MRocky-150D
Digital Rockwell Hardness Tester
Instruction Manual



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1.Brief Introduction

Digital Rockwell hardness tester adopts a high precision EHMC digital Rockwell indicator, which can display and set the current test scale, dwell time, hardness conversion scale, etc. The instrument adopts the dead weight loading mechanism. During operation, do the manual pre-loading until it beeps, and press the start button, the instrument will automatically load, dwell, unload, and display the hardness value. The operation is convenient and the display is intuitive.

1. The cast iron structure achieves 99% rigidity of the main body, minimizes the deformation, and the shell undergoes natural aging treatment for more than half a year, resulting in stable physical properties.

2. After heat treatment, the hardness of the lifting screw reaches 35HRC~40HRC, with a stable structure and wear resistance.

3. The weights and levers are manufactured and calibrated by classic techniques, with high accuracy and can be fine adjusted by mechanical structures.

4. High precision EHMC digital Rockwell indicator supports all Rockwell hardness testing scales and scale conversion for ISO/GBT/ASTM standards.

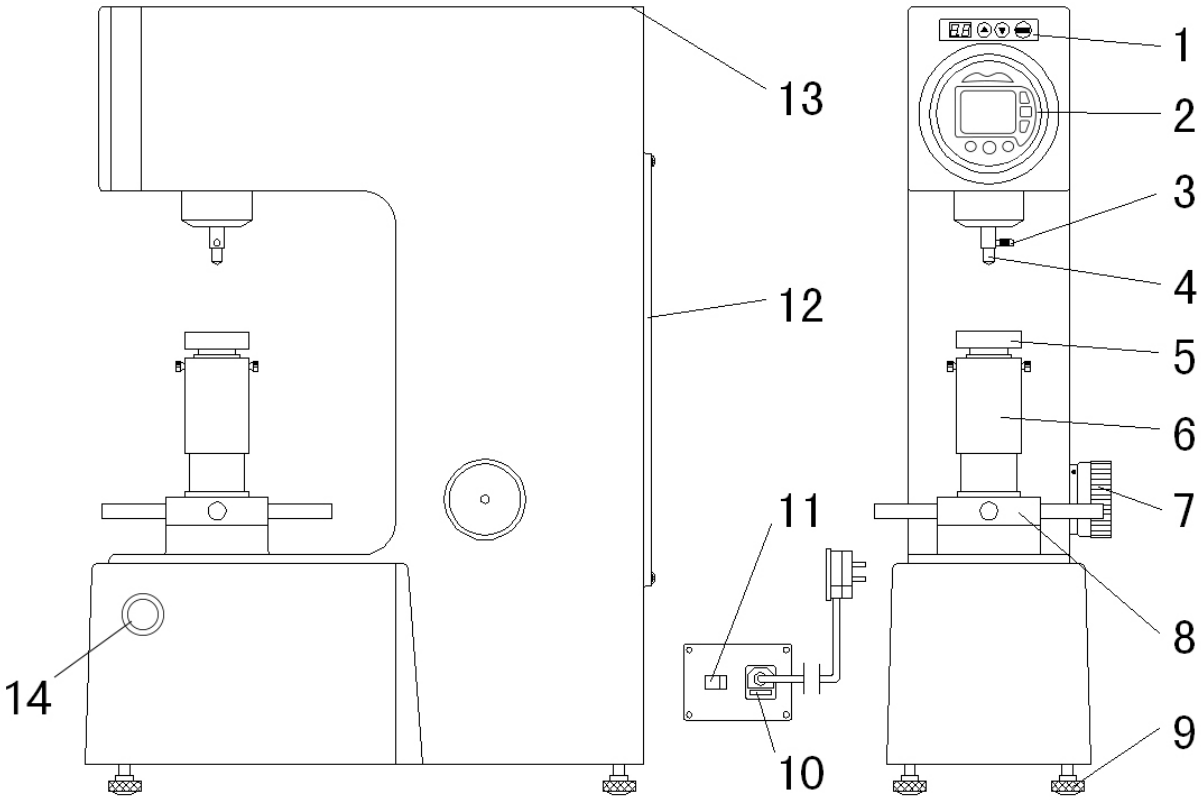
5. With upper and lower limit settings, it has out of tolerance prompts.

6. The hardness test results are saved in real-time, and the test time is automatically recorded. The data can be output via USB or wireless.

