

Technical Data

Test force range:

HM-210A: 9 steps + arbitrary test force

HM-220A: 19 steps + arbitrary test force

Load dwell time: 0 - 999s

Manual XY stage unit

Stage size: 100x100mm

Travel range: 25x25mm

with Digimatic in/mm micrometer heads

Resolution: 0.001mm

Max. specimen height: 133mm (Stage size: 25 x 25mm)

Max. specimen height: 121mm (Stage size: 50 x 50mm)

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

Optical path: 4-port objectives switching system of

Infinity-correction optical system

Resolution: 0.01μm (When using objectives of X40 or more)

Data output: Serial interface (RS-232),

Digimatic interface, USB 2.0

Power supply: 39VA 100-125/220-240V AC, 50/60Hz

Dimensions: (W x D x H): 315x671x595mm

Mass: 43kg

Optional Accessories (Factory-installed option)

11AAE665 Objective lens unit 2X

11AAE666 Objective lens unit 5X

11AAE667 Objective lens unit 10X

11AAE668 Objective lens unit 20X

11AAE669 Objective lens unit 100X

11AAE677 Measuring microscope (Digital ocular)

11AAE670 Knoop Indenter Assembly (HM-210 Series)

11AAE671 Knoop Indenter Assembly (HM-220 Series)

Optional Accessories

810-454-20A TV camera unit (8.4 inch LCD)

19BAA058 Diamond indenter for Vickers

(HM210 Series standard test force)

19BAA059 Diamond indenter for Vickers

(HM220 Series low test force)

19BAA061 Diamond indenter for Knoop (HM210 Series)

19BAA062 Diamond indenter for Knoop (HM220 Series)

810-013 Specimen (thin plate) holder

810-014-1 Specimen (wire) holder

810-015-1 Specimen (wire or ball) holder

810-016 50 mm Vise

810-017 100 mm Vise

810-018 Rotary table

810-019 Specimen tilting holder

810-020 Universal specimen holder

810-085 Adjustable specimen (thin plate) holder

810-095 Rotatable specimen stage

375-056 Stage Micrometer (glass) Micro-scale

810-650-1 Resin mold specimen stage ø25.4

810-650-2 Resin mold specimen stage ø30

810-650-3 Resin mold specimen stage ø31.75

810-650-4 Resin mold specimen stage ø38.1

810-650-5 Resin mold specimen stage ø40

810-641 Vibration Isolator

810-424 1"x1" in/mm stage (standard)

810-427 2"x2" in/mm stage



Power turret with up to 2 indenter mounts and 4 objective mounts (manual operation possible)



Touch-screen type control panel

HM-210 / 220 Type A

SERIES 810 — Micro Vickers Hardness Testing Machines

- The electromagnetic force motor used in the loading mechanism enables the test force to be freely selected (see test force specifications) over the wide range of 0.4903mN to 19610mN (0.05gf to 2 kgf). It is also possible to freely set load dwell times. Now your desire for absolute control over the indentation size in Vickers hardness testing can be satisfied. The HM-200 series always offers the test force most appropriate for the specimen material and shape.
- Newly-designed 'MH Plan' objectives are optimized for measuring indentation images. The lineup includes 6 types of long working distance objectives: 10X, 20X, 50X and 100X for measuring indentation images, and 2X and 5X for enabling wide-range measurement around indentations.
- The long working distance objectives enable a comfortable working distance between the objective and the specimen surface. This greatly reduces the possibility of collision between the specimen and the objective during focusing operations. (e.g. for 50X objectives: 1.1mm for conventional models, 2.5mm for HM-200 series).
- LEDs, which have a longer life, produce less heat, consume less power and are more energy efficient than incandescent bulbs, are employed for the illumination system.
- The motorized turret allows for up to 4 objective lenses and 2 indenter assemblies to be mounted at the same time.



