

# **Shore D Hardness Tester TH210**

## Instruction Manual

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## **Chapter 1. Introduction :**

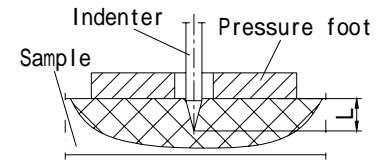
### **1.1 Main features and application :**

TIME TH210 Shore D hardness tester (hereafter called hardness tester) is a kind of advanced integral digital hardness tester. It includes measuring device and data processing system. It is of the merit of advanced technology, pocket size, accurate measuring data, appearance beautiful, light weight, and easy to operate. It can be connected with computer by RS-232 communication cable. It is mainly used to measure hardness of hard plastic and rubber such as heat plasticity, hard resin, floor materials, bowling etc. Especially suitable for finished products in working situation.

### **1.2 Fundamental :**

When the steel indenter of certain shape is pushed into the sample surface vertically with testing force, and when surfaces of pressure foot and the sample touched completely (see figure 1), the indenter extends out for a certain length "L" from the pressure foot plane. Greater length "L" means lower Shore hardness value and smaller length "L" means bigger Shore hardness value. The formula is  $HD=100-L/0.025$ , HD is Shore D hardness value in the formula. The formula indicates that the hardness value is relevant to displacement of indenter. Displacement of

the indenter is measured by the sensor, then the value is given through calculation and processing of the CPU.



( figure 1 )

### 1.3 Basis :

· International standards: 《Rubber—Determination of indentation hardness by means of pocket hardness meter》 ISO7619

《Plastics and ebonite—Determination of indentation hardness by means of a durometer ( Shore hardness ) 》 ISO868

· America standards: 《Standard Test Method for Rubber Property—Durometer Hardness 》 STM D 2240-02

· Japanese standards: 《Hardness Testing methods for rubber , vulcanized or thermoplastic》 JIS K6253

### Chapter 2. Technical Specification:

Measuring range : 0HD ~ 100HD

Measuring error : within 20HD ~ 90HD, error  $\leq \pm 1$  HD ;

Resolution: 0.2HD

Environmental temperature : 0 °C ~ 40 °C

Power supply : 1.55V×3 button batteries and 5V AC- DC adapter

Dimensions: 173mm×56mm×42mm

Weight: 230g

### **Chapter 3. Main functions and configuration :**

#### **3.1 Main functions :**

Peak value locked storage, average value calculating and low-voltage alarming.

Data communication with computer by use of RS-232 communication cable of company

Shut off automatically.

#### **3.2 Basic configurations :**

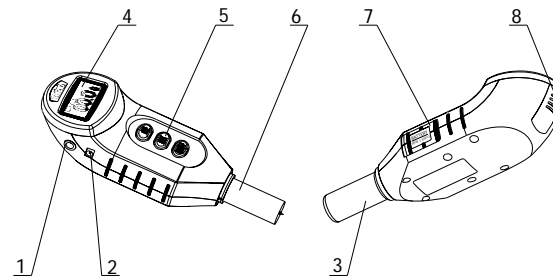
TH210 main unit      Three SR44 button batteries

### 3.3 Optional configurations:

RS-232 communication cable    5V AC- DC power adapter    Shore hardness stand of TH210FJ

## Chapter 4. Composition :

### 4.1 Composition of main unit ( See figure 2 ) :

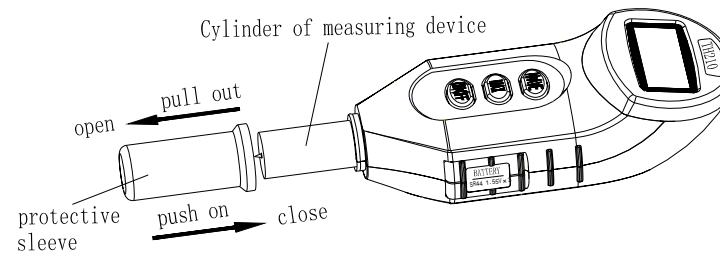


(figure 2)

- |                            |                     |
|----------------------------|---------------------|
| 1. communication interface | 2. power plug board |
| 3. protective sleeve       | 4. display screen   |
| 5. press button            | 6. measuring device |
| 7. battery house           | 8. joint cover      |

#### 4.2 Usage of protective sleeve :

The protective sleeve is used to prevent indenter from damage under non working condition. Before put into service, first take off protective sleeve. **Grasp and pull out it by hand.** When finished measuring, protective sleeve should be pulled on in time. Put protective sleeve on cylinder and push up untill it clamped closely with main unit, see figure 3.

