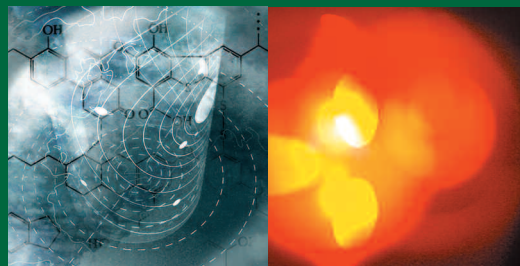


Our instruments stand up to the toughest testing.



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**Epsilon** Extensometers for materials testing

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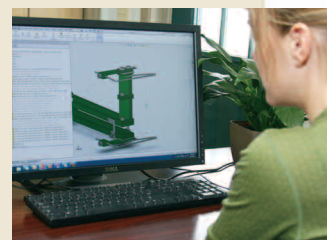
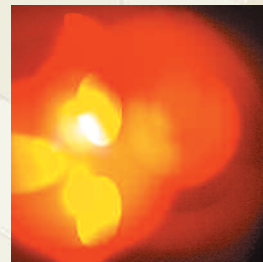
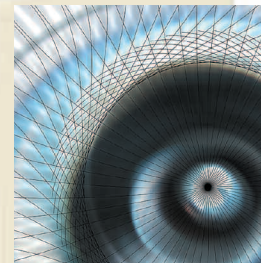
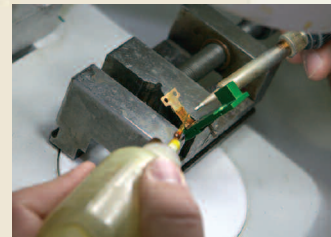
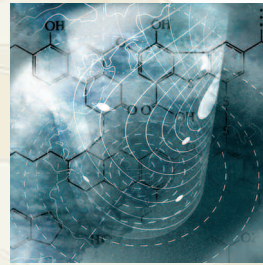
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torque  
fatigue  
compression  
fracture  
mechanics  
stress/strain

Our  
instruments  
stand up to  
the toughest  
testing.

-265°C  
+1600°C  
bend  
extremes

## OUR COMPANY

### Strain measurement for materials testing is our sole business at Epsilon.

Over forty years of experience have gone into the development of our products. At our facility in Jackson, Wyoming, we design and build extensometers for testing around the world. Extensometers are available for testing almost all engineering materials including: elastomers, plastics, composites, metals, ceramics, geomaterials (e.g. rock, concrete, and asphalt), and biomaterials including bone. There are models for tiny and delicate samples, including relatively fine wire, up to massive metal samples and large rock cores. The huge variety of models covers nearly every type of test as well, including: tensile, compression, bend, fracture mechanics, and cyclic strain controlled tests like low cycle fatigue. Many of our extensometers are capable of relatively high frequency operation as well.

## Why Epsilon?

- **World's largest extensometer manufacturer:** Epsilon's focus exclusively on extensometers and related items has led to this growth. With sales in more than 60 countries, we have become the recognized choice for testing laboratories around the globe.
- **Broadest product line anywhere:** Over 31 models available in many thousands of variations. Our focus on helping customers has led to the development of models to cover nearly any test method.
- **Expertise—in both testing and extensometers:** Epsilon has several degreed engineers. These include engineers with advanced degrees in materials as well as mechanical and electrical engineering. Our most senior engineer has over 36 years of experience designing extensometers and materials test equipment, as well as test method knowledge. We have engineers who have worked in test labs using extensometers. One engineer is dedicated to improving our quality systems. We have an in-house machine shop led by a tool and die maker with 42 years experience. The many technicians who build our products are also highly experienced.
- **Responsive—talk to our experts anytime:** When you call Epsilon, you can expect to talk to a degreed engineer with expertise in materials, testing and extensometers. You have access to this same expertise if you have technical questions or problems. If you contact us by email, we promise a quick response. If you ever need repairs, our service is prompt. We are here to help.
- **Unrivaled quality:** The technicians who build our devices understand the company's commitment to quality. Every unit is checked by a quality control person before shipment. Epsilon is accredited by A2LA to the ISO/IEC 17025 international standard (General Requirements for the Competence of Testing and Calibration Laboratories) and certified by DNV to the ISO 9001 international quality management system standard. Epsilon uses a laser interferometer for increasing the accuracy of much of what we measure. This allows calibration of extensometer calibrators as well as extensometers. With an accuracy of 0.5 parts per million, it approaches the measurement accuracy of national standards. Our scope of accreditation and quality system certificates can be viewed on our website.



Visit our website at [www.epsilontech.com](http://www.epsilontech.com)

## Compatibility



# Interfacing Epsilon extensometers to test equipment.

All of Epsilon's strain gaged transducers employ a full wheatstone bridge design. They are powered by an excitation voltage, typically between 5 and 10 VDC. The output of the extensometer is proportional to the excitation. For this reason the calibrated output is often expressed as a mV/V value. An extensometer with a full scale span of 2.345 mV/V will have a full scale output of 23.450 mV if the excitation is 10V. This span data is provided by Epsilon on each extensometer test certificate.

All strain gaged sensors must be connected to some external electronics to provide readings. The electronics provide the excitation and normally amplifies the sensor's output to a high level DC voltage. This resultant voltage is used for readout or control of the test machine. In digital systems the voltage output is converted via data acquisition hardware into engineering units of strain. In instances where a chart recorder or X-Y recorder is used, the output is set to easily yield a specified strain/cm on the graph.

When any new device like an extensometer is first used, the sensor must be calibrated with the electronics to ensure proper configuration. There are several ways to accomplish this. Generally the process is very straightforward. If your extensometer will be connected to an available strain channel in your test controller, Epsilon can normally supply the unit with the correct connector to plug directly in. For external data acquisition systems, a strain gaged signal conditioning module capable of providing the excitation is required. Often this is part of the data acquisition system. For systems that require high level inputs or for use with chart recorders and X-Y plotters, Epsilon offers optional signal conditioning electronics.

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## CALIBRATING EXTENSOMETERS WITH EXISTING ELECTRONICS

Required for any extensometer you buy, this process can be performed many ways, most of which are quite simple. The most common options are as follows:

### Using Epsilon's shunt calibration module

As detailed on the shunt calibration page, this is a very quick and easy way to set your electronics, regardless of brand. Shunt calibration allows the user to transfer Epsilon's calibration to on-site electronics using a two point calibration line fit (or more if additional shunt calibration modules are requested). Please see page 104 for more information on the operation of the shunt calibration module.

### With signal conditioning electronics from Epsilon

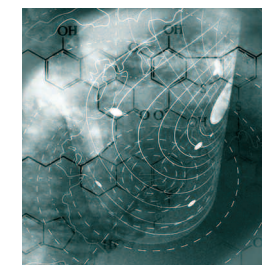
All extensometers purchased with electronics from Epsilon are shipped as fully calibrated systems. The output from the system is set to exact values (typically  $\pm 10\text{VDC}$ ), and is noted on the test certificate. No further calibration is required. Periodic recalibration can be performed by Epsilon.

### With an extensometer calibrator from Epsilon

Epsilon's digital electronic calibrators are the easiest to use units available. These calibrators provide an ideal way to perform calibrations if you have many extensometers. They allow you to check many data points along the curve for the highest accuracy. The new 3590VHR calibrator meets the accuracy and resolution requirements for ASTM E83 Class B-1 for a 6 mm gauge length and greater extensometers and ISO 9513 Class 0,5 over the full measuring range of the calibrator. Periodic re-calibration of the calibrator can be performed by a third party calibration service or by sending the unit back to Epsilon Technology.

### By calibration services such as the equipment manufacturer or independent calibration service

Epsilon's extensometers can be calibrated with test controls by any third party calibration service with the capability of calibrating extensometers. Many customers have their entire test machine re-calibrated annually by the service department of the manufacturer. This includes the load cell, extensometers and any other installed sensors. Most calibration services will have no difficulty calibrating Epsilon's extensometers.



bend  
interfacing  
calibration  
torque



## Performance Features

### OUTSTANDING PERFORMANCE FEATURES IN EVERY MODEL

- Rugged construction withstands constant handling and mounting
- Most models may be left on through specimen failure
- Light weight to minimize specimen influence
- Most models operate in both tension and compression
- Most models are capable of being used in cyclic tests
- Low operating force, normally less than 40g, with many under 20g
- Easy to attach to specimens, with quick attach kits for most models
- Immersible in many non-conductive fluids
- Initial gauge length accurately established
- All come with foam lined case

### Backed by many years of experience

Over forty years of experience in materials testing and extensometer design combine to provide the best performing extensometers in the industry. Epsilon's experienced staff combined with our factory direct sales structure means if you have questions, you can speak with an expert to help resolve your issue. Our extensometers are the result of design refinements based on the experiences and inputs from customers over many years.

### Full one year warranty on every extensometer

The warranty covers defects in materials or workmanship for a full year, excluding normal wear and damage from excessive force. Each unit is produced under stringent quality standards and is fully tested and calibrated. Certain items such as knife edges wear under normal circumstances and a spare pair is included. Should your extensometer require repair, Epsilon maintains a policy of quick response to keep your test lab running.

### High accuracy, exceeding requirements of ASTM E83, ISO 9513, EN 10002-4

All of Epsilon's extensometers are designed for very high accuracy, with performance significantly better than required by various testing standards. Epsilon's extensometers adhere to the highest requirements of ASTM E83 and ISO 9513, where applicable. For all other units, linearities of better than 0.15% of full scale measuring range are commonly achieved.

All units ship with an ISO 17025 accredited test certificate. Each extensometer is individually calibrated, with relevant data provided.

### Highest quality and the best value

Epsilon's entire line of extensometers were engineered for high performance during even the most demanding materials testing applications. They have the ruggedness needed for high volume testing labs, proven through years of customer use.

Epsilon extensometers are sold factory direct. Coupled with our innovative design, the result is substantial cost savings to your company, with world class performing products.

### Unique dual flexure design combined with overtravel stops for ruggedness

Nearly all models use a dual, flexure design which protects the extensometer from undesired motions. This isolates the sensing element from side forces and accelerations from dynamic test, and helps eliminate most out-of-plane errors.

### All standard axial extensometers may be left on through specimen failure

Integral mechanical stops protect the extensometer from damage when specimen failure occurs. The stops also prevent damage from mishandling.

### Replaceable parts for added life and versatility

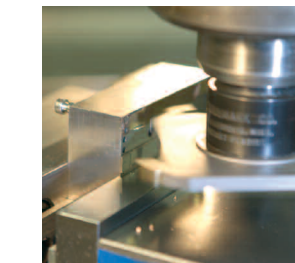
All models have easily replaceable knife edges (where applicable). An additional set is included in the spare parts kit. The standard knife edges are made from hardened tool steel for long life. The modular design of the extensometers allows easy replacement of damaged components.

## We are all about service at Epsilon.

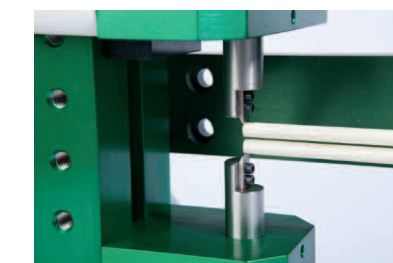
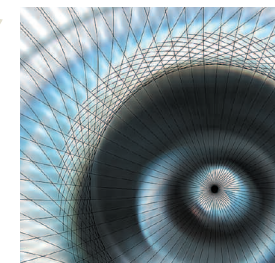
Each extensometer comes with a full, one year warranty. The warranty covers defects in materials or workmanship for a full year, excluding normal wear and damage from excessive applied force. Each unit is produced under stringent quality standards and is fully tested and calibrated before leaving the factory.

Certain items such as knife edges and ceramic rods wear under normal use, and a spare set is included. The modular design of the extensometers allows for easy replacement of damaged parts. Should your extensometer require repair, Epsilon maintains a policy of quick response to keep your test lab running.

Epsilon Technology takes pride in ensuring that our experts are available to speak with customers. If you have an issue you wish to discuss, please contact us with your questions.



fully tested  
one year warranty  
stringent standards  
highest quality



Visit our website at [www.epsilontech.com](http://www.epsilontech.com)

## Frequently Asked Questions

### Can Epsilon extensometers be left on through specimen failure?

Yes. All Epsilon standard extensometers are designed to withstand remaining on the sample through specimen failure. On certain materials, such as high strength metals, knife edges will wear out faster if the extensometer is left on through failure. A spare set of knife edges is included.

### Will the extensometer be compatible with my existing electronics?

All extensometers in this catalog can easily be shipped with the mating connector already installed, so you can plug right in to your existing electronics. We stock connectors for every common brand of test machine.

The majority of Epsilon's extensometers are strain gaged transducers which may be connected to most brands of materials testing controls. If your controls have the signal conditioning module for a strain gaged extensometer, we can supply the unit with the necessary connector to plug in directly. If you are using a data acquisition board to acquire test data, the extensometers can almost always be interfaced properly. A few of our extensometers use capacitive sensing technology or DVRT sensors, and these include the required electronics.

If your controls are designed for LVDT type extensometers only, we can provide the electronics to work with our extensometers. Available electronics are covered in this catalog. This is also ideal for older test machines, which may not have any extensometer electronics, allowing the output to run a chart recorder or plotter, or interface to a data acquisition board.

The unique shunt calibration module from Epsilon helps make calibrating the electronics for the extensometer quick and easy. This also allows you to send your extensometer back to Epsilon for periodic re-calibration. For further details on shunt calibration see page 104.

### What electronics are needed?

Most of our extensometers are strain gage based sensors. They use a full Wheatstone bridge design. Functionally they require the same signal conditioning electronics used for any strain gaged transducer (load cell, pressure sensors, etc.). If you do not already have the electronics, Epsilon has signal conditioners available.

### How do I decide what measuring range I need?

For tensile tests on ductile materials (most metals and plastics), there is often a desire to obtain the whole stress-strain curve to specimen failure. In this case, there is a trade-off. If you specify a higher measuring range, like 50 or 100 percent strain, the accuracy of the measurements at the low end are somewhat degraded. For example, modulus of elasticity and yield strength are measured in the first few percent of the strain range, often occurring in the range of 0.1 to 2 percent strain. However, standards like ASTM E83 take this into account, since they require certain levels of accuracy expressed in percent of reading, not percent of the full scale range.

Generally speaking, Epsilon's extensometers will meet the higher levels of accuracy requirements in today's standards, such as ASTM class B-1. You can thus be assured that reasonably accurate measurements at the low end of the range can still be made.

For the highest accuracy of measurements like yield strength, customers often choose lower measuring ranges, such as 5 to 20 percent strain. Many modern test systems allow the user to remove the extensometer after a certain strain is reached, and use crosshead or actuator measuring range to obtain the rest of the strain data to specimen failure. This allows measurements like elongation to failure to be approximately obtained, even with a low measuring range extensometer.

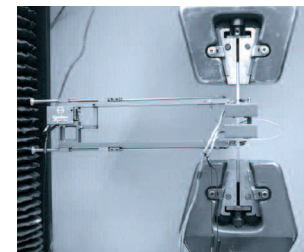
Finally, it is possible to use a long measuring range extensometer and get more accurate measurements at the low end. This is done during calibration. The gain of the electronics must be adjusted to maximize the accuracy at the low end. Then at the maximum range, the error will be greater. However, the most important data is obtained at the low end of the measuring range and the accuracy for the elongation to failure measurement is not normally critical.

### Why do I need an extensometer when I can get strain from crosshead displacement?

Measuring crosshead deflection during a test does not just measure strain in a defined region of a test sample. It also measures machine deflection, grip deflection and possible slippage and deflection of the part of the test sample outside the normal reduced section. Strain is defined as the change in length divided by the initial length (gauge length). There is no defined initial length without an extensometer and the change in length is not correctly measured due to the other deflections included in crosshead measuring range.

## What our customers have to say about us.

"I use Epsilon extensometers because they are rugged, well built and economical. I find their versatility to be their most appealing aspect.



Model 3542-2 inch extensometer with a Model 3575AVG r-Value extensometer in use determining deep drawing sheet metal properties.

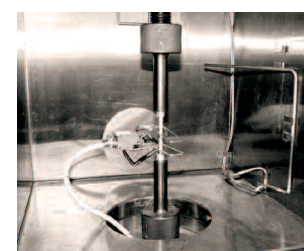
We interface them with several data acquisition systems as well as testing machines. We use them in traditional testing modes to non-traditional, stand alone applications. It's the versatility of these instruments that makes Epsilon extensometers a perfect fit for our test laboratory."

RICK PEARSON  
ANDERSON LABORATORIES, INC.

"Epsilon's products, technical support and service on repairs are very easy. We have never before experienced such a well organized company. We are in Austria, but it is much faster and easier to buy high temp extensometers via the US instead of from nearer European companies! The technical support is very good, since every question is answered in less than 24 hours! Other companies take weeks to answer – if they answer at all."

MARTIN RIEDLER  
Department Product Engineering  
MONTANUNIVERSITÄT LEOBEN, AUSTRIA

"...I have been doing testing for over 15 years and have used Epsilon extensometers for more than seven years (3542 series). Your extensometers represent the best value for their cost in the industry.

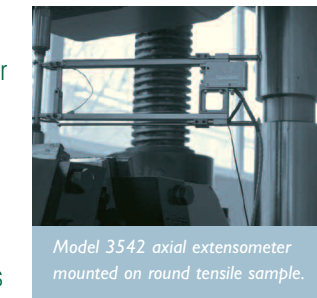


Model 3555 high temperature extensometer being used at 550 °F in the determination of mechanical properties of an aluminum alloy used in an engine head application.

... Since, we can "leave" the extensometer until break in most applications (because of the robust design), we can get invaluable information on the material evaluated. ... The response time in getting a new unit is by far the shortest in the industry."

BRUNO BELANGER  
President and CEO  
BCOMTESTING, INC.

"At Laborator Dinamic we are using your Epsilon extensometers for modernizing different kinds of Universal Testing Machines or on new machines. ... I really appreciate your product's simple and clever embedding solutions with high quality and technical performances."

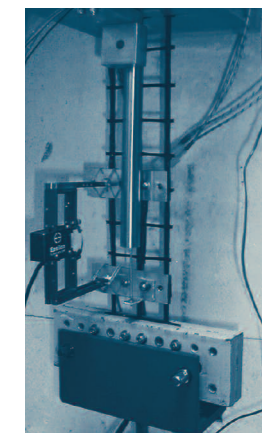


Model 3542 axial extensometer mounted on round tensile sample.

JOHN DINA  
LABORATOR DINAMIC, ROMANIA

"... With the fastest repairs completed in less than two weeks (from the moment it was dispatched overseas from our factory to the moment it was received again). Our previous extensometer supplier never managed a turnaround in less than eight weeks. For a front line piece of equipment that is entirely unacceptable."

MIKE DAVIES  
CYTEC, UNITED KINGDOM



Polyethylene geogrid undergoing pullout testing in TRI's Compact Connection Device using a specially designed Model 3542 extensometer.

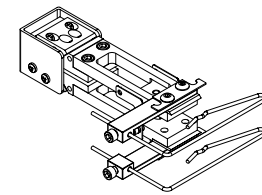
"We use Epsilon extensometers for their high quality, stability and ruggedness. When we do eventually damage an extensometer, Epsilon has, without fail, offered excellence of service we would like from all of our vendors. Epsilon has provided custom engineering support to maximize reliability after many cycles of specimen ruptures."

SHAWN ARNETT  
TEXAS RESEARCH INSTITUTE

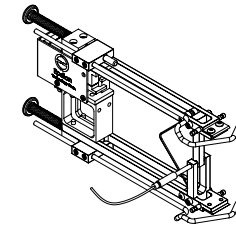
"I have been really happy with all extensometers purchased from you: good quality, high precision, friendly."

GREGORY BANAS  
Senior Research Engineer  
UNIVERSITY OF ILLINOIS

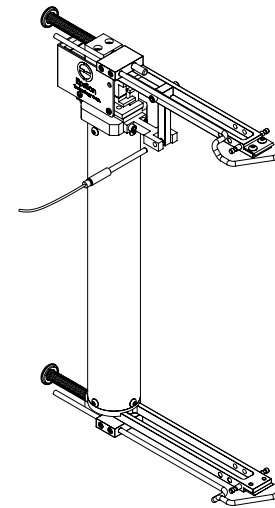
Visit our website at [www.epsilontech.com](http://www.epsilontech.com)  
Contact us for your special testing requirements.



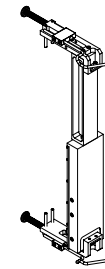
3442 Miniature Extensometers



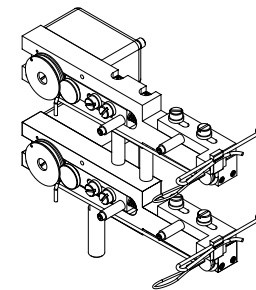
3542 Axial Extensometers



3542L Long Gauge Length Extensometers

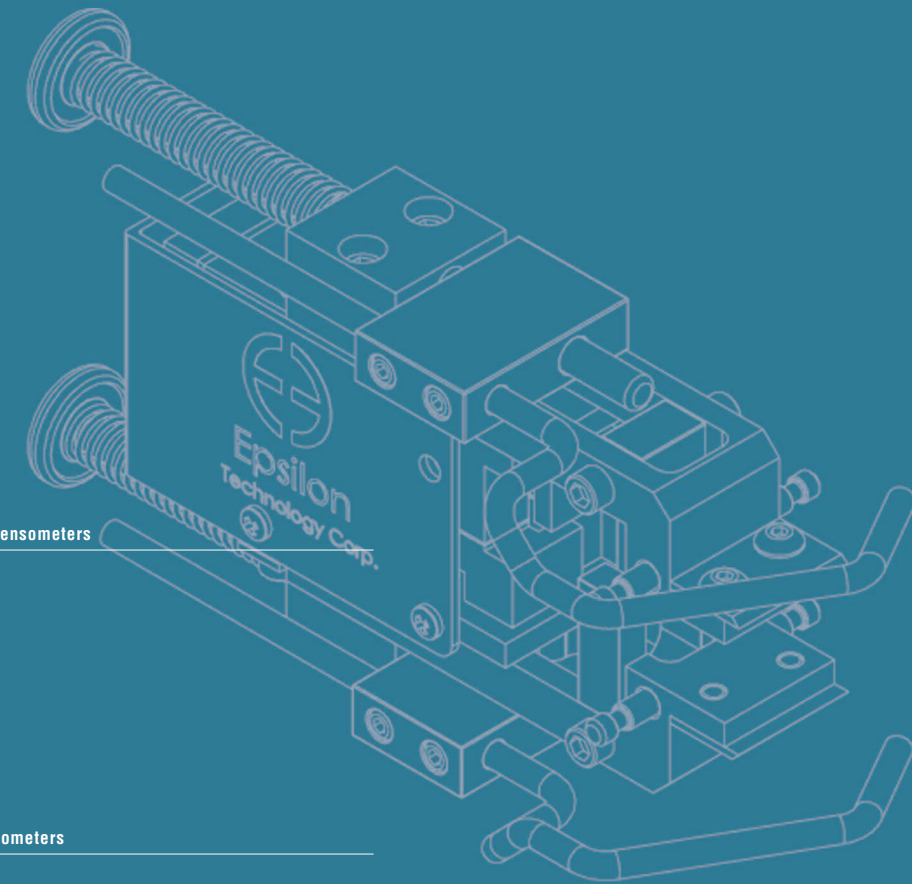


3543 Long Gauge Length Extensometers



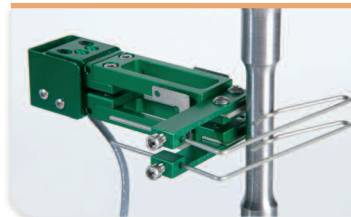
3800 High Elongation Extensometers

## Axial Extensometers



LE-05 and LE-15 Laser Extensometers

Very small and rugged, yet ultra-light weight, these units are widely used for testing small and delicate samples. Ideal for many biomedical tests, as well as for wire and thin sheet materials. Also great for low cycle fatigue testing where short samples are used.



