

FENIX 200AR

Rockwell Hardness Tester

USER **MANUAL**



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FENIX 200AR

Rockwell Hardness Tester

Thank you for buying this advanced INNOVATEST® hardness testing instrument.

The product meets the applicable DIN, ISO-EN, ASTM and JIS standards.

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Please contact our sales office for up-to-date information.

INNOVATEST Europe BV
Borgharenweg 140
6222 AA Maastricht
The Netherlands
Phone: +31 43 3520060
Fax: +31 43 3631168
info@innovatest-europe.com

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Read the “User Manual” thoroughly before usage, and properly operate the product.
In order to use the product safely, do not ignore visual cautions, warnings or safety symbols.

Please refer to the limited guarantee and responsibility issues in the INNOVATEST® guarantees conditions.

Table of Contents

1.	INTRODUCTION	7	6.	PROBLEM MESSAGES	26
1.1	General instructions	7	7.	MAINTENANCE	27
1.2	Target groups	8	7.1	Cleaning	27
1.3	Liability and disclaimer	8	7.2	Maintenance general	28
1.4	Re-order	8	7.2.1	Periodical inspection	28
1.5	Copyright	8	7.3	Spare parts	29
1.6	Intended use	9	7.4	Functional test	29
1.7	Improper use	9	7.5	Adjustment of the Hardness value display	29
1.8	Layout of the user manual	9	7.6	Adjustment of the Main load applying speed	30
2.	DESCRIPTION AND FUNCTION	10	8.	DECOMMISSIONING OR DISPOSAL	31
2.1	Identification	11	8.1	Decommissioning	31
3.	SAFETY	12	8.2	Disposal	32
3.1	Used symbols	13	9.	TRANSPORT AND STORAGE	33
3.2	Fundamental safety requirements	13	9.1	Transport/movement	33
3.3	Safety provisions	14	9.2	Packaging	34
3.3.1	Safety devices	14	9.3	Storage	34
4.	INSTALLATION	15	10.	TECHNICAL SPECIFICATIONS	35
4.1	Lighting	15	10.1	Technical drawing	37
4.2	Vibration	16	10.2	Standard delivery and (optional) accessories	38
4.3	Wind, sound and humidity	16	10.3	Optional accessories	38
4.4	Workbench	16	11.	DECLARATION OF CONFORMITY	39
4.4.1	Spindle	16			
4.5	Installation	16			
4.5.1	Leveling	17			
4.5.2	Remove transportation safety	17			
4.5.3	Electrical connections	18			
4.5.4	Installation of indenters	19			
4.5.5	Installation of anvils/clamps/fixtures/vices/sample holder	19			
4.5.6	Installation of clamping nose	20			
4.6	Basic settings	20			
5.	OPERATION	21			
5.1	Machine overview	21			
5.1.1	Screen – Hardness Dial	22			
5.1.2	Controls	22			
5.1.3	Clamping nose	22			
5.2	Before first time use of the machine	22			
5.3	Before every usage of the machine	23			
5.4	Performing a hardness test	23			
5.4.1	Additional settings before starting an indent	24			
5.4.2	Additional actions after a measurement	24			
5.5	After each usage	25			
5.6	After last usage in the day	25			

1

INTRODUCTION

This user manual contains essential information for the operator to make (safe) use of the hardness tester. This manual includes a description of the system functions, capabilities, safety provisions and instructions for the further life cycle of the machine.

1.1 GENERAL INSTRUCTIONS

WARNING

Before using, servicing or transporting the machine, read the “Safety chapter” of this manual thoroughly. In case of doubt, the manufacturer should always be consulted.

The user manual contains important warnings to use the **FENIX 200AR**, also referred to as “**machine**” hereinafter, safely, professionally and economically. By following this information, hazards can be avoided, repair costs and downtime can be reduced and the reliability and service life of the machine can be increased.

The user manual must always be accessible and available to the user. Always keep a copy of this manual with the machine! Before you work with the machine or carry out any maintenance or repairs, you must first read the relevant chapter of this manual completely.

Text indicated as following: “**EXAMPLE**”, refers to a button or selector.

1.2 TARGET GROUPS

The **user / owner** is, as legal person, responsible for the intended use of the machine and for the training and deployment of the authorized persons. The user/owner keeps a record of qualifications and competences of these authorized persons.

Professional is a person who, based on their professional training, knowledge and experience, is able to assess the assigned tasks and is able to identify possible hazards. Furthermore, they are aware of the applicable standards and conventions. The competence level of persons and therefore the qualification assessment is done by the user/owner.

Educated / trained person is a person who has been trained in the assigned tasks and the possible hazards concerning improper use. Furthermore, this person is aware of the implemented protective devices and safety measures. The competence level of persons and therefore the qualification assessment is done by the user/owner.

Assembly, disassembly, maintenance and repair may only be carried out by **professionals**. Normal use can be carried out by **educated / trained persons**. The legally permissible minimum age is to be observed.

1.3 LIABILITY AND DISCLAIMER

All indications and instructions for operation, maintenance and repair are given with due regard to our current experience and insight. The original of this user manual was written in the English language and checked by INNOVATEST® in terms of content. This user manual has been compiled with the utmost care. Should you nevertheless detect imperfections and / or errors, we ask you to inform us in writing. Your suggestions are well appreciated and will help us to improve the manual in the future.

1.4 RE-ORDER

This user manual will be supplied as an electronic copy. Also, a hard copy can be ordered, please note that there are costs associated with hard copies of this manual. A hard copy can be re-ordered at the address below:

INNOVATEST Europe BV
Borgharenweg 140
6222 AA Maastricht
The Netherlands
+31 43 3520060
www.innovatest-europe.com

1.5 COPYRIGHT

All rights reserved. No part of this user manual may be reproduced, modified or utilized otherwise without prior written permission.

1.6 INTENDED USE

The intended use of the machine is the hardness testing of products. The machine is to be used in an industrial or laboratory setting. The machine is intended to be used by non-disabled trained full aged people. The machine may only be operated as described in this manual. The manufacturer is not liable for the damage caused by incompetent use (unintentional use). Only use the machine when it is technically in good working order and use it according to the intended use, paying attention to the safety and potential hazards referred to in this manual.

- Manufacturer responsibilities expire when:
- Not or insufficiently complying with the information in this manual.
- Using spare parts or parts not approved by the manufacturer.
- The machine is operated incorrectly.
- Removing, manipulating or not using safety features.
- Changing functions of the machine.
- Unauthorized modifications to the machine are applied.
- Maintenance is not carried out according to instructions.
- The machine is used unintentional.

1.7 IMPROPER USE

Dangers and hazards can occur due to unintentional or improper use of the machine. The limits stated in the documentation may not be exceeded under any circumstances.

