# **USER'S MANUAL**



ST☆RR<sup>°</sup>. INSTRUMENTS

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### Caution

### **Please Carefully Read This First**

- 1. Any components of the product cannot be submerged in water and exposed in the rain, which could cause a battery explosion and display unit damage.
- 2. When stored for a long time, the equipment should be stored in dry environment and used the original packing seal. Environmental temperature:  $32~122^{\circ}F$  and the relative humidity: 20%~85%

### **Applicable Standards**

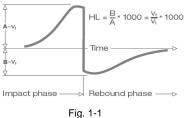
Standards and Guidelines applied: DIN 50156 (2007), ASTM A956 (2006), GB/T17394 (1998), JB/T 9378 (2001), JJG 747 (1999), DGZfP Guideline MC 1 (2008), VDI/VDE Guideline 2616 Paper 1 (2002), ISO 18625 (2003), CNAL T0299 (2008), JIS B7731 (2000).

#### 1. Summarize

#### 1.1 Measuring Principle Scope

When the test is carried out, an impact body with a tungsten carbide tip is impelled by spring force against a test surface from which it rebounds. Impact and rebound velocities are measured. These voltages are proportional to the velocities and are processed and displayed as the hardness value L on the indicating device.

Modern electronics with power saving features provide for long operating life. The large LCD display always shows how this **series** is configured to test. Variable function keys allow for guick change of common test parameters. No subjective measuring errors are possible, giving highly repeatable results. Internal self diagnostics with error messages assure reliable test results. Readings can be stored automatically in the internal memory or sent directly to



a printer. PC evaluation software allows for data analysis. These conversions to other scales (HRC, HRB. HB. HV. HSD etc.) are programmed into the electronics and can be shown directly on the display as the test result.

#### 1.2 The Hardness Value

With reference to a particular material group (e.g. steel, aluminum etc.), the L-value represents a direct hardness measurement and is used as such. Comparison curves with standard static hardness values have been established (Brinell, Vickers, Rockwell C, B, Shore D) for the most prevalent materials, enabling the L-value to be converted into the relevant values for these procedures.

With **this SERIES**, such hardness values can be directly displayed in the hardness scales HLD, HRC, HRB, HB, HV, HSD.

#### 1.3 Features

- The most advanced integrated tester (Impact Device D integrated): no cables
- Integrated impact direction sensor
- Highly accuracy (±6HL) in any impact direction (360°) automatically



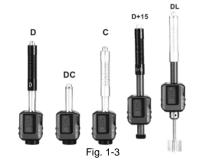
- Integrated display of results for all common hardness scales
- Large, high contrast LCD for optimum viewing in all conditions
- Easy calibration
- Full USB communication with PC, software included free of charge
- Internal storage of data with day and time
- Rechargeable Li-ion battery, charges through USB port
- Intelligent sleep mode
- Wireless mini printer

### 1.4 Applications

- Good for all materials
- Best suited for on-site testing of heavy, big or already installed parts
- Handy for difficult to access or confined test locations
- Automatic sensing and compensation for impact direction
- Excellent for material selection and acceptance tests

### 1.5 Application Range

- Metal production & processing
- Automotive & transportation
- Machinery & power plants
- Petro-chemical, refineries
- Aerospace & shipyard
- Metal constructions testing services & laboratories



### 1.6 Types

TYPES	D	DC	С	DL	D+15
Application	The majority of your hardness testing assignments.	Very confined spaces, e.g. holes, cylinders or for internal measurements.	Surface hardened components, coatings, thin walled or impact sensitive components.	For extremely Confined spaces or at the base of grooves.	Measurements in grooves and on recessed surfaces.

# 2. Technical Specifications

TYPES		D	DC	С	DL	D+15
Indication Ran	ge	0~999HL				
Accuracy		±4HL	±4HL			
Testing Direction	on	All direction (	Automatic ident	ification)		
Impact Energy		11 mJ	11mJ	2.7mJ	11mJ	11mJ
Impact Tip		Material: tung	sten carbide; Di	ameter: 3mm;	Hardness: ≥ 16	00HV
Data Memory 500 groups						
Conversion HB, HRB, HRC, HV, HSD			HV, HSD			
Power		Li-Ion Battery, Rechargeable				
Environment Operating Storage		-10~60℃; 20%~85% RH				
		-30~80℃; 5%~95% RH				
Display			128*64	dot LCD with	backlight	
Dimensions (mm)		147*35*22.	86*35*22	141*35*22	202*35* 22	162*35* 22
Weight		100 g	75 g	100 g	125g.	125g
Standards			P Guideline MC 1, T 9378, JJG 747, CI	•	,	525,ASTM A956,

# 3. Checking Supplied Accessories

Make sure you have each items and you can obtain various accessories from your local distributor.

