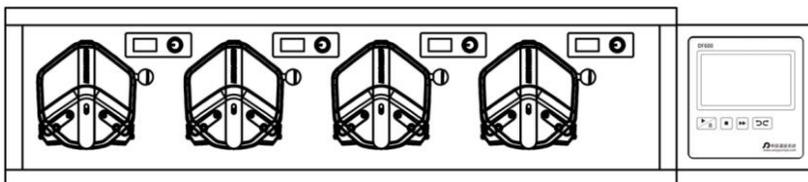


# Shenchen Precision Pump Manual of DF Plus



**Note:**

- Please read the manual carefully before operating the product.

**Warning:**

- 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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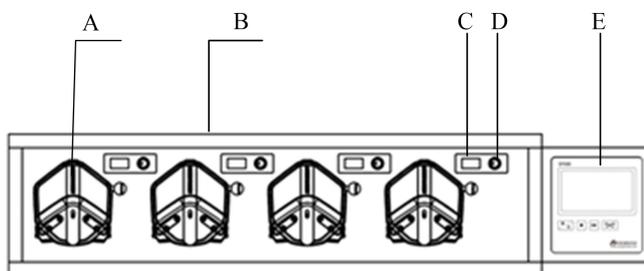
## 1. Product Introduction

The DF Plus series are a high-precision, low-pulsation intelligent filling system which are consist of a controller and an integrated filling units. Each group integrates 4 filling units. One controller can control 8 groups and a total of 32 filling units at the same time. It adopts 4.3-inch color touch screen control, graphical interface. Animation displays working status, the filling parameters or filling times are displayed on the same screen. Filling accuracy can reach 0.1%-0.6%. Achieve high precision dispensing of micro and large metering liquids.

This series include most products: DF600 Plus, DF600 PlusII, DF600 PlusIII, DF600 PlusIV, DF350 Plus.

## 2. Product Appearance

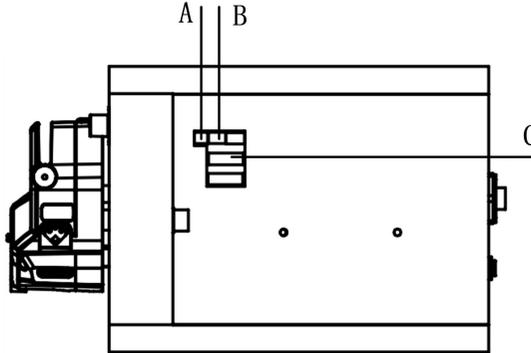
Composition instruction:



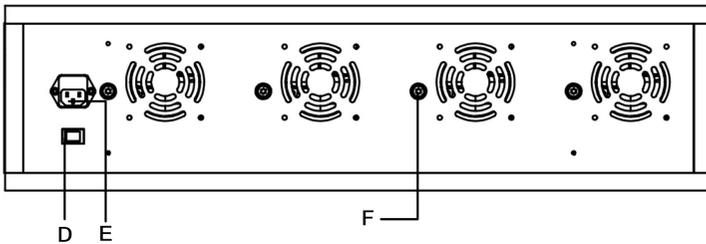
- A—Pump Head
- B—Filling Units
- C—Speed display of filling units
- D—Speed knob of filling units
- E—Controller

### 3. Interface Description

#### 3.1 Filling Units Interface Instruction



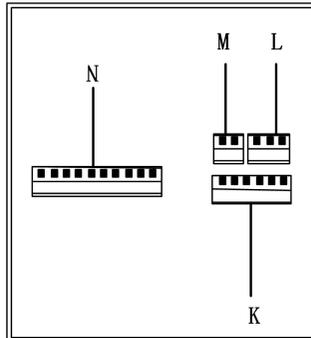
Side of the Filling Units



Back of the Filling Units

- Interface Instruction:
- A——Connect with Controller Power Supply Port (M)
  - B——RS485 Communication Interface
  - C——Connection Controller Communication Interface
  - D——Power Supply Switch
  - E——Power Supply Socket
  - F——Lack of Bottles Stop Filling Signal Input Port

### 3.2 Controller Interface Instruction



**Back of the Controller**

Interface Instruction:

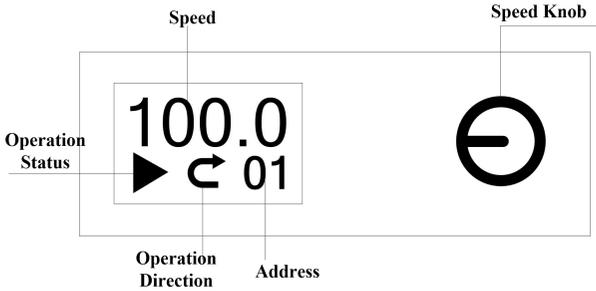
M——Power supply interface, connect with (D) port at side of filling units.

