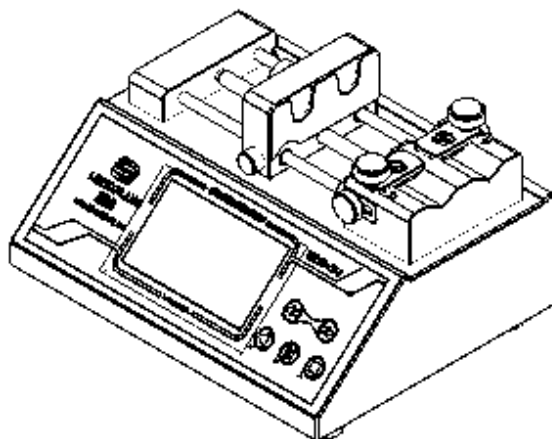




Laboratory Syringe Pump Series Manual



BAODING LEAD FLUID TECHNOLOGY CO.,LTD.

Safety Caution

Please read the following safety precautions to ensure that the correct use of Syringe pump. Wrong operation may cause dangerous situation, and cause personnel injury or equipment damage.

Danger:



- Please use the power as the same as the nameplate on the equipment, or it will damage the equipment!
- Please do not remove or remold the equipment, or it will cause the malfunction, even the electrical shock!
- Please not use it in the open air!
- About the maintenance of the equipment, please contact with the dealers or the company.

Danger: in the process of the syringe pump operation, please don't near the screw of the rotating parts, prevent the fingers and clothing were involved in machinery agency!

Warning:



- The tube would be broken and, causing the liquid spill, please take the protection measures and periodic checking on the tube!
- Please power-off, when install and knock down the tube, and prevent the hand and clothes rolling into the equipment!
- Please power-off and choose the good ground wire, when install and knock down the external control equipment, prevent damaging the equipment and the electric shock.
- This series product has no the technology of the explosion-proofed, please not use it in the environment of requirement for explosion-proofed!

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Description

This series product can assemble a variable size of the syringe, choose different work mode according to the requirement, high resolution color LCD display, touch screen operation convenient and fast set parameters, multiple lights clearly indicating its working state, and a variety of built-in syringe convenient to select vendors and specification, prestore multigroup of data to meet the requirements of different experimental flow. It also has high precision control and protection agencies and alarm mechanism. External signal control start-stop, built-in RS - 485 communication, support the Modbus protocol, full metal jacket, wide range power input, adapt to various occasions

TYD01-01 apply single syringe 0.5-60 ml, linear velocity 1um/min-150mm/min

TYD01-02 apply two syringe 0.5-60 ml, linear velocity 1um/min-150mm/min

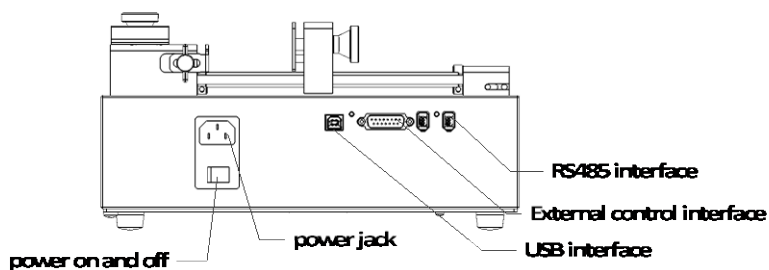
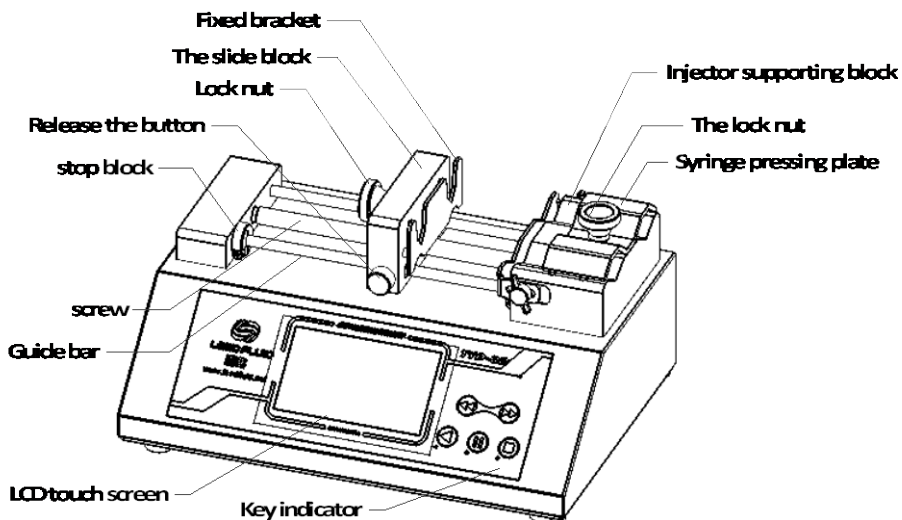
Applications

- It apply micro fluid transmission
- It apply micro flow transmission
- It apply to no pulse transmission
- It is suitable for high precision transmission

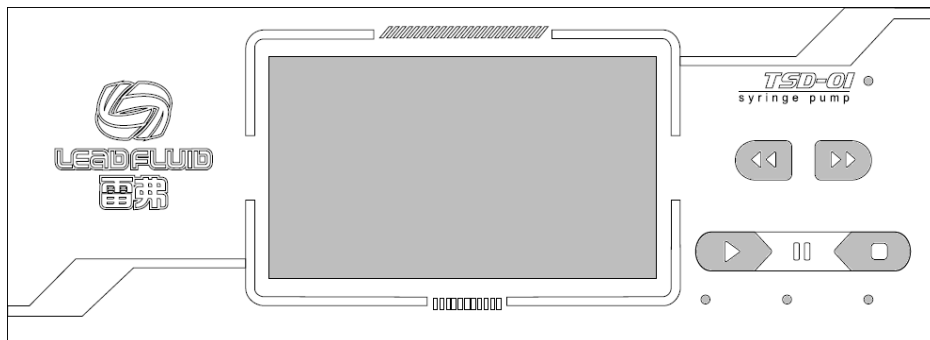
Function and Feature

- Variable working mode
- Color LCD touch screen, fast and convenient operation
- Support screen lock, key mute operation
- Button with indicator light, clearly working state.
- Support for a variety of syringes
- Prestore multigroup of data
- The high accuracy control
- Syringe protection and traffic jam alarm
- RS485 communication, support the Modbus protocol
- The external signal control start-stop and direction
- Wide range power input
- Full metal shell

Components and Connectors





Display Panel and Operating Keypads





Keypad

 : Start key, .Used to start or continue to set the movement process

 : Pause key,pause the working process.

 : Stop key, stop working process, reset working process.

 : Fast forward key. In Stop state, long press this button to top speed rapid advance.

 : Come back key. In Stop state, long press this button to top speed quick return

Switch on the blue indicator light: power light, this mean power had been opened.

Green light: running lights, when the movement process starts, the indicator lights

Yellow light: pause lights, the process of movement in pause mode, this indicator light.

