

Mitutoyo

HM-100

Micro-Vickers Hardness Testing Machines



The HM-100 Micro-Vickers hardness testing machine is a new series in Mitutoyo hardness testers. To expand the measurement application range, a new designed indenter/object turret and control unit are employed. The new turret has three objective mounts. By adopting the calibration function, all of three objectives can be used for the indentation measurement. For easy setup of Knoop hardness measurement, the turret also has an additional mount for a Knoop indenter. The new separate control unit has two choice of display type. The LED type employes a durable sheet switch for hard workshop environment. The other LCD type employes a touch screen function. All of operations including statistical data processing, data conversion to other hardness scale and condition setting for OK/ \pm NG tolerance judgment can be performed by a simple touch of screen.

HM-100

Micro-Vickers Hardness Testing Machines

Simplified model

HM-101 –with measuring microscope



Order No.

	HM-101
100V	810-124K
120V	810-124A
220V	810-124D
240V	810-124E

Standard models

HM-102 –with durable sheet 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



Order No.

	HM-102	HM-112	HM-122	HM-114	HM-124
100V	810-125K	810-126K	810-127K	810-128K	810-129K
120V	810-125A	810-126A	810-127A	810-128A	810-129A
220V	810-125D	810-126D	810-127D	810-128D	810-129D
240V	810-125E	810-126E	810-127E	810-128E	810-129E

Available test force (N) and hardness scale

	4.903x10 ⁻³ HV0.005	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 /System 5	—	—	—	—	—	—	✓	✓	✓	✓	✓	✓	✓	✓	—
HM-122/123 /System 6	—	—	—	—	—	—	✓	✓	✓	✓	✓	✓	✓	✓	—
HM-114/115 /System 7	—	✓	✓	✓	—	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
HM-124/125 /System 8	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Advanced models

HM-103 – with video monitor system and durable sheet switch control unit

HM-113 – with video monitor system and touch screen control unit

HM-123 – with video monitor system, touch screen control unit and power turret

HM-115 – with video monitor system and touch screen control unit

HM-125 – with video monitor system, touch screen control unit and power turret

Order No.

	HM-103	HM-113	HM-123	HM-115	HM-125
100V	810-959K	810-969K	810-990K	810-998K	810-975K
120V	810-959A	810-969A	810-990A	810-998A	810-975A
220V	810-959D	810-969D	810-990D	810-998D	810-975D
240V	810-959E	810-969E	810-990E	810-998E	810-975E



Multi-functional models

Hardness Testing System with AT-400

System 5 (AT-400 system+HM-112)

System 6 (AT-400 system+HM-122)

System 7 (AT-400 system+HM-114)

System 8 (AT-400 system+HM-124)

Order No.

	System 5	System 6	System 7	System 8
100V	810-314-5K	810-314-6K	810-314-7K	810-314-8K
120V	810-314-5A	810-314-6A	810-314-7A	810-314-8A
220V	810-314-5D	810-314-6D	810-314-7D	810-314-8D
240V	810-314-5E	810-314-6E	810-314-7E	810-314-8E

AT-400 System..... Integrates an automatic XY stage system and automatic indentation reading program into the HM series.

FEATURES

Machine proper

- A wide range of test force from $4.903 \times 10^{-3} \text{N}$ to 19.61N^* is available for measuring a various type of specimens.

The load duration can be set in 1sec increments between 5 and 99sec**

The minimum reading of indentation is $0.01 \mu\text{m}^{***}$. It allows small indentations to be measured with high precision.

*HM-124/125/System 8

**60sec: HM-102/103

HM-101 (5sec increments)

*** $0.1 \mu\text{m}$: HM-102/103, $0.2 \mu\text{m}$: 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 of objectives installed to be used for the measurement. This expands the measurement application. The magnification can be switched according to the indentation result.

*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-100 of a Knoop hardness testing machine.

