

# UT Thickness Gauge

## DC-5000

### *Instruction Manual*



# CONTENTS

<b>1. GENERAL DESCRIPTION</b> .....	<b>- 1 -</b>
<b>2. STANDARD DELIVERY</b> .....	<b>- 1 -</b>
<b>3. TECHNICAL SPECIFICATIONS</b> .....	<b>- 2 -</b>
<b>4. OVERVIEW</b> .....	<b>- 2 -</b>
<b>5. KEYPAD FUNCTIONS</b> .....	<b>- 3 -</b>
<b>6. DISPLAY SCREEN</b> .....	<b>- 5 -</b>
<b>7. QUICK STARTUP GUIDE</b> .....	<b>- 8 -</b>
<b>8. MENU</b> .....	<b>- 10 -</b>
<b>8.1 MEA. (MEASUREMENT)</b> .....	<b>- 10 -</b>
8.1.1 T-E Mode:.....	- 10 -
Standard Measurement: .....	- 11 -
Minimum Measurement: .....	- 11 -
Difference mode:.....	- 12 -
Average mode: .....	- 13 -
Limitation Mode .....	- 14 -
8.1.2 E-E Mode .....	- 14 -
<b>8.2 SET.</b> .....	<b>- 15 -</b>
8.2.1 Velocity rate .....	- 15 -
Materials .....	- 16 -
Velocity input .....	- 17 -
Velocity measurement .....	- 18 -
Velocity storage .....	- 19 -
8.2.2 Resolution .....	- 19 -
8.2.3 Probe Calibration .....	- 20 -
8.2.4 Measurement rate .....	- 21 -
8.2.5 Auto measurement .....	- 21 -
8.2.6 Manual measurement.....	- 22 -
8.2.7 Rectification .....	- 24 -
8.2.8 A-SCAN custom setting.....	- 25 -
8.2.9 B-SCAN display range .....	- 26 -
<b>8.3 MEM.</b> .....	<b>- 26 -</b>
8.3.1 Set a new file .....	- 27 -
8.3.2 Memory Read.....	- 27 -
8.3.3 Delete a file .....	- 28 -
8.3.4 Delete all files.....	- 28 -
<b>8.4 FUN.</b> .....	<b>- 29 -</b>
8.4.1 Swich off mode.....	- 29 -
8.4.2 Languages.....	- 29 -
8.4.3 Contrast.....	- 29 -
8.4.4 Default.....	- 30 -
<b>9. MEASURING TECHNOLOGY</b> .....	<b>- 30 -</b>
<b>9.1 MEASURING METHODS</b> .....	<b>- 30 -</b>
<b>9.2 PIPELINE MEASUREMENT METHOD</b> .....	<b>- 31 -</b>
<b>10. MAINTENANCE AND PRECAUTIONS</b> .....	<b>- 31 -</b>
<b>10.1 POWER CHECK</b> .....	<b>- 31 -</b>
<b>10.2 PRECAUTIONS</b> .....	<b>- 31 -</b>
10.2.1 General precautions.....	- 31 -
10.2.2 Precaution during the measuring.....	- 31 -
<b>APPENDIX : SOUND VELOCITY MEASUREMENT CHART</b> .....	<b>- 32 -</b>

## 1. General Description

DC-5000 is a visual A / B scan ultrasonic thickness gauge with high energy. It is a Multi-Mode thickness gauge that has the ability to measure very thick composite material or material that is very hard for ultrasonic to go through. This unit can measure the thickness of metallic and non-metallic materials such as steel, aluminum, titanium, plastics, ceramics, glass and any other good ultrasonic wave conductor.

DC-5000 comes with following features:

- Large color TFT display
- Automatic probe recognition,
- Automatic probe zero calibration
- Automatically locates the detection point if the measurement is out of the viewable display area.
- Allow user to adjust the range of GAIN, RANGE, DELAY, GATE, BLANK, E-BLANK in manual-measurement mode.
- Limitation setting, alarm with sound and display.
- Multi-language
- Memory of 100 files X 100 data, transfer data to PC without software, available for any windows operating systems.
- Measurement screen automatic frozen, which make it easy to analyze the data for users.

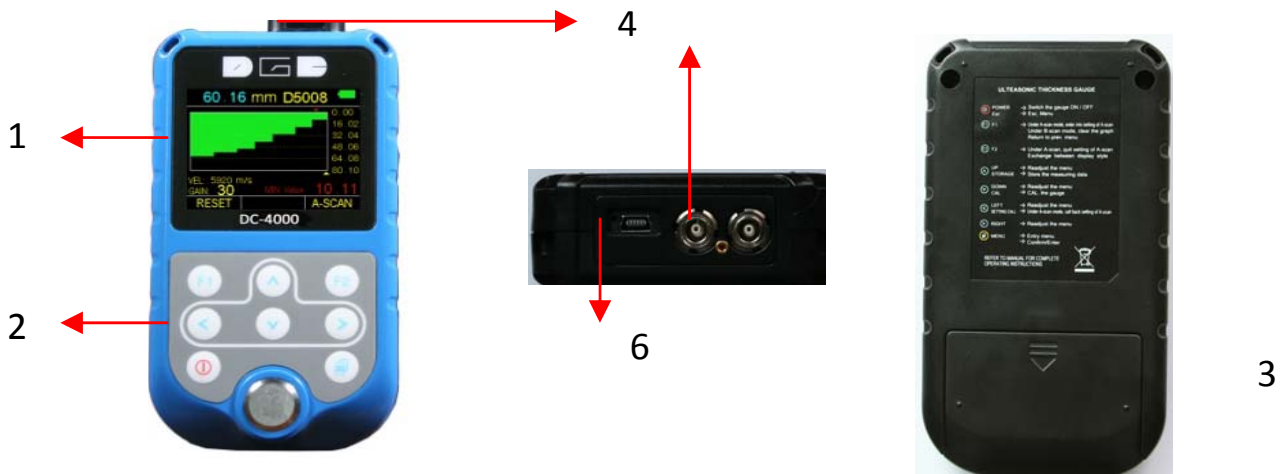
## 2. Standard Delivery

- Main Unit
- Transit-Echo transducer (S1025)
- 75ML Couplant
- Build-in calibration block (Thickness=4mm, Velocity = 5920m/s)
- USB Cable
- Carrying case
- Operating manual
- Calibration Certificate

### 3. Technical Specifications

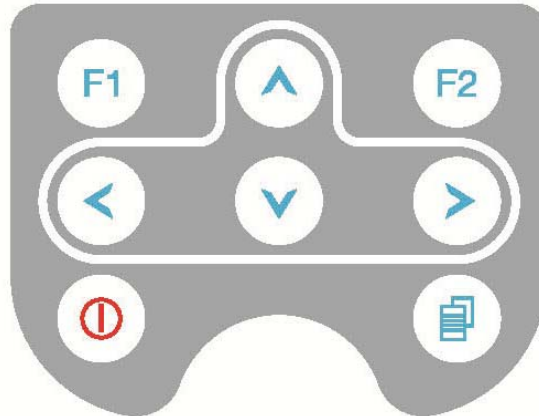
Measurement range	T-E: 20mm~590mm
Resolution	0.01mm(0.001inch), 0.1mm (0.01inch)
Velocity range	1000m/s~9999m/s
Measurement rate	2 /s and 10/s in fast mode
Average mode	2 to 9 times average measurement
Limited setting	With Low-high indication and alarm
Measuring Units	mm / inch
Memory	Memory of 10,000 readings in 100 files
Data output	USB to PC without software
Display	320×240 TFT Color LCD
Battery	2 x AA Batteries
Operating	-20°C ~+50°C
Dimensions	133mm (L) ×75mm (W) ×29mm (H)
Weight	0.26kg (including batteries)

### 4. Overview



1. LCD Screen
2. Keypad
3. Battery Pack
4. Transducer port
5. Standard Test Block
6. USB port

## 5. Keypad Functions



### On & Off Key

**Function 1** It is used to power the unit either **ON** or **OFF**.

**Function 2** Pressing this key to escape the menu setting and return back to the main measurement screen.







### Menu Key

**Function 1** It is used to enter the menu and confirm the selection.

**Function 2** It is as a shortcut key in A-scan mode. After finish one A-scan measurement (keeping the Parameters field in highlight), press this key to store the current set-up parameters into the CUSTOM SETTING.



