

DK Infusetek Syringe Pump

Manual of ISPLab Series



DK INFUSETEK CO., LTD.

**Note**

- Please read the instruction before operating the product.

**Warning**

- Please connect directly the power line to the wall socket, and avoid using the extension electric line.
- If power line or plug have wear and other damage, please unplug it, holding the plug, not the line.
- If following situations happened, please turn off the electric power and unplug the plug, holding the plug, not the line.
 1. Fluid splash on the pump.
 2. You think the pump need to maintain or amend.
- The customers' power socket must have ground wire, and have reliable grounding.

Note: The foot switch and other external control plugs must be loaded and unloaded in the power-off state to prevent burning of the external control interface.

Catalogue

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1. Product Introduction

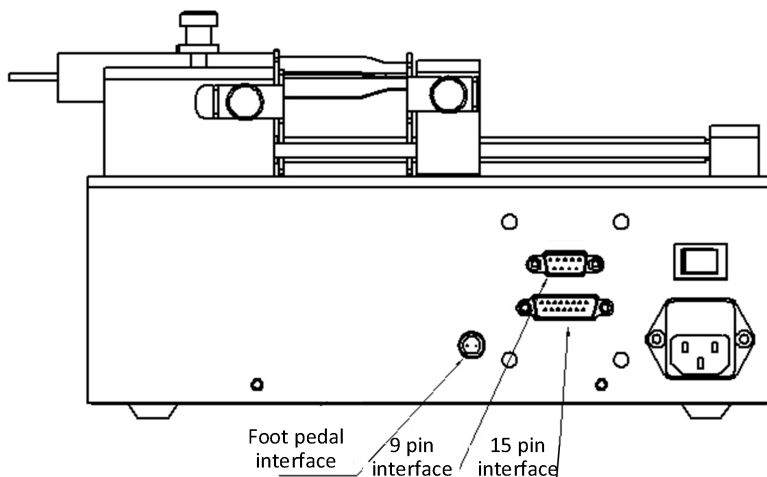
ISPLab series syringe pump, 304 stainless steel mirror housing, 4.3" color LCD touch screen and mechanical keypad control, graphical interface, dynamic display the working status. The filling parameters and running status display in same screen. Support RS232 and RS485 communication, rich external control interface, convenient for users to remote control under different conditions.

2. Product Appearance



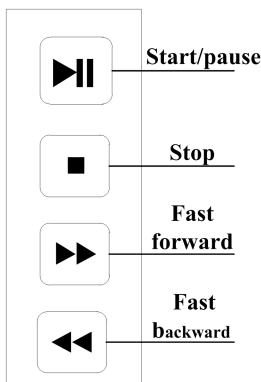
3. ISPLab Series Interface Instruction

3.1 External Control Interface



- (1) Foot pedal interface: Connect with foot pedal switch
- (2) 9 pin interface: RS232 and RS485
- (3) 15 pin interface: External input and output

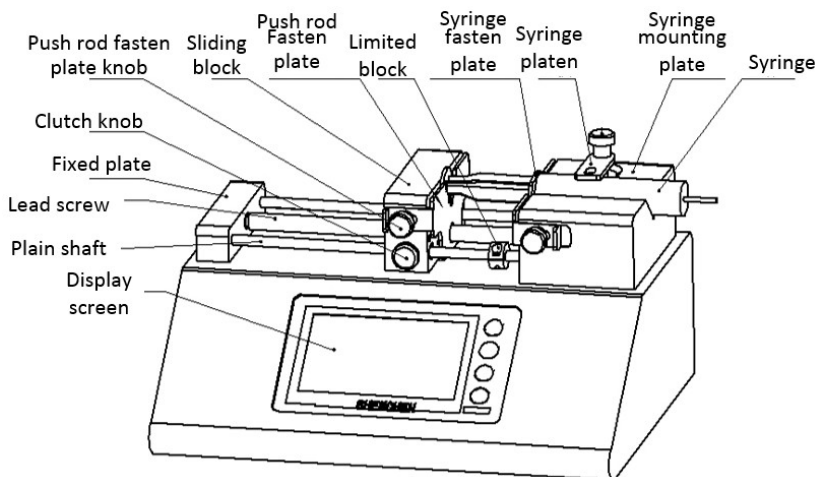
3.2 Mechanical Keypad Instruction



- **Start/pause:** After setting the running parameters, click the start and pause button, the syringe pump will start running, and click the button again to pause the current running. After click the button, the main interface will be grayed out (disabled) except that the calibration button is colored (available).
- **Stop:** Click the button to stop running. Main interface disabled status button becomes available
- **Fast forward:** Press this button when the pump is stop, the pump will run with full speed move forward, press this button again, pump stop running.
- **Fast backward:** Press this button when the pump is stop, the pump will run with full speed move backward, press this button again, pump stop running.

