

# Shenchen Precision Pump Manual of Lab V Series



Baoding Shenchen Precision Pump Co.,Ltd



**Note:**

- Please read the manual carefully before operating the product.



**Warning:**

- Tubing may have cracks due to wear. It results in the overflow of fluid from tubing. In that time human body and instruments may be harmed. So, users must check frequently and change tubing in time.
- Connect the power cord to the wall socket directly and avoid using the extended electric wire.
- If the power cord or plug had wear and other damage, please disconnect the plug. (Hold the plug instead of the wire)
- If following situations happened, please turn off the power supply and disconnect the plug. (Hold the plug instead of the wire)
  1. Fluid splash on the pump.
  2. You think the pump need to maintain or repair.
- The user's power socket must have ground wire and have reliable grounding.

**Note:** The foot pedal switch and other external control plugs must be connected or disconnected in the power-off status to prevent the external control interface from being burned.

## **Catalogue**

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## 1. Product Introduction

LabV series product is the flow measurement type intelligent peristaltic pump, 4.3-inch color touch screen control; Animation shows working state; flow data, setting parameters and system settings display in the same screen. Intelligent calibration and online micro adjusting function; three measurement modes: fixed volume measurement, fixed time and volume, timer start and stop. It can load different pump heads, and multiple external control methods are optional. It is the ideal choice for laboratory, equipment supporting and industrial production.

**Product range includes:** LabV1, LabV3, LabV6, LabV1-II, LabV3-II, LabV1-III, LabV3-III, LabV6-III

**Suitable pump head:** EasyPump pump head,

AMC pump head, YZ1515x,

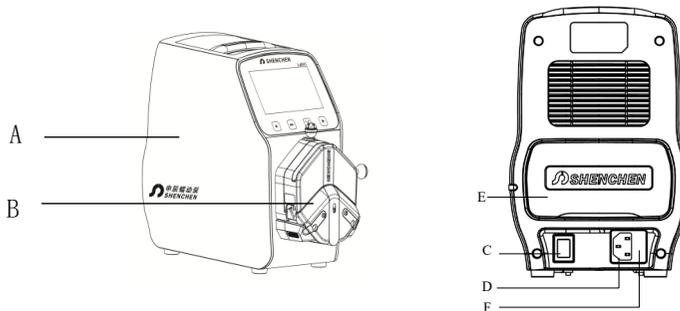
YZ2515x easy load pump head,

MC series multichannel pump head (MC1-MC12),

SN series standard pump head (SN15, SN25),

DZ25-3L.

## 2. Product Appearance



**A - Drive**

**B - Pump Head**

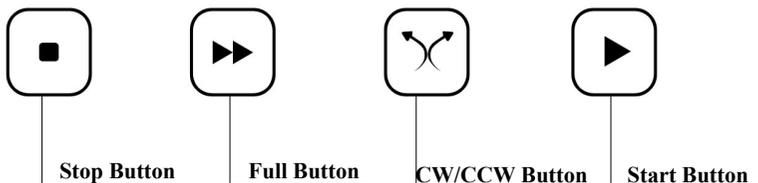
**C - Power Switch**

**D - Power Socket**

**E - External Control Port**

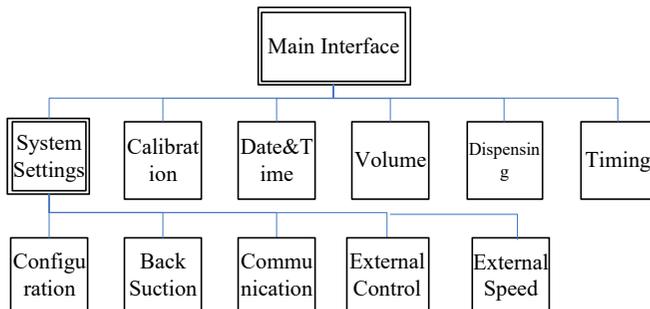
**F - Built-in fuse**

### 3. Keyboard Instruction



- **Stop Button:** Press stop button, pumps stop working. Forbidden buttons in the main interface can be used.
- **Full Button:** When stopping state or transferring state, press this button, the pump will run with the highest speed. This button can be used for washing tube or fast filling liquid.
- **CW/CCW Button:** Press this button once, the motor will change running direction once. When the fixed volume measurement or fixed time and volume function are on, this button does not work.
- **Start Button:** Press this button, the motor starts running. When fixed volume measurement or fixed time and volume function are on, press this button, the pump will start work with the function.

#### 4. Operation Interface Structure



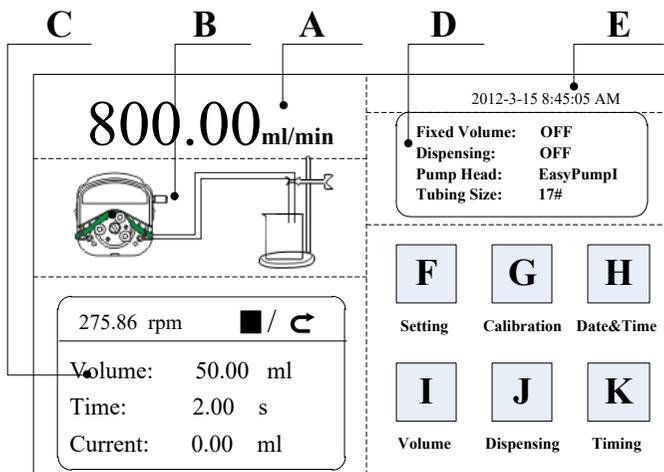
#### LabV Series Operation Interface Instruction

##### 4.1 Booting Interface

After power on the system, enter the welcome interface, click anywhere, or wait for 2.5 seconds and it will enter the English main operation interface automatically.

