

Stel 3

Auto Hematology Analyzer



LINEAR

Linear Chemicals, S.L.
Joaquim Costa 18, 2ª planta.
08390 Montgat, Spain

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1. Introduction of STEL3

1.1 Product features

- 10.4' colorful LCD, English graphics interface
- Test modes with whole blood and peripheral blood.
- 3-part differentiation.
- Low cost of blood sample (only 9.8μL). Easy collection of sample blood, especially for children, infants, elders and patients under radiochemical treatment.
- Without inside power supply board, using external DC power supply unit. Solve the problem of electromagnetic interference caused by alternating current.
- Intelligent back flush with high pressure, avoid the problem of hole-block
- Using of appointed reagent for STEL3 is suggested.
- Internal printer to print reports and program parameters

1.2 Structure and composition

STEL3 is composed of mechanical system, pipeline system, computer control system and software.

1.2.1 Front view

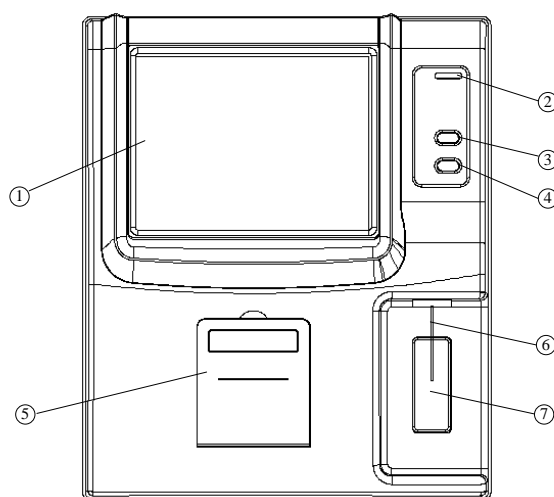


Figure 1-1 Front view

- ① Display screen: Display the software interface
- ② Indicator light: yellow at startup, turn red when starting sample test, turn yellow after test.
- ③ Feed key: built-in printer feeds paper outward
- ④ Aspiration key: in sample analysis, press this key, the instrument will aspirate sample
- ⑤ Printer cover: print paper installing position for built-in printer

- ⑥ Sampling needle: use sampling needle to aspirate sample into counting baths
- ⑦ Aspiration key: in sample analysis, press this key, the instrument will aspirate sample, function the same as key ④

1.2.2 Rear view

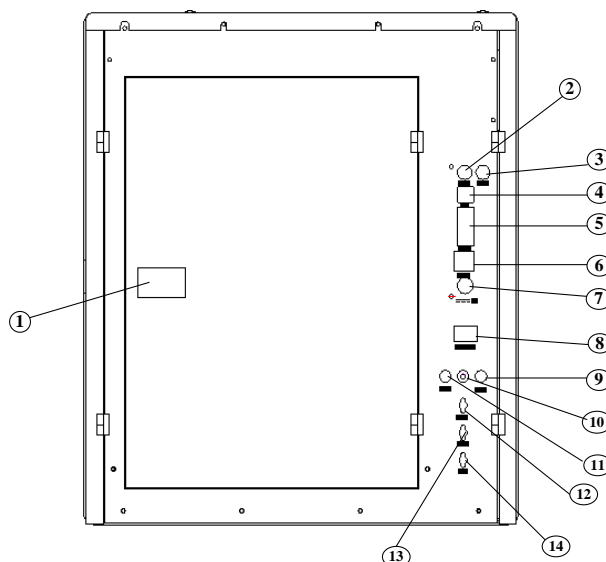


Figure 1-2 Rear view

- (1) Rear cover switch: turn this button, open the rear cover to replace reagent
- (2) Keyboard interface: PS/2 keyboard interface
- (3) Mouse interface: PS/2 mouse interface
- (4) USB port
- (5) RS-232 serial port: to connect with data receiving devices
- (6) Network interface
- (7) Power interface: to connect with external power supply
- (8) Power switch: switch instrument power
- (9) Diluent sensor
- (10) Grounding hole: used for instrument grounding
- (11) Cleanser sensor
- (12) Cleanser port
- (13) Diluent port
- (14) Waste port

1.3 Application scope

STEL3 can be used for clinical routine blood tests.

1.4 Product technical parameters

Test principle:	WBC/RBC/PLT: Impedance method; HGB: colorimetry
Aspiration volume:	9.8μL(Whole Blood), 9.8μL(Anticoagulant Peripheral Blood), 20μL(Pre-diluted Peripheral Blood)
Test rate:	About 1 min /ea.
Working environment:	15°C~35°C, relative humidity 10%~90%
Store environment:	0°C~40°C, relative humidity ≤ 80%
Power supply:	a.c.110V~220V, 50/60Hz
Input power:	96VA

1.4 Test items

This analyzer is using impedance principle (colorimetry for hemoglobin measurement) to categorize and count blood cells in blood. Test items are shown in Table 1-1.

Full English name	English abbreviation	Unit(Default)
White blood cell count	WBC	10 ⁹ /L
Lymphocyte count	LYM#	10 ⁹ /L
Intermediate cell count	MID#	10 ⁹ /L
Granulocyte Cell count	GRA#	10 ⁹ /L
Lymphocyte percentage	LYM%	%
Intermediate cells percentage	MID%	%
Granulocyte Cells percentage	GRA%	%
Red blood cell count	RBC	10 ¹² /L
Hemoglobin content	HGB	g/L
Hematocrit	HCT	%
Mean corpuscular volume	MCV	fL
Mean corpuscular hemoglobin	MCH	pg
Mean corpuscular hemoglobin concentration	MCHC	g/L
Red cell distribution width SD	RDW-SD	fL
Red cell distribution width CV	RDW-CV	%
Platelet count	PLT	10 ⁹ /L
Mean platelet volume	MPV	fL
Platelet distribution width	PDW	%
Plateletcrit	PCT	%
Platelet-large cell ratio	P-LCR	%
White blood cell histogram	WBC Histogram	
Red blood cell histogram	RBC Histogram	
Platelet histogram	PLT Histogram	

Table 1-1

2. Installation of STEL3

2.1 Instrument unpacking

1. Unpack the instrument's package and remove material for transportation. Please keep original packing carton and packing material, in case you need to repack the instrument in the future.
2. Take out the instrument from plastic package.
3. In accordance with packing list, make sure the packing carton content includes:
 - STEL3 hematology analyzer
 - User's manual
 - Packing list
 - Warranty card
 - Power adapter
 - Product COA

Note: *Product packing feature is as per packing list, in case of inconformity, please contact seller.*

2.2 Installation environment

In order to ensure instrument work normally, please choose working place compliant with following condition to place **STEL3 Hematology Analyzer**:

- No direct sunlight;
- No massive dust or powder;
- No strong electromagnetic radiation;
- Sufficiently large flat and solid desktop.

Note: *Instrument working environment: temperature 15 °C~35 °C, relative humidity 10%~90%.*

2.3 Power requirement

- a.c.110V~220V
- 50/60Hz
- 96VA

Warning: (1) *AC power must be well earthed.*

(2) *AC power shall be stable, sharing with heavy-duty power appliance is forbidden, and rectified power supply is better equipped.*

(3) *If there is smoke, smell or noise in instrument, immediately shut off power, and contact distributor.*

(4) *When plugging power line, one must catch the plug itself, instead of power line.*

2.4 Check mechanical parts

- 1) Loosen the screw which fixed the right side cover, open the cover.
- 2) Cut the belt which fix the sample needle carrier and installation board, take the belt out of instrument, check whether the sample needle has been bent or the screws which fix the carrier and track are loosen.
- 3) Loosen the two screws which fix the shield cover of WBC and RBC counting bath. Lift up the cover and take it out. Check whether the WBC and RBC counting bath with bracket has been installed correctly. Take off the adhesive tape which sealed the counting baths.
- 4) When the checking finished, install the shield cover and right side cover again.

2.5 Reagent

The instrument needs to use Lyse, Cleanser, diluents for measurement and maintenance. To ensure accuracy of test result, please use reagents accompanied with instrument.

2.5.1 Connection of Lyse and Cleanser

- 1) From reagent packing carton, take out Lyse and Cleanser respectively, open the bottle lids, and place them in instrument reagent booth horizontally.
- 2) Insert plastic tube marked Lyse into the Lyse bottle and tighten the bottle cap.
- 3) Insert plastic tube marked Cleanser into the Cleanser bottle and tighten the bottle cap.

2.5.2 Connection of diluent

- 1) Take out diluent catheter from the accessories bag.
- 2) Connect diluent catheter end to "Diluent" route adapter on rear panel of instrument.
- 3) Insert the other end of catheter into diluent bottle, and tighten the bottle cap.

2.5.3 Connection of waste

- 1) Take out waste catheter from accessories bag.
- 2) Connect waste catheter end to "Waste" route adapter on rear panel of instrument.
- 3) Clockwise rotate the bottle cap with waste catheter to tighten it on the waste bottle.

Note:

- (1) Reagent tubing must not be twisted, folded or rotated by force.**
- (2) Please using appointed reagent for the instrument to ensure test accuracy.**
- (3) Please do not use expired reagent.**
- (4) The waste must be treated in accordance with related national regulations, wear rubber gloves when disposing of waste.**

2.6 Connection of keyboard, mouse

- 1) Carefully take out keyboard and mouse from packing carton.
- 2) Carefully insert keyboard cable plug into socket marked "Keyboard" on instrument rear panel.
- 3) Carefully insert mouse cable plug into socket marked "Mouse" on instrument rear panel.

2.7 Connection of external printer

- 1) Make sure both printer and instrument have been shut down.
- 2) Insert one end of USB cable into printer USB interface socket.
- 3) Insert another end of USB cable into instrument USB interface.
- 4) Connect printer and AC power supply with power line accompanied to printer.

3. Function description

STEL3 circuit system is mainly composed by the following boards:

Analogue board (integrated with front CPU board and analog signal board)

Mainboard (Working as controlling computer)

Power supply interface board

Printer driving board (integrated in the printer module)

