

# **BL600**

**Variable Speed & Flowrate Display Pump**

**User manual**

## Safety Information

Before using this product, please follow the notes below in order to avoid fire, lighting strokes and personal injuries.

- 1) Please turn off the drive power before installing or disassembling the pump head and tubing, otherwise fingers or coat corner may get caught into the drive;
- 2) Turn off the power before connecting to external control equipment, otherwise the pump may get damaged;
- 3) Put the pump on a flat, horizontal, rigid surface, free from excessive vibration;
- 4) Put the pump in a protected place to avoid being stepped over, which may lead to personal injuries;
- 5) Pull out the power plug before cleaning the pump;
- 6) You are forbidden to break down, alternate or repair this product. If needed, please contact us.

## Attention

- 1) Before using peristaltic pump, please carefully read this manual and make sure you fully understand this manual;
- 2) Before using peristaltic pump, please carefully read and follow the safety guidance in this manual;
- 3) Pump tubing is consumable product, long-term use may lead to split because of fatigues, please inspect and change tubing frequently so as to avoid unnecessary leaking accidents;
- 4) Take care of this manual.

## Warning!

- 1) In certain kinds of special industrial environment or nearby the wireless firing device, pump may have error because of electromagnetic field interference;
- 2) Please don't make unwarranted repair or alternation to the pump, otherwise the warranty could be invalid.

## Contents

<b>1 GENERAL DESCRIPTION.....</b>	<b>1</b>
<b>2 INTRODUCTION.....</b>	<b>3</b>
2-1 FEATURES.....	3
2-2 SPECIFICATIONS.....	3
<b>3 CONTROL PANEL AND REAR PANEL.....</b>	<b>5</b>
3-1 CONTROL PANEL.....	5
3-2 PUMP REAR.....	6
<b>4 OPERATION INSTRUCTION.....</b>	<b>7</b>
4-1 SWITCHING THE PUMP ON.....	7
4-2 DISPLAYS AND WORKING MODE SELECTION.....	7
4-3 SPEED MODE OPERATION.....	8
4-4 FLOWRATE MODE OPERATION.....	9
4-5 RUNNING DIRECTION SWITCH.....	11
4-6 SPECIAL SETTINGS.....	11
4-7 ERROR.....	13
<b>5 EXTERNAL CONTROL.....</b>	<b>14</b>
5-1 DB-15 PIN CONFIGURATION.....	14
5-2 WIRING SCHEME.....	14
<b>6 REPAIR AND MAINTENANCE.....</b>	<b>17</b>
6-1 REPAIR.....	17
6-2 MAINTENANCE.....	17
<b>7 WARRANTY.....</b>	<b>19</b>

## 1 General Description

BL series peristaltic pump is an economy pump with flow rate display features. It is an upgrade model from BT series. It's designed with features of speed/flow rate display, running direction display, tubing selection and calibration. The pump house is made of aluminum extruded materials or aluminum die-casting materials, and is covered with anti-corrosive coating.

The pump uses stepper motor, which features stable operation. The model is used widely in the industry of beverage production, health care products, pharmaceutical, fine chemicals and painting for fluid control.

➤ **BL100:**



➤ **Main parts:** The product consists of two major parts,

**Pump head** See ***Pump head Instruction*** for more information

**Drive** Main part of the pump (power source)

➤ **Main Power cable:**

The Pump is suitable for 120V or 240v supplies and earthed effectively.

The power cord plug with grounding conductor is requested here. Do ensure using the same type plug as shown.



If there are any questions about the correct connection to an earthed, consult professional. Do not alter the provided plug arbitrarily. If the socket is inapplicable, it is suggested to be changed by trained electricians.