1.8 LAYOUT OF THE USER MANUAL

This FENIX 200AR user manual may only be used with INNOVATEST® equipment covered by this user manual. This complete user manual consists of:

- This FENIX 200AR series user manual.
- FENIX 200 series unpack instruction (attached to the packaging).
- Declaration of Conformity.

2

DESCRIPTION AND FUNCTION

Quality long life mechanics, readings from a precision analogue indicator. Load applied from a dead weight force actuator, with solid test load selector design. The newly designed C frame made out of steel (no casting) provides 100% more rigidity compared to traditional casted designs and assures excellent results, even after years of use. The internal system can be easily serviced by removing the side and top covers, no need to turn the machine around.

2. DESCRIPTION AND FUNCTION

2.1 IDENTIFICATION

This manual belongs to the model FENIX 200AR of the FENIX 200 Series.
The type / identification plate with the CE mark is placed on the back of the machine and is shown in the following figure:



3

SAFETY

A first requirement for the safe handling and trouble-free operation of this machine is knowledge of the basic safety instructions.

Throughout this manual, warnings, cautions and notes have been used to direct the attention to:

- Potentially hazardous or dangerous situations.
- Actions that could lead to potentially hazardous or dangerous situations.

Definitions

 **WARNING:**
Situation, operation or action that could potentially harm the professional or educated/trained person (operator) or lead to potentially dangerous situations for the professional or educated/trained person (operator).

 **CAUTION:**
Situation, operation or action that could damage the machine.

NOTE:
Text with higher priority than plain text but not being a warning or caution.

3. SAFETY

3.1 USED SYMBOLS

The following symbols are used on the machine or in this manual:



This symbol indicates a **WARNING** or **CAUTION**.



This symbol indicates hazards that could be dangerous for the environment.



This symbol indicates that for disposal certain regulations must be considered. All electrical and electronic products and batteries must be taken to a separate collection point at the end of their working life. Do not dispose of these products as unsorted municipal waste: take them for recycling. For information on your nearest recycling point, check with your local waste authority.

3.2 FUNDAMENTAL SAFETY REQUIREMENTS

WARNING

The machine complies with the essential health and safety requirements of the EC. Nevertheless, dangerous situations can arise.

1. To ensure safety, all persons who come into contact with the machine must take note of the contents of this user manual. Only then possible risks can be reduced to a minimum.
2. It is not allowed to use the machine for any other purpose provided by the manufacturer. Unintended use can lead to unexpected risks.
3. Local applicable safety regulations and laws must always be followed. The same applies to environmental regulations.
4. If the personnel detect any errors or dangers, the user/owner or his authorized representative must be informed immediately.
5. When several people are working on the machine, good cooperation and precise coordination is necessary.
6. The professional knowledge and sense of responsibility of the employer and the employee largely determine the safe and efficient use of the machine.
7. Safety devices, such as protective covers/safety switches, must never be removed or bridged during normal use of the machine.
8. If disassembly of safety devices during installation, inspection, maintenance or repair is necessary, the reassembly and inspection of the safety devices must be done immediately after the completion of these activities.
9. Work on the technical equipment (e.g. electrical) may only be carried out by the relevant professional personnel.
10. When handling oils, greases and other chemical substances, the safety regulations applicable to that product must be observed! Contact with chemicals should be avoided as much as possible. Before working with these materials, the instructions on the package must be read and followed. This applies to all chemicals, including cleaning agents.
11. When handling electric motors, be aware these can get warm during use. Let the motors cool down before you work on them. If this is not possible, appropriate safety measures should be taken, for example the use of gloves.
12. Untrained persons or persons present during a general training, may only perform work under the permanent supervision of a competent person.
13. All safety and hazard warnings on the machine must always be kept in a legible condition.
14. Hot parts should not come into contact with explosive or highly flammable chemicals.

3. SAFETY

3.3 SAFETY PROVISIONS

WARNING

All safety provisions must be kept in perfect condition.

3.3.1 SAFETY DEVICES

Safety devices may in principle only be removed/deactivated by authorized persons and only if this is absolutely necessary. Immediately after carrying out this work, the safety devices must be mounted/activated again and checked for their functionality. Only the original fixing material of the safety devices may be (re)used for this purpose.

4

INSTALLATION

For the execution of the activities described in this chapter, qualified persons with relevant professional knowledge are required. The machine must always be easily accessible, in a way that operation, maintenance and troubleshooting can be carried out easily and safely.

The required space must be considered, as indicated in the chapter [“10 technical specifications”](#).

For detailed unpacking instructions refer to the dedicated unpacking instruction.
After unpacking, store the original packaging. Avoid shipping or transporting the machine without the complete and original packing materials.

Install the machine according the conditions described in this chapter in order to make full use of its functions and performances and to avoid defects or inaccuracy of any kind.

4.1 LIGHTING

The machine may only be used in an environment where sufficient lighting is available, in accordance with the ergonomic regulations.

4.2 VIBRATION

NOTE:

Vibrations reaching the machine can result in inaccurate measurements in particular during low force Hardness tests.

To avoid unwanted vibrations reaching the machine, the following points must be considered:

- Install the machine in a place free from floor vibrations.
- Install the machine on a solid workbench.
- Do not install the machine in a place where many people come and go.
- Do not install the machine near equipment generating vibrations.
- Install the machine on ground level of a building if possible.
- Do not install the machine in a building near a road with heavy traffic.
- Do not install the machine in a building where a crane, vibration generator or similar equipment is installed.

4.3 WIND, SOUND AND HUMIDITY

To avoid environmental factors such as wind, sound and air humidity affecting the hardness measurement, the following points must be considered:

- Do not install the machine near an air conditioner or similar equipment.
- Do not install the machine in a room with excessive air circulation.
- Do not install the machine near an entrance or an exit.
- Do not install the machine near sound generating equipment.
- The ambient temperature should be between 10 °C and 35 °C.
- The recommended ambient temperature is: 23 ± 2 °C.
- The relative humidity in the room should be $\leq 70\% \pm 10\%$.

4.4 WORKBENCH

Place the machine on a sturdy and stable workbench, cabinet, desk or table which can carry the weight of the machine. For the weight and installation area needed see the [technical specifications](#) of the machine.

CAUTIONS

When carrying or moving the machine, make sure not to hit any objects and the machine does not tilt by 30 degrees or more.

When carrying or moving the machine, make sure you do not touch the test head.

4.4.1 SPINDLE

Machine has a spindle that can go lower than bottom of machine. In order to make use of the full range of vertical capacity, make a hole in the workbench; read [technical drawing](#) to see how far the spindle can move downwards. Keep a clearance of at least 10 mm around the spindle.

4.5 INSTALLATION

Before starting the installation, please check the following:

- The assembly and/or mounting of machine parts.
- The supporting surface has to be distributed evenly along all supporting points, avoiding critical tension.

WARNING

In case of doubt, the manufacturer should always be consulted.

