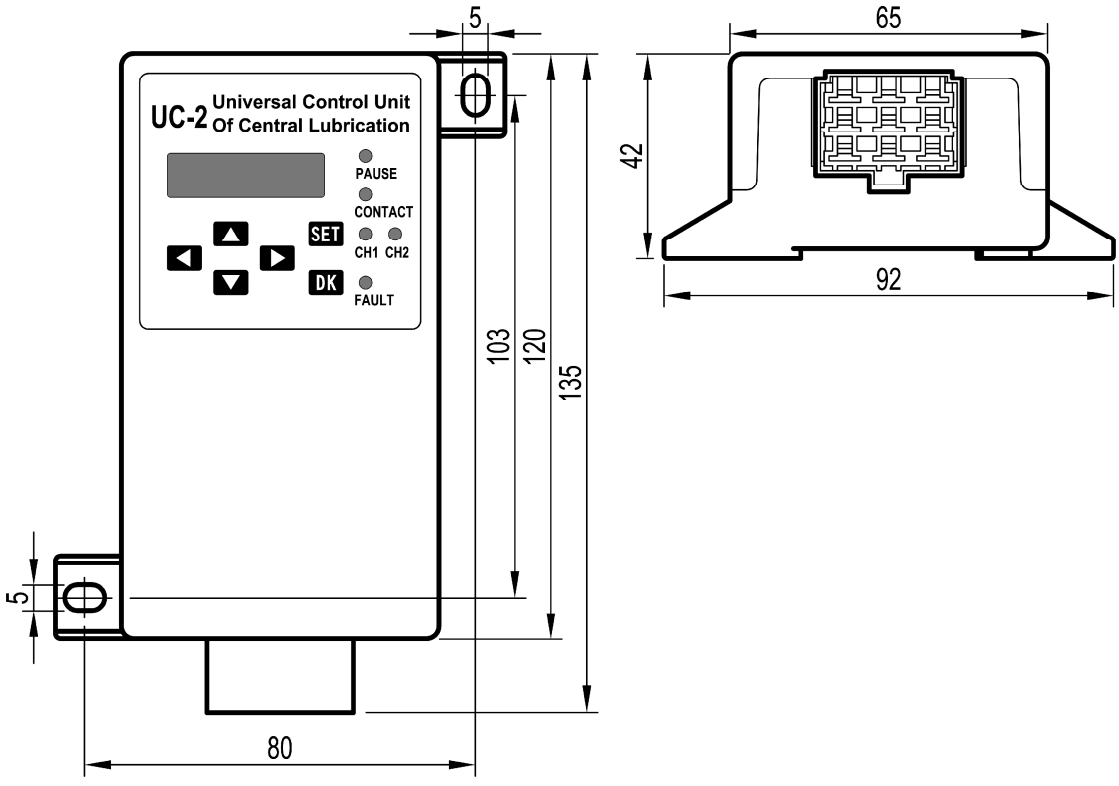
Universal Control Unit UC-2 is **not** designed to work in open-air. It has to be installed in the room or in switch box to protect it from environmental influences.

If UC-2 is installed at an inaccessible position, it is advisable to install additional signal lights in operation room. So that the operating situation of the control unit can be remote monitored.

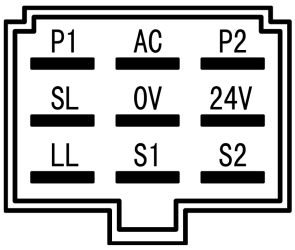
UC-2 belongs to Class I over-voltage electrical equipment. It should be installed after over-voltage electrical equipment of Class II, which supplies over-voltage protection. It is prohibited to install UC-2 directly to a bus bar or a trunk line.

UC-2 is designed with power supply reverse connection protection. Once the power is reverse connected, UC-2 will automatically melt power fuse to protect the control unit. In such cases, please check power supply connection.

1.1 Installation dimension

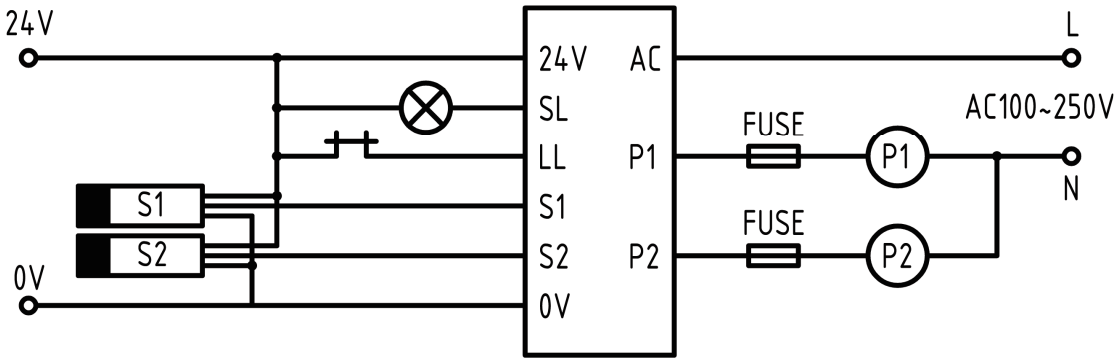


1.2 Electrical connection



Connector terminal definition diagram

S1	Sensor signal input of Channel 1 (CH1)
S2	Sensor signal input of Channel 2 (CH2)
LL	External oil level switch signal input
AC	AC power input
P1	CH1's pump drive output
P2	CH2's pump drive output
SL	External 24V indicator light
24V	24V DC power input
0V	0V DC power supply common contact



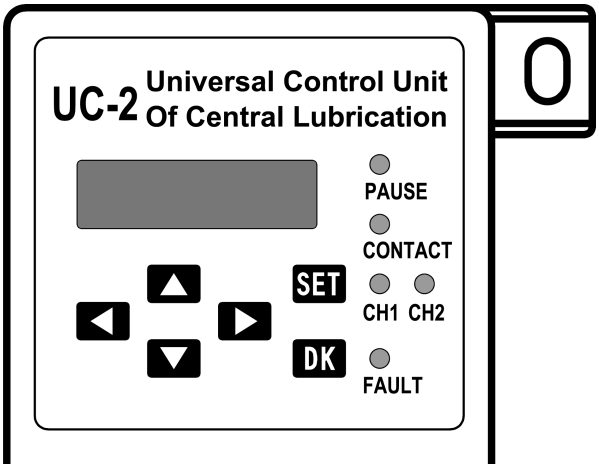
Electrical connection diagram

Note:

When UC-2 is in use, be sure the system voltage is within voltage limit range. Lower or higher than the voltage limit will permanently damage the control unit. The supply voltage for UC-2's control part should be in the scope of DC18V-36V. For pump's drive part, it should be in the scope of AC100V-250V. Pump's drive circuit must be power supplied by a system with over-voltage protection and to be well grounded. To protect the pump drive circuit, a proper fuse must be connected in the return circuit according to pump's rated current, and the fuse specification should not exceed the maximum drive capacity of UC-2.

The installation and connection of UC-2 should be done under power failure condition. To avoid danger of electric shock, live working is prohibited.

2. Display and control panel



Film panel protects UC-2 from humidity and dust.
Please use soft cloth with warm water or neutral detergent to clean the film panel. Organic solvent is prohibited.
To avoid damage to the panel, do not use sharp tools/ object to touch it.

2.1 LCD display

CONTROL UNIT SN: 07010001

LCD displays operating status and parameters.

It is deactivated normally. To activate it, press key ▲ or ▼ , LCD then starts to display current status and programmed parameters. †

2.2 LED indicator lights

PAUSE: Pause indicator light.

LED “PAUSE” on: Power is supplied to control unit. The current indicating channel is in PAUSE state.

CONTACT: Lubricating indicator light

LED “CONTACT” on: Power is supplied to pump and control unit. The current indicating channel is in CONTACT status.
LED “CONTACT” flashes: The current indicating channel is now carrying out oil draining operation.

CH1: Indicator light for channel 1††

LED “CH1” on: The status that indicator lights on control panel indicate is for channel 1. At this time, checking or programming control parameters and status are all for channel 1.

CH2 CH2: Indicator light for channel 2

LED “CH2” on. The status that indicator lights on control panel indicate is for channel 2. At this time, checking or programming control parameters and status are all for channel 2.

FAULT FAULT: Fault indicator light

LED “FAULT” flashes quickly: Fault occurs in the lubrication system.
Press key ▲ or ▼ , fault message will be displayed on LCD.

2.3 Keys

▲ ▼ Up / Down key

Activate display in display state.
Increase with key ▲ or decrease with key ▼ the displayed value at cursor position by 1 in programming state. ††††
Press key ▲ to roll up the menu in menu operation.

◀ ▶ Left / Right key

To move the cursor position when input parameters in programming status.

SET **SET** key

Activate programming mode. Confirm options or parameters.

DK **D**rain oil or clear **K**ey

During PAUSE time, to initiate an oil drain process for current channel by press DK longer than 2 seconds.
In FAULT status, operate this key to clear fault message and get system back to normal lubrication cycle.

2.4 External Signal Light SL

If external signal lights have been installed, whenever the control unit detects any faults during operating process, light “SL” will be flashing to remind user that fault occurs in the lubrication system.

When control unit UC-2 is electrified, signal light will be on for 3 second, then goes out. This means lubrication control system finishes self-inspection and gets into normal control state.

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† Under display state or programming state, if no key operations for more than 2 minutes, LCD turns off automatically and quit current operation.

†† Before switching to another channel from the current one, the indicator light of the current channel will be flashing twice, to remind user that the control unit is switching channel. Do not press any keys on the panel when channel indicator light is flashing, because control unit does not answer the key at this period.

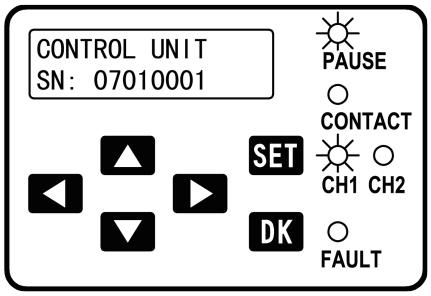
††† Whenever use key ▲ or ▼ to alter parameters, control unit would refuse to perform the change if new parameter is out of the programmable range of the control unit. In such cases, please check your operation.

3. Display mode

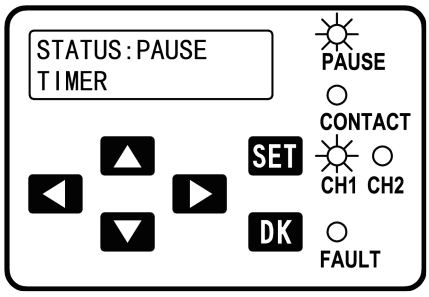
Briefly press key ▲ or ▼ to activate display. Each preset parameters and values of the current channel and system can be displayed.
LED indicator lights are used to show status of the control unit in normal times. Control unit automatic timing switches and displays status of the two channels in turns. Switch cycle is generally 15 seconds.

3.1 Display operation

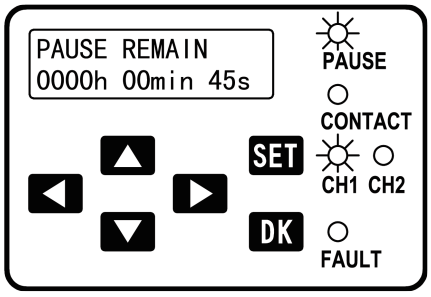
1. When indicator light of the channel that wanted to be displayed is on, briefly press key ▲ or ▼, control unit UC-2 then gets into display state by displaying control unit's **S**erial **N**umber. †
Example: 07010001



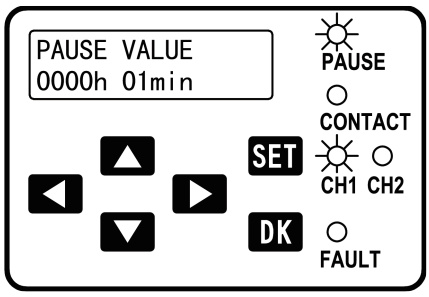
2. Press key ▲, displays current operating status and control mode of the control unit.
Example: PAUSE & TIMER MODE
(Pause in timer mode)



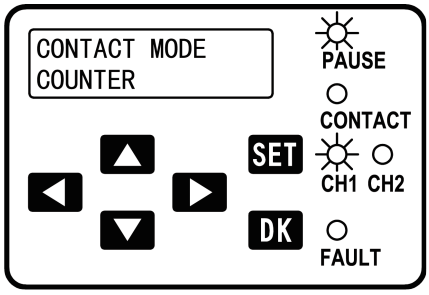
3. Press ▲, displays remaining pause time.
Example: In the ongoing lubricating task, there is 45 seconds left for PAUSE.
If PAUSE is set in counter mode, a number will be displayed here.