Model 3442 with 0.25 inch gauge length and 100% measuring range

Weighing as little as 8 grams, these tiny extensometers have very low operating force, resulting in low specimen contact force and influence. All use an Epsilon proprietary dual flexure design, which makes them very rugged for their size. Most are only 0.6 inches tall (15.25 mm). These

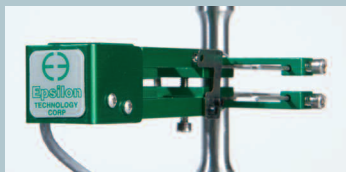
extensometers will fit in the small space between grips, which usually results when small test samples are used.

The Model 3442 extensometers are strain gaged devices, making them compatible with any electronics designed for strain gaged transducers. Most often they are connected to a test machine controller. The signal conditioning electronics for the extensometer is typically included with the test machine controller or may often be added. In this case the extensometer is shipped with the proper connector and wiring to plug directly into the electronics. For systems lacking the required electronics, Epsilon can provide a variety of solutions, allowing the extensometer output to be connected to data acquisition boards, chart recorders or other equipment.

See the electronics section of this catalog for available signal conditioners and strain meters.



Model 3442 with 6 mm gauge length and 10% measuring range



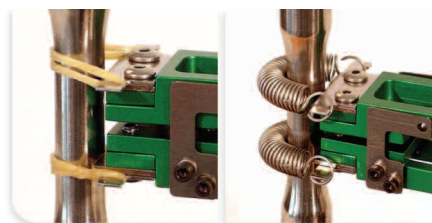
Model 3442 with 0.25 inch gauge length and 100% measuring range



Model 3442 with 1 inch gauge length and 5% measuring range (Special order)

### Extensometers for Composites Compression Testing

Models 3542 and 3442 extensometers can be furnished to clip directly onto composites compression fixtures, such as for ASTM D695. These use specially made quick attach kit wire forms for the test fixture. Consult the factory for specifics. Also see the Model 3542 extensometer.



Optional rubber band and spring attachment options included with Model 3442 and 3542

### Features

- May be left on through specimen failure.
- Full bridge, 350 ohm strain gaged design for compatibility with nearly any test system.
- All models can measure in both tension and compression and can be used for cyclic testing.
- Mechanical overtravel stops in both directions.
- Standard units meet existing ASTM class B-1 requirements for accuracy. A calibration certificate is included. ISO 9513 class 0,5 calibrations are available upon request.
- Hardened tool steel knife edges are easily replaced. A spare set comes with every extensometer.
- High and low temperature options extend operation from as low as -265 °C (-450 °F) to +200 °C (400 °F).
- Includes high quality foam lined case.
- Replaceable arms and spacers for ease of repair. This also allows changing the gauge length for different test requirements.
- Rugged, dual flexure design for strength and improved performance. Much stronger than single flexure designs, this also allows cyclic testing at higher frequencies.

### SPECIFICATIONS

- Excitation:** 5 to 10 VDC recommended, 12 VDC or VAC max.
- Output:** 2 to 4 mV/V nominal, depending on model
- Linearity:** 0.10% to 0.15% of full scale measuring range, depending on model
- Temperature Range:** Standard (-ST) is -40 °C to +100 °C (-40 °F to 210 °F)
- Cable:** Integral, ultra-flexible cable, 8 ft (2.5 m) standard
- Standard Quick Attach Kit:** Fits round samples up to 0.5 inch diameter (12 mm) and flats to 0.5 inch thick by 1.0 inch wide (12 mm by 25 mm)
- Operating Force:** 10 to 20 g typical

### OPTIONS

- Adapter kits to change gauge lengths
- Connectors to interface to nearly any brand test equipment
- Special coatings and stainless steel knife edges available for biomedical tests.
- Shunt calibration module (see page 104)
- Specialty knife edges (see page 105)



Model 3442 with Compression Fixture



### ORDERING INFORMATION

Model 3442 Available Versions: ANY combination of gauge length, measuring range and temperature range listed below is available, except as noted. Other configurations may be available with special order; please contact Epsilon to discuss your requirements.

Gauge Length		Measuring Range	
U.S.A.		DESIGNATION	% STRAIN
-0025	0.250"	-005 <sup>2</sup>	±5%
-0050	0.500"	-010	±10%
-0064	0.640"		
METRIC			
-003M <sup>1,2</sup>	3.0 mm	-020	+20%/-10%
-004M <sup>1,2</sup>	4.0 mm	-025	+25%/-10%
-005M <sup>1</sup>	5.0 mm	-050	+50%/-5%
-006M	6.0 mm	-100	+100%/-5%
-008M	8.0 mm		
-010M	10.0 mm		
-012M	12.0 mm		

Model Number 3442 - \_\_\_\_\_

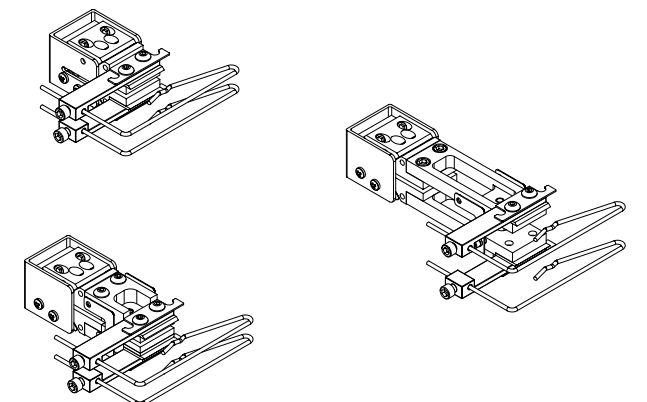
Temperature Range	
-LT	-265 °C to 100 °C (-450 °F to 210 °F)
-ST	-40 °C to 100 °C (-40 °F to 210 °F)
-HT1	-40 °C to 150 °C (-40 °F to 300 °F)
-HT2	-40 °C to 200 °C (-40 °F to 400 °F)
-LHT	-265 °C to 200 °C (-450 °F to 400 °F)

<sup>1</sup> Special order.

<sup>2</sup> 5% strain range not available in 3 or 4 mm gauge length versions.

**Example:** 3442-008M-010-ST: 8.0 mm gauge length, ±10% measuring range, standard temperature range (-40 °C to 100 °C)

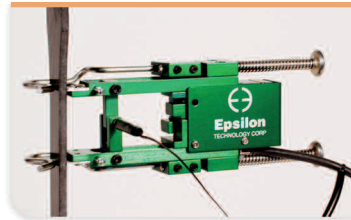
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Contact us for your special testing requirements.



MODEL 3442 EXAMPLES

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**General purpose extensometers for axial tensile, compression and cyclic testing. Gauge lengths from 0.5 to 2 inches (and 10 to 50 mm) and measuring ranges from 5% to 100% strain.**



Model 3542 with 25 mm gauge length and ±10% measuring range

These extensometers are designed for testing a wide range of materials, including metals, plastics, composites and ceramics. All will work in both tension and compression. The dual flexure design makes them very rugged and insensitive to vibrations, which permits higher frequency operation.

They come standard with Epsilon's quick attach kit, making it possible to mount the extensometer on the test specimen quickly and easily with one hand. The quick attach kit can be removed, allowing mounting of the extensometer with springs or rubber bands.

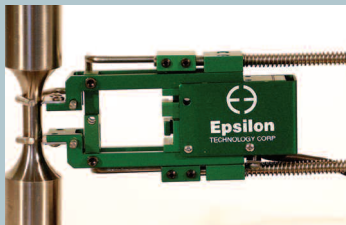
The Model 3542 extensometers are strain gaged devices, making them compatible with any electronics designed for strain gaged transducers. Most often they are connected to a test machine controller. The signal conditioning electronics for the extensometer is typically included with the test machine controller or may often be added. In this case the extensometer is shipped with the proper connector and wiring to plug directly into the electronics. For systems lacking the required electronics, Epsilon can provide a variety of solutions, allowing the extensometer output to be connected to data acquisition boards, chart recorders or other equipment.

For gauge lengths 4 inches or greater (100 mm) see Model 3542L.

See the electronics section of this catalog for available signal conditioners and strain meters.



Model 3542 with 25 mm gauge length



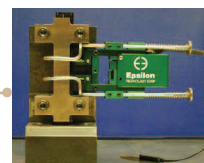
Model 3542 with 0.5 inch gauge length and ±25% measuring range



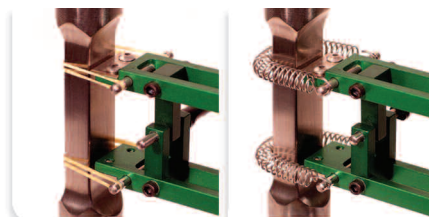
Model 3542 configured for a very large specimen diameter

**Extensometers for Composites Compression Testing**

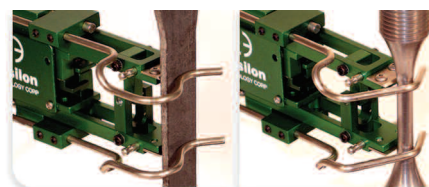
Models 3542 and 3442 extensometers can be furnished to clip directly onto composites compression fixtures, such as for ASTM D695. These use specially made quick attach kit wire forms for the test fixture. Consult the factory for specifics. Also see the Model 3442 miniature extensometer.



Model 3542 mounted on a D695 compression fixture for composite materials



Optional rubber band and spring attachment options included with Model 3442 and 3542



Standard quick attach wire forms included for round and flat samples

**Features**

- May be left on through specimen failure.
- Full bridge, 350 ohm strain gaged design for compatibility with nearly any test system.
- All models can measure in both tension and compression and can be used for cyclic testing.
- Mechanical overtravel stops in both directions.
- Cable stops are used for overtravel protection where required. Epsilon's cable stops are contained fully between the arms of the extensometer, and do not hang below where they can interfere with fixturing—especially during compression testing.
- Standard units meet existing ASTM class B-1 requirements for accuracy. A calibration certificate is included. ISO 9513 class 0,5 calibrations are available upon request.
- Hardened tool steel knife edges are easily replaced. A spare set comes with every extensometer.
- High and low temperature options extend operation from as low as -265 °C (-450 °F) to +200 °C (400 °F).
- Includes high quality foam lined case.
- Replaceable arms and spacers for ease of repair. This also allows changing the gauge length for different test requirements.
- Rugged, dual flexure design for strength and improved performance. Much stronger than single flexure designs, this also allows cyclic testing at higher frequencies.
- Standard quick attach kit allows one hand mounting to specimens.

**SPECIFICATIONS**

- Excitation:** 5 to 10 VDC recommended, 12 VDC or VAC max.
- Output:** 2 to 4 mV/V, nominal, depending on model
- Linearity:** 0.10% to 0.15% of full scale measuring range, depending on model
- Temperature Range:** Standard (-ST) is -40 °C to +100 °C (-40 °F to 210 °F)
- Cable:** Integral, ultra-flexible cable, 8 ft (2.5 m) standard
- Standard Quick Attach Kit:** Fits round samples up to 1.0 inch diameter (25 mm) and flats to 0.5 inch thick by 1.25 inch wide (12 mm by 31 mm)
- Operating Force:** 30 g typical

**OPTIONS**

- Quick attach kit wire forms for large specimens
- Adapter kits to change gauge lengths
- Connectors to interface to nearly any brand test equipment
- Special coatings and stainless steel knife edges available for biomedical tests.
- Shunt calibration module (see page 104)
- Specialty knife edges (see page 105)



**ORDERING INFORMATION**

**Model 3542 Available Versions:** ANY combination of gauge length, measuring range and temperature range listed below is available, except as noted. Other configurations may be available with special order; please contact Epsilon to discuss your requirements.

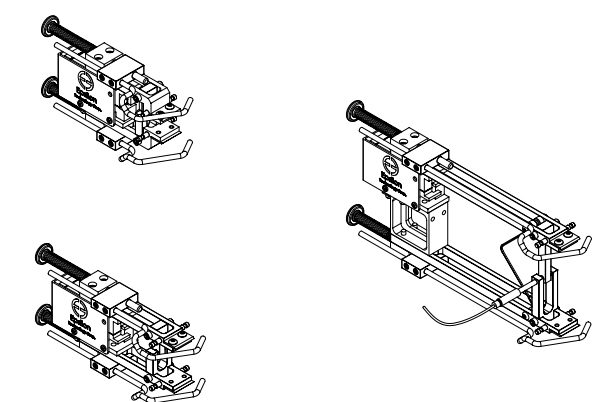
Gauge Length		Measuring Range <sup>1</sup>	
U.S.A.			
-0050	0.500"	-005 <sup>2</sup>	±5%
-0064	0.640"	-010	±10%
-0100	1.000"	-020	+20%/-10%
-0140	1.400"	-025	+25%/-10%
-0200	2.000"	-050	+50%/-10%
METRIC			
-010M	10.0 mm	-100 <sup>3</sup>	+100%/-10%
-012M	12.0 mm		
-0125M	12.5 mm		
-025M	25.0 mm		
-050M	50.0 mm		
-080M <sup>4</sup>	80.0 mm		

Model Number 3542 - \_\_\_\_\_

Temperature Range	
-LT	-265 °C to 100 °C (-450 °F to 210 °F)
-ST	-40 °C to 100 °C (-40 °F to 210 °F)
-HT1	-40 °C to 150 °C (-40 °F to 300 °F)
-HT2	-40 °C to 200 °C (-40 °F to 400 °F)
-LHT	-265 °C to 200 °C (-450 °F to 400 °F)

<sup>1</sup> Compressive ranges can be adjusted to higher values if required. Please contact Epsilon for your special testing requirement.  
<sup>2</sup> Not available in 0.50", 10 mm or 12.5 mm gauge lengths.  
<sup>3</sup> For 2" and 50 mm gauge lengths, linearity is 0.2% of full scale or better.  
<sup>4</sup> Gauge length has a maximum of 5% compressive range.

**Example:** 3542-0100-020-LT: 1.000 inch gauge length, ±20% measuring range, low temperature option (-450 °F to 210 °F)



MODEL 3542 EXAMPLES

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Long gauge length extensometers with gauge lengths greater than 4 inches (100 mm) for tensile and compression testing. These units have been specially designed for long gauge length applications where low level strain measurements are required.



Model 3542L with 8 inch gauge length and ±0.4 inch measuring range

The dual flexure design makes the 3542L very rugged and insensitive to vibrations. These extensometers are designed for testing a wide range of materials including metals, plastics, composites and ceramics. Epsilon's Model 3543 is recommended for applications requiring long gauge lengths and larger measuring ranges.

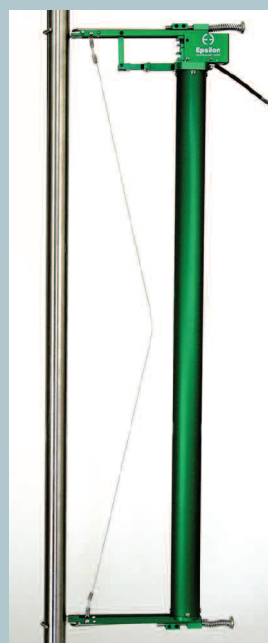
The Model 3542L comes standard with Epsilon's quick attach kit, making it easy to mount the extensometer on the test specimen. The quick attach kit can be removed, allowing mounting of the extensometer with springs or rubber bands.

The 3542L extensometers are strain gaged devices, making them compatible with any electronics designed for strain gaged transducers.

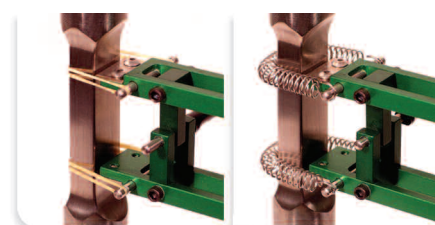
Most often they are connected to a test machine controller. The signal conditioning electronics for the extensometer is typically included with the test machine controller or may often be added. In this case the extensometer is shipped with the proper connector and wiring to plug directly into the electronics. For systems lacking the required electronics, Epsilon can provide a variety of solutions, allowing the extensometer output to be connected to data acquisition boards, chart recorders or other equipment.

For gauge lengths less than 100 mm (4 inches), see Model 3542.

See the electronics section of this catalog for available signal conditioners and strain meters.



Model 3542L with 500 mm gauge length and ±10 mm measuring range



Optional rubber band and spring attachment options included with Model 3442 and 3542

### Features

- May be left on through specimen failure.
- Full bridge, 350 ohm strain gaged design for compatibility with nearly any test system.
- All models can measure in both tension and compression and can be used for cyclic testing.
- Mechanical overtravel stops in both directions.
- Standard units meet existing ASTM class B-1 requirements for accuracy. A calibration certificate is included. ISO 9513 class 0,5 calibrations are available upon request.
- Hardened tool steel knife edges are easily replaced. A spare set comes with every extensometer.
- High and low temperature options extend operation from as low as -265 °C (-450 °F) to +200 °C (400 °F).
- Includes high quality foam lined case.
- Replaceable arms and spacers for ease of repair. This also allows changing the gauge length for different test requirements.
- Rugged, dual flexure design for strength and improved performance. Much stronger than single flexure designs, this also allows cyclic testing at higher frequencies.
- Standard quick attach kit allows quick mounting to specimens.

### SPECIFICATIONS

- Excitation:** 5 to 10 VDC recommended, 12 VDC or VAC max.
- Output:** 2 to 4 mV/V, nominal, depending on model
- Linearity:** 0.10% to 0.15% of full scale measuring range, depending on model
- Temperature Range:** Standard (-ST) is -40°C to +100°C (-40 °F to 210°F)
- Cable:** Integral, ultra-flexible cable, 8 ft (2.5 m) standard
- Standard Quick Attach Kit:** Fits round samples up to 1.0 inch diameter (25 mm) and flats to 0.5 inch thick by 1.25 inch wide (12 mm by 31 mm)
- Operating Force:** Depends on model configuration, less than 30 g typically

### OPTIONS

- Quick attach kit wireforms for large specimens
- Adapter kits to change gauge lengths
- Connectors to interface to nearly any brand test equipment
- Special coatings and stainless steel knife edges available for biomedical tests.
- Shunt calibration module (see page 104)
- Specialty knife edges (see page 105)



### ORDERING INFORMATION

**Model 3542L Available Versions:** ANY combination of gauge length, measuring range and temperature range listed below is available, except as noted. Other configurations may be available with special order; please contact Epsilon to discuss your requirements.

Gauge Length		Measuring Range	
U.S.A.		U.S.A.	
-0400	4.000"	-010T	±0.10"
-0600	6.000"	-025T	±0.25"
-0800	8.000"	-050T	+0.50"/-0.25"
-1000	10.000"	METRIC	
-2000	20.000"	-002M	±2.5 mm
		-006M	±6.0 mm
		-012M	+12.5 mm/-6.0 mm
METRIC			
-100M	100.0 mm		
-150M	150.0 mm		
-200M	200.0 mm		
-250M	250.0 mm		
-500M	500.0 mm		

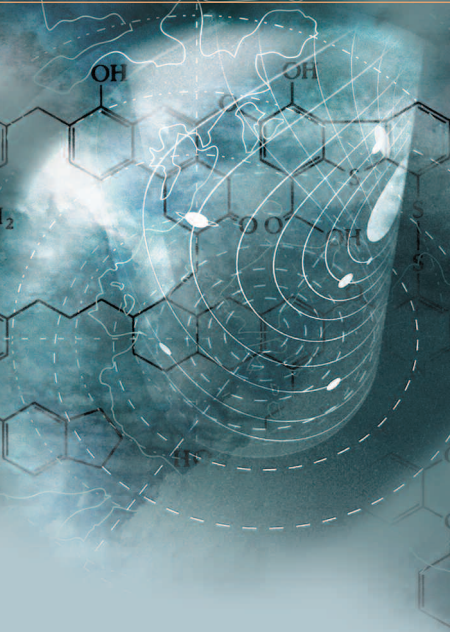
Model Number 3542L- - - - -

Temperature Range	
-LT	-265 °C to 100 °C (-450 °F to 210 °F)
-ST	-40 °C to 100 °C (-40 °F to 210 °F)
-HT1	-40 °C to 150 °C (-40 °F to 300 °F)
-HT2	-40 °C to 200 °C (-40 °F to 400 °F)
-LHT	-265 °C to 200 °C (-450 °F to 400 °F)

**Example:** 3542L-0800-050T-ST: 8.000 inch gauge length, ±0.50 inches measuring range, standard temperature option (-40 °F to 210 °F)

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This model is available in gauge lengths from 2 inches (50 mm) and larger, with measuring ranges up to 4 inches (100 mm). It is a uniquely designed unit that may be left on through specimen failure. These extensometers are widely used where long samples and large measuring ranges are required. They are ideal for testing steel re-bar, weld joints, and wire materials.



Model 3543-0400-200T-ST with 4 inch gauge length and +2 inch measuring range

With over 15 years of proven reliability in the world's most demanding testing environments, the Model 3543 extensometer is designed to survive in those applications where standard axial extensometers would not. Designed by Epsilon, the Model 3543 was created to survive specimen failure by separating into two halves, thus preventing permanent damage to the module body. During operation, the upper half of the extensometer pulls out of the main body. Tapered measuring beams activate strain gaged flexures within the unit. This unique design allows long measuring ranges, yet retains compatibility with electronics for strain gaged transducers. These models offer high accuracy and are light weight but rugged, with low operating force. They are tension only units.

The units have hardened tool steel knife edges. Standard quick attach wires provided with the extensometer work on flat specimens up to 0.5 x 1.25 inch (12 x 31 mm) and on rounds up to 1 inch (25 mm) diameter. Optional quick attach kit wire forms are available for use on larger samples. See Model 3542L for long gauge lengths with smaller measuring ranges.

The Model 3543 extensometers are strain gaged devices, making them compatible with any electronics designed for strain gaged transducers. Most often they are connected to a test machine controller. The signal conditioning electronics for the extensometer is typically included with the test machine controller or may often be added. In this case the extensometer is shipped with the proper connector and wiring to plug directly into the electronics. For systems lacking the required electronics, Epsilon can provide a variety of solutions, allowing the extensometer output to be connected to data acquisition boards, chart recorders or other equipment.

See the electronics section of this catalog for available signal conditioners and strain meters.



Special Model 3543 with ability to work on test samples that twist up to 15° during the test



Model 3543 with 12 inch gauge length



Model 3543 with 4 inch gauge length

### Features

- Specifically designed to be left on through specimen failure. The unit is designed so that the two halves of the extensometer come apart to prevent damage at specimen failure.
- Full bridge, 350 ohm strain gaged design for compatibility with nearly any test system.
- All standard units meet ASTM class B-2 requirements for accuracy.
- Hardened tool steel knife edges are easily replaced. A spare set comes with every extensometer.
- High temperature options extend operation to +150 °C (300 °F).
- Includes high quality foam lined case.
- Replaceable arms and spacers for ease of repair. The optional gauge length spacers allow the gauge length of the extensometer to be easily increased for different testing requirements.
- Rugged design for reliable testing.
- Standard quick attach kit for quick mounting to specimens.

### SPECIFICATIONS

- Excitation:** 5 to 10 VDC recommended, 12 VDC or VAC max.
- Output:** 2 to 4 mV/V nominal, depending on model
- Linearity:** ≤0.15% of full scale measuring range
- Temperature Range:** Standard (-ST) is -40 °C to +100 °C (-40 °F to 210 °F)
- Cable:** Ultra-flexible cable, 8 ft (2.5 m) standard
- Standard Quick Attach Kit:** Fits round samples up to 1.0 inch diameter (25 mm) and flats to 0.5 inch thick by 1.25 inch wide (12 mm by 31 mm)
- Operating Force:** 125 g typical

### OPTIONS

- Quick attach kit wireforms for large specimens
- Spacers to change gauge lengths
- Connectors to interface to nearly any brand test equipment
- The 3543 is available with a twist option for use in applications where specimen twisting greater than 3° is expected. The 3543TW option can accommodate up to 15° of twist.
- Gauge length spacers to change gauge lengths
- Shunt calibration module (see page 104)
- Specialty knife edges (see page 105)



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### ORDERING INFORMATION

Model 3543 Available Versions: ANY combination of gauge length, measuring range and temperature range listed below is available, except as noted. Intermediate and longer gauge lengths are easily attained by adding gauge length spacers.

