HAWK 250/400

Rockwell Hardness Testers

USER **MANUAL**

INNOVATEST®
Advanced Hardness Testing Solutions

USER **MANUAL**

HAWK **250/400**

Rockwell Hardness Testers

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

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

Products and/or product specifications can change due to new technologies and continuous development.

We reserve the right to change or modify specifications of products without prior notice.

INNOVATEST Europe BV assumes no responsibility or liability for any errors or omissions in the content of this instructions.

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

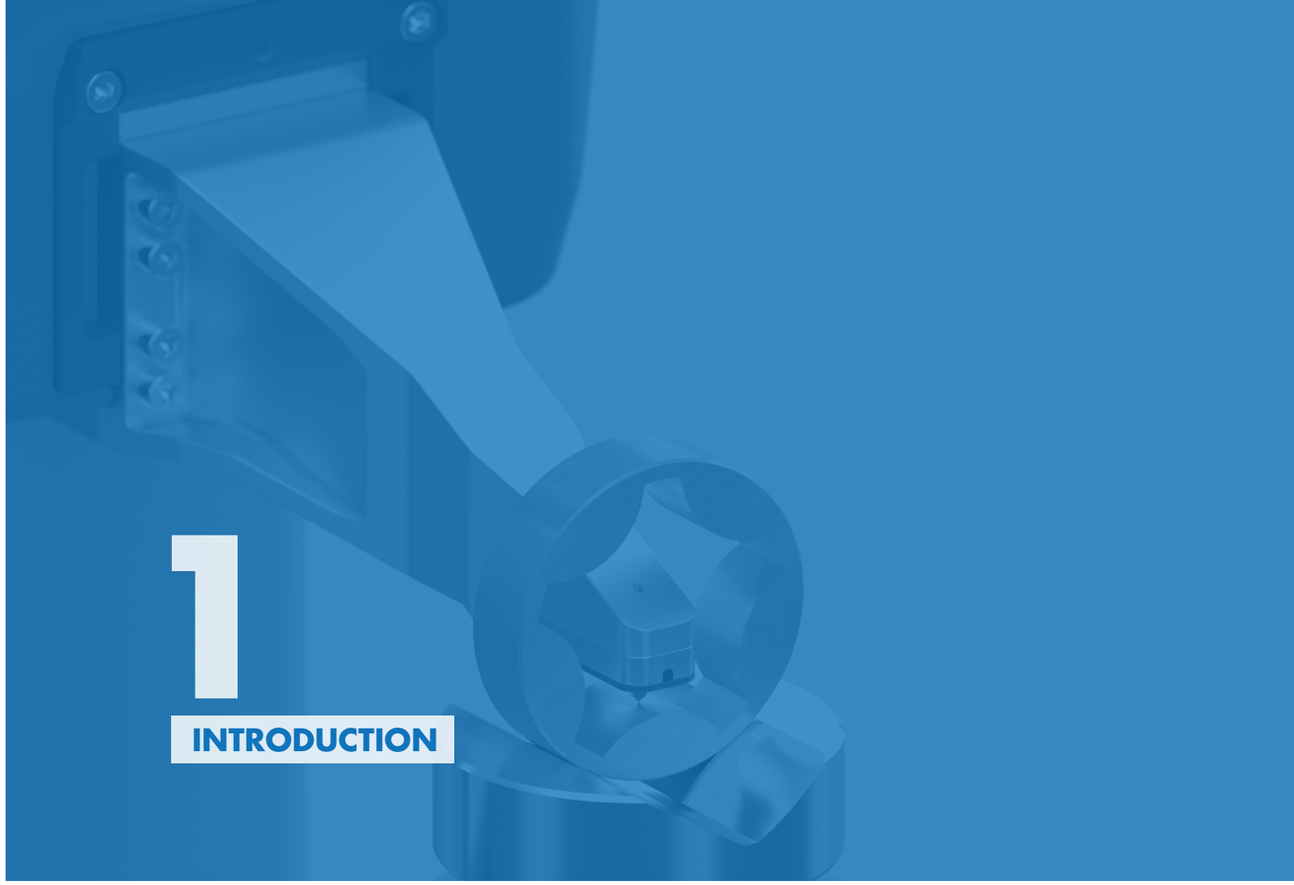
Date of release : November 2020
Document number : RAD_X_UMH250-400 Version 1.1 (Original Instructions)

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**
1.1	General instructions	7
1.2	Target groups	8
1.3	Liability and disclaimer	8
1.4	Re-order	8
1.5	Copyright	8
1.6	Intended use	9
1.7	Improper use	9
1.8	Layout of the user manual	9
2.	**DESCRIPTION AND FUNCTION**	**10**
2.1	Identification	11
3.	**SAFETY**	**12**
3.1	Used symbols	13
3.2	Fundamental safety requirements	13
3.3	Safety provisions	14
3.3.1	Safety devices	14
3.3.2	Emergency stop	14
3.3.3	Fixed guards	14
3.3.4	Two-hand control (motorized spindle configuration)	15
4.	**INSTALLATION**	**16**
4.1	Lighting	16
4.2	Vibration	17
4.3	Wind, sound and humidity	17
4.4	Workbench	17
4.5	Installation	17
4.5.1	Leveling	18
4.5.2	Electrical connections	18
4.5.3	Install indenters	19
4.5.4	Install sample holder/anvils/clamps/fixtures/vices	19
4.5.5	Installation of clamping nose (Option)	19
4.5.6	(HAWK 400RS-IMP) Install Visuals	20
4.6	Basic settings	20
4.6.1	(HAWK 250RS/400RS) Installation of data the output option	20
4.6.2	(HAWK 400RS-IMP) Windows 10: Setting a fixed IP-address	22
5.	**OPERATION**	**25**
5.1	Machine overview	25
5.2	Power ON the machine	26
5.3	Starting hardness testing software	26
5.4	Performing a basic hardness test	27
5.4.1	Additional settings before starting an indent	27
5.4.2	Report and export possibilities	27
5.5	Exit hardness testing software	27
5.6	Power OFF the machine	27
6.	**PROBLEM MESSAGES**	**28**
6.1	Hardware	28
6.2	Software	29
7.	**MAINTENANCE**	**30**
7.1	Cleaning	30
7.2	Maintenance general	31
7.2.1	Periodical inspection	32
7.2.2	Force calibration	32
7.3	Replacement of the fuse(s)	33
7.4	Spare parts	33
7.5	Functional test	33
8.	**DECOMMISSIONING OR DISPOSAL**	**34**
8.1	Decommissioning	34
8.2	Disposal	35
9.	**TRANSPORT AND STORAGE**	**36**
9.1	Transport/movement	36
9.2	Packaging	37
9.3	Storage	37
10.	**TECHNICAL SPECIFICATIONS**	**38**
10.1	Technical drawing	41
10.2	Standard delivery and (optional) accessories	43
10.3	Optional accessories	43
11.	**DECLARATION OF CONFORMITY**	**44**



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 **HAWK 250/400 Series**, 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 in the INNOVATEST software for the hardness tester.

