Hardness Testing Machines

Rockwell hardness testing machines
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Mitutoyo

Rockwell HR-200/300/400

Series 963

These are four economical Rockwell hardness testing machines to suit practically every application you need.
The Rockwell HR-200/300/400 offers you the following benefits:

- The newly designed frame provides maximum clearance for positioning the work piece, all you need is a flat table for mounting these testing machines.
- They are very simple to operate: the analogue type HR-210 uses an automatic presetting dial gauge.
- Digital models HR-430MR/MS use automatic steering wheel braking and load sequencing for easy handling.
- Digital models HR-320MS and HR-430MR/MS can use our Digimatic Mini-processor (DP-1VR) for printing results, and you can use an input tool (USB-ITN-E) to connect to a PC for data transfer, analysis and storage.
- You can perform Brinell hardness tests by using the following optional accessories: a Brinell indenter, a weight set and a measurement microscope.

HR-210MR
Rockwell hardness testing machine

Manual weight changing (with total test force selected) and handling of preload force. Motor drive controls loading sequence.

HR-320MS

Dual type (Rockwell / Rockwell Superficial) hardness testing machine:

Manually handles test force and preload force selection. Motor drive controls loading sequence.

HR-430MR

Rockwell hardness testing machine:

Economy type, but supports dial switching, power steering and support of all test standards and is equipped with automatic brake handle auto start feature. Motor drive controls loading sequence.

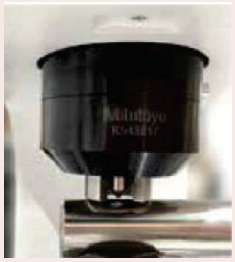
HR-430MS

Dual type (Rockwell / Rockwell Superficial) hardness testing machine:

Economy type, but supports dial switching, power steering and support of all test standards and is equipped with automatic brake handle auto start feature. Motor drive controls loading sequence.

Specifications

Height	Max. 180 mm (100 if cover is attached) mm
Measuring depth	Max. 165 mm (from the center of the endenter axis)
Functions	HR-320MS, HR-430MR, HR-430MS : GO/NG, Compensation fubction, Hardness conversion



K543817
Workpiece clamping device for:

- **HR-210MR**
- **HR-430MR**

HR-300-400 digital display

HR-400 Automatic preliminary test force brake

SPC Digimatic and RS-232C interface

Scan QR Code with your mobile device and watch our product videos on YouTube
All main units are supplied without power cord, indenters and hardness reference materials.
Please choose the required accessories separately.

Please choose for example:

63DIA023 diamond indenter ISO 6508 and ASTM E18
63ETB040DG 60HRC hardness reference material ISO 6508 and ASTM E18

Manual Rockwell hardness testing machines

All main units are supplied without power cord, indenters and hardness reference materials.
Please choose the required accessories separately.

Please choose for example:

63DIA023 diamond indenter ISO 6508 and ASTM E18
63ETB040DG 60HRC hardness reference material ISO 6508 and ASTM E18

Manual Rockwell hardness testing machines

Model	HR-210MR	HR-320MS	HR-430MR	HR-430MS
No.	**810-191-21**	**810-192-31**	**810-193-31**	**810-194-31**
Rockwell (EN ISO 6508, ASTM E-18, JIS B7726)	ISO 6508	●	●	●
Brinell, Indentation only (non standard due to application of preliminary load)	Optional	Optional	Optional	Optional
Analog type	●	-	-	-
Digital type LCD matrix with backlight	-	●	●	●
HR unit resolution	0,5 HR	0,1 HR	0,1 HR	0,1 HR
Test force range 60-150KG, 588- 1471N Rockwell	●	-	●	-
Test force range 62,5-187,5KG, 612,9-1839N Brinell**	Optional	-	Optional	-
Test force range 3-150KG, 29,42- 1471N Rockwell, Rockwell Superficial	-	●	-	●
Test force range 30-187,5KG, 29,42- 1839N Brinell**	-	Optional	-	Optional
Test force switching	Manual	Manual	By dial	By dial
Test force duration	Fixed 3-5.5s or manual	1-99s setting or manual operation	1-99s setting or manual operation	1-99s setting or manual operation
Preliminary test force 10kg/98.07N	-	-	●	-
Preliminary test force 3kg and 10kg/29.42 N and 98.07N	-	●	-	●
Preliminary test force (handling support)	-	Loading navigator indication	Automatic elevation unit brake	Automatic elevation unit brake
Preliminary test force switching - by dial	-	-	●	●
Total test force load operation Manual/lever operation	-	Motor drive, Button start	Motor drive, Automatic start	Motor drive, Automatic start
LED workroom illumination	●	●	●	●
RS-232C, Digimatic interface	-	●	●	●
Compensation	-	●	●	●
Cylindrical compensation	-	●	●	●
Acoustic signal for end of test, error	-	●	●	●
Conversion	-	●	●	●
Limit indication	-	●	●	●
Jominy-test capability	Additional accessories required	Additional accessories required	Additional accessories required	Additional accessories required
Workpiece clamping device K543817 capability	●	-	●	-
Basic test surface Ø 64mm	●	●	●	●
Anvil adaption	Ø 19 mm	Ø 19 mm	Ø 19 mm	Ø 19 mm
Max. specimen height	180 mm	180 mm	180 mm	180 mm
Throat depth	165 mm	165 mm	165 mm	165 mm
Max. specimen weight	20 kg	20 kg	20 kg	20 kg
External dimensions 235(W) x 512(D) x 780(H)mm	●	●	●	●
Approx. mass main unit	47 kg	46,3 kg	49,3 kg	49,9 kg
Power supply 100-240V AC 1.2A (AC adapter DC12V 3.5A)	●	●	●	●

** requires optional Brinell weight set
*** can be enhanced with additional accesories
** requires optional Brinell weight set

Mitutoyo

Rockwell, Rockwell Superficial, Brinell Hardness Tester HR-530

Series 810

The HR-530 series offers five different hardness testing methods: Rockwell, Rockwell Superficial, Brinell, Brinell Depth Measurement and Plastic Testing in a single unit.

This makes it a versatile tool ready to tackle tasks in production, goods inwards inspection and quality control in general.

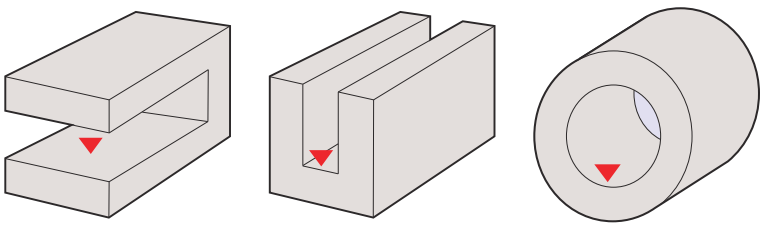
- A real time electronic test force control system is built into the compact body along with an electronic force gage. The test force control prevents the system from applying too much test force at the point of reaching total testforce.
- Real time force control provides accurate test force generation and stable time cycle sequences conform to ISO standards.
- The serial measurement mode enables fast execution of a high numbers of tests on identical workpieces.
- A magnet brake system stops the spindle movement immediately at sensing of workpiece contact. This enables the HR-530 to perform semi automatic test sequences, eliminating the user influence.
- The lever indenter arm design enables not only interior and exterior measurements but also an excellent specimen surface overview. The functionality is furthermore enhanced by an LED workroom illumination.
- The intelligent lever arm design allows testing at inside positions without cutting the specimen. The minimum diameter that can be entered by the lever arm with the standard size diamond indenter is 35 mm.
- The optional short type diamond indenter (Part No. 63DIA007) additionally enables inside testing from Ø22 mm.
- HR-530L long type with an optional max. specimen height of 395 mm.
- Indenters and testblocks are not included in the scope of delivery.

HR-530 (810-233-33)

Maximum workpiece size:
- Height 250mm
- Depth 150 mm

HR-530L (810-333-33)

Maximum workpiece size:
- Height 395 mm
- Depth 150 mm



Specifications

Functions	• Conversion function [HV, HK, HR (Rockwell hardness A, B, C, D, F, G / Rockwell Superficial 15T, 30T, 45T, 15N, 30N, 45N), HS, HB, tensile strength] • GO/NG judgment function Serial test function (for specimens of the same thickness) • Cylindrical correction, spherical correction, offset correction, multi-point correction functions • Statistical calculation function • Graph generation function (X-R control charts)
Power supply	AC100V, 120V, 220V, 240V Auto-selection
Preleminary test force	29,42; 98,07 N
Statistic function	Maximum value, minimum value, mean value, standard deviation, upper limit, lower limit, GO count, range, NG count
Test force setting	By software setting
Table lifting	Manual (automatic breaking and load sequencing)
Standard	ISO 6508; JIS 7726; ISO 6506, JIS 7726; ISO 2039-2, ASTM D785, JIS K 7202; VDI/VDE 2616-1
Load control	Automatic (load/hold/unload)
Max. specimen depth	150 mm
Brinell Scale [N]	61,29; 98,07; 153,2; 245,2; 294,2; 306,5; 612,9; 980,7; 1226; 1839 N
Data output	RS-232C Digimatic, USB2
Force dwell time	1-120s (Selectable in units of 1s)

All main units are supplied without power cord, indenters and hardness reference materials.
Please choose the required accessories separately.

