



Hardness Tester  
Rockwell / Super Rockwell / Brinell

Hardness Tester Micro-Vickers

Hardness Tester Vickers

Hardness Tester Vickers + Brinell

Portable Hardness Tester Shore

Portable Hardness Testing Devices



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# Hardness Tester

## Rockwell/Super Rockwell Type Durotwin

## Rockwell/Super Rockwell/Brinell Type Durotwin Plus

• Robust and user-friendly manual Rockwell, Super Rockwell and Brinell hardness testers.

### Series 963



963-102 R



963-103

### Overview Durotwin and Durotwin Plus (DT10, DT20)

| Model          | Durotwin   | Durotwin with Brinell Nachrüstsatz   | Durotwin Plus  |
|----------------|--|--|--|
| No.            | 963-102 R  | 963-102 R + 56AAE552   | 963-103  |
| Rockwell       | Skales A – D – C<br>(Diamond indenter)<br>Skales F – B – G<br>( $\frac{1}{16}$ " Steel ball indenter)<br>Skales H – E – K*<br>( $\frac{1}{8}$ " Steel ball indenter) | Skales A – D – C<br>(Diamond indenter)<br>Skales F – B – G<br>( $\frac{1}{16}$ " Steel ball indenter)<br>Skales H – E – K*<br>( $\frac{1}{8}$ " Steel ball indenter) | Skales A – D – C<br>(Diamond indenter)<br>Skales F – B – G<br>( $\frac{1}{16}$ " Steel ball indenter)<br>Skales H – E – K*<br>( $\frac{1}{8}$ " Steel ball indenter)               |
| Super Rockwell | Skales 15N – 30N – 45N<br>(Diamond indenter)<br>Skales 15T – 30T – 45T<br>( $\frac{1}{16}$ " Steel ball indenter)  | Skales 15N – 30N – 45N<br>(Diamond indenter)<br>Skales 15T – 30T – 45T<br>( $\frac{1}{16}$ " Steel ball indenter)  | Skales 15N – 30N – 45N<br>(Diamond indenter)<br>Skales 15T – 30T – 45T<br>( $\frac{1}{16}$ " Steel ball indenter)  |
| Brinell        | –  | Skale HBW1/30<br>(1 mm Carbide ball)<br>Skale HBW2,5/187,5<br>(2,5 mm Carbide ball)  | Skale HBW5/125*<br>(5 mm Carbide ball)<br>Skale HBW2,5/187,5<br>(2,5 mm Carbide ball)<br>Skale HBW2,5/62,5<br>(2,5 mm Carbide ball)<br>Skale HBW2,5/31,25<br>(2,5 mm Carbide ball) |

\* Accessories (optional)

| No.                        | 963-103  |                     |                          |
|----------------------------|--|---------------------|--------------------------|
|                            | 963-102 R  |                     |                          |
|                            | Rockwell   | Super Rockwell      | Brinell                  |
| Preliminary test force (N) | 98,07  | 29,42               | 98,07                    |
| Test force (N)             | 588,4; 980,7; 1471                                       | 147,1; 294,2; 441,3 | 306,5; 612,9; 1226; 1839 |
| Graduation                 | 0,5 HR   | 1 HR                | –                        |
| Display                    | Analogue   |                     | Stand microscope*        |
| Max. workpiece height      | 105 mm (with spindle cover)<br>170 mm (no spindle cover) |                     | –                        |
| Max. workpiece depth       | 150 mm from the center of the indenter ball              |                     | –                        |
| Mass                       | 44 kg  |                     | 48 kg                    |

\* Accessories (optional)

### Standard accessories

- No. 19BAA072 Diamond indenter
- No. 19BAA074 Steel ball indenter  $\frac{1}{16}$ "  
– Steel balls  $\frac{1}{16}$ " (5 pcs.)  
– Flat table Ø 64 mm  
– V-anvil Ø 41 mm, groove width 25 mm  
– Dust protection cover  
– Hardness testing block 60-65 HRC  
– Hardness testing block 60-64 HR30N  
– Level

### Additional standard accessories Durotwin Plus

- No. 19BAA279 Carbide indenter  
Ø 2,5 mm
- No. 19BAA283 Replacement carbide ball indenter  
Ø 2,5 mm (5 pcs.)  
– Hardness testing block  
350 HBW 2,5/187,5

### Optional accessories

- No. 19BAA072 D Diamond indenter  
(incl. MPA certificate)
- No. 19BAA075 Steel ball indenter  $\frac{1}{8}$ "
- No. 19BAA082 Steel balls  $\frac{1}{16}$ " (10 pcs.)
- No. 19BAA083 Steel balls  $\frac{1}{8}$ " (10 pcs.)
- No. 075202 Round table Ø 200 mm
- No. 810-040 V-anvil Ø 40 mm, groove width 30 mm, 120°
- No. 810-041 V-anvil Ø 40 mm, groove width 6 mm, 90°
- No. 810-042 V-anvil Ø 10 mm, groove width 8 mm, 120°
- No. 810-030 Point anvil  
(diamond tipped for Super-Rockwell)
- No. 810-043 Point anvil (Ø 12 mm)
- No. 810-044 Point anvil (Ø 5,5 mm)

### Additional optional accessories Durotwin Plus

- No. 19BAA280 Carbide indenter Ø 5 mm
- No. 19BAA162 Replacement carbide ball Ø 5 mm (1 pcs.)
- No. 19BAA318 D Stand microscope 40x
- No. 19BAA319 D Stand microscope 100x

### No. 56AAE552 Brinell upgrade set for 963-102 R

### Standard accessories for Brinell upgrade set

- No. 19BAA277 Carbide indenter Ø 1 mm
- No. 18BAA279 Carbide indenter Ø 2,5 mm  
– Hardness testing block  
350 HBW 2,5/187,5  
– Additional weight 187,5

Further certified hardness comparison plates on request.

