

GM200-1A, GM400-1A GM200-2A, GM400-2A Operating Manual



LONGER

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Mini Peristaltic Pump

Baoding Longer Precision Pump Co.,Ltd.

A **Halma** company

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1. General Information

1.1 Statements

- Longer Pump adheres to a strategy of continuous product improvement. The upgrades, modifications or change to the pumps appearance, specification or software may occur without prior notice.
- Depending on the pump model and software version you are using, the screenshots or function descriptions in this manual may be different, please refer to the functions of the current software version.
- The pumps shown in the manual are for illustration purposes only and may differ from the actual products. Please refer to the actual items.

1.2 Precautions

- The housing of the drive is provided with grounding terminal. In order to guarantee the operator's safety and improve the electromagnetic compatibility of the equipment, please ground the product reliably.
- Please do not disassemble, refit or maintain the product without permission, so as to avoid any damage or reduction to its performance.
- All ports on the rear housing of the drive must be protected against vapor and water ingress. Ensure all ports are either connected with cables or sealed with protective covers.
- If tubing leaks or bursts, fluid may spray from the tubing and pump head. Take reasonable practicable measures to ensure the operators' safety.
- Make sure fluid in the tubing has been drained out, that there is no pressure in the pipeline and disconnect pump from mains power, while removing or replacing the tubing.
- Disconnect the pump from the mains power before connecting the control signal wire.
- Do not touch the rotor while pump is running.
- Release the compression block when pump stops running for a long time to avoid tubing deformation caused by occlusion.
- Keep the rotor clean and dry to avoid tubing excessive wear and premature failure of pump head or drive.

- Please do not add the lubricating oil to the rotor by yourself, any improper operation could corrode the pump head housing or dislocate the tubing.
- Please connect the power cord or foot switch in correct way, and do not damage the plug.
- If the pump head can't resist organic solvent and corrosive liquid, please clean the liquid left on the surface of the pump head in time.

1.3 Contacts

- Baoding Longer Precision Pump Co., Ltd.
- Address: Floor 3-4, Block B, Building 6, University Science Park, No. 5699 North Second Ring Road, National High-tech Industrial Development Zone, Baoding City, Hebei Province, China
- Telephone: +86-312-3110087
- Website: www.longerpump.com

2. Product Introduction

2.1 Main Features

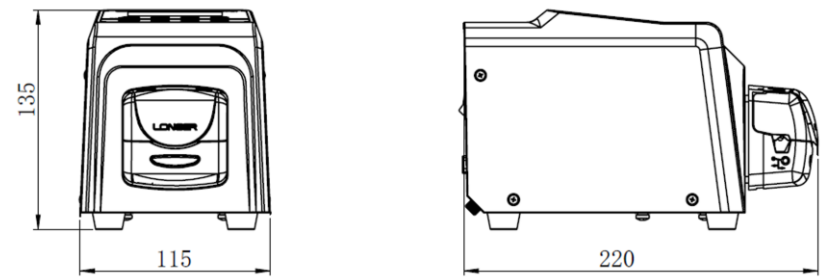
- Compact size and structure, space saving footprint with a stackable design.
- Features physical button operation and a LCD display for intuitive and convenient use.
- Provides continuous and timer modes for different applications.
- High speed control accuracy up to $\pm 0.1\%$.
- GM200-2A and GM400-2A can be controlled by keypad or a footswitch.
- GM200-1A and GM400-1A can be controlled by keypad, footswitch, external signals and RS485 communication commands.
- Excellent EMC performance certified by TUV and compliant with both lab standard EN IEC 61326 and industrial standard EN IEC 61000.
- Mounted with a 4-roller pump head BPH01 for low pulsation and longer tubing life.

2.2 Unpacking

- (1) Remove the pump and the accessories from the shipping carton.
- (2) Check the packing list to confirm all accessories are included.
- (3) In case of any questions, please contact Longer Pump or the local distributor.

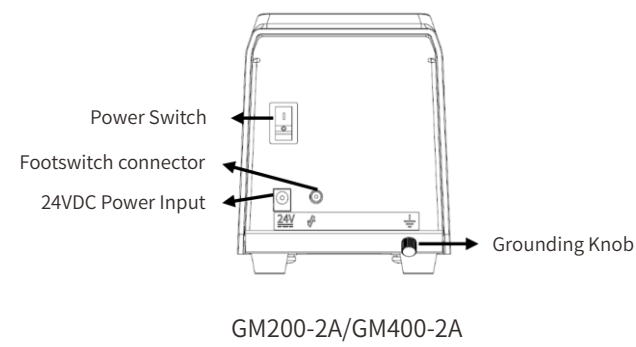
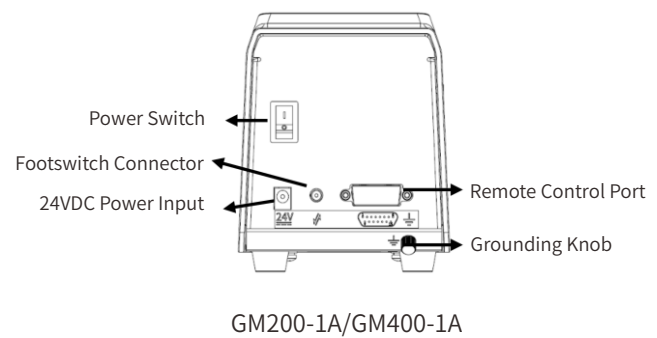
2.3 System Structure and Dimensions

2.3.1 Outline Dimensions



GM200-1A/GM400-1A/GM200-2A/GM400-2A with BPH01 Pump Head

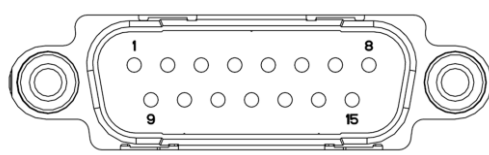
2.3.2 Pump Interfaces

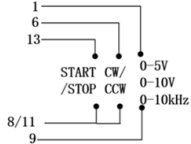
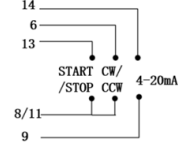
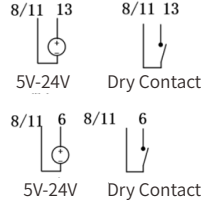
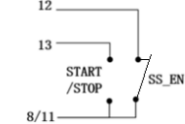


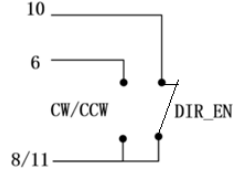
GM200-2A/GM400-2A

To enhance the EMC performance of the pump, it is recommended to connect the grounding knob to the system's protective earth (PE).

2.3.3 GM200-1A/GM400-1A Remote Control Port



Pin	Function	Description	Wiring Instruction
1	V/F	Speed signal 0-5V/0-10V/0-10kHz input terminal: by default, the 0-5V/0-10V/0-10kHz signal linearly corresponds to 0-200rpm or 0-400rpm. The relationship between the signal range and speed range can be configured through communication commands. Refer to Appendix B, Modbus Register Definition.	(1) Wiring diagram when the speed signal is 0-10kHz/0-5V/0-10V: 
2	B	RS485-B	(2) Wiring diagram when the speed signal is 4-20mA: 
3	A	RS485-A	
4	5V	DC5V output, Max 10mA	
5	NC	Reserved	
6	CW/CCW	Pump running direction control signal input. The default factory trigger logic is level trigger (momentary): The contact between Pin 6 and Pin 8 is open, or Pin 6 receives a high level signal, pump runs clockwise. The contact between Pin 6 and Pin 8 is closed, or Pin 6 receives a low level signal, pump runs counterclockwise. The trigger mode can be configured via communication commands to either level trigger (momentary) or pulse trigger (maintained). Refer to Appendix B Modbus Register Definition.	(3) In the external control modes, the Pin 13 and Pin 6 can receive logic level signal (pump will operate in different status when receives a 5-24V level signal or a low level signal) or dry contact signal. 
7	NC	Reserved	(4) In keypad control mode, control the start/stop by external signal: 
8	GND	GND	
9	AGND	GND for the speed signal.	
10	DIR_EN	In keypad control mode, the pump running direction can be controlled by an external signal. The contact between Pin 10 and Pin 8/11 is closed: direction key of the keypad is disabled, and the direction is controlled by the input signal to Pin 6. The contact between Pin 10 and Pin 8/11 is open: direction key of the keypad is enabled, and the direction is controlled by the direction key.	
11	GND	GND	

Pin	Function	Description	Wiring Instruction
12	SS_EN	In keypad control mode, the pump start/stop can be controlled by an external signal. The contact between Pin 12 and Pin 8/11 is closed: start/stop key is disabled, and the start/stop is controlled by the input signal to Pin 13. The contact between Pin 12 and Pin 8/11 is open: start/stop key is enabled, and the start/stop is controlled by the start/stop key.	(5) In keypad control mode, control the running direction by external signal: 
13	START/STOP	Pump start/stop control signal input. The default factory trigger logic is level trigger (momentary): The contact between Pin 13 and Pin 8 is open, or Pin 13 receives a high level signal, pump runs. Contact between Pin 13 and Pin 8 is closed, or Pin 13 receives a low level signal, pump stops. The trigger mode can be configured via communication commands to either level trigger (momentary) or pulse trigger (maintained). Refer to Appendix B, Modbus Register Definition.	
14	mA	Speed signal 4-20mA input terminal: by default, the 4-20mA signal linearly corresponds to 0-200rpm or 0-400rpm. The relationship between the signal range and speed range can be configured through communication commands. Refer to Appendix B, Modbus Register Definition.	
15	NC	Reserved	

