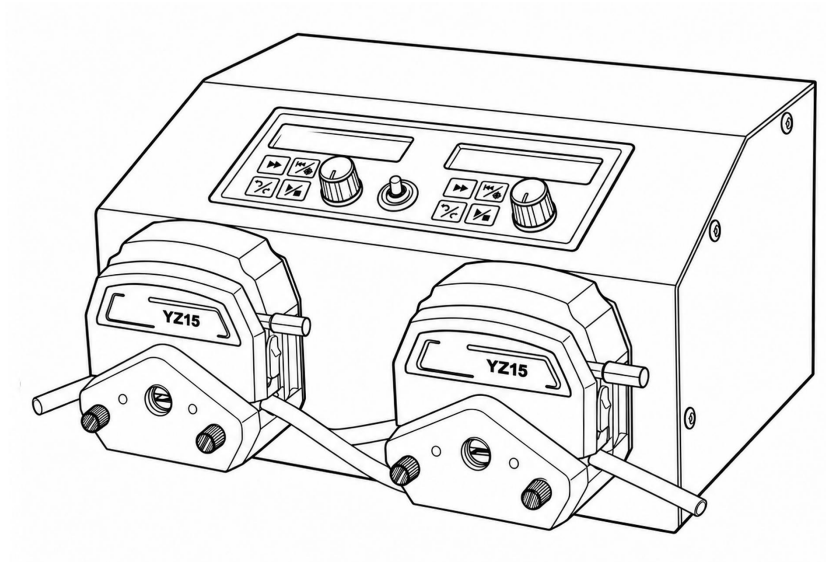


BT600F2

Peristaltic Pump Operating Manual



Contents

1. Precautions for Peristaltic Pump Use	1
2. Product Features	1
3. BT600F2 Driver Performance Specifications	1
4. Operation Instructions	3
4.1 Glossary	3
4.2 Front-panel Operation Panel Introduction	4
4.3 Rear-panel Interface Introduction	5
4.4 Basic Operation Instructions	7
4.5 Dispensing Mode Interface	7
4.6 Dispensing Calibration Interface	10
4.7 Flow Mode Interface	12
4.8 Flow Calibration Interface	13

1. Precautions for Peristaltic Pump Use

- The hose may crack due to wear, causing liquid leakage which may result in injury to personnel or equipment. Inspect frequently and replace hoses in a timely manner. When the peristaltic pump is idle, release the pressing block compressing the hose or remove the hose, to avoid plastic deformation or inner-wall adhesion/blockage caused by long-term compression which shortens hose service life.
- Keep pump-head rollers clean and dry. Contamination or moisture accelerates hose wear, shortens hose service life and causes premature roller failure.
- The driver surface and some pump heads are not resistant to organic solvents and highly corrosive liquids. Special attention shall be paid during application.
- When you consider that the unit needs maintenance or repair, power off the unit and unplug the power cord.
- Reliably connect the protective earth ground of the power cord before use, to ensure personal safety in humid environments.
- Power off the driver before installing any external-control equipment.

2. Product Features

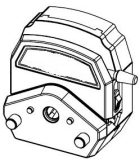
- BT600F2 is a dual-channel independently-controlled peristaltic pump.
- Flow range: 0.07 mL/min – 2400 mL/min (per channel).
- Two operating modes are available: Flow Mode and Dispensing Mode. Flow Mode is suitable for continuous liquid delivery; Dispensing Mode is suitable for timed and quantitative liquid dispensing.
- Precise quantitative liquid dispensing with an automatic calibration function for quick and convenient operation. The pump can be controlled by communication signals through the standard external-control interface.
- Compatible with multiple pump heads: YZ15, YZ25 and DMD15.
- Rotary encoder combined with membrane keys for more convenient user operation.
- Independent full-speed key for rapid pipeline filling and emptying.
- LCD display for intuitive and comprehensive information presentation.
- Back-suction function: in Dispensing Mode, the pump reverses by a set angle after stopping to effectively prevent liquid dripping.
- Calibration function: calibration is available to ensure higher accuracy.
- RS485 communication control adopting the Modbus protocol for easy commissioning and use.

