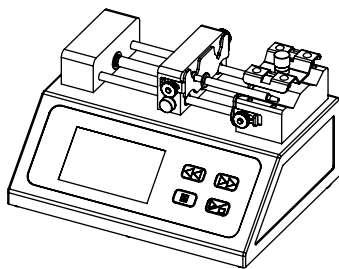

PRODUCT OPERATION MANUAL



TE100SP

• Important information •

- Please read this operation manual carefully before using the product!
- The contents of this operation manual are for reference only.
- The company reserves the right to change the product (design or specification) without prior notice.
- If you need the latest version of this manual, please contact the company or an authorized distributor.

• Safety warning •

- Before any cleaning or maintenance work, be sure to cut off the power supply.
- Please connect the power cord directly to the wall outlet, and avoid using extension Cords.
- If the power cord or plug is frayed or otherwise damaged, Please turn off the power immediately and pull off the power plug(hold the plug in your hand, not the power cord).
- If the following situations occur, turn off the power and unplug the power plug (hold the plug instead of the power cord):
 - 1.Fluid is spilled on the machine.
 - 2.You think this machine needs maintenance or repair.
 - 3.The product is abnormal.
- The power supply must have a reliable grounding.
- The foot switch or other external control plug must be installed and unloaded when the power is off to prevent the external control interface from being burned.

QUICK INSTALLATION OPERATION

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PART 1 Matters needing attention

>>Matters needing attention

- ◆ Please read the operating instruction manual carefully before operating this equipment. This pump is not FDA registered and cannot be used clinically in humans.

Safety:

1. The staff responsible for the installation or maintenance of this equipment should have the experience and ability to carry out relevant work.
2. This product is not applicable to ATEX explosion-proof directive and cannot be used in flammable and explosive environments.
3. When handling dangerous liquids, please follow the safety precautions.
4. Non-professionals should not install the pump with other equipment to reduce safety risks.
5. Special operation procedures should be specified for dangerous fluids to prevent personal injury.
6. The power plug can be disconnected from the power supply in an emergency. Do not place the pump in a workplace where it is difficult to cut off the power supply. Otherwise, the emergency stop operation will be affected.
7. According to the actual use, it is necessary to regularly add special grease to the sliding rod to ensure smooth operation.

PART 2 Unboxing

>>Unboxing

2.1 Unpacking inspection

Confirm that the pump is packaged in good condition. Please check the packing list, when unpacking, check the product model and the number of accessories, and check whether the parts are damaged during transportation. If you have any questions, please contact us immediately.

The packing list is sent with the goods, and the actual delivery content is subject to the list.

2.2 Product storage

This product can be stored for a long time, but before putting it into installation and operation, please confirm that the syringe pump, syringe and limit block and other accessories can be used normally. Syringe is a commonly used consumable, and special attention should be paid to the use time and expiration date.

PART 3 Product description

>>Product description

3.1 Product description

TE100SP is a high-precision syringe pump that supports multiple working modes. It adopts a 4.3-inch color touch LCD screen, which is convenient and quick to set parameters. Multiple indicator lights clearly confirm its working status, and it supports a variety of syringe options. It is suitable for different experimental flow rates. Requirements, high-precision control, and hardware and software protection mechanisms and alarm mechanisms. It supports four working modes, such as injection and extraction. Single-channel, dual-channel and multi-channel (4, 6, 8, 10) are available for selection.

