

# **Online moisture analyzer Instructions**

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### **Main technical index of instrument**

- Measuring range: 0-50% (The water absorption saturation of the material is the maximum measurement range.)
- Static accuracy: 0.1%
- Measuring accuracy: 0.1%-0.5%
- Measuring channel: 50
- Height range: 250mm±100mm
- Environment temperature: -30-60°C
- Environment humidity: 5-90%
- Repeatability: 0.1%
- Response time: 0-10 seconds
- Filtering range: 0-2.5%
- Power supply: 220V 50HZ
- Power consumption: 100W
- Light interference: not be affected by outside environmental light variation, the probe needs no cover for environmental light
- Temperature effect: temperature auto-compensate and basically not be affected by outside temperature variation

## Chapter One Preface

### 1.1 Quality Assurance

The products of have a 12-month quality assurance period from the delivery time. During this period, it is free to repair and change the components. The company will not be responsible for the lost or damage that is not caused by the instrument itself. The company also provides after sale-service for customers, any affairs relates to repairing and component changing can all contact the appointed repairing service center directly.

### 1.2 Unpack

Keep all the packing materials of the instrument for repairing or transporting if needs, which will ensure the safety of instruments when transporting.

When opening the box, please take out the internal things carefully in turns and put them in the clean room to check: check the supplying amount and type if they are consistent with the contract by comparing to packing list, the appearance of instrument if be damaged, and the external insulating layer of cable if be damaged.

**Attention:**

Do check the packing list if be consistent with the contract before opening the box.

### 1.3 Use the instrument safely

In order to use the instrument safely, please do comply with the following attention items when operating and maintaining.

- Power supply: confirm that the supplying power is consistent with the power needed by the instrument before supplying.
- Power supply demand: the supplying power of the instrument must be added the AC voltage stabilizer.
- Grounding protection: in order to prevent shock accident, please do grounding protection before using the instrument.
- Necessity of grounding protection: please don't cut off or remove the internal and external grounding circuits of the instrument, otherwise the human will be in great danger.

- External wiring: do the cable connecting in each part of the instrument after confirming the grounding protection is connected.
- Instrument maintaining: there are circuits with high voltage in internal of instrument, so don't put your hands into the internal when the power is on.
- Components changing: when changing the fuse wire and transformer, the power cannot be absolutely cut off even turn off the host. Therefore, please do confirm that the plug of power supply is pulled out.
- Power interface: the two 3-core cables under the host shell is the power interface of supplying host and probe, which is with 220V high voltage, so don't dismantle it when the power is on.

**Attention:**

There is high voltage in internal of the instrument introduced by this instruction, do cut off the power during the circuit connecting and maintaining period. If you don't meet the demands of the instruction to install and use the instrument, the safety of instrument will be reduced. In order to guarantee the electric safety of the instrument, any changes of the power interface and mating cable are not allowed.

## 1.4 Technical parameter

### 1.4.1 Probe

- Size: 310mm (length) × 180mm (width) × 150mm (height), refer to Figure1.3
- Weight: 6kg
- Shell standards: metal sealed box
- Environment temperature: work temperature 0-50°C, 0-80°C (add the cooling plate)
- Cable length: max. 10m
- Measuring height: 250mm ± 100mm (refer to figure2.1)
- Measuring range: Φ40mm in rating height
- Power supply: A.C 220V 50/60Hz, 50W
- Environment light affection: the instrument performance will not be affected by any kind of environment light variation, however, it is possible to interfere the normal measuring of the instrument as the strong light goes into the window directly. The following environment light will not affect the measuring accuracy:

Stable light source (color temperature 2500° K, light flux 250W/m<sup>2</sup>, produced measuring noise



<0.02%)

Halogen lamp (AC power supply 80W, distance 2.5m, produced measuring noise <0.1%)

Incandescent lamp (AC power supply 100W, distance 2.5m, produced measuring noise <0.1%)

Mercury lamp (AC power supply 250W, distance 2.5m, produced measuring noise <0.1%)

● I/O interface: The rear of the probe shell:

(1) 7-pin aerial socket: probe power supply interface, the probe power supply of AC 220V input interface.

(2) 10-core aerial socket: The probe output signal and the host supply to probe  $\pm 12V$  interface.

#### 1.4.2 Host

● Size: 440mm (length)  $\times$  335 mm (width)  $\times$  110 mm (thickness), refer to Figure 1.5

● Weight: 7kg

● Chassis sealed standards: metal sealed case

● Environment temperature: 0-50°C

● Relative humidity: 5%-95% (no condensing, 0-50°C)

● Power supply: A.C 220V 50/60Hz, max. 50W

● Displayer: digital tube 7 digits display

● Keyboard: membrane keypad

● I/O interface: The lower part of the host shell

(1) 3-core cable: the power supply interface of host, the total power input interface of instrument.

(2) 25 holes D-type socket: the host input signal interface, probe input signal and host supply to probe  $\pm 12V$  interface.

(3) 4-core cable :host output signal interface, RS485 signal, RS232 signal, 4-20mA (optional).

(4) 3-core cable (with 7-core aerial socket): Probe power supply interface, the host supply A.C 220V power to probe.

#### 1.4.3 Sampling remote-reading meter

● Size: 115mm (length)  $\times$  50mm (width)  $\times$  85mm (thickness), refer to figure 1.7

● Weight: 0.5kg,

- Shell standards: engineering plastics
- Environment temperature: 0-50°C
- Relative humidity: 5%-95% (non- condensing, 0-50°C)
- Power supply: A.C 220V 50/60Hz, max. 10W
- Signal input: the two connection bolts of “A” and “B” marked on the back of sampling remote-reading meter.
- Supplying power: the two connection bolts of “220V” marked on the back of sampling remote-reading meter.
- Signal connection: Through shielded twisted pair to connect to the host output signal interface.

