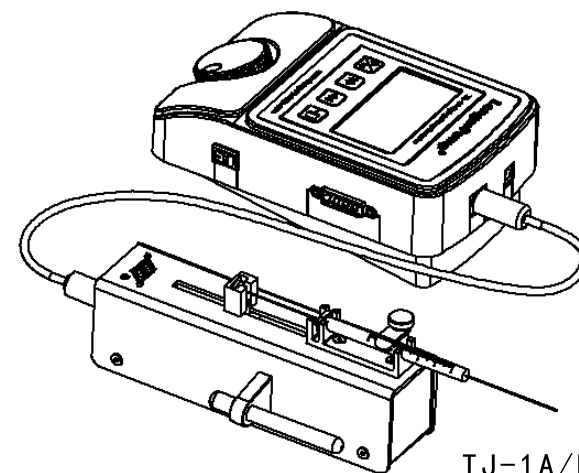


LONGER

SYRINGE PUMP OPERATING MANUAL



TJ-1A/L0107-1A
TJ-2A/L0107-2A
TJ-3A/W0109-1B

LONGER

Baoding Longer Precision Pump Co., Ltd.

Add: 3rd/4th Floor, Building 6B, University Science Park
Baoding National, High - Tech Industrial Development Zone
Baoding, Hebei, China 071051
Tel: 86 - 312 - 3110087 3138553
Fax: 86 - 312 - 3168553
E - mail: longer@longerpump.com
[Http://www.longerpump.com](http://www.longerpump.com)

2019.7

Longer Syringe Pump Operating Manual

Baoding Longer Precision Pump Co.,Ltd.

Important Information:

Please read operating manual carefully before operation.

Warning:

- Over-push or over-draw the syringe may result in the fluid sprayed. Use appropriate measures to protect operator and equipment. Be careful during operation.
- When the fluid sprays out on the drive unit please shut down the power supply immediately and clean the drive unit, then turn on the power supply.
- If a trouble happens please contact us or our dealer. Don't repair the equipment by yourself.
- Be careful when inserting or extracting the connection wire between controller and drive unit to prevent the plug from damaging.
- If the power line or the plug are worn or damaged please pull out the plug.
- Please shut down the power supply before connecting the external control equipment.

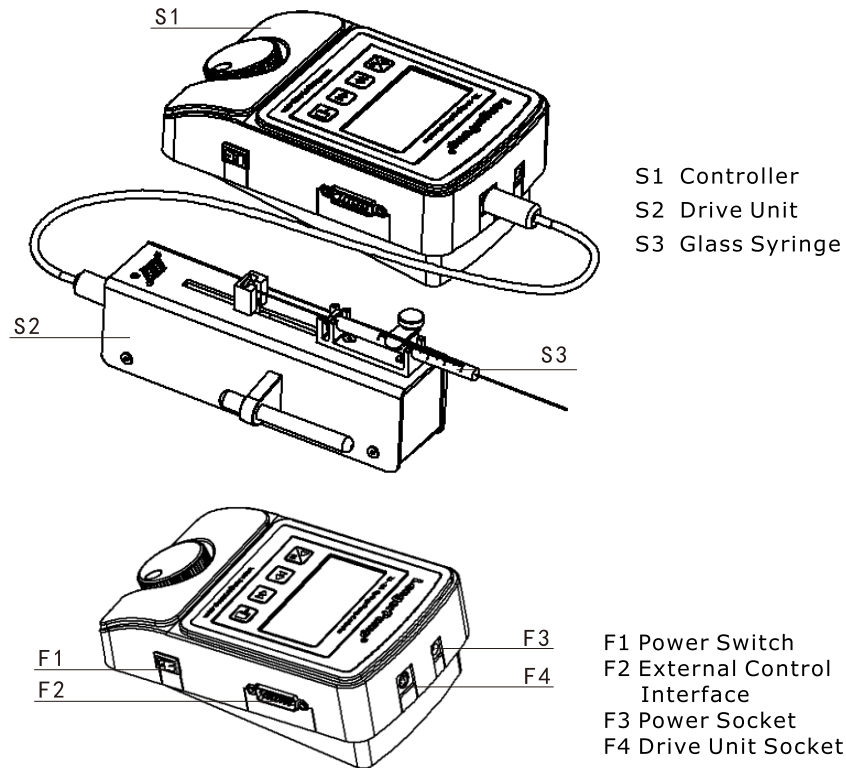
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Introduction

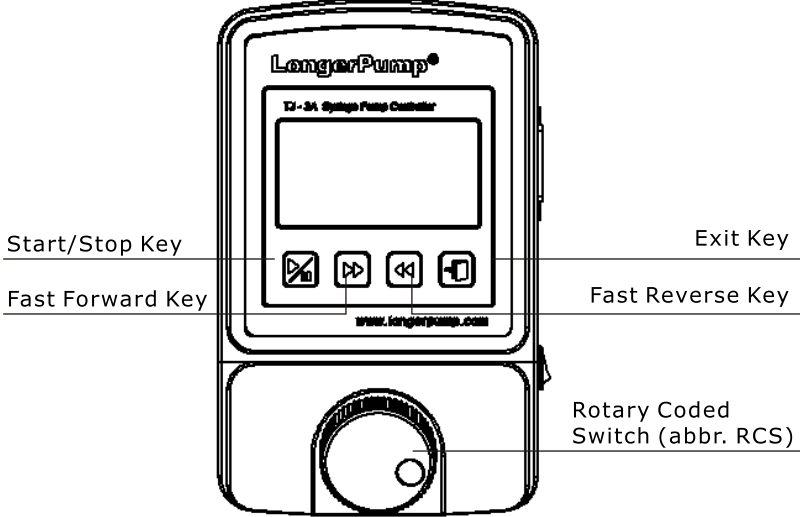
TJ-*A series products are controllers for multi-function syringe pumps. They need to be connected with drive units to constitute syringes of strong functions and easy-to-operate. There are 3 types.

Controller Type	Drive Unit Type	Working Mode
TJ-1A	L0107-1A	Infusion-only
TJ-2A	L0107-2A	Infusion/Withdrawal
TJ-3A	W0109-1B	Infusion/Withdrawal



Note: Controller and drive unit are connected through 8 pin S terminal. Be careful when insertion or extraction. Please see page 18 for detail information about External control function.

