Flow Controller Systems

FCS PDS II Product Manual

2950 Buskirk Ave, Suite 300, Walnut Creek, CA 94597
925-516-4459 | justin@fcs-us.net
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.

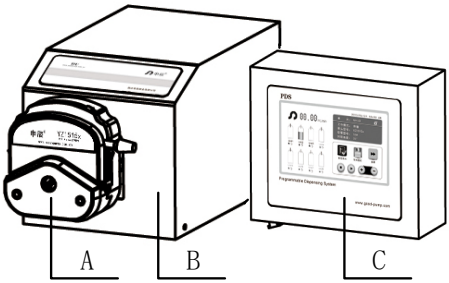
Catalogue

1. Product Introduction

PDS (Programmable Dispensing System) series consists of a controller and multiple independent dispensing units. Each filling unit can be used as a single peristaltic pump to realize liquid transmission or distribution filling. One unit sets up a group dispensing according to a user's requirement. Multiple units work independently by transmitting at different flow rates or distributing a variety of liquids at the same time.

The PDS system adopts 7 inch industrial true color LCD screen and touch screen control, and has the function of intelligent calibration and online micro adjusting. There are various external control modes options, and the product supports RS232/RS485 communication interface and standard MODBUS communication protocol to realize remote control under various industrial conditions. It is suitable for non-polluting, high accuracy transferring liquid, and the transmission accuracy can reach 0.5%-1%.

2. Product Appearance

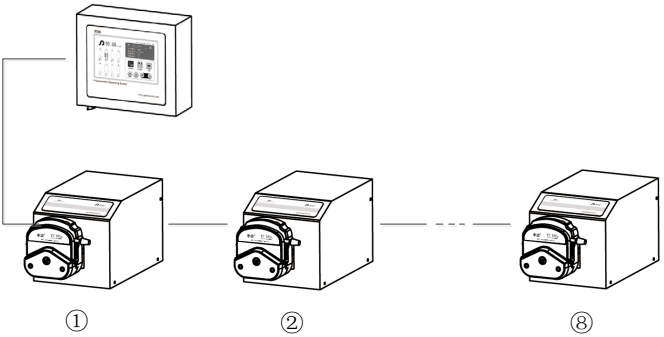


Composition: A——Pump head
B——Filling unit
C——Controller

3. Product Composition

One controller with multiple independent filling units. The number of filling units can be increased or decreased arbitrarily according to needs, and the effectiveness of the matching filling units can be set at will to meet different production needs.

Schematic diagram of cascading multiple filling units

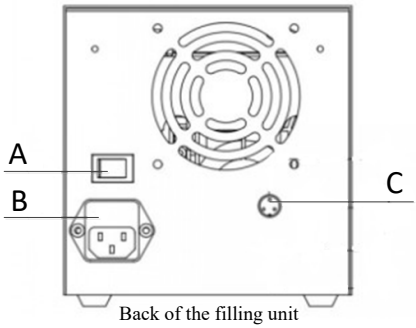


Cascading instruction:

1) All the filling units (Independently) are connected to the controller, the controller has a separate interface for each filling unit.
2) One controller can control a maximum of 8 filling units.

4. Connection Interface Instruction

Filling unit connection interface description



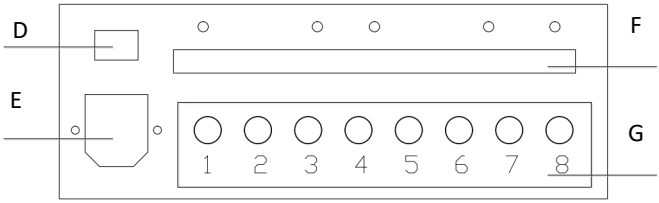
Back of the filling unit

Interface Specification: A——Power switch

B——Power socket

C——Interface controller connecter (G)

Controller interface description



Back side of controller

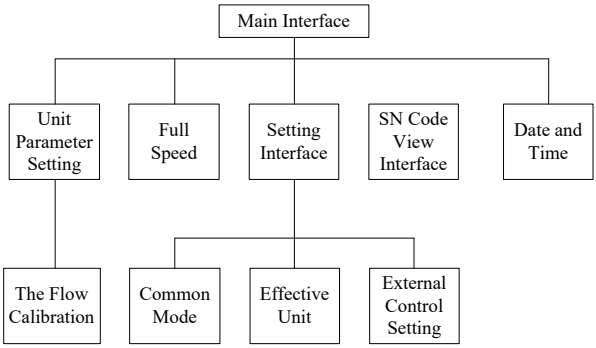
D——Power switch

E——Power socket

F——External control input interface

G——Connect Interface to Filling Units (C)