Gauge Length		Measuring Range	
U.S.A.			
-0200	2.000"	-100T	+1.00"
-0400	4.000"	-200T	+2.00"
-0600	6.000"	-400T <sup>1</sup>	+4.00"
-0800	8.000"	METRIC	
-1000	10.000"	-025M	+25 mm
METRIC			
-050M	50.0 mm	-050M	+50 mm
-100M	100.0 mm	-100M <sup>1</sup>	+100 mm
-150M	150.0 mm		
-200M	200.0 mm		
-250M	250.0 mm		

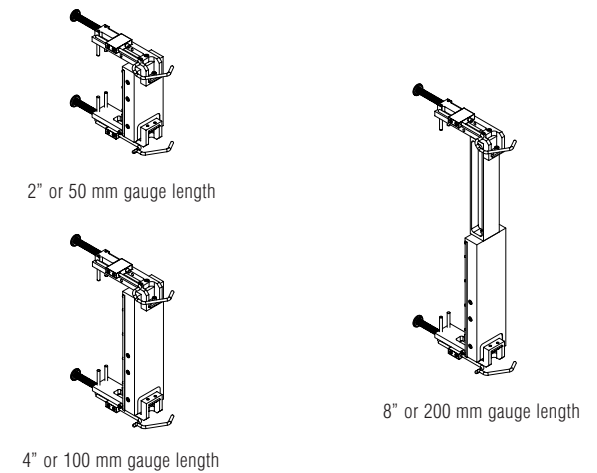
Model Number 3543- \_\_\_\_\_ - \_\_\_\_\_ - \_\_\_\_\_

Temperature Range	
-ST	-40 °C to 100 °C (-40 °F to 210 °F)
-HT1	-40 °C to 150 °C (-40 °F to 300 °F)

<sup>1</sup> Not available in 50 mm or 2 inch gauge length models.

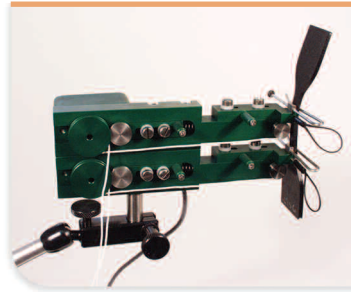
**Example:** 3543-0800-400T-ST: 8.0 inch gauge length, +4 inch measuring range, standard temperature range (-40 °F to 210 °F)

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MODEL 3543 EXAMPLES

Designed for plastics, rubber and elastomer testing, these extensometers have very long measuring ranges. Their unique design allows testing to failure and minimizes interaction with the sample.



Model 3800 with mounting stand

The main body of this unique extensometer remains stationary during testing, held in position by the adjustable magnetic base included. Only the very light, small traveling heads move as the sample elongates during a test. These attach to the sample with small spring clips. Each head pulls a cord out from the extensometer as the head moves.

These models use high precision, low friction potentiometers, and, as a result, have a wide range of factory selectable outputs. The extensometer is driven by an excitation voltage and has output proportional to the input. They can be provided with high level outputs (approximately 2-8 VDC) or ones that mimic strain gaged devices (2-4 mV/V). When set to mimic strain gaged extensometers, the Model 3800 can be used with virtually any signal conditioning electronics designed for strain gaged sensors. The potentiometers employ a hybrid wire wound around conductive plastic, which provides excellent long term stability. The output from the extensometer is readily interfaced with most existing test controllers, and may be directly input to data acquisition systems and chart recorders.

Please let us know at the time of order what type of output and connector you require.



Specimen attachment with Model 3800

**Features**

- May be left on through specimen failure. The main body is stationary with only the lightweight traveling heads moving.
- Includes high quality foam lined case.
- Comes with an adjustable magnetic base for easy mounting.
- Large measuring range to 20 inches (500 mm).
- Low cost, high accuracy elastomer strain measurement.

**SPECIFICATIONS**

- Excitation:* 5 to 10 VDC recommended, 12 VDC or VAC max.
- Output:* Either 2 to 8 VDC, depending on model (at 10 VDC input) or 2 to 4 mV/V, nominal, selectable at time of order
- Linearity:* ≤0.15% of full scale measuring range
- Resolution:* 0.18 mm for all measuring ranges
- Temperature Range:* -40 °C to 100 °C (-40 °F to 210 °F)
- Cable:* Integral, ultra-flexible cable, 8 ft (2.5 m) standard
- Operating Force:* 20 grams typical, each head

**OPTIONS**

- Can be provided with either:
- High level outputs (approximately 2-8 VDC)
  - Or output that mimics strain gaged devices (2-4 mV/V nominal) 2 mV/V output for use with electronics designed for strain gaged sensors
- Shunt calibration module is available for units configured to mimic strain gaged sensors (see page 104)



**ORDERING INFORMATION**

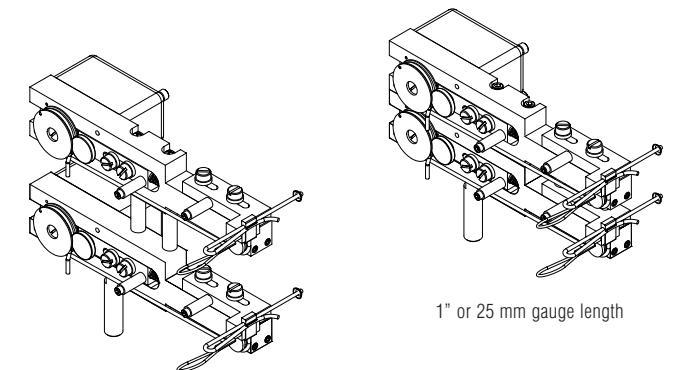
Model 3800 Available Versions: ANY combination of measuring ranges and gauge length listed below is available. Available in intermediate and larger gauge lengths on special order.

Gauge Length		Measuring Range	
U.S.A.	-0100 -0200	1.000" 2.000"	
METRIC	-020M -025M -050M	20.0 mm 25.0 mm 50.0 mm	
U.S.A.			+5.000" +10.000" +20.000"
METRIC			+125 mm +250 mm +500 mm

Model Number 3800- \_\_\_\_\_ - \_\_\_\_\_

Example: 3800-0100-100T: 1.0 inch gauge length, +10 inches measuring range (+1000% strain), temperature range of -40 °F to 210 °F

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Contact us for your special testing requirements.



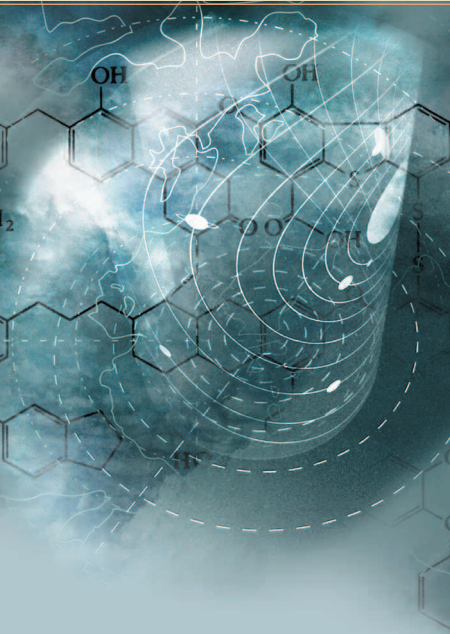
2" or 50 mm gauge length

1" or 25 mm gauge length

MODEL 3800 EXAMPLES

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These extensometers are high precision non-contacting units for strain measurement in materials testing. They use a high speed laser scanner to measure the spacing between reflective tape strips on the sample. The measurement range is from 0.3 to 5 inches (8 to 127 mm) on the LE-05 and 0.3 to 15 inches (8 to 381 mm) on the LE-15. The gauge length is determined by the user. This allows high elongation measurements when shorter gauge lengths are used. The high resolution also allows accurate measurements of smaller strains.



Model LE-05 laser extensometer control panel



Model LE-15 laser extensometer

The self-contained extensometer uses state-of-the-art laser diode technology. A digital display is included. The analog output may be used to connect to existing test controls. The RS-232 serial communications interface provides two way communications. Operation may be local or remote.

The scanning beam is always perpendicular to the specimen, unlike most laser extensometers. This eliminates errors when viewing through windows in chambers. It also minimizes sensitivity to the distance between the extensometer and the sample. Because the unit measures reflected light, no receiver is required behind the sample.

**Easy to use.**

The visible laser light is simply aimed at the specimen, which has small reflective tape strips set at the gauge length desired. The extensometer displays the actual measured gauge length. If desired, the zero button will offset the output to zero. As the specimen is tested, the display will then read the elongation directly.

The analog output and RS-232 interface are easily connected to existing controls or data acquisition systems.

High temperature clip-on reflectors may be used as an alternate to tape reflectors. The reflective tape can be used at temperatures up to 300 °F (150 °C). These are re-useable and available as an option. They are rated for use to 800 °F (425 °C).

**Features**

- Non-contacting design requires only reflective tape marks on the specimen, or clip-on reflectors
- Ideal for use in chambers-calibration not affected by aiming through viewing windows
- High resolution of 1 micron
- Full 5 inch (127 mm) or 15 inch (381 mm) measuring range allows high elongation measurements (e.g. 200% on a 1 inch gauge length)

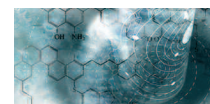
**SPECIFICATIONS**

Measurement Range:	LE-05: 0.3 to 5 inches (8 to 127 mm) LE-15: 0.3 to 15 inches (8 to 381 mm)
Resolution:	LE-05: 0.0001 in. (0.001 mm) LE-15: 0.001 in (0.01 mm)
Linearity <sup>1</sup> :	LE-05: ±0.0004 inches (±0.01 mm) LE-15: ±0.002 inches (±0.04 mm)
Repeatability <sup>1</sup> :	LE-05: ±0.0002 inches (±0.005 mm) LE-15: ±0.002 inches (±0.04 mm)
Scan Rate:	100 scans/second
Target Distance:	Two selectable factory preset values between 10 and 18 inches. Default values are: LE-05: 12 and 15 inches LE-15: 15 and 18 inches
Zero Suppression:	Reading may be set to zero anywhere in measuring range
Scan Line Orientation:	Vertical
Scan Averaging:	Moving window averaging over a selectable number of scans
Analog Output:	16 bit, ±10 VDC standard
Full Scale Ranges:	0.1, 0.2, 0.5, 1.0, 2.0, 5.0, 10.0, or 20.0 inches (model dependent) Optional 2.0, 5.0, 10, 20, 50, 100, 200, or 500 mm (model dependent)
Digital Communications:	RS-232 serial communications, standard 3 wire
Selectable Baud Rate:	9600, 4800, 2400, or 1200
Display:	2 line, 16 character digital display, backlit LCD
Power Input:	115 VAC ±10%, 50/60 Hz standard 230 VAC ±10%, 50/60 Hz optional
Size:	LE-15: 27 L x 18 H x 7.7 W inches (668 x 457 x 196 mm)
Weight:	LE-05: 10 lbs (4.5 kg ), LE-15: 45 lbs (20.4 kg)
Mounting Provisions:	1/4-20 UNC tapped holes in base (4)
Laser Source:	Diode laser, 670 nM, <1 mW maximum scanned output CDRH Certified Class II laser instrument
Options:	Consult factory for options like reflective clips for high temperature use

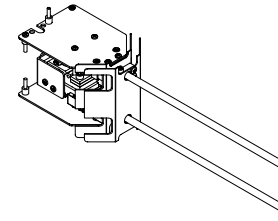
<sup>1</sup> Over optimum displacement range at calibrated distance  
Note: Specifications measured at 25 °C and 50 percent rel. humidity.

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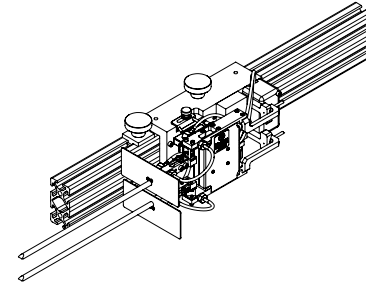
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Contact us for your special testing requirements.



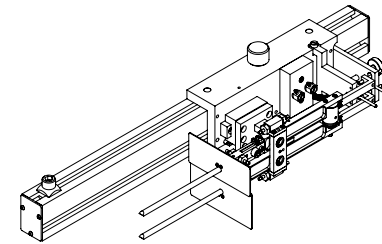
EPSILON TECH—World class quality at substantial savings.



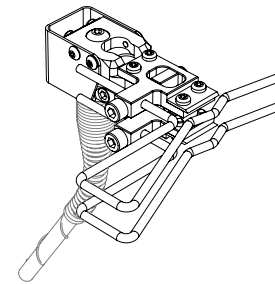
3448 High Temperature Extensometers (1200 °C)



3549 High Temperature Hot Mountable Furnace Extensometers (1200 °C or 1600 °C)

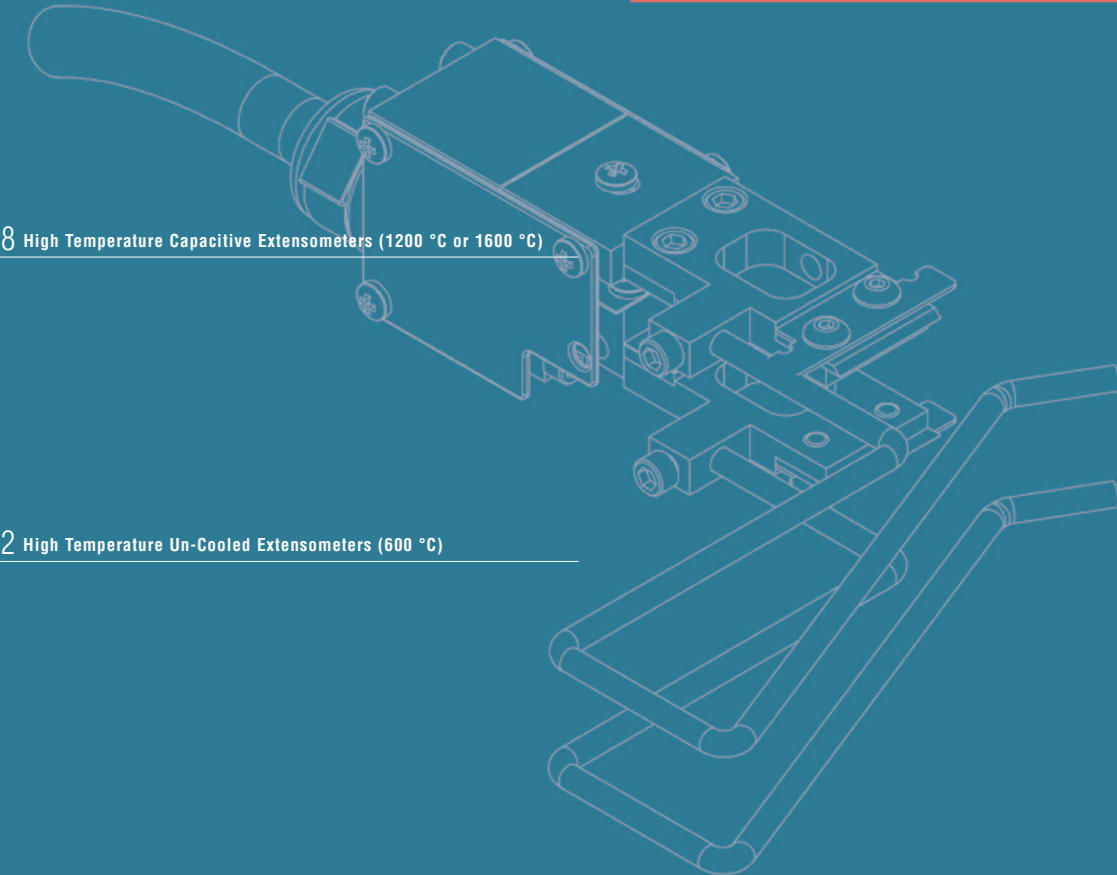


3648 High Temperature Capacitive Extensometers (1200 °C or 1600 °C)



7642 High Temperature Un-Cooled Extensometers (600 °C)

**High Temperature  
Axial Extensometers**  
(Above 200 °C or 400 °F)



Designed for use with furnaces and induction heating systems, these extensometers use Epsilon's exclusive, self-supporting design.

A wide range of options cover most testing applications.



Model 3448 with 25 mm gauge length and 20% measuring range

xEpsilon developed this unique high temperature extensometer for testing metals, ceramics, and composites at the high temperatures produced by furnaces and induction heating systems. A combination of features make these extensometers easier to use and better in

performance than other similar high temperature extensometers.

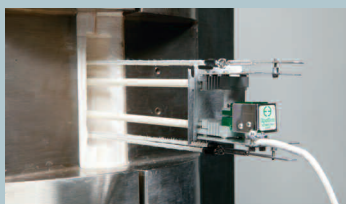
The units are held on the specimen by light, flexible ceramic fiber cords. These make the extensometer self-supporting on the specimen. No furnace mounting brackets are required. The side load on the test sample is greatly reduced because of the self-supporting design and light weight of the sensor. Most materials testing furnaces with a side cut-out for an extensometer will readily accept a Model 3448. For induction heating systems, a different ceramic cord placement allows the extensometer to easily pass between the coils.

The combination of radiant heat shields and convection cooling fins allow this model to be used at specimen temperatures up to 1200 °C (2200 °F) without any cooling. An optional tiny air fan does enhance stability at the highest temperatures and is recommended for the highest accuracy and for tests with small elongations. The fan comes with a magnetic base for support so it can be mounted at any convenient location near the extensometer. Fan cooling is not generally needed for induction heated systems. High purity alumina ceramic rods are used. These are available in lengths as required to fit your furnace. A spare set is included with every extensometer. Specify chisel, vee chisel or conical contact points as desired.

Most units operate equally well in tension and compression. Thus tensile, compression and cyclic tests like low cycle fatigue can all be performed with a single unit.

For vacuum furnaces, special models are available. Epsilon can also provide a radiant heat transfer cooled version. This requires that the extensometer module be surrounded by a water cooled enclosure with a front slot for the ceramic rods.

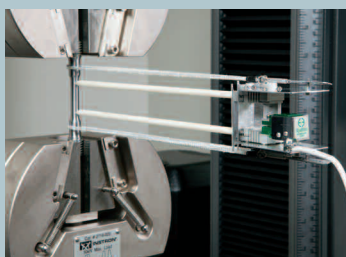
See the electronics section of this catalog for available signal conditioners and strain meters.



Model 3448 with 25 mm gauge length and 20% measuring range



Model 3448 with 25 mm gauge length and 20% measuring range



Model 3448 with 25 mm gauge length and 20% measuring range

### Features

- May be left on through specimen failure.
- Full bridge, 350 ohm strain gaged design for compatibility with nearly any test system.
- Mechanical overtravel stops in both directions.
- Most standard units meet existing ASTM class B-1 requirements for accuracy. A calibration certificate is included. ISO 9513 class 0,5 calibrations are available upon request. Rod length configurations can affect the final class rating.
- All units come with high purity alumina ceramic rods.
- Mount with flexible ceramic fiber cords. Very simple to install, this Epsilon exclusive design eliminates the need for external support brackets. Low contact force does not vary during testing like some externally supported extensometers.
- Includes high quality foam lined case, a spare set of ceramic rods, and eight ceramic fiber cords.
- Use without cooling to 1200 °C (2200 °F). Optional small fan improves stability at highest temperatures.
- Rugged, dual flexure design for strength and improved performance.
- Versions available for use in vacuum and controlled atmospheres. Radiant heat transfer cooled versions are available for these applications.
- May be used on nearly any furnace with side entry cut-out for extensometers. Alternate configuration available for insertion between coils of induction heaters.

### SPECIFICATIONS

- Excitation: 5 to 10 VDC recommended, 12 VDC or VAC max.
- Output: 2 to 4 mV/V, nominal, depending on model
- Linearity: ≤0.15% of full scale measuring range, depending on model
- Temperature Range: Ambient to 1200 °C max (2200 °F), all versions
- Cable: Integral, ultra-flexible cable, 8 ft (2.5 m) standard
- Contact Force: Adjustable, approximately 200 g depending on configuration
- Operating Force: 10 to 20 g typical

### OPTIONS

- Air cooling fan, add suffix -AC
- Ceramic cord orientation for furnaces or induction heaters (specify)
- Specify rod tip style desired. Available choice are:
  - Straight chisel, vee chisel, conical tip
- Shunt calibration module (see page 104)



### ORDERING INFORMATION

Model 3448 Available Versions: ANY combination of gauge length and measuring range listed below is available, except as noted. Ceramic rod lengths are made to fit furnaces as required. Please provide furnace dimensions at the time of order. Other configurations may be available with special order; please contact Epsilon to discuss your requirements.

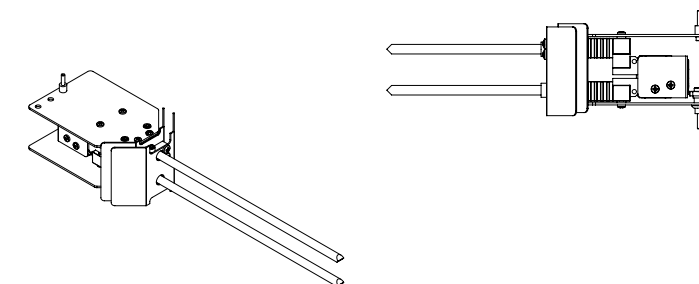
Gauge Length		Measuring Range	
U.S.A.		DESIGNATION	% STRAIN
-0050	0.500"	-005 <sup>1</sup>	±5%
-0100	1.000"	-010	±10%
-0200	2.000"	-020	+20%/-10%
METRIC		-050	+50%/-10%
-010M	10.0 mm		
-025M	25.0 mm		
-050M	50.0 mm		

Model Number 3448 - \_\_\_\_\_ - \_\_\_\_\_

<sup>1</sup> For 0.5 inch and 10 mm gauge lengths, 5% strain range only available with short ceramic rods.

Example: 3448-0100-020: 1.000 inch gauge length, +20%/-10% measuring range, temperature range of -40 °F to 2200 °F

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MODEL 3448 EXAMPLES

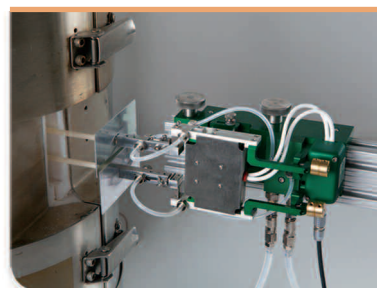
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This model can be connected to the test sample in a few seconds.

With very low sensitivity to vibrations, this hot mountable unit is

ideal for the demanding requirements of strain controlled, elevated

temperature axial testing and other common test methods.



Model 3549 with a 25 mm gauge length shown with a split furnace

The Model 3549 is a major advancement in the design of externally mounted, furnace extensometers. This new extensometer is designed to meet the stringent requirements of strain controlled testing as prescribed in ISO 6892, while introducing many new innovative features that help improve productivity with static testing applications (tension and compression testing) and long term testing

such as low cycle fatigue and creep. The overall design virtually eliminates any influence from normal external vibrations. This unit also incorporates a new feature that allows the user to precisely set the contact force against the test specimen. This allows for even and repeatable contact force, limiting contact force induced errors. This extensometer mounts on a slide bracket (included) that can attach to the load frame of your test system; optional load frame mounting brackets are available. The gauge length for the 3549 is automatically set prior to mounting on the test specimen, which allows for hot mounting after thermal equilibrium has been reached.

The Model 3549 standard temperature version is made for use in split type materials testing furnaces to 1200 °C (2200 °F) and includes water-cooled bracketry. The high temperature option allows use to 1600 °C (2900 °F). These extensometers can be used in carousel systems for rapid high temperature testing.

The standard temperature version (to 1200 °C) is supplied with high purity alumina rods. The high temperature option is furnished with alpha grade silicon carbide rods. Rods are made to order to the length required for your furnace. Mounting brackets may be integrated with the furnace cut-out. Epsilon can also provide load frame mounting brackets to fit your test frame.

The Model 3549 extensometers are strain gaged devices, making them compatible with any electronics designed for strain gaged transducers. Most often they are connected to a test machine controller. The signal conditioning electronics for the extensometer is typically included with the test machine controller or may often be added. In this case the extensometer is shipped with the proper connector and wiring to plug directly into the electronics. For systems lacking the required electronics, Epsilon can provide a variety of solutions, allowing the extensometer output to be connected to data acquisition boards, chart recorders or other equipment.



