

# equotip®

Portable Hardness Testing



## **Measuring Performance**

- High accuracy
- Custom conversions
- Combined methods

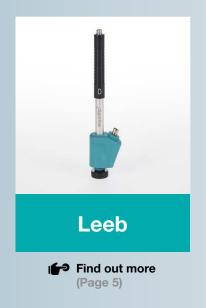


## **Ease of Use**

- Large touchscreen
- Personalized views
- Custom reports



# The All-In-One Portable Hardness Testing Solution



**Powerful Hardware** 

High capacity battery

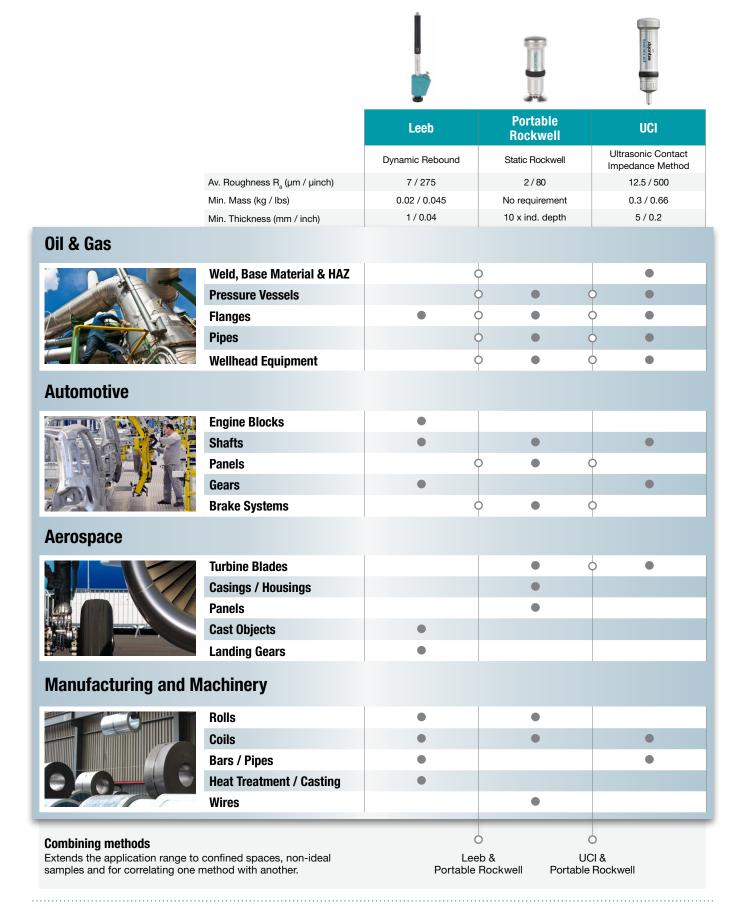
Versatile connectivity

Rugged housing



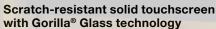


# **Covering Broad Application Range**







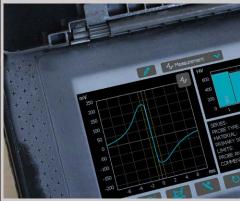




Shock-absorbing, dust and water proof (IP 54) rugged housing



Functional at a wide temperature range from -10 °C to +50 °C



Connectors and circuits are protected against dust and voltage spikes







**ASTM** A956 / A370

ISO **EN** 16859

DIN 50156

**GB/T** 17394

**JB/T** 9378

#### **Conversion Standards**

ASTM E140

#### **Guidelines**

ASME CRTD-91

DGZfP Guideline MC 1

VDI / VDE Guideline 2616 Paper 1

Nordtest Technical Reports 99.12, 99.13, 99.36





## (S) Highly accurate ±4 HL



#### Wide Measurement Range

Leeb impact devices are best suited for on-site testing of heavy, large or already installed parts.



#### **Impact Devices & Accessories**

The global

Proceq offers a wide variety of impact devices along with support rings to serve most hardness testing requirements.



#### **Broad Hardness Scales** Coverage

The measurements are automatically converted to all common hardness scales (HV, HB, HRC, HRB, HRA, HS) as required.



