Niigata Seiki PROFESSIONAL

Instruction Manual

Model No. LHT-400

Digital Hardness Tester for Metals (Rebound Type)

LEEB HARDNESS TESTER

Thank you for purchasing the Niigata Seiki Leeb-Type Hardness Tester.
This digital instrument measures the hardness of (non-magnetized) metals: steel, cast steel, tool steel, stainless steel, heat resistant steel, standard (gray) cast iron, ductile (nodular cast) iron, cast aluminum alloys, brass, bronze, and copper. Hardness is measured by impacting the surface of the sample with a test probe and measuring the rebound velocity.

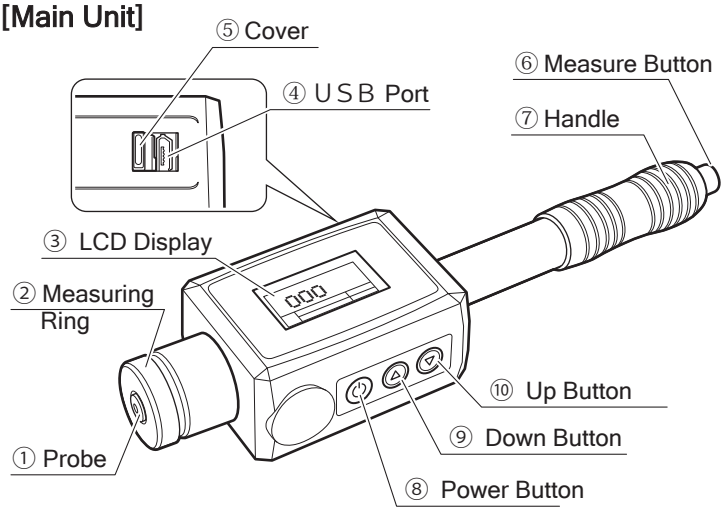
- For safe and proper use of this product, please read this instruction manual before use and follow the procedures described. Please keep manual where it is accessible to user for future reference.
- Keep this manual with the instrument if transferred or leased to a third party.
- For inquiries about this product, please contact dealer or Niigata Seiki at the address listed on the following page.

SAFETY NOTIFICATIONS

In this manual, ⚠ indicates RISK OF PERSONAL INJURY OR PROPERTY DAMAGE if not followed. The ⃠ symbol indicates something which is PROHIBITED, and the ◎ symbol indicates REQUIRED step or necessary condition.

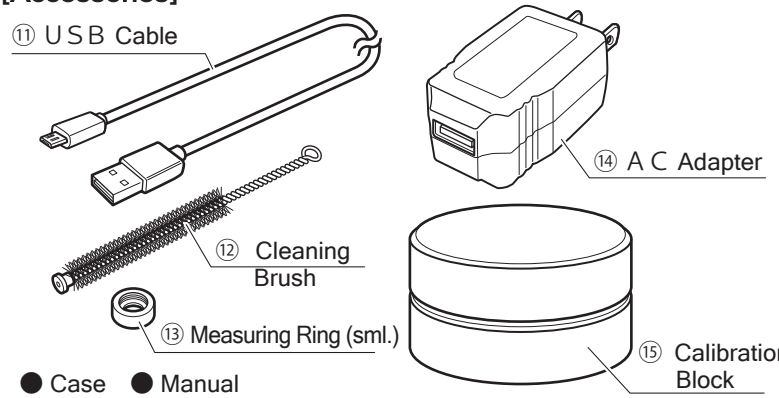
■ PART IDENTIFICATION & FUNCTION

[Main Unit]



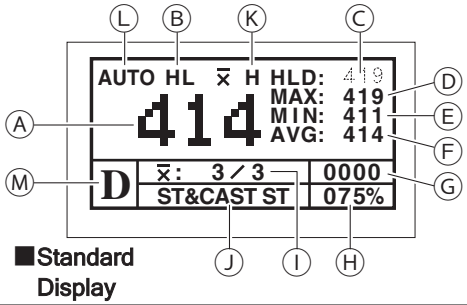
① Probe ····· Impactor which strikes surface during measurement.
② Measuring Ring ····· Pressed to surface during measurement.
③ LCD Display ····· For display of measurements and settings.
④ USB Port ····· Connects to included USB cable for charging and data output.
⑤ Cover ····· Cover for USB Port. Please keep closed when not in use.
⑥ Measure Button ····· Press to release Probe and trigger a measurement.
⑦ Handle ····· Move down to position Probe for measurement.
⑧ Power Button ····· Power ON/OFF, and menu select button.
⑨ Up Button ····· Button to select a setting, and to control display size.
⑩ Down Button ····· Button to select a setting, and to delete last measurement.

