

# REED

## Model R9030

### Hardness Tester



## Instruction Manual

[www.reedinstruments.com](http://www.reedinstruments.com)

**REED Instruments**

1-877-849-2127 | [info@reedinstruments.com](mailto:info@reedinstruments.com) | [www.reedinstruments.com](http://www.reedinstruments.com)

# Table of Contents

Features.....	3
Applications.....	3
Specifications.....	4
Instrument Description .....	5
Display Description .....	6
Operating Instructions.....	6
<i>Power On/Off.....</i>	<i>6</i>
<i>Navigating Instrument Menu .....</i>	<i>7</i>
Instrument Calibration.....	7
Charging .....	8
Battery Replacement.....	8
Auto Shut Off.....	8
Maintenance.....	9
Appendix A: Hardness Scale Tables .....	10-12
Appendix B: Setup Guide.....	13-15
<i>1.0 Hardness Testing principle.....</i>	<i>13</i>
<i>2.0 Preparation of test surface.....</i>	<i>13</i>
<i>3.0 Adjusting R9030 Settings .....</i>	<i>14</i>
<i>4.0 Instrument Calibration.....</i>	<i>14</i>
<i>5.0 Start-up.....</i>	<i>14</i>
<i>6.0 Loading.....</i>	<i>14</i>
<i>7.0 Taking Measurements.....</i>	<i>15</i>

## Features

- Measures a wide range of materials including; cast steel, alloy steel, stainless steel, aluminum, bronze, copper and cast irons
- Measures 7 types of hardness scales; Rockwell (HRC, HRB, HRA), Brinell (HB), Leeb (HL), Vickers (HV) and Shore (HS)
- Compact pen style design
- Bright OLED display
- Real-time clock and internal memory stores up to 350 measurements
- USB connectivity and software allows for further measurement analysis
- Rechargeable lithium battery
- Low battery indicator

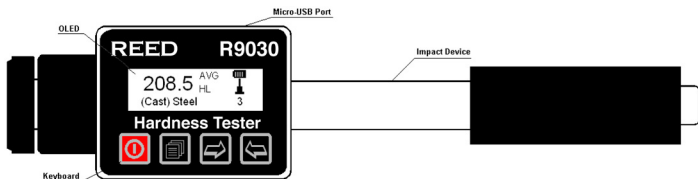
## Applications





- Ideal for hardness testing of large and heavy objects
- In production lines of mass produced components
- Materials identification in stores and warehouses
- In locations with difficult access, or in confined spaces

# Specifications

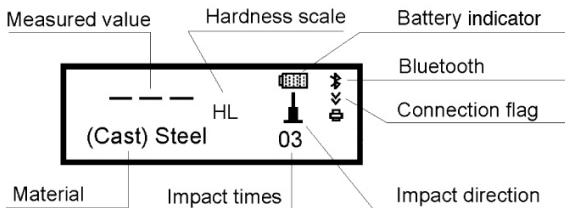
Hardness Scales	Rockwell (HRA, HRB, HRC) Brinell (HB) Leeb (HLD) Vickers (HV) Shore (HS)
Measuring Ranges	HRA: 59 to 85 HRB: 13 to 100 HRC: 20 to 68 HB: 19 to 651 HLD: 170 to 960 HV: 80 to 967 HS: 30 to 100
Measuring Direction	360°
Sampling Time	Less than 1 sec (when triggered)
Display	Dot Matrix OLED
Battery Life	Approx. 40 hours
Low Battery Indicator	Yes
Power Supply	Rechargeable Lithium Ion Battery
Charge Time	Approx. 2 hours
Internal Memory	Yes (up to 350 readings)
PC Connectivity	USB Cable / Bluetooth
Software	Yes (Included)
Software OS Compatibility	Windows XP / Vista / 7 / 8
Product Certifications	CE
Operating Temperature	32 to 104°F (0 to 40°C)
Storage Temperature	-4 to 140°F (-20 to 60°C)
Operating Humidity Range	0 to 90%
Dimensions	5.7 x 1.3 x 1" (146 x 32 x 26 mm)
Weight	5.6oz (160g)

