SINO AGE DEVELOPMENT TECHNOLOGY

ULTRASONIC THICKNESS GAUGE SA40+/SA40/SA40EZ

OPERATION MANUAL

Contents

1. Overview

SA40+ / SA40 / SA40EZ are the miniaturized ultrasonic thickness gauges that can measure wall thickness and velocity. Our intelligent gauges are designed to measure the thickness of metallic and nonmetallic materials such as steel, aluminum, brass, silver and etc. They are quite versatile model which can be easily equipped with the low & high frequency probes.

Using new technique of multiple echo(echo-to-echo), SA40+ can measure wall thickness under paint. For a normal ultrasonic thickness gauge, you must remove paint on work piece, but with new SA40+, you can take measurement directly over the paint of work piece and you can get real thickness value of work piece. SA40+ has two measuring modes: normal mode and multiple echo(MEC) mode. By normal mode, SA40+ is a normal ultrasonic thickness gauge; by MEC mode, SA40+ can measure over coatings.

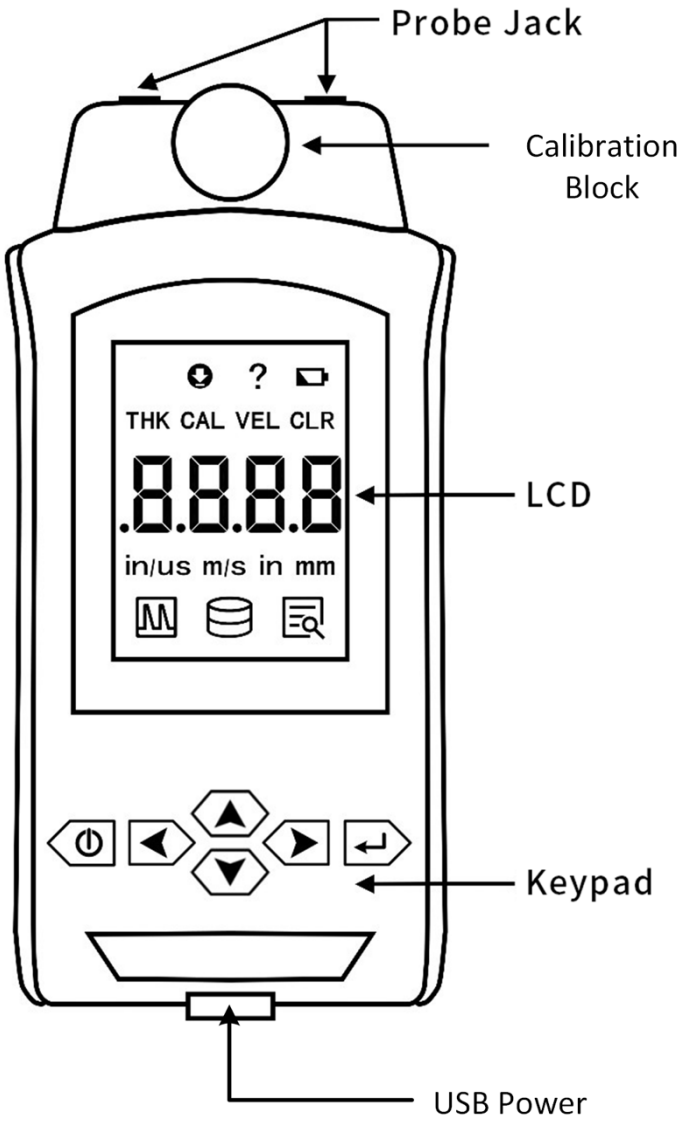
2. Measuring Principle

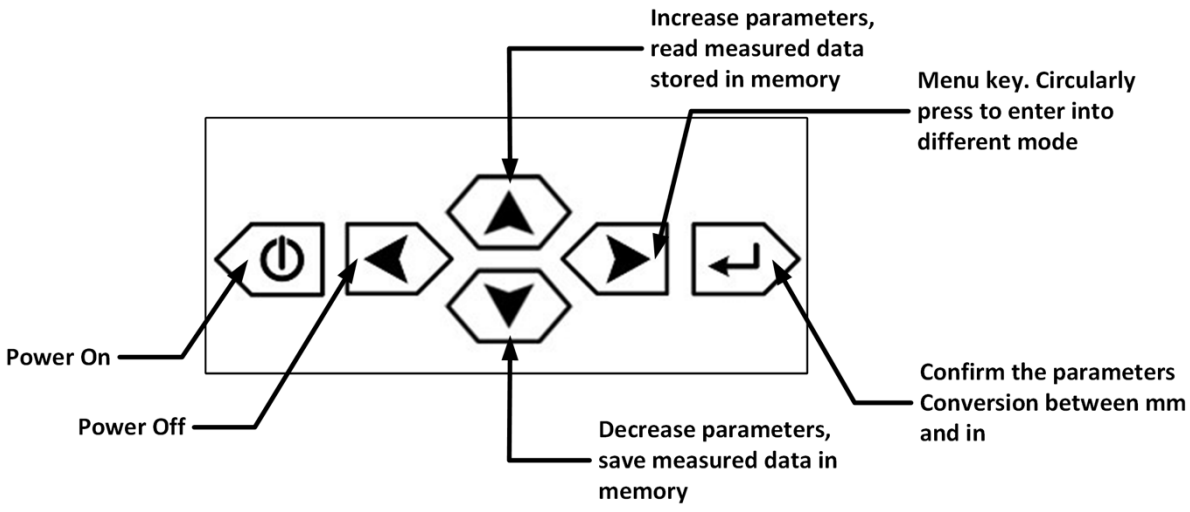