(Fig. 3-1) Packing List

(Fig. 3-1) Facking List					
No.	Description	QTY.			
1	Carrying Case	1			
2	Hardness Tester	1			
3	Standard Block	1			
4	Wireless Mini Printer	1			
5	PC Software	1			
6	USB Cable	1			
7	Battery for Printer	1			
8	Charger for Hardness Tester	1			
9	Charger for Printer	1			
10	Little Support Ring	1			
11	Cleaning Brush	1			
12	User's Manual	1			
13	Certificate	1			



Fig. 3-1

# 4. Operating Instructions

### 4.1 Keys and Function (Fig. 4-1)

- 1. Next;
- Menu & Select;
- 3. **T:** Print;
- 4. ON/OFF & Back; Key Combinations:
- 5. " + " せい ": Hardness Calibration; press and hold " for two seconds to display the calibration mode;
- 6. "B" + "B": Delete; press and hold "B", then press "B" to delete the current data;
- 7. "Set date and time; In power off state, press and hold "", then press" to set the date and time;
- 8. "B" + "D": Data Browse; press and hold "B", then press "D" to browse data.



#### 4.2 LCD Screen

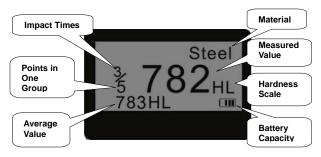


Fig.4-2

### 4.3 Setting

### 4.3.1 Material Type

In measurement mode, press "three times once, the material character will highlight, then press to select the Material Type;

the material type changed according to following sequence:

Steel & Cast steel  $\rightarrow$ Alloy Tool Steel  $\rightarrow$ Stainless Steel  $\rightarrow$ Grey Cast Iron  $\rightarrow$ Ductile Iron  $\rightarrow$ Cast Aluminum Alloys

 $\rightarrow \textit{Brass} \rightarrow \textit{Bronze} \rightarrow \textit{Copper} \rightarrow \textit{Forging Steel} \rightarrow \textit{Steel} \& \textit{Cast steel} \\ \rightarrow \dots$ 

#### Note:

- It is necessary to select the material classification. When you did not know the material type, you must refer the related material handbook.
- 2. When you change the material group, the Impact Times counter will be set to "0"

#### 4.3.2 Hardness Scale

In measure mode, press " twice, the hardness scale character will highlight, then press " to select the hardness scale; the hardness scale changed according to following sequence:

$$\label{eq:hld} \begin{split} & HLD \rightarrow HB (\textit{BrineII}) \rightarrow HRB (\textit{RockwelI B scale}) \rightarrow HRC (\textit{RockwelI C scale}) \rightarrow HV (\textit{Vickers}) \rightarrow HSD (\textit{Shore D}) \rightarrow HLD \dots \end{split}$$



Fig.4-3



Fig.4-4

#### Note:

- 1. The value "---" means out of range and no conversions.
- 2. The default hardness scale is HLD.

### 4.3.3 Data in One Group

In measurement mode, press " four times, the **data in one group** character will highlight, then press " to set the number, the maximum number is 9. (Fig.4-6)

#### 4.3.4 Browse Data

- ① Browse the data in current group: in measurement mode, press " once, the **impact time** character will highlight, then press " you can browse the data in current group. (Fig.4-7)
- ② Browse the historical data: in measurement mode, press and hold "•, then press • to display the historical



Fig. 4-5



Fig. 4-6

data browse mode,
press " " to select
the next group, press
" " to select the
previous group;
Press" " you can
see a select window
(Fig.4-8);
Select "Into" and

press" to browse the data in the





Fig. 4-7

Fig. 4-8

selected group (Fig.4-9). Press " **めい** " will return to previous menu.

#### 4.3.5 Delete Data

① Delete the data in current group: in measurement mode, press and hold " , then press " " to delete the current



Fig.4-9

data.

② Delete the historical data:

In the browsing history data interface (Fig.4-8), press " or " select "Delete", then press " can delete the data in the current group which you selected, if select "DelAll" it will delete all the historical data. (Fig.4-10)

### 4.3.6 Setting the Date and Time

The series tester has built-in real-time clock, It must be adjusted the clock and the calendar when it is necessary. Please as follows:

Press " to increase the "day" from 1 to 31, press " to decrease the "day" from 31 to 1; press " to set the month, press " to increase the "month" from 1 to 12, press " "



Fig.4-10



Fig.4-11

to decrease the "month" from 12 to 1.

