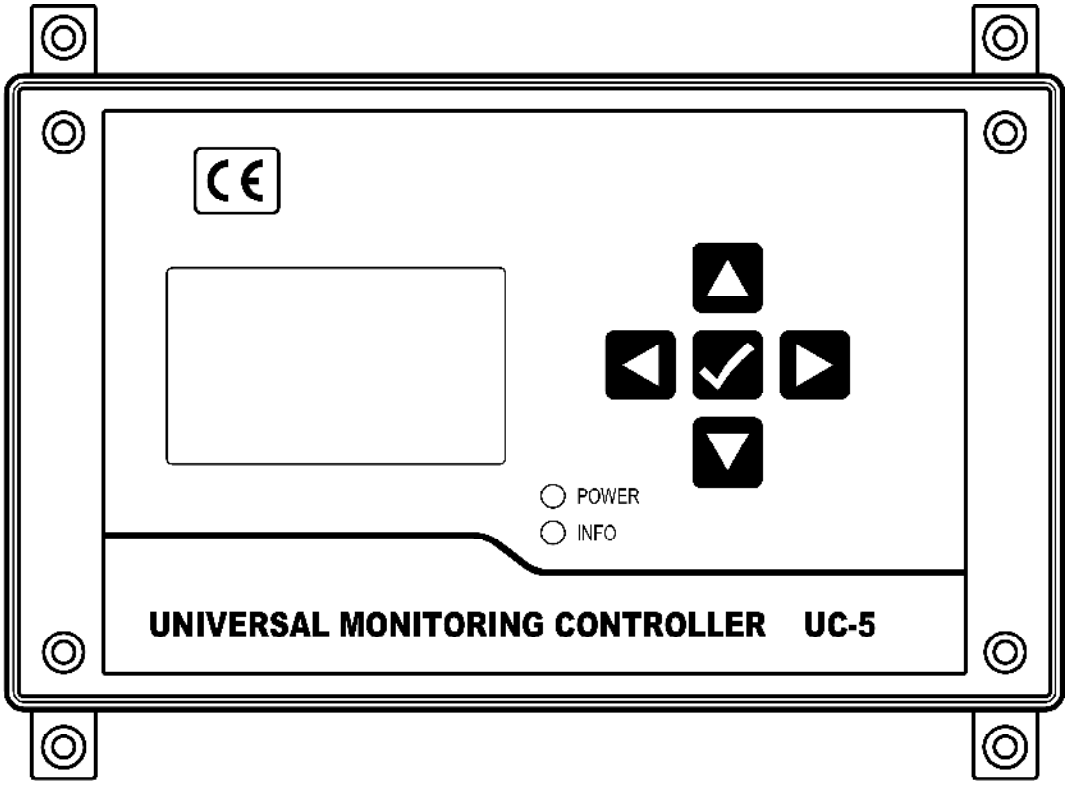
Universal monitoring controller UC-5

User's Manual

UC-5 润滑系统控制器用户手册



SUZHOU LEETERN INDUSTRY CONTROL

Ver 1.0 June 2012

Contents

Universal Monitoring Controller UC-5 is designed for controlling and monitoring of projection Lubrication systems. It is applicable to lubrications systems for conveyor and escalator etc.

The controller UC-5 intuitively displays operating information like operating state and parameters with LCD. It is easy to use. UC-5 stores configuration data and parameters in EEPROM, which made those data can be stored safely for long time.

UC-5 owns 2 lubrication control channels. Operating modes and control parameters of each channel are completely independent, which make it can separate control two lubrication systems at the same time. It is very suitable for lubrication system that has dense lubrication points, and asks for different lubrication control requirements.

UC-5 is of completely sealed design, Its protection grade reaches IP65, thus it can work steadily in severe Industrial working environment.

Safety Warning!

There is AC high voltage on the PCB inside the controller. It directly outputs high voltage power to drive lubrication pump. Mounting and using UC-5 should be specially pay attention to safety, to avoid the danger of shock.

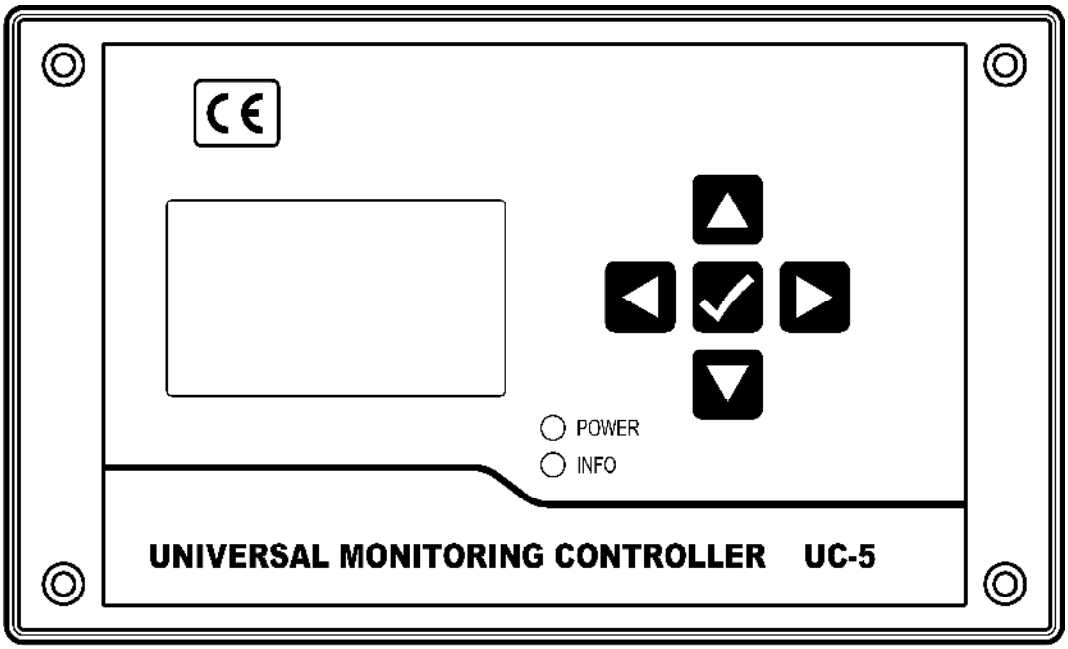
Mounting and connecting controller UC-5 must be done under power cut-off condition. Hot-line work is prohibited to prevent electric shock hazard. Ground terminal of UC-5 must be well grounded. The system should be protected with specified fuse to ensure controller safe and personal security.

UC-5 must be mounted, tested and maintained only by trained qualified personnel. In order to guarantee system operating safely and properly, its safe condition should be periodically inspected.
Although UC-5 complies with relevant safety technical requirements, the use of the controller may still entail dangers leading to personal injury of the user or third parties or damage to property. Therefore, the operation must strictly comply with operation manual. Errors that may affect safety must be rectified immediately.

UC-5 is designed for controlling and monitoring centralized lubrication systems. The user himself shall be liable for any damage caused by improper use.

1. Display and control panel

Display and control panel of UC-5：



1.1 LED indicator lights

POWER – power indicator light. When power supply to the controller is normal, the green indicator light of POWER is on.
INFO – Information indicator light. When controller detects fault, the red indicator light will be continuously flashing.

1.2 Keys

▲ -Key UP. Scroll up key. When selecting menu, press key UP to scroll up the menu; under setting mode, to increase the displayed value at cursor position with this key.

▼ -Key DOWN. Scroll down key. When selecting menu, press key down to scroll down the menu; under setting mode, to decrease the displayed value at cursor position with key DOWN.

◀ -Key LEFT. scroll left key. To move cursor left in setting mode.

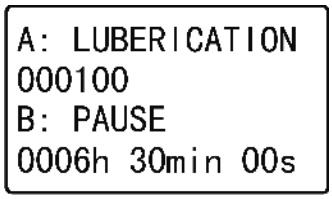
▶ -Key RIGHT: scroll right key. To move cursor right in setting mode.

✓ -Key OK: To start setting mode with key OK in display mode; Confirm menu or programmed parameters; This key also has function to exit fault state

or advance terminated OIL DRAINING.

1.3 LCD display

LCD displays operating status and parameters.
When controller is operating, LCD mainly displays current states. “A” and “B” represent two lubrication channels.



“A: LUBRICATION” means channel A is now in lubrication phase. The figure on the next line means how much lubrication impulses remain. Example: 000100 means there is still 100 impulses remain for lubrication phase.

“B: PAUSE” means channel B is now in pause phase. The figure “0006h 30min 00s” on the next line means there is still 6 hours and 30 minutes remain for pause phase. (This also implicates that PAUSE adopts “timer” mode.)

Other possible status may be displayed on LCD are “stop”, “oil draining’, “low oil level “, “low air pressure” and “no signal” etc. For more details, please see the follow chapters.

Please NOTE: Please use soft cloth with warm water or neutral detergent to clean the film panel. Organic solvent is prohibited. In order to avoid damage to panel and keep its leak tightness, do not use sharp tools/ object to touch the panel.

2. Main lubricating functions

Under normal operating conditions, the controller controls lubrication system working in continuous cycle of ’LUBE-PAUSE-LUBE-PAUSE…..”
Default factory setting:
LUBRICATION: 1 impulse,
PAUSE: 1min.
User can enter into setting mode to modify control modes and parameters.

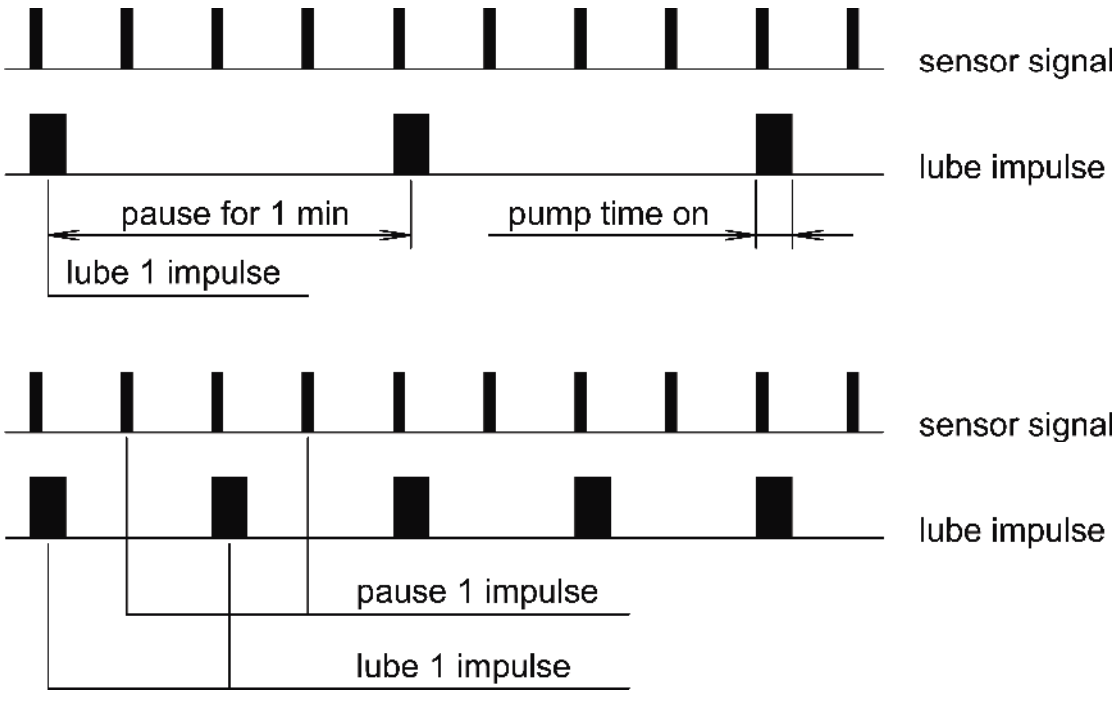
UC-5 can permanently memories those programmed parameters. When power is cut off, the control unit auto stores current operating status, remain values. When next electrify starts, the control unit will continue carrying out operation from the interruption.