**⚠ Caution:** Risk of electrical shock will be caused by the incorrect assembling of power cord protective grounding conductor. When replacing power cord or plug, do not connect the GND (green wire) to the flat terminal

#### ➤ Fuse

Two type 1A standard fuses are contained in the power socket. Replace the fuse using screwdriver to open the fuse drawer with the spare one. Fuse type: 1.0AH 250V 5\*20mm time-delayed



**WARNING - Unplug the appliance before replacing the fuse.**



## 2 Introduction

### 2-1 Features

- Four digit LED shows operation parameters.
- Six LED lights indicate operation mode.
- Six keys for manual operations.
- Keypad beep is enabled to indicate a positive key-press with beep sound.
- Remote controls of speed, direction, start/stop. Direct/inverse proportion control options.
- RS485 interface is available for control of speed, direction, start/stop.
- Automatic data memory. In case of sudden power off, the pump will save the current operation settings and return to the same settings when power is reapplied.
- Capable of parameters saving.

### 2-2 Specifications

<b>Model</b>	BL100	
<b>Supply voltage</b>	120V	240V
<b>Frequency</b>	50Hz/60Hz	
<b>Power Consumption</b>	25W	
<b>Noise Level</b>	54dB	
<b>Control range</b>	0~100.0rpm	
<b>Drive mode</b>	32 stepped drive	
<b>Step</b>	0. 1rpm	
<b>Flow rate range</b>	0.1~400ml/min	
<b>Operation mode</b>	Keypad presses, RS485 communication, Current control signal inputs	

<b>Display</b>	Four digit LED shows operation parameters, Six LED lights indicate operation modes.
<b>External control</b>	Contact signal controls start/stop and direction. Analog signal(current 4~20mA) controls speed. RS485 signal controls S/S, direction and speed (flow rate).
<b>Working Condition</b>	Temperature 0~40℃, Humidity <80%, Indoor Use, Altitude< 2000M, Pollution Degree 2
<b>Pump head</b>	YZ15/KZ15, DG series
<b>Technical Features</b>	rpm/flowrate displays, External control interface available.
<b>Housing</b>	Die – casting chassis with special coating
<b>Dimensions</b>	390×200×196 (mm)

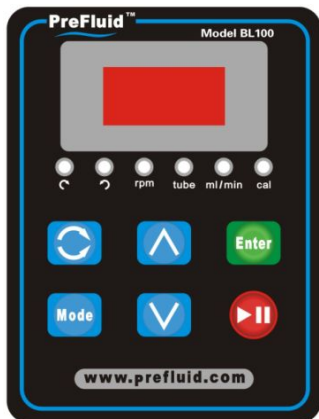
**Note 1:** The pump head listed in the table above can be exchanged to fit the same type of drive to meet the actual requirements of different channel, flow rate and pressure.

**Note 2:** See ***Pump Head Specification*** for reference flow rate.

### 3 Control panel and rear panel

#### 3-1 Control panel

The control panel located on the top of pump consists of one LED screen, six LED indicators and six buttons.



➤ **LED Screen:** 4-digit LED shows the current speed, flow rate, tube no. and so on

➤ **Pop-up Press Key Function:**



—— Starts or stops the pump running.



—— Confirms the parameters input.



—— Down – Changes the parameters to be smaller



—— Up – Changes the parameters to be bigger



—— Mode – Switches working modes and digits.



—— Direction – Changes the pump running direction

➤ **Six LED Indicators**





 : CCW

**rpm**—Illuminates to indicate speed mode. In this mode, pump works at the displayed speed and allows speed adjustment.

**tube**—Illuminates to indicate Tube No. Selection;

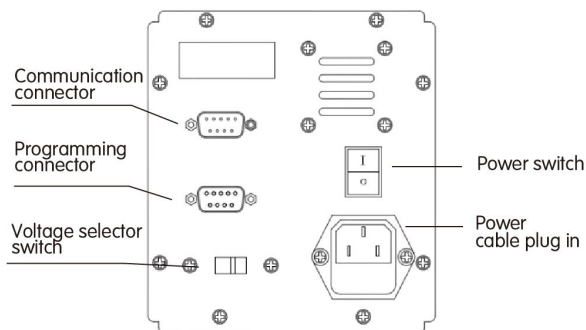
**ml/min**—Illuminates to indicate flow rate mode. In this mode, pump works at the displayed flowrate and allows flowrate adjustment.

