

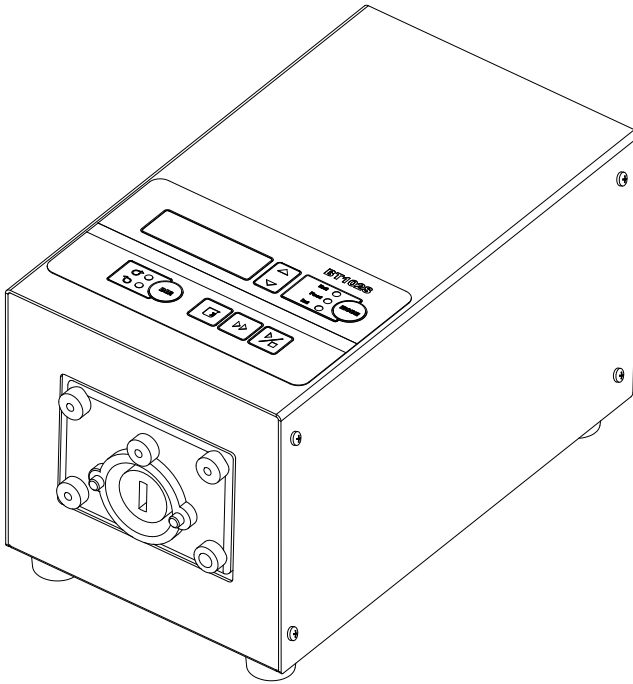


GOLANDER PUMP

Operation Manual

For Microflow Variable-Speed Peristaltic

Pump BT50S/BT102S



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<http://golanderpump.com>

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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 micrometer variable-speed peristaltic pump offers not only the basic functions such as reversible direction, start/stop and adjustable speed, but also Easy Dispense feature. With MODBUS RS485 interface, pump is easy to communicate with external device, such as PC, HMI or PLC.

This pump series includes:

- BT50S, flow rate: 0.00011-190 mL/min, speed: 0.1-50 rpm.
- BT102S, flow rate: 0.00011-480 mL/min, speed: 0.1-100 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.

- Four-digit LED displays speed and working mode.
- LED indicator shows working state.
- Membrane keypad.
- Reversible direction, start/stop control and adjustable speed.
- Easy Dispense Mode.
- 0.5% high precision rotating speed control with 0.1 rpm speed.
- External logic level signal can control start/stop, direction and dispense function; external analog signal can adjust the rotating speed. Signal is optically isolated.
- With RS485 MODBUS interface, easy to communicate with external device.
- Internal double-deck isolation structure; circuit board with conformal coating makes it 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

