

**Mitutoyo**

# **HV-100 & AT-400 System**

## **Vickers Hardness Testing Machines**



# HV-100

## Vickers Hardness Testing Machines

### Order No.

	HV-112	HV-114
100V	810-163K	810-165K
120V	810-163A	810-165A
220V	810-163D	810-165D
240V	810-163E	810-165E



**HV-112**

### Standard models

#### **HV-112**

with touch screen control unit

#### **HV-114**

with touch screen control unit

### Order No.

	HV-113	HV-115
100V	810-981K	810-985K
120V	810-981A	810-985A
220V	810-981D	810-985D
240V	810-981E	810-985E



**HV-113**

### Advanced models

#### **HV-113**

with touch screen control unit and video monitor system

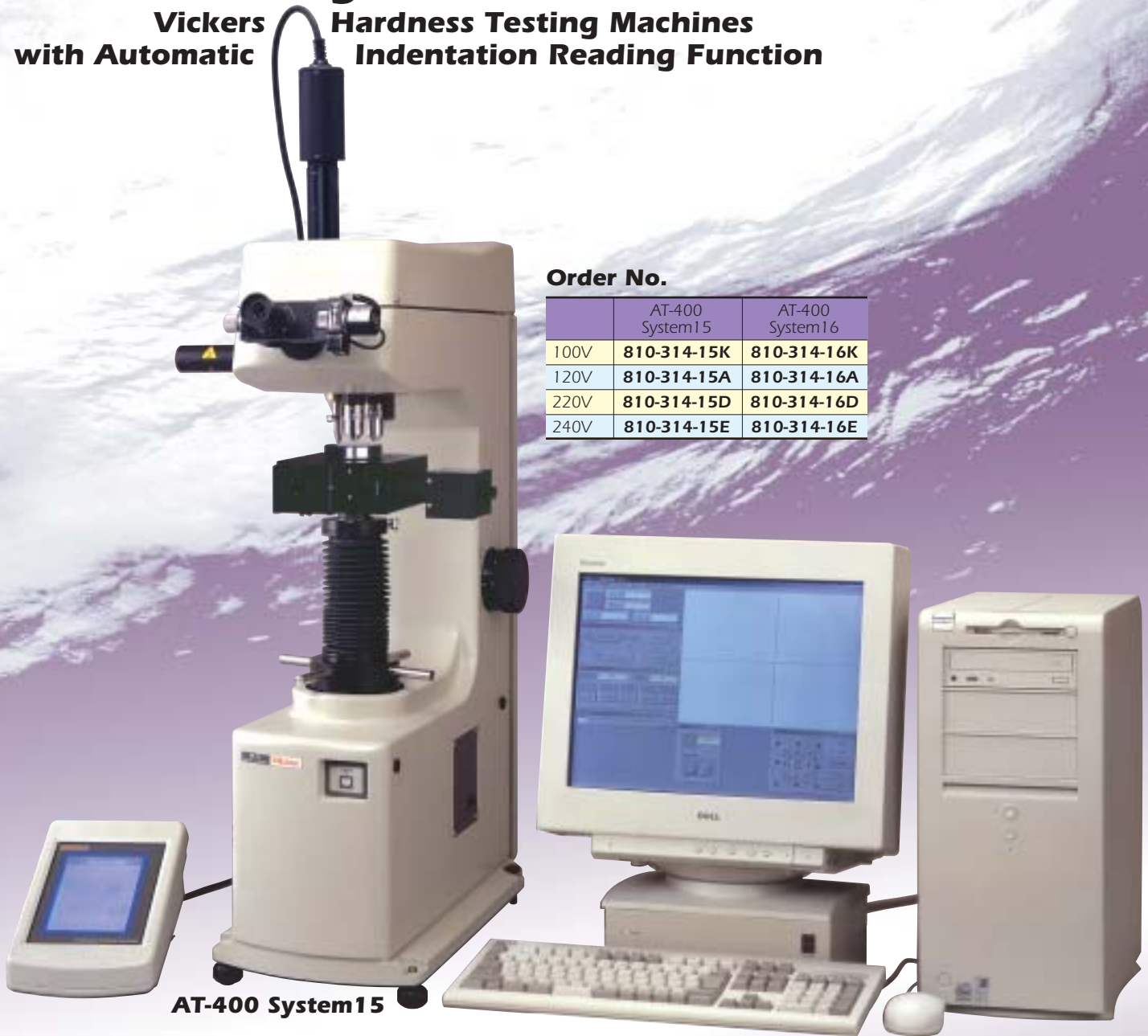
#### **HV-115**

with touch screen control unit and video monitor system

The HV-100 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 is employed. The new turret has two objective mounts. By adopting the calibration function, both objectives can be used for the indentation measurement. The new separate control unit employs a touch screen function. All of operations including statistical data processing, data conversion to other hardness scale and condition setting for OK/±NG tolerance judgment can be performed by a simple touch of screen.