Operation Panel



Basic Operation

- **Start/Stop Key**
Press the Start/Stop Key to start or stop the pump.
- **Fast Forward Key**
In stop state, pressing the Fast Forward Key the pump infuses at 2 times max. speed. Other keys are invalid. Loose this key the pump stops.
- **Fast Reverse Key**
In stop state, pressing the Fast Reverse Key the pump withdraws at 2 times max. speed. Other keys are invalid. Loose this key the pump stops.
- **Rotary Coded Switch (RCS)**
Turn the Rotary Coded Switch for menu selections or parameters setting. Press the Rotary Coded Switch for confirmation.
- **Exit Key**
Cancel current operation and return to previous menu.

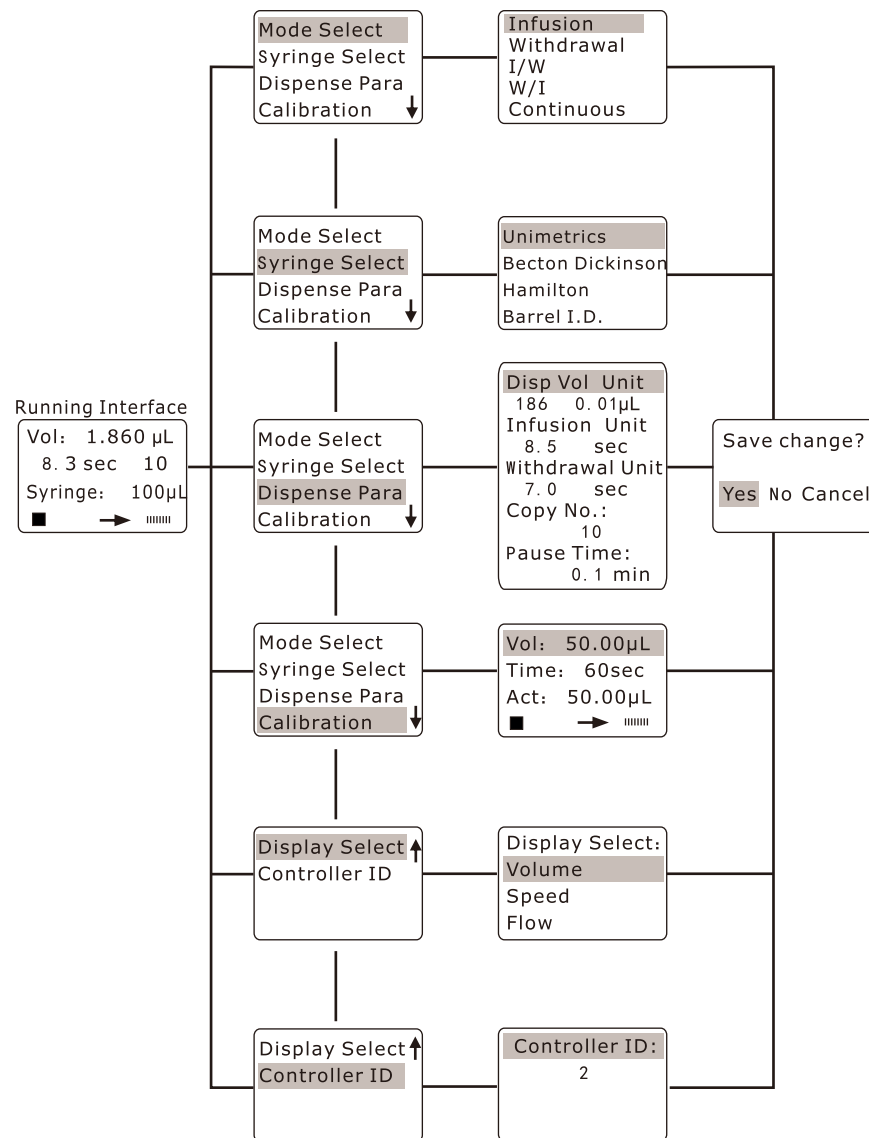
Running Interface

When the pump is turned on, the LCD will display the initializing interface (Interface 1) first and then the language selection interface (Interface 2). Turn the **Rotary Encoded Switch (RES)** to select the language (Interface 3). Chinese and English can be selected. The selected language is highlighted. If the user doesn't select the language, the language which selected last time is highlighted. The pump will enter working interface directly after three seconds.



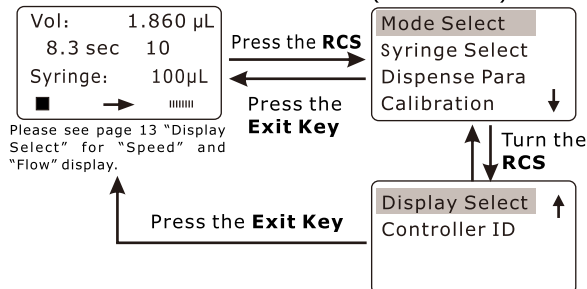
- Volume Display
 - Speed Display
 - Flow Rates Display
- a. Vol: 1.860 μ L
b. 8.3 sec 10
c. Syringe: 100 μ L
d. ■ → ▤▤▤▤
e.
f.
g.
- Spd: 6.715mm/min
8.3 sec 10
Syringe: 100 μ L
■ → ▤▤▤▤
- Flow: 224.0nL/sec
8.3 sec 10
Syringe: 100 μ L
■ → ▤▤▤▤
- Display mode: Display the current volume, flow rates or speed. Please see page 13 "Display Select" for setting method.
 - Time: Required time for one time infusing or withdrawal. Counting down when running.
 - Syringe: Display selected syringe.
 - Start/Stop state: Start displays ►. Stop displays ■. Pause displays ▤▤.
 - Copy number: Display dispensing copy number. Counting down when running (no display in "continuous" mode).
 - Working mode: Display current working mode. Display ▤▤▤▤ in infusion, withdrawal, infusion/withdrawal, withdrawal/infusion modes. Display ▤▤▤▤ in "continuous" mode.
 - Direction: Display running direction. Infusion displays →. Withdrawal displays ←.