Controller UC-5 can also accepts external control signals, to realize interconnected control with other control system.

2.1 Select PAUSE mode

There are two kinds of pause modes, TIMER mode and COUNTER mode for user to choose from.

If user needs to lube equipment based on time (such as to lube equipment once a work shift), we recommend “TIMER mode” for PAUSE; If user needs to lube based on equipment’s working situation, we then recommend “ COUNTER mode”.



No matter under which PAUSE mode, the pause value could be set as “0”. In case of this, lube system operates in LUBRICATION phase all the time and will not go to PAUSE phase any more.

2.2 LBRICATION control

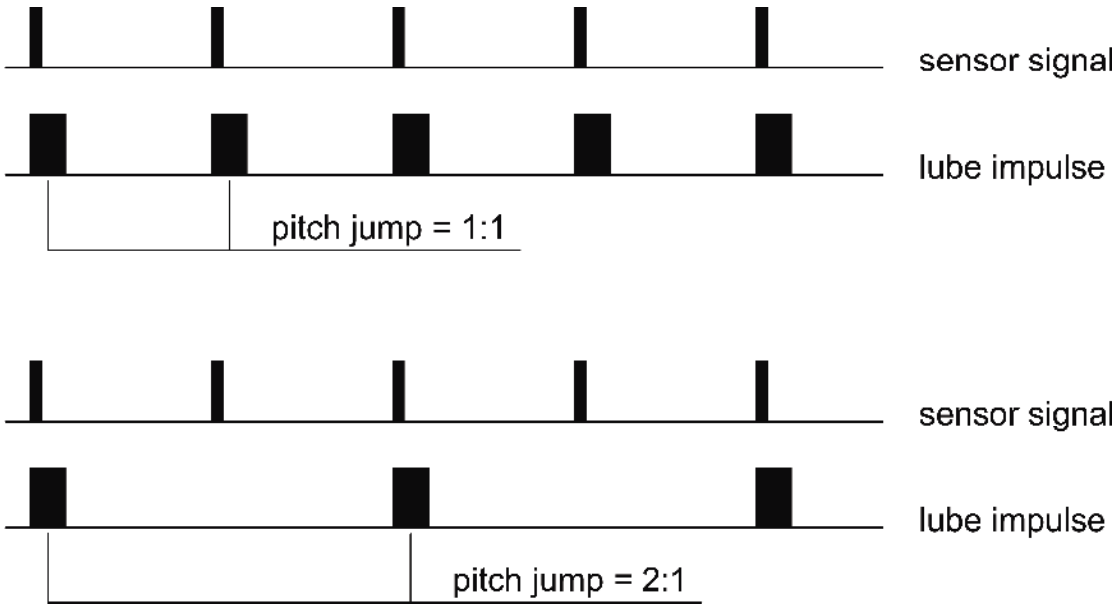
When equipment is in lubrication phase, user can set lubrication parameters depend on situation for different needs.

Lubrication is always performing by tracking sensor impulse signals, thus there’s only COUNTER mode for LUBRICATION. In order to fully lubricating the system, there are several auxiliary parameters for precise adjustment in the process of lubrication.

2.2.1 Pitch jump

Oil projection action performs by tracking sensor-signal impulses. If the impulses are too dense, and pump is required to project oil by tracking each impulse, this would lead to the pump can not track signals successfully. This result in the oil projection can not be performed properly.

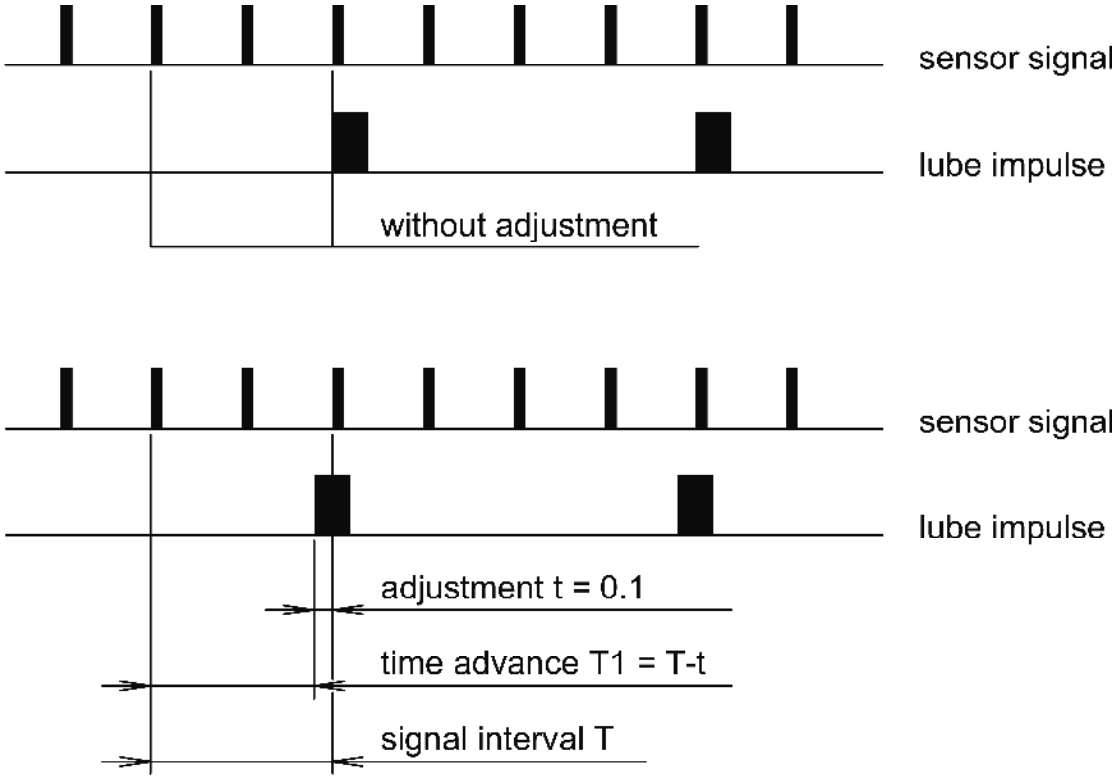
User can eliminate this phenomenon by proper pitch jump setting. After setting pitch jump value, UC-5 performs oil projection and lubrication movement once every N pitches as show in figure below.



Pitch jump 1:1 means oil projection follows every sensor signal impulse in LUBRICATION phase; 2:1 means oil projection performs once every two sensor signal impulses. Pitch jump setting range is 1:1 to 999:1.

2.2.2 Oil projection adjustment

For the reason of installation or chain speed changes, oil projection movements sometimes don't match sensor signal impulses. Such as projects oil after receiving sensor signal. Due to the electric, machine and hydraulic circuit of lubrication system may exist time delay, the projected oil may not right onto lubrication points. Then user could adjust oil projection time to advance the projection action, which can make the lubricant fall at lubrication points as show in figure below.



Oil projection time can be adjusted in the scope of 0 to 9.99 s. If the time value is set as "0", which means oil projection time adjustment function is cancelled.

2.2.3 Pump time on (Electrifying time)

Lubrication pump is driven by electrical impulses. The impulse electrifying time of pump is different for different pump type, specification as well as lubrication systems.
The range of programmable electrifying time (pump time) is 0.1-9.99s.

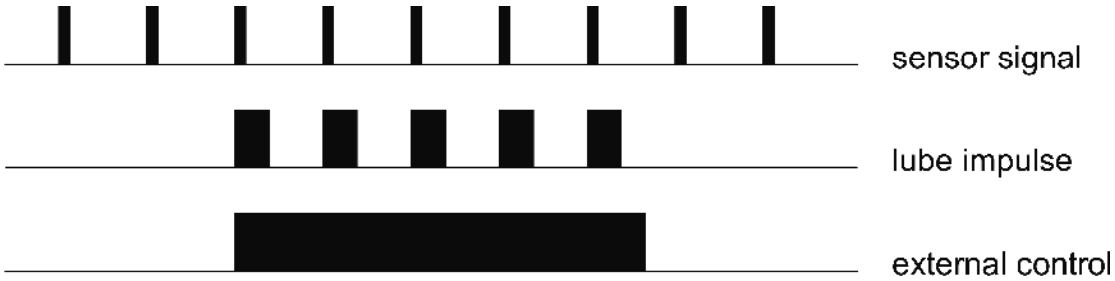
2.3 Oil draining

In case to discharge the air in pipes or replace expired lubricant, “oil draining” function is then required. In OIL DRAINING status, controller ignores those LUBRICATION and PAUSE settings. It drives pump with an interval of 0.5s to discharge the pipe until oil draining impulses decrease and finish. System then automatically goes to LUBRICATION phase.

The default setting of oil draining is 100 impulses. Detailed OIL DRAINING operation is listed in setting mode.
In the process of OIL DRAINING, shortly press key ”OK” can advanced stop oil draining and turn to LUBRICATION phase..
The controller will stop oil draining when it detects fault during oil draining process and then goes to stopped status.

2.4 External Control

There is a set of terminals inside the controller to support the input of external control signals. When external control signal is effective, controller performs lubrication control normally. When external control signal is cut-off, controller pauses. After external control signal recovers, controller will continue control operation from the point it paused.

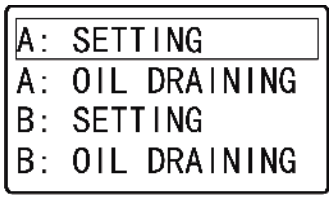


3. Parameter and function setting

All functions and control parameters of UC-5 can be set via setting mode.

3.1 Start setting mode

Press and hold key “OK” for 3 seconds to enter into setting mode.

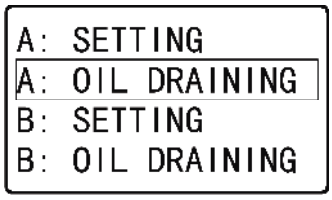


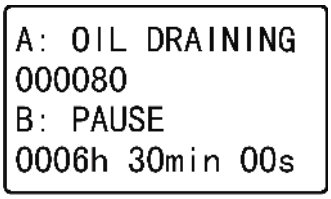
Press key “DOWN” and “UP” to select the channel and item to be set.
Press key “OK” to confirm the selected item and go to next step.

In setting mode, if there is no operation to the controller longer than 2 minutes, controller will automatically quit setting mode and back to state display mode.

3.2 Oil draining

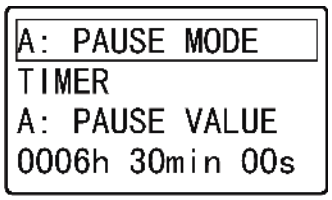
If user choose one channel to perform oil-draining operation, controller will exit setting mode. The channel selected then goes into oil-draining state while the remaining oil-draining impulses value is continuously showed till oil draining finish or being stopped in advance.





3.3 PAUSE setting

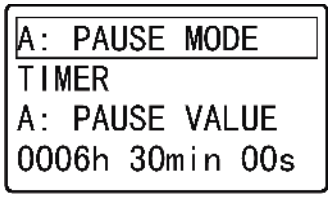
Select one channel and press key “OK” to enter into setting mode for this channel. For example, choose ”A: SETTING”, then the LCD shows as follow figure:



Press key ”DOWN’ and “UP” to choose the specific item to be set.

