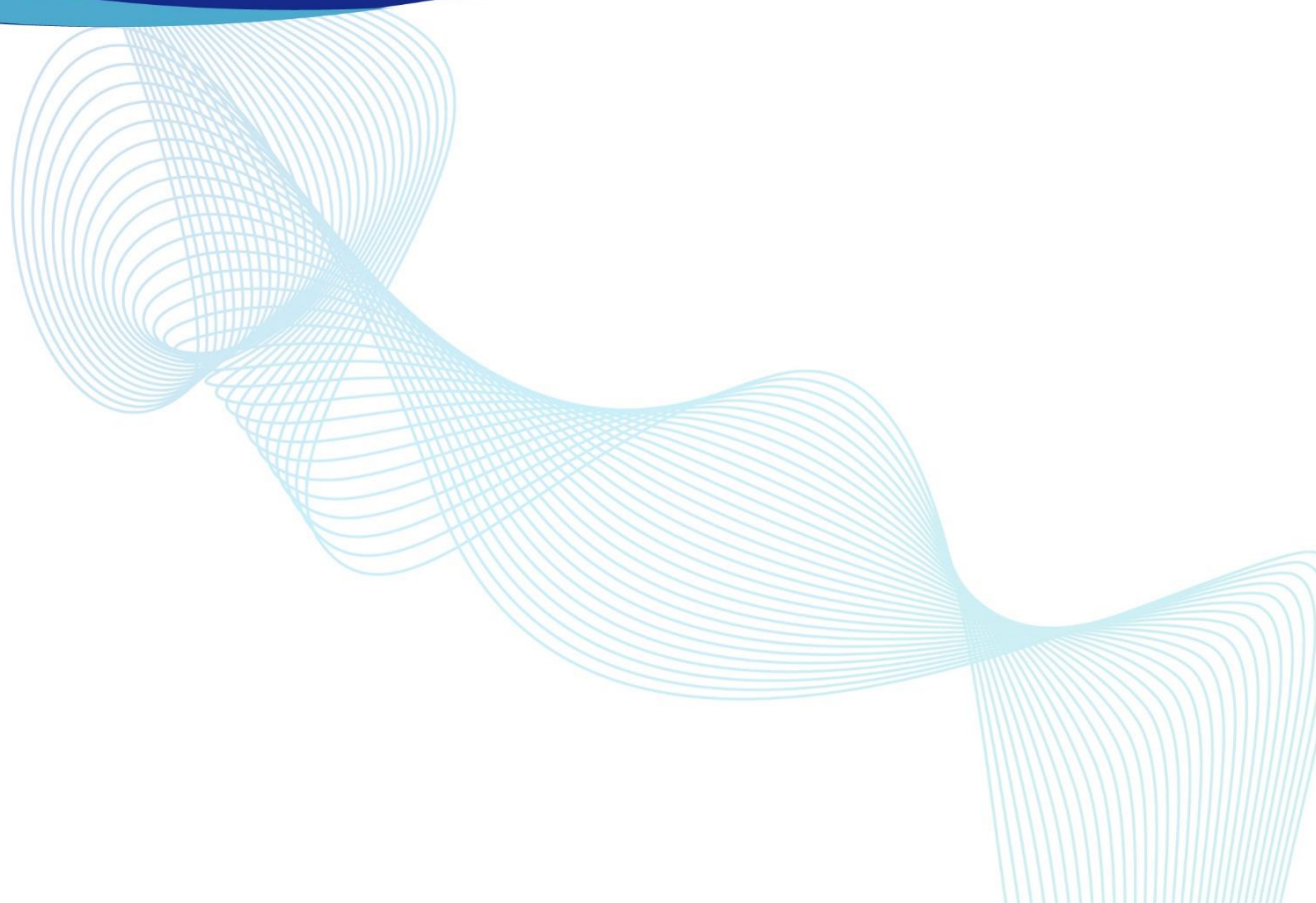




BP101 Laboratory Basic Peristaltic Pump User Manual





Safety Precautions!

To prevent fire, electric shock or personal injury when using this product, please follow the following safety precautions:

1. Please turn off the driver power before installing (or removing) the pump head and tube, otherwise your fingers or clothes may be entangled in the driver;
2. Please turn off the power before connecting the external control device, otherwise the equipment may be damaged;
3. This product should be installed on a stable surface, otherwise the product will fall over due to vibration and be damaged;
4. This product should be installed in a protected place to prevent anyone from stepping on the connecting wires or tripping over the connecting wires, thereby damaging the connecting wires or injuring people;
5. Before cleaning this product, please unplug the power plug from the socket;
6. Do not disassemble, change or repair this product without permission. If necessary, please contact Duoning.

