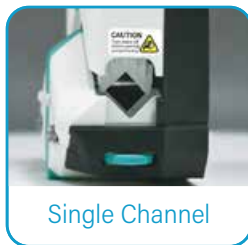




# FCS KA-DISP

Dispensing Pump  
Operation Manual



Single Channel



Dual Channel

2950 Buskirk Ave, Suite 300, Walnut Creek, CA 94597

925-516-4459 | [justin@fcs-us.net](mailto:justin@fcs-us.net)

[flowcontrollersystems.com](http://flowcontrollersystems.com)



**Note:**

- Please read the manual carefully before operating the product.



**Warning:**

Tubing may crack due to wear and results in the leak of fluid from tubing. This can result in bodily harm to the user or damage to equipment. Inspect the tubing frequently and change tubing before cracks or damage occurs.

Connect the power cord to the wall socket directly, and avoid using an electric extension cord.

If the power cord or plug has wear and/or other damage, please disconnect the plug. (Hold the plug instead of the wire.)

If any of the 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 needs to be maintained or repaired.

The user's power socket must have a 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

The KA-DISP series product is a flow measurement type intelligent peristaltic pump. It has a 4.3-inch color touch screen control, uses an animated working state visual with flow data, allowing the setting of parameters and system settings in the same screen. It features intelligent calibration and an online micro adjusting function. There are three measurement modes: fixed volume measurement, fixed time and volume, timer start and stop. It can load different pump heads, and there are multiple external methods as options. It is the ideal choice for laboratory, equipment supporting, and industrial production.

**Product mode includes:** KA-DISP 1, KA-DISP 3, KA-DISP 6, KA-DISP 1-II, KA-DISP 3-II, KA-DISP 1-III, KA-DISP 3-III, KA-DISP 6-III

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

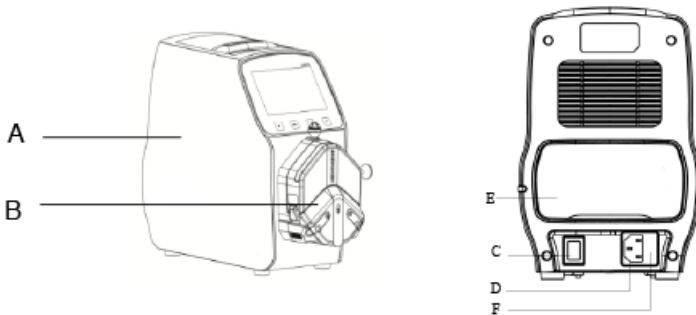
AMC pump head, YZ1515x,

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

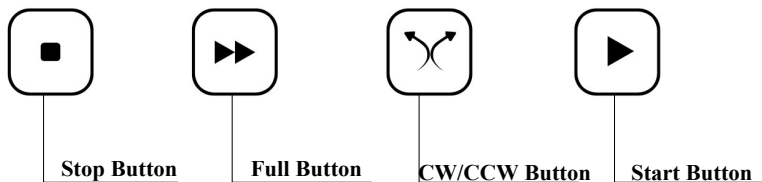
**C**—Power Switch

**D**—Power Socket

**E**—External Control Port

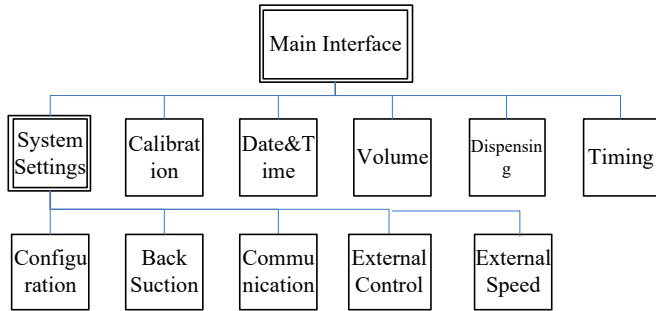
**F**—Built-in fuse

### 3. Keyboard Instruction



- **Stop Button:** Pressing the stop button stops the pump from working. Locked buttons in the main interface can be used.
- **Full Button:** When in stopping state or transferring state, press this button so the pump will run at the highest speed. This button can be used for washing a tube or fast filling liquid.
- **CW/CCW Button:** Press this button once and 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 for the motor to start running. When fixed volume measurement or fixed time and volume function are on, press this button and the pump will start working using the function.