3.3.1 PAUSE mode setting

Choose ”A: PAUSE MODE”, press key “OK”, the words on the next line glittering to remind user the PAUSE mode is modifiable. To change PAUSE mode with key “DOWN” or “UP” between ”TIMER mode” and “COUNTER mode”.

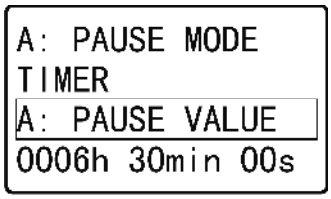


Press key “OK” to confirm the new setting of pause mode.

Once PAUSE mode is changed, PAUSE value will auto restore the default factory setting; If PAUSE is set with TIMER mode, the default value is 1min; If PAUSE is set as COUNTER mode, the default value is 1 impulse.

3.3.2 PAUSE value setting

Press key “DOWN” to select ”A: PAUSE VALUE”. After press key “OK”, the least significant digit of the PAUSE value on the next line begin to blink (this is called cursor position). User can modify PAUSE value.



With key “DOWN” and “UP” can modify the figure at cursor position. With key “LEFT” and “RIGHT” can move cursor left and right.

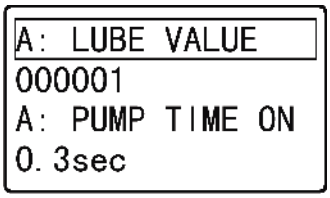
When PAUSE is set in “COUNTER” mode, the setting range of PAUSE is 0-9999 9999 impulses. And when PAUSE is set in “TIMER” mode, the range is 0-9999h 59min 59s.

Press key “OK” to confirm new PAUSE value setting.

PLEASE NOTE: The controller will check the parameter-changing situation in real time. It refuses any changes that beyond the setting range.

3.4 Lubrication setting

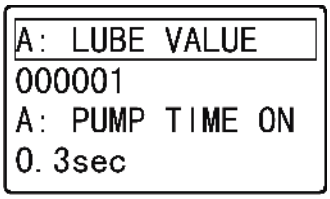
Press key “Down” till the content on LCD shows as figure below:



Select the item to be set with key “DOWN” and “UP”.

3.4.1 Lubrication value setting

Choose ”A: LUBE VALUE” and press key “OK”. When the least significant digit of the lubrication parameter value blinks, then user can modify lubrication value.



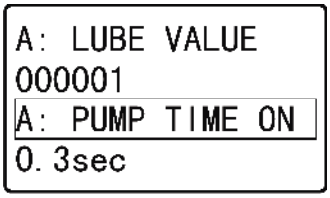
LUBRICATION value setting range is 1-999 999.
Press key “OK” to confirm the new setting of LUBE value.

3.4.2 Electrifying time (Pump time) setting

Press key “DOWN” to select ”A: PUMP TIME ON”. After press key “OK”, the least significant digit of the power on time value begins to blink. User then can modify power on time.

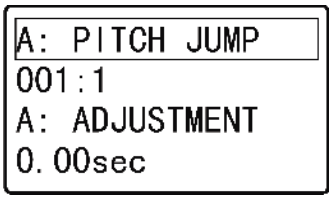
The setting range is between 0.1s to 1.99s.

Press key “OK” to confirm the new setting.



3.4.3 Pitch jump

Press key “Down” till the content on LCD shows as figure below:



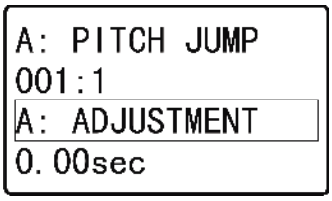
Choose ”A: PITCH JUMP”. After press key “OK”, the least significant digit of the pitch adjustment value begins to blink. User then can modify the value. The setting range is between 1:1 to 999:1.

Press key “OK” to confirm the new setting of pitch adjustment parameter.

3.4.4 Oil projection adjustment setting

Press key “DOWN” to choose ”A: ADJUSTMENT”. Press key “OK”, the least significant digit of oil-projection adjustment parameter begins to blink. User can modify the value. And the setting range of oil projection is between 0s to 9.99s. If the value is set as 0, which means the oil projection adjustment function is disabled.

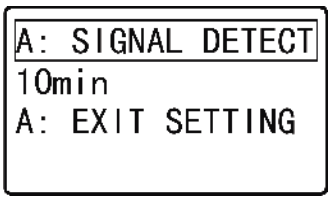
We recommend not setting the parameter in a small value like 0.1-0.2s.



Press key “OK” to confirm the new setting.

3.5 Set and Exit Signal Monitoring

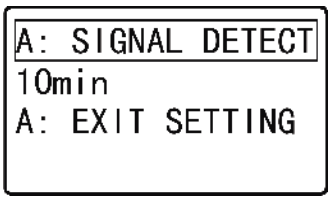
Press key “Down” till the content on LCD shows as figure below:



Select the item to be set with key “DOWN” and “UP”.

3.5.1 Signal monitoring and control setting

Choose ”A: SIGNAL DETECT”. After press key “OK”, the parameter value on the next line begins to blink, user can modify it.

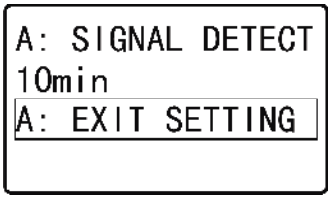


Signal monitoring parameter setting range is 0-99min. If the value is set as “0”, which means the signal monitoring function is cancelled.

Press key “OK” to confirm the new setting. For the specific meaning of signal monitoring, please refer to the chapter ”Fault detection and clearance”.

3.5.2 Exit setting

Select “A: EXIT SETTING” with key “DOWN”. Then press key “OK” to quit setting. Controller now turns back to state display mode.



If some parameters are modified in setting mode, controller will automatically restart when user quit setting mode.

4. Fault detection and clearance

The controller owns the ability to detect faults in lubrication system and give warning information to keep the system working safe and reliable.
The monitoring only performs when lubrication system is running into operation. Once the external control signal is removed, the controller will pause; and after the external control signal is effective again, it recovers monitoring function.

4.1 Oil level monitoring and warning

The controller can detect the oil (lubricant) level via oil level switch. Oil level switch will open when oil level is too low. When controller detects the cut-off signal, it warns immediately and both lubrication channels get into stopped state.
Oil level monitoring is always effective and cannot be closed via setting.

4.2 Pressure monitoring and warning for compressed air

Some lubrication systems use compressed air as motive power for the pump. Controller can detect the pressure of compressed air to assure the system working safe and reliable.

The pressure switch that mounted on the compressed air pipes will open when pressure is too low. When controller detects the cut-off signal, it warns immediately and both lubrication channels get into stopped state.

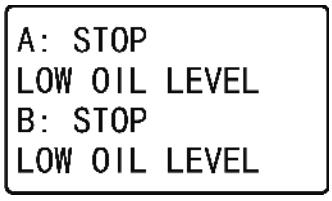
Pressure monitoring for compressed air is always effective and cannot be closed via setting. User can short-circuit the terminal 2-3 of the connector (JP4) if system does not need compressed air pressure monitoring function.

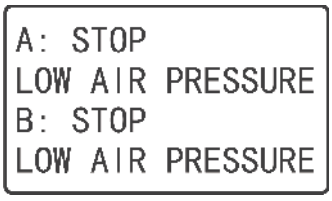
4.3 Signal monitoring and warning

If signal monitoring value is set as figure other than “0”, which means signal monitoring function is initiated. The controller will track sensor impulse signals. If there’s no signals detected in the time of monitoring, controller warns immediately. Meanwhile, the corresponding channel will turn into stopped state.
Signal transducer is out of order or chain stops may cause impulse signal disappear.

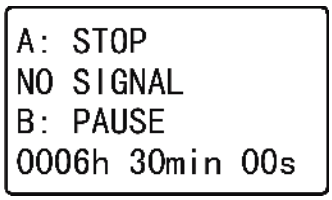
4.4 Fault display and handle

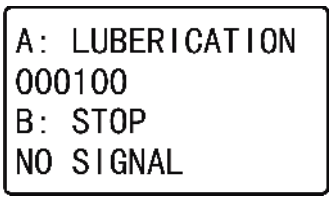
When controller detects fault, LCD screen will show relevant fault information. Meanwhile, the indicator light of FAULT on the panel is flashing. The contact of fault output relay inside the controller will cut off to pass the fault information to control room or other control system.
Fault information for low oil level and low pressure of compressed air to be displayed on LCD are as shown in figures:





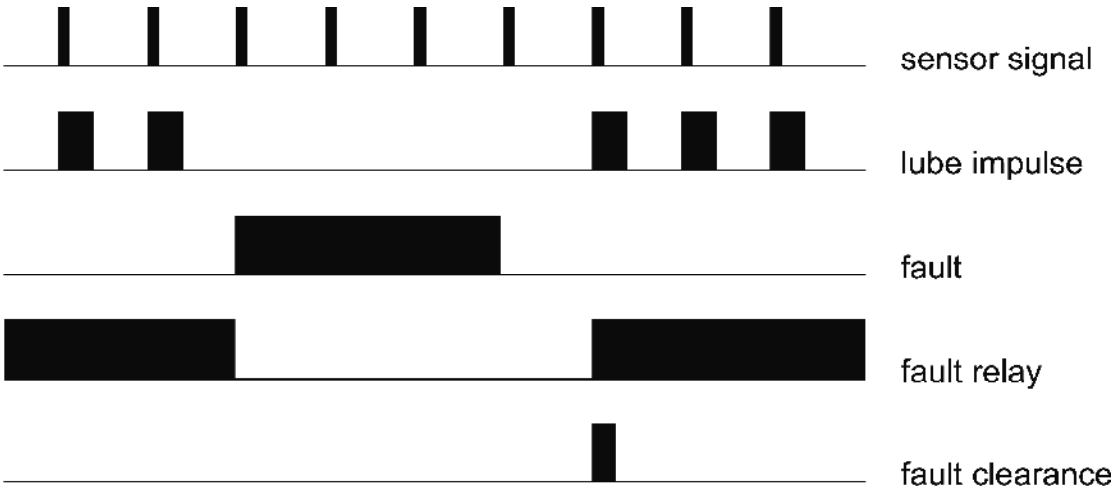
Fault information for signal monitoring to be displayed on LCD is show as figure:





Differ from LOW OIL LEVEL and LOW AIR PRESSURE faults, NO SIGNAL fault only cause stopped state to its own channel for protection. The other channel is not affected.