2.4 Technical Specifications

	GM200-1A	GM400-1A	GM200-2A	GM400-2A
Pump speed	0-200rpm	0-400rpm	0-200rpm	0-400rpm
Speed resolution	0.01 rpm (speed<10rpm) 0.1rpm (10rpm≤speed<100rpm) 1rpm (100rpm≤speed≤max. speed)			
Display	LCD screen for pump speed, running direction, time, start/stop status and work mode			
Running direction	Clockwise or counter-clockwise, can be toggled during running			
Work mode	Continuous or timer mode			
Control mode	Keypad, footswitch, external signal or communication control		Keypad or footswitch control	
Keypad control	Set the parameters and control the pump via keypad: start/stop, running direction, prime status, speed adjustment, work mode, control mode, timer, communication control parameters		Set the parameters and control the pump via keypad: start/stop, running direction, prime status, speed adjustment, work mode, timer	
External control	Start/stop: switch signal, level trigger or pulse trigger Running direction control: switch signal, level trigger or pulse trigger Speed control: 4-20mA/0-5V/0-10V/0-10kHz. The relationship between the signal range and speed range can be configured through communication commands.		N/A	
Communication control	RS485 interface, Modbus RTU protocol and Longer OEM protocol		N/A	
Footswitch control	Control the start/stop via a footswitch			
Timer function	In time mode, the pump runs and stops based on the set timer duration. Timer range: 0.1s to 999h.			
Runtime counter	In continuous mode, the pump automatically records the runtime and can accumulate the multiple operation periods (reset upon power-up). Timing range: 0.1s-999h			
Keypad lock	To prevent misoperation			
Pump status when powered up	Timer mode: stop Continuous mode: stop as default, can be set to the status before power-off via communication command		Stop	
Parameter retention	Run and system parameters are saved after power loss in both keypad control and communication control modes.			

Prime	Fast filling or emptying at full speed			
Certificates	CE,UKCA EMC standard: EN IEC 61326-1:2021, EN IEC 61000-6-1:2019, EN IEC 61000-6-2:2019, EN IEC 61000-6-3:2021, EN IEC 61000-6-4:2019			
Dimensions (L*W*H)	220mm x 115mm x 135mm (including pump head)			
Power supply for adapter	AC100-240V, 50Hz-60Hz			
Power supply for pump	DC24V/8W	DC24V/16W	DC24V/8W	DC24V/16W
Working condition	Environment temperature:0°C-40°C, relative humidity:<80%			
IP rating	IP31			
Weight	1.35kg (including pump head)			

2.5 Applicable Tubing and Flow Rate

Pump Head	Tubing		Max Flow Rate Reference (mL/min)	
	Silicone Tubing	PharMed® Tubing	GM200-1A GM200-2A	GM400-1A GM400-2A
dPOFLEX BPH01	13#, 14#, 19#, 16#, 25#	13#, 14#, 19#, 16#, 25#	170	340

3. GM200-2A/GM400-2A Operating Instructions

3.1 Keypad and Display

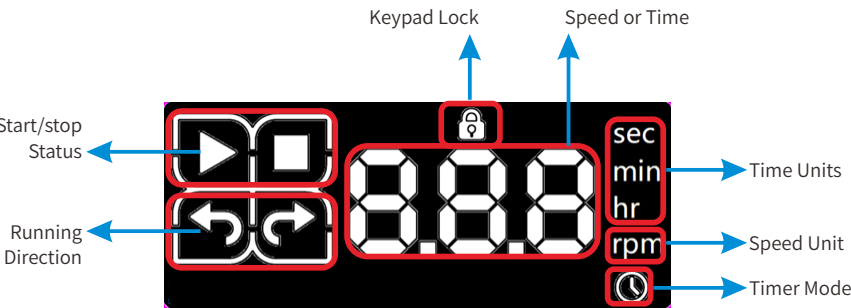


3.1.1 Keypad Function

 Start/Stop Key	Press the key to start or stop the pump. When the pump is in the prime status via the Max Key, it also can be stopped by pressing this key. When the pump is running and the keypad is locked, long pressing this key can unlock the keypad and stop the pump.
 Direction Key	Press the key to toggle the pump running direction, clockwise or counter clockwise. The direction key is disabled when the pump is in the prime status via Max Key.
 Increase Key	Increase the pump speed or timer duration. Press and hold the key will increase the value quickly.
 Decrease Key	Decrease the pump speed or timer duration. Press and hold the key will decrease the value quickly.
 Clear Run Time Keys	Press the Increase and Decrease keys at the same time to reset the accumulated run time. This operation is valid whether pump is running or stopped.
 Max Key	Press the Max Key to prime the pump at full speed 100rpm, whether the pump is running or stopped. Press the key again to return to the previous status.
 Lock Key	1.Lock the keypad: Short press the Lock Key to lock the keypad. Only Stop Key and Lock Key will be functional. Other keys will be disabled. 2. Unlock the keypad: a. When the pump is running or stopped and the keypad is locked, long press the Lock Key (> 1 second) to unlock the keypad. All keys will then be functional. b. When the pump is running and the keypad is locked, long press the Start/Stop Key (> 1 second) to stop the pump and unlock the keypad.
 Unit Key	Pump in the continuous work mode: Pump running: short press the Unit Key to toggle the display between pump speed and accumulated run time. Pump stopped: short press the Unit Key to toggle the display between pump speed and accumulated run time. When displays the pump speed, long press the Unit Key to cycle through the speed units (0.01rpm, 0.1rpm and 1rpm). Pump in the timer work mode: Pump running: short press the Unit Key to toggle the display between pump speed and remaining run time. Pump stopped: short press the Unit Key to toggle the display between pump speed and timer duration. When LCD displays the pump speed, long press the Unit Key to cycle through the speed units (0.01rpm, 0.1rpm and 1rpm). When LCD displays the timer duration, long press the Unit Key to cycle through the time units (sec, min and hour).

 Mode Key	When the pump stopped, press the Mode Key to toggle the work mode between continuous mode and timer mode.
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3. 1.2 LCD Display



Icon	Name	Description	Remark
	Run	This icon will be displayed when the pump is running	Only one icon can be displayed at a time.
	Stop	This icon will be displayed when the pump is stopped	
	Counter-clockwise	This icon will be displayed when the pump is running counter-clockwise.	Only one icon can be displayed at a time.
	Clockwise	This icon will be displayed when the pump is running clockwise.	
	Keypad Lock	The lock icon appears when the keypad is locked and disappears when the keypad is unlocked.	
	Timer	The timer icon indicates that the pump is running in timer mode. When the icon is not displayed, the pump is running in continuous mode.	

	Speed or Time	1. Displays the current pump speed with unit of “rpm” Displays “---” when pump is in the prime status. 2. Displays time with unit of “sec, min or hr”: a. Pump stopped in the timer mode: displays the set timer duration. b. Pump running in the timer mode: displays the remaining time (countdown). c. Continuous mode: displays the accumulated run time.	1. In timer mode, the pump can not be paused. When restarted, the countdown time will begin from the full set duration. 2. In continuous mode, the accumulated run time can be reset by the Clear Run Time Key, powering up, or switching back to continuous mode from timer mode.
	Time Unit	second	Only one icon can be displayed at a time.
	Time Unit	minute	
	Time Unit	hour	
	Speed Unit	rpm	

3.2 Operating Instructions

3.2.1 Power Up

GM200-2A operates on DC24V/8W, GM400-2A operates on DC24V/16W. The pump can be powered by connecting to a single-phase mains supply using the AC100-240V to DC24V adapter provided by Longer Pump. Upon power-up, the pump remains in a stopped status. The work mode and parameters will be retained from the previous power-off status.

3.2.2 Set the Work Mode

The pump can run in continuous mode or timer mode. When the pump is stopped, press the Mode Key  to toggle between the two modes. The timer icon  will be displayed when timer mode is active.

In timer mode, press the Start/Stop Key or a footswitch to start the pump. The pump will stop automatically when the set timer duration expires, or it can be manually stopped by pressing the Start/Stop Key or a footswitch.

✧ Note: the mode can not be changed when the pump is running.



3.2.3 Display Pump Speed or Time

Whether pump is running or stopped, press the Unit Key  to toggle the display between pump speed and time.

- a. Continuous mode: the displayed time represents the total run time accumulated over multiple start-stop cycles.
- b. Reset the accumulated run time:
When LCD displays the run time, press the Increase and Decrease Keys  at the same time to reset the accumulated run time. If the pump is running at this time, it will automatically start counting from zero.
✧ Note: the accumulated time will be reset automatically when pump powered up, or switching back to continuous mode from timer mode.
- c. Timer mode: the displayed time represents the set timer duration (when the pump is stopped) or remaining countdown time (when the pump is running)
✧ Note: In timer mode, the pump can not be paused. When restarted, the countdown will begin from the full set duration.

