

HV-112 / 113 / 114 / 115

SERIES 810 — Vickers Hardness Testing Machines

FEATURES

• A wide range of test forces from 1.961N to 490.3N* (.2kgf - 50kgf) is available for measuring a wide variety of specimens. The load duration can be set in 1sec increments between 5 and 99sec. The minimum reading of indentation is 0.1µm. It allows small indentations to be measured with high precision.

Function: 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), GO / ±NG tolerance judgment, Cylindrical and spherical surface compensation and offset
- Remote control of power turret
- Conversion to other hardness scales
- Statistical processing



HV-112, HV-114



HV-113, HV-115

SPECIFICATIONS

Model	HV112	HV113	HV114	HV115
Order No.	810-163A	810-981A	810-165A	810-985A
Test force	1.961N (0.2kgf), 2.942N (0.3kgf), 4.903N (0.5kgf), 9.807N (1kgf), 24.51N (2.5kgf), 49.03N (5kgf), 98.07N (10kgf), 196.1N (20kgf)		9.807N (1kgf), 19.61N (2kgf), 29.42N (3kgf), 49.03N (5kgf), 98.07N (10kgf), 196.1N (20kgf), 294.2N (30kgf), 490.3N (50kgf)	
Test force selection	Dial			
Loading accuracy	±1%			
Load control	50 - 100µ/s Automatic (loading, duration, unloading) Automatic			
Load rate	5~99 sec.			
Objective lenses	10X, 20X			
Measuring microscope Total magnification	100X / 200X		100X / 200X	—
Measuring range	350, 700µm	—	350, 700mm	—
Minimum reading	0.1µm			
Video monitor Camera	—	CCD	—	CCD
Display	—	9" monochrome CRT	—	9" monochrome CRT
Total magnification	—	250X, 500X	—	250X, 500x
Monitoring range	—	520 x 670µm, 260 x 330µm	—	520 x 670µm, 260 x 330µm
Measuring range	—	410 x 570µm, 200 x 280µm	—	410 x 570µm, 200 x 280µm
Display Function	Conversion: Hard: TENS, HS, HBS, HR15N, HR30N, HR45N, HRA, HRD, HRC, HK, HV, Soft: TENS, HR15T, HR30T, HR45T, HRA, HRF, HRB, HRG, HK, HV, Statistical list; N, Max., Min., Average, Range, High, Low, Good, Over, Under, SD(n-1), SD(n-1), SD(n) OK/NG Judgement, Curve correction; 0.01 to 200.00mm			
Specimen Maximum height	8.07" (205mm) or Flat anvil			
Maximum depth	6.7" (170mm) from center of indenter shaft			
Optical path	2-way switchable (microscope/photograph)			
Output	SPC, RS-232C Centronics			
Power supply	120V AC (±10%) 60Hz			
Dimensions (WxDxH) Main Unit only	9.7" x 20.3" x 31.3" (245 x 515 x 770mm)			
Mass	110 lbs. (50kg)	121.4 lbs. (55.2kg)	110 lbs. (50kg)	121.4 lbs. (55.2kg)

* 7.48" (190mm) if using 50 x 50mm-travel XY stage (No. 810-012).

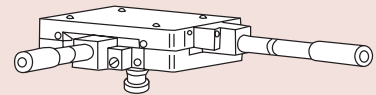
Technical Data

- Motorized lens turret
- Adjustable loading rate

Optional Accessories

- 19BAA011: Hardness test block (200HV)
- 19BAA012: Hardness test block (300HV)
- 19BAA013: Hardness test block (400HV)
- 19BAA014: Hardness test block (500HV)
- 19BAA015: Hardness test block (600HV)
- 19BAA016: Hardness test block (700HV)
- 19BAA017: Hardness test block (800HV)
- 19BAA018: Hardness test block (900HV)

50x50mm travel stage



Dimensions: 4.92x4.92" (125x125mm)

Minimum reading: 0.01mm

810-012

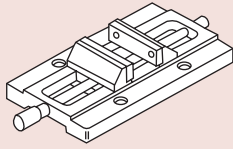
Consumable Parts

- 513667: Illumination lamp (1 pc.)

