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Chapter 1 Overview of urine analyzer LTH600

1.1 Overview of urine analyzer LTH600

Urine analyzer LTH600 is a high performance,high testing speed, multi-functional medical urinalysis inspection instruments after LTH100 series. Adopting the advanced “High luminosity cold light source reflection determination” technology and D pipeline architecture, the users put the test strips on the platform at any time and does not need to consider the reaction time. The instruments check the strips with the above sensor, and then transmit the strips to start testing, print the testing results automatically. The barcode reader scan to input the ID NO. Of hospital, key input was replaced by touch screen, The information exchange between users and instruments are through the touch screen and interactive programs.

The urine analyzer LTH600 should be used the matched urine strips produced by our company, can test the 13 kinds of chemical component of Bilirubin (BIL), Urobilinogen(URO) , Ketone(KET) ,Blood (BLD) ,Protein (PRO), Nitrite(NIT), Leukocytes(LEU),Glucose (GLU),pH, Specific Gravit (SG) , Ascorbic Acid within 6.9 seconds.

1.2 Technical index

*Testing Principle: super-high luminosity cold light source reflection testing principle

*Testing Items

Items	Name	Abbr	Items	Name	Abbr

1	Bilirubin	BIL	8	Glucose	GLU
2	Urobilinogen	URO	9	Specific Gravity	SG
3	Ketone	KET	10	pH	PH
4	Blood	BLD	11	Ascorbate	VC
5	Protein	PRO			
6	Nitrite	NIT			
7	Leukocytes	LEU			

***Above 11 parameters distribute on three kinds of strips

* Testing Speed: 522 tests/hour

* Data Memory： 1000 test results

*Matching Test Strip: R-11P(exclusive used only on LTH600)

* Display Screen:LTH600 display is 7 inch color touch screen

* Language： English

* Environment Condition：tempreture：0℃~40℃；Optimum condition：20℃～25℃ RH＜85%RH

* Power Supply: AC220V（±15%），50~60Hz

* Fuse wire specification： 250 V 2A

* Power：≤60W

* Net Weight：6.9Kg

* Size：485mm×485mm×410mm

* Baud Rate of Data Communication Interface：1200bps，2400bps，4800bps，9600bps（default），19200bps，38400bps，57600bps，115200bps（selection）

* Qualitative index, quantative data results display and print, Thermal printer inside, with outer stylus printer interface

* Connect with the computer through Standard RS232C port

1.3 Operation Principle

Urine Analyzer adopts the principle of photoelectric color comparison to test the quantity of biochemical component according to the color change caused by getting the urinalysis strips react with the biochemical components in urine.

The instrument uses three kinds of monochromatic light to scan the reagent areas one after another, and the scanning system converts the optical signal to electric signal. After treatment, the reflection rate of the reagent area can be calculated according to the strength of the electric signal. The amount of the biochemical component in the urine sample can be calculated according to the reflective rate.

Optics system principle is as follows:

$$R(\%) = \frac{Tm \times Cr}{Tr \times Cm} \times 100\%$$

R —The reflection rate

Tr —The reflected intensity of the blocks on the strips under the reference light

Cr —The reflected intensity of the blank block under the reference light

Tm —The reflected intensity of the blocks on the strips under the predetermined light

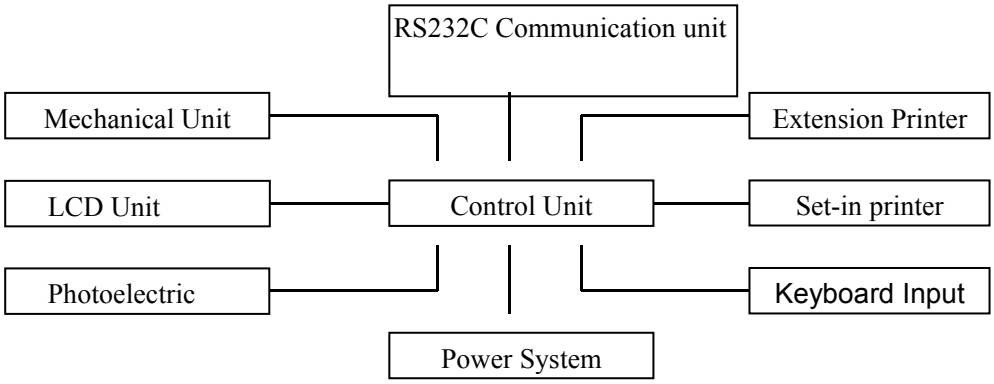
Cm —The reflected intensity of the blank block under the predetermined light

The consistency of the biochemical component on the block in the urine specimen can be calculated according to the reflective rate. The testing results will be printed in the way of clinical meaning units through the dispose of processer.

1.4 **Composite Structure**

Urine Analyzer LTH600 is mainly composed of controlling unit, mechanism unit and photo electricity scanning unit etc.

Following is the structure Diagram



The core of the Urine Analyzer is controlling unit. The main function is to taking over, transmitting, storing, disposing and sending all kinds of signal, so that each part will run harmony. Photo electricity cell is to finish the sending and inception of the cold

light resource, the collection and transition of the testing signal, and further more change the Optical signal into the electronic signal. Mechanism cell mainly carries and scans the strip by the order of the control cell. LCD and the keyboard mainly realize the comfortable interface for the users. As to the data output, the Urine Analyzer mounts the traditional thermal printer inside, besides outer stylus printer with 25 parallel interfaces, which realize the data memory permanently. The Urine Analyzers manage and control the data through RS232C port connected with computer.

1.5 Appearance introduction





1.6 Testing related data(+ system open constantly)

Testing Grade

Testing	English	Report		
		International System	Convention System	+ system

Item	abbreviation	Unit	Testing value	unit	Testing value	off	on
Bilirubin	BIL	μmol/l	neg 17 50 100	mg/dl	neg 1 3 6		- 1+ 2+ 3+
Urobilinogen	URO	μmol/l	3.3 16 33 66 131	mg/dl	0.2 1.0 2.0 4.0 8.0		+- +- 1+ 2+ 3+
Ketone	KET	mmol/l	neg 0.5 1.5 4.0 8.0 16	mg/dl	neg 5 15 40 80 160		- +- 1+ 2+ 3+ 4+
Blood	BLD	cells/μl	neg 10 25 80 200	cells/μl	neg 10 25 80 200		- +- 1+ 2+ 3+
			neg 0.2		neg 20		- +-

Protein	PRO	g/l	0.3 1.0 3.0 20	mg/dl	30 100 300 2000		1+ 2+ 3+ 4+
Nitrite	NIT		neg pos		neg pos		- +
Leukocyte	LEU	cells/μ l	neg 15 70 125 500	cells/μ l	neg 15 70 125 500		- +- 1+ 2+ 3+
Glucose	GLU	mmol/l	neg 5.5 14 28 55	mg/dl	neg 100 250 500 1000		- 1+ 2+ 3+ 4+
Specific Gravity	SG	no	1.005 1.010 1.015 1.020 1.025 1.030	no	1.005 1.010 1.015 1.020 1.025 1.030	no	no
			5.0 6.0 6.5		5.0 6.0 6.5		

pH	pH	no	7.0 7.5 8.0 8.5 9.0	no	7.0 7.5 8.0 8.5 9.0	no	no
Ascorbic acid	VC	mmol/l	0 0.5 1.5 3.0 6.0	mg/dl	0 10 25 50 100	no	no

Chapter 2 Setup Instruction of Urine Analyzer LTH600

This chapter will introduce installation and operation methods of urine analyzer LTH600. You must read the installation carefully before using the analyzer. Please install, operate and maintain analyzer according to manual strictly.

