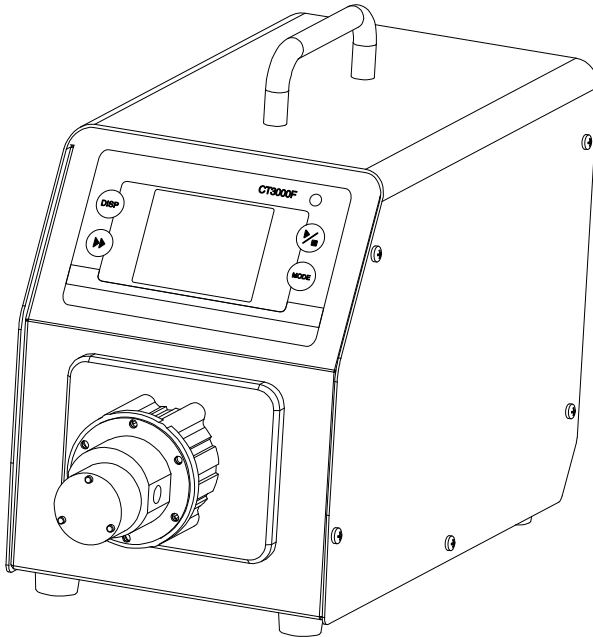




# CT3000F Intelligent Dispensing Gear Pump

## Operating Manual



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## Safety Precautions



### Danger

- Please use the correct AC power voltage source shown on the sticker attached to the equipment to avoid any damage. Please do not open the case. It may cause malfunction or electric shock. For maintenance, please contact the manufacturer or distributor directly.
- To install or remove the pump head, please first turn off the power supply. Handle the flange of the pump head carefully and refrain from using pliers to clamp it, as this may cause inner core displacement or even permanent damage to the pump.



### Warning

- Tubing breakage may result in fluid being spayed from the pump. Take appropriate measures to protect the operator and equipment.
- Always remove power from the pump before attempting any maintenance or cleaning operation.
- Remove power from the pump before connecting or disconnecting the external control device or communication interface.
- The pump is equipped with a grounded plug, and it must remain well-grounded at all times.
- This product is not designed for, nor intended for use in patient-connected applications, including, but not limited to, medical and dental use.
- Avoid any foreign bodies, including sealant or Teflon tape, from entering the pump when sealing the tubing. Only remove the two covers on the pump head when installing a connector or tubing.
- It is strongly recommended that when using the pump, especially for the inlet, the tubing size should correspond to the pump's

capacity to avoid cavitation caused by inadequate fluid leading to abnormal wear. Under no circumstances should the pressure between the inlet and outlet exceed 20 bar / 290 psi.

- It is strongly recommended to add a filter to the pump's inlet to filter out particles larger than 10 um to prevent abnormal wear and tear of internal components. Ensure the filter surface area is large enough to avoid pressure loss in the loop. Regularly check the filter to ensure it functions effectively. If a vacuum gauge is installed after the filter, and the vacuum increases by more than 0.1 bar, clean or replace the filter.
- The gear pump can only transfer liquid in one direction.

## 1 Introduction

CT3000F is a high-performance, low-noise micro gear pump, providing a speed range from 50 to 3000 rpm, with a 1 rpm resolution. Its brushless servo motor and stainless-steel magnetic drive pump head enable the continuous and smooth transfer of fluids. The color LCD touch screen offers an intuitive and clear display, while the various working modes make it suitable for a wide variety of uses. Equipped with a standard MODBUS RS485 interface, the pump can be easily controlled by external devices, such as computers, human-machine interfaces, or PLCs.

## 2 Functions and Features

- Compatible with variable pump heads
- Suitable for high-viscous and high-pressure liquid transfer
- Minimal pulsation and low noise operation
- Magnetic coupling drive, easy maintenance
- Brushless servo drive, high efficiency, maintenance free
- Color LCD display, touch screen
- Displays and controls flow rate
- Multiple working modes
- Includes a flow calibration wizard for accuracy
- Intelligent temperature control

- External signal controls start/stop/dispensing; external analog signal adjusts speed
- RS485 MODBUS communications interface
- Stainless steel case

### 3 Specifications

Pump Head	MS204, MS209, MS213 (PEEK gear material)
Communication	RS485, supports Modbus communication protocol
Display	Color LCD display
Flow Range	15-2700 mL/min
Speed Range	50-3000 rpm/min
Speed Resolution	1rpm
Liquid Viscosity	≤200cSt
Particle Size	≤10um
Operation	Keypad and touchscreen
Control Mode	Flow Mode, Time Dispense, Volume Dispense, Copy Dispense
Display Mode	Color LCD
External Control	5V (12V/24V optional) to control Start/Stop 0-5V (0-10V,4-20mA optional) to control speed
Power Supply	AC 100-240V, 50Hz/60Hz
Consumption	<150W
Working Environment	Temperature 0-40°C, humidity <80%
Dimensions (LxWxH)	320x150x237mm (12.6x5.9x9.3inch)
Drive Weight	5.5kg (12.1lbs)
P Standard	IP31