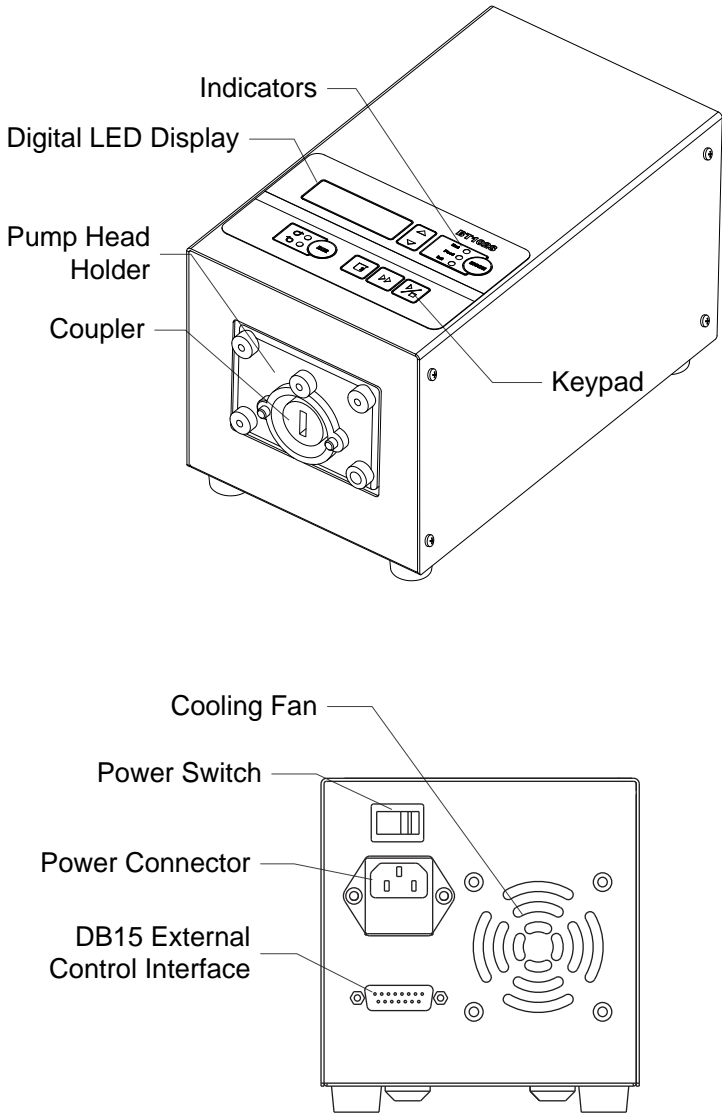


Figure 1. Components and Connectors

4 Display Panel and Operating Keypads

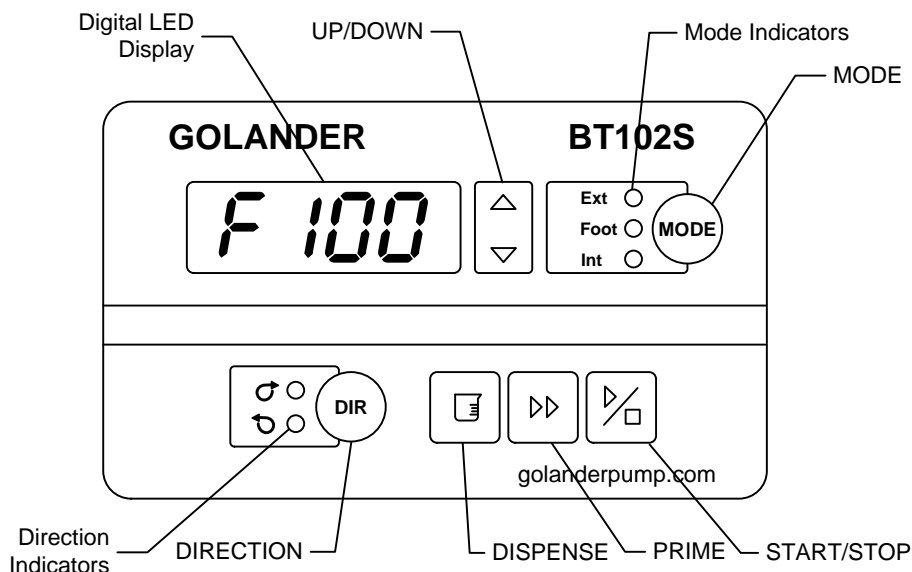
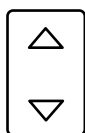


Figure 2. Display Panel

4.1 Keypad



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

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



MODE key. When the drive is not running, use the MODE key to change the working mode: Internal Control Mode, Easy Dispense Mode (footswitch), External Control Mode or Logic Level Control Mode.



DIRECTION Key. Change the drive rotating direction, clockwise or counterclockwise.



DISPENSE key. When the drive is not running, use the DISPENSE key to start dispensing. Press and hold the key to enter Easy Dispense Setup Mode.



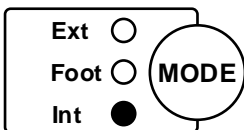
PRIME key. Press the key to run pump at maximum allowed speed. Press again to return to the previous state.



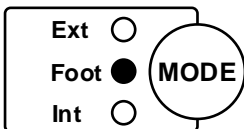
START/STOP key. Press the key to start or stop the drive.

4.2 Digital LED and Indicators

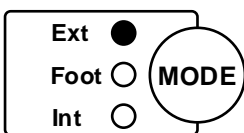
4.2.1 Indicators



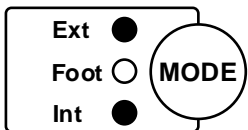
Int: Internal Control Mode. Use the keypad to operate the pump. Footswitch can be used to control start /stop.



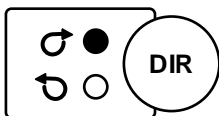
Foot: Easy Dispense Mode. Use footswitch to start or stop dispensing. Use the keypad for other operations.



