



MODEL: GM130

Ultrasonic Thickness Gauge Instruction Manual



Version: GM130-EN-02

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1. Before use

Check-up

Carefully unpack your kit and ensure that you have the following items. In case that any item is missing or if you find any mismatch or damage, promptly contact your dealer.

| | |
|------------------------------|------|
| ○ Ultrasonic Thickness Gauge | 1PCS |
| ○ Ø10 Transducer (5KHz) | 1PCS |
| ○ Ø6 Transducer (5KHz) | 1PCS |
| ○ Coupling agent (50ml) | 1PCS |
| ○ 4mm Sample block | 1PCS |
| ○ 1.5V AAA Alkaline battery | 3PCS |
| ○ English Instruction Manual | 1PCS |
| ○ Aluminium Packing Box | 1PCS |

Optional accessories transducer:

| | |
|-------------------------|------|
| Ø10 Transducer (2.5KHz) | 1PCS |
|-------------------------|------|

Introduction

1).Introduction

This unit is an intelligent handheld 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 application is to monitor the level of thickness-decreasing during operation of various and pressure container. Diffusely applied in manufacture fields, metal processing, and commercial inspection.

2).Scope of application

This unit is suitable for measuring materials that are good ultrasonic conductor such as metal, plastic, acrylic, 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.

3).Features and functions

- Auto calibration to assure the accuracy
- Sound velocity measurement: with a given thickness to measure the sound velocity to improve accuracy
- Preset 12 sound velocities for different material
- Coupling status indication
- 12 thickness measurement data store and recall
- Thickness alarm setup
- Backlight display
- Low battery indication
- Auto power off
- Metric / Imperial selection
- Measuring mode selection

Specification

①. Measuring range: 1.00 to 300.0mm(steel)

②. Accuracy: $\pm(1\%H+0.1\text{mm})$

H denotes the measured thickness

③. Working frequency: 5MHz

④. Resolution:0.01mm(1.00 to 99.99mm)

0.1mm(100 to 300mm)

⑤. Minimum limit for tube measuring (steel) :

$\varnothing 15*2.0\text{mm}(\varnothing 6\text{mm transducer})$

$\varnothing 20*3.0\text{mm}(\varnothing 10\text{mm transducer})$

⑥. Sound velocity range:1000 to 9999m/s

Thickness $\leqslant 25\text{mm}$, accuracy of velocity: $\pm 1.25\text{mm}/\text{Hx}100\%$

Thickness $\geqslant 25\text{mm}$, accuracy of velocity: $\pm 5\%$

⑦. Operating environment :

Operation temperature: 0 to 40°C

Relative Humidity: <90%

Do not apply in violent vibration / erosive material

Avoid impact and humidity

⑧. Power supply:1.5V AAA * 3 PCS

⑨. Weight:223g

⑩. Size: 72*29*146mm

Diagram Of The Unit

1). Main Body:



①. LCD display

③. Sample block

⑤. Transducer

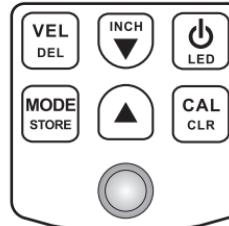
②. Keypad

④. Battery compartment (rear case)

⑥+⑦. Trasmit socket / Receive socket

2). Keyboard

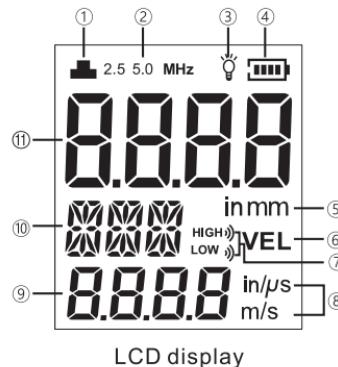
-  - On/off/backlight key
-  - Key for mode setup and retrieval of data saved.
-  - Key for sound speed adjustment
-  - Key for confirmation and calibration
-  - Key for sound speed selection, adjustment, depth value adjustment and alarming value adjustment.
-  - Key for sound speed selection, adjustment, thickness value adjustment and alarming value adjustment.



Control Panel

3).LCD display :

- ①. Coupling indicator
- ②. Transducer Frequency
- ③. Back light icon
- ④. Battery power
- ⑤. Thickness unit
- ⑥. Sound velocity indicator
- ⑦. Measuring mode selection
- ⑧. Sound velocity unit
- ⑨. Sound velocity reading
- ⑪. Velocity stored unit
- . Thickness reading



LCD display

2. Operation Instruction

1. Thickness measuring

Paste the coupling agent on the measured place to couple the sensor with the measured material. The thickness value appears on LCD with the coupling icon  "(the coupling fails if this icon flashes or disappears)



Well coupled, and in process

Thickness measuring completes,
remove the sensor away.