3.2.4 Set the Timer Duration

a. Set the time unit:

In timer mode, when the pump is stopped, short press the Unit Key  to display the set timer duration (in seconds, minutes or hours). Then, long press the Unit Key  to cycle through the time units: sec (seconds), min (minutes), and hr (hours).

b. Set the timer duration with the Increase or Decrease Keys:

In timer mode, when the pump is stopped, short press the Unit Key  to display the set timer duration (in seconds, minutes or hours). Use the Increase Key  or Decrease Key  to adjust the timer value. Long press the Increase or Decrease Key to adjust the value quickly.
Timer range: 0.1s to 999hrs.

3.2.5 Start and Stop

When the pump is stopped (display speed or time), short press the Start/Stop Key , the pump will run at the set speed and direction. The running status indicated on the screen will be .

When the pump is running (display speed or time), short press the Start/Stop Key , the pump will stop. The running status indicated on the screen will be .

✧ Note: When the keypad is locked and the pump is running, long press the Start/Stop Key for more than one second, the pump will be stopped and the keypad will be unlocked.



Running Status



Stop Status

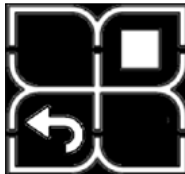
3. 2. 6 Change the Direction

When the pump is stopped or running (displays speed or time), press the Direction Key , the pump will toggle the running direction between clockwise and counter-clockwise.

✧ Note: the direction can not be changed when the pump is in prime status (displays "---").



Clockwise



Counter-clockwise

3.2.7 Prime the Pump

When the pump is stopped or running (displays speed or time), press the Max Key  to prime the pump at full speed 200rpm/ 400rpm and in the direction indicated. Press the key again to return to the previous status.

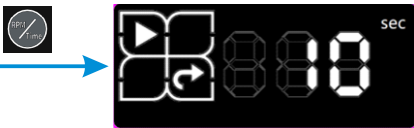
When pump is in the prime status, the pump can be stopped by pressing Start/Stop Key , but the Direction Key  is disabled.

In continuous mode, the accumulated running time continues during prime status.

In timer mode, the countdown of the remaining time continues during prime status.



Display the Speed in the Prime Status (Continuous mode)



Display the Accumulated Run Time in the Prime status (Continuous mode)



Display the Speed in the Prime Status (Timer mode)

Display the Remaining Time in the Prime status (Timer mode)

3.2.8 Increase and Decrease Pump Speed

a. Using Increase and Decrease Keys:

When the pump is stopped or running, press the Unit Key  to display current speed in rpm. Then press the Increase or Decrease Keys   to adjust the pump speed. Press and hold the keys will quickly adjust the speed until the maximum of 200rpm/ 400rpm or minimum of 0.01rpm.

b. Change the speed unit:

When the pump is stopped, press the Unit Key  to display current speed in rpm. Then long press the Unit Key  to cycle through the speed units: 0.01rpm, 0.1rpm and 1rpm.

3.2.9 Keypad Lock

When the pump is stopped or running (displays speed or time), short press the Lock Key  to lock the keypad, then the lock icon  will appear. Then long press the Lock Key  to unlock the keypad, and the lock icon will disappear.

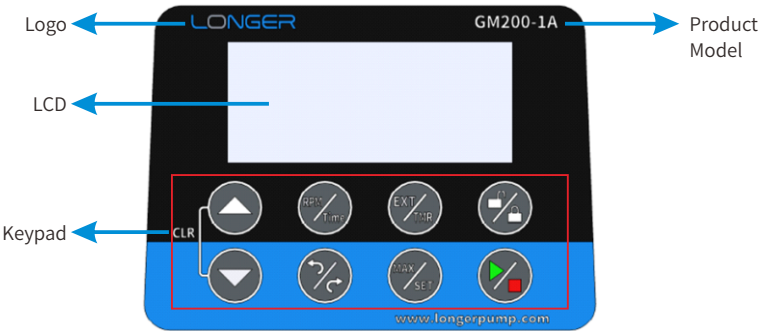
✧ Note: when the pump is running and the keypad is locked, long press the Start/Stop Key  , the pump will stop and the keypad will be unlocked.

3.2.10 Footswitch Control Start and Stop

The pump can be controlled by a footswitch, functioning the same as the Start/Stop Key. Each press of the footswitch toggles the pump between running and stopped statuses. The footswitch and the Start/Stop Key remain functional simultaneously.

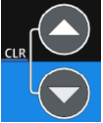
4. GM200-1A/GM400-1A Operating Instructions

4.1 Keypad and Display



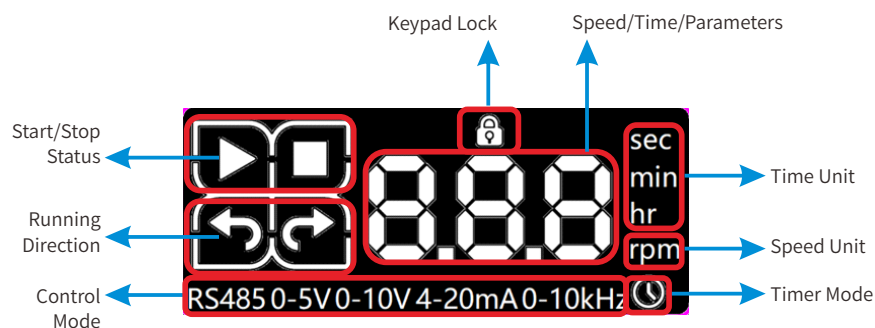
4.1.1 Keypad Function

Keys	Keypad Control Mode (continuous or timer)	External Signal Control Mode (0-10kHz/ 4-20mA/ 0-10V/ 0-5V)	Communication Control Mode (RS485)
 Start/Stop Key	1.Press the key to start or stop the pump. 2.When the pump is in the prime status via the Max Key, it also can be stopped by pressing this key. 3.When the pump is running and the keypad is locked, long pressing this key can activate the emergency stop function and stop the pump.	When the pump is running and the keypad is locked/unlocked, long pressing this key can activate the emergency stop function and stop the pump.	When the pump is running and the keypad is locked/unlocked, long pressing this key can activate the emergency stop function and stop the pump.
 Direction Key	Press the key to toggle the pump running direction, clockwise or counterclockwise. The direction key is disabled when the pump is in the prime status via Max Key.	Disabled	Disabled
 Increase Key	Increase the pump speed or timer duration. Press and hold the key will increase the value quickly.	Disabled	Select the communication control parameters: pump address, baud rate, parity.
 Decrease Key	Decrease the pump speed or timer duration. Press and hold the key will decrease the value quickly.	Disabled	Select the communication control parameters: pump address, baud rate, parity.

 Clear Run Time Keys	Press the Increase and Decrease keys at the same time to reset the accumulated run time. This operation is valid whether pump is running or stopped.	Disabled
 Max Key	Press the Max Key to prime the pump at full speed 200rpm or 400rpm, whether the pump is running or stopped. Press the key again to return to the previous status.	Disabled
 SET Key	Disabled	When RS485 is selected, short press the SET key to confirm and enter the communication control mode, and the corresponding running screen will be displayed. Set the communication control parameters: When the pump is in RS485 control mode and the pump stops, short press the SET key to enter the communication parameter setting screen. The parameters can be set: pump address, baud rate and parity. After select the parameters by pressing the Increase and Decrease Keys, short press the SET key to confirm the parameter setting and enter next parameter setting screen. Confirm the control mode: when changing the control mode, short press the SET key to confirm and enter the selected the control mode, and the corresponding running screen will be displayed. The pump will not receive a new communication control command when displaying the parameter setting screen.

 Lock Key	1.Lock the keypad: Short press the Lock Key to lock the keypad. Only Stop Key and Lock Key will be functional. Other keys will be disabled. 2. Unlock the keypad: a. When the pump is running or stopped and the keypad is locked, long press the Lock Key (> 1 second) to unlock the keypad. All keys will then be functional. b. When the pump is running and the keypad is locked, long press the Start/Stop Key (> 1 second) to stop the pump and unlock the keypad.		
 Unit Key	1.Pump in the continuous work mode: a.Pump running: short press the Unit Key to toggle the display between pump speed and accumulated run time. b.Pump stopped: short press the Unit Key to toggle the display between pump speed and accumulated run time. When LCD displays the pump speed, long press the Unit Key to cycle through the speed units (0.01rpm, 0.1rpm and 1rpm). 2.Pump in the timer work mode: a.Pump running: short press the Unit Key to toggle the display between pump speed and remaining run time. b.Pump stopped: short press the Unit Key to toggle the display between pump speed and timer duration. When LCD displays the pump speed, long press the Unit Key to cycle through the speed units (0.01rpm, 0.1rpm and 1rpm). When LCD displays the timer duration, long press the Unit Key to cycle through the time units (sec, min and hour).	When the pump is running or stopped, short press the Unit Key to toggle the display between pump speed and accumulated run time.	1.Pump in the continuous work mode: When the pump is running or stopped, short press the Unit Key to toggle the display between pump speed and accumulated run time. 2.Pump in the timer work mode: a.Pump running: short press the Unit Key to toggle the display between pump speed and remaining run time. b.Pump stopped: short press the Unit Key to toggle the display between pump speed and timer duration.
 Mode Key	When the pump is stopped, press the Mode Key to cycle through the work mode and control mode: keypad control continuous mode, keypad control timer mode, 0-10kHz external control mode, 4-20mA external control mode, 0-10V external control mode, 0-5V external control mode, RS485 communication control mode.		

