GOLANDER PUMP
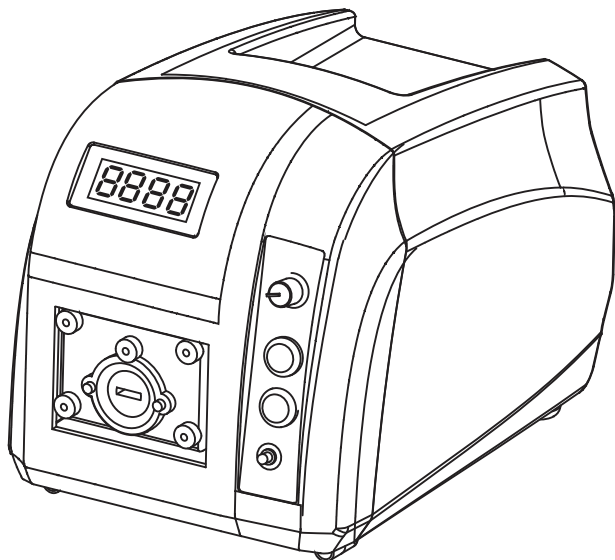
Operation Manual

For Basic Variable-Speed Peristaltic Pump

BT101S, BT301S, BT601S

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http://golanderpump.com

1-678-587-8806

Contents

Safety Cautions

Danger: Please use correct AC power voltage source shown on the sticker 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-01S series basic variable-speed peristaltic pump provides not only the basic functions such as reversible direction, start/stop and adjustable speed, but also *Easy Dispense Mode*. With MODBUS RS485 interface, the pump is easy to communicate with external device, such as PC, HMI or PLC. This pump series includes:

- BT101S, flow rate range: 0.00016-720 mL/min, speed: 0.1-150 rpm
- BT301S, flow rate range: 0.00016-1600 mL/min, speed: 0.1-350 rpm
- BT601S, flow rate range: 0.00016-2900 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.

- Four-digit LED displays speed and working mode.
- Membrane keypad.
- Reversible direction, start/stop control and adjustable speed.
- Easy Dispense Mode: Use DISPENSE button to dispense the recorded volume.
- 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 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.
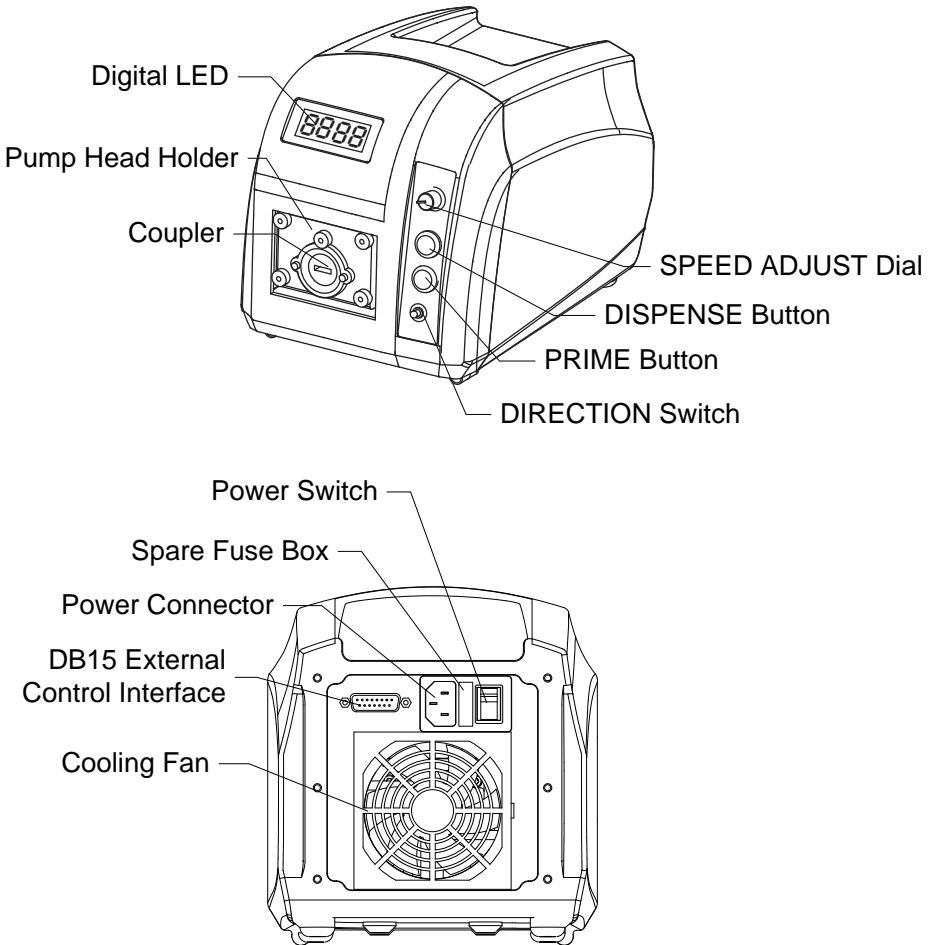- ABS case.

