

Operation Manual

for S1100+ Autosampler

V1.0.0

Statement

The manual is intended to help users to understand, use and maintain S1100+ Auto-sampler. Our company does not assume the responsibility caused by business or special purpose use of the manual.

The information in this document is subject to change without notice and should not be construed as a commitment by our company.

This manual is believed to be complete and accurate at the time of publication. Our company assumes no responsibility for any errors that may appear in this document.

In no event shall our company be liable for incidental or consequential damages in connection with, or arising from, the use of this manual.

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Please read the document carefully before using S1100+ Autosampler.

Foreword

Thank you for purchasing our equipment. To ensure correct and safe use of the instrument, please read it carefully before using.

The details of the equipment's composition, installation, method of using, maintenance, parts selection and other points are described in the manual. After reading, please keep it carefully. Please delivery the manual with the instrument.

For safe operation, please read the following **Safety Precautions** before using the instrument.

Safety Precautions

According to the level of danger and harm, safety signs here are divided into the following three categories:



[Warning] Failure to properly follow the instructions and precautions indicated by this sign may result in serious injury or damage to health and property. The property damage includes the environment around and the instrument.



[Caution] Failure to properly follow the instructions and precautions indicated by this sign may result in slight injury or damage to health and property. Slight injury means no hospitalization is needed to the wounded. Slight property damage means the instrument can be recovery through simple maintenance.



[Note] The sign is used wherever information is given to ensure optimal performance of the instrument.

1. Precaution for usage



[Warning] S1100+ Autosampler should only be used as a part of HPLC. Do not use it for any other purpose. Except for special instructions, this instrument does not have explosion-proof function.

2. Ambient Conditions



[Warning] When we use organic solvent it is recommended that interior must be well ventilated and the firework should be prohibited. Also, a sink or equipment for washing eyes should be installed nearby in case of the organic solvent meeting the eyes or skin.



[Note] In order to ensure good efficiency, keep the instrument away from caustic gas, dusty environment or strong magnetic. The worktable should be wide and strong enough. Ambient should be between 10°C to 30°C with a small fluctuation, and humidity should be between 20% to 80%. Avoid it from cold or hot source as well as direct sunshine. The air conditioners and other equipment should not blow directly into the instrument.

3. Precaution for installation



[Warning] The instrument should be installed following the instructions strictly by professionals, make sure that the voltage of the power socket is the same as the power supply voltage indicated on the instrument. Using the wrong power voltage could result in danger and fire.

The accessory power cable should be used to connect the pump to the power socket. Other cable should not be used.

Make sure the line cord is connected to a properly grounded power receptacle to prevent static and electric leakage.



[Caution] The instrument is so heavy that you should move it carefully and watch your hands in the same time.



[Note] The instrument should be connected following the instructions strictly. Wrong connection could cause communication error.

4. Precaution for use



[Warning] Do not use the instrument in places where heat resource, fire seat, magnetic resource, strong vibration exist or may exist. It is prohibited to put flammable nearby.

The bottle for storing the mobile phase should have a pore in cap to prevent the danger caused by negative pressure in the bottle.

A gap between the waste tubing and the cork of the waste bottle is necessary to prevent the waste bottle bursting when it is overfilled. But the gap should be small to prevent evaporate of hazardous solvents. Even though, the waste need to be clean up promptly.



[Caution] When using organic solvents, please wear safety goggles, special lab coats, gloves mask etc. If your body contact with toxic solvent accidentally, wash it immediately, and then go to hospital for specialized treatment.



[Note] When preparing mobile phase, please use HPLC grade solvents or equivalent ones. You'd better filtrate the eluent with a membrane filter (0.45 μ m), and a online filter is also necessary to prevent small particles from scratching plunger rod, seal ring or blocking tubing. What's more, please degas all mobile phase before using, degassing is an effective method to prevent chromatogram noise and wrong indicator.

Before first use, rinse the entire piping system according to the requirements of the manual. Direct use is likely to block tubing.

Before sample test, ensure that the tubing in the system is filled with mobile phase without any bubbles, otherwise it will affect the reliability of test results.

If an eluent is replaced with another eluent which is insoluble, such as positive mobile phase (hexane) and reverse phase (methanol), be sure to operate according to the specified method in the manual, otherwise it will cause serious tubing jam, and even system paralysis.

Halogen ions are harmful for stainless steel, if there is stainless steel tubing and fitting in your system, please avoid the use of a mobile phase containing halogen ions. If you can't avoid it, please minimize the content and clean the system with water as soon as finishing the analysis.

If there is peek tubing in your system, it is important to note that:

Do not use the following solvent: concentrated sulfuric acid, nitric acid, dichloroacetic acid, dichloromethane, trichloromethane, chloroform, dimethyl sulfoxide, acetone, tetrahydrofuran, etc. Such solvents can reduce the strength of the PEEK material, make it become fragile and broken. But the impact of short-term use of aqueous solution of acetone (lower than 0.5%) in gradient performance is acceptable.

When using PEEK tubing, the pressure of the system should be lower than the tolerance pressure of peek material, otherwise it may burst.

The bending radius of peek tubing should be more than 10mm, make the peek tubing natural relaxation during installation.

The PEEK tubing should be intercepted with professional tubing cutter in order to make the tubing more smooth. Pay attention to that there should be no cutting debris left in the tubing.

5. Repair, maintenance and parts replacement



[Warning] Before repair, maintenance and parts replacement, please turn off the power in case of leakage and electric shock.

There is no need to open the host cover while daily maintenance and repair. If the repair needs to open the host cover please entrust agents or communicate with us.

You should clean the dust on the power cord plug regularly to reduce the electrostatic. Then, dry it before using, otherwise electric shock may occur.

Use dry cloth to wipe the instrument. Do not use thinner or alcohol to avoid erasing characters or color on the panel.

Do not replace components (e.g. fuses, deuterium lamp, etc.) from other company or other type, all accessories are required to be specified to prevent danger.

6. Precaution for static electricity



[Warning] As the instrument may use a lot of flammable, explosive organic reagents which may contaminate laboratory air, when the reagent concentration is too high, any spark or flame could cause fire or explosion accidents. Do not use the pump near any fire resource or hot resource, and keep reducing the electrostatic in mind. To reduce static electricity, please take the following measures:

- 1) Make the instrument grounded. It is very important, please pay attention to it.
- 2) Maintain proper indoor humidity (humidity is greater than 65% can prevent static electricity effectively) and keep the environment clean.
- 3) Metal waste bottles (external conductive) should be grounded (no ground insulation). When using other materials container, you can insert one end of the wire into liquid in the bottle and make the other end earthed.
- 4) Replace a larger I.D. tubing when the flow of mobile phase is higher than usual.
- 5) Wipe the instrument regularly.
- 6) Staffs should wear anti-static clothing. An anti-static pad is needed on the floor.
- 7) People and objects with static electricity is prohibited to touch the instruments.

7. Warning label instructions

To ensure the safety of staffs, we attach warning labels on the equipment where are dangerous. If the label is missing, please request new ones from our company, and attach to the correct position.

Contents

CHAPTER 1 INTRODUCTION	1
1.1. Overview	1
1.2. Features	1
1.3. Performance specification	2
1.4. Physical Specifications	2
1.5. Principle	3
1.6. Appearance	5
1.7. Structure	7
CHAPTER 2 INSTALLATION AND TRANSPORT	8
2.1 Unpacking inspection	8
2.2 Stack Order	8
2.3 Removal Of Transport Fixed Screws	10
2.4 Installation Requirements	11
2.5 Hardware Installation	13
2.6 Software installation	17
2.7 Verification	21
2.8 Transportation	22
CHAPTER 3 INSTRUMENT OPERATION	23
3.1 Power On and Turn Off	23
3.2 Preparatory work	23
3.3 System Configuration	25
3.4 Method setting	26

3.5 Sequence analysis	27
CHAPTER 4 TROUBLESHOOTING AND HANDLING OF COMMON FAULTS	31
CHAPTER 5 MAINTENANCE AND REPAIR	37
5.1 Syringe replacement	37
5.2 Sample ring replacement	38
5.3 replacement of sampling needle	39
CHAPTER 6 COMPONENTS AND MATERIAL LIST	40
6.1 Consumption Parts	40
6.2 Replacement Parts	41
APPENDIX	I
Introduction for Tubing Materials	I
Safety Information	II

Chapter 1 Introduction

1.1 Overview

Agress S1100+ Autosamplers (S1100+ for short) is one of the Agress 1100+ series products from our company. The S1100+ Autosampler is driven by a high-precision stepper motor, which features easy operation, high accuracy, automatic control, and remote monitoring. It can work continuously under non-manual monitoring, reducing human error and improving work efficiency.

As an injection unit for the Agress 1100+ high performance liquid chromatograph, the S1100+ Autosampler can be easily used with other liquid chromatograph detectors, high pressure infusion pumps, column ovens and other units. It can also be used with other instruments through the S1100+ Autosampler Control Module.

1.2 Features

Superior design

- The working mode of simultaneous movement of the tray and the sample needle optimizes the pipeline connection, shortens the injection cycle, and is compatible with 120-well trays, 96-well plates and 72-well trays.
- The imported high-precision side-opening sample needle adopts high-purity special steel, which improves the needle strength, reduces the adsorption, and avoids the problem that the traditional sample needle is easily blocked by the septum debris.
- High-precision stepper motor combined with world-class guide rails improves the positioning accuracy of the system and makes the position accuracy close to “zero deviation”.
- Highly integrated 32-bit STM32 embedded microcontroller and the current popular SPI and I2C bus technology, which reduces the size of the board and the number of devices used, and improves reliability.

Intelligent system

- Fully automatic power-on self-test function and preparation function, the circuit and mechanical fault of the Autosampler can be found in the first time, and the system is completely exhausted to achieve good experimental repeatability.

Diversified functions

- Three different injection modes are available for users to select, and the appropriate mode can be selected according to the specific experimental requirements, so as to obtain the best analysis results.
- A standard 120-well tray and an optional 96-well and 72-hole tray are available to meet the needs of most users.

1.3 Performance specification

Table 0-1: Performance Specification for S1100+

No.	Items	Specifications
1	Injection range	0~100μL, 500μL, 2mL
2	Injection repeatability	RSD<0.3% Full sample loop injection (standard conditions) RSD<0.5% Partial volume injection lossy injection (standard conditions) RSD<1.0% Partial volume injection without loss (standard conditions)
3	Injection linearity	$R^2 > 0.999$
4	Sample residue	<0.01%
5	Highest pressure	45MPa
6	communication method	UDP network communication
7	Injection trigger	Digital mode, analog mode



[Warning] S1100+ Autosampler can be equipped with 100μL, 500μL, 2mL quantitative rings.



