Ultrasonic Thickness Gauge

UM Series

Operating Manual

YUSHI INSTRUMENTS

CONTENT

1.General Information of The Gauge

UM series ultrasonic thickness gauge made by our factory is a simple-to-use, highly accurate, hand-held ultrasonic thickness gauge with the operating principle of ultrasonic wave measuring. It can measure quickly, nondestructively and precisely with a resolution of 0.001in/0.01in or 0.01mm/0.1mm. This instrument can be widely used in the fields such as manufacturing, metal processing, chemistry and business inspecting for measuring the thickness of all sorts of materials where ultrasonic wave can spread through with a constant speed and get the reflection from the back side. Apart from making accurate measure on various kinds of plates and processing components, it can also make detection on various kinds of pipes and pressure containers of the manufacturing facilities about their thickness loss after corrosion. It's the necessary specialized instrument for material protection.

This manual applies to the models of UM-1, UM-1D, UM-2 and UM-2D ultrasonic thickness gauges, the difference between them in the list below:

Model	UM-1	UM-1D	UM-2	UM-2D
Resolution	0.1mm	0.1mm	0.01mm	0.01mm
Through coating function	N	Y	N	Y
Probe selection function	N	N	Y	Y

Note: The schematic diagram and features in the manual reference to UM-2 model without special mark.

1.1 Measuring Principle

UM series ultrasonic thickness gauge measures the thickness of an object by precisely calculating the times of the probe sending ultrasonic pulse with the help of couplant to the object and passing through the object until the probe receiving the reflection from the boundary.

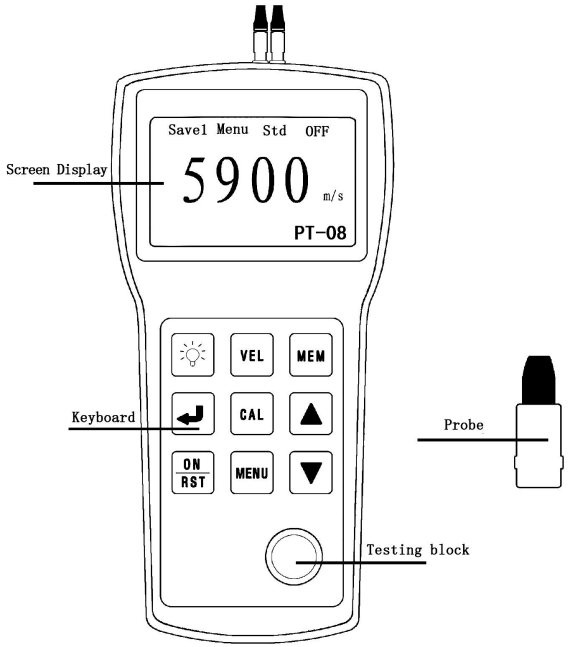
1.2 Through Coating Function

There are two operating modes of UM-1D / UM-2D ultrasonic thickness gauge: standard mode and coating mode. The principle of coating mode is E-E (echo-echo). When there is coating or paint on the surface of the object, the net thickness of the material can be directly measured neither having to remove the coating nor calibration. While the defect of this mode is that the measuring range is relatively narrow: 3mm-18mm (with standard probe). The principle of standard mode is P-E. With the covered coating, the measurement will not be very accurate, so the coating should be removed before measuring in standard mode. The advantage of this mode is that the measuring range is relatively wide: 0.8mm-300mm.

Press MENU key to make “Std/Coat” into highlighted, and then press ENTER to alter between the two modes.

1.3 Basic Configuration and Names of Various Parts

1.3.1 Names of Various Parts



LCD Screen Display:

m/s——unit of material velocity　　BATT——Sign of low voltage

mm/inch——units of thickness　　凸——Sign of good-coupling

PT-08——applying probe

Keyboard Function Illustration:

ON——Open　　VEL ——Velocity

MENU——Menu　　MEM——Memory

CAL——Calibration　　☼ ——Backlight

↵——Enter　　△▽——Turn

1.3.2 Standard Configuration

UM series thickness gauge

Standard probe

Carrying case

Two 1.5V AA alkaline batteries （Air transport is prohibited）

Couplant （Air transport is prohibited）

Operating manual

Certification of quality

Packaging list

Warranty card

1.3.3 Optional Accessories

Rubber sheath

Numerous special probes on request (High-temperature probe, cast iron probe, small probe, mini probe)

Probe cables

Step block for calibration

Data transmission cable

Application software

2. Specifications

Display:

128×64 dot-matrix LCD screen

Measuring Range on Standard Mode:

0.8mm~300mm; (According to probe and material)

Measuring Range on Coating Mode (only UM-1D& UM-2D):

3mm~18mm (Use standard probe)

Measuring Limits of Tube (Steel):

Φ20mm×3.0mm(PT-08 probe)

Φ15mm×2.0mm(PT-06 probe)

The measuring error is up to ±0.1mm

Measuring Error:

UM-1 and UM-1D:

Low limit to 10mm: ±0.1mm

10mm to high limit: ± (1%H+0.1) mm

UM-2 and UM-2D:

Low limit to 10mm: ±0.05mm

10mm to high limit: ± (0.5%H+0.01) mm

Note: H is the actual thickness of the measurement material

Repeatability:

UM-1 and UM-1D: ±0.1mm

UM-2 and UM-2D: ±0.05mm

Display Resolution:

UM-1 and UM-1D: 0.1mm

UM-2 and UM-2D: H < 100.0mm: 0.01/0.1mm selectable

H≧100.0mm: 0.1mm

Measurement Update rate: 4 Hz

Material Velocity Range: 1000 ~ 9999 m/s

Operating Temperature: -10℃~60℃

Power:

Two 1.5V AA alkaline batteries

Size: 149mm×73mm×32mm (H×W×D)

Weight:

160g (no include batteries)

3.Main Functions

☆ Through coating function (only UM-1D and UM-2D).