# AT-400 System 15/16

**Vickers Hardness Testing Machines with Automatic Indentation Reading Function**



## Order No.

	AT-400 System 15	AT-400 System 16
100V	810-314-15K	810-314-16K
120V	810-314-15A	810-314-16A
220V	810-314-15D	810-314-16D
240V	810-314-15E	810-314-16E

**AT-400 System 15**

## AT-400 System 15

Integrates an automatic XY stage system and automatic indentation reading program into the HV-112 hardness testing machine.

## AT-400 System 16

Integrates an automatic XY stage system and automatic indentation reading program into the HV-114 hardness testing machine.

### Available test force (N) and hardness scale

	1.961 HV0.2	2.942 HV0.3	4.903 HV0.5	9.807 HV1	19.61 HV2	24.51 HV2.5	29.42 HV3	49.03 HV5	98.07 HV10	196.1 HV20	294.2 HV30	490.3 HV50
HV-112/113 AT-400 System 15	✓	✓	✓	✓	—	✓	—	✓	✓	✓	—	—
HV-114/115 AT-400 System 16	—	—	—	✓	✓	—	✓	✓	✓	✓	✓	✓

## FEATURES

### Machine proper

- A wide range of test force from 1.961N to 490.3N\* is available for measuring a various type of specimens. The load duration can be set in 1 sec increments between 5 and 99sec. The minimum reading of indentation is 0.1  $\mu\text{m}$ . It allows small indentations to be measured with high precision.

\*Refer to the page 3 for details.



Indentation on a structural material

- Two objectives can be installed on the turret mount. 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.
- The power turret can switch indenter/objective position by a single touch of LCD screen.



- The indenter/objective turret provides a high positioning accuracy and repeatability. This allows the HV-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.

### 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.

\*HV-113/115



### Touch screen control unit

- Back-lit LCD graphic display for Indentation size (D1 and D2)  
Hardness value and scale  
Number of measurement point  
Test conditions (HV/HK indenter type, test force, load duration)  
OK/NG tolerance judgment  
Cylindrical and spherical surface compensation and offset
- Remote control of power turret
- Complete conversion to other hardness scales  
(Soft metal: HV, HK, 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



## TECHNICAL DATA

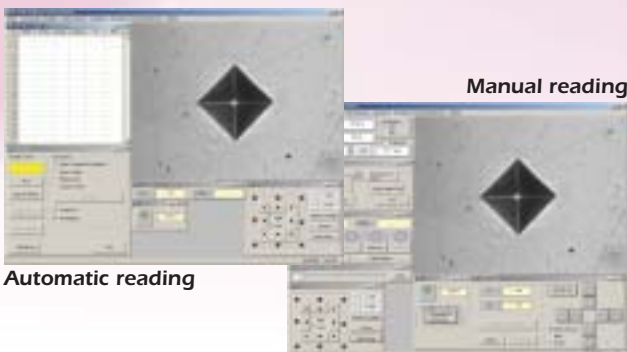
(common specifications)

### Automatic XY stage and automatic indentation reading program

#### AT-400 System 15, System 16



- 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.



#### Loading accuracy

±1%

#### Test force selection

By dial

#### Load control

Automatic (loading, duration, unloading)

Load duration

5sec to 99sec (1sec step)

#### Hardness standards conformed

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

\*Contact with Mitutoyo for prearrangement.

#### Maximum specimen size (HxD\*)

210x170mm (8.26"x6.69") for flat anvil

210x170mm (8.26"x6.69") for round table (optional)

195x170mm (7.67"x6.69") for XY stage (optional)

175x170mm (6.88"x6.69") for AT-400 automatic XY stage system

#### Optical path

Split in two ways for video monitor and photograph

#### Indenter/objective turret

Power drive

#### Number of indenter mount

1-mount

#### Number of objective mount

2-mount\*

\*All for measurement with calibration function.

