Struers

Manual No.: 16607025-01
Revision A

Date of Release 2023.09.15

Duramin-40

Instruction Manual

Original instructions.

colour inside

Table of Contents **Page**

Intended use

Automatic Micro/Macro hardness tester for Automatic Micro/Macro hardness testing of solid materials.
The machine is designed to be used with indenters specially designed for this purpose and fixed in the turret of the motorized test head. Samples are secured on a fixed anvil or optional motorized XY-stage.
For load ranges 10 gf-10 kgf, 10 gf-31.25 kgf, and 1 gf-62.5 kgf
The hardness tester meets the applicable DIN, ISO-EN, ASTM and JIS standards.

The machine is for use in a professional working environment (e.g. a materialography laboratory).

Models:

Duramin-40 M1/M2/M3
Duramin-40 A1/A2/A3
Duramin-40 AC1/AC2/AC3

NOTE:
READ the instruction manual carefully before use.
Keep a copy of the manual in an easy-to-access place for future reference.

Always state *Serial No* and *Voltage/frequency* if you have technical questions or when ordering spare parts. You will find the Serial No. and Voltage on the type plate of the machine itself. We may also need the *Date* and *Article No* of the manual. This information is found on the front cover.

The following restrictions should be observed, as violation of the restrictions may cause cancellation of Struers legal obligations:
Instruction Manuals: Struers Instruction Manual may only be used in connection with Struers equipment covered by the Instruction Manual.

Struers assumes no responsibility for errors in the manual text/illustrations. The information in this manual is subject to changes without notice. The manual may mention accessories or parts not included in the present version of the equipment.

Struers
Pederstrupvej 84
DK 2750 Ballerup
Denmark
Telephone +45 44 600 800
Fax +45 44 600 801

Duramin-40

Safety Precautions[1]

Read carefully before use

1. The operator(s) must read the Safety and User's Guide sections of this manual and the relevant sections of the manuals for any connected equipment and accessories.

WARNING

Ignoring this information and mishandling of the equipment can lead to severe bodily injuries and material damage.

2. The machine must be installed in compliance with local safety regulations.

3. The machine must be placed on a safe and stable support. Failure to do so can affect the proper working and cause the equipment to fall down and/or cause accidents and injuries. All safety functions and guards of the machine must be in working order.

4. Do not modify this equipment. Doing so can cause fire and/or electric shock.

5. Do not twist or damage the power cords. Damaged power cords can cause fire and/or electric shock.

6. Do not disassemble this equipment. Doing so can cause electric shock.

7. Do not operate the equipment at a voltage other than the power voltage that is indicated. Doing so can cause fires.

8. Do not allow the machine to become wet. Fires can occur if water gets inside the equipment.
If water or other liquid does get inside the equipment, turn off the power to the equipment's main unit, disconnect the power supply, and call technical service.

9. If malfunctions, smoke or unusual noises are observed - turn off the power, disconnect the power supply and call technical service.

10. Do not connect/ disconnect power with wet hands. Doing so can result in electric shock.

[1] From Safety Precaution sheet, Revision A

11. Disconnect the power supply prior to any cleaning, maintenance or service.
Failure to do so can result in electric shock.

12. Do not block the ventilation. Blocking the ventilation can cause heat to accumulate inside the machine, which in turn, can generate fire.

13. Do not open any panel on the machine.
High voltages exist inside the machine and may cause electrical shocks to personnel.

The equipment should only be used for its intended use and as detailed in the Instruction Manual.

The equipment is designed for use with accessories supplied by Struers. If subjected to misuse, improper installation, alteration, neglect, accident or improper repair, Struers will accept no responsibility for damage(s) to the user or the equipment.

Dismantling of any part of the equipment, during service or repair, should always be performed by a qualified technician (electromechanical, electronic, mechanical, pneumatic, etc.)

Icons and typography

Struers uses the following icons and typographical conventions.
A list of the Safety Messages used in this manual can be found in the chapter on Cautionary Statements.

Always consult the Instruction Manual for information on the potential hazards marked by the icons fixed to the machine.

Icons and Safety Messages

ELECTRICAL HAZARD
indicates an electrical hazard which, if not avoided, will result in death or serious injury.

DANGER
indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

WARNING
indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.

CAUTION
indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.

CRUSHING HAZARD
indicates a crushing hazard which, if not avoided, could result in minor, moderate or serious injury.

EMERGENCY STOP

General Messages

NOTE:
indicates a risk of damage to property, or the need to proceed with special care.

HINT:
indicates additional information and tips.

Colour Inside Logo

The 'colour inside' logo on the cover page of this Instruction Manual indicates that it contains colours which are considered to be useful for the correct understanding of its contents.
Users should therefore print this document using a colour printer.

Typographic conventions

Bold type	indicates button labels or menu options in software programs
Italic type	indicates product names, items in software programs or figure titles
Blue text	indicates a link to another section or webpage
■ Bullets	indicates a necessary work step

User's Guide

Table of Contents **Page**

1. Getting Started

Unpacking Duramin

Refer to the **DURAMIN-40: HOW TO UNPACK** instructions delivered with Duramin.

HINT:
Take care whilst unpacking and handling Duramin.
Do not expose to external impact.
Do not tilt over 30 degrees.
Do not touch the turret.

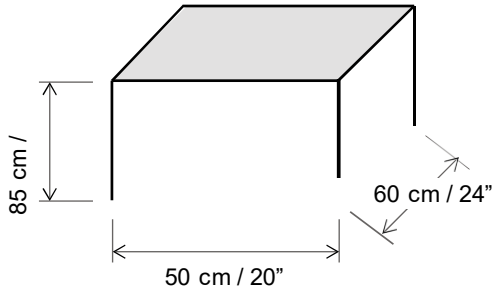
- Carefully open and remove the top of the packing crate.
- Remove the sides of the packing crate.
- Remove the accessories case(s).
- Carefully lift the foam pieces to access Duramin.