The ultrasonic wave sent out by the probe reaches the object to be measured through couplant and reflects back from its back surface. The probe receives the ultrasonic wave reflected and gets the thickness of the object to be measured through calculating the time of ultrasonic reflecting back.

3. Technical Parameters

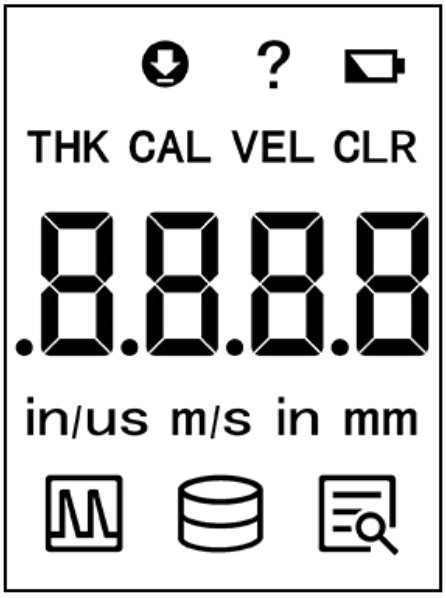
Model	**SA40+**	**SA40**	**SA40EZ**
Display	4 digits LCD		
Backlight	Yes		
Measuring range	0.70~300.0mm in steel with MT-5 probe (Normal mode) 3.00~200.00mm in steel, thickness for coating: <1.2mm (MEC mode)	0.7~300.0mm in steel with PT-5 probe	
Resolution	0.01mm@0.70~99.99mm, 0.1mm@100.0~300.0mm		0.1mm
Accuracy	0.70~9.99mm ±0.05mm / 10.00~99.99mm ±(0.5%+0.01)mm 100.0~300.0 ±(1%+0.1)mm		0.7~99.9mm ±(0.5%+0.1)mm 100.0~300.0mm ±(1%+1)mm
Unit	mm/inch		mm
Velocity	1000~9999m/s		
Coupling indicator	Yes		
Calibration	Auto		
Memory	500 data		N/A
Low battery indicator	Yes		
Working environment	0~40°C, 20~90%RH		
Power off	Auto		
Power supply	AA battery x 2 / USB cable		
Dimension (mm)	145x68x28		
Net weight (g)	240		
Standard probe	MT-5	PT-5	
Optional probes	XT-5 / GT-5	XT-5 / GT-5 / CT2.5	