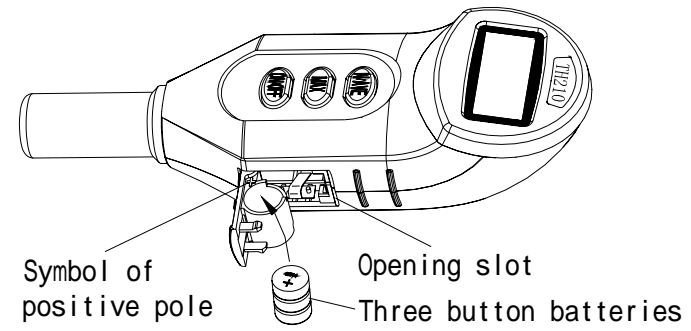


( figure 3 )

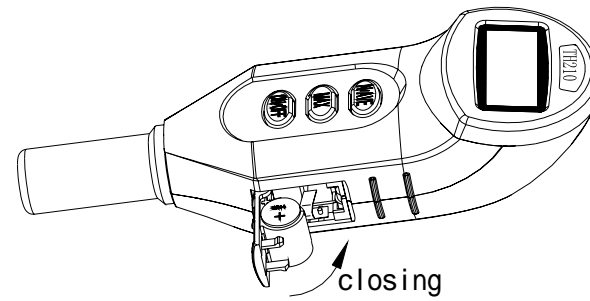
#### 4.3 Usage of battery house :

Pull out and turn the battery house slightly to make it rotate about 90° around axis with thumb, see figure 4. Put into three button batteries. Take care of positive pole symbol “ + ” consistently. At last, turn battery house reversely until clamped closely with main unit, see figure 5.





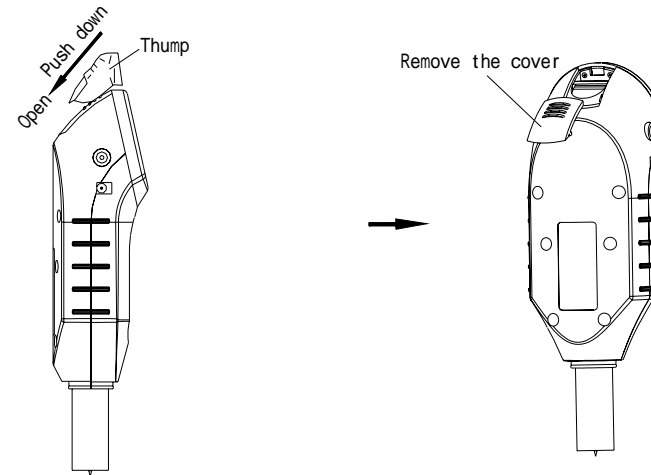
( figure 4 )



( figure 5 )

#### 4.4 Usage of joint cover :

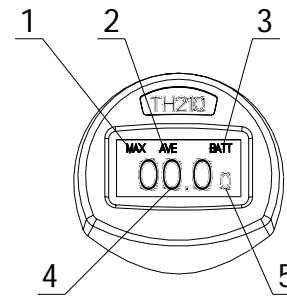
The joint cover is mainly used to close joint hole on the top of main unit. When measuring by operating stand, it must be removed and let out screw. Press the arris on the cover by thumb and push it down ( reverse screen direction), see figure 6. Then completed removal. The assembling method of joint cover is similar with disassembling.



( figure 6 )

#### 4.5 Usage of display screen :

Screen is used to display results as well as working states of tester. The screen is divided into 5 displaying areas which is stated as follow, see figure 7



( figure 7 )

- 1---MAX Max value function (tester locked automatically and stored peak value),
- 2---AVE Average value function,
- 3---BATT Low-voltage indication,
- 4---Hardness value
- 5---Test times,

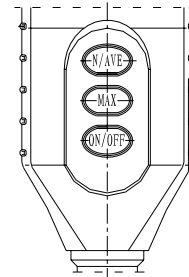
#### 4.6 Usage of press button :

Buttons is used to turn on or turn off power as well as set functions, see figure 8:

N/AVE---- Test times function and Average function button,

MAX-----Max value function button,

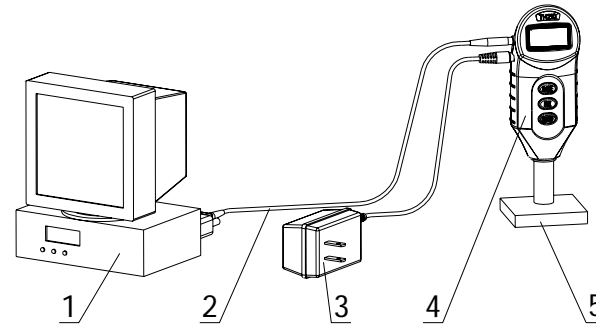
ON/OFF---Switch button ( red ) .



