

Duramin-A300

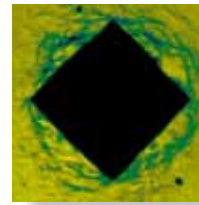


**Hardness tester with
extended test load range
for Vickers, Knoop,
Brinell and Superficial
Rockwell tests**



- Unique test load range from 0.981 N (100 g) to 306.6 N (31.25 kg) enables Duramin-A300 to replace several single task machines
- Suitable for Vickers, Brinell, Knoop and Superficial Rockwell tests
- Innovative closed-loop technology ensures accurate test loads
- Completely automatic test cycles eliminate operator influence and frees operator time
- Automatic exchange of lens and indenter eliminates the number one cause of machine misalignment
- Automatic image evaluation assures the highest possible repeatability and reproducibility
- State-of-the-art focus technology enables the system to auto focus fast and perfectly the first time
- High-resolution CCD-camera offering <0.2 micron per pixel thus complying with the ISO 6507 requirements
- With an electric XY stage case hardness depth Chd (Eht), Rht, and nitrided depth (Nht) test runs are performed automatically
- A second CCD-camera makes it easy to select starting points and test series with just a few mouse clicks
- Automatic stop function once a defined case hardness limit has been reached minimizes the number of indents and time required to perform an evaluation
- Case depth evaluation is projected graphically for reporting, including multiple curves
- Automatic indent spacing ensures perfect spacing according to norms
- With multiple specimens software automatic measuring of test lines on multiple specimens is easily programmed, allowing hours of unattended testing

Duramin-A300



Extended test load range

The unique test load range up to 31.25 kg enables you to cover many applications, which usually require minimum 2 pieces of equipment – a micro- and a macro indentation hardness tester. With Duramin-A300, just one hardness tester will do the job!

Duramin-A300 covers all of the following test methods:

- **Vickers:** HV0.1, HV0.2, HV0.3, HV0.5, HV1, HV2, HV3, HV5, HV10, HV20, HV30
- **Knoop:** HK0.1, HK0.2, HK0.3, HK0.5, HK1
- **Brinell:** HB1/1, HB1/2.5, HB1/5, HB1/10, HB1/30, HB2.5/6.25, HB2.5/15.625, HB2.5/31.25
- **Rockwell:** HR15N, HR15T, HR30N, HR30T

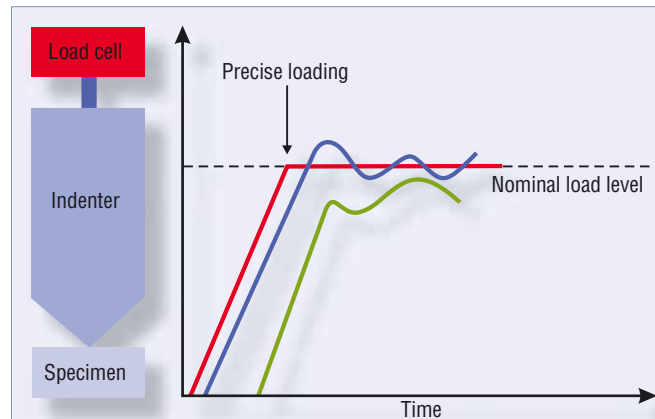
Time saving automatic test cycles

Duramin-A300 is available with semi-automatic and fully-automatic software systems.

Regardless which Duramin-A300 model you choose, the entire test cycle of applying load, uploading, focusing and capturing of the image is performed fully automatic. This greatly improves reproducibility as operator influence is not required, thus preventing causes for potential vibrations.

Equipped with a swiveling body or an automatic turret, exchange of indenter and lens runs fully automatic. Again, the operator does not touch the machine, which eliminates the number one cause of machine misalignments.

Fully-automatic measuring of indentations with image analysis software significantly improves the repeatability of the results and eliminates variations among operators. In combination with a motor-



The load is applied accurately due to the closed-loop technology. No load overshoot or undershoot as commonly known from dead weight systems

ized stage, entire test series can be run automatically, saving time and allowing the operator to attend to other tasks.

