

Online phosphate measuring instrument

Instruction manual

1、 Summary:

This online phosphate measuring instrument, is a has the auto complete chemical reaction, photoelectric detection, display, transmission output and data storage function, the on-line automatic instrument of high precision; the instrument adopts the unique air mixing and photoelectric detection technology, which has the chemical reaction speed and high measuring accuracy and excellent characteristics; the instrument adopts color liquid crystal display, with rich colors, text, charts and curves, display of measurement results, system information and the English menu operation interface; combined with the humanized design concept and high new technology, highlighting the advantages of the instrument and competitive products.

2、 Product features:

- a.** the examination inferior limit is low, suit the phosphate contents of power station water supply, saturated steam and superheated steam very much examination and control;
- b.** the online phosphate measuring instrument use monochromatic cool light source table, the light source service life is long;
- c.** the instrument has the history song wire recording function, can store a data for 30 day;
- d.** the instrument have an automatic mark settle function, the cycle arbitrarily sets;(this function need to explain while ordering)
- e.** favor the measurement of much channel water kind;(can choose 1-6 channels)
- f.** the instrument the addition tries an agent and marks kind, besides which, have no operation capacity, truely come to a to don't need a maintenance.

3、 Technical parameters

- a.** Measuring range: 0~2000ug/l, 0~10mg/l, 0~20mg/l, 0~50mg/l optional
- b.** Accuracy: $\pm 1\%$ F.S
- c.** Repeatability: $\pm 1\%$ F.S
- d.** Stability: $\leq \pm 1\%$ F.S / 24 hours
- e.** Response time response of 4 minutes, 6 minutes to reach at least 98%
- f.** Sampling period: 3 minutes / Channel
- g.** Water conditions: Flow: >50 ml / min
Temperature: 10~45 °C
Pressure: 10 kPa ~ 100 kPa
- h.** Environmental conditions: Temperature: 5~50 °C
Humidity: 10%~85% RH
- i.** Reagent consumption: about 3 liters / month
- j.** Output current: 4~20mA (programmable in the range of 0~20mA, multi channels instrument each channel independent output)
- k.** Alarm output: the normally open contact of a relay (220V/1A), multi channel share.
- l.** Power supply: AC220V $\pm 10\%$ 50HZ
- m.** Power Dissipation: ≈ 50 VA
- n.** Outline Size: 720mm(h) \times 460mm(w) \times 300mm(d)
- o.** Install Size:: 665mm \times 405mm