**Cal**—Illuminates to enable calibration for flow rate correction.

### 3-2 Pump Rear

The rear panel consists of one external control connector, one voltage selector switch, one power switch and one power cord plug-in.

The rear panel figure follows:



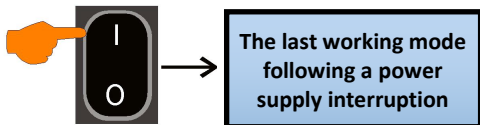
- **Power switch**: I as ON, O as OFF.
- **External control connector**: For external or communication signal of start/stop, speed and direction inputs.
- **Power cord plug-in**: 120V/240V AC voltage inlet.
- **Voltage selector switch**: 120V /240V switch
- **Backup Connector**: NC.



**Ensure switch is correctly set for supply voltage before connecting mains**

## 4 Operation instruction

### 4-1 Switching the pump on



**Note:** Please be sure to use the advised power supply.

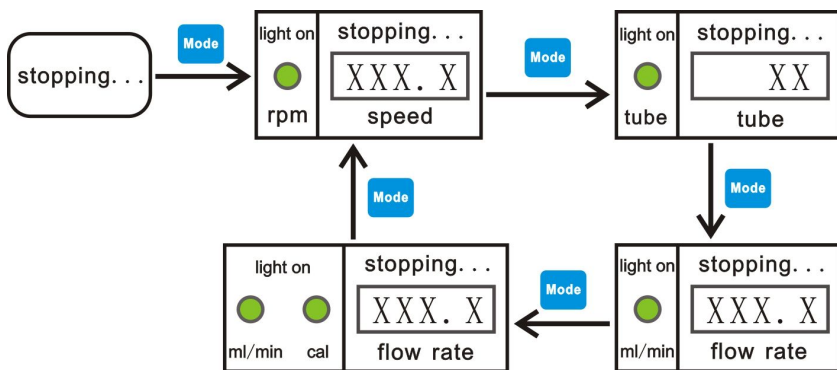
**Power On/Off Switch:** “I” for on, “O” for off.

After **power-up**, the control panel shows the last status following a power supply interruption. The pump provides two working mode options:

- **Speed mode:** Pump runs at rpm displayed and in direction indicated.
- **Flow rate mode:** Pump runs at flow rate displayed and in direction indicated.

### 4-2 Displays and working mode selection

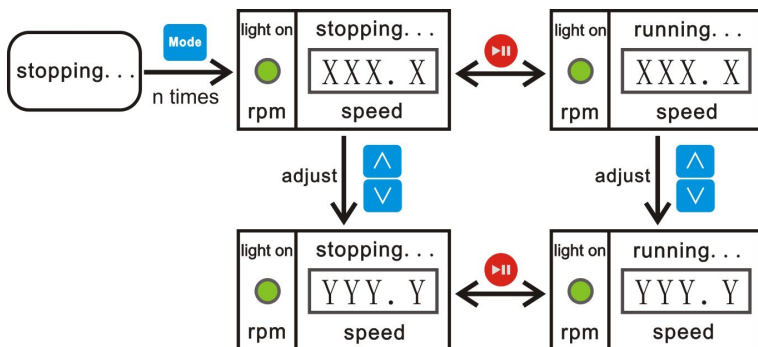
Operations as shown below:






- Pressing **Mode** key can switch between four displays and working modes

### 4-3 Speed mode operation

Operations as shown below:



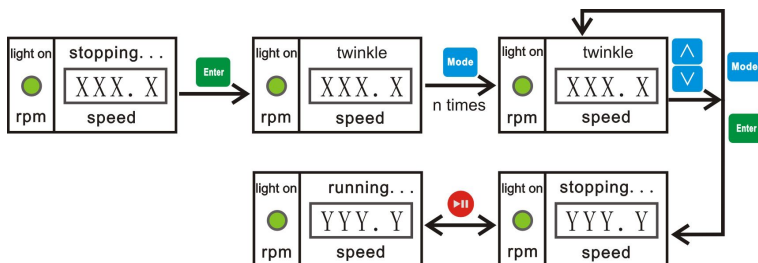
Press the  key on the keypad to start the pump, press again to stop.

