GOLANDER

LAA V3 Series Syringe Pump

Operating Manual

Contents

Safety Precautions

 Danger

- To avoid damage, use the correct voltage indicated on the rating plate label of the pump.
- Make no unauthorized dismantling, changes, or modifications to the pump. This may result in malfunctions or potential accidents. Take special care when servicing internal components.
- Keep a distance from the lead screw when the syringe pump is in operation. Fingers or loose clothing may get caught in the drive.

 Warning

- When installing a syringe, the limit block must be adjusted to the appropriate position to avoid accidental damage to the syringe. Our company cannot be held liable for loss caused by damage to the syringe, including leakage of toxic, hazardous, or valuable liquids.
- Turn off the power before connecting or disconnecting external control devices or communication interfaces.
- The pump is equipped with a grounding plug. It must be well-grounded at all times.
- This product is not intended for medical use.

(DE) SICHERHEITSHINWEISE

⚡ Gefahr

- Um Schäden zu vermeiden, verwenden Sie die auf dem Typenschild der Pumpe angegebene korrekte Spannung.
- Nehmen Sie keine unbefugten Demontagen, Änderungen oder Modifikationen an der Pumpe vor. Dies kann zu Fehlfunktionen oder potenziellen Unfällen führen. Achten Sie besonders auf den Service der internen Komponenten.
- Halten Sie beim Betrieb der Spritzenpumpe einen Abstand zur Gewindespindel ein. Finger oder lose Kleidung können eingeklemmt werden.

⚠ Warnung

- Bei der Installation einer Spritze muss der Begrenzungs-block in die richtige Position gebracht werden, um versehentliche Schäden an der Spritze zu vermeiden. Unser Unternehmen haftet nicht für Verluste, die durch Schäden an der Spritze, einschließlich Leckagen von giftigen, gefährlichen oder wertvollen Flüssigkeiten, verursacht werden.
- Schalten Sie die Stromversorgung aus, bevor Sie externe Steuergeräte oder Kommunikationsschnittstellen anschließen oder trennen.
- Die Pumpe ist mit einem Erdungsstecker ausgestattet. Er muss jederzeit gut geerdet sein.
- Dieses Produkt ist nicht für medizinische Zwecke bestimmt.

(FR) PRÉCAUTIONS DE SÉCURITÉ

 Danger

- Pour éviter les dommages, utilisez la tension correcte indiquée sur l'étiquette de la plaque signalétique de la pompe.
- N'effectuez aucune démontage, modification ou changement non autorisé sur la pompe. Cela pourrait entraîner des dysfonctionnements ou des accidents potentiels. Soyez particulièrement prudent lors de la maintenance des composants internes.
- Gardez une distance par rapport à la vis sans fin lorsque la pompe à seringue est en fonctionnement. Les doigts ou les vêtements amples pourraient se coincer dans le mécanisme.

 Avertissement

- Lors de l'installation d'une seringue, le bloc limiteur doit être ajusté à la position appropriée pour éviter d'endommager accidentellement la seringue. Notre entreprise ne peut être tenue responsable des pertes causées par des dommages à la seringue, y compris les fuites de liquides toxiques, dangereux ou précieux.
- Éteignez l'alimentation avant de connecter ou de déconnecter des dispositifs de contrôle externe ou des interfaces de communication.
- La pompe est équipée d'une prise de mise à la terre. Elle doit toujours être correctement mise à la terre.
- Ce produit n'est pas destiné à un usage médical.

(ES) INSTRUCCIONES DE SEGURIDAD

⚠ **Peligro**

- Para evitar daños, utilice la tensión correcta indicada en la etiqueta de la placa de clasificación de la bomba.
- No realice desmontajes, cambios o modificaciones no autorizadas en la bomba. Esto podría provocar fallos o accidentes potenciales. Tenga especial cuidado al realizar el mantenimiento de los componentes internos.
- Mantenga una distancia de la varilla roscada cuando la bomba de jeringa esté en funcionamiento. Los dedos o la ropa suelta podrían quedar atrapados en el mecanismo.

⚠ **Advertencia**

- Al instalar una jeringa, el bloque limitador debe ajustarse a la posición adecuada para evitar daños accidentales en la jeringa. Nuestra empresa no se hace responsable de las pérdidas causadas por daños en la jeringa, incluyendo la fuga de líquidos tóxicos, peligrosos o valiosos.
- Apague la alimentación antes de conectar o desconectar dispositivos de control externos o interfaces de comunicación.
- La bomba está equipada con un enchufe de puesta a tierra. Debe estar correctamente conectada a tierra en todo momento.
- Este producto no está destinado a uso médico.

(IT) ISTRUZIONI DI SICUREZZA

 Pericolo

- Per evitare danni, utilizzare la tensione corretta indicata sull'etichetta della piastra di classificazione della pompa.
- Non effettuare smontaggi, modifiche o cambiamenti non autorizzati alla pompa. Ciò potrebbe causare malfunzionamenti o potenziali incidenti. Prestare particolare attenzione durante la manutenzione dei componenti interni.
- Mantenere una distanza dalla vite senza fine quando la pompa a siringa è in funzione. Le dita o gli indumenti larghi potrebbero rimanere intrappolati nel meccanismo.

 Avvertenza

- Durante l'installazione di una siringa, il blocco limite deve essere regolato nella posizione appropriata per evitare danni accidentali alla siringa. La nostra azienda non può essere ritenuta responsabile per le perdite causate da danni alla siringa, comprese le perdite di liquidi tossici, pericolosi o preziosi.
- Spegnere l'alimentazione prima di collegare o scollegare dispositivi di controllo esterni o interfacce di comunicazione.
- La pompa è dotata di una spina di messa a terra. Deve essere correttamente messa a terra in ogni momento.
- Questo prodotto non è destinato all'uso medico.

1 Description

LAA series syringe pumps work with various sizes of syringes and with five working modes: infuse, withdraw, infuse/ withdraw, withdraw/infuse, and continuous cycle. Its high-resolution color LCD touchscreen is convenient for parameter setting. Multiple indicators indicate the working status. A variety of built-in syringe manufacturers and specifications for easy selection. Pre-stored data can adapt to different flow requirements. High-precision control with protection and alarm mechanisms. External signal controls start and stop. The built-in RS-485 communication interface which supports the MODBUS protocol allows one or multiple pumps to be easily controlled by external devices.

LAA-01, single syringe, size 10uL-60mL, linear velocity from 1um/min to 150mm/min

LAA-02, dual syringes, size 10uL-60mL, linear velocity from 1um/min to 150mm/min.

Applications
- Micro volume transfer
- Micro flow rate transfer
- No pulsation transfer
- High-precision transfer

2 Functions and Features

- Multiple work modes
- Color LCD touch screen for ease of use
- Support screen lock, and key mute operation.
- Indicators for clear indication of operation status
- Support a variety of syringes, both standard and self-defined
- Multiple pre-stored data

- High precision control
- RS485 MODBUS communication
- External control signal to control start/stop and direction
- Wide range of power input
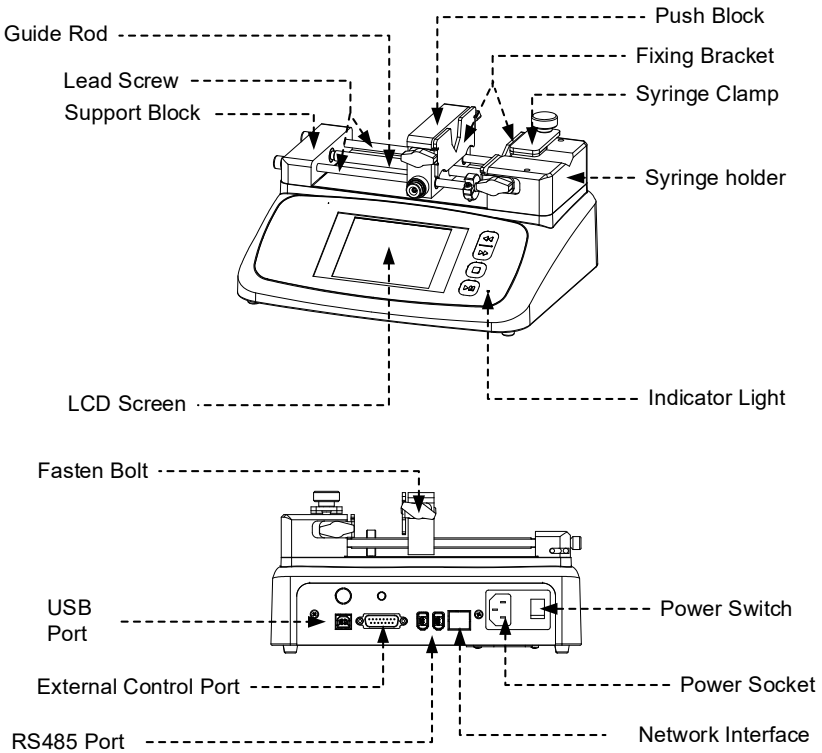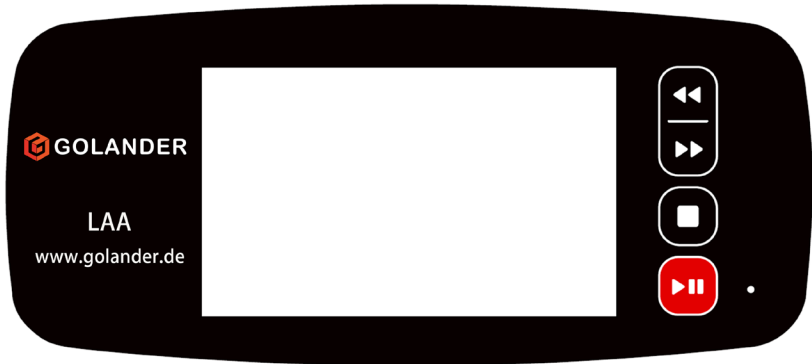- Streamlined plastic housing