4、 Instrument structure and operate priniple

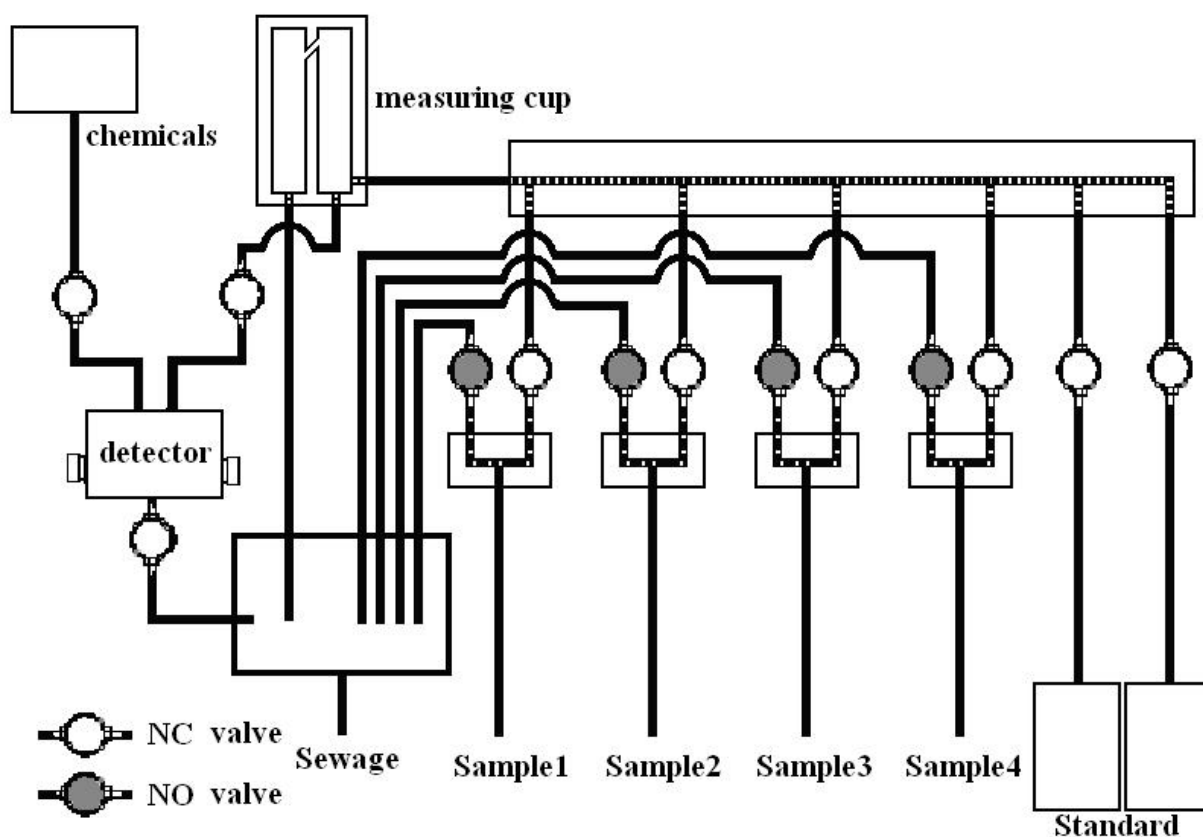
- a.** Chemistry priniple

Under certain pH conditions, phosphate and molybdate and vanadate reaction of yellow phosphorus vanadium Molybdate / commonly known as phosphorus vanadium molybdenum yellow. Silicate under these conditions also have similar reaction acidity, but far below the required reaction acidity, by controlling the time of acidity and reaction, the silicon interference to a minimum. The instrument when the silicon (SiO_2) is 5mg/L, the interference of less than 0.2mg/ PO_4^{3-} .

The color product absorption maximum at about 400nm, the selection of instruments were measured 405nm refrigeration source.

b. Analysis of flow path

The measurement adopts quantitative sampling, color reaction, colorimetric analysis, flow path as shown below.

