INSIZE

www. insize. com

OPERATION MANUAL

ISH-RSR150
Digital Rockwell And Superficial Rockwell Hardness Tester

INSIZE

In Compliance with International Standard
ISO 6508-2: 1999

Important Notes

1. This instruction manual shall be read through prior to the use of the apparatus, to understand the detailed operation steps and special attentions, in order to prevent apparatus damage and/or damage and/or personal injury resulted from improper operation.
2. All bands and shake-reducing tapes shall be carefully removed before apparatus installation and calibration.
3. It is strictly prohibited to tamper with the installation position of all electric elements, switches, sockets etc. It may cause damage and/or injury.
4. It is not permitted to turn the pressure selecting hand-wheel or lifting screw during the testing pressure charging or relieving period (i.e. when the pressurzing motor is turning) or during the pressure keeping period.

Content

1. A Brief Introduction to ISH-RSR150

1.1 ISH-RSR150 is a novel product integrating advanced mechanical and electronic technologies and featured with neoteric appearance, complete functions, easy operation, intuitive display, and stable performance etc. It can be used in whole range of Rockwell/superficalcial Rockwell hardness determination. The main functions include the followings:

1.1.1 Selection of Rockwell/superficial Rockwell hardness scales;
1.1.2 Selection of hardness testing pressure keeping period;
1.1.3 Reset and delete functions;
1.1.4 Hardness test value display browse;
1.1.5 Data processing and printout of hardness test result;
1.1.6 Comparison between different hardness units;
1.1.7 RS-232C serial communication interface for functional extention.

2. Technical Specifications of the Hardness Tester

2.1 Initial Pressure:
2.1.1 Initial pressure for Rockwell hardness test: 98.07N (10 kg), torelance: ±2.0%
2.1.2 Initial pressure for superficial Rockwell hardness test: 29.42N(3kg), torelance: ±2.0%

2.2 Total Pressure:
2.2.1 Total pressure for Rockwell hardness test: 588.4, 980.7, 1471N (60,100,150 kg), torelance: ±1.0%
2.2.2 Total pressure for superficial Rockwell hardness test: 147.1, 294.2, 441.3N (15,30,45 kg),torelance: ±1.0%

2.3 Type of Indenter:
2.3.1 Conical diamond Rockwell indenter
2.3.2 Φ1.5875mm ball indenter

2.4 Time Delay Control: 0-60 seconds

2.5 Max Height of Sample: 180mm

2.6 Distance between Center of Indenter and the Column: 160 mm

2.7 Overall Size of the Tester (L x W x H): 551 x 260 x 800mm

2.8 Total Weight of the Tester. 67 kg (approx.)

2.9 Repeatability & Tolerance of Rockwell Hardness Display Value (Table 1)

Table 1

Rockwell Hardness Scale	Hardness of Standard Blocks	Display Tolerance	Allowable Display Repeatablity[a]
A	20HRA - ⩽75HRA >75HRA - ⩽88HRA	± 2HRA ± 1.5HRA	⩽0.02(100-$\bar{H}$) or 0.8 Rockwell Unit[b]
B	20HRB - ⩽45HRB >45HRB - ⩽80HRB >80HRB - ⩽100HRB	± 4HRB ± 3HRB ± 2HRB	⩽0.04(130-$\bar{H}$) or 0.8 Rockwell Unit[b]
C	20 HRC - ⩽70HRC	± 1.5HRC	⩽0.02(100-$\bar{H}$) or 0.8 Rockwell Unit[b]
D	40 HRD - ⩽70 HRD >70HRD - ⩽77HRD	± 2HRD ± 1.5HRD	⩽0.02(100-$\bar{H}$) or 0.8 Rockwell Unit[b]
E	70 HRE - ⩽90HRE >90HRE - ⩽100HRE	± 2.5HRE ± 2HRE	⩽0.04(130-$\bar{H}$) or 1.2 Rockwell Unit[b]
F	60HRF - ⩽90HRF >90HRF - ⩽100HRF	± 3HRF ± 2HRF	⩽0.04(130-$\bar{H}$) or 1.2 Rockwell Unit[b]
G	30HRG - ⩽50HRG >50HRG - ⩽75HRG >75HRG - ⩽94HRG	± 6HRG ± 4.5HRG ± 3HRG	⩽0.04(130-$\bar{H}$) or 1.2 Rockwell Unit[b]
H	80HRH- ⩽100HRH	± 2HRH	⩽0.04(130-$\bar{H}$) or 1.2 Rockwell Unit[b]
K	40HRK - ⩽60HRK >60HRK - ⩽80HRK >80HRK - ⩽100HRK	± 4HRK ± 3HRK ± 2HRK	⩽0.04(130-$\bar{H}$) or 1.2 Rockwell Unit[b]

