iThick-4000 Ultrasonic Thickness Gauge

Instruction Manual

Anhui Mikrosize Precision Instrument Co.,Ltd

Add: A-4035 RuiFeng Business Expo, Wuhu City, China, 241000.

Web: www.mikrosize.com **Email:** mikrosize@mikrosize.com

Contents

1.Overview

The ultrasonic thickness gauge developed and produced by our company adopts IPS color screen ,which has the functions of built-in A-scan snapshot, B-scan snapshot, thickness measurement through coating, large capacity data storage and so on. Based on the principle of ultrasonic measurement, it is a portable industrial nondestructive testing instrument with high precision and high resolution.

The instrument can be widely used in manufacturing, metal processing, chemical industry, commodity inspection and other testing fields. In addition to accurately measuring all kinds of plates and processed parts, it can also monitor all kinds of pipes and pressure vessels in production equipment to monitor their thinning degree after corrosion in the process of use. It is a necessary instrument in the nondestructive testing industry.

All models of this series of instruments are equipped with A-scan snapshot and B-scan snapshot function as standard, which can help users better control the measurement and avoid wrong measurement caused by the factors of the material itself. This thickness gauge has the function of measuring through the coating: when there is a coating or paint layer on the surface of the measured material, the actual thickness of the workpiece substrate can be obtained without grinding and damaging the surface coating of the workpiece.

1.1 Composition of Instrument

1.Overview

1.2 Standard Configuration

Name	Qty
Host	1
Probe	1
Alkaline battery	2
Coupling agent	1
Instrument sealing box	1
User Manual	1
Product warranty card	1
Product certificate	1

1.3 Optional Parts

High temperature probe	Cast iron probe
Small diameter tube probe	Micro probe
Probe line	Step test block
Rubber sheath	Storage options

Probe and measuring range

Probe description	Frequency (MHz)	Diameter of contact area	Measuring range (in steel)	Allowable contact
Cast iron probe ZT12	2	16.2mm	(4.0~300.0)mm	temperature
Standard probe PT12	5	12mm	(1.0~200.0)mm	(-10~50)ºC
Standard probe PT08	5	10mm	(0.8~100.0)mm	(-10~50)ºC
Standard probe TC510	5	13.5mm	(1.0~270.0)mm	(-10~50)ºC
Small crystal tube probe PT06	7.5	7.6mm	(0.8~30.0)mm	(-10~50)ºC
Micro probe PT04	10	5mm	(0.8~20.0)mm	(-10~50)ºC
High temperature probe	5	14mm	(4.0~80.0)mm	(-10~50)ºC

1.Overview

Technical Parameters

Display screen	2.4QVGA(320×240) IPS color screen,contrast ratio 1000;1
Principle of operation	Ultrasonic pulse / echo / echo method using double crystal probe
Measuring range	0.6~508mm(0.025~20.00 inches)
Measurement resolution	0.01mm or 0.1mm(0.001in or 0.01in)
Unit	mm or inch
Display mode	A-scan snapshot mode, B-scan snapshot mode, Thickness value mode,min/max capture mode,difference/reduction rate mode
V path correction	Automatic v-path correction to compensate the nonlinearity of double crystal probe
Measurement update rate	4Hz, 8Hz, 16Hz per second optional
Material sound velocity range	500-9999m/s,0.0179-0.3937in/μs
Working language	Chinese/English/French/German/Japanese(optional)
Alarm settings	Max/Min alarm, dynamically change thickness reading color when alarm
Power supply	Two 1.5V AA batteries
Standby time	Low brightness for about 15 hours.
High brightness for about 7 hours	
Instrument shutdown	Optional automatic shutdown after 5,10,20 minutes of no operation,or manual shutdown
Size	151mm×76mm×37mm(H×W×D)
Weight	280g battery included
Quality guarantee time	1 year

1.Overview

1.5 Main Functions and Features

●Simple and easy-to-operate single-level parameter configuration menu

●A-scan snapshot function.The users can directly see ultrasonic signal waveform on the screen to verify whether the thickness reading is correct,analyse the cause of the problem and help users find a solution to the problem.

●B-scan snapshot function. It displays the cross-sectional view of the workpiece, which is used to observe the bottom surface contour of the measured workpiece.

●When the probe is coupled with workpiece,the thickness value is displayed in white font.

●Thickness alarm: the alarm thickness limit can be set,and the thickness reading color can be changed dynamically during alarm.

●Extreme value mode: capture the maximum and minimum value during the measurement process

●Difference mode: obtain the difference between the current measured thickness and the nominal thickness and the percentage between the difference and the nominal thickness

●It supports two thickness units:mm and inch

●Large capacity data storage function: it can store 100000 thickness values(optional)

●It can penetrate the coating on the surface of the workpiece and directly measure the substrate thickness of the workpiece (optional)

●User-selectable measurement resolution : X.XX and X.X in metric,X.XXX and X.XX in imperial

●Optional multilingual interface

●Standby time up to 35 hours

2.Understand Keyboard Functions

There are nine keys on the keyboard of the thickness gauge, including three virtual functions(▲), four direction keys (↑ ↓ ← →), and two special function keys (MODE CAL ON).For details, please refer to the following figure (Figure 2.1)

Figure 2.1 Keyboard Function Introduction

3.Thickness Measurement

3.1Instrument Calibration

Before using the instrument,the instrument and probe need to be calibrated. The purpose of calibration is to zero the probe and calculate the sound velocity of the measured material. Before starting the calibration process, it is very important to set the correct probe model first. Calibration is divided into the following categories:

Probe zero calibration: Use the zero test block provided by the instrument to zero the probe

One point calibration: Firstly, zero the probe with the zero position test block provided

