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**ST200
ULTRASONIC THICKNESS GAUGE
OPERATION MANUAL**

ACCUD

Material	inch/ μ s	m/s
Neoprene	0.063	1600
Nickel	0.220	5600
Nylon, 6.6	0.100	2600
Oil (SAE 30)	0.067	1700
Platinum	0.130	3300
Plexiglass	0.110	1700
Polythylene	0.070	1900
Polystyrene	0.093	2400
Polyurethane	0.0700	1900
Quartz	0.230	5800
Rubber, Buty	0.070	1800
Silver	0.140	3600
Steel, Mild	0.233	5920
Steel, Stainless	0.228	5800
Teflon	0.060	1400
Tin	0.130	3300
Titanium	0.240	6100
Tungsten	0.200	5200
Uranium	0.130	3400
Water	0.584	1480
Zinc	0.170	4200

Attention

- ◆ In order to obtain good measurement precision, you need to clear away the rusty, sundry, grease, etc. on the working surface.
- ◆ Please use the couplant on the working surface, measure repeatedly around the target area and take average value.
- ◆ Please clean the couplant on the transducer and working surface after measure.
- ◆ Please don't pull the transducer cable when use the instrument.

Overview

The Thickness Gauge is a digital ultrasonic thickness gauge. Base on the same operating principles as SONAR is capable of measuring the thickness of various materials with accuracy as high as 0.01mm or 0.001inch. It is suitable for a variety of metallic and non-metallic materials.

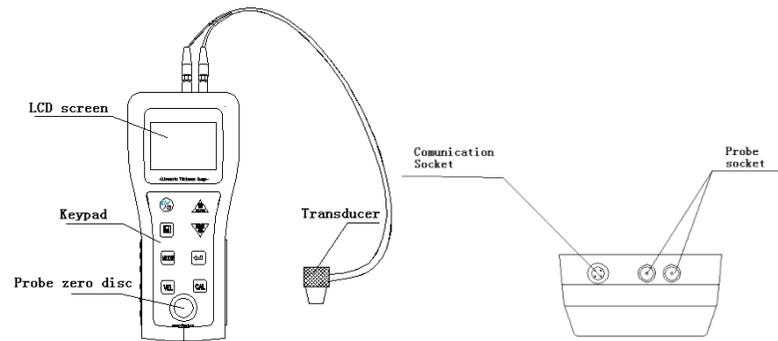
1 Specification:

Resolution: 0.01mm (range<100mm), 0.1mm (range ≥100mm)

Accuracy: ±0.05mm (range < 10mm), ±(0.01+0.5%H)mm≥ (range 10mm). H is the thickness to be measured.

Velocity: 1000~9999m/s

2 Structure:



3 Measuring principle:

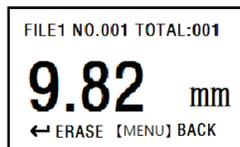
The digital ultrasonic thickness gauge determines the thickness of a part or structure by accurately measuring the time required for a short ultrasonic pulse generated by a transducer to travel through the thickness of the material, reflect from the back or inside surface, and be returned to the transducer. The measured two-way transit time is divided by two to account for the down and back travel path, and then multiplied by the velocity of sound in the material. The result is expressed in the wall-known relationship:

$$H = \frac{v \times t}{2}$$

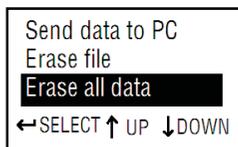
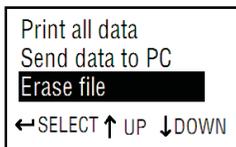
H is the thickness, v is the velocity, t is the time.

Sound velocity

Material	Sound Velocity	
	inch/μs	m/s
Air	0.013	330
Aluminum	0.250	6300
Alumina Oxide	0.390	9900
Beryllium	0.510	12900
Boron Carbide	0.430	11000
Brass	0.170	4300
Cadmium	0.110	2800
Copper	0.180	4700
Glass(crown)	0.210	5300
Glycerin	0.075	1900
Gold	0.130	3200
Ice	0.160	4000
Inconel	0.220	5700
Iron	0.230	5900
Iron (cast)	0.180	4600
Lead	0.085	2200
Magnesium	0.230	5800
Mercury	0.057	1400
Molybdenum	0.250	6300
Monel	0.210	5400



- ◆ Press key or to view all data saved.
 - ◆ Press key to exit.
- 3 Delete data:
Press key when you are viewing data saved to delete that data and the next data will show on the screen. You can also enter the function menu to delete single file or all files.