Model 3549 with 25 mm gauge length



Model 3549 contact force scale for repeatable placement against test specimens

### Features

- May be left on through specimen failure.
- Designed for those applications requiring greater than ±0.10 inches (±2.5 mm) full scale measuring range. For applications requiring smaller full scale ranges, see Model 3648 (page 28).
- Designed to meet the demanding requirements of strain controlled testing, such as required by ISO 6892, as well as more common testing. The 3549 is designed to isolate the strain sensing components from external vibrations.
- The gauge length is set automatically between each test with Epsilon's unique auto-setting mechanism, which allows the device to be mounted to the sample in seconds.
- The low contact force is easily controlled through the included contact force setting assembly. This allows for easy, repeatable placement of the extensometer on subsequent specimens with the same amount of force.
- Innovative slide mount allows the extensometer to engage the specimen once the test temperature has been achieved.
- All models can measure in both tension and compression and can be used for cyclic testing.
- The gauge length of the 3549 can be easily adjusted to virtually any gauge length through the use of gauge length spacers.
- Most standard units meet existing ASTM class B-1 requirements for accuracy. A calibration certificate is included. ISO 9513 class 0.5 calibrations are available upon request. Rod length configurations can affect the final class rating.
- The 3549 includes quick attach connectors for the water cooling lines and the electrical connections, which allow for easy installation of the extensometer body.
- Rugged, dual flexure design for strength and improved performance.
- The 3549 is designed to be used in carousel systems or with single furnaces.
- Full bridge, 350 ohm strain gaged design for compatibility with nearly any test system.
- Mechanical overtravel stops in both directions.
- All units come with either high purity alumina ceramic rods (1200 °C) or alpha grade silicon carbide rods (1600 °C).
- Includes high quality foam lined case and a spare set of ceramic rods.

### SPECIFICATIONS

- Excitation:** 5 to 10 VDC recommended, 12 VDC or VAC max.
- Output:** 1.5 to 2 mV/V nominal, depending on model
- Linearity:** ≤0.15% of full scale measuring range, depending on model
- Temperature Range:** Standard (-ST) is to 1200 °C (2200 °F), optional (-HT) 1600 °C (2900 °F)
- Cable:** Integral, ultra-flexible cable, 8 ft (2.5 m) standard
- Contact Force:** Adjustable from 50 to 400 g
- Operating Force:** <30 g typical

### OPTIONS

- Model 2050 constant temperature water re-circulating bath
- High temperature option (-HT suffix) for use to 1600 °C
- Load frame mounting brackets
- Connectors to interface to nearly any brand test equipment
- Specify rod tip style desired. Available choice are:
  - Straight chisel, vee chisel, conical tip
- Shunt calibration module (see page 104)

### ORDERING INFORMATION

**Model 3549 Available Versions:** ANY combination of gauge length, measuring range and temperature range listed below is available, except as noted. Other configurations may be available with special order; please contact Epsilon to discuss your requirements.

Gauge Length	
U.S.A.	
-0050	0.500"
-0100	1.000"
-0200	2.000"
METRIC	
-010M	10.0 mm
-025M	25.0 mm
-050M	50.0 mm

Measuring Range	
DESIGNATION	% STRAIN
-010 <sup>1</sup>	±10%
-020	+20%/-10%
-050	+50%/-10%
-100 <sup>2</sup>	+100%/-5%

Model Number 3549- \_\_\_\_\_ - \_\_\_\_\_ - \_\_\_\_\_

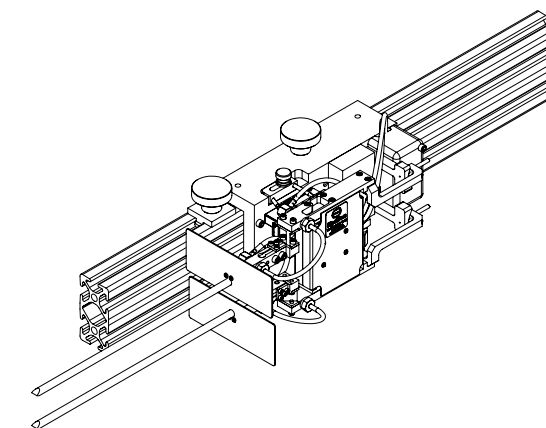
Temperature Range	
-ST	Ambient to 1200 °C (Ambient to 2200 °F)
-HT	Ambient to 1600 °C (Ambient to 2900 °F)

<sup>1</sup> Not available in 0.50", 10 mm or 12.5 mm gauge lengths.

<sup>2</sup> Not available in 2" or 50 mm gauge lengths.

**Example:** 3549-025M-050-HT: 25 mm gauge length, +50%/-10% measuring range, high temperature option (room temperature to 1600 °C)

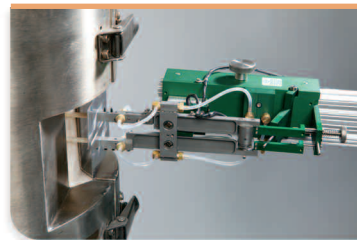
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MODEL 3549 EXAMPLE

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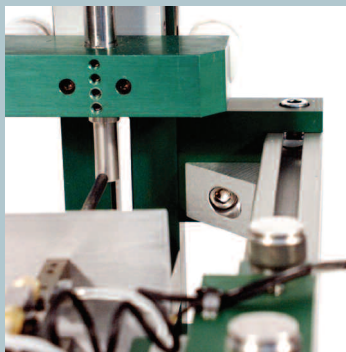
This model was designed for low strain applications for use with split type materials testing furnaces or induction heaters. It features very low specimen contact force and includes a slide bracket for mounting. Water cooling allows use to 1200 °C (2200 °F) standard or 1600 °C (2900 °F) with the high temperature option.



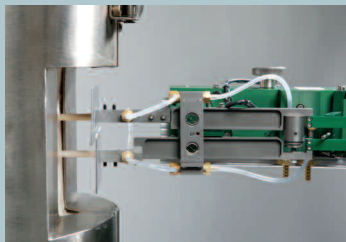
Model 3648 with 1 inch gauge length

These extensometers use a high temperature capacitive sensor in combination with an innovative design to achieve high accuracy strain measurements in low measuring ranges not possible with other high temperature extensometers. They mount on a slide bracket (included) that can attach to the load frame of your test system; optional load frame mounting brackets are available. The standard temperature version (to 1200 °C) is supplied with high purity alumina rods. The high temperature option is furnished with alpha grade silicon carbide rods. Rods are made to order to the length required for your furnace. These units are made to order in many different gauge lengths and measuring ranges.

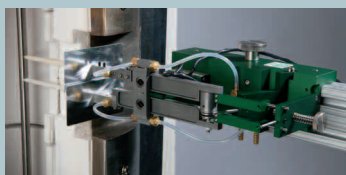
The extensometer comes with a signal conditioner. The output is an analog DC voltage, factory calibrated with the extensometer to 0 to ±10 VDC typically. They are readily interfaced with most existing test controllers, and may be directly connected to data acquisition systems and chart recorders. Bringing the signal into a spare DC input channel (or external input) on the test controller allows the extensometer to be used for strain controlled tests like low cycle fatigue.



Model 3648 extensometer



Model 3648 with 1 inch gauge length



Model 3648 with 1 inch gauge length

**Features**

- May be left on through specimen failure.
- Designed for those applications requiring ±0.10 inches (±2.5 mm) full scale measuring range or less. For applications requiring greater measuring ranges, see Model 3549 (page 30).
- A signal conditioner and power supply included. Provides high level DC voltage output with exceptionally low noise (typical 0.1 mV on 10VDC output). Easily interfaced to test controllers, data acquisition boards, and chart recorders.
- Shipped fully calibrated with electronics (traceable to NPL) with user specified voltage output.
- All models can measure in both tension and compression and can be used for cyclic testing.
- Mechanical overtravel stops in both directions.
- Standard units meet existing ASTM class B-1 requirements for accuracy. A calibration certificate is included. ISO 9513 class 0,5 calibrations are available upon request.
- Includes high quality foam lined case and a spare set of ceramic rods.
- Innovative slide mount allows the extensometer to engage the specimen once the test temperature has been achieved.
- Low strain range, high resolution versions available.

**SPECIFICATIONS**

- Input:** Includes power supply for your country (specify)
- Output:** User specified, +/-5 VDC or +/-10 VDC typical
- Linearity:** 0.15% of full scale measuring range (rod length dependent)
- Resolution:** 0.001% of full scale
- Temperature Range:** Standard (-ST) is to 1200 °C (2200 °F), optional (-HT) 1600 °C (2900 °F)
- Cable:** Integral, ultra-flexible cable, 8 ft (2.5 m) standard
- Contact Force:** Adjustable up to 150 g (30-50 g typically used)
- Operating Force:** <10 g typical

**OPTIONS**

- Model 2050 constant temperature water re-circulating bath
- High temperature option (-HT suffix) for use to 1600 °C
- Load frame mounting brackets
- Specify rod tip style desired. Available choice are:
  - Straight chisel, vee chisel, conical tip

**Model 2050 Constant Temperature Re-Circulation Bath**

This bath provides the controlled temperature flow for water-cooled extensometers. Capable of cooling or heating the water, temperature is maintained within 0.1 °C. These units are ideal for obtaining the maximum stability of any water-cooled extensometer.



**ORDERING INFORMATION**

**Model 3648 Available Versions:** ANY combination of gauge length and measuring range listed below is available, except as noted. Ceramic rod lengths are made to fit furnaces as required. Please provide furnace dimensions at the time of order. Other configurations may be available with special order; please contact Epsilon to discuss your requirements.

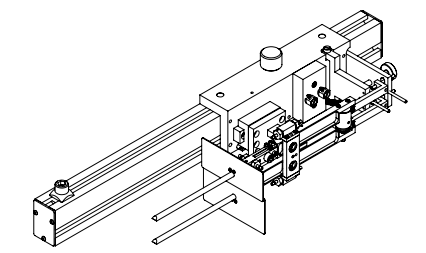
Gauge Length <sup>1</sup>		Measuring Range	
U.S.A.		DESIGNATION	% STRAIN
-0050	0.500"	-0005	±0.5%
-0100	1.000"	-001	±1%
-0200	2.000"	-005	±5%
METRIC		-010 <sup>2</sup>	±10%
-010M	10.0 mm	-020 <sup>2</sup>	±20%
-0125M	12.5 mm		
-025M	25.0 mm		
-050M	50.0 mm		

Model Number 3648- \_\_\_\_\_ - \_\_\_\_\_ - \_\_\_\_\_

Temperature Range	
-ST	Ambient to 1200 °C (RT to 2200 °F)
-HT	Ambient to 1600 °C (RT to 2900 °F)

<sup>1</sup> Please consult the factory for specific gauge length requirements.  
<sup>2</sup> ±2.5 mm (±0.10 inch) maximum allowable measuring range for any given gauge length.  
**Example:** 3648-010M-003-ST: 10.0 mm gauge length, ±3.0% (±0.30 mm) measuring range, standard temperature option (room temperature to 1200 °C)

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 Contact us for your special testing requirements.



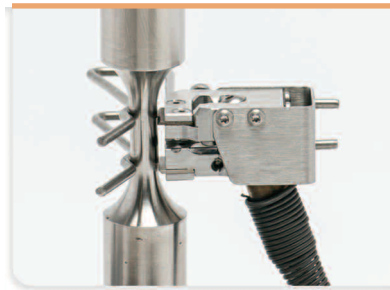
MODEL 3648 EXAMPLE

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**NEW PRODUCT**

For use in environmental chambers where the entire extensometer must be exposed to elevated temperatures. These capacitive extensometers may be used up to 600 °C (1100 °F) without any cooling.



Model 7642-010M-025M extensometer

These extensometers use a high-temperature capacitive sensor and do not require any cooling. They will operate up to the maximum temperature limit of most environmental chambers used in materials testing. The Model 7642 is ideal for testing composites, metals and

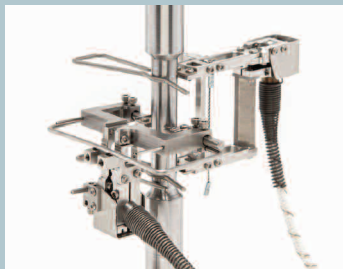
high temperature polymers in tensile, compression or cyclic testing. All units can be displaced in both compression and tension.

The extensometer is supplied with the revolutionary DT6229 controller. The standard output is 0-10VDC analog signal, factory calibrated with the extensometer. This system provides a number of functional enhancements, including high speed digital output, built in calibration and tare functions, analog and digital filters, and more.

The 7642 is readily interfaced with most existing test controllers, and may be directly connected to a data acquisition system or chart recorder, or directly to a PC. The 7642 may be used for strain controlled tests such as low cycle fatigue.



Model 7642-050M-125M extensometer



Models 7642 and 7675 extensometers



Models 7642 and 7675 extensometers

**Features**

- May be left on through specimen failure.
- Improved performance at high temperature
- Reduced size and weight, and improved high frequency performance up to 100 Hz
- Improved noise rejection
- Digital controller and power supply included. Provides high level DC voltage output with low noise. Easily interfaced to test controllers, data acquisition boards and chart recorders.
  - Includes high speed analog and digital outputs
  - Intuitive web-based user interface for setup, calibration, and data acquisition
  - Built-in calibration reference and auto-zero features
  - Multiple extensometer calibration files may be loaded for use with one controller
  - Multiple temperature-specific calibrations may be stored
  - Selectable analog and digital filter options from 2 Hz to 3 kHz.
- Ships fully calibrated with electronics with user specified voltage output. (traceable to NPL)
- All models can measure in both tension and compression and may be used for cyclic testing.
- Mechanical over-travel stops
- Standard units meet existing ASTM class B-1 requirements for accuracy. A calibration certificate is included. ISO 9513 class 0,5 calibrations are available upon request.
- Hardened tool steel knife edges are easily replaced. A spare set comes with every extensometer.
- Includes high quality foam lined case and a spare set of knife edges
- Rugged, dual flexure design for strength and improved performance. Much stronger than single flexure designs, this also allows cyclic testing at higher frequencies.

**SPECIFICATIONS**

- Input:** Includes power supply for your country (specify)
- Analog Output:** User specified, +/-5 VDC or +/-10VDC typical, ±10.8VDC rail
- Digital Output:** 24 bit high speed Ethernet output with built-in web interface
- Linearity:** 11 point linearization, ≤0.1% FS typical linearity
- Resolution:** <55 PPM (0.006%FS) RMS@4 kHz, <6 PPM (0.0006%FS)@100 Hz
- Cyclic Testing:** >25 Hz typical, up to 100 Hz with small travel units, @0.5mm travel.
- Analog Filter:** Selectable 100 Hz analog and 2Hz-3 kHz digital filters
- Temperature Range:** Ambient to 600 °C (1100 °F) typical†
- Temperature Sensitivity (Gain):** <100 PPM/°C (0.01%FS/°C) typical
- Temperature Sensitivity (Offset):** 20 PPM/°C (0.002%FS/°C) typical
- Sensor Cable:** 2.5 ft (.7 m) tri-axial high temperature cable, plus 5 ft (1.5 m) room temperature extension cable
- Standard Quick Attach Kit:** Fits round samples up to Ø0.60" (15 mm) and flats to 2.0" (50 mm) wide for thicknesses up to 0.25" (6.35 mm) and 0.75" (19 mm) wide for specimens 0.25" (6.35 mm) to 0.50" (12.5 mm) thick.
- Operating Force:** <100 g typical
- Environment:** Recommended for elevated temperature testing in dry air or some other gases.

**OPTIONS**

- Gauge length adapter kits (†: not recommended over 570 °F (300 °C))
- Connectors to interface to nearly any brand test equipment
- Bulkhead adapters for vacuum chambers
- Dual-channel DT6229 controller available

**ORDERING INFORMATION**

Model 7642 Available Versions: ANY combination of gauge length, measuring range and temperature range listed below is available, except as noted. Other configurations may be available with special order; please contact Epsilon to discuss your requirements.

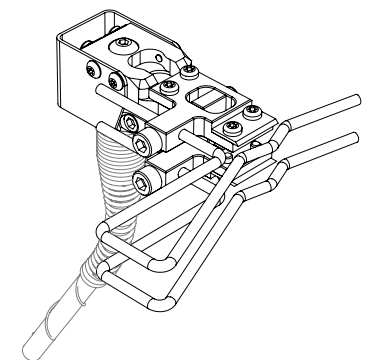
Gauge Length		Measuring Range	
U.S.A.		U.S.A.	
-0050	0.50"	-010T	+ .10"/-.02" mm*
-0100	1.00"	-030T	+ .30"/-.05" mm**
-0200	2.00"	-050T	+ .50"/-.07" mm**
METRIC		METRIC	
-010M	10.0 mm	-025M	+2.5/-0.5 mm*
-012M	12.0 mm	-075M	+7.5/-1.5 mm**
-0125M	12.5 mm	-125M	+12.5/-2.0 mm**
-020M	20.0 mm		
-025M	25.0 mm		
-050M	50.0 mm		

Model Number 7642- \_\_\_\_\_ - \_\_\_\_\_

\* Tilted cable exit  
\*\* Vertical cable exit

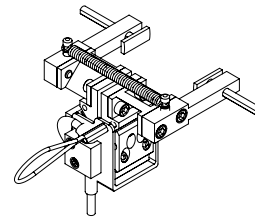
Example: 7642-0100-030T: 1.00" gauge length, +0.30"/-.05" measuring range

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Contact us for your special testing requirements.

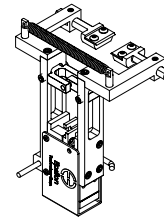


MODEL 7642 EXAMPLE

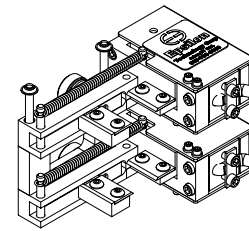
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3475 Miniature Transverse Diametral Extensometers

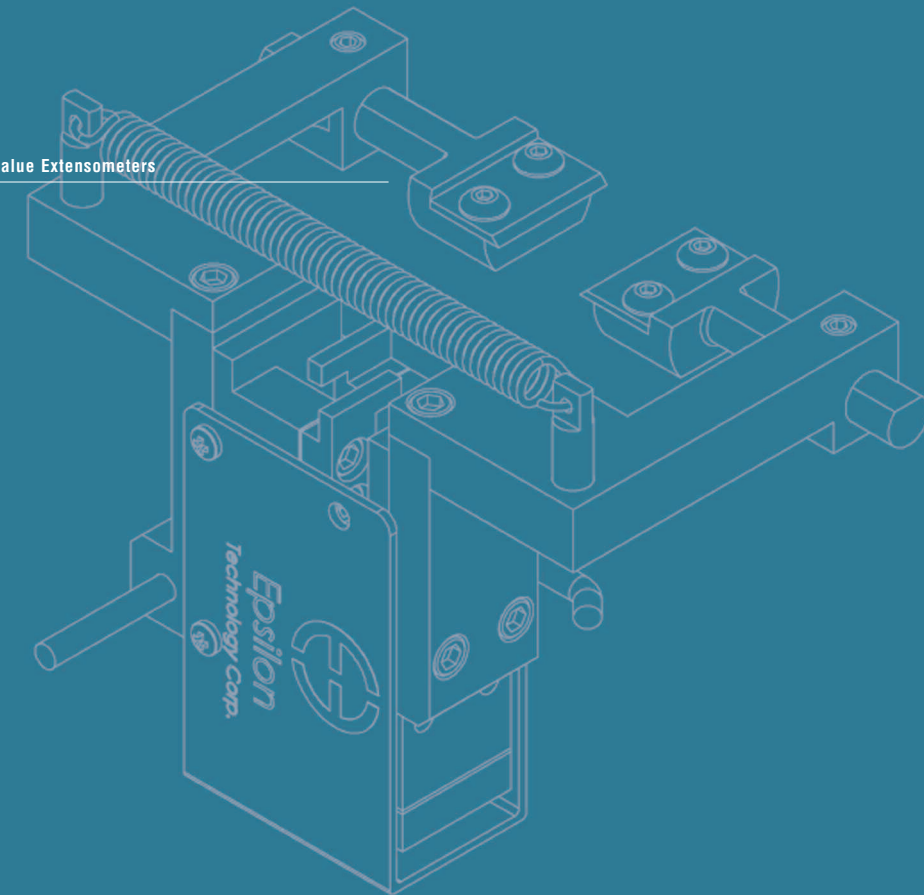


3575 Transverse (Diametral) Extensometers



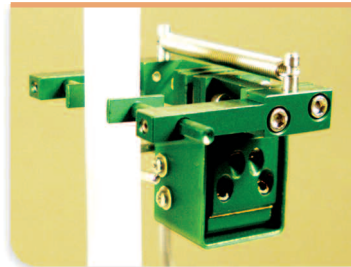
3575AVG Sheet Metal r-Value Extensometers

**Transverse and  
Diametral  
Extensometers**



A miniature extensometer designed for general purpose transverse or diametral strain measurements on small or thin specimens.

May be used simultaneously with the Model 3442 miniature axial extensometers or the Model 3542 axial extensometers.



Model 3475-050M-ST with ±0.50 mm measuring range

These very lightweight extensometers are self-supporting on the test sample. They are used for measuring transverse or diametral strain. Often they are used simultaneously with an Epsilon axial strain measuring extensometer to determine Poisson's ratio. They also are used for characterizing materials with anisotropic properties, such as with many

composite materials.

This model clips easily onto the sample with an integral spring to hold the unit in place. It can be adjusted to work on any size sample from 0 to 1 inch (25 mm) width or diameter. The Model 3475 has an arm thickness of only 0.15 inches (3.81 mm), and will work simultaneously with any axial extensometer having sufficient clearance between arms (not all versions of the 3442 miniature extensometer can be used). Large radius contacts prevent the unit from digging into the samples. This model utilizes Epsilon's dual flexure design, allowing use in dynamic applications. All units have measuring ranges in both directions.

The Model 3475 extensometers are strain gaged devices, making them compatible with any electronics designed for strain gaged transducers. Most often they are connected to a test machine controller. The signal conditioning electronics for the extensometer is typically included with the test machine controller or may often be added. In this case the extensometer is shipped with the proper connector and wiring to plug directly into the electronics. For systems lacking the required electronics, Epsilon can provide a variety of solutions, allowing the extensometer output to be connected to data acquisition boards, chart recorders or other equipment.

See the electronics section of this catalog for available signal conditioners and strain meters.



Model 3475-050T-ST with ±0.050 inch measuring range

**Features**

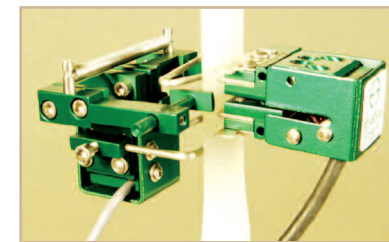
- May be left on through specimen failure.
- Full bridge, 350 ohm strain gaged design for compatibility with nearly any test system.
- All models will measure both positive and negative displacements.
- All standard units have linearity readings of 0.20% or better.
- Includes high quality foam lined case.
- Rugged, dual flexure design for strength and improved performance. Much stronger than single flexure designs, this also allows cyclic testing at higher frequencies.
- Easy to mount, with integral springs to keep the extensometer on the sample.
- Self-supporting on the specimen.

**SPECIFICATIONS**

- Excitation:** 5 to 10 VDC recommended, 12 VDC or VAC max.
- Output:** 2 to 4 mV/V, depending on model
- Linearity:** 0.15% to 0.20% of full scale measuring range, depending on model
- Temperature Range:** Standard (-ST) is -40 °C to +100 °C (-40 °F to 210 °F)
- Cable:** Integral, ultra-flexible cable, 8 ft (2.5 m) standard
- Specimen Size:** Works with samples up to 1 inch (25 mm) width or diameter

**OPTIONS**

Connectors to interface to nearly any brand test equipment  
Shunt calibration module (see page 104)



**Model 3475 Transverse**  
Used simultaneously with Model 3442 axial extensometer.

**ORDERING INFORMATION**

**Model 3475 Available Versions:** ANY combination of measuring range and temperature range listed below is available. Other configurations may be available with special order; please contact Epsilon to discuss your requirements.

