

HMV-G Series

The Microhardness Testing System
that makes everyone an expert



Quality Assured

Automatic length measurement



In recent years, instruments have been increasingly used by inexperienced operators. At the same time, reliable measurements are essential in order to ensure quality, so instruments are needed that can be used easily by anyone, with minimal risk of human measurement error. Our Micro Vickers Hardness Testers, featuring automatic length measurement, have been standardized as a response to such demands.

Quality product and superior service

We are proud to offer the HMV-G, manufactured by one of the oldest and most technologically advanced Japanese testing instrument producers who is also a major manufacturer of microhardness testers. All of these microhardness testing instruments offer a level of quality and reliability that are bench marks in the industry. Together with Newage's nearly 50 years of expertise in the design, manufacture, installation and service of hardness testing instruments, we are able to offer you the desirable combination of quality product and superior service.



A unique design

The HMV-G testers feature a truly unique design based around its "G" style frame from which the tester gets its name. Featuring a 100 mm vertical capacity and unlimited capacity on both the X & Y axis, a fully motorized turret to switch between indenter and objective positions, together with a load range from 10 to 2000 grams and fully automatic load change standard, are just a few of the great features of the HMV-G.

Built-in CCD camera

The HMV-G21 models feature an integral CCD camera built right into the G frame, eliminating obtrusive and unsightly camera attachments. These two models also include as standard and are controlled by our C.A.M.S. Computer Assisted Measurement System. A powerful PC based unit that improves the accuracy, repeatability and productivity of any optical microhardness tester, C.A.M.S. provides the ability to view and measure conventional microhardness impressions directly on the computer screen with few simple clicks of the mouse.



HMV-G20 Series

The design now incorporates an open space at the center of the frame. This makes it possible to place long samples at test positions that could not be tested conventionally.

A direct USB transfer function allows data to be stored automatically on a USB memory stick. Test data can be extracted and transferred without using a PC. Furthermore, a color LCD touch panel has been adopted with a big, user-friendly display. This improves the visual ease of use, enabling fast, efficient measurements.

Utilizing the assist function, the indentation force can be set automatically based on the estimated indentation depth and the estimated hardness of the sample. In addition, the lens magnification is automatically determined based on the estimated hardness. This means that users who are unfamiliar with the instrument can use it securely, even when testing new samples.

Touch Panel Operation

A color touch panel has been adopted, making it easy to set conditions, measure indentation lengths, and display results.



In standard test mode, test can be performed by setting detailed conditions such as sample information, shape corrections, and pass/fail determinations. Fracture toughness tests are also possible.



Simple test mode can be selected to start testing immediately just by setting the test force and the duration time.

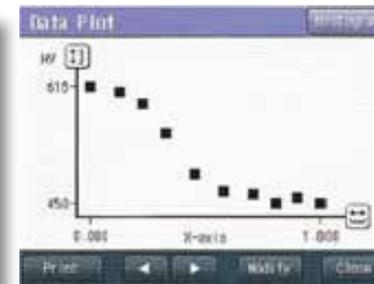


The system is equipped with a test conditions assist function to determine the optimal lens or test force from the estimated hardness.



No.	HV	L1	L2	L(Avg.)	HV0	OK
1	719	22.91	22.91	22.91	66.1	✓
2	706	22.99	22.99	22.99	66.4	✓
3	703	22.96	22.96	22.96	66.2	✓
4	696	23.18	23.13	23.16	66.6	✓
5	693	23.13	23.13	23.13	66.8	✓
6	703	22.97	22.97	22.97	66.2	✓
7	696	23.05	23.05	23.05	66.5	✓
8	699	23.03	23.03	23.03	66.3	✓
9	707	22.91	22.91	22.91	66.4	✓
10	702	22.96	22.96	22.96	66.2	✓

Test results can be listed and statistics can be displayed. Results can be written in text format to a USB memory stick.



Depth of hardening graph measurements are also possible with the G20 series by using a digital micrometer head.



The hardness values can be displayed in a histogram.

