GSGG-5089Pro Silicate Measuring Instrument

Instruction Manual

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1、Summary

This online silicate 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 Chinese menu operation interface; combined with the humanized design concept and high new technology, highlighting the advantages of the instrument and competitive products.

The high-end configuration product integrates Internet functions. It can view real-time measurement results and query historical data through the network on mobile phones, tablets, PCs and other terminals, and can operate all functions of field instruments. As in the field operation, it is convenient for users to timely understand the field operation conditions and maintain the normal operation of instruments.

2、Product features

a. The examination inferior limit is low, suit the Huo contents of power station water supply, saturated steam and superheated steam very much examination and control;

b. The online silicate 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 road water kind;(can choose 1-6 channels)

f．Internet function can be selected, and the instrument can be viewed, operated and maintained without being on site.

g． 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: The 0~200 ug/l, 0~2000 ug/l can choose

b．Accuracy：±1%F.S

c．Repeatability：±1%F.S

d．Stability：≤±1% F.S / 24 h

e．Responser time：About 10minutes

f．Message Cycle：8minutes / channel

g．Sample condition：flow：>100 ml / min

temperature：10~45℃

pressure：10 kPa ~ 100 kPa

h．Environment requests：temperature ：5~45℃

humidity：<85% RH

i．Chemicals Dosage：3 kinds 3L/kind/month

j．Current Output：4~20mA or 0~10mA can choose

k．Alarm Output：Relay（220V/1A）

l．Communication: RS-485, LAN, WiFi or 4G are optional.

m．Power supply：AC220V±10% 50Hz

n．Power Dissipation： ≈50VA

o．Outline Size：720mm(h)×460mm(w)×300mm(d)

p．Install Size:：665mm×405mm

4、Instrument structure and operate priniple

a．Chemistry priniple

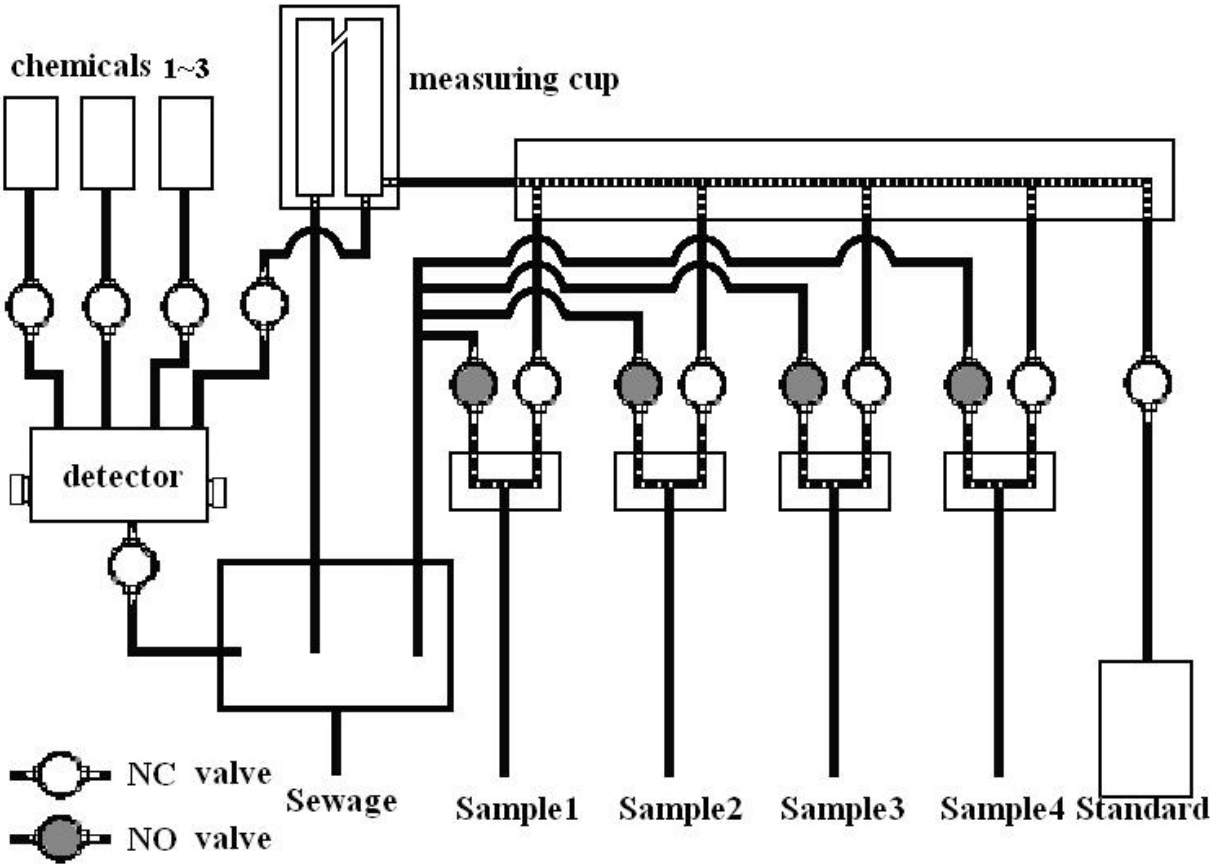
Under the certain acidity condition, Silicate and molybdate reaction of silicon molybdenum yellow, Then the reductant into silicon molybdenum blue, then determined by spectrophotometric method.

Phosphate under these conditions also have similar reaction, can cause interference to measurement by interference, adding oxalic acid phosphate.

The color product absorption maximum at about 810nm, the selection of instruments were measured 810nm refrigeration source.