HINT:
Store the packing crate, foam packaging and fittings for use whenever Duramin is transported/re-located.
Failure to use the original packaging and fittings could cause severe damage to the tester and will void the warranty.

Location

- Place the machine close to the power supply.
- Place the machine on a rigid, stable workbench with a horizontal surface.
  The workbench must be able to carry at least 130 Kg / 280 lbs.

Recommended workbench dimensions



To take advantage of the maximum spindle capacity, a hole must be drilled in the table top to accommodate the full stroke of the spindle. Please refer to the *Drilling Plan* for dimensions.

- To facilitate easy access for service technicians, allow sufficient space around the machine.

Vibration-free Location

- Install Duramin in a vibration-free location.

NOTE:
Vibrations can lead to inaccurate measurements and must be avoided.

Sources of vibration can include:

- Passers-by (persons walking past), a road with heavy traffic, cranes, equipment generating vibrations, equipment generating sound (acoustic vibration), exposure to wind or air conditioning fans.

If possible, install the hardness tester on the ground floor of a building and away from exits or doorways.

Lifting Duramin

A crane and lifting straps[2] are required to lift the machine from the packing crate. The crane should have a minimum lifting capacity of 100 kg.

NOTE:
Take care whilst handling Duramin.
Do not expose to external impact.
Do not tilt over 30 degrees.
Do not touch the turret.

- Check that the crane has a free pathway from the lifting point to the final location.
- Place the lifting straps securely around the lifting bar.
- Remove the bolts securing Duramin to the pallet.
- Carefully lift Duramin out of the packing crate.
- Check whether the 4 adjustable vibration dampers are installed.

If not:

- Mount the dampers and adjust the height of each damper so that they are of equal height.
- Lift Duramin into its final location

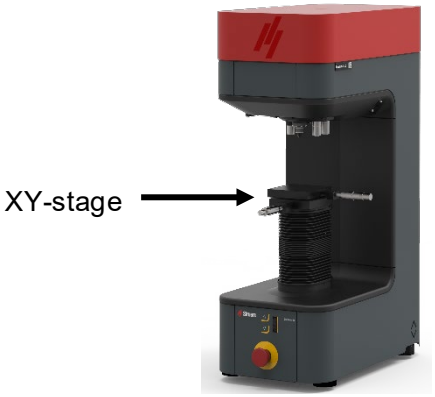
[2] Straps must be approved to at least twice the weight of the machine.

Placing Duramin

Levelling

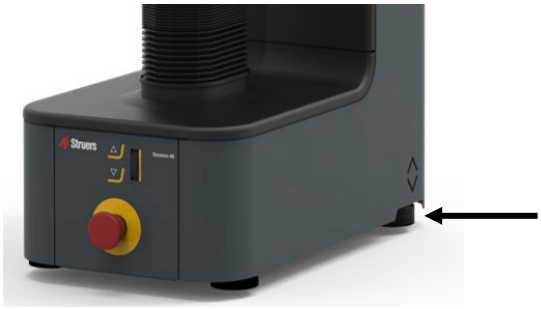
To eliminate possible wear and tear or the testers mechanical structure, the tester should be levelled once it is in its final location.

- Check that the XY-stage is level.



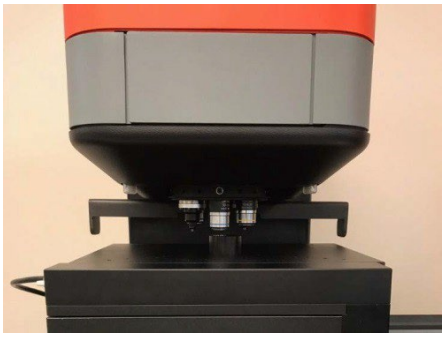
If not:

- Turn the vibration damper in the rear right hand corner, to level the XY-stage.



Removing the Lifting Bar

- Support the lifting bar and remove the screws and washers from both sides of the bar.



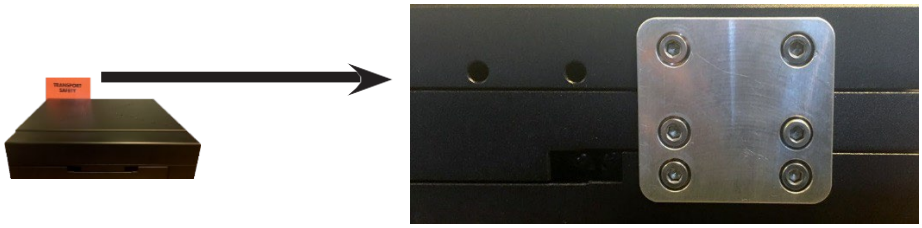
NOTE:
Keep the lifting bar, screws and washers for use whenever the machine is to be relocated.

Removing the Transport Plate
(Motorized XY-stage option only)

- Remove the transport safety **before** turning on the tester. The motorized XY-stage will automatically move to perform a reference search on initialization.

NOTE:
Damage to the stage will result if the tester is switched on with the transport safety plate mounted.

- Unscrew the six screws securing the transport safety plate at the rear.
- Keep the plate and screws for use whenever the machine is to be relocated.