Innovative closed-loop technology

The test load is applied via a closed-loop control unit with a load cell, a DC motor and an electronic measurement and control unit. The result is highly accurate measurements at all test loads. The common load overshoot or undershoot as known from traditional dead weight, or open-loop, systems is eliminated. The absence of mechanical weights not only eliminates friction problems but also makes the equipment less sensitive to misalignments caused by vibrations. Duramin-A300 not only conforms to all standards but offers higher accuracy, which will ensure that the unit also can do the job in the future.

State-of-the-art auto focus technology

An important result of the use of the closed-loop technology is the fast and reliable auto focus system. Since the load cell detects exactly when the indenter touches the specimen, the system is also able to bring the objective lens in focus automatically every time. Not relying on an image analysis system and correct contrasting eliminates iterative focusing adjustments and saves a lot of operation time.

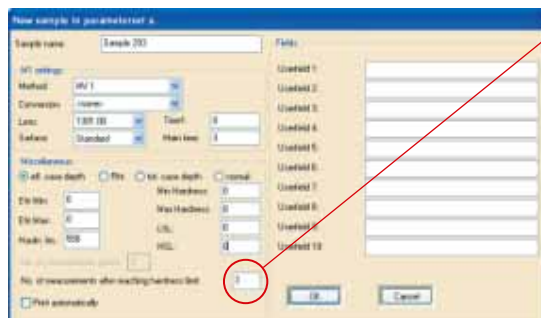
Duramin-A300 uses the load-cell displacement to focus perfectly on first attempt, even on specimens with surface characteristics that are usually hard to focus automatically e.g. etched surfaces.

The time saver for case depth measurement

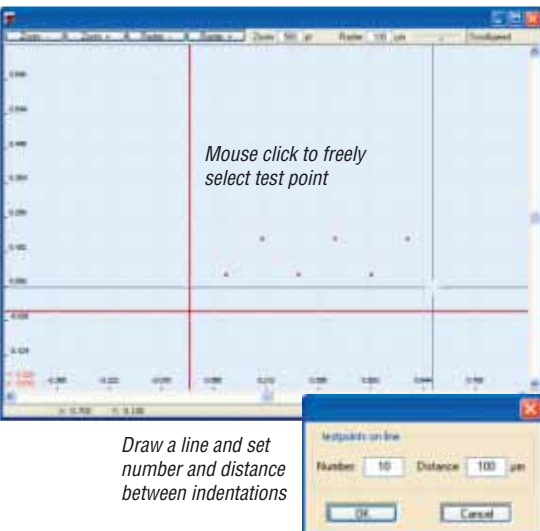
Duramin-A300 is second to none when it comes to automatic case hardness depth measuring (chd). An electric XY stage and automatic test cycles are important in that respect. But no other equipment in the market will allow you to perform case depth evaluations as fast and reliable as the Duramin-A300.

These unique features are time savers you would not want to be without:

- Easy test point editor
- Second overview camera
- Automatic stop at defined hardness limit
- Graphical projection of case depth evaluation
- Automatic indent spacing
- Multiple specimens software



Decide how many measurements you want once the hardness limit has been reached and save time on your case depth test runs



Draw a line and set number and distance between indentations

Easy test point editor

The test point editor allows you to freely select test points just by clicking coordinates with the mouse. Alternatively, you can draw a line and set number of test points and distance between the points. All set with a few mouse clicks.

Second overview camera

The second CCD-camera offers a field of view of 30 x 40 mm. It allows you to overview your entire specimen surface, and with a few mouse clicks you can easily select starting test points for case depth measuring or define test series. An infinite number of test points can be set, and the electric stage will automatically take you to each one for fine-tuning if necessary. This will save you setup time and once you start the testing, Du-

ramin-A300 can run unattended due to the fully automatic testing cycles.

In addition, a picture from the second camera can be included in your report for easy identification and overview.

