

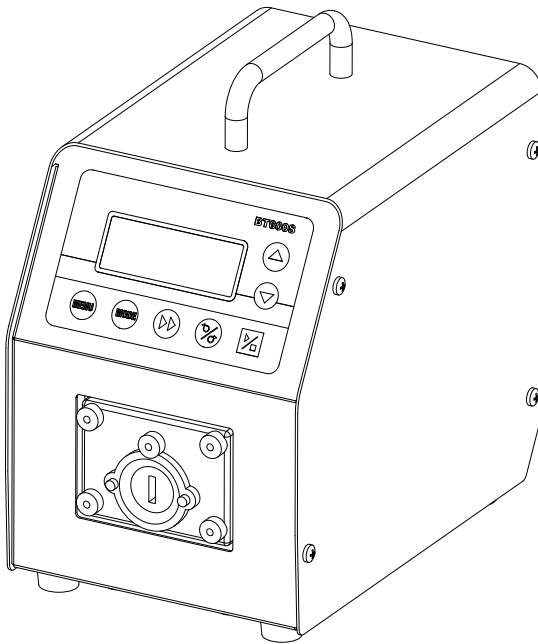


GOLANDER PUMP

Operation Manual

For Basic Variable-Speed Peristaltic Pump

BT100S, BT300S, BT600S



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Safety Cautions



Danger: Please use correct AC power voltage source shown on the sticker attached on the equipment to avoid any damage.

Please do not open the case. High voltages exist and are accessible. Use extreme caution when servicing internal components. For maintenance, please contact the manufacturer or distributor directly.

Danger: Turn drive off before removing or installing tubing. Fingers or loose clothing could get caught in drive mechanism.



Warning: Tubing breakage may result in fluid being sprayed from pump. Use appropriate measures to protect operator and equipment.

Warning: Remove power from pump before attempting any maintenance or any cleaning operation is started.

Warning: Remove power from pump before connecting or disconnecting the external control device or communication interface.

Warning: Pump is provided with a grounded plug, it must be well-grounded at all times.

Warning: This product is not designed for, nor intended for use in patient connected applications; including, but not limited to, medical and dental use.

1 Description

BT-S basic variable-speed peristaltic pump provides not only the basic functions such as reversible direction, start/stop and adjustable speed, but also Time Dispense Mode and Anti-Drip function. With MODBUS RS485 interface, pump is easy to communicate with external device, such as PC, HMI or PLC. This pump series includes:

- BT100S, flow rate 0.00011-720 mL/min, speed 0.1-150 rpm
- BT300S, flow rate 0.006-1600 mL/min, speed 0.1-350 rpm
- BT600S, flow rate 0.006-2900 mL/min, speed 0.1-600 rpm

2 Functions and Features

Advantage of peristaltic pump: Peristaltic pump can handle extremely viscous fluids, abrasive slurries and corrosive fluids. There is no seals in contact with the medium pumped and no valves to clog. The inner surfaces are smooth and easy to clean; fluid contacts only the tubing or tube material. Suction lift and priming can be up to 8m water column at sea level. It can handle the most shear sensitive of fluids like latex or firefighting foam with low shearing. It is capable of running dry and pumping fluids with high quantities of entrained air, such as black liquor soap. The high volumetric efficiency allows operation in metering or dosing applications where high accuracy is required. Tubing and tube materials are available for food and pharmaceutical use.

- LCD displays rotating speed and working mode.
- Membrane keypad.
- Reversible direction, start/stop control and adjustable speed.
- Time dispense mode: automatically dispense by setting the duration for each dose, lag time between doses and number of cycles.
- 0.5% high precision rotating speed control with 0.1 rpm speed resolution when speed is between 0-100 rpm, 1 rpm speed resolution when speed is between 100-600 rpm.
- External logic level signal can control start/stop, direction and dispense functions; external analog signal can adjust the rotating speed. Signal is optically isolated.
- With RS485 MODBUS interface, easy to communicate with external device.
- Internal double-layer isolation structure; circuit board with conformal coating makes the pump dust-proof and moisture proof.
- Anti-electromagnetic interference feature, wide input voltage range for complex power environment.
- Stainless steel enclosure, easy to clean, resistant to the corrosion of the acid, alkali, sodium and organic solvents.