HMV-G21 Series



- Equipped with an automatic reading function that adopts highly specialized algorithms. Even scratched samples can be measured with good repeatability.
- User-friendly software allows all the information to be seen at a glance. This improves operational efficiency and eliminates errors.
- Equipped with a smart, compact built-in CCD camera mechanism. The instrument can be installed neatly and simply, with no need for wiring arrangements.
- With the routine inspection graph generating function, the data can be assessed in chronological order. The stability of the testing system can be evaluated using statistical methods, which means the instrument can be used effectively for obtaining ISO 17025 and ISO 16949 certification.
- A low test force function can be added to enable tests from 9.8 mN. Soft samples and thin samples can be evaluated.
- Select a system with a multi turret function where two indenters and four objective lenses can be attached. (D models only.) Select the optimal model to suit the usage application.
- Equipped with an automatic lens switching function that switches the lens to suit the size of the indentation. Samples of unknown hardness can be measured easily and reliably even by inexperienced users. (T models only.)



C.A.M.S. software with HMV-G21 Series

▪ C.A.M.S. functionality options:

- Manual or automatic on-screen impression measurement
- Manual or motorized positioning tables in one or two axels
- Built-in statistic process control
- Manual or automativ traverses
- Image capture
- Test block verification
- Image analysis of metallurgical structure
- Auto focusing
- Auto or manual case depth
- Grain sizing
- Crack length analysis

C.A.M.S. software

Provides on-screen viewing and measuring of conventional Microhardness test impressions. On-screen zoom feature can be used to further enlarge the image for easy viewing and measuring. To measure, you simply "click" on each corner of the impression, or use the **Automatic Measurement Function**. The resulting diagonal measurement(s) as well as primary microhardness value and secondary converted hardness value (i.e.: HRC) are automatically calculated and displayed directly on the screen. Video image, operational text and test result data appear on the monitor simultaneously. User defined test parameters include load used and measuring objective used. Test result data parameters include file into which test result data can be stored, adjustable HI, HI-Warn, LO and LO-Warn tolerances. Basic statistics, including average, auto-average and range, can be viewed on screen. User definable field labels allow for custom reports and headings.

Manual Effective Case Depth Software function provides for the automatic calculation of effective case depths when used with systems having manual X/Y stages. The software provides operator prompts for properly moving the X/Y stage based upon user programmed traverse sequences. It then enters test results, which are achieved through the software, directly into the effective case formula.

C.A.M.S. Image Save Function allows the operator with an option to save the impression image, traverse image (depending on magnification used) or other on screen image, as seen on the screen, to a user named file.



C.A.M.S. can be used for on-screen measurements of other than hardness impressions. Providing the ability to simply click on any two points as viewed on the screen and providing a precise measurement between those two points. Provides measurement resolution to .00001" or .0001 mm. Ideal for manual **measurement of grain size, parts size or case depth** as viewed on etched samples.

C.A.M.S. provides automatic and semi-automatic measurement of the conventional **Microhardness impression, in accordance with ASTM E384 and E92**, without operator involvement. Using unique gray scale imaging technology, the computer automatically scans the impression as viewed on the screen, locates each measurement point and measures the diagonal distance between each point.

C.A.M.S. provides **real time SPC**, including XBar-R chart, chronological test result history with date and time "stamp", histogram, average, standard deviation and Cpk.

Provides an easy to use manual grain size measurement function in order to **size grains according to ASTM E112 and E1382**. When in use, the software features a unique split screen image with a typical grain size grid overlapping one half of the live image of the area to be sized. To carry out a measurement, the operator simply increases or decreases the overlapping grid on the live image, until the grid grain size most closely emulates the grain size as seen in the live image. The software automatically assigns a micron value and an ASTM grain size value to the grains being measured.

A variety of functions



Compact Design

The CCD camera is built in, making the design compact.

USB Communication with General Purpose PCs

The instrument can be connected with a PC using only two USB cables. (Except when an electric stage is attached.)

Automatic High-Speed Readings

A single sample can be read in 0.3 seconds.