☆ Modifying systematical errors by using the 4mm standard block on the instrument.

☆ Data logger: Up to 500 readings can be divided into 5 different material files for easy store and management. The data cannot get lost after power off.

☆ Thickness restriction alarm: set the thickness limits and the value out of the limits will cause the alarm ringing.

☆ Minimum value scanning (MIN Capture mode): catch the minimum value during the measurement.

☆ 2-point calibration: Curve surface measurement or other special application with a high precision.

☆ 2 thickness units of mm and inch.

☆ 5 different velocities can be stored.

☆ The calibration value can be stored automatically without loss after turning off the gauge.

☆ Low voltage warning function.

☆ Backlight: Bring convenience to night working.

☆ Delete: The skeptical data in the file or the whole file can be deleted, so that new data can be stored.

☆ Automatic shut off: Five minutes without operating.

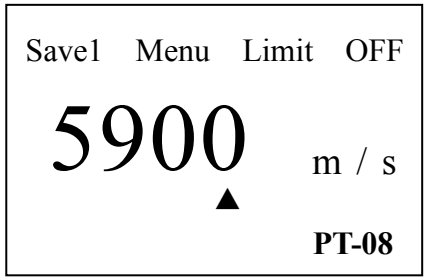
☆ Language: English and Chinese.

☆Coupling state identification: The stability of coupling can be aware by the coupling mark.

4. Measuring Steps

4.1 Gauge Preparation

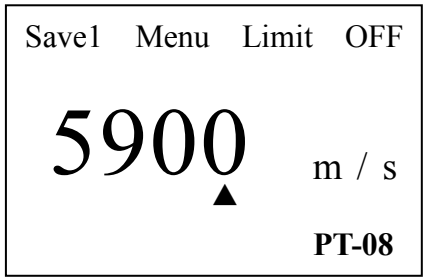
After plugging-in the probe connector to the gauge and pressing ON, there will be two beep and the screen lights up. The velocity displayed is that of last time. The screen display is as follows:

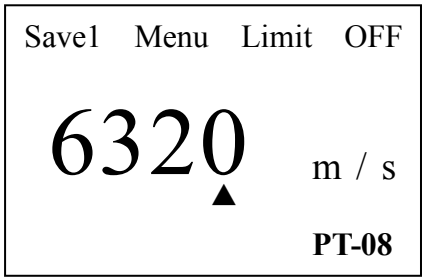


4.2 Velocity Setting

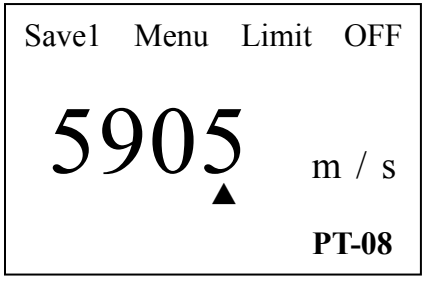
With the known velocity of the material, the build-in velocity can be set manually according to the Velocity List in the appendix. Totally, there are 5 velocities can be stored in the gauge. The steps are as follows:

If the present displays is not the velocity, press VEL to enter the velocity status. The velocity in the present velocity storing file will display and every time you press VEL, the 5 velocities will change in turn. See the following figures:





Press VEL to enter the velocity status Press VEL to change the velocity If there is not the needed velocity, press △ or ▽ to change. At the same time, you can store the velocity to the gauge so that you can easily find it next time. See following figure:



Press △ or ▽ to change

The ▲ below ones place, tens place and hundreds place can be moved when adjusting the velocity value and every time you press △or ▽, the value will be added by 1, 10, and 100 in turn. Press ↵ to move the ▲.

4.3 Velocity Measurement

With the unknown material velocity, velocity calibration is necessary.

Do as the following steps:

① Prepare a testing block of the same component with the testing object. Make its surface suitable for testing. Then measure the thickness of the block with a slide caliper.

② Measure the thickness of the prepared testing block with the ultrasonic thickness gauge.

③ Press VEL and adjust △ or ▽ until the thickness is the same with the known thickness of the testing block. The velocity displayed is that of the testing object.

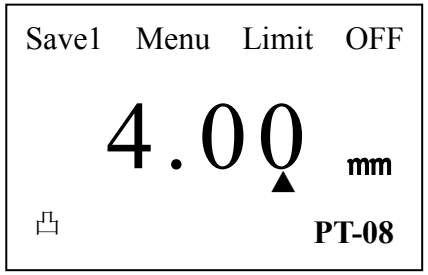
④ The velocity will be stored into the present velocity unit automatically.

