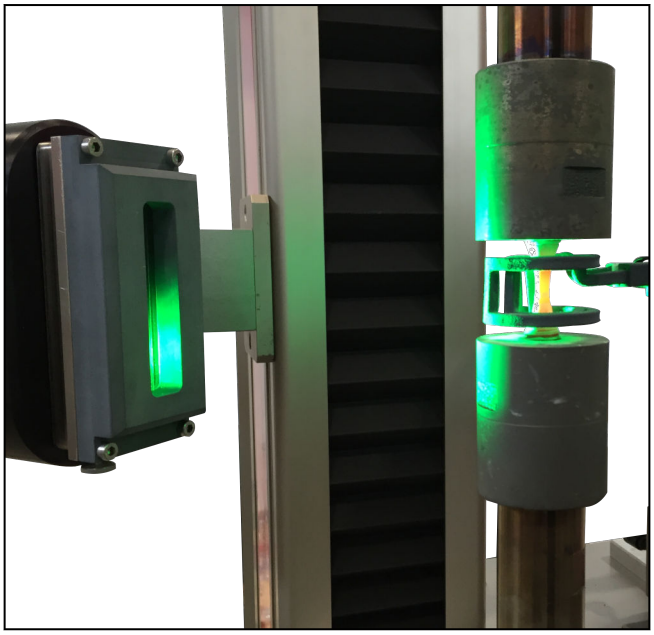
Zwick / Roell

Product Information

laserXtens 1-32 HP/TZ – The High-Temperature Specialist for Small Specimens

CTA: 201182 247149

laserXtens 1-32 HP/TZ on vacuum chamber



laserXtens 1-32 HP/TZ with induction heating

Applications

The laserXtens 1-32 HP/TZ measures deformations on different materials in various environmental conditions, without making contact. The measuring principle eliminates the need to apply gauge marks.

The laserXtens 1-32 HP/TZ is ideal for deformation measurement of small specimens starting at a gauge length of 1.5 to 25 mm in accuracy class 0.5 to EN ISO 9513 in a wide range of applications. The advantages of this extensometer are ideal if tests are performed in a variety of environmental conditions.

- 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 1-32 HP/TZ features high precision in micro and macro measurement ranges
- The resolution is 0.11 µm
- Short specimens with gauge lengths starting at 1.5 mm can be tested with high accuracy
- The laserXtens 1 -32 HP/TZ satisfies the requirements of class 0.5 to ISO 9513 (class B1 to ASTM E83)

Prominent functions

- The laserXtens 1-32 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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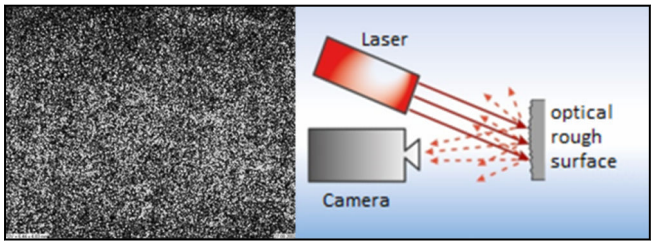
No specimen contact - no specimen marking
The laserXtens 1-32 HP/TZ does not make mechanical contact with the specimen, and provides the following benefits:

- 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 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.

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.

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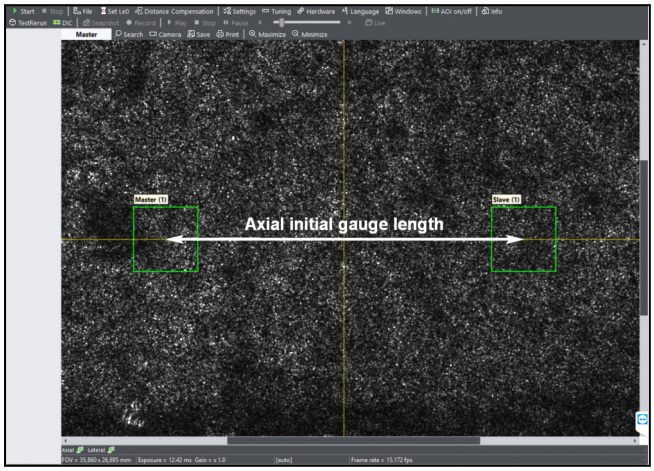
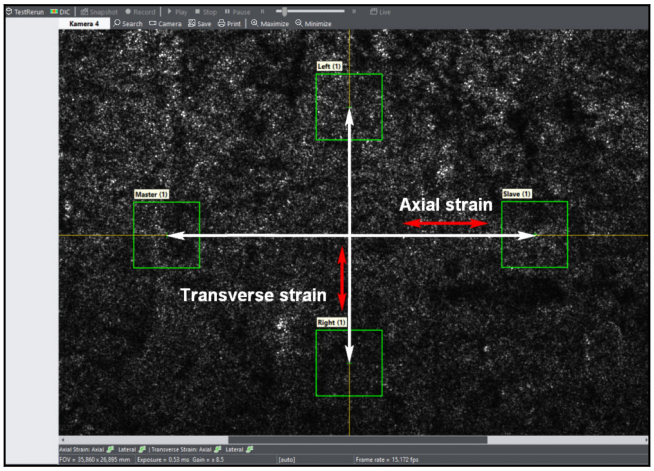