5. Interface Structure Diagram



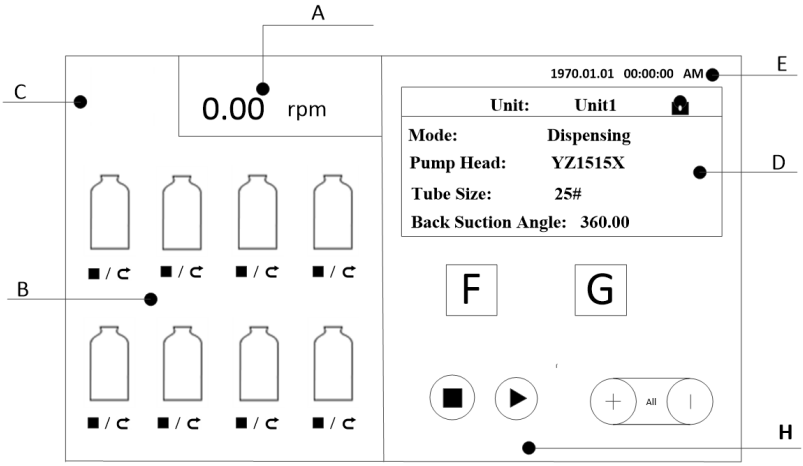
PDS series interface operation instructions

5.1 Boot interface

After the system is powered on, it enters the boot interface, click any position or wait for 2.5 seconds, the system will automatically enter the English main interface.

5.2 Main interface

The main interface structure is as shown below



A. **Speed display**: The interface will loop display the speed of the effective units every 5 seconds.

B. **Real-time animation display**: Display the working state of each unit in real time. Animation displays monitor results, and also has alarm function. If one of the bottles has a red alarm signal, the corresponding unit is out of fluid, please check the production line; when the unit is stopped, click the bottle to enter the corresponding unit parameter setting interface.

a. When the unit is in dispensing mode, you can click the bottle to enter the parameter checking interface, and adjusting flow rate online.

b. When the unit is on transferring mode, you can click the bottle to enter the parameter setting interface, in this condition you can only change the flow rate, speed and direction, other parameters can't be modified.

c. If the unit is not the effective unit, it will highlight errors when clicking the bottle.

C. **SN code view interface**: Click to view the SN code of the machine.

D. **Parameter display**: This area will loop display the system settings of the effective units every 5 seconds. Click the lock sign in the upper right corner to lock the current unit and stop loop display.

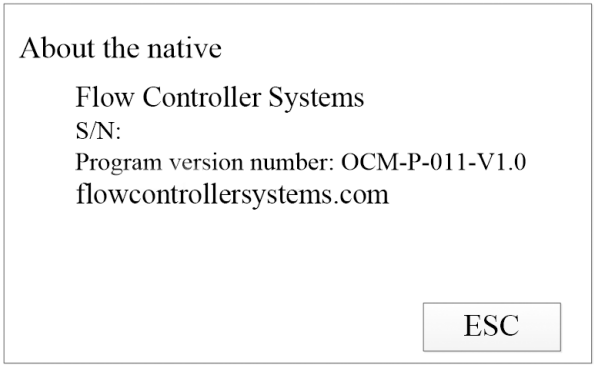
E. **Date and time display**: Real-time display the Date/Time, and click to set the parameters.

F. **Step button**: Click this button to enter the logical steps checking interface.

G. **Full speed button**: Click this button to enter the full speed interface.

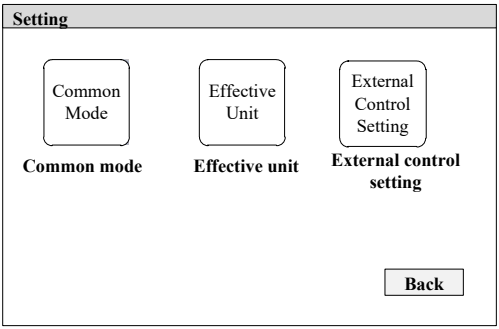
H. **Start-stop selection area**: This area can start or stop the unit operation.