## 4 Components and Connectors

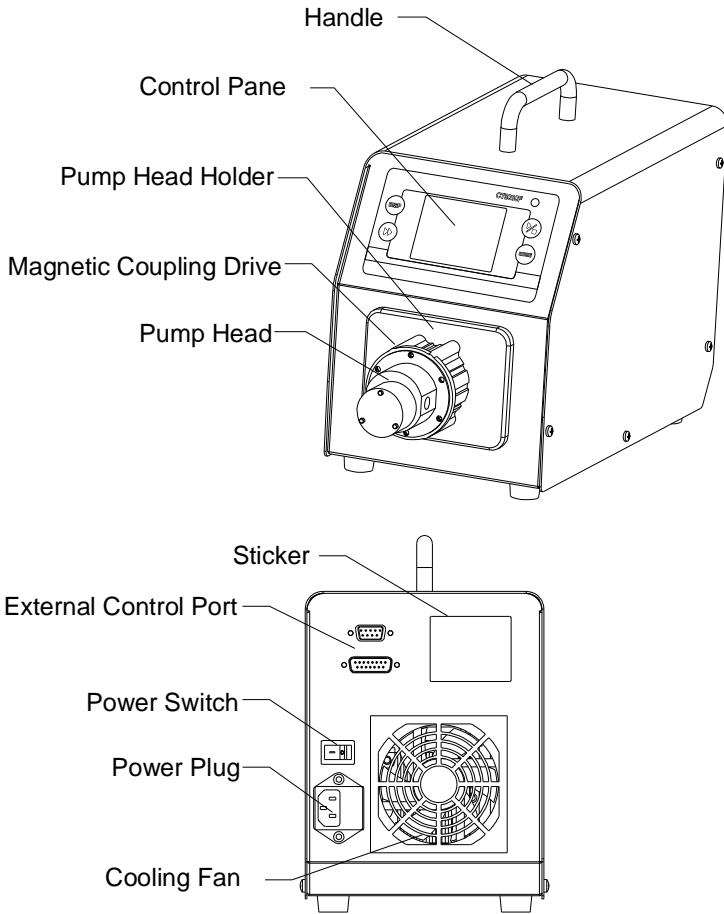


Figure 1. Components and Connectors

## 5 Display Panel and Operating Keypads

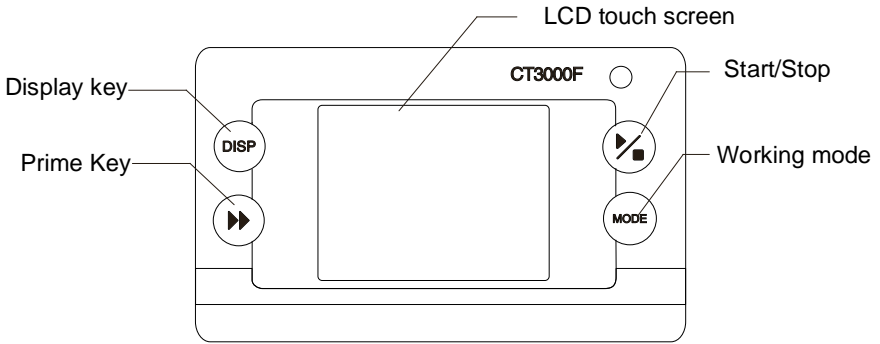


Figure 2. Display Panel

### 5.1 Keypad



START/STOP Key. Press to start or stop the drive.



DISPLAY Key. Use to switch the display mode.



PRIME Key. Press to operate the pump at the maximum allowable speed. Press again to return to the previous state.



MODE key. When the drive is not running, use this key to change the working mode.

## 5.2 LCD Touch Screen Display

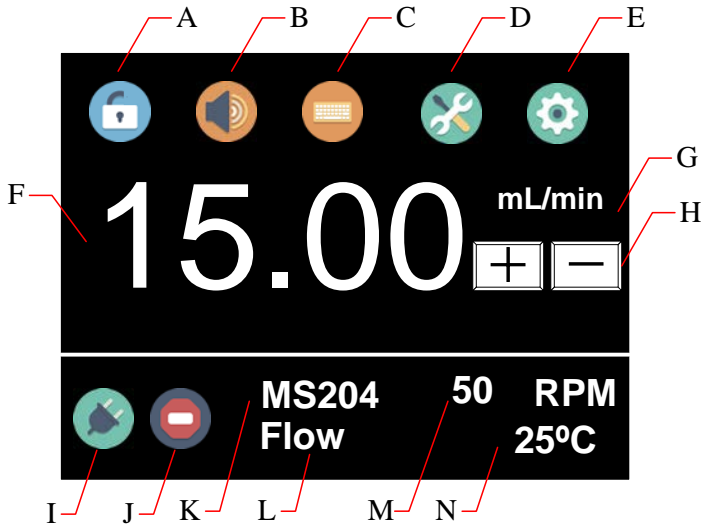



Figure 3. Main Display Screen

### 5.2.1 A - Keypad Lock

Press the icon  to lock/unlock the keypad. When the keyboard is locked, a user cannot modify the control mode and system parameters. A Password can be set to unlock the keypad, preventing accidental changes to the system parameters.



Keypad locked



Keypad unlocked

Figure 4. Keypad Lock



### 5.2.2 B - Tone Button

Press the icon to turn on/off the key tone.



Tone on



Tone off

Figure 5. Key Tone

### 5.2.3 C - Control Mode

Press the icon to access the **Control Mode** window, where you can choose from four available control modes as shown below:

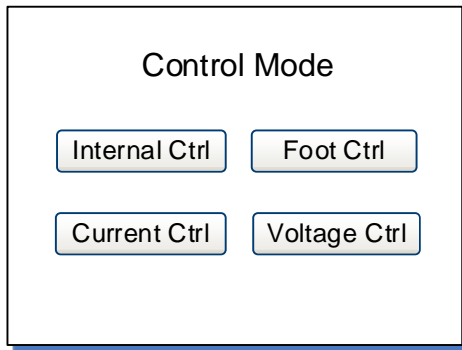


Figure 6. Control Mode

- **Internal Ctrl** - Internal Control Mode. Operate the pump using the keypad and touch screen.
- **Foot Ctrl** - Footswitch Control Mode. Footswitch controls start/stop, while utilizing the keypad and touch screen for other operations.
- **Current Ctrl** - Current Control Mode. An external 4-20mA analog current signal controls the rotating speed, and a logic level signal controls start/stop. The keypad is disabled in this mode.
- **Voltage Ctrl** - Voltage Control Mode. An external 0-5V or 0-10V analog voltage signal controls the rotating speed, and a logic

level signal controls start/stop. The keypad is disabled in this mode.



Internal Control  
Mode



Footswitch  
Control Mode



Current Control  
Mode

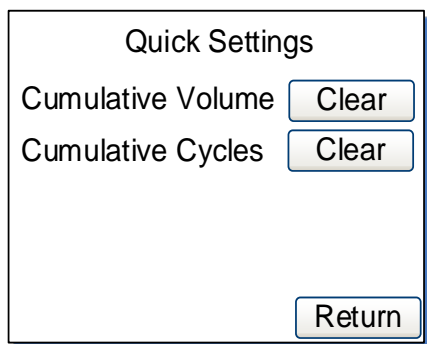


Voltage Control  
Mode

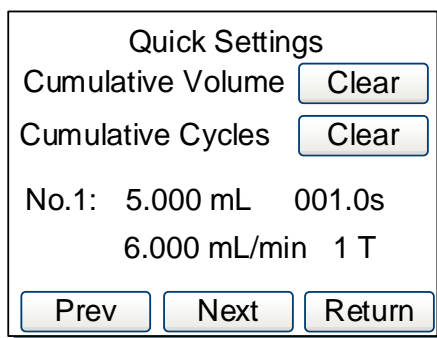
Figure 7. Control Mode Icon

#### 5.2.4 D - Quick Settings

Press the icon to access the quick setting interface to reset the accumulated liquid volume and the time. Under the fluid volume dispense mode, time dispense mode and copy dispense mode, there are five groups of preset data. Use the **Prev** key and **Next** key to select the desired group. The settings displayed on the main screen will adjust accordingly.



Flow Mode



Other Modes

Figure 8. Quick Settings

#### 5.2.5 E - System Settings

Press this icon to access the System Settings menu and change the parameters shown on the screen.

## 5.2.6 F - Flow Rate Setting

It displays the current flow rate setting. When the drive is not running, press it to input the desired value in the pop-up window. Please pay attention to the range of the value and flow rate unit.

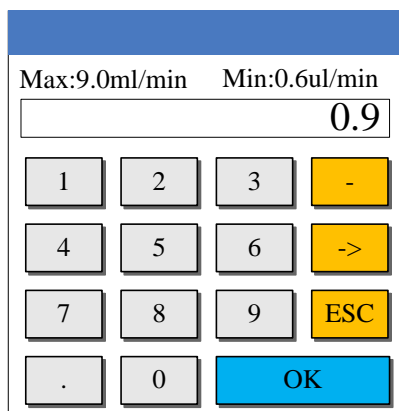




Figure 9. Flow Rate Setting

## 5.2.7 G - Flow Rate Unit

It shows the current flow rate unit, mL/min.

## 5.2.8 H - Fine Adjustment Button

When the drive is running, utilize the fine adjustment button to adjust the flow rate in real time. Briefly press the  button or  button to increase or decrease the flow rate. Hold down the buttons for rapid value adjustment.