Field of view of a 1-camera system: initial gauge length corresponds with the distance between the two evaluation fields



Additional "left" and “right” evaluation fields for determination of local transverse strains

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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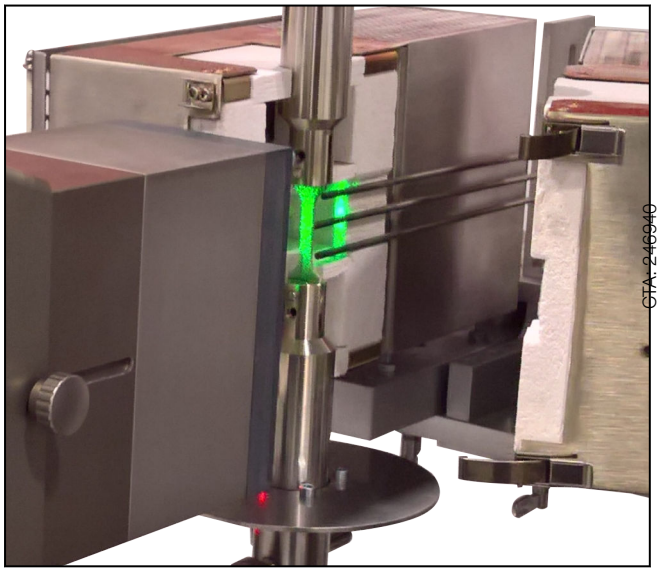

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laserXtens 1-32 HP/TZ with optical high-temperature tunnel on short furnace

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

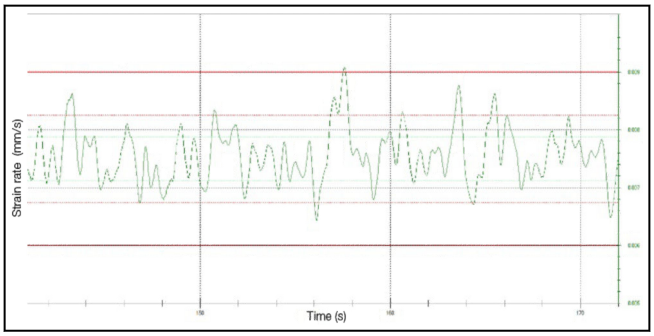
Green laser diodes are used with the laserXtens. The lenses are equipped with interference filters, which only transmit the green laser light and block interfering red light from a glowing specimen, for example. Therefore, measurements can also be carried out at very high temperatures.

Important note:

For reliable operation of the laserXtens, 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.



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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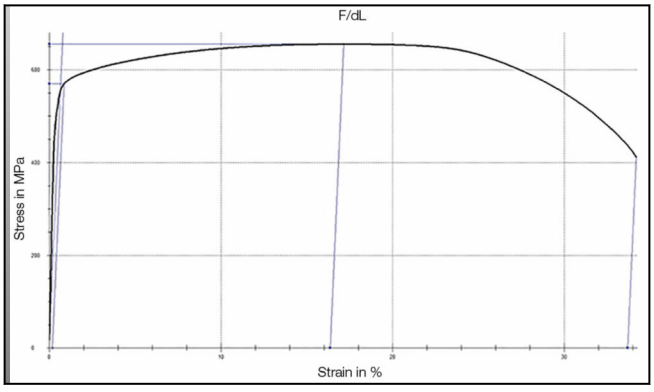

Stress-strain curve: Tensile test on metal specimen to ISO 6892-2, Method A1 (closed loop)

All data at ambient temperature.

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Type	laserXtens 1-32 HP/TZ
Item No.	MP01632
Laser safety class	2 to DIN EN 60825-1 [1]
Initial gauge length, L_0	1.5 ... 25 mm
Measurement displacement with speckle tracking [2]	32 mm - L_0 mm with automatic tracking
Measurement displacement 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 [3]	To ISO 6892-1 Method A1 and ISO 6892-2 Method A1
Max. tracking speed on the specimen	500 mm/min
Measurement frequency (for standard setting)	70 Hz
Scope of delivery	Measuring head with one digital camera incl. high resolution telecentric lens, two green laser light sources, high-temperature tunnel for reduction of environmental influences, software for image acquisition, evaluation of cross-correlation and transfer to testXpert III, accessory case with scaling aid, INC module (for tC: RS module). Incl. connection to crosshead: the extensometer is tracked at half test speed. The laserXtens 1-32 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) Where applicable, limited by furnace and temperature chamber design
3) Pre-tests required

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 on the front left (measurement: front center)	**Diverse**
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**
Hardware option [1] Through the videoXtens add-on, the laserXtens 1-32 HP/TZ can be switched to videoXtens functionality: Specimens that do not reflect laser light adequately (transparent, semi-transparent, absorbent and porous specimens) can be marked and tested in videoXtens mode.	
Stand-alone operation	
High-resolution AD/DA converter, 4 inputs, 2 outputs	**021661**
High-resolution D/A converter, 4 outputs	**032319**

1) This option cannot be retrofitted.

All data at ambient temperature.

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