Use the same way to set the year, hour, minute and second. In the "second" set-up process, press

the "**ひい**" will finish the setting and back to measurement mode. (Fig. 4-11)

#### 4.3.7 Calibration

Calibration is used to calibrate the measured value (HLD) of the hardness tester, so as to farthest decrease the measuring error, please as follows:

①In power off mode, press and hold

"①", then press and hold "②)" for about 3 seconds to display the calibration mode (Fig.4-12).

Then test five times on the test block and get the average of measurements value.



- ②Press " to browse 5 data test, you can press " to delete the error data.
- ③Press " to display the mode like (Fig. 4-13), the "hundred" bit will be highlighted, input the
- ④Press "■" to increase from 0 to 9, to set the "hundred" bit.
- ⑤Press the "•" the "ten" bit will be highlighted, Press "•" to increase from 0 to 9, to set the "ten" bit (Fig.4-14).
- ⑥Press the " ▶" the "last" bit will be highlighted, Press " to increase from 0 to 9, to set the "last" bit(Fig.4-15).
- ⑦Press "めう" to return to the measurement mode, the calibration is finish.

#### Note:

- 1. You must calibrate it on the test block before your first use the hardness tester.
- 2. The impact direction must be down straight.

### 4.4 The Memory

The data (such as hardness value, scale, sample material and impact direction, time, date etc.) will be saved in memory automatically after one individual impact. **The tester** can store 500 data, when

test times are more than 500, the last data will be stored in the 1th position and the first data will be erased, simultaneously the position of other data will be moved into lower position.

#### 4.5 Backlight

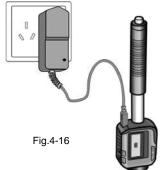
LED backlight is used for poor light conditions. If there is no impact, or not press any key in 3 seconds, the backlight will be turn off automatically, when testing or press any key, the backlight will turn on automatically.

#### 4.6 Automatic Power off

If there is no measure, and no key operation in 3 minutes, display unit will automatically switch off in order to saving battery power. Display unit will automatically store all the parameters before turning-off.

### 4.7 Charging

Users need to recharge batteries when batteries are used for the first time and exhaustion of electricity arises.



Firstly, users should connect the tester and the charger use the USB cable (Fig 4-16), and then

connect the charger with AC socket to start charging. Meanwhile, the screen will display in charging mode. (Fig 4-17). You can also use other USB device (e.g.

The charging time: 2~3 hours. Fig 4-18 shows the charging is finish.



Fig.4-17

Fig.4-18

#### 4.8 Full Screen Mode

Laptop) to charge it.

In measuring interface, press " key to full screen. Hardness values are displayed only.

Press "**b'>**" key to return to measurement interface or return after 2 s automatically.

(Fig 4-19)



Fig 4-19

# 5. Data Printing

THE TESTER can be linked with a wireless mini printer for printing a test report. Test Report

First, place the printer near the tester, turn on the printer, press " will print out the current data.

A complete test report is shown at

Fig. 5-2.

Because printing paper is thermal paper, it

Impact Unit Type: D Material : Steel& Caststeel 808 HLD 61.2 HRC Date: 06/07/31 Time: 18:21:27 808 HLD 61.2 HRC Date: 06/07/31 Time: 18:21:27 805 HLD 1 60.8 HRC Date: 06/07/31 Time: 18:21:27 808 HLD 61.2 HRC Date: 06/07/31 Time: 18:21:27 805 HLD 60.8 HRC Date: 06/07/31 Time: 18:21:27

s = 3 HLD 00.4 HRC v = 806 HLD 61.0 HRC Printed: 06/07/31

Fig.5-2

should be preserved to avoid the heat and direct light. If the print records are necessary to be kept in long-term preservation, please copy and preserve in time.



Fig.5-1

### 6. Hardness Test

### 6.1 Setting the Tester

Press """ to turn on, and check if it's need to charge. Inspect if every setting of is correctly, particularly the material type and scale. The setting inconsistent with the actual condition may cause a great error.

#### 6.2 Sample Preparation

Inappropriate sample will cause a great measurement error. Therefore, users should make the necessary handling and preparation under the original conditions of sample.

Preparation of the sample and the surface of test should be coincident with the following basic requirements:

- During the process of sample surface preparation, users should avoid the impacts of cold processing and thermal processing.
- The sample surface is plane for better, the test surface should be with a metallic sheen, and not involve oxide layer or other stains.
- 3) Roughness of the test surface see A-1 1).
- 4) Sample must be of sufficient mass and rigidity. If it's lack of quality and rigidity, it may cause

displacement or shaking in the process of testing impact, which can lead to large errors.