## 5.2.9 I - Communication State

It displays the current state of RS485 communication.



Communication  
connected



Communication  
disconnected

Figure 10. Communication State

### 5.2.10 J - Running state

It shows the current operational status. When the drive is not running, the following icon will be displayed.



*Figure 11. Drive Stopped*

Upon initiation of the drive, the icon transforms into an animated illustration as depicted below:



*Figure 12. Running Animation*

### 5.2.11 K - Pump Head Model

It shows the current configured pump head model. For instance, "MS204" denotes the MS204 pump head.

### 5.2.12 L - Working Mode

It shows the current working mode, such as **Flow** Mode, **Volume** Dispense Mode, **Time** Dispense Mode, or **Copy** Dispense Mode.

### 5.2.13 M - Speed or Cumulative Cycles

It shows the current speed or cumulative dispense cycles, switchable by pressing the **MODE** key. In the event that the speed exceeds the maximum allowable speed, it will display **U\_Overflow**. Conversely, if the speed falls below the minimum allowable speed, it will display **D\_Overflow**. The cumulative cycles can be reset within the Quick Settings menu.

### 5.2.14 N - Internal Temperature or Cumulative Volume

It shows the internal temperature of the drive or cumulative volume that the pump has delivered. The cumulative volume can be reset within the Quick Settings menu.

## 5.3 System Settings


When the drive is not running, press the icon  to access the System Settings menu.



Figure 13. System Settings

### 5.3.1 Setup

Configure the general parameters as shown below.

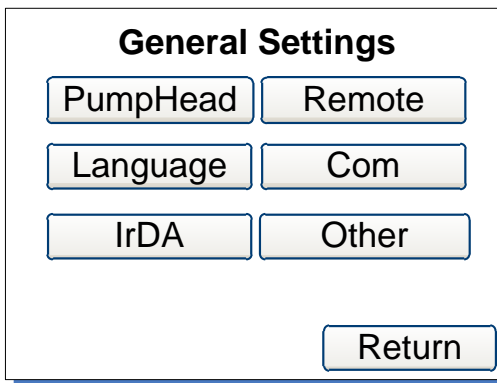


Figure 14. General Settings

- **PumpHead** - Choose the model of the installed pump head.

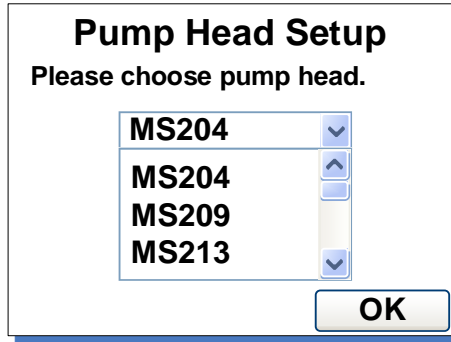


Figure 15. Pump Head Select

- **Language** - Choose the display language as English only.
- **IrDA** - Activate or deactivate the infrared control function.

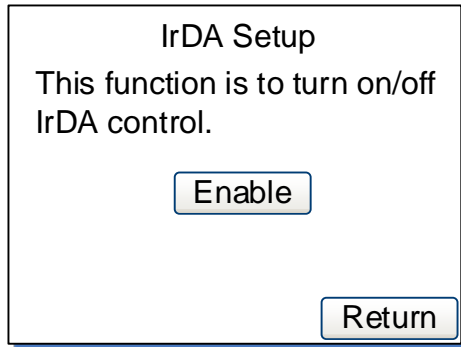


Figure 16. IrDA Setup

- **Remote**

This setting enables the external control mode, which includes the options of Logic Level control mode or Pulse control mode. When set to Logic Level, the pump's state will change upon closure or opening of an external switch. This mode is intended for use with a maintained switch. When set to Pulse, the pump's state will change upon the switch being closed and then opened again. This mode is designed for use with a normally open momentary switch.

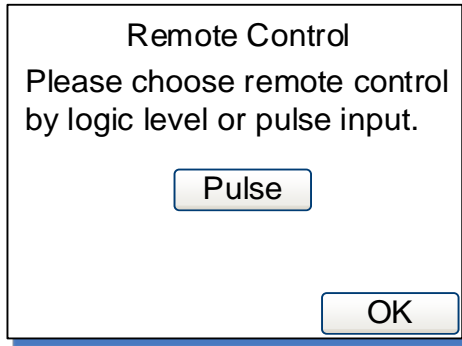


Figure 17. Remote Control Mode

- **Com**

This setting pertains to RS485 MODBUS communication and includes parameters such as baud rate, transmission mode, and pump address. To modify the address, click on the address number displayed on the screen, then input the desired value in the pop-up window. Restart the pump to apply the modified settings..

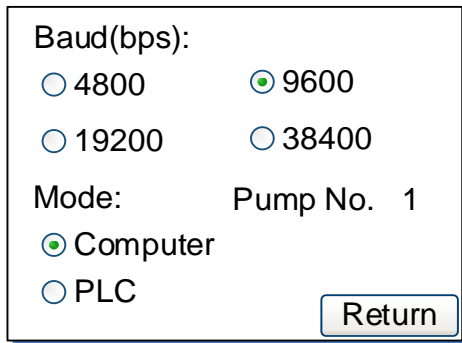


Figure 18. Communication Settings

- **Other**

Set up the acceleration time of the drive to start from 0 to the maximum speed.

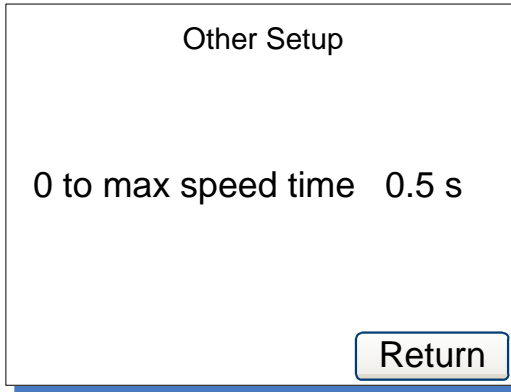


Figure 19. Anti-Drip Settings

### 5.3.2 Calibrate

Ensure accurate display of the current flow rate/volume by conducting the Flow Rate Calibration.

**Note:** Calibration is necessary for precise flow rate display.

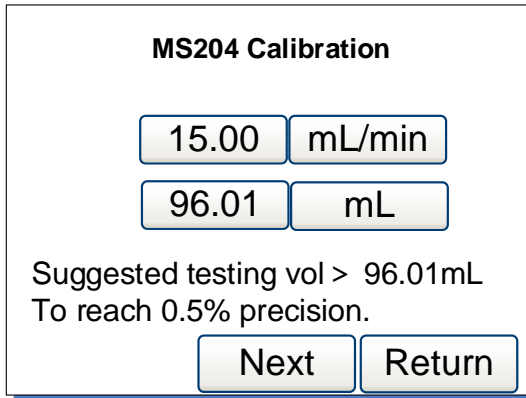
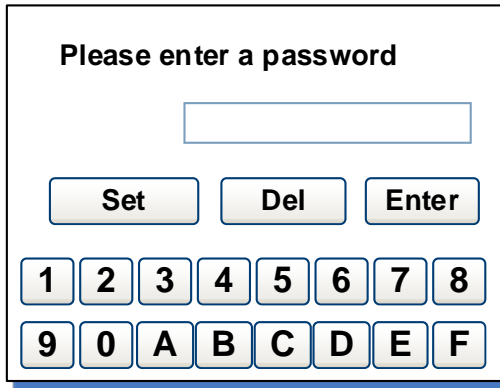


Figure 20. Flow Rate Calibration

### 5.3.3 Password

This function enables the setup of a password to secure the keypad and prevent accidental parameter changes. The default password is empty.