2.1. Environment Condition of Instrument Installation

Please don't put urine analyzer in place with direct sunlight, high temperature and high humidity. For keeping steady working, there should be constant environment temperature and humidity. When do the operation, the surrounding temperature should be 0℃～40℃； the best temperature is 20℃～25℃, surrounding humidity should be RH＜85%

Please don't put the urine analyzer in place which is near heat equipments, such as oven, hot plate, stove and so on.

Analyzer LTH600 is a kind of precision equipment, please handle with care. If the mechanical structure and circuit will be damaged, it will affect the testing precision, even unable to work.

2.2. Unpacking

Please take out the LTH600 Urine Analyzer and its accessories, and then check them with packing list to see whether the following parts have been damaged or not. If there are some damages please contact the supplier immediately.

Take LTH600 urine analyzer on the fixed work table; keep LTH600 urine analyzer flat and away from the wall 50 cm.

Note: please keep the LTH600 urine analyzer cartoon. If the analyzer needed to transport, the carton is the best protection.

2.3 Instrument Installation

2.3.1 Install Printing Paper

(a) Choose the thermal printing paper with 57mm width.

(b) Press the hook at the back of the cover of printer, and then lift the cover and take it off.

(c) Unfold the printing paper to extrude for certain centimeters in order to form “U”type.

(d) Pull the hand of installing paper; insert the U type part of the paper into the entry of the printer. Make the part go over the roll of the printer (Don’t change the bending direction of the paper).

(e) Put the part through the outlet of the cover of printer.

(f)Close the cover of printer.

2.3.2 Computer Connection

The standard RS232C communication interface can be connected with the outer computer, further more to realize the data communication .Through storing the testing

results and building up the integrated case database, the operator can finish database management case acquirement, data printing and so on. Meanwhile transmit the data to hospital's manage network, offer service to the system of the medical professor, composing the automatically assistant diagnose.

2.3.3 Stylus Printer Connection

Another data interface can connect with the external stylus printer. There is an option in the menu, setup, printer, choose External. Through this way, the testing data of urine analyzer can be transferred to the external stylus printer; the information of illness case can be stored for long time.

Attention: LTH600 series urine analyzer can connect with EPSON LQ1600K series, EPSON LQ 300K series, and Panasonic 1121 series stylus printer.

2.3.4 Barcode Reader Scan Function

Barcode reader can scan 13 digits. The connected port is 9 angles, 5V power. The barcode reader scans ID number to HIS system.

Barcode reader scans the ID number from the medical instruction then send to computer. This can confirm the patient identity and history.



NOTE: the barcode scanning is valid after the strips put into the analyzer and before testing finished.

Chapter 3 Functions and Setup of Urine Analyzer LTH600

3.1 Menu Functions

3.1.1Main Screen and Keys



Figure 1

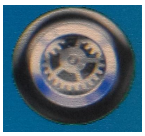
Figure 1 is the main screen after initializing, also main strips testing screen, it includes status display area and keys controlling area

*Time status display: 

*Urine strips movement position display： 

Close machine key **Test Stop key** **Species** **Key to enter screen** **silence key**








3.1.2 Functions Screen



Figure 2



Data checking key， press this key to check testing results.



Contact， Press this key to check contact information and series no.



Parameters setup, press this key to enter parameters setup screen.



Paper in， press this key to release paper but no printing.



Printer on/off and setup, Press this key to set up the printer.



Series no. and name, press this key to set up series no.and name.



Data output.

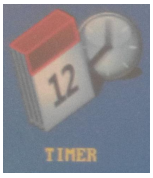


Data watch

3.1.3 Setup Screen



Figure 3



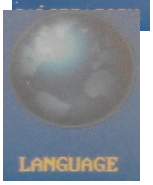
Date and time setup .



White balance setup .



Calibration input.



Language select key.



Format setup key, unit,buzzer,count mode can be set up here.



Printer setup key, copy no.,typeface, definition can be setup here.



LCD test, touch screen and LCD calibration set up.



Strips mode Setup

3.1.4 Name and No.

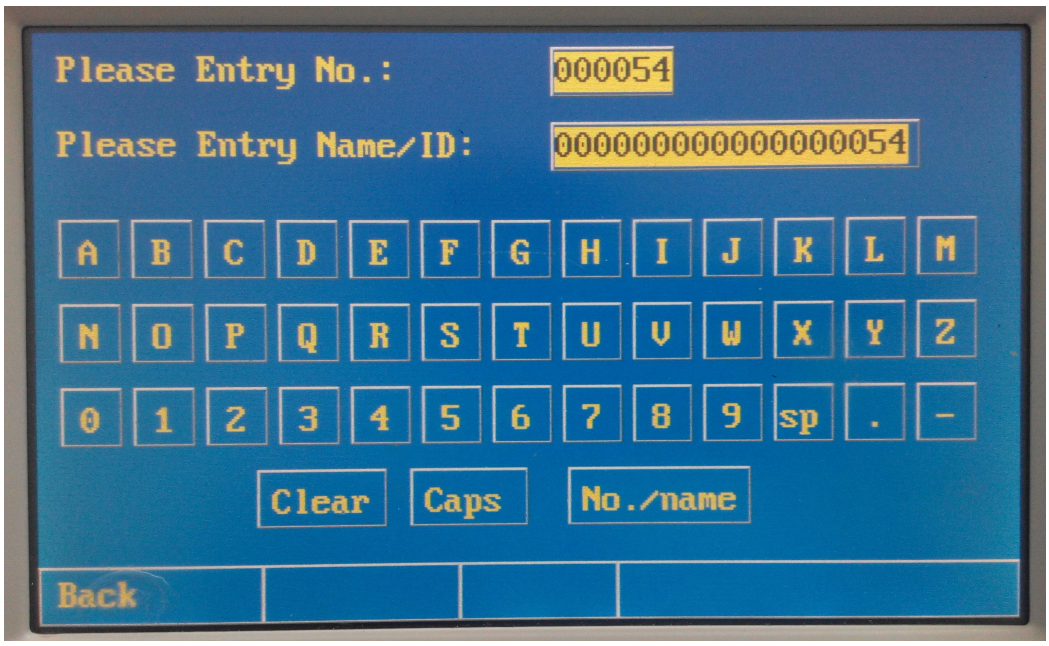


Figure 4



NO./Name switch key,if show yellow words, it is in status of number input; if show green words, it is in status of name input.



