

DT800 Ultrasonic Thickness Gauge



Haian Discory Detecting Instrument CO.,Ltd

Preface

Thank you for choosing the DT800 Series Ultrasonic Thickness Gauge. It is our great pleasure to have you as a user of the Haian Discory Detecting Instrument CO. In order for you to become proficient in the use of this instrument, we have included an instruction manual with the instrument.

This manual is an important part of the instrument and provides operating and safety guidelines for the proper use and maintenance of the instrument. Before using the instrument for the first time, be sure to read this manual carefully to understand the instrument's performance and fully utilize its functions. After reading this manual, please keep it in a safe place for future reference.

The contents and specifications of this manual are subject to change when necessary. Haian Discovery Detecting Instrument CO., Ltd reserves the right to improve and innovate the instrument at any time without prior notice.

- 1、Call the company's after-sales service line: 400-012-6866.
- 2、Send an email to the company's email address:
postmaster@dscr.com.cn.
- 3、Log on to the company website for inquiry: <http://www.dscr.com.cn>.

Thanks for your cooperation!

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1.1 Composition of the instrument



1.2 Standard configuration

Name	Quantity
Host	1 pc
Probe	1 pc
Alkaline battery	2 pcs
Coupling agent	1 bottle
Instrument sealed case	1 pc
Instruction manual	1 copy

1.3 Optional parts

High-temperature probes	Cast Iron Probes
Small diameter pipe probes	Miniature Probes
Probe wire	Stepped test blocks
Rubber sheath	

1.4 Technical parameters

Display	2.4QVGA (320x240) color OLED screen with 10000:1 contrast ratio
Working Principle	Ultrasonic pulse/echo method using single crystal probe
Measuring range	0.6 to 508 mm (0.025 to 20.00 inches)
Measurement resolution	0.01 or 0.1mm (0.001 or 0.01in)
Measurement error	+0.05 (below 10mm), $\pm (0.5\%H+0.01)$ (above 10mm)
Unit	Millimeter or inch
Display mode	A-scan mode, B-scan mode, thickness value mode, min/max capture mode, difference/scaling rate mode
V-path correction	Automatic V-range correction to compensate for non-linearity of double crystal probe
Measurement update rate	4HZ, 8HZ, 16HZ per second optional
Material speed of sound range	500-9999m/s, 0.0179-0.3937in/u
Working language	Chinese / English / French / German / Japanese (optional)








Alarm settings	Maximum/minimum value alarm, dynamic change of thickness reading color when the alarm
Save data	8888group
Power Supply	Two 1.5V AA batteries
Operation time	Two AA batteries, use time more than 35 hours
Instrument shutdown	Optional automatic shutdown after 5, 10, 20 minutes of no operation, or manual shutdown only
Operating temperature	-10 to +50°C, with special requirements up to -20°C
Dimension	153mm×76mm×37mm (H×W×D)
Weight	With battery 280g

1.5 Main Functions

1. Simple and easy to operate Parameter configuration interface
2. Adjustable real-time A-scan, adjustable gain, gate, fade, range, pan, and other parameters
3. Time-based B-scan function, displaying the section of the workpiece, used to observe the bottom profile of the measured workpiece
4. Numerical view, with large numbers to display the thickness value
5. Thickness alarm: thickness limit can be set, and the measurement value outside the limit is automatically alarmed
6. Most value mode: capture the maximum and minimum values in the measurement process

7. Difference mode: obtain the difference between the current thickness measurement value and the nominal thickness and the percentage of the difference, and the nominal thickness
8. Support two thickness units of millimeter and inch
9. User-selectable measurement resolution X.XX and X.X in the metric system, and X.XXX and X.XX in the imperial system
10. User-selectable waveform style: profile line or fill
11. User-selectable rectification modes: RF, inverted RF, full-wave, negative half-wave, positive half-wave
12. Multi-language interface selectable
13. Standby time: ultra-long standby, up to 35 hours
14. Can penetrate the surface of the workpiece coating, directly measure the thickness of the substrate workpiece

2、Understand keyboard functions

The DT-800 has a total of nine keys on the keyboard, including three virtual screen keys (), four directional keys (   ), two dedicated function keys ( ). For details, see the following figure (Figure 2.1)