#### See A-1 3)

**Coupling method:** Testing sample's back should be prepared to make a plane as a supporting surface with a smooth formation. Filling with a little coupling substance (Industry Vaseline can be used), users can now press to the surface of the supporting object (The weight of supporting object should be more than 5 kg, and it can be replaced by test block) to stick into integration.

- 5) Samples should be thick enough and with sufficient surface absorption layered. The thickness of sample should not be less than 5mm( 1mm for Type C), and surface absorption layer (or surface-hardening layer) should not be less than 0.8mm(0.2mm for Type C).
- 6) When testing sample surface is not horizontal, the curvature radius of testing and nearby surface should be larger than 30mm, and appropriate supporting ring should be elected and installed.
- 7) A sample should not be with magnetic; otherwise the signal of the impact device would be seriously interfered by the magnetic, which may cause inaccurate test results.

#### 6.3 Test Steps

Loading
 Simply load by sliding the loading tube forward.
 (Fig.6-1)





Fig.6-2

### 2) Place

Then place and hold test on

the surface of the test piece at the desired test point. Impact indirection should be vertical with the test of surface. (Fig.6-2)



Trigger the impact by pressing the release button. The hardness value will be instantaneously displayed. (Fig.6-3)

4) Read out the test result from LCD.



Fig.6-3

### 7. Maintenance and Service

#### 7.1 Maintenance for Impact Device

After using 1000-2000 times, users should clean the catheter of impact device and impact body with nylon brush, and screw off the supporting ring before clean the catheter, and then take out the impact body, rotate the nylon brush into the tube in an anti-clockwise direction, and pull out when touching the bottom. So repeatedly, and then load up the impact body and supporting ring; Users should release the impact body after use. And the lubricant is banned.

#### 7.2 Troubles and Solutions

No.	Trouble	Reasons	Solutions		
1	No response switched	Lack power	Charge the battery		
2	Abnormally high results	Test tip wearing	Replace the test tip		
3	No test results	Coil damage	Contact agencies		
4 Printer no response Beyond the transmission range In the 3 meters					
*The others, please contact with agencies or distributor.					

#### 7.3 Maintenance

In calibration of the hardness tester, if finding that error is larger than 12HL, you should be replace the impact ball or impact body, because the reason may be that the impact ball or impact body is wore out to lead to failure in operation.

When the hardness tester arises other abnormal phenomena, you should not demolish or adjust any fixed assembly parts, instead, they should complete warranty cards, send them to authorized maintenance department for maintenance.

### **Appendix**

### A-1 Factors that Affect Accuracy

Incorrect operation or improper testing conditions would have serious impact on testing accuracy. Following is several common factors affect the accuracy of testing in use for reference:

1) Roughness of sample surface

Type	Roughness(µm)	
D , DC, DL, D+15	1.6	
С	0.4	

### 2) The shape of sample surface

Radius of test surface curvature must be no less than 30mm.

3) The weight of the sample

Type	Mass of sample(kg)			
Туре	Stable placement Fixed or clamped		Coupling	
D , DC, DL, D+15	≥5	2~5	0.05~2	
С	≥1.5	0.5 ~ 1.5	0.02 ~ 0.5	

### 4) The sample stability

Any effective tests need to minimize possible interference from outside; it's more important to dynamic measure such as Leeb hardness test. Therefore, measuring only allowed in stable hardness testing system. If it's likely to lead to sample movement in the tests, users should fix it

### before testing.

### A-2 Measuring Range

### TYPE D, DC, DL,D+15

Materials	HV	НВ	HRC	HRB	HSD
Steel & Cast Steel	81-955	81-654	20.0-68.4	38.4-99.5	32.5-99.5
Alloy Tool Steel	80-898		20.4-67.1		
Stainless Steel	85-802	85-655	19.6-62.4	46.5-101.7	
Grey Cast Iron		63-336			
Ductile Iron		140-387			
Cast Aluminum Alloys		19-164		23.8-84.6	
Cu-Zn Alloys (Brass)		40-173		13.5-95.3	
Cu-Sn Alloys (Bronze)		60-290			
Copper		45-315			
Forging Steel	83-976	142-651	19.8-68.5	59.6-99.6	26.4-99.5

### TYPE C

Material	HLC	HRC	НВ	HV	HSD
Steel	350~960	20.0~69.5	80~683	80~996	31.9~102

# **Warranty Card**

Description: Portable Hardness Tester				
Tel:				
Tel:				

### **Warranty Description**

Please use our product exactly according to our user's manual.

All products sold by our company or authorized dealer are covered by 12 month warranty.

Anthropogenic causes, irresistible natural factors cause the product damage, our company will not warranty.

Models	Type
LHT-D	D
LHT-DC	DC
LHT-C	С
LHT-DL	DL
LHT-D+15	D+15