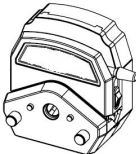
3. BT600F2 Driver Performance Specifications

Table 1. BT600F2 driver specifications

Item	Description
Product Model	BT600F2
Product Features	Dual-channel independent control; liquid volume, flow rate, time and other parameters can be set separately
Speed Adjustment Range	1–600 RPM
Speed Resolution	1 RPM
Dispensing Function	Precise quantitative liquid dispensing
Dispensing Volume Range	0.1 mL – 999 L
Dispensing Cycles	1–9999 cycles ("0" = infinite cycles)
Dispensing Interval	0.1 S – 24 Hr
Display Function	128×32 graphic dot-matrix LCD, simultaneous display of flow rate and rotational speed
Direction Control	Reversible rotation function
Operation Mode	Rotary encoder combined with membrane keys for user-friendly operation
Full-speed Function	Rapid pipeline filling and emptying via full-speed button
Power-off Memory Function	Resume operation from pre-power-off status after power-on
Back-suction Function	In Dispensing Mode, the pump reverses by a set angle after stopping to effectively prevent liquid dripping
Flow Calibration Function	Automatic flow calibration; flow accuracy up to $\pm 0.5\%$
Dispensing-volume Calibration Function	Input actual dispensed volume for automatic dispensing-volume calibration; dispensing accuracy up to $\pm 1\%$
Communication Function	Optional communication module for RS485 communication control (adopts general Modbus protocol)
Foot-switch Function	Optional foot switch for start-stop control
Power Consumption	150 W
Power Supply	Wide-voltage AC 90–260 V, 50 Hz/60 Hz
Operating Environment	0–40 °C, humidity < 80% non-condensing
Driver Weight	8 KG
Ingress Protection	IP31

Table 2. Driver, pump-head and hose compatibility

Driver	Compatible Pump Head	Tubing	Flow Range (mL/min)	Remarks
BT600F2	 YZ15A / YZ15B	13#, 14#, 19#, 16#, 25#, 17#, 18#	0.07–2400	Multiple hose options; quick hose replacement; wide flow range

Driver	Compatible Pump Head	Tubing	Flow Range (mL/min)	Remarks
BT600F2	 YZ25A / YZ25B	15#, 24#	1.7–1600	
BT600F2	 DMD15	13#, 14#, 19#, 16#, 25#, 17#	0.13–3200	Special low-pulsation pump head for higher accuracy

Proper selection of pump head and hose is particularly important for improving flow accuracy or dispensing accuracy.

4. Operation Instructions

4.1 Glossary

- **Short Press** — Press and immediately release a key; press duration < 1 s.
- **Long Press** — Hold down a key for more than 3 seconds and then release. The operation takes effect at the moment of release.
- **Operating Modes** —
 - **Flow Mode:** Marked "L". This mode operates continuously at the set flow rate.
 - **Dispensing Mode:** Marked "F". This mode operates intermittently according to the set volume and time.
 - **Calibration Mode:** Calibrates the flow rate or dispensing volume to guarantee flow/volume accuracy. Entered by long-pressing the Return key.
- **Focus** — The editable/modifiable parameter position, highlighted in reverse video on the LCD. Except for the flow rate, which can be adjusted directly by rotating the knob in Flow Mode, all other parameter changes require switching to a focused state. Each focus position has descriptive text on the screen; the position of this prompt may change with the focus location.
- **Edit State** — The state in which system parameters can be modified, i.e. values can be changed by rotating the knob.
- **Non-edit State** — The state in which values cannot be changed by rotating the knob.

4.2 Front-panel Operation Panel Introduction

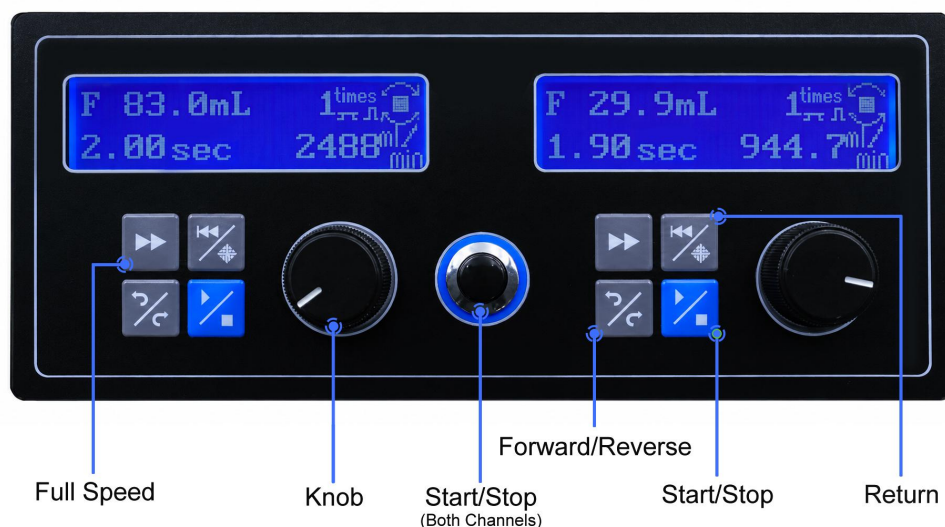


Figure 1. Front-panel operation panel

Definitions of each control element shown in the figure:

