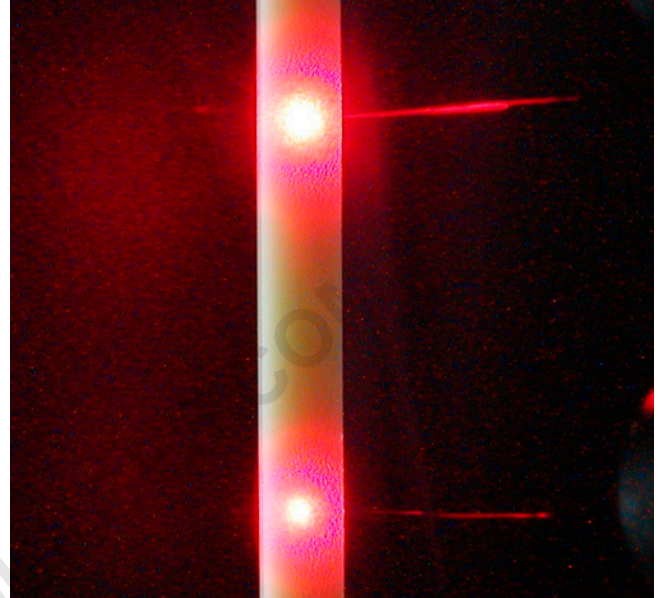
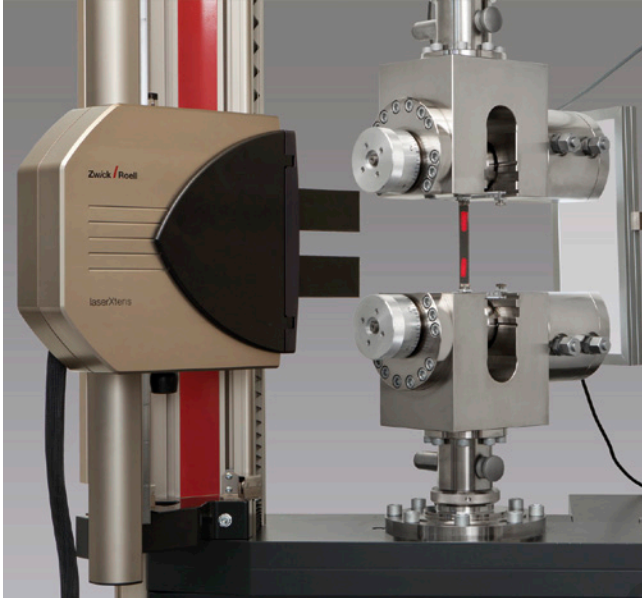


## Product Information

laserXtens HP - Strain measurement without contact and specimen marking



### Applicational range

The laserXtens can be used to measure strain or deformation on a wide range of materials. Using the latest laser speckle technology means that there is no contact with the specimen during the test and no need to attach marks. This enables the laserXtens to work in a wide range of applications:

- Tensile, compression and flexure tests on metals and plastics
- Tests on components and subassemblies
- Applications where a contact extensometer might be unsuitable due to its physical contact with the specimen and which might be damaged by the whiplash experienced at specimen failure.
- Tests in temperature chambers
- High temperature tests
- Applications, where non contact biaxial strain measurement is necessary

### High precision and resolution

- The laserXtens provides high precision in micro and macro measurement ranges
- The resolution is 0.11  $\mu\text{m}$
- Short specimens with gage lengths down to 3 mm can be tested with high accuracy
- The laserXtens HP meets or exceeds class 0.5 of ISO 9513 (Class B2 of ASTM E83)

### No specimen contact, no specimen markings

- The laserXtens HP makes no contact with the specimen and there is no influence on the test caused by the laser light
- The laserXtens does not require specimen markings which results in several advantages:
  - Saving of time - especially at high specimen throughput
  - Simple use in temperature chambers
  - The system can plainly be used in robotic testing systems, as no manual specimen preparation is needed prior to the test

### Outstanding functionalities and options

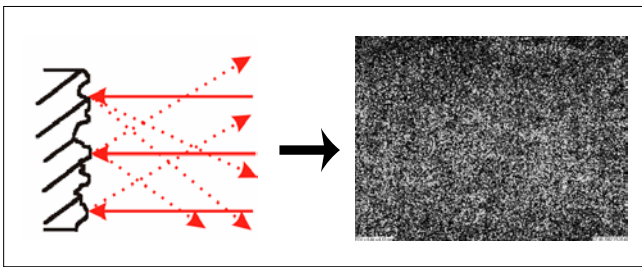
- The laserXtens HP can be used for strain controlled tests to ISO 6892-1 Method A1 „Closed Loop “ - suitable for gage lengths of  $\geq 50$  mm
- Measurement of transverse strain or flexion without the need of additional specimen marks or hardware extensions for the system (software option)
- Measurement of r&n values on metals according to ISO 10113 and ISO 10275 via option

## Product Information

### laserXtens HP - Strain measurement without contact and specimen marking

#### Function description

The laserXtens HP consists of two measuring heads containing digital cameras and laser light source. The specimen is illuminated with the laser light and this generates a speckle pattern on the surface of the test specimen.