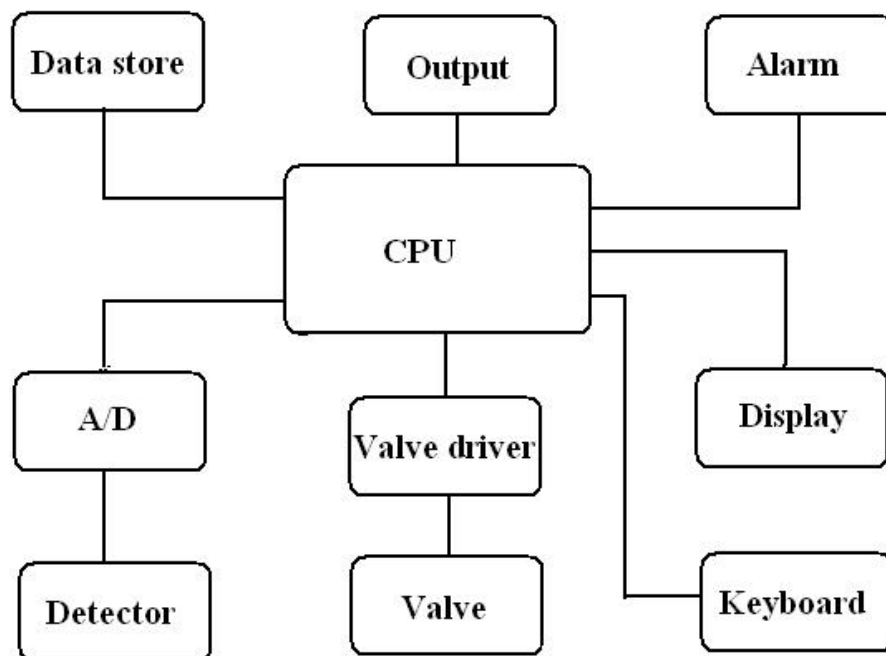


4 channel phosphate measuring instrument flow diagram

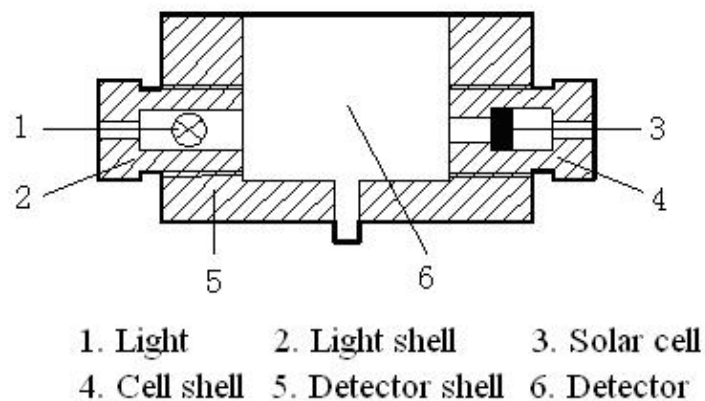
c. Electricity principle

Electrical system equipment mainly consists of two parts.

Test drive: drive each executive component instrumentation system (solenoid valve, air pump) and the light source; and the voltage signal of the photocell detector in digital processing, realized the function of automatic action and electric signal to light to electricity conversion, digital signal process and. This part is composed of detector, A/D MCU circuit board, electromagnetic valve and air pump.



The Electronic works principle



Display and output fraction:

Vs the data progress for examining storage and display; Combine to output switch(report to the police output all the way) and simulation(six channel currents output a 0~20 mas) semaphore, be applicable to control various automation equipment; Can pass keyboard to mark to settle an instrument and testing instrument and search history to measure a data. This fraction constitutes to° from the display, keyboard, host(CPU) and output mold mass.

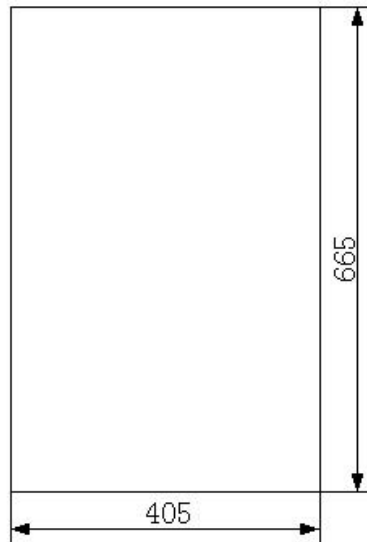
5、 The instrument installs

a. the setup request and regulation:

- ① Analytical instrument setup the location close to sample to click possibly, water kind taken should have to represent ;
- ② Being measured water kind and environment temperature should otherwise will effect chemical analysis process between 5~45 °C and effect to measure accuracy thus;
- ③ Assure water kind has no impurity and filth, because of overhaul when the reason make fluid matter unqualified, should break boiled water kind, the instrument breakup circulates;
- ④ The working condition surround that installs an instrument should not have strong electroma - gnetic fie - ld and strong vibrating source;
- ⑤ The instrument wants to install at the drying have no dust, have no the environment of causticity gas amid;

b. Fixed method:

The instrument can install on various meter pan or the stationary packing block, at with dial setup, press chart to open hole, open hole size for;(665 ×s 405 mms)



c. Sampling piping and row discard the connectivity of piping:

Instrument water kind connecting orifice is a $\Phi 6$ card modes deal with contact, can link $\Phi 6$ rustproof steel pipes or use to link a plastics hose after transferring the principal;

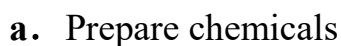
Line up the waste water tube provides and discards an orifice with instrument lower part row it to put connecting with the instrument and after fixing, directly connectivity at row discard piping top then. Noting can not squeeze or curved fold, assure to drain smoothly.