# Instrument Description



-  On / Off / Exit
-  Menu / Confirm
-  Measuring set short cut / Right / Down / Increase
-  Scan / Delete / Left / Up / Decrease

# Display Description



**Battery Indicator:** Displays battery capacity and charge status when plugged in.

**Impact direction:** Set impact direction.

**Hardness scale:** Set hardness scale.

**Measured value:** Current measured value (without average value indicator), or current average value (with average value indicator).

**Material:** Set material.


**Impact times:** The total number of impact times will be displayed. Impact times set through the menu will also be displayed here.

**Bluetooth:** The Bluetooth flag will be displayed when Bluetooth is connected.

**Connection flag:** The connection flag will blink when the instrument is trying to connect to the PC. A solid flag means successful connection.

## Operating Instructions








### Power On/Off

Press the  key to turn power on or off.






**Note:** If the tester has been shut down, it will start up automatically when charging.

## Navigating Instrument Menu





### Browsing measurements

When testing is finished, press the  key to enter data browse mode. Press the  key to scroll through data. If you want to delete displayed data, press the  key. Press the  or  key to confirm selection. Press the  key to delete displayed data, or press the  key to exit.

### Measured value storage



When testing is finished the instrument displays the average value. Press the  key and then press the  or  keys to choose to store the average value measurement. Press the  key to confirm or the  key to exit.




### Short-cut measuring setting

In the standby interface, press the  key to enter the short-cut measuring settings. First the cursor is on the hardness scale and press the  key to change it cyclically. Then press the  key to move cursor cyclically on the measuring conditions and press the  key to exit.

## Instrument Calibration





The tester and impact device must be calibrated with a standard Leeb hardness test block prior to first use, or after not using the instrument for an extended period of time.

Press the  key as well as the  key at the same time to enter instrument calibration mode. The interface impact times is set to 5 by default. The selected impact direction should be vertically down on the Leeb hardness test block.

Average value will be showed after measuring. Press the  or the  key to input nominal value. Press the  key to finish calibration and back to the main unit.

**Note:** calibration range is  $\pm 15\text{HL}$ .


## Charging

Battery symbol will flash  if battery capacity is close to empty. The tester will automatically switch on during charging.  and  will flash alternately while in charge mode.  will flash once fully charged.

## Battery Replacement

The R9030 is equipped with a lithium rechargeable battery. Battery life expectancy with regular use is 3 years. Should you require a new battery please contact REED Instruments 1-877-849-2127 or [info@REEDinstruments.com](mailto:info@REEDinstruments.com).

## Auto Shut Off

- Auto switch off function is supplied to save the energy of battery.
- If neither measurement nor any key operation is performed within 5 minute, the tester will switch off automatically, a flash showing for 10 seconds on the OLED screen prior to switch off. At this time, any key except the  key can be pressed to stop the flash of OLED screen, and cancel the switch off operation.
- In case of too low battery voltage, "Battery Empty!" will be displayed and switch off automatically.



# Maintenance

- After using the impact device 1000 times, it is recommended to use the nylon brush provided to clean the guide tube and the impact body of the impact device. To clean the guide tube, unscrew the support ring and then take out the impact body. Use the nylon brush to clean in a counter-clock direction. Repeat this 5 times and remount the impact body and the support ring.
- Remember to release the impact body after use
- It is strongly recommended to not use any lubricant agent to clean the impact device
- The tester should be stored at room temperature, away from vibration, strong magnetic field, corrosive medium, dampness and dust.

For service on this or any other REED product or information on other REED products, contact REED Instruments at [info@reedinstruments.com](mailto:info@reedinstruments.com)

**REED Instruments**

1-877-849-2127 | [info@reedinstruments.com](mailto:info@reedinstruments.com) | [www.reedinstruments.com](http://www.reedinstruments.com)

# Appendix A: Hardness Scale Tables

The R9030 includes D impact device. Please note that impact devices DL, DC, D+15 and C can be ordered separately. For more information please contact us at 1-877-849-2127 or info@REEDinstruments.com.

