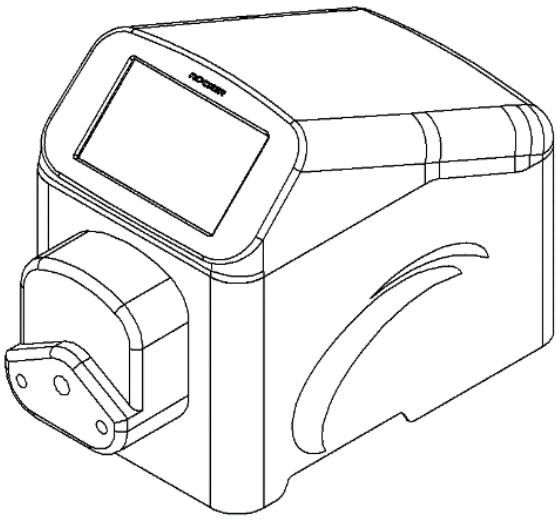
INSTRUCTION MANUAL

Dispensing Peristaltic Pump

Model No.

Buller 600

Tech support



ROCKER

Please read this instruction manual before using this product.

Table of Contents

1. Important Notice

This instrument is designed for laboratory usage only. Please read this manual carefully before installing and operating. The instrument shall not be modified in any way. Any modification will void the warranty and may result in potential hazard. We are not responsible for any injury or damage caused by any non-intended purposes and modifying the instrument without authorization.

1. Check the voltage specified on the name plate and ensure it matches the line voltage in your location.
2. For tubing selection and compatibility, please refer to the tubing manufacture.
3. Please check the compatibility of sample solution and tubing material before using.
4. Keep instrument away from flammable or explosive materials. Install it in a clean, dust-less and ventilated area.
5. To maintain the optimal accuracy of flow rates, please recalibrate tubing regularly.
6. When cleaning or performing maintenance, please disconnect power from the instrument.
7. Pump tubing may rupture due to continuous contact with moving parts; it is advisable to replace it according to the tubing manufacture's replacement interval.
8. In case of any issues with instrument, please contact the manufacturer or your service agent for assistance. Do NOT disassemble it improperly.
9. Please discard packing materials in accordance with relevant local regulations.
10. Visit the official website and refer to the latest product guide for more information.
11. Operating Condition
    (a) Ambient temperature: 5 ~ 50°C
    (b) Relative humidity: 80% RH Max.
    (c) Power supply: 100-240V~, 50/60Hz, 80W
    (d) Fuse: T1.5A, 250V
    (e) Altitude: Up to 2000 m
    (f) Pollution degree: II
    (g) Indoor use

Do NOT start the system with the pump head open.

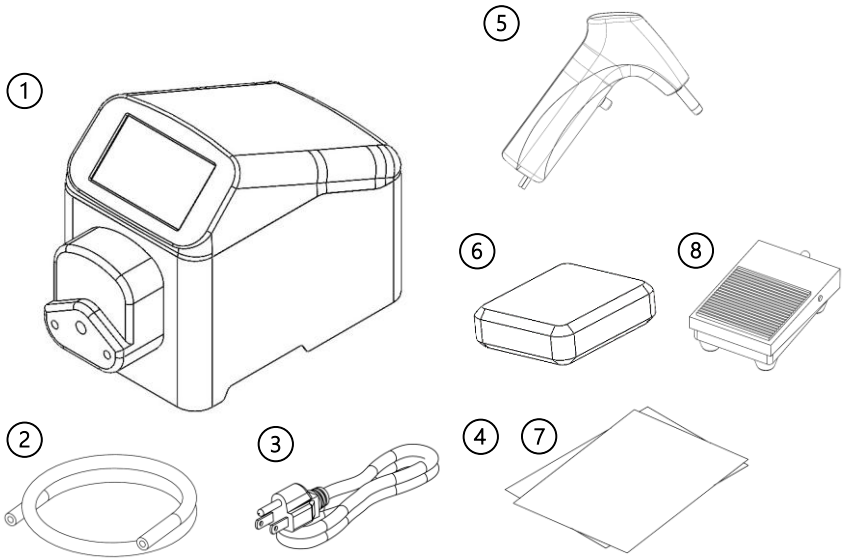
Please turn off and unplug the instrument before replacing the fuse.

** When handling hazardous chemical and biological solutions, take all appropriate protective measures.*

** Before operation, please check whether the compatibility of contact materials of instrument with sample solution.*

2. Unpacking

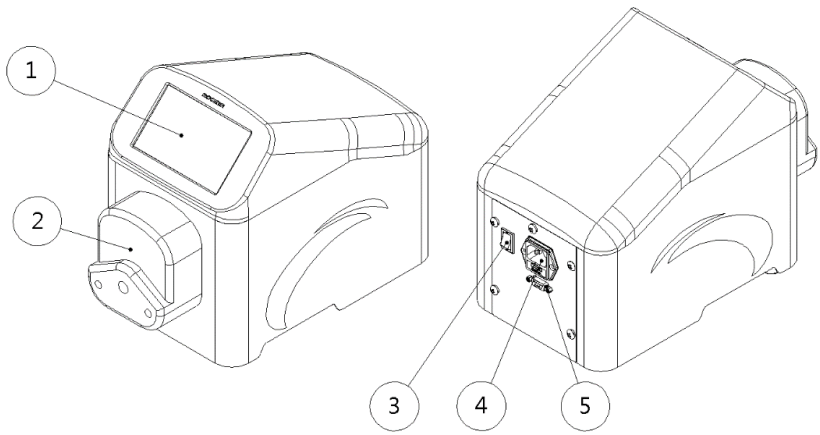
Please check if the package is complete without any damage before unpacking. When unpacking, please make sure you have all accessories that indicated on the list. If there is any problem, please keep the serial number along with packing case and contact your local distributor immediately for assistance.



Model		Standard Package Includes:	
Buller 600		1	Buller 600, Dispensing Peristaltic Pump
		2	Silicone Tube
		3	Power Cord
		4	Instruction Manual
Buller 600 - DSP		5	Handling Dispenser
		6	Dispensing Kit
		7	Instruction Manual

* A foot switch (8) is available as another option.