## 1.5 QL-300Systems

### 1.5.1 QL-300System

Figure 1.1 the figure of QL-300 System

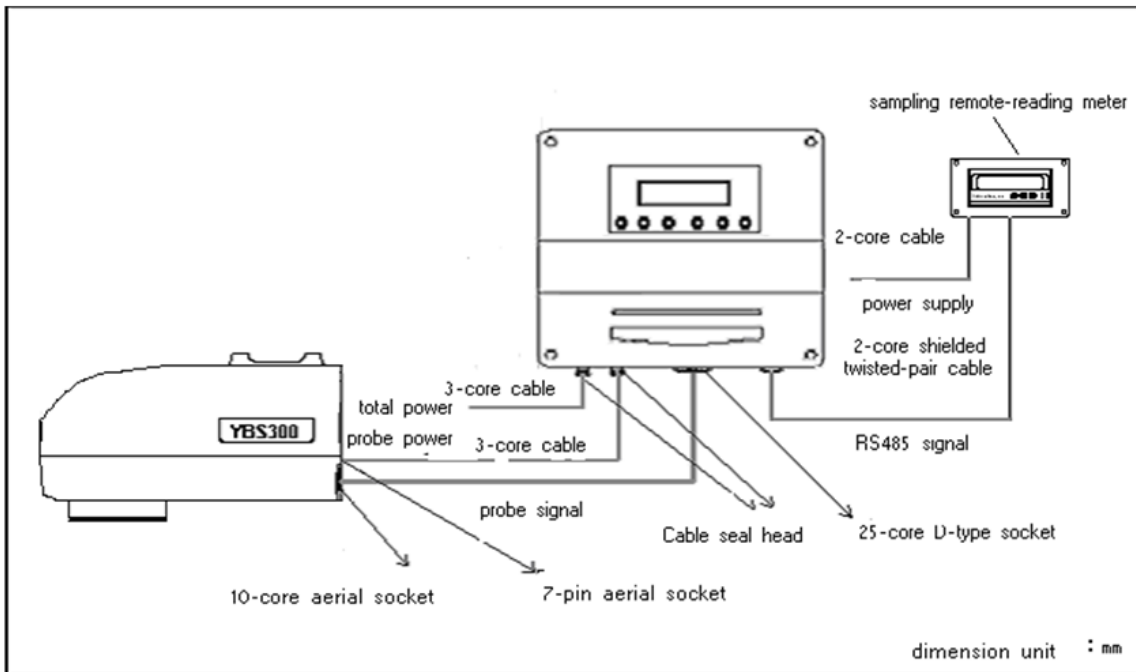


Figure 1.2 the photos of QL-300 System



### 1.5.2 The outline of QL-300 Probe

Figure 1.3 the figure of the outline of QL-300 probe

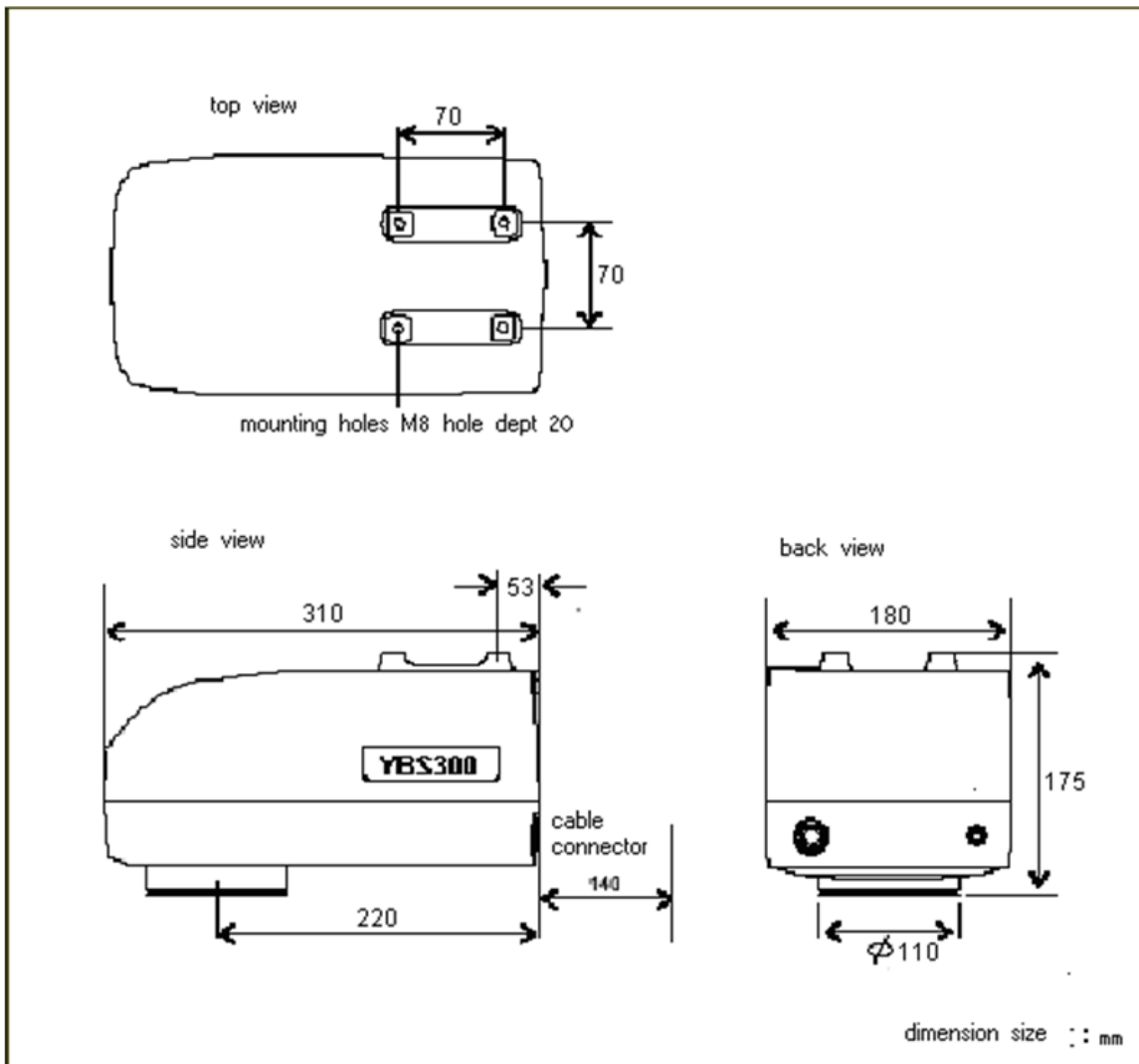


Figure 1.4 the photos of QL-300 probe



### 1.5.3 The outline of host

Figure 1.5 the figure of outline of the host

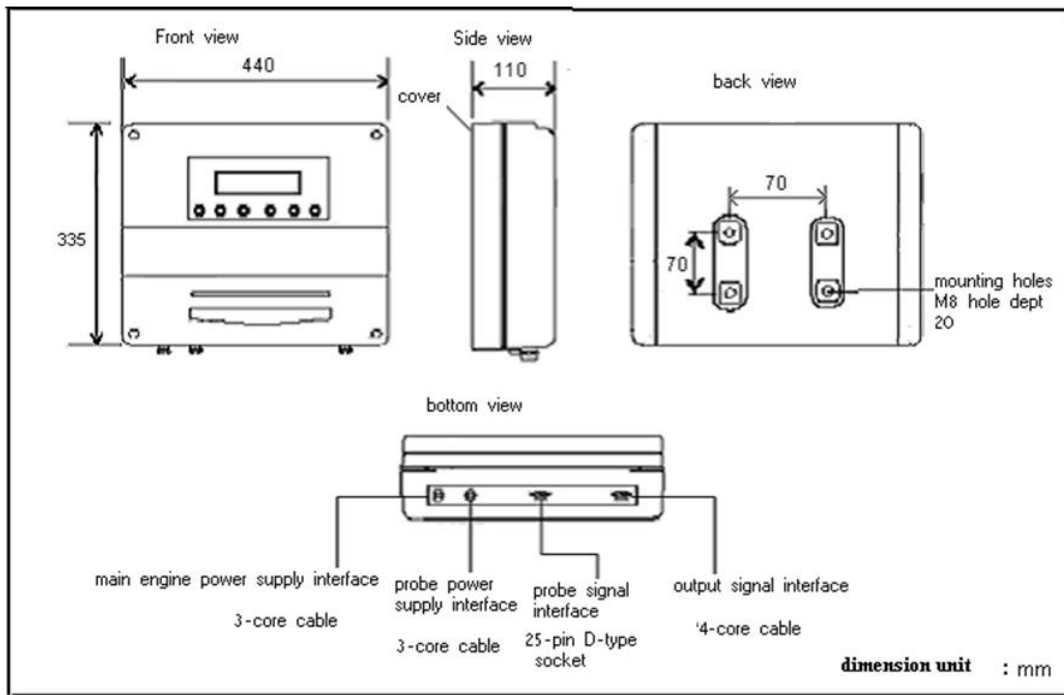
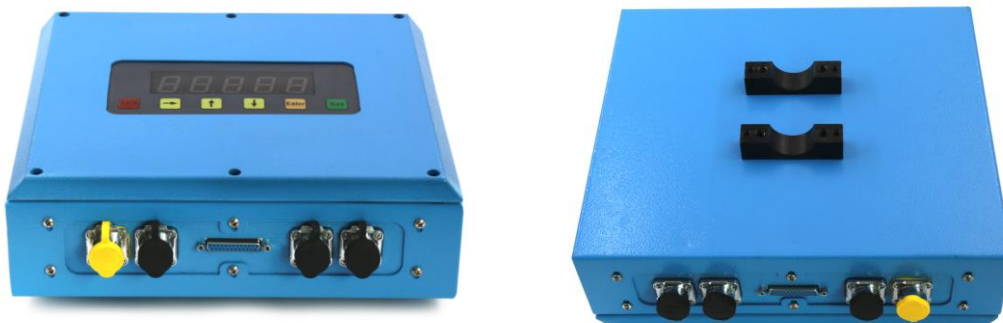


Figure 1.6 the photos of host



### 1.5.4 Sampling remote-reading meter

Figure 1.7 the outline figure of sampling remote-reading meter

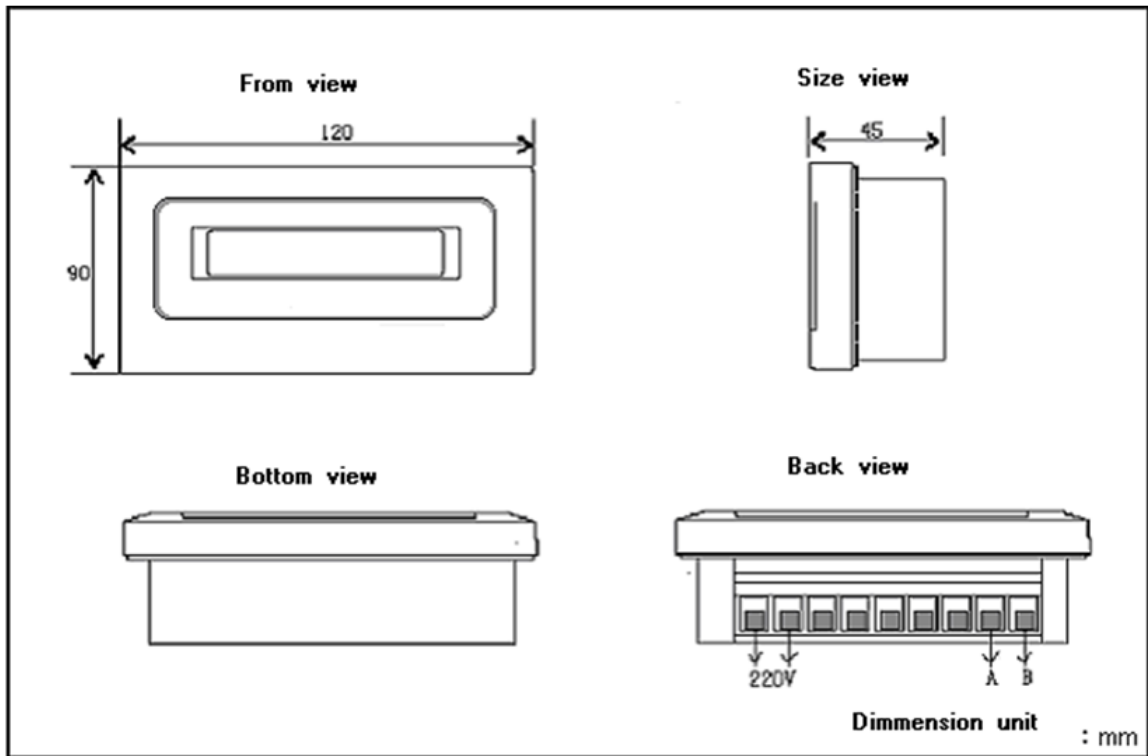


Figure1.8 the picture of sampling remote-reading meter



## Chapter Two Installation

### 2.1 Points for attention of QL-300 installation

- Power supply: the system needs an uninterruptible power supply fit for voltage range demand.

The supplying power must be added the AC voltage stabilizer:

Voltage: A.C220V, Frequency: 50/60Hz Power: 200W

- Isolation switch

Connecting to the total power supply need to pick up a two-pole switch or current circuit breaker.

- Cabling

● The QL-300Signal cable wiring is in the weak signal bridge, the power cable wiring is in small power bridge. Users can not change the special cable which matches the instrument.

- Avoid the electromagnetic interference

Never put any parts of QL-300 system close to the strong electromagnetic interference source installation such as large power motor, welding equipment, equipments with strong electrostatic discharging, large power transformer, and frequency converter etc.

- Avoid mechanical shock

QL-300 system is a precise photoelectric instrument, and the excessive mechanical shock would cause damage.

- Running environment temperature: probe: 0-50°C, 0-80°C (add the cooling plate)

Other parts: 0-50°C

- Environment light

The instrument performance will not be affected by any kind of environment light variation. When using it, there is no need to add light hood for probe. However, it is possible to interfere the normal measuring of the instrument as the strong light goes into the window directly.

The following environment light will not affect the measuring accuracy:

Stable light source (color temperature 2500° K, light flux 250W/m<sup>2</sup>, produced measuring noise <0.02%)

Halogen lamp (AC power supply 80W, distance 2.5m, produced measuring noise <0.1%)

Incandescent lamp (AC power supply 100W, distance 2.5m, produced measuring noise <0.1%)

Mercury lamp (AC power supply 250W, distance 2.5m, produced measuring noise <0.1%)

- Measuring through window

Sometimes it is possible to measure the internal products through a window. The window material can be glass, but it mustn't be organic glass, polyester materials or any plastic, because these materials are able to absorb and save the water molecule. Meanwhile, in order to ensure the measurement accuracy, the measured material and window glass should be together to maintain continuous contact.

- Environment temperature

QL-300 probe has the function of auto compensating the temperature influence, so the variation of environment temperature will not affect measuring accuracy.

- Condensed steam

The steam formed with water drops will affect the measurement; we can use the air-cleaning window to solve the problem.

Attention:↵

If there is strong interference in the production line, please don't fix the probe and host of the moisture tester in it and make another bracket to fix the probe and host of the moisture tester. Meanwhile, don't put bracket and host together, please set the position independently for fixing the bracket of probe and host of moisture tester. (if when the probe and host of moisture tester are fixed in the production line, the value of moisture changes more greatly than its actual value, and when dismantle it for testing, it don't move, please make another bracket for fix the probe and host of the moisture tester and fix the bracket independently rather than fix in the production line.↵

## **2.2 The installation of QL-300 moisture meter**

### **2.2.1 The installation demand for QL-300 Probe**

QL-300 probe should be installed in accessible areas, first of demand is that are easy to sample below the probe, another should be easy to maintain (such as cleaning windows, cleaning surfaces, etc.);

(1) The instruments should be installed in the safe measuring position which the materials will not touch the probe.

(2) The installation height and direction of YBS300 Probe (refer to figure2.1), the probe is installed above the continuous materials, For example, conveyor belt or vibration, the attention that there must have sufficient depth of material, the material should have a minimum thickness of 10mm

(15mm and above is recommended), so be able to completely eliminate the background impact on the conveyor belt.

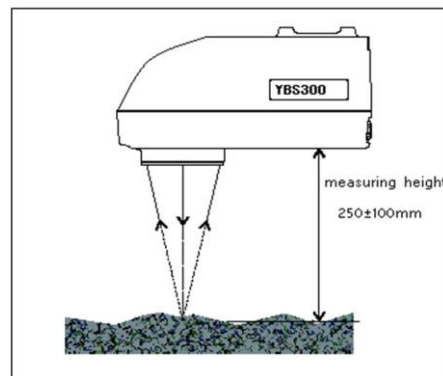
(3) In order to get a long time for the balance of material before the measurement, drying machine or the probe adjusting the export of other conditioning equipment is best installed

Away from the location of the steam as far as possible

(4) It is a basic requirement of the production line that to ensure the materials are measured with a certain degree of uniformity and continuous in the production process.

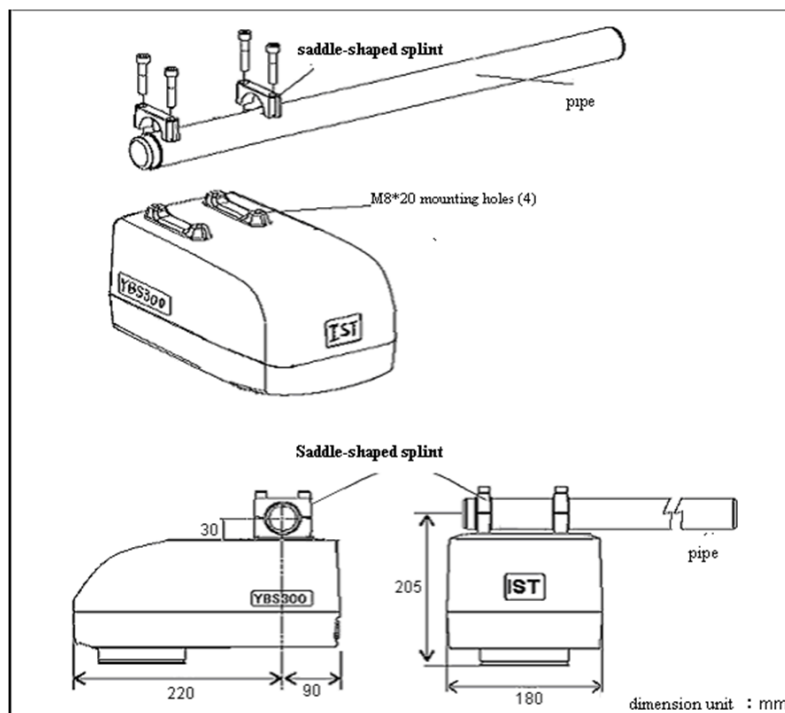
(5) Uniformity of materials has great influence on measurement accuracy of which contrast with the oven method, uniformity directly affects the kind of error of double-oven method.

Figure 2.1 the installation height of QL-300 probe



## 2.2.2 The installation of QL-300 Probe

Figure 2.2 the installation bracket of QL-300 probe



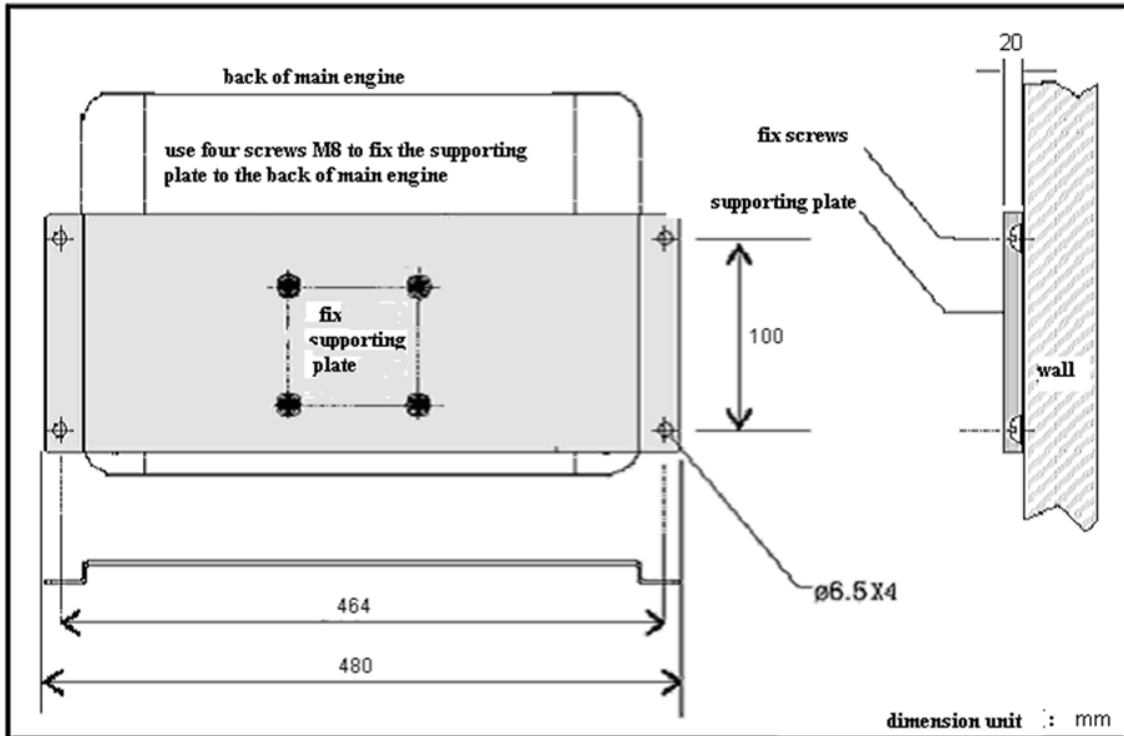


### 2.2.3 The installation of host

(1) The host is installed on the wall:

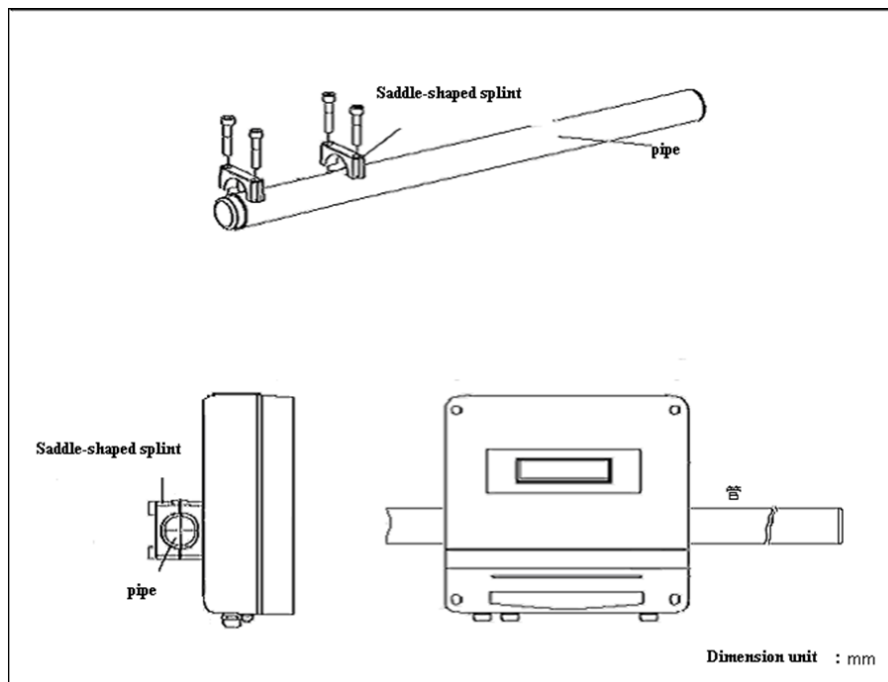
The host can be installed on the wall or the production of the host device through the adapter board, such as the host can be installed on the channel bracket of production device

Figure 2.3 the picture that host installed on the wall



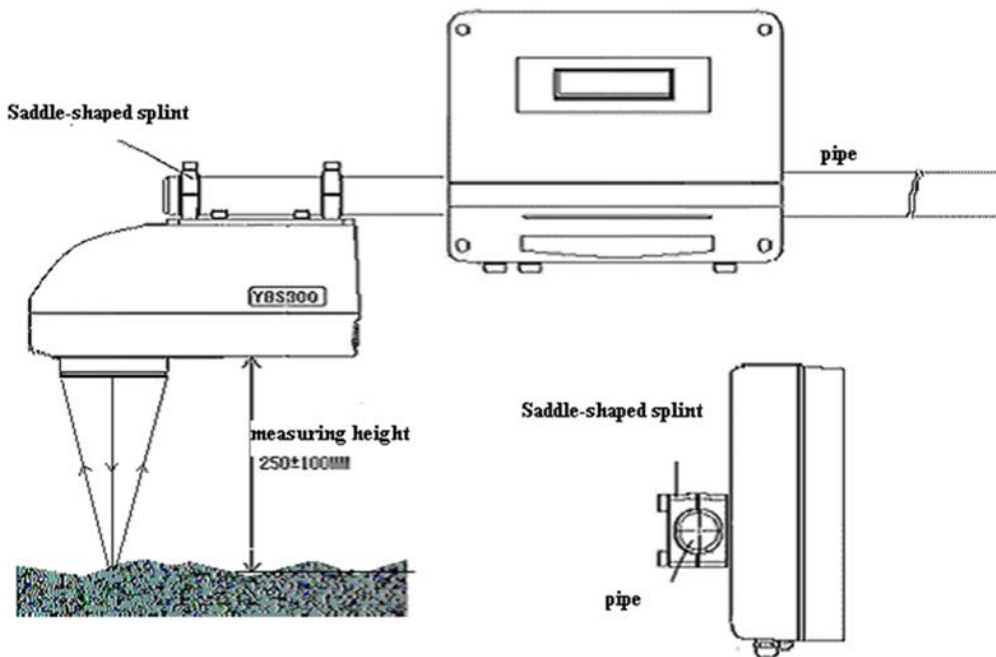
(2) The host is installed in the Tube-shaped bracket.

Figure 2.4 the picture that the host installed in the tube-shaped bracket.



## 2.2.4 The installation of the whole host

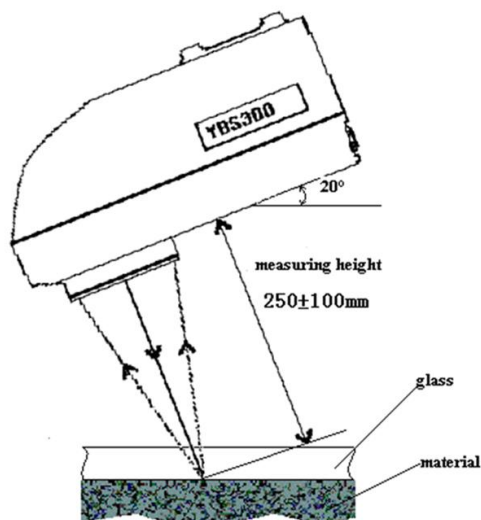
Figure2.5 QL-300 System is installed in the Tube-shaped bracket.



## 2.2.4 Measuring the probe installation through window

Sometimes we may measure the internal materials through a window. The window material can be glass, but it mustn't be organic glass, polyester materials or any plastic, because these materials are able to absorb and save the water molecule. Keep some distance and angle between probe and the measured material. (Refer to Figure2.6), the probe tilted  $20^\circ$  in order to avoid the window glass reflector. Meanwhile, in order to ensure the measurement accuracy, the measured material and window glass should be together to maintain continuous contact

Figure 2.6 the installation picture that measures the installation of probe through the window



## Chapter Three Electric connection of QL-300 system

### 3.1 The parts of QL-300 system

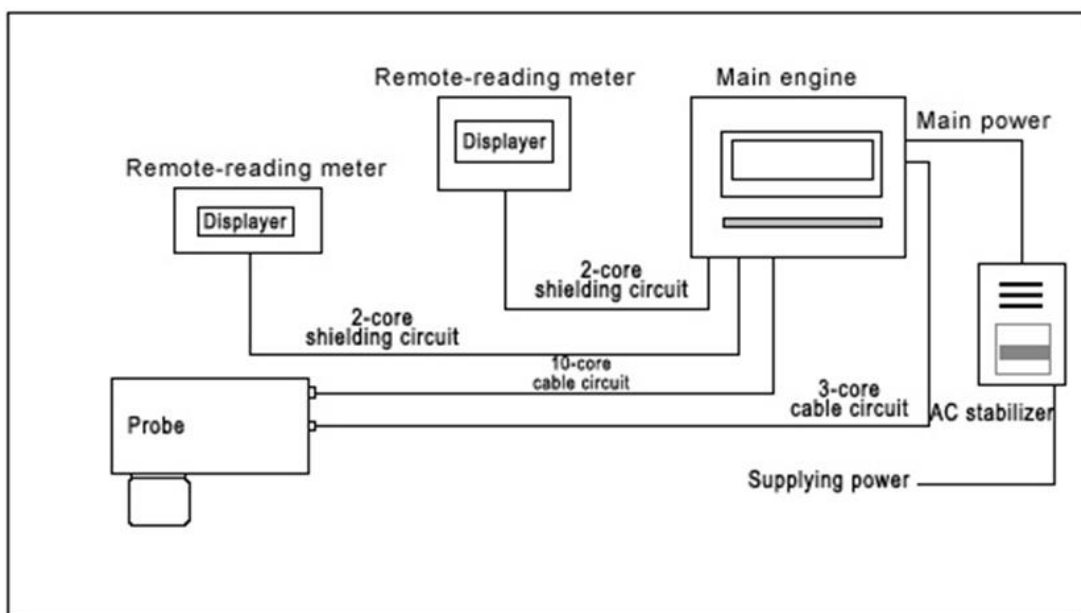
QL-300 system includes the following parts:

- A probe
- two sampling remote-reading meters
- a host
- A 10-core shielded cable
- a 3-core r cable (with 7-core aerial plug)
- A host supply power with 3-core cable

### 3.2 QL-300 Single-probe systems

Signal-probe system includes a host, a probe and two sampling remote-reading meters.

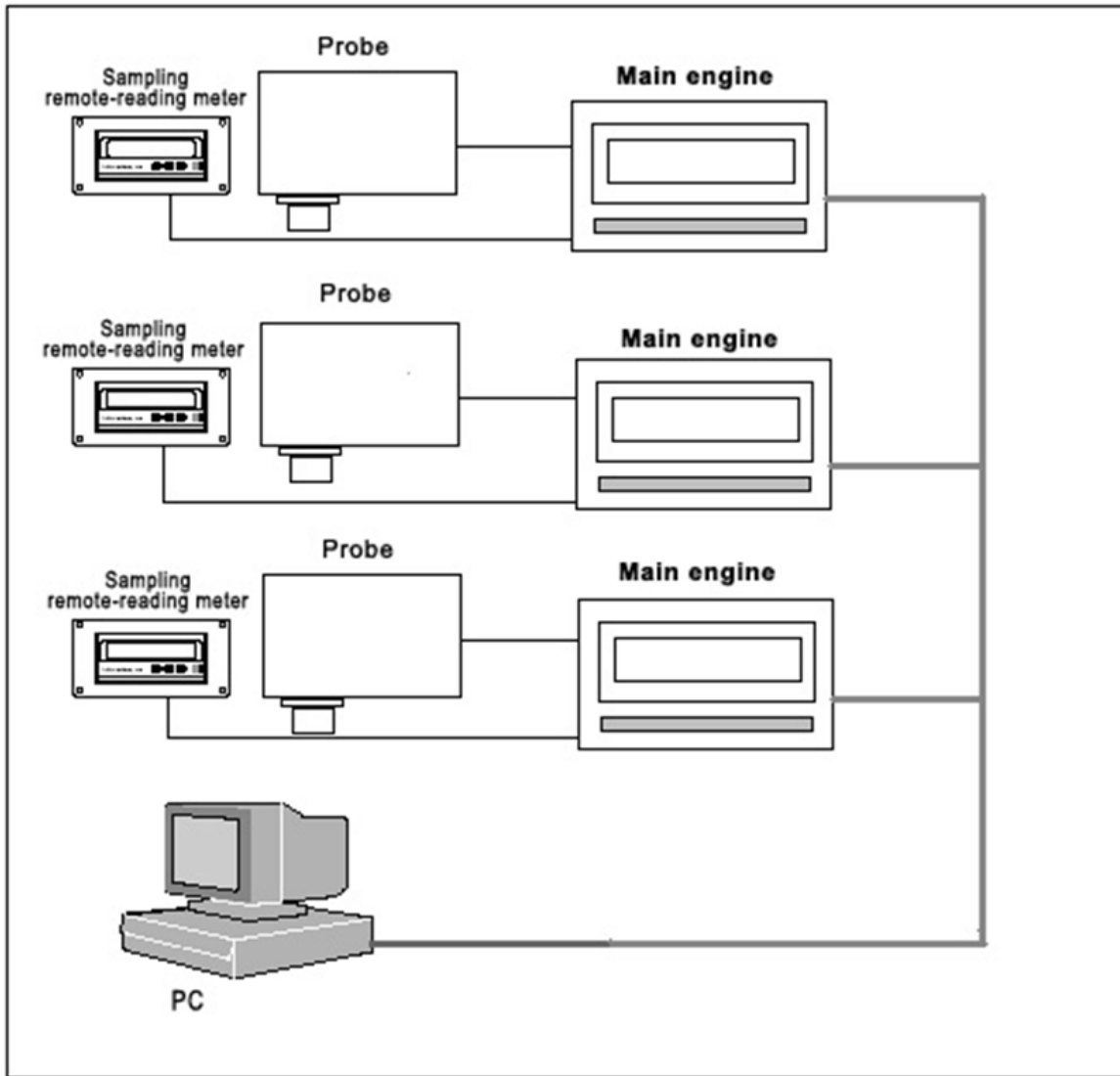
Figure 3.1 connection picture of single-probe system



### 3.3 Multi-probe system of QL-300

Connect several such basic elements together to make up of a multi-probe system.

Figure 3.2 a multi-probe QL-300 system



### 3.4 Electric connection

#### 3.4.1 The host supply power

The host power supply is AC 220V, the power supply need to pick up a two-pole switch or current circuit breakers, switch is put near the host ,a place which is easy to operate. Addition, In order to ensure a stable supply of power equipment, power should be retrofitted with AC voltage stabilizer.

#### 3.4.2 Probe supply power

Probe power supply is AC 220V, the probe power through the host provided, and connected by a host with 3-core cable (with 7-pin aerial socket), the aerial socket of one end of cable connect with

the probe 7-pin aerial socket.