3 Components and Connectors

Digital LED

Pump Head Holder

Coupler

SPEED ADJUST Dial

DISPENSE Button

PRIME Button

DIRECTION Switch

Power Switch

Spare Fuse Box

Power Connector

DB15 External
Control Interface

Cooling Fan

Figure 1. Components and Connectors

4 Display Panel and Operating Buttons

4.1 Digital LED Display

Digital LED display shows the current speed and working mode.

$$115$$

Figure 2. Internal Control Mode, 115 rpm

$$F\,115$$

Figure 3. Easy Dispense Mode, 115 rpm

$$E\,100$$

Figure 4. External Control Mode, 100 rpm.

$$H\,115$$
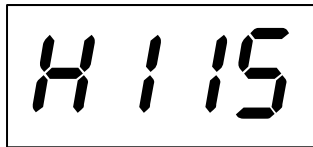
Figure 5. Logic Level Control Mode, 115 rpm

$$L\,115$$

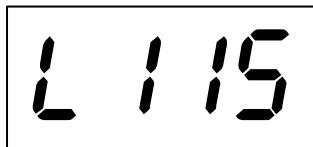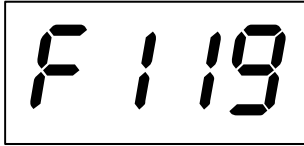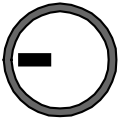*Figure 6. Communication Mode, 115 rpm*

Figure 7. When the Digital LEDs are flashing, the pump is on Easy Dispense

Recording Mode, 119 rpm. See 6.5

Figure 8. Drive is running at full speed

4.2 SPEED ADJUST Dial

 Rotate the dial in clockwise direction to increase the setting. Rotate one position to increase 1 to the last digit. Rotate continuously to increase the setting fast.

Rotate the dial in counterclockwise direction to decrease the setting. Rotate 1 position to decrease 1 to the last digit. Rotate continuously to decrease the setting fast.

Press the dial to switch the control mode. When the **DIRECTION** button is on the middle position and the drive is not running, press the dial to change the control mode (*Figure 9*).
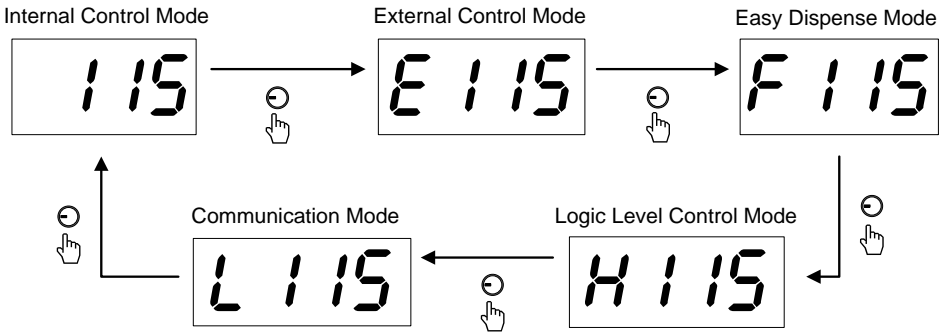
Figure 9. Change Control Mode

4.3 DISPENSE Button (Orange)

When the pump is on Easy Dispense Mode and the **DIRECTION** switch is on left or right position, press the **DISPENSE** button to dispense the recorded volume.

When the pump is on Easy Dispense Mode and the **DIRECTION** switch is on middle position, press and hold the key to enter the *Easy Dispense Recording Mode*.