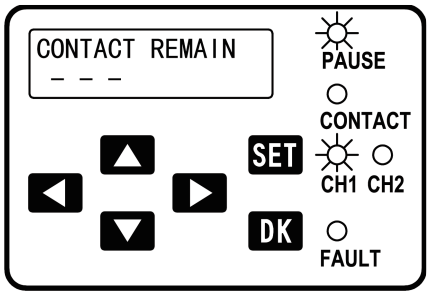
4. Press ▲, displays preset parameter of pause.
Example: 1minute
If PAUSE is set in counter mode, a number will be displayed.



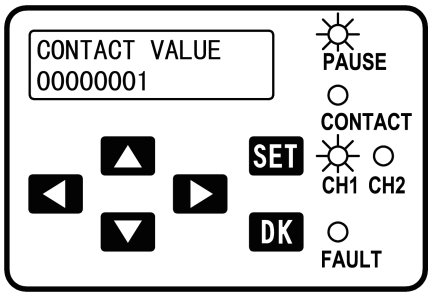
5. Press ▲ , displays the control mode of CONTACT.
Example: COUNTER



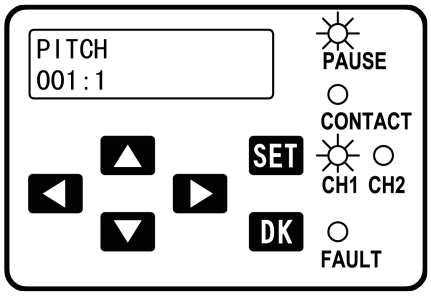
6. Press ▲ , “ – – – ” is displayed. Because system is now in PAUSE time, there is no remaining value of CONTACT.



7. Press ▲ , displays preset parameter of CONTACT.
Example: 1 impulse
If CONTACT is set in timer mode, a time value will be displayed.

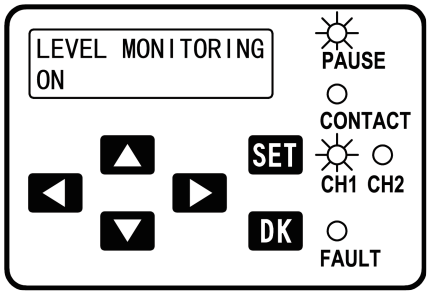


8. Press ▲ . If CONTACT is set in counter mode, then the preset pitch value comes up. Otherwise, it steps over.
Example: 1:1

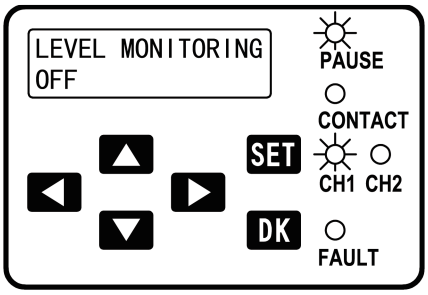


9. Press ▲ to display the preset parameter of oil level monitoring.

Displayed content may be:
ON



or OFF
(Monitoring disabled)



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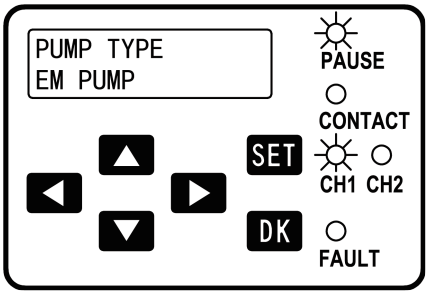
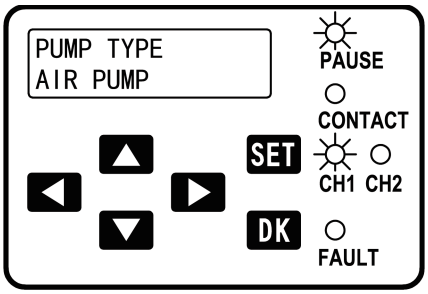
10. Press ▲ to display pump type.

Displayed content may be:
EM PUMP (electromagnetic pump)



or AIR PUMP



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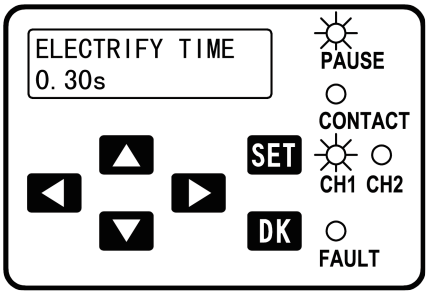
11. Press ▲. If pump type is set as EM pump (**E**lectro**M**agnetic pump), the electrifying time of each drive impulse of pump comes up. Otherwise, it steps over to step 13.
Example: 0.3 second



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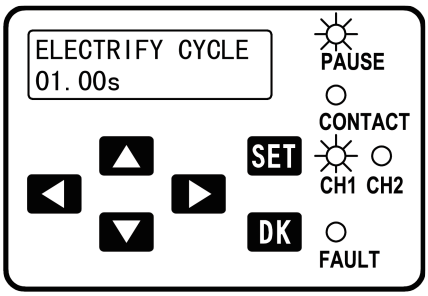
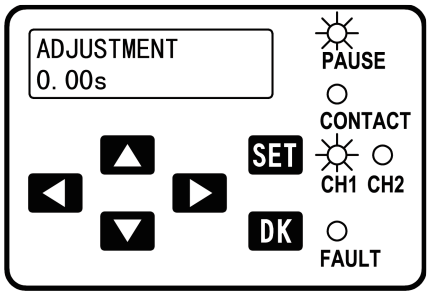
12. Press ▲, displays the electrifying cycle of pump drive impulse if contact mode is set as timer mode.
Example: 1 second



If contact is set in counter mode, then injection action adjustment value will be displayed.
Example: 0 second



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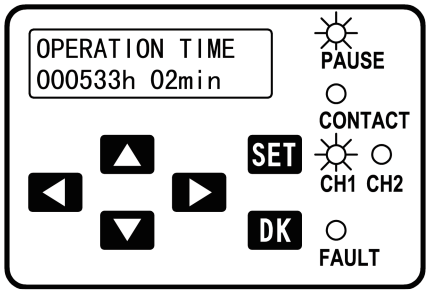
13. Press ▲, displays total operation time.



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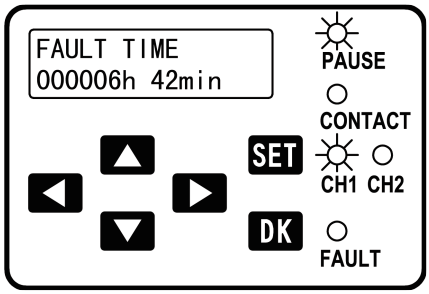
14. Press ▲, displays total fault time.



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15. Press ▲, display goes out.
Total operation time and total fault time will not be erased. They are permanently stored in the control unit.

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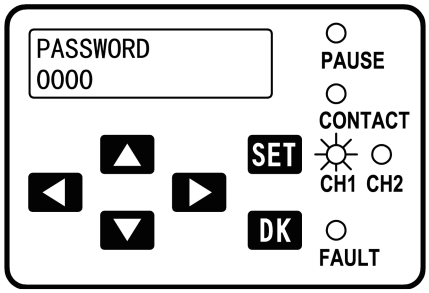
† This function is set according to EU's regulations. According to relevant EU directives, electronic product for EU market must owns an only serial number, which enables to trace and manage the product.

4. Programming

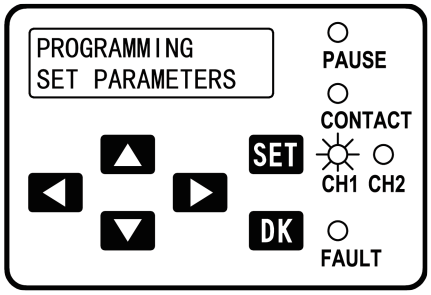
Press **SET** longer than 2 seconds to activate programming. All preset parameters and control modes can be altered.
Please note: Programming always starts with steps 1-2（enter password）.

4.1 Starts programming

1. When indicator light of the channel to be programmed is up, press key **SET** longer than 2 seconds, the control unit will then ask for password.
Please enter the preset password.



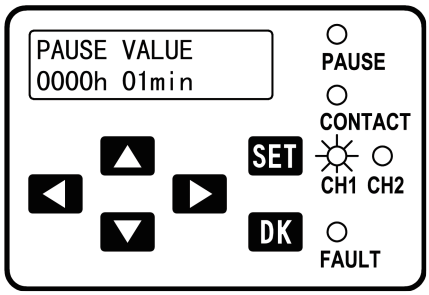
2. Press **SET** to confirm the password. † LCD displays PROGRAMMING. And the default operation is “SET PARAMETERS”.



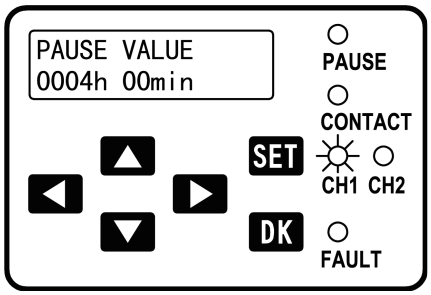
† If input wrong passwords for three consecutive times, control unit will quit from password input state, and LCD will be shut off. This function is to protect control unit against password guessing attack.

4.2 Alters PAUSE and CONTACT values (Carry out steps 1-2)

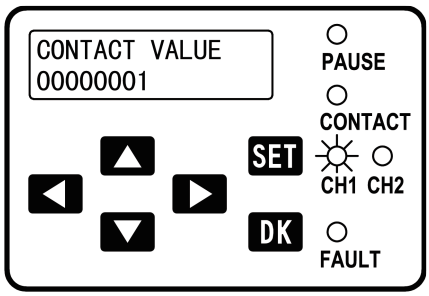
3. Briefly press SET to display the preset PAUSE value.
Example: 1 minute (Factory setting)



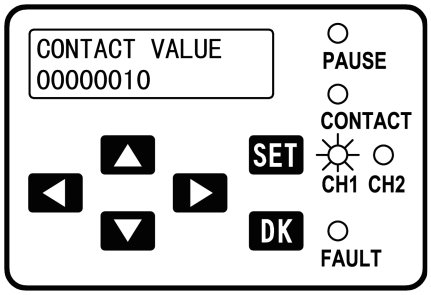
4. Use keys ▲ ▼ ◀ ▶ to alter pause value.
Example: new value is 4 hours.



5. Press SET to confirm the new PAUSE value. Then the preset CONTACT value comes up.
Example: 1 impulse (Factory setting)



6. Use keys ▲ ▼ ◀ ▶ to alter contact value.
Example: new value is 10 impulses.

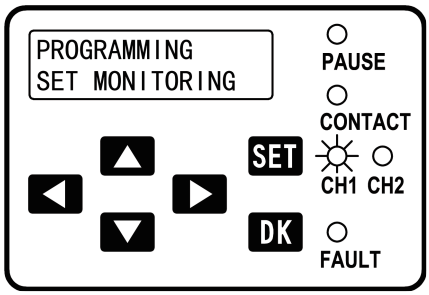


7. Press SET to confirm the new contact value.

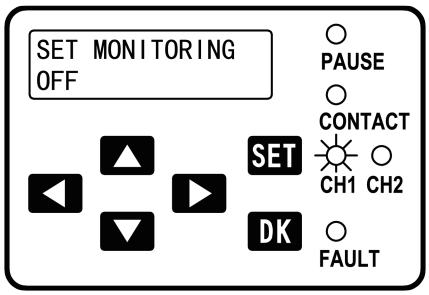
8. LCD begins to flash to remind user that all new values have been confirmed. Then press and hold key SET , LCD stops flashing; 2 seconds later, the new values are saved permanently and display goes out.
Note: If press SET shorter than 2 seconds, the control unit will give up new values and go back to the initial state of PROGRAMMING.

4.3 **Change oil level monitoring settings** (Carry out steps 1-2)

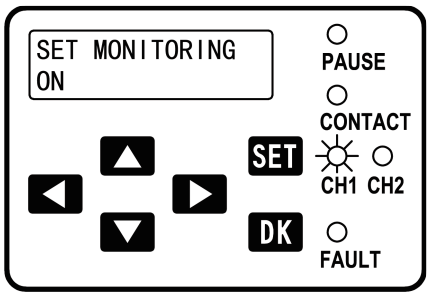
3. Continually press ▲ till “SET MONITORING” is displayed on the second line of the screen.



4. Briefly press SET to get into system monitoring setting state. The current monitoring mode is displayed.
Example: OFF (Factory setting)



5. Press ▲ or ▼ to select monitoring mode.
Example: ON
(To activate oil level monitoring.)

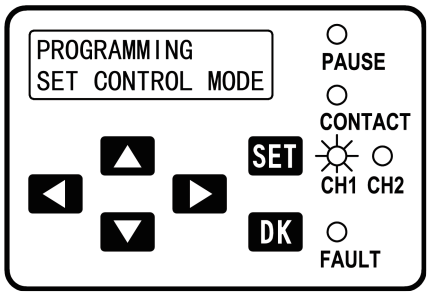


6. Press SET to confirm the new settings.

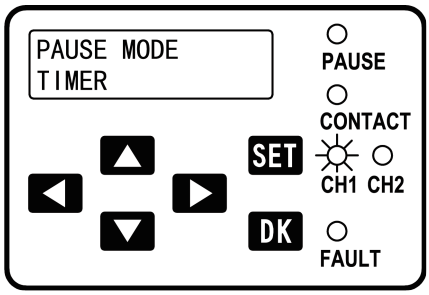
7. LCD begins flashing to remind user all new settings have been confirmed. Then press SET without releasing, LCD stops flashing; 2 seconds later, the new values are saved permanently and display goes out.
Note: If press SET shorter than 2 seconds, the control unit will give up new settings and go back to the initial state of PROGRAMMING.