#### Resolution of indentation measurement

0.1 μm

#### Touch screen control unit

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

#### Data output

RS-232C, Digimatic Code(SPC) and Centronics

#### Power supply

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

#### Power consumption

Approximately 67VA

#### Dimensions (WxDxH)

Machine: 245x515x840mm (9.64"x20.27"x33.07")

Control unit: 165x260x105mm (6.50"x10.23"x4.13")

#### Mass

Approx. 57.5kg (127 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 HV-112, HV-114, HV-113, and HV-115.

**Order No.**

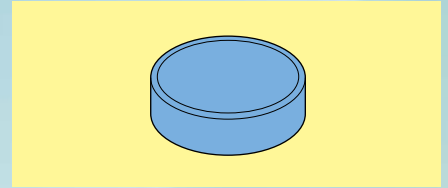
- 810-097K:** 100V AC, with connecting cable
- 810-097A:** 120V AC, with connecting cable
- 810-097D:** 220V AC, with connecting cable
- 19BAA157:** Printer paper (10-roll set)



### Hardness test blocks

**Order No.**

- 19BAA011:** 200HV
- 19BAA012:** 300HV
- 19BAA013:** 400HV
- 19BAA014:** 500HV
- 19BAA015:** 600HV
- 19BAA017:** 800HV
- 19BAA018:** 900HV

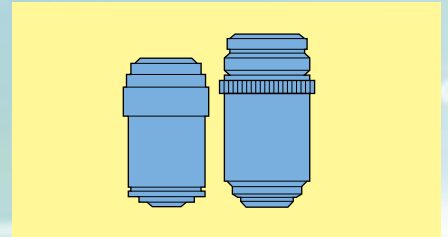


### Objectives

—factory set option—

**Order No.**

- 810-616:** 5x
- 810-619:** 50x



### Diamond indenter for Knoop hardness

**Order No.**

- 19BAA063**

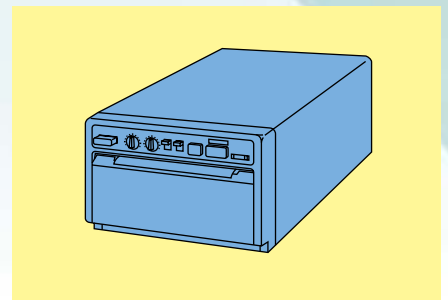
### Video printer

#### 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)



### Standard accessory

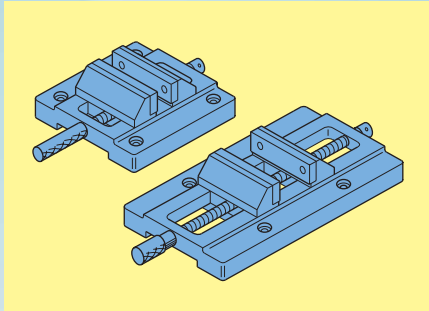
- 810-617:** 10x objective
- 810-618:** 20x objective
- 19BAA060:** Diamond indenter
- 810-039:** Flat anvil
- 810-040:** V-anvil (30mm groove depth)
- 810-041:** V-anvil (6mm groove depth)
- : CCD video monitor system with connecting cables (HV-113, HV-115)
- 19BAA016:** Hardness test block (700HV10)
- 19BAA098:** Level
- 19BAA219:** Halogen bulb (6V/20W)
- Machine cover
- Power cable

## Clamping devices (Vises)

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

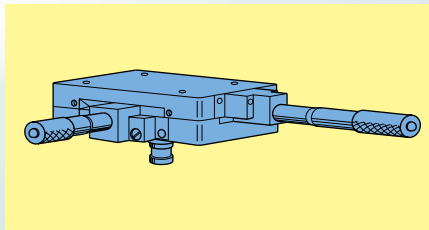
Table top dimension:

125x125mm (4.9"x4.9")