When fault occurs, controller responses and handles the fault as show in the figure:

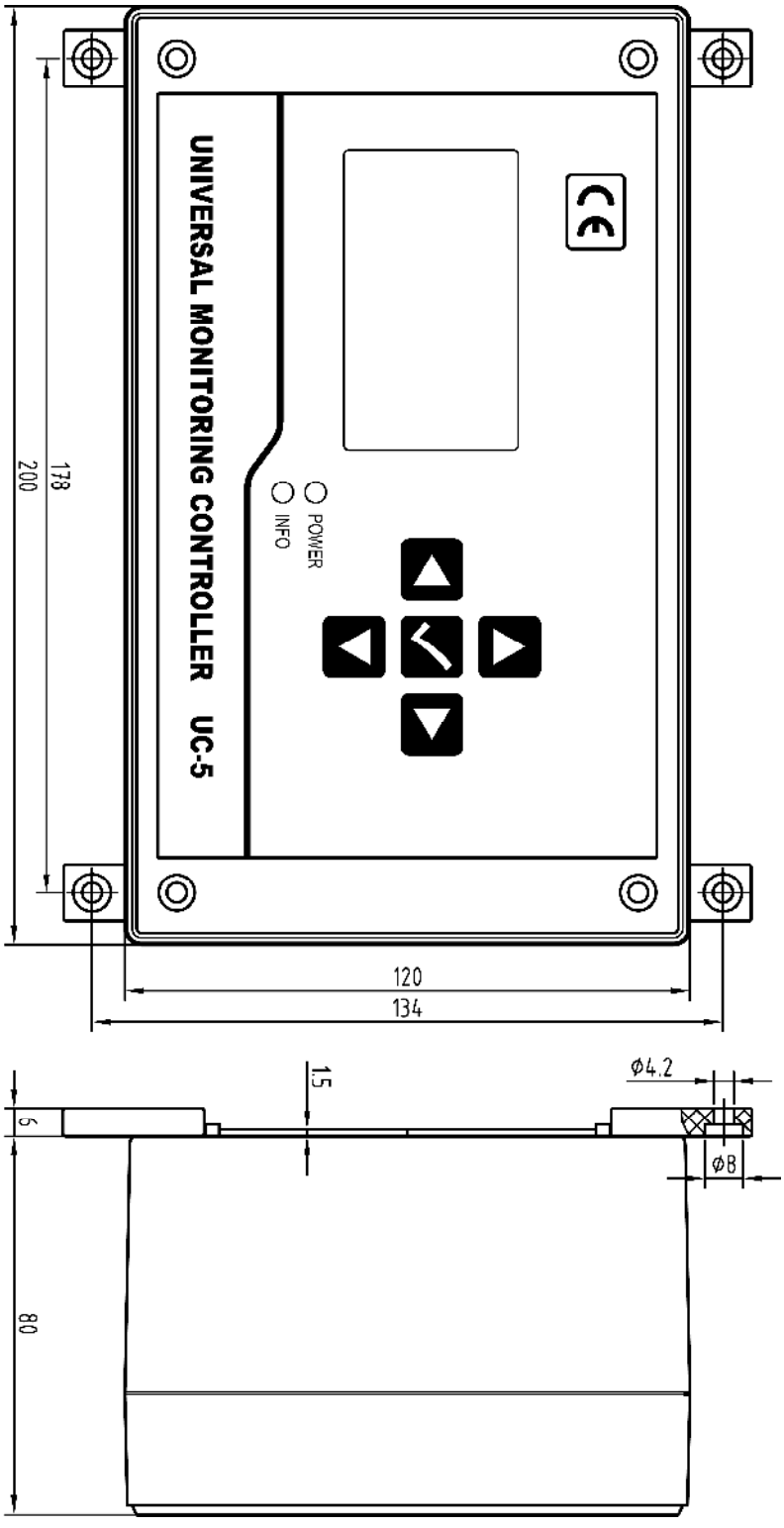


The fault information that caught by controller will be stored in EEPROM. It will not disappear (even power-off) until user clears the fault manually.

After handling the fault, press key “OK” shortly to quit Fault State and clear fault information. Controller will then goes back to normal lubrication cycle. But if the reason that caused the fault still exist, the above operation does not work.

5. Installation and electrical connection

5.1 Installation



Installation dimensions of the controller is show as figure above.

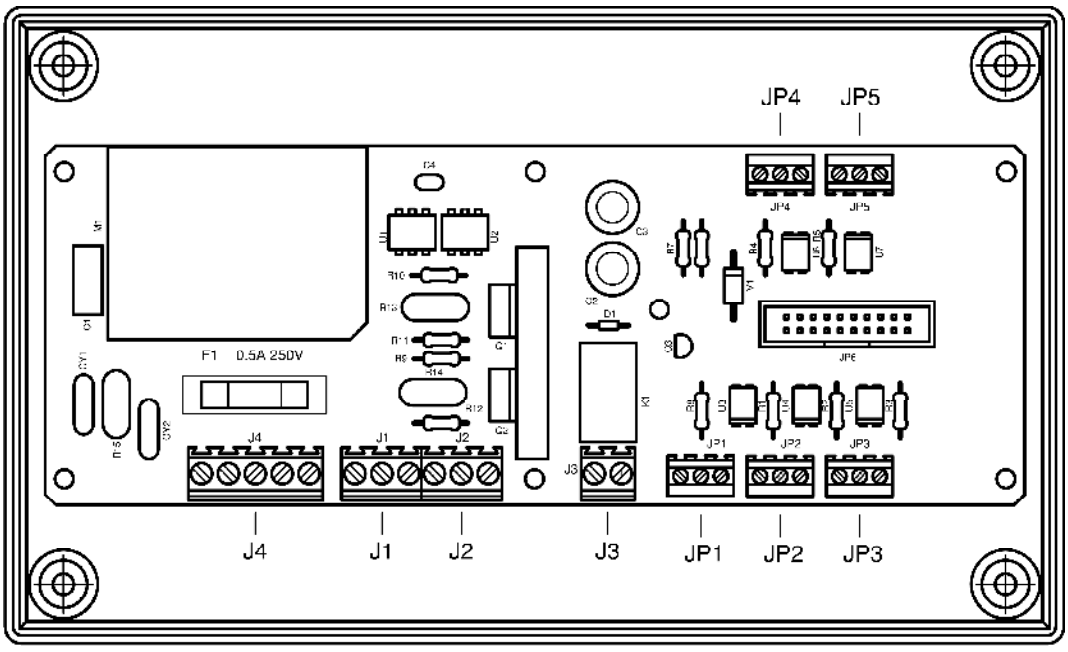
The control panel of the controller should be perpendicular to the earth, and controller to be fixed on a place that is secure, non-violent vibration, no corrosive atmosphere and out of direct sunlight. It is recommend fixing the controller with machine screws. (Self-tapping screws should not be used to prevent fall off damage to the controller with time passing.)

5.2 Power supply

Required power supply is: Voltage: 85-264V, 45/65Hz of industry frequency AC. please input power class II.
For the controller is designed with multiple level power supply filtering, UC-5 can effectively filter those strong interference that superimposed in power supply, which ensures control system work well. Even so, it is still necessary to supply the controller a separate power supply and avoid being power supplied together with large-scale electrical equipment (such as frequency transformer) that creates electrical interference easily. If the interference of the power supply is too strong that the controller cannot work steady, user may connect another filter to the power input side of the controller.

5.3 Electrical connection

Cut off power first. Carefully pry off the small covers at four corners with small slotted screwdriver, remove four screws inside. Lift top case and disconnect the flat cable that connecting the Operate & control unit with Power and InputOutput unit.
Put the top case aside carefully, the inside Power and InputOutput unit is shown as figure.



Connect external electrical equipment onto this Power and InputOutput unit. Electrical input and output terminals are indicated in the figure. From left to right, the terminal code is 1,next is “2”, “3”etc. The definition of each terminal is as follow.

J4: Power input terminal

Terminal code	Definition	Instruction
1	AC_N	AC_ N
2	Not available	
3	AC _L	AC_L
4	Not available	
5	PG	Ground protection and interference clearance

J1 : A Output terminal (for channel A)

Terminal code	Definition	Instruction
1	PG	Ground protection and interference clearance
2	Pump drive output N	To connect pump N
3	Pump drive output L	To connect pump L

J2: B output terminal (for channel B)

Terminal code	Definition	Instruction
1	PG	Ground protection and interference clearance
2	Pump drive output N	To connect pump N
3	Pump drive output L	To connect pump L

J3: Terminal for fault signal output

Terminal code	Definition	Instruction
1	Relay contact A	
2	Relay contact B	

JP1: A signal input terminal

Terminal code	Definition	Instruction
1	DC 0V	Current circuit for DC 0V
2	A sensor signal input	Connect PNP type sensor output
3	DC 24V	Supply work power of +24V to sensor

JP2: B signal input terminal

Terminal code	Definition	Instruction
1	DC 0V	Current circuit for DC 0V
2	B sensor signal input	Connect PNP type sensor output
3	DC 24V	Supply work power of +24V to sensor

JP3: Signal input terminal of oil-level switch

Terminal code	Definition	Instruction
1	DC 0V	Current circuit for DC 0V
2	Signal input of Oil-level switch	
3	DC 24V	Supply work power of 24V to sensor

JP4: Pressure switch signal input terminal of compressed air

Terminal code	Definition	Instruction
1	DC 0V	Current circuit for DC 0V
2	Pressure switch signal input	
3	DC 24V	Supply work power of 24V to sensor

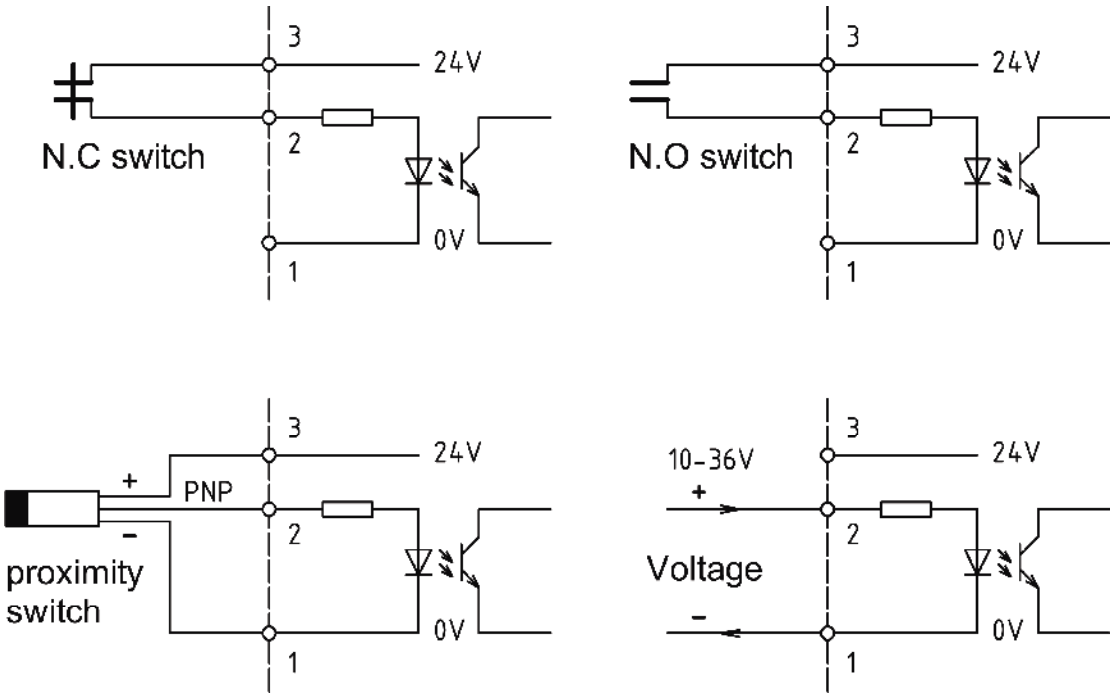
*** If user does not need pressure switch monitoring function for compressed air, please short circuit the terminal 2 and 3 of the connector.**

JP5: External control signal input terminal

Terminal code	Definition	Instruction
1	DC 0V	Current circuit for DC 0V
2	External signal input	Input signal of 10-36V, or connect switch between terminal 2 and 3.
3	DC 24V	Supply work power of 24V to sensor

*** If user does not need external control function, please short-circuit terminal 2 and 3 of the connector.**

The typical connection method between input terminal's internal circuit structure and external circuit is shown as figure:



Please note:

①The 24V power supplied by terminal is only for sensor and external switch's initiation. It is NOT allowed to use for other purposes due to its limited load capacity. Otherwise, it may cause error to the controller.