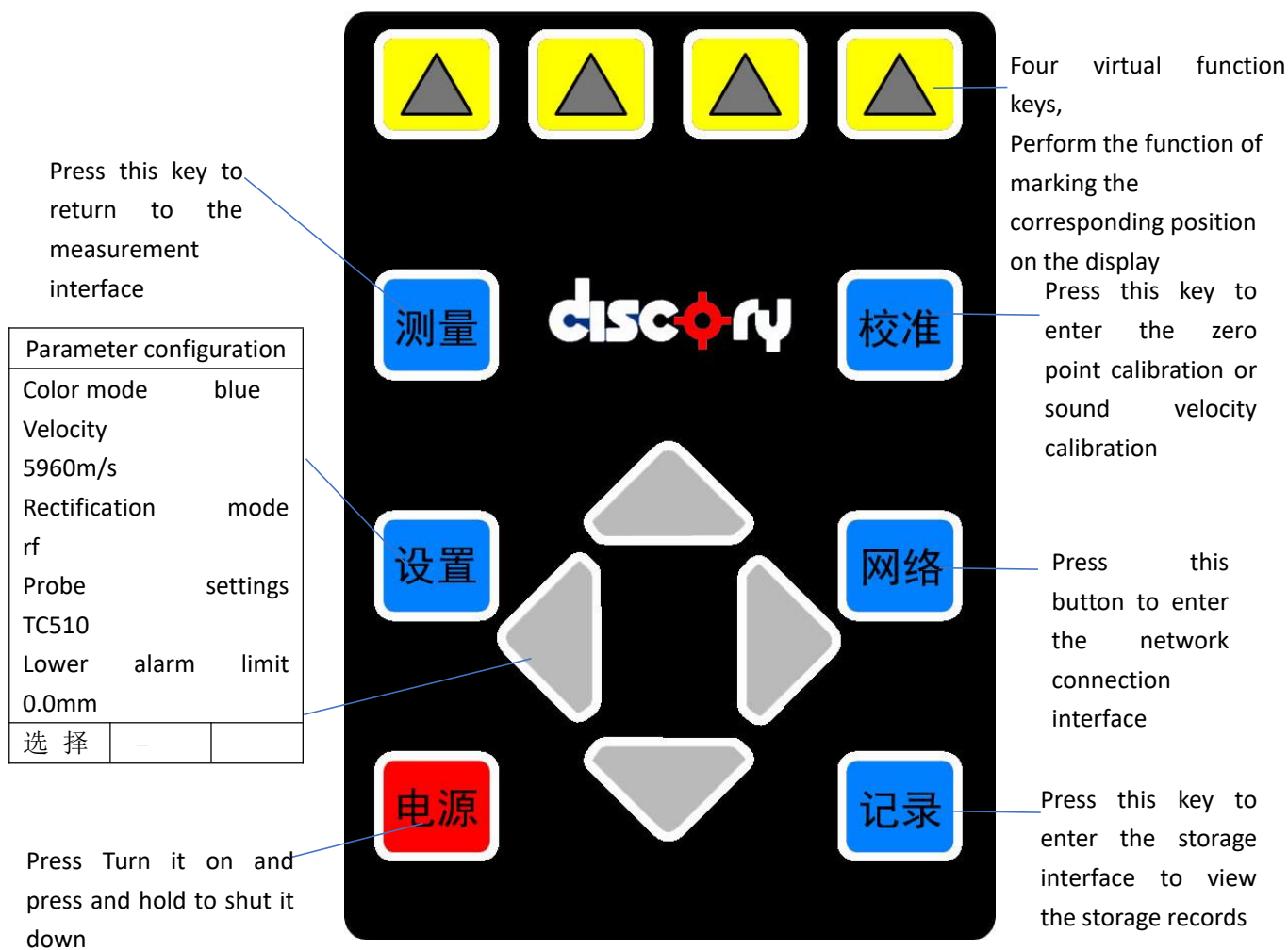


Figure 2.1 Introduction to keyboard functions

3. Thickness measurement

3.1 Instrument Calibration

Before using the DT800 series, the instrument and the probe need to be calibrated.

The purpose of calibration is to zero the probe and to find out the speed of sound of the material to be measured. Before starting the calibration process, it is important to first set the correct probe type. The DT800 is calibrated in the following ways:

1. Probe zeroing. Use the zero test block that comes with the instrument to zero the probe.
2. One-point calibration. Firstly, use the zero position test block to zero the probe, then find out the speed of sound of the test block on a standard test block of known thickness prepared by the user.
3. Two-point calibration. In the user's own two standard test blocks of the same material and known thickness, find out the zero point of the probe and the speed of sound of the test block.
4. Double-echo calibration. On a standard test block of known thickness prepared by the user, find out the speed of sound of the test block.
5. Manually set the speed of sound. When you know the speed of sound of the material, for example, the speed of sound of steel is 5900m/s, you can manually input the speed of sound.