[Accessories]

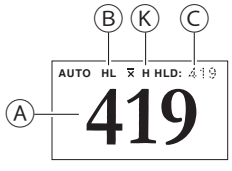


⑪ USB Cable ····· Connects for charging Main Unit and transferring data.
⑫ Cleaning Brush ····· For cleaning inside of Main Unit.
⑬ Measuring Ring (sml.) ··· Replaceable tip for use in tight places.
⑭ AC Adapter ····· Charges Main Unit via the USB Cable.
⑮ Calibration Block ····· Test Block of specified hardness for checking, and calibrating unit before each test.
● Storage Case ····· Storage case for Main Unit and accessories.
● Instruction Manual ····· This user guide.

[Measurement Screen]



■Standard Display



■Large Readout Display

Ⓐ Scaled t / Average
Ⓑ Scale Units
Ⓒ Measurement
Ⓓ Maximum
Ⓔ Minimum
Ⓕ Average
Ⓖ Record Number
Ⓗ Battery Charge Level
Ⓘ No Measurements / Total
Ⓙ Material Setting
Ⓚ High・Low Limit Exceeded (H) (L)
Ⓛ Memory Auto / Off
Ⓜ Probe Type

Press the Up Button ▲ to toggle between Standard and Large readout

SAFETY PRECAUTIONS Please Observe

Always follow the procedures specified below in order to prevent harm to yourself or others, and to prevent damage to property.

■ **Content marked as follows indicates risk of injury or damage if not followed.**

⚠ WARNING Indicates risk of personal injury or property damage if not followed.

■ **These symbols mark content that must be observed.**

Denotes a prohibition - You MUST NOT do

Denotes a requirement - You MUST do

⚠ CAUTION

Read the manual and follow all instructions.
- Use of product other than as described in the manual may cause accident.

Use only for measuring hardness.
- Use for any purpose other than measuring may damage or wear the instrument. Improper use may also cause accident.

Use in an environment which meets the following conditions:
- ● Keep away from direct sunlight
- ● Keep in dry location protected from rain and water.
- ● Protected from use by children and unauthorized people.
- Use in location contrary to the above may cause poor accuracy, damage to the product, or may result in accident or injury.

Handle With Care.
- Do not drop or subject to shock, do not place under heavy objects. Damage may cause failure or poor accuracy.

Not for use on on materials which are easily fractured, or which will be damaged by the dents created during tests.
- This instrument measures hardness by impacting a probe, with a hardness of HLD 1600, against the test surface. Please note: after testing, some small dents will remain on workpiece.

Do not use on magnetized material or in presence of magnetic fields.
- Hardness is measured based on rebound speed of the Impact Probe. If magnetic field is present, the rebound speed may be affected and a precise measurement is not possible.

Do not dry–fire instrument.
- If test is performed without test surface under probe, the instrument may be damaged and affect accuracy.

Do not Modify or disassemble beyond the procedures described in this manual.
- It may damage product or affect accuracy. For service, please contact distributor or place of purchase.

Preparation of Test Surface

The workpiece and measured surface must meet the following conditions.

① Mass: 5 kg or more
- ※For workpiece weighing between 2 and 5 kg, or for thin and easily deformed parts, place on a surface plate or stable surface of more than 5kg.
- ※For workpiece weighing less than 2kg, secure it to a surface plate of more than 5kg using a coupling agent, such as petroleum jelly, with a tight fit to stabilize.

② Surface Roughness: Ra 2 μm or less
- ※If surface is rougher than Ra 2μm, please polish to meet specification.

③ Radius of Curvature: greater than 30mm

④ Surface Temperature: 80°C or less

⑤ For testing surface hardness, a hardened surface thickness: 0.8mm or greater

⑥ Not Magnetized
- ※Be sure to demagnetize if there is any residual magnetism.

⑦ Bare (unpainted) Surface
- ※ If sample is painted, remove any paint or coating before test.

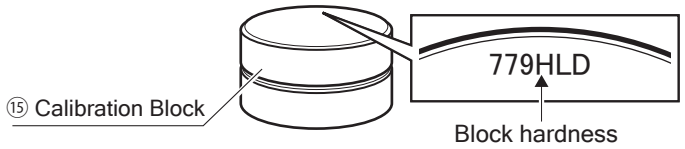
⑧ Not easily fractured, or damaged by the surface indents resulting from the test
- ※This instrument measures hardness by impacting a probe, with a hardness of HLD 1600, against the test surface. Please note: after testing, some small dents will remain on workpiece.