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

1.6 INTENDED USE

The intended use 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:

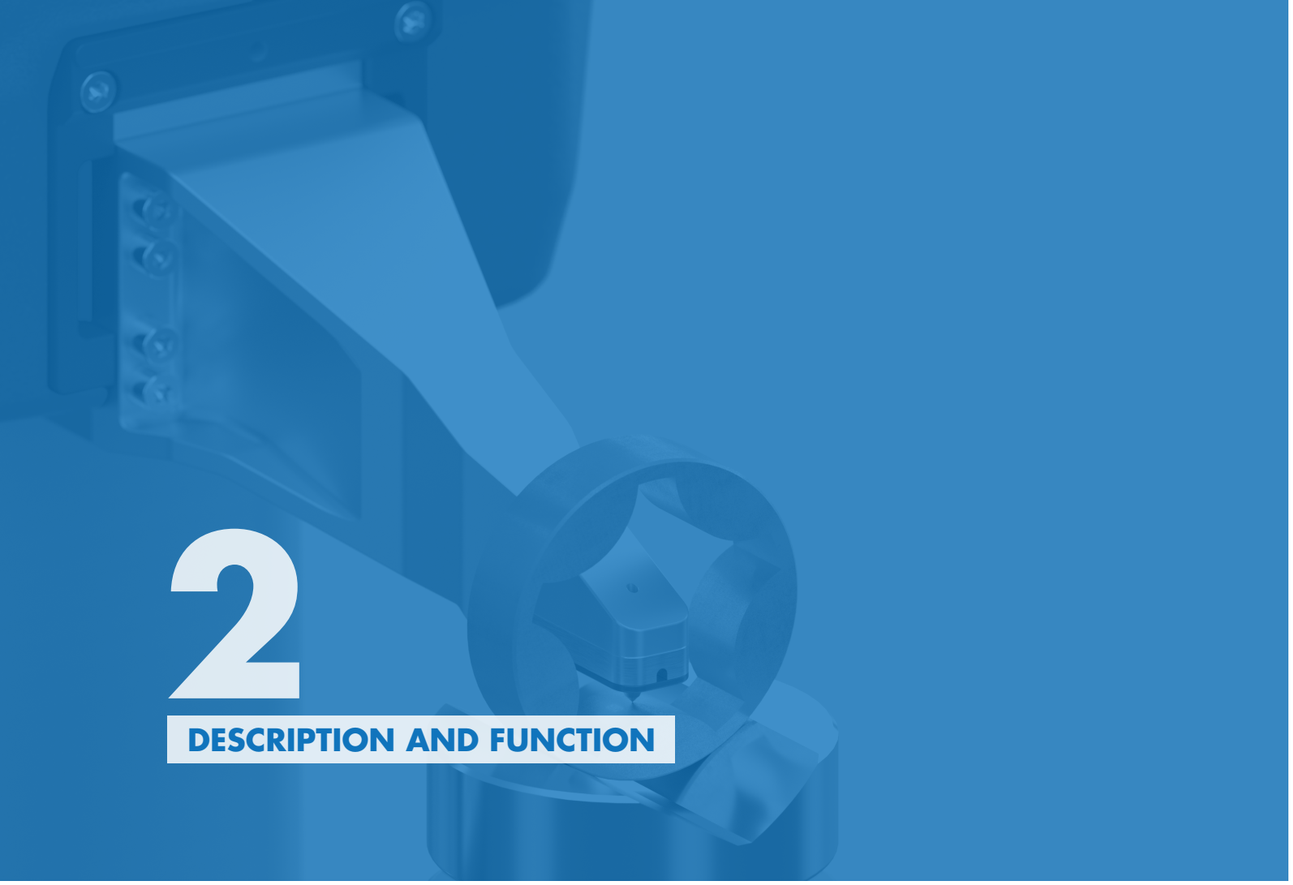
- Not or insufficiently complying with the information in this manual.
- Using spare parts or parts not approved by the manufacturer.
- The machine is operated incorrectly.
- Removing, manipulating or not using safety features.
- Changing functions of the machine.
- Unauthorized modifications to the 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 HAWK 250/400 series user manual may only be used with INNOVATEST® equipment covered by this user manual.
This complete user manual consists of:
• This HAWK250/400 series user manual.
• Dedicated Software user manual:
HAWK 250RS and 400RS: I-TOUCH software
HAWK 400RS-IMP: IMPRESSIONS MT software
• Dedicated HAWK 250/400 series unpack instruction (attached to the packaging).
• Declaration of Conformity.

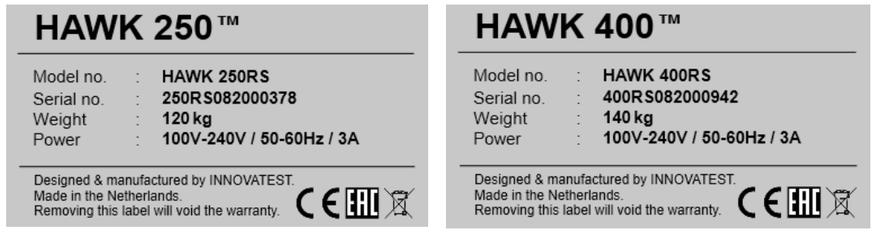


2

DESCRIPTION AND FUNCTION

2.1 IDENTIFICATION

This manual belongs to the HAWK 250/400 series (models HAWK 250RS, 400RS and 400RS-IMP).
The type / identification plate with the CE mark is placed on the back of the machine and is shown in the following figure:



HAWK 250RS

The HAWK 250RS delivers the latest technology on internal Rockwell Hardness testing. A Twin Scale Rockwell machine that also provides in Brinell testing as well as the optional Vickers and Knoop impressions. Easy to use, excellent workpiece overview. The protruding nose design enables to test hardness inside objects or on external surfaces.
Unique for this system are the vertical indentation process, load cell (test force measurement) on the indenter position and the optional clamp that fixes your workpieces firmly on the test anvil. The standard version of the HAWK has a working height of 250mm and throat depth of 200mm. The I-TOUCH™ workflow controller leads you through all advanced functionality with selections to print or export data to MS Office applications or storage on a USB drive.

HAWK 400RS

The HAWK 400RS is a taller version of the 250RS.
Similar to the 250RS it provides a vertical indentation process, load cell (test force measurement) on indenter position and the optional clamp that fixes your workpieces firmly on the test anvil or table.
This taller version of the Hawk increases the sample height to 400 mm while maintaining the 200 mm throat depth. When selecting the option of the automatic spindle, the full process of lifting, clamping, test procedure on your sample will be performed by only 1 touch of the "Start" icon on the touch screen. The I-TOUCH™ workflow controller effortlessly leads you through all advanced functionality including options to print or export data to MS Office applications or to store files on a regular USB drive.