3.1.1 Probe self-calibration

1. Press the power button to enter Figure 3.1.1.1 after displaying the Diskerry, select the current probe through the "Up and Down" key, and press the Set key to enter Figure 3.1.1.2



图 3.1.1.1

图 3.1.1.2

2. Enter Figure 3.1.1.3 from Figure 3.1.1.2 to Figure 3.1.1.3, press the "Up and Down" button to select the actual battery power, and automatically enter the measurement interface Figure 3.1.1.4

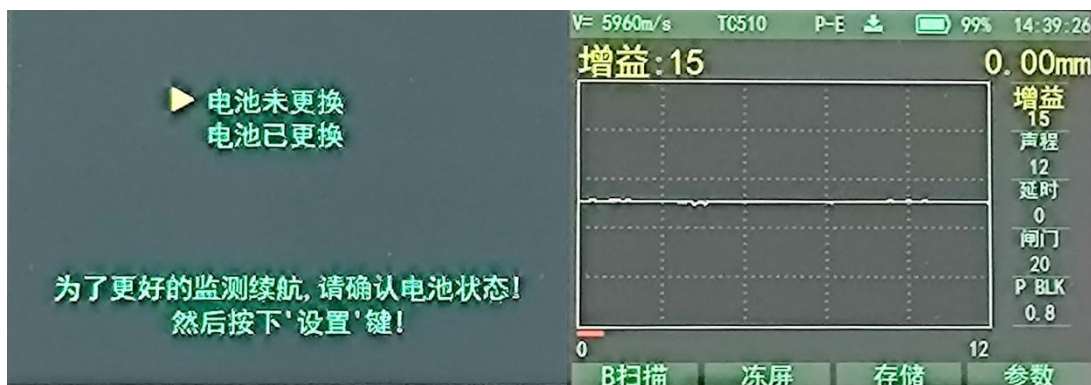


图 3.1.1.3

图 3.1.1.4

3.1.2 Zero calibration

1. Press the "calibrate" button to enter the zero calibration interface (Figure 3.1.2.1), place the probe on the standard test block, please pay attention to the use of couplant, press the "confirm" key corresponding to the virtual key to complete the zero point calibration.



图 3.1.2.1

3.1.3 Sound speed calibration

1. Press the "calibration" key to enter the zero calibration interface, press the "sound speed calibration" key corresponding to the virtual key to enter the sound velocity calibration interface (Figure 3.1.3.1), place the probe on the test block, please pay attention to the use of couplant, press the "confirm" key corresponding

to the virtual key to complete the sound velocity calibration.



图 3.1.3.1

3.1.4 Sound speed adjustment



1. You can press the "calibrate" key to enter the zero point calibration interface, and press the "speed of sound" key corresponding to the virtual key to enter the sound velocity adjustment;
2. You can also press the "Set Key" to enter the parameter configuration interface and select "Sound Velocity" to adjust the speed of sound.

Note 1: Before calibration, measure the standard block to ensure that the currently set instrument parameters can measure the standard block correctly.

Note 2: Probe zeroing, one-point calibration, and two-point calibration are available for single-echo mode.

3.2 Parameter configuration interface

Press the "Settings" key to display the parameter configuration interface, where there are several parameter adjustment options.

Refer to the figure below (Figure 3.2).

参数配置		
Color	mode	
Green		
声速	5960m/s	
Rectification	mode	1. Press the "Settings" key to display the parameter configuration interface
RF		
Probe setup	TC-510	
Lower alarm limit	0.0mm	
Alarm upper limit	100.0mm	
Nominal thickness	30.0mm	2. Press the "Up and Down" key to select the corresponding parameter
B-scan minimum value	0.0mm	
B-scan maximum	40.0mm	
Measurement mode: Dual		
element		3. Press the "left and right" keys to adjust the parameters with the keys corresponding to the virtual keys
Resolution	X.X	
UPDATE RATE	F 8 HZ	
Language	Chinese	
Unit	Metric	
Key tone	off	4. Press the "Up and Down" key to select other parameters that need to be adjusted
Vibration	off	
Brightness adjustment level	3	
Date set	2000-01-22 18:51	
Automatic shutdown for	5 minutes	

Figure 3.2 Parameter adjustment steps

Color modes – there are blue, cyan, red, gold, green and white.