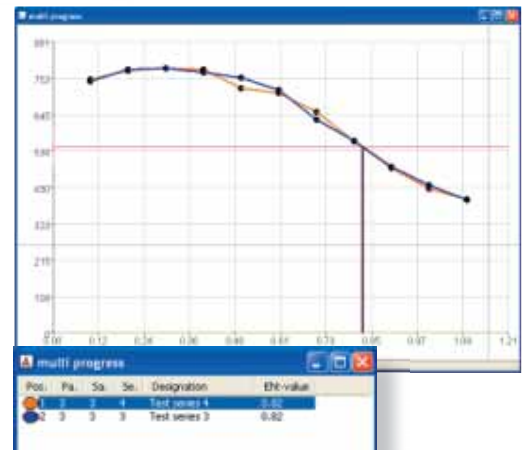
Unique automatic stop at defined hardness limit

On Duramin-A300, set-up of automatic case depth test runs is done easily and without guessing. You simply define a hardness limit and decide how many measurements you want after the limit is reached (3 in example shown). This way, you do not have to know in advance how many indentations are necessary to reach the case depth. Duramin-A300 automatically stops the test run and prevents time-consuming measuring of indentations that you do not need.

Graphical projection of case depth evaluation

The case depth evaluation is automatically plotted graphically as a curve together with the preset hardness limit. The curve is shown real-time and new points are added continuously as indentations are measured, allowing you to monitor the test run.

The graphic can be included in your final report and multiple curves can be displayed in the same graphic for easy comparison.

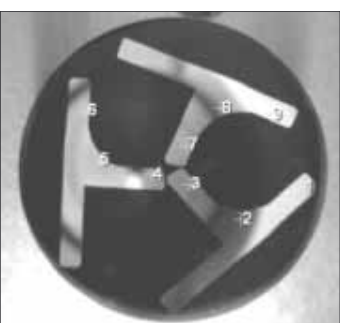


Multiple curves can be shown in the same graph for easy comparison

Automatic indent spacing

When running case depth measurements, you traditionally need to set a fixed spacing (in µm) between your indents, regardless of the fact that the size of your indentations changes through the case.

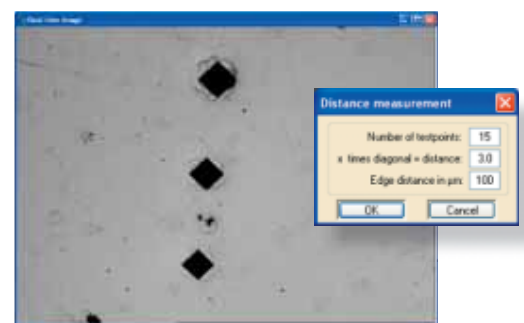
Duramin-A300 offers the unique automatic indent spacing feature, allowing the spacing to be set according to actual indentation size (e.g. 3x indentation diagonal). The spacing between each indentation is calculated individually, ensuring that spacing increases as the indentation increases in size. The result is perfectly spaced indentations and a more smooth and accurate projection of the case depth curve.



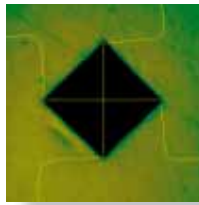
Test series or starting test points for case depth series are easily selected with a few mouse clicks



The second camera allows you to overview your entire specimen surface



The spacing between indentations are calculated individually with the automatic indent spacing feature



Multiple specimens software

The second camera allows for fast setup of multiple test points or series on your specimen. With the multiple specimens software added on, you can do this on up to 6 specimens at a time and further increase the level of automation.

Again, this will save you setup time and once you start the testing, Duramin-A300 can run unattended for hours, or even overnight, due to the fully automatic testing cycles.

The testing pattern you setup once, can be stored and recalled later for repetitive tasks, saving operator time and ensuring reproducibility.

Customer defined surface settings

As not all surfaces reflect light equally, a major challenge of fully automatic image analysis systems is to ensure the optimal lightning and contrasting to define the indentation tips correctly.