##### 4.2 Main Interface

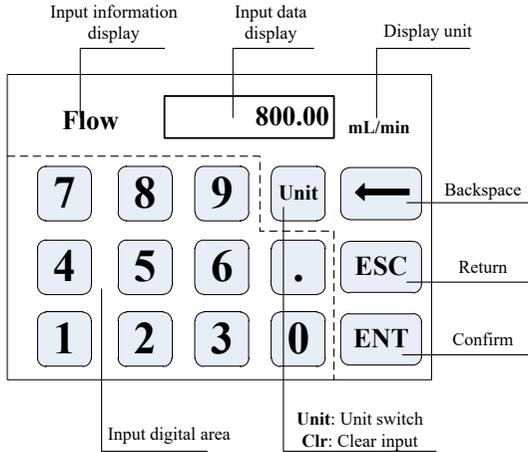
Main Interface Composition as below:



- A. **Speed/Flow Rate Display:** In the flow rate mode, it displays the current flow rate, the motor speed is displayed at the C frame. In the speed mode, displays the current set up speed, flow rate is displayed at the C frame. Click A to amend the flow rate or speed. When fixed time and volume function is turned on, A is forbidden, and it is not allowed to amend the flow rate or speed.
- B. **Real-time Dynamic Display:** Real-time display of the current running status, and dynamic display of the running results.
- C. **Real-time Parameter Display:** Display the current running state and set up parameter. When the fixed volume measurement is turned on, it displays the fixed volume measurement parameter. When the fixed time and volume function is turned on, display the fixed time and volume parameter. When these two functions are turned off, all displayed parameters are 0.
- D. **Setting Parameter Display:** Displays the fixed volume measurement, fixed time and volume state information, and the pump head model and tube size.
- E. **Date and Time Display:** Display the current date and time, you can change it in the system settings. When it displays an alarm clock on the right side, it means the timer start and stop function had turned on.
- F. **System Settings Button:** Click this button to set up other parameters.
- G. **Flow Calibration Button:** Click this button to enter the flow rate calibration interface.
- H. **Date & Time Button:** Click this button to enter the setup of current date and time interface.
- I. **Fixed Volume Measurement Button:** Click this button to enter the fixed volume measurement interface.
- J. **Fixed Time and Volume Button:** Click this button to enter fixed time and volume interface.
- K. **Timer Start and Stop Button:** Click this button to enter timer start and stop interface.

### 4.3 Numeric Keypad Input Interface

Numeric keypad input interface as below:



**Input Information Display:** The information displayed is the current operation object.

**Input Data Display:** Display the current input data, range is 0.01-9999.

**Unit Display:** Display input units when you input flow rate or volume.

**Input Digital Area:** Numeric keypad.

**Unit/Clr Button:** When you input flow rate or volume, this button is unit switch, and you can choose different units. When it is Clr, you can clear the current input data.

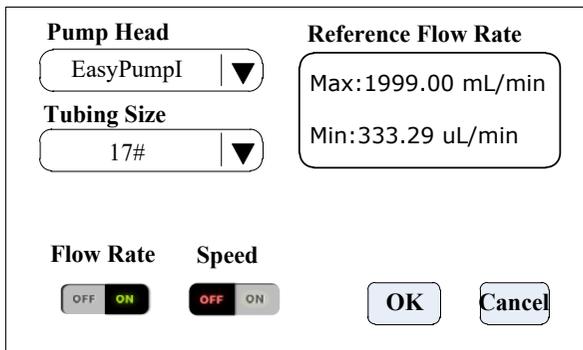
**Backspace Button:** Delete an input digital.

**ESC Button:** Cancel the current input, and go back to the previous interface.

**ENT Button:** Confirm the current input.

#### 4.4 The Basic Configuration Interface

The basic configuration interface:



The configuration interface is enclosed in a rectangular box. At the top left, there is a dropdown menu for 'Pump Head' with 'EasyPumpI' selected and a downward arrow. Below it is another dropdown menu for 'Tubing Size' with '17#' selected and a downward arrow. To the right of these is a rounded rectangular box labeled 'Reference Flow Rate' containing 'Max: 1999.00 mL/min' and 'Min: 333.29 uL/min'. At the bottom left, there are two toggle switches: 'Flow Rate' (with 'ON' highlighted in green) and 'Speed' (with 'OFF' highlighted in red). At the bottom right are two buttons: 'OK' and 'Cancel'.

Click the pump head and tubing size to choose the pump head and tubing.

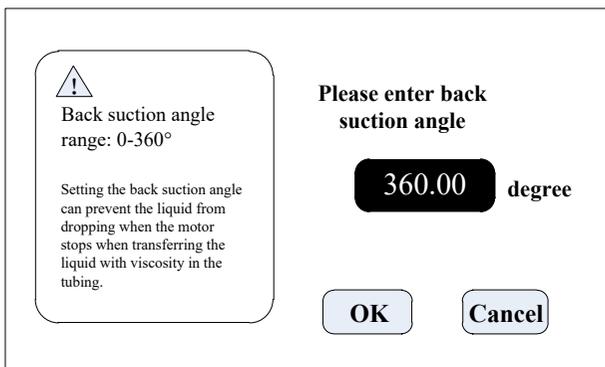
Reference flow rate display the maximum and minimum flow rate with the current pump head and tubing.