Stepper motor driving board

Keypad board

Touch panel driving board

LCD convert board

Interface board

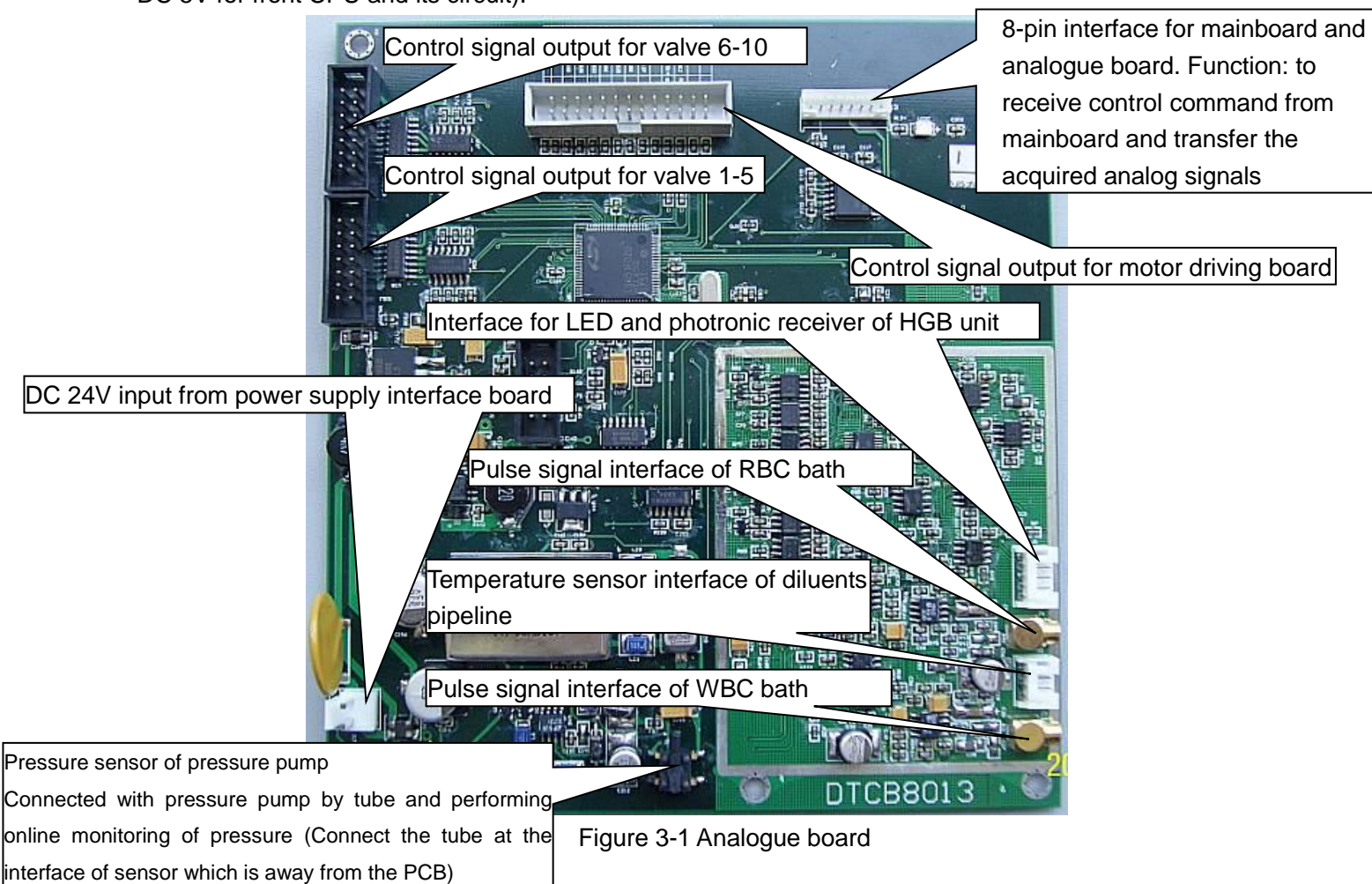
3.1 Analogue board

Analogue board is composed by two parts of front CPU board and analog signal board.

Function description:

1. The front CPU board sends the commands to each part of the instrument, and executes next procedure after receiving the feedback signals, until the end of test. It also gives out warnings when receiving error signal or the command has been out of time.
2. It connects with mainboard by serial port, receiving the high-level control command from the mainboard.
3. The sub front control system is composed of C8051F020, it controls the movements of each part by MCS 51, including X-axis motor, Z-axis motor, syringe motor, negative pressure syringe motor and 11 valves. It also performs the original position detecting of there mechanic parts.
4. It performs the acquisition and processing of different analog signals (including the pulse signal from WBC and RBC counting baths, analog signals of from the HGB photoelectric and pressure sensor). It transfers the pulse signals into digital signal, class them to WBC, RBC and HGB, save the signals provisionally and transfer them to the mainboard.
5. Though the backdoor of STEL3 controlling program in the mainboard, it adjusts the 5024 digital Potentiometer in the analogue board, to perform the adjustment of signal gaining.

It performs part of the output voltage transfer (DC 24V input transfers into +12V and -12V for analog circuit, DC 5V for front CPU and its circuit).



3.2 Mainboard

EMB-3680 is a low power consumption mainboard, which is using Geode™ LX 700/800+AMD Geode CS5536 chip of AMD, supporting AMD Geode™ LX 700@0.8W or Geode™ LX 800@0.9W CPU, supporting one 200 pin DDR SO-DIMM memory (ECC not supported, 333/400MHZ DDR supported, max 1G Bytes), integrated with two RealtekRTL 8100 network card.
+5V---+24 single power supply.

Supporting VGA, LVDS, and TTL display output mode (VGA, LVDS, TTL support two individual displays, LVDS and TTL can not be used at the same time)

About external storage, there is one Mini IDE channel providing 2 hard disk interfaces, 1 socket for COMPACT FLASH card, and 4 USB 2.0 interfaces.

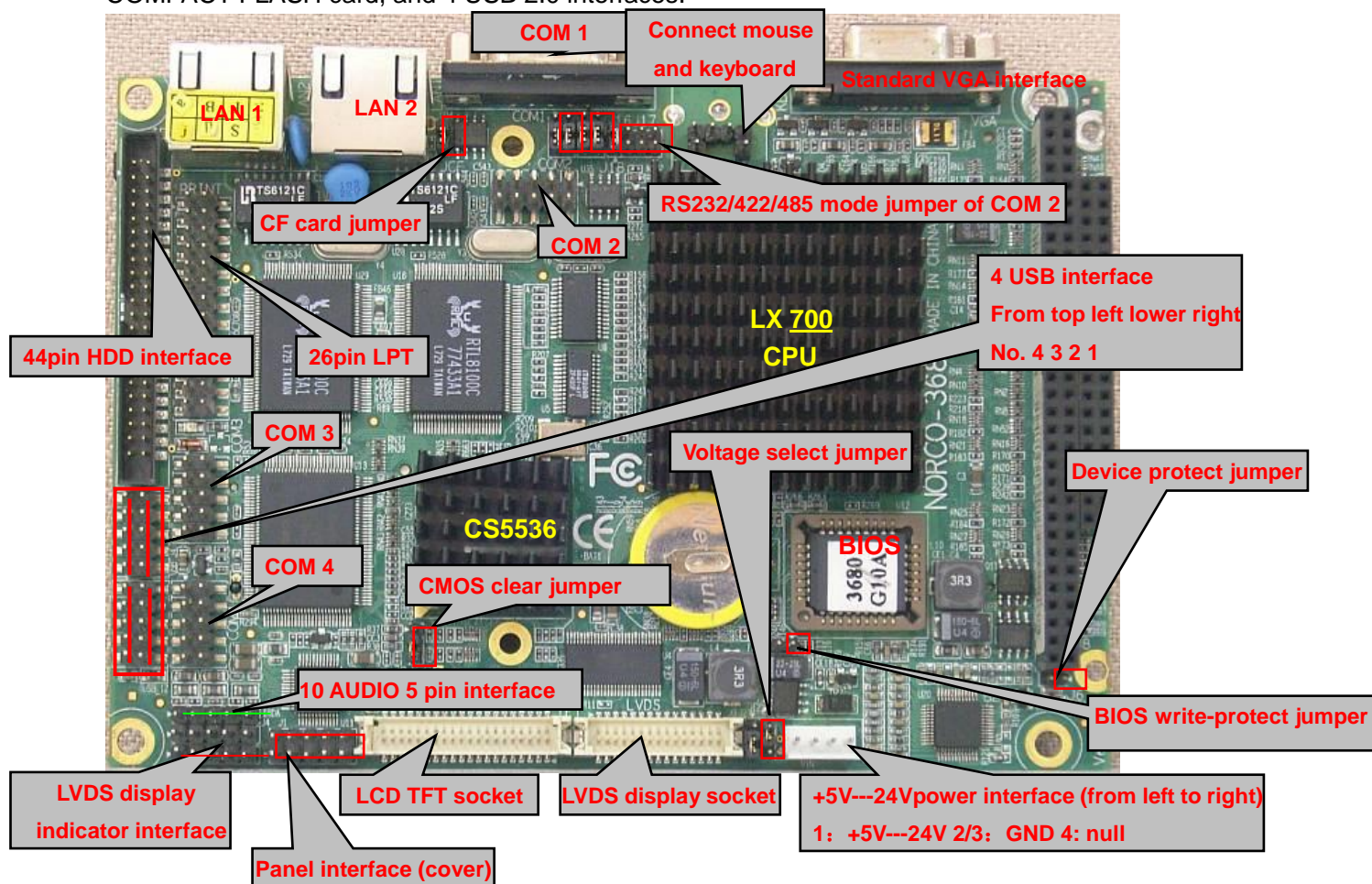


Figure 3-2 mainboard

Definitions of STEL3 interfaces :

- C O M 4 connected to analogue board
- C O M 3 connected to printer
- C O M 2 connected to touch panel
- C O M 1 connected to interfaces

Other information refers to the following:

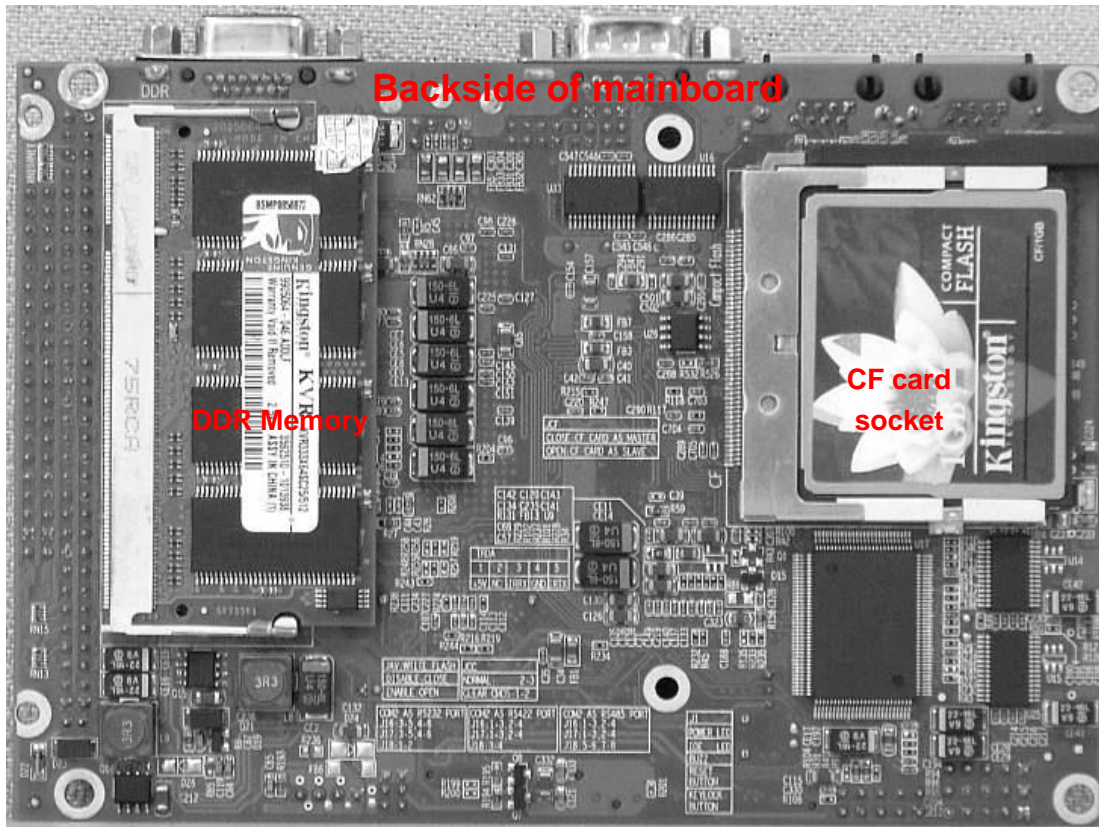


Figure 3-3 backside of mainboard

Definition of jumpers

Jumper to clear CMOS configuration (JCC)

From top to bottom is pin1, 2 and 3, when you want to clear the CMOS configuration, first please cut off the power supply of STEL3 (or you can just cut off +5V---24V power supply), use the jumper to connect pin 1 and 2, then take off the jumper and connect pin 2 and 3 again, connect STEL3 with power supply and start the instrument, the CMOS configuration will be reset to default value.