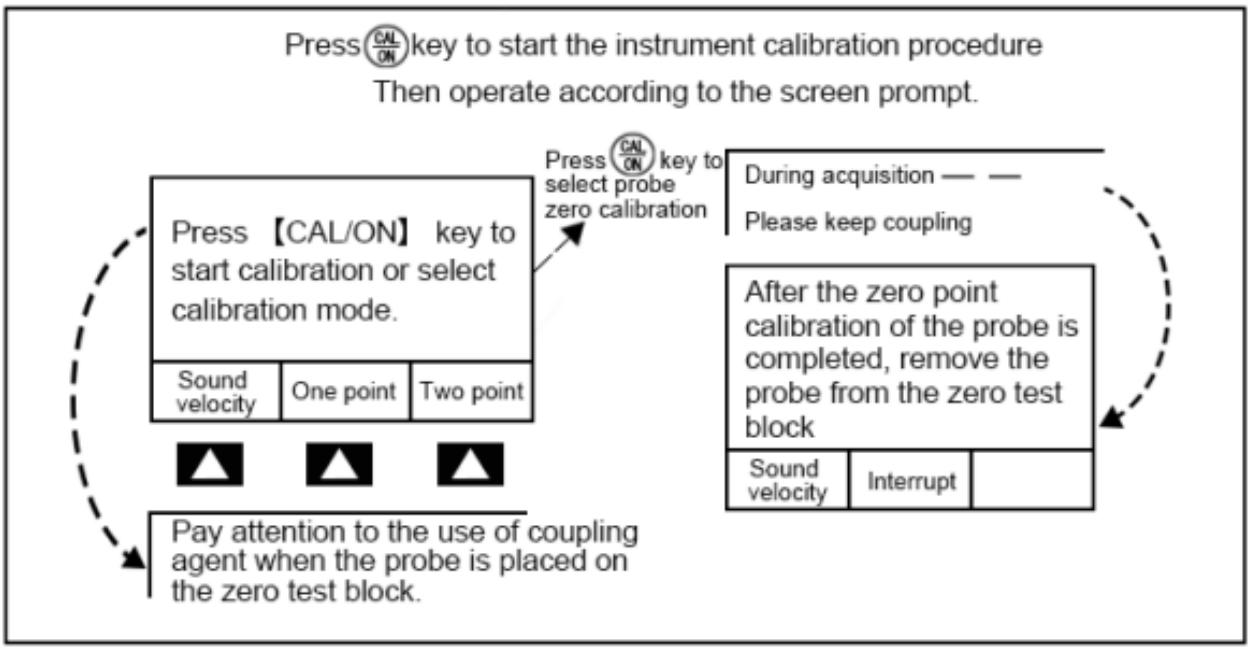
by the instrument, and then calculate the sound velocity of the test block on a standard test block with known thickness provided by the user.

Two point calibration:On two standard test blocks of the same material and known thickness prepared by the user, find out the probe zero point and the sound velocity of the test block.

Sound velocity calibration:On a standard test block with known thickness prepared by the user,calculate the sound velocity of the test block.

Set the sound velocity manually:When the sound velocity of material is known,for example,the sound velocity of steel is 5900m/s,the sound velocity can be input manually

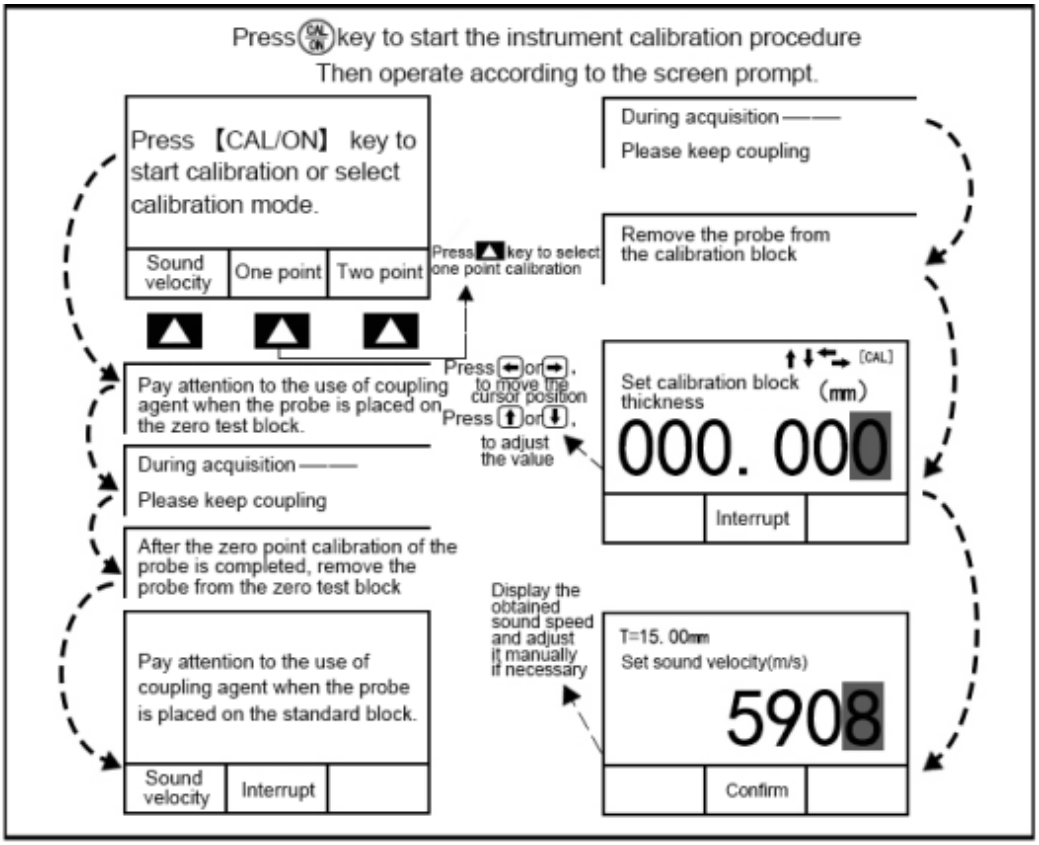
3.1.1 Probe Zero Calibration



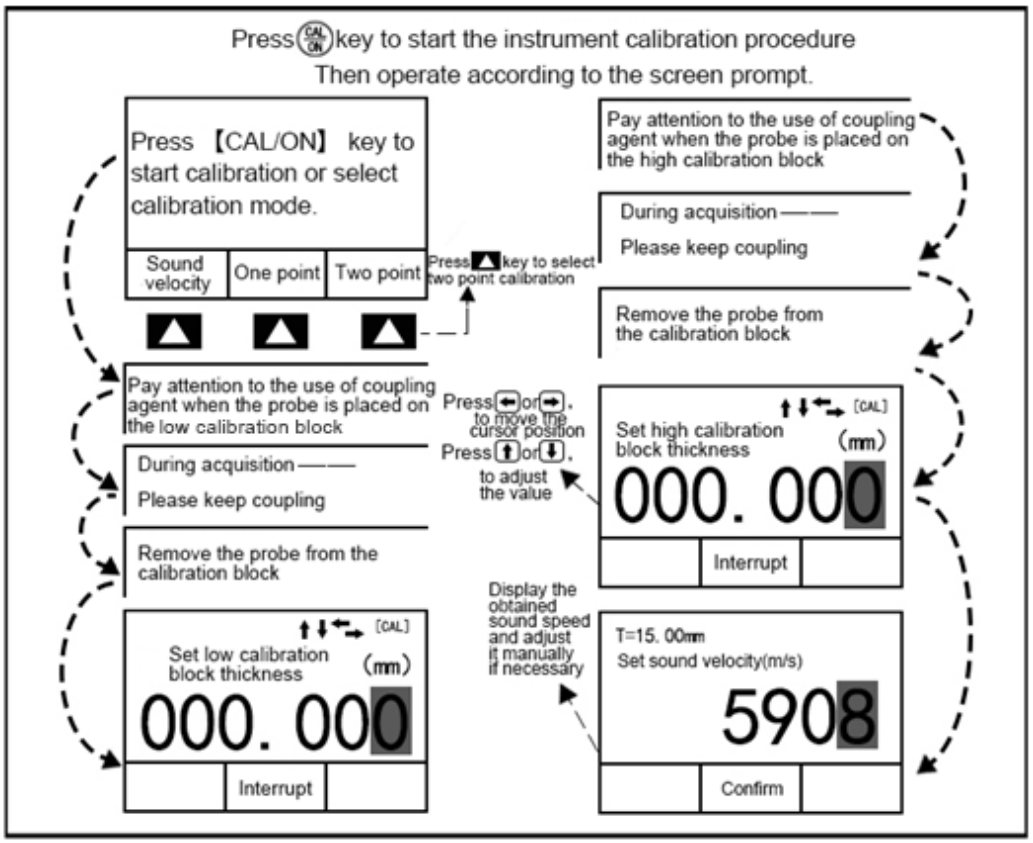
Note: Explanation: The calibration result is 4.00mm only when the sound speed is 5900m/s.