Figure 3.4 7-core aerial plug



figure 3.3 the photo of 3-core cable



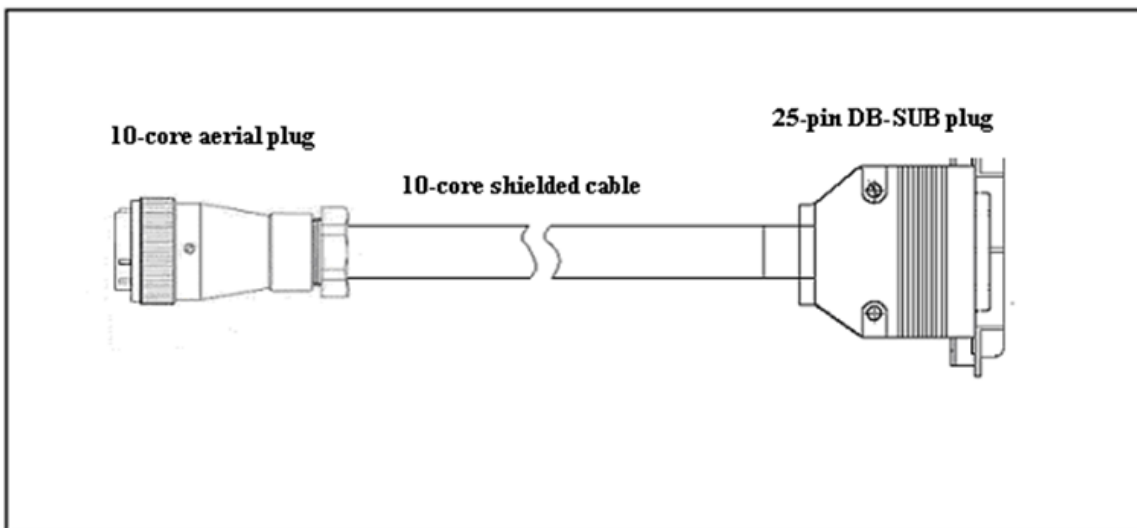
Table3.1 the definition of 7-core aerial plug

Number	signal
2	neutral wire
5	Live wire
4	ground wire

### 3.4.3 Signal connection of the probe and host

The probe is connected with the host by a 10-core shielded cable. One end of the aerial plug of 10-pin cable is connected with probe; one end of 25-pin D-type plug is connected with the host. Plug interface definition the signal cable at both ends of the probe and the host is as follows:

Figure 3.5 10-core shielded cable



### 3.4.4 The definition of 10-core shielded cable interface

Figure 3.6 10-core shielded cable aerial plug



Figure 3.7 the photo of 10-core shielded cable aerial plug



Figure 3.8 10-core shielded cable D-type plug

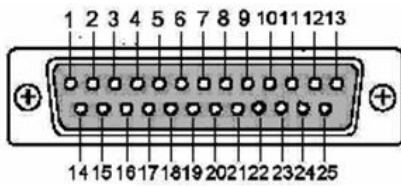


Figure 3.9 the photo of 10-core shielded cable D-type plug

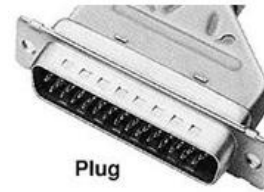


Figure 3.8 the wiring diagram of 10-core shielded cable

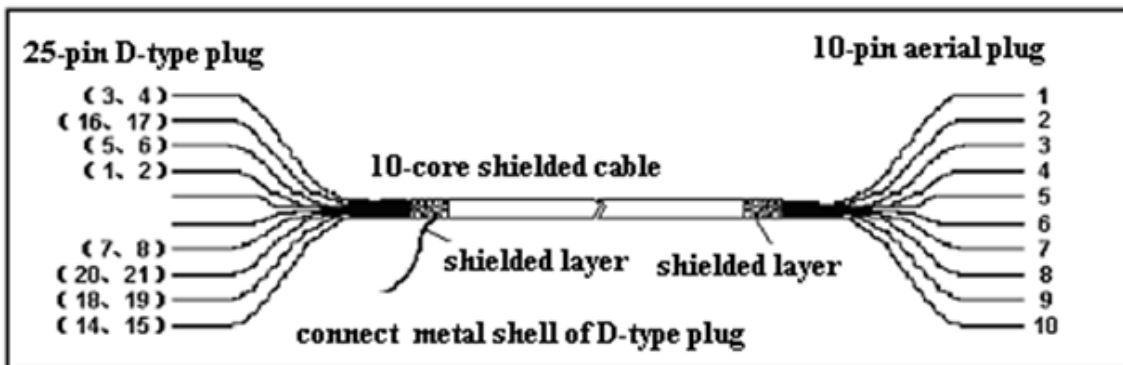


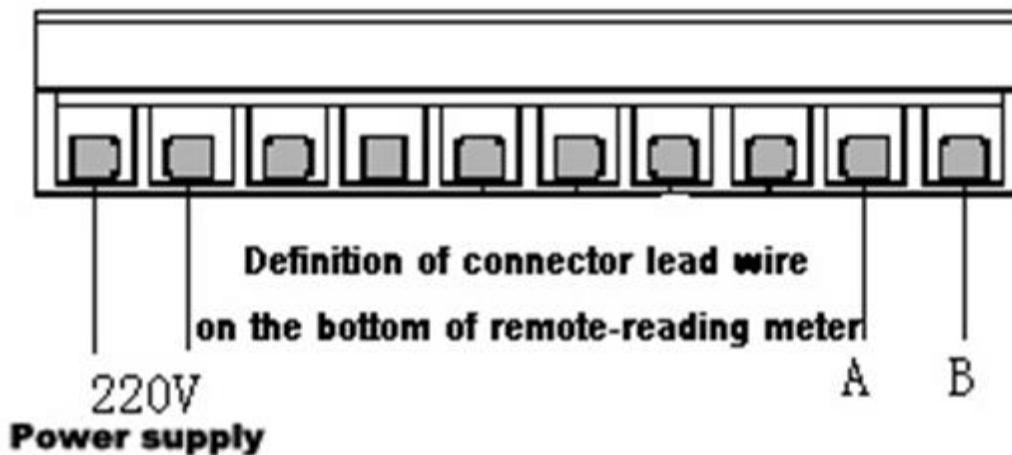
Table 3.2 10-core shielded cable wiring definition

10-pin aerial plug	25-pin D-type plug	signal
1	3—4	+0.3V
2	16—17	+12V
3	5—6	-0.5V
4	1—2	-0.3V
5	9—10	+5V
6	11—12	+2.5V
7	7—8	+0.5V
8	20—21	-0.6V
9	18—19	0V
10	14—15	-12V

### 3.4.5 The connection of sampling remote-reading meter and host

- The power supply of remote-reading meter is AC 220V 50HZ (2 core)
- Power wire of remote-reading meter (2 core) and the signal wire (2-core shielded), prepared by the user;
- the signal connection of remote-reading meter and the host adopts a 2-core shielded cable, the 4-core cable lead wire "A" of host output signal interface is connected with remote-reading meter "A" terminal and lead wire "B" is connected with remote-reading "B" terminal. The signal wire of remote-reading meter and host is adopted shield wire, shield should be grounded, the best shield to overhead wiring, and other power wires do not close.

Figure 3.10 Definition of connector lead wire of remote-reading meter



### 3.4.6 4-20mA output signal connection (Appendix)

### 3.4.7 RS232 output signal connection (Appendix)

## Chapter Four Debugging

### 4.1 Outline

QL-300 moisture meter has been done the entire measuring range linearization before delivery. You just need to debug the modifying value accurately to make the measuring of moisture meter be consistent with your standard method (e.g. oven method). The sensitivity has been adjusted before delivery (Factory Default 2.5), and it does not need to adjust generally.

This chapter includes two contents for debugging:

(1) Setting part: in order to apply to users' actual demands, a series of parameter settings should be done to the instrument ,such as translation amount , sensitivity, filter points, filter range.

(2) Debugging part: to make the measuring value of instrument in a certain accuracy range.

Be consistence with users' standard method (e.g. oven method), by means of sample measuring and accurately adjusting the translation amount of moisture meter.

In order to make users operate it quickly and conveniently, the flowchart of buttons on the host operating panel of QL-300is as followings given:

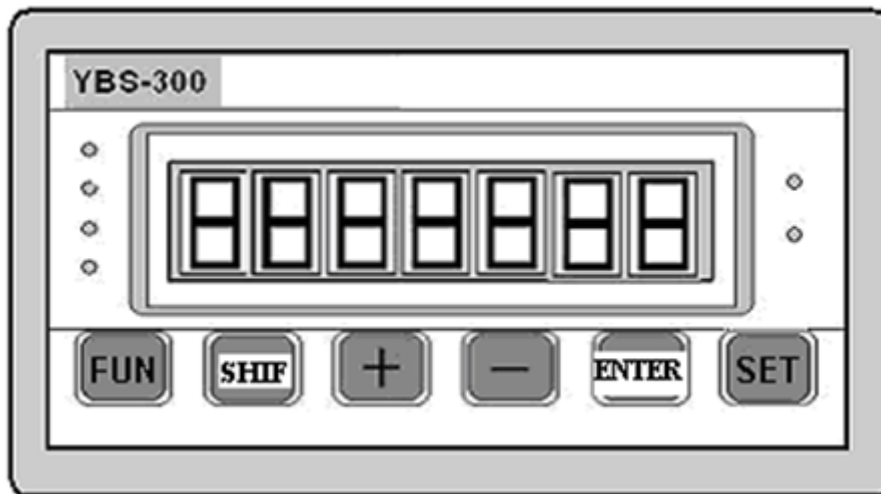
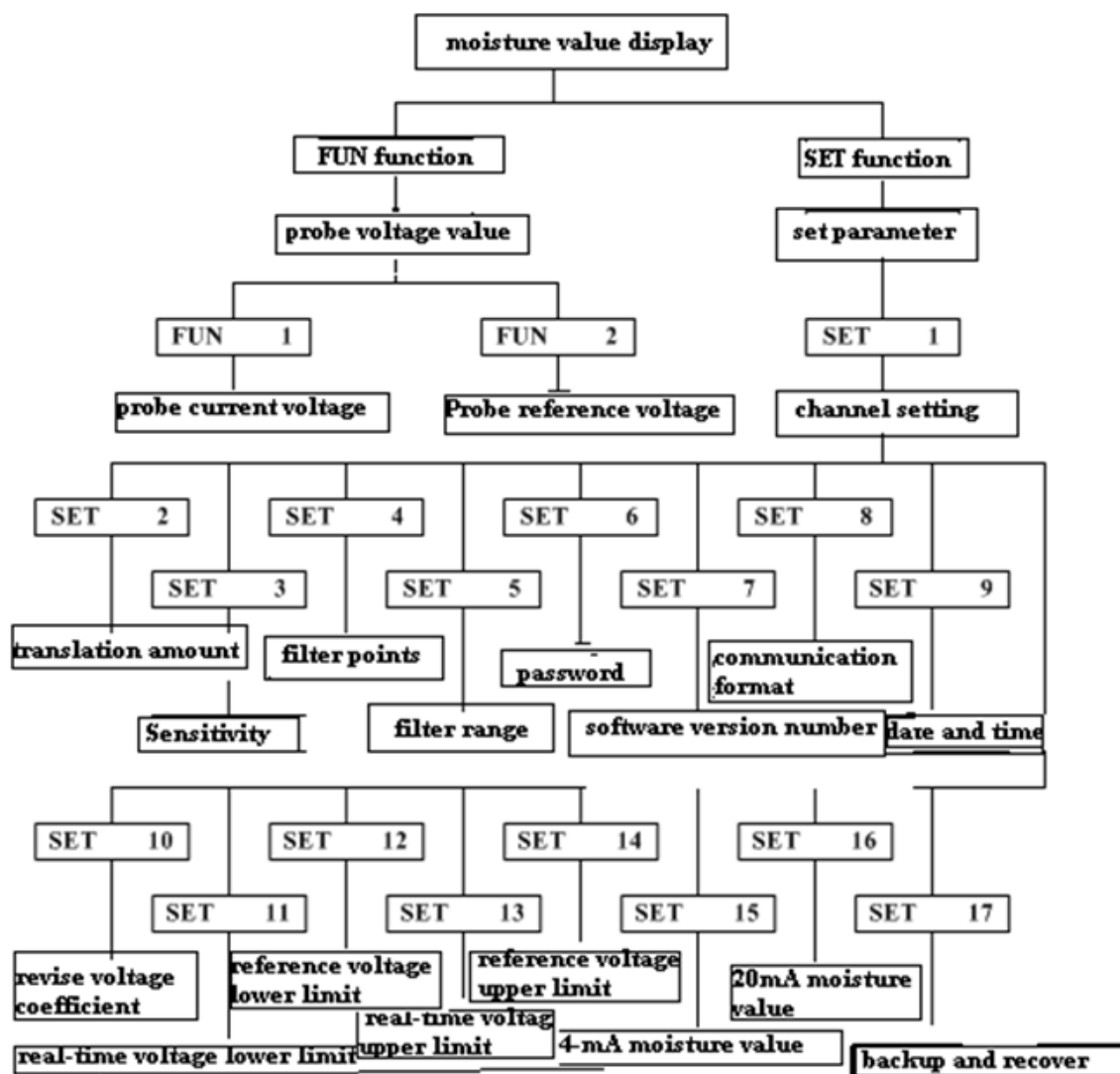




Figure 4.1 the operation interface of host and operation flowchart.