②To meet controller's needs, proximity switch must be 3-wires PNP proximity switch with no load current less than 50mA.

When delivery, there is no openings on the controller's shell (case). User should make openings and connect wires depend on his own needs. Wires should be brought out from PG waterproof joint to keep the tightness of the controller.

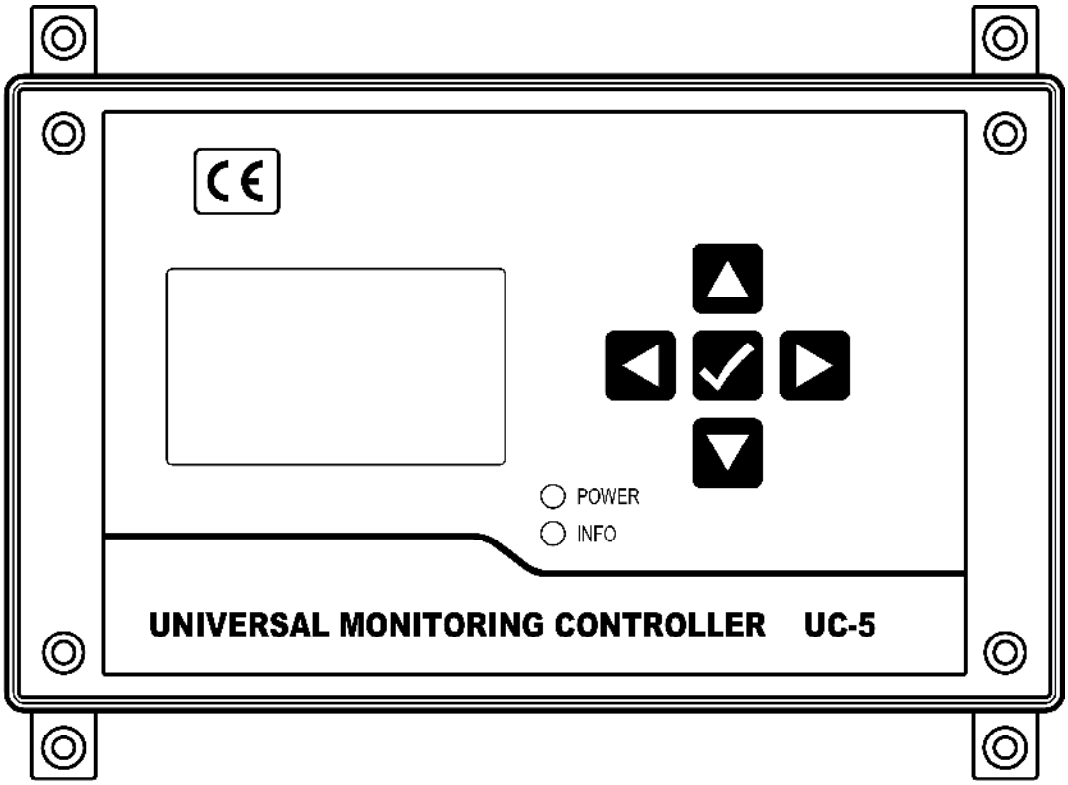
In order to protect the **Power and InputOutput unit** from damage, **please remove it before making holes.**

6. Technical specification

Voltage of power supply	85V~264V, 45~65Hz
Max. output	>3A
Pump current on time	0.1sec~9.99sec
Lubrication counting	1~999 999
Pause time	0~9999h 59min 59sec
Pause counting	0~9999 9999
Pitch jump range	1:1~999:1
Oil projection adjustment	0~9.99 sec
External input signal	10V ~30V DC，input equivalent resistance of 5.1k
Fault relay output	250V AC，5A Max，normally-closed
Operation temperature	-20℃~+50℃
Fuse	250V 0.5A (5×20)
Protection grade	IP65

Manufacturer: Suzhou Leetern Industry Control
Office: Rm. 501, Bldg. 45, No. 188, West Guoxin Road,
Wuzhong Dist. Suzhou, China
Technical Support Fax: +86-512-68661838
Technical Support Email: suns@leetern.com support@leetern.com
Website: http://www.leetern.com

UC-5 润滑系统控制器用户手册



苏州力天工业控制事业部

2012 年 6 月

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目　　录

UC-5 润滑系统控制器用户手册

UC-5 润滑系统控制器是为喷射润滑系统设计的，适用于输送机、扶梯等机械的润滑系统控制。

UC-5 控制器采用液晶显示器（LCD）直观显示控制器的工作状态和工作参数，使用方便；控制参数存储在 EEPROM 存储器内，可以可靠地长期存储。

UC-5 控制器内部包含两个润滑控制通道，每个通道的工作方式、控制参数是完全独立的，可以同时对两个润滑系统分别进行控制，非常适合润滑点密集、而控制要求又不相同的润滑系统的控制。

UC-5 控制器采用全密闭设计，防护等级可以达到 IP65，能够胜任严酷工业环境下的控制工作。

安全警告！

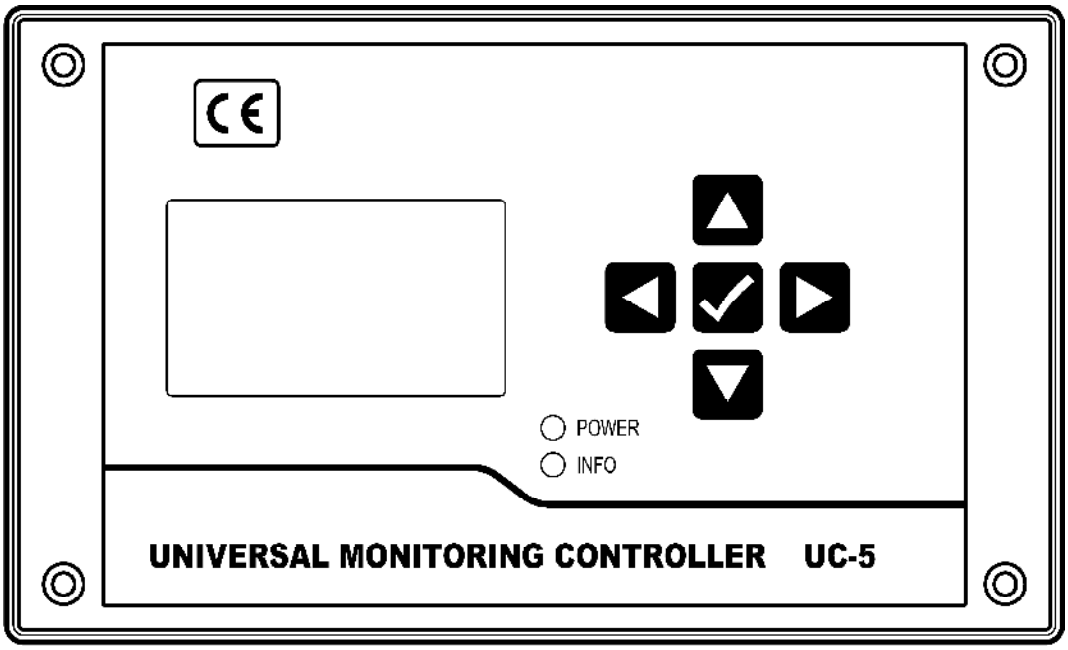
控制器内部电路板上有交流高电压，并直接输出高压电力驱动润滑泵。安装、使用时候要特别注意安全、防止发生电击危险。

控制器安装、接线必须在断电情况下进行，严禁带电作业以防止发生触电危险。控制器专门的接地端子必须良好接地，系统要用规定规格的熔断器保护，以确保控制器设备和人员的安全。

控制器必须由受过专业训练的人员安装、调试和维护。使用过程中要定期检查系统的安全状况，以确保系统的安全运行。

1. 显示控制面板

控制器的显示控制面板如下图



1.1 LED 指示灯

POWER – 电源指示灯。当控制器电源供应正常时候，这个绿色的指示灯点亮。

INFO – 状态信息指示灯。如果控制器检测到润滑系统发生了故障，这个红色灯会连续闪烁。

1.2 薄膜按键

▲ – UP 键: 向上滚动键。在进行菜单选择时候，按下此键，向上滚动菜单选项；在进行参数设定时候，按下此键，光标位数值递增。

▼ – DOWN 键: 向下滚动键。在进行菜单选择时候，按下此键，向下滚动菜单选项；在进行参数设定时候，按下此键，光标位数值递减。

◀ – LEFT 键: 向左滚动键。在进行参数设定时候，按下此键，光标位向左滚动。

▶ – RIGHT 键: 向右滚动键。在进行参数设定时候，按下此键，光标位向右滚

动。

✔ – OK 键: 用于启动控制器进入阅读设定模式；在进行菜单选择或者参数设定时，用于确认选项参数。此键还有退出故障状态和提前终止放油的功能。

1.3 液晶显示器

用来显示润滑系统状态和设定参数。

在控制器工作时候，液晶显示器是主要的状态显示工具。两个润滑通道分别用 CH1 和 CH2 表示，典型的显示画面如下

“CH1:润滑”表示通道 1 处于润滑状态，下面一行的数字表示还剩余多少个润滑脉冲，例如，000100 表示还剩余 100 个脉冲润滑即将结束。

“CH2:间歇”表示通道 2 处于间歇状态，下面一行的 0006 时 30 分 00 秒 表示间歇还剩余 6 小时 30 分钟（这也隐含指示了间歇是采用定时器控制）。

其它可能出现的状态指示还有“停机”、“放油”、“油位低”、“气压低”和“没有信号”等。后续章节会加以介绍。

请注意：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，破坏控制器的密封。

2. 主要润滑功能

在工作状态下，控制器控制润滑系统在“润滑-间歇-润滑-间歇…”的连续循环中工作。

出厂默认的控制方式和控制参数，是润滑 1 个脉冲、间歇 1 分钟。可以进入控制器的设定模式，修改这些控制方式和控制参数。

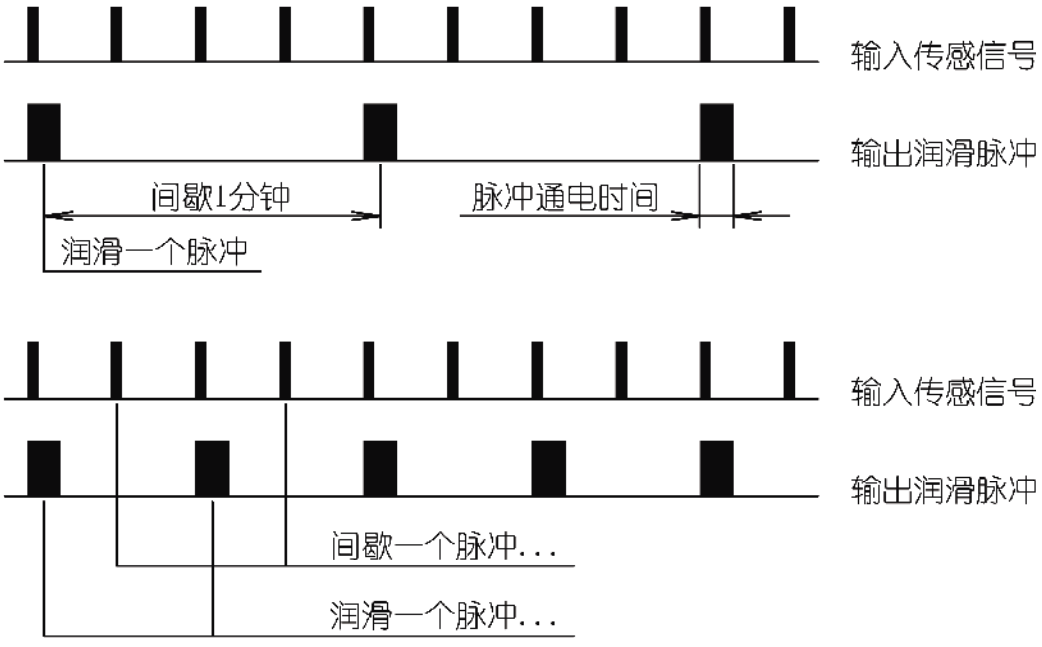
控制器能够永久记忆设定的工作参数，不会因断电等原因丢失。另外，它也能记忆当前的工作状态和剩余参数，如果发生断电，控制器自动保存这些数据，当再次来电时，会从中断处继续执行润滑任务。