Menu Frame Work



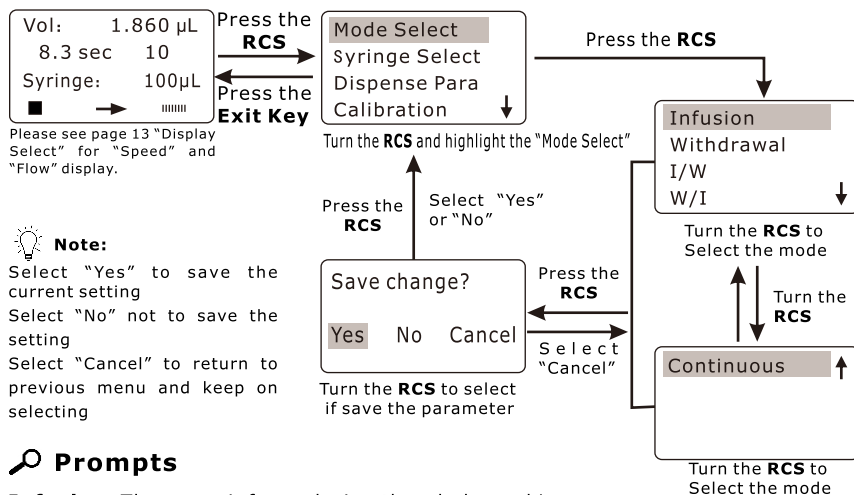
Function Setting

In "Running Interface", press the **RCS** to enter the next interface.
Turn the **RCS** and select 6 functions (see below).



Note: TJ-1A controller has only infusion working mode. Other modes are not available.

Mode Select



Prompts

Infusion: The pump infuses during the whole working course

Withdrawal: The pump withdraws during the whole working course

Infusion/Withdrawal: The pump infuses first and then withdraws during the whole working course

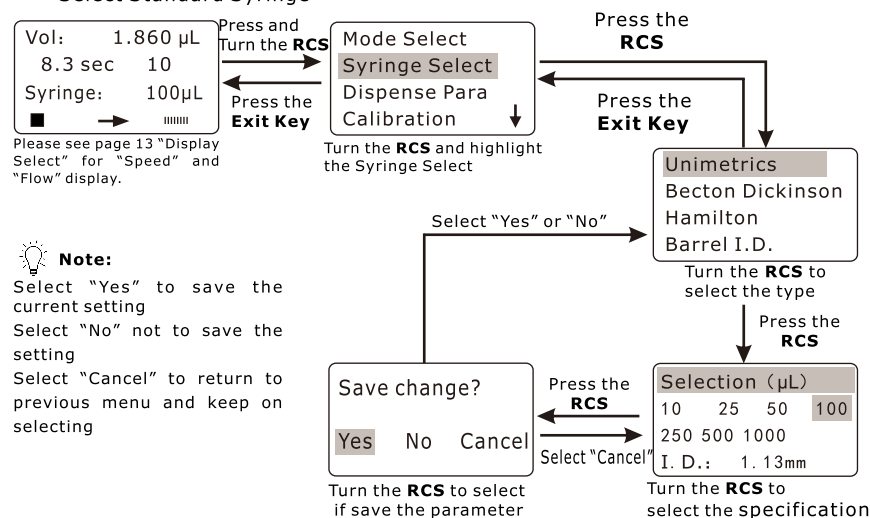
Withdrawal/Infusion: The pump withdraws first and then infuses during the whole working course

Continuous: The pump infuses first and then withdraws, and then cycles continuously

Please see page 8 "Dispensing Parameters Setting" to set the parameters for above working modes

Syringe Select

- Select Standard Syringe



The syringes used for TJ-3A controller

Unimetrics	Spec(µL)	10	25	50	100	250	500	1000
	I.D. (mm)	0.46	0.73	1.03	1.46	2.30	3.26	4.61
Becton Dickinson		1	3	5	10	20	30	60
	I.D. (mm)	4.70	8.59	11.99	14.48	19.05	21.59	26.60
Hamilton	Spec(mL)	1	2.5	5	10	25	50	
	I.D. (mm)	4.61	7.28	10.30	14.57	23.03	32.57	

The syringes used for TJ-1A/TJ-2A controller

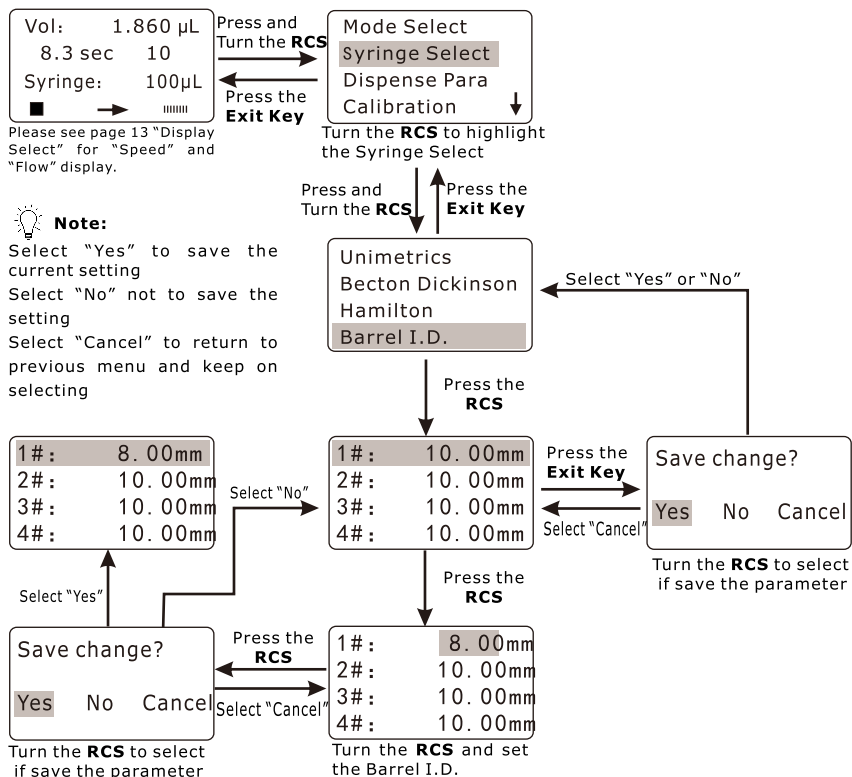
Unimetrics	Spec(µL)	10	25	50	100	250	500	1000
	I.D. (mm)	0.46	0.73	1.03	1.46	2.30	3.26	4.61
Hamilton	Spec(µL)	10	25	50	100	250	500	
	I.D. (mm)	0.48	0.73	1.03	1.46	2.30	3.26	
SGE	Spec(mL)		25	50	100	250	500	
	I.D. (mm)		0.73	1.03	1.46	2.30	3.26	

- Setting and Select the User - defined Syringe

1. Setting the User - defined Syringe

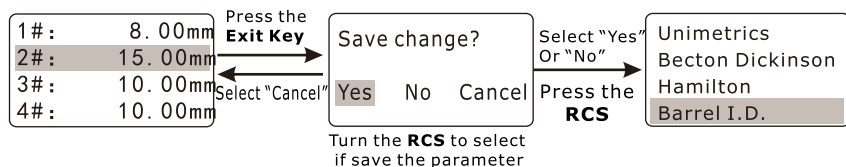
If the syringe used is not listed in the menu the inner diameter of the syringe needs to be measured and entered (0.01 mm - 40 mm).