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

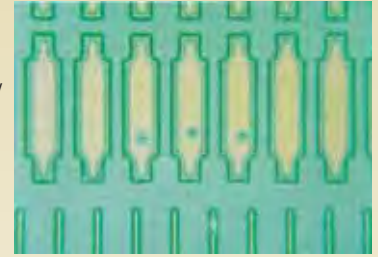
- The power turret* can switch indenter/objective position by a single touch of LCD screen.

*HM-122/123/System 6,

HM-124/125/System 8



- The indenter/objective turret provides a high positioning accuracy and repeatability. This allows the HM-100 to indent a target place set through the objective exactly. A hardness in minute area like crystal grain boundary and deposit of metal material 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 vibration-resistance and shock-resistance CCD camera.
- With the optional video printer connected, video images can be printed out easily.

*HM-103, HM-113/System 5, HM-123/System 6, HM-115/System 7, HM-125/System 8



TECHNICAL DATA

Loading accuracy

	HM-101	HM-102 HM-103	HM-112 HM-113 System 5	HM-122 HM-123 System 6	HM-114 HM-115 System 7	HM-124 HM-125 System 8
$4.903 \times 10^{-3} \text{N}$	—	—	—	—	—	3%
$9.807 \times 10^{-3} \text{N}$	—	—	—	—	2%	2%
$19.61 \times 10^{-3} \text{N}$	—	—	—	—	2%	2%
$29.42 \times 10^{-3} \text{N}$	—	—	—	—	2%	2%
$39.22 \times 10^{-3} \text{N}$	—	—	—	—	—	1%
$49.03 \times 10^{-3} \text{N}$	—	—	—	—	1%	1%
$98.07 \times 10^{-3} \text{N}$	1%	1%	1%	1%	1%	1%
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/System 5, HM-122/123/System 6

Load control

Automatic (loading, duration, unloading)

Load duration

5sec to 90sec/60sec*/30sec** (specified in 1sec increments)

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

Hardness standards conformed

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

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

810-314-1: AT-301 automatic XY stage system (0.005mm/step)
130x130mm (5.1"x5.1") table top size
50x50mm (2"x2") travel range
Standard for System 5, 6, 7, 8

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

Control unit

Touch screen type

HM-112/113/System 5, HM-122/123/System 6, HM-114/115/System 7, HM-124/125/System 8

- Back-lit LCD graphic display for Indentation size (D1 and D2) Hardness value and scale
- Number of measurement point
- XY table position
- Test conditions (HV/HK indenter type, test force, load duration)
- 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 passing/defective) with flexible data point editing and 256 data memory

*HM-114/115/System 7, HM-124/125/System 8

**HM-122/123/System 6, HM-124/125/System 8

Durable sheet switch type

HM-102/103/131

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



Touch screen type

Durable sheet switch type

Automatic XY stage and automatic indentation reading program

AT-400 System 5/6/7/8



- The high-speed auto-reader captures the indentation and displays hardness result in just 0.3 second, so the otherwise lengthy measuring work can be performed quickly.
- Complex multi-point measurement can be performed with ease.
- The movement pattern of the XY stage can be set line, zigzag, matrix, circle, random, or combination.
- The learn function allows part programs to be easily created.
- Measurement conditions and positional data can be displayed on the monitor.
- The evaluation curves of case depth and hardness curves can be displayed on the monitor.

Optical path

2-way (video monitor/photograph) switchable

Indenter/objective turret

	HM-101	HM-102 HM-103	HM-112 HM-113 System 5	HM-122 HM-123 System 6	HM-114 HM-115 System 7	HM-124 HM-125 System 8
Manual type	✓	✓	✓	—	✓	—
Power drive	—	—	—	✓	—	✓

Number of indenter mount

	HM-101	HM-102 HM-103	HM-112 HM-113 System 5	HM-122 HM-123 System 6	HM-114 HM-115 System 7	HM-124 HM-125 System 8
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 System 5	HM-122 HM-123 System 6	HM-114 HM-115 System 7	HM-124 HM-125 System 8
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.