HAWK 400RS-IMP

The HAWK 400RS-IMP shares all functionality available on the 400RS such as working height of 400mm and throat depth of 200mm and can be optionally equipped with an automatic spindle. Simply push "START" and the full process of lifting, clamping and testing takes place without operator interference. Moreover, the 400RS-IMP has an integrated Industrial PC, running Windows 10 and the INNOVATEST IMPRESSIONS™ MT workflow tester control software and a larger touch screen with even more functionality. The system has all nowadays available connectivity such as LAN, WLAN, USB. Advanced tester operation and on-screen guidance as well as remote service capabilities via INNOVATEST Team Viewer.

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.

3.1 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 an electricity hazard

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.

3.3 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.

3.3.2 EMERGENCY STOP

Emergency is a situation of (potential) danger to a person or the machine.
In an emergency, one of the emergency stop devices must be operated, causing the machine to stop immediately.
In all other cases, the machine must be switched off in a normal way.

One major emergency stop device is:
- Manually operated
- Red/yellow in color
- Located at the front of the machine, in reach for the operator.

When activating the emergency stop devices, the following functions or machine parts are affected:
- All electrical components are disabled.
- All motorized drives: stop moving.
- Lights may be kept on.

To reset the emergency stop, turn the emergency stop button until it unlocks.
When resetting the emergency stop devices, only the following functions or machine parts remain switched on:
- Motorized drives: only manual control enabled.
- Lights on.

By using an emergency stop, under certain circumstances, an undefined (switched-off) condition can occur. Therefore, the machine must be checked before a restart. Before the machine can be started permanently, the emergency stop device must be reset.

NOTE:
Further instructions how the software handles an emergency and for (re)starting Software, see the dedicated Software user manual.

3.3.3 FIXED GUARDS

The fixed guards on drives such as a belt drive, chain drive and gear drive are fitted with fasteners. These safety features prevent contact with these moving parts and therefore protect against severe injuries.
Removing fixed guards or operating the machine without these guards is not permitted!

3.3.4 TWO-HAND CONTROL (MOTORIZED SPINDLE CONFIGURATION)

For safety reasons the two-hand control button on the left side of the hardness tester must be used to move the motorized spindle (depending on model) upwards or downwards.

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 **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 work bench.
- 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 ≤70% ± 10%.

4.4 WORKBENCH

NOTE:
In order to make use of the full range of vertical capacity, you will have to make a hole in the workbench.
Read chapter ***"10 Technical specifications"*** *to see how far the spindle can move downwards.*

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 indenter holder.

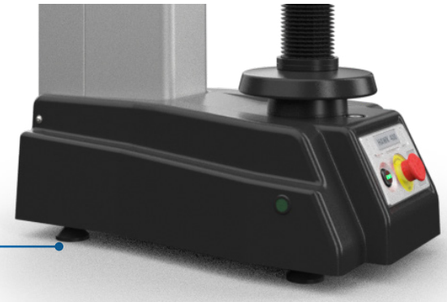
4.5 INSTALLATION

Before starting the installation, please check the following:
- The assembly and/or mounting of machine parts.
- Electrical connectors on the machine.
- 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 dampers

4.5.2 ELECTRICAL CONNECTIONS

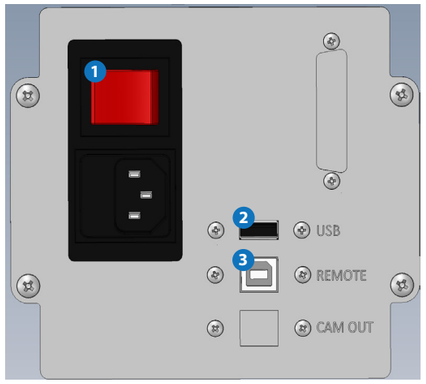
This section describes the correct way of connecting electrical components of the machine.

⚠ CAUTION

Make sure that the power requirement of the machine is in compliance with the local power mains to which the machine will be connected. The voltage details can be found on the reference label on the back of the unit.

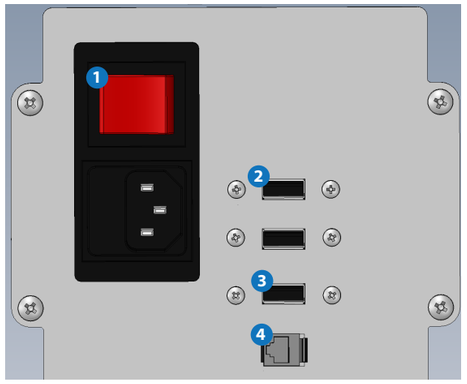
⚠ WARNING

Connecting your machine to an incorrect main power supply could cause severe damage to the machine and could create fire.



HAWK 250RS & 400RS

1. Main power
2. USB A (for measurement export)
3. USB B (for data transfer to a PC)



HAWK 400RS-IMP

1. Main power
2. 3x USB A (keyboard, export)
3. 1x USB A 3.0 (BIOS)
4. Network

4.5.3 INSTALL INDENTERS

The machine can be equipped with a pre-installed indenter, 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.

NOTE:
The (optional) clamping nose does not need to be removed to access the screw of the indenter holder.

Use a soft cloth to wipe any dirt or debris from the indenter holder or shoulder. The shank surface must face the screw hole in the indenter holder when being inserted. Insert the shank into the holder, entirely and securely. Before testing a specimen, install an anvil and run a test on a test block to securely seat the indenter.

4.5.4 INSTALL SAMPLE HOLDER/ANVILS/CLAMPS/FIXTURES/VICES

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 (Anvil Support), 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 into the Spindle (Anvil Support).
- Before testing a specimen, perform a few hardness tests on a test block, to securely seat the anvil.

4.5.5 INSTALLATION OF CLAMPING NOSE (OPTION)

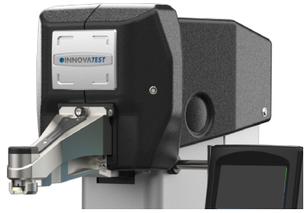
The machine is (optional) equipped with a clamping nose that presses the workpiece firmly to the stage or anvil. The clamp also protects the indenter against unwanted damage.

4.5.5.1 INSTALL CLAMP BODY OVER NOSE

NOTES:
Clamp body has magnetic parts.
Do not use clamp body without clamp piece.
Do not use clamp in combination with:

- *IN/6004 Rockwell diamond indenter Ø3mm, L=12mm*
- *IN/7808 Rockwell Ball Indenter 1/2". Includes 1 carbide ball. Ø3mm.*

(SA-02-0110) Clamping nose (Option)



Attach to tester:
slide, lock with captive screw and connect (electric)

4.5.5.2 INSTALL PIECE IN CLAMP BODY

NOTE: *Do not install a set of mixed types.*
Install the appropriate clamp piece in the ***nose clamp body.***

4.5.6 (HAWK 400RS-IMP) INSTALL VISUALS

The Brinell Indent Optical Scanner (BIOS) can be found in the accessory box. Please handle this part with care as it is a sensitive part of the machine. Connect the BIOS to the USB A 3.0 connector on the back of the tester.