控制器还能接受外部控制信号，实现与其他控制系统的联锁控制。

2.1 间歇方式的选择

间歇有定时方式和计数方式两种方式，用户可根据需要进行选择。

如果用户希望根据工作时间（例如，设备在每个操作班次润滑一次）进行润滑，建议间歇采用定时方式；如果用户希望根据设备运转情况进行润滑，建议间歇采用计数方式。



无论在哪种间歇方式下，间歇参数数值都可以设定为 0。这时候，润滑系统即连续在润滑状态下运转，不再进入间歇状态。

2.2 润滑控制

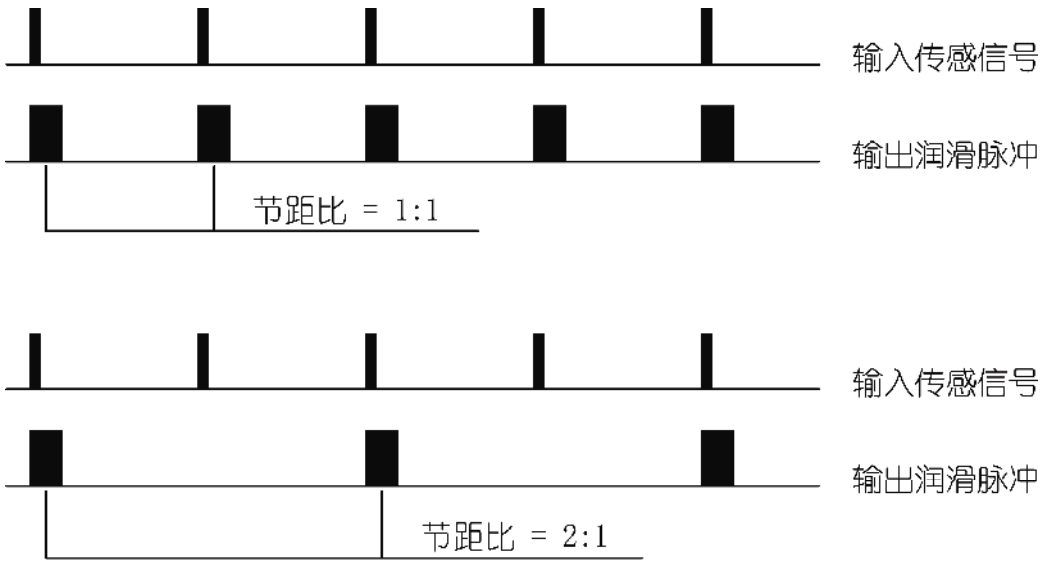
设备在进行润滑时，可以根据情况设置润滑相关的控制参数，来适应不同的润滑需要。

润滑总是跟踪传感脉冲信号进行的，因此它只有计数方式这一种工作方式。但是为了更好地完成润滑任务，在润滑控制过程中有若干辅助参数用于精细调整润滑过程。

2.2.1 节距调节

喷油润滑动作是跟踪传感信号脉冲进行的。如果传感信号脉冲过于密集，并且要求润滑泵跟踪每个传感信号脉冲进行喷油，就会导致润滑泵来不及跟随传感信号动作，使喷油润滑无法正常进行，典型的现象就是润滑泵一直保持通电而不释放。

可以通过合理设置节距比来比消除这一现象。设置了节距比参数后，控制器在执行润滑任务时，每检测到 N 个节距数的传感信号执行 1 次喷油润滑动作，如下图所示。



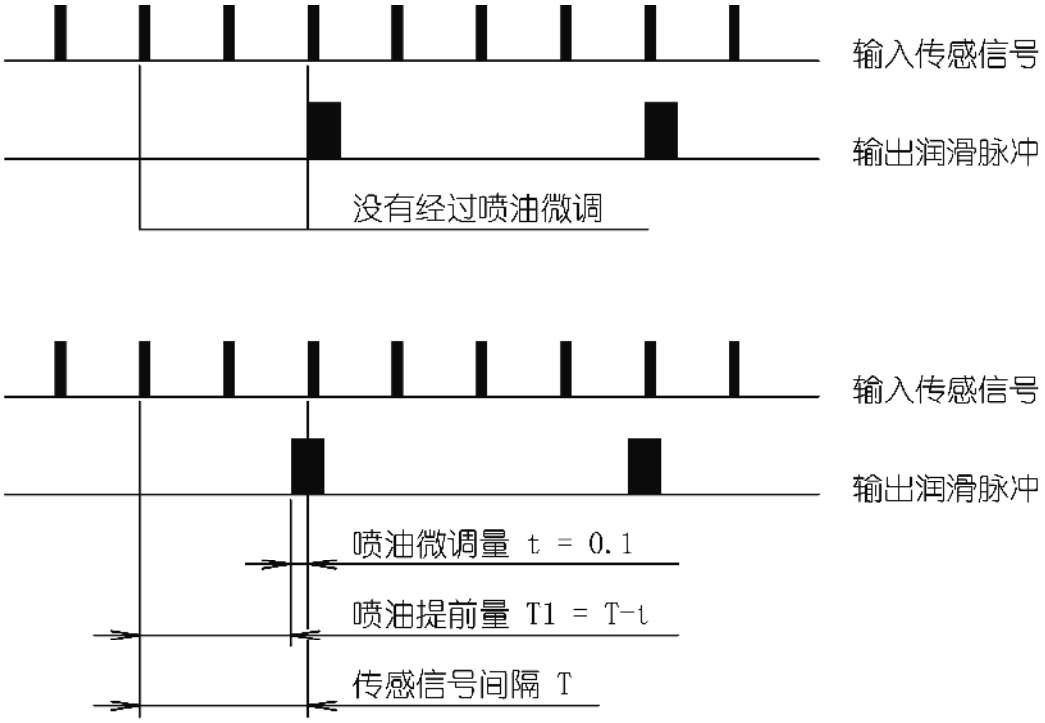
节距比 1:1 表示在润滑期间，每个传感信号脉冲都跟随喷油润滑动作；2:1 则表示在润滑期间，每 2 个传感信号脉冲产生 1 次喷油润滑动作，以此类推。

节距比可以在 1:1-999:1 范围内调整。

2.2.2 喷油调节

因为安装的原因，或者链条速度变化以后，可能会出现喷油动作与传感信号脉冲不协调的情况。例如，收到传感信号以后再喷油，由于润滑系统的电气、机械、液压油路都存在时间延迟，喷出的润滑油有可能落不到润滑点上。

这时候可以通过调整喷油调节数值，将喷油动作时刻提前，以使润滑油准确地落在润滑点上，如下图所示。



喷油调节时间可以在 0-9.99 秒范围内调整。如果设置为 0，意味着取消喷油调节功能。

2.2.3 通电时间

润滑泵是通过电脉冲驱动的。根据泵种类、型号以及润滑系统的不同，泵的每次脉冲通电时间也不相同。控制器支持用户根据需要，自行设定泵的通电脉冲

持续通电时间。

电脉冲通电时间可以在 0.1 秒-9.99 秒范围内调整。

2.3 放油

当需要排出管路内空气或替换管路内润滑油时候，可以使用放油功能。在放油状态下，控制器不理会润滑和间歇的设定，按照 0.5 秒的间隔驱动润滑泵，排空管路，直到放油脉冲递减结束后，自动转入润滑状态。

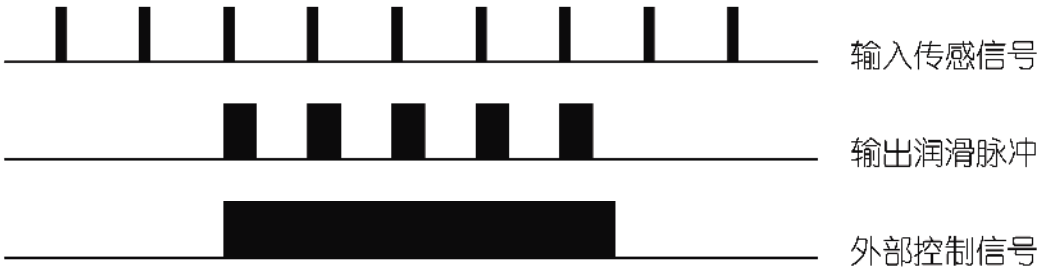
放油脉冲数出厂设定是 100 个脉冲，具体放油操作功能在设定模式中。

在放油过程中，短暂按下面板上 OK 键，放油即提前终止，转入润滑状态。

如果在放油过程中检测到了故障，控制器将立即终止放油，进入故障停机状态。

2.4 运行监控

控制器内部设有一组端子，可以接入外部信号。当监测到外部控制信号有效时，控制器正常执行润滑控制；当监测到外部控制信号断开时，控制器暂停控制，润滑系统进入停机状态。外部控制信号恢复后，控制器从暂停点开始，继续原来的控制过程。

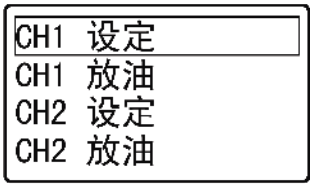


3. 参数和功能的设定

控制器的各个功能和控制参数可以通过设定模式予以设定。

3.1 进入设定模式

按下控制器面板上 OK 键不放，3 秒后控制器进入设定模式，可以开始设定。此时显示器显示（由于印刷方面的原因，本手册用线框表示显示画面上的反白显示项目）



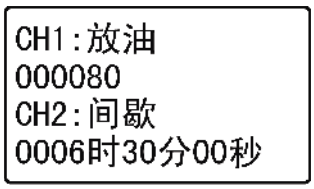
可以用 DOWN 键和 UP 键来选择具体设定的通道和项目。随着相应按键的按动，当前被选择项目跟随变化，而被选择的项目显示字样将被反白显示（黑底白字）。