- **Knob** — Short-press or long-press to switch the current editable focus. If currently in non-edit state, the pump enters edit state. Rotation: in edit state, rotate to adjust the value at the current focus or select different modes; clockwise increases or selects forward, counter-clockwise decreases or selects backward. Note: in Flow Mode without focus, knob rotation directly adjusts the flow-rate value.
- **Full-speed Key** — Mainly used for emptying or cleaning. Under normal conditions, short-pressing or long-pressing the full-speed key runs the pump at maximum speed; if the pump was stopped before pressing, it enters running state. Short-pressing or long-pressing again in full-speed state returns to the original state. In full-speed state, all other keys are disabled.
- **Start/Stop Key** — Toggles between running and stopped states. Valid for both short-press and long-press.
- **Return Key** — Short-press: exit edit state if in edit state; in Dispensing Mode, cycle between the dispensing-mode main and auxiliary interfaces; in calibration mode, calculate and correct the calibration coefficient and then exit calibration mode. Long-press: enter the dispensing-calibration interface from the dispensing screen, or enter the flow-calibration interface from the Flow-Mode screen.
- **Forward/Reverse Key** — Cycles the motor rotation direction. Valid for both short-press and long-press.
- **Power Switch** — Connects or disconnects the power supply.

4.3 Rear-panel Interface Introduction

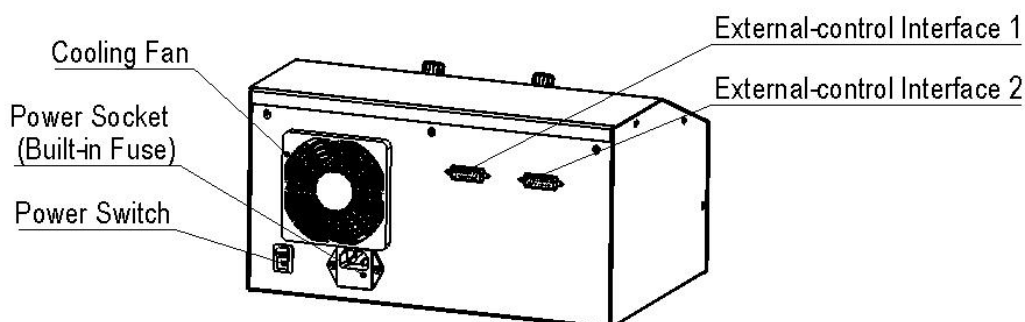


Figure 2. Rear-panel interfaces

4.3.1 Power Socket (Built-in Fuse)

AC power inlet. The power socket contains two 250 V/1 A glass fuses, including one spare fuse.

If a power abnormality occurs, check whether the fuse is blown. If blown, use the spare fuse, and afterwards place a new spare fuse in the socket for future use.

4.3.2 External-control Interface

The two interfaces control the two channels independently. The external-control interface uses a standard DB15 male connector and can be used with the manufacturer's external-control module (DB15 female connector on one end, screw-type terminal block on the other), or with the manufacturer's foot switch.

The external-control module is shown below:

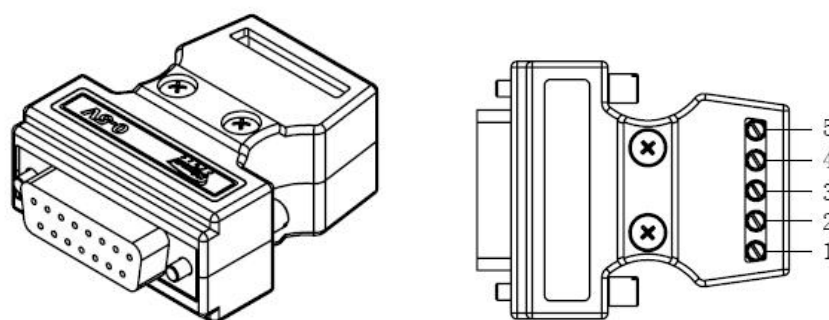


Figure 3. External-control module (left: DB15 male connector; right: terminal numbering)

Available external-control module types and their terminal definitions are listed below (NC = not defined, may be left floating):

Table 3. External-control module pin definitions

Module Type	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5
0–10 KHz	NC	Low level:	Low level:	0–10 KHz	Common