Accuracy Confirmation · Calibration

Instrument accuracy will be affected by shock or Probe wear. Please check accuracy and calibrate before each use using the supplied Calibration Block.

① Confirm the hardness written on Calibration Block

The hardness of the calibration master is marked on the block surface.



② Measure the Calibration Block hardness

Use the "Hardness Test Procedure" on the following page to test the hardness.

● Material = Steel ● Unit = HL ● No. of Measurements = 5

※Make sure the Calibration Block surface is clean before measurements.

※Take the measurements in a spot free of marks from previous measurements.

③ Error Correction

※If the measured hardness from step ② is within ±17HL of the hardness from step ①, then the accuracy is confirmed within the guaranteed range and the instrument is ready to use.

※If the measured hardness from step ② is NOT within ±17HL of the hardness from step ①, then the calibration must be adjusted. Enter the measurement error In the "Setup Menu" → "6. Calibration" as shown in the following page.

Charging

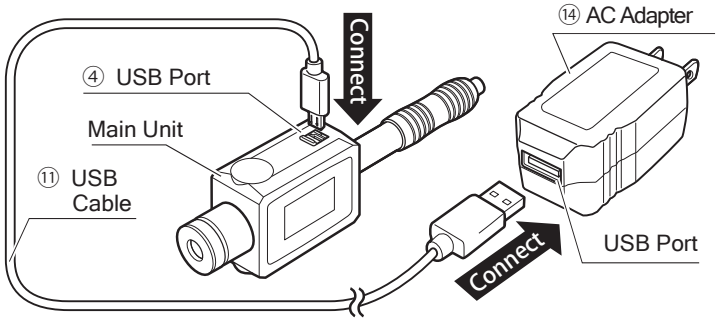
The Main Unit contains a rechargeable battery. When power level drops below 20%, please charge as follows.

① Connect with the provided USB Cable

Connect to the AC Adapter using the included USB cable.

②Plug in the AC adapter

Plug the AC adapter into the power mains (100V AC).



Power ON／OFF

● Power ON ····· Press the Power Button. ⏻ The power will turn on and the Measurement Screen will display on the LCD.

● Power OFF ····· From the Measurement Screen, press and hold the Power Button ⏻ for 3 seconds. Power and LCD will turn off.

Hardness Test Procedure

※Because workpiece hardness my not be uniform, measurements should be taken from multiple locations on the surface of the workpiece for averaging.

Follow the steps below for a basic hardness test.

①Turn the power ON.
Press the Power Button ⏻ to turn on the power.

② Set the material and measurement units.
Specify the workpiece material and desired scale units in the "Setup Menu" → "3. Material & Scale" After entering the settings, select "1. Measurement" to return to the Measurement Screen.

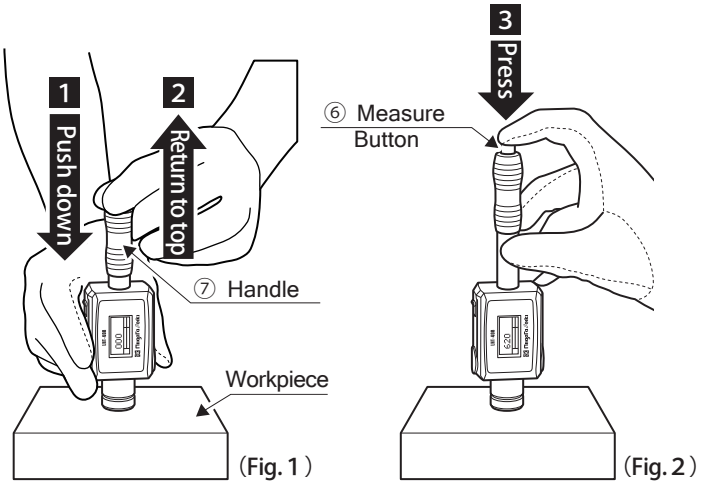
③Press the Measuring Ring against the surface.
Make sure the workpiece and test spot meet the conditions listed in the section "Preparation of Test Surface", and press the Measuring Ring onto the surface.
※ Make sure there are no scratches or marks from previous measurements.

④ Push down on the Handle, and then pull it back up. (Figure 1)
Push down on the Handle to charge the internal probe for the test, then lift the Handle to bring it into position for the test.
※Make sure you hold the Handle secure while bringing it up to the top. If the Handle slips, it may return with a shock and cause damage.