4.5.1 LEVELING

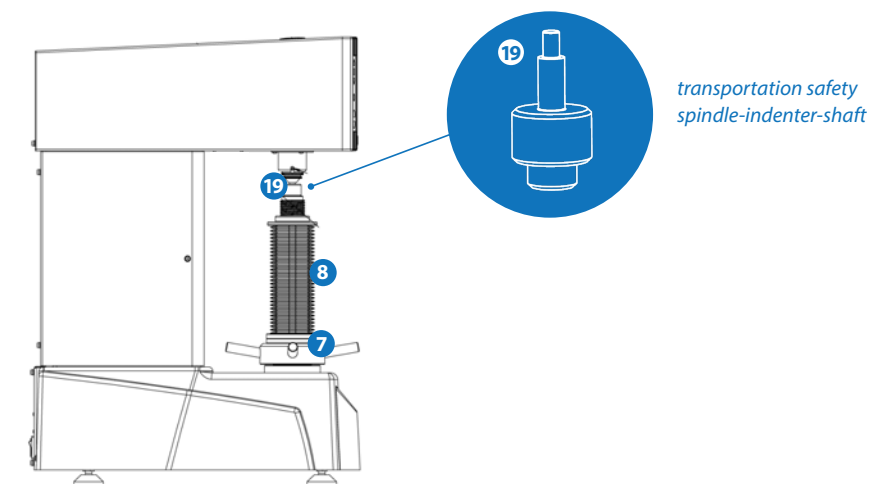
The machine is equipped with a unique load application system which is not sensitive for incorrect leveling. Nevertheless, to eliminate possible wear and tear of the mechanical structure of the machine we advise to verify your machine is correctly leveled. Your machine is standard equipped with 4 adjustable vibration dampers. Install the dampers on the machine, if not installed yet, and use a correct tool to adjust the height of each damper.



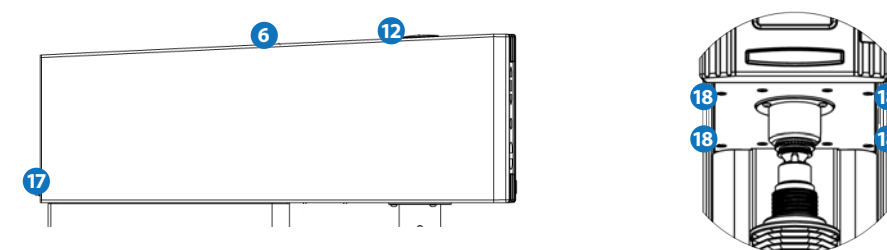
Adjustable vibration damper

4.5.2 REMOVE TRANSPORTATION SAFETY

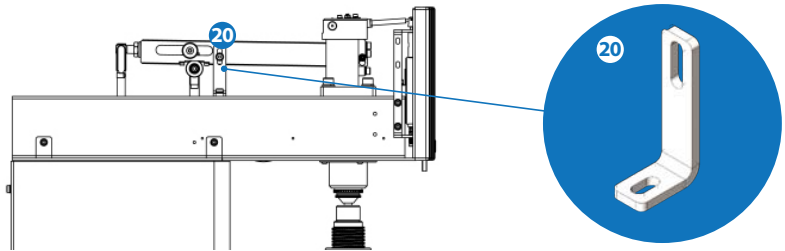
- Remove the “transportation safety spindle-indenter-shaft” (19) by rotating the hand wheel (7) so the spindle goes down.



- Temporal remove the top cover (6) by removing the bolts (rear: 2x 17, near indenter holder: 4x18).



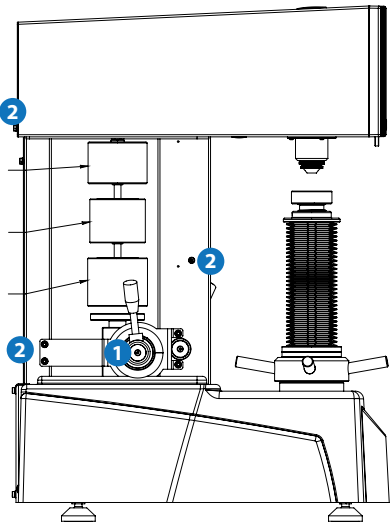
- Remove the "transportation safety loadarm-frame" (20) by removing the bolts.



- Place back the top cover.

NOTE: Please make sure the transportation safety parts are stored with the packaging.

NOTE: Excessive movement of the load lever can severely damage the load application system, ALWAYS insert transportation security while moving the tester to any other position.



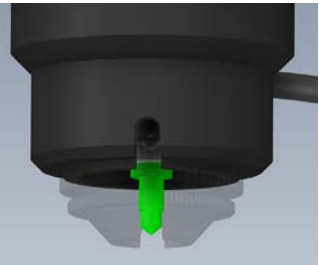
1. Remove the load selector handle (1) on the left side by removing the bolt (mind the parallel key).
2. Remove the 3 bolts to temporal remove side cover.
3. Remove the foam and foil around the 3 weights.
4. Place back the cover and the handle.

4.5.3 ELECTRICAL CONNECTIONS

The FENIX 200AR is fully mechanical, so requires no electricity in any kind of form.

4.5.4 INSTALLATION OF INDENTERS

The machine can be equipped with pre-installed indenters, following customer's needs. Indenters for this machine have specific dimensions and quality approvals. Replacing the indenters by non-genuine indenters (non INNOVATEST®) can lead to severe damage to the machine (which is not covered by guarantee). Always use original INNOVATEST® parts.



6.35mm indenter:
The flat surface must face the screw hole in the indenter holder when being inserted.

Use a soft cloth to wipe any dirt or debris from the indenter holder or shoulder. The flat surface must face the screw hole in the indenter holder when being inserted. Insert the shank into the holder, entirely and securely and fasten the fixating screw finger-tight.