Sound velocity –1---9999m/s adjustment

Rectification mode – divided into RF, full wave, negative half wave, positive half wave and inverting RF RF depicts the complete echo waveform; Full wave refers to the positive half wave of the echo and the negative half wave that flips to positive; Negative half-wave refers to removing the positive half-wave of the echo and flipping the negative half-wave to show it as positive; Positive half-wave means that the negative half-wave with the hoard wave removed only shows the positive half-wave; Inverting RF refers to the inverting waveform of an RF waveform.

Probe Setup – Within the probe setup, there are a variety of probe models to choose

from.

Probe model	frequency	diameter	Measuring range	remark
TC510 DT800 Standard probe	5MHz	10mm	0.8-275mm	Dedicated probe for penetrating coatings
PT-08 DT300 standard Probe	5MHz	8mm	1.0-100mm	Normal probes
PT-06	7.5MHz	6mm	0.8-30mm	Small diameter tube probe
PT-04	10MHz	4mm	0.7-12mm	Miniature probes
GT-12	5MHz	10mm	4.0-80mm	High temperature probes
ZT-12	2MHz	12mm	4.0-300mm	Cast iron probe
PT-12	5MHz	10mm	1.0-150mm	Normal probes

Lower Alarm Limit – Sets the minimum thickness alarm value. The setting range is 0-635mm. If the measured thickness is less than the lower alarm limit, the measurement data is displayed in red font.

Upper Alarm – Set the maximum thickness alarm value. The setting range is 0-635mm. If the measured thickness is greater than the upper alarm limit, the measurement data is displayed in red font. Note: The upper limit of measurement must be greater than the lower limit of measurement.

Nominal Thickness – Sets the nominal thickness value. The setting range is 0-635mm. Introduction to the specific application reference difference mode.

B-Scan Minimum – Sets the minimum thickness value of the B-scan image.

B-scan maximum – Sets the maximum thickness value of the B-scan image.

Measurement mode – dual element.

View Mode – This parameter is divided into: normal mode, difference mode, and maximum value capture mode.

Resolution – Sets the number of decimal places for the measurement result. The metric system is divided into X.X and X.XX. The imperial system is divided into X.XX and X.XXX.

Update Rate – The rate at which measurement results are updated, which can be set by the user to 4Hz, 8Hz or 16Hz.

Language – Sets the language displayed on the instrument screen. Generally, only one language is installed, please contact the factory if you need other languages.

Unit—Set the measurement unit to metric/imperial.

Key tone – can be turned on and off.

Vibration – can be turned on and off.

Brightness adjustment – set 1-5 levels.

Date setting – Set the time.

Automatic shutdown – the instrument automatically shuts down after a certain period of inactivity, which can be selected for 5 minutes, 10 minutes, 20 minutes or can only be manually shut down.

Factory reset – Restore the default settings of the machine when it was factory.

3.3 Value display mode

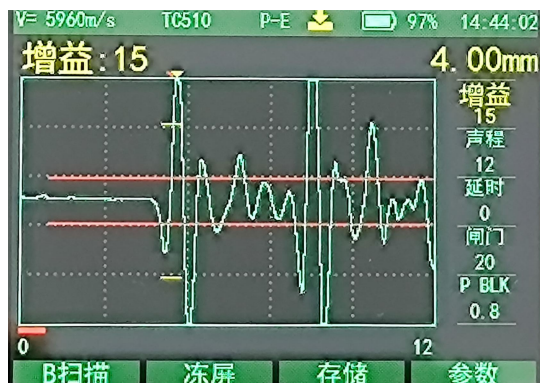
The DT-800 ultrasonic thickness gauge has four measurement interfaces: A-scan interface, B-scan interface, numerical interface and differential interface.

In cases where the probe and the subject are not coupled, the coupling signs are shown in green.

