SonoDur 3

The **New** UCI Generation after SonoDur 2

Mobile Hardness testing on metals with UCI* in production and maintenance. Starting with goods income inspection until the final product is reached.

*Ultrasonic Contact Impedance

Norms: ASTM A 1038 and DIN 50159-1, 2
Conversions: ASTM E 140-13, EN ISO 18265

Multiple Solutions for the SonoDur Family and also for MIC10/MIC20 (by probe retrofit)

Motor probes (HV 0,1 – HV 0,8): 0.1 kgf, 0.3 kgf, 0.8 kgf
Handheld probes (HV 1 – HV 10): 1 kgf, 3kgf, 5 kgf, 10 kgf

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The better Way to Hardness Testing

Rugged, easy to use, fast and precise. Made in Germany.

Instrument Features

- Carrying strap, edge protection, IP65, MIL-810G (vibration, shock, drop)
- Brilliant color display in 5", smooth glass shield for easy cleaning
- Direct function access just by touch, intuitive menu control, ideal for MIC10/MIC20 users and others
- No set-up needed at beginning of shift – ready for immediate use

Android Operating System and Data Transfer

- USB: transfer of measurement data in txt-format using the file explorer
- WLAN: automatic transfer of single values, completed data stets
- Bluetooth: manual transfer of a set of measurement data
- "Unlimited" storage capacity for measurement data and settings

Intelligent Management of Measurement Data and Settings

- Simple access to data and qualified back-traceable assessment of results
- File names can be predefined, automatic closing of data sets
- "AllMeas"- summarized list of results in stored data sets

Reliable Measurement Technique with long-Term Stability

Efficient working tool, optimized for the daily needs of the inspector

Unique

Can be calibrated in full according to DAKKS after DIN 50159-2 (calibration curve 150 – through 900 HV, diamond, nominal test force)

Handheld Probe
SONO-10HL "long nose" used on valve head

Comprehensive Documentation of Results

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For qualified assessments, data are clearly laid out and traceable back to genuine results

File	Date	Probe	Result	Unit	Δ %	St.Dev [%]	R [%]
302 HV1-10_01	20190325	Sono50/50N	302,2	HV	-0,1%	0,8	2,0
302 HV1-10_02	20190325	Sono50/50N	305,0	HV	-1,0%	3	6,9
302 HV1-10_03	20190325	Sono50/50N	297,1	HV	1,6%	2,1	6,6
302 HV1-10_04	20190325	Sono50/50N	294,6	HV	2,5%	1,8	5,5
302 HV1-10_05	20190325	Sono50/50N	300,6	HV	0,5%	0,8	2,1
302 HV1-10_06	20190325	Sono50/50N	296,2	HV	1,9%	0,8	1,9

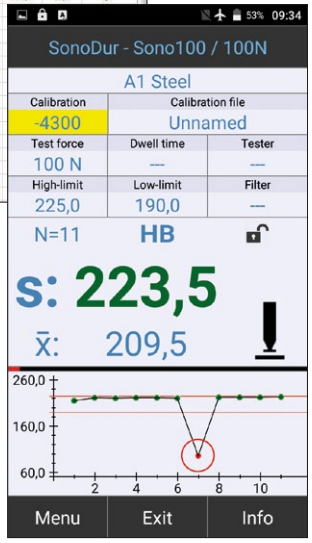
AllMeas – summary of results, here novices using probe SONO-50H/50N after quick briefing on 302 HV-hardness plate on March 25th 2019, measured manually. Conclusion: dependence on user ability cannot be verified.

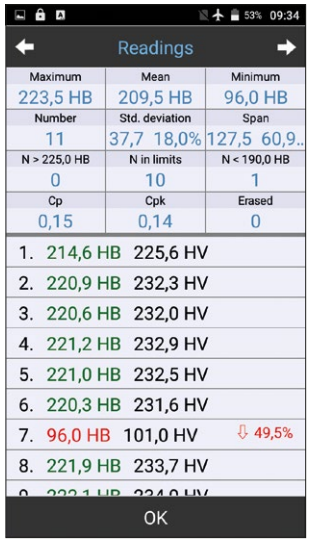
Measurement protocol in detail (example) with the possibility of data transfer by WLAN - of each individual data and/or of the test series in full.