b．Flow path of measurement

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



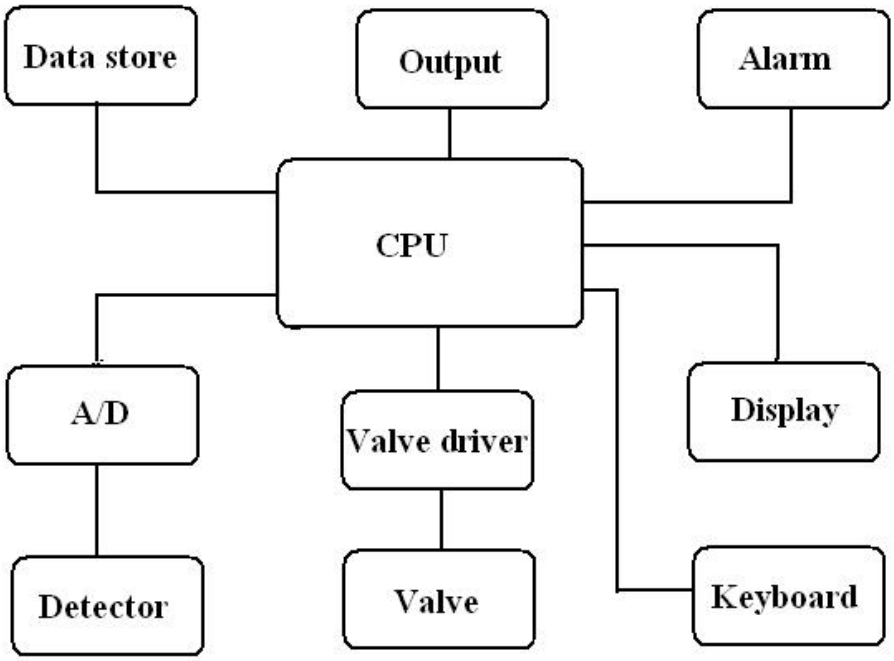
4 channel silicate measuring instrument flow diagram

c. Electricity priniple

Electrical system equipment mainly consists of two parts.

Detection and driving part:

Drive the actuators (solenoid valves) and light source of the instrument flow system; digitize the detection signal of the photovoltaic cell in the detector, realize the automatic operation of the instrument and the signal conversion of electricity, light and electricity, as well as the digitization process of the electric signal. This part is composed of measuring flow path, detector, circuit board (single chip), solenoid valve and air pump (providing reagent and sample conveying power).



The Electronic works priniple

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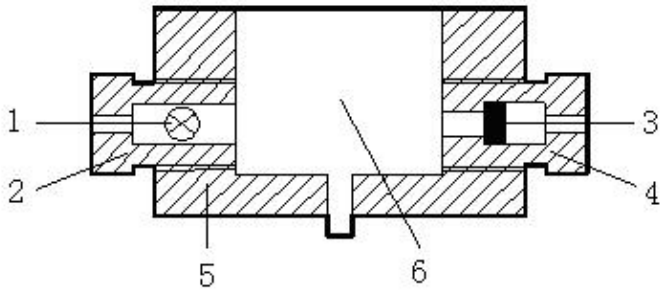


1. Light 2. Light shell 3. Solar cell
4. Cell shell 5. Detector shell 6. Detector

Display and output part:

It can store and display the detected data, and output switch (one alarm output) and analog (six current output 4-20mA) signals, which are suitable for controlling various automation devices. It can set parameters, calibrate, test and query historical measurement data (curve) through menu operation of touch screen. This part is composed of touch display, host computer (CPU) and output module.

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 ℃ and effect to measure accuracy thus;

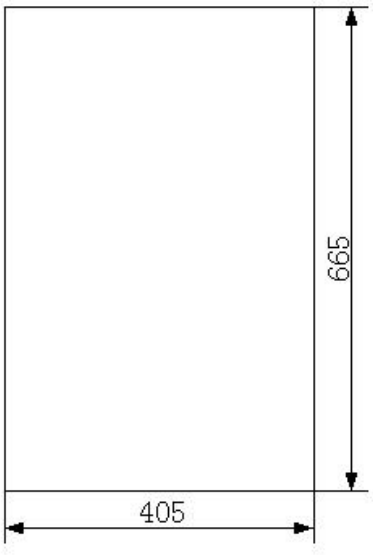
③ Assure water kind has no impurity and filth, because of overhaul when the reason make fluid matter unqualified, should break boiled water kind, the instrument breakup circulates;

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;(665mm ×405 mm)



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

Instrument water kind connecting orifice is a *Φ*6 card modes deal with contact, can link *Φ*6 rustproof steel pipes or use to link a plastics hose after transfering the prinipal; 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.

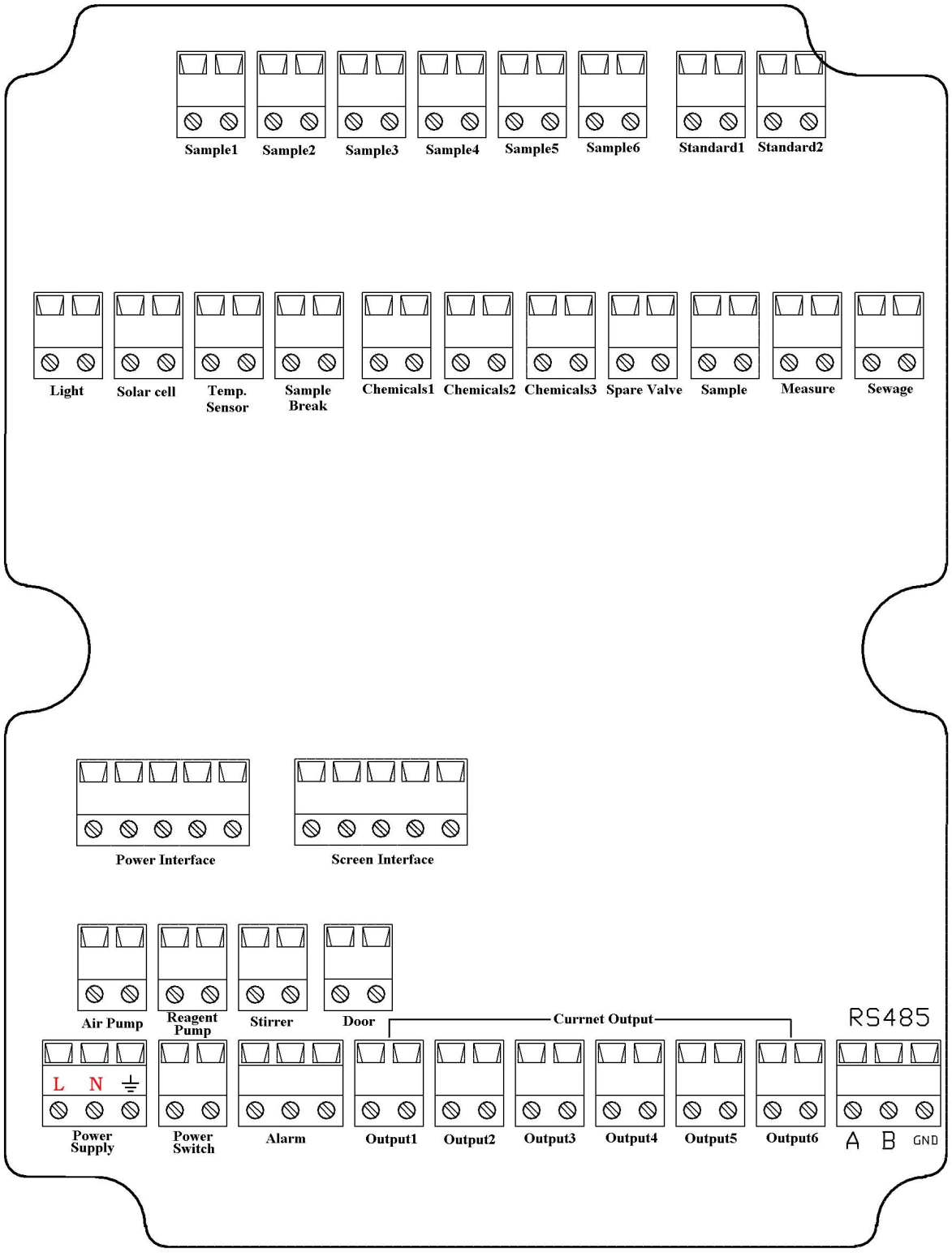
Note:The instrument tries agent and mark kind feed and adopts a barometric mode and circulate each barrel and its piping that try a barrel and mark kind all have certain press, therefore as to it's the piping connecting orifice section need particularly note, assure a connectivity firm, seal completely 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 :