Click the Flow rate mode or Speed mode button to choose the working mode. When you choose the flow rate mode, the flow rate is adjustable, the speed will change with the flow rate. When you choose the speed mode, the speed is adjustable, the flow rate will change with the rotating speed.

Click the confirm button when you have finished choosing parameters, then you return to the main interface.

#### 4.5 Back Suction Angle Interface

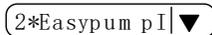
The back suction angle interface as below:



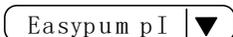
Click the **System Settings** button in the main interface, then click **Back Suction** button to enter the back suction angle setting interface. Click the **angle** button, the numeric keyboard pops up for inputting the suction angle, enter back suction angle and click OK. If you click the **Cancel** button, it will go back to the system settings main interface.

**Note:** When the pump comes with two pump heads, and the output of two pump heads are connected to one channel with Y-type connector, then you will need to choose 2\* pump head model. If the two pump heads are used as two channels, then you need to choose single pump head model number.

For example, the pump come with two EasyPumpI, and output connect with Y-type connector to one channel, then when choose pump head need to select 2\*EasyPumpI, as in below picture:

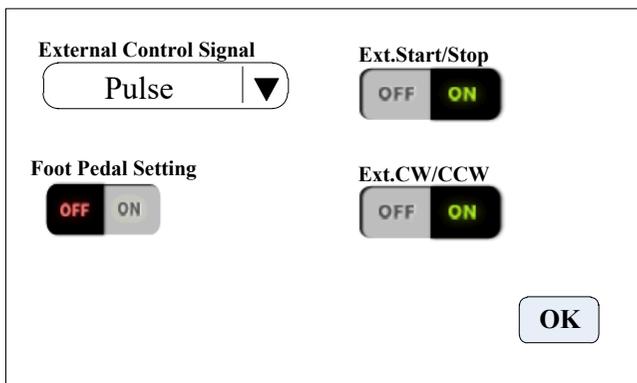


In other cases, such as: the pump comes with one pump head EasyPumpI, or with two EasyPumpI use as two channels, or with 3 or 4 EasyPumpI pump heads, you need to select single pump head EasyPumpI, as in below picture:



#### 4.6 External Setting Interface

External Setting Interface as below:



Click the **System Settings** button in the main interface, then click **External control** to enter **External Settings** interface.

- a. **There are two types of signals for external control motor start/stop and direction: Level mode and Pulse mode.** Connection interface refer to the external control interface instruction.
- b. **Various external control modes are independently set on switches, which will only work after the corresponding external control function is turned on.**

### 4.7 External Speed Control Setting Interface

External Speed Control Setting Interface as below:

<b>Analog signal selection</b> <input type="text" value="0-5V"/> ▼	<b>ON/OFF</b> <input type="checkbox"/> OFF <input checked="" type="checkbox"/> ON
0V corresponds to the speed <input type="text" value="0.0/"/> rpm	<b>Work speed limit</b> <input type="checkbox"/> <input type="text" value="600.00"/> rpm
5V corresponds to the speed <input type="text" value="600.00"/> rpm	<input type="button" value="OK"/>

Click the **System Settings** button in the main interface, then click **External Speed Control** button to enter External Speed Control Settings interface.

According with external input signal to set the analog signal: **0-5V, 0-10V or 4-20mA**. Between analog signal voltage range and motor speed, there is linear relationship (when the working speed limit is off).

**After turning on the maximum working speed limit, the motor speed will be limited.** For example, if 0V to 0rpm, 5V to 600rpm (then 2.5V should be 300rpm). But if the maximum working speed limit is 300rpm, when external input analog signal is 2.5V, the motor speed is 300rpm. After the input signal exceeds 2.5V, the motor speed remains unchanged at 300 rpm.

#### 4.8 Communication Setting Interface

<b>Set baud rate</b>	<b>Communication protocol</b>
9600 ▼	ShenChen ▼
<b>Communication interface</b>	<b>ON/OFF</b>
RS485 ▼	OFF ON
<b>Slave No.</b>	<b>OK</b>
01	

Click the **System Settings** button in the main interface, then click **Communication** button to enter Communication Settings interface.

This pump support MODBUS-RTU Mode. Please select baud rates and communication interface (RS485/RS232). Click the **Slave No.** button to enter peristaltic pump address No. (range:1-32), select communication enable **ON**. Then the pump can communicate with master, receiving master signal.

**Note:** After settings, the peristaltic pump only receives communication control when in the main interface, it is invalid for the communication control in the other settings interface.

#### 4.9 Flow Rate Calibration Interface

Flow Rate Calibration Interface as below:

Fixed time and volume	<b>Actual Vol.</b> 0.0000ml	<b>Volume adjust</b> +0.0000ml
<b>Volume</b> 10.00 ml	Test	Add
<b>Run Time</b> 1.00 s	CAL	Dec
	Reset	Esc

The top left corner displays the function, when fixed volume measurement is turned on, it displays fixed volume. When fixed time and volume turn on, it displays fixed time and volume. Others display transferring mode.

If fixed time and volume is turned on, the target volume and running time are set up parameter and are unable to amend. Other modes, the running time is 60s, you can click the run time button to amend the running time.