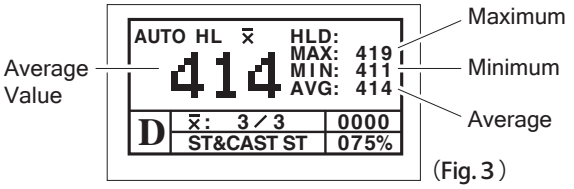
⑤Press the Measure Button. (Figure 2)
With the Measuring Ring held firm to the surface, press the Measure Button. The Probe will release and impact the surface. Hardness will be calculated from the rebound velocity.
※Be careful not to push down on the Handle when pressing the Measure Button, it will cause inaccurate readings.

⑥Repeat the measurement in steps ④~⑤.
Repeat the required number of times specified in the "Setup Menu"→ "2. $\bar{x}$ Average" for calculating an averaged reading.

⑦The measurements are displayed. (Figure 3)
The average value, maximum reading, and minimum reading are displayed on the LCD display.

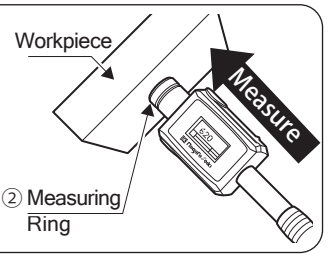


(Fig. 1) (Fig. 2)



(Fig. 3)

【Automatic Angle Compensation】
The instrument automatically senses the measurement angle and applies a correction factor to the reading. Measurement can be made freely over 360° range. Please make sure the Measuring Ring is always pressed firm against the surface when taking a measurement.



Setup Menu

When power is ON, pressing the Power Button ⏻ will display the Setup Menu screen. Within the Setup Menu, the Up and Down buttons ▲▼ are used to select items and to change values, and the power button ⏻ is used to enter the selection.

1. Measurement ····· Return to the Measurement Screen.
2. $\bar{x}$ Average ····· Change the number of measurements averaged for each reading. You can select 2-8 measurements.
3. Material & Scale ··· Specify the workpiece material, and set the measurement units. Back Page: Meas. Range Listing for Each Material, Units
   When specifying the material and units, options are shown, so select as required.
4. Tolerance ····· To set up tolerance function. Press Up Button ▲ to change the value, and Down Button ▼ to move to next digit. "H" or "L" will appear on the display for readings above or below the set limits.
5. Memory ····· Control the storage of measured data.
   1. Memory on/off ····· ON - Measurements saved sequentially up to number specified below.
      OFF - Measurement data is not saved
   2. File Setting ····· Specify the storage destination for the group of measurements.
      Ten groups, A to J, can be stored with 200 Measurement averages each.
   3. Delete Single ····· Delete data from the specified group.
   4. Delete All ····· Clear the Main Unit stored measurement data.
6. Calibration ····· Correct the measurement by entering the error value determined in the accuracy check from the "Calibration" section on the previous page.
7. Auto Shutdown ···· Automatic power shut off can be selected for 1, 2, 5 minutes; or disabled.
8. Contrast ····· Adjust the contrast of the display.
9. Impact Type ····· Set parameters to match the type of probe Back Page: Installing DL-Type Probe (sold separately)
10. Language ····· Select from Japanese / English.
11. Default ····· Restore all settings to factory default.

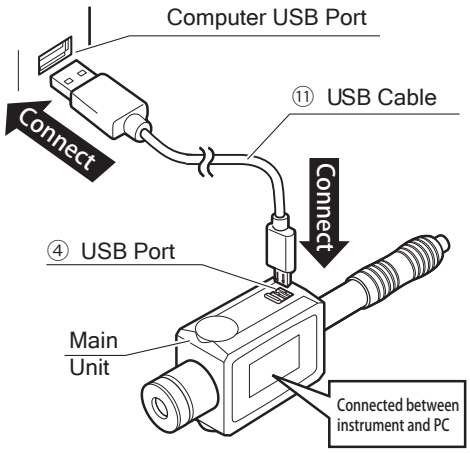
Measurement Data Output

① **Connect the Main Unit to the computer**
Please connect the USB Port of the Main Unit to the computer's USB Port using the USB Cable and turn on the power. The Display will show "Connected between instrument and PC"and the computer will show a CD drive icon.

② **Open the CD drive icon on the computer.**
The data is stored as text (.txt) files labeled A~J, and you can open the desired file to view.
The file contents are listed below

Num	File Number
Impact	Probe type: D/DL
Material	The material type set in the "Material & Scale" setting
Scale	The scale set in the "Material & Scale" setting
AVG-DATA	Average of Measurements
DATA1～8	Measurement data. The number will correspond to the "$\bar{x}$ Average" setting

※ Files can not be deleted or created through the computer, you must delete at the Main Unit.



Changing The Measuring Ring, Cleaning

※ Before cleaning, or replacing the Measuring Ring, make sure the power is turned OFF.

