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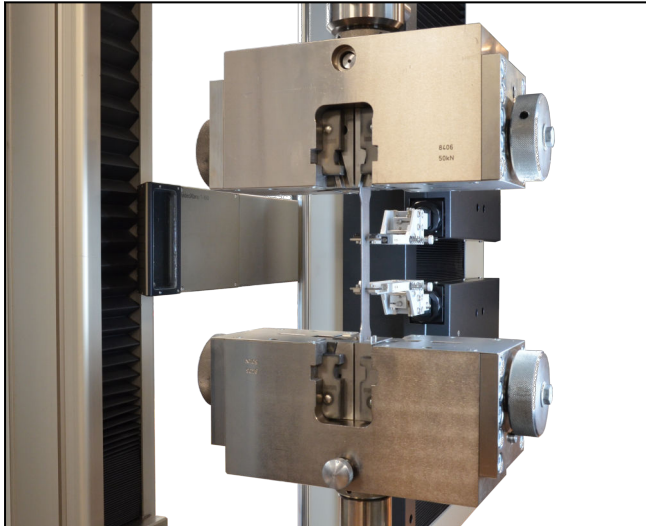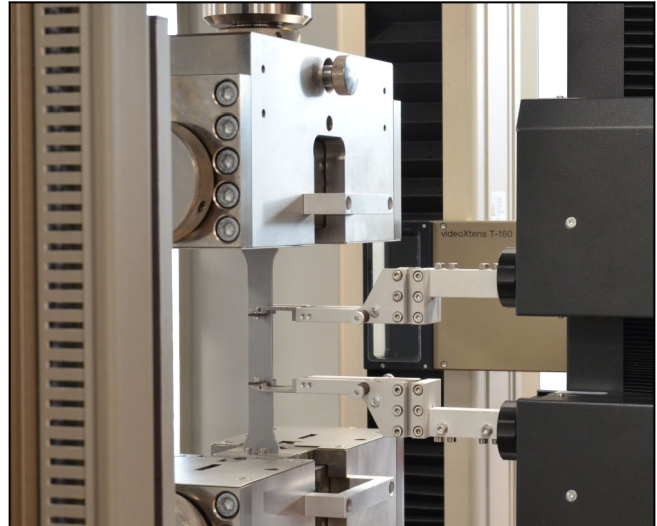# Product Information
videoXtens T-160 HP transverse strain extensometer

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Offset sensor arms for multiXtens II HP / makroXtens II

Applications

- *r*-value determination to ISO 10113 (vertical aniso-tropy), ASTM E517 and JIS Z2254 over the entire axial gauge length, with automatic determination of the break location and break classification
- *n*-values to ISO 10275 (hardening exponent) and ASTM E646
- Closed loop strain rate control to ISO 6892-1 Method A1, through combination with multiXtens II HP or makroXtens II HP

Change in standard ISO 10113 (2020-08): Evaluation of the entire gauge length

Since the 2020 edition, ISO 10113 (2020-08) recommended measurement of change in width on several measuring locations that should be uniformly distributed over the entire gauge length.

In this recommended procedure, the r-value determination includes tapering of the material that already occurs during uniform elongation.

With this change in the standard, the same specimen volumes are considered for change in width and extension.

The videoXtens T-160 HP was specially developed to meet this specification in the standard, and provides additional functions that guarantee highly accurate values and easy handling.

Function description

The videoXtens T-160 HP is a camera-based measuring system specifically designed for non-contact measurement of the change in width, without gauge marks. An active backlight is placed behind the specimen so that the specimen edges are clearly visible and optimal contrast is achieved in the digitized image.

The image of the specimen, which is digitized by the video camera, is processed by a PC-supported video processor in real time. During the test, the images recorded with the camera are compared with each other and the change in width is determined. Through a highly developed edge detection algorithm, the measurement is highly accurate and specimen markings are not required.

Through the testXpert III software, 10 parallel measurement axes are positioned on the specimen, on which measurement of the width is carried out during the test. For each measurement axis, the number of measuring lines that are used to calculate the individual measured value can be defined in the software, for example 60 measuring lines (recommended for the videoXtens T-160 HP). With 10 measurement axes, this results in 10 mean values of 60 measuring lines each. The change in width value is therefore determined based on 600 measuring lines over the entire gauge length. The mean value of all measurement axes is in turn used for calculation of the *r*-value.