N——External control interface, external control input port.

K——Signal Port, connect with communication (F) port at side of filling units.

L——RS485 communication port. Connect with side communication port (E) of filling units.

### 3.3 Filling Unit LCD Screen Instruction



**Speed Knob:** Except for full speed and suction status, the speed cannot be modified. The rest can be modified in any mode such as pump running, stop, etc. After pressing the speed knob, the speed displayed on the left LCD screen starts to flash, at this time, if you rotate the knob in clockwise, the speed will increase, otherwise, the speed will decrease. After the modification is done, press the knob, the speed displayed on the left screen is always on, indicating that the speed modification is completed.

For controller, click the stop button for over 5 times in the main interface, and click the system settings button to enter the interface of setting filling units address. Press and hold the speed control knob to select the address number on the controller and click OK to set the address number of the corresponding filling units.

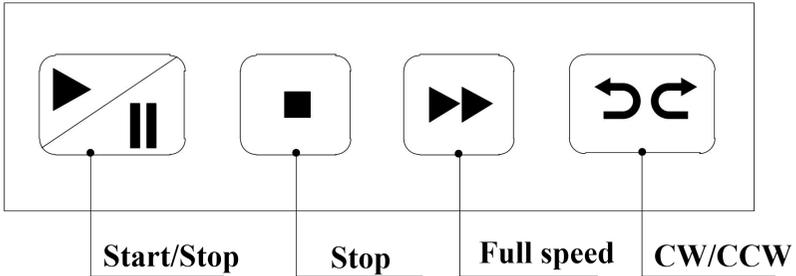
**Speed display of the filling units:** Displays the speed of every filing units.

**Operation status:** Displays four status of running, full speed, stop, pause.

**Operation direction:** Displays the operation direction of motor.

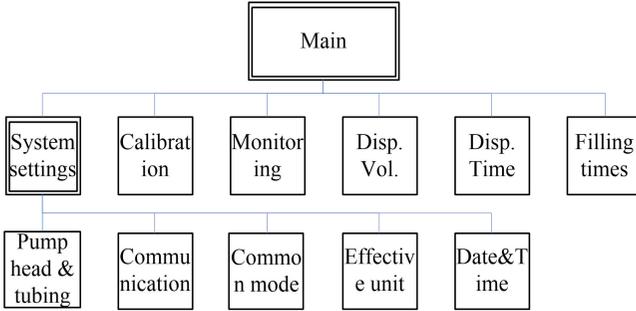
**Address display:** Displays the address number of the current filling units corresponding to the entire system.

#### 4. Controller Membrane Keypad Description



- **Start/Stop Button:** After setting up the filling parameter, press the Start/stop button, every filling units will run according to the parameters. Press the Start/stop button again, pause the current state. After clicking the Start/stop button, besides the calibration and monitor button on the main interface are colorful (available), other buttons turn gray, forbidden to use.
- **Stop Button:** Press Stop button to stop working. Forbidden buttons can be used on the main interface. Keep pressing the button and turn on the power supply at the same time, and the pump will be initialized and all the parameters will be lost.
- **Full speed Button:** Press this button at the stop state, the filling unit will run with maximum speed. This button can be used to wash tube and fill liquid rapidly.
- **CW/CCW Button:** Press this button once at the stop state, the motor will change running direction once.

## 5. Operation Interface Structure Diagram



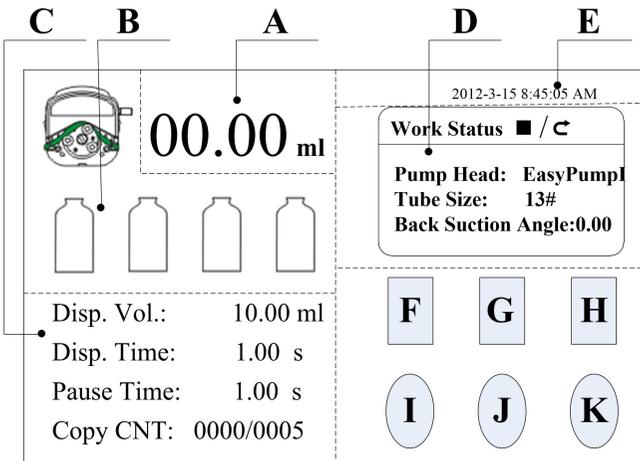
### DF Plus Controller Operation Interface Instruction