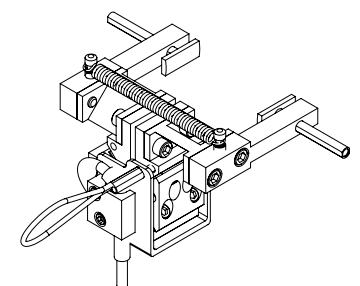
Measuring Range	
U.S.A.	
-010T	±0.010"
-020T	±0.020"
-040T	±0.040"
-050T	±0.050"
METRIC	
-025M	±0.25 mm
-050M	±0.50 mm
-100M	±1.00 mm
-125M	±1.25 mm

Model Number 3475- \_\_\_\_\_ - \_\_\_\_\_

Temperature Range	
-LT	-265 °C to 100 °C (-450 °F to 210 °F)
-ST	-40 °C to 100 °C (-40 °F to 210 °F)
-HT1	-40 °C to 150 °C (-40 °F to 300 °F)
-HT2	-40 °C to 200 °C (-40 °F to 400 °F)
-LHT	-265 °C to 200 °C (-450 °F to 400 °F)

**Example:** 3475-050M-LT: ±0.50 mm measuring range, low temperature option (-265 °C to 100 °C)

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Contact us for your special testing requirements.



±1 mm measuring range  
MODEL 3475 EXAMPLE

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Designed for general purpose transverse or diametral strain

measurement on axially loaded specimens. This model may be used

simultaneously with the Model 3542 axial extensometer.



Model 3575 extensometer

Self-supporting on the test sample, these extensometers will work on any width or diameter specimen from 0 to 1 inch (25 mm). They are commonly used for measurement of Poisson's ratio, for transverse measurements with anisotropic materials like many composites and for sheet metal testing such as r-value determination. Most often they are used simultaneously with Epsilon's axial extensometers.

These units easily clip onto the sample and are held in place with an integral spring. Rounded contact edges maintain the position on the specimen. All are high accuracy strain gaged units, compatible with most test controllers.

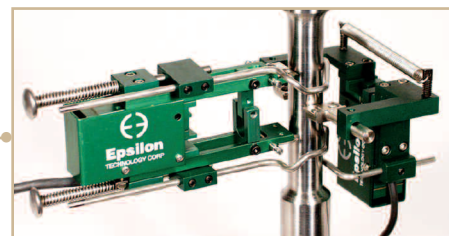
The Model 3575 extensometers are strain gaged devices, making them compatible with any electronics designed for strain gaged transducers. Most often they are connected to a test machine controller. The signal conditioning electronics for the extensometer is typically included with the test machine controller or may often be added. In this case the extensometer is shipped with the proper connector and wiring to plug directly into the electronics. For systems lacking the required electronics, Epsilon can provide a variety of solutions, allowing the extensometer output to be connected to data acquisition boards, chart recorders or other equipment.

See the electronics section of this catalog for available signal conditioners and strain meters.

**Sheet Metal r-Value Determination with Models 3575 and 3542**

The Model 3575 may be used simultaneously with a Model 3542 axial extensometer to measure r-value. Many researchers are now using only this single lateral measurement for their tests, rather than the older method using three manual measurements.

An alternative unit with dual lateral measurements is the Model 3575AVG, which averages transverse readings over two locations.



Models 3575 and 3542 extensometers

**Features**

- May be left on through specimen failure.
- Full bridge, 350 ohm strain gaged design for compatibility with nearly any test system.
- All models will measure both positive and negative displacements.
- All standard units have linearity readings of 0.20% or better.
- Includes high quality foam lined case and spare set of tool steel knife edges.
- Rugged, dual flexure design for strength and improved performance. Much stronger than single flexure designs, this also allows cyclic testing at higher frequencies.
- Easy to mount, with integral springs to keep the extensometer on the sample.
- Self-supporting on the specimen.

**SPECIFICATIONS**

Excitation: 5 to 10 VDC recommended, 12 VDC or VAC max.

Output: 2 to 4 mV/V, depending on model

Linearity: ≤0.20% of full scale measuring range, depending on model

Temperature Range: Standard (-ST) is -40 °C to +100 °C (-40 °F to 210 °F)

Cable: Integral, ultra-flexible cable, 8 ft (2.5 m) standard

Specimen Size: Works with samples up to 1 inch (25 mm) width or diameter

**OPTIONS**

Connectors to interface to nearly any brand test equipment

Shunt calibration module (see page 104)

Specialty knife edges (see page 105)



**ORDERING INFORMATION**

Model 3575 Available Versions: ANY combination of measuring range and temperature range listed below is available. Other configurations may be available with special order; please contact Epsilon to discuss your requirements.

Measuring Range	
U.S.A.	
-020T	±0.020"
-050T	±0.050"
-100T	±0.100"
-150T	±0.150"
-200T <sup>1</sup>	±0.200"
METRIC	
-050M	±0.5 mm
-100M	±1.0 mm
-250M	±2.5 mm
-300M	±3.0 mm
-500M <sup>1</sup>	±5.0 mm

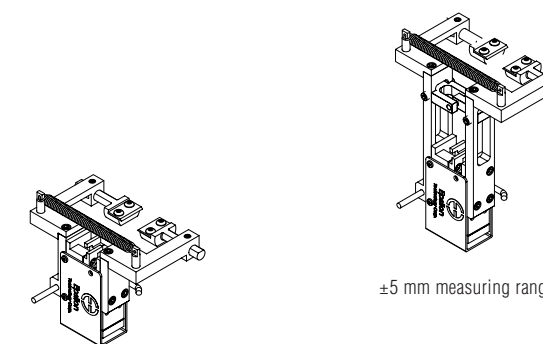
Model Number 3575- \_\_\_\_\_ - \_\_\_\_\_

Temperature Ranges	
-LT	-265 °C to 100 °C (-450 °F to 210 °F)
-ST	-40 °C to 100 °C (-40 °F to 210 °F)
-HT1	-40 °C to 150 °C (-40 °F to 300 °F)
-HT2	-40 °C to 200 °C (-40 °F to 400 °F)
-LHT	-265 °C to 200 °C (-450 °F to 400 °F)

<sup>1</sup> Special order.

Example: 3575-050T-ST: ±0.050 inches measuring range, standard temperature option (-40 °F to 210 °F)

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Typical version

±5 mm measuring range

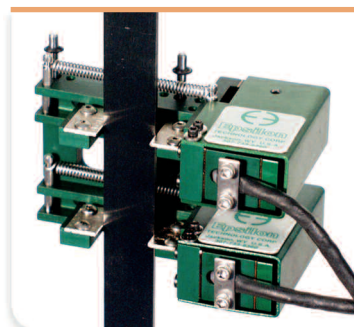
MODEL 3575 EXAMPLES

Designed for measuring r-values in sheet metal testing, this

extensometer averages the lateral strain at two locations.

This model may be used simultaneously with the Model 3542

axial extensometer.



Model 3575AVG extensometer

This extensometer is self-supporting on the sample. It has rounded contact edges which measure the sample at two locations. As the test sample is pulled, the contact edges follow the part of the sample they were mounted on, measuring lateral strain on the sample at the same location throughout the test. The extensometer has a single output, which is the average of the two lateral measurements.

These extensometers are used with a 2 inch or 50 mm gauge length Model 3542 extensometer, which measures the axial strain.

The Model 3575AVG extensometers are strain gaged devices, making them compatible with any electronics designed for strain gaged transducers. Most often they are connected to a test machine controller. The signal conditioning electronics for the extensometer is typically included with the test machine controller or may often be added. In this case the extensometer is shipped with the proper connector and wiring to plug directly into the electronics. For systems lacking the required electronics, Epsilon can provide a variety of solutions, allowing the extensometer output to be connected to data acquisition boards, chart recorders or other equipment.

See the electronics section of this catalog for available signal conditioners and strain meters.

**Features**

- May be left on through specimen failure.
- Full bridge, 350 ohm strain gaged design for compatibility with nearly any test system.
- All standard units have linearity readings of 0.15% or better.
- Includes high quality foam lined case and spare set of tool steel knife edges.
- Rugged, dual flexure design for strength and improved performance. Much stronger than single flexure designs.
- Self-supporting on the specimen.
- Measuring range of 0.075 inches or 2 mm (specify).
- Single clip-on unit directly measures lateral strain as an average of two locations.
- Greatly speeds up testing and allows digital data collection as compared to manual measurements.

**SPECIFICATIONS**

- Excitation:* 5 to 10 VDC recommended, 12 VDC or VAC max.
- Output:* 2 to 4 mV/V nominal, depending on model
- Linearity:* ≤0.15% of full scale measuring range
- Temperature Range:* Standard (-ST) is -40 °C to +100 °C (-40 °F to 210 °F)
- Cable:* Integral, ultra-flexible cable, 8 ft (2.5 m) standard
- Specimen Size:* Works with samples 0.375 to 1.0 inch (9.5 to 25 mm) width

**OPTIONS**

- Connectors to interface to nearly any brand test equipment
- Shunt calibration module (see page 104)
- Specialty knife edges (see page 105)



**Models 3575AVG Transverse**  
Used with Model 3542 extensometer.

**ORDERING INFORMATION**

Model 3575AVG Available Versions: ANY combination of measuring range and temperature range listed below is available, except as noted.

**Measuring Range**

0.075 inches or 2 mm (specify)

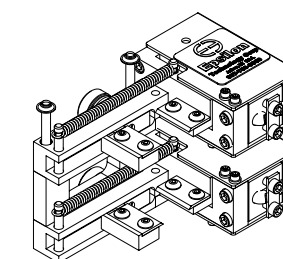
Model Number 3575AVG- \_ \_ \_

**Temperature Ranges**

-LT	-265 °C to 100 °C (-450 °F to 210 °F)
-ST	-40 °C to 100 °C (-40 °F to 210 °F)
-HT1	-40 °C to 150 °C (-40 °F to 300 °F)
-HT2	-40 °C to 200 °C (-40 °F to 400 °F)
-LHT	-265 °C to 200 °C (-450 °F to 400 °F)

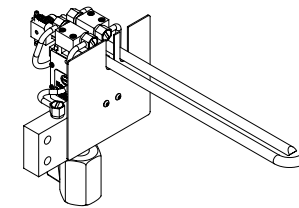
Example: 3575AVG-LT: 2 mm measuring range, low temperature option (-265 °C to 100 °C)

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Contact us for your special testing requirements.

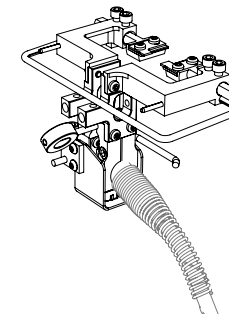


MODEL 3575AVG EXAMPLE

Visit our website at [www.epsilontech.com](http://www.epsilontech.com)

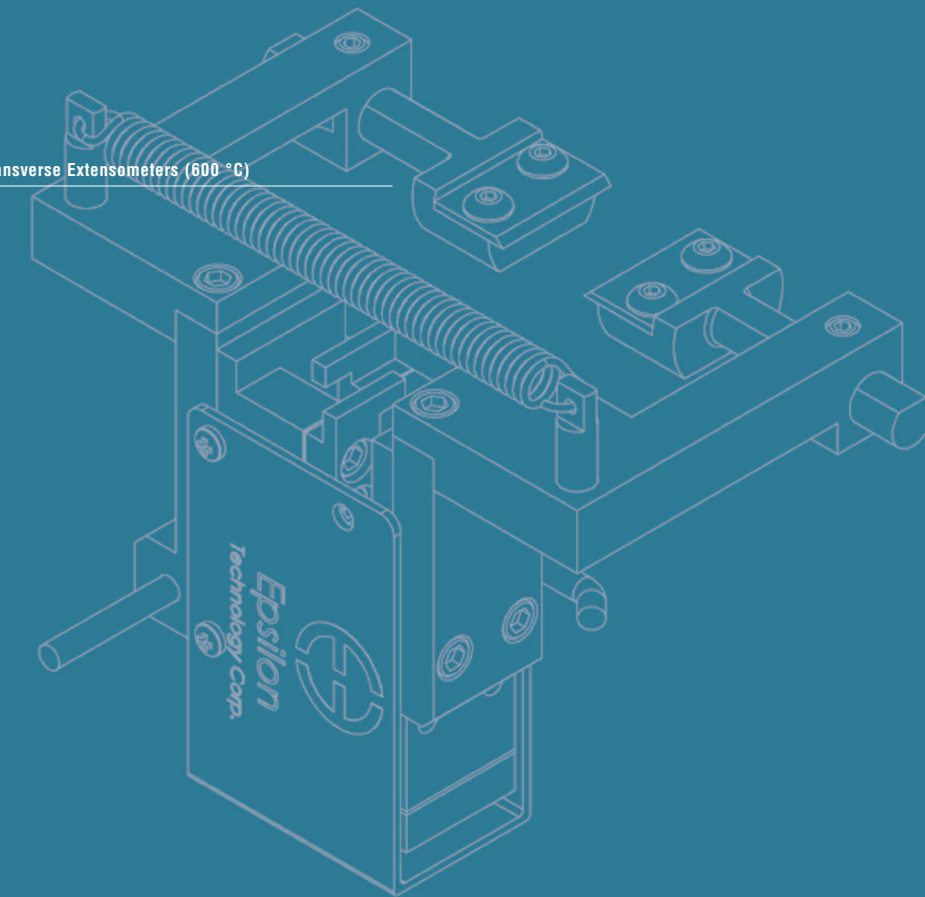


3580 High Temperature Diametral Extensometers (1000 °C)



7675 High Temperature Transverse Extensometers (600 °C)

**High Temperature  
Transverse and Diametral  
Extensometers**



For transverse or diametral strain measurements at temperatures to 1000 °C (1832 °F). These extensometers may be used with furnaces having a side entry slot for an extensometer or with induction heating systems. They utilize a proprietary, rugged dual flexure design.



Model 3580 extensometer

This model is for diametral strain measurement with furnace and induction heating systems. Quartz rods and water-cooling allow the unit to be used for high temperature testing of metals, ceramics and composites.

With induction heating, this model often can be used without water-cooling.

When used in furnaces, the extensometer is often mounted directly to the furnace side cut-out. Optional load frame mounting brackets are available for supporting the extensometer in cases where furnace mounting is not possible. These optional mounts are used with induction heating or furnace systems.

The Model 3580 extensometers are strain gaged devices, making them compatible with any electronics designed for strain gaged transducers. Most often they are connected to a test machine controller. The signal conditioning electronics for the extensometer is typically included with the test machine controller or may often be added. In this case the extensometer is shipped with the proper connector and wiring to plug directly into the electronics. For systems lacking the required electronics, Epsilon can provide a variety of solutions, allowing the extensometer output to be connected to data acquisition boards, chart recorders or other equipment.

See the electronics section of this catalog for available signal conditioners and strain meters.



Model 3580 mounted to split furnace

**Features**

- May be left on through specimen failure.
- Full bridge, 350 ohm strain gaged design for compatibility with nearly any test system.
- All standard units have linearity readings of 0.15% or better.
- Each unit comes with a spare set of quartz rods, universal water-cooled mounting bracket and a foam lined storage case.
- Rugged, dual flexure design for strength and improved performance. Much stronger than single flexure designs, this also allows cyclic testing at higher frequencies.
- Versions available for use in vacuum environments (consult factory).
- Special rods are available for 1200 °C temperature testing or 1000 °C creep testing.

**SPECIFICATIONS**

- Excitation:* 5 to 10 VDC recommended, 12 VDC or VAC max.
- Output:* 2 to 4 mV/V nominal, depending on model
- Linearity:* ≤0.15% of full scale measuring range, depending on model
- Temperature Range:* Standard is -40 °C to +1000 °C (-40 °F to 1832 °F)
- Cable:* Integral, ultra-flexible cable, 8 ft (2.5 m) standard
- Specimen Size:* Works with samples 0.18 to 0.63 inch diameters (4.5 to 16 mm)
- Contact Force:* Adjustable, 100 to 300 g typical

**OPTIONS**

- Model 2050 constant temperature water re-circulating bath
- Connectors to interface to nearly any brand test equipment
- Special rods are available for large specimens
- Special rods are available for 1200 °C temperature testing or 1000 °C creep testing.
- Shunt calibration module (see page 104)



**Model 2050 Constant Temperature Re-Circulation Bath**

This bath provides the controlled temperature flow for water-cooled extensometers. Capable of cooling or heating the water, temperature is maintained within 0.1 °C.

These units are ideal for obtaining the maximum stability of any water-cooled extensometer.



**ORDERING INFORMATION**

**Model 3580 Available Versions:** ANY combination of measuring range and temperature range listed below is available. Quartz rod lengths are made to fit furnaces as required. Please provide furnace and specimen dimensions at the time of order. Other configurations may be available with special order; please contact Epsilon to discuss your requirements.

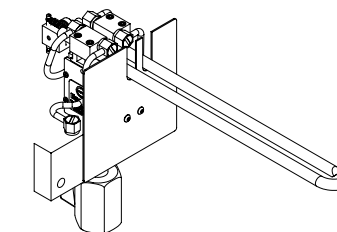
Measuring Range	
U.S.A.	
-020T	±0.020"
-030T	±0.030"
-060T <sup>1</sup>	0.060"
-075T <sup>1,2</sup>	0.075"
-200T <sup>1,2</sup>	0.200"
METRIC	
-050M	±0.50 mm
-075M	±0.75 mm
-150M <sup>1</sup>	1.50 mm
-200M <sup>1,2</sup>	2.00 mm
-500M <sup>1,2</sup>	5.00 mm

Model Number 3580- \_\_\_\_\_

<sup>1</sup> Tension only.  
<sup>2</sup> Special order only.

**Example:** 3580-030T: ±0.030 inches measuring range, temperature range of -40 °F to 1832 °F

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MODEL 3580 EXAMPLE

Visit our website at [www.epsilontech.com](http://www.epsilontech.com)

**NEW PRODUCT**

Designed for transverse or diametral strain measurement in environmental chambers where the entire extensometer must be exposed to elevated temperatures. These capacitive extensometers may be used up to 600 °C (1100 °F) without any cooling.



Model 7675 extensometer

These transverse extensometers use a high-temperature capacitive sensor and do not require any cooling. They will operate up to the maximum temperature limit of most environmental chambers used in materials testing. The Model 7675 is ideal for determination of Poisson's ratio, and for characterization of anisotropic materials

such as composites. All units can accommodate both positive and negative displacements. Model 7675 transverse extensometers are compatible with most Model 7642 high-temperature axial extensometers.

The 7675 is supplied with the revolutionary DT6229 controller. The standard output is 0-10VDC analog signal, factory calibrated with the extensometer. This system provides a number of functional enhancements, including high speed digital output, built in calibration and tare functions, analog and digital filters, and more.



Model 7675 and 7642 with DT6229-02 (dual channel) signal conditioner

**Features**

- May be left on through specimen failure.
- Self-supporting on specimen
- Improved accuracy, resolution, and noise rejection at high temperature
- Reduced size and weight, and improved high frequency performance
- All standard models are suitable for cyclic testing, >25 Hz is typical.
- Digital controller and power supply included. Provides high level DC voltage output with low noise. Easily interfaced to test controllers, data acquisition boards and chart recorders.
  - Includes high speed analog and digital outputs
  - Intuitive web-based user interface for setup, calibration, and data acquisition
  - Built-in calibration reference and auto-zero features
  - Multiple extensometer calibration files may be loaded for use with one controller
  - Multiple temperature-specific calibrations may be stored
  - Selectable analog and digital filter options from 2 Hz to 3 kHz
- Ships fully calibrated with electronics (traceable to NPL (UK)) with user specified voltage output
- Mechanical over-travel protection
- Suitable for measuring Poisson's ratio per ASTM E132 with most materials and specimens
- Durable stainless steel knife edges
- Includes high quality foam lined case
- Rugged, dual flexure design for strength and improved performance. The next-generation design enables cyclic testing at much higher frequencies.

**SPECIFICATIONS**

- Input:* Includes power supply for your country (specify)
- Analog Output:* User specified, +/-5 VDC or +/-10VDC typical, ±10.8VDC rail
- Digital Output:* 24 bit high speed Ethernet output with built-in web interface
- Linearity:* 11 point linearization, ≤0.1% of full scale typical
- Resolution:* <55 PPM (0.006%FS) RMS@4 kHz, <6 PPM (0.0006%FS)@100 Hz
- Cyclic Testing:* >25 Hz typical
- Analog Filter:* Selectable 100 Hz analog and 2Hz-3 kHz digital filters
- Temperature Range:* Ambient to 600 °C (1100 °F) typical
- Temperature Sensitivity (Gain):* <100 PPM/°C (0.01%FS/°C) typical
- Temperature Sensitivity (Offset):* 20 PPM/°C (0.002%FS/°C) typical
- Sensor Cable:* 2.5 ft (.7 m) tri-axial high temperature cable, plus 5 ft (1.5 m) room temperature extension cable
- Operating Force:* 1-2 kgf (30-60 oz) typical, depending on model
- Environment:* Recommended for elevated temperature testing in dry air or some other gases

**OPTIONS**

- Reverse cable exit available
- Connectors to interface to nearly any brand test equipment
- Bulkhead adapters for vacuum chambers
- Dual-channel DT6229 controller
- Specialty knife edges (see page 106)

**ORDERING INFORMATION**

**Model 7675 Available Versions:** Available standard measuring ranges are listed below. Other configurations may be available with special order; please contact Epsilon to discuss your requirements.

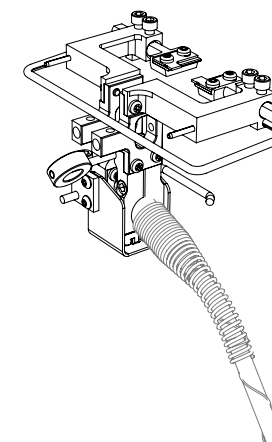
Measuring Range	
U.S.A. -050T -100T	±0.05" ±0.10" *
METRIC -012M -025M	±1.2 mm ±2.5 mm *

Model Number 7675- \_\_\_\_\_

\* Preferred configuration

**Example:** 7675-025M: ±2.5 mm measuring range

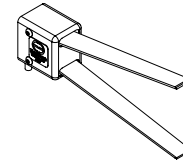
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Contact us for your special testing requirements.



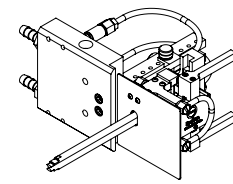
MODEL 7675 EXAMPLE

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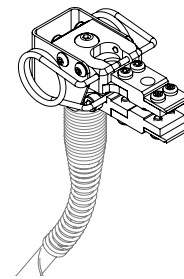




3541 Fracture Mechanics Clip-On Gages

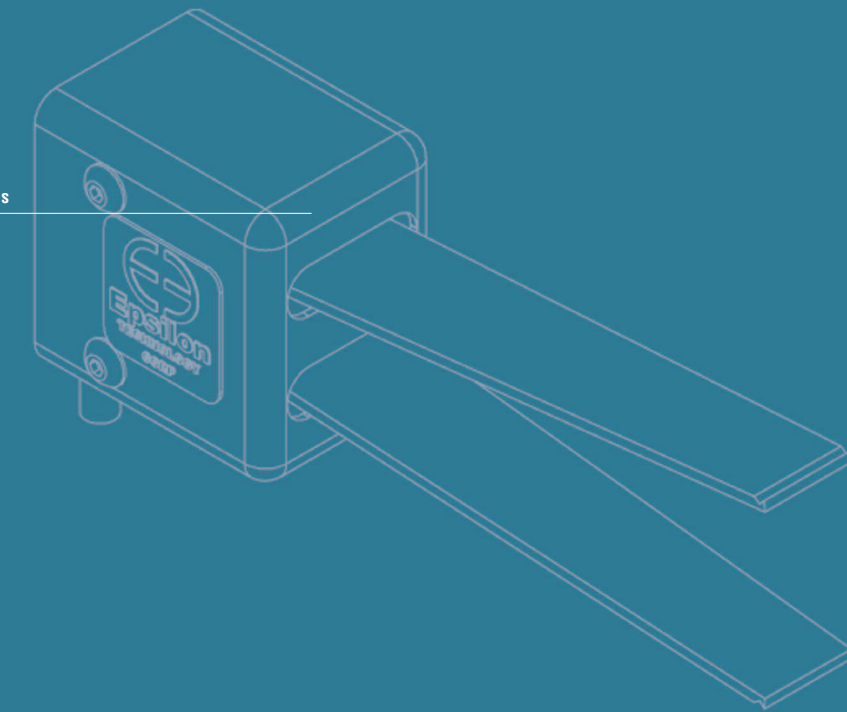


3548COD High Temperature COD Gages (1200 °C or 1600 °C)



7641 High Temperature Clip-On Gages

**Fracture Mechanics  
Clip-On Gages**



For fracture mechanics studies, these COD gages are in compliance with standardized test methods, such as ASTM E1820 for determination of fracture toughness properties of metallic materials.