3 Components

Figure 1. Components

4 Operating Keypad and Display Panel

4.1 Keypad

▷ ❚❚START/PAUSE key. Press to start, pause, or resume the
▷ defined operation.

▢ STOP key. Stop or reset the operation

▶▶ FAST FORWARD key. When the pump stops, press and hold the key to push at the maximum speed.

◀◀ FAST BACKWARD key. When the pump stops, press and hold the key to retreat at the maximum speed.

Green indicator: operation indicator. When the drive starts, this indicator turns on. The light blinks when the operation is paused.

Red indicator: this indicator turns on when an operation is stopped or completed. The light blinks when the motor loses speed.

4.2 LCD Touch Screen Display

Icon	Indication	Icon	Indication

🔊	Tone On	🔇×	Tone Off
⇅	Communication Connected	⇅	Communication Disconnected
→	Infuse	←	Withdraw
🔒	Screen Locked	🔓	Screen Dislocked
▶	Running	‖	Pause
■	Stop	◻	Selected
◻	Not Selected		

Data entry: When the drive is not running, press the number to input the desired value in the pop-up window.

Figure 2. Flow input screen

Max: Maximum input value

Min: Minimum input value

⊗ : Delete the last digit

X: Cancel the current entry data

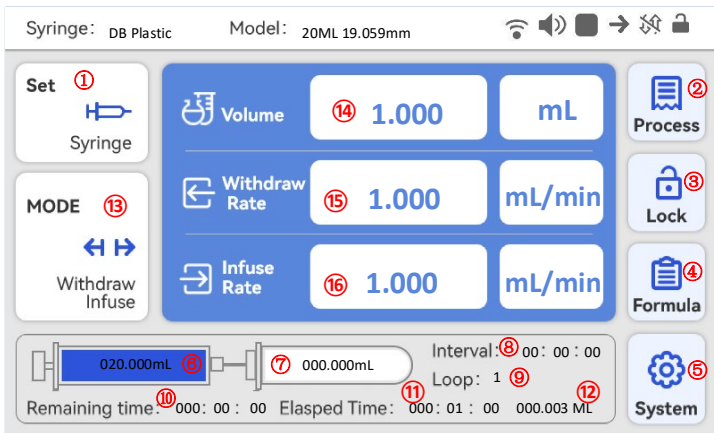**Enter**: Confirm the current entry data
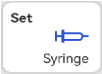
4.3 Main Display

Figure 3. Main Interface Display

1. ⬚ Click the icon to access the syringe manufacturer selection and then the syringe specification interface. Choose "Custom" if the syringe manufacturer is not specified (details see section 6.5.1).
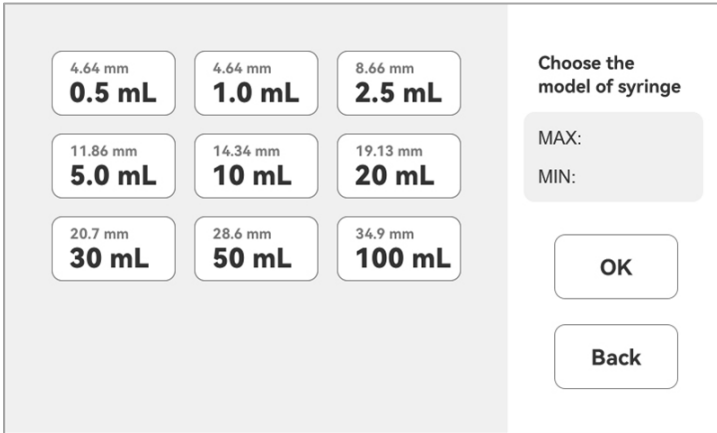
Figure 4. Syringe Manufacturers Interface

Figure 5. Syringe Specification Interface

2. Press this icon to access the process setup interface.

Process Setup

Set Delay

| 0 | h | 0 | min | 0 | sec | 0 | ms |

Set Loop   Early Warning

| 1 | | 0 % |

| Clear Total Volume | | OK |

Figure 6. Process Setup

Set Delay: set the delay time in motion, first delay then operation.

Set Loop: set the number of loops for repetitive operation.

Early Warning: configure a reminder to alert before completing the operation, triggered when a preset percentage of the total transmission volume is reached.

Clear Total Volume：clear the accumulative volume.

3. 🔒 Lock Press this icon to lock the screen to prevent accidental modification of parameters. When the screen is locked, the icon will change to 🔒 Lock. Press 🔒 Lock and enter the password to unlock the screen. If there is no preset password, simply press "OK" to unlock the screen.

4. 📋 Formula Press this icon to enter the quick setting interface for the selection of pre-entered three sets of data (see section 6.5.5 for details).
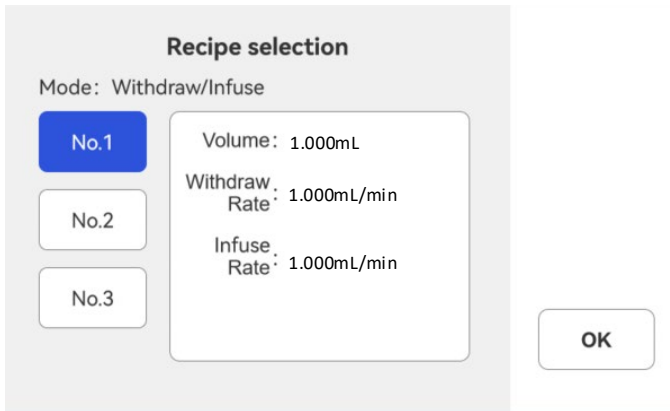
Recipe selection

Mode: Withdraw/Infuse

No.1	Volume: 1.000mL
No.2	Withdraw Rate: 1.000mL/min
No.3	Infuse Rate: 1.000mL/min

OK

Figure 7. Quick Setting

5. ⚙️ System Press the icon to access the system setting menu, and then select the corresponding menu to modify the parameters (see section 4.4 for details).

6. The current volume in a syringe is displayed, with the blue bar indicating progress with the current fluid volume.

7. The current volume in an external container, with the blue bar showing progress with the current fluid volume.

8. Display the current interval time.

9. Display the current number of repetitions.

10. Display the remaining time of the currently running process.

11. Display the elapsed time of the current running process.

12. Display the current accumulated total liquid volume.

13. MODE ↦ Infuse Only Press the icon to enter the interface for the selection of operating mode (see section 6.5.2 for details).
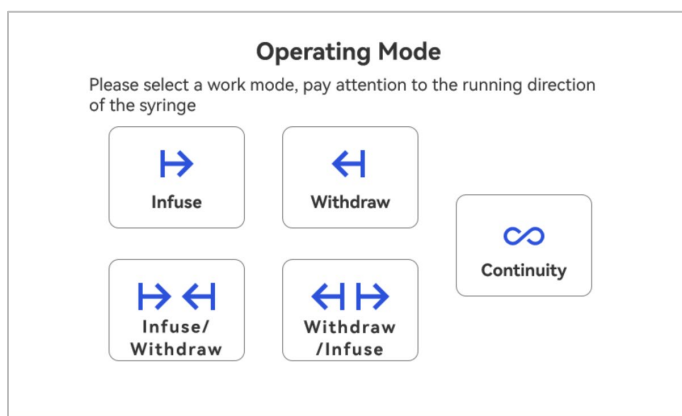
Figure 8. Work Mode interface

14. Volume: Set the fluid volume to be withdrawn or infused. Tap the liquid volume value to input the desired value, and tap the liquid volume unit to switch between nL, uL, and mL.

