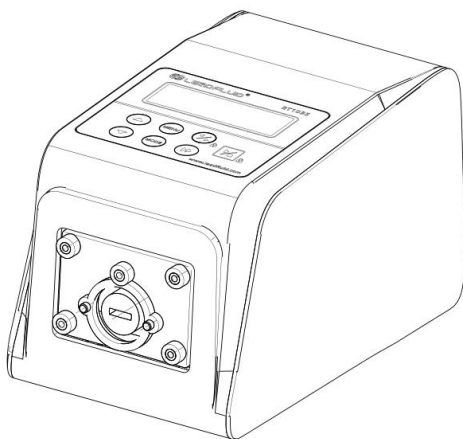


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# BT103S Series

## Variable-Speed Peristaltic Pump

### Operation Manual



**Create Flow s.r.o.**

Tel: +420 722 712 652 [info@createflow.cz](mailto:info@createflow.cz) [www.createflow.cz](http://www.createflow.cz)

## Safety Cautions



### Important information:

Read the manual carefully before operation !



### Danger:

- Please use the power supply consistent with the machine name plate, otherwise the equipment will be damaged!
- Please do not disassemble and disassemble the shell and transform the interior of the equipment, otherwise it will cause fault or even electric shock accident!
- When installing and removing the pump tube, please turn off the power supply first and keep away from the rotating roller to prevent fingers and clothes from being drawn into the mechanical mechanism!
- When installing and removing the external control device, please turn off the power supply to prevent electric shock accident or damage the equipment!
- Please connect the protective ground of the machine with the earth, otherwise there will be the risk of electric shock, electromagnetic interference or induced static electricity!



### Warning:

- Before using, please confirm that the liquid transferred will not react with the tube and pump head, otherwise the tube or pump head will be damaged; if not, please consult our engineer.

## BT103S Variable-Speed Peristaltic Pump v1.0

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- The tube is a vulnerable part, please pay attention to regular inspection. As a result of tube damage caused by the loss, especially including toxic and harmful liquid leakage, our company is not responsible for the relevant!
- For the machine damage caused by the actual working environment conditions (including temperature, humidity, power supply voltage, etc.) exceeding our technical indicators, our company is responsible for the paid warranty, but we will not be responsible for any other damage caused by this!
- This product should not be used in clinical medicine!

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## Introduction

BT103S variable-speed peristaltic pump not only has the basic functions of start stop, variable-speed, full speed, reversible direction and so on, but also is improved to LCD Chinese/English display, adding multi-stage

## BT103S Variable-Speed Peristaltic Pump v1.0

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timing operation and suction function, and can be easily connected with other equipment through RS485 communication of Modbus protocol.

This series of variable-speed peristaltic pumps include:

BT103S flow rate 0.00011-480 ml/min, speed 0.1-100 rpm.

### Application

- It is suitable for abrasive liquids
- The pump body is not in contact with liquid
- There is no valve blockage
- The inner surface is smooth and easy to clean
- The liquid only contacts with the tube
- It can up to 8 meters water suction
- Low shear force can be used to transfer emulsion or liquid containing foam
- It is suitable for transporting liquid containing large amount of gas
- It is suitable for precise transmission and quantitative feeding, and can achieve certain accuracy
- It can transport viscous liquid
- Changing the tube and material easily, can be used in food and medical

care

## Function and Features

- LCD speed display and working mode
- Mask key operation
- Running time, intermittent time and running times can be set
- High precision speed control
- External analog variable-speed, high and low level control, start stop, reversible direction, signal physical isolation
- The RS485 communication supports MODBUS communication protocol, which is convenient to connect with various control devices
- It supports WIFI communication and is convenient for wireless and remote control
- The circuit board is sprayed with three proofing paint to achieve dust-proof and moisture-proof effect
- Strong anti-interference characteristics, wide voltage design, suitable for complex power supply environment
- Plastic shell is easy to clean and has strong anti-interference ability

## Components and Connectors

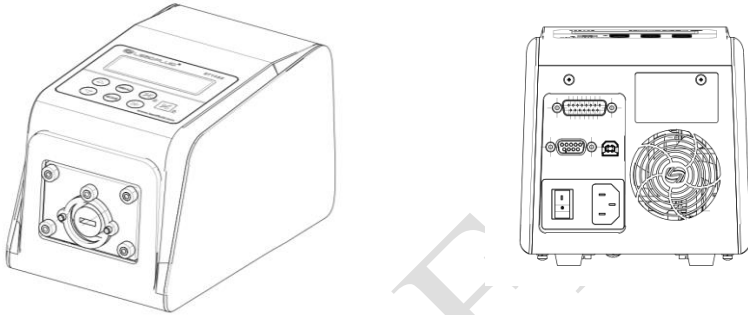
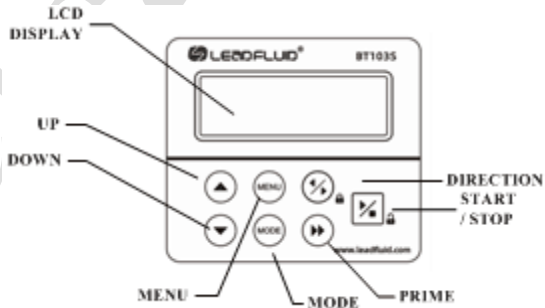


Figure 1. Components and Connectors

## Display Panel and Operating Keypads





## Keypads



**UP** Key: Value increase key. Press the key once to add one to the lowest value, long press this key to increase the value quickly.