## 4. Operation Interface Structure



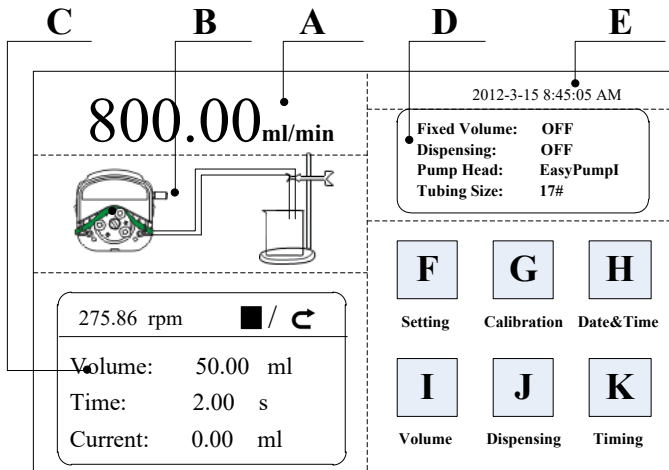
## KA-DISP Series Operation Interface Instruction

### 4.1 Booting Interface

After powering on the system, it will 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

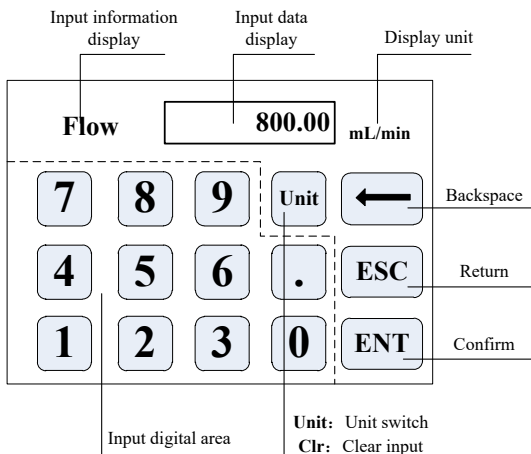
Main Interface Composition as below:



- A. **Speed/Flow Rate Display:** In flow rate mode, displays the current flow rate, and the motor speed is displayed at the C frame. In speed mode, displays the current set up speed and 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 disabled and you are not allowed to amend the flow rate or speed.
- B. **Real-time Dynamic Display:** Real-time display of the current running status, dynamic display of the running results.
- C. **Real-time Parameter Display:** Display the current running state and setup parameters. When the fixed volume measurement turns on, displays the fixed volume measurement parameter. When the fixed time and volume function turns on, displays the fixed time and volume parameter. When these two functions turn off, display parameters are all 0.
- D. **Setting Parameter Display:** Display the fixed volume measurement, fixed time and volume state information, the model of pump head and tube size.
- E. **Date and Time Display:** Display the current date and time which you can change in the system settings. When it displays an alarm clock on the right side, it means the timer start and stop function is turned on.
- F. **System Settings Button:** Click this button in order 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 set up 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 inputting flow rate or volume.

**Input Digital Area:** Numeric keypad.

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

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

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

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



#### 4.4 The Basic Configuration Interface

The basic configuration interface:

The screenshot displays a configuration window with the following elements:

- Pump Head:** A dropdown menu currently showing "EasyPumpI".
- Tubing Size:** A dropdown menu currently showing "17#".
- Reference Flow Rate:** A box displaying "Max: 1999.00 mL/min" and "Min: 333.29 uL/min".
- Flow Rate Mode:** A toggle switch with "OFF" and "ON" labels, where "ON" is highlighted in green.
- Speed Mode:** A toggle switch with "OFF" and "ON" labels, where "OFF" is highlighted in red.
- Buttons:** "OK" and "Cancel" buttons.

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

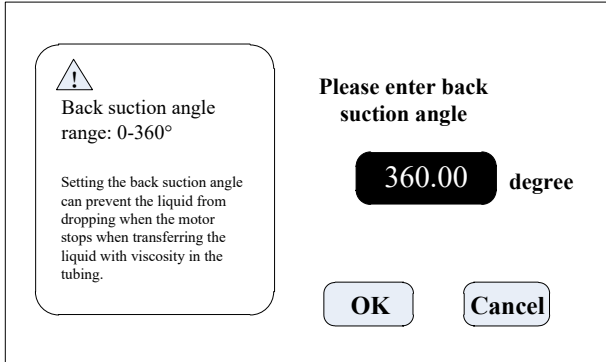
Reference flow rate displays the maximum and minimum flow rate with the current pump head and tubing.