15. Withdraw Rate: Set the withdrawal flow rate. Tap the flow rate value to input the desired value, and tap the flow rate unit to switch between nL/min, uL/min, and mL/min.

16. Infuse Rate: Set the infusion flow rate. Tap the flow rate value to input the desired value, and tap the flow rate unit to switch between nL/min, uL/min, and mL/min.

Attention： When "Overflow" or "Underflow" is shown, the value entered is out of range. Please re-enter the value or change the unit.

4.4 System Setting

When the drive is not running, press ⚙ on the main screen to enter the system setting interface.
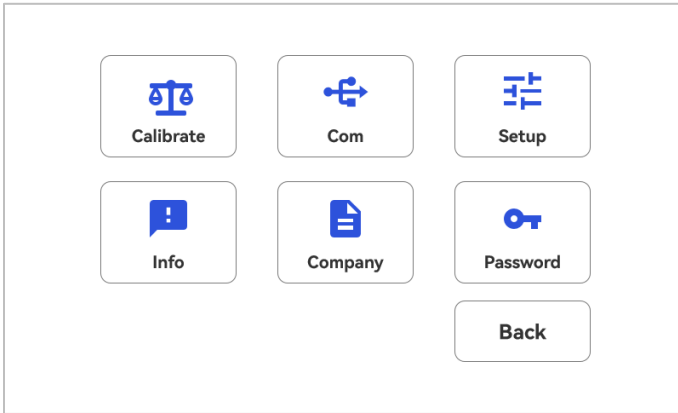
Figure 9. System Setting

Calibrate - Calibrate the flow rate for a custom syringe by using the calibration wizard. Follow the provided instructions and measure the dispensed volume to accurately display the actual flow rate.

Com - This setting configures RS485 MODBUS communication parameters, such as baud rate, transmission mode, and pump address. To change the address, tap the address number displayed on the screen, then input the desired value in the pop-up window. Restart the drive to implement the changes.
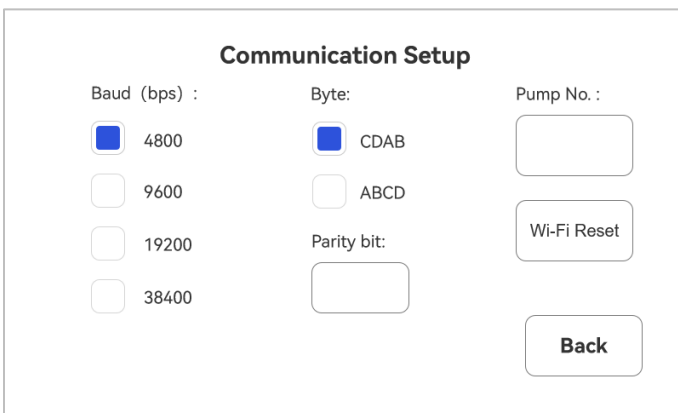

Figure 10. Communication Settings

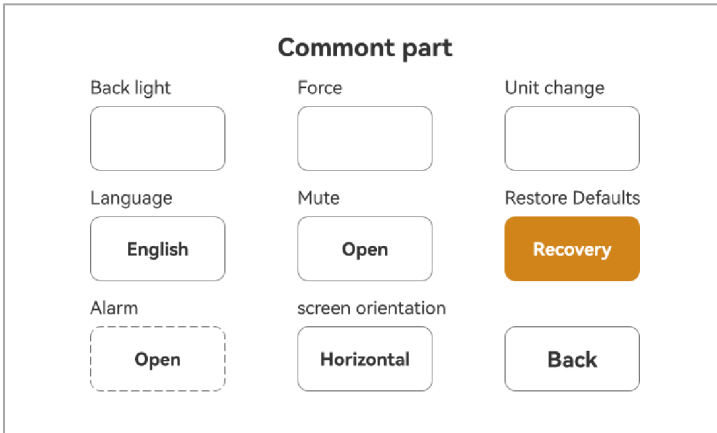**Setup** - Set general settings as shown below.

Figure 11. General Settings

- **Backlight**: Adjust the brightness of the backlight. Tap the number to modify the value.
- **Force**: Set the force according to the material of the syringe to prevent damage. Tap the number to adjust the value.
- **Unit Change:** Switch between units.
- **Language**: System language, English or Chinese.
- **Mute:** Choose whether to enable or disable the sound.
- **Restore Defaults:** Reset all parameters to factory defaults. Restart to apply the settings.
- **Alarm:** Activate or deactivate the alarm function.
- **Screen Orientation:** Choose between a vertical or horizontal interface.

Info- This section displays the syringe pump's hardware version, software version, ambient temperature, and device serial number.
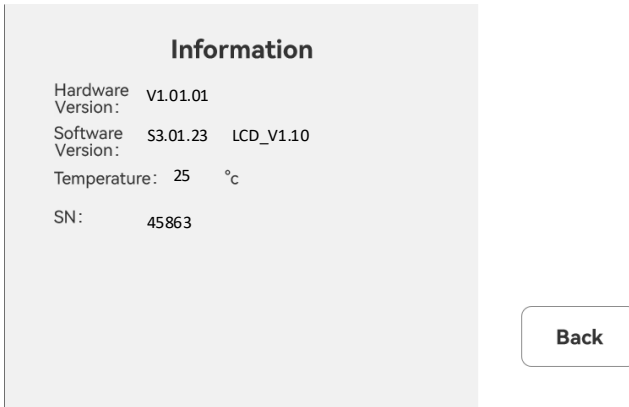
Figure 12. Information

Password – A password can be set to lock the screen and prevent accidental changes to parameters. The default password is empty. To set a new password, enter the desired password and confirm by pressing "OK".
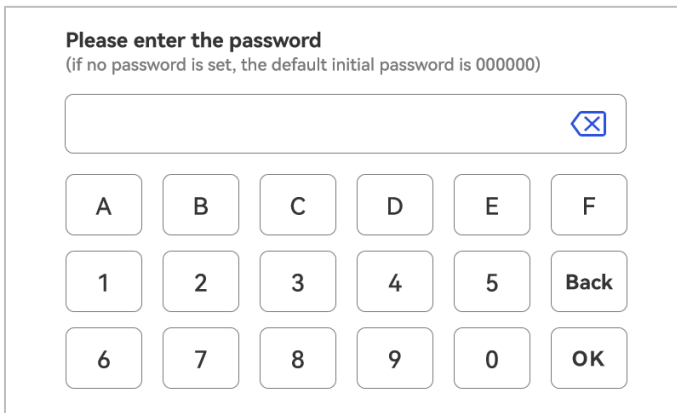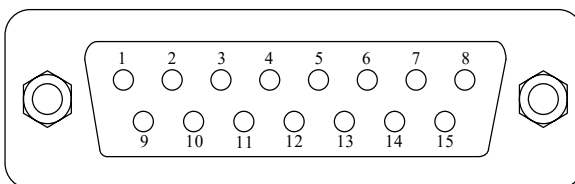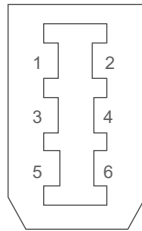

Figure 13. Password

5 External Control Interface

- **DB15 Interface**

Pin	Mark	Note
1		
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_IN	External input signal to control direction
7		
8	COM	Ground of external power
9		
10	+24V	Positive of internal +24V power source
11	GND	Ground of Internal power source
12	CW	Direction signal output
13	RS_IN	External start/stop signal input
14		
15	RS	Start/stop signal output

- **RS485 Interface**

Pin	Mark	Note
1		
2		
3	B	Communication interface, B pole of RS485
4	A	Communication interface, A pole of RS485
5		
6		

- **USB Interface**
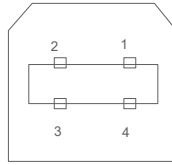
Pin	Mark	Note
1	+5V	+5V power source
2	DATA-	Data -
3	DATA+	Data +
4	GND	Power Ground

6 Operating Instructions

6.1 Before Operation

1) Please check the packing slip to ensure all parts are included and undamaged. If any issues are detected, please contact the manufacturer or distributor.
2) Read the manual thoroughly.
3) Maintain a minimum distance of 200mm from the back of the pump while it is in operation.

