

# MHRS-45A

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## Digital Surface Rockwell Hardness Tester



### Overview

Mitech MHRS-45A Digital Display 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. 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%. It is stable performance, intuitive and convenient LCD display, which makes it easy to operate menu-style design, mechanical and electrical integration of a new generation of high-tech products. It is widely used in metal processing and manufacturing, various metal material's failure analysis and other fields like colleges and research institutions, and it is the sophisticated detection equipment to test the surface hardness of metal and other materials.

## Technical Parameters

### Technical specifications

Preliminary testing force
Testing force
Measuring range
Testing force application Mode
Indentor 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

29.4N , tolerance±2.0%
147N、294N、441N , tolerance±1.0%
HR15N : 70-91、 HR30N : 42-80、 HR45N : 20-70、 HR15T : 73-93、 HR30T : 43-82、 HR45T : 12-72
Automatic operation (preliminary test needs manual operation)
Diamond cone Rockwell indenter, Φ1.5875mm steel ball indenter.
LCD and LED digital tube dual screen display
HR15N 、 HR30N 、 HR45N 、 HR15T 、 HR30T 、 HR45T
HV、 HB、 HR
1~30s
0.1HR
170mm
165mm
AC220V/50Hz
510*212*730mm
80kg

## Indication Error

Scale	Standard Hardness Range	Allowed Maximum Tolerance
HR15N	70-91HR15N	±2HRN
HR30N	42-80HR30N	
HR45N	20-70HR45N	
HR15T	73-93HR15T	±3HRT
HR30T	43-82HR30T	
HR45T	12-72HR45T	

## Features

- Widely used for surface Rockwell hardness test with a variety of metal and non-metallic materials;
- Adopt large-screen LCD and LED digital dual-screen display, easy to operate, and it can visually display the test results and the measurement parameters;
- With fast test speed, small indentation of the workpiece after testing, it is the high-tech products of the mechanical and electrical integration ;
- Support the conversion among various hardness scales such as Brinell, Vickers and etc;
- Option for various specifications of the indenter, support many types of Rockwell hardness scales testing ;
- Equipped with high-speed thermal printer, quickly print out the test data;
- Diamond indenter, durable wear and accurate measurement;
- Using grating displacement sensor, and the measurement error is small;
- Consistent with EN-ISO-6508、 GB/T230.1、 GB/T230.2、 JG112、 ASTM E18 and other relevant standards at home and abroad.

## The Scope of Application

Different hardness test scale can measure different ranges of the sample materials and hardness. The commonly used rulers of the surface Rockwell hardness are N and T. It is mainly used to measure the Rockwell hardness value of the metal surface layer and metal thin surface.

Scale	Indenter type	Preliminary test force	Testing force	The scope of application
HR15N HR30N HR45N	Diamond cone	3kfg ( 29.42N )	15kgf ( 147.1N )	Surface carburizing layer, surface nitriding layer, surface hardened steel plate and so on.
HR15T HR30T HR45T			30kgf ( 294.2 )	
HR15W HR30W HR45W			45kgf ( 441.3N )	
HR15X HR30X HR45X	Φ1.5875mm ( 1/16Inch ) steel ball	3kfg ( 29.42N )	15kgf ( 147.1N )	The cast iron, magnesium alloy, bearing alloy, mild steel, copper alloy, annealed steel, phosphor bronze, beryllium bronze, malleable cast iron and other thin specimens.
HR15Y HR30Y HR45Y			30kgf ( 294.2 )	
			45kgf ( 441.3N )	
HR15Z HR30Z HR45Z	Φ3.175mm ( 1/8Inch ) steel ball	3kfg ( 29.42N )	15kgf ( 147.1N )	The aluminum, zinc, lead, tin, hard plastic and other thin specimens.
HR15AA HR30AA HR45AA			30kgf ( 294.2 )	
HR15AB HR30AB HR45AB			45kgf ( 441.3N )	
HR15AC HR30AC HR45AC	Φ6.35mm (1/4Inch) steel ball	3kfg ( 29.42N )	15kgf ( 147.1N )	The hard rubber, copper, synthetic resin and friction materials such as thin specimens.
HR15AD HR30AD HR45AD			30kgf ( 294.2 )	
HR15AE HR30AE HR45AE			45kgf ( 441.3N )	

## 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

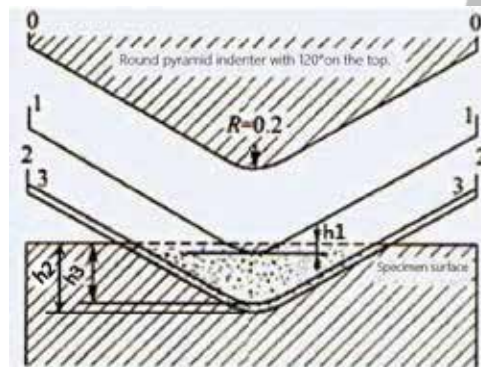
- Used for quality control in metal processing manufacturing
- Used for failure analysis testing of metallic materials;
- Demonstration experiment for education and teaching in Colleges and Universities;
- Hardness testing of materials in scientific research institutions.

## Working Principle

The surface Rockwell hardness test is based on a diamond cone or a diameter of the ball head, with a small test force to press the sample surface hardness value. In the test, the initial test force is first loaded and the main test force is loaded. After pressing the specimen test surface, the main test force is removed, and the surface Rockwell hardness value of the measured metal material can be determined, according to the depth of the specimen indentation while retaining the initial test force.

As is shown in the figure below, 0-0 is the position where the diamond indenter is not yet in contact with the specimen. 1-1 for the initial test force under the action of the indenter position, press the depth of  $h_1$ , the initial test is to eliminate the sample surface. It is not clean which is caused by the accuracy of the test results. In the figure, 2-2 is the position of the indenter under the total test force (initial test force and main test force), the pressing depth is  $h_2$ . 3-3, and the position of the indenter after unloading the main test force, for metal elastic deformation will produce a certain recovery, so the actual pressure into the depth of  $h_3$ . The main test force caused by the plastic deformation of the indenter into the depth of  $h$  is  $h_3 - h_1$ . Rockwell hardness value determined by the size of  $h$ , the greater the depth  $h$ , the lower the hardness; the other hand, and the higher the hardness. Each press 0.001mm is a surface Rockwell hardness unit. The hardness value obtained is called the surface Rockwell hardness value, denoted by the symbol HRN (T).

$$HRN(T) = 100 - \frac{h}{0.001}$$



Rockwell hardness tester working principle Figure

## Configurations

	NO.	Name	QTY.	Remarks
Configuration instructions	1	Main unit	1	
	2	Diamond Rockwell indenter	1	
	3	φ1.5875mm 1/16in ball indenter	1	
	4	Counterweights	3	
	5	Thermal printing paper	1	
	6	Small testing table	1	Diameter 40mm
	7	Large testing table	1	Diameter 150mm
	8	V-shape testing table	1	Diameter 40mm, test cylindrical specimens
	9	Rockwell Standard Block HR15N	1	
	10	Surface Rockwell Standard Block HR30N	1	
	11	Surface Rockwell Standard Block HR30T	1	
	12	Fuse 2A	2	
	13	Power cable	1	
	14	RS-232C Communication line	1	
	15	Plastic dust cover	1	
	16	Attached files	1	
	17	Instrument case	1	