Product Information
laserXtens 1-15 HP - specialist for small specimen

Applicational range
The laserXtens 1-15 HP can be used for contact-free and high-precision measurement of strain or deformation on a wide range of materials in a small or micro measurement range. Using the latest laser speckle technology means that there is no contact with the specimen during the test and no need to attach marks.

- 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
- Where non contact biaxial strain measurement is necessary

Flexible – yet easy to operate, the laserXtens 1-15 HP is perfectly suited for quality control applications and yet offers major technological benefits to organizations engaged in research and development.

Highest precision and resolution
- The laserXtens 1-15 HP provides high precision in micro and macro measuring ranges
- It meets or exceeds class 0.5 of ISO 9513 (Class B2 of ASTM E83)
- The resolution of the laserXtens 1-15 HP is 0.04 µm. Measuring inaccuracies which may be caused by lateral movements occurring are minimized by the telecentric imaging

Smallest specimens are measurable
Easily and with high accuracy you can also perform measurements on small specimen geometries from 3 mm gage length or with a specimen width/diameter of 1 mm or even smaller after pretests.

No specimen contact, no specimen markings
- The laserXtens 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

Unrivaled functions and options
- Measurement of transverse strain or flexion without the need of additional specimen marks or hardware extensions for the system (software option)
- Measurement in two dimensions, up to 100 measuring points in any desired configuration or arranged in matrix form on a plane specimen surface can be dimensioned (option 2D dot-matrix)
- Determination of the strain distribution and the strain at break according to ISO 6892-1 annex H
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Description of operation
laserXtens 1-15 HP consists of a measuring head with a digital camera and two laser light sources. The specimen is illuminated with laser light and a speckle pattern is generated by the reflected laser rays.

The specimen surface plus speckle patterns are recorded by a full-frame digital camera. Two evaluation windows are positioned within the overall image (= field of view) of the camera as virtual gage-marks. laserXtens tracks the speckle pattern in the virtual gage-mark using a sophisticated correlation algorithm between the individual camera image frames (speckle tracking).

The algorithm operates in two different modes. As long as the virtual gage-mark moves within the field of vision of the camera, it will be tracked (= speckle tracking). As soon as the mark reaches the edge of the field of vision, changeover to a second measuring mode is available (= flow measurement). In this mode the flow of the material below the evaluation window is measured and the measured value determined from this. Depending on the material and/or deformation of the specimen, very good results are also obtained with this non-standard method.

Two additional virtual gage-marks can optionally be measured in parallel in the transverse direction.

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Software options

Strain distribution
The option strain distribution is used to determine localized strains at several measuring locations along the gage length on the specimen. The evaluation of up to 16 measurement marks is possible. In addition, a balancing of the beginning gage length can be performed in order to follow the necking-in automatically in real time (according to ISO 6892-1, annex H).

Second measurement axis
This option enables the determination of extension and local transverse strain at the same time.

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 for optimum functionality

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 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 based on pretested specimens and the test conditions (= process reliability).

2D dot-matrix
This option enables measurement in two dimensions for measurement points on a plane specimen surface. Thereby it is possible to identify local strains and inhomogeneities of the specimen under strain. X- and Y-coordinates as well as the distances between points are available as measurement values.
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<table>
<thead>
<tr>
<th>Item number</th>
<th>laserXtens 1-15 HP</th>
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<tbody>
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<td>1043981</td>
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</table>

laserXtens 1-15 HP for mounting on a zwickiLine materials testing machine
Laser Class 2: no protective actions are necessary
Accuracy Class 0.5 according to EN ISO 9513
Resolution 0.04 µm according to EN ISO 9513 under real testing conditions
Gage length \( L_0 \) 3 – 14 mm
Measuring range to 15 mm-\( L_0 \) via SpeckleTracking. After measurement range via speckle tracking the laserXtens switches to flow measurement
Max. following speed on the specimen 250 mm/min
Measurement frequency 70 Hz (with basic settings)
Specimens thickness flat specimens max. 30 mm
Measurement frequency 0.5 - 30 mm pre-tests required for specimen with dia. < 1 mm
Scope of supply Measuring head with 1 digital camera incl. objective \( f=75 \) mm, 2 red laser light sources, software, toolset with scaling aid
testControl or testControl II and testXpert II (from version 3.71) or testXpert III is required
The required tC-RS-module rsp. INC-module is already included in the scope of supply. A free slot for the tC-RS-module or INC-module is required in the testControl II.

Description

<table>
<thead>
<tr>
<th>Description</th>
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<tbody>
<tr>
<td>Basic package for laserXtens</td>
<td>various</td>
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<tr>
<td>The basic package includes a multilingual workstation, operating system Windows 7 / Windows 10, software, 23” TFT-screen</td>
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<tr>
<td>Mounting set for zwickiLine</td>
<td>1032778</td>
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<tr>
<td>Software options</td>
<td></td>
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<tr>
<td>Second measurement axis for measuring axial strain and a local transverse strain simultaneously</td>
<td>011069</td>
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<tr>
<td>Strain distribution for determination of localized strains at several measuring locations</td>
<td>077063</td>
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<tr>
<td>2D dot-matrix: Measurement in two dimensions for up to 100 measurement points</td>
<td>077070</td>
</tr>
<tr>
<td>Measurement of deflection in 3- and 4-point flexure tests in test axis</td>
<td>077071</td>
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<tr>
<td>Stand-alone operation</td>
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<tr>
<td>High performance AD/DA converter 4 inputs, 2 outputs</td>
<td>021661</td>
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<tr>
<td>High performance D/A converter, 4 outputs</td>
<td>032319</td>
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</tbody>
</table>

Tests in temperature chambers or ovens only on request