4.4 Gauge Calibration

4.4.1 Fast Calibration

Calibration should be made every time after changing the probe, which is very important to ensure the accuracy of the testing. Fast calibration can be made every time before testing if necessary.

Spread the couplant on the testing block on the gauge, and make the probe coupled to the testing block until the coupling mark appears without flickering. Then press CAL to finish calibration. If the velocity is 5900m/s, the thickness value display is 4mm. See the following figure:



Tips: If the velocity is not 5900m/s, the thickness value is not 4.0mm after fast calibrating and testing the block on the gauge, which is a common phenomenon.

4.4.2 2-Point Calibration

In order to make curve surface measurement or other special application with a high precision, 2-point calibration can be applied. For detail see Chapter 7.5.

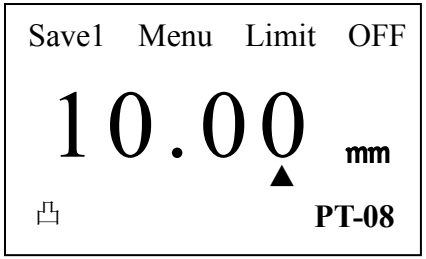
4.4.3 Difference between Fast Calibration and 2-Point Calibration

①Fast calibration use the testing block on gauge, while 2-point calibration can use any block of various materials and thicknesses.

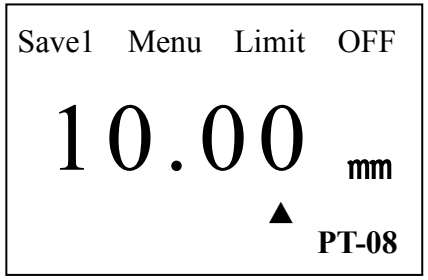
②Fast calibration use only one testing block, while the 2-point calibration use two blocks in different thicknesses.

4.5 Thickness Measurement

After calibration and velocity setting, spread the couplant on the testing area of the object and coupled the probe with the object completely. The screen will display the thickness value of the testing object. See the following figure:



Note: When the probe is coupling to the testing material, there will be a coupling sign 凸 on the screen; On the contrary, if the coupling status is not very good, the coupling sign won't appear, or it will keep flittering. See the following figure:

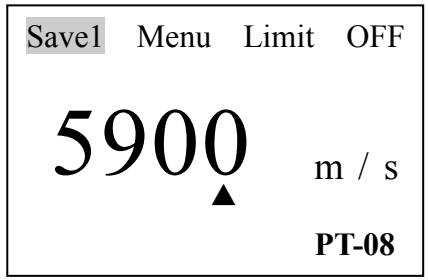


5. Thickness Value Storing and Viewing

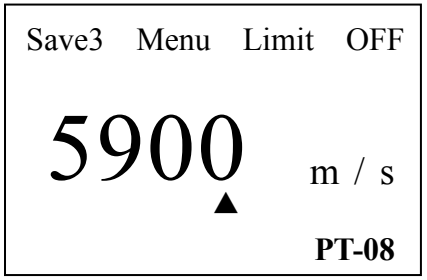
5.1 Thickness Storing

Up to 500 thickness values can be divided into 5 files for storing.

Firstly, choose the storing file number. Press MENU key to make “Save” into highlighted. See the following figure:



Press ↵ to change the file number so that the storing file number can be fixed. The five files will display in turn. See the following figure:



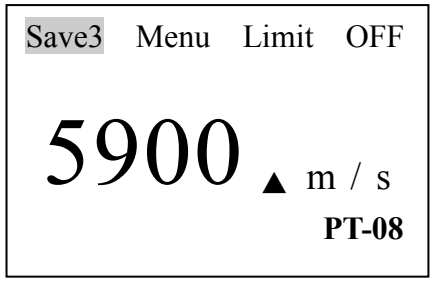
Secondly, measure thickness.

Thirdly, save reading. After measuring the thickness, the screen will display

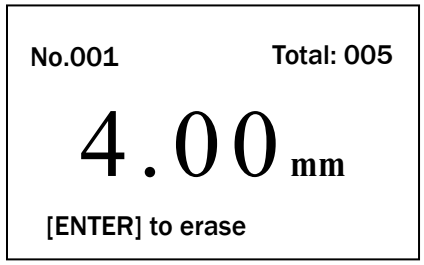
the thickness. Then press MEM, there will be a word “Memory” shinning once in the lower left corner, meaning that the storage has finished and the reading has been stored in the corresponding file.

5.2 Thickness Viewing

Press MENU to make “Save” into highlighted. Then press ↵ and the five files will display in turn so that you can choose the file you want to check. See the following figure:



Finally, press MEM key to enter the file. See the following figure:



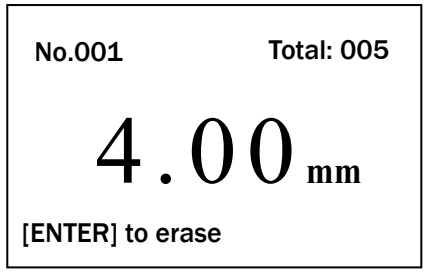
Note: “No.” is the number of the present data in the file; “Total” is the total quantity of the data in the present file. You can check the readings in this file by pressing △ or ▽. Press MENU or continue measuring will back to the main operation interface after checking.