3.Thickness Measurement

3.1.2 One Point Calibration

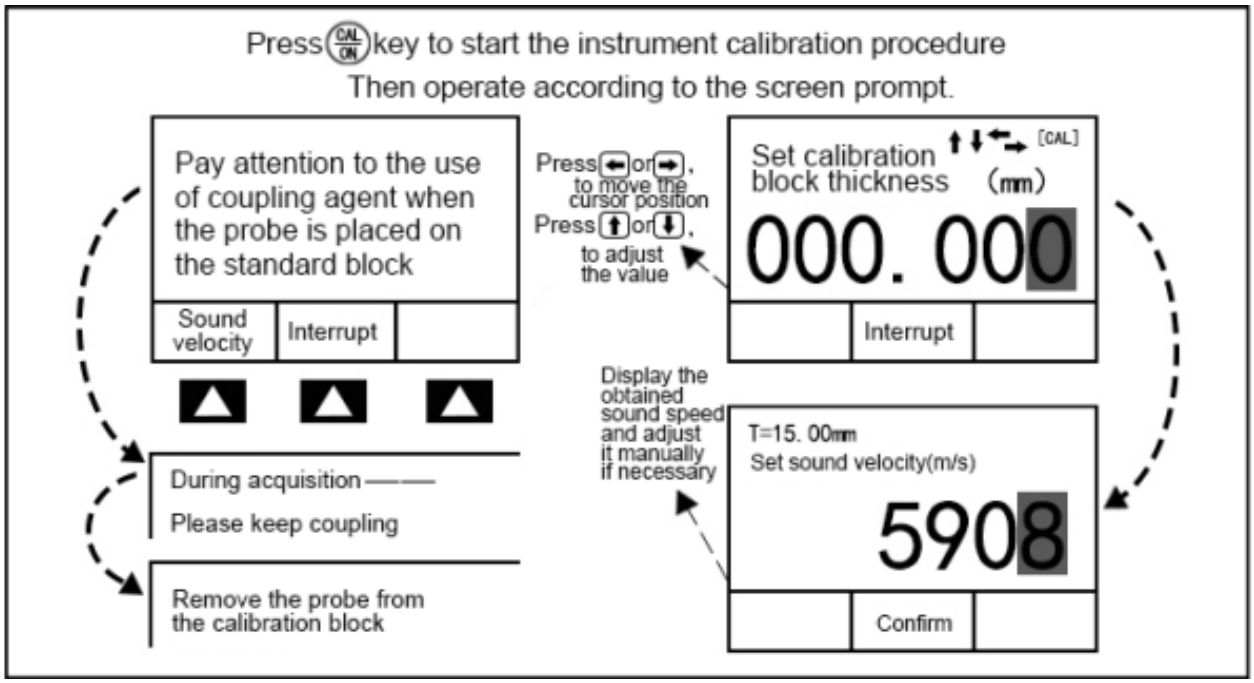


3.1.3 Two Point Calibratio



3.Thickness Measurement

3.1.4 Dual Echo Calibration



3.1.5 Sound Velocity Adjustment

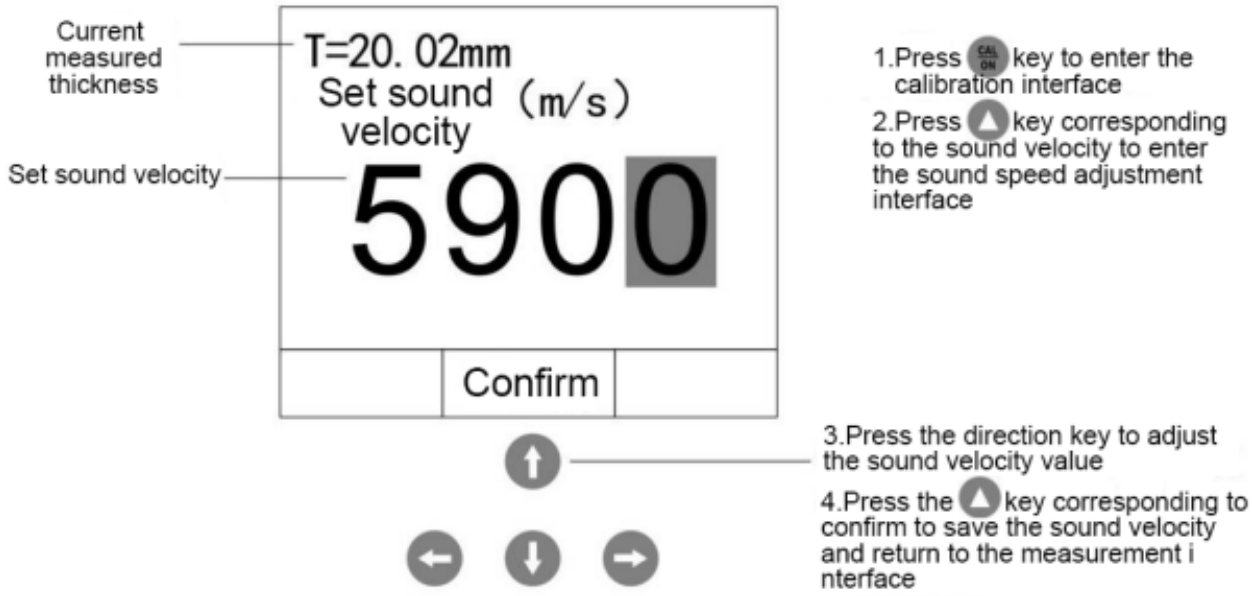


Figure 3.1 Steps of Sound Velocity Adjustment

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

Note 2 : Probe zero calibration, one point calibration and two point calibration are applicable to single echo mode, and dual echo calibration is applicable to dual echo mode.