Non conventional impact devices		DC(D)/DL	D+15	C
Impacting energy		11mJ	11mJ	2.7mJ
Mass of impact body		5.5g/7.2g	7.8g	3.0g
Test tip Hardness		1600HV	1600HV	1600HV
Diameter of test tip		3mm	3mm	3mm
Material of test tip		Tungsten carbide	Tungsten carbide	Tungsten carbide
Impact device Diameter		20mm	20mm	20mm
Impact device Length		86(147)/75mm	162mm	141mm
Impact device Weight		50g	80g	75g
Max. hardness of workpiece		940HV	940HV	1000HV
Mean roughness of workpiece surface of the Ra		1.6µm	1.6µm	0.4µm
Min. weight of sample: Measure directly Need support firmly Need coupling tightly		>5kg	>5kg	>1.5kg
		2-5kg	2-5kg	0.5-1.5kg
		0.05-2kg	0.05-2kg	0.02-0.5kg
Min. thickness of sample: Coupling tightly Min.layer thickness for surface harden		5mm	5mm	1mm
		≥0.8mm	≥0.8mm	≥0.2mm
Hardness 300HV	Indentation diameter	0.54mm	0.54mm	0.38mm
	Indentation depth	24µm	24µm	12µm
Hardness 600HV	Indentation diameter	0.54mm	0.54mm	0.32mm
	Indentation depth	17µm	17µm	8µm
Hardness 800HV	Indentation diameter	0.35mm	0.35mm	0.35mm
	Indentation depth	10µm	10µm	7µm
Available type of impact device	<b>D: General test</b> <b>DC: Hole or hollow-cylindrical test</b> <b>DL: Slender narrow groove or hole test</b>		D+15: groove or reentrant surface	C: small, light, thin parts or surface of hardened layer

Type of impact device	Hardness value of standard Leeb hardness block	Error of displayed value	Repeatability of displayed value
<b>D (included)</b>	<b>760±30HLD</b>	<b>±6 HLD</b>	<b>6 HLD</b>
	<b>530±40HLD</b>	<b>±10 HLD</b>	<b>10 HLD</b>
DC (optional)	760±30HLDC	±6 HLDC	6 HLD
	530±40HLDC	±10 HLDC	10 HLD
DL (optional)	878±30HLDL	±12 HLDL	12 HLDL
	736±40HLDL		
D+15 (optional)	766±30HLD+15	±12 HLD+15	12 HLD+15
	544±40HLD+15		
C (optional)	822±30HLC	±12 HLC	12 HLC
	590±40HLC		

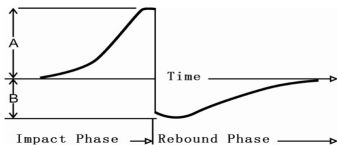
Material	Hardness test method	Impact Device			
		D/DC	D+15	C	DL
Steel and cast steel	HRC	<b>17.9~68.5</b>	19.3~67.9	20.0~68.2	20.6~68.2
	HRB	<b>59.6~99.6</b>			37.0~99.9
	HRA	<b>59.1~85.8</b>			
	HB	<b>127~651</b>	80~638	80~638	81~646
	HV	<b>83~976</b>	80~937	80~996	80~950
	HS	<b>32.2~99.5</b>	33.3~99.3	31.8~102.1	30.6~96.8
Hammered steel	HB	<b>143~650</b>			
Cold work tool steel	HRC	<b>20.4~67.1</b>	19.8~68.2	20.7~68.2	
	HV	<b>80~898</b>	80~935	100~941	
Stainless steel	HRB	<b>46.5~101.7</b>			
	HB	<b>85~655</b>			
	HV	<b>85~802</b>			
Gray cast iron	HB	<b>93~334</b>			
Nodular cast iron	HB	<b>131~387</b>			
Cast aluminum alloys	HB	<b>19~164</b>		23~210	
	HRB	<b>23.8~84.6</b>		22.7~85.0	
Brass (copper-zinc alloys)	HB	<b>40~173</b>			
	HRB	<b>13.5~95.3</b>			
Bronze (copper-aluminum/ copper-tin alloys)	HB	<b>60~290</b>			
Wrought copper alloys	HB	<b>45~315</b>			