6. Erasing the Storing Thickness Values

6.1 Erasing Individual Thickness Value

In the state of thickness viewing, press ENTER key to delete the present reading.

① Enter into the state of thickness viewing. See the following figure:

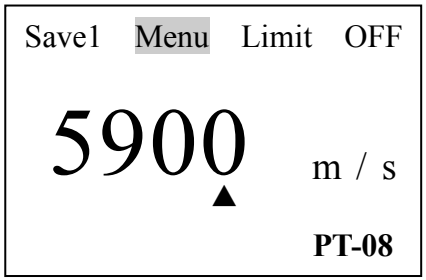


②Press ENTER key to delete the present reading and the next reading will appear. See the following figure:

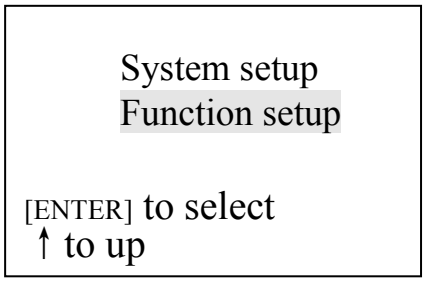
6.2 Erasing Current File

To delete all the content in the current file, do as the following steps:

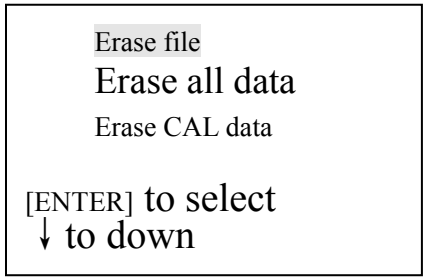
① Press MENU key to make “Menu” into highlighted. See the following figure:



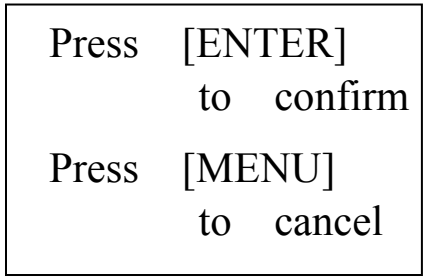
Press ENTER key to enter the menu and make “Function setup” into highlighted by pressing ▽. See the following figure:



② Press ENTER key to enter the interface, and select “Erase file” by pressing △ or ▽. See the following figure:



③ After selection, press ENTER and the screen displays as follows:



Then, press ENTER to confirm deleting the current file, or press MENU to back to the last interface.

④ After deleting, press VEL or MENU to go back to the main operation interface.

6.3 Erasing All Data

To delete all the thickness values in the gauge, just select “Erase all data” and do other steps as above.

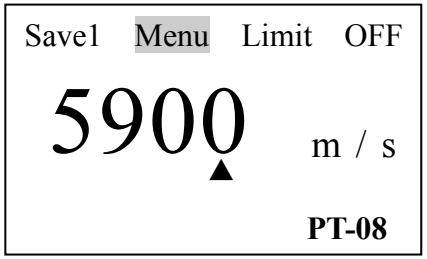
6.4 Erasing CAL Data

To delete the calibration thickness value, just select “Erase CAL data” and do other steps as above.

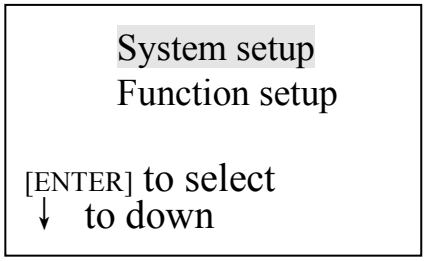
7. System Setup and Function Setup

7.1 System Setup

Press MENU to make “Menu” into highlighted. See the following figure:



Then, press ENTER key to enter into the menu. See the following figure:

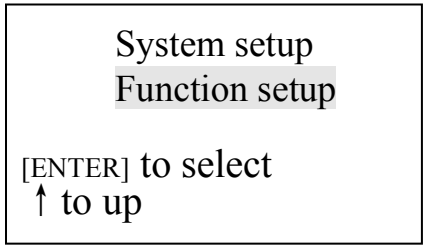


The “System setup” is highlighted (if not, you can adjust by moving △or▽), and press ENTER to enter into system setup menu. Press △or▽ to select the item you want to alter, and press ENTER to make the alteration.

There are six items in system setup totally, they are: units (metric and imperial), probe (only UM-2 and UM-2D), resolution (only UM-2 and UM-2D), min capture, 2-point cal and language. You can set these items according to your need. After setting, you can go back to the main operation interface by pressing MENU or start measuring.

7.2 Function Setup

Press MENU key to make “Menu” into highlighted. Then, press ENTER key to enter into the menu. See the following figure:



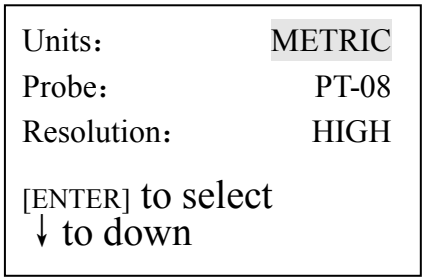
Make “Function setup” into highlighted by moving △or▽, and press ENTER key to enter into function setup menu. Press △or▽ to select the item you want to erase or alter, and press ENTER to make it.