**DOWN** Key: Value decrease key. Press the key once, the lowest value will decrease by one, long press this key, the value will decrease quickly.



**MENU** Key: When on main screen, press the **MENU** key to enter the setting menu. When on the setting menu, press the **MENU** key to switch between the different setting menus. Press and hold it to return to main screen. When the drive is running, this key is disabled.



**MODE** key: When the drive is not running, use the **MODE** key to change the working mode: Internal Control mode, External Control mode, Time Dispense mode, Logic Level 1 control mode or Logic Level 2 Control mode.



**PRIME** key: Press the key to run pump at maximum allowed speed in the direction shown on the display. Press again to return to the previous state.



**DIRECTION** Key: Press to key to change the drive rotating direction, clockwise or counterclockwise.



**START/STOP** key: Control the start and stop of the motor, press this key in the menu mode to enter the submenu

## LCD Display

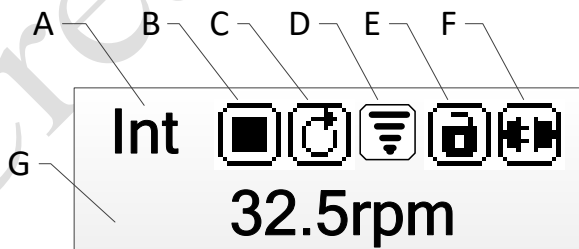



Figure 2. Display screen

- A. Control Mode: It displays current control mode. Press  key to switch the control mode: Internal Control mode, External Control mode, Time Dispense mode, Logic Level 1 control mode or Logic Level 2 Control mode.
- **Chyba! Nenalezen zdroj odkazů.:** Use the keypad to operate pump. Use external pulse signal to control start and stop.
  - **Chyba! Nenalezen zdroj odkazů.:** Use external analog signal to control speed. Use external logic level signal to control direction, start and stop. The keypad is disabled.
  - **Chyba! Nenalezen zdroj odkazů.:** Dispense fluid automatically by setting duration for each dose, time between doses and number of cycles.
  - **Chyba! Nenalezen zdroj odkazů.:** Use external logic level signal to control start and stop. Use the keypad to control direction and speed.
  - **Chyba! Nenalezen zdroj odkazů.:** Use external logic level signal to control start, stop and direction. Use the keypad to adjust speed.
- B. Running State: It shows current drive direction setting.

## BT103S Variable-Speed Peristaltic Pump v1.0

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Stopped



Running



Paused

C. Direction State: It shows current drive direction setting.



Clockwise



Counterclockwise

D. WIFI signal strength: Displays the current WIFI signal strength.



The signal strength is good



The signal strength is moderate



The signal strength is not good



WIFI is failed to connect

E. Keypad Lock State: It shows the state of the keypad lock. When the keypad is locked, only the **START/STOP** key will work. On the main screen, press and hold the **DIRECTION** key to lock the

## BT103S Variable-Speed Peristaltic Pump v1.0

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keypad, press and hold the **START/STOP** key to unlock the keypad.



Keypad unlocked



Keypad locked

F. Communication State: It shows communication state.











Communication disconnected

**#1** Pump NO. display on communication

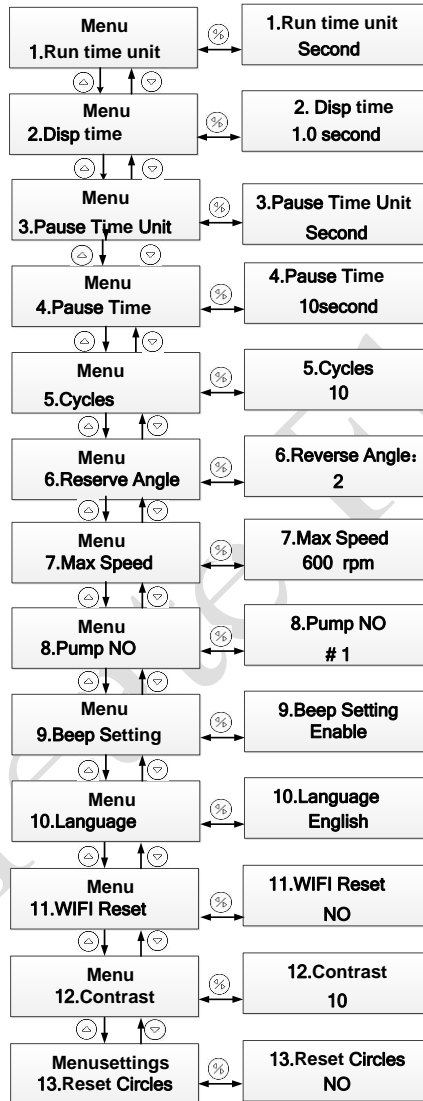
G. Rotating Speed State: It shows the current rotating speed, rpm. When the drive is running at full speed, the display will be >>>>>>.

