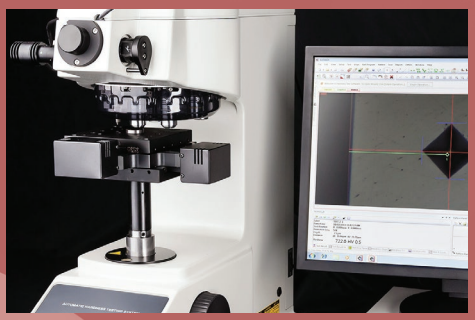
HARDNESS TESTING

M

Micro-Vickers Hardness Testing Machines



Vickers Hardness Testing Machines

Rockwell Hardness Testing Machines

Portable Hardness Testing Instruments

Contents

Mitutoyo

HM-200 Series

SERIES 810 – Micro-Vickers Hardness Testing Machines

- The latest electromagnetic force motor used in the loading mechanism enables the test force to be freely selected over the wide range of 0.05 gf to 2 kgf. It is also possible to freely set the time for loading and load dwell time. Now the benefits of absolute control over the indentation size in Vickers hardness testing can be realized. The HM-200 series always offers the test force most appropriate for the specimen material and shape.
- The objectives used enable a very comfortable working distance between the objective and the specimen surface. This greatly reduces the possibility of collision between the specimen and the objective during focussing operations. (For example, for 50X objectives: 1.1 mm for conventional models; 2.5 mm for HM-200 series models.)
- Newly designed 'MH Plan' objectives are optimized for measuring indentation images. The lineup includes 6 long working distance objectives: 10X, 20X, 50X and 100X for measuring indentation images, and 2X and 5X for enabling wide-range measurement around indentations. LEDs are used in the illumination system for their advantages of longer life, lower heat generation and higher energy efficiency than the traditional incandescent bulb.

System A
All-in-one model with simple colour touch-panel operation for motorized test force switching and motorized turret mount.

Technical Data

Test force range
- HM-210A: 9 steps + arbitrary test force
- HM-220A: 19 steps + arbitrary test force

Load dwell time: 0 - 999s

Max. specimen height
- System A/B: 133 mm (stage size: 25 x 25 mm)
- System C: 112 mm (stage size: 25 x 25 mm)
- System D: 72 mm (stage size: 25 x 25 mm)

Max. specimen depth: 160 mm (from the centre of indenter)

Optical path: 4-port turret, infinity-corrected objectives

Resolution: 0.1 µm when using objectives less than 50X (0.01 µm when using objectives of 50X or more)

Data output: Serial (RS-232), Digimatic and USB 2.0 interfaces

Functions: Calculation of Vickers/Knoop*2 hardness and ceramic fracture toughness based on IF method (JIS R1697), 3 display formats (standard, list, simple), GO/NG judgement, test condition guide, curve and user correction, hardness corresponding value, statistics calculation

*2 For Knoop hardness test, Knoop indenter (optional) is required.

Optional Accessories

Code No.	Description	Price
375-056	Micro-scale	£263.00
810-013	Specimen (thin plate) holder	£287.00
810-017	Vice (100 mm)	£903.00
810-018	Rotary table	£759.00
810-019	Specimen tilting holder	£1450.00
810-020	Universal specimen holder	£478.00
810-085	Adjustable specimen (thin plate) holder	£878.00
810-095	Rotatable specimen stage	£1830.00
810-454E	Video camera, 8.4" LCD (System A only)	£3220.00
810-641	Vibration isolator stand	£4260.00
11AAC104	Objective lens 2X	£1100.00
11AAC105	Objective lens 5X	£679.00
11AAC106	Objective lens 10X	£702.00
11AAC107	Objective lens 20X	£874.00
11AAC108	Objective lens 100X	£1270.00
11AAC109	Indenter shaft (HM-210)	£3130.00
11AAC110	Indenter shaft (HM-220)	£4960.00
11AAC129	Measuring eyepiece (System B, C and D)	£2290.00

For Hardness Test blocks refer to page M-12 for details.
For Indenters refer to page M-12 for details.

Specifications

Model	HM-210		HM-220	
System	A	B / C / D	A	B / C / D
Code No.	810-401E	810-404E	810-406E	810-409E
Indentation measurement	Measuring eyepiece	Automatic (AVPAK-20)	Measuring eyepiece	Automatic (AVPAK-20)
Main unit operation	Touch panel	PC	Touch panel	PC
Fixed test forces	10, 20, 30, 50, 100, 200, 300, 500, 1000 gf		0.05, 0.1, 0.2, 0.3, 0.5, 1, 2, 3, 5, 10, 20, 30, 50, 100, 200, 300, 500, 1000, 2000 gf	
Arbitrary test force	One setting can be saved, default is HV0.025 (25 gf)			
Test force control	Force generation by electromagnetic and automatic control (load, dwell, unload)			
Turret drive	Motor-driven			
Control unit	Touch screen type	—	Touch screen type	—
Indenters	A maximum of two can be installed. (One indenter shaft with diamond indenter is provided as standard in the main unit.)			
Objectives	A maximum of four can be installed in turret. (A 50X objective is provided as standard.)			
Dimensions (W x D x H)*1	315 x 671 x 595 mm	315 x 586 x 741 mm	315 x 671 x 595 mm	315 x 586 x 741 mm
Mass (main unit)	38.5 kg	37.4 kg	38.5 kg	37.4 kg
Power supply	220-240 VAC			
Price	POA	POA	POA	POA

*1 Excluding protrusions and stage.

