Zwick / Roell

Product Information
ZHU250CL-S Universal Hardness Tester

Applications

The ZHU250CL universal hardness tester is suitable for the following test methods:

- **Rockwell**
  to ISO 6508 and ASTM E18
  Scales: A B C D E F G H K L M N P R S T V W X Y
- **Vickers / Knoop**
  to ISO 6507/ ISO 4545 and ASTM E92
  HV0.5 - HV100 / HK 0.5 - HK 2
- **Brinell**
  to ISO 6506 and ASTM E10
  HBW1/10 - HBW5/250

Advantages and features

All in one - fast and reliable hardness testing with the ZHU250CL-S universal hardness tester from Zwick-Roell:

- The innovative force application system with closed-loop control provides a better signal-to-noise ratio compared with conventional instruments using load cells. The resulting force accuracy is significantly better than that defined in the relevant ISO and ASTM standards.
- The unique 4-plus-4 turret allows Vickers, Knoop, Rockwell and Brinell hardness testing without the need for the time consuming task of changing objective lenses and indenters.

- The unrestricted accessibility to the indenter optimizes the test procedure.
- With the comfortable and variable test area, a wide variety of specimens can be tested at eye level.

Operational control of the hardness tester is handled by **Diamond** hardness testing software:

- The intuitive and workflow-based test procedure is adapted to the ZwickRoell testing software. Operators can move seamlessly from one testing machine to another - thus training is reduced to a minimum.
- Diamond features a deep learning algorithm which mimics human behavior. It is especially suited for samples whose surface is not ideally suited to automatic indentation measurement. This improves the reproducibility of measurements between operators and sample preparation time is minimized.
- All data associated with the test is stored automatically, for example, the test method, hardness value, tolerances, and an image of the indentation with measuring lines. This allows the operator to reassess an automatic measurement even after the test has been completed and the sample removed from the hardness tester.

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Diamond Hardness Testing Software
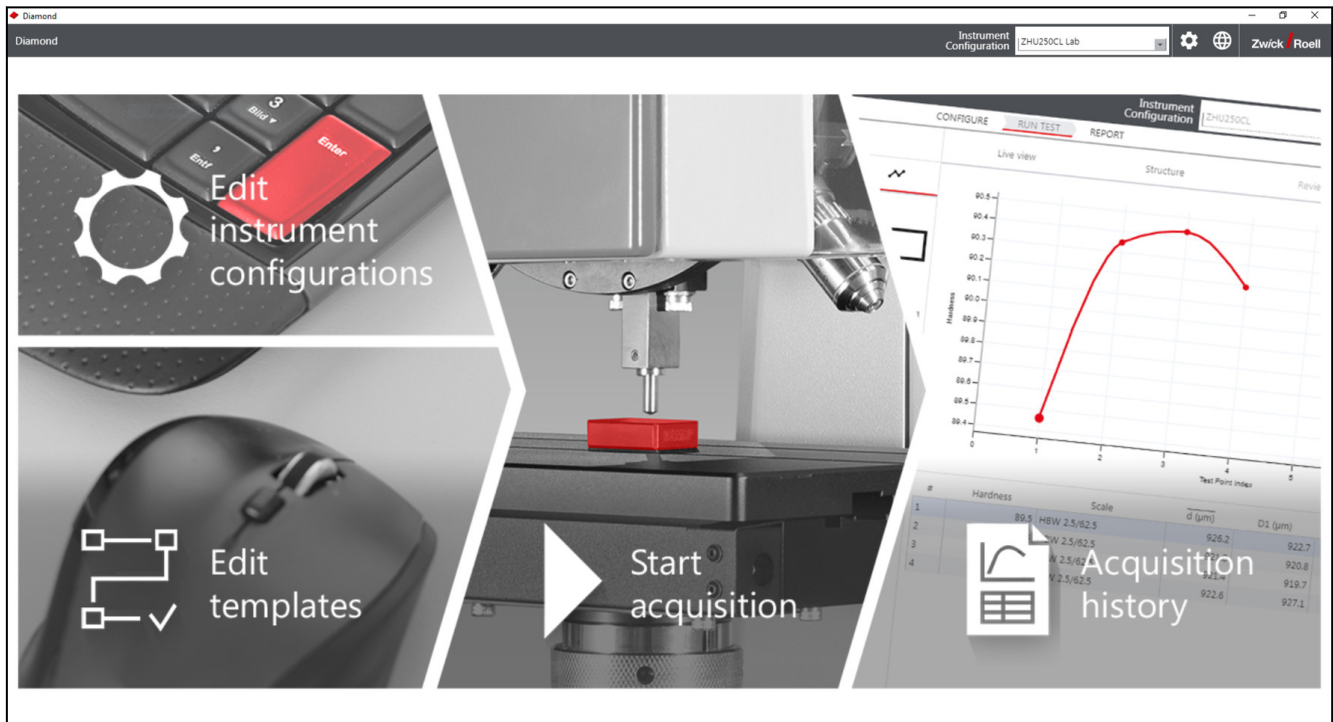
Start screen for Diamond hardness testing software