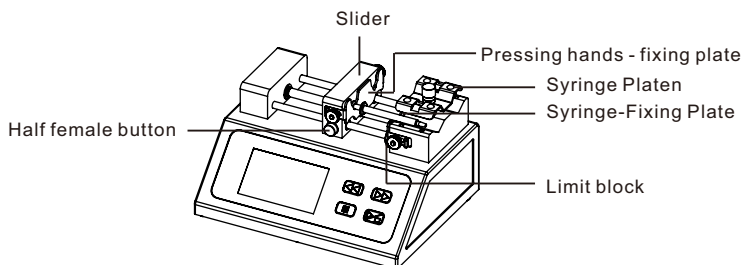
3.2 Product features

- ① Multi-channel option: One-piece single/dual channel, multi-channel option, suitable for high-precision transmission of small flow.
- ② Wide adaptability: It can be loaded with syringes of different specifications (customized), and the adaptability is wider.
- ③ Structural upgrade: The operation structure is newly upgraded, the start and stop are more stable, and the fluid volume is more accurate.
- ④ Precise fixation: The single/dual-channel pressure plate adopts a rubber body to fix the syringe, and the multi-channel pressure plate adopts a rubber soft edge design, which can cope with fragile syringes such as glass.
- ⑤ Flexible application: exquisite structure design, adjustable pressure plate and fixed plate, more flexible application.

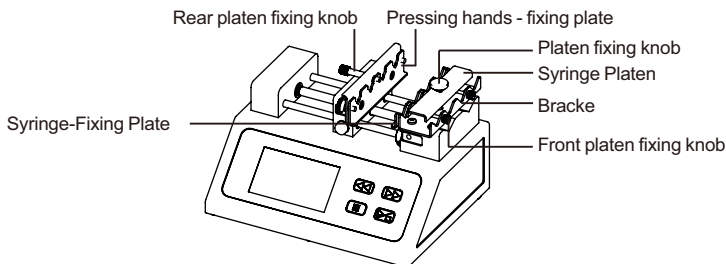
- ⑥ Color screen touch: Using 4.3-inch color screen touch, the operation is intelligent and convenient, and the working status is clear in real time.
- ⑦ Multiple working modes: extraction, injection, injection extraction, extraction injection.
- ⑧ Multiple function operations: RS485 communication function, syringe protection function, user data storage function, liquid volume calibration function, etc.

3.3 Product structure

· Injection pump



*TE100SP single/dual channel installation structure



*TE100SP multi-channel installation structure

· Syringe selection and reference flow

Syringe model	Syringe model	ID(mm)	Flow range($\mu\text{L}/\text{min}$ - mL/min)
TE100SP	10 μL	0.5	0.001 $\mu\text{L}/\text{min}$ - 0.020 mL/min
	25 μL	0.64	0.0025 $\mu\text{L}/\text{min}$ - 0.051 mL/min
	50 μL	1.1	0.0052 $\mu\text{L}/\text{min}$ - 0.101 mL/min
	100 μL	1.59	0.0105 $\mu\text{L}/\text{min}$ - 0.204 mL/min
	250 μL	2.3	0.0212 $\mu\text{L}/\text{min}$ - 0.506 mL/min
	500 μL	3.26	0.0420 $\mu\text{L}/\text{min}$ - 1.017 mL/min
	1 mL	4.73	0.0895 $\mu\text{L}/\text{min}$ - 2.035 mL/min
	2.5 mL	8.92	0.3675 $\mu\text{L}/\text{min}$ - 5.074 mL/min
	5 mL	12.39	0.6854 $\mu\text{L}/\text{min}$ - 10.158 mL/min
	10 mL	14.75	1.0374 $\mu\text{L}/\text{min}$ - 20.327 mL/min
	20 mL	19.8	1.8546 $\mu\text{L}/\text{min}$ - 34.749 mL/min
	30 mL	23.36	2.5837 $\mu\text{L}/\text{min}$ - 44.634 mL/min
	50 mL	28.91	3.9428 $\mu\text{L}/\text{min}$ - 79.976 mL/min
	60 mL	29.38	4.0753 $\mu\text{L}/\text{min}$ - 80.530 mL/min

Note: The test environment for flow data is normal temperature and pressure, and the test fluid is water. The values are for reference only, please refer to the actual situation.