4.4 **Change PAUSE and CONTACT control mode** (Carry out steps 1-2)

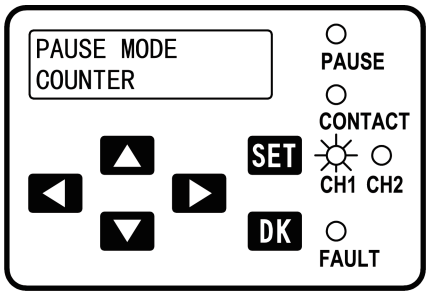
3. Continually press ▲ till “SET CONTROL MODE” is displayed on the second line.



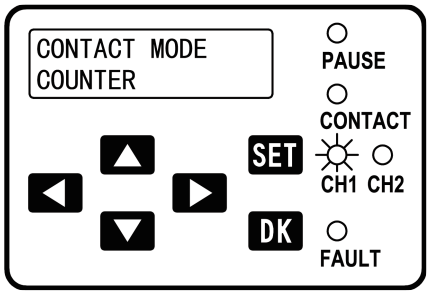
4. Briefly press SET to get into pause mode setting state, the preset PAUSE MODE is displayed.
Example: TIMER (factory setting)



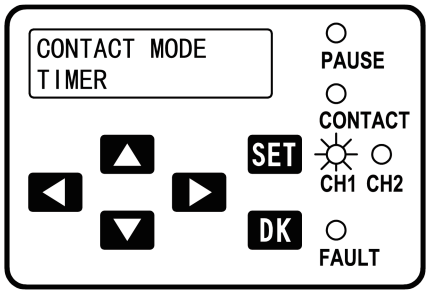
5. Press ▲ or ▼ to change pause mode.
Example: COUNTER



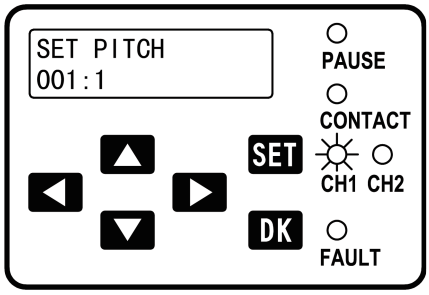
6. Press SET to confirm the new PAUSE control mode.
Then the preset CONTACT mode is displayed
Example: COUNTER (Factory setting)



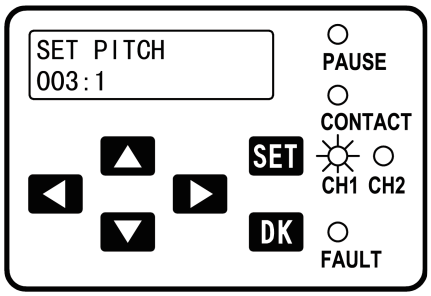
7. Press ▲ or ▼ to change contact mode.
Example: TIMER



8. Press SET to confirm the new CONTACT control mode. If CONTACT control is in counter mode, the pitch adjustment value is then displayed. Otherwise, it steps over to step 10.
Example: 1:1 (Factory setting)



9. Use keys ▲ ▼ ◀ ▶ to modify pitch adjustment value.
Example: new value is 3:1.



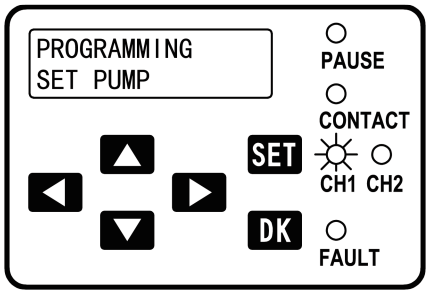
10. Press SET to confirm the new settings.

11. LCD flashes to remind user all new settings have been confirmed. Then press and hold SET , LCD stops flashing; 2 seconds later, the new values are saved permanently and display goes out.
Note: If press SET shorter than 2 seconds, control unit will give up the new settings and go back to the initial state of PROGRAMMING.

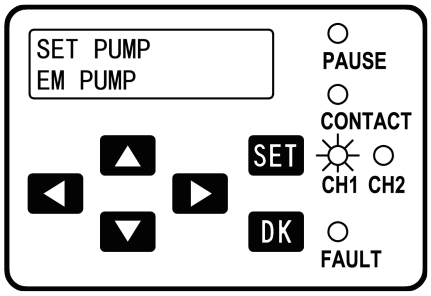
Please note: after the control mode of PAUSE or CONTACT being changed, the new PAUSE/CONTACT control parameters should be set according to the requirement of actual lubricating task**.**

4.5 **Change PUMP settings** (Carry out steps 1-2)

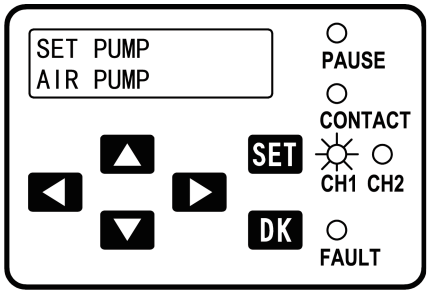
3. Continually press ▲ till “SET PUMP” is displayed on the second line.



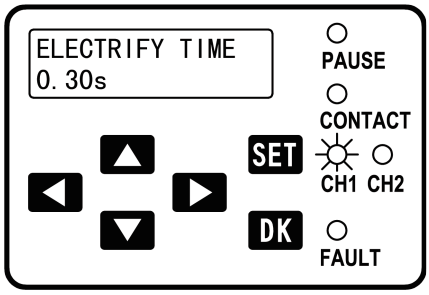
4. Briefly press SET to get into pump type setting. The preset pump type is displayed.
Example: EM PUMP
(**e**lectro**m**agnetic pump)



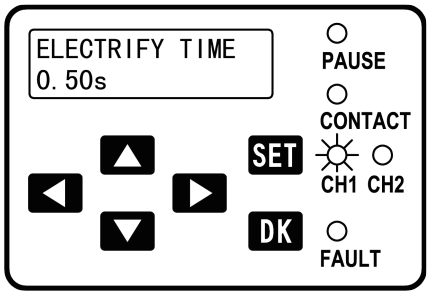
5. Press ▲ or ▼ to change pump type.
Example: Optional pump type is AIR PUMP.



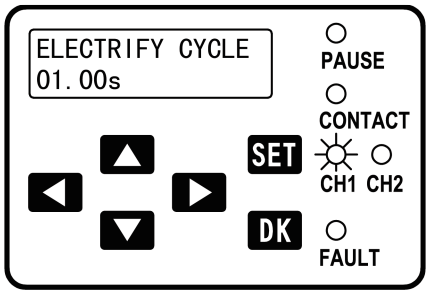
6. Press SET to confirm the new pump type. If EM PUMP (electromagnetic pump) is set, then the preset electrifying time will be displayed. Otherwise, it steps over to step 12.
Example: 0.3 second (Factory setting)



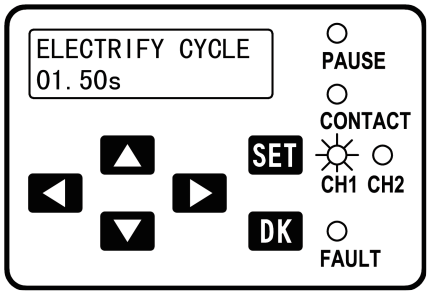
7. Use keys ▲ ▼ ◀ ▶ to modify electrifying time value.
Example: The value is changed to 0.5 second.



8. Press SET to confirm the new electrifying time value. If CONTACT is set in TIMER mode, the value of preset electrifying cycle is then displayed. Otherwise, it steps over.
Example: 1 second. (Factory setting)

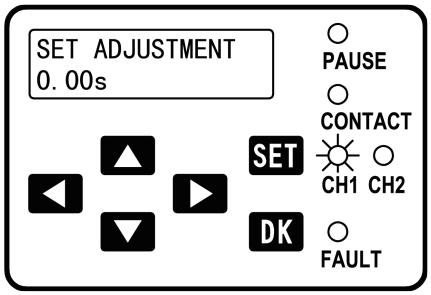


9. Use keys ▲ ▼ ◀ ▶ to modify electrifying cycle value.
Example: Electrifying cycle is modified to 1.5 second.
After modified, it steps over to step 12.

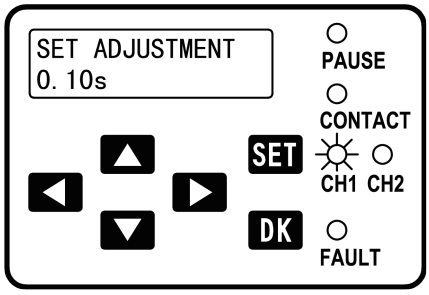


10. Displays the preset action adjustment value.

Example: 0 second (Factory setting)



11. Use keys ▲ ▼ ◀ ▶ to modify action adjustment value.
Example: 0.1s



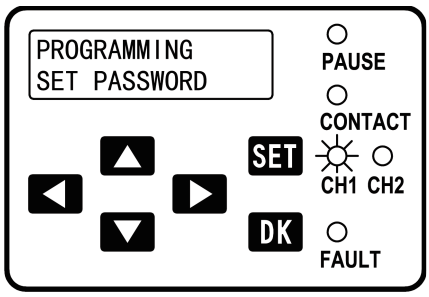
12. Press SET to confirm the new pump settings.

13. LCD begins to flash to remind user all new settings have been confirmed. Then press SET without release, LCD stops flashing; 2 seconds later, the new values are saved permanently and display goes out.
Note: If press SET shorter than 2 seconds, control unit will give up the new settings and go back to the initial state of PROGRAMMING.

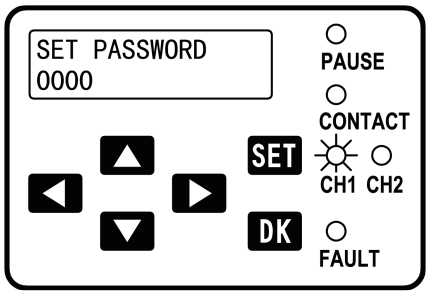
4.6 **Change password** (Carry out steps 1-2)

Once the password is changed, the password set by factory will be erased. The new password is saved till next change.

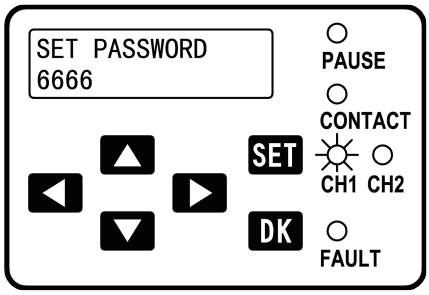
3. Continually press ▲ till “SET PASSWORD” is displayed on the second line.



4. Briefly press SET to get into PASSWORD set state. LCD displays the current password.
Example: 0000 (Factory setting)



5. Input 4 digits new password.
Example: 6666
The password range of UC-2 is from 0000 to 9999. There is no limitation within this area.



6. Press SET to confirm the new password.

7. LCD begins to flash to remind user the new password was confirmed. Then press SET without release, LCD stops flashing; 2 seconds later, the new password is saved permanently and display goes out.
Note: If press SET less than 2 seconds, the control unit will give up new password and go back to the initial state of PROGRAMMING.

Please note:
The password should be kept in a safe place. If the password gets lost, the programming of parameters for the control unit is impossible. In case of that, please contact the manufacturer. The contact information of manufacturer is printed on title page of the MANUAL.

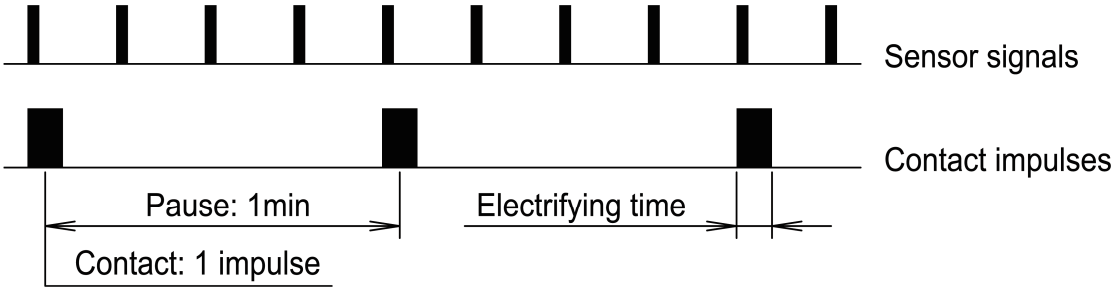
5. Operating modes

5.1 Timer operating mode

Set “TIMER” mode for PAUSE and “COUNTER” mode for CONTACT.

