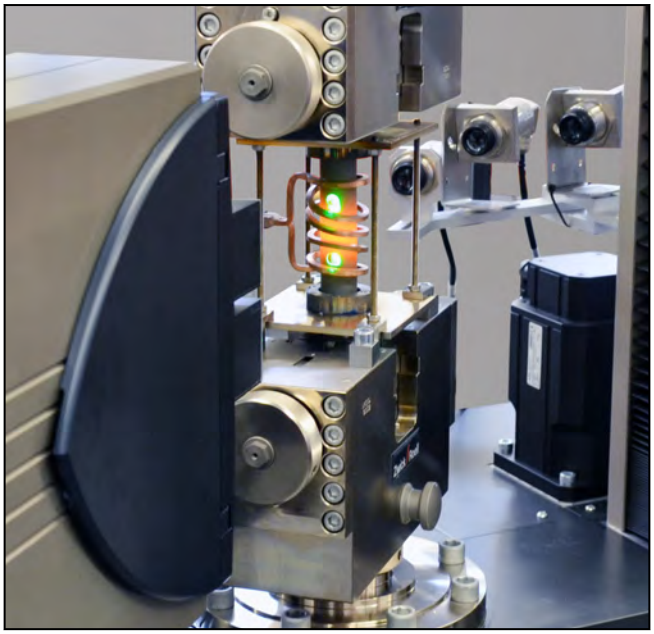
Zwick / Roell

Product Information

laserXtens 2-120 HP/TZ – The High-Temperature Specialist for all Specimens

CTA: 210318 246849

laserXtens 2-120 HP/TZ on high-temperature furnace



laserXtens 2-120 HP/TZ with induction heating

Applications

The laserXtens 2-120 HP/TZ measures deformations on different materials in various environmental conditions, without making contact. The measurement principle eliminates the need to apply gauge marks.

With the second camera, the laserXtens 2-120 HP/TZ is ideal for deformation measurement of specimens with gauge lengths from 1.5 to 120 mm in accuracy class 0.5 to EN ISO 9513 in a wide range of applications. This extensometer can be used in the same way as the laserXtens 1-32 HP/TZ for any environmental condition, but it has a larger measurement range.

- Tensile, compression and flexure testing
- Tests on specimens for which specimen contact is undesirable or not possible due to specimen condition or properties
- Deformation measurements on specimens that would damage a contact measuring system due to their high break energy
- An extensometer for any environmental condition
- Testing at ambient temperature
- Testing in temperature chambers
- Testing at high temperature
  - Furnaces up to 1,600 °C
  - Induction up to 1,600 °C
  - Vacuum up 2,000 °C

High precision and resolution

- The laserXtens 2-120 HP/TZ features high precision in micro and macro measurement ranges
- The resolution is 0.11 µm
- Automatically adjustable initial gauge lengths L_0 from 1.5 mm to 120 mm can be tested with high accuracy
- The laserXtens 2 -120 HP/TZ satisfies the requirements of class 0.5 to ISO 9513 (class B1 to ASTM E83)
- Since high-temperature materials sometimes display nonlinear strain increase, we recommend that you perform pre-tests for high-temperature tensile tests to ISO 6892-2, Method A1 closed loop.

Prominent functions

- The laserXtens 2-120 HP/TZ can be used for tests to ISO 6892-2 (high-temperature) and ISO 6892-1 (ambient temperature).
- Measurement of the change in width and deflection without additional markings and without required hardware expansion is possible as a software option.