## Parameter Settings

On the main screen, press the  key to enter the setting menu, and press   key choose the parameter, press  key enter the submenu, on the submenu press   key change the parameter, If you want to return to the main screen, press and hold the  key or press the  key a few times until it goes back to the main screen

(Figure     )


# BT103S Variable-Speed Peristaltic Pump v1.0



## BT103S Variable-Speed Peristaltic Pump v1.0

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Figure 4. Parameter Setting Flow Chart

- ◆ 1. Run Time Unit: Time unit for dispense mode. The time can be in days, hours, minutes or seconds.
- ◆ 2. Disp Time: Dispense time for Time Dispense mode. It is the dispense duration for each dose. The range is 0.1-999 seconds/minutes/hours/days.
- ◆ 3. Pause Time Unit: in the timing mode, the interval time unit can be set, including days, hours, minutes and seconds.
- ◆ 4. Pause Time: Pause time for dispense mode. It is the lag time between doses when the number of cycles setting is more than 1. The range is 0.1-999 seconds/minutes/hours/days.
- ◆ 5. Cycles: Number of cycles for dispense mode. The range is 0-999 cycles. When it is set to 0, the dispense process will keep running until  is pressed. When it is set to the other value, pump will stop when pump finishes dispensing the set number of cycles
- ◆ 6. Reverse Angle: To minimize the drip after a dispense, the drive can reverse direction to draw the fluid back at the end of the tubing. The reverse angle range is 0-720 degrees. When it set to 0, the anti-drip function is disabled.
- ◆ 7. Max Speed: Maximum speed for External Control mode. It is the maximum speed that the external analog signal can control.

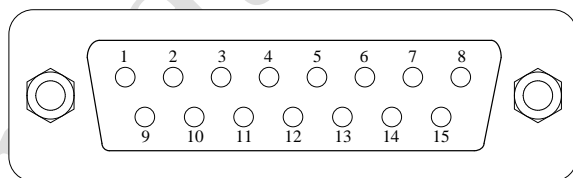


## BT103S Variable-Speed Peristaltic Pump v1.0

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- ◆ 8. Pump No: It is the pump communication address for communication mode. When the number is changed, please restart pump to apply the setting.
- ◆ Note: You need to restart the drive to take effect.
- ◆ 9. Beep Setting: Set the key tone on or off.
- ◆ 10. Language: System language setting, English or Chinese.
- ◆ 11. WIFI reset: after WIFI is reset, mobile app can be rebound.
- ◆ 12. Backlight setting: LCD backlight contrast setting.
- ◆ 13. Reset Circles: after replacing new tube, it is necessary to reset hose life and recalculate tube owners.

### External Control Interface



DB15	Mark	Note
1	ADC_W	Positive of external analog input

## BT103S Variable-Speed Peristaltic Pump v1.0

2	B	Communication interface, B pole of RS485
3	A	Communication interface, A pole of RS485
4	VCC_W	External DC power input
5	-	
6	CW_W	External input signal to control direction
7	PWM	Pulse output
8	COM	Ground of external power
9	AGND	Negative of analog signal input
10	+12V	Positive of internal +12V power source
11	GND	Ground of Internal power source
12	CW	Internal direction signal output
13	RS_W	External start/stop signal input terminal
14	PWM_W	External pulse signal input

# BT103S Variable-Speed Peristaltic Pump v1.0

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15	RS	Internal start stop signal output terminal
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Table1 Definition of external control pin

## Operation Instructions

### Preparation Work

- Please check the packing slip to make sure nothing is wrong or damaged in the package. If there is problem, please contact the manufacturer or distributor.
- Read the manual carefully and keep it at hand or in a fixed place for reference at any time
- Put the pump on a horizontal table top and keep the distance between the rear and the obstacle more than 200 mm

### Install Pump Head and Tube

#### Install YZ15, YZ25 pump head

Align the flat shaft of the pump head with the groove of the driver coupling, rotate the pump head to align the screw hole of the pump head with the screw

## BT103S Variable-Speed Peristaltic Pump v1.0

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hole of the pump head bracket of the driver, fit the pump head with the pump head bracket, and thread two fixing screws into the fixed hole of the pump head to tighten.

### **Install the tube**

Pull the lever of the pump head, open the pump head, put the tube smoothly into the pump head and straighten it. Pull the lever in the opposite direction to the horizontal position, and the installation of the tube is completed.


### **Install DG multichannel pump head**

Align the flat shaft of the pump head with the groove of the driver coupling, rotate the pump head to align the screw hole of the pump head with the screw hole of the pump head bracket of the driver, and fit the pump head with the pump head bracket; thread two hexagon socket fixing screws into the fixed hole of the pump head and tighten. Put the hose into the card smoothly and straighten it. Fix both ends of the tube. Then install one end of the card into the guide rail of the pump head, and press the other end into the card. The installation of the hose is completed.

## **Power Connection**

The power supply shall be consistent with the power supply marked on the rear of the chassis. Plug the included power cord into the power socket on the back of the driver.