2.11 Repeatability & Tolerance of Supedicial Rockwell Hardness Display Value (Table 2)

Table 2

Superficial Rockwell Hardness Scale	Hardness of Standard Blocks	Display Tolerance	Allowable Display Repeatablity[a]
15N	70HR15N - 77HR15N 78HR15N - 88 HR15N 89 HR15N - 91 HR15N	± 2HRA	⩽0.04(100-$\bar{H}$) or 1.2 Rockwell Unit[b]
30N	42HR30N - 54HR30N 55HR30N - 73HR30N 74HR30N - 80HR30N		
45N	20HR45N - 31HR45N 32HR45N - 61HR45N 62HR45N - 70HR45N		
15T	73HR15T - 80HR15T 81HR15T - 87HR15T 88HR15T - 93HR15T	± 3HRT	⩽0.06(100-$\bar{H}$) or 2.4 Rockwell Unit[b]
30T	43HR30T - 56HR30T 57HR30T - 69HR30T 70HR30T -82HR30T		
45T	12HR45T - 33HR45T 34HR45T - 54HR45T 55HR45T - 72HR45T		

[a] Where $\bar{H}$ is the mean hardness value.
[b] Take the larger one of these two values as basis.

3. Scale, Indenter, Testing Pressure and Applicable Range for Rockwell/Superficial Rockwell Hardness Test

3.1 Scale, Indenter, Testing Pressure and Applicable Range for Rockwell Hardness Test (Table 3)

Table 3

Scale	Indenter	Initial Pressure (N)	Combined Pressure (N)	Applications
A	Diamond indenter conical angle:120° spherical radius at vertex: 0.2 mm	98.07	588.4	hard alloy, carbide, surface quenched steel, carburizing steel
D			980.7	thin steel sheet, surface quenched steel
C			1471.0	quenched steel, tempered steel, hard cast iron
F	Ball indenter diameter: 1.5875mm (1/16in)		588.4	cast iron, aluminum, magnesium alloy, bearing alloy, annealed copper alloy, mild steel sheet
B			980.7	mild steel, aluminum alloy, copper alloy, malleable cast iron, annealed steel
G			1471.0	phosphorus iron, beryllium bronze, malleable cast iron
H	Ball indenter diameter: 3.175mm (1/8in)		588.4	aluminum, zinc, lead etc.
E			980.7	bearing alloy, tin, plastics, cardboard and other soft materials
K			1471.0	

The most commonly used scales for Rockwell hardness test are A, B and C

3.2 Scale, Indenter, Testing Pressure and Applicable Range for Superficial Rockwell Hardness Test (Table 4)

Table 4

Scale	Indenter	Initial Pressure (N)	Combined Pressure (N)	Applications
HR15N	Diamond indenter conical angle:120° spherical radius at vertex: 0.2 mm	29.42	147.1	nitiding steel, thin steel sheet, the edge and surface of knife and other parts
HR30N			294.2	
HR45N			441.3	
HR15T	Ball indenter diameter: 1.5875mm (1/16in)		147.1	thin sheet of mild steel, brass, bronze, aluminum alloy etc.
HR30T			294.2	
HR45T			441.3	

4. Installation of the Tester

4.1 Working conditions of the tester:

4.1.1 Under ambient temperature, i.e. between 10-30°C;
4.1.2 The relative humidity in test room shall not be over 65%;
4.1.3 In an environment free from vibration;
4.1.4 No corrosive medium in surrounding.

4.2 Tester unparking

4.2.1 Open the packing box cover and remove all cushion materials.
4.2.2 Remove the accessory box.
4.2.3 Loosen the four (4) nuts on bottom of the packing box, then lift the box upward and remove it.
4.2.4 Lift the bottom plate, unscrew the two (2) M 10 bolts under the bottom plate with a spanner,to separate the hardness tester from bottom plate.
4.2.5 After unpacking, the tester shall be placed on a stable bench, take out four leveling screws out of the accessory box and fix them at the bottom of the tester .Adjust the screws until the tester is leveled.T he tester's levelness deviation is less than 1 mm/m. A hole shall be drilled at an appropriate location on the bench (see figure 1) to enable the lifting screw to operate properly.