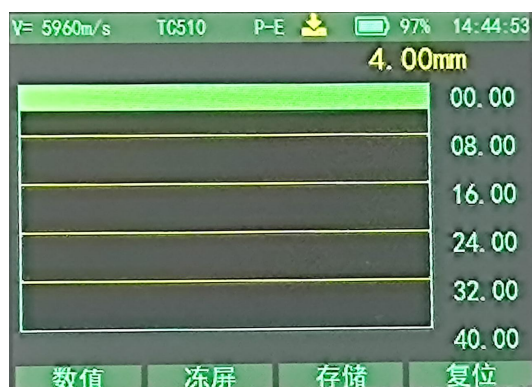
When the coupling is good, the coupling signs are shown in yellow. When the alarm

range is exceeded, the thickness value is displayed in red font.

A-Scan Interface One This interface displays the waveform



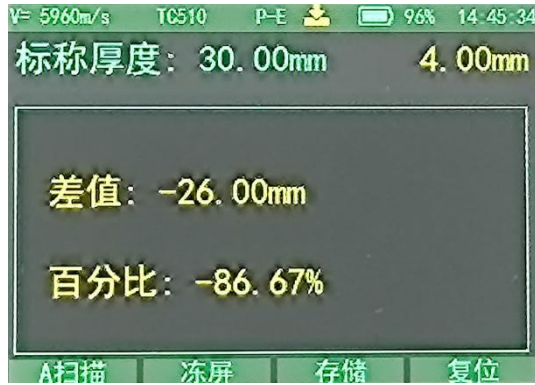
B-Scan Interface One This interface displays a histogram



Value interface 1: This interface displays the current measured thickness value in large font.



Difference Interface - This interface displays the difference (the difference between the measured thickness value and the nominal thickness) and the reduction rate (the percentage of the difference to the nominal thickness), as well as the value of the current measured thickness value and the nominal thickness. Before measuring thickness in difference mode, you must set the nominal thickness.



3.4 A-Scan interface mode

A-scan mode can be used to view both thickness measurements and A-scan waveforms. On the right side of the interface is the parameter adjustment area, which can be adjusted to maximize the solution of various difficult thickness measurement applications.

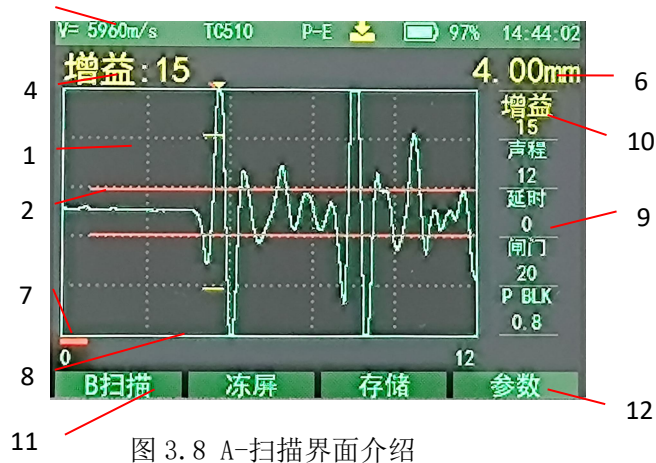



图 3.8 A-扫描界面介绍

- 1 - Waveform display area
- 2 - Gate
- 3 - Thickness measuring material sound velocity
- 4 - Magnified display of selected parameters
- 5 - Measurement point (i.e. the first intersection point of the waveform and the gate)
- 6 - Current thickness value
- 7 - Blanking range identification
- 8 - Screen starting coordinates
- 9 - Parameter adjustment area
- 10 - Currently selected parameter
- 11 - Large number pattern identification
- 12 - Parameter selection identification
- 13 - Battery level display

On the A-Scan interface, move the cursor to the parameter position to be adjusted by pressing the key corresponding to the parameter in the lower right corner of the screen,  and adjust the parameter value by pressing the arrow key. The up and

down keys are small step adjustments, and the left and right keys are large step adjustments.

Gain – Adjusts the magnification of the echo signal by the instrument, allowing manual increases or decreases in 1dB increments. This function is very effective for measuring sound attenuating materials such as metal castings.

Sound Path – Adjusts the range of waveforms displayed on the screen, visually the waveform is compressed or expanded. If the display range is not set correctly, the echo waveform may be out of the display area and not visible, but the measured value will still be displayed correctly.

Delay – Adjusts the starting position of the waveform displayed on the screen, visually moving the waveform horizontally. Without the correct setting of the delay, the echo waveform may be out of the display area and not visible, but the measured value will still be displayed correctly.