4. Introduction to the Instrument





5. LCD display



→ contact measuring
? → to be confirmed
→ low battery
THK → measuring mode
CAL → calibration mode
VEL → velocity setting
CLR → clear the memory
→ memory mode

→ read the data

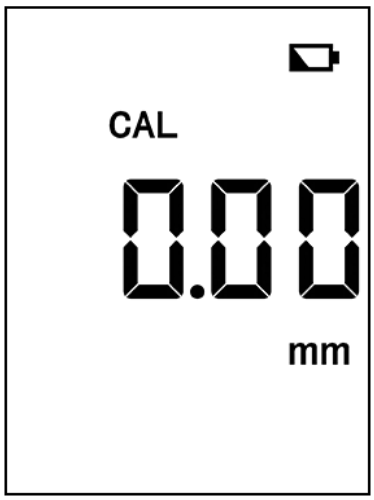
→ measuring over coating

THK+CAL → velocity measurement
m/s → velocity unit (Metric system)
in/us → velocity unit (British system)
in / mm → thickness unit

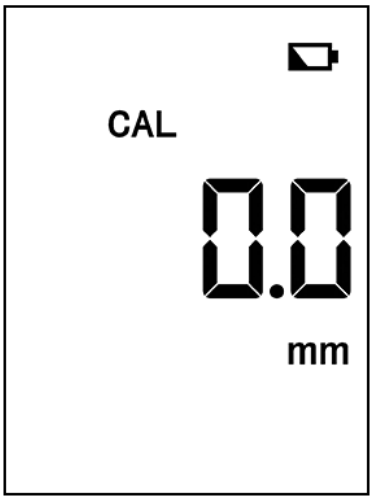
6. Calibration

Calibration should be done after changing the battery or probe. Please use the 3mm block attached on the tester to calibrate.

1) Press circularly until “CAL” is displayed on LCD.



SA40+ / SA40



SA40EZ

2) Take the probe to measure the block of 3.00mm attached on the panel of gauge. After 3.00mm displays, the calibration is finished and the gauge will come back into the mode of thickness measurement automatically.

SA40+ / SA40

SA40EZ

7. Measuring

7.1. Turn on the tester

In below 3 situations, the tester will come into measuring mode:

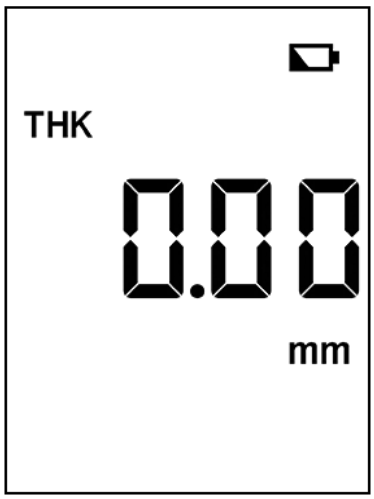
- It comes into measuring mode automatically when press  .
- No matter what mode it is, once the probe contacts the object to be measured, the instrument will be back to the measuring mode automatically.

- In memory reading mode, press to go back to measuring mode. (only for SA40+/SA40)

When measuring, the probe and the object to be measured shall be coupled well.

7.2. Take measurements in normal mode

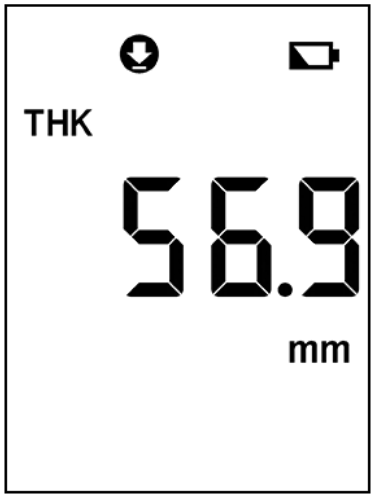
1) Press to turn on the tester, “THK” means the tester is in measuring mode.