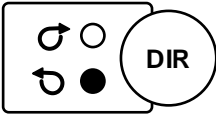
Ext: External Control Mode. Use external analog signal to control rotating speed. Use External logic level signal to control direction, start and stop. The keypad is disabled.



Int+Ext: Logic Level Control Mode. External logic level signal controls start and stop. Use the keypad control direction and speed.



Clockwise Direction: The drive runs in clockwise direction.



Counterclockwise Direction: The drive runs in counter-clockwise direction.

4.2.2 Digital LED Display

The digital LED displays the rotating speed and working mode.

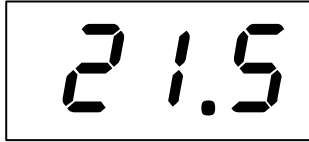


Figure 3. Internal Control Mode, 21.5 rpm



Figure 4. External Control Mode, 100 rpm



Figure 5. Easy Dispense Mode, 100 rpm

When flashing, pump is on Easy Dispense Setup Mode

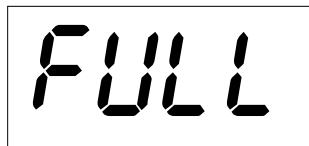
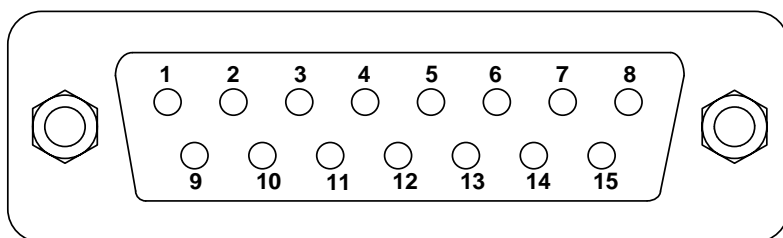


Figure 6. Drive is running at full speed

5 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	CW	Internal direction signal output terminal
13	RS_W	External start/stop signal input terminal
14		
15	RS	Internal start/stop signal output terminal

6 Operation Instructions

6.1 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 rear of the pump when it is running.

6.2 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.

6.3 Mode Change

Turn on the power switch. The display will be on. Press MODE key to change the working mode.

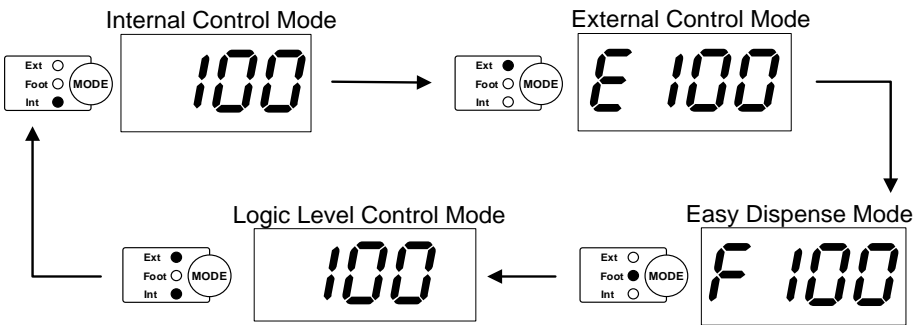
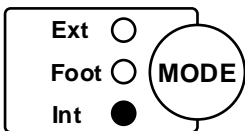


Figure 7. Change Working Mode

6.4 Internal Control Mode

On this mode, use the keypad to operate the pump.

- 1) Turn on the power switch. The display will be on.
- 2) Press MODE key to change the mode to Internal Control Mode.
- 3) Press UP or DOWN key to set the speed.



- 4) Press DIRECTION key to change the rotating direction.
- 5) Press START/STOP key to start or stop the drive.
- 6) Press PRIME key to run the drive at full speed.

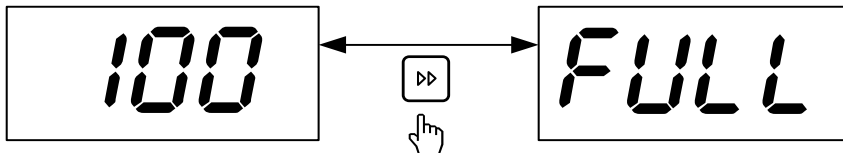


Figure 8. Full Speed

6.5 External Control Mode

On this mode, use external logic level signal to control direction, start and stop, and 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 9. Analog Signal Control Board Setting

To control pump by external signal

- 1) Switch the power off. Wire the DB15 connector as shown on [Figure 10](#) or [Figure 11](#), and connect it to the DB15 port on the rear of the pump.