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What is so special about the change in width measurement with a videoXtens T-160

Here is what differentiates the videoXtens T-160 HP from the other optical transverse strain extensometers:

- Measurement of change in width over the entire gauge length according to the recommendation of ISO 10113:2020.
- Automatic axial gauge length detection through the use of offset sensor arms with multiXtens II HP / makroXtens II.
- Uniform distribution of the 10 measurement axes over the entire gauge length. The outer measurement axes run through the measuring points of the gauge length.
- Tracking of the 10 measurement axes during the test; no slipping of the specimen through the measurement axes.
- Automatic detection of the break location and break classification to ISO 6892 or JIS Z2254.
- Very high accuracy (class 0.5 to ISO 9513) through use of a camera and lens specifically selected for the test task.

Accuracy of optical change in width measurement for precise test results

The use of a camera with lens that is specifically set up for change in width measurement and the intelligent algorithm provide highly accurate and reliable test results with low scatter. A comparison between measuring graphs of the regular transverse strain software option and the videoXtens T-160 HP, which includes a specially aligned transverse strain camera, shows the reduced influence of artifacts in the initial measuring range. In addition, the significantly lower scatter can be seen on the (color coded) measuring graphs, which represent the measured values of the individual measurement axes.

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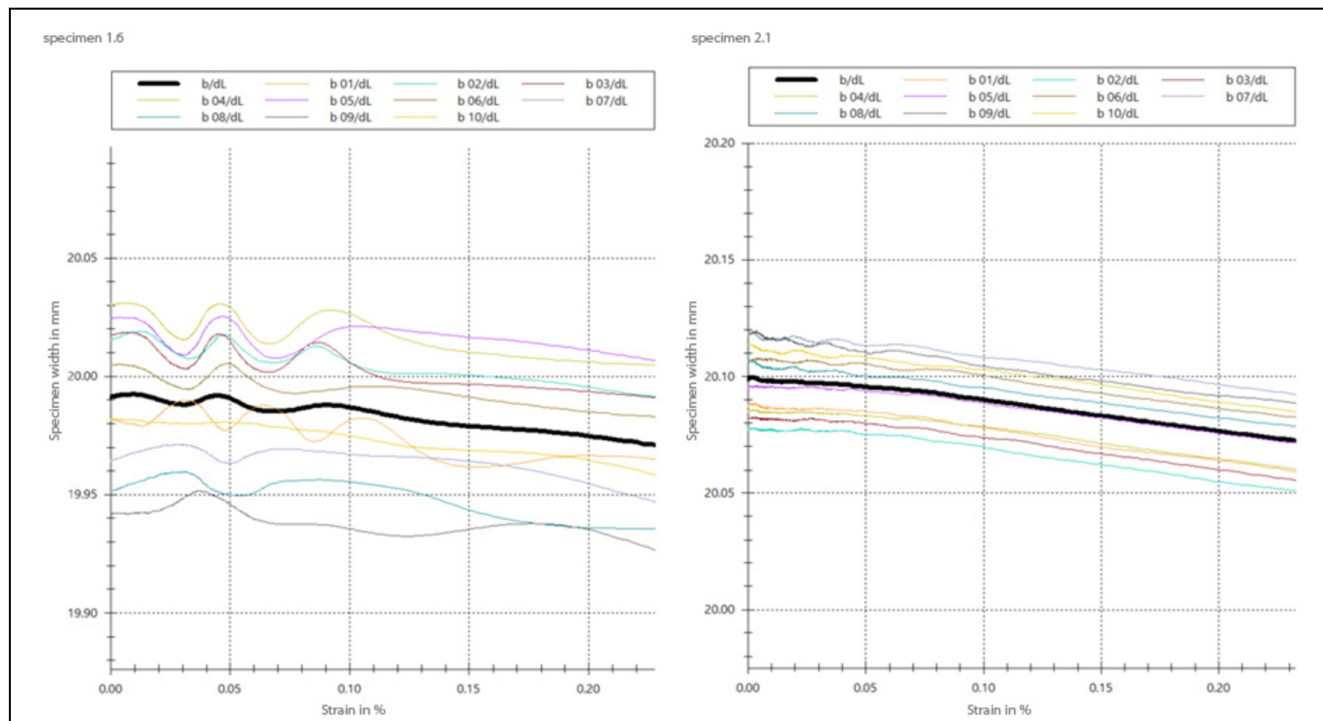
Measurement of change in width on a steel specimen: on the left, measurement using the transverse strain software option. Right: measurement via videoXtens T-160 HP with low scatter and significantly less artifacts at the start of the test.