Module Type	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5
frequency module		start; high level: stop	forward; high level: reverse	input	ground for pins 2, 3, 4
0–5 V voltage module	Analog input (+)	Low level: start; high level: stop	Low level: forward; high level: reverse	Analog input (–)	Common ground for pins 2, 3
0–10 V voltage module	Analog input (+)	Low level: start; high level: stop	Low level: forward; high level: reverse	Analog input (–)	Common ground for pins 2, 3
4–20 mA current module	Analog input (+)	Low level: start; high level: stop	Low level: forward; high level: reverse	Analog input (–)	Common ground for pins 2, 3
RS485 communication module	485-A	485-B	NC	NC	NC
Foot switch	No external terminal	No external terminal	No external terminal	No external terminal	No external terminal

Table 4. Electrical limits for external-control modules

Item	Range
Linear input-to-output correspondence	Yes
Minimum high-level voltage for 0–10 KHz frequency module	1.5 V
Maximum high-level voltage for 0–10 KHz frequency module	24 V
Maximum voltage for start-stop forward logic	0.5 V
Minimum voltage for start-stop stop logic	1.5 V
Maximum voltage for start-stop stop logic	24 V
Maximum voltage for forward-reverse forward logic	0.5 V
Minimum voltage for forward-reverse reverse logic	1.5 V
Maximum voltage for forward-reverse reverse logic	24 V
Maximum number of devices controlled by one host via RS485	254
Communication protocol	Modbus

Note: To activate the external-control module, set the external-control status icon to "⏏". The pump's communication address can be set via RS485 commands. For the communication protocol, contact the us.

4.3.3 Cooling Fan

The cooling fan, fitted with a dust-proof cover, dissipates heat for the peristaltic pump.

4.3.4 Power Switch

Used to connect or disconnect the power supply.

4.4 Basic Operation Instructions

The two channels can be configured with independent parameters and calibrated independently. Each channel can run individually via its own start/stop key; pressing the simultaneous-start key starts both channels, which stop automatically upon completion of the set time.

4.4.1 Focus Switching

Short-press the knob to cycle the focus position on the current screen.

4.4.2 Value Adjustment

Rotate the knob while a parameter is in focus to change its current value.

Except for the operating mode, external-control status, foot-switch mode and dispensing cycles, which support cyclic switching, all other items (such as pump head, hose and numeric values) do not cycle.

4.4.3 Calibration Execution

In Flow Mode, long-press the Return key to enter the flow-calibration mode.

In Dispensing Mode, long-press the Return key to enter the dispensing-calibration mode.

4.4.4 Switching between Dispensing Main and Auxiliary Interfaces

Short-press the Return key on the dispensing main interface to enter the dispensing auxiliary interface.

Short-press the Return key on the dispensing auxiliary interface to return to the dispensing main interface.

4.5 Dispensing Mode Interface

Dispensing Mode is divided into a main interface and an auxiliary interface. In Dispensing Mode, short-pressing the Return key cycles the display between the dispensing main interface and the dispensing auxiliary interface.

The factory default interface is the dispensing main interface.

Editing the dispensing-mode parameters in the Flow-Mode screen also switches to the dispensing-mode main interface. (Short-press the knob repeatedly until the mode selection screen is displayed, showing "L = Flow, F = Dispensing". Rotate the knob to select "L" or "F". When "F" is displayed in the upper-left corner, short-press the Return key to exit the Edit State and enter Dispensing Mode.)

The two interfaces are introduced in order below.

4.5.1 Dispensing Main Interface

The dispensing main interface displays the most frequently used dispensing parameters and data.

As shown below:

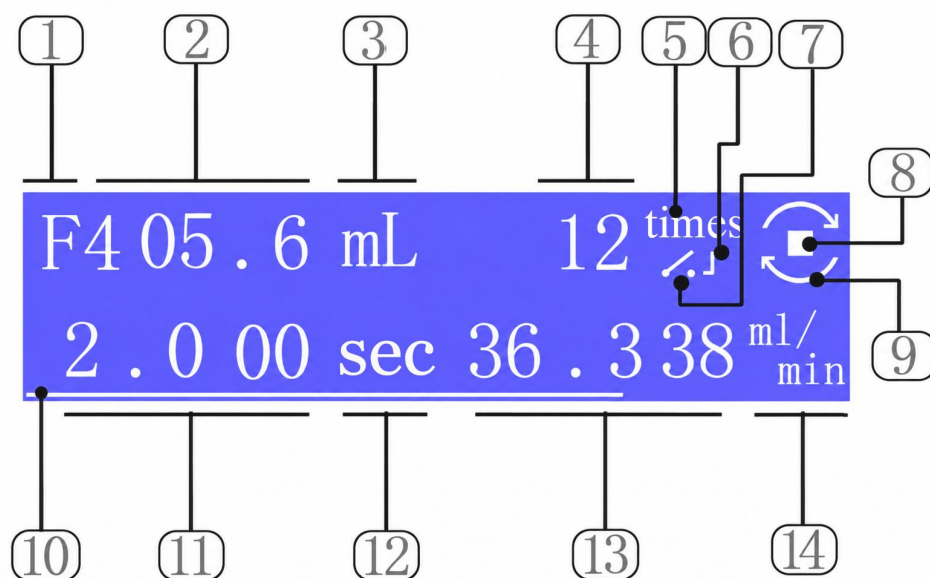


Figure 4. Dispensing main interface

Definitions of the items in the interface:

- 1: Mode identifier. "F" denotes Dispensing Mode. Editable — editing this item switches the operating mode.
- 2: Dispensing-volume value (editable). Adjusting the dispensing volume changes the runtime (item 11); it does not change the flow rate (item 13). Dispensing volume = (runtime – back-suction time) × flow rate.
- 3: Dispensing-volume unit. "uL" denotes microliter, "mL" milliliter and "L" liter. Non-editable.
- 4: Dispensing cycles, range 0–9999; 0 denotes infinite dispensing. In non-edit state, this item displays the remaining dispensing cycles; in edit state, it displays the cycles to be dispensed at the next start.
- 5: Dispensing-cycle unit, always "times". Non-editable.
- 6: Foot-switch status (editable). Level-triggered ("┐"): the motor runs while the foot switch is released and stops while pressed. Pulse-triggered ("┘"): each press-and-release of the foot switch toggles the pump start/stop state once — a running pump stops and a stopped pump starts.
- 7: External-control status (editable). "External control off" means external control is inactive ("↘"); "external control on" means the external-control module is active ("↗").

- 8:** Run-stop / full-speed indicator: running ▶ / stopped ■ / full speed ► . Cannot be changed via the knob; it can be changed by the Start/Stop key, the Full-speed key, or external control.
- 9:** Forward/reverse indicator. The arrow direction indicates clockwise or counter-clockwise rotation. The direction changes automatically with running or back-suction. Cannot be changed via the knob; it can be changed by the direction key or external control.
- 10:** Dispensing progress bar. The progress bar is displayed in two stages: the first stage shows the progress of the current task within "runtime + back-suction time"; after back-suction completes, the second stage shows the progress of the "stop time". The progress bar is not displayed before dispensing starts and disappears automatically after the dispensing run finishes.
- 11:** Runtime (editable). Modifying this value changes the dispensing-volume value.
- 12:** Runtime unit. Non-editable; changes automatically with the runtime.
- 13:** Flow-rate value. Adjusting this value changes the runtime while the dispensing volume remains constant.
- 14:** Flow-rate unit. "uL/min" denotes microliters per minute, "mL/min" milliliters per minute and "L/min" liters per minute. Auto-adjusted according to the preceding value; non-editable.

4.5.2 Dispensing Auxiliary Interface

The dispensing auxiliary interface displays the system and operating parameters that are infrequently used during the dispensing process.

The dispensing auxiliary interface is shown below:

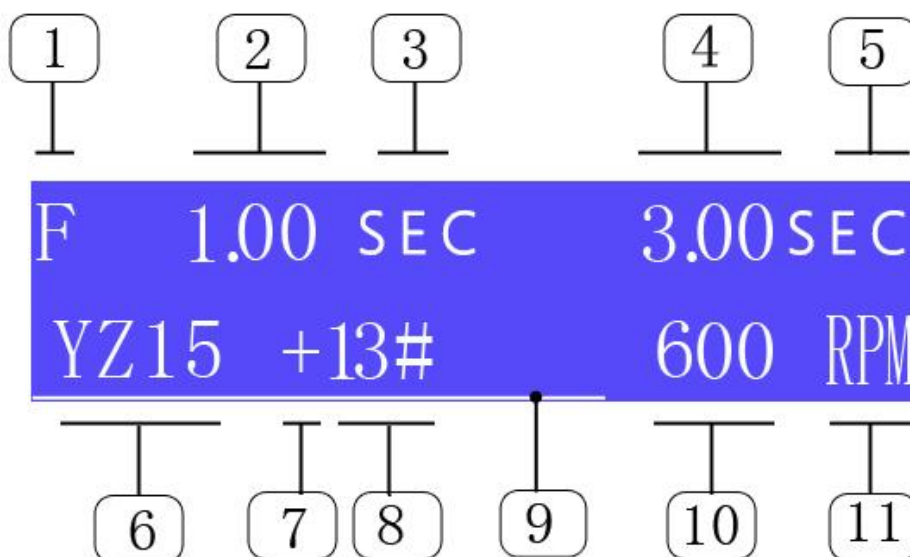


Figure 5. Dispensing auxiliary interface

Definitions of the items in the dispensing auxiliary interface:

- 1:** Mode identifier. "F" denotes Dispensing Mode. Non-editable in the auxiliary interface.

