Operating Instructions

For

FP6410 Flame Photometer

HINOTEK GROUP LIMITED

Contents

I. Introduce

1.1 Principle:

The Flame Photometer is a analysis instrument using the basic principle of emission band spectrum, Using the heat energy produced the flame itself to exciting the parts of atom in the alkali soil, and to make these atoms jump to upper energy level by absorb energy, this energy be released have the characteristic of spectrum, with the range of wave length. For instance, put the salt in the flame, the flame shows yellow color, this is because the spectrum of Na atom is yellow color in the flame when it turn to normal energy level and release the energy. It be called flame reaction. The different alkali metal or alkali soil metal with the different color in flame, when you using different light filter you can make qualitative test. Furthermore the flame strength is direct ratio with the concentration with atom in liquid, thus it make up the basic of quantitative test. The method be called Flame Photometry, and this kind of instrument be called Flame Photometer.

Due to the flame temperature is not very high, the energy be tested atom release is limited. At the same time there is self-absorb and reverse in the course of burning, so only when the test in the range of low concentration is linear.

The Flame Photometer is a instrument of relative measuring, the concentration value of sample be tested is a standard sample's concentration relative value of same test condition. So before test you must make a group of relative standard samples, then process the standardization operation. You can handy or by meter to drawing standard curve, final you can test for the samples you want to, and get the concentration value and other calculate data.

This Flame Photometer is a wholly new design instrument. Small dimensions, simple structure, easy operation and reliable. Adopted LCD, keyboard, and storage standard curve and with the function of output and print connection.

The Flame Photometer using field is very vast, include:

1) cement, glass, ceramics and fireproofing etc. construction materials test;
2) fertilizer, earth, drinks test;
3) mine, petrol, metallurgy, chemical product's test;
4) drug, food product's test;
5) living rubbish of city's test;
6) science and study, health, education's lab for test.

1.2 Technical Data:

Min. Test value:K 0.004mmol/L
Na 0.004mmol/L
Stability: inner 30s :3%
Repeatability: Variation ratio less than 2%.
Linear error: K inner 0.01mmol/L~0.09mmol/L less than 5%
Na inner 1.20mmol/L~1.60mmol/L less than 5%
Na inner 0.90mmol/L~1.20mmol/L & 1.60mmol/L~1.90mmol/L less than 8%.
Disturb between measuring elements: less than 5%
Responding time; less than 8s.

1.3 Using Condition:

1) Circumstance temperature: 10℃~ 35℃:
2) Relative temperature: less than 85%

3) The unit must put on the working table level and non-shock, avoid highlight directly, no strong magnetic field disturb around, no strong air flow, no shake to influence using.
4) Using place shouldn't have flammable, explosive and corrode materials, must have the extinguishment device.
5) Source power 220V±22V, 50Hz±1Hz, good connect with ground. Please separate the socket for Flame Photometer and air compressor if you can. The power socket of air compressor must have independent switch.
6) Consumption:
   The unit : less than 30W
   Air compressor: less than 200W

1.4 Complete set system

Main	1	set
Air compressor	1	set
Accessories	1	set
Operation manual	1	copy
Spare part list	1	copy
Printer	1	set

2. Structure

2.1 Atomizing System

The system building up by air compressor, air filter reduce valve, sprayer and atomizing room.

2.1.1 Air Compressor

The air compressor is non-oil type, it can output air Max. Pressure 0.25MPa, flow rate 0.9m3/min.it input power less than 200W, source power 220V±22V. Its better the socket is independent and with switch device.

2.1.2 Air filter reduce valve

The air output from the air compressor flow through by air filter become clean, dry and reliable pressure. The air compressor have two roles: the first is reduce pressure. The compressed air about 0.10Mpa~0.15MPa spray needed is supplied by it. The method of adjust air pressure is: pull up the adjusting knob at the top of the air filter reduce valve, turn the knob clockwise to increase output pressure, counter clockwise to reduce the output pressure. After adjusting please push the adjust knob. Normally air pressure about 0.10Mpa~0.15MPa, you may adjusting the pressure according the test demand. The second role is water filter. There are some moisture in the air, through by the air compressor, the air temperature will raise. At the role of condense, there are some accumulated water in the two air containers of the air compressor, and another water be gathered in the air filter reduce valve, this part of water can be seen. No matter where have the accumulated water should be released on time or periodic. (the method of release water see Maintenance part)

2.1.3 Sprayer (fig.1)

The sprayer installed at the front cover of the atomizing room, turn off the nut of the cover the sprayer can be pull out. The sprayer connected with the outlet of the reduce valve through soft pipe. Turn on the air compressor and insert the plastic capillary of the sprayer into distill water, the spray will spout at the outlet. The pressure of working state is 0.10MPa~0.15MPa, the water spray's strong and weak along with the change of the air pressure.

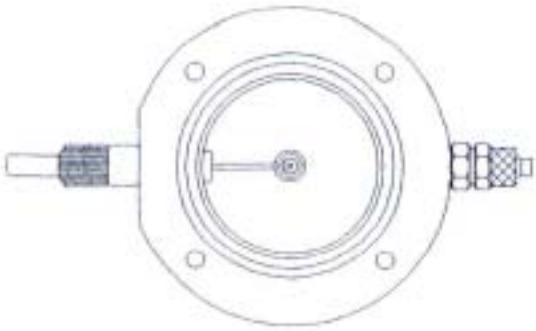


Fig.1 Sprayer

2.1.4 Atomizing room (fig.2)

The Atomizing room is cylinder shape, it include front cover, rear cover, shock ball, poke piece, waist liquid outlet, lock nuts and the gas inlet etc. the sample been atomized will be even mixed here with gas, then be send to burning head together.

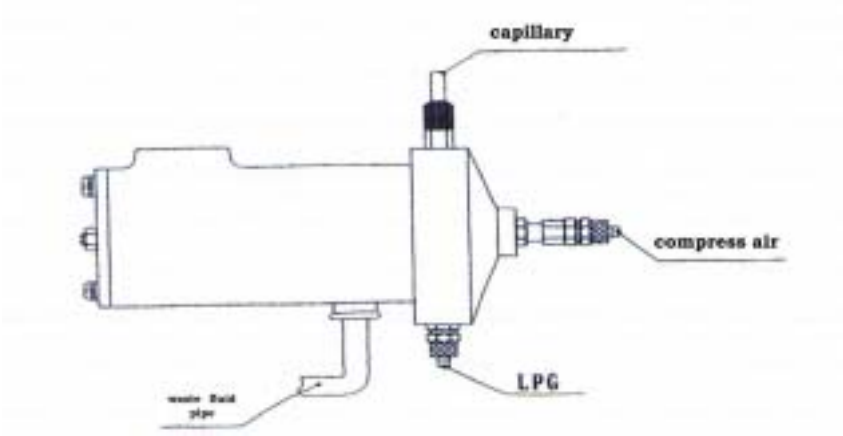


Fig.2 Atomizing room

2.2 Gas system

2.2.1 Liquid Gas

The Liquid Gas, abbreviated as LPG, the main component is propane and ethane, they are gas of no color and no smell, the specific weight is large than air, once it leak will gathering at lower place, and create disaster. Odor agent has been added when producing, please alarm when you smell the odor in working area, inspecting carefully to avoid disaster.