### F1 Key

**Function 1** In A-scan manual mode, it is a toggle button mainly used to set up the parameters **RANGE, GAIN, DELAY, GATE, BLANK** by adjusting the key    .

**Function 2** In B-scan mode, press this key to clear current graph And ready for next measurement.



### F2 Key

**Function 1** Press this key to toggle between display view options- A-Scan, B-SCAN and DIGITS.

**Function 2** In A-scan mode, press this key to save current custom setup that has been modified or created by the user.



### **UP key**

**Function 1** It is used to navigate the menus and increase values while setting the parameters.

**Function 2** In measurement mode, press this key to store the current measurement reading.



### **DOWN key**

**Function 1** It is used to navigate the menus and decrease values while setting the parameters.

**Function 2** In the measurement mode, it is used as the calibration Key. Put the probe in the air, press this key to complete the calibration.



### **LEFT Key**

**Function 1** It is used to navigate the menus and decrease values while setting the parameters.

**Function 2** In A-SCAN mode, press this key to enter CUSTOM SETTING screen to open a setup that has been saved before.

**Function 3** In B-Scan mode, press this key to control the thickness reading indicator(the small yellow triangle).



### **RIGHT Key**

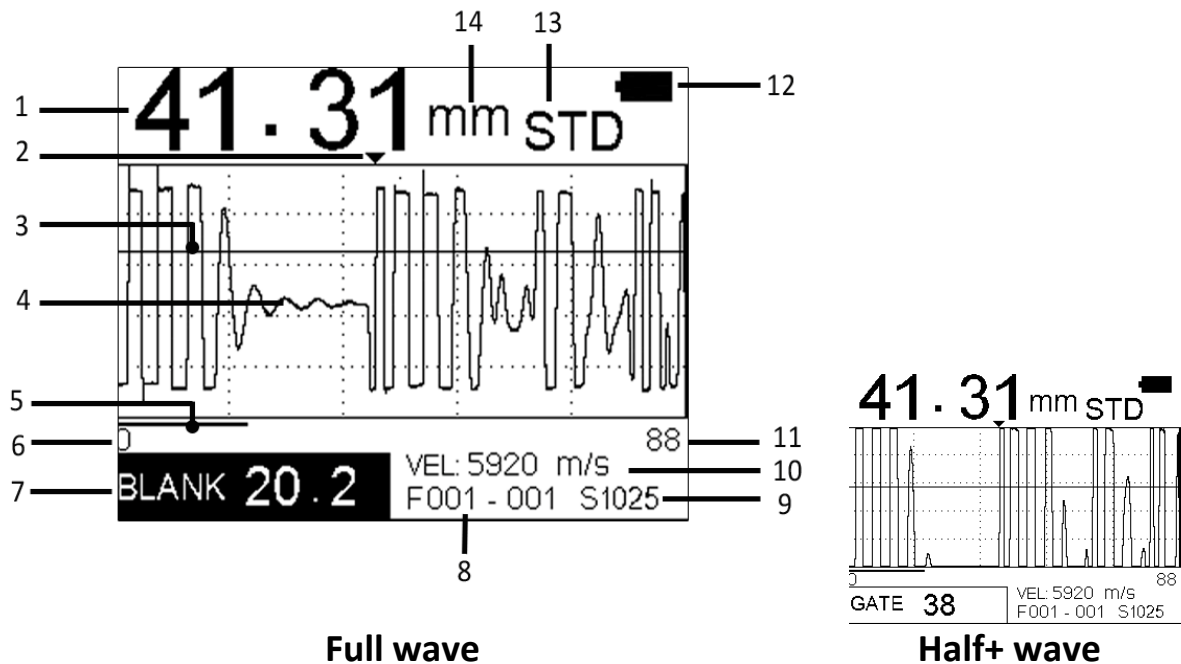
**Function 1** It is used to navigate the menus and increase values while setting the parameters.

**Function 2** In DIGIS and A-SCAN mode, the readout will be changed between mm to inch by pressing this key.

**Function 3** In B-Scan mode, press this key to control the thickness reading indicator(the small yellow triangle).

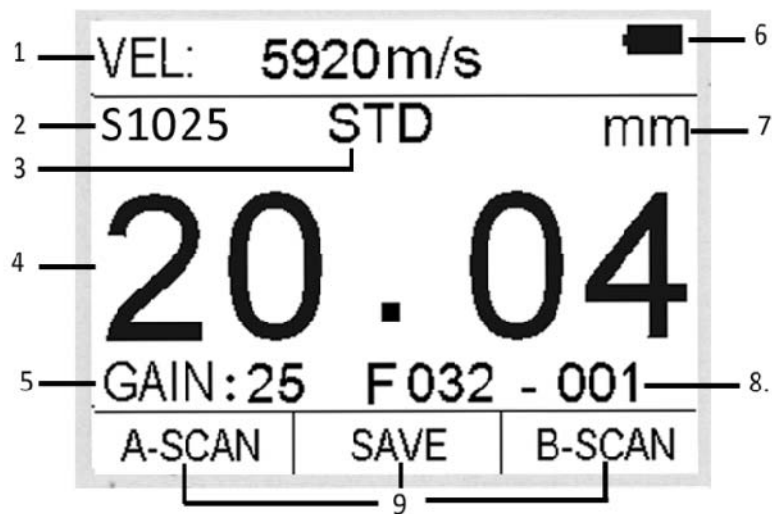
## 6. Display Screen

### A-SCAN MODE



1. **Thickness reading** - Digital readout of thickness. Display with white color means in testing, with blue color means frozen.
2. **The 1st back wall indicator** - The Red ▼ indicates the first back wall
3. **Gate indicator** - The red line can be adjusted up or down.
4. **Full waveform** - Display with green color means in testing, with blue color means In frozen)
5. **Blank indicator** - The length of Red line changes with the BLANK number adjusted.
6. **Delay value indicator**
7. **Parameters field** - Gain, Delay, Blank, E-blank, Range adjustable
8. **Memory location** - Files 100 X 100 data can be stored
9. **Transducer model** - The transducer automatically recognizes and display
10. **Velocity**
11. **End of Range indicator**
12. **Power life**
13. **Measuring mode**
14. **Measuring unit**- millimeters or inches