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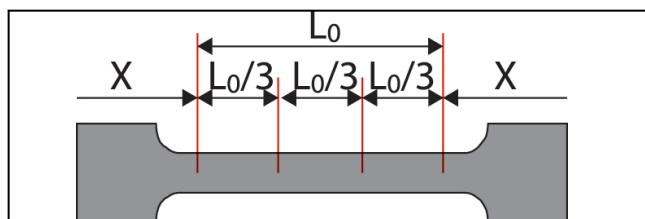
Advantages and features
Reliable r-values based on a minimum of 600 measuring lines

- The videoXtens T-160 ensures reliable, realistic *r*-values to ISO 10113:2020 with low scatter through evaluation of the entire gauge length with high accuracy and effectiveness.
- The measurement of width reduction occurs on up to 10 measurement axes that are automatically and uniformly distributed over the entire gauge length.
- The values of the measurement axes are based on a minimum of 600 measuring lines, which allows us to guarantee correct and precise *r*-values.

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Through offset sensor arms of the multiXtens II HP / makroXtens II, the videoXtens T-160 HP automatically records the gauge length and uniformly distributes the 10 measurement axes. For each measurement axis, 60 measuring lines are used for the calculation, for a total of 600 measuring lines. The measured values of each individual measurement axis can be seen to the left of the specimen. The specimen geometry with regard to parallelism and shape tolerances can be checked by comparing the values.

Evaluation of the individual measurement axes: traceable and plausible measured values

- The measured values of all 10 measurement axes can also be individually evaluated and displayed. This way it is possible to verify at any time whether values are plausible, and a Portevin-Le Chatelier effect as well as Lueders bands can be detected and visualized. In addition, valid *r*-values can be determined for materials that display these effects.
- The specimen geometry can be verified in terms of parallelism and form tolerances through comparison of the values from the 10 measurement axes.

High accuracy and low scatter

- With accuracy class 0.5 (ISO 9513) and 0.20 µm resolution, the width measurement is uniquely accurate.
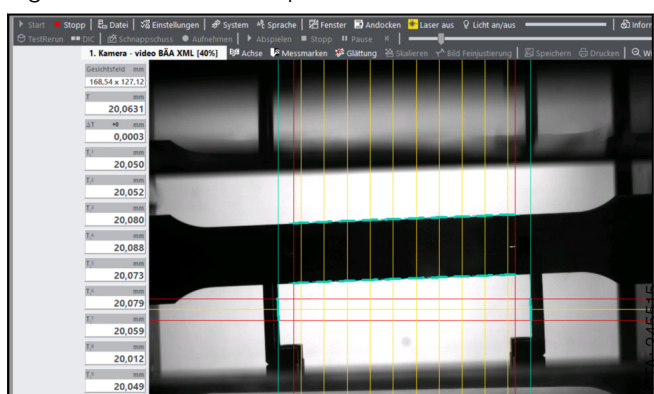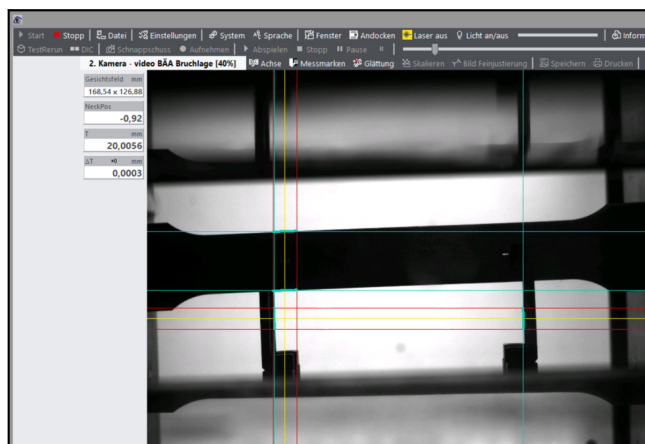
- The use of a camera with lens that is specifically set up for change in width measurement achieves more accurate and more reliable test results with low scatter.
- The intelligent algorithm results in accurate measurement on the specimen edge, without the need for gauge marks.
- The videoXtens T-160 HP is scaled on all 10 measurement axes, which ensures the reliability of the measured values.
- The stable mounting of the videoXtens features low-vibration characteristics and protects against misalignment.
- The images are processed in the software in real time.
- Exact synchronization of all measurement channels.

Automatic break location identification and classification

- Automatic detection of the break point and break classification to ISO 6892 or JIS Z2254 in testXpert III saves time and results in valid and traceable data. Invalid tests are automatically and reliably excluded.

The break location inside the entire parallel specimen length is recorded by the system and automatically classified. In this example, to ISO 6892: testXpert III classifies the specimen according to break in the middle or outer third of the gauge length; breaks outside the L0 (X range in the image) are invalidated.

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During the test, simultaneous to the r-value measurement, the break is recorded over the entire parallel specimen length in a cloned image.