3 Components and Connectors

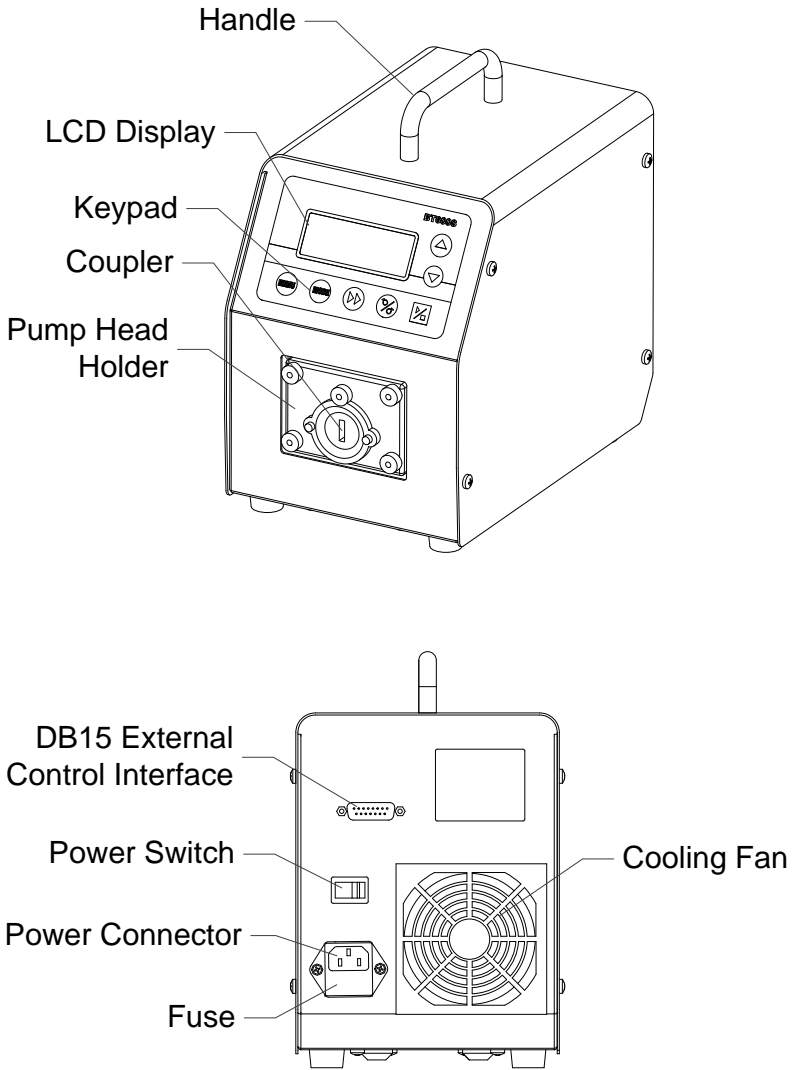


Figure 1. Components and Connectors

4 Display Panel and Operating Keypads

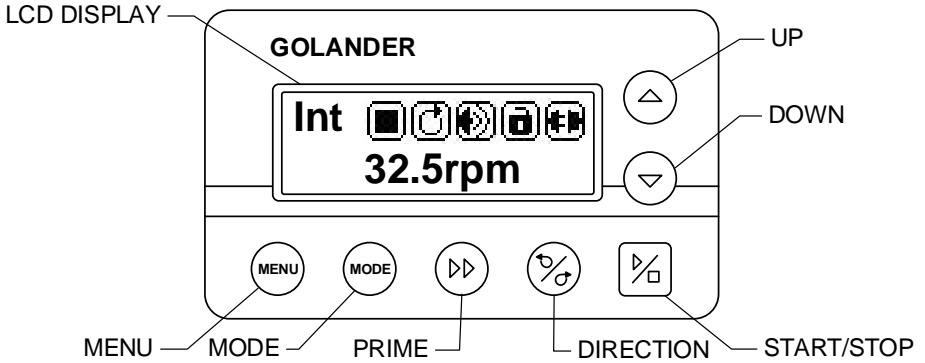


Figure 2. Display Panel

4.1 Keypad



UP Key. When press it shortly, the last digit of the value will increase 1. Hold the key to increase the value quickly.



DOWN Key. When press it shortly, the last digit of the value will decrease 1. Hold the key to decrease the value 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.



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



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.



START/STOP key. Press to start or stop the drive.

4.2 LCD Screen Display

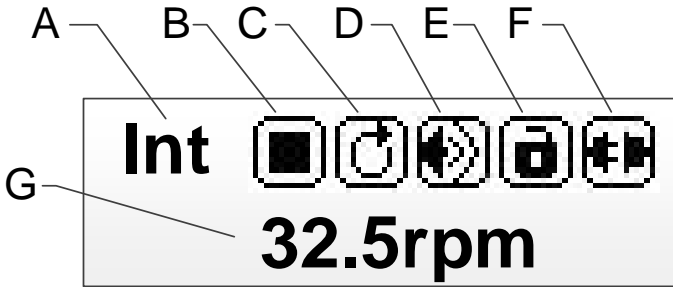


Figure 3. Display screen

4.2.1 A. Control Mode

It displays current control mode. Press **MODE** 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.

- Internal Control Mode: Use the keypad to operate pump. Use optional external pulse signal to control start and stop.
- External Control Mode: Use external analog signal to control rotation speed. Use external logic level signal to control direction, start and stop. The keypad is disabled.
- Time Dispense Mode: Dispense fluid automatically by setting duration for each dose, time between doses and number of cycles.
- Logic Level 1 Control Mode (footswitch): Use external logic level signal to control start and stop. Use the keypad to control direction and speed.
- Logic Level 2 Control Mode (footswitch and direction switch): Use external logic level signal to control start, stop and direction. Use the keypad to adjust speed.

4.2.2 B. Running State

It shows current drive running state.



Figure 4. Running State

4.2.3 C. Direction State

It shows current drive direction setting.



Figure 5. Direction

4.2.4 D. Key Tone State

It shows the state of the key tone, on or off.



Figure 6. Key Tone

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



Figure 7. Keypad Lock

4.2.6 F. Communication State

It shows the current RS485 communication state.