Send data to PC

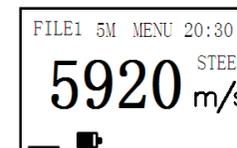
- 1 Connect instrument to the computer by using USB cable.
- 2 The system can make the driver automatically, if not, please download the driver from <http://www.accud.com/software.d.php>. If it is successful, there is device called "CP210X USB to UART" in device Manager
- 3 Use serial port software like Hyper terminal or serial port testing software from <http://www.accud.com/software.d.php>.
- 4 Enter the function menu and select the tab "Send data to PC", then press key.
- 5 The screen will display the data saved before, now you can edit, save, print the data.

Key Functions

Key	Function
	--Turn on/off the instrument (long press) --Turn on/off the backlight (short press)
	Data save: after get a new reading, press this key once and the screen appear "***", then long press this key to save the reading.
	Function key: continue to press this key and select the functions then press enter key to set.
	Velocity key: continue to press this key and select the velocity and you can press the up or down keys to adjust the value.
	Up key and quickly enter scan mode
	Down key and quickly enter alarm mode
	Enter key
	Calibration key

Basic operations

- 1 Power on and off:
 - ◆ Insert the plus of the probe into the socket on the instrument.
 - ◆ Long press the key until screen show the picture as below:



FILE1: File selection(5 files in total).
5M: Probe selection(4 kinds of probe: 2M, 5M, 7M, H2M).
MENU: Menu selection.

20:30: System time.

||||: Sign of coupling.

■: Battery information(When it is □, the battery should be charged).

MIN: Sign of scan mode.

± : Sign of difference mode.

🔔 : Sign of alarm mode.

2 Transducer frequency setting:

The frequency of the transducer should be preset to the instrument before measuring operation. This enables the user to select the transducer type among supported transducers according to frequency and diameter depending on application requirements.

Use the following steps to select your transducer frequency:

- ◆ On the measurement screen, press the key **MODE** twice to activate the transducer frequency tab.



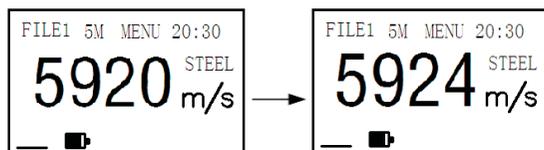
- ◆ Press the key **←** to select the desired frequency of the probe.
- ◆ Press the **MODE** key twice back to the measurement screen.

3 Sound velocity setting:

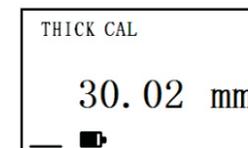
In order for the gage to make accurate measurements, it must be set to the correct sound velocity for the material be measured.

Use the following steps to select your transducer frequency:

- ◆ On the measurement screen, press the **VEL** key to preset commonly using velocity.
- ◆ Use the **▲** and **▼** to adjust the value until it matches the sound velocity of the material to be measured.



- ◆ Press **MODE** key to “froze” the reading, then press key **▲** or **▼** to change the value to standard value and then press key **←** to confirm. At the same time the tester remind you to make thick calibration as below:



- ◆ Make thick calibration just as thin calibration.
- ◆ Press key **←** to confirm and return to main interface.

Memory management

There are 5 files (FILE1-FILE5) that can be used to store the measurement values inside the gage. At most 100 records can be stored to each file. On measurement screen, press the key **MODE** multiple times to activate the **FILE name** tab as below:



Use the key **←** to select the desired file to save the data.

1 Storing a reading:

- ◆ After get a new reading, press **□** key once and the screen appear “*”. Then long press this key to save the reading.
- ◆ Long press **□** key to save the reading.

2 Viewing stored readings:

- ◆ Press key **MODE** to activate the **FILE name** tab and press **←** key to select the desired file to view the data.
- ◆ Press **□** key to view the data saved as below:

3 Difference mode setting:

- ◆ Enter difference mode setting according to “ scan mode setting”.
- ◆ Press to turn on the difference mode and enter menu “TARGET MENU” as below:



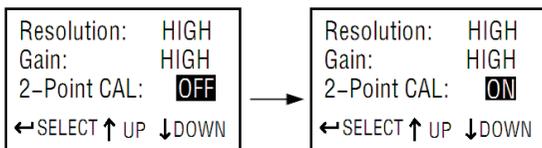
- ◆ Press key or to change the target value and press to go back.
- ◆ Press key to confirm setting and return to main interface.

When making measurement, if the measurement value is larger than target value, mark is replaced by + and if the measurement value is smaller than target value, mark is replaced by -. The value showing on the screen is absolute of measurement value minus target value.

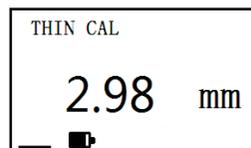
4 Two-point CAL setting:

This procedure requires that the operator has two known thickness points on the test piece that are representative of the range to be measured.

