

Duramin-100

Instruction Manual

Original instructions



Duramin-100
Instruction Manual

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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-62.5 kgf, 10 gf-150 kgf, and 10 gf-250 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-100 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 Manuals 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 change without notice. The manual may mention accessories or parts not included in the present version of the equipment.

The content of this manual are the property of Struers. Reproduction of any part of this manual without the written permission of Struers is not allowed.

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Duramin-100

Safety Precautions¹

Read carefully before use

1. Ignoring this information and mishandling of the equipment can lead to severe bodily injuries and material damage.
2. 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.
3. The machine must be installed in compliance with local safety regulations.
4. Do not operate the equipment at a voltage other than the power voltage that is indicated. Doing so can cause fires.
5. Do not twist or damage the power cords. Damaged power cords can cause fire and/or electric shock.
6. Do not block the ventilation. Blocking the ventilation can cause heat to accumulate inside the machine, which in turn, can generate fire.
7. 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.
8. Do not modify this equipment. Doing so can cause fire and/or electric shock.
9. Do not disassemble this equipment. Doing so can cause electric shock.
10. Do not open any panel on the machine. High voltages exist inside the machine and may cause electrical shocks to personnel.

¹ From Safety Precaution Sheet, Revision A

- 11.** 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.
- 12.** In case of fire, alert bystanders, the fire brigade and cut power. Use a powder fire extinguisher. Do not use water.
- 13.** Do not connect/ disconnect power with wet hands. Doing so can result in electric shock.
- 14.** If malfunctions, smoke or unusual noises are observed - turn off the power, disconnect the power supply and call technical service.
- 15.** Disconnect the power supply prior to any cleaning, maintenance or service.
Failure to do so can result in electric shock.
- 16.** If two persons work together, make sure to communicate clearly to avoid injuries.

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

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

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.

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
<i>Italic type</i>	indicates product names, items in software programs or figure titles
<u>Blue text</u>	indicates a link to another section or webpage
■ Bullets	indicates a necessary work step

User's Guide

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1. Getting Started

General Device Description

Duramin-100 is an automatic hardness tester that offers the most common-used hardness testing methods for all types of stable and non-explosive metals.

The test operator starts the procedure by positioning – and eventually – securing the sample to the anvil or stage. A wide range of clamping tools and vices are available to fit your needs.

Via the included software, the operator selects the test type and presses start on the stand-alone touch screen. The software calculates the values instantly and stores them on the internal hard drive. Afterwards, the data can be moved to a memory stick or to a network drive.

In the unlikely situation of an accident or unforeseen incident, the operator can hit the emergency stop to bring the machine to a standstill

Unpacking Duramin-100

Refer to the **DURAMIN-100: HOW TO UNPACK** instructions delivered with Duramin.



NOTE:

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

NOTE:

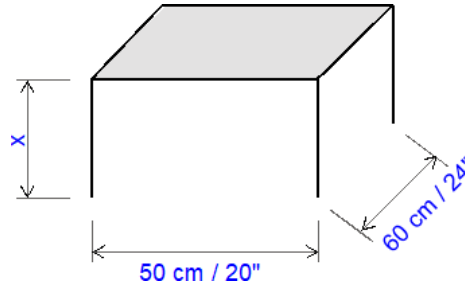
Store the packing crate and foam packaging for use whenever Duramin is transported/re-located.

Failure to use the original packaging and fittings could cause severe damage to the tester and will void the warranty.

- Carefully open and remove the top of the packing crate.
- Remove one side of the packing crate.
- Remove the monitor, box of accessories and other loose items.
- Carefully lift the foam pieces to access Duramin.
- Remove the plastic covering.

Location

- Duramin must be placed close to the power supply.
- Duramin is designed to be placed on a rigid, stable workbench with a horizontal surface.



Recommended workbench dimensions. Height of table (X) follows local preferences.

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.

A simple way of detecting vibrations is to set up a tray of water and watch for ripples on the surface.



HINT:

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-100

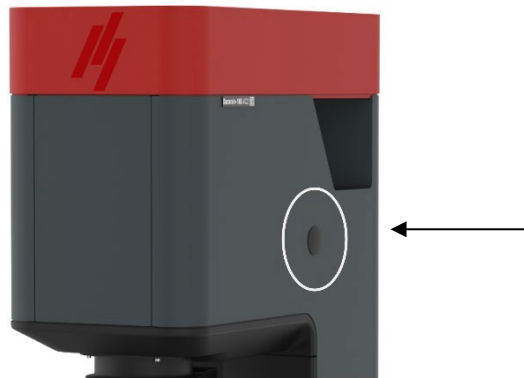
A crane, lifting bar (approx. 75cm length, 25mm diameter) and lifting straps¹ are required to lift the machine from the packing crate. The crane should have a minimum lifting capacity of twice the weight of the machine.



