

MHR-150DT

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Electronic Rockwell Hardness Tester



Overview

Mitech MHR-150DT Electronic Rockwell Hardness Tester, based on the mechanical principle of conical diamond or hard alloy indenter pressing into the sample surface to produce indentation, realizing the material hardness measurement by measuring the depth of the indentation. Capable of inspecting the finished or semi-finished parts of the machined sample, it is suitable for high accuracy hardness testing for batches parts with various metal or non-metallic materials. According to statistics, Rockwell hardness testing is the most widely used hardness testing method in metal processing industry, which utilization ratio is more than 70%. With stable performance, convenient visual reading, electric loading and operation more convenient, it is widely used in metal processing and manufacturing, various metal material's failure analysis and other fields like colleges and research institutions. It is the new type Brinell hardness testing instrument for testing the hardness of the materials like cast iron, steel, soft alloy and so on.

Technical Parameters

Technical specifications

Preliminary testing force
Testing force
Hardness measuring range
Testing force application Mode
Indenter specification
Display
Rockwell scale
Conversion scale
Duration time
Indication error
Maximum height of specimen
Distance of indenter to outer wall
Power supply
Dimensions
Main unit weight

Technical Parameters

98.07N , tolerance $\pm 2.0\%$
588.4N , 980.7N , 1471N , tolerance $\pm 1.0\%$
HRA : 20-88、HRB : 20-100、HRC : 20-70、HRD : 40-77、 HRE : 70-100、HRF : 60-100、HRG : 30-94、HRH : 80-100、 HRK : 40-100
Automatic operation (preliminary test needs manual operation)
Diamond cone Rockwell indenter , $\Phi 1.5875\text{mm}$ steel ball indenter
Classic dial
HRA、HRB、HRC、HRD、HRE、HRF、HRG、HRH、HRK
HV、HB、HRW、HK
1~30s
0.1HR
170mm
165mm
AC220V / 50Hz
510*212*700mm
85kg

Indication Error

Scale	Standard Hardness Range	Allowed tolerance
HRA	(20-75)HRA ; (75-88)HRA	$\pm 2\text{HRA}$; $\pm 1.5\text{HRA}$
HRB	(20-45)HRB ; (45-80)HRB ; (80-100)HRB	$\pm 4\text{HRB}$; $\pm 3\text{HRB}$; $\pm 2\text{HRB}$
HRC	(20-70)HRC	$\pm 1.5\text{HRC}$
HRD	(40-70)HRD ; (70-77)HRD	$\pm 2\text{HRD}$; $\pm 1.5\text{HRD}$
HRE	(70-90)HRE ; (90-100)HRE	$\pm 2.5\text{HRE}$; $\pm 2\text{HRE}$
HRF	(60-90)HRF ; (90-100)HRF	$\pm 3\text{HRF}$; $\pm 2\text{HRF}$
HRG	(30-50)HRG ; (50-75)HRG ; (75-94)HRG	$\pm 6\text{HRG}$; $\pm 4.5\text{HRG}$; $\pm 3\text{HRG}$
HRH	(80-100)HRH	$\pm 2\text{HRH}$
HRK	(40-60)HRK ; (60-80)HRK ; (80-100)HRK	$\pm 4\text{HRK}$; $\pm 3\text{HRK}$; $\pm 2\text{HRK}$

Features

- Widely used for high-precision hardness testing for parts with a variety of metal and non-metallic materials;
- Adopt automatic loading and unloading test force mechanism, variable hand wheel can control the size of the test force, easy to operate;
- Equipped with potentiometer to ensure their own load time;
- Option for various specifications of the indenter, support 15 types of Rockwell hardness scales testing;
- With multi-level test force, a wider range of tests, and higher accuracy;
- With high-precision mechanical dial structure shows hardness values, simple operation, easy to read;
- With modeling novel, strong structure, high reliability, simple operation, intuitive readings, and high test efficiency;
- The stability of the main unit is good. The surface quality of the workpiece and the human operation factors have little influence on the hardness test results;
- Equipped with excellent performance of the carbide indenter, high hardness, wear resistance, good toughness, meanwhile with high temperature and corrosion resistance to ensure the accurate, stable and reliable instrument test value ;
- With the function of error value correction, and the hardness value of the error can be corrected by key input, to make the hardness value more accurately meet the tests' requirements;
- Consistent with GB/T230.1、GB/T230.2、JJG112 and other relevant domestic and foreign standards.

