

Micro Vickers Hardness Testing Machines HM-100



Redesigned range now even better for
making hardness measurements on the smallest
specimens

Mitutoyo

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Micro-Vickers Hardness Testing Machines

The HM-100 Micro-Vickers hardness testing range now has a newly designed indenter/objective turret and control unit to expand the measurement application range. The new turret has three objective mounts and, by using the calibration function, all three objectives can be used for indentation measurement. For easy setup of Knoop hardness measurement, the turret has a dedicated mount for a Knoop indenter. The new separate control unit allows a choice of two types of display. The LED type uses a durable membrane switch for tough workshop environments while the LCD type provides touch-screen functionality. All operations including statistical data processing, data conversion to other hardness scales and condition setting for OK/±NG tolerance judgment can be performed by simply touching the LCD screen.

HM-100

Simplified model

HM-101 – with measuring microscope

Order No.

HM-101
810-124■*1



HM-101

Standard models

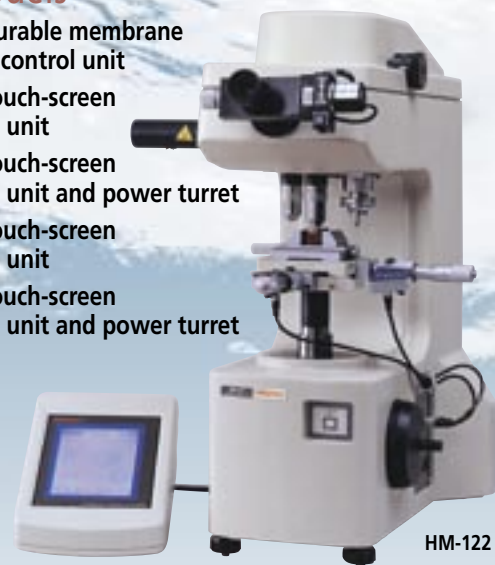
HM-102 – with durable membrane switch control unit

HM-112 – with touch-screen control unit

HM-122 – with touch-screen control unit and power turret

HM-114 – with touch-screen control unit

HM-124 – with touch-screen control unit and power turret



HM-122

Order No.

HM-102	HM-112	HM-122	HM-114	HM-124
810-125■*1	810-126■*1	810-127■*1	810-128■*1	810-129■*1

*1 In a order No. box, fill in the following marks corresponding to the power supply specifications that can be accepted in a country using the testing machine.

none: 100V (for Japan)
A: 125V (for U.S.)
C: 110V (for Taiwan)
D: 220V (for E.U.)
E: 240V (for U.K.)
K: 220V (for Korea)
DC: 220V (for China)

Available test force (N) and hardness scale

	4.903x10 ⁻³ HV0.0005	9.807x10 ⁻³ HV0.001	19.61x10 ⁻³ HV0.002	29.42x10 ⁻³ HV0.003	39.22x10 ⁻³ HV0.004	49.03x10 ⁻³ HV0.005	98.07x10 ⁻³ HV0.01	0.2452 HV0.025	0.4903 HV0.05	0.9807 HV0.1	1.961 HV0.2	2.942 HV0.3	4.903 HV0.5	9.807 HV1	19.61 HV2
HM-101	—	—	—	—	—	—	✓	✓	✓	✓	✓	✓	✓	✓	—
HM-102/103	—	—	—	—	—	—	✓	✓	✓	✓	✓	✓	✓	✓	—
HM-112/113	—	—	—	—	—	—	✓	✓	✓	✓	✓	✓	✓	✓	—
HM-122/123	—	—	—	—	—	—	✓	✓	✓	✓	✓	✓	✓	✓	—
HM-114/115	—	✓	✓	✓	—	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
HM-124/125	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

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Advanced models

The TV monitor removes fatigue in visual measurement, reducing detecting errors.

- HM-103** – with video monitor system and durable membrane switch control unit
- HM-113** – with video monitor system and touch-screen control unit
- HM-123** – with video monitor system and touch-screen control unit and power turret
- HM-115** – with video monitor system and touch-screen control unit
- HM-125** – with video monitor system and touch-screen control unit and power turret



HM-123

Order No.