6.2 Power Connection

Ensure that the voltage of the power supply matches the rating indicated on the pump's rating plate label. Plug the power cord into the power connector located at the rear of the drive, and then connect the opposite end of the power cord to an electrical outlet. Flip the power switch, also located at the rear of the drive, to turn it on.
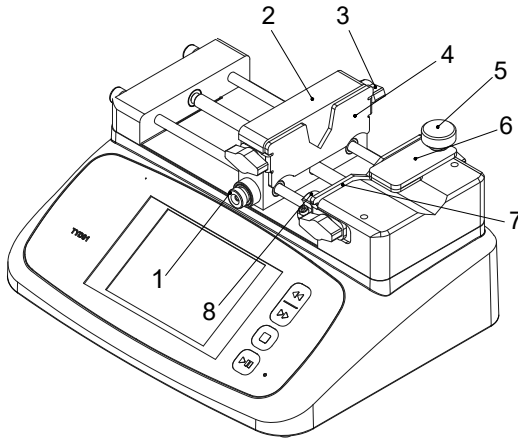
6.3 Install a Syringe

Figure 14. Install Syringe

1) Press and hold the release button (1), then slide the block (2) to a position near the length of the syringe.
2) Loosen the fasten bolts (3) and adjust the position of the fixing brackets (4) (7).
3) Lift the screw (5) and rotate the syringe clamp (6) 180 degrees outward.
4) Place the syringe into the right holder groove, securing the syringe plunger flange onto the fixing bracket (4) and the syringe barrel flange onto the fixing bracket (7).
5) Lift the screw (5), rotate the syringe clamp (6) 180 degrees to hold the syringe in position.
6) Tighten the fastening bolt (3).
7) Use an Allen Key to adjust the position of the stop block (8) to prevent over-pushing the syringe.

6.4 First Run Wizard

When using the syringe pump for the first time or after a factory reset, the system will show a welcome message, followed by the selection of Syringe Manufacture-> Syringe Specification -> Work

Mode. A user can set the parameters and operation mode according to the requirement. This information will be saved, eliminating the need to run the wizard again.
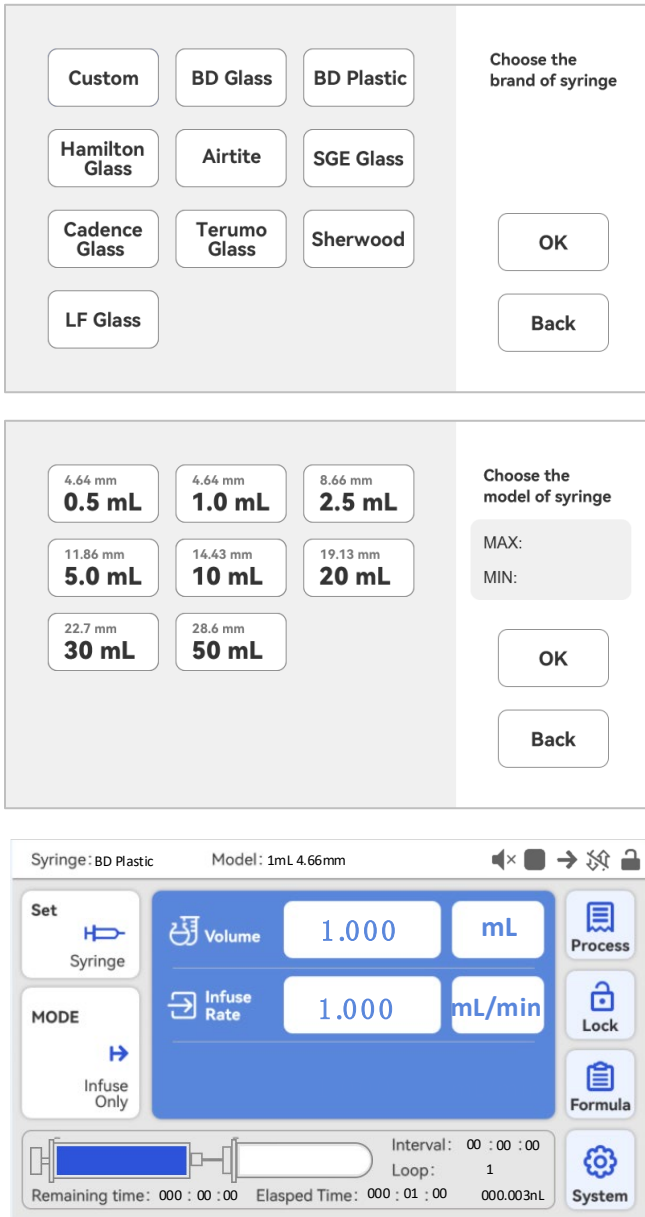

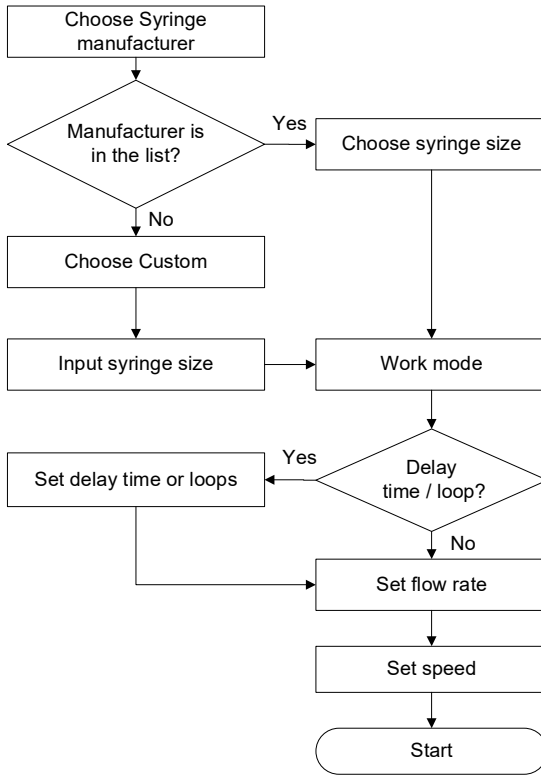*Figure 15. First Run Wizard*

6.5 Operation Flowchart

Figure 16. Operation Flowchart

6.5.1 Syringe

On the main screen, press [Set Syringe] to access the syringe manufacturer interface. Choose "Custom" if a manufacturer is not listed. Press "OK" to proceed to the syringe specification interface, and press "Back" to return to the main screen.
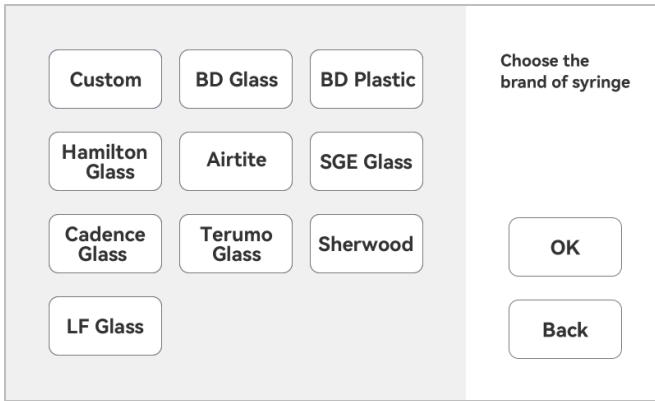
Figure 17. Select a Syringe Manufacturer

In the syringe specification interface, select the corresponding syringe. The left side of the screen shows the syringe volume capacity and barrel internal diameter, while the right side shows the maximum and minimum flow rates.
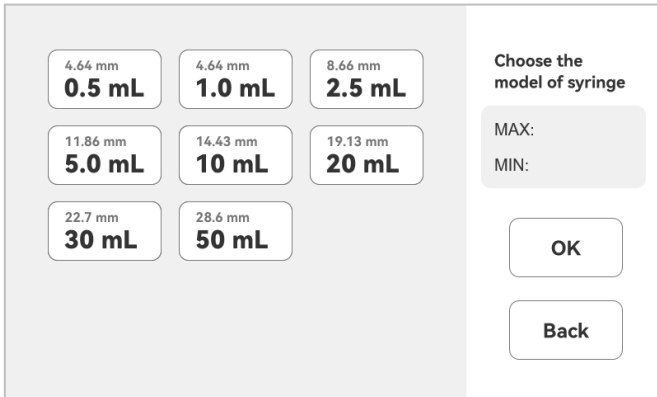