4.1.2 LCD Display



Icon	Name	Description	Remark
	Run	This icon will be displayed when the pump is running	Only one icon can be displayed at a time.
	Stop	This icon will be displayed when the pump is stopped	
	Counter-clockwise	This icon will be displayed when the pump is running counter-clockwise.	Only one icon can be displayed at a time.
	Clockwise	This icon will be displayed when the pump is running clockwise.	
	Keypad Lock	The lock icon appears when the keypad is locked and disappears when the keypad is unlocked.	
	Timer	In keypad control mode or RS485 mode: The timer icon indicates that the pump is running in timer mode. When the icon is not displayed, the pump is running in continuous mode.	
	0-10kHz control mode	Current control mode is external signal control, and the pump speed signal is 0-10kHz	Only one icon can be displayed at a time. No icon means the control mode is keypad control.
	4-20mA control mode	Current control mode is external signal control, and the pump speed signal is 4-20mA	
	0-10V control mode	Current control mode is external signal control, and the pump speed signal is 0-10V	
	0-5V control mode	Current control mode is external signal control, and the pump speed signal is 0-5V	
	RS485 communication control mode	Current control mode is RS485 communication control mode	

	Parameters/Status	- Displays the current pump speed with the unit of "rpm" - Displays time with unit of "sec, min or hr": - Pump stopped in the timer mode: displays the set timer duration. - Pump running in the timer mode: displays the remaining time (countdown). - Continuous mode: displays the accumulated run time. - Displays the communication parameters: pump address, baud rate, parity. - Displays "---": when the pump is in the prime status. - Displays "SET": ready for remote control mode - Displays "E-S": in the emergency stop status by long pressing the Start/Stop Key	- In timer mode, the pump can not be paused. When restarted, the countdown time will begin from the full set duration. - In continuous mode, the accumulated run time can be reset by the Clear Run Time Key, powering up, or switching back to continuous mode from timer mode.
	Time Unit	second	Only one icon can be displayed at a time.
	Time Unit	minute	
	Time Unit	hour	
	Speed Unit	rpm	

4.2 Power Up

GM200-1A operates on DC24V/8W, GM400-1A operates on DC24V/16W. The pump can be powered by connecting to a single-phase mains supply using the AC100-240V to DC24V adapter provided by Longer Pump.

The work mode and parameters when powered up will be retained from the previous power-off status. Pump status when powered up is related to the work mode and control mode:

- Keypad control continuous mode: stop as default, can be set to the status before power-off via communication command.
- Keypad control timer mode: stop
- 0-10kHz/ 4-20mA/ 0-10V/ 0-5V external control mode: the pump status depends on the input signal.
- Rs485 control mode: stop

4.3 Set the Work and Control Mode

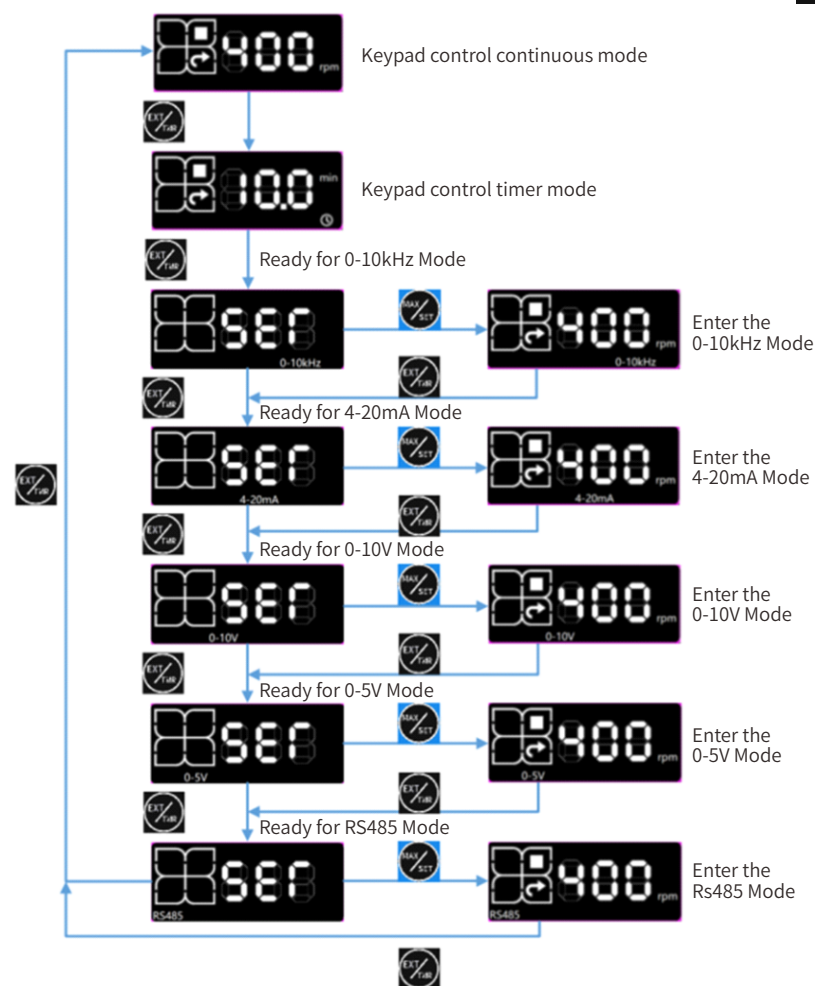
The pump can operate in 7 modes: keypad control continuous mode, keypad control timer mode, 0-10kHz mode, 4-20mA mode, 0-10V mode, 0-5V mode and RS485 mode. When the pump is stopped, short press the Mode Key  to cycle through these 7 modes.

◇ Note: The mode can not be changed when the pump is running.

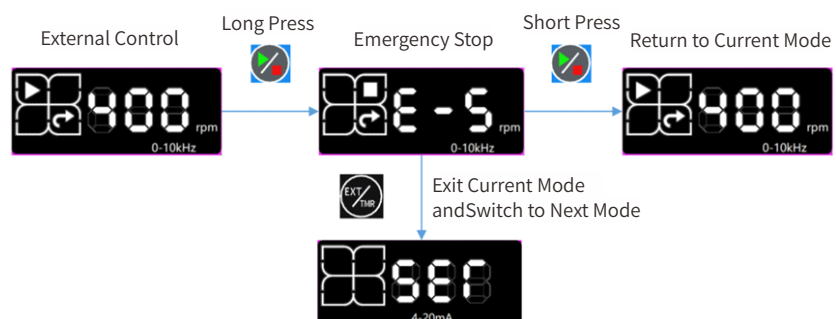
- Keypad control continuous mode: the pump speed can be set via the keypad; the start/stop can be set via keypad/ footswitch/ external control signal; the running direction can be set via keypad/ external control signal. When the pump is running, it will automatically record the runtime and can accumulate multiple operation periods.
- Keypad control timer mode: the pump speed and timer duration can be set via the keypad; the start/stop can be set via keypad/ footswitch/ external control signal; the running direction can be set via keypad/ external control signal. And the pump can stop automatically when the set timer duration expires.
- 0-10kHz mode: The start/stop, running direction and pump speed will be controlled by external signals. And the pump speed signal is 0-10kHz pulse signal.
- 4-20mA mode: The start/stop, running direction and pump speed will be controlled by external signals. And the pump speed signal is 4-20mA analog signal.
- 0-10V mode: The start/stop, running direction and pump speed will be controlled by external signals. And the pump speed signal is 0-10V analog signal.
- 0-5V mode: The start/stop, running direction and pump speed will be controlled by external signals. And the pump speed signal is 0-5V analog signal.
- Rs485 mode: The pump parameters and running status will be set by the communication control commands. The interface is RS485, the protocol is Modbus RTU or Longer Pump OEM protocol.

Change the mode:

Short press the Mode Key  to cycle through the modes: Keypad continuous → Keypad timer → 0-10kHz → 4-20mA → 0-10V → 0-5V → Rs485. When the screen displays , short press the SET Key  to enter the corresponding control mode. To exit the current mode and switch to another, the pump must be stopped first, then short press the Mode Key .

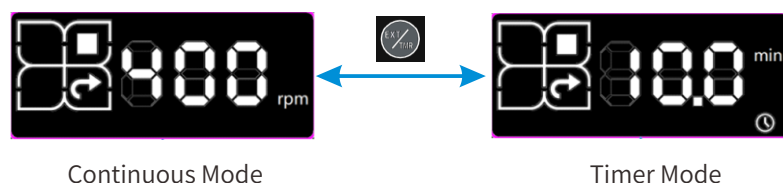


✧ Note: when the pump is in the external signal control mode, the default start/stop control logic: the pump will run when the start/stop input pin is left floating. So after entering the external control mode and no start/stop signal input, the pump will be in the running status. Then long press the Start/Stop Key  to stop the pump and display the emergency stop status **E-S**. Then short press the Start/Stop Key  to return to the current control mode, or short press the Mode Key  to exit current control mode and display next mode ready screen.