HM-103	HM-113	HM-123	HM-115	HM-125
810-959■*1	810-969■*1	810-990■*1	810-998■*1	810-975■*1

Multi-functional models

Automatic indentation detection program
VLPAK2000 Order No. 810-312-2■*1



For hardness measurement, the diagonal length of an indentation must be measured on the TV monitor, and operator variation in measurement and labor saving are major issues. The automatic length measuring program VLPAK2000 automatically reads the diagonal length of an indentation and converts the result to a hardness value, reducing measurement errors due to operator variation. In addition, it can read hardness at high speed in only 0.3 seconds, dramatically improving the work efficiency of hardness testing.

It is easy to use with your hardness testing machine (*HM-112, 122, 114, 124, etc.) and provides additional functions.

Stage control system with automatic indentation detection program

AT-400 Order No. 810-314-2■*1



AT-400 has the indentation automatic detection function in addition to the automatic stage control function which is useful for multi-point measurement of hardness. It improves operational efficiency and reduces measurement result variations due to operator bias at the same time.

It is easy to use with your hardness testing machine (*HM-112, 122, 114, 124, etc.) and provides additional functions.



Features

Indentation/measuring system

- A wide range of test force from $4.903 \times 10^{-3} \text{N}$ to 19.61N^* is available for measuring various type of specimen. The load dwell time can be set in 1sec increments between 5 and 999sec^{**}. The minimum indentation resolution is $0.01 \mu\text{m}^{***}$. This allows small indentations to be measured with high precision.

* HM-124/125

** 60sec: HM-102/103

HM-101 (5sec increments)

*** $0.1 \mu\text{m}$: HM-102/103, $0.1 \mu\text{m}$: HM-101



Indentation on a structural material

- Up to three* objectives can be installed on the turret mount (except for HM-101). The calibration function allows all objectives installed to be used for the measurement. This expands the application of the instrument considerably. The magnification can be switched according to the size of the indentation.

*two: HM-102/103

- In addition to the standard Vickers indenter, an optional Knoop indenter can be installed at the next mount on the turret*. A simple turn of the turret makes the HM-100f a Knoop hardness testing machine.

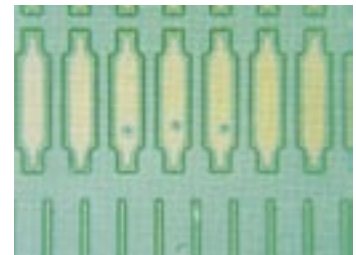
*except for HM-101, HM-102/103

- The power turret* can switch indenter/objective position by a single touch on the LCD screen.

*HM-122/123

HM-124/125

- The indenter/objective turret provides high positional accuracy and repeatability. This allows the HM-100 to indent the target point exactly after identifying it through the objective lens so that the hardness of a minute area (like crystal grain boundaries or deposited metal edges) can be measured simply and accurately.



Pattern of PCB

CCD video monitor system*

- Indentation measurement on the 9-inch monitor reduces operator's eye fatigue and therefore operator error.
- Flicker-free images on the video monitor due to the use of the a vibration- and shock-resistant CCD camera.
- With the optional video printer connected, video images can be printed out easily.

*HM-103, HM-113, HM-123, HM-115, HM-125



Control unit

Touch screen type

HM-112/113, HM-122/123, HM-114/115, HM-124/125

- Back-lit LCD graphic display for Indentation size (D1 and D2)
Hardness value and scale
Number of measurement points
XY table position
Test conditions (HV/HK indenter type, test force, load dwell time) OK/±NG tolerance judgment
Cylindrical and spherical surface compensation and offset
- Remote selection of the test force*
- Remote control of power turret**
- Complete conversion to other hardness scales
(Soft metal: HV, HK, HBS, TENS, HRA/B/F/G/15T/30T/45T)
(Hard metal: HV, HK, HS, HBS, TENS, HRA/C/D/15N/30N/45N)
- Powerful statistical processing (No. of data, max./min./mean values, range, upper/lower limit values, standard deviation (n, n-1), No. of pass/defective) with flexible data point editing and 256 data memory

* HM-114/115, HM-124/125

**HM-122/123, HM-124/125

Durable membrane switch type

HM-102/103/131

- LED display for Indentation size (D1 and D2) and hardness value
- OK/NG tolerance judgment