	JCC:
	1-2 CLEAR CMOS
	2-3 NORMAL

Note: to prevent from damaging the mainboard, you must not perform the cleaning of CMOS configuration when system is working.

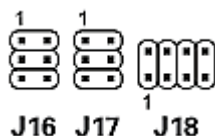
Write-protect jumper for anti-virus

When you want to modify BIOS configuration, please keep this jumper open. At normal conditions during your daily operation, please keep this jumper close to prevent BIOS data from CIH virus.

JAV: WRITE FLASH	
CLOSE	DISABLE
OPEN	ENABLE

RS232/422/485 mode jumper for COM 2

This jumper is used to set RS232/422/485 transfer mode for COM 2, default mode is RS232. About the settings please refer to following table:



COM2	RS232		COM2	RS422		COM2	RS485	
J16	3-5	4-6	J16	1-3	2-4	J16	1-3	2-4
J17	3-5	4-6	J17	1-3	2-4	J17	1-3	2-4
J18	1-2		J18	3-4		J18	5-6	7-8

CF card jumper (JCF)

This jumper is used to set CF card and IDE2 devices (such as hard disk) as master or slave device.

JCF	
OPEN	Set CF card as slave device
CLOSE	Set CF card as master device

If you want to set CF card as the master startup device, please set JCF jumper as CLOSE

If you want to set CF card as the slave startup device, please set JCF jumper as OPEN

Because STEL3 use CF card as master external storage device, so the JCF jumper is set as CLOSE.

Voltage select jumper

Voltage settings		
J3	1-2	5V
	2-3	3V
J2	1-2	5V
	2-3	12V



Device protect jumper

This jumper is used to protect PC104 device and display device. When the power supply +5V--+24V are higher than +12V, this jumper is set as CLOSE.

J6	
VCC>12V	CLOSE
VCC<12V	OPEN



Block diagram of communication connections between computer system module

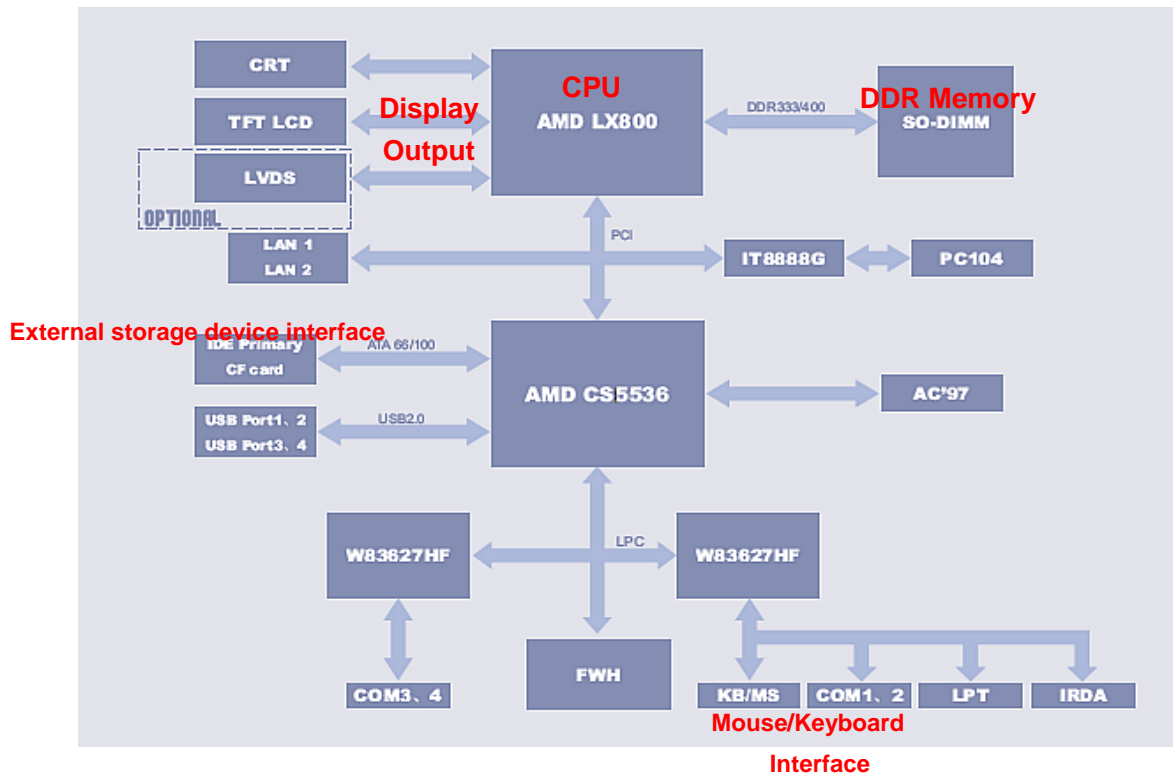


Figure 3-4 Block diagram of communication connections

3.3 Power supply interface board

This board takes the work of connection of different parts and providing power supply for them. It uses a power supply chip to complete the DC/DC converse, providing +12V, two way +5V output for Mainboard, touch panel and printer.

J4 5 pin interface for touch panel driving board

J7 3 pin interface for LCD inverter

J3 3 pin interface for the printer

J2 for mainboard

J1 Connect to J5 of analogue board

J6 2 pin interface for aspirate button of keypad board

J8 Power output for mainboard

J10 moni board power output

J5 power output for the indicator of keypad board

J9 24V power input from adapter

Figure 3-5 Power supply interface board

3.5 Motor driving board

This board takes the work of controlling and detecting of movement parts. It uses L297 and L298 to drive different motors and transfer the original position signal to front CPU board.

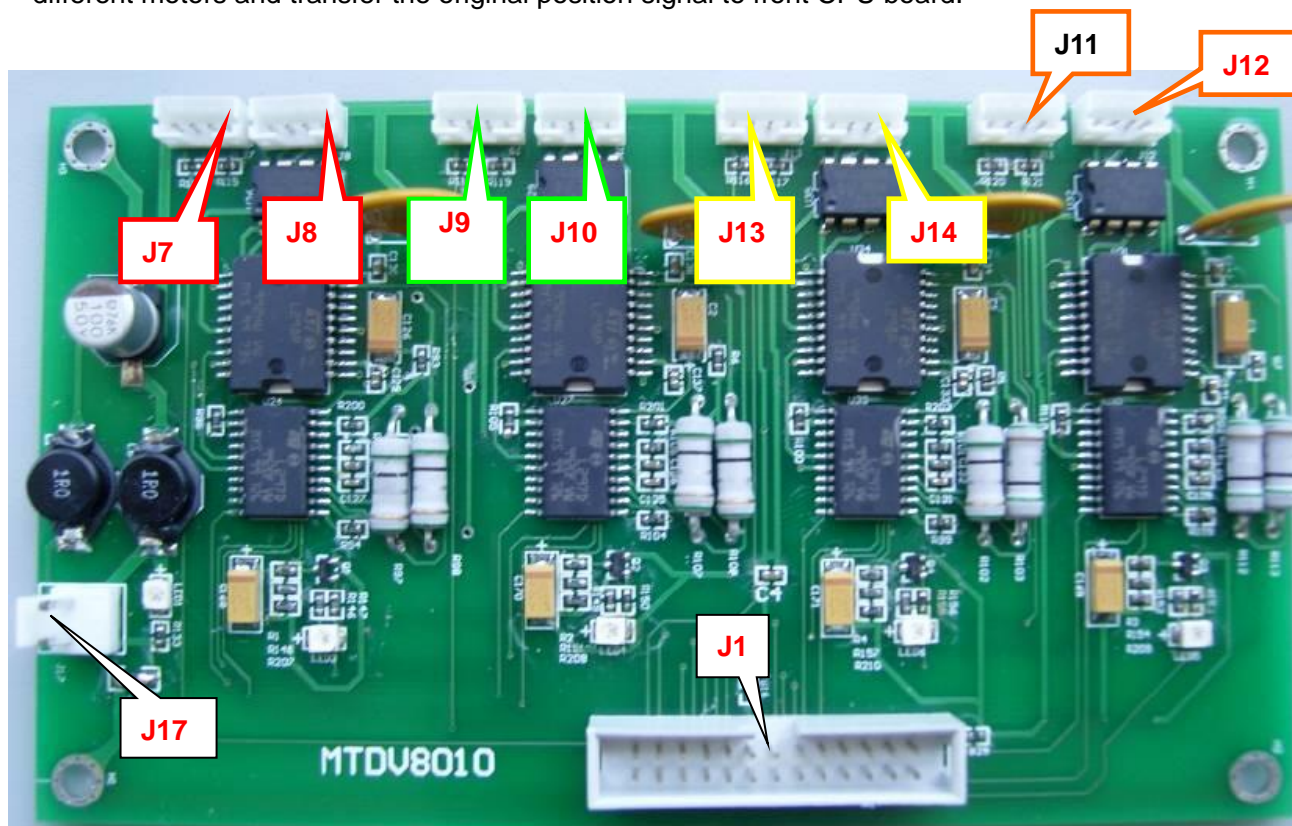


Figure 3-6 Motor driving board

- J1: Four-channel stepper motor driving signal input from analogue board (connect to J7 of analogue board)
- J7: 4-pin interface for the original position detector of pressure syringe.
- J8: 4-pin interface for the stepper motor of pressure syringe.
- J9: 4-pin interface for the original position detector of reagent dispensing pump.
- J10: 4-pin interface for the stepper motor of reagent dispensing pump
- J11: 4-pin interface for original position detector of horizontal movements of sampling needle carrier.
- J12: 4-pin interface for the stepper motor which controls the horizontal movements of sampling needle carrier.
- J13: 4-pin interface for original position detector of Vertical movements of sampling needle carrier.
- J14: 4-pin interface for the stepper motor which controls the vertical movements of sampling needle carrier.
- J17: 24V input from power adapter.

Warning: Be careful when you are connecting the lines, if there is any wrong connection, it may cause damage to the sampling needle and counting baths, the instrument can not work normally.

3.6 Keypad board

There are two status indicator and two buttons on this board. The indicators indicate the status of instrument and the two buttons are paper feeding and aspiration button.