Stray light reduction around the indentation



HM-210A

SPECIFICATIONS

TYPE A Digital Hardness Tester

Model No.	HM-210 Type A	HM-210 Type A V/K	HM-220 Type A	HM-220 Type A V/K
Order No.	64AAB305PA	64AAB306PA	64AAB307PA	64AAB308PA
Fixed test force (mN)	98.07, 196.1, 294.2, 490.3, 980.7, 1961, 2942, 4903, 9807 (10gf-1000gf)		0.4903, 0.9807, 1.961, 2.942, 4.903, 9.807, 19.61, 29.42, 49.03, 98.07, 196.1, 294.2, 490.3, 980.7, 1961, 2942, 4903, 9807, 19610 (0.05 gf-2kgf)	
Arbitrary test force	≤100 gf in 1 gram increments, > 100gf in 10 gram increments		< 1 gf in .1 gf increments, ≤100 gf in 1 gram increments, > 100gf in 10 gram increments	
Test force control	Force generation by electromagnetic and automatic control (load, dwell, unload)			
Control unit	Color LCD Touch Screen			
Loading rate	60 μ/ sec		60μm/s, Variable between 2 and 60μm/s. ≤ 30 gf.	
Load dwell time	0-999 sec			
Indenter	Vickers	Vickers and Knoop	Vickers	Vickers and Knoop
Objective lenses	10x, 50x	10x, 20x, 50x	10x, 50x, 100x	10x, 50x, 100x
Objective turret	Motor driven and manual operation			
Filar eye piece	Dual Line, 10X, .01μ min			

With TV camera unit 810-454-20A (selectable with HM-210A/220A)

Measurement of indentation dimensions on a TV monitor reduces eye fatigue, which leads to improvement in operation efficiency in multi-point testing.



HM-200 Series with AVPAK Software

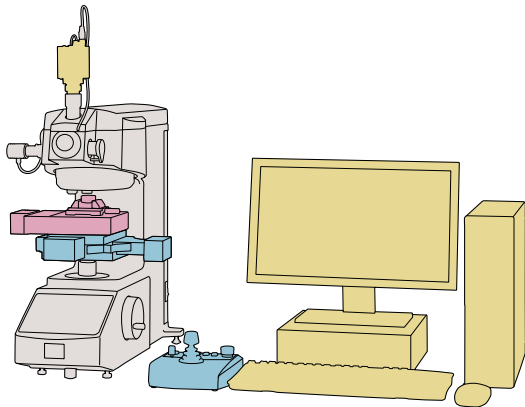
For Semi and Fully Automatic Type B and D Systems

System B (HM-210B/220B)



System B is equipped with **AVPAK-10**, a software package 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, thereby reducing costs.

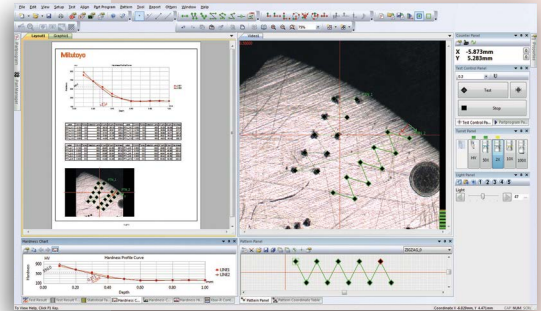
Automatic measurement of indentation/ manual stage.



System D (HM-210D/220D)

In addition to the functions of System B, System D is equipped with the autofocus function and motorized x-y stage. This function allows for automatic hardness testing, thereby increasing efficiency and reducing labor costs.

Automatic measurement of indentation / motorized XY stage / Autofocusing



AVPAK Software



Indentation-reading example

System D Technical Data

Motorized X-Y Stage	Travel Max	50 x 50 mm*
	Travel Min	1μ
	Table Size	130 x 130mm
Motorized Focusing Stage	Speed Max	25mm/ sec
	Max Range	1.4mm
	Min Unit	.1μ
Joystick Controller Functions	Max Speed	1mm/ sec
	Functions	X and Y Lock out
	Axis	X, Y and Z (Focus)
	Speed Control	Adjustable H,M,L
	Tester Control	Indent, Turret Position
	Other	Emergency Stop

*Optional 100 x 100 mm

SPECIFICATIONS TYPE B PC-Driven Test System TYPE D PC-Driven Test System with motorized stage and auto focus

