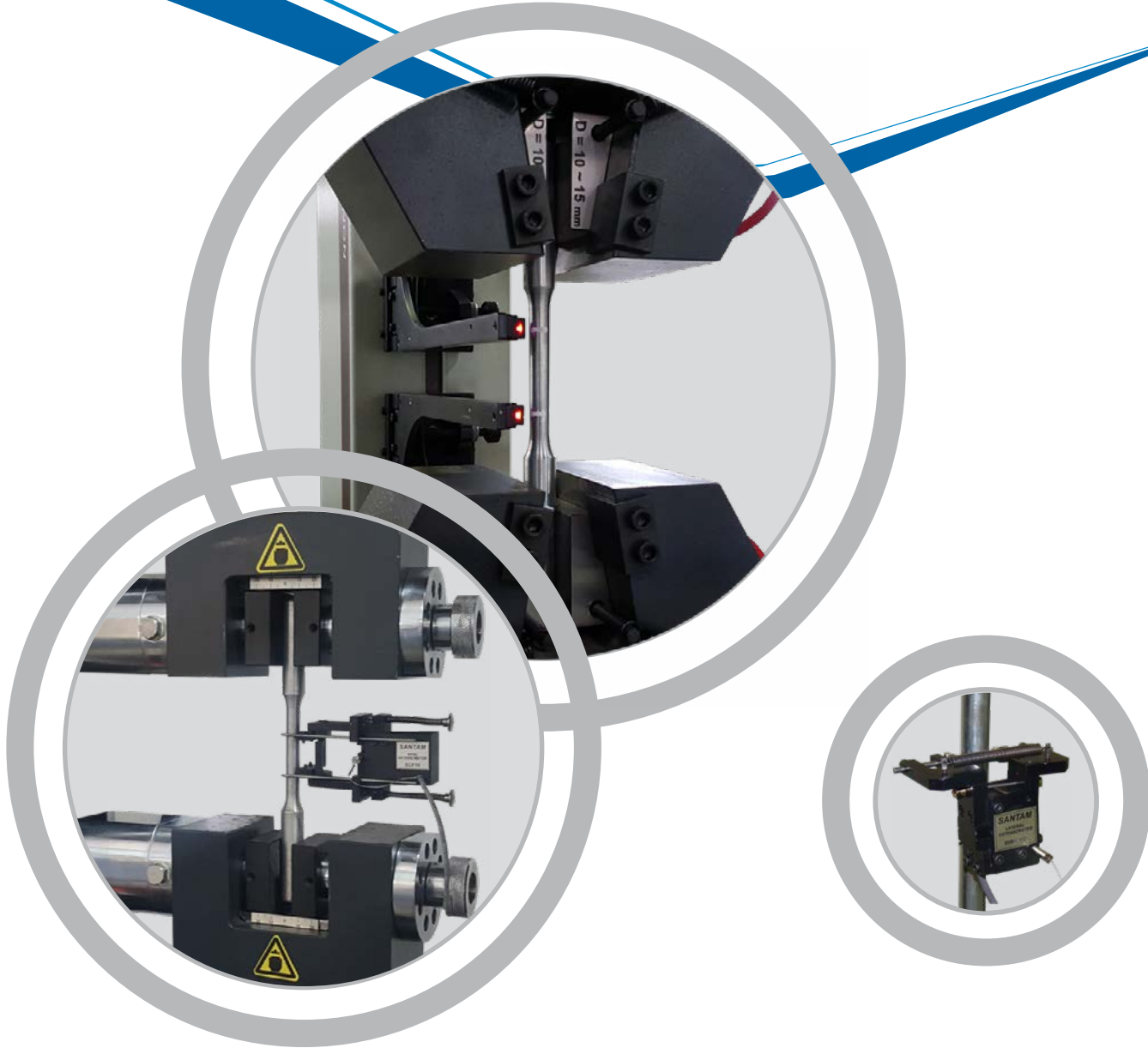


SANTAM

Materials Testing Equipment



Extensometers Catalog (Santam Company)



Affordable Price , High Performance

Extensometer



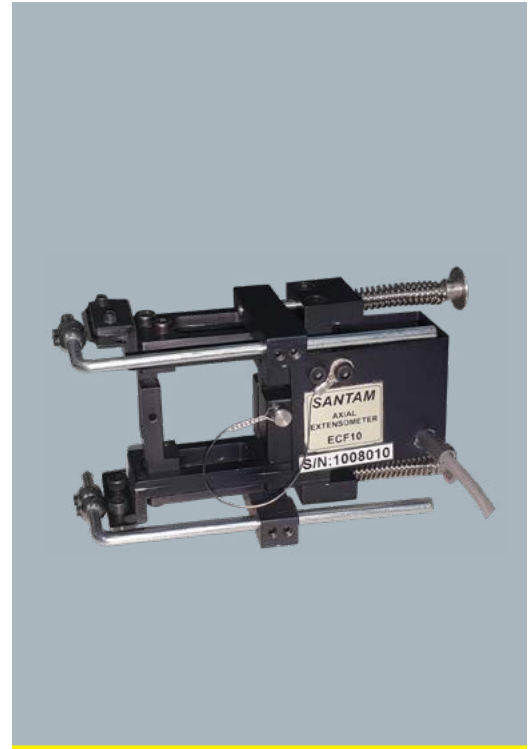
ENA-800

Non Contact Automatic Servo Motion Extensometer
High Resolution
Minimum Gauge 15 mm
800 mm Travel



ELT-500

Long Travel Extensometer
Variable Gauge
20 · 25 · 30 · 50 · 75 · 100 · 150 · 200 mm
500 mm Travel



ECF10

Cross Flexure Design Extensometer Clip on
High Resolution
Gauge-25 & 50
10 mm Travel

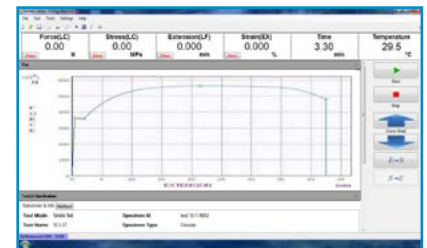
SANTAM Extensometers

To measure deformation (strain or displacement) precisely on test pieces, there is an accessory called "Extensometer" which determines the displacement in a specified range of specimen independent from the machine; it can be connected to software as well as tensile, compression, bend, creep, and relaxation testing machines. Extensometer was first invented in 1897. Various extensometers were designed to measure elongation as per pertinent standards, they can measure and record specimen displacement. Regarding different restrictions (including accuracy, stroke, clamping type, type of test, ...), SANTAM has designed different types of extensometers (more than 20 models).