#1

Communication
disconnectedConnected, pump
number is set to 1*Figure 8. Communication state*

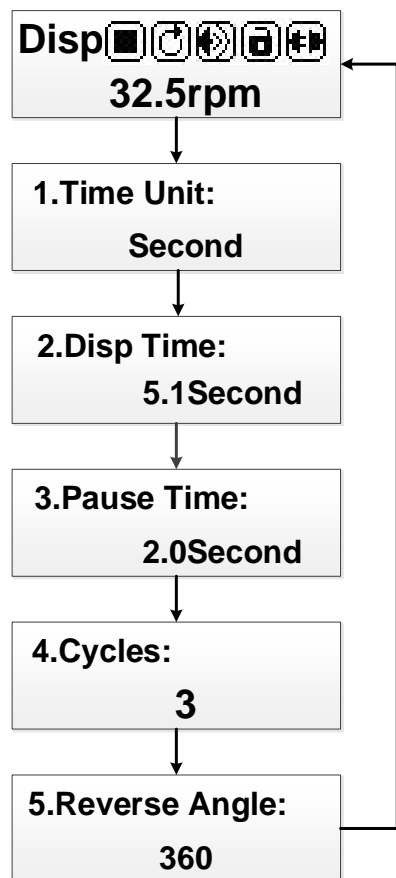
4.2.7 G. Rotating Speed State

It shows the current rotating speed, rpm. When the drive is running at full speed, the display will be >>>>>>.

5 Parameter Settings

On the main screen, press the **MENU** key to enter the setting menu, and press **UP** or **DOWN** key change the value, then press **MENU** key again to confirm the setting. The screen will change to the setting for next parameter. To return the main screen, press and hold the **MENU** key or press the **MENU** key a few times until it goes back to the main screen (*Figure 9*). Please note for Time Dispense mode, there are 5 parameters; for the other modes, there are 6 parameters.

Time Dispense Mode



Int, Ext, Lev1, Lev2

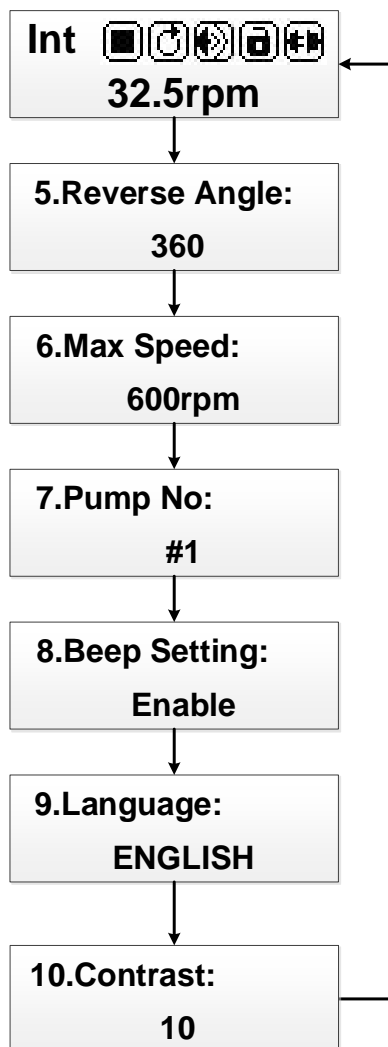


Figure 9. Parameter Setting Flow Chart

Note 1. Time Unit: Time unit for dispense mode. The time can be in hours, minutes or seconds.

Note 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.

Note 3. 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.

Note 4. 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 **START/STOP** is pressed. When it is set to the other value, pump will stop when pump finishes dispensing the set number of cycles (*Figure 20*).

Note 5. 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.

Note 6. Max Speed: Maximum speed for External Control mode. It is the maximum speed that the external analog signal can control.

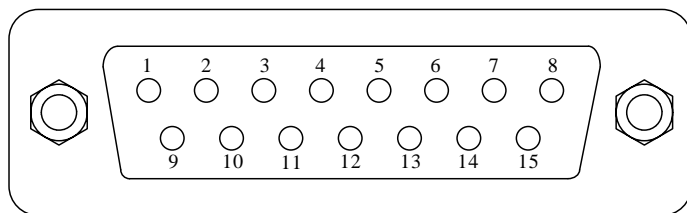
Note 7. Pump No: It is the pump communication address for communication mode. When the number is changed, please restart pump to apply the setting.

Note 8. Beep Setting: Set the key tone on or off.

Note 9. Language: System language setting, English or Chinese.

Note 10. Contrast: LCD backlight contrast setting.

6 External Control Interface



DB15	Mark	Note
1	ADC_W	Positive of external analog input
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		
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		
13	RS_W	External start/stop signal input terminal
14		
15		

7 Operation Instructions

7.1 Before Operation

- 1) 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.
- 2) Read through the instruction.
- 3) There should be more than 200 mm space for the back of the pump when it is running.

7.2 Power Connection

The voltage of the power supply should be marked on the sticker of the pump. Please make sure to use the right power source for the pump. Please plug the power cord into the IEC Power Connector on the rear of the pump and plug the opposite end of the power cord into an electrical outlet. Flip the power switch located on the rear of the pump.

7.3 Mode Change

Turn on the power switch. The display will show welcome message then show the main screen. Press the **MODE** key to change the working mode (*Figure 10*).