Model No.	HM-210 Type B	HM-210 Type B V/K	HM-220 Type B	HM-220 Type B V/K
Order No.	64AAB323PA	64AAB324PA	64AAB325PA	64AAB326PA
Model No.	HM-210 Type D	HM-210 Type D V/K	HM-220 Type D	HM-220 Type D V/K
Order No.	64AAB380PA	64AAB381PA	64AAB382PA	64AAB383PA
Fixed test force (mN)	98.07, 196.1, 294.2, 490.3, 980.7, 1961, 2942, 4903, 9807 (10gf-1000gf)		0.4903, 0.9807, 1.961, 2.942, 4.903, 9.807, 19.61, 29.42, 49.03, 98.07, 196.1, 294.2, 490.3, 980.7, 1961, 2942, 4903, 9807, 19610 (0.05 gf-2kgf)	
Arbitrary test force	≤100 gf in 1 gram increments, > 100gf in 10 gram increments		< 1 gf in .1 gf increments, ≤100 gf in 1 gram increments, > 100gf in 10 gram increments	
Test force control	Force generation by electromagnetic and automatic control (load, dwell, unload)			
Control unit	None, By PC*			
Loading rate	60 μ/ sec		60μm/s, Variable between 2 and 60μm/s. ≤ 30 gf	
Load dwell time	0-999 sec			
Indenter	Vickers	Vickers and Knoop	Vickers	Vickers and Knoop
Objective lenses	10x, 50x	10x, 20x, 50x	10x, 50x, 100x	10x, 50x, 100x
Objective turret	Motor-driven and manual operation			
Filar eye piece	None			
CCTV camera	3 megapixel, 1/2"		3 megapixel, 1/2"	
Software	AV Pak		AV Pak	

*Must use specified PC

HV110 / HV120

Optional Accessories

Lens:

11AAC712	OBJECTIVE LENS 2X
11AAC713	OBJECTIVE LENS 5X
11AAE674	OBJECTIVE LENS 20X
11AAE675	OBJECTIVE LENS 50X
11AAE676	OBJECTIVE LENS 100X

Stage

810-423	MANUAL STAGE 50X50
810-427	MANUAL STAGE 2"X 2"(ln/mm)

Optical

810-454-20	CCTV System
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Indenters

19BAA060	DIAMOND INDENTER (VICKERS TYPE)
19BAA063	KNOOP DIAMOND INDENTER

Data Management

936937	SPC cable (1m / 40")
06AFM380D	USB Input Tool Direct for data entry into Excel

Series 810—Vickers Hardness Testing Machines – Type A

- Heavy load Vickers testing machines feature motorized force selection from 1-50kgf or .3 to 30kgf. Fully adjustable long-life LED illumination runs cool.
- A dual-line filar eyepiece combines with a color touch-screen LCD to create accurate measurements with the touch of a button.
- The motorized turret can accommodate up to 3 long working distance objective lenses for an even wider range of materials and a wide variety of anvils and x-y stages are also available.



HV120 show with optional
810-454-20 CCTV Camera

SPECIFICATIONS

Model	HV110	HV120
Order No.	810-441A	810-446A
Test force	9.807N (1kgf), 19.61N (2kgf), 29.42N (3kgf), 49.03N (5kgf), 98.07N (10kgf), 196.1N (20kgf), 294.2N (30kgf), 490.3N (50kgf)	2.942N (0.3kgf), 4.903N (0.5kgf), 9.807N (1kgf), 24.51N (2.5kgf), 49.03N (5kgf), 98.07N (10kgf), 196.1N (20kgf), 294.2N (30kgf)
Supported test method	HV, HK, HB (Light Force*), Kc	
Test force selection	Motorized	
Loading accuracy	±1%	
Load control	60μ/s, 150μ/s Automatic (loading, duration, unloading)	
Load rate	5~999 sec.	
Objective lens	2X, 5X, 10X (standard), 20X, 50X, 100X	
Measuring microscope	10X Dual-line filar	
Total magnification	20-1000X (100X Standard) ¹	
Field of view	1,400μ (10X Lens) Type A	
Minimum reading	< 50x = 0.1μm, ≥50x = 0.01μm	
Display	Color LCD touch-screen	
Scaled conversion:	8 Types (ASTM, ISO, JIS, SAE and BS)	
Statistics:	N, Max., Min., Average, Range, High, Low, Good, Over, Under, SD(n-1), SD(n), SD(n) Go/No-go judgment,	
Curvature correction:	0.01 to 200.00mm	
Maximum sample height	210mm Type A	
Maximum sample depth	160mm	
Maximum sample weight	20 Kg Anvil, 10 Kg with x-y Stage	
Optical path	100% Eyetube or Camera	
Output	Rs232, SPC, USB2.0	
Power supply	120 Volt AC/ 60 Hz	
Dimensions main unit (WxDxH)	9.9"x 24.7"x30.7" (252x627x781mm)	
Mass	110lbs. (50kg)	

