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HDT-CRS200

**AUTOMATIC DIGITAL ROCKWELL/SUPERFICIAL
ROCKWELL HARDNESS TESTER**

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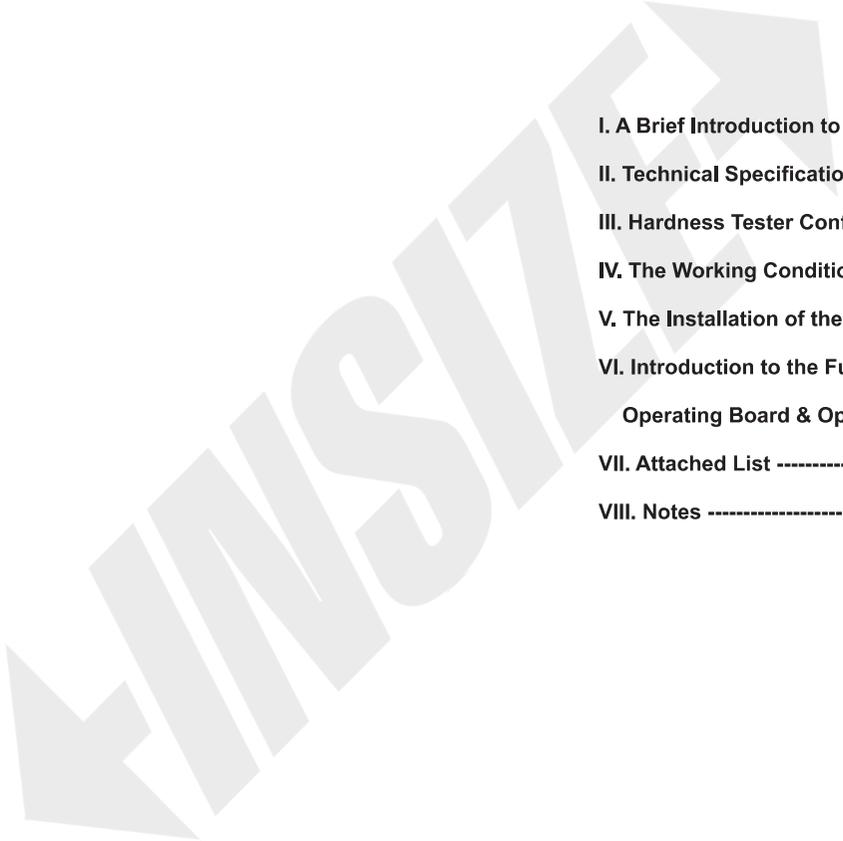
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I . A Brief Introduction to the Hardness Tester

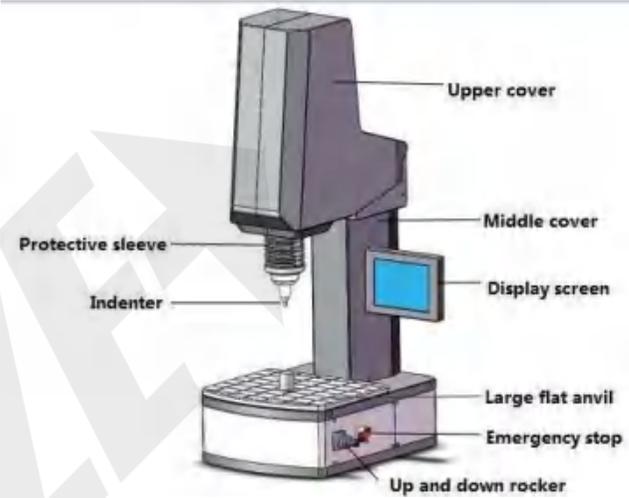
HRSS-150C automatic Rockwell hardness tester has complete functions, convenient operation, clear and intuitive display and stable performance. It is a high-tech product integrating electromechanics. The instrument eliminates the weights and adopts electric loading and unloading test force, which can carry out the hardness test of all Rockwell scales.