Please choose for example:

63DIA023 diamond indenter ISO 6508 and ASTM E18
63ETB040DG 60HRC hardness reference material ISO 6508 and ASTM E18

Rockwell, Rockwell Superficial, Brinell Hardness Tester HR-530

Metric

No.	Model	Rockwell Scale Diamond	Rockwell Scale Ball 1,5875 mm	Rockwell Scale Ball 3,175 mm	Rockwell Scale Ball 6,35 mm	Rockwell Scale Ball 12,7 mm	Rockwell Superficial Scale Diamond
810-233-33/810-333-33/810-512-23	HR-530 HR-530L HR-610A	HRA HRD HRC	HRF HRB HRG	HRH HRE HRK	HRL HRM HRP	HRR HRS HRV	HR15N HR39N HR45N
810-522-23/810-527-21	HR-620A HR-620B	HRA HRD HRC	HRF HRB HRG	HRH HRE HRK	HRL HRM HRP	HRR HRS HRV	HR15N HR39N HR45N

No.	Rockwell Superficial Scale Ball 1,5875 mm	Rockwell Superficial Scale Ball 3,175 mm	Rockwell Superficial Scale Ball 6,35 mm	Rockwell Superficial Scale Ball 12,7 mm	Ball Indentation plastic test	Rockwell Plastic Test Scales Ball 3,175 mm	Rockwell Plastic Test Scales Ball 6,35 mm	Rockwell Plastic Test Scales Ball 12,7 mm
810-233-33/810-333-33/810-512-23	HR15TW HR20TW HR45TW	HR15WW HR30WW HR45WW	HR15XW HR30XW HR54XW	HR15YW HR30YW HR45YW		HRE HRK	HRL HRM	HRR
810-522-23/810-527-21	HR15TW HR20TW HR45TW	HR15WW HR30WW HR45WW	HR15XW HR30XW HR54XW	HR15YW HR30YW HR45YW	HB 49N HB 132N HB 358N HB 961N	HRE HRK	HRL HRM	HRR

No.	Rockwell α Test Ball 12,7 mm	Vickers Depth Measurement	Brinell Scales indentation only Ball 1,0 mm	Brinell Scales indentation only Ball 2,5 mm	Brinell Scales indentation only Ball 5,0 mm	Brinell Scales indentation only Ball 10,0 mm	Brinell depth measurement Ball 2,5 mm
810-233-33/810-333-33/810-512-23	(HRR)		HBW 1/10 HBW 1/30	HBW 2,5/6,25 HBW 2,5/15625 HBW2,5/31,25 HBW 2,5/62,5 HBW 2,5/187,5	HBW 5/25 HBW 5/62,5 HBW 5/125	HBW 10/100	HBD 2,5/62,5 HBD 2,5/187,5
810-522-23/810-527-21	(HRR)	HVD 30 HVD 50	HBW 1/1 HBW 1/2,5 HBW 1/5 HBW 1/10 HBW 1/30	HBW 2,5/6,25 HBW 2,5/15625 HBW2,5/31,25 HBW 2,5/62,5 HBW 2,5/187,5	HBW 5/25 HBW 5/62,5 HBW 5/125 HBW5/250	HBW 10/100 HBW 10/250	HBD 2,5/62,5 HBD 2,5/187,5 HBD 5/250

Mitutoyo

Rockwell Automatic Hardness Testing HR-600

Series 810 - HR-600 Series

With innovative design and functionality that enables a wide variety of measurements, the HR-600 Series delivers hardness testing that defies conventional thinking.

Go above and beyond

High-End CNC Rockwell Hardness Testing Machine, providing a fully automatic Rockwell hardness test sequence. It is operated either with the provided display unit or by the use of AVPAK 3.1 hardness testing software (11AAE525-DEE AVPAK for HR-600A).
When run with AVPAK 3.1, it can easily be integrated in an automation cell via the programmable Mitutoyo Form EIO automation interface.

The HR-600 Series combines the functionality of several test methods:

- Rockwell hardness testing
- Brinell hardness testing (indentation only)
- Brinell depth measurement hardness testing
- Vickers depth measurement hardness testing
- Hardness testing of plastic materials

Supporting all test methods in a single machine, this new series expands the range of available measurements.

With its high-resolution scale load cell developed uniquely by Mitutoyo that allows for high-precision test load feedback control and state-of-the-art design that delivers both aesthetics and usability on the ground, the new HR-600 Series enables hardness testing that defies conventional thinking.

New design with functional beauty.

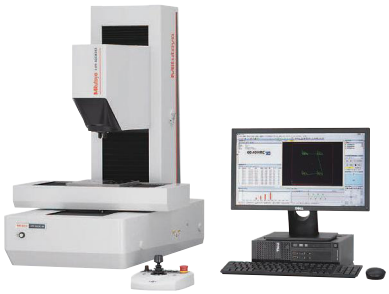
With a table for mounting workpieces and head with vertical mobility, the HR-600 Series is built for operability and usability. Its new design is highly focused on end-user usability, and the entire product structure has been inventively modified for functional beauty — a true embodiment of Mitutoyo's pioneering spirit. Indenters and test blocks are not part of the scope of delivery.

Attention:

* requires optional accessories

810-512-23
Model HR-610A

810-527-21
Model HR-620B with Display



810-527-21
Model HR-620B with PC

810-512-23

No.	Hardness testing methods*	Initial test force N (kgf)	Test force N (kgf)
Model HR-610A	Rockwell: JIS B 7726:2017, ISO 6508-2:2015, ASTM E18-20 Brinell (indentation only): JIS B 7724:2017, ISO 6506-2:2017, ASTM E10-18 Plastic: JIS K 7202-2:2001, ISO 2039-2:1987, ASTM D785-08 [A&B] Brinell Depth Measurement HBT HBD: VDI/VDE 2616	Rockwell: 29.42 (3) 98.07 (10) Plastic: 98.07 (10) Brinell Depth Measurement HBT HBD: 98.07 (10) 490.3 (50)	Rockwell: 147.1 (15) 294.2 (30) 441.3 (45) 588.4 (60) 980.7 (100) 1471 (150) Brinell (indentation only): 49.03 (5) to 1839 (187.5) Plastic: 588.4 (60) 980.7 (100) 1471 (150) Brinell Depth Measurement HBT HBD: 612.9 (62.5) 1839 (187.5)

Rockwell Automatic Hardness Testing HR-600

810-522-23

No.	Hardness testing methods*	Initial test force N (kgf)	Test force N (kgf)
Model HR-620A	Rockwell: JIS B 7726:2017, ISO 6508-2:2015, ASTM E18-20 Brinell (indentation only): JIS B 7724:2017, ISO 6506-2:2017, ASTM E10-18 Plastic: JIS K 7202-2:2001, ISO 2039-2:1987, ASTM D785-08 [A&B], ISO 2039-1:2001 Brinell Depth Measurement HBT HBD: VDI/VDE 2616 Vickers Depth Measurement HVT HVD: VDI/VDE 2616	Rockwell: 29.42 (3) 98.07 (10) Plastic: 9.807 (1), 98.07 (10) Brinell Depth Measurement HBT HBD: 98.07 (10) 490.3 (50) Vickers Depth Measurement HVT HVD: 9.807 (1)	Rockwell: 147.1 (15) 294.2 (30) 441.3 (45) 588.4 (60) 980.7 (100) 1471 (150) Brinell (indentation only): 9807 (1) to 2452 (250) Plastic: 588.4 (60) 980.7 (100) 1471 (150), 49.03 (5) 132.4 (13.5) 358 (36.5) 962.1 (98.1) Brinell Depth Measurement HBT HBD: 612.9 (62.5) 1839 (187.5) 2452 (250) Vickers Depth Measurement HVT HVD: 294.2 (30) 490.3 (50)

810-527-21

No.	Hardness testing methods*	Initial test force N (kgf)	Test force N (kgf)
Model HR-620B	Rockwell: JIS B 7726:2017, ISO 6508-2:2015, ASTM E18-20 Brinell (indentation only): JIS B 7724:2017, ISO 6506-2:2017, ASTM E10-18 Plastic: JIS K 7202-2:2001, ISO 2039-2:1987, ASTM D785-08 [A&B], ISO 2039-1:2001 Brinell Depth Measurement HBT HBD: VDI/VDE 2616 Vickers Depth Measurement HVT HVD: VDI/VDE 2616	Rockwell: 29.42 (3) 98.07 (10) Plastic: 9.807 (1), 98.07 (10) Brinell Depth Measurement HBT HBD: 98.07 (10) 490.3 (50) Vickers Depth Measurement HVT HVD: 9.807 (1)	Rockwell: 147.1 (15) 294.2 (30) 441.3 (45) 588.4 (60) 980.7 (100) 1471 (150) Brinell (indentation only): 9807 (1) to 2452 (250) Plastic: 588.4 (60) 980.7 (100) 1471 (150), 49.03 (5) 132.4 (13.5) 358 (36.5) 962.1 (98.1) Brinell Depth Measurement HBT HBD: 612.9 (62.5) 1839 (187.5) 2452 (250) Vickers Depth Measurement HVT HVD: 294.2 (30) 490.3 (50)

Vickers Hardness Testing Machine HV-110/120

Series 810

The manual line up of the HV-100 Series has the following benefits:

- 144 mm (5.7 inch) coloured touchsreen display (Type A) with higher visibility, easy to operate user interface
- Digimatic output for report creation.
- USB stick data export
- Electronic test force change.
- Max. specimen height up to 210mm
- LED illumination for best image.
- High number of accessories
- Vickers, Knoop, Brinell and KC fracture toughness measurement.
- Supports Brinelltest up to 62.5KG with an optional test force weight.