## Mode Change

- Turn on the power switch. The display will show welcome message then show the main screen.
- Press  key, change the working mode, Figure 5:

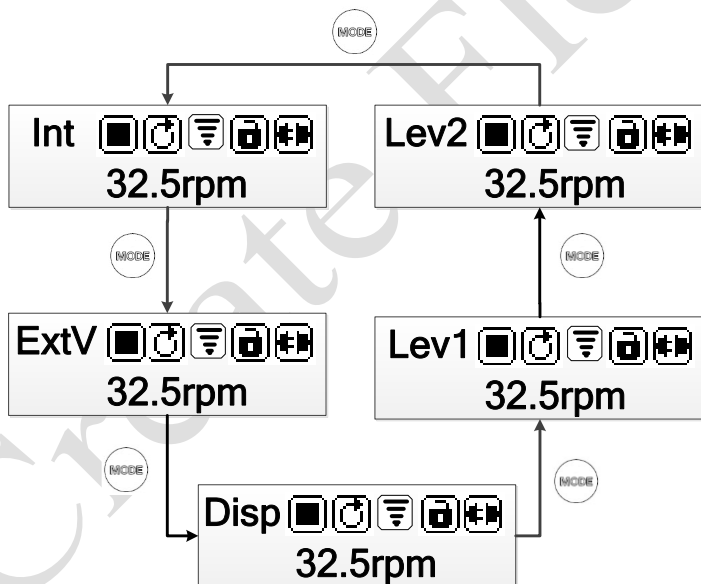








Figure5. Change Working Mode

## Internal Control Mode

Use the keypad to operate pump.

- Turn on the power switch. Pump will display the main screen.
- Press  key to change the mode to Internal Control mode.
- Press   key to adjust the speed.
- Press  key to change the rotating direction.
- Press  key to start or stop pump.
- Press  key, pump will run at maximum allowed speed.

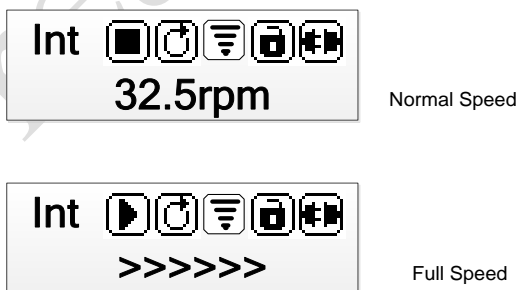


Figure 6 Internal Control Mode

## External Control Mode

On this mode, use external logic level signal to control direction, start and stop; use external analog signal to control rotation speed. The keypad is disabled.

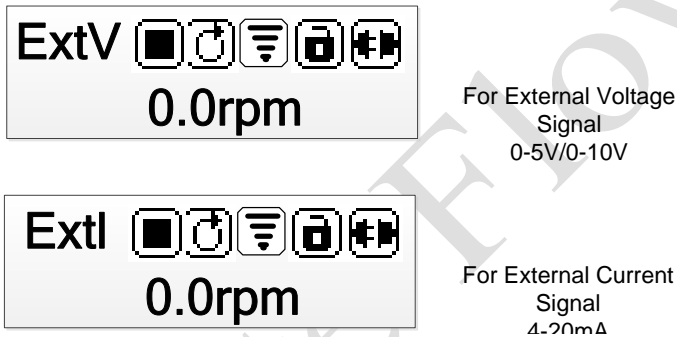


Figure 7 External Control Mode

- When the power supply is cut off, connect the circuit according to the following wiring Figure 8 or 9, and connect the DB15 interface to the back interface of the pump

# BT103S Variable-Speed Peristaltic Pump v1.0

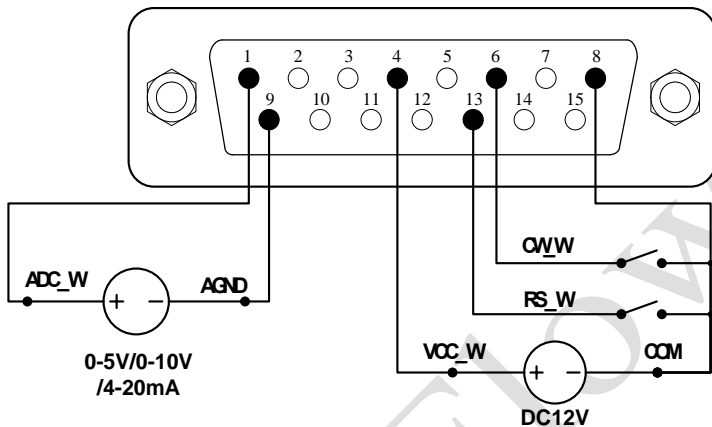


Figure 8 Wiring diagram of external control mode connecting with external DC12V power source

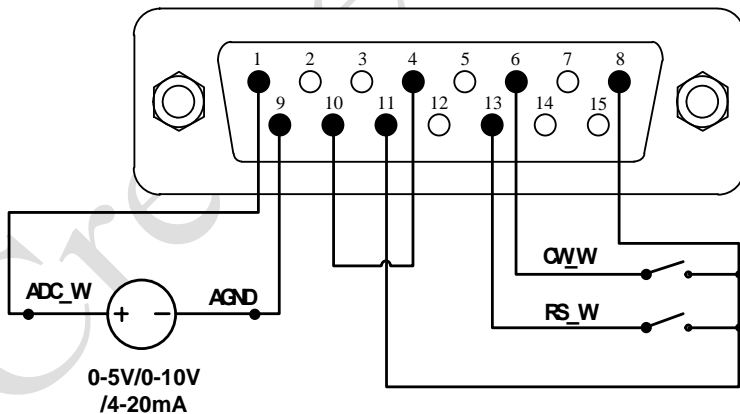



Figure 9 Wiring diagram of external control mode connecting with internal DC12V power source



# BT103S Variable-Speed Peristaltic Pump v1.0

- Turn on the power switch. Pump will display the main screen.
- Press  key to change the mode to External Control mode
- Close the external RS\_W switch, and turn on the external analog signal power source. The speed will change according to the analog signal. Open the RS\_W to stop the drive.