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.



- Remove the bolts that secure the transportation plate to the pallet.
- Remove the plastic hole covers.
- Insert the lifting bar.
- Place the lifting straps securely around the lifting bar. Ensure that the straps do not press on the tester.
- Carefully lift Duramin out of the packing crate.
- While lifted, remove the transportation plate.
- Mount the four adjustable vibration dampers.
- Make sure that the dampers are of equal height.
- Lift Duramin to its final location.



NOTE:

DO NOT place the lifting bar or the lifting straps through the space in the tester's cover.

¹ Lifting straps must be approved to at least twice the weight of the machine.

Placing Duramin-100

Levelling

To eliminate possible wear and tear on the tester's 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

- Remove the lifting bar.
- Re-mount the two black hole covers.



NOTE:

Keep the lifting bar for future use.

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-100 (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:

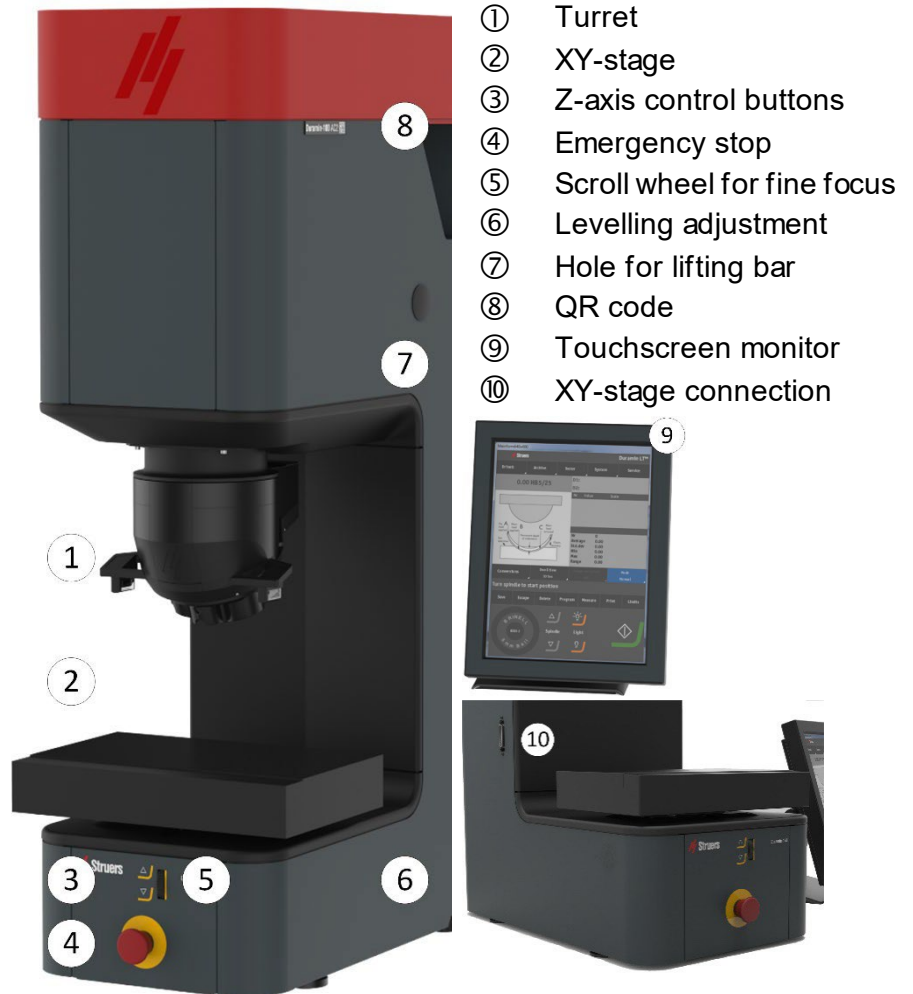
Some components or parts may be packaged separately and may not be included in the accessory case or may have been installed on the hardness tester.

HINT:

The actual packaging and accessories may appear different to those shown in the picture.