# Hardness Tester Rockwell/Super Rockwell/Brinell\* Type Wizhard

## Series 810

### Standard accessories

- No. 19BAA073 Diamond indenter, min. bore  $\varnothing$  40 mm
- No. 19BAA074 Steel ball indenter  $1/16''$
- No. 810-039 Flat table  $\varnothing$  64 mm
- No. 810-040 V-anvil  $\varnothing$  40 mm, groove width 30 mm,  $120^\circ$
- No. 19BAA123 Hardness testing block 30-35 HRC
- No. 19BAA125 Hardness testing block 60-65 HRC
- No. 19BAA126 Hardness testing block 90-95 HRB
- No. 19BAA128 Hardness testing block 64-69 HR30N
- No. 19BAA129 Hardness testing block 74-79 HR30T
- No. 19BAA517 Dust protection cover
- No. 19BAA098 Level

### Optional accessories

- No. 19BAA072D Diamond indenter (incl. MPA certificate)
- No. 19BAA292 Diamond indenter, min. bore  $\varnothing$  22 mm
- No. 19BAA075 Steel ball indenter  $1/8''$
- No. 810-037 Round table  $\varnothing$  180 mm
- No. 810-038 Round table  $\varnothing$  250 mm
- No. 810-040 V-anvil  $\varnothing$  40 mm, groove width 30 mm,  $120^\circ$
- No. 810-041 V-anvil  $\varnothing$  40 mm, groove width 6 mm,  $90^\circ$
- No. 810-042 V-anvil  $\varnothing$  10 mm, groove width 8 mm,  $120^\circ$
- No. 810-029 V-anvil length 400 mm, groove width 50 mm,  $120^\circ$
- No. 810-030 Point anvil (diamond tipped for Super-Rockwell)
- No. 810-043 Point anvil ( $\varnothing$  12 mm)
- No. 810-044 Point anvil ( $\varnothing$  5,5 mm)

### Optional accessories for Brinell hardness testing

- No. 19BAA277 Carbide ball indenter  $\varnothing$  1 mm
- No. 19BAA279 Carbide ball indenter  $\varnothing$  2,5 mm
- No. 19BAA280 Carbide ball indenter  $\varnothing$  5 mm
- No. 19BAA284 Carbide ball indenter  $\varnothing$  10 mm
- No. 19BAA281 Replacement carbide ball  $\varnothing$  1 mm (5 pcs.)
- No. 19BAA283 Replacement carbide ball  $\varnothing$  2,5 mm (5 pcs.)
- No. 19BAA162 Replacement carbide ball  $\varnothing$  5 mm (1 pcs.)
- No. 19BAA163 Replacement carbide ball  $\varnothing$  10 mm (1 pcs.)
- No. 19BAA318D Stand microscope 40x
- No. 19BAA319D Stand microscope 100x

Further certified hardness comparison plates on request.



HR-522



HR-511 Control unit



HR-522 / HR-523 Touch Screen

| Model  | HR-511   | HR-522 / HR-523  |
|--|--|--|
| Control unit operation   | ●  | —  |
| Touch screen operation   | —  | ●  |
| Test force control   | ●  | ●  |
| Data offset  | ●  | ●  |
| Measured value compensation when testing cylindrical or spherical surfaces | —  | ●  |
| Conversion into other hardness scales                                      | —  | HV, HK, HBS, Tensile strength, HRA, HRB, HRC, HRD, HRF, HRG, HR15T, HR30T, HR45T, HR15N, HR30N, HR45N, HS, HB (HBS)  |
| Statistical functions  | No. of values, Max, Min, mean value, range, UL, LL, standard deviation, no. of OK/±NG evaluations (via data output only)<br>Storage of 1024 values | No. of values, Max, Min, mean value, range, UL, LL, standard deviation, no. of OK/±NG evaluations, histogram, X-R control card<br>Storage and editing of 1024 values |
| Tolerance evaluation   | ●  | ●  |