SA40+ / SA40

SA40EZ

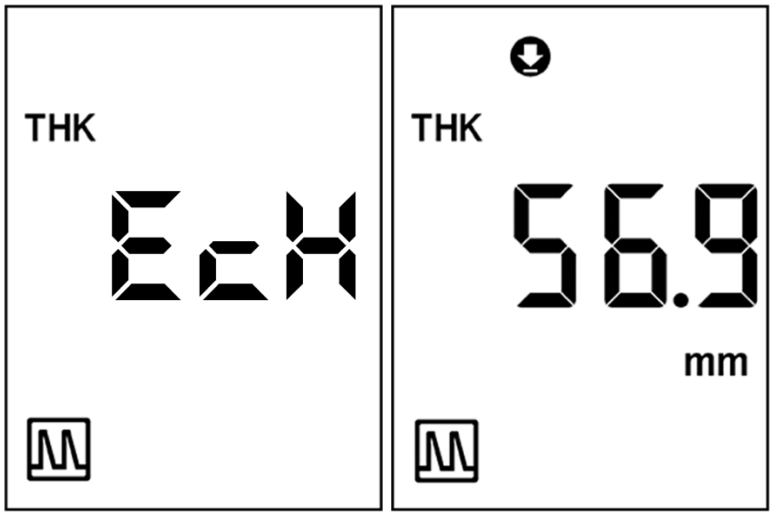
2) Coupled probe and the object to be measured well, indicates the measurement is valid. Measurement result will be displayed on LCD.



7.3. Take measurements in MEC mode (over coating, for SA40+)

1) Press to turn on the tester

2) Press circularly until “EcH” is displayed, then press to enter MEC mode (measuring over coating). In this mode, will be displayed on lower left corner of LCD. You can get thickness over coating in MEC mode. Press and hold until MEC is disappeared to exit MEC mode.



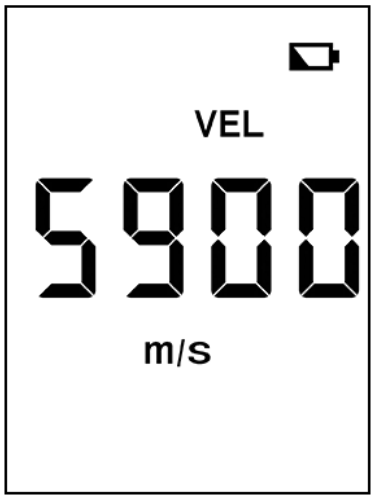
3) In measuring mode, press and hold until appeared / disappeared to switch MEC and normal mode.

8. Velocity

8.1. Changing velocity (for SA40+/SA40)

Velocity should be changed to measure different materials. If the velocity is known for the material, set the material velocity by this way.

1) Press menu key consecutively until “VEL” and current velocity value is displayed on LCD.



2) Press key ▲ or ▼ to change the value of velocity to the velocity required.

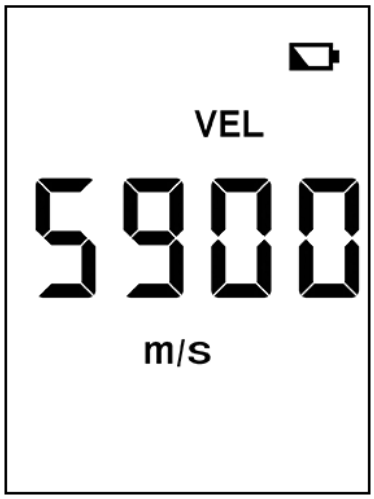
3) Press ↵ key to confirm and the gauge will enter measurement mode with new velocity.