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, and the speed will change with the flow rate. When you choose the speed mode, the speed is adjustable, and the flow rate will change with the rotating speed.

Click the confirm button when you have finished choosing parameters to go back to the main interface.

#### 4.5 Back Suction Angle Interface

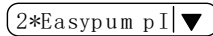
The back suction angle interface as below:



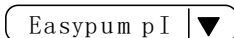
Click the **System Settings** button in the main interface, then click the **Back Suction** button to enter the back suction angle setting interface. Click **angle** button. Use the pop-up numeric keyboard to input the suction angle, enter the back suction angle, then click OK. If the **Cancel** button is clicked, it will back out to the system settings main interface.

**Note:** When the pump comes with two pump heads, the output of two pump heads is connected to one channel with a Y type connector. You will need to choose 2\* pump head model. If the two pump heads are to use two channels, then you need to choose single pump head model numbers.

For example, the pump comes with two EasyPumpI, and output connects with a Y type connector to one channel. When choosing a pump head, you need to select 2\*EasypumpI, as in below picture:



In other cases, such as: The pump come with one pump head EasypumpI, or with two EasypumpI to 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:

The screenshot displays the 'External Setting Interface' with the following elements:

- External Control Signal:** A dropdown menu currently set to 'Pulse' with a downward arrow icon.
- Ext.Start/Stop:** A toggle switch with 'OFF' on the left and 'ON' on the right. The 'ON' position is highlighted in green.
- Foot Pedal Setting:** A toggle switch with 'OFF' on the left and 'ON' on the right. The 'OFF' position is highlighted in red.
- Ext.CW/CCW:** A toggle switch with 'OFF' on the left and 'ON' on the right. The 'ON' position is highlighted in green.
- OK:** A light blue button with the text 'OK' in black.

Click **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 refers 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:

**Analog signal selection**

0-5V ▼

0V corresponds to the speed

0.0/ rpm

5V corresponds to the speed

600.00 rpm

**ON/OFF**

OFF ON

**Work speed limit**

600.00 rpm

OK

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

According to the 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 a linear relationship (when the working speed limit is off).

**With the maximum working speed limit turned on, 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 the 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

The screenshot displays the Communication Setting Interface with the following elements:

- Set baud rate:** A dropdown menu showing the value 9600.
- Communication protocol:** A dropdown menu that is currently empty.
- Communication interface:** A dropdown menu showing the value RS485.
- ON/OFF:** A toggle switch currently set to OFF.
- Slave No.:** A button displaying the value 01.
- OK:** A button to confirm the settings.

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

This pump supports MODBUS-RTU Mode. Please select baud rates and communication interface (RS485/RS232). Click **Slave No.** button to enter peristaltic pump address No. (range:1-32). Turn the communication enable toggle to **ON**. This pump can now 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	Actual Vol. 0.0000ml	Volume adjust +0.0000ml
Volume 10.00 ml	Test	Add
Run Time 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 are turned 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 pre-set parameters and are unable to be amended. In other modes, the running time is 60s. You can click the run time button to amend the running time.

**Before the pump works, you 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 a pre-set time and unable to be changed.
- (2) Click **Test** button to start the test. A countdown displays the run time. It will stop automatically and display a numerical keyboard. Input the actual volume, then it will ask whether to continue the test (suggest more than 3 times). Choose **Yes** and the pump will test again. Choose **No** to go back to the calibration interface.
- (3) After clicking the **Test** button, while the pump is running, you can click the **Stop** button to stop the test.

- (4) After you finish the tests, the actual volume area displays the average data. Click the **CAL** button and a prompt shows the calibration is successful.
- (5) If you need 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.

**Flow Rate Transferring Mode:** If the actual flow rate during the production process is larger or smaller 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 larger or smaller than the set-up volume, you can micro adjust the volume online, no need to stop the pump.

**Fixed Volume Measurement Mode:** Does not support online micro adjust function.

- Click the **Calibration** button from the main interface to enter the flow rate calibration interface.
- Now only the Add, Dec, and Esc button are usable. Other buttons are not useable.
- Click the Add or Dec button to micro adjust the flow rate or volume.