4.4 PRIME Button (Black)

On Internal Control Mode or Communication Mode, when the **DIRECTION** switch is on left or right position, press the **PRIME** button to switch between normal speed and full speed.

On Easy Dispense Mode, when the **DIRECTION** switch is on left or right position and the dispense process is stopped, press the **PRIME** button to switch between normal speed and full speed.

4.5 Direction Switch

When on left position: the drive runs in counterclockwise direction
When on middle position: the drive stops.
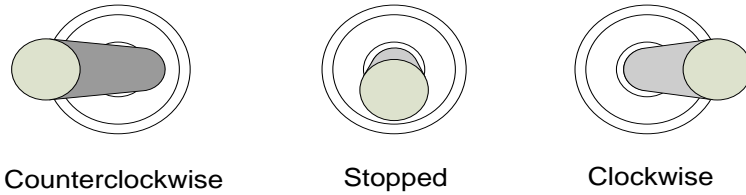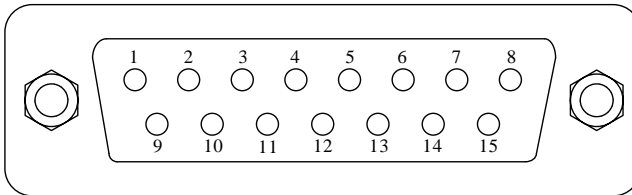When on right position: the drive runs in clockwise direction.

Counterclockwise   Stopped   Clockwise

Figure 10. DIRECTION Switch

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		
13	RS_W	External start/stop signal input terminal
14		
15		

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 back of the pump when it is running.

6.2 Power Connection

The voltage of the power supply is 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 Internal Control Mode

On this mode, use the buttons/dial on the front panel to operate the pump.

1) Turn on the power switch. The LED display will be on.
2) Press **SPEED ADJUST** dial to change the mode to Internal Control Mode.
3) Rotate the **SPEED ADJUST** dial to adjust the speed to desired value.
4) Change **DIRECTION** switch position to desired rotating direction. The drive starts running.
5) Press **PRIME** button, the drive will run at maximum allowed speed. Press the **PRIME** button again to switch back to the normal speed.
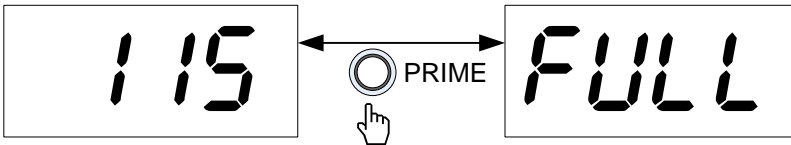6) Change **DIRECTION** switch to the middle position to stop the drive at any time when an accident occurs.

Figure 11. Prime the Pump

6.4 External Control Mode (E)

On this mode, logic level signal 5V, 12V or 24V controls direction, start and stop, and external analog signal controls rotation speed. The buttons/dial are 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 12*).
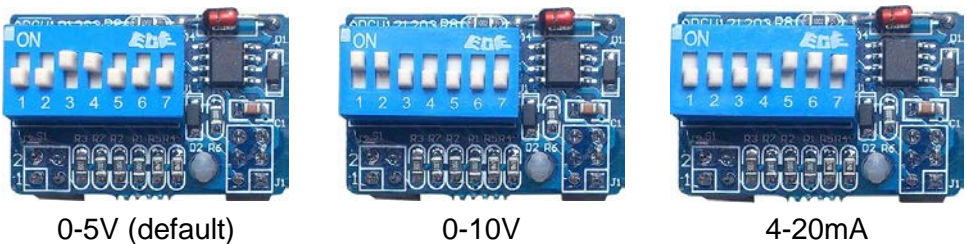