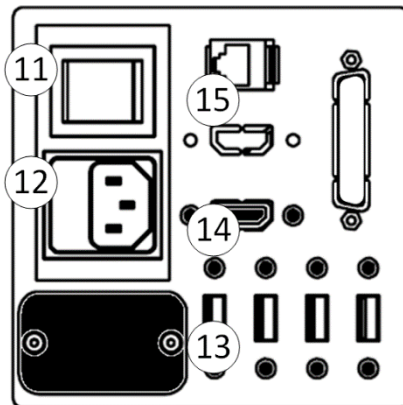
Getting Acquainted with Duramin-100

Take a moment to familiarise yourself with the location and names of the Duramin-100 components.



- ① Turret
- ② XY-stage
- ③ Z-axis control buttons
- ④ Emergency stop
- ⑤ Scroll wheel for fine focus
- ⑥ Levelling adjustment
- ⑦ Hole for lifting bar
- ⑧ QR code
- ⑨ Touchscreen monitor
- ⑩ XY-stage connection

Power Connections



- Main Power
- Main power connection
- USB connections
- HDMI connection
- Network (RJ-45 LAN connection)

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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 machine.

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.

Power Supply
Connecting the Tester

Always remember to switch the power off when installing electrical equipment!



ELECTRICAL HAZARD

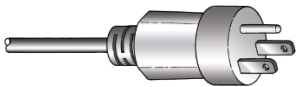
The machine must be earthed.
Check that the mains voltage corresponds to the voltage stated on the type plate on the side of the machine.
Incorrect voltage may result in damage to the electrical circuit.



Duramin-100 is shipped with 2 types of Mains cables:
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



The 3-pin (North American NEMA 5-15P) 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:

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

Connection to the Machine

Standard IEC 320 connector:



- 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 HDMI-DVI cable
- 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 HDMI 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 labelled *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.

Dovetail connection



Fixation screw

- 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 dummy sample to securely seat the stage.



NOTE:

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



- ① Spindle up/down
- ② Scroll wheel for fine adjustment
- ③ Emergency stop

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.
Emergency Stop

- Push the red button to Activate.
- Turn the red button clockwise to Release.



NOTE:

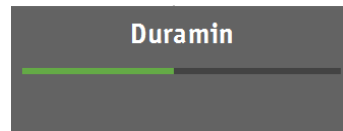
Do not use the Emergency stop for operational stop of the machine during normal operation.
BEFORE releasing (disengaging) the Emergency stop, investigate the reason for activating the Emergency stop and take any necessary corrective action.

Software

Duramin-100 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.

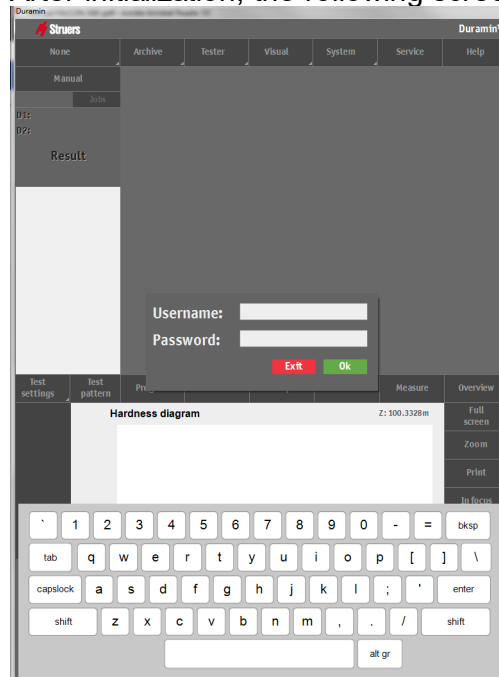
Start-up

- Switch the machine on.
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.

After initialization, the following screen appears:



To prevent scratching the screen, avoid using sharp objects

The actual screen may appear different depending on the configuration and model of the Duramin-100.

Alternatively, use the external keyboard and mouse to operate Duramin-100.

- Your first Username and password.
Username: Admin
Password: none
- Press **Ok**.

HINT:

The default username is not case sensitive.

HINT:

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



Start-up After Emergency Stop

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

- Release the emergency stop.
- Press **System**, then **Exit**.



← Exit

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

Overview Screen

The overview screen is primarily divided into 5 main areas.