- 1.1 Support the selection of all scales of Rockwell and surface Rockwell hardness;
- 1.2 The hardness scale can be changed by one value;
- 1.3 With arc correction compensation function;
- 1.4 Touch screen display and operation, equipped with dynamic graph, real-time monitoring of the operation status of force sensor and displacement sensor; this function is to be opened.
- 1.5 Operation of the head rocker, rapid rise or fall;
- 1.6 Complete the test with one button, load, hold, and unload the indenter, display the hardness value, and return the machine head to the specified position;
- 1.7 With data storage, automatic calculation of maximum, minimum, and average values, test results can be selectively deleted, support for printing out, and equipped with Bluetooth interface for users to connect to the computer for output.
- 1.8 Suitable for hardening, quenching and tempering, annealing, chilled castings, malleable castings, hard alloy steel, aluminum alloy, copper alloy, bearing steel and other hardness testing. It is also suitable for surface hardened steel, material surface heat treatment and chemical treatment layer, copper, aluminum alloy, thin plate, galvanized, chrome-plated, tin-plated materials, bearing steel, chilled castings, etc.

II. Technical Specifications of the Hardness Tester

Initial test force	3kg (29.42N) , 10kgf (98.07N)
Total test force	15kgf (147.1N), 30kgf (294.2N),45kgf (441.3N), 60kgf (588.4N), 100kgf (980.7N), 150kgf (1471N)
Indenter type	Rockwell diamond indenter, φ1.588mm steel ball indenter
Loading Method	Automatic (fully automatic loading, dwell, unloading)
Operation mode	A Automatic press, test, one key complete
Hardness reading	Digital touch screen to obtain hardness value
Measuring scale	HRA, HRD, HRC, HRF, HRB, HRG, HRH, HRE, HRK, HRL, HRM, HRP, HRR, HRS, HRV,HR15N, HR30N, HR45N, HR15T, HR30T, HR45T, HR15W, HR30W, HR45W, HR15X, HR30X, HR45X, HR15Y, HR30Y, HR45Y
Conversion scale	HV, HK, HRA, HRB, HRC, HRD, HRE, HRF, HRG, HRK, HR15N, HR30N, HR45N, HR15T, HR30T, HR45T, HBW
Data Output	Bluetooth printer
Hardness value Resolution	0.01HR
Dwell time	0~99s
Max height of test piece	300mm
Depth of throat	200mm
Power	110V , AC220V, 50Hz
Standard	ISO 6508 , ASTM E18 , JIS Z2245 , GB/T 230.2
Machine Dimension	555*400*1250mm
Net Weight	130KGS

III. Hardness Tester Configuration structure

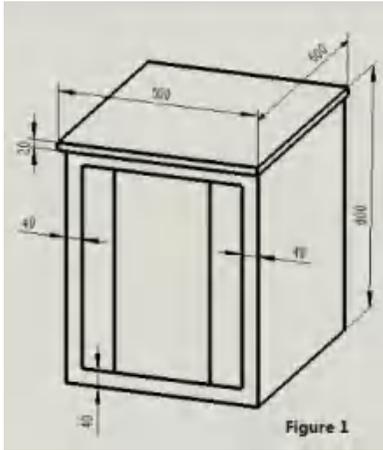


IV. The Working Condition of Hardness Tester

- 4.1 Under the room temperature between 10~30 °C;
- 4.2 The relative humidity in the test room inferior to 65%;
- 4.3 Horizontal placement on a solid foundation, free from vibration and without corrosive agent in surroundings.
- 4.4 Use a well-grounded stabilized power supply for access

V.The Installation of the Hardness Tester

- 5.1 Cut the packing Belt on the packing box.
- 5.2 Unscrew the screws on the middle iron sheets on both sides of the bottom of the packing box.
- 5.3 Lift the wooden box up to see the instrument,take out accessory box&dust cover
- 5.4 Use a wrench to unscrew the two M10 hexagonal bolts under the bottom plate.
- 5.5 Lift the hardness tester and place it on a stable worktable prepared in advance (the size of the worktable is recommended to be as Figure1).



- 5.6 Remove the belts on the lifting screw and the hand wheel.
- 5.7 Take out the anvil and install the anvil on the lifting screw.
- 5.8 Take out the power cord and connect the power supply.

VI.Introduction to the Functions of the Keys on Operating Board & Operational Process

- 6.1 Choose the corresponding indenter, Push the indenter toward the spindle hole, close to the supporting surface, and face the notched surface of the indenter handle against the screw, and tighten the indenter fixing screw slightly. Need to adjust the hardness tester head up and down correspondingly by the rocker according to the specimen height and size.



