Ultrasonic Thickness Gauge

TIME®2190

Features

- » **A-scan waveform can be displayed for echo analysis and measurement of complex workpiece;**
- » **Compatible with many types of transducers, single and dual element transducers are suitable;**
- » **With a variety of measurement methods, users can set blanks to shield aftershocks or clutter;**
- » **Echo-echo measures the true metal thickness with ignoring the thickness of coating layer.**

  Thru-coat technology measures metal and nonmetallic coating thickness.
- » **Signal auto-amplification function (centered display of the detected echo);**
- » **The resolution is 0.001, 0.01, 0.1 mm optional in any mode (or 0.0001, 0.001, 0.01 inch optional)**
- » **Gain adjustment range 0-99dB;**
- » **Adjustable voltage variable pulse width square wave pulse generator;**
- » **Single value B-scan display function;**
- » **Users can turn on fast measurement mode up to 20 times per second;**
- » **Alarm function, user can set the upper and lower limits of the alarm;**
- » **Differential, maximum and minimum display mode;**
- » **Internal data storage, data can be output to a removable MicroSD memory card. Can store up to 500,000 measured values and waveforms;**

Standard Configuration

Main unit 1

5MHz dual element wideband transducer 1

Couplants 1

AA battery 1

User manual 1

Optional Configuration

Standard block

1 MHz single element contact transducer

TSTU32 2MHz Dual element transducer

5MHz Single element contact transducer

15MHz single element with delay lines transducer

ZW5P high temperature transducer

Transducer Measurement Range

Transducer Type	Measuring Range (steel)	Indication Error	Using Mode
5MHz dual element narrow pulse transducer:	1.2 ~ 225.0mm 3.0 ~ 100.0mm	H < 10mm，±0.05mm； H≥10mm， ±(0.01+0.5%H)mm	Standard Echo-Echo
5MHz single element contact transducer	5.0 ~ 225.00mm 5.0 ~ 100.00mm	H < 10mm，±0.05 mm； H≥10mm， ±(0.01+0.5%H)mm	Standard Echo-Echo
TSTU32 2MHz Double element transducer	3.0 ~ 300.00mm	H < 10mm，±0.1 mm； H≥10mm， ±(0.01+1%H) mm	Standard
1MHz single element contact transducer	10. ~ 500.00mm	H < 10mm，±0.1 mm； H≥10mm， ±(0.01+1%H) mm	Standard
15MHz Single element delay block transducer:	3.0mm ~ 20.0mm 0.25m ~ 10.0mm	H < 10mm，±0.05 mm； H≥10mm， ±(0.01+0.5%H)mm	Interface-echo Echo-echo

TECHNICAL PARAMETERS

Resolution:	0.001mm or 0.01 or 0.1mm optional
Sound velocity adjustment range:	508 m/s~18699m/s
Display screen:	Color TFT LCD, 320x240 pixels
Pulse Generator:	Adjustable Square Wave Pulse Generator
Emission voltage:	60V, 110V, 150V, 200V optional
Emission pulse width:	varies with transducer frequency
Gain range:	0-99dB, 1dB step
Frequency range:	0.5 Mhz~20Mhz
Measurement rate:	standard (4Hz), fast (20Hz)
Transducer settings:	10 sets of fixed transducer setting and 22 sets of custom transducer setting
Data Storage:	500 data files, each capable of storing 1000 measurements and waveforms
Working environment temperature:	0°C～40°C

POWER

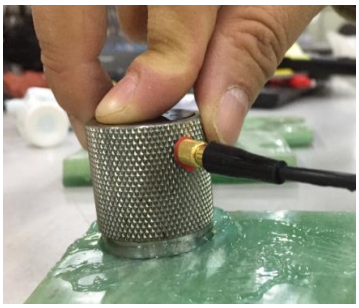
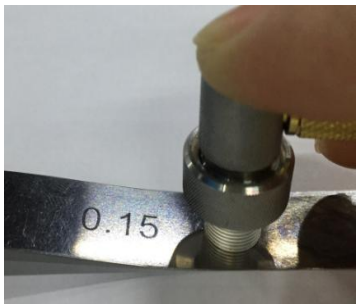
Power:	three AA battery or NiMH batteries
Power consumption:	Working current does not exceed 250mA (WiFi is turned off, brightness is dark, 4.5V)
Size:	187mm×87 mm×43 mm
Weight:	360g