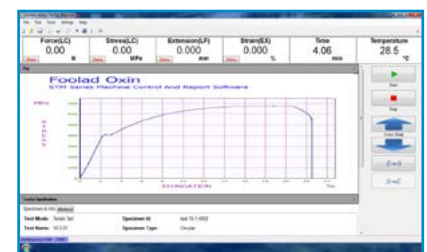
By measuring the deformation directly from test piece, extensometers omit the errors caused by additional deformations (specimen tails, specimen clamping mechanism, load cell, frame stiffness, and slippage from grip ...).

Extensometers have various applications, but regarding their installation method, they are divided into two groups: contact and non-contact, and when it comes to measurement structure and the sensors used in them, they are designed as analogue and digital extensometers.

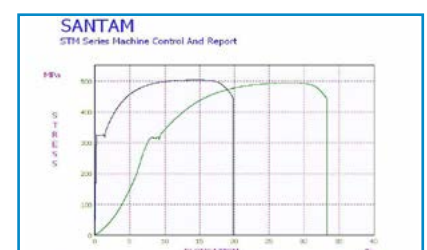
The main application of extensometers is reading the displacement out of the specimen allowable limit according to standards; they are used in tensile, compression, bend, crack tip opening displacement, thickness reduction, thickness increase ... tests. Extensometers can measure and calculate strain rate, elongation percentage and other engineering parameters.



Tensile test with Extensometer



Tensile test without extensometer



Comparison of tensile test with and without extensometer

**1 Non-contact automatic servo motion extensometer
(for testing types of metal and polymer materials)**

- ✓ ENA-800
- ✓ ENA-800B for tests under 100°C



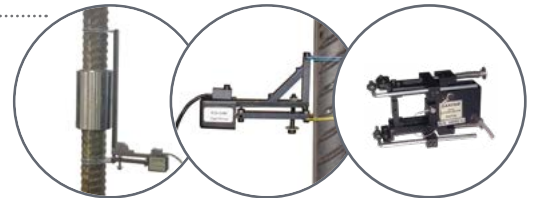
**2 Long stroke extensometer
(for materials with high elongation such as polymers)**

- ✓ ELP-500
- ✓ ELP-500B for testing polymer pipes



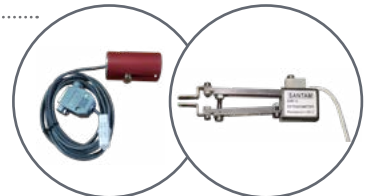
**3 Short stroke, high-resolution extensometer
(For materials with very low elongation)**

- ✓ HER 10
- ✓ EHR10-A
- ✓ ECF 10 cross flexure design extensometer



4 Crack Opening Displacement Extensometer

- ✓ EHR10-B
- ✓ ECG2



5 Thickness Reduction Extensometer

- ✓ EHR10-A



6 Transverse strain extensometer and longitudinal strain

- ✓ EHR10-D2



7 Thickness increase extensometer

- ✓ EHR10-D



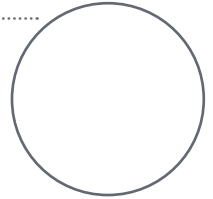
8 **Longitudinal strain extensometer**

- ✓ ELP50-3



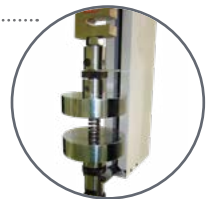
9 **R&N value determination extensometer**

- ✓ EHR10-RN



10 **Compression extensometer**

- ✓ ELMR-500



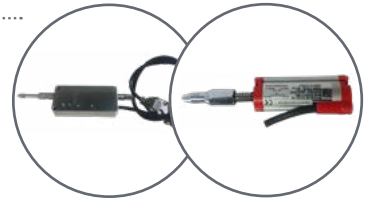
11 **Extensometer for reduction in pipe diameter**

- ✓ ELT1000



12 **Elongation extensometer**

- ✓ LEG15-2, two digital sensors
Magnetic linear encoder system
- ✓ LEG15, one digital sensor
Magnetic linear encoder system
- ✓ ELP10-2, two analog sensors
- ✓ ELP10, an analog sensor
- ✓ ELP50, an analog sensor





Extensometer ENA-800

Non-contact automatic servo motion extensometer, high resolution

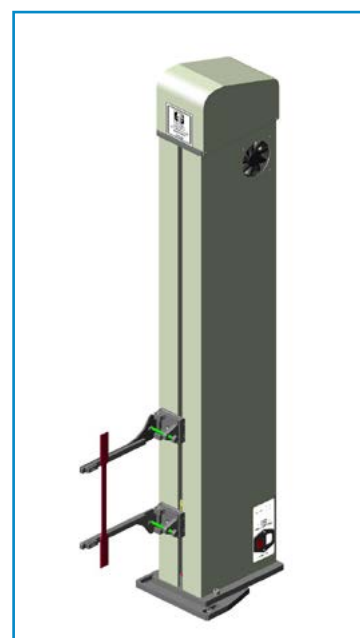
For the first time in the world, SANTAM Company succeeded in designing and manufacturing extensometer ENA-800 with unique specifications and capabilities, and was able to solve problems and limitations of clip-on, long stroke, video, laser, and robotic extensometers after all.