4. Syringe Installation

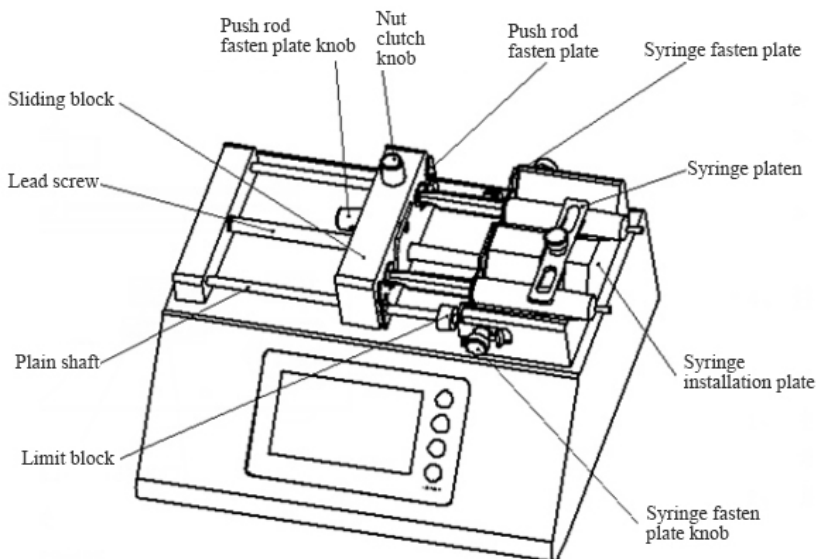
4.1 Single Channel Syringe Installation



- ① Hold down [clutch knob] to disengage [sliding block] from [lead screw] and move to other positions manually (or use the fast forward and rewind buttons to move [sliding block]).
- ② Rotate two [Push rod fasten plate knob] on the side of the [Sliding Block] to open the [Push rod fasten plate]. Rotate the [Syringe fasten plate knob] on the side of the [Syringe mounting plate] to open the [Syringe fasten plate].
- ③ Lift and rotate the [Syringe platen], place the syringe, adjust the syringe to the appropriate position, and rotate the [Syringe platen] to hold the syringe.
- ④ Tighten the knobs to secure the syringe.

Note: If need to install glass syringe, please contact with us for technical support.

4.2 Dual Channel Syringe Installation

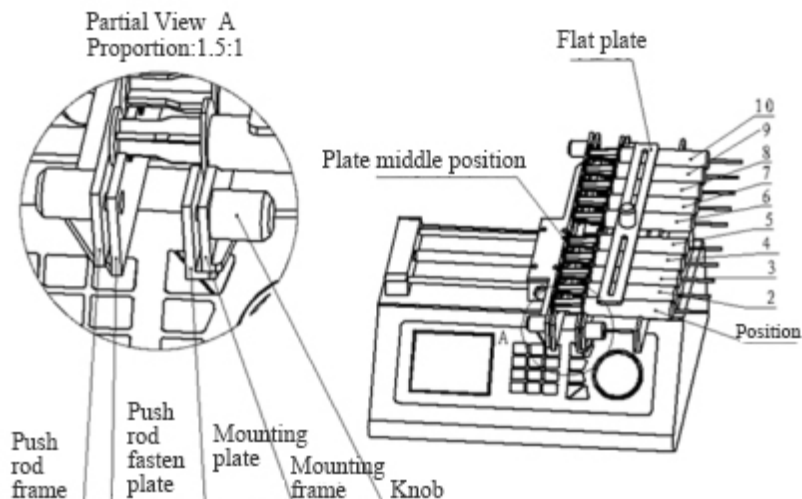


- ① Turn **【Clutch knob】** , separate the **【Sliding block】** and **【lead screw】** and move **【Sliding block】** by hand (or use ◀◀/▶▶ to move **【Sliding block】**).
- ② Turn **【Push rod fasten plate knob】** on the side of **【sliding block】** to open **【Push rod fasten plate】** . Respectively positive and negative rotation the two **【Syringe fasten plate knob】** on the side of **【Syringe installation plate】** to open **【Syringe fasten plate】** . Lift and turn **【Syringe platen】** , interpose syringe, and adjust the syringe to a suitable position, turn **【Syringe platen】** to hold the syringe.
- ③ Tighten the knob fixing syringe, and turn **【clutch knob】** , make **【Sliding block】** occlude with **【lead screw】** into working state.

Note: If need to install glass syringe, please contact with us for technical support.