After UC-2 experiences the programmed PAUSE time, it begins to detect sensor pulses and carries out lubrication based on the programmed number of CONTACT impulses. When the programmed CONTACT impulses number is reached, UC-2 goes to PAUSE timing process again and performs the cycle control of “PAUSE – CONTACT – PAUSE ”.

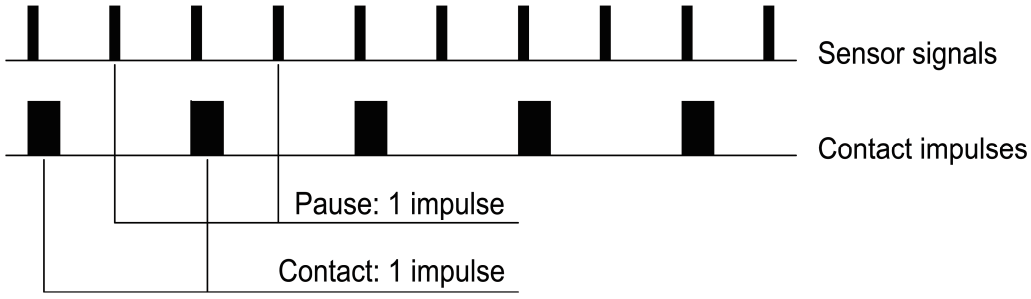
If pump is air pump, UC-2 constantly drives the pump during CONTACT time till the programmed number of CONTACT impulses is reached. Then CONTACT (lubrication) ends.



Example:
Programmed PAUSE time: 1 minute
Programmed CONTACT impulse: 1 impulse

5.2 Counter operating mode

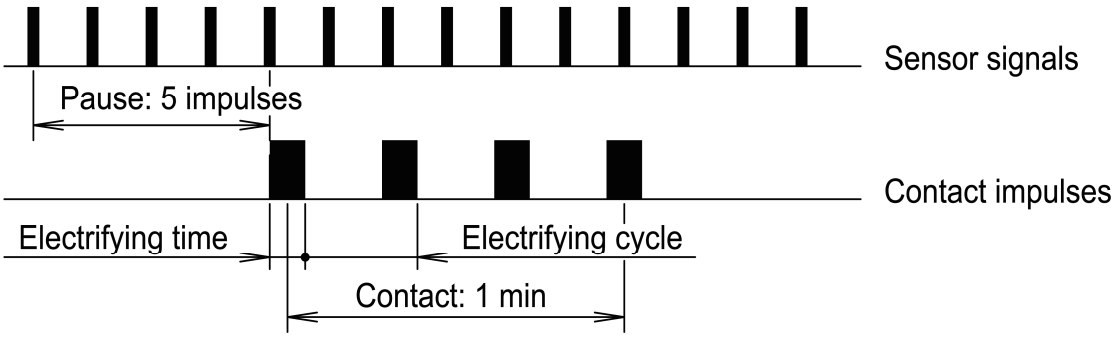
Set “COUNTER” mode for both PAUSE and CONTACT. PAUSE and CONTACT take place based on impulse numbers. This operating mode is very suitable for discontinuous running equipment’s lubrication control.
PAUSE: Display and program values in sensor pulses.
CONTACT: Display and program values in CONTACT impulses.



Example:
Programmed PAUSE impulse: 1 impulse
Programmed CONTACT impulse: 1 impulse

5.3 Special operating mode

PAUSE: Display and program values in impulses or time.
CONTACT: Display and program values in time.
Lubrication is timing controlled under this mode. If the pump is electromagnetic pump, control unit UC-2 sends drive impulse to make the pump inject oil according to programmed electrifying cycle. The length of drive impulse is the programmed electrifying time. Especially, the operating mode that PAUSE and CONTACT are all timing controlled is very suitable for applications where sensor is not easy to install, such as steel cord's lubrication.
If the pump is air pump, UC-2 will constantly drives pump during the whole programmed CONTACT time until lubrication complete.

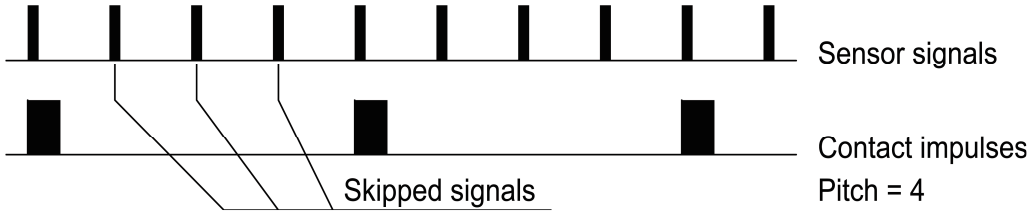


Example:
Programmed PAUSE impulse: 5 impulses
Programmed CONTACT time: 1minute

5.4 Pump's action adjustment

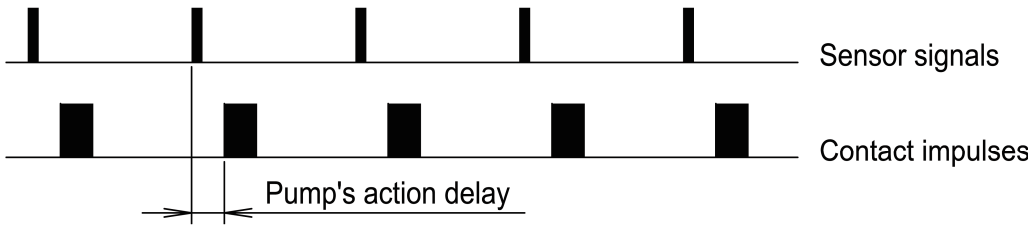
In case of that the interval of chain sensor signals is too short which causes the pump has no enough time to take action, user can program pitch value to

make the pump inject oil according to the ratio of sensor pulses number to pump action. This lowers the pump's requirement to signal response speed, and to meet the lubrication requirements of chains at high speed.



Example: Pitch=4:1

To ensure the injected oil aims at the lubrication points even under situations that chain speed is varying or the lubrication equipment's installation and position is difficult, UC-2 may control pump's action of injection through action adjustment.



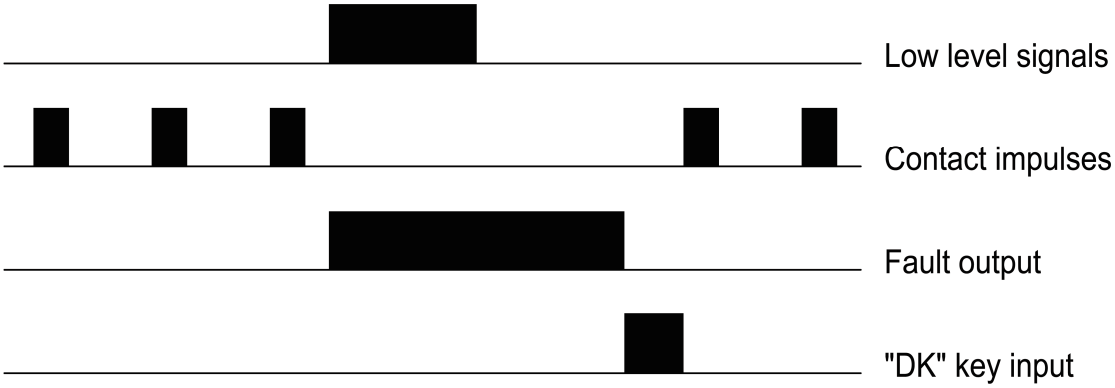
Under normal situation, control unit UC-2 sends impulses to drive electromagnetic pump right after it receives sensor signals. After pump's action adjustment value is programmed, when UC-2 receives sensor signals, oil injection is carried out only after a delayed time (action adjustment value). By proper program action adjustment value to guarantee the oil is injected right to the lubrication points.
These two values are used to adjust electromagnetic pump, they are invalid to air pump.

5.5 Operation without oil level monitoring

The lubrication cycle does not perform oil level monitoring.
Under this mode, monitoring function must be disabled. Monitoring mode should be "OFF". Fault caused by lack of oil will not be automatically detected and displayed.

5.6 Operation with oil level monitoring

In this mode, system can be monitored by external oil level switch. Whichever channel performs lubricating task, fault caused by lack of oil will be automatically detected and displayed when oil level monitoring is activated.



UC-2 can promptly catch the fault of abnormal oil level. Even oil level of the tank fluctuates at the critical point between lack of oil and not-lack of oil, UC-2 can correctly record the fault, and then gives fault warning and stop lubricating work, waiting user to handle the fault.

Please note:
Oil level switch must be normally closed switch. When lack of oil fault occurs, switch will send out a fault signal with switch opens. If other liquid level sensors are used, they have to use liquid level sensor signals that are low voltage effective.

5.7 Oil drain function

Before the newly installed lubrication system put into use, the air in the lines needs to be discharged; Sometimes, the lubrication system which is now using still needs to be replaced those expired oil in lines. In such cases, user can use the “oil drain function”. Operation is as following:

Under no-fault status of lubrication channels, press key DK longer than 2 seconds, UC-2 will initiate an oil drain process. It first turns the current channel to oil drain state, then sends drive impulses constant driving the pump to drain oil according to a frequency of 1 impulse per second. 1 minute later, oil drain finishes; the current channel automatically goes back to PAUSE state.

If the pump is air pump, then control unit will constantly drives the pump during

the oil-draining process. Oil drain process will not stop until the programmed time is over.

When lubrication channel is in oil drain process, LED “CONTACT” on control panel flashes, which means the current channel is draining oil. Meanwhile, control unit stops switching channels and all the keys on panel except DK are locked till this process finish.

To terminate this oil drain process earlier, briefly press DK again. Then the current channel will quit from this process and get into PAUSE state.

If control unit detects fault during oil draining process, this process will be automatically terminated and UC-2 sends fault-warning signals. If power down happens during oil draining process, oil-draining process also will be automatically terminated and UC-2 auto starts from CONTACT state when power is supplied again.

5.8 Power-off protection function

The control unit UC-2 has power-off protection function. When power is cut off, it auto stores operating status, remaining values, total operation time and total fault time at the point of power-off. When power is supplied again, UC-2 will continue carrying out operation from where it stopped.
UC-2 stores operating status and values in EEPROM. The data can reliable be stored for at least 10 years.

6. Faults

When control unit UC-2 detects faults, LED “FAULT” on the panel will be flashing quickly. If an external Signal Light has been installed, light “SL” will be also flashing to remind user the lubrication system is at fault. Meanwhile, UC-2 stops normal operation and wait for user to handle the faults. User may check the detailed cause of the fault through LCD.

6.1 Fault display

Briefly press ▲ or ▼ to start the display of fault messages. The meaning of the displayed content are as followings:

LOW LEVEL (lack of lubricant): The oil level in lubricant tank has dropped below the minimum level.

SYSTEM ERROR: The control unit itself has error inside. If such situation occurs, get the control unit power off, then get it power on 3 seconds later. If error still exists, please contact the manufacturer.

6.2 Fault signal clearance

Press DK to acknowledge and clear fault messages, and to start a normal lubrication cycle.

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

6.3 Fault message storage

The time that has elapsed since the occurrence of the fault message up to its acknowledgement will be added up and saved automatically. And the saved fault time is not erasable.

The maximum savable fault time is 999 999 hours and 59 minutes. And the minimum savable fault time is 1 minute.