Words upper-case and lower-case key, if yellow words, it is upper-case status, press the key, it will change to green words, it is lower-case status.



If input the wrong letter or digits, press Clear to delete, and will show Zero instead

"Back "key return to upper screen, and save the settings. If you do not save the settings, please keep original words. For No. You can input numbers only, letter can not be accepted.

3.1.5 Calibration Setup

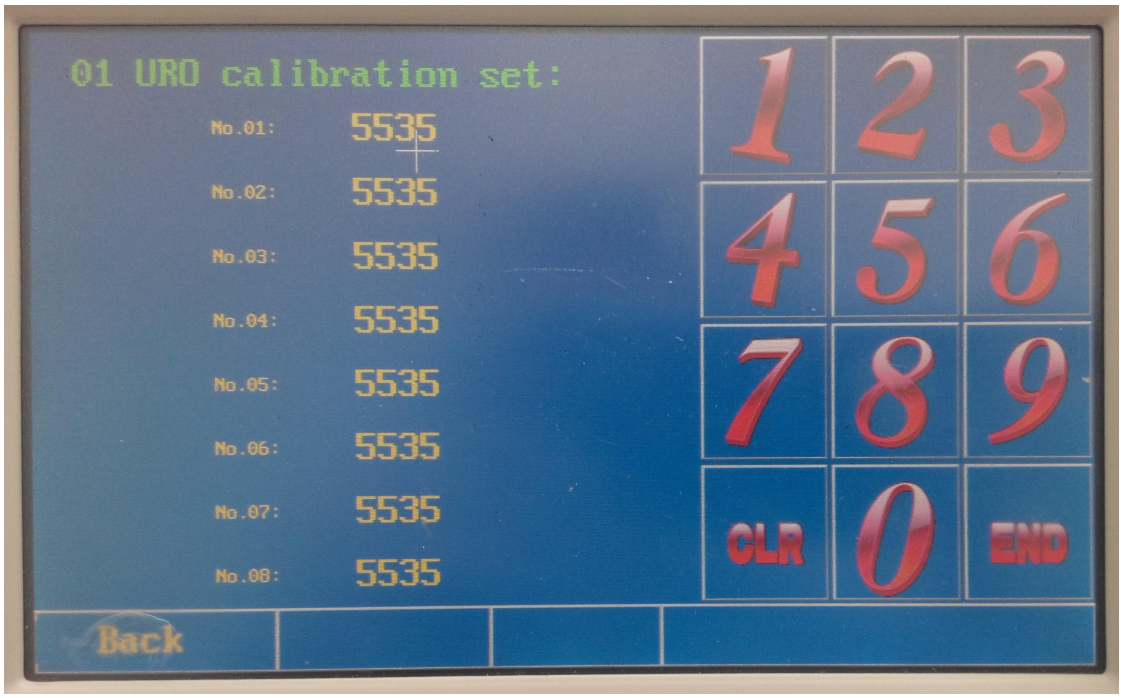


Figure 5



END key to save calibration setup. Press the keys on the photos 5 to Input the numbers, then press END to save records. Make sure save the records after all calibration value inputted.



CLR key to clear one inputted number, and Zero to display instead.

3.2 System Functions and Operations

3.2.1 System Start up

Open the power switch , system will start self-testing to inspect hardware sources and software environment. If self-testing successfully, will display the main screen Figure 1.

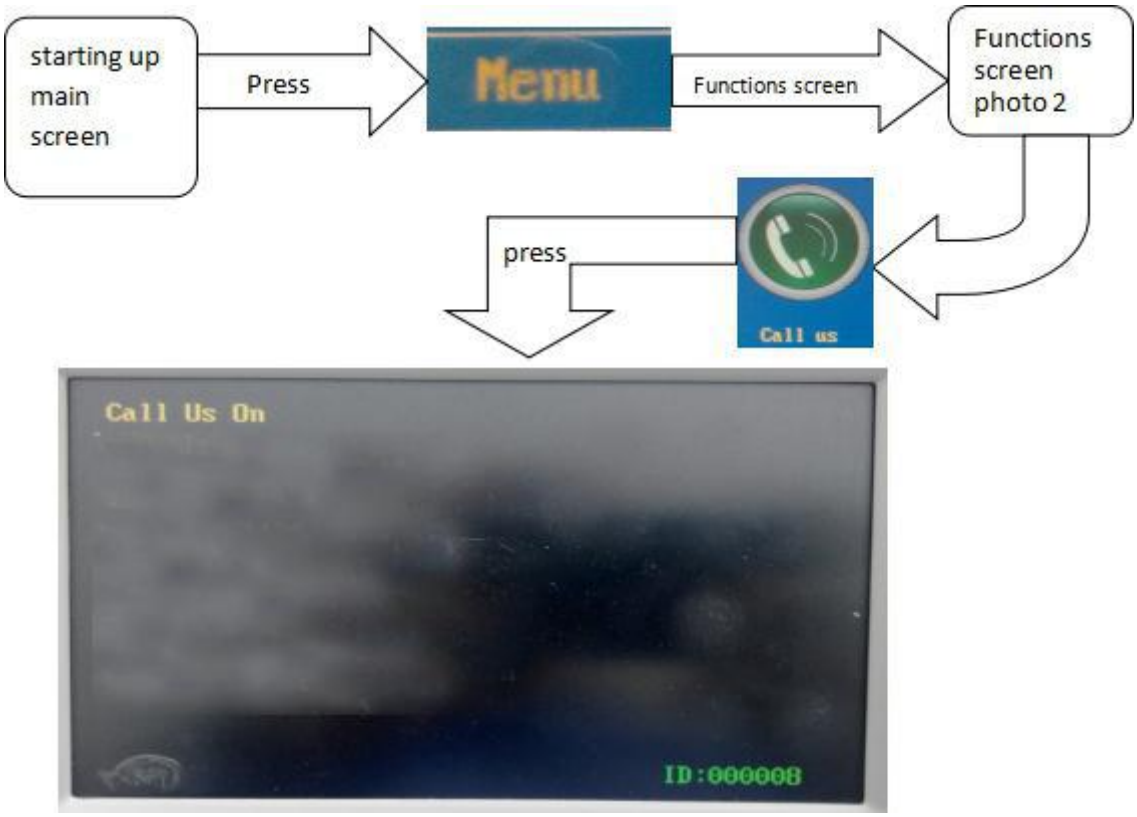
3.2.2 Calibration strips testing

After operating 3.2.1, press Calibration key to enter calibration strips testing screen, as following photos, put the calibration strips on the loading platform and start the testing.



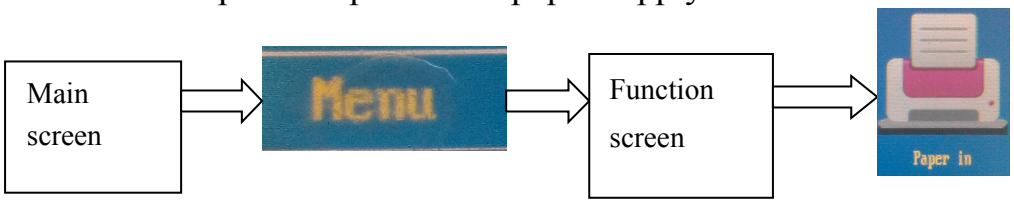
3.2.3 Screen display company's contact information and manufacturing series number

Steps to enter contact information and manufacturing series number.



