



MODEL:GM100+

ULTRASONIC THICKNESS GAUGE INSTRUCTION MANUAL



Specific Declarations:

Our company shall hold no any responsibility resulting from using output from this product as an direct or indirect evidence.
We reserves the right to modify product design and specification without notice.



Version: GM100+-EN-00

CONTENTS

1. Introduction-----(01)
2. Operation condition-----(04)
3. Operation instruction-----(06)
4. Measurement tips----- (11)
5. Precautions for accuracy----- (13)
6. Maintenance----- (15)
7. Table of sound velocity----- (16)

1. Introduction

This ultrasonic thickness gauge is an intelligent handhold product, which adopts ultrasonic measuring principle, and is controlled by micro processor, provides quick and precise measurement of thickness for most of industrial material.

This unit is widely used in various precise measurement for different hardware / parts in industrial realm; one of its important applications is to monitor the level of thickness during operation of various and pressure container.

Diffusely applied in manufacture fields, metal processing, and commercial inspection. The material that conduct and reflect constant sonic velocity, this product is to be applicable to used.

1. Scope of application

This unit is suitable for measuring materials that are good ultrasonic conductor such as metal, plastic, ceramic, glass etc., as long as the measured part in two parallel surfaces for measurement of thickness.

This unit is not suitable for cast iron due to its big crystalloid composition.

2. Standard packing & Parts description:

2.1 Standard packing:

Main unit-1PCS

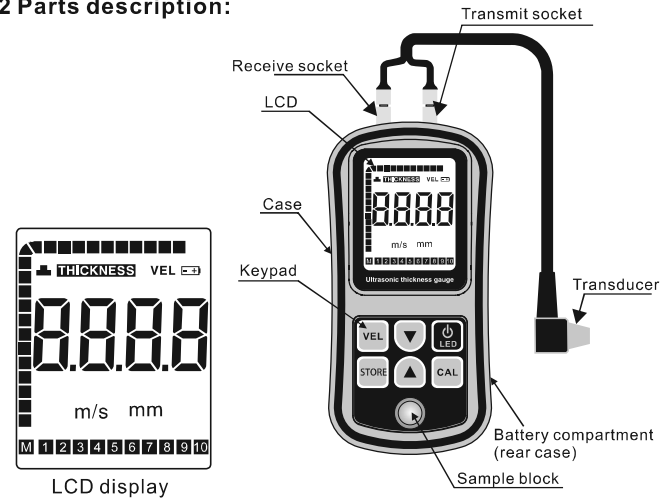
Transducer: (Φ10mm 5MHz) 1PCS

Coupling agent: 1PCS (50ml)

4mm Sample block: 1PCS

Optional accessories: (Φ10mm 2.5MHz) 1PCS

2.2 Parts description:



2.2.1 LCD diagram:

☐ : Low battery indicator

■ : Coupling indicator

m/s : Sound velocity unit

mm : Thickness unit

VEL : Sound velocity indicator







THICKNESS : Thickness indicator

M : Store / recall indicator

1 - 10 : Stored unit indicator

■ : Calibration indicator

2.2.2 Keypad diagram

-  : LCD/ON/OFF key
-  : Calibration key
-  : Sound velocity key
-  : Mode shift key
-  : Sound velocity, thickness, thickness unit adjust/recall key
-  : Sound velocity, thickness, thickness unit adjust/recall key



3. Specification

Display: 4-digital LCD display

Resolution: 0.01mm (1.20 to 99.99mm)
0.1mm (100 to 300mm)

Working frequency: 5MHz

Measuring range: 1.20 to 300.00mm (steel)

Minimum limit for tube measuring: $\Phi 20 \times 3$ mm (steel)

Accuracy: $\pm 1\%H + 0.05$ mm H denotes the measured thickness.

Sound velocity range: 1000 to 9999 m/s

Measuring sound velocity with a given thickness:

Measuring range: 1000 to 9999 m/s.

When the given thickness less than 20mm, the accuracy is $\pm 5\%$; when the given thickness over 20mm, the accuracy is $\pm 1\%$.