7. Technical Data

Power supply:	24V(18V-36V), 0.1A, DC
Type of protection:	IP40
Data storage:	No limitation
Operation temperature:	-20℃~70℃
Storage temperature:	-40℃~80℃
Installation dimensions L × W × H:	135mm × 92mm × 42mm
Single piece Mass:	200g
Programmable contact time range:	1s to 17h 59min 59s
Programmable contact counter range:	1~59999
Programmable pitch adjustment scope:	1:1~199:1
Programmable pause time:	0 min to 9999h 59min
Programmable pause counter range:	0-9999 9999
Pump type:	EM pump (electromagnetic pump) or Air pump
Max. Pump drive output:	AC: 3A, 100~250V, 50/60Hz
Max. SL signal light output:	DC: 24V, 5W
EM pump's electrifying time range:	0.01s~1.99s
EM pump's electrifying cycle range:	0.01s~19.99s
EM pump's action adjustment range:	0.01s~1.99s
Operation time Memory:	0 to 999 999h 59 min
Fault time Memory:	0 to 999 999h 59 min

Notes

UC-2 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，适用于传送带、扶梯等机械设备喷射润滑的控制。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。

控制器采用液晶显示器，以文字方式显示信息，并且有中文和英文两种语言版本，方便用户操作使用。

控制器拥有完全独立的两个润滑控制通道，可以分别控制两个润滑系统，很适用于润滑点密集，而润滑要求又不相同的润滑系统控制。

UC-2 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：	1 分钟
润滑控制方式：	计数器控制
润滑脉冲数：	1 个脉冲
泵类型：	电动泵（电磁泵）
通电时间：	0.3 秒
通电周期：	1 秒（预留）
节距调节：	1:1
动作调节：	0 秒
初始保护密码：	0000
油位监控设定：	关闭

型号说明

UC-2-C　中文操作界面控制器

UC-2-E　英文操作界面控制器

产品制造商：　苏州力天工业控制事业部

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-2 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。

本产品适用于机械设备的喷射润滑，控制以单相工频交流电驱动的润滑系统。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

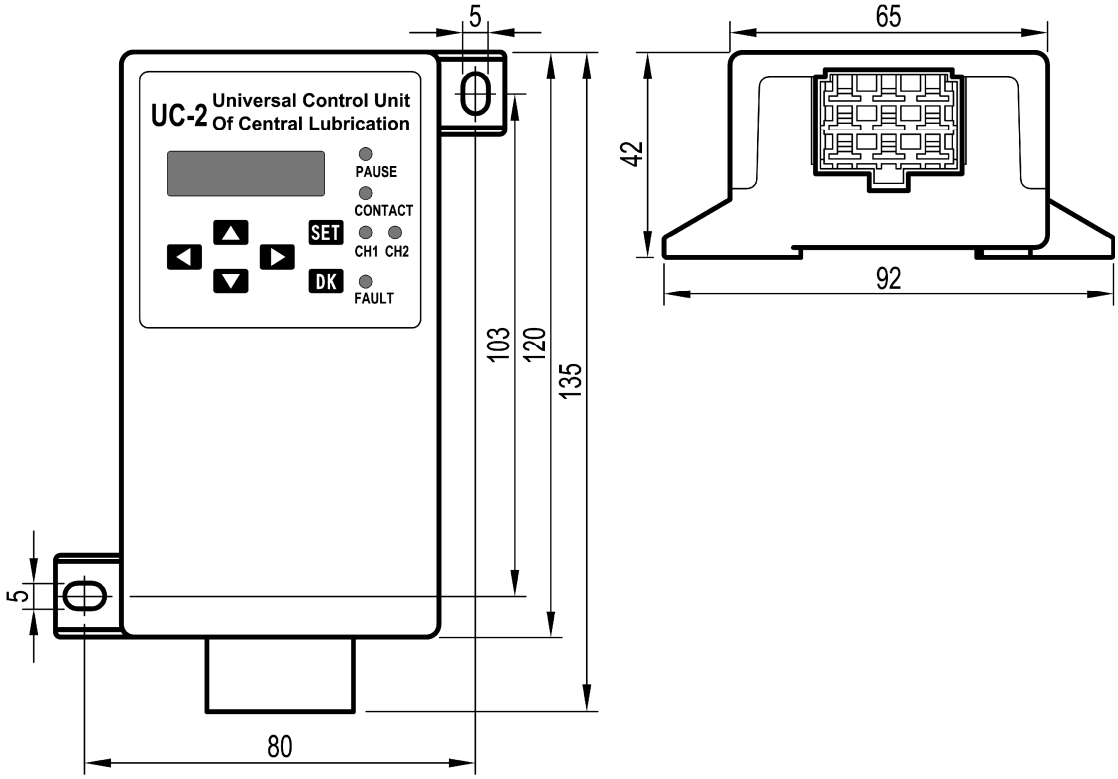
UC-2 通用润滑系统控制器**不是**为露天使用设计的，控制器必须安装在室内或者开关箱内，以保护控制器不受环境影响。

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，以便远程监控控制器的运转。

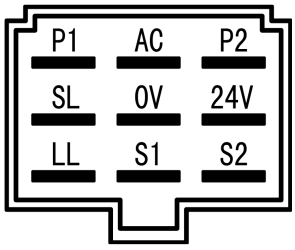
UC-2 控制器属于Ⅰ类过压电气设备，必须安装于Ⅱ类过压电气设备之后，由Ⅱ类过压电气设备提供过压保护，严禁直接接于供电母线或者干线上。

控制器有电源反接保护。如果电源不慎反接，会自动熔断电源保险管而保护控制器。遇到这种情况，请检查电源接线是否错误。

1.1 外形尺寸



1.2 电气接线



连接器端子定义图

S1 第 1 通道传感信号输入

S2 第 2 通道传感信号输入

LL 外接油位开关输入

AC AC(交流)电源输入

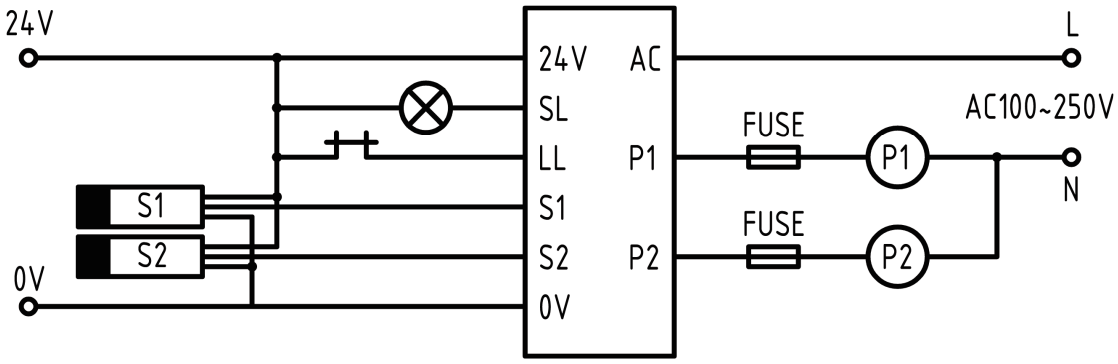
P1 第 1 通道泵驱动输出

P2 第 2 通道泵驱动输出

SL 外接 24V 指示灯

24V 直流电源 24V 输入

0V 直流电源 0V 公共接点



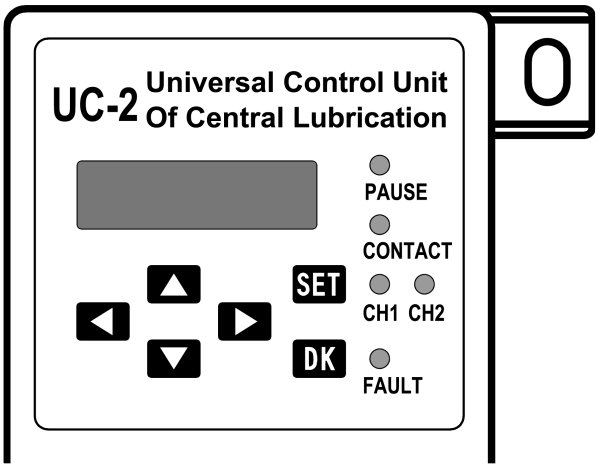
电气连接器接线图

请注意：UC-2 控制器使用时候，必须保证工作电压在规定供电电压范围内，低于或者高过这个电压范围都会给控制器造成永久损害。

控制器控制部分工作电压必须在直流 **18V~36V** 范围内；泵驱动部分电压在交流 **100V~250V** 范围内。泵驱动电路必须通过有过压保护及良好接地的供电系统供电，在泵驱动电路回路中还必须根据泵的额定电流接入适当的保险丝予以保护，且保险丝规格不能超过控制器的最大驱动能力。

控制器安装、接线必须在断电后进行，**严禁带电作业**以防发生触电危险。

2. 显示控制面板及其操作



UC-2 控制器采用薄膜面板来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。绝不能用尖锐的物体刺薄膜面板，以免损坏薄膜面板。

2.1 LCD 液晶显示器

LCD 液晶显示器用来显示数据和工作状态

LCD 液晶显示器平时是关闭的。要启动显示，只要按下 ▲▼ 任意一个键，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 灯亮表示：控制器已经接通电源，当前指示的通道处于间歇状态。

CONTACT：润滑指示灯

CONTACT 灯亮表示：控制器和泵已经接通电源，当前指示的通道处于润滑状态。

CONTACT 灯闪亮表示：当前指示的通道正在进行放油操作。

CH1：通道 1 指示灯 ††

CH1 灯亮表示：控制器面板上指示灯指示的状态是通道 1 的状态。此时察

看或者设定润滑控制参数、状态，针对的均为通道 1。

CH2 CH2：通道 2 指示灯

CH2 灯亮表示：控制器面板上指示灯指示的状态是通道 2 的状态。此时察看或者设定润滑控制参数、状态，针对的均为通道 2。

FAULT FAULT：故障指示灯

FAULT 灯急速闪亮表示：润滑系统发生了故障。

按动 ▲ 或者 ▼ 键后，故障信息就显示在液晶显示器上。

2.3 按键

▲ ▼ 上下滚动键

在显示状态下，启动控制器进入显示模式；

在编程状态下，▲ 令光标位数字加 1，▼ 令光标位数字减 1；ttt

在菜单操作中，▲ 键滚动显示菜单项目。

◀ ▶ 左右滚动键

在编程状态下输入参数过程中，左右移动光标位置。

SET 设置键

启动进入编程设定状态， 确认选项或者工作参数。

DK 放油/清除键

在间歇状态下，按下 DK 超过 2 秒，将启动一次当前通道的放油过程；

在故障状态下，按一次 DK，清除故障信号并使系统重新进入正常的润滑周期循环。

2.4 外接指示灯 SL

如果控制器外接了指示灯 SL，那么在工作过程中控制器检测到了故障，SL 指示灯会持续闪亮，以提醒用户：润滑系统发生了故障。

控制器上电时候，指示灯 SL 会点亮 3 秒，然后熄灭。这表示润滑控制系统完成了自检，进入正常控制状态。

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† 在显示状态或者编程状态下，如果超过 2 分钟没有按键操作，LCD 显示器将自动关闭，并退出当前操作。

†† 在将当前通道切换到另一个通道前，当前通道指示灯会闪烁两次，以提醒用户：控制器即将进行通道切换。通道指示灯闪烁时候请勿按面板上的按键，并且控制器在这期间也不会响应按键操作。

††† 在使用 ▲ 和 ▼ 键改变设定参数时候，若改变后的参数超过控制器允许的范围，控制器将拒绝执行这个改变。遇到这种情况，请用户注意检查自己的操作。

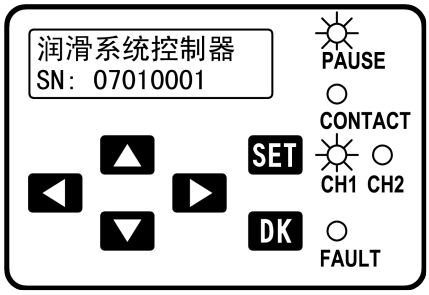
3. 显示状态

短暂按 ▲ 键或 ▼ 键，控制器就进入了显示状态，显示当前通道和系统的各个设定参数和数据。LED 指示灯用来在平时显示控制器的状态，控制器的两个通道状态自动定时轮流切换显示，切换周期约 15 秒。

3.1 显示操作

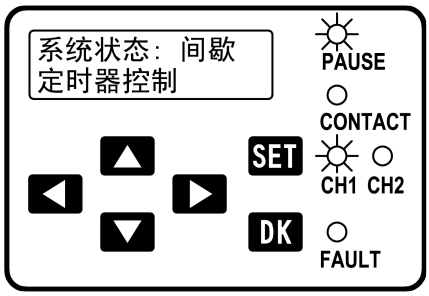
第 1 步：在需要显示的通道指示灯点亮时，短暂按 ▲ 或 ▼ 键，控制器以显示控制器编号的方式进入显示状态 †