Press the  /  keys to adjust speed in work/stop mode. Keep pressing Up/Down to adjust the number continuously.

➤ **Note 1: Speed unit is rpm, which represents revolutions per minute.**

➤ **Note 2: XXX.X: the original speed; YYY.Y: the target speed**

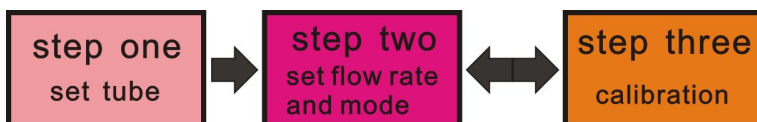
#### Quick speed adjustment operations as shown below.



➤ Each digit can be changed from 0 to 9, only if limited.

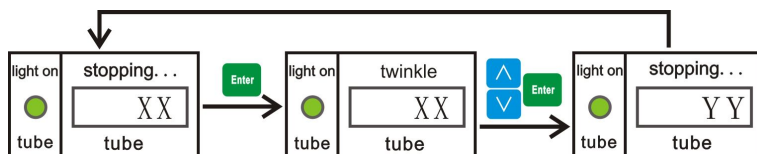
#### 4-4 Flowrate Mode operation

##### Key steps:



##### Step 1: Tuber number selection

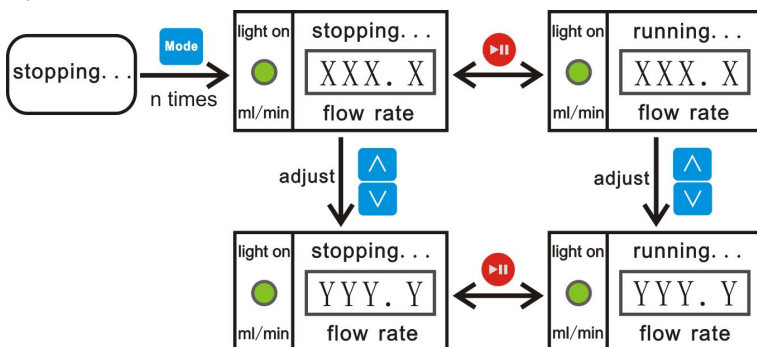
The ml/rev is calculated based on default tube number before the right tube selection






➤ **Tube options:** 13#, 14#, 19#, 16#, 25#, 17#, 18#, 15#, 24#, 35#, 36# and **oth** (non-standard tube option, it's wall thickness must be in range of pump head limitation, otherwise, there will be the failures of pumping or dispensing). Choose the proper tube as per the pump head specifications and applications.

##### Step2: Target flow rate input and Flowrate Mode operation

##### Operations as shown below:

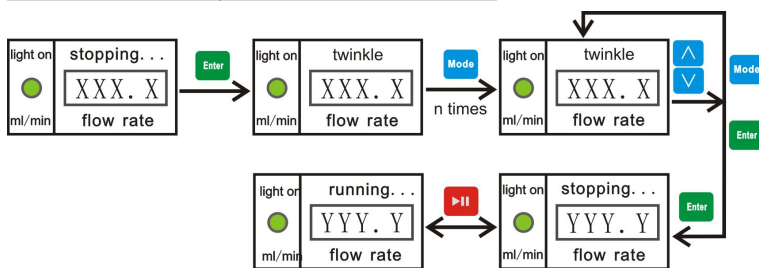


Press the  key on the keypad to start the pump, press again to stop.