4.4 Manual Operating

When the pump is in keypad control continuous mode or timer mode, the parameters can be set and the pump can be controlled via the keypad.



4.4.1 Display Pump Speed or Time

Whether pump is running or stopped, press the Unit Key  to toggle the display between pump speed and time.

- Continuous mode: the displayed time represents the total run time accumulated over multiple start-stop cycles.
- Reset the accumulated run time:

When LCD displays the run time, press the Increase and Decrease Keys  at the same time to reset the accumulated run time. If the pump is running at this time, it will automatically start counting from zero.

- ✧ Note: the accumulated time will be reset automatically when the pump powered up, or switching back to continuous mode from timer mode.
- Timer mode: the displayed time represents the set timer duration (when the pump is stopped) or remaining countdown time (when the pump is running)
- ✧ Note: In timer mode, the pump can not be paused. When restarted, the countdown will begin from the full set duration.

4.4.2 Set the Timer Duration

- Set the time unit:
In timer mode, when the pump is stopped, short press the Unit Key  to display the set timer duration (in seconds, minutes or hours). Then, long press the Unit Key  to cycle through the time units: sec (seconds), min (minutes), and hr (hours).
- Set the timer duration with the Increase or Decrease Keys:
In timer mode, when the pump is stopped, short press the Unit Key  to display the set timer duration (in seconds, minutes or hours). Use the Increase Key  or Decrease Key  to adjust the timer value. Long press the Increase or Decrease Key to adjust the value quickly.

4.4.3 Start and Stop

When the pump is stopped (display speed or time), short press the Start/Stop Key , the pump will run at the set speed and direction. The running status indicated on the screen will be .

When the pump is running (display speed or time), short press the Start/Stop Key , the pump will stop. The running status indicated on the screen will be .

✧ Note: When the keypad is locked and the pump is running, long press the Start/Stop Key for more than one second, the pump will be stopped and the keypad will be unlocked.



Running Status



Stop Status

Start/stop the pump via an external control signal (Start/Stop Key is disabled, and other keys are functional): connect the Pin 12 to Pin 8 of remote control port, then input the start/stop control signal to Pin 13. Refer to the Chapter 2.3.3 for details.

4.4.4 Change the Direction

When the pump is stopped or running (displays speed or time), press the Direction Key , the pump will toggle the running direction between clockwise and counter-clockwise.

✧ Note: the direction can not be changed when the pump is in prime status (displays "---").



Clockwise



Counter-clockwise

Control the running direction via an external control signal (Direction Key is disabled, and other keys are functional): connect the Pin 10 to Pin 8 of remote control port, then input the direction control signal to Pin 6. Refer to the Chapter 2.3.3 for details.

4.4.5 Prime the Pump

When the pump is stopped or running (displays speed or time), press the Max Key , to prime the pump at full speed 200rpm/ 400rpm and in the direction indicated. Press the key again to return to the previous status.

When the pump is in the prime status, the pump can be stopped by pressing Start/Stop Key , but the Direction Key  is disabled.

In continuous mode, the accumulated running time continues during prime status.

In timer mode, the countdown of the remaining time continues during prime status.



Display the Speed in the Prime Status (Continuous mode)



Display the Accumulated Run Time in the Prime status (Continuous mode)



Display the Speed in the Prime Status (Timer mode)

Display the Remaining Time in the Prime status (Timer mode)

4.4.6 Increase and Decrease Pump Speed

a. Using Increase and Decrease Keys:

When the pump is stopped or running, press the Unit Key  to display current speed in rpm. Then press the Increase or Decrease Keys   to adjust the pump speed. Press and hold the keys will quickly adjust the speed until the maximum of 200rpm/ 400rpm or minimum of 0.01rpm.

b. Change the speed unit:

When the pump is stopped, press the Unit Key  to display current speed in rpm. Then long press the Unit Key  to cycle through the speed units: 0.01rpm, 0.1rpm and 1rpm.

4.4.7 Keypad Lock

When the pump is stopped or running (displays speed or time), short press the Lock Key  to lock the keypad, then the lock icon  will appear. Then long press the Lock Key  to unlock the keypad, and the lock icon will disappear.

✧ Note: when the pump is running and the keypad is locked, long press the Start/Stop Key , the pump will stop and the keypad will be unlocked.

4.5 Footswitch Control Start and Stop

When the pump is in the keypad control mode, the pump can be controlled by a footswitch, functioning the same as the Start/Stop Key. Each press of the footswitch toggles the pump between running and stopped statuses. The footswitch and the Start/Stop Key remain functional simultaneously.

4.6 External Signal Control

The start/stop, running direction and pump speed can be controlled by external signals. Please refer to the Chapter 2.3.3 for the remote control port definition, and connect the control signals.

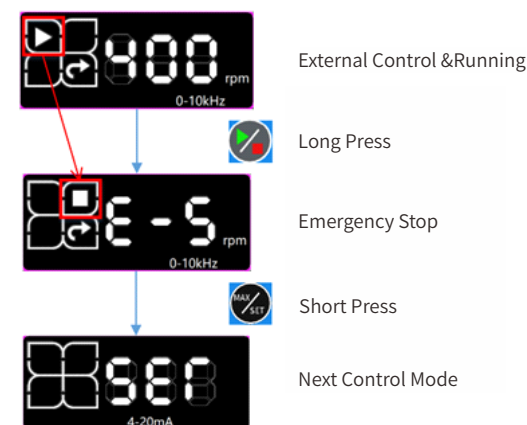
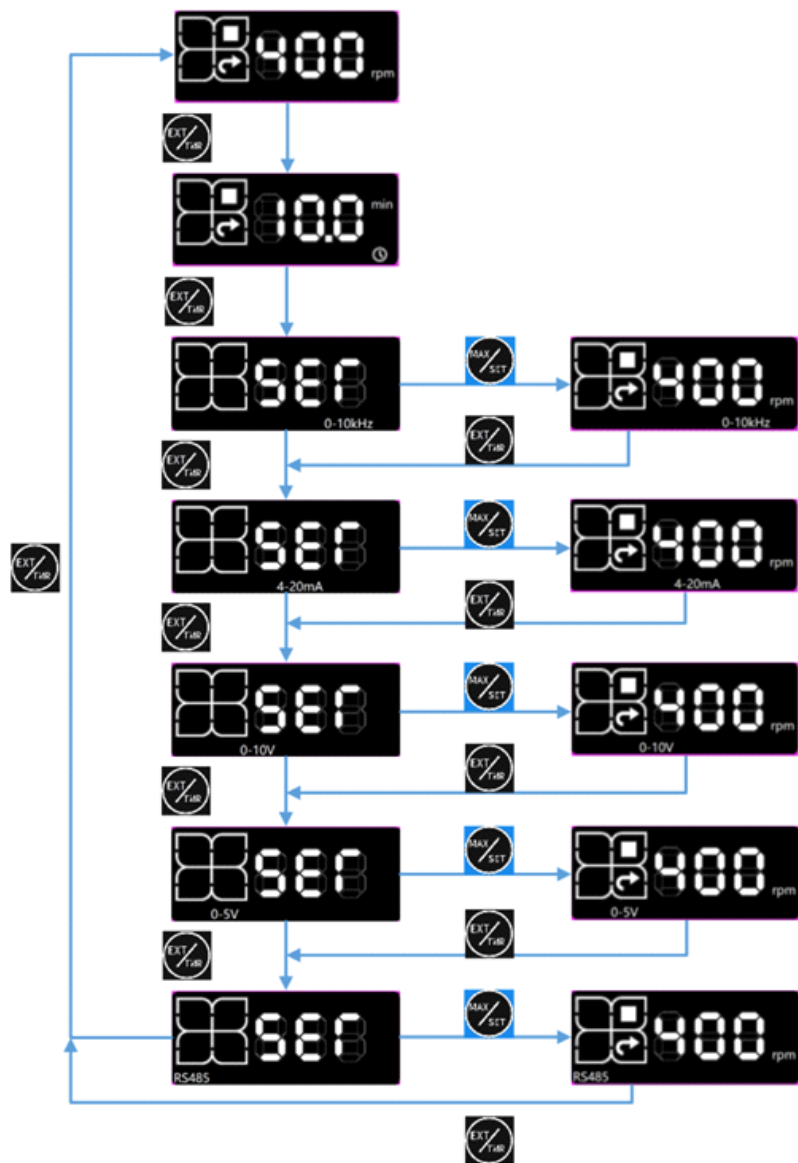
✧ Note: Disconnect the pump from the mains power before connecting the control signal wire.

4.6.1 Set the Control Mode

GM200-1A and GM400-1A have 4 external control modes: 0-10kHz mode, 4-20mA mode, 0-10V mode, 0-5V mode. When the pump is stopped, short press the Mode Key  to switch the control mode and set the control mode based on the pump speed signal.

When the pump is in the keypad control mode, the start/stop and running direction also can be controlled by external signals (speed, timer and other functions will be set via the keypad):

- Start/stop the pump via an external control signal (Start/Stop Key is disabled, and other keys are functional): connect the Pin 12 to Pin 8 of remote control port, then input the start/stop control signal to Pin 13. Refer to the Chapter 2.3.3 for details.
- Control the running direction via an external control signal (Direction Key is disabled, and other keys are functional): connect the Pin 10 to Pin 8 of remote control port, then input the direction control signal to Pin 6. Refer to the Chapter 2.3.3 for details.