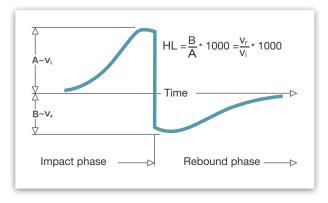
#### **Test Blocks Portfolio**

Extensive range of precise hardness test blocks available for each impact device with different hardness levels for regular verification.

## The Leeb Measuring Principle – Invented by Proceq

Leeb hardness principle is based on the dynamic (rebound) method. An impact body with a hard metal test tip is propelled by spring force against the surface of the test piece. Surface deformation takes place when the impact body hits the test surface, which results in loss of kinetic energy. This energy loss is detected by a comparison of velocities v, and v, when the impact body is at a precise distance from the surface for both the impact and rebound phase of the test, respectively.

Velocities are measured using a permanent magnet in the impact body that generates an induction voltage in the coil which is precisely positioned in the impact device. The detected voltage is proportional to the velocity of the impact body. Signal processing is then providing the hardness reading.



# **Equotip® Leeb Impact Devices**

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				D/DC	DL	S	E	G	С
	Impact energy			11 Nmm	11 Nmm	11 Nmm	11 Nmm	90 Nmm	3 Nmm
	Indenter			Tungsten carbide 3 mm	Tungsten carbide 2.8 mm	Ceramics 3 mm	Polycrystalline diamond 3 mm	Tungsten carbide 5 mm	Tungsten carbide 3 mm
	Scope		Most com- monly used probe. For the majority of applications.	Narrow indent- er (probe) tip for measure- ment on hard reach areas or spaces with limited access.	For mea- surements in extreme hard- ness ranges. Tool steels with a high carbide content.	For mea- surements in extreme hard- ness ranges. Tool steels with high carbide content.	Large and heavy com- ponents, e.g. casts and forged parts.	For surface hardened components, coatings, thin or impact-sen- sitive parts.	
	Test blocks			<500 HLD ~600 HLD ~775 HLD	<710 HLDL ~780 HLDL ~890 HLDL	<815 HLS ~875 HLS	~740 HLE ~810 HLE	~450 HLG ~570 HLG	~565 HLC ~665 HLC ~835 HLC
	Steel and cast steel	Vickers Brinell Rockwell	HV HB HRB HRC HRA HS	81-955 81-654 38-100 20-68 30-99	80-950 81-646 37-100 21-68	101-964 101-640 22-70 61-88 28-104	84-1211 83-686 20-72 61-88 29-103	90-646 48-100	81-1012 81-694 20-70 30-102
	Oald wards to all atoms	Rm N/mm²	σ1 σ2 σ3 HV	275-2194 616-1480 449-847 80-900	275-2297 614-1485 449-849 80-905	340-2194 615-1480 450-846 104-924	283-2195 616-1479 448-849 82-1009	305-2194 618-1478 450-847	275-2194 615-1479 450-846 98-942
a)	Cold work tool steel	Vickers Rockwell	HRC	21-67	21-67	22-68	23-70		20-67
Range	Stainless steel	Vickers Brinell Rockwell	HV HB HRB HRC	85-802 85-655 46-102 20-62	*	119-934 105-656 70-104 21-64	88-668 87-661 49-102 20-64	*	*
Measuring	Cast iron lamellar graphite GG	Brinell Vickers Rockwell	HB HV HRC	90-664 90-698 21-59	*	*	*	92-326	*
/leas	Cast iron, nodular graphite GGG	Brinell Vickers Rockwell	HB HV HRC	95-686 96-724 21-60	*	*	*	127-364 19-37	*
	Cast aluminium alloys	Brinell Vickers Rockwell	HB HV HRB	19-164 22-193 24-85	20-187 21-191	20-184 22-196	23-176 22-198	19-168 24-86	21-167 23-85
	Copper/zinc alloys (brass)	Brinell Rockwell	HB HRB	40-173 14-95	*	*	*	*	*
	CuAl/CuSn-alloys (bronze)	Brinell	НВ	60-290	*	*	*	*	*
	Wrought copper alloys, low alloyed	Brinell	НВ	45-315	*	*	*		
	Surface	0 0		N7				N9	N5
ıts	preparation	Max. roughness depth R <sub>t</sub> (µm / µinch)		2 / 80				30 / 1200 7 / 275	2.5 / 100 0.4 / 16
Requirements	Minimum sample	Average roughness R <sub>a</sub> (µm / µinch) Of compact shape (kg / lbs)		5 / 11			15 / 33	1.5 / 3.3	
E E	mass	On solid supp		2/4.5			5 / 11	0.5 / 1.1	
Ē		Coupled on p		0.05 / 0.2			0.5 / 1.1	0.02 / 0.045	
5	Minimum sample	Uncoupled (n	· · · · · · · · · · · · · · · · · · ·	25 / 0.98			70 / 2.73	15 / 0.59	
Re	thickness			3 / 0.12			10 / 0.4	1 / 0.04	
		-	thickness (mm / inch)	0.8 / 0.03				0.2 / 0.008	
Test Piece	Indentation size on	With 300 HV, 30 HRC	Diameter (mm / inch)	0.54 / 0.021				1.03 / 0.04	0.38 / 0.015
ם	test surface		Depth (µm / µinch)	24 / 960				53 / 2120	12 / 480
st		With 600 HV, 55 HRC	Diameter (mm / inch)	0.45 / 0.017				0.9 / 0.035	0.32 / 0.012
<u>1</u>			Depth (µm / µinch)	17 / 680 0.35 / 0.013				41 / 1640	8 / 2560 0.30 / 0.011
		With 800 HV, 63 HRC	Diameter (mm / inch) Depth (µm / µinch)					-	7 / 280
			Debru (hur / hurcu)	10 / 400				1 / 200	