| Model                              | HR-511  | HR-522  | HR-523  |
|------------------------------------|---|---|---------|
| No.                                | 810-208   | 810-203   | 810-204 |
| Preliminary test force (N)         | 29,42; 98,07  |   |         |
| Test force                         |   |   |         |
| Rockwell (N)                       | 588,4; 980,7; 1471  |   |         |
| Super Rockwell (N)                 | 147,1; 294,2; 441,3   |   |         |
| Brinell* (ball- $\varnothing$ /kg) | HBW 2,5/187,5   | HBW 1/10; HBW 1/30; HBW 2,5/6,25; HBW 2,5/15,625; HBW 2,5/31,25; HBW 2,5/62,5; HBW 2,5/187,5; HBW 5/25; HBW 5/62,5; HBW 5/125; HBW 10/100 |         |
| Loading process                    | Automatic control (loading, duration, unloading)                    |   |         |
| Display unit                       | Control unit  | LCD Touch Screen  |         |
| Test force selection               | Via keyboard input  | Via Touch Screen  |         |
| Effective period                   | 0 to 120 sec (in 1-second stages)                                   |   |         |
| Max. workpiece height              | Height: 205 mm, Depth: 150 mm from the center of the indenter shaft |   |         |
| Table movement                     | manual  | fully automatic   |         |
| Data output                        | RS-232 C / DIGIMATIC / Centronics                                   |   |         |
| Power supply                       | 230 V, 50/60 Hz   |   |         |
| Dimensions (W x D x H)             | Main unit 250 x 670 x 605 mm  |   |         |
| Mass                               | Main unit approx. 60 kg   |   |         |

\* Indentations must be measured using a measuring microscope (not supplied).

# Hardness Tester ROCKWELL

## Series 810

Analogue and digital types.



AR-10



AR-20



ARK-600

### Standard accessories

- No. 19BAA072 Diamond indenter
- No. 19BAA074 Steel ball indenter 1/16"
- No. 810-039 Flat table Ø 64 mm
- No. 19BAA123 Hardness testing block 30-35 HRC
- No. 19BAA125 Hardness testing block 60-65 HRC
- No. 19BAA126 Hardness testing block 90-95 HRB
- No. 19BAA111 Dust protection cover

### Optional accessories

- No. 19BAA072 D Diamond indenter (incl. MPA certificate)
- No. 264-504 D Printer DP-1 VR
- No. 810-037 Round table Ø 180 mm
- No. 810-038 Round table Ø 250 mm
- No. 810-040 V-anvil Ø 40 mm, groove width 30 mm, 120°
- No. 810-041 V-anvil Ø 40 mm, groove width 6 mm, 90°
- No. 810-042 V-anvil Ø 10 mm, groove width 8 mm, 120°
- No. 810-029 V-anvil length 400 mm, groove width 50 mm, 120°
- No. 810-043 Point anvil (Ø 12 mm)
- No. 810-044 Point anvil (Ø 5,5 mm)
- No. 810-026 Special table for Jominy-Test
- No. 810-027 Variable support arm (length 250 mm)

Further certified hardness comparison plates on request.

### Consumables

- No. 19BAA097 Lamp

| Model No.                  | AR-10<br>810-200                                  | AR-20<br>810-201                                  | ARK-600<br>810-218                                |
|----------------------------|---|---|---|
| Version                    | Rockwell  |   |   |
| Preliminary test force (N) | 98,07   |   |   |
| Test force (N)             | 588,4; 980,7; 1471                                |   |   |
| Table up/down drive        | manual  |   |   |
| Loading process            | automatic (loading, duration, unloading)          |   |   |
| Effective period           | adjustable  |   |   |
| Display                    | Analog dial                                       |   | LED (4 digit)                                     |
| Resolution/Graduation      | 0,5   |   | 0,1   |
| Max. workpiece height      | 140 mm  |   |   |
| Max. workpiece depth       | 115 mm<br>(from the center of the indenter shaft) | 122 mm<br>(from the center of the indenter shaft) | 122 mm<br>(from the center of the indenter shaft) |
| Data output                | -   |   | RS-232 C / DIGIMATIC                              |
| Dimensions (WxDxH)         | 220x445x655 mm                                    |   | 210x486x680 mm                                    |
| Mass                       | 36 kg   |   | 40 kg   |

# Hardness Tester ROCKWELL, SUPER-ROCKWELL

## Series 810

Digital type.

### Standard accessories

- No. 19BAA073 Diamond indenter
- No. 19BAA074 Steel ball indenter 1/16"
- No. 810-039 Flat table Ø 64 mm
- No. 19BAA123 Hardness testing block 30-35 HRC
- No. 19BAA125 Hardness testing block 60-65 HRC
- No. 19BAA126 Hardness testing block 90-95 HRB
- No. 19BAA128 Hardness testing block 64-69 HR30N
- No. 19BAA129 Hardness testing block 74-79 HR30T
- No. 19BAA112 Dust protection cover

### Optional accessories

- No. 19BAA072D Diamond indenter (incl. MPA certificate)
- No. 264-504 D Printer DP-1 VR
- No. 810-037 Round table Ø 180 mm
- No. 810-038 Round table Ø 250 mm
- No. 810-040 V-anvil Ø 40 mm, groove width 30 mm, 120°
- No. 810-041 V-anvil Ø 40 mm, groove width 6 mm, 90°
- No. 810-042 V-anvil Ø 10 mm, groove width 8 mm, 120°
- No. 810-029 V-anvil length 400 mm, groove width 50 mm, 120°
- No. 810-030 Point anvil (diamond tipped for Super-Rockwell)
- No. 810-043 Point anvil (Ø 12 mm)
- No. 810-044 Point anvil (Ø 5,5 mm)
- No. 810-026 Special table for Jominy-Test
- No. 810-027 Variable support arm (length 250 mm)

Further certified hardness comparison plates on request.