File	302 HV1-10_01
Date	25 March 2019
Start of meas.	11:34 AM
Tester	
Probe / Test force	Sono50 / 50N
Probe-SN	646
Dwell time	0 sec
Material table	A1 Steel
Norm; HV	EN ISO 18265
Adjustment file	Unnamed
Adjust number	0
Limits	Off
Number	5

Mean	302,2	HV	
Std. deviation	2,3	HV	0,80%
Maximum	305,4	HV	
Minimum	299,4	HV	
R	6	HV	2,00%
Cp			
Cpk			
1		299,4	HV
2		302,0	HV
3		303,5	HV
4		300,8	HV
5		305,4	HV

SONO-Link – Evaluation and graphical presentation of test results at PC.





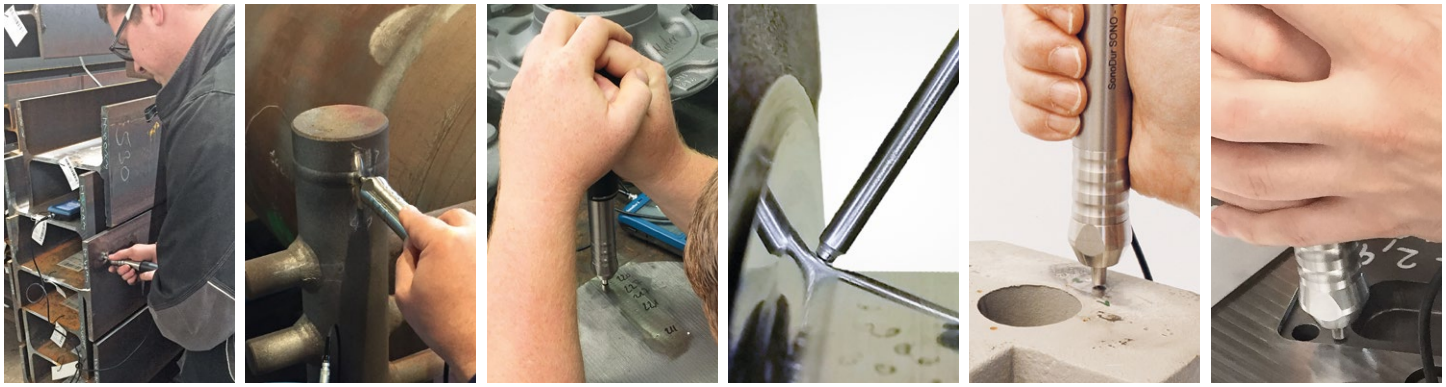
Easy identification and treatment of outliers when testing of cast iron, wires or solving complex testing tasks in general.

SonoDur 3 Highly Reliable UCI-Hand-Probes

Vickers-Testing under load:
Attach, press, measurement result is instantly displayed – „on the fly“!

Fast, flexible measurement can be done in each orientation,
even without protecting attachment sleeve.

Load	Applications
98 N (10kgf)	welds, thermally cut edges DIN EN 1090-2, goods income (tensile strength), cast iron, cast Aluminum, induction heating
49 N (5 kgf)	Induction heating, case hardening, tools, Aluminum
10 N (1 kgf)	Surface hardness, plasma nitriding, small complex formed parts, Aluminum



Special Applications with thin tip (diameter 1,7 mm instead of 2,5 mm)

Pinion gear root HV5 (UCI)

Roller bearing HV1 (UCI)

Highly precise test stands, mobile stand SONO-S

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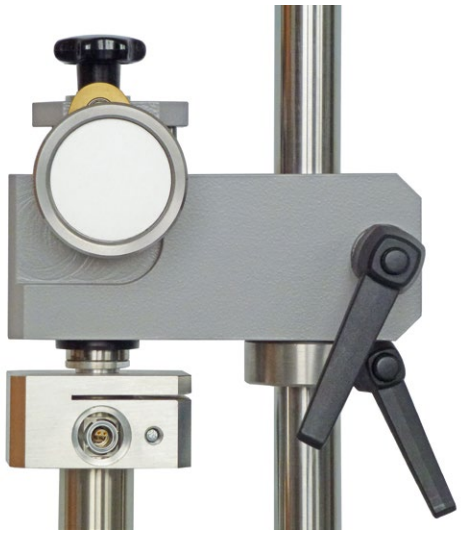
Steady and precise measurement of small and big parts

Using manual probes – in laboratory and onsite.