0-5V (default)   0-10V   4-20mA

Figure 12. Analog Signal Control Board Setting

To control the pump by external signal

1) Switch the power of the pump off. Wire the DB15 connector as shown on *Figure 13* or *Figure 14*, and connect it to the DB15 port on the rear of the pump.
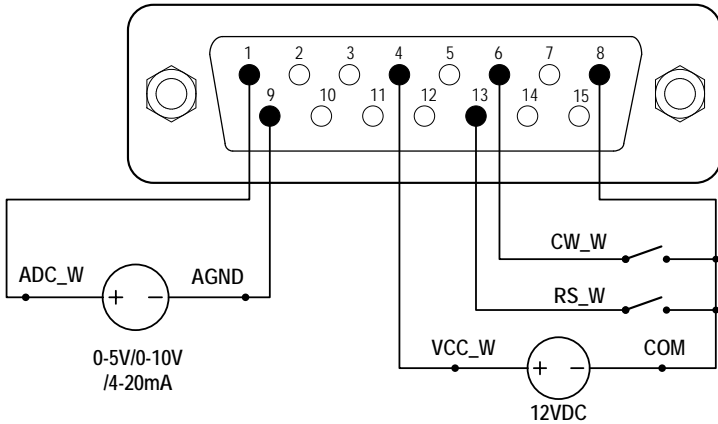
Figure 13. External Control with External 12VDC Power Source
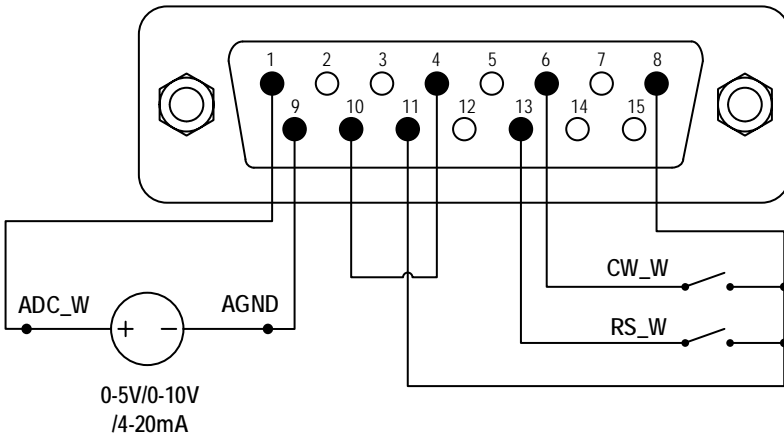
Figure 14. External Control with Internal 12VDC Power Source

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

3) Press **SPEED ADJUST** dial 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

10

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

Drive Stopped   Drive Running

Figure 15. 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 16. DB15 Wiring with External 24VDC Power Source

6.5 Easy Dispense Mode (F)

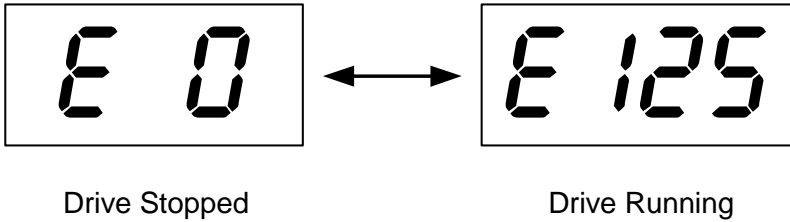On this mode, the pump will dispense fluid by recording the volume for each dose. The drive will stop automatically when finished dispensing the set volume.

To record the volume for each dose

1) Turn on the power switch. The LED display will be on.
2) Press **SPEED ADJUST** dial to change the mode to Easy Dispense Mode.
3) When the **DIRECTION** switch is on the middle position, press and hold

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DISPENSE key for 3 seconds, the four-digit LED display will be flashing. The pump is on Easy Dispense Recording Mode.
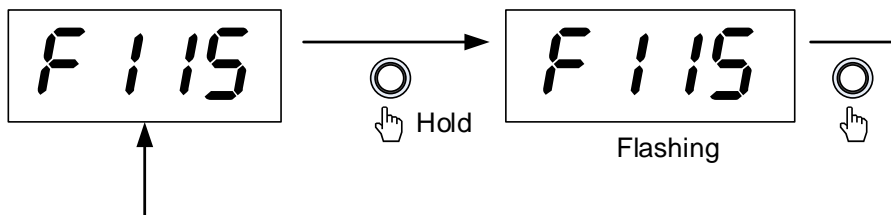
Figure 17. Easy Dispense Recording Mode

4) When on Easy Dispense Recording Mode, change **DIRECTION** switch position to desired rotating direction to start the drive. When it has delivered the desired volume for each dose, change **DIRECTION** switch to middle position to stop the drive. You can start/stop the drive multiple times to adjust the volume, until the cumulative volume reaches the desired volume.
5) Press the **DISPENSE** key again to exit the Easy Dispense Recording Mode. Pump will record the cumulative volume for Easy Dispense Mode.

