

dPOFLEX GP/BP02 Industrial Peristaltic Pump Installation and Operation Manual



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dPOFLEX[®] Industrial Peristaltic Pump

Baoding Longer Precision Pump Co.,Ltd.

company

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1. General Instructions

1.1 Statement

- Adhering to the policy of continuous improvement of products, during the continuous improvement, Longer will not provide further notice for any appearance or software upgrades, changes, or production halts.
- Longer reserves the right to make changes to the specifications and materials contained therein without prior notice.
- The screenshots in the Manual may vary depending on the device model and software version you are using.
- The device and pump head shown in the schematic diagram may differ from the actual product, please refer to the actual product.
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1.2 Use and Safety

Please read the Manual carefully before using the system. During the operation of this series of products, please strictly follow the safety precautions in the Manual.

- Tubing rupture may cause fluid to spray out. Please replace it or take appropriate protective measures in time to ensure the safety of operators.
- During tubing disassembly and assembly, please disconnect the power supply of the device and discharge the medium in the tubing completely to ensure that there is no pressure in the pipe system.
- During the connection of control cable, please disconnect the power supply.
- During pump operation, do not touch the rollers.
- If the pump does not operate for a long time, the pressing block that presses the tubing should be released to avoid deformation caused by prolonged compression of the tubing.
- The roller of the pump head should be kept clean and dry, otherwise it will accelerate the wear of the tubing and shorten the service life of the pump head and driver.
- Do not add lubricating oil to the rollers of the pump head by yourself as improper operation may cause the tubing to move or corrode the pump head casing.

- Do not add lubricating oil to the rollers of the pump head by yourself as improper operation may cause the tubing to move or corrode the pump head casing.
- Please connect the power cord, external control communication cable, etc. of the driver correctly. Do not damage the plug.
- The pump head cannot tolerate organic solvents and highly corrosive liquids. Please remove the liquid (if any) on the surface of the pump head in time.

1.3 Quality assurance and after-sales service commitment

1.3.1 Warranty commitments

- (1) The warranty period for the entire product is 3 years, and consumables such as tubing and fittings, etc. are not covered by the warranty.
- (2) Any fault or damage to this product that falls under the following circumstances, regardless of whether it is within the free warranty period, is not covered by the free warranty.
 - The entire product has exceeded the warranty period.
 - Faults or damages caused by improper installation, storage, maintenance, or use by product users who do not follow the Manual.
 - It is not used according to the usage conditions stipulated in the contract or technical agreement.
 - Faults or damages caused by installation, repair, modification, or disassembly of non Longer service agencies and personnel.
 - Faults or damages caused by the use of non original parts or replacement of spare parts that are not purchased from Longer or designated dealers by the user.
 - Faults or damages caused by unexpected factors or human factors (including inappropriate input voltage, corrosion, drops, etc.).
 - Faults or damages caused by force majeure events such as natural disasters, earthquakes, fires, etc.
 - Faults or damages caused by non product design, manufacturing, quality, and other issues.

1.3.2 Maintenance commitments

- If the product malfunctions outside the warranty period, repair and replacement of spare parts will be charged at cost.

- The replacement of parts can be completed within 3 business days. If it cannot be completed within the repair time, an estimated completion date will be notified in advance.

1.3.3 Dispute settlement

Any dispute arising from product quality, service, etc. shall be settled in accordance with the contract or agreement. If there is no contract or agreement, both parties shall negotiate to resolve it, otherwise it shall be handled in accordance with relevant national laws and regulations.

1.3.4 Product repair instructions

To return the product for repair, please contact the Company or authorized dealer in advance, provide the product serial number, and indicate customer contact information and product faults. If the product has been exposed to toxic chemicals or other substances harmful to human health, please clean the product thoroughly before returning it. The product needs to be properly packed in its original packaging or according to standard not lower than the original packaging to prevent damage to the pump during transportation.

2. Product Overview

2.1 Main features

dPFLEX BP02/GP02 is the latest industrial peristaltic pump designed and developed by Longer using high-end technology specifically for general industrial and biological processing applications. Its main features are as follows:

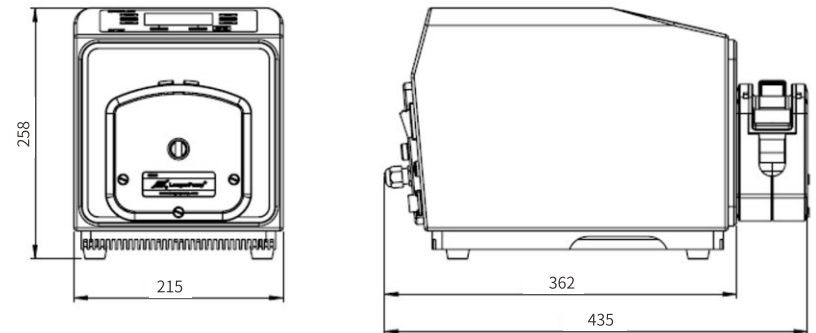
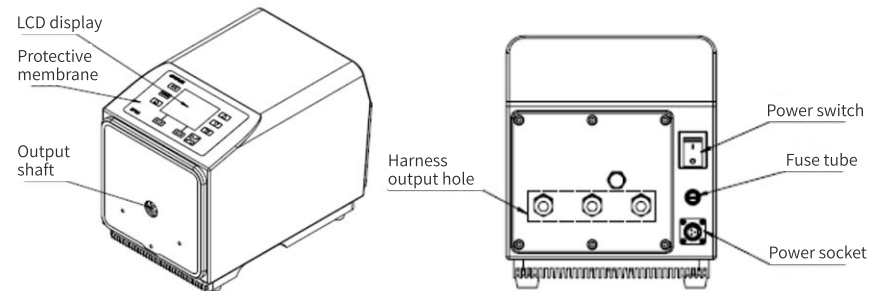
- Available in stainless steel and die-cast aluminum to meet different application needs.
- High protection grade of IP66, suitable for complex and harsh environments.
- Supporting multiple control modes, including key internal control, RS485/Ethernet cable communication control, and remote external control.
- Level 3 user permission management, equipped with electronic signature and audit tracking functions, meeting the requirements of 21CFR Part11 and GMP laboratory.
- Supporting various sensing technologies: flow sensors, pressure tube detection, and pressure sensors, achieving predictive maintenance.

2.2 Unpacking inspection

- (1) Take out the device and accessories from the packing box.
- (2) Check the packing list and confirm that the accessories are intact and complete.
- (3) In case of any issues, please contact our Company or local dealer.

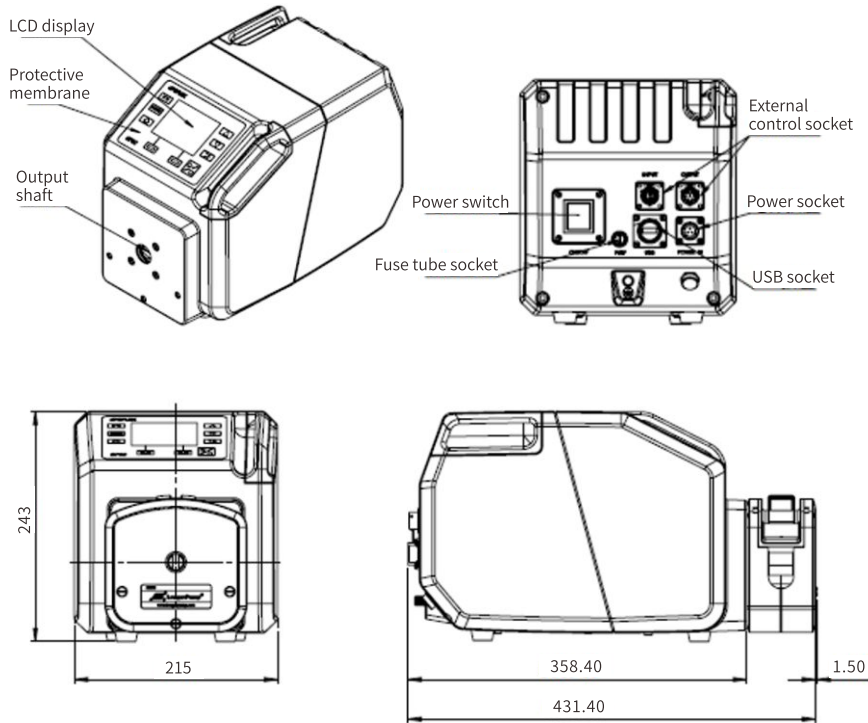
2.3 Drive structure and size

BP02:



Outline Dimensional Drawing of BP02

GP02:



Outline Dimensional Drawing of GP02

2.4 Adaptive pump head, tubing and flow rate

Applicable pump head	Applicable tubing/ silicone tube	Maximum reference flow rate (L/min) (0 suction lift, no pressure, clear water)	Maximum allocation quantity per time under quantitative mode (L)
KZ35-13-D YZ35-13-F	26#	2.00	50.00
KZ35-13-B KZ35-13-D YZ35-13-B YZ35-13-D	73#	4.00	100.00
KZ35-13-B KZ35-13-D YZ35-13-B YZ35-13-D	82#	6.50	162.50
KZ35-13-D YZ35-13-D	82A#	8.00	200.00
KZ35-13-D	184#	9.00	225.00

2.5 Driver cable instructions

- (1) To ensure IP66 protection, you need to install the back cover correctly. For the cable reconnection, additional protection is required for the cable and reconnection module.
- (2) The fuse tube used is a quick recovery fuse tube, with a specification and model of F5A 250V. To replace it, the power supply must be cut off.

2.6 Technical specification

dPOFLEX industrial peristaltic pump		Reference flow rate range (single channel):0.001-9.0L/min	
<p>Available in stainless steel and die-cast aluminum to meet different application needs. High protection grade of IP66, suitable for complex and harsh environments. Supporting multiple fieldbus communications, digital and analog input/output control. Level 3 user permission management and compliance with GMP laboratory requirements Supporting various sensing technologies: pressure tube detection, flow sensor, and pressure sensor</p>			
Applicable pump head		YZ35-13-B, YZ35-13-D, YZ35-13-F, KZ35-13-B, KZ35-13-D	
Product model		GP02	BP02
Main functions	Casing material	Die-cast aluminum	304 stainless steel
	Speed range	1.0rpm - 300rpm, reversible	
	Speed regulation resolution	0.1rpm	
	Display language	Chinese or English available	
	Control mode	Key control, external signal control, and communication control	
	Real-time clock function	Available	
	Operating mode	Flow rate mode, quantitative mode, and calibration mode	
	Flow rate mode	The pump operates continuously according to the set flow rate, and displays the flow rate and speed during operation	
	Flow rate setting range	1.0ml/min-9.0L/min (depending on pump head and tubing)	
	Quantitative mode	According to the set allocation volume, allocation frequency, interval time, and anti-suction parameters, perform continuous automatic quantitative allocation, and display single allocation volume, cumulative allocation volume, and allocation frequency/total frequency during operation	
	Quantitative single allocation range	1mL - 225L (depending on pump head and tubing)	
	Quantitative frequency	1-9999, infinite cycle	
	Quantitative interval time	1-9999 s	
	Anti-suction function	Delay before anti-suction, anti-suction speed, and anti-suction coefficient can be set	