The gas cylinder for this unit should equipped by user. Please check the certificate of the supplier when you buy liquid gas. It is said the local fire control manage department’s proof is needed. Please keep well air through, the cylinder be put in the case, the bottom of the case should have some air hole. The cylinder put lying is forbidden, please keep it vertical. Never put flammable materials around the cylinder, never put in the sunlight. The rubber pipe using time not longer than 2 years.

Please turn off the switch of the cylinder at once if the liquid gas leak in unknown reason, open your doors and windows quickly, never turn off or turn on any electric appliance, avoid iMPact between objects. Silence in heart and action lightly when the people move away if necessary, same time please report to the fire control department.

2.2.2 Gas Valve

The Gas Valve include firing device, adjust device and flameout protection device.

Firing device: Push the adjust knob of Gas valve, the firing device connecting the power automatically, pulse generator start to work, firing head producing high pressure electric spark at the edge of the burning head. This time the liquid gas have start to flow out from burning head, it meet with the electric spark, the burning happened. Push adjust knob for seconds and release, the flame will burning normally if the adjust knob in working position.

Adjusting advice: the strong and weak of the flame related the precision of the test data and stability, you can control the flame by turning the adjusting knob, the flame weaker when the knob clockwise, the stronger the knob counterclockwise.

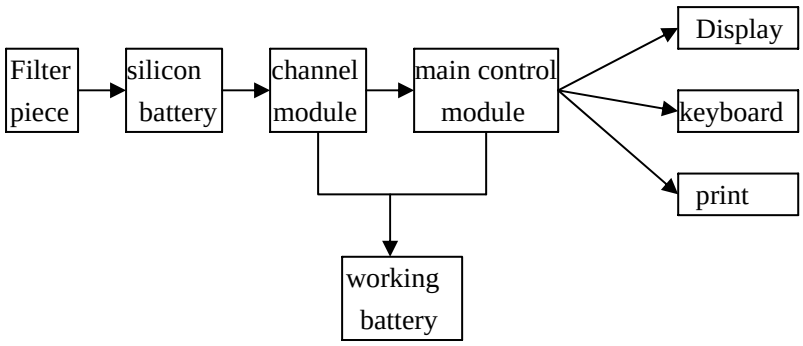
Flameout protection device: this is a device for safety protection. The gas can't flow out if you do not push it even when the gas cylinder's switch turned on and the adjusting knob in the working state. After firing for seconds, the heat couple on the burning head start to work and guide the electromagnetic valve be connected, thus the flame will burning go on even you don't push the adjusting knob. So you needn't adjusting turn the knob too much every time using since the working position be fixed, so as to keep the temperature of the flame same basically. If the flameout suddenly, and the heat couple cooling down to make electromagnetic valve turn off. This device can cut off liquid gas in few seconds, stopping the gas flow out from the burning head. Certainly there is gas in the air pipe and no way to release, you must turn off the switch on the cylinder can the gas be cut off completely.

2.3 Measuring device:

The measuring device includes a complete optics and electric device. Among this, optics building up by protecting glass and interferential light filter. The protecting glass can protect the dirty and burning the interferential light filter from soot, and prolong the using life. You must choose different wavelength interferential light filter to testing different metal atom, because generally we mentioned K light filter and natrium light filter can only for testing related K and natrium atom, and can not be change each other, also can't testing other metal atoms.

Electricity device can transfer some light energy of metal atom into electricity energy, the electricity energy changes along with the change of the light energy. The working of transfer the light energy to electricity energy made by silicon battery. Due to the window of the silicon battery is very small, so the signal output is very weak and can't be use by main control module directly, so there are channel module for transit between the silicon battery and main control module. And LCD and key board also connected with the main control module. LCD display in three lines, the first line display sample sequence number, simulate data etc. the second line display data of input and output of the related atom, the third line display operation manual. Key board only three operation, three key's operation method is same even manual is different. Thus the operator can easily use the unit in a short time.

Generally to description above, this meter we can show with the diagram below:



3. Installation & adjustment

3.1 Installation

1) Open the case, and check the quantity and outer view quality according to the Packing List.

2) Check the spare parts according to the Spare Part List.
3) Please install the propane pressure reducer in Cylinder's mouth for liquid gas. There are cone connectors on the outlet of pressure reducer and inlet of the gas, both connected by rubber pipe, you must fix it with clips. After you installed please check the quality of installation, turn on the switch of the cylinder, turn the handle of the propane pressure reducer and make the outlet pressure at about 0.02~0.06MPa. Then fan the air of the connector to smell if any bad smelly, meanwhile put some soap water on the connector to watch if any foam occur.
4) Contacting the outlet of the air compressor with the air inlet of the filter pressure reducer of the unit by 5x3 PVC pipe. When you install it first cover the nut, then insert the pipe opening into the pipe mouth, please insure insert to the end then tighten the nut, and press tighten the pipe end, you must re-install it if you can pull out the PVC pipe.
5) With one end of the rubber pipe (waste liquid) insert into the outlet of the waste liquid cup, another end to the container for the waste liquid.
6) One end of the power cable insert the socket of the power on the unit, and another end insert to the city source power; please note: the socket for the air compressor must have switch. The source power must connecting ground well.
7) You have printer, please connecting printer with the unit by connecting cable and lock it; insert the power transformer to the socket, another end insert the power input of the printer.

3.2 Adjusting

3.2.1 Sprayer

1) Turn on the power of the air compressor, turn the adjusting knob of the air filter pressure reducer to make the pressure meter shows 0.10MPa, this pressure can adjusting according to the test requirement.
2) Turn off the nut on the front cover of the atomizing room and take the sprayer out. Insert the plastic capillary of the sprayer into distill water, and watch if any fog producing at the outlet of sprayer.
3) Turning the knob on the air filter pressure reducer in clockwise and counter clockwise, watching if the fog changing along with the changing of the pressure.
4) Put the sprayer to the atomizing room, and tighten the nut hardly. There is a rubber seal between sprayer and front cover, please check if the rubber seal broken and distortion before you put sprayer back.

3.2.2 Fire up

1) Turn on the power switch on the panel, power pilot lighting,
2) Push down the gas adjusting knob on the panel, producing sound " DA,DA, DA", meanwhile you should watching the spark between the fire head and burning head.
3) Turn on the switch on the cylinder (counter clockwise open; clockwise close) . turn the handle of the propane pressure reducer clockwise and make the outlet pressure at about 0.04MPa, this pressure can be regulate according the requirement, the normal is 0.02MPa~0.06MPa.
4) Turn on the air compressor, the plastic capillary to distilled water.
5) Before fire up please spraying first for several minutes if your unit is new or not be use for a long times, until the water drops from the waste liquid pipe.
6) Press down gas adjusting knob, you should watching the little lower on the manometer of the propane pressure reducer, you loose the knob the pressure resume. If the needle of the manometer is no change, it means the gas adjusting knob not be press to the end, the gas air circuit not be connected through, please press heavy to the end again.
7) Fire up you should by spot fire way, that is press down the adjusting knob for 3 seconds then loose

it, and press down again until the fire burning.

