Product Information
laserXtens 1-32 HP/TZ - the high-temperature-specialist for small specimens

Range of application
The laserXtens 1-32 HP/TZ delivers non-contact measurement of deformations on a range of materials in varied environmental conditions. The measuring principle eliminates the need to apply specimen marks, giving laserXtens 1-32 HP/TZ a wide range of application:
- Tensile, compression and flexure tests
- Tests on specimens where specimen contact is undesirable or not possible due to specimen condition or properties
- Deformation measurements on specimens prone to whipping at break which might damage a contact-type measuring system
- Tests at ambient temperatures
- Tests in temperature chambers
- Tests at high temperature
  - furnaces up to 1,600°C
  - induction up to 1,600°C
  - vacuum up to 2,000°C
- 1 extensometer for all environmental conditions

High precision and resolution
- The laserXtens 1-32 HP/TZ features high precision in the micro and macro measurement ranges.
- Resolution is 0.11 µm.
- Short specimens with gauge lengths from 1.5 mm can be tested with high precision.
- The laserXtens 1-32 HP/TZ satisfies the requirements of class 0.5 according to ISO 9513 (ASTM E83 class B2).

No specimen contact - no specimen marking
The laserXtens 1-32 HP/TZ has no mechanical contact with the specimen and possesses the following advantages:
- The specimen is not affected by the laser light.
- Sensitive specimens are not influenced by the extensometer, even at elevated temperatures.
- Maintenance-free - no fragile sensor arms.
- Temperature chambers and high-temperature furnaces can remain completely closed. Openings are thermally sealed via glass windows.
- Specimen marks are not required. This has several advantages:
  - saves time, especially with high specimen throughput, e.g. with carousel solutions
  - initial gauge length easily adjusted in the testing software.

Outstanding functions and options
- The laserXtens 1-32 HP/TZ can be used for tests to ISO 6892-2 (high temperature) and ISO 6892-1 (ambient temperature).
- Pretests are required for strain-controlled tests (see Page 3).
- Measurement of transverse strains and deflection without additional markings; no hardware expansion required (software option).
- Different gauge lengths can be set motorized.
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Description of operation
The specimen is illuminated with laser light, generating a speckle pattern on the surface.

Two additional evaluation fields can optionally be positioned for simultaneous local measurement of transverse strain.

The specimen surface plus speckle patterns are recorded by one full-frame digital camera. Two evaluation fields are positioned within the camera image (= field of view) and two part-patterns defined for tracking. The initial gauge length is defined by the distance of the green evaluation fields.

With laserXtens 1-32 HP/TZ the two evaluation fields appear in a single image. In this case the initial gauge length must not exceed the size of the field of view.

The entire measuring system can either track at half-speed via a mechanical connection to the crosshead or have a fixed mounting. Tracking keeps the extensometer in the center of the specimen and extends the measuring range.

The displacement of each speckle pattern is calculated using a sophisticated correlation algorithm. Displacement measurement is performed in each evaluation field for the speckle pattern located in the field. Specimen strain is calculated from the difference between these displacement measurements.

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

Field of view, 1-camera system: initial gauge length corresponds to the distance of the two evaluation fields

Additional evaluation fields "left" and "right" for determining local transverse strains
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High-temperature version - optical tunnel
When laserXtens 1-32 HP/TZ is used in conjunction with temperature chambers and high-temperature furnaces it should be noted that a change in optical conditions may have a negative effect on the measurement signal. This basically relates to air swirls inside the temperature chamber / furnace and outside on the viewing port / furnace slot. The optical tunnel minimizes these influences. The laserXtens 1-32 HP/TZ is therefore equipped with an adjustable tunnel with an optical-quality glass pane, together with an adapter plate including a rope seal which fits snugly against the temperature chamber glass pane or the slot of the high-temperature furnace.

Telecentric lens
The telecentric lens means that laserXtens 1-32 HP/TZ is not affected by changes in the distance between lens and specimen. In the case of temperature chambers and high-temperature furnaces, rods are used to apply the force to the specimen. If these rods are not exactly aligned or if they employ self-aligning (spherical) mounting, there will be alignment movements at the start of the test, causing the distance from the specimen to the lens to change. With ordinary lenses these movements result in measuring errors. The telecentric lens used with laserXtens 1-32 HP/TZ has a tolerance range of approximately ±1.5 mm.