Touch screen type



Durable membrane switch type



Technical Data

Loading accuracy

	HM-101	HM-102 HM-103	HM-112 HM-113	HM-122 HM-123	HM-114 HM-115	HM-124 HM-125
4.903x10 ⁻³ N	—	—	—	—	—	1.5%
9.807x10 ⁻³ N	—	—	—	—	1.5%	1.5%
19.61x10 ⁻³ N	—	—	—	—	1.5%	1.5%
29.42x10 ⁻³ N	—	—	—	—	1.5%	1.5%
39.22x10 ⁻³ N	—	—	—	—	—	1.5%
49.03x10 ⁻³ N	—	—	—	—	1.5%	1.5%
98.07x10 ⁻³ N	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%
0.2452N	1%	1%	1%	1%	1%	1%
0.4903N	1%	1%	1%	1%	1%	1%
0.9807N	1%	1%	1%	1%	1%	1%
1.961N	1%	1%	1%	1%	1%	1%
2.942N	1%	1%	1%	1%	1%	1%
4.903N	1%	1%	1%	1%	1%	1%
9.807N	1%	1%	1%	1%	1%	1%
19.61N	—	—	—	—	1%	1%

Test force selection

By dial/touch screen or dial*

*HM-101, HM-102/103, HM-112/113, HM-122/123

Load control

Automatic (load, dwell, unload)

Load dwell time: 5sec to 999sec/60sec*/30sec**
(specified in 1sec increments)

*HM-102/103, **HM-101

Hardness standards compliance

ISO 6507-2, ISO 4546, ASTM E-384, JIS B 7725, JIS B 7734

Maximum specimen size (HxD*)

95x150mm (3.74"x5.90") for 810-011/810-074 XY stage

85x150mm (3.34"x5.90") for 810-012 XY stage (optional)

65x150mm (2.56"x5.90") for 810-093 XY stage

*From the center of indenter shaft

XY stage

810-011: XY stage with 0.01mm micrometer head
100x100mm (4"x4") table top size
25x25mm (1"x1") travel range
Standard for HM-101, HM-102/103

810-074: XY stage with 0.001mm Digimatic micrometer head
100x100mm (4"x4") table top size
25x25mm (1"x1") travel range
Standard for HM-112/113, HM-114/115, HM-122/123, HM-124/125

Optical path

2-way (video monitor/photograph) switchable

Indenter/objective turret

	HM-101	HM-102 HM-103	HM-112 HM-113	HM-122 HM-123	HM-114 HM-115	HM-124 HM-125
Manual type	✓	✓	✓	—	✓	—
Power drive	—	—	—	✓	—	✓

Number of indenter mount

	HM-101	HM-102 HM-103	HM-112 HM-113	HM-122 HM-123	HM-114 HM-115	HM-124 HM-125
1-mount	✓	✓	—	—	—	—
2-mount	—	—	✓*	✓*	✓*	✓*

*Second (Knoop) indenter is a factory-set option.

Number of objective mount

	HM-101	HM-102 HM-103	HM-112 HM-113	HM-122 HM-123	HM-114 HM-115	HM-124 HM-125
2-mount*	✓	—	—	—	—	—
2-mount**	—	✓	—	—	—	—
3-mount**	—	—	✓***	✓***	✓	✓

* One for measurement and the other for observation.

** All for measurement with calibration function.

***Additional third objective is a factory-set option.

Control unit

Touch screen type:

HM-112/113, HM-122/123,
HM-114/115, HM-124/125

- LCD
- Indentation size (D1 and D2)
- Hardness value/converted hardness value and scale
- Number of measurement points
- XY table position
- Test conditions (HV/HK indenter type, test force, load duration)
- OK/±NG tolerance judgment
- Cylindrical and spherical surface compensation and offset

Durable membrane switch type:

- HM-102/103
- LED display
 - Indentation size (D1 and D2)
 - Hardness value
 - OK/NG tolerance judgment

Resolution of indentation measurement

0.01μm/0.1μm (HM-102/103)/0.1μm (HM-101 with 50X objective)

Data output*

RS-232C, Digimatic Code and Centronics

*Except for HM-101

Power supply

100/120/220/240V AC (not switchable), 50/60Hz

Power consumption

Approximately 60VA

Dimensions (WxDxH)

Machine: 410x600x590mm (16.14"x23.62"x23.23")
Control unit: 165x260x105mm (6.50"x10.23"x4.13")

Mass

Approx. 42kg (92.4 lb.)

