Ultrasonic Thickness Gauge

DC2000C

Instruction Manual

V. 7.11

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1. General Description

The DC2000C Ultrasonic Thickness Gauge is our new and improved basic readout unit with automatic probe recognition, automatic zeroing and a larger, more easily read LCD. This instrument can measure with very high resolution (0.01 mm or 0.001 inches) the thickness of metallic and non-metallic materials such as steel, aluminum, titanium, plastics, ceramics, glass and any other good ultrasonic wave conductor. The DC2020C accurately displays readings in either inches or millimeters.

2. Technical Specifications

Measurement range	:	0.65mm～400.0mm
Resolution	:	0.01mm(0.001″), 0.1mm (0.01″)
Accuracy	:	0.65mm～9.99mm　　　±0.04mm
		10.00mm～99.99mm　　±(0.1%H+0.04) mm
		100.0mm～500.0mm　　±0.3%H
Zero calibration	:	Auto
Velocity range	:	1000m/s～9999m/s
Measurement rate	:	4 / s and 10 / s in the fast mode
Display	:	128×64 LCD with back light
Battery	:	2 x AAA Batteries
Operating temp.	:	20℃～+50℃
Measuring temp.	:	-20℃～+350℃(according to the probes)
Dimensions	:	116mm（L）×64mm（W）×27mm（H）
Weight	:	0.22kg (including batteries)

3. Standard Delivery

-- Main Unit　1PC　　　　　　　-- Standard 5MHZ transducer (D5008) 1PC

-- Couplant　75ML　　　　　　-- AAA batteries (Do not apply)

-- Build-in calibration block with 4mm

-- Carrying case 1PC

-- Operating manual

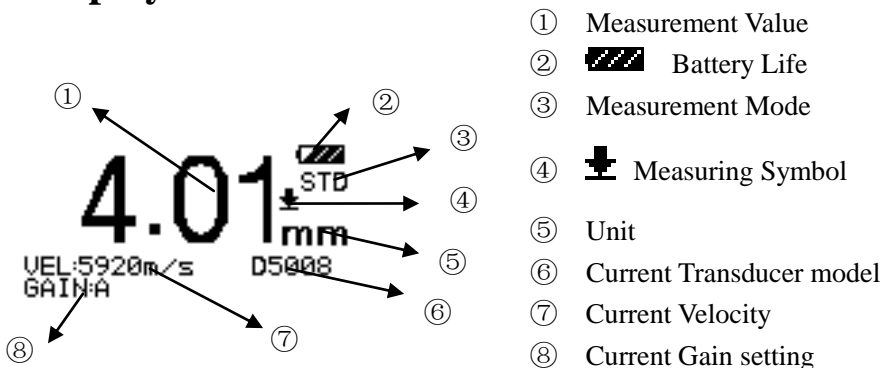-- Certificate

4. Overview the Display Unit

1. LCD Screen   2. Key Pad   3. Battery Pack
4. Probe socket   5. Test block with 4mm

Important: This test Block is not for calibration, just for checking if the instrument works correctly.

5. Keypad Functions

	On/ Off Key	Press this key to switch on or off the instrument.
	Esc. Menu	Press this Key to Escape the Menu.
	Menu Key	Press This Key to go to the operation Menu.
	Confirm Key	Press this Key to confirm the selection.
	Up Arrow	Achieve switch among the menu options in the menu operation
	Backlight Key	Press this key to switch on or off the backlight. (Under the measurement)
	Down Arrow	Achieve switch among the menu options in the menu operation.
	Calibration	Put the probe in the air, press this key to complete the calibration.(Under the measurement)

6. Display Screen

① Measurement Value

② Battery Life

③ Measurement Mode

④ Measuring Symbol

⑤ Unit

⑥ Current Transducer model

⑦ Current Velocity

⑧ Current Gain setting

7. Preparation before measurement

【7.1】 Preparation of the instrument

For the newly purchased instrument, please check the instrument and its accessory according to the standard delivery table in chapter 3. If you find it is not the same as the table listed, please contact the manufacture in time. If the instrument is damaged, please do not use it and contact the manufacture as soon as possible.

【7.2】 Selection of the Probe

Users can select the suitable probe according to the thickness of the workpiece to be measured.

Type	Freq.	Meas.Rang	Temp.	Application
D5008	5.0MHz	0.8~300mm	<60℃	The probe is used common in many measurements, for example when the measuring surface is flat or with huge curvature, or the thickness of the workpiece to be measured is large than 50mm.