[Warning] S1100+ Autosampler when 500μL or 2mL quantitative ring is selected, partial volume sampling is not recommended for lossy sampling (standard condition), and partial volume sampling is recommended for lossy sampling (standard condition).

1.4 Physical Specifications

Table 1-2: Physical Specification for S1100+

No.	Items	Specifications
1	Weight	23Kg
2	Size (length × width × height)	540mm×400mm×300mm
3	Power supply	220V±10%
4	Power	30W

1.5 Principle

The S1100+ Autosampler uses a working mode in which the tray and the sample needle move at the same time, and is combined with a two-position six-way valve for injection. The basic structure principle is shown in Figure 1-1.

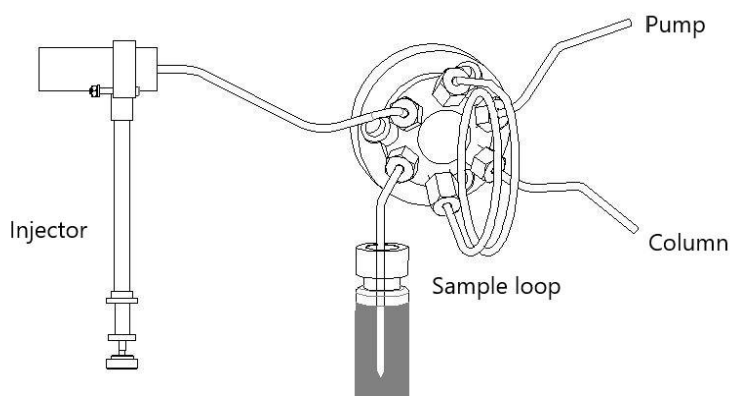
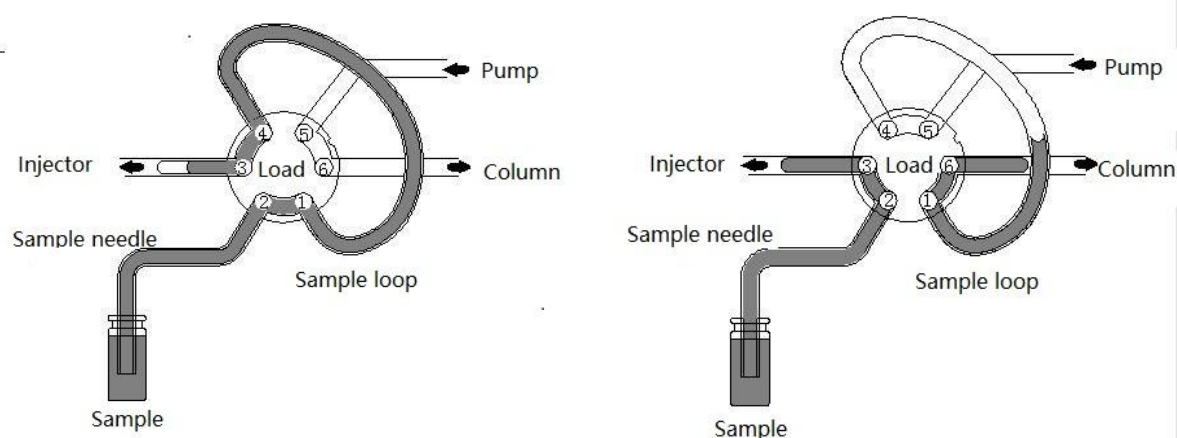


Figure 0-1: Structural schematic

The S1100+ Autosampler uses the basic principle of suction injection. The sample is quantitatively sucked into the sample loop through a syringe connected to the sample needle, and the injection valve is switched to achieve the purpose of injection. The S1100+ Autosampler is divided into three injection modes: full sample loop injection, partial volume injection (with sample loss), partial volume injection (no sample loss), and the specific principle is shown in Figure 1-2~1- 4 is



shown.

Figure 0-2: Full sample loop injection

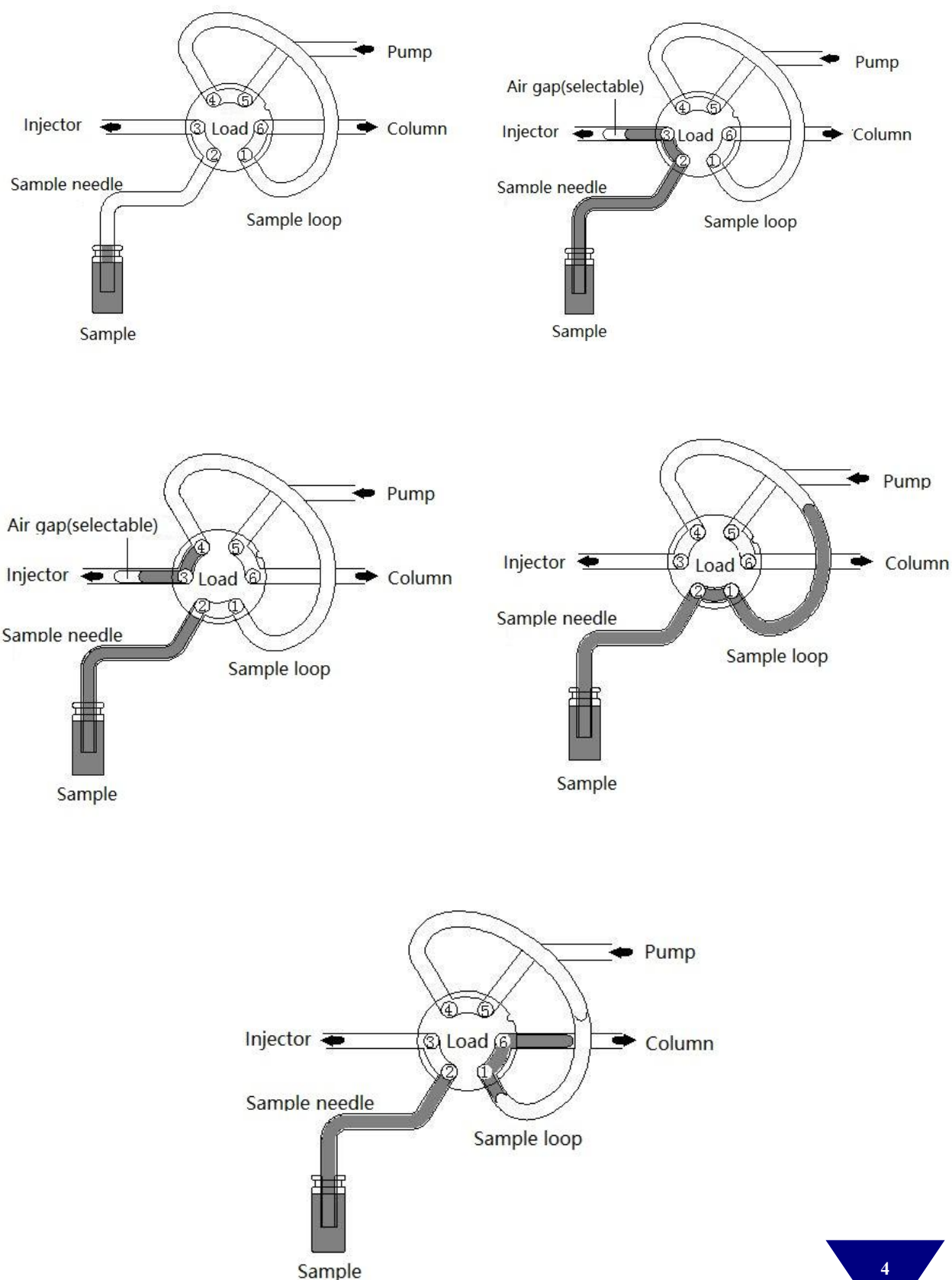


Figure 0-3: Partial volume injection (with sample loss)

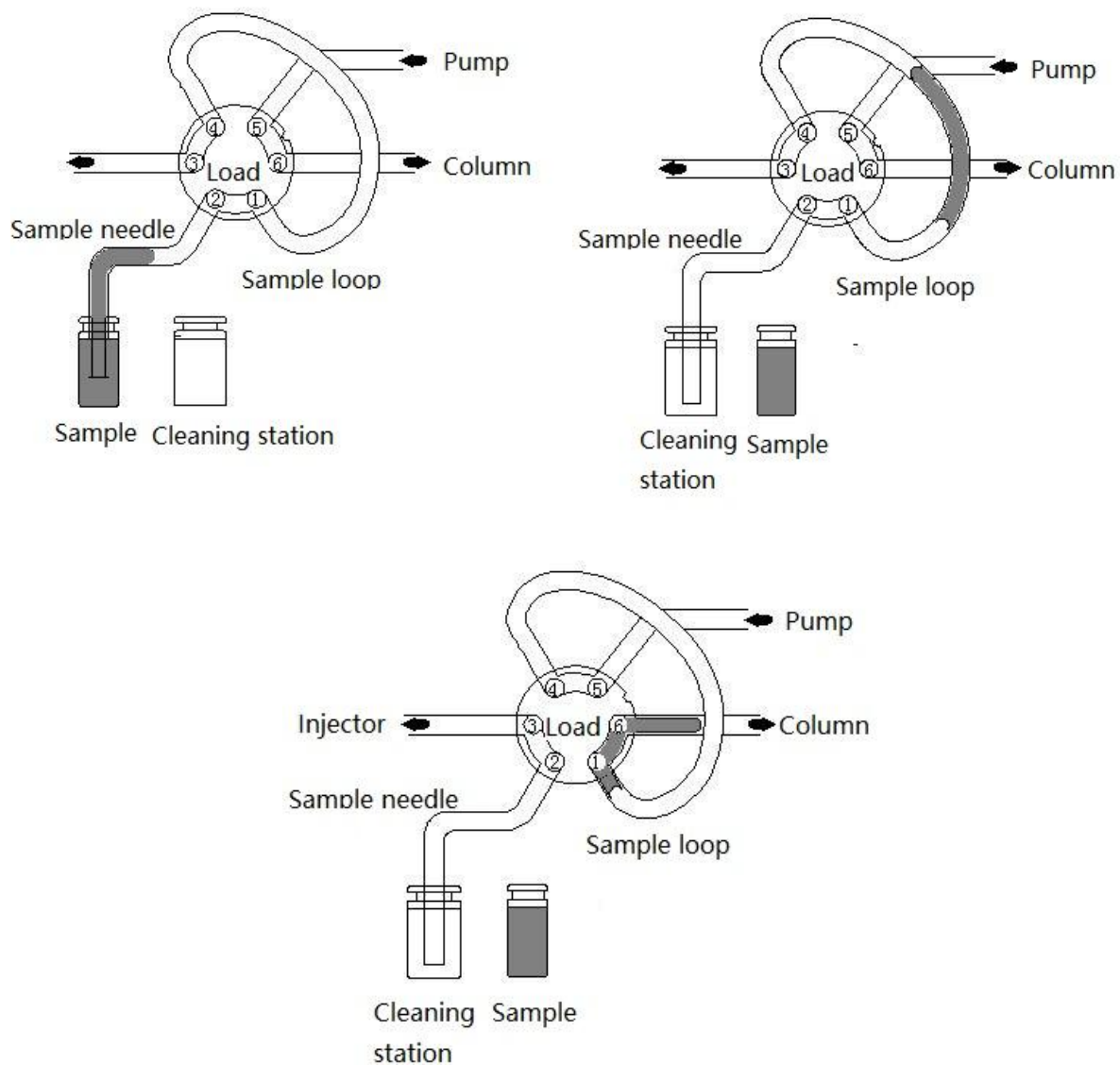


Figure 0-4: Partial volume injection (no sample loss)

1.6 Appearance

The appearance of the instrument of the S1100+ Autosampler is shown in Figure1-5.