Note: The instrument tries agent and mark kind feed and adopts a barometric mode and circulate each barrel and its piping that try a barrel and mark kind all have certain press, therefore as to it's the piping connecting orifice section need particularly note, assure a connectivity firm, seal completely good, and need regular audit, discover damaged part in advance and avoid resulting in and try agent or mark kind leakage.

d. Instrument power supply :

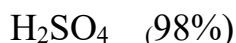
① Instrument have to dependable resistance of connecting ground is in response to less than 0.4Ω s;

③Wiring location the following chart;



Reagents must be used high pure water preparation, in order to ensure the accuracy of measurement instrument.

the chemicals needed(analytical pure):



Prepare method:

- ①Weigh 3.0g ammonium metavanadate dissolved in concentrated sulfuric acid in water containing 160ml 400ml, this is A solution.
- ②Weigh 60g ammonium molybdate solution in 400ml water, B solution.
- ③Pour the B solution into A solution, and diluted with water for 1L, the reagent solution into stand-by reagent in the bucket.

b. Prepare standard:

Standard solution must use the high pure water preparation, the chemicals for KH_2PO_4 .

①1000mg/L PO_4^{3-} Standard:

Weigh accurately 1.433g after 105 °C drying KH_2PO_4 , Dissolved in a small amount of high pure water, and diluted to 1L.

②1000mg/L PO_4^{3-} Standard:

Take some 1000mg/L PO_4^{3-} standard, dilution to 1000% with pure water.

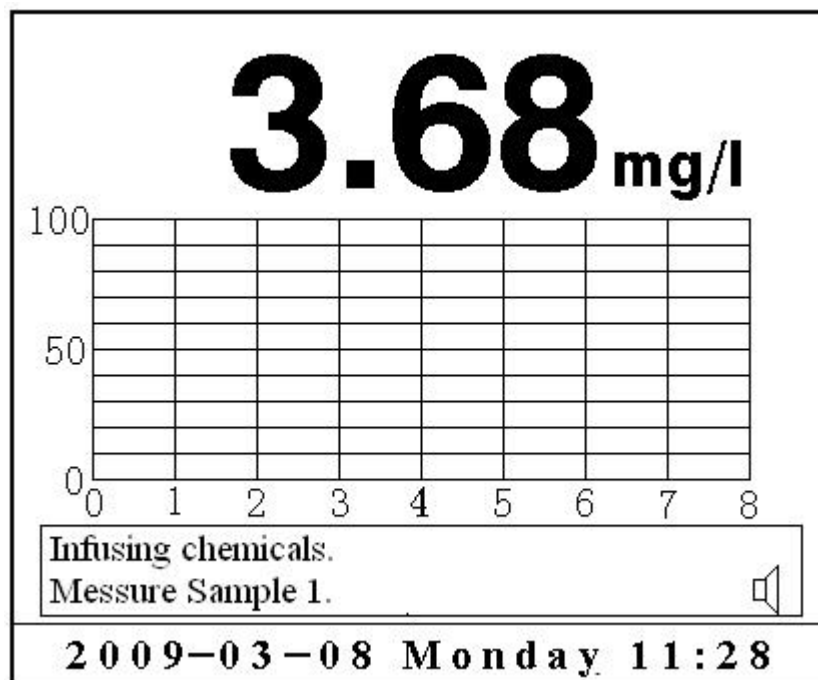
③prepare the standard1 and standard2 with 100mg/ L PO_4^{3-} Standard and pure water.