3.4 Technical parameter

Model	TE100SP-01/ TE100SP-02	TE100SP-04	TE100SP-10
Channels	Single/dual channel can be customized	4	10 (6/8 Channel can be customized)
Flow range	0.001 μ L/min -82.6130mL/min	0.001 μ L/min-20.8223mL/min	
Applicable syringe type	10 μ L-60mL	10 μ L-10mL	10 μ L-10mL
Syringe User Settings	Can save 10 sets of custom syringe data, ID, solvent (customized)		
Distance per microstep	0.0235736 μ m		
Maximum line speed	120mm/min		
Minimum line speed	6.1 μ m/min		
Operating mode	Injection, extraction, injection extraction, extraction injection		
Linear thrust	0-100% adjustable		
Maximum pace	85333 (1/128step) 30sec		
Minimum pace	256 (1/128step) 30sec		
Control precision	When >30% of full stroke, control error $\leq \pm 0.3\%$		
How to set	Touch screen + common function keys		
Display method	4.3-inch color LCD display		
Voltage range	AC100V-240V		
Ambient temperature	0-40°C		
Weight	4kg		
Size	260x204x143	260x210x160	260x210x160

PART 4 Product installation

>>Product installation

4.1 Syringe installation

Installation steps

***Single/Dual Channel Mounted Syringes**

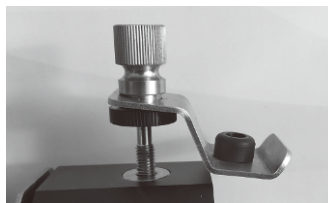
- ① Use the "fast forward" or "rewind" button of the syringe to adjust the slider to the appropriate position.
- ② Loosen the knob on the "slider", put the syringe "pressing hand" between the "slider" and "pressing hand fixing plate", and push the pressing plate fixing knob.
- ③ Loosen the knob on the "right fixing block", put the "jacket rib" of the syringe between the "right fixing block" and the "syringe fixing plate", and push the pressure plate fixing knob.
- ④ Rotate the "syringe pressure plate" to press the syringe and fix the knob.
- ⑤ "Fast forward key" to empty the syringe, put the "limit block" against the "slider", and fix it with an Allen wrench (according to the determined position, the limit block can move freely on the polished rod to prevent the slider from overtravelling damage to the syringe).
- ⑥ After the position is determined, after the parts are fastened, the "half female" meshes with the lead screw and enters the working state.

***Multichannel Mount Syringe**

- ① Use the "fast forward" or "rewind" button of the syringe to adjust the slider to the appropriate position.
- ② Loosen the knobs on the "slider" and "bracket" respectively, put the syringe "pressing hand" on the "hand pressing fixing plate", and put the syringe "jacket flange" vertically on the "syringe fixing plate".
- ③ Adjust and tighten the two sets of fixing plates and fix the knobs respectively.
- ④ Press the syringe with the "syringe pressure plate" to fix the pressure plate knob.
- ⑤ "Fast forward key" to empty the syringe, put the "limit block" against the "slider", and fix it with an Allen wrench (according to the determined position, the limit block can move freely on the polished rod to prevent the slider from overtravelling damage to the syringe).
- ⑥ The position is determined. After each component is fastened, the "half female" meshes with the lead screw and enters the working state.

Platen installation:

Syringe size larger than 30ml



Syringe size is less than or equal to 30ml

Note: When the syringe is less than 30ml, it is necessary to unscrew the fixing knob of the "syringe pressure plate", turn the pressure plate, and install it in reverse to fix the small-sized syringe.

4.2 Precautions

- ① Use the power cord that matches the product.
- ② The quality inspection of the slider and the fixed block is in danger of being squeezed. Do not put your fingers between the slider and the fixed block when the pump is running.
- ③ When using the syringe, due to excessive pushing and pulling, the liquid may overflow, which will cause harm to the human body or equipment. Please operate with caution.
- ④ When the liquid spills onto the actuator, immediately turn off the power and wait for the liquid to dry before powering on again.
- ⑤ When the equipment fails, you should contact the seller or manufacturer in time, and do not open the case by yourself.
- ⑥ Please be careful to plug and unplug the connection between the controller and the execution unit quality inspection, and do not damage the plug.
- ⑦ If the power cord or plug is frayed or otherwise damaged, please unplug the power plug.
- ⑧ Before installing the external control equipment, please turn off the power of the controller.
- ⑨ According to the actual use, it is necessary to regularly add special grease to the sliding rod to ensure smooth operation.