**Before the pump works, need to calibrate the flow rate to ensure the transferring or dispensing accuracy**

**Process as below:**

- (1) Confirm the running time, if fixed time and volume function, the running time is set up time, unable to change.
- (2) Click **Test** button to start the test, countdown display the run time, it will stop automatically, and display numerical keyboard, input the actual volume, then it will ask whether continue test (more than 3 times is recommended), choose **Yes**, and the pump will test again, choose **No**, and you go back to the calibration interface.
- (3) After clicking the **Test** button, during the pump running, you can click the **Stop** button to stop the test.

- (4) After finishing the tests, the actual volume area displays the average data, click the **CAL** button, and it will prompt that the calibration is successful.
- (5) If you request higher accuracy, you can click **Add** and **Dec** button to micro-adjust the flow rate, to reach high accuracy transferring and dispensing.
- (6) Click the **Reset** button to restore to the factory default calibration parameters.

#### **Online Micro Adjust Volume Process:**

**Flow Rate Transferring Mode:** If the actual flow rate during the production process is too big or small than the set-up flow rate, you can micro-adjust the flow rate online without affecting the product line.

**Fixed Time and Volume Mode:** If the dispensing volume is bigger or smaller than the set up volume, you can micro-adjust the volume online, and there is no need to stop the pump.

**Fixed Volume Measurement Mode:** Do not support online micro-adjustment function.

- Click the **Calibration** button from the main interface, it enters the flow rate calibration interface.
- Now only the Add, Dec and Esc button are usable, other buttons are forbidden.
- Click Add or Dec button to micro adjust the flow rate or volume.

#### **4.10 Date & Time Interface**

Setting Date & Time Interface as below:

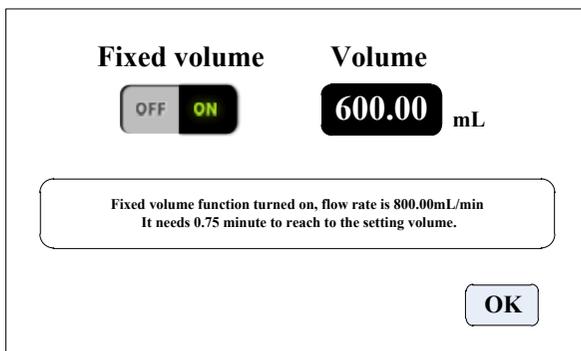


In this interface, you can set the current date and time, and it will display at the top right of corner. Click the **Set Date** button, and out comes the **Set year** numeric keypad, the range of the year is **1970-2099**. After setting up the year, then set the month and date.

Click the **Set Time** button, out comes the numeric keypad, where you set the hour, minute and second.

#### 4.11 Fixed Volume Measurement Interface

Fixed Volume Measurement Interface as below:



After turning on this function, the peristaltic pump will measure the volume automatically. When the volume reach set up volume, the pump will stop working automatically. The flow rate can be changed during the pump working.

Click the **Fixed Volume** button, set **ON** to turn on this function. Click **Set Volume**, to input volume, the unit can be mL or L, range is 0.01mL to 9999L. The prompting frame display the needed time to finish the volume with set up flow rate. The maximum time is 9999min, when more than 9999min, the system will warn.

#### 4.12 Dispensing Interface

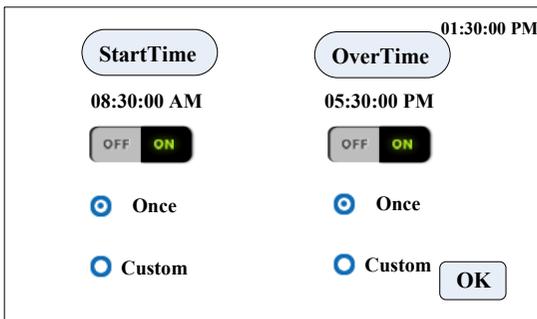
Dispensing Interface as below:

<b>Fixed volume</b>	<b>Runing time</b>	<b>Repeat times</b>
OFF ON	1.00 s	0002
<b>Set volume</b>	<b>Suspend time</b>	OK
5.00 mL	1.00 s	
Fixed time and volume function turned on, flow rate is 300.00mL/min, speed is 103.44rpm		

After turning on this function, the pump will enter dispensing mode.

The peristaltic pump will transfer a fixed volume in fixed time, transfer times are the **Repeat times**. Click the suspend time button then input suspend time, a prompt box displays the current diameter, after clicking the OK button, click the start button, the pump begins dispensing according to the diameter.

### 4.13 Timer Start and Stop Interface

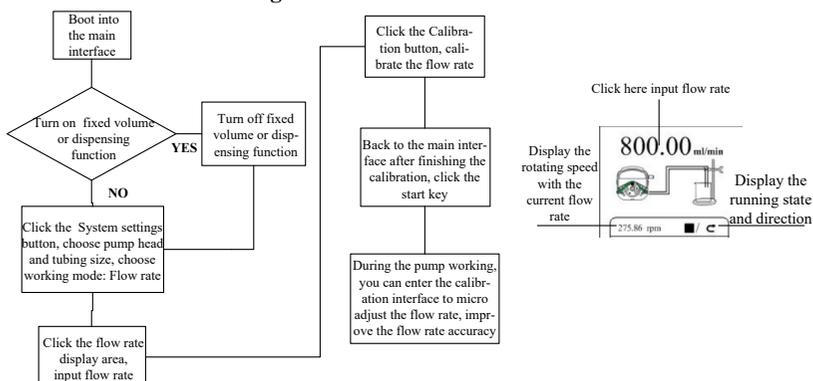


Start and stop time of the pump can be set in any time with this function. After the current time reaches to the setting time, it will automatically start and stop or stop the motor.