Getting started is easy!

From the very start, users can easily and intuitively navigate through Diamond testing software.
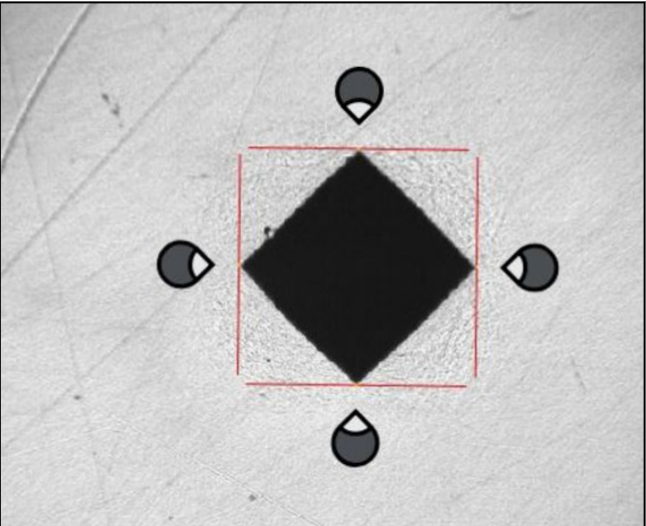
- The simple and straightforward structure of the intuitive interface mirrors laboratory work processes.
- Test definition and task execution, result analysis and general system settings are logically grouped together, allowing users to easily find what they are looking for and to navigate through the software with confidence. This also prevents user input errors.
  - Edit instrument configurations (set up the testing system): defines which machine components and settings will be used
  - Edit templates (configure test): create at least one program template, which defines the overall structure and parameters of the hardness test
  - Start acquisition (run test): enter the specimen attributes, set the indentations, obtain the hardness values
  - Acquisition history (view results): displays the test data acquisition history; open a test that has already been completed for further analysis

Measurement using artificial intelligence

Image analysis is carried out using a unique deep learning algorithm which recognizes indentations even on low-contrast surfaces - in short, effortless repeatability and reproducibility for a wide range of operators.

- To date, more than 300,000 indentations on different surfaces and materials have been manually measured and fed into the deep learning algorithm.
- When performing an optical measurement, the algorithm mimics human behavior as if manually measured. This allows "difficult-to-detect indentations", which would not be detected by conventional image analysis, to be measured automatically.
- Specimen preparation for Vickers, Knoop and Brinell testing can be reduced to a minimum, also eliminating the need for additional manual remeasurement.

All data at ambient temperature.

We reserve the right to make technical changes in the course of ongoing development.