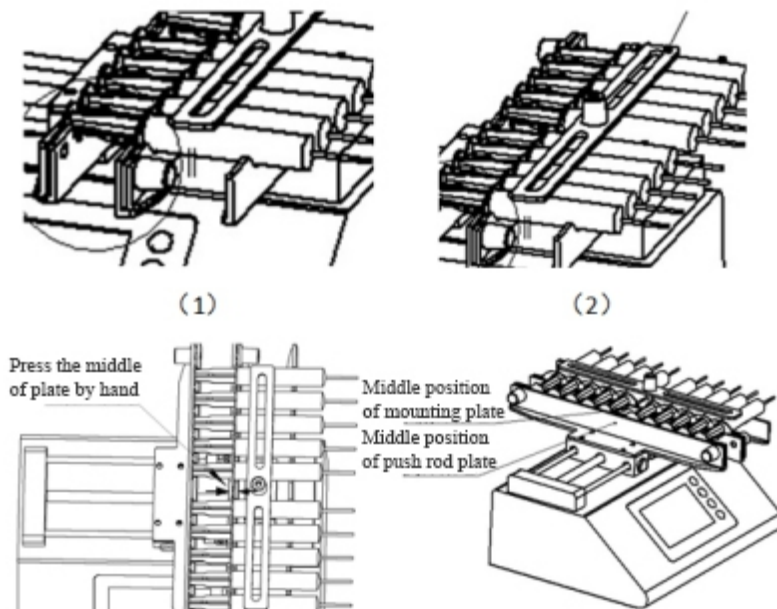
4.3 Multichannel Syringe Installation

Multichannel syringe pump include ISPLab04, ISPLab06, ISPLab08, ISPLab10, ISPLab12, we take ISPLab 10 for example.



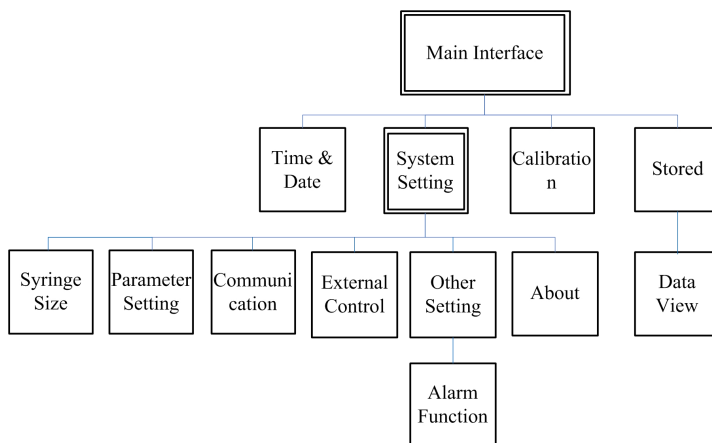
- ① Loosen the knob for **【mounting plate】** and **【push rod fasten plate】**, move the push plate to suitable position, put the syringes on **【mounting frame】**.
- ② Put on the **【flat plate】**, fasten the **【knob】**.
- ③ Fasten the **【mounting plate】** and middle of **【mounting frame】** by hand, make the plate press the syringes tightly. In the same time, tighten one knob, then tighten the other knob.
- ④ Fasten the **【push rod fasten plate】** by the same way.

Note: Fasten the middle of fasten plate with hand to avoid fasten plate incline, and avoid fasten plate curve.



Note: If only use 1 syringe, please put another empty syringe in the symmetrical position, do not put on the middle position. If not use all syringes, please also install on the both side with symmetrical position. Do not install in the middle, to avoid the fasten plate deformation.