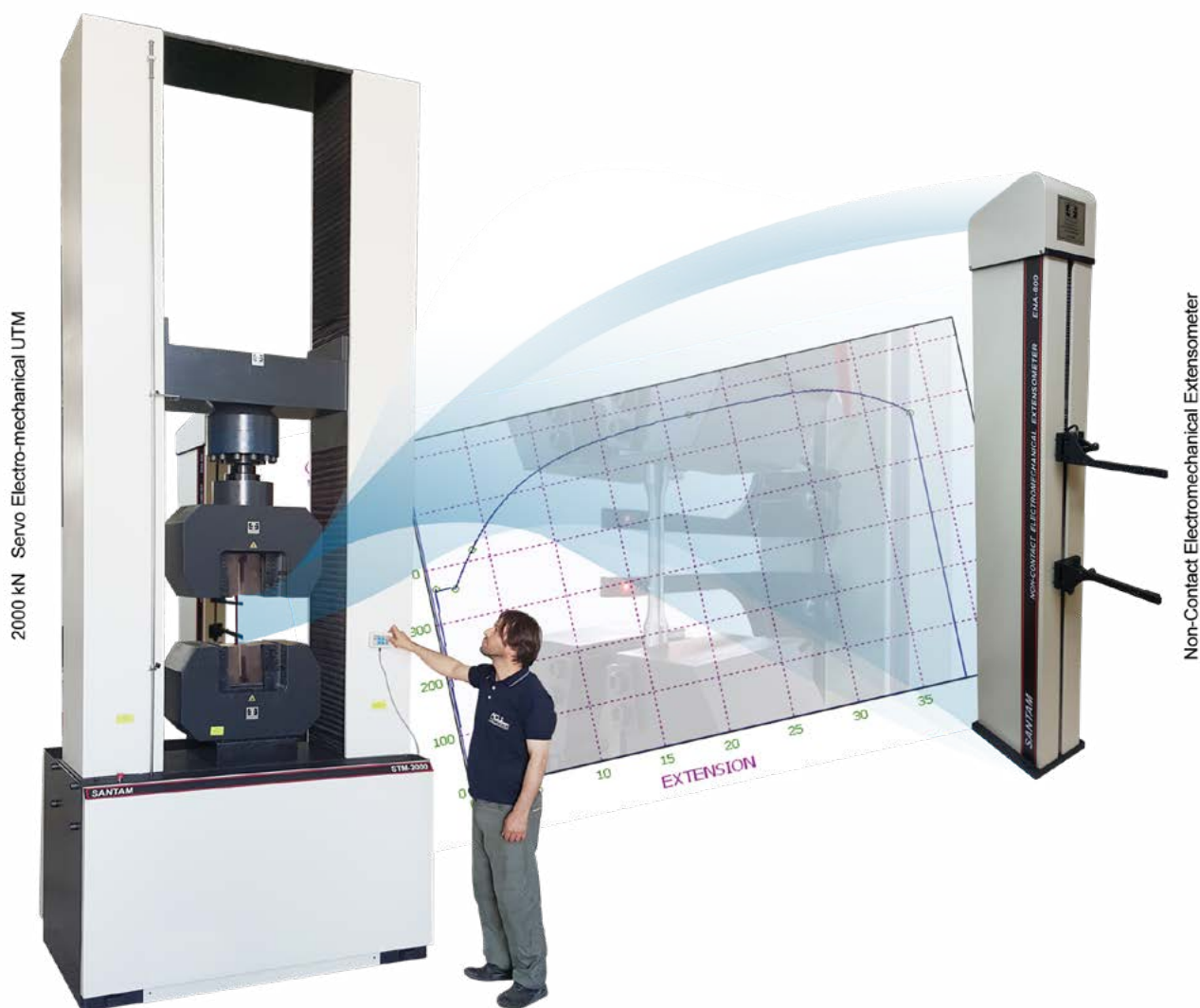
The most outstanding features of this extensometer are lack of contact with test piece, high accuracy as well as lack of limitation in stroke. The issue of damage to specimen due to its failure (metal parts), the effect of arm forces on workpiece (film and thread test), mechanism and the amount of arm clamping force applied to various test pieces as well as measuring the initial length were solved. Extensometer ENA-800 made by SANTAM is equipped with sensitive sensors that track the changes in specimen length precisely. Precision devices such as motor, ball screw, and linear guide are used in the design of its mechanical sections to perform tracking the changes in a better way. The device is equipped with precision and flexible arms that can move in two directions in order to avoid any damage to specimen in case of failure. The electronic and instrumentation parts of this product have modular design to perform real-time and closed loop control through the whole process.

ENA-800 application

It is recommended to use this extensometer in research and industrial centers to obtain the elongation for a wide range of materials (ferrous and non-ferrous, composite, rubber, plastic, textile and thread, film as well as all brittle materials) with round, flat, and cylindrical sections and with different initial gauge lengths.

Extensometers series ENA, due to their high precision in measuring quantities such as elastic modulus, max. elongation, proof stress, and strain at UTS point, can be used almost for all kinds of materials including those of high rigidity and elongation with wide range of gauge length.





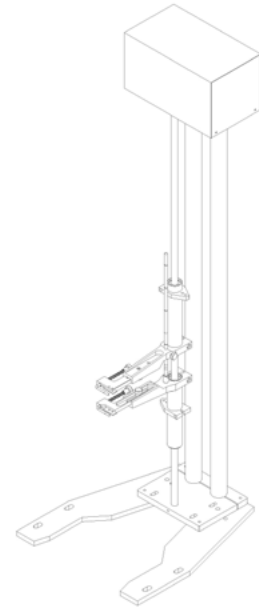
Description	Technical Specifications	
Code	ENA-800	ENA-800B
Standard	ISO 9513, ASTM E 83	
User interface	Remote control and software control panel	
Control system	Opto electromechanical	
Displacement resolution	Extension resolution for the whole stroke 0.0001mm	
Accuracy	Class C for gauge length 15-50mm Class B1 for gauge length 50-100mm Class B2 for gauge length 100-500mm Class A for gauge length 500-750mm	
Clamping type	Non-contact (line tracking) zero force	
Drag force	Zero	
Testable material	No limitation, able to test kinds of materials with high stiffness, transparent and tiny	
Velocity	0-600 mm/min	
System lag	10ms or 0.02% set speed (mm/min)	
Minimum gauge length	15mm	
Limitation in gauge length	No limitation in distance selection	
Max. stroke	800mm, (can be increased on request)	
Installation requirements	A special bracket for mounting on any type of machines	
Working temperature	10~50 °C	10~100 °C
Dimension (L×W×H)	550 × 300 × 1135 mm	580 × 300 × 1135 mm
Weight	20 Kg	21 Kg



ELT-500

Long Travel Extensometer
Variable Gauge

20 · 25 · 30 · 50 · 75 · 100 · 150 · 200 mm
500 mm Travel

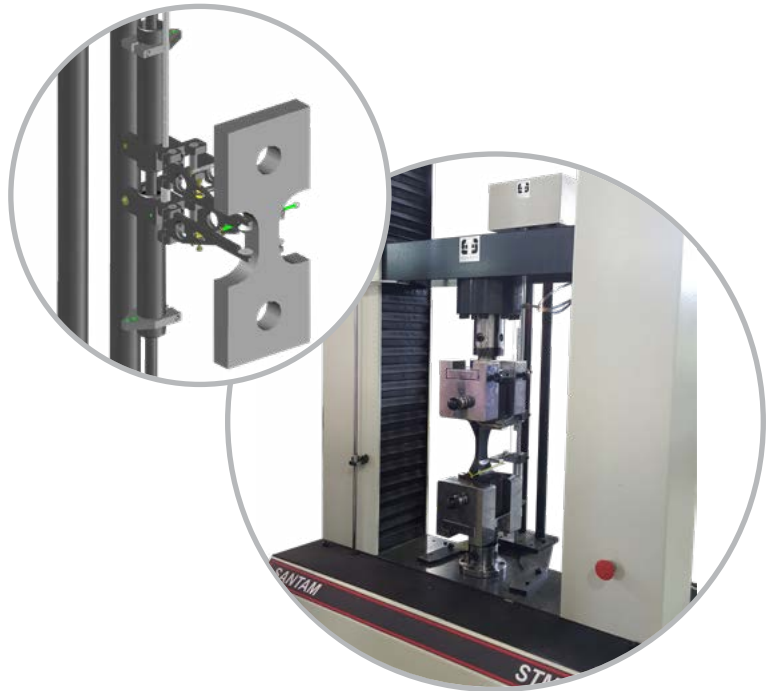


Long Travel Extensometer

Long travel extensometer, series ELP, is equipped with digital sensor used to measure strain in highly extensible specimens. The arms of this type of extensometers are precisely designed, and move away from each other with the least force (friction)