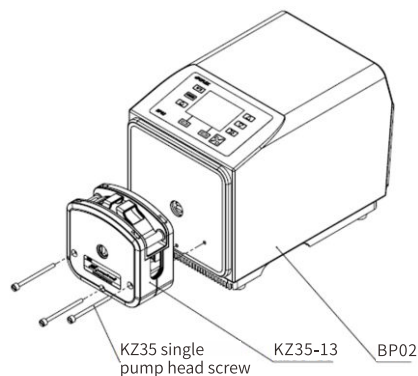
Manual control	Display mode	3.5-inch industrial grade LCD screen	
	Input	Waterproof film key	
	Flow rate calibration	The actual liquid volume value is automatically calibrated after input, and the calibration time can be set	
Communication control	Communication interface	RS485, Profibus (optional)	RS485, industrial Ethernet (optional) Profibus (optional)
	Communication protocol	Support Modbus RTU, Profibus DP	Support Modbus RTU, Modbus TCP/IP (optional) Profibus DP
Analog control	Analog input function	0~5V (10V) analog input 1 channel, 4~20mA analog input 2 channels	
	Digital input function	0~10K Hz frequency input 1 channel	
Remote control	External control trigger	Direction switching trigger, start/stop control trigger	
	Digital output function	None	Frequency-speed output
	External triggering	2-channel relay, dry contact (30VA)	
Safety control	Pressure tube detection	It can be set. If the pressure tube abnormality is detected during operation, the pump will automatically stop operation and prompt an alarm message	
	Power-on operating status	Power-on stop or restoration of the state before power failure can be set (flow rate mode)	
	Parameter memory	Automatically save operation parameters and system parameters	
	Lock the screen to prevent misoperation	Yes	
Sensing detection	Flow rate detection and display function	Flow meter (optional), real-time flow display	
	Pressure detection and display function	Pressure sensor (optional), real-time pressure display	
Compliance	Level 3 permission management function	Administrator, technician, operator	
	Log recording function	Keep operation logs for at least 90 days, which can be viewed and exported	
	3Q verification system	IQ/OQ	
	Certification	CE: UKCA (TUV SUD authoritative certification) Safety specification: EN 61010-1:2010; EMC; EN IEC61000-6-2, EN IEC 61000-6-4	

Physical parameters	Overall dimensions (L*W*H), excluding pump head	215*358*243mm	215*362*258mm
	Applicable power supply	AC100-240V 50/60Hz, maximum power 115W	
	Operating ambient temperature	5-40°C	
	Relative humidity of operating environment	Maximum 100% RH	
	Noise	Less than 70dB	
	Protection grade	IP66	
	Weight (excluding pump head)	≤10.4 kg	≤10.5kg

3. System Installation

3.1 Pump head installation

Taking BP02 driver with KZ35 pump head as an example, the installation steps for GP02 driver and YZ35 pump body are the same.

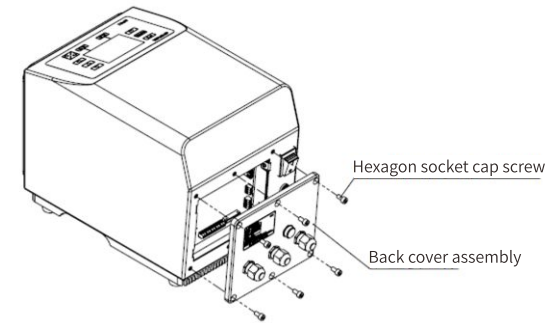


- (1) Align the pump head shaft with the driver shaft slot and insert it into the driver slot;
- (2) Secure the pump head and driver together using three single pump head screws.

3.2 Disassembly and assembly of back cover

For wiring control, it is necessary to remove the back cover of BP02. The schematic diagram is shown below :

BP02:



Disassembly and assembly method of back cover

Disassembly method: Remove the six M5 hexagon socket cap screws that secure the back cover assembly to remove the back cover;

Assembly method: Install the back cover into the opening of the rear casing, align the screw holes, and fix it with six M5*10 hexagon socket cap screws.

Note:

- During the disassembly and assembly, be careful not to let the sealing ring come out of the sealing groove.
- The external wiring of GP02 can be led out through external control sockets and USB sockets without disassembly.

3.3 Tubing installation

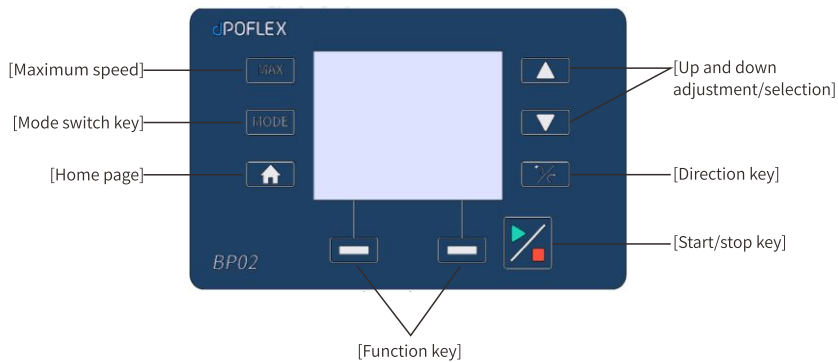
See KZ35 and YZ35 pump head manuals for details.

4. Use and Operation




4.1 Icon instructions

	: Longer logo		: Flow sensor
	: Flow rate mode		: Pressure sensor
	: Quantitative mode		: Fault icon
	: Calibration mode		: Safety lock enable
	: Standby status		: Safety lock disable
	: Rotating during operation		: Ethernet module

4.2 Operation panel instructions



4.3 Operating mode instructions


GP02/BP02 supports three operating modes: flow rate mode , quantitative mode , and calibration mode , which can be cyclically switched through the MODE key. In case that the flow rate parameters of any of the three operating modes are changed, the flow rate of the other two modes are changed synchronously.

4.3.1 Flow rate mode 



Flow rate mode: the mode in which the pump operates continuously according to the set flow rate (speed). The flow rate mode supports power-off state memory function.

You can use the [Parameter] function key to set flow rate mode parameters, including flow rate values, units, and power-on operating status.

- The flow rate mode supports real-time flow rate adjustment through the  key during standby mode and operation, with synchronous speed changes.
- After enabling the [Power-on Memory], the pump can restore its state before the power outage when it is powered on again after an unexpected power outage. If the pump is in operation before the power outage, when it is powered on again after the power outage, the pump will continue to operate according to the parameters before the power outage.
- During standby operation in flow rate mode, the pump can be operated at full speed by long pressing the full speed key for quick emptying/anti-suction.
- After enabling the input of pressure sensors and flow sensors, it supports the display of values for pressure sensors and flow sensors.

Note :

- The default startup speed for flow rate mode is 1 s.
- The flow sensor and pressure sensor are optional. See the “interface instructions” for the wiring method; See Appendix "Accessory Parameters" for specific parameters.

See function description in "home page/flow rate mode" for flow rate mode display and operation description.

4.3.2 Quantitative mode



Quantitative mode: the mode in which the pump operates according to the set quantitative parameter intervals. Quantitative mode supports the setting of slope speed and anti-suction parameters

Enter quantitative parameter settings through the [Parameter] function key, including allocation parameters, slope speed, and anti-suction parameters.

Allocation parameter: the allocation parameters include flow rate, liquid volume, allocation interval, and allocation frequency, and the infinite cycle allocation operation is supported.

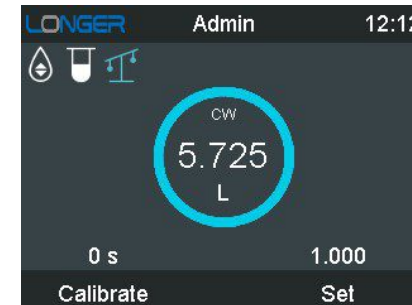
Slope speed: the slope speed (the motor accelerates from 0 to the set speed value) can be set according to actual needs, which is divided into 1-5 levels. The higher the number of levels is, the longer the startup time will be. When the viscosity of the liquid is high, a larger slope gear can be set to prevent bubbles in the tubing caused by rapid start-up.

Anti-suction parameter: the anti-suction parameters include the delay before anti-suction, anti-suction coefficient, and anti-suction speed parameters. When there is dripping during the allocation, different filling needles can be connected to the tubing and anti-suction parameters can be set to prevent dripping problems and ensure allocation accuracy.

- Quantitative mode does not support real-time flow rate adjustment during operation.
- During standby operation in quantitative mode, the pump can be operated at full speed by long pressing the full speed key for quick emptying/anti-suction .
- Quantitative mode does not support power-off memory function.

See function description in "home page/quantitative mode" for specific display and operation description.

4.3.3 Calibration mode



Calibration mode: the function of calibrating the liquid volume by inputting the measured liquid volume value after the pump operates according to the set flow rate and calibration time.

After setting the flow rate and calibration time parameters through the [Calibration] function key, return to the calibration page. After the operation, confirm the generation of calibration coefficients by setting the measured liquid volume through the [Calibration] function key.

- It supports direct input of measured liquid volume for calibration without operation.

- If manually stopped before reaching the set operating time during operation, the theoretical liquid volume will be displayed according to the actual operating time.
- After calibration, the calibration coefficient will be synchronized to the flow rate and quantitative modes.

See function description in "home page/calibration mode" for specific display and operation description.

Note : When operating in calibration mode, it will operate at the slope speed set in quantitative mode.

4.4 Control mode instructions

GP02/BP02 supports three control modes: internal control mode, external control mode, and communication mode.

Note :

- The external control mode only supports the operation in flow rate mode and does not support quantitative and calibration operating modes.
- The communication mode supports both flow rate and quantitative modes, but does not support calibration mode.

4.4.1 Internal control mode

The internal control mode is the default operating mode of the pump. The key of the protective membrane is used for parameter adjustment, direction, start/stop control. In the internal mode, "Local Ctrl" will be displayed on the home page.



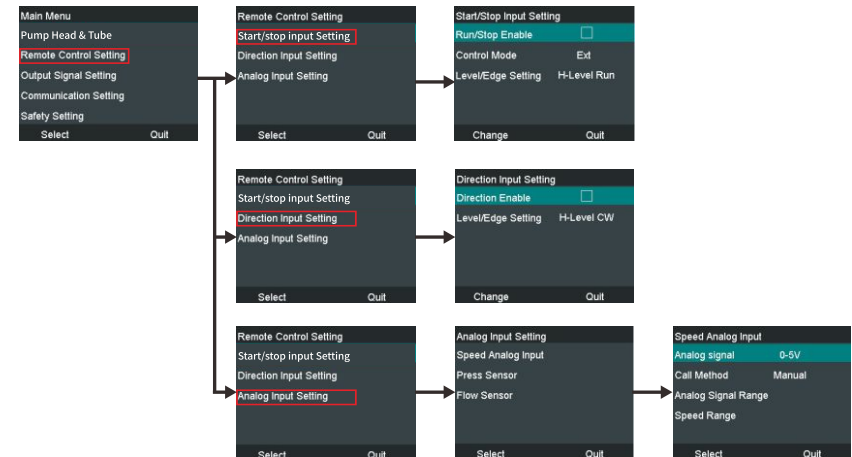
4.4.2 External control mode

The external control mode uses external control signals to remotely control the speed, direction, and start/stop of the pump. After enabling the start/stop of the input control is enabled and selecting [Ext Ctrl] as the control mode, the external control mode is effective and [Ext Ctrl] is displayed on the home page.