Resolution of indentation measurement

0.01µm/0.1µm (HM-102/103)/0.2µm (HM-101 with 50x objective)

Control unit

Touch screen type: HM-112/113/System 5, HM-122/123/System 6, HM-114/115/System 7, HM-124/125/System 8

- LCD
- Indentation size (D1 and D2)
- Hardness value/converted hardness value and scale
- Number of measurement point
- 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 sheet switch type: HM-102/103

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

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 lbs.)

OPTIONAL ACCESSORIES

Printers

iDP-3110-40PF

Standard printer that can be connected to a hardness testing machine with a Centronics output interface.

Order No.

- 810-078K:** 100V AC, with connecting cable
- 810-078A:** 120V AC, with connecting cable
- 810-078D:** 220V AC, with connecting cable
- 810-078E:** 240V AC, with connecting cable
- 19BAA173:** Printer paper (20-roll set)
- 19BAA174:** Ink ribbon cartridge (5 pcs. set)



DP-1VR —SPC printer—

A cost-effective portable printer capable of statistically calculating up to 100000 pieces of data. The DP-1VR can be connected to a hardness testing machine with an SPC output.

Order No.

- 264-504:** 100V AC
- 264-504A:** 120V AC
- 264-504D:** 220V AC
- 264-504E:** 240V AC
- 936937:** Connecting cable (1m/40")
- 965014:** Connecting cable (2m/80")
- 937179T:** Foot switch
- 09EAA082:** Printer paper (10-roll set)

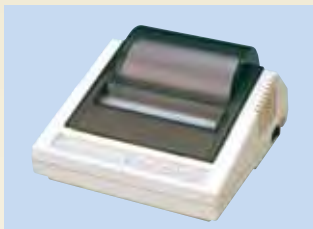


NP-104

Dedicate 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.

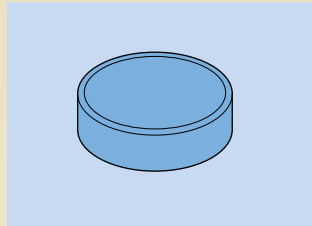
- 810-097K:** 100V AC, with connecting cable
- 810-097A:** 120V AC, with connecting cable
- 810-097D:** 220V AC, with connecting cable
- 19BAA157:** Printer paper (10-roll set)



Hardness test blocks

Order No.

- 19BAA001:** 100HV0.3
- 19BAA002:** 200HV0.3
- 19BAA003:** 300HV0.3
- 19BAA004:** 400HV0.3
- 19BAA005:** 500HV0.3
- 19BAA006:** 600HV0.3
- 19BAA007:** 700HV0.3
- 19BAA008:** 800HV0.3
- 19BAA009:** 900HV0.3
- 19BAA010:** 40HV0.01

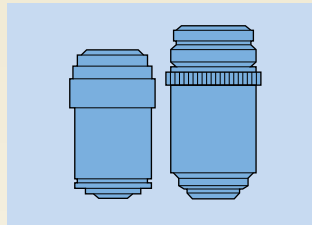


Objectives

—factory set option—

Order No.

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



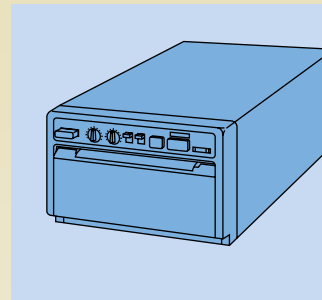
Video printer

VP-1200 (Seikosha)

By connecting with the video monitor unit, the image displayed on the screen can be recorded with 256 gray levels.

Order No.