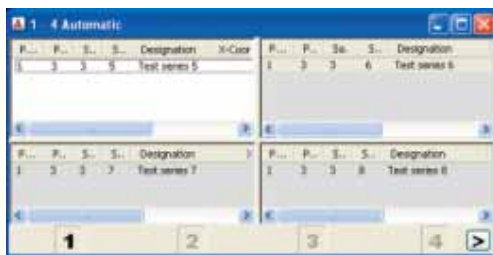
Duramin-A300 allows you to define surface settings for specific materials (e.g. steel, welds, etc). This ensures that a material is always tested with the same settings, independently of operator, thus offering the highest reproducibility.

Automatic turret

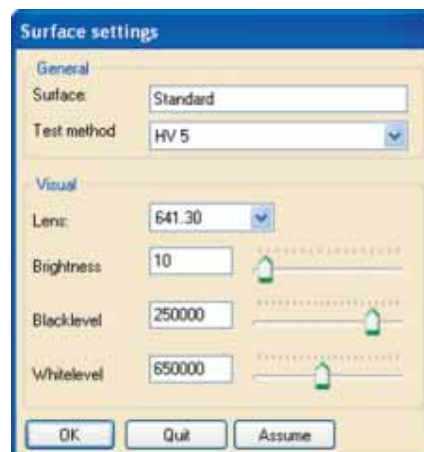
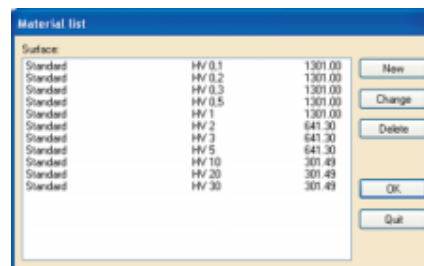
Duramin-A300 comes standard with a swiveling body holding one indenter and two objective lenses. Alternatively, it can be equipped with a 4-position automatic turret facilitating exchange between two indenters (e.g. Vickers and Knoop) and two objective lenses, or one indenter and three objective lenses.

Electric stages

The fully automatic Duramin-A300 models are equipped with an electric stage allowing specimen holders for up to 6 specimens to be used. Alternatively, an even larger stage is offered with the E version to facilitate very large specimens or up to 12 specimens.



Multiple test series can be setup for hours of unattended test runs



Optimal lightning and contrasting can be defined for a specific material to ensure that several operators always test the material with the same settings



The automatic turret holding four positions facilitates lens and indenter exchange and ensures correct lens selection