When the Fixed volume measurement or fixed time and volume function is turned on, the timer stop function is unavailable.

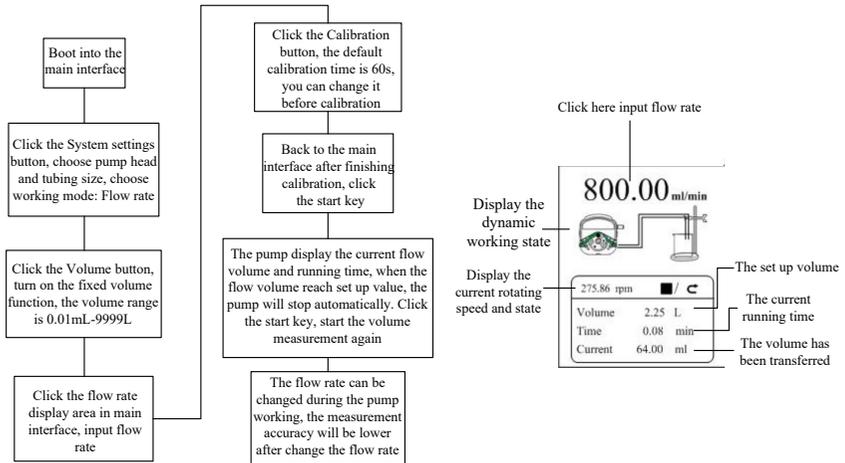
## 5. Main Functions Operation Process

### 5.1 Flow Rate Transferring Function



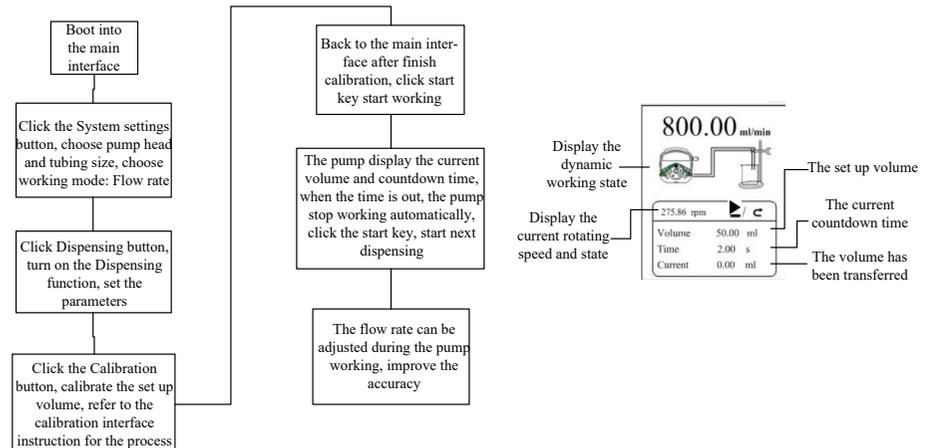
**Note:** Please refer the flow rate calibration interface instruction for flow rate calibration process.

## 5.2 Fixed Volume Measurement Function



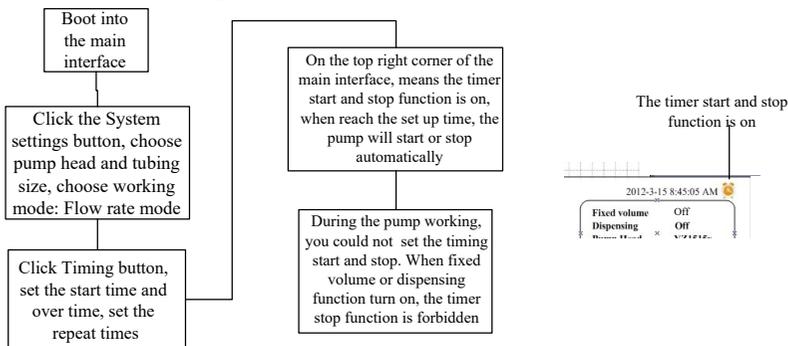
**Note: Please refer the flow rate calibration interface instruction for flow rate calibration process.**

## 5.3 Dispensing

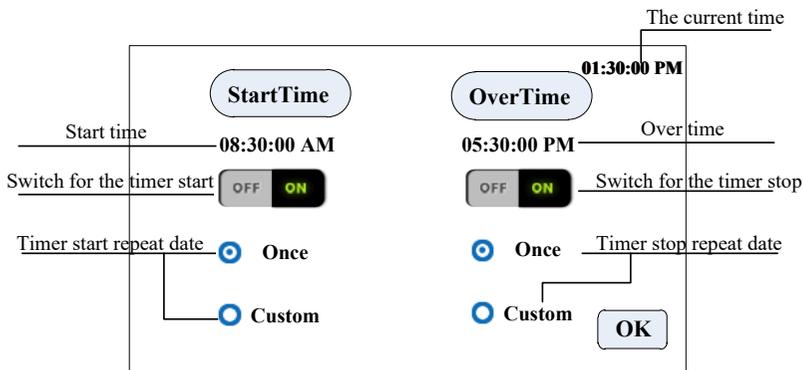


**Note: Please refer the flow rate calibration interface instruction for flow rate calibration process.**

### 5.4 Timer Start And Stop Function



Under the flow rate transferring mode, set the pump start at 8:30 a.m. from Monday to Friday, stop at 5:30 p.m., the process as below:



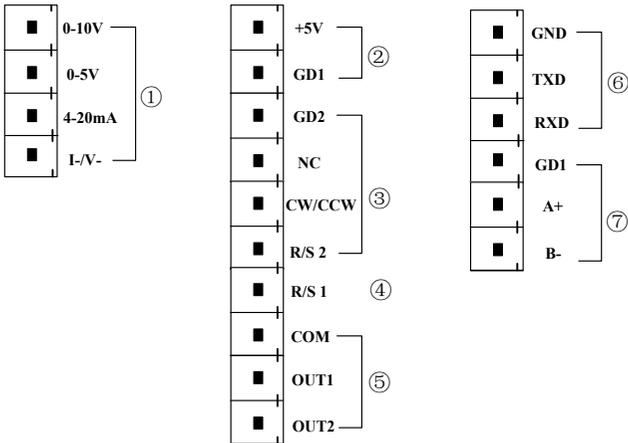
Click the **Start Time**, set the start time is 8:30 a.m., turn the button to **ON**.

Click **Custom**, out come the repeat date window, as below:

<input checked="" type="checkbox"/> Monday	<input checked="" type="checkbox"/> Friday
<input checked="" type="checkbox"/> Tuesday	<input type="checkbox"/> Saturday
<input checked="" type="checkbox"/> Wednesday	<input type="checkbox"/> Sunday
<input checked="" type="checkbox"/> Thursday	<input type="checkbox"/>

### 6. External Control Interface Instruction

External control interface as below:



① **Analog signal input terminal:** Choose the **External speed control signal** and turn on the **Ext. Speed** in external control setting interface, control the motor speed from 0 rpm to maximum speed through analog signal.

**0-10V:** 0V to 10V voltage signal input terminal.

**0-5V:** 0V to 5V voltage signal input terminal.

**4-20mA:** 4mA to 20mA current signal input terminal.

**I\_/V\_:** Analog signal negative terminal.

**Notice: Please do not connect 0-10V signal to 0-5V terminal or 4-20mA terminal.**

**This is forbidden. Wrong connection will damage the pump.**

② **Internal isolation 5VDC output**

③ **External control start/stop, cw/ccw signal input terminal:**  
Active signal input, 5-24 VDC input.

**GD2:** External control signal common input terminal.

**NC:** Null.

**CW/CCW:** External control direction signal input

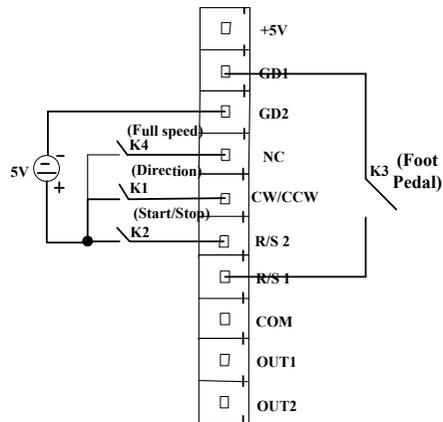
**R/S 2:** External control start/stop signal input

Set up the external control mode in the setting interface, turn on the correspond external control function, external control signal is active.

④ **R/S 1 External control signal input terminal:** Passive signal input.

The passive switch or foot pedal switch can be connected with the terminal. Set the validity of this input in external setting interface--foot pedal option.

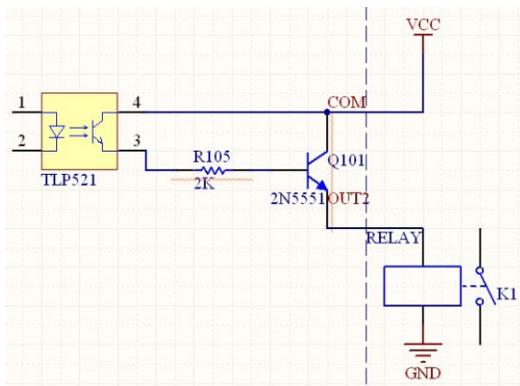
The external control wiring diagram is as follows:



- a. In **Pulse mode**: Short connect K2 then disconnect, the motor start running. Short connect and disconnect again, motor stop running. In **Level mode**: Short connect K2, the motor start running, disconnect K2, motor stop running.
- b. In **Pulse mode**: Short connect and then disconnect K1 once, the motor change working direction once. In **Level mode**: Short connect K1, motor running clockwise, disconnect K1, motor running anticlockwise.
- c. In **Pulse mode**: Short connect K3 then disconnect, the motor start running; short connect K3 and disconnect again, motor stop running. In **Level mode**: short connect K3, motor start running, disconnect K3, motor stop running.
- d. In **Pulse mode**: Short connect K4, the motor will run with full speed; Disconnect it, the motor stop.

⑤ **The motor working status output terminal:**

Output motor working status as below:



If connect with relays, when the motor runs, K1 connect; when the motor stop running, the K1 disconnect.

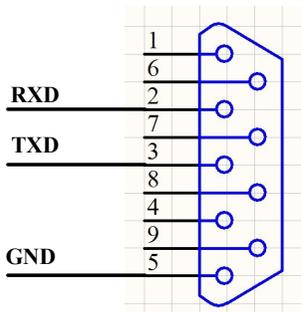
⑥ **RS232 Communication:** Choose RS232 in the Communication setting interface, this terminal is active.

**GND:** Communication ground terminal.

**TXD:** Master sending, peristaltic pump receive signal terminal.

**RXD:** Peristaltic pump sending, master receive signal terminal.

**RS232 Communication Interface Connection Diagram as below:**



⑦ **RS485 Communication Interface:** Choose RS485 in the communication setting interface, this terminal is active.