2. Main Parameters

Initial Test Force	10kgf (98.07N)
Total Test Force	60kgf (588.4N), 100kgf (980.7N), 150kgf (1471N)
Indenter	Diamond Rockwell Indenter,
Φ1.5875mmBall Indenter	
Loading Method	Automatic (Loading/Dwell/Unloading)
Hardness Reading	LCD Display
Test Scale	HRA, HRD, HRC, HRFW, HRBW, HRGW, HRHW, HREW, HRKW, HRL, HRM, HRP, HRR, HRS, HRV
Conversion Scale	Support for ISO/GBT/ASTM standards
Data Statistics	500 pcs, Auto-record testing time
Data Output	USB, Wireless
Hardness Resolution	0.1HR
Dwell Time	2~60s
Max. Sample Height	185mm
Throat Depth	165mm
Power Supply	AC220V,50Hz
Execute Standard	GB/T 230,ISO 6508,ASTM E18,JIS Z2245
Dimension	520×215×700mm
Weight	78kg

3. External Structure



1. Panel
2. Digital meter
3. Fasten screw
4. Indenter
5. Test table
6. Lifting screw
7. Load-change knob
8. Hand wheel
9. Horizontal regulating screw
10. Fuse
11. Power switch
12. Back cover
13. Upper cover
14. Emergency stop button

4.Working Condition

1. Under the room temperature between 10~30℃.

2. The relative humidity of the room is inferior to 65%.

3. Placed on a stable table, free from vibration and without corrosive agent in surroundings.

4. Connect the stable voltage power supply with good grounding.

5.Unpacking and Installation

A. Unpacking

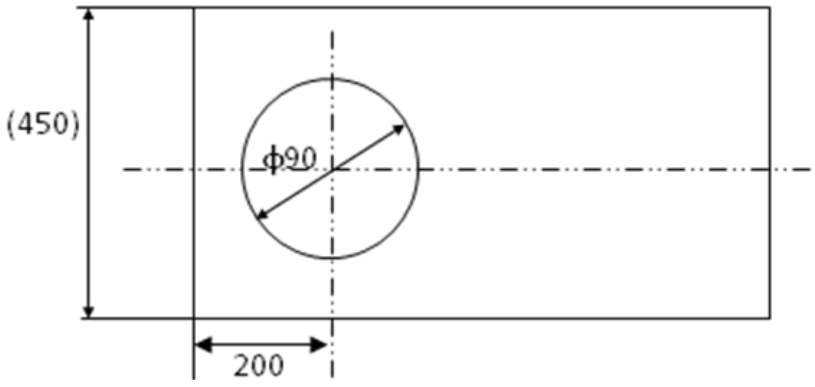
1. Cut the belts on the packing box.

2. Loosen the screws on the middle bottom iron sheet on both sides of the case.

3. Lift the case up and you can see the machine; take out the accessory box and dust cover.

4. Unscrew the two M10 bolts under the bottom plate with a spanner.

5. Lift the hardness tester and place it on the prepared stable table (suggested height 450mm). There should be a hole on the table as following proposal:



6. Remove the straps on the lifting screw and hand wheel.

B. Installation

1. Take out 4 horizontal regulating screws from accessories kit and screw them at the

holes on the bottom hole of the hardness tester.

2. Take out the test table and install it on the lifting screw.

3. Take out the level gauge in accessories kit and put it on the test table, then regulate the level of hardness tester to enable the bulb in the center.

4. After the hardness tester is properly placed, open the upper cover and the back cover. Untie the fastening rubber tape on the connecting rod and draw out the protecting gasket and the pad under the lever. Untie all the white gauzes on moving parts.

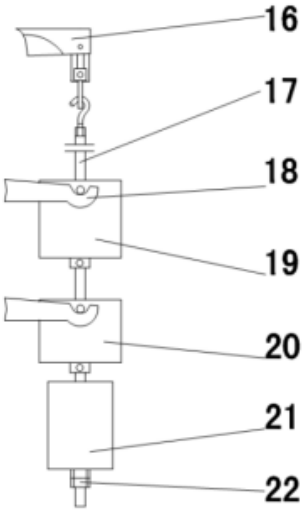
5. Take the weights out of the accessories kit and clean them thoroughly.

6. Rotate the load-change knob to **588.4**(**60**)**.**

7. Take the hanging rod from the back cover and insert it in the hole of the Weight A, fasten the M10 nut at the tail of the hanging rod. Hook the hanging rod in the ear of the tail of the lever. And then place the Weight B and Weight C separately on two fork-shaped frames.

8. Rotate the load-change knob and observe the round pegs on the Weight and see if they are properly placed in 2 grooves of the fork-shaped frame.

9. Observe when the Weights are suspending, they should not touch the inside wall of the instrument body. Note: firstly put the level gauge on the test table of hardness tester to calibrate the level of the hardness tester. After that cover the upper cover and back cover.