Optional Accessories

Printers

Digimatic Mini-Processor DP-1VR

A cost-effective portable printer capable of making statistical calculations with up to 100,000 pieces of data. The DP-1VR can be connected to a hardness testing machine with an SPC output.

Order No.

264-504:	100V (for Japan)
264-504-5A:	230V (for North America)
264-504-5D:	230V (for Europe)
264-504-5E:	230V (for U.K.)
264-504-5F:	230V (for Oceania)
264-504-5K:	220V (for South Korea)
936937:	Connecting cable (1m/40")
965014:	Connecting cable (2m/80")
937179T:	Foot switch
09EAA082:	Printer paper (10-roll set)



DPU-414

Dedicated thermal printer for HM-102, HM-112, HM-122, HM-114, HM-124, HM-103, HM-113, HM-123, HM-115 and HM-125.

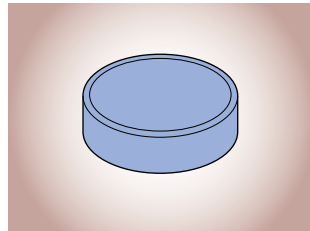
Order No.

810-622:	100V AC
810-622A:	120V AC
810-622D:	220V AC
19BAA157:	Printer paper (10-roll set)
19BAA266:	Connecting Cable

Hardness test blocks

Order No.

19BAA001:	100HV
19BAA002:	200HV
19BAA003:	300HV
19BAA004:	400HV
19BAA005:	500HV
19BAA006:	600HV
19BAA007:	700HV
19BAA008:	800HV
19BAA009:	900HV
19BAA010:	40HV

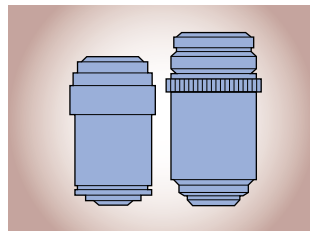


Objectives

—factory set option—

Order No.

810-616:	5X
810-617:	10X
810-618:	20X
810-619:	50X
810-620:	100X



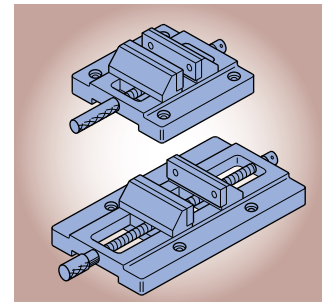
Vises

Clamping devices

Used to clamp a specimen.

Order No.

810-016:	45mm (1.77") max. opening
810-017:	100mm (3.94") max. opening

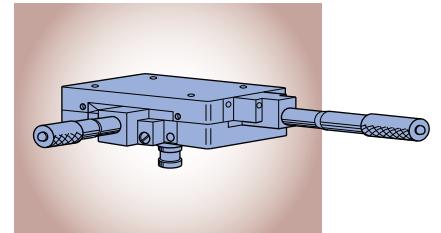


50x50mm (2"x2") XY travel stage

Table top dimension:	125x125mm (4.9"x4.9")
Minimum reading:	0.01mm

Order No.

810-012



Standard accessories

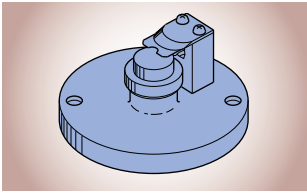
810-617:	10X objective
810-619:	50X objective
810-620:	100X objective (HM-114/115, HM-124/125)
19BAA058:	Diamond indenter (HM-101/102/103/112/113)
19BAA059:	Diamond Indicator (HM-114/115/124/125)
810-011:	XY stage (HM-101, HM-102/103)
810-074:	XY stage (HM-112/113, HM-114/115, HM-122/123, HM-124/125)
810-016:	Vise
:	CCD video monitor system with connecting cables (HM-103, HM-113, HM-123, HM-115, HM-125)
19BAA134:	Camera mount adapter
:	Hardness test block (700HMV0.3)
19BAA269:	Vickers hardness calculation table (HM-101)
19BAA219:	Halogen bulb (12V/50W)
	Machine cover
	Power cable

Specimen clamping devices

Specimen (thin plate) holder

Secures a plate or foil-like specimen.