The Scope of Application

Scale	Indenter type	preliminary testing force	Testing force	Measuring range	Application
HRA	Diamond cone	98.07 N	60kgf(588.4N)	20-88HRA	hard alloy, carbide, surface quenched steel, carburizing steel
HRD			100kgf(980.7N)	40-77HRD	thin steel sheet, surface quenched steel
HRC			150kgf(1471N)	20-70HRC	quenched steel, tempered steel, chilled cast iron
HRF	Φ1.5875mm	98.07 N	60kgf(588.4N)	60-100HRF	cast iron, aluminum, magnesium alloy, bearing alloy
HRB	(1/16inch)		100kgf(980.7N)	20-100HRB	mild steel, copper alloy, annealed steel
HRG	steel ball		150kgf(1471N)	30-94HRG	phosphorus iron, beryllium bronze, malleable cast iron
HRH	Φ3.175mm		60kgf(588.4N)	80-100HRH	aluminum, zinc, lead etc.
HRE	(1/8inch)		100kgf(980.7N)	70-100HRE	bearing alloy, tin, hard plastics and other soft materials
HRK	steel ball		150kgf(1471N)	40-100HRK	bearing alloy, tin, hard plastics and other soft materials
HRL	Φ6.35mm(1/4		60kgf(588.4N)	50-115HRL	Hard plastic ,hard rubber, aluminum, tin, bronze, mild steel, synthetic resin, friction materials
HRM	inch)steel ball		100kgf(980.7N)	50-115HRL	
HRR	Φ12.7mm(1/2		60kgf(588.4N)	50-115HRL	

Note: The specimen should have a certain size and thickness to ensure the distance between the adjacent indentation center and the distance from the indentation center to edge of the specimen is greater than 3mm, and the minimum thickness of the specimen should not be less than 8 times the depth of indentation. After the test, the back of the sample shall not have obvious deformation marks, and the minimum thickness of the sample depends on the load size used in its material and hardness test.

Working Conditions

- Operation Temperature : 10 ~ 30°C ;
- Relative Humidity : ≤65% ;
- The surrounding environment should avoid of vibration, strong magnetic field, corrosive medium and heavy dust.

Applications

- Used for quality control in metal processing manufacturing
- Used for failure analysis testing of metallic materials;
- Demonstration experiment for education and teaching in Colleges and Universities;
- Hardness testing of materials in scientific research institutions

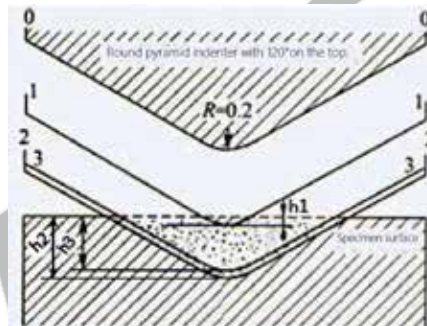
Working Principle

The Rockwell hardness test is taking the diamond cone with 120° apex angle or the hardened steel ball with specified diameter as the indenter to press into sample surface with specific test force, then get the Rockwell hardness of the measured metallic materials according to the sample surface indentation depth.

The Rockwell hardness measurement principle is shown as below figure. 0-0 is the position that the diamond indenter is not yet in contact with the sample. 1-1 figure is the indenter position under the affect of the preliminary test force, the indentation depth is h_1 . The preliminary test is to eliminate the influence to the testing result accuracy caused by the roughness of the sample surface. 2-2 in the figure is the indenter position under the influence of the testing force (the preliminary test force and the main test force). The depth is h_2 . 3-3 in the figure is the indenter position after dismantling the main test force. As the metal elasticity will recovery some degree after deformation, the really indentation depth of the indenter is h_3 . The plastic deformation caused by the main test force make the indenter pressing into the depth is $h = h_3 - h_1$. Rockwell hardness value is determined by the size of h , the greater the depth h , the lower the hardness, otherwise, the higher the hardness. In the traditional concept, usually use a constant C minus h to represent the level of hardness, while the depth of indentation per 0.002mm as a unit of hardness. The hardness value obtained is called the Rockwell hardness value, denoted by the symbol HR.

$$HR = \frac{c-h}{0.002}$$

In the formula, c is a constant (for HRC, HRA, c is 0.2; for HRB, c is 0.26). The Rockwell hardness value HR obtained is an unknown number which is usually read directly on the test machine indicator when testing.



Rockwell hardness tester working principle Figure

It should be noted that the measured hardness values would be different with different indenter and test force. Therefore, the Rockwell hardness testing specifies 15 different hardness test scales according to the different indenter specification and test force sizes. And the HRB, HRC, HRA are the most widely used.

Configurations

	NO.	Name	QTY.	Remarks
	1	Instrument host	1	
	2	Diamond Rockwell indenter	1	
	3	Φ1.5875mm 1/16in steel ball indenter	1	
	4	Small testing table	1	
	5	Large testing table	1	
	6	V-shape testing table	1	
	7	Spare bulbs	2	
Standard Configuration	8	Rockwell standard block HR15N	1	
	9	Rockwell standard block HR30N	1	
	10	Rockwell standard block HR30T	1	
	11	Counterweights	1	
	12	Fuse 0.5A	2	
	13	Power cable	1	
	14	Plastic dust cover	1	
	15	Attached files	1	
	16	Instrument case	1	