If the external control mode is selected, it is necessary to set the start/stop input, direction input, and speed analog input. See "input control" section for the specific setting methods.

Procedure of setting external control mode:



(1) External control start/stop signal

Input and set corresponding start/stop digital signals at the STAT and G pins of the external control terminal to control the start/stop status of the pump. It supports level input signals and pulse input signals. See "interface instructions" section for specific signal instructions

When the level mode is selected to trigger, the external control START pin will trigger and be effective after receiving a level change. If [High Level Start] is selected, the pump will start when START receives a signal that changes from low to high level, and stop when it receives a signal that changes from high to low; If the pulse triggering mode of rising edge switching or falling edge switching is selected, the external control START pin switches the start/stop status when a pulse signal is given. For example, if [Rising Edge] is selected, the pump starts when the rising edge is received in standby mode, and stops when the rising edge is received again.

(2) External control direction signal

Input and set corresponding direction digital signals at the corresponding DIR and G input pins of the external control terminal to control the direction status of the pump. It supports level input signals and pulse input signals. See "interface instructions" section for specific signal instructions.

If the level mode is selected to trigger, the external control DIR pin will be effective after a level change is received. For example, if [High Level Clockwise] is selected, when the DIR pin receives a signal that changes from low level to high level, the pump will be clockwise. When it receives a signal that changes from high level to low level, the pump will be counterclockwise; If the pulse triggering mode of rising edge switching or falling edge switching is selected, the direction switches when the external control DIR pin detects the pulse signal. For example, if [Rising Edge] is selected, the pump receives the rising edge clockwise, and switches to counterclockwise, and it will switch to clockwise when it receives the rising edge again.

(3) External control speed input

The speed control inputs for GP02/BP02 include: 0-5V/0-10V/0-10Khz and 4-20mA inputs. The selection of speed input source and the corresponding relationship with speed can be set in [Input Control]/[Analog Input Settings]/[Speed Analog Input Settings]. See "input control" section for details.

Among them, 0-5V/0-10V/0-10K correspond to the same terminal V_F+, V_F, and 4-20mA input corresponds to 4-20mA_1. See "interface instructions" section for specific signal instructions.

Note : The external control mode only supports the flow rate operating mode, and it cannot switch to the quantitative and calibration pages in the external control mode.

4.4.3 Communication mode

BP02 supports communication and control of pumps through RS485 and Ethernet communication on the upper computer, and supports Modbus RTU and Modbus TCP/IP protocols. See Appendix for the register definitions. GP02 only supports RS485 communication to control the pump. After enabling [Communication Control], the communication mode is effective and the "Communication" is displayed on the home page.



RS485 communication control mode requires settings for communication address, communication baud rate, parity bit, stop bit, etc. See [Communication Control] for the specific setting methods.

Ethernet communication control mode requires DHCP enable/disable and manual network settings, including port number, IP address, subnet mask, and gateway parameters.

The procedure for setting RS485 and Ethernet communication modes is as follows:



RS485 corresponds to communication terminals A and B, while Ethernet corresponds to communication terminals TX+ TX- RX+ RX. See "interface instructions" section for specific signal instructions.

Note : The communication mode does not support calibration operating mode. If calibration is required, it must be completed in internal control mode before switching to external control.

4.4.4 Relationship between three control modes

1. The internal control mode supports external start/stop signal input control (e.g., pedal signal), which needs to be configured in the [Input Control]/[Start/Stop Input Settings] to enable the start/stop signal, and [Pedal] needs to be selected in the control mode. When the pump receives the external control start/stop signal, it will operate according to the speed and direction set by the keys in the internal control mode, and support key start/stop operation.
2. In standby state of external control and communication mode, the start/stop and direction keys are ineffective. In operation state of external control and communication modes, the device can be stopped and switched to internal control mode by long pressing the start/stop key.

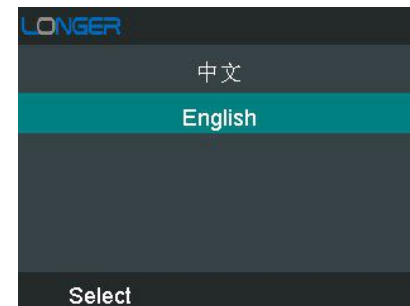
3. To switch to internal control mode (non pedal mode) in external control and communication mode, it is necessary to disable the start/stop enable in the start/stop input settings under external control or disable communication enable under communication control.
4. The start/stop enable and communication enable under input control can only be enabled for one item.

4.5 Startup login

(1) After startup, the following Logo screen will be displayed.

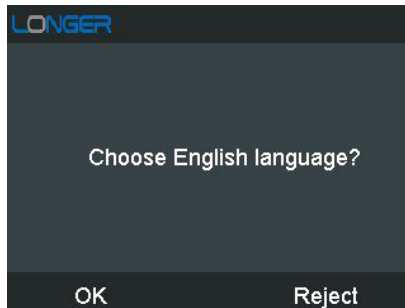


(2) If the system is started for the first time, it will enter the following interface to select the language. If the system is not started for the first time, it will skip this interface and directly display the home page of Step 4.



- Click [▲] and [▼] keys to switch between languages (Chinese, English).
- Click the key below [Select] to confirm the selected language.

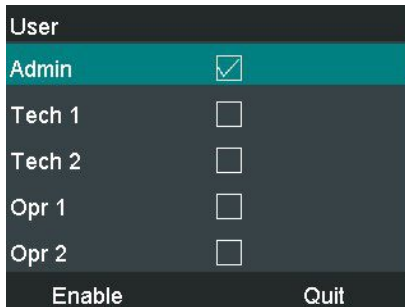
(3) Click the [Select] key to confirm the selected language.



- Click the [Confirm] key to enter the login page, and click the [Reject] key to return to Step 2 and re-select the language.

Note : If the driver is started for the first time, a language selection page appears. Afterwards, it will directly enter the user selection page. To change the language later, switch it in the "System Settings/Language" option.

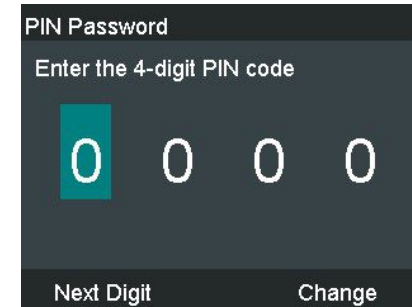
(4) After language selection, enter the user selection page.



Select the account you want to log in to through [▲] and [▼] keys, and click the [Select] key to enter the password input page.

Note : You can only log in after the account is enabled. See the "Security Settings/PIN Password Protection" settings for user activation and password settings.

(5) Password input page



- Click [▲] and [▼] keys to adjust the current digit. Click [Next Digit] key to move to the next digit. [Confirm] key will be displayed at the bottom left corner when you move to the last digit. After clicking [Confirm], if it is the password of the current username, the interface will enter the home page.
- After click the [Change] key, all four digits of the PIN will be reset to zero.
- The default username and password are [Administrator] and 1234 respectively.
- If you enter an incorrect password, a message will appear below the password saying "Invalid password, please re-enter". Click [Change] to re-enter the password.

4.6 Home page

4.6.1 Flow rate mode display and operation

The following figure shows the default screen after the first startup (default mode is flow rate mode).



Flow rate mode interface

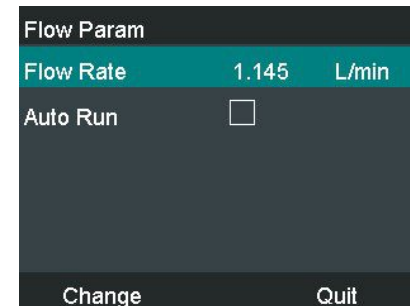
Interface display instructions:

- (1) The startup default mode is flow rate mode. The flow rate mode icon in the upper left corner of the display area lights up, while the other two mode icons are white. From left to right are icons for flow rate mode, quantitative mode, and calibration mode respectively.
- (2) The current flow rate and unit are displayed in the middle of the screen, clockwise/counterclockwise (CW/CCW). The screen rotating ring remains stationary in standby or stop mode, and dynamically rotates during operation.
- (3) The parameters displayed below the display area are tubing, current flow rate corresponding speed, and speed/full speed percentage from left to right.
- (4) When the flow sensor or pressure sensor is set in the analog settings of the input settings, it will be displayed on the flow rate mode page. The left side displays the flow sensor, and the right side displays the pressure sensor.
- (5) The flow sensor icon is displayed along with its value when the flow sensor is set in the [Analog Settings] of the [Input Settings].
- (6) The pressure sensor icon is displayed along with its value when the flow sensor is set in the [Analog Settings] of the [Input Settings].

Operation instructions:

- (1) Click to start/stop the pump operation.

- (2) During operation and in a stopped state, the speed can be adjusted by pressing . Click to increase and to decrease, long press to speed up. The adjustable speed range is 0.1-300rpm.
- (3) Click the key to switch the direction of the pump during operation and in a stopped state.
- (4) Click the key to operate the pump at its maximum speed during operation and in a stopped state.
- (5) When the pump is stopped, press the key to switch modes on the interface.
- (6) The appearance of key lock indicates that the key lock function has been enabled and the screen is locked. If not operated for 20 s during operation, a lock icon will appear. Two function keys can be pressed simultaneously to unlock.
- (7) The fault icon indicates that the device has malfunctioned, and the corresponding fault information will pop up on the interface when a fault occurs. See Appendix "Fault Prompt" for details.
- (8) [Parameter] function key When you click the [Parameter] function key in standby mode, the parameter settings page for the flow rate mode will appear, where you can set the flow rate value and power-on operating status.



Flow rate parameter interface

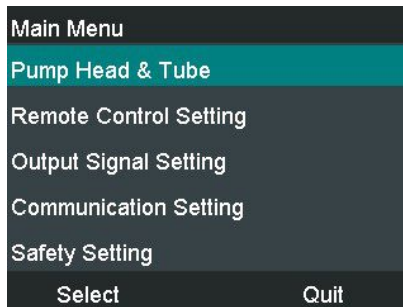
- Flow rate: Set the values within the flow rate range corresponding to the current pump head and tubing. See Section 2.4 for the flow rate range corresponding to different pump head tubing. Click the [Change] function key to switch between values/units. After selecting the

value/unit, you can adjust the value and unit through [▲] and [▼] keys. When adjusting the value, you can quickly adjust it by long pressing [▲] and [▼] keys. Select and click the [Confirm] function key to return to the previous page.

- Power-on operating status: When enabled, the pump will maintain the standby/operating status before the last power outage when powered on again after a power outage.

Note : The power-on operating status only applies to the internal control mode and does not include the pedal mode.

- (9) [Settings] function key. After clicking the [Settings] function key, the main menu page will appear, where you can set and view options such as pump head tubing, input control, output signal, communication control, safety settings, system, etc.



Main menu parameters

4.6.2 Quantitative mode display and operation

Click the [MODE] key on the panel in non quantitative mode to switch to quantitative mode. The home page of the quantitative mode is shown in the following figure.




Quantitative mode interface

Interface display instructions:

- (1) The quantitative mode icon in the upper left corner of the display area lights up, while the other two mode icons are white. From left to right are icons for flow rate mode, quantitative mode, and calibration mode respectively.
- (2) The current cumulative allocation quantity and unit are displayed in the middle of the screen, clockwise/counterclockwise (CW/CCW). The screen rotating ring remains stationary in standby or stop mode, and dynamically rotates during operation.
- (3) The parameters displayed below the display area are the single allocation quantity, current operating frequency/total frequency from left to right.