( figure 8 )

#### 4.7 Usage of communication interface and power adapter :

It can communicate with computer by RS-232 communication cable. It can use 4.5V AC-DC power adapter instead of batteries, see figure 9.



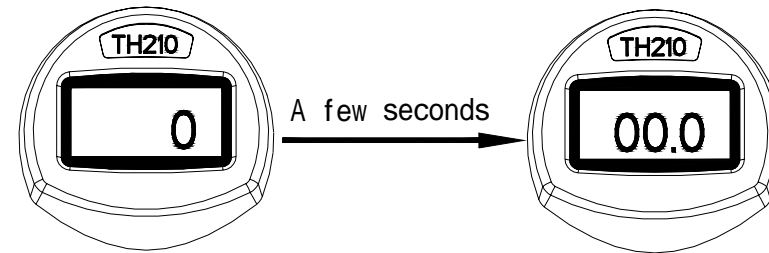
( figure 9 )

1. Computer    2. Communication cable  
3. AC-DC power adapter    4. Hardness tester    5. Sample

## Chapter 5. Functions setting :

### 5.1 Start :

Press button ON/OFF , screen displays “0” firstly , after seconds,the data displayed changed as “00.0”. At same time, the program of hardness tester starts to work, see figure 10. Press switch button ON/OFF again, the machine power off.

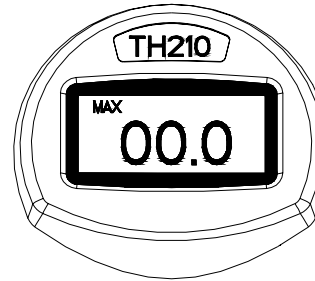


( figure 10 )

### 5.2 Max value function :

Press MAX button, screen displays MAX symbol, see figure 11. The value is the maximum of once test (auto locks peak value function). If you want to cancel this function, only need to press MAX again (MAX symbol vanishes).

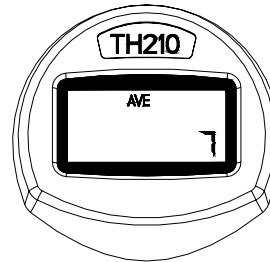
Under MAX situation (when do not set Ave. function), it needs to press button MAX to clear zero before next measurement ( MAX symbol vanishes correspondingly), then press MAX again to start measuring.



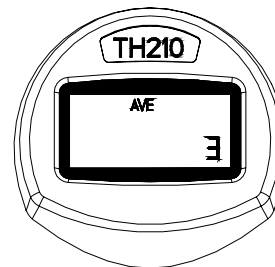
( figure 11 )

### 5.3 Test times function and average value function setting :

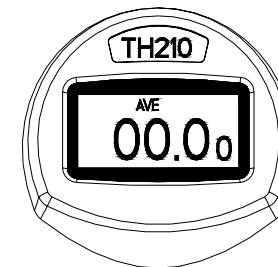
Press down button N/AVE (the MAX function do not be set), the “00.0” vanishes and displays AVE symbol at same time as well as display test times on right bottom corner ( before setting, it displays the test times to be set last time, the test times is supposed as 7 on illustration), see figure 12. At this moment, the test times setting should be carried on. The setting method sees below 5.3.1. Supposed setting value is 3 shown on screen, see figure 13. Seconds later of completed setting, displaying area restore hardness value as “00.0” and test times changed as “0” at same time, see figure 14. It indicates setting successful and can be put into measuring situation. If want to cancel this function, only need to press button N/AVE again, AVE symbol and test times vanishes at this moment.



( figure 12 )



( figure 13 )



( figure 14 )

### 5.3.1 Setting methods of test times :

Under figure 12 state, the test times can be set by press button N/AVE continually. The max test times is 9, in which the times can be circled within 0 ~ 9 range. There are two kinds of setting method:



Method 1 : Press button N/AVE for a while, the times circulated among 0 ~ 9 range until it reaches requirement, then release button at once and completed.