* Optional test forces may be required.

1: 10x eyepiece included.

Contact Mitutoyo for more information.

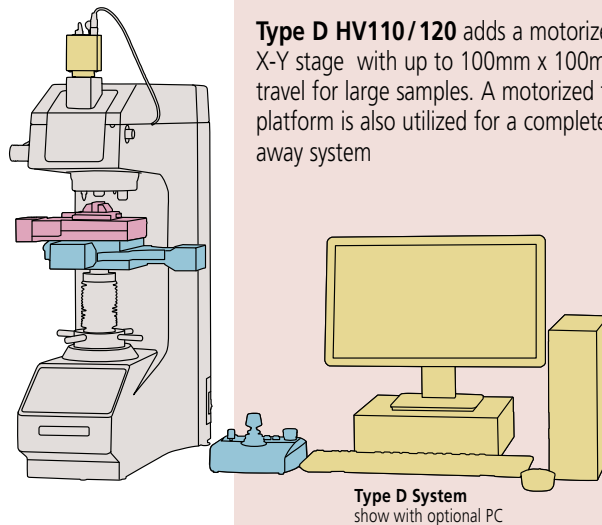
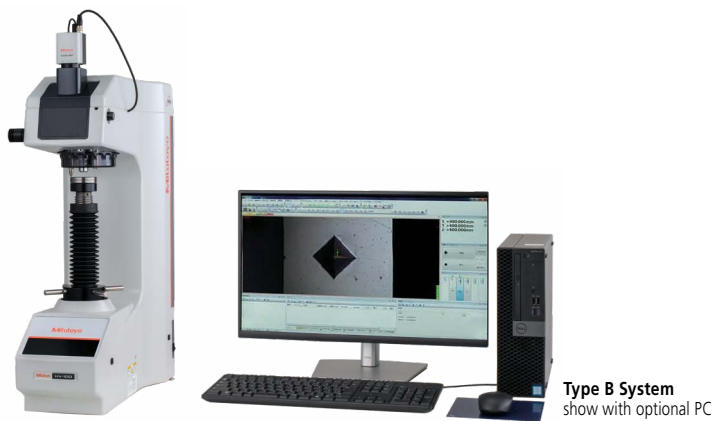


Got Questions?

HV110 / HV120

Series 810—Vickers Hardness Testing Machines – Type B / D

- The Type B HV110/ HV120 Vickers hardness testers add computer control to make measurements even more repeatable.
- A high-resolution 3 mega-pixel camera produces crisp images that are automatically measured in less than .3 seconds.
- Various software functions such as automatic light intensity, simple-to-use report generator and programming wizards make tedious and repetitive testing requirements more accurate than manual testing and eliminates common operator errors.