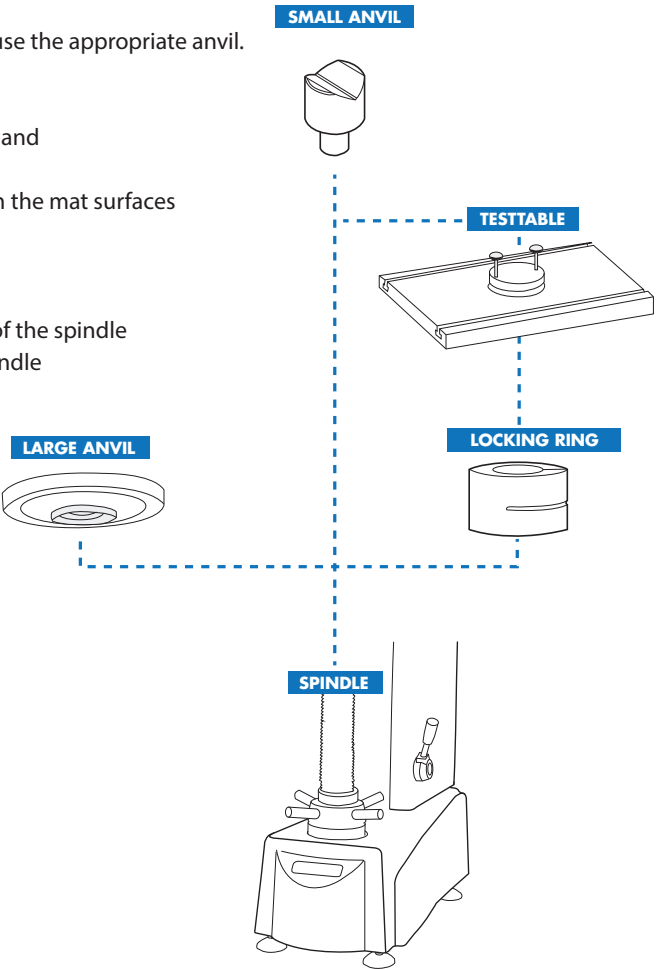
Before testing a specimen, install an anvil and run a test on a test block to securely seat the indenter.

4.5.5 INSTALLATION OF ANVILS/CLAMPS/FIXTURES/VICES/SAMPLE HOLDER

An anvil supports the specimen during a hardness test.
Use a V-type anvil for cylindrical specimens.
Use a flat type anvil for flat specimens. Please make sure to use the appropriate anvil.

- The anvil can be installed as following:
- Be sure that there is enough room between the indenter and the spindle, to install the anvil.
 - Use a soft (fiber-free) cloth to wipe any dirt or debris from the mat surfaces of the anvil and spindle.
 - Carefully place the anvil to the spindle.
 - Most small anvils slide into the hole in the spindle
 - Most large anvils are screwed onto the outside thread of the spindle
 - Most tables are fixed with a locking ring around the spindle

Before testing a specimen, perform a few hardness tests on a test block, to securely seat the anvil.



4. INSTALLATION

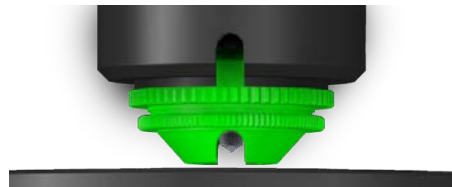
4.5.6 INSTALLATION OF CLAMPING NOSE

Install the clamping nose by screwing in the nosepiece holder:

Individual clamping nose:



Example of installed usage:



4.5.6.1 ADJUST CLAMPING FORCE

Increase the clamping force by lowering the nose:

Release nut that locks Clamping Nose:



*Rotate Clamping Nose to increase extension for higher clamp force:
Rotate Counter nut to lock Clamping Nose:*



4.6 BASIC SETTINGS

It is not allowed to modify settings without the written permission of the manufacturer. Should, after agreement, changes be necessary, they must be done by a qualified professional.

5

OPERATION

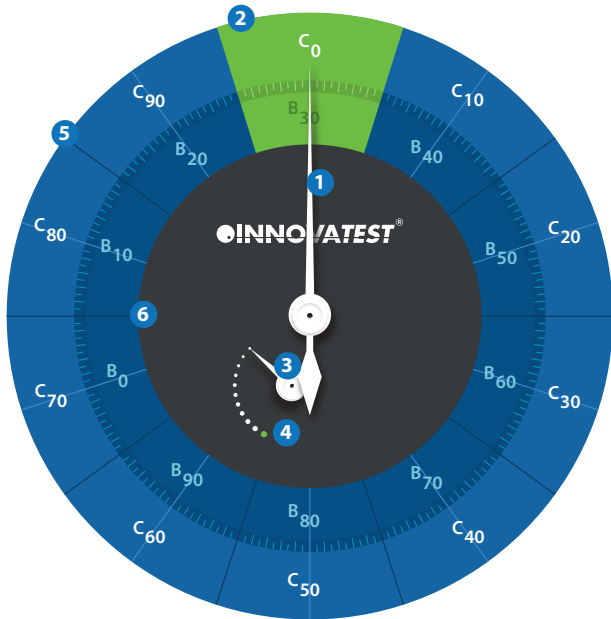
This section describes the basic (hardware and software) controls of the machine and gives some basic instructions on how to get started:

5.1 MACHINE OVERVIEW



1. [Screen](#)
Adjustable hardness dial indicator
2. Zero dial knob
3. Load Selector
4. Load Applicator
5. Test head with:
 - Nosepiece holder
 - [Indenter](#)
 - [Adjustable clamping nose](#)
6. [Test table](#)
7. Spindle protection cover
8. Elevator spindle screw
9. ABS Bottom cover
10. Adjustable vibration dampers

5.1.1 SCREEN – HARDNESS DIAL



Rockwell hardness dial with:

1. "LARGE INDICATOR" as hardness pointer
2. "SET AREA"
3. "SMALL INDICATOR" as preload indicator
4. "GREEN DOT"
5. Scale HRA/HRC
6. Scale HRB

5.1.2 CONTROLS

5.1.2.1 ZERO DIAL SLIDER

After preload is applied, use this slider to rotate dial, so LARGE INDICATOR points exactly to zero on dial.

5.1.2.2 LOAD HANDLES



Load Selector handle:

- "HRA" = 60kgf
- "HRB" = 100kgf
- "HRC" = 150kgf

Load Applicator handle:

- Forward = load not applied
- Backward = load applied

5.1.3 CLAMPING NOSE

The machine is (optional) equipped with a [clamping nose](#) that provides adjustable pressure on the workpiece surface and presses the workpiece firmly to the stage or anvil. The clamping nose also protects the indenter against unwanted damage.

5.2 BEFORE FIRST TIME USE OF THE MACHINE

Remove [transportation safety](#).

5.3 BEFORE EVERY USAGE OF THE MACHINE

1. Nothing touching the indenter
2. Load Applicator handle placed in forward position.
3. LARGE INDICATOR must be in green SET AREA of display, else [adjust hardness value display](#).
4. SMALL INDICATOR must be in highest location, else [adjust hardness value display](#).

5.4 PERFORMING A HARDNESS TEST

Following example will describe, from start to end, a basic single point hardness test, based on default machine settings.

CAUTION:

To prevent injury, keep your hands away from the moving spindle underneath the tester.

Rockwell measurement:

1. Position the sample on the test table.
 - Sample must not touching the indenter, else move Spindle down.
2. Turning the load selector handle to required Rockwell scale.
3. Check that the installed Rockwell indenter (cone or ball) corresponds with the selected scale:
 - HRA, HRC: 120 degrees conical diamond indenter
 - HRB: 1/16" ball indenter
4. Move the elevator spindle upward (rotate spindle screw clockwise), preferable without interruption and at a constant speed:
 - Until the sample touches the indenter.
 - Continue moving upwards while the large indicator makes three complete rotations.
 - At the same time the Small indicator reaches the lowest position at the Green dot.
 - The preload of 10kgf is applied now.