16. Lever

17. Hanging Rod

18. Fork-Shaped Frame

19. Weight C

20. Weight B

21. Weight A

22. Nut

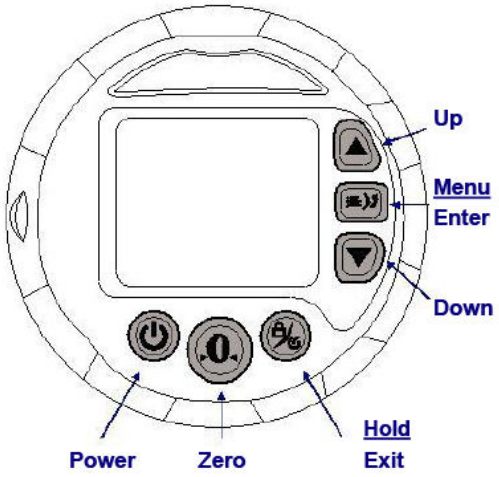
10. Take out the power cable and connect to the power supply.

6.Introduction of Digital Indicator

keypad

Pressing and holding for about 2 seconds (long pressing)to power on or off.

This key will be invalid when the power is plugged in from the back soket. Now, the indicator will automatically power on or off as the power is turned on and off.



Under the Measurement

Set the display to initial volue of hardness, 100 or 130.

To Locking the value of hardness.
Return to measuring interface.

To browse data saved in memory.Press to return.

To view current setups.Press to return.

Under the Menus

Enter or confirm the setting.

Changing the setting.
Move digit.

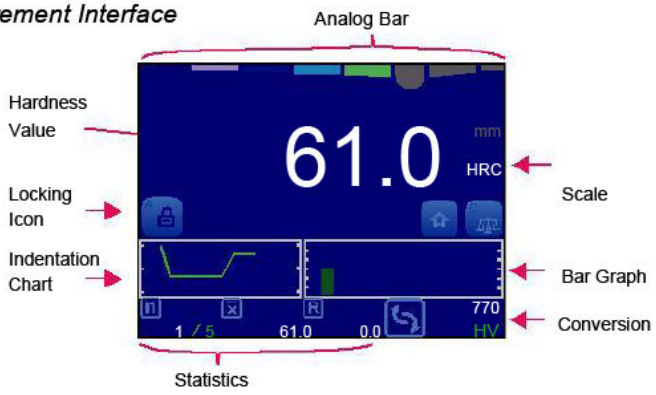
Exit or return to the previous item.

Move the setup item up. Or increase the value.

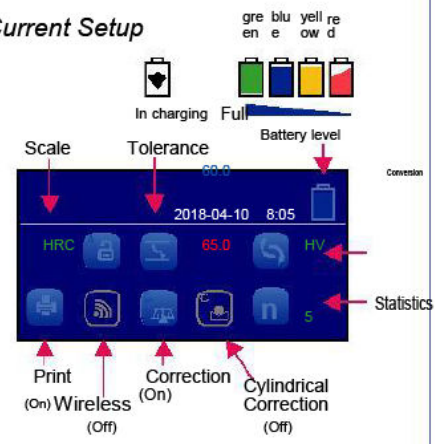
Move the settings item down. Or reduce the value.

Display

Measurement Interface



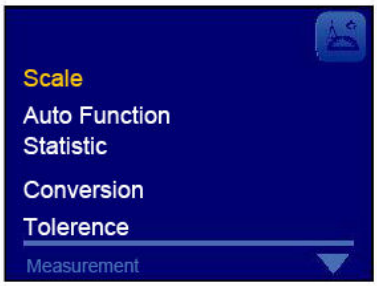
Current Setup



Menus Interface





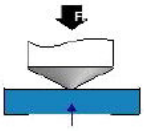


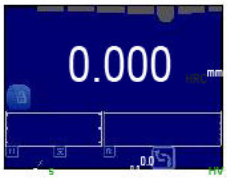
* The yellow word indicates the currently selected item

6.Introduction of Digital Indicator

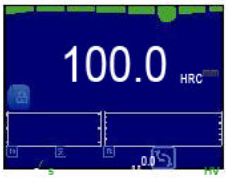
Test Procedure

1. Lift the test piece, until the indicator reading is between 2.80mm and 3.20mm(Zeroing zone).



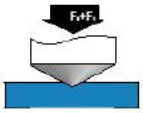






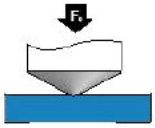
Zeroing automatically.
For scales of A,C,D,N,T,W,X,Y, to be initialized to "100".
For the other scales, to be initialized to "130".

2. Loadinging the main test force.





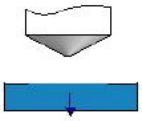
3. Unloadinging the main test force.

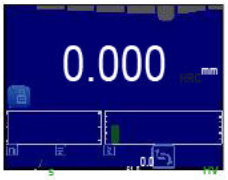




Locking the hardness number automatically or pressing .

4. Lower and remove the test piece.The indicator turns to “0.000mm”.





Correction

Calibration can eliminate some systematic errors in the hardness tester. The correction can be added to the test result by setting "Correction" on.