Note: Press and hold ▲ or ▼ to change the number quickly.

8.2. Changing velocity (for SA40EZ)

Velocity should be changed to measure different materials. If the velocity is known for the material, set the material velocity by this way.

1) Press menu key ▶ consecutively until “VEL” and current velocity value is displayed on LCD.



2) The first digit flashes, press key ▲ or ▼ to change the value of the first digit, then press ↵ to move to the second digit, press ▲ or ▼ to change the value of the second digit as before, repeat this operation for four digits till the velocity is set properly.
3) After setting, press ➤ twice to enter measuring mode.

8.3. Measuring velocity (for SA40+/SA40)

If you do not know the velocity of the measured material but know the thickness of the material, you can measure the velocity. Please note in order to make the measured velocity more accurate, we suggest the thickness of the sample block is more than 10mm.

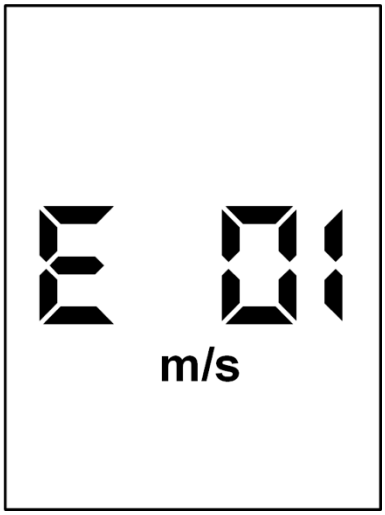
1) Press key ➤ consecutively until both THK and VEL are displayed on LCD. The last stored thickness value will also be displayed.

2) Press  or  to change the number to the thickness value of measured sample.

3) Put the probe on the sample and make sure there is a correct coupling. The value of the velocity that appears on the screen will correspond to the velocity of the measured sample. The gauge will automatically save this velocity and go into the mode of thickness measurement.

Please note in order to make the measured velocity more accurate, we suggest the thickness of the sample block is more than 10mm.

If the setting thickness value is much different from the actually thickness value, the screen will appear E01. And the gauge cannot get the new velocity.



8.4. Measuring velocity (for SA40EZ)

If you do not know the velocity of the measured material but know the thickness of the material, you can measure the velocity. Please note in order to make the measured velocity more accurate, we suggest the thickness of the sample block is more than 10mm.

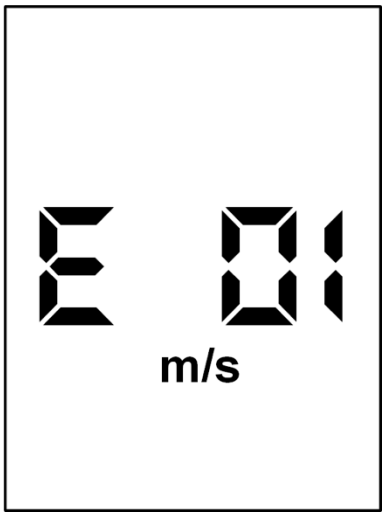
1) Press key  consecutively until both THK and VEL are displayed on LCD. The last stored thickness value will also be displayed.

2) The first digit flashes, press key  or  to change the value of the first digit, then press  to move to the second digit, press  or  to change the value of the second digit as before, repeat this operation for four digits till the thickness value is set properly.
3) After setting, put the probe on the sample and make sure there is a correct coupling. The value of the velocity that appears on the screen will correspond to the velocity of

the measured sample. The gauge will automatically save this velocity and go into the mode of thickness measurement.

Please note in order to make the measured velocity more accurate, we suggest the thickness of the sample block is more than 10mm.