Operation temperature: 0°C to 40°C

Power supply: 3*1.5V AAA batteries

Operation current: Normal operation current ≤ 45 mA

With Backlight turn on current ≤ 55 mA

Stand-by current: ≤ 20 uA

Size: 72*146*29mm

Weight: 202g

4. Features

- Auto calibration to assure the accuracy.
- Auto linear compensation: this advanced software program enhances the precision by correcting the non-linear accuracy of transducer.
- Use “▲” and “▼” keys to make a quick adjustment for the sound velocity /thickness, and a quick recall to the stored data.
- Coupling status indication: Observing the coupling icon to learn if the coupling is accomplished or not.
- 10 thickness measurement storage and recall function available, which facilitates the height work or working in wild area.
- Sound velocity measurement: With a given thickness by a sample hardware to measure the sound velocity, which avoid the further conversion or consultation of the table.
- 12 sound velocity for different material which also adjustable.
- Low battery indication
- Auto power off mode designed to conserve battery life.
- More than 10000 times long lift keys.
- The unit has a special memory that retains all of its setting even when the power is off.


2. Operation condition

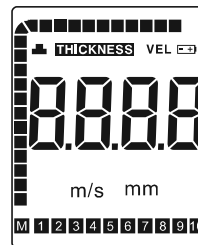
1. Operation area condition: For areas that is equal or bigger than the area, this unit is suitable for measurement. To measure the slim parts axially that is not vertical to the surface, the area shall not be too small, otherwise the error measure may happen.

2. Curved surface condition: When the material is curved surface like boiler wall or tubing, the curvature radius must be more than or equal to 10 mm, and the wall thickness must be more than or equal to 3 mm. This requirements is referring to steel material, as for the curve surface of other materials measuring requirements we still can not provide exact data, we highly appreciate if you feedback us and share with your precious experience.
3. Roughness condition: This gauge wildly applies upon the rough hardware/material, for most cases, our provided transducer can make exact measurement. However, if the roughness is too big due to the rust etc. the error measure may happen, in such case, please try to minimize the roughness or select the 2.5MHz transducer (optional accessories). If the transducer is worn out, please re-purchase on the local distributor.
4. Working temperature condition
Material thickness and sound velocity will change along with temperature. In normal measurement, environment temperature impact can be ignored.
The transducer is made of propylene material, considering the protection of the transducer and its precision we recommend that the surface temperature of the hardware/workpiece should not be over 60°C, otherwise the transducer can not put into use.
Operation temperature: 0~40°C
Relative humidity: <90%RH
Hardware/workpiece/material temperature: <60°C
Do not apply in violent vibration / erosive material.
Avoid impact and humidity.

3. Operation instruction

1. Before measurement

- (1). Connect the transducer with the main unit, press  to turn on, LCD display full screen for 0.5 second with back light, After that, LCD display the last applied sound velocity with registered memory unit, indicating the gauge is ready for use.



Full screen



Last applied sound velocity & registered unit

- (2). Reviewing and calibrating the voice speed
Short press on VEL key after turning on to delete the piece recorded, and press VEL key again to enter into voice speed status, M/S displays on LCD with current voice speed value, the VEL icon flashes. For example the value is 5900, and increase or decrease the value with "▲" or "▼" key. If you want to set up the voice speed press the VEL key again with the VEL and M/S flashing, then use "▲" and "▼" key to set the value to your desired value. The adjusting range is 1000-9999 M/S. and the speed will be saved automatically as current voice speed piece and press the VEL key to confirm the new setup and the VEL and M/S stop flash.



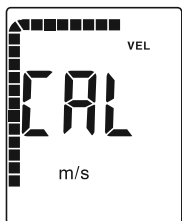
Velocity adjustment



Velocity revision

2. Calibration

Long press on CAL key enters into calibration period with the CAL appears and the side bar increases. Now you may use calibrating piece to calibrate, the calibrating piece is set for 4.00mm at voice speed 5690M/S. after calibration the voice speed goes back to the one before calibration automatically, if the speed is 5900M/S before calibration then the display will be 4.14mm after calibration, because the calibration piece has been measured on the basis of 5900 m/s. if the calibration fails it will display LOSE as shown below.



Calibration statu

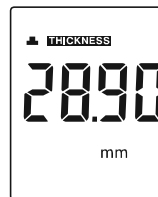


Calibration accomplished

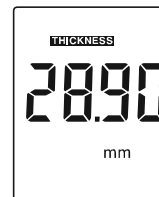
3. Thickness measurement

Put the coupling agent on the area to be measured to couple the transducer with the hardware/workpiece, LCD will display the thickness reading.