Cautions:

1. Before using this product, please read carefully and fully understand the contents of this manual;
2. Before using this product, please read and follow the instructions in the safety precautions carefully;
3. The tube are consumable materials. Long-term use may cause rupture due to fatigue, resulting in liquid leakage. Please check and replace the tube in time.
4. Please keep this manual well.

Warning!

- This product may be interfered by electromagnetic fields and cause malfunction in certain special industrial environments or near radio transmitting devices.
- Non-professionals are not allowed to open the casing of this product, otherwise they will not receive normal after-sales service.

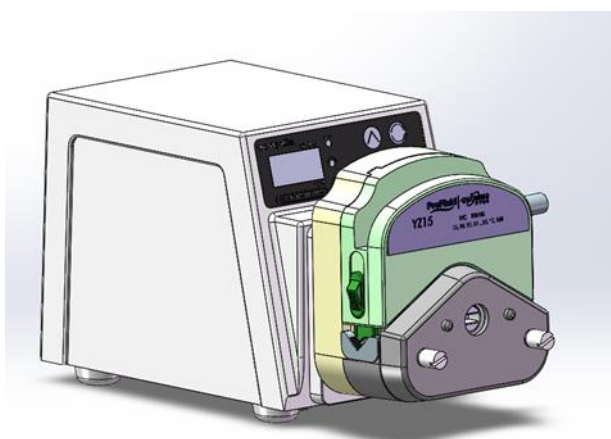
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1. Overview

BP101 peristaltic pump is a variable speed pump. The upper casing is made of aluminum die-casting material, and the lower casing is made of aluminum. The overall appearance is elegant, clean, and lightweight. The compact structure and user-friendly design of the upper casing make it easy to hold and carry. The driving part adopts an integrated stepper motor with high-speed accuracy and multi-subdivision working mode. The motor runs smoothly and generates low noise, which is suitable for the low noise requirements of the laboratory.

Image of BFL laboratory peristaltic pump:



This series of products mainly consists of two parts:

- **Pump head:** For detailed specification, please refer to the "Pump Head Instructions".
- **Driver:** The main body (power source) of the peristaltic pump.

2. Product Introduction

2.1. Product functions

- The front four-digit digital LED displays functions, speed, parameters, and other information.
- The front three LED lights indicate forward, reverse, start and stop information.
- The four front touch buttons adjust pump parameters and start/stop.
- Button prompt sound when pressing the button. The buzzer sounds to indicate that the button is working. This function can be turned off.
- The speed, direction, start/stop of the pump can be controlled by external signals.
- The speed, direction, start/stop of the pump can be controlled through RS485 communication.
- The speed, direction, start/stop of the pump can be controlled through RS232 communication.
- Designed with power-down memory function, all working parameters can be stored.

2.2. Product technical specifications

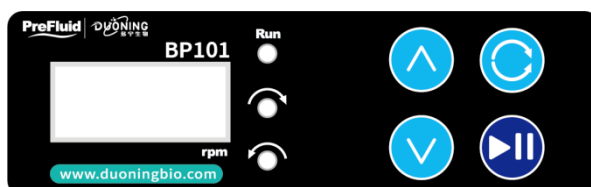
The detailed technical specifications of the product are shown in the table below:

Model	BP101
Drive mode	Multi-subdivision stepper motor
Speed range	1-600.0 rpm
Resolution	0.1 rpm
Display mode	The four-digit digital LED displays the speed and other information, and the three indicator lights indicate forward, reverse, start/stop.
External control interface	Dry contact signal controls start, stop and direction; analog signal (4~20mA/0~10V) controls speed; RS485 and RS232 control start, stop, direction and speed.
Applicable pump head	KZ15, E313D, E314D, DGX, YG15, KZ163, KZ164, YZ15
Applicable power supply	24 VDC (±10%)
Working environment	Temperature 0 ~ 40°C, relative humidity <80%
Enclosure	The upper casing is made of aluminum die-casting material, and the lower casing is made of aluminum.
Dimensions	170×115×130 (mm)

3. Control Panel and Rear Panel

3.1. Control panel

The front control panel includes a four-digit digital LED, three light-emitting LED lights and three touch buttons, as shown in the figure below.