Manual type A

Software type D

HV-110 Testing force range

No.	Test force								
HV-110	V.S.*	HV1	HV2	HV3	HV5	HV10	HV20	HV30	HV50
	N	9807	19,61	29,42	49,03	98,07	196,1	294,2	490,3
	(kgf)	1	2	3	5	10	20	30	50
	*V.S. = Vickers Scale								

HV-120 Testing force range

No.	Test force								
HV-120	V.S.*	HV0,3	HV0,5	HV1	HV2,5	HV5	HV10	HV20	HV30
	N	2942	4903	9807	24,51	49,03	98,07	196,1	294,2
	(kgf)	0,3	0,5	1	2,5	5	10	20	30
	*V.S. = Vickers Scale								

Hardness Testing Machines brochure on request

Scan QR Code with your mobile device and watch our product videos on YouTube

Specifications

External dimensions [mm]	System A: 307(W)×696(D) ×786(H)mm System B/C/D: 307(W)×627(D) ×875(H)mm
Objective lens	Up to 3 pcs. mountable (one standard lens 10X mounted as standard)
Force dwell time	5-999 sec (selectable)
Load control	Automatic (load, dwell, unload)
Optical system	Infinity corrected optical system
Illumination unit	LED light
Standard	JIS B 7725, ISO 6507-2
Data output	RS-232C, Digimatic, USB 2. 0 interface
Working distance	50X = 2,5 mm (other objectives available)
Indenter approach speed	60 µm/s, 150 µm/s selectable
Mass	43 kg
Control panel	Built-in touch panel, 5,7" Colour LCD (HM-110A/ 120A for System A), Control software (PC for System B/C/D)
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 judgment, test condition guide, curve and user correction, hardness corresponding value, statistics calculation
Main unit mass	HV-110: Approx. 60kg, HV-120: Approx. 58kg
Output	Digimatic, serial, USB2 series A (for memory)*1, USB2 B Type (for system communication)
Resolution of diagonal length of an indentation	Objective lens less than 50X: 0,1µm (Objective lens more than 50X: 0,01µm)
Specimen dimensions	System A: height 210mm, depth 170mm (when using flat anvil) System B: height 181mm, depth 170mm (when using manual XY stage 50X50mm) System C: height 172mm, depth 170mm, System D: height 132mm, depth 170mm
Test force control	Lever method and automatic control (load, duration, unload)
Turret drive	Motor driven and manual operation

Vickers Hardness Testing Machine HV-110/120

Manual or complete automatic testing

Optional accessories

No.	Description
63ETB775	750HV1 Vickers Hardness Reference Material, with ISO 6507-3 DAkkS calibration certificate, 60x60x16mm, steel
63ETB749	500HV10 Vickers Hardness Reference Material, with ISO 6507-3 DAkkS calibration certificate, 60x60x16mm, steel
63ETB754	750HV10 Vickers Hardness Reference Material, with ISO 6507-3 DAkkS calibration certificate, 60x60x16mm, steel
63ETB875	500HV20 Vickers Hardness Reference Material, with ISO 6507-3 DAkkS calibration certificate, 60x60x16mm, steel
63ETB880	750HV20 Vickers Hardness Reference Material, with ISO 6507-3 DAkkS calibration certificate, 60x60x16mm, steel
63ETB897	500HV30 Vickers Hardness Reference Material, with ISO 6507-3 DAkkS calibration certificate, 60x60x16mm, steel
63ETB902	750HV30 Vickers Hardness Reference Material, with ISO 6507-3 DAkkS calibration certificate, 60x60x16mm, steel
810-038	Round table, Ø250 mm
810-040	V-anvil, groove length 40 mm, Ø15 mm-Ø60 mm
810-041	V-anvil, groove length 40 mm, Ø3 mm-Ø9 mm

Vickers HDMI camera system

Code number	Description
63AAA765	HDMI camera
11AAC729	C-mount
NEC EA241WM	24" monitor

System A

HV-110A/HV-120A

Features:

- 144 mm (5.7 inch) colour LCD display
- 3 types of display styles settable
- Equipped measuring microscope allows diagonal length measurement by visual observation
- Positioning using a manual XY stage

System B

HV-110B/HV-120B

Features:

- Operation using highly functional AVPAK-20 software
- Light intensity of LED illumination adjusted with aperture or AVPAK
- Positioning using a manual XY stage

System C

HV-110C/HV-120C

Features:

- Operation using highly functional AVPAK-20 software
- Light intensity of the LED illumination adjusted with aperture diaphragm or through AVPAK.
- Automatic indentation reading.
- Automatic positioning using motorized XY stage.

System D

HV-110D/HV-120D

Features:

- Operation using highly functional AVPAK software
- Light intensity of the LED illumination adjusted with aperture diaphragm or through AVPAK
- Automatic positioning with motorized XY stage
- Auto focussing

Mitutoyo

Vickers Hardness Testing Machine HV-110/120

Configuration

Two additional objective lenses can be selected

		Minimum system configuration		In addition selectable FACTORY OPTIONS		Remarks
TOUCH SCREEN MODELS	SYSTEM A	HV-110 SYSTEM A	Main unit standard test force 810-440-13	Video camera unit	810-454-20	
				Objective lens 2X	11AAE672	
				Objective lens 5X	11AAE673	
				Objective lens 20X	11AAE674	
				Objective lens 50X	11AAE675	
				Manual XY stage 50X50	810-423	
		HV-120 SYSTEM A	Main unit low test force 810-445-13	Video camera unit	810-454-20	
				Objective lens 2X	11AAE672	
				Objective lens 5X	11AAE673	
				Objective lens 20X	11AAE674	
				Objective lens 50X	11AAE675	
				Manual XY stage 50X50	810-423	

		Minimum system configuration		In addition selectable FACTORY OPTIONS		Remarks
SOFTWARE MODELS	SYSTEM B	HV-110 SYSTEM B	Main unit standard test force 810-443-11	Measuring microscope	11AAE678	Cannot be used simultaneously with vision unit
				Objective lens 2X	11AAE672	
				Objective lens 5X	11AAE673	
			AVPAK-20* 11AAE270-DEE	Objective lens 20X	11AAE674	
				Objective lens 50X	11AAE675	
				Manual XY stage 50X50	810-423	
		HV-120 SYSTEM B	Main unit low test force 810-448-11	Measuring microscope	11AAE678	Cannot be used simultaneously with vision unit
				Objective lens 2X	11AAE672	
				Objective lens 5X	11AAE673	
			AVPAK-20* 11AAE270-DEE	Objective lens 20X	11AAE674	
				Objective lens 50X	11AAE675	
				Manual XY stage 50 x 50	810-423	

		Minimum system configuration		In addition selectable FACTORY OPTIONS		Remarks
SOFTWARE MODELS	SYSTEM C	HV-110 SYSTEM C	Main unit standard test force 810-443-11	Measuring microscope	11AAE678	Cannot be used simultaneously with vision unit
			Motorized XY stage 50 x 50mm 810-461-10	Objective lens 2X	11AAE672	
			AVPAK-20* 11AAE270-DEE	Objective lens 5X	11AAE673	
				Objective lens 20X	11AAE674	
		HV-110 SYSTEM C	Main unit standard test force 810-443-11	Objective lens 50X	11AAE675	
			Motorized XY stage 100 x 100mm 810-462-10	Objective lens 100X	11AAE676	
			AVPAK-20* 11AAE270-DEE			
		HV-120 SYSTEM C	Main unit low test force 810-448-11	Measuring microscope	11AAE678	Cannot be used simultaneously with vision unit
			Motorized XY stage 50 x 50mm 810-461-10	Objective lens 2X	11AAE672	
			AVPAK-20* 11AAE270-DEE	Objective lens 5X	11AAE673	
				Objective lens 20X	11AAE674	
		HV-120 SYSTEM C	Main unit standard test force 810-448-11	Objective lens 50X	11AAE675	
			Motorized XY stage 100 x 100mm 810-462-10	Objective lens 100X	11AAE676	
			AVPAK-20* 11AAE270-DEE			

		Minimum system configuration		In addition selectable FACTORY OPTIONS		Remarks
SOFTWARE MODELS	SYSTEM D	HV-110 SYSTEM D	Main unit standard test force 810-443-11	Measuring microscope	11AAE678	Cannot be used simultaneously with vision unit
			Motorized XY stage 50 x 50mm 810-461-10	Objective lens 2X	11AAE672	
			Auto Focus stage unit 810-465	Objective lens 5X	11AAE673	
			AVPAK-20* 11AAE270-DEE	Objective lens 20X	11AAE674	
				Objective lens 50X	11AAE675	
		HV-110 SYSTEM D	Main unit standard test force 810-443-11	Objective lens 100X	11AAE676	
			Motorized XY stage 100 x 100mm 810-462-10			
			Auto Focus stage unit 810-465			
			AVPAK-20* 11AAE270-DEE			
		HV-120 SYSTEM D	Main unit low test force 810-448-11	Measuring microscope	11AAE678	Cannot be used simultaneously with vision unit
			Motorized XY stage 50 x 50mm 810-461-10	Objective lens 2X	11AAE672	
			Auto Focus stage unit 810-465	Objective lens 5X	11AAE673	
			AVPAK-20* 11AAE270-DEE	Objective lens 20X	11AAE674	
				Objective lens 50X	11AAE675	
		HV-120 SYSTEM D	Main unit low test force 810-448-11	Objective lens 100X	11AAE676	
			Motorized XY stage 100 x 100mm 810-462-10			
			Auto Focus stage unit 810-465			
			AVPAK-20* 11AAE270-DEE			

* The above configuration does not include PC.