Checking the Contents

In the packing crate you should find the following parts:

1 Duramin-40 (Hardness Tester)
1 Accessories Case
1 15“ Monitor (2nd monitor optional)
1 Keyboard (Option)
1 Mouse (Option)

Accessories Case
Standard Accessories

Indenter(s) and objective lens(es)
1 Wireless Mouse and keyboard (Option)
2 Power cables
1 USB cable to monitor
1 HDMI to DVI cable
1 Spare fuse
1 Certificate of calibration on USB
1 USB Wi-Fi Adapter
1 Cables for motorized XY-stage (Option)
1 ASUS Bluetooth dongle (Option)

Optional Accessories

Please consult your order confirmation to check that all the accessories ordered are included in the delivery.

HINT:
Some components or parts may be packaged separately and may not be included in the accessory case or may have been installed on the hardness tester.
The actual packaging and accessories may appear different to those shown in the picture.

Getting Acquainted with Duramin-40

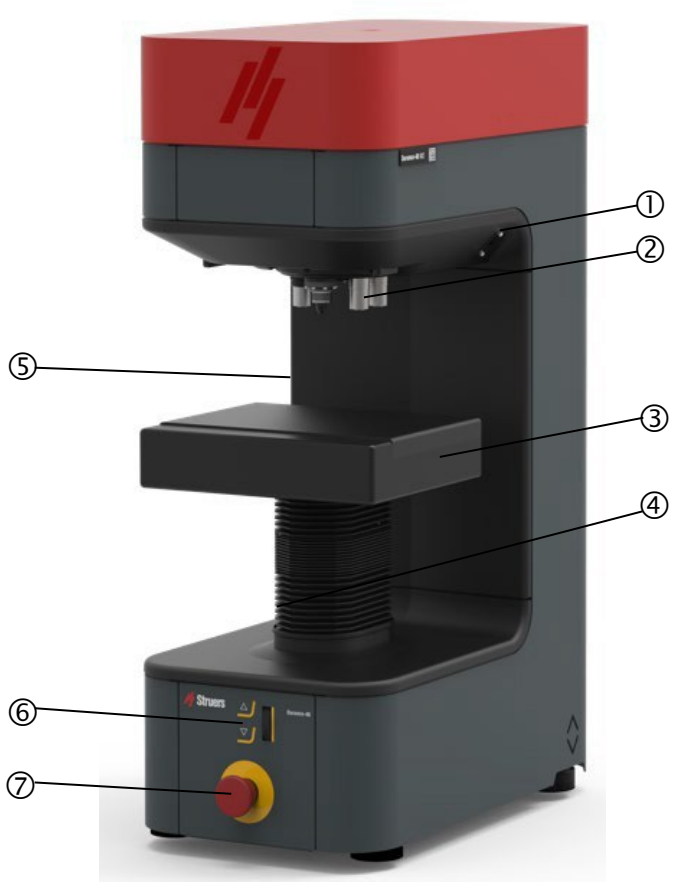
Take a moment to familiarise yourself with the location and names of the Duramin-40 components.

Tester

15'' LCD monitor touchscreen

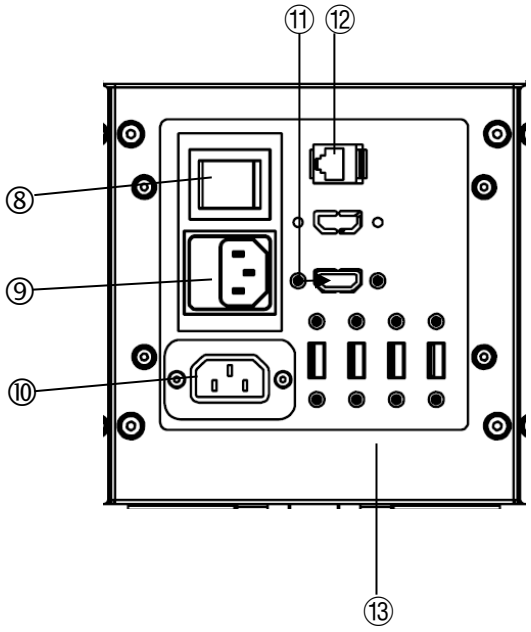
Wireless keyboard & mouse (Option)

Hardness Tester Body



① USB port
② 6 position turret
③ XY-stage
④ Spindle cover
⑤ Connection for motorized XY-stage
⑥ Z-axis & focus control
⑦ Emergency stop

Power Connections



⑧ Main power switch
⑨ Main power connection / Fuse
⑩ Power connector to monitor
⑪ HDMI connector to monitor
⑫ Network (RJ-45 LAN connection)
⑬ USB connections to monitor and receiver for keyboard and mouse

USB Drive and WiFi Adapter

The USB drive contains direct and indirect calibration documents.

The USB WiFi Adapter allows for cable free communication with the Duramin.

Rear plate

Information on the model number, serial number, weight, date of manufacture, and power requirements can be found on the type plate on the back of the machine.

Noise Level

See Technical Data in the rear of the Instruction Manual for information on the sound pressure level value.

Supplying Power
Connecting the Tester

ELECTRICAL HAZARD

Switch the power off when installing electrical equipment.

The machine must be earthed (grounded).

Check that the mains voltage corresponds to the voltage stated on the type plate on the side of the machine.
Incorrect voltage may result in damage to the electrical circuit.

Power Socket

The mains power socket must be easily accessible and located between 0.6 m - 1.9 m (2½" – 6') above floor level. (An upper limit of 1.7 m (5' 6") is recommended).

Machine is shipped with 2 types of Mains cables:

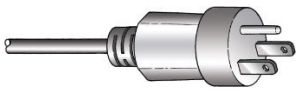
Single-phase Supply

The 2-pin (European Schuko) plug is for use on single-phase connections.

If the plug supplied on this cable is not approved in your country, then the plug must be replaced with an approved plug. The leads must be connected as follows:

Yellow/green:	earth (ground)
Brown:	line (live)
Blue:	neutral

3-phase Supply



The 3-pin (North American NEMA) plug is for use on 3-phase power connections.