The speckle pattern can be thought of as a 'virtual measuring mark' or 'digital fingerprint' on the surface of the specimen and is monitored with the two full frame digital cameras. The laserXtens software tracks this virtual measuring mark in consecutive images taken during the test, and this procedure is called speckle tracking.

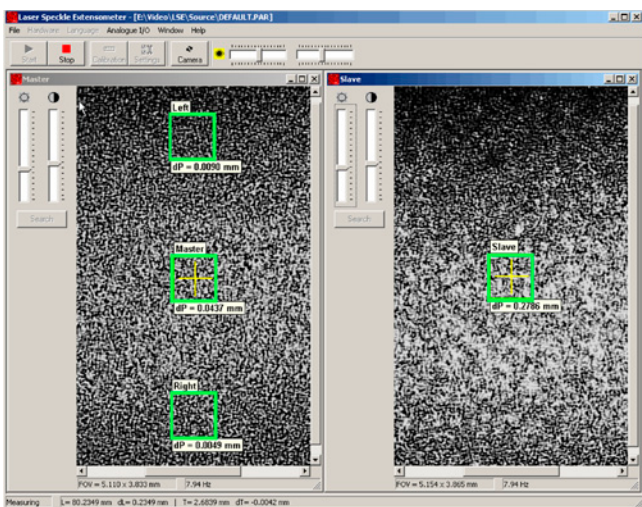
As load is applied to the specimen by the testing machine the speckle pattern moves and the laserXtens software tracks the speckle pattern iteratively from image to image in real-time and determines the strain in the specimen.

Each camera image is displayed in an analysis window on the PC, and the gage length is defined by yellow crosshair lines. For the optional measurement of transverse strain crosshairs are available to set up the transverse measurement systems.

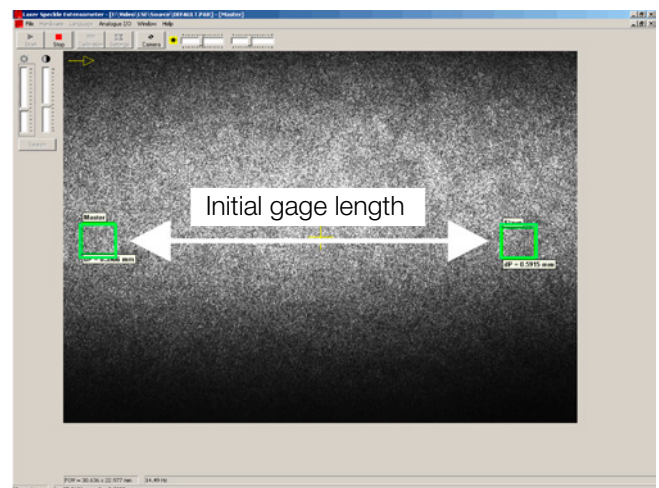
The software algorithm has two modes of operation. As the virtual marks move within the field of view of the camera the software automatically moves the analysis window. An elongation of typically 30 mm can be measured in this mode.

When the analysis window reaches the edge of the field of view, you can switch to the second measuring mode. Now the flow of material within the analysis windows is measured and the calculation of the strain value calculated accordingly. Depending on material and behaviour of specimen this mode leads to high accurate measurements, even being not according to the Standard.

As an option, the laserXtens HP can work with just one camera head. In this configuration, both analysis windows are set within the single camera image and the gage length is represented by the distance between the analysis windows. The gage length is therefore limited to the size of the field of view of the camera.



Additional analysis window „Left“ and „Right“ for determination of local transverse strain (see options)



The extensometer is mechanically and securely connected to the testing machine and follows the crosshead at half the test speed. This ensures that the laserXtens is always in the middle of the test area and as a result the effective measuring range for speckle tracking is increased.

## Product Information

### laserXtens HP - Strain measurement without contact and specimen marking

#### Notes regarding use with temperature chambers and high-temperature furnaces

When using laserXtens HP in conjunction with temperature chambers and high-temperature furnaces it should be borne in mind that the changed optical testing conditions will have a negative effect on the measurement signal. This is basically due to air swirls inside the temperature-controlled chamber or the furnace and outside around the viewing window or furnace aperture. To minimize these influences the air-stream around the specimen must be smoothed and the air swirls around the viewing window or aperture minimized by means of optical tunnels. These solutions are custom-designed. The dimensions of the temperature chamber require a different mounting of the laserXtens HP with more distance to the specimen. This implicates changed data for resolution and accuracy grade (technical data on request).