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MiCAT
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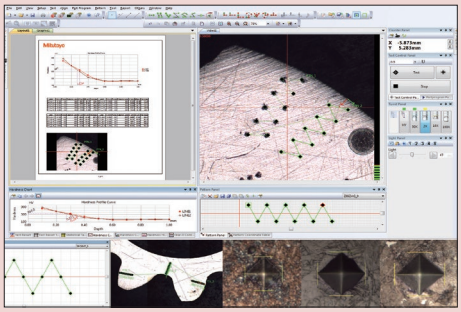
the standard in world metrology software
TESTING

AVPAK-20 Software

- Software that supports control, testing and report creation related to hardness testing.
- Supports parameter setting and automatic measurement.
- Part Program and Part Manager functions support testing of multiple and irregular specimens.
- Test patterns such as straight lines, zigzag lines and teaching patterns can be created using the Pattern Creation tool.
- The digital zoom function can be used to easily magnify the entire specimen for checking the pattern positioning and the site being tested.

Functions

Layout view:	Photos from individual views, graphs, tables, etc., can be freely positioned to help with report creation.
Stitching:	Takes images of an entire rectangular field from the moving stage then combines the images.
Auto trace:	Automatically traces the shape of the sample. Takes images as the stage moves along the outer contours of the specimen then combines the images.
Navigation function:	When moving between measurement points during multipoint testing, this function guides the travel of the XY fine adjustment manual stage to the next position (System B).



AVPAK-20 sample screenshot.

System Configurations

Model	HM-210				HM-220			
System	A	B	C	D	A	B	C	D
Code No.	810-401E	810-404E			810-406E	810-409E		
Standard accessories								
50X objective	✓	✓	✓	✓	✓	✓	✓	✓
1/2" 3 megapixel USB camera		✓	✓	✓		✓	✓	✓
Measuring eyepiece, **11AAC129**	✓				✓			
Auto-focus stage				✓				✓
Essential-options elements								
PC		•	•	•		•	•	•
AVPAK-20 software		•	•	•		•	•	•
Manual XY stage 25 x 25 mm **810-420***1	○	○			○	○		
Manual XY stage 50 x 50mm **810-423***1	○	○			○	○		
Motorized XY stage 50 x 50 mm **810-461E**			○	○			○	○
Motorized XY stage 100 x 100 mm **810-462E**			○	○			○	○

Key: ✓ Included
• Selectable
○ One of the types must be selected from the choice offered

*1 These units are also available in inch versions. Please contact us for details.

System B
System B is equipped with AVPAK-20, a software package for automatic hardness testing systems that automatically measures the diagonal length of an indentation and calculates the corresponding hardness value. This means that measurement error caused by variation in operator interpretation is eliminated, so reducing costs.

System C
In addition to the functions of System B, System C is equipped with a motorized XY stage. This system is useful for improving the efficiency of operations such as multipoint hardness testing.

System D
In addition to the functions of System B and System C, System D is equipped with an autofocus function that enables automatic hardness testing, thereby increasing efficiency and reducing labour costs.

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HV-100 Series

SERIES 810 – Vickers Hardness Testing Machines

- Vickers hardness testers have a wide application in testing metals, especially small heat-treated parts, and are also suitable for making special-purpose tests such as carburized case hardness, maximum hardness of spot welds, high-temperature hardness, and fracture toughness of ceramic materials.
- Objective lenses specifically developed for hardness testing are supplied. A clear and natural view of an indentation is achieved by changing the light source of the illumination from halogen to LED.
- A new 2X lens for wide-angle observation has been added to the range. Now, magnifications of 10X, 20X, 50X and 100X for observation and gauging; and 5X and 2X for observation are available. Also, the working distance is doubled (5.9 to 11.8mm) for the 10X objective lens (in-house comparison) to minimize the risk of collision between the workpiece and the lens during operations.
- In addition to Vickers hardness testing, fracture toughness tests (IF Method: JIS R 1607) and other tests can be performed with optional accessories such as a Knoop indenter and additional indenters and a weight for Micro Brinell testing.
- Four systems are available: Basic model A; model B equipped with automatic indentation reading function; model C equipped with automatic indentation reading function and automatic XY stage; model D equipped with automatic indentation reading function, automatic XY stage, and auto-focus stage.

System A
All-in-one model with simple colour touch-panel operation for motorized test force switching and motorized turret mount.

Technical Data

Test force range:	8 steps
Load dwell time:	5 - 999 s
Max. specimen height	
System A:	210 mm (using flat anvil)
System B:	181 mm (stage size: 50 x 50 mm)
System C:	172 mm
System D:	132 mm
Max. specimen depth:	170 mm (from the centre of indenter)
Optical path:	3-port objectives switching system of infinity-corrected optical system
Resolution:	0.1 µm when using objectives less than 50X (0.01 µm when using objective lens more than 50X)
Data output:	Serial interface (RS-232), Digimatic interface, USB 2.0
Functions:	Calculation of Vickers/Knoop*2/ Brinell*3 hardness and ceramic fracture toughness based on IF method (JIS R1697), 3 display format (standard, list, simple), GO/NG judgement, test condition guide, curve and user correction, hardness corresponding value, statistics calculation

*2 For Knoop hardness testing the Knoop indenter (optional) is required.
*3 For Brinell hardness testing a Brinell indenter (optional) and additional weight are required.