3.Thickness Measurement

3.2Parameter Configuration Interface

Press MODE key, and screen displays the parameter configuration interface, in which there are many parameter adjustment options, including file number, measurement mode, viewing mode, probe setting, lower alarm limit, upper alarm limit, nominal thickness, B-scans the minimum value, B-scans the maximum value, rectification mode, waveform style, resolution, update rate, language, unit, automatic shutdown, emptying all files and restoring factory settings. Refer to the following figure (Figure 3.2)

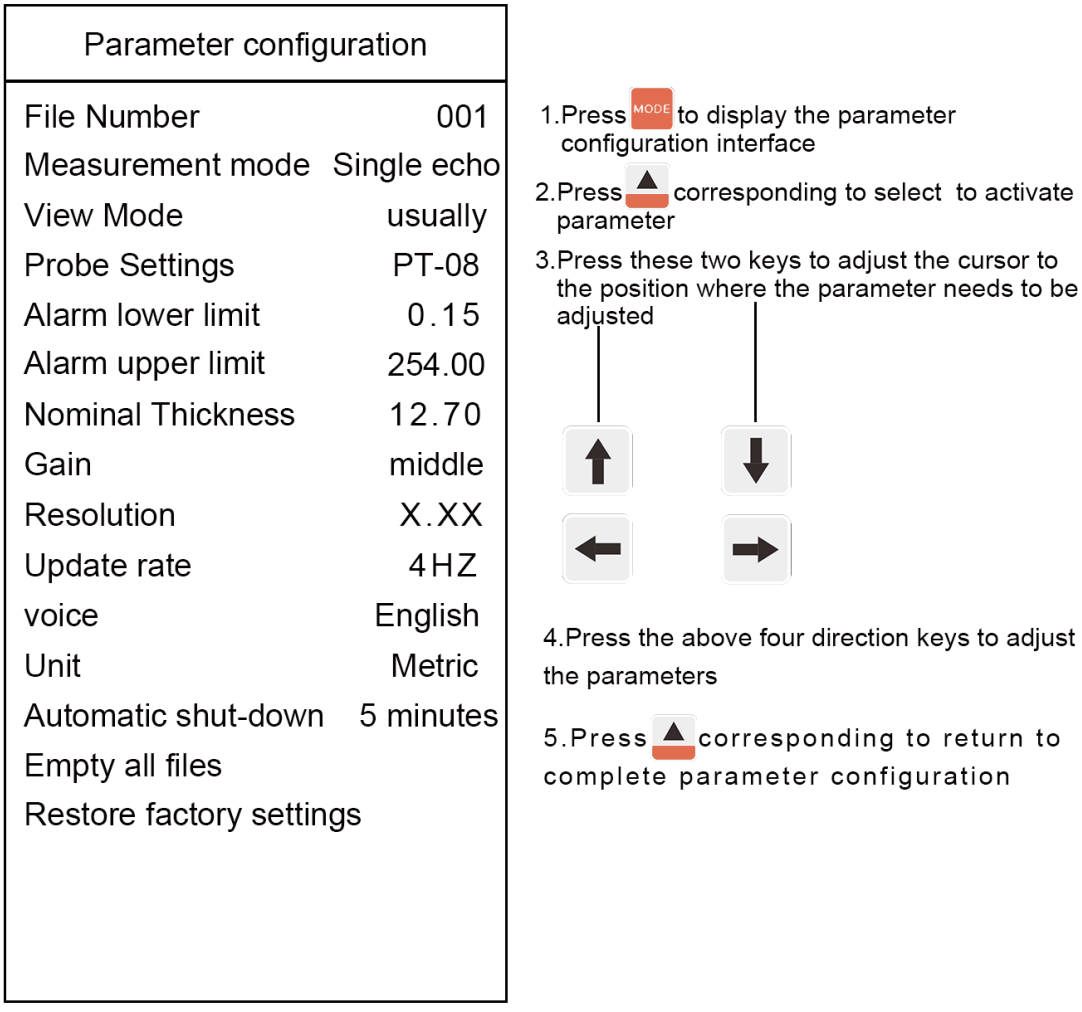


Figure 3.2 Parameter Adjustment Steps

File number - select the current file. There are 400 files in total, and 252 thickness values can be stored in each file.

Measurement mode - there are two modes: single echo and double echo. Single

3.Thickness Measurement

echo mode is selected for ordinary measurement, and double echo mode is set when penetrating coating function is used.

Viewing mode - this parameter is divided into: Normal mode, difference mode and extreme value capture mode.

Probe settings - in probe settings, there are a variety of probe models to choose from:

TC510 (Standard Probe):1-300mm

TC550(Composite Crystal Probe)

PT-08 (General Purpose Probe):0.8-150mm

PT-06 (Small Diameter Pipe Probe):0.6-100mm

PT-04 (Miniature Probe):0.5-25mm

GT-12 (High-Temperature Probe):4-80mm

ZT-12(Cast lron Probe):4-508mm

PT-12(General Purpose Probe):1-250mm

Alarm lower limit—Set the minimum thickness alarm value.The setting range is 0.15~635mm.If the measured thickness is less than alarm lower limit,the measured thickness value is displayed in red font.

Alarm upper limit—Set the maximum thickness alarm value.The setting range is 0.15~635mm.If the measured thickness is more than alarm upper limit,the measured value is displayed in red font. Note:the upper measurement limit must be greater than the lower measurement limit.

Nominal thickness—Set the nominal thickness value. The setting range is 0.15~635mm. For specific applications,please refer to the introduction of difference mode.

B-Scan Minimum — Sets the minimum thickness value for the B-scan image.

B-Scan Maximum — Sets the maximum thickness value for the B-scan image.

Rectification Mode — The rectification modes include RF (Radio Frequency), Full Wave,

3.Thickness Measurement

Negative Half-Wave, Positive Half-Wave, and Inverted RF.

RF (Radio Frequency) — Displays the complete echo waveform.

Full Wave — Displays both the positive half-wave and the inverted negative half-wave.

Negative Half-Wave — Removes the positive half-wave and inverts the negative half-wave for display as positive.

Positive Half-Wave — Removes the negative half-wave and displays only the positive half-wave.

Inverted RF — Displays the waveform with inverted phase of the RF signal.

Waveform Style — Two options are available: Outline and Fill.

Resolution—Set the decimal digits of 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 of updating the measurement result. Users can set 4Hz、8Hz or 16 Hz by themselves.

Language—Chinese, English, German, French, Japanese, etc.

Unit—Set the unit of measurement to metric system/imperial system

Automatic shutdown—The instrument will shut down after a certain period of time without operation.It can be selected to shut down after 5 minutes,10 minute,20 minutes or only manually.

Empty all data—Empty the thickness data in all files

Restore factory settings—Restore the factory default settings of the machine.

3.3Set Display Mode

The measurement interface of the thickness gauge is divided into three types: Numeric Interface, A-Scan Interface, and B-Scan Interface.