Method 2 : Press button N/AVE repeatedly. The value adds one for every times press in which the times circulated among 0 ~ 9 range until reaches requirement, then release button at once and completed.

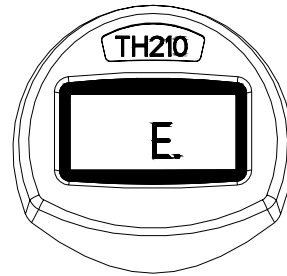
After completed test times setting, machine is in ready state for testing, see figure 14.

#### 5.3.2 Average value setting:

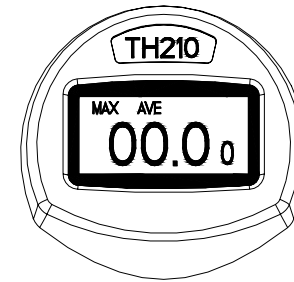
After test times being set, hardness tester can judge based on test times. When test times is among 3 ~ 9, hardness tester displays current measured value and test times of this test. When reached the set times, automatically cancels rough error and displays average value. If rough error is too larger, displays “E.”, see figure 15. When test times is set as 2, arithmetical mean of the two tested data will be displayed. When test times is set as 1, tester displays the measure value only. After average value displays for 8 seconds, hardness tester clears zero automatically and restores ready state. The times to be set is still valid.

User can record measured data by manual and calculates arithmetic mean. The average value is divided as max average value and random average value. When calculating max average value, the max function and

average function should be set and displays MAX and AVE symbol at same time, see figure 16. Their setting method is the same as above mentioned and setting order is not required. When calculating random average value, only need to set average function and displays AVE on screen, see figure 14. The setting method is the same as above mentioned



( figure 15 )



( figure 16 )

#### 5.4 Auto turn off function :

If tester is in ready state for three minutes, and flashes on screen for fifteen seconds then turns off automatically.

## **Chapter 6. Measuring :**

### **6.1 Preparation before measuring :**

The preparation of sample: The sample thickness should be equable, surface smooth, no bubble inner, no damaged, no impurities and so on.

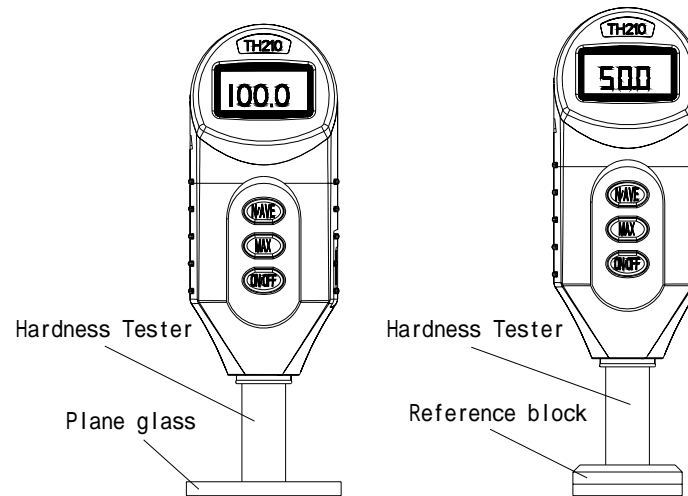
Tester preparation: disassemble protective sleeve and put into batteries or connect power adapter.

### **6.2 Calibration :**

6.2.1 Zero point calibration: After switch on power, hardness tester is in ready state. The protrusion length of indenter needle is max, the hardness value displayed on the screen is zero.

6.2.2 Non zero point calibration :

Make bottom surface of pressure foot of hardness tester touch glass surface completely. At this moment, hardness value displayed should be 100 on the screen, see figure 17. Note: when calibrating in this method, in order to protect indenter, it should avoid indenter point to touch glass promptly and rudely. Otherwise, it is easy to damage the point of indenter needle of hardness tester and operate abnormally.



( figure 17 )

### 6.3 Operation method :

#### 6.3.1 Manual measure:

Place the sample on the slab. Hold the tester and press indenter needle into sample vertically and slowly to avoid any shake. When the bottom of pressure foot touches the sample surface completely, read the value within 1

second. The displayed value then is the hardness value of the sample.