Optional Accessories

Code No.	Description	Price
810-037	Round table (ø180 mm)	£430.00
810-038	Round table (ø250 mm)	£943.00
810-040	V-anvil (ø40 mm, 120° groove 30 mm wide, ø15 - ø60 mm)	£238.00
810-041	V-anvil ((ø40 mm, 120° groove 30 mm wide, ø3 - ø9 mm)	£196.00
810-420	Manual XY stage (25 x 25 mm)	£633.00
810-423	Manual XY stage (50 x 50 mm)	£1180.00
810-454E	Video camera, 8.4" LCD (System A only)	£3220.00
11AAC129	Measuring eyepiece (System B, C and D)	£2290.00
11AAC697	Brinell weight (0.5 kg)	£91.00
11AAC698	Brinell weight (1.25 kg)	£91.00
11AAC699	Brinell weight (5.625 kg)	£101.00
11AAC700	Brinell weight (12.5 kg)	£150.00
11AAC702	Stand for testing machine	£1110.00
11AAC712	Objective lens 2X	£851.00
11AAC713	Objective lens 5X	£610.00
11AAC714	Objective lens 20X	£667.00
11AAC715	Objective lens 50X	£782.00
11AAC716	Objective lens 100X	£1080.00
11AAC719	Vibration isolator	£4870.00

For Hardness Test blocks refer to page M-12 for details.
For Indenters refer to page M-12 for details.

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Specifications

Model	HV-110		HV-120	
System	A	B / C / D	A	B / C / D
Code No.	810-440E	810-443E	810-445E	810-448E
Indentation measurement	Measuring eyepiece	Automatic (AVPAK-20)	Measuring eyepiece	Automatic (AVPAK-20)
Main unit operation	Touch panel	PC	Touch panel	PC
Fixed test force	1, 2, 3, 5, 10, 20, 30, 50 kgf		0.3, 0.5, 1, 2.5, 5, 10, 20, 30 kgf	
Test force control	Lever method and automatic control (load, dwell, unload)			
Turret drive	Motor-driven and manual			
Control unit type	Touch screen	—	Touch screen	—
Objectives	A maximum of three can be installed in turret. (A 10X objective is provided as standard.)			
Dimensions (W x D x H)*1	307 x 696 x 786 mm	307 x 627 x 875 mm	307 x 696 x 786 mm	307 x 627 x 875 mm
Mass (main unit)	Approx. 60 kg	Approx. 58 kg	Approx. 60 kg	Approx. 58 kg
Power supply	240VAC ±10%, 50/60Hz			
Price	POA	POA	POA	POA

*1 Excluding protrusions and stage.

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AVPAK-20 Software

- Software that supports control, testing and report creation related to hardness testing.
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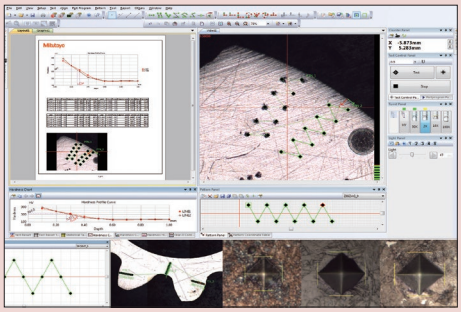
- Part Program and Part Manager functions support testing of multiple and irregular specimens.
- Test patterns such as straight lines, zigzag lines and teaching patterns can be created using the Pattern Creation tool.
- The digital zoom function can be used to easily magnify the entire specimen for checking the pattern positioning and the site being tested.

Functions

Layout view:	Photos from individual views, graphs, tables, etc., can be freely positioned to help with report creation.
Stitching:	Takes images of an entire rectangular field from the moving stage then combines the images.
Auto trace:	Automatically traces the shape of the sample. Takes images as the stage moves along the outer contours of the specimen then combines the images.
Navigation function:	When moving between measurement points during multipoint testing, this function guides the travel of the XY fine adjustment manual stage to the next position (System B).



AVPAK-20 sample screenshot.

System Configurations

Model	HV-110				HV-120			
System	A	B	C	D	A	B	C	D
Code No.	810-440E	810-443E			810-445E	810-448E		
Standard accessories								
10X objective	✓	✓	✓	✓	✓	✓	✓	✓
1/2" 3 megapixel USB camera		✓	✓	✓		✓	✓	✓
Measuring eyepiece, **11AAC129**	✓				✓			
Auto-focus stage				✓				✓
Essential-options elements								
PC		•	•	•		•	•	•
AVPAK-20 software		•	•	•		•	•	•
Motorized XY stage 50 x 50 mm **810-461E**			○	○			○	○
Motorized XY stage 100 x 100 mm **810-462E**			○	○			○	○

Key: ✓ Included
• Selectable
○ One of the types must be selected from the choice offered

System B
System B is equipped with AVPAK-20, a software package for automatic hardness testing systems that automatically measures the diagonal length of an indentation and calculates the corresponding hardness value. This means that measurement error caused by variation in operator interpretation is eliminated, so reducing costs.