### Consumables

- No. 19BAA097 Lamp



ATK-600

| Model No.                  | ATK-600<br>810-257                               |
|----------------------------|--|
| Version                    | Rockwell / Super-Rockwell                        |
| Preliminary test force (N) | 98,07 / 29,42                                    |
| Test force (N)             | 588,4; 980,7; 1471; 147,1; 294,2; 441,3          |
| Table up/down drive        | manual   |
| Loading process            | automatic (loading, duration, unloading)         |
| Effective period           | adjustable                                       |
| Display                    | LED (4 digit)                                    |
| Resolution/ Graduation     | 0,1 / 0,2  |
| Max. workpiece height      | 140 mm   |
| Max. workpiece depth       | 122 mm<br>(from the center of the indenter ball) |
| Data output                | RS-232 C / DIGIMATIC / Centronics                |
| Dimensions (W x D x H)     | 210 x 486 x 720 mm                               |
| Mass                       | 42 kg  |

# Hardness Tester Micro-VICKERS Type HM

## Series 810



HM-101



HM-112 / HM-122 / HM-124  
Touch Screen



HM-112

| Model  | HM-112  | HM-122 / HM-124 |
|--|---|-----------------|
| "Touch screen" operation   | ●   | ●               |
| Reading of diagonals D1 and D2   | ●   | ●               |
| Reading of hardness values   | ●   | ●               |
| Reading of XY stage position   | ●   | ●               |
| Test conditions such as test force or effective period                     | ●   | ●               |
| Tolerance evaluation   | ●   | ●               |
| Measured value compensation when testing cylindrical or spherical surfaces | ●   | ●               |
| Control of automatic lens system switch                                    | -   | ●               |
| Conversion into other hardness scales                                      | Soft: HV, HK, HBS, Tensile strength, HRA, HRB, HRF, HRG, HR15T, HR30T, HR45T<br>Hard: HV, HK, HS, HBS, Tensile strength, HRA, HRC, HRD, HR15N, HR30N, HR45N |                 |
| Statistical functions  | No. of values, Max, Min, mean value, range, UL, LL, standard deviation, No. of OK/±NG evaluations, storage and editing of 256 values                        |                 |

## Test force (N)

|   | HM-101 | HM-112 | HM-122 | HM-124 |
|---|--------|--------|--------|--------|
| 4.903 x 10 <sup>-3</sup> /HV0.0005; 9.807 x 10 <sup>-3</sup> /HV0.001; 19.61 x 10 <sup>-3</sup> /HV0.002; 29.42 x 10 <sup>-3</sup> /HV0.003; 39.22 x 10 <sup>-3</sup> /HV0.004; 49.03 x 10 <sup>-3</sup> /HV0.005 | -      | -      | -      | ●      |
| 98.07 x 10 <sup>-3</sup> /HV0.01; 0.2452/HV0.025; 0.4903/HV0.05; 0.9807/HV0.1; 1.961/HV0.2; 2.942/HV0.3; 4.903/HV0.5; 9.807/HV1   | ●      | ●      | ●      | ●      |
| 19.61/HV2   | -      | -      | -      | ●      |

| Model                  | HM-101   | HM-112                            | HM-122             | HM-124            |
|------------------------|--|-----------------------------------|--------------------|-------------------|
| No.                    | 810-124  | 810-126                           | 810-127            | 810-129           |
| Loading process        | automatic (loading, duration, unloading)                           |                                   |                    |                   |
| Effective period       | 5-30 s (in 5 sec increm.)  | 5-90 s (in 1 sec increments)      |                    |                   |
| Lens system            | 10x; 50x   | 10x; 50x                          | 10x; 50x           | 10x; 50x; 100x    |
| Lens system switch     | manual   |                                   | motor driven       |                   |
| Magnification          | 100x; 500x   | 100x; 500x                        | 100x; 500x         | 100x; 500x; 1000x |
| Min. resolution        | 0,2 μm (50x Objective)   |                                   | 0,01 μm            |                   |
| XY-stage dimensions    | 100x 100 mm  |                                   |                    |                   |
| Traveling range        | 25x 25 mm  |                                   |                    |                   |
| Graduation             | 0,01 mm (Nonius)   |                                   | 0,001 mm (Digital) |                   |
| Max. Workpiece size    | height 95 mm; depth 150 mm (from the center of the indenter shaft) |                                   |                    |                   |
| Observation by         | micrometer eyepiece  |                                   |                    |                   |
| Display                | LCD Touch Screen   |                                   |                    |                   |
| Data output            | -  | RS-232 C / DIGIMATIC / Centronics |                    |                   |
| Dimensions (W x H x D) | Main unit 410 x 600 x 590 mm                                       |                                   |                    |                   |
| Mass                   | Main unit 42 kg  |                                   |                    |                   |