Application

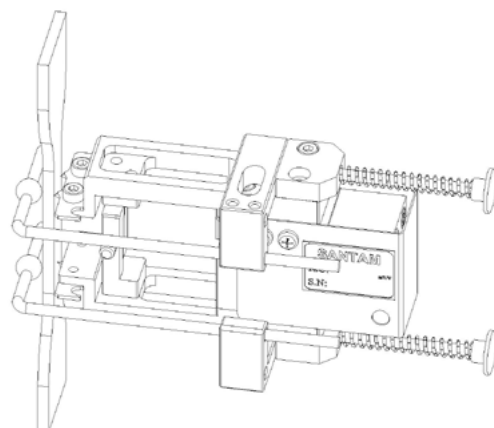
This extensometer is used to obtain the elongation of types of pieces made of rubber, plastics, tiny wires and strings; by changing the arms of this model of extensometer a new version, i.e. ELP500B is presented which is suitable for testing specimens cut of polyethylene pipes.



Description	Technical Specifications	
Code	ELP500	ELP500B
Standard	ISO 9513, ASTM E 83	
Sensor type	Digital	
Displacement resolution	0.017mm	
Measurement accuracy	0.5% F.S	
Accuracy class	ASTM E83, class B1 and ISO 9513 class 0.5	
Specimen clamping mechanism	Contact (clamped directly onto the specimen, need bracket)	
Clamping method	Metal gripping arm	Special gripping arm for polyethylene pipes
Gauge length	20, 25, 30, 50, 75, 100, 200	
Test stroke	500mm	
Installation requirements	A bracket for mounting on any type of machines	
Working temperature	10 ~ 50°C	
Dimension (L×W×H)	550×230×1050 mm	
Weight	7Kg	



ECF10
Cross Flexure Design Clip-on extensometer
High Resolution
Gauge-25 & 50
10 mm Travel



High Resolution Extensometer

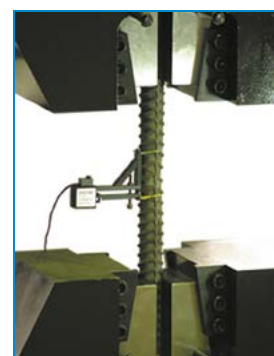
High resolution extensometers, HER and ECF series, are products with high accuracy equipped with analog sensor to measure strain in low extensible specimens. These extensometers have no brackets but attach to specimen; they are called “clip-on” extensometers. The arms of these extensometers are precisely designed so that they can attach to specimens with round and flat sections and minimize the installation error.

Application

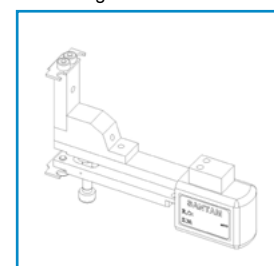
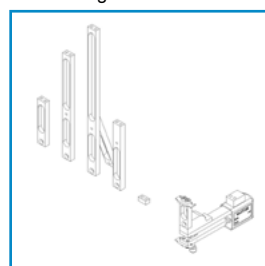
This type of extensometer is offered to obtain elongation of various specimens (ferrous and non-ferrous, composite, as well as all brittle materials) with round, flat, and cylindrical sections and with different initial gauge lengths (according to the table).



EHR10-A
Clip-on extensometer
Variable Gauge
25,50,75, 100, 150, 200
High Resolution



EHR10
Clip-on extensometer
Gauge-25
10 mm Travel
High Resolution



Description	Technical Specifications		
Code	ECF10	EHR10-A	EHR10
Standard	ISO 9513 , ASTM E 83		
Sensor type	Analog		
Displacement resolution	0.001 mm		
Measurement accuracy	0.5% F.S		
Accuracy class	ASTM E83 Class B1 and ISO 9513 Class 0.5 for Gauge Length 50 mm		
Specimen clamping mechanism	Clip-on (clamped directly onto the specimen, no need to bracket)		
Clamping method	Elastomer	Elastomer	Clamping arm (metal)
Gauge length	25mm, increase on request	25 , 50 , 75 , 100 , 150 , 200 mm	50 mm
Test stroke	10 mm		
Installation requirements	No limitation		
Working temperature	10~50 °C		
Dimension (L×W×H)	130 × 40 × 65 mm	100 × 22 × 45 mm (For GL 25 mm)	100 × 22 × 70 mm
Weight	200g	100g	60g



EHR10-B
COD Crack Opening
Displacement
High Resolution 2 mm Travel



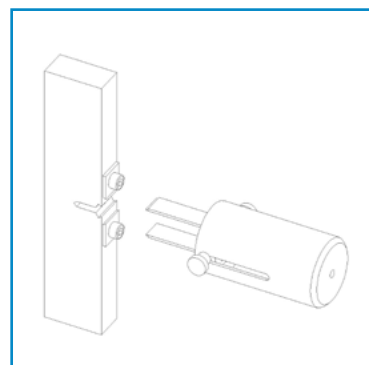
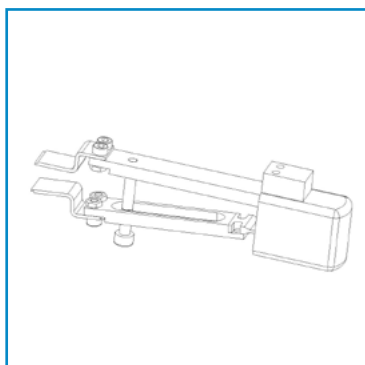
ECG2
Crack Growth - Extensometer
1 mm Travel

Crack Opening Displacement (COD) Extensometer

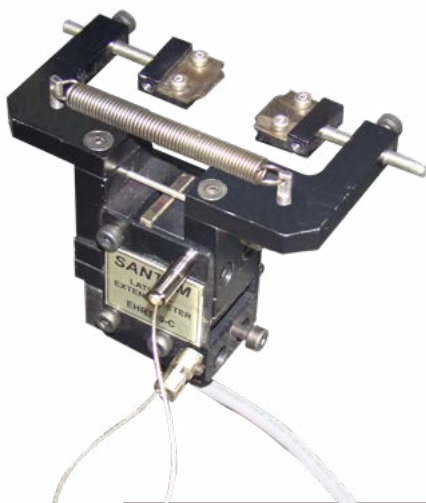
COD extensometer, series EHR10 and ECG is equipped with analog sensor to measure crack opening displacement with high accuracy, they have no bracket and are called clip-on extensometers. The arms of these extensometers are precisely designed so that they can easily attach to the crack.