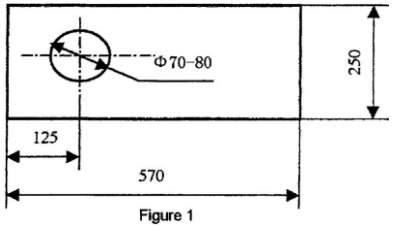


Figure 1

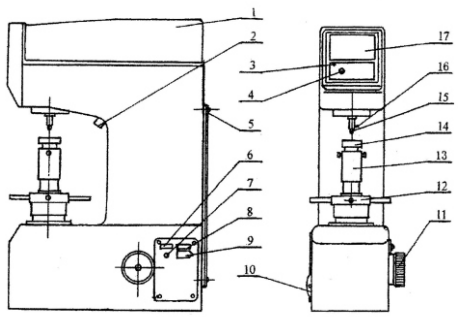
4.2.6 After the hardness tester (figure 2) is properly placed, open up and remove the top cover (1).Untie the rubber ring on the displacement sensor which serves as a fastener during transportation. Next open the rear cover (5) and remove the fastening white gauze tape on moveable parts.
4.2.7 Loosen screws and remove the lifting screw cover (13). Wipe off the anti-rust oil on the lifting screw and apply some thin lubricating oil instead.

4.3 Installation of weights

4.3.1 Take the weights out of the accessory box (figure 3) and rub them clean.
4.3.2 Turn the pressure selecting handwheel (11) to position 588 (60), put the changing weight (18)on the stock at rear of the beam (19). Then turn the handwheel to position 147 (15).

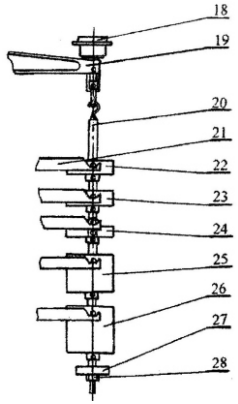
4.3.3 Turn by tum put the weight 5 (27), weight4(26), weight3 (25), weight2 (24), weight 1 (23) on the resting forks (22).

4.3.4 Turn the pressure selecting handwheel a whole cycle and ensure that the weights' pins shall fall into the groove on the resting forks and the up/down movement of changing weight shall be stable.



1. Top Cover
2. Illumination Light
3. Touching Panel
4. LCD Brightness Control
5. Rear Cover
6. Switch
7. Fuse
8. RS-232C Adaptor
9. Power Source Plug
10. Printer
11. Pressure Selecting Handwheel
12. Turn Wheel
13. Lifting Screw Cover
14. Test Stock
15. Indenter
16. Indenter Locking Screw
17. LCD Display

Figure 2



18. Changing Weight
19. Beam
20. Hanger
21. Resting Fork
22. Weight 1
23. Weight 2
24. Weight 3
25. Weight 4
26. Weight 5
27. Tare Weight
28. Nu

Figure 3

5. Touching Panel Button Functions Description (Figure 4)

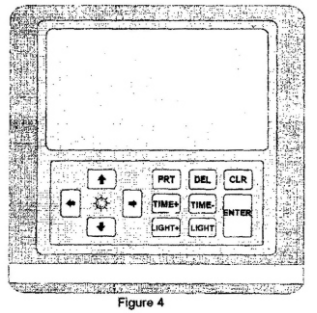


Figure 4

5.1 ◀ ▶

5.1.1 Cursor left/right shifting

5.2 ▲ ▼

5.2.1 Cursor up/down shifting

5.2.2 When LCD display in its page B (figure 6), these buttons can be used to set the date/time. Take file following steps:
Press the left button to shift the cursor at the position of date/time to be changed, then press up/down buttons to change the values of minute, hour, day, month, year, finally press the right button to replace the cursor. (The changing sequence is exactly the above listed)

5.3 ENTER

5.3.1 After selecting a scale, press this button to confirm.(In case no confirmation within 10 seconds, display will automatically changed into page B).

5.3.2 Memory function: when display is in page B, pressing of this button may browse all executed operation results.

5.4 PRT

5.4.1 Print command button: when operation times ≥ 2 so that NO = 1 is shown on LCD display,pressing of this button will start printing (the first operation after power-on or scale changing wil1 not be accounted that is, NO = 0).