Reading Scratched Surfaces

The system can read not only samples with a mirror finish, but also samples scratched by etching.

G Frame

A stable frame that is devoid of angles, has a graceful style, and disperses test loads uniformly has been adopted. The inner direction has been expanded to increase the workspace, which improves both efficiency and operability. Even large samples can be accommodated. The center of the G frame is open, so long and narrow samples can now be tested as is.

Test Conditions Assist Function

This function selects the optimal lens from the estimated hardness, or determines the optimal test force from the estimated indentation depth and hardness.

Multi Turret (Optional)

Two indenters and four lenses can be attached.

Ultra Long Life Illumination

An LED is provided as standard. It is energy efficient, which is great for the environment, and has a long life, which reduces replacement maintenance.

Low Test Force (Optional)

Tests can be performed at arbitrary test forces in the range from 1 gf to 2 kgf.

Electromagnetic Force Control

The indentation test force can be configured seamlessly.

Fracture Toughness Measurements

The system measures the lengths of cracks created when the indenter makes an impression, so it is possible to measure the fracture toughness value for brittle materials.

Measurement Mode Settings

Select either standard tests, in which indentations are read in each test, or sequential tests, in which readings are performed in sequence after applying loads for a set number of test cycles.

Direct USB Transfers

Connect a USB memory stick to the instrument to automatically save data in CSV format.

LCD Touch Panel

The simple window configuration is easy to use. In addition to test condition settings, statistical graphs are displayed to summarize result

LCD Data Graphs

The data is displayed in graphs, and it is easy to re-select or re-measure data.

Simple Test Mode

Simple test mode can be selected to start testing immediately just by setting the test force and the duration time.

Sleep Mode

Sleep mode starts up when the instrument is not in use to conserve the amount of power used.

Specifications

Model	MS-HMV-G20SV	MS-HMV-G20SK	MS-HMV-G20DTV	MS-HMV-G20DTK	MS-HMV-G21DTV	MS-HMV-G21DTK	
Operation Method	Standalone				Via PC with C.A.M.S.		
Max. Number of Indenters Attached	1		2		2		
Standard Indenters Provided	Vicker Indenter	Knoop Indenter	Vicker Indenter	Knoop Indenter	Vicker Indenter	Knoop Indenter	
Max. Number of Objective Lenses Attached	2		4		4		
Standard Objective Lenses Provided	40x		40x and 10x		40x 10x		
Electric Turret Function ¹	No		Yes		Yes		
Test Force	Nine forec types: 98.07 mN, 245.2 mN, 490.3 mN, 980.7 mN, 1.961 N, 2.942 N, 4.903 N, 9.807 N and 19.61 N (HV0.01, 0.025, 0.05, 0.1, 0.2, 0.3, 0.5, 1 and 2) Three types ³ in addition to the above: 9.807 mN, 19.61 mN and 49.04 mN (HV0.001, 0.002 and 0.005)						
Test Force Accuracy	Test force 9.807 mN to 1.951 N range: ±1.5% max.; Test force 1.961 N to 19.61 N range: ±1% max.						
Loading Unit	Automatic loading and automatic force changing						
Test Force Duration Time	0 to 999 secs. ⁴ Selectable in second units						
Indentation Reading Method	Manual reading with an optical microscope				Automatic reading from analysis of a digital image from the built-in CCD camera, or by manual setting		
Eyepiece	10x				Image capture by the built-in CCD camera		
Effective Measurement Range	250 µm x 250 µm (with 40x objective lens)				120mm x 90mm (with 40x objective lens)		
Indentation Measurement Resolution	0.01 µm (with 40x objective lens)				0.09 µm (aut), 0.18 µm (man) (with 40x objective lens)		
XY Stage	Manual type area: 100mm x 100mm; stroke: ±12.5mm; sample: max. height of 100 mm instrument lateral direction (width direction); unlimited ⁵ ; instrument depth direction: for sample width of 120mm or less, unlimited ⁵ ; for sample width of 120mm or more: 200mm max. ⁵ Z axis stroke: 60mm; spacers provided: 40mm thick						
Data Processing Functions	Measurement modes; 1) Vickers hardness HV, 2) Knoop hardness HK, 3) Brinell hardness HB ⁶ , 4) Triangle pyramid hardness HT ⁶ , 5) Direct length reading L (µm), 6) Fracture toughness Kc ⁷						
Statistical Calculation	Max. Number of Data Points	999				5000	
	Statistical Items	Average, Standard deviation, Coefficient of variation, Max. value, Min. value, Conversion value (HK, HBW, HS, MPa, HRA, HRB, HRC, HRD, HR15N, HR30N, HR45N)					
	Graphical Display	Variance, depth of hardening ⁸ , histogram				Variance, depth of hardening ⁸ , transition graph	
Result Display	Displayed Items	Data No., diagonal line length, hardness, conversion value, average, standard deviation, coefficient of variation, max. value, min. value, pass/fail determination					
	Graphical Display	Variance graph, depth of hardening graph ⁸ , histogram				Variance, depth of hardening graph ⁸	
External Output	USB	Transfer of test results to USB memory stick (CSV format)				Communication with PC and C.A.M.S.	
	Printers	Dot printer, thermal printer, laser printer compatible					
External Dimensions	Approx. W 350mm x D 570mm x H 540mm						
Weight	Approx. 44 kg						
Power Requirements	Single phase AC 100-115 V, 1A AC230 V, 0.5 A. Provide a grounding wire. (Grounding resistance 100 Ω max.)						
Compatible PC	OS: Windows 7 (32 bit) ⁹ , CPU (InterCore2Duo or faster recommended), two USB 2.0 ports used						