PART 5 Product operation

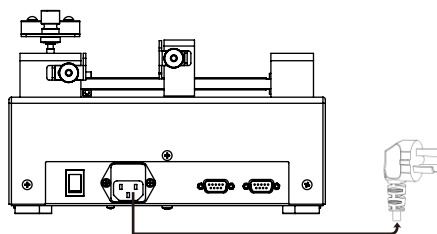
>>Product operation

5.1 Power connection

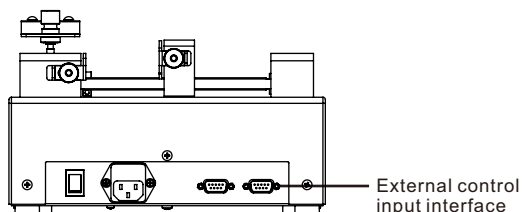
AC100-240V power supply.

Make sure all power supplies match the power of the equipment and are well grounded. The location of the pump must ensure that the power supply to the device is easily disconnected when the equipment is in operation.

Power wiring diagram:



External control wiring diagram:



5.2 Power-on

·Power-on inspection

- ① Check whether the syringe has been installed correctly, and whether the syringe fixing plate and the pressing hand fixing plate are connected correctly.
- ② Check whether it is connected to a matching power supply.
- ③ Check whether the syringe pump has been installed according to "Installation Suggestions and Precautions" (see 4.2). After the pump is turned on, the LCD display is powered on and turned on to enter the main interface, where specific settings and operations can be started.

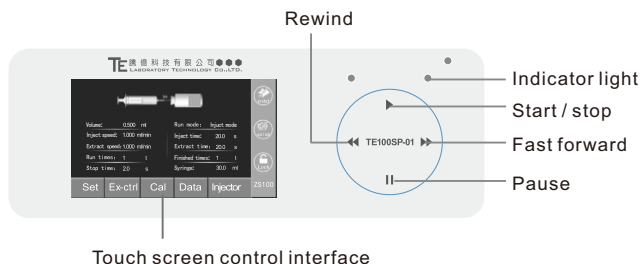
·First boot default factory settings

Factory settings: After the pump is turned on, it starts to run with the default set value, and all operating parameters can be changed by touch screen operation (see 5.4 menu function operation)

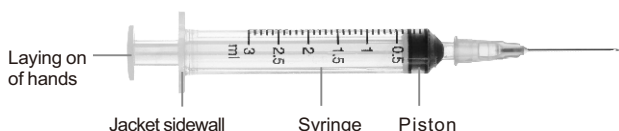
Note: Advance communication is supported, and the factory setting can be adjusted according to the actual needs of customers.

5.3 Operation panel and partitions

·Operation panel



*Syringe installation structure



5.4 Syringe Pump System Operation Settings

(1) Set up

1>Injection mode: Syringe pump only performs injection action.

2> Extraction mode: Syringe pump only performs extraction action.

3>Injection extraction mode: After the injection pump completes the injection action, it immediately extracts the liquid.

4>Extraction injection mode: After the injection pump completes the extraction action, it immediately extracts the liquid.

Language: Chinese/English.

Thrust: 0-100% adjustable. Proper thrust can effectively avoid syringe damage.

Left limit: The software left limit can be adjusted from 0-10mm. The syringe will alarm if it is less than the left limit distance, which is an effective means to avoid the damage of the syringe.

(Note: Press the pause button first, then press the start button to initialize the slider position)

Operating liquid volume: 0.001 μ l - the maximum liquid volume of the syringe, optional unit ml/ μ l.