5.3 About the native interface



Click on the logo at C on the main interface to enter this interface, and you can view the relevant information of the machine.

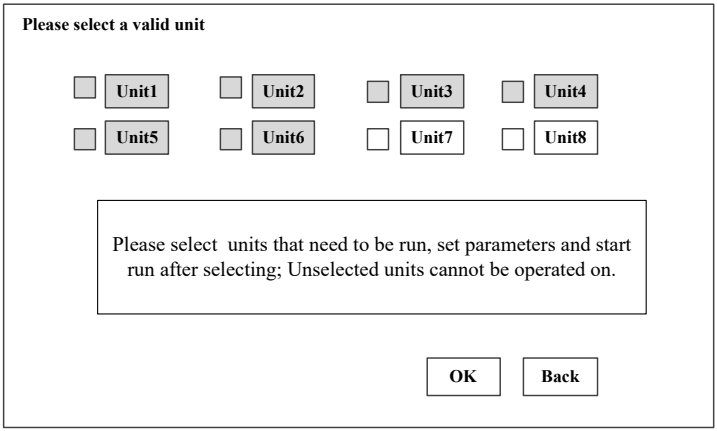
5.4 Setting interface



Click the **Setting Interface button** in the main interface to enter the setting interface.

5.5 Effective unit interface

The effective unit interface diagram as below

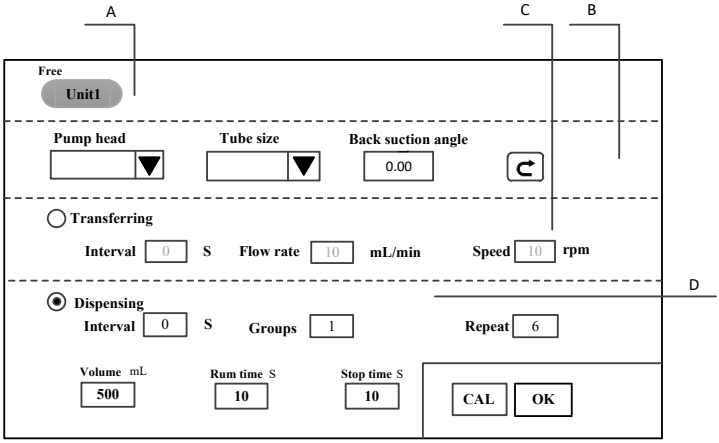


Click **Setting Interface button** in main interface enter to setting interface, then click **Effective unit** button in this interface to enter the effective unit selection interface, you can set the validity of the unit here. Once finished with the settings, you can click the "OK" button to return to the main interface. Having any operational units will prevent the modification of any other units from this interface.

Note: Selecting effective unit is the first step to set parameters, you can only operate on the effective units.

5.6 Parameters setting interface

The diagram of parameters setting as below:



When the unit stops working, click the bottle to be selected as the independent effective unit to enter the parameter setting interface of the corresponding unit.

A. **Unit number display**: This area displays the current parameter setting unit number.

B. **System parameter setting**: This area is for setting the system parameters of this unit, it includes the pump head, tube size, back suction angle and direction. If the pump head or tube changed, then it will recalculate the parameters and the calibration data will resume to default setting.

C. **Transferring working mode parameter setting**: This area is for setting the transferring parameters, click the " ◯" sign to select this mode and set the start delay, flow rate and speed of this unit under transferring working mode.

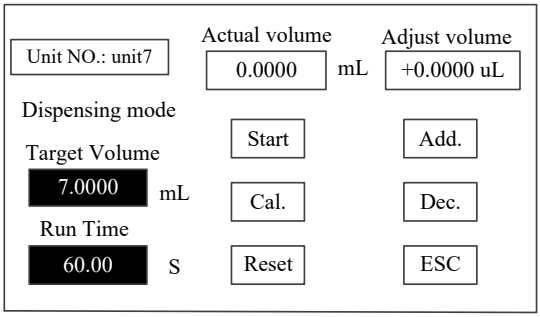
D. **Dispensing working mode parameter setting**: This area is for setting the dispensing parameters of the unit, click the " ◯" sign to select this mode and set the parameters of this unit under dispensing working mode. The repeat

times range is 1-9999, enter 0 for unlimited repetitions. After the parameters are set, click the **OK button** to return back to the main interface, click the **Start button** to run.