NOTE:

When the large indicator ended up clockwise outside of the green area, do not move the hand wheel to move the large indicator counter clockwise, because the backlash will cause an inaccurate measurement at a slightly different position. Instead, move the spindle down so the indenter does not touch the test specimen anymore and restart the whole process.

5. Rotate the hardness dial by its ZERO DIAL SLIDER, so the large INDICATOR point at "C0 B30", exact in the middle of the green area.
6. Push the load applicator handle slowly backwards:
 - The indentation starts automatically.
 - The "LARGE INDICATOR" starts moving again.
 - The main load is applied within 1 to 8 seconds, else adjust the [load applying speed](#).
7. After 5 seconds (the main dwell time), pull the load applicator handle forward to remove the main load within 2 to 3 seconds
 - After the main load is removed, the initial force (preload) is still present

NOTE: *Do not move the spindle yet.*

8. The "LARGE INDICATOR" now points to the measured Rockwell hardness value of the sample:
 - For scales HRA and HRC, read the outer circle of the dial
 - For scale HRB, read the inner circle of the dial
9. Remove the sample:
 - Rotate the hand wheel counterclockwise to lower the test table.

5.4.1 ADDITIONAL SETTINGS BEFORE STARTING AN INDENT

- When different scale than HRA, HRB or HRC is required, use table Rockwell scale - indenter - force:
 - Find row with needed scale.
 - Lookup the required indenter.
 - Install this indenter.**
 - Lookup the required force.
 - Position the load selector handle.
- Adjust force in (optional) **clamping nose**.

Table: Rockwell scale - indenter - force:

Scale	Indenter	Force	Load selector	Dial
HRA	Diamond Conical	60	HRA	Outer
HRD	Diamond Conical	100	HRB	Outer
HRC	Diamond Conical	150	HRC	Outer
HRF	Ball 1/16"	60	HRA	Inner
HRB	Ball 1/16"	100	HRB	Inner
HRG	Ball 1/16"	150	HRC	Inner
HRH	Ball 1/8"	60	HRA	Inner
HRE	Ball 1/8"	60	HRB	Inner
HRK	Ball 1/8"	150	HRC	Inner
HRL	Ball 1/4"	60	HRA	Inner
HRM	Ball 1/4"	100	HRB	Inner
HRP	Ball 1/4"	150	HRC	Inner
HRR	Ball 1/2"	60	HRA	Inner
HRS	Ball 1/2"	100	HRB	Inner
HRV	Ball 1/2"	150	HRC	Inner

5.4.2 ADDITIONAL ACTIONS AFTER A MEASUREMENT

- For measuring the hardness on convex cylindrical parts we need to apply a shape correction value on the indicated hardness:
 - Lookup offset in Table ASTM E18-20 table A6.1 or A6.2.

ASTM E18-20 Table A6.1:

Offsets for HRA/HRC and D Rockwell hardness test when diameter of the specimen is less than 38 mm:

Hardness Value (HRA) (HRC) (HRD)	Diameter of Cylindrical Specimen (mm)								
	6	10	13	16	19	22	25	32	38
	Offsets (HR) to Rockwell Scale C & A								
20				2.5	2.0	1.5	1.5	1.0	1.0
25			3.0	2.5	2.0	1.5	1.0	1.0	1.0
30			2.5	2.0	1.5	1.5	1.5	1.0	1.0
35		3.0	2.5	2.0	1.5	1.0	1.0	1.0	1.0
40		2.5	2.0	1.5	1.0	1.0	1.0	0.5	0.5
45	3.0	2.0	1.5	1.0	1.0	1.0	0.5	0.5	0.5
50	2.5	2.0	1.5	1.0	1.0	0.5	0.5	0.5	0.5
55	2.0	1.5	1.0	1.0	0.5	0.5	0.5	0.5	0
60	1.5	1.0	1.0	0.5	0.5	0.5	0.5	0	0
65	1.5	1.0	1.0	0.5	0.5	0.5	0.5	0	0
70	1.0	1.0	0.5	0.5	0.5	0.5	0.5	0	0
75	1.0	0.5	0.5	0.5	0.5	0.5	0	0	0
80	0.5	0.5	0.5	0.5	0.5	0	0	0	0
85	0.5	0.5	0.5	0	0	0	0	0	0
90	0.5	0	0	0	0	0	0	0	0

ASTM E18-20 Table A6.2:

Offsets for HRB, F and G Rockwell hardness test when diameter of the specimen is less than 25 mm:

Hardness Value (HRB) (HRF) (HRG)	Diameter of Cylindrical Specimen (mm)						
	6	10	13	16	19	22	25
	Offsets (HR) to Rockwell Scale B						
20				4.5	4.0	3.5	3.0
30			5.0	4.5	3.5	3.0	2.5
40			4.5	4.0	3.0	2.5	2.5
50			4.0	3.5	3.0	2.5	2.0
60		5.0	3.5	3.0	2.5	2.0	2.0
70		4.0	3.0	2.5	2.0	2.0	1.5
80	5.0	3.5	2.5	2.0	1.5	1.5	1.5
90	4.0	3.0	2.0	1.5	1.5	1.5	1.0
100	3.5	2.5	1.5	1.5	1.0	1.0	0.5

5.5 AFTER EACH USAGE

Park load applicator handle in the backward position.

5.6 AFTER LAST USAGE IN THE DAY

Protect the machine with a dust cover.

6

PROBLEM MESSAGES

Following troubleshooting list shows the most common errors which may occur, their possible causes, and countermeasures to be taken against such errors. If proposed solution does not solve the problem, contact your service representative.

Problem	Possible cause	Possible solution
Irregular indentation shape.	• Indenter tip is dirty. • Indenter tip is chipped off. • Specimen surface is coarse (or dirty). • Specimen is curved (spherical or columnar). • Hardness tester is faulty (such as indenter shaft is broken).	• Check mains cable otherwise contact service representative. • Contact service representative. • Contact service representative. • Adjust the indentation position.
No indentation is made.	• Indenter tip is chipped off. • Hardness tester is faulty. • Indenter shaft curve. • Abnormal position of Indentation.	• Contact service representative. • Replace indenter. • Contact service representative • Contact service representative • Adjust the indentation position.
Abnormal hardness value.	• Indenter tip is dirty. • Installed in bad conditions.	• Wipe indenter. • Improve installation conditions.

7

MAINTENANCE

This chapter describes the procedures for maintenance. Regular maintenance and inspection of the machine is of great importance. This reduces potential downtime and increases operational safety.

WARNING

Assembly, disassembly, maintenance and repair may only be carried out by a professional.