To start dispensing
1) Press **SPEED ADJUST** dial to change the mode to Dispense Mode.
2) Change the **DIRECTION** position for running direction, clockwise or counterclockwise.
3) Press **DISPENSE** key to start dispensing. Once the volume reaches the set volume, the drive will stop. Press **DISPENSE** key to dispense again.

6.6 Logic Level Control Mode (H)

On this mode, use external logic level signal to control start and stop.
1) Switch the pump 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. Logic Level Control with Internal 12V DC Power Source

Figure 19. Logic Level Control with External 5V/12V DC Power Source

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

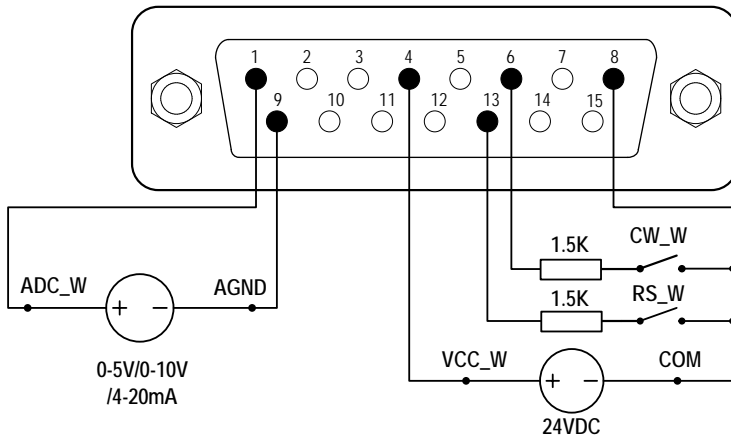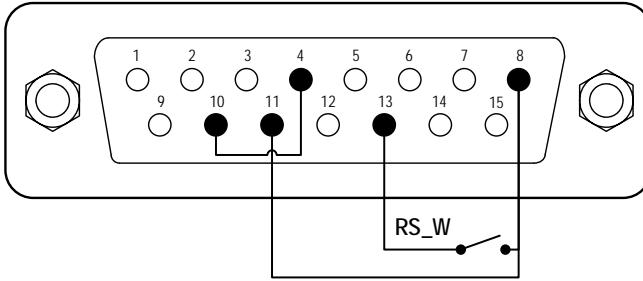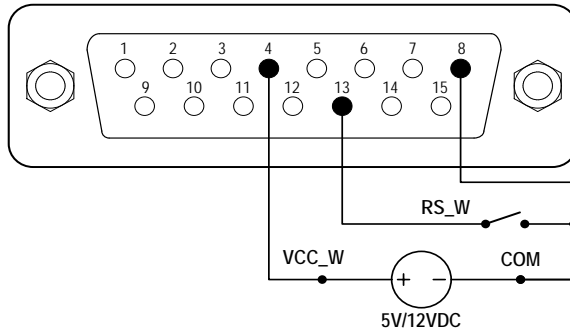*Figure 20. Logic Level Control with External 24V DC Power Source*