SPECIFICATIONS

Model	HV110 Main Unit Only	HV120 Main Unit Only
Order No.	810-443A	810-448A
Test force	9.807N (1kgf), 19.61N (2kgf), 29.42N (3kgf), 49.03N (5kgf), 98.07N (10kgf), 196.1N (20kgf), 294.2N (30kgf), 490.3N (50kgf)	2.942N (0.3kgf), 4.903N (0.5kgf), 9.807N (1kgf), 24.51N (2.5kgf), 49.03N (5kgf), 98.07N (10kgf), 196.1N (20kgf), 294.2N (30kgf)
Supported test method	HV, HK, HB (Light Force**), Kc	
Measuring microscope	Optional	
Field of View w/ 10X Lens	590 x 443 μ m	
Display	Via PC	
Curvature correction:	0.01 to 200.00mm	
Maximum sample height	172mm Type B, 132mm Type D	
Maximum sample depth	160mm	
Maximum sample weight	10 Kg Type B, 3 kg Type D	
Optical path	100% Eyetube or Camera	
Output	USB2.0	
Mass	110lbs. (50kg)	

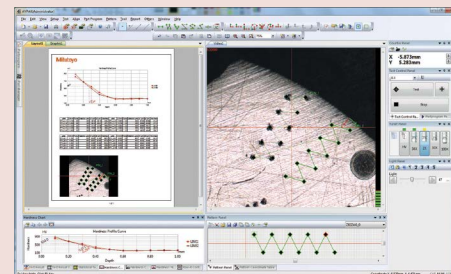
*Other specifications as Type A testers

** Optional test forces may be required

Basic Configuration	Type B	Type D
Main Unit	810-443A or 810-448A	810-443A or 810-448A
AVPak-10 Software	11AAE268-USE	11AAE268-USE
PC***	***	***
Automatic Focus Stage		810-465
Motorized X-Y Stage 50x50		810-461-10
Motorized X-Y Stage 100x100		810-462-10

*** PC not included

Type D HV110/120 adds a motorized X-Y stage with up to 100mm x 100mm of travel for large samples. A motorized focusing platform is also utilized for a complete walk away system



Talk to Sales

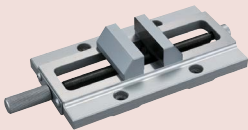
Optional Accessories

50x50mm Travel Stage

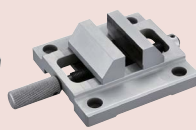
Manual XY Stage Unit 50 x 50
Manual XY Stage Unit 2"x 2"
810-423 Metric
810-427 Inch/Metric



Clamping Devices (Vises)



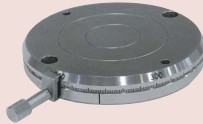
Vise
Max. opening: 3.94"(100mm)
810-017



Vise
Max. opening: 2"(51mm)
810-016

Rotary Table

Rotary Table
810-018



Round Tables

Dimensions: 7.08"(180mm)
810-013



Specimen (Thin Plate) Holder

Secures a plate with a thickness of .197"(5mm) or less, or foil-like specimens.
810-013



Specimen (wire) Holder



Used to horizontally or vertically secure a wire or needle specimen that has a diameter of .126"(3.2mm) or less.