**Note:** If you want to use the external 24 V DC power supply to control the start stop and direction of the pump, you need to use the RS\_W and CW\_W series 1.5K resistor can be used, as shown in Figure 10, otherwise the internal circuit of the pump will be damaged.

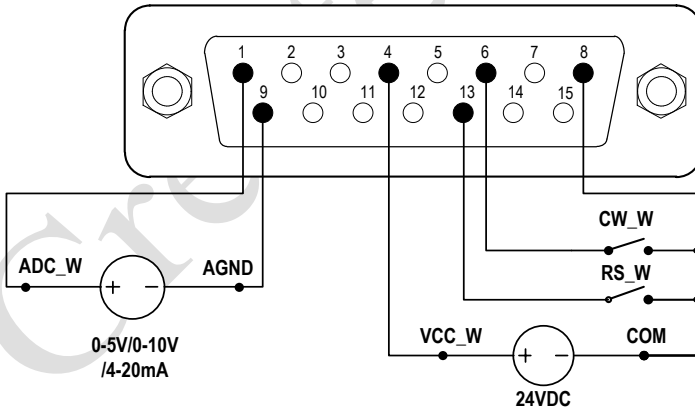


Figure 10

external control mode connection external 24 V external power supply wiring diagram

## Time Dispense Mode (Disp Mode)

Pump will dispense fluid automatically by timing.

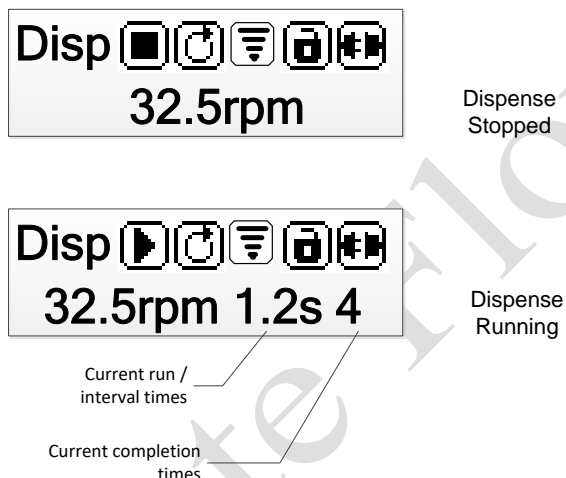




Figure 11. Time Dispense Mode

### Parameter Setting

- Turn on the power switch and LCD display
- Press  key change the mode to timing mode
- Press  key enter the parameter setting interface

## BT103S Variable-Speed Peristaltic Pump v1.0

- Set timing unit, running time, interval time and cycle times respectively
- Return to the main interface

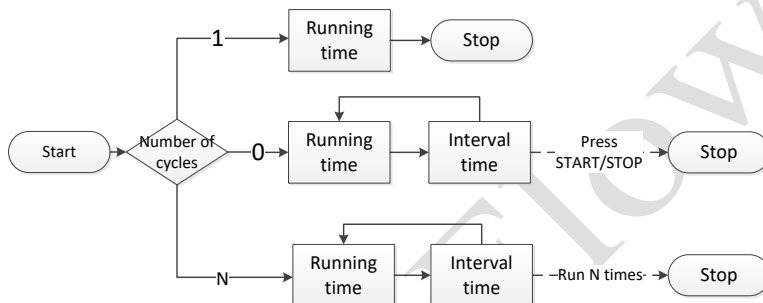




Figure 12 flow chart of timing operation

- Press  key adjust the direction of rotation
- Press  key run the setup process
- During operation, press the start stop key to stop the process
- In the timing mode, the start can also be started with the foot switch
- During the operation, the running time or interval time and the operation times are displayed.

## Logic Level 1 Control Mode (footswitch)

Use external logic level signal to control start and stop.

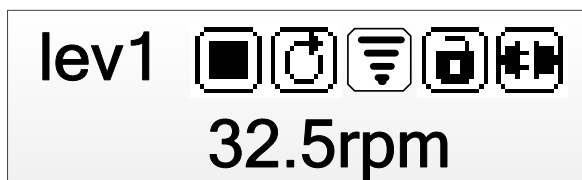


Figure 13. Logic Level 1 Control Mode

When the power supply is cut off, refer to Figure 14 or Figure 15, connect the circuit and connect the DB15 interface to the back interface of the pump .