- 2:** Back-suction time, mainly used to reduce dispensing error. Range 0-24 h, minimum resolution 0.1 s. Editable.
- 3:** Back-suction time unit. Non-editable; changes automatically with the back-suction time.
- 4:** Stop time: the interval between the completion of one dispensing run (including back-suction) and the start of the next. Range 0-24 h, minimum resolution 0.1 s. Editable.
- 5:** Stop-time unit. Non-editable; changes automatically with the stop time.
- 6:** Selected pump-head model (editable). Options: YZ15, YZ25, DMD15. After changing the pump-head model, the system automatically selects the first compatible hose model from its database.
- 7:** Pump-head and hose connection symbol, indicating the connection relationship between the current pump head and hose. Non-editable.
- 8:** Hose used by the current pump head (editable). Only hoses compatible with the selected pump head are listed. The available pump-head and hose combinations are as follows:

Table 5. Pump-head and hose combinations

Pump Head	Available Tubing (see the product manual for hose parameters)
YZ15	13# 14# 19# 16# 25# 17# 18#
YZ25	15# 24#
DMD15	13# 14# 19# 16# 25# 17#

- 9:** Dispensing progress bar. The progress bar is displayed in two stages: the first stage shows the progress of the current task within "runtime + back-suction time"; after back-suction completes, the second stage shows the progress of the "stop time". The progress bar is not displayed before dispensing starts and disappears automatically after the dispensing run finishes.
- 10:** Speed corresponding to the selected flow rate. Non-editable. This value is provided for speed reference only; it is calculated from the flow-rate data on the dispensing main interface.
- 11:** Speed unit. Non-editable. RPM = revolutions per minute.

4.6 Dispensing Calibration Interface

Long-press the Return key in the dispensing screen (either the main interface or the auxiliary interface) to enter the dispensing-calibration interface.

The calibration interface is shown below:

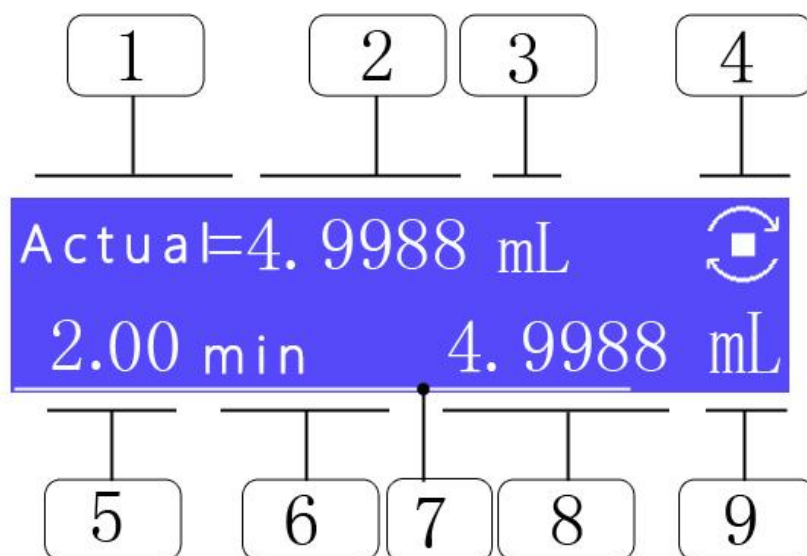


Figure 6. Dispensing-calibration screen

Definitions of the items in the calibration interface:

- 1:** Prompt information, indicating that the following data are measured data. Non-editable.
- 2:** Measured liquid volume (editable). Used to input the measured value after the dispensing test.
- 3:** Measured-volume unit. Non-editable; changes automatically with the measured volume.
- 4:** Direction and run-stop indicator.
- 5:** Runtime. Non-editable in the dispensing-calibration interface.
- 6:** Runtime unit, non-editable, auto-updated according to the runtime value.
- 7:** Calibration progress bar showing the progress of the current task within the total runtime.
Unlike dispensing, there is no back-suction time or stop time. The progress bar is not displayed before dispensing starts and disappears automatically after a single calibration run completes.
- 8:** Theoretical liquid volume, non-editable. This value is the calculation result based on the pre-calibration data.
- 9:** Theoretical-volume unit, non-editable. May display "uL", "mL" or "L", denoting microliters, milliliters or liters.