#### 6.3.2 Measuring by the operating stand:

Before using Shore hardness operating stand for measurement, the hardness tester should be assembled with the operating stand firstly, the assembled state see figure 18. Assemble 5 kg balancing weight on top of fixing rod through its middle hole. Place sample 3 on working table 2, then loosen locked wheel. Adjust height between hardness tester 4 and sample 3 by using of lifting and decending sliding arm 9. Make proper distance between indenter point and sample surface (forbid to touch). Fasten locked wheel 10. Fix sliding arm 9, then press down handle 7. At this moment, test sample 3 moves up with working table 2 until the pressure foot 4 touches sample 3 surface with balancing weight 5 lifted up slightly. The value displayed on the screen is hardness value, read it within 1 second.

#### **6.4 Communication with computer :**

This tester can communicate with computer which the band rate is 9600. The data is trasfered by text file which can receive by common communication software (such as super tecnicl device of WINDOWS). The RS-232 communication cable is needed to connect the tester with a computer , see figure 9. It can send signal to computer when gets the reading value. The operation procedure is as follow when using super terminal device of WINDOWS:

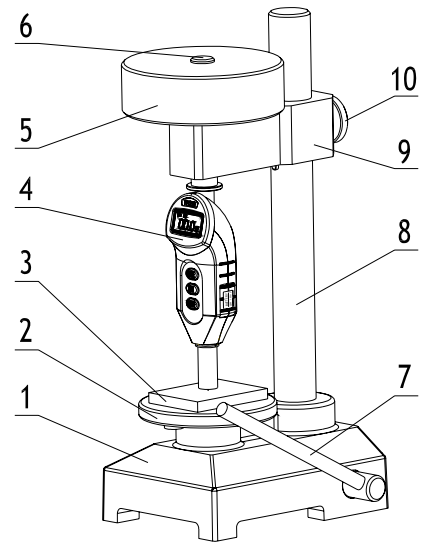
6.4.1 Connect the nine cores bottom of RS-232 communication cable to series interface of computer. Insert the other bottom into communication interface of hardness tester (series interface), see figure 9. Switch on the tester.

6.4.2 Click “start” → “program” → “ Accessories” → “communication” on WINDOWS to Hyperterminal.

6.4.3 Run Hyperterminal, type in a file name at new established connection, then press “Enter”.

6.4.4 Select the series interface of communication cable, then select band rate 9600, press “Enter”. At this moment, the measured value should be displayed on computer.

6.4.5 If you want to store the measured result, select “Disconnect” under “dial” menu of Hyperterminal, select “save as” under “file” menu. Type in a file’s name. That is OK.



( figure 20 )

1. base    2. work table    3. sample    4. hardness tester  
5. balancing weight    6. balancing weight fixing rod  
7. handle    8. upright post    9. sliding arm    10. lock wheel

## **Chapter 7. Attention items :**

7.1. The indenter of hardness tester is sharp cone, forbid to touch it with glass plate forcely in order to protect it. Otherwise, it is easy to be damaged and to operate abnormally.

7.2. Forbid hardness tester collision and fall break. After service, pull on protective sleeve so as to protect the indenter needle.

7.3. When displays symbol BATT in low-voltage, see figure 8, replace batteries in time and pay attention to the pole of batteries, see figure 5.

7.4 After completed measurement by using operating stand, see figure 7, close the joint cover of hardness tester so as to avoid dust entering into.

## **Chapter 8. Maintenance :**

8.1. Routine maintenance :

This hardness tester should avoid impact and heavy loading, and keep away from strong magnetic field, damp or oil environment.

If store for long time and do not use it, take out batteries and take care of them.



When do not using the tester, please put it into packing box.

8.2. Maintenance :

If any abnormal phenomenon occurs, please contact the service maintenance center of company.

8.3. The list of non maintenance parts :

Items	Name	Quantity	Remarks
1	Indenter needle	1	
2	Button battery	3	

### **Points for consumers attention**

1. From purchased date, the products occur any fault except for non guarantee maintenance parts, will free maintain by warranty card and invoice copy within one year. If you could not show above mentioned requirement, company calculates guarantee period in accordance with the date of leaving factory, valid period is one year.
2. If the fault product exceeds maintenance period, in accordance with stipulation of Company, it will be taken charge of maintenance and service.
3. The “special configuration” out of Company’s approved products would take fees in accordance with related standards.

4. The product should not receive free maintenance service if belongs to conditions as follow: storage unsuitable, operated incorrectly which is not in accordance with manual book, disassembled, altered by oneself as well as no purchasing proof.