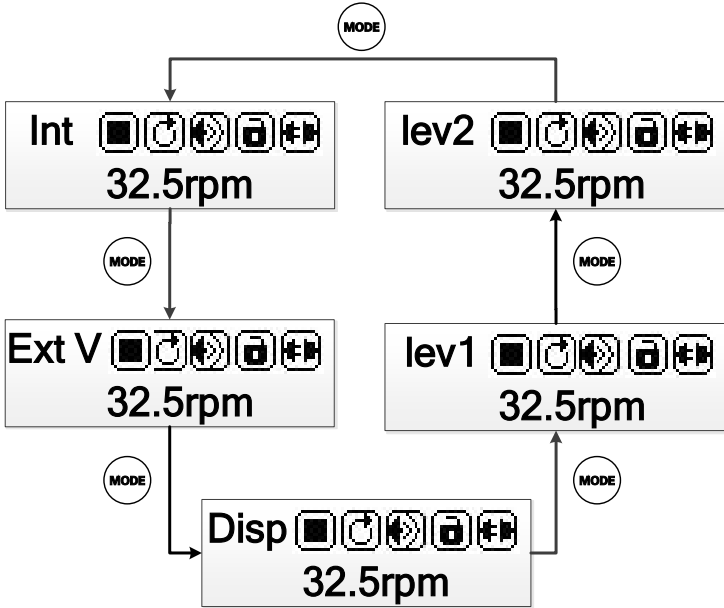


Figure 10. Change Working Mode

7.4 Internal Control Mode

Use the keypad to operate pump. Use optional external pulse signal to control start and stop.

- 1) Turn on the power switch. Pump will display the main screen.
- 2) Press **MODE** key to change the mode to Internal Control mode (Int shown on the screen).
- 3) Press **UP** or **DOWN** key to adjust the speed.
- 4) Press **DIRECTION** key to change the rotating direction.
- 5) Press **START/STOP** key to start or stop pump.
- 6) Press **PRIME** key, pump will run at maximum allowed speed.

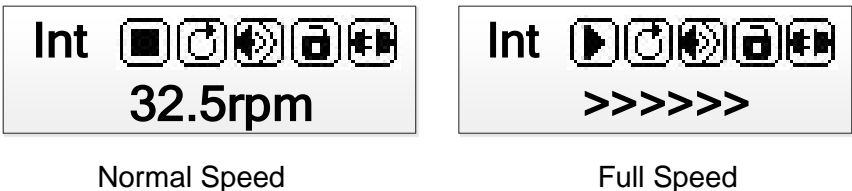


Figure 11. Normal vs Full Speed

To use external pulse signal to control start and stop, wire the DB15

connector as shown on [Figure 12](#) or [Figure 13](#), and connect it to the DB15 port on the rear of the pump.

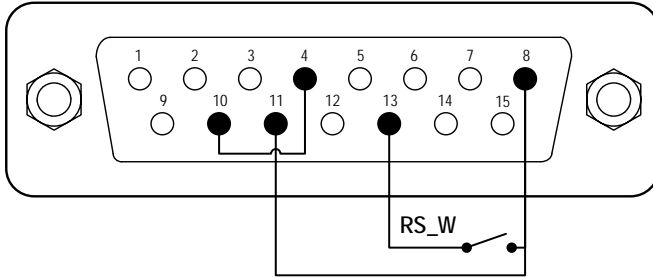


Figure 12. Control Start/Stop with internal 12V Power Source

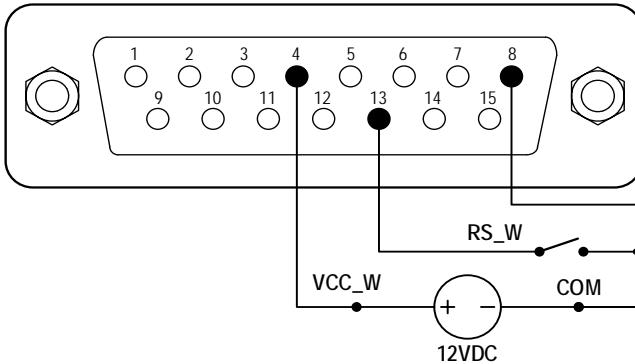


Figure 13. Control Start/Stop with External 12V Power Source

The RS_W would act like a momentary switch. When the switch is pushed then released, pump will start or stop.

7.5 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. The analog signal could be 0-5V, 0-10V or 4-20mA. By default, the signal is 0-5V. For 0-10V or 4-20mA, the jump setting on the analog signal control board has to be changed ([Figure 14](#)).

BT-S V2 Basic Variable-Speed Peristaltic Pump



0-5V (default)

0-10V

4-20mA

Figure 14. Analog Signal Control Board Setting



For External Voltage Signal

For External Current Signal

0-5V/0-10V

4-20mA

Figure 15. External Control Mode

To control pump by external signal:

- 1) Switch the power off. Wire the DB15 connector as shown on [Figure 16](#) or [Figure 17](#). Connect it to the DB15 port on the rear of the pump.