The pump can save 4 inner diameters of the user - defined syringes.



2. Select the User - defined Syringe

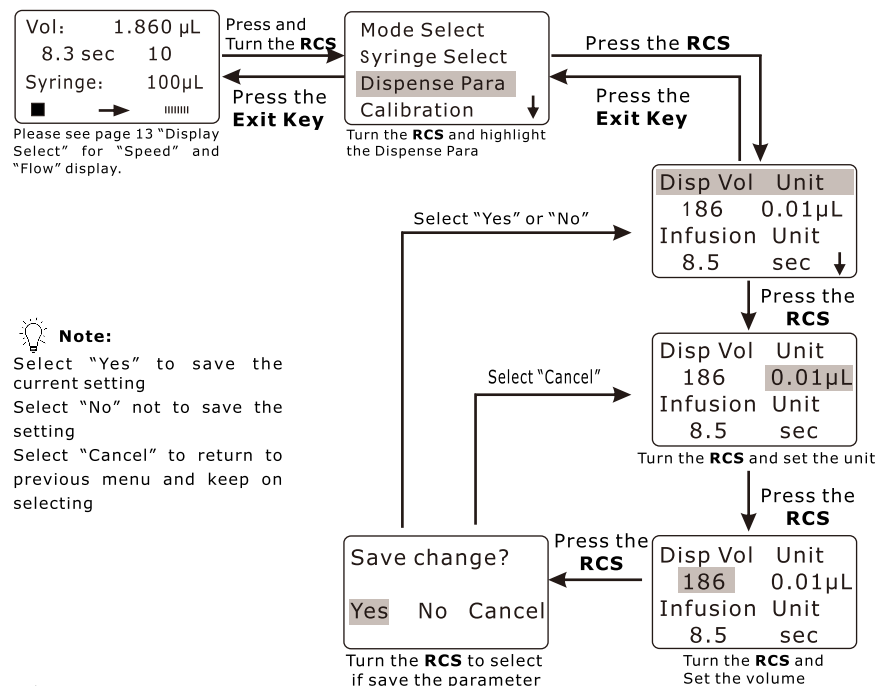
Select the inner diameter of the user - defined syringe after setting the inner diameter.



❖ Dispense Parameters Setting

The dispense parameters include dispense volume, infusion time, withdrawal time, copy number and pause time.

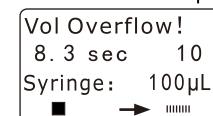
- **Dispense volume:** It is the volume for one time infusion or withdrawal
The volume range is 1 nL to 60 mL
There are volume units of nL, 0.01nL, 0.1μL, μL and 0.01mL available.



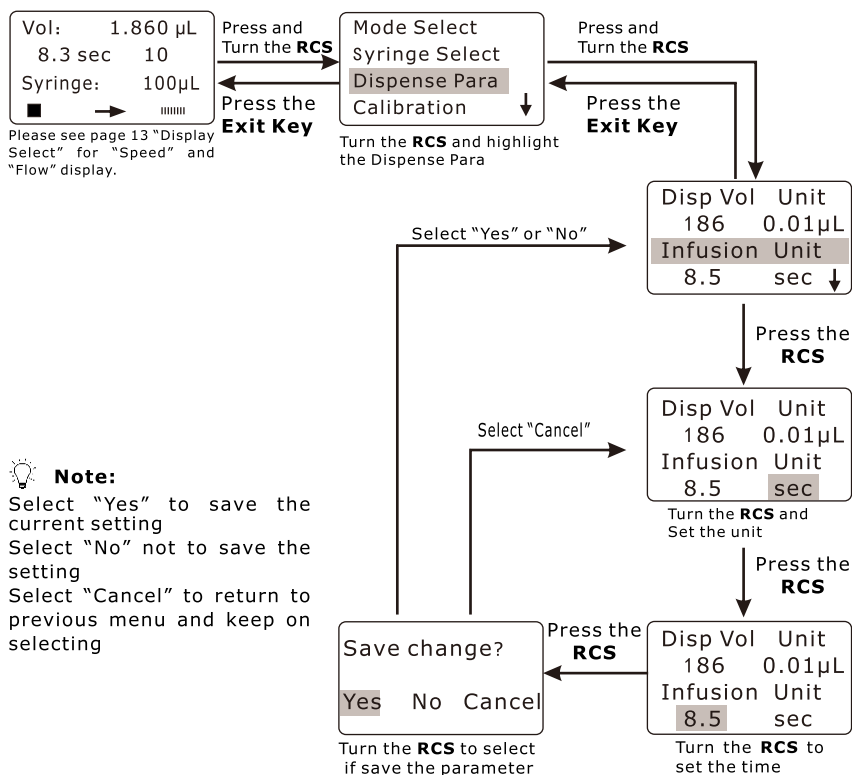
- 

Note:

When the one time dispensing volume or the total dispensing volume (multiply one time dispensing volume by copy number) are more than the volume of the syringe the running interface will display “Vol Overflow” (see below). Please change the syringe or adjust the dispensing volume or the copy number.