1. Long press to enter Menus.Select calibration to enter.





2. Use the standard block (For example: 62.0HRC) to test.







3. Input the hardness value of standard block.





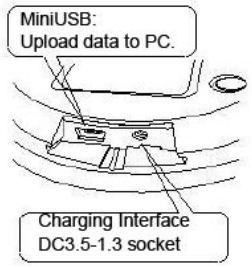


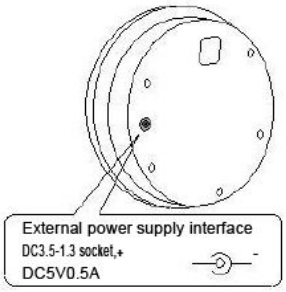
Press ▲/▼ to +/- the number
Press 0 to move next digit.
Press to confirm the input.

* It is best to use multiple standard blocks for full-range calibration to ensure full range of measurement accuracy.
** Testing multi-point on a standard block, the mean value is used as the basis for calibration, which usually improves the accuracy of the calibration.

6.Introduction of Digital Indicator

Power Supply





The indicator can be powered by an internal rechargeable battery, charged or directly powered by a recharger, or externally powered by an external power connector.

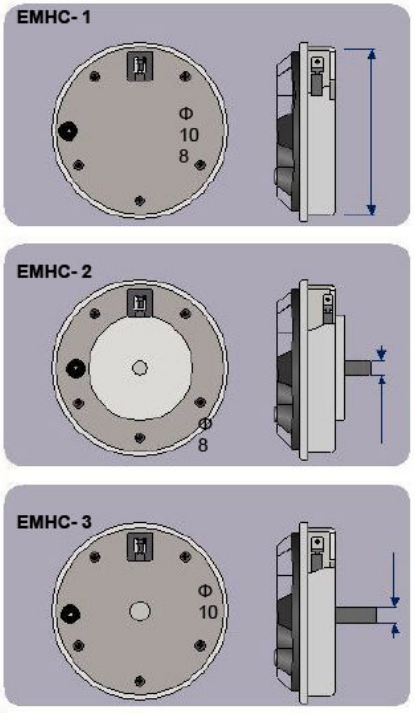
When the power supply is powered through the external interface, the indicator will turn on or off with the power on and off. The power key on the front panel will be invalid.

Specifications

Scale	All kings of scales	Conversion	GB/T 1172, GB/T 3771,ISO 18265, ASTM E140
Resolution	0.1HR(0.001mm)	Statistics	Mean, Range
Displayer	320*240 TFT LCD	Communication	USB, wireless serial port (Receiver optional)
Memory	500 readings	Printing	Wireless(Printer optional)
Power	Li-ion rechargeable battery 3.7V 800mAh. Recharging: USB recharger AC100~240V;DC5V, 1A External power supply: DC 5V,0.5A		
Dimension	~ Φ114x 37 mm		
Weight	~ 420gr		
Standards	GB/T 230, ASTM E18, ISO 6508,GB/T 3398.2, ISO 2039.2, ASTM D785		

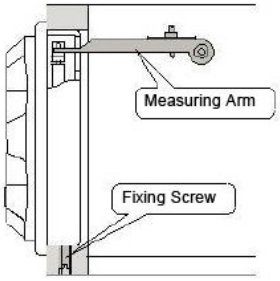
There are 3 basic types of installation.
Please confirm that it is suitable for your application.