Application

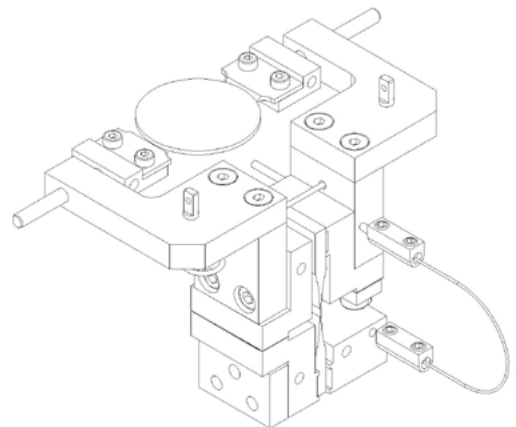
Two models of extensometers are offered to obtain the amount of crack opening displacement of steel and concrete specimens according to the following table.



Description	Technical Specifications	
Code	EHR10-B	ECG2
Standard	ISO 9513 , ASTM E 83	ASTM-E399
Sensor type	Analog	
Displacement resolution	0.001 mm	0.1 μ
Measurement accuracy	0.5% F.S	1% F.S
Accuracy class	ASTM E83 Class B1 and ISO 9513 Class 0.5	
Specimen clamping mechanism	Clip-on (clamped directly onto the specimen, no need to bracket)	
Gauge length	2 mm	1 mm
Test stroke	3-5 mm	10 mm
Installation requirements	No limitation	
Working temperature	10~50 °C	
Dimension (L×W×H)	120 × 17 × 50 mm	90 × 32 × 32 mm
Weight	40 g	55 g



EHR10-C
Thickness Reduction Extensometer
High Resolution 10 mm Travel

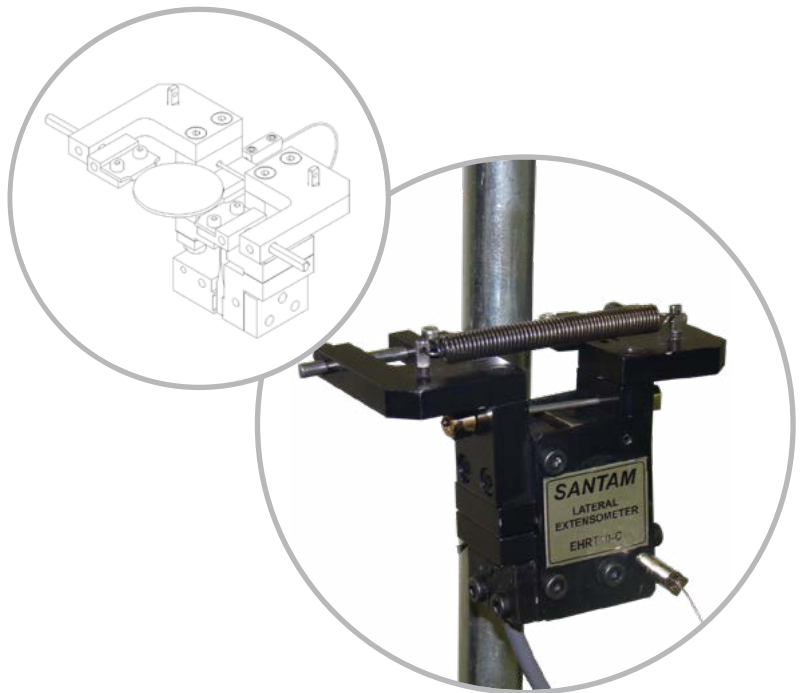


Thickness Reduction Extensometer

Thickness reduction extensometer, EHR10 series, has analog sensor to measure thickness reduction with high accuracy on specimens with flat and round sections. These types of extensometers have no brackets and since they attach to specimens, they are called clip-on extensometers; they have special arms to attach to specimen easily minimizing the installation error.

Application

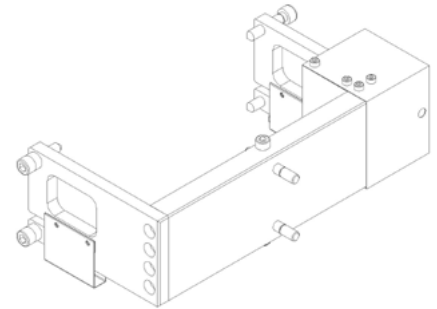
This type of extensometer is offered to obtain thickness reduction of various ferrous and non-ferrous specimens.



Description	Technical Specifications
Code	EHR10-C
Standard	ISO 9513 , ASTM E 83
Sensor type	Analog
Displacement resolution	0.0002 mm
Measurement accuracy	0.5% F.S
Accuracy class	ASTM E83 Class B1 and ISO 9513 Class 0.5
Specimen clamping mechanism	Clip-on (clamped directly onto the specimen, no need to bracket)
Clamping method	Clamping arm (metal)
Gauge length	25 mm
Test stroke	2.5 mm
Installation requirements	No limitation
Working temperature	10~50 °C
Dimension (L×W×H)	60 × 100 × 100 mm
Weight	120 Kg



EHR10-D2
Transverse and longitudinal
strain extensometer
To calculate the Poisson's ratio



Transverse and Longitudinal Strain Extensometer

Transverse and longitudinal strain extensometer, HER10 series, have two sets of extensometers the sensors of which are analog and act independently in measuring longitudinal and transverse strains. The accuracy in these sensors is so high; these extensometers have no brackets, but attach to specimen and this is the reason why they are called clip-on extensometers. The arms of these extensometers are designed so that they can attach easily to specimen and minimize the installation error.

Application

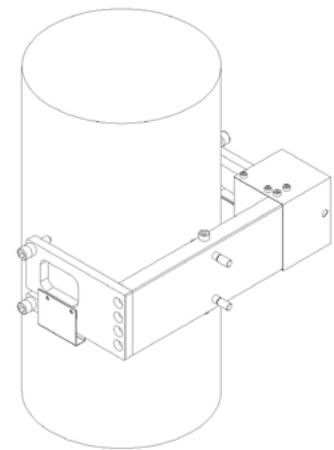
These extensometers are used to measure thickness increase and length reduction in cylindrical concrete specimens, as well as obtaining transverse and longitudinal strain to calculate Poisson ratio.



