

# MHBRVU-187.5II

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 Core technology with independent intellectual property rights, certificate of CE, GOST and etc.. ●

## Advanced Optical Hardness Tester



### Overview

Mitech MHBRVU-187.5II advanced optical hardness tester, based on the mechanical principle of 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 optical projection screen, 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.

## Technical Parameters

### Technical specifications

Preliminary testing force
Brinell testing force
Rockwell testing force
Vickers testing force
Brinell measuring range
Rockwell measuring range
Vickers measuring range
Brinell scale
Rockwell scale
Vickers scale
Diamond indenter specifications
Steel ball indenter specifications
Drum minimum scale value
Testing Force Application Mode
Indenter objective lens conversion mode
Microocular magnification
Eyepiece magnification
Test force holding time
Display features
Max sample height
Maximum distance of indenter to fuselage center
Voltage
Dimensions
Total Weight

### Technical Parameters

98.07N ( 10kgf )
306N ( 31.25kg ) , 613N ( 62.5kg ) , 1839N ( 187.5kg ) Tolerance±1.0%
588N ( 60kg ) , 980N ( 100kg ) , 1471N ( 150kg ) Tolerance±1.0%
294N ( 30kg ) , 980N ( 100kg ) Tolerance±1.0%
8HBW~650HBW
20HR~100HR
14HV~1000HV
HBW2.5/31.25, HBW2.5/62.5, HBW2.5/187.5, HBW5/62.5
HRA , HRB, HRC, HRD, HRE, HRF, HRG, HRK, HRH
HV30, HV100
Diamond Rockwell indenter, diamond Vickers indenter
φ1.5875mm, φ2.5mm, φ5mm steel ball indenter
0.002mm
Semi-automatic (loading, holding, unloading)
Manual operation
2.5X(Observing), 5X(measuring)
15x
2~60s
High - end optical projection screen
220mm(Brinell, Vickers) , 260mm(Rockwell)
200mm
AC220V, 50Hz
600*300*900mm
130kg

## 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;
- Using high-end optical projection screen display hardness value, simple operation, easy to read;
- Test force of the loading, holding, unloading with semi-automatic control, high efficiency;
- Adjustable cold light source measurement system that can adjust the light source strength through turning the adjustment handwheel;
- Equipped with excellent performance of the carbide indenter with high hardness, wear resistance, good toughness, while high temperature, corrosion resistance to ensure that the instrument test value is accurate, stable and reliable;
- With seven test power, a wider range of testing, higher accuracy;
- Adopt diamond indenter, durable and accurate;
- Adopt high magnification optical sensing system and high precision photoelectric sensing technology, the test point positioning is accurate, the test result is more accurate;
- Consistent with GB/T230, GB/T231, GB/T4340, JIG144-1999, 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 Rockwell hardness testing of hardened steel, quenched and tempered steel, annealed steel, cold rolled steel, hard aluminum alloy, nonferrous metals, hardened steel sheet, soft metal and other workpiece with surface treatment.
- The Vickers indenter is mainly used for Vickers hardness testing for the small and thin parts, surface coating and workpiece with surface heat treatment.

## Working Conditions

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

## Applications

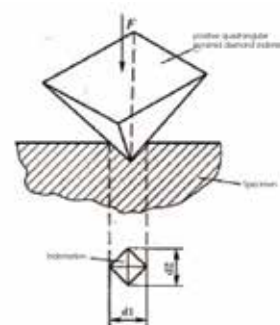
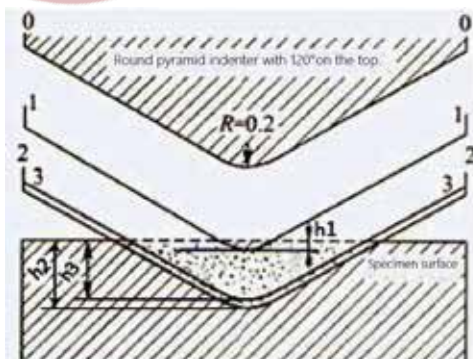
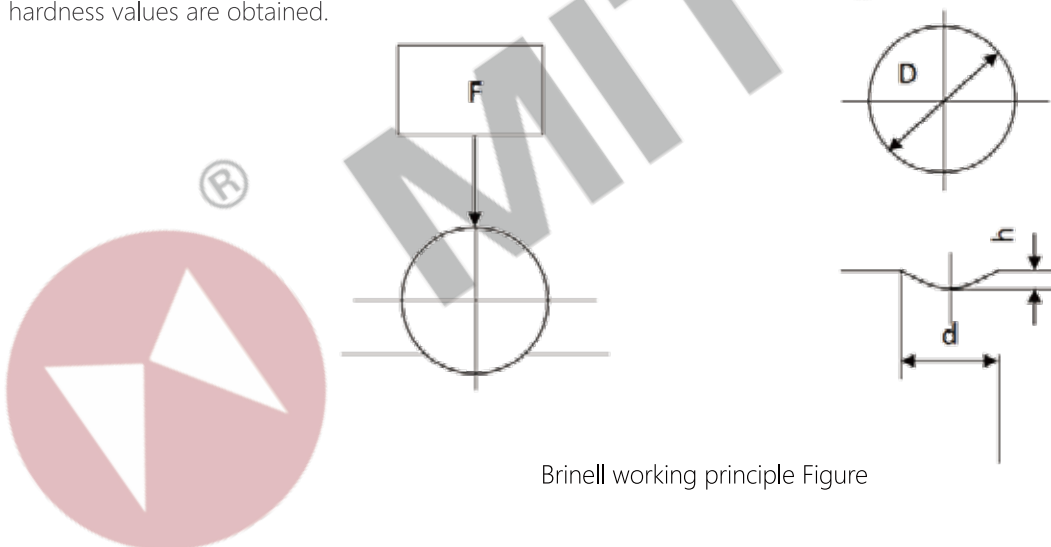
- Used for quality control in metal processing manufacturing
- Used for failure analysis testing of metallic materials;
- Demonstration experiment for education and teaching in Colleges and Universities;
- Hardness testing of materials in scientific research institutions

## Working Principle

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  $120^\circ$  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, Rockwell, Vickers hardness values can be converted according to the following formula:

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

$$\textcircled{2} \quad HR = \frac{c - h}{0.002}$$

$$\textcircled{3} \quad HV = \text{constant} \times \text{test force} / \text{indentation surface area} \approx 0.1891 F / d^2 ;$$

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.

## Configurations

NO.	Name	QTY.	Remarks
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	Large Testing Table	1	For Rockwell hardness test
6	Medium Testing Table	1	For Rockwell hardness test
7	V-shape Testing Table	1	For Rockwell hardness test
8	Standard Rockwell hardness blocks	3	
9	Standard Brinell hardness blocks	1	
10	Standard Vickers hardness blocks	1	
11	Counterweight	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	Spare bulbs	2	
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	

Standard Configuration