# MHBRV-187.5

- Professional manufacturer, best quality with competitive price
- Recommended by the world UT NDT inspection association for training and examination
- Core technology with independent intellectual property rights, certificate of CE, GOST and etc..

# Electric Multifunctional Hardness Tester

## Overview

Mitech MHBRV-187.5 electric multifunctional hardness tester, based on the mechanical principle of positive pyramid diamond or spherical cemented carbide indenter pressing into the sample surface to produce indentation, realizing Brinell, Rockwell, Vickers three different materials hardness measurement by measuring the depth or diameter of the indentation. With novel appearance, full-featured, Rockwell hardness value can be directly read by the dial, Vickers, Brinell hardness values need to look up the table, easy operation, it can meet the needs of users of a variety of hardness testing. 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 multifunctional testing instrument for mental and part of the the non-metallic materials research and hardness test.



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## Technical Parameters

| Technical specifications | Technical Parameters |
|---|---|
| Brinell measuring range | 8HBW~650HBW |
| Rockwell measuring range | 20HR~100HR |
| Vickers measuring range | 8HV~2900HV |
| Preliminary testing force | 98.07N ( 10kgf ) |
| Brinell testing force | 306N ( 31.25kg ) , 613N ( 62.5kg ) , 1839N ( 187.5kg ) Tolerance±1.0% |
| Rockwell testing force | 588N ( 60kg ) , 980N ( 100kg ) , 1471N ( 150kg ) Tolerance±1.0% |
| Vickers testing force | 294N ( 30kg ) , 980N ( 100kg ) Tolerance±1.0% |
| Diamond indenter specifications | Diamond Rockwell indenter, diamond Vickers indenter |
| Steel ball indenter specifications | φ1.5875mm、φ2.5mm、φ5mm |
| Brinell scale | HBW2.5/31.25、HBW2.5/62.5、 HBW2.5/187.5、HBW5/62.5 |
| Rockwell scale | HRA 、HRB、HRC、HRD、HRE、HRF、HRG、HRK、HRH |
| Vickers scale | HV30 、HV100 |
| Testing Force Application Mode | Automatic (loading, holding, unloading) |
| Indenter objective lens conversion mode | Manual operation |
| Display features | Classic mechanical dial |
| Microocular magnification | 2.5X(Observing), 5X(measuring) |
| Eyepiece magnification | 15x |
| Maximum distance of indentor to main unit | 165mm |
| Test force holding time | 2~60s |
| Max sample height | 200mm(Brinell, Vickers) , 260mm(Rockwell) |
| Voltage | AC220V/50Hz |
| Dimensions | 525*240*760mm |
| Total Weight | 80kg |

## Features

- Equipped with Brinell, Rockwell, Vickers three hardness test indenter, full-featured, widely used that can meet a variety of hardness testing needs of metal and non-metallic materials;
- High precision mechanical dial, easy to operation, intuitive display the test result;
- Unique displacement sensing system design, greatly reducing the error that produced by measure the depth of indentation;
- Adjustable cold light source measurement system that can control the light strength through the software;
- Consistent with GB/T230, GB/T231, GB/T4340, JJG144-1999, ISO 6508, ASTM E 10, ASTM E92, ASTM E18, ASTM E384, ASTM E103 and other relevant domestic and foreign standards.

## Scope of application

- The Brinell indenter is mainly applied to the Brinell hardness testing for metallic materials like cast iron, forged steel and etc.
- The Rockwell indenter is mainly applied to Rockell hardness testing of harden steel, quenched and tempered steel, annealed steel, cold rolled steel, hard aluminum alloy, nonferrous metals, hardened steel sheet, soft metal and other workpeice with surface treatment.
- The Vickers indenter is mainly used for Vickers hardness testing for the small and thin parts, surface coating and workpeice with surface heat treatment.

## Working Conditions

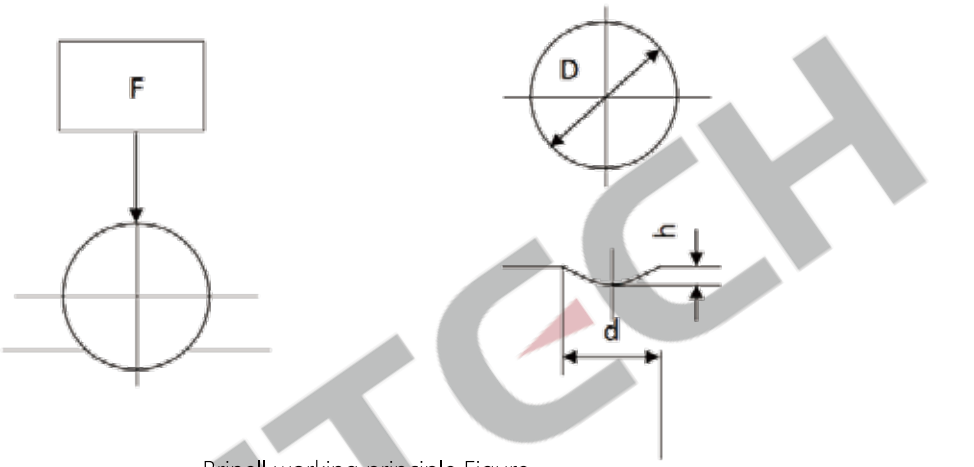
- Operation Temperature : 18 ~ 28°C;
- Relative Humidity : ≤65%;
- Clean environment, no vibration;
- No corrosive media around.