Unique loading head with eccentric disk and safety ring for all test stands with manual probes. Free of play loading along the long axis of the probe suppressing side forces for utmost possible precision. It is similar to the optical Vickers test, namely for all test loads from 10N (HV1) through 98N (HV10).

SONO-PS-1

Precision Stand, can be dismantled in pieces and used according to the needs. Replacement of base plate by a sample fixture is possible.

SONO-PS-1-M

Measurements are possible anywhere in the shop even under complicated conditions in any orientation like, heavy plates, containers tubes and rails etc...

SONO-MSP-1

Magnetic Weld Test Stand (pull-off strength 1200 N) and safety belt. Scanning of tubes, containers etc. worldwide the first and only stand to hold high test loads like 98 N (HV10) for precise measurements. Height adjustment and X-Y-micrometer feed (70 mm, 25 mm in 0,01 mm steps) for exact positioning and measurement in any orientation.

SONO-S

Mobile Stand with loading head for free of play use, can measure in classic UCI manner (handheld) but also guided on flat and cylindrical surface using shape adapted probe shoes. Customizing is always possible even by the users. It can be built in automated test environments.

SonoDur 3

Guided Hardness Testing with Precision

Best possible results with Motor Probes
due to light weight uniform and automated loading - nearly non-destructive.

Load is kept constant even on floating materials, programming of dwell time (1 – 99 sec).

Load	Applications
SONO-8M (8,6 N, 0,8 kgf)	General production control, testing of gears in heat treatment shops (induction heating), on crank shafts, non-ferrous, finishing operation
SONO-3M / -1M (3 /1 N or 0,3/0,1 kgf)	Rotogravure rolls, very thin Cu-, Cr-layers (10µm), high-strength panels after press hardening, thin and stiff parts in general (disturbing resonances need to be watched)

Testing of tooth flanks with metal support tube (diamond protected)

Precision Test Stand for small parts and Cu-/Cr-covered cylinder (rotogravure)

SONO-PM4
perpendicular/centric placement on flat or cylindrical surface

Measuring Specifications

Measuring principle	UCI Method, corresponds to DIN 50159, ASTM A1038		
Test indenter	Vickers diamond 136°		
Test loads Newton scale (1kgf = 9.81 N)	Motor probes: 1N (0.1 kgf), 3N (0.3kgf) and 8.6 N (0.9 kgf) Handheld Probes: 10N (1 kgf), 30N (3kgf), 49N (5kgf), 98N (10kgf), (Other test loads on request)		
Hardness scales and range (according to relevant standards), in this case table A1 respectively T1, T2 (low alloy steel). Different measuring ranges are valid for other materials. When exceeding the limits the conversion range will be extended. The calculated values are highlighted in red besides the original data in HV. **Note:** Conversions are acc. to latest ASTM E140-12bε1 (2013) und EN ISO 18265:2014. Conversions into tensile strength: 98N (10kgf) test load only.	Vickers Brinell Rockwell Rockwell Rockwell Rockwell Rockwell (EN ISO 18265 only) Rockwell Knoop (ASTM E140 only) Shore (ASTM E140 only) Tensile strength	HV HB HRB HRC HRE HRF HRA HRD HR45N HK HS MPa	10 – 1999 (9999) 76 – 618 41 – 105 20,3 – 68 70 – 108,5 82,6 – 115,1 60,7 – 85,6 40,3 – 76,9 19,9 – 75,4 87 – 920 34,2 – 97,3 255 – 2180
Measurement uncertainty*	< 4 % (HV5, HV 10). For other test loads and ranges see table below.		
Relative repeatability*	< 5 % (HV5, HV 10). For other test loads and ranges see table below.		