Figure 18. Choose syringe model

If "Custom" is selected as the syringe manufacturer, it allows a user to input the specification of a syringe. Press the numbers to change the values for the ID and volume, and press the volume unit to switch between ml and ul.
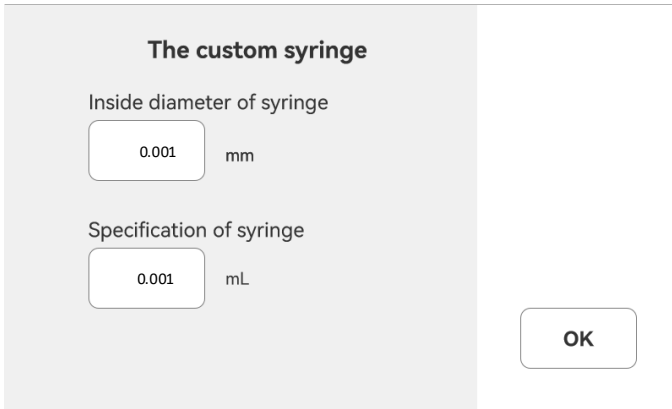
Figure 19. Custom Syringe

6.5.2 Operating Mode

Press "Mode" on the main screen to access the operating mode interface, then select the work mode.
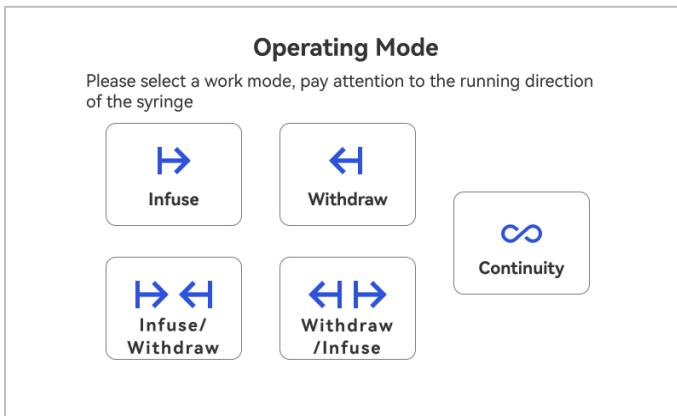

Figure 20. Operating Mode

Infuse Only: This mode permits single-direction infusion operations. If replay loops are set, multiple infusions can be conducted.
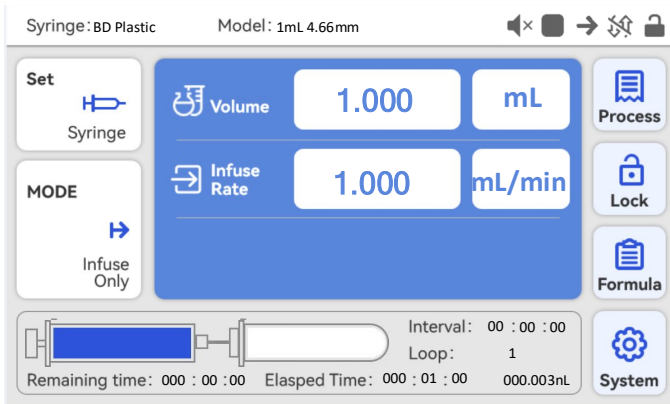
Figure 21. Infuse-only Display Interface

Withdraw only: This mode allows single-direction withdrawal operations. If replay loops are set, multiple withdrawals can be performed.
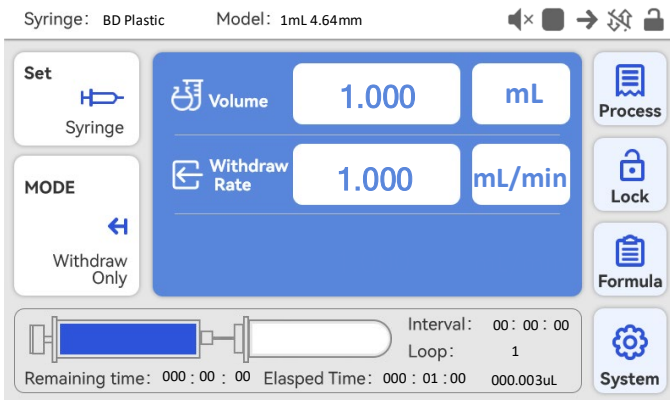

Figure 22. Withdraw-only Display Interface

Withdraw/infuse: This mode enables withdrawal first, followed by infusion. Multiple loops can be set for multiple operations.
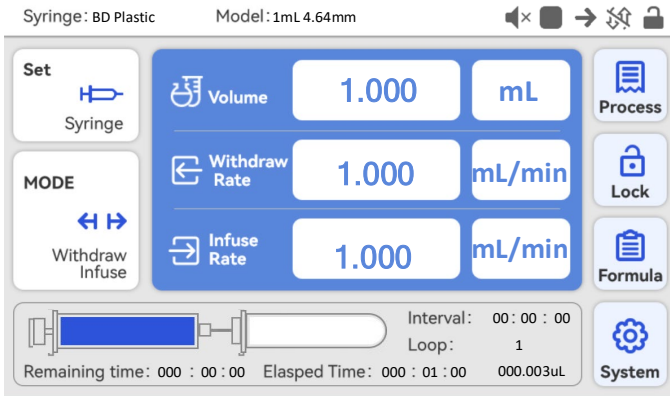
Figure 23. Withdraw/infuse display interface

Infuse/withdraw: This mode allows infusion first, followed by withdrawal. Multiple loops can be set for multiple operations.
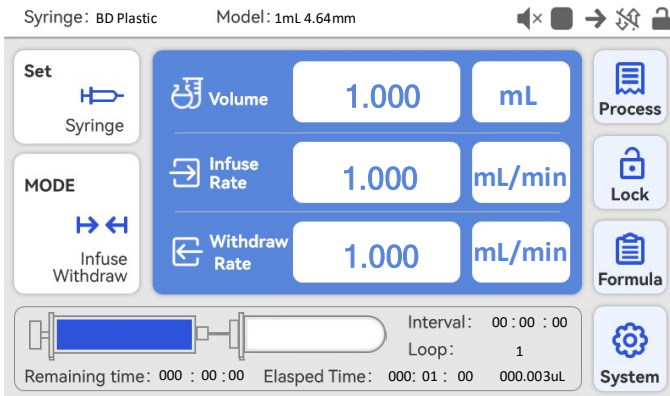

Figure 24. Infuse/Withdraw display interface

Continuity: Operations are conducted through external signals or communication. Pulse or level can be selected as the control mode.
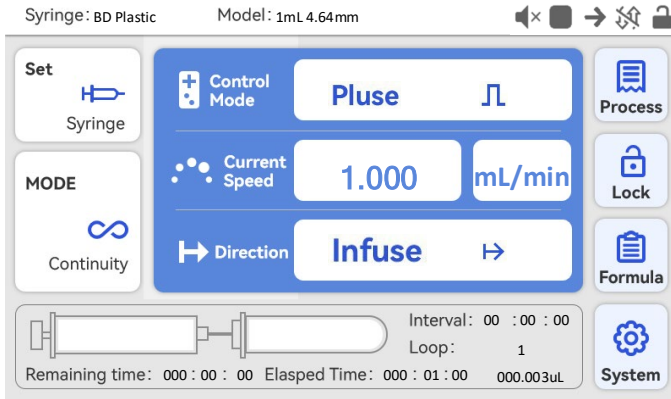
Figure 25. Continuity display interface

Press to set delay time and loop as shown below.