System C
In addition to the functions of System B, System C is equipped with a motorized XY stage. This system is useful for improving the efficiency of operations such as multipoint hardness testing.

System D
In addition to the functions of System B and System C, System D is equipped with an autofocus function that enables automatic hardness testing, thereby increasing efficiency and reducing labour costs.

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WIZHARD HR-500 Series

SERIES 810 – Rockwell Hardness Testing Machines

- Multiple test force generation for Rockwell, Rockwell Superficial and Brinell hardness.
- Dolphin-nose indenter arm for easy reach of interior and exterior surfaces.
- Real time electronic test force control for accurate loading. This effectively eliminates load force overshoot.
- Indenter escape function for continuous testing at fixed table position. This eliminates instability caused by table retraction.
- Auto-stop elevation table and automatic preload to provide stable test force generation.

810-203-01E

810-204-01E

Specifications

Model		HR-521	HR-522	HR-523
Code No.		810-202-01E	810-203-01E	810-204-01E
Preload test force		3, 10 kgf		
Test force	Rockwell Superficial	15, 30, 45 kgf		
	Rockwell	60, 100, 150 kgf		
	Brinell	187.5 kgf	6.25, 10, 15.62, 25, 30, 31.25, 62.5, 100, 125, 187.5 kgf	
Conversions to other hardness scales		HV, HK,HRA, HRB, HRC, HRD, HRF, HRG, HR15T, HR30T, HR45T, HR15N, HR30N, HR45N, HS, HB, HBS, tensile strength		
Functions		Number of values, max., min., average value, range, upper and lower limit, standard deviation, number of GO/NG evaluations, storage of 1024 values, OFFSET, hardness value, test condition, continuous measurement, X-R control chart, editing of 1024 values, hardness conversion value, statistical results, cylindrical correction, spherical correction, multipoint correction		
Test force setting		By control unit		
Stage elevation		Manual		Power drive
Control unit		Touch-screen type		
Dimensions (W x D x H)		250 x 670 x 605 mm		
Mass		Approx. 65 kg		
Price		POA	POA	POA

Touch screen

- Touch-screen operation with a back-lit LCD graphic display.
- Remote selection of the test force linked to the hardness scale selection.
- Choice of message language in English, German, French, Spanish, Italian and Japanese for user-friendly operation.
- Cylindrical and spherical surface compensation.
- Data offset.
- Conversion to other hardness scales.
- Powerful statistical processing with flexible data point editing and 1024 data memory.
- Measurement data editing.
- OK/±NG tolerance judgement.
- Statistical processing, histogram and X-R chart.

Technical Data

Load control:	Automatic (load, dwell, unload)
Load dwell time:	0 - 120 s (1 s increments)
Max. specimen height:	250 mm (for standard flat anvil)
Max. specimen depth:	150 mm (from the centre of indenter shaft)
Data output:	RS-232C, Digimatic code (SPC) and Centronics
Power supply:	240VAC ±10%, 50/60Hz
Control unit	
Dimensions:	165 x 260 x 105 mm
Mass:	Approx. 0.75 kg

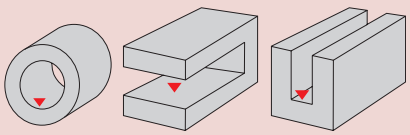
Optional Accessories

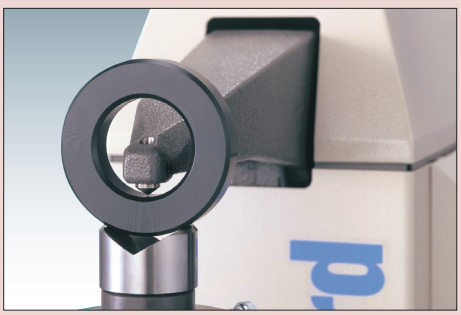
Code No.	Description	Price
810-029	V-anvil (400 mm long, 120° groove 50 mm wide, ø50 - ø100 mm)	£1520.00
810-030	Spot anvil (diamond tipped type for Rockwell Superficial, ø3.5 mm)	£1190.00
810-037	Round table (ø180 mm)	£430.00
810-038	Round table (ø250 mm)	£943.00
810-039	Flat anvil (ø64 mm)	£181.00
810-040	V-anvil (ø40 mm, 120° groove 30 mm wide, ø15 - ø60 mm)	£238.00
810-041	V-anvil (ø40 mm, 90° groove 6 mm wide, ø3 - ø9 mm)	£196.00
810-042	V-anvil (ø10 mm, 120° groove 8 mm wide, ø4 - ø16 mm)	£158.00
810-043	Spot anvil (ø12 mm)	£174.00
810-044	Spot anvil (ø5.5 mm)	£174.00
264-504-5E	Printer (DP-1VR, 100V)	£394.00
11AAC237	EXPAK-07 data processing program	£978.00
19BAA517	Vinyl cover	£26.00

For Hardness Test blocks refer to page M-12 for details.
For Indenters refer to page M-12 for details.