13

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

```
H2 15
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3) Press **SPEED ADJUST** dial to change the mode to Logic Level Control Mode.

4) Rotate the **SPEED ADJUST** dial to adjust the speed to desired value.

5) Change **DIRECTION** switch position to desired rotating direction.

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

7) Change **DIRECTION** switch to the middle position to stop the drive anytime.

6.7 Communication Mode (L)

The RS485 interface supports standard MODBUS protocol. The pump can communicated 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 21*, and connect it to the DB15 port on the rear of the pump. External DC power source is recommend to avoid electrical interference.

Figure 21. RS485 MODBUS Wiring

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

$L2$ 15

3)   Press **SPEED ADJUST** dial to change the mode to Communication Mode.

4)   Change **DIRECTION** switch position to desired rotating direction.

5) Control pump with communication interface on the external control device.

6) Change **DIRECTION** switch to the middle position to stop the drive anytime.

6.8 Footswitch Control

1) Switch the power of the pump 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.
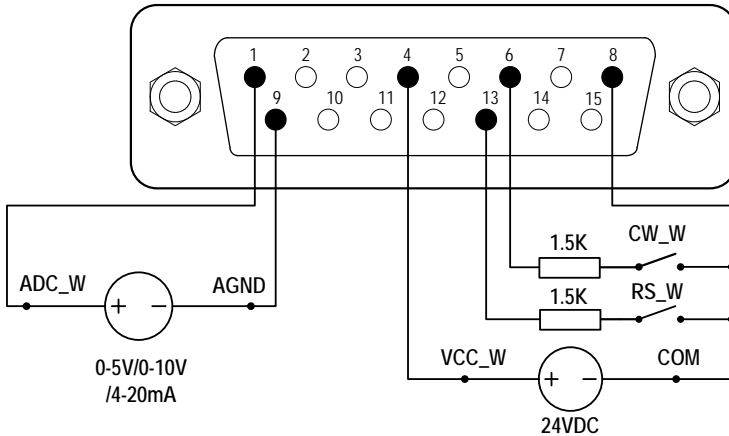

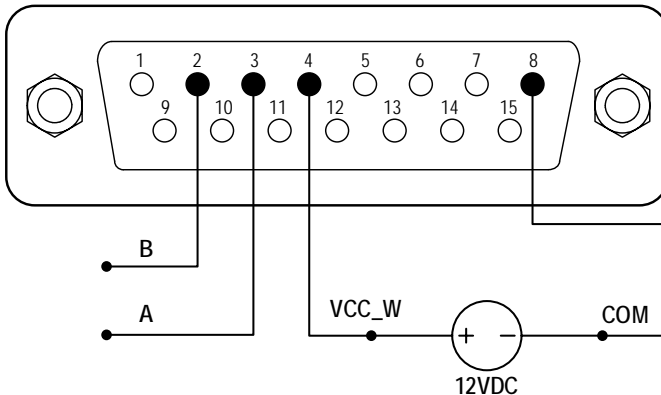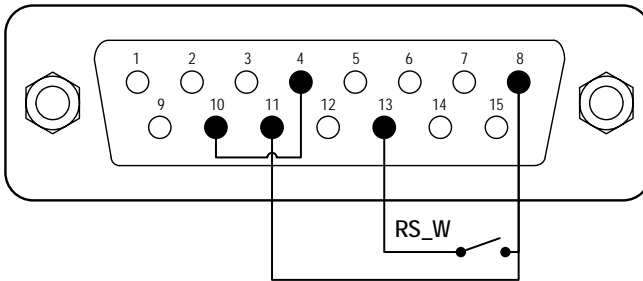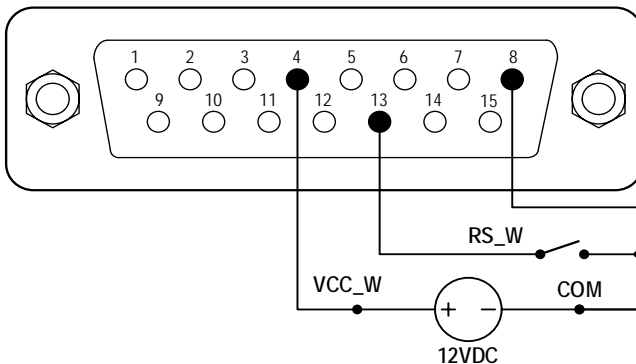*Figure 22. Footswitch with internal 12V Power Source*

Figure 23. Footswitch with External 12V Power Source

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

3) Press **SPEED ADJUST** dial to change the mode to Easy Dispense Mode. The RS_W would act like a momentary switch. When the switch is pushed then released, the pump will dispense one dose.

4) Press **SPEED ADJUST** dial to change the mode to Logic Level Control Mode. When RS_W switch is closed, the drive will be running; when switch is open, the drive will stop.

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 the pump head dry.

4) Do not use chemical solvents to clean the pump and the pump head.

7.3 Malfunction Solutions

NO.	Malfunction	Description	Solution
1	Hardware	No display	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	1. Check the **DIRECTION** switch if it is on the middle position. 2. Check the indicator of the driver board.

			3. Check the wire connection between the motor and the driver board. 4. Check the wire connection between the driver and the main board. 5. Check the power voltage for the pump.