- 810-092:** 100V AC, with connecting cable
- 19BAA221:** Printer paper (1 roll)

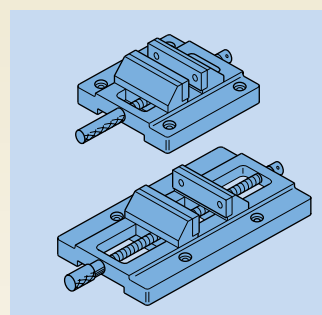


Clamping devices (Vises)

Used to clamp a specimen.

Order No.

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



Standard accessory

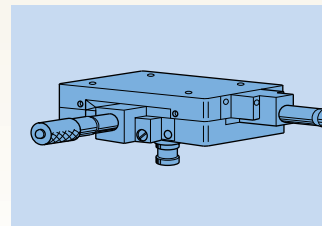
- 810-617:** 10x objective
- 810-619:** 50x objective
- 810-620:** 100x objective (HM-114/115/134, HM-124/125)
- 19BAA058:** Diamond indenter
- 810-011:** XY stage (HM-101, HM-102/103)
- 810-074:** XY stage (HM-112/113, HM-114/115, HM-122/123, HM-124/125)
- 810-314-1:** AT-400 automatic XY stage system (System 5/6/7/8)
- 810-016:** Vice
- _____ : CCD video monitor system with connecting cables (HM-103, HM-113/System 5, HM-123/System 6, HM-115/System 7, HM-125/System 8)
- 19BAA134:** Camera mount adapter
- 19BAA007:** Hardness test block (700HMV0.3)
- 19BAA269:** Vickers hardness calculation table (HM-101)
- 19BAA219:** Halogen bulb (6V/20W, except for HM-101)
- Machine cover
- Power cable

50x50mm (2"x2") XY travel stage

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

Order No.

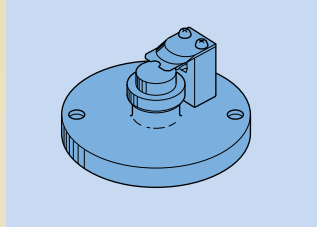
810-012



Specimen clamping devices

Specimen (thin plate) holder
Secures a plate or foil-like specimens.

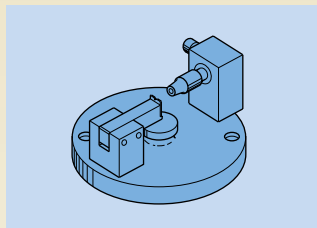
Order No.
810-013



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

Specimen (wire) holder
Used to horizontally secure a wire or needle specimen.

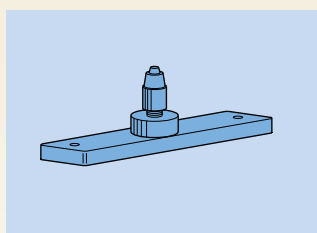
Order No.
810-014



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

Specimen (wire or ball) holder
Used to vertically secure a wire or specimen.

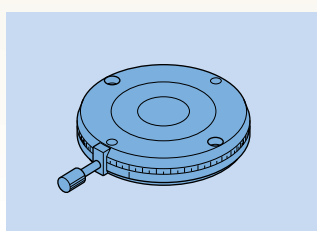
Order No.
810-015



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

Rotary table
Used to rotate a specimen by 1° increments

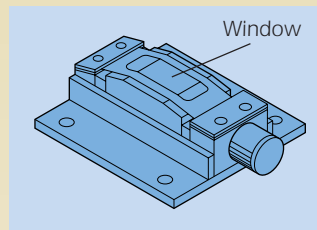
Order No.
810-018



Adjustable specimen (thin plate) holder

Secures a plate or foil-like specimens.