The dispensing-calibration procedure should be performed in the following order:

1. In the dispensing screen, set the dispensing volume, flow rate, rotation direction, pump head and hose parameters. The dispensing cycles can be ignored.
2. Long-press the Return key to enter the calibration mode, then short-press the Start/Stop key to perform a single dispensing run. (For multiple runs, short-press the Start/Stop key after each run.)
3. Measure the volume of liquid dispensed, or the average volume of multiple runs.
4. Short-press the knob to enter the measured-volume edit state, then rotate the knob to input the measured volume or average volume.

5. Short-press the Return key to exit edit state. Re-check whether the input measured volume is consistent with the displayed value; if not, return to step 4 to re-edit. If consistent, proceed to step 6 to confirm the calibration.
6. Short-press the Return key to exit the calibration interface and return to the dispensing screen. Upon exit, the system automatically calculates and corrects the dispensing parameters.

4.7 Flow Mode Interface

Short-press the knob repeatedly until the mode selection screen is displayed, showing "L = Flow, F = Dispensing". Rotate the knob to select "L" or "F". When "L" is displayed in the upper-left corner, short-press the Return key to exit the Edit State and enter Flow Mode. The main screen of Flow Mode is shown below:

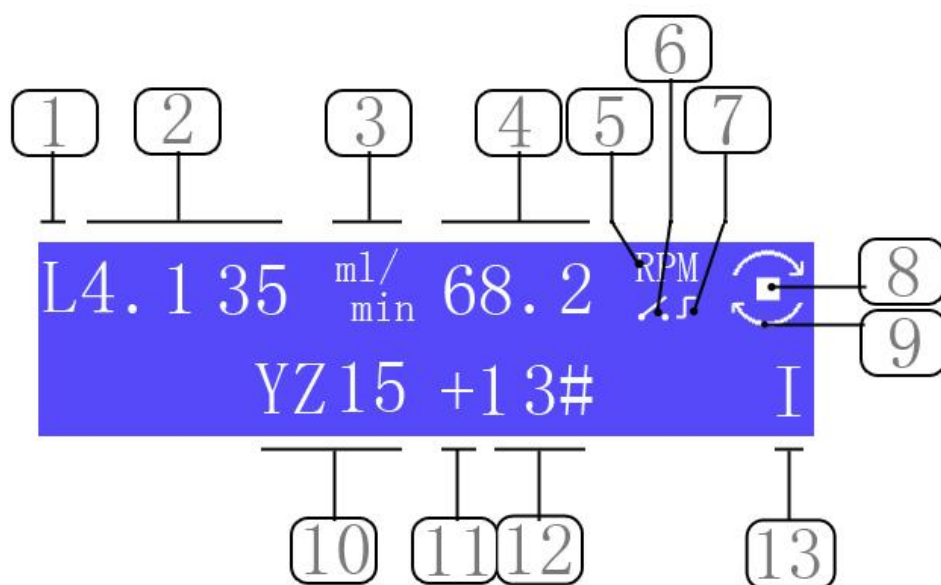


Figure 7. Flow-Mode main screen

Definitions of the items in the Flow-Mode screen:

- 1: Mode identifier. "L" denotes Flow Mode. Editable — editing this item switches the operating mode.
- 2: Flow-rate value. In Flow Mode, this value can only be changed directly by rotating the knob in non-edit state. This item cannot receive focus.
- 3: Flow-rate unit. Auto-updated according to the flow-rate value; non-editable. Possible units are "uL/min", "mL/min" and "L/min", denoting microliters, milliliters and liters per minute respectively.
- 4: Rotational-speed value. Non-editable; calculated from the flow rate for reference only. Displays "---" when the system is running at full speed.
- 5: Speed unit. Non-editable. RPM = revolutions per minute.