- ◆ Enter two-point CAL setting according to “ scan mode setting”.
- ◆ Press to turn on the two-point CAL then press key return to main interface.

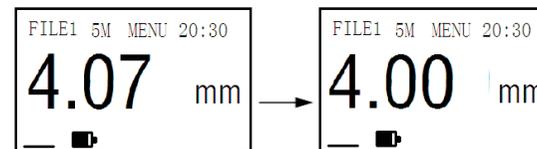


- ◆ When thickness value shows on the screen, press key to make 2-Point CAL, the tester remind you to make thin calibration as below:



4 Zero setting:

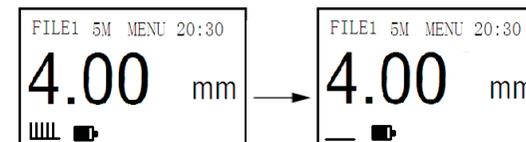
- ◆ Plug the transducer into the instrument, make sure that the connector are fully engaged. Check that the wearface of the transducer and surface of the zero disc is clean.
- ◆ Select the frequency(5M) and sound velocity(5920m/s).
- ◆ Apply a single droplet of couplant to the face of the zero disc.
- ◆ Press the transducer against the probe disc, making sure that transducer sits flat against the surface.
- ◆ While the transducer is firmly coupled to the zero disc, the thickness value is shown on the screen.
- ◆ Press the key to set the value to 4.00mm.



5 Thickness measurement:

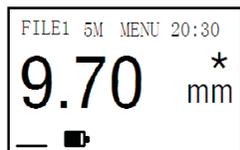
When the screen is displaying thickness measurements, the display will hold the last value measured, until a new measurement is made.

- ◆ Plug the transducer into the instrument, make sure that the connector are fully engaged. Check that the wearface of the transducer and surface of the workpiece is clean.
- ◆ Select the frequency and sound velocity according to material of the workpiece.
- ◆ Apply a single droplet of couplant to the face of the workpiece.
- ◆ Press the transducer against the workpiece, making sure that transducer sits flat against the surface.
- ◆ While the transducer is firmly coupled to the workpiece, the thickness value is shown on the screen.



6 Calibration to a known velocity:

- ◆ Make measurement of the test block whose thickness is known(for example: 10mm) according to chapter “Thickness measurement” correctly.
- ◆ After the thickness value shows on the screen, press  key and remove the transducer from the surface, the display will hold the last measurement made. At the same time, sign * shows on the right of the screen as below.



- ◆ Press key  or  to change the value to the exact value 10.00mm.
- ◆ Press key , the sound velocity of the material measured will show and it is saved as one of the commonly using velocities at the same time.

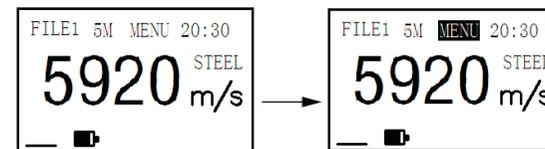


System setup

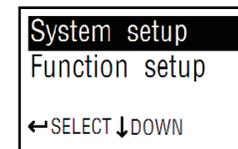
1 Scan mode setting:

While the gauge excels at making single point measurements, it is sometimes desirable to examine a larger region, searching for the thinnest point. The gauge includes a feature, called Scan Mode, which allows it to do just that.

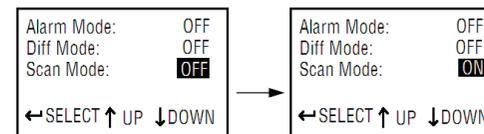
- ◆ On the measurement screen, press the key  multiple times to activate the **[MENU]** tab.



- ◆ Press key  to enter the main menu interface.



- ◆ Press key  or  to move the cursor to “System setup” and then press  to enter it.
- ◆ Press key  or  to move the cursor to “Scan Mode” and then press  to switch on or off scan mode as below.

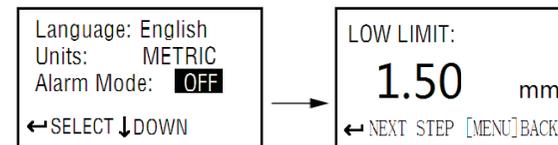


- ◆ Press  key to confirm setting and return to main menu interface.

2 Alarm mode setting(Limit Setting):

The Thickness Gauge will alarm when the measured value is beyond measurement range. The buzzer will ring if the measured value reaches pre-set lows or pre-set highs.

- ◆ Enter alarm mode setting according to “ scan mode setting”.
- ◆ Press  to turn on the alarm mode and enter menu “LOW LIMIT” as below.



- ◆ Press key  or  to change lower limit.
- ◆ Press key  to enter menu “HIGH LIMIT” to set high limit.
- ◆ Press key  to confirm setting and return to main interface.