3. Main Part Diagram



Item	Designation	Item	Designation
1	5″ Touch Screen	4	AC Socket and Fuse Holder
2	Normal Flow Rate Pump Head	5	RS232 Signal Port (DB9F)
3	Power Switch		

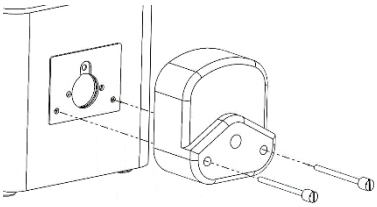
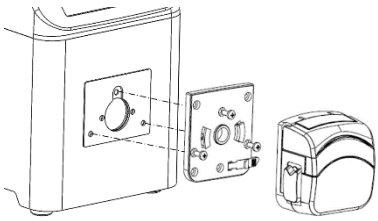
4. Installation

(1) Power Supply

Please connect the instrument to the correct power source as indicated by the rated voltage on the instrument and ensure that there are no flammable materials around the instrument.

(2) Installation and Operation of Pump Head

	Norm. Flow Rate Pump Head	High Flow Rate Pump Head
Picture		
Installation	1. Insert 2 screws into the mounting holes. 2. Connect the pump head with the driver unit and tighten the screws. *NOTICE: (1) Ensure that the axis of the pump head corresponds to the groove of the main unit for connection. (2) Please tighten the screws in the same degree. Do not over-tighten the screws to prevent the support block from deforming and abnormal noise.	1. Connect the adaptor with main unit by using screws. 2. Insert the pump head onto the main unit. *NOTICE: Ensure that the axis of the pump head corresponds to the groove of the main unit for connection. 3. Rotate the pump head 45° clockwise to complete the installation.

		
Disassemble	1. Loose the screws, remove them from the pump head. 2. Remove the pump head from the instrument directly.	1. Rotate the pump head counter-clockwise to remove the pump head. 2. Remove the adaptor if needed.
Installation of tubing	1. Rotate the lever counter-clockwise to open the pump head. 2. Pull up the tubing clamp and load the tubing on the roller. 3. Rotate the lever clockwise to close the pump head and fix the tubing. 4. Ready to use	1. Pull up the flip cover to open the pump head. 2. Load the tubing on the roller. 3. Close the pump head with the flip cover to fix the tubing. 4. Ready to use
Suitable tubing	TYGON S3 ™ E-3603, PHARMED® BPT	Biosicon, PHARMED® BPT

(3) Technical Data of Tubing

Tubing	ID (mm)	Wall Thickness (mm)	Max. Flow Rate (mL/min)	
			Norm. Flow Rate Pump Head	High Flow Rate Pump Head
16#	3.1	1.6	576	629
25#	4.8	1.6	1158	1326
17#	6.4	1.6	1950	2130

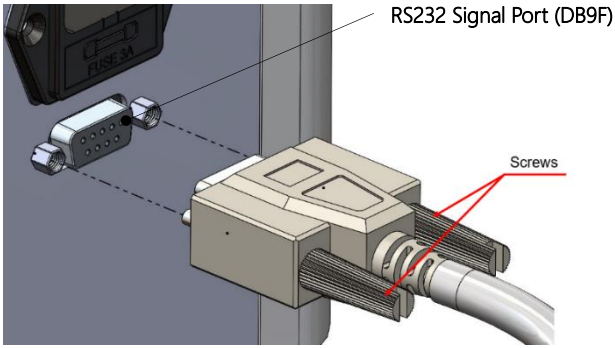
* For tubing selection and compatibility, please refer to the tubing manufacture.

* Pump tubing may rupture due to continuous contact with moving parts; it is advisable to replace it according to the tubing manufactures' replacement interval.

(4) Dispenser and Foot Switch Connection

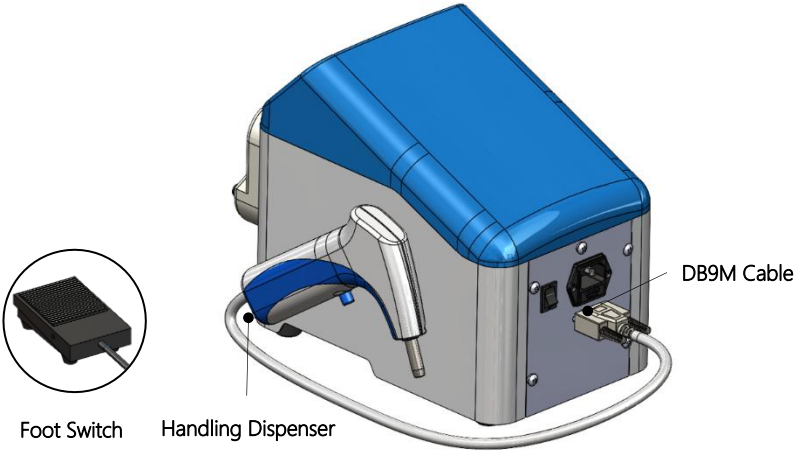
a. DB9M Cable Connection

Please connect the DB9M cable from the handling dispenser or foot switch to the RS232 signal port (DB9F) which is located at the back of the instrument. Ensure the screws are securely tightened for proper fixation.



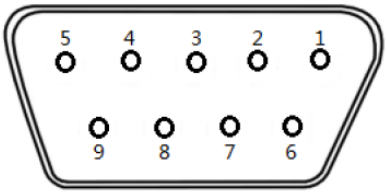
b. Dispenser and Foot Switch Connection

When the handling dispenser or foot switch is connected to main unit, please change the control mode by referring to p.14 (5) b. External Control. After changing the control mode, the start / stop function is disabled from the control panel.



(5) Configure of DB9F

To use the pump and to monitor the status of pump, Buller 600 adopts a DB9 female connecter (DB9F) at the back of main unit. The configure of DB9F is shown as below.