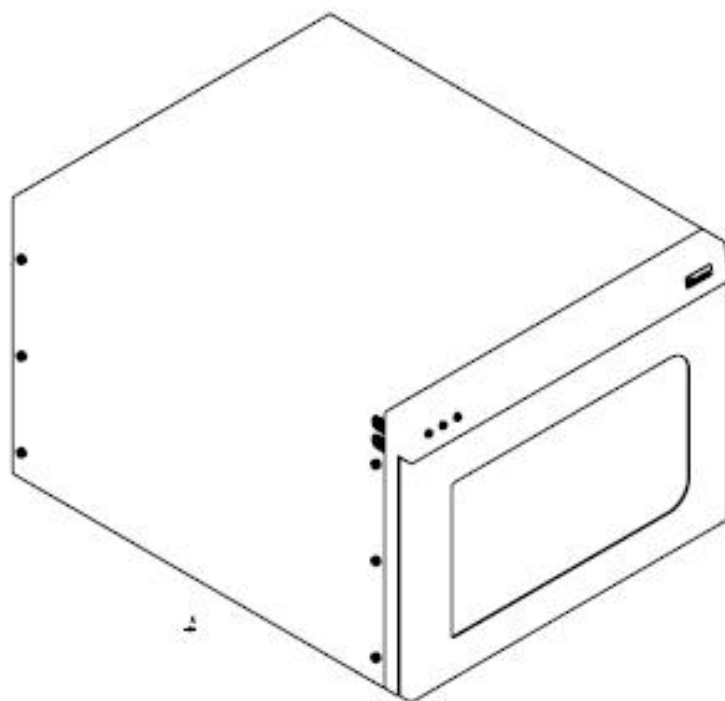


Figure1-5: S1100+ Autosampler

1.7 Structure

1.7.1 S1100+ front panel schematic

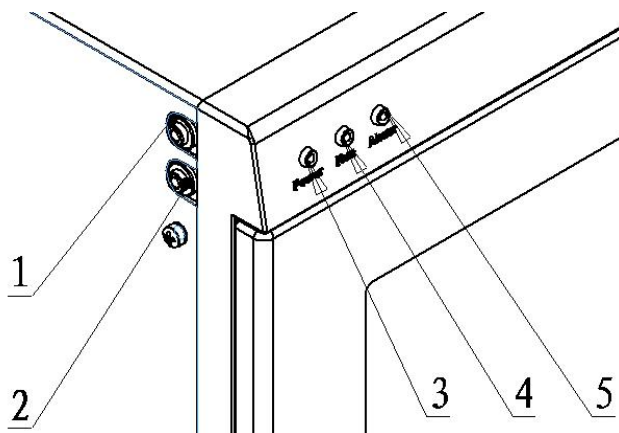


Figure 1-6: S1100+ Autosampler front liner schematic

Figure 0-3: Main components of the S1100+ Autosampler front liner

No.	Items	Specifications
1	Outlet	Interface connected to the column by the Autosampler
2	Inlet	Interface connected to the Autosampler by the pump
3	Power light	Used to show if the Autosampler is powered
4	Running light	Used to display the Autosampler status
5	Alarm light	Reserved

1.7.2 S1100+ rear panel schematic

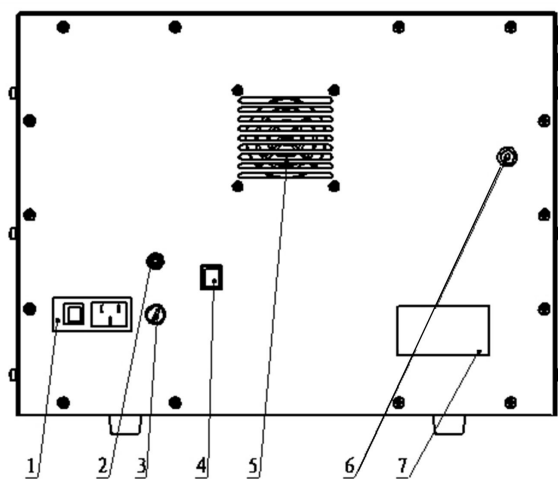


Figure1-7: S1100+ Autosampler rear panel schematic

- 1.Power socket; 2.Grounding bolt; 3.fuse; 4.LAN Cable interface;
5.Exhaust fan; 6.Trigger interface; 7.Instrument nameplate

Chapter 2 Installation and transport

2.1 Unpacking inspection

S1100+ Autosampler is packaged with corrugated boxes and foam lined structure, as you receive the instrument, check the packaging first, if you found packaging is damaged, please contact with our company or local dealer.



[Warning] If there is any damage to the instruments when you receive it, please don't try to install it. You can ask our company to inspect and assess it.

2.1.1 Demolition of the packing

Place the wooden box with the S1100+ Autosampler face up on a level surface. Use pliers to straighten the wooden box and remove the top cover of the wooden box. Use scissors or a blades to cut the top tape of the carton, take out the Autosampler and accessories, and place them on the table, open the instrument packaging film.



[Warning] It is suggested that installation operation should be careful to prevent instrument slide or damage to health.

2.1.2 Deliver checklist

Table 2-1: Deliver list of S1100+ Autosampler

NO.	Items	Quantity
1	S1100+ Autosampler	1 pc.
2	Certificate	1 pc.
3	Package	1 pc.



[Note] If there are discrepancies between the packing list in the box and in the specification, please refer to the packing list in the box. It is subject to change without prior notice.

2.2 Stack Order

In order to guarantee the best working state of the instrument, it is recommended that the

instruments should be stacked as shown in figure 2-1.

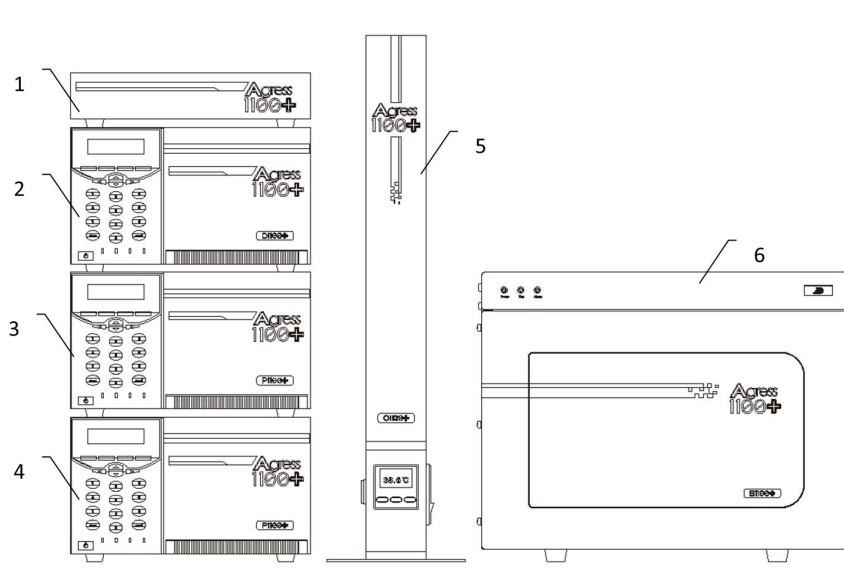


Figure 2-1: Agres 1100+ stack order

1. Solvent tray, 2. UV-visible detector, 3., High-pressure constant flow pump A
4. High-pressure constant flow pump B, 5. Column oven, 6. Autosampler

2.3 Removal Of Transport Fixed Screws

In order to avoid damage to the internal mechanical structure of the Autosampler caused by impact and vibration during transportation, the transport of fixed screws are installed inside the Autosampler. After the instrument is placed stably, screw down screws as shown in Figure 2-2 and Figure 2-3.

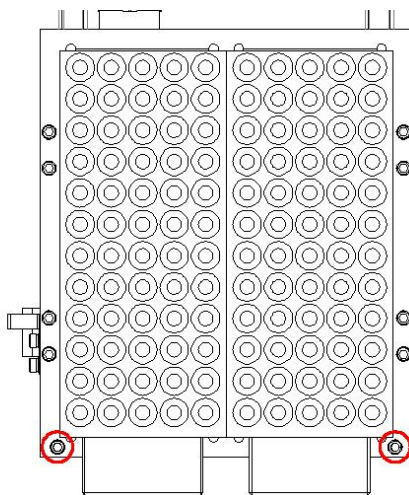


Figure 2-2: Pallet transport fixed screws

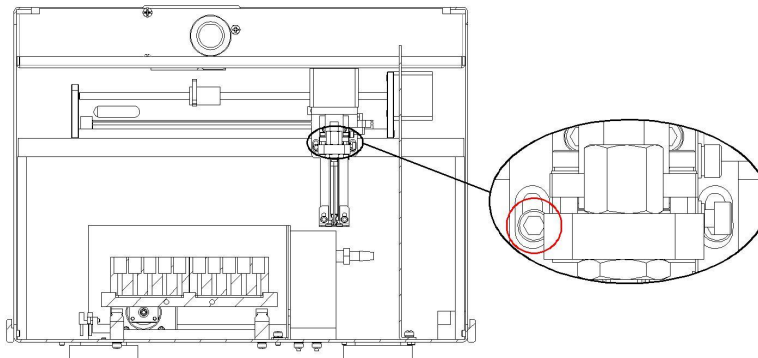


Figure 2-3: Z-axis shipping fixing screws



[Caution] Remove the transport fixed screws before turning on the Autosampler power supply, otherwise the motor and the screw will be seriously damaged!