Press  and  to adjust speed in work/stop mode. Keep pressing Up/Down to adjust the number quickly.

- **Note 1:** Flow rate unit is ml/min, which represents dose volume in ML per minute.
- **Note 2:** XXX.X: the original value; YYY.Y: the target value

**Quick flow rate adjustment is shown here,**

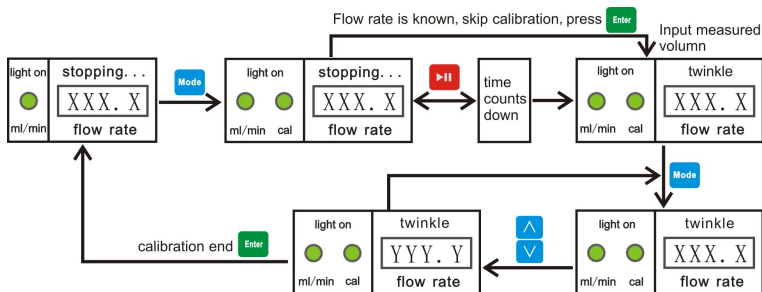


- Every digit can be changed from 0 to 9, only if limited.

### Step 3: Flworate Calibration

In order to match the displayed flow rate to the actual flow rate, calibration is needed.

**Operation as shown below:**




- Flow rate calibration can be repeated. After calibration is

completed, the pump will be operated in **Flow rate mode**.

- Enter the calibration volume using the same way for speed/flow rate quick adjustment.
- **XXX.X**: The target dose volume per minute;  
**YYY.Y**: The measured volume
- **Note1: Be sure that the tube has been primed before calibration.**
- **Note2: The factory default flow rate is measured with 25c water at 1 ATM. If the real condition is different, please calibrate the flow for more accurate performance.**
- **Note3: The calibration will be suggested after a period of tube duty**
- **Note4: The calibration will be suggested after tube loading.**

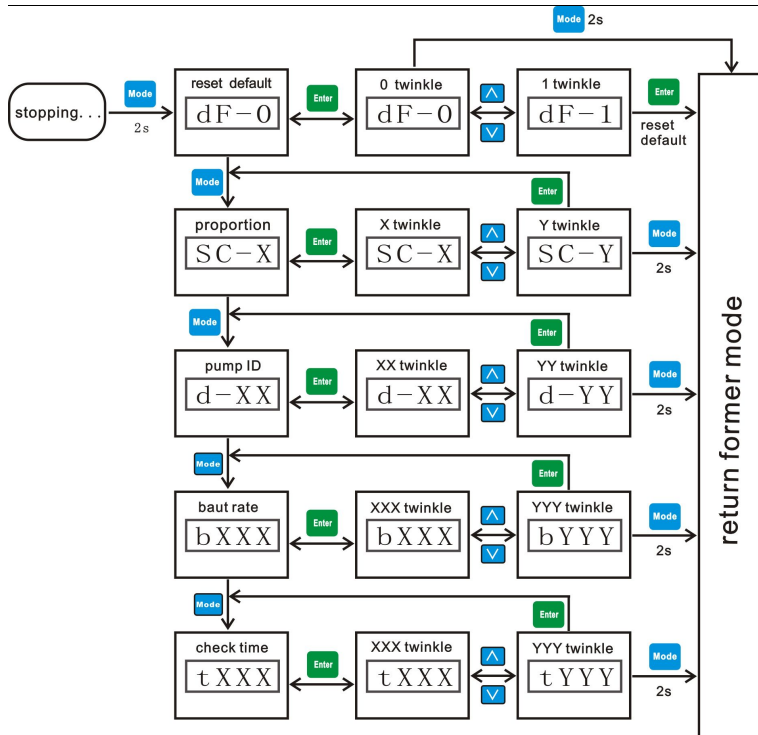
#### **4-5 Running direction switch**

In stop mode, press  key to switch between CW and CCW, the LED illuminates to indicate the direction selected.