Minimum reading: 0.01mm

### Order No.

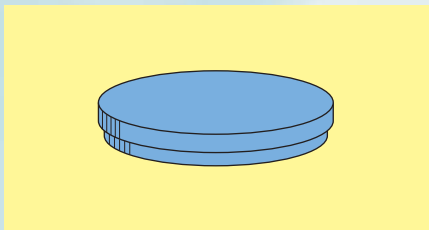
**810-012**



## Round tables

### Order No.

- 810-037:**  $\phi$ 180mm
- 810-038:**  $\phi$ 250mm



## For Brinell hardness testing

### Order No.

- 19BAA277:**  $\phi$ 1mm carbide ball indenter
- 19BAA278:**  $\phi$ 2mm carbide ball indenter
- 19BAA279:**  $\phi$ 2.5mm carbide ball indenter
- 19BAA280:**  $\phi$ 5mm carbide ball indenter
- 19BAA281:** Spare  $\phi$ 1mm carbide ball
- 19BAA282:** Spare  $\phi$ 2mm carbide ball
- 19BAA283:** Spare  $\phi$ 2.5mm carbide ball
- 19BAA162:** Spare  $\phi$ 5mm carbide ball
- 19BAA415:** 22.73g weight for Brinell hardness HBW1/2.5 (for HV-114)
- 19BAA416:** 113.6g weight for Brinell hardness HBW2.5/6.25 (for HV-112, HV-114) HBW2.5/31.25 (for HV-114)
- 19BAA417:** 454.5g weight for Brinell hardness HBW5/25 (for HV-112, HV-114)
- 19BAA418:** 511.4g weight for Brinell hardness HBW2.5/15.625 (for HV-112, HV-114)

## Photographing units

### SC-35

35mm film type.

Camera magnification: 1.2x

### Order No.

**810-021** (excluding eyepiece)

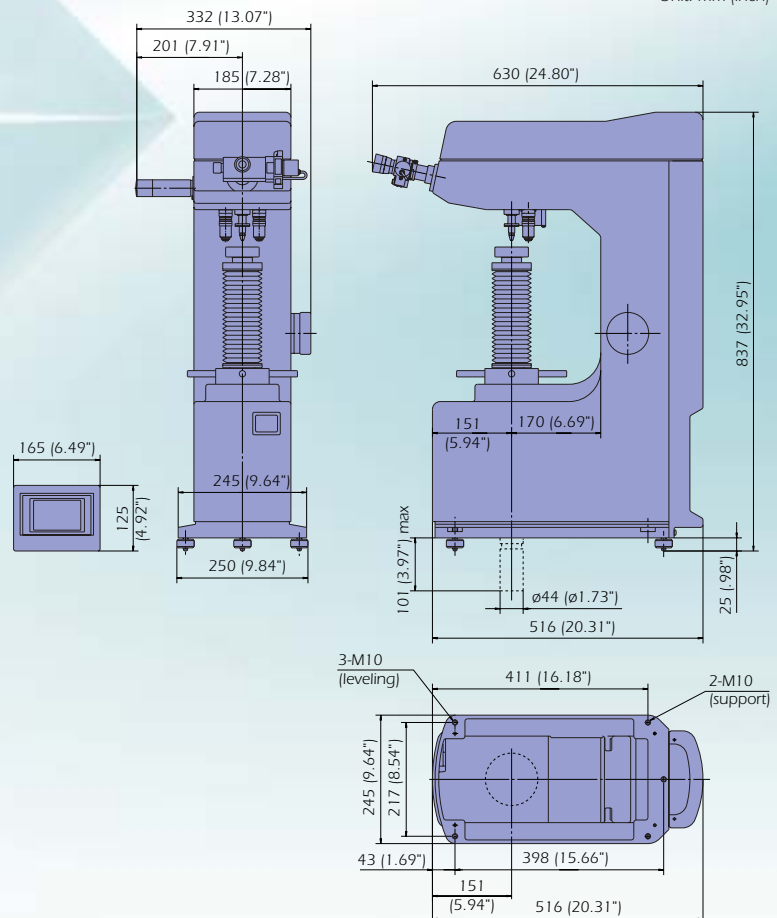
### Eyepieces

#### Order No.

- 810-050:** 2.5x
- 810-051:** 3.3x
- 810-052:** 5.0x
- 810-053:** 6.7x

## Dimensions

Unit: mm (inch)

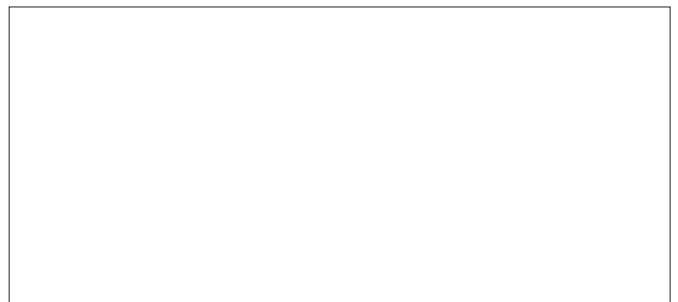




**Mitutoyo**  
PRECISION IS OUR PROFESSION

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