2.4 Installation Requirements

2.4.1 Site Requirements

● *Environment*

S1100+ Autosampler need to work under ambient conditions in table 2-2 below. It is recommended that the ambient temperature change less than 2°C/h. If the ambient temperature fluctuates significantly, the sample volume may change slightly.

Table 2-2: Environment requirements

Items	Specifications	Requirements
1	Work environment	Room should be free of dust, inflammable and explosive materials, also, good ventilation is important
2	Electromagnetic field	No electromagnetic noise nearby
3	Operating temperature	4~40°C (39~104°F)
4	Humidity	20%~80%, non-condensing



[Caution] Do not use the column oven under conditions of temperature fluctuations. If the ambient temperature is too low, make the room temperature increase slowly to avoid condensation inside caused by rapid heating.

● *Bench space*

The S1100+ Autosampler are allowed to place on almost any laboratory bench. If you want to display the complete 1100+ system on the bench, make sure that the table can bear the weight of all components. It needs an additional 100mm on the left, 50mm on the right, 150mm on the back to facilitate the circulation of air, electrical connections.



[Warning] The instruments should be placed on a horizontal position, otherwise there is a danger of falling!

- **Place space**

The position of the S1100+ Autosampler should be close to the computer and test equipment. The area required for the S1100+ Autosampler is 600×500mm, and the countertop needs to be stable and level. When placing, the left end should reserve at least 50mm space from the instrument, at least 20mm space should be reserved at the right end, and at least 80mm space should be reserved at the back end to ensure the line connection.



[Warning] The instruments should be placed on a horizontal position, otherwise there is a danger of falling!

2.4.2 power line

To ensure that the instrument can be normal and safe, please use a dedicated power line within the specified voltage range.

- Grounding, T1.25A (250V) fuse.
- Please use T2A/250V fuse



[Warning] The accessory power cable should be used to connect the Autosampler with the power socket. Other cable should not be used in case of danger or damage to the instrument. If the instrument is connected to a grid above the scope of application, it may cause electrical shock or damage to the equipment and staff.

Please unplug the power cord before replacing the fuse to avoid electric shock.

For the safety of the person and the protection of the instrument, an external fuse is installed at the rear of the instrument.

2.5 Hardware Installation

2.5.1 Pipeline connections of Autosampler and pump

Install the mobile phase capillary (stainless steel or PEEK pipe) on the inlet of the Autosampler with the standard screws and blades, and connect the other end of the pipe to the pump (gradient system is connected to the mixer). See Figure 1-6 for details.

2.5.2 Pipeline connections of Autosampler and detector

The sample capillary (stainless steel or PEEK) should be connected to the instrument's outlet and connected to the column. The other end of the column is connected to the detector inlet.



[Warning] When connecting the pipeline, the solvent may leak from the tube joint. Operation of toxic and harmful reagents may endanger health. Please take protective measures.

2.5.3 Synchronous Trigger Interface Connection

Connect the sync interface to the trigger connection terminal on the rear panel of the Autosampler and connect the sync interface to the detector trigger line.

2.5.4 Communication network cable

Insert the two network cables into the yellow interface on the router. The other end of the blue network cable is connected to the computer network interface. The white network cable is connected to the network interface on the rear panel of the S1100+.

2.5.5 Mobile phase and mobile phase bottles

Before using the mobile phase liquid, it should be strictly filtered with a membrane with a pore diameter of not more than 0.45 μ m, and degassed. Otherwise, the tiny solid particles in it will seriously damage the service life of the syringe and reduce the injection precision, while the tiny bubbles will cause the injection. Repeatability is worse.

The degassed mobile phase liquid is poured into the mobile phase bottle, and the mobile phase bottle is sealed with the matching bottle cap. Place the mobile phase bottle in the standard position as shown in Figure 2-4, then insert the pipe into mobile phase bottle and make sure the pipe is at the bottom of the mobile phase bottle.

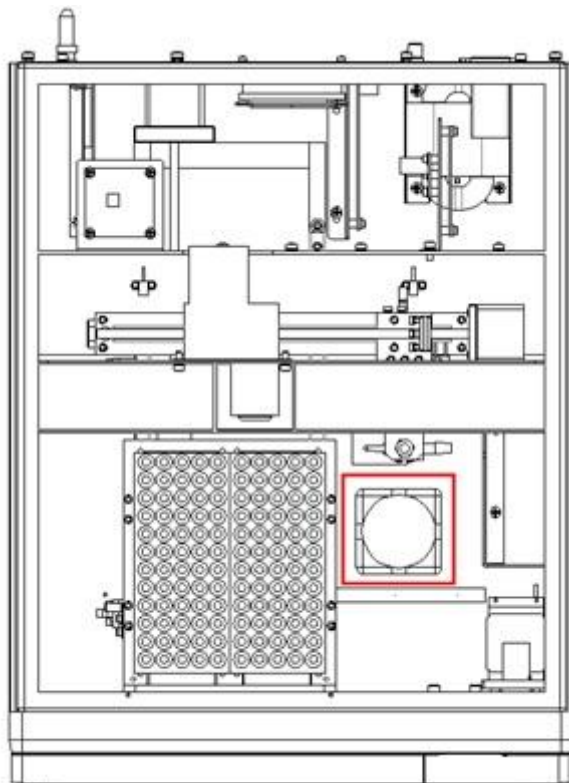


Figure 2-4: Mobile phase placement

2.5.6 Waste bottle

The S1100+ Autosampler waste liquid flows into the waste liquid bottle through the waste liquid pipe. One end of the waste liquid tube is connected to the waste liquid discharge port at the lower right, and the other end is placed in the waste liquid bottle. The waste liquid bottle should be placed below the automatic position. The height of the injector is placed and the waste liquid is discharged smoothly.

2.5.7 Sample holder

The Autosampler sample tray is divided into a left tray (1#~60#) and a right tray (61#~119#, blank). The position of the positioning pins under the two trays is different. Please place them in the style of Figure 2-5.

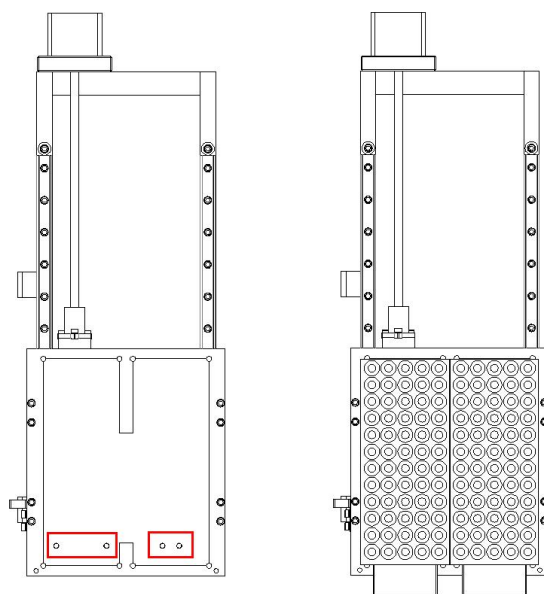


Figure 2-5: Sample tray placement

2.5.8 Syringe Exhaust

When the mobile phase bottle is replaced, the washing liquid at the front end of the liquid washing pipe will be lost, and the air bubbles will be entered into the pipe. To ensure good sample repeatability, the syringe should be vented after replacing the liquid washing bottle. Usually, the Autosampler will automatically perform self-test and syringe exhaust after power-on, so the lotion bottle should be placed before starting up. If the lotion bottle is replaced after the instrument has self-tested, after replacing the lotion bottle, click on the “Cleaning” button in the “Autosampler” module in the Kromstation Data Station to vent the syringe.

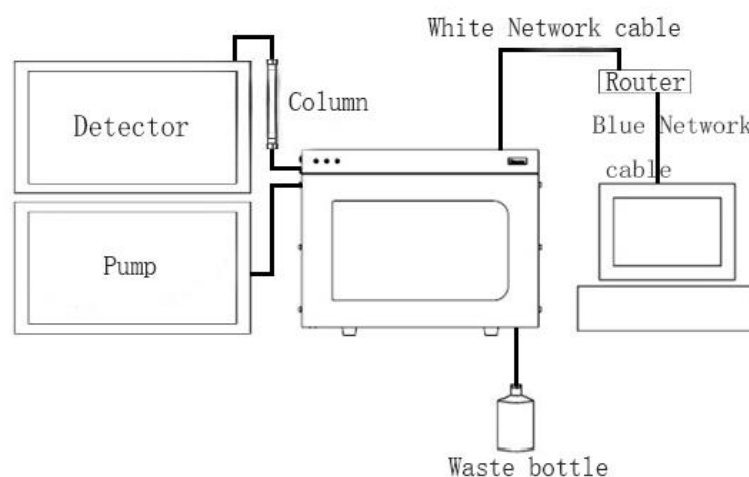


Figure 2-6: S1100+ connection diagram

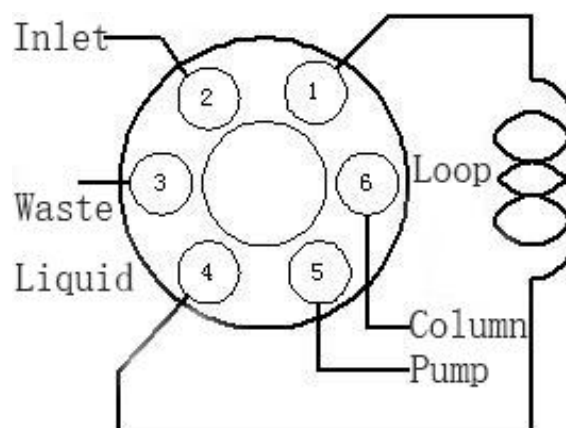


Figure 2-7: S1100+ six-way valve connection diagram



[Warning] The router used to connect to the S1100+ Autosampler is a dedicated communication router. It is not allowed to connect to any other network and connection. Otherwise, communication stability and reliability may be greatly reduced or communication may be interrupted. The instrument communication caused by the user's private connection to the network may result. The problem, our company has the right to refuse to carry out maintenance and repair.