Injection speed: 0.001 μ l/min - the current maximum flow rate of the syringe.

Optional units: μ l/min, ml/min.

Pumping speed: 0.001 μ l/min - the current maximum flow rate of the syringe.

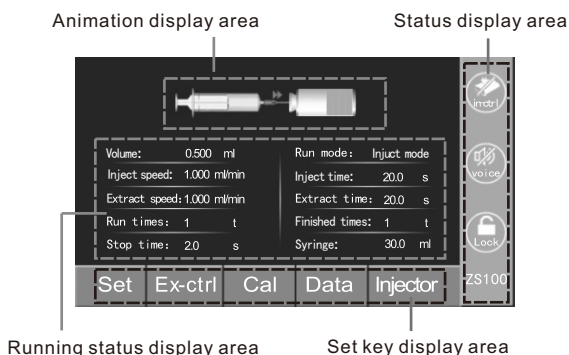
Optional units: μ l/min, ml/min.

Interval time: 0.1s-99999s

Number of runs: 0-9999 times, if the number of times is set to 0, it is infinite.

(2) Calibration

1. Install the syringe on the syringe pump correctly, and select the corresponding syringe model in **[Syringe]**.
2. In the **[Settings]** menu, set **[Injection Mode]** **[Operating Fluid Volume]** **[Injection Speed]** and **[Extraction Speed]** respectively.
3. Enter the **[Calibration]** menu, and after checking the **[Calibration Volume]** is correct, press the **[Start]** key. The device will run according to your settings. Click **[Cancel]** during the running process to cancel this operation.
4. Measure the liquid volume and input it to the **[Actual Liquid Volume]**.
5. Input 3 actual liquid volumes and click **[Finish]** this calibration.



(3) External control

- External control input (the user can control the start, stop and running direction of the equipment with external signals)

- ① **Start and stop:** The external control signal controls the start and stop status of the equipment

[Pulse]: Rising edge: Rising edge is valid

Falling edge: the falling edge is valid

Off: the function is invalid

[Level]: High: Active high

Low: Active low

Off: the function is invalid

②**Direction:** Input signal of equipment running direction

Left

Right

Closure

-RS485

Baud rate: The baud rate can be set to 1200 2400 4800 9600.

Enable: Yes - RS485 is enabled No - RS485 function is invalid.

Address: 1-99, address 0 cannot be set, address 0 is the broadcast address.

(4) Data storage

Store user operating parameters, provide users with 6 groups of storage space.

(5) Syringe Instructions

1> **[Standard]:** Provide users with the data of 15 commonly used syringes.

2> **[Add]:** Provide 10 groups of space to store user-defined syringe data.

Serial number: record storage location, cannot be 0Inner .

Diameter: The inner diameter of the syringe.

Volume: the capacity of the syringe.

OK: Store this injector information.

Cancel: Change the syringe without saving and return.

3> **[Apply]:** Select a record, click **[Apply]** the data of this record will be used.

4> **[Delete]:** The user deletes the user-defined syringe data.

5> **[Cancel]:** Return to the main page.

(6) Instructions

1> Install the syringe correctly

2> Select the corresponding model in the **[Standard]** button in the **[Syringe]** menu, and press **[Apply]**. If there is no syringe model used by the user in the **[Standard]** menu, measure the inner diameter of the syringe and select the **[Add]** button in the **[Syringe]** menu to add a new syringe model.

3> Press the **[Settings]** button to enter the settings menu.

- Set**[Operation Mode]**Select the corresponding mode according to your needs
- Set**[Operating Fluid Volume]**Set the target fluid volume as required. When the target liquid volume is reached, the syringe pump is based on the injection mold mode, stop (extract or inject mode), extract or inject (inject extract or extract inject mode).
- Set**[Injection Speed]** must be set when it is not in **[Extraction Mode]**.
- Set**[Extraction Speed]** must be set when it is not in **[Injection Mode]**.
- Set**[Interval Time]** When setting **[Number of Runs]** is not 1, two actions (such as extraction injection mode, time interval between draw and injection as one action).
- Set**[Run times]** When the run times is 0, it is infinite times. Until the traffic jam or the button stops.
- Press **[OK]** to exit. Press the start button on the right side of the screen to work.