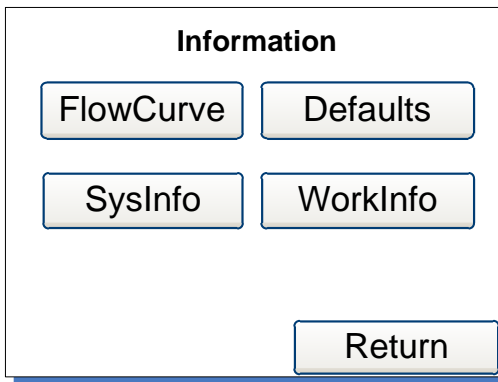


The image shows a password entry screen. At the top, it says "Please enter a password". Below this is a rectangular input field. Underneath the input field are three buttons: "Set", "Del", and "Enter". Below these buttons is a numeric keypad with buttons for digits 1 through 8 in the first row, and 9, 0, A, B, C, D, E, F in the second row.

Figure 21. Password

### 5.3.4 Info

This section provides comprehensive information about the pump.



The image shows an "Information" menu screen. At the top, it says "Information". Below this are four buttons arranged in a 2x2 grid: "FlowCurve", "Defaults", "SysInfo", and "WorkInfo". At the bottom right of the screen is a "Return" button.

Figure 22. Information

- **Flowcurve** - To show the flow curve of the pump head (not currently applied).
- **SysInfo** - Provides details such as software version, memory size, operating temperature, etc.

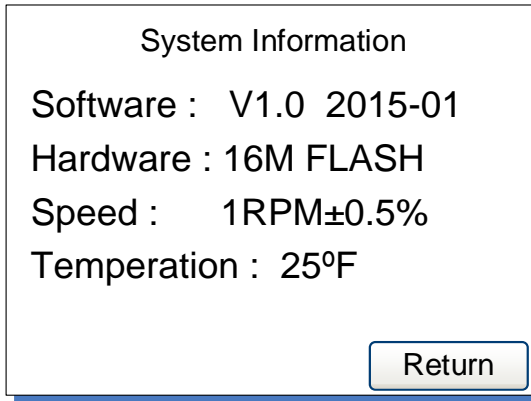




Figure 23. System Information

- **Defaults**

This feature resets the pump to its factory settings. Restart the pump to apply the new settings. Additionally, the system can be restored to its factory settings by simultaneously pressing the  and  when powering on the pump, then releasing the keys after the beep.

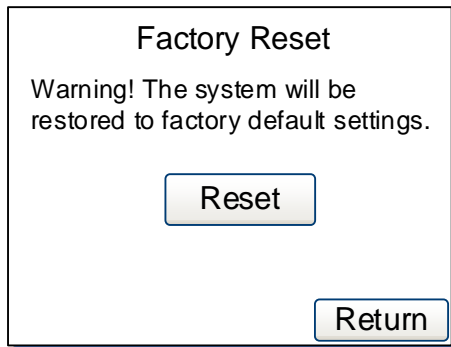


Figure 24. Factory Reset

- **Workinfo**

It shows essential information including the total power-on time, running time, and power cycles.

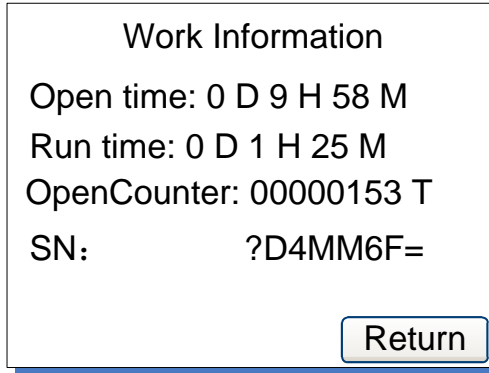
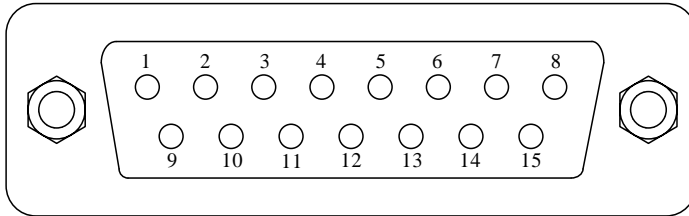


Figure 25. Work Information

### 5.3.5 Return

To return to the main display screen.

## 6 External Control Interface



DB15	Mark	Note
1	ADC_W	Positive of external analog input
2	B	Communication interface, B pole of RS485
3	A	Communication interface, A pole of RS485
4	VCC_W	External DC power input
5	DAC	Analog voltage signal output
6		
7		
8	COM	Ground of external power
9	AGND	Negative of analog signal input

10	+12V	Positive of internal +12V power source
11	GND	Ground of Internal power source
12		
13	RS_W	External start/stop signal input
14		
15	RS	Start/stop signal output

## 7 Operation Instructions

### 7.1 Before Operation

- 1) Please check the packing slip to verify that everything is intact and undamaged in the package. If there are any issues, please reach out to the manufacturer or distributor for assistance.
- 2) Carefully read through the provided instructions to familiarize yourself with the setup and operation process.
- 3) Allow for at least 200 mm of space behind the pump during operation to ensure proper ventilation.

### 7.2 Power Connection

Before connecting the power, ensure that the voltage requirements specified on the pump's sticker are met. Follow these steps:

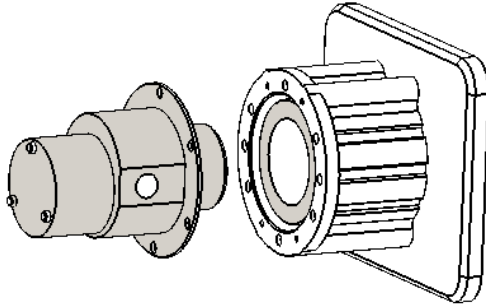
Connect the power cord to the rear power connector of the pump. Insert the opposite end of the power cord into an appropriate electrical outlet. Activate the power by using the switch located at the rear of the pump. pump.

### 7.3 Install pump head and tubing

#### 7.3.1 Install pump head

- 1) Place the pump head into the designated pump head holder, ensuring that the entrance remains horizontal.
- 2) Align the pump head with the bracket's mounting holes. Secure the pump head onto the bracket using the provided M3x8 mm

stainless steel screws and nuts.

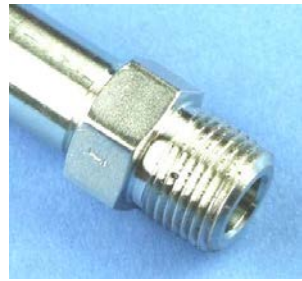


### 7.3.2 Install tubing

- 1) Attach 1/8NPT threaded stainless steel or plastic joints onto the pump head. Ensure the threads are undamaged and free from any residue.