2.6 Software installation

There are two kinds of Autosampler control software: Kromstation data workstation (including S1100+ Autosampler control module) and S1100+ Autosampler control module.

The Kromstation data workstation (including the control module of S1100+ Autosampler) can be used by using the Agrest 1100+ chromatography system of our company. This software can fully control the instrument in the above two systems, and Autosampler.

Users of P230II and P1201 chromatographic systems can use the EC2006 chromatography data processing station with the S1100+ Autosampler control module, and the two software can respectively control the instrument and the Autosampler;

Other uses can use S1100+ Autosampler control module to control the Autosampler.

2.6.1 Computer requirements

Hardware requirements

- Intel Core 2 CPU, more than 8G running memory (PDA module requires more than 16G memory); The data storage space in the Kromstation installation path is more than 4 GB. The recommended storage space is more than 50 GB based on the actual test amount.
- Minimum display resolution: 1024 × 800, 64K color (16-bit true color).
- Computer accessories requirements: at least one USB port for the Hardware Key, at least one network interface (LAN) for device communication, and one USB port for software installation.
- Network management requirements: It is recommended that the computer used to connect the HPLC is not networked. If it is necessary to connect to the Internet, please complete the connection under the guidance of Dalian Yili Analytical Instrument Co., LTD engineers.

Software requirement

- Confirm that the operating system used to run the Kromstation chromatography data workstation is genuine.
- Ensure that the firewall of the operating system is disabled.
- Sets the "Put your computer to sleep" option in your operating system to Never;
- Set the properties of the network adapter and make sure that "Allow

computer to turn off this device to save power" in the Power Management option of the network adapter is not selected;

- Anti-virus software is not recommended for computers connected to the HPLC, and you must ensure that the mobile storage device used for data copying does not contain any computer viruses.

2.6.2 Computer network IP Settings

- Before installing software, you should set up your computer network.
- Right-click network places on your desktop and left-click properties.



Fig. 2-8 Computer network Settings picture 01

After entering the network connection window, right-click local connection and left-click properties.



Fig. 2-9 Computer network Settings picture 02

After selecting Internet protocol (TCP/IP) in "this connection uses the following items", click "Properties".

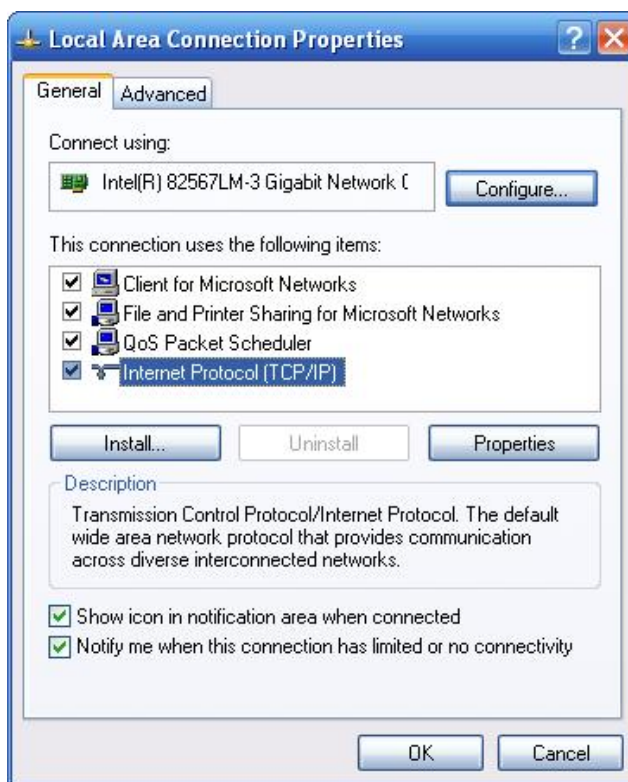


Fig. 2-10 Computer network Settings picture 03

After entering the “Internet protocol (TCP/IP) properties” dialog box, set the IP address as shown in Fig. 2-10. Click “ok” after setting.



Fig.2-11Computer network Settings picture 04

Click ok again in the local connection properties dialog box to make the

system accept the above changes.

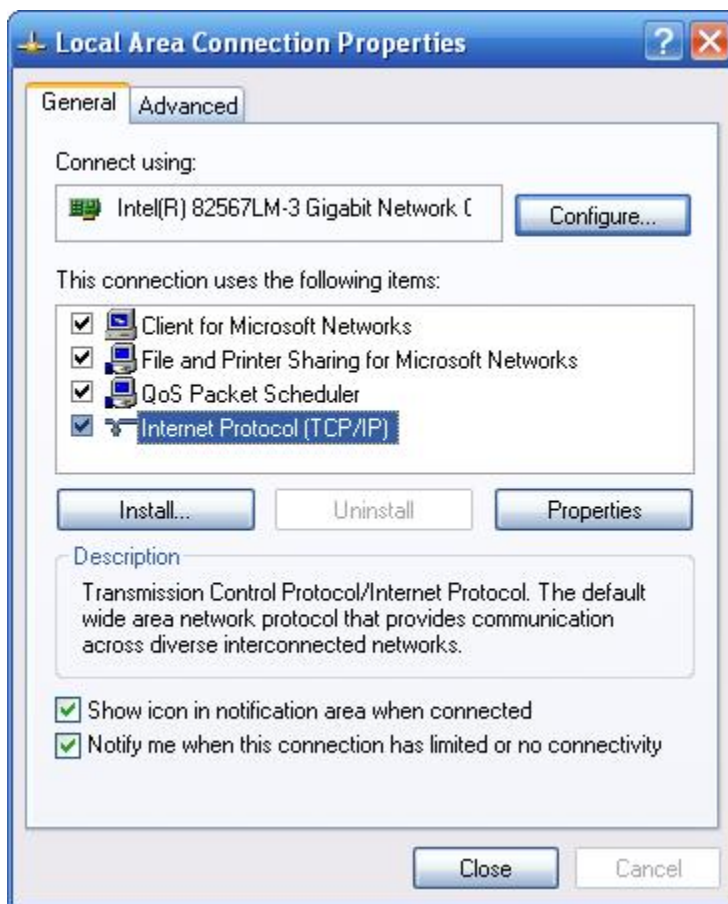


Fig.2-12 Computer network Settings picture 05



【Caution】

Client-computers must be equipped with network communication and corresponding drivers in the form of LAN interfaces as hardware communication.

2.6.3 chromatography data workstation installation

The installation method of Kromstation is shown in the operating instructions attached to the disk of Kromstation.

2.6.4 S1100+ Autosampler control module installation

Put the S1100+ Autosampler control module into the optical drive, copy all folders, find the " S1100+ Control Module.exe" file and double-click, it will run.

2.7 Verification

In normal instance, the instrument customers received have been tested and came with verification, the performance met our requirements in factory, users have no need to test and verify. If you have any doubt about the performance of the instrument, verify it refer to the following steps:



【Caution】 The test results of the Autosampler are affected by the whole system.

It is important to ensure the normal operation of other equipment except the Autosampler.

- **Chromatographic conditions**

Components	content
moving phase	methanol/water=85/15(v/v)
chromatographic column	C18
velocity	1.0mL/min
wavelength	254nm
response time	1.0S
Autosampler washing liquid	methanol/water=85/15(v/v)
standard sample	naphthalene

- **Method setting**

Use the default parameters of the Autosampler in S1100+.

- **Injection repeatability (S1100+)**

Sample volume is 10 μ L, repeat injection 11~13 times, and the RSD value is calculated for 11 times of peak area. $RSD \leq 0.5\%$.

- **Injection linearity (S1100+)**

Injection volume is 5 μ L, 10 μ L, 15 μ L, 20 μ L, 25 μ L, respectively. For each 3-time injection, linear curves are taken for the average of the same volume input peak area and the input volume, $R^2 \geq 0.999$.

- **Samples of residual (S1100+)**

When the sample volume is 20 μ L, one stitch for the standard naphthalene samples and the blank solution, peak area of Standard naphthalene is divided by the blank solution the peak area of naphthalene, and multiplied by 100%, the residual shall be $\leq 0.01\%$.

2.8 Transportation

The detector is a precision instrument, please gently while long-distance transportation, severe vibration, drops are likely to cause damage to the internal parts of the instrument. The random original packaging can effectively protect the instrument.

When the instrument is required to move or returned for service, please follow these steps for packaging.

- 1) Turn off the power.
- 2) Unplug the power cord and communication lines.
- 3) Removing the connecting pipe and other elements between components.
- 4) Refer to 2.3 and screw the shipping set screw back onto the Autosampler.
- 5) Remove the detector from chromatography system, put it into special sealed bag on a large platform.
- 6) Put the detector into the original packaging foam, fix it.
- 7) Placed the fixed detector and other accessories into original packaging carefully.
- 8) Tape the box sealed to prevent liquid from entering. Cover the packaging box with plastic wrap is recommended.
- 9) Transport packaged instrument.



【Caution】 Before packing, please check the box, if the original packaging has been damaged, do not use it, you should consult your local dealer or Our company customer service staff to solve!

Chapter 3 Instrument operation

3.1 Power On and Turn Off

Power On: Put the total power switch on the back panel at the "I" position, and the Autosampler enters the energizing state, the power indicator light on the front panel turns red. After a short time of self-inspection, the instrument enters the normal operation state, and the state indicator light will change from colorless to green and always on.

Turn Off: Put the total power switch on the back panel in the "O" position.

3.2 Preparatory work

3.2.1 Selection of lotions

Before using the S1100+ Autosampler for the experiment, you should first observe whether the lotion is sufficient, and it is recommended to add the filtered and degassed lotion before opening the instrument.

When choosing a lotion, consider the following:

- Samples are highly soluble in detergents.
- Poor stability of lotion leads to precipitation and Plug the inlet valve and line
- Washing liquid and moving phase can be mixed at any ratio, washing liquid should not produce interference peak
- The device should be used to allow washing fluids within the pH range
- Normally, the moving phase can be used as wash solution, but when the fluid phase contains buffer salts, the non-salt mobile phase can be used as wash solution.

3.2.2 Power On Self-Test

Put the total power switch on the back panel of the system organizer in the "I" position, the S1100+ Autosampler will perform self-check operation for about 3 minutes at the same time.



【Caution】 When S1100+ Autosampler self-test, you must close the front door, never allow the hand into the instrument, otherwise may cause serious mechanical damage to the human body!