3.2.4 Paper-in

Paper- in is the process when you add paper to the printer, and the paper supply automatically. First, keep ready for the printer, then put the paper into the entrance of printer. The steps is the process of paper supply.

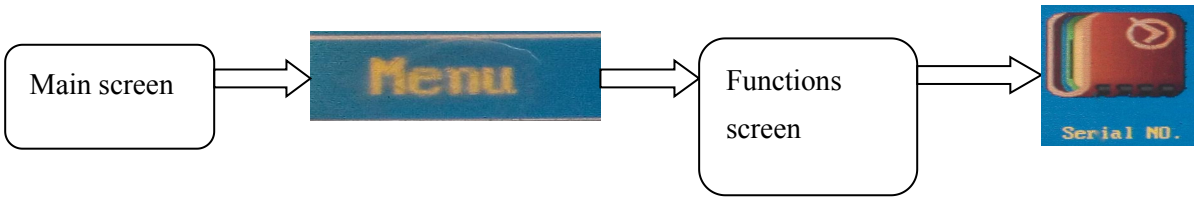


Press key "Paper In" , the paper will supply automatically.

3.2.5 Series no., and Name

Urine analyzer LTH600 series has complete database functions, can keep 1000 testing records, and also supply to check and print at any time. Every records includes testing date, series number and results. The instruments will keep records automatically after every testing. If the records is over 1000, the new records will cover the old one.

Steps to the screen of opening series number and name setup.

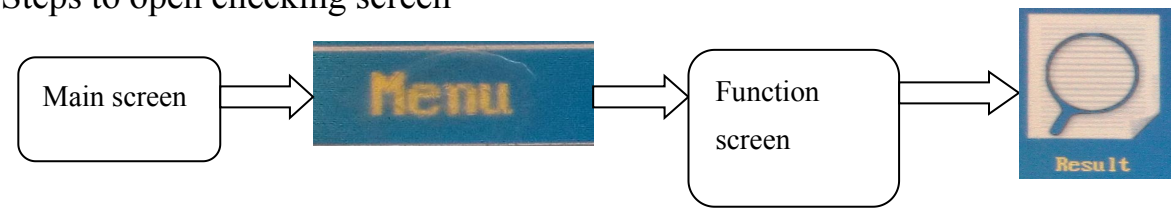


Series number and name can be inputted according to 3.1.4.

3.2.6 Data Checking

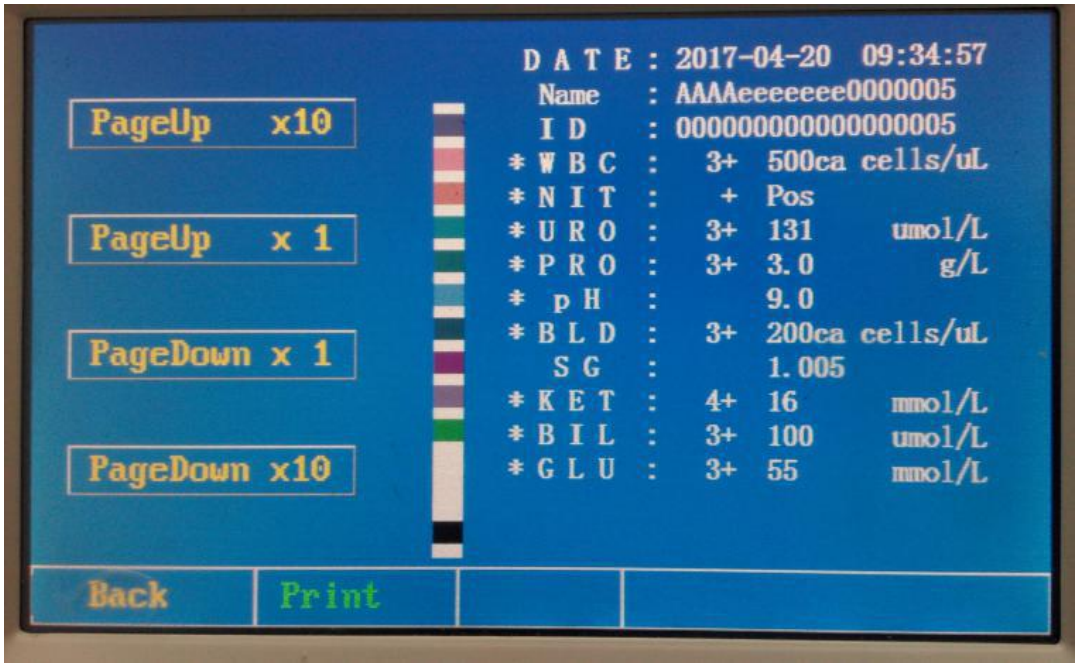
Urine analyzer LTH600 supply data checking factions, it can check one or 10 in one time, and print the results at any time.

Steps to open checking screen



Press results to check the following checking data screen,four keys appear.

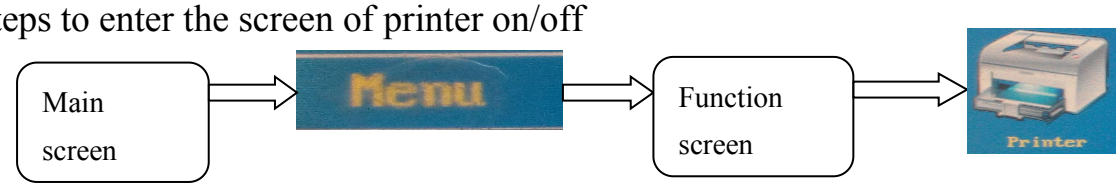
Press 1 or 10 to check the data in the in the base, display on the screen. If you want to print the data, display the data, and then press the “Print” key on the screen.



3.2.7 Printer

Urine analyzer LTH600 has printer, it will print the results after testing, and print data on the checking screen. The printer can print result immediately or not , according to actual situation or your requirements.

Steps to enter the screen of printer on/off



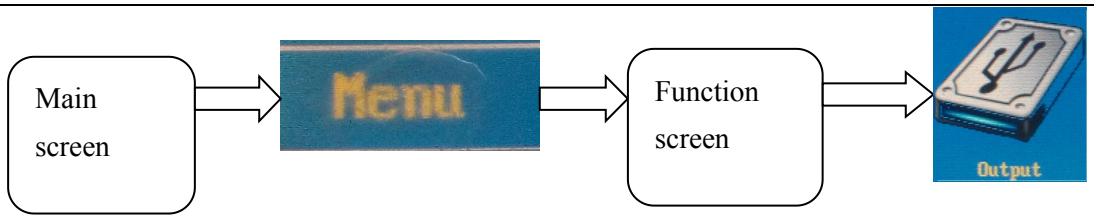
After entering the screen, two keys appear, 

, Print on is to turn on and turn off the printer; press Print on to turn on the printer, and key change to Print off. Print test is to check if the printer has problems, press it, the printer will print some testing words.