#### 4.1.1 Probe signal detecting function

(1) When start the moisture meter and there are some materials under the probe,

You can detect the probe 2 output voltage signal to judge the probe if works normally.

(2) Normal voltage range of probe output signal: FUN 01: 0.55V; FUN 02: 1.1V;

(3) The voltage of FUN 02 will not vary with the variation of material moisture.

(4) The voltage of FUN 01 will vary with the variation of material moisture, both inversely, the higher the material moisture, the lower the FUN 01 voltage is; the lower the material moisture, the higher the FUN 01 voltage is.

Look at the FUN 01、 FUN 02 according to the following method.

- Press <FUN> to enter into FUN 01; display: FUN 01

- Press <ENTER> ,look at the FUN 01 voltage; display: 

0.	5	5	7
----	---	---	---
- Press<ENTER>, go back; display: 

FUN			1
-----	--	--	---
- Press<+>, enter into FUN 02; Display 

FUN			2
-----	--	--	---
- Press <ENTER>, look at FUN 02 voltages; display: 

1.	1	2	8
----	---	---	---
- Press<FUN>twice, back to moisture testing, display moisture value.

#### 4.1.2 Parameter definition and factory default

parameter	definition	factory default
SET 1	channel parameter	01
SET 2	Translation amount	10.000
SET 3	Sensitivity	02.500
SET 4	filter points	150
SET 5	filter range	0.05
SET 6	password	0000
SET 7	Software version number	
SET 8	communication format	12
SET 9	date and time	
SET 10	revise voltage coefficient	0.0
SET 11	real-time voltage lower limit	0.150
SET 12	reference voltage lower limit	0.250
SET 13	real-time voltage upper limit	5.000
SET 14	reference voltage upper limit	5.000
SET 15	4mA moisture value	04.00
SET 16	20mA moisture value	20.00
SET 17	backup and recover	

#### 4.1.3 Parameter setting function

● **Set channels:** When the moisture meter test color, texture difference between the quite different varieties of materials, when display the moisture value, it will produce deviations. Re-adjusting translation amount is very troublesome, you can set several different channels, each channel is set within the corresponding parameters (translation amount, sensitivity, filter points),

and measurement of different species of materials is measured by selecting the channels of different varieties;

● **Translation amount:** When there is a larger difference between the moisture meter displays values and the value of laboratory testing oven, through adjusting the translation amount of the moisture meter accurately to make the instrument measurement accuracy in a certain context and the user's standard methods (such as the oven method) in line.

● **Sensitivity:** there is a big difference between the fluctuation range the moisture meter display and the fluctuation range of material moisture. when the sensitivity is set too large: There is large fluctuations in moisture meter display changes, measuring the value of high moisture material showed the high side, low-moisture measurements show the value of the low side; when the sensitivity is set too small: There is moisture meter shows a stable illusion, which can not truly reflect the actual change in material moisture, measurement shows the value of high-moisture low, low-moisture measurements show high values.

● **Filter points:** This parameter affects the stability of the moisture meter display, when filter points is too large, moisture shows stable but showed delayed for too long that can not be timely reflect the actual material moisture change; when filter points is too small, the moisture showed fluctuations frequently, which is difficult for users to reference.

● **Filter range:** This parameter affects the stability of the moisture meter display, when filtering range is too large, moisture shows stable but showed delayed for too long that can not be timely reflect the actual material moisture change; when filter range is too small, the moisture showed fluctuations frequently, which is difficult for users to reference.

● **Set password:** the parameter is used to set password for the instrument, after setting the password, when you want to modify the parameter, you need to enter the password.

● **Communication format:** the parameter is used to set the communication format for the host. It is total two digits

The first digital can set two communication formats.

1 Is the communication format with remote-reading meter?

3 is the communication with 4-20mA digit-analog converter (DAC) (only the host is modified, can it have this communication)

The second digital can set three communication formats.

2 Is communication with density meter?

3 is the communication with 4-20mA digit-analog converter (DAC) (only the host is modified, can it have this communication)

4 is Yaohua response format is the lifeblood of order A, B (communication wire have to re-raises RXD wire)

● **Amend voltage coefficient:** This parameter is used to amend voltage. If there is a deviation between the displayed voltage and the actual testing value of the millimeter, we can amend it through this parameter.

● **Real-time voltage lower limit:** FUN 1<SET 11 display “1L”

● **reference voltage lower limit:** FUN 2<SET 12 display” 2L”

● **Real-time voltage upper limit:** FUN 1<SET 13 display “1H”

● **reference voltage upper limit:** FUN 2<SET 14 display” 2H”

The SET11~SET14 is used for testing whether the probe output voltage is normal.

● the moisture value when 4-20mA minimum output current / voltage represented ,

When the water value is lower than this value, 4-20mA output minimum current.

● the moisture value when 4-20mA maximum output current / voltage represented

When the water is higher than this value, 4-20mA output maximum current.

● Backup and data recovery.

Enter "1111" backup on all current SET data.

Enter "2001"recover channel 1 data

Enter "2002"recover channel 2 data

.....

Enter "2010"recover channel 10 data

Enter "5500" recover initialization data;

Enter "6000" set the sampling time, the unit is” seconds.”

When set to a non-zero value, in the measurement mode, press "+" key to start the measurement, the screen shows the remaining sampling time, when the time is zero, displaying the average moisture value in this period , this value can display for 5 seconds . Click "-" key to cancel sampling.

## 4.2 Calibration

After finishing installation, the instrument calibrated accurately is always the first demand of users, so the calibrating method is introduced in advance.

Before calibrating, we should do the general contents and procedures of calibration:

(1) If the moisture meter is the first time installation, the moisture may be great differences between displays, too large or too small, for example: display "0" or "30", the user should first adjust the translation amount coarsely to make the moisture value close to the normal level of the detected material. For example: display "9" or so, and then collect samples;

(2) Collect the samples and measure the data in lab.

(3) Calculate the new translation amount and deal with the calculated data.

(4) If it is necessary to modify the instrument, just enter a new translation amount and save it.

### Attention

Before calibrating the instrument, you must confirm that the channel, Sensitivity, filter points have been set.

### 4.2.1 Points for attention of sampling

It can reach the accurate calibration only through multisampling and the standard measuring of samples in lab.

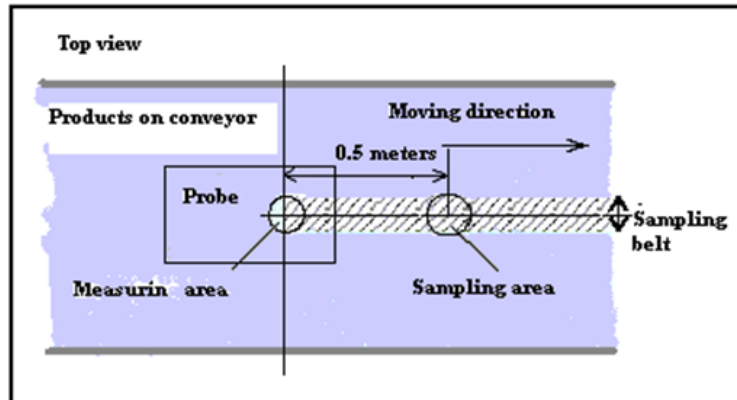
Pay attention to the following aspects on sampling:

- You must collect the samples that can be measured by instrument and have representative ness.
- It must be in the rear of the probe measured 0.5 m sampling area, the collecting line of sampling point and instrument measuring point must be consistence with materials' moving direction.
- Grasp one layer of material surface when sampling.
- Do sampling in the status of stable production and no large trend. It is very important.
- The samples must be put into the seal bag immediately
- In lab, use the double-sample method at least, and use the standard method to measure the true value of samples.
- Ignore anything that the double-sample error is very large. (do not use such samples)
- Use at least 5 samples to calibrate the instrument, because more samples will debug the

instrument more accurate.

- Compare with the noted instrument reading and the analytical value of standard method, and calculate the average error between them. The error is the modified value for accurate calibration.

Figure 4.2 General view of sampling position



#### 4.2.2 Sampling procedure

- When the production is stable and the measuring material need to be calibrated approach standard level, the operators begin to do sampling.
- In sampling phase, operators grasp the samples from production line. The sampling position must be at the back of measuring point and at a same line to ensure that the grasped samples are consistent with measuring materials. The samples must be stored in the sealed container. For the moving fine products on production line, grasp one time every five seconds and put them into the plastic bags of polyethylene that can be sealed.
- Repeat the above sampling procedure at least 5 times. More sampling times, the debugging will be more accurate.
- When analyzing moisture of the samples in lab, do double-sample measuring to each collected sample at least.
- For each calibrated measuring, all samples to calculate the average of the laboratory tests (Y) and instruments measuring the average (X).

#### 4.2.3 Data Processing

Suggested use a similar table as followings to record and calculate the data:

Table 4.1 Calibrating datasheet of moisture meter

Order	Displaying value (%)	Oven measuring value (%)	Double-sample error (%)	Double-sample average value (%)	Error (%)
1	12.53	13.11	0.13	13.045	0.515
		12.98			
2	13.01	13.76	0.03	13.775	0.765
		13.79			
3	12.15	12.88	0.11	12.825	0.675
		12.77			
4	12.71	12.65	0.54	12.38	0.67
		12.11			
...	...	...	...	...	...
N	12.47	13.7	0.09	13.745	1.275
		13.79			
	X : 12.574			Y : 13.154	Error average value:0.580

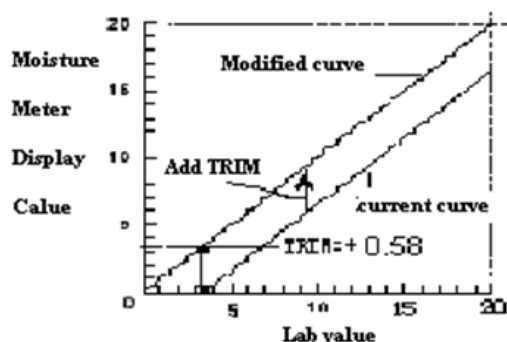
For the samples with large double-sample error, such as the No.4 sample in the example can be referenced for users' standard to delete. You can use the method of deleting the samples with largest error and smallest error to resolve the effect of accidental factors.

Calculate the new translation amount:␣

Error average value= the average value of the laboratory tests(Y) - instruments measuring the average (X)␣

New translation amount=old translation amount + error average value.␣

#### 4.2.4 Adjust the moisture display value (translation amount adjustment)




Basic condition: the probe has been installed and normally works on production line; do sampling according to the above method and calculate the new translation amount e, set new translation amount.


Reference to Table 4.1 table: the old translation amount = 1.8, error average value = 0.58.

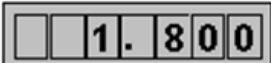
Adjust the translation amount according to the steps as follows:

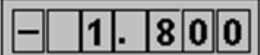
- Error average error < 0.5%, it is unnecessary to adjust.

Error average error > 0.5%, adjust the translation amount (change the SET 0.2 Parameter).

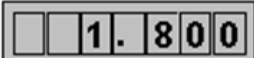
- Press <SET>, enter into parameter setting function, display: 

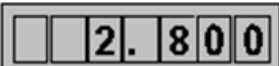
- Press <+>, choose "SET 02" translation amount setting, display: 

- Press <ENTER>, display the old translation amount (1.8); display: 

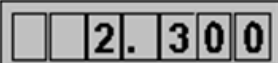
- If want to enter the negative number, press <SET>, display minus: 


- Press <SET> again, the minus disappears, back and then input positive value, display:



- digital bit flash, press "<+>", change bit "1" to "2"; display: 

- press <SHIFT>, The first decimal point flashes;

- press <+>, Decimal point as the first "8" to "3"; display: 

- press <ENTER>, save the input. Display: 

- Press <SET>, back to testing moisture state, display moisture value.



## 4.3 Settings

### 4.3.1 Basic operation of setting buttons

- <SET>: Enter the parameter setting function or input parameter value "-" number;
- <ENTER>: Transferred out parameter value or save parameter input.
- <SHIFT>: Choose the decimal point bit and integer bits of the parameter values you want to modify.

### 4.3.2 Set channel

Set up a new product must start here: set the corresponding parameters (translation amount, sensitivity, filter points, filter range) to each channel at the same time.