810-014-1 horizontal
810-015-1 vertical

Micro-Vickers/Vickers Hardness Testing Machine

Test Blocks

Order No.	Description	Load
64HAA375	Vickers 100HV Test Block	100gf
64HAA376	Vickers 200HV Test Block	100gf
64HAA377	Vickers 300HV Test Block	100gf
64HAA378	Vickers 400HV Test Block	100gf
64HAA379	Vickers 500HV Test Block	100gf
64HAA380	Vickers 600HV Test Block	100gf
64HAA381	Vickers 700HV Test Block	100gf
64HAA382	Vickers 800HV Test Block	100gf
64HAA383	Vickers 900HV Test Block	100gf
64HAA384	Vickers 100HV Test Block	300gf
64HAA388	Vickers 500HV Test Block	300gf
64HAA385	Vickers 200HV Test Block	300gf
64HAA386	Vickers 300HV Test Block	300gf
64HAA387	Vickers 400HV Test Block	300gf
64HAA389	Vickers 600HV Test Block	300gf
64HAA390	Vickers 700HV Test Block	300gf
64HAA391	Vickers 800HV Test Block	300gf
64HAA392	Vickers 900HV Test Block	300gf
64HAA393	Vickers 100HV Test Block	500gf
64HAA394	Vickers 200HV Test Block	500gf
64HAA395	Vickers 300HV Test Block	500gf
64HAA396	Vickers 400HV Test Block	500gf
64HAA397	Vickers 500HV Test Block	500gf
64HAA398	Vickers 600HV Test Block	500gf
64HAA399	Vickers 700HV Test Block	500gf
64HAA400	Vickers 800HV Test Block	500gf
64HAA401	Vickers 900HV Test Block	500gf
64HAA402	Vickers 100HV Test Block	1,000gf
64HAA403	Vickers 200HV Test Block	1,000gf
64HAA404	Vickers 300HV Test Block	1,000gf
64HAA405	Vickers 400HV Test Block	1,000gf
64HAA406	Vickers 500HV Test Block	1,000gf
64HAA407	Vickers 600HV Test Block	1,000gf
64HAA409	Vickers 800HV Test Block	1,000gf
64HAA408	Vickers 700HV Test Block	1,000gf
64HAA410	Vickers 900HV Test Block	1,000gf
64HAA411	Knoop 100HK Test Block	100gf
64HAA412	Knoop 200HK Test Block	100gf
64HAA413	Knoop 300HK Test Block	100gf
64HAA414	Knoop 400HK Test Block	100gf
64HAA415	Knoop 500HK Test Block	100gf
64HAA416	Knoop 600HK Test Block	100gf
64HAA417	Knoop 700HK Test Block	100gf
64HAA418	Knoop 800HK Test Block	100gf
64HAA419	Knoop 100HK Test Block	500gf
64HAA420	Knoop 200HK Test Block	500gf
64HAA421	Knoop 300HK Test Block	500gf
64HAA422	Knoop 400HK Test Block	500gf
64HAA423	Knoop 500HK Test Block	500gf
64HAA424	Knoop 600HK Test Block	500gf
64HAA425	Knoop 700HK Test Block	500gf
64HAA426	Knoop 800HK Test Block	500gf
64HAA427	Knoop 100HK Test Block	1,000gf
64HAA428	Knoop 200HK Test Block	1,000gf
64HAA429	Knoop 300HK Test Block	1,000gf

64HAA430	Knoop 400HK Test Block	1,000gf
64HAA431	Knoop 500HK Test Block	1,000gf
64HAA434	Knoop 800HK Test Block	1,000gf
64HAA432	Knoop 600HK Test Block	1,000gf
64HAA433	Knoop 700HK Test Block	1,000gf
64HAA435	Vickers 100HV Test Block	10kgf
64HAA436	Vickers 200HV Test Block	10kgf
64HAA437	Vickers 300HV Test Block	10kgf
64HAA438	Vickers 400HV Test Block	10kgf
64HAA439	Vickers 500HV Test Block	10kgf
64HAA440	Vickers 600HV Test Block	10kgf
64HAA441	Vickers 700HV Test Block	10kgf
64HAA442	Vickers 800HV Test Block	10kgf
64HAA443	Vickers 100HV Test Block	30kgf
64HAA444	Vickers 200HV Test Block	30kgf
64HAA445	Vickers 300HV Test Block	30kgf
64HAA446	Vickers 400HV Test Block	30kgf
64HAA447	Vickers 500HV Test Block	30kgf
64HAA448	Vickers 600HV Test Block	30kgf
64HAA449	Vickers 700HV Test Block	30kgf
64HAA450	Vickers 800HV Test Block	30kgf

*Other hardness ranges and test forces available

Indenters

Order No.	Type	Model
19BAA058	Vickers Indenter	HM-210 Series
19BAA059	Vickers Indenter	HM220
19BAA061	Knoop Indenter	HM-210 Series
19BAA062	Knoop Indenter	HM220
19BAA060	Vickers Indenter	HV Series
19BAA063	Knoop Indenter	HV Series

Universal Specimen Holder

Used to secure a specimen that has a measuring surface that is hard to stabilize perpendicular to the indenter axis.



810-020

Mounted Specimen Vise



1.5" (39mm) Max Height

810-650-1

810-650-2

810-650-3

810-650-4

810-650-5

Diameter

1" 25.4mm

30mm

1.25" 31.75mm

1.5" 38.1mm

40mm