3.2.3 Place sample tray

After the Autosampler self-test is completed, the user can take out the sample tray, place the sample bottle, and then put it into the Autosampler.



【Caution】 The tray must be placed smoothly in the order of left tray (1#~60#) and right tray (61#~119#, blank). The wrong placement may cause serious damage to the needle or motor !

3.2.4 Sample bottle selection

The sample bottle recommended for S1100+ Autosampler is shown in table 3-1.

Table 3-1: Recommended sample bottle type

	Name	Specifications	Minimum sample volume	Distance from needle tip to bottle bottom (set)
	Standard sample bottle	1.8mL	≈360μL	1.0mm
	Standard casing	300μL	≈15μL	2.0mm



【Caution】 To ensure the injection performance of the S1100+ Autosampler, use the recommended standard sample bottle and casing. If the use of non-standard bottles and sleeves lead to poor sampling repeatability, sample needle damage and other consequences , the user should bear!

3.3 System Configuration

Before using S1100+, please add S1100+ auto sampler in the configuration interface of Kromstation and enter the SN of the instrument. The specific operations are as follows:

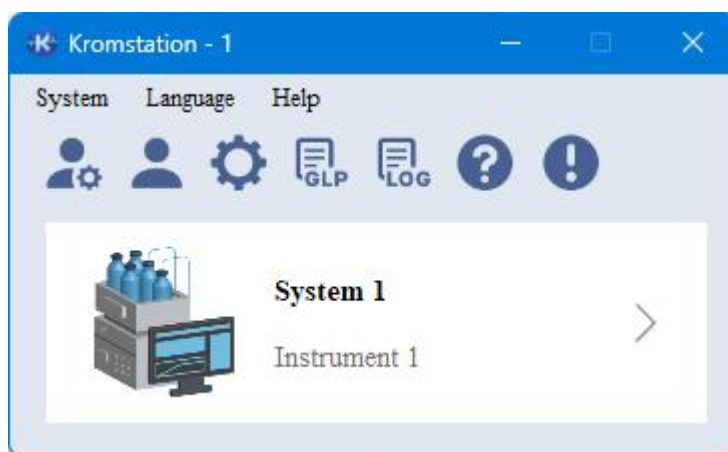


Fig.3-1 Configuration Interface 01

2) The system configuration interface is displayed. As shows in Fig.3-2:

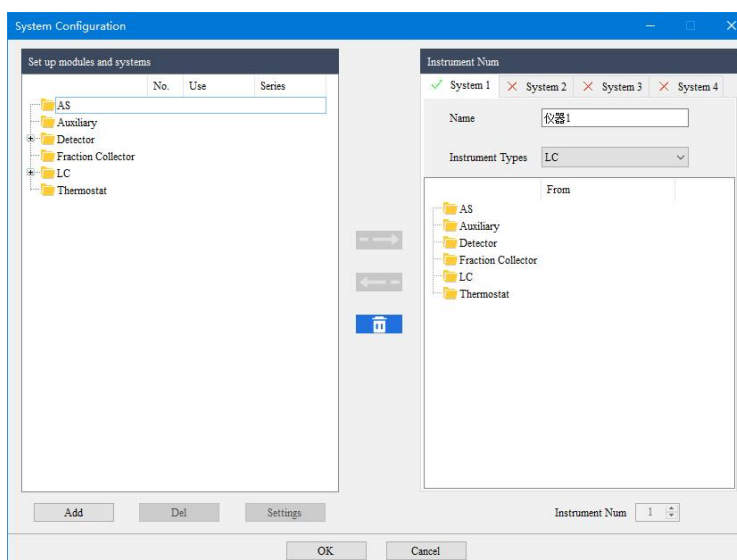


Fig.3-2 Configuration Interface 02

3) Click the "Add" button at the lower left corner of interface Fig.3-2, and the interface as shown in Fig.3-3 will pop up:

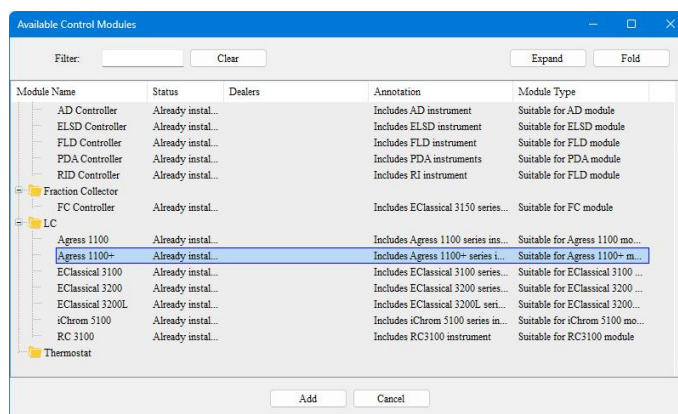


Fig.3-3 Configuration Interface 03

4) Select Agress 1100+ Controller, double-click to enter the configuration screen, and enter the SN to verify the system.



Fig.3-4 Configuration Interface 04

3.4 Method setting

Before using the S1100+ for sequence analysis, first set the auto sampler method, as shown in Fig 3-5.

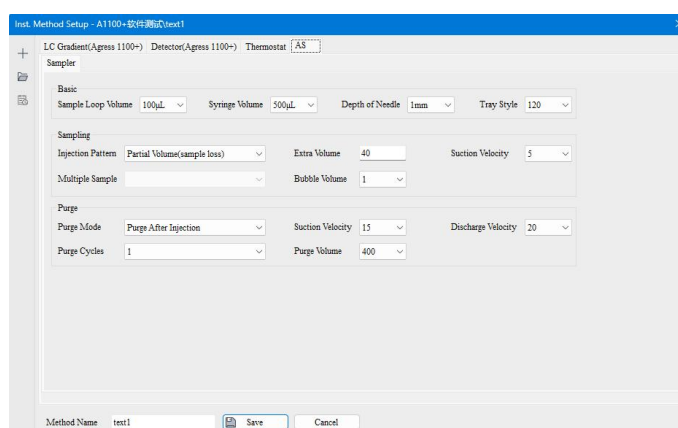


Fig.3-5 S1100+ Method setting for Autosampler

● Injection mode

There are three kinds of injection modes to choose, which are full loop, partial loop needle overfill and partial loop.

- **Extra volume**

Full loop, partial loop needle overfill can produce the additional loss of the sample, and partial loop can consume the additional consumption of the blank solution. This value is recommended to use 40μL, which can ensure the repeatability of the injection. If there is a special need, it can be reduced to no less than 30μL.

- **Suction speed(sample)**

Default setting can satisfy the absorptive speed of most samples viscosity, if the sample is particularly viscous, this parameter can be reduced to 2.

- **Bubble volume**

It is used to isolate the bubbles between the sample and the cleaning solution or the blank solution, which can prevent the sample diffusion effect. Usually 1 μL can meet the needs of most situations.

- **Purge method**

There are four modes to choose that are no purge, purge before injection, purge after injection, purge before and after injection. It is necessary to purge after injection and before injection , that will to avoid cross contamination as well as damage to the injection valve caused by solidified samples.

- **Suction velocity**

When sampling needle is purging, the suction speed of lotion.

- **Discharge speed**

When the sample needle is purging, the discharging speed of the lotion.

- **Purge times**

Purge times according to purge mode.

- **Purge volume**

The volume of lotion consumed during each purging process.

3.5 Sequence analysis

When using kromstation chromatographic data workstation to control sampler, the sequence analysis can be set and run according to the following steps:

- 1) After entering the workstation, click the "sequence" interface, as shown in Fig.3-6 below. Click the sequence analysis button to enter the sequence analysis dialog box.



Fig.3-6 Sequence analysis open method

2) In the sequence analysis dialog box, fill in the starting sample bottle number, ending sample bottle number, injection times, injection volume, sample type, spectrogram name, storage location, instrument method, analysis method, calibration method, reporting method, etc.

Sequence analysis dialog box settings:

- **"Status"** refers to the status of the sequence. It refers to whether the sequence is in the status of waiting for running, running or

completed running. The running status is displayed as ,

the waiting running status is displayed as  , and the

running completion status is displayed as .

- **"Operation"** refers to whether the line sequence needs to be operated. If it needs to be operated, it will be displayed as a status. If it does not need to be operated, it will be displayed as a  status.

- **"Starting bottle"** refers to the starting sample bottle number.

- **"Termination bottle"** refers to the termination sample bottle number.

- **"Number of injections"** refers to the number of injections per sample bottle.

- **"Sample ID"** refers to the sample identification number, which is used to distinguish samples. Description information of no more than 64 characters can be set.

- **"Sample name"** refers to the name of the injected sample.

- **"Sample type"** is only used when the sample for this injection is "unknown", "standard" or "bypass". The "unknown" is generally used when the sample is injected, "standard" generally refers to the standard curve. The "bypass" is not injected and is generally used when the system is balanced.

- **"Spectrum name"** refers to the name of the chromatogram saved, and the suffix of the spectrum name can be selected as required.

- **"Total sample quantity"** refers to the sample quantity required to prepare the solution.

- **"Sample dilution degree"** refers to the sample dilution factor. The

result calculated by the calibration file will be automatically multiplied by the corresponding dilution factor to obtain the final calculation result, which appears in the report form, and the default value is 1.

- **"ISTD1 quantity"** refers to the quantity of internal standard substance 1 in the internal standard method. If there are multiple internal standards, you can right-click to select Add.
- **"Instrument method"** refers to the method of controlling the instrument.
- **"Analysis method"** means the method used for the analysis, including the running time.
- **"Standard method"** refers to the calibration method to be used for automatic calibration of this chromatogram.
- **"Rapid sample injection"** After the check is enabled, the fast sampling function can effectively shorten the running time of the sequence table and improve work efficiency.
- **"Pre-sample Time"** set the start time of rapid injection, for example: the current sample analysis time is 20min, and the pre-injection time is 5min, that is, the next line of sample injection will start when the current line runs to the 15th minute.

3) After editing the sequence, the workstation will automatically check the sequence. Click the  run sequence in the toolbar above the sequence to start the analysis sequence.

4) After the sequence analysis is completed, the corresponding sequence status changes, as shown in Fig.3-7.