7、 The instrument operates


a. Power on

Check each parts of instrument first before booting, validation without any error after,




the accurate building - out tries agent and mark kind, the switch on instrument power supply, and place instrument power switch the location is at "ON", at this time instrument up electricity, after needing the calculator system completion beginning to start to turn process, the instrument enters a regular work status and runs as follow an interface:



b. Main menu

Presses the  key after booting and enters a main course unipole; The instrument displays at this time:

M E N U ↩ Parameter System test Calibrate Channel Cycle Maintain Move the cursor,press "ENT" to select.	
2 0 0 9-0 3-0 8 M o n d a y 1 1:2 8	







Press key or key, can up and down move cursor to select a submenu, press the key, enter a submenu.


c. The parameter establishes

S E T U P			
↩ Iout1	2 0 . 4 7 mA	Stand1	3 . 0 0 mg/l
Iout2	2 0 . 4 4 mA	Stand2	7 . 0 0 mg/l
Iout3	2 0 . 4 2 mA	K =	3 . 6 0
Iout4	2 0 . 5 3 mA	B =	1 . 0 6
Iout5	2 0 . 4 5 mA	AlarmL	0 . 0 0 mg/l
Iout6	2 0 . 4 2 mA	AlarmH	1 0 . 0 0 mg/l
Izero	4 . 0 0 mA	Range	1 0 . 0 0 mg/l
Ifull	2 0 . 0 0 mA	I-temp	4 . 0 0 mA
Date	2 0 0 9 -- 0 3 -- 0 8		
Time	1 1 : 2 8	Week	1
Move the cursor,press "ENT" to select.			
2 0 0 9-0 3-0 8 M o n d a y 1 1:2 8			




Display an interface in "parameter setup" amid, can vs the each parameter progress tune setup of instrument, its concrete operation method presses the monitor prompt progress, now with "the automatic school checks" the setup of the function for instance,

as to it's establish process to make is explained with synopsis:

Press  key or  key first, move the cursor to "the automatic school checks" item , press the  key, make its parameter value anti- white display, press  key or  key at this time, can enlarge or let up value, press the  key while treating to adjust the value needed, keep a setup result.

All parameters after establishing the end press the  key, can make instrument return a normal measurement operate status.





d. Systems test


Display an interface in "main course unipole" amid, press  key or  key, move the cursor to "systems test" item , press the  key, enter "systems test" display interface:

Name	St.	Name	St.	Name	St.
Sample1	✓	Chem.1	×	Light	×
Sample2	×	Chem.2	×	Speaker	×
Sample3	×	Chem.3	×	Alarm	×
Sample4	×	Chem.4	×	Output	×
Sample5	×	Sample	×	V-spare	×
Sample6	×	Measure	×	P-stand	×
Stand.1	×	Sewage	×		
Stand.2	×	Stirrer	×		



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In "systems test" display interface, can "open" vs each execution parts and semaphore output progress of instrument system with the test of "pass", use to testing each parts can regular work, output whether the semaphore is accurate, particularly vs system chemistry streaming channel of the maintenance has an important action. "Open" by light source and "close" to come now as to it's the operation interface take into to explain:

Display an interface in "systems test" amid, press  key or  key, move the cursor to "light source" item, make character list "pass" for anti white suggest and press the  key at this time, character list from "pass" change into to "open", at the same time the light source of the detector operate, can observe the orchid color of the delivery of light source it is thus clear that optics; This means light source operate normal, and according to the performance that the flaring intensity can judge light source; Press the  key again at this time, character list will from "open" to change into a "pass", at the same time the light source lay - off of detector.




All tests press  key after ending, can make instrument return a normal measurement operate status.


e. The instrument calibrates

Display an interface in "main course unipole" amid, press key or  key, move the cursor to "calibrates" item, press the  key, enter "calibrates" operation interface.