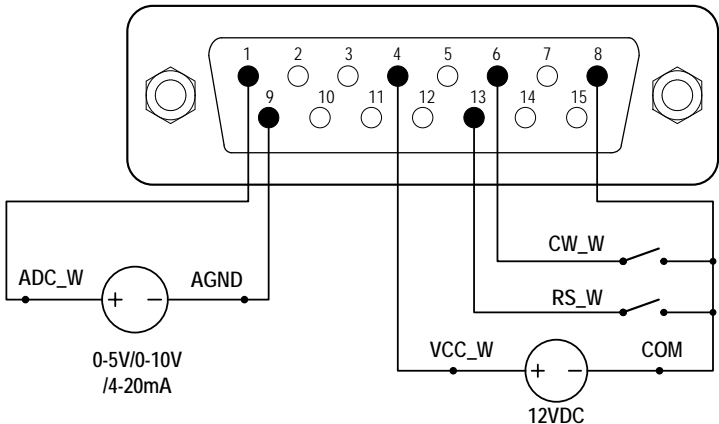


Figure 16. DB15 Wiring with External 12VDC Power Source

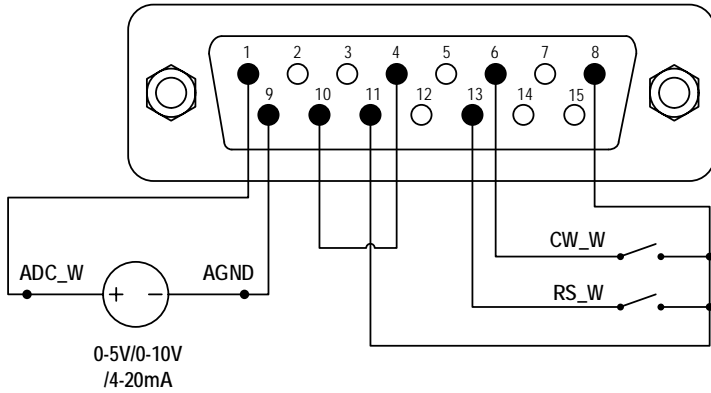


Figure 17. DB15 Wiring with Internal 12VDC Power Source

- 2) Turn on the power switch. Pump will display the main screen.
- 3) Press **MODE** key to change the mode to External Control mode (ExtV or ExtI shown on the screen).
- 4) Close the external RS_W switch, and turn on the external analog signal power source. The speed will change according to the intensity of the input signal. Open the RS_W to stop the drive.
- 5) Open CW_W switch, then pump will run in clockwise direction; close the CW_W switch, then pump will run in counterclockwise direction.

Note: The external DC power source can be 5V or 12V. If it is 24V, 1.5K resistor is needed to protect internal circuit.

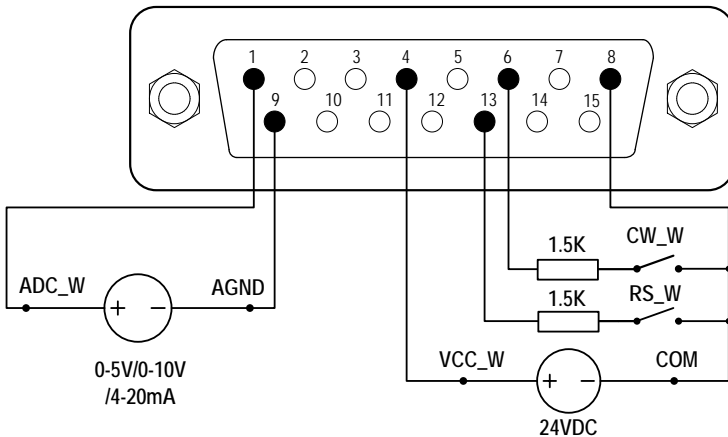


Figure 18. DB15 Wiring with External 24VDC Power Source

7.6 Time Dispense Mode

Pump will dispense fluid automatically by setting duration for each dose, pause time between doses and number of cycles. When dispensing, the display will show the dispensing time or lag time that has passed (1.2s on the figure below), and the total cycles (4 on the figure) that has dispensed.

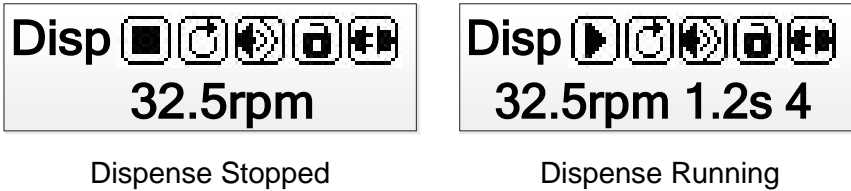


Figure 19. Time Dispense Mode

To set Time Dispense mode:

- 1) Turn on the power switch. Pump will display the main screen.
- 2) Press **MODE** key to change the mode to Time Dispense mode (Disp shown on the screen).
- 3) Press **MENU** key to enter the Setting menu.
- 4) Set duration for each dose, pause time between doses and number of cycles.
- 5) Return to main screen.

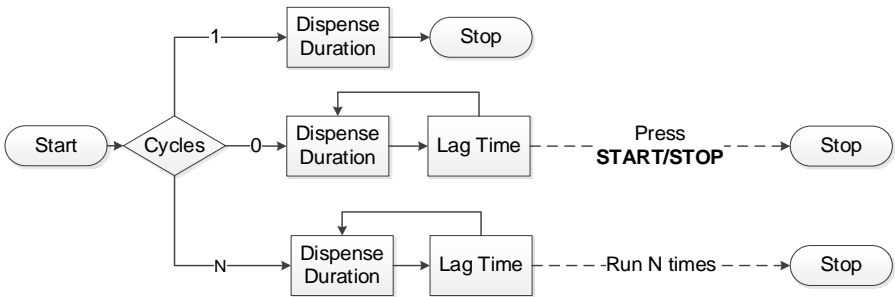


Figure 20. Dispense Cycle Setting

To run Time Dispense:

- 1) Press **DIRECTION** key to change the running direction, clockwise or counterclockwise.
- 2) Press **START/STOP** key to start dispensing.
- 3) When the drive is running, press **START/STOP** key to stop the

drive anytime when an accident occurs.