8) When you can't fire up, you can adjusting the air filter reducer to zero position, press down gas adjusting knob, if still no fire, you can increase gas pressure; if the fire producing, please keep press not loose the knob, and adjusting the air filter reducer to open more, until the fire stable then loose the knob. After you loose the press, the flame may have two abnormal state:
   One is fire dead, another is light in middle. For first you should adjusting gas knob or air knob counter clockwise, for second you should adjusting gas knob or air knob clockwise.
9) After you fire up successfully, please keep the press knob for about 5 seconds. If you loose the press, the flame will dead slowly, you can turn gas adjusting knob counter clockwise then press down. Covering the chimney cover at last.

3.2.3 Turn on/ off the unit.

1) Turn on the main power, and turn on the power of air compressor, insert the capillary into distillatory.
2) Open the switch of the gas cylinder, and make the fire up process.
3) Before start the machine, cleaning for 5 minutes with distillatory in the condition of burning, then turn off the switch of the cylinder, then turn off the switch of source power and air compressor.

4. **Manual operation:**

When you start the machine, the screen should display "Welcome to use SM640! SURGIFRIEND MEDICALS, ENGLAND". push the key "ENTER" then turn to beginning manual.(fig.3) at the all the manual below, all basically choose key "L", "R" except some special description. The item be choose display in black ground and white word, the shape is rectangle. Push key "ENTER" then to next operating.

4.1 Beginning Manual

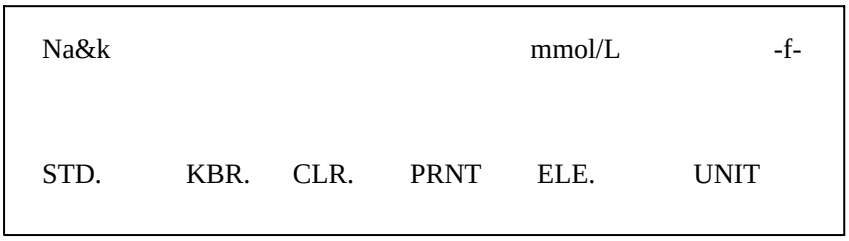


Fig.3 Beginning Manual

4.1.1 Note of Screen

1) the first group of upper line from the left is the symbol of element be choose, the operation manual example in K, Na. The second group is the concentrate unit be choose, the machine can choose three concentrate unit: mmol/L, ug/mL and mg/100mL. The third group is standard curve correct method, the machine can choose two methods: the method of subsection (-f-) and the method of linearity regress (-2x), Among the Beginning Manual, the key "L" push for 2s, two method be change each other. The manual make case in subsection(-f-).
2) The lower word is manual items, you can choose with key left and right move, the item be choose display in black ground and white word, push key "ENTER" turn into the item.

4.1.2 Manual operation:

1) Demarcate
   Please choose "STD" and push key "ENTER", the machine into Demarcate Operation. The detail see 4.2 Demarcate Operation.
2) kb value: when –f- be display at the upper right of screen, you push key "ENTER" display: No kb for –f-. Push key "ENTER" again turn back. Only when you choose linearity regress method, that is –2x- be display at upper right of the screen, and there are 2 standard liquid be input in the

Demarcate Test, the kb value can be display: (fig.4)

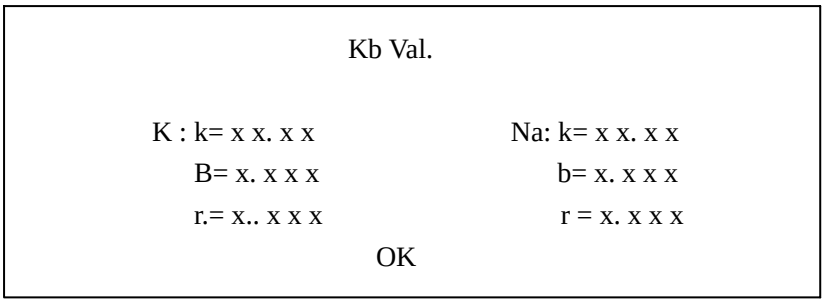


Fig.4

Press “ ENTER” then turn back.

3) Clear

Choose “ CLR”, press key “ENTER”, the screen display as below:

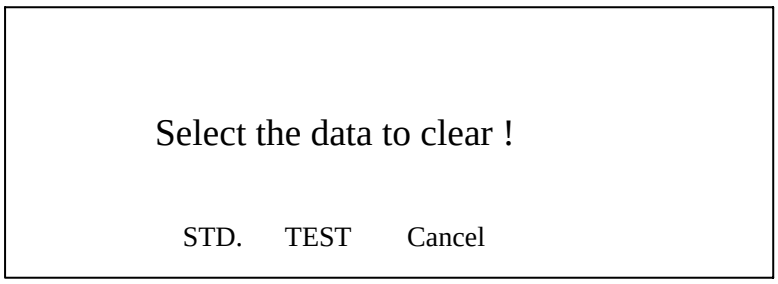


Fig.5

Choose “STD” or “TEST”, press key “ENTER”, enters the related operation of cleaning data. Here mentioned “CLR” means clean all the standing or test data restored in the meter, not means the only single data. For protect misapply, after enters the clean operation you must “OK” or “cancel”. Choose “Cancel”, the press “ENTER” and turn to Beginning Manual.

4) Print

Choose “PRNT”, press “ ENTER”, display as below:

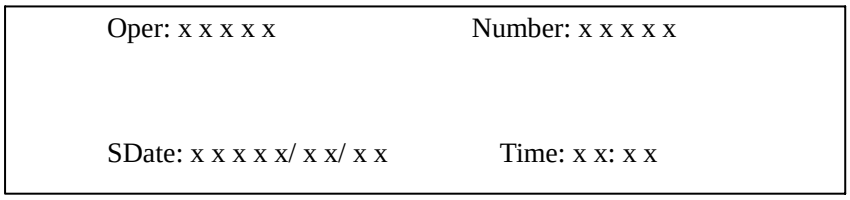


Fig.6

At the above fig, you can fill each items by “LEFT” or “ RIGHT”, all the contents finished, please press “ ENTER” the machine enters the Printer start to work; choose “cancel” then press “ENTER” turn back to Beginning Manual,.

5) Element

Choose “ELE” then press “ENTER”, display as below: (fig.7)

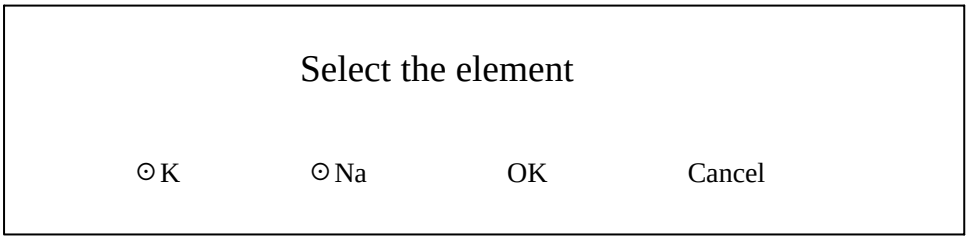


Fig. 7

When the cursor at the position of K or Na, press “ ENTER”, the point at the center of the circle will occur or disappear, the point occur means be choose, then press “OK” to choose. Choose “Cancel” then press “ENTER” to return the Beginning Manual.