Remarks:

- a)Select the corresponding sound speed according to the measured material and make direct measuring. Because the actual speed differs with the speed preset, this measuring method is not for accurate measurement.
- b)For accurate measurement, select a standard block of the same material with that of the measured object and measure its sound speed (refer to the part of Sound Speed Measuring for details).

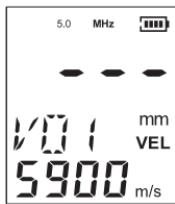


2. Sound speed adjustment

Press "VEL/DEL" key and the sound speed icon flashes, then press the Up key or Down key to adjust the speed, press the "VEL/DEL" key the "VEL" icon flashes, then press the Up key or Down key to adjust the speed preset.



Adjusting the sound speed within the unit



Adjusting the unit of sound speed.

3. Calibration:

Long press on the "CAL/CLR" key until 4.00 appears with "CAL" flashing at the bottom. Take 4.00 standard calibrating piece at the 5900m/s until the "CAL" disappears.



Calibration window

4. Sound speed measuring

How to determine the sound speed of a certain material with piece of given depth: Measure the depth of the material with caliber or micrometer. Select a preset speed close with the measured and couple the sensor with the block with given thickness until a value is given, remove the sensor and adjust the value with Up or Down key to make it equaling with the actual thickness value. Press the "CAL/CLR" key to display the measured speed and save the value to the current unit automatically. The thickness must be sufficient for measuring that is at least 25.0mm.



Measuring the thickness



Measuring the speed

5. Restoring the default speed value

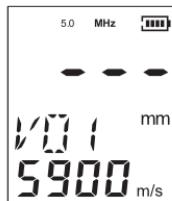
Long press on "CAL/CLR" key until "CAL" followed with "CLR" interface, release the key the speed jump to 5900 m/s automatically.



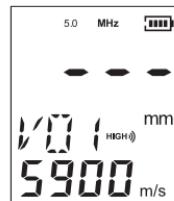
Restoring default speed

6.Mode switching

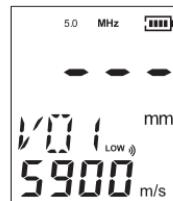
Press“MODE/STORE”key to switch among normal mode, high gain mode and low gain mode. The normal mode has no icon display while high gain and low gain have their icons. The normal mode is for measuring the steel material while the low gain mode for aluminum and copper material and high gain mode acrylic material such as.



Normal mode



High gain mode



Low gain mode

7.Data saving

The thickness displayed while measuring, press“CAL/CLR” key can save the thickness value with the memory unit flashing once indicating the current thickness is saved. “FUL” on the LCD indicates the memory is full.



Saving the current value



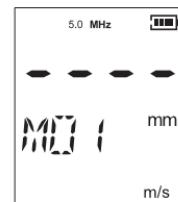
Memory is full

8.Data reviewing

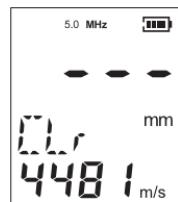
Long press on the“MODE/STORE” key to enter into reviewing window, it displays “NON” if there is no datum saved. Use Up key or Down key to review the data. Short press on the“VEL /DEL” key is to delete the current data. Long press on “VEL /DEL” key until “CLR” appears, that may clear all data saved. Short press on “CAL/CLR” key to leave reviewing window.



Review the thicknesses saved



Delete the data in current unit



Clear the data saved

9.High/low alarm value setting

Long press on “MODE/STORE” key and key at the same time until “LO” appears at the bottom and a value appears at the top of the LCD indicating entry to the low alarm value setting, then press Up key or Down key to adjust the value; short press on “MODE/STORE” key to switch to high alarm value setting with “HI” appears at the bottom of the LCD, then press Up key or Down key to adjust the value. After adjustment, press “CAL/CLR” key to enter into measuring window. High alarm limit is 305mm and low alarm limit 0.7 mm if the measuring is less than the low limit the buzzer beeps once while larger than high limit it beeps 3 times.



Low alarm limit setting



High alarm limit setting.

10. Backlight

When turning on, short press on the key to activate or deactivate the backlight.

11. Sensor selection

Long press on key and press Up key to switch between sensor 2.5MHz and sensor 5MHz. Under 5MHz sensor press "MODE/STORE" key to switch between d6 and d10. Release the key after selection is done.

12. Unit selection

Long press on key , and press Down key to switch between metric system and British system. Release the key after selection is done.

13. Window after turning on

Full display appears after turning on with buzzer beep for 1 second and then enter into measuring mode.

14. Turning off

While turning on, long press on key to deactivate the device. It turns off automatically if there is no further operation within 3 minutes.