Terminal	Declaration
1	4-20mA Input
2	RS232 TXD
3	RS232 RXD
4	Pump state input, 0=CCW, 1=CW
5	COMM (GND)
6	0-5V Input
7	Pump state output, 0=STOP, 1=RUN
8	Pump state output, 0=CCW, 1=CW
9	Pump state input, 0=STOP, 1=RUN

5. Control Panel

(1) Homepage

Item	Designation	Description
1	Continuous	Setting flow rate or rpm for continuous dispensing.
2	Microbial	Build-in frequently used dispensing volume in microbial tests.
3	Dispense	Dispensing based on dispensing volume, dispensing time, interval time and dispensing dosages.
4	Manual	Build customized dispensing program with multi-functions, including constant, ramp, dispense, interval and cycle.

(2) Functional Buttons

Item	Valid	Invalid	Description
1			• Back to Homepage
2			• Return to previous page
3			• Setting
4			• Calibration
5			• Start
6			• Pause
7			• Stop
8			• Prime / Stop Prime
9			• Direction (Clockwise / Counterclockwise)
10			• Lock Screen
11			• Add Step
12			• Store Method

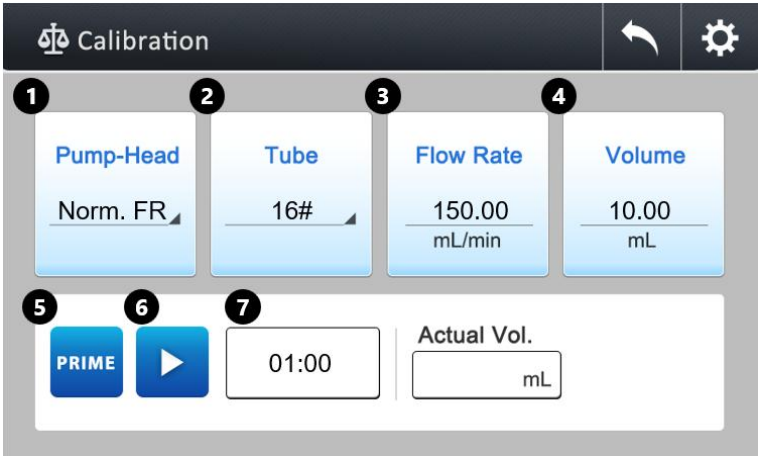
(3) Calibration

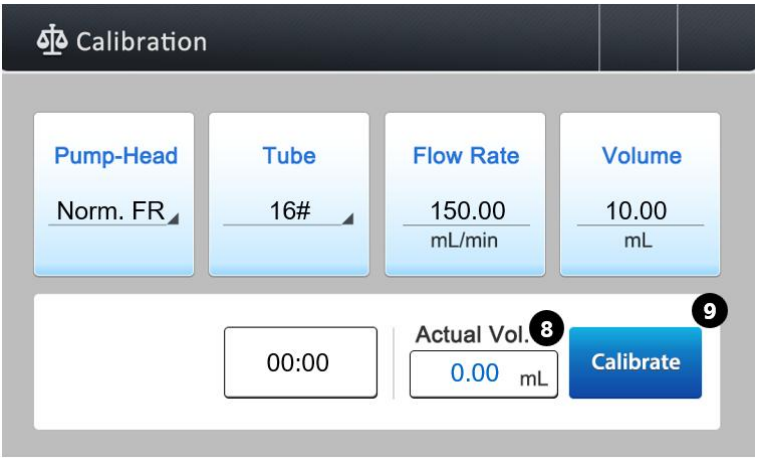
Please calibrate before use. This calibration method is volume calibration, please prepare a cylinder for volume measurement.

When a volume discrepancy beyond the permissible range is identified during use, calibration should be performed.

Click in each mode to perform the calibration.

a. Calibration Page Instruction





Item	Designation	Description
1	Pump Head	Click to exchange the pump head. Norm. FR: Normal Flow Rate Pump Head; High FR: High Flow Rate Pump Head
2	Tubing	Click to exchange for different tubing. (16#, 25#, 17#)
3	Flow Rate	The instrument will calculate automatically based on dispensing time and dispensing volume.
4	Volume	Automatic calculation of dispensing volume based on setting parameter under each mode.
5	Prime	Turn On / Off the Prime function.
6	Start	Click to start dispensing the liquid.
7	Dispensing Time	Automatically input the corresponding dispensing time according to different mode (mm:ss).
8	Actual Volume	Click to enter the measured volume.
9	Calibrate	Press for calculation and calibration.

b. Calibration Procedure

(i) Select appropriate pump head and tubing.

(ii) Check if the calibration volume is correct. If it is incorrect, return to the previous page for modification.

(iii) Insert the tube inlet and outlet into supplied liquid and click "PRIME" to full the tubing with liquid.

(iv) Remove the tube outlet into graduated cylinder or container, press "▶" to initiate the peristaltic pump.

(v) After pumping, click "Actual Vol." and key in the actual volume. Then click "Calibrate" to start calibrating.

(vi) Then click "✓" to complete calibration.

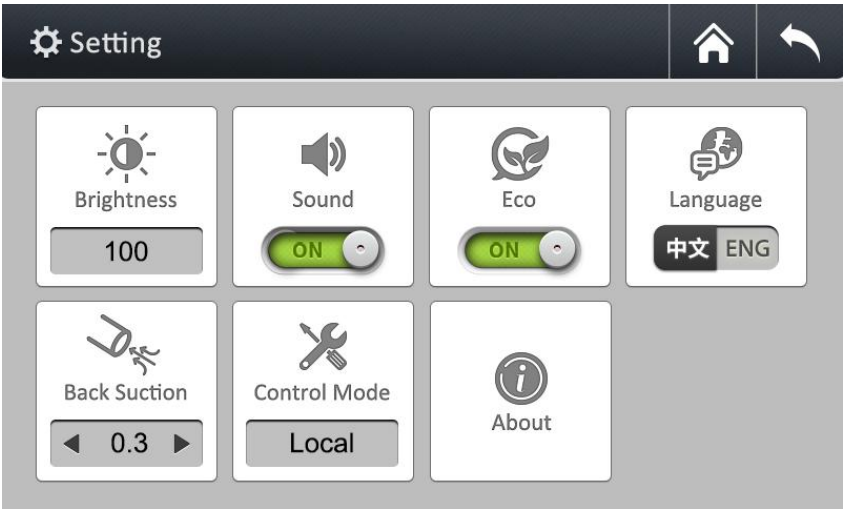
*NOTICE:

(1) If the pump head is opened, or if parameters such as dispensing volume and dispensing time are modified, it is recommended to recalibrate for precise dispensing volumes.