- Press <SET>, enter the parameter setting function; display: 

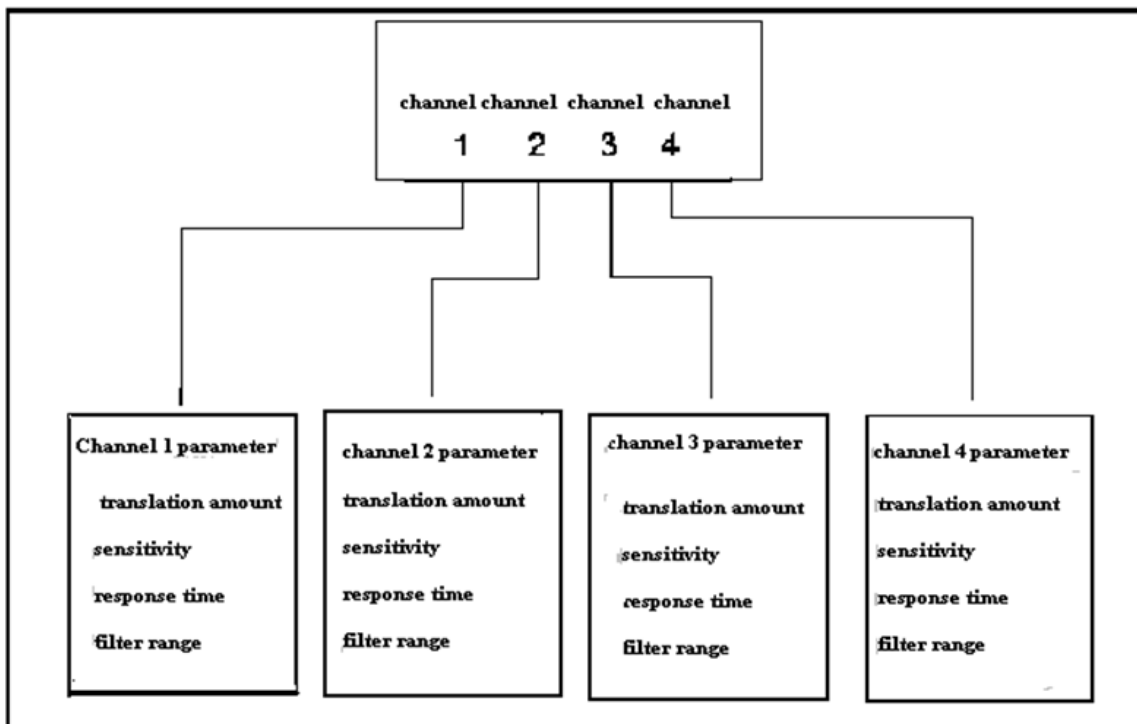
S	E	T				1
---	---	---	--	--	--	---
- Press <ENTER>, display the current channel number; display 

						0	1
--	--	--	--	--	--	---	---
- Press <+>, choose the new channel; display: 

						0	2
--	--	--	--	--	--	---	---
- Press <ENTER>, enter the channel "02" ; display: 



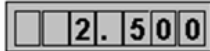
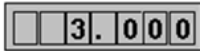

S	E	T				2
---	---	---	--	--	--	---
- Set the channel parameters one by one down: translation amount, sensitivity, filter points, filter range.

Figure 4.3 hierarchy pictures of channel parameters



### 4.3.3 Sensitivity setting

When in the moisture meter debugging process, there is a larger difference between the variation range of moisture meter display and oven method for testing, the sensitivity should be adjusted.







- Press <SET>, enter the parameter setting function; display: 
- Press <+>, choose "SET3" Sensitivity setting; display: 
- Press <ENTER>, display the original sensitivity; display: 
- Press <+> or <->, input new sensitivity; display: 
- Press <ENTER>, save the input setting; display: 
- Press <SET>, go back to moisture testing state, and display moisture value.

### 4.3.4 Filter Points Setting


Set the delayed time of moisture display, factory default: 150. When variation range of moisture displaying value is larger, we can increase the filter points to make the moisture meter display stably. On the contrary, when moisture meter delay displaying for too long, we should reduce the filter points.


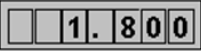
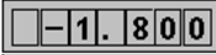
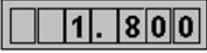
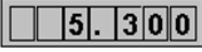

The steps we set filter points is as follows:

For example: the original filter points: 150, new filter points: 175.

- Press <SET>, enter parameter setting function; display: 
- Press <+>, choose "SET 04" filter points setting ; display: 
- Press <ENTER>, display the original filter points: 150 ; display: 
- Press <SHIFT>, Select the second digit, the digit selected will flash;
- Press <+>, change the number, change 5 to 7, display: 
- Press <SHIFT>, Select the third digit, the digit selected will flash;
- Press <+>, change the number, change 0 to 5, display: 
- Press <ENTER>, save input settings; display: 
- Press <SET>, back to moisture testing, display moisture value.





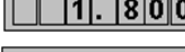

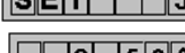




### 4.3.5 Translation Amount Setting

- press <SET>, enter parameter setting function; display: 

- press <+>, choose “SET 02” translation amount setting; display: 
- Press <ENTER> to confirm, display the original translation amount. display: 
- If want to input negative number, press <SET>, display: 
- Press <SET> again, the minus disappear, back to positive value input. display: 
- Press <+> or <->, change the number, and input new translation amount,  
New translation amount= original translation amount+ error average value; Display: 
- Press <ENTER>, save input settings; display: 
- Press <SET>, back to moisture testing state, display the moisture value.

#### 4.3.6 View Saved Parameters

The parameters calibrated are saved in the channels, In order to view a channel of these parameters, we need to know to which channel these parameters belong to:

- Press <SET>, enter parameter setting function; display: 
- Press <ENTER>, See the current channel number; display: 
- Press <ENTER>, go back; display: 
- Press <+>, choose “SET 02” translation amount; display: 
- Press <ENTER>, view translation amount; display: 
- Press <ENTER>, go back; display: 
- Press <+>, choose “SET 03” sensitivity; display: 
- Press <ENTER>, view sensitivity; display: 
- Press <ENTER>, go back; display: 
- Press <+>, choose “SET 04” filter points; display: 
- Press <ENTER>, view filter points; display: 

## Chapter Five the structure of QL-300 moisture meter

### 5.1 Probe

The main parts of QL-300 Probe: Optical components, the probe board (signal amplification board), power supply board, connection interface of the probe and the host.

- the probe board (signal amplification board): processing detector output signal, the optical components are fixed on this board, Probe main board shall not be Self-demolition by user, if user do this , our company will not be responsible for damage caused by the demolition of the board and not responsible for the maintenance

- optical components: light bulbs, detector (lead sulfide), filter discs, modulation plate, synchronous locator, optical components are strictly prohibited demolition, minor changes in optical components can also cause moisture meter out of work;

- (1) Lighting: transformer inside the probe supplies the power to light bulbs (AC 5 V/3A), when replacing the light bulb , we must do according to instruction requirements

- (2) Filter discs: infrared interference filter is one of the key components of the infrared moisture meter, filter disk has two sets of holes for the Synchronization holes

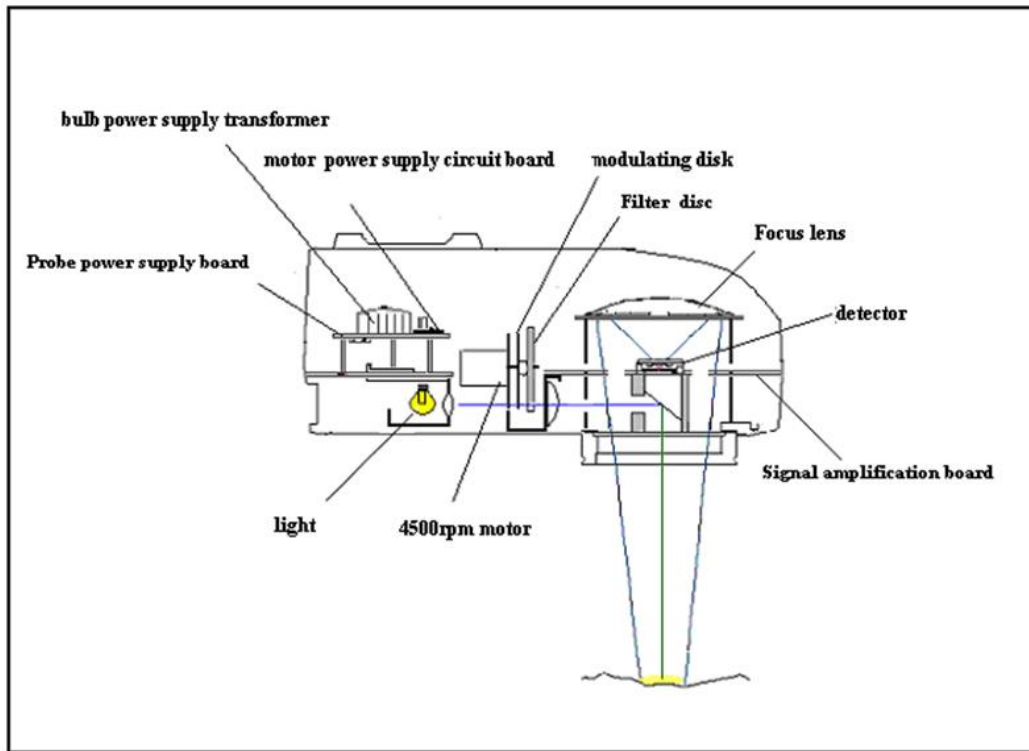
- (3) Synchronization locator: fixed to the main board of the probe through the synchronization bracket ,filter discs need to maintain rotating freely and do not occur friction in the middle of the Synchronization Locator .when replacing the synchronization locator, according to instruction requirements

- power supply board: it is composed of probe transformers and electrical power board which are fixed on a metal liner, providing bulb power supply AC (5V/3A) and electrical power supply DC (9V/0.5A), there is high voltage in the input socket of electrical power board transformer. When the instrument is power up, don't touch it.

- Probe signal interface:10-core aerial socket at the rear of probe;

- Probe power interface;7-pin aerial socket at the rear of probe

Figure 2.3 the structure picture of QL-300 probe



### 5.1.1 Main board of probe (signal amplification board)

Probe signal amplification circuits and optical components are integrated on the main board. Of the probe, 7 points on the circuit board marked "screw" is removal screws of the circuit Board. Others which are not marked on the optical component is a fixed screw, the user is strictly prohibited to dismantle it.

The voltage detection point used for detecting the signal amplification circuit and synchronous locator is set on the main board of probe.

Figure 5.1 location pictures of probe main boards and optical components

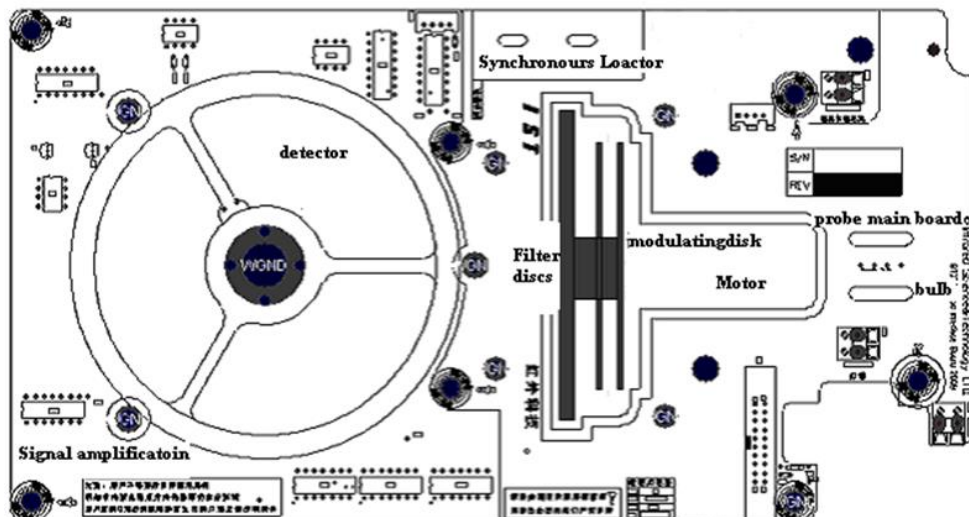


Figure 5.2 the test point of probe main board signal amplification circuit

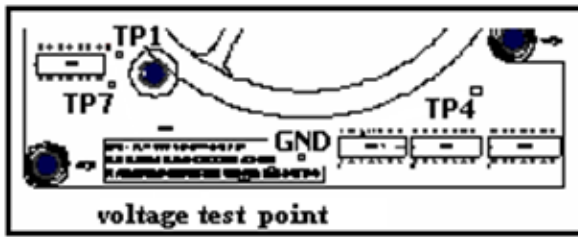


Table 5.1 Probe board test point voltage

Test point	Test point voltage
TP0	0V (GND)
TP4	+1V~+4V
TP7	+5V
TP1	-0.2V~-1.2V

Figure 5.3 the testing point of probe main board signal amplification circuit (2007 version)

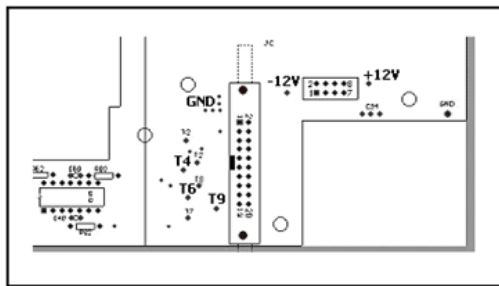


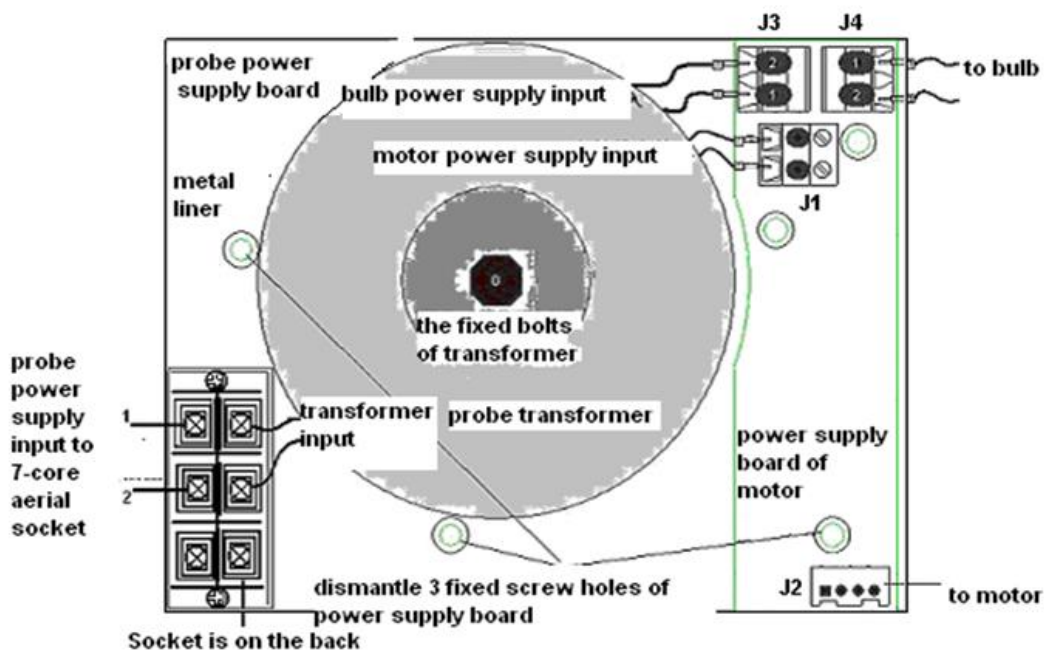
Table 5.2 Probe board test point voltage

Test point	Test point voltage
T0	0V (GND)
T4	+1V~+4V
T6	+5V
T9	-0.2V~-1.2V

### 5.1.2 Probe power supply board

Probe power board is fixed to the top of the probe main board by three Ø8 Steel columns, supply work power to light bulbs and motor. Attention that there is a high voltage on the back of the transformer input socket which is at the back of power board, do cut off the total power supply of instrument before dismantle this board.