5. ISPLab Series Controller Interface Structure

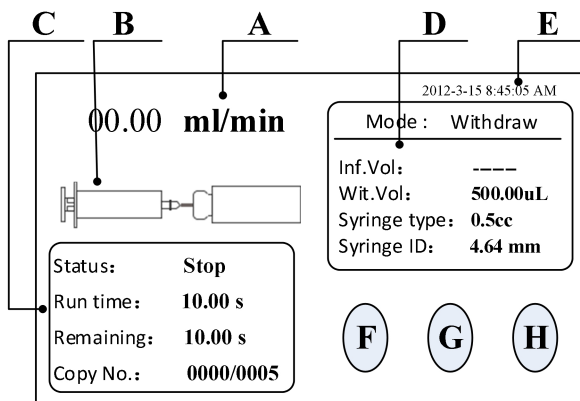


ISPLab Series Controller Operation Interface Instruction

5.1 Booting Interface

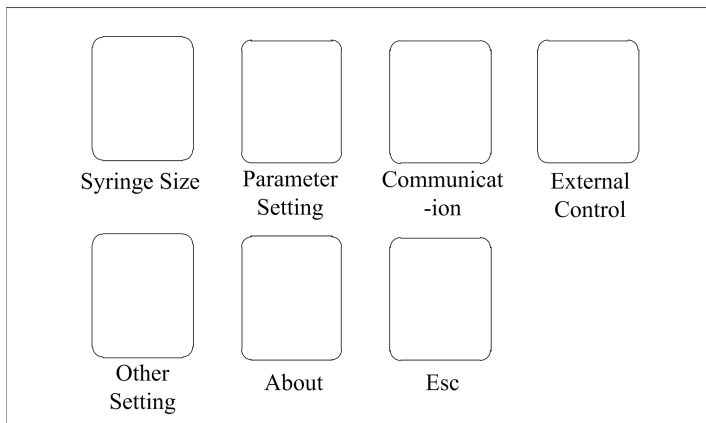
Display welcome interface when power is turned on. Click any place or wait 2.5 seconds enter main interface automatically.

5.2 Main Interface



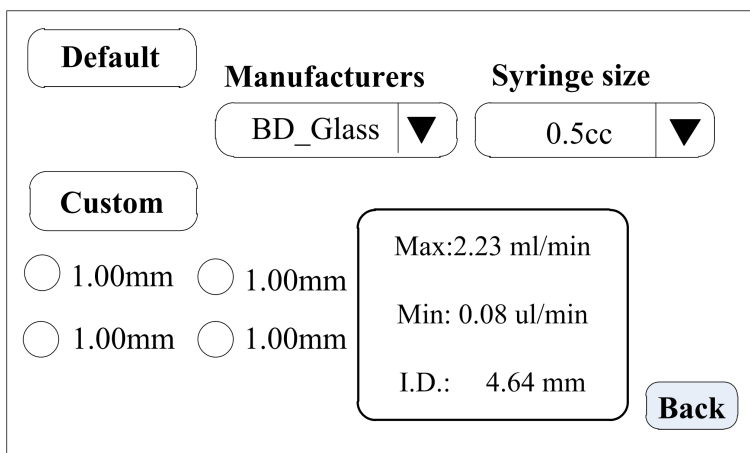
- a) **Real-time flow rate display:** Display the current flow rate, click this area to change the flow rate during the pump working.
- b) **Real-time Dynamic Display:** Display the filling unit running state and monitoring results.
- c) **Real-time Parameter Display:** Display the current running state, setting time, remaining time, repeat count.
- d) **Set Parameter Display:** Display the current working mode, infusion volume, withdraw volume, syringe size and syringe ID.
- e) **Date and Time Display:** Display the current data and time, you can change it in the system setting.
- f) **System Setting:** Click this button, enter system setting interface, set up syringe size, running data, external control, other settings, parameter view.
- g) **Calibration:** Click this button enter the flow rate calibration interface.
- h) **Stored:** Click this button enter the common mode interface.

5.3 System Setting Interface



Click **System setting** button, enter system setting interface

5.4 Syringe Interface



In the main interface clicks **System set** button, click **Syringe** button, enter syringe size set interface.

In this interface, click **Default**, select Manufacturers and size from Manufacturers list and Syringe list. After click Default, the Custom is forbidden to use.

Click **Custom** in Syringe interface, select Customized syringe size. Can set 4 groups syringe size. After select the size, can change the syringe ID by click the numbers. At the right side of the interface, display the maximum and minimum flow rate and syringe ID.

Click 'Back', back to system set interface.

5.5 Parameter Set Interface

Mode	Volume <small>uL</small>	Flow <small>uL/min</small>	
Withdraw	500.00	500.00	
Infuse	Run time <small>Sec</small>	Reverse <small>mm</small>	
Withdraw-infuse	500.00	0.5	NEXT
Infuse-withdraw	Pause time <small>Sec</small>		
	1.00		

In main interface, click 'System Set' button, then click 'Parameter' enter parameter setting interface.

Select working **Mode** (take Withdraw-infuse for example), set the working parameters of withdrawal (**Volume**, **Run time**, **Pause Time** and **Flow**) and **Reverse** (After withdrawal, the pump run with opposite direction with set distance, this function used for exhaust bubbles. The Reverse range is 0.01-10mm). Click 'NEXT', enter next interface to set the infusion parameters.

Note: Only Withdrawal can be set Reverse.