3.2.8 Output

Urine analyzer LTH600 can transfer the data into inspection monitoring system through RS232 port.

Steps to output screen



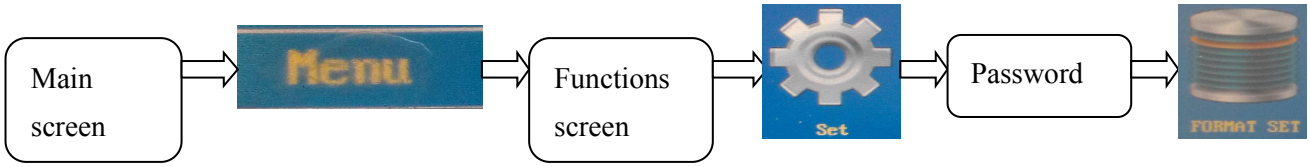
Output setup has the same operation system with printer. You can set it up the same as printer.

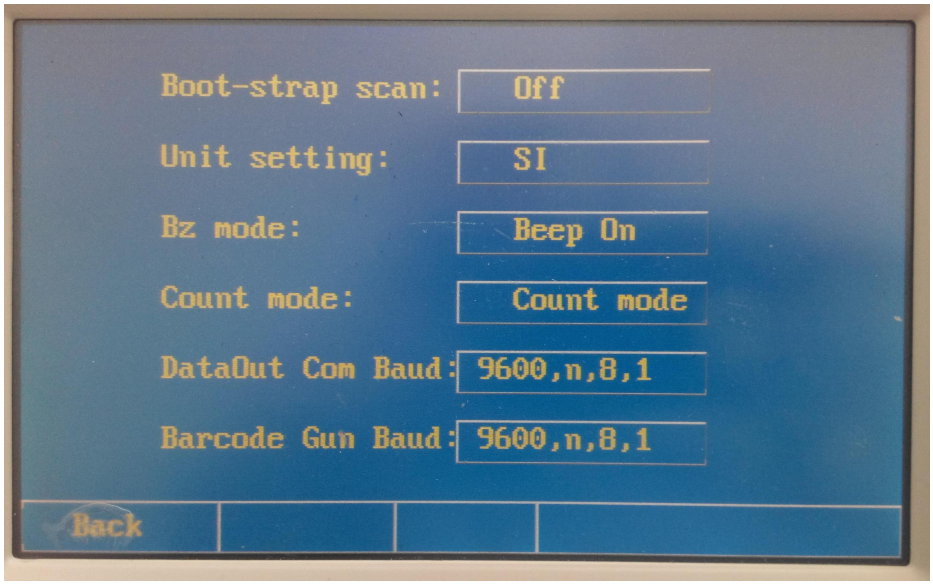
3.3 Parameters Setup

Urine analyzer LTH600 need to set parameters before routine urine tests. The setup parameters can keep test results accurately . Include White Balance, calibration value of each test parameters, print numbers of copies, touch screen calibration and so on.

3.3.1 Port Parameters

Port parameters, the setup of technical mode and units parameters supply unified on the format parameter screen. The steps to enter the format parameter screen as following:





Check the photos of Format parameters screen: SI key to change the unit system. Beep on key to turn on / off the buzzer. Count mode to count mode changing. 9600 key to change BAUD RATE.

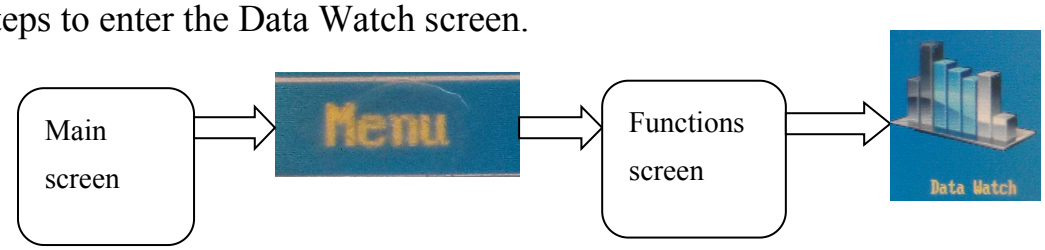
3.3.2 Unit Parameter

The instrument has SI international standard system and universal system, user can choose as their requirements. The setup of unit parameters refer to 3.3.1.

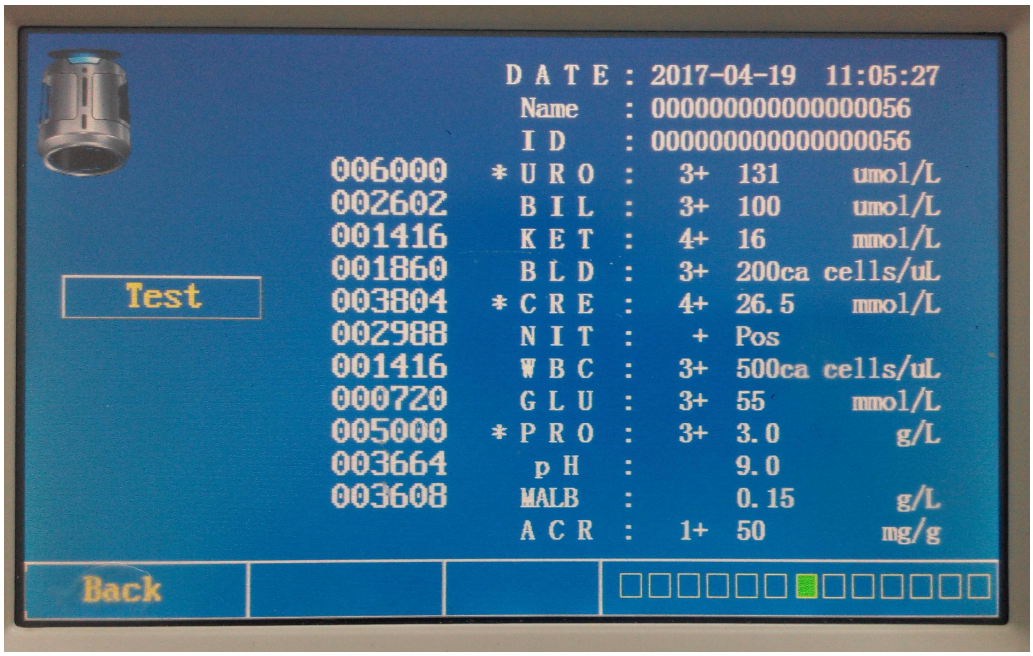
3.3.3 Test Results

The instruments has the reflectivity screen of visual observations test items, it can assure the test items grades and test stability.

Steps to enter the Data Watch screen.