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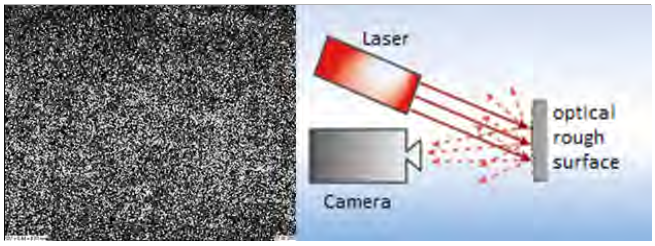
No specimen contact - no specimen marking
The laserXtens 2-120 HP/TZ does not make mechanical contact with the specimen, and provides the following benefits:

- The specimen is not influenced by the laser light
- Even at elevated temperatures, sensitive specimens are not influenced by the extensometer
- Maintenance-free, sensor arms are not exposed to a risk of breakage
- Temperature chambers and high-temperature furnaces can remain completely closed. Openings are thermally sealed with glass windows.
- Specimen markings are not required. This provides various benefits:
  - Time saving, especially with high specimen throughput, e.g. carousel solutions
  - Easy adjustment of the initial gauge length in the testing software

Function description
The specimen is illuminated with laser light, generating a speckle pattern on the specimen surface.



Speckle pattern on specimen surface

The specimen surface with speckle patterns is recorded with a full-frame digital camera. Two evaluation fields are set within the camera image (=field of view) and thereby two sub-patterns are defined and tracked. The initial gauge length is defined by the distance of the green evaluation fields.

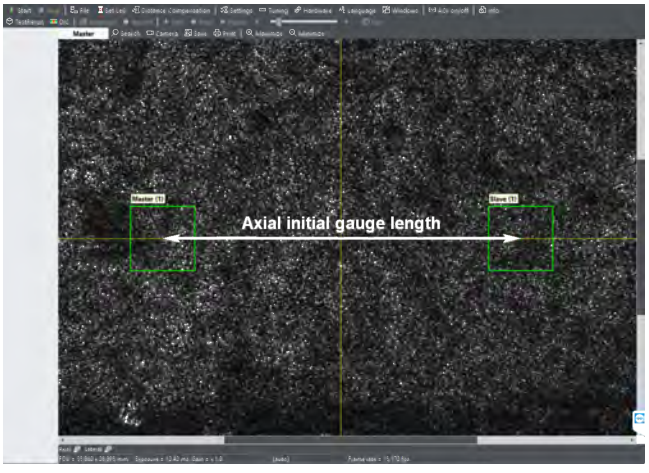
The displacement of each speckle pattern is calculated using a highly advanced correlation algorithm. A displacement measurement of the speckle pattern takes place within each evaluation field. The elongation of the specimen is calculated from the difference of these displacement measurements.

Each evaluation field tracks the displacement of its originally selected sub-pattern. This process is known as speckle tracking.

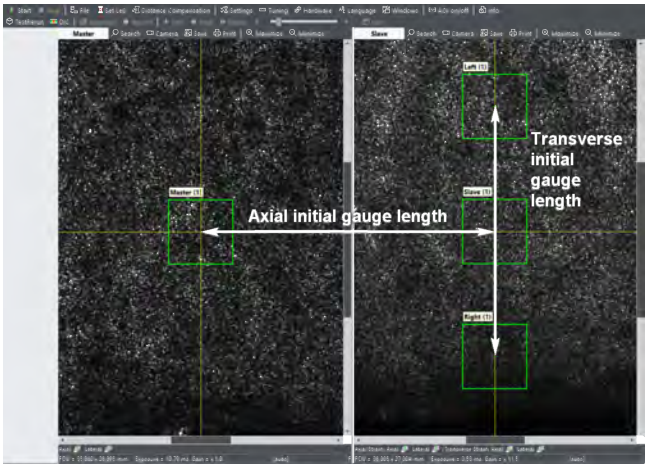
Optionally, two additional evaluation fields can be set to simultaneously measure the local transverse strain.

With the laserXtens 1-32 HP/TZ (one camera) both evaluation fields appear in a single image. In this case, the initial gauge length may not exceed the size of the field of view.
With the laserXtens 2-120 HP/TZ (two cameras) each evaluation field appears in its own image. In this case, the initial gauge length is set through the motor-adjustable camera distance.

The entire measuring system can either be tracked at half crosshead speed via a mechanical connection to the crosshead, or it can be fixed mounted. Due to the tracking feature, the extensometer position is maintained at the center of the specimen and the measurement range is extended.