Consider safe and environmentally friendly disposal of operating and auxiliary materials as well as replacement parts. Harmful substances must be disposed in such a way that there is no danger to people and the environment. Leakage of hazardous substances also leads to an environmental hazard. The locally applicable regulations must be observed.

7.1 CLEANING

WARNINGS

When using cleaning agents, the instructions on the packaging must be observed.

Avoid contact with chemicals as much as possible. For example, if your hands come into direct contact with chemicals, clean them immediately.

Avoid using compressed air to clean the machine. Although dirt particles are blown away with compressed air, there is a risk that these dirt particles enter vital parts (e.g. bearings). This can result in increased wear, tear and malfunction.

The machine must be kept clean during operation.

- Keep the surfaces of the machine clean.
- Make sure the surrounding is clean, meaning free of packaging materials, chemicals, tools, brooms, vacuum cleaners etc.

The following is to be observed:

- Avoid aggressive and/or abrasive cleaning agents.
- Do not use wire brushes or other hard tools.
- Always use fiber-free cloths for cleaning the machine.
- Use a soft brush in combination with a vacuum cleaner to remove dust.

Procedure:

1. Before cleaning the machine with cleaning agents, cover all openings in which no cleaning agent may enter (for safety and/or functional reasons). Do not use water or a steam cleaner/high-pressure cleaner for cleaning.
2. After cleaning, the protective covers, previously applied to openings, must be removed.
3. After cleaning, check the machine for any damage or defects. Fix any defects immediately.

 WARNING

Any defects observed must be repaired before using the machine.

7.2 MAINTENANCE GENERAL

 WARNINGS

If it is necessary to dismantle safety devices during installation, maintenance or repair, the reassembly and inspection of the safety devices must be done immediately after the completion of these activities.

The machine must be disconnected from the mains during all maintenance, repairs and inspections.

When handling oil, grease and other chemical substances, the safety regulations applicable to that product must be observed!

Loosened connections during the maintenance or repairs must always be tightened.

Instructions for handling the machine:

1. Disassembly of springs or parts subject to mechanical stress must be carried out with caution, the mechanical energy stored in these parts can cause injury.

7.2.1 PERIODICAL INSPECTION

Part	To be checked	Action & tool	Precaution
Indenter	Indenter tip dirty	Wipe indenter Soft fiber-free cloth (e.g. micro-fiber, cotton)	Do not bend the indenter shaft
Anvil ^{A)}	Rust	Remove rust Rust solvent and a Soft cloth (e.g. microfiber, cotton)	Do not bring stage into contact with turret, etc.
Test block	Rust	Replace test block	Do not use a rusted or expired test block

A) Depending on the configuration of the machine

B) Only use special lens products and take notion of the instructions on the packaging of the lens cleaning product.

7.2.2 FORCE CALIBRATION

If the application forces of your machine need to be recalibrated, please seek advice from you supplier or contact the service department of INNOVATEST® directly, hence for the calibration of the application force specific equipment is required.

7.3 SPARE PARTS

 CAUTION

Only use spare parts or parts approved by the manufacturer.

Spare parts must meet the technical requirements specified by the supplier. This is always guaranteed with original spare parts. The installation and/or use of spare parts not supplied by the supplier can potentially affect certain machine properties and active and/or passive safety provisions, negatively. For ordering spare parts you can contact your supplier. After replacing parts, always perform a functional test.

7.4 FUNCTIONAL TEST

To verify the machine is in good working order, perform a functional test when in doubt and after, maintenance, repairs or replacing any parts. A functional test is performed on a valid and certified test block and by following the instructions of chapter “5.4 Performing a basic hardness test”. The measured hardness value should match the hardness value of the test block.

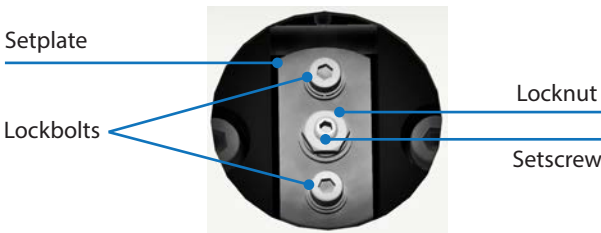
7.5 ADJUSTMENT OF THE HARDNESS VALUE DISPLAY

The tester is calibrated at the factory. If improper handling during transportation affected the accuracy of the tester, the operator can correct this by doing adequate adjustments. However, prior to doing that, the user shall thoroughly understand the structure and working principle of the tester.

The procedure is as following:

1. Temporal remove the plug in the top cover, so the adjustment screws are accessible.
2. Loosen the two outer M4 lockbolts:
 - a. If the measured value was lower than the actual hardness of the test specimen (standard block), gently and slightly move the set plate towards the dial, so towards the front of the tester.
 - b. If the measured value was higher than the actual hardness of the test specimen, then move the set plate towards the back of the tester.
3. Then tighten the two outer M4 lockbolts again to lock the set plate.
4. By moving the set plate, the “**LARGE INDICATOR**” now has moved away from the vertical position, either clockwise or counter clockwise:
 - a. Loosen the M4 locknut of the setscrew situated in the middle of the two outer bolts.
 - b. Adjust the setscrew until the “**LARGE INDICATOR**” is pointing straight up (vertical) again.
 - c. To lock the set screw tighten the locknut carefully without moving the set screw.
5. Repeat the whole process until the measured hardness value is within the **specified tolerance**.
6. Place back the plug in the top cover.

View on set plate through hole on top:

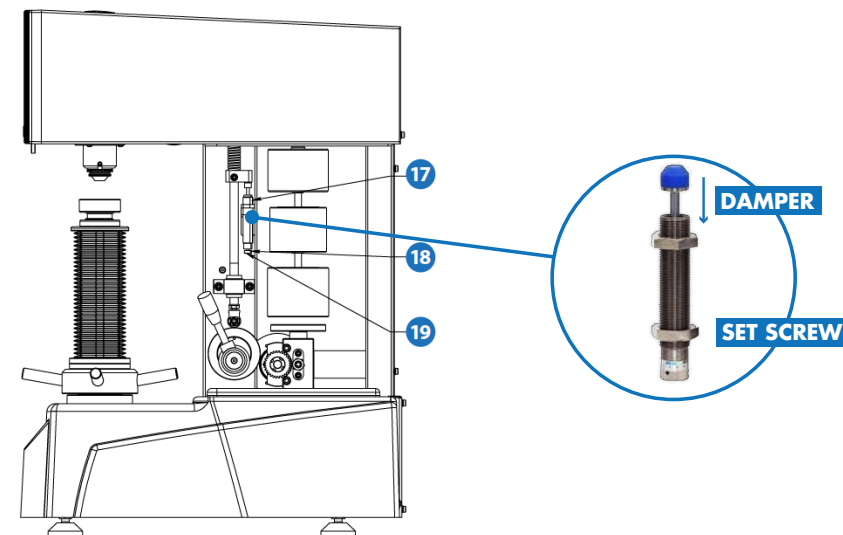


7.6 ADJUSTMENT OF THE MAIN LOAD APPLYING SPEED

The main load applying speed is set at the factory when the tester is calibrated; between 1 to 8 seconds. The speed is about the same for every test force.