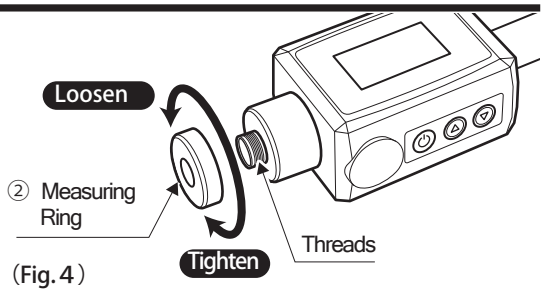
The Measuring Ring can be exchanged with a small one if required to fit in tight locations. Also, the ring can be removed to for periodic cleaning inside of the mechanism.

① **Press the Measure Button.**
Release the probe from charged position.

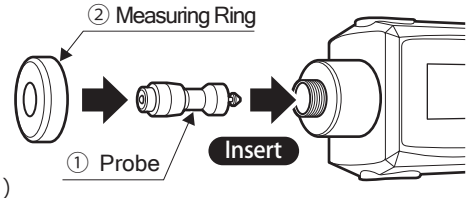
② **Turn the Measuring Ring to remove it from the Main Unit (Figure 4) and take out the Probe.**

③ **Cleaning.**
Using the supplied brush, clean the inside of the main unit as well as the Probe to remove any dust or dirt.

④ **Replace the Probe and reattach the Measuring Ring to the Main Unit.**
Insert the Probe in the direction shown in the drawing. (Figure 5)Screw the Measuring Ring back on to the main body.



(Fig. 4)



(Fig. 5)

Installing DL-Type Probe (sold separately)

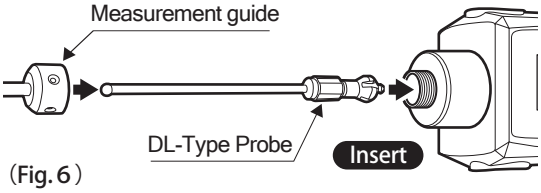
Measurement can be made in narrow spaces, such as the bottom groove of a large gear, by replacing the Probe with the DL-type Probe available for the Hardness Tester.

① **Press the Measure Button.**
Release the Probe from charged position.

② **Turn the Measuring Ring to remove it from the Main Unit (Figure 4) and take out the (D–type) Probe.**

③ **Insert the DL–type Probe as shown in the drawing and attach the measurement guide. (Figure 6)**

④ **Change "Setup Menu → "9. Impact Type" from "D" to "DL".**



(Fig. 6)

Measurement Range Listing by Material, Units / Specifications

Material \ Unit Scale	HL	HRC	HRB	HB	HS	HV	σb
1. ST& CAST ST.	300 ～ 900	20.0 ～ 68.0	38.4 ～ 99.5	80 ～ 647	32.5 ～ 99.5	80 ～ 940	373 ～ 2008
2. CWT STEEL	300 ～ 640	20.4 ～ 67.1	—	—	—	80 ～ 898	—
3. STAINLESS ST.	300 ～ 800	19.6 ～ 62.4	46.5 ～ 100.7	85 ～ 656	—	85 ～ 802	—
4. G CAST IRON	360 ～ 650	—	—	90 ～ 334	—	—	—
5. N CAST IRON	400 ～ 660	—	—	131 ～ 367	—	—	—
6. CAST ALUM	174 ～ 560	—	—	20 ～ 190	—	—	—
7. BRASS	200 ～ 550	—	13.5 ～ 95.3	40 ～ 173	—	—	—
8. BRONZES	300 ～ 700	—	—	60 ～ 290	—	—	—
9. COPPER	200 ～ 690	—	—	45 ～ 315	—	—	—

- Accuracy: within ±17HL
- Operating Temperature: 0~+40°C
- Weight: Main unit··· 97g
- Data Storage Capacity: Max. 2,000 avg. readings
- Auto Power Off: 1, 2, 5 minutes, or disabled
- Charge time: approx. 3 hours

Maintenance and Storage

Remove any dust or grime with a dry cloth.
Any contamination entering inside the Main Unit will prevent smooth operation of the Probe.

Store in a cool, dry, and dark location in the provided case.
Keep out of direct sunlight and moisture, and please keep secure from unauthorized personnel.

Niigata seiki Co., Ltd.
5-3-14, Tsukanome, Sanjo, Niigata, Japan, 955-0055
Tel. : +81-256-33-5522 Fax. : +81-256-33-5518
MAIL intl.sales@niigataseiki.co.jp
URL http://www.niigataseiki.co.jp