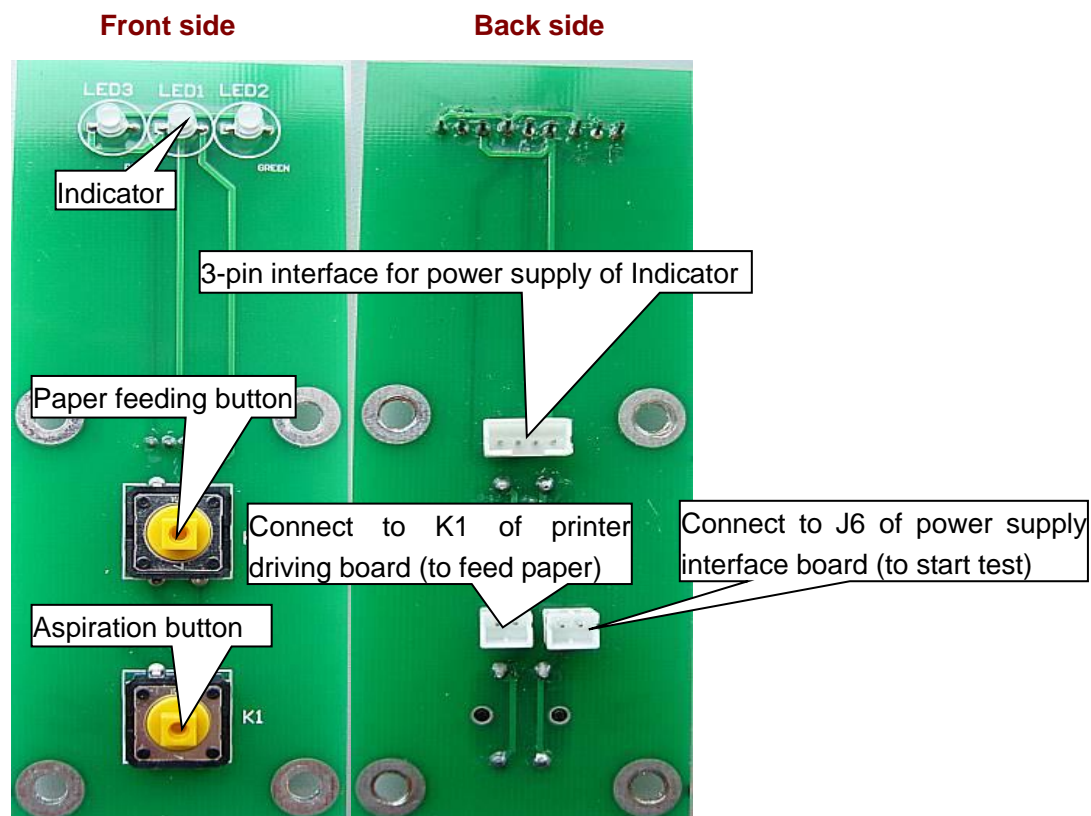


Figure 3-7 Keypad board

Aspiration button is series-wound with aspiration key at the position of sampling needle. Their functions are the both to start the instrument for testing.

Indicator: It shows the status of instrument, Red indicates that the instrument is under testing; all the keys are not functional when the indicator is red. Green means that the instrument is under standby status, you can start operation any time.

4.3 Functions of valves

As shown in figure 4-1, there are 11 valves in STEL3, there functions are as following:

Valve 1: Controls the dispensing of LYSE.

Valve 2: Release pressure of the pressure syringe, aspirate air.

Valve 3: Add CLEANSER to WBC counting bath.

Valve 4: Drain waste from the waste chamber of pressure syringe to waste bottle.

Valve 5: Works when WBC/RBC counting bath is counting, it controls the negative pressure.

Valve 6: Add DILUENT into WBC counting bath.

Valve 7: Drain the waste from the cleaning chamber when washing the sampling needle.

Valve 8: Add DILUENT into sampling needle.

Valve 9: Controls the dispensing of DILUENT.

Valve 10: Drain WBC counting bath.

Valve 11: Drain RBC counting bath.

4.4 Introduction on the solenoid valve

4.4.1 Working principle of solenoid valve

Please refer to the bellowing sketch map which shows the working principle of solenoid valve. At left side shows the status when it is not electrified, at right side shows the status when it is electrified, the direction of magnetic force is right.

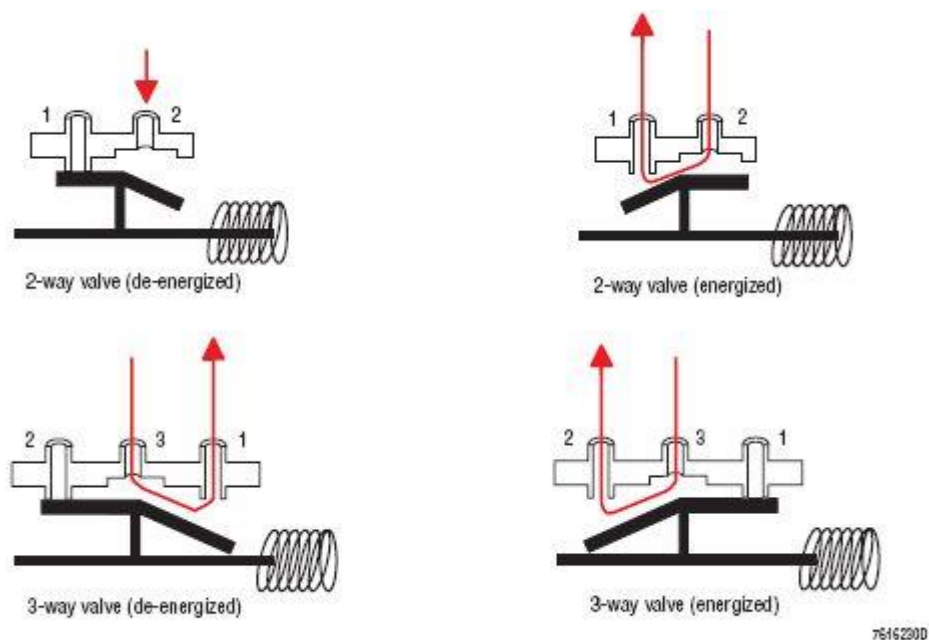
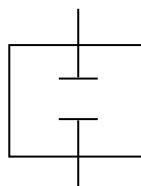


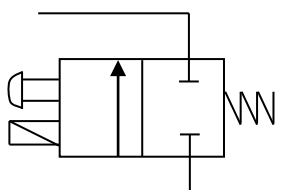
Figure 4-2 Working principle of solenoid valve

4.4.2 Symbol of solenoid valve in the piping diagram

2-way valve

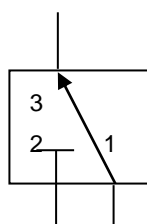


This symbol indicates that it is a 2-way solenoid valve which is normally closed. It is closed when not electrified at normal conditions.

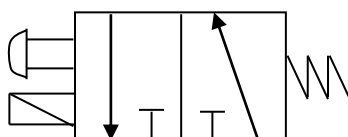


The above shows the figure of a 2-way solenoid valve in the piping diagram of STEL3. There are two parts of this figure. The right side indicates the status when the valve is not electrified, you can see that it is closed. The left side indicates the status when the valve is electrified and open; the arrowhead indicates the direction of liquid flowing.

3-way valve



This symbol indicates that it is a 3-way solenoid valve. When it is not electrified, common end 3 and 1 is connected, the direction of liquid flowing is from end 1 to 3. Common end 3 and 2 is not connected.



The above shows the figure of a 3-way solenoid valve in the pipeline diagram of STEL3. There are two parts of this figure. The right side indicates the direction of the liquid flowing and the common ends it passes when the valve is not electrified. The left side indicates the direction of the liquid flowing and the common ends it passes when the valve is electrified.

At 3-way solenoid valve, we usually use COM as symbol of the common ends, abbreviated as C. NC indicates that this end is closed at normal conditions, NO indicates that it is open at normal conditions. When the valve is not electrified, NO connected with end C and NC not connected.

4.5 Introduction on the pipeline system of STEL3

Introduction:

1. The cycle has been marked with different color.
2. Without special explanation, other 2-way valves which are not related to the cycle are considered as close, the triple valves are considered as 1-3 connected.
3. At left side from top to bottom is valve 1-5; at right side from top to bottom is valve 6-11.

4.5.1 Pressure releasing cycle

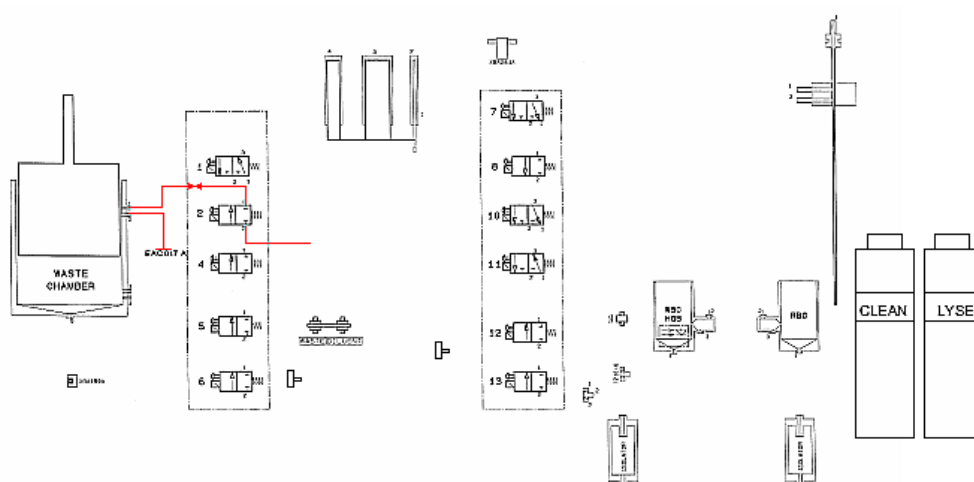


Figure 4-2 Pressure releasing cycle

Create negative pressure: Valve 2 closed and the main piston is pulled back (pressure sensor monitor the pressure, when it reaches the target value, the piston will be stopped).

Create positive pressure: Valve 2 closed and the main piston is pushed down (pressure sensor monitor the pressure, when it reaches the target value, the piston will be stopped).

Pressure release: Valve 2 open.