Red indicator light: when running process to terminate or to finish, the indicator light long; When the motor stall, the light is flashing.

Touch screen display

◆ numerical value input

Click on the numbers, numerical input dialog.The diagram below.

Max:9.0ml/min Min:0.6ul/min

0.9

1	2	3	-
4	5	6	->
7	8	9	ESC
.	0	OK	

MAX: display the input values of the maximum;

MIN: display the input value of the minimum;

->: ; delete the last input number;

ESC: give up the current input values;

OK: confirm the current input values;

◆ Keypad instruction



The return key, returns an interface;



Confirmation key: current value and save;



Give up key: give up current changes, not kept;

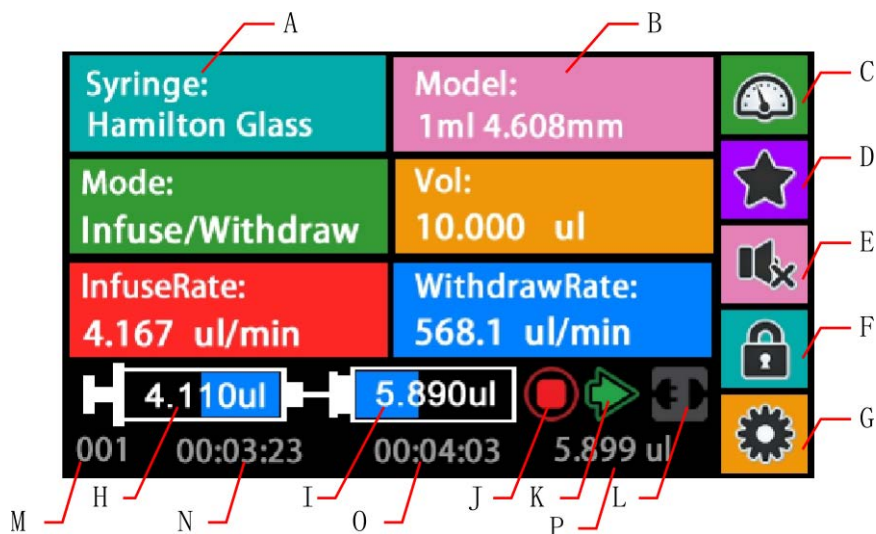


The next page: get to the next page;



Back: return on a page;

◆ Main interface specification



Syringe:
Hamilton Glass

A: Syringe

Display syringe manufacturers. Click here to enter the injector manufacturers choose interface, the following figure. If display the Custom,

Mail: master@leadfluid.com

Web: www.leadfluid.com

it is user-defined syringe.

Syringe Brand

Custom

Custom

BD Glass

BD Plastic

Cadence Glass

Choose the brand of syringe

✓

✗

B: Model:
1ml 4.608mm

Show syringe specification, the inner diameter of the syringe and the syringe volume respectively.Click into the syringe specification selection interface, as the below chart

Syringe Model

1ml 4.699mm

1ml 4.699mm

3ml 8.585mm

5ml 11.989mm

10ml 14.427mm

Mn

17.324nl/min

Max

2601.308ul/min

↺

If syringe manufacturer selection for the Custom, click Custom syringe set into the interface, as below chart

Custom Syringe

Syringe ID


2345

mm

Syringe Volume

20

u





C: Process parameter setting

click icon enter into process parameter setting as below chart.

Process Setup

Set Delay

00: 50: 23


11

Set Loop

1

Total Volume

Clear



- Set in motion of delay: delay, set the process of motion, first delay then operation
- The number of repeat: set the operation process of the number of

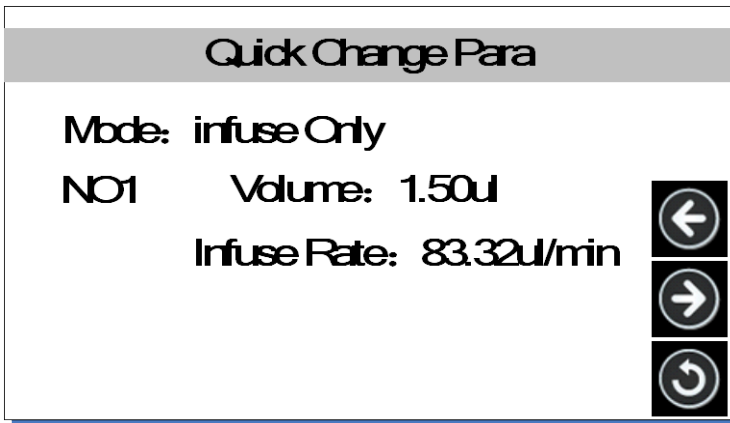
repeat;

- The accumulative fluid volume: to clean accumulated fluid volume into zero.



D: Fast setting

Click the icon to enter quick setting interface, quick call restore of three groups of different data, the following figure



E:

The mute button.Touch the key and alarm sound turned on or off. ICONS are as follows:



warning ton open



warning ton close

Lock key.Lock screen, the parameter modification is prohibited. ICONS as follows:



Unlock mode



Lock mode



G: System settings.

Click the icon to enter the system Settings menu, you can re-choose corresponding menu to modify parameters.



H:

According to currently liquid in the syringe, blue strip shows the progress of the current fluid volume.



I:

Show the current amount of liquid outer container, blue strip display the current progress of fluid volume.

J:

Running state. Show the current motor running state. Specific icon is displayed below



motor is running



motor is stop



the motor stall



fast forward



fast backward

K:

Running direction. According to the currently running direction.



injection



withdraw

L: Communication mode. Show the current status of communication.



communication interrupt



communication connection

M: Show the current operation of the rest of The Times

N:Displays the current movement process time has been used

O:Display the current movement process the rest of the time

P:Displays the current total amount of liquid

Mode:
Infuse/Withdraw

- Work mode: set the current working mode, click here to choose working mode into the interface, the following figure
- only injection: only into one direction movement process.If set cycles for multiple injection process;
- only extracts: only the motion process of extraction in one direction.If set cycles for multiple extraction process;
- extract/injection: first set the amount of fluid extraction, and the process of injection.Many times can be set up cycles, process
- injection/draw: first set the amount of fluid injection, extraction process.Many times can be set up cycles, process

Work Mode

Infuse Only

Withdraw Only

Withdraw/Infuse

Infuse/Withdraw

Please select a work mode,
pay attention to the running
direction of the syringe

Vol:
10.000 ul

Flow volume: set withdrawal or injection of fluid volume. Click can input numerical value, click liquid unit switch available in microliter and ml.


InfuseRate:
4.167 ul/min

WithdrawRate:
568.1 ul/min

Injection speed/withdrawal speed: set injection or withdrawal speed, click on the flow rate value can be input values. Click on the velocity of flow units can be in litres per minute, microlitre/min, ml/min
Note: if the show "super cap" or "super limit" shows that velocity adjustment range, please input the number again or switch unit change.