#### 4.10 Date & Time Interface

Setting Date & Time Interface as below:

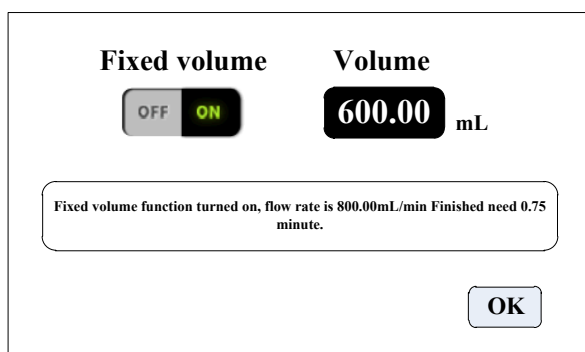
<input checked="" type="checkbox"/> <b>12-hour</b>	2012-3-15
<input type="checkbox"/> <b>24-hour</b>	<b>8:45:35 AM</b>
<b>Set Date</b>	<b>Thursday</b>
<b>Set Time</b>	<b>Back</b>

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

Click **Set Time** button and a numeric keypad will pop up. 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 reaches set-up volume, the pump will stop working automatically. The flow rate can be changed while the pump is 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 and the range is 0.01mL to 9999L. A prompting frame displays the needed time to finish the volume with the set-up flow rate. The maximum time is 9999min. When more than 9999min, the system will warn you.



#### 4.12 Dispensing Interface

Dispensing Interface as below:

The screenshot shows a control interface for a dispensing pump. It features several settings and a status message:

- Fixed volume:** A toggle switch is currently set to **ON** (green).
- Running time:** A digital display shows **1.00** s.
- Repeat times:** A digital display shows **0002**.
- Set volume:** A digital display shows **600.00** mL.
- Suspend time:** A digital display shows **1.00** s.
- OK button:** A rectangular button labeled **OK**.
- Status message:** A rounded rectangular box at the bottom contains the text: "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.

Peristaltic pump transfers fixed volume in fixed time. Transfer times are the **Repeat times**. Click suspend time button, then input suspend time. The prompt box displays current diameter. After you click the OK button, click the start button, and the pump begins dispensing according to the diameter.

#### 4.13 Timer Start and Stop Interface

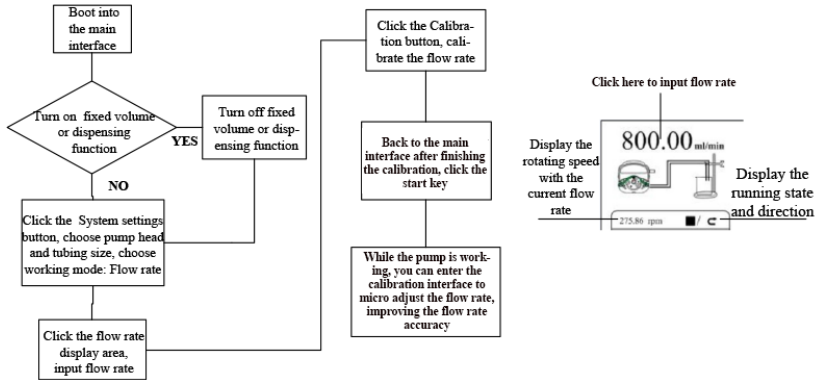
The screenshot shows a control interface for setting timer start and stop times. It features two main sections:

- StartTime:** A rounded rectangular button labeled **StartTime** is shown above a digital display showing **08:30:00 AM**. Below the display is a toggle switch set to **ON** (green). Underneath are two radio button options: **Once** (selected) and **Custom**.
- OverTime:** A rounded rectangular button labeled **OverTime** is shown above a digital display showing **05:30:00 PM**. Below the display is a toggle switch set to **ON** (green). Underneath are two radio button options: **Once** (selected) and **Custom**.
- OK button:** A rectangular button labeled **OK** is located at the bottom right.
- Current Time:** The time **01:30:00 PM** is displayed in the top right corner of the interface.

Start pump and stop time can be set in any time on this function. After the current time reaches 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.