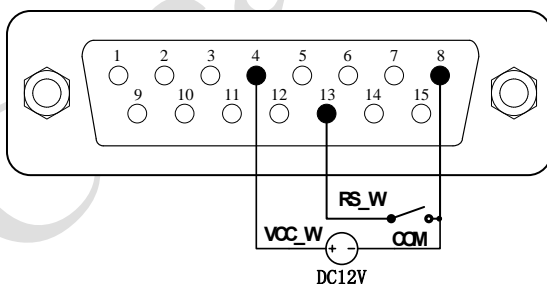


Figure 14. Logic Level 1 Control with Internal 12V Power Source

## BT103S Variable-Speed Peristaltic Pump v1.0

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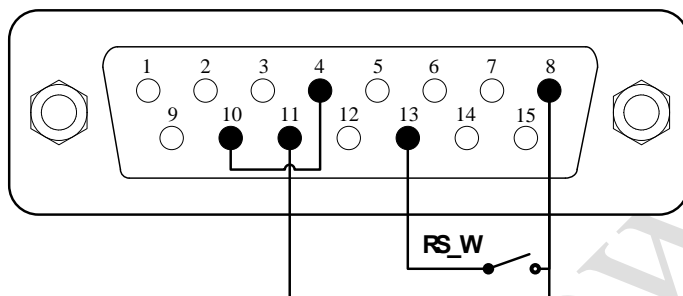


Figure 3. Logic Level 1 Control with External 12V Power Source

- Turn on the power switch. Pump will display the main screen.

- Press  key to change the mode to footswitch mode

- Press  to change the rotating direction.

- Press   key to adjust the speed.

When the switch is closed, the drive will start running, when the switch is open, the drive will stop.

**Note:** Use this mode to work with a TIME CONTROLLER.

## Logic Level 2 Control Mode

Use external logic level signal to control start, stop and direction.



Figure 4. Logic Level 2 Control Mode

When the power is cut off, refer to Figure 17 or Figure 18, connect the circuit and connect the DB15 interface to the back interface of the pump.

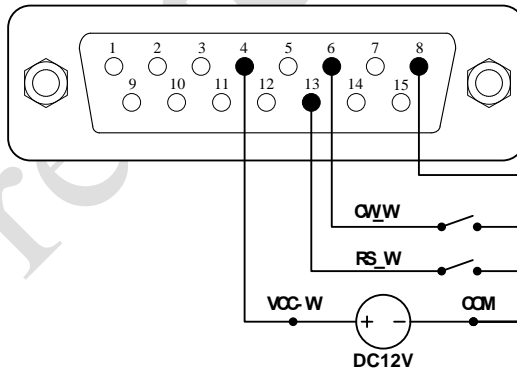


Figure17. Logic Level 2 Control with Internal 12V Power Source

## BT103S Variable-Speed Peristaltic Pump v1.0

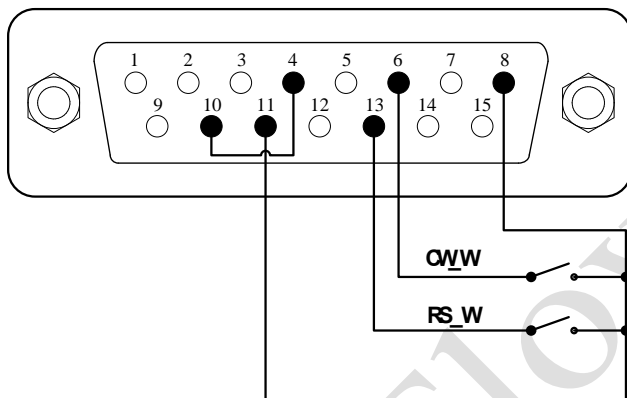





Figure 18. Logic Level 2 Control with External 12V Power Source

- Turn on the power switch. Pump will display the main screen.
- Press  key to change the mode to Logic Level 2 control mode
- Press   key to adjust the speed.
- When the switch RS\_W is closed, the drive will be running at the set speed, when the switch RS\_W is open, the drive will stop.
- When the switch CW\_W is cut ,the drive will be running in clockwise direction. When the switch CW\_W is closed, the drive will be running in counterclockwise direction.

## Communication Mode

The RS485 interface supports standard MODBUS protocol. Pump can communicate with external device via the communication port. Please refer to the [Communication Instruction manual](#) for the parameters and supported commands.

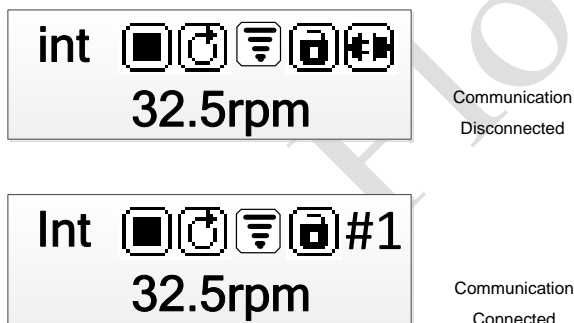


Figure19 Communication Mode

- When the power is off, wire the DB15 connector as shown on **Chyba! Nenalezen zdroj odkazů.** 21, and connect it to the DB15 port on the rear of the pump. Then connect the DB15 interface to the back interface of the pump.