(2) Calibration under manual mode could ONLY be performed in the first step of the method.

(4) Setting

Click to enter the setting page.

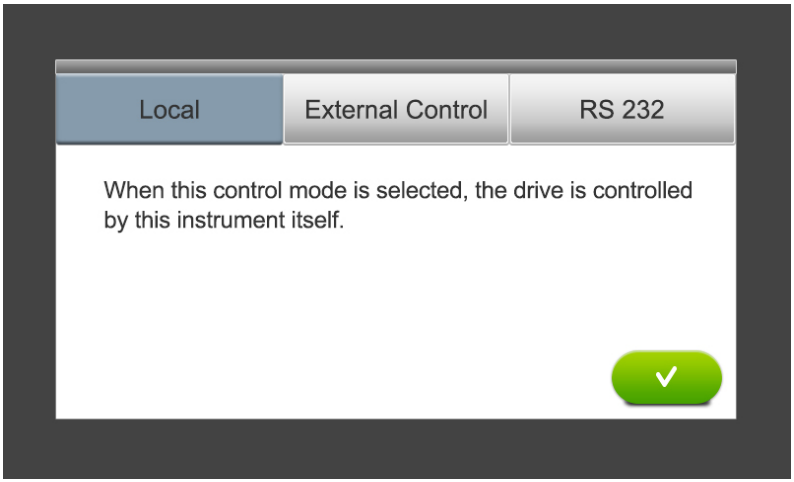


Designation	Description
Brightness	Click for different level of brightness (20%, 40%, 60%, 80%, 100%).
Sound	Turn ON / OFF the sound.
Eco	Turn ON / OFF the Eco mode.
Language	English / Chinese
Back Suction	Click to set the back suction time (0.0, 0.3, 0.4, 0.5, 0.6 sec).
Control Mode	Exchange the control mode (see p.14 for detail).
About	Display the current program version.

(5) Control Mode

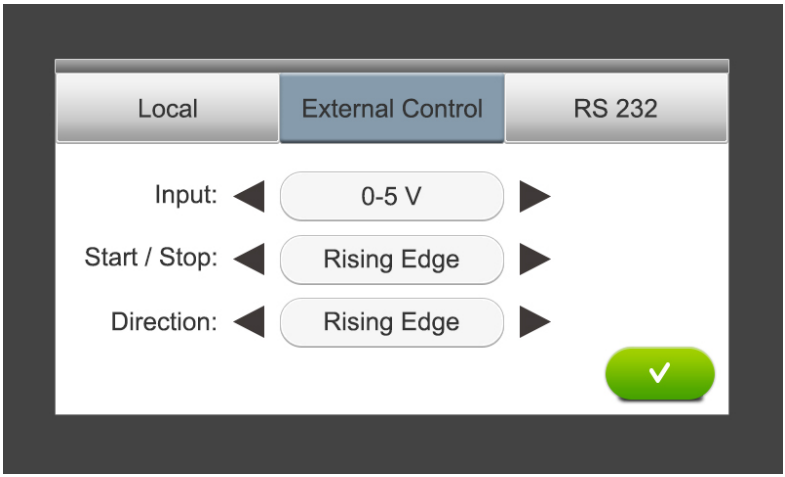
a. Local

Control the main unit via touch screen.



b. External Control

Control the main unit via external signal. Setting parameters are shown below. After setting it, click "✓" to complete the procedure.



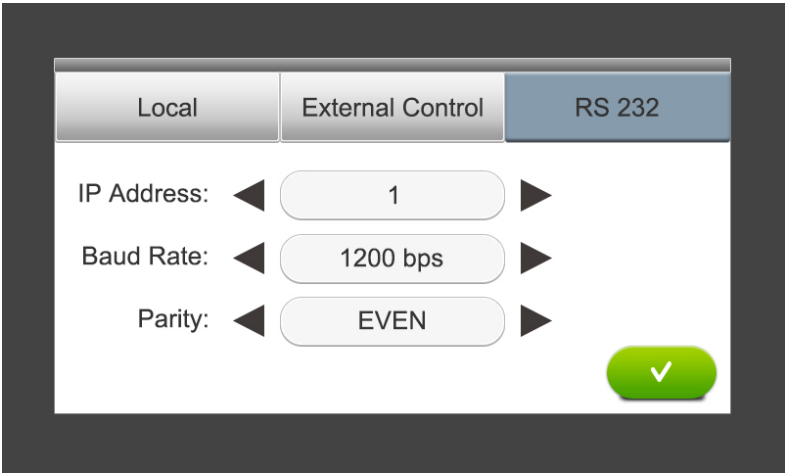
Input	Start / Stop	Direction
0-5V	Rising Edge / Falling Edge / Low Level / High Level	Rising Edge / Falling Edge / Low Level / High Level
4-20mA	Rising Edge / Falling Edge / Low Level / High Level	Rising Edge / Falling Edge / Low Level / High Level
0-10kHz	Rising Edge / Falling Edge / Low Level / High Level	Rising Edge / Falling Edge / Low Level / High Level
Dispenser*	-	-

* When using foot switch or dispenser, please switch the Input to "Dispenser". After changing the control mode, the start / stop function is disabled from the control panel.

c. RS 232

Control the main unit via RS 232. Setting parameters are shown below.

After setting it, click "✓" to complete the procedure.