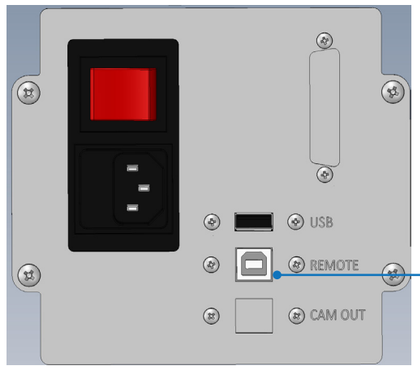
4.6 BASIC SETTINGS

It is not allowed to modify settings without the written permission of the manufacturer. In addition, program changes (software) of programmable control systems are not allowed. Should, after agreement, changes be necessary, they must be done by a qualified professional.

4.6.1 (HAWK 250RS/400RS) INSTALLATION OF DATA THE OUTPUT OPTION

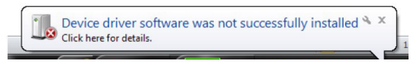
It is possible to connect the machine to a PC and transfer measurement data to the PC, on which the data can be ported to Excel. Hereinafter a description will follow on "how to set-up the machine" for this purpose.

Installing software drivers

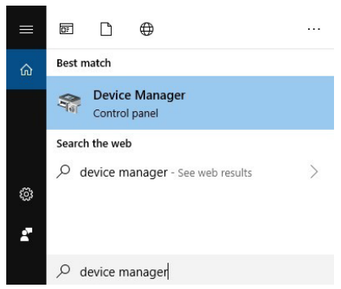


Connect the machine to a PC with a USB B cable.
Use the USB B connector on the back of the machine.

USB B Port

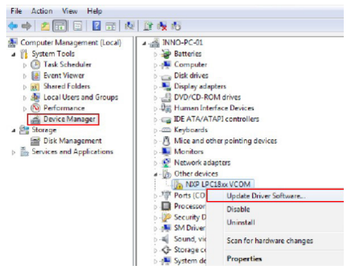


Windows will try to automatically install the drivers and show the progress in a balloon. However windows will not be able to find the correct drivers automatically.



In windows, open the search bar and type:
"Device manager".

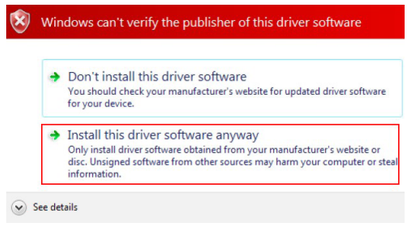
Double click on the device manager.



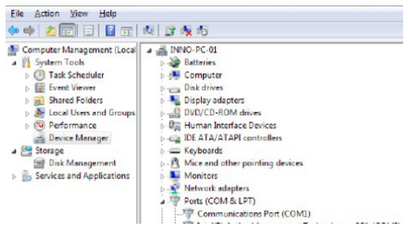
Click with the right mouse button on **"NXP LPC18XX VCOM"** and select **"UPDATE DRIVER SOFTWARE…".**

A popup will appear.
Select **"BROWSE MY COMPUTER FOR DRIVER SOFTWARE"**.

Navigate to the directory with the drivers for **"NXP LPC18XX VCOM"**, like a delivered USB drive.
Click on **"NEXT"**.



Next a windows security window will popup.
Select **"Install this driver software anyway".**

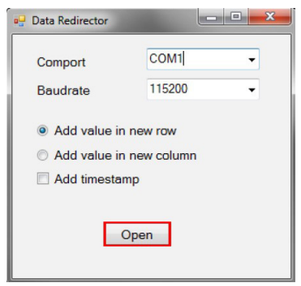


Write down which COM port has been assigned to the **"LPC USB VCOMPORT"** in the Device Manager.

In shown example picture, COM port is **"COM5"**.

The driver is now correctly installed.

Output data to Microsoft Excel with Data Redirector
Start the program "Data Redirector".



Set the value of Comport which you wrote down earlier.

Set the value of Baudrate to 115200.

- If each measurement should be inserted in a new row, select **"ADD VALUE IN NEW ROW"**.
- If each measurement should be inserted in a new column, select **"ADD VALUE IN NEW COLUMN"**.
- If also a timestamp should be inserted with each measurement, select the box **"ADD TIMESTAMP"**.
- Select **"OPEN"** to start Excel.

After each measurement, the selected cell in Excel will be updated with the measured value.

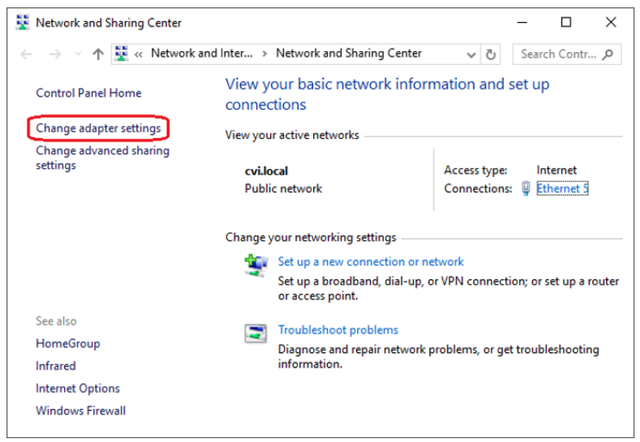
TIP!
If only the value, without the scale (e.g. HRC), is needed, add a row with following formula:
=LEFT(A1, LEN(A1)-4)
A1 is the cell which contains the measured value. -4 is the number of characters you wish to strip.

4.6.2 (HAWK 400RS-IMP) WINDOWS 10: SETTING A FIXED IP-ADDRESS

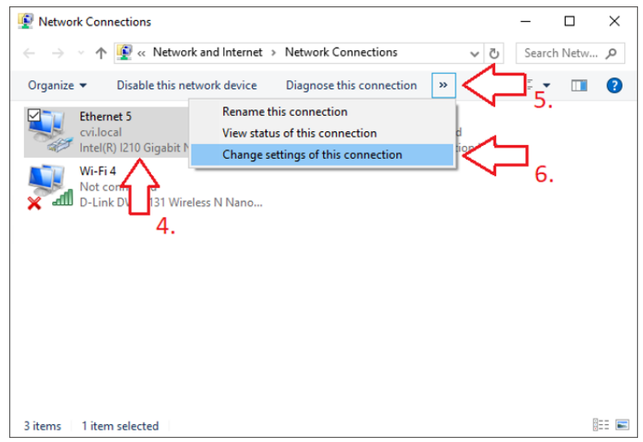
Windows 10 is by default configured to use a dynamic IP address (DHCP).
This network settings may be changed to use a fixed IP address.