Operation instructions:





















- (1) Click to start/stop the pump operation.
- (2) When the pump is stopped, click the key to change direction.
- (3) When the pump is stopped, click the key to operate the pump at maximum speed.
- (4) When the pump is stopped, press the key to switch modes on the interface.
- (5) The appearance of key lock indicates that the key lock function has been enabled and the screen is locked. If not operated for 20 s during operation, a lock icon will appear. Two function keys can be pressed simultaneously to unlock.

- (6) The fault icon  indicates that the device has malfunctioned, and the corresponding fault information will pop up on the interface when a fault occurs. See Appendix "Fault Prompt" for details.
- (7) [Parameter] function key. After clicking the [Parameter] function key, the allocation parameter settings page for the quantitative mode will appear, where you can set the flow rate, allocation quantity, interval time, cycle number, and anti-suction parameters.

Filling Param		
Flow Rate	1.145	L/min
Dispense	1.138	L
Ramp Speed	3	
Interval	1	s
Cycles	1	time
Change		OK

Allocation parameter

- Flow rate: Set the values within the flow rate range corresponding to the current pump head and tubing. See "Adaptive pump head, tubing and flow rate" section for the flow rate range corresponding to different pump head tubing. Click the [Change] function key to switch between values/units. After selecting the value/unit, you can adjust the value and unit through  and  keys. When adjusting the value, you can quickly adjust it by long pressing  and  keys. Select and click the [Confirm] function key to return to the previous page.
- Allocation quantity: Set the single allocation quantity value and unit. Click the [Change] function key to switch between values/units. After selecting the value/unit, you can adjust the value and unit through  and  keys. When adjusting the value, you can quickly adjust it by long pressing  and  keys. Select and click the [Confirm] function key to return to the previous page. The maximum value can be 999L.
- Slope speed: The slope speed can be set to 1-5 levels. Corresponding relationship between gear and startup time: 1-0.1s; 2-0.3s; 3-1s; 4-3s,5-10s.

- Interval time: Set the interval time between two allocations. Click the [Change] function key to enter the interval time settings, adjust the value through  and  keys, and long press  and  keys for quick adjustment, with a range of 1-9999s.
- Cycle number: Set the number of repetitions for allocation. Click the [Change] function key to enter the interval time settings, adjust the value through  and  keys, and long press  and  keys for quick adjustment, with a range of 0-9999s, of which 0 means infinite cycle.
- Slope speed: Set the acceleration time for the pump to reach the target speed from startup. The slope speed is divided into 1-5 levels, with 1 representing 0.1s, 2 representing 0.3s, 3 representing 1s, 4 representing 3s, and 5 representing 10s. The suitable slope speed can be selected based on the viscosity of the liquid. The higher the viscosity of the liquid is, the longer the selection time will be.
- Delay before anti-suction: Set a delay with anti-suction function. Click the [Change] function key to enter the parameter settings, adjust the value through  and  keys, and long press  and  keys for quick adjustment, with a range of 0-10s.
- Anti-suction coefficient: Set the anti-suction coefficient with anti-suction function. Click the [Change] function key to enter the parameter settings, adjust the value through  and  keys, and long press  and  keys for quick adjustment, with a range of 0-30. 1 represents 120°.
- Anti-suction speed: Set the anti-suction speed with anti-suction function. Click the [Change] function key to enter the parameter settings, adjust the value through  and  keys, and long press  and  keys for quick adjustment, with a range of 0-300rpm.

Note : If dripping occurs after filling, you can set the anti-suction parameters to prevent dripping. To reduce dripping, suitable filling needles can be used in conjunction for vertical filling.




- (8) [Settings] function key is consistent with the flow rate mode [Settings] function keys.

4.6.3 Calibration mode display and operation





Click the [MODE] key on the non calibration mode panel to switch to calibration mode. The home page of calibration mode is shown in the figure below.




Interface display instructions:

- (1) The calibration mode  icon in the upper left corner of the display area lights up, while the other two mode icons are white. From left to right are icons for flow rate mode, quantitative mode, and calibration mode respectively.
- (2) The current cumulative allocation quantity and unit are displayed in the middle of the screen, clockwise/counterclockwise (CW/CCW). The screen rotating ring  remains stationary in standby or stop mode, and dynamically rotates  during operation.
- (3) The parameters displayed below the display area are calibration time and calibration coefficient from left to right.

Operation instructions:

- (1) Click  to start/stop the pump operation
- (2) When the pump is stopped, click the  key to change direction.
- (3) When the pump is stopped, click the  key to operate the pump at maximum speed.
- (4) When the pump is stopped, press the  key to switch modes on the interface.

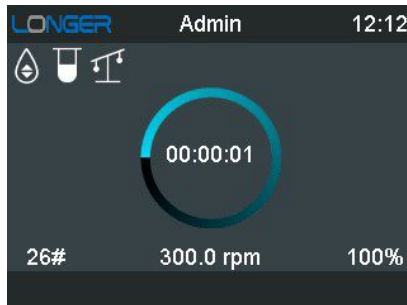
- (5) The fault icon  indicates that the device has malfunctioned, and the corresponding fault information will pop up on the interface when a fault occurs. See Appendix "Fault Prompt" for details
- (6) [Calibration] function key. After clicking the [Calibration] function key, the parameter settings page of the calibration page will appear, where you can set measured liquid volume, flow rate, and calibration time. The theoretical liquid volume and calibration coefficient are displayed values.

Cal Param		
Actual Volume	5.725	L
Flow Rate	1.145	L/min
Calibration Time	5	min
Target Volume	5.725	L
Coefficient	1.000	
Change		Quit

- Measured flow rate: After calibration, click the [Change] function key to switch between values/units. After selecting the value/unit, you can adjust the value through [▲] and [▼] keys. When adjusting the value, you can quickly adjust it by long pressing [▲] and [▼] keys. Select and click the [Confirm] function key to return to the previous page.
- Flow rate: Before calibration, you can set the values within the flow rate range corresponding to the current pump head and tubing. See Section 2.3.2 "Adaptive pump head and tubing" for the flow rate range corresponding to different pump head tubing. Click the [Change] function key to switch between values/units. After selecting the value/unit, you can adjust the value and unit through [▲] and [▼] keys. When adjusting the value, you can quickly adjust it by long pressing [▲] and [▼] keys. Select and click the [Confirm] function key to return to the previous page.

- Calibration time: Set the calibration time, click the [Change] function key to set the interval time, and adjust the value through [▲] and [▼] keys, with a range of 1-5 min. After the calibration time is set, a countdown will be displayed on the home page. When the calibration ends before the calibration time is reached, the theoretical liquid volume will be calculated based on the actual calibration time.
- Theoretical fluid volume: Set flow rate and calibration time. Theoretical liquid volume = flow rate * calibration time (actual operating time).
- Calibration coefficient: The calibration coefficient is the ratio of theoretical capacity to measured capacity, with a range of 0.5-1.5. When the calibration coefficient exceeds the limit or the corresponding speed after calibration exceeds the limit, a range exceeding prompt will be given, and the input is invalid.
- Click the function key below the [Accept] key to save and exit.
- To reset the calibration coefficient to 1, you can first select any other pump head or tubing model, and then reselect the required pump head or tubing model.

4.6.4 MAX mode display and operation

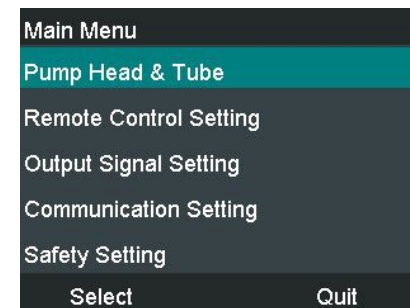


- (1) When the device is idle, long press the [MAX] key in any mode, at this time, the home page will switch to the page shown in the figure above.
- (2) When the device is in operation, the MAX key can only be enabled in flow rate mode, and the MAX function will not be enabled during operation in the other two modes.

- (3) Long press MAX to start the stopwatch timer in the middle display area. The rotation direction of the right rotating ring depends on the current direction setting value.
- (4) The parameters displayed below the display area are current tubing specifications, maximum speed of 300RPM and full speed ratio of 100% from left to right. (The maximum value may vary depending on the configuration of different tubing and pump heads.)
- (5) In case of long pressing MAX key, all keys on the panel except for the MAX key are disabled.
- (6) Release the MAX key to stop the pump (if released during operation, it will return to the previous speed), and restore the operating mode and all parameter settings before pressing.

4.7 Setup page

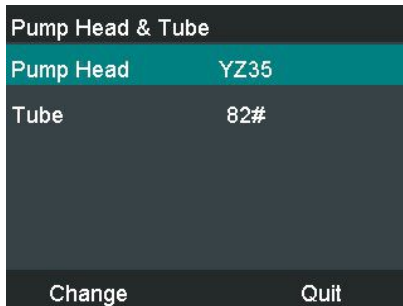
Under the home page of any mode, click [Setting] to enter the home page of setting.



From top to bottom are [Pump Head Tubing], [Input Control], [Output Signal], [Communication Control], [Safety Settings], and [System Settings].

4.7.1 Pump head tubing

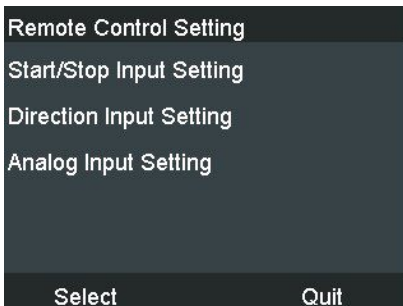
On the home page, click [▲] and [▼] keys to select [Pump Head Tubing]. The list of tubing supported by each pump head is different. After selection of the pump head, the tubing list in the tubing specification settings should be adjusted accordingly. The corresponding table for the pump head tubing specifications is shown in [Adaptive Pump Heads and Tubing].



Click the [Change] function key to enter the pump head/tubing settings page. Use [▲] and [▼] keys to switch options. After replacement of the pump head, if the currently selected tubing specification does not support the selected pump head, the tubing specification will automatically switch to the default tubing specification that supports this model of pump head. Click the [Confirm] function key to return to the previous page.

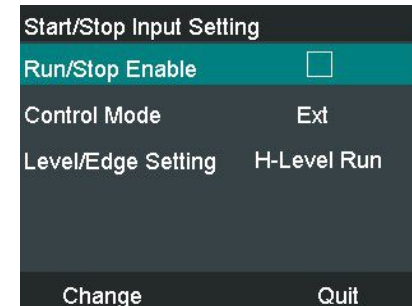
4.7.2 Input control

On the home page, click [▲] and [▼] keys to select [Input Control]. Set external input signal control related functions in the input control options, including startup input settings, direction input settings, and analog input settings.



4.7.2.1 Start/stop input settings

Under the input control page, select [Start/Stop Input Settings] through [▲] and [▼] keys to enter the settings page. The start/stop input settings include start/stop enable, control mode, and level/pulse settings. The start/stop control signal corresponds to the START pin of the external control. See "interface instructions" section for details.