Model 3541 COD gage

These gages conform to the requirements of E1820 (the replacement for E813 and E1737) for JIC and R-curve determination. Special configurations are available to meet the requirements of ASTM E399 for fracture toughness (please consult the factory for these configurations). In addition, the modified groove design complies

with E1820 tests where greater stability and accuracy results from the sharper groove root. Clip-on gages are used for a variety of fracture mechanics tests, including compact tension, arc shaped, disk shaped, bend specimens or other specimen geometries in compliance with ASTM and other standards organization's test methods. Clip-on gages can be used directly on test specimens where the knife edges are integral with the test specimen or, alternately, with optional bolt-on knife edges mounted on the test specimen.

The Model 3541 extensometers are strain gaged devices, making them compatible with any electronics designed for strain gaged transducers. Most often they are connected to a test machine controller. The signal conditioning electronics for the extensometer is typically included with the test machine controller or may often be added. In this case the extensometer is shipped with the proper connector and wiring to plug directly into the electronics. For systems lacking the required electronics, Epsilon can provide a variety of solutions, allowing the extensometer output to be connected to data acquisition boards, chart recorders or other equipment.

See the electronics section of this catalog for available signal conditioners and strain meters.



Model 3541-004M-120M attached to bolt-on knife edges



Model 3541-004M-120M with 4 mm gauge length and +12/-2 mm measuring range

**Features**

- Full bridge, 350 ohm strain gaged design for compatibility with nearly any test system.
- Fully enclosed gages to protect from accidental damage.
- All standard units meet existing ASTM E1820 requirements for accuracy.
- Special models available for ASTM E399 accuracy requirements.
- Sharp grooves per ASTM E1820, E813, and E399 for improved stability when mounted.
- Includes high quality foam lined case.
- All capable of high frequency operation (50 Hz or faster, depending on version). In in-house testing, the small measuring range 3541 units (+2.5/-1.0 mm) were able to successfully test to 150 Hz with a ±0.005 inch amplitude. At this level, there was no appreciable change in the noise level compared to lower frequencies. For longer measuring range units (+10/-1.0 mm), 50Hz was the maximum frequency that could be achieved with reasonable noise levels.

**SPECIFICATIONS**

- Excitation: 5 to 10 VDC recommended, 12 VDC or VAC max.
- Output: 2 to 4 mV/V nominal, depending on model
- Linearity: 0.15% for measuring ranges less than 0.25 inch (6 mm), 0.20% for greater measuring ranges
- Temperature Range: Standard (-ST) is -40 °C to +100 °C (-40 °F to 210 °F)
- Cable: Integral, ultra-flexible cable, 8 ft (2.5 m) standard
- Operating Force: Exerts 2 to 3 lbs (9 to 14 N), depending on model

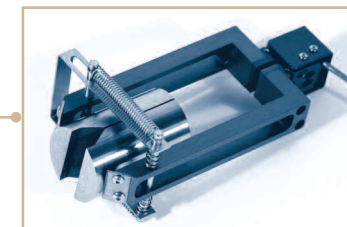
**OPTIONS**

- Connectors to interface to nearly any brand test equipment
- Available in special versions
- Bolt on knife edges
- Severe environment versions available
- Shunt calibration module (see page 104)



**Special Model for Other Fracture Mechanics Testing**

Special units are available for other fracture mechanics tests. For example, the photo to the right shows a gage for ASTM E1304, Standard Test Method for Plane-Strain (Chevron-Notch) Fracture Toughness of Metallic Materials. This example was produced for a 1 inch diameter bar, with 0.4 inches of measuring range. Its performance, design, and accuracy is an enhancement of the design recommended in E1304.



**ORDERING INFORMATION**

**Model 3541 Available Versions:** The following combinations of gauge length and measuring range listed below are available as standard, except as noted. All are available in any temperature range listed. Other configurations may be available with special order; please contact Epsilon to discuss your requirements.

Gauge Length		Measuring Range	
U.S.A.			
-0010	0.100"	-100T <sup>1</sup>	+0.100"/-0.050"
-0020	0.200"	-150T <sup>1</sup>	+0.150"/-0.050"
-0030	0.300"	-200T	+0.200"/-0.050"
-0040	0.400"	-250T	+0.250"/-0.050"
-0047	0.475"	-500T	+0.500"/-0.100"
-0050	0.500"		
METRIC			
-003M	3.0 mm	-025M <sup>1</sup>	+2.5 mm/-1.0 mm
-005M	5.0 mm	-040M <sup>1</sup>	+4.0 mm/-1.0 mm
-008M	8.0 mm	-070M	+7.0 mm/-1.0 mm
-010M	10.0 mm	-100M	+10.0 mm/-1.0 mm
-012M	12.0 mm	-120M	+12.0 mm/-2.0 mm
-020M	20.0 mm		

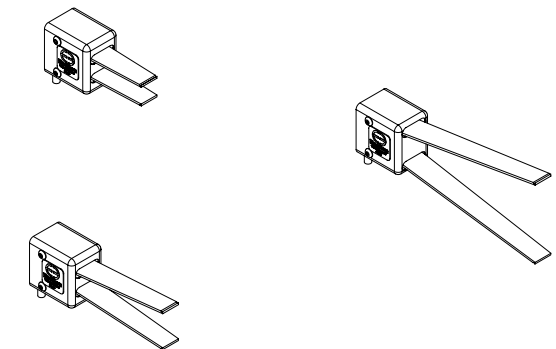
Model Number 3541- \_\_\_\_\_ - \_\_\_\_\_ - \_\_\_\_\_

Temperature Range	
-LT	-265 °C to 100 °C (-450 °F to 210 °F)
-ST	-40 °C to 100 °C (-40 °F to 210 °F)
-HT1	-40 °C to 150 °C (-40 °F to 300 °F)
-HT2	-40 °C to 200 °C (-40 °F to 400 °F)
-LHT	-265 °C to 200 °C (-450 °F to 400 °F)

<sup>1</sup> Available with special configuration to meet the requirements of ASTM E399. Please consult the factory.

**Example:** 3541-0050-200T-LT: 0.50 inch gauge length, +0.20 inch measuring range, low temperature option (-450 °F to 210 °F)

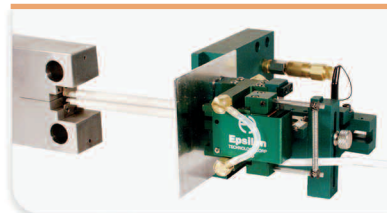
Visit our website at [www.epsilontech.com](http://www.epsilontech.com)  
Contact us for your special testing requirements.



MODEL 3541 EXAMPLES

Visit our website at [www.epsilontech.com](http://www.epsilontech.com)

High temperature COD gages for use in split type materials testing furnaces with a slot for the ceramic rods. Water-cooled and furnace bracket mounted, these extensometers are for use to 1200 °C (2200 °F). The high temperature option allows use to 1600 °C (2900 °F). They are specifically designed for fracture mechanics testing.



Model 3548COD mounted to a compact tension specimen

These COD gages mount on a water-cooled bracket, which is mounted on the furnace side cut-out or with optional load frame support brackets. The standard temperature version (to 1200 °C) is supplied with high purity alumina rods. The high temperature option is furnished with alpha grade silicon carbide rods. Rods are made to order to the length required for your furnace. Mounting brackets may be integrated with the furnace cut-out. Epsilon can also provide optional load frame mounting brackets to fit your test frame. Contact edges on the test sample should be somewhat rounded (not sharp knife edges) for best performance with this model.

The Model 3548COD extensometers are strain gaged devices, making them compatible with any electronics designed for strain gaged transducers. Most often they are connected to a test machine controller. The signal conditioning electronics for the extensometer is typically included with the test machine controller or may often be added. In this case the extensometer is shipped with the proper connector and wiring to plug directly into the electronics. For systems lacking the required electronics, Epsilon can provide a variety of solutions, allowing the extensometer output to be connected to data acquisition boards, chart recorders or other equipment.

See the electronics section of this catalog for available signal conditioners and strain meters.



Model 3548COD with no heat shields mounted to a Model 3590VHR calibrator

**Features**

- Full bridge, 350 ohm strain gaged design for compatibility with nearly any test system.
- All standard units meet existing ASTM E1820 requirements for accuracy.
- All units come with either high purity alumina ceramic rods (1200 °C) or alpha grade silicon carbide rods (1600 °C).
- Rugged, dual flexure design for strength and improved performance.
- Includes high quality foam lined case and a spare set of ceramic rods.

**SPECIFICATIONS**

Excitation: 5 to 10 VDC recommended, 12 VDC or VAC max.  
 Output: 2 to 4 mV/V nominal, depending on model  
 Linearity: ≤0.15% of full scale measuring range, depending on model  
 Temperature Range: Standard (-ST) is to 1200 °C (2200 °F), optional (-HT) 1600 °C (2900 °F)  
 Cable: Integral, ultra-flexible cable, 8 ft (2.5 m) standard  
 Operating Force: <30 g typical

**OPTIONS**

Load frame mounting brackets  
 High temperature option (-HT suffix) for use to 1600 °C  
 Connectors to interface to nearly any brand test equipment  
 Shunt calibration module (see page 104)



**ORDERING INFORMATION**

Model 3548COD Available Versions: ANY combination of gauge length, measuring range and temperature range listed below is available, except as noted. Ceramic rod lengths are made to fit furnaces as required. Please provide furnace dimensions at the time of order. Other configurations may be available with special order; please contact Epsilon to discuss your requirements.

Gauge Length		Measuring Range	
U.S.A.		U.S.A.	
-0020	0.200"	-100T	+0.100"
-0030	0.300"	-150T	+0.150"
-0040	0.400"	-200T	+0.200"
-0047	0.475"	-250T	+0.250"
-0050	0.500"	-500T	+0.500"
METRIC		METRIC	
-005M	5.0 mm	-025M	+2.5 mm
-008M	8.0 mm	-040M	+4.0 mm
-010M	10.0 mm	-070M	+7.0 mm
-012M	12.0 mm	-100M	+10.0 mm
-020M <sup>1</sup>	20.0 mm	-120M	+12.0 mm

Model Number 3548COD- \_\_\_\_\_ - \_\_\_\_\_ - \_\_\_\_\_

Temperature Range	
-ST	Ambient to 1200 °C (Ambient to 2200 °F)
-HT	Ambient to 1600 °C (Ambient to 2900 °F)

<sup>1</sup> Only available in small measuring ranges (rod length dependent).

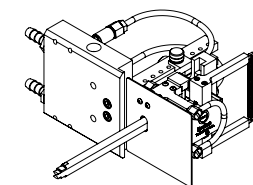
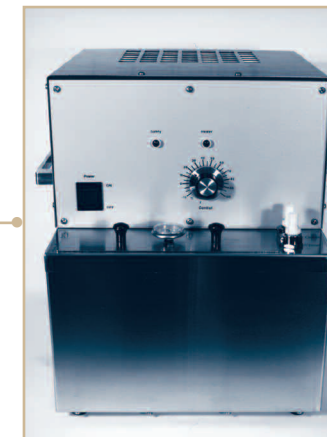
**Example:** 3548COD-0050-200T-HT: 0.500 inch compressed gauge length, +0.20 inch measuring range, high temperature option (room temperature to 1600 °C (2900 °F))

Visit our website at [www.epsilontech.com](http://www.epsilontech.com)  
 Contact us for your special testing requirements.

**Model 2050 Constant Temperature Re-Circulation Bath**

This bath provides the controlled temperature flow for water-cooled extensometers. Capable of cooling or heating the water, temperature is maintained within 0.1 °C.

These units are ideal for obtaining the maximum stability of any water-cooled extensometer.



MODEL 3548COD EXAMPLE

Visit our website at [www.epsilontech.com](http://www.epsilontech.com)

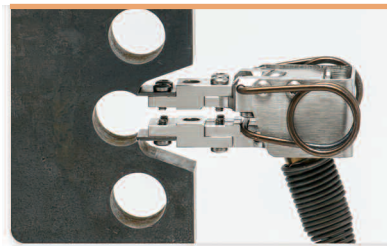
**NEW PRODUCT**

Designed for fracture mechanics testing in environmental chambers

where the entire gage must be exposed to elevated temperatures.

These capacitive sensors may be used up to 600 °C (1100 °F) without

any cooling.



Model 7641 COD gage

These COD gages use a high-temperature capacitive sensor and do not require any cooling. They will operate up to the maximum temperature limit of most environmental chambers used in materials testing. The Model 7641 is ideal for determination of fracture

mechanics parameters such as JIC, KIC, R-curve, fatigue crack growth rate (da/dN), and testing to standards such as E1820, E399, E647, etc. All units can be displaced slightly in compression for ease of installation.

The COD gage is supplied with the revolutionary DT6229 controller. The standard output is 0-10VDC analog signal, factory calibrated with the COD gage. This system provides a number of functional enhancements, including: high speed digital output, built in calibration and tare functions, analog and digital filters, and more.

The 7641 is readily interfaced with most existing test controllers, and may be directly connected to a data acquisition system or chart recorder, or directly to a PC. The 7641 may be used for strain controlled tests such as JIC.

See the electronics section of this catalog for available signal conditioners and strain meters.



Model 4641 COD gage



Model 4641 COD gage with signal conditioner

**Features**

- May be left on through specimen failure.
- Improved performance at high temperature
- Improved noise rejection, resolution, and accuracy
- Improved clearance with most clevis designs
- Improved linearity and reduced stiffness
- Reduced size and weight, and improved high frequency performance
- All standard models are suitable for cyclic testing.
  - >25 Hz is typical for 10mm GL and larger, up to 100 Hz for some configurations
  - Typically limited by the user's test apparatus, software settings, and filter selection
- Digital controller and power supply included. Provides high level DC voltage output with low noise. Easily interfaced to test controllers, data acquisition boards and chart recorders.
- Includes high speed analog and digital outputs
- Intuitive web-based user interface for setup, calibration, and data acquisition
- Built-in calibration reference and auto-zero features
- Multiple extensometer calibration files may be loaded for use with one controller
- Multiple temperature-specific calibrations may be stored
- Selectable analog and digital filter options from 2 Hz to 3 kHz
- Ships fully calibrated with electronics (traceable to NPL (UK)) with user specified voltage output.
- Mechanical over-travel protection
- All standard units meet existing ASTM E399 and E1820 requirements for accuracy.
- Durable stainless steel knife edges
- Includes high quality foam lined case
- Rugged, dual flexure design for strength and improved performance. The next-generation design enables cyclic testing at much higher frequencies.

**SPECIFICATIONS**

- Input:** Includes power supply for your country (specify)
- Analog Output:** User specified, +/-5 VDC or +/-10VDC typical, ±10.8VDC rail
- Digital Output:** 24 bit high speed Ethernet output with built-in web interface
- Linearity:** 11 point linearization, ≤0.1% FS typical linearity
- Resolution:** <55 PPM (0.006%FS) RMS@4 kHz, <6 PPM (0.0006%FS)@100 Hz
- Cyclic Testing:** >25 Hz typical@10mm GL, >10 Hz@5mm GL
- Analog Filter:** Selectable 100 Hz analog and 2Hz-3 kHz digital filters
- Temperature Range:** Ambient to 600 °C (1100 °F) typical<sup>1</sup>
  - Temperature**
- Sensitivity (Gain):** <100 PPM/°C (0.01%FS/°C) typical
  - Temperature**
- Sensitivity (Offset):** 20 PPM/°C (0.002%FS/°C) typical
  - Sensor Cable:** 2.5 ft (.7 m) tri-axial high temperature cable, plus 5 ft (1.5 m) room temperature extension cable
- Operating Force:** 1-5 k g typical, depending on model
- Environment:** Recommended for elevated temperature testing in dry air or some other gases.

**OPTIONS**

- Connectors to interface to nearly any brand test equipment
- Bulkhead adapters for vacuum chambers
- Bolt on knife edges for attachment to test specimens without machined attachment points

**ORDERING INFORMATION**

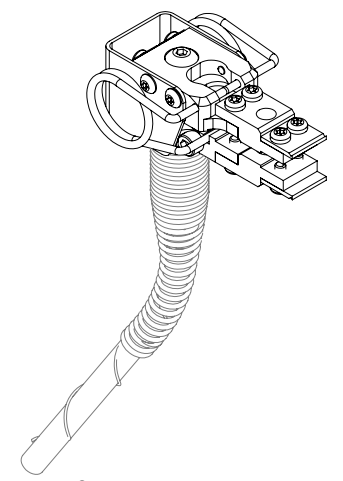
Model 7641 Available Versions: ANY combination of gauge length and measuring listed below is available, except as noted. Other configurations may be available with special order; please contact Epsilon to discuss your requirements.

Gauge Length		Measuring Range	
U.S.A.		U.S.A.	
-0020	0.20"	-010T <sup>2</sup>	+ .10" *
-0025	0.25"	-025T	+ .25" **
-0040	0.40"	-040T	+ .40" **
-0050	0.50"	-050T	+ .50" **
METRIC		METRIC	
-003M <sup>1</sup>	3.0 mm	-025M <sup>2</sup>	+2.5 mm *
-005M	5.0 mm	-040M	+4.0 mm *
-006M	6.0 mm	-060M	+6.0 mm **
-010M	10.0 mm	-080M	+8.0 mm **
-012M	12.0 mm	-100M	+10.0 mm **
		-125M	+12.5 mm **

Model Number 7641- \_\_\_\_\_ - \_\_\_\_\_

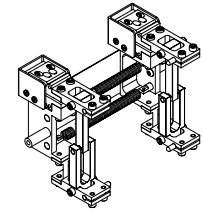
<sup>1</sup> Special order, <5 Hz typical  
<sup>2</sup> Suitable for front-face mounting only  
 \* Tilted cable exit  
 \*\* Vertical cable exit

**Example:** 7641-010M-060M: 10.0 mm gauge length, +6.0 mm measuring range

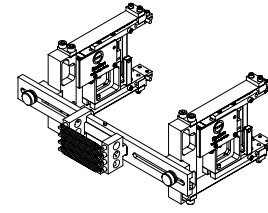


MODEL 7641 EXAMPLE

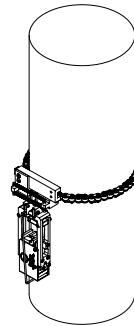
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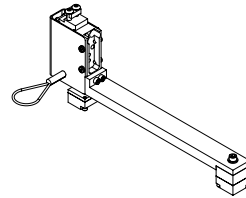
3442RA1 Miniature Averaging Axial Extensometers



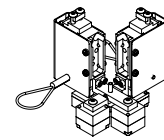
3542RA Averaging Axial Extensometers



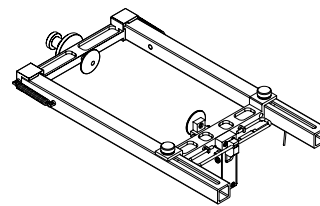
3544 Circumferential Extensometers



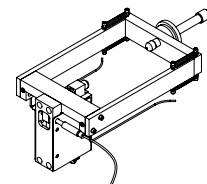
3909 Extensometers for Simple Performance Testing of Asphalt



3910 Extensometers for Creep Compliance and Tensile Strength Testing of Asphalt

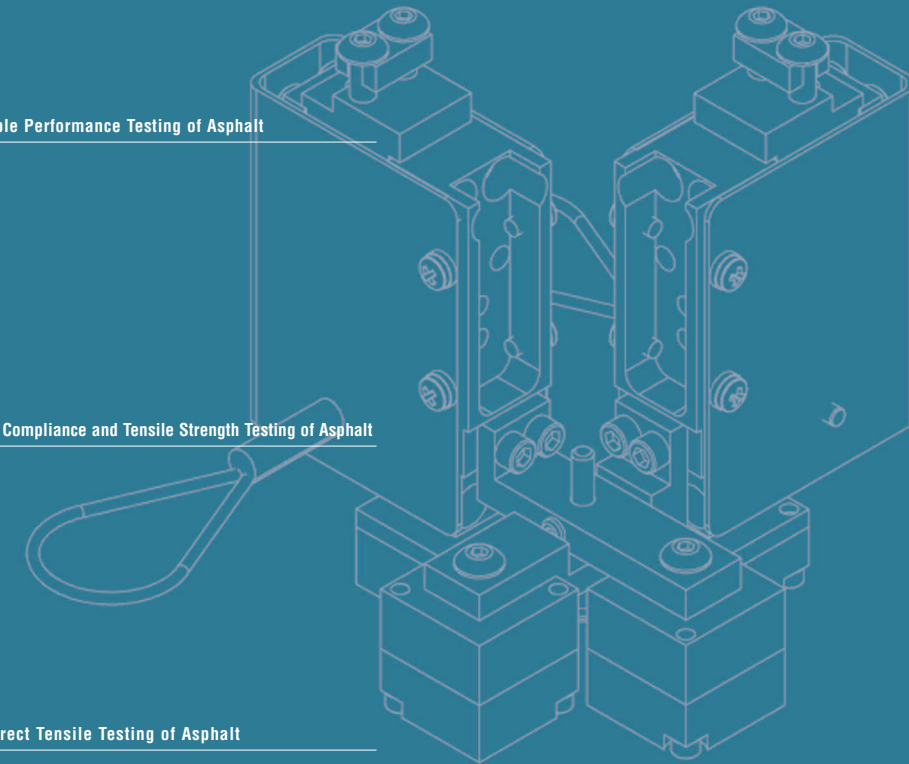


3911 Extensometers for Indirect Tensile Testing of Asphalt

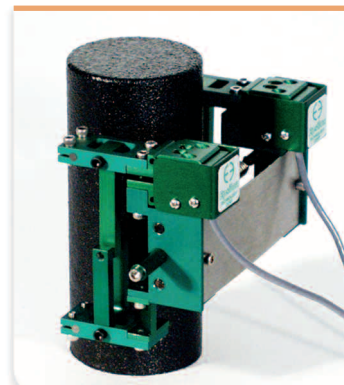


3975 Extensometers for Diametral Rock and Concrete Testing

**Rock, Concrete and  
Asphalt Extensometers**



With gauge lengths of 1 and 2 inches (25 and 50 mm) and measuring ranges of 0.050 and 0.100 inches (1.2 and 2.5 mm), the Model 3442RA1 was designed for applications where tensile or compressive strength tests on small rock, concrete and other small compression samples is desired.



Model 3442RA1-0200-050T-ST with 2 inch gauge length and ±0.050 inch measuring range

Axial strain is measured on opposite sides of the test specimen and the output is an average of the two readings. The Model 3442RA1 is available in a variety of configurations for samples 2 inches (50 mm) or smaller in diameter. All are self-supporting on the specimen and mount very easily. The conical point contacts included with the extensometer are made from tungsten carbide. If desired, the two outputs can be independently configured, providing two readings. Epsilon has versions for use in oil to 20,000 psi at 400 °F (1360 bar at 200 °C). These units will fit in small inside diameter vessels.

For large diameter specimens, we suggest one of the Model 3542RA averaging axial extensometers.

The Model 3442RA1 extensometers are strain gaged devices, making them compatible with any electronics designed for strain gaged transducers. Most often they are connected to a test machine controller. The signal conditioning electronics for the extensometer is typically included with the test machine controller or may often be added. In this case the extensometer is shipped with the proper connector and wiring to plug directly into the electronics. For systems lacking the required electronics, Epsilon can provide a variety of solutions, allowing the extensometer output to be connected to data acquisition boards, chart recorders or other equipment.