Installation

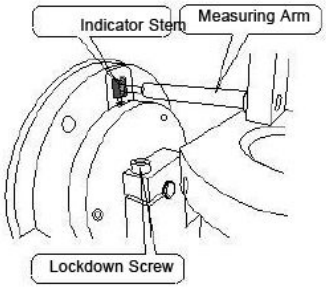


1 Mounting the Indicator

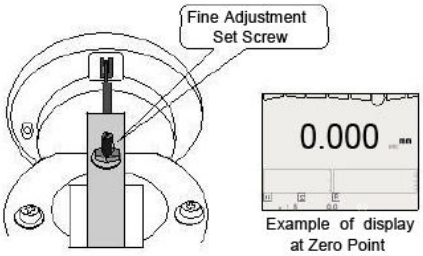
EMHC- 1



EMHC- 2,EMHC-3



2 Adjusting the Zero Position



6.Introduction of Digital Indicator

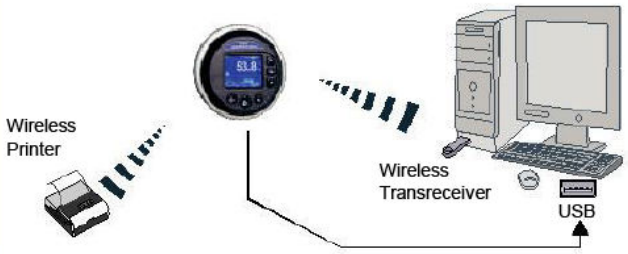
Menus

- Scale
  - Metal: A B C D E F G H K L M P R S V
  - Superficial: 15N 30N 45N 15T 30T 45T 15W 30W 45W 15X 30X 45X 15Y 30Y 45Y
  - Plastics: EKL M R
- Auto Function
  - Locking
  - Zeroing
  - Correct
  - Convex Cyld.
  - Print
  - Upload
- Statistic
- Conversion
  - Points
  - GB/T: C & Aly ST, C ST, UHS ST, Cr-V ST, Cr ST, Cr-Mo ST, Cr-Mn-Si ST, Cr-Ni ST, Cr-Ni-Mo ST, SS, Al Aly, Cu & Aly
  - ISO: ULA ST & CI, QT ST 1, QT ST 2, QT ST 3, CW ST, HS ST, HM, Al & ALY, Ni & ALY, BRS, Cu, WT Al PD
  - ASTM: N-AUST ST, AUST SS, ALY WTI, Ni & ALY, BRS, Cu, WT Al PD
  - Customized: Mat 1~5
  - OFF
- Tolerence
- Test Config
  - TC Group
  - Save Corrent

- Browse All
  - Browse Select: Scale, No.
  - Delete All
  - Printing: Scale, No.
- Calibration
- Language: English, 中文
- Date/Time
- Information
- Default
- Firmware Update

Data Output

Data can be uploaded via USB or wireless, and print reports wirelessly. The PC software can be downloaded free from the website.



Index of Material

Abbreviation	Materials
C & ALY ST	Carbon Steel & Alloy Steel
C ST	Carbon Steel
Cr ST	Chrome Steel
Cr-V ST	Chromium Vanadium Steel
Cr-Ni ST	Chrome Nickel Steel
Cr-Mo ST	Chrome-Molybdenum Steel
Cr-Ni-Mo ST	Chromium Nickel Molybdenum Steel
Cr-Mn-Si ST	Chromium Manganese Silicon Steel
UHS ST	Ultra-high Strength Steel
SS	Stainless Steel
Al ALY	Aluminum Alloy
Cu & ALY	Copper Alloy
ULA & CI	UN-LOW Alloy Steels & Cast Iron
QT ST 1	Q-T Steels in Quench-Tempered
QT ST 2	Q-T Steels in Untreated,Normalized
QT ST 3	Q-T Steels in Quenched
CW ST	Cold Working Steels
HS ST	High Speed Steels
NonAUST ST	Non-Austenitic Steels
AUST SS	Austenitic Stainless Steel
ALY WTI	Alloyed White Irons
Al & ALY	Aluminium & Alloys
WT Al PD	Wrought Aluminium Products
BRS	Cartridge Brass
Cu	Copper
Ni & ALY	Nickel & High-NickelAlloys
HM	Hardmetals

*The embedded conversion data is processed according to the standards, it may include a very small calculation error. Please check it from the standards text if necessary.

Index of Icon

- Manual Lock
- Auto Lock
- Timing Lock
- Conversion
- Tolerance
- Wireless Data Transfer
- Print
- Upload
- Correction
- Cylinder Correction
- Statistic
- Standard Volue
- Test Force
- Diamonde Indenter
- Ball Indenter
- Statistic Points
- Mean Value
- Range
- PageUp
- PageDown
- Page Up/Down
- Delete
- Print
- Update
- Save
- Upload

* on off

7.Operation Procedure

1. Turn on the power switch, and the digital meter shows the main interface.

2. Press and hold  to enter the menu, click  to enter Measurement→ Scale → Metal, select the test scale and then press to return to  the main interface.

3. Select the corresponding indenter, push the indenter into the spindle hole, press it tightly against the support surface, align the notch of the indenter handle with the screw, and tighten the indenter fasten screw slightly.

4. Rotate the load-change knob to the required test force.

5. Click the "+/-" button on the panel to set the dwell time, select "Conversion" in the menu to set the conversion scale, select "Tolerance" to set the upper and lower limit qualification judgment, and so on.

6. Wipe the specimen clean, place it on the edge of the test table, and then push it under the indenter (be careful not to hit the indenter when pushing). Rotate the hand wheel clockwise to raise the lifting screw. The specimen should slowly and impact free contact with the indenter, so that the reading on the indicator is between 2.80~3.20mm. The buzzer will sound continuously and then stop rising. The reading will automatically convert to 100 or 130 according to the scale. (When the reading is less than 2.80mm, continue to raise the test table. If it exceeds 3.20mm, the buzzer will quickly sound an alarm. At this time, lower the test table, replace the test point and reload.)

7. Click the START button on the panel, and the instrument will automatically apply the main test force, hold and then unload the main test force, and retain the initial test force. After completion, the hardness result will be automatically displayed.

