

SH-21B Specifications

Product name		Ultrasonic Hardness Tester SH-21B (Motorized/manual switchover type probe)		Display make-up	a. Measured value: 3 digits b. TIMES: 2 digits (measuring frequency) c. MAX value: 3 digits d. MIN value: 3 digits e. σ : 4 digits (standard deviation) f. $\bar{x}$: 4 digits (average value)
Model	English version	SH-21B-E1	SH-21B-E2		
	for EU countries, CE certified	SH-21B-E1CE	SH-21B-E2CE		
	for China, with CCC/ CQC*3 certified parts	SH-21B-C1	SH-21B-C2		
Indenter		Diamond indenter for Micro-Vickers (Facing angle to surface: 136°)			
Indenting force		10N (Approx. 1kgf)	20N (Approx. 2kgf)		
Display language		English			
Manual language		English (Quick manuals in English, Chinese and Japanese included)			
Measuring range		1. Vickers hardness 100~999 HV 2. Rockwell C hardness 10.0~70.0 HRC 3. Shore hardness 20.0~99.9 HS 4. Brinell hardness 85~550 HBW			
Reproducibility		HV : $\pm$ (3%rdg)HV, HRC : $\pm$ 1.0HRC, HS : $\pm$ 1.0HS, HBW : $\pm$ (3%rdg)HBW *1*2		Set-up	a. UPPER (upper limit) b. LOWER (lower limit) c. TIMES (measuring frequency)
Applicable test materials		With steel as the principle material, other metallic materials may also be measured by calibrating against a standard hardness test block.			
Display of measured values		Digital display (LCD, 4 digits) with EL backlight			
Data memory		2000 pieces		Alarm	Alarm (buzzer sound)
Digital display units		1HV, 0.1HRC, 0.1HS, 1HBW, 1N/mm ² (tensile strength) Conversion to tensile strength is not compliant with ASTM.			
Allowable operating temperature		0 to 50 degrees Celsius		Output	RS-232C output used for data transmission or printing
Power source		AC adapter (AC100V to 240V) Lithium ion battery (Rechargeable, operatable for continuous 8 hours without backlight)			
Dimensions		Display unit: 97mm(W) x 172mm(H) x 50mm(D), Motorized probe diameter: 50mm, length: 171mm		Frequency	Motorized / manual switchover type probe approx 70kHz
Weight		Display unit: approx. 445g (including battery), Motorized probe and cable: approx. 400g			
Carrying case dimensions		389mm(W) x 132mm(H) x 200mm(D)			
Standard components		1 display unit, 1 probe (including standard attachment/SH-P12), 1 hardness standard test block (around 55HRC), 1 probe cable 1.5m (SH-P22), 1 AC adapter (AC100V to 240V), (A10WN-090101), 1 recharger (MK-9512), 1 lithium ion battery (MK-9511),1 carrying case (MK-9701A), 1 instruction manual, 1 inspection sheet		Conversion	HV, HRC, HS, HBW, N/mm ² Compliant with SAE J417, JIS B 7731
Options		Standard hardness test blocks around 600HV, 50HS, 300HB for scale calibration, Measuring stand for small objects (SH-P07), Stand for the main unit (SH-P03), Probe attachment for pipe materials (SH-P06 Applicable outer diameter approx.R50 to R120), Probe attachment for inner races (SH-P05 Applicable inner diameter approx.R15 to R42), Printer model DPU-S245 with cable, Printer paper (TP-S245L)			
Standards		ASTM A1038-19 Standard Test Method for Portable Hardness Testing by the Ultrasonic Contact Impedance Method			

*1 Reproducibility by using measuring stand

*2 Surface roughness may affect measurement data.

*3 CCC ... China Compulsory Certification, CQC...China Quality Certification Center

- When using the tester installed in automated machinery, please contact our hardness tester sales department for specifications concerning the testers used for automatic machines.
- The SONOHARD™ SH-21B is calibrated using the standard hardness test block produced in compliance with JIS B7730/ ISO 6508-3 and JIS B7735/ ISO 6507-3 by Yamamoto Scientific Tool Laboratory Co., Ltd., Japan, who has the quality management system approved under ISO 9001. The values measured by SH-21B are therefore guaranteed by us.
(Accuracy of measurement under calibration with other makers' test blocks is out of our guarantee.)
- The model name on the catalog is SH-21B, while it is referred to as SH-21B only in the relevant operation manual, test certificate and ISO certificate, etc.