5.5 DEL

5.5.1 Delete the hardness test result of the latest operation, the test times NO will be automatically reduced by 1.

5.6 CLR

5.6.1 Clear the LCD display.

5.7 TIME+ TIME-

5.7.1 The combined pressure keeping period during hardness test can be selected by these buttons.Time period can be selected between 0-60 seconds. When Rockwell scale is selected, the default time period is 5 seconds, while 5 seconds is set as default for superficial Rockwell scale.

5.8 LIGHT+ LIGHT-

5.8.1 These buttons can be used to adjust the light illumination between 00L- 15L, Default value after power-on is 04L.

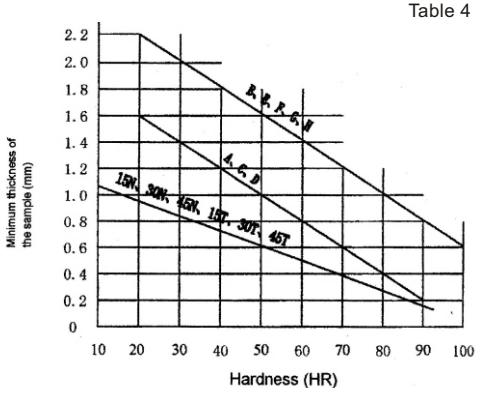
6. Proper Use of the Tester

6.1 Preparation prior to the use

6.1.1 Surface of the sample to be tested must be smooth and clean, free from dirt, scaling, cracks,indentation or significant marks resulted from machining.

6.1.2 Minimum thickness of the sample shall be larger than 10 times the depth of indenture. No obvious deformation shall be seen on back of the sample after hardness test. The relationship between minimum thickness of the sample and its hardness are shown in the following table (Table 4).

Table 4



6.1.3 The sample to be tested shall be placed in stable state on top of the test stock. It shall be fixed during the test process. Ensure that the test pressure is perpendicularly exerted on the sample.

6.1.4 In case of a cylindrical shape sample to be tested, the V type test stock shall be used and offset needs to be made to the values.

6.1.5 Offsets for Rockwell hardness test when diameter of the cylindrical sample is less than 38mm (Table 5)

Table 5

Hardness Value (HRC) (HRA)	Diameter of Cylindrical Samples (mm)								
	6	10	13	16	19	22	25	32	38
	Offsets (HR) to Rockwell Scale C & A								
20				2.5	2.0	1.5	1.5	1.0	1.0
25			3.0	2.5	2.0	1.5	1.0	1.0	1.0
30			2.5	2.0	1.5	1.5	1.0	1.0	0.5
35			2.0	1.5	1.5	1.0	1.0	0.5	0.5
40			2.0	1.5	1.0	1.0	1.0	0.5	0.5
45	3.0	2.0	1.5	1.0	1.0	1.0	0.5	0.5	0.5
50	2.5	2.0	1.5	1.0	1.0	0.5	0.5	0.5	0.5
55	2.0	1.5	1.0	1.0	0.5	0.5	0.5	0.5	0
60	1.5	1.0	1.0	0.5	0.5	0.5	0.5	0	0
65	1.5	1.0	1.0	0.5	0.5	0.5	0.5	0	0
70	1.0	1.0	0.5	0.5	0.5	0.5	0.5	0	0
75	1.0	0.5	0.5	0.5	0.5	0.5	0	0	0
80	0.5	0.5	0.5	0.5	0.5	0	0	0	0
85	0.5	0.5	0.5	0	0	0	0	0	0
90	0.5	0	0	0	0	0	0	0	0

Hardness Value (HRC)	Diameter of Cylindrical Samples (mm)						
	6	10	13	16	19	22	25
	Offsets (HR) to Rockwell Scale B						
20				4.5	4.0	3.5	3.0
30			5.0	4.5	3.5	3.0	2.5
40			4.5	4.0	3.0	2.5	2.5
50			4.0	3.5	3.0	2.5	2.0
60		5.0	3.5	3.0	2.5	2.0	2.0
70		4.0	3.0	2.5	2.0	2.0	1.5
80	5.0	3.5	2.5	2.0	1.5	1.5	1.5
90	4.0	3.0	2.0	1.5	1.5	1.5	1.0
100	3.5	2.5	1.5	1.5	1.0	1.0	0.5