#### 5.1 Boot Interface

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

#### 5.2 Main Interface

Main Interface Composition as below:



A. **Real-time Display Filling Volume:** After starting filling, the total current

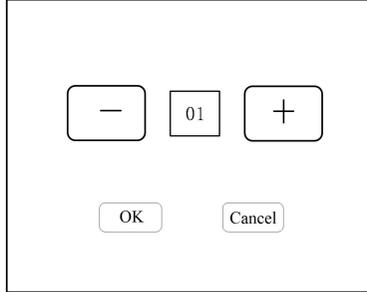


filling volume will be displayed in real time.

- B. **Real-time Dynamic Display:** Display the filling unit working state in real-time, animation shows monitor results, and has alarm function. If one of the bottle appear red alarm signal, means the relevant filling unit error, please check the communication connection. Starting from the left, the first bottle filling unit number corresponding to No.1/5/9/13/17/21/25/29, the second bottle filling unit number corresponding to No.2/6/10/14/18/22/26/30, the third bottle filling unit number corresponding to No.3/7/11/15/19/23/27/31, the forth bottle filling unit number corresponding to No.4/8/12/16/20/24/28/32.
- C. **Real-time Parameter Display:** Display the set filling volume, countdown filling time, countdown pause time, and filling numbers.
- D. **Set Parameter Display:** This area display filling unit current working state, pump head, tubing size and back suction angle etc.
- E. **Date and Time Display:** Display the current date and time, they can be amend in system settings.
- F. **System settings Button:** Press this button enter system settings interface, include set the pump head and tube size, set the back suction angle, choose and set common filling mode, set effective filling unit, set current date and time.
- G. **Flow Calibration Button:** Press this button enter calibration interface.
- H. **Real-time Monitor Button:** Press this button enter monitor interface.
- I. **Filling Volume Button:** Press this button, the numerical keyboard comes out, input the filling volume here.
- J. **Filling Time Button:** Press this button, the numerical keyboard come out, input the filling time. Click confirm, it will ask whether continue to input the pause time, choose 'YES', you can input the pause time, choose 'NO', back to the main interface.
- K. **Filling Numbers Button:** Press this button, the numerical keyboard come out, input the filling numbers. If input '0', the filling number is unlimited.

### 5.3 Adjust Address Interface

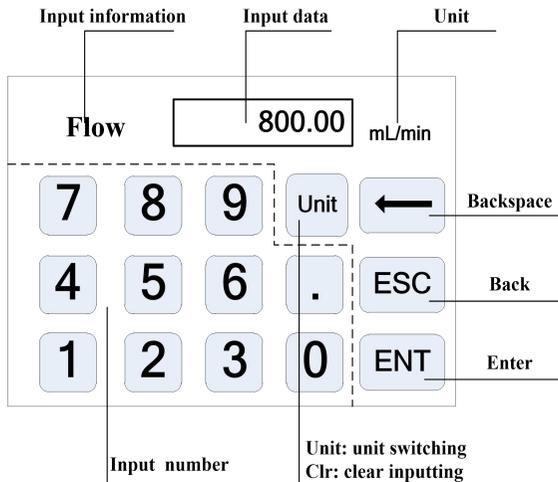
Adjust address interface as below:



In main interface press more than five times in a row and then click the system settings button in main interface to enter interface of setting address.

Click “+”, “-” button to select filling units address number (the range is 1-32). Press the speed control knob of the filling units whose address needs to be set and do not lift it. Click OK button to set the filling unit address NO. After the setting is successful, return to the setting success prompt message.

### 5.4 Digital keyboard input interface



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

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

**Display unit:** Display input units when input flow rate or in fixed volume measuring liquid.

**Input number:** Digital keypad area.

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

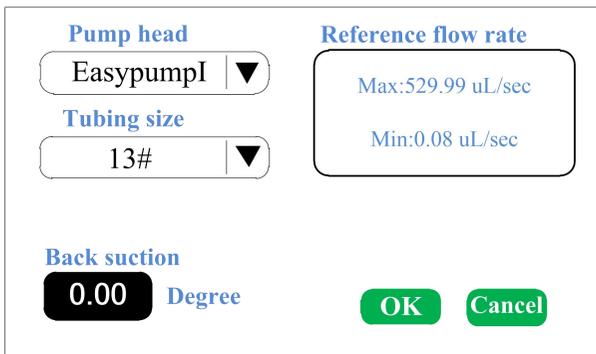
**Backspace button:** Delete an input digital.