- 4) A footswitch can be used to start/stop pump.

7.7 Logic Level 1 Control Mode (footswitch)

Use external logic level signal to control start and stop. Use the keypad to control direction and speed.



Figure 21. Logic Level 1 Control Mode

- 1) Switch the power off. Wire the DB15 connector as shown on [Figure 22](#) or [Figure 23](#), and connect it to the DB15 port on the rear of the pump.

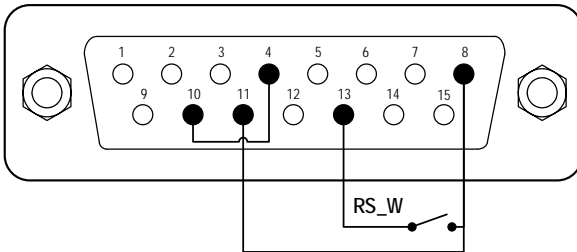


Figure 22. Logic Level 1 Control with Internal 12V Power Source

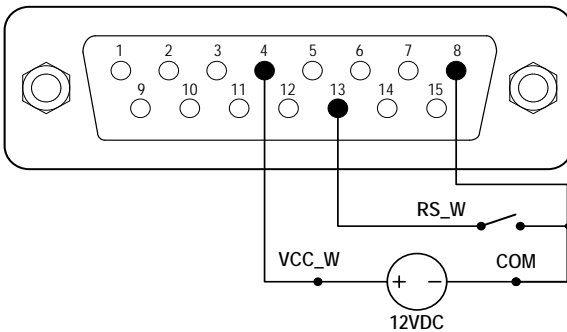


Figure 23. Logic Level 1 Control with External 12V Power Source

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

- 3) Press **MODE** key to change the mode to Logic Level 1 control mode (shows lev1 on the screen).
- 4) Press **UP** or **DOWN** key to adjust the speed.
- 5) Press **DIRECTION** key to change the rotating direction.
- 6) 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.

7.8 Logic Level 2 Control Mode (footswitch and direction switch)

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



Figure 24. Logic Level 2 Control Mode

- 1) Switch the power off. Wire the DB15 connector as shown on [Figure 25](#) or [Figure 26](#), and connect it to the DB15 port on the rear of the pump.

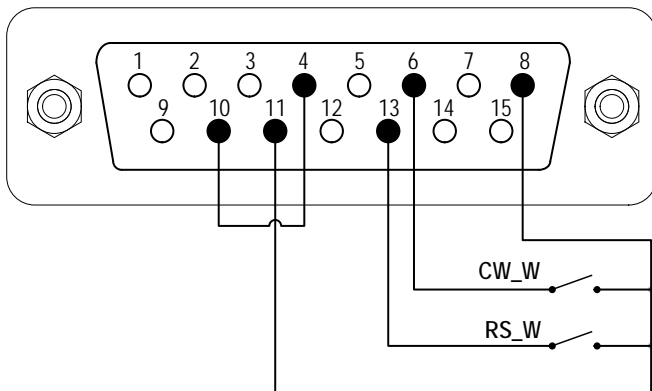


Figure 25. Logic Level 2 Control with Internal 12V Power Source

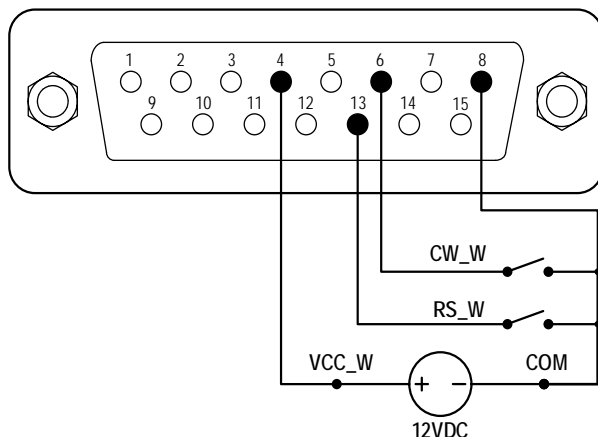
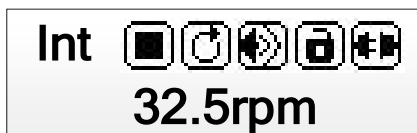


Figure 26. Logic Level 2 Control with External 12V Power Source

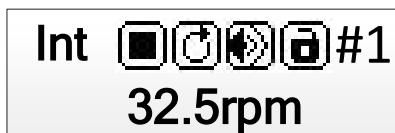
- 2) Turn on the power switch. Pump will display the main screen.
- 3) Press **MODE** key to change the mode to Logic Level 2 control mode (shows lev2 on the screen).
- 4) Press **UP** or **DOWN** key to adjust the speed.
- 5) When the switch RS_W is closed, the drive will be running at the set speed; when the switch RS_W is open, the drive will stop.
- 6) When the switch CW_W is open, the drive will be running in clockwise direction. When the switch CW_W is closed, the drive will be running in counterclockwise direction.

7.9 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.



Communication Disconnected



Communication Connected
Pump number is set to 1.

Figure 27. Communication Mode

- 1) When the power is off, wire the DB15 connector as shown on Figure 28, and connect it to the DB15 port on the rear of the pump. External DC power source is recommend to avoid electrical interference.