To adjust the apply load speed, follow the procedure below:

1. Remove the load applicator handle by removing the bolt. Mind the parallel key.
2. Remove the right side cover by removing three bolts
3. Remount the load applicator handle
4. Loosen the small set screw in the damper (depending on damper type).
5. Install a conical diamond indenter
6. Place a HRC test block of lower hardness on the test table
7. Rotate the hand wheel clockwise to move the spindle upwards, so the test block pushes up against the indenter. Keep turning the hand wheel until the **"SMALL INDICATOR"** on the dial is on the green dot. Doing so, the **"LARGE INDICATOR"** will have fully rotated 3 times and is positioned within the green area.
8. Push back the load applicator handle to apply the load and watch the rotation speed of the **"LARGE INDICATOR"**. The time between starting the apply load and when the LARGE INDICATOR stops moving shall be between 1 to 8 seconds.
9. If the apply load speed is too high, adjust the damper by adjusting the damper knob [18] clockwise. If the apply load speed is too low, adjust the damper by adjusting the damper knob counterclockwise.
10. Repeat the procedure until the apply load speed is within the specified time range.
11. If the damper is set right, secure the set screw on the damper (depending on damper type).



8

DECOMMISSIONING OR DISPOSAL

8.1 DECOMMISSIONING

NOTE:
The machine has different hazardous parts that must be handled with care. Therefore, please note the following comments.

- Consider:**
- Government regulations, inspections of certain authorities.
 - Conditions and/or status for exterior or interior configurations, depending on condition.
 - Instructions for temporary decommissioning:
 1. Planning.
 2. Sequence.
 3. Special procedures.
 - Work to be performed during decommissioning.
 - Special measures for continuity.
 - Special measures for safety and the environment.

- The following must be observed:**
1. All electrical parts must first be completely de-energized and discharged before disassembly.
 2. Disassembly of springs or parts subject to mechanical stress must be carried out with caution, the mechanical energy stored in these parts can cause injury.
 3. Batteries that may have been used in the machine must be disposed of separately according to local regulations.
 4. In addition, instructions mentioned in the other manuals, which are part of this user manual, are to be observed, see chapter **"1.8 layout of the user manual"**.

8. DECOMMISSIONING OR DISPOSAL

The following actions should be carried out:

- Disconnect from all supply connections.
- Releasing all attachments from the floor, wall or ceiling.
- Fixation of individual parts.

8.2 DISPOSAL

For disposal certain regulations must be considered. All electrical and electronic products and batteries must be taken to a separate collection point at the end of their working life. Do not dispose of these products as unsorted municipal waste: take them for recycling. For information on your nearest recycling point, check with your local waste authority.

The following actions should be carried out:

- Remove and destroy the reference label with the CE marking, at the backside of the unit.
- Complete removal/disposal of machine parts.

9

TRANSPORT AND STORAGE

This section gives some guidelines in the event the machine needs to be transported or stored.

9.1 TRANSPORT/MOVEMENT

Transport or movement of the machine must be performed by authorized, trained and experienced personnel, capable of transporting or moving the machine (e.g. a specialized industrial moving company).

⚠ WARNINGS

Use only undamaged transportation equipment and tools that are suitable for the load.

Cabling should be stored and fixated to prevent hazards and damage during transport.

Care and cleanliness are required.

⚠ CAUTIONS

When carrying or moving the machine, make sure not to hit any objects and the machine does not tilt by 30 degrees or more.

When carrying or moving the machine, make sure you do not touch the test head.

NOTE:

Excessive movement of the load lever can severely damage the load application system, ALWAYS insert transportation security while moving the tester to any other position.

The below indicates important lifting information, relevant for transport or moving the machine:

- Dedicated unpacking instruction.
- Center point of gravity; see chapter [“10.1 Technical drawing”](#).
- Machine weight; see chapter [“10 Technical specifications”](#).

9.2 PACKAGING

After unpacking, store the original packaging. Avoid shipping or transportation of the machine without the complete and original packing materials.

When the machine is equipped with a motorized XY-stage, be sure the transportation safety strip is placed correctly to the machine, otherwise the load application system could be damaged (see the dedicated unpack instruction).

To avoid possible damage, the packaging of the different parts must be carried out professionally. The measures taken in this context must fulfill the following objectives, depending on the situation (outdoors or indoors):

- Protection against rain during transport.
- Protection against damage caused by doors, walls and other objects.
- Protection against high (air)humidity (risk of corrosion due to condensation!).

9.3 STORAGE

When storing the machine, the following points must be considered:

- Protect the corrosion-sensitive parts (bare metal).
- Store the machine only in dry rooms.
- Store the machine in a way that any damage is avoided.
- Store the machine including all parts, avoiding important parts are missing when putting it back into operation.

10

TECHNICAL SPECIFICATIONS

Hardness scales			
Rockwell (ISO 6508) (ASTM E18)	Regular Rockwell scales; Pre Load: 10kgf Main Load: 60kgf 100kgf 150kgf		A, B, C, D, E, F, G, H, K, L, M, P, R, S, V
Standards	ISO 6508 (Rockwell)	ASTM E18 (Rockwell)	

Test forces	
Force application	Manual, Dead weight, with adjustable hydraulic force speed damper
Test forces	10kgf – 150kgf
Test force tolerance	< 1%
Dwell time settings	User defined, like between 1-99s