E. **Calibration button**: Click this button to enter the independent running flow rate calibration interface, you can calibrate the flow rate of an independent operating unit.

5.7 Flow rate calibration interface

The calibration interface is as shown in the figure below



In the independent operation parameter setting interface, click the **Calibration button** to enter the calibration interface.

In the dispensing mode, first click the **dispensing groups** drop-down list, the **target volume** and **running time** are the previously set data and cannot be modified.

In the transferring working mode, the target volume is the calculation result of the flow rate and the current running time, and cannot be modified; the default **running time** is 60S, click to modify.

Calibration process before working is as below:

A. Set **working time** (in transferring working mode).

B. Click the **start button** to start the test and display the dispensing time countdown. It will stop automatically and a numerical keyboard will display, you can input the actual dispensing volume. Click the OK button and it will ask whether to continue the test (suggested is 3 times). If you choose 'YES' it

will test again; choose 'NO' and it will take you back to the calibration interface.

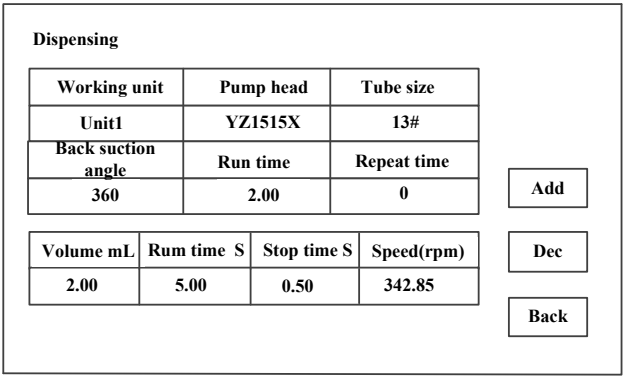
C. After several tests, the **actual dispensing volume** display area will display the average value of the tested multiple sets of actual filling volume. Click the **calibration button**, it should display calibrate successful.

D. Test again to check whether the dispensing volume meet requests. If you need higher accuracy, you can click **Add** or **Dec** button to micro adjust the dispensing volume in order to meet high accuracy dispensing requests.

E. Clicking the **Reset button** will restore the factory default correction parameters.

5.8 Dispensing parameter view interface

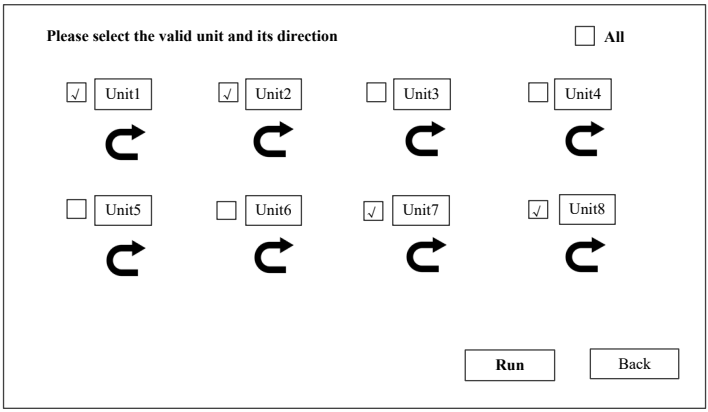
Dispensing parameters to view the interface as follows:



In dispensing working status, click the working bottles in the main interface to enter this interface. In this interface the user can check the current unit setting parameters and dispensing data. Clicking the **Add** or **Dec** button can online adjust the dispensing group. Clicking the **Back** button brings you back to the main interface.

5.9 Full speed interface

Full speed interface shown as below



Click the **Full speed button** on the main interface to enter the full speed interface. After selecting the direction and unit number of the unit in this interface, click the **Full speed button**, and the selected unit will run at full speed in the selected direction. Clicking the **Select All button** will select all the units. If the running unit is in the transferring mode, the unit can be selected, but the direction cannot be changed; if the running unit is in the dispensing mode, then the unit cannot be at full speed.