See the electronics section of this catalog for available signal conditioners and strain meters.

**Features**

- Full bridge, 350 ohm strain gaged design for compatibility with nearly any test system.
- High accuracy, averaging output or optional dual independent outputs.
- Standard units meet existing ASTM class B-1 requirements for accuracy. A calibration certificate is included. ISO 9513 class 0,5 calibrations are available upon request.
- Rugged, dual flexure design for strength and improved performance.
- Includes high quality foam lined case.
- Easy mounting, attaches with integral springs.
- Self-supporting on the specimen.
- Designed for smaller diameter specimens.

**SPECIFICATIONS**

- Excitation:* 5 to 10 VDC recommended, 12 VDC or VAC max.
- Output:* 2 to 4 mV/V nominal, depending on model
- Linearity:* ≤0.20% of full scale measuring range, depending on model
- Temperature Range:* Standard (-ST) is -40 °C to +100 °C (-40 °F to 210 °F)
- Cable:* Integral, ultra-flexible cable, 8 ft (2.5 m) standard
- Operating Force:* <30 g typical per side

**OPTIONS**

- Dual independent outputs
- Connectors to interface to nearly any brand test equipment
- Shunt calibration module (see page 104)



**ORDERING INFORMATION**

**Model 3442RA Available Versions:** ANY combination of gauge length, measuring range and temperature range listed below is available, except as noted. Test specimen diameter(s) must be specified at the time of order. Other configurations may be available with special order; please contact Epsilon to discuss your requirements.

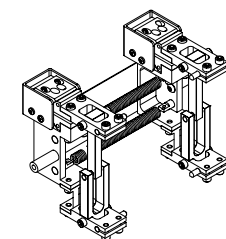
Gauge Length		Measuring Range	
U.S.A.		U.S.A.	
-0100	1.000"	-050T	±0.050"
-0200	2.000"	-100T	±0.100"
METRIC		METRIC	
-025M	25.0 mm	-125M	±1.25 mm
-050M	50.0 mm	-250M	±2.50 mm

Model Number 3442RA1- \_\_\_\_\_ - \_\_\_\_\_ - \_\_\_\_\_

Temperature Range	
-LT	-265 °C to 100 °C (-450 °F to 210 °F)
-ST	-40 °C to 100 °C (-40 °F to 210 °F)
-HT1	-40 °C to 150 °C (-40 °F to 300 °F)
-HT2	-40 °C to 200 °C (-40 °F to 400 °F)
-LHT	-265 °C to 200 °C (-450 °F to 400 °F)

**Example:** 3442RA1-0200-050T-ST: 2.0 inch gauge length, 0.050 inch measuring range, standard temperature option (-40 °F to 210 °F)

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Contact us for your special testing requirements.



2" or 50 mm gauge length  
MODEL 3442RA1 EXAMPLE

Visit our website at [www.epsilontech.com](http://www.epsilontech.com)

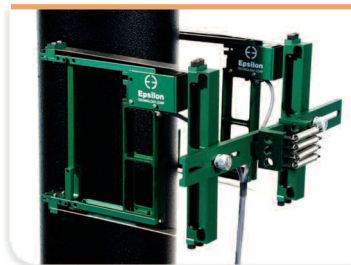
Designed primarily for compressive strength tests on rock, concrete and other large compression samples, this model measures axial strain on opposite sides of the test specimen, and the output is an average of the two readings. Gauge lengths from 1 to 8 inches (25 to 200 mm) and measuring ranges from .050 to .250 inches (1.2 to 6 mm) are available.



Model 3542RA1 extensometer



Model 3542RA1 extensometer with 50MM gauge length



Model 3542RA2 dual averaging rock and concrete extensometer

The Model 3542RA is available in a variety of configurations. All are self-supporting on the specimen and mount very easily. For tests where a single diameter specimen is typically used, the fixed diameter Model 3542RA1 is recommended. For applications where a continuously adjustable diameter extensometer is required, the Model 3542RA2 is available.

The standard configuration for this model allows it to work on samples from 2 inches to 6 inches (50 mm to 150 mm). If desired, the two readings can be independent, providing two outputs. Many rock tests are done in tri-axial pressure vessels. Epsilon has versions for use in oil to 1360 bar at 200 °C (20,000 psi at 400 °F). These will fit in unusually small inside diameter vessels. For small diameter specimens, we suggest the Model 3442RA1 averaging axial extensometer.

All Model 3542RA extensometers are designed so they may be used together with the Model 3544 circumferential or Model 3975 diametral extensometer. Epsilon's rock extensometers can withstand the punishment of daily, high volume testing. Some units have been used for several thousand tests without damage. The conical point contacts included with the extensometer are made from tungsten carbide.

The Model 3542RA extensometers are strain gaged devices, making them compatible with any electronics designed for strain gaged transducers. Most often they are connected to a test machine controller. The signal conditioning electronics for the extensometer is typically included with the test machine controller or may often be added. In this case the extensometer is shipped with the proper connector and wiring to plug directly into the electronics. For systems lacking the required electronics, Epsilon can provide a variety of solutions, allowing the extensometer output to be connected to data acquisition boards, chart recorders or other equipment.

See the electronics section of this catalog for available signal conditioners and strain meters.

**Features**

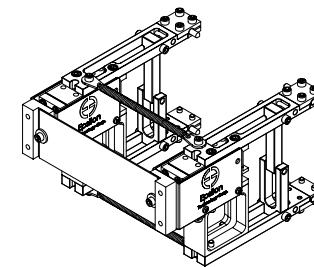
- Full bridge, 350 ohm strain gaged design for compatibility with nearly any test system.
- High accuracy, averaging output or optional dual independent outputs.
- Standard units meet existing ASTM class B-1 requirements for accuracy. A calibration certificate is included. ISO 9513 class 0,5 calibrations are available upon request.
- Rugged, dual flexure design for strength and improved performance.
- Includes high quality foam lined case.
- Easy mounting, attaches with integral springs.
- Self-supporting on the specimen.
- May be used simultaneously with Model 3544 circumferential extensometers or Model 3975 diametral extensometer.
- The 3542RA1 is configured for a single diameter size (customer specified), and the 3542RA2 works on sample diameters from 2 inches to 6 inches (50 mm to 150 mm). Special configurations of the 3542RA2 will allow for smaller diameter sizes.

**SPECIFICATIONS**

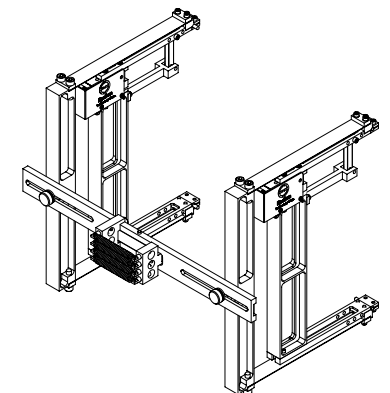
- Excitation:** 5 to 10 VDC recommended, 12 VDC or VAC max.
- Output:** 2 to 4 mV/V nominal, depending on model
- Linearity:** ≤0.20% of full scale measuring range, depending on model
- Temperature Range:** Standard (-ST) is -40 °C to +100 °C (-40 °F to 210 °F)
- Cable:** Integral, ultra-flexible cable, 8 ft (2.5 m) standard
- Specimen Size:** Wide range of specimen sizes available, including AX, BX, NX and larger, to 8 inches (and 200 mm) diameters standard (larger sizes on special order)
- Operating Force:** <30 g typical per side

**OPTIONS**

- Fixed or variable diameter configurations
- Dual, independent outputs
- Connectors to interface to nearly any brand test equipment
- Shunt calibration module (see page 104)



2" or 50 mm gauge length  
MODEL 3542RA1 EXAMPLE



6" gauge length, to fit samples from 2" to 6" in diameter  
MODEL 3542RA2 EXAMPLE

**ORDERING INFORMATION**

**Model 3542RA Available Versions:** ANY combination of gauge length, measuring range and temperature range listed below is available, except as noted. Test specimen diameter(s) must be specified at the time of order. Other configurations may be available with special order; please contact Epsilon to discuss your requirements.

Gauge Length		Measuring Range	
U.S.A.			
-0100	1.000"	-050T	±0.050"
-0200	2.000"	-100T	±0.100"
-0300	3.000"	-250T	±0.250"
-0400	4.000"	METRIC	
-0500	5.000"	-120M	±1.2 mm
-0600	6.000"	-250M	±2.5 mm
-0800	8.000"	-600M	±6.0 mm
METRIC			
-025M	25.0 mm		
-050M	50.0 mm		
-080M	80.0 mm		
-100M	100.0 mm		
-150M	150.0 mm		
-200M	200.0 mm		

Model Number 3542RA - - - - -

Diameter Type <sup>1</sup>	
1	Fixed
2	Adjustable

Temperature Range	
-LT	-265 °C to 100 °C (-450 °F to 210 °F)
-ST	-40 °C to 100 °C (-40 °F to 210 °F)
-HT1	-40 °C to 150 °C (-40 °F to 300 °F)
-HT2	-40 °C to 200 °C (-40 °F to 400 °F)
-LHT	-265 °C to 200 °C (-450 °F to 400 °F)

<sup>1</sup> Additional diameter configurations are available with special order.

**Example:** 3542RA1-100M-600M-ST: Fixed size, 100 mm gauge length, 6.0 mm measuring range, standard temperature option (-40 °C to 100 °C)

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Designed for concrete and rock compression testing or for compression tests on other large samples. This model may be used simultaneously with the Model 3542RA axial extensometers.



Model 3544 in a horizontal body style

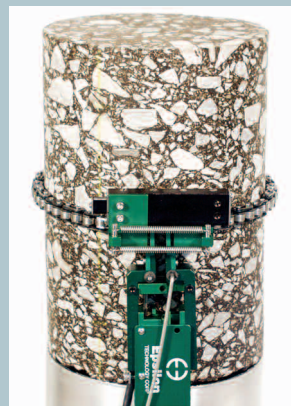
Circumferential extensometers measure the change in circumference as the sample is compressed. This is considered by many researchers to be a more accurate way to determine diametral strain, since the measurement is taken over the entire material inside the circumference.

A high precision, custom roller chain with special rollers mounts the extensometer to the specimen. As the specimen diameter enlarges during the test, the chain causes the extensometer to expand. The unit is self-supported on the sample with integral springs. Links are easily added or removed to adjust for different size specimens. A mechanical adjustment allows the output to be set to zero. A breakaway device protects the extensometer in the event of specimen rupture. Often rock specimens are tested in tri-axial pressure cells. Versions of the Model 3544 are available to fit inside the vessel and operate in oil environments at up to 1360 bar at 200 °C (20,000 psi at 400 °F). These units were designed to fit inside small inner diameter vessels.

The Model 3544 is the best choice for large diametral strains in large compression samples. Epsilon's diametral rock and concrete extensometer, the Model 3975, is recommended for small strain measurements such as Poisson's ratio.

The Model 3544 extensometers are strain gaged devices, making them compatible with any electronics designed for strain gaged transducers. Most often they are connected to a test machine controller. The signal conditioning electronics for the extensometer is typically included with the test machine controller or may often be added. In this case the extensometer is shipped with the proper connector and wiring to plug directly into the electronics. For systems lacking the required electronics, Epsilon can provide a variety of solutions, allowing the extensometer output to be connected to data acquisition boards, chart recorders or other equipment.

See the electronics section of this catalog for available signal conditioners and strain meters.



Model 3544-0400 with 1.25 inch to 4 inch diameter range

**Features**

- Full bridge, 350 ohm strain gaged design for compatibility with nearly any test system.
- Adapts to a wide range of specimen sizes by adding or removing chain links.
- Rugged, dual flexure design for strength and improved performance.
- Includes high quality foam lined case.
- Self-supporting on the specimen.
- May be used simultaneously with Model 3542RA axial extensometers.
- Versions available for use in tri-axial confining pressure cells, at high pressures and temperatures.

**SPECIFICATIONS**

Excitation: 5 to 10 VDC recommended, 12 VDC or VAC max.

Output: 2 to 4 mV/V nominal, depending on model

Linearity: 0.25% to 0.30% of full scale measuring range, depending on model

Temperature Range: Standard (-ST) is -40 °C to +100 °C (-40 °F to 210 °F)

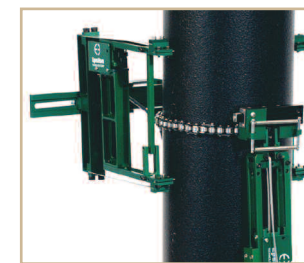
Cable: Integral, ultra-flexible cable, 8 ft (2.5 m) standard

**OPTIONS**

Horizontal, vertical or user convertible orientations

Connectors to interface to nearly any brand of test equipment

Shunt calibration module (see page 104)



**Model 3544**  
Used with Model 3542RA dual averaging extensometer.

**ORDERING INFORMATION**

**Model 3544 Available Versions:** Any combination of diameter range, measuring range and temperature range is available, except as noted. Other configurations may be available with special order; please contact Epsilon to discuss your requirements.

Diameter Range	
U.S.A.	
-0400	2.00" to 4.00"
-0600	2.00" to 6.00"
-0800	2.00" to 8.00"
METRIC	
-100M	50 mm to 100 mm
-150M	50 mm to 150 mm
-200M	50 mm to 200 mm

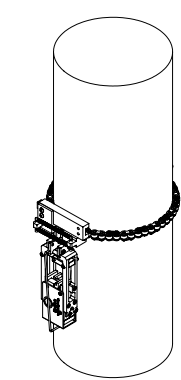
Circumferential Measuring Range	
U.S.A.	
-080T	+0.080"
-125T	+0.125"
-250T	+0.250"
-500T	+0.500"
METRIC	
-020M	+2.0 mm
-030M	+3.0 mm
-060M	+6.0 mm
-120M	+12.0 mm

Model Number 3544- \_\_\_\_\_ - \_\_\_\_\_ - \_\_\_\_\_

Temperature Range	
-LT	-265 °C to 100 °C (-450 °F to 210 °F)
-ST	-40 °C to 100 °C (-40 °F to 210 °F)
-HT1	-40 °C to 150 °C (-40 °F to 300 °F)
-HT2	-40 °C to 200 °C (-40 °F to 400 °F)
-LHT	-265 °C to 200 °C (-450 °F to 400 °F)

**Example:** 3544-200M-120M-ST: 50 mm to 200 mm diameter range, +12 mm measuring range, standard temperature option (-40 °C to 100 °C)

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MODEL 3544 EXAMPLE

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Designed for measuring axial displacements in the simple performance tests prescribed by NCHRP Report 465, and determining dynamic modulus of hot mix asphalt per AASHTO TP062.



Model 3909-0400 with 4 inch gauge length

These extensometers are typically mounted as two axial modules with independent outputs capable of measuring specimen deformations in two locations, but they can be mounted as a single unit or up to four on a sample. They quickly clip onto gage points mounted per the test requirements.

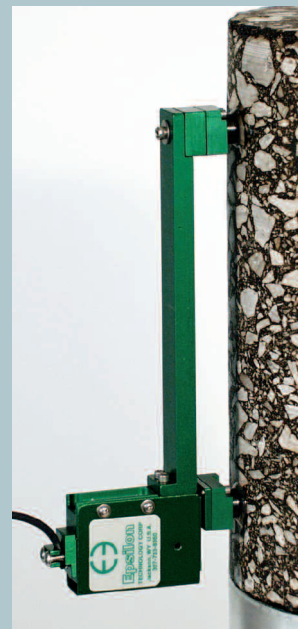
Magnets at each end of the extensometer snap instantly in place on the steel gage points glued to the test sample.

The quick attachment is most advantageous when testing preconditioned samples that are heated or cooled, since the extensometers can be mounted before the sample changes temperature appreciably. For units intended to be used inside triaxial cells, extensometers are available with modules rotated 90°.

The standard Model 3909 has full scale measuring range of 0.020 inches (0.5 mm). Gage points are included with the extensometers and optional gluing fixtures are available. Two standard 3909 units can be converted to the Model 3910 with the purchase of optional gauge length adapters.

The Model 3909 extensometers are strain gaged devices, making them compatible with any electronics designed for strain gaged transducers. Most often they are connected to a test machine controller. The signal conditioning electronics for the extensometer is typically included with the test machine controller or may often be added. In this case the extensometer is shipped with the proper connector and wiring to plug directly into the electronics. For systems lacking the required electronics, Epsilon can provide a variety of solutions, allowing the extensometer output to be connected to data acquisition boards, chart recorders or other equipment.

See the electronics section of this catalog for available signal conditioners and strain meters.



Model 3909-0400 with 4 inch gauge length



Model 3909 gluing fixture for 180° spacing

**Features**

- Model 3909 for simple performance testing per NCHRP Report 465, and determining dynamic modulus of hot mix asphalt per AASHTO TP062.
- Full bridge, 350 ohm strain gaged design for compatibility with nearly any test system.
- All standard units have linearity readings of 0.20% or better.
- Includes high quality foam lined case.
- Rugged, dual flexure design for improved performance.
- Easy mounting, attaches with magnets, which allows dynamic testing to 40 Hz.

**SPECIFICATIONS**

- Excitation:* 5 to 10 VDC recommended, 12 VDC or VAC max.
- Output:* 2 to 4 mV/V nominal, depending on model
- Linearity:* ≤0.20% of full scale measuring range, depending on model
- Temperature Range:* Standard is -40 °C to +100 °C (-40 °F to +210 °F)
- Cable:* Integral, flexible Teflon® cable, 8 ft. (2.5 m) standard
- Operating Force:* <30 g typical

**OPTIONS**

- Gauge length adapters
- Gluing fixture for gage points
- Connectors to interface to nearly any brand test equipment
- Shunt calibration module (see page 104)



**ORDERING INFORMATION**

**Model 3909 Available Versions:** Available in intermediate and larger gauge lengths on special order. Other configurations may be available with special order; please contact Epsilon to discuss your requirements.

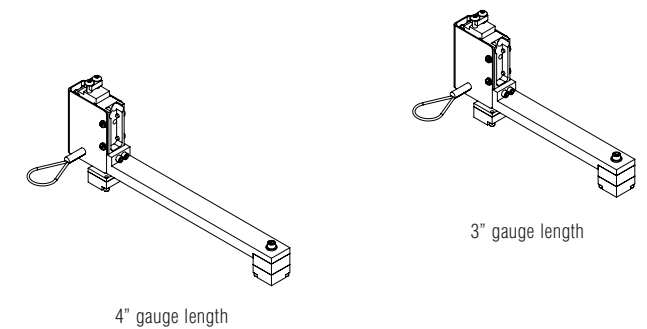
Gauge Length	
U.S.A.	
-0275 <sup>1</sup>	2.75"
-0300	3.00"
-0400	4.00"
METRIC	
-070M <sup>1</sup>	70mm
-076M	76mm
-100M	100mm

Model Number 3909- \_\_\_\_\_

<sup>1</sup> Special order.

**Example:** 3909-0300: 3.000 inch (76 mm) gauge length with a full scale measuring range of 0.020 inches (0.5 mm)

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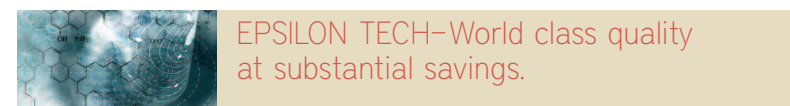


4" gauge length

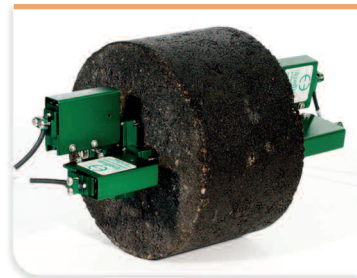
3" gauge length

MODEL 3909 EXAMPLES

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Designed to meet many of the needs for testing asphalt core samples in 4 and 6 inch diameters. The unit meets test method requirements for strain measurement developed under the U.S. Federal Highways SHRP program.



Model 3910-0100 with 1 inch gauge length

These extensometers are for creep compliance, tensile strength testing and dynamic resilient modulus testing. They are single integral, bi-axial units which measure both lateral and vertical deformations. They quickly clip onto gage points mounted per the test requirements. They mount much faster and easier than other types.

Two units are typically required, with one extensometer mounting to each side of the test specimen. They are changeable from the 1 inch centers used for 4 inch diameter specimens, to the 1.5 inch centers used for 6 inch diameter samples using optional gauge length adapters. Magnets at each end of the extensometer snap instantly in place on the steel gage points glued to the test sample. The quick attachment is most advantageous when testing pre-conditioned samples that are heated or cooled, since the extensometers can be mounted before the sample changes temperature appreciably.

The standard Model 3910 has full scale measuring range of 0.020 inches (0.5 mm). Gage points are included with the extensometers and optional gluing templates are available. This model can be converted to the Model 3909 with optional gauge length adapters.

The Model 3910 extensometers are strain gaged devices, making them compatible with any electronics designed for strain gaged transducers. Most often they are connected to a test machine controller. The signal conditioning electronics for the extensometer is typically included with the test machine controller or may often be added. In this case the extensometer is shipped with the proper connector and wiring to plug directly into the electronics. For systems lacking the required electronics, Epsilon can provide a variety of solutions, allowing the extensometer output to be connected to data acquisition boards, chart recorders or other equipment.

See the electronics section of this catalog for available signal conditioners and strain meters.



Model 3910 gluing template

**Features**

- Model 3910 for creep compliance, resilient modulus, and tensile strength for testing per AASHTO T322.
- Full bridge, 350 ohm strain gaged design for compatibility with nearly any test system.
- All standard units have linearity readings of 0.20% or better.
- Includes high quality foam lined case.
- Rugged, dual flexure design for improved performance.
- Easy mounting, attaches with magnets, which allows dynamic testing to 40 Hz.

**SPECIFICATIONS**

- Excitation:* 5 to 10 VDC recommended, 12 VDC or VAC max.
- Output:* 2 to 4 mV/V nominal, depending on model
- Linearity:* ≤0.20% of full scale measuring range, depending on model
- Temperature Range:* Standard is -40 °C to +100 °C (-40 °F to +210 °F)
- Cable:* Integral, flexible Teflon® cable, 8 ft. (2.5 m) standard
- Operating Force:* <30 g typical

**OPTIONS**

- Gauge length adapters
- Gluing template for gage points
- Connectors to interface to nearly any brand test equipment
- Shunt calibration module (see page 104)



**ORDERING INFORMATION**

**Model 3910 Available Versions:** Available in intermediate and larger gauge lengths on special order. Other configurations may be available with special order; please contact Epsilon to discuss your requirements.

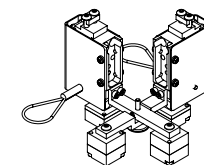
Gauge Length	
U.S.A.	
-0100	1.000"
-0150	1.500"
-0200 <sup>1</sup>	2.000"
-0300 <sup>1</sup>	3.000"
-0400 <sup>1</sup>	4.000"
METRIC	
-025M	25mm
-038M	38mm
-050M <sup>1</sup>	50mm
-076M <sup>1</sup>	76mm
-100M <sup>1</sup>	100mm

Model Number 3910- \_\_\_\_\_

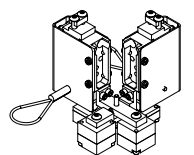
<sup>1</sup> Special order only.

**Example:** 3910-0100: 1.000 inch (25.4 mm) gauge length with a full scale measuring range of 0.020 inches (0.5 mm)

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1.5" gauge length



1" gauge length

MODEL 3910 EXAMPLES

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Designed to meet many of the needs for testing asphalt core samples in 4 and 6 inch diameters. It meets test method requirements for strain measurement developed under the U.S. Federal Highways SHRP program.



Model 3911 extensometer

For indirect tensile testing, such as for resilient modulus, these extensometers measure the lateral deformation of specimens. They are self-supporting on the sample and clip on in seconds. The traditional way this deformation has been measured was prone to errors caused by slight

rocking of the sample as it is loaded. The self-supporting design of the Model 3911 eliminates this problem. This unit will handle the dynamic pulse requirements of resilient modulus testing.

The speed of mounting makes test set-up much faster than with the older method. The pivot mounting used ensures that the specimen contact pads meet the often uneven asphalt surface as well as possible. The measuring range options available allow a wide range of testing, yet can easily measure the sometimes very small displacements required.