Description	Technical Specifications
Code	EHR10-D2
Standard	ISO 9513 , ASTM E 83
Quantity of sensors	2
Sensor type	Analog
Displacement resolution	0.001 mm
Measurement accuracy	0.5% F.S
Accuracy class	ASTM E83 Class B1 and ISO 9513 Class 0.5
Specimen clamping mechanism	Clip-on (clamped directly onto the specimen, no need to bracket)
Clamping method	Clamping arm (metal)
Gauge length	50 mm
Test stroke for transverse strain	1 mm
Longitudinal strain gauge length	150 mm
Test stroke for longitudinal strain	5 mm
Installation requirements	No limitation
Working temperature	10~50 °C
Dimension (L×W×H)	70 × 140 × 190 mm
Weight	500 Kg



EHR10-D
Extensometer Thickness
Increase
The exact transverse strain



Thickness Increase Extensometer

Thickness increase extensometer, HER10 series, has a set of analog sensors to measure the transverse strain. Measurement accuracy in this type of extensometers is so high, they have no bracket clamped directly onto the specimen, and this is the reason why they are called clip-on extensometers. The arms are designed so that they can attach to the specimen easily and minimize the operator error.

Application

These extensometers are used to measure thickness increase, obtain transverse strains, and calculate Poisson ratio (it should be noted that in this extensometer, only thickness increase is measured and the ratio is obtained indirectly).



Description	Technical Specifications
Code	EHR10-D
Standard	ISO 9513 , ASTM E 83
Sensor type	Analog
Displacement resolution	0.001 mm
Measurement accuracy	0.5% F.S
Accuracy class	ASTM E83 Class B1 and ISO 9513 Class 0.5
Specimen clamping mechanism	Clip-on (clamped directly onto the specimen, no need to bracket)
Clamping method	Clamping arm (metal)
Longitudinal strain gauge length	70-150 mm
Test stroke for longitudinal strain	10 mm
Installation requirements	No limitation
Working temperature	10~50 °C
Dimension (L×W×H)	70 × 140 × 190 mm
Weight	500 Kg



ELP50-3
The exact longitudinal strain
(For Compression)
Double Sensor



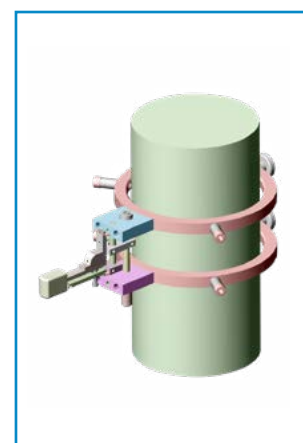
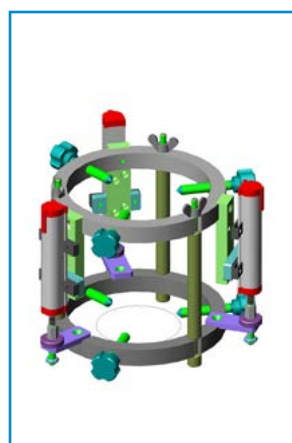
HB-EHR10
Extensometer Clip on
Gauge-25
High Resolution 10 mm Travel

Longitudinal Strain Extensometer

Longitudinal strain extensometer, ELP50 series, has three analog sensors to measure longitudinal strains at different angles around a cylindrical specimen (120) independently, the output is measured as differential after all. These extensometers have no brackets and are directly clamped onto the specimen, and this is the reason why they are called clip-on extensometers. In this type of extensometers, three sensors are used around the cylindrical specimen attached to the test piece by means of a fixture to measure longitudinal strain accurately by specified gauge.

Application

It is used to obtain longitudinal strains (deflections) and compression modulus for concrete, stone, asphalt as well as rigid and brittle specimens.



CF150-165R

Description	Technical Specifications	
Code	ELP50-3	HB-EHR10
Standard	ISO 9513 , ASTM E 83	ISO 9513 , ASTM E 83
Quantity of sensors	3	1
Sensor type	Analog	Analog
Displacement resolution	0.003 mm	0.001 mm
Measurement accuracy	0.5-50mm of the reading in 1%, 0.1% F.S	0.5% F.S
Linearity	Linearity \pm %0,05	---
Specimen clamping mechanism	Clip-on (clamped directly onto the specimen, no need to bracket)	
Clamping method	Clamping arm (metal)	Elastomer
Gauge length	Adjustable	50 mm
Clamping dia. for cylindrical specimen	70-100 mm	---
Test stroke	100 mm	10 mm
Installation requirements	---	Extensometer EHR10
Other possibilities	Interface for measuring and averaging 3 sensors	---
Working temperature	10~50 °C	10~50 °C
Dimension (L×W×H)	150 × 150 × 170 mm	360 × 250 × 200 mm
Weight	1 Kg	1.2 Kg

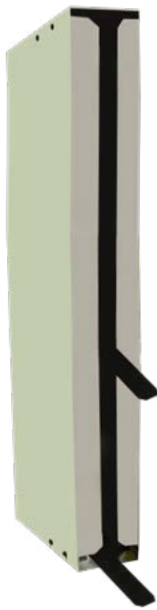
R&N-Value Extensometer

Transversal and longitudinal strain extensometer, EHR10 series, has two sets of analog sensors to measure transversal and longitudinal strains at the same time. This type of extensometers need no bracket clamped directly onto the specimen and this is the reason why they are called clip-on extensometers. The arms are designed so that they can attach to the specimen easily and minimize the operator error.

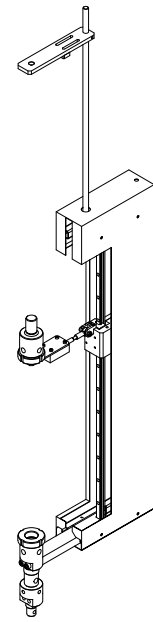
Application

This extensometer is designed to study longitudinal strains as well as transversal thickness reduction simultaneously, and determine r-and-v value for specimens made of metal sheets, thus facilitating the measurement and analysis of strain in two directions on steel sheets.