6) Unit

Choose “unit”, press “ENTER”, the screen display as below:

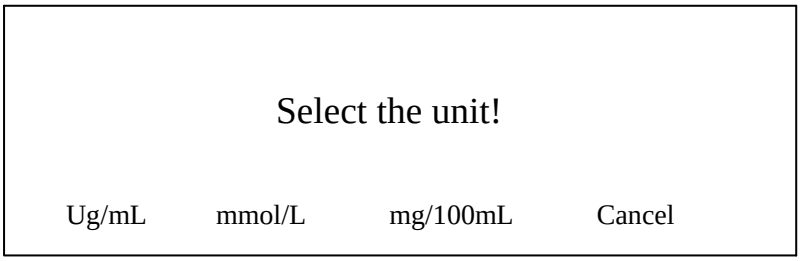


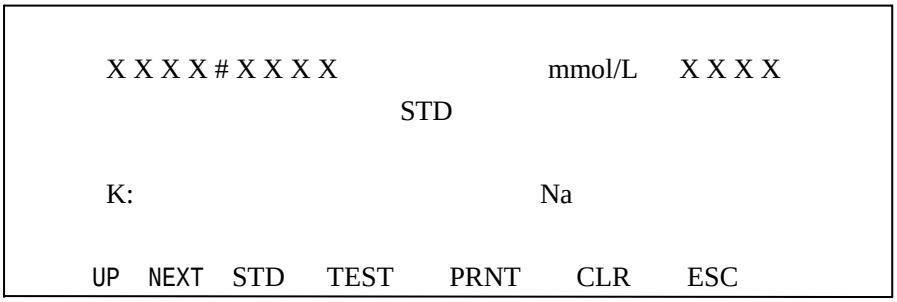
Fig.8

Three concentrate unit can be choose. This screen be displaying, if the cursor is on the unit you wanted, you can press “confirmation” then turn to Beginning Manual, or you can choose “ Cancel” then press “ENTER” back to Beginning Manual. The machine be pre-set at the mmol/L when ex-factory. You must cleaning all the data no matter with standard or test data if you want to change concentrate unit. This time press “ENTER” and back to Beginning Manual, and cleaning all data.

4.2 Demarcate Manual

The role of this manual is input the standard liquid concentrate value in certain concentrate, and build-up standard curve automatically in machine (the method of subsection or linearity regress)

The screen display as below: (fig.9)



4.2.1 The description for the screen

1) the first group of the first line from the left is code of standard liquid, the second number is the simulate value of K, third group is concentrate unit of standard liquid, fourth group is the simulate value of Na.
2) Medium line is the input data of K and Na, If you never input any data, only display two words of K and Na, the data position empty; if you input the data before, the data will be display.
3) The third line is operating manual.

4.2.2 Manual Operation:

1) UP NEXT

Use together with key “ENTER”, choose “UP” ,press “ENTER” once, the standard liquid code number decrease 1; choose “NEXT” ,press “ENTER” once, the standard liquid code number increase 1; the Max. of this machine can set 10 groups of standard liquid., the code 1~10 can be display circle.

2) Demarcate

Choose “STD”, press “ ENTER”, enters the standard data operating. Detail see 4.2.3.

3) Test

Choose “TEST”, press “ENTER”, enters the samples test operating. Detail see 4.3

4) Print

Choose “PRNT”, press “ENTER”, printer print the standard data be input. If you choose the method of linearity regress, the data (k, b, r) and standard data be printed together. The date on it decided by print item (fig.6) in Beginning Manual.

5) Clear

Choose “CLR”, press “ENTER”, only clean one standard data in current, not influence other standard data.

6) Turn back

Choose “ESC”, press “ENTER”, back to Beginning Manual.

4.2.3 Data input

Choose “Demarcate” is for input standard liquid concentrate, and built up standard curve. The screen display as below:

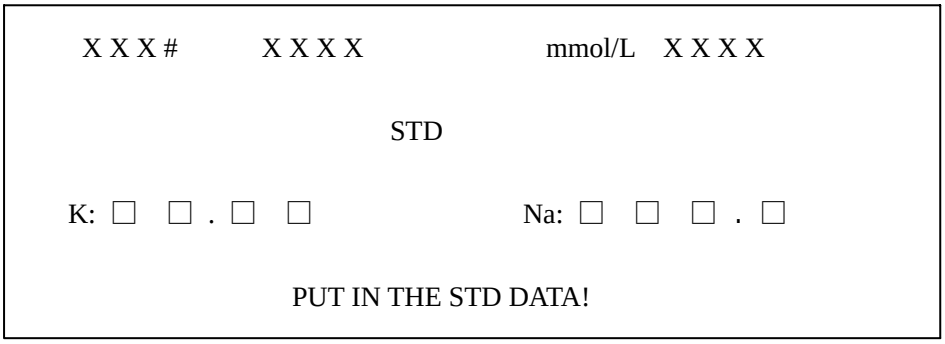


Fig.10

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4.2.3.1 Screen description:

1) The first group data of first line from left is going to input standard code current; the second group data is simulate value of K; the third group is concentrate unit current, the fourth group data is simulate value of Na. The simulate value of K and Na can’t over 1000 in the course of work..
2) The second line is input data of K and Na. If you never input any data, display as K : □ □. □ □, Na: □ □ □ . □; if you had input data before, the data should display. Radix point can’t be move. The data can’t lost after you turn off the machine. Flashing short line is cursor.
3) The third line is warning.

4.2.3.2 Input operation;

1) Press “R” once, the cursor move one bit. This key can move cursor circle.
2) When the cursor stop at certain place, press “L” once, the number add 1. beginning from “0” to “9”, then turn to “0”. Every standard input 4 bit, not enough 4 bit please adding “0”, no matter left radix point or right radix point.
3) To change set data, choose standard code from the Demarcate Manual, then enter data input operating, and change data with “L” or “R”.
4) No matter you first set standard data or change standard data, press “ENTER” it turn back to Demarcate Manual.
5) The standard data you input can arrange as the concentrate of the standard liquid from high to low or from low to high, also you can input free no mind concentrate high and low freely. But please attention, the concentrate of you processing must same as you set, otherwise the machine can’t test

operation.

4.3 Test manual

Choose “TEST” from Demarcate Manual, press “ENTER”, enters the sample test operation. The screen display as below: (fig.11)

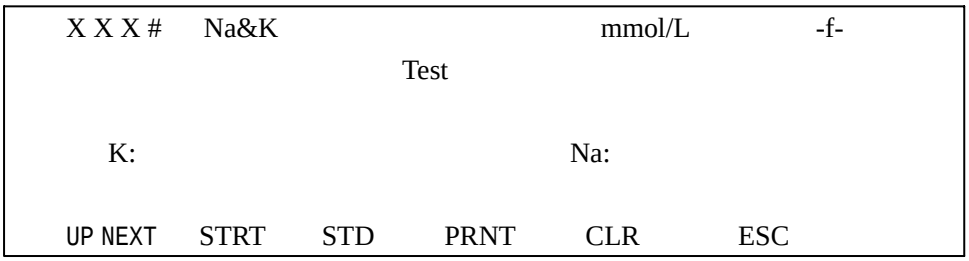


Fig.11

4.3.1 Screen description:

1) The first group data of first line from left is the testing sample code (Max.100), the second group is element symbol, the third group is concentrate unit, the fourth group is the correct method of standard curve: -f- is subsection method, -2x- is linearity regress method.
2) The second line is test data of K and Na, the data contrast with the code of testing sample. Some certain never store data the space display empty, if had been store the data, the data display. The same code display nearest data. The data can’t lost when you turn off the machine.
3) The third line is operating manual.