5.10 Common mode interface

Common Mode Interface in Independent Working Mode:

Common mode 01 | Save mode | Detail parameters

Unit	Pump head	Tubing	Back suction angle	Mode	Flow rate	Volume ml	Run time
1	YZ1515X	13#	360.00	Transfer	7.00ml/min	--	--
2	YZ1515X	16#	0.00	Dispensing	90.00ml/min	45	30.00 S
3	--	--	--	--	--	--	--
4	--	--	--	--	--	--	--
5	--	--	--	--	--	--	--
6	--	--	--	--	--	--	--

<< | Call | Delete | Clear | Back | >>

In the main interface click the **Setting Interface button** to enter the setting interface then click the **Common mode button** to enter the common mode interface.

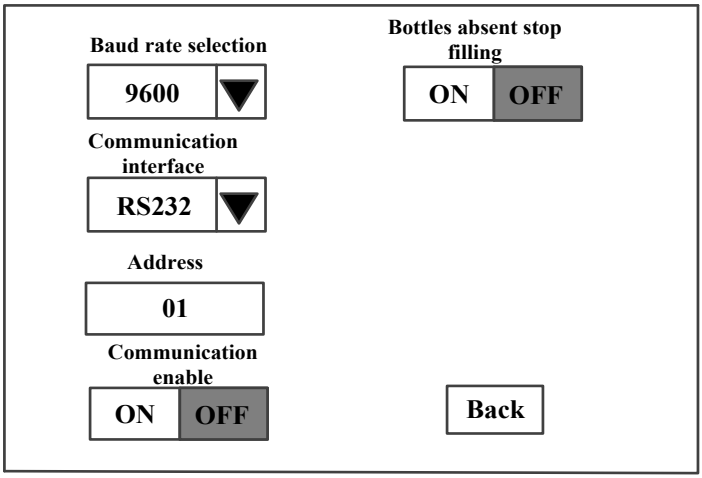
- **Call button**: Click this button to call the common mode. The operating parameters of the corresponding unit after the call will be changed to the parameters of the commonly used mode.
- **Delete button**: Select a common mode then click the delete button. This will pop-up a dialog box asking whether to delete the dialog box. Click 'yes' to delete this model.
- **Clear button**: Clicking this button will pop-up a dialog box asking whether all

are empty. Click "yes" to clear all mode.

- **Back button**: Click this button to return to the system settings interface.
- **Add and subtract the page button**: If you have more than one common mode you can click on this button to view the previous page or the next page of commonly used mode.
- **Save mode button**: Click this button to save the current parameters of all independent operation units as common mode, which is convenient for users to call in order to save the time of setting parameters. Up to 5 groups can be saved.
- **Detailed parameter button**: After selecting a certain allocation mode unit in the table below, click this button to view the detailed parameters of the allocation unit.

5.11 External control setup interface

The external control settings interface is shown below:



Click the **Setting Interface button** in the main interface enter to the setting interface. Click the **External control setting button** to enter the external control setting interface. In this interface, you can set the communication data and missing bottle

stop filling function.

The product supports MODUBS communication protocol, RTU mode, first select the communication baud rate and communication interface (RS485 or RS232), click the local address button, enter the peristaltic pump address number (range 1-32), select the communication enable as ON, the pump can communicate with the host computer at this time, and receive the signal control from the host computer.

Note: After the setting is completed, the peristaltic pump can only receive communication signal control under the main interface, and the communication control of other setting interfaces is invalid.

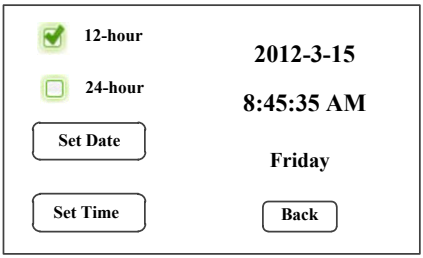
This product supports missing bottle stop filling function. Turn the bottles absent stop filling on, then the pump can receive the missing bottle stop filling signal. When the pump receives this signal, the pump will stop working and alarm.

5.12 Start/stop operation area

Click right side **Add** or **Decrease** button, then you can choose the unit. “All” will operate all effective independent working units.

5.13 Set date time interface

Set date and time interface shown as below



Click the **Time and Date** in the upper right corner of the main interface, enter the date and time setting interface.