Excellent capability for testing difficult specimens

The nose-type indenter mechanism enables measurement of surfaces inside pipes and grooves.





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HR-110MR / HR-320MS / HR-430MS

SERIES 963 – Rockwell Hardness Testing Machines

- The newly designed frame provides maximum clearance for positioning the workpiece. A table or bench is all that is needed for mounting these testing machines.
- Simple to operate. With the analogue type, HR-110MR, the gauge presetting operation has been eliminated by the adoption of an automatic presetting dial gauge.
- The HR-430MS uses an automatic steering wheel brake and loading sequence to enable simple test handling.
- HR-110MR does not require a power source, and is considered to be environmentally friendly.
- The digital types HR-320MS and HR-430MS provide Digimatic output for direct data transfer to the DP-1VR Mini-Processor, and the USB-ITN-E input tool can be used to connect to a PC for data transfer and processing.
- Brinell hardness tests can be performed by using the following optional accessories: a Brinell indenter, a weight set and a measurement microscope.

Technical Data

Max. specimen height: 180 mm (100 mm if cover is attached)
Max. specimen depth: 165 mm (from indenter axis to the frame)

Optional Accessories

Code No.	Description	Price
810-026	Stage with fine adjustment	£2870.00
810-027	Adjustable support for long workpieces	£1690.00
810-028	Height adjustable jack rest	£1690.00
810-029	V-anvil (400 mm long, 120° groove 50 mm wide, ø50 - ø100 mm)	£1520.00
810-030	Spot anvil (diamond tipped type for Rockwell Superficial, ø3.5 mm)	£1190.00
810-037	Round table (ø180 mm)	£430.00
810-038	Round table (ø250 mm)	£943.00
810-040	V-anvil (ø40 mm, 120° groove 30 mm wide, ø15 - ø60 mm)	£238.00
810-041	V-anvil (ø40 mm, 90° groove 6 mm wide, ø3 - ø9 mm)	£196.00
810-042	V-anvil (ø10 mm, 120° groove 8 mm wide, ø4 - ø16 mm)	£158.00
810-043	Spot anvil (ø12 mm)	£174.00
810-044	Spot anvil (ø5.5 mm)	£174.00
810-048	Steel table	£1350.00
937387	SPC data cable (1 m)	£37.90
965013	SPC data cable (2 m)	£45.00
264-504-5E	Printer (DP-1VR, 100V)	£394.00
06ADV380E	USB Input Tool Direct USB-ITN-E (2 m)	£105.00
56AAK286B	Brinell weight set for HR-110MR (3 pcs.)	£120.00
56AAK287B	Brinell weight set for HR-320MS (4 pcs.)	£170.00
56AAK289B	Brinell weight set for HR-430MS (4 pcs.)	£138.00

For Hardness Test blocks refer to page M-12 for details.
For Indenters refer to page M-12 for details.

963-210-20

963-231E

963-241E

Specifications

Model	HR-110MR	HR-320MS	HR-430MS
Code No.	963-210-20	963-231E	963-241E
Type of hardness test	Rockwell	Rockwell / Rockwell Superficial	
Standard	JIS B 7726	ISO 6508-2, JIS B 7726, ASTM E 18	
Display	Analogue	Digital	
Minimum reading	0.5HR graduation	0.1HR indication	
Preload force (handling support)	Automatic pre-setting dial gauge	Loading navigator indication	Automatic steering wheel brake
Preload force setting	—	Dial switching	
Total test force setting	Weight change		Dial switching
Total test force control	Manual	Motor drive – button start	Motor drive – automatic start
Test force duration	Manual	Fixed 3 - 5.5 s or manual	3 - 60 s setting or manual operation
Functions	—	Success or failure decision function, offset revision function, hardness conversion function	
Data output	—	Digimatic (SPC), RS-232C	
Power supply	No power required	240VAC ±10%, 50/60Hz, 1.2A	
Dimensions (W x D x H)	Approx. 296 x 512 x 780 mm	Approx. 235 x 516 x 780 mm	
Mass	Approx. 49 kg	Approx. 47 kg	Approx. 50 kg
Price	POA	POA	POA

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Hardmatic HH-411

SERIES 810 – Impact Type Hardness Tester

- The HH-411 is a rebound type portable hardness tester for metal with a compact body and high operability. It allows anyone to perform hardness testing easily at the touch of a key, so can be used widely on various types of workpiece in the field.
- In addition to the general-purpose impactor (D type) supplied as standard equipment, the impactor lineup includes many variations (available separately) to support special applications. The DC type is provided for hardness testing of internal walls of pipes with diameters that cannot be tested with the D type, the D+15 type for bearings and gears, and the DL type for small areas such as the bottom of small gears and weld corners.
- For the rebound type hardness tester, gravity affects the measurement result depending on the orientation of the impactor relative to the vertical when pressed against the specimen surface. The HH-411 is equipped with the latest measurement technology that automatically detects the orientation of the impactor to automatically correct for this effect, so maximum accuracy is always achieved.
- Only a small surface area on a workpiece is required for hardness testing (standard D type: ø22 mm; optional DL type: ø4 mm). Therefore the HH-411 can be used for testing of various specimen shapes such as around grooves and gear teeth.
- Up to 1800 hardness test results can be saved, which is useful for patrol tests in the field.
- Based on the hardness HL value (L value: according to ASTM A 956), conversion can be performed to Vickers, Brinell, Rockwell C, Rockwell B, and Shore hardness as well as tensile strength. Conversion can be performed after the test, or hardness value can be displayed in conversion mode.
- To operate, the impactor is pressed against the sample surface and the button is pushed with a finger just like clicking a ballpoint pen, so is very easy for anyone to operate.