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

②Communicate to input the voltage as AC220 V ±10%50 Hzs, power cord the body bottom wear wire hole to wear to go into from the instrument box and link in a - c source terminal;The front line connects L, the null wire connects N, and the ground wire connects on the gnd to mark location.

③Wiring location the following chart;



Wiring diagram

6、Preparing of chemicals and standards

a. Prepare chemicals

i.Trying the agent has to adopt to have no silicate water to prepare to assure the instrument measurement of accuracy, the chemicals needed(analytical pure)：

$(NH_4)_6 Mo_7O_{24}\cdot 4H_2O$

$C_2H_2O_4\cdot 2H_2O$

H_2SO_4 (98%)

$Fe(NH_4)_2\cdot(SO_4)_2\cdot 6H_2O$

ii. Prepare method：

①Chemical 0（R0）：

Take 42ml 98% H_2SO_4，slow-moving to pour into 400ml pure water，Cool off indoor temperature，then fill to 500ml with pure water.

②Chemical 1 （R1）：

Take 50g $(NH_4)_6 Mo_7O_{24}\cdot 4H_2O$, Dissolve into 400ml pure water.

③Mixs R0 and R1 ，then fill to 1L，move into the bottle of R1.

④Chemical 2 （R 2 ）：

Take 80g $C_2H_2O_4\cdot 2H_2O$，Dissolve into 800ml pure water，then fill to 1L，move into the bottle of R2.

⑤Chemical 3 （R 3 ）：

Take 12ml 98% H_2SO_4，slow-moving to pour into 800ml pure water，Cool off indoor temperature，then take 12g $Fe(NH_4)_2\cdot(SO_4)_2\cdot 6H_2O$，Dissolve into these water，then fill to 1L，and move into the bottle of R3.

b．Prepare standard:

The standard liquid has to adopt to have no silicate water to prepare, the chemicals used for:(analytical pure)

（Na_2SiF_6）or（$Na_2SiO_3.9H_2O$）

①1000mg/ L SiO_2 Standard：

The accuracy calls to take **Na_2SiF_6** 3.130 g or **$Na_2SiO_3.9H_2O$** 4.730 g.

Be dissolved to a little amount have no silicate water amid, then fill to 1 L.

② 100mg/ L S iO₂ Standard：

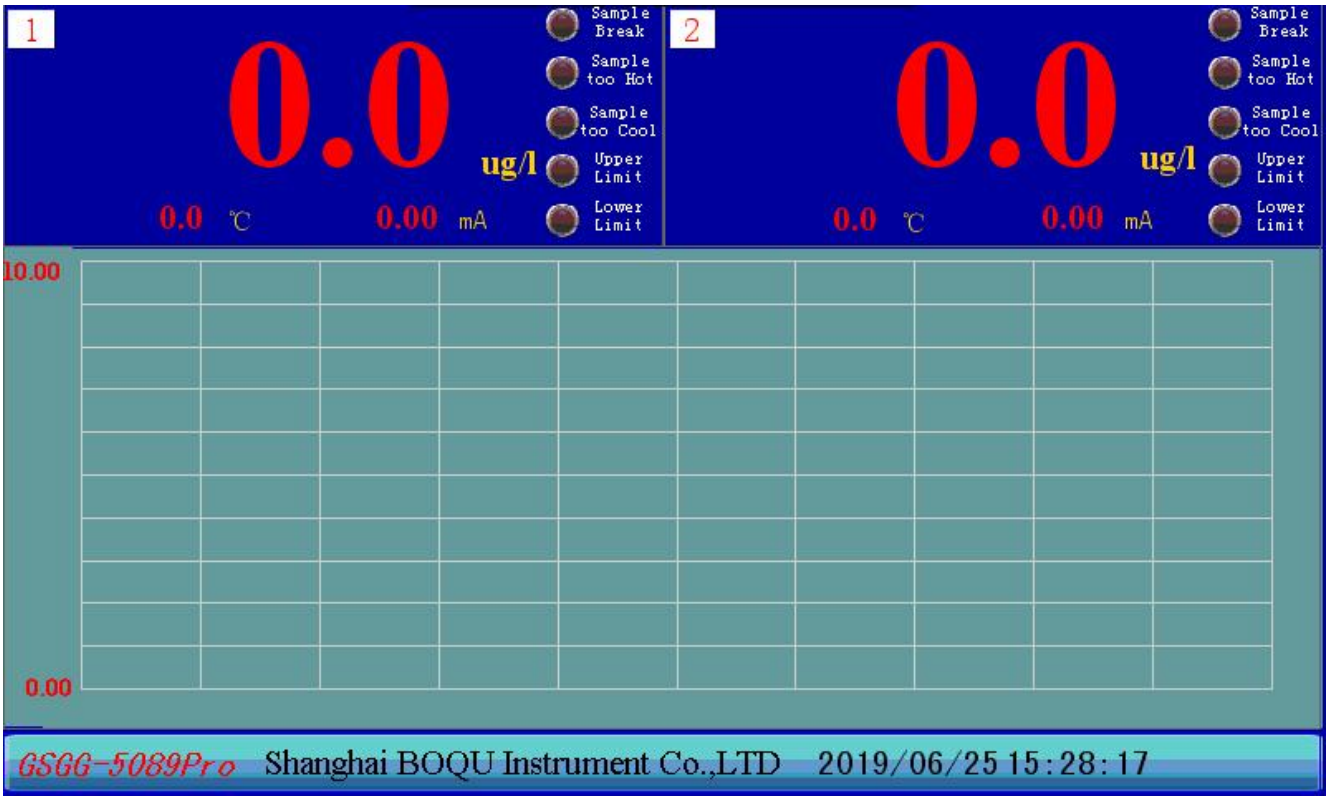
Take some 1000mg/L S iO₂ standard，dilution to 1000% with pure water.