The Numeric Measurement Interface offers three display modes: Thickness Value Mode;

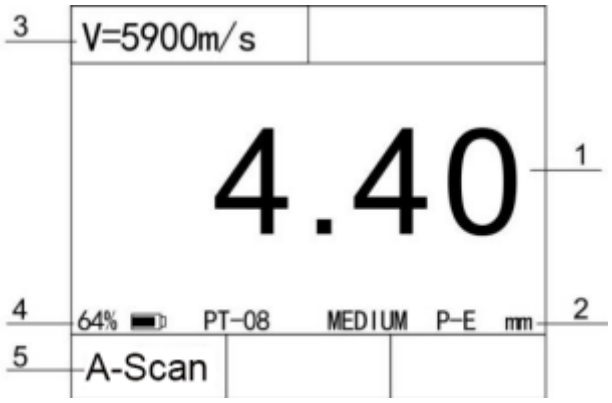
3.Thickness Measurement

Difference / Reduction Rate Mode; Max / Min Value Mode

These modes can be selected in the "View Mode" option within the Parameter Configuration Interface.When the probe is not fully coupled with the measured object,the thickness of each interface is displayed in green font.When the coupling is good,it is displayed in white font.When it exceeds the alarm range,it is displayed in white font.

3.3.1 Thickness Value Mode

Thickness value mode—the default interface,which displays the current measuring thickness value in large font



1—Current thickness measurement value

2—The order is probe type、gain degree、single echo and measurement unit

3—Material sound velocity

4—Battery power display

5—A-scan snapshot interface

3.3.2 Difference Value Mode

Difference value/reduction rate mode—The interface displays difference value(difference between measured thickness and nominal thickness) and reduction rate(percentage of difference value and nominal thickness),as well as the value of current measured thickness value and nominal value.Before using the difference mode to measure thickness,the nominal thickness must be set first.Refer to Section 3.2 for the method.

3.Thickness Measurement

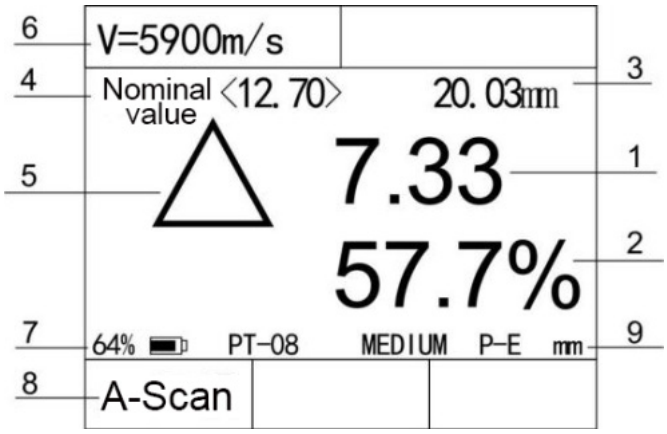


Figure 3.6 Difference Value Mode Interface Introduction

1—Difference value

2—Reduction rate

3—Current thickness measurement value

4—Nominal value

5—Deviation identification

6—Sound velocity of thickness measurement material

7—Battery power display

8—A- scan snapshot identification

9—They are in the following order: probe type, gain level, single echo, measurement unit

3.3.3 Extreme Value Scanning Mode

Extreme value scanning mode—This mode captures the minimum thickness value and maximum thickness value in real time when the user continuously detects material thickness.This interface displays the minimum/maximum detected in the detection process,as well as the current measured thickness.During thickness process,press the key corresponding to "reset"to capture the extreme value again.

3.Thickness Measurement

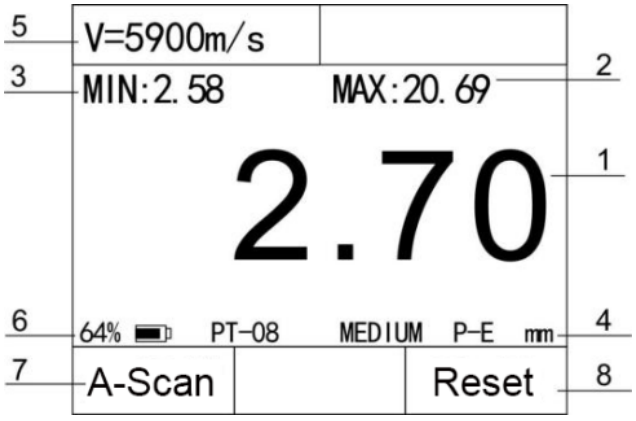


Figure 3.7 Extreme value mode interface introduction

1—Current thickness measurement value

2—Maximum value detected

3—Minimum value detected

4—Units of measurement

5—Sound velocity of thickness measurement material

6—Battery power display

7—A-scan snapshot identification

8—Reset identification

3.3.4 A-scan Snapshot

Upon entering the A-Scan Snapshot Interface, you can simultaneously view the thickness measurement value and the A-scan waveform. The parameter adjustment zone is located on the right side of the interface. By adjusting these parameters, you can optimally resolve various challenging thickness measurement applications.

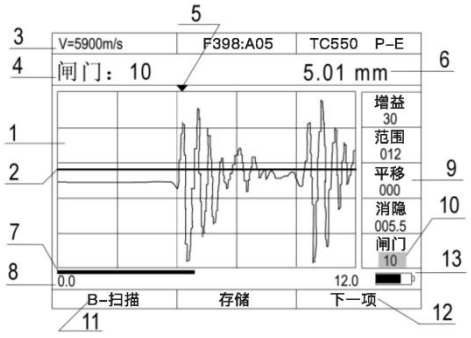


Figure 3.8 A-scan Snapshot Interface Introduction

3.Thickness Measurement

1—Waveform Display Area

2—Gate

3—Sound Velocity of the Material Under Test

4—Zoom Display of the Selected Parameter

5—Measurement Point (i.e., the first intersection point of the waveform and the gate)

6—Current Thickness Reading

7—Blanking Range Indicator

8—Screen Start Coordinate

9—Parameter Adjustment Zone

10—Currently Selected Paramete r

11—Large Digit Mode Indicator

12—Parameter Selection Indicator

13—Battery Level Display

Note: When the probe is not coupled to the test object, the thickness reading is displayed in green font; when coupling is good, the thickness reading is displayed in white font; when exceeding the alarm range, the thickness reading and A-scan waveform are displayed in red font.

In the A-scan interface, press the key corresponding to "Next Item" at the lower right corner of the screen to move the cursor to the parameter position to be adjusted, and press the direction keys to adjust the parameter value. The up and down keys are for small step adjustment, and the left and right keys are for large step adjustment.