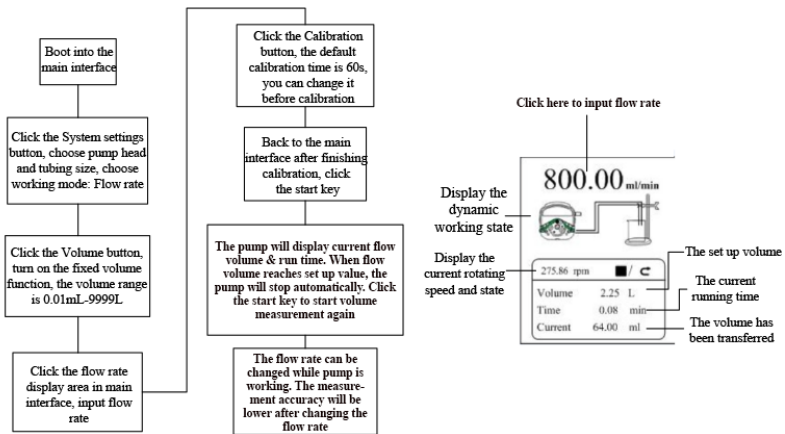
## 5. Main Functions Operation Process

### 5.1 Flow Rate Transferring Function



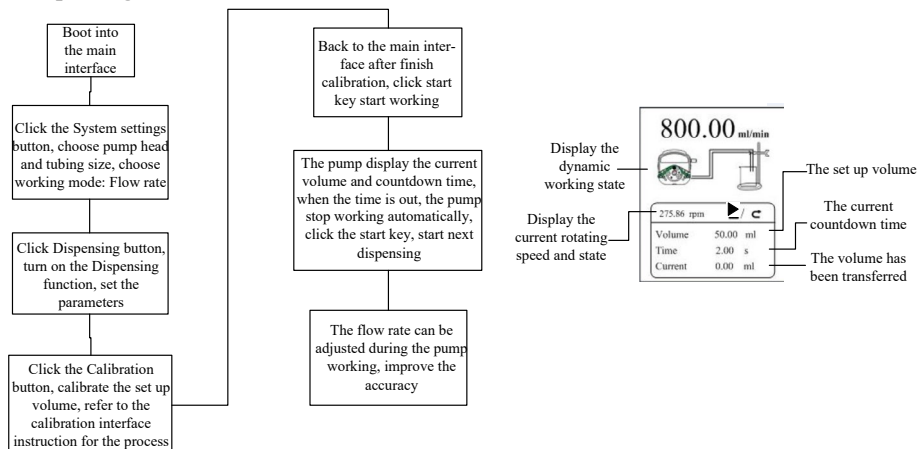
**Note:** Please refer to the flow rate calibration interface instructions for the flow rate calibration process.

### 5.2 Fixed Volume Measurement Function



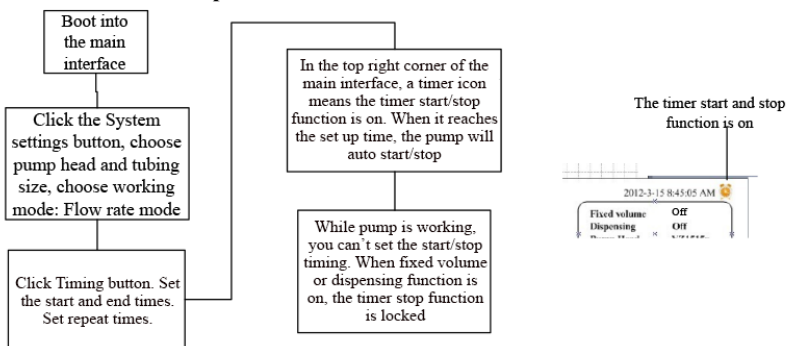
**Note:** Please refer to the flow rate calibration interface instructions for the flow rate calibration process.

### 5.3 Dispensing

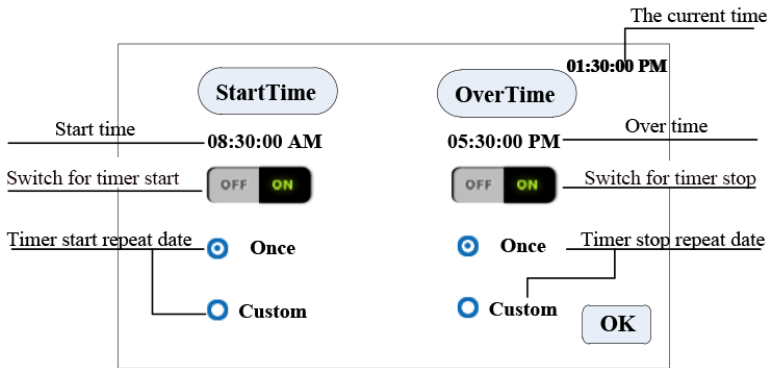


**Note:** Please refer to the flow rate calibration interface instructions for the flow rate calibration process.

### 5.4 Timer Start and Stop Function

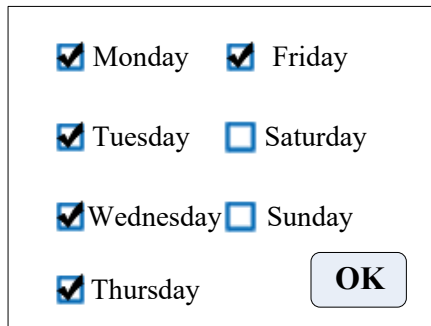


Under the flow rate transferring mode, set the pump start to 8:30 a.m. from Monday through Friday. Set the pump to stop at 5:30 p.m. using the process below:



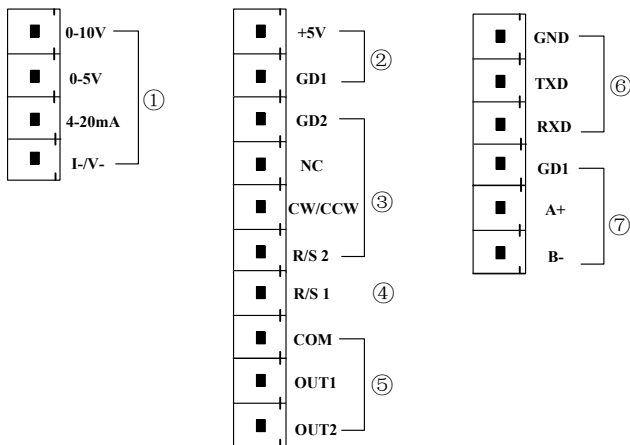
Click **Start Time**. Set the start time to 8:30 a.m. Turn the button **ON**.

Click **Custom**. The repeat date window will pop up, as below:



## 6. External Control Interface Instructions

External control interface as below:



① **Analog signal input terminal:** Choose **External speed control signal** and turn on the **Ext. Speed** in the external control settings interface to 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 prohibited. Incorrect 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

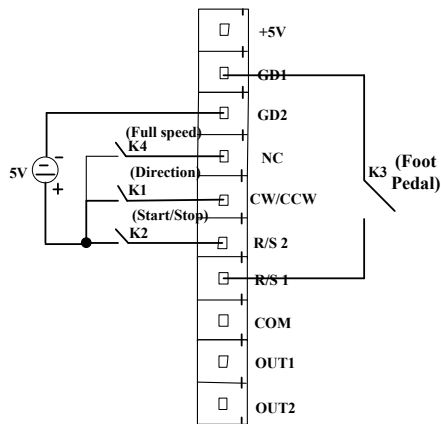
**R/S 2:** External control start/stop signal input

Set up the external control mode in the settings interface. Turn on the corresponding external control function to make the external control signal 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 the external settings interface - foot pedal option.

The external control wiring diagram is as follows:



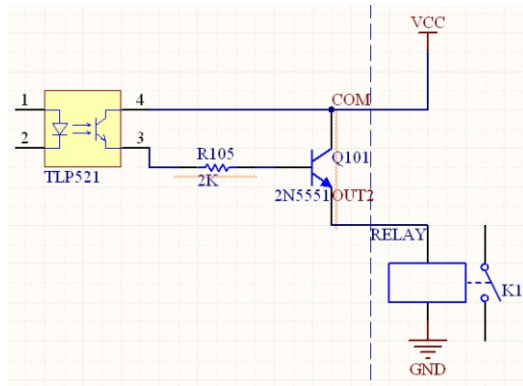
- a. **In Pulse mode:** Short connect K2 then disconnect for the motor to start running. Short connect and disconnect again for the motor to stop running. **In Level mode:** Short connect K2 for the motor to start running. Disconnect K2 for the motor to stop running.
- b. **In Pulse mode:** Short connect and then disconnect K1 once for the motor to change working direction once. **In Level mode:** Short connect K1 for the motor to run clockwise. Disconnect K1 for the motor to run counterclockwise.
- c. **In Pulse mode:** Short connect K3 then disconnect for the motor to start running. Short connect K3 and disconnect again for the motor to stop running. **In Level mode:** Short connect K3 for the motor to start running. Disconnect K3 for the

motor to stop running.

- d. In **Pulse mode**: Short connect K4 for the motor to run at full speed. Disconnect it for the motor to stop.

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

Output motor working status as below:



If connecting with relays, when the motor runs, K1 connects. When the motor stops running, the K1 disconnects.

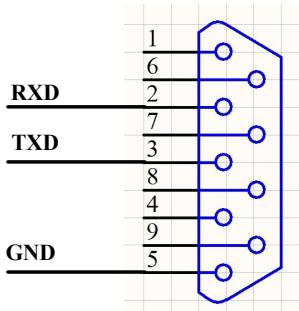
- ⑥ **RS232 Communication**: Choosing RS232 in the communication settings interface makes this terminal active.