15. Low battery indication

The icon indicating low battery, and the battery should be replaced immediately.

3. 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 3.2, 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 3.4, 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 unit.

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, please check for calibration operations.

In different material & situation, only one sample block may not satisfy every calibration. The more similar sample block, the more exact reading obtained. Ideally, referring block is a group of different thickness and same material,

by calibrating to the referring block, the effect of variation of sound velocity will be minimized. To get the most exact measure, a set of referring block is very important.

When measuring thin material which thickness close to the minimum limit range of this unit, please use a referring block to define exact limit of this material. Do not measuring the material that the thickness under the minimum limit.

10). The wear of the transducer will effect the measurement, when below situation happen, please replace the transducer:

- only display one reading when measured different thickness;
- reading display without take measurement.

11). Selection of transducer

| ITEM | Characteristic | Range | Operation temperature |
|---------------------------|-----------------|--------------------------|-----------------------|
| 5MHZ $\Phi 10\text{mm}$ | General-purpose | 1.00mm to 300.0mm(steel) | -10 to 60°C |
| 5MHZ $\Phi 6\text{mm}$ | Thin workpeice | 1.00mm to 50.0mm(steel) | -10 to 60°C |
| 2.5MHZ $\Phi 10\text{mm}$ | General-purpose | 1.00mm to 300.0mm(steel) | -10 to 60°C |

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

2). For stained, rusting surface

The stained/rusting surface on the contra side will occurs the ruleless wrong readings. Sometimes a small stained spot is hard to find out. Take care for measurement while measuring the known rusting spot/suspicious area. Or using sound insulation boardcelotex to locates the spot in different testing angles.

3). Identify different velocity with vary material

A fault reading would obtains, when measuring the hardware with the velocity calibrated by prior material. So a correct velocity should be adopted. The fault reading may also result form 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 unsteady, the transducer should be replaced with new one.

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5). ZERO function

ZERO(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 ult-

rasonic reflect principle cannot be applied to measure 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.

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. Choose incorrect agent or wrong operation man cause error or poor coupling which lead to failure of measuring. The coupling agent should be used in proper way, typically, 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 smooth surface. For rough / vertical / aluminum surface, high viscosity agent like glycerin and lubrication grease is applicable. All kinds of coupling agent is available in local market, you can buy it from local distributor as well.

5. Maintain And Warranty

1). Maintain

(1). Battery replacement

A). When low battery icon is showed, please replace the batteries.

(A). Press  to turn off.

(B). Open the battery door properly.

(C). Replace the low power batteries by new batteries.

B). When the gauge is not use for long period, please take out the batteries.

2). Protection of transducer

Because the wear face of transducer is propylene material which easy to be scratched. During taking measurement on rough material, please using the transducer in gentle motion. The temperature of the hardware should not over 60°C, otherwise it will cause damage on the transducer. Adhering oil, dust on the wear face will speed up aging of transducer and lead to rupture. Clean the lead-wire & transducer after use.

3). Cleaning the cabinet

Do not use solvent/alcohol for cleaning which erode the cabinet & LCD window, brush and sweep only with a moist cotton cloth.

4). Cleaning the sample block

Because of coupling agent should be put on the sample block during calibration, after use the sample block should be cleaned for preventing rust. In higher temperature environment, be sure protect the block form the droplet of water. If the gauge is not use for a long period, please apply some antirust on the sample block.

5). Avoid shocking/impact. Do not store the unit in high humidity environment.

2. Warranty:

1). When the tolerance is over than stated in this manual, please refer to the 3, 4, 5 chapter, in this manual.

2). Please contact us or distributor if the following occurs:

A. Component being destroyed, enable to measure.

B. Abnormal LCD display.

C. The tolerance is too big in proper operation.

D. Malfunction of keypad.

3). This gauge is a advanced technology product, the repairing only by technician authorized by us, do not try any alterations or repair attempts.

4). 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 warranty 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 charge 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, abnormality transducer, lengthen lead-wire, special software).

We disclaims any liability due to: transportation damages; incorrect use or operation; manipulation, alterations or repair attempts; without warranty card, invoice.

5). Non-warranty list:

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

6. Table of sound velocity

Sound velocity 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 | Nickel | 5630 |
| SUS | 5790 | Steel 4330 (mild) | 5850 |
| Acrylic resin | 2730 | Steel 330 | 5660 |
| Water (20°C) | 1480 | Titanium | 6070 |
| Glycerin | 1920 | Zirconium | 4650 |
| soluble glass | 2350 | Nylon | 2620 |

Specific Declarations:

- 1).The product design and the manual updating, repairing by technician authorized by us, do not try any alternations or repair attempts.
- 2).Dispose of battery should in accordance with local laws and regulations.