## Standard accessories

|              |   |
|--------------|---|
| No. 810-617  | 10x Objective   |
| No. 810-619  | 50x Objective   |
| No. 810-620  | 100x Objective (HM-124)   |
| No. 19BAA058 | Diamond indenter for HM-101, HM-112, HM-122   |
| No. 19BAA059 | Diamond indenter for HM-124   |
| No. 810-011  | XY table (HM-101)   |
| No. 810-074  | XY table (HM-112, HM-122, HM-124)   |
| No. 810-016  | Vise, max. 45 mm groove width   |
| No. 10BAA445 | Camera-Adapter for CCD-camera   |
| No. 19BAA109 | Dust protection cover   |
| No. 19BAA007 | Hardness testing block (700 HV0.3)<br>- Vickers hardness testing table (HM-101)<br>- Halogen lamp (6 V/20 W) built-in (all models)<br>- Level |

## Optional accessories

|                            |   |
|----------------------------|---|
| No. 19BAA058 HD            | Diamond indenter for HM-124 (incl. MPA certificate)                 |
| No. 19BAA058 D             | Diamond indenter for HM-101, HM-112, HM-122 (incl. MPA certificate) |
| No. 810-616                | 5x Objective*   |
| No. 810-617                | 10x Objective*  |
| No. 810-618                | 20x Objective*  |
| No. 810-619                | 50x Objective*  |
| * Installation by Mitutoyo |   |
| No. 810-012                | XY table 50 x 50 mm, Table dimensions 125 x 125 mm                  |
| No. 810-017                | Vise, max. 100 mm groove width                                      |
| No. 810-013                | Thin plate holder, (max. specimen thickness 5 mm)                   |
| No. 810-014                | Wire holder horizontal, (max. Ø 3,2 mm)                             |
| No. 810-015                | Wire holder vertical, (max. Ø 3,2 mm)                               |
| No. 810-018                | Rotary table  |
| No. 810-019                | Variable angle anvil (horizontal, vertical)                         |
| No. 810-020                | Universal specimen holder   |
| No. 810-085                | Specimen holder, adjustable, for thin plates                        |

Further certified hardness comparison plates on request.

Software with camera for measuring and evaluation on request.

# Hardness Tester VICKERS Type AVK

• With manual measurement of diagonals.

## Series 810

### Standard accessories

- No. 810-064 10x Objective
- No. 19BAA060 Diamond indenter
- No. 810-039 Flat table Ø 64 mm
- No. 810-040 V-anvil Ø 40 mm,  
groove width 30 mm, 120°
- No. 810-041 V-anvil Ø 40 mm,  
groove width 6 mm, 90°
- No. 19BAA219 D Lamp built-in
- No. 19BAA110 Dust protection cover
- No. 19BAA016 Hardness testing block  
(720 HV 10)
  - Vickers table
  - Level

### Optional accessories

- No. 19BAA060 D Diamond indenter  
(incl. MPA certificate)
- No. 810-037 Round table Ø 180 mm
- No. 810-038 Round table Ø 250 mm
- No. 810-017 Vise  
(max. groove width 100 mm)

Further hardness testing blocks and upgrade kits for Brinell testing on request



AVK-C0

| Model               | AVK-C0   |
|---------------------|--|
| No.                 | 810-160  |
| Test force (N)      | 9,807; 49,03; 98,07; 196,1; 294,2; 490,3                             |
| Loading process     | automatic (loading, duration, unloading)                             |
| Effective period    | 5 to 30 sec (in 5 sec increments)                                    |
| Objective           | 10x  |
| Magnification       | 100x   |
| Min. resolution     | 1 µm   |
| Max. workpiece size | height 205 mm / depth 165 mm (from the center of the indenter shaft) |
| Observation by      | micrometer eyepiece  |
| Power supply        | 230 V, 50 Hz   |
| Dimensions          | 330x580x705 mm   |
| Mass                | 49 kg  |

# Hardness Tester VICKERS + Brinell Type HV

## Series 810



810-163



HV-112 / HV-114

| Model  | HV-112 / HV-114  |
|--|--|
| "Touch screen" operation   | ●  |
| Reading of diagonals D1 and D2   | ●  |
| Reading of hardness values   | ●  |
| Test conditions such as test force or effective period                     | ●  |
| Tolerance evaluation   | ●  |
| Measured value compensation when testing cylindrical or spherical surfaces | ●  |
| Control of automatic lens system switch                                    | ●  |
| Conversion into other hardness scales                                      | Soft: HV, HK, Tensile strength, HRA, HRB, HRF, HRG, HR15T, HR30T, HR45T<br>Hard: HV, HK, HS, HBS, Tensile strength, HRA, HRC, HRD, HR15N, HR30N, HR45N |
| Statistical functions  | No. of values, Max, Min, mean value, range, UL, LL, standard deviation, No. of OK±NG evaluations, storage and editing of 256 values                    |

| Model               | HV-112   | HV-114  |
|---------------------|--|---|
| No.                 | 810-163 D  | 810-165 D   |
| Test force (N)      | 1,961; 2,942; 4,903; 9,807; 24,51; 49,03;<br>98,07; 196,1            | 9,807; 19,61; 29,42; 49,03; 98,07;<br>196,1; 294,2; 490,3 |
| Loading process     | automatic (loading, duration, unloading)                             |   |
| Effective period    | 5-99 sec (in 1 sec increments)                                       |   |
| Lens system         | 20x, 10x   |   |
| Lens system switch  | motor driven   |   |
| Magnification       | 200x, 100x   |   |
| Min. resolution     | 0,1 μm   |   |
| Max. workpiece size | height 210 mm / depth 170 mm (from the center of the indenter shaft) |   |
| Observation by      | Micrometer eyepiece  |   |
| Display             | LCD Touch screen   |   |
| Data output         | RS-232 C / Centronics / DIGIMATIC                                    |   |
| Dimensions (WxDxH)  | Main unit: 245 x 515 x 840 mm  |   |
| Mass                | Main unit: 57 kg   |   |