There are four items in function setup totally, they are: erase file, erase all data, erase CAL data and set brightness. You can set these items according to your need. After setting, you can go back to the main operation interface by pressing MENU or start measuring.

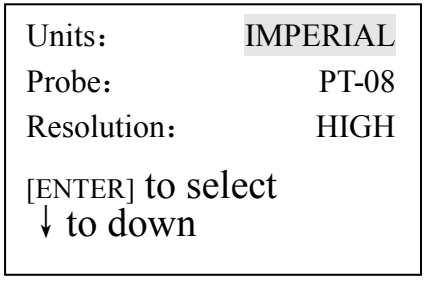
7.3 Setting the Measuring Unit, Probe and Resolution

The detailed steps are as follows:

① Enter into the system setup menu, and then move the cursor to “Units” by moving △or▽. Alter the unit between METRIC and IMPERIAL by pressing ENTER key. See the following figures:

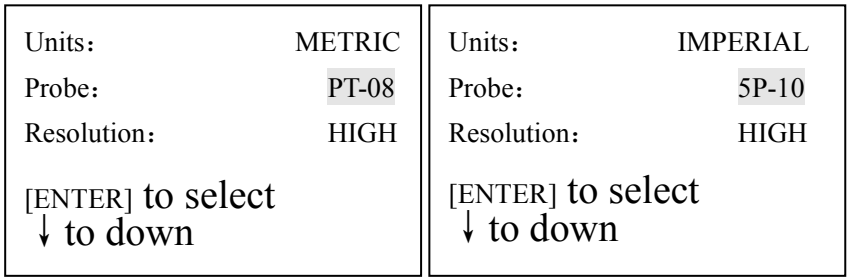


Choosing the altering item



After altering by pressing ENTER

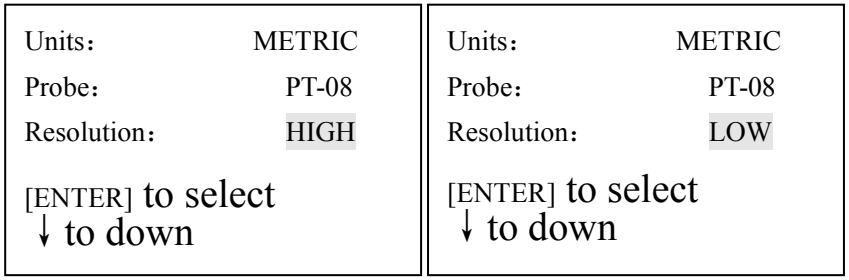
② Enter into the system setup menu, and then move the cursor to “Probe” by moving △or▽. Alter the unit among PT-08，5P-10，PT-12，ZT-12，GT-12，PT-04 and PT-06 by pressing ENTER key. See the following figures:



Choosing the altering item　　After altering by pressing ENTER

Note: Only UM-2 and UM-2D have the probe selection function, to make precise measuring, alter the probe type when choosing different probes.

③Enter into the system setup menu, and then move the cursor to “Resolution” by moving △or▽. Alter the unit between HIGH (0.01mm) and LOW (0.1mm) by pressing ENTER key. See the following figures:



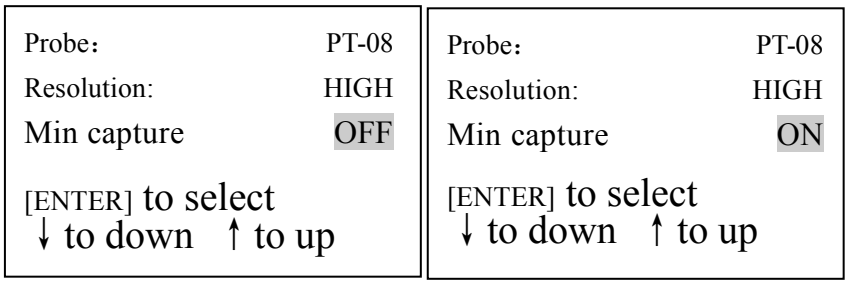
Choosing the altering item　　After altering by pressing ENTER

Note: only UM-2 and UM-2D have “Resolution” item.

7.4 Min Capture

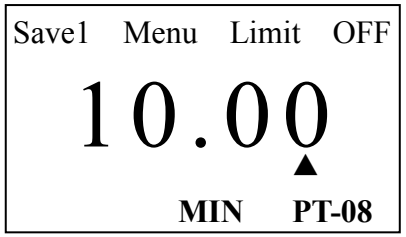
Min capture means catching the minimum thickness value among the measuring results when measuring. The detailed setting steps are as follows:

a) Enter into the system setup menu, and then set “Min capture” ON. (OFF means to close Min capture while ON means to open the function) See the following figures:



Choosing the altering item　　After altering by pressing ENTER

b) After setting, press MENU key to go back to the main operation interface. See the following figure:



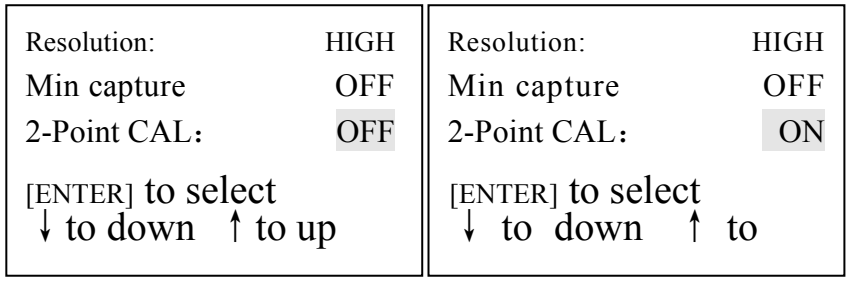
Note: with “Min capture” on, when the probe is coupling to the work-piece, the screen displays the present thickness value; when lifting the probe up, the screen displays the minimum thickness value among the measuring results, and the min capture sign “MIN” flickers for six times. If you continue to measure during the time the sign “MIN” flickering, the present thickness value goes on participating the min capture. Measurement after the sign “MIN” stops flickering makes the gauge start again to catch the minimum value.

7.5 2-Point Calibration

Choose two standard blocks of the same material, velocity and curve rate with the testing object. The thickness of one of the blocks should be near to the low limit of the measuring scope, while the thickness of the other to the high limit. 2-point calibration can improve the accuracy of measuring. The “2-Point CAL” should be turned ON and the “Min capture” should be turned OFF before using the “2-Point CAL” function. The detailed steps are as follows:

① Enter into the system setup menu, and then set “2-Point CAL” ON.

See the following figures:

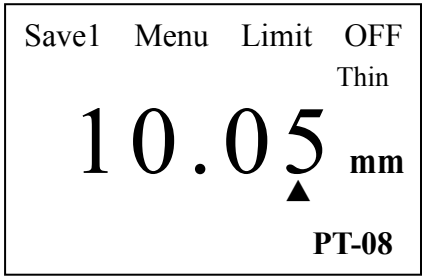


Choosing the altering item　　After altering by pressing ENTER

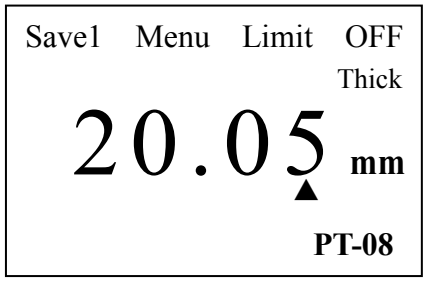
② After setting, press MENU key to go back to the main operation interface. With "2-Point CAL" on, the function of 2-point calibration can be used at any time when measuring.

③ Process the 2-point calibration. The detailed steps are as follows:

Firstly, measure the thickness of the thinner block. In the status of thickness display, press CAL, and there will be a "Thin" mark on the top right corner. Adjust the value to the standard low limit by using △or▽.



Secondly, press CAL, and there will be a "Thick" mark on the top right corner, then measure the thickness of the thicker block. Adjust the value to the standard high limit by using △or▽.

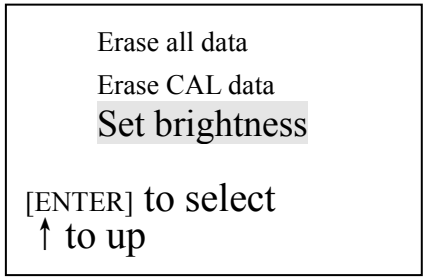


Finally, press CAL to finish the calibration.

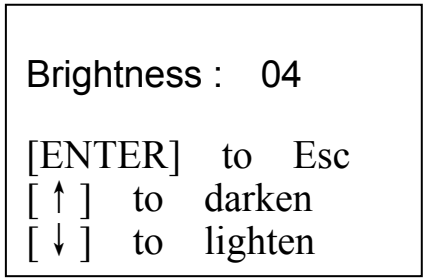
7.6 Brightness Setting

The detailed steps are as follows:

① Enter into the function setup menu. Then move the cursor to "Set brightness" by moving △or▽. See the following figure:



② Enter into the interface of brightness by pressing ENTER key. See the following figure:



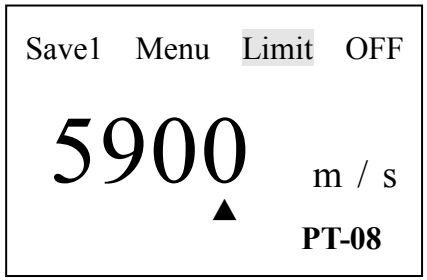
Adjust the brightness by moving △or▽. After finishing the adjustment, press ENTER key to go back to the last interface and press MENU key to the main operation interface.

7.7 Limits Setting

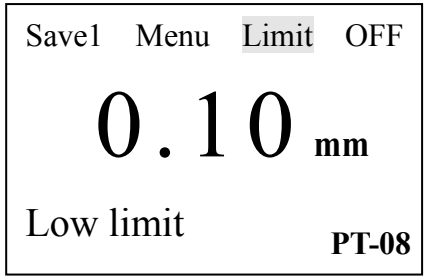
UM series ultrasonic thickness gauge can set low limit and high limit to realize the function of fast measurement.