Mode			
Withdraw	Volume uL 500.00	Flow uL/min 500.00	
Infuse	Run time Sec 500.00		
Withdraw- infuse	Pause time Sec 1.00	Repeat	PREV
Infuse- withdraw		06000	OK

In this interface, set the parameters of infuse data of Withdraw-Infuse working mode. Set the **Cycle Pause** and **Repeat** (Repeat number between 1-9999, 0 means infinite repeat). Click **PREV**, back to check and edit the parameters of withdrawal. Click **OK** to save the working parameters and back to System Set interface.

Note: Users can enter this interface to change the operating parameters while the pump is running, but cannot change the working mode

5.6 Communication Interface

Baud rate	Com. On/Off
9600 ▼	On Off
Communication	Parity set
RS485 ▼	Even Parity ▼
Slave No.	
01	
Back	

The interface is setting communication between pump controller and HMI, if there is multiple syringe pumps, need to change slave (syringe pump) address.

In main interface click **System Set**, click **Communication**, enter communication setting interface.

The syringe pump support Modbus communication protocol-RTU mode. First need to select **Baud Rate** and communication way **RS232 or RS485**. Click **Slave No.** to enter pump address number (between 1-32). Click **Com. ON/OFF** to On, select **Parity**, then the pump controller can communicate with HMI, receive signal control from HMI.

Note: (1) After set the communication parameters, need back to main interface. The pump only can receive communication signal when the pump is in main interface.

(2) One HMI can cascade connect up to 32 pumps.

5.7 External Control Setting Interface

External Control

Pulse ▼

External Control Enable

On Off

Foot Pedal Switch

On Off

Back

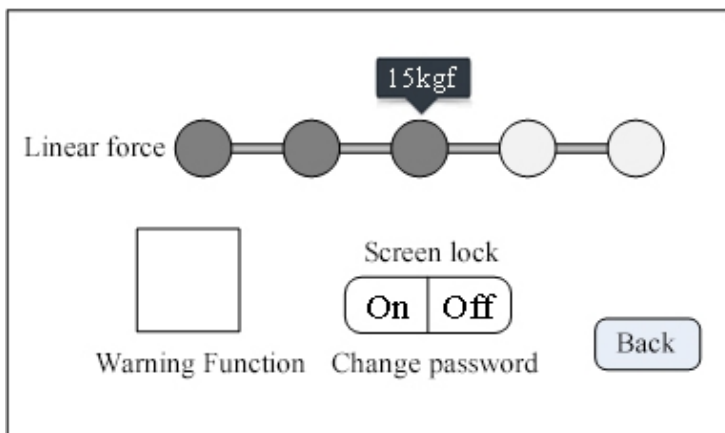
In this interface to set the external control signal, external control signal include: Pulse signal and Level signal.

Please note: Fast forward and fast backward do not support Level mode;

In level mode: External control start/stop and foot pedal switch can not be turned on in same time.

In level mode: The relative internal buttons can not be used.

5.8 Other Setting Interface



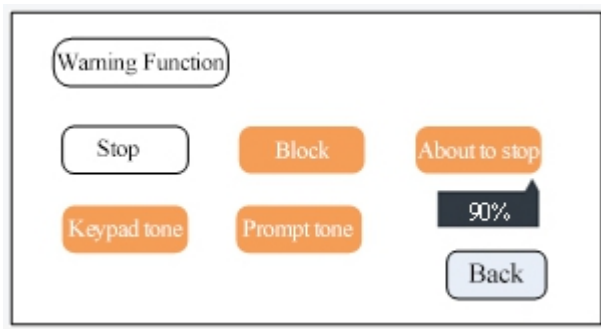
In the main interface clicks **System Set**, click **Other set**, enter other set interface.

In this interface, click **Force** buttons to change the pump torque. (Note: **Please set the suitable torque force according with actual situation. Not suitable torque force may cause the pump working abnormally.** The pump torque force divided into 5 stages: 8kgf, 12kgf, 15kgf, 18kgf and 20kgf).

Click **Warning** button, enter warning setting interface.

Click **Screen lock** button to turn on or turn off the screen lock function. Turn on or turn off the screen lock function both need to input password, the default password is 12345678. Click '**Change password**' to change the password freely.

Warning Set Interface as below:



In this interface, we can turn on or turn off the warning function. Include:

Stop: Turn on this function, the buzzer warning after pump stop working, and indicate the current status with red words in main interface.

Blocking: Turn on this function, the buzzer warning when the pump blocked, and indicate the current status with red words in main interface.

About to stop: Turn on this function, the buzzer warning when the pump working to set percent, and indicate the current status with red words in main interface. Click the percent number to enter percent set interface. The percent number should be between 0-100 integer.

Keypad tone: After turn on this function, when click mechanical keypad, the buzzer will give 'beep' sound.