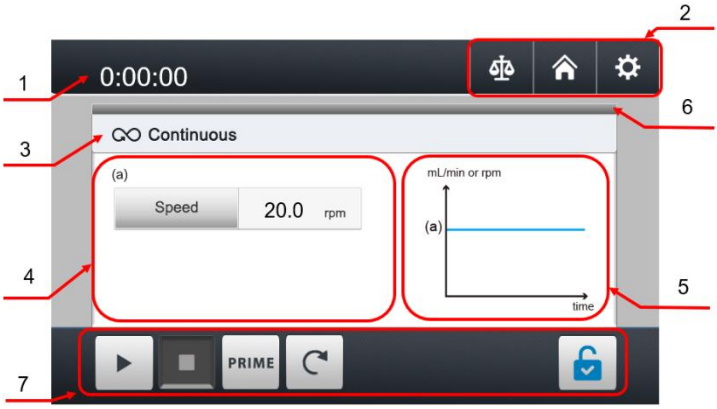
IP Address	Baud Rate	Parity
1~31	1200 bps / 2400 bps / 4800 bps / 6900 bps / 19200 bps / 38400bps	EVEN / ODD / NONE

6. Operation

Dispensing methods are classified as Continuous / Microbial / Dispensing / Manual. Follow the instructions to set up the parameters and initiate the instrument.

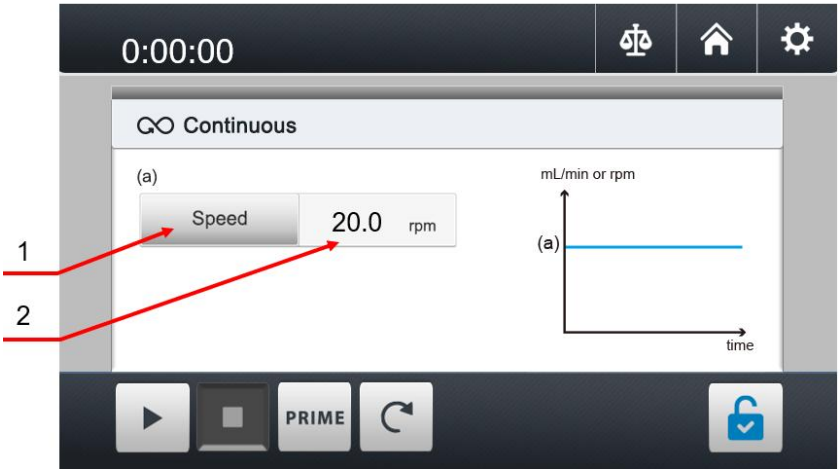
*NOTICE: Back suction function could affect the first dispensing volume of liquid that could lead to inaccuracy result. Consequently, we recommend that the first dispensing liquid should be discarded.

(1) Operating Page Instruction



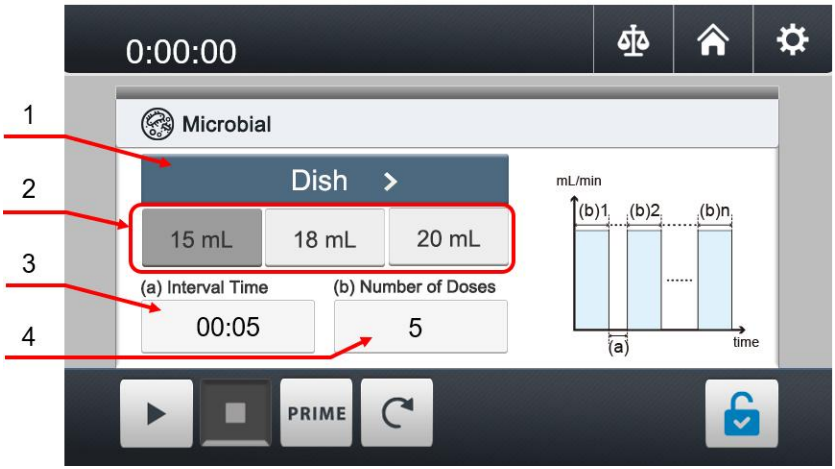
Item	Designation	Description
1	Timer	Count up timer (h:mm:ss, ~999:59:59)
2	Function	Calibration / Homepage / Setting (Refer to p.10 for detail)
3	Mode Name	Continuous / Microbial / Dispense For Manual mode, please refer to p.20.
4	Content	Adjustment for parameters.
5	Schematic Diagram	Diagram for the mode.
6	Working Status	When the bar turns blue, it means that the step is under operation.
7	Operating Area	Functional buttons (Refer to p.10 for detail)

(2) Continuous



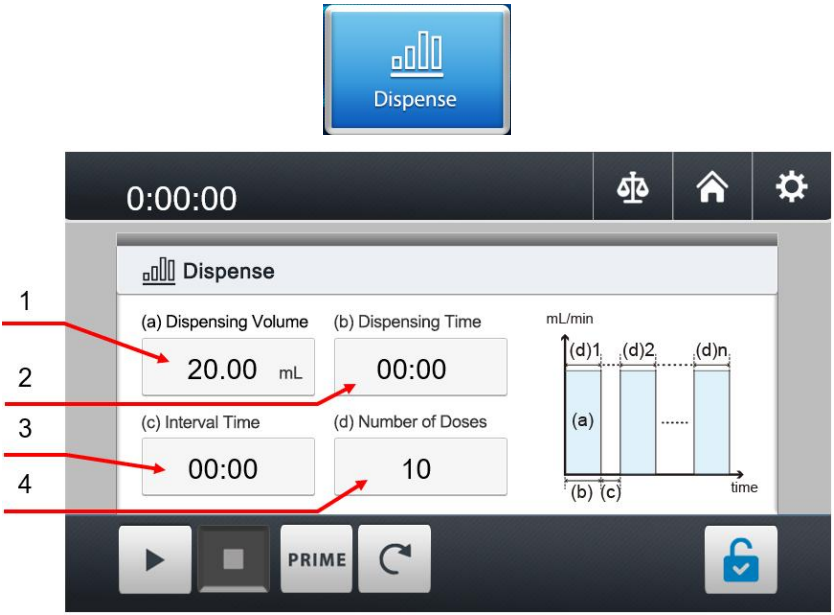
Item	Designation	Description
1	Unit	Speed (rpm) / Flow Rate (mL/min)
2	Value	Speed: 1~600 rpm Flow Rate: Based on pump head and tubing.