Description	Technical Specifications
Code	EHR10-RN
Standard	ASTM E517 , E646
Sensor type	Analog
Displacement resolution	0.001 mm
Measurement accuracy	0.5% F.S
Accuracy class	Class 0.5, 0.5% of the reading in 0.5-10mm. accuracy 0.005mm in 0.05mm
Specimen clamping mechanism	Clip-on (clamped directly onto the specimen, no need to bracket)
Clamping method	Clamping arm (metal)
Gauge length	10 mm
Base thickness	12.5 mm
Test stroke	10 mm
Installation requirements	No limitation
Working temperature	10~50 °C



ELMR-500
Extensometer For Compression
High Reduction
500 mm Travel

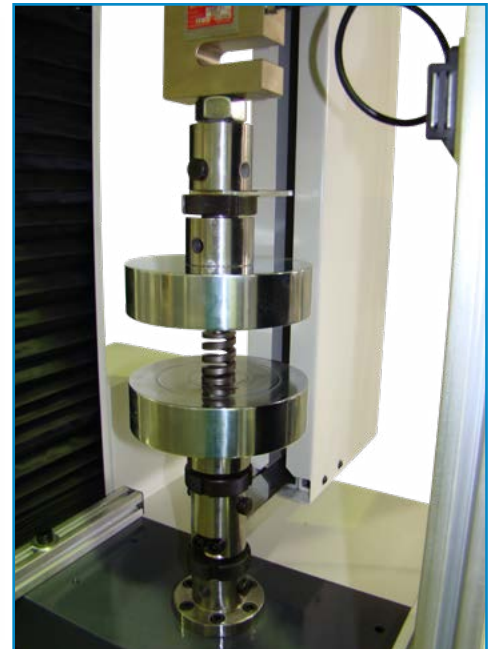


Compression Extensometer

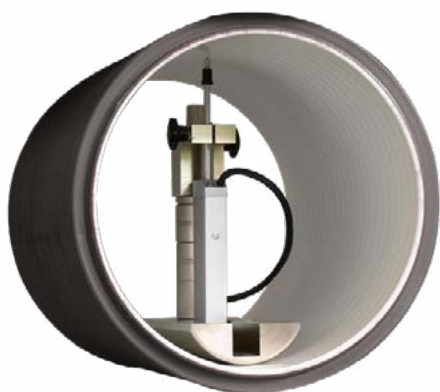
Compression extensometer, ELMR series, has digital sensor to measure the exact displacements from both compression grip platens with long stroke. The arms are designed so accurate and proportional to compression grip. The stiffness error and clearance in compression tests are eliminated if this extensometer is mounted.

Application

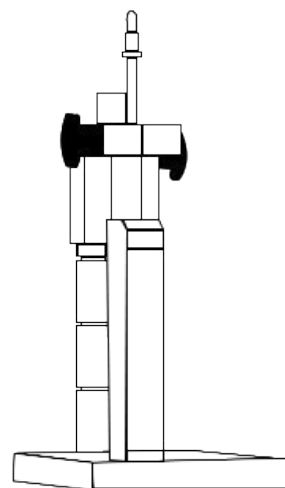
This extensometer is offered to carry out precision compression test and determine deflection and elastic module, stiffness of rubber specimen as well as calculating the exact amount of "K" (stiffness).



Description	Technical Specifications
Code	ELMR-500
Standard	ISO 9513 , ASTM E 83
Sensor type	Digital
Displacement resolution	0.001 mm
Measurement accuracy	Mechanism and measurement error better than 0.5% of the reading in 2-500mm Measurement accuracy up to 5mm, error 10μ Measurement accuracy up to 50mm, error 0.2% Measurement accuracy up to 500mm, error 0.05%
Specimen clamping mechanism	Contact, connected to compression jaw
Clamping method	Special fittings and arms
Gauge length	500 mm
Test stroke	500 mm
Installation requirements	Can be mounted on double column tensile machines, compression grip required
Working temperature	10~50 °C
Dimension (L×W×H)	ƒ × ƒ × ƒ mm
Weight	ƒ Kg



ELT1000
Extensometer
(For Pipe) DIN 16961 ISIRI
11436

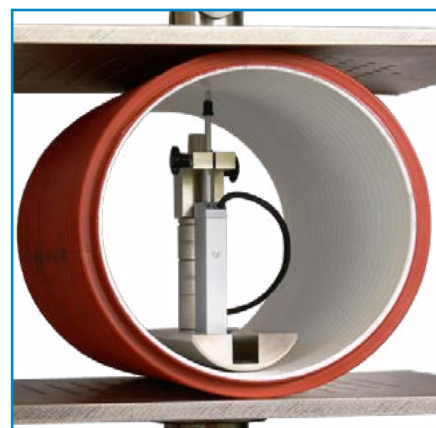
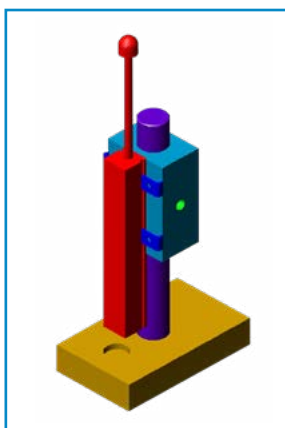


Pipe Diameter Reduction Extensometer

Pipe diameter reduction extensometer, ELT1000 series, has digital sensor to measure the diameter reduction in polymer pipes and tubes, it is equipped with bracket, proportional to pipe diameter

Application

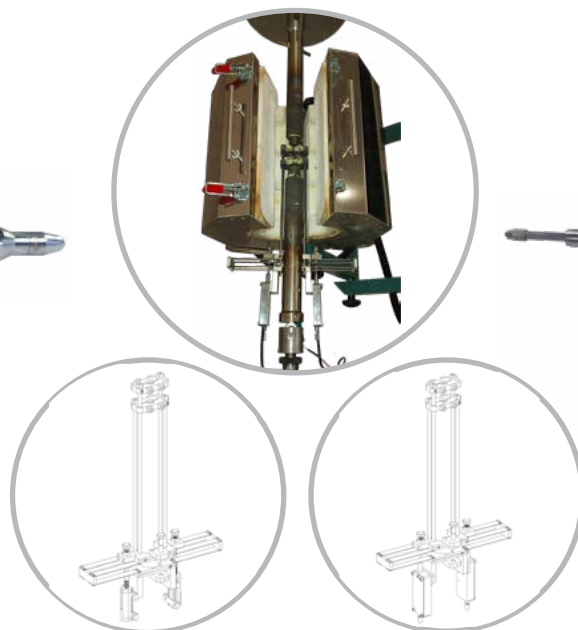
This extensometer is designed to measure the reduction in inner diameter of pipes (including corrugated, spiral, and double wall pipes) according to ISIRI 11436 national standard and DIN 16961, they are manufactured with different strokes.