Calibrate							
☞ Calibrate Standard1 3.00 mg/l							
Calibrate Standard2 7.00 mg/l							
Return to measuring							
R E S U L T		1	2	3	4	5	A.
	Nor.	12.10	12.06	12.01	12.04	12.08	12.06
	Qui.	26.45	26.42	26.39	26.47	26.50	26.46
	K=	3.60			B=	1.26	
	Time: 2 0 0 9 - 0 3 - 0 4 14:00						
Move the cursor,press "ENT" to select.							
2 0 0 9-0 3 -0 8 M o n d a y 1 1 : 2 8							




After entering " calibrates " display interface, can carry on mark to settle an operation vs the instrument, its operation can screen indicate that prompt progress, the process is as follows:

Display an interface in " calibrates " amid, press key or key, use up the mark select"rapid calibration" or"normal calibration", press the key, the instrument enters at this time vs mark kind of automatic measurement operate status, Will automatically computing measure after completing five(is rapid calibration for three times) samples in the instrument a measurement as a result, beg average value, and computing a gradient(S) of measurement to be worth, will calibration result and calibration time keep together, completion calibration process.




Instrument calibration end, press the k ey, the instrument return measures a status as usual;If adoption of is rapid calibration, the instrument after calibrating the completion automatically returns normal measure status.


f. Select channel

The instrument is many gateway uses but designs, but sometimes the consumer don't need to use all gateways, can select at this time feeling close among them a few some gateways, the operation method is as follows.


Display an interface in "main course unipole" amid, press  key or  key, move the cursor to "gateway select" item , press the  key, enter "gateway select" operation interface.

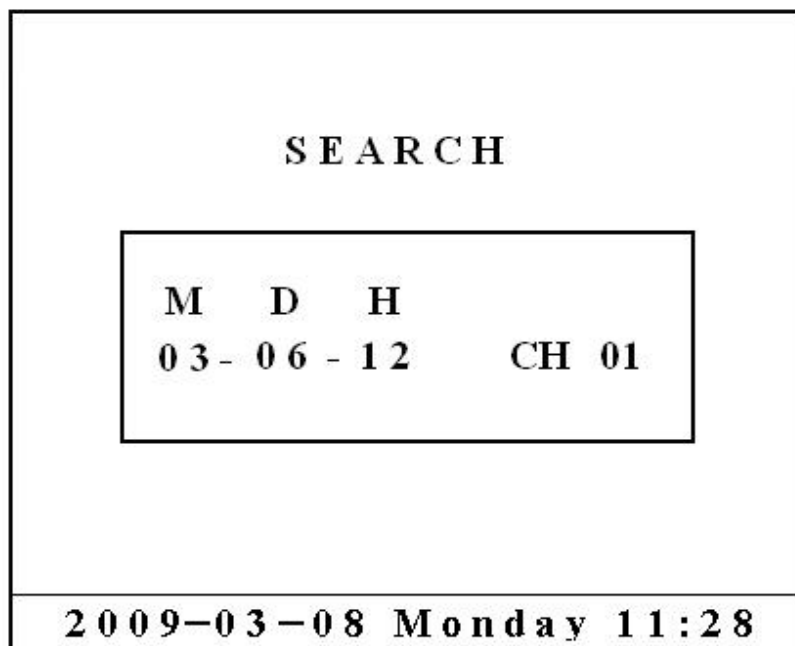
CHANNEL	
☛ Sample - 1	✓
Sample - 2	×
Sample - 3	×
Sample - 4	×
Sample - 5	×
Sample - 6	×
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Press  key or  key select channel, press the  key to open or lock some gateway. The gateway being picked out will display ✓, the gateway of the close display ×.





Press the  key conservancy setup, return to measure a status.