The detailed steps are as follows:

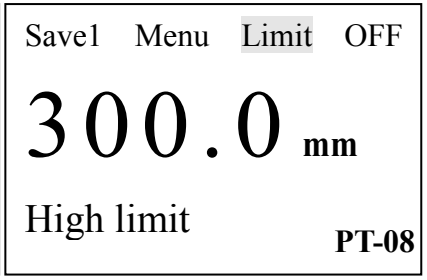
① Move the cursor to “Limit” by pressing MENU key. See the following figure:



② Enter into the limit interface by pressing ENTER key. The screen displays the original settings of the limits. See the following figures:



Low limit



High limit

The high limit and low limit can display in turn by pressing ENTER key. You can also set the new limits by pressing △or▽.

③ After setting, pressing VEL, MENU or start measuring can help you go back to the main operation interface.

Note: If the present thickness of a work-piece is out of the limits, the buzzer in the gauge will give an alarm automatically.

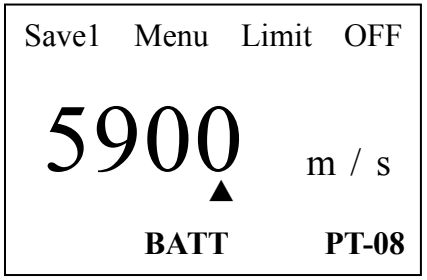
7.8 Backlight Function

The backlight function offers you convenience when getting the readings in dark condition. At the same time, you should pay attention to saving electric quantity.

Press and the backlight will be turned ON; press again, it will be turned OFF. After turning off the gauge, the backlight will also turn off automatically.

7.9 Low Voltage Warning Function

When the voltage of the battery is low, there will be a “BATT” sign appear on the screen. You should change the battery for further usage. See the following figure:



7.10 Ways of Turning Off

There are two ways of turn off the gauge for you to choose: auto off and manual off. The gauge will turn off in 5 minutes with no operation. You can also press MENU key to move the cursor to “OFF” and press ENTER key to turn off the gauge.

8. Measurement Application

8.1 The Condition Requirements on the Surface of the Work-piece

8.1.1 Clean Surface

Before measuring, all the dust, dirt and rust corrosion should be removal, as well as the covered paint.

8.1.2 Enhancing the Roughness Requirement

The extremely rough surface, such as the pebble-like finish of some cast irons, will always arouse measuring error or reading lost, which be proved most difficult to measure. Making the surface smooth before measuring is therefore very important. Often, a wire brush or scraper will be helpful in cleaning surfaces. Polishing, filing and grinding with rotary sanders or grinding wheels may be used, though care must be taken to prevent surface gouging, which will inhibit proper probe coupling. High-viscosity couplant is also usually applied.

8.1.3 Surface of the Rough Machine Processing

The regular slugs after rough machine processing (such as lathing or planning) on the surface of the work-piece may also arouse measuring errors. The compensation methods have been mentioned in 8.1.2. In addition to posing obstacles to measurement, rough surfaces contribute to excessive wear of the probes, particularly in situations where the probe is “scrubbed” along the surface. Probes should be inspected on a regular basis, for signs of uneven wear of the wear face. If the wear face is worn on one side more than another, the sound beam penetrating the test material may no longer be perpendicular to the material surface. In this case, it will be difficult to exactly locate tiny irregularities in the material being measured, as the focus of the sound beam no longer lies directly beneath the probe. The test result may be more accurate by adjusting the angle between the sound insulating wall (the metal film through the center of the probe bottom) of the probe and the slugs of the material and making them perpendicular or parallel with each other to get the minimum reading as the thickness value.

8.2 Measuring Methods

8.2.1 Single-Point Measurement

This method involves measuring the thickness at a single point. Use the probe to measure a random point on the surface of the testing object, the value displayed is the thickness value.

8.2.2 Double-Point Measurement

This method involves performing two thickness measurements near a single spot by using a dual crystal probe inclined at 0°and 90°respectively, with respect to the split face. Take the smaller of the two indicated values as the thickness of the material.

8.2.3 Multiple-Point Measurement

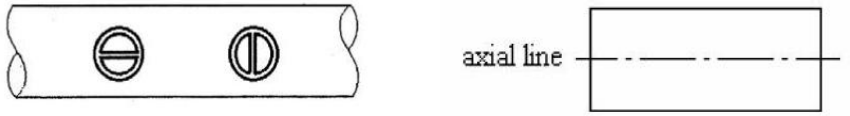
This method involves performing a number of measurements within a circle having a maximum diameter of about 30mm.Take the minimum indicated value as the thickness of the material

8.2.4 Continuous Measurement

Continuous measurement method involves taking continuous measurements along a specified line according to the single measurement method, at intervals of 5mm or less. Take the minimum indicated value as the thickness of the material.

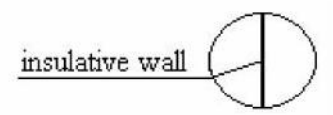
8.3 Pipe Walls Measurement

The thickness of a pipe can be measured accurately with this gauge.
The split-plane of the probe may be along the pipe axis or perpendicular to it as shown in the following figures:



Pipe samples

In this case, the readings on the screen will change with some regular patterns and the smallest display value should be taken as the thickness value.
For small pipes, measurement should be made in both directions (moving probe a little bit). For large pipes, measure the thickness of the wall along the direction perpendicular to the pipe axis. See the following figure:



Bottom view of probe

8.4 Cast Measurement

There are special features of cast measurement. The grain size of cast material is relatively rough, and the organization is not very tight. Added with the rough surface measuring status, the measurement of cast material is very difficult. So the following tips should be taken:

①Use low frequency probe like ZT-12 of our company.