¹ - The electric turret function is available when the system is newly purchased. It cannot be added

² - In the 98.07 mN to 19.61 N range, arbitrary test force values can be set with min. units of 9.807 mN (HV0.001)

³ - The low test force option is only available when the system is newly purchased. It cannot be added.

There are 3 initial low test force settings: 9.807 mN to 19.61 mN, and 49.04 mN

When the arbitrary test force settings is used, the test force can be set with min. units of 9.807 mN (HV0.001) in the range from 9.807 to 88.26 mN (HV0.001 to HV0.009)

⁴ - When the test force duration time is set to 60 sec. or more, wait 30 min. or longer with the power ON before testing

⁵ - Ensure that the shape of the sample fits stably in the XY stage

⁶ - The Knoop, Brinell, and Triangle pyramid indenter are optional

⁷ - Crack determination is performed by the operator

⁸ - Depth of hardening graphs can only be displayed when the digital micrometer (optinal) is used

⁹ - Not compatible with 64 bit OS versions. The PC specifications are subject to change with time.

Accessories

Number	Description
MS-120	Stage Micrometer
MS-120C	Stage Micrometer, Certified
MS-101	Slender Sample Attachment, Type 1
MS-201A	Slender Sample Attachment, Type 2
MS-102	Thin Sample Attachment, Type 1
MS-103	Thin Sample Attachment, Type 2
MS-203A	Thin Sample Attachment, Type 3
MS-104	Universal Vise
MS-205	Rotary Stage
MS-106	Self-leveling vise, for mounted samples
MS-107V	Test Block, Vickers. 300 g 700 value

Number	Description
MS-107K	Test Block, Knoop, 300 g 700 value
MS-301	Vibration Isolation Pads, set of four (4)
MS-322	Objective lens, 10x
MS-308	Objective lens, 20x
MS-321	Objective lens, 50x
MS-309	Objective lens, 100x
MS-310	Objective lens, 40x, extra long working distance
MS-311	Indenter, Vickers
MS-312	Indenter, Knoop
MS-320	Halogen lamp

Safe & Reliable

Newage Testing Instrument's sales and service staff and our associates have the capability to support hardness testing needs anywhere in the world.

Newage C.A.M.S. Computer Assisted Microhardness System conforms to ASTM E384 and E-92 for Microhardness and Vickers testing.

Newage Testing Instruments also offers calibration service which is accredited to A2LA.



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Pub code: SS-HMV-G Series Issue: 1601

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