810-298

Technical Data

Hardness value:	Hardness L (Leeb)
Accuracy:	±12HL (800HL ±1.5%)
Impactor:	Impact hammer with integrated detector and carbide-ball tip D type: conforming to ASTM A 956)
Display unit:	7-segment LCD
Functions:	Auto angle compensation, offset, OK/NG judgement, hardness scale conversion, data storage (1800 data entries), statistical analysis (average, maximum, minimum, dispersion), auto sleep, impact counter display.
Power supply:	Alkaline AA battery 2pcs or optional AC adapter (battery life: 70 hours)
Output:	RS-232C, Digimatic (SPC)
Dimensions	
Display unit:	70 x 110 x 35 mm
Impactor:	ø28 x 175 mm
Mass:	320 g

Optional Accessories

Code No.	Description	Price
810-288	DC type impactor UD-412	£2190.00
810-289	D+15 type impactor UD-413	£2280.00
810-290	DL type impactor UD-414	£2740.00
937387	SPC data cable (1 m)	£37.90
264-504-5E	Printer (DP-1VR, 100V)	£394.00
11AAC238	EXPAK-08 data processing program	£978.00
06AEG302E	AC adapter (9V, 500 mA)	£60.50
19BAA248	Support ring for convex surface of cylinder (R10 - R20)	£28.20
19BAA249	Support ring for concave surface of cylinder (R14 - R20)	£28.20
19BAA250	Support ring for convex surface of sphere (R10 - R27.5)	£15.90
19BAA251	Support ring for concave surface of sphere (R13.5 - R20)	£15.90
19BAA457	Carbide ball for D, DC, D+15 type impactors	£10.30
19BAA458	Ball shaft for DL type impactor	£319.00

For Hardness Test blocks refer to page M-12 for details.

Application example.

Specifications

Model		HH-411
Code No.		810-298
Conversion range / increment	Vickers	43 - 950HV / 1HV
	Brinell	20 - 894HB / 1HB
	Rockwell C	19.3 - 68.2HRC / 0.1HRC
	Rockwell B	13.5 - 101.7HRB / 0.1HRB
	Shore	13.2 - 99.3HS / 0.1HS
	Tensile strength	499 - 1996MPa / 1MPa
Testable workpiece	Thickness	Min. 5 mm
	Mass	5 kg or more
Price		£4270.00

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Hardmatic HH-300 Series

SERIES 811 – Dial Readout Durometers

- Dial Durometers are suitable for testing the hardness of non-metallic materials such as natural rubber, neoprene, polyesters, P.V.C., leather, Thiokol, nitrite rubber, wax, vinyl, cellulose acetates, glass, polystyrene, etc.
- Designed in accordance with the ASTM D 2240, ISO868, ISO 7619, DIN 53 505, JIS K 6253, and JIS K 7215 specifications.
- Units are available reading both in Shore A and Shore D scales to suit a wide variety of applications.
- The Dial Durometer is provided with a peak retaining hand for error-free reading.

Technical Data

Functions: Peak retaining hand

Optional Accessories

Code No.	Description	Price
811-012	Test stand (Shore D)	£1670.00
811-013	Test stand (Shore A)*1	£1460.00
811-019	Test stand (Shore A)*2	£1460.00
64AAA590	Shore D reference material (3 pcs.)	£209.00
64AAA964	Shore A reference material (3 pcs.)	£209.00

*1 Only available for Compact Type Durometer.
*2 Only available for Long Type Durometer.

811-337-10

810-331-10

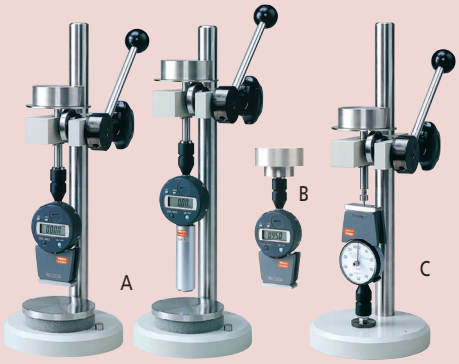
Test stand applications

These stands are used to mount Durometers. They allow constant-force hardness measurement by ensuring that the Durometer presses vertically on the workpiece surface at all times.

A Anyone can perform repeatable hardness measurement due to fewer possibilities for human error and measurement variations.

B The supplied weights can be attached directly to a Durometer and allow constant-force hardness measurement of large samples for which a stand cannot be used.

C The supplied weights are used for calibrating the spring force of Durometers.



- Workstage size: ø90 mm.
- Maximum specimen height: 90 mm.

