SH-22A Specifications

Hardness tester

Product name		Ultrasonic Hardness Tester SH-22A (Manual type probe)			
Model	English version	SH-22A-E01	SH-22A-E1	SH-22A-E2	SH-22A-E4
	for EU countries, CE certified	SH-22A-E01CE	SH-22A-E1CE	SH-22A-E2CE	SH-22A-E4CE
	for China, with CCC/CQC*4 certified parts	SH-22A-C01	SH-22A-C1	SH-22A-C2	SH-22A-C4
Indenter		Diamond indenter for Micro-Vickers			
Frequency		Manual probe approx. 38 to 40kHz			
Indenting force		1N (Approx. 0.1kgf)	10N (Approx. 1kgf)	20N (Approx. 2kgf)	40N (Approx. 4kgf)
Display language		English			
Manual language		English (Quick manuals in English, Chinese and Japanese included)			
Measuring range	Vickers hardness	400-1000HV*1 (Hardness value in scales of HRC, HRB, HS, HBW are also indicated for reference.)	100 - 1000HV		
	Rockwell C hardness		10.0 - 70.0HRC		
	Rockwell B hardness		60.0 - 100.0HRB		
	Shore hardness		20.0 - 100.0HS		
	Brinell hardness		85 - 550HBW		
Reproducibility (With measuring stand)	Vickers hardness	± (5%rdg)HV*1	± (3%rdg)HV		
	Rockwell C hardness		±1.0HRC		
	Rockwell B hardness		±2.0HRB		
	Shore hardness		±1.0HS		
	Brinell hardness		± (3%rdg)HBW		
Nonlinearity (With measuring stand)		400 to 1000HV ± (5%rdg)HV (Measuring on standard hardness block)	200 to 1000HV ± (5%rdg)HV (Measuring on standard hardness block)		
Allowable measuring angle		Within ±3°			
Standards		ASTM A1038-19 Standard Test Method for Portable Hardness Testing by the Ultrasonic Contact Impedance Method			

Object to be measured

Material to be measured	Steel and metals which can be measured with hardness standard block made of the material
Size of object to be measured	Bigger than 15mm ×15mm, thicker than 6mm*2
Measurable curvature	Shaft/Pipe OD: bigger than 10mm Ball radius: bigger than 20mm (At use of standard attachment)
Surface roughness	Under Ra1.6μm

Display

Scale conversion	HV, HRC, HRB, HS, HBW, N/mm² (tensile strength) Compliant with SAE J417, JIS B 7731*3
Display of measured value	Digital 4 digits
Display resolution	1HV, 0.1HRC, 0.1HRB、0.1HS, 1HBW, 1N/mm²
Display contents	Measured value, Measuring times, Maximum value, Minimum value, Standard deviation, Average value

General specifications

Power supply	AC adapter (100-240V), or rechargeable lithium ion battery
Operating temperarure	0 to 50 degrees Celsius
Dimensions	Display unit 97mm(W)×170mm(H)×50mm(D) Probe head diameter 20mm (With grip) 8mm (Without grip) Probe length 195mm Carrying case 389mm (W)×132mm (H)×200mm (D)
Mass	Display unit Approx. 420g (including battery) Probe Approx. 270g (without cable)

Function specifications

Data memory	2000 data
User settable item	Upper limit, Lower limit, Measurement times (1 to 99)
Alarm	Alarm signal (beeping)
Output	Data output in ASCII code from RS-232C socket or printer (RS-232C)

Standard configuration

1 Display unit, 1 probe (with grip SH-P26), 1 Probe cable (1.5m), Hardness standard block : around 55HRC, (For SH-22A-E01 : around 600HV), 1 standard attachment SH-P16, attachment for narrow area (round-shaped) SH-P17, 1 AC adapter 100V to 240V (A10WN-09010I), 1 recharger (MK-9512), 1 Lithium ion battery (MK-9511), 1 Carrying case (MK-9701A), 1 Instruction manual, 1 test report

Options

Standard hardness block around HV600 (included in standard configuration of SH-22A-E01)/around 50HS/around 300HBW, Measuring stand (SH-P07), Thermal printer (DPU-S245 with connecting cable), Printer paper in roll(TP-S245L), Stand for main unit (SH-P03), Nosepiece for narrower area(SH-P11), Attachment for narrow area (square-shaped) SH-P23

*1 Contact us about measurement of the hardness which is over/under the range showed here.
*2 Contact us about measurement with SH-22A-E01 (of 100g indenting force, designed for thinner material checking)
*3 Conversion to tensile strength is not compliant with ASTM.
*4 CCC … China Compulsory Certification, CQC…China Quality Certification Center

- Contact us about request for installation in automatic testing system, or one for use of contact point signal.
- SONOHARD™ SH-22A is calibrated with standard hardness block made by Yamamoto Scientific Tool Laboratory Co., Ltd. Hardness blocks are manufactured complying with ISO6508-3/JIS B7730 and ISO6507-3/JIS B7735.
  Our performance guarantee is based on hardness standard blocks made by Yamamoto Scientific Tool Laboratory Co., Ltd.

Read an instruction manual before use of our products. Specifications may be changed without notice.