- 6.2 Turn on the Power Switch, Screen display main interface (figure 2)

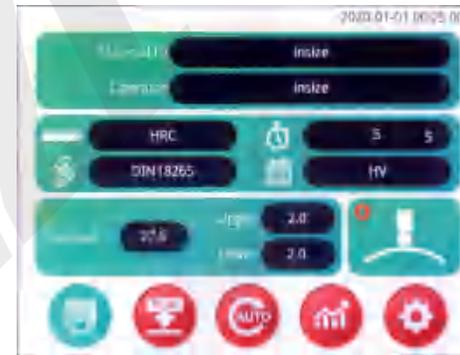


figure 2

- 6.3 Set the material name:Click the blank to enter the material name(figure 3)
- 6.4 Set the Operator: Click the blank to enter the operator name(figure 3)



figure 3

- 6.5 Choose the Scale: Press  button blank to choose the corresponding scale(figure 4)



figure 4

6.6 Set the dwell time: Click  button blank to set the corresponding dwell time

6.7 Set conversion standard click  button blank to choose the corresponding standard(Figure 5)



Figure 5

6.8 Set conversion scale. Click  button to choose the corresponding scale(Figure 6)



Figure 6

6.9 Set the upper and lower limit, qualified judgment: click , Select  if you want to set

it then change into yellow one and input the corresponding data.

6.10 Set arc correction: Click  button to set cylinder diameter.

6.11 Wipe the specimen clean, place it on the edge of the anvil and slowly push it under the indenter, up and down the rocker to adjust the indenter location.

6.12 Click the  key to get into the test interface(Figure 7)

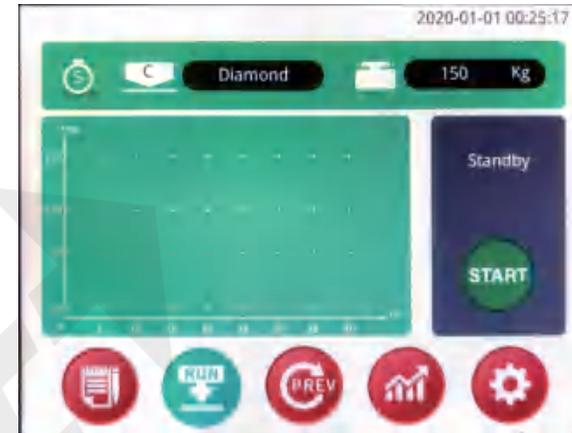


Figure 7

6.13 Click  to start the test(Figure 8),automatically loading,maintain loading, unloading etc.

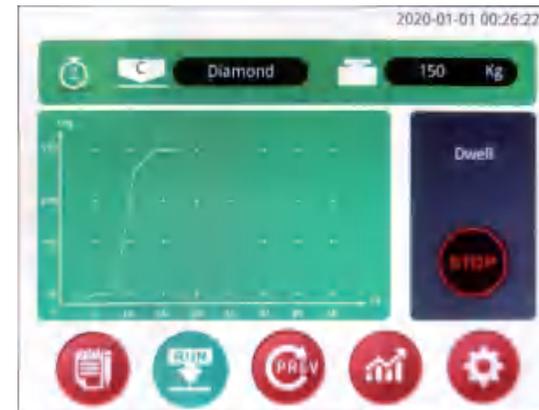


Figure 8

6.14 Test finished automatic display result (Figure 9)



Figure 9

6.15 The machine head automatically lifts and the work ends.

6.16 The Rockwell first point is not counted. After adjusting the test point and changing the test point, press the start button again, the instrument will automatically test and display the hardness result.



6.17 After several times test, you can click button to check the all test result(Figure 10)



Figure 10

6.18 Print: Open the printer, Click  then show(Figure 11) searching the printer and connect ok, the click the  again can print the data(Figure 12)



Figure 11



6.19 Save the data: Click  button then display(Figure 13),click the  to save he data, if need to check the data

of saved before, can click  button



Figure 13

VII. Attached List

7.1 Rockwell hardness technical parameter

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	HRB	HRC	HRD	HRE
	HRF	HRG	HRH	HRR	HRM
	HRP	HRS	HRK	HRL	HRV

7.2 Rockwell hardness values allow error and repeatability

Scale	Hardness scope of blocks	The hardness tester shows allowable error	Repeatability of display value allowed by hardness tester ^a
A	20~≤75HRA	±2HRA	≤0.02 (100-H) Or 0.8 Rockwell unit ^b
	>75~≤88HRA	±1.5HRA	
B	20~≤45HRB	±4HRB	≤0.04 (130-H) Or 1.2Rockwell unit ^b
	>45~≤80HRB	±3HRB	
	>80~≤100HRB	±2HRB	
C	20~≤70HRC	±1.5HRC	≤0.02 (100-H) Or 0.8Rockwell unit ^b