4> If it is found that the liquid volume cannot meet the accuracy requirements, please press **[Calibration]** to calibrate the syringe.

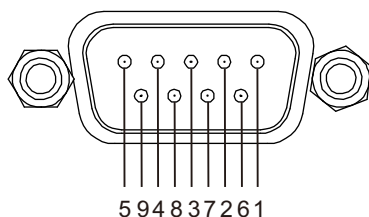
5>When the traffic jams, the motor stops running to prevent other dangers from happening.

You can use the **[Fast Forward]** or **[Rewind]** key to clear.Traffic jam detection: The motor is detected by the optical encoder to ensure the normal operation of the syringe pump. When the resistance is too large or the limit distance is reached, the pump will automatically stop running and give an alarm. It can be cleared by the **[Fast Forward]** key/ **[Fast Backward]** key.

5.5 External control operation

Please provide the correct signal to the pins shown, do not exceed the specified range of signal values, and do not connect the supply voltage across other pins to avoid permanent damage.Make sure the ends of the stranded cables are fastened with clips or cable ties to prevent the risk of electric shock.

Schematic diagram of DB-9 external control port



Syringe pump external control interface (DB-9 description)

1.How to use the external control line: the start-stop line and the ground line are on and off to control the start and stop of the pump.

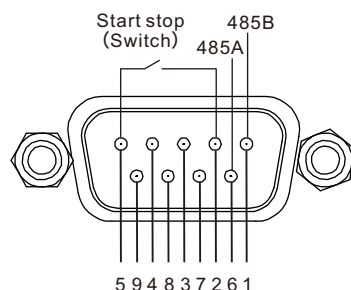
2.Optional external control output port

*The 9-pin interface on the back of the machine can control the machine through external signals. First prepare a DB9 connector and several different colors of signal lines, open the 9-pin female connector and solder the signal lines of different colors in the order shown in the above figure, and fix the signal lines together with the clips of the 9-pin connector, if necessary It can be reinforced with glue, and finally screwed.

External control input

Definition of external control input interface:

PIN	1	2	3	4	5	6	7	8	9
Definition	485-B	E-c Ground			Start/stop	485-A			



2 pins are common ground

External control input (TE100SP) wiring diagram

External control input line color function definition:

Serial number	1	Corresponding wire function
1	485 communication	Brown wire---485A Blue wire---485B
2	Start stop	Brown wire---start and stop Blue wire---ground

Foot switch operation instructions

The foot switch and dispensing controller are optional, these devices only control the start and stop status or direction of the pump. The foot switch is connected to the external control port of the peristaltic pump DB-9. Under external control, the operation of the start-stop key and the full-speed key is invalid, and the touch screen settings are normally used.

Operation settings:

Main interface→①Click the internal control to change to the external control

②Click Settings to enter the external control settings page

③The type of start-stop signal control in the external control input area

④Select rising edge or falling edge

⑤Click OK and return to the main interface, the external control setting is completed.

PART 6 Troubleshooting and maintenance

>>Troubleshooting and maintenance

Note: There are no parts in the pump that can be repaired by the user. If you need repairs, please contact the dealer or the company!

6.1 Troubleshooting

*No response at startup	>>If a circuit protection device is installed, verify that the circuit is not tripped >> Make sure the power plug is plugged into a working outlet >>Check whether the power cord is inserted firmly >>Confirm whether the power interface fuse is blown
* Fan, display is normal, pump cannot start	>>Check if the device is in external control mode >>Check if the key is working
*Pump cannot be controlled in external control mode	>>Check if the internal control icon in the upper right corner of the LCD screen is switched to the external control icon >>Check if the external control settings are connected correctly >>Check if the signal source is normal

6.2Product Maintenance

Basic maintenance and cleaning

Basic maintenance

- ① Please follow the storage recommendations and the expiration date of the syringe, so that it can be used normally after long-term storage.
- ② Replaceable accessories such as syringes and sliders need to be installed and replaced under the guidance of professionals or after-sales.
- ③ It is recommended that the working environment temperature be between 0-40°C.