Order No.
810-013

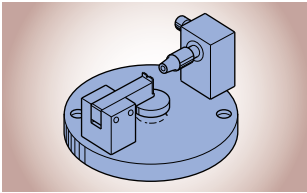


Specimen thickness: 5mm (.197") or less

Specimen (wire) holder

Used to secure a wire or needle type specimen horizontally.

Order No.
810-014

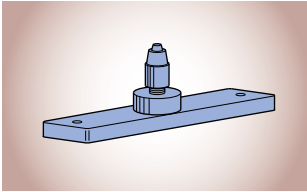


Specimen diameter: 0.4 to 3mm (.015" to .118")

Specimen (wire or ball) holder

Used to secure a wire or ball type specimen vertically.

Order No.
810-015

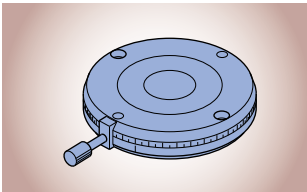


Specimen diameter: 0.4 to 3mm (.015" to .118")

Rotary table

Used to rotate a specimen by 1° increments

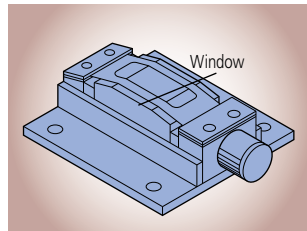
Order No.
810-018



Adjustable specimen (thin plate) holder

Secures a plate or foil-like specimen.

Order No.
810-085

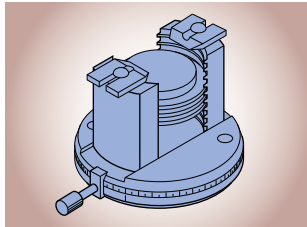


Window size: 25x10mm (.98"x.39")
Specimen thickness: 3mm (.118") or less

Rotatable universal specimen holder

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

Order No.
810-084

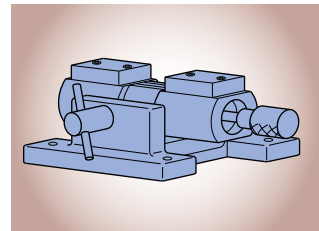


Specimen thickness: 32mm (1.25") or less
Specimen diameter: 38mm (1.49") or less

Specimen tilting holder

Used to secure a specimen that has a measuring surface not perpendicular to the indenter axis.

Order No.
810-019

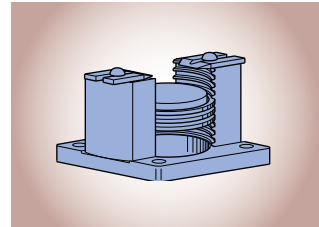


Max. opening: 37mm (1.45")
Tilting: ±15°
Rotation: ±25°

Universal specimen holder

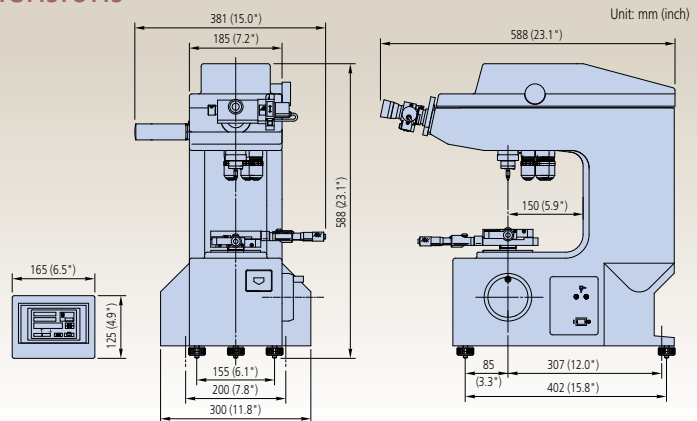
Used to secure a specimen, that has a measuring surface that is hard to stabilize, perpendicular to the indenter axis.

Order No.
810-020



Specimen thickness: 30mm (1.18") or less
Specimen diameter: 38mm (1.49") or less

Dimensions





Micro-Vickers

Knoop



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