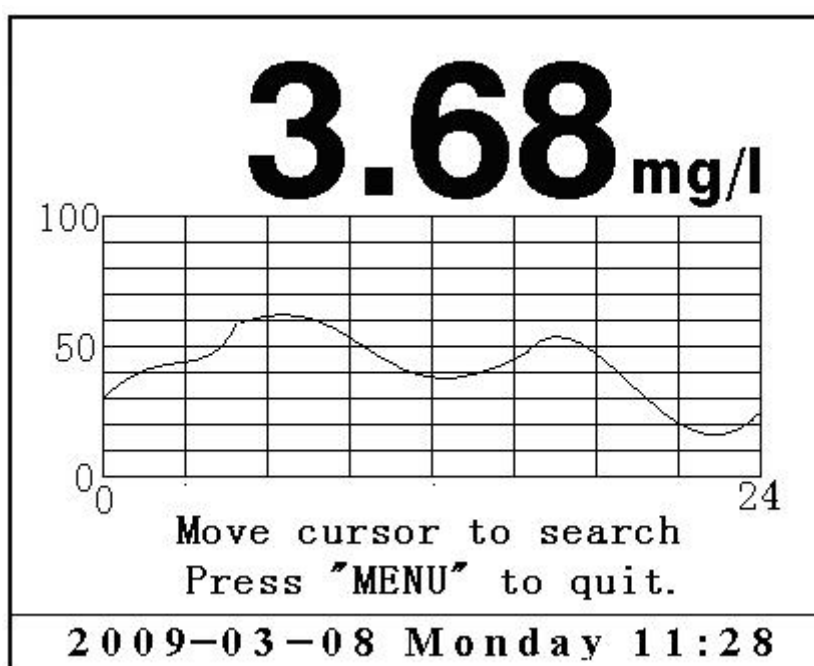
g. The data searches

In the instrument regular work under the status, press the  key, enter time of "data search" to establish to display an interface:





Can screen indicate at this time that of prompt, carry on a month, day, of setup operation, it operates process as follows:

Press the  key, move a cursor, select a month, day, etc. item, make its figure present anti white display, press  key or  key, tune figure, establish want to search of time, press the  key, enter "data search" display interface:



Display one measurement curve of 24 hours time segment of holding at this time,

press the  key or  key, move a cursor select for concrete time, is then suggested by the figure of screen, read the then measured value.

8、 The instrument supports

a. The instrument carries on the following inspection and operation to the system before throwing in run - time each time:

- ① Checking the parts of gnds of electricities whether is good, each terminal tie line had no loose, shed off;
- ② The inspection tries each connectivity parts of agent, water kind streaming channel to have have no corrosion and seep into;
- ③ Enter "systems test" status, carry on an inspection test to instrument system each parts;
- ④ Has been checked above, confirm system without any error or through overhaul, after expeling all faults, accurate the building - out try agent and standard liquid, the switch on water kind, try instrument invest run - time.

b. the instrument carry on the following maintenance and operation to the system after throwing in run - time:

- ① The periodical addition chemicals;
- ②Assure water kind continuously flows, otherwise the instrument can not be accurate to measure;
- ③Terminal or irregular dates vs the instrument carry on mark settle, if in the instrument system"parameter setup", establish auto mark in fixed time cycle, the instrument will press the automatic completion mark to settle an operation.(Because the instrument auto marks in fixed time incapability vs mark the kind status carry on

criterion, so have to assure two kinds of marks sample guilder firm, the amount of medicine is ample. The in bar of bug mark fixes photographic film and rings instrument run - time, plant this function have already been locked, if need and use this function, can contact the plant house, the CPU mold mass that make gratis providing and include this function in the plant house)

c. the instrument breakup carry on to clean an operation to the system after circulating:

The chemistry adopted by instrument tries an agent and has stronger causticity, so when the instrument stops a luck, try a streaming channel to carry on cleaning to the instrument.

Dismantle each a barrel of trying first, print with the clear water, then join clear water, the switch on instrument system power supply, and enter "systems test" status; Open "the row discards" electromagnetism valve first, then one by one in order open each one to try a control electromagnetism valve (don't open several electromagnetism valves at the same time), until the vestigial in the streaming channel tries an agent to completely flush, again exit an instrument "systems test" status, lock instrument power supply.

The instrument canned also enter main course while stopping a luck unipole, select "halt upkeep" function, then press the instrument prompt good clear water of connecting, the instrument canned automatically complete to clean process, finally according to hinting to lock power supply then.

Note A: Between different batches of the instrument may be slightly different, with instruments with instructions shall prevail.

Note B: Instrument Reagent and sample delivery by air pressure, running the reagent

containers, standard pressure barrel and pipeline are, therefore need regular check, found damaged parts in advance, avoid reagent and sample leakage.