# BT103S Variable-Speed Peristaltic Pump v1.0

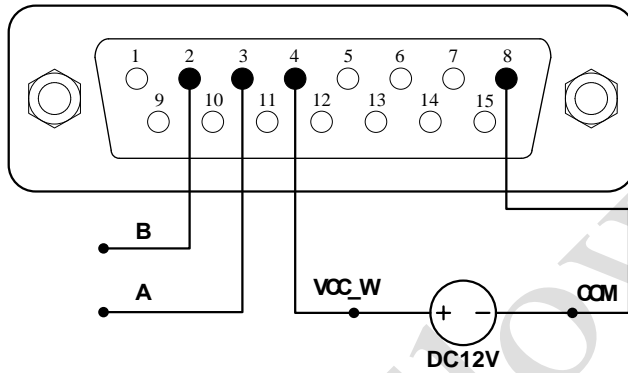


Figure 20 wiring diagram of external 12V power supply for communication

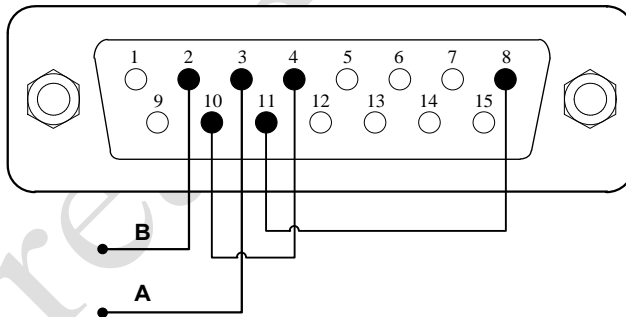




Figure 21 internal 12V power supply wiring diagram of communication


## BT103S Variable-Speed Peristaltic Pump v1.0

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- Turn on the power switch. Pump will display the main screen.
- Press  key to change the mode to Internal Control mode or Time Dispense mode.
- Control pump with communication interface.
- Press  key to stop the drive anytime.

### Speed Setting

On the main screen, the speed resolution is 0.1 rpm when the speed is

between 0.1 and 100 rpm, The speed can be set by pressing the 

 key, each time the key is pressed, the lowest speed will be increased

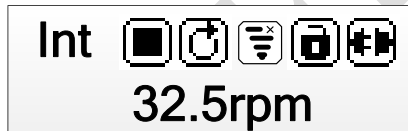
or subtracted by one, long press   Key can increase or decrease continuously and rapidly.

long press  key, press again  key to set the speed to maximum directly.

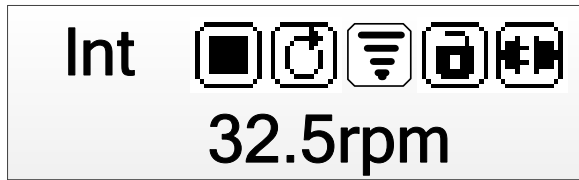
long press  key, press again  key to set the speed to minimum.

## WI-FI Distribution Network Setting

- When the device is powered on, Wi-Fi shows that the device is not connected successfully



- Connect your mobile phone to Wi-Fi for distribution network and log in to your cloud control APP account.
- The APP will automatically read the current Wi-Fi and click the "+" button after manually entering the Wi-Fi password. After waiting for 20 seconds, the added device can be seen.



## Failure and Repair

## Warranty and After-sales

- This product is guaranteed for one year free of charge. During the warranty period, the company is not responsible for the free warranty for improper operation or artificial damage.
- For repairs beyond the free warranty period, only materials and labor costs will be charged.

## Daily Maintenance

- Regularly inspect the tube for damage or loss of elasticity
- There is a cooling fan behind the peristaltic pump, please do not cover it to avoid affecting the heat dissipation.

## BT103S Variable-Speed Peristaltic Pump v1.0

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- The peristaltic pump cannot be washed with water. If the pump pipe breaks during operation, the liquid in the pump head should be wiped dry or dried in time.
- Please do not use chemical solvent to clean the surface of peristaltic pump and pump head.

### Malfunction Solutions

No	Fault type	Fault description	Solution
1	Hardware	Driver is no display	<ol style="list-style-type: none"><li>1. Check the power cord</li><li>2. Check the fuse. If it was blown, replace it with a 0.5A slow-blow fuse</li><li>3. Check the internal power cord connection inside the pump.</li></ol>
2	Hardware	Motor dose not run	<ol style="list-style-type: none"><li>1. Check the indicator of the driver board</li><li>2. Check the wire connection between the motor and the driver board.</li><li>3. Check the wire connection between the main control panel and the driver board</li></ol>

## BT103S Variable-Speed Peristaltic Pump v1.0

3	Hardware	Motor only runs in one direction	1. Check the connection between the drive board and the main control panel.
4	Hardware	Keypad does not work	1. Check the wire connection between keypad and the main board. 2. Check if the key is broken.
5	Hardware	External control does not work	1. Check the wiring of the connector. 2. Check if the external control power voltage is provided. 3. Check the connections of the external control board.
6	Hardware	Communication does not work right	1. Check the wiring of the connector. 2. Check if the external control power voltage is provided. 3. Check the connections of the communication board.
7	Hardware	Noisy when running	1. Check the screws and level on pump head to make sure they are secure.
8	Software	External control	1. Check if pump is on External Control Mode.

## BT103S Variable-Speed Peristaltic Pump v1.0

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		does not work	
9	Software	Communication does not work right	<ol style="list-style-type: none"><li>1. Check if the display shows the communication is ready.</li><li>2. Reset the address of the pump.</li><li>3. Check whether on the bus there are two pumps using the same address</li></ol>



If the problem cannot be solved, please contact the manufacturer or distributor.



**Note:** This product has not been certified by medical treatment. When the product acts as a component on the medical device, the medical device itself needs to have medical certification.