6.1.6 Offsets for Rockwell hardness test when diameter of the cylindrical sample is less than 25 mm(Table 6).

Table 6

Hardness Value (15N) (30N) (45N)	Diameter of Cylindrical Samples (mm)					
	3.2	6.4	10	13	19	25
	Offsets to Superficial Rockwell Scale N					
20		3.0	2.0	1.5	1.5	1.5
25		3.0	2.0	1.5	1.5	1.0
30		3.0	2.0	1.5	1.0	1.0
35		2.5	2.0	1.5	1.0	1.0
40		2.5	1.5	1.5	1.0	1.0
45		2.0	1.5	1.0	1.0	1.0
50		2.0	1.5	1.0	1.0	0.5
55		2.0	1.5	1.0	0.5	0.5
60	3.0	1.5	1.0	1.0	0.5	0.5
65	2.5	1.5	1.0	0.5	0.5	0.5
70	2.0	1.0	1.0	0.5	0.5	0.5
75	1.5	1.0	0.5	0.5	0.5	0.0
80	1.0	0.5	0.5	0.5	0.0	0.0
85	0.5	0.5	0.5	0.5	0.0	0.0

Hardness Value (15T) (30T) (45T)	Diameter of Cylindrical Samples (mm)						
	3.2	6.4	10	13	16	19	25
	Offsets to Superficial Rockwell Scale T						
20						3.0	2.0
30						2.5	2.0
40					3.0	2.5	2.0
50				3.0	2.5	2.0	1.5
60			3.0	2.5	2.0	1.5	1.5
70			2.5	2.0	1.5	1.0	1.0
80	3.0	2.0	1.5	1.5	1.0	1.0	0.5
90	1.5	1.0	1.0	0.5	0.5	0.5	0.5

6.2 Example of the hardness tester operation

6.2.1 Choose the standard block 90HRB. Refer to table 3 to find HRB scale. Φ1.5875mm ball indenter and total pressure 980.7N shall be selected.Turn the pressure selecting handwheel to position 980.

6.2.2 Plug thc power cord (9) and turn on the switch (6). The indicator light(2)is on.

6.2.3 Page A will be initially shown on LCD display(17)after power on.

Page A

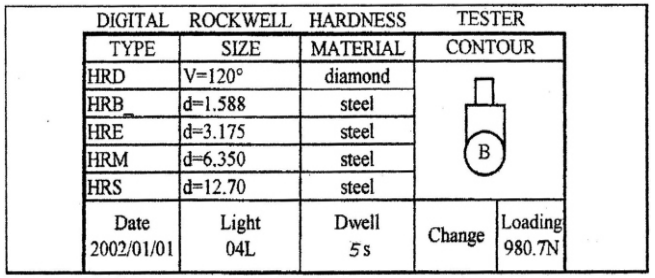


Figure 5

6.2.3.1 TYPE: Type of the scale. For each combined value, a selection can be made from five (5)scales, thus for three(3) bands of Rockwell test pressure there are 15 scales, in which the commanly used scales are HRA, HRB and HRC, so these are set as default when the tester is switch on. Similarly in superficial Rockwell test three bands of test pressure correspond to 15 scales where N and T are commonly used and N is set to deault.

6.2.3.2 SIZE: Technical parameter of the indenter. Value V means a diamond indenter conical angle of 120° at vertex. Value d means diameter of the ball indenter.

6.2.3.3 MATERIAL: Material of the selected indenter, diamond or steel.

6.2.3.4 CONTOUR: An icon to show the contour of the indenter: D means a diamond conical indenter. B means a ball indenter.

6.2.4 Press up/down buttons to find the wanted scale, then press "ENTER" button to confirm.HRB is the default scale, what needed to do is only the confirmation opration.

6.2.5 Test pressure can not be changed when page A is shown on LCD display.

6.2.6 After confirmation LCD display will change into page B:

Page B

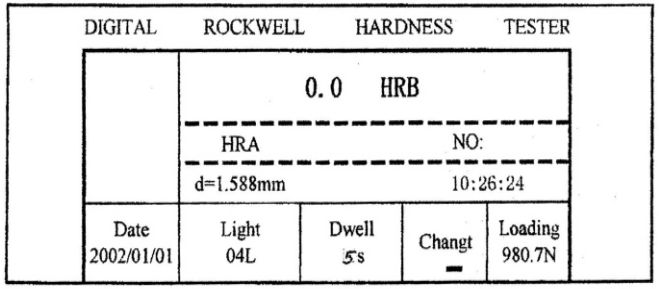


Figure 6

6.2.6.1 Loading: Combined test pressure,preset to 980.7N before power-on.

6.2.6.2 Change: Comparison between different hardness scales. Press up/down buttons to select a conversion scale. For example if HRA is selected, display will be exactly the figure 6.