1. Click with the right mouse button on the network icon

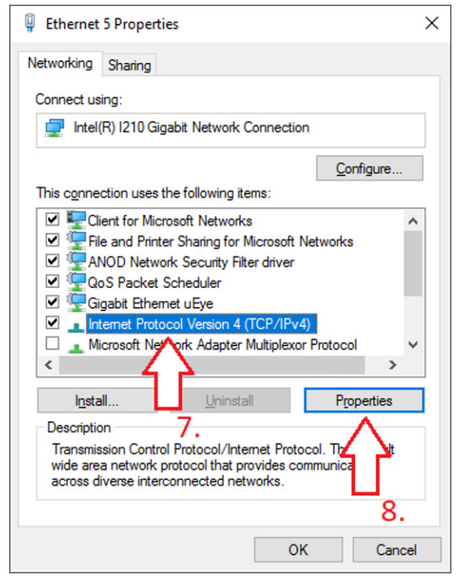
2. Select Open Network and Sharing Center



3. Select Change adapter settings



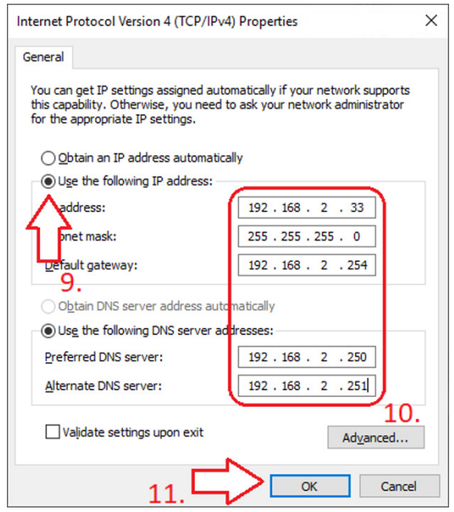
4. Select the connected Network Adapter
5. Click on the arrows to expand the settings bar
6. Select Change settings of this connection



7. Select Internet Protocol Version 4 (TCP/IPv4)

4. INSTALLATION

8. Click on the Properties button



9. Select Use the following IP address
10. Fill in the desired IP address, subnet mask, gateway and DNS server
11. Click on the OK button
12. Close all dialog windows

5 OPERATION

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

5.1 MACHINE OVERVIEW

HAWK 250RS

1. Replaceable ABS top cover
2. Nose.
   Houses the indenter.
   Houses the LED workpiece light
3. Removeable Nose clamp
4. 6.5”Touch screen

⚠ CAUTION:
Do not use any sharp objects to operate the touch screen.

5. Workpiece table
6. Spindle protection cover
7. Elevating Spindle wheel
   (Manual spindle configuration)
8. Emergency switch
9. Replaceable ABS bottom cover
10. Adjustable dampers

HAWK 400RS-IMP

1. Replaceable ABS top cover
2. Nose.
   Houses the indenter.
   Houses the LED workpiece light
3. Removeable Nose clamp
4. 8.4"Touch screen

⚠ CAUTION:
Do not use any sharp objects to operate the touch screen.

5. Workpiece table
6. Spindle protection cover
7. Spindle hand wheel
8. Emergency switch
9. Z-axis & focus control
   - ▲▼: Moves the Z-axis up and down in high speed
   Use up with one of the two-hand controls.
10. Replaceable ABS bottom cover
11. Adjustable dampers
12. Brinell Indent Optical Scanner (Option)
13. Safety two-hand control
14. Start/Stop button

5.2 POWER ON THE MACHINE

NOTE: *Make sure that the emergency stop switch on the front side of the machine is not activated when switching ON the machine, this will result in not powering up or failure messages. To unlock the emergency stop, see* **chapter 3.3.2 Emergency Stop.**

⚠ WARNING
Do not operate the machine during initialization and keep your hands away from motorized parts (e.g. nose, stage and spindle).

1. Switch on the machine using the red ON/OFF button on the back panel, see chapter **"4.5.2 Electrical connections"**.
2. The machine will start the initialization. During this initialization, several system functions and parameters will be checked, in case there are any problems, a message will appear on the user interface.

5.3 STARTING HARDNESS TESTING SOFTWARE

When there are no issues during initialization, the dedicated INNOVATEST® hardness testing software will be started:
- HAWK 250RS/400RS: I-TOUCH
- HAWK 400RS-IMP: IMPRESSIONS MT

NOTE:
For more detailed information concerning the user interface and advanced (software) controls, please see the dedicated software user manual.

Some items in the software user manual may differ or are disabled, depending on the type of your machine series.

5.4 PERFORMING A BASIC HARDNESS TEST

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

NOTE:
For more detailed information concerning the user interface and advanced (software) controls, please see the dedicated software user manual Some items in the software user manual may differ or are disabled, depending on the type of your machine series.

Rockwell test:
1. Position the sample.
2. Select the desired Rockwell hardness scale in the software.
3. Locate the nose indenter specimen about 1mm above the specimen nose indenter:
   - Manual spindle configuration: manual rotate spindle wheel
   - Auto spindle configuration: use z-axis controls together with two-hand control; manual rotate spindle wheel also possible.
4. Select the (software or hardware) **"START"** button to start the indentation. Select the (Software or hardware) **"STOP"** button to stop/abort the indentation process. The indenter will slowly move downward towards the specimen's surface. After the indentation cycle, the calculated hardness value is shown on the screen, and saved. The indenter retracts automatically.
5. Move table spindle down to release clamp.

Brinell test with BIOS:
Follow the instruction as described for Rockwell above, while now selecting a Brinell scale.
6. Press the **"MEASURE"** button and position the BIOS (Brinell Indent Optical Scanner) above the indentation.
7. Press again **"MEASURE"** to automatic detect the Brinell indentation.
8. Accept the measurement:
   - Change the measuring lines in case of wrong detection and press Save, or
   - Decline the measurement with **"ESCAPE"**
9. The hardness value will be calculated based on the diagonals and shown on the screen.

5.4.1 ADDITIONAL SETTINGS BEFORE STARTING AN INDENT

1. Set the Dwell times to desired values.
2. Set up the hardness conversions.
3. Enter tolerance limits if required.
4. For measuring cylindrical parts shape correction is required.
   Select the shape (convex, concave, cylindrical) and enter the sample diameter.
5. Optimize the intensity of the light.

5.4.2 REPORT AND EXPORT POSSIBILITIES

1. Export measurements in different formats to a USB stick.
2. HAWK 400RS-IMP: Create report; Snapshots can be integrated.