Note: There are no user-repairable parts in the pump. If repair is required, please contact the dealer or the company for repairs. Gotta get in touch!

Warning: Always disconnect power to the syringe pump before attempting any maintenance work.

When there are stubborn stains on the surface of the housing, please use a mild detergent to scrub the surface, do not immerse the machine in liquid or use too much liquid to clean.

6.3 Warranty Information

· Warranty commitment

- ① The whole product is guaranteed for one year. If there is a failure during the warranty period, you can enjoy free maintenance and replacement of spare parts; if it is damaged due to human beings, it is not covered by the warranty.
- ② After the warranty period, only the cost will be charged when maintenance is required.
- ③ There are no user-repairable parts inside the pump. If you need to arrange maintenance, please contact the company.

Note: The company does not guarantee the applicability of its various categories of products for any application, and any employee or distributor has no right to change it. Change or violate the above-mentioned terms of warranty commitment; The company is only responsible for the production product for repair, exchange or refund.

· Warranty details

- ① Non-product quality problems, such as direct loss or damage caused by external reasons such as operational errors or human negligence. Consequential damages are not responsible. Direct losses: products, supporting machinery, working environment, surrounding buildings, etc. Indirect losses: employment losses, profit losses, etc.
- ② We are not responsible for any transport damage caused by returned products and accessories during the return journey.
- ③ For the product, in any case, the compensation cost obtained by the customer shall not exceed the actual payment price.

· Explanation of non-warranty scope

The following cases are not included in the warranty free maintenance:

- ① The whole product has exceeded the warranty period.
- ② Product failure caused by abuse, misuse or accidental damage as judged by the company.
- ③ Product problems caused by ultraviolet rays or direct sunlight.
- ④ Damage caused by non-the company's after-sales personnel during the repair or disassembly process.
- ⑤ Damage caused by chemical erosion or improper long-term maintenance.
- ⑥ Product failure caused by force majeure factors such as natural disasters.
- ⑦ The operator did not follow the corresponding operation suggestions and requirements, improper loading and unloading, improper maintenance, improper operation.
- ⑧ Other failures or damages not caused by product manufacturing, quality and other problems.

Note: The company reserves the right to modify the above terms at any time.

6.4 Repair information

- ① If there is a product that needs to be returned/repared, please contact the sales, dealer or the company for delivery and other related processes Contact to ensure the quick completion of after-sales needs such as return and exchange, return to the factory for maintenance.
- ② If there is no special agreement or written instructions, please return or exchange within the specified time.
- ③ When applying for return to the factory for after-sales service, please provide a clear reason for the return, the specific information of the contact substance, and the responsible product. cleaning and decontamination. (especially products that have been exposed to toxic chemicals or processed media that are harmful to humans)
- ④ When the product is returned to the factory, please pay attention to the packaging specifications to prevent damage to the pump during transportation; due to improper packaging the company is not responsible for any damage to the product, and is not covered by the warranty.

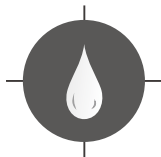
***Disclaimer**

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- The company reserves the right to change the product (Design or specification) without prior notice.
- The information contained in this article has been edited from the correct perspective. The company will not be responsible for any errors.
- If you need the latest version of the operation manual, please contact the company.
- The company will not be responsible for any loss caused by non-product quality problems or human errors.

***Caveat**

- This product is not suitable for equipment with its own problems.
- Do not place this product in hazardous work areas, flammable and explosive environments, including but not limited to the transmission of flammable liquids.

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