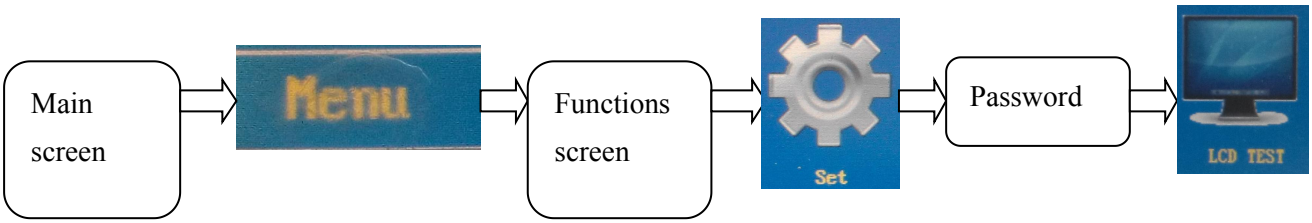


After entering the data watch screen, then start testing the strips, results will display on the screen as following, you can analyze the results.



3.3.4 Touch Screen Calibration

Urine analyzer LTH600 possesses advanced sensitive touch screen, also you can adjust the sensitive of touch screen. Steps as following:



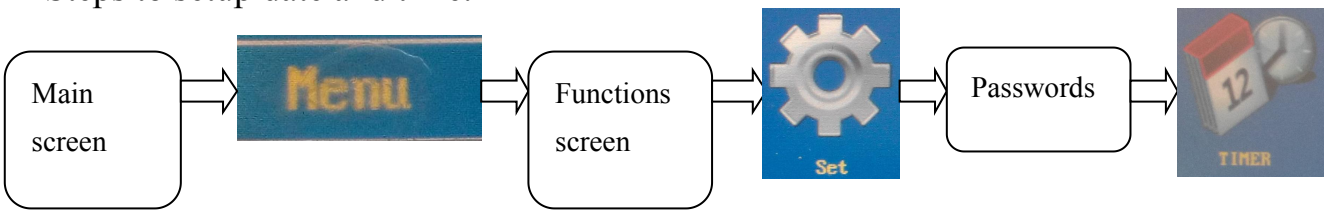
Calibration screen:

Use stylus pen or similar object, press cursor crossing point according to system reminder to finalize the screen calibration.



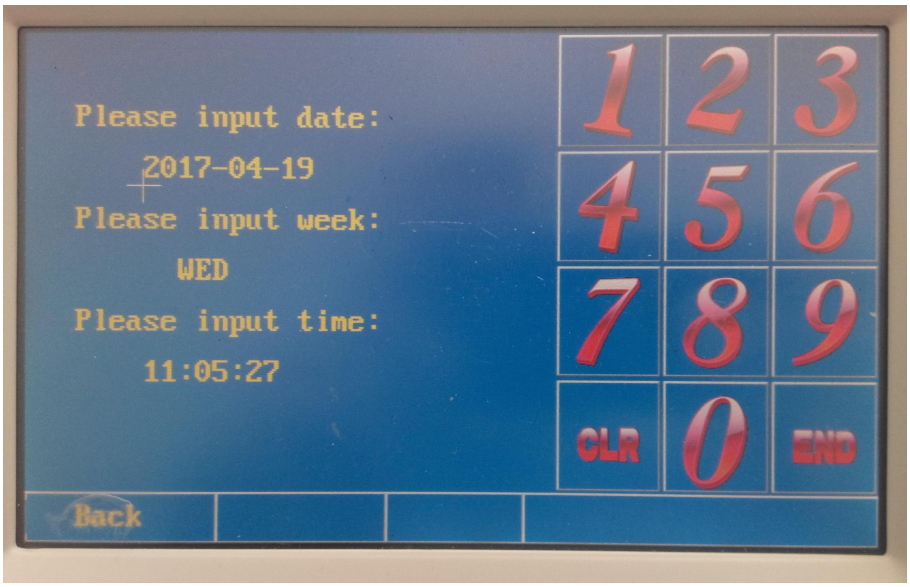
3.3.5 Date and Time

Steps to setup date and time.



Date and Time Screen

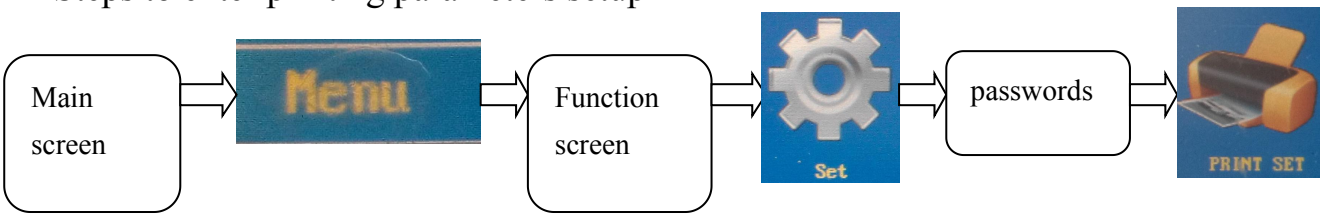
Use the number keys to set up the date and time along with the cursor. 1 to 7 stands for Monday to Sunday.



3.3.6 Printing Parameters

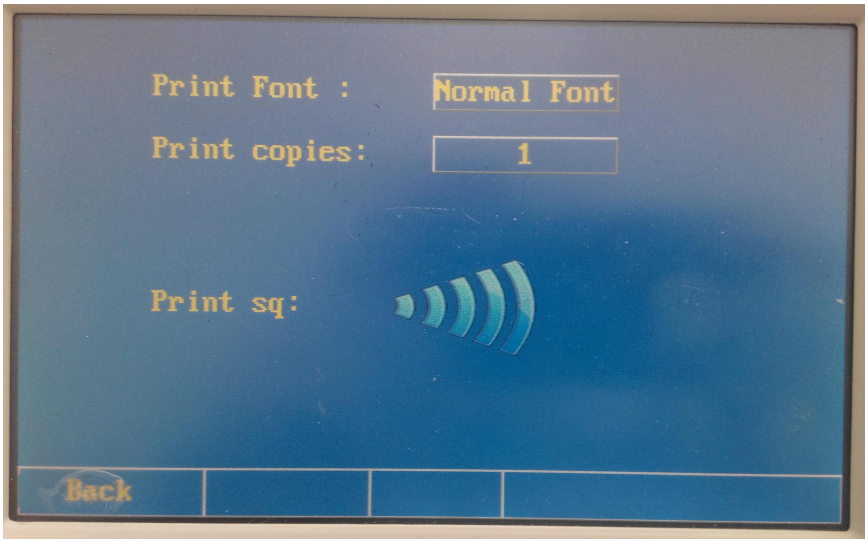
Printing parameters include copy numbers, words size, printing definition, these parameters setup will change printing appearance.