5.5 EXIT HARDNESS TESTING SOFTWARE

1. Exit software by following instructions as in dedicated software user manual.

5.6 POWER OFF THE MACHINE

1. Switch the machine OFF with the main ON/OFF switch on the back of the machine;
   See chapter **"4.5.2 Electrical connections"**.

6
PROBLEM MESSAGES

Irregular indentation shape.	• Indenter tip is dirty. • Indenter tip is chipped off. • Specimen surface is coarse (or dirty). • Specimen is tilted. • Specimen is curved (spherical or columnar). • Hardness tester is faulty (such as indenter shaft is broken).	• Clean Indenter tip. • Replace indenter. • Polish specimen surface. • Make specimen surface in parallel with fine adjustment stage. • Make an indentation at highest position if specimen curved. • Contact service representative.

6.2 SOFTWARE

The machine's software has a central control. In this control several problems can be detected and registered. A message is displayed on the user interface when a problem occurs. Based on these messages, problems can easily be found and solved. However, not all problems are detected by the control system. These are more complex malfunctions or malfunctions that occur rarely.

NOTE:
For more detailed information concerning the user interface and advanced (software) controls, please see the dedicated software user manual. Some items in the software user manual may differ or are disabled, depending on the type of your machine series.

⚠ WARNING
If the personnel detect problems or dangers, the user/owner or his authorized representative must be informed immediately. The user/owner or his authorized representative informs the manufacturer.

6.1 HARDWARE

If proposed solution does not solve the problem, contact your service representative.

Problem	Possible cause	Possible solution
User interface LCD does not light up.	• Power is not supplied. • Fuse has burnt out. • Mains Cable is connected improperly or broken. • LCD defective.	• Check power mains & supply. • Replace fuse. • Check mains cable otherwise contact service representative. • Contact service representative.
No indentation is made.	• Indenter tip is chipped off. • Hardness tester is faulty. • Indenter shaft curve. • Abnormal position of Indentation.	• Replace indenter. • Contact service representative • Contact service representative • Adjust the indentation position.
Abnormal hardness value.	• When using a digital eyepiece and the eyepiece is not zeroed properly after powering ON, the measurement of the diameter will be incorrect. • Indenter tip is dirty. • Installed in bad conditions.	• Switch OFF the device, wait for a few seconds and switch it ON again. Then execute the zeroing properly in the software. • 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.

⚠ CAUTIONS

Avoid contact of electric live parts with liquids as this can lead to "short circuits".

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). This especially applies to all electrical components. 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. Installation, inspection, maintenance or repairs on the electrical equipment of the machine must be performed by qualified personnel in accordance with technical regulations.
2. When installing, inspecting or maintaining live parts, a second person must be available, who can handle the emergency stop in case of an emergency. Only use voltage isolated tools!
3. Before connecting or disconnecting cables, make sure that the power is switched OFF, to prevent electric shock or malfunction of the machine.
4. 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
Lens[A]	Lens surface polluted	Wipe lens Lens brush, Lens cleaning tissue or Lens cloth (microfiber)[B]	Do not scratch the lens
Anvil[A]	Rust	Remove rust Rust solvent and a Soft cloth (e.g. microfiber, cotton)	Do not bring stage into contact with indenter, 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 REPLACEMENT OF THE FUSE(S)

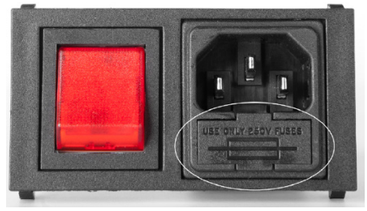
⚠ CAUTION

Only use fuses with the correct specified ratings, see chapter **"10 Technical specifications"**.

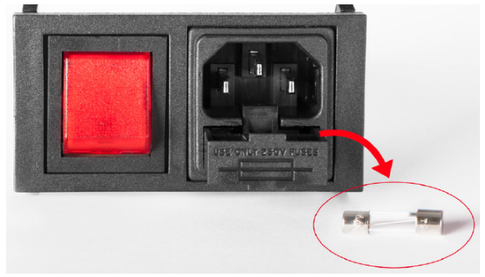
For this machine the fuse dimensions and ratings are:
5x20mm
3.15AT, 250V

Replacement procedure

- Turn off the machine and disconnect the main power cable.
- Pull out the fuse holder using a small flat-headed screwdriver.



- Inside the fuse holder a spare fuse is stored.
- Replace the broken blown fuse with the new fuse.



- Reconnect the main power cable and turn on the machine again.

7.4 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.

7.5 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 hardness test"**. The measured hardness value should match the hardness value of the test block.

8

DECOMMISSIONING OR DISPOSAL

This section gives some guidance for the decommissioning or disposal of the machine.

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 **"layout of the user manual"**.

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 (nose).

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.

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

Vickers **(indent only!)** (ISO 6507) (ASTM E384, E92) (JIS B 7725)		HV1 HV3 HV4 HV5	HV10 HV20 HV25 HV30 HV40 HV50	HV100 HV120 HV150
HVD (HVT) **(Vickers >= 5kgf)** (VDI/VDE 2616)		HV5	HV10 HV20 HV25 HV30 HV40 HV50 HV60	HV100 HV120 HV125 HV150
Knoop **(indent only!)** (ISO 4545) (ASTM E92) (JIS Z 2251)		HK1 HK3 HK4 HK5		
Plastics **(Ball indentation)** (ISO 2039)	49,03 N	132,0 N	357,9 N	961 N
Fracture toughness (Kic)	(none)			
Conversions	Conversions to other hardness scales according to ASTM E140, ISO 18265 and GB/T 1172			
Standards	ISO 4545 ISO 6506 ISO 6508 ISO 2039	ASTM E92 ASTM E10 ASTM E18	JIS Z 2251 JIS Z 2243 JIS B 7725	DIN 51917 VDI/VDE 2616

Hardness scales (scales available depends on hardness tester configuration)				
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	
	Superficial Rockwell scales; Pre Load 3kgf, Main Load 15kgf | 30kgf | 45kgf		HR15N, HR30N, HR45N HR15T, HR30T, HR45T HR15W, HR30W, HR45W HR15X, HR30X, HR45X	
Rockwell (Carbon) (DIN 51917)	HR2.5/7	HR5/7 HR5/15 HR5/20 HR5/40 HR5/60 HR5/100 HR5/150		
Brinell (ISO 6506) (ASTM E10) (JIS Z 2243)	HBW1/5 HBW1/10 HBW1/30	HBW2.5/6.25 HBW2.5/7.8125 HBW2.5/15.625 HBW2.5/31.25 HBW2.5/62.5 HBW2.5/187.5	HBW5/25 HBW5/31.25 HBW5/62.5 HBW5/125	
HBD (HBT) (Brinell >= 5kgf) (VDI/VDE 2616)	HB1/5 HB1/10 HB1/30	HB2.5/6.25 HB2.5/7.8125 HB2.5/15.625 HB2.5/31.25 HB2.5/62.5 HB2.5/187.5	HB5/25 HB5/31.25 HB5/62.5 HB5/125	

Test forces	
Force application	Custom loadcell
Force feedback	Closed loop
Operation method	Fully automatic
Test forces	1kgf – 187.5kgf
Test force tolerance	< 0.5%
Dwell time settings	Adjustable 1 to 99s.