If the plug supplied on this cable is not approved in your country, then the plug must be replaced with an approved plug. The leads must be connected as follows:

Green:	earth (ground)
Black:	line (live)
White:	line (live)

Connection to the Machine

- Connect the power cable to the Machine. (IEC 320 connector).
- Connect to the mains power supply.

Assembling the Monitor

Contents of the monitor box:

1 monitor with base
1 power cord adapter
1 USB cable, and European power cords

HINT:
The dual monitor option will be delivered with 2 monitor boxes.

- Remove the monitor's rear panel.
- Slide the panel off to expose the connection ports.

- Remove the two black plastic pieces around the monitor stand joint.
- Adjust the stand angle.
  If necessary loosen the two nuts around the joint using a 13 mm hexagonal wrench.

- Lay the monitor face down on a flat surface.
- Unscrew the four screws on the rear of the monitor.

- Position the stand on the back of the monitor and line up the four holes with the four screw holes.
  Check that the label **TOP** will be at the top of the monitor when it is upright.
- Tighten the four screws to attach the monitor to the stand.

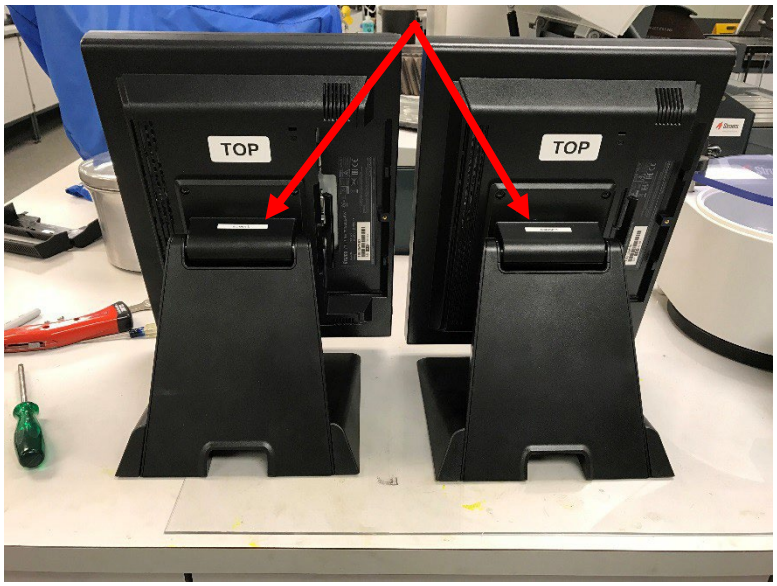
Connecting the Monitor

- Plug the USB cable into the USB port, HDMI cable to the DVI port, and the power cord adapter to the power port on the rear of the tester.
- Check that all plugs are connected correctly and replace the rear panel of the monitor.

NOTE:
Only monitors supplied by Struers may be connected to Duramin.
Failure to adhere to this may result in material damage.

Dual Monitor Option

The monitors will be labeled *Screen L* and *Screen R*.
The ports at the rear of the Duramin will also be labelled *Screen L* and *Screen R*.



- Connect the correct USB and HDMI cables to the corresponding Screen L and Screen R ports.

- The power cable for the 2nd monitor must be plugged into a mains power socket.
  The mains power socket must be easily accessible and located between 0.6 m - 1.9 m (2½” – 6’) above floor level. (An upper limit of 1.7 m (5’ 6”) is recommended).

Installing an XY Stage

HINT:
The XY-stage is usually delivered already mounted on the machine.

NOTE:
Switch Duramin OFF at the mains when installing or /removing an XY-stage. Failure to comply may result in damage to the tester.

- Move the spindle to its top position.
- Use a soft cloth to wipe any dirt or debris from the mat surfaces of the dovetail connection.
- Carefully slide the stage into the dovetail connection.
- Tighten the fixation screw to secure the stage in place.
- Connect the cable to the motorized XY-stage and to the connection on the machine.

Connection for motorized XY-stage

- Perform a few hardness tests on a test block to securely seat the stage.

The Duramin software must be configured correctly when a motorized XY-stage is mounted or removed.

NOTE:
The range of force that can be applied is limited when using an XY-stage.
Check that XY-stage is set to **On** in the Duramin software.
Failure to do so may result in overload and possible damage to the stage. Excessive overload may result in irreparable damage!

2. Basic Operations

Front Panel Controls

MAIN SWITCH
The main switch is located on the rear of the machine.
The main switch will be illuminated when the power is turned on.

The EMERGENCY STOP is located on the front of the machine.
- Push the red button to Activate.
- Turn the red button clockwise to Release.

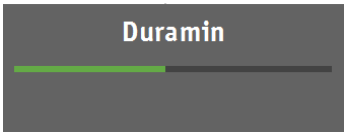
NOTE:
Do not use the Emergency stop for operational stop of the machine during normal operation.
BEFORE releasing (disengaging) the Emergency stop, investigate the reason for activating the Emergency stop and take any necessary corrective action.

Software

Duramin-40 is operated through the Duramin software.
A short description of the software is included in this manual.
Please refer to the Duramin software manual for a detailed description of the software functions.