Specifications

Model		HH-335	HH-331	HH-337	HH-333
Code No.		811-335-10	811-331-10	811-337-10	811-333-10
Scale		Shore A		Shore D	
Type		Compact	Long-leg	Compact	Long-leg
Applications		Natural rubber, soft elastomers, etc.		Hard elastomers, plastics, hard rubber, ebonite, etc.	
Resolution		1			
Range		HA: 10 - 90		HD: 20 - 90	
Standards	ASTM D 2240	✓	✓	✓	✓
	ISO 868	✓	✓	✓	✓
	ISO 7619	✓	✓	✓	✓
	DIN 53 505	—	✓	—	✓
	JIS K 6253	✓	✓	✓	✓
	JIS K 7215	✓	✓	✓	✓
Pressure foot size		44 x 18 mm	ø18 mm	44 x 18 mm	ø18 mm
Spring force (mN)		550+75H (Hardness reading: 10 - 90)		444.5H (Hardness reading: 20 - 90)	
Indenter		Blunt taper (tip diameter: 0.79 mm)		Sharp point (tip radius: 0.1±0.01 mm)	
Tip angle		35°±0.25°		30°±0.5°	
Indenter diameter		1.25 mm			
Indenter protrusion		2.5 mm			
Dimensions (W x D x H)		68 x 34 x 146 mm	68 x 35 x 188 mm	68 x 34 x 146 mm	68 x 35 x 188 mm
Mass		300 g	320 g	300 g	320 g
Price		£606.00	£606.00	£606.00	£606.00

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Hardmatic HH-300 Series

SERIES 811 – Digital Readout Durometers

- Digital Durometers are suitable for testing the hardness of non-metallic materials such as natural rubber, neoprene, polyesters, P.V.C., leather, Thiokol, nitrite rubber, wax, vinyl, cellulose acetates, glass, polystyrene, etc.
- Units are available reading both in both Shore A and Shore D scales to suit a wide variety of applications.
- Designed in accordance with the ASTM D 2240, ISO868, ISO 7619, DIN 53 505, JIS K 6253, and JIS K 7215 specifications.
- The Digital Durometer is provided with a data hold function for error-free reading.

811-336-10

811-334-10

Technical Data

Functions: Data hold, zero-setting, SPC output, power ON/OFF (power supply: SR44 x 1pc.)

Optional Accessories

Code No.	Description	Price
811-012	Test stand (Shore D)	£1670.00
811-013	Test stand (Shore A)*1	£1460.00
811-019	Test stand (Shore A)*2	£1460.00
905338	SPC data cable (1 m)	£32.90
264-504-5E	Printer (DP-1VR, 100V)	£394.00
64AAA590	Shore D reference material (3pcs.)	£209.00
64AAA964	Shore A reference material (3pcs.)	£209.00

*1 Only available for Compact Type Durometer.
*2 Only available for Long Type Durometer.

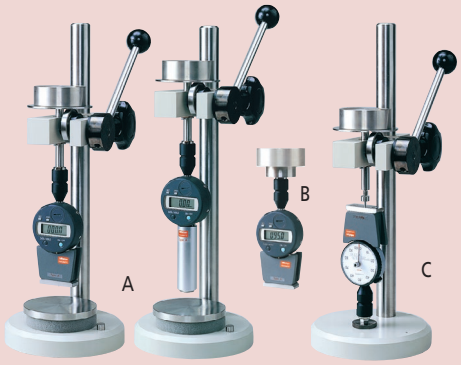
Test stand applications

These stands are used to mount Durometers. They allow constant-force hardness measurement by ensuring that the Durometer presses vertically on the workpiece surface at all times.

A Anyone can perform repeatable hardness measurement due to fewer possibilities for human error and measurement variations.

B The supplied weights can be attached directly to a Durometer and allow constant-force hardness measurement of large samples for which a stand cannot be used.

C The supplied weights are used for calibrating the spring force of Durometers.



- Workstage size: ø90 mm.
- Maximum specimen height: 90 mm.

Specifications

Model		HH-336	HH-332	HH-338	HH-334
Code No.		811-336-10	811-332-10	811-338-10	811-334-10
Scale		Shore A		Shore D	
Type		Compact	Long-leg	Compact	Long-leg
Applications		Natural rubber, soft elastomers, etc.		Hard elastomers, plastics, hard rubber, ebonite, etc.	
Resolution		0.5			
Range		HA: 10 - 90		HD: 20 - 90	
Standards	ASTM D 2240	✓	✓	✓	✓
	ISO 868	✓	✓	✓	✓
	ISO 7619	✓	✓	✓	✓
	DIN 53 505	—	✓	—	✓
	JIS K 6253	✓	✓	✓	✓
	JIS K 7215	✓	✓	✓	✓
Pressure foot size		44 x 18 mm	ø18 mm	44 x 18 mm	ø18 mm
Spring force (mN)		550+75H (Hardness reading: 10 - 90)		444.5H (Hardness reading: 20 - 90)	
Indenter		Blunt taper (tip diameter: 0.79 mm)		Sharp point (tip radius: 0.1±0.01 mm)	
Tip angle		35°±0.25°		30°±0.5°	
Indenter diameter		1.25 mm			
Indenter protrusion		2.5 mm			
Dimensions (W x D x H)		60 x 28.5 x 151 mm	60 x 29.5 x 193 mm	60 x 28.5 x 151 mm	60 x 29.5 x 193 mm
Mass		290 g	310 g	290 g	310 g
Price		£1050.00	£1050.00	£1050.00	£1050.00