STANDARDS

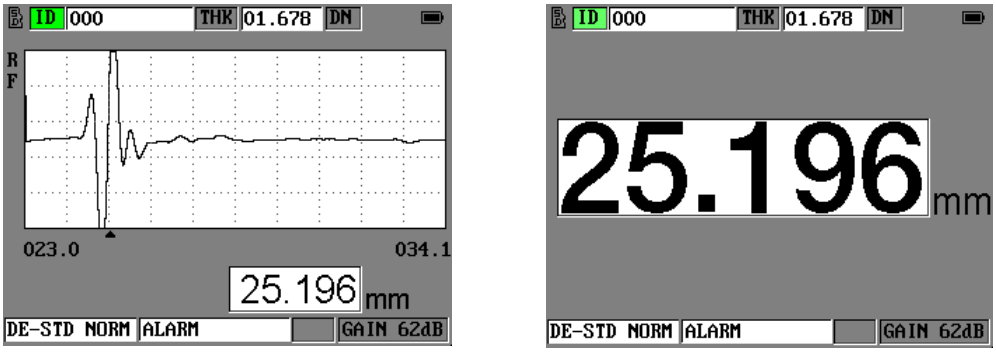
Applicable standards and specifications:	Q/HD SDF0001-2014 ultrasonic thickness gauge
	JJF 1126-2004 Ultrasonic Thickness Gauge Calibration Specification
	GB/T 6587 General specification for electronic measuring instruments





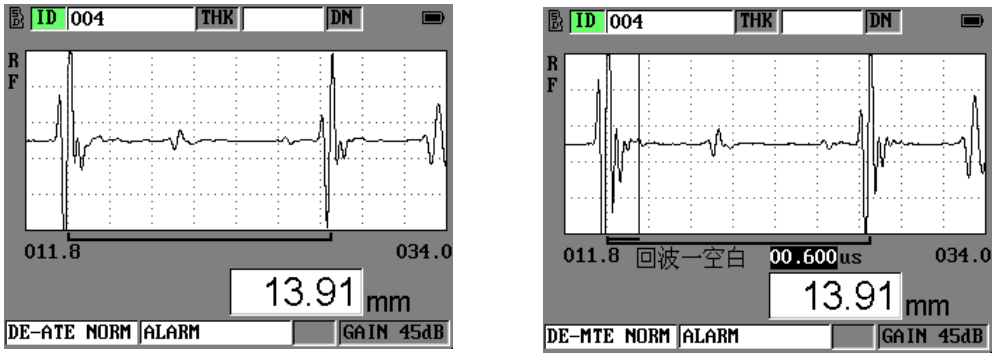



◆ **The standard echo detection mode measures the thickness based on the time interval between the excitation pulse and the first back-wall echo. User can measure uncoated materials in this mode.**



Measure in standard echo detection mode

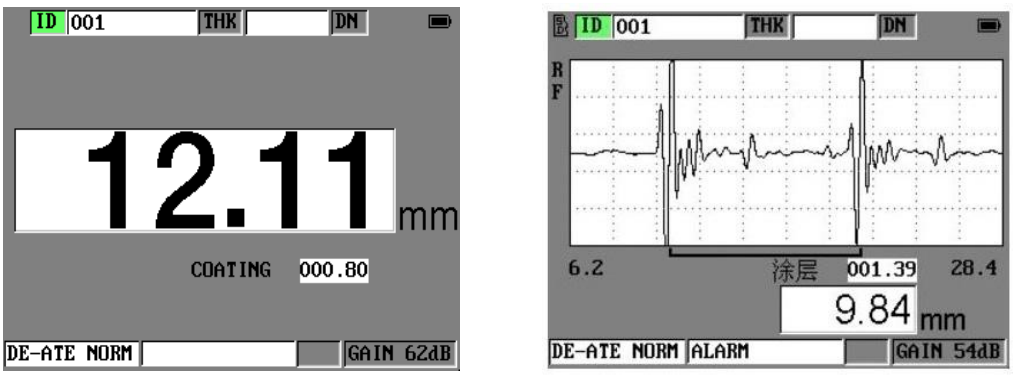
◆ **Automatic echo-echo detection mode allows thickness measurement of materials with paint or coating because the time interval between two successive back-wall echoes eliminate paint or coating thickness**