The screenshot shows the Duramin software interface. On the left, there is a 'Main Menu' section with options like 'Vickers 1Kgf', 'Archive', 'Tester', 'Visual', 'System', 'Service', and 'Help'. Below this is a 'Results' table showing test data. The central part of the screen displays a 'Objective view' of a diamond-shaped indenter on a material surface. Below the objective view is a 'Test settings' section with options like 'Test pattern', 'Program', 'Delete', 'Escape', 'Save', 'Measure', and 'Overview'. At the bottom, there is a 'Graph' showing a 'Chd diagram' with 'Hardness' on the y-axis and 'Depth (mm)' on the x-axis. The bottom-most section is the 'Dashboard Controls', which includes a circular turret control and various navigation buttons.

Labels and arrows pointing to the interface elements:

- Main Menu
- Test result
- Objective view
- Test settings
- Graph
- 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.

Graph

The *Graph* 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 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.



Perform a Test

Consider the following as your basic test.

Follow these steps:

- Check that the sample surface is smooth and even.
- Check that the sample surface is free from oxide scale, foreign matter and completely free from lubricants.
- Setup the tester with the required type of test, scale (load) and required indenter.
- Place the specimen on the anvil / XY-stage.

Starting the test

-  Press Start to start the test.
The testing procedure will proceed automatically.
-  The start button will turn into a red stop button.
Press Stop to interrupt the test.
(Do not use the Emergency Stop unless necessary).



CAUTION

Do not place your hand between the sample and the indenter.

3. Maintenance

General Cleaning

- Keep Duramin-100 as clean as possible.
To ensure a longer lifetime for your equipment Struers strongly recommends regular cleaning.
- Clean all accessible surfaces with a soft, damp cloth.

Daily Maintenance Machine



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 Weekly Inspection

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

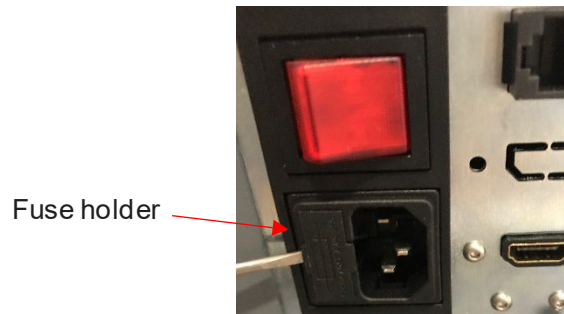
The emergency stop is the only safety device on a Duramin. Follow these steps to test it:

- Start the machine.
- Hit emergency stop.
If the machine powers off, all is OK.
If the machine does not stop, call Struers Service.

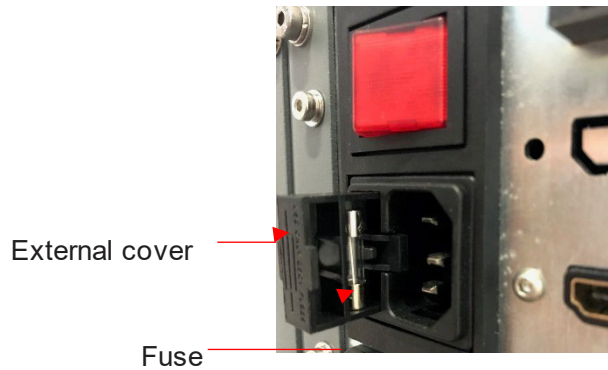
Replacing the Fuse

The fuse holder is located directly under the power connection on the rear of Duramin-100.

- Turn Duramin-100 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 spare fuse.

Calibration

Duramin-100'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



ELECTRICAL HAZARD

The machine must be earthed.

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.



CAUTION

Do not place your hand between the sample and the indenter.

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:

- Familiarize yourself with the **DURAMIN-100: HOW TO UNPACK** document
- Disconnect Duramin from power.
- Mount the transport plate on the motorized XY-stage (if present).
- Place the lifting straps² securely on the lifting bar.
- Move the machine to its new position.

If the machine is bound for long-time **storage** or **shipping**, follow these steps:

- While lifted, remove the feet.
- Line up the holes on the transport plate with the bolts on the machine. Fasten the machine to the plate.
- Place the machine on the pallet.
- Secure the transport plate with bolts and nuts to the pallet.
- Mount the sides of the crate.
- 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.
- Mount the lid of the crate.



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:

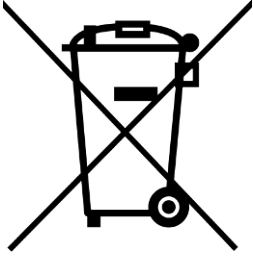
Always transport the hardness testing machine in an upright position.