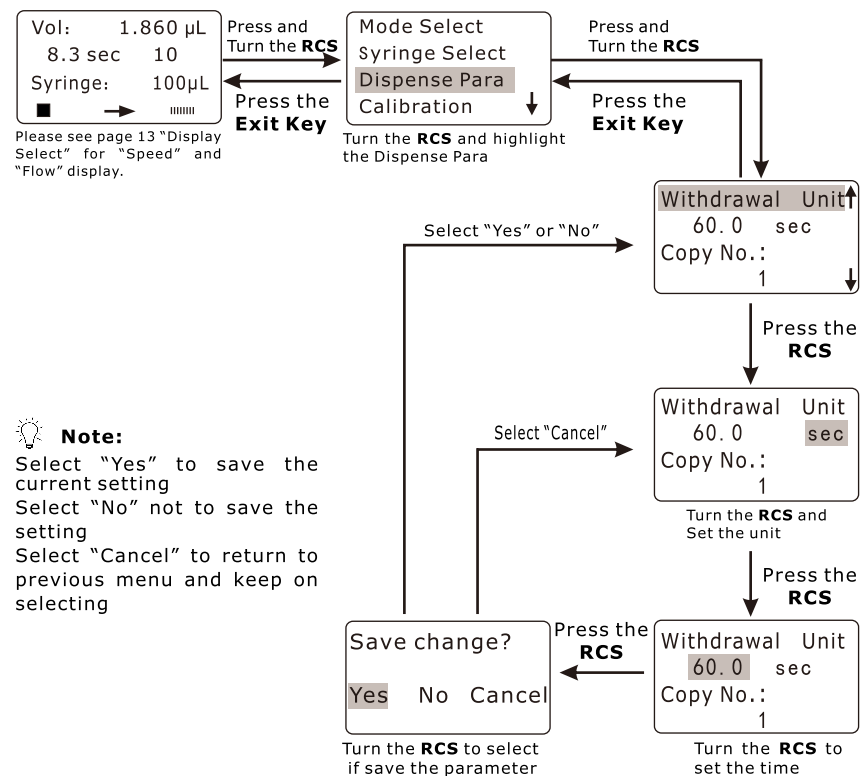
- Infusion time: It is the time for one time infusion
The range of infusion time is 0.1 second to 999.9 hours
There are time units of second, minute and hour available



- Note:**
When the pump can't infuse the setting volume in the setting time the running interface will display "I-speed Overflow" (see below). Please adjust the dispensing time or the dispensing volume.

I-speed Overflow!
8.3 sec 10
Syringe: 100 μ L

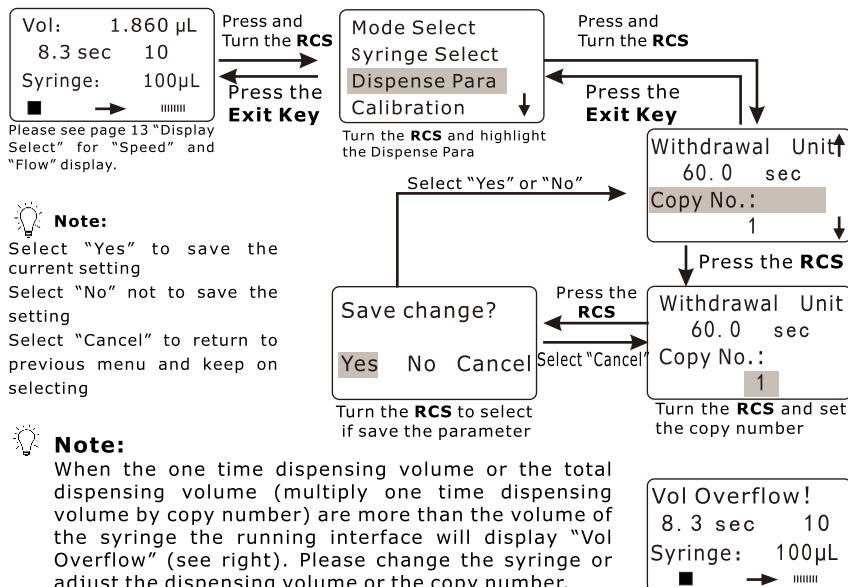
- Withdrawal time: It is the time for one time withdrawal
The range of withdrawal time is 0.1 second to 999.9 hours
There are time units of second, minute and hour available



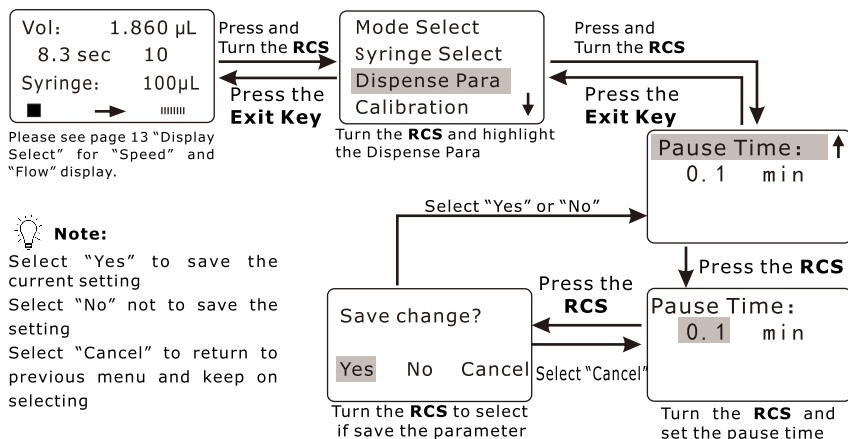
- Note:**
When the pump can't withdraw the setting volume in the setting time the running interface will display "W-speed Overflow" (see below). Please adjust the dispensing time or the dispensing volume.

W-speed Overflow!
8.3 sec 10
Syringe: 100 μ L

- **Copy Number:** It is the total infusion and withdrawal numbers of the whole working course. The range is 1 - 999. In Infusion/Withdrawal (I/W) and Withdrawal/Infusion (W/I) modes, one time working course is finishing one time infusion and withdrawal.

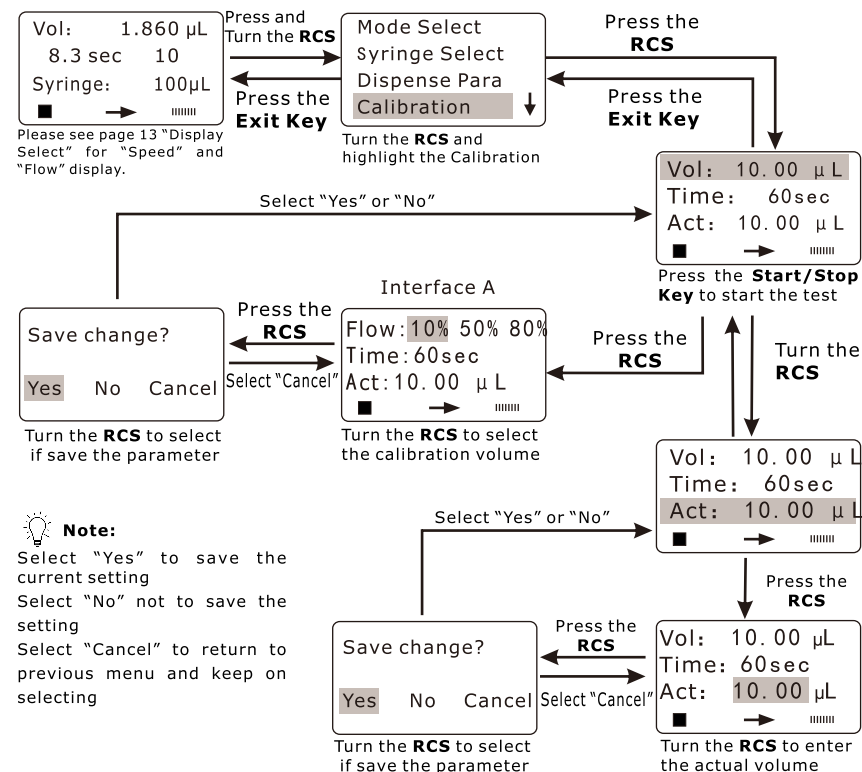


- **Pause Time:** It is the stop time between two dispensing operation. The range is 0.1 - 999 min.