For all systems: 10 x objective as standard.

Micro-Vickers and Vickers Set

Configuration

A-Type

B-Type

C-Type

D-Type

A-Type set

No.	Code No.:	Description	Content of Set
HV-110 A-Type Set	810-440-13-ASET	Single indenter configuration	**810-440-13** - Manual main unit HV-110 **02ALP300** - 10x Objective lens **11AAE674** - 20x Objective lens
HV-120 A-Type Set	810-445-13-ASET	Single indenter configuration	**810-445-13** - Manual main unit HV-120 **02ALP300** - 10x Objective lens **11AAE674** - 20x Objective lens

B-Type set

No.	Code No.:	Description	Content of Set
HV-110 B-Type Set	810-443-11-BSET	Single indenter configuration	**810-443-11** - System main unit HV-110 **02ALP300** - 10x Objective lens **11AAE674** - 20x Objective lens
HV-120 B-Type Set	810-448-11-BSET	Single indenter configuration	**810-448-11** - System main unit HV-120 **02ALP300** - 10x Objective lens **11AAE674** - 20x Objective lens

C-Type set

No.	Code No.:	Description	Content of Set
HV-110 C-Type Set	810-443-11-CSET	Single indenter configuration	**810-443-11** - System main unit HV-110 **11AAE672** - 2x Objective lens **02ALP300** - 10x Objective lens **11AAE674** - 20x Objective lens **810-462-10** - Motorized XY stage 100x100mm
HV-120 C-Type Set	810-448-11-CSET	Single indenter configuration	**810-448-11** - System main unit HV-120 **11AAE672** - 2x Objective lens **02ALP300** - 10x Objective lens **11AAE674** - 20x Objective lens **810-462-10** - Motorized XY stage 100x100mm

D-Type set

No.	Code No.:	Description	Content of Set
HV-110 D-Type Set	810-443-11-DSET	Single indenter configuration	**810-443-11** - System main unit HV-110 **11AAE672** - 2x Objective lens **02ALP300** - 10x Objective lens **11AAE674** - 20x Objective lens **810-462-10** - Motorized XY stage 100x100mm **810-465** - Autofocus unit
HV-120 D-Type Set	810-448-11-DSET	Single indenter configuration	**810-448-11** - System main unit HV-120 **11AAE672** - 2x Objective lens **02ALP300** - 10x Objective lens **11AAE674** - 20x Objective lens **810-462-10** - Motorized XY stage 100x100mm **810-465** - Autofocus unit

Please order AVPAK-20 Software **11AAE270-DEE** and the PC additionally!

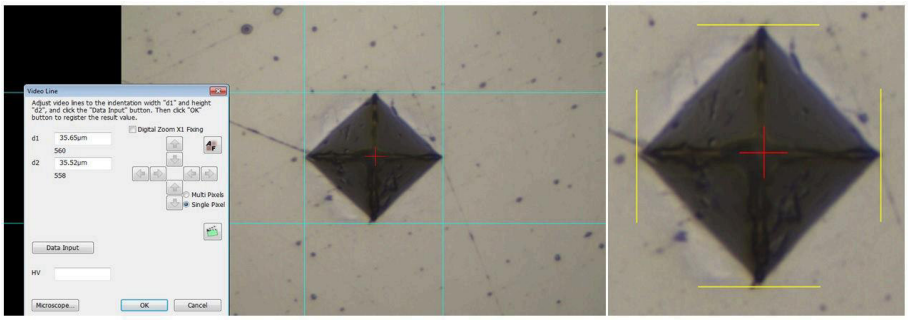
All items listed below the set code number are included in the scope of delivery.

Hardness Testing Software

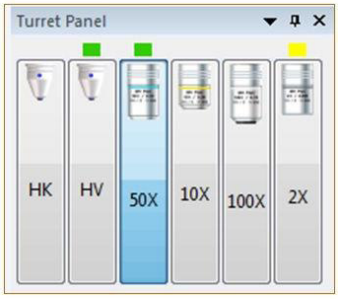
Software AVPAK-20 for System B,C and D No. 11AAE270-DEE

Software to control test sequence, evaluate hardness and make report
Supports Windows® 10, 64 bit operating system

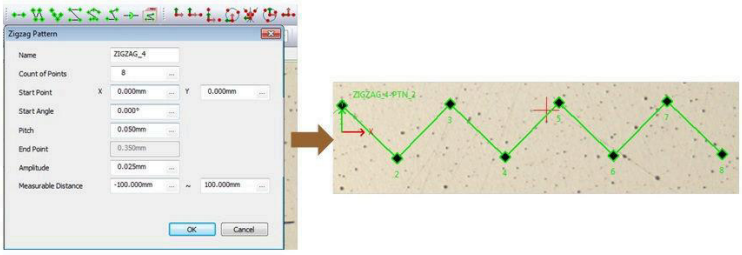
.



Automatic and manual video line measurement of indentation diagonals

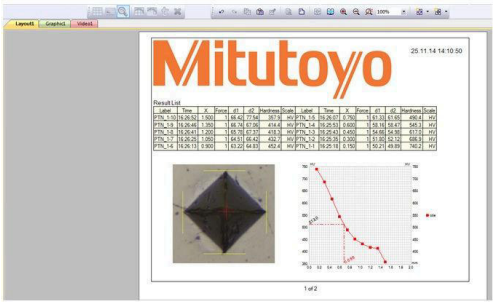


Turret control function with colour indicator

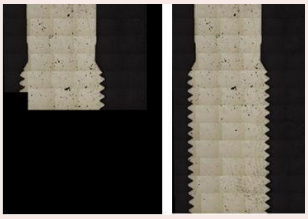


Test pattern function
Operator friendly presets of test patterns (line, zigzag, grid or circle/ arc) with adjustable indentation spacings. Additionally patterns can be combined or test points can be set freely as a teach in pattern.

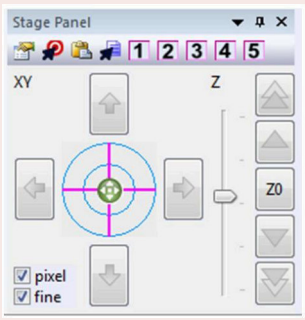
Coordinate alignment function
Several test pattern alignment methods (1-point, 2-points, 3-points, arc, and centre of circle, bisector, midpoint) are available to place the pattern in the correct position. The automatic contour recognition allows to place indentations in accordance with the obtained contour or a specified excerpt from the contour. Therefore lines, patterns or a matrix of indentations can be placed accordingly.



Analysis and report function
Provides to display several types of graph (carburize transition, carburize distribution, X-R control chart) and layouts. It is possible to edit these graphs on the report. Tracebility comments, indentation images and tables of test data can be inserted as well.



Overview image generation



Stage control function

Functions

Stitching
Generates specimen overview images by stitching several images together. Indentation patterns can be placed on the overview image precisely and easily. (motorized XY stage is required)

Automatic indentation measurement
Automatically measure the indentation's diagonal lengths according EN ISO 6507-1

Illumination control
Set the illumination level manually or automatically according to the specimen surface. Additionally display the saturation on the camera image

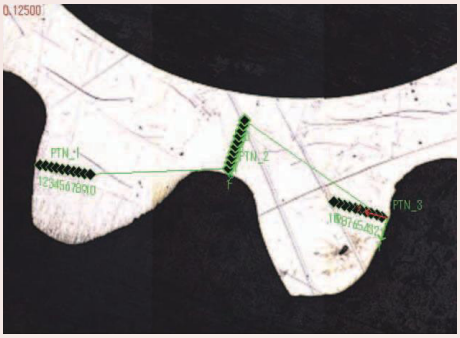
Stage control function
Control the motorized XY stage unit (for C- and D-Types) and the autofocus stage unit (type D) by the virtual joystick on the AVPAK-20 window. (Hardware joystick box is always included in the motorized XY stage's scope of delivery) Insert XY positioning steps in your part program and store 5 settable postions.

Turret control function
Choose and change the Objective lens on the turret panel. Green colour marks indicate the indenter and objective lenses that are set for measurement in the software. The objective lens set for overview image stitching is marked in yellow.