Figure 5.4 probe power supply board



Socket: J1: AC 9V/0.5A; J2: DC 9V/0.5A, motor power supply interface;  
 J3: AC 5V/3A; J4: AC 5V/3A, light bulb power supply interface;

Probe power supply board is fixed at the top of the probe main board through three Ø8 of steel columns.

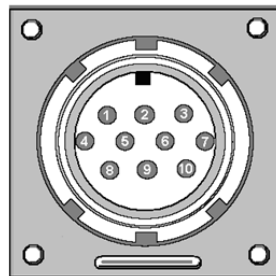
Figure 5.5 the photo of probe power supply board



### 5.1.3 Connection interface of probe and host

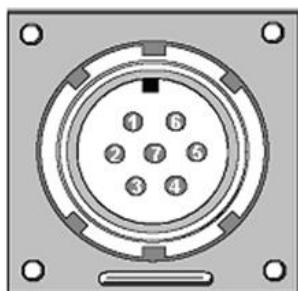
(1) Probe signal interface: 10-core aerial socket at the rear of probe, is supplied D.C±12V by host and the probe output signal is input through 10-core aerial socket.

Figure 5.7 probe 10-core aerial socket



(2) Probe power interface: 7-pin aerial socket at the rear of probe, the host supply power to probe through 7-pin aerial socket input, and supply power to light bulbs and motor, the socket has a high voltage, do not dismantle when the instrument start up.

Figure 5.8 Probe 7-pin aerial socket



Number	Signal
1	Neutral wire
2	Live wire
3	Ground wire

Figure 5.9 the photo of aerial socket at the rear of probe

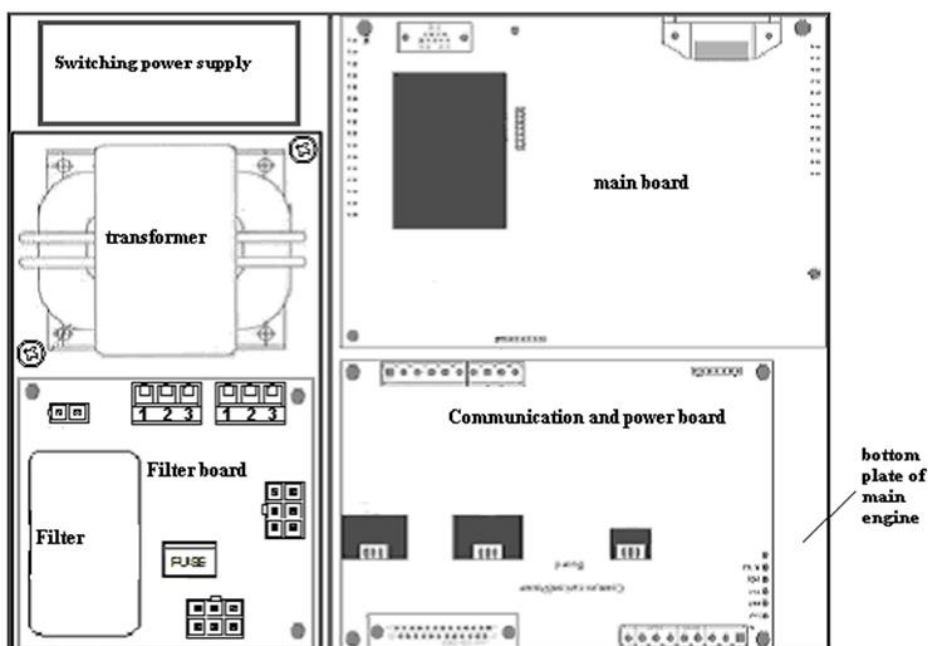


## 5.2 The host

The main parts of QL-300: input power modules, communication and power supply board, main board and display board.

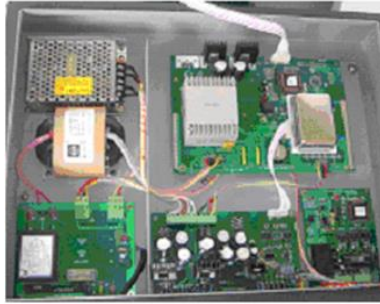
- Input power modules: Including host transformer and filter board, fixed on the bottom board of probe through a metal liner, there is a high voltage on the module's circuit, do confirm that the total power has been cut off prior to demolition
- Communication and power supply board: To provide the probe board  $\pm 12V$  and the instrument and the remote - reading meter, .microcomputer connected output signal, fixed on the bottom of the host.
- Main board: Including the A / D acquisition module, CPU processors, fixed on the bottom of the host.
- Display board: Fixed in the main box cover, connect with the main board by an 8-core flat cable.

Figure 5.10 internal structure of host



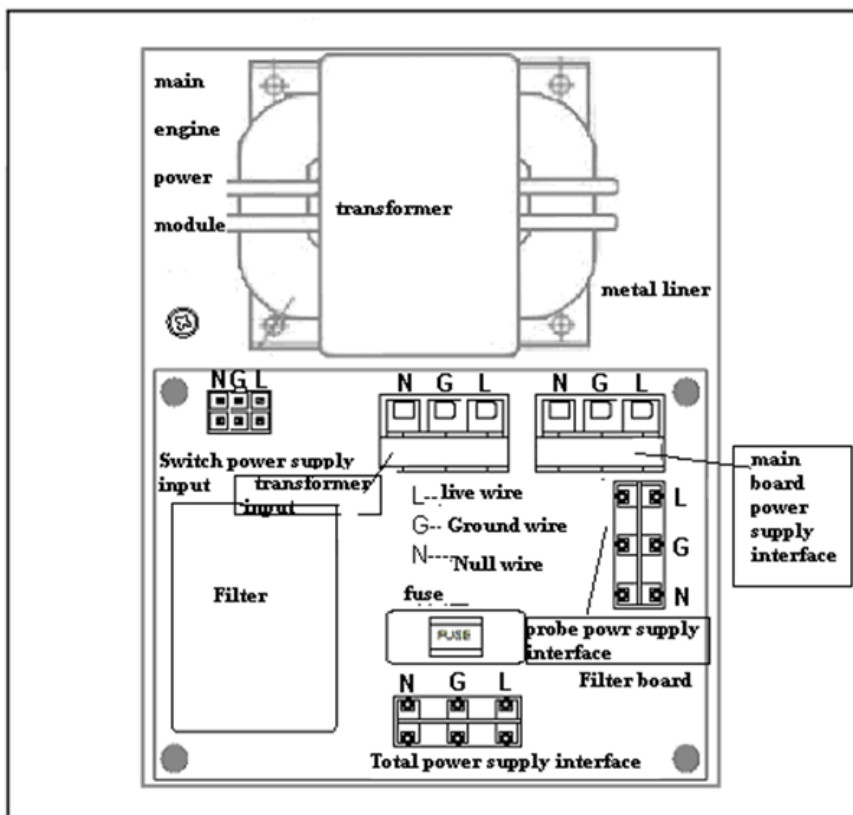


### 5.11 host internal photo



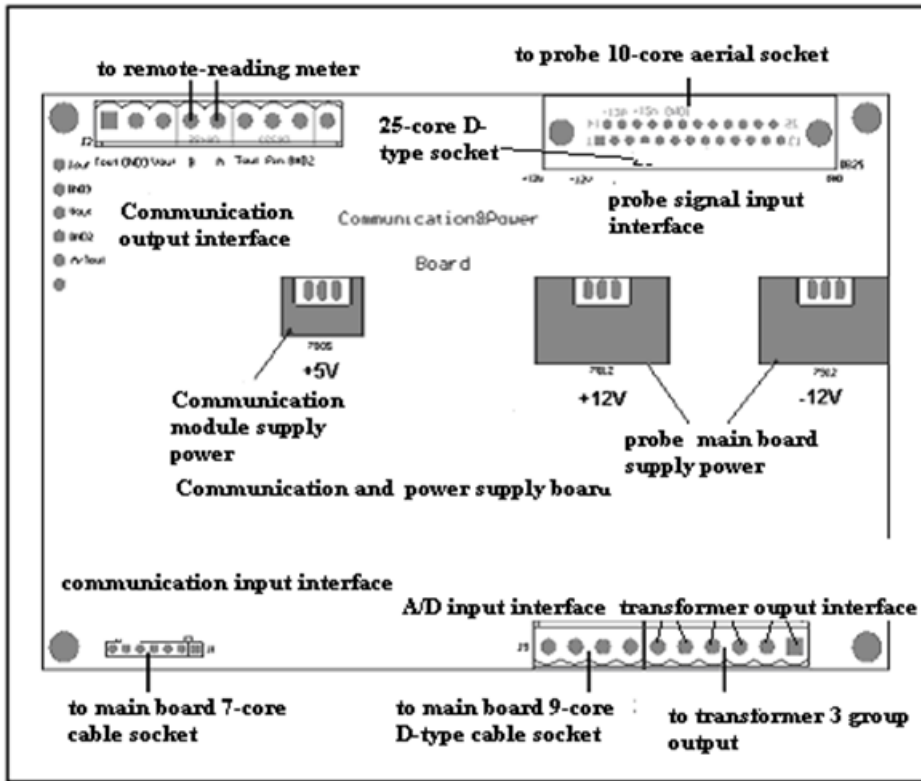
### 5.2.1 The connecting wiring of host power module

Figure 5.10 interface definition of host power module



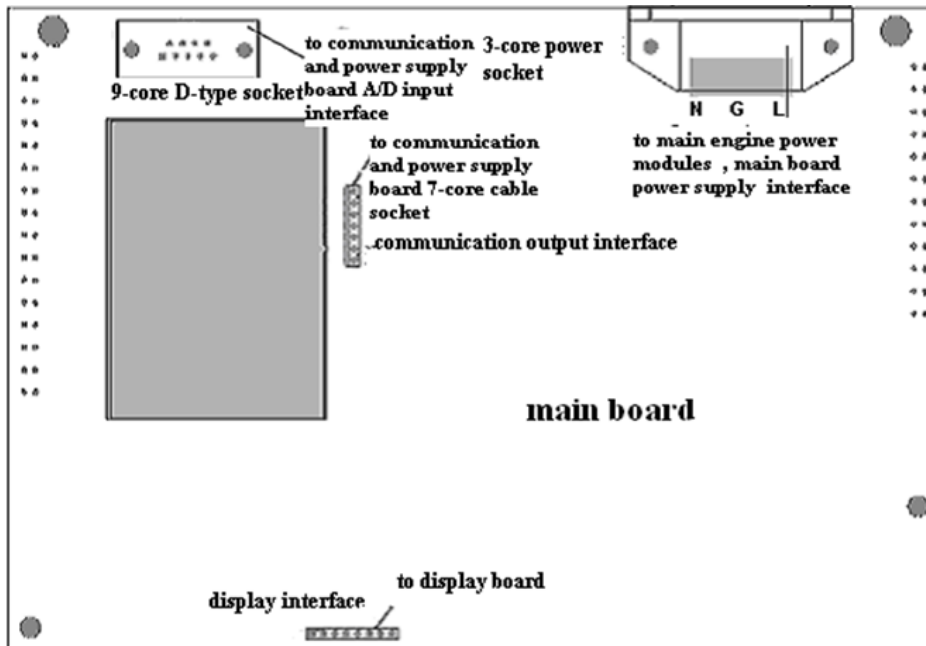
### 5.2.2 The connecting wire of host communication and power board

Figure 5.10 interface definition picture of host communication and power board



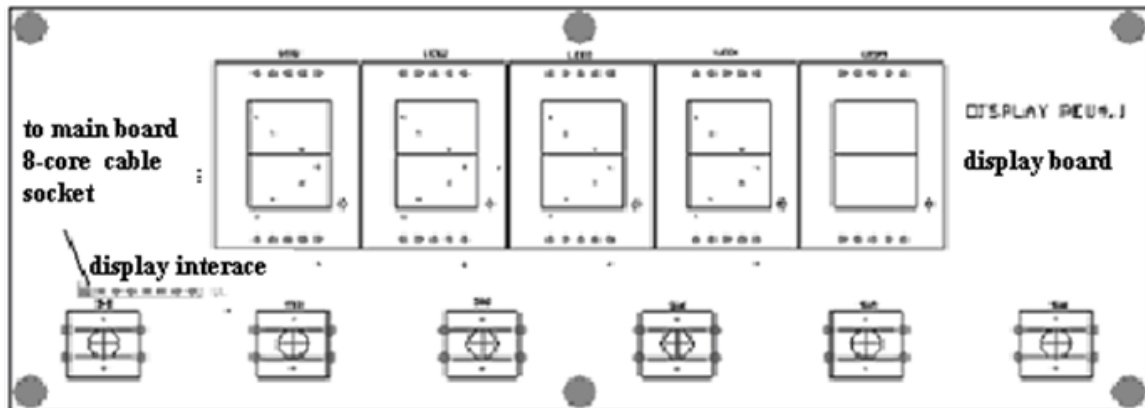
### 5.2.3 The main board connecting wire

Figure 5.10 interface definition picture of host board.