Gate – Adjust the height of the gate. Note that only when the waveform is higher than the gate does the instrument consider that it has received an echo and there will be a measured value. In addition, the gate is only displayed when the cursor reflects the gate parameters. A red arrow indicates the first intersection of the waveform with the gate to help determine if the thickness reading is correct, and when measured correctly, the red arrow should point to the first backwall echo front.

3.5 B—Operation of the scanning interface

3.5.1 B—Scan interface

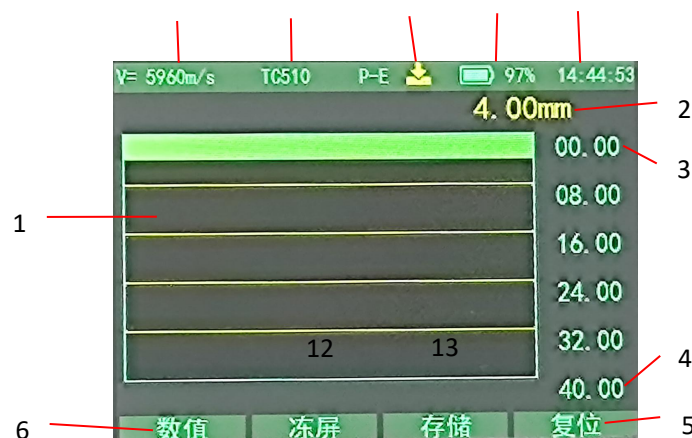


Figure 3.15 B-Scan interface diagram

1-B scan image display area 2 - current measured thickness value 3 - minimum value of B-scan image 4 - maximum value of B scan image 5 - clear current B-scan image and measured value 6- Enter the numerical measurement interface 7 - Velocity of sound 8 - Probe model 9 - Coupling case 10 - Charge 11 - Time 12 - Freeze screen 13 - Storage

3.5.2 B. Introduction to scanning

DT800 Series Thickness Gauges with Time Base B-Scan Capability. Move the probe along the surface of the workpiece to display a profile of the workpiece to observe the undersurface profile of the workpiece to be measured. The smallest value on a B-scan image is automatically captured as the probe leaves the workpiece.

3.6 Dual echo (penetrating coating) measurement mode

When the surface of the workpiece has a coating or paint layer, it will bring considerable error to the measurement results, with an echo-echo measurement method, without grinding the coating and other processes that destroy the surface of the workpiece, it can measure the actual thickness of the substrate under the workpiece coating. This function is achieved by measuring the two continuous backwall echoes of the substrate.

Select the measurement mode on the parameter configuration screen and set the measurement mode to double echo E-E, which can be used to measure through the coating.

3.7 Network Configuration

DT-800 supports WIFI function, through the network configuration interface, click the corresponding virtual button of the function description on the screen, select the account and password box, cooperate with the directional button, select the network, and enter the password. Press the connected virtual key to connect to the local wireless network and upload the measurement data to the application software.



1 - Displays the connection status of WIFI (left image - not connected; Right - connected).

3.8 Test thickness data storage

The DT-800 supports saving test data. On the test interface, press the virtual key of "frozen screen" first, and then press the virtual key of "Save" to store the test thickness data. You can enter the viewing interface through the "Record" button and view historical data.



1 - Freeze screen function Freeze the content of the test interface 2 - Storage function The test thickness data is saved to memory 3 - Through the "Record" key, enter the interface to view the record

4. Applied Technology

4.1 Prevention of measurement errors

1. Impact of materials

In many test materials, such as non-metals or plastics, the variation in the speed of ultrasound propagation is very significant and can affect the measurement's accuracy. If the material to be measured is not isotropic, then the speed of sound will vary in different directions. In this case, the average value of the speed of sound within the detection range must be used for the calculation. The average value is obtained by measuring a reference block whose speed of sound is comparable to the average speed of sound of the block to be tested.

2. Ultra-thin materials

In the use of Ultrasonic Thickness Gauge, when the thickness of the material to be measured drops below the lower limit of probe use, it will lead to measurement errors. If necessary, the minimum limit thickness can be measured by the test block comparison method.

When measuring ultra-thin materials, an erroneous result called "double refraction" sometimes occurs, which shows that the reading is twice the actual thickness. Another error result is called "pulse envelope, cycle jump." Its result is that the measured value is greater than the actual thickness. In order to prevent this kind of error, pay attention to the waveform display when measuring the critical thin material. If it can be judged, the error reading can be eliminated by adjusting the gain or using the blanking function.