Start-up

- Switch Duramin-40 on using the main switch at the rear.
  The Duramin software will initialize and the following progress bar will appear on the monitor:

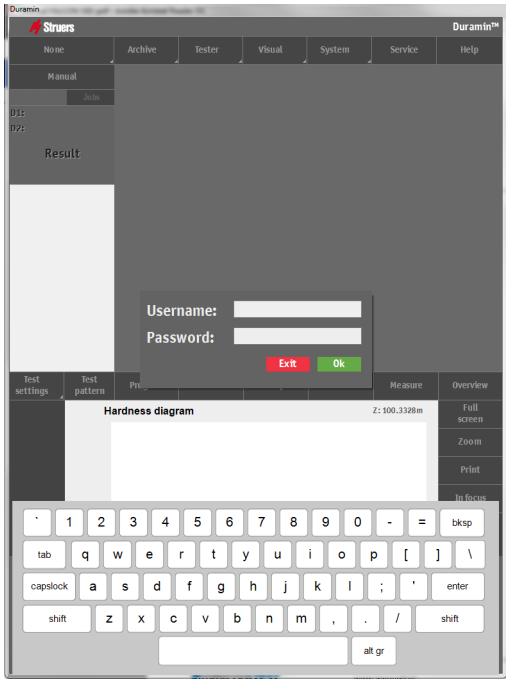


HINT:
Make sure that the emergency stop is not activated during start-up.

If the emergency stop is activated during start-up, a failure message will appear.

- Release the emergency stop.
- Press **System**, then **Exit**.
- Switch Duramin Off using the Main switch, then switch on again to start initialization.

The following screen will appear on the monitor.



HINT:
The actual screen may appear different depending on the configuration and model of the Duramin-40.

- Push gently in the middle of the designated buttons for tester operation. Do not use force. Do not use sharp objects.

Alternatively, use the external keyboard and mouse to operate Duramin-40.

- Enter the *Username* and *Password*.
  When Duramin is used for the first time, the default will be:
  Username: Admin
  Password: none
- Press **Ok**.

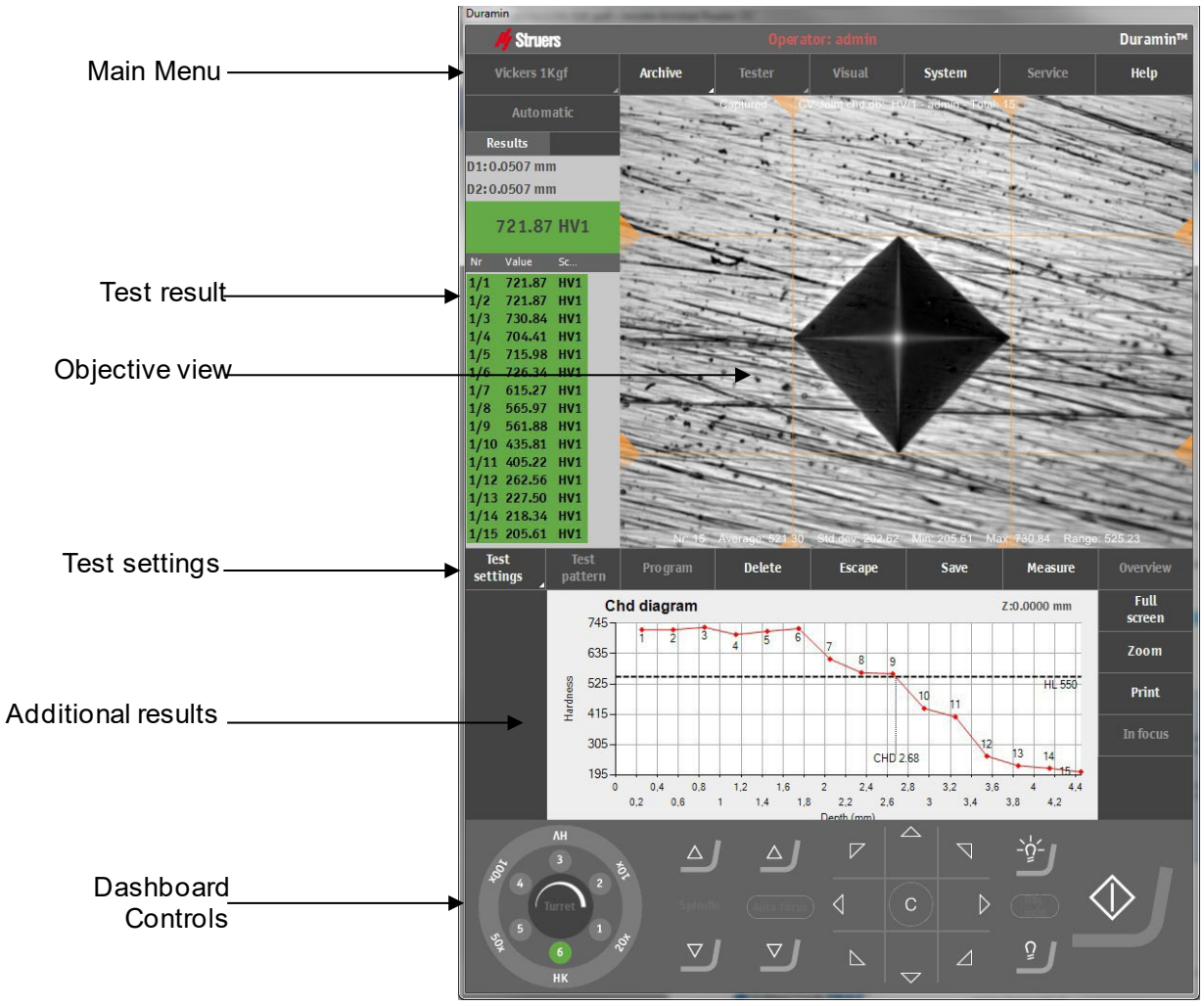
HINT:
The default username is not case sensitive.

For instructions on how to add new users, please refer to the Software manual.

Overview Screen

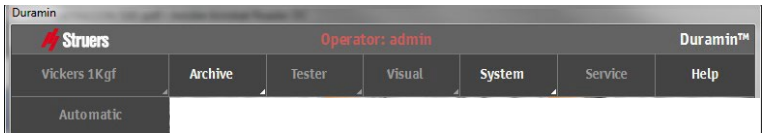
The overview screen is primarily divided into 5 main areas.