Multiple specimen holder

SPECIFICATIONS	Code	Cat.no.
Duramin-A300 Hardness tester with load-cell technology and extended load range. With CCD-camera, auto focus and automatic exchange of indenter and objective lens. Swivel head has room for 2 objective lenses and 1 indenter. A 4-position turret (DULET) is optional. Objective lenses and indenters are ordered separately. PC and monitor are necessary but not included.		
Duramin-A300 A Version with software for manual measuring and manual hardness progression evaluation. Manual cross slide, size 150×150 mm, stroke 45×45 mm. Manual input of cross slide coordinates.	DULEA	E5646319
Duramin-A300 B Version with software for manual measuring and manual hardness progression evaluation. Manual cross slide, size 150×150 mm, stroke 45×45 mm. Automatic input of cross slide coordinates.	DULEB	E5646419
Duramin-A300 C Version with software for fully automatic measuring and hardness progression evaluation. Electric stage, size 140×205 mm, stroke 200×75 mm.	DULEC	E5646519
Duramin-A300 D Version with 2nd CCD-camera with FOV 30×40 mm. Software for fully automatic measuring and hardness progression evaluation. Electric stage size 140×205 mm, stroke 200×75 mm.	DULED	E5646619
Duramin-A300 E Version with 2nd CCD-camera with FOV 30×40 mm. Software for fully automatic measuring and hardness progression evaluation. Electric stage size 505×150 mm, stroke 340×120 mm.	DULEE	E5646719
Rockwell Methods Standardized Superficial Rockwell test methods; HR15N, HR30N, HR15T and HR30T according to ASTM E18 and DIN EN ISO 6508. Only with non-turret models. Clamping bracket for securing the specimen is included and can be used in combination with objective lenses ≤40x, version for 80x on request.	DUROC	05646101
Multiple Specimens Software For programming of test lines on up to 6 specimens for automatic measuring. To be used with multiple specimens holder.	DUMUL	05646102
PC and 17" TFT monitor, English Windows® operating software	DUPCE	05646110
PC and 17" TFT monitor, German Windows® operating software	DUPCG	05646111
PC Requirements 2.66 MHz processor 40 GB hard disc 512 MB RAM 2 serial interfaces (2nd interface necessary when operated with a turret) 1 free USB port recommended 17" or larger monitor Window® XP Professional operating software		
ACCESSORIES	Code	Cat.no.
Automatic Turret, 4 positions for lenses and indenters	DULET	05646915
Objective Lens, 5x	HOFIV	05646901
Objective Lens, 10x	HOTEN	05646902
Objective Lens, 20x	HONTY	05646909
Objective Lens, 40x	HOFOR	05646910
Objective Lens, 80x	HOATY	05646908
Vickers diamond indenter for ≥HV0.01 with MPA-certificate	HAVIL	05646913
Vickers diamond indenter for ≥HV5 with MPA-certificate	HAVIH	05646914
Knoop diamond indenter with MPA-certificate	HAKNE	05646903
Rockwell diamond indenter with MPA-certificate	HAROC	05646906
Brinell 1 mm carbide ball indenter with MPA-certificate	HABON	05646904
Brinell 2.5 mm carbide ball indenter with MPA-certificate	HABTO	05646905
Dust Cover	DULCO	05646916
The correct selection of objective lens depends on the test method and the material hardness. Please refer to the Objective Lens Selection Guide on www.struers.com/Duramin-A300 for assistance		





Struers A/S
Pederstrupvej 84
DK-2750 Ballerup, Denmark
Phone +45 44 600 800
Fax +45 44 600 801
struers@struers.dk

TECHNICAL DATA

Version specific data

	Version A	Version B	Version C	Version D	Version E
Cross slide / Stage					
Size XY	150×150 mm	150×150 mm	140×205 mm	140×205 mm	505×150 mm
Stroke XY	45×45 mm	45×45 mm	200×75 mm	200×75 mm	340×120 mm
Movement	Manual	Manual	Automatic	Automatic	Automatic
Coordinates input	Manual	Automatic	Automatic	Automatic	Automatic
2nd Camera	No	No	No	Yes	Yes
Field of view	--	--	--	30x40 mm	30x40 mm
Offset between cameras*	--	--	--	82 mm	82 mm
Automatic turret	Optional	Optional	Optional	Optional	Optional
Software					
Vickers measurement	Manual	Manual	Automatic	Automatic	Automatic
Brinell measurement	Manual	Manual	Automatic	Automatic	Automatic
Knoop measurement	Manual	Manual	Manual	Manual	Manual
Rockwell measurement	Optional	Optional	Optional	Optional	Optional
	automatic	automatic	automatic	automatic	automatic
	not with turret	not with turret	not with turret	not with turret	not with turret
Case depth evaluation	Automatic	Automatic	Automatic	Automatic	Automatic
Multiple specimens software	Not possible	Not possible	Optional	Optional	Optional

* When the 2nd camera is used in combination with the multiple specimens software to select visual test points on multiple specimens, the stroke of the XY stage cannot be fully utilised due to the offset between the two cameras.