# Appendix B: Setup Guide

## 1.0 Hardness Testing principle

The hardness value comes from the rate of rebound velocity and impact velocity at 1mm distance from the testing surface. Using the Leeb hardness scale as an example, the following calculation is used to calculate the hardness value:

$$HL = 1000 \times VB / VA$$



HL - Leeb hardness value  
VB - Rebounding velocity of the impact body  
VA - Impacting velocity of the impact body

## 2.0 Preparation of test surface

Please note that measurement values may be affected if the material under test is exposed to extreme temperatures.

If the tested material is too rough, a measuring error will appear. The surface of the sample must have metallic luster and the surface must be flat and smooth. No oil or dirt should be present.

**Curved surface:** It is better that the testing surface of workpiece is flat. When the curvature radius (R) of the curved surface to be tested is less than 30mm (for D and DL type impact device), a small support ring (included with the R9030) should be used.



Self-magnetism of the workpiece should be less than 30 Gauss.




### 3.0 Adjusting R9030 Settings

Set your hardness scale, material and impact direction on the R9030.

### 4.0 Instrument Calibration


The tester and impact device must be calibrated with a standard Leeb hardness test block prior to first use, or after not using the instrument for an extended period of time.

Press the  key as well as the  key at the same time to enter instrument calibration mode. The interface impact times is set to 5 by default. The impact selected direction should be vertically down on the Leeb hardness test block.

Average value will be showed after measuring. Press the  or the  key to input nominal value. Press the  key to finish calibration and back to the main unit.

**Note:** calibration range is  $\pm 15HL$ .

### 5.0 Start-up

Press the  key to turn on the power, then the tester enters into the measuring status.

### 6.0 Loading

Push down the loading sheath to lock the impact body; then loading has been finished.

If used, press tightly on the support ring of the impact device on the surface of test sample, the direction of impact should be vertical with testing surface.

## 7.0 Taking Measurements

Press down on the release button on the top of the impact device to take a measurement. At this point, the test sample, impact device and the operator are all required to be stable; and the force direction should comply with the axis set on the instrument.

Five measurements should be carried out per measuring position of test sample. The divergence of data should be not exceeds  $\pm 15\text{HL}$  of mean value.

Distance between any two indentations, or the distance between any indentation center and the edge of test sample should be in accordance with the following specifications:

Type of impact device	The distance of two indentations center	The distance between indentation center and edge of test piece
	No less than	No less than
<b>D, DC, DL, D+15</b>	<b>3 mm</b>	<b>5 mm</b>
C	2 mm	4 mm

For any special material, a comparative test must be performed to obtain relevant conversion relation if Leeb hardness value accurately conversing to other type of hardness value is required. Procedures are as following: tests are made on the same test sample via Leeb hardness tester which recalibrated well and relevant hardness meter respectively; for each hardness value, five points which uniformly distributed around hardness indentation should be chosen to make tests, and tests for three (at least) indentations should be made; the mean value of Leeb hardness and the mean value of relevant hardness will be act as relevant values respectively to make a comparative hardness curve. Three groups corresponding data should be included at least in comparative curve.

**Notes** \_\_\_\_\_

## REED Instruments

1-877-849-2127 | [info@reedinstruments.com](mailto:info@reedinstruments.com) | [www.reedinstruments.com](http://www.reedinstruments.com)



This image shows a single page of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page, leaving small margins at the top and bottom. There are no vertical margin lines, and the paper is otherwise completely blank.

[illegible]