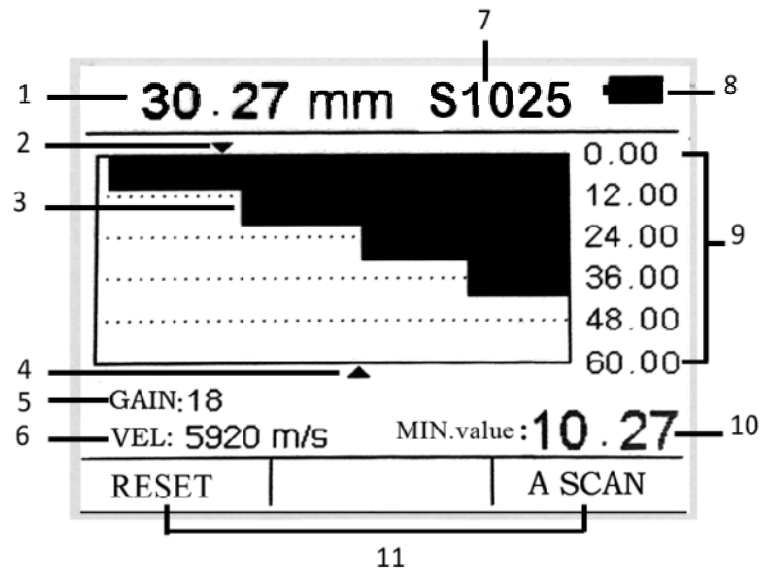
## BIG DIGITS MODE



1. **Velocity**
2. **Transducer model** - The transducer automatically recognizes and display
3. **Measuring mode**
4. **Thickness Reading** - Digital readout of thickness. Display with white color means in testing, with blue color means frozen.
5. **Gain value** - Can be adjusted from 10-50
6. **Power life**
7. **Measuring unit** - millimeters or inches
8. **Memory location** - Files 100 X 100 data can be stored
9. **Hot menu indicators** - Press the corresponding button, easy to converts the display or function.



## B-SCAN MODE




1. **Thickness reading** - Digital readout of thickness. Display with white color means in testing, with blue color means frozen.
2. **Min. value indicator** - Indicates where the minimum is located.
3. **B scan graphic**
4. **Thickness reading indicator** - Indicates where the current thickness reading is located.
5. **Gain value** - Can be adjusted from 10-50.
6. **Velocity**
7. **Transducer model** - The transducer automatically recognizes and display.
8. **Power life**
9. **B scan display range** - Displays the range set in the menu and auto divides into 5 equal parts.
10. **Min. value reading** - Displays the minimum value of workpiece.
11. **Hot menu indicators** - Press the corresponding button, easy to converts the display or function.

## 7. Quick startup guide

**Step one:** Selecting the Transducer and Probe zero & calibration


Right now, there is probe S1025 available and its information is as below:

Type	Freq. (MHz)	Dia. (mm)	Meas. Rang (mm)	Working Temp.	Application
S1025	1	25	20~590	<60°C	Used in the measurement of composite materials

Plug in transducer; turn on the main unit using the  Key. The gauge does auto calibration of the transducer, thus eliminating the need for an on-block zero. After turning on the gauge, the screen flashes the Series No. and software version, and then, it comes into the measurement mode directly. If users turning on the unit without the transducer, screen will remind to "Plug in the probe". At this moment, please insert a transducer into the socket, the gauge directly comes into the measurement mode after Auto calibration.

THICKNESS GAUGE  SN: NC00013 Version: 1.32	Message  Plug in the probe	Message  Auto. calibration  Please wait...
---	----------------------------------	--

**Notice:** Please use the standard transducer offered. Otherwise the unit does not work normally and displaying "Error".

If users feel the thickness reading is incorrect during the measurement, please put the probe in the air, and press  for zero calibration at any time.

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

**Step Two:** 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.

### **Step Three:** Setting velocity

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. Please refer to 8.2.1.2 on page 3.
2. Input the new velocity which is not preset into the menu. Please refer to 8.2.1.3 on page 4.
3. Get the accurate sound velocity of the workpiece which the thickness is known. Please refer to 8.2.1.4 on page 4.

### **Step Four:** Measurement

The DC-5000 is now ready to measure. There are four different measurement view options, A-Scan RF+, A-Scan HALF+, B-Scan and DIGITS, each with a specific purpose.

A-Scan RF+: It shows both the positive and the negative peaks.

A-Scan HALF +: It shows the positive.

B-Scan: It displays a time based cross section view of test material.

DIGITS: It is a basic digital thickness gauge look and feel. The color and larger digits make it much easier for the operator to monitor the thickness readings.





User can toggle between the different view mode options by pressing .

## 8. MENU

### 8.1 MEA. (Measurement)

DC-5000 provides two measurement modes, T-E mode and E-E mode.

<b>MEA.</b> SET. MEM. FUN.
T-E Mode
E-E Mode

- 1) Press the  key to illuminate **MEA.**
- 2) Press  or  to select T-E or E-E mode, Press  to confirm.

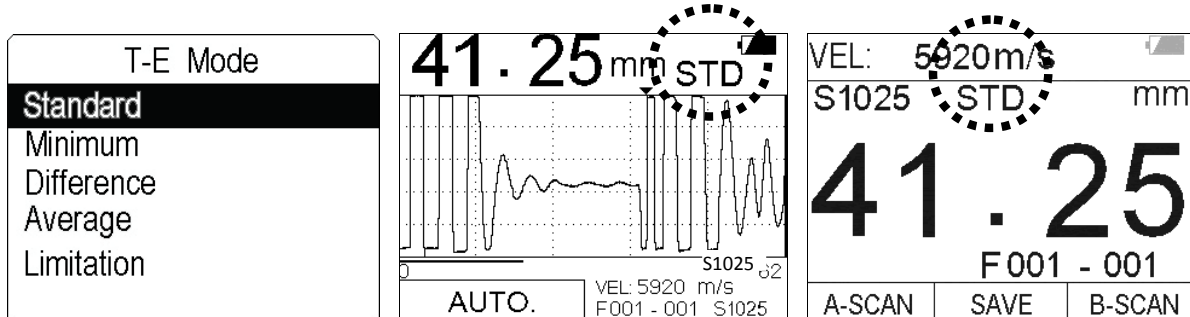
#### 8.1.1 T-E Mode:

When T-E mode is selected, all probes are available. And measurement modes of Standard, Minimum, Difference, Average and limitation can be selected.








<b>MEA.</b> SET. MEM. FUN.	T-E Mode
T-E Mode	Standard
E-E Mode	Minimum
	Difference
	Average
	Limitation

### Standard Measurement:

With this function, DC-5000 displays the current measurement value, satisfied with the normal measuring needs.



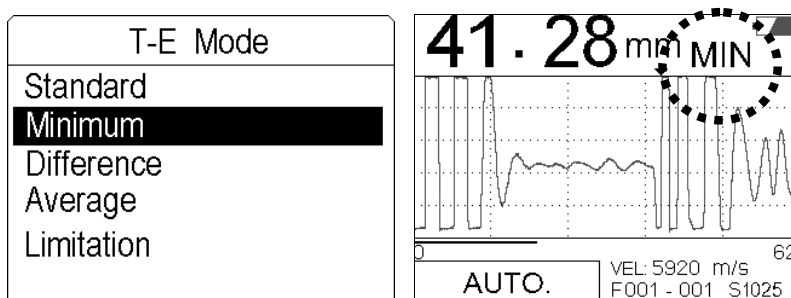
The following pages outline how to enable and set up this feature.

- 1) Press the  key to illuminate **MEA**.
- 2) Use     keys to scroll through the sub menu items until **Standard** is highlighted. Press the  key to confirm.
- 3) Press the  key to exit setting and DC-5000 is now ready to perform measurements.








### Minimum Measurement:

When taking measurements, DC-5000 displays the smallest thickness reading it found. It is suitable for testing the curvature surface or needs to get the minimum value which is widely used in the measurement of pipeline.

