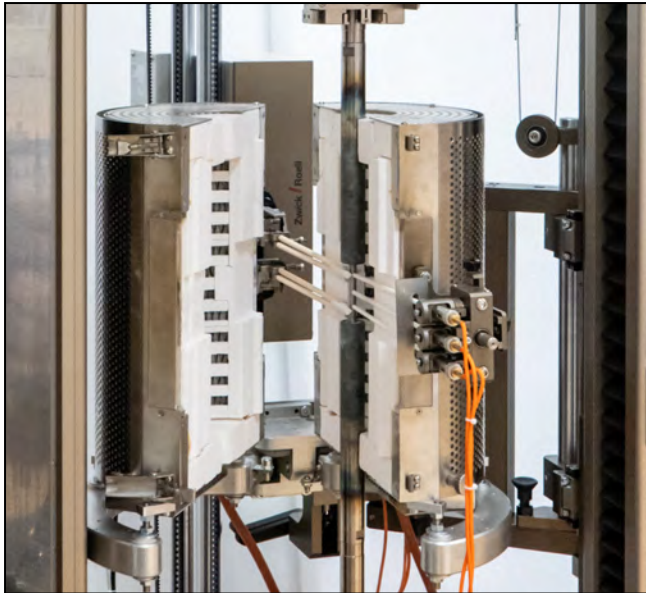


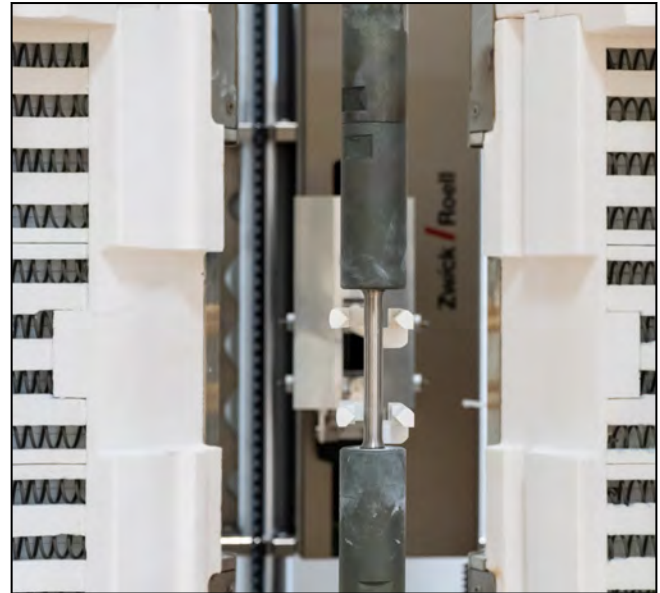
Product Information

High-Temperature Extensometer from Ambient Temperature to 1,200 °C/1,600 °C/2,000 °C

CTA: 209688 257887



makroXtens II 100 HP on high-temperature furnace HTF-LVW 1,250 °C



makroXtens II with ceramic sensors for temperatures up to 1,200 °C

High-temperature extensometer

This PI covers the optimal extensometers for strain measurement in high-temperature testing. The following non-contact and contact extensometers are available:

- makroXtens II HP (contact)
- laserXtens 2-120 HP/TZ (non-contact)
- Extensometer, variable (contact)
- Extensometer, fixed (contact)

Contact makroXtens II up to 1,200 °C

Applications

The makroXtens II is a universal, high-resolution extensometer optimally suited for applications such as tensile, compression and flexure tests on metals. In addition, it can be used for high-temperature tests up to +1,200 °C.

The measuring system is ideal for measurements both inside and outside a high-temperature furnace.

Advantages and features

- Optimal combination of makroXtens II HP with high-temperature resistant ceramic sensors and high-temperature furnace (patented)
- Two-sided-contact strain measurement on the specimen

- Accuracy class 0.5 to EN ISO 9513
- The makroXtens II is calibrated starting at a measurement travel distance of 20 µm in class 0.5
- Extremely low drag force of the sensor arms (< 0.05 N)
- The sensor arms can be changed between ambient-temperature and high-temperature tests quickly and without the need for tools
- Ideally suited for use in AllroundLine table-top and floor-standing testing machines, as well as Allround-Line testing machines with a side test area
- Suited for closed loop strain rate control to ISO 6892-2 Method A1 and to ASTM E8-09 Method B
- 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".