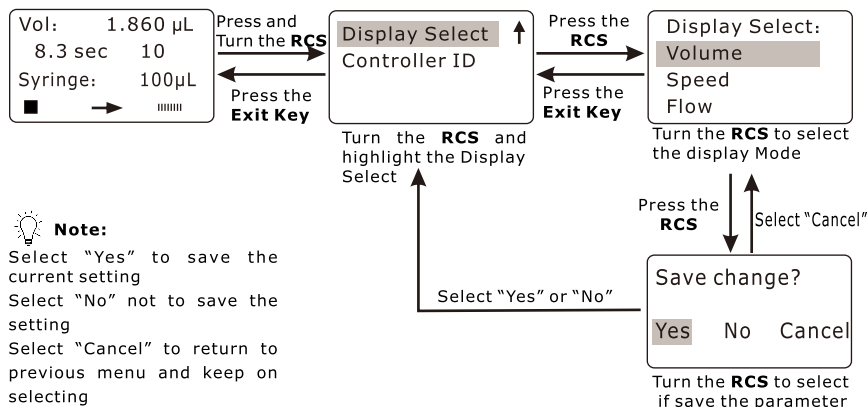
Calibration

When the accuracy of the dispensing volume is not less than 0.5% (in the condition of $\geq 30\%$ of max. infusion distance), calibration is needed to adjust the linear speed of the drive unit.



- **Volume (Vol):** The required volume for calibration
Enter volume setting interface (see Interface A) and turn the **RCS** to set the calibration volume. There are 10%, 50% and 80% of the syringe volume available. When selecting the user-defined syringe the default calibration volume is 50% of the syringe volume. Please see page 6 "Syringe Select" to select suitable syringe.
- **Time:** The calibration time for the pump is 1 minute.
- **Actual volume (Act):** Press the **Start/Stop Key** after setting the calibration volume. Measure and enter the actual volume.

❖ Display Mode

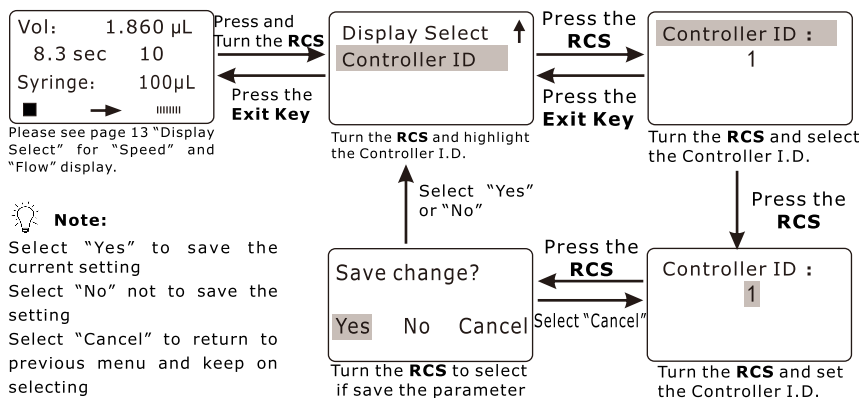


There are volume, speed and flow rates display modes available.

- Volume: Display current one time infusion or withdrawal volume
- Speed: Display current running speed
- Flow rates (Flow): Display current flow rates

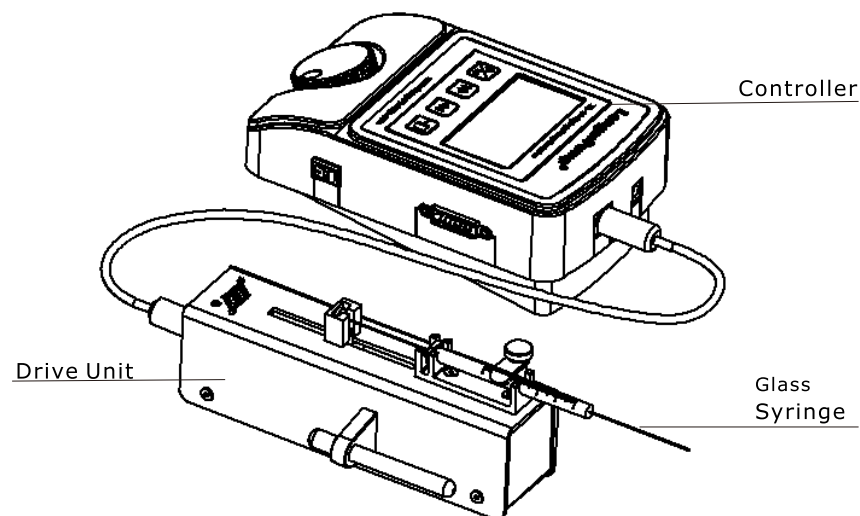
❖ **Controller I.D.**

- When control computer controls many pumps through RS485 interface, it must identify each controller's I.D.. This controller I.D. should be unique. It's the identification of this controller. The controller address serial number is from 1 to 30.