When the pump is in external signal control mode, and the pump is running, long press the Start/Stop Key  to stop the pump first, then short press Mode Key  to switch the control mode.

4.6.2 Start and Stop

In the external control mode, the start/stop can be controlled by a dry contact signal or logic level signal (5-24V as high).

The control logic can be set by the communication commands. Refer to Appendix B, Modbus Register Definition, register 0x0031.

Default control logic: level trigger (momentary), pump runs when the start/stop input Pin 13 is left floating or high level, pump stops when the Pin 13 is connected to Pin 8 (GND).

✧ Note: to change the control logic, stop the pump first, then send the setting commands.

1. The start/stop trigger logic can be configured via communication commands as follows:
 - a. Level trigger (momentary), pump runs when the start/stop input Pin 13 is left floating or high level, pump stops when the Pin 13 is connected to Pin 8 (GND).

- b. Level trigger (momentary), pump stops when the start/stop input Pin 13 is left floating or high level, pump runs when the Pin 13 is connected to Pin 8 (GND).
 - c. Pulse trigger (maintained), start/stop will switch on the falling edge signal to Pin 13.
 - d. Pulse trigger (maintained), start/stop will switch on the rising edge signal to Pin 13.
2. When the trigger logic is set to level trigger and the start/stop input Pin 13 receives a start signal, the pump's power-up status (running or stopped) can be configured via communication commands. Refer to Appendix B, Modbus Register Definition, register 0x0031, for details.
 3. In external control mode, whether the start/stop signal is enabled can be set through communication commands. Refer to Appendix B, Modbus Register Definition, register 0x0031, for details.
 - a. The start/stop signal is enabled: a start/stop signal must be input to control the pump's start/ stop status (default setting).
 - b. The start/stop signal is disabled: the pump's start/ stop status is only controlled by the speed signal. speed = 0rpm, the pump stops; speed $\neq$ 0rpm, the pump runs.

4.6.3 Change the Direction

In the external control mode, the running direction can be controlled by a dry contact signal or logic level signal (5-24V as high).

The control logic can be set by the communication commands. Refer to Appendix B, Modbus Register Definition, register 0x0032.

Default control logic: level trigger (momentary), pump runs clockwise when direction input Pin 6 is left floating or high level, pump runs counterclockwise when direction input Pin 6 is connected to Pin 8 (GND).

✧ Note: to change the control logic, stop the pump first, then send the setting commands.

The direction trigger logic can be configured via communication commands as follows:

- a. Level trigger (momentary), pump runs clockwise when direction input Pin 6 is left floating or high level, pump runs counterclockwise when direction input Pin 6 is connected to Pin 8 (GND).

- b. Level trigger (momentary), pump runs counterclockwise when direction input Pin 6 is left floating or high level, pump runs clockwise when direction input Pin 6 is connected to Pin 8 (GND).
- c. Pulse trigger (maintained), running direction will switch on the falling edge signal to Pin 6.
- d. Pulse trigger (maintained), running direction will switch on the rising edge signal to Pin 6.

4.6.4 Increase and Decrease Pump Speed

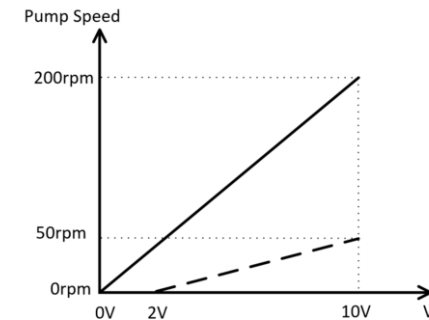
The pump speed is linearly proportional to the speed control signal.

The relationship between the signal range and speed range can be configured through communication commands. Refer to Appendix B, Modbus Register Definition, registers from 0x0034 to 0x003D, for details.

Default setting:

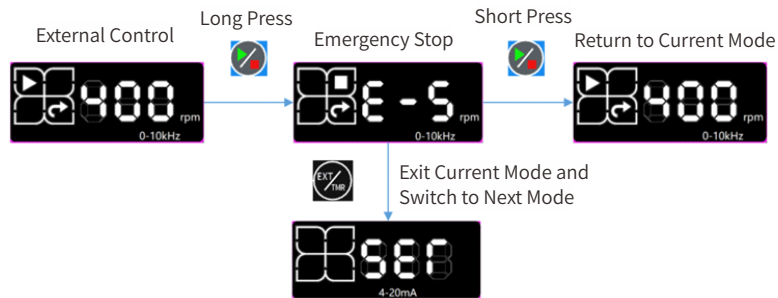
GM200-1A: the 4-20mA/0-5V/0-10V/0-10kHz signal linearly corresponds to 0-200rpm.

GM400-1A: the 4-20mA/0-5V/0-10V/0-10kHz signal linearly corresponds to 0-400rpm.



4.6.5 Manual Emergency Stop

In the external control mode, when the pump is running, long press the Start/Stop Key  to stop the pump and display the emergency stop status **E-S**. Then short press the Start/Stop Key  to return to the current control mode, or short press the Mode Key  to exit current control mode and display next mode ready screen.



4.6.6 Display Pump Speed or Accumulated Time

In the external control mode, whether pump is running or stopped, press the Unit Key  to toggle the display between pump speed and the accumulated time over multiple start-stop cycles.

Reset the accumulated run time: When LCD displays the run time, press the Increase and Decrease Keys  at the same time to reset the accumulated run time. If the pump is running at this time, it will automatically start counting from zero.

✧ Note: the accumulated time will be reset automatically when pump powered up, or switching back from other mode.

4.6.7 Keypad Lock

When the pump is stopped or running (displays speed or time), short press the Lock Key  to lock the keypad, then the lock icon  will appear. Then long press the Lock Key  to unlock the keypad, and the lock icon will disappear.

✧ Note: when the pump is running and the keypad is locked, long press the Start/Stop Key , the pump will stop and the keypad will be unlocked, and the emergency stop status **E-S** will be displayed.

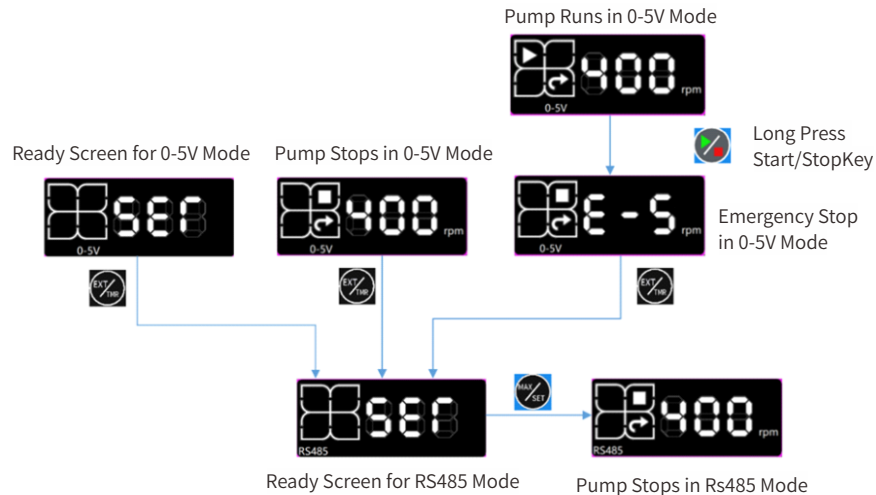
4.7 Communication Control

GM200-1A and GM400-1A are equipped with RS485 interface, which allows setting running parameters and controlling pump operation via communication commands according to Modbus RTU protocol or Longer Pump OEM protocol. Refer to Appendix B and C for details.

Communication control function: start/stop the pump, change the running direction, prime the pump, set the pump speed, set the work mode as continuous or timer, set the timer duration, reset the accumulated run time, set the communication parameters (pump address, baud rate, parity).

4.7.1 Enter and Exit RS485 Mode

Enter RS485 mode: short press the Mode Key  to switch the mode to RS485, displaying **RS485** and **500**. Then short press the SET Key  to enter the RS485 mode.



Exit RS485 mode: When pump stops, short press the Mode Key  to exit the RS485 mode and enter the keypad continuous mode.

4.7.2 Set the Communication Parameters

a. Modbus RTU Protocol:

Parameter default settings: pump address: 1, baud rate: 1200bps, even parity, 1 stop bit

Pump address range: 1-30, and 0 is the broadcast address.

Baud rate options: 1200bps, 9600bps, 19200bps, 38400bps, 115200bps

Parity options: none, even, odd

Stop bit can not be set.

Modbus RTU parameters can be set through the keypad and communication commands. Refer to the Appendix B for the registers.

b. Longer Pump OEM protocol:

Parameter default settings: pump address: 1, baud rate: 1200bps, even parity, 1 stop bit

Pump address range: 1-30, and 31 is the broadcast address.