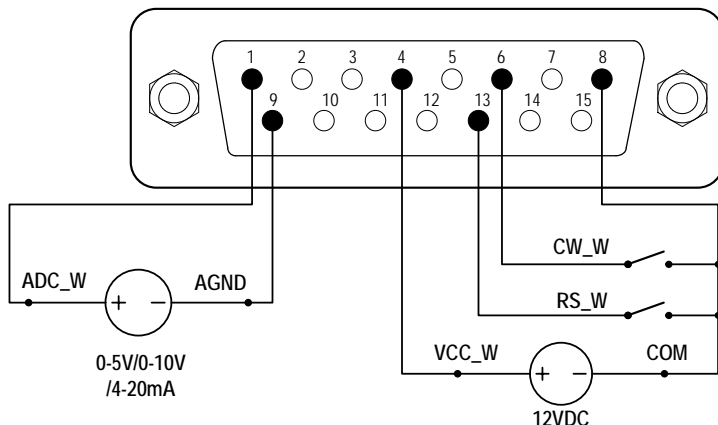


Figure 10. DB15 Wiring with External 12VDC Power Source

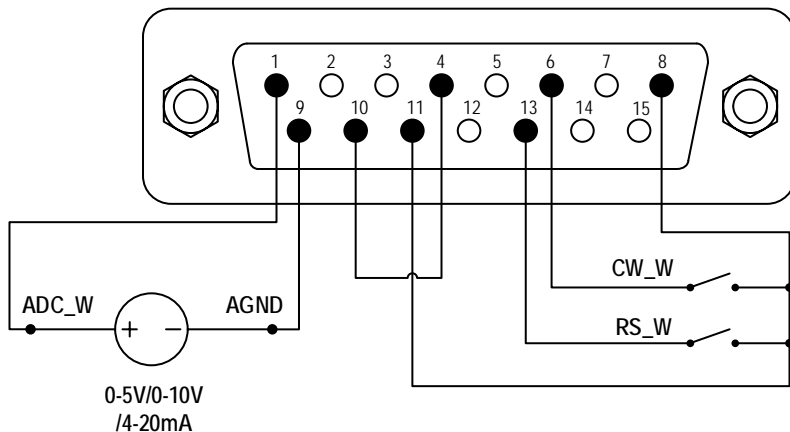
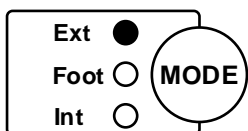


Figure 11. DB15 Wiring with Internal 12VDC Power Source

2) Turn on the power switch. The LED display will be on.



3) Press MODE key to change the mode to External Control Mode.

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 the drive will run in clockwise direction; close the CW_W switch, then the drive will run in counterclockwise direction.

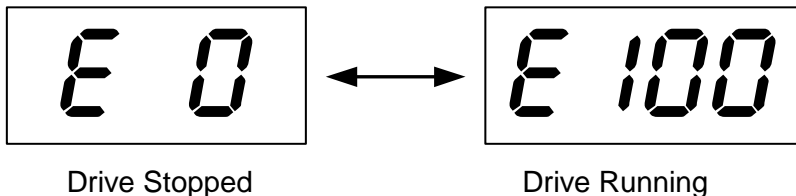


Figure 12. External Control Mode

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

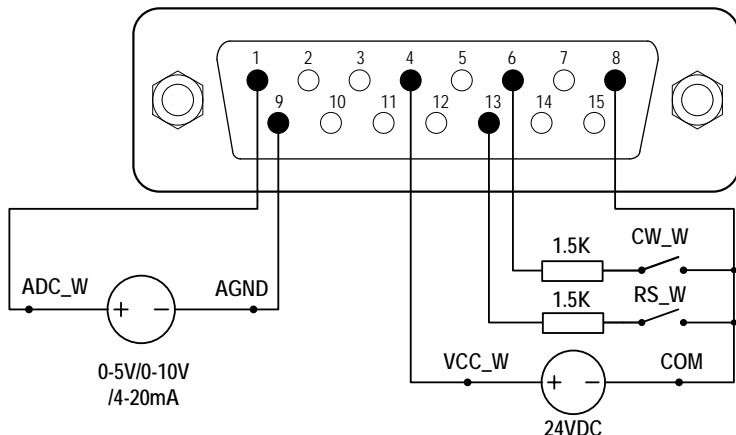


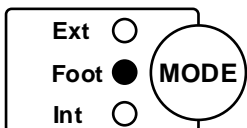
Figure 13. DB15 Wiring with External 24VDC Power Source

6.6 Easy Dispense Mode

On this mode, the pump will dispense fluid by recording the volume for each dose. The drive will stop when finished dispensing the set volume.