Prompt tone: Turn on this function, the buzzer warning when the prompt interface or warning interface come out.

Percent Set interface as below:

Warning set interface showing percentage options:

- ☐ 95%
- ☒ 90%
- ☐ 85%
- ☐ 80%
- ☐ 75%
-
-

In warning set interface click the **percentage number** under ‘About to stop’ button, enter percentage set interface.

Several commonly used values are preset in this interface. Click the radio button in front of the commonly used value to set the value. Click ‘**Other**’ button to input other percentage value.

5.9 Calibration Interface

Calibration interface showing Mode (Withdraw), Actual Vol. (0.0000ml), volume adjust (+0.0000ml), Disp. Vol (500.00 ul), Disp. Time (15.00 s), and buttons for Test, CAL, Reset, +, -, and Esc.

A. If the working mode is withdraw/infuse or Infuse/withdraw, firstly need to choose calibrate for withdraw or Infuse.

B. Click **Test** to start the test. Disp. Time count-down display, the pump stop running automatically when finish the Disp. Time. The digital keyboard for inputting the actual volume is automatically popped up. After inputting the actual volume, click

the confirmation button, ask if the test should continue (more than three times recommended), select 'Yes', to continue. Select 'No', back to calibration interface.

C. After several tests, the actual volume display area shows the average value of the actual volume of the tests, then click **CAL**, indicate calibration success.

D. Test again, check whether it meets the volume requirement or not. If need high precision, can click the button "+" or "--" at the '**volume adjust**' to achieve high-precision volume.

E. Click **Reset**, back to factory default calibration data.

Online micro adjusting process as below:

If the volume is larger or smaller in the production process, it can be micro adjust online without affecting the production line.

A. In the main interface click **Calibration**, enter calibration interface.

B. Now only the mode button (withdraw/infuse, infuse/withdraw), **increase(+)**, **decrease(-)** and **Esc** button is valid. Other buttons are forbidden.

C. Click "+" or "--" to do micro adjust online.

5.10 About



In the main interface click **System set**, click **About**, enter About interface. Can check syringe pump and company information.

5.11 Stored

Work mode	Manufacturer	Model	I.D.
Withdraw/infusion	BDGlass	0.5cc	4.64

<
Add
Del.
Clear
Calling
Param
Cancel
>

In the main interface click **Stored**, enter common mode interface.

Add: Click it to save current parameters as common mode. In this function, we can save 60 groups working mode maximum.

Del.: Select one common mode, click **Del.**, Click 'OK' to delete this mode.

Clear: Click this button, ask for confirm clear or not. Click 'OK' delete all common modes.

Calling: Select one common mode, click **Calling**, ask for confirm calling or not, click 'OK', back to the main interface, running parameters are selected common mode datas.

Param.: Select one common mode, click **Param.**, can check detailed parameters.

Cancel: Back to main interface.

“<”, “>”: View the common mode on the previous or next page

Detailed parameters view interface as follows:

Withdraw vol.	Withdraw flow	Withdraw time	Reverse
500.00ul	2000ul/min	15.00 sec	6000
Infuse vol.	Infuse flow	Infuse time	Pause time
500.00ul	1875ul/min	16.00 sec	2.00 sec

Repeat parameters

Cycle pause	Repeat
2.00sec	0010

Back

5.11 Date & Time

12-hour

24-hour

Set date

Set time

2012-3-15
8:45:35 AM
Thursday

Back

In the main interface clicks the time and date in the upper right corner to enter the time and date setting interface.

Click the **Set Date** button come out keyboard to Set Year Number. Set the year from

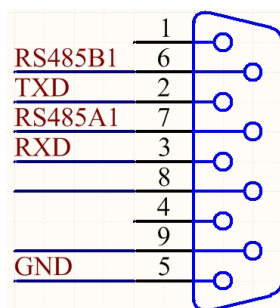
1970 to 2099. After set up the year, click the ENT to enter the Set Month Number Keyboard, and then set the Day Number Keyboard.

Click the **Set Time** button come out the digital keyboard and set the time, minutes and seconds in turn.

6. ISPLab Series External Control Interface Instruction

6.1 Communication Interface

The communication interface is located in the DB9 pin plug on the back of the syringe pump, as shown in the below picture.



- (1) RS232 interface, in the Communication set interface, select RS232, the port is valid.

GND: Communication ground terminal

TXD: Master send, syringe pump receive signal terminal

RXD: Syringe pump send, master receive signal terminal

- (2) RS485 interface, in the Communication set interface, select RS485, the port is valid.

RS485A1: connect RS485 A+.

RS485B1: connect RS485 B-.