Order No.
810-085

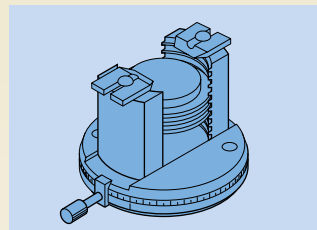


Window size:
25x10mm (.98"x.39")
Specimen thickness:
3mm (.118") or less

Rotatable universal specimen holder

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

Order No.
810-084

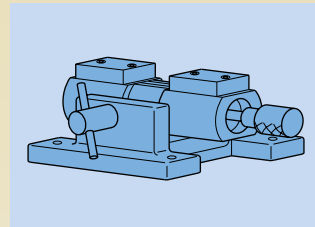


Specimen thickness:
32mm (1.25") or less
Specimen diameter:
38mm (1.49") or less

Specimen tilting holder

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

Order No.
810-019

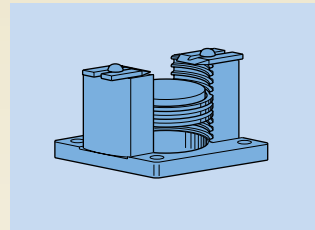


Max. opening: 37mm (1.45")
Tilting: ±15°
Rotation: ±25°

Universal specimen holder

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

Order No.
810-020



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

Photographing units

PM-10M-Pola

Polaroid film (#667) type.
Camera magnification: 3.6x

Order No.
810-022 (excluding eyepiece)

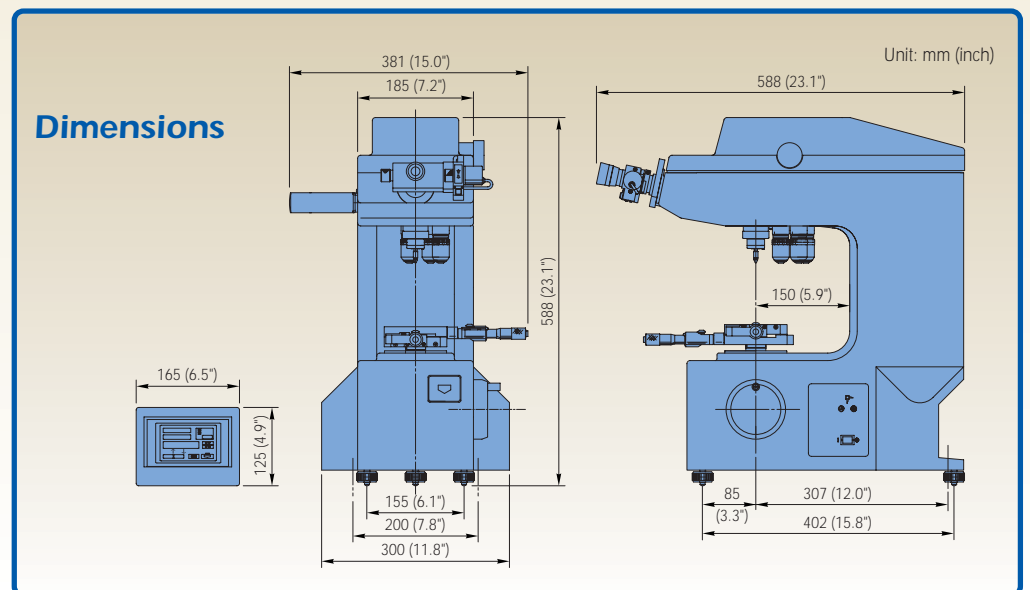
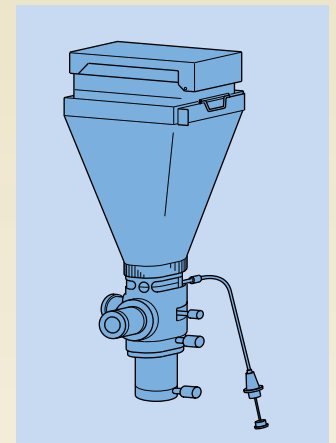
SC-35

35mm film type.
Camera magnification: 1.2x

Order No.
810-021 (excluding eyepiece)

Eyepieces

Order No.
810-050: 2.5x
810-051: 3.3x
810-052: 5.0x
810-053: 6.7x





Specifications are subject to change without notice.

Mitutoyo
PRECISION IS OUR PROFESSION

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