Steps to enter printing parameters setup



Print parameters Screen：

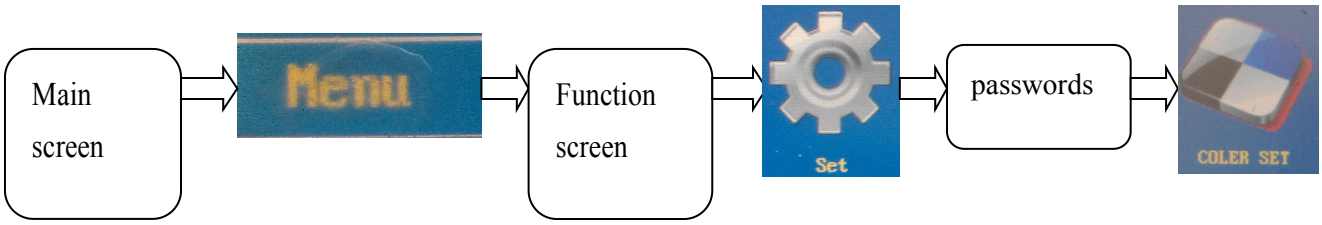
Press related keys to setup.



3.3.7 White Balance

Urine analyzer LTH600 possess a basis white balance to inspect data, only proper white balance can assure the reflectivity accuracy of testing. White balance is a proper RGB which tested using standard white pad and full band light source. And RGB value will measure reflectivity of other color pads.

Steps to open white balance parameter screen.



White Balance Screen：



** Press Run key, you will see white, red, green, blue four rows data start changing.

**Put the strips backward, then to testing.

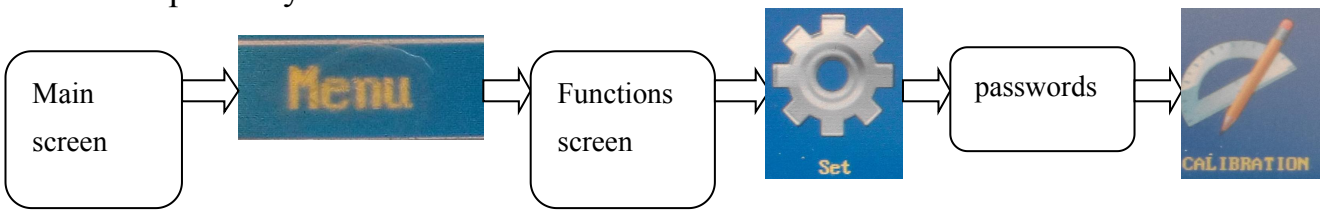
**To check the screen, when red and green pads overlap. You can see the value changing of different color.

** After all changes finished, press “save” to save white balance.

3.3.8 Calibration Value Setup

calibration is to input a group of data according to the biochemical reaction from the reagent area on the strip and urine, reflectivity data confirmed by the different color and color depth degree, then confirming the gradient of each semi-product. so that, we can test 13 parameters semi-product chemical components.

Input password to enter the calibration setup screen, not allow to revise calibration values optionally.



Calibration value input screen

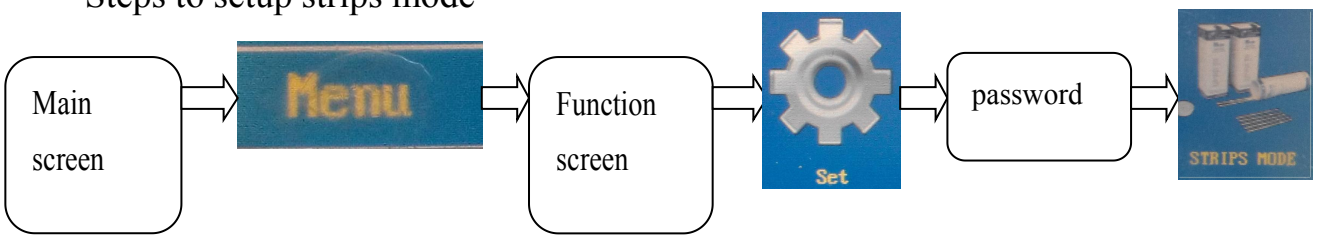


Press number key to input value at the position of cursor, then the cursor moves one to the left. After four number finishing input, the cursor will move to next four numbers, until all calibration values finished input. Press END key to save calibration value, and display next testing parameters CLR key is to clear values and will display by 0.

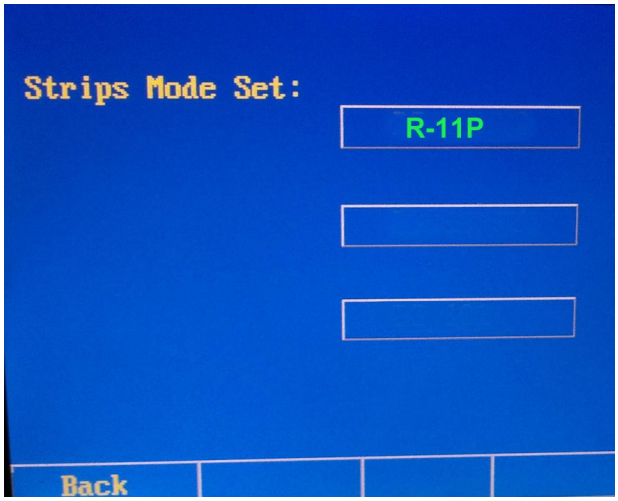
3.3.9 Strips mode

Before routine urine test, you should be assure which strips mode be used, then set up the strips mode in the analyzer. Urine analyzer LTH600 will support testing of urine strips DS10A, DS11MAU, DS11ACR, strips mode can be set up in the strips mode screen.

Steps to setup strips mode



Strips mode select：



The green words stands for the strips model you test at present, if you want to change the strips mode, you can press mode you want to test, the mode will turn green, that's the right one you test at present.

Chapter 4 Urine Controls and Routine Urine Testing

4.1 Urine Control testing

After the self-testing, press Normal Test key to enter urine control testing(QC high and low testing screen) as following:





Under the screen of urine controls, dip the urine strips into control then put the urine strips on the loading platform to test.

4.2 Routine urine test

Summarize

The analyzer can conventional urine test after assembling and setting up. Please read this chapter before your testing.

⚠ NOTE:

◆ Do not use the sharp, hard objects touch the LCD Screen.

◆ The urine sample may have potential infectivity; protective measures should be taken when testing, cleaning, or doing maintenance to the instrument.

◆ Please dispose the urine sample and the waste strips according to the local laboratory regulation.

⚠ Test operation process

(1) After finishing installing the analyzer, power on the analyzer. The system will conduct self-testing, then display main screen.

(2) The continuous tests will carry on under main screen. Test speed for the analyzer is 522 reagent strips per hour, the test time for each reagent strip is 6.9 seconds.

（3）The operation method is as follows:

Step 1: Pusher is at the start location after self-testing.

Step 2: Put the reagent part of the strips completely into the fresh, completely mixed, uncentrifuged urine sample and take it out immediately by moving the side of the reagent strip along the inside wall of the urine container to get rid of excessive urine or use the blotting paper.

Step 3: Place the reagent strip on the work place, make sure that the front end of the reagent strip contacts the front wall of the work table. When analyzer detects the existence of the reagent strip, it will push the strip to the test section.

Step 4: when pusher returns to the start position, put another reagent strip to keep testing.