- Digital LED display screen: displays functions and parameter information.

012.3

: 012.3 means the speed is 12.3 rpm, which is 12.3 revolutions per minute.

- 3 LED indicators, functions as below:

Run



: Run, the light is on and the motor is running



: Forward rotation, steady light means the pump is stopped, flashing means the pump is running



: Reverse rotation, steady light means the pump is stopped, flashing means the pump is running

- 3 buttons, functions as below:



: Up button, the value of the parameter is adjusted upward.



: Down button, the value of the parameter is adjusted downward.



: Direction button to adjust the rotation direction of the pump



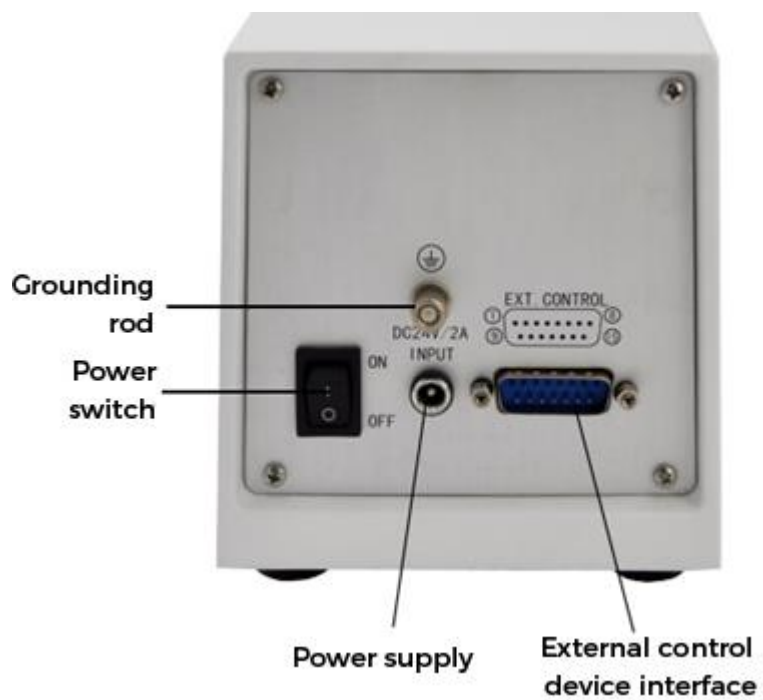
: Start/stop button to control the start and stop of the pump

3.2. Rear panel

The rear panel includes a power socket, power switch, and external control interface, as shown in the figure below.

- Power socket: DC24V/2A DC voltage input socket.
- Power switch: Turn to "I" for ON, turn to "O" for OFF.
- Grounding rod: It must be reliably grounded during use.

- External control interface: external control signal and status output interface. For details, please refer to "5. External Control".



4. Operation

4.1. Power on

The software version will be displayed after powering on, and the status before powering off is displayed after 2 seconds. This equipment has two types of screens: speed screen and system setting screen.

Speed screen: Run according to the set speed and direction.

System setting: Set parameters such as the maximum pump speed, pump address and baud rate as needed.


Note: Be sure to confirm that the power supply voltage is consistent with the equipment requirement before plugging in the power.

4.2. System settings

There are 7 menu items in the system settings, and their corresponding screen displays, system parameters and setting ranges are as shown in the following table:

Item	Display	Function	Description
1	U X X X	The maximum speed setting of the equipment	Range: 100, 200, 300, 400, 500, 600
2	H X X X	Analog maximum speed setting	Range: \leq Maximum speed of the equipment
3	L X X X	Analog minimum speed setting	Range: \leq Analog maximum speed-5RPM
4	d - X X	Local communication address setting	The range is 01~16, which is the pump address number. It is used when communicating to control multiple pumps. The default is 01.
5	b X X X	Baud rate setting	There are three ranges: 096, 192 and 384, indicating baud rates of 9600 bps, 19200 bps and 38400 bps, used for communication.
6	P O F F	Buzzer switch	"POn" means the buzzer will sound when the button is pressed, and "POFF" means the buzzer will not sound when the button is pressed.
7	r E - U	External control analog type	"rE-A" external control current 4 ~ 20 mA controls the speed, "rE-U" external control voltage 0 ~ 10 V controls the speed


(1) Enter the system setting screen

In the speed screen, press and hold the  button when the pump is stopped to enter the system setting screen.