\*Custom conversion curve / correlation







#### **Specially For Thin Parts**

Particularly suited for scratchsensitive and polished parts or on thin parts, profiles and pipes. The required minimum thickness for a reliable hardness reading is ten times the indentation depth. For the mass there is no minimum requirement.



# Suits Various Sample Geometries

Unique measuring clamp and support feet are available for the probe allowing tests to be carried out on various geometries.



# **Broad Hardness Scales Coverage**

Measurements in HRC and HV with automatic integrated conversions to HB, HRA, HRB and many more common scales in compliance to ASTM E140 and ISO 18265.

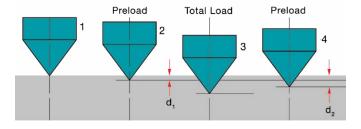


#### For Any Environment

The Equotip 550 Portable Rockwell can be utilized for on-site, factory and lab environment with almost no limitation.

## **The Rockwell Measuring Principle**

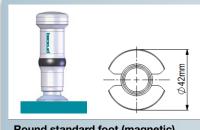
The test principle of the Equotip Portable Rockwell follows the traditional Rockwell static test method. During measurements with the Equotip Portable Rockwell Probe, a diamond indenter is forced into the test piece using a precisely controlled force. The indentation depth of the diamond is continuously measured while a load is applied and released. From the indentation depths  $\mathbf{d_1}$  and  $\mathbf{d_2}$  recorded at two defined loads, the difference is calculated:  $\Delta = \mathbf{d_2} - \mathbf{d_1}$ . This is traditionally referred to as plastic deformation.





# Equotip® Portable Rockwell Probe and Accessories

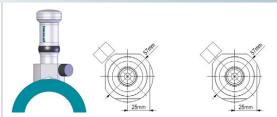
	Measuring range	0-100 μm; 19-70 HRC; 35-1'000 HV
	Resolution	0.1 μm; 0.1 HRC; 1 HV
100 E	Measuring accuracy	$\pm$ 0.8 $\mu$ m; $\sim$ $\pm$ 1.0 HRC over entire range
	Test loads	Preload 10 N / Total Load 50 N
	Diamond indenter	Angle 100.0° ± 0.5°, diameter of flat area of 60 μm ± 0.5 μm
	Dimensions	Ø 40 mm, Length 115 mm



Round standard foot (magnetic) Ideal for flat parts, and test locations more than 10 mm from an edge.



**Tripod foot**Designed for tests that require accurate positioning (welds, heat-affected zones).

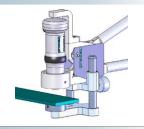


Special feet RZ 18-70 and 70-∞ Designed for curved test pieces such as cylindrical parts, tubes, pipes.