Figure 26. Process Setup

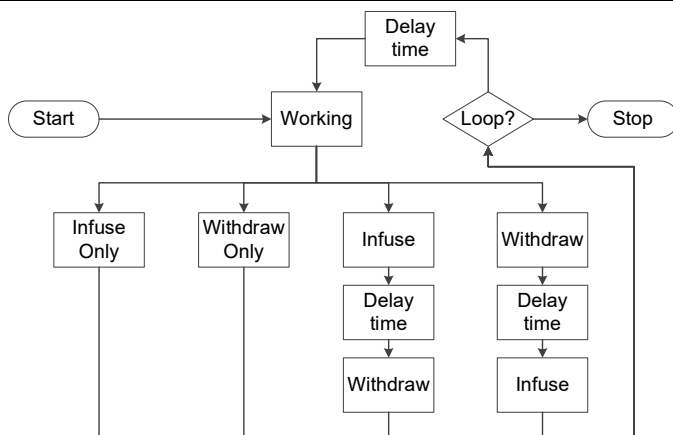Please refer to the workflow chart below for details.

Figure 27. Workflow chart

6.5.3 Volume and Flow Rate

To set the desired injection or withdrawal volume, press the volume value to change it. Press the volume unit to switch between ul and ml.

To set the desired inject or withdraw flow rate, press the flow rate value to change it. Press the flow rate unit to switch between nl/min, ul/min, or ml/min.

6.5.4 Start the process
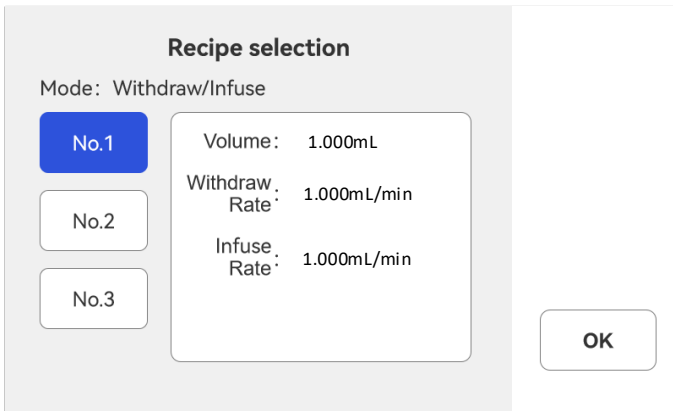
Press the START/PAUSE key ▷ǁ to start the running process, indicated by a green indicator light. Upon completion, the red indicator will be on. During the running process, pressing the START/PAUSE key will suspend the current operation, indicated by the green indicator blinking. Pressing the START/PAUSE key again to resume the paused process. To terminate the process entirely, press the STOP key ▢, reset the process parameters, and the red indicator light turns on.

If the push block encounters the limit block or is obstructed by external force mid-process, the syringe pump will trigger an alarm, with the red light flashing. Press the START/PAUSE key to disarm the alarm and resume the process, or press the STOP key to end it.

6.5.5 Save and Recall Settings

- Save settings

Set the work mode on the main screen, then press [Formula] to proceed to the quick setting interface.

Recipe selection

Mode： Withdraw/Infuse

No.1

Volume：	1.000mL
Withdraw Rate：	1.000mL/min
Infuse Rate：	1.000mL/min

No.2

No.3

OK

Figure 28. Quick Settings

Settings can be saved to one of the three slots, with the system initialized to the No. 1 by default. After choosing a slot, proceed to configure the settings for liquid volume and flow rate. Once the desired parameters are set, click OK to save this group of data. Repeat these steps for the second and third groups for convenient storage and retrieval of settings as needed.

- Recall settings

Press [Formula] to access the Quick Settings interface to choose settings saved in a group slot, and then press "OK" to return to the

main screen. The settings on the main screen will be updated accordingly.

6.6 Flow Rate Calibration

To calibrate the flow rate:
1) Install a syringe and prepare a suitable balance or measuring cylinder and measuring cup.
2) On the main screen, select" Custom" syringe, and enter the Inner diameter and syringe volume capacity.
3) When the drive is not running, press the fast backward key

   ◁◁ to fill the syringe with fluid.

4) Press ⚙ System to enter System Setting, and press "Calibrate" to access the calibration wizard.

Figure 29. System setting

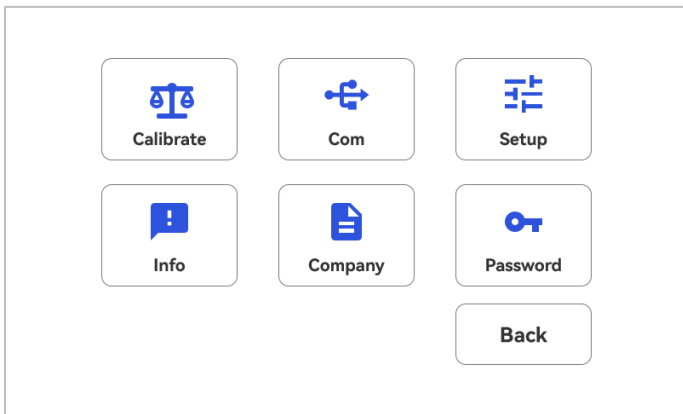5) Flow rate and volume are shown in the calibration wizard interface. Flow rate is the expected speed, and volume is the testing volume. Press the number to change the value if necessary. Press "Next" to enter the test window or press "Back" to return to the system setting window.

Note: To ensure the test accuracy, the liquid volume value should not be less than the value recommended by the system.
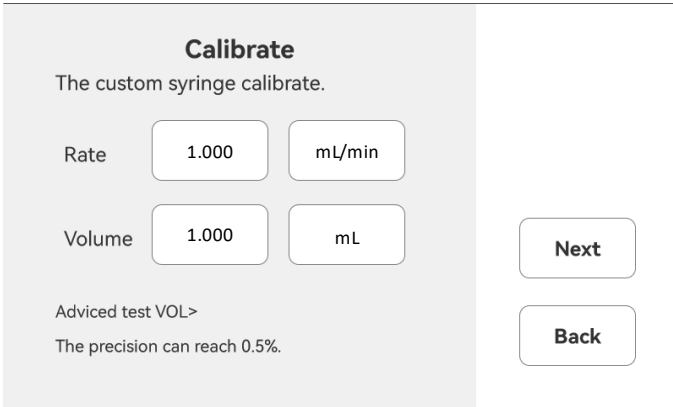
Figure 30. Flow rate calibration

6) The calibration test interface is shown below.
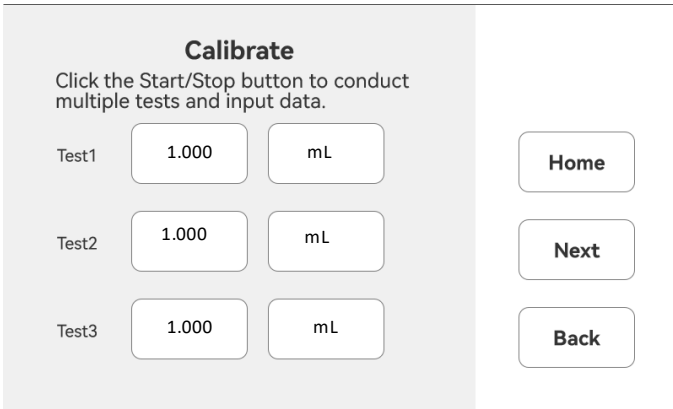
Figure 31. Calibration

First, make sure the syringe is filled with liquid. Press the START/

PAUSE key▶❚❚, the syringe pump will start injecting fluid. Wait for

the pump to stop, measure the volume of the transferred fluid with a measuring cylinder, and enter the result value under Test 1 on the screen. Repeat the above steps two more times (optional), and enter the result value for Test 2 and Test 3. Make sure the unit is correct. Press "Next" to enter the" Analyse and calculate" interface.

To modify the desired flow rate and test volume, press "Back" to re-

enter values, and input the results into the system. Press "Home" to exit the calibration wizard and return to the system setting interface. Press the STOP key to stop a test at any time and press the START/PAUSE key to resume the test.