4.3.2 Manual operation:

1) UP: press “ENTER” , the code will decrease one.
2) NEXT: press “ENTER” , the code will increase one.
3) STRT: press “ENTER”, the concentration value of being testing sample current code occur. (Fig.12)

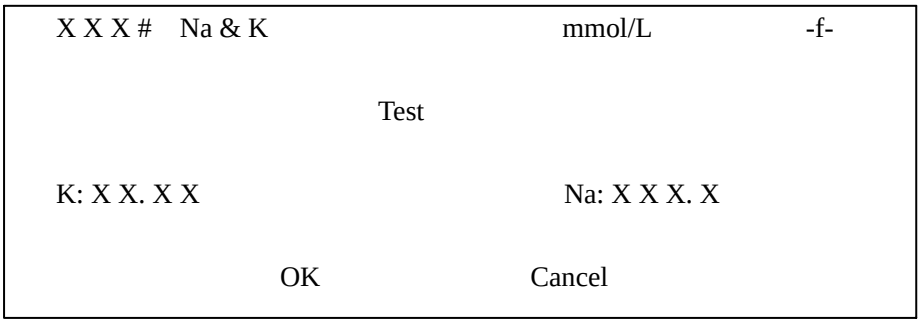


Fig. 12

Choose “OK” this time, and press “ENTER”, the data and code be stored in. the data can’t lost when you turn the machine off until new data be “OK”.

Choose “cancel” this time and press it, no any change and turn to test manual.

4) STD: press “ENTER”, return to Demarcate Manual. (Fig.9)
5) PRNT: press “ENTER”, the printer print test data be stored only. The date should be decided by print item (Fig.6) in Binning Manual.
6) CLR: press “ENTER”, the current code test data should be clear, not influence other code’s data. After clear, data item at the item display empty.

5. Test operation:

5.1 Test prepare:

After install and adjust of the machine, the operator must read and master manual operation, this is very important for the regular operation.

And before you regular operation, choose the range and number of the standard liquid correctly, and choose the right position of concentrate on meter, also the air, gas pressure data.

Due to the test circumstance is always changing, so we can only give principle way, the operator can make up the data according the real situation.

5.1.1 select standard liquid

The concentrate range of standard liquid makes sure must according to the concentrate of be tested sample. When the concentrate be tested sample over 10times upper and lower limit, we suggest testing in groups. So the value ratio between high concentrate and low concentrate of the standard liquid not over 10 times is better. For instance there are two groups objects for testing, object A content about 0.1ug/mL~ 1ug/mL, object B content about 1ug/mL~10ug/mL, thus you can make two groups of standard liquid and standard curves, and test separately. Certainly you can test together, but the data's veracity lower then groups, especially in lower concentrate.

After you make sure the range of the standard liquid, otherwise you must make sure the number of standard liquid in this range. In theory, more less of value differential of standard liquid, more higher the veracity. But it will increase the number of the standard liquid and increase the complexity of demarcate. You need to carry out many times to choose suitable differential value of standard liquid, and decrease the number of the standard liquid as you can.

5.1.2 Select the position of concentrate switch

There are two green button switch on the back of the machine, use for K and Na each, each with two steps: spring out or press down; its suit for high concentrate object when spring out; and for lower concentrate when press down. Here regarding the high and low concentrate no any very clear sideline, they are just concerned the linearity range (see 1.2 technique data) of machine- Flame photometer. It is very clearly that the concentrate of K is more lower than Na , this time you should press down the k's button, and let the Na's button spring out. This is a special example in inspecting product's technique data. For the clients from the different field, the position of the 2 switches can make sure according to the test before regular testing. The testing operating as below: first fire up, then the screen enters the data input 4.2.3 (fig.10). sample in with highest concentrate liquid, not input any data, just watch K, Na's simulate value of second, fourth position at first line. The simulate value increase when the button press down, and decrease when the button spring up. The principle of make sure the position of the switch is: its better the simulate biggest, but can't flow out, it means can't over 1000. please attention: not only simulate value concerned with button switch position, but also concerned with pressure of spray, flame small or bigger. You must make the three factor in one.

5.1.3 Select the data of air & gas

The machine haven't strict demand for the height of flame, no matter flame high or low, the shape is same----- outer & inner flame are cone, the flame lower is blue color and upper yellow color when sample in with distillatory. This is the normal color and shape. Otherwise there are two unmoral flame: poor burn & rich burn. You can judge the poor burn in flame's lower part, the flame isn't cone, and the outer fire leaves the burning head, sometimes the flame break by air; judge the rich burn you can watch flame upper part, the bright yellow may occur of the flame when you sample in with distillatory, it shows two yellow colors of flame but one. The poor burn means too little gas in mixed gas, the dealing way is decrease the air pressure or increase gas pressure; the rich burn means too much gas in mixed gas, the dealing method is increase air pressure or decrease gas pressure.

At the state of normal flame, you can select suitable height flame according to different liquid concentrate. Just same as you choose button switch position, at the state of fire up, screen enters 4.2.3 data input (fig.10). sample in with highest concentrate of standard liquid, don't input any data, just watch K, Na's simulate value at second and fourth position of screen's first line. The principle of make sure the flame's height is : its better simulate value biggest, but can't flow up, that is said less then 1000.

5.2 Test simulate

5.2.1 first example

5.2.1.1 Standard [K2O + Na2O] or K, Na ion:

5ug/mL (0.5mg/100mL), 20ug/ mL (2mg / 100mL)

40 ug /mL (0.5mg/100mL), 60ug/mL (2mg/mL)

5.2.1.2 Simulate test liquid [K2O + Na2O] or K, Na ion:

5ug/mL (0.5mg/100mL), 10ug/ mL (1mg / 100mL)

20ug/mL (2mg/100mL), 30ug/ mL (3mg / 100mL)

40ug/mL (4mg/100mL), 50ug/ mL (5mg / 100mL)

60ug/mL (6mg/100mL)

5.2.1.3 Data select

unit: mg/100mL

correct method: subsection (-f-)

K button switch: spring out

Na button switch: press down

air pressure: 0.10 MPa

gas pressure: 0.055 MPa

5.2.1.4 Standard liquid demarcate:

1) make sure data setting format:
   5ug/mL standard liquid set as: K: 00.05, Na: 000.5:
   20ug/mL standard liquid set as: K: 00.20, Na: 002.0:
   other liquid analogy as above.
2) Setting four groups standard separately, (4.2.3.2 input operate), in sure format and according to the standard code with keyboard input to screen (fig10). The setting operation of standard data can do after turn on power, or can do after fire up.