NOTE:

DO NOT ship or transport the tester without the correct packing materials.

² Lifting 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.

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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.



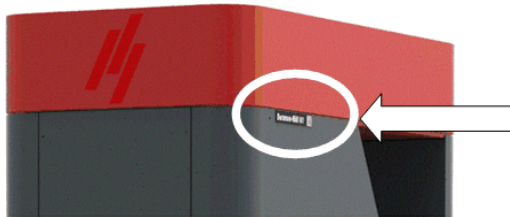
HINT:

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 to go to the web-site.



2. Trouble-Shooting

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

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



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



NOTE:

Failure to follow the above procedure may cause you to lose all your stored data.

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 after every 1500 hours of use.

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-100 brochure](#) for further details.

		Duramin-100
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
	Rockwell - optional	ISO 6508 ASTM E18 JIS Z 2245
Conversion		-
Force range	Duramin-100 M1	0.49-612.9 N (50 gf-62.5 kgf)
	Duramin-100 A2	0.49-1176.8 N (50 gf-120 kgf)
	Duramin-100 AC3	0.49-2452 N (50 gf-250 kgf)
Test force	Force application	Load cell, closed loop, force feedback system
	Test force tolerance	< 0.25% for test force 100 gf to 250kgf < 0.5 % for test forces below 100gf
	Dwell time settings	Default 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. work load	72 W
	Power consumption IdlePower consumption idle	60 W
	Power consumption max. load Power consumption Max. load Power consumption max. load	156W
Residual Current Circuit Breaker (RCCB)		Type A, 30 mA is required depending on local regulations.
Dimensions	Width	31.5 cm (12.4")
	Depth	61.5 cm (24.2")
	Height	110 cm (43.3")
Weight		190 kg /418.88 lbs)
Read method		Automated from Camera Image
Overview camera resolution		5 Mpix

		Duramin-100
Overview camera field of view		200x160 mm (7.87"x6.3")
Measurement camera resolution		10.8 Mpix
Positions in nosepiece		6
Position in nosepiece for overview camera		1
Max no. of indentersMax no. of Indenters		2
Max no. of objectivesMax No. of Objectives		4
Indenter Shaft	Diameter	6.35 mm or 3 mm (two positions, one for 3mm shaft size and one for 6.35 mm shaft size. The 6.35 mm shaft indenter position can only perform loads $\geq 3\text{kgf}$.)
Standard objectives included		5x, 10x, 20x and 40x standard (2.5x, 60x, 100x optional)
Z-Axis		Motorized
XY Stage / Anvil	Duramin-100 M1	Anvil or manual
	Duramin-100 A2/AC3	Motorized
Stage Size	Duramin-100 M1	Anvil $\varnothing=200\text{mm}$
	Duramin-100 A2/AC3	337x187mm (13.3"x7.4")
Stage Stroke (travel range)	Duramin-100 M1	NA
	Duramin-100 A2/AC3	200 x 100 mm (7.9" x 3.9")
Auto Illumination		Yes
Stage Illumination		Yes
Laser/LED Guide		Yes
Software	Operating software	Embedded software for work flow system & tester control
	Integrated PC	Yes
	Monitor	15" touchscreen_ (2nd monitor optional)
	Dual view	Optional
	Possibility to connect Printer	Yes, but optional (A4, A3 full color laser printer)
	Ethernet Connection	Yes
	Data Export	5 USB ports, RJ45 Ethernet LAN, W-LAN, RS-232, Blue Tooth, 5 Axis CNC & motorized XY- stage connector, Dual HDMI screen connectors

		Duramin-100
System	Data output	XML, CSV, Certified for Q-DAS (Optional)
Software modules		Total test, max, min, average, range, standard deviation, All in real time after each test
Sample height		136 mm (5.4")
Sample weight	Duramin-100 M1	50 kg (110 lbs)
	Duramin 100 A2/AC3	200 kg (441 lbs)
Throat depth		230 mm (9.1")
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/s ² .

Declaration of Conformity

Manufacturer	Struers ApS • Pederstrupvej 84 • DK-2750 Ballerup • Denmark
Name	Duramin-100
Model	M1, A2, AC1, AC2 or AC3
Function	Hardness tester
Type	661
Cat. no.	06616101, 06616112, 06616121, 06616122, 06616123
Serial no.	



Module H, according to global approach



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]



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