a: where H is the average hardness value

b: subject to the larger value

The commonly used scales of Rockwell hardness are A, B, C

7.3. Rockwell hardness test scale, indenter, test force and application examples

Scale	Indenter	Initial testing force	Total testing force (N)	Application
HRA	Diamond indenter	98.07 N (10kg)	588.4(60kg)	Hard metals and hard alloys
HRD			980.7(100kg)	Thin steel plate, surface hardened steel
HRC			1471(150kg)	Heat-treated structural steel, tool steel
HRF	Ball indenter φ1.5875mm (1/16inch)		588.4(60kg)	Non-ferrous metals
HRB			980.7(100kg)	Non-ferrous metals and soft metals
HRG			1471(150kg)	Pearlitic iron, copper, nickel, zinc alloy
HRH	Ball indenter φ3.175mm (1/8inch)		588.4(60kg)	Annealed Copper Alloy
HRK			1471(150kg)	Non-ferrous metals, hard plastics
HRE			980.7(100kg)	Aluminum and aluminum alloy
HRL	Ball indenter φ6.35mm (1/4inch)		588.4(60kg)	
HRM			980.7(100kg)	
HRP			1471(150kg)	
HRR	Ball indenter φ12.7mm (1/2inch)	588.4(60kg)		
HRS		980.7(100kg)		
HRV		1471(150kg)		

7.4. Surface rockwell hardness technical parameters

Test force	29.42 (3 kg)	Tolerance±2.0%
	147.1 (15 kg)	
	294.2 (30 kg)	Tolerance±1.0%
	441.3 (45 kg)	
Indenter	Diamond cone indenter, φ1.5875mm ball indenter	
Scale	HR15N, HR30N, HR45N	HR15T, HR30T, HR45T
	HR15W, HR30W, HR45W	HR15X, HR30X, HR45X
	HR15Y, HR30Y, HR45Y	

7.5. Surface Rockwell hardness values allow error and repeatability

Scale	Hardness scope of blocks	Display value allows error	Allowed repeatability of display values ^a		
15N	70~77 HR 15N	±2 HRN	≤0.04(100-H) Or 1.2hardness unit ^b		
	78~88 HR 15N				
	89~91 HR 15N				
30N	42~54 HR 30N				
	55~73 HR 30N				
	74~80 HR 30N				
45N	20~31 HR 45N			±3 HRT	≤0.06(100-H) Or 2.4hardness unit ^b
	32~61 HR 45N				
	63~70 HR 45N				
15T	73~80 HR 15T				
	81~87 HR 15T				
	88~93 HR 15T				
30T	43~56 HR 30T				
	57~69 HR 30T				
	70~82 HR 30T				
45T	12~33 HR 45T	±3 HRT	≤0.06(100-H) Or 2.4hardness unit ^b		
	34~54 HR 45T				
	55~72 HR 45T				

a: where H is the average hardness value

b: Subject to the larger value

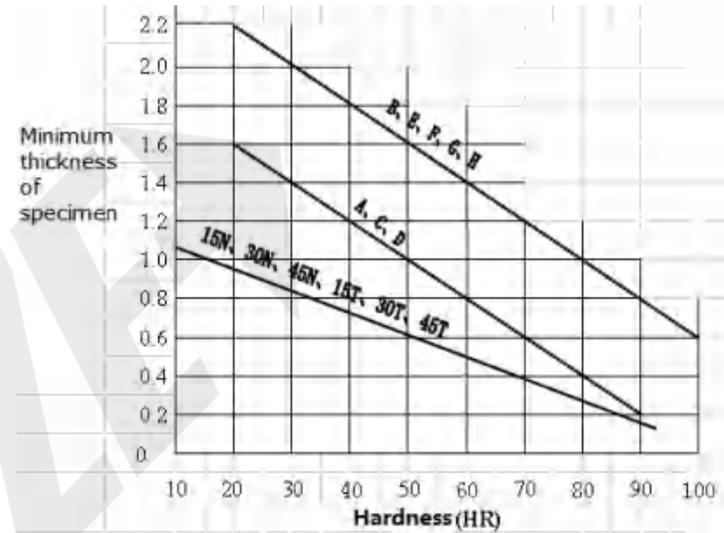
Commonly used scales for surface Rockwell hardness are N and T