③ Prepare the standard1 and standard2 whith 100mg/ L S iO₂ 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:

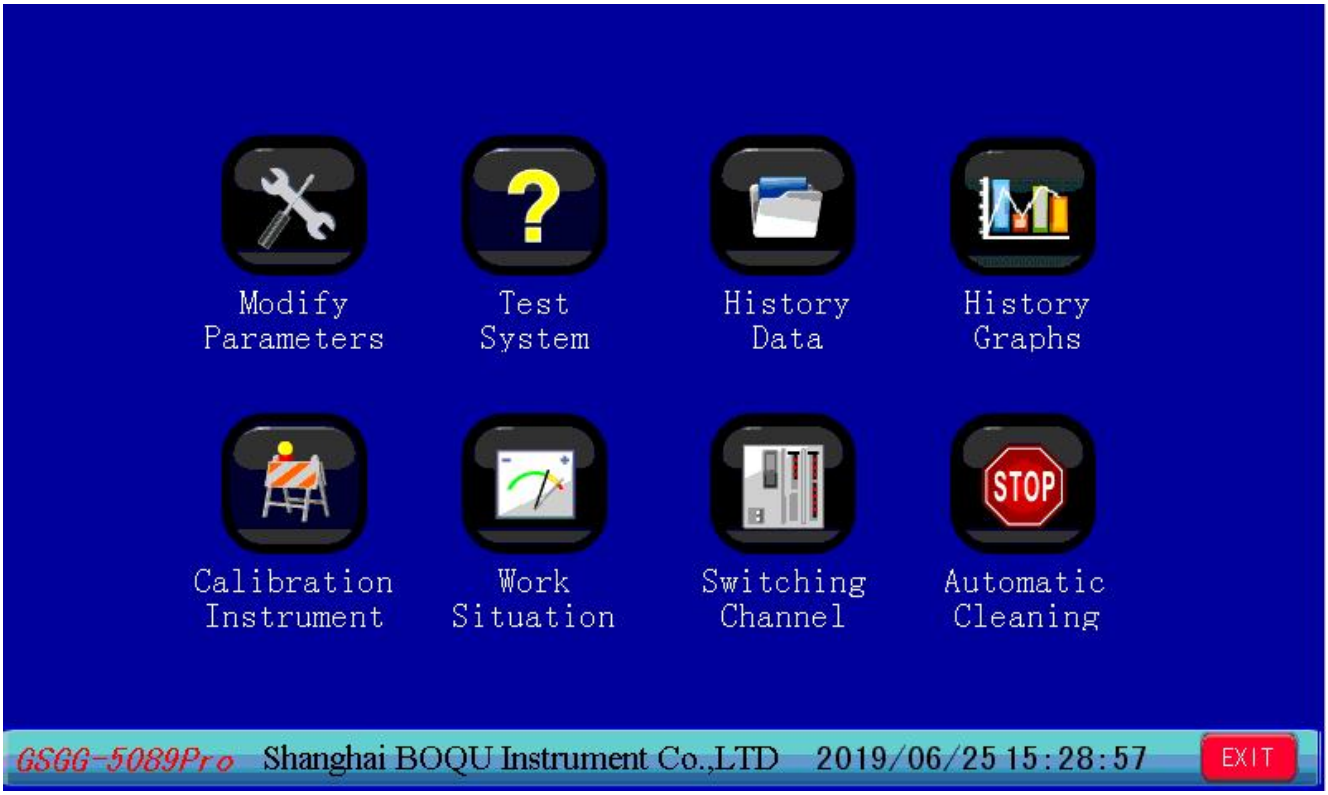


If the new instrument is put into use for the first time, please enter the test interface

of the system, open the reagent valve manually, discharge the air in the reagent tube, and close the reagent valve manually until reagent continuously flows out. If you can't judge whether there is any reagent flowing out, just open the reagent valve and close it after 5 seconds.

b. Main menu

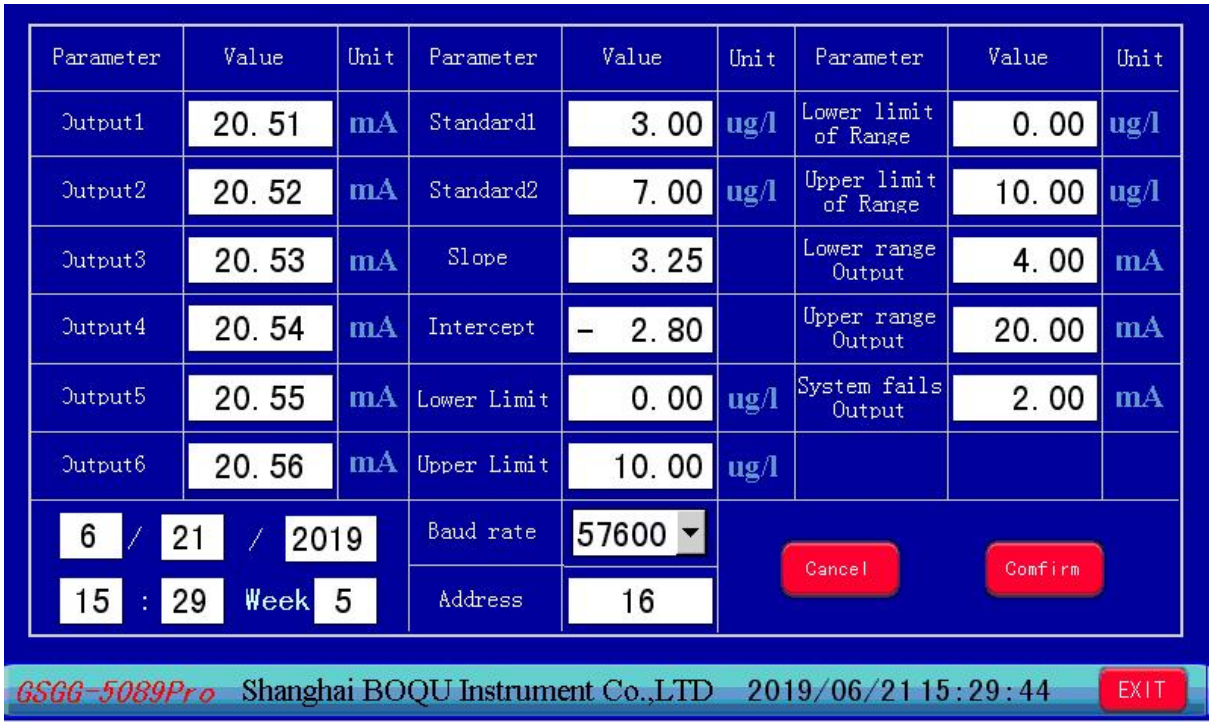
When the instrument is on and running normally, click the "menu" button on the touch screen and enter the main menu of the instrument. At this time, the instrument shows as follows:



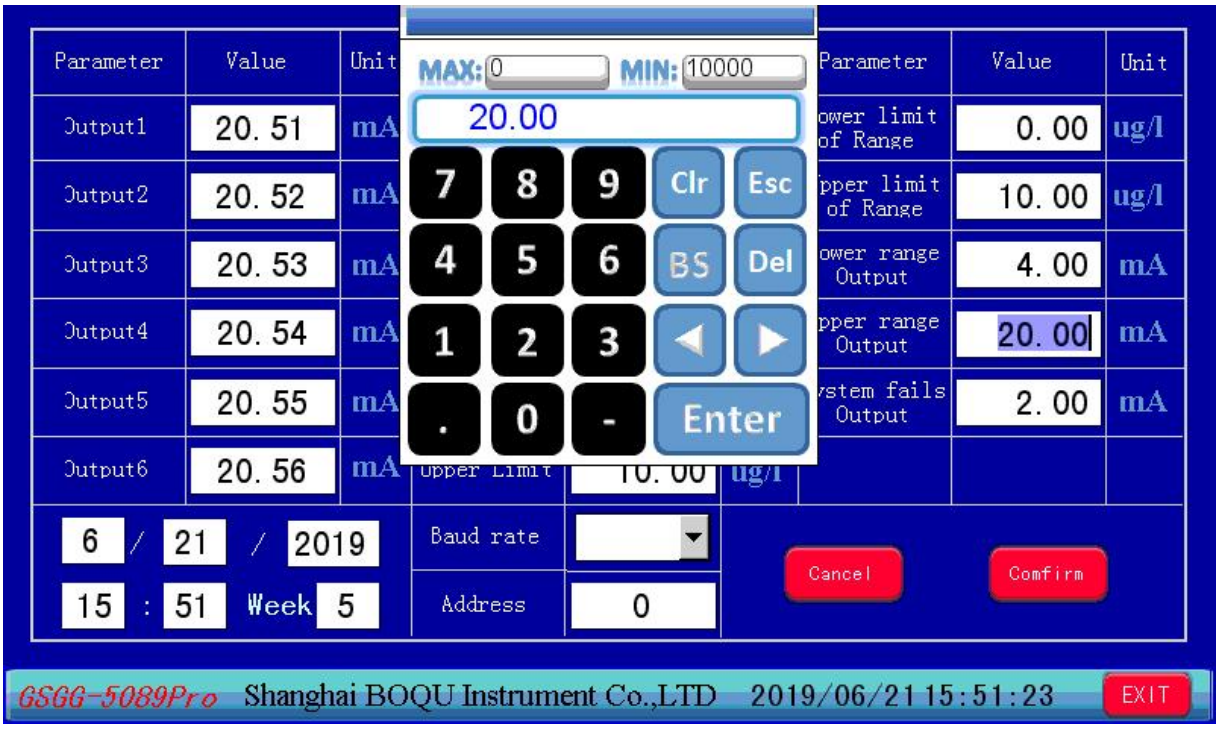
Click on the required function icon to enter the corresponding next menu.

c. Modify Parameters

Click on the "modify parameters" icon to enter the modify parameters interface.



In the "Modify Parameters" interface, the parameters of the instrument can be modified. Clicking on the value you want to modify pops up the data entry window.



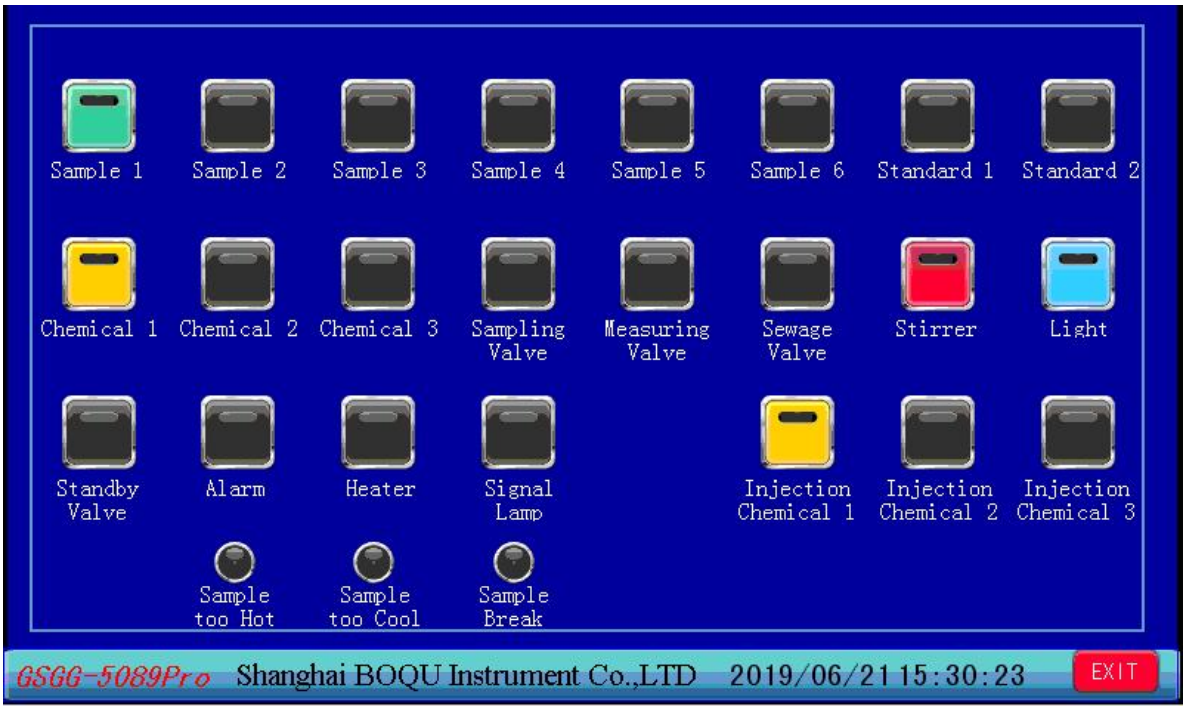
Enter the target data that needs to be modified. Click on the "Enter" button to complete an input of data.