To record the volume for each dose

- 1) Turn on the power switch. The display will be on.



- 2) Press MODE key to change the mode to Easy Dispense Mode or Internal Control Mode.

- 3) Press and hold DISPENSE key for 3

seconds, the digital LED display will be flashing. Pump is on Easy Dispense Setup Mode.

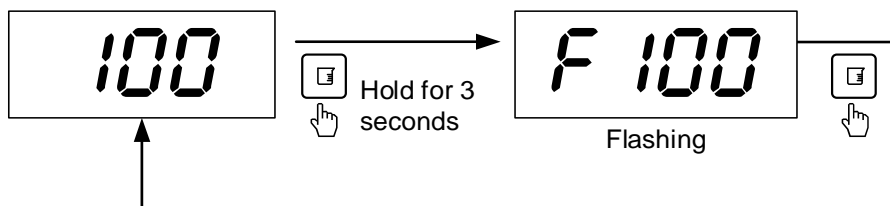


Figure 14. Easy Dispense Setup Mode

- 4) When on Easy Dispense Setup Mode, press START/STOP key to start the drive. When it has dispensed the desired volume, press START/STOP key again to stop the drive. You can start/stop the drive multiple times to adjust the volume, or press the PRIME key to fine adjust the volume, until the cumulative volume reaches the desired volume.
- 5) Press the DISPENSE key again to exit the Easy Dispense Setup Mode. Pump will record the cumulative volume for Easy Dispense Mode.

To Dispense Fluid

- 1) Press DIRECTION key to change the running direction, clockwise or counterclockwise.
- 2) When on Easy Dispense Mode, close then open the footswitch to dispense one dose. Close then open the footswitch again to repeat dispensing. See [6.9 Footswitch Control](#) for details.
- 3) When on Internal Control Mode, press DISPENSE key to dispense one dose. Press DISPENSE key again to repeat dispensing.
- 4) When the drive is running, press START/STOP key to stop the drive at any time when an accident occurs.

6.7 Logic Level Control Mode

On this mode, use external logic level signal to control start and stop. Use keypad to control direction and speed.

- 1) Switch the power off. Wire the DB15 connector as shown on Figure 15 or Figure 16, and connect it to the DB15 port on the rear of the pump.

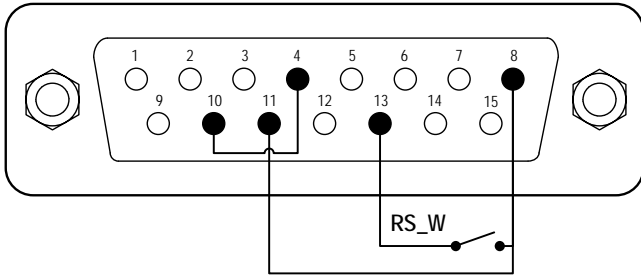


Figure 15. Logic Level Control with Internal 12V Power Source

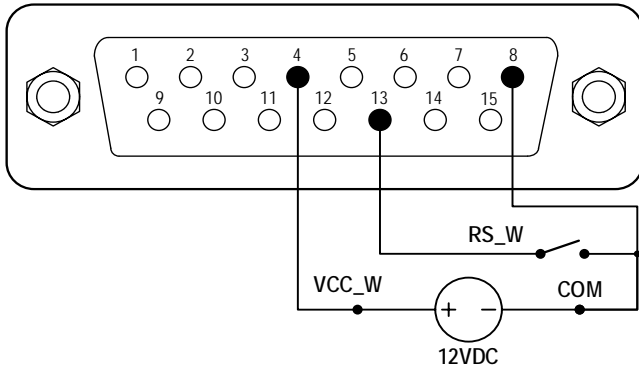
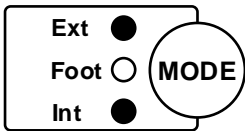


Figure 16. Logic Level Control with External 12V Power Source

- 2) Turn on the power switch. The display will be on.