3. Effect of surface cleaning

Before measurement, all dust, dirt, and rust on the surface of the measured object shall be removed, and paint and other covers shall be removed.

4. Influence of roughness

The excessively rough surface will cause measurement error and even no reading of the instrument. Before measurement, try to make the surface of the measured material smooth, which can be made smooth by grinding, polishing, filing, and other methods.

High viscosity couplants can also be used.

5. Rough machined surfaces

Rough machining surface (such as lathe or planer) caused by the regular fine groove will also cause measurement errors to make up for the same method as 4, in addition to adjusting the probe insulation layer (through the probe bottom center of the thin metal layer) and the measured material between the angle of the fine groove, so that the spacer plate and the fine groove perpendicular or parallel to each other, take the smallest value in the reading as the measured thickness, can achieve better results.

4.2 Measurement Method

1. Single point measurement method

The measurement is performed using the probe at any point on the measured body, and the displayed value is the thickness value.

2. Two-point measurement method

Two measurements are made with the probe at the same point of the measured body. In the second measurement, the probe is split at 90° , and the smaller of the two measurements is taken as the thickness value.

3. Multi-point measurement method

When the measured value is unstable, multiple measurements are taken in a circle with a diameter of about 30 mm, centered on a measurement point. The minimum value is taken as the thickness value.

4. Continuous measurement method

Using the single-point measurement method, continuous measurement along the specified line, the interval is not less than 5mm, taking the smallest of which is the thickness value.

4.3 Pipe wall measurement

When measuring, the probe split surface can be measured along the axis of the pipe or perpendicular to the axis of the pipe, respectively. At this time, the reading on the screen will have regular changes. Choose the minimum value in the reading

as the exact thickness of the material.

If the pipe diameter is large, it should be measured in the direction of the vertical axis. When the pipe diameter is small, two types of Measurement Method should be chosen: along the axis direction and in the vertical axis direction. The smallest value in the reading should be taken as the thickness value of the workpiece.

4.4 Casting measurement

The measurement of casting materials has its own peculiarities. Casting material grain is coarse, the organization is not dense enough, plus often in the gross state on the measurement so that the measurement encountered greater difficulties. Therefore, Casting measurement should pay attention to the following points.

1. Use a low-frequency probe, such as our ZT-12 probe.
2. When measuring the surface of the casting without processing, it is necessary to use the viscosity of oil, grease, and water glass as a coupling agent.
3. It is best to use the same material to be measured. The measurement direction and the measured object are also the same standard test block calibration material speed of sound.

5. Maintenance and Repair

5.1 Power check

When the instrument cannot be turned on, the battery should be replaced first.

The battery replacement method is as follows.

1. Turn off the machine
2. Loosen the screws and open the battery compartment cover
3. Remove the battery and put in a new battery. Pay attention to the polarity

Note: The battery should be removed when the instrument is not in use for a long time because even if the power is off, there is weak energy consumption, and after a long time, the battery will not be able to turn on after running out of power.

5.2 Cautions

1. When using the random test block to test the instrument, it is necessary to apply

a coupling agent, so please pay attention to rust prevention. Wipe the random test block clean after use. Do not get sweat when the temperature is high. When not used for a long time, apply a little grease on the surface of the random test block to prevent rust, and when used again, wipe off the grease and then work normally.

2. Alcohol, diluent, etc., have a corrosive effect on the housing, especially the window, so when cleaning, wipe with a small amount of water can be.

3. The probe surface should avoid heavy scratching, lightly press the measurement.

If the probe wear, the measurement will appear unstable value, the probe should be replaced.

5.3 Maintenance

If the following problems occur, please contact our Maintenance Department.

1. The instrument is damaged and cannot be measured.

2. The display is not normal.

3. The error is too large in normal use.

4. The keyboard operation is malfunctioning or confusing.





Since DT800Ultrasonic Thickness Gauge is a high-tech product, maintenance work should be done by professionally trained maintenance personnel. Please do not disassemble and repair by yourself.