System setting

Under the main control interface and downtime, according to system

Settings icon  to enter, the interface is as follows



Wizard: according to the custom syringe to calibration of flow volume. According to the wizard prompt, through balance or measuring cylinder weighing of transmission fluid, to make the display value and the actual flow accurately.

Communications: set the communication speed, transmission mode or change the address. To change the communication rate and transfer mode click to select the project; To change the address, click on the address, then pop-up window input values. Need to restart the drives, the values can take effect.

Communication Setup

Baud (bps)

☐ 4800

☒ 9600

☐ 19200

☐ 38400

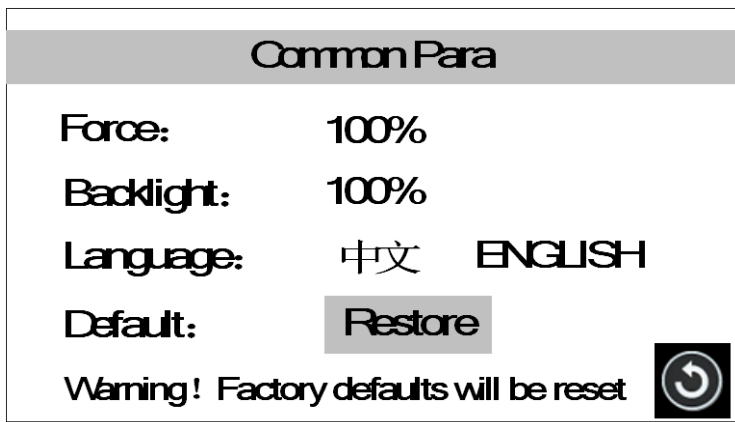
Mode

☒ Computer

☐ PLC

Pump NO. 1

Parameters: set the parameters of the commonly used, specific as follows



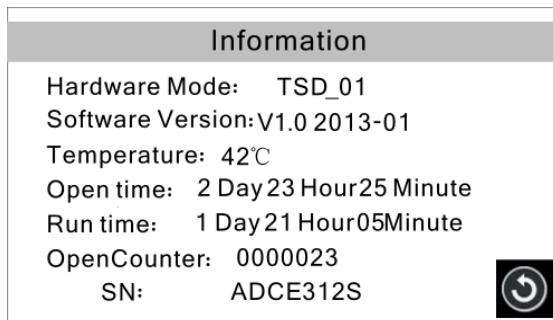
Syringe linear thrust: according to different materials, different size of thrust, prevent damaged the syringe in use process. Click on the numerical value can be modified.

LCD backlight: As your willing the brightness of the LCD backlight, click on the numerical value can be modified.

Language: choose the language, Chinese or English

Restore the default value: the restoration of all the parameters to factory default. Restart the drive.

Information: display the injection pump product model, software version, environment temperature, the boot time, running time, boot number and serial number information



Laboratory syringe pump operation manual

Description: the company's contact information and brief introduction

Password: remove and modify the password screen lock

Password

Please enter a Password

Del

Enter

1

2

3

4

5

6

7

8

9

0

A

B

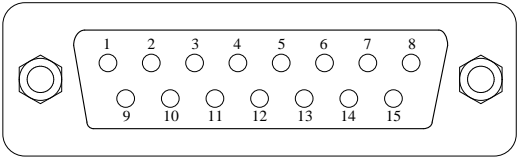
C

D

E

F

External control interface description

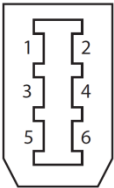


● **DB15 interface**

DB15	English notes	Specification
1	ADC_W	Positive of external analog input
2	B	Communication interface,B pole of RS485
3	A	Communication interface,B pole of RS485
4	VCC_W	External DC power input
5		
6	CW_W	External input signal to control direction
7		

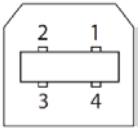
8	COM	Ground of external power
9	AGND	Negative of analog signal input GND
10	+12v	Positive of internal +12Vpower source
11	GND	Ground of Internal power source
12		
13	RS-W	External start/stop signal input terminal
14		
15		

●



● RS485port

numbers	English note	specification
1		
2		
3	B	RS485 - The cathode
4	A	RS485 + The anode
5		
6		



● USB port

Numbers	English note	Specification
1	+5V	+5V power

2	DATA-	- data
3	DATA+	+data
4	GND	ground

Instructions

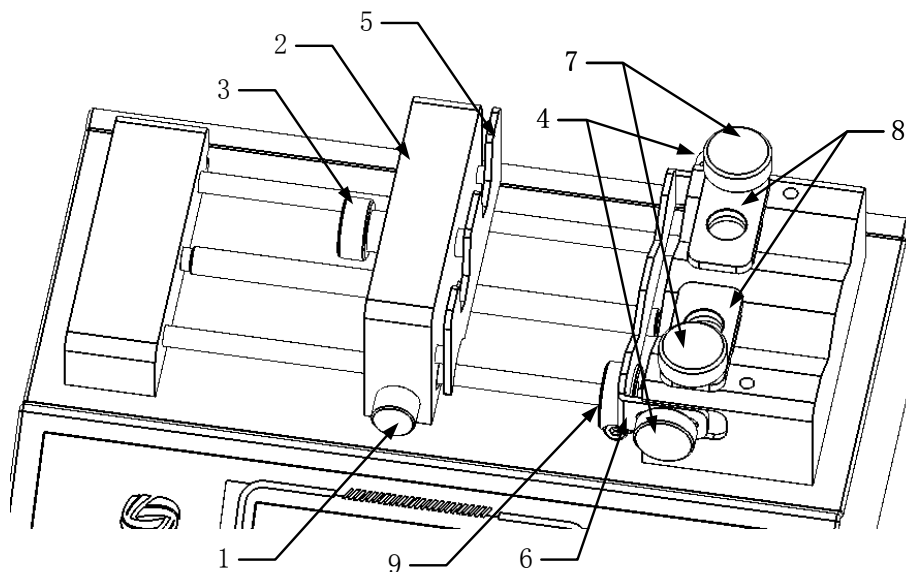
for

The preparatory work

Open the injection pump outer packing, please compare the packing list, check whether all the parts is wrong or damaged, if found the problem, please contact the manufacturer or agent. Read the instruction for use, and put it in the hand, or a fixed site collection, in order to check at any time.

Place the injection pump in a level table, the back of the distance barrier to keep a distance of more than 200 mm.

Syringe installation



1. Hold down the release button (1), move the slider (2) to close to the location of the injector length
2. Loosen the lock nut (3) (4), regulating the fixed bracket (5) (6)
3. Lift clamp nut (7), injector plate (8) to the lateral rotated 180 degrees
4. The syringe into the grooves in the right side of the fixed seat, at the same time the syringe putter tail card into the fixed bracket (5), syringe needle wings card fixed bracket (6)
5. lift clamp nut (7), the syringe plate (8) reverse rotate 180 degrees, the syringe platen press on the syringe needle tube
6. To tighten the lock nut (3) (4)
7. Adjust the spacing block (9) with Allen key position, to prevent excessive damage syringe

The power supply connection

The power of the power supply should be used with the chassis at the back of the nameplate marking. It will be accompanied with the power switch at the back of the power supply cord into the drive.