7) The system will automatically compute the average value, calculate the correction coefficient, and display the reference of the original coefficient. Press "OK" to save the data. Press "Back" to cancel the test and return to the system setting interface.
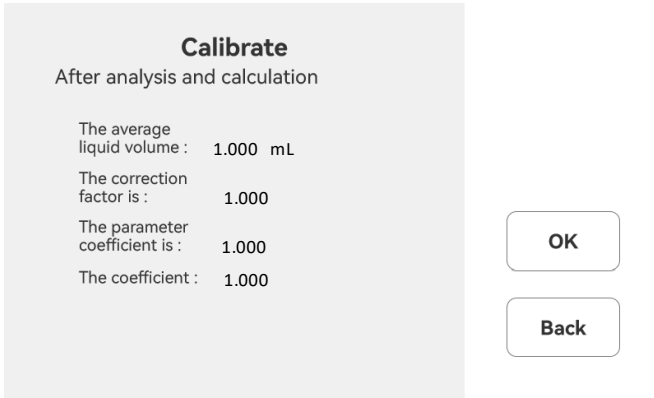
Figure 32. Analyze and calculate

If no result data is entered, the window below will appear. Press "Back" to redo the test.
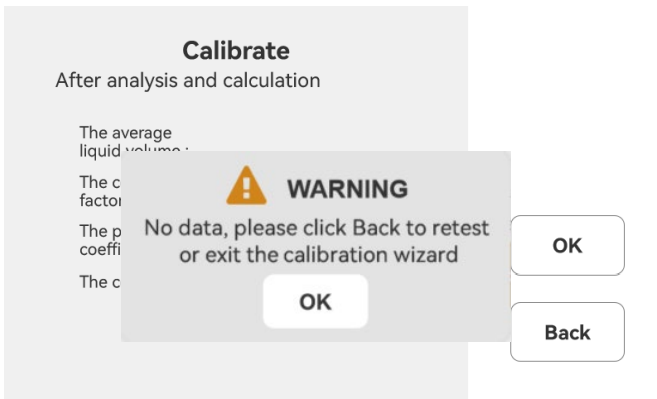
Figure 33. No date entered

6.7 External Control Mode

Follow the steps below to use an external signal to control the pump.

1) Switch the power off. Wire the DB15 connector as shown below and connect it to the DB15 port on the rear of the pump.

Figure 34. DB15 wiring with external 24VDC power source

Figure 35. DB15 wiring with internal 24VDC power source

2) Power on to display the main screen.
3) When the work mode is Infuse Only, Withdraw Only, Withdraw/Infuse, or Infuse/Withdraw, close then open the external RS_IN switch, the pump will run. Repeat the process

to stop the pump.

4) In Continuity work mode:

- Pulse Signal Control: close and then open the external RS_IN switch to start the pump. Repeat the process to stop the pump.
- Level Signal Control: close the external RS_IN switch to start the pump. Open the RS_W switch to stop the pump.
- Open the external CW_IN switch for infusion. Close the external CW_IN switch for withdrawal.

6.8 Footswitch Mode

1) Switch off the power. Wire the DB15 connector as shown below and connect it to the DB15 port on the rear of the drive.

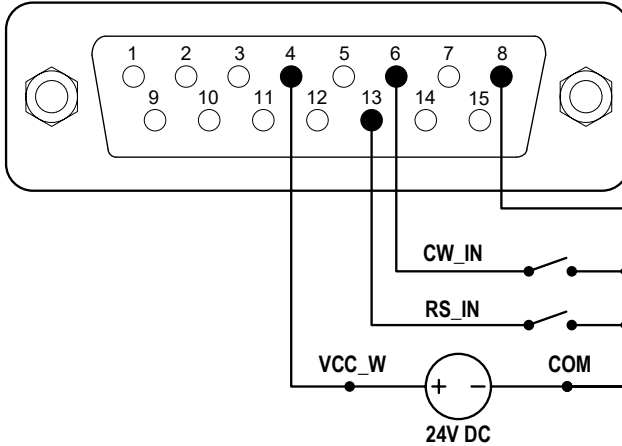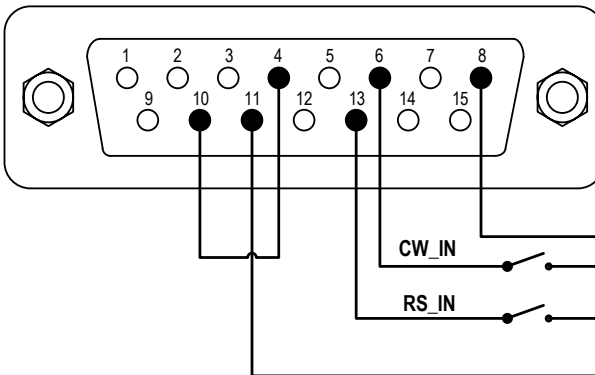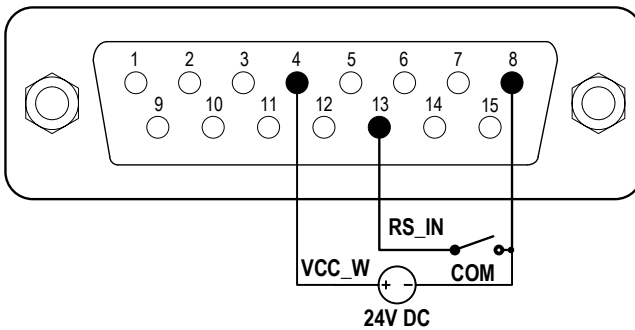*Figure 36. Control with external 24V DC power source*
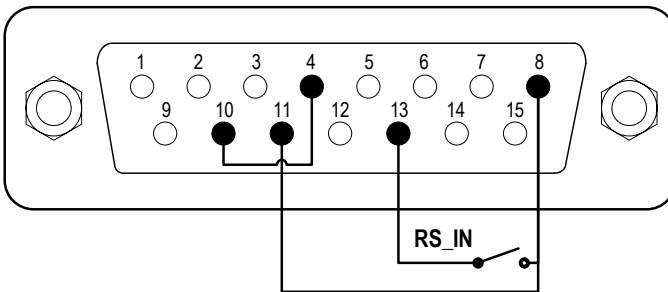
Figure 37. Control with internal 24V DC power source

2) Power on to display the main screen.
3) When the work mode is infuse only, withdraw only, Withdraw/Infuse or Infuse/Withdraw, close and then open the external RS_IN switch to start the pump; close and then open the RS_IN switch again to stop the pump.
4) In Continuity work mode:
   - Pulse Signal Control: close and then open the external RS_IN switch to start the pump. Repeat the process to stop the pump.
   - Level Signal Control: close the external RS_IN switch to start the pump. Open the RS_W switch to stop the pump.
   - Open the external CW_IN switch for infusion. Close the external CW_IN switch for withdrawal.

6.9 Communication Mode

The RS485 interface supports the standard MODBUS protocol. The pump can communicate with external devices via the communication port. Please refer to the Communication Instruction manual for the parameters and supported commands.

To work in communication mode
1) Switch off the power. Wire the DB15 connector as shown below and connect it to the DB15 port on the rear of the pump. An external DC power source is recommended to avoid electrical interference.
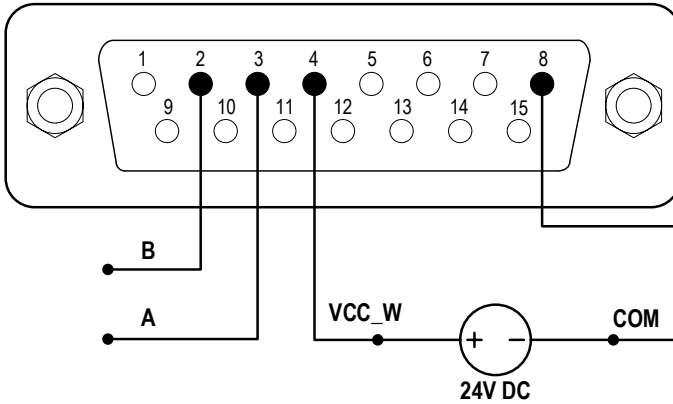
Figure 38. RS485 MODBUS wiring with external 24V DC Power Source
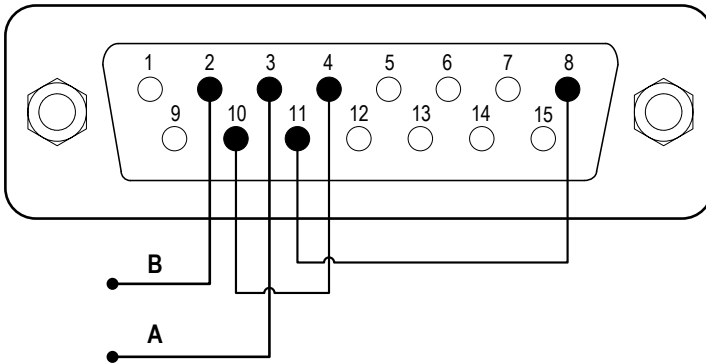

Figure 39. RS485 MODBUS wiring with internal 24V DC power source

2) Turn on the power to display the main screen.

3) When ⟨↻⟩ is displayed on the main screen, the communication

is connected. The communication is disconnected when ⟨↻⟩ is
displayed.