4.5.2 Diluent cycle

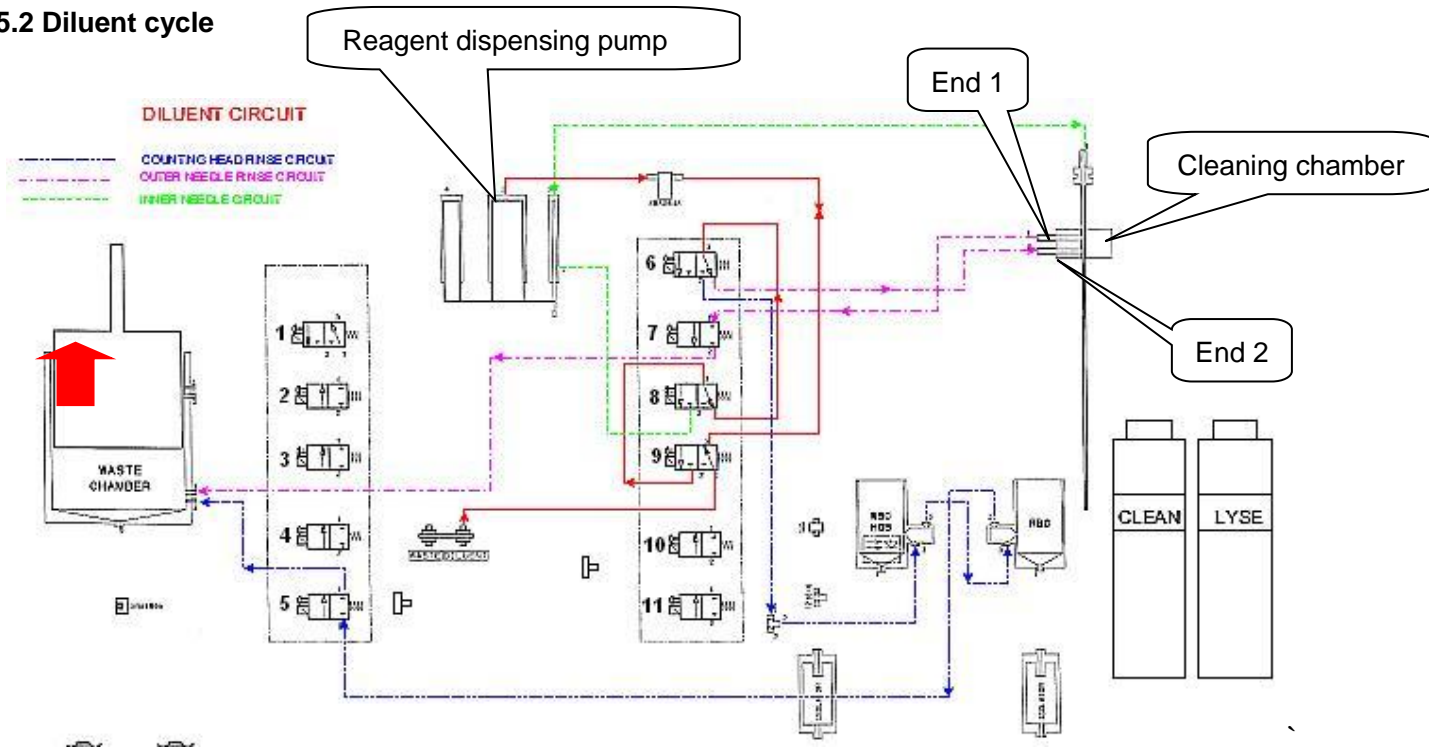
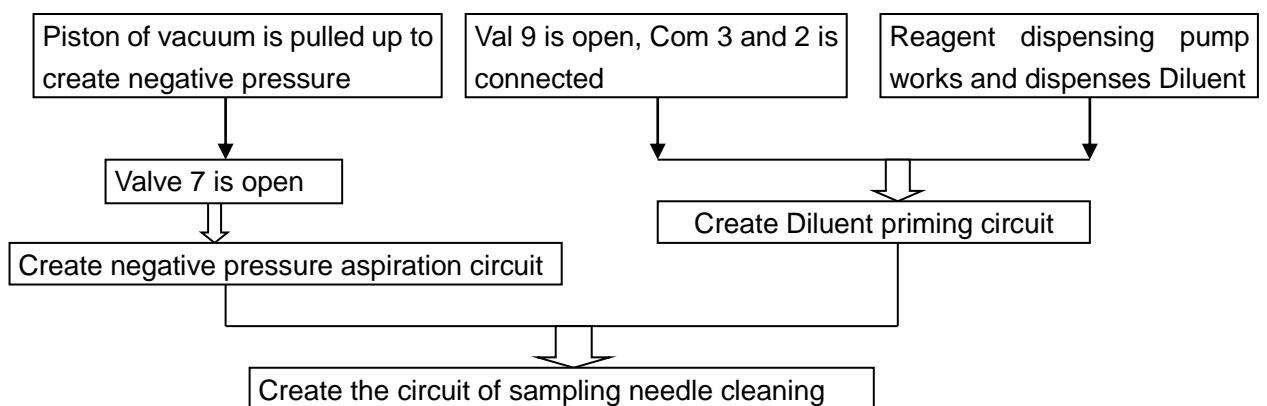


Figure 4-3 Diluent cycle

1. **Aspirate liquid:** Valve 9 is not electrified (1, 3 connected), the piston of reagent dispensing pump is pulled down and aspirate the Diluent.
2. **Rinse the surface of sampling needle:**
 - A. Create Diluent priming cycle
The Diluent from reagent dispensing pump passes through 3-2 end of valve 9, 3-1 end of valve 8, 3-1 end of valve 6, reaches at end 2 of the cleaning chamber.
 - B. Create negative pressure aspiration cycle.
After valve 7 is open, the piston of pressure syringe is pulled up to create negative pressure; the Diluent is aspirated from end 1 of the cleaning chamber.



3. Rinse the inside surface of sampling needle

Valve 8 and 9 is electrified, the Diluent flows though the sampling needle to rinse its inside surface.

The piston of reagent dispensing pump pushes up again

Part of the Diluent flows into the counting chamber with the samples at inside surface of the sampling needle.

4.5.3 Rinsing cycle of the back bath

Create the Diluent priming cycle

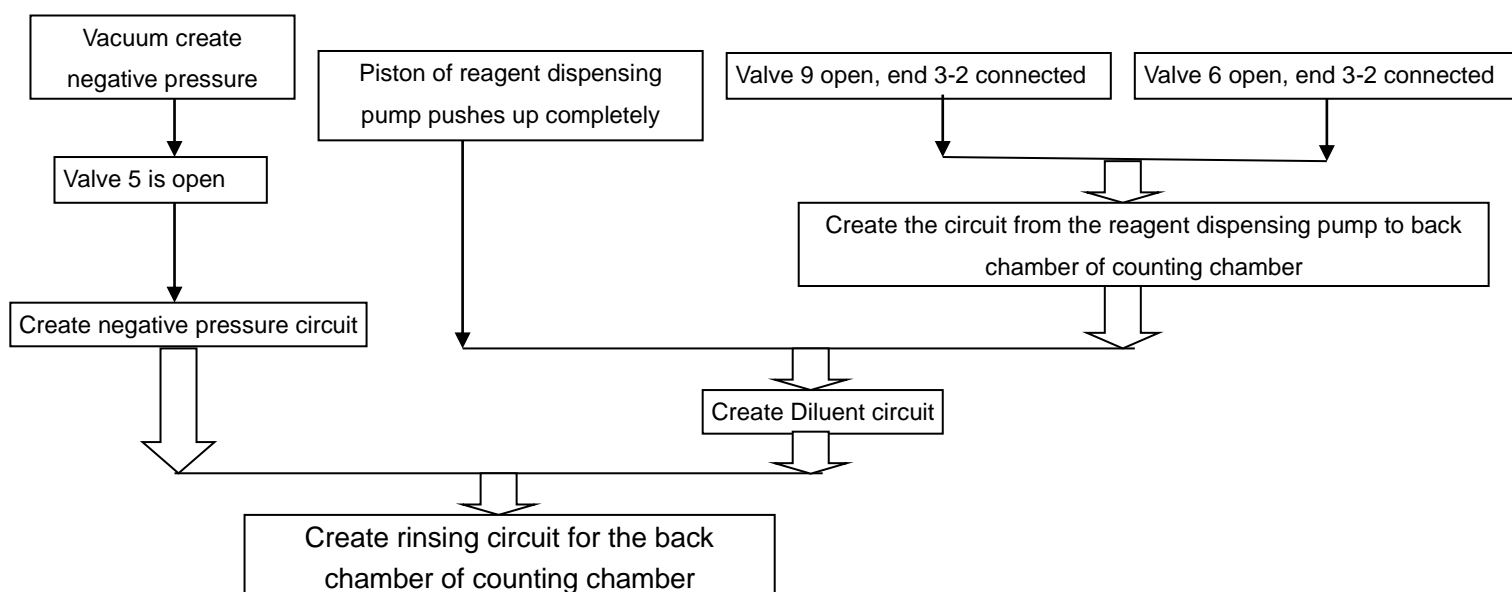
The Diluent comes from the reagent dispensing pump passes though 3-2 end of valve 9, 3-1 end of valve 8, 3-2 end of valve 6, reaches the back bath.

Create negative pressure cycle.

Valve 5 is open, the negative pressure aspirate Diluent.5

Rinse the back bath.

Flow chart



4.5.4 Lyse cycle

There are two main steps of Lyse cycle, step 1 is to aspirate Lyse and step 2 is to add Lyse to WBC counting bath.

Aspirate Lyse: Valve 1 is close (The reagent dispensing pump is connected with Lyse bottle), the piston of reagent dispensing pump is pulled down and aspirate Lyse form the bottle.

Add Lyse to WBC counting bath: Valve 1 is open (The reagent dispensing pump is connected with WBC counting bath), the piston of reagent dispensing pump is pushed up and add Lyse into WBC counting bath.

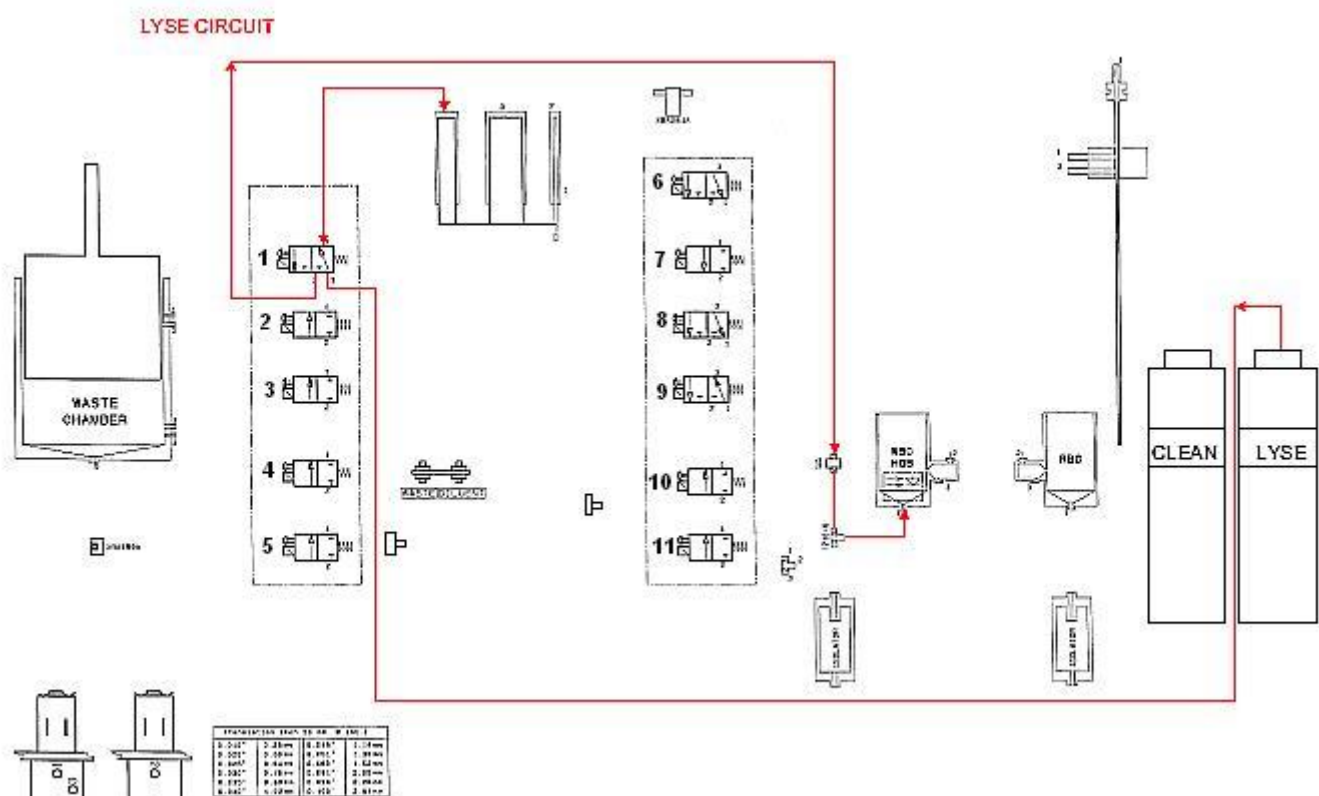
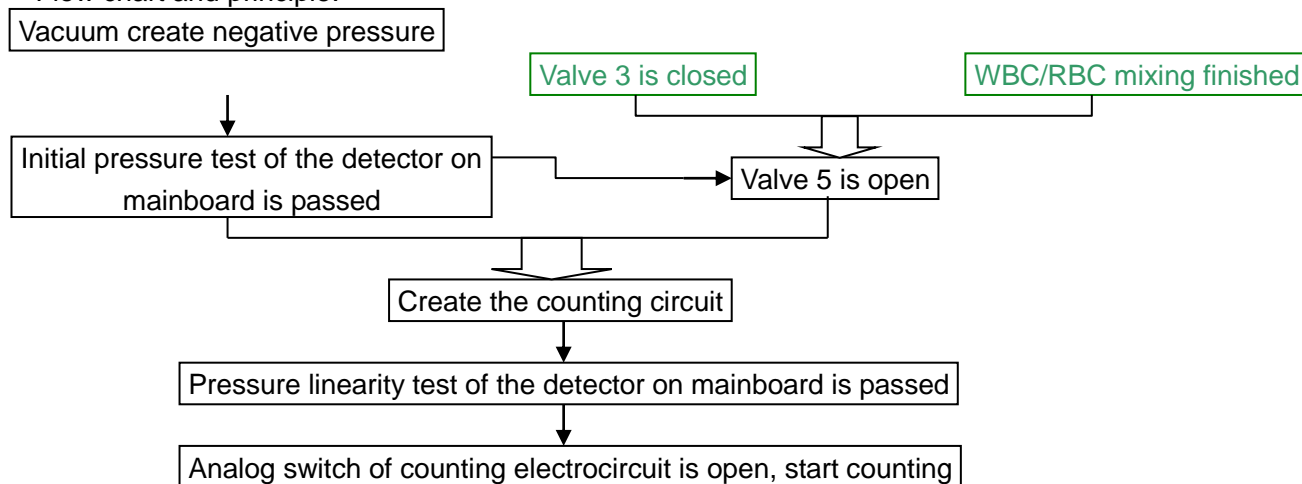


Figure 4-5 Lyse cycle

4.5.5 WBC/RBC counting cycle

Time of creating counting circuit: After dilution of RBC and WBC, Lyse has been added and air bubble mixing has been finished.