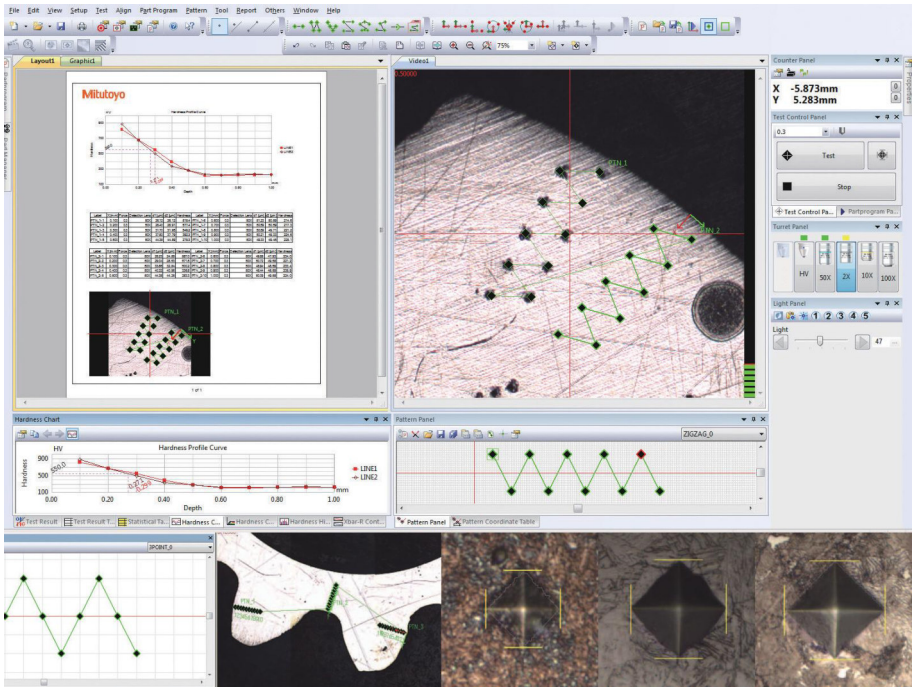
Automatic execution function
Record any kind of operation, store and rerun as part programs.

Hardness Testing Software

Software AVPAK-20 for System B, C and D



Graphic view (of stored images)
For displaying the specimen overview images and checking the pattern positioning The digital zoom function can be used to easily magnify and check the indentation site.



Screen layout for control, testing status, result display and reporting can be changed freely.

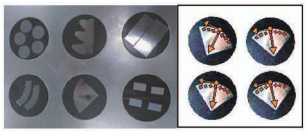
FUNCTIONS

Layout view
Indentation images, graphs, tables, etc., can be laid out freely to create the report in need.

Stitching
Takes images of an entire rectangular field from the moving stage then combines the images. Use stitching for a complete overview of sample.

Auto trace
Automatically traces the shape of the sample. Take images as the stage moves along the outer contours of the specimen, then combines the images.

Navigation function for the manual XY stage
(System B)
When the test position is to be moved during multi-point testing (CHD etc.), this function guides the positioning of the manual XY fine adjustment stage to the next position by pop up on screen menu. User positioning errors are reduced drastically

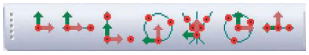


Handling of multiple specimens
Part program and Part Manager function support testing of multiple and irregular specimens.

Multi-specimen testing
Executes different part programs for each irregular specimen.

Parts Manager
Executes a common part program for specimens having the same shape. Parts can be arranged in grid positions.

Pattern creation:
This tool supports the creation of test patterns such as straight lines, zigzag lines and teaching patterns.



Pattern pasting :
This tool supports the pasting of created test patterns by applying a coordinate system. It adjusts the origin, direction, etc. of the before created pattern. Works coordinate systems for complex applications can be generated.

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Hardness Testing Software

Type	A	B	C	D
No.	**HR-610A HR-620A**	**HM-210B HM-220B HR-620B HV-110B HV-120B**	**HM-210C HM-220C HV-110C HV-120C**	**HM-210D HM-220D HV-110D HV-120D**
Indentation control function	●	●	●	●
Auto reading function	-	●	●	●
Focusing function (Contrast level indicator)	-	●	●	●
Focusing function (Auto Focus)	-	-	-	●
Illumination control function	-	●	●	●
Stage control function	-	●	●	●
Turret control function	-	●	●	●
Test pattern function	-	●	●	●
Coordinate alignment function	-	●	●	●
Wide area image synthesis function	-	-	●	●
Automatic execution function	●	●	●	●
Multiple specimens testing function	-	●	●	●
Wizard function for single test/pattern test/ standard test	●	●	●	●
Image analysis function	-	●	●	●
Report creation	-	●	●	●
Hardness scale conversion, spherical compensation, judgment, statistical factor	●	●	●	●
Extemal output function	●	●	●	●
Security level function	●	●	●	●
Simple dimension function	-	●	●	●
Edging surface reading function	-	●	●	●
Jominy test function	-	●	●	●
User layout save function for software window	●	●	●	●
FORMEio compatibility for automation	●	●	●	●
Status Monitor compatibility	●	●	●	●
Inch system (mm/inch main unit required)	●	●	●	●
Retrofittable to C-type	-	●	-	-
Retrofittable to D- type	-	●	●	-

Micro-Vickers Hardness Testing Machines HM-210/220

Series 810

This is a high performance hardness testing machine that uses advanced technology and is ideal for quality control.
The manual line up of the HM-200 Series has the following benefits:

- 144 mm (5.7 inch) coloured touchsreen display (Type A) with higher visibility, easy to operate user interface
- Digimatic output for report creation.
- USB stick data export
- Electromagnetic test force generation system for higher accuracy.
- A high performance optical system provides a high quality image of the indentation load.
- A long working distance greatly reduces the possibility of collision.
- A range of six different objectives: 2x, 5x, 10X, 20X, 50X and 100X for measuring the indentation images.
- LED lighting gives you an observation image in natural colour, with better contrast, as well as longer operation.
- You can set different kinds of conditions on a touch panel, and display test results for easy operation.
- Vickers, Knoop and KC fracture toughness measurement.
- Test force ranges from 0.05g to 2kg.

Touchscreen type

Software type

V.S.*	HV0,01	HV0,02	HV0,03	HV0,05	HV0,1	HV0,2	HV0,3	HV0,5	HV1
mN	98,07	196,1	294,2	490,3	980,7	1.961,0	2.942,0	4.903,0	9.807,0
(gf)	10,0	20,0	30,0	50,0	100,0	200,0	300,0	500,0	1.000,0

HM-210 Testforce range

V.S.*	HV0,00005	HV0,0001	HV0,0002	HV0,0003	HV0,0005	HV0,001	HV0,002	HV0,003	HV0,005	HV0,01
mN	0,4903	0,9807	1,961	2,942	4,903	9,807	19,61	29,42	49,03	98,07
(gf)	0,05	0,1	0,2	0,3	0,5	1,0	2,0	3,0	5,0	10,0
V.S.*	HV0,01	HV0,02	HV0,03	HV0,05	HV0,1	HV0,2	HV0,3	HV0,5	HV1	
mN	196,1	294,2	490,3	980,7	1.961,0	2.942,0	4.903,0	9.807,0	19.610,0	
(gf)	20,0	30,0	50,0	100,0	200,0	300,0	500,0	1.000,0	2.000,0	

HM-220 Testforce range

*V.S. = Vickers scales

Specifications

Indenter / Objective turret	Motor driven and manual operation
Standard	ISO 6507-2, ISO 4545-2, JIS B 7725
Data output	RS-232C, Digimatic, USB 2 interface
XY stage [mm]	Travel range system A+B: 25 x 25 / 50 x 50 manual Travel range system C+D: 50 x 50 / 100 x 100 motorized
Arbitrary test force	1 type [Default: 245,2mN (25gf)]
Control panel	Built-in touch panel, 5,7" Colour LCD (HM-210A/220A for System A), Control software (PC for System B/C/D)
External dimensions Main unit mass	System A: 315(W)×671(D)×595(H)mm/38,5kg System B/C/D: 315(W)×586(D)×741(H)mm/37,4kg
Functions	Calculation of Vickers / Knoop*2 hardness, and ceramic fracture toughness based on IF method (JIS R1697), 3 display format (standard, list, simple), GO/NG judgment, test condition guide, curve and user correction, hardness corresponding value, statistics calculation
Objective lens unit	Up to 4 pcs. mountable (one mounted 50X as standard)
Output	Digimatic, serial, USB2 series A (for memory)*1, USB2 B Type (for system communication)
Resolution of diagonal length of an indentation	Objective lens less than 50X: 0,1µm (Objective lens more than 50X: 0,01µm)
Specimen dimensions	System A/B: height 133mm, depth 160mm (when using manual XY stage 25X25) System C: height 112mm, depth 160mm, System D: height 72mm, depth 160mm
Test force control	Electromagnetic generation of force (force motor) and automatic control (load, duration, unload)
Turret drive	Motor-driven and manual operation

Hardness Testing Machines brochure on request

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Micro-Vickers Hardness Testing Machines HM-210/220

Manual or complete automatic testing

System A

HM-210A/HM-220A

Features:

- Touch-panel operation
- Measurement of indentation dimensions using a measuring microscope
- Positioning using a manual XY stage

System B

HM-210B/HM-220B
Automatic measurement by AVPAK-20 eliminates operator measurement errors.