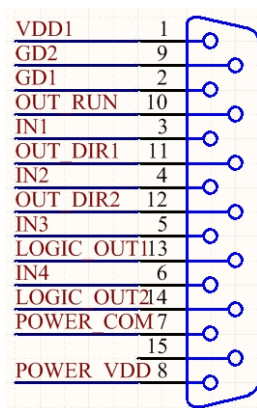
Note: ①No matter select RS232 or RS485, the communication protocol is

MODBUS protocol standard.

- ② **The syringe pump only can support communication when the pump is in main interface.**

6.2 External Control Interface Instruction

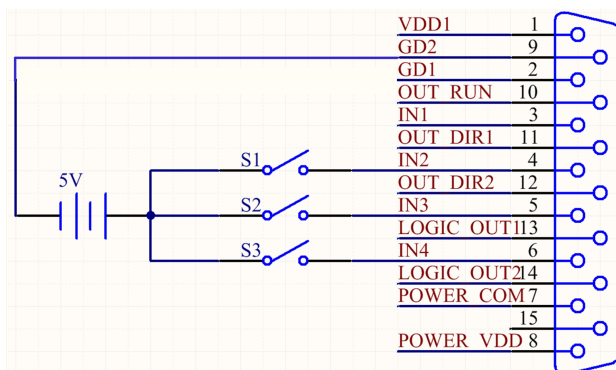
The external control interface is located in the DB15 pin plug on the back of the syringe pump, as shown in the below picture:



- (1) VDD1 and GD1: internal 5V output.
- (2) IN2, quick start withdrawal (active signal)
- (3) IN3, quick start infusion (active signal)

(4) IN4, active start and stop

Wiring diagram as below:



Function Instruction:

A. In Pulse Mode:

Disconnect S1 after short-circuit, the syringe pump starts to run according with the parameters in withdraw mode (repeat number is 1), disconnect again after short-circuit, the pump stop running.

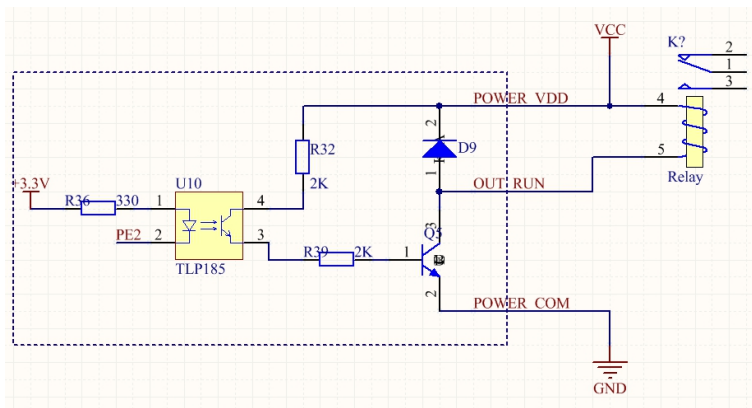
Disconnect S2 after short-circuit, the syringe pumps starts to run according with the parameters in infusion mode (repeat number is 1), disconnect again after short-circuit, the pump stop running.

Disconnect S3 after short-circuit, the syringe pump starts to run according with current setting working mode, disconnect again after short-circuit, the pump stop running.

B. In Level Mode:

Short-circuit S3, the syringe pump starts to run with current setting working mode; after disconnect, the pump stop running.

(5) OUT_RUN motor working status output, OUT_DIR1 and OUT_DIR2 motor running direction output, wiring diagram as below:



If it is an external relay, when the motor is running, K1 closed; when it stops, K1 disconnect.

(6) Foot Pedal Interface

Foot pedal switch interface is the on aviation plug on the back of the syringe pump.

In Pulse mode: Step on the foot pedal switch and then lift it up, the syringe pump will start to run according with the current setting working mode; step on it and lift up again, the syringe pump will stop running.

In Level mode: Step on the foot pedal switch, the syringe pump will start to run according with the current setting working mode; lift it up, the syringe pump will stop running.