Notes: ▲ icon on the screen indicates a well coupling, if the icon flashes or not shows that means a poor coupling. After remove the transducer, the reading will be hold.



In a well coupling measurement



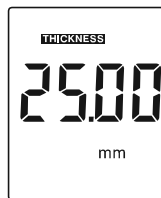
Measurement accomplished

4. Determine the voice speed

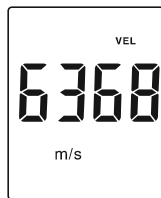
The voice speed in a certain material can be determined by given thickness of the material: Measure the testing piece with vernier caliper or micro caliper to find the thickness then couple the given testing piece with the detector until a reading displays, remove the detector adjust the display with "▲" and "▼" key to adjust the display reading to its real thickness and press the VEL key to display the voice speed being determined, and the speed is saved automatically in current memory unit(it is highly recommended to determine the voice speed of a material with the testing piece over 20mm thickness)



Measuring the thickness



Adjusting actual thickness



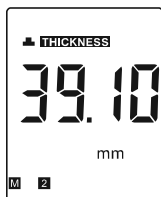
Velocity read out

5. Saving the thickness readings

- 1) Press STORE key for 2 seconds to enter into thickness saving status, it displays THICKNESS, MM, thickness saving icon M, memory unit number 1 and the value saved in the memory unit. If the unit is empty it display 0,00.
- 2) Press the "▲" "▼" key to find the memory unit for saving the value. The memory units total 10 and the data may be covered by latest saving value.
- 3) After picked up the memory unit, the new measurement will be renew the memory unit, when the measurement completed the last reading will be stored in the selected memory unit.



Select memory unit



Taking measurement & saving data



Measurement & storage accomplished

6. Review the saved data

In normal status, press STORE for 2 seconds will enter into review data mode, press ▲ or ▼ will display saved data orderly.

Press STORE to exit the review mode and back to normal status.




Review saved data


7. Restore built-in voice speed

Long press the CAL key until CLr displays on LCD, release the key to go back to voice speed window, the built-in voice speed is restored.

8. Low battery indication

When icon  flashes, please replace the batteries for further measurement.

9. Activating the LED backlight and automatic turning off function

Short press on " " key will activate or deactivate backlight. The product turns off automatically if there is no further operation within 3 minutes.

10. In any mode, pressing VEL key will go back to voice speed window.

4. Measurement Tips

1. Cleaning surface

Before measuring, the dust, dirt, rusting and grease etc that adheres on the hardware/workpiece must be removed off and cleaned.

2. Decreasing the roughness of surface

Too rough surface may result in measure error/ fault reading. Please try to make the surface smooth by milling, polishing, filling or using high viscosity coupling agent.

3. Rough machining surface

The regular tiny texture/slots resulting from rough machining process may cause error, and the compensation method is the same as in 4.2, adjusting the angle between the crosstalk segregating board of the transducer a metal membrane crossing the detector bottom centre and linear texture /slots (parallel or vertically) may also get a better result.

4. Measuring pipe and tubing

When measuring cylindrical parts to determine the thickness of the pipe wall, orientation of the transducers is important. If the diameter of the pipe is large than approximately 4 inches, measurements should be made with the transducer oriented so that the gap in the wearface is perpendicular (at right angle) to long axis of the pipe. For smaller pipe diameters, two measurements should be performed, one with the wearface gap perpendicular, another with the gap parallel to the long axis of the pipe.

The smaller of the two displayed values should then be taken as the thickness at that point.

5. Complex shape material

For complex shape material measurement, please refer to the 4.4, the smaller of the two reading should then be taken as the thickness.

6. Non-parallel surface

To get a satisfying ultrasonic response, the surface must have its one measuring side parallel with another, otherwise will obtain wrong result.

7. Influence of the material temperature

The size & sound velocity of material will change with the temperature, when the precision is critical, please make measurement in 2 samples of the material under the same temperature to determine the proper reading resulting from the temperature. When taking measurement for steel parts in high temperature, this method may be adopted to obtain the correct reading.

8. High acoustic reduction material

For materials in fiber, poriferous or big granular, acoustic dispersion will cause the energy attenuation that may result in abnormal readings (practically the reading less than the actual thickness), in this case, the material is not suitable for the gauge.

9. Reference sample block

For calibration for the gauge, a given thickness or sound velocity of the material is very import. Calibration needs at least one referring standard sample block. This gauge is provided with a 4.0mm sample block on the front cabinet, please see for calibration operations.