Appendix: Speed of sound of various materials

Media material	speed of sound(m/s)
Aluminum	6320
Chromium	6200
Copper	4700
Gold	3240
Iron	5930
Lead	2400
Magnesium	5750
Silver	3600
Steel	5900
Titanium	5990
Zinc	4170
tungsten	5174
Tin	3320
Brass	4280–4700
Cast Iron	4400–5820
Glass	5260–6120
Nylon	2680
Stainless steel	5740
Water (20°C)	1480
Glycerin	1920
Sodium silicate	2350

Instrument packing list

Packing date:

Serial No.	Item Name	Instrument No.	Unit	Quantity	Instrument pictures
1	Main Machine		pc	1	
2	Probe		pc	1	
3	Alkaline batteries		pc	2	
4	Coupling agent		bottle	1	
5	Screwdriver		pc	1	

Supervisor:

Packer:

Checker:

Inspection Certificate

Haian instrument No. 325

Manufacturer: Haian Discory Detecting Instrument CO.,Ltd

Product Name: Ultrasonic Thickness Gauge

Specification Model:

Factory No.:

Test conclusion:

Supervisor:

Inspector:

Verifier:

Inspection date: Year Month Date

Validity period: one year

Product Warranty Card

Filling date Year Month Date

Product Name	Ultrasonic Thickness Gauge	Date of purchase	
Model		Factory Number	
Purchase unit		User Name	
Contact number		Mobile phone	
Contact address		Postcode	

Maintenance Record

Number of repairs	1	2	3
Failure phenomenon			
Treatment			
Maintenance date			
Maintenance personnel			

Warranty Card Description:

- I. Warranty period: one year from the date of sale.
- II. Warranty conditions: the user in full accordance with the provisions of the manual operation and custody of the instrument, within the warranty period due to quality problems and failure, the user with a warranty card or a valid invoice to give warranty.
- III. The following cases to implement paid Maintenance: (1) can not present the

warranty card or

(1) can not produce a warranty card or a valid invoice.

(2) the user's own disassembly, maintenance, modification of the instrument caused by instrument failure.

(3) the instrument due to improper storage caused by the failure.

(4) The user due to human damage, improper operation, or irresistible natural disasters caused by the failure.

(5) More than the warranty period of one-year instrument failure.

IV, the user should keep the card. The loss of no replacement, the card shall not be altered.

V. The warranty card stamped with the special seal of the factory warranty is valid when the instrument requires maintenance, with this card and Certificate of Inspection Maintenance.

VI. After-sales service telephone: 400-012-6866

VII. Address: #159 TanGangLu HaiAnZhen JiangSu China

After-sales service commitment

Dear Customer:

Thank you very much for choosing our products. Our company takes quality as our life, reputation as our development, and service as our development guideline.

Our Commitment

1. All the production processes of our company strictly implement the ISO9001 international quality standard system and fully comply with the enterprise standard.

2. 24/7 telephone line service, our company will provide the latest information and technical data to the majority of customers at any time.

3. Our company can send professional and technical personnel to provide free operation guidance and technical training for users who purchase the instruments.

4. My company promises: one year warranty and lifelong maintenance from the date of purchase of the instrument.

5. Provide long-term quality technical support to users, and supply relevant spare parts to users at any time at a discount.

6. Timely tracking service, regular research market, listen to feedback and suggestions, and immediately improve the adjustment.

7. On-line acceptance, online interpretation of doubts, expert guidance.

After-sales Service Program

1. 24/7 technical service hotline (technical service phone number: 400-012-6866)

When the after-sales service personnel receives the fault and repair call, they will immediately arrange for the engineer to return the call and make a preliminary judgment of the fault. If no on-site solution is needed, it will be solved by telephone and other means in 4 hours.

If the on-site solution is needed, technical engineers can be contacted to rush to the site. Provincial capital cities will be solved within 24 hours, other cities within 48-72 hours.

In case of hardware failure, technical engineers can be arranged to rush to the site with spare parts to ensure that the problem will be solved for customers within 2 working days.

2. Email reply service (Email: postmaster@dscr.com.cn)

Provide users with technical support services based on email method, and the response time of user help email is 12 hours.

3. Website service (www.dscr.com.cn)

Provide product technical introduction to customers

4. Fax response service (0513-88931551)

To provide users with technical support services based on the fax method, users use the fax method for technical communication for help, and the response time is 4 hours.

5. Emergency on-site service

In the event of an emergency or other support methods can not be solved, we provide on-site service, to reach the customer site on time.

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Address: #159 TanGangLu HaiAnZhen JiangSu China

Tel: +86-513-88931553 88931552

Fax: +86-513-88931551

Website: [Http://www.dscr.com.cn](http://www.dscr.com.cn)

Postcode: 226600