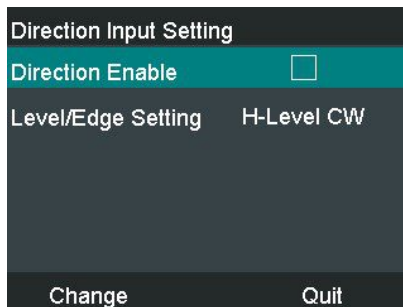


- (1) Start/stop enable: Enable and disable operations through the [Change] function key. After enabling , the external start signal START control is effective.
 - (2) Control mode: The control mode options include [External Control] and [Pedal]. Select the control mode through [▲] and [▼] keys, and click the [Select] function key to enter the control mode change page. Click [▲] and [▼] keys to switch between [External Control] and [Pedal]. Click the [Confirm] function key to return to the previous page.
- External control: When selecting the external control mode, you can set the correspondence between analog quantity and speed by configuring the [Speed Analog Input Settings] in the [Analog Input Settings]. The analog current control signal is input into the 4-20mA_1 analog input interface. The external control mode is only suitable for flow rate mode. When the external control mode is selected and the start/stop is enabled, the "external control" is displayed on the flow rate mode page. During the operation of external control mode, long press the start/stop key of protective membrane to perform local stop operation. It will automatically switch to internal control mode after stopping.
 - Pedal: If the pedal mode is selected, when the START pin receives a signal corresponding to the set start signal, the driver operates according to the internal control parameters. The pedal signal and the start/stop key of the driving protective membrane can jointly control the driving flow rate, quantitative and calibration modes. When the pedal mode is selected, the "internal control" is displayed on the home page of flow rate mode.

(3) Level/pulse settings :The level/pulse settings include high-level start, low-level start, rising edge, and falling edge. Select [Level/Pulse Settings] through [▲] and [▼] keys, and click the [Select] function key to enter the option change page. Click [▲] and [▼] keys to switch between [High-level Start], [Low-level Start], [Rising Edge], and [Falling Edge]. Click the [Confirm] function key to return to the previous page.

4.7.2.2 Direction input settings

Under the input control page, select [Start/Stop Input Settings] through [▲] and [▼] keys to enter the settings page. Direction input settings include direction enable, level/pulse setting, and corresponding external control DIR pin for direction control signals. See the "interface instruction" section for details.

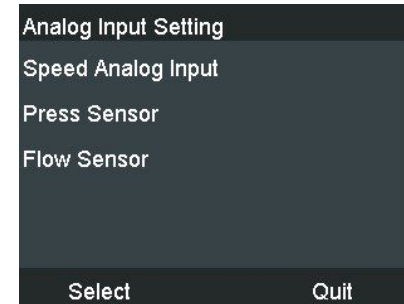


- (1) Direction enable: Enable and disable operations through the [Change] function key. After enabling, the external direction signal DIR control is effective.
- (2) Level/pulse settings: Select [Level/Pulse Settings] through [▲] and [▼] keys, and click the [Select] function key to enter the option change page. Click [▲] and [▼] keys to switch between [High-level Clockwise], [Low-level Clockwise], [Rising Edge], and [Falling Edge]. Click the [Confirm] function key to return to the previous page.

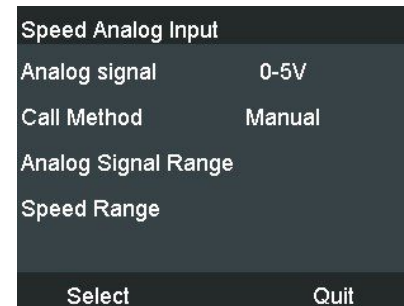
4.7.2.3 Analog input settings

Under the input control page, select [Analog Input Settings] through [▲] and [▼] keys to enter the settings page. The analog input settings include speed analog input settings, pressure sensor settings, and flow sensor settings. The analog input interface includes 2 analog current input

interfaces and 1 voltage/frequency input interface. The analog current input corresponds to mA_1 and mA_2 of the external control, and the voltage/frequency input interface corresponds to V_F. See "interface instructions" section for details.



- (1) Speed analog input settings: Under the analog input settings page, select [Speed Analog Input Settings] through [▲] and [▼] keys to enter the settings page. When the external control mode is selected, the external control will operate at the speed corresponding to the analog input signal when starting.



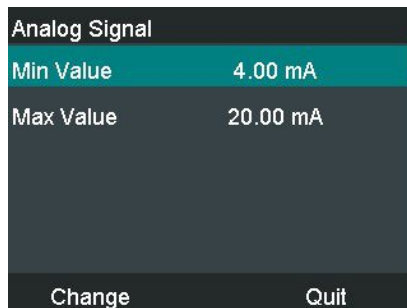
- Signal type: Select [Signal Type] through [▲] and [▼] keys, and click the [Select] function key to enter the option change page. Click [▲] and [▼] keys to switch between [0-5v], [0-10v], [0-10KHz], and [4-20mA_1]. Click the [Confirm] function key to return to the previous page.
- Different analog signals correspond to different external control interfaces. See the "interface instructions" section for details.

- Calibration mode settings : Select [Calibration Method Settings] through [▲] and [▼] keys, and click the [Select] function key to enter the option change page. Click [▲] and [▼] keys to switch between [Manual] and [Automatic], and click the [Confirm] function key to return to the previous page.

When the calibration method is set to manual, the analog signal range needs to be manually set

When the calibration mode is set to automatic, the upper and lower limits of the analog signal range are obtained by reading the external analog input values in real time.

- Analog signal range : Select [Analog Signal Range] through [▲] and [▼] keys to enter the settings page and set the maximum and minimum value ranges. The maximum and minimum value ranges set form a linear correspondence with the maximum and minimum speed range.



Analog Signal	
Min Value	4.00 mA
Max Value	20.00 mA
Change Quit	

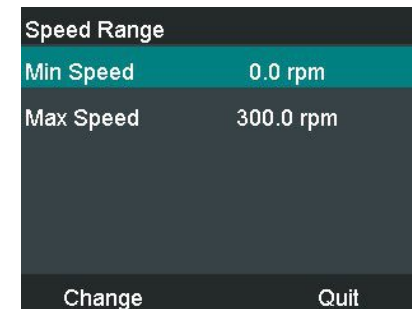
When the manual mode is selected, click [Change] and adjust the value through [▲] and [▼] keys, with the maximum value not exceeding the maximum value of the signal type range. The difference between maximum and minimum value ranges of the analog current signal is greater than 1.6mA; The difference between maximum and minimum value ranges of the analog voltage signal is greater than 1V; The difference between the maximum and minimum values of the frequency signal is greater than 1000Hz.

When the automatic mode is selected, the minimum and maximum values are read from the analog signal input terminal corresponding to the signal type. When the minimum value is selected, the analog signal input terminal provides the minimum value. When the maximum value is selected, the analog signal input terminal provides the maximum value.

When [0-5v], [0-10v], and [0-10KHz] signals types are selected, the corresponding external control analog signal input terminal is V_F. See "interface instructions" section for details.

When 4-20mA_1 signal type is selected, the corresponding external control analog signal input terminal is mA_1. See "interface instructions" section for details.

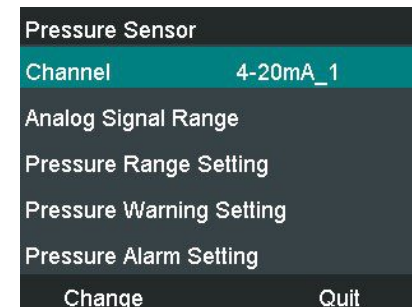
- Speed range settings :Select [Speed Range Settings] through [▲] and [▼] keys to enter the settings page and set the maximum and minimum value ranges.



Speed Range	
Min Speed	0.0 rpm
Max Speed	300.0 rpm
Change Quit	

Click [Change], adjust the value through [▲] and [▼] keys, with a maximum speed not exceeding 300rpm.

- (2) Pressure sensor settings:Select [Pressure Sensor Settings] through [▲] and [▼] keys to enter the settings page. Set this option when the pressure sensor accessory is connected.



Pressure Sensor	
Channel	4-20mA_1
Analog Signal Range	
Pressure Range Setting	
Pressure Warning Setting	
Pressure Alarm Setting	
Change Quit	

LONGER Instructions for use of peristaltic pump

- Channel type : On the pressure sensor settings page, select [Channel Type] through [▲] and [▼] keys to enter the settings page, click [Change], and then switch between [Disable], [4-20mA_1], and [4-20mA-2] through [▲] and [▼] keys.

Note : When the analog signal interface is selected for the speed analog input or flow sensor settings, the channel type here can only be switched between the currently available options.

- Analog signal range: On the pressure sensor settings page, select [Analog Signal Range] through [▲] and [▼] keys to enter the maximum and minimum value settings page. The maximum and minimum value ranges set correspond to the maximum and minimum pressure range.

Analog Signal	
Min Value	4.00 mA
Max Value	20.00 mA
Change	Quit

Click [Change] and adjust the value through [▲] and [▼] keys, with the maximum value not exceeding the maximum value of the signal type range. The difference between maximum and minimum value ranges of the analog current signal is greater than 1.6mA

- Pressure range settings : On the pressure sensor settings page, select [Pressure Range Settings] through [▲] and [▼] keys to enter the maximum and minimum value settings page. Click [Change], and adjust the value through [▲] and [▼] keys. The minimum value shall not be less than -1 bar, and the maximum value shall not exceed 5 bar.

LONGER Instructions for use of peristaltic pump

Press Range Setting	
Min Value	0.00 bar
Max Value	5.00 bar
Change	Quit

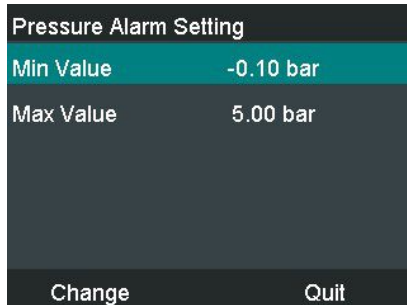
Note : The pressure sensor range set should correspond to the actual pressure range value of the pressure sensor used. The pressure range of the Longer pressure sensor accessory GPT235 is -1-3 bar.

- Pressure warning settings : On the pressure sensor settings page, select [Pressure Warning Settings] through [▲] and [▼] keys to enter the pressure warning upper and lower limit range settings page.

Pressure Warning Setting	
Min Value	0.00 bar
Max Value	4.00 bar
Change	Quit

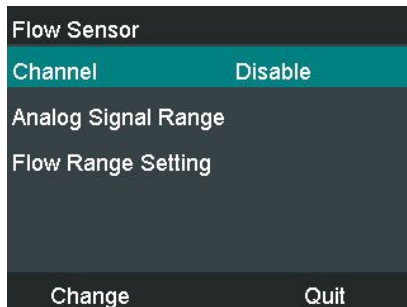
When the pressure warning value is set, if the feedback value from the pressure sensor during the flow rate mode is greater than the maximum value or less than the minimum value, the pump will give a warning prompt, and the pressure value on the flow page will turn yellow without shutdown.

- Pressure alarm settings : On the pressure sensor settings page, select [Pressure Alarm Settings] through [▲] and [▼] keys to enter the pressure warning upper and lower limit range settings page.



When the pressure alarm value is set, if the feedback value from the pressure sensor during the flow rate mode is greater than the maximum value or less than the minimum value, the pump will give an alarm prompt and stop.