Head	
Head Type	Protruding Nose, fixed, single indenter
Clamp	Holder for exchangeable clamps
Workpiece Light	Dimmable
Indenters	Certified indenters (ISO/ASTM) available at choice
Objective	Analogue microscope (Option) **HAWK 400RS-IMP:** BIOS (Option)

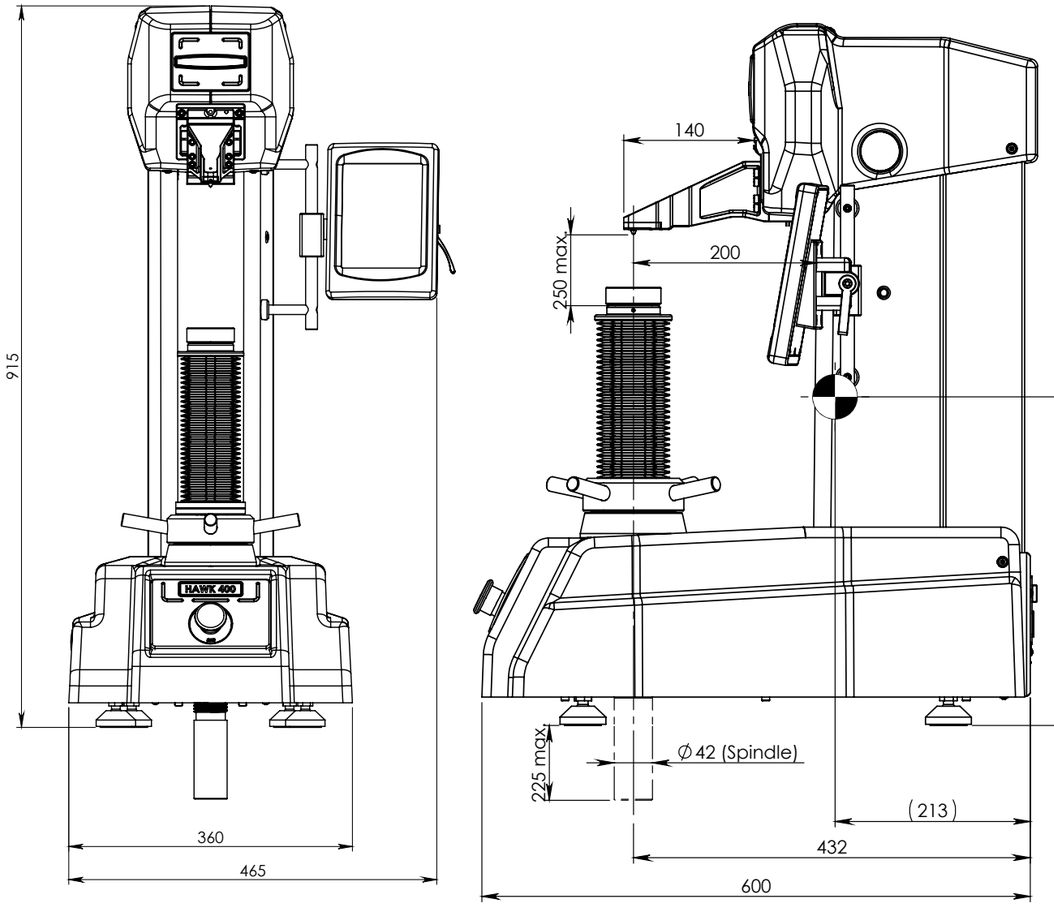
System	
Electronic system	**HAWK 250RS:** Embedded **HAWK 400RS:** Embedded **HAWK 400RS-IMP:** Windows 10
Screen(s)	**HAWK 250RS:** 6.5" portrait mode capacitive touch screen **HAWK 400RS:** 6.5" portrait mode capacitive touch screen **HAWK 400RS-IMP:** 8.4" portrait mode capacitive touch screen
Display resolution	Selectable 0.1 or 0.01 HR, 0.5 HB, others 0.1
Statistics	Total test, max., min., average, range, standard deviation, all in real time after each test.
Hardness conversion	Rockwell, Rockwell Superficial, Vickers, Brinell, Knoop, Leeb & Tensile
Software	**HAWK 250RS:** i-Touch **HAWK 400RS:** i-Touch **HAWK 400RS-IMP:** IMPRESSIONS™ 2 MT, work-flow system & tester control
Data storage	Internal and external
Data output	**HAWK 250RS:** TXT **HAWK 400RS:** TXT **HAWK 400RS-IMP:** XML, CSV, Q-DAS certified (Option)
Connectivity	**HAWK 250RS:** 1x USB A, 1x USB B **HAWK 400RS:** 1x USB A, 1x USB B **HAWK 400RS-IMP:** 2x USB 2, 1x USB 3, Ethernet LAN, Wi-Fi, RS232, Bluetooth (depending on configuration)

General	
Dimensions	**HAWK 250RS:** W 360 x D 600 x H 765mm **HAWK 400RS:** W 360 x D 600 x H 915mm **HAWK 400RS-IMP:** W 360 x D 600 x H 915mm
Weight	**HAWK 250RS:** 120kg **HAWK 400RS:** 140kg **HAWK 400RS-IMP:** 140kg
Power supply	100 - 240 V AC, 50/60 Hz, single phase
Operating temperature	10 – 35 °C
Power consumption	100 W
Humidity	10 – 90 %, non-condensing
Fuse size/rating	5x20 mm, 3.15AT, 250V
Noise emission	< 70 dB(A)
Workpiece depth	200mm
Workpiece height	**HAWK 250RS:** 250mm **HAWK 400RS:** 400mm **HAWK 400RS-IMP:** 400mm