(2) Exit the system setting screen

In the setting screen, press and hold the  button at the same time to exit the system setting screen.

(3) Menu item switching

After entering the system setting screen, press the  button to switch to the next menu. When the current menu item is the last item, switch to the first menu item.





(4) Parameter setting

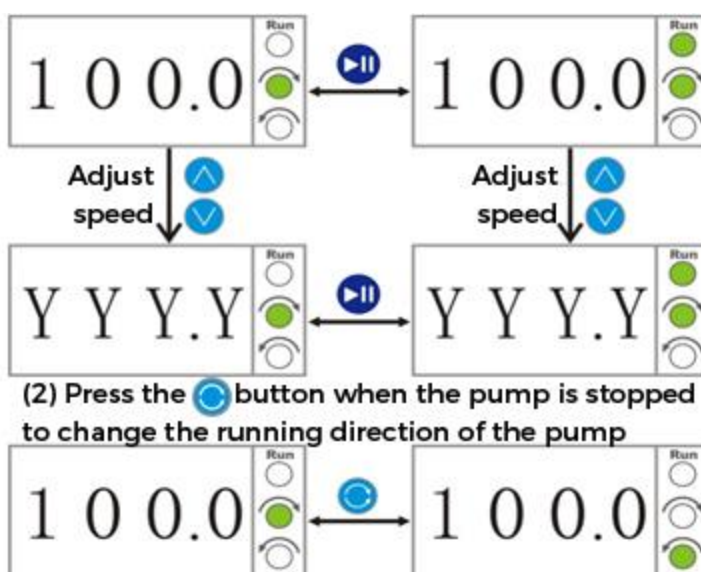
Press the  button or  button to adjust the parameters corresponding to the current menu item. When in the [Analog Maximum Speed Setting] and [Analog Minimum Speed Setting] menu items, press and hold the  button or  button for more than 2 seconds, the parameter value will be continuously increased (or decreased).

(5) Saving parameter settings

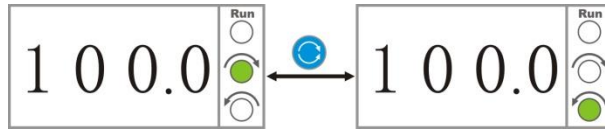
After the parameters are changed, if no button is pressed for more than 3 seconds, the parameters will be automatically saved.




4.3. Run

(1) Press the  button once to start the pump, and press the  button again to stop it. Press  or , the speed value will change accordingly.



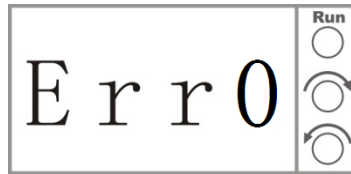
(2) When the pump is stopped, press the  button to change the running direction of the pump.



(3) When the pump stops, press the , ,  buttons simultaneously to enter the system setting screens.

4.4. Error message

When the motor fails, the equipment will enter the error screen. At this time, please cut off the power supply to troubleshoot and then turn the power on again.

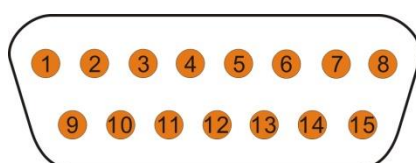


5. External Control

The peristaltic pump can be operated and controlled through the buttons on the panel, or through dry contact signals to control start, stop, and direction; analog signals (current 4~20mA or voltage 0~10V) control the speed; RS485 and RS232 communication methods control start, stop, direction and RPM.

5.1. External control interface

A DB15 interface on the rear panel is the external control interface, and its internal pin sequence is as follows:

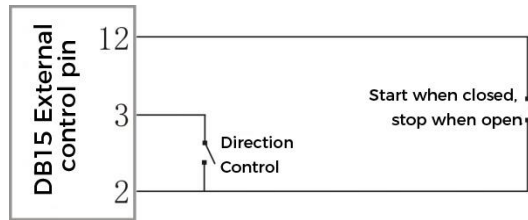


The definitions of each pin of the external control interface are as follows:

Pin	Definition	
1	+5V	For use by external devices, the current is less than 100mA
2	GND	Common ground
3	F/R	Rotation direction control signal
4	+12V	For use by external devices, the current is less than 100mA
5	Iin	Current input (4~20mA), control speed
6	232R	RS232 communication receiving end
7	232T	RS232 communication sending end
8	GND	RS232 communication address
9	A	RS485 communication terminal A
10	B	RS485 communication terminal B
11	REM	Analog enable port
12	S/S	Level signal control start/stop
13	COM	Relay output common terminal
14	NO	Relay output normally open
15	Vin	Voltage input (0~10V), control the speed