3.3.5 B-Scan Snapshot

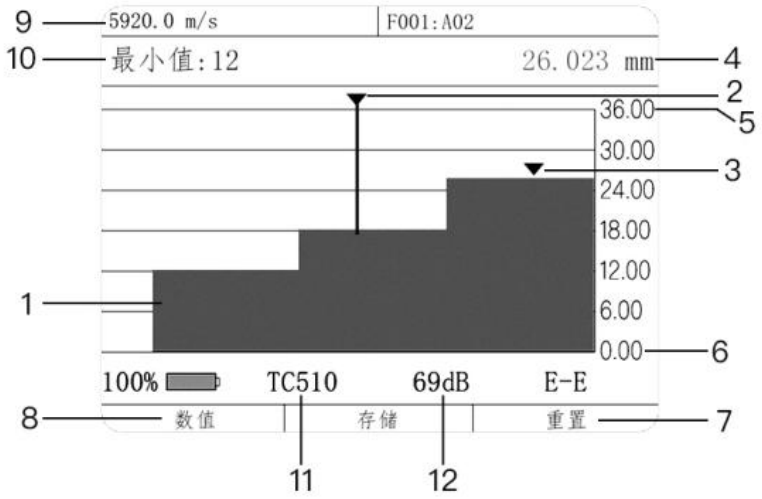


Figure 3.9 B-scan Snapshot Interface Introduction

1—B-Scan Image Display Area

2—White Pointer

3—Red Triangle (indicates the location of the minimum thickness value)

4—Thickness Value at the Pointer Position

5—Minimum Value of the B-Scan Image

6—Maximum Value of the B-Scan Image

7—Clear Current B-Scan Image and Measurement Values

8—Enter Numeric Measurement Interface

9—Sound Velocity

10—Minimum Value on the B-Scan Image

11—Parameter Display Area

12—Gain Value

B-Scan Introduction

This thickness gauge features a time-based B-scan function. Moving the probe along the workpiece surface displays a cross-sectional view of the workpiece, used for observing the

bottom surface contour of the workpiece under test.

When the probe leaves the workpiece, the minimum value on a B-scan image is automatically captured, and its location is indicated by the red triangle. By moving the white pointer, the thickness value at any point on the B-scan image can be viewed.

3.4Measurement Through Coating Function(Optional)

When there is a coating or paint layer on the workpiece surface,it will bring considerable error to the measurement result.The thickness gauge has an echo-echo measurement method,which can accurately measure the actual thickness of the substrate under the workpiece coating without grinding the coating and other processes damaging the workpiece surface.The function is realized by measuring two continuous bottom echoes of the substrate.

In the measurement mode of the parameter configuration interface,choose to set the measurement mode to double echo,which is the measurement through coating.As shown in figure 3.9 below.

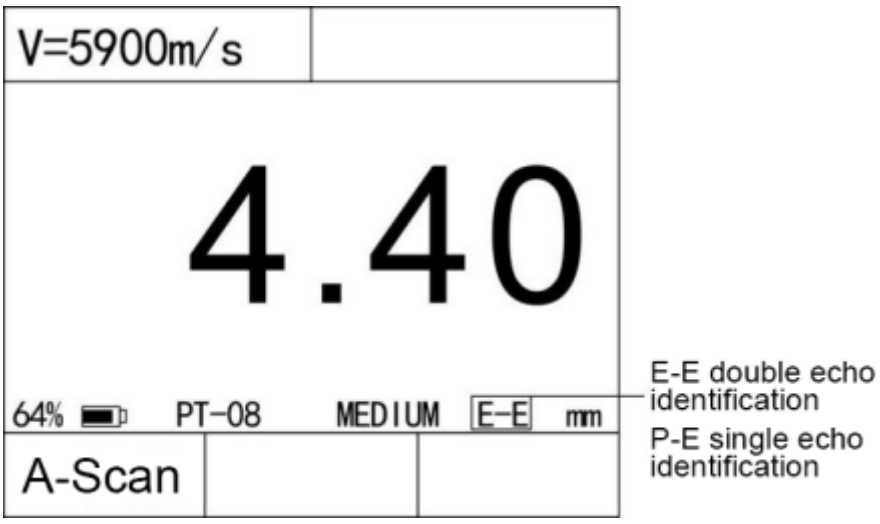


Figure 3.10 Through Coating Mode Thickness Measurement Interface

4.Data Storage Function

The instrument has powerful storage function,which can store 100000 thickness values. It adopts to the grid file form(as shown in figure 3.10 below),which is convenient to check and select storage position.The storage position can be selected arbitrarily by adjusti ng  he data stored in the instrument can be imported into the computer through USB communication,and stored in the format of EXCEL table or TXT file.It is equipped with powerful Data View upper computer software,which can perform statistics,a nalysis,archiving,report printing and other operations on data.

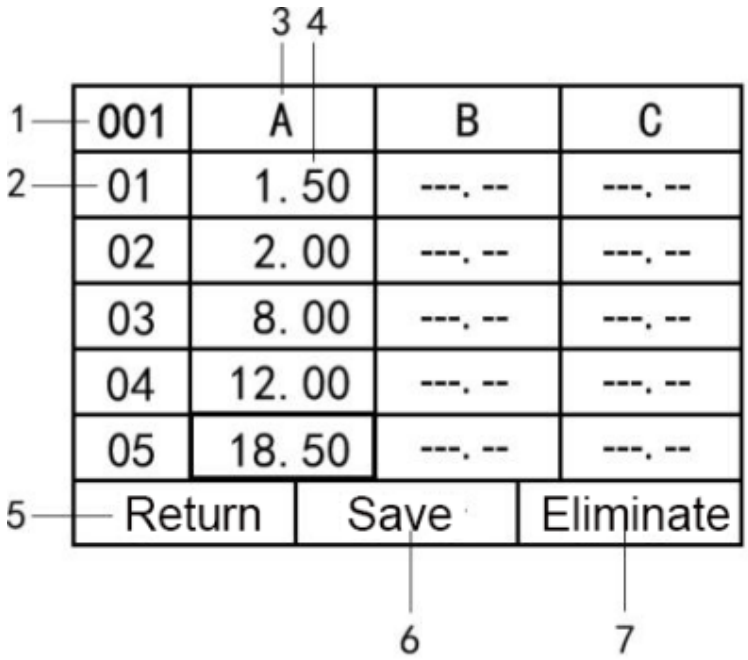


Figure 4.1 Grid Storage Mode

1—Storage file number

2—Line identification

3—Column identification

4—Stored thickness value

5—Return to upper menu

6—Storage thickness value

7—Clear the selected thickness value

5.Application Technology

5.1Prevention of Measurement Error

5.1.1 Influence of material

In many testing materials,such as nonmetal or plastic,the change of ultrasonic propagation velocity is very magnificent,which will affect the accuracy of measurement.If the material of the object to be tested is not isotropic,the sound velocity will be different in different directions.In this case,the average value of sound velocity with the detection range must be used for calculation.The average value is obtained by measuring the reference test block whose sound velocity is equivalent to the average sound velocity of the block to be tested.

5.1.2 Ultra-thin material

When using the ultrasonic thickness gauge,when the thickness of measured material falls below the lower limit of the probe,it will cause measurement error.If necessary,the minimum limit thickness can be measured by the test block comparision method.

When measuring ultra-thin material,sometimes an erroneous result called "double refraction" occurs,which results in the display reading being twice the actual thickness. Another erroneous result is called "pulse envelope, cycle jump".The result is that the measured value is greater than the actual thickness.To prevent this kind of error,pay attention to the waveform display when measuring critical thin material.If you can judge,you can eliminate the erroneous reading by adjusting the gain.