**GND**: Communication ground terminal.

**TXD**: Master sending: Peristaltic pump receives terminal signal.

**RXD**: Peristaltic pump sending: Master receives terminal signal.

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



⑦ **RS485 Communication Interface:** Choosing RS485 in the communication settings interface makes this terminal active.

**GD1:** RS485 signal ground

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

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

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



## 7. Technical Specification

Flow rate resolution	0.01 ml/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	KA-DISP 1, KA-DISP II, KA-DISP 1-III	0.1-150rpm	
	KA-DISP 3, KA-DISP 3-II, KA-DISP 3-III	0.1-350rpm	
	KA-DISP 6, KA-DISP 6-III	0.1-600rpm	
Power consumption	KA-DISP 1, KA-DISP 1-II, KA-DISP 3, KA-DISP 3-II, KA-DISP 6	<50W	

	KA-DISP 1-III, KA-DISP 3-III, KA-DISP 6-III		<80W
Motor type	KA-DISP 1, KA-DISP 1-II, KA-DISP 3, KA-DISP 3-II, KA-DISP 6		Stepper motor
	KA-DISP 1-III, KA-DISP 3-III, KA-DISP 6-III		Closed loop stepper motor
Temperature	0-40°C	Humidity	<80%

## 8. Function and Features

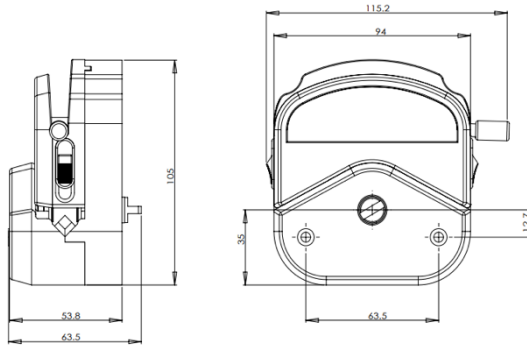
- 4.3 inch color touch screen control: Animation shows working state. The flow volume and motor speed are displayed on the same screen.
- Intelligent calibration function: It can calibrate the flow rate and dispensing volume, ensure the flow accuracy, and is suitable for high accuracy transferring liquid.
- On-line micro adjusting function: It can adjust the flow rate during production progress to avoid filling errors because of tubing fatigue and decreased elasticity.
- 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 a fixed volume within a set amount of time. It is suitable for liquid dispensing in laboratory and industrial production.
- Timer start and stop function: Pump start and stop times can be set at any time to automate control.
- Power down memory function: Store the running parameters in a timely, safe, and reliable manner.
- 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 heads, meeting different application requests.

External control start and stop: Convenient for supported equipment.

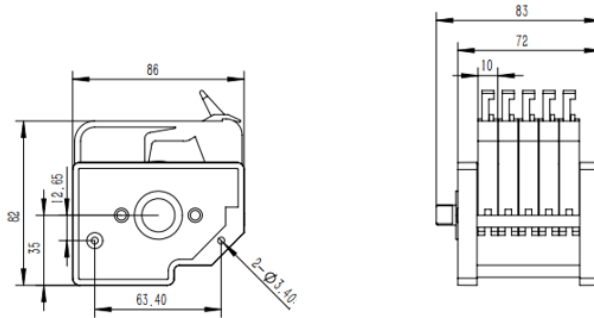
## 9. Dimension Drawing

Unit: (mm)