5.2. Connection of external control device

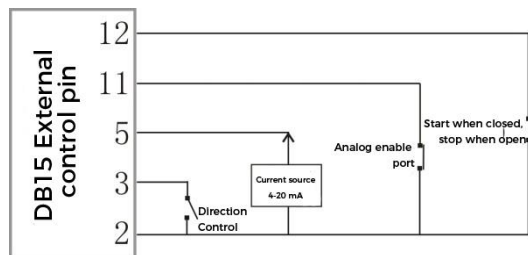
Wiring method 1: Connect pins 2, 3, and 12 of the external control interface to the external control device.



Description:

- ① By using this wiring method, the speed is set by pressing the button;
- ② When PIN12 and PIN2 are short-circuited, the pump runs, and when PIN12 and PIN2 are disconnected, the pump stops;
- ③ When PIN3 and PIN2 are short-circuited, the running direction of the pump is opposite to the direction set by the button. When PIN12 and PIN2 are disconnected, the running direction is the same as the direction set by the button;
- ④ In this mode, the buttons can normally control the start, stop and direction of the pump.

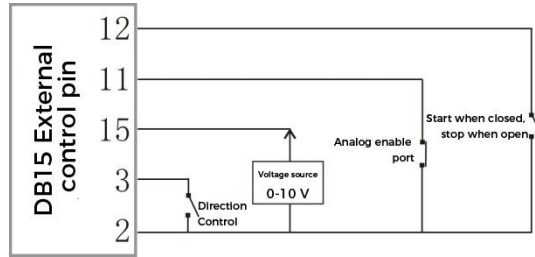
Wiring method 2: Connect pins 2, 3, 5, 11, and 12 of the external control interface to the external control device.



Description:

- ① For this wiring method, you need to refer to 4.2. System Settings first, set the analog type to current mode, and set the maximum analog speed and the minimum analog speed;
- ② By using this wiring method, the speed is determined by the input current of 4-20mA;
- ③ When PIN12 and PIN2 are short-circuited, the pump runs, and when PIN12 and PIN2 are disconnected, the pump stops;
- ④ When PIN3 and PIN2 are short-circuited, the running direction of the pump is opposite to the direction set by the button. When PIN3 and PIN2 are disconnected, the running direction is the same as the direction set by the button.
- ⑤ In this mode, the buttons can normally control the start, stop and direction of the pump.

Wiring method 3: Connect pins 2, 3, 15, 11, and 12 of the external control interface to the external control device.

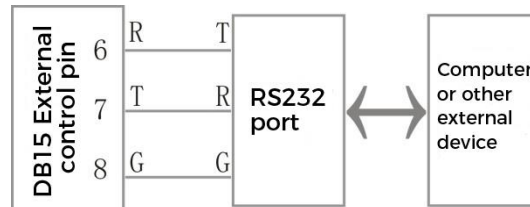


Description: The external control signal controls the direction, start and stop, and the analog signal controls the speed.

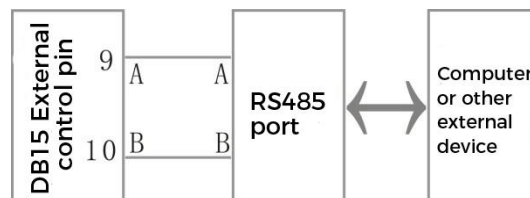
- ① For this wiring method, you need to refer to 4.2 System Settings first, set the analog type to voltage mode, and set the maximum analog speed and the minimum analog speed;
- ② By using this wiring method, the speed is determined by the input voltage of 0--10V;
- ③ When PIN12 and PIN2 are short-circuited, the pump runs, and when PIN12 and PIN2 are disconnected, the pump stops.
- ④ When PIN3 and PIN2 are short-circuited, the running direction of the pump is opposite to the direction set by the button. When PIN3 and PIN2 are disconnected, the running direction is the same as the direction set by the button.

In this mode, the buttons can normally control the start, stop and direction of the pump.