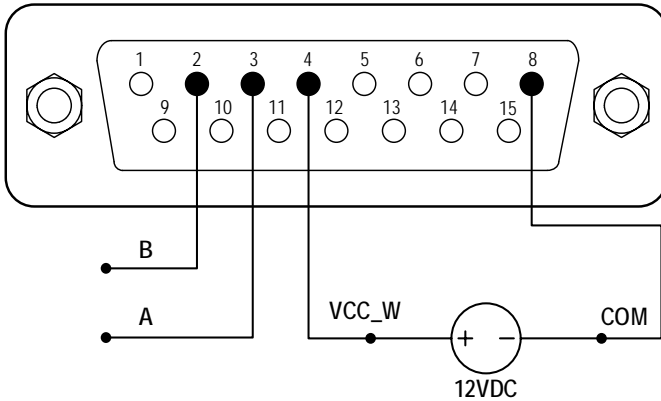


Figure 28. RS485 MODBUS Wiring

- 2) Turn on the power switch. Pump will display the main screen.
- 3) Press **MODE** key to change the mode to Internal Control mode or Time Dispense mode.
- 4) Control pump with communication interface.
- 5) Press the **START/STOP** key to stop the drive anytime.

7.10 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 resolution is 1 rpm when the speed is between 100 and 600 rpm. The speed can be set by pressing the **UP** or **DOWN** key. Press the **UP** or **DOWN** key shortly, the last digit of the value will change 1. Hold the **UP** or **DOWN** key to change the value fast. Hold the **PRIME** key, then press the **UP** key to set the speed to maximum directly; hold the **PRIME** key, then press the **DOWN** key to set the speed to minimum (0.1 rpm) directly.

8 Maintenance

8.1 Warranty

The product comes with one-year labor and parts warranty. The limited warranty does not cover any damage that is caused by improper usage and handling.

8.2 Regular Maintenance

- 1) Always check the tubing and connections to make sure there is no leakage.
- 2) Do not cover the fan on the rear of the pump.
- 3) Do not use water to wash the pump. Keep pump head dry.
- 4) Do not use chemical solvents to clean pump and pump head.

8.3 Malfunction Solutions

No.	Malfunction	Description	Solution
1	Hardware	No display	<ol style="list-style-type: none"> 1. Check the power cord 2. Check the fuse. If it was blown, replace it with a 1A slow-blow fuse 3. Check the internal power cord connection inside the pump.
2	Hardware	Motor does not work	<ol style="list-style-type: none"> 1. Check the indicator of the driver board. 2. Check the wire connection between the motor and the driver board. 3. Check the wire connection between the driver and the main board. 4. Check the power voltage for the pump.
3	Hardware	Motor is trembling	<ol style="list-style-type: none"> 1. Check the wire connection between the motor and the driver board. 2. The motor is overloaded. Check the mechanical connection.
4	Hardware	Motor only	Check the connection between the

BT-S V2 Basic Variable-Speed Peristaltic Pump

		runs in one direction	drive board and the main control board.
5	Hardware	Keypad does not work	<ol style="list-style-type: none"> 1. Check the wire connection between keypad and the main board. 2. Check if the key is broken.
6	Hardware	External control does not work	<ol style="list-style-type: none"> 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.
7	Hardware	RS485 com does not work	<ol style="list-style-type: none"> 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.
8	Hardware	Noisy when running	Check the screws and level on pump head to make sure they are secure.
9	Software	External control does not work	Check if pump is on External Control Mode.
10	Software	RS485 does not work right	<ol style="list-style-type: none"> 1. Check if the display shows the communication is ready. 2. Reset the address of the pump. 3. Check whether on the bus there are two pumps using the same address



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

9 Dimensions

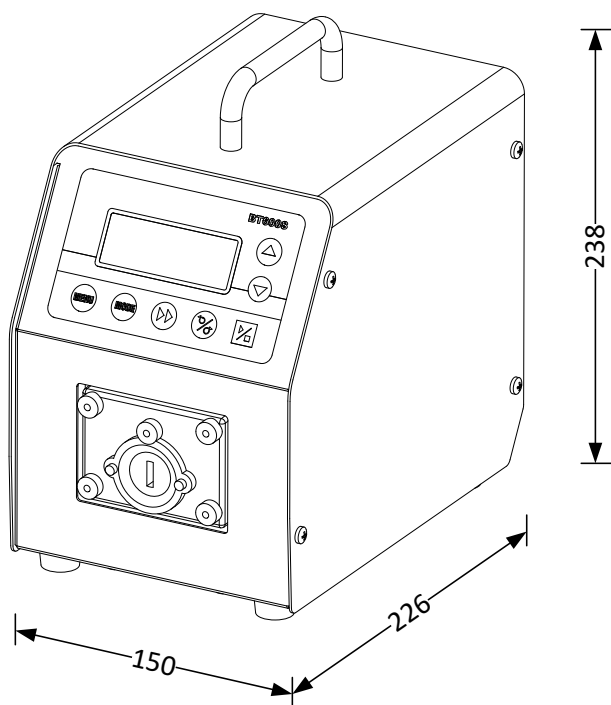
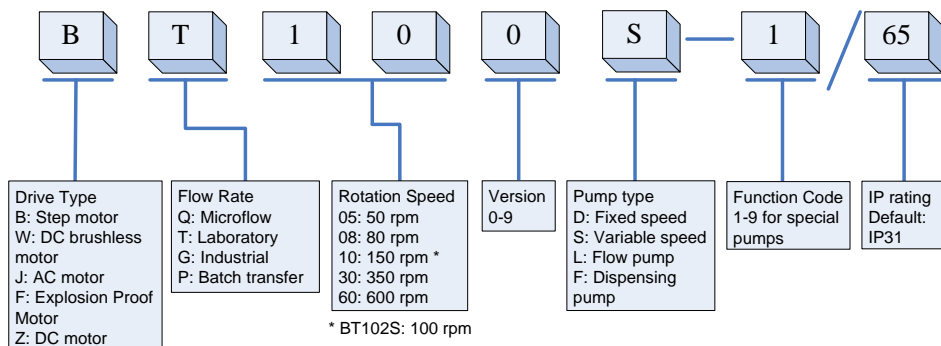