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

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

### 5.5 Pump head & tubing interface

Pump head & tubing interface as below



**Pump head**  
EasypumpI ▼

**Tubing size**  
13# ▼

**Reference flow rate**  
Max:529.99 uL/sec  
Min:0.08 uL/sec

**Back suction**  
0.00 Degree

OK Cancel

Click **System settings** in the main interface, then click **Pump Head & Tubing button**, enter pump head and tubing setting interface.

Click Pump head and Tube Size drop-down menu, choose pump head and tube. The reference flow rate area display the max. and min. flow rate with the pump head and tubing size.

Click **back suction button**, pop up the numerical keyboard, input the back suction angle and click **OK button**. All filling units are set with this suction angle. Click **Cancel** back to the system settings interface.

**Note that:** When the pump come with two pump heads, 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 use 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:

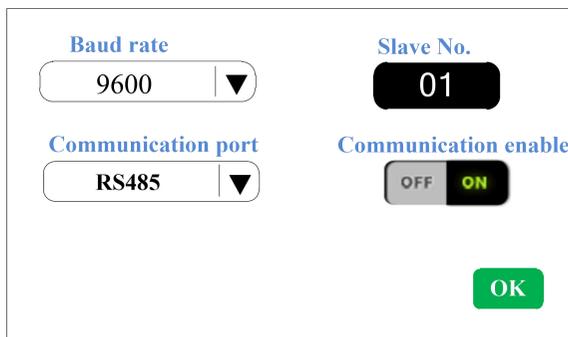
2\*Easypum pI ▼

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

Easypum pI ▼

## 5.6 Communication Setting Interface

Communication Setting Interface as below



The screenshot shows a communication settings interface with the following elements:

- Baud rate:** A dropdown menu showing '9600'.
- Slave No.:** A black button with the white text '01'.
- Communication port:** A dropdown menu showing 'RS485'.
- Communication enable:** A toggle switch with 'OFF' on the left and 'ON' on the right.
- OK:** A green button with white text.

- This interface is for the communication between controller and HMI. The communication between controller and pump only need to change the filling unit address. Controller just need to choose the relative effective unit. When you change the slave address need to be re-powered to take effect.
- Click **Setting button** in the main interface, then click **Communication button** to enter Communications Setting interface.

- This pump support MODBUS--RTU Mode. Please select baud rates and communication interface (RS485). Click Slave No. button to enter peristaltic pump address No.(range:1-32 ), select communication enable is ON. Then this pump can be communication with controller, receiving HMI signal.

**NOTE: After finishing setting, the peristaltic pump receive the communication signal only in main interface, it is invalid in other interface.**

### 5.7 Common Mode Interface

Common mode interface as below

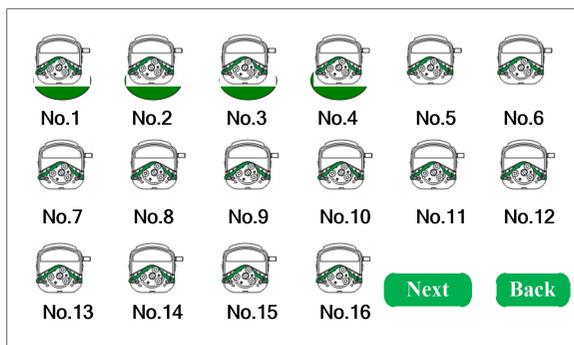
Pump Head	Tube	Disp. Vol. (mL)	Disp. Time (s)	Pause Time (s)	Back suction (°)
EasypumpI	14#	2	1	2	0
EasypumpI	16#	7	1	2	0

«
**Add**
**Del.**
**Clear**
**OK**
**Cancel**
»

Click **System settings** button on the main interface, click **Common Mode** button, enter choose common mode interface.

- **Add Button:** Click this button to add one common mode, it can save 60 modes.
- **Delete Button:** Choose one common mode button, click **Delete** button, it will ask whether delete, click 'YES', then you can delete this mode.
- **Clear Button:** Click this button, it will ask whether empty all, click 'YES', then empty all the common mode.
- **OK Button:** Choose one of the common mode, click '**OK**' button, then it will back to the main interface. The filling parameter is same as the one you choose from the common mode.
- **Cancel Button:** Click this button back to the system settings interface.
- “<<”, “>>”: Check the previous and next page common mode.