Good

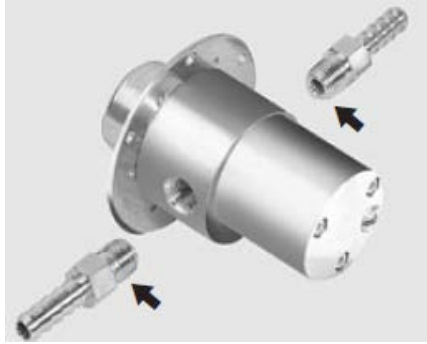


Defective

- 2) Wrap two layers of Teflon tape clockwise around the threads, ensuring the tape does not enter the inner part of the pump.



- Using a torque wrench, carefully tighten the nut on the pump. Avoid applying excessive force that could potentially strip the threads .



## 7.4 First Run Wizard

When using the pump for the first time or following a factory reset, the system will display a welcome screen. Proceed by selecting the appropriate model number of the installed pump head. The system will then guide you through the pump head selection, working mode setting, and calibration in sequence. You can customize the parameters and operation mode based on your specific requirements. The entered information will be saved, and you will only need to complete the wizard once.

<p>Welcome to use First Run wizard. Please check the user manual for details if you have any questions.</p> <p><input type="button" value="continue"/></p>	<p><b>Pump Head Setup</b> Choose pump head</p> <table border="1"><tr><td>MS204</td><td>▼</td></tr><tr><td>MS204</td><td>▲</td></tr><tr><td>MS209</td><td>▲</td></tr><tr><td>MS213</td><td>▼</td></tr></table> <p><input type="button" value="OK"/></p>	MS204	▼	MS204	▲	MS209	▲	MS213	▼
MS204	▼								
MS204	▲								
MS209	▲								
MS213	▼								

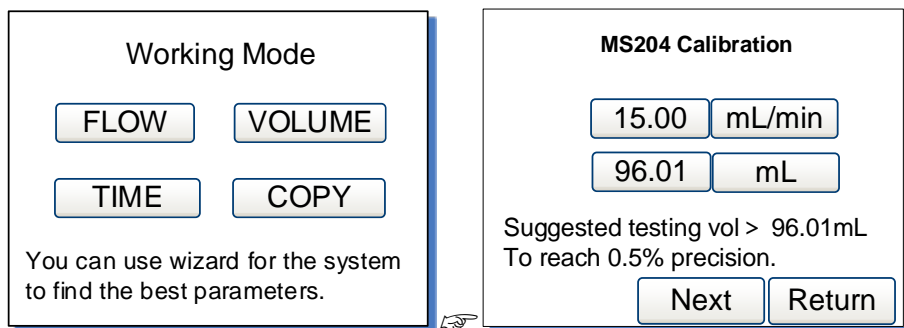


Figure 26. First Run Wizard

## 7.5 Flow Rate Calibration

The calibration is necessary under the following circumstances:

- First-time pump usage
- Pump head replacement
- Fluid transfer in a single channel with dual pump heads
- Reinstallation of tubing
- Prolonged continuous operation

### Calibration Steps



- 1) Install the pump head and tubing.
- 2) In the *General Settings* window, set the model number of the installed pump head.
- 3) When pump shows the *Main Display Screen*, press PRIME  to initiate pump priming.
- 4) When the pump is not running, press the System Settings icon , then select Calibrate.



Figure 27. System Settings

- 5) In the calibration wizard window, it shows the current pump head, the desired flow rate and the suggested testing volume.

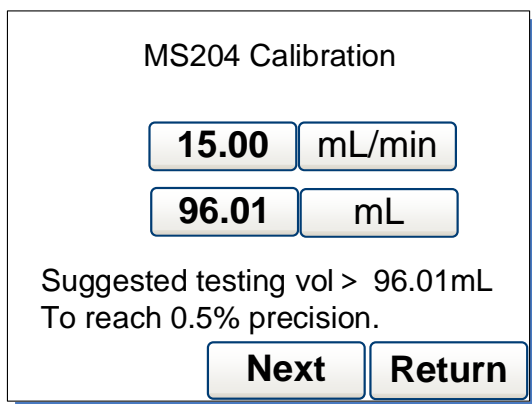


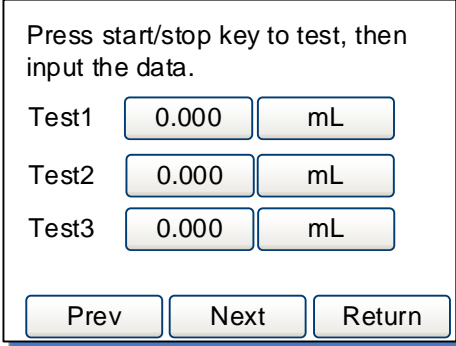
Figure 28. Flow Rate Calibration

The displayed values are as follows: the desired flow rate is 15.00 ml/min, and the suggested test volume is 96.01 ml. You can directly modify the values or units by pressing the corresponding button. Select the '**Next**' button to proceed to the calibration window, or choose the '**Return**' button to exit the wizard and return to the System Settings window.



**Note:** Ensure that the liquid volume is not less than the suggested value.

6) Test window as shown below.



Press start/stop key to test, then input the data.

Test1	0.000	mL
Test2	0.000	mL
Test3	0.000	mL

Prev      Next      Return

*Figure 29. Calibration*

Ensure that the tubing is filled with liquid, then press **START/STOP** key to initiate fluid transfer. Allow the pump to complete the dispensing process, and measure the delivered volume accurately. Repeat the steps a few more times and input the results of Test1, Test2, and Test3 into the calibration window, ensuring the correct units are used. Press **Next** to proceed to the **Analyze and Calculate** window.

If adjustments are required for the desired flow rate and volume to test, press **Prev** to re-enter the values. Input the test results into the system. The system will disregard any results of 0 and solely utilize the results you input to calculate the appropriate speed for the desired flow rate.

**Note:** Use the **START/STOP** key to halt the test immediately in case of any accidents during the test.

7) The system calculates the corrected testing scale, and the previous scale is displayed on the screen for reference.

Analyze and Calculate		
Average Vol	97.0	mL
Cal scale	6.400000	
Re scale	6.400000	
Old scale	6.400000	

Prev      Return      OK

Figure 30. Analyze and Calculate

The scale represents a coefficient for the tubing. The calculated scale should be close to the reference scale (the “Re scale” shown on [Figure 30](#)). Otherwise, please verify the following and press **Prev** to redo the test.

- The accuracy of the volume measurement
- The volume unit settings
- The pump head model settings

If no issues are identified, press the **OK** button to save the new value. The pump will automatically adjust the speed based on the calculated scale. Alternatively, press 'Return' to exit without saving the new value and return to the System Settings window.

If no data has been input into the system, the window will display as shown below. Press 'Prev' to redo the test, or simply press 'Return'.

Analyze and Calculate	
No data. Please go back to re-enter the data or return to the main menu.	

Prev      Return

Figure 31. No Input Data

## 7.6 Working Mode

When the drive is not running, press the MODE key to enter the Working Mode window as shown below.