按下 OK 键，即确定了当前选择项目，进入下一步操作。

在设定模式下，超过 2 分钟没有按键操作，控制器会自动退出设定模式，返回状态显示模式。

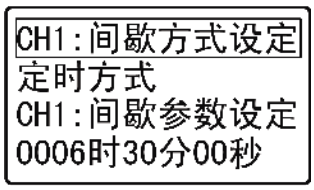
3.2 选定放油

如果选定了某个通道放油，控制器将退出设定模式，所选定的通道进入放油状态并连续显示剩余的放油脉冲数，直到放油结束或提前终止。



3.3 间歇相关设定

选定设定某一通道，按下 OK 键，即进入设定过程。例如，选定“CH1 设定”，液晶显示器画面开始显示

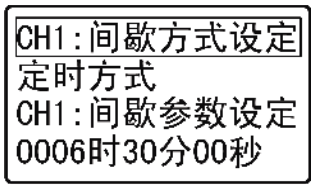


可以用 DOWN 键和 UP 键来选择具体设定的项目。

3.3.1 间歇方式设定

选择“CH1:间歇方式设定”，按下 OK 键以后，下面表示间歇控制方式的文字会闪烁，提示用户可以更改间歇方式。

可以用 DOWN 键和 UP 键来改变间歇方式。间歇方式可以在“定时方式”和“计数方式”之间改变。

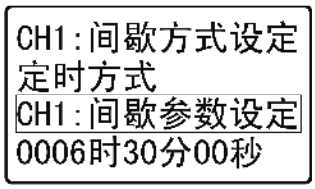


按下 OK 键即确认新的间歇方式设定。

如果在设定中改变了间歇方式，间歇参数将自动恢复到出厂默认数值上：间歇控制采用定时方式时，默认的间歇参数是 1 分钟；间歇控制采用计数方式时，默认的间歇参数是 1 个脉冲。

3.3.2 间歇参数设定

按 DOWN 键，选择“CH1:间歇参数设定”，按下 OK 键后，下行显示的的间歇参数数值最低位开始闪烁（这个位称为光标位），提示用户可以更改间歇参数。



用 DOWN 键和 UP 键可以更改光标位的数值；用 LEFT 键和 RIGHT 键可以左右移动光标位。

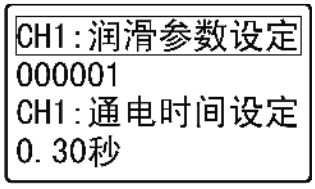
间歇采用计数方式控制时，间歇参数设定范围在 0-9999 9999；间歇采用定时方式控制时，间歇参数设定范围在 0-9999 时 59 分 59 秒。

请注意：控制器会实时检查参数更改情况。如果改变后的间歇参数数值大于最大允许值或小于最小允许值，控制器将拒绝这个更改。

按下 OK 键即确认新的间歇参数设定。

3.5 润滑相关设定

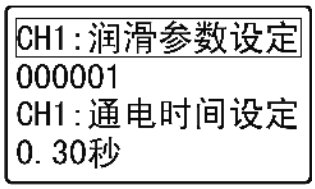
按 DOWN 键，直到液晶显示器显示画面内容更新为



即可用 DOWN 键和 UP 键来选择具体设定项目进行设定。

3.4.1 润滑参数设定

选择“CH1: 润滑参数设定”，按 OK 键，显示的润滑参数数值最低位闪烁，即可修改润滑参数。



润滑参数设定范围在 1-999 999。

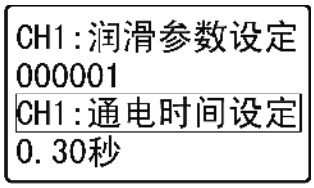
按下 OK 键即确认新的润滑参数设定。

3.4.2 通电时间设定

按 DOWN 键，选择“CH1: 通电时间设定”，按 OK 键，显示的通电时间数值最低位闪烁，即可修改通电时间。

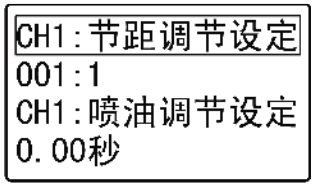
通电时间设定范围在 0.1 秒-9.99 秒。

按下 OK 键即确认新的通电时间设定。



3.4.3 节距调节设定

按 DOWN 键，直到液晶显示器显示画面内容更新为



选择“CH1: 节距调节设定”，按 OK 键，显示的节距调节参数数值最低位闪烁，即可修改节距调节参数。

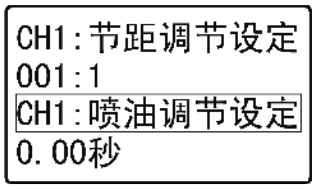
节距调节参数设定范围在 1:1-999:1。

按下 OK 键即确认新的节距调节设定。

3.4.4 喷油调节设定

按 DOWN 键，选择“CH1: 喷油调节设定”，按 OK 键，显示的喷油调节参数数值最低位闪烁，即可修改喷油调节参数。

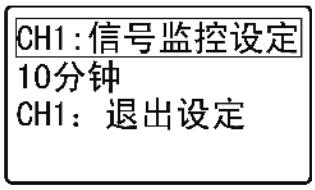
喷油调节设定范围在 0-9.99 秒。如果设定喷油调节为 0，即取消了喷油调节功能。不建议喷油调节参数设定在 0.1-0.2 秒这样很小的数值上。



按下 OK 键即确认新的喷油调节设定。

3.5 信号监控设定和退出设定

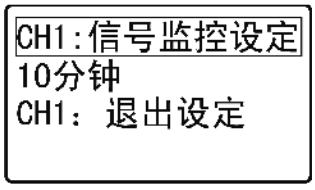
按 DOWN 键，直到显示内容更新为



即可用 DOWN 键和 UP 键来选择具体操作设定项目。

3.5.1 信号监控设定

选择“CH1: 信号监控设定”，按下 OK 键以后，显示的信号监控参数数值最低位闪烁，即可修改信号监控参数。

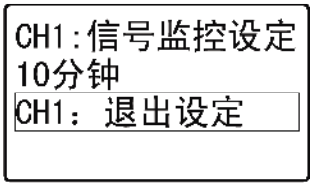


信号监控参数设定范围在 0-99 分钟，如果设定信号监控为 0，即取消了信号监控功能。

按下 OK 键即确认新的信号监控设定内容，信号监控的具体含义请见“故障检测和处理”有关章节。

3.5.2 退出设定

按 DOWN 键，选择“CH1: 退出设定”，按下 OK 键后，设定过程结束，控制器回到状态显示模式。



如果在设定模式中修改了某项设定内容，退出设定模式后控制器将自动重启动。

4. 故障检测和处理

控制器拥有对润滑系统状态进行故障检测、报警的能力，以保护系统的安全可靠运行。

监控工作只在润滑系统运行时进行。如果外部控制信号撤销，控制器将暂时停止监控，在外部控制信号变为有效后恢复监控。

4.1 润滑油油位监控报警

控制器能通过油位开关检测油箱内润滑油油位，当润滑油过低时，油位开关断开。控制器检测到油位开关断开后，立即发出警报，所有润滑通道同时进入停机状态。

油位监控是一直有效的，不能通过设定来关闭。

4.2 压缩空气压力监控报警

某些润滑系统采用压缩空气为润滑泵的动力，控制器能够通过压力开关检测压缩空气压力，保证润滑系统的安全可靠运行。

当压缩空气压力过低时，安装在压缩空气管路上的压力开关断开，这个信号被控制器检测到，控制器立即发出警报，所有通道进入故障停机状态。

压缩空气压力监测也是一直有效的，不能通过设定来关闭。如果系统不需要压缩空气压力监测功能，可以将压缩空气压力监控连接器（JP4）的 2-3 号端子短接。

4.3 信号监控报警

如果将设定信号监控设置为 0 以外的数值，意味着启动了信号监控功能，控制器将追踪传感器脉冲信号。如果在信号监控设定的时间范围内，没有传感脉冲信号出现，控制器将报警，同时令对应的通道进入故障停机状态。

导致传感脉冲信号消失的原因，可能是传输链条已经停止运行，或者是信号传感器发生了故障。

4.4 故障显示和处理

控制器检测到任一故障，液晶显示器上会显示对应的故障信息文字，同时面板上 FAULT 灯会闪烁；控制器内部的故障输出继电器触点断开，将故障信息远传到控制室，或者与其他控制系统相连接。

发生低油位和空气压力低故障时，液晶显示器画面显示内容如下

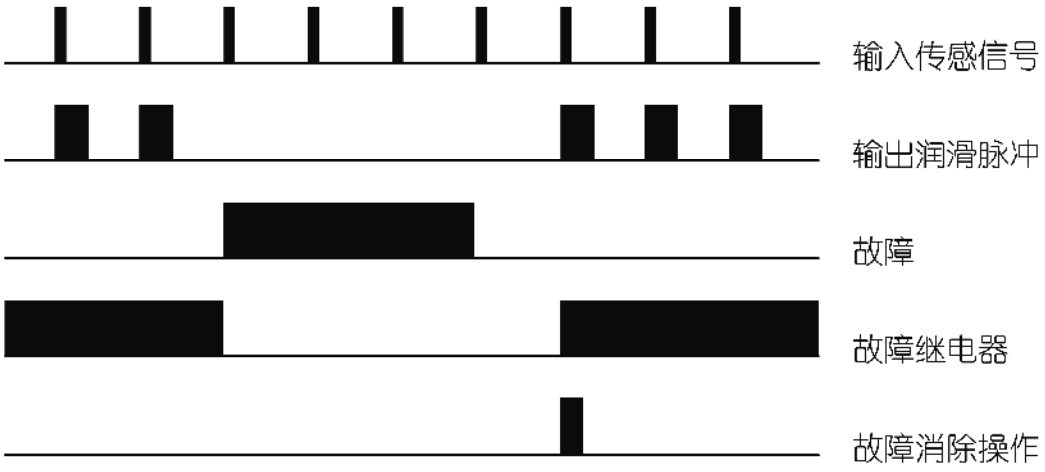
CH1:停机 油位低 CH2:停机 油位低	CH1:停机 气压低 CH2:停机 气压低