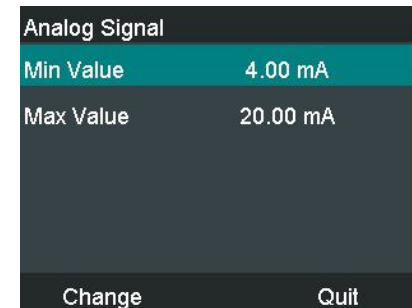
- (3) Flow sensor settings : Select [Flow Sensor Settings] through [▲] and [▼] keys to enter the settings page. Set this option when the flow sensor accessory is connected.



- Channel type : On the flow sensor settings page, select [Channel Type] through [▲] and [▼] keys to enter the settings page, click the [Change] function key, and then switch between [Disable], [4-20mA_1], and [4-20mA-2] through [▲] and [▼] keys.

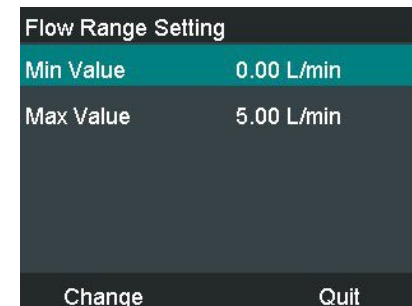
Note : When the analog signal interface is selected for the speed analog input or pressure sensor settings, the channel type here can only be switched between the currently available options.

- Analog signal range: On the flow sensor settings page, select [Analog Signal Range] through [▲] and [▼] keys to enter the maximum and minimum value settings page. The maximum and minimum value ranges set correspond to the maximum and minimum flow rate range.



Click [Change], and adjust the value through [▲] and [▼] keys. The maximum value should not exceed the maximum value of the signal type range. The difference between maximum and minimum value ranges of the analog current signal is greater than 1.6mA

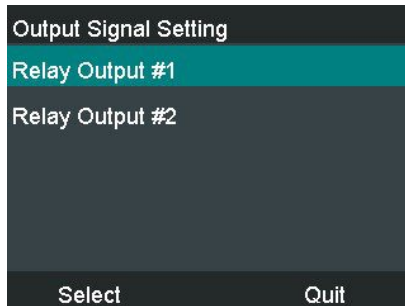
- Flow rate range settings : Under the flow rate range setting page, select [Flow Rate Range Settings] through [▲] and [▼] keys to enter the maximum and minimum value settings page. Click [Change], and adjust the value through [▲] and [▼] keys. The minimum value shall not be less than 0mL/min, and the maximum value shall not exceed 10L/min.



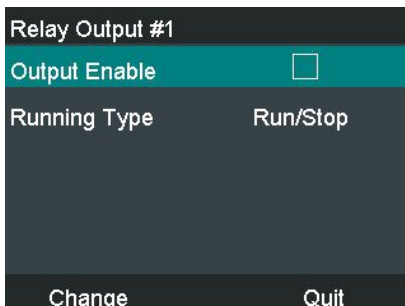
Note : The flow sensor range set should correspond to the actual flow rate range value of the flow sensor used. The flow rate range of Longer flow sensor accessories can be set. See the flow sensor instructions for details.

4.7.3 Output signal

On the home page, click [▲] and [▼] keys to select [Output Signal]. Set 2 relay output signals on the output page, corresponding to two normally open signals (COM1 NO1) and (COM2 NO2) output terminals. See "interface instructions" section for details.



On the output page, click [▲] and [▼] keys to select [# 1 Relay Output] or [# 2 Relay Output] to enter the relay output configuration page, where you can enable the output and set the operating node.

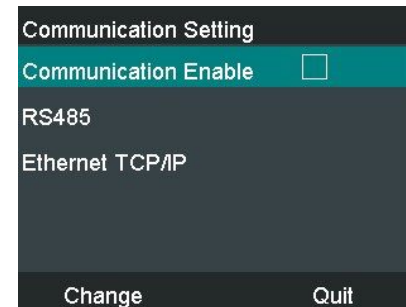


- Output enable : Switch between enable/disable options by clicking [Change]. After enabling, the relay node output is effective. Click [Change] to enable/disable switching.
- Operating node : Select the [Operating Node] through [▲] and [▼] keys, click [Change], and then switch between [Start/Stop] and [Fault] through [▲] and [▼] keys.

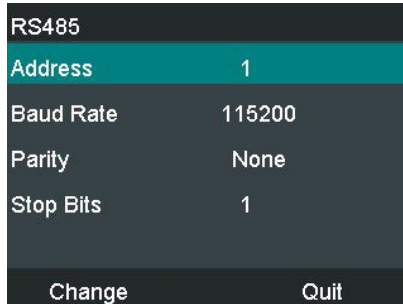
When [Start/Stop] is selected, after the driver operates, the corresponding relay normally open contact is closed; When [Fault] is selected, if the driver malfunctions, the corresponding relay normally open contact closes. See Appendix "Error Code Comparison Table" for faults.

4.7.4 Communication control

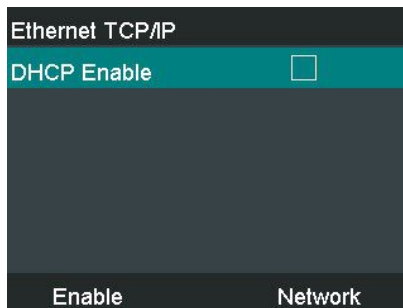
On the home page, click [▲] and [▼] keys to select [Communication Control]. Set communication enable, RS485, and Ethernet TCP/IP communication parameters on the communication control page. Configure this parameter when remote communication and log printing operations are required. See Appendix "Definition of Modbus Register " for control instructions.



- (1) Communication control enable : After enabling, the communication control is effective. Switch enable/disable through the [Change] function key.
- (2) RS485 : On the communication control page, click [▲] and [▼] keys to select [RS485] and enter the RS485 parameter configuration page. See "interface instructions" section for RS485 interface description.

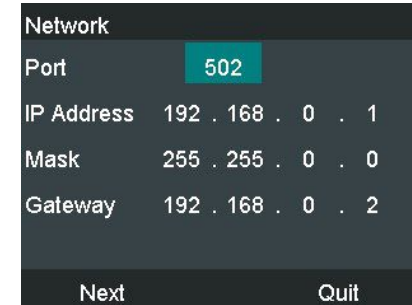


- Communication address: The range can be set from 1 to 32. Click [Change] to set the address through [▲] and [▼] keys.
 - Baud rate: Click [Change] to switch between three baud rates: 4800, 9600, and 115200 through [▲] and [▼] keys.
 - Parity bit: Click [Change] to switch between odd, even, and no verification through [▲] and [▼] keys.
 - Stop bit: Click [Change] to switch between 1 and 2 stop bits through [▲] and [▼] keys.
- (3) Ethernet : On the communication control page, click [▲] and [▼] keys to select [Ethernet TCP/IP] and enter the Ethernet TCP/IP parameter configuration page. See "interface instructions" section for Ethernet TCP/IP interface description.



When DHCP is enabled, it can automatically assign an IP to the driver. It takes about 30 s for the successful IP settings. Specific parameters can be viewed through network settings.

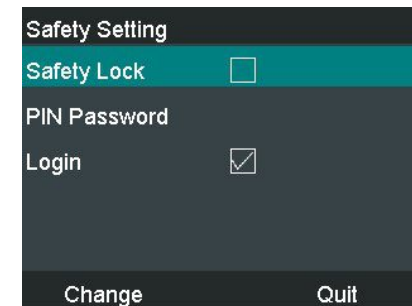
When DHCP is disabled, Ethernet parameter configuration can be done through [Network Settings].



Switch between value options by clicking on [Next Digit], and set values through [▲] and [▼] keys.

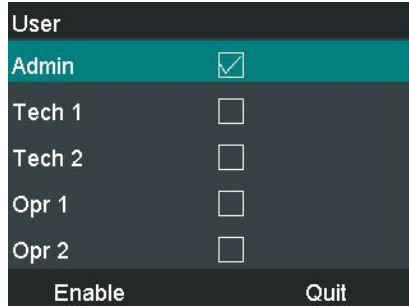
4.7.5 Security settings

On the home page, click [▲] and [▼] keys to select [Security Settings]. Perform safety lock, PIN password protection, and password login settings on the security settings page.

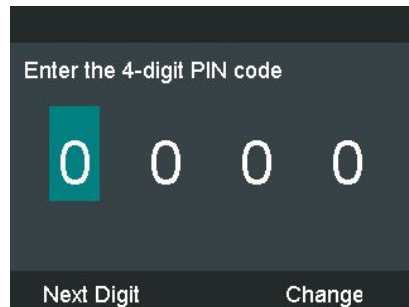


- (1) Safety lock : Click the [Change] function key to enable/disable the safety lock. When the safety lock function is enabled , the driver will start in flow rate and quantitative mode for 20 s, and all function keys will turn to[Unlock]. The safety lock icon "🔒" in the upper right corner of the home page will change to the locked state "🔒". Click the left and right unlock keys at the same time to unlock.

(2) PIN password protection : Click [▲] and [▼] keys to select [PIN Password Protection], and click [Select] to enter the user page.



The driver supports 1 administrator account, 2 technician accounts, and 2 operator accounts. After the account is selected by clicking [▲] and [▼] keys, click [Enable] to enable the account and enter the password settings page.



- Click [▲] and [▼] keys to adjust the current digit. Click [Next Digit] key to move to the next digit. [Confirm] key will be displayed at the bottom left corner when you move to the last digit. After clicking [Confirm], if it is the password of the current username, the interface will enter the home page.
- After click the [Change] key, all four digits of the PIN will be reset to zero.

Note: After enabling and setting a password, you can select and log in to the enabled account on the page for the next login.

(2) Password login:

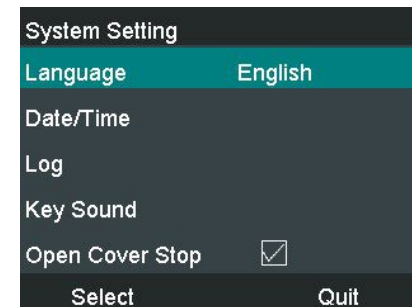
Click [▲] and [▼] keys to select [Password Login], and then click the [Change] function key to enable/disable password login.

After enabling password login, you need to select the account and enter the password to enter the home page of the flow rate mode each time the device is turned; If not enabled, you can directly enter the home page of the flow rate mode after startup.

Note: Password login can only be set in the administrator account.

4.7.6 System settings

On the home page, click [▲] and [▼] keys to select [System Settings]. The system settings page includes settings and views for language, date/time, logs, keying tone, pressure tube detection, firmware upgrade, factory reset, and more.



4.7.6.1 Language selection

On the system settings page, click [▲] and [▼] keys to select [Language], then click the [Select] function key to enter the language settings page, and select the language for Chinese and English through [▲] and [▼] keys.

4.7.6.2 Date/time

On the system settings page, click [▲] and [▼] keys to select [Date/Time], and then click the [Select] function key to enter the settings page.

- Click [Select] to choose between year, month, day, hour, and minute. Click [▲] and [▼] keys to set the corresponding values.
- After setting, click [Exit] to return to the previous page.

4.7.6.3 Log

On the system settings page, click [▲] and [▼] keys to select [Log], and then click the [Select] function key to enter the log page. View different logs through [▲] and [▼] keys.