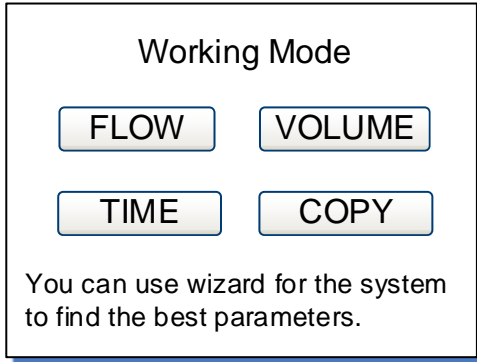


Figure 32. Working Mode

- **FLOW - Flow Mode**

In this mode, the pump operates based on the designated flow rate and records the cumulative fluid volume.

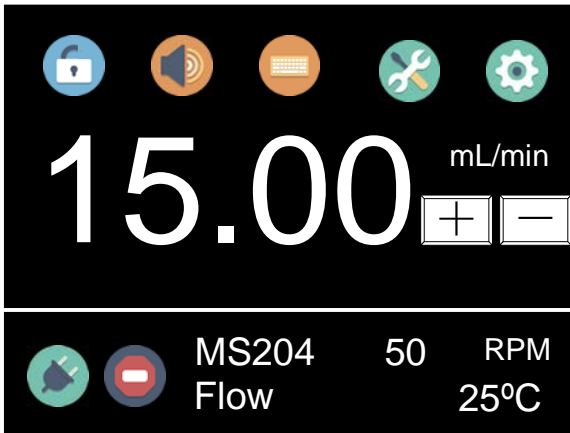


Figure 33. Flow Mode

- **VOL - Volume Dispense Mode**

In this mode, the pump dispenses the specified volume for each dose, along with the lag time between doses and the total number of cycles. The system automatically calculates the duration for each

dose.



Figure 34. Volume Dispense Mode

A - Dispense volume for each dose in units of uL, mL or L.

B - Dispense flow rate in mL/min.

C - Lag time, indicating the duration between consecutive doses.

D - Dispense cycles.

- Setting dispense cycles to 0 enables the drive to continue running until the START/STOP key is pressed.
- Setting dispense cycles to 1 allows the drive to operate a single time, rendering the lag time setting invalid.
- Setting dispense cycles to a value greater than 1 prompts the drive to operate for the specified number of cycles before stopping.

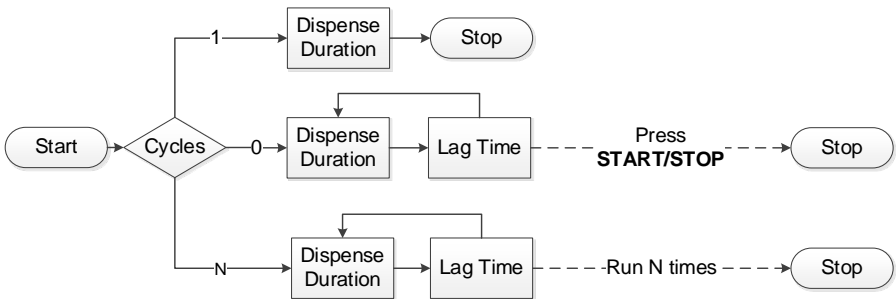


Figure 35. Dispense Cycles

E - Dispense duration for each dose. The system automatically calculates the dispensing duration based on the dispense volume and time.

### • TIME - Time Dispense Mode

In this mode, the pump dispenses by configuring the dispense duration for each dose, along with the lag time between doses and the total number of cycles. The system automatically calculates the dispense volume for each dose.



Figure 36. Time Dispense Mode

A - Dispense duration for each dose

B - Dispense flow rate in mL/min.

C - Lag time, indicating the duration between consecutive doses.

D - Dispense cycles.

- Setting dispense cycles to 0 enables the drive to continue running until the START/STOP key is pressed.
- Setting dispense cycles to 1 allows the drive to operate a single time, rendering the lag time setting invalid.
- Setting dispense cycles to a value greater than 1 prompts the drive to operate for the specified number of cycles before stopping.

E - Dispense volume for each dose. The system calculates the

dispense volume for each dose automatically based on the dispense duration and flow rate.

### • COPY - Copy Dispense Mode

In this mode, the pump dispenses by setting the total volume to be dispensed, along with the lag time between doses and the number of dispense cycles. The system automatically calculates the dispense volume for each dose.

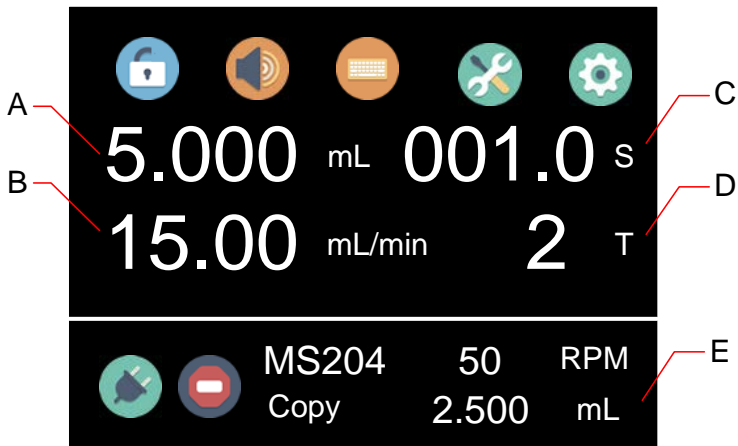


Figure 37. Copy Dispense Mode

A - Total dispense volume in units of  $\mu\text{L}$ , mL or L

B - Dispensing flow rate in mL/min

C - Lag time, indicating the duration between consecutive doses.

D - Dispense cycles.

- Setting dispense cycles to 0 enables the drive to continue running until the START/STOP key is pressed.
- Setting dispense cycles to 1 allows the drive to operate a single time, rendering the lag time setting invalid.
- Setting dispense cycles to a value greater than 1 prompts the drive to operate for the specified number of cycles before stopping.

E - Dispense volume for each dose. The system automatically calculates the dispense volume for each dose based on the total

dispense volume and the number of cycles.

## 7.7 External Control Mode

In this mode, the start/stop function is controlled by an external logic level signal, while the rotating speed is governed by an external analog signal. The keypad is disabled during this mode. The analog signal can be set to operate within the ranges of 0-5V, 0-10V, or 4-20mA, with the default signal set to 0-5V. To switch to 0-10V or 4-20mA, it is necessary to adjust the jump setting on the analog signal control board.

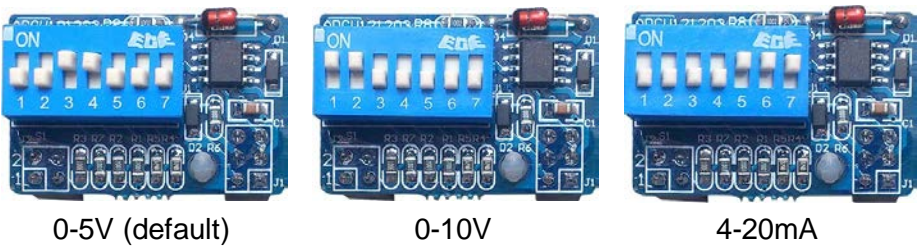


Figure 38. Analog Signal Control Board Setting

To control the pump using an external signal:

- 1) Power off the device. Wire the DB15 connector as shown in [Figure 39](#) or [Figure 40](#), and connect it to the DB15 port located at the rear of the pump.