## Working Principle

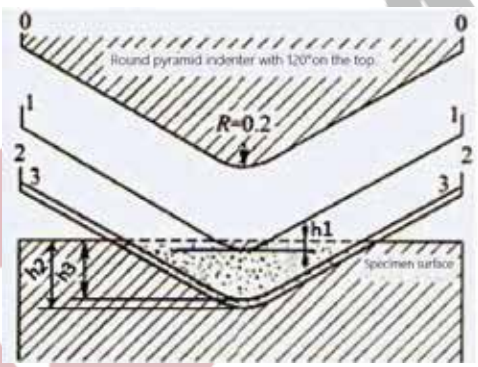
Brinell hardness test: Test force(F) is on the steel ball with certain diameter(D) , pressed on sample surface. After a period of time, cancel the force. The indentation diameter is get by measuring with micrometer ocular,thus to calculate the average pressure ($N/mm^2$).Then we can get the Brinell hardness.

Rockwell hardness test is a vertex angle of 120 ° diamond cone or a certain diameter of the hardened steel ball as a pressure to the specified test force will be pressed into the sample surface, according to the sample surface indentation depth to be measured The Rockwell hardness of metallic materials.

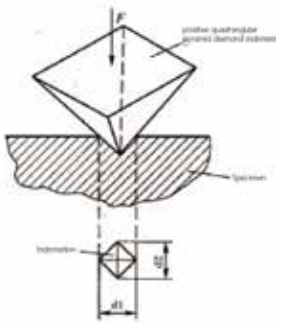
Micro-Vickers (or Knoop) hardness test principle is that put the provisions of the positive pyramid diamond indenter into the sample surface(with fixed experimental force) and maintain a certain length (holding), and then unloading. Finally, there is a positive quadrangular pyramid or kenup indentation with a square surface on the surface of the specimen. Then we can attain the area of indentation via measuring the length of the diagonal by a micrometer eyepiece. Then the corresponding Vickers (or Knoop) hardness values are obtained.




Brinell working principle Figure




Rockwell working principle figure



Vickers working principle figure

Brinell, Rockwell, Vickers hardness values can be converted according to the following formula:

① $$HB = 0.102 \times \frac{2F}{\pi D(D-\sqrt{D^2-d^2})}$$

② $$HR = \frac{c-h}{0.002}$$

③ HV=constant×test force / indentation surface area ≈0.1891 F / $d^2$ ;

① In a formula: F:Test force on steel ball,unit:N; D:Diameter of steel ball; unit:mm; d: Indentation diameter,unit:mm;0.102—Rule coefficient;
② In a formula: c, a constant (for HRC, HRA, c is 0.2; for HRB, c is 0.26); H:the plastic deformation caused by the main test force causes the indenter to press into the depth of the material surface; 0.002: 0.002 mm indentation depth as a hardness unit;
③ In a formula: F,test force (N); d, the arithmetic mean of of the two diagonal d1, d2.

## 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

## Configurations

| | NO. | Name | QTY. | Remarks |
|---|---|---|---|---|
| Standard Configuration | 1 | Main unit | 1 | |
| | 2 | Rockwell diamond indenter | 1 | |
| | 3 | Vickers diamond indenter | 1 | |
| | 4 | Carbide ball indenter φ1.5875mm, φ2.5mm, φ5mm | 3 | |
| | 5 | Big platform | 1 | For Rockwell hardness test |
| | 6 | Middle platform | 1 | For Rockwell hardness test |
| | 7 | V type platform | 1 | For Rockwell hardness test |
| | 8 | Standard Rockwell hardness blocks | 3 | |
| | 9 | Standard Brinell hardness blocks | 1 | |
| | 10 | Standard Vickers hardness blocks | 1 | |
| | 11 | Weights | 5 | Numbers 0 to 4 |
| | 12 | Objective lens | 2 | 2.5X, 5X |
| | 13 | Measuring microscopic | 1 | 15X |
| | 14 | Microscope seat | 1 | |
| | 15 | Slipped Table | 1 | |
| | 16 | Cone-shape Table | 1 | |
| | 17 | Flashlight | 1 | |
| | 18 | Fuse(0.5A) | 2 | |
| | 19 | Lighting head | 1 | |
| | 20 | Lighting shade | 1 | |
| | 21 | Power cable | 1 | |
| | 22 | Plastic dust cover | 1 | |
| | 23 | Attached files | 1 | |
| | 24 | Host accessory box | 1 | |