Description	Technical Specifications
Code	ELT1000
Standard	ISO 9513 , ASTM E 83 , SIRI 11436 , DIN 16961
Sensor type	Digital
Displacement resolution	0.017 mm
Measurement accuracy	0.5% F.S
Accuracy class	ASTM E83 Class B1 and ISO 9513 Class 0.5
Specimen clamping mechanism	Contact (connected to extensometer bracket)
Clamping method	Special fittings and arms
Gauge length	Proportional to the pipe diameter
Test stroke	150 , 100 , 50 mm
Installation requirements	Requires bracket for mounting on any machines
Working temperature	10~50 °C
Dimension (L×W×H)	ℓ × ℓ × ℓ mm
Weight	ℓ Kg



ELP50-B
The exact longitudinal strain
(For Compression)
Double Sensor



LEG15
MAGNETIC LINEAR
ENCODER SYSTEMS
High Resolution
Travel 15 mm

Elongation Extensometer

Elongation extensometer, LEG series, has digital sensor with high measurement accuracy and is designed to measure the displacement amounts from both ends of the specimen.

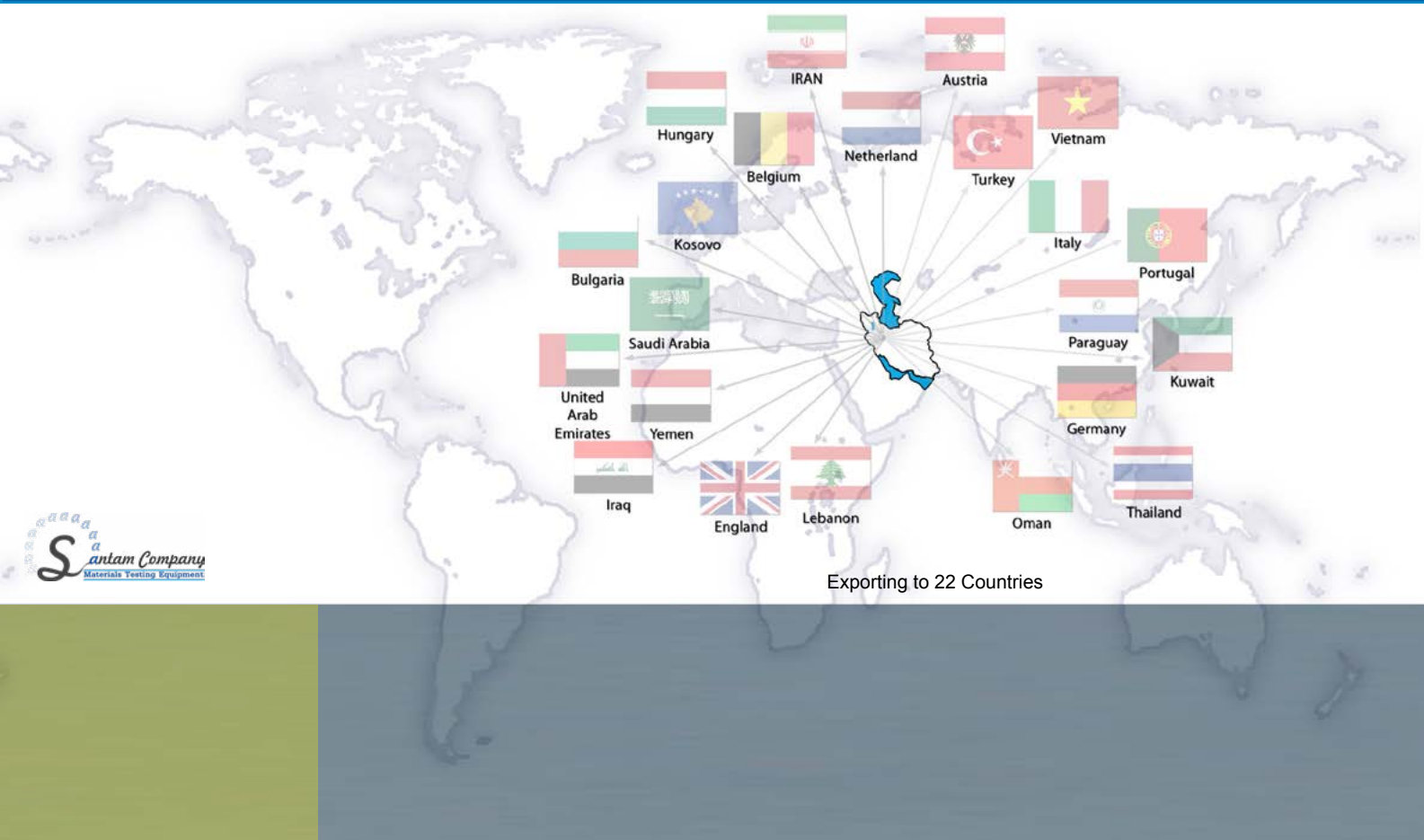
ELP extensometer has analog sensor with high measurement accuracy and is designed to measure the displacement amounts from both ends of the specimen.

LEG and ELP extensometers can be clamped onto the specimen individually and jointly to eliminate deviation errors in tensile and compression test pieces. In these products, the displacement amounts are measured by individual sensors, and the outcome is transmitted to the machine differentially after all. Regarding the type of test and its thermal conditions, the quantity and type of the proposed elongation extensometers will be different enabling the user to measure the strain on the specimen with high accuracy. These types of extensometers have various arms, which are offered proportional to their applications in creep, hot tensile, and compression tests.

Application

It is used to measure the elongation amount in hot tensile tests, displacement in hot creep test, and elongation amount in relaxation and compact tests.

Description	Technical Specifications		
Code	ELP10-10...200	LEG15-2	LEG15
Standard	ISO 9513 , ASTM E 83		
Sensor type	Analog	Digital	Digital
Quantity of sensors	1	2	1
Displacement resolution	0.005 mm	0.001 mm	0.001 mm
Measurement accuracy	0.5% F.S	0.1% F.S	
Accuracy class	Class C	ASTM E83 Class B1 and ISO 9513 Class 0.5	
Specimen clamping mechanism	Contact, clip-on (clamped onto the specimen)		
Clamping method	Connected to special interfaces for different test (creep, bend ,...)		
Test stroke	10 ,20 ,50 ,100 ,200 mm	15 mm	15 mm
Installation requirements	No limitation		
Working temperature	10~50 °C		
Extensometer interfaces working temperature	1150 °C		
Other possibilities	Protection rating IP67, resistant against vibration up to 30g, frequency 2 KHz		
Dimension (L×W×H)	120 × 40 × 20 mm	ƒ × ƒ × ƒ mm	140 × 40 × 15 mm
Weight	ƒ g	ƒ g	ƒ g



Designing & Manufacturing of
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All of the specifications shown in this brochurs are subject to change without notice.



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