### Standard accessories

- No. 810-617 10x Objective
- No. 810-618 20x Objective
- No. 19BAA060 Diamond indenter
- No. 810-039 Flat table Ø 64 mm
- No. 810-040 V-anvil Ø 40 mm, groove width 30 mm, 120°
- No. 810-041 V-anvil Ø 40 mm, groove width 6 mm, 90°
- No. 19BAA219 Halogen lamp (6 V/20 W), built-in
- No. 19BAA016 Hardness testing block (720 HV 10)
- No. 19BAA110 Dust protection cover

### Optional accessories

- No. 19BAA060 D Diamond indenter (incl. MPA certificate)
- No. 810-616 5x Objective\*
- No. 810-619 50x Objective\*
- \* Installation by Mitutoyo
- No. 19BAA063 Knoop diamond indenter
- No. 810-012 XY table 50x50 mm, Table dimensions 125x125 mm
- No. 810-016 Vise, max. 45 mm groove width
- No. 810-017 Vise, max. 100 mm groove width
- No. 810-037 Round table Ø 180 mm
- No. 810-038 Round table Ø 250 mm
- No. 19BAA445 Camera-Adapter for CCD-camera

### Optional accessories for Brinell hardness testing (Upgrading only by Mitutoyo engineer on request!)

- No. 19BAA277 Carbide ball indenter Ø 1 mm
- No. 19BAA278 Carbide ball indenter Ø 2 mm
- No. 19BAA279 Carbide ball indenter Ø 2,5 mm
- No. 19BAA280 Carbide ball indenter Ø 5 mm
- No. 19BAA415 Mass 22,73 g for Brinell hardness testing HBW 1/2.5 (for HV-114)
- No. 19BAA416 Mass 113,6 g for Brinell hardness testing HBW 2.5/6.25 (for HV-112, HV-114)
- No. 19BAA417 Mass 454,5 g for Brinell hardness testing HBW 5/25 (for HV-112, HV-114)
- No. 19BAA418 Mass 511,4 g for Brinell hardness testing HBW 2.5/15.625 (for HV-112, HV-114)

Further certified hardness comparison plates on request.

Devices with external monitor for measuring diagonals: HV-113 and HV-115 on request.

Software with camera for measuring and evaluation, on request.

# Portable Hardness Tester Shore

- Testing of rubber, elastomers and plastics.

## Series 811

### Analog type

- Long leg and compact design
- Shore hardness "A" and "D"

#### Shore A

Hardness scale range: 0–100 Shore A  
Measuring range: 10– 90 Shore A

#### Shore D

Hardness scale range: 0–100 Shore D  
Measuring range: 20– 90 Shore D

#### Optional accessories

No. 811-019 Measuring stand for 811-331

No. 811-012 Measuring stand for 811-333

No. 811-013 Measuring stand for 811-335-01

No. 811-014 Measuring stand for 811-337-01

additional optional accessory on request



811-331



811-335-01

| No.                    | Long leg design  |                             | Compact design                 |                             |
|------------------------|--|-----------------------------|--------------------------------|-----------------------------|
|                        | 811-331  | 811-333                     | 811-335-01                     | 811-337-01                  |
| Materials to be tested | regular rubber<br>soft plastic                         | hard rubber<br>hard plastic | regular rubber<br>soft plastic | hard rubber<br>hard plastic |
| Shore hardness         | A  | D                           | A                              | D                           |
| Standard               | JIS K 7215, JIS K 6253, ISO 868, ISO 7619, ASTM D 2240 |                             |                                |                             |
| Tip form               | Cut cone   | Cone                        | Cut cone                       | Cone                        |
| Tip radius             | –  | 0,1 ± 0,012 mm              | –                              | 0,1 ± 0,012 mm              |
| Tip diameter           | Ø 0,79 mm  | –                           | Ø 0,79 mm                      | –                           |
| Graduation             | 1 degree / dial with maximum pointer                   |                             |                                |                             |
| Pressure plan form     | Ø 18 mm  |                             | Ø 18 mm                        |                             |
| Mass                   | 320 g  |                             | 300 g                          |                             |

#### No. 64AAA964

Hardness Testing Block Set (Rubber) (Hardness 30, 60, 90 Shore "A")



# Portable Hardness Tester Shore

- Testing of rubber, elastomers and plastics.