Features:

- Operation using AVPAK-20
- Automatic measurement of indentations
- Positioning using a manual XY stage

System C

HM-210C/HM-220C

Features:

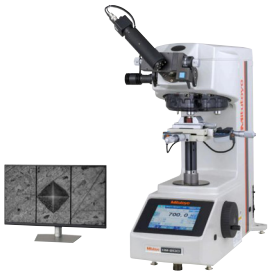
- Operated using AVPAK-20
- Automatic indentation reading
- Automatic positioning with motorized XY stage

System D

HM-210D/HM-220D
Top-end model with autofocus

Features:

- Operated using AVPAK-20
- Automatic identation reading
- Automatic positioning with motorized XY stage
- Autofocusing



Vickers HDMI camera system
(To be used with manual Vickers testing machines)
The 1/3" 1.2 Mpixel HDMI camera and a 24"standard monitor enables observation and measurement of indentations at high magnification, thereby reducing operator error. Additionally, images can be stored on the included 16GB SD card. No PC needed due to built in processor. Scope of delivery includes HDMI cable and wireless mouse. Please order 63AAA765, 11AAC729 and NEC EA21N for complete set.

AVPAK-20 software 11AAE270-DEE for automatic hardness testing systems.
Software that supports control, testing and report creation related to hardness testing. Supports parameter setting and automatic measurement.

High-functionality PC and TFT monitor
Compatible with Windows® 10 Professional. Supports a wide-screen TFT and provides improved operability.
*depending the version

Optional accessories

No.	Description
63ETB601	500HV0,1 Vickers Hardness Reference Material, with ASTM E92 DAkkS calibration certificate, 30x30x6mm, steel
63ETB606	750HV0,1 Vickers Hardness Reference Material, with ASTM E92 DAkkS calibration certificate, 30x30x6mm, steel
63ETB635	500HV0,3 Vickers Hardness Reference Material, with ISO 6507-3 DAkkS calibration certificate, 30x30x6mm, steel
63ETB640	750HV0,3 Vickers Hardness Reference Material, with ISO 6507-3 DAkkS calibration certificate, 30x30x6mm, steel
63ETB670	500HV1 Vickers Hardness Reference Material, with ISO 6507-3 DAkkS calibration certificate, 30x30x6mm, steel
63ETB675	750HV1 Vickers Hardness Reference Material, with ISO 6507-3 DAkkS calibration certificate, 30x30x6mm, steel
810-017	Special vise, (opening width 100mm)
810-013	Sheet specimen table
810-014-1	Micro Vickers hardness testing machines, Wire specimen holder horizontal
810-015-1	Micro Vickers hardness testing machines, Wire specimen holder vertikal
810-019	Tilting specimen table
810-020	Adjustable specimen holder, Ø15-30mm
810-018	Rotary table, 360°
810-084	Rotatable adjustable specimen table, Ø15-30mm / 360°
810-085	Sheet specimen table
810-095	Rotary tilting specimen table, vise Ø15-50mm
810-650-1	Resin mold specimen table, Ø25.4 mm
810-650-2	Resin mold specimen table, Ø30 mm
810-650-3	Resin mold specimen table, Ø31.75 mm
810-650-4	Resin mold specimen table, Ø38.1 mm
810-650-5	Specimen holder f. resin molded specimen, 1 specimen Ø40 mm
810-641	Vibration Isolator, (for testing machine)

Code number	Description
63AAA765	HDMI camera
11AAC729	C-mount
NEC EA241WM	24" monitor

Micro-Vickers Hardness Testing Machines HM-210/220

Single indenter configuration for HM-200 Series

A-Type*

B-Type*

C-Type*

D-Type*

*Please order AVPAK-20 Software **11AAE270-DEE** and the PC additionally!

All items listed below the set code number are included in the scope of delivery.

A-Type set

No.	Code No.:	Description	Content of Set
HM-210 A-Type set	810-401-13-ASET1	Single indenter configuration	**810-401-13** - Manual main unit HM-210 **2ALP300**- 10x Objective lens **2ALP500** - 50x Objective lens **810-420** - Manual XY stage 25x25mm
HM-220 A-Type set	810-406-13-ASET1	Single indenter configuration	**810-406-13** - Manual main unit HM-210 **2ALP300**- 10x Objective lens **2ALP500** - 50x Objective lens, Standard lens **11AAE669** - 100x Objective lens **810-420** - Manual XY stage 25x25mm

B-Type set

No.	Code No.:	Description	Content of Set
HM-210 B-Type set	810-404-11-BSET1	Single indenter configuration	**810-404-11** - System main unit HM-210 **2ALP300**- 10x Objective lens **2ALP500** - 50x Objective lens **810-420** - Manual XY stage 25x25mm
HM-220 B-Type set	810-409-11-BSET1	Single indenter configuration	**810-409-11** - System main unit HM-220 **2ALP300**- 10x Objective lens **2ALP500** - 50x Objective lens **11AAE669** - 100x Objective lens **810-420** - Manual XY stage 25x25mm

C-Type set

No.	Code No.:	Description	Content of Set
HM-210 C-Type set	810-404-11-CSET1	Single indenter configuration	**810-404-11** - Systemmain unit HM-210 **11AAE665** - 2x Objective lens **2ALP300**- 10x Objective lens **2ALP500** - 50x Objective lens **810-462-10** - Motorized XY stage 100x100mm
HM-220 C-Type set	810-409-13-CSET1	Single indenter configuration	**810-409-11** - System main unit HM-220 **11AAE665** - 2x Objective lens **2ALP300**- 10x Objective lens **2ALP500** - 50x Objective lens **11AAE669** - 100x Objective lens **810-462-10** - Motorized XY stage 100x100mm

D-Type set

No.	Code No.:	Description	Content of Set
HM-210 D-Type set	810-404-11-DSET1	Single indenter configuration	**810-404-11** - System main unit HM-210 **11AAE665** - 2x Objective lens **2ALP300**- 10x Objective lens **2ALP500** - 50x Objective lens **810-462-10** - Motorized XY stage 100x100mm **810-465** - Auto Focus unit
HM-220 D-Type set	810-409-13-DSET1	Single indenter configuration	**810-409-11** - System main unit HM-220 **11AAE665** - 2x Objective lens **2ALP300**- 10x Objective lens **2ALP500** - 50x Objective lens **11AAE669** - 100x Objective lens **810-462-10** - Motorized XY stage 100x100mm **810-465** - Auto Focus unit

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Micro-Vickers Hardness Testing Machines HM-210/220

Double indenter configuration HM-200 Series

A-Type set

No.	Code No.:	Description	Content of Set
HM-210 A-Type set 2	810-401-13-ASET2	Double indenter configuration	**810-401-13** - Manual main unit HM-210 **11AAB997** - Second indentershaft for Knoop test **2ALP300**- 10x Objective lens **2ALP500** - 50x Objective lens **810-420** - Manual XY stage 25x25mm
HM-220 A-Type set 2	810-406-13-ASET2	Double indenter configuration	**810-406-13** - Manual main unit HM-210 **11AAB998** - Second indentershaft for Knoop test **2ALP300**- 10x Objective lens **2ALP500** - 50x Objective lens **11AAE669** - 100x Objective lens **810-420** - Manual XY stage 25x25mm

B-Type set

No.	Code No.:	Description	Content of Set
HM-210 B-Type set 2	810-404-11-BSET2	Double indenter configuration	**810-404-11** - System main unit HM-210 **11AAB997** - Second indentershaft for Knoop test **2ALP300**- 10x Objective lens **2ALP500** - 50x Objective lens **810-420** - Manual XY stage 25x25mm
HM-220 B-Type set 2	810-409-11-BSET2	Double indenter configuration	**810-409-11** - System main unit HM-220 **11AAB998** - Second indentershaft for Knoop test **2ALP300**- 10x Objective lens **2ALP500** - 50x Objective lens **11AAE669** - 100x Objective lens **810-420** - Manual XY stage 25x25mm

C-Type set

No.	Code No.:	Description	Content of Set
HM-210 C-Type set 2	810-404-11-CSET2	Double indenter configuration	**810-404-11** - System main unit HM-210 **11AAB997** - Second indentershaft for Knoop test **11AAE665** - 2x Objective lens **2ALP300**- 10x Objective lens **2ALP500** - 50x Objective lens **810-462-10** - Motorized XY stage 100x100mm
HM-220 C-Type set 2	810-409-11-CSET2	Double indenter configuration	**810-409-11** - System main unit HM-220 **11AAB998** - Second indentershaft for Knoop test **11AAE665** - 2x Objective lens **2ALP300**- 10x Objective lens **2ALP500** - 50x Objective lens **11AAE669** - 100x Objective lens **810-462-10** - Motorized XY stage 100x100mm

D-Type set

No.	Code No.:	Description	Content of Set
HM-210 D-Type set 2	810-404-11-DSET2	Double indenter configuration	**810-404-11** - System main unit HM-210 **11AAB997** - Second indentershaft for Knoop test **11AAE665** - 2x Objective lens **2ALP300**- 10x Objective lens **2ALP500** - 50x Objective lens **810-462-10** - Motorized XY stage 100x100mm **810-465** - Autofocus unit
HM-220 D-Type set 2	810-409-11-DSET2	Double indenter configuration	**810-409-11** - System main unit HM-220 **11AAB998** - Second indentershaft for Knoop test **11AAE665** - 2x Objective lens **2ALP300**- 10x Objective lens **2ALP500** - 50x Objective lens **11AAE669** - 100x Objective lens **810-462-10** - Motorized XY stage 100x100mm **810-465** - Autofocus unit

A-Type*

B-Type*

C-Type*

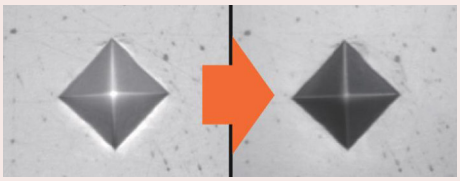
D-Type*

*Please order AVPAK-20 Software **11AAE270-DEE** and the PC additionally!