**Notice:** it is not recommended to use this function when measuring cast iron or alloy materials.

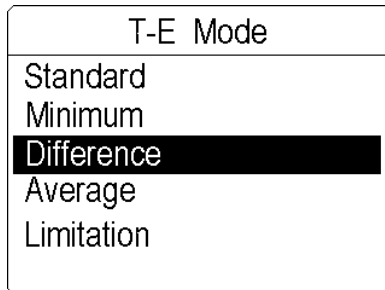


The following pages outline how to enable and set up this feature.







- 1) Press the  key to illuminate **MEA**.
- 2) Use     keys to scroll through the sub menu items until **Minimum** is highlighted. Press the  key to confirm.
- 3) Press the  key to exit setting and DC-5000 is now ready to perform measurements.

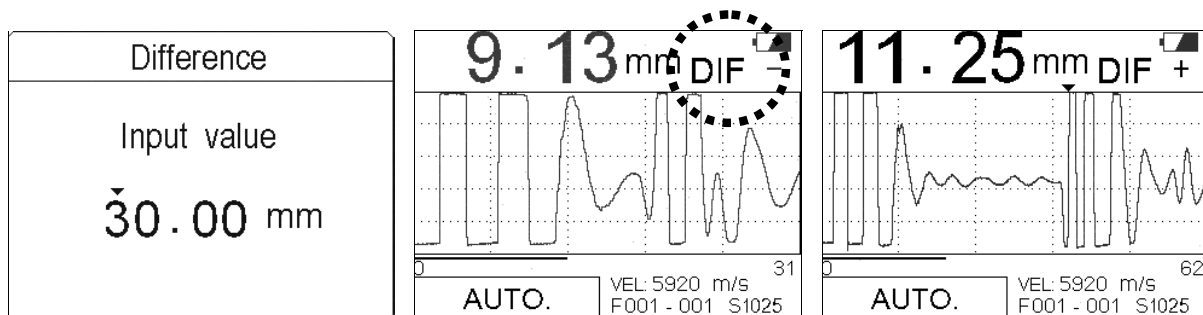
## Difference mode:






In the quality Control environment, it is sometimes necessary to know the difference between a nominal (target) thickness value and an actual thickness value. With the Difference mode enabled, DC-5000 will display the positive (+) or negative(-) difference from an entered nominal value.




The following pages outline how to enable and set up this feature.

- 1) Press the  key to illuminate **MEA**.
- 2) Use     keys to scroll through the sub menu items until **Difference** is highlighted. Press the  key to confirm. The Display shows as follows:



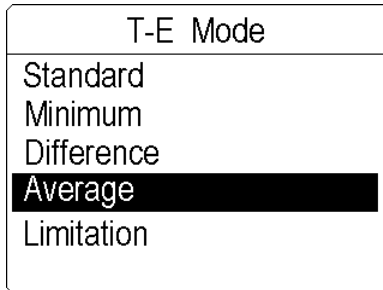
- 3) Press the  or  key to move the cursor,
- 4) Press the  or  key to change the numbers and Dot position. The value could be set as 0.000, 00.00 and 000.00. The 1<sup>st</sup> and the last position can be set numbers 1-9 as a circle. The other positions can be set numbers 1-9 and dot as a circle. Press the  key to confirm.

**Note:** 500.0 is the Max. value can be set. If User sets the value exceeding the max. value, the unit will correct it as 500.0 automatically.







- 5) Press the  key to exit and DC-5000 is now ready to work.

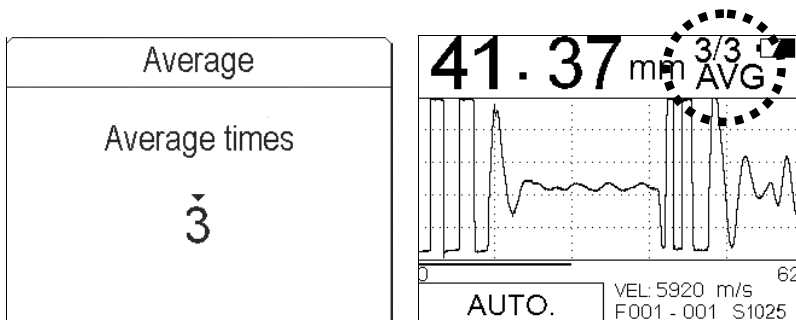
## Average mode:





With this function, DC-5000 displays the average value of 2 to 9 measured points. It can help user to check the surface planeness of flat board and their manufacturing process.



The following pages outline how to enable and set up this feature:

- 1) Press the  key to illuminate **MEA**.
- 2) Use     keys to scroll through the sub menu items until **Average** is highlighted. Press the  key to confirm. The Display shows as follows:









- 3) Press the  or  key to change the numbers among 2 to 9,
- 4) Press the  key to confirm.
- 5) Press the  key to exit setting and DC-5000 is now ready to perform measurements.







## Limitation Mode

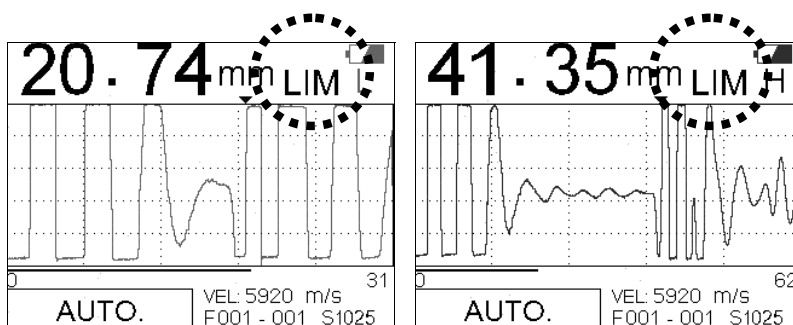
This function allows the user to set an audible and visual (Hi/Lo ) parameter when measurements. If the measurement falls below or above the HI/LO limits, set by the user, the red H or green L will be displayed and the beeper sounded. This improves the speed and efficiency of the inspection process by eliminating constant viewing of the actual reading displayed.

The following pages outline how to enable and set up this feature:

- 1) Press the  key into **MEA**.
- 2) Use     keys to scroll through the sub menu items until **Limitation** is highlighted. Press the  key to confirm. The display shows as follows:

T-E Mode	Limitation
Standard	<b>Low limitation</b>
Minimum	25.00 mm
Difference	High limitation
Average	30.00 mm
<b>Limitation</b>	

- 3) Use     keys to set the low / high limitation. The value could be set as 0.000, 00.00 and 000.00. The 1<sup>st</sup> and the last position can be set numbers 1-9 as a circle. The 3<sup>rd</sup> positions can be set numbers 1-9 and dot as a circle. Press the  key to confirm.
- 4) Press the  key to exit setting and DC-5000 is now ready to perform measurements.



### 8.1.2 E-E Mode

The E-E (echo-echo) function is not available owing to suitable probe is under developing right now.



## 8.2 SET.

This function allows user to set following parameters of measurement.

MEA.	SET.	MEM.	FUN.
Velocity rate			
Resolution			
Probe calibration			
Measurement rate			
Auto measurement			
Manual measurement			↓

MEA.	SET.	MEM.	FUN.
Rectification			↑
A-SCAN custom setting			
B-SCAN display range			

The following pages outline how to enable and set up these parameters.

### 8.2.1 Velocity rate

Sound velocity plays an important role in measurement. Different types of material have different inherent sound velocities. If the gauge is not set to the correct sound velocity, all of the measurements the gauge makes will be erroneous by some fixed percentage.