First start guide

Boot after commissioning or restore the default value for the first time, the system first enter the boot wizard interface, system running in turn syringe manufacturers - syringe size selection, working mode, the user according to the allocation is set up and operation. After the completion of the set boot will not perform this step

Welcome to use first using Study, please
Setup Para.If you have trouble, please read
user manual



Syringe Brand

Custom	▼
Custom	▲
BD Glass	☰
BD Plastic	
Cadence Glass	▼

Choose the brand of
springe



Syringe Model

1ml 4.699mm

1ml 4.699mm

3ml 8.585mm

5ml 11.989mm


10ml 14.427mm

Mn

17.324nl/min

Max

2601.308ul/min



Syringe Model

1ml 4.699mm

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3ml 8.585mm

5ml 11.989mm


10ml 14.427mm

Mn

17.324nl/min

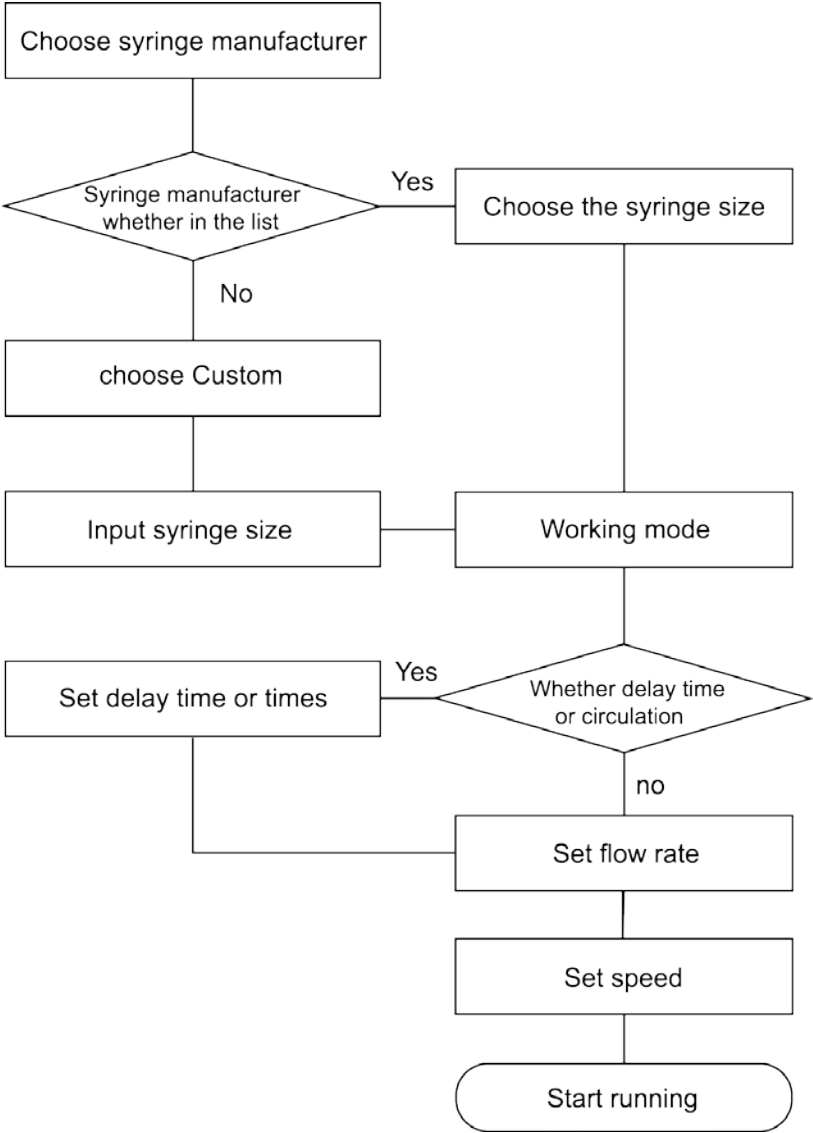
Max

2601.308ul/min





Operation guide




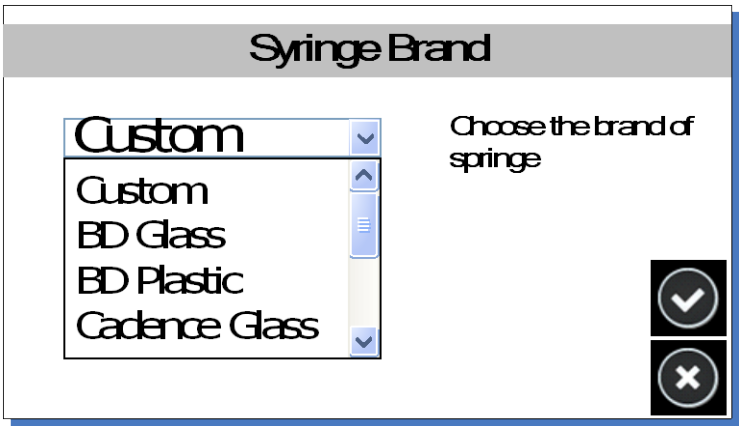
1. Choose syringe

Syringe:
Hamilton Glass

Click under the main interface

in a syringe vendor selection interface, choose the syringe used brand, without the

brand, please select Custom, click again  to return to the main interface.

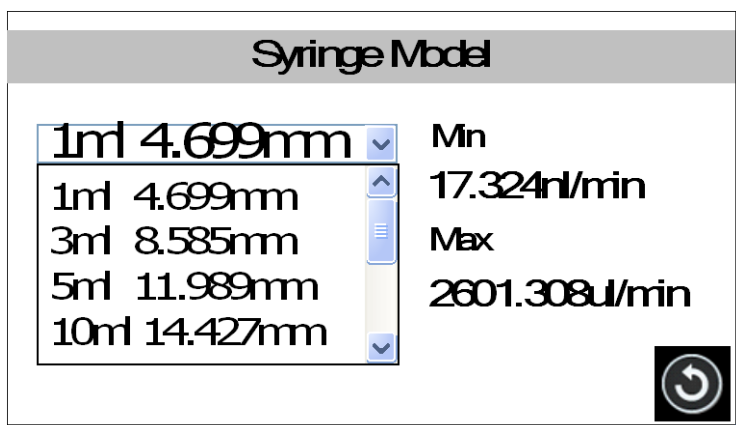


Model:
1ml 4.608mm

Click

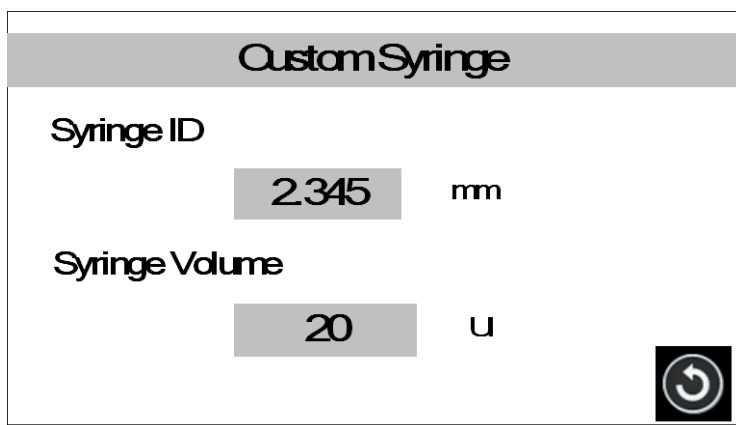
in the syringe

specification selection interface, select the corresponding specifications, the syringe to the left side of the display in the volume and the syringe needle tube inner diameter, on the right selection of syringe is maximum velocity and minimum flow rate