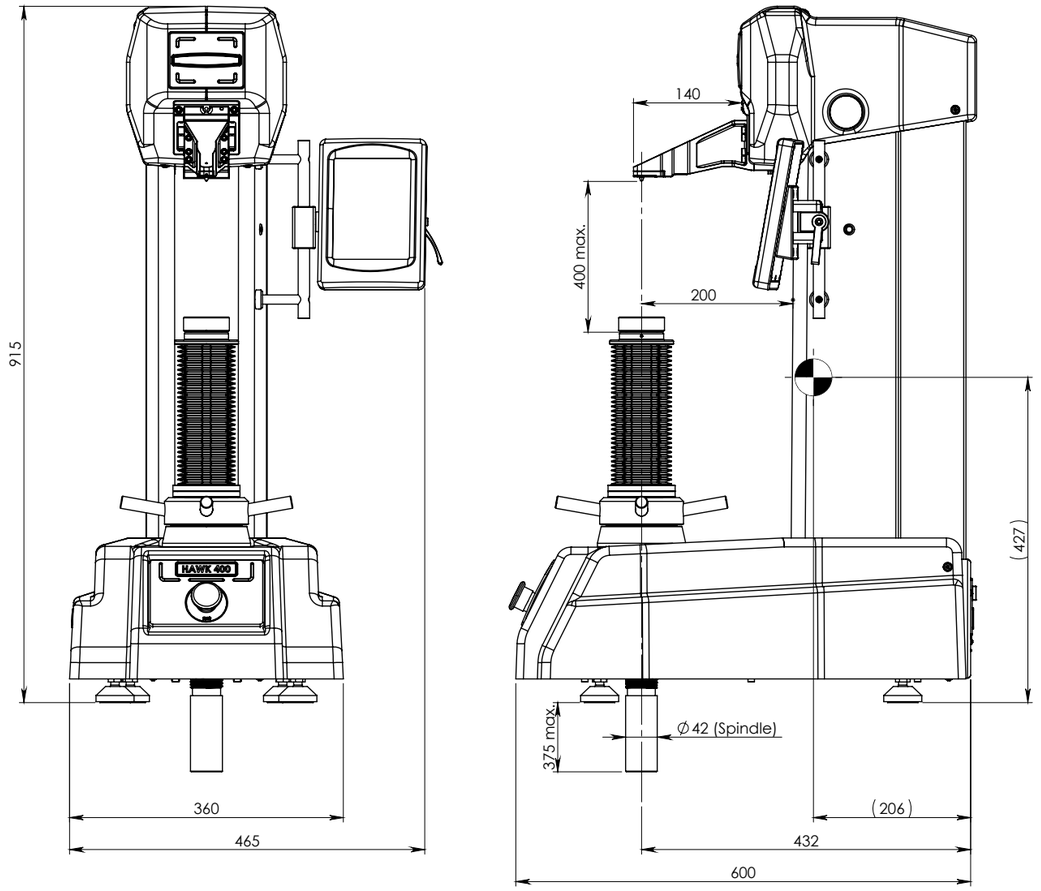
10.1 TECHNICAL DRAWING

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.

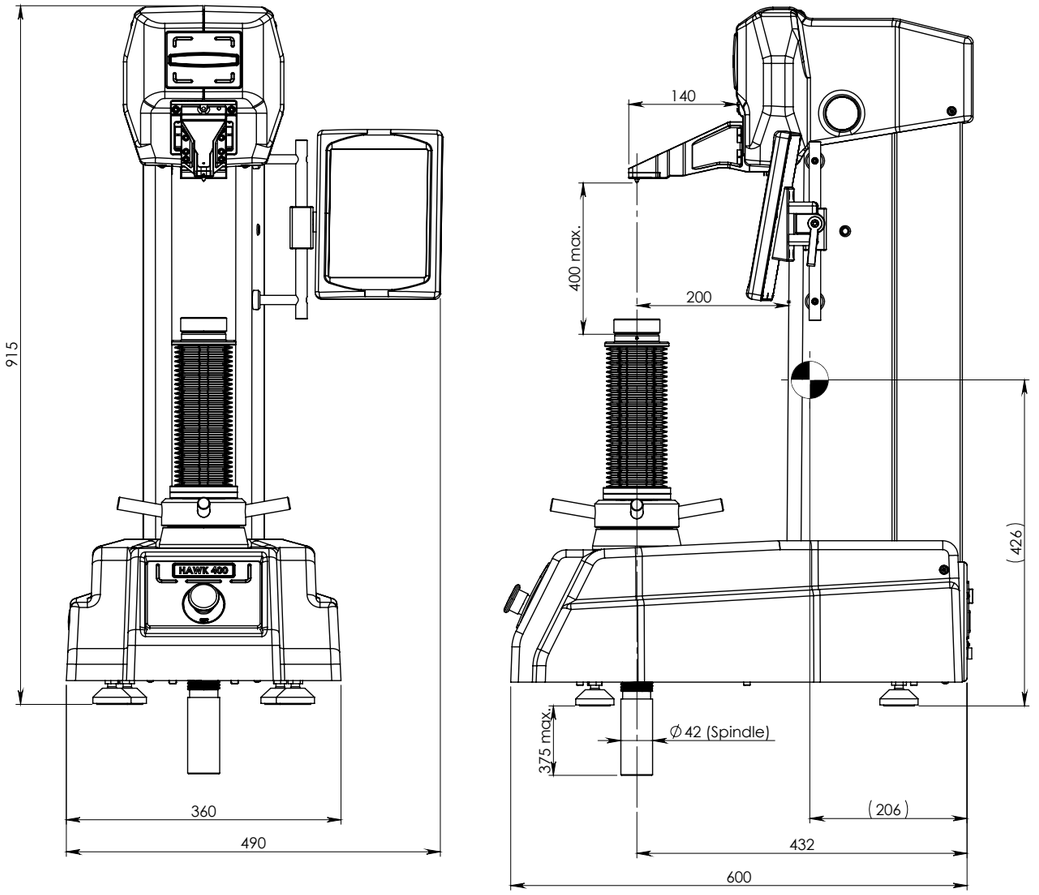
HAWK 250RS



HAWK 400RS



HAWK 400RS-IMP



10.2 STANDARD DELIVERY AND (OPTIONAL) ACCESSORIES

- Power cable
- Fuses
- Four adjustable vibration dampers
- User manual
- (HAWK 400RS-IMP) Keyboard
- (HAWK 400RS-IMP) Mouse

10.3 OPTIONAL ACCESSORIES

- Machine calibration certificate
- Certified indenters
- Certified hardness reference blocks
- Anvils
- Cabinet test table with drawer
- Machine Cover
- Analogue Brinell indent optical scanner
- (HAWK 400RS-IMP) Brinell Indent Optical Scanner
- Auto spindle (SA-03-0033)
- Clamping nose kit (SA-02-0110)
- etc.

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

INNOVATEST®
Advanced Hardness Testing Solutions

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:	HAWK 250/400 series
Model:	HAWK 250RS, 400RS, 400RS-IMP
Serial number:	xxx(xxx)(r)mmyyssssss

(xxx(xxx)=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 ISO 13850:2015
- EN 60204-1:2006/AC:2010
- EN 55011-1:2009/A1:2010
- EN 61326-1:2013
- EN 61000-3-2:2014
- EN 61000-3-3:2013
- EN 61000-4-2:2009
- EN 61000-4-3:2006
- EN 61000-4-4:2012
- EN 61000-4-5:2014
- EN 61000-4-6:2014
- EN 61000-4-8:2010
- 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	Edwin Lansink
Maastricht, 21-08-2020	R&D Manager/CTO

CE

EN Original

NOTES

NOTES

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