After all the parameters are modified, click the "Comfirm" button. The instrument saves the settings and returns to the main menu.

If you don't want to save the modified parameters, you can click "Cancel", abandon the modification and return to the main menu directly.

d. Systems test

On the main menu, click the "Test System " icon to enter the system testing interface.



In the "Test System" interface, the "on" and "off" tests can be carried out on the executing components and signal output of the instrument system, which can be used to test whether the components can work properly and whether the output signals are correct. It plays an important role in maintaining the measurement flow of the system.

Among the states of the valves and indicators shown, the icon illuminates in the "on" state and the icon darkens in the "off" state. Click on the corresponding icon to switch between "on" and "off", and the corresponding executing parts will switch to the corresponding state synchronously. For example, when switching the switch state of the "phosphorus light source" of the detector, if the shell of the light source is removed, the blue visible light emitted by the light source can be observed to light up and extinguish, so as to judge whether the light source works properly or not, and the performance of the light source can be judged according to the intensity of the light emission.

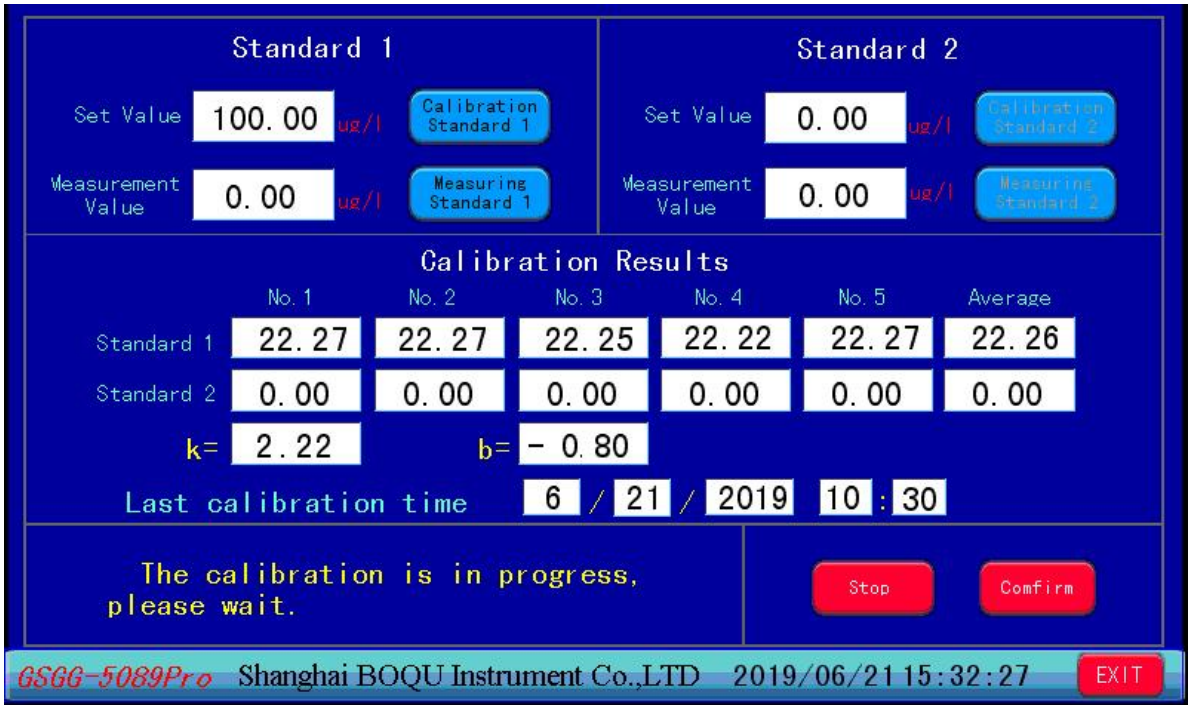
Sample to hot, Sample to cool and Sample Break are state indicators, so the state can not be changed manually.

After all tests, click the "EXIT" button and return to the main menu.

Note: The electrical part of the instrument is designed for the general use of phosphorus meter, Silicon Meter and hydrazine meter. Some valves are not available on phosphorus meter, which can be ignored.

e. Calibration Instrument

On the main menu, click the "Calibration Instrument" icon and enter the operation interface as shown below.



At this time, the instrument can be calibrated, or the measurement sample can be selected to verify the accuracy of the instrument measurement.

If you need to calibrate sample 1, click the "Calibrate Standard 1" button, and then the instrument enters the state of sampling the standard sample 1. Each sample is collected and the result of sampling is displayed at the corresponding position. After the instrument completes five sampling measurements, the measurement results will be

automatically calculated, the average value will be obtained, and the "slope" and "intercept" will be calculated, showing "k" and "b" values.

If the five sampling results are stable and within a reasonable range, click the "Comfirm" button to save the calibration results.

The silicate analyzer is calibrated at one point without the need to calibrate the second sample.

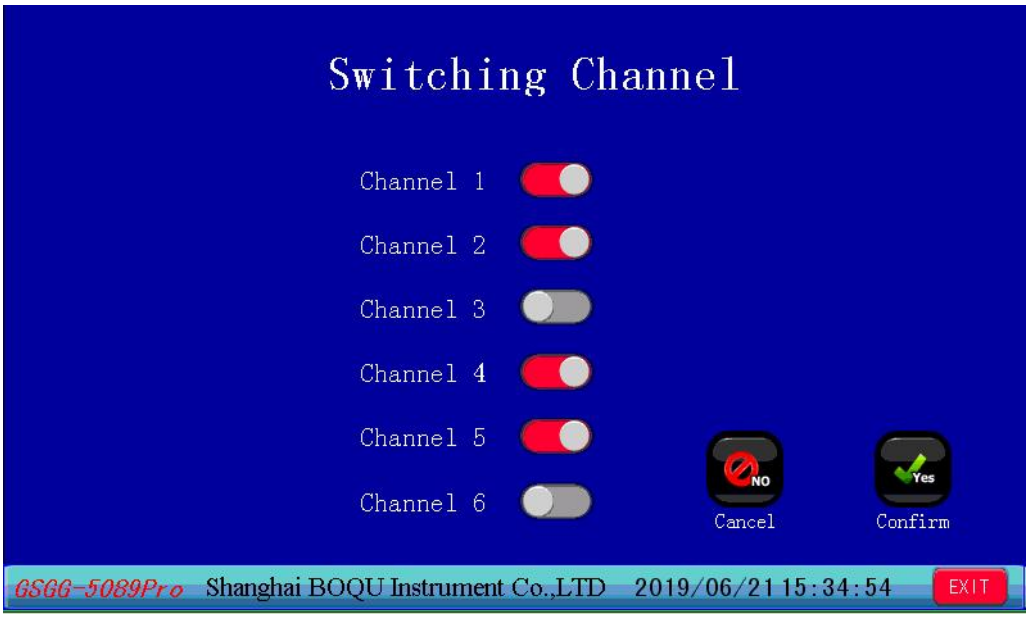
In the process of sampling or measuring the standard sample, the instrument can click on the "stop " ammonium button, interrupt the sampling process, and re-select other operations.