Sequence													
#	Status	Run	RT[Min]	RT[Min]	RT	Inj Volume	Sample	Sample Type	File Name	Storage Location	Instrument Method	Analysis Method	Calibration Method
20		120	120	3	1.9		Udun...	Udun...	万源科检测材料小体检测性 检测口3	万源科检测材料小体检测性 光路选择 2024	万源科检测材料小体检测性 3min	万源科检测材料小体检测性 无	万源科检测材料小体检测性 无
21		120	120	3	2		Udun...	Udun...	万源科检测材料小体检测性 检测口3	万源科检测材料小体检测性 光路选择 2024	万源科检测材料小体检测性 3min	万源科检测材料小体检测性 无	万源科检测材料小体检测性 无
22		120	120	3	0.1		Udun...	Udun...	万源科检测材料小体检测性 检测口3	万源科检测材料小体检测性 光路选择 2024	万源科检测材料小体检测性 3min	万源科检测材料小体检测性 无	万源科检测材料小体检测性 无
23		120	120	3	0.2		Udun...	Udun...	万源科检测材料小体检测性 检测口3	万源科检测材料小体检测性 光路选择 2024	万源科检测材料小体检测性 3min	万源科检测材料小体检测性 无	万源科检测材料小体检测性 无
24		120	120	3	0.3		Udun...	Udun...	万源科检测材料小体检测性 检测口3	万源科检测材料小体检测性 光路选择 2024	万源科检测材料小体检测性 3min	万源科检测材料小体检测性 无	万源科检测材料小体检测性 无
25		120	120	3	0.4		Udun...	Udun...	万源科检测材料小体检测性 检测口3	万源科检测材料小体检测性 光路选择 2024	万源科检测材料小体检测性 3min	万源科检测材料小体检测性 无	万源科检测材料小体检测性 无
26		120	120	3	0.5		Udun...	Udun...	万源科检测材料小体检测性 检测口3	万源科检测材料小体检测性 光路选择 2024	万源科检测材料小体检测性 3min	万源科检测材料小体检测性 无	万源科检测材料小体检测性 无
27		120	120	3	0.6		Udun...	Udun...	万源科检测材料小体检测性 检测口3	万源科检测材料小体检测性 光路选择 2024	万源科检测材料小体检测性 3min	万源科检测材料小体检测性 无	万源科检测材料小体检测性 无

Fig.3-7 Status after sequence analysis

5) If you want to run the sequence again, just select the completed sequence and right-click "reset status", as shown in Fig.3-8.

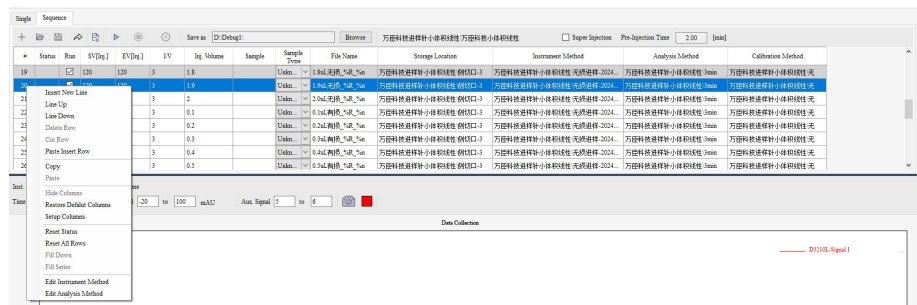


Fig.3-8 Complete sequence reset

Chapter 4 Troubleshooting and handling of common faults

The Autosampler sometimes malfunctions during operation. Please contact our customer service or local agent if you can not solve the problem by looking at the common trouble and solution list.

4.1 Poor repeatability of injection

Poor sampling repeatability is One of the more prone problems. Please check the system according to the following points.

- ***Lack of washing fluid or pipe nozzle above liquid level***

The lotion bottle must be placed in the specified position, must ensure that there is adequate washing liquid, and the lotion pipe nozzle is below the level of the lotion liquid.

- ***Insufficient degassing of washings lotion***

Very small bubbles can affect repeatability, especially when the size of the injection is very small. Therefore, the lotion must be strictly degassed before being used.

- ***Bubble volume is too large***

The S1100+ Autosampler provides 1-5 μ L bubble volume for selection. When the sample viscosity or suction rate is fast, the bubble volume is too large (for example, 4~5 μ L), which may make the injection repeatability worse.

- ***The speed of inhalation is too fast.***

When the viscosity of the sample is high, the reduction of the injection rate can significantly improve the injection repeatability and the default suction rate of the S1100+ Autosampler is 5 μ L/s, which can generally meet the requirements of most samples. If you cannot achieve good injection repeatability at the default suction rate, try changing the suction rate to 2 μ L/s.

- ***Syringe piston damage***

The syringe may wear out the piston or the tube wall of the syringe due to the long time of use or the unfiltered degassing of the washing liquid, resulting in air leakage and poor repeatability of the injection. Users can change syringes to improve injection repeatability.

- ***Selection of sample bottles***

Please use the standard sample bottles provided by our company. The sample bottles not approved by our company will also lead to poor sampling repeatability.

- ***Wear of injection valve***

For a long time, the Autosampler carries on the sample analysis which is easy to precipitate.

The sample is not filtered by 0.45 μ m filter membrane, or no cleaning operation is carried out after the sample is injected, all of which may cause the rotor of the injection valve to be worn by solid particles, resulting in poor repeatability of sample injection and even leakage.

- ***2 bit 3 way isolation solenoid valve pollution***

Inadequate cleanliness (impurities, bacteria, etc.) may contaminate the diaphragm of 2-position 3-way isolating solenoid valves, resulting in lax sealing. Please be sure to ensure the cleanliness of the lotion, do not use the high water content of the lotion.

- ***Under the partial volume injection (no sample loss) mode, the blank solution is insufficient***

In the partial volume injection (no sample loss) mode, the blank position of the right tray must be guaranteed, the sample bottle with the blank solution should be placed, and the blank solution must be sufficient.

- ***High pressure constant flow pump flow instability***

In addition to the problems of the automatic injector equipment itself, if the flow rate of the high-pressure constant flow pump of the system is unstable, it may also result in poor injection repeatability.

- ***The column is damaged or the equilibrium time is not enough.***

when the column is damaged or the system balance time is not enough. There may also be problems of poor repeatability. If necessary, replace the chromatographic column to prolong the equilibrium time of the system.

- ***Experimental environment temperature instability***

Use this instrument in accordance with the temperature conditions specified in the previous article. In order to obtain more ideal experimental data, column thermostat box was used in the specified temperature conditions.

4.2 Injection does not produce peak

If there is no peak in the injection, please check the system according to the following points, please check the following systems:

- ***Zero sample volume.***

Please check the input value of injection volume in sequence analysis, if 0, do not sample.

- ***Sample shortage***

When the liquid level of the sample bottle is low to a certain extent, the sample cannot be inhaled, which will lead to no peak injection. At this point, the bottle should be supplemented with samples.

- ***Sample bottle position error***

Please approve that the sample bottle number entered in the ordinal list corresponds to the position actually placed on the sample tray, otherwise the air will be injected into the system because of the wrong placement.

- ***2 bit 3 way solenoid valve failure***

when 2 bit 3 way solenoid valve malfunction, the sample will not be inhaled in the sample. Injection valve, thus will lead to the sample injection no peak.

- ***Injection valve failure***

When the injection valve fails, the sample will not be switched to the system, which will lead to no peak injection.

- ***High pressure constant flow pump pressure zero***

Please note that the pump pressure is zero, at this time the system mobile phase is not in the flow state, so no peak, please refer to the P1100+ high pressure constant flow pump user manual check the high pressure constant flow pump.

- ***Deuterium lamp / tungsten lamp unlit***

The deuterium / tungsten lamp of the user detector does not appear any peak signal without lighting.

- ***Wavelength setting error***

Please check the wavelength setting of the detector, the wrong wavelength may lead to no peak.

- ***Mobile phase mismatch***

Please approve the preparation of the mobile phase, if the organic solvent ratio is not sufficient to remove the substance from the chromatographic column, it may cause no peak problem.

4.3 Column efficiency decrease or peak width increase

- **Connection line leakage**

Please check the output of the Autosampler, the interface, sample needle connection 2-position 3-way solenoid valve connector for leakage problems.

- **Partial volume injection (no sample loss) model**

Check that the blank bottle is filled with the solution in this mode and placed in the blank position of the sample tray.

- **Sample concentration or sample volume is too large**

When the concentration or volume of the sample is too large, the column saturation will decrease the column efficiency.

- **Chromatographic column life limit**

Columns that have reached their useful life are usually less effective. Replace the columns with good performance.

- **Error in mobile phase preparation**

The column efficiency may be reduced by the wrong solvent ratio, buffer salt and pH.

- **Modification of buffer solution (especially ion pair reagents)**

The deterioration of buffer solution will lead to the change of ionic concentration and pH value of solution, which may lead to the decrease of column efficiency.

Common faults and solutions are shown in Table 4-1.

Table 4-1 comparison table of troubleshooting and handling

Symptoms	Cause	Solutions
Poor repeatability of injection	Lack of washing fluid or pipe opening above liquid level	Replenish the lotion Insert the washing pipe below the liquid level
	Insufficient degassing of washings lotion	Re-degassing the lotion
	Bubble volume is too large	Reducing bubble volume
	The speed of inhalation is too fast.	Reduce the suction rate
	Syringe piston damage	Replacement of syringe
	Selection of sample bottles	Use recommended standard sample bottles
	Wear of injection valve	Maintenance of sampling valve roto
	2 bit 3 way isolation solenoid valve pollution	Replacement parts
	Under the partial volume injection (no sample loss) mode, the blank solution is insufficient	Add blank solution

	High pressure constant flow pump flow instability	(1) removing bubbles (2) Washing filter cup assembly (3) cleaning one-way valve
	Column damage or insufficient balance time	(1) replacement of chromatographic columns (2) extend the balance time.
	Experimental environment temperature instability	(1) choosing stable temperature experiment as far as possible. (2) use chromatographic column temperature box
Injection do not peak	The injection volume is zero.	Modification of injection volume re-injection
	Sample shortage	Add enough samples
	Sample bottle position error	Put the sample bottle in the right place
	2-bit 3-way solenoid valve failure	Please contact customer service center
	Sampling valve failure	Please contact customer service center
	X/Y/Z/S shaft motor fault	Please contact customer service center
	High pressure constant flow pump pressure zero	(1) check if the emptying valve is open (2) check whether the system is seriously leaking (3) remove air bubble (4) clean filter cup assembly (5) clean one way valve
	Deuterium lamp / tungsten lamp unlit	Re lighting the deuterium lamp / tungsten lamp
	Wavelength setting error	Reset wavelength
	Errors in mobile phase preparation	Reformulated mobile phase
Column efficiency decrease or peak width increase	Connection line leakage	(1) Refastening pipe joint (2) Retighten after replacement of edge ring screws
	Partial volume injection (no sample loss) model	Confirm that the blank solution is adequate and the location is correct.
	Sample concentration or injection volume is too large.	To reduce the concentration or volume of a sample.
	Chromatographic column life limit	Replace chromatographic columns with good performance
	Errors in mobile phase preparation	Reformulated mobile phase
	Modification of buffer solution (especially ion pair reagents)	Reformulated buffer solution

4.4 Comparison table between the error code of the host computer and the actual fault

When the workstation detects a fault, a prompt dialog box will automatically pop up, and the error code will be given in the dialog box, and the user can query the cause of the fault according to the error code.