### 5.8 Choose Effective Unit Interface



Click the **System settings** button on the main interface, click **Effective Unit** button to enter Effective Unit setting interface.

You can choose the effective filling unit freely, click pump head icon to make the relevant filling unit effective or noneffective. There is a green shadow under the pump head icon when it is valid as in the above picture No.1, No.2, No.3 and No.4. No shadow when invalid.

This function can turn on or turn off one or several filling units when using it, to meet different requests of the filling channel. Click **Back** button, back to the system settings interface.

### 5.9 Date and Time Setting Interface

Date&Time Setting Interface as below:



12-hour  
 24-hour

Date

Time

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

Back

Click **System settings** button on the main interface, click **Date & Time** button, enter date and time setting interface.

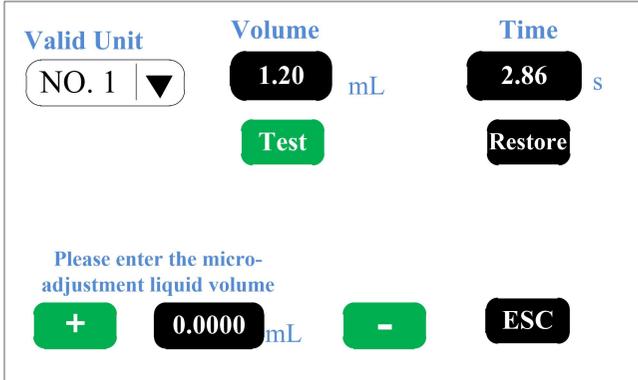
You can set the current date and time, it is displayed on the top right corner on the main interface.

Click **Set Date** button, the numerical keyboard comes out, input the Year, setting year range is 1970-2099. After input the year, click OK to set the month and day.

Click **Set Time** button, the numerical keyboard comes out, input the hour, minute and second.

### 5.10 Flow Calibration Interface

Flow calibration interface as below:



First, click the **Valid Unit** drop-down menu, select the number of the filling unit to be calibrated. The filling volume and time are previously set data.

#### Calibration Process as below:

- A. Choose the pump head No.
- B. Click **Test** button to start the test, display countdown filling time, it will stop automatically, and the numerical keyboard comes out, input the actual filling volume and click ENT button, and back to calibration interface.
- C. Test the data again to check whether meet the requirements of filling volume. If needs higher precision, you can input the value of micro-adjustment liquid volume in the micro-adjustment area. Click “+” or “-” to achieve high precision liquid filling.
- D. Click **Restore** button, restore to the factory default calibration parameters. And the filling units need be restored individually.

#### Online Micro Adjust Filling Volume Process:

If you need to micro-adjustment without stopping the production line, you need to rotate the knob of the lower computer and directly modify the speed to reach the required liquid volume.

### 5.11 Real-time Monitor Interface

Monitor interface as below:

Address	Speed (rpm)	Instruction
01	305.25	Normal
02	298.34	Normal

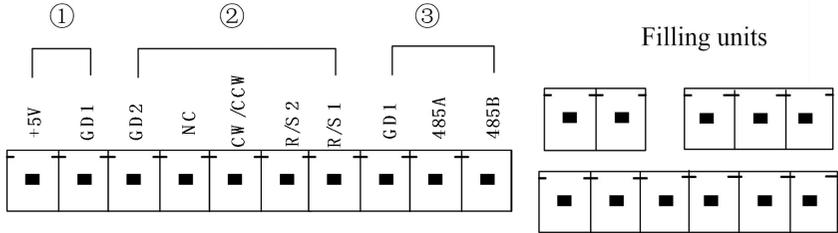
 

Click **Monitoring** button on the main interface to enter the monitor interface, check the current working state of the effective filling unit, include current speed and running status instruction. All the filling units working state cycle display on this interface, click **Pause** button to pause the cycle display, click again it will continue display.

## 6. External Control Interface Description

### 6.1 Controller External Control Interface Instruction

The green terminal on the back of the controller is the external control interface, as shown in the below picture:



- ① Internal isolated +5VDC output  
**+5V**: internal 5V output active  
**GD1**: internal 5V output negative
- ② External control signal input port (Hand-held dispenser and foot pedal are equipped by our company)

**External control direction, start/stop signal input port:** Active signal input (5-24 VDC)

The signal recognition is rising edge effective, the minimum duration of the high level is 200ms.