(3) Microbial



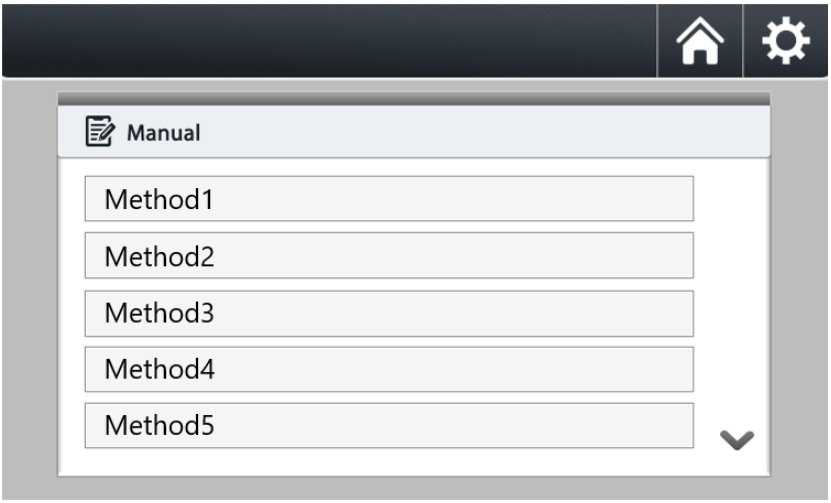
Item	Designation	Description
1	Container	Click to choose Tube / Petri dish / Bottle.
2	Volume	Tube: 2.5 mL / 5 mL / 9 mL Petri dish: 15 mL / 18 mL / 20 mL Bottle: 90 mL / 225 mL / 450 mL
3	Interval Time	Enter interval time (mm:ss, ~59:59).
4	Number of Dose	Enter dispensing dosage (1~250).

(4) Dispense



Item	Designation	Description
1	Dispensing Volume	Click to enter dispensing volume (mL) of single dosage.
2	Dispensing Time	Click to enter dispensing time (mm:ss, ~59:59) of single dosage.
3	Interval Time	Click to enter the duration between two dispensing (mm:ss, ~59:59).
4	Number of Doses	Enter dispensing dosage (1~250).

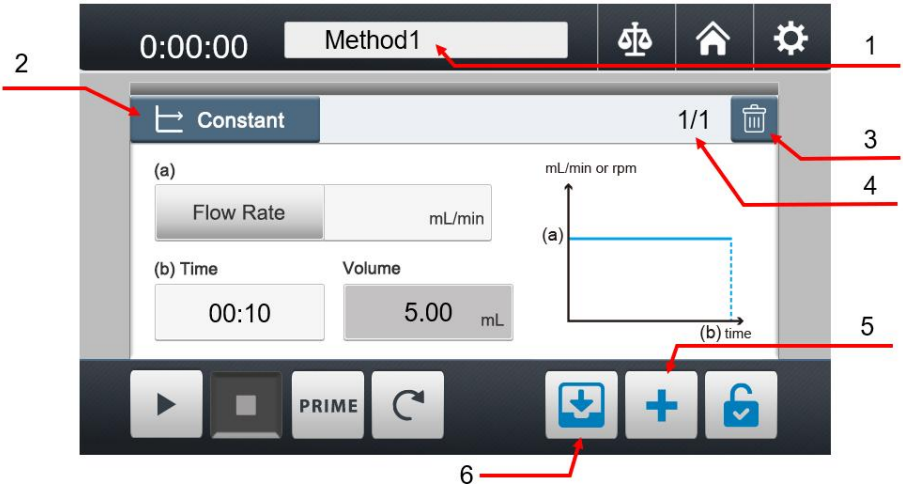
(5) Manual



Under "Manual" mode, you can set up all the function and parameters. And it can be stored as methods for future use.

- Self-define work process and its parameters.
- There are total 5 editable functions.
- It can store up to 8 methods. Each method can have up to 8 steps.
- Method name can be defined in English alphabet, numbers and symbols to facilitate method identification and selection.

a. Operating Instruction of Manual Mode

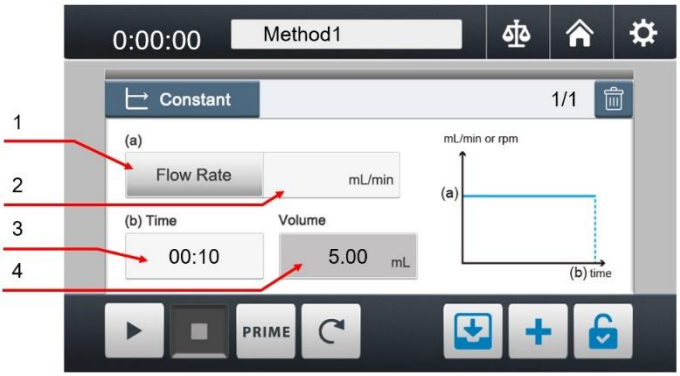


Item	Designation	Description
1	Method Name	Click to modify method name with English alphabet, numbers and symbols for maxium 19 characters.
2	Function	Click to select Constant / Ramp / Dispense / Interval / Cycle.
3	Delete	Delete the step.
4	Step	Current step / Total steps
5	Add Step	Click to add step.
6	Store Method	Click to store the method.

b. Functions in Manual Mode

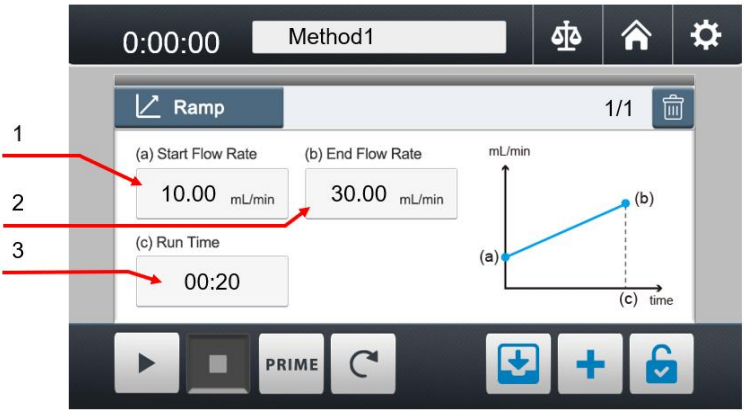
Designation	Description
	Set up speed or flow rate in a period of time for constant dispensing.
	Set up start flow rate, end flow rate and dispensing time to enable the instrument to dispense in a gradient manner.
	Set up dispensing volume, dispensing time, interval time and dispensing dosage for batch dispensing.
	Defines the duration of the interval between two steps.
	Set up cycle number and start step. Defines the number of cycles of a sequence. A cycle always initiates a return back to a defined step.