- Main menu
- Test result
- Objective view
- Test settings with Additional results
- Dashboard Controls



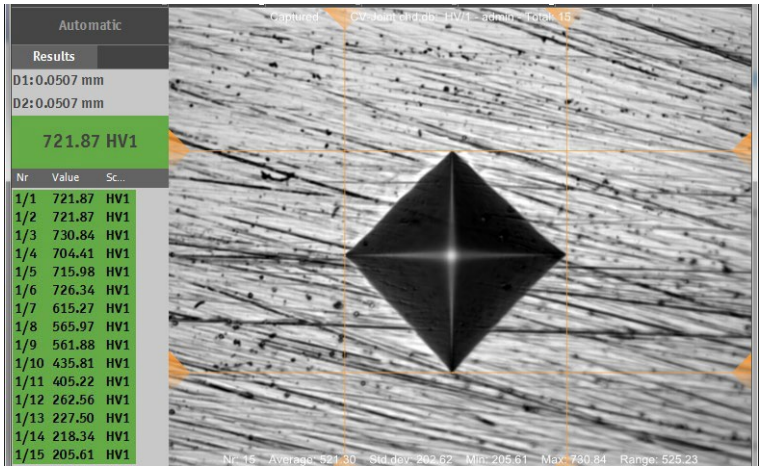
Main Menu

The *Main Menu* is used to select the test method and scale required as well as adjusting settings and other functions.



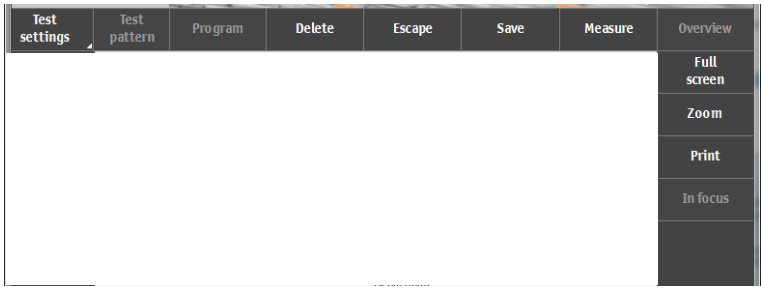
Test Result Window

The *Test Result Window* shows an image of the indent (or the indent pattern) and a list of the indents performed.



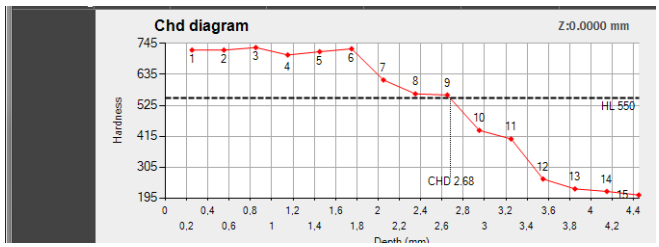
Test Settings

The *Test Settings* menus are used to select test patterns and to perform additional functions.



Additional Results Window

The *Additional Results Window* shows an illustration of the results obtained.



Dashboard Controls

The *Dashboard Controls* are used to move the turret and select the indenter or objective to be used, fine positioning of the spindle, the light controls and to start the indentation process.

HINT:
Please refer to the Duramin Software manual for a detailed description of the software and its functions.

3. Maintenance

General Cleaning

- Keep Duramin-40 as clean as possible.
  To ensure a longer lifetime for your equipment Struers strongly recommends regular cleaning.

Daily Maintenance
Machine

- Clean all accessible surfaces with a soft, damp cloth.

HINT:
Do not use a dry cloth as the surfaces are not scratch resistant.
Do not use aggressive or abrasive products.
Grease and oil can be removed with ethanol or isopropanol.

NOTE:
Never use acetone, benzol or similar solvents.

Weekly Maintenance
Cleaning Surfaces

- Clean painted surfaces and the control panel with a soft damp cloth and common household detergents.

Weekly Inspection

- Inspect the following parts before every hardness test or at least weekly.

Part	Attention	Action	Precaution
Indenter	Tip dirty	Wipe indenter	Do not bend the indenter shaft
Objective or lens	Lens surface polluted	Wipe lens	Do not scratch the objective or lens
Anvil	Rust	Remove rust	Do not bring the stage into contact with the turret.
Test block	Rusted	Replace test block	Do not use rusted test blocks

Yearly Maintenance

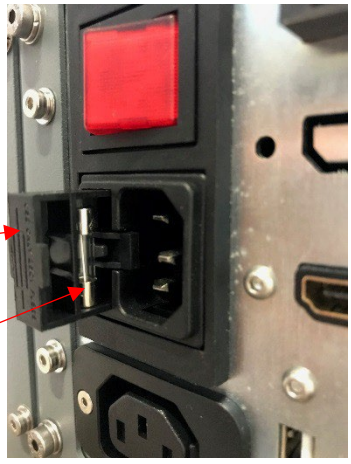
- Clean the elevator spindle and oil lightly with e.g. a universal household oil (do NOT lubricate the spindle with motor oil).
  - Carefully lift the spindle cover.
  - Wipe the spindle THOROUGHLY after lubrication so that as little as possible oil is left on the spindle.
  - Wipe the spindle again after a few days to ensure no oil residue is left on the spindle surface.

Replacing the Fuse

The fuse holder is located directly under the power connection on the rear of Duramin-40.

- Turn Duramin-40 off.
- Disconnect the power cable.
- Pull out the fuse holder using a flat-head screwdriver.

- Take out the blown fuse and replace with the reserve fuse.



- Re-install the fuse holder.
- Re-connect the electric power cable.