For the example of 5ug/mL standard liquid, demo operation as below:

a) Turn power on, press "ENTER", enters beginning manual (fig.3), choose element as K, Na, choose unit as ug/mL, choose correct method as subsection (-f-).
b) Select "STD", press "ENTER", enters Demarcate Manual (fig.9)
c) When code is 001# in the Demarcate Manual, choose "Demarcate" and press "ENTER", enters screen of data input (fig.10)
d) At the screen of data input, setting standard data in make sure format already (K: 0.05, Na: 0.5). Start from K's first bit: press "LEFT" once, display "0". Press "R" once, cursor move to second bit. press "L" once, display "0", Press "R" once, cursor move to third bit. press "L" once, display "0", Press "R" once, cursor move to fourth bit. press "L" five times, display " 5". Press "R" once, cursor move to first bit of Na, press "L" once, display "0", Press "R" once, cursor move to second bit of Na, press "L" once, display "0", Press "R" once, cursor move to third bit of Na. press "L" once, display "0", Press "R" once, cursor move to fourth bit of Na. Press "L" five times, display " 5". Check it no error, press "ENTER". Thus code 001# standard liquid data input finished, the screen turn back to fig.9.

e) If you want to input next standard liquid, first you choose “NEXT” at fig.9, press “ENTER”, the code display as 002#. Choose “ STD” again, the screen enters state of fig.10 repeat, then use “ L” “ R” to input data according to above way. Others can do analogy.

3) After fire up and pre-heat for 25 minutes, make sure sample in with highest concentrate standard liquid and simulate value can’t flow out (the simulate value did not over 1000), then sample in with standard liquid one by one. Sample in with 5ug/mL standard liquid, at the state of fig.9, choose code 001# by “UP” “NEXT”, then choose “STD”, and press “ENTER”. The screen display as below:

001#	0077	ug/mL	0146
	STD		
K:	00.05	Na:	0.5
	Put in the sta. Data!		

When simulate value stabled, press “ENTER”, the screen turn to fig.9, choose “NEXT” press key confirmation, the code as 002#, choose “STD”, press “ENTER”, sample in with 20ug/mL standard liquid, the screen display as below:

002#	0298	ug/mL	0437
	STD		
K :	0.20	Na:	2.0
	Put in the sta. Data!		

When simulate value stabled, press “confirmation”, the screen turn to fig.9 again, you can repeat as above, when sample in with 40ug/mL & 60ug/mL, the screen display as each:

003#	0552	ug/mL	0734
	STD		
K:	0.40	Na:	4.0
	Put in the sta. Data!		

004#	0800	ug/mL	0958
	STD		
K:	0.60	Na:	6.0
	Put in the sta. Data!		

When simulate value stabled, press “ENTER”, the screen turn to fig.9 again, now the demarcate finished.

The essential of demarcate is make sure one standard curve on the machine, this standard curve is built up by few simulate value come from few standard liquid and on the machine.

For the example of K, as fig.13:

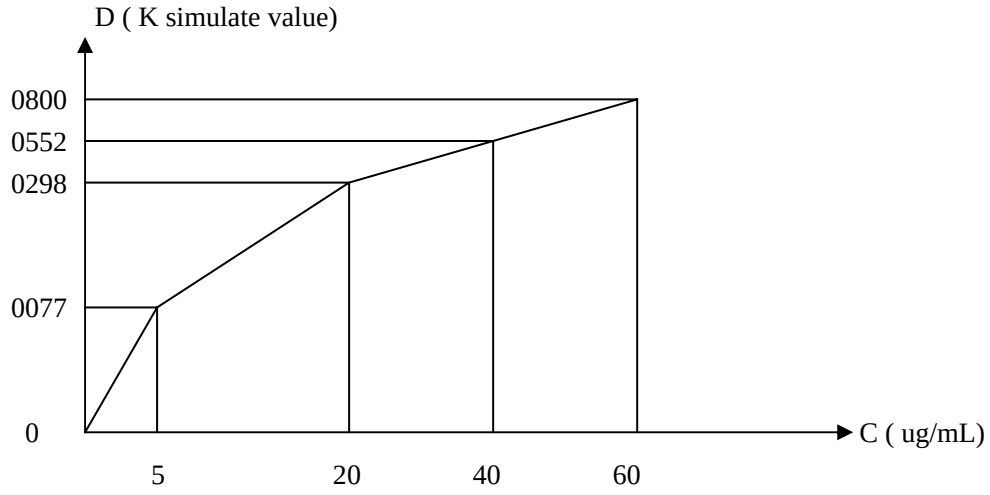


fig.13

5.2.1.5 Simulate liquid test

Choose “test” at the state of fig.9, press “ENTER”, enters the test manual (fig.11)

1) Choose “UP” or “NEXT”, press “ENTER”, make sure the code of test liquid from code 001#.
2) Sample in with 5ug/mL simulate liquid, choose “STRT”, press “ENTER”, the screen display:

001#	Na&K		ug/mL	-f-
		test		
k:	0.05	Na:	0.5	
	OK	cancel		

when data stabled, choose “OK”, press “ENTER”, the test data be stored in machine, meanwhile the screen turn back to fig.11.

3) Choose “NEXT”, press “ENTER”, the code as 002#.
4) Sample in with 10ug/mL simulate liquid, choose “STRT”, press “ENTER”, the screen display as below:

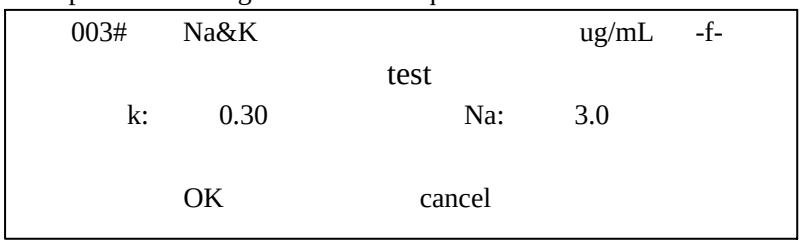
002#	Na&K		ug/mL	-f-
		test		
k:	0.10	Na:	1.0	
	OK	cancel		

when data stabled, choose “OK”, press “ENTER”, the test data be stored in machine again, the screen turn back to fig.11 again

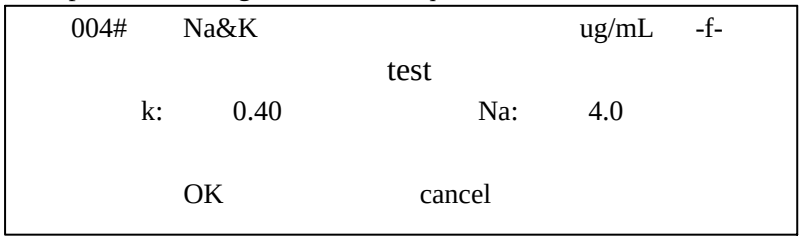
5) Operating with above 3),4) steps, sample in with different simulate liquid you can gain

different test result:.