Syringe Model	
1ml 4.699mm	Min
1ml 4.699mm	17.324nl/min
3ml 8.585mm	Max
5ml 11.989mm	2601.308ul/min
10ml 14.427mm	

If syringe vendor selection for the Custom, click Custom syringe set into the interface, the following figure



Custom Syringe	
Syringe ID	2345 mm
Syringe Volume	20 u

Click on the location of the corresponding input custom syringe inside diameter and specifications.

Note: the specifications of the syringe unit can switch between ml and edged.

2. Choose working mode

1. Select work mode

Click on the main interface working mode on the square

Mode: Infuse/Withdraw

In the working mode of interface, choose the right work mode

Work Mode

Infuse Only


Withdraw Only

Withdraw/Infuse

Infuse/Withdraw

Please select a work mode,
pay attention to the running
direction of the syringe

If you need to set up in the process of delay or repetitions, click on the right

side of  the main interface process Settings

Process Setup

Set Delay


00: 50: 23 11

Set Loop

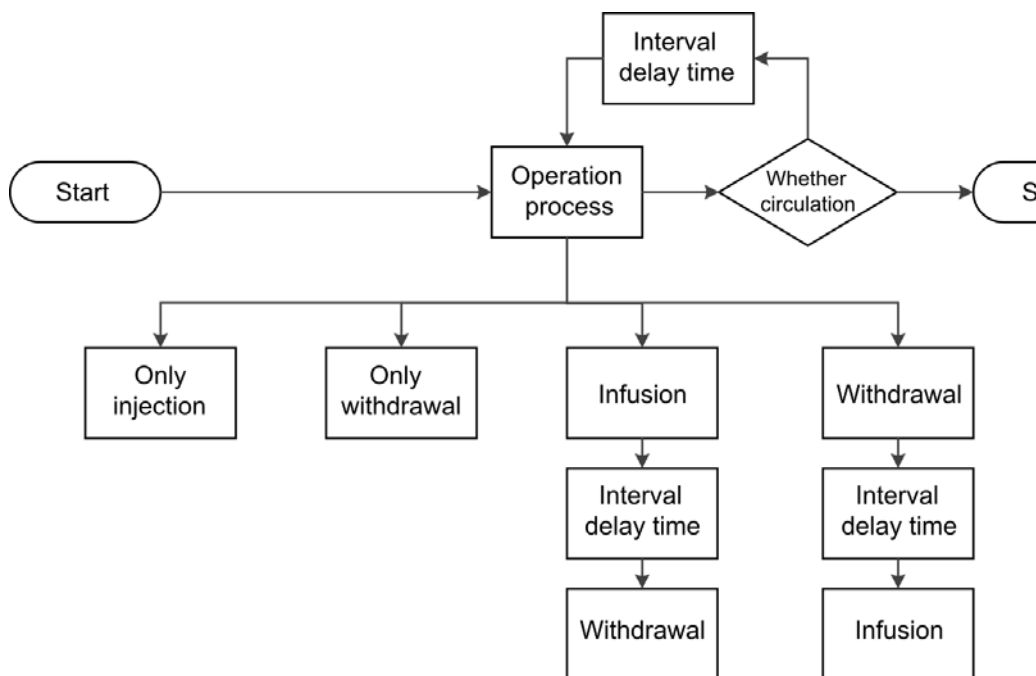
1

Total Volume

Clear



Its movement process schematic diagram as follows:

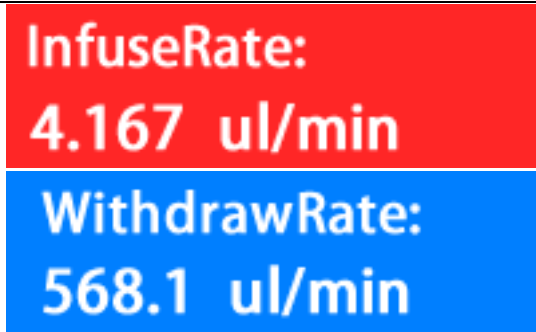


3. Set the fluid volume and speed


Set to the amount of fluid injection, click can input numerical value, click on the fluid volume switch available in microliter and ml.




Vol:
10.000 ul



Set injection or extraction velocity, click on the flow rate value can be input values. Click on the velocity of flow units can be in litres per minute, microlitre/min, ml/min



4. Start running

Press start button  to start running set movement process, the green indicator; When running over, and the red indicator lights.


In the process of running, press the pause button  to suspend the current movement process, the yellow indicator; Restart button  may continue to perform the movement process of unfinished; If you press the stop button  to terminate the movement process, the red light is lit, the parameters of the movement process reset.

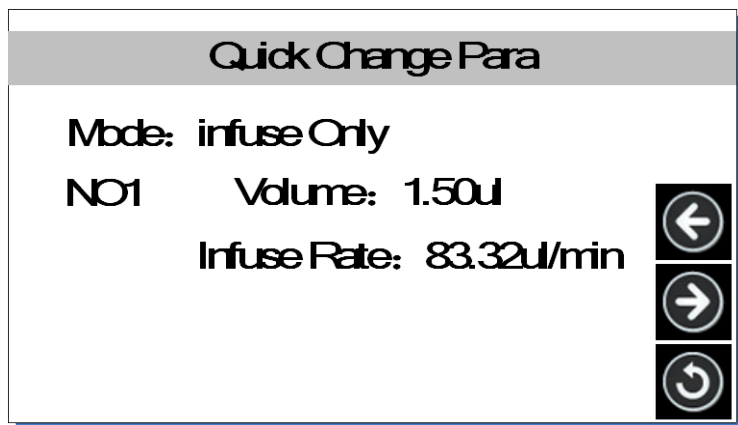
In the process of operation, push block access to limit block or by external block, injection pump alarm, main interface status  display buzzer stopped ringing, red light flashing. Press stop button  to remove the alarm, and then press the start button to start the process.




Multiple sets of data storage and calls



- Data storage

Main interface to choose the work mode, and then click on the quick set





icon , fast set into the interface.



Choose by flip key   which group to save (system initialization is the first group), and then click the back button  to return to the main interface, fluid volume and velocity of the set, the set of data has been saved.

Repeat the above steps, through page up  page down  change groups, can save the other two groups of data.