At the end of calibration, click the "EXIT" button and return to the main menu. If the result is not saved, it returns to the main menu, and the final calibration result will not be saved.

f. Select channel

The instrument is designed for multi-channel use, but sometimes users do not need to use all channels, or some channels do not have water samples due to equipment overhaul. At this time, they can choose to close several channels. The operation method is as follows.

On the main menu, click on the "Channel Switch" icon and enter the "Channel Selection" operation interface as shown below.



Click on the switch button on the right side of each water sample channel to open or close the corresponding channel.

After the channel switch is selected, you need to click the "Save Selection" button to save the result of the selection, or click the "Give up Selection" button to exit the selection interface and return to the main menu.

g. The Historical data searches

On the main menu, click the "Historical Data" icon to enter the historical data query interface.

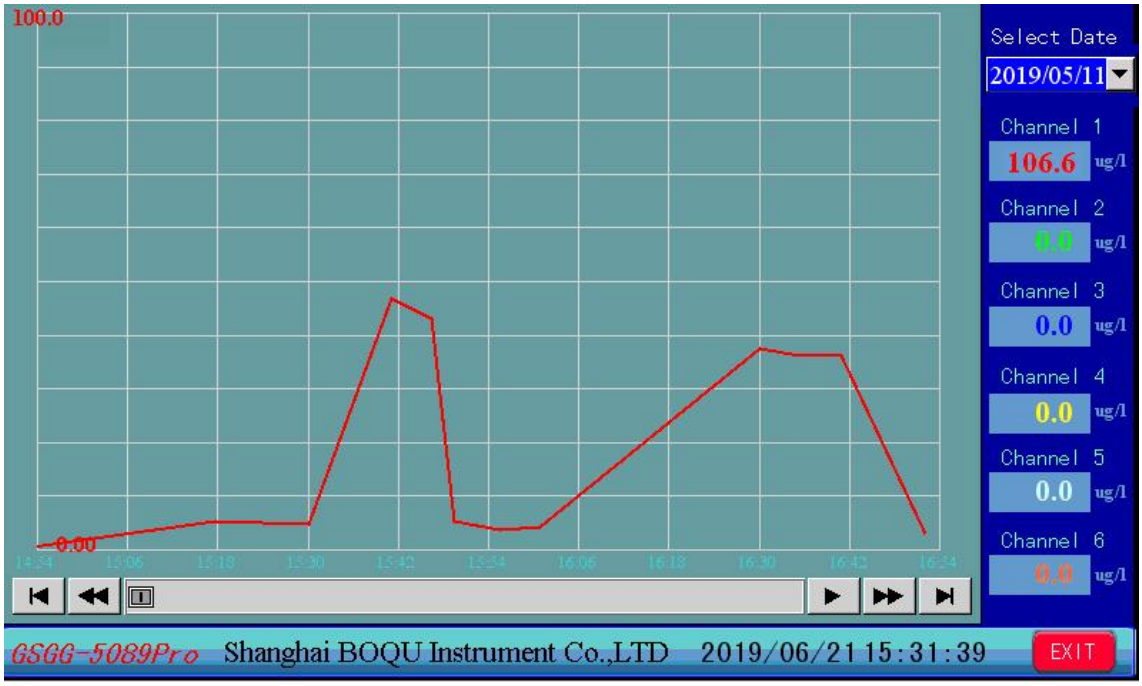
No.	Date	Time	ch.1	ch.2	ch.3	ch.4	ch.5	ch.6
22	19/05/11	16:52	3.04	4.93	0.00	0.00	0.00	0.00
21	19/05/11	16:41	36.14	4.93	0.00	0.00	0.00	0.00
20	19/05/11	16:35	36.22	4.93	0.00	0.00	0.00	0.00
19	19/05/11	16:30	37.48	4.93	0.00	0.00	0.00	0.00
18	19/05/11	16:01	4.38	4.93	0.00	0.00	0.00	0.00
17	19/05/11	15:55	3.85	4.93	0.00	0.00	0.00	0.00
16	19/05/11	15:52	4.77	4.93	0.00	0.00	0.00	0.00
15	19/05/11	15:49	5.29	4.93	0.00	0.00	0.00	0.00
14	19/05/11	15:46	43.03	4.93	0.00	0.00	0.00	0.00
13	19/05/11	15:41	46.89	4.93	0.00	0.00	0.00	0.00
12	19/05/11	15:30	4.92	4.93	0.00	0.00	0.00	0.00
11	19/05/11	15:24	4.68	4.93	0.00	0.00	0.00	0.00
10	19/05/11	15:18	5.26	4.93	0.00	0.00	0.00	0.00
9	19/05/11	14:52	0.25	4.93	0.00	0.00	0.00	0.00
8	19/05/11	14:49	0.25	4.93	0.00	0.00	0.00	0.00
7	19/05/11	14:46	0.25	4.93	0.00	0.00	0.00	0.00

Click on the Single-selection bar in the upper right corner to select the date to query. All the data on the date to be queried will be displayed in the list. You can drag the slider on the right side of the list to read the historical data up and down.

After the query is completed, click the "EXIT" button to return to the main menu.

h、Query history curve

On the main menu, click the "History Graphs" icon to enter the History Curve Inquiry Interface.



Click on the selection bar in the upper right corner to select the date to be queried. The data curve on the date to be queried will be displayed in the coordinate grid. You can drag the slider under the table and flip the history curve back and forth.

Click on any position of the display curve on the current screen, and the measurement results of the corresponding time point at the clicked position will be displayed by channel in the space on the right side.

After the query is completed, click the "EXIT" button to return to the main menu.