Table 4-1 Error code and fault comparison table

Fault Number	Fault Description	LED status	Workaround
SB00	The system CPU is running faultily	----	----
SB01	EEPROM failure	----	----
SB02	8M crystal oscillator failure	----	----
SB03	32K crystal failure	----	----
SB04	Operational failure	Flashing orange	----
SB05	Leakage	Flashing orange	----
SB06	The door is not closed	Flashing blue	Close the door
SS00	The system CPU is running faultily	Flashing orange	----
SS01	EEPROM failure	Flashing orange	----
SS02	8M crystal oscillator failure	Flashing orange	----
SS03	The needle motor is faulty	Flashing orange	----
SS04	Y-axis motor failure	Flashing orange	----
SS05	X-axis motor failure	Flashing orange	----
SS06	Injection valve motor failure	Flashing orange	----
SS07	Syringe motor failure	Flashing orange	----

Chapter 5 Maintenance and repair

In order to ensure the normal operation of the Autosampler, some components need to be maintained and repaired. Maintenance mainly refers to simple maintenance, such maintenance can generally be carried out through the front panel. Maintenance mainly refers to those that need to replace internal parts and disassemble the Autosampler.

5.1 Syringe replacement

When the syringe of the S1100+ automatic injector exceeds its life, it needs to be replaced due to irreversible glass wear.

The specific replacement steps are as follows:

- 1) Turn on the power supply of the Autosampler, wait for the Autosampler self-check to complete.
- 2) Open the auxiliary tool in the S1100+ user manual CD, click the "replace syringe preparation" button.
- 3) Release the fixed screw at the bottom of the syringe, Unscrew the syringe clockwise.
- 4) Rotate the new syringe counterclockwise.
- 5) Tighten the screw at the bottom of the syringe, note that the piston rod must be perpendicular to the fixed position when tightened.
- 6) Click the replace syringe finish button.

5.2 Sample ring replacement

The sample ring volume of the standard S1100+ Autosampler is 100 μ L. for the users who want the sample volume to be 10 μ L or 20 μ L, if they want to have better sample injection repeatability ($RSD < 0.3\%$), they can choose to purchase a 10 μ L or 20mL sample ring and replace the sample ring.

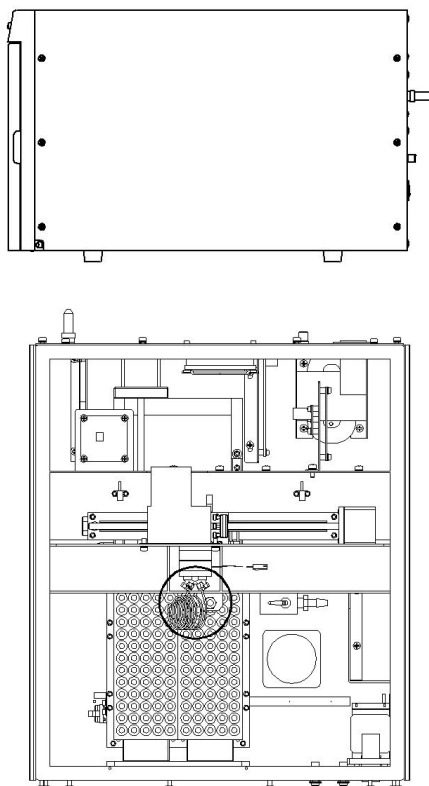


Figure. 5-2: removal of cover and sample ring position

The specific replacement steps are as follows:

- 1) Remove the screw of the outer cover of the Autosampler and open the cover of the Autosampler.
- 2) Wrench to remove the screws on the injection valve at the position 1# and N-M, and remove the sample ring.
- 3) According to the requirement of "2.5.1 pipeline connection", the new sample ring is put into the sampling valve 1# and 4#.
- 4) Buckle the outer cover of the Autosampler and screw the back panel.

5.3 replacement of sampling needle

In general, the sample needle of the S1100+ Autosampler is very strong, and the equipment has good positioning performance, so the sample needle will not be damaged.

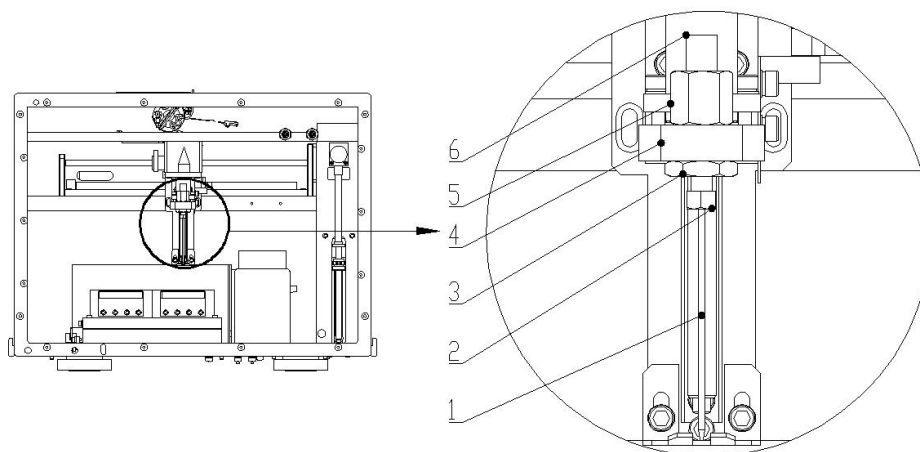


Figure. 5-3: sample needle position and component name

1. Sample needle; 2. Connecting screw; 3. Thin nut; 4. Z shaft lead screw cushion plate;
5. Needle pressing cap; 6. Sampling needle mounting wire plug

If a sample needle replacement is required under special circumstances, follow these steps:

- 1) Turn off the power.
- 2) Push the Z axis assembly (sample needle assembly) to the center of the X axis.
- 3) Remove the sample needle with a 1/4 "5/16" wrench.
- 4) According to the requirement of "2.6.1 pipeline connection", install.
- 5) Turn on the power supply of the system organizer and wait for the Autosampler self-inspection to be completed.

Chapter 6 Components and Material List

6.1 Consumption Parts

NO.	Describe	PN
1	3/16"-32 Stainless steel connection screw	14510027
2	1/16"Stainless steel blade ring	14990070
3	Stainless steel pipe OD1/16 " ~ID0.007 "	12010005
4	Stainless steel pipe OD1/16 " ~ID0.01 "	12010006
5	Sample bottle	3201C4000-1
6	Sample bottle cap	3201C4000-55
7	Sample bottle pad	3201C4000-98B
8	Cleaning bottle assembly	18080171
9	120 hole sample tray	18080169
10	Power line	17000001
11	Cable	17000035
12	Trigger Line	18080168
13	T2A/250V Fuse wire	15080006
14	Waste liquid pipe	13010050

6.2 Replacement Parts

NO.	Describe	PN
1	Injection needle	14039805
2	Injection syringe	33090033
3	Teflon tube \OD1/16''*ID0.25mm	13010029
4	Hexagonal screw	14992230
5	PEEK double-cone blade ring	14990128
6	Teflon tube \OD1/16''*ID0.03''	13010031
7	Through-wall two-way connection	14050029

Appendix

Introduction for Tubing Materials

In a HPLC system, extra-column volumes in the column systems, tubing, fittings, injectors and detectors are likely to cause peak broadening. Improper tubing material will also lead to peak broadening, and even the sample degeneration, which affects the reliability of analysis results directly. Good tubing connection is an important way to fully exert the function of the instrument and improve the work efficiency.

Different tubing materials are used to support the difference of the system pressure and the properties of mobile phase and samples. There are several commonly used materials including stainless steel, polyether ether ketone (PEEK), polytetrafluoroethylene, polyvinylidene fluoride, polyethylene or polypropylene. The stainless steel tubing is the most common one.

Outer diameter of HPLC system connecting tubing is 1/16"(1.59mm). Inside diameter can be chosen according to your need. The regularly used inside diameters includes 0.007"(0.175mm), 0.01"(0.25mm), 0.02"(0.5mm), 0.03"(0.75mm) and 0.04"(1.0mm)etc.

Stainless steel tubing is generally used in high pressure part. In HPLC systems, the part from the pump to the column inlet is high pressure section. Stainless steel tubing is recommended. Stainless steel tubing has good corrosion resistance and precise coaxiality. The bore diameter match between tubing and fittings should be taken into consideration.

Also, polymer tubing can be used in many sections of HPLC systems, such as low pressure parts including parts from the eluent reservoir to the pump, from detector outlet, from sampler waste outlet from draw-off valve outlet, etc. Polytetrafluoroethylene is inertial to HPLC solvents and is the most commonly used plasticity tubing.

When the pressure is lower than 20MPa, PEEK tubing is more inert than stainless steel tubing and it is applied to biological sample analysis.

Safety Information

General safety information

At the every stages of the instrument operation, maintenance and repair, everyone should abide the following general safety rules. Breaking the rules may cause damage to instruments or staff. Our company is not responsible for the impact caused by non-standard operation.

Standard of security

This instrument is Class I safety equipment (provide the ground protection terminal), and it is manufactured and tested according to national safety standard.

Symbols	Descriptions
	Before using equipment marked with this symbol, please refer to the instruction manual first to avoid harm to the operator and the equipment.
[Warning]	Casualties may appear. Please do not operate beyond the scope of warning, unless you have fully understood and met the required conditions.
[Caution]	Data loss or equipment damage may appear. Please do not operate beyond the scope of caution, unless you have fully understood and met the required conditions.
[Note]	Unsatisfactory experimental data and instrument failure may appear. Please do not operate beyond the scope of note, unless you have fully understood and met the required conditions