Figure 29. Dimensions (mm)

10 Naming Rule



11 Specifications

Speed resolution	0.1-100 rpm, 0.1 rpm resolution; 100-600 rpm, 1 rpm resolution
Speed accuracy	0.5%
Power supply	AC 220V \pm 10% 50Hz/60Hz; AC 110V \pm 10% 50Hz/60Hz
Power consumption	BT100S: < 40W; BT300S:< 50W; BT600S: < 60W
External logic level control signal	5V, 12V (standard), 24V (optional)
External analog control signal	0-5V (standard); 0-10V, 4-20mA (optional)
Communication interface	RS485 MODBUS
Operating condition	Temperature 0~40°C Relative humidity <80%
IP grade	IP31
Display	132x32 LCD
Dimensions (LxWxH)	226 x 150 x 238 mm (8.90 x 5.91 x 9.37 inch)
Weight	BT100S: 4.7 kg (10.4 lbs) BT300S: 4.9 kg (10.8 lbs) BT600S: 5.2 kg (11.5 lbs)

BT100S Suitable Pump Heads and Tubing, Flow Parameters

Drive type	Pump head	Ch	Tubing size (mm)	Flow rate per channel (mL/min)
BT100S	DG6-1 (6rollers)	1	Wall:0.8~1, ID:≤2.4	0.00016~26
	DG10-1 (10rollers)	1	Wall:0.8~1, ID:≤2.4	0.00011~20
	DG6-2 (6rollers)	2	Wall:0.8~1, ID:≤2.4	0.00016~26
	DG10-2 (10rollers)	2	Wall:0.8~1, ID:≤2.4	0.00011~20
	DG6-4 (6rollers)	4	Wall:0.8~1, ID:≤2.4	0.00016~26
	DG10-4 (10rollers)	4	Wall:0.8~1, ID:≤2.4	0.00011~20
	DT10-18	1	13# 14# , Wall: 0.8~1, ID:≤3.17	0.0002~82
	DT10-28	2	13# 14# , Wall: 0.8~1, ID:≤3.17	0.0002~82
	DT10-48	4	13# 14# , Wall: 0.8~1, ID:≤3.17	0.0002~82
	YZ15	1	13# 14# 16# 19# 25# 17#	0.006~420
	YZ25	1	15# 24#	0.17~420
	2 x YZ15	2	13# 14# 16# 19# 25# 17#	0.006~420
	2 x YZ25	2	15# 24#	0.17~420
	YT15	1	13# 14# 16# 19# 25# 17# 18#	0.006~570
	YT25	1	15# 24# 35# 36#	0.17~720
	2 x YT15	2	13# 14# 16# 19# 25# 17# 18#	0.006~570
	2 x YT25	2	15# 24# 35# 36#	0.006~720
DT15-24	2	19# 16# 25# 17#	0.05~400	

BT300S Suitable Pump Heads and Tubing, Flow Parameters

Drive type	Pump Head	Ch	Tubing size	Flow rate per channel (mL/min)
BT300S	YZ15	1	13# 14# 16# 19# 25# 17#	0.006~990
	YZ25	1	15# 24#	0.16~990
	2 x YZ15	2	13# 14# 16# 19# 25# 17#	0.006~990
	2 x YZ25	2	15# 24#	0.16~990
	DT15-24	2	19# 16# 25# 17#	0.05~930
	DT15-44	4	19# 16# 25#	0.05~610
	YT15	1	13# 14# 16# 19# 25# 17# 18#	0.006~1300
	YT25	1	15# 24# 35# 36#	0.16~1600
	2 x YT15	2	13# 14# 16# 19# 25# 17# 18#	0.006~1300

BT600S Suitable Pump Heads and Tubing, Flow Parameters

Drive type	Pump head	Ch	Tubing size	Flow rate per channel (mL/min)
BT600S	YZ15	1	13# 14# 16# 19# 25# 17#	0.006~1700
	YZ25	1	15# 24#	0.16~1700
	2 x YZ15	2	13# 14# 16# 19# 25# 17#	0.006~1700
	2 x YZ25	2	15# 24#	0.16~1700
	DT15-24	2	19# 16# 25# 17#	0.047~1600
	YT15	1	13# 14# 16# 19# 25# 17# 18#	0.006~2300
	YT25	1	15# 24# 35# 36#	0.16~2900
	2 x YT15	2	13# 14# 16# 19# 25# 17# 18#	0.006~2300