MEA.	SET.	MEM.	FUN.
Velocity rate			
Resolution			
Probe calibration			
Measurement rate			
Auto measurement			
Manual measurement			↓

Velocity rate
Materials
Velocity Input
Velocity measurement
Velocity storage

If the name or sound-velocity of the material to be measured is known, the user could select material name directly in the menu **Materials**. Or input the known velocity in the menu **Velocity Input**.

And the user could measure the sound velocity by using the function **Velocity measurement** if the sound-velocity of the material to be measured is unknown, but the exact thickness of which is known.








## Materials

The DC-5000 presets 9 common materials' sound velocity. They are: aluminum, titanium, steel, stainless steel, glass, copper, cast iron, brass, polystyrene.

The user may opt to choose such basic material type from the menu. It's important to note that these velocities will not always be an exact representation of the material being tested. Use these values only if a close approximation is acceptable.

Velocity rate	Materials	Materials
<b>Materials</b>	Aluminum	Cast iron ↑
Velocity Input	Titanium	Brass
Velocity measurement	Steel	Polystyrene
Velocity storage	Stainless steel	
	Glass	
	Copper ↓	

The following pages outline how to enable and set up this feature:












- 1) Press the  key to illuminate **SET-Velocity rate-Materials**,
- 2) Use     keys to scroll through the sub menu items until the target material is highlighted. Press the  key to confirm.
- 3) Press the  key to exit setting and DC-5000 is now ready to perform measurements.

## Velocity input

If the material velocity is known, the user may wish to simply enter the velocity number into the DC-5000, rather than have the DC-5000 calculate the velocity value on using a known thickness. And DC-5000 also can store 4 new velocities as custom.





Velocity rate	Velocity Input
Materials	Input value
<b>Velocity Input</b>	6666 m/s
Velocity measurement	
Velocity storage	

The following pages outline how to enter the velocity:

- 1) Press the  key to illuminate **SET-Velocity rate**,
- 2) Use     keys to scroll through the sub menu items until **VELOCITY INPUT** is highlighted. Press the  key to confirm.
- 3) Press the  or  key to move the cursor, Press the  or  key to change the numbers,
- 4) Press the  key to confirm and store it into **Velocity Storage**,

Velocity Storage
1. 1234
2. 5920
3. <b>6666</b>
4. 4020







m/s

- 5) Press the  or  key to illuminate the place where want to store, Press the  key to confirm.
- 6) Press the  key to exit setting and DC-5000 is now ready to perform measurements.










## Velocity measurement

Sometimes the sound velocity of a material is not known. In this case a sample with a known thickness can be used to determine the sound velocity. It would be very handy to carry a set of mechanical calipers to use in conjunction with the DC-5000 in the field.

The following steps outline how to enable and set up this feature:

- 1) Physically measure an exact sample of the material or a location directly On the material to be measured using a set of calipers or a digital micrometer.
- 2) Apply a drop of couplant on the transducer and place the transducer in steady contact with the sample or actual test material.
- 3) The display should show a thickness reading(probably incorrect).
- 4) Having achieved a stable reading, remove the transducer. (If the Displayed thickness changes from the value shown while the transducer Was coupled, repeat step 3.)
- 5) Press the  key to illuminate **SET**, Use     keys to scroll through the sub menu items until **Velocity Measurement** is highlighted. Press the  key to confirm.

Velocity rate	Velocity measurement
Materials	20.94 mm 4120 m/s
Velocity Input	
<b>Velocity measurement</b>	
Velocity storage	











- 6) Press the  or  key to move the cursor, press the  or  key to adjust the displayed velocity up or down, until the thickness value displayed matches the thickness of the sample piece. And now the displaying sound velocity value is accurate.
- 7) Press the  key to confirm and store it into **Velocity Storage**,
- 8) Press the  or  key to illuminate the target place, Press the  key to confirm.
- 9) Press the  key to exit setting and DC-5000 is now ready to perform measurements.

## Velocity storage

It allows user to store 4 new Velocities as custom and use it in future measurement. User can get the custom velocities by the features of **Velocity input** or **Velocity measurement**.

Velocity rate	Velocity Storage
Materials	1. 1234
Velocity Input	2. 5920
Velocity measurement	3. 6666
<b>Velocity storage</b>	4. 4020
	m/s










The following steps outline how to enable and set up this feature:

- 1) Press the  key to illuminate **SET-VELOCITY RATE**
- 2) Use     keys to scroll through the sub menu items until **Velocity storage** is highlighted. Press the  key to confirm.
- 3) Press   key to illuminate the target velocity, Press  to confirm.
- 4) Press  to exit and DC-5000 is now ready to perform measurements.


## 8.2.2 Resolution

User can select the displayed resolution. When 0.01mm or 0.001 inch be selected, the workpiece surface to be measured should be smooth for the purpose of getting an accurate value.

The following pages outline how to enable and set up this feature:

- 1) Press the  key to illuminate **SET**.
- 2) Use     keys to scroll through the sub menu items until **Resolution** is highlighted. Press the  key to confirm.
- 3) Press   key to select resolution and unit. Press  to confirm.

MEAS. SET. MEM. FUN.	Resolution
Velocity rate	0.1mm
<b>Resolution</b>	0.01mm
Probe calibration	0.01in
Measurement rate	0.001in
Auto measurement	
Manual measurement ↓	

- 4) Press the  key to exit setting and DC-5000 is now ready to perform measurements.







### 8.2.3 Probe Calibration

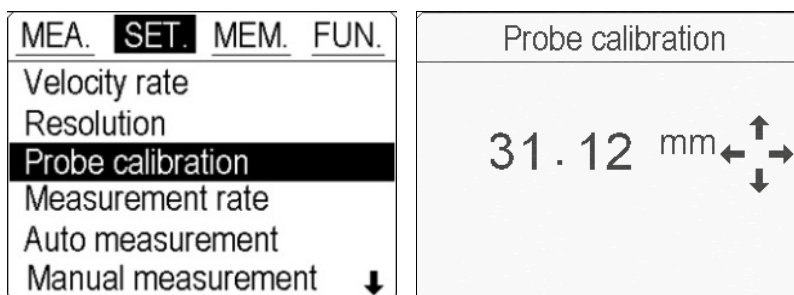
It causes error during the primary stage of usage or operate for long time. User should make probe calibration during following three aspects are happened.





1. The probe itself or the temperature variation,
2. System error caused by the match between the unit and the transducer,
3. Calculation error caused by the sound velocity set in the unit is different from that of the actual material.

This feature requires a sample piece of the specific material to be measured, the exact thickness of which is known. E.g. from having been measured by some other means. Or to use the build-in standard test block (4MM) comes with DC-5000.

The following steps outline how to enable and set up this feature:

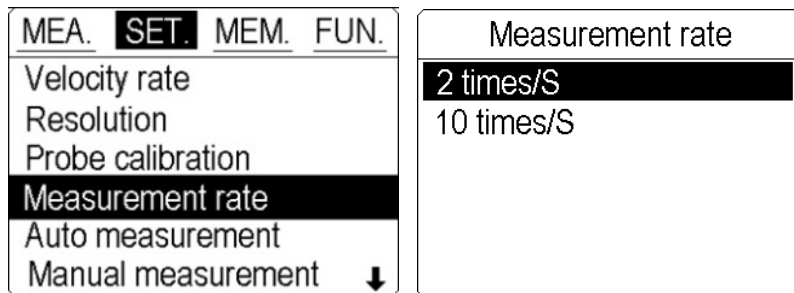
- 1) Apply a drop of couplant on the transducer and place the transducer in steady contact with the sample or standard test block.
- 2) Having achieved a stable reading, remove the transducer.
- 3) Press the  key to illuminate **SET**, Use     keys to Scroll through the sub menu items until **Probe calibration** is highlighted. Press the  key to confirm.