**GD2:** The common port of the external control signal input.

**NC:** External stop signal input ( signal rising edge effective) .

**CW/CCW:** External direction signal input (signal rising edge effective. )

**R/S 2:** External start signal input ( signal rising edge effective) .

**External control start/stop signal input port: negative signal input**

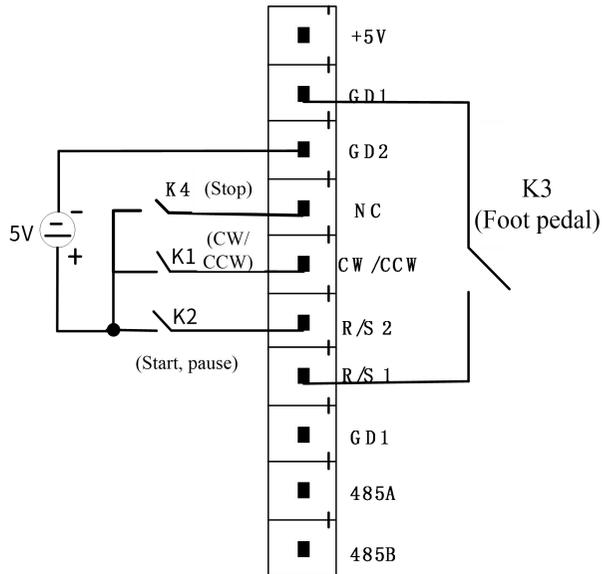
**R/S 1: External control start/stop signal**

The switch can be connected between R/S 1 and GD1, the signal is effective when

the momentary of the switch closure, then start filling.

When received this signal during operation, the device stops, this signal is received again, and the device restarts filling. This port can connect with passive switch or foot pedal. Set the validity of this input in the external control setting interface - foot switch option.

The external control wiring diagram is as follows



- (1) Short circuited K2 and then disconnect it, the motor starts, and do it again, the motor pauses.
- (2) After short circuited K4, the motor stops running.
- (3) Every time disconnect the K1 after short circuited, the motor direction changes once;
- (4) Disconnect K3 after short circuited, the motor starts, and disconnect again after short circuited, the motor stops running.

③ **Communication interface:** Select RS485 in the communication setting interface to realize communication between the human-machine interface and the controller.

**GD1:** RS485 signal ground.

**A+:** Connect RS485 converter A+ terminal.

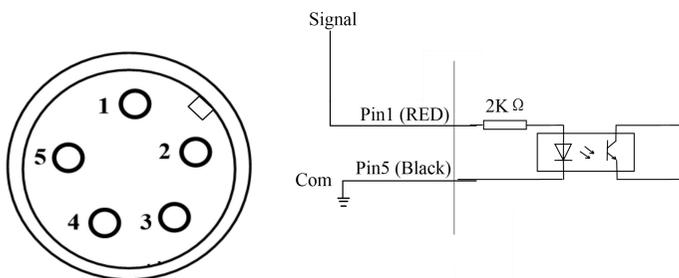
**B-:** Connect RS485 converter B- terminal.

**Note that:** When leaving factory, the wiring terminal will be plugged in the external control port, if you need to use other external control devices from our company, like: foot pedal, hand-held dispenser etc, please unplug the wiring terminal, and then plug the external control device.

## 6.2 Description of the external control interface of the filling unit

### ① Lake of bottles stop filling signal interface description

The 5 pin aviation plug port on the back of filling unit. Port B of the filling unit port instruction.



This signal is optocoupler isolation signal, as in the above picture, when the optocoupler turns on, the missing bottle stop filling signal is effective. The filling unit does not work. When optocoupler off, the filling unit work normally.

**Pin1 (red wire) Signal:** filling unit lacking bottle stop signal line

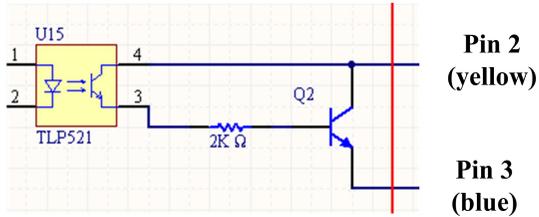
Signal is connected to the sensor signal output that detects the lack of bottle (the default is 24VDC sensor).