6.2.6.3 Dwell: Combined test pressure keeping period. Press “TIME +” or “TIME ”to change the period. As a general rule, the combined test pressure keeping period for Rockwell test is 5 seconds, and 5 seconds for superficial Rockwell test.

6.2.6.4 Light: Illumination.Press "LIGHT+” or “LIGHT-" to increase or decrease the illumination.

6.2.6.5 Date: Date display.

6.2.7 Insert ball indenter (15) into the hole in indenter rod, then turn slightly tighter the indenter locking screw (16).

6.2.8 Place 90 HRB block on testing table (14), rotate the turn wheel (12) clockwise to slowly lift the standard block by the lifting screw, ensuring that the block contact with the indenter with no impact, till it reads 500 on the first line of LCD display. This indicates that the initial test pressure is achieved and the buzzer sounds. Then the lifting screw will automatically lock with the turn wheel, and the automatic major test pressurization process begins. In case that display shows over 500 because of too fast lifting, do not lower the testing table. You need to wait until an automatic operation completed, then press “DEL” button to delete the result value of this hardness test, and re-start from a new test spot.

6.2.9 “↓”shown on the left side of LCD display means the motor is automatically applying The main pressure.

6.2.10 After keeping the main pressure for a preset period,“↑”will be shown on the display indicating the automatic release of main pressure.

6.2.11 The buzzer gives off signal at this point and the hardness value for the sample being tested is shown on the first line of LCD display.

6.2.12 Otate the lifting wheel counterclockwise to lower the testing table. Repeat above procedure at various spots.

6.2.13 After 6 spots are tested, i.e. NO = 5 (first spot will not be accounted), then press “PRT” button to print out a sample sheet as following:

F=980.7N	← Combined pressure selected (N)
01 90.4 HRB	← 5 spot hardness test values
02 91.0 HRB	
03 90.9 HRB	
04 91.2 HRB	
05 91.2 HRB	
AVE: 90.9	← Arithmetical average of the 5 spots
MAX: 91.2	← Maximum of the 5 spots
MIN: 90.4	← Minimum of the 5 spots
Date: 2002/01/01	← Date of test
Time: 12/57/33	← Time of test

6.2.14 Test operation is completed.

6.3 Instructions for RS-232C communication line

6.3.1 Connect RS-232C communication line in accessory box with a computer (computer shall be power off) prior to power on the hardness tester. 9-pin adaptor shall be plugged to 9-pinhole socket on the tester, and 9-pin adaptor shall be connected to COM2 interface on the computer.

6.3.2 Power on the computer at first, then switch the hardness tester on. When the computer has entered WIN95/WIN98 interface, choose “start” →“program”→ “accessory”→ “communication” → super terminal (in case that the computer has not installed Super Terminal Program, please install the program in its Control Panel). At this time point a super terminal window will be shown on win98 page. When double-clicking "HYpertrm",an upgrading passage will appear. Choose "AA" in the field of name, for example, “for use when connected”; then choose “directly connected to serial interface 1” or "directly connected to serial interface 2" in the pulled-down menu, choose "9600" for Baud rate, keep others unchanged, and press “ENTER” to confirm and exit (after completion of the above preset operation, only a double-clicking on "AA" icon is needed to get the serial interface on-line). Thus the computer is at a connected state and waiting for data input.

6.3.3 When NO ≥ 1, press "PRT" button to print out, and the content of print-out is exactly the same as shown on the computer monitor.

7. Maintenance & Special Attentions

7.1 Please read carefully this instruction manual and understand all the operation steps and special attentions in detail prior to use of the hardness tester,to prevent from any apparatus damage and/or personal injury resulted from improper operation.

7.2 It is strictly prohibited to tamper with the installation position of all electric elements, switches,sockets etc.

7.3 It is not permitted to turn the pressure selecting handwheel or lift/lower the testing table during the testing pressure charging or relieving period.