- 4) Press the  or  key to adjust the displayed reading up or down, until the thickness value displayed matches the thickness of the test block or sample piece. Press the  key to confirm.
- 5) Press the  key to exit setting, Test the block or sample piece again to verify the result.

### 8.2.4 Measurement rate

The DC-5000 performs measurement of 2 times/second and 10 times / second. 2 times/second is quite adequate for single measurements. And 10 times/second is recommended to measure the high temperature surfaces.

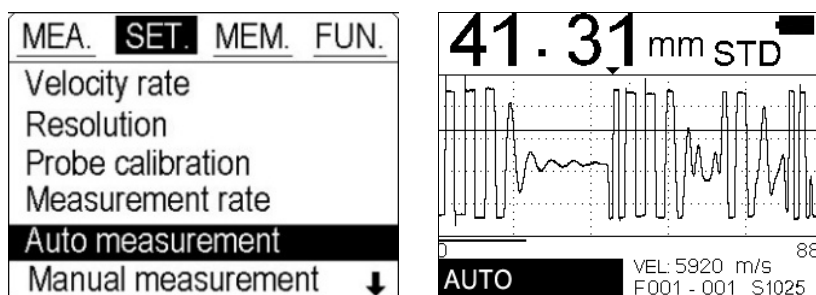


The following steps outline how to enable and set up this feature:








- 1) Press the  key to illuminate **SET**
- 2) Use     keys to scroll through the sub menu items until **Measurement rate** is highlighted.
- 3) Press the  or  key to select **2 times/S** or **10 times/S**. Press the  key to confirm.
- 4) Press the  key to exit setting and DC-5000 is now ready to perform measurements.

### 8.2.5 Auto measurement

This feature is recommended to measure some basic materials. All parameters are preset according to the different transducers. For A-scan mode, it is a convenient way to let DC-5000 find the detection point and bring the waveform signal into view automatically.



The following steps outline how to enable and set up this feature:

- 1) Press the  key to illuminate **SET**
- 2) Use     keys to scroll through the sub menu items until **Auto measurement** is highlighted. Press the  key to confirm.
- 3) Press the  key to return to the measurement screen. There is **Auto** displayed on the left down corner of screen.

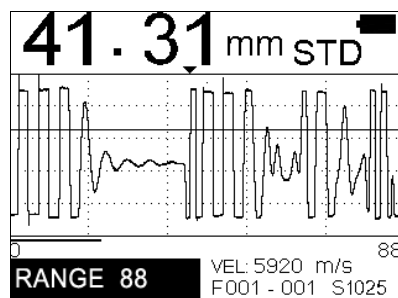
## 8.2.6 Manual measurement

This feature allows user to make fine adjustment of RANGE, GAIN, DELAY, GATE, BLANK, and E-BLANK manually in A-SCAN mode. They can be set through toggle the HOT MENUS what is displayed at the lower left side of the screen.

And once the above mentioned parameters are set, it will remain the same for B-SCAN and DIGITS display.

### Range

The range refers to the overall viewable range being displayed on the screen. Make change the range of display, shorten or enlarge it, finally serve User conveniently.



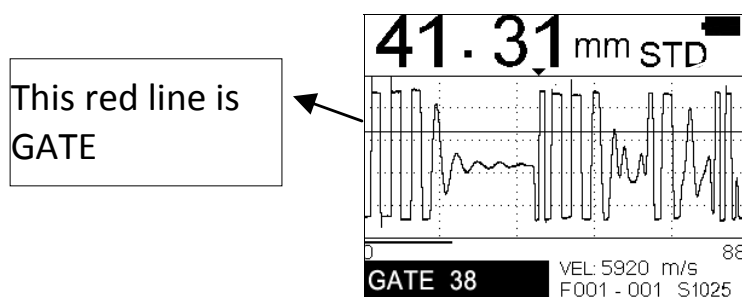
The following steps outline how to enable and adjust the RANGE.

- 1) Press **F1** once to illuminate **RANGE**.
- 2) Use keys **▲**(+1), **▼**(-1), **◀** (-coarse adjustment), **▶** (+ coarse adjustment) to adjust value.

### Gate

GATE is used in both T-E and E-E modes. The purpose of GATE is to force DC-5000 to measure the useful echo wave.

The following steps outline how to enable and adjust the GATE.



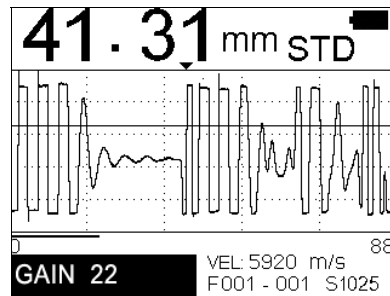
- 1) Press **F1** once to illuminate **GATE**.
- 2) Use keys **▲**(+1), **▼**(-1), **◀** (-coarse adjustment), **▶** (+ coarse adjustment) to adjust value.








## Gain

The gain can be adjusted over a wide range. The setting of the gain is crucial in order to obtain valid reading during the measurement process. Too much gain may result in erroneous measurements, by detecting on noise rather than the actual material back wall itself. Too little gain may result in detection on an undesirable section of the waveform.

The gain will also be represented in both the B-SCAN and DIGITS views. The following steps outline how to enable and adjust the GAIN.

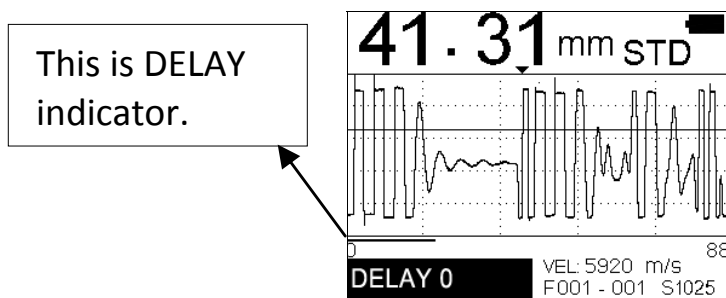


- 1) Press  once to illuminate **GAIN**.
- 2) Use keys  (+1),  (-1),  (-coarse adjustment),  (+ coarse adjustment) to adjust value.

## Delay

The starting DELAY is the value displayed on the bottom lower left side of the display in both RF+ and HALF+ views. It is the minimum thickness value that can be viewed on the display.

The following steps outline how to enable and adjust the DELAY.

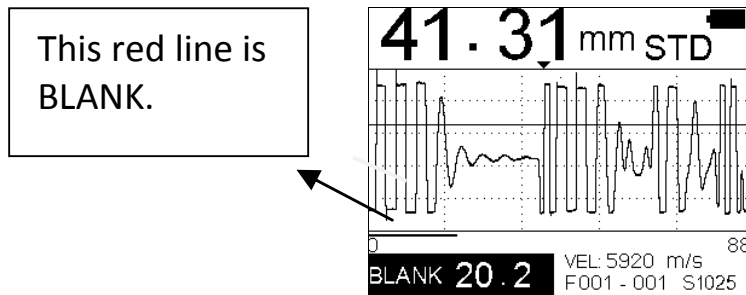


- 1) Press  once to illuminate **DELAY**.
- 2) Use keys  (+1),  (-1),  (-coarse adjustment),  (+ coarse adjustment) to adjust value.