5.1.3 Influence of surface cleaning

Before measurement,all dust,dirt and rust on the surface of the object to be measured should be removed,and paint and other coverings should be removed.

5.1.4 Influence of roughness

Excessively rough surface can cause measurement errors or even no readings from the instrument.The surface of material to be tested should be as smooth as possible before

measurement, and can be made smooth by grinding,throwing,filing,ect.High viscosity coupling agent can also be used.

5.1.5 Rough machined surface

Regular fine grooves caused by rough machined surface (such as lathe or planer) will also cause measurement error. The compensation method is the same as 4. In addition, adjust the included angle between the sound insulation layer of the probe (the thin metal layer passing through the center of the probe bottom) and the fine grooves of the measured material, so that the partition plate and the fine grooves are perpendicular or parallel to each other. Take the minimum value in the reading as the measurement thickness, which can achieve good results.

5.2Measurement Method

5.2.1 Single point measurement

Use the probe to measure any point of the measured object and the displayed value is the thickness value.

5.2.2 Two-point measurement

Use the probe to measure twice at the same point of the object to be measured.In the second measurement,the dividing plane of the probe is at 90°,and the smaller of the two measurements is taken the thickness value.

5.2.3 Multi-point measurement

When the measured value is not stable,take a measuring point as the center,make multiple measurements in a circle with a diameter of about 30mm,and take the smaller value as the thickness value.

5.2.4 Continuous measurement

Use the single point measurement to measure continuously along the specified line,the

interval is not less than 5 mm,and the minimum value is taken as the thickness value.

5.3Pipe Wall Measurement

During measurement, the dividing surface of the probe can be measured along the axis of the pipe or perpendicular to the axis of the pipe. At this time, the readings on the screen will change regularly, and the minimum value in the readings will be selected as the accurate thickness of the material. If the pipe diameter is large, it should be measured in the direction of the vertical axis. If the pipe diameter is small, two measurement methods along the axis direction and the vertical axis direction are selected, and the minimum value of the readings is taken as the thickness value of the workpiece.

5.4Casting Measurement

The measurement of casting material has its particularity.The grain size of the casting material is relatively coarse and the structure is not dense enough.In addition,it is often measured when it is in the rough surface state,so it is difficult to measure.So the following points should be paid attention to when measuring castings.

1.Use low-frequency probe,such as ZT-12 probe of our company

2.When measuring castings whose surface is not machined,the engine oil with high viscosity,grease and water glass must be used as coupling agents

3.It is best to calibrate the sound velocity of the material with a standard test block with the same material as the object to be measured and the same measurement direction as the object to be measured.

6.Introduction to Terms

If you encounter problems that cannot be solved by ordinary thickness gauge, please choose our iThick-4000,which can solve various thickness measurement problems to the greatest extent and provide you with cost-effective solutions.

6.1Principle Explanation

The common ultrasonic thickness gauge based on the principle of pulse-echo method needs to the following two conditions to measure successfully.

1.The first bottom echo is higher than the gate(The gate level height is fixed and can not be adjusted)

2.No other clutter is higher than the gate before the first bottom echo.(Otherwise,the measured thickness will be the thickness where the cluster is generated)

Sometimes, the above requirements cannot be met in many cases, such as high corrosion near the surface, coarse-grained materials (such as cast iron), aluminum materials, small-diameter tubes, ultra-thin plates, ultra-thick plates, rough surface, uneven internal

materials, internal defects, laminated structure, etc. ordinary ultrasonic thickness gauges will be powerless.

iThick-4000 can easily solve the above problems

1.The first bottom echo can be higher than the gate by adjusting the gain and gate height.

2. Other clutter before the first bottom echo can be invalidated through the blanking function.

Previous thorny problems solved.

6.2Live Color A-Scan

The user can directly see the wave pattern of color ultrasonic signal (or A-scan) on the screen, which is very important for the occasion where it is necessary to verify whether the thickness reading is correct. Many cases may lead to wrong thickness readings or even no readings. The problem can be easily found according to the waveform, and then the correct thickness readings can be obtained by properly adjusting the gain, blanking and gate parameters according to the waveform.

Use of waveform: verify the thickness reading according to the waveform, find the problem according to the waveform, seek a solution according to the waveform, and adjust the parameters according to the waveform to solve the problem.

6.3Gain Adjustment(GAIN)

Adjust the amplification factor of the instrument to the echo signal, allowing manual increase or decrease in ldb. This function is very effective for the measurement of sound attenuation materials (such as metal castings).

6.4Blanking Function(BLANKING)

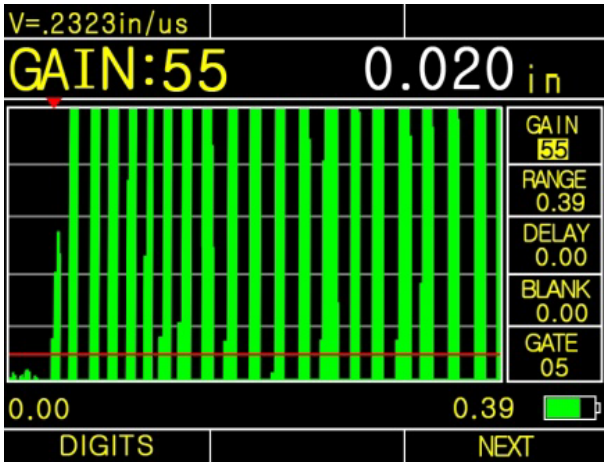
Make the waveform within the red blanking strip invalid, and the harmful clutter that

affects the measurement can be omitted, such as the noise caused by the roughness of the material surface or the internal unevenness.

Use Blanking Strips to Omit Preceding Noise

6.5Adjustable Gate Height(GATE)

Only when the echo is higher than the gate, the instrument considers that the echo is received, and there will be a measurement value. It can be seen the importance of adjustable gate height, especially in applications dealing with low echo signals (such as measurement of ultra-thin and ultra-thick plates).



Waveform Diagram of 0.5mm Thin Plate Measured by PT04 Probe

6.6Red Arrow

A-scan mode has a red arrow indicating the measuring point, and the thickness reading is the abscissa of the point. It can help judge whether the thickness reading is correct. When

measuring correctly, the red arrow should point to the front edge of the first bottom echo.

6.7Range

Adjusts the range of the waveform displayed on the screen, and the waveform is visually compressed or expanded. If the display range is not set correctly, the echo waveform may go out of the display area and cannot be seen, but the measured value can still be displayed correctly.

6.8Pan(DELAY)

Adjust the starting position of the waveform displayed on the screen. Visually, the waveform is moved horizontally. If the pan is not set correctly, the echo waveform may be out of the display area and cannot be seen, but the measured value can still be displayed correctly. The range and pan functions can enlarge and display any part of the waveform on the screen

6.9Rectification Mode

Four rectification modes of RF, positive half-wave, negative half-wave and full-wave can be selected.