## The Portable Rockwell Measuring Clamp



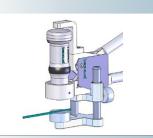
#### **Clamp Adapters**



Support Z1 for flat parts max. 40 mm thickness



**Support Z4** for tubes and pipes up to Ø 28 mm



Support Z2 for thin cylindical parts, wires, bolts min. Ø 3 mm



Support Z4+28 for tubes and pipes over Ø 28 mm



Equotip® 550 UCI

Most Flexible and Convenient Ultrasonic Hardness Tester

#### **Conversion Standards**

ASTM E140

**Standards** 

ASTM A1038

**DIN** 50159

**ISO** 18265

#### Guidelines

DGZfP Guideline MC 1 VDI / VDE Guideline 2616 Paper 1 ASME CRTD-91



( One-Step Calibration



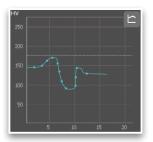
# Adjustable test load from HV1 to HV5

With this unique and patented feature a wide range of applications can be covered with out HV1-HV5 probe.



# Quick & Reliable Measurements

User guidance enables reliable and accurate hardness readings to be obtained quickly and easily.



#### **Unique Software Features**

HAZ feature is specially designed for one of the most often applications with UCI, the evaluation of heat affected zones of welds. This feature makes it even easier to evaluate and document the results.

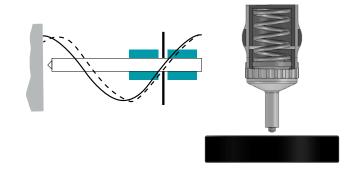


# **Broad Hardness Scales Coverage**

Measurements in HV with automatic integrated conversions to HB, HRA, HRB, HRC and many more common scales in compliance to ASTM E140 and ISO 18265.

## **The UCI Measuring Principle**

The UCI (Ultrasonic Contact Impedance) method uses the same pyramid-shaped diamond as a conventional Vickers hardness tester. Unlike Vickers testing, no optical evaluation of the indentation is required, enabling fast and portable measurements. The UCI method excites a rod into an ultrasonic oscillation. The test load is applied by a spring and typically ranges from 1 to 5 kg of force (HV1 – HV5). As the diamond is forced into the material, the frequency of the rod oscillation changes in response to the contact area between the diamond and the material under test. The instrument detects the shift in frequency, converts it to a hardness value which is immediately displayed on the screen.





# Equotip® UCI Probe and Accessory

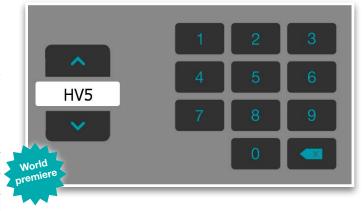
	Measuring range	20 – 2000 HV
	Resolution	1 HV (UCI), 0.1 HRC
dypridus	Measuring accuracy	± 2 % (150 – 950 HV)
	Test loads (in 10 N steps)	Selectable: HV1, HV2, HV3, HV4, HV5, HV10
	Diamond indenter	Vickers diamond according to ISO 6507-2
	Dimensions	155 x ø 40 mm (6.1 x ø 1.57 inches) without foot

## Adjustable test load for the HV1-HV5 probe

The required test load can be selected by the user in the settings menu. For each measurement series, the force can be chosen from five levels between HV1 and HV5 (~10 N and ~50 N), to fit a wide range of applications. The minimum required mass for reliable UCI measurements is 0.3 kg (0.66 lbs), and a thickness of at least 5 mm (0.2 inch).

#### Examples:

HV1	Precision parts, thin coatings, hardened layers
HV5	hardened or carburized material, weld inspection, HAZ
HV10	forgings, cast material, weld inspection







# Equotip® 550 Touchscreen Unit Unique Features

Equotip 550 takes advantage of a new generation full color, dual processor Touchscreen Unit with enhanced software capabilities. The instrument offers a unique range of functions which ultimately help speed up on-site and laboratory inspections and analysis.





Best-in-class reliability arising from 40 years of experience

Equotip solutions are recognised worldwide for providing best-in-class durability, high long-term accuracy and premium service.



Increased accuracy through conversion curve options

Select from preloaded established conversions. Create, edit and verify material conversion curves directly on the instrument (one-point, two-point shift or polynomial). PC software allows to share conversions with customers, suppliers and associated companies.