Field of view of a 1-camera system: initial gauge length corresponds with the distance between the two evaluation fields



Field of view of a 2-camera system: additional evaluation fields "left" and "right" for determination of local transverse strains

CTA: 246923

All data at ambient temperature.

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

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High-temperature version – optical tunnel When using the extensometer in connection with temperature chambers and high-temperature furnaces, it should be noted that the change in optical conditions can have a negative effect on the measurement signal. This basically concerns air currents in the temperature chamber or in the furnace and outside on the view window / furnace port. These influences are minimized by the optical tunnel. The extensometer therefore features an adjustable tunnel with an optical grade glass pane and an adapter plate including sealing cord, which lies snug against the glass pane of the temperature chamber or the high-temperature furnace port.

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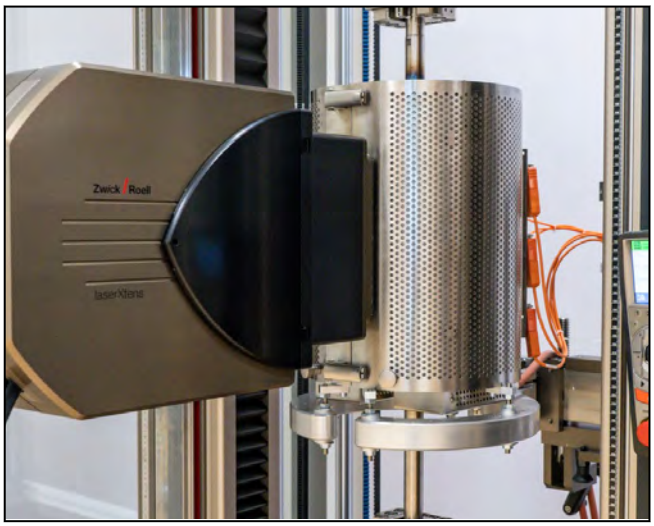

Non-contact measurement under extreme temperatures with laserXtens 2-120 HP/TZ on a high-temperature furnace

Telecentric lens

Telecentric lenses make the extensometer insensitive to distance changes between the lens and specimen. Load strings are used with temperature chambers and high-temperature furnaces to apply force on the specimen. If these load strings are not accurately aligned, or if they are self-aligning (spherically seated), alignment movements occur at the beginning of the test, in which the distance of the specimen to the lens changes. With ordinary lenses these movements lead to incorrect measurements. The telecentric lenses on this extensometer have a tolerance range of approx. ± 1.5 mm.

Lighting

Green laser diodes are used with the laserXtens. The lenses are equipped with interference filters, which only transmit the green laser light and block interfering red light from a glowing specimen, for example. Therefore, measurements can also be carried out at very high temperatures.

Important note:

For reliable operation of the laserXtens 2-120 HP/TZ, certain general requirements must be met, i.e.:

- The specimen surface must be suitable for laser light reflection. This is the case with metallic and ceramic surfaces.
- A low-vibration environment is necessary for reliable and accurate operation (laboratory conditions).

Upon customer request, the above mentioned general requirements are verified through pre-testing, ensuring reliable operation of the laserXtens 2-120 HP/TZ.