7.6. Surface Rockwell hardness test scale, indenter, test force and application examples

Scale	Indenter type	Initial test force	Total test force (N)	Application
15N	Diamond indenter	29.42 N (3kg)	147.1(15)	Cemented carbide, nitrided steel, carburized steel, various heavy steel plates, etc.
30N			294.2(30)	Surface hardened steel, carburized steel, knives, thin steel plates, etc.
45N			441.3(45)	Hardened steel, quenched and tempered steel, hard cast iron and part edges, etc.
15T	Ball indenter φ1.5875mm (1/16 inch)		147.1(15)	Annealed copper alloy, thin mild steel, brass and bronze sheet, etc.
30T			294.2(30)	Thin mild steel, aluminum alloy, copper alloy, brass, bronze, malleable cast iron, etc.
45T			441.3(45)	Pearlitic iron, copper-nickel, zinc-nickel alloy sheet, etc.
15W	Ball indenter φ3.175mm (1/8inch)		147.1(15)	Annealed copper alloy, mild steel, etc.
30W			294.2(30)	Aluminum and its alloys, magnesium mild steel, etc.
45W			441.3(45)	Zinc, aluminum, lead, bronze, beryllium bronze, etc.
15X	Ball indenter φ6.35mm (1/4inch)	29.42 N (3kg)	147.1(15)	Soft metals such as aluminum, tin, zinc, plastics, cardboard, etc.
30X			294.2(30)	
45X			441.3(45)	

7.7. Selection of the minimum thickness of the specimen

The minimum thickness of the test piece should be greater than 10 times the depth of the indentation, and there should be no visible deformation marks on the back of the test piece after the test.



7.8. Arc correction

When testing the Rockwell hardness HRC and HRA scales, the diameter of the tested piece is less than 38mm; when testing the HRB scale hardness, the diameter of the tested piece is less than 25mm, the test results need to be corrected, and the correction values are all positive.

Hardness value HR	Cylindrical specimen diameter (mm)								
	6	10	13	16	19	22	25	32	38
Correction of Lowe's A, C, D scales (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

Hardnessvalue (HR)	Cylindrical specimen diameter (mm)						
	6	10	13	16	19	22	25
Correction of Lowe's B, F and G scales (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

When the rockwell hardness is tested on the surface and the diameter of the specimen is less than 25mm, it needs to be corrected, and the corrected values are all positive.

Hardness value (HRN)	Cylindrical specimen diameter (mm)					
	3.2	6.4	10	13	19	25
Correction of the Surface rockwell N scale						
20		3	2	1.5	1.5	1.5
25		3	2	1.5	1.5	1
30		3	2	1.5	1	1
35		2.5	2	1.5	1	1
40		2.5	1.5	1.5	1	1
45		2	1.5	1	1	1
50		2	1.5	1	1	1
55		2	1.5	1	0.5	0.5
60	3	1.5	1	1	0.5	0.5
65	2.5	1.5	1	0.5	0.5	0.5
70	2	1	1	0.5	0.5	0.5
75	1.5	1	0.5	0.5	0.5	0
80	1	0.5	0.5	0.5	0	0
85	0.5	0.5	0.5	0.5	0	0

Hardness value (HRT)	Cylindrical specimen diameter (mm)						
	3.2	6.4	10	13	16	19	25
Correction of the surface Rockwell T scale							
20						3	2
30						2.5	2
40					3	2.5	2
50				3	2.5	2	1.5
60			3	2.5	2	1.5	1.5
70			2.5	2	1.5	1	1
80	3	2	1.5	1.5	1	1	0.5
90	1.5	1	1	0.5	0.5	0.5	0.5

VIII. Notes

- 8.1. The surface of the test piece should be smooth and clean, and there should be no dirt, oxide scale, pits and obvious processing marks. The supporting surface of the sample and the test bench should be clean to ensure a good fit.
- 8.2. The test piece should be placed on the test bench stably, the test piece must not move during the test, and the test force can be applied to the test piece vertically.
- 8.3. When the test piece is convex cylindrical, the "V" type test bench must be used.
- 8.4. When installing the diamond cone indenter, hold the middle finger of the hand against the diamond head and gently push it toward the indenter rod hole to avoid damage to the diamond head.
- 8.5. The tester should abide by the operating procedures and be able to calibrate the instrument with standard blocks before and after the test.
- 8.6. The hardness block can only be used on the working surface, and the distance between the measuring points of each test is greater than 3mm.
- 8.7 Do a good job of periodic inspection of the hardness tester, once a year to ensure the accuracy of the instrument.