Common technical data

Test load range	0.981 N (100 g) to 306.6 N (31.25 g)
Camera	½" CCD, 1.0 LUX, 752×582 pixel
Field of view	160 µm at 40× magnification
Max. sample height	80 mm
Test anvil height adjustment	Manual
Throat depth	125 mm (max. distance from indenter to machine base)
Power supply	110-220 V / 50-60 Hz
Dimensions H×W×D	700×240×435 mm
Weight (net)	Approx. 35 kg
Conforms with standards	Vickers: DIN EN ISO 6507, ASTM E384, ASTM E92 (HV 0.05 – HV 30), JIS Z 2244 Knoop: ISO 4545, ASTM E384, JIS Z 2251 Brinell: DIN EN ISO 6506, ASTM E10 (HBW 2.5 – 31.25) Superficial Rockwell (option): DIN EN ISO 6508 (HR15N, HR30N, HR15T, HR30T), ASTM E 18 (HR15N, HR30N, HR15T, HR30T)

DEUTSCHLAND

Struers GmbH
Karl-Arnold-Strasse 13 B
D-47877 Willich
Telefon +49(0)2154) 486-0
Telefax +49(0)2154) 486-222
verkauf.struers@struers.de

ÖSTERREICH

Struers GmbH
Zweigniederlassung Österreich
Ginzkeyplatz 10
A-5020 Salzburg
Telefon +43 662 625 711
Telefax +43 662 625 711 78
stefan.lintschinger@struers.de

SCHWEIZ

Struers GmbH
Zweigniederlassung Schweiz
Weissenbrunnstrasse 41
CH-8903 Birmensdorf
Telefon +41 17 77 63 07
Telefax +41 17 77 63 09
rudolf.weber@struers.de

CZECH REPUBLIC

Struers GmbH
Ocelá ská 799
CZ-190 00 Praha 9
Tel. +420 2 84 818 227
Fax +420 2 660 32 278
david.cernicky@struers.de

POLAND

Struers Sp. z o.o.
Oddział w Polsce
ul. Lirowa 27
PL-02-387 Warszawa
Tel. +48 22 824 52 80
Fax +48 22 8806 43
grzegorz.uszynski@struers.de

HUNGARY

Struers GmbH
Magyarországi fióktelep
Puskás Tivadar u. 4
H-2040 Budaörs
Phone +36 (23) 428-742
Fax +36 (23) 428-741
zoltan.kiss@struers.de

SINGAPORE

Struers A/S
10 Eunos Road 8,
#12-06 North Lobby
Singapore Post Centre
Singapore 408600
Phone +65 6299 2268
Fax +65 6299 2661
struers.sg@struers.dke

THE NETHERLANDS

Struers GmbH Nederland
Electraweg 5
NL-3144 CB Maassluis
Tel. +31 (0) 10 599 72 09
Fax +31 (0) 10 599 72 01
glen.van.vugt@struers.de

FRANCE

Struers S.A.S.
370, rue du Marché Rollay
F- 94507 Champigny
sur Marne Cedex
Téléphone +33 1 5509 1430
Télécopie +33 1 5509 1449
struers@struers.fr

BELGIQUE

Struers S.A.S.
370, rue du Marché Rollay
F- 94507 Champigny
sur Marne Cedex
Téléphone +33 1 5509 1430
Télécopie +33 1 5509 1449
struers@struers.fr

USA and CANADA

Struers Inc.
24766 Detroit Road
Westlake, OH 44145-1598
Phone +1 440 871 0071
Fax +1 440 871 8188
info@struers.com

UNITED KINGDOM

Struers Ltd.
Erskine Ferry Road,
Old Kilpatrick
Glasgow, G60 5EU
Phone +44 1389 877 222
Fax +44 1389 877 600
info@struers.co.uk

JAPAN

Marumoto Struers K.K.
Takara 3rd Building
18-6, Higashi Ueno 1-chome
Taito-ku, Tokyo 110-0015,
Phone +81 3 5688 2914
Fax +81 3 5688 2927
struers@struers.co.jp

CHINA

Struers (Shanghai) Ltd.
Room 2705, Nanzheng Bldg.
580 Nanjing Road (W)
CN - Shanghai 200041
Phone +86 (21) 5228 8811
Fax +86 (21) 5228 8821
struers.cn@struers.dk

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