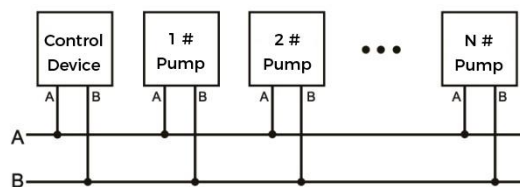
Wiring method 4: Connect pins 6, 7, and 8 of the external control interface to the external control device. Mainly used for communication control methods.



Wiring method 5: Connect pins 9 and 10 of the external control interface to the external control device. Mainly used for communication control methods.



Some applications require remote communication control of multiple peristaltic pumps. You can connect pins 9 (A) and 10 (B) of the external control interface to form a control system as shown in the figure below:



Note 1: $1 \leq N \leq 16$.

Note 2: Before performing communication control, please refer to "System Settings" to set a machine number for each pump.

5.3. Status output

Pins 13 and 14 of the external control interface are used to output the operating status of the pump, and there are relay contacts inside. The two legs are connected when the pump is running and disconnected when it stops.

6. Maintenance and Repair

6.1. Product maintenance

- If the peristaltic pump will not be used for a long time, the tube installed should be removed;
- Keep the enclosure of the product clean and wipe it with a soft cloth dipped in clean water.

6.2. Product repair

Get familiar with and master the correct operation of the product, external connection methods and various working conditions, to avoid failures caused by human errors.

Common fault and troubleshooting methods are shown in the table below:

Fault description	Cause of fault	Troubleshooting	Note
After powering on, the digital screen and indicator light have no display.	Check whether the power socket has power; whether the power plug has fallen off	Re-plug the plug	
After starting up, the digital screen displays correctly (and the indicator light indicates correctly), but the pump roller does not rotate.	Check whether the block on the pump head is pressed too tightly and the shaft is stuck; check whether the motor connecting wire is plugged in properly.	Reinstall the block of the pump head as required; plug in the plug	Otherwise, there is a problem with the circuit board. It is best to contact the supplier to solve it.
The pump roller rotates but cannot deliver liquid (or gas)	Check whether the tube is crushed, whether the tube is broken or leaking	Adjust the tube clamps on both sides of the pump head; replace with new tube	
During operation, the tube slides to one side along with the roller.	Check whether the tube clamp is locked and whether it is locked properly	Adjust the tube clamp and lock it properly	