All items listed below the set code number are included in the scope of delivery.

Micro-Vickers Hardness Testing Machines HM-210/220

Objectives	Vickers-Scale		
	HV 0,00005 - 0,02	HV 0,2 - 1	HV 1-2
2x	Use this objectives only for probe overview		
5x	Use this objectives only for probe overview		
10x			
20x			
50x			
100x			
10x objective for easy focus			
Use this table for first orientation			



Observation image of the indentation (50X)
Stray light reduction around the indentation

Wide range of lenses available for different magnifications

Configuration

Up to three additional objective lenses can be added.

System A - Touch Screen Models

No.	Minimum system configuration	Selectable factory options
HM-210 SYSTEM A standard test force	Main unit: 810-401-13 Standard objective lens: 10x / 50x Selectable option manual XY stage: 810-420: 25x25 mm 810-423: 50x50 mm	Video camera unit: 810-454-20 Objective lens 2X: 11AAE665 Objective lens 5X: 11AAE666 Objective lens 20X: 11AAE668 Objective lens 100X: 11AAE669 Indentershaft unit HM-210: 11AAE670 with Knoop indenter
HM-220 SYSTEM A low test force	Main unit: 810-406-13 Standard objective lens: 10x / 50x Selectable option manual XY stage: 810-420: 25x25 mm 810-423: 50x50 mm	Video camera unit: 810-454-20 Objective lens 2X: 11AAE665 Objective lens 5X: 11AAE666 Objective lens 20X: 11AAE668 Objective lens 100X: 11AAE669 Indentershaft unit HM-210: 11AAE671 with Knoop indenter

System B Semi automatic - Software Models

No.	Minimum system configuration	Software	Selectable factory options
HM-210 SYSTEM B standard test force	Main unit: 810-404-11 Standard objective lens: 10x / 50x Selectable option manual XY stage: 810-420: 25x25 mm 810-423: 50x50 mm	11AAE270-DEE	Measuring microscope: 11AAE677 Objective lens 2X: 11AAE665 Objective lens 5X: 11AAE666 Objective lens 20X: 11AAE668 Objective lens 100X: 11AAE669 Indentershaft unit HM-210: 11AAE670 with Knoop indenter
HM-220 SYSTEM B low test force	Main unit: 810-409-11 Standard objective lens: 10x / 50x Selectable option manual XY stage: 810-420: 25x25 mm 810-423: 50x50 mm	11AAE270-DEE	Measuring microscope: 11AAE677 Objective lens 2X: 11AAE665 Objective lens 5X: 11AAE666 Objective lens 20X: 11AAE668 Objective lens 100X: 11AAE669 Indentershaft unit HM-210: 11AAE671 with Knoop indenter

System C Automatic - Software Models

No.	Minimum system configuration	Software	Selectable factory options
HM-210 SYSTEM C standard test force	Main unit: 810-404-11 Standard objective lens: 10x / 50x Selectable option motorized XY stage: 810-461-10: 50x50 mm 810-462-10: 100x100 mm	11AAE270-DEE	Measuring microscope: 11AAE677 Objective lens 2X: 11AAE665 Objective lens 5X: 11AAE666 Objective lens 20X: 11AAE668 Objective lens 100X: 11AAE669 Indentershaft unit HM-210: 11AAE670 with Knoop indenter
HM-220 SYSTEM C low test force	Main unit: 810-409-11 Standard objective lens: 10x / 50x Selectable option motorized XY stage: 810-461-10: 50x50 mm 810-462-10: 100x100 mm	11AAE270-DEE	Measuring microscope: 11AAE677 Objective lens 2X:11AAE665 Objective lens 5X: 11AAE666 Objective lens 20X: 11AAE668 Objective lens 100X: 11AAE669 Indentershaft unit HM-210: 11AAE671 with Knoop indenter

System D Fully automatic - Software Models

No.	Minimum system configuration	Autofocus unit	Software	Selectable factory options
HM-210 SYSTEM D standard test force	Main unit: 810-404-11 Standard objective lens: 10x / 50x Selectable option motorized XY stage: 8810-461-10: 50x50 mm 810-462-10: 100x100 mm	810-465	11AAE270-DEE	Measuring microscope: 11AAE677 Objective lens 2X: 11AAE665 Objective lens 5X: 11AAE666 Objective lens 20X: 11AAE668 Objective lens 100X: 11AAE669 Indentershaft unit HM-210: 11AAE670 with Knoop indenter
HM-220 SYSTEM D low test force	Main unit: 810-409-11 Standard objective lens: 10x / 50x Selectable option motorized XY stage: 8810-461-10: 50x50 mm 810-462-10: 100x100 mm	810-465	11AAE270-DEE	Measuring microscope: 11AAE677 Objective lens 2X: 11AAE665 Objective lens 5X: 11AAE666 Objective lens 20X: 11AAE668 Objective lens 100X: 11AAE669 Indentershaft unit HM-210: 11AAE671 with Knoop indenter

Mitutoyo

Impact Hardness Testing Device HH-V400

HH-V400

The HH-V400 is a modern light-weight portable hardness testing instrument for metal workpieces. It works on the Leeb rebound hardness principle.
The measurement is conducted with hardness value L (Leeb-value), however, conversion to any desired hardness scale can be performed.
For a reliable test procedure, an offset value is generated and stored each individual workpiece.
Up to 100 set-ups can be stored in the device.
A total of 1800 measured values can be saved on the device memory.
For best ease of use, all impact devices are automatically recognized by the software without the need for compensational measurement.
So is the measuring direction angle. According to the recognized angle, the measurement value is automatically compensated.
The display provides an intuitive menu where important information like range and average are shown.
The durable menu buttons provide reliable use even in harsh environments.
An environment friendly rechargable battery pack supplies enough power for a working day on the go.
Wired (USB cable included) or wireless data transmission accessories from the Mitutoyo U-WAVE range and the Mitutoyo SPC software MeasurLink ensure the best data evaluation options.

Model	
No.	**810-306**
Accuracy	±12 HL (800 HL +/- 1.5%)
Display unit	7-segment LCD
Hardness Display range	Leeb hardness: 100.0 to 999.0 HL
	Conversion range / Increment
Vickers	43-950HV / 1 HV
Brinell	20-894 HB / 1 HB
Rockwell C	19.3-68.2 HRC / 0.1 HRC
Rockwell B	13.5-101.7 HRB / 0.1 HRB
Shore	13.2-99.3 HS / 0.1 HS
Tensile strength	499-1996 MPa / 1 MPa
Specimen Thickness Specimen Mass	Minimum Mass: No additional support 5 kg Rigid support 2-5 kg Coupled to rigid support 0,1 - 2 kg Minimum Thickness: Uncoupled 5 mm Coupled 3 mm
Specimen requirements	Testing point: 5 mm or more from edge of specimen 3 mm or more between testing points Specimen surface roughness: Ra of 2 µm or less
Mass	400 g
Connector cable for	HH-V400
PIN	-
USB-ITN	06AFM380E
DP-1VA (264-506D)	965013
USB Input Tool Interface Box (264-020)	937387

HH-V400 Impact device
HLDC scale
Use for inner walls of cylinders. The grip is short to allow positioning within a cylinder.

HH-V400 Impact device
HLD+15 scale
Use for concave workpieces such as gear teeth, grooves, etc.

HH-V400 impact device
HLDL scale
Use for gear teeth, welded corners, etc.