7. ISPLab Series Technical Specification

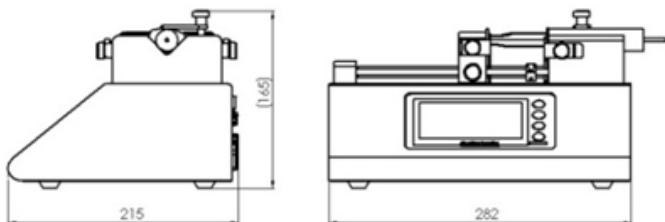
Working mode	Infusion, withdrawal ,infusion/withdrawal, withdrawal/infusion						
Channel No.	1	2	4	6	8	10	12
Syringe size	10uL-140mL		10uL-10mL				
Flow rate	0.001uL/min-127mL/min		0.001uL/min-21.997mL/min				
Route resolution	0.078um						
Min. linear rate	5um/min						
Max. linear rate	132um/min						
Min. step rate	0.035ms/Micro step						
Max. step rate	0.937sec/Mirco step						
Max. linear force	8—20kgf for option						
Distance of each step	0.078um						
Accuracy	Error≤±0.5%（Stroke≥30% of the maximum stroke）						
Syringe selection	Installed syringe size and custom syringe ID						
Display	Industrial grade 4.3’’LCD color display						
Control method	Touch screenand Mechanical keypad						
Power-off memory	Display the previous data parameter after power supply again						
Output state	OC gate signal output,used to indicate running status and direction.						
Eexternal control signal	Active switch signal: 5V, 12V, 24V for option Passive switch signal: foot pedal switch						
Communication interface	RS232/RS485（Modbus protocol, RTU mode）						
Power supply	AC 90-264V						
Condition temperature	0-40℃						
Relative humidity	<80%						
IP rate	IP31						

8. ISPLab Series Function & Features

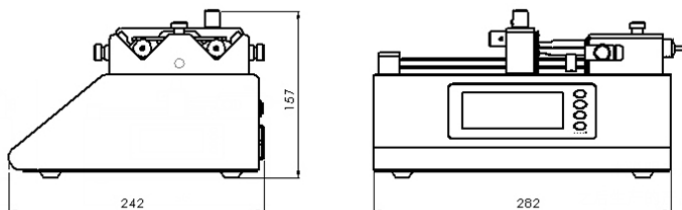
- **Input Syringe ID function:** Users can choose syringe from menu or input the syringe ID directly.
- **Choose working mode:** Syringe pump has 4 working mode--Infusion, withdrawal, infusion/withdrawal, withdrawal/infusion. Each working mode technical data save separately, do not influence each other.
- **Calibration and online micro adjusting function:** Users can control the flow volume more precisely with this function.
- **Memory function:** After turn on the pump again, no need to re-set up the parameters.
- **Block protection function:** The pump will stall and give an alarm when the drive structure of the pump is blocked.
- **External control function:** Input/Output control function.
- **Syringe protection function:** Prevent syringe damage by adjusting the position of the limit block.
- **Online adjusting linear force:** The linear force can be adjusted on the interface, 8-20kgf for option.
- **Common mode:** It can save up to 60 common modes and reduce the input time of customers.
- **Communication interface:** Support RS232 and RS485 Modbus communication.

9. Dimension (Unit: mm)

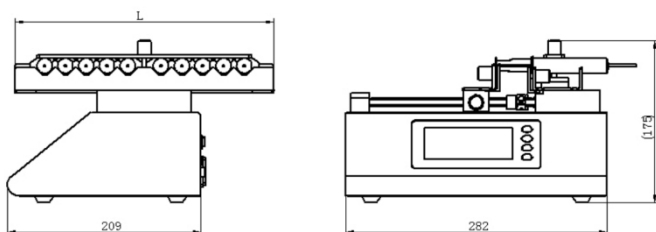
ISPLab01



ISPLab02



ISPLab04~12



通道数	4	6	8	10	12
L值	145	190	235	280	325

Channel	4	6	8	10	12
L (mm)	145	190	235	280	325

10. Maintenance

- In order to keep the machine good performance and long service life, please pay attention to routine maintenance, regular inspection of syringe pump.
- Cleaning and maintenance: during operation or after the completion of the operation, please keep the equipment clean, with a soft cloth to wipe the liquid splashing into the syringe pump.
- Cleaning note:
 1. In the cleaning process, please disconnect the power to avoid electric shock.
 2. Do not immerse the pump in the water
 3. Do not heat or high pressure treatment to the syringe pump.
- The edge must be inserted into the syringe pump side ring fixing groove, and pay attention to clean syringes.
- Regular check the parts and screws of syringe pump.
- Keep good working condition.
- **Lead screw lubrication:** Before first use the syringe pump, please coat lubrication oil on the lead screw to ensure the lead screw can work normally. To extend the lifetime of lead screw, we suggest to coat lubrication oil every 3 or 5 days. Before coating lubrication oil, please clean the lead screw.

11. Warranty and After-sales Service

We support three years warranty (not including syringe). During the warranty, the products are damaged because of users' wrong operation or other human damages, our company do not responsibility for warranty. Beyond the warranty, we only charge the cost of maintenance. Refer to all maintenance including in and beyond the warranty, we do not bear any freight charges because of maintenance.