8. Reverse the hand wheel, lower the test table and complete the experiment. The first point of Rockwell test is excluded, adjust the test piece and replace the test point, and repeat the above operation.

9. Test data can be viewed by selecting "Memory" from the menu, and can be classified and viewed according to the scale.

8.Attached List

1. Technical specifications of Rockwell hardness

Test Force	Initial Test Force(N)		98.07(10kg)		Tolerance ±2.0%
	Total Test Force(N)		588.4(60 kg)		Tolerance ±1.0%
			980.7(100 kg)		
			1471(150kg)		
Indenter	Diamond Cone Indenter				
	Φ1.5875mm Ball Indenter				
Scale	HRA	HRBW	HRC	HRD	HREW
	HRFW	HRGW	HRHW	HRR	HRM
	HRP	HRS	HRKW	HRL	HRV

2. Allowed tolerance and repeatability of Rockwell hardness

Scale	Hardness Range of Standard Hardness Blocks	Allowed Tolerance of Displaying Value	Allowed Repeatability of Displaying Value a
A	20~≤75HRA	±2HRA	≤0.02(100-H) or 0.8 Rockwell unit b
	＞75~≤95HRA	±1.5HRA	
B	10~≤45HRBW	±4HRBW	≤0.04(130-H) or 1.2 Rockwell unit b
	＞45~≤80HRBW	±3HRBW	
	＞80~≤100HRBW	±2HRBW	
C	10~≤70HRC	±1.5HRC	≤0.02(100-H) or 0.8 Rockwell unit b
a:H means average hardness value b:select a larger value			

The normally used Rockwell hardness scales are A, B, C 3 kinds.

8.Attached List

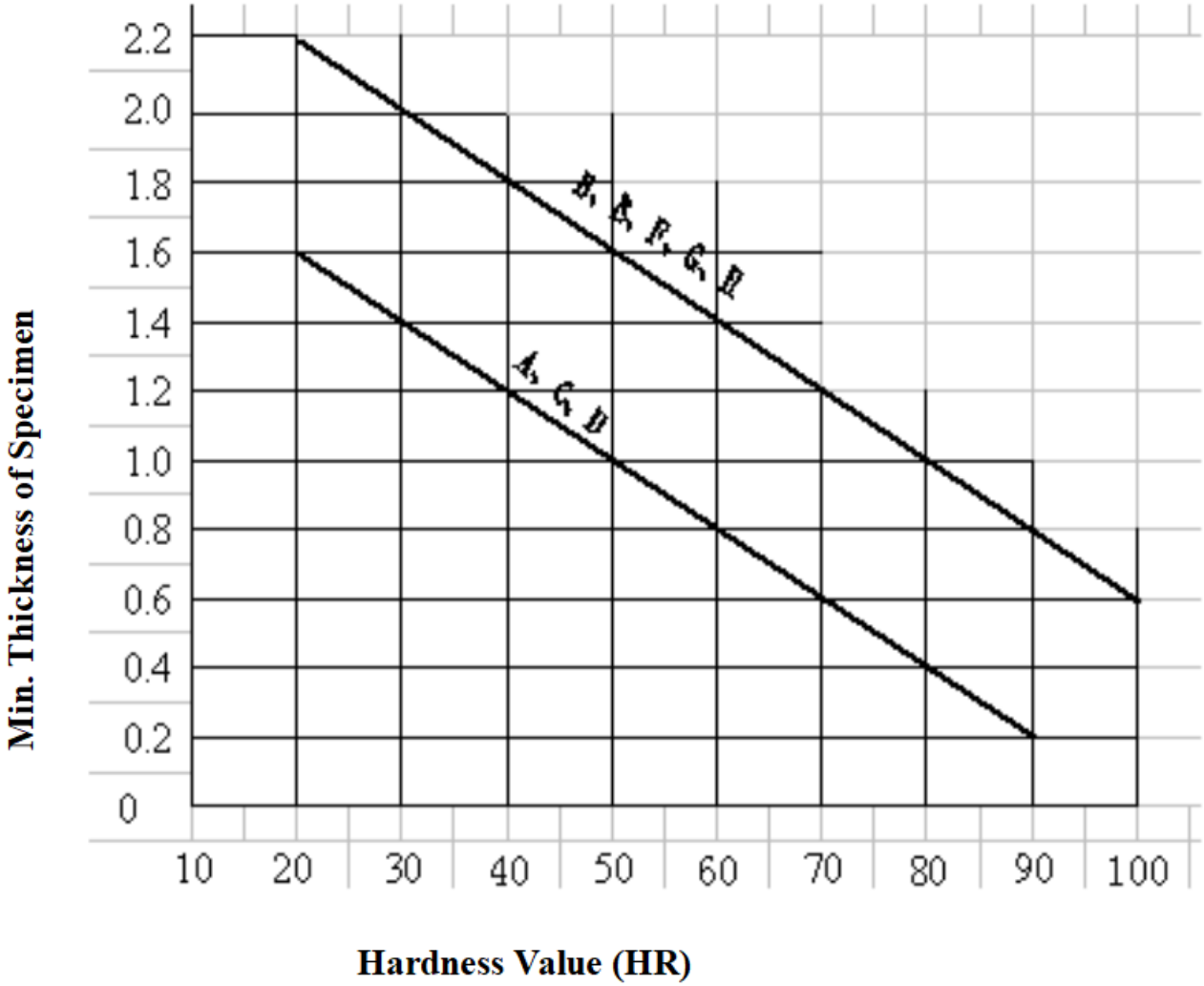
3. The scales, indenters, test force and application examples of Rockwell hardness test