- 3) Press MODE key to change the mode to Logic Level Control Mode.

- 4) Press UP or DOWN key to set the speed.

- 5) Press DIRECTION key to change the rotating direction.

- 6) When RS_W switch is closed, the drive will be running; when RS_W switch is open, the drive will stop.

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

6.8 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.

- 1) When the power is off, wire the DB15 connector as shown on [Figure 17](#), and connect it to the DB15 port on the rear of the pump. External DC power source is recommend to avoid electrical interference.

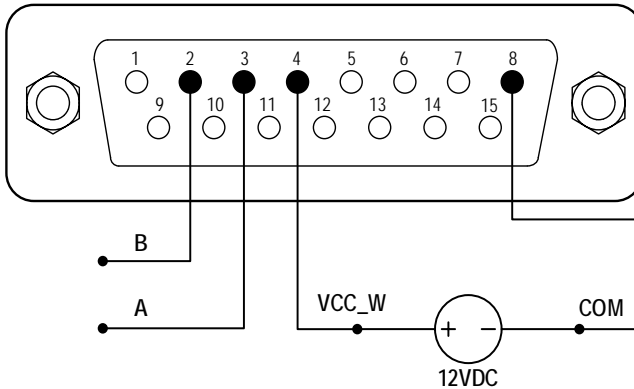


Figure 17. RS485 MODBUS Wiring

- 2) Turn on the power switch. The LED display will be on.
- 3) Press MODE key to change the mode to Internal Control Mode or Easy Dispense Mode.
- 4) Control pump with communication interface.
- 5) Press the START/STOP key to stop the drive anytime.

6.9 Footswitch Control

- 1) Switch the power off. Wire the DB15 connector as shown on [Figure 18](#) or [Figure 19](#), and connect it to the DB15 port on the rear of the pump.

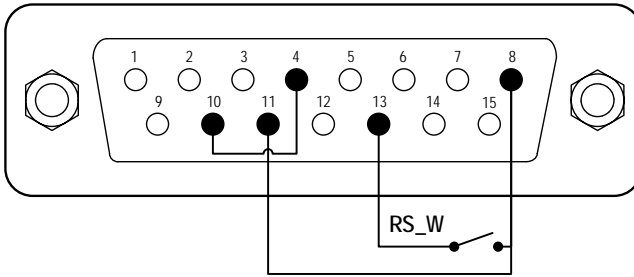


Figure 18. Footswitch with internal 12V Power Source

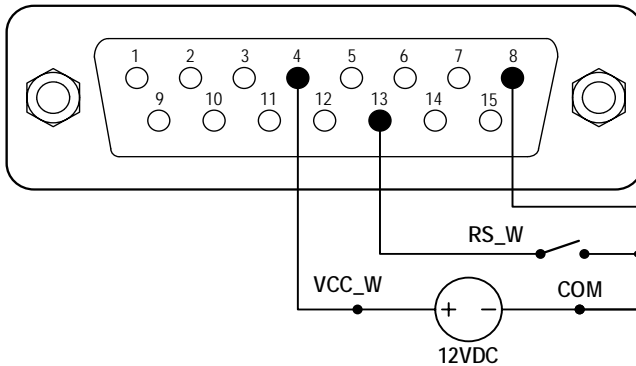


Figure 19. Footswitch with External 12V Power Source

- 2) Turn on the power switch. The LED display will be on.
 - 3) Press MODE key to change the working mode.
- On Internal Control Mode, close then open the switch RS_W to start the drive; close then open the switch again to stop the drive
 - On Easy Dispense Mode, close then open the switch RS_W to dispense one dose. Close then open the switch again to repeat dispensing.
 - On Logic Level Control Mode, close the switch RS_W to start the drive; open the switch to stop the drive.

7 Maintenance

7.1 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.

7.2 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.

7.3 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 pump.
3	Hardware	Motor is trembling	<ol style="list-style-type: none"> 1. Check the wire connection between the motor and the driver

BT-S Microflow Variable-Speed Peristaltic Pump

			board. 2. The motor is overloaded. Check the mechanical connection.
4	Hardware	Motor only runs in one direction	Check the connection between the drive board and the main control board.
5	Hardware	Keypad does not work	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	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	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	1. Check if the display shows the communication is ready. 2. Reset the address of 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.