- The data call

Click fast setting icon , with a fast setting interface, through the page button   to call the set of data, then click on the return key , main interface of the data is updated.

Flow rate calibration

Through the balance or measuring cylinder to get the actual transmission of liquid weighing, complete the custom syringe flow calibration.



Specific operation as follows:



Laboratory syringe pump operation manual

- 1) install the syringe, ready for balance or measuring cylinder, measuring cups.
- 2) To set the main interface in custom injector, and enter the inner diameter of the custom syringe and specifications (specific reference to choose the syringe)
- 3) Under state of downtime, press retreat ◀◀ quickly let syringes filled with liquid.
- 4) According to the system Settings icon into the system parameters, choose the wizard icon





- 5) Enter the calibration guide interface, the system displays the current syringe to calibration of flow rate and liquid volume. Flow rate is the speed of the fluid transmission and fluid volume refers to the transmission fluid volume.

Calibration		
The custom syring calibration		
Rate	5.98	ul/min
Volume	10.00	ml
Advised test vol>3ml the precision higher 0.5%		
		 

Wizard		
The custom syringe calibration		
Rate	5.98	U/min
Volume	10.00	ml
Advised test vol> 1.500 ml the precision igher 0.5%		
		 

Both numerical value and unit can be directly click to modify, and then

click the next button  to start the test interface. Click the exit

button  to exit the guide to return to the interface of system parameters.

Note: in order to guarantee the test precision, fluid quantity not less than the numerical system that recommended.

6) Testing interface as below

Calibration



Press runstop key to test, then input the data

Test1	0.000	ml	<div><div>←</div><div>→</div><div>↺</div></div>
Test2	0.000	ml	
Test3	0.000	ml	

Wizard

Press runstop key to test, then input the data

Test1	0.000	ml	<div><div>←</div><div>→</div><div>↺</div></div>
Test2	0.000	ml	
Test3	0.000	ml	

Ready for measuring cylinder or a beaker, confirm has been filled with liquid in the syringe, press the start button  , syringes began to transfer the liquid, wait for after the completion of the syringe pump stop transferring automatically, with scales or measuring cylinder weighing liquid, record its value. Can repeat the above process, weighing multiple transmission liquid, fill in the numerical test 1, test 2 and test 3, pay attention to their unit is correct, then click 

enter into correction calculation interface.



If you want to modify the test flow rate and liquid volume, you can click



up the step, to the store values; Click the exit button



the calibration guide then return to the interface of system parameters.


Notes: in the process of the test, if there is an accident, suspension test, press the stop button .after that then press the start key  to test again.

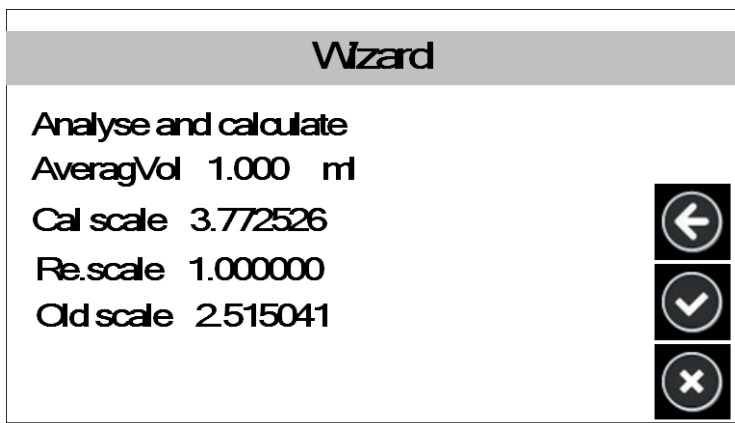
Testing value may choose to enter one group or several groups of data, the system adjust the average value automatically .

7) The system calculate correction coefficient automatically and display the original reference coefficient. If no problem, press the key

system, then it will save the new coefficient. In the previous step

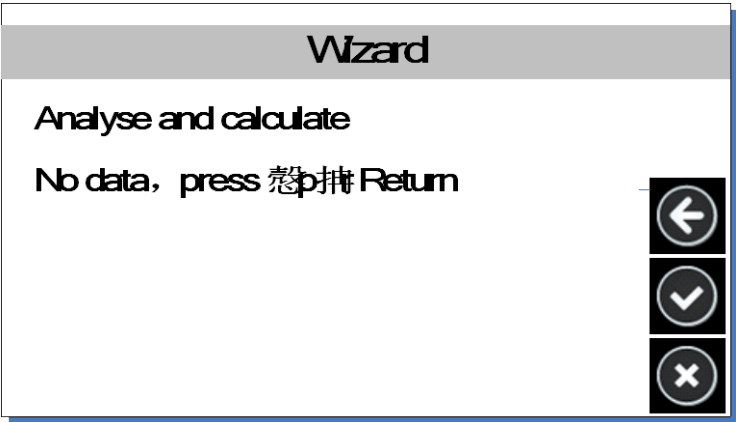
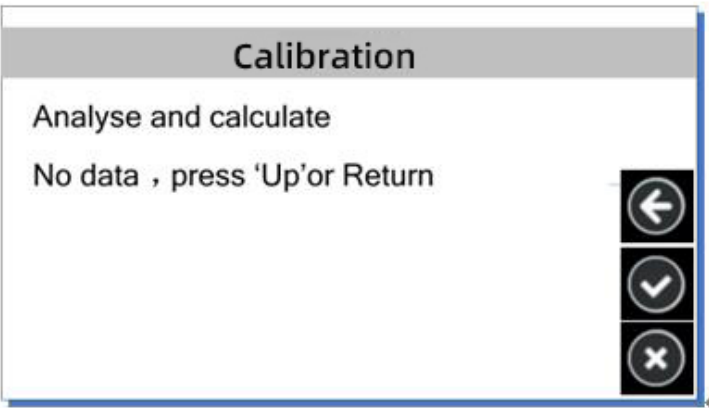


to retest, press exit  without saving the new coefficient, to return to the interface of system parameters



If without input data, shows the diagram as below, please click the

last step  to retest.




Lock password

Through setting a password, to prevent others to modify the setting data of syringe pump

◆ Lock


Under the main interface, unlocked state , click the lock icon, the



icon changes to , at this moment the screen is locked.

◆ Unlock



Under the main interface, click the lock icon , enter the password input interface, enter the correct password, click ok to unlock, or continue to keep it locked.

Password

Please enter a Password

Del

Enter

1	2	3	4	5	6	7	8
9	0	A	B	C	D	E	F

The initial password is empty.