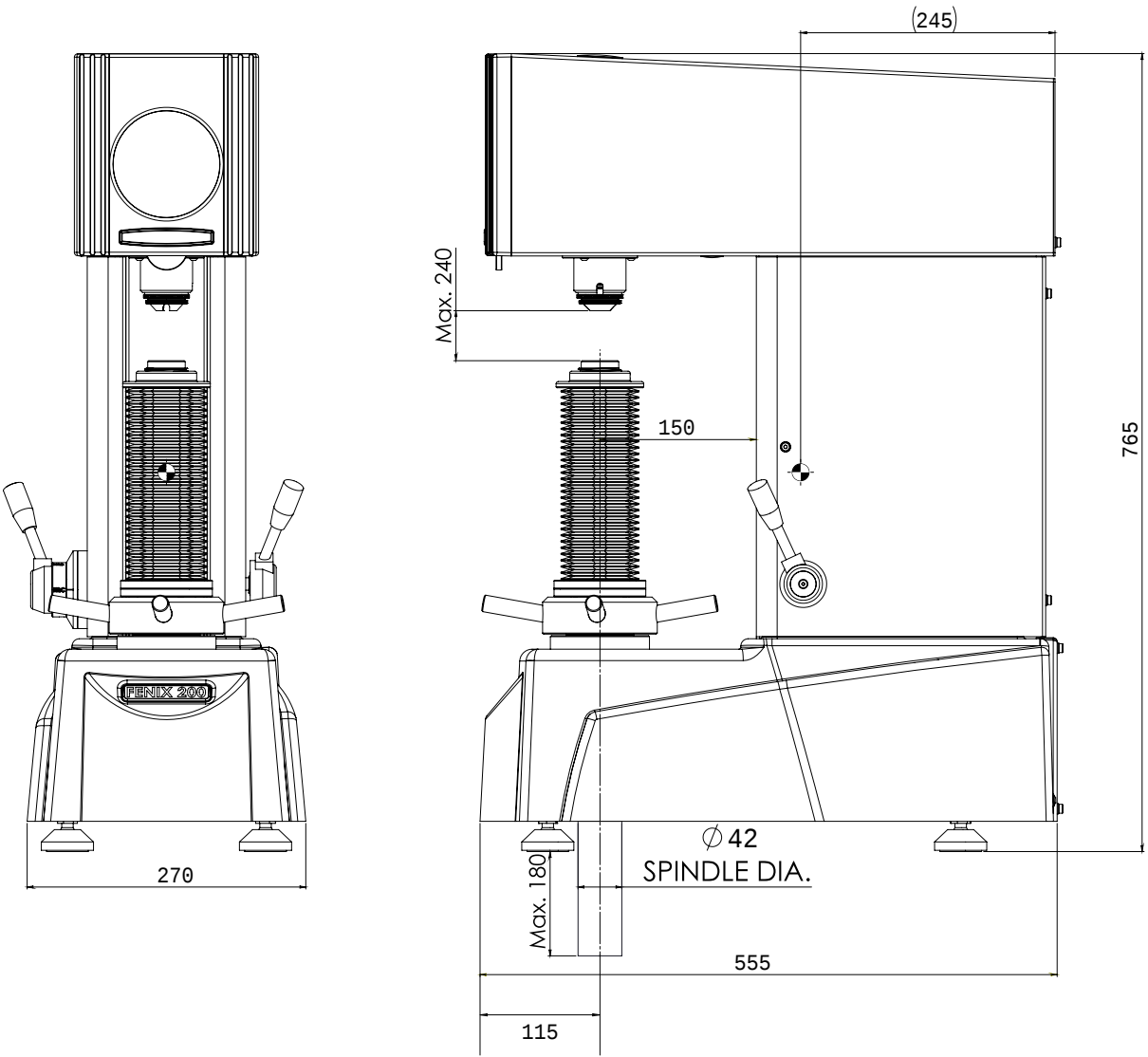
Head	
Type	Single indenter position
Clamp	Adjustable/Removable
Indenters	Certified indenters (ISO/ASTM) available at choice

System	
Screen(s)	Adjustable dial indicator with 0.5 HR Rockwell units
Display resolution	0.5 HR

General	
Dimensions	D 555 x W 270 x H 765 mm
Weight	122kg
Operating temperature	10 – 35 °C
Humidity	10 – 90 %, non-condensing
Noise emission	< 70 dB(A)
Workpiece accomodation	H 150 x V 240 mm

10.1 TECHNICAL DRAWING

All dimensions in these drawings are in mm, approximate. Working heights and or workpiece accommodation varies depending on the stages and/or (stage) accessories used.



10. TECHNICAL SPECIFICATIONS

10.2 STANDARD DELIVERY AND (OPTIONAL) ACCESSORIES

- Four adjustable vibration dampers
- User manual

10.3 OPTIONAL ACCESSORIES

- INNOVATEST calibration certificate
- Certified indenters
- Certified hardness reference blocks
- Anvils
- Testing tables
- Machine cover
- Cabinet test table with drawer
- etc.

For detailed information about available accessories, please contact the sales office of INNOVATEST Europe BV for up-to-date information.

EC DECLARATION OF CONFORMITY

MANUFACTURER

INNOVATEST Europe BV
Borgharenweg 140
6222 AA Maastricht
The Netherlands

Declares fully under own responsibility that the Hardness Tester:

Make: INNOVATEST
Product name: FENIX 200 series
Model: FENIX 200AR, 200ACL, 200DCL
Serial number: 200xx(x)(r)mmyysssss
(200xx(x)=model, (r)=hardware revision, mmyy=manufacturing month year, sssss=IDnr.)

To which this declaration refers,
is in accordance with the provisions of the Directive(s):
2006/42/EC **Machinery directive**
2014/30/EU **Electromagnetic Compatibility**

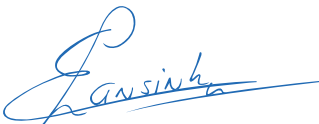
And is in compliance with the following standard(s) or other
standard documentation:

EN ISO 12100:2010	EN 61000-4-2:2009
EN ISO 13850:2015	EN 61000-4-3:2006
EN 60204-1:2006/AC:2010	EN 61000-4-4:2012
EN 55011-1:2009/A1:2010	EN 61000-4-5:2014
EN 61326-1:2013	EN 61000-4-6:2014
EN 61000-3-2:2014	EN 61000-4-8:2010
EN 61000-3-3:2013	EN 61000-4-11:2014/A1:2017

Authorized person to compile the technical file:
Edwin Lansink
Borgharenweg 140
6222 AA Maastricht
The Netherlands

Place and Date
Maastricht, 1-08 -2018

Edwin Lansink
R&D Manager/CTO



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[illegible]This image shows a full page of white paper with horizontal dotted lines, typical of primary school writing paper. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

Distributor :

CORPORATE HEAD OFFICE

INNOVATEST Europe BV

Manufacturing, Distribution & Service

Borgharenweg 140

6222 AA MAASTRICHT

The Netherlands

Phone: +31 43 3520060

Fax: +31 43 3631168

info@innovatest-europe.com

www.innovatest-europe.com

INNOVATEST Deutschland GmbH Sales & Service

Phone: +49 245 670 59 500

info@innovatest-deutschland.com

www.innovatest-deutschland.com

INNOVATEST Shanghai Co., Ltd. Sales & Service

Phone: +86 21 60906200

info@innovatest-shanghai.com

www.innovatest-shanghai.com

INNOVATEST USA Company Sales & Service

Phone: +1 267 317 4300

info@innovatest-usa.com

www.innovatest-usa.com

INNOVATEST Polska sp. z o.o Sales & Service

Phone: +48 697 099 826

info@innovatest-polska.pl

www.innovatest-polska.pl

INNOVATEST Japan Co., Ltd. Sales & Service

Phone: +81 3 3527 3092

info@innovatest-japan.com

www.innovatest-japan.com

INNOVATEST South East Asia Sales & Service

Phone: +65 6451 1123

info@innovatest-singapore.com

www.innovatest-singapore.com