Illumination
Green laser diodes are used with laserXtens 1-32 HP/TZ. The lenses are equipped with interference filters which only allow the green laser light through, blocking interfering red light from a glowing specimen, for example. This enables measurements at very high temperatures also.

Important
To ensure reliable operation of the laserXtens 1-32 HP/TZ certain conditions must be observed, including those listed below.

• The specimen surface must be suitable for reflecting laser light. This can be assumed to be the case with metallic and ceramic surfaces.
• A low-vibration environment is necessary for reliable, accurate operation (laboratory conditions).
• As high-temperature materials sometimes display non-linear strain increases, we recommend performing pretests for high-temperature tensile tests according to ISO 6892-2 using Method A1 (closed loop).

If the customer requires, the conditions referred to above will be verified via pretests, ensuring reliable operation of laserXtens 1-32 HP/TZ.

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**laserXtens 1-32 HP/TZ - the high-temperature-specialist for small specimens**

<table>
<thead>
<tr>
<th>Item No.</th>
<th>laserXtens 1-32 HP/TZ MP01632</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accuracy class</td>
<td>0.5 according to EN ISO 9513.</td>
</tr>
<tr>
<td>Resolution</td>
<td>0.11 according to EN ISO 9513.</td>
</tr>
<tr>
<td>Initial gauge length $L_0$</td>
<td>1.5 to 25 mm</td>
</tr>
</tbody>
</table>
| Measuring range via speckle tracking 1) | 32 mm - $L_0$ (fixed mounting)  
2 x (32 - $L_0$) (with automatic tracking) |
| Measuring range, flow measurement | switches to flow measurement mode on reaching maximum measuring range |
| Strain-rate control 2) | according to ISO 6892-1 Method A1 and ISO 6892-2 Method A1 |
| Max. following speed on the specimen | 500 mm/min |
| Measurement frequency | 70 Hz (with standard setting) |
| Laser safety class | 2 (no protective measures required.) |

Scope of supply: measuring head with 1 digital camera including high-resolution telecentric lens, 2 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) including connection to crosshead: extensometer tracks at half test speed.

The laserXtens 1-32 HP/TZ operates with testXpert II (Version 3.71 and above) only and in combination with testControl/testControl II. The required tC RS module or INC module is already included in scope of supply. A free slot is required in testControl/testControl II.

### Description

<table>
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<th>Description</th>
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<tbody>
<tr>
<td><strong>Basic package for laserXtens</strong></td>
<td>Various</td>
</tr>
<tr>
<td>The basic package contains a multilingual workstation, optionally with Windows 10 64-bit, 23&quot; TFT monitor and operating instructions in English or German.</td>
<td></td>
</tr>
<tr>
<td><strong>Mounting kit</strong> for installation at front left (measurement front center)</td>
<td>Various</td>
</tr>
<tr>
<td><strong>Software options</strong></td>
<td></td>
</tr>
<tr>
<td>Second measurement axis for simultaneous determination of longitudinal strain and local transverse strain.</td>
<td>011069</td>
</tr>
<tr>
<td>Measurement of deflection in 3 and 4-point flexure tests in test axis</td>
<td>077071</td>
</tr>
<tr>
<td>Strain distribution: determination of local strains at multiple measuring-points</td>
<td>077063</td>
</tr>
<tr>
<td><strong>Hardware option</strong> 3)</td>
<td></td>
</tr>
<tr>
<td>The videoXtens AddOn allows laserXtens 1-32 HP/TZ to be switched to videoXtens functionality. Specimens which do not reflect laser light adequately (transparent, semi-transparent, absorbent and porous specimens) can be marked and tested in videoXtens mode.</td>
<td></td>
</tr>
<tr>
<td><strong>Stand-alone operation</strong></td>
<td></td>
</tr>
<tr>
<td>High-resolution AD/DA converter, 4 inputs, 2 outputs</td>
<td>021661</td>
</tr>
<tr>
<td>High-resolution D/A converter, 4 outputs</td>
<td>032319</td>
</tr>
</tbody>
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1) Note: possible restriction due to furnace or temperature chamber design  
2) Pretests required.  
3) This option cannot be retrofitted.