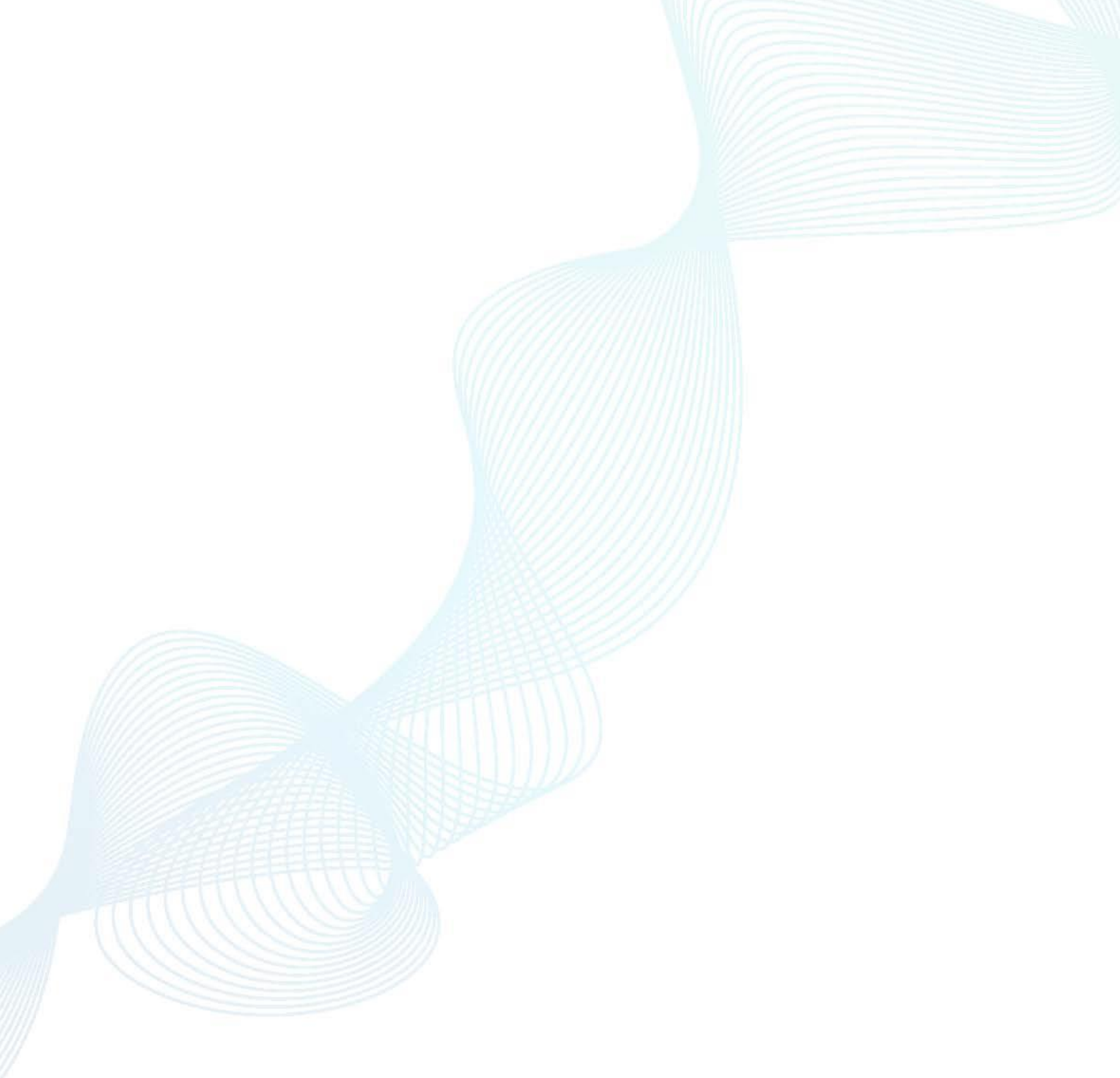


7. After-Sales Service

1. If this product does have quality problems within three months from the date of purchase, the supplier will be responsible for replacing it;
2. This product will be repaired free of charge within one year from the date of purchase;
3. After the warranty period, if the user cannot solve the fault by himself, please contact the distributor or Duoning/Prefluid to get preferential repair and service;
4. Failures caused by the following reasons are not covered by warranty services:
Any modification by end user, overload operation, improper maintenance, operating environment that does not meet product specifications, operation beyond the voltage range, and failure to wire correctly.

Appendix: Applicable Tube Specification

Tube		13#	14#	19#	16#	25#	17#	18#	
Wall thickness (mm)		1.6							
Inner diameter (mm)		0.8	1.6	2.4	3.1	4.8	6.4	8	
Pump head		YZ15-3							
Delivery volume per revolution per minute (mL/min/rev)		0.06	0.27	0.56	0.82	1.92	3.0	/	
200RPM Delivery volume	(mL/min)	11.8	54.2	113	165.0	384	600	/	
	(mL/sec)	0.19	0.90	1.88	2.75	6.4	10	/	
Pump head		KZ15-3							
Delivery volume per revolution per minute (mL/min/rev)		0.12	0.21	0.45	0.73	1.76	2.81	/	
200RPM Delivery volume	(mL/min)	24.0	42.0	90.0	146.0	352.0	562.0	/	
	(mL/sec)	0.40	0.70	1.50	2.43	5.87	9.37		
Pump head		E313-3							
Delivery volume per revolution per minute (mL/min/rev)		/	0.25	/	0.86	2.16	3.20	4.20	
200RPM Delivery volume	(mL/min)	/	50.0	/	172	432	640	840	
	(mL/sec)	/	0.83	/	2.87	7.20	10.67	14.0	
Pump head		E313-4							
Delivery volume per revolution per minute (mL/min/rev)		/	/	/	0.65	1.62	/	/	
200RPM Delivery volume	(mL/min)	/	/	/	130	324	/	/	
	(mL/sec)	/	/	/	2.17	5.40	/	/	
Tube (mm*mm)		1.6*4.8							
Pump head		YG15							
Delivery volume per revolution per minute (mL/min/rev)		0.275							
200RPM Delivery volume	(mL/min)	55							
	(mL/sec)	0.92							
Tube (mm*mm)				1*1	2*1	0.5*0.8	2.4*0.8		
Pump head				DG					
Delivery volume per revolution per minute (mL/min/rev)				0.06	0.16	0.02	0.21		
200RPM Delivery volume	(mL/min)			12.0	32.0	4.00	42.0		
	(mL/sec)			0.20	0.53	0.07	0.70		



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