Optional Accessories

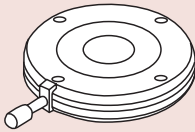
Micro-Vickers/Vickers Hardness Testing Machine

Clamping devices (Vises)



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

Rotary Table



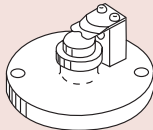
Rotary Table
810-018

Round Tables



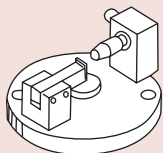
Dimensions: 8" (203mm)
810-037-7

Specimen (thin plate) Holder



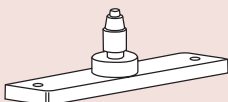
Secures a plate with a thickness of .197" (5mm) or less, or foil-like specimens.
810-013

Specimen (wire) Holder



Used to horizontally secure a wire or needle specimen that has a diameter of .126" (3.2mm) or less.
810-014

Specimen (wire or ball) Holder



Used to vertically secure a wire or ball specimen that has a diameter of .126" (3.2mm) or less.
810-015

Test Blocks

Order No.	Description	Load
64BAA173	Vickers 100HV Test Block	100gf
64BAA174	Vickers 200HV Test Block	100gf
64BAA175	Vickers 300HV Test Block	100gf
64BAA176	Vickers 400HV Test Block	100gf
64BAA177	Vickers 500HV Test Block	100gf
64BAA178	Vickers 600HV Test Block	100gf
64BAA179	Vickers 700HV Test Block	100gf
64BAA180	Vickers 800HV Test Block	100gf
64BAA181	Vickers 900HV Test Block	100gf
64BAA182	Vickers 100HV Test Block	500gf
64BAA183	Vickers 200HV Test Block	500gf
64BAA184	Vickers 300HV Test Block	500gf
64BAA185	Vickers 400HV Test Block	500gf
64BAA186	Vickers 500HV Test Block	500gf
64BAA187	Vickers 600HV Test Block	500gf
64BAA188	Vickers 700HV Test Block	500gf
64BAA189	Vickers 800HV Test Block	500gf
64BAA190	Vickers 900HV Test Block	500gf
64BAA191	Vickers 100HV Test Block	1000gf
64BAA192	Vickers 200HV Test Block	1000gf
64BAA193	Vickers 300HV Test Block	1000gf
64BAA194	Vickers 400HV Test Block	1000gf
64BAA195	Vickers 500HV Test Block	1000gf
64BAA196	Vickers 600HV Test Block	1000gf
64BAA197	Vickers 700HV Test Block	1000gf
64BAA198	Vickers 800HV Test Block	1000gf
64BAA199	Vickers 900HV Test Block	1000gf
64BAA200	Knoop 200HK Test Block	100gf
64BAA201	Knoop 300HK Test Block	100gf
64BAA202	Knoop 400HK Test Block	100gf
64BAA203	Knoop 500HK Test Block	100gf
64BAA204	Knoop 600HK Test Block	100gf
64BAA205	Knoop 700HK Test Block	100gf
64BAA206	Knoop 800HK Test Block	100gf
64BAA207	Knoop 250HK Test Block	500gf
64BAA208	Knoop 300HK Test Block	500gf
64BAA209	Knoop 400HK Test Block	500gf
64BAA210	Knoop 500HK Test Block	500gf
64BAA211	Knoop 600HK Test Block	500gf
64BAA212	Knoop 700HK Test Block	500gf
64BAA213	Knoop 800HK Test Block	500gf
64BAA214	Knoop 250HK Test Block	1000gf
64BAA215	Knoop 300HK Test Block	1000gf
64BAA216	Knoop 400HK Test Block	1000gf
64BAA217	Knoop 500HK Test Block	1000gf
64BAA218	Knoop 600HK Test Block	1000gf
64BAA219	Knoop 700HK Test Block	1000gf
64BAA220	Knoop 800HK Test Block	1000gf