Log		
Date	Param	User
23-10-11	Flow Rate	Admin
09:05:58	Stop	
KZ35 26# 1.900L/min 1.000		
300.0rpm 100%		
Export		Quit

- Click [Export] to export the log. If the device has been inserted into a USB flash drive, the logs will be stored in CSV format on the USB flash drive. Export path: USB flash drive/Longer.
- If the device is connected to a thermal printer (accessory) through an RS485 interface, the logs will be printed through the printer. Click [Exit] to return to the previous page.
- Due to the limitation of screen size, only the information about the mode, pump head, tubing and other parameters is displayed. The information exported from the log is as follows:
 - (1) Model: Current device model
 - (2) Serial No.: Current device serial number
 - (3) User: Current user
 - (4) Control mode: Current operating mode, internal control, external control, communication mode
 - (5) Classification: Flow rate, quantity, calibration, password, factory reset, calibration coefficient
 - (6) Pump head: Current pump head parameters
 - (7) Tubing: Current tubing parameters
 - (8) Flow rate: Current flow rate parameters
 - (9) Speed: Current speed parameters

- (10) Full speed ratio: Current full speed ratio parameters
- (11) Allocation frequency: Allocation frequency under the quantitative mode
- (12) Interval time: Interval time under the quantitative mode
- (13) Allocation quantity: Single allocation quantity under the quantitative mode
- (14) Calibration coefficient: Calibration coefficient for the current mode
- (15) Calibration time: Calibration time value set
- (16) Calibration time: Actual operating time of calibration mode
- (17) Information: Start/stop actions, program updates, coefficient changes, etc., as well current error message code (if any). See Appendix "Error Code Comparison Table" for specific information
- (18) Generation time: Device time for log generation
- (19) Printing time: Device time during log printing
- (20) Printed by: Operation account during log printing

4.7.6.4 Keying tone

On the system settings page, click [▲] and [▼] keys to select [Keying Tone], and then click the [Select] function key to enter the keying tone page. Click [Change] to switch the keying tone enable/disable status. When enabled , clicking the key will sound a buzzer sound.

4.7.6.5 Pressure tube abnormality

On the system settings page, click [▲] and [▼] keys to select [Pressure Tube Inspection], and then click [Change] to switch the keying tone enable/disable status.

When enabled, if there is an abnormality in the pump head pressure tube, an alarm message of pressure tube abnormality will pop up.

4.7.6.6 Firmware upgrade

On the system settings page, click [▲] and [▼] keys to select [Firmware Upgrade], and then click the [Select] function key to enter the firmware upgrade page, which displays application upgrade and driver module upgrade.

Upgrade procedure:

- Insert a USB flash drive with upgrade files and select the firmware to be upgraded.
- Click [Upgrade] and then perform [Confirm Again] to upgrade the firmware and restart the machine.
- Click [Exit] to abandon this upgrade and return to the upgrade page.

Note :

- The upgraded firmware .bin file is saved to the root directory of the USB flash drive. The rear back of the USB interface of the BP02 device backplane needs to be opened, and GP02 can be directly inserted into the socket terminal.
- After the application driver upgrade is displayed, it will automatically restart. After the driver module upgrade, it needs to be manually restarted to be effective.

4.7.6.7 Factory reset

On the system settings page, click [▲] and [▼] keys to select [Factory Reset], and then click the [Select] function key to enter the factory reset page.

- After entering the factory reset page, click the [Select] function key to enter the confirmation prompt interface. After clicking [Confirm Again], the system will be restored to factory settings. Click [Exit] to abandon this selection and return to the previous page.
- After factory reset, the system will perform parameter reset and restart. See Appendix "Default Parameters" for default values.

4.7.6.8 About

On the system settings page, click [▲] and [▼] keys to select [About], and then click the [Select] function key to enter the about page.

About	
Model	BP02
SN	202305010001
App Version	RC0.5.0.38
Driver Version	V0.16 H
Telephone	400-620-5333
Quit	

- Display: Model, serial number, application version, driver module version, service hotline.
- Click [Exit] to return to the home page of the system settings.

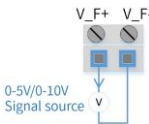
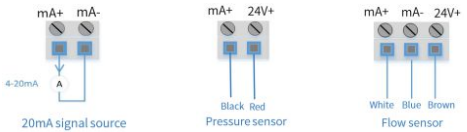
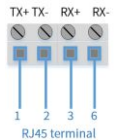
5. Interface instructions

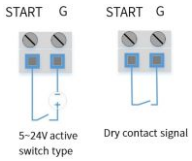
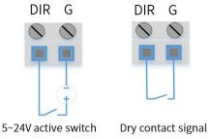
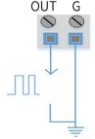
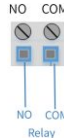
5.1 BP02 interface instructions

When external control or firmware upgrade is required, the control and upgrade interface pins need to be led out through wiring. The back cover of the BP02 driver needs to be removed for wiring. After removing the back cover of the driver, the required control wires should be led out from the terminal board. The terminal diagram is shown below:



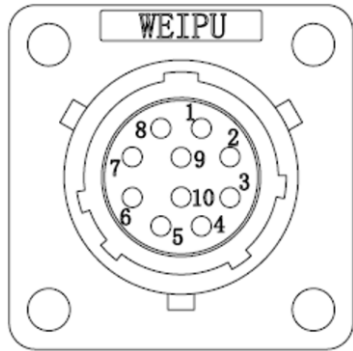
The BP02 terminal is described as follows:

Terminal number	Function definition	Description
J400	Analog voltage/frequency input	 <p>Input signal: 0-5V/0-10V/0-10KHz, analog voltage/frequency input for external control</p> <p>Note : When different input signals are fed externally, the corresponding signal and speed relationship need to be selected in [Analog Input Settings] of [Input Control].</p>
J401	Analog current input	<p>Input signal: 4-20mA_1, with 3 applications: (1) analog current input for external control, (2) analog current input for flow sensors, (3) analog current input for pressure sensors</p>  <p>(1) External control speed analog input wiring (2) Flow sensor signal wiring (3) Pressure sensor signal wiring</p> <p>Note :</p> <ul style="list-style-type: none"> When input signals for different applications are fed externally, the corresponding signal settings need to be selected in [Analog Input Settings] of [Input Control]. The example figure shows the wiring of Longer pressure sensor and flow sensor accessories. If other models of sensors are purchased, the actual wiring should be done according to the instructions of the selected pressure sensor and flow sensor.
J402	Analog current input	<p>Input signal: 4-20mA_2, with two applications: (1) analog current input for flow sensors, and (2) analog current input for pressure sensors</p> <p>See J401 flow sensor and pressure sensor wiring for details</p> <p>Note: J402 4-20mA_2 does not currently support the application of external control speed analog current signals</p>
J403	Power supply output	Power supply output: 24VDC/50mA, capable of supplying power to pressure sensors
J404	Ethernet signal receiving end	<p>Ethernet interface, used for communication control of Ethernet TCP/IP</p>  <p>RJ45 terminal</p>
J405	Ethernet signal transmitting end	

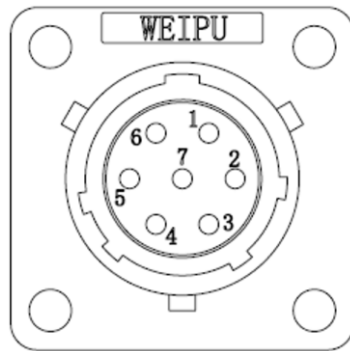
J406	External control start/stop input	<p>START is connected to external control or pedal start/stop control signals; G: digital ground. Connect 5-24V active switch type input or dry contact signal</p> 
J407	External control direction input	<p>DIR: direction control signal; G: digital ground. Connect 5-24V active switch type input or dry contact signal</p> 
J408	Rs485 communication	<p>RS485 communication interface, used for (1) RS485 communication control, (2) thermal printer log printing application, (3) Profibus module switchover input</p> <p>A: RS485+, B: RS485-; G: digital ground</p>
J409	Frequency output	<p>The speed corresponds to the frequency output function, and the frequency and speed correspond to 1rpm and 12hz. The amplitude is $\leq 5V$</p> 
J410、J411	Relay dry contact output	<p>Relay dry contact output (normally open output, NO normally open contact, COM common terminal)</p> <p>Maximum switching power: 30VA</p> 
USB400	USB interface	Firmware program upgrade, log export USB interface

5.2 GP02 interface instructions

The GP02 driver has already led out the signal through 2 external control sockets and 1 USB socket, which can be directly led out through the socket terminals without removing the back cover. The pin definition is shown in the figure below, and the specific function and wiring are consistent with the BP02 definition. See the BP02 interface instructions.



GP02 driver external control socket 1_10PIN



GP02 driver external control socket 2_7PIN

Definition of 1-10PIN socket pin

PIN	PIN definition	Function description
1	G	Digital ground
2	B	RS485-
3	A	RS485+
4	COM2	Relay dry contact output (normally open output: NO normally open contact, COM common terminal)
5	NO2	
6	COM1	
7	NO1	
8	G	Digital ground
9	DIR	External control direction input
10	START	External control start/stop input

Definition of 2-7PIN socket pin

PIN	PIN definition	Function description
1	24V	Power supply output: 24VDC/50mA, used as a power supply for flow sensors or pressure sensors
2	G	
3	V_F	Analog voltage/frequency input signal
4	G	Digital ground
5	mA+_2	4-20mA_2 analog current input positive end
6	G	Digital ground
7	mA+_1	4-20mA_1 analog current input positive end

Note: GP02 no frequency output and Ethernet interface.

6. Appendix

6.1 Default Parameters

S/N	Category	Parameter	Factory default settings
1	System	Language	Selection after delivery
2		Default mode	Flow rate mode
3		Default speed	165rpm
4		Operating status	Stop
5		Maximum speed	300rpm
6	Flow rate mode	Direction	Clockwise
7		Pump head	KZ35
8		Tubing specification	#26
9		Calibration coefficient	1
10		Flow rate value	Corresponding to the speed of 165rpm selected for the pump head tubing
11		Flow rate unit	L/min
12	Quantitative mode	Power-off memory	No
13		Single allocation volume	According to the flow rate value of 165rpm for 1 min
14		Unit of single allocation volume	L
15		Cycle number	5 times
16		Interval time	1s
17		Slope speed	3 (1s)
18		Delay before anti-suction	0s
19		Anti-suction coefficient	0
20		Anti-suction speed	165rpm

21	Calibration mode		Calibration time	5min
22			Flow rate	According to the flow rate value corresponding to 165rpm
23			Flow rate unit	L/min
24	Start/stop input settings		Start/stop enable	Disable
25			Control mode	External control
26			Level/pulse	High-level start
27	Direction input settings		Direction enable	Disable
28			Level/pulse	High-level clockwise
29	Input control	Analog input settings, speed analog settings	Analog signal type	0-5V
30			Analog calibration type	Manual
31			Analog minimum voltage	0
32		Analog maximum voltage	5V	
33		Analog input settings, flow sensor settings	Channel selection	Disable
34			Analog signal range	4-20mA
35	Flow rate range		0-5L/min	
36	Analog input settings, pressure sensor settings	Channel selection	Disable	
37		Analog signal range	4-20mA	
38		Pressure range settings	-1-3bar	
39		Pressure warning value settings	-0.08-1.00bar	
40		Pressure alarm value settings	-01.0-2.00bar	
41	Communication control	RS485	Communication control enable	Disable
42			Communication address	1
43			Baud rate	115200
44			Stop bit	1
45			Parity bit	None
46		Ethernet	DHCP enable	Disable
47			IP address settings	192.168.0.2
48			Subnet mask	255.255.0.0
49			Gateway	192.168.0.1
50			Port	502
51	Output signal	1# relay output	Output enable	Disable
52			Output signal	Start/stop
53		2# relay output	Output enable	Disable
54	Output signal		Fault	
55	System settings		Language	Both Chinese and English are optional. After selection and upgrade, the default language is the selected language