**GD1:** RS485 signal ground

**A+:** Connect RS485 A+ terminal

**B-:** Connect RS485 B- terminal

Note: No matter if you choose RS232 or RS485, the communication protocol is standard MODBUS protocol.

**7. Technical Specification**

Flow rate resolution	0.01ml/min	Power supply	AC 220V±10% 50Hz/60Hz(standard) AC 110V±10% 50Hz/60Hz(optional)
Operation mode	Touch screen and mechanical keypad	External control	Switch signal
External control speed	0-5V, 0-10V, 4-20mA for option	External control	Passive switching signal: Foot pedal switch Active switching signal: 5-24V universal
Communication	RS232/RS485, support Modbus (RTU mode)	Output port	Output motor running status (Open collector output)
Back suction angle	0-360°	Protection rate	IP31
Speed range	LabV1, LabV1-II, LabV1-III	0.1-150rpm	
	LabV3, LabV3-II, LabV3-III	0.1-350rpm	
	LabV6, LabV6-III	0.1-600rpm	
Power consumption	LabV1, LabV1-II, LabV3, LabV3-II, LabV6	<50W	

	LabV1-III, LabV3-III, LabV6-III		<80W
Motor type	LabV1, LabV1-II, LabV3, LabV3-II, LabV6		Stepper motor
	LabV1-III, LabV3-III, LabV6-III		Closed loop stepping motor
Temperature	0-40°C	Humidity	<80%

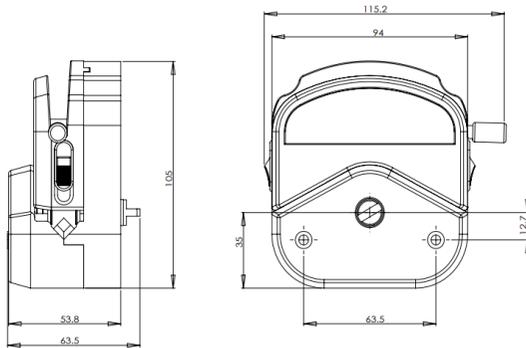
## 8. Function and Features

- 4.3-inch color touch screen control, animation shows working state, the flow volume and motor speed are displayed in the same screen.
- Intelligent calibration function, it can calibrate the flow rate and dispensing volume, ensure the flow accuracy, suitable for high accuracy transferring liquid.
- On-line micro adjusting function, it can adjust the flow rate during production progress, to avoid the filling errors because of tubing fatigue and elasticity decreased.
- Accurate angle control technology, reach high precision dispensing and measurement.
- Fixed volume measurement function: After turning on this function, the peristaltic pump will measure the liquid volume automatically, it will stop automatically after the volume reaches the set value. During this process, the flow rate can be changed. It is suitable for liquid metering in the laboratory or quantitative feeding in the chemical reaction process, etc.
- Fixed time and volume function: After turning on this function, the peristaltic pump will transfer fixed volume within set time. It is suitable for liquid dispensing in laboratory and industrial production.
- Timer start and stop function: Pump starts and stop time can be set any time to realize automation control.
- Power down memory function, store the running parameters in time, safe and reliable.
- Fast fluid-filled function, can wash the tubing and also fill fluid in the tubing.
- High torque and low power loss, it can load several pump heads or multichannel pump head, meet different application requests.
- External control start and stop, convenient for equipment supporting.

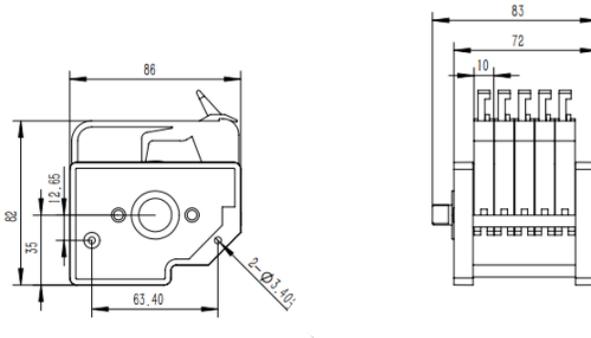
### 9. Dimension Drawing

Unit: (mm)