*other hardness ranges and test forces available

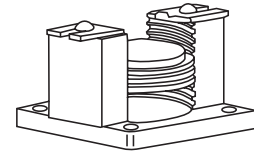
Bulbs

Order No.	Description
513667	Bulb, 12v/50w, halogen double pin type, HM series with box style illuminators.
19BAA219	Bulb, 6v/20w, halogen double pin type, Later H series
19BAA095	Bulb, 6v/15w, halogen bayonet type, all E, G and early H series testers.

Indenters

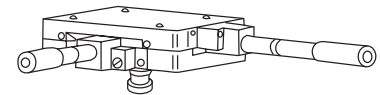
Order No.	Type	Model
19BAA061	Knoop Indenter	H, HM Standard Series
19BAA058	Vickers Indenter	H, HM Standard Series
19BAA062	Knoop Indenter	MVK-H2, H3, HM114, HM220
19BAA059	Vickers Indenter	MVK-H2, H3, HM114, HM220
19BAA060	Vickers Indenter	HV, AVK-C Series

Universal Specimen Holder



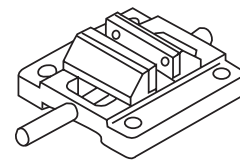
Used to secure a specimen, that has a measuring surface that is hard to stabilize, perpendicular to the indenter axis.
810-020

50x50mm travel stage



Dimensions: 4.92x4.92" (125x125mm)
Minimum reading: 0.01mm
810-012

Clamping devices (Vises)



Vise
Max. opening: 1.77" (45mm)
Standard for the HM 100 series.
810-016

Rockwell hardness scales

Preliminary test force: 98.07N (10kgf)

Scale	Indenter	Test force	Applications
A	Diamond	588.4N(60kgf)	Cemented carbide, thin steel plates
D		980.7N(100kgf)	case hardened steel
C		1471N(150kgf)	
F	1/16" diameter steel ball	588.4N(60kgf)	Bearing metal, copper, annealed steel,
B		980.7N(100kgf)	brass, hard-drawn aluminum alloys
G		1471N(150kgf)	beryllium copper, phosphor bronze
H	1/8" diameter steel ball	588.4N(60kgf)	Bearing metal
E		980.7N(100kgf)	
K		1471N(150kgf)	
L	1/4" diameter steel ball	588.4N(60kgf)	Plastics, lead
M		980.7N(100kgf)	
P		1471N(150kgf)	
R	1/2" diameter steel ball	588.4N(60kgf)	Plastics
S		980.7N(100kgf)	
V		1471N(150kgf)	

Hardness and Hardness Measurement

Hardness is a measure of resistance of a material to deformation when an external force or load is applied to the material. There are several hardness scales, which use different methods of applying force and quantifying the resistance to deformation. Hardness is closely correlated to other mechanical characteristics. It is, like many other mechanical characteristics, a relative value that has no fundamental quantity or absolute standard and is different from physical quantities such as length, time, and force. Because of this, hardness values are determined using a standard testing machine under standard conditions.

Today the most popular hardness scales are Brinell hardness (HB), Vickers hardness (HV), Rockwell and Rockwell superficial hardness (HR) and Knoop hardness (HK). Most hardness tests determine hardness from the area of the indentation made in a specimen by the indenter under a known load. The Brinell test was devised in Sweden, the Vickers test in the United Kingdom, and the other hardness tests in the United States. Although hardness is a relative value, Brinell, Vickers, and Knoop hardness are expressed in a unit of stress (1 kgf/mm² or 9.8MPa).