Notice: Only the suitable strips can promise the testing precision

Read the user manual carefully before operation.

For operation, please see the operation methods or process drawing.

Don’t put the urine analyzer under the sunshine, or the test precision will be affected.

Please check the model of the urine test strips, avoid the wrong testing results because of the wrong chosen strip model.

Don’t use the expired or metamorphic urine test strips.

Immerse all the reagent parts of the urine test strips into urine sample, the immerse time not too short or too long, wipe off excess urine against the rim of the specimen container or absorbent paper, or there will be measurement error.

Don’t put the urine test strip when the pusher is moving.

Chapter 5 Cleaning and maintenance

Note:

Do not clean the analyzer when the power is on.

Do not use any organic solvent such as petrol, thinner lacquer, benzene compounds and things that may erode the analyzer to wipe it.

Do not clean the LCD with water.

5.1 **Daily Cleaning**

(a) The analyzer can be wiped by soft cloth with gentle eradicator to keep it clean

(b) LCD can be wiped by soft and no abrasion cloth.

(c) In order to make the analyzer work normally and provide correct test result, the worktable must keep clean.

(d) Draw out the pusher, worktable and conveyer board from the analyzer gently. After wash with fresh water, wipe them with soft cloth.

5.2 **Periodical Cleaning**

If there is accumulated dirt on the pusher, worktable and conveyer board, cleaning can be done according to the following procedures:

(a) Prepare a little 0.1N NaOH solution.

(b) Draw out the pusher, worktable and conveyer board from the instrument gently.

(c) Wipe the strip table thoroughly by the cotton bar dipped with 0.1N NaOH solution. Clean the remains of the NaOH solution on the strip table by fresh water.

(d) Wipe and dry those with soft cloth, install them well according the chapter 2

(e) Restart the analyzer and conduct self-testing.

5.3 **Disinfections**

As the pusher, worktable and conveyer board contact the urine sample, they should be disinfected.

(a) Each of the following solutions can be used to conduct disinfections.

-------2% glutaric dialdehyde solution

-------5% hypo chlorite natrium solution

(b) Pour some disinfect liquid into an appropriate container.

(c) Immerge the pusher, worktable and conveyer board into the disinfect liquid, and make sure

the white benchmark does not contact the liquid.

(d) Immerge them for10 minutes.

(e) Clean with water the disinfect liquid that remains on them after removing it from the disinfect liquid.

(f) Restart the analyzer and conduct self-testing.

Chapter 6 Appendix and Transportation

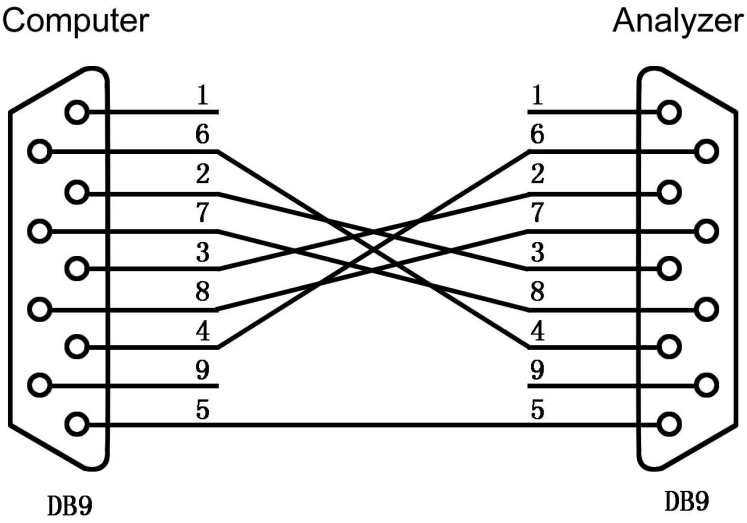
Appendix 1

Urine analyzer LTH600 can connect with computer

Urine analyzer LTH600 can connect with computer or other intelligent instruments through standard RS-232 port cable of 9 DB outlet at the back of analyzer, to realize data communication. LTH600 has the complete data transmission function with computer, can transmit all data or part of data saved in the analyzer to computer, to set up complete urine samples clinical database. Instrument running status, such as language usage, strips models, can transmit to the computer, the newest testing results will display on computer continuously, to realize synchronization between analyzer and computer. The operator can easy to operate and manage accurately on computer screen.

The computer has LTH600 series data transmission software, it can run under system of Windows98、WindowsNT、WindowsXP、Windows7. The software includes instruments data reception operation, also can transmit the data to management network of whole hospital. Analyzer connect with computer:

：



Appendix 2

Warranty

Products Name: Urine Analyzer LTH600

Our company provide free parts replacement or technical consultations within a year after your purchase date, maintenance will be charged in the following conditions:

1) Product which has pass the date for free maintenance.

2) Damage caused by accidental factor or improper use.

3) Damage caused by the operation that not according to the instruction manual.

Appendix 3

Malfunction Information List

No.	Trouble State	Solution
1	Nothing was shown on the screen	1. Check whether the power supply is normally electrified. 2.Check whether the tube fuse is damaged 3. Contact with the supplier if the trouble cannot be removed.
2	Power cannot go through	1. Power off then unplug power line 2. Take out damaged fuse 3. Change to new fuse
3	Remote sensor cannot judge strips (it means that even no strips, it still push)	1. Keep the analyzer away from direct sunlight. 2. Power off the twinkling light source. 3. Restart the analyzer.
4	Pusher system cannot go	1. Put the worktable in the right place 2. Put some lube oil on the metal Slider rod.
5	Self-test cannot finish	1. Power off, take off the worktable, then power on. When self-test go, install the worktable. 2.Check whether there is something stop the moving
6	Testing results are wrong	Check whether the type of the strips is accorded with the Setup or not.

7	Screen shows messy code	1. Check the program chip and data chip. If become flexible, please press tight. 2. Change the program chip. 3. Change the data chip.
8	The printer doesn't work	1. Check whether set "int. printer" in "on" or not. 2. To see is there any paper in the printer. 3. Check if the paper goes aside to jam the printer, if yes, re-install the printer.
9	Push strip rod cannot work	Take off the rod, make it suitable to the instrument
10	Pusher system are noisy	Put some lube oil on the metal parts of the pusher system Clear the pusher system

When screen shows "strip error", there maybe two reasons, first, there is urine sediment on the worktable; second, too sticky urine sample. Please clear the worktable then do the test. Avoid such situation, please clear worktable regular. It is better clear worktable after testing sticky urine samples.

Appendix 4

Accessories

1、 User Manual .....……....1pc
2、 Warranty Card .....…… 1pc
3、 Product Certificate ..... ……..... 1pc
4、 Packing list …… 1pc
5、 Fuse …… 2 pcs
6、 Power line …… 1pc
7、 Paper …… 1 pc

8、 Calibration strip .....…… 2 pcs

9、 Barcode reader .....1 pc

Transportation requirements

Transportation: Avoid severely shocking and extrusion, light candle and light up

Storage: No corrosion, good ventilation, clear place, temperature is （10℃ - +40℃）