## 5.2.4 The connecting wire of display board

Figure5.10 host display board



## Chapter Six Maintaining

### 6.1 Replace Light source bulb

**Warning:**  
Don't touch the bulb before cooling.

- (1) Don't touch the bulb shell or will shorten bulb life.
- (2) Do not disassemble the instrument in a clean room. Prevent electrostatic discharge when operating and do not open the instrument in the workshop with dust and steam etc.
- (3) Replacing the bulb means replacing the whole bulb components: Light bulbs, ceramic light bulb base, fuses, do not dismantle light bulbs separately.

Disassemble the light source bulb components according to the following method:

#### Disassembling procedure of light source bulb components:

- Put the probe window upwards to worktable.
- Loosen 6 fixed screws and put them together with the cover to prevent losing.
- Put instrument on the position that is easy to disassemble bulb. We can see the light bulb components are fixed on the bulb bracket through the two inner hexagonal screws;
- Take out of the light bulb components and insert them in the plug of the circuit board
- Use the hexagonal wrench to loosen one inner hexagonal screw which is fixed on bulb lamp

holder, one under inner hexagonal screw need to disassemble through shell Ø6 hole;

- Unscrew Ø6 screws on the shell side ,inserted Hexagon wrench From the hole Ø6
- Unscrew one hexagon screw which is under fixed ceramic lamp-pedestal; carefully take out of the bolt components.

**Installing procedure of light bulb components:**

- Take out the new bulb components from packing box.
- Carefully put the new bulb components into the bulb bracket. Don’ t touch the glass shell of bulb during operating procedure.
- Screw two screws which are used for fixing ceramic lamp-pedestal and fix the light bulb components, note that the fixed-hole plastic ceramic seat cushion pad is necessary, so as not to screw ceramic lamp-pedestal broken
- screw the Ø6 screw on the side of shell;
- insert the two power plug of the light bulb components in the circuit board on the light bulb socket (regardless of polarity);
- cover the probe cover, and screw 6 fastening screws

**Please note:**

Replacement of light bulbs is to replace the whole bulb components. Light bulbs or lead wire can not be dismantled alone.

The height from the bottom of Ceramic lamp-pedestal to midpoint of filament is 44mm;



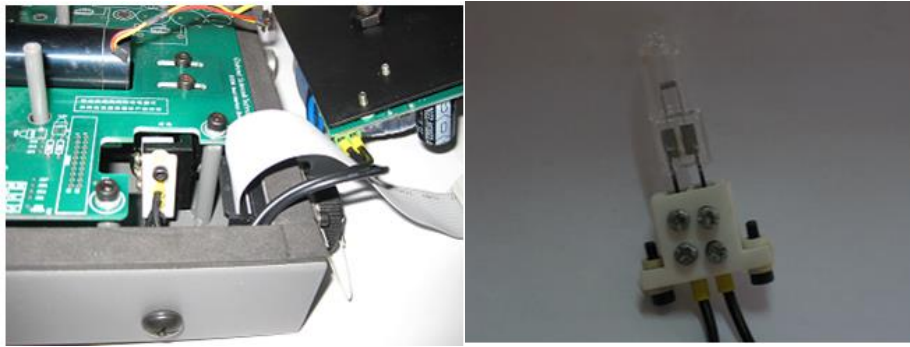


Figure 6.1 Bulb replacing

## 6.2 Filter wheel motor replacement

**Warning:**  
Don't electrify the probe after opening cabinet

**Attention:** don't touch and damage the filter on disc when disassemble filter wheel motor. Put the optical part of filter disc upwards in a clean plastic bag, otherwise the filter disc will be probably damaged.

### Assembling and disassembling of filter wheel motor

The filter and modulating disc are both fixed on motor shaft.

Operating according to the following method:

- Put the probe window upwards on the worktable.
- Loosen the fixed screws of probe cover, and put them together with the cover to prevent losing.
- First disassemble the power supply board on the motor; it is fixed by 3 M4 inner hexagon screws through three Ø8 Steel columns...
- unscrew the power supply board screws, opened a power supply board, see the motor and two fixed screws;
- Pull out the motor 2-core plug of the power supply board.
- screw loose 2 fixed motor M4 × 8 stainless steel screws, but do not wring out
- Carefully take out the motor and filter wheel components, because the filter disc and modulating disc are pierced on motor shaft. so be careful when you remove it.
- Refer to figure 6.2, Screw loose filter wheel fixed screws, remove the filter wheel components from motor shaft, put the optical components of filter wheel upward and put it in a clean plastic

bag, or may be damage the filter disc.

- Replace the filter wheel motor according the following process.
- Take out the new motor; install the filter wheel components on motor shaft by original. Don' t hurry to tighten the screws which are fixed on the filter wheel.
- Install the new motor, and adjust the location of the filter wheel motor, and make it fixed in the middle of location hole.(there is a position mark of filter wheel on the main board),  
Screw fixed screws of the filter wheel.
- Install the motor and filter wheel components on the motor fixed bracket of motor, screw the two M4×8 stainless steel screws to fix motor., in order to install the motor solid,  
Stainless steel screws must be screw tightly
- resume power supply board installation, tighten the three fixed crews;
- insert the motor 2-core cable plug into the socket of power supply board
- Check whether it will occur friction when modulation disk and filter wheel are rotating.
- Cover the probe cover, tighten the 6 fixed screws.

**Please Attention:**

- When fixing the motor, the motor and filter wheel components should be installed on the motor fixed bracket of main board.
- When fixing the filter disc, attention that don' t make friction between filter disc and synchronous locator.
- The two stainless steel screws used for fixing the motor must be screw tightly.

### 6.3 Synchronous locator replacement.

The instrument must be opened in clean room but not the workshop with dust and steam etc.

Put the instrument on the position that is easy to repair, replace the synchronous locator with the following steps:

- Put the probe cover upwards on worktable.
- Loosen the fixed screws of cover and put them together with the cover to prevent losing.
- We can see that the synchronous locator was fixed on “L-shaped” bracket through two inner M3 hexagonal screws.
- Plug out of the 4-core flat wire plugs which are connected with the Synchronous locator;
- Loosen the two M3 inner hexagonal screws fixed on the synchronous locator and take down

synchronous locator.

- Put new synchronization locator, when install, please note that there are two marked lines in the long strip installing hole of synchronous locator. Marked lines are to be aligned 2 fixed screws of L-shaped bracket (refer to Figure 6.3)
- screw the two M3 inner hexagonal screws ,and fix the synchronous locator;
- Plug 4-core flat connecting wire plug which connect with the synchronous locator.
- Cover the cabinet and tighten the fixed screws.

Figure 6.2 filter wheel motor replacement

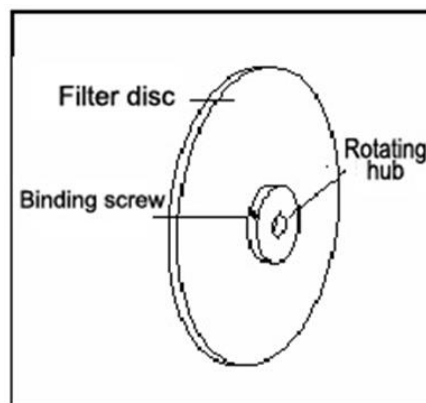
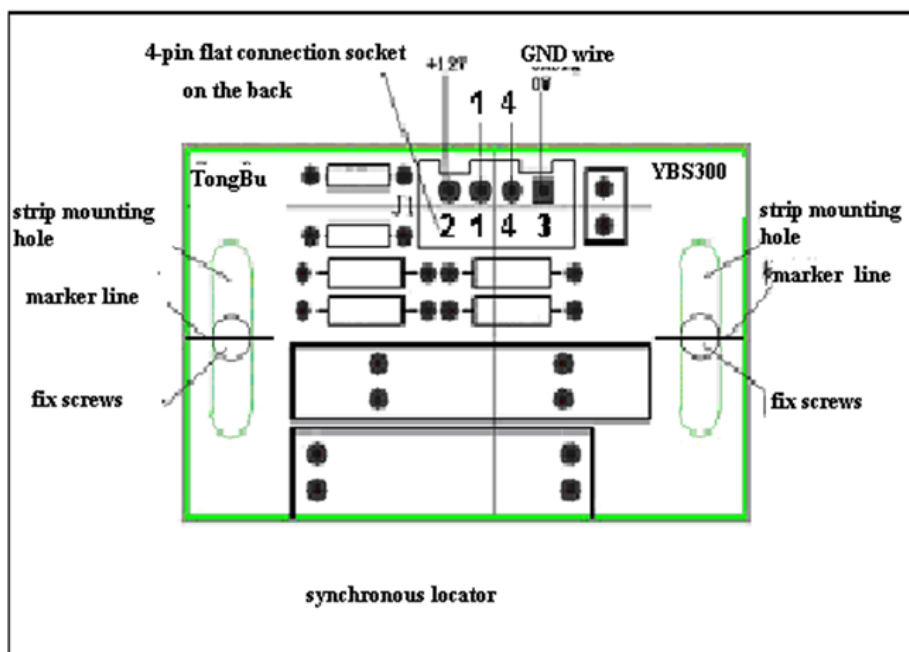


Figure 6.3 the front view of synchronous locator



**Fault judging method of the synchronous locator:**

- Take down the probe cover.
- Connect prude with the 3-core cable and 10-core cable of the host

- Instrument connect to the power turn, use digital multimeter to measure 4-core flat connection socket "1", "4" voltage, Socket "3" is the ground (GND);
- Digital Multimeter black table pen connect "3"; digital multimeter red table pen connect "1" or "4";

"1" Normal Voltage: 0.3V

"4" Normal Voltage: 1.0V

## 6.4 Fuse replacement

**Attention:**

There is high voltage in the main engine and probe, before replacing the fuse, please confirm that the total power supply has been cut off.

The instrument must be opened in clean room but not the workshop with dust and steam etc. Put the instrument in a position that is easy to repair, replacing the synchronous lector in the following steps:

- Unscrew the eight screws which are used for fixing the cover of host.
- Take down the cover, attention that there is cable between the cover and main board. To prevent losing, put screws and cover together.
- Refer to figure5.10, find the fuse location on the main board, fuse is installed in the plastic fuse box which has cover.
- Pull out the fuse cover; fuse is in the fuse box.
- Put in the new fuse
- Screw the eight screws which are used for fixing the cover of host.

## 6.5 Check the cable and cable joint

Check the cable of system regularly, to see if there is mildew, broken, twisted situation, and solve them at any time. Clean any waste which may touch with the cable. Because these waste will damage the cable mechanically or chemically. The cable joints must be fully screwed so as to avoid interference with equipment.

## 6.6 Live interference judging of moisture meter

When the instrument appears unstable displaying value and large fluctuation, you should first check



if there is live interference. When the host equipment is not in work or the moisture meter is moved to office to be connected with power, place the fixed sample under the probe at the distance of 250mm to observe the changes in moisture displaying... If the moisture displaying is stable that indicates the moisture meter works normally and there is interference in the site. Check the grounding wire if be well connected and if there is frequency converter or large motor closed to the moisture meter.

### **6.7 Common fault adjustment of moisture meter**

- When the host displays “E7” , the host is malfunction.
- No ray comes out from the probe that means the bulb burns out.
- Aperture flash obviously, frequency of flash is very slow, that means the motor of probe is damaged.
- When the motor does not rotate , that means the probe or motor power supply circuit Is malfunction...?
- When the screen of the host displays “EL” or “EH” , press <FUN>, view FUN01, FUN02 voltage, if the voltage value is abnormal, that means the probe malfunction...
- If the probe signal is normal: we can judge that the host is malfunction.
- When the screen of the host displays “0” , view FUN01, FUN02 voltage, the translation amount is too small.

### **6.8 Fault checking of instrument**

Attention: when check the instrument fault, we must place a fixed sample under the probe, at the distance of 250mm, when the instrument displaying value is unstable, large fluctuation or no change in displaying value, on the avoiding live interference situation, we can judge that instrument malfunction.

Check the instrument fault according to the following process.

- First you should check if there is ray comes out from the probe.

If there is no ray, the bulb may be broken, replace the bulb; the other possibility is that the motor is broken, replace the motor.

- Check the probe output signal; press <FUN>, view FUN01, FUN02 voltage (refer to page4.1.1 the probe signal testing).
- If the probe output signal is normal, we can judge the host fault.
- If the probe signal is abnormal; pull out 10-pin aerial plug (refer to page21 table3.2), use multimeter measure  $\pm 12V$  voltage.
- $\pm 12V$  voltage is normal; we can judge the probe fault.
- $\pm 12V$  voltage is abnormal; we can judge the host fault.

Figure 6.4 the flowchart of instrument fault checking.