## Dimensions

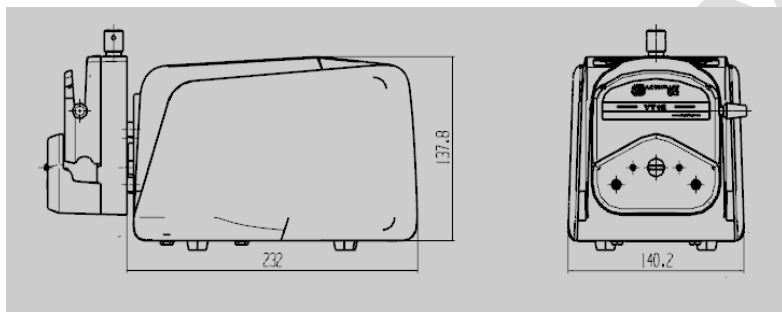
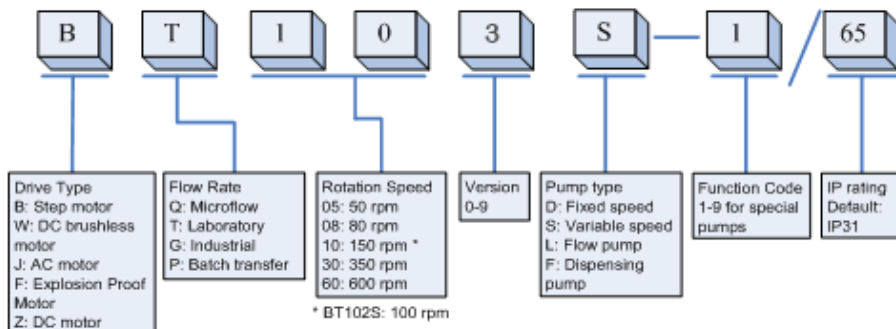


Figure15. Dimensions



## Naming Rule



## Technology Parameters

### BT103S Technology Parameters

#### Main function

Pump head	YZ15, YZ25, YT15, YT25, DG1, DG2, DT10-18, DT10-28
External control function	Keys control speed, reversible direction, start stop, full speed, state memory (power down memory), timing operation; foot switch control, external control start and stop, external control direction, with physical isolation; 0 ~ 5V / 10V, 4 ~ 20mA speed regulation is

## BT103S Variable-Speed Peristaltic Pump v1.0

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	optional;
Communication function	RS485, support Modbus communication protocol, support WIFI remote control
Display function	Display the current speed
Direction control	Reversible direction

### Main performance

Flow rate range	0.0001~480 ml/min
Speed	0.1-100rpm
Speed resolution	0.1rpm, accuracy 0.5%
Timing range	0.1 ~ 999 sec / min / h
Adjustment mode	Mask key operation

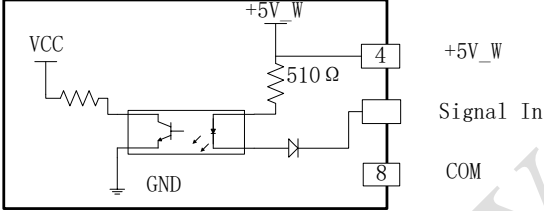
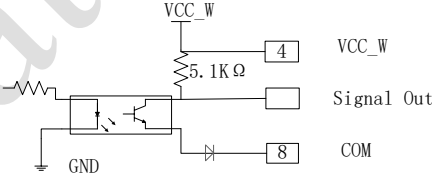
## BT103S Variable-Speed Peristaltic Pump v1.0

Display	132*32 LCD digital display
Power	AC 220V±10% 50Hz/60Hz (Standard configuration) AC 110V±10% 50Hz/60Hz(Matching)
Consumption power	40W
Working condition	Temperature 0~40℃ relative humidity<80%
Dimensions	232*140*145mm
Driver weight	2.9kg
Protection grade	IP31

### Input and Output Performance of External Control Port

Input switch value or OC door specification	
Project	parameter

# BT103S Variable-Speed Peristaltic Pump v1.0

<p>Principle of input interface</p>	
<p>Mode of input signal</p>	<p>Switching value (close, open) or NPN Transistor OC gate</p>
<p>Mode of isolation</p>	<p>Photoelectric isolation</p>
<p><b>Output specifications</b></p>	
<p>Project</p>	<p>parameter</p>
<p>Principle of output interface</p>	
<p>Mode of output</p>	<p>NPN Transistor OC gate with internal pull-up</p>
<p>Mode of isolation</p>	<p>Photoelectric isolation</p>

# BT103S Variable-Speed Peristaltic Pump v1.0

## Input analog specification

Project	parameter		
Principle of interface			
Input impedance ( <100HZ )	0-5V(0-10V) Voltage input	R1=2.1KΩ	R2=1KΩ
	4-20mA current	R1=91Ω	R2=160Ω
Accuracy	0-5V, 0-10V, 4-20mA	±1%	
Resolution	0-5V(0-10V)	2.5mV	
	4-20mA	4uA	
Internal output power specification			
Project	parameter		
output voltage	DC12V ±1V		

## BT103S Variable-Speed Peristaltic Pump v1.0

Allowable output current	< 130mA
<b>External input power specification</b>	
Project	parameter
Allowable input voltage	DC5-25V
Allowable output current	> 350mA

## Version History

Date	Version	Change
2018.11	V1.0	Initial release version