Measurement in automatic E-E detection mode

Measurement in manual E-E detection mode

◆ **Paint thickness measurement can simultaneously display layer thickness and substrate thickness.**



THRU-COAT mode showing the thickness of a coating and steel (waveform not activated)

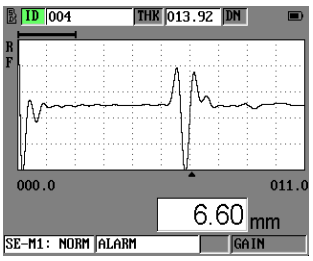
THRU-COAT mode with optional waveform

◆ **The instrument includes three detection modes (Mode 1, Mode 2, and Mode 3):**

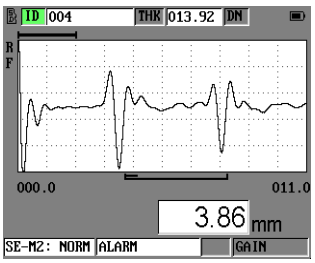
Mode 1: Measures the time interval between the main pulse signal and the first back-wall echo with direct contact transducer.

Mode 2: Measure the time interval between the interface echo (or delay line echo) and the first back-wall echo with a delay line or immersion transducer.

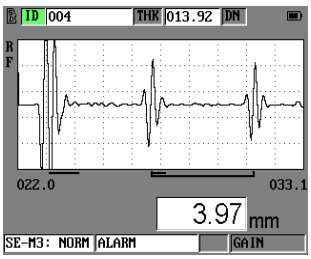
Mode 3: Measure the time interval between two successive back-wall echoes with a delay line or a immersion transducer.



Mode 1



Mode 2

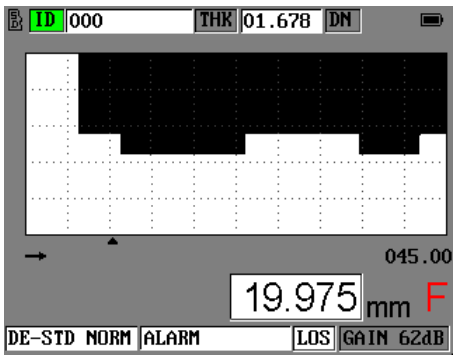


Mode 3

Measuring Mode

Measuring Mode	Echo 1	Echo 2
Mode 1 Us contact transducer	The back echo is usually the negative electrode. However, in special applications where low acoustic impedance materials bonded to high acoustic impedance materials are measured (eg, plastic or rubber is adhered to the metal), the echoes appear to be phase inverted.	Not applicable
Mode 2 Use a delay line transducer or a immersion transducer	When measuring materials with high impedance such as metals and ceramics, the interface echo is usually positive, while when measuring low-impedance materials like most plastics, the echo is negative.	The back-wall echo is typically the negative electrode unless it is from an interface between a low acoustic impedance material and a high acoustic impedance material that are bonded together.
Mode 3 Use a delay line transducer or a immersion transducer	For high impedance materials, the interface echo is usually positive.	The back echo is usually the negative electrode. However, in special measurement applications for some irregular geometry materials, the bottom echo is set to the positive electrode due to the phase distortion causing the positive electrode of the bottom echo to be clearer than the negative electrode.

The instrument is capable of acquiring and displaying B-scan data;



The TIME®2190 gage B-scan feature convers live thickness reading into cross-sectional images drawn on the display. This standard feature is very helpful in viewing the changes in thickness measurements over a distance. The B-scan is activated as soon as the transducer makes contact with the surface of the material.

◆ **The ZW5P transducer can be used to measure the thickness of steel with a surface temperature of up to 300 °C.**

For every 100 °C increase in steel temperature, the sound velocity of the material drops by about 1%, so the measured value should be corrected.

Example: H0 is defined as the actual thickness value of the material, and H1 is defined as the measured value of the measurement.

so： 100℃, H0 H1×0.99
200℃, H0 H1×0.98
300℃, H0 H1×0.97

In the high temperature measurement, the two-point calibration method can also be used to eliminate the measurement error generated during high temperature measurement.

Sound velocity of various materials

Material	Sound velocity(m/s)
Aluminum	6470
Zinc	4170
Silver	3600
Gold	3240
Tin	2960
Steel	5920
Brass	4399
Copper	4700
Sus	5970
Acrylic Resin	2726
Chrome Steel	5684
Water (20 ° C)	1480
Glycerin	1920
Water Glass	2350