Product Information

High-Temperature Extensometer from Ambient Temperature to 1,200 °C/1,600 °C/2,000 °C

Technical data

Type	makroXtens II 100, HP
Item No.	083939
Accuracy to EN ISO 9513	Class 0.5 (1)
Drag force	≤ 0.05 N
Resolution in conjunction with:	
450 mm sensor arm length	0.009 µm
Initial gauge length	From 10 mm to 50 mm ¹⁾
Measurement displacement	74 mm (standard) - L _e 0 ¹⁾
Specimen thickness/diameter, max.	
Round specimens	16 mm
Flat specimens	8 mm
Dimensions (HxWxD)	380 x 120 x 375 mm
Weight, approx.	10 kg
Minimum version	testXpert II V3.6 or testXpert III

1) The sum of initial gauge length and measurement travel is limited by the height of the furnace port. The standard port height is 100 mm.

Accessories required

Sensor arms for tensile tests

Description	Sensor arms for round specimens at ambient temperature	Sensor arms for round specimens at high temperature	Sensor arms for flat specimens at high temperature
Item No.	325870	1101921	1107341
Sensor arm length	450	450 ¹⁾	450 ¹⁾ mm
Initial gauge length, min.	10	10	10 mm
Accuracy to EN ISO 9513	Class 0.5 from L ₀ 20 mm	Class 0.5 from L ₀ 20 mm	Class 0.5 from L ₀ 20 mm
Measurement displacement of the sensor arm	112.5	112.5	112.5 mm
Material	Metals	Ceramic	Ceramic
Temperature range	-70 to +250	+200 to +1,200	+200 to +1,200 °C
Scope of delivery	2	2	2 piece(s)

1) Sensor arm length of 450 mm, suited for high-temperature furnace HTF-LVW 1,250 °C

Mounting options for table-top and floor-standing testing machines:

Description	Table-top testing machine with AR 640 mm	Floor-standing testing machine with AR 640 mm
Item No.	1102197	1102199
Swivel mounting set for makroXtens II	Test positions: 90° rear center with sensor arms 450 mm and 45° rear left with sensor arms 600 mm	Test positions: 90° rear center with sensor arms 450 mm and 45° rear left with sensor arms 600 mm

Product Information

High-Temperature Extensometer from Ambient Temperature to 1,200 °C/1,600 °C/2,000 °C

CTA: 210318



laserXtens 2-120 HP/TZ

Non-contact laserXtens 2-120 HP/TZ up to 2,000 °C

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.

The laserXtens 2-120 HP/TZ is ideal for the 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 B2 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.

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

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.

Product Information

High-Temperature Extensometer from Ambient Temperature to 1,200 °C/1,600 °C/2,000 °C

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 ≥ 50 mm, L ₀ ≤ 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 ₀ setting), 2 digital cameras including high resolution telecentric lenses, 2 laser light sources green, high-temperature tunnel for the reduction of environmental influences, software image acquisition, evaluation of the cross correlation and transfer to testXpert II (Version 3.71 or higher) or testXpert III, 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 exclusively with testXpert II (Version 3.71 or higher) or testXpert III 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

Product Information

High-Temperature Extensometer from Ambient Temperature to 1,200 °C/1,600 °C/2,000 °C

CTA: 75303 257888



High-temperature contact extensometer up to 1,500 °C

High-temperature contact extensometer up to 1,500°C

The high-temperature contact extensometer is used for acquisition of the specimen strain for operation in air up to 1,500 °C. The axial recording of specimen extension occurs via direct attachment of the high-temperature extensometer.

Advantages and features

- One-sided measurement with LVDT
- Continuously adjustable initial gauge length
- Fast test preparation and easy operation with swivel-slide-suspension and positioning wheel for the sensor arms, for simple attachment on the specimen once the test temperature has been reached



High-temperature contact extensometer up to 1,600 °C

High-temperature contact extensometer up to 1,600 °C

This high-temperature contact extensometer can be used in combination with high-temperature furnaces and induction heating systems up to 1,600 °C. The extension on the specimen is measured through contact.

Advantages and features

- One-sided measurement with strain gauges
- Incrementally adjustable initial gauge length
- Sensor arms and spacers are available for various specimen shapes and initial gauge lengths (measurement range dependent on base gauge length)
- Innovative guide rail allows for lateral attachment of the extensometer through the furnace port, once the test temperature has been reached.
- Usable up to the point of specimen break
- Ideal for cyclic tests

Description	Extensometer, variable	Extensometer, fixed
Temperature, max.	1,500 °C	1,200 °C / 1,600 °C
Accuracy class	Class 0.5 to ISO 9513	Class 0.5 to ISO 9513
Initial gauge length (L ₀)	6 - 50 mm, continuous	10 - 50 mm, in increments
Measurement range	± 10 mm	± 10% ¹⁾ or +20%/ -10% or +50%/ -10% or +100%/ -5% of L ₀ ²⁾
Resolution	< 0.1 µm	< 0.1 µm

1) Not available with 10 mm or 12.5 mm initial gauge length

2) Not available with 50 mm initial gauge length