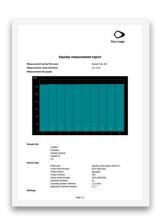


Reduce incorrect measurements with interactive guides

Intelligent on-screen notifications to obtain the most relevant settings for any application and to recognize and prevent faulty usage.



Time saving through customized reports



The Equotip 550 allows to easily create pdf reports on-site directly on the instrument and export to a USB stick.

The reports can be fully configured and enhanced with customer specific information and company logo.



# Equotip® 550 Touchscreen Unit Unique Features





Traceable precision by verification management

Step by step verification wizard in line with applicable standards helps to regularly check the proper functioning of the instrument over time.



Optimized production process with automation package



Comprehensive software tools and libraries help to easily include the Equotip 550 into existing production chains. Feed the measurement results directly into data management systems.



Reduced costs due to a future proof all-in-one solution

The high versatile Equotip 550 gives the possibility to apply three measuring principles and to connect nine different probes to only one device. There is no need to buy several instruments from now on.



Enlarged application range by combining methods

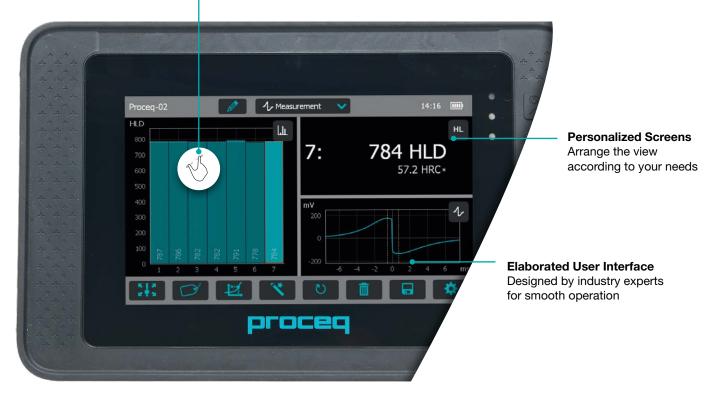
The step by step combined method wizard allows automatic on-site correlation of two different measuring principles to reduce dependencies on material and geometries.



# Equotip® 550 Touchscreen Unit Unmatched User Experience

#### **Touchscreen Features**

For simplified and improved usability on high resolution display



Display	7" color display 800x480 pixels
Memory	Internal 8 GB flash memory
Regional Settings	Metric and Imperial units, multi-lan- guage and timezone supported
Power Input	12 V +/-25 % / 1.5 A
Connectors	Probe, USB host / device and Ethernet
Dimensions	250 x 162 x 62 mm
Weight	1525 g (incl. Battery)

Battery	3.6 V, 14.0 Ah
Battery Lifetime	> 8 h (in standard operating mode)
Humidity	< 95 % RH, non condensing
Operating Temperature	-10 °C to +50 °C
IP	54
Certification	CE



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# Proceq – A Story of Success over more than 60 Years



#### Market Leader

Proceq SA, founded 1954 in Switzerland, is the global leader in portable measurement solutions for the non-destructive testing of material properties of metal, concrete, rock, paper and composites.

Find out more on the Proceq history

## **INVENTOR OF LEEB**

**INDUSTRY STANDARD** 

**NON-DESTRUCTIVE** 





**PORTABLE** 

LEEB

ROCKWELL

UCI



### **Worldwide Local Support**

Our team of dedicated experts are available to advise you on our instruments and their applications. In addition you may take further benefits from our instructional videos, evaluation tools, online webinars and of course our live seminars globally.



#### **Swiss Made**

Proceq instruments are developed, designed and manufactured in Switzerland, that guarantees the highest product and service quality. Since 1994, the management system of Proceq SA is also certified according to ISO 9001.

#### **Experience**

Proceq has been a proud innovator in the field of portable nondestructive testing, developing solutions that have conquered the inspection industry for decades. Most famous brands are Equotip®, Schmidt®, Pundit®, Profometer® and Carboteg®.