7.4 When installing the diamond indenter, use middle finger to support the vertex and slightly push it into the hole in intender rod to prevent the vertex of diamond frtm damage.

7.5 Hardness tester shall be supported under the bottom during transportation and do not handle it in an accumbent state. The sensor indicator and the main loading beam shall be tightly fixed, and all weights shall be removed before transportation. Power cord nmst be unplugged if the weights or hangers are to be removed or the fuse to bce replaced.

7.6 The brightness of LCD display may be adjusted by slightly rotating of adjusting knob (4).

7.7 The operator shall operate the tester by following the instructions contained in this manual. Frequent calibration against standard blocks is necessary before and after actual tests. If the tester has not been in use for a long lime, several pre-tests shall be done on the standard blocks after the tester is turned on. Actual test on sample can be carried out only when the display is stable.

7.8 The display accuracy has been set in factory and there is no need for user to make further adjustment. In case of a deteriorated accuracy resulted from any cause, please contact the manufacturer.

7.9 Use of the standard blocks can only be done on their working surface. A minimum distance of 3 mm between two successive test spots is necessary.

7.10 Verification shall be done, at least once a year, on the tester so as to ensure its accuracy.

7.11 As the manufacturer is making his best endeavor to improve the quality and structure of the apparatus, some trivial difference between the description in this manual and the actual apparatus function is possible without notification from the manufacturer.

7.12 Trouble shooting

It is recommended that the user contact the manufacturer if problems occur with the tester.However, the following table may help the user to detect and solve some common problems(Table 7).

Table 7

Problem	Possible cause	Suggested remedy
Indicator and LCD display do not light up when tester is turned on	No power	Check if the power cord is properly connected.
	Fuse blows out	Replace the fuse.
Buzzer cannot stop and all buttons do not function properly when tester is turned on	The apparatus is locked in a working state	Re-start the tester to reset the motor. Start operation after the buzzer stops.
Button on panel beeps when depressed	Operation error	Operate correctly according to the panel button function description
Extraordinary error occurs on display	Damaged indenter	Replace indenter or ball
	Wrong order of weights placement	Place weights according to figure 3.
	The tester is not leveled and the weights are leaning against the column.	Check the tester levelness with a leveler according to 4.2.5
	Changing weight displaced.	Correct the position of changing weight and rotate the pressure selecting hand-wheel a whole turn.
	Incorrect selection of the combined testing pressure or indenter.	Select the appropriate scale according to table3, table 4 or LCD page A.
	The dust-proof cover is higher than the supporting surface of the lifting screw	Lower the dust-proof cover to below the upper surface of the lifting screw.
The printing paper gets stuck.	The roll of printing paper is too thick.	Outer diameter of the paper roll shall be < 40 mm

7.13 Things to be noted by the hardness verification operator

7.13.1 The tester has two operation modes: automatic and manual. The automatic mode is preset at factory.

7.13.2 In regular verification, the manual operation mode shall be selected. To do this,please open the top cover and place the 2-way switch (red) on the PCB behind LCD display at “ON” position.

7.13.3 Under manual operation mode, the buttons on panel are no longer effective except for the following three, which however take on new functions in manual operation.

Set LCD display values to zero.

Press this button to start motor and charge the main test pressure.

Press this button to start motor and relieve the main test pressure.

8. Accessories (Packing List)

The tester is supplied with the following accessories:

Item No.	Description & Specification	Quantity
1	Diamond Conical Indenter	1
2	Φ1.5875 mm Ball Indenter	1
3	Test Tables of Large, Middle Size, V Type Test Table	3 (1 for each)
4	Changing Weight	1
5	Weights 1#, 2#, 3#, 4#, 5#	5 (1 for each)
6	Standard Rockwell Hardness Blocks, HRB, HRC high, HRC low	3 (1 for each)
7	Standard Superficial Rockwell Hardness Blocks, HR30N, HR30T	2 (1 for each)
8	Power Cord	1
9	RS-232C Communication Line	1
10	Instrument Lamp, 6V, 12W	2
11	Fuse 2A/250V, 5×20	2
12	Printing Paper Φ44×20	1 roll
13	Dust-proof Plastic Bag	1
14	Lifting Screw Protecting Cover	1
15	HRSS-150 Hardness Tester Instruction Manual	1
16	Printer Instruction Manual	1
17	Horizontal adjusting screw	4