Baud rate options: 1200bps, 9600bps, 19200bps, 38400bps, 115200bps

Parity options: none, even, odd

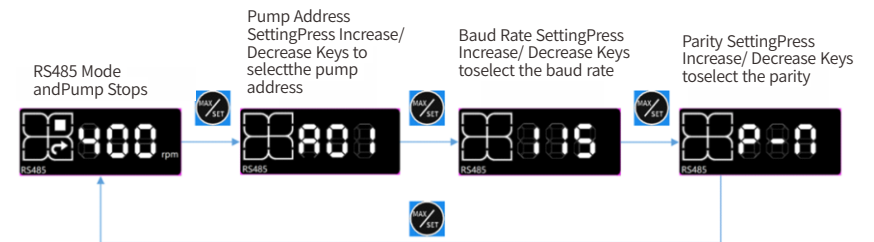
Stop bit can not be set.

Longer Pump OEM parameters can be set through the keypad.

c. Set the parameters through the keypad:

In the RS485 mode, when pump stops, short press the SET Key  to enter the parameter setting screen. The parameters can be set: pump address, baud rate, parity.

Press the Increase and Decrease Keys   to select the parameters, then press the SET Key to confirm the parameter and enter next parameter setting screen.



Pump address: A01 represents address of 1, A30 represents address of 30
 Baud rate: 1.2 represents 1200bps, 9.6 represents 9600bps, 19.2 represents 19200bps, 38.4 represents 38400bps, 115 represents 115200bps
 Parity: P-O represents odd, P-E represents even, P-N represents none.

✧ Note: the pump can not receive communication commands when displaying communication parameter setting screen.

4.7.3 Set the Continuous or Timer Mode

The work mode can be set to continuous mode or timer mode through communication commands. Refer to Appendix A or B for details.

Continuous mode: both starting or stopping the pump must be performed by sending the communication commands. The pump will automatically record the running time.

Timer mode: starting the pump by sending the communication command. The pump can stop automatically when the set timer duration expires.



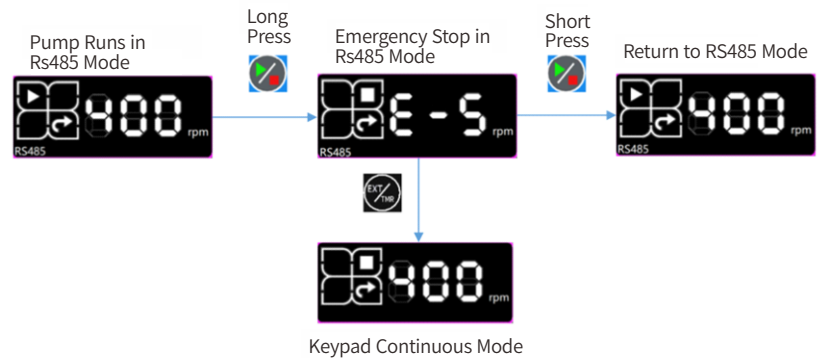
RS485 Continuous Mode



RS485 Timer Mode

4.7.4 Manual Emergency Stop

In the RS485 control mode, when the pump is running, long press the Start/Stop Key  to stop the pump and display the emergency stop status **E-S**. Then short press the Start/Stop Key  to return to the RS485 control mode, or short press the Mode Key  to exit Rs485 control mode and display keypad continuous mode.



4.7.5 Display Pump Speed or Time

Whether pump is running or stopped, press the Unit Key  to toggle the display between pump speed and time.

- a. Continuous mode: the displayed time represents the total run time accumulated over multiple start-stop cycles.
- b. Reset the accumulated run time: by using communication command, refer to Appendix B and C.
 - ✧ Note: the accumulated time will be reset automatically when pump powered up, or switching back to RS485 mode.
- c. Timer mode: the displayed time represents the set timer duration (when the pump is stopped) or remaining countdown time (when the pump is running).
 - ✧ Note: In timer mode, the pump can not be paused. When restarted, the countdown will begin from the full set duration.

4.7.6 Keypad Lock

When the pump is stopped or running (displays speed or time), short press the Lock Key  to lock the keypad, then the lock icon  will appear. Then long press the Lock Key  to unlock the keypad, and the lock icon will disappear.

- ✧ Note: when the pump is running and the keypad is locked, long press the Start/Stop Key , the pump will stop and the keypad will be unlocked, and the emergency stop status **E-S** will be displayed.

Appendix A Factory Default Settings

Reset the pump to the factory default settings: During power-up, long press the Mode Key  until “---” appears on the display. Then, short press the Increase Key  to display “FFF”. Finally, short press the Max Key  to reset the pump to the factory default settings.

Product model	GM200-1A	GM200-2A	GM400-1A	GM400-2A
Work mode	Keypad continuous	Keypad continuous	Keypad continuous	Keypad continuous
Pump speed	200rpm	200rpm	400rpm	400rpm
Run direction	Clockwise	Clockwise	Clockwise	Clockwise
Timer duration	60s	60s	60s	60s
Max speed to the max speed signal	200	/	400	/
Min speed to the min speed signal	0	/	0	/
Start/stop trigger	Pump runs when control pin is at high level or left floating	/	Pump runs when control pin is at high level or left floating	/
Direction trigger	Pump runs clockwise when control pin is at high level or left floating	/	Pump runs clockwise when control pin is at high level or left floating	/
Pump address	1	/	1	/
Baud rate	1200bps	/	1200bps	/
Parity	Even	/	Even	/
Stop bit	1	/	1	/
Pump status when powered up (keypad control mode)	Stop	Stop	Stop	Stop

Appendix B Modbus Register Definition

Default communication parameters: pump address 1, baud rate 1200bps, even parity, 1 stop bit.

Pump address range: 1-30, and 0 is the broadcast address.

Baud rate options: 1200bps, 9600bps, 19200bps, 38400bps, 115200bps

Parity options: none, even, odd

Stop bit can not be set.

✧ Note: in any control mode (keypad control mode, external control mode, RS485 control mode), all registers can be read by commands.

Function	Parameter Variable	Register Address	Data Type	Read/Write	Parameter Stored?	Default	Description	Note
Running Control	Start/stop	0x0001	uint_16	R/W	N	0	0: stop 1: start	
Running Control	Prime the pump at full speed	0x0006	uint_16	R/W	N	0	0: Exit prime status and return to the previous status 1: Prime the pump at full speed	
System	Pum address	0x0010	uint_16	R/W	Y	1	Setting range: 1-30	The command is valid when pump stops.
System	Baud rate	0x0011	uint_16	R/W	Y	0	0: 1200bps 1: 9600bps 2: 19200bps 3: 38400bps 4: 115200bps	The command is valid when pump stops.
System	Parity	0x0012	uint_16	R/W	Y	2	0: non 1: old 2: even	The command is valid when pump stops.
System	Enable communication control mode	0x0020	uint_16	R/W	N	0	1: enable When this register is set to 1, the pump directly enters RS485 mode. To switch from RS485 to another mode, manual switching via keypad is required.	The command is valid whether pump is running or stopped. The pump will stop first before switching to RS485 mode.

LONGER Instructions for use of peristaltic pump

Function	Parameter Variable	Register Address	Data Type	Read/Write	Parameter Stored?	Default	Description	Note
Parameters for keypad control	Pump status when power-up	0x0021	uint_16	R/W	Y	0	0: stop 1: return to the status before power-off Only valid for keypad control continuous mode.	The command is valid when pump stops.
Parameters for keypad control	Disable the Direction Key	0x0022	uint_16	R/W	Y	0	0: the Direction Key is enabled 1: the Direction Key is disabled, pump can only run clockwise. Only valid for keypad control.	The command is valid when pump stops.
Parameters for the external control mode	Start/stop control logic via external signal	0x0031	uint_16	R/W	Y	0x200	b1-b0 00: Level trigger, pump runs when the start/stop input pin is left floating or high level, pump stops when the pin is connected to GND. 01: Level trigger, pump stops when the start/stop input pin is left floating or high level, pump runs when the pin is connected to GND. 10: Pulse trigger, start/stop will switch on the falling edge signal to start/stop input pin. 11: Pulse trigger, start/stop will switch on the rising edge signal to start/stop input pin.	The command is valid when pump stops.

LONGER Instructions for use of peristaltic pump

Function	Parameter Variable	Register Address	Data Type	Read/Write	Parameter Stored?	Default	Description	Note
Parameters for the external control mode	Start/stop control logic via external signal	0x0031	uint_16	R/W	Y	0x200	b8: 0: the start/stop signal is enabled, and a start/stop signal must be input to control the pump's start/ stop status. 1: the start/stop signal is disabled, and the pump's start/ stop status is only controlled by the speed signal. Speed = 0, the pump stops; speed ≠ 0, the pump runs. bit9: 0: when the trigger mode is set to level trigger, the pump remains stopped upon initial power-up. The start/stop signal must change from stop to start to make the pump start running. 1: when the trigger mode is set to level trigger, the pump's initial power-up status depends on whether the input signal is a start or stop signal. Note: 1. When the trigger mode is set to level trigger, the pump's powered up status depends on the settings of bit 8 and bit 9, as well as the start/stop input signal. 2. When the trigger mode is set to pulse trigger and bit 8 is 0, the pump will be in a stopped status upon power-up.	The command is valid when pump stops.