All data at ambient temperature.

Subject to change in the course of further development.

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Easy operation and traceable test results with testXpert III

- In the Standard Test Program for ISO 10113, all measurement channels and parameters are already set up.
- A separate layout with prepared curve graphs identifies sources of error in the test arrangement and artifacts (to ISO 10113 Annex A). Here each individual measurement axis is shown in addition to the mean value. The permissible deviation of the technical change in width of +/-0.05 % is automatically monitored and displayed.
- Automatic axial gauge length detection and equidistant distribution of the 10 measurement axes over the entire gauge length.
- Tracking of the 10 measurement axes with the gauge length throughout the test, no slipping of the specimen through the measurement axes or influence from contact with measuring pins.
- Automatic break location identification and classification according to standard.
- The break location is traceable and can be confirmed through image recording (Video Capturing).
- The specimen thickness is automatically compensated via testXpert III; rescaling of the system is not necessary.
- With the test re-run option, the test can be re-evaluated under different parameters (number of measurement axes/measuring lines).
- The entire test sequence can be followed on the monitor and recorded via Video Capturing for documentation purposes.
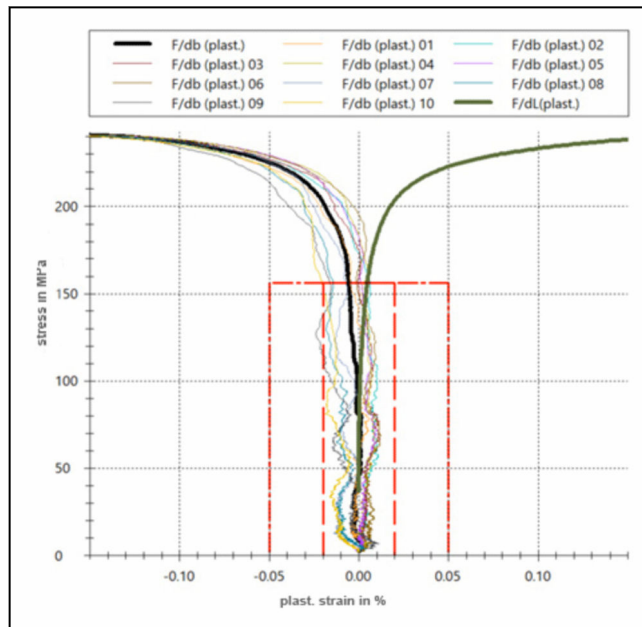
A separate layout in testXpert III identifies sources of errors in the test sequence and artifacts (to ISO 10113 Annex A).

An optimal system for testing of metals

- In addition to the makroXtens II/multiXtens II HP and testXpert III, the videoXtens T-160 HP is the new standard for *r*-value determination.
- Measurement of the longitudinal strain can be carried out with closed loop strain rate control to ISO 6892-1 Method A1.
- Due to its automated functions, the system is independent of the operator and delivers reproducible measured values.
- Gauge marks on the specimen are NOT needed.
- The system is low maintenance and features high availability.
- Also ideal for automated systems.

Optical, non-contact measurement

- Even with high break energies, the videoXtens will not be damaged.
- Thin and sensitive specimens can also be measured.
- The measured values are free from tactile influences such as pressure from measuring pins or sliding specimens. Operator influence is also eliminated.
- The system can be used for different gauge lengths and specimen shapes with a high level of flexibility. The width can be determined at one or several locations (up to 10 measurement axes).
- Measurement on the specimen edge without gauge marks eliminates specimen preparation with markings.

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- The system is wear-free due to the fact that no mechanically movable components are used. Costs for wear parts and continuous maintenance do not apply.
- The camera has an enclosure that serves for protection from dust as well as misalignment.

Knowhow – we are the experts

- Optical change in width measurement on the specimen edge without gauge marks has been a proven ZwickRoell technology for 20 years. Many installations, including automations, confirm our success.

- Through years of experience we are now able to offer the right solution for any application. From the software option in videoXtens to the highly accurate transverse strain camera for measurements over the entire parallel length.

Technical data

Type	videoXtens T-160 HP	
Item No.	1089318	
Field of view		
Width, approx.	50	mm
Height, approx.	160	mm
Mounted height	134	mm
Specimen width, max.	25	mm
Accuracy class		
To EN ISO 9513	0.5	
Resolution	0.20	µm
Ambient temperature	+10 ... +35	°C
Minimum version	testXpert III V1.6	
Scope of delivery	• Image acquisition and evaluation via testXpert III • Accessories case with scaling accessories • Backlight screen with installation kit for load frame • Incremental measurement module	