56	System settings		Date	Retain the previously set values
57			Log	Empty, not cleared after factory reset or upgrade
58			Keying tone	None
59			Firmware upgrade	/
60			Pressure tube inspection	Disable
61			Factory reset	/
62	Security settings		About	Display current software and driver version information
63			Safety lock	Disable
64			User settings	Default administrator factory password (1234)
65			Password login	Enable

6.2 Definition of Level 3 Permission Scope

Function	Administrator	Technician	Operator	Remarks
Start/stop operation	●	●	●	Under function operation without assigned permissions, display relevant pages, but prompt "Assigned Permissions" during operation
Mode selection	●	●		
MAX key operation	●	●	●	
Calibration function	●	●		
Log export	●	●	●	
Communication settings	●			
Firmware upgrade	●			
Language switch	●			
Safety lock	●	●		
Keying tone	●	●		
Parameter settings	●	●		
Factory reset	●			
Date/time	●			
Pressure tube detection	●	●	●	
Version information	●			
Output signal	●			
Input signal	●			
Pump head tubing	●	●		
Modify password	●	●	●	The administrator can change all user passwords, while other roles can only change their own passwords

6.3 Error Code Comparison Table

Error code	Alarm name	Possible cause
E03	Undervoltage	Main circuit power undervoltage
E04	Overvoltage	Main circuit power overvoltage
E08	Abnormal shutdown	Driver exception
E09	Position deviation exceeded	The instruction position deviation with actual position of the motor exceeds the set value
E10	PID saturated	When the deviation exists for a long time, the integral control function in the controller will cause the problem of excessive integration
E11	Overspeed	Motor speed exceeds maximum speed
E14	Overcurrent	1. Check whether the motor wiring is in good condition, whether there is any damage, and whether the motor wire and encoder wire are connected correctly. 2. Check whether the motor is damaged. Replace the motor or driver. 3. Check whether the load is too heavy. Disconnect the load for comparative testing. 4. Check whether the instruction acceleration is too high. Reduce the acceleration for comparative testing.
E15	Overload	Usually caused by excessive motor load. Please check the load.
E16	Thermal overload	Cumulative output work of motor
E18	Brake fault	Temporarily invalid
E23	Retain	
.....	Retain	
E30	Parameter error	Invalid parameter
E32	Pressure tube abnormality	Alarm when pump head pressure tube is abnormal, enable/disable alarm through system settings
E33	Range exceeded	The input value exceeds the limit. The device is abnormal
E35	Driver communication fault	Communication failure between driver and display
E36	Pressure sensor alarm	The pressure value exceeds the alarm threshold set by the pressure sensor, triggering an alarm and shutting down

6.4 Definition of Modbus Register

Address	Corresponding PLC address	Type	Read-write	Variable	Description	Remarks
0x0001	40002	uint_16	R/W	Start/stop control	Start/stop: 0 - Stop, 1 - Start	Start and stop of flow rate, quantitative, calibration modes
0x0006	40007	uint_16	R/W	Maximum speed (full speed) operation	Start/stop: 0 - Stop, 1 - Clockwise in full speed, 2 - Counterclockwise in full speed	Corresponding to the MAX key function

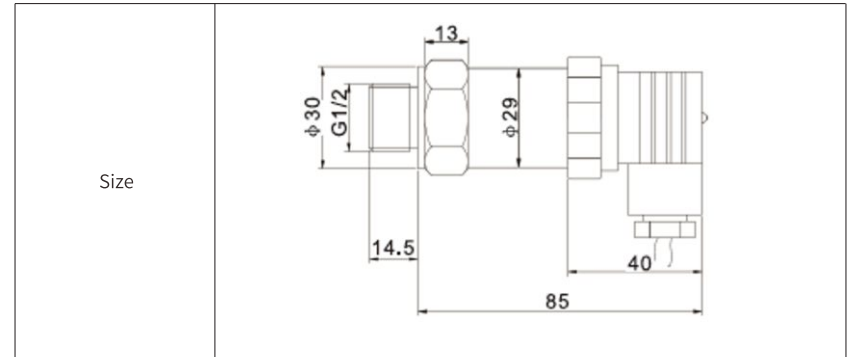
0x0009	40010	uint_16	R/W	Clear alarm	1 Clear When an alarm occurs, send 1 to clear it	
0x0060	40097	uint_16	R/W	Transmission direction	Operation direction: 0 - Counterclockwise, 1 - Clockwise	
0x0062	40099	uint_16	R/W	Operating mode	5 - Flow rate mode, 6 - Quantitative mode	
0x0063	40100	uint_16	R/W	Fluid volume allocated	0 - 9999	This parameter is only applicable to quantitative mode
0x0064	40101	uint_16	R/W	Fluid volume allocated	Unit index value, 1nL, 10nL, 100nL, 1uL, 10uL, 100uL, 1mL, 10mL, 100mL, 1L 100 represents 1uL; 99 represents 100nL; 101 represents 10uL	
0x0067	40104	uint_16	R/W	Flow rate value	0 - 9999	
0x0068	40105	uint_16	R/W	Flow rate unit	100 - uL/min, minimum nL/min 200 - uL/s, minimum nL/s, maximum L/s 300 - uL/hour, minimum nL/hour, maximum L/hour	
0x0069	40106	uint_16	R/W	Speed	1-3000	The range is 0.1-300rpm. It only supports speed changes for flow rate mode
0x006A	40107	uint_16	R/W	Speed unit	99 represents 0.1rpm	
0x006B	40108	uint_16	R/W	Slope startup speed under quantitative mode	1-5 gear adjustable, 1-0.1s; 2-0.3s; 3-1s; 4-3s,5-10s	This parameter is only applicable to quantitative mode
0x006E	40111	uint_16	R/W	Allocation frequency	1 - 65535, 0 - unlimited	This parameter is only applicable to quantitative mode
0x006F	40112	uint_16	R/W	Allocation delay value	1 - 9999	Setting range: 1-9999s This parameter is only applicable to quantitative mode
0x0070	40113	uint_16	R/W	Allocation delay unit	100 represents 1s	
0x0077	40120	uint_16	R/W	Number of rounds for anti-suction	1 represents 120°, with a range of 0-30	This parameter is only applicable to quantitative mode
0x0078	40121	uint_16	R/W	Delay value before anti-suction	0-100	Range of 0-10s This parameter is only applicable to quantitative mode
0x0079	40122	uint_16	R/W	Unit of delay before anti-suction	99 represents 0.1s	

0x007A	40123	uint_16	R/W	Anti-suction speed value	1-300	1-300rpm This parameter is only applicable to quantitative mode
0x007B	40124	uint_16	R/W	Anti-suction speed unit	100 represents 1rpm	
0x100	40257	uint_16	R	Alarm information	See error code	
0x101	40258	uint_16	R	Operating status	0: Stop; 1: Operation	
0x104	40261	uint_16	R	Real-time speed value	Measured current operating speed value	0-300rpm
0x105	40262	uint_16	R	Real-time speed unit	100 represents 1rpm	
0x0220	40545	uint_16	R/W	Date/time - year	2000 - 2099	
0x0221	40546	uint_16	R/W	Date/time - month	1 - 12	
0x0222	40547	uint_16	R/W	Date/time - day	1 - 31	
0x0223	40548	uint_16	R/W	Date/time - hour	1 - 23	
0x0224	40549	uint_16	R/W	Date/time - minute	1 - 59	
0x0225	40550	uint_16	R/W	Date/time - second	1 - 59	
0x0226	40551	uint_16	R/W	Date/time - day of the week	1 - 7	

6.5 Accessory Parameters

Pressure sensor parameter

Name	Corrosion-resistant pressure transmitter
Model	GPT235
Pressure range	-1~3bar
Output	4-20mA
Power supply	8-30Vdc
Accuracy	0.5%FS
Pressure interface	G1/2
Electrical connection	Direct lead, 1m cable
Material	Stainless steel 316L shell material, PVDF liquid receiving material



Flow sensor parameter

Model		FD-Q10C	
Supported pipe diameter	Pipe outer diameter (mm)	φ13 - φ16mm	φ16 - φ18mm
	NPS (rated pipe size)	1/4"	1/8"
	DN (rated diameter)	8A	10A
Supported pipe materials		Metal pipe/resin pipe	
Supported fluid		Various liquids [i.e. water (including DI), oil, chemicals, etc.] 1	
Supported fluid temperature (pipe surface temperature)		0-85°C (no freezing on the pipe surface)	
Rated flow rate range		20L/min	30L/min
Zero cut-off flow rate (preset) 3		1	
Display mode		Status indicator light, output indicator light, dual column display with 4 digits, 7-segment LED, stability indicator light	
Display refresh cycle		About 3Hz	
Display resolution response time		0.01/0.1/1 (preset: 0.1)	
Repetition accuracy/F.S. (depending on the selected response time)		0.5 s: +2.0%, 1 s: +1.5%, 2.5 s: +1.0%, 5 s: +0.5%, 10 s: +0.35%, 30 s: +0.2%, 60 s: +0.15%	
Lag		Variable	
Integrated flow device display		0.1/1/10/100/1000 (preset: 0.1)	
Integrated flow rate data storage cycle		Store to memory every 10 s	
Memory backup		EEPROM (data storage length: over 10 years, data read/write frequency: over 1 million times)	
Power I/O connector		M12 4-pin connector	

LONGER Instructions for use of peristaltic pump

Input/ output (optional) 5	Output (channel 1/ channel 2)	Control output/pulse output/error output (optional, preset: channel 1 control output/channel 2 unused), NPN/PNP setting switch, collector open circuit output below 30 V, maximum 100 mA/channel, residual voltage below 2.5V
	Analog output (channel 2)	4-20 mA/0-20 mA (optional, preset: unused), load resistance below 500 Ω
	External input (channel 2)	Integrated flow rate reset input/zero flow rate input/original adjustment input (optional, preset: unused), short circuit current below 1.5 mA, input time above 20 ms
Power supply	Power voltage	20-30 VDC, maximum ripple (P-P) 10%, Class 2/LPS
	Current consumption	Below 100 mA (excluding load current)
Protective circuit		Power reverse protection, power surge protection, short circuit protection for each output, surge protection for each output
Environ- mental tolerance	Enclosure protection grade	IP65/P67 (IEC60529)
	Ambient temperature	-10-60°C (non freezing)
	Relative humidity	35-85%RH (no condensation)
	Vibration resistance	10-55 Hz, double amplitude 1.5 mm, 2 hours on each of the X, Y, and Z axes
	Shock resistance	100 m/s ² 16ms pulse, 1000 times on each of the X, Y, and Z axes
Material	Main device of sensor	Rubber
	Piping contact surface	PPSPES/PBT/SUS303/SUS304/SUSXM7
	Mounting bracket	SUS304/PASUSXM7
Weight (including mounting bracket)		About 340 g

For specific installation and operation information on accessories, please contact Longer sales department.