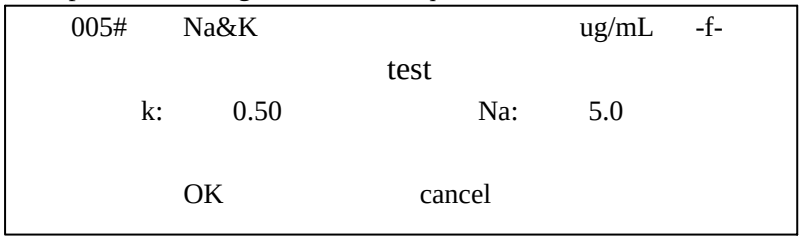
Sample in with 30ug/mL simulate liquid:



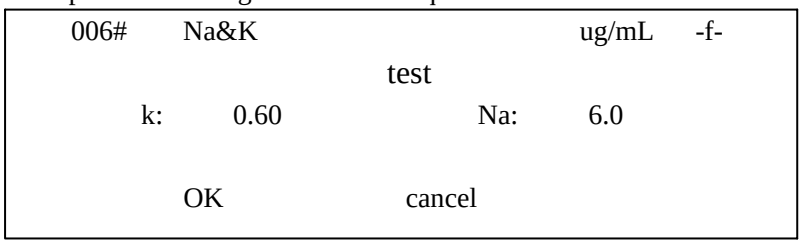
Sample in with 40ug/mL simulate liquid:



Sample in with 50ug/mL simulate liquid:



Sample in with 60ug/mL simulate liquid:



6) when we ensure the format of setting data, K be minification 100 times, and Na minification 10 times, thus the result be reduced. You must enlarge when calculate. In the real apply, you can decide if enlarge or reduce by yourself.
7) If you have some doubt on some test result, for example the result of code 003# (30ug/mL) above. You can choose " demarcate" on test screen (fig.11), press "confirmation", and return to demarcate screen (fig.9). re-make standard liquid code as 002# (20ug/mL) and code as 003# (40ug/mL) according to demarcate operating method. Then re-choose "test" and press "confirmation", sample in with 30ug/mL simulate liquid, thus you can gain new test result.
8) After test, you can check every code and related test result by change code at the screen of fig.11.

5.2.2 Second example

5.2.2.1 Standard liquid (ion K + ion Na)

K 0.03mmol/L + Na 1.20mmol/L

K 0.07mmol/L + Na 1.60mmol/L

5.2.2.2 Simulate test liquid

K 0.03mmol/L + Na 1.20mmol/L

K 0.05mmol/L + Na 1.40mmol/L

K 0.07mmol/L + Na 1.60mmol/L

5.2.2.3 data select

unit: mmol/L

correct method: subsection (-f-)

K button switch: press down

Na button switch: press down

Air pressure: 0.10MPa

Gas pressure: 0.06MPa

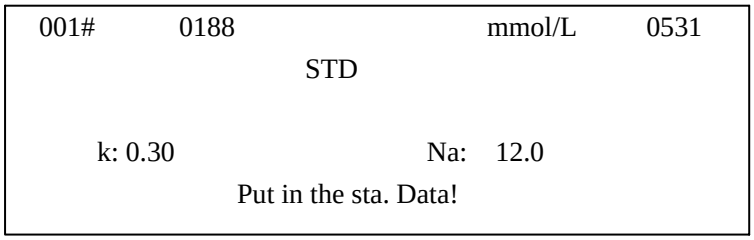
5.2.2.4 Standard liquid demarcate;

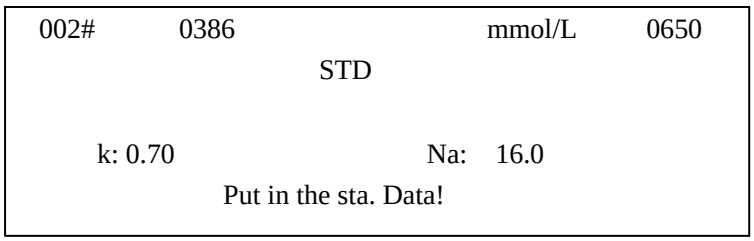
1) Ensure data setting format:

K 0.03mmol/L + Na 1.20mmol/L set as K 00.30, Na012.0

2) Setting operation can see first example, all the same except standard number and value detail.

3) Sample in with two kinds standard liquid, the result can be gained as below:

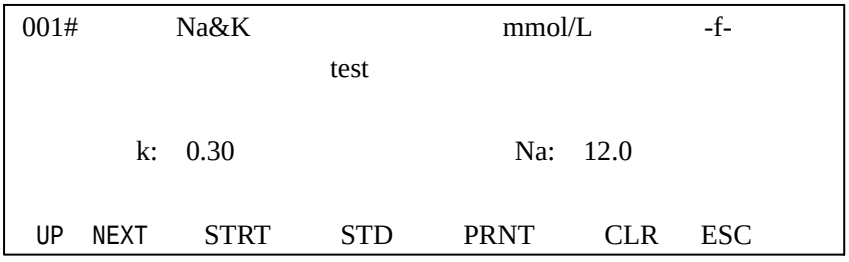




in fact this is a standard curve built up by two points.

5.2.2.5 Simulate liquid test

The test method same as first example, sample in with three simulate liquid separately. Finishing test, choose “UP”, ”NEXT”, together with key “ENTER” and check test results one by one. The fig as below:



002#	Na&K			mmol/L		-f-
		test				
k: 0.50			Na: 14.0			
UP	NEXT	STRT	STD	PRNT	CLR	ESC

003#	Na&K			mmol/L		-f-
		test				
k: 0.70			Na: 16.0			
UP	NEXT	STRT	STD	PRNT	CLR	ESC

6. Attention:

1) Gas and air must be dry, purity and no pollute, never using the machine at the condition of wet and dusty.
2) Never put the material easy burn and explosion at the around of machine and cylinder. Please keep good ventilation. The better is setting fan device or using the machine in ventilation cabinet.
3) Stable source power 220v is needed, there aren't any large power and often start/off electric equipment near the machine. Good ground connected, instead of ground wire by zero line is forbidden.
4) It is very hot of the burning room and bonnet in the course of operation, never close it in your body or hand touch it, or never watching from upper towards lower.
5) Please collect the waste liquid from the waste cup and well dealing, never unbending with it.
6) Keeping the clean and care demand of atomizing room and burning head. Please prolong the burning time for distillatory if you done the high salt sample test.
7) For some sample of surface tension more, adding some surface active agent is necessary, meanwhile attention adding the same value in sample standard space.
8) You must made the standard test liquid precision. Please note the keep condition when you need store it long time, also need add some bacteriostatic. Any sample can't put in natrium glassware.
9) There aren't any grain material in samples, the better way is use after filter. Please always attention the height of liquid to make the capillary suck upper liquid only. This is a good habit for operator.

7.Maintanance

7.1 Air compressor

When the machine working time reached about 100 hours, you should cut off the source power, turn the connector off, spill the seeper of two air container, and dismantle filter of air-in and wash it with cleanser, drying it then reinstall it. The bad circumstance around the machine such as high temperature and powder, please do it in time.

7.2 Water release method of air filter reduce valve

At the condition of with pressure, take gasket, turn the knob under the air filter reduce valve clockwise, and pull down, the seeper will release on the gasket. After that, turn the knob counter

clockwise and pull up, the reset be done.

7.3 Clean

You should clean for about 5 minutes with distillatory every work finished, but some grain materials of liquid should keep at the burning head of atomizing room or some other place and make the test result not stable and precision. So it is very important to clean these parts timing. You can clean the atomizing room and burning head same time just because they will be dismantle together.

You must clean the machine when it was turn off, the steps as below:

1) Turn off the nut from front cover plate, take out the sprayer and rubber seal.
2) Turn off nut of connector, and put out gas pipe.
3) Turn off lock-nut, and take the atomizing room out from burning room together with burning head.
4) Turn off four nuts from rear cover plate and take out the plate.
5) Turn off four nuts from front cover plate and take out the plate.
6) First turn off the nut from adjust pole on rear cover plate, then turn touch-ball in counter clockwise and take out the touch-ball & interfere piece from front of atomizing room.
7) Immerge all the parts be dismantle in the water with cleanser for 30 minutes, and clean them with brush, then washing in clean water repeat and dry them. Install the parts as counter steps above at last.