Specifications

Impact device	Impact hammer with integrated carbide-ball tip, D scale (ASTM A 956)
Functions	Auto angle compensation, Offset, OK/NG judgement, Hardness scale conversion, Data storage (1800 data entries), Statistical analysis (Average value, Max. value, Min. value, Dispersion), Auto sleep function, Impact counter display function
Power supply	Battery LR6 (2 pcs.) or AC adapter (optional)
Data output	RS-232C, SPC

Standard accessories

No.	Description
05CAA952	Screw Driver, 468-161,-162,-163
12BAS450	AC adapter 9V, for Surftest SJ-220
12BAS451	USB 2.0 cable, for Surftest SJ-220

Optional accessories

No.	Description
19BAA458	Replacement carbide ball on shaft, Leeb hardness testing HH-V400 Series DL
264-506D	Statistic Processing Printer DP-1VA, Data Printer and Logger CEE Type
Computer accessories	
937387	Digimatic Cable, Round 6-Pin Type, 1 m
Impact devices	
11AAE902	HH-V400 impact device HLD, Leeb hardness testing HH-V400 Series
11AAE903	HH-V400 impact device HLDC, Leeb hardness testing HH-V400 Series
11AAE904	HH-V400 impact device HLD+15, Leeb hardness testing HH-V400 Series
11AAE905	HH-V400 impact device HLDL, Leeb hardness testing HH-V400 Series
Support rings for D/DC type impact devices	
19BAA248	Support ring cylindrical specimen, R10-20 Leeb hardness testing HH-V400 Series D DC
19BAA249	Support ring hollow cylindrical specim., R14-20 Leeb hardness testing HH-V400 Series D DC
19BAA250	Support ring spherical specimen, R10-27.5 Leeb hardness testing HH-V400 Series D DC
19BAA251	Support ring hollow spherical specimen, R13.5-20 Leeb hardness testing HH-V400 Series D DC

Digital and Analogue Durometers HARDMATIC HH-300

Series 811 - Shore A

These compact digital/dial durometers in the Shore A scale can test a range of different materials and offer you the following benefits:

- You can use them for testing the hardness of the materials including soft rubber, elastomers, natural rubber, casting resin, neoprene, polyesters, soft PVC, leather, etc.

Model	HH-331	HH-332	HH-335	HH-336	HH-335-01	HH-336-01
No.	**811-331-10**	**811-332-10**	**811-335-10**	**811-336-10**	**811-335-11**	**811-336-11**
Shore Scale	Shore A	Shore A	Shore A	Shore A	Shore A	Shore A
Display	Analog Dial	Digital	Analog Dial	Digital	Analog Dial	Digital
Indenter b	ø 1,25 mm	ø 1,25 mm	ø 1,25 mm	ø 1,25 mm	ø 1,25 mm	ø 1,25 mm
Indenter d	ø 0,79 mm	ø 0,79 mm	ø 0,79 mm	ø ,079 mm	ø 0,79 mm	ø 0,79 mm
θ	35°	35°	35°	35°	35°	35°
Pressure foot a	ø 3 mm	ø 3 mm	ø 3 mm	ø 3 mm	ø 3 mm	ø 3 mm
Pressure foot f	ø 18 mm	ø 18 mm	44 x 18 mm	44 x 18 mm	ø 18 mm	ø 18 mm
Indenter protrusion	2,5 mm	2,5 mm	2,5 mm	2,5 mm	2,5 mm	2,5 mm
Spring force WE, WA, WD	WA=550+75 HA [mN]	WA=550+75 HA [mN]	WA=550+75 HA [mN]	WA=550+75 HA [mN]	WA=550+75 HA [mN]	WA=550+75 HA [mN]
Mass	0.32 kg	0.31 kg	0.3 kg	0.29 kg	0.27 kg	0.26 kg
Connector cable for	HH-300 Series	HH-300 Series	HH-300 Series	HH-300 Series	HH-300 Series	HH-300 Series
PIN	Flat	Flat	Flat	Flat	Flat	Flat
USB-ITN	06AFM380F	06AFM380F	06AFM380F	06AFM380F	06AFM380F	06AFM380F
DP-1VA (264-506D)	959149	959149	959149	959149	959149	959149
USB Input Tool Interface Box (264-020)	937387	937387	937387	937387	937387	937387

811-331-10

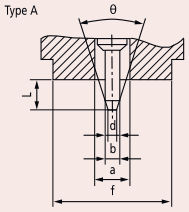
811-332-10

811-335-11

811-336-11

Optional accessories

No.	Description
905338	Digimatic Cable, Flat Straight Type, 1 m
811-013	Testing stand, HH-300 Series Shore A compact types
218000MIT	35, 60, 90 Shore A Shore Hardness Reference Material Set
Testing stand	
811-019	Testing stand, HH-300 Series Shore A long types



Indenter geometry Shore A and D

Testing stand
- Workstage dimension: Ø90 mm
- Max. specimen height: 90mm

218000MIT Shore A

Digital and Analogue Durometers HARDMATIC HH-300

Series 811 - Shore E

These compact digital/dial durometers in the Shore E scale can test a range of different materials and offer you the following benefits:

- You can use them for testing the hardness of the materials including soft rubber, elastomers, natural rubber, casting resin, neoprene, polyesters, soft PVC, leather, etc.

Model	HH-330	HH-329
No.	**811-330-10**	**811-329-10**
Shore Scale	Shore E	-
Display	Digital	Analog Dial
Indenter b	ø 5 mm	ø 1,25 mm
Indenter r	ø 2,5 mm	R 0,1 mm
θ	-	30°
Pressure foot a	ø 5,4 mm	ø 3 mm
Pressure foot f	44 x 18 mm	ø 18 mm
Indenter protrusion	2,5 mm	2,5 mm
Spring force WE, WA, WD	WE=550+75 HE [mN]	WD=444,5H D [mN]
Mass	0.29 kg	0.32 kg
Connector cable for	HH-300 Series	HH-300 Series
PIN	Flat	Flat
USB-ITN	06AFM380F	06AFM380F
DP-1VA (264-506D)	959149	959149
USB Input Tool Interface Box (264-020)	937387	937387

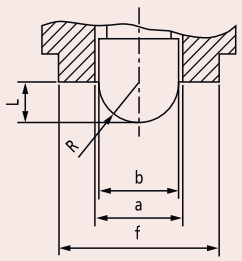
811-329-10

811-330-10

Optional accessories

No.	Description
218010AOMI	27, 62, 90 Shore AO Shore Hardness Reference Material Set
905338	Digimatic Cable, Flat Straight Type, 1 m
Testing stand	
811-013	Testing stand, HH-300 Series Shore A compact types

Type E



Indenter geometry Shore E

Testing stand
- Workstage dimension: Ø90 mm
- Max. specimen height: 90mm

218010AOMI

Digital and Analogue Durometers HARDMATIC HH-300

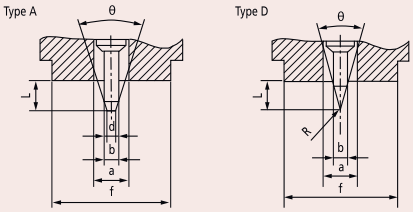
Series 811 - Shore D

These compact digital/dial durometers in the Shore D scale can test a range of different materials and offer you the following benefits:

- You can use them for testing the hardness of the materials including hard rubber, hard plastics, acrylic glass, Polystyrene, rigid thermoplastics, vinyl, cellulose acetate, etc.

Optional accessories

No.	Description
905338	Digimatic Cable, Flat Straight Type, 1 m
811-012	Testing stand, HH-300 Series Shore D all types
218000DMIT	35, 60, 85 Shore D Shore Hardness Reference Material Set



Indenter geometry Shore A and D

218000DMIT Shore D

Model	HH-333	HH-334	HH-337	HH-338	HH-337-01	HH-338-01
No.	**811-333-10**	**811-334-10**	**811-337-10**	**811-338-10**	**811-337-11**	**811-338-11**
Shore Scale	Shore D	Shore D	Shore D	Shore D	Shore D	Shore D
Display	Analog Dial	Digital	Analog Dial	Digital	Analog Dial	Digital
Indenter b	ø 1,25 mm	ø 1,25 mm	ø 1,25 mm	ø 1,25 mm	ø 1,25 mm	ø 1,25 mm
Indenter r	R 0,1 mm	R 0,1 mm	R 0,1 mm	R 0,1 mm	R 0,1 mm	R 0,1 mm
θ	30°	30°	30°	30°	30°	30°
Pressure foot a	ø 3 mm	ø 3 mm	ø 3 mm	ø 3 mm	ø 3 mm	ø 3 mm
Pressure foot f	ø 18 mm	ø 18 mm	44 x 18 mm	44 x 18 mm	ø 18 mm	ø 18 mm
Indenter protrusion	2,5 mm	2,5 mm	2,5 mm	2,5 mm	2,5 mm	2,5 mm
Spring force WE, WA, WD	WD=444,5H D [mN]	WD=444,5H D [mN]	WD=444,5H D [mN]	WD=444,5H D [mN]	WD=444,5H D [mN]	WD=444,5H D [mN]
Mass	0.32 kg	0.31 kg	0.3 kg	0.29 kg	0.27 kg	0.26 kg
Connector cable for	HH-300 Series	HH-300 Series	HH-300 Series	HH-300 Series	HH-300 Series	HH-300 Series
PIN	Flat	Flat	Flat	Flat	Flat	Flat
USB-ITN	06AFM380F	06AFM380F	06AFM380F	06AFM380F	06AFM380F	06AFM380F
DP-1VA (264-506D)	959149	959149	959149	959149	959149	959149
USB Input Tool Interface Box (264-020)	937387	937387	937387	937387	937387	937387

811-333-10

811-334-10

811-337-11

811-338-11

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