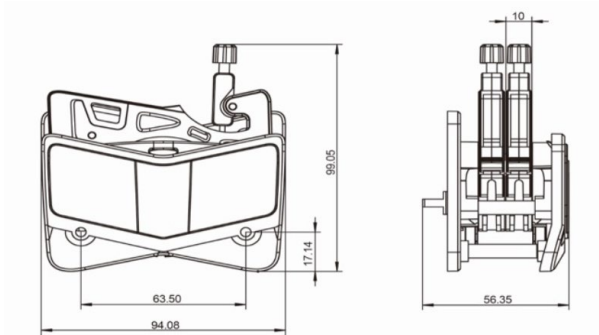
### 9.1 Single pump head



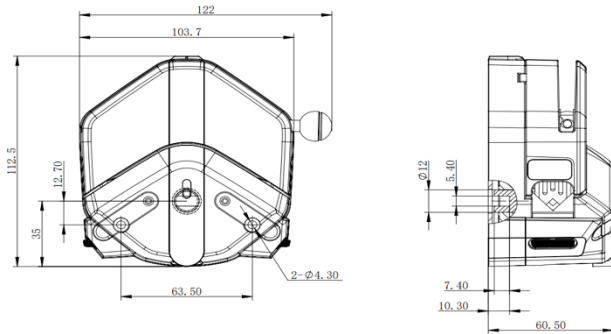
**YZ1515x pump head**



**MC pump head**

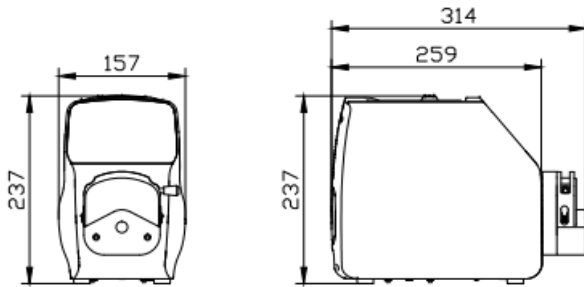


**AMC pump head**



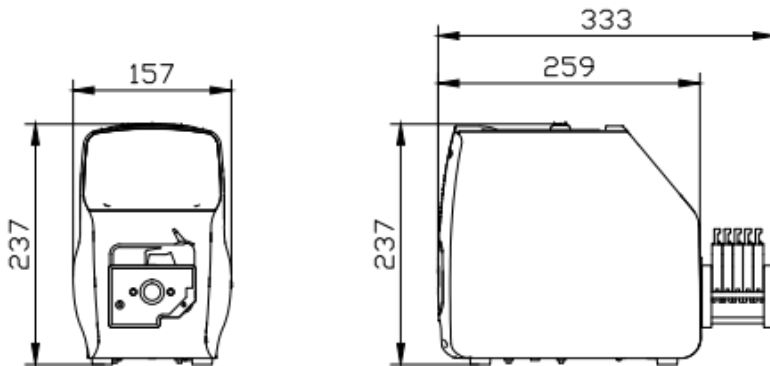
**EasyPump pump head**

**9.2 KA-DISP series product**



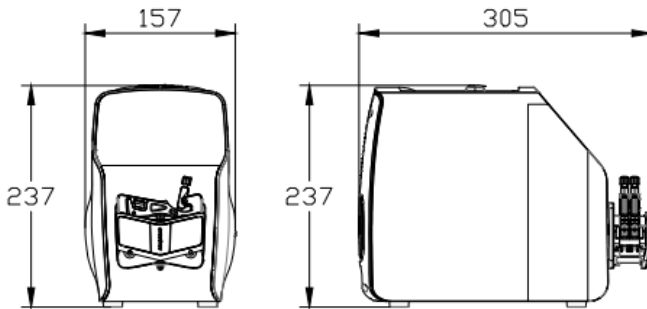
**KA-DISP + YZ15 pump head**

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



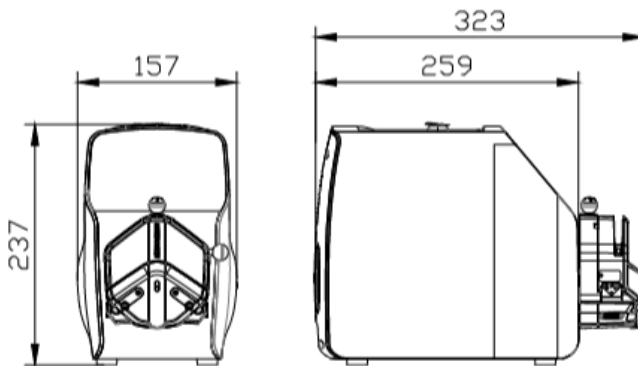
**KA-DISP + MC pump head**

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



**KA-DISP+AMC pump head**

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



**KA-DISP+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 if it appears.
- Clean liquid overflowed from the pump as soon as possible.
- Please turn off the power supply and unplug the power socket (hold the socket instead of power cord) when liquid splashes on pump. Check whether liquid flows into the machine. If it does, please contact the manufacturer.
- 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 a ground wire and reliable grounding.
- This product has no waterproof measures. Please take protective measures when using in a 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 is not used for a long time, please clean it and keep it in a dry and ventilated environment.
- The company shall not bear the direct or indirect losses caused by the malfunction or improper operation of this product.



## 11. Warranty and After-Sales Service

We support a three-year 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.



### **Flow Controller Systems**

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