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Automatic measurement of a Vickers indentation
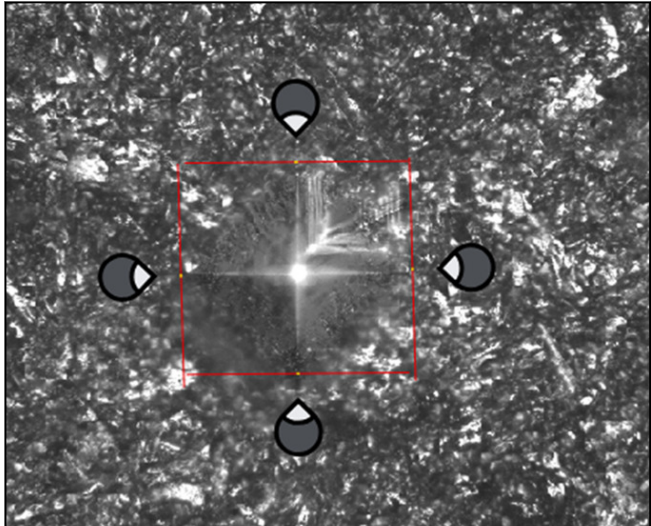
Measurement lines on a Vickers indentation in an etched weld sample

Traceability down to the last pixel
For each test, all of the test data is saved in the acquisition history. After completion or cancellation of the test, this can be recalled either for further analysis or to continue adding results to the test series.

- The sidebar contains numerous filter options, which can narrow down the sequence quickly and display only the most relevant results.
- In addition to the test data, images of the indentations can be displayed which include the measuring lines. The lines are color coded to indicate if any have been manually adjusted.
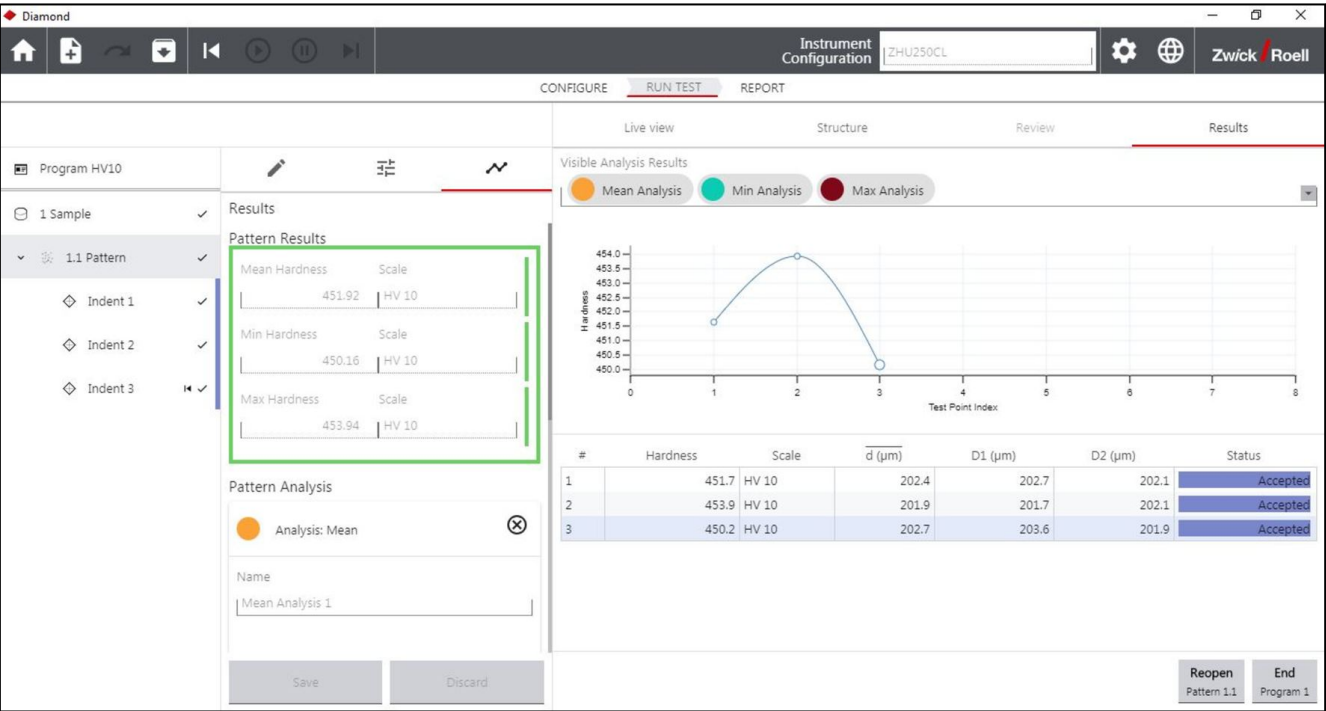
Overview of the hardness test results including limits