例如：控制器编号为 07010001



第 2 步：按 ▲ 键，开始显示控制器当前状态和控制方式

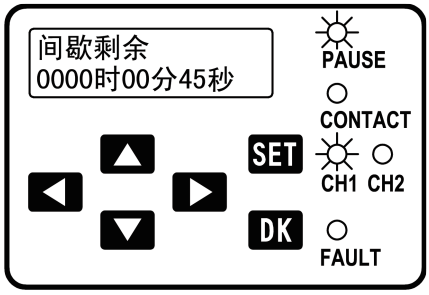
例如：定时器方式控制下的间歇状态



第 3 步：按 ▲ 键，显示当前剩余的数据

例如：正在进行的润滑工作中，剩余的间歇时间为 45 秒

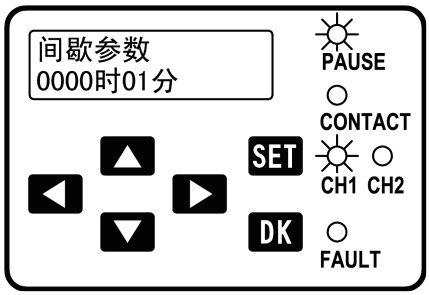
如果间歇采用计数控制，这里将显示数字



第 4 步：按 ▲ 键，显示预先设定的当前状态的控制参数

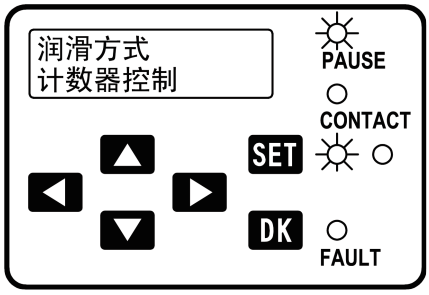
例如：预先设定的间歇参数为 1 分钟

如果间歇采用计数控制，这里将显示数字

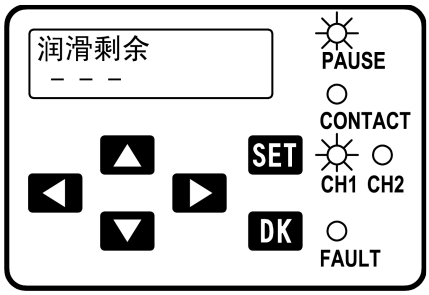


第 5 步：按▲键，显示控制器另一个状态的工作模式

例如：润滑泵为计数器控制



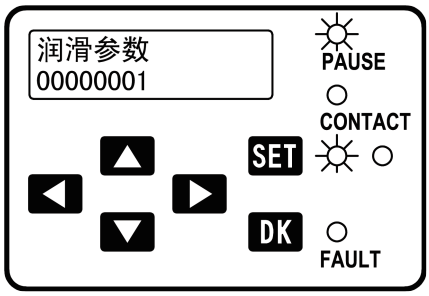
第 6 步：按▲键，由于控制器不在另一个状态，另一个状态的当前剩余数据没有意义，所以显示“ – – –”



第 7 步：按▲键，显示另一个状态预先设定的参数

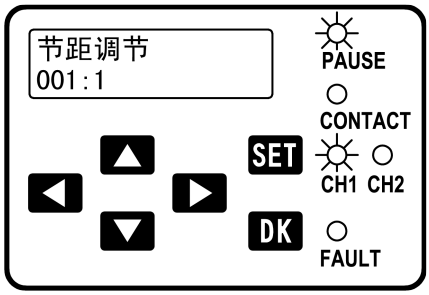
例如：润滑 1 个脉冲

如果润滑采用定时控制，这里将显示时间



第 8 步：按▲键。如果润滑采用计数控制，显示节距设定参数；否则跳过

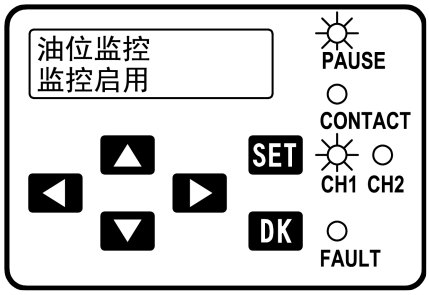
例如：节距调节数值为 1:1



第 9 步：按▲键，进入显示油位监控设定的状态

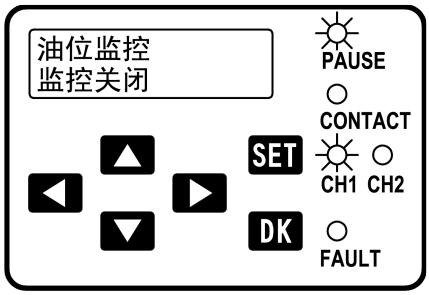
可能显示的内容是

监控启用



或者是

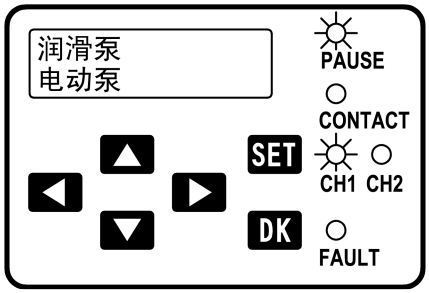
监控关闭



第 10 步：按 ▲ 键，进入润滑泵种类显示状态

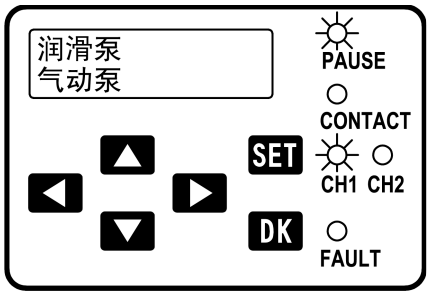
可能显示的内容是

电动泵



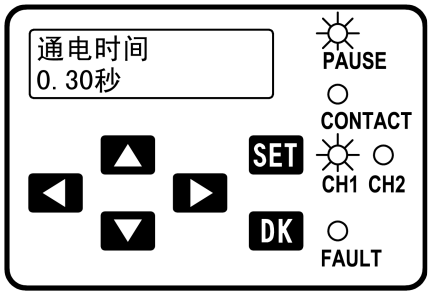
或者是

气动泵



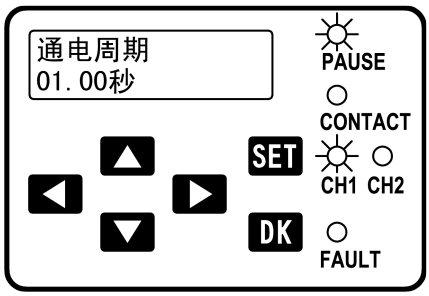
第 11 步：按 ▲ 键。如果泵设定为电动泵，显示泵的每个驱动脉冲的通电时间。否则直接跳到第 13 步

例如：通电时间为 0.3 秒



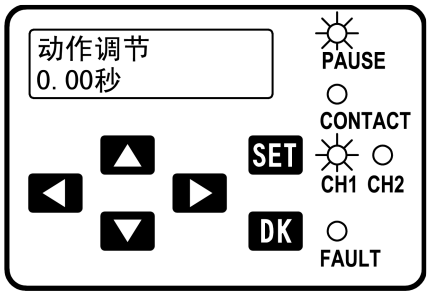
第 12 步：按 ▲ 键。如果润滑采用定时控制，开始显示泵驱动脉冲的通电周期

例如：通电周期为 1 秒

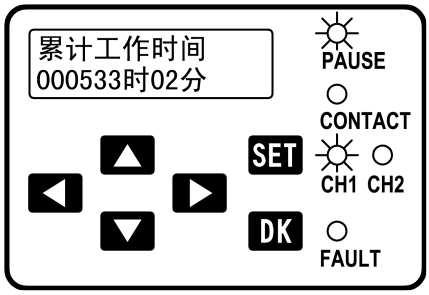


如果润滑采用计数控制，显示喷油动作调节数值

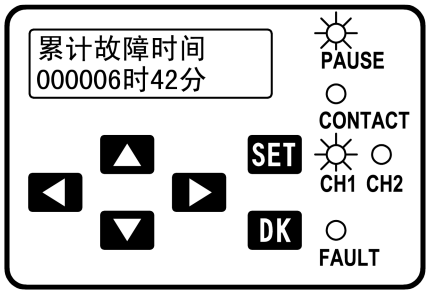
例如：动作调节值为 0 秒



第 13 步：按 ▲ 键，进入累计工作时间显示状态



第 14 步：按 ▲ 键，进入累计故障时间显示状态



第 15 步：按 ▲ 键，关闭显示。

累计工作时间和累计故障时间不会被清除，被永久保存在控制器内

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† 该功能是根据欧盟的法规设置的。欧盟指令规定，在欧盟销售的电子产品必须有一个唯一的序列号，以实现对产品的追踪和管理

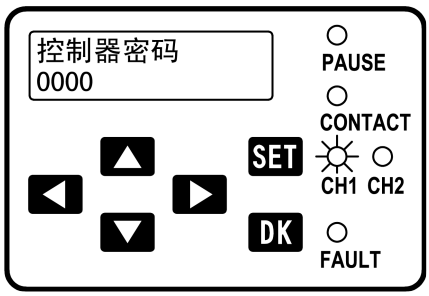
4. 编程状态

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

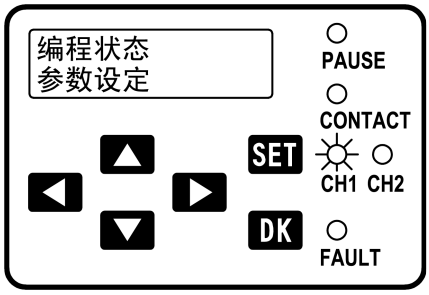
请注意：所有的编程操作都要从第 1-2 步（输入保护密码）开始。

4.1 进入编程状态

第 1 步：在需要编程的通道指示灯点亮时，按住 SET 键不放。2 秒钟以后，显示器开始显示输入密码提示
请输入预先设定的密码



第 2 步：按 SET 键确认输入的保护密码 † 显示切换成操作项目显示，下面就可以进行具体编程操作了
默认的编程项目是“参数设定”

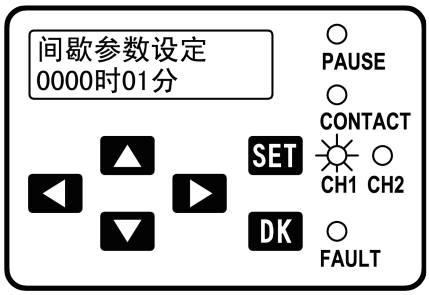


† 密码如果连续三次输入错误，控制器会自动退出密码输入状态并关闭显示。这个功能用来保护控制器不被恶意猜测密码猜中

4.2 更改间歇和润滑参数（先完成 1-2 步！）

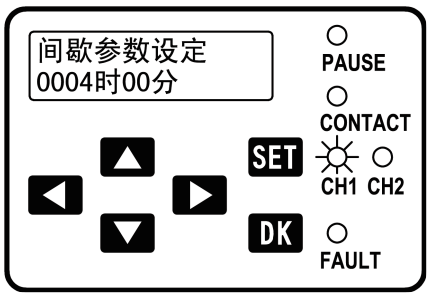
第 3 步：短暂按一下 SET 键，始显示预先设定的间歇控制参数

例如：1 分钟（出厂设定）



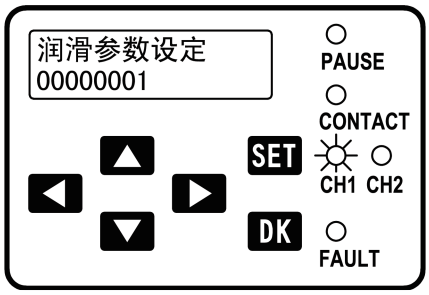
第 4 步：可以用 ▲ ▼ ◀ ▶ 键修改间歇参数

例如：修改为 4 小时



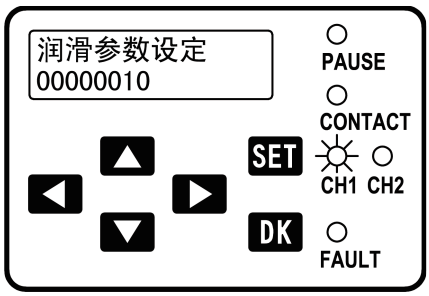
第 5 步：按 SET 键确认新的间歇参数。开始显示预先设定的润滑参数

例如：1 个脉冲（出厂设定）



第 6 步：可以用 ▲ ▼ ◀ ▶ 键修改润滑参数

例如：修改为 10 个脉冲



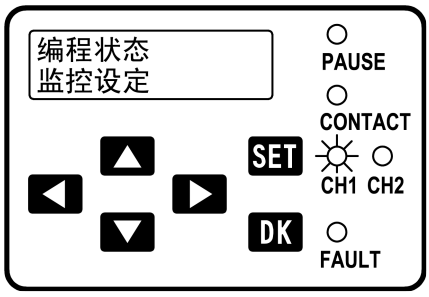
第 7 步：按 SET 键确认新的润滑参数

第 8 步：液晶显示器画面开始闪动，提示用户：所有的新参数已经被确认。按下 SET 键不放，液晶显示器画面停止闪动；2 秒以后，新参数被永久存储记忆、显示被关闭。

请注意：如果按 SET 键达不到 2 秒，控制器自动放弃新参数、重新回到“编程状态”的初始状态

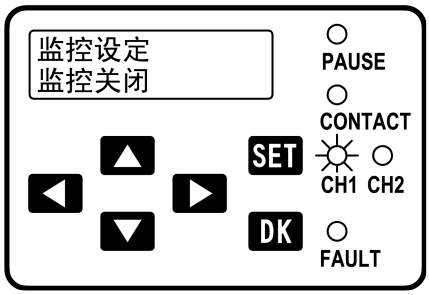
4.3 更改油位监控设置（先完成 1-2 步！）

第 3 步：多次按 ▲ 键，一直按到第二行出现“监控设定”字样



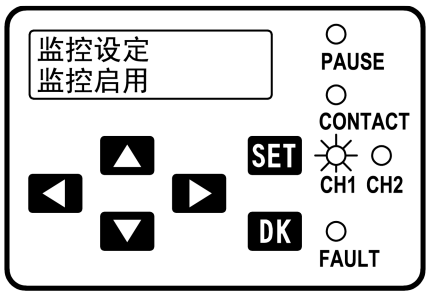
第 4 步：短暂按一下 SET 键，进入系统监控设置状态，开始显示当前的监控方式