Please Attention: The fit nuts of sprayer front cover plate on atomizing room must tighten it repeat; please adjust carefully the space between touch-ball and spray mouth renew.

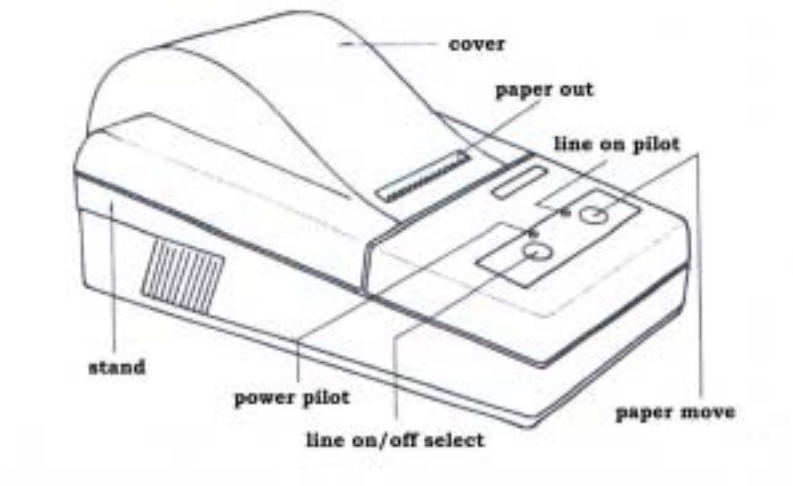
Remove troubles:

Troubles	cause	repair method
No sound of discharge	1. 1.5V power no output 2. pulse generator broken	1. check 5v power 2. change the generator
with sound of discharge no electrospark	no circuit of discharge	1.regular the space of fire up and burn head and ground wire state. 2.change fire up wire.
Burn room smell Fire up failed Burn room no smell Fire up failed	1. burn head position error 2. too big of air pressure no gas be sent to burn head	1.regular the position 2. make the pressure smaller 1.burn head blocked, wash it 2.gas valve need repair/change 3. LPG use out, replace cylinder 4.gas valve don't press to end
fire off when loose the adjust knob	no continuous gas supply or too less supply gas	1. prolong press time 2. left turn knob then fire up 3. reduce air pressure then fire up 4. replace electric couple
air pressure too big	air filter reduce valve broken	replace
air pressure too little	1. air filter reduce valve broken 2. air compressor broken	replace replace
no spraying	1. metal capillary block 2. plastic capillary block or leak	1. loose the nut of spray room cover plate, pull out sprayer a

	3. spray mouth block 4.spray mouth trouble	little, increase air pressure, resume after spraying. 2.dredge metal capillary by needle 3. replace plastic capillary
spray too little	pressure or position changed	1. regular or replace sprayer 2.increase air pressure
power pilot failed	1. pilot broken 2. fuse broken	1 replace 2. check two circuit fuse and replace fuse

APPENDIX: THE MANUAL OF PRINTER:

1. THE FIGURE OF PRINTER



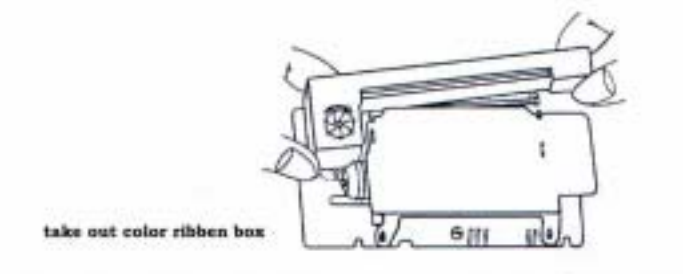
The ribbon has been ready when it ex-factory, also with source power adopter for 9V, 1A, and one print cable.

2. INSTALL RIBBON BOX

The box has been installed when ex-factory, after a period using, you need replace the ribbon box. The steps as below:

(1) See fig.2, pull up the front cover of the printer.

(2) Take out the old ribbon from printing head lightly (see fig.3)



(3) Install new ribbon box:

First put the left end of ribbon box on the gear axle of head left, the right pull up little, this time if you found the ribbon box left end don't fall down, please press on the knob of the box and turn it little as the target direction until the left end fall down then fall down the right end. Please check ribbon, if the ribbon haven't straight or keep in outer, you can repeat turn the knob until the ribbon be roll in ribbon box, then covering the cover.

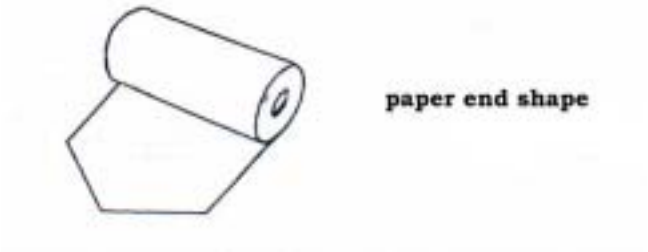
3. INSTALL PRINTING PAPER

Using ordinary paper, Max. Diameter: 70mm, width: 57.5mm±0.5mm, weight: 53g/m2~64g/m2

The paper has been ready when ex-factory, but the paper head don't be insert to head to avoid the destroyed the ribbon and the print head when transportation. So before you use, please insert the paper into the head , the steps as below:

(1) pull up the front cover (see fig.2)

(2) Cut the end of the paper as the shape as fig.4



(3) Connecting the power to printer, press key { SEL } to make the SEL pilot darken, then press key { FEED} to make the head rotate, then you feed the paper end in, the paper should enters and go out from head front, when the paper go out enough length, repeat press {FEED} or turn off the power.

(4) Let the end of the paper go out from the front cover, covering the cover.

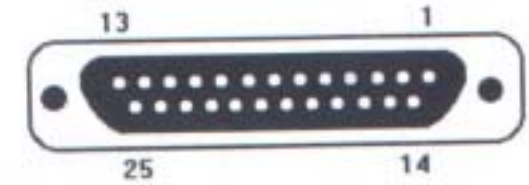
Power connection: the printer connect from the adopter DC9V,1A, the polarity as fig.5

Attention: use not suitable power should effect the printer normally working, even make the printer damage permanently.

4. SERIES INTERFACE CONNECTION:

The printer adopted D-25 series interface connection pluralizing with RS232C standard, the socket assort with the Flame Photometer connector RS232C, the foot needle code of the series interface

connection as fig.6



SPARE PARTS LIST:

1. Operation manuals…….1copy
2. Spare parts list…….1copy
3. Air compressor……1unit
4. Rubber Pipe (LPG) Dia.10mm……..2m
5. PE pipe (air) Dia.5x3 ……2m
6. PE pipe (spare) Dia.5x3……0.5m
7. Latex pipe (waste fluid) Dia.6mm (0.5m spare)……..1.5m
8. Lock clamp (LPG)…….2pcs
9. Pipe nut……2pcs
10. Pipe connector (installed)……1 pc
11. Fuse 0.5A…….2pcs
12. Seal Dia.20x2.4……2pcs
13. Seal Dia.40…… .2pcs
14. Power cable……..1pc
15. Capillary (1.8x0.8x180)……..1pc
16. cover ……1pc