(i) Constant



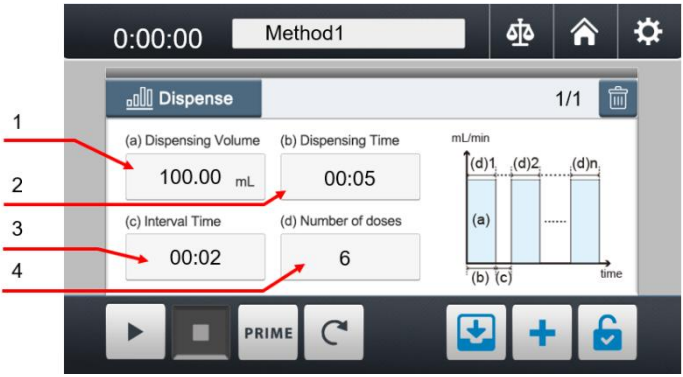
Item	Designation	Description
1	Unit	Speed (rpm) / Flow Rate (mL/min)
2	Value	Speed: 1~600 rpm Flow Rate: Based on pump head and tubing
3	Time	mm:ss, ~59:59
4	Volume	The system will calculate the total volume under this function automatically.

(ii) Ramp



Item	Designation	Description
1	Start Flow Rate	Click to enter starting flow rate.
2	End Flow Rate	Click to enter the ending flow rate.
3	Time	mm:ss, ~59:59

(iii) Dispense



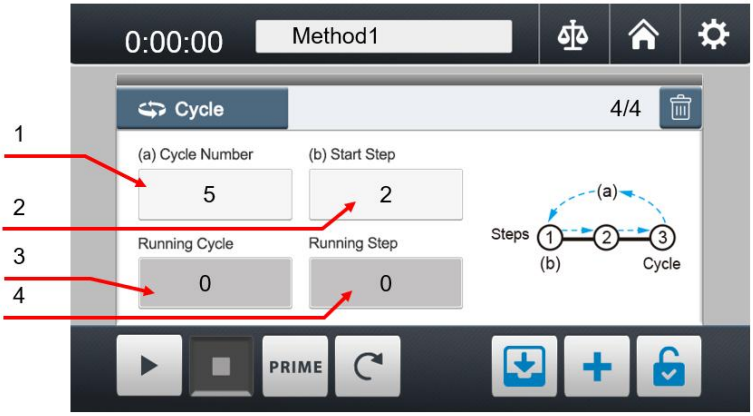
Item	Designation	Description
1	Dispensing Volume	Click to enter dispensing volume (mL) of single dosage.
2	Dispensing Time	Click to enter dispensing time (mm:ss, ~59:59) of single dosage.
3	Interval Time	Click to enter the duration between two dispensing (mm:ss, ~59:59).
4	Number of Doses	Enter dispensing dosage (1~250)

(iv) Wait

Item	Designation	Description
1	Time	Duration of the interval between two steps (mm:ss,

		~59:59)

(v) Cycle

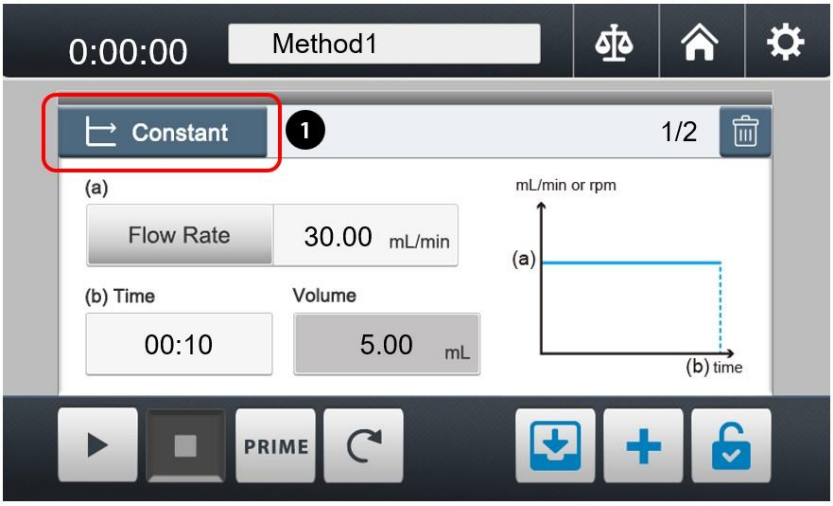


Item	Designation	Description
1	Cycle Number	Set up cycle number (1~250).
2	Start Step	Define the initial step.
3	Running Cycle	Display the current number of loops.
4	Running Step	Display current working step.

*Causion: DO NOT use this function in a stacked manner, meaning DO NOT incorporate more than one loop within a single cycle, to avoid the instrument from not stopping or potential damage. If such a situation occurs, the only solution is to TURN OFF the main power supply.

c. Set Up Method

(i) Click the function button to switch the function.



(ii) Select the function you need.

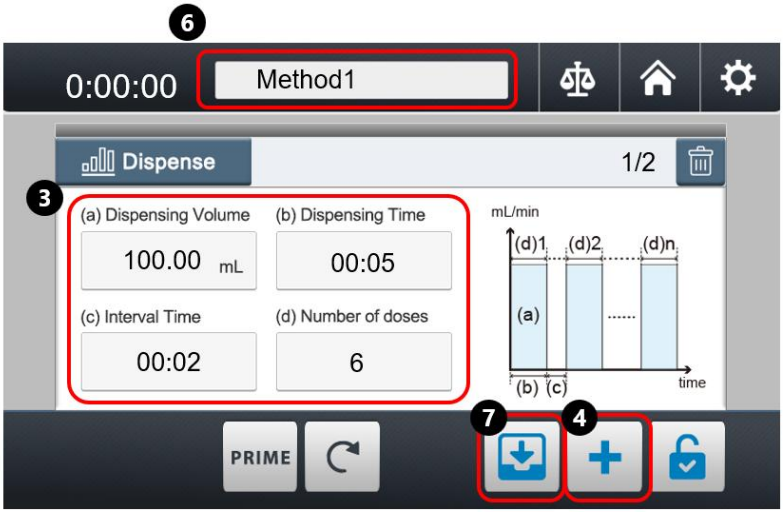
(iii) Set up parameters.