例如：监控关闭（出厂设定）



第 5 步：按 ▲ ▼ 键，选择所需要的监控方式

例如：改为监控启用



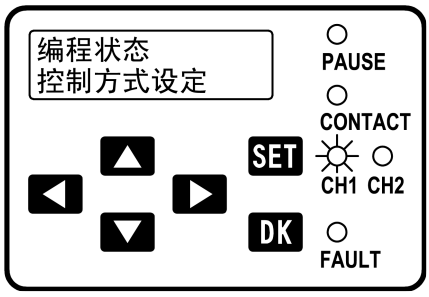
第 6 步：按 SET 键，确认新的监控方式

第 7 步：液晶显示器画面开始闪动，提示用户：所有的新设定已经被确认。按下 SET 键不放，液晶显示器画面停止闪动；2 秒以后，新设定被永久存储记忆、显示被关闭

请注意：如果按 SET 键达不到 2 秒，控制器自动放弃新设定、重新回到“编程状态”的初始状态

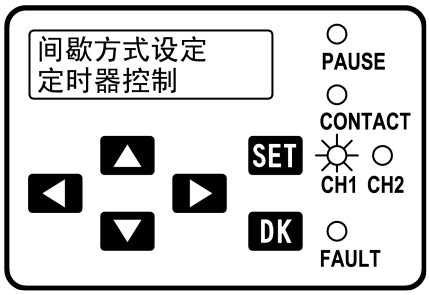
4.4 更改间歇和润滑控制方式（先完成 1-2 步！）

第 3 步：多次按 ▲ 键，一直按到第二行出现“控制方式设定”字样



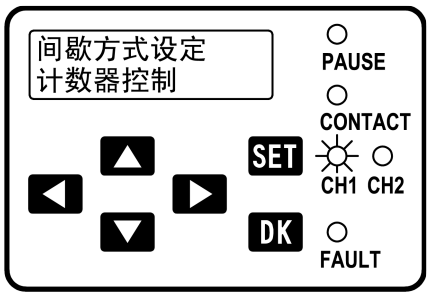
第 4 步：短暂按一下 SET 键，进入间歇方式设置状态，显示预先设定的间歇控制方式

例如：定时器控制（出厂设定）



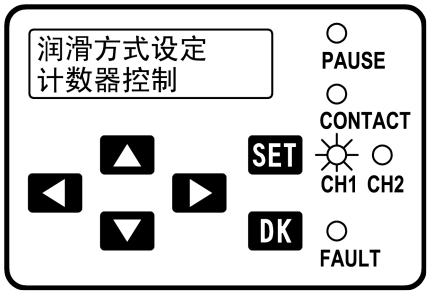
第 5 步：可以用 ▲ ▼ 键改变间歇控制方式

例如：改为计数器控制



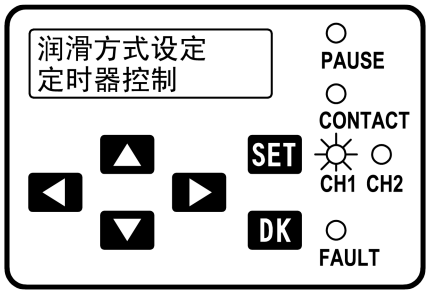
第 6 步：按 SET 键确认新的间歇控制方式显示切换成预先设定的润滑控制方式

例如：计数器控制（出厂设定）



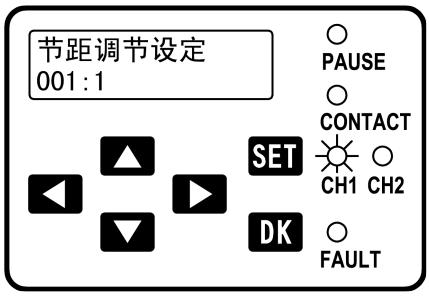
第 7 步：可以用 ▲ ▼ 键改变润滑控制方式

例如：改为定时器控制



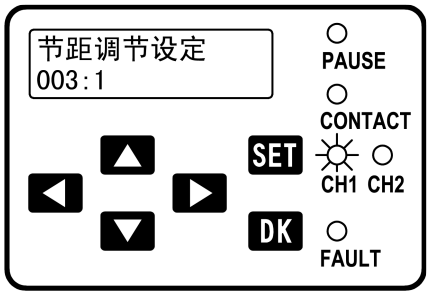
第 8 步：按 SET 键，确认新的润滑控制方式。如果润滑采用计数器控制，显示切换成节距调节参数设定；否则跳到第 10 步

例如：1:1（出厂设定）



第 9 步：可以用 ▲ ▼ ◀ ▶ 键修改节距调节参数

例如：修改为 3:1



第 10 步：按 SET 键确认新的设定

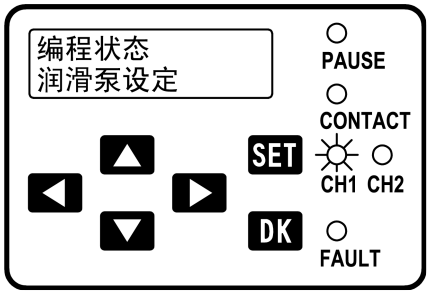
第 11 步：液晶显示器画面开始闪动，提示用户：所有的新设定已经被确认。按下 SET 键不放，液晶显示器画面停止闪动；2 秒以后，新设定被永久存储记忆、显示被关闭

请注意：如果按 SET 键达不到 2 秒，控制器自动放弃新设定、重新回到“编程状态”的初始状态

请注意：改变间歇或润滑控制方式以后，务必要根据实际润滑任务的需要，重新设定新的间歇／润滑的控制参数

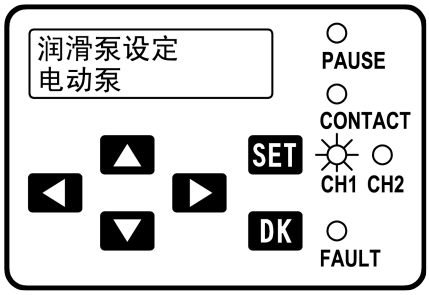
4.5 更改润滑泵设定（先完成 1-2 步！）

第 3 步：多次按 ▲ 键，一直按到第二行出现“润滑泵设定”字样



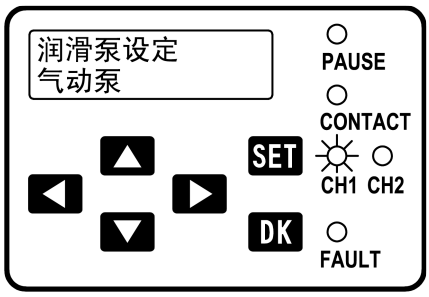
第 4 步：短暂按一下 SET 键，进入润滑泵设定状态，显示当前设定的润滑泵类型

例如：电动泵



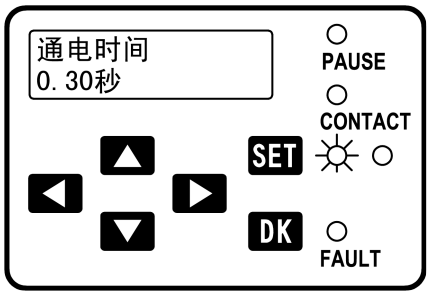
第 5 步：可以用 ▲ ▼ 键改变润滑泵的类型

例如：可以选择泵种类为气动泵



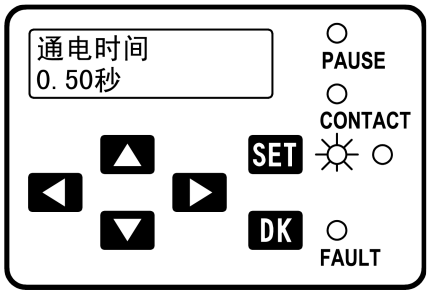
第 6 步：按 SET 键确认新的润滑泵类型。如果润滑泵类型为电动泵，开始预先设定的显示通电时间，否则跳到第 12 步

例如：0.3 秒（出厂设定）



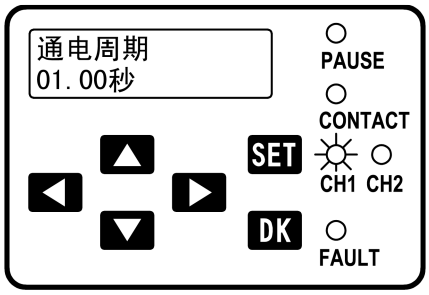
第 7 步：可以用 ▲ ▼ ◀ ▶ 键修改通电时间设定参数

例如：修改为 0.5 秒



第 8 步：按 SET 键确认新的通电时间参数。如果润滑方式为定时器控制，开始预先设定的显示通电周期参数。否则跳过

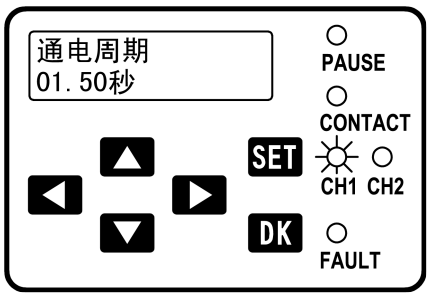
例如：1 秒（出厂设定）



第 9 步：可以用 ▲▼◀▶ 键修改通电周期设定参数

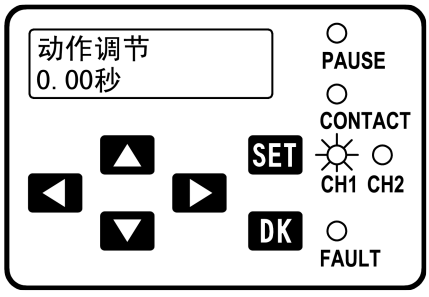
例如：修改为 1.5 秒

修改后，直接跳到第 12 步



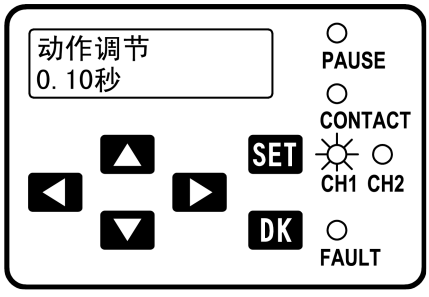
第 10 步：开始显示预先设定的动作调节设定数值

例如：0 秒（出厂设定）



第 11 步：可以用 ▲▼◀▶ 键修改动作调节设定数值

例如：修改为 0.1 秒



第 12 步：按 SET 键确认新的润滑泵设定

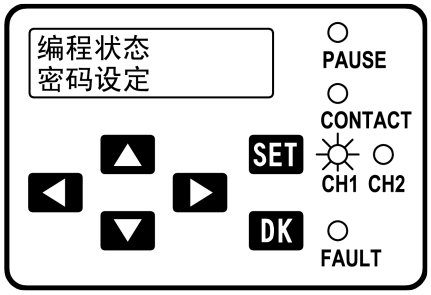
第 13 步：液晶显示器画面开始闪动，提示用户：所有的新设定已经被确认。按下 SET 键不放，液晶显示器画面停止闪动；2 秒以后，新设定被永久存储记忆、显示被关闭

请注意：如果按 SET 键达不到 2 秒，控制器自动放弃新设定、重新回到“编程状态”的初始状态

4.6 更改保护密码（先完成 1-2 步！）

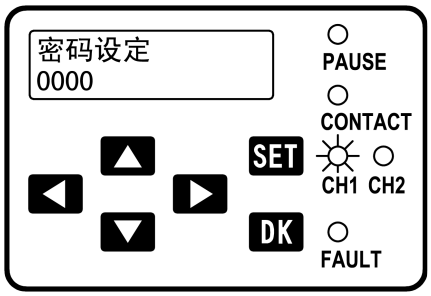
用户更改保护密码后，出厂预先设置的保护密码被清除，代之以用户输入的新保护密码。新保护密码将被永久存储，直到下一次更改保护密码。