* exceeds DIN 50159, dependent on test load and range (see table below). Specifications are valid for 5 measurements using Vickers reference blocks and according to test conditions given in standard DIN 50159.

Hardness scale	Measurement uncertainty [%]				Relative repeatability [%]	
	< 250 HV	250 HV - 500 HV	500 HV - 800 HV	> 800 HV	< 250 HV	> 250 HV
HV 0,1	5	6	7	8	8	6
HV 0,3	5	6	7	8	8	6
HV 0,8	4	4	5	6	8	6
HV 1	4	4	5	6	8	6

Mechanical and Environmental (Instrument and probe)

Operating time	>10 hours in measurement operation (depending on system performance, temperature and instrument settings), up to 8 hours continuous operation, quick exchangeable battery pack (3.7V 3900mAh LiPolymer)
Operating Temperature	Probe: 0°C to ~ +45°C Instrument: -10° ~ +50°C // Charging +10°C ~ +40°C
Storage Temperature	-20°C ~ +70°C
Humidity	Max. 90%, non-condensing
Dimensions	Instrument ca. 164x86x23 mm, Motor probe Ø38mm, L=190 mm Handheld probe Ø25 mm, L=176 mm (free length of rod ca. 12,5 mm) Handheld probe Ø25 mm, L=207 mm (free length rod ca. 43 mm)
Weight	Instrument ca. 320 gr (incl. battery pack) Handheld probe ca. 280 gr, Motor probe ca. 370 gr

Instrument

Processor and Memory	ARM® Cortex™-A53 Octa Core 1.3 GHz / System 2GB RAM / storage me mory 16 GB eMMC / Micro SD card 4 GB (up to 32 GB)
Operating system	Android 5.1 (Android 7.0)
Keypad	4 function keys, system touch keyboard
Power	Main battery: 3,7V / 3900mAh, LiPo hard pack, quick exchange Charging time: <3h to 80% capacity (Instrument off) Shelf Hours: Up to 6 months AC Power supply/charger: 90V to 264VAC 50/60Hz to 5VDC
Display	5“ sunlight readable multi touch display (1280x720 pixel), LED-backlight (500 Cd/m2), adjustable
Interfaces	Jack for 5VDC operating/ charging |Docking connector (charging) USB 2.0 Micro USB (PC) / probe connector Lemo 4 pos. Micro SD-card 4 GB (up to 32 GB) | 2x SIM card WLAN 802.11 a/b/g/n | WCDMA/HSDAP/HSPUA, FDD-LTE / TDD-LTE) | GSM/GPRS/EDGE (b2/b3/b5/b8 | GPS / AGPS / GLONASS Bluetooth 4.0 (supports BLE mode) | NFC | Speaker, microphone
Sensors / Camera / LED	Light sensor, G-sensor, proximity sensor, rear camera 8 mega-pixel, multicolor status LED
IP-Proof	IP65 according IEC 60529 Edition 2.1:2001-02
Drop test	MIL-STD-810G Methode 516.6, 4 ft.
Shock Test	MIL-STD-810G Methode 516.6 Prozedur I
Vibration Test	MIL-STD-810G Methode 514.6 Prozedur I
Instrument Language	D, EN, IT, FR, SP, PL, CZ, CN - more on request

Scope of delivery

SonoDur3, Hardness Tester with Data Logger and Data Export, Data Transfer to PC (USB, WLAN or Bluetooth resp.), incl. SONO3-NG, Power Source, SONO2-NG/USB USB-Cable, SONO2-HM, ca. 1,5 m Probe Connection Cable, SONO3-TK-1, Transportation Case, SONO-CD, Product-USB-Stick, SONO3-Protect, Protection Foils.

Mandatory accessory

Motor probe or handheld probe respectively

Other accessories

Reference blocks (MPA, company certificate), test stands, guiding harnesses, auxiliary SW.
Carrying bag, cradle, replacement battery with external charging station.

Example for configurations