- 6:** External-control status (editable). Indicates external control disconnected (module inactive, “”) or enabled (module active, “”).
- 7:** Foot-switch status (editable). Level-triggered (“”): the motor runs while the foot switch is released and stops while pressed. Pulse-triggered (“”): each press-and-release of the foot switch toggles the pump start/stop state once — a running pump stops and a stopped pump starts.
- 8:** Run-stop / full-speed indicator (running  / stopped  / full speed ). Cannot be changed via the knob; it can be changed by the Start/Stop key, the Full-speed key, or external control.
- 9:** Forward/reverse indicator. The arrow direction indicates clockwise or counter-clockwise rotation. Cannot be changed via the knob; it can be changed by the direction key or external control.
- 10:** Selected pump-head model (editable). Options: YZ15, YZ25, DMD15. After changing the pump-head model, the system automatically selects the first compatible hose model from its database.
- 11:** Pump-hose connection symbol, non-editable.
- 12:** Hose used by the current pump head (editable). Only hoses compatible with the selected pump head are listed.
- 13:** External-control module-type indicator. Non-editable; the displayed value changes with the module type. "U", "I", "Hz" and "RS" denote voltage-type, current-type, frequency-type and communication-type external-control modules respectively.

A communication-type external-control module is recognized by the system only after one complete communication command has been sent after insertion; other module types are recognized automatically upon insertion. A communication-type module cannot recover automatically after being disconnected — power cycling is required. Other module types automatically revert to the no-external-control state after being disconnected.

4.8 Flow Calibration Interface

Long-press the Return key in the Flow-Mode screen to enter the flow-calibration interface.

The calibration interface is shown below:

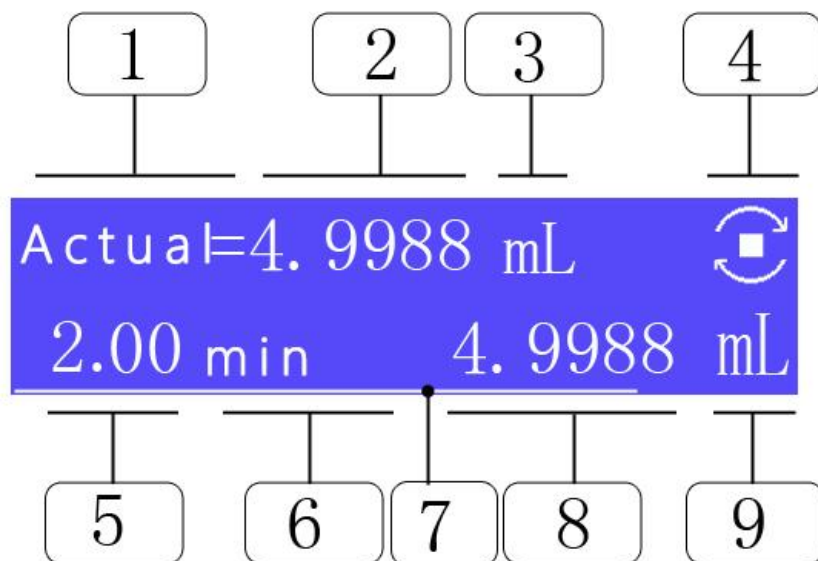


Figure 8. Flow-calibration screen

Definitions of the items in the calibration screen:

- 1:** Prompt information, indicating that the following data are measured data. Non-editable.
- 2:** Measured liquid volume (editable). Used to input the measured value after the dispensing test. In flow calibration, this value should be the total volume measured after dispensing completes — do not input the flow rate per unit time.
- 3:** Measured-volume unit, auto-updated with the measured value. Non-editable.
- 4:** Direction and run-stop indicator.
- 5:** Test runtime, default 1 minute. Editable in the flow-calibration interface to improve test accuracy. Range: 0–24 h, minimum resolution 0.1 s.
- 6:** Runtime unit, non-editable, auto-updated according to the runtime value.
- 7:** Calibration progress bar showing the progress of the current task within the total test runtime. Not displayed before dispensing starts, and disappears automatically after a single calibration run completes.
- 8:** Theoretical liquid volume, non-editable. This value is the calculation result based on the pre-calibration data; if the runtime is adjusted, the theoretical volume is recalculated from the flow rate.
- 9:** Theoretical-volume unit, non-editable. May display "uL", "mL" or "L", denoting microliters, milliliters or liters.

The flow-calibration procedure should be performed in the following order:

1. In the Flow-Mode screen, set the flow rate for which higher accuracy is desired.
2. Long-press the Return key to enter the calibration mode.
3. If a longer test time is desired, short-press the knob twice to move the focus to item 5, then rotate the knob to adjust the test time. After adjustment, short-press the Return key

to exit edit state and verify that the displayed value is set correctly. This step can be skipped if the test time need not be changed.

4. Short-press the Start/Stop key to perform a single dispensing run.
5. Measure the total volume of the liquid pumped.
6. Short-press the knob to enter the measured-volume edit state, then rotate the knob to input the measured total volume.
7. Short-press the Return key to exit the calibration interface and return to the Flow-Mode screen. Upon exit, the system automatically calculates and corrects the parameters.