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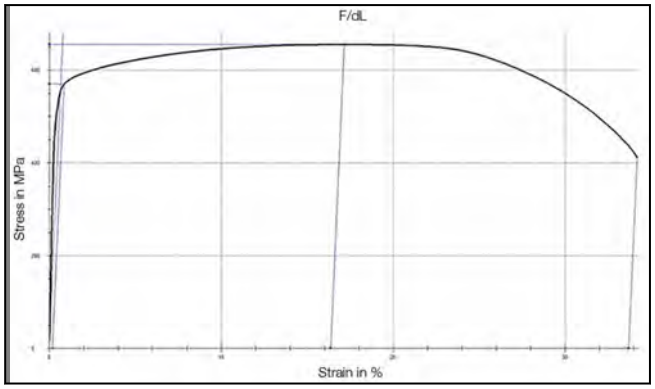
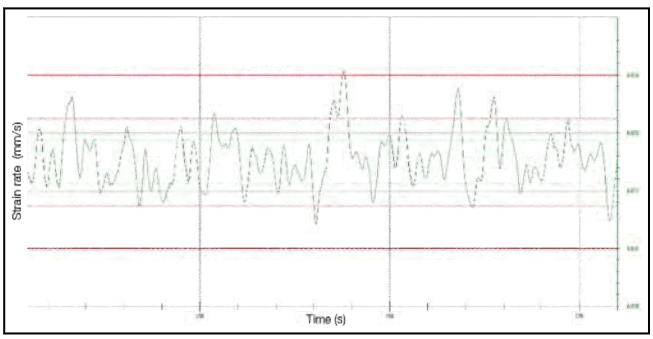


Stress-strain curve: Tensile test on metal specimen to ISO 6892-2, Method A1 (closed loop)

CTA: 246940



Strain rates: Tensile test to ISO 6892-2, Method A1, closed loop with X mm/s within the required tolerance of ±20%

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Technical data

Type	laserXtens HP/TZ
Item No.	**1061538**
Temperature	In air up to 1,500°C In vacuum up to 2,000°C
Laser safety class to DIN EN 60825-1	2[1)]
Initial gauge length, L_0	
Measurement with a camera	1.5 ... 25 mm
Measurement with two cameras[2)]	25 ... 120 mm
Measurement displacement with speckle tracking[3)]	32 mm minus L_0 at an initial gauge length of 1.5 ... 25 mm 30 mm (fixed assembly) at an initial gauge length of 25 ... 120 mm 60 mm (automatic entrainment) at an initial gauge length of 25 ... 120 mm
Measured displacement for flow measurement	After reaching maximum measurement displacement, switch to flow measurement mode
Resolution	0.11 µm to EN ISO 9513
Accuracy class	0.5 to EN ISO 9513
Strain-rate control	To ISO 6892-1 Method A1 as of $L_0 \geq 50$ mm, $L_0 \leq 50$ mm pre-tests required; to ISO 6892-2 Method A1 pre-tests required
Max. tracking speed on the specimen	500 mm/min
Measurement frequency (for standard setting)	70 Hz
Scope of delivery	Measuring head with motorized gauge length adjustment (autom. L_0setting), 2 digital cameras including high resolution telecentric lenses, 2 laser light sources green, high-temperature tunnel for the reduction of environmental inf luences, software image acquisition, evaluation of the cross correlation and transfer to testXpert III (Version 1.51 or higher), accessories case with adjustment module, INC module (for tC: RS module). Incl. connection to crosshead: the extensometer is tracked at half test speed. The laserXtens 2-120 HP/TZ works with testXpert III (Version 1.51 or higher) and in combination with testControl and testControl II. The required tC-RS module or INC module is included in the scope of delivery. A plug-in slot is required for this in testControl / testControl II.

1) No safety measures required.
2) No overlapping field of view.
3) Where applicable, limited by furnace and temperature chamber design

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Description	Item number
Basic package for laserXtens The basic package contains a multilingual workstation, optionally with Windows 10/64 bit, 23” TFT monitor and operating instructions in German or English	**Diverse**
Assembly kit For mounting to the front left of the AllroundLine table-top and floor-standing testing machine with a test area width of 440 mm, 630 mm and 640 mm (Measurement: front center)	**1064713**
Software Options	
Second measurement axis for simultaneous determination of longitudinal strain and local transverse strain	**011069**
Measurement of deflection for 3- and 4-point flexure tests in the test axis	**077071**
Strain distribution: Determination of local strain on several measuring points	**325932**
Stand-alone operation	
High resolution AD/DA converter, 4 inputs, 2 outputs	**021661**
High-resolution D/A converter, 4 outputs	**032319**

All data at ambient temperature.