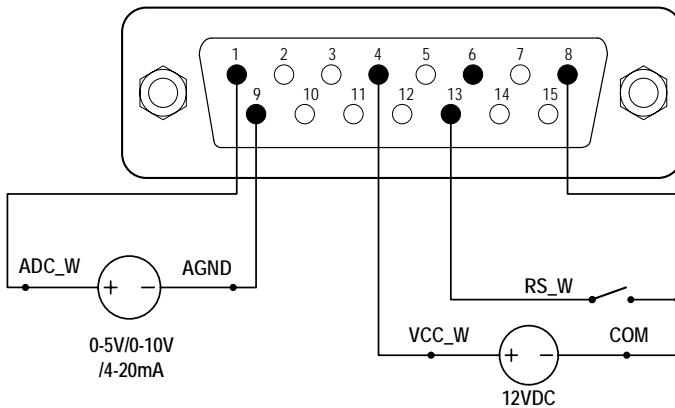


Figure 39. DB15 Wiring with External 12VDC Power Source

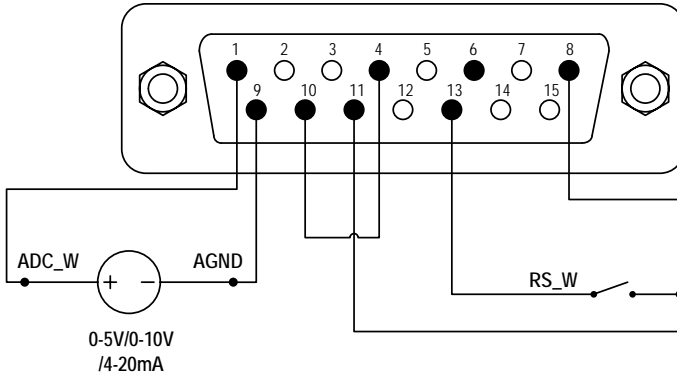





Figure 40. DB15 Wiring with Internal 12VDC Power Source

- 2) Power on the device. The pump's main screen will appear.
- 3) Press  to set the Control Mode to either voltage  or current .
- 4) Activate the external analog signal power source.
- 5) When the Remote Control Mode is set to Logic Level, close the external RS\_W switch to initiate the pump, and the speed will adjust based on the intensity of the analog input signal. Open the RS\_W switch to stop the pump.
- 6) When the Remote Control Mode is set to Pulse, close and then open the external RS\_W switch to start the pump, with the speed adjusting according to the analog input signal's intensity. Close and open the RS\_W switch again to halt the pump.

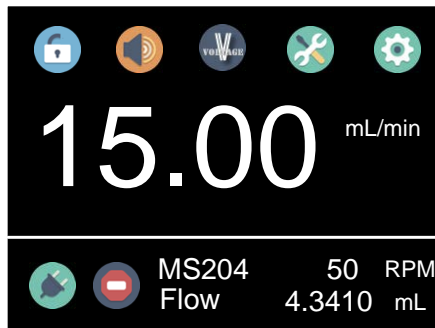


Figure 41. Voltage Control Mode



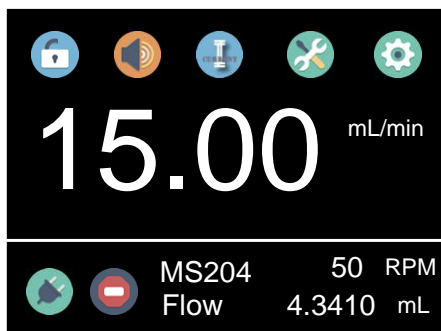


Figure 42. Current Control Mode

**Note:** The external DC power source can be 5V or 12V. If it is 24V, use a 1.5K resistor for internal circuit protection.

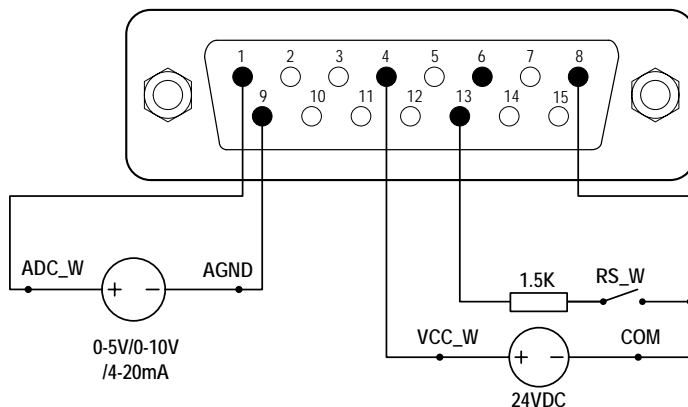


Figure 43. DB15 Wiring with External 24VDC Power Source

## 7.8 Communication Mode

The RS485 interface facilitates communication via the standard MODBUS protocol, enabling the pump to interact with external devices through the communication port. For specific parameters and supported commands, please consult the [Communication Instruction manual](#).

To work with communication mode:

- 1) Power off the device. Wire the DB15 connector as shown on [Figure 44](#), and connect it to the DB15 port located at the rear of the pump. It is recommended to use an external DC power source to minimize

electrical interference.

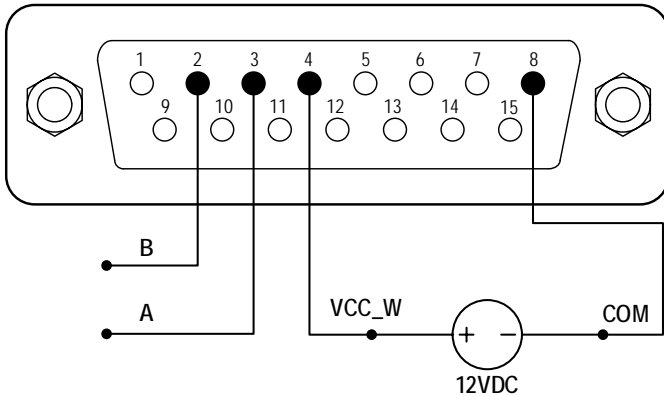




Figure 44. RS485 MODBUS Wiring

- 2) Power on the device. The main screen will be displayed.
- 3) In the Internal Control Mode, the connected status is indicated by , while the disconnected status is denoted by .
- 4) Control the pump with the communication interface.

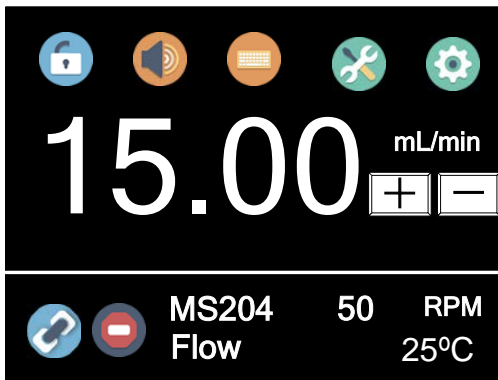


Figure 45. Communication Connected

## 7.9 Footswitch

To utilize a footswitch for controlling the start and stop functions, follow these steps:

- 1) Power off the pump. Wire the DB15 connector as shown in [Figure 46](#) or [Figure 47](#), and connect it to the DB15 port located at the rear of the pump.