◆ Change password

After input the correct password to unlock, system Settings



icon  into the system parameters, select the password icon

Password

Please enter a Password

SetPasswordDelEnter

1	2	3	4	5	6	7	8
9	0	A	B	C	D	E	F

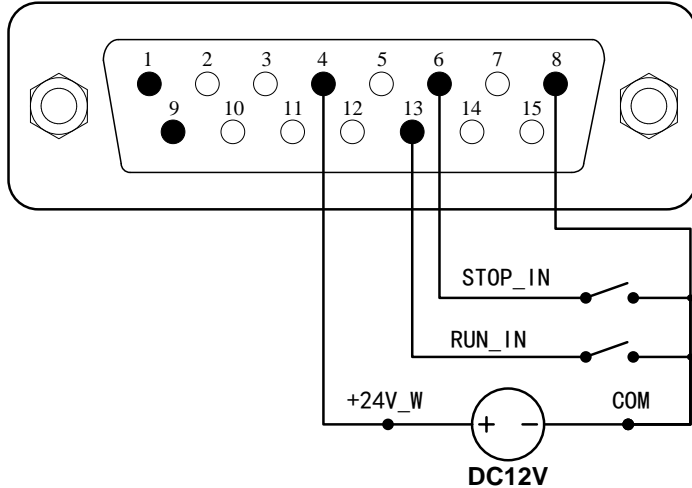
Enter a new password, then click the change password button, and then click OK button ,go back upper menu.

Note: please keep in mind that the modified password, if forget the password, please contact the manufacture.

External mode

External control signal to start and stop

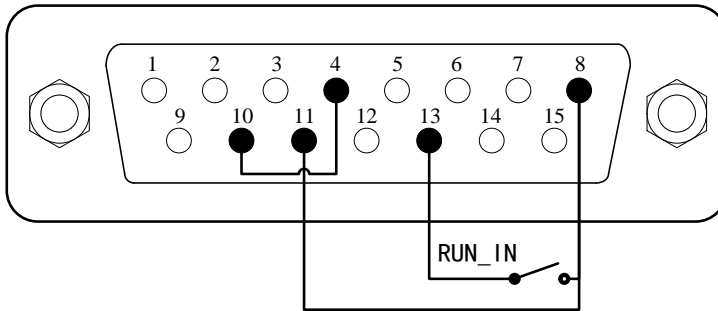
- Under the cut off power mode, according to the following wiring diagram connect circuit, then connect the DB15 interface with the back interface of the pump.



- Open the power switch, the screen shows the control interface
- Set the parameters of the motion control
- Closing the external RUN_IN switch, syringe pump start running ;Closing the external STOP_IN switch, syringe pump operation process will be terminated

Foot switch

Under the cut off power mode, according to the following wiring diagram connect circuit, then connect the DB15 interface with the back interface of the pump.

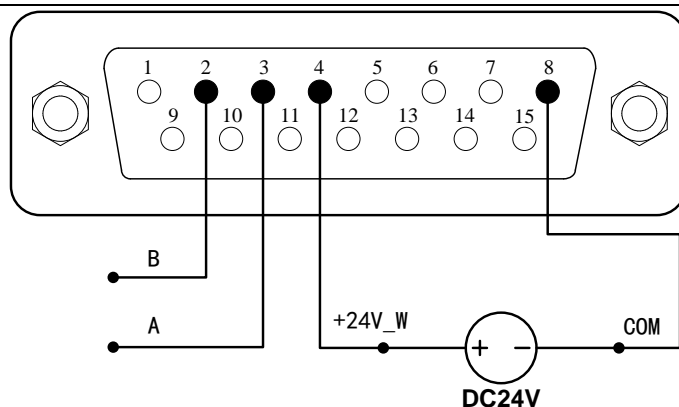


- Open the power switch, the screen shows the control interface
- Set the parameters of the pump motion control.
- Closing the external RUN_IN switch, injection pump running process; Closing the external STOP_IN switch, injection pump operation process will be terminated.

Communication mode

Support the MODBUS protocol RS485 communication, can control the various functions of the pump. Address specific parameters and reference to Lead Fluid communication technology standard support instructions.

- Under the cut off power mode , according to the following wiring diagram connect circuit, then connect the DB15 interface with the back interface of the pump.



- open the power switch, the screen display control interface
- communication icon closed, mean communication is normal,

otherwise the communication interrupt



- communication interrupt communications connectivity
- Through communication to control pump's various functions



Malfunction and maintenance

Guarantee Repair and after-sales

The product has guarantee period as one year. But during the guarantee period, the company would be not responsible for the warranty, if the product has the improper operation or the man-made damage. Over the guarantee period, only the material and labor costs will be charged at cost price.

Routine Maintenance

- Regularly check the slider on the lead screw and guide bar is normal

operation,

and add oil to maintenance

- The syringe pump can not wash with water, if you find the fluid overflow in the process of running, should be timely to dry or drying liquid
- Do not use chemical solvents to clean the syringe pump housing

Minor Malfunction

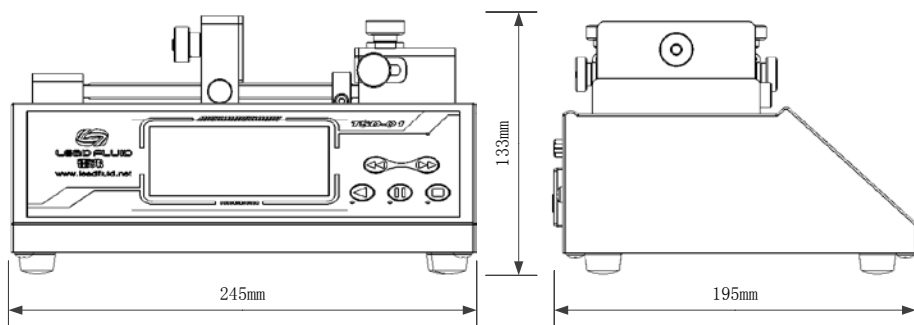
N O.	Type of malfunction	Malfunction description	Solution
1	hardware	no display of the drive	1. check the lines connected well 2. the fuse is good, or change with the 0.5A time-delay fuse 3. the lines in internal equipment connected well 4. Check the LCD panel and the main control board connection is loose or not.
2	hardware	the motor not work	check the motor and the driver connected well 2. check the voltage corresponding with the nameplate
3	hardware	the motor trembling	1. check the motor and the driver connected well 2. The motor overloaded, check the machine drive well
4	hardware	the motor	1. the line loose or not connected the

	e	rolling in one direction	driver and the main board
5	hardware	the keypad not work	1. check the keypad and the main board connected well 2. check the keypad broken or not
6	hardware	external not work	1.check the lines connection right or not 2.check external power on or off 3.check the external board fixed well
7	hardware	communication not work	1. check the lines connected right or not 2.check external power on or off 3.check the communication board fixed well
8	hardware	operation noise loud	1. check the motor and the main control board connected well
9	hardware	dispensing is wrong	1. press fast forward fast rewind button to open the pump,enter into the touch screen calibration procedure
10	software	Flow rate is not right	1.For the flow calibration
11	software	communication not work	1.Use the soft provided by LEADFLUID, reset up the address 2.Check up whether two pump use the same address on bus