D7006	7.5MHz	0.65～50mm	<60℃	Used in the measurement of thin wall thickness and small curvature surface.
D7004	10.0MHz	0.65～20mm	<60℃	Used in the measurement of thin wall thickness and small curvature surface.
D2012	2.0MHz	2.0～500mm	<60℃	Used in the measurement of coarse particles such as cast iron.
D5113	5.0MHz	3.0～100mm	<350℃	Used in the measurement when the temperature is less than 350℃. And High‐Temp. couplant must be required to use together.

【7.3】Treatment of the measured surface

When the surface to be measured is too rough or rusty heavily, please perform the treatment according to the following methods:

1. Clean the measured surface by grinding, polishing or filing, etc. or use coupling agent with high viscosity for that.
2. Use coupling agents on the workpiece surface to be measured.
3. Take multiple measurements around the same testing point

8. Basic Gauge Operations

【8.1】Switch on

Select the probe and insert it into the probe socket and then press to switch on the instrument, the screen displays: the Series No. and the version number.

If you did not insert the probe before switching on the instrument, the screen will prompt you than "Please insert the probe", at this moment insert the probe into the socket and waiting to go to the measuring status.

Important: Please use the standard provided probe, otherwise the instrument

will not work normally and displaying "Error".

【8.2】 Probe Zero

The gauge does an automatic zeroing of the transducer thus eliminating the need for an on-block zero. Switch on the instrument, then the gauge came into the measurement mode directly.

If customer feel the measurement value is incorrect during the measurement, or

when replace the new probe, please put the probe in the air, and preess 🔽 for zero calibration ay any time.

Important: Please make sure the transducer is not coupled to the test piece when the gauge is first turned on and that there is no couplant on the end of the transducer. The transducer should also be at the room temperature, clean without any noticeable wear.

【8.3】 Backlight

Press 🔼 to turn on / off the backlight.(Under the measurent state)

【8.4】 Parameters setting

〖8.4.1〗 Measurement

There are six measuring modes provided. Users can select different measuring modes according to their requirements and measuring environments.

- Press 📑 into **1. Measurment**
- Press 🔼 or 🔽 to select desired measurment mode
- Press 📑 to confirm selection,
- Press ⭕ to Esc. Menu and into the measurment.

8.4.1.1 Standard measurement:

Display the current value, satisfied with the normal measuring needs.

8.4.1.2 Minimum value measurement:

Among one measurement, display the minimum value of the current measured point. It is suitable for testing the curvature surface or needs to get the minimum value which is widely used in the thickness measurement of pipeline.

Important: It is not recommended to use this function when measuring cast iron or alloy materials

〖8.4.2〗 Velocity Rate

Sound velocity plays an important role in measurement. Different material is of different sound velocity. When the sound velocity is incorrect, it will cause wrong measured results. There are 3 ways to set the material's sound velocity, which are:

1. Directly select preset material velocity,
2. Input the new velocity which is not preset into the menu,
3. Get the accurate sound velocity of the workpiece which the thickness is known.

8.4.2.1 Materials

The Velocity selection gives the sound velocity of 9 different materials which can be selected by yourself. The 9 materials are: aluminum, titanium, steel, stainless steel, glass, copper, brass, polystyrene and nylon.

- Press 🗐 into "⑴**Materials**",

- Select one material by pressing ⌃ or ⌄,

- Press 🗐 to confirm.

Important: The 9 values are just the theriotic values, if users want to get accuret measuremnts , please refer to the "Velocity measurement" and get the more accurate sound velocity.

8.4.2.2 Velocity Input

When the sound velocity of 9 materials is not satisfied with the requirements of the users, there is a sound velocity tabe which give the sound velocity of various materials in the appendix. Use this table to set the correct sound velocity.

- Press ⬚ into " ⑵**VEL. input**",

- Press ⬇ to move the "black arrow", Press ⬆ to change the value.

- Press ⬚ to confirm,screen will display 4 places for selection one to store

   this new velocity, press ⬇ to select one, press ⬚ to confirm.

- Press ⊙ to Esc. Menu and into the measurment.

This new velocity will be stored. And it can be found from **"2. Velocity rate"- "⑷Vel. Storage"** for the further use.