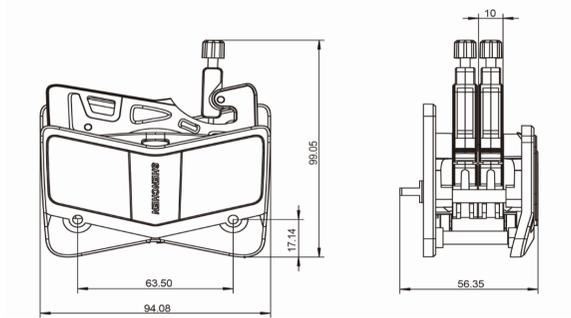
#### 9.1 Single pump head



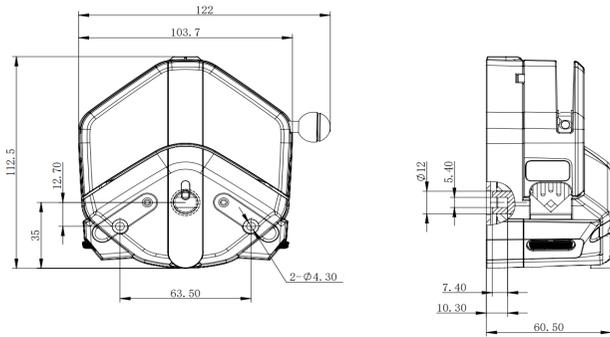
**YZ1515x pump head**



**MC pump head**

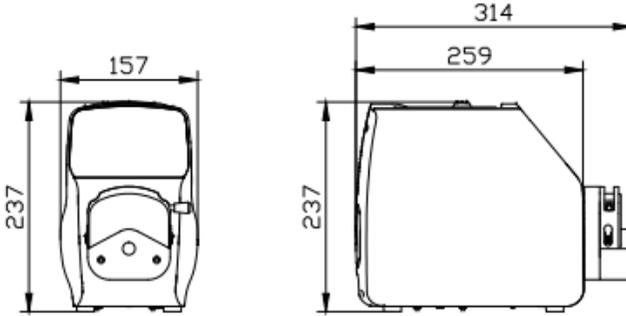


**AMC pump head**



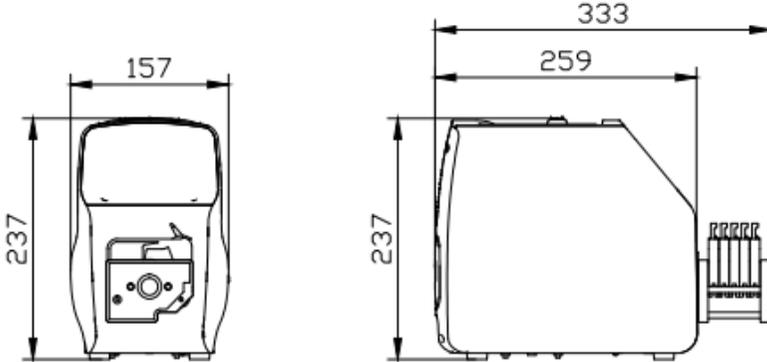
**EasyPump pump head**

9.2 LabV series product



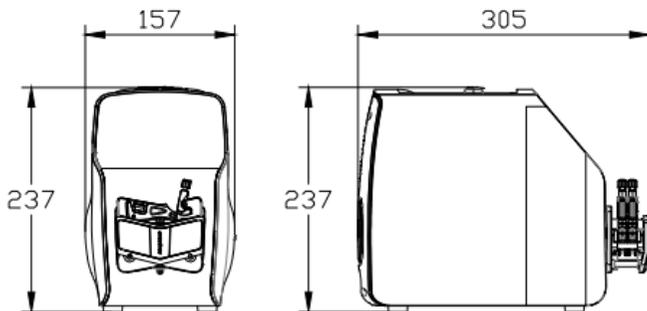
LabV+YZ15 pump head

**Note:** For each additional pump head in series, the longitudinal dimension shall be increased by 55mm.



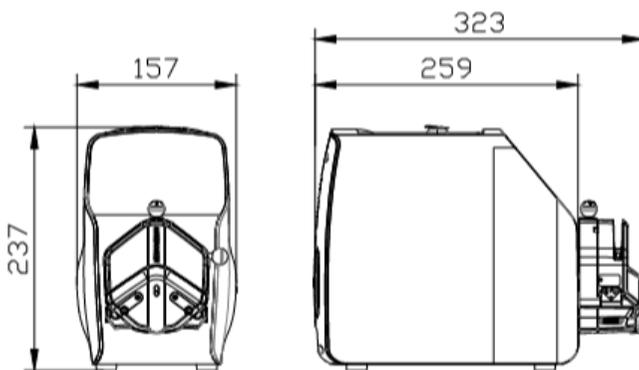
LabV + MC pump head

**Note:** For each additional channel, the longitudinal dimension shall be increased by 10mm.



**LabV + AMC pump head**

**Note:**For each additional channel, the longitudinal dimension shall be increased by 10mm.



**LabV+EasyPump pump head**

**Note:**For each additional pump head in series, the longitudinal dimension shall be increased by 61mm.

## 10. Maintenance

- Check the running status of machine before starting it, normal operation can be put into use.
- Check for leakage, and correct fault which can be appeared.
- Clean liquid overflowed from the pump in time.
- Please turn off the power supply and unplug the power socket (Hold the socket instead of power cord) when liquid splashed on pump. Check whether liquid flows into the machine, if it does, please contact the manufacture.
- The foot pedal switch and other external control plugs must be connected or disconnected in the power-off status to prevent the external control interface from being burned.
- The user's power socket must have ground wire and have reliable grounding.
- This product has no waterproof measures. Please take protective measures when using in wet environment.
- This product does not have special certification such as medical certification. When it needs to be used in special fields such as medical and military, please self-certify.
- If the pump does not use for a long time, please clean it and keep it in dry and ventilated environment.
- The company shall not bear the direct and indirect losses caused by the malfunction or improper operation of this product.

## 11. Warranty and After-sales Service

We support 3 years warranty for the pumps, subject to the exceptions below. Our company shall not be liable for any loss, damage, or expense directly or indirectly related to or arising out of the use of its products. This warranty does not obligate our company to bear any costs of removal, installation, transportation, or other charges which may arise in connection with a warranty claim.

If the pump fails during the warranty period, after confirmation by our technical department, we will provide spare parts free of charge. Customers will need to bear the shipping cost.

### **Exceptions:**

- The warranty shall not apply to repairs or service necessitated by normal wear and tear or for lack of reasonable and proper maintenance.
- All tubing and pumping accessories as consumable items are excluded.
- Electrical surge as a cause of failure is excluded.
- Chemical attack is excluded.
- Improper operation or man-made damage as a cause of failure is excluded.

MADE IN CHINA

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