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Ultrasonic Hardness Tester

SONOHARD™ SH-21B series



Perfect for use in making on-site measurements

- **Check deterioration level with hardness tester**
— Pipes, iron frames, heavy machinery arms, and etc.
- **Check hardness after heat treatment**
— Assembly components such as molds, gears, crankshafts, bolts, and etc.

Features

- Measures in few seconds
- Unnoticeable tiny measurement indentation (approx. 0.1mm)
- Applicable to various hardness units (HV·HRC·HS·HBW)
- Able to convert hardness into tensile strength (N/mm²)*1
- Workable on any place
- Easy operation with motorized probe
- Memory for 2,000 data
- Memorable 10 calibration factors
- Small and light-weight
- No need of cut-off or treatment on measuring object
- Direction-free
- Not required periodic parts
- Suitable for quenching or annealing condition
- Printer available (Option)
- Alarm for exceeding upper or lower limit
- Integrable into testing facility (Option)
- Compliant with ASTM A1038-19

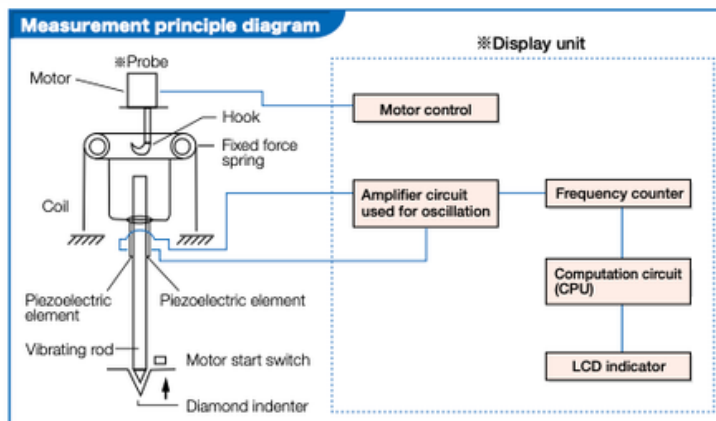
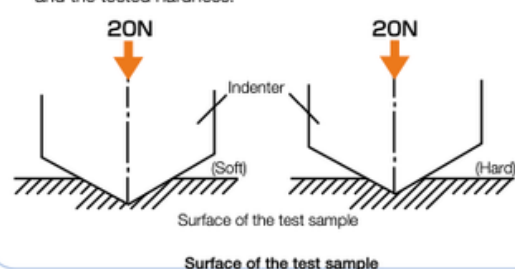
(*1 Excluding tensile strength indication/conversion)

TOSHSENS

The trustworthy name...

Ultrasonic Hardness Tester (SONOHARD™) model SH-21B differs completely from traditional hardness testers from a viewpoint that instead of measuring the size of the indentation of the test sample using a microscope, it employs a diamond indenter equipped with a vibrating rod that presses on the test surface at a fixed force and then measures its hardness by applying ultrasonic vibrations.

When the vibrating rod is applied to a soft-surfaced test sample with identical qualities and at a fixed force, it makes a deep indentation and gets locked into the groove. Due to this, the resonance frequency increases. Conversely, it does not get locked in when used on hard test samples and the resonance frequency drops. The test sample's hardness can be calculated using the correlation between this deviation and the tested hardness.



Calculation values of SH indentation

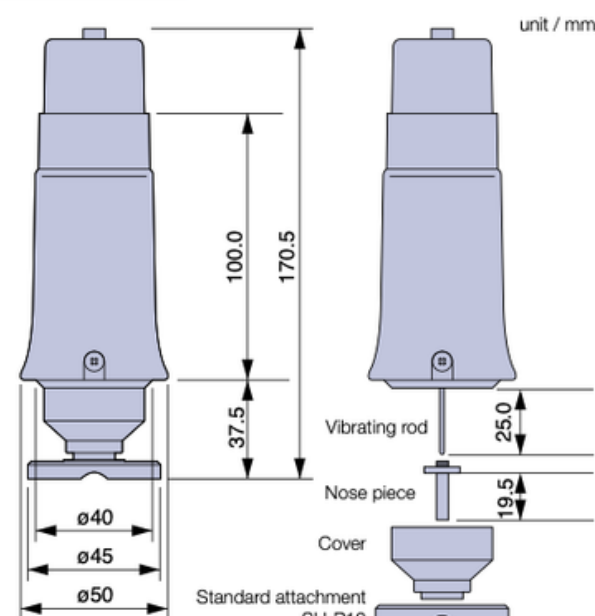
Load P= approx. 20N (approx. 2kgf)