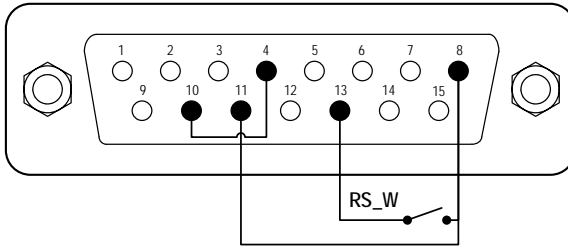


Figure 46. Control Start/Stop with Internal 12V Power Source

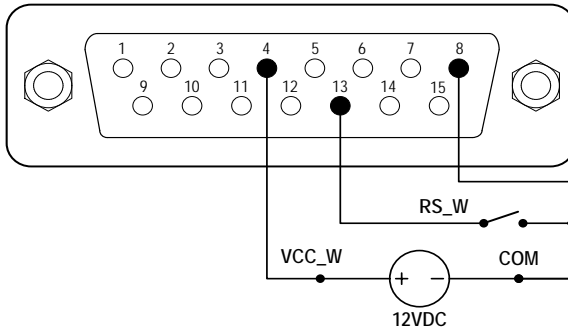


Figure 47. Control Start/Stop with External 12V Power Source

- 2) Power on the pump. The main screen will be displayed.
- 3) In the Internal Control Mode, if the pump is set to one of the dispense modes, closing and then opening the RS\_W switch will initiate the dispensing process.
- 4) In the Footswitch Control Mode, with the Remote Control Mode set to Logic Level, closing the RS\_W switch will start the drive, while opening it will stop the drive.
- 5) In the Footswitch Control Mode, with the Remote Control Mode set to Pulse, closing and then opening the RS\_W switch will start the drive, and closing and then opening it again will stop the drive.

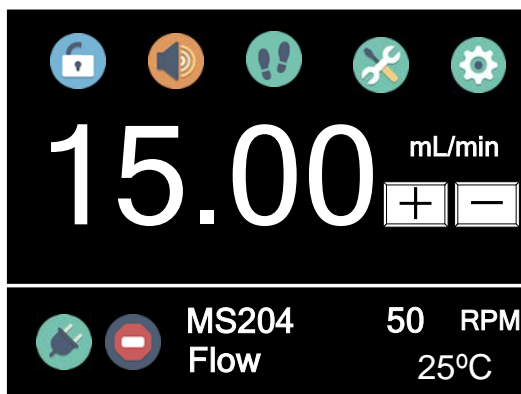


Figure 48. Footswitch Control

## 8 Maintenance

### 8.1 Warranty

The product includes a one-year warranty covering both labor and parts. Please note that the limited warranty does not extend to any damages caused by improper usage or handling.

### 8.2 Regular Maintenance

- 1) Regularly inspect the tubing and connections to ensure there are no signs of leakage.
- 2) Avoid obstructing the fan located at the rear of the pump.
- 3) Maintain the pump head in a dry condition.
- 4) If a filter is employed, check and replace it at regular intervals.
- 5) Refrain from using chemical solvents to clean the pump and pump head.

### 8.3 Malfunction Solutions

No	Malfunction	Description	Solution
1	Hardware	No display	1. Check the power cord 2. Check the fuse. Replace any blown

			<p>3A slow-blow fuse.</p> <p>3. Inspect the internal power cord connection within the pump.</p> <p>4. Check the wire connection between the LCD and main control board.</p>
2	Hardware	Motor does not work	<p>1. Check the indicator on the driver board.</p> <p>2. Check the wire connection between the motor and driver board.</p> <p>3. Check the wire connection between the driver and the main board.</p> <p>4. Check the power voltage supplied to the pump.</p>
3	Hardware	Motor is trembling	<p>1. Check the wire connection between the motor and the driver board.</p> <p>2. Check for possible motor overloading and examine the mechanical connection.</p>
4	Hardware	Keypad does not work	<p>1. Check the wire connection between the keypad and the main board.</p> <p>2. Check if any keys are broken.</p>
5	Hardware	External control does not work	<p>1. Check the wiring of the connector.</p> <p>2. Confirm the provision of the external control power voltage.</p> <p>3. Check the connections of the external control board.</p>
6	Hardware	RS485 comm. does not work	<p>1. Check the wiring of the connector.</p> <p>2. Check if the external control power voltage is provided.</p> <p>3. Check the connections of the communication board.</p>
7	Software	Incorrect dispensing volume	Perform calibration.

8	Software	External control does not work	Check if the pump is in the External Control Mode.
9	Software	RS485 comm. issue	<ol style="list-style-type: none"> <li>1. Check if the display shows that communication is ready.</li> <li>2. Reset the address of the pump.</li> <li>3. Check whether there are two pumps on the bus using the same address.</li> </ol>



If the issue persists, please contact the manufacturer or distributor for assistance.

## 9 Dimensions

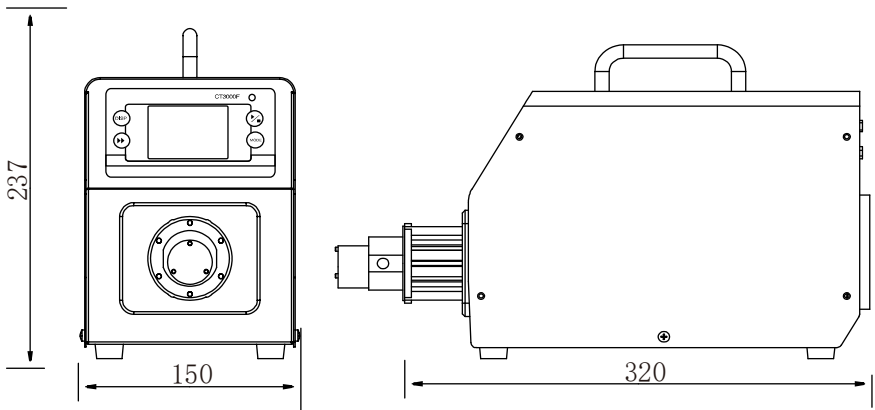
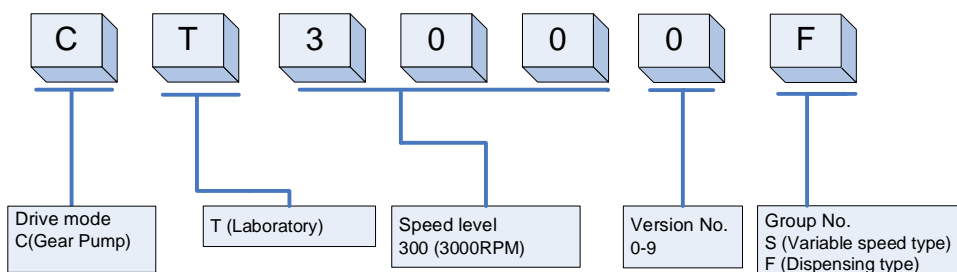


Figure 49. Dimensions (mm)

## 10 Naming Rule



## 11 Suitable Pump Heads

Pump Head	Gear Material	Max Output Pressure	Flow Range	Liquid Temperature
MS204	PEEK	1.4MPa (203psi)	15-900mL/min	-45-120°C
MS209	PEEK	0.9MPa (131psi)	30-1800mL/min	-45-120°C
MS213	PEEK	0.8MPa (116psi)	45-2700mL/min	-45-120°C

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