8.4.2.3 Velocity measurement

Because the workpiece is made from various materials and even the same material with different content and processing technology, the sound velocity will changed and this change will cause the measuring error. If the error is not enough to influence the measuring accuracy, it can be neglect, otherwise it is necessary to get the accurate sound velocity of the workpiece to be measured. Measuring the workpiece which thickness is known(Using any velocity), get one measurement value,

- Press ⬚ key into **"⑶Vel. measurement"**

- Press ⬆ or ⬇ to up and down the value of velocity value to determine

   the thickness as the same as the value of sample that is measured.

- Press ⬚ key to confirm. Screen will display 4 places for selection one to

store this new velocity, press [icon] to select one, press [icon] to confirm.

- Press [icon] to Esc. Menu and into the measurment.

This new velocity will be stored. And it can be found from **"2. Velocity rate"- "⑷Vel. Storage"** for the further use.

8.4.2.4 Velocity Storage
DC2020C provides 4 spaces for storing the new velocities.

〖8.4.3〗 Resolution

- Press [icon] key into "Resolution"

- Press [icon] or [icon] to select resolution and unit.

 1. 0.1 mm
 2. 0.01 mm
 3. 0.01 in
 4. 0.001 in

- Press [icon] key to enter/confirm

〖8.4.4〗 Probe Calibration

It will cause error during the primary stage of usage and operating. If this caused by the probe itself, please use following calibration method:

- Measure the test piece with known thickness.

- Press [icon] into**"4.Probe calibration"**

- Press [icon] or [icon] into "Calibration"

- Adjust the measured value by pressing ⊙ or ⊙ and make the test

  value equal to the acuter thickness of test piece.

- Press 🖱 to confirm.

The gauge will return to the Measurement mode.

〖**8.4.**5〗 **Function**

- Press 🖱 into the menu "**5. Function**", the screen will display:

   1. Switch off Mode
   2. Gain adjustment
   3. Languages
   4. Contrast
   5. Default
   6. Information

Press ⊙ or ⊙ into the selected item, press 🖱 to confirm.

8.4.5.1 Switch off mode

- Press 🖱 into the menu **"5.Function"- "**⑴**Switch off mode"**

- Select Auto shut down after 1 Min. 3 Min. 5 Min.

- Press 🖱 to confirm**.**

8.4.5.2 Gain adjustment

In the user's measuring environment, both different materials and the same material with different status will have different effects on the accurate and stable measuring. So for different measured objects and different measuring environment, users should adjust the work status of the instrument to meet more measurements.

For many materials and measuring conditions, auto gain adjustment can be used, but for some special measurement, adjusting the instrument's working

status is necessary. There are four different working modes: Auto, Low, medium and high.

Auto: match different probe and meets almost all the measuring
requirements.

Low: Suitable for high scattering and small attenuation materials

Medium: Suitable for many measurements.

High: Suitable for high attenuation material

- Press ⬚ into the Menu**" 5.Function"-"**⑵**Gain**

adjustment", the screen will display:

1. High
2. Medium
3. Low
4. Automatic

- Press ⬚ or ⬚ to select desired item

- Press ⬚ to confirm.

8.4.5.3 Languages

- Press ⬚ into the Menu **"5.Function"- "**⑶ **languages"**

- Select desired language

- Press ⬚ to confirm**.**

8.4.5.4 Contrast

- - Press ⬚ into the Menu **"5.Function"- "**⑷ **Contrast"**

- Press ⬚ ⬚ to adjust the Contrast from 1-6.

- Press ⬚ to confirm. The default number is 4.

8.4.5.5 Default

- Press ⬚ into the Menu **"5.Function" - "**⑸**Default"**

- Press [icon] to confirm. The gauge will recover the default parameter.

8.4.5.6 Information

- Press [icon] into the Menu **"5.Function" – "⑥Information".**

- The screen displays the version number and Transducer Number.

APPENDIX: SOUND VELOCITY MEASUREMENT CHART

Material	Sound Velocity	
	M/s	Inch/ μS
Air	330	0.013
Aluminum	6300	0.250
Alumina Oxide	9900	0.390
Beryllium	12900	0.510
Boron Carbide	11000	0.430
Brass	4300	0.170
Cadmium	2800	0.110
Copper	4700	0.180
Glass(crown)	5300	0.210
Glycerin	1900	0.075
Gold	3200	0.130
Ice	4000	0.160
Inconel	5700	0.220
Iron	5900	0.230
Iron (cast)	4600	0.180
Lead	2200	0.085
Magnesium	5800	0.230
Mercury	1400	0.057
Molybdenum	6300	0.250