#### **4-6 Special Settings**

System setting menu contains: “Reset”, “Control proportion”, “Pump ID”, “Baud ratio” and “Calibration Time”

**Operations as shown below**



- **dF-0:** Current settings; **dF-1:** Factory settings
- **SC-0:** This allows user to input current to control speed in inverse proportion;
- SC-1:** This allows user to input current to control speed in direct proportion;
- **d-XX:** Pump.ID 01#-16#. Default is 01#. When the pump is connected into a network under a communication protocol, it needs to be set.
- **b096:** Baud Rate, 096/192/384 represents 9600bps, 19200bps, and 38400bps respectively.
- **tXXX:** The Calibration time can be set from 20 to 999S. The short

time is recommended for large flow rate calibration and the longer time for the small flow to ensure the accuracy.

- **Note:** If users select **dF-1**, all the parameters will be reset to factory defaults. Be cautious.

#### **4-7 Error**

**Errh: The target flow rate exceeds the maximum limit of flow rate.**

**After display, the pump will revert to Flowrate Mode with the maximum flow rate calibrated.**

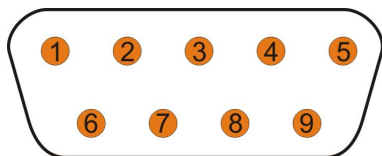
**ErrL: The target flow rate is lower than the minimum limit of flow rate. After display, the pump will revert to Flowrate Mode with the minimum flow rate calibrated**



## 5 External control

The pump can be controlled by key-presses or by means of analogue signal inputs and communication.

### 5-1 DB-15 Pin Configuration



#### DB-9 Pin Definitions:

Pin#	Color	Definition
1	Brown	+5V, for external control device. Current < 100mA
2	Red	GND
3	Orange/pink	F/R, Rotation direction control
4	Yellow/creamy white	+12V, for external control device. Current < 100mA
5	Green	lin, current (4-20mA), speed (flowrate) control
6	Blue	A, RS485 port A
7	Purple	B, RS485 port B
8	Grey/black	REM, Speed (flowrate) control analog signals access (in continuous work mode)
9	White	S/S, Pulse control signal input

### 5-2 Wiring Scheme

There are three wiring methods in external analogue control and communication control, as follows,

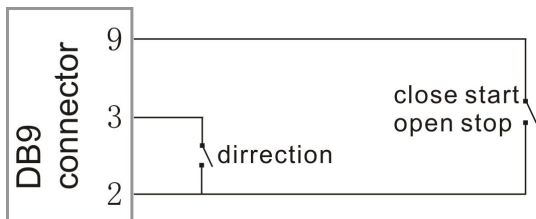
**Wiring 1:** Connect pins 2, 3 and 9 to external control device.

**Wiring 2:** Connect pins 2, 3, 5, 8 and 9 to external control device.

**Wiring 3:** Connect pins 6 and 7 to external control device.

**Typical Use Case Diagram:**

**Wiring 1:** Connect pins 2, 3 and 9 to external control device.



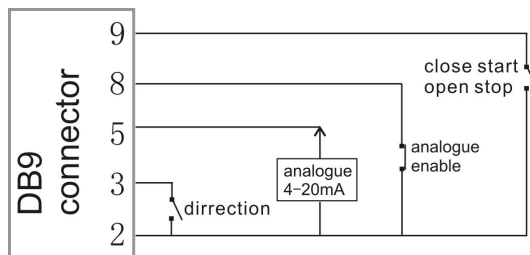
**Description:**

- ① When pins 2 and 9 are connected, the drive runs at the parameters displayed on the panel. When disconnected, the drive stops.
- ② When pins 2 and 3 are connected, the drive runs at the same direction as control panel indicated. When disconnected, the running direction reverses.

**Note:** When the pump is controlled by external signal, the control panel

keys  /  /  still function.