HINT:
Remember to order a new reserve.

Calibration

Duramin-40's highly sensitive and accurate load cell and objectives are calibrated prior to shipping.

Please contact Struers Service should the load cell or objectives require recalibration.

4. Cautionary Statements

List of Safety Messages in the Manual

WARNING

Ignoring this information and mishandling of the equipment can lead to severe bodily injuries and material damage.

ELECTRICAL HAZARD

Switch the power off when installing electrical equipment.

The machine must be earthed (grounded).

Check that the mains voltage corresponds to the voltage stated on the type plate on the side of the machine.
Incorrect voltage may result in damage to the electrical circuit.

5. Transport and Storage

NOTE:
Package the machine securely before transportation.
Insufficient packaging could cause damage to the machine and will void the warranty. Contact Struers Service for advice.
Struers recommends that all original packaging and fittings are kept for future use.

Follow these steps:

a. Familiarize yourself with the **Duramin-40: HOW TO UNPACK** document.
b. Disconnect Duramin from power.
c. If an XY-stage is mounted, remove the stage before moving the tester.
d. Position a foam block between the anvil/ stage and the turret.
e. Position a foam block between the indenter and the anvil to prevent it from moving.
f. Remove the lifting bar hole covers and insert the lifting bar.
g. Place the lifting straps[3] securely around the lifting bar.
h. Lift the machine and (while lifted) remove the feet.
i. Move the machine to its new position.

If the machine is bound for long-time storage or shipping:

j. Place the machine on the pallet. Remember to line up the holes on the pallet with the holes in the machine.
k. Mount the transport bolts.
l. Secure the actuator with a plastic strip
m. Mount the sides of the crate.
n. Place the accessories box, and other loose items in the crate. To keep the machine dry, place a desiccant (silica gel) in the box, too.
o. Mount the lid of the crate.

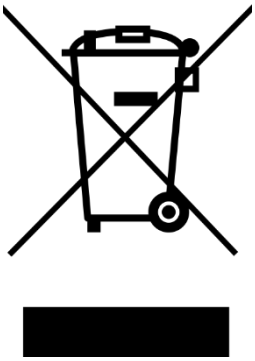
At the new location:

p. Check the Pre-Installation Checklist.

NOTE:
Always use the lifting bar when moving the machine.
Failure to use the lifting bar could cause severe damage to the machine and will void the warranty.
NOTE: Always transport the hardness testing machine in an upright position.

[3] Straps must be approved to at least twice the weight of the machine.

6. Disposal



Equipment marked with a WEEE symbol contain electrical and electronic components and must not be disposed of as general waste.
Please contact your local authorities for information on the correct method of disposal in accordance with national legislation.

Reference Guide

Table of Contents **Page**

1. Struers Knowledge

The need for fast, robust and well proven test methods for materials verification is inevitable. Vickers, Knoop, Rockwell and Brinell methods, with a countless number of loads and indenter geometries, gives an almost countless number of procedures, suitable for simple characterization of a large fraction of existing materials.

HINT:
Visit the Struers Hardness testing website for a comprehensive introduction to the principles of hardness testing, useful troubleshooting tips and the latest application knowledge in the field.

Click on the link: Struers - Ensuring Certainty / Knowledge / Hardness testing

OR

Scan the QR code on the Duramin tag on your machine

2. Trouble-Shooting

Some of the minor malfunctions can be resolved by restarting the tester:

- Press **System**, then **Exit**.
- Click on the stop icon on the taskbar to shut down the embedded PC.

- Switch Duramin Off, then switch on again to start initialization.

Error	Explanation	Action
Start-up failure	The emergency stop is activated	- Release the emergency stop. - Restart the tester.
Max. down reached!	The maximum down position of the force actuator has been reached.	
Motor failure!	Failure of force application motor.	- Restart the tester. If the error remains, contact Struers Service.
System not initialized!	Failure of Software communication.	- Restart the tester. If the error remains, contact Struers Service.
Failed to open connection to AUX on EURP AUX Virtual Com Port (COM3)	Failure of Software communication.	- Restart the tester. - Press **System**, then **Exit**. - Switch Duramin Off, then switch on again to start initialization. If the error remains, contact Struers Service.
Load motor is not in home position		- Press **Escape**. - Then press **Start**. If this does not help, - Restart the tester. If the error remains, contact Struers Service.

3. Service

Struers recommends that a regular service check be carried out on a yearly basis.
Servicing must be carried out by Struers Field Engineers, or skilled personnel specifically trained by Struers.

Struers offers a range of comprehensive maintenance plans to suit the requirements of our customers. This range of services is called **ServiceGuard**.
The maintenance plans include equipment inspection, replacement of wear parts, adjustments/calibration for optimal operation, and a final functional test.

4. Legal and Regulatory

FCC Notice

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the Instruction Manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.
Pursuant to Part 15.21 of the FCC Rules, any changes or modifications to this product not expressly approved by Struers ApS could cause harmful radio interference and void the user's authority to operate the equipment.

5. Technical Data

HINT:
Please refer to the Duramin-40 brochure for further details.