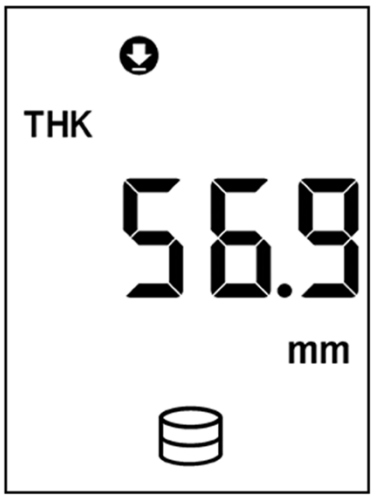
If the setting thickness value is much different from the actually thickness value, the screen will appear E01. And the gauge cannot get the new velocity.



9. Memory (for SA40+ / SA40)

9.1. Data Store

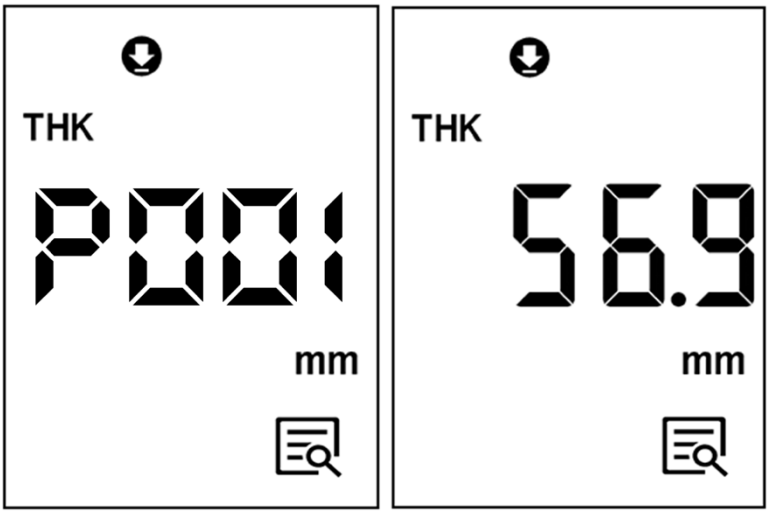
In measuring mode, after taking a measurement of thickness, press, when flashes, the current measurement result will be stored in memory. If PPPP is displayed on LCD, it means the memory is full.



9.2. Data Read

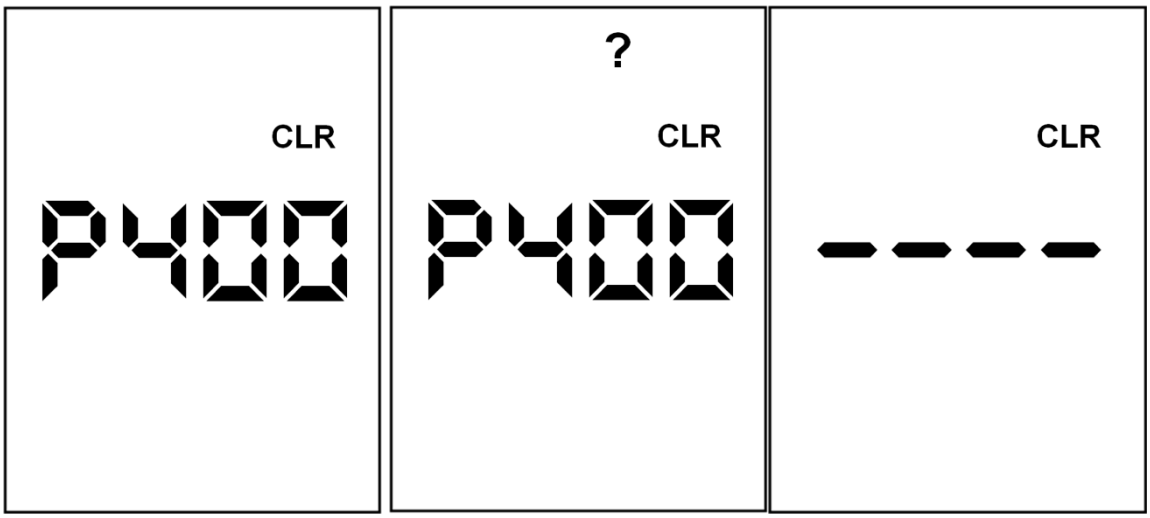
In measuring mode, press key to recall the data in memory. The last stored value will be displayed after its address number flashes. At the same time, is displayed on LCD which means this value is a recalled value. Press key continually, all stored values will be displayed one by one from the end to the head.