Pin5 (black wire) Com: The negative end of the sensor.

### ② Filling completion signal interface description

The pin 2 (yellow line) and the pin 3 (blue line) of the 5-pin aviation plug on the back of the filling unit are the output signal interface of the filling unit, and the filling is completed once, and the indication signal is output once.

The circuit board output circuit diagram is shown below



**7. Technical Specification**

Filling Volume Range	0.01-9999.99mL	Power Supply	AC 220V±10% 50Hz/60Hz (standard)
Filling Time Range	0.1-9999.99s		AC 110V±10% 50Hz/60Hz (optional)
Pause Time Range	0.5-9999.99s	Copy Time Range	1-9999, 0 is unlimited
Communication Port	RS485	External Control	Switching signal
Time Resolution	0.01s	Volume resolution	0.01mL
Environment Temperature	0-40°C	Relative Humidity	<80%
		IP Rate	IP31
Motor Type	DF600 Plus /DF600 PlusII	Stepper motor	
	DF600 PlusIII /DF600 PlusIV /DF350 Plus	Closed-loop stepper motor	
Power Consumption	DF600 Plus	Each unit<50W	
	DF600 Plus II	Each unit<80W	
	DF600 Plus III	Each unit<180W	
	DF600 Plus IV	Each unit<300W	
	DF350 Plus	Each unit<180W	



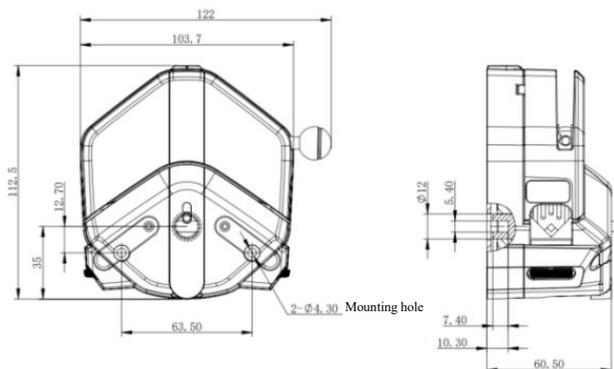
## 8. Function and Features

- It can load different pump heads.
- Accurate angle control technology, high precision filling.
- Color touch screen control, animation shows filling state, the filling parameter and system settings are displayed at the same screen.
- Intelligent calibration function, calibrate the filling volume automatically before production, to ensure the filling accuracy.
- Online micro adjustment function, you can micro adjust the filling volume during production. It can avoid the filling errors because of tubing fatigue and elasticity decreased.
- Can extend filling volume on one controller, to save cost.
- Real-time monitor, dynamic display monitor results, alarm function to ensure produce safely.
- Effective unit setting, you can start or stop one or several of the filling units during production.
- Can save 30 common filling modes, save setting times, improve working efficiency.
- Back suction angle setting range: 0-3600°, avoid liquid dropping off when the pump stop working.
- External control start and stop.
- Each channel receives missing bottle stop signal separately, to make the single channel can stop when missing bottles.
- Fast filling liquid function, not only can wash the tubing, but also can fill liquid in the tubing.
- 304 stainless steel housing, resist corrosion, no rust, conform to GMP sanitary request.
- Standard Modbus communication protocol for remote control under various conditions

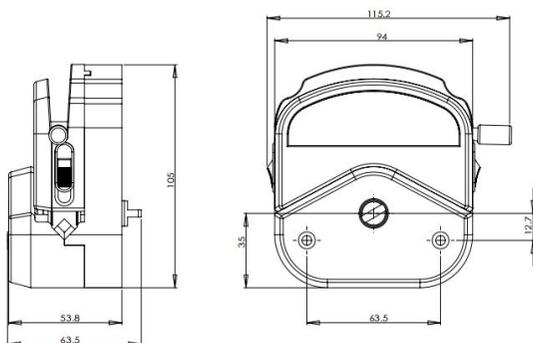
## 9. Dimension Drawing

Unit: (mm)