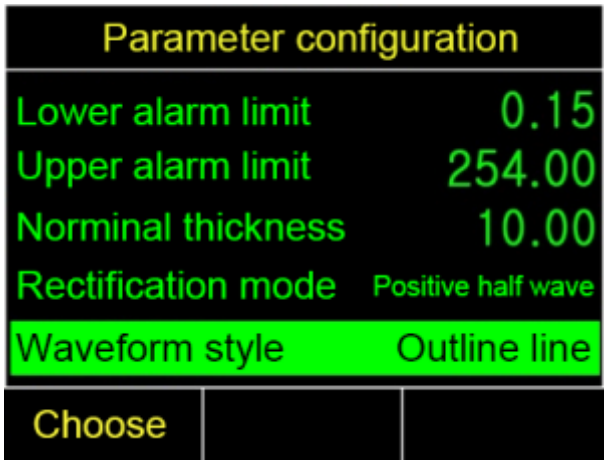
RF: describes the complete echo waveform;

Positive half wave: refers to the negative half wave with echo removed, and only the positive half wave is displayed;

Negative half wave: it means that the positive half wave of echo is removed and the negative half wave is reversed and displayed as positive;

Full wave: it means that both the positive half wave and the negative half wave reversed to positive are displayed

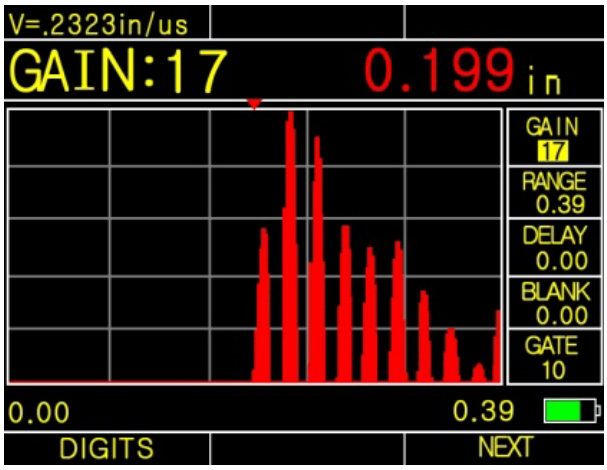
6.Introduction to Terms



Set Rectification Mode

6.10Alarm Mode

The upper and lower alarm limits can be set. The waveform and thickness value change color dynamically during alarm.



Positive Half Wave at Alarm

6.11Reduction Rate Measurement

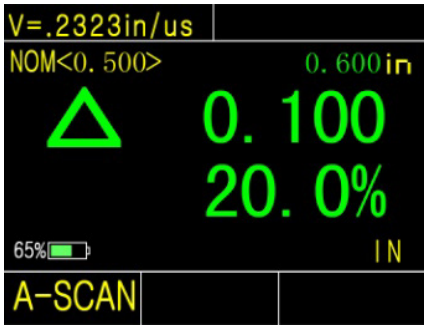
The instrument has difference and reduction modes. The difference mode shows the difference change between the measured thickness and the preset thickness. Reduction rate is the percentage of thickness reduction after material thinning is calculated and displayed. A typical application is to measure metallic materials that have become thinner due to bending.

6.Introduction to Terms

6.12Minimum/Maximum Mode

This mode displays the current thickness value, minimum thickness value and maximum thickness value on the screen at the same time. The probe can be dragged along the workpiece surface, and the instrument automatically finds out the thinnest value and the thickest value

White Numbers Indicate Coupling



Difference / Reduction Rate Model

Min / Max Mode, Red Number Indicates Alarm

6.13Multiple Probe Options

The instrument has built-in v-path correction program for a variety of probes, including standard probe, small diameter tube probe, micro probe, coarse-grained probe and high-temperature probe. The frequency range is from 2 to 10MHz, and the chip size is from 4 to 12mm. Generally speaking, the higher the probe frequency and the smaller the diameter, the more suitable for the measurement of thin or curved workpieces.

PROBE TABLE					
Model	PT08	PT06	PT04	ZT12	GT12
Type	Standard	Small diameter tube	Fingertip	Coarse grained (cast iron)	High temperature
Frequency	5MHz	7MHz	10MHz	2MHz	5MHz
Contact diameter	11mm	8mm	6mm	17mm	15mm
Measuring range	0.8~150.0mm	0.6~100.0mm	0.5~25.0mm	4.0~508.0mm	4.0~80.0mm
Allowable temperature	-10~70℃	-10~70℃	-10~70℃	-10~70℃	-20~480℃
Photograph					
Code	TP0508150	TP0707100	TP1006025	TP0217508	HTP0315480

7.Repair and Maintenance

7.1Power Check

If the instrument cannot be started, replace the battery first.

The battery replacement method is as follows:

1. shutdown
2. loosen the screws and open the battery compartment cover
3. take out the battery, put in a new battery, and pay attention to the polarity

Note: the battery should be taken out when the instrument is not used for a long time, because even if it is turned off, there is a weak energy consumption. After a long time, the battery cannot be turned on when it is dead.

7.2Notice

1. when using random test block to test the instrument, it is necessary to apply coupling agent, so please pay attention to rust prevention. Clean the random test block after use. Do not sweat when the temperature is high. If it is not used for a long time, a little grease shall be applied on the surface of the random test block to prevent rust. When it is used again, it can work normally after the grease is wiped off.
2. Alcohol, diluent, etc. have a corrosive effect on the casing, especially the window, so when cleaning, just wipe it with a small amount of water.
3.The surface of the probe should avoid re-scribing, and lightly press to measure. If the probe is worn out, the displayed value will be unstable, and the probe should be replaced.

7.3Maintenance

In case of any of the following problems, please contact our maintenance department:

1. the instrument is damaged and cannot be measured.
2. the display screen is abnormal.
3. the error is too large during normal use.
4. keyboard operation failure or confusion.

As this series of ultrasonic thickness gauge is a high-tech product, the maintenance work should be completed by professionally trained maintenance personnel. Please do not disassemble and repair it by yourself.

8.Appendix

Media Material Name	Velocity (m/s)
Aluminium	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
Glycerol	1920
Water Glass	2350

Note: the sound velocity in the above table is for reference only, and the actual sound velocity calibration refers to Section 3.1

Mikrosize Distributors Worldwide

Coventry,UK /Warsaw,Poland/Burago di Molgora, Italy/Langgöns,Germany/
Madrid, Spain/Istanbul,Turkey/Minsk,Belarus/Moscow , Russia /Sao Paulo, Brazil/
Mexico City ,Mexico/Penang, Malaysia/Bangkok Thailand etc.....

Anhui Mikrosize Precision Instrument Co.,Ltd

Factary Producing Add: NO13 Shuiku Road Shatou, Changan Town, Dongguan, China.
International Trading Office: A-4035 RuiFeng Business Expo , Wuhu City, China.
Web: www.mikrosize.com Email: mikrosize@mikrosize.com