Flow chart and principle:



Principle of pressure test:

1. Test the time it takes to make the pressure raise certain unit from sometime
2. If the time is less than expected, it will give out warning of "Air bubbles" (air leakage); it means that there is air leakage existed in the pipeline related to the counting circuit.
3. If the time is more than expected, it will give out warning of "Aperture jam", also it may be caused by pipeline folded or blocked.

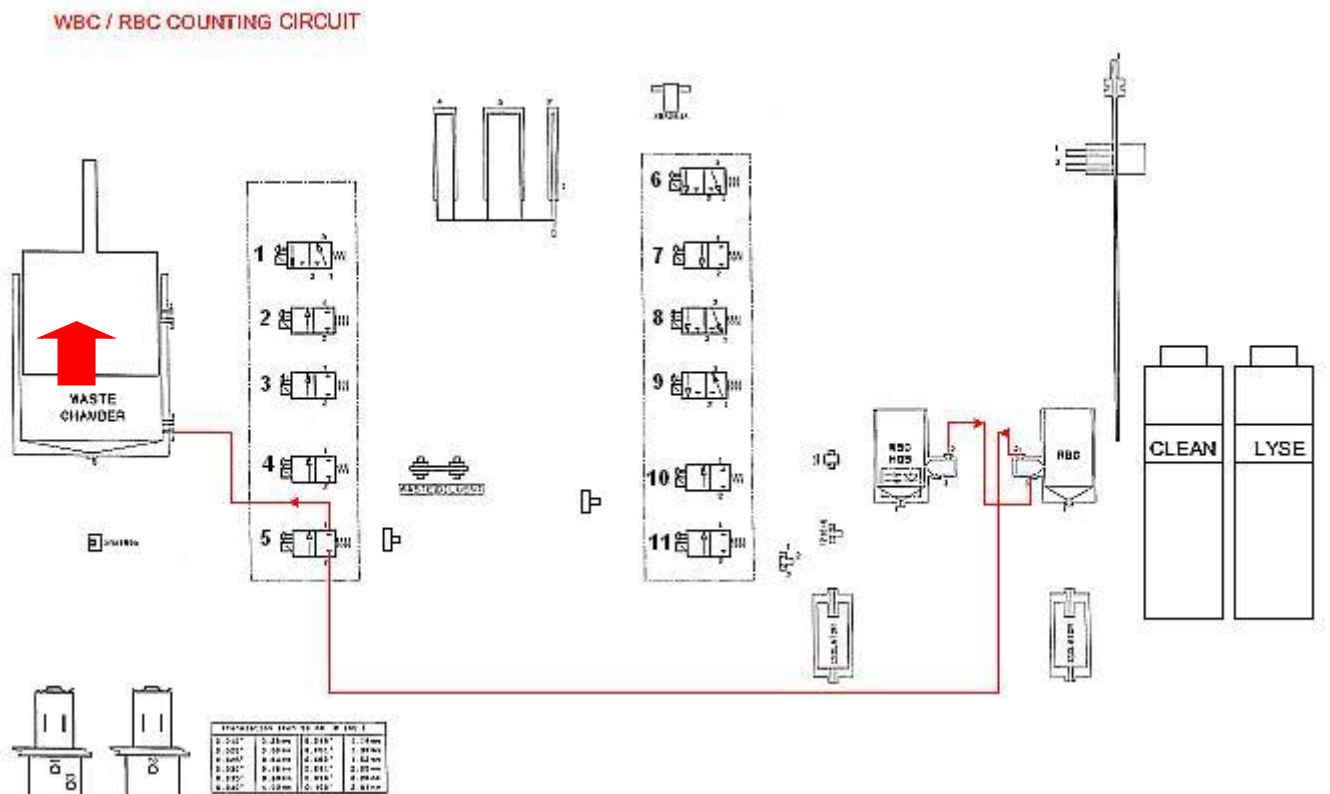
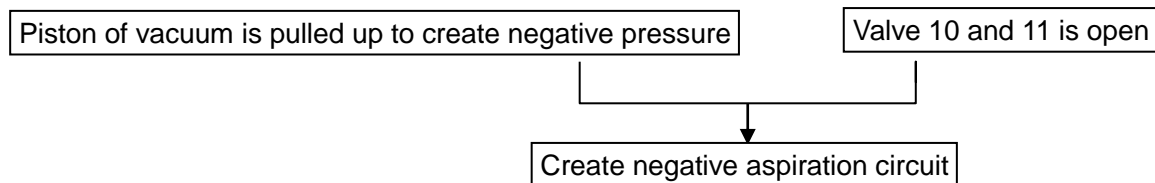


Figure 4-6 WBC/RBC counting circuit

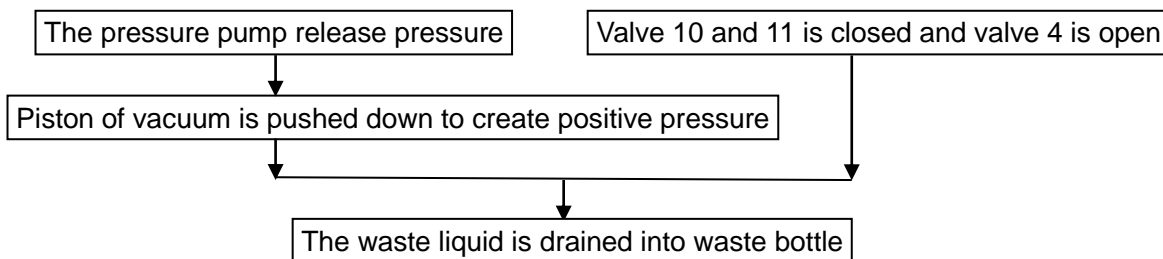
4.5.6 Drain the waste from counting bath

The pressure syringe aspirates the waste liquid into the pump and drains it into the waste bottle by switch between positive and negative pressure.

1. Aspirate the waste liquid from the counting bath



2. Drain the waste liquid



5. Replacement of spare parts

5.1 Disassemble the instrument

STEL3 is an instrument with high precision; there are no parts which can be repaired by users. When there are problems which can not be solved by users, you shall ask professional service engineer for repair.

5.2 Replacement of aperture, LED and photocell

After several times of back flush and soaking with concentrated Cleanser, if you still can not eliminate the problem of aperture block, you shall take out the aperture following the below steps strictly. You can clean the aperture or replace a new one.

- 1) At first, remove the two screws which fix the side covers, also remove the screw at backside, and remove the side covers. Loosen the two screws which fix the shielding cover of counting bath, lift the shielding cover and remove it, you can see WBC/RBC counting bath assembly, as shown in figure 5-1:

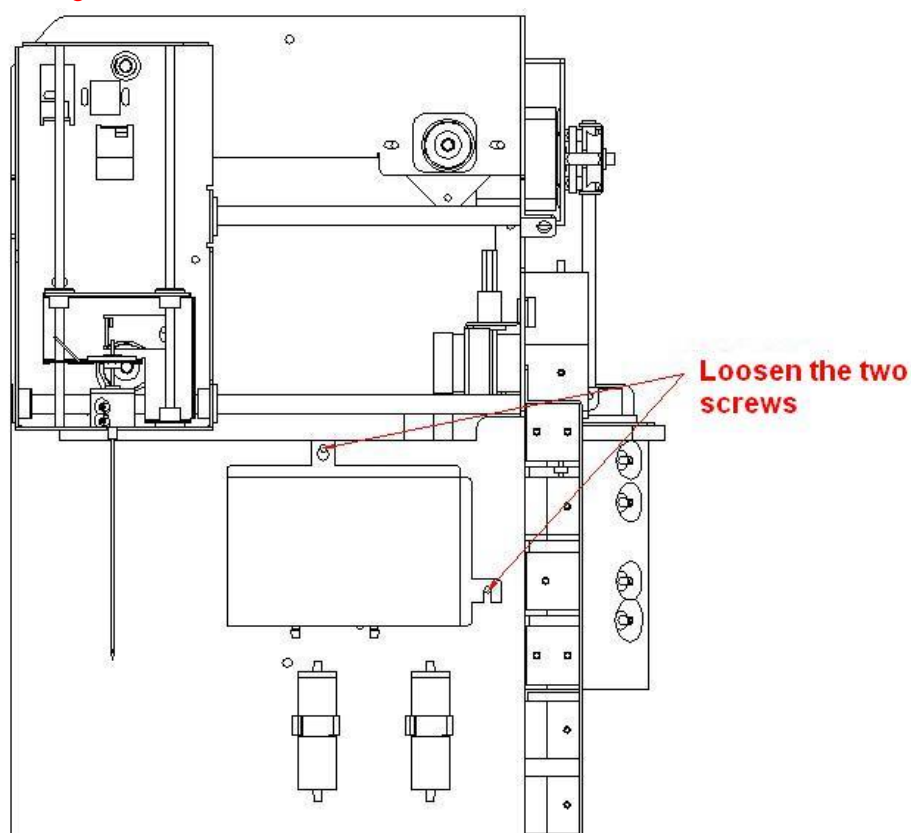


Figure 5-1 Take out the counting bath

- 2) First, take off the signal cable of counting bath from PCB, pull out the counting bath slowly from the bracket. Take the counting bath out of the instrument and disassembly it as following figure:

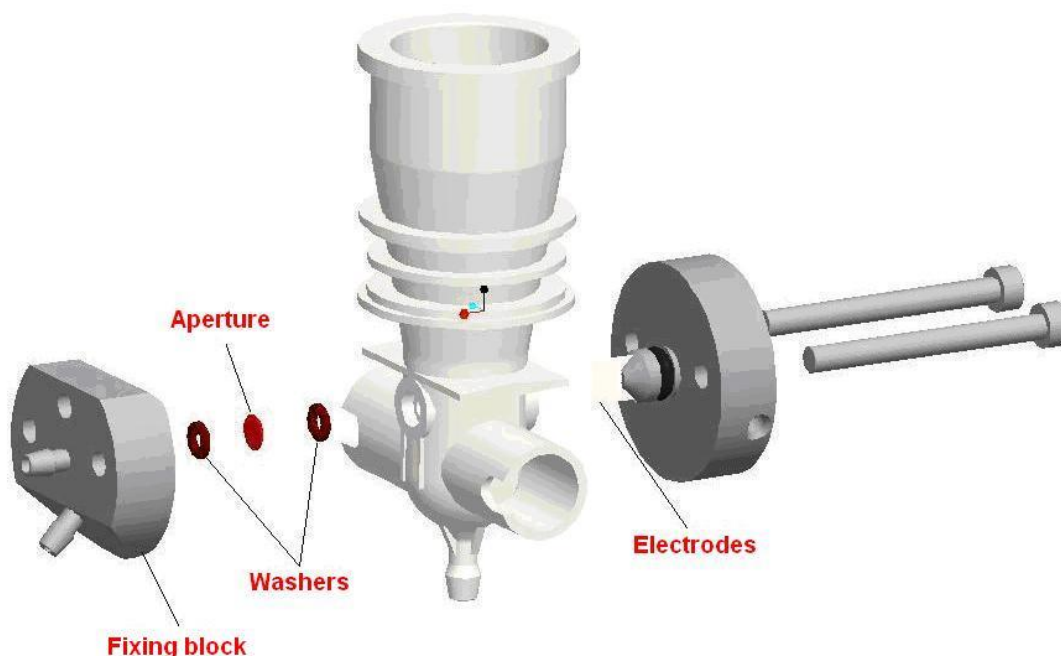


Figure 5-2 Disassembly the counting bath

Please pay more attention when you are disassembling the aperture, make the aperture facing up, remove the 2 fixing screws, take out the washer carefully. Pay attention to the aperture; don't take it together with the washer. Hold the body of counting bath make the aperture facing down, blow air into the bath to make the aperture out. Clean the aperture with absolute alcohol or enzymatic cleanser. Watch the aperture under microscope to check if it is slippery inside. After cleaning the aperture, install it into the counting bath again. Please pay attention that the aperture should be installed between two washers. Do not fix it too tight to prevent from breaking the aperture.

When you want to replace LED and photocell, just take out the fixing block with LED or photocell from the counting bath, replace a new one, then install it again.

Warning: It is not allowed to take the aperture with forceps. You shall use your forefinger, dip it into clean water and take out, then use the forefinger to take the aperture and install it into the bath.

5.3 Replacement of airproof washers

5.3.1 Replace the airproof washers of pressure syringe

If there is air leakage in the pressure syringe (can be detected by pressure detector), you shall replace the airproof washer (O-type) of the pressure syringe. Please follow bellow procedures to make the replacement.

- 1) Pull the piston of the pressure syringe to extreme position, then loosen the three screws which fix the syringe, disassemble the body of the pressure syringe from the inside board, as figure 5-3:

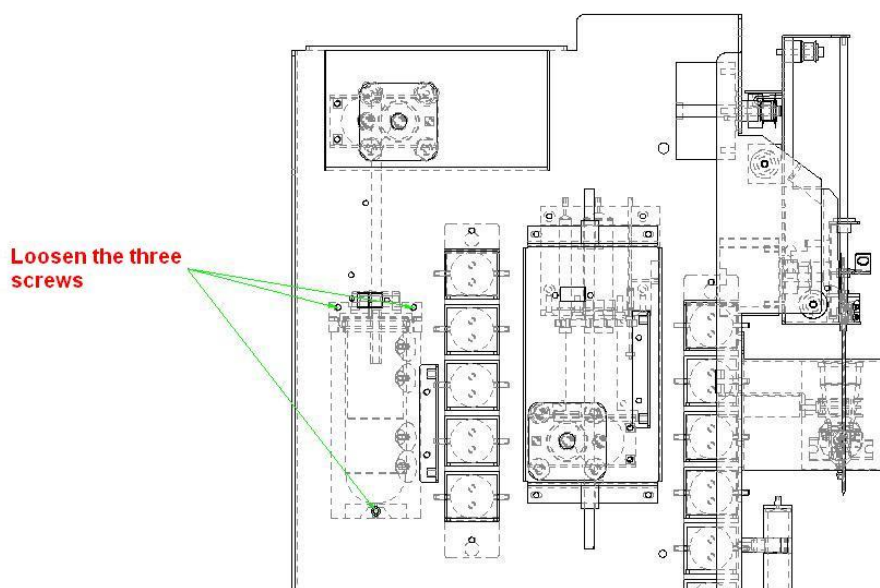


Figure 5-3 Disassembly the pressure syringe

- 2) Loosen the 4 screws on the installation board of pressure syringe, take out the broken airproof washer (O type), install a one to the original position and fix it (smear the inside and outside of the washer with airproof lubricating grease), as shown in figure 5-4.
- 3) Install the pressure syringe.

Loosen the four screws

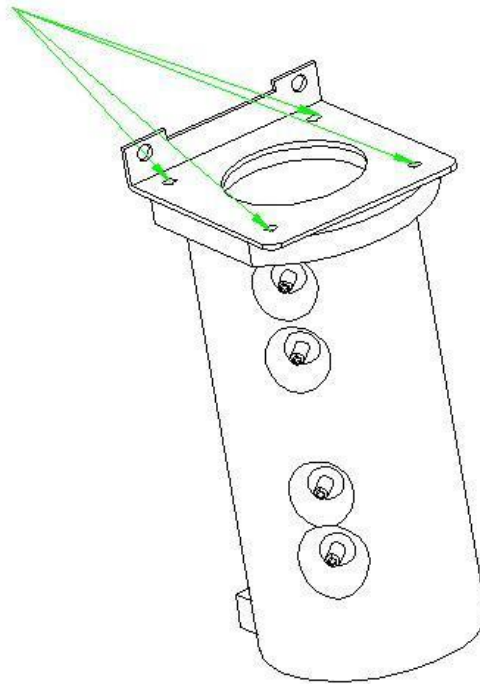


Figure 5-4 Disassembly the airproof washer

5.3.2 Replacement of washer for reagent dispensing syringe

The washers (O type) for reagent dispensing syringe need to be replaced regularly. Please following the below procedures to finish the replacement:

- 1) Loosen the 4 screws which fix the reagent dispensing syringe assembly, take off the syringe from the inside board, as shown in figure 5-5:

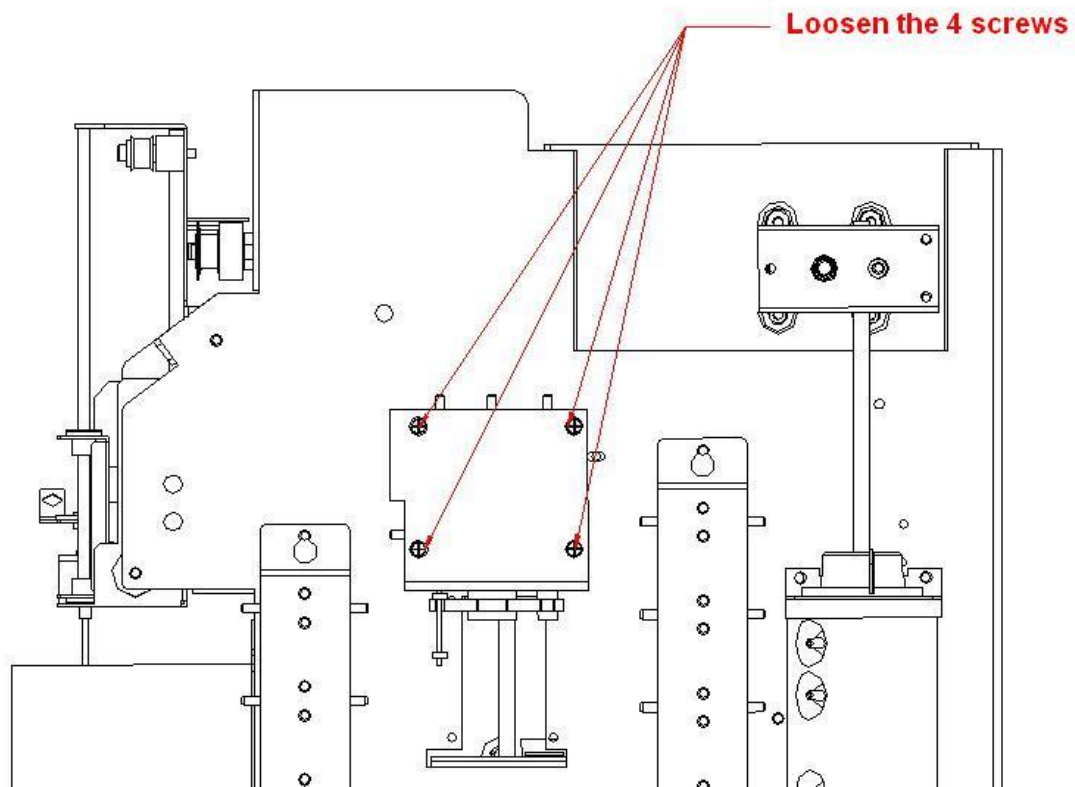


Figure 5-5 Disassembly the reagent dispensing syringe

- 2) Loosen the 6 screws at the bottom of reagent dispensing syringe, pull out the 3 pistons from the body of syringe, as shown in figure 5-6:

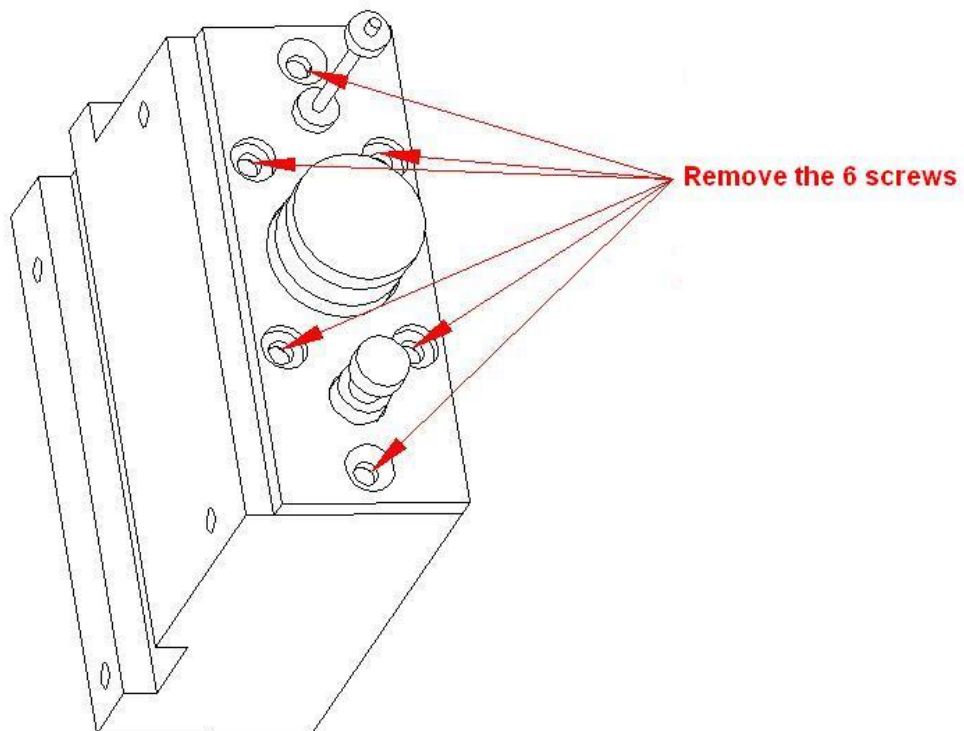


Figure 5-6

- 3) Take off the broken washer and replace new washer for each piston, smear the inside and outside of the washers with airproof lubricating grease and fix the syringe again, As show in figure 5-7:

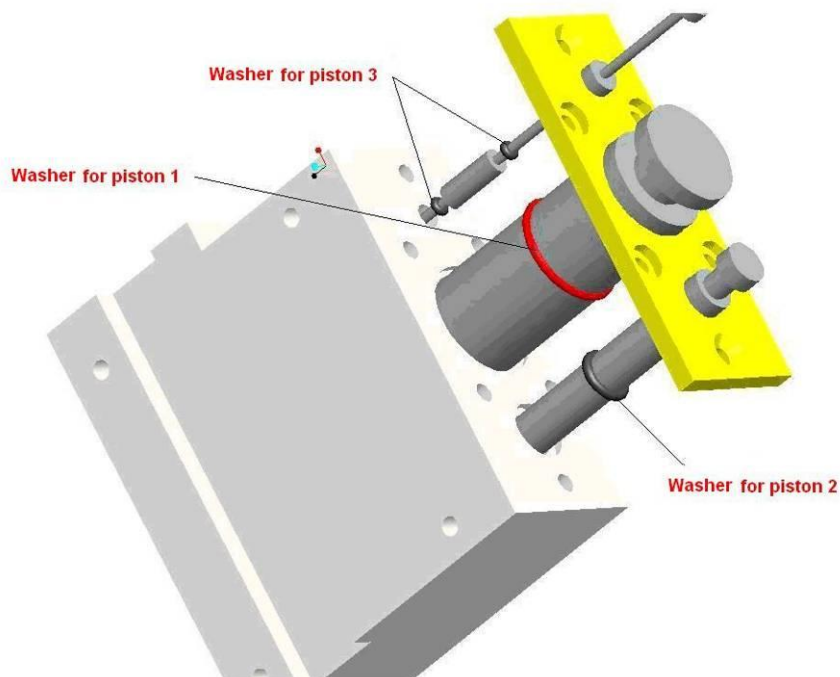


Figure 5-7

5.3.3 Replace the airproof washer for sampling needle cleaning chamber

If the airproof of sampling needle is not good, you should replace the airproof washer (O type) at the sampling needle cleaning chamber, please follow the below procedures to finish the replacement, as shown in figure 5-8:

- 1) Loosen the 2 screws which fix the sampling needle, then loosen the 2 screws which fix the cleaning chamber assembly.

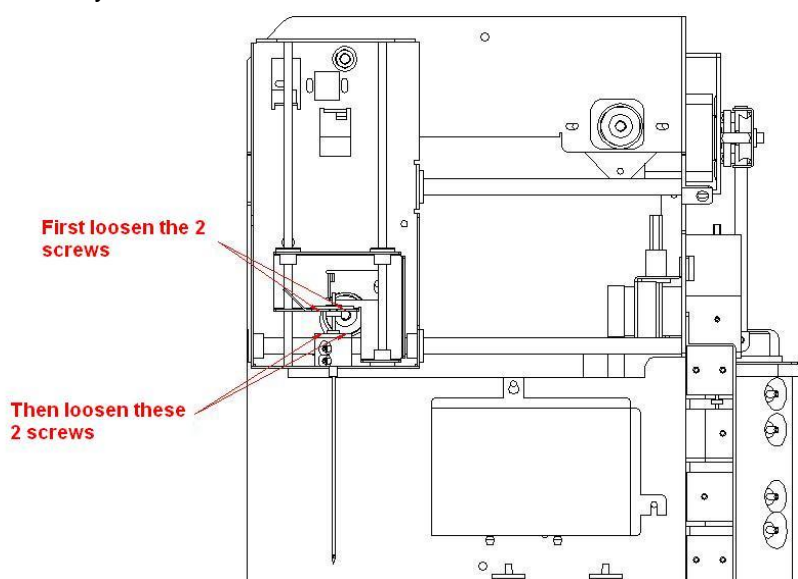


Figure 5-8 Disassembly the cleaning chamber

- 2) Take off the sampling needle and cleaning chamber assembly from the carrier, then take out the cleaning chamber cover and sampling needle from the cleaning chamber assembly, you can take off the airproof washer and replace a new one. Please remember to smear the inside and outside of the washers with airproof lubricating grease and fix the cleaning chamber assembly again, as shown in figure 5-9:

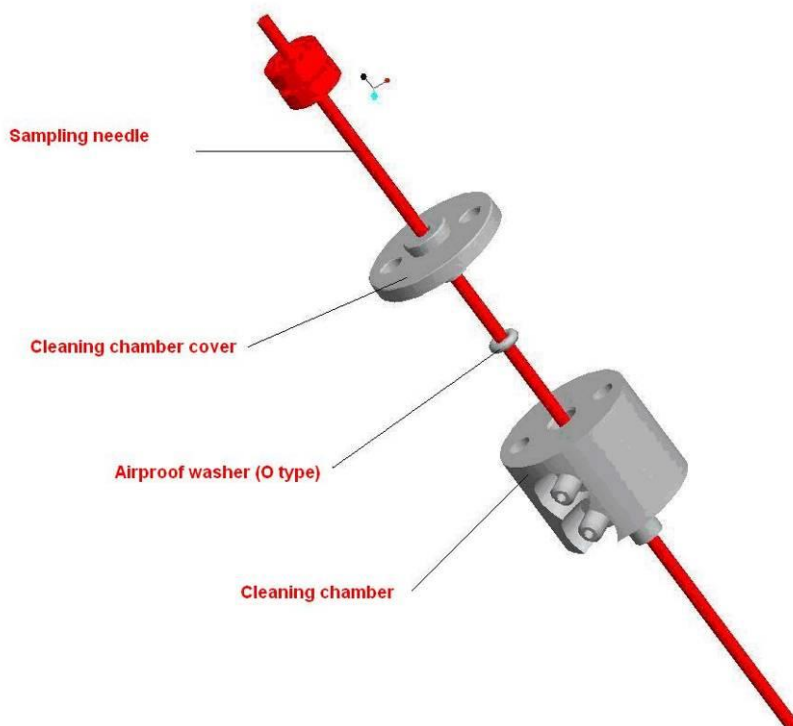


Figure 5-9 Replace the airproof washer for cleaning chamber

Warning: You must smear the inside and outside of the washers with airproof lubricating grease when you replace a new washer.

5.4 Replace sampling needle

The procedures of replacing sampling needle are similar to the procedures of replacing airproof washer for sampling needle. First loosen the 4 screws as shown in figure 5-8, take out the sampling and cleaning chamber assembly, take off the PVC tubes connected to the sampling needle. At last take out the sampling needle from the cleaning chamber, take out the cleaning chamber cover and airproof washer from the sampling needle, replace a new needle and fix the cleaning chamber again.

6. Maintenance of STEL3

STEL3 is a precise auto hematology analyzer. To ensure its good working status, it is very important to perform the daily maintenance. The procedure is easy but it must be done according to requirements.

6.1 Clean the instrument

6.1.1 Clean the surface of instrument

- Keep instrument working environment clean.
- Instrument surface can be cleaned with neutral detergent and wet cloth.
- Clean the LCD with soft cloth.
- If there is liquid in the plate at the bottom of instrument, please wipe it with clean duster cloth.

Warning: do not use any solvent, fat, corrosive substance to clean instrument.

6.1.2 Clean the counting bath

The WBC/RBC counting bath must be kept clean to ensure the accuracy and stability of instrument.

1. Clean the surface of counting bath

If the shield cover of counting bath is dirty, you must take off the cover and clean it with clean wet cloth, this is to prevent unexpected objects entering the counting bath and block the aperture.

2. Clean the inside of counting bath

- 1) During daily maintenance, you must rinse the pipeline before shut down the instrument. If the instrument is not shut down normally (sudden electricity loss during operation), you shall perform the rinse procedure when you turn on the instrument again. This is to avoid blockage in aperture.
- 2) If the counting bath is dirty, the aperture is blocked. After several operation of removing blockage, it is still not working, please disassembly the aperture and clean it under the instructions in chapter 5.2.

6.1.3 Clean the sampling needle

If there is residue at the surface of sampling needle can not be cleaned automatically, you can wipe it by soft cloth dipped with absolute alcohol.

Warning: You must drain the counting bath if the instrument will not be used for more than one week.

6.2 Daily maintenance

A. Every day

- a) Before shut down the instrument, you should use a soft cloth or clean paper dipped with a little concentrated cleanser, to clean the sampling needle. You should from top to bottom, clean the 2cm area which is above the needlepoint. After cleaning, get into the menu of "Maintenance"; perform the operation of "Back flush", "Remove Blockage" and "Cleaning" one time.
- b) If there is liquid in the plate which is at the bottom inside the instrument, please wipe it with clean cloth.
- c) If you find the test results abnormal, please perform blank test and check if the bank values are high. If these values remain high, please refer to trouble shooting.
- d) If the shield cover of counting bath is dirty, please take it off and wipe with wet clean cloth. This is to avoid unexpected objects like dust entering the counting bath and block the aperture.

B. Every week

- a) Every week you should perform the operation of "Concentrated cleanser soaking" at least twice. Add 2ml concentrated cleanser into the counting bath. You can also increase times of soaking according to your sample volume.
- b) If the instrument will not be used for a week, you should perform the operation of "Drain chamber" and "Drain pipeline" after the last use of instrument.

C. Two weeks

If the instrument will not be used for more than two weeks, you should perform the operation of "Stop use" in maintenance menu to clean and drain counting bath and pipeline.

6.3 Common trouble shooting

trouble	Solutions
1) Instrument can not start	Check the power supply of instrument. Check if the power cord has been well connected. Check the voltage from power supply. Turn off the instrument, cut off the power supply, and turn on the instrument again.
2) No Diluent	Change Diluent; perform the operation of Prime->Diluent in maintenance menu.
3) No Cleanser	Change Cleanser; perform the operation of Prime->Cleanser in the maintenance menu.
4) No Lyse	Change Lyse; perform the operation of Prime->Lyse in the maintenance menu.
5) Waste bottle full	Empty the waste bottle.
6) Temperature abnormal	Click "System Info"->"System status" at main menu of software, check the environment temperature, if it is not in the range of 15°C ~35°C, and make the environment temperature get back to this range.
7) Blank value remains high	<p>Check is the reagent has run out. Check if the reagent is degenerative or polluted.</p> <p>Perform the operation of "Back Flush" at the maintenance menu, if can not solve the problem, please perform the operation of "Concentrated cleanser soaking".</p> <p>Check if the temperature of pressure is in normal range.</p>
8) Blockage in Aperture	<p>Perform the operation of "Remove Blockage" at the maintenance menu. Also perform the operation of "Concentrated cleanser soaking".</p> <p>If you can not solve the problem by above method, perform the operation of "Burn".</p>
9) Air bubbles	<p>Perform the operation of "Cleaning" in the maintenance menu. Check if the solenoid is working well.</p> <p>Check if the reagent pipeline system is well connected.</p>
0) Printer can not print	Check if there are enough papers in the printer; check if the printer and instrument are well connected; check the printer settings in the software.
11) Abnormal noise in the instrument	<p>Open the two side doors of the instrument, check if there is unexpected object to block the movement parts, clean it away.</p> <p>If you can not perform the operation, please contact our service people.</p> <p>Check if the piston of the pressure syringe is out of the pump body. If so, please make the piston towards the pump body; push it back to the original position.</p>

Note: If you meet problem that can not be solved, or some errors continue, please contact the distributor.

Note: This service manual may contain declaration and information of copyright. They must be complied. Although we have paid much attention, some errors in interpretation or printing can not be avoided.

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