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EC-SH-22A-02

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Ultrasonic Hardness Tester

SONOHARD™ SH-22A series

ISO9001
JQA-0950

Perfect for hardness check on narrow/curved surface of quenched material

Features

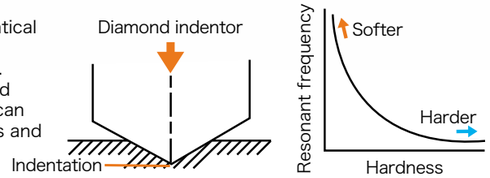
- **Small Probe — 8ϕ head for narrow space / curved surface**
- **Highly durable**
  — 1 million use or more and no need of periodical parts replacement using Static Loading Method
- **Quick measurement**
  — Measures in just around 2 seconds to save your time
- **Unnoticeable Indentation (Approx. 0.1mm)**
  — Ideal for product inspection
- **Location Free**
  — Not affected by workbench material (wooden, iron, resin, etc.)
- **Direction Free**
  — Able to measure in all directions
- **Configurable Threshold**
  — Alarms when exceeds Upper / Lower limit
- **Integratable Device**
  — Inline integration for automatic testing measurements (Optional function)
- **Compliant with ASTM A1038-19**

Made in Japan by

JFE Advantech Co., Ltd.

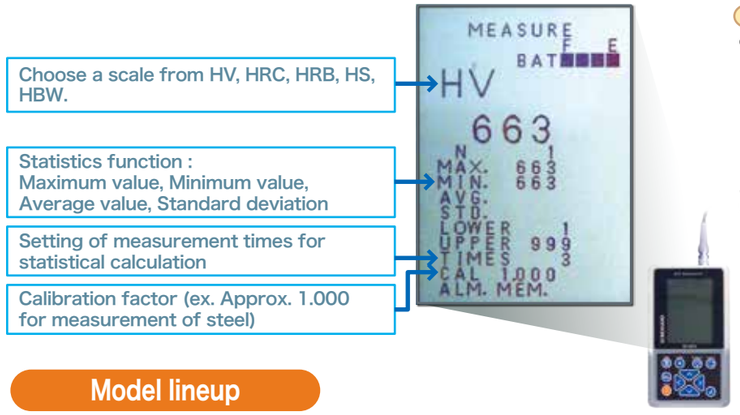
Ultrasonic Hardness Tester (SONOHARD™) model SH-22A completely differs from conventional testers which measure sizes of indentations on test samples using microscopes. SH-22A applies a diamond indenter equipped on a vibrating rod that presses on a test surface at a fixed force and then measures the hardness by fluctuation of ultrasonic vibration.

When the vibration rod is applied to a softer surface object of identical material at a fixed force, it makes a deeper indentation and is constrained. Due to this, the resonance frequency highly increases. Conversely, vibration rod is less constrained when it applied on hard object surface and resonance frequency do less. Hardness value can be calculated using the correlation between the frequency changes and hardnesses.

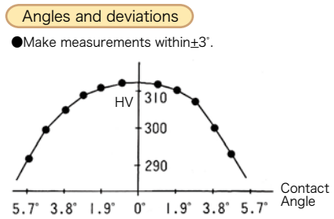


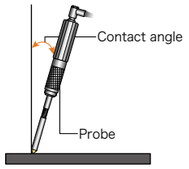
*SH-22A is calibrated with standard hardness block made with steel before shipment from our works. Recalibrate your SH-22A at measurement of other materials than steel for correct measurement.

Function / Display



Contact angle and deviation





Model lineup

Model lineup	SH-22A-E01 SH-22A-E01CE SH-22A-C01	SH-22A-E1 SH-22A-E1CE SH-22A-C1	SH-22A-E2 SH-22A-E2CE SH-22A-C2	SH-22A-E4 SH-22A-E4CE SH-22A-C4
Indenting force	1N (Approx. 0.1kgf)	10N (Approx. 1kgf)	20N (Approx. 2kgf)	40N (Approx. 4kgf)
Typical application	Press-formed metal sheet Gravure printing roll (chrome/copper plated) Thin metal sheet, Thin plated sheet	Crankshaft Camshaft Gravure printing roll (copper plated) Gear, Small parts Narrow measuring area, Bearing, Nitrided part	Crankshaft Camshaft Heat treated parts Carburized part	Crankshaft (Rougher surface) Camshaft (Rougher surface) Object of rougher surface Welded part, forged parts (Mainly for automatic testing machines)

Indentation size

Relationship between Vickers hardness value and indentation size

$HVxxx = 0.1891 \times P/d^2$ P : Indenting force (N) d : Indentation depth (mm)

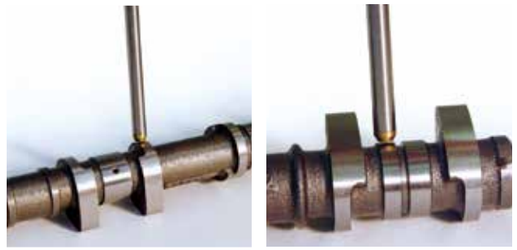
or $HVxxx = 1.8544 \times P/d^2$ P : Indenting force (kgf) d : Indentation depth (mm)

Hardness (HV)	At indentation force of 1N (approx. 0.1kgf)			At indentation force of 10N (approx. 1kgf)			At indentation force of 20N (approx. 2kgf)			At indentation force of 40N (approx. 4kgf)		
	Indentation size (calculated value)	Indentation depth (calculated value)	Reference hardness (HRC)	Indentation size (calculated value)	Indentation depth (calculated value)	Reference hardness (HRC)	Indentation size (calculated value)	Indentation depth (calculated value)	Reference hardness (HRC)	Indentation size (calculated value)	Indentation depth (calculated value)	Reference hardness (HRC)
200	0.030	0.004	(11)	0.096	0.014	(11)	0.136	0.019	(11)	0.193	0.028	(11)
400	0.021	0.003	41	0.068	0.010	41	0.096	0.014	41	0.136	0.020	41
800	0.015	0.002	64.5	0.048	0.007	64.5	0.068	0.010	64.5	0.096	0.014	64.5

Application examples of SH-22A

Measurement of a gear

Measurement of a crankshaft



Measurement of a camshaft

Options

Measuring stand
SH-P07

Thermal printer
DPU-S245

Examples of use