Hardness HV	Calculation value, Size of indentation (mm)	Calculation value, Depth of indentation (mm)	Conversion value, HRC
100	0.193	0.028	—
200	0.136	0.019	(11)
300	0.111	0.016	30
400	0.096	0.014	41
500	0.086	0.012	49
600	0.079	0.011	55
700	0.073	0.010	60
800	0.068	0.010	64
900	0.064	0.009	67

Load P= approx. 10N (approx. 1kgf)

Hardness HV	Calculation value, Size of indentation (mm)	Calculation value, Depth of indentation (mm)	Conversion value, HRC
100	0.136	0.019	—
200	0.096	0.014	(11)
300	0.079	0.011	30
400	0.068	0.010	41
500	0.061	0.009	49
600	0.056	0.008	55
700	0.051	0.007	60
800	0.048	0.007	64
900	0.045	0.006	67

Probe dimensions



Precautions on measurements

1. The affect of surface roughness

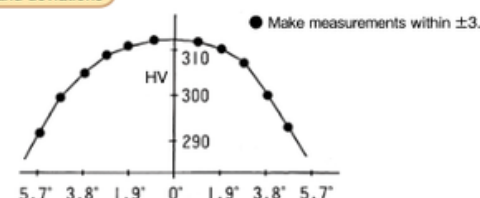
Hardness	Surface roughness	0.8a	1.6a	3.2a
31.5HRC	$\bar{X}$	31.5	31.7	30.9
	σ	0.4	0.5	0.8
50.8HRC	$\bar{X}$	50.5	50.5	50.3
	σ	0.3	0.3	0.6
65.5HRC	$\bar{X}$	65.4	65.3	65.1
	σ	0.2	0.2	0.4

● For items with a roughness of 3.2a or greater, you will need to polish the surface before making measurements. If decarbonization occurs, make measurements after having removed it.

2. Measurable dimensions (For loading of approx. 20N (approx. 2kgf))

- Size : 15mm wide x 15mm long or greater
- Thickness $t \geq 7$ mm or greater
- Minimum diameter of sphere : 50mm(In case of using standard attachment)

3. Angles and deviations



Utilization of the Ultrasonic Hardness tester SH-21B

Examples of quality control and maintenance usage by measuring hardness



● Processed goods, Press parts, Metal mold



● Tapered parts



● Car wheels

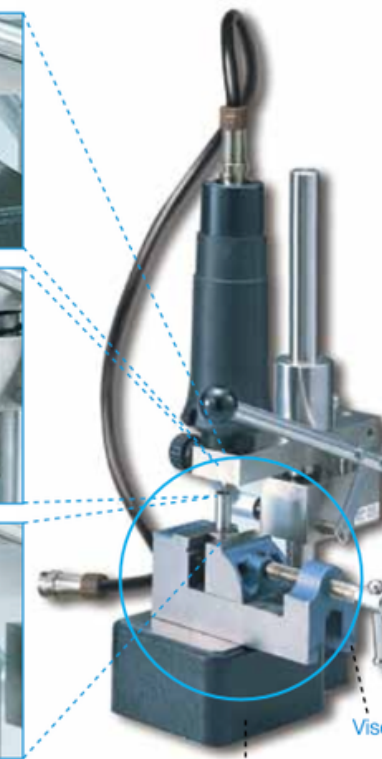


● Diagnosing wear and tear using hardness measurements

Measuring metal fatigue in steel towers, bridges and reinforcing bars



Measurements with Measuring stand for small objects



* Measuring stand (SH-P07) is available as option. Vise is not manufactured by us.

SH-P07
Measuring stand