# **Overcome the limitations of stationary** hardness testing



# **Ordering Information**

Contact us for an on-site demo

## **Prepacked Units**

All units include: Equotip Touchscreen incl. Battery, Power Supply, USB Cable, Surface Roughness Comparator Plate, DVD with Software, Documentation, Carrying Strap and Carrying Case

#### Equotip® 550

356 10 001



For flexible probe configuration and for existing owners of Equotip and Equostat 3 probes

#### Equotip® 550 Leeb D

356 10 002



Additionally includes Equotip Leeb Impact Device D, Impact Device Cable, Test Block ~775 HLD / ~56 HRC, Coupling Paste, Cleaning Brush

#### Equotip® 550 Leeb G

356 10 003



Additionally includes Equotip Leeb Impact Device G, Impact Device Cable, Test Block ~570 HLG / ~340 HB, Coupling Paste, Cleaning Brush

# Equotip<sup>®</sup> 550 Portable Rockwell

356 10 004



Additionally includes Equotip Portable Rockwell Probe 50 N, Protective Rubber Sleeve, Probe Cable, Test Block ~62 HRC

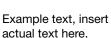
#### Equotip® 550 UČI

Equotip 550 UCI HV5

356 10 005



Additionally includes Equotip UCI Probe HV1-HV5, UCI Probe Cable, UCI Test Block ~850 HV



#### 2-in-1 Kits **Special Offers**

356 10 020: Equotip 550 Portable Rockwell & UCI Kit

356 10 021: Equotip 550 Portable Rockwell & Leeb D Kit

356 10 022: Equotip 550 Leeb D & UCI Kit

## **Impact Devices & Probes**

Equotip Leeb Impact Devices		
356 00 500	Equotip Leeb Impact Device C	
356 00 100	Equotip Leeb Impact Device D	
356 00 110	Equotip Leeb Impact Device DC	
356 00 120	Equotip Leeb Impact Device DL	
356 00 400	Equotip Leeb Impact Device E	
356 00 300	Equotip Leeb Impact Device G	
356 00 200	Equotip Leeb Impact Device S	

#### **Equotip Portable Rockwell Probe**

Equotip Portable Rockwell Probe 50N (for Equotip 550 or PC) 356 00 600

### **Equotip UCI Probe**

356 00 700 Equotip UCI Probe HV1-HV5

### **Accessories**

Equotip Leeb Accessories		
353 03 000	Set of Support Rings	
356 00 080	Equotip Impact Device Cable 1.5 m (5 ft)	
353 00 086	Equotip Impact Device Cable 5 m (15 ft)	

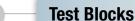
Equotip Portable Rockwell Accessories		
354 01 200	Equotip Portable Rockwell Measuring Clamp	
354 01 130	Equotip Portable Rockwell Tripod	
354 01 250	Equotip Portable Rockwell Special Foot RZ 18 - 70	
354 01 253	Equotip Portable Rockwell Special Foot RZ 70 - ∞	
354 01 243	Equotip Portable Rockwell support Z2 for measuring clamp	
354 01 229	Equotip Portable Rockwell Support Z4+28 for measuring clamp (for tubes and pipes over Ø 28 mm)	
354 01 228	Equotip Portable Rockwell support Z4 for measuring clamp (for tubes and pipes up to Ø 28 mm)	

### **Equotip UCI Accessories**

356 00 720 Equotip UCI Special Foot



# **Ordering Information**



Equotip Lea	eb Test Blocks Calibrated by Proceq
357 11 500	Equotip Test Block C, ~565 HLC / <220 HB
357 12 500	Equotip Test Block C, ~665 HLC / ~325 HB
357 13 500	Equotip Test Block C, ~835 HLC / ~56 HRC
357 11 100	Equotip Test Block D/DC, <500 HLD / <220 HB
357 12 100	Equotip Test Block D/DC, ~600 HLD / ~325 HB
357 13 100	Equotip Test Block D/DC, ~775 HLD / ~56 HRC
357 13 105	Equotip Test Block D/DC, ~775 HLD, one side
357 11 120	Equotip Test Block DL, <710 HLDL / <220 HB
357 12 120	Equotip Test Block DL, ~780 HLDL /~325 HB
357 13 120	Equotip Test Block DL, ~890 HLDL / ~56 HRC
357 13 400	Equotip Test Block E, ~740 HLE / ~56 HRC
357 14 400	Equotip Test Block E, ~810 HLE / ~63 HRC
357 31 300	Equotip Test Block G, <450 HLG / <200 HB
357 32 300	Equotip Test Block G, ~570 HLG / ~340 HB
357 13 200	Equotip Test Block S, ~815 HLS / ~56 HRC
357 14 200	Equotip Test Block S, ~875 HLS / ~63 HRC