(iv) Click + to add steps.

(v) Repeat step (i)~(iv) to complete the dispensing method.

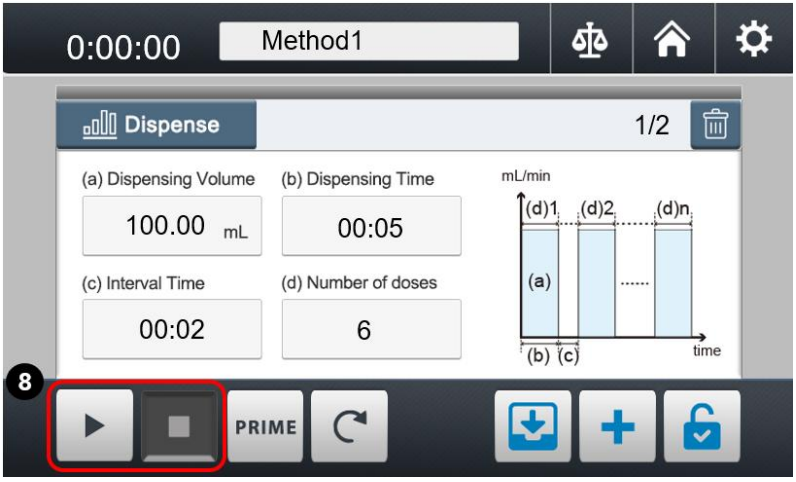
(vi) Click the Method1 to rename the method name if needed.

(vii) Click to store the method.



5 Repeat step 1~4

(viii) Working button appears. Using the buttons to start / stop the dispensing method.



7. Maintenance

1. Please operate the instrument in a well-ventilated area and keep it clean. Ensure to unplug it before cleaning.
2. The instrument is not autoclavable. Please clean the surface by pure water or 75% ethanol.
3. Open the pump head when not in operation to prevent the tubing from remaining in a deformed state and optimize its performance lifetime.
4. If there's any solution drop or splash to instrument, please switch off and unplug it immediately and clean the surface to prevent damage from penetration or corrosion.
5. Keep rollers clean and dry to prevent accelerated wear on tubing, prolonging service life and preventing premature roller damage.
6. If fuse blows, please troubleshoot and solve problems first. When replace fuse, get the spare fuse from the fuse holder by a flathead screwdriver.
7. Tubes are consumables, it is recommended to replace it according to the tubing manufacture's replacement interval or on a yearly basis to ensure good operation.

8. Troubleshooting

Issue	Cause and Solution
Fail to start	• Loose plug → Reconnect plug to power supply. • Power switch disorder → Contact distributor for assistance. • Burnt fuse → Replace with a new fuse. • Display or components failure → Contact distributor for assistance • Power supply disorder → Contact distributor for assistance.
Motor shutdown	• Pump module overload → Stop the running procedure, clear any bent or clog in tube, regulate the speed to low rpm, then restart the procedure. • Liquid viscosity → Regulate the flow rate to match viscosity required.
Leakage during operation	• Tubing broken → Replace with a new tube. • Improper installation of tubing → Replace with a new tube and install correctly.
Low or no sound	• Disable sound option → Turn ON the sound in setting page. • Control board disorder → Contact distributor for assistance.
Abnormal touchscreen	• Wiring incorrect or damage → Contact distributor for assistance. • Screen disorder → Contact distributor for assistance. • Main board disorder → Contact distributor for assistance.
Unusual noise	• Pump head installation → Reinstall the pump head. • Hand tighten screws on the pump head are too tight → Loosen the screws slightly. • Improper tubing installation → Reinstall the tubing.
Others	Contact distributor for assistance.

Ordering information

185600-01 (02)	Buller 600 Dispensing Peristaltic Pump, AC100-240V, 50/60Hz, US plug (EU plug)
185601-01 (02)	Buller 600 - DSP Dispensing Peristaltic Pump, AC100-240V, 50/60Hz, US plug (EU plug)
184100-15	Normal Flow Rate Pump Head, ~1950 mL/min
184100-20	High Flow Rate Pump Head, ~2130 mL/min
185600-10	Handling Dispenser, DB9 connector, 2 m
185600-51-16	Dispensing Kit (16#) for Handling Dispenser (include nozzle, holder, sinker and tubing)
185600-51-17	Dispensing Kit (17#) for Handling Dispenser (include nozzle, holder, sinker and tubing)
185600-51-25	Dispensing Kit (25#) for Handling Dispenser (include nozzle, holder, sinker and tubing)
185600-41	Foot Switch, DB9 connector, 2 m
185600-48	TYGON S3 ™ E-3603 Tubing, 16#, 15 m / box
185600-53	TYGON S3 ™ E-3603 Tubing, 17#, 15 m / box
185600-54	TYGON S3 ™ E-3603 Tubing, 25#, 15 m / box
185600-55	Biosicon Tubing, 16#, 15 m / box
185600-56	Biosicon Tubing, 17#, 15 m / box
185600-57	Biosicon Tubing, 25#, 15 m / box
184100-48	PHARMED® BPT Tubing, 16#, 7.5 m / box
185600-49	PHARMED® BPT Tubing, 17#, 7.5 m / box
185600-50	PHARMED® BPT Tubing, 25#, 7.5 m / box
197000-61-P2N	SC45 Suction Cap for GL45 Bottle (for transfer in closed system)
197100-10SC	PP Vacuum Bottle, 1000 mL with SC45 Suction Cap

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