## Blank

BLANK is used in T-E mode. Make change of Blank to conceal those useless echoes that influence measuring result. When making changes, the red line at the left bottom conner changes accordingly. User could take it as for reference and achieve the best measuring effect.

The following steps outline how to enable and adjust the BLANK.



- 1) Press once to illuminate **BLANK**.
- 2) Use keys (+1), (-1), (-coarse adjustment), (+ coarse adjustment) to adjust value.

## Saving the setting

Once all the parameters are set, there is two ways to save the setting.

- 1) The user can Press to store this setting into the current location. When turn on the gauge next time, this setting will be displayed.
- 2) Or the user can Press to store this setting into the **A-SCAN CUSTOM SETTING** for further use while measuring the same workpiece.









## 8.2.7 Rectification

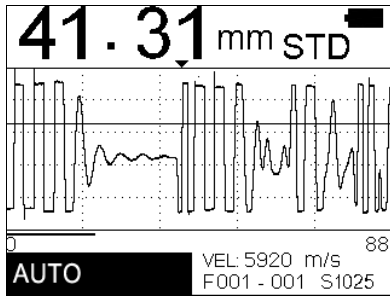
DC-5000 supplys two display views of A-Scan. RF+ mode shows both the positive and the negative peaks. HALF+ mode shows the upper of complete waveform only.

MEA. <b>SET.</b> MEM. FUN.	Rectification
Rectification	RF+
A-SCAN custom setting	HALF+
B-SCAN display range	

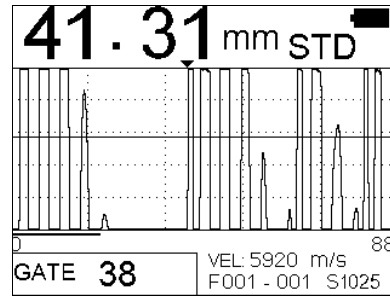
The following steps outline how to select the RECTIFICATION.

- 1) Press the key to illuminate **SET**.

- 2) Use   keys to scroll through the sub menu items until **RECTIFICATION** is highlighted. Press the  key to confirm.
- 3) Press     key to select RF+ or HALF+,
- 4) Press  to confirm and return to the measurement screen and begin taking readings.



**RF+**



**HALF+**








### 8.2.8 A-SCAN custom setting

DC-5000 can store 4 A-SCAN custom settings. This feature saves a great deal of time and knowledge for future inspection of the same job or project. Also it eliminates error between two or more users during the setup and calibration process.


A-SCAN custom setting	
Setting 1	RANGE 50
Setting 2	GAIN 22
Setting 3	DELAY 0
Setting 4	GATE 40
	BLANK 19.9

The following steps outline how to open/store an A-SCAN CUSTOM SETTING.

#### Opening a custom setting.

- 1) Press the  key to illuminate **SET**
- 2) Use   keys to scroll through the sub menu items until **A-SCAN CUSTOM SETTING** is highlighted. Press the  key to confirm.
- 3) Press   key to select target setting.
- 4) Press  to confirm and return to the measurement screen and begin taking readings.

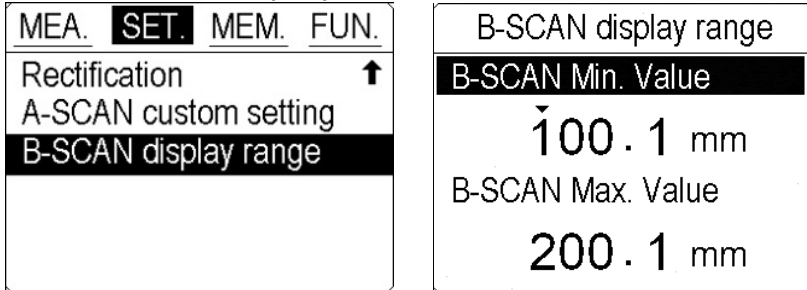
#### Store a custom setting

Once the DC-5000 parameters and features have been adjusted for an application, the user can Press  to save this setting to any one of 4

custom setting locations.

### 8.2.9 B-SCAN display range

It's important to note that the measurement range of B-scan on the display be set wide enough, so that the Maximum thickness of the material can be viewed on the display.



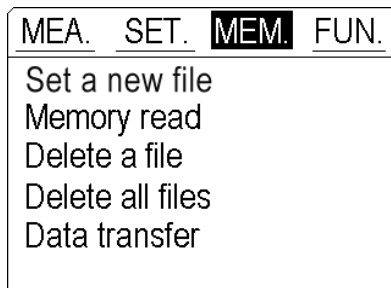
The following steps outline how to set the B-SCAN DISPLAY RANGE.

- 1) Press the key to illuminate **SET**
- 2) Use keys to scroll through the sub menu items until **B-SCAN DISPLAY RANGE** is highlighted. Press the key to confirm.
- 3) Press to move the cursor, press or to change numbers, Press to confirm.
- 4) Press again to return to the measurement screen. Then Press twice go to B-SCAN interface.

### 8.3 MEM.




The gauge has a memory capacity of 10,000 measurements in 100 files. The current memory location will be displayed on the screen as F000-000 in both A-scan and DIGIS mode. The files are numbered from 1-100, and measurement number will be followed automatically from 001.


This feature allows user to complete following function:



### 8.3.1 Set a new file







The following steps outline how to set a **new memory file**.


- 1) Press the  key to illuminate **MEM**.
- 2) Use   keys to scroll through the sub menu items until **set a new**

**File** is highlighted. Press the  key to confirm.

MEA.	SET.	<b>MEM.</b>	FUN.
Set a new file			
Memory read			
Delete a single file			
Delete all files			
Data transfer			












Memory unit
Input file No.
File 001

- 3) Press  or  to move the cursor, Press  or  set the file Number (001-100 can be set), Press  to confirm.
- 4) Press  to return to the measurement screen.

**NOTE:** After taking every measurement, press  key to store this reading with a location number.

### 8.3.2 Memory Read

It is sometimes necessary to go back and view the stored readings. The following procedures outline how to read memory.










- 1) Press the  key to illuminate **MEM**.
- 2) Use   keys to scroll through the sub menu items until **Memory read** is highlighted. Press the  key to confirm.
- 3) Press   to move the cursor, Press   to set the target File Number. Press  to confirm. All stored readings in this file will be Displayed. And press  or  to page forward or backward.

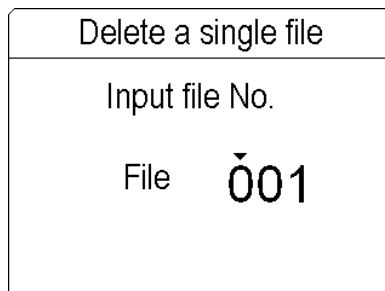
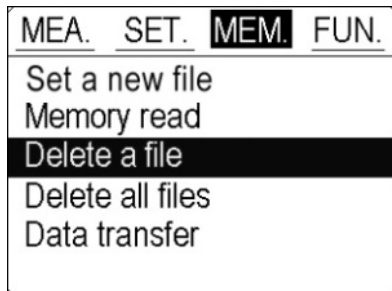
MEA.	SET.	<b>MEM.</b>	FUN.
Set a new file			
<b>Memory read</b>			
Delete a file			
Delete all files			
Data transfer			

Memory read
Input file No.
File 001

F 001	004/100
001	
41.42	mm
5920	m/s
S1025	STD





### 8.3.3 Delete a file

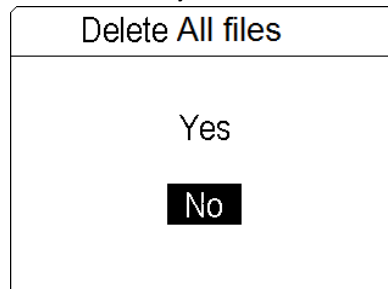
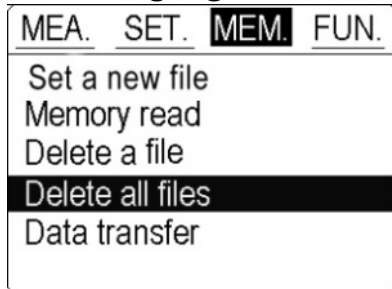
- 1) Press the  key to illuminate **MEM**.
- 2) Use   keys to scroll through the sub menu items until **Delete a file** is highlighted. Press the  key to confirm.
- 3) Press   to move the cursor, Press   to set the target File Number. Press  to confirm.