LONGER Instructions for use of peristaltic pump

Function	Parameter Variable	Register Address	Data Type	Read/Write	Parameter Stored?	Default	Description	Note
Parameters for the external control mode	Running direction control logic via external signal	0x0032	uint_16	R/W	Y	0	b1-b0 00: Level trigger, pump runs clockwise when direction input pin is left floating or high level, pump runs counterclockwise when direction input pin is connected to GND. 01: Level trigger, pump runs counterclockwise when direction input pin is left floating or high level, pump runs clockwise when direction input pin is connected to GND. 10: Pulse trigger, running direction will switch on the falling edge signal to direction input pin. 11: Pulse trigger, running direction will switch on the rising edge signal to direction input pin.	The command is valid when pump stops.
Parameters for the external control mode	Max speed corresponding to the max speed signal	0x0034	uint_16	R/W	Y	GM200: 200 GM400: 400	(min speed set in 0x0035 +1rpm) to the max speed of the pump. Data unit: 0.01rpm Max speed of the pump: GM200: 200rpm GM400: 400rpm	The command is valid when pump stops.
	Max speed corresponding to the max speed signal	0x0035	uint_16	R/W	Y	0	0rpm to (max speed set in 0x0034 -1rpm) Data unit: 0.01rpm	The command is valid when pump stops.
	0-5V speed control, min signal	0x0036	uint_16	R/W	Y	0	0V to (max input set in 0x0037 -1V) Data unit: 0.01V	The command is valid when pump stops.

LONGER Instructions for use of peristaltic pump

Function	Parameter Variable	Register Address	Data Type	Read/Write	Parameter Stored?	Default	Description	Note
Parameters for the external control mode	0-5V speed control, max signal	0x0037	uint_16	R/W	Y	500	(min input set in 0x0036 +1V) to 5V Data unit: 0.01V	The command is valid when pump stops.
	0-10V speed control, min signal	0x0038	uint_16	R/W	Y	0	0V to (max input set in 0x0039 -1V) Data unit: 0.01V	The command is valid when pump stops.
	0-10V speed control, min signal	0x0039	uint_16	R/W	Y	1000	(min input set in 0x0038 +1V) to 10V Data unit: 0.01V	The command is valid when pump stops.
	4-20mA speed control, min signal	0x003A	uint_16	R/W	Y	400	4mA to (max input set in 0x003B - 1.6mA) Data unit: 0.01mA	The command is valid when pump stops.
	4-20mA speed control, max signal	0x003B	uint_16	R/W	Y	2000	(min input set in 0x003A +1.6mA) to 20mA Data unit: 0.01mA	The command is valid when pump stops.
	0-10kHz speed control, min signal	0x003C	uint_16	R/W	Y	0	0 to (max input set in 0x003D-1kHz) Data unit: 1Hz	The command is valid when pump stops.
Running Control	Direction	0x0060	uint_16	R/W	Y	1	0: clockwise 1: counterclockwise	
	Work mode	0x0062	uint_16	R/W	Y	7	4: timer mode 7: continuous mode	

Function	Parameter Variable	Register Address	Data Type	Read/Write	Parameter Stored?	Default	Description	Note
Running Control	Timer duration	0x0065	uint_16	R/W	Y	600	1 - 999	The command is valid when pump stops.
Running Control	Timer unit	0x0066	uint_16	R/W	Y	99	99: 0.1s 100: 1s 101: 0.1min 102: 1min 103: 0.1h 104: 1h	The command is valid when pump stops.
Running Control	Pump speed	0x0069	uint_16	R/W	Y	GM200: 200 Gm400: 400	0 to 999	
Running Control	Speed unit	0x006A	uint_16	R/W	Y	100	98: 0.01rpm 99: 0.1rpm 100: 1rpm	
Running Control	Accumulated run time (most significant byte)	0x0109	uint_16	R/W	N	0	Unit: 10ms Read the register for the accumulated run time Write 0 to the register to reset the accumulated run time.	
Running Control	Accumulated run time (least significant byte)	0x010A	uint_16	R/W	N	0	Unit: 10ms Read the register for the accumulated run time Write 0 to the register to reset the accumulated run time.	

Appendix C Longer Pump OEM Protocol

Parameter default settings: pump address: 1, baud rate: 1200bps, even parity, 1 stop bit

Pump address range: 1-30, and 31 is the broadcast address.

Baud rate options: 1200bps, 9600bps, 19200bps, 38400bps, 115200bps

Parity options: none, even, odd

Stop bit can not be set.

1. Frame format: 1start + 8data + parity + 1stop

1 start bit

8 data bits

1 parity bit (non, odd or even)

1 stop bit

2. Message format: flag+ addr + len + pdu + fcs

flag:E9H, the message head. When sending the message, the data E8H after message head will be replaced with E8H 00H, and E9H after message head will be replaced with E8H 01H. When receiving the message, the data E8H 00H after message head will be reverted to E8H, and E8H 01H after message head will be reverted to E9H. (Note: if E8 00 replaced E8 or E8 01 replaced E9, E8 00 or E8 01 will be regarded as one byte, no influence on the length of pdu.)

addr:one byte, pump address, 1-30. 31 is broadcast address.

len:one byte, length of pdu.

fcs:one byte, XOR of addr, len , pdu.

3. pdu format: application layer code format

3.1 Set the pump running parameters (continuous mode)

Send to the pump:

WJ	Speed (2 bytes)	Full speed and start/stop (1 byte)	Direction (1 byte)
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Pump responds:

WJ

❖ Note: The addr in message can be pump address (1-30) or broadcast address 31. All pumps will operate according to the same command without response when using broadcast address.

3.2 Read the pump running status (continuous mode)

Send to the pump :

RJ

Pump responds :

RJ

Speed (2 bytes)

Full speed and start/stop (1 byte)

Direction (1 byte)

- ✧ Note: When reading the running status, the addr in the message only can be pump address (1-30).

3.3 Set the pump address:

Send to the pump:

WID

Pump responds:

WID

New address (1 byte)

- ✧ Note: When setting the pump address, the addr in the message can be pump address (1-30) or broadcast address 31. When using broadcast address, only one pump should be on the RS485 bus and be set with the new address, and no pump response.

3.4 Read the pump address:

Send to the pump:

RID

Pump responds:

RID

- ✧ Note: When reading the pump address, the addr in the message only can be pump address (1-30). This command is only used to verify the pump address is correct.

3.5 Set the timer duration (timer mode):

Send to the pump:

WM

Time value (2 bytes)

Time unit (1 byte)

Full speed and start/stop (1 byte)

Direction (1 byte)

Pump responds:

WM

Time unit: 99 - 0.1s, 100 - 1s, 101 - 0.1min, 102 - 1min, 103 - 0.1h, 104 - 1h
Time value: 1 - 999.

- ✧ Note: The addr in message can be pump address (1-30) or broadcast address 31. All pumps will operate according to the same command without response when using broadcast address.

✧ Note:

1. If the pump needs to work in the timer mode, use WJ command to set the pump speed first and stop the pump. Then use WM command to set the timer duration, running direction, and start the pump. Then the pump will run in the timer mode, and count down the time. When the pump is running in the timer mode, the pump speed and direction can be changed by WJ command, and in the same command, the start/stop status should be start.
2. To exit the timer mode, use WJ or WM command to stop the pump first. Then use WJ command to start the pump, then the pump will run in continuous mode, and the pump will record the run time automatically.

3.6 Read the pump running status (timer mode)

Send to the pump:

RM

Pump responds:

RM

Time value (2 bytes)

Time unit (1 byte)

Full speed and start/stop (1 byte)

Direction (1 byte)

Time unit: 99 - 0.1s, 100 - 1s, 101 - 0.1min, 102 - 1min, 103 - 0.1h, 104 - 1h
Time value: 1 - 999

Note: When reading the pump status, the addr in the message only can be pump address (1-30).

3.7 Reset the accumulated run time

Send to the pump :

WCT

Pump responds :

WCT

✧ Note: The addr in message can be pump address (1-30) or broadcast address 31. All pumps will operate according to the same command without response when using broadcast address.

3.8 Read the accumulated run time

Send to the pump :

RCT

Pump responds :

RCT

Accumulated run time (4 bytes)

Time unit: 10ms.

✧ Note: When reading the run time, the addr in the message only can be pump address (1-30).

Supplementary Information

1. The ASCII codes of W, R, J, I, D, M, C, T are 57H, 52H, 4AH, 49H, 44H, 4DH, 43H, 54H
2. Pump speed is hexadecimal number, most signification byte first.
GM200: max speed is 200.0 rpm, data unit is 0.1rpm. Example: 07D0H means 200rpm.
GM400: max speed is 400 rpm, data unit is 1rpm. Example: 0190H means 400rpm.
3. Full speed and start/stop control:
Bit0: 1 means pump runs, 0 means pump stops.
Bit1: 1 means full speed, 0 means normal speed.

4. Direction control:

Bit0: 1 means CW, 0 means CCW.

5. addr default setting: 1

6. Examples:

- a. To set the pump GM200 (addr:01) to run clockwise with speed of 200rpm. The command string is as follows:

E9 01 06 57 4A 07 D0 01 01 CD

- b. To set the pump GM400 (addr:01) to run clockwise with speed of 400rpm. The command string is as follows:

E9 01 06 57 4A 01 90 01 01 8B