Equotip Portable Rockwell Test Blocks		
357 41 100	Equotip Portable Rockwell Test Block ~20 HRC, ISO 6508-3 HRC Calibration	
357 42 100	Equotip Portable Rockwell Test Block ~45 HRC, ISO 6508-3 HRC Calibration	
357 44 100	Equotip Portable Rockwell Test Block ~62 HRC, ISO 6508-3 HRC Calibration	

Equotip UCI Test Blocks		
357 51 100	Equotip UCI Test Block ~300HV, ISO 6507-3 HV5 Calibration	
357 52 100	Equotip UCI Test Block ~550HV, ISO 6507-3 HV5 Calibration	
357 54 100	Equotip UCI Test Block ~850HV, ISO 6507-3 HV5 Calibration	

## **Additional Test Block Calibrations**

Factory Calibrations by Proceq	
357 10 109	Equotip Leeb Test Block Additional Calibration HLD / HLDC
357 10 129	Equotip Leeb Test Block Additional Calibration HLDL
357 10 209	Equotip Leeb Test Block Additional Calibration HLS
357 10 409	Equotip Leeb Test Block Additional Calibration HLE
357 10 509	Equotip Leeb Test Block Additional Calibration HLC
357 30 309	Equotip Leeb Test Block Additional Calibration HLG

By Accredited Institutes		
357 90 909	Equotip Leeb Test Block Additional Calibration HL (DIN 50156-3)	
357 90 919	Equotip Leeb Test Block Additional Calibration HB (ISO 6506-3)	
357 90 929	Equotip Leeb Test Block Additional Calibration HV (ISO 6507-3)	
357 90 939	Equotip Leeb Test Block Additional Calibration HR (ISO 6508-3)	

By Accredited Institutes		
357 90 918	Equotip Portable Rockwell Test Block Additional Calibration HB (ISO 6506-3)	
357 90 928	Equotip Portable Rockwell Test Block Additional Calibration HV (ISO 6507-3)	

By Accredited Institutes		
357 90 940	Equotip UCI Test Block Additional Calibration HB, ISO 6506-3	
357 90 941	Equotip UCI Test Block Additional Calibration HR, ISO 6508-3	
357 90 942	Equotip UCI Test Block Additional Calibration HV1, ISO 6507-3	

## **Service and Support**

Proceq is committed to providing the best support and service available in the industry through the Proceq certified service centers worldwide. This results in a complete support for Equotip by means of our global service and support facilities.

#### **Warranty Information**

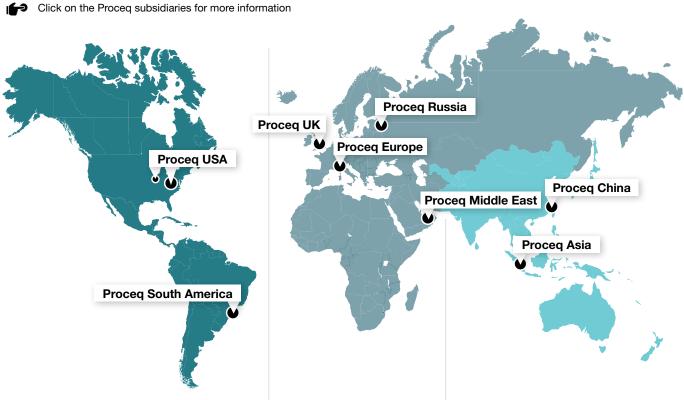
Each instrument is backed by the standard Proceq warranty and extended warranty options.

- » Electronic portion of the instrument: 24 months
- » Mechanical portion of the instrument: 6 months

Subject to change without notice. All information contained in this documentation is presented in good faith and believed to be correct. Proceq SA makes no warranties and excludes all liability as to the completeness and/or accuracy of the information. For the use and application of any product manufactured and/or sold by Proceq SA explicit reference is made to the particular applicable operating instructions.







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**E-Shop Europe** 



E-Shop Asia



Globally organized seminars to help you learn more about our products and applications. Contact your local representative for further information.

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