8、Serial Data Communication (RS485)

The instrument supports RS485 communication. Using Modbus RTU protocol, the communication address can be set to 00-99, and the baud rate can be 4800, 9600, 14400, 19200, 28800, 38400 and 57600.

To use the communication function, please set the address and baud rate correctly in the "Modify Parameters" menu. The communication address is set to 00, which will turn off the communication function of the instrument.

The instrument only supports reading the measurement results. The data format is 32 bit BCD code, and the decimal number is fixed to 2 bits. Function code 03 or 04 can be used to read, other communication instructions are invalid.

9、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 road to have have no corrosion and seep into;

③ Enter "Test Systems" 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 fixs 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 road 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 vestigital in the streaming road 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.

Attachment: Cautions for the Use of Silicon Watches

I. Installation of Instruments

1. Installation location selection

a. Installation position as close as possible to the measured water sample to reduce sampling lag time.

b. There should be drainage pipeline under the instrument. The instrument drainage has no pressure and can not connect too long pipeline.

c. No dust, no strong vibration and no strong electromagnetic interference are required.

d. The ambient temperature is required to be between 5 and 45 degrees Celsius and the humidity is less than the saturated humidity. When the temperature is lower than 20 C, the calibration should be carried out with the standard sample which has been shelved for more than 12 hours at the same temperature, otherwise the measured value will be smaller.

e. Do not install in direct sunlight.

2. Instrument water sample

a. Water samples measured by instrumentation must be solid-free, colloid-free and colourless. Otherwise, water samples should be pretreated, such as adding water sample filters.

b. The water sample temperature should be 10-45 ℃. Excessive temperature will permanently damage the flow circuit components of the instrument.

c. The flow rate of water sample should be 5-20 L/h.

d. The PH value of water sample is not higher than 10 pH.

e. Water sample control valves should be equipped with by-pass valves with drainage outlets before the instrument water sample inlet. When the water sample is abnormal, such as unit start-up, the by-pass valves should be opened and closed until the water sample is normal (no impurities, suitable temperature), then the sampling valves should be opened and the by-pass valves closed.

3. Instrument power supply

a. The instrument uses an AC 220V single-phase power supply, and the actual power consumption is about 30 VA.

b. Instrument power supply should be equipped with 10A single-phase AC circuit breaker, because the instrument uses a switching power supply, the power-on current is relatively large, too small circuit breaker may automatically disconnect when it is turned on.

II. Preparation of Relevant Reagents and Standard Samples

1. Users must use silicon-free water at room temperature to dissolve the reagent slowly. Do not heat it with electric furnace or hot water. The reagent prepared after heating will crystallize and precipitate, blocking the reagent pipeline and solenoid valve. The prepared reagent should be kept for one day, if there is a small amount of crystallization, the upper layer of clear reagent can be used; if a large number of crystallization occurs, it should be discarded and re-prepared.

2. All preparations of reagents and standard drugs require the use of analytical pure or higher levels.

3. Ammonium molybdate is recommended to choose the products of Tianjin Chemical Reagent Plant 4 (Kaida Chemical Plant). Long-term use proves that crystallization rarely occurs.

4. If crystallization occurs and the pipeline is blocked, soak it in dilute ammonia water and rinse it repeatedly with clean water. Ammonia water can not be long-term residue in pipelines and reagent bottles, reagent bottles and solenoid valves are not resistant to ammonia water.

5. New reagent bottles and standard sample bottles should be rinsed repeatedly with silicon-free water to avoid contaminating reagents and standard samples.

6. Because the actual silicon-free water may also contain a certain amount of silicon, the preparation process will also produce certain artificial errors, so the prepared standard sample may not fully meet the required accuracy. It is suggested to use spectrophotometer to accurately measure the concentration value of the prepared standard sample, and then use it according to the actual measurement value.

III. Initial commissioning of related instruments

1. Check carefully the plugs and connections at the back of the instrument before switching on the power.

2. Check whether the drainage pipeline is connected reliably and smoothly.

3. Check whether the water sample meets the requirements and adjust the flow rate to the flowmeter indication of 5-15 L/h.

4. The fixed tape paper on the water sample overflow cup measured on the upper left and the waste discharge water cup below the instrument must be torn off.

5. Before injecting reagents into reagent bottles and standard samples into standard bottles, silicon-free water is injected into each bottle to replace reagents and standard samples. The reagents and standard samples are entered into the "System Test" menu of the instrument, and the valves are opened separately to check whether reagents and standard samples can be injected normally. The injection state of reagent can be observed in the reaction cup, and the injection state of standard sample can be observed in the overflow cup. When it is necessary to inject the standard sample into the test, the standard pump must be operated on the menu first.

6. If reagent or standard sample cannot be injected properly, check whether the pump works properly first. The method is to remove the outlet pipe of the pump and check whether there is air blowing out.

7. If the exhaust of the pump is normal, check whether the reagent bottle or the standard bottle is tightly capped and tightened. The test method is soapy water. If the cap is tightened and the mouth of the bottle leaks, it can be solved by wrapping tetrafluoro raw material tape around the edge of the bottle mouth.

8. After the above checks are normal, replace the reagents needed for normal operation, enter the menu of "System Test", open the reagent valve about 10S one by one, discharge the residual water and air in the pipeline, and then close. Previous measurements would be inaccurate if the water or air in the pipeline were not discharged first.

IV. Outage and Maintenance of Instruments

1. If it is only a short shutdown time, turn off the instrument power supply and the water sample inlet valve directly.

2. If it is necessary to shut down the instrument for a long time, it is necessary to clean the flow path of the instrument, and then turn off the power supply and water samples.

3. Remaining reagent in reagent bottle and standard sample in standard sample bottle are poured out before cleaning. Reagent bottle and standard sample bottle are washed with non-silicon water.

4. Fill about half of the reagent bottle and standard sample bottle with silicon-free water and tighten the cap.

5. Enter the "main menu" of the instrument, select the "downtime maintenance" function, and then operate according to the prompt until the prompt maintenance is completed, turn off the power supply and water samples.

6. When the instrument is put into operation again after long-term shutdown, please check and put it into operation in the same way as it was first put into operation.

Special reminder:

In order to prevent the instrument pipeline from being polluted and blocked, and ensure the safe and reliable operation of the instrument, water sample filters should be installed at the inlet of each water sample of the instrument, and filter elements should be replaced regularly according to the water quality. When replacing the filter element, the power supply of the instrument should be turned off first. After replacing the filter element, the water sample should be turned on and flushed for several minutes to remove the impurities that may be carried in the filter element, and then the power supply of the instrument should be turned on.