5. Precautions for accuracy

1. For very thin material

Any ultrasonic thickness gauge, when the thickness of the material to be measured is less than the minimum limit the fault reading will occur.

Using sample block compare method to get a minimum limit of this material.

In measuring the thin material, an error may happen that the reading is two times as the actual dimension. Another error which display the reading much more bigger than the actual. To prevent the wrong reading by double check out the minimum limit in the thin material.

2. For stained, rusting surface

The stained/rusting surface on the contra side will occur the ruleless wrong readings. Sometimes a small stained spot is hard to find out.

Take care for measurement while measuring the known throughsting spot/suspicious area. Or using sound insulation boardcelotex to locate the spot in different testing angles.

3. Identify different velocity with vary material

A fault reading would obtain, when measuring the hardware with the velocity calibrated by prior material. So a correct velocity should be adopted. The fault reading may also result from the difference between the actual velocity with the calibrated value.

4. Abrasion fo the transducer

Because the transducer is made of propylene, long period use will cause the surface of transducer became more rough which will decline the sensitivity lead to the wrong reading. Please polish the surface with sand paper or whetstone to assure the smoothness and parallel. If the reading still uns- teady, the transducer should be replaced with new one.

5. CAL function

CAL (calibration) is used to calibrate the unit with the standard block on the panel, do press this key for calibration with other materials or will the wrong measuring will take place.

6. Multilayer / composite material

It is impossible to read out the thickness of the uncoupled multilayer for the ultrasonic wave can not go through the uncoupled space. Further more, the sonic wave cannot travel in the composite material at an even speed, so ultrasonic reflect principle cannot be applied for measuring the multilayer/composite material.

7. Influence from the oxidized surface

For some metals, such as aluminum a layer of oxide being generated on their surface. The oxidized layer combined with the substrate tightly, but the sonic wave travel within 2 different material which will lead to error reading, the more oxidized layer the reading will be more tolerant.

Please calibrated the unit with the sample block that pick up along the hardware to be measured, and obtain the thick of sample block by using micrometer/caliber.

8. Abnormal reading A seasoned operator should be

Capable to distinguish the abnormal reading, practically result from rusting, erosive recess surface / incorrect calibrate sample block/ the inner flaw of material.

9. Choose and using coupling agent

Coupling agent serves the high frequency ultrasonic wave transmitting between the transducer to the hardware. Cho-

se incorrect agent or wrong operation man cause error or poor coupling which lead to failure of measuring. The coupl- ing agent should be used in proper way, typicccally, a single droplet of agent is sufficient.

It is important to use proper coupling agent, low viscosity agent(the provided agent / machining oil) is suitable for sm- ooth surface. For rough / veritcal / aluminum surface, high viscosity agent like glycerin and lubrication grease is appli- cable. All kinds of coupling agent is available in local market, you can buy it form local distributor as well.

6. Notice

1. Warranty and warranty policy

Please fill the warranty card with your cachet/chop after purchasing this products, the warranty period for repaired is 12 months form the date of original purchase. During warra- nty period, product must be returned with the invoice(copy) and warranty card to our customer service department. The product will not be warranted which without the warranty card.

Over warranty period, any repairing / maintenance will ch- arge the fee on the buyer in standard rate by local distributor.

The standard rate is not including the accessories which not packing in standard package(For example, abnormity transducer, lengthen lead-wire, special software) .

We disclaims any liability due to: transportation damages; incorrect use or operation; manipulation, alterations or rep- air attempts; without warranty card, invioce.

2. Non-warranty list

LCD, battery, probe, sample block, plastic case, coupling agent

7. Table of sound velocity

Sound velocities of common materials

Material	Velocity(m/s)	Material	Velocity(m/s)
Aluminum	6320	Acetate resin	2670
Zinc	4170	Phosphor bronze	3530
Silver	3600	Turpentine	4430
Gold	3240	Glass	5440
Tin	3230	Incoloy alloy	5720
Iron/Steel	5900	Magnesium	6310
Brass	4640	Monel alloy	6020
Copper	4700	Nickle	5630
SUS	5790	Steel 4330 (mild)	5850
Acrylic resin	2730	Steel 330	5660
Water (20°C)	1480	Titanium	6070
Glycerinl	1920	Zirconium	4650
soluble glass	2350	Nylon	2620