- 4) Use   keys to select YES or NO, press  key to confirm.

### 8.3.4 Delete all files





- 1) Press the  key to illuminate **MEM**.
- 2) Use   keys to scroll through the sub menu items until **Delete all files** is highlighted. Press the  key to confirm.



- 3) Use   keys to select YES or NO, press  key to confirm.

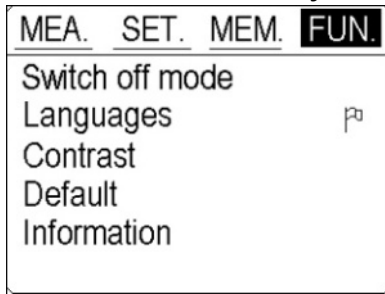
### 8.3.5 Data Transfer

The data can be transferred to PC using USB cable. Then User could copy them into DOC, .TXT. Or Excel for further analysis. Procedure is as follows:

- 1) Press the  key to illuminate **MEM**.
- 2) Use   keys to scroll through the sub menu items until **Data transfer** is highlighted. Press the  key to confirm.
- 3) Connect the DC-5000 with PC using the cable which comes with the standard delivery; then a new disk will be shown on the PC.
- 4) Open the new disk, double click DATA File and all files stored in DC-5000 will be shown as .TXT document. Double click one file to open it, user could copy the data into Word, Excel for further analysis.

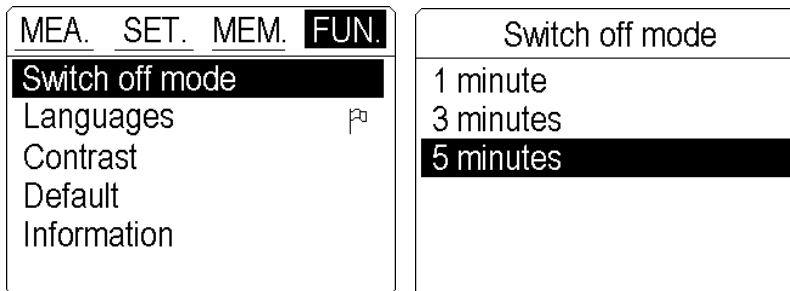
## 8.4 FUN.

It allows user to adjust following functions:



### 8.4.1 Switch off mode

Auto shut down after 1 Min. 3 Min. 5 Min. can be selectable.



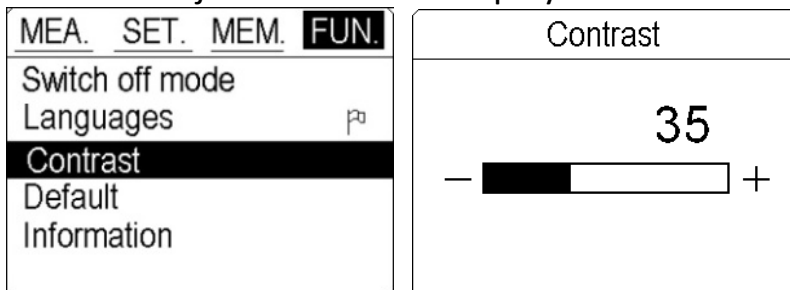
### 8.4.2 Languages

The gauge provides multi-languages for selection.



### 8.4.3 Contrast

User can adjust contrast of display.



### 8.4.4 Default

During the usage, when User can not ensure why the problems comes out and with some questions on setting, he can use this function to make the parameters to restore the factory status to eliminate any abnormal because of the parameters setting.

MEA. SET. MEM. <b>FUN.</b>	MEA. SET. MEM. <b>FUN.</b>	Default
Switch off mode	Switch off mode	
Languages <span style="float: right;">P</span>	Languages <span style="float: right;">P</span>	Yes
Contrast	Contrast	
<b>Default</b>	<b>Default</b>	<b>No</b>
Information	Information	

### 8.4.5 Information

The screen displays the Transducer Number.

MEA. SET. MEM. <b>FUN.</b>	Information
Switch off mode	Probe No.:
Languages <span style="float: right;">P</span>	S1025-172905982
Contrast	
Default	
<b>Information</b>	

## 9. Measuring technology

### 9.1 Measuring methods

The unit provides many measuring methods.

1). Single point measuring method:

Use the probe to measure any point Of the workpiece to be measured and the displayed value is the thickness.

2). Two point measuring method:

Perform two measurements on the same point of the measured Surface. In the second measurement, splitting plane of the probe should be 90 degree, take the minimum as the thickness value.

3). Multiple point measurement method:

Perform several measurements In a circle about 30mm in diameter and take the minimum value as the thickness value.

4. Continuous measurement methods:



Apply the single point measurement method, and take measurements continuously along the designated route, the intervals should be less than 5mm, and take the minimum value as the workpiece's thickness.

## **9.2 Pipeline measurement method**

During the measurement, make the probe's crosstalk interlayer plate be perpendicular or parallel to the axial line of the pipeline. For a pipeline with larger diameter, the probe's crosstalk interlayer plate should be perpendicular to the axial line of the pipeline, but for pipeline with small diameter, User should perform measurements making the crosstalk being both parallel and perpendicular to the axial line of the pipeline and take the minimum readout as the thickness value.

## **10. Maintenance and precautions**

### **10.1 Power check**

When the power is low, the low battery indicator will appear, at this moment User should replace the battery in time, or it will affect the measuring accuracy. The backlight cannot be switched on for a long time, because it is a big consumer of electricity.

Note: if the unit did not used for a long time, please take out of the battery to avoid leakage to damage the unit.

### **10.2 Precautions**

#### **10.2.1 General precautions**

The unit should avoid strong vibration, do not let it in an excessively humid environment, plug in or out the probe should hold the jacket to avoid the core wire of the probe damaged.

#### **10.2.2 Precaution during the measuring**

- 1). During the measurement, only the measuring icon appears and displayed stable, it can be regarded as a good measurement.
- 2). If there are large quantity coupling agents attached on the measured surface, when taking away the probe, it will cause error, so when the measurement is completed, please move the probe away from the measured surface quickly.
- 3). If the probe wears out, it will cause the displayed value unstable, please replace the probe.

## APPENDIX : Sound Velocity Measurement Chart

Material	Sound Velocity	
	M/s	Inch/ $\mu$ S
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
Polyurethane	1900	0.0700
Polythylene	1900	0.070
Polystyrene	2400	0.0930
Quartz	5800	0.230
Rubber, Butyl	1800	0.070
Silver	3600	0.140
Steel, Mild	5920	0.233
Steel, Stainless	5800	0.228
Teflon	1400	0.060
Tin	3300	0.130
Titanium	6100	0.240
Tungsten	5200	0.200
Uranium	3400	0.130
Water	1480	0.584
Zinc	4200	0.170