②When measuring the cast work-piece with no processing on the surface, high viscosity couplant such as machine oil, grease and water glass are needed.

③ Calibrate the sound velocity with the standard block, which shares the same material and same measuring direction with the testing object.

④ Programming 2-point calibration if needed.

9. Maintenances and Cautions

9.1 Power Source Inspection

When the power source voltage is low, there appears a low voltage sign. Battery should be change promptly in order not to influence the accuracy of the gauge. Backlight should not be always on, so that the battery can be used for longer.

Change the battery as the following steps:

① Turn off the gauge.

② Open the battery cassette.

③Take out the battery, and put in new battery. Pay attention to the polarity.

For long time sparing the gauge, take out the battery in case that they will leak out the battery electrolyte, which will corrode the battery case and pole piece.

9.2 Cautions

9.2.1 General Cautions

- Avoid shocking and putting the caustic liquid (such as dilute and ethyl alcohol) into the instrument and the probe. Wipe the cover and window with little amount of water.
- After using, the coupling paste and the dirt should be wiped away to keep the instrument clean and free from rust.
- Avoid dripping sweat on the gauge in high temperature. Spread some grease on the testing block on the gauge if the gauge will not be used for long and wipe it out when using.
- Prevent the instrument from getting wet and do not leave it in a humid atmosphere for a long time.
- When the probe is being plugged into or unplugged from the socket, just hold the metal lead of the plug and push/pull it straight along the axis.
- Do not rotate the plugs, or the probe cable may get damaged.
- Take the batteries out of the chamber if the gauge will not be used for a long time.
- Don’t try to open the instrument, or the warranty will be void.

9.2.2 Measuring Cautions

① Only when the coupling sign appears and keeps stable, can you get the reliable results.

② With the probe worn, the measurement readings will be unstable. Please change in that case.

9.2.3 Changing the Probe

① When measuring different thicknesses, the readings are all the same.

② There are the sign of coupling and readings only with the probe plugged into the socket and without measuring.

9.3 Maintenances

Contact with the maintaining department of our company with the following problems:

① Components damage and the gauge cannot be used.

② The display of the screen is disordered.

③ The measuring error is abnormally big with ordinary usage.

④ Keyboard operation is disordered or doesn't work.

As the ultrasonic thickness gauge is a sort of high-tech product, the fixing work should be made by professional operator. Do not try to open the instrument by yourself, or we will not be responsible for any of the problem nor the maintenance service.

10. After-Sale Services

The ultrasonic thickness gauge products of our company have been tested strictly with high standards. Customers can enjoy the following services:

① The warranty period is ONE year after buying and the gauge would be maintained at any time for good. (The wear of the probe is not in the range of fixing insurance)

② During the warranty period, the breakdowns caused by the quality problems of the gauge itself can be fixed by our company for free with your guarantee card.

③ Our company offers you fixing service after the warranty period with a reasonable costing fee.

Appendix A: Sound Velocities of Some Common Materials

Material	Sound Velocity	
	Inch/μS	M/s
Air	0.013	330
Aluminum	0.250	6300
Alumina Oxide	0.390	9900
Beryllium	0.510	12900
Boron Carbide	0.430	11000
Brass	0.170	4300
Cadmium	0.110	2800
Copper	0.180	4700
Glass(crown)	0.210	5300
Glycerin	0.075	1900
Gold	0.130	3200
Ice	0.160	4000
Inconel	0.220	5700
Iron	0.230	5900
Iron (cast)	0.180	4600
Lead	0.085	2200
Magnesium	0.230	5800
Mercury	0.057	1400
Molybdenum	0.250	6300
Monel	0.210	5400
Neoprene	0.063	1600
Nickel	0.220	5600
Nylon, 6.6	0.100	2600
Oil (SAE 30)	0.067	1700
Platinum	0.130	3300
Plexiglass	0.110	1700
Polyethylene	0.070	1900
Polystyrene	0.0930	2400
Polyurethane	0.0700	1900
Quartz	0.230	5800
Rubber, Butyl	0.070	1800
Silver	0.140	3600

Steel, Mild	0.233	5900
Steel, Stainless	0.230	5800
Teflon	0.060	1400
Tin	0.130	3300
Titanium	0.240	6100
Tungsten	0.200	5200
Uranium	0.130	3400
Water	0.584	1480
Zinc	0.170	4200

Tips: the table above is for reference, the actual velocities should be measured with the method mentioned in 4.3 Velocity measurement.

Appendix B: Probe and Measuring Range

Probe description	Frequency (MHZ)	Diameter of the contact proportion	Measuring range(in steel)	Available contact temperature
Cast iron probe ZT12	2	17.2mm	(4.0～300.0)mm	(-10～60)℃
Standard probe PT12	5	12.5mm	(1.0～200.0)mm	(-10～60)℃
Standard probe PT08	5	10.5mm	(0.8～100.0)mm	(-10～60)℃
Small probe PT06	7.5	8.5mm	(0.8～30.0)mm	(-10～60)℃
Tiny probe PT04	10	7.1mm	(0.7～12.0)mm	(-10～60)℃
High temperature probe	5	15mm	(4.0～80.0)mm	Below 300℃