Rockwell Superficial hardness scales

Preliminary test force: 29.42N (3kgf)

Scale	Indenter	Test force	Applications
15N	Diamond	147.1N(15kgf)	Carburized layer, sintered
30N		294.2N(30kgf)	
45N		441.3N(45kgf)	
15T	1/16" diameter steel ball	147.1N(15kgf)	Thin copper plates (brass, bronze), mild steel
30T		294.2N(30kgf)	
45T		441.3N(45kgf)	
15W	1/8" diameter steel ball	147.1N(15kgf)	Plastics, zinc, bearing alloys
30W		294.2N(30kgf)	
45W		441.3N(45kgf)	
15X	1/4" diameter steel ball	147.1N(15kgf)	Plastics, zinc, bearing alloys
30X		294.2N(30kgf)	
45X		441.3N(45kgf)	
15Y	1/2" diameter steel ball	147.1N(15kgf)	Plastics, zinc, bearing alloys
30Y		294.2N(30kgf)	
45Y		441.3N(45kgf)	

Rockwell Hardness and Rockwell Superficial Hardness

In the Rockwell hardness and the Rockwell superficial hardness tests, a conical diamond indenter with a 120° angle and a radius of curvature of 0.2mm, or a steel or carbide ball indenter is pressed into the specimen. First, a preliminary test force is applied, then a total test force is applied, and then the test load is reduced to the preliminary test force. The hardness number is determined from the difference, h, of the indentation depth of the indenter between the first and second applications of the preliminary test force.

The Rockwell hardness test uses a preliminary load of 10kgf, and the Rockwell superficial hardness test uses a preliminary test force of 3kgf. The Rockwell and Rockwell superficial hardness have multiple scales to indicate specific combinations of the indenter type, test force, and formula to obtain the hardness. A unique symbol is given to each scale.

Minimum Thickness Chart

Thicker or harder material can be tested.	Rockwell Superficial Hardness Scales			Rockwell Regular Hardness Scales		
Thickness inches (mm)	15N	30N	45N	A	D	C
.006 (0.15)	92	•	•	•	•	•
.008 (0.20)	90	•	•	•	•	•
.010 (0.25)	88	•	•	•	•	•
.012 (0.30)	83	82	77	•	•	•
.014 (0.36)	76	78.5	74	•	•	•
.016 (0.41)	68	74	72	86	•	•
.018 (0.46)	√	66	68	84	•	•
.020 (0.51)	√	57	63	82	77	•
.022 (0.56)	√	47	58	79	75	69
.024 (0.61)	√	√	51	76	72	67
.026 (0.66)	√	√	37	71	68	65
.028 (0.71)	√	√	20	67	63	62
.030 (0.76)	√	√	√	60	58	57
.032 (0.81)	√	√	√	√	51	52
.034 (0.86)	√	√	√	√	43	45
.036 (0.91)	√	√	√	√	√	37
.038 (0.96)	√	√	√	√	√	28
.040 (1.02)	√	√	√	√	√	20
Thicker or harder material can be tested.	Rockwell Superficial Hardness Scales			Rockwell Regular Hardness Scales		
Thickness inches (mm)	15T	30T	45T	F	B	G
.010 (0.25)	91	•	•	•	•	•
.012 (0.30)	86	•	•	•	•	•
.014 (0.36)	81	80	•	•	•	•
.016 (0.41)	75	72	71	•	•	•
.018 (0.46)	68	64	62	•	•	•
.020 (0.51)	√	55	53	•	•	•
.022 (0.56)	√	45	43	•	•	•
.024 (0.61)	√	34	31	98	94	94
.026 (0.66)	√	√	18	91	87	87
.028 (0.71)	√	√	4	85	80	76
.030 (0.76)	√	√	√	77	71	68
.032 (0.81)	√	√	√	69	62	59
.034 (0.86)	√	√	√	√	52	50
.036 (0.91)	√	√	√	√	40	42
.038 (0.96)	√	√	√	√	28	31
.040 (1.02)	√	√	√	√	√	22

√ - Can be tested - no minimum hardness.