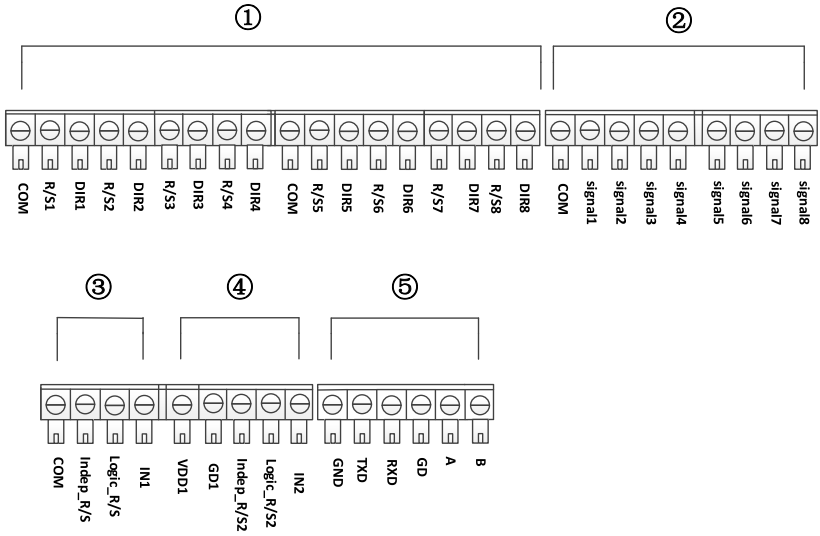
This interface can be set to the current date and time, and display in the upper right

corner of the main interface.

Click **set date button**, a pop-up of the annual set digital keyboard will display, set the year range for 1970-2099. After setting, click the OK button to enter month and day using their own pop-up keyboards. Click the **set time button** and a pop-up digital keyboard will display to set the hours, minutes, seconds in turn.

6. External Control Interface

The external control interface shown as:



① **Independent start/stop signal**: Active signal input (5-24VVDC)

COM: External control signal input common.

R/Sn: The start/ stop signal line of filling unit n (signal rising edge effective, high level duration is 200ms).

DIRn: The change direction signal line of filling unit n (signal rising edge effective, high level duration is 200ms)

②**Missing Bottle Stop Filling Signal**: Active switch signal input (5-24VVDC)

Signal recognition as high level effective.

COM: External control signal input common port.

SignaIn: Missing bottle stop filling signal line. (Signal high level is effective).

③ **All start and stop signals**: Active signal input (5-24VVDC)

The signal is recognized as valid on the rising edge, and the minimum duration of high level is 200ms.

COM: External control signal input common terminal.

Indep_R/S: All independent effective units start and stop signals.

④ **All start and stop signals** (passive signal input) and **isolated 5V output**

VDD1: Isolated 5V positive pole

GD1: Isolated 5V negative pole

Indep_R/S2: All independent effective units start and stop signals, short-circuited Indep_R/S2 and GD1, start all independent effective units, short-circuited again, stop all independent effective units.

⑤**Communication interface**

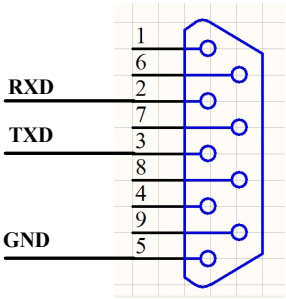
TXD, RXD, GND: RS232 communication interface, select RS232 in the communication setting interface, this interface is valid.

GND: Communication ground.

TXD: The host computer sends and the peristaltic pump receives the signal terminal.

RXD: The peristaltic pump sends and the host computer receives the signal.

The connection diagram with the computer RS232 communication port is as follows:



A, B, GD: RS485 communication interface, select RS485 in the communication setting interface, this interface is valid.

GD1: RS485 signal ground

A+: Connect to RS485 A+ terminal

B-: Connect to RS485 B- terminal

VDD1,GD1: 5V output.

Note:

1) Choose RS232 or RS485, the communication protocol is standard MODBUS protocol.
2) To choose RS232 or RS485, communication must be realized under the main interface.