Press to enter measuring mode.



9.3.Clear memory

To clear the memory, press key consecutively until CLR is displayed on LCD, then press , when "?" is displayed, it wants to ask if you need to clear the memory. Press again to clear all memory. After "- - - -" is displayed, press twice to go back to the measuring mode.



10. Thermal Material Measuring

Materials thickness with maximum 400℃ surface temperature could be measured using high temperature probe GT-5. Precautions: when measuring thermal materials:

Apply high temperature couplant, measure immediately after the couplant melts, the probe contact shall be less than 10 seconds and the interval between two measurements shall be no less than 1 minute.

Prevent the probe from being vibrated; otherwise the probe will be damaged.

When the temperature of thermal material increases 100℃, the velocity decreases about 1%. Correction needs to be done to the measuring values.

E.g.: we can define δ0 as the actual thickness of the material, δt as the display value in the instrument

Then:

When 125℃, δ 0 =δ t×0.99

When 225℃, δ 0 =δ t×0.98

When 325℃, δ 0 =δ t×0.97

Also, when we know accurately the material temperature to be measured, we can also correct the velocity of the instrument.

For example: under normal temperature (25℃), velocity of the material =5900 m/s,

When 125℃, velocity ≈5840m/s

When 225℃, velocity ≈5780m/s
When 325℃, velocity ≈5720m/s
Then, the displayed value is the actual value of the material.

11. Optional probes

MT-5	5MHz	Dia. ∅10mm	For standard applications	For SA40+
PT-5	5MHz	Dia. ∅10mm	For standard applications	For SA40/SA40EZ
XT-5	5MHz	Dia. ∅6mm	For tubes with small diameter	For SA40+/ SA40/SA40EZ
GT-5	5MHz	Dia. ∅12mm	For high temperature up to 400℃	For SA40+/ SA40/SA40EZ
CT-2.5	2.5MHz	Dia. ∅12mm	For unfavorable attenuation cast	For SA40/SA40EZ

12. Reference Velocity of Various Materials

Material	Sound Velocity (L wave, m/s)	Acoustic impedance (Lwave,10^6kg/m^2s)
Al	6260	16.9
Zn	4170	29.6
Ag	3600	38.0
Au	3240	62.0
Su	3230	24.2
Fe	5900	46.0
Cu	4700	41.8
Brass	4640	39.6
SUS	5790	45.7
Acrylic resin	2730	3.2
Water(20°C)	1480	1.48
Oil	1390	1.28
Glycerin	1920	2.43
Water glass	2350	3.99

14. Notes

Accurate readings cannot be guaranteed unless COUPLANT is applied between (a) probe and test block or (b) probe and the material to be measured, for accurate results, we recommend Vaseline is used as the couplant.

The Probe sleeve can be removed if it is prohibiting any particular measurement in a difficult area.

When measuring on pipes ensure that the “Separator” (i.e. the line on the face of the probe between the Transmitter & the Receiver) is at 90 deg. (Right Angles) to the length of the pipe.

Avoid shock, heavy dust and damp. Remove the batteries from the gauge when not in use for long time.

Sino Age Development Technology
Building 5, TEDA Technology Park, No.12 Zhu Yuan Rd.,
Tianzhu Shunyi, 101312, Beijing, China
TEL: +86 (10) 8260-0228, FAX: +86 (10) 8260-0229
sadt@sinoage.com.cn
www.sadt.cn