Scale	Indenter	Initial Test Force (N)	Total Test Force (N)	Application Examples
HRA	Diamond Indenter	98.07 N (10kg)	588.4(60kg)	Hard metal and hard alloy
HRD			980.7(100kg)	Steel sheet, surface-quenched steel
HRC			1471(150kg)	Heat treated structural steel, tool steel
HRFW	Ball Indenter φ1.5875mm (1/16 inch)		588.4(60kg)	Non-ferrous metals
HRBW			980.7(100kg)	Non-ferrous metals; soft metals
HRGW			1471(150kg)	Pearlite iron, copper, nickel, zinc alloy
HRHW	Ball Indenter φ3.175mm (1/8 inch)		588.4(60kg)	annealed copper alloy
HRKW			1471(150kg)	Non-ferrous metals, hard plastics
HREW			980.7(100kg)	Aluminum and aluminum alloy
HRL	Ball Indenter φ6.35mm (1/4 inch)		588.4(60kg)	
HRM			980.7(100kg)	
HRP			1471(150kg)	
HRR	Ball Indenter φ12.7mm (1/2 inch)		588.4(60kg)	
HRS			980.7(100kg)	
HRV			1471(150kg)	

8.Attached List

4. Min. thickness of the specimen

The Min. thickness of the specimen should be 10 times superior to the depth of the indentation. After the test, the back of the specimen should not have any visible signs of deformation.



5. Arc correction

When test Rockwell hardness value with HRC and HRA scales, the diameter of specimen to be tested is less than 38mm or when test with HRBW scale, the diameter of specimen to be tested is less than 25mm, the results of the test should be revised. The revised values are all positive numbers.

8.Attached List

Hardness Value HR	Diameter of the Columned Specimen(mm)								
	6	10	13	16	19	22	25	32	38
	Modified Value of Rockwell Scales A, B, C(HR)								
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		3.0	2.0	1.5	1.5	1.0	1.0	0.5	0.5
40		2.5	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 HR	Diameter of the Columned Specimen(mm)						
	6	10	13	16	19	22	25
	Modified Value of Rockwell Scales B, F, G(HR)						
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

9.Precautions

1. The surface of the specimen should be smooth and clean without any feculence, oxidized peels, concaves and the outstanding machining signs. The supporting plane of specimen and the test table should be clean to assure a good smoothness between them.

2. The specimen should be stably fixed on the test table. There should be no movement during the testing process and the test force should be assured to load perpendicularly on the specimen.

3. If the specimen is columned, the V-shaped test table must be used.

4. During installation of the diamond cone indenter, the middle finger of hand should withstand the head of diamond, push the indenter forward to the indenter shaft hole slightly, avoid damaging the head part of diamond.

5. When transporting the hardness tester, it should be supported at the bottom and not allowed to tilt horizontally. Before transportation, the power plug should be unplugged, the extension rod and main load lever should be fixed, and the weight should be removed.

6. The operator should observe the operation regulations and calibrate the instrument with the standard hardness block before and after the test.

7. The standard hardness block should be used only on the working plane with the distance of the two neighboring indentations and distance of the center of the indentations to their edges are not inferior to 3 mm.