发生信号监测故障时，液晶显示器画面显示内容如下

CH1:停机 无信号 CH2:间歇 0006时30分00秒	CH1:润滑 000100 CH2:停机 无信号

可以看到，不同于油位低或者气压低故障，无信号故障只针对自己本身所处的通道发生保护性停机，另一通道不受影响，继续自己的润滑工作。

发生故障时，控制器对故障的响应和处理示意图如下

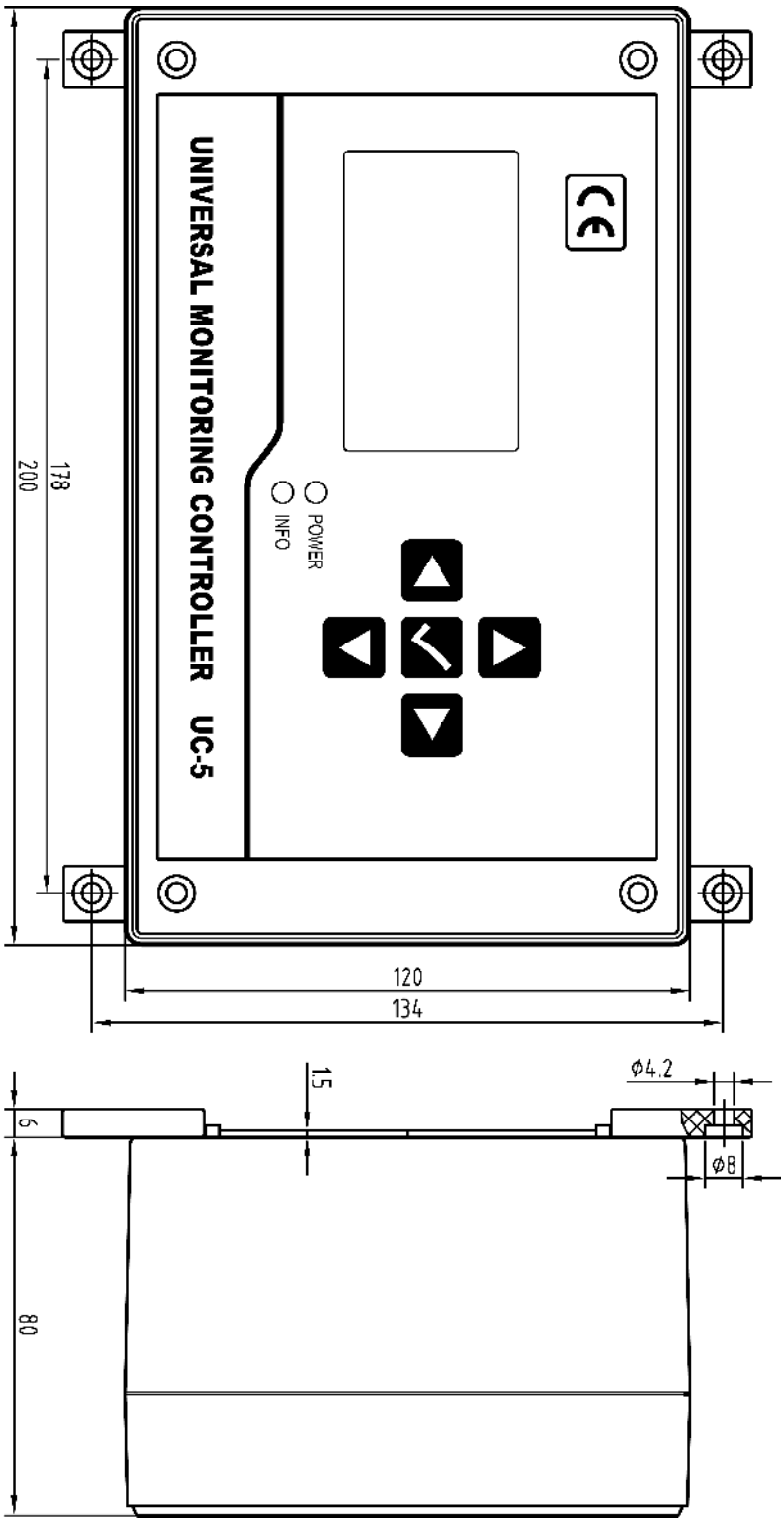


控制器捕捉到的故障信息，会记忆在控制器内，不会因断电等原因消失，直到用户手动消除故障状态为止。

用户处理故障完毕，短暂按下面板上 OK 键，即可令控制器退出故障状态、消除故障信息，回到正常润滑循环。但是如果产生故障的原因还继续存在，这个操作是无效的。

5. 安装和电气连接

5.1 控制器的安装



控制器安装尺寸如上图所示。

控制器要面板垂直于地面安装，固定在牢固、无剧烈震动和腐蚀性氛围、无阳光直射的场所。建议采用机械螺钉固定控制器，不宜用自攻螺钉固定，以防日久控制器脱落损坏。

5.2 电源供应

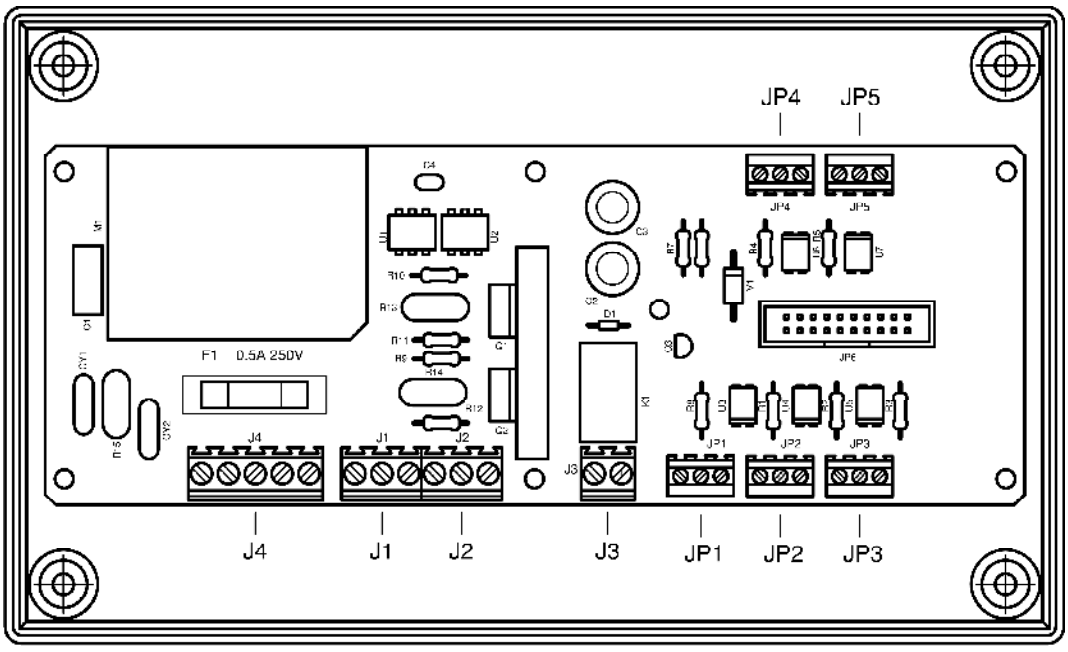
控制器供电要求为 85-264V，45-65Hz 工频交流电，请接入 II 级电源。

控制器自身设计有多重电源滤波器，可以有效地滤除电源中叠加的各种强干扰，保证控制系统正常工作。即便如此，也应当为控制器单独供电，避免与容易产生电气干扰的大型电气设备(例如变频器)共用电源。如果供电电源电气干扰过强影响控制器工作，可以在控制器电源输入端另行插入电源滤波器。

5.3 电气接线

先断开控制器电源，用平口小螺丝刀小心撬下面板上四角的装饰板，旋下里面 4 个面板固定螺钉；拿起面板，拔下面板和底板间连接的扁平电缆，小心取下面板。

取下面板后，可以看到如下图的安装底板。



与外界的电气连接就在这块底板上进行，电气输入输出的端口已经在图上标明。**每个端口正对接线孔观察，自左到右：第 1 个端子为“1”，其次为“2”，“3”…，以此类推。**各个端子定义如下表

J4: 电源输入端子

端子号	定　　义	说　　明
1	交流电源 N	接交流电源输入 N
2	空	
3	交流电源 L	接交流电源输入 L
4	空	
5	交流电源 G	接地保护和干扰滤除

J1: CH1 输出端子

端子号	定　　义	说　　明
1	交流电源 G	接地保护和干扰滤除
2	泵驱动输出 N	接润滑泵 N
3	泵驱动输出 L	接润滑泵 L

J2: CH2 输出端子

端子号	定　　义	说　　明
1	交流电源 G	接地保护和干扰滤除
2	泵驱动输出 N	接润滑泵 N
3	泵驱动输出 L	接润滑泵 L

J3: 故障继电器输出端子

端子号	定　　义	说　　明
1	继电器触点 A	
2	继电器触点 B	

JP1: CH1 信号输入端子

端子号	定　　义	说　　明
1	直流 0V	直流电源 0V 回路
2	CH1 传感信号输入	连接 PNP 型传感器输出
3	直流 24V	提供传感器工作用+24V 电源

JP2: CH2 信号输入端子

端子号	定　　义	说　　明
1	直流 0V	直流电源 0V 回路
2	CH2 传感信号输入	连接 PNP 型传感器输出
3	直流 24V	提供传感器工作用+24V 电源

JP3: 油位开关信号输入端子

端子号	定　　义	说　　明
1	直流 0V	直流电源 0V 回路
2	油位开关信号输入	
3	直流 24V	提供传感器工作用 24V 电源

JP4: 压缩空气压力开关信号输入端子

端子号	定　　义	说　　明
1	直流 0V	直流电源 0V 回路
2	压力开关信号输入	
3	直流 24V	提供传感器工作用 24V 电源

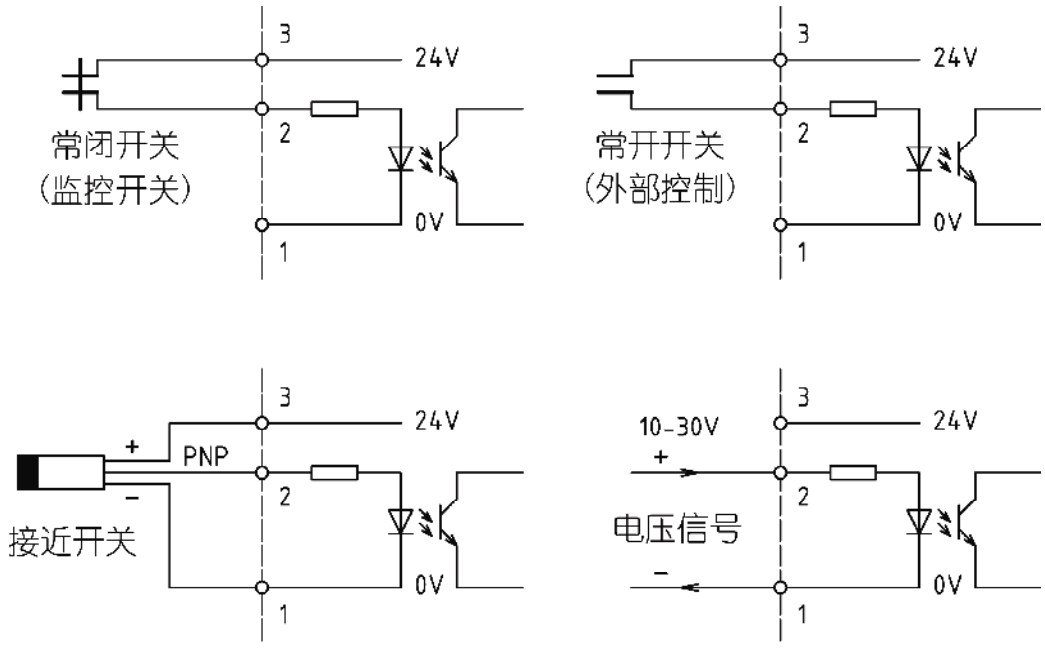
* 如果不使用压缩空气压力开关监测功能，请将连接器的 2-3 号端子短接

JP5: 外部控制信号输入端子

端子号	定　义	说　明
1	直流 0V	直流电源 0V 回路
2	外部信号输入	输入 10-30V 信号，或在 2-3 号端子间接开关
3	直流 24V	提供传感器工作用 24V 电源

* 如果不使用外部控制功能，请将连接器的 2-3 号端子短接

输入端子的内部电路结构及其外部电路的典型接法如下图。



请注意：①端子提供的 24V 电源仅用于传感器和外接开关激励，带负载能力有限，切不可用于其他用途，否则可能导致控制器发生故障；②接近开关须选用空载电流≤50mA 的三线制 PNP 接近开关，以满足控制器的要求

控制器出厂时没有在外壳上开孔。用户要根据自己的实际需要开孔、连接引线。引线应当穿过 PG 防水接头引出，以保证控制器的密封。

为保护底板不被损坏，**在开孔前请先取下底板**。

6. 主要技术指标

工作电压	----------	85V~264V, 45~65Hz
最大输出电流	----------	>3A
润滑泵通电时间	-------	0.1 秒~9.99 秒
润滑计数	----------	1~999 999
间歇时间	----------	0~9999 小时 59 分钟 59 秒
间歇计数	----------	0~9999 9999
节距比	----------	1:1~999:1
喷油调节	----------	0~9.99 秒
外部输入信号	----------	10V ~30V DC，输入等效电阻 5.1k
最大传感脉冲频率		2000Hz
故障继电器输出	-------	250V AC，5A Max，常闭
工作温度	----------	-20℃~+50℃
保险丝规格	----------	250V 0.5A (5×20)
防护等级	----------	IP65

产品制造商： 苏州力天工业控制事业部

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