3	Hardware	Motor is trembling	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 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. 4. Check the **DIRECTION** switch if it is on the middle position.
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. 4. Check the **DIRECTION** switch if it is on the middle position.
8	Hardware	Noisy when running	Check the screws and lever on the pump head to make sure they are secure.
9	Software	External control does	Check if pump is on External Control Mode.

10	Software	RS485 does not work right	1. Check if pump is on Communication Mode. 2. Reset the address of the pump. 3. Check whether on the bus there are two pumps using the same address
		not work	

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

8 Dimensions
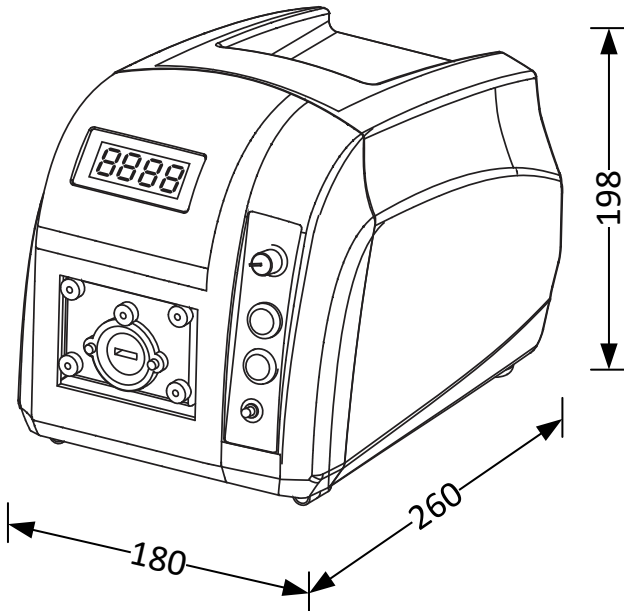
Figure 24. Dimensions (mm)

9 Naming Rule

| B | T | 1 | 0 | 0 | S | — | 1 | / | 65 |

Drive Type
B: Step motor
W: DC brushless motor
J: AC motor
F: Explosion Proof Motor
Z: DC motor

Flow Rate
Q: Microflow
T: Laboratory
G: Industrial
P: Batch transfer

Rotation Speed
05: 50 rpm
08: 80 rpm
10: 150 rpm *
30: 350 rpm
60: 600 rpm

* BT102S: 100 rpm

Version
0-9

Pump type
D: Fixed speed
S: Variable speed
L: Flow pump
F: Dispensing pump

Function Code
1-9 for special pumps

IP rating
Default: IP31

10 Specifications

Speed resolution	0.1-100 rpm, 0.1 rpm resolution; 100-600 rpm, 1 rpm resolution
Speed accuracy	0.5%
Direction	Reversible, clockwise/counterclockwise
Display	Rotating speed
Power supply	AC 220V±10% or 110V±10%, 50Hz/60Hz
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)	260x180x198 mm (10.2x7.1x7.8 inch)
Weight	BT101S: 4.5 kg (9.9 lbs) BT301S: 4.7 kg (10.4 lbs) BT601S: 4.9 kg (10.8 lbs)

BT101S Suitable Pump Heads and Tubings, Flow Parameters

Drive type	Pump head	Ch	Tubing size (mm)	Flow rate per channel (mL/min)
BT101S (ABS case)	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
	YZ15	1	13# 14# 16# 19# 25# 17#	0.006~420
	YZ25	1	15# 24#	0.16~420
	YT15	1	13# 14# 16# 19# 25# 17# 18#	0.006~570
	YT25	1	15# 24# 35# 36#	0.006~720

BT301S Suitable Pump Heads and Tubings, Flow Parameters

Drive type	Pump heads	Ch	Tubing size (mm)	Flow rate per channel (mL/min)
BT301S (ABS Case)	YZ15	1	13# 14# 16# 19# 25# 17#	0.006~990
	YZ25	1	15# 24#	0.16~990
	YT15	1	13# 14# 16# 19# 25# 17# 18#	0.006~1300
	YT25	1	15# 24# 35# 36#	0.16~1600

BT601S Suitable Pump Heads and Tubings, Flow Parameters

Drive type	Pump head	Ch	Tubing size (mm)	Flow rate per channel (mL/min)
BT601S (ABS Case)	YZ15	1	13# 14# 16# 19# 25# 17#	0.006~1700
	YZ25	1	15# 24#	0.16~1700
	YT15	1	13# 14# 16# 19# 25# 17# 18#	0.006~2300
	YT25	1	15# 24# 35# 36#	0.16~2900