Acceptable Drive Units and Syringes

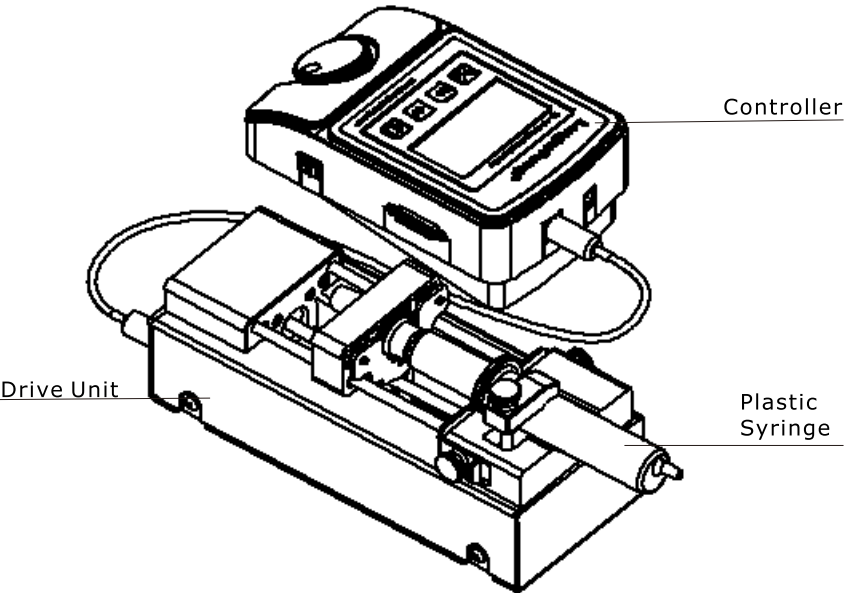
- ❖ TJ-1A/L0107-1A、TJ-2A/L0107-2A



TJ-1A/L0107-1A

Syringe Material	Glass Syringe							
Syringe Specification (μL)	5	10	25	50	100	250	500	1000
Syringe Inner Diameter (mm)	0.35	0.5	0.8	1.1	1.6	2.3	3.25	4.61
Effective Stroke (mm)	51.97	50.93	49.74	52.61	49.74	60.17	60.27	59.91
Flow Rates (/min)	0.764nL - 7.64μL	1.559nL - 15.59μL	3.989nL - 39.89μL	7.544nL - 75.44μL	15.96nL - 159.6μL	32.98nL - 329.8μL	65.85nL - 658.5μL	132.5nL - 1325μL

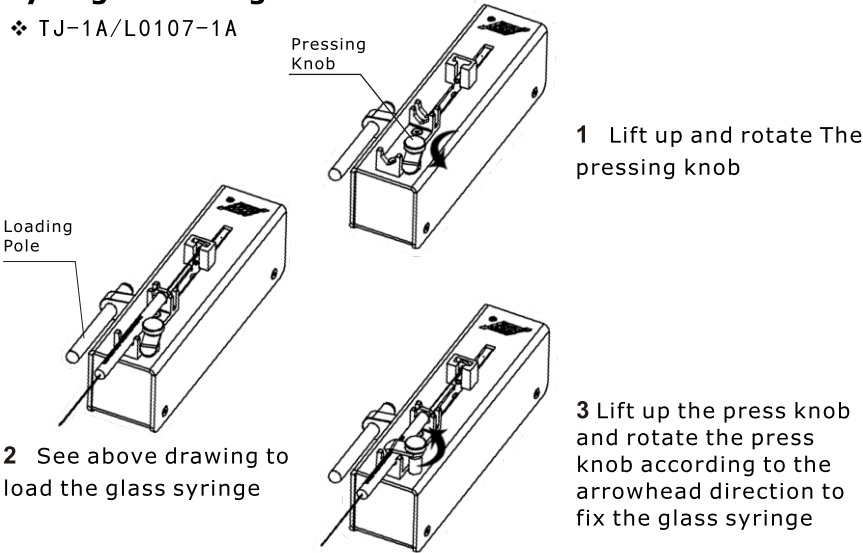
❖ TJ-3A/W0109-1B



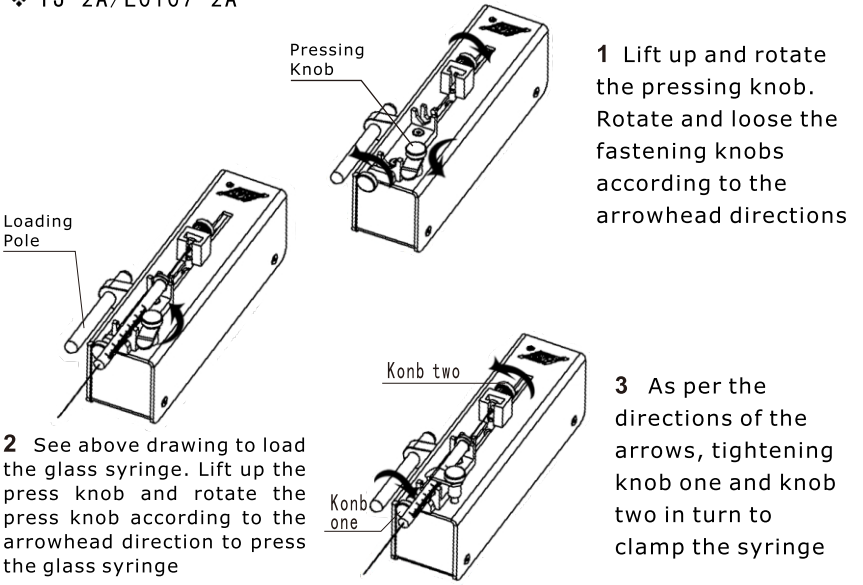
Syringe Material	Plastic Syringe						
Syringe Specification (μL)	1	2	5	10	20	30	60
Syringe Inner Diameter (mm)	4.7	9.0	13.1	14.8	19	23	29.1
Effective Stroke (mm)	57	31.2	37.1	58.2	70.1	72.0	89.96
Flow Rates (/min)	0. 139μL	0. 509μL	1. 07μL	1. 364μL	2. 265μL	3. 307μL	5. 294μL
	1. 39mL	5. 09mL	10. 7mL	13. 64mL	22. 65mL	33. 07mL	52. 94mL

Syringe Loading

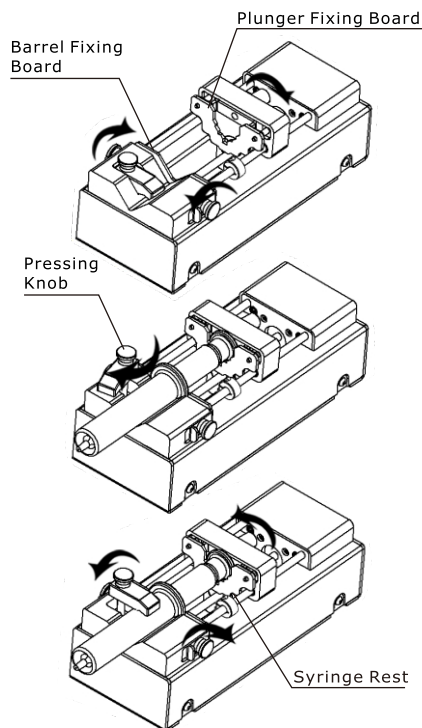
❖ TJ-1A/L0107-1A



❖ TJ-2A/L0107-2A



❖ TJ-1A/W0109-1B



1 Rotate the fastening knobs according to the arrowhead directions. Loose the plunger fixing board and the barrel fixing board

2 Lift up the pressing knob and rotate the pressing knob according to the arrowhead direction. Load the syringe. Rotate the pressing knob to press the syringe

3 Tighten the fastening knobs according to the arrowhead directions to fix the syringe. Adjust and fix the syringe rest to prevent the syringe from damaging.