7. Technical Indicators

Dispensing volume range	0.1-9999.99ml	Power supply	AC 220V±10% 50Hz/60Hz (Standard) AC 110V±10% 50Hz/60Hz (Optional)
Dispensing time range	0.5-9999.99s	External control	Switch signal
Pause time range	0.5-9999.99s	Communication	RS232/RS485
Liquid volume resolution	0.01ml	Temperature	0-40°C
Time resolution	0.01s	Relative humidity	<80%
Dispensing time range	1-9999, 0 is unlimited	Operation mode	Touch screen control
Back suction angle	0-360°	IP rate	IP31

8. Main Functions and Features

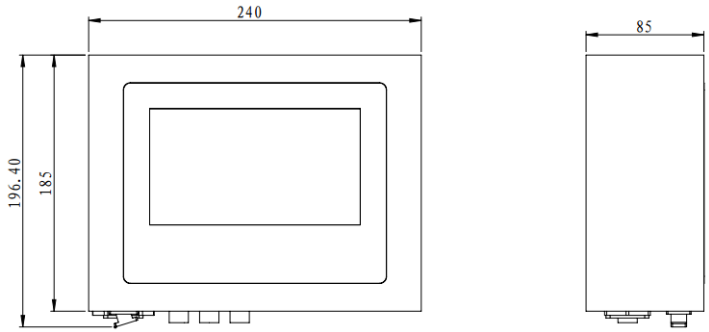
- This pump can install all models of pump heads, and the same controller can control a variety of different models of the pump head working at the same time.
- Precise angle control technology to achieve high precision filling.
- Each filling unit can not only transfer liquid but also can dispense liquid, and it can realize each different filling unit dispensing different amount of liquids at the same time.
- Color touch screen control, dynamic display filling status, display system settings for 8 cells in turn in the same screen.
- Intelligent calibration function, automatic calibration of filling volume before production, to ensure the filling accuracy.
- Online micro adjusting function to allow you to adjust the liquid volume to a certain filling unit, in order to prevent the filling error caused by the fatigue and the elasticity of the tube.
- Multiple filling units can be extended on a controller, to maximize the cost savings.
- Each unit is independently controlled and can be set with different filling parameters, start/stop independently or at the same time.
- Real-time monitoring, dynamic display monitoring results, and with alarm function, to ensure safe production.
- Effective unit setting can be opened or closed at any one or multiple filling units in order to meet different filling needs.
- Back suction angle setting helps avoid liquid drop off when the pump stops working.
- External control start/stop function, each channel can independently receive external control signal, but also all the effective channels can be start and stopped at the same time. The pump also can be unified controlled by the host computer when working in a filling line.

- Each channel can independently receive the missing bottle stop filling signal. Ensure safe production by realizing single channel missing bottle stop filling.
- Fast filling liquid function can not only wash the tubing, but it can also fill liquid in the tubing.
- 304 stainless steel housing is resistant to corrosion, will not rust, and it conforms to GMP sanitary request.

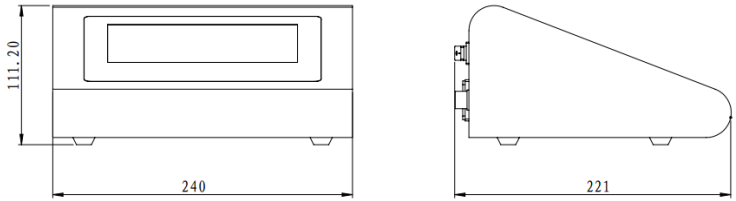
9. Dimension Drawing

Unit: (mm)

Square controller size drawing



Triangle controller size drawing



Note: Filling unit size depends on pump head.

10. Maintenance

- When the pump does not work, please loosen the cartridges from pressing the

tubing to avoiding changing the shape of tubing because of longtime extrusion.

- Pump head is not resistant to strong corrosive liquids, users should be cautious about this.
- Keep the rollers of pump head clean and dry, otherwise it can accelerate tubing wearing, reducing the useful life of tubing and cause damage to the rollers earlier.
- If there is a liquid drop on the pump, please clean it as soon as possible. Longtime moisture can damage the roller.

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.

Flow Controller Systems

2950 Buskirk Ave Suite 300 Walnut Creek CA 94597

Tel: 925-516-4459

Website: flowcontrollersystems.com

Email: justin@fcs-us.net