## Series 811

### Digital type

- Long leg and compact design
- Shore hardness "A" and "D"



811-332



811-338-01

| No.                    | Long leg design  |                             | Compact design                 |                             |
|------------------------|--|-----------------------------|--------------------------------|-----------------------------|
|                        | 811-332  | 811-334                     | 811-336-01                     | 811-338-01                  |
| Materials to be tested | regular rubber<br>soft plastic   | hard rubber<br>hard plastic | regular rubber<br>soft plastic | hard rubber<br>hard plastic |
| Shore hardness         | A  | D                           | A                              | D                           |
| Standard               | JIS K 7215, JIS K 6253, ISO 868, ISO 7619, ASTM D 2240                 |                             |                                |                             |
| Tip form               | Cut cone   | Cone                        | Cut cone                       | Cone                        |
| Resolution             | 0,5 degree / Digital display with HOLD function and "DIGIMATIC" output |                             |                                |                             |
| Pressure plan form     | Ø 18 mm  |                             | Ø 18 mm                        |                             |
| Mass                   | 310 g  |                             | approx. 290 g                  |                             |

### No. 64AAA964

Hardness Testing Block Set (Rubber) (Hardness 30, 60, 90 Shore "A")



| Functions    | Series 811 |
|--------------|------------|
| Data output  | ●          |
| ON / OFF     | ●          |
| DATA / HOLD  | ●          |
| ZERO setting | ●          |

### Shore A

Hardness scale range: 0-100 Shore A  
Measuring range: 10- 90 Shore A

### Shore D

Hardness scale range: 0-100 Shore D  
Measuring range: 20- 90 Shore D

### Optional accessories

- No. 905693 Signal cable (1 m)
  - No. 905694 Signal cable (2 m)
  - No. 264-504 D Data processor (printer)
  - No. 811-019 Measuring stand for 811-332
  - No. 811-012 Measuring stand for 811-334
  - No. 811-013 Measuring stand for 811-336-01
  - No. 811-014 Measuring stand for 811-338-01
- additional optional accessory on request

## "HARDMATIC" Portable Hardness Testing Devices

- These "HARDMATIC" instruments are direct-reading hardness testers that include the generally-recognised hardness scales and make the use of conversion tables superfluous.
- The clear division of the large digits on these instruments covers the whole range of Vickers, Brinell, Rockwell B and Rockwell C hardness scales.

### Series 810

#### Analog type

#### Relation between surface roughness and minimum depth of workpiece

- 1) Surface  
The workpiece surface should be  $R_{max}$  1,5  $\mu\text{m}$  to 1,7  $\mu\text{m}$  or less.
- 2) Minimum depth  
Minimum depth has to be at least 3 times the indentation depth.

#### Optional accessories

No. 60BAA014 Measuring stand



810-503

| No.            | Description | Scale            | Measuring range            |
|----------------|-------------|------------------|----------------------------|
| <b>810-503</b> | HH-110-03   | Vickers          | 100-1000 HV                |
|                |             | Brinell          | 100- 500 HB                |
|                |             | Rockwell B       | 50- 100 HRB                |
|                |             | Rockwell C       | 20- 70 HRC                 |
| <b>810-504</b> | HH-110-04   | Tensile strength | 350-1400 N/mm <sup>2</sup> |
|                |             | Brinell          | 100- 400 HB                |
|                |             | Rockwell B       | 50- 100 HRB                |
|                |             | Rockwell C       | 20- 70 HRC                 |

# "HARDMATIC" Portable Hardness Testing Devices

- These "HARDMATIC" instruments are direct-reading hardness testers that include the generally-recognised hardness scales and make the use of conversion tables superfluous.

## Series 810

### Digital type

- 5 Hardness scales plus option for measuring tensile strength  
Vickers HV, Brinell HB, Rockwell C (HRC), Rockwell B (HRB), Shore HS.
- Memory for 450 measured values.



### Relation between surface roughness and minimum depth of workpiece

- 1) Surface  
The workpiece surface should be  $R_{max}$  1,5  $\mu\text{m}$  to 1,7  $\mu\text{m}$  or less.
- 2) Minimum depth  
Minimum depth has to be at least 3 times the indentation depth.

### Standard accessories

- No. 19BAA190 Indenter (built-in)
- No. 19BAA180 Clamping shaft ( $\varnothing$  8 mm) for mounting on drill chuck for 810-264 (HH-140)
- No. 19BAA196 Hardness testing block 30HRC
- No. 19BAA197 Hardness testing block 60HRC
  - Battery
  - Power supply unit
  - Carry case

### Optional accessories

- No. 937386 Signal cable 1 m
- No. 965012 Signal cable 2 m
- No. 19BAA191 RS-232 C cable
- No. 810-081 Measuring stand (only HH-140)
- No. 19BAA189 Cylinder probe anvil
- No. 19BAA194 Step anvil
- No. 19BAA195 V-anvil
- No. 19BAA037D Hardness testing block 30HRC (incl. MPA certificate)
- No. 19BAA040D Hardness testing block 60HRC (incl. MPA certificate)