8 Dimensions

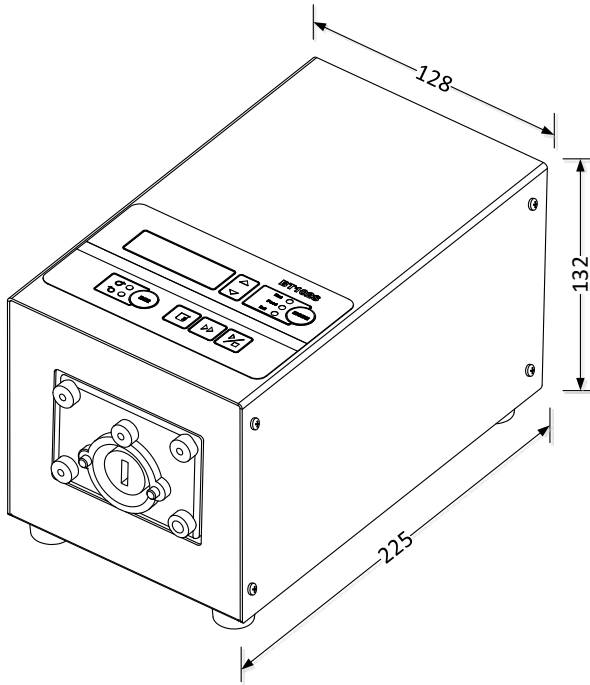
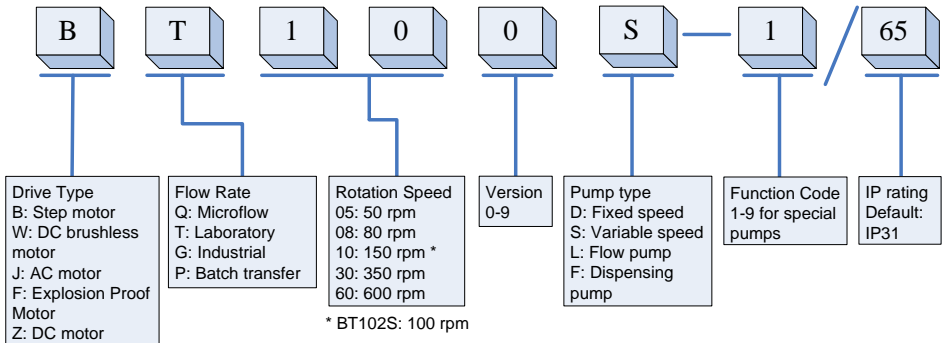


Figure 20. Dimensions

9 Naming Rule



10 Specifications

Speed resolution	0.1 rpm resolution
Speed accuracy	0.5%
Power supply	AC 220V \pm 10% 50Hz/60Hz; AC 110V \pm 10% 50Hz/60Hz
Power consumption	BT50S: < 25W; BT102S: <30W
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	Four-digit LED
Dimensions (LxWxH)	225 x 132 x 128 mm (8.86 x 5.20 x 5.04 inch)
Weight	2.7 kg (6.0 lbs)

BT50S Suitable Pump Heads and Tubings, Flow Parameters

Drive type	Pump head	Ch	Tubing size (mm)	Flow rate per channel (mL/min)
BT50S	DG10-1(10 rollers)	1	Wall:0.8~1, ID:≤2.4	0.00011~13
	DG10-2(10 rollers)	2	Wall:0.8~1, ID:≤2.4	0.00011~13
	DT10-18	2	Wall:0.8~1, ID:≤3.17	0.0002~41
	DT10-28	2	Wall:0.8~1, ID:≤3.17	0.0002~41
	YZ15	1	13# 14# 16# 19# 25# 17#	0.006~140
	YT15	1	13# 14# 16# 19# 25# 17#18#	0.006~190

BT102S Suitable Pump Heads and Tubings, Flow Parameters

Drive type	Pump head	Ch	Tubing size (mm)	Flow rate per channel (mL/min)
BT102S	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
	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
	YZ15	1	13# 14# 16# 19# 25# 17#	0.006~280
	YZ25	1	15# 24#	0.16~280
	YT15	1	13# 14# 16# 19# 25# 17#	0.006~380
	YT25	2	15# 24# 35# 36#	0.16~480