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Technical data

Description	Value	
Type	ZHU250CL-S	
Item No.	2112553	
Test loads	0.5 ... 250	kg
Vickers HV	Standard load steps from HV 0.5	
Knoop HK	Standard load steps from HK 0.5	
Brinell HBW	Standard load steps with 1 mm, 2.5 mm, 5 mm and 10 mm ball indenter	
Rockwell and Superficial	All scales	
Focusing	manually via lead screw	
Optics	4 megapixel USB3 camera	
Data export	USB	
Test area (Height x Depth)	379 x 150	mm
Dimensions	600 x 1100 x 400	mm
Weight	150	kg
Electrical supply	3A single-phase, 240/120V, switchable, 50/60 Hz	

Includes UKAS certification, accessory case, user manual and dust cover

Testing software and hardware

Description	Item number
Diamond software–semi-automated version • For use with Windows 10 operating system • Automatic measurement of indentations (Vickers, Knoop and Brinell) eliminates operator influence	**2112532**
PC for using Diamond • Operating system Microsoft® Windows® 10 • Intel Core i7 or higher with 16 GB RAM • Incl. keyboard, mouse, and connection cable	**2112554**
Graphics card with Nvidia chip set enabled with CUDA technology • Minimum 4 GB graphics card memory • Minimum 1152 CUDA core • Operating system and program on SSD or M.2 or faster memory type installed	**2112555**
23" LCD monitor	**2112556**
15" touchscreen monitor	**2112547**
Telescopic/articulated arm for 15" touchscreen monitor	**2112548**

Indenter
All indenters are accredited to ISO and ASTM Standards.

Indenter	Included in scope of delivery	Item No.
Vickers, Diamond pyramid 136°	UKAS test certificate	2111468
Rockwell, Diamond cone 120°	UKAS test certificate	2111456
Rockwell, with tungsten carbide ball 1/16''	UKAS test certificate	2111458
Rockwell, with tungsten carbide ball 1/8''	UKAS test certificate	2111462
Rockwell, with tungsten carbide ball 1/4''	UKAS test certificate	2111465

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Indenter	Included in scope of delivery	Item No.
Rockwell, with tungsten carbide ball 1/2''	UKAS test certificate	2111467
Brinell, with tungsten carbide ball 1 mm	UKAS test certificate	2111469
Brinell, with tungsten carbide ball 2.5 mm	UKAS test certificate	2111471
Brinell, with tungsten carbide ball 5 mm	UKAS test certificate	2111473
Brinell, with tungsten carbide ball 10 mm	UKAS test certificate	2112551
Knoop, Diamond pyramid	UKAS test certificate	2111479

Indenter holder

Required	Item No.
1 x per indenter	2111454

Lenses

Type	Individual magnification	Field of view (4 MP camera) [µm]	Resolution (4 MP camera) [µm/pixel]	Item No.
Objective lens	5 : 1	2200	1.11	2111211
Objective lens	10 : 1	1100	0.55	2111212
Objective lens	20 : 1	550	0.27	2111213
Objective lens	40 : 1	280	0.13	2111214

Lens holder

Required	Item No.
1 x per lens	2111209

Optional accessories

X-Y tables

Type	Dimensions [mm]	Adjustment	Travel [mm]	Item No.
Manual X-Y table	100 x 100	manual micrometers	50 x 50	2111222
Manual X-Y table	100 x 100	digital micrometers	50 x 50	2111221
Manual X-Y table	100 x 100	manual micrometers	25 x 25	2111224
Manual X-Y table	100 x 100	digital micrometers	25 x 25	2111223

Table

Type	Height of table [mm]	Width of table [mm]	Depth of table [mm]	Item No.
Table for hardness testing system	610	800	800	2111481

Additional accessories are available on request.

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