External Control Function

COM1: Reference potential for external control input

COM2: Reference potential for external control output

EX-R/S: External control start/stop function

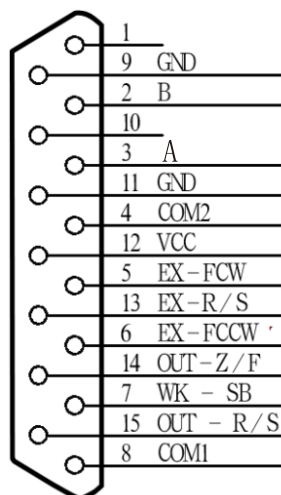
EX-FCW: External control fast infusion function

EX-FCCW: External control fast withdrawal function

OUT-R/S: Start/stop state output

OUT-Z/F: Direction state output

WK-SB: External control enable

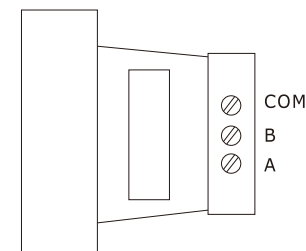


- External Control Enable: Connect pin WK-SB and pin GND to enable the external control function. Then the pump could be controlled through the external control signal.
- External Control Start/Stop Function: One impulse (the impulse low level is more than 5 ms), the pump starts; another impulse, the pump stops.
- External Control Fast Infusion Function: Low level is fast infusion state; High level returns to normal state.
- External Control Fast Withdrawal Function: Low level is fast withdrawal state; High level returns to normal state.
- External Control State Output Function: Provide Start/Stop state output and direction state output.
- Note: The effective high level signal is between 2.5V and 5V, effective low level signal is $\leq 0.8V$.

Start/Stop State Output	Stop State: OC gate is open
	Running State: OC gate is close
Direction State Output	Infusion State: OC gate is open
	Withdrawal State: OC gate is close

Communication Function

The pump can connect to the control computer (computer, PLC, SCM) through RS485 serial communication interface. Standard communication module is available (see right). Please contact Longer Company for communication protocol.



Maintenance

- Keep the surface of the pump clean and dry. Prevent the liquids from entering the inner of the drive unit.
- The surfaces of drive units are not organic solvent and aggressive liquids resistant. Please pay attention when using.

Note

If a trouble happens, please contact us or our dealers.

Warranty

The warranty period for this product is one year. If repair or adjustment is necessary within the warranty period, the problem will be corrected at no charge if it is not due to misuse or abuse on your part, as determined by the manufacturer. Repair costs outside the warranty period, or those resulting from product misuse or abuse, may be invoiced to you.

Technical Specifications

TJ-1A/L0107-1A,TJ-2A/L0107-2A

❖ Functions

User-defined Glass Syringe: Save 4 inner diameters of user-defined glass syringes
Linear Force Output: Whole course > 20 N
Adopt membrane key, easy to operate
Memory function: Storing the running parameters automatically
Signal Output: Start/Stop output, cw/ccw output (Open Collector)
Calibration: Acquire accurate volume through calibration
Fast Forward & Fast Reverse: Infusion or filling at the max. speed (158.8 mm/min)

❖ Specifications

Max. Infusion Distance: 70 mm
Acceptable Glass Syringe : 5 µL - 1000 µL
Linear Speed: 7.9 µm/min - 79.4 mm/min
Adjusting Resolution: 7.9 µm/min
Distance Resolution: 0.165 µm
Linear Force: > 20 N
Setting Mode: Membrane Keypad and rotary coded switch
Accuracy: ≤ 0.5% error in the condition of ≥ 30% of max. infusion distance
Display: 128x64 graphic LCD
External Control: Start/Stop control, fast forward control, fast reverse control
Communication Interface: RS485
Power: AC 100V - 240V or DC12V
Power Consumption: ≤ 10W
Operating Condition: Temperature 0 - 40 °C Relative humidity < 80 %
Controller Dimensions (L × W × H): 170×108×65 (mm)
Controller Weight: 0.8 Kg
Drive Unit Dimensions (L × W × H): 180×46×78 (mm)
Drive Unit Weight: 0.6 Kg
IP Rating: IP21

TJ-3A/W0109-1B

❖ Functions

User-defined Glass Syringe: Save 4 inner diameters of user-defined glass syringe
Linear Force Output: Whole course > 90 N
Adopt membrane key, easy to operate
Memory function: Storing the running parameters automatically
Signal Output: Start/Stop output, cw/ccw output (Open Collector)
Calibration: Acquire accurate volume through calibration
Fast Forward & Fast Reverse: Infusion or filling at the max. speed (158.8 mm/min)
Syringe Protection: Adjust syringe rest to prevent the syringe from damaging

❖ Specifications

Max. Infusion Distance: 90 mm
Acceptable Glass Syringe : 1 mL - 60 mL
Linear Speed: 7.9 µm/min - 79.4 mm/min
Adjusting Resolution: 7.9 µm/min
Distance Resolution: 0.165 µm
Linear Force: > 90 N
Setting Mode: Membrane Keypad and rotary coded switch
Accuracy: ≤ 0.5% error in the condition of ≥ 30% of max. infusion distance
Display: 128x64 graphic LCD
External Control: Start/Stop control, fast forward control, fast reverse control
Communication Interface: RS485
Power: AC 100V - 240V or DC12V
Power Consumption: ≤ 10W
Operating Condition: Temperature 0 - 40 °C Relative humidity < 80 %
Controller Dimensions (L × W × H): 170×108×65 (mm)
Controller Weight: 0.8 Kg
Drive Unit Dimensions (L × W × H): 245×100×95 (mm)
Drive Unit Weight: 1.3 Kg
IP Rating: IP41