Struers
Ensuring Certainty

TECHNICAL DATA

Duramin-40

		Duramin-40
Hardness methods	Vickers	ISO 6507 ASTM E384, E92 JIS B 7725
	Knopp	ISO 4545 ASTM E92 JIS Z 2251
	Brinell	ISO 6506 ASTM E10 JIS Z 2243
	Conversion	Conversions to other hardness methods according to ASTM E140, ISO 18265, GB/T 1172
Force range	Duramin-40 M1/A1/AC1	0.098 - 98,1 N (10gf - 10 kgf)
	Duramin-40 M2/A2/AC2	0.098 - 306.5 N (10 gf - 31.25 kgf)
	Duramin-40 M3/A3/AC3	0.0098 - 612.9 N (1.0 gf - 62.5 kgf)
Test force	Force application	Load cell, closed loop, force feedback system
	Test force tolerance	< 0.25% for test force above 0.1kgf < 0.5 % for test forces lower than 0.1kgf
	Dwell time settings	Standard 10 seconds, user defined up to 250 seconds
Turret	Motorized turret	6 position turret, 2 indenter positions, 4 objective positions
Electrical data	Power supply	100 V AC - 240 V AC, 50/60Hz, single phase
	Power consumption Max. load Power consumption max. load	90 W
	Idle	67 W
Residual Current Circuit Breaker (RCCB)		Type A, 30 mA is required depending on local regulations.
Dimensions	Width	27.4 cm (10.8")
	Depth	47.2 cm (18.6")
	Height	77.5 cm (30.5")
Weight	Duramin-40 M1/M2/M3	120 kg (264.6 lbs)
	Duramin-40 A1/A2/A3/AC1/AC2/AC3	130 kg (286,6 lbs)
Read method		Automated from Camera Image
Overview camera resolution	Duramin-40 M1/ M2/ M3/A1/A2/A3	No camera
	Duramin-40 AC1/AC2/AC3	5 Mpix (optional)

Struers
Ensuring Certainty

TECHNICAL DATA

Duramin-40

		Duramin-40
Overview camera field of view	Duramin-40 M1/ M2/ M3/A1/A2/A3	No camera
	Duramin-40 AC1/AC2/AC3	200 x 160 mm (7.9" x 6.3")
Meassurement camera resolution		5 Mpix or higher
Positions in nosepiece	Duramin-40	6
Position in nosepiece for overview camera	Duramin-40 M1/ M2/ M3/A1/A2/A3	NA
	Duramin-40 AC1/AC2/AC3	1
Max no. of Indenters		2
Max No. of Objectives		4
Indenter Shaft	Diameter	3 mm (0.12")
Standard objectives included		Objective lenses and indenters are ordered separately
Z-Axis		Motorized
XY Stage / Anvil	Duramin-40 M1/M2/M3	Manual XY-stage
	Duramin-40 A1/ A2/ A3/ AC1/ AC2/AC3	Automatic XY-stage
Stage Size	Duramin-40 M1/M2/M3	100 x 100 mm (3.9" x 3.9")
	Duramin-40 A1/ A2/ A3/ AC1/ AC2/AC3	357 x 208 mm (14" x 8.2")
Stage Stroke (travel range)	Duramin-40 M1/M2/M3	25 x 25 mm (0.98" x 0.98")
	Duramin-40 A1/ A2/ A3/ AC1/ AC2/AC3	220 x 120 mm (8.7" x 4.7")
Auto Illumination		Yes
Stage Illumination		Yes
Laser/LED Guide		No
Software	Operating software	Embedded software for work flow system & tester control
	Integrated PC	Yes
	Monitor	15” touchscreen
	Possibility to connect Printer	Yes (A4, A3 full color laser printer optional)
	Ethernet Connection	Yes
	Data Export	5x USB, Ethernet LAN, Wi-Fi, RS232, Bluetooth, HDMI
System	Data output	XML, CSV, Q-DAS certified (optional)

Struers
Ensuring Certainty

TECHNICAL DATA

Duramin-40

		Duramin-40
Software modules	Duramin-40 M1/M2/M3	Basic Statistics (included) Data export (included) Report editor (included) Test pattern (included) Editor, CHD (optional)
	Duramin-40 A1/ A2/ A3/ AC1/ AC2/AC3	Basic Statistics (included) Data export (included) Report editor (included) Test pattern (included) Editor, CHD (included) Kc Fracture (optional)
Sample height	Duramin-40 M1/M2/M3	172 mm (6.8")
	Duramin-40 A1/ A2/ A3/ AC1/ AC2/AC3	148 mm (5.8")
Sample weight		25 kg (55 lbs)
Throat depth		170 mm (6.7") (from Center of indenter to back)
Safety standards		CE labelled according to EU directives
REACH		For information about REACH. contact your local Struers office
Operating environment	Surrounding temperature	10-35°C (50-95°F)
	Humidity	10%-90% RH non-condensing
Safety Circuit Categories/Performance Level	Emergency stop	EN ISO 13849-1 PL c, Category 1 Stop category 0
Noise level	A-weighted sound emission pressure level at workstations	< 70 dB(A)
Vibration level	During operation	Total vibration exposure to upper parts of the body does not exceed 2.5 m/s2.

Doc. no.: 16607750_A_en
Date of release: 30-06-2023

Declaration of Conformity

Manufacturer	Struers ApS • Pederstrupvej 84 • DK-2750 Ballerup • Denmark
Name	Duramin-40
Model	M1, M2, M3, A1, A2, A3, AC1, AC2 or AC3
Function	Hardness tester
Type	660
Cat. no.	06606101, 06606102, 06606103, 06606111, 06606112, 06606113, 06606121, 06606122, 06606123
Serial no.	

CE Module H, according to global approach **EU**

We declare that the product mentioned is in conformity with the following legislation, directives and standards:

2006/42/EC	EN ISO 12100:2010, EN ISO 13850:2015, EN ISO 13849-1:2015, EN ISO 13849-2:2012, EN 60204-1:2018
2011/65/EU	EN 63000:2018
2014/30/EU	EN 61000-3-2:2014, EN 61000-3-3:2013, EN 55011:2016/A1:2017/A11:2020, EN 61326-1:2021

Authorized to compile technical file/
Authorized signatory

Date: [Release date]

Pederstrupvej 84
DK-2750 Ballerup
Denmark