4) Control the pump with the communication interface.

7 Maintenance

7.1 Warranty

The product comes with a 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) Check the push block and the lead screw regularly, and apply bearing grease when necessary.
2) Do not use water to wash the pump. Keep the pump dry.
3) Do not use chemical solvents to clean the case.

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 drive. 4. Check the wire connection between the LCD and the main control board.
2	Hardware	Motor does not work	1. Check the wire connection between the motor and the drive board. 2. Check the power voltage for the drive.
3	Hardware	Motor vibrates	1. Check the wire connection between the motor and the drive 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 the keypad and the main board. 2. Check if the key is damaged.
6	Hardware	External control does not work	1. Check the wiring of the connector. 2. Check if the external control power voltage is provided. 3. Check the connections of the external control board.
7	Hardware	RS485 com does not work	1. Check the wiring of the connector. 2. Check if the external control power voltage is provided. 3. Check the connections of the communication board.
8	Hardware	Noisy when running	Check the wire connection between the motor and the main board.
9	Software	Touch screen does not work	Press and hold the FAST FORWARD and FAST BACKWARD buttons at the same time, then power on the drive to calibrate the screen.
10	Software	Flow rate not accurate	Calibrate the flow rate
11	Software	RS485 does not work properly	1. Check if the display shows that the communication is ready. 2. Reset the address of the drive.

			3. Check if two pumps on the bus utilizing the same address.

If a problem cannot be solved, please contact the manufacturer or distributor.

8 Dimensions
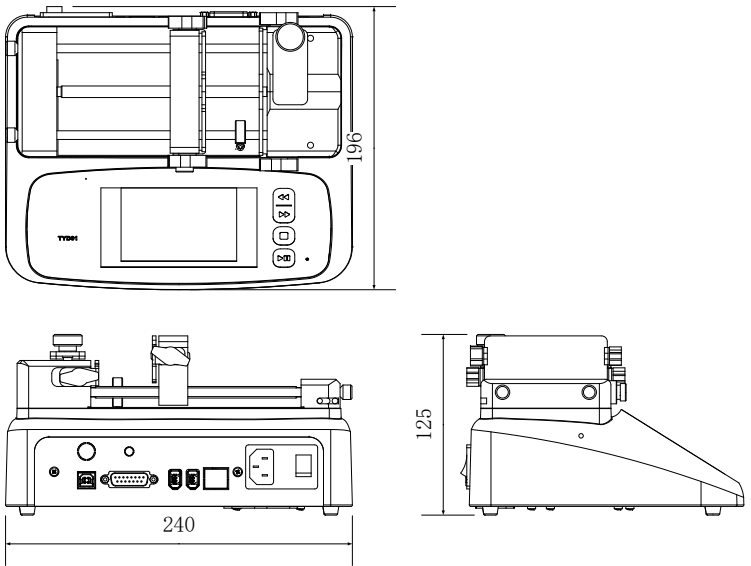
Figure 40. LAA-01 Dimensions (mm)
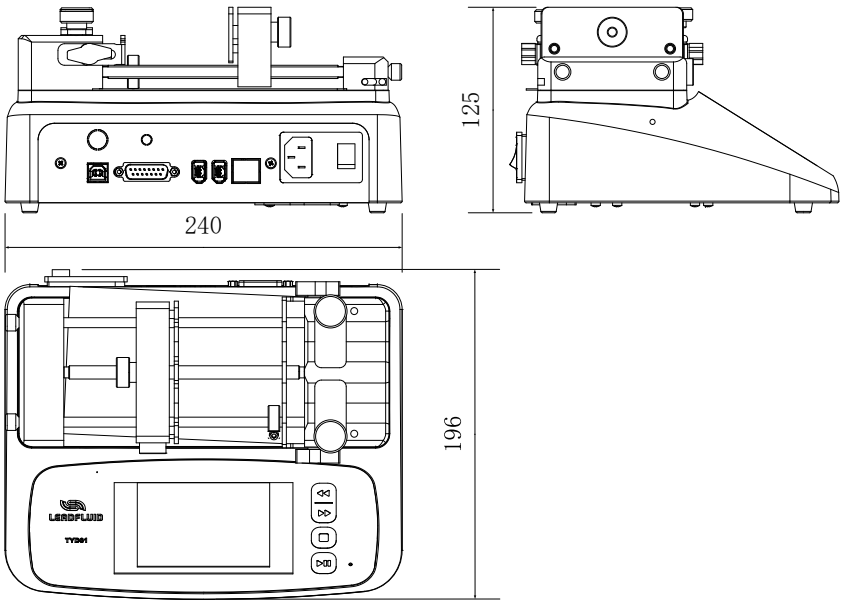
Figure 41. LAA-02 Dimensions (mm)

9 Naming Rule

| L | A | A | - | 01 |

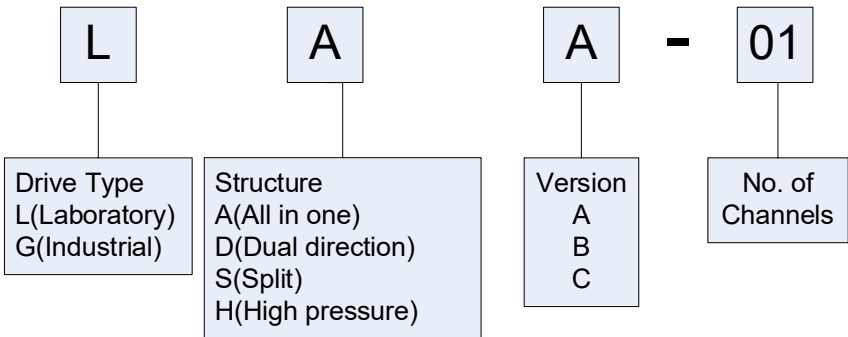| Drive Type | Structure | Version | No. of |
L(Laboratory)	A(All in one)	A	Channels
G(Industrial)	D(Dual direction)	B	
	S(Split)	C	
	H(High pressure)		

Figure 42. Naming Rule

10 Specifications

LAA-01: for one syringe
LAA-02: for one or two syringes

Syringe	10ul-60ml
Function	Infusion, withdrawal, infusion/withdrawal, with drawal/infusion, continuation mode. Built-in main brand syringes. Syringe protection and traffic jam alarm. Thrust adjustable
Communication	RS485 Modbus
Display	Color LCD touchscreen
External control	External signal control start-stop and direction. Direction status signal output.

Flow rate	0.184nl/min(10ul) - 83.318ml/min(60ml)
Linear speed	1um/min - 150mm/min
Linear travel accuracy	± 0.35% (when >30% of drive stroke)
Linear force	>16kgf, adjustable
Pusher advance per microstep	0.156um/ustep
Operation	touch screen + button
Display	5-inch high-resolution color LCD
Power supply	AC 100-240V 50Hz/60Hz
Wattage	<50W
Working environment	Temperature 5-40°C Relative humidity <80%
Dimension	240x196x125mm
Weight	2.95 kg

11 Flow rate table

Size	ID	Min flow rate	Unit	Max flow rate	unit
0.5ul	0.103mm	8.000	pl/min	1.249	ul/min
1ul	0.146mm	16.000	pl/min	2.511	ul/min
2ul	0.206mm	33.000	pl/min	4.999	ul/min
5ul	0.343mm	83.000	pl/min	12.497	ul/min
10ul	0.485mm	184.00	pl/min	27.711	ul/min
25ul	0.729mm	417.00	pl/min	62.608	ul/min
50ul	1.03mm	833.00	pl/min	124.984	ul/min
100ul	1.457mm	1.667	nl/min	250.092	ul/min
250ul	2.304mm	4.169	nl/min	625.383	ul/min
500ul	3.256mm	8.326	nl/min	1.248	ml/min
1000ul	4.608mm	16.676	nl/min	2.501	ml/min
1ml	4.699mm	17.342	nl/min	2.601	ml/min
3ml	8.585mm	57.885	nl/min	8.682	ml/min
5ml	11.989mm	112.890	nl/min	16.933	ml/min
10ml	14.427mm	163.469	nl/min	24.520	ml/min
20ml	19.05mm	285.027	nl/min	42.754	ml/min
30ml	21.59mm	366.090	nl/min	54.913	ml/min
50ml	26.594mm	555.459	nl/min	83.318	ml/min
60ml	26.594mm	555.459	nl/min	83.318	ml/min