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Optional Accessories

For Hardness Testing Machines

Indenters

Code No.	Description	Price
For HM-210		
19BAA058	Vickers diamond indenter	£275.00
19BAA061	Knoop diamond indenter	£533.00
For HM-220		
19BAA059	Vickers diamond indenter	£275.00
19BAA062	Knoop diamond indenter	£275.00
For HV-100 Series		
19BAA060	Vickers diamond indenter	£275.00
19BAA063	Knoop diamond indenter	£275.00
For all HR Series		
19BAA072	Rockwell diamond indenter (standard)	£204.00
19BAA073	Rockwell diamond indenter (ISO 6508-3)	£204.00
19BAA162	Brinell carbide ball only (5 mm)	£47.80
19BAA163	Brinell carbide ball only (10 mm)	£59.70
19BAA277	Brinell carbide ball indenter (1 mm)	£168.00
19BAA279	Brinell carbide ball indenter (2.5 mm)	£191.00
19BAA280	Brinell carbide ball indenter (5 mm)	£207.00
19BAA281	Brinell carbide ball only (1 mm)	£12.10
19BAA283	Brinell carbide ball only (2.5 mm)	£13.70
19BAA284	Brinell carbide ball indenter 10 mm)	£234.00
19BAA504	Rockwell carbide ball indenter (3.175 mm)	£145.00
19BAA505	Rockwell carbide ball indenter (6.35 mm)	£145.00
19BAA506	Rockwell carbide ball indenter (12.7 mm)	£240.00
19BAA507	Rockwell carbide ball only (1.5875 mm)	£25.30
19BAA508	Rockwell carbide ball only (3.175 mm)	£27.40
19BAA509	Rockwell carbide ball only (6.35 mm)	£44.30
19BAA510	Rockwell carbide ball only (12.7 mm)	£127.00
19BAA515	Rockwell carbide ball indenter (1.5875 mm)	£156.00

Hardness Test Blocks

Code No.	Calibrated hardness	Applicable Hardness Testing Machines					Price
		HM-210 HM-220	HV-110 HV-120	HR-521 HR-522 HR-523	HR-110MR HR-320MS HR-430MS	HH-411	
19BAA001	100HMV	✓					£442.00
19BAA002	200HMV	✓					£442.00
19BAA003	300HMV	✓					£442.00
19BAA004	400HMV	✓					£442.00
19BAA005	500HMV	✓					£442.00
19BAA006	600HMV	✓					£442.00
19BAA007	700HMV	✓					£442.00
19BAA008	800HMV	✓					£442.00
19BAA009	900HMV	✓					£442.00
19BAA010	40HMV	✓					£442.00
19BAA011	HV5/200HV		✓				£294.00
19BAA012	HV5/300HV		✓				£294.00
19BAA013	HV5/400HV		✓				£294.00
19BAA014	HV5/500HV		✓				£294.00
19BAA015	HV5/600HV		✓				£294.00
19BAA016	HV5/700HV		✓				£294.00
19BAA017	HV5/800HV		✓				£294.00
19BAA018	HV5/900HV		✓				£294.00
19BAA028	32HRB			✓	✓		£161.00
19BAA029	42HRB			✓	✓		£161.00
19BAA030	52HRB			✓	✓		£161.00
19BAA031	62HRB			✓	✓		£161.00
19BAA032	72HRB			✓	✓		£161.00
19BAA033	82HRB			✓	✓		£161.00
19BAA034	92HRB			✓	✓		£161.00
19BAA035	10HRC			✓	✓		£161.00
19BAA036	20HRC			✓	✓		£161.00
19BAA037	30HRC			✓	✓		£161.00
19BAA038	40HRC			✓	✓		£161.00
19BAA039	50HRC			✓	✓		£161.00
19BAA040	60HRC			✓	✓		£161.00
19BAA041	70HRC			✓	✓		£161.00
19BAA042	41HR30N			✓	✓		£161.00
19BAA043	50HR30N			✓	✓		£161.00
19BAA044	60HR30N			✓	✓		£161.00
19BAA045	73HR30N			✓	✓		£161.00
19BAA046	83HR30N			✓	✓		£161.00
19BAA047	75HR15N			✓	✓		£161.00
19BAA048	85HR15N			✓	✓		£161.00
19BAA049	90HR15N			✓	✓		£161.00
19BAA050	32HR30T			✓	✓		£161.00
19BAA051	42HR30T			✓	✓		£161.00
19BAA052	52HR30T			✓	✓		£161.00
19BAA053	62HR30T			✓	✓		£161.00
19BAA054	72HR30T			✓	✓		£161.00
19BAA055	78HR30T			✓	✓		£161.00
19BAA056	82HR15T			✓	✓		£161.00
19BAA057	87HR15T			✓	✓		£161.00
19BAA243	880HLD					✓	£490.00
19BAA244	830HLD					✓	£490.00
19BAA245	730HLD					✓	£490.00
19BAA246	620HLD					✓	£490.00
19BAA247	520HLD					✓	£490.00

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