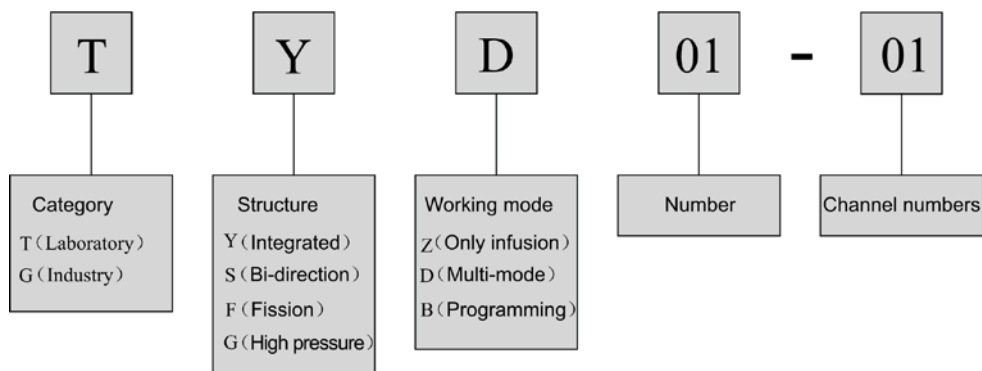
If the malfunction cannot be solved, please contact with the manufacturer.

Appearance size



Naming rule

Syringe pump naming rules



Technology Parameters

TYD01-01 parameters

Main-function

Suitable Syringe	one syringe 10ul-60ml
Main function	Support infusion,withdrawal,infusion/withdrawal,withdrawal/infusion, continuous working modes,prepare more parameters on each mode.Prepared a variety of brands' the syringe, and protection feature and stalling alarm, linear force is adjustable .
Communication function	RS485, support MODBUS protocol
Display function	True color touch screen display
External control	External signal control Start/Stop, and have a status signal output

Main-parameters

Flow range	0.185nl/min(10ul) - 83.320ml/min(60ml)
Linear speed	0.1um/min – 150mm/min
Linear travel accuracy	±0.5%
Linear force	34kg, force is adjustable
Advance per microstep	0.156um/ustep
Display	Mask keypad + touch screen operation

Laboratory syringe pump operation manual

setting	
Display way	65565 color LCD
Power supply	AC 100-240V 50Hz/60Hz
Consumption	<50W
Working environment	environment temperature 0~40℃ relative humidity < 80%
Dimension	245*195*133mm
Drive weight	4.8kg

TYD01-02 technical parameters

Main function

Suitable syringe	one syringe / two syringe 10ul-60ml
Main function	Support infusion, withdrawal, infusion/withdrawal, withdrawal/infusion, continuous working modes, various working mode. Prepared a variety of brands' the syringe, and protection feature and stalling alarm, linear force is adjustable .
Communication function	RS485, support MODBUS protocol
Display function	True color touch screen display
External control	External signal control Start/Stop, and have a status signal output

Main performance

Flow range	0.185nl/min(10ul) - 83.320ml/min(60ml)
Linear	0.1um/min – 150mm/min

speed	
Linear travel accuracy	±0.5%
Linear force	34kg, force is adjustable
Advance per microstep	0.156um/ustep
Display setting	Mask keypad + touch screen operation
Display way	65565 color LCD
power supply	AC 100-240V 50Hz/60Hz
Working environment	environment temperature 0~40℃ relative humidity < 80%
Dimension	245*195*133mm
Drive weight	4.8kg
Working environment	environment temperature 0~40℃ relative humidity < 80%

Note:

The above flow data are obtained by testing pure water under normal temperature and pressure. The actual use is affected by specific factors such as pressure and medium characteristics, which is for reference only.

Syringe manufacture and specification

Air-Tite HSW Norm-Ject		SGE Scientific Glass		Cadence Science, Inc. glass	
Spec	ID	Spec	ID	Spec	ID
1 ml	4.69 mm	5 µl	0.343 mm		
2.5	9.65	10	0.485	0.25 ml	3.47 mm
5	12.45	25	0.728	0.5	3.62
10	15.9	50	1.03	1	4.82

Laboratory syringe pump operation manual

20	20.05	100	1.457	2	8.91
30	22.9	250	2.303	3	8.91
50	29.2	500	3.257	5	11.71
Becton Dickinson Plastic		1 ml	4.606 mm	10	14.65
Spec	ID	2.5	7.284	20	19.56
1 ml	4.699 mm	5	10.301	30	22.7
3	8.585	10	14.567	50	28.02
5	11.989	25	23	100	35.7
10	14.427	50	27.5	Becton Dickinson Glass	
20	19.05	100	35	Spec	ID
30	21.59	Hamilton Glass		0.5 ml	4.64 mm
50	26.594	Spec	ID	1	4.64
60	26.594	0.5 µl	0.103 mm	2.5	8.66
Terumo		1	0.146	5	11.86
Spec	ID	2	0.206	10	14.34
1 ml	4.70 mm	5	0.3257	20	19.13
3	8.95	10	0.485	30	22.7
5	13	25	0.729	50	28.6
10	15.8	50	1.03	100	34.9
20	20.15	100	1.457	Sherwood-Monoject Plastic	
30	23.1	250	2.304	Spec	ID
60	29.1	500	3.256	1 ml	4.65 mm
		1 ml	4.608 mm	3	8.94
		1.25	5.151	6	12.70
		2.5	7.285	12	15.90
		5	10.3	20	20.40
		10	14.567	35	23.80
		25	23.033		
		50	32.573		
		100	32.573		

		60	26.60
		140	38.40

Flow rate chart

Normal syringe Max/min flow rate					
Spec	ID	MIN flow rate	Unit	MAX flow rate	Unit
0.5 µl	0.103 mm	8.000	pl/min	1.249	µl/min
1 µl	0.146 mm	16.000	pl/min	2.511	µl/min
2 µl	0.206 mm	33.000	pl/min	4.999	µl/min
5 µl	0.343 mm	83.000	pl/min	12.497	µl/min
10 µl	0.485 mm	184.00	pl/min	27.711	µl/min
25 µl	0.729 mm	417.00	pl/min	62.608	µl/min
50 µl	1.03 mm	833.00	pl/min	124.984	µl/min
100 µl	1.457 mm	1.667	nl/min	250.092	µl/min
250 µl	2.304 mm	4.169	nl/min	625.383	µl/min
500 µl	3.256 mm	8.326	nl/min	1.248	ml/min
1000 µl	4.608 mm	16.676	nl/min	2.501	ml/min
1 ml	4.699 mm	17.342	nl/min	2.601	ml/min
3 ml	8.585 mm	57.885	nl/min	8.682	ml/min
5 ml	11.989 mm	112.890	nl/min	16.933	ml/min
10 ml	14.427 mm	163.469	nl/min	24.520	ml/min

Laboratory syringe pump operation manual

20 ml	19.05 mm	285.027	nl/min	42.754	ml/min
30 ml	21.59mm	366.090	nl/min	54.913	ml/min
50 ml	26.594 mm	555.459	nl/min	83.318	ml/min
100 ml	35.7 mm	1000.982	nl/min	150.147	ml/min
140 ml	38.4 mm	1158.117	nl/min	173.718	ml/min



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