Non-contact measuring at extreme temperatures

#### Measurement of the deflection in 3- and 4-point flexure tests

The laserXtens is also used for 3- and 4-point flexure tests. The measurement can be made in one point (displacement of a measurement point) or at three points (relative displacement of the middle measurement point in relation to the outside points. Maximum measurement basis is 15 mm.



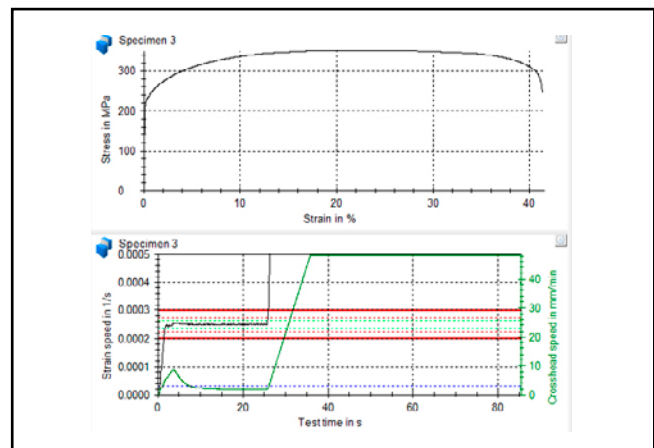
#### Important notice:

Due to physical constraints there are some conditions which must be fulfilled in order to guarantee laserXtens' optimum performance.

- In order to get good speckle patterns the specimen surface needs to adequately reflect the laser light. These conditions are easily achieved for metals and also for most plastic materials. If necessary, simple tools can be used to improve the conditions on the specimen surface.
- The specimen grips must ensure that the specimen remains in good axial alignment during the test.
- For safe and accurate operation a low vibration environment is necessary (laboratory conditions).

Particularly for plastics we recommend pretests to ensure the reflection characteristics of the material. Aside from that through the pretests the Zwick test laboratory can determine the optimum configuration for your application.

Zwick guarantees reliable operation of the laserXtens HP based on pretested specimens and the test conditions (= process reliability).



Tensile test on metal to ISO 8692 - strain controlled

## Product Information

### laserXtens HP - Strain measurement without contact and specimen marking

Description	laserXtens HP 1001638
Scope of supply: Measuring head with motorised gage length setting (automatic $L_0$ setting), 2 digital cameras, including lenses $f = 75$ mm, 2 red laser light sources, software for image acquisition, calculation of cross correlation, testXpert II integration, accessories box with calibration tools	
Laser class 2: no protective actions are necessary	
Class	0.5 in accordance with EN ISO 9513
Resolution	0.11 $\mu$ m
Measurement range via speckle tracking	- 40 mm at a measurement range from 20 up to 200 mm - 20 mm minus gage length from 1.5 up to 20 mm
Measurement range via flow measurement	After measurement range via speckle tracking the laserXtens switches to flow measurement
Strain control to ISO 6892	From measurement length $\geq 50$ mm onwards
Gage length	3 ... 200 mm
Max. following speed on the specimen	500 mm/min
Measurement frequency	70 Hz (with basic settings)
Flat specimen, measured on wide side	Thickness 0 - 30 mm
Flat specimen, measured on specimen edge	Thickness 1 - 30 mm (pre-tests required for specimen with thickness $< 1$ mm)
Round specimen	1 - 30 mm (Pre-tests required for specimen with dia. $< 1$ mm)

**Remark:** In combination with testXpert II and testControl or testControl II a free slot in the electronic is required.

Description	Item number
<b>Basic package for laserXtens</b>	<b>various</b>
The basic package includes a multilingual workstation, operating system Windows XP or Windows 7 / 32 bit, 23" TFT-screen and a manual in German or English	
<b>Mounting</b>	<b>various</b>
Mounting kits are available for mounting at the front left side, back left side and back central on all Allround-Line table-top and floor testing machines.	
<b>Hardware options</b>	
Option second measurement axis for additional determination of the transverse strain (also r-value). For use with laserXtens facing broadside of specimen and with round specimens. Includes additional camera (mounting in laserXtens housing), objective lens and software. Backlight required.	<b>1001634</b>
Backlight 420 x 190 mm, incl. mounting unit	<b>013593</b>
Backlight 840 x 190 mm, incl. mounting unit	<b>013596</b>
videoXtens transverse strain extensometer for determination of r-values according to ISO 10113. Extra housing with 90° deflection (please see also extra product information). Extra mounting kit required.	<b>1001420</b>
Tests in temperature chambers or ovens	<b>on request</b>
<b>Software options</b>	
Software option second measurement axis for measuring axial strain and a local transverse strain simultaneously	<b>011069</b>
Software option measurement of deflection in 3- and 4-point flexure tests in test axis	<b>077071</b>
<b>Stand-alone operation</b>	
High performance AD/DA converter 4 inputs, 2 outputs	<b>021661</b>
High performance D/A converter, 4 outputs	<b>032319</b>