| Model No.                        | HH-120<br>810-263  | HH-140<br>810-264                      |
|----------------------------------|--|--|
| Measurement and conversion range |  |  |
| Vickers                          | 32 HV-999 HV   |  |
| Brinell                          | 81 HB-767 HB for hard materials (e.g. steel, ...)<br>42 HB-169 HB for soft materials (e.g. brass, ...)             |  |
| Rockwell B                       | 41.0 HRB-110.0 HRB for hard materials (e.g. steel, ...)<br>10.0 HRB- 93.5 HRB for soft materials (e.g. brass, ...) |  |
| Rockwell C                       | 0 HRC-68.0 HRC for hard materials (e.g. steel, ...)  |  |
| Shore                            | 14.0 HS-101.3 HS for hard materials (e.g. steel, ...)<br>5.5 HS- 30.2 HS for soft materials (e.g. brass, ...)      |  |
| Tensile strength                 | 390-1999 N/mm <sup>2</sup> for hard materials (e.g. steel, ...)  |  |
| Resolution                       | HV / HB / Tensile strength: 1<br>HRB / HRC / HS: 0.1   |  |
| Test force                       | 15 kg  |  |
| Indenter shaft                   | Diamond cone 100°  |  |
| Data output                      | RS-232 C / DIGIMATIC   |  |
| Power supply                     | AC adapter or battery (9 V battery pack)   |  |
| Dimensions (W x D x H)           | 136 x 100 x 143 mm   | 136 x 83 x 60 mm* / 82 x 112 x 33 mm** |
| Mass                             | 950 g  | 800 g* / 200 g**                       |

\* Measuring unit

\*\* Display unit

# "HARDMATIC" HH-411 Portable Hardness Testing Devices

- The "HARDMATIC" HH-401 is a light-weight portable hardness testing instrument for metal workpieces.
- It works on the rebound hardness principle (standardised according to ASTM 7956).
- Measurement is conducted with hardness value L (Leeb-value), however, conversion to any desired hardness scale can be performed.
- In addition the display automatically shows OK/NG with the tolerance function set and selected.
- Memory function for 1800 measured values.
- Automatic measuring direction angle-compensation.



810-288 (optional accessory)



810-289 (optional accessory)



810-290 (optional accessory)

## Series 810 Digital type



810-283-01

### Surface roughness and minimum depth/mass of workpiece

- 1) Surface  
The workpiece surface should be Ra 10 µm or less.
- 2) Minimum depth/mass  
Minimum depth has to be at least 5 mm, minimum mass at least 5 kg; workpieces with other characteristic may be measured after certain preparation (i.e. mounting on granite plate).

### Standard accessories

- |                 |  |
|-----------------|--|
| No. 810-287     | Main unit (impact device)                        |
| No. 19BAA450-01 | Valuation unit                                   |
| No. 19BAA457    | Carbide ball indenter                            |
| No. 19BAA451    | Support ring Ø 22 mm<br>– Batteries (2 pcs.)     |
| No. 19BAA258    | Cleaning brush                                   |
| No. 19BAA452    | Support ring Ø 14 mm                             |
| No. 19BAA265    | Hardness testing block HLD 800<br>– Plastic case |
| No. 19BAA460    | Detector cable                                   |

### Optional accessories

- |               |   |
|---------------|---|
| No. 19BAA248  | Anvil for convex cylinder<br>(r = 10–20 mm)             |
| No. 19BAA249  | Anvil for concave cylinder<br>(r = 14–20 mm)            |
| No. 19BAA250  | Anvil for convex spheric<br>surfaces (r = 10–27,5 mm)   |
| No. 19BAA251  | Anvil for concave spheric<br>surfaces (r = 13,5–20 mm)  |
| No. 19BAA243  | Hardness testing block HLD 880                          |
| No. 19BAA244  | Hardness testing block HLD 830                          |
| No. 19BAA245  | Hardness testing block HLD 730                          |
| No. 19BAA246  | Hardness testing block HLD 620                          |
| No. 19BAA247  | Hardness testing block HLD 520                          |
| No. 264-504 D | "DIGIMATIC" miniprocessor<br>DP1-VR                     |
| No. 937386    | Signal cable (1 m)                                      |
| No. 19BAA238  | RS-232 C cable  |
| No. 526688 D  | AC/DC adapter   |
| No. 810-288   | Impact device Type DC<br>approx. Ø 22 x 85 mm, 50 g     |
| No. 810-289   | Impact device Type D+15<br>approx. Ø 28 x 190 mm, 130 g |
| No. 810-290   | Impact device Type DL<br>approx. Ø 28 x 230 mm, 140 g   |

| Model          |                  | HH-411  |
|----------------|------------------|---|
| No.            |                  | 810-283-01  |
| Hardness value |                  | Hardness L (Leeb)   |
| Impacter       |                  | Carbide   |
| Functions      | Conversion range |   |
|                | Rockwell C       | 19.3 HRC – 68.2 HRC   |
|                | Rockwell B       | 13.5 HRB – 101.7 HRB  |
|                | Vickers          | 43 HV – 950 HV  |
|                | Shore            | 13.2 HS – 99.3 HS   |
|                | Tensile strength | 499 – 1996 MPa  |
|                | Brinell          | 20 – 894 HB   |
|                |                  | Automatic compensation for impact or test direction, tolerance evaluation,<br>Offset values, data storage 1800 measured values,<br>Statistical analysis (average value, max. value, min. value, standard deviation),<br>Internal counter for measurements carried out |
| Data output    |                  | RS-232 C / DIGIMATIC  |
| Power supply   |                  | AC-Adapter or Battery LR6 (2 pcs.)  |
| Dimensions     |                  | Ø 28 x 175 mm (Measuring unit) / 70 x 110 x 35 mm (Display unit)  |
| Mass           |                  | 120 g (Measuring unit) / 200 g (Display unit)   |



Sample application