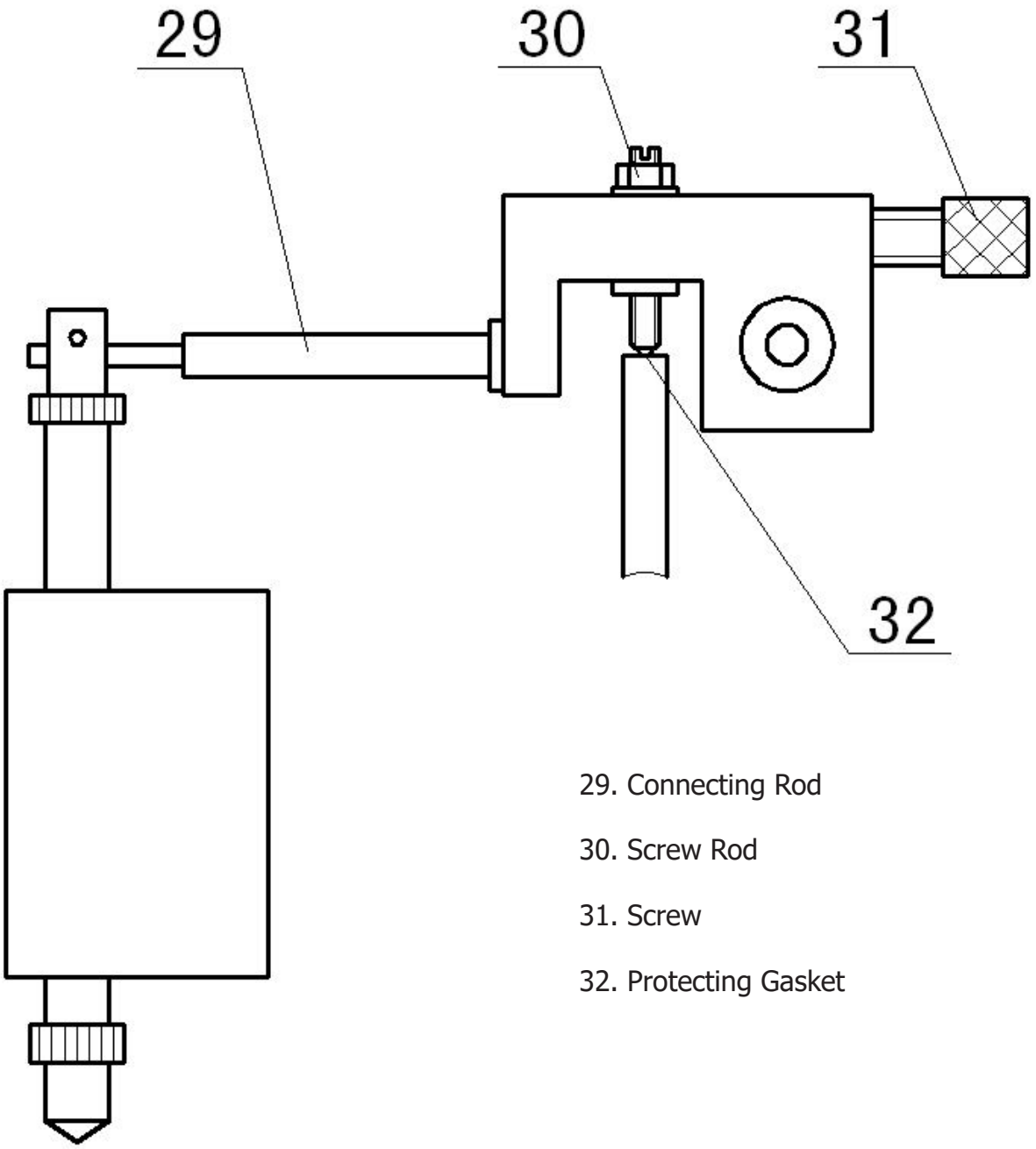
7. Carry out periodic inspection of the tester, at least once a year in order to assure the accuracy of the tester.

8. The adjustment of displaying hardness value:

•The precision of the displaying hardness value of the tester is just calibrated before the instrument leaves the factory. If a tolerance is caused due to the transportation, the operator may regulate it based on the understanding of the instrument structure and principle.

9.Precautions

•Remove the upper cover. If the measured value is lower than the standard hardness block, first fix the Screw Rod with an inner hexagon spanner, loosen the nut slightly, rotate the Screw in slightly clockwise, and then fix the Screw Rod and tighten the nut. Do the test again and adjust until the value stands in the tolerance range. If the measured value is higher than the hardness value of the standard block, rotate the Screw in the opposite direction.



29. Connecting Rod

30. Screw Rod

31. Screw

32. Protecting Gasket

10.Packing List

Name	Qty
Instrument Main Body	1 set
Diamond Rockwell Indenter	1 pc
Φ150mm Flat Anvil	1 pc
Φ40mm V-shaped Anvil	1 pc
Hardness Block 20~30 HRC	1 pc
Weight A, B, C	3 pcs
Horizontal Regulating Screw	4 pcs
Fuse 2A	2 pcs
Spanner 7mm	1 pc
Usage Instruction Manual	1 copy
Accessory Box	1 pc
Φ1.5875mm Ball Indenter	1 pc
Φ74mm Flat Anvil	1 pc
Hardness Block 60~70 HRC	1 pc
Hardness Block 80~100 HRBW	1 pc
Level	1 pc
Power Cable	1 pc
Inner Hexagon Spanner 3mm	1 pc
Anti-dust Cover	1 pc

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