**Wiring 2:** Connect pin 2, 3, 5, 8 and 9 to external control device.




When pins 2 and 8 are connected, running speed is controlled by analogue signals. At this point, apply to pin 5 (relative to pin2) a current signal(4~

20mA) to control the speed.

① Connect pins 2 and 9 for drive running and disconnect them for stop.

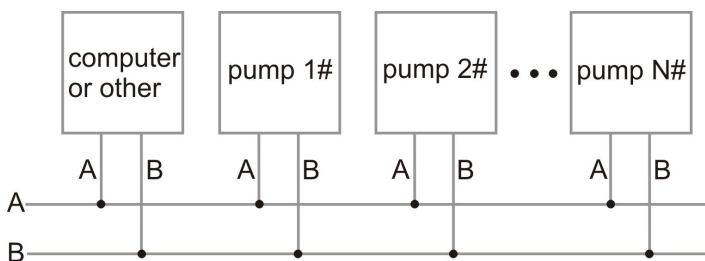
② Connect pins 2 and 3 for CW running and disconnect them for CCW.

③ “SC-0” means inversely proportional control; “SC-1” means directly proportional control. The running speed is calculated by the value of analog input in inverse / direct proportion.

**Note:**  S/S key functions in this mode.

**Wiring 3:** Connect pins 6 and 7 to external control device.

If you need to control multiple units at the same time, you can connect pin 6 and pin 7 between units. The system will look like this:



Where:  $1 \leq N \leq 16$

**Note 1:** When there are multiple units, please set up the address number for each unit. It can be controlled through control panel.

**Note 2:** You can get communication protocol from our company or through website.

## **6: Repair and Maintenance**

### **6-1 Repair**

- Please remove the tubing if the pump is going to be kept unused for a long time.
- Please keep the pump clean on the outside. You can clean the pump with soft cloth and clean water.

### **6-2 Maintenance**

Get familiar with the correct operation, external control and other working requirement so as to make trouble shooting.

Troubling shooting chart:

Problem	Check	Trouble Shooting	Note
Pump start, but the fan , the numerical display and direction light doesn't work.	Check if the power supply is on; if the fuse is loose or broken.	Plug in the power supply cable, make sure it's intact; use a new fuse; make sure the fuse is the required model.	Make sure you find out what caused the fuse to burn out.
Pump start, the fan and light works normally, but the pump head doesn't work.	Check if the pump head is pressed too tight; if the motor is correctly connected.	Adjust the pump head; re connect the motor.	Otherwise the problem lies on the circuit board. Please contact the supplier or our company for resolution.
The pump is running, but the fluid (or air) doesn't transfer accordingly.	Check if the tubing is pressed too hard; if the tubing is leaking.	Adjust tubing clipper on both sides of the pump head; use new tubing.	
The speed display doesn't change as the rotary switch turns, and the power on switch doesn't work	Check if the internal/external switch is on the right position; if the power switch is working properly.	Put the switch on the right position; replace the switch.	

The tubing moves along with the roller in operation.	Check if the clipper is in the right place.	Adjust the clipper.	
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**Chapter 7: Warranty**

1. From the day of purchase, within three months, we will provide product exchange in case of product quality problem.
2. From the day of purchase, we will provide free maintenance and repair.
3. After this period, if there are problems that the clients can't resolve by themselves, please contact the supplier or us. We will provide maintenance and repair at a reasonable rate.
4. The following problems are not covered by our warranty:

Make unwarranted alternation; overload work; lack of proper maintenance; work in unsuitable environment; work in voltage other than required and make faulty connections.

Changzhou PreFluid Technology

Tele: 400-111-0186

Fax: +86-519-85133860

http:// [www.prefluid.net](http://www.prefluid.net)

E-mail: [pump@prefluid.com](mailto:pump@prefluid.com)

Address: 21-1, Hengshan Rd., New North District, Changzhou, Jiangsu, Chian.

Post code: 213022