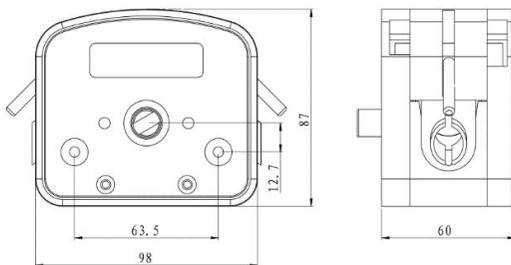
### 9.1 Single pump head



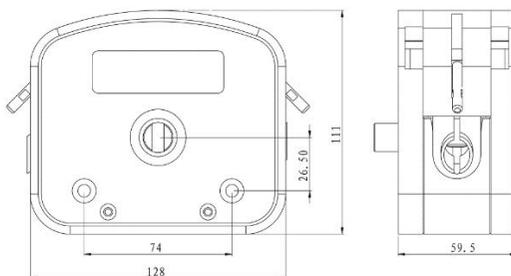
EasyPump pump head



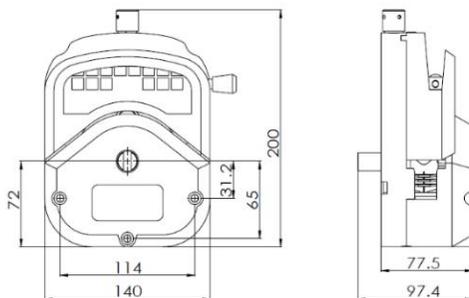
YZ15 pump head



**DZ25-3L pump head**

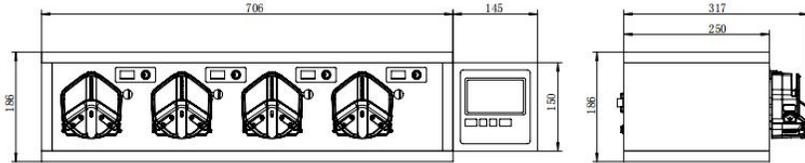


**DZ25-6L pump head**



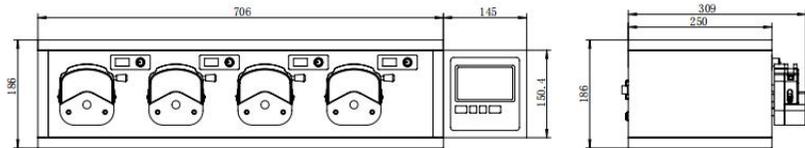
**YZ35 pump head**

## 9.2 Product Appearance dimension drawings



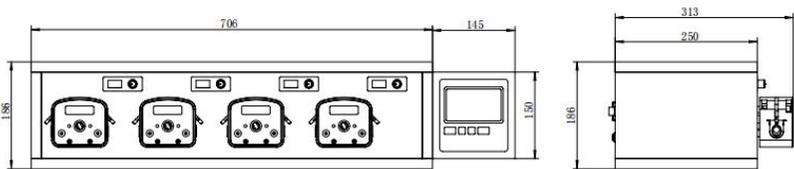
DF600II 4FU-EasyPump

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



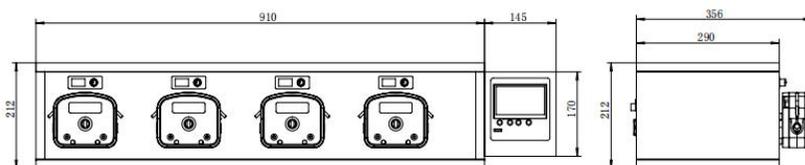
DF600 4FU+YZ15(25) 15X dimension drawing

**Note:** For each additional pump head in series, the longitudinal dimension increases by 53mm.



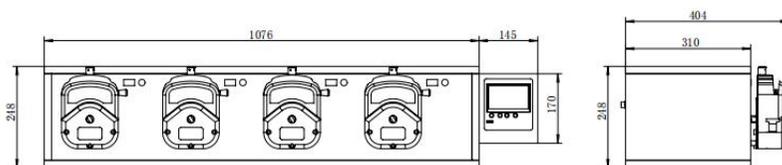
DF600II 4FU-DZ25-3L

**Note:** For each additional pump head in series, the longitudinal dimension increases by 60mm.



DF600III 4FU+DZ25-6L

**Note:** For each additional pump head in series, the longitudinal dimension increases by 60mm.



DF600IV 4FU+YZ35

**Note:** For each additional pump head in series, the longitudinal dimension increases by 78mm.



## 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 water 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

Baoding Shenchen Precision Pump Co., Ltd.

Address: No.103, Building 2, ZhiDian Industrial Park, FuXing East Road 999,  
Baoding, China. 071000

Tel: 0086-312-5958380

Fax: 0086-312- 6780636

Website: [www.good-pump.com](http://www.good-pump.com)

Email: [info@good-pump.com](mailto:info@good-pump.com)