第 3 步：多次按 ▲ 键，一直按到第二行出现“密码设定”字样



第 4 步：短暂按一下 SET 键，进入保护密码修改状态，同时 LCD 显示当前密码

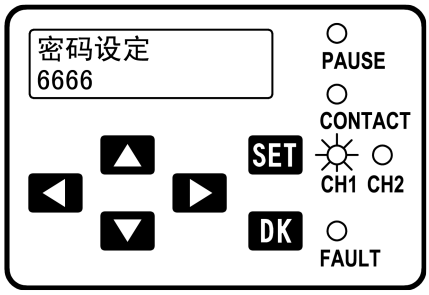
例如：0000（出厂设定）



第 5 步：输入 4 位数的新保护密码

例如：6666

新保护密码可在 0000~9999 间任意取值，控制器对此没有限制



第 6 步：按 SET 键确认新的保护密码

第 7 步:液晶显示器画面开始闪动,提示用户:新密码已经被确认。按下 SET 键不放，液晶显示器画面停止闪动；2 秒以后，新密码被永久存储记忆、显示被关闭

请注意：如果按 SET 键达不到 2 秒，控制器自动放弃新密码、重新回到“编程状态”的初始状态

请妥善保管新保护密码。如果忘记了保护密码，就不能再对控制器编程了。遇到这种情况，请联系制造商。制造商的联系方式印刷在手册扉页上

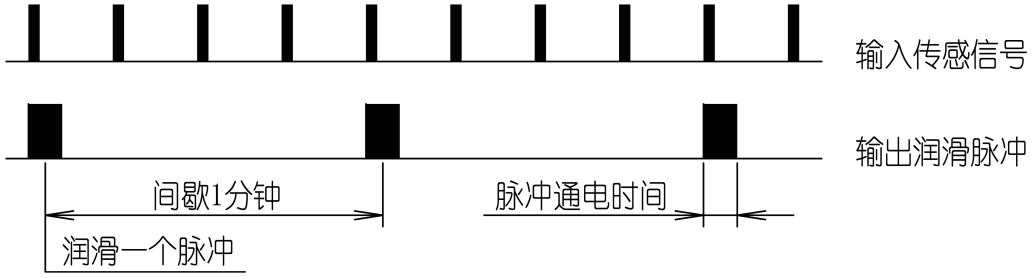
5. 工作模式

5.1 定时工作方式

设定“间歇定时方式”控制和“润滑计数方式”控制。

当控制器经历了预先设定的间歇时间后，开始检测传感脉冲，进行按脉冲计数的润滑。完成预定的润滑脉冲数，再次进入间歇定时过程，实现“间歇”-“润滑”-“间歇”的循环控制。

如果润滑泵为气动泵（空气泵），控制器在润滑定时期间持续驱动润滑泵，一直到计数到预定的润滑脉冲数，润滑结束。例如下图所示，间歇设定为 1 分钟，润滑设定为 1 个脉冲



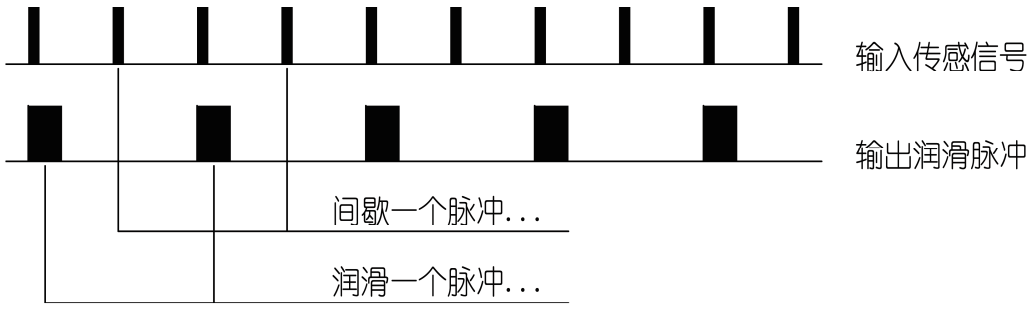
5.2 计数工作方式

设定“间歇计数方式”控制和“润滑计数方式”控制。间歇和润滑都以脉冲计数为准。这种方式非常适合于断续运转的设备的润滑控制。

间歇：显示和设置的参数为传感器脉冲数

润滑：显示和设置的参数为润滑脉冲数

例如下图所示，间歇、润滑均设定为 1 个脉冲



5.3 特别工作方式

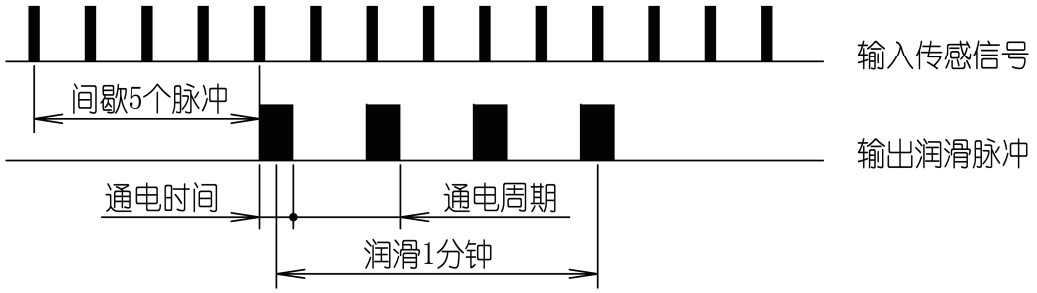
间歇：显示和设置的参数为计数脉冲数或者时间

润滑：显示和设置的参数为润滑定时时间

这种方式润滑采用定时控制。如果润滑泵是电动泵（电磁泵），控制器按照预定的通电周期，发出驱动脉冲令润滑泵喷油。驱动脉冲持续时间长短按照设定的通电时间执行。特别是润滑和间歇均为定时控制的方式，适合不方便安装传感器的场合，例如钢丝绳的润滑。

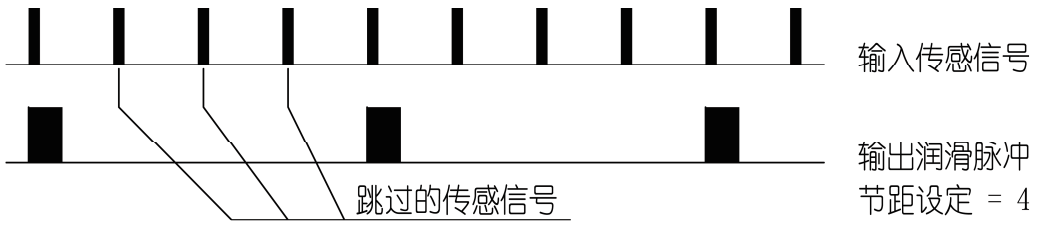
如果润滑泵为气动泵（空气泵），控制器在润滑期间持续驱动润滑泵，直到达到预定的定时时间，结束润滑。

例如下图所示，间歇设定为 5 个脉冲，润滑 1 分钟

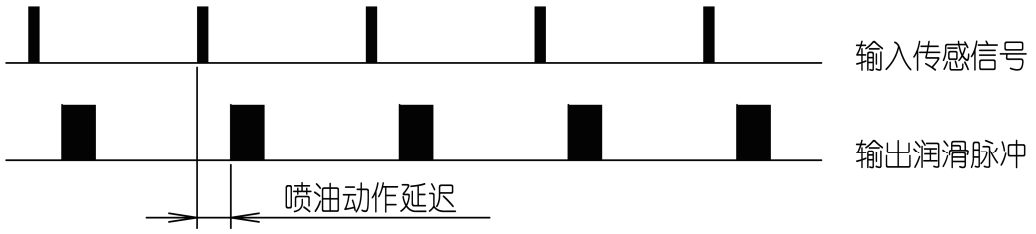


5.4 润滑泵工作调节

如果链条传感信号间隔过短，润滑泵可能来不及动作，可以设定**节距调节**参数，令润滑泵按照与传感脉冲数量比例喷油。这样就降低了润滑泵对信号响应速度的要求，适应高速链的润滑需要。例如下图所示，节距为 4:1。



为了保证在链条运行速度变化，或者润滑设备安装定位困难的情况下，润滑泵喷射的润滑油也能准确对准润滑部位，可以通过**动作调节**来控制油泵的喷油动作。



正常情况下，控制器收到传感信号后立刻发出脉冲驱动电磁泵。设定了动作调节参数以后，控制器在接收到传感信号时，延迟一个动作调节时间后再喷油。通过适当设置动作调节数值，能够使喷出的润滑油准确地落在润滑位置。

这两个参数是用来调节电动泵（电磁泵）工作的，对气动泵无效。

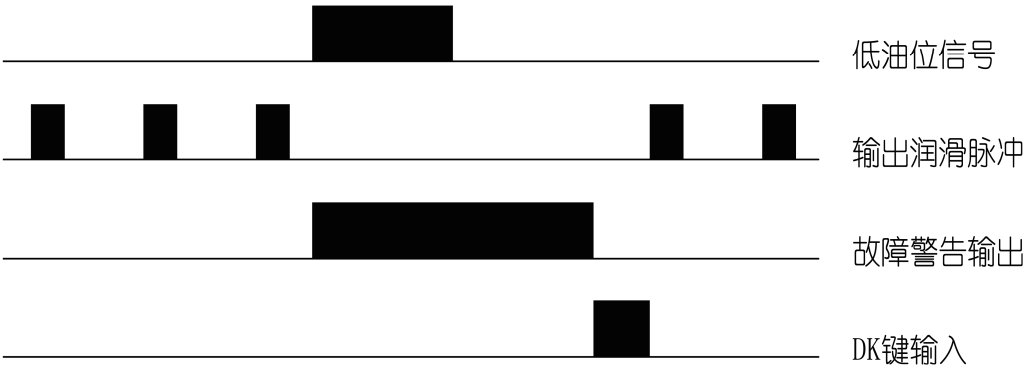
5.5 无油位监控工作

在这种方式下，润滑循环不去监控执行油位监控工作。

在无油位监控工作方式下，必须关闭监控功能，将油位监控方式为“监控关闭”。这时候，缺油造成的润滑故障不能被自动检测和显示出来。

5.6 有油位监控工作

在这种方式下，系统是可以由外接油位开关监控的。启用油位监控后，在任一润滑通道执行润滑任务时，油箱缺油能够被自动检测和显示出来。



控制器能够敏捷地捕捉油位异常故障。即使油箱油位在缺油与不缺油的临界点波动，控制器也能正确记录下缺油故障，然后发出故障警告，停止润滑工作，等待用户处理故障。

请注意：油位开关必须使用动断开关。亦即发生润滑油油位过低故障时候，开关以断开的方式发出故障信号。如果使用其他液位传感器，也必须使用低电平有效的液位传感信号。

5.7 放油功能

新安装的润滑系统投入使用前，需要排空管路内空气；正在运转的润滑系统有时候需要置换管路中过期的润滑油。这种情况下，可以使用控制器提供的放油功能来实现，操作方法如下：

控制器的润滑通道在非故障状态下，按下 DK 键不放，2 秒钟后控制器即启动一次放油过程。控制器先令当前通道转入放油状态，然后按照每秒 1 个脉冲的频率发出驱动脉冲，连续驱动电磁泵喷油。1 分钟后放油结束，当前通道自动回到间歇状态。

如果润滑泵为气动泵（空气泵），控制器在放油期间持续驱动润滑泵，直到达到预定的定时时间，结束放油。

润滑通道放油期间，控制器相应的 CONTACT 指示灯会闪亮，表示本通道正在放油。同时，暂停通道切换并封锁面板上除 DK 键以外的所有按键，直到放油结束。

如果想提前终止放油，短暂按一下 DK 键，当前通道即提前终止放油，进入间歇状态。

如果在放油过程中控制器检测到错误，放油操作自动终止，发出故障警报；如果放油过程中发生断电，放油操作也会终止，控制器再次上电时候，自动进入间歇状态。

5.8 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、剩余参数以及累计工作时间和累计故障时间。当控制器再次上电时候，能够从断电点继续执行原来被中断的润滑任务。

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。

6. 故障监测和处理

当控制器检测到故障时候，操作控制面板的 FAULT 指示灯会急速闪烁；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 ▲ 或 ▼ 键，具体故障信息就会显示出来，具体信息含义

润滑油油位低：油箱中油位低于最低油位，无法正常润滑

系统错误：控制器内部发生了错误。遇到这种情况，请先切断控制器电源，3 秒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

发生故障后，按下 DK 键，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 DK 键，否则设备可能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 故障信息储存

每次发生故障停机后，故障停机时间都会被自动累计、储存。被储存的累计故障时间是不能清除的。

控制器可以储存的最大累计故障时间为 999999 小时 59 分钟，可以储存的最小故障时间为 1 分钟。

7. 技术参数

控制器工作电源:	直流 24V（18V~36V），0.1A
防护等级:	IP40
数据存储:	无限制
工作温度:	-20℃~70℃
储存温度:	-40℃~80℃
外形尺寸:	135mm（长）×92mm（宽）×42mm（高）
单件质量:	200 克
润滑时间设定范围:	1 秒~17 小时 59 分钟 59 秒
润滑计数设定范围:	1~59999
节距调节设定范围:	1:1~199:1
间歇时间设定范围:	0 分钟~9999 小时 59 分钟
间歇计数设定范围:	0~9999 9999
润滑泵类型:	电动泵（电磁泵）／气动泵（空气泵）
泵驱动最大输出:	交流 3A，100~250V，50/60Hz
SL 指示灯最大输出:	直流 24V，5W
电动泵通电时间范围:	0.01 秒~1.99 秒
电动泵通电周期范围:	0.01 秒~99.99 秒
电动泵动作调节范围:	0.01 秒~2.50 秒
累计工作时间记忆范围:	0~999999 小时 59 分钟
累计故障时间记忆范围:	0~999999 小时 59 分钟

记事栏