The Model 3911 extensometers are strain gaged devices, making them compatible with any electronics designed for strain gaged transducers. Most often they are connected to a test machine controller. The signal conditioning electronics for the extensometer is typically included with the test machine controller or may often be added. In this case the extensometer is shipped with the proper connector and wiring to plug directly into the electronics. For systems lacking the required electronics, Epsilon can provide a variety of solutions, allowing the extensometer output to be connected to data acquisition boards, chart recorders or other equipment.

See the electronics section of this catalog for available signal conditioners and strain meters.

**Features**

- Model 3911 indirect tensile extensometer for asphalt, for testing per AASHTO TP31 and ASTM D4123.
- Full bridge, 350 ohm strain gaged design for compatibility with nearly any test system.
- All standard units have linearity readings of 0.20% or better.
- Includes high quality foam lined case.
- Rugged, dual flexure design for improved performance.
- Easy mounting with built-in breakaway feature should specimen fracture.

**SPECIFICATIONS**

- Excitation:* 5 to 10 VDC recommended, 12 VDC or VAC max.
- Output:* 2 to 4 mV/V nominal, depending on the model
- Linearity:* ≤0.20% of full scale measuring range, depending on model
- Temperature Range:* Standard is -40 °C to +100 °C (-40 °F to +210 °F)
- Cable:* Integral, ultra-flexible cable, 8 ft (2.5 m) standard
- Specimen Size:* Adjustable to fit both 4 inch and 6 inch diameter specimens (100 mm and 150 mm)

**OPTIONS**

- Connectors to interface to nearly any brand test equipment
- Shunt calibration module (see page 104)



**ORDERING INFORMATION**

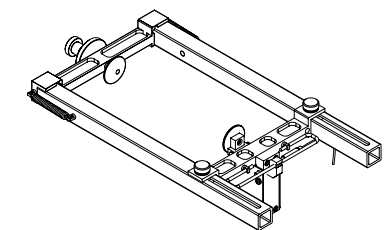
Model 3911 Available Versions: Consult factory for additional ranges.

Measuring Range	
U.S.A.	
-0003	+0.030"
-0006	+0.060"
-0008	+0.080"
METRIC	
-076M	+0.76mm
-150M	+1.50mm
-200M	+2.00mm

Model Number 3911- \_\_\_\_\_

Example: 3911-0006: +0.060 inches (1.50 mm) measuring range

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MODEL 3911 EXAMPLE

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Designed for accurate measurement of small diametral strains such as those required to determine Poisson's ratio of rock, concrete and asphalt samples. The units are designed to be used in conjunction with the Model 3542RA axial averaging extensometer.



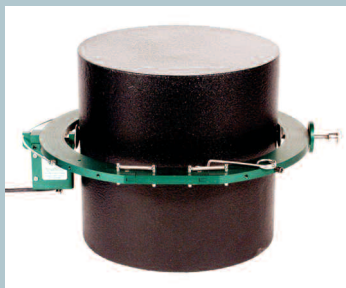
Model 3975 extensometer

Self-supporting on the test sample, these extensometers will work on standard sized diameter samples, but special configurations are available upon request. They are designed for use in testing for Poisson's ratio and for applications where accurate diametral measurements with low strains are required.

The Model 3975 is the best choice for small diametral strains in large compression samples. Epsilon's circumferential extensometer, the Model 3544, is recommended for large strain measurements. These units are easily attached to the sample, and rounded contact edges maintain the position on the specimen.

The Model 3975 extensometers are strain gaged devices, making them compatible with any electronics designed for strain gaged transducers. Most often they are connected to a test machine controller. The signal conditioning electronics for the extensometer is typically included with the test machine controller or may often be added. In this case the extensometer is shipped with the proper connector and wiring to plug directly into the electronics. For systems lacking the required electronics, Epsilon can provide a variety of solutions, allowing the extensometer output to be connected to data acquisition boards, chart recorders or other equipment.

See the electronics section of this catalog for available signal conditioners and strain meters.



Model 3975 extensometer



Model 3975 extensometer

**Features**

- Full bridge, 350 ohm strain gaged design for compatibility with nearly any test system.
- All standard units have linearity readings of 0.20% or better.
- Includes high quality foam lined case.
- Rugged, dual flexure design for improved performance.
- Easy mounting, attaches with integral springs.
- Self-supporting on the specimen.

**SPECIFICATIONS**

Excitation: 5 to 10 VDC recommended, 12 VDC or VAC max.

Output: 2 to 4 mV/V nominal, depending on model

Linearity: ≤0.20% of full scale measuring range, depending on model

Temperature Range: Standard (-ST) is -40 °C to +100 °C (-40 °F to +210 °F)

Cable: Integral, ultra-flexible cable, 8 ft (2.5 m) standard

**OPTIONS**

Connectors to interface to nearly any brand test equipment

Shunt calibration module (see page 104)



**ORDERING INFORMATION**

Model 3975 Available Versions: Consult factory for additional ranges. Other configurations may be available with special order; please contact Epsilon to discuss your requirements.

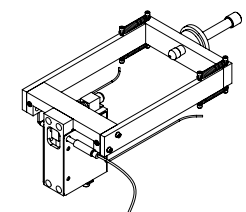
Measuring Range	
U.S.A.	
-0003	+0.030"
-0006	+0.060"
-0008	+0.080"
METRIC	
-076M	+0.76mm
-150M	+1.50mm
-200M	+2.00mm

Model Number 3975- \_\_\_\_\_ - \_\_\_\_\_

Temperature Range	
-LT	-265 °C to 100 °C (-450 °F to 210 °F)
-ST	-40 °C to 100 °C (-40 °F to 210 °F)
-HT1	-40 °C to 150 °C (-40 °F to 300 °F)
-HT2	-40 °C to 200 °C (-40 °F to 400 °F)
-LHT	-265 °C to 200 °C (-450 °F to 400 °F)

Example: 3975-0008-ST: +0.080 inches (2.00 mm) measuring range

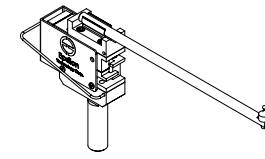
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MODEL 3975 EXAMPLE

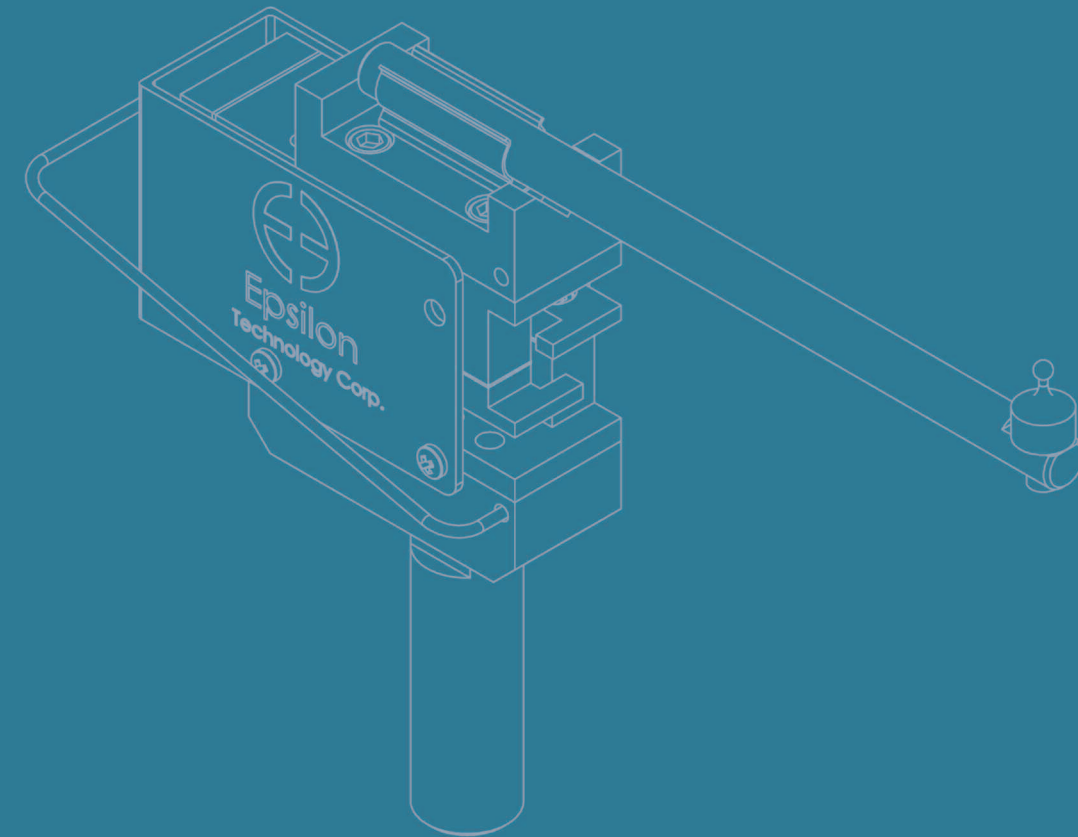
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3540 Deflection Gages (Deflectometers)

## Deflection Gages



Widely used for measuring deformations in three and four point bend tests, compression tests and a variety of general purpose deformations. These strain gaged devices come with a magnetic base for easy mounting.



Model 3540 with 0.05 inch measuring range

Deflection is measured with a single arm with an attached spherical contact tip, similar to those on a dial indicator. The full bridge strain gaged construction provides an electrical output compatible with any electronics designed for a strain gaged transducer.

The magnetic base furnished with the gage can be mounted to the desired reference surface, whether flat or round. The tip can then be positioned to measure the deformation encountered during the test. The magnetic base can only be used for low and standard temperature testing. Elevated temperature testing requires additional support considerations.

All models feature a spring loaded arm that can break free in the event of excessive displacement, protecting the gage from damage. The upper arm exerts a small spring force against the specimen, which is sufficient to allow dynamic cyclic testing if desired, yet light enough in force to avoid influence on the test.

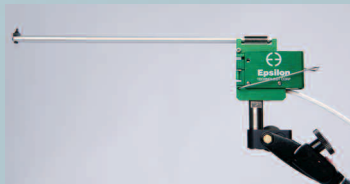
These units come standard with the arm set to measure downward deflections when oriented in the upright position. They can be used upside down or in any orientation. They may also be configured with the extensometer arm spring loaded downward. Specify this if desired. Note that the measuring ranges listed are total displacement.

The Model 3540 extensometers are strain gaged devices, making them compatible with any electronics designed for strain gaged transducers. Most often they are connected to a test machine controller. The signal conditioning electronics for the extensometer is typically included with the test machine controller or may often be added. In this case the extensometer is shipped with the proper connector and wiring to plug directly into the electronics. For systems lacking the required electronics, Epsilon can provide a variety of solutions, allowing the extensometer output to be connected to data acquisition boards, chart recorders or other equipment.

See the electronics section of this catalog for available signal conditioners and strain meters.



Model 3540 deflectometer



Model 3540 with 1 inch measuring range

**Features**

- Full bridge, 350 ohm strain gaged design for compatibility with nearly any test system.
- All standard units have linearity readings of 0.25% or better.
- Rugged, dual flexure design for improved performance.
- Includes high quality foam lined case.
- Comes with an adjustable magnetic base for easy mounting.
- General purpose deflection sensor covers many test requirements.
- Spring loaded arm detaches to prevent damage from overtravel.

**SPECIFICATIONS**

- Excitation: 5 to 10 VDC recommended, 12 VDC or VAC max.
- Output: 2 to 4 mV/V, nominal, depending on model
- Linearity: 0.15% to 0.25% of full measuring range, depending on model
- Temperature Range: Standard (-ST) is -40 °C to +100 °C (-40 °F to 210 °F)
- Cable: Integral ultra-flexible cable, 8 ft. (2.5 m) standard
- Operating Force: 50 g typical

**OPTIONS**

- Connectors to interface to nearly any brand test equipment
- Arm orientation
- Shunt calibration module (see page 104)



**ORDERING INFORMATION**

Model 3540 Available Versions: ANY combination of measuring range and temperature range listed below is available. Other configurations may be available with special order; please contact Epsilon to discuss your requirements.

Measuring Range	
U.S.A.	
-005T	0.050"
-015T	0.150"
-025T	0.250"
-050T	0.500"
-100T	1.000"
-200T	2.000"
METRIC	
-001M	1.0 mm
-004M	4.0 mm
-006M	6.0 mm
-012M	12.0 mm
-025M	25.0 mm
-050M	50.0 mm

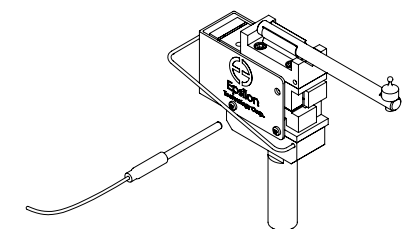
Model Number 3540 - \_\_\_\_\_ - \_\_\_\_\_

Temperature Range	
-LT	-265 °C to 100 °C (-450 °F to 210 °F)
-ST	-40 °C to 100 °C (-40 °F to 210 °F)
-HT1	-40 °C to 150 °C (-40 °F to 300 °F) <sup>1</sup>
-HT2	-40 °C to 200 °C (-40 °F to 400 °F) <sup>1</sup>
-LHT	-265 °C to 200 °C (-450 °F to 400 °F) <sup>1</sup>

<sup>1</sup> Magnetic base not suitable for high temperature use; 50 °C (125 °F) max.

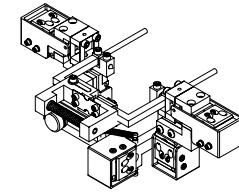
Example: 3540-012M-ST: 12.0 mm measuring range, standard temperature option (-40 °C to 100 °C)

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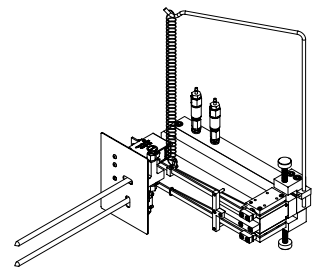


Without magnetic base  
MODEL 3540 EXAMPLE

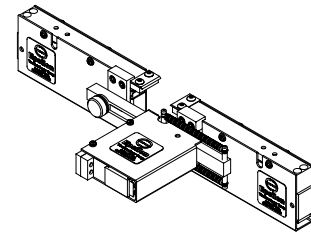
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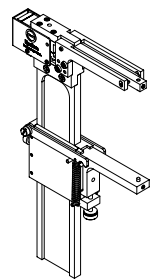
3550 Axial/Torsional Extensometers



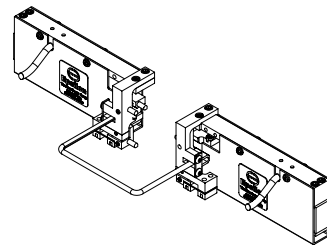
3550HT High Temperature Axial/Torsional Extensometers (1200 °C or 1600 °C)



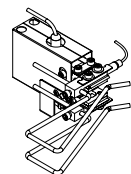
3560 Bi-Axial and Axial Averaging Extensometers



3565 Bolt Extensometers for Proof Load Testing

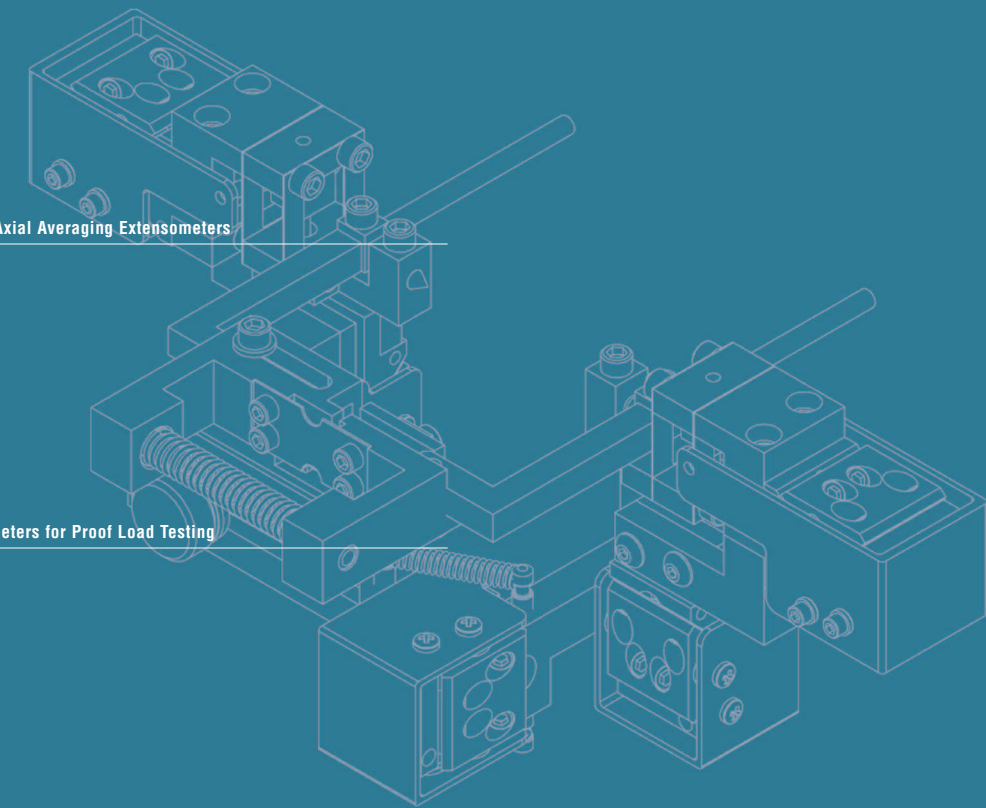


4013 Averaging Extensometers for ASTM D5656 Shear Tests

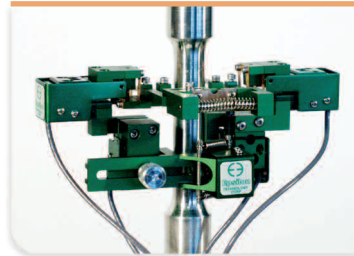


4030 Submersible Extensometers

**Specialty  
Extensometers**



**Designed for simultaneously measuring axial and torsional deflections on specimens tested in axial/torsional machines.**



Model 3550 axial/torsional extensometer features 1 inch gauge length with ±10% axial strain and ±2.5° torsional shear strain angle (note this corresponds to a 10° angle of twist on a 0.5 inch diameter specimen)

The Model 3550 extensometer is most often used on round specimens tested in bi-axial test machines capable of simultaneous axial and torsional loading. The extensometer is often customized for particular applications. All units are capable of bi-directional displacement, so they may be used for cyclic testing under fully reversed loading conditions. The standard sized model is self-supporting on the specimen, and works on specimens from 0.375 to 1.000 inches (9.5 to 25.4 mm). The conical point contacts included with

the extensometer are made from tungsten carbide. Their unique design directly measures the surface shear strain angle, which allows operation on a wide range of specimen diameters without changing calibration.

All models are designed specifically to minimize crosstalk between axes and to provide high accuracy measurements. All feature the dual flexure design common to other Epsilon extensometers.

Available options cover temperature ranges from -265 °C to 200 °C (the standard temperature range is -40 °C to 100 °C). Both inch and metric versions are available. A wide range of gauge length and measuring ranges are available. Because these transducers are often used for specialized tests, contact Epsilon with your specific test needs.

The Model 3550 extensometers are strain gaged devices, making them compatible with any electronics designed for strain gaged transducers. Most often they are connected to a test machine controller. The signal conditioning electronics for the extensometer is typically included with the test machine controller or may often be added. In this case the extensometer is shipped with the proper connector and wiring to plug directly into the electronics. For systems lacking the required electronics, Epsilon can provide a variety of solutions, allowing the extensometer output to be connected to data acquisition boards, chart recorders or other equipment.

See the electronics section of this catalog for available signal conditioners and strain meters.

**Features**

- Full bridge, 350 ohm strain gaged design for compatibility with nearly any test system.
- Standard units meet existing ASTM class B-1 requirements for accuracy in axial measuring range. A calibration certificate is included. ISO 9513 class 0,5 calibrations are available upon request. All standard units have linearity readings of 0.20% or better in torsion.
- Rugged, dual flexure design for strength and improved performance. Much stronger than single flexure designs, this also allows cyclic testing at higher frequencies.
- Includes high quality foam lined case.
- Self-supporting on the specimen.

**SPECIFICATIONS**

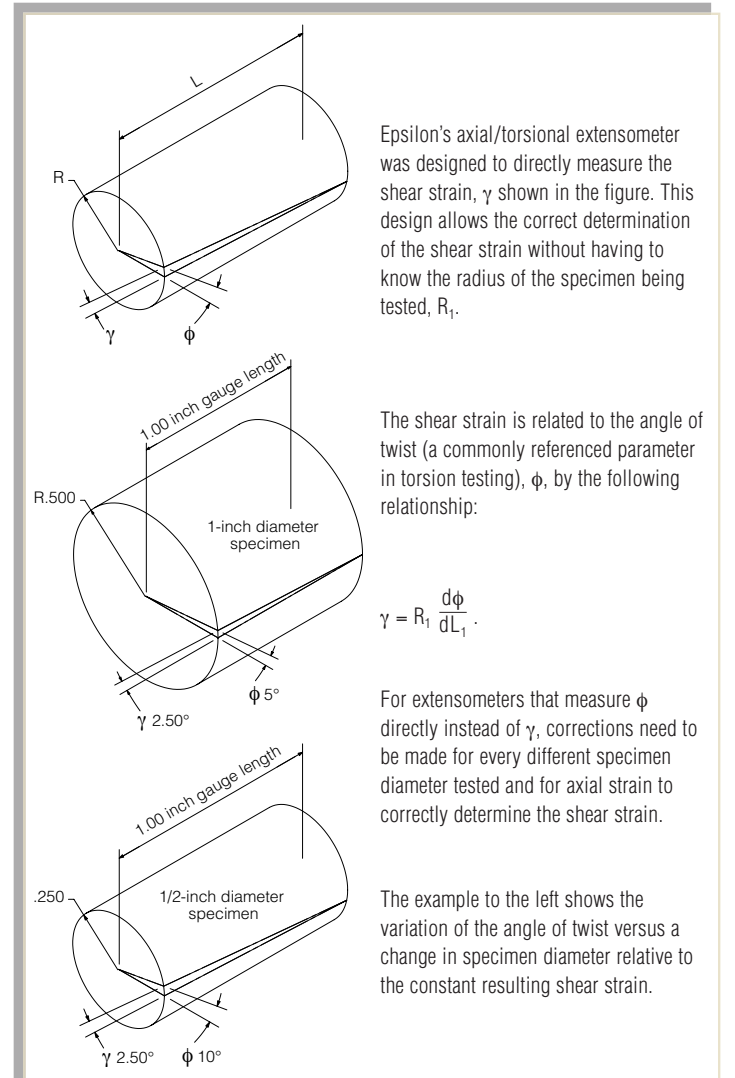
- Excitation:** 5 to 10 VDC recommended, 12 VDC or VAC max.
- Output:** 2 to 4 mV/V, nominal, depending on model
- Linearity:** ≤0.15% of full scale measuring range, depending on model
- Temperature Range:** Standard (-ST) is -40 °C to +100 °C (-40 °F to 210 °F)
- Cable:** Integral, ultra-flexible cable, 8 ft. (2.5 m) standard
- Operating Force:** <30 g typical
- Crosstalk:** Less than 0.5%

**OPTIONS**

- Connectors to interface to nearly any brand test equipment
- Model 3590AT axial/torsional calibrator (see page 103)
- Shunt calibration module (see page 104)

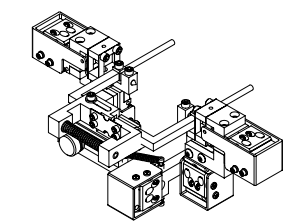


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Model Number	Axial Gauge Length	Axial Strain	Torsional Shear Strain Angle
3550-0100-010-002-ST	1 inch	±10%	±2°
3550-025M-005-002-ST	25 mm	±5%	±2°
3550-025M-005-003-ST	25 mm	±5%	±3°
3550-025M-010-002-ST	25 mm	±10%	±2°

-ST temperature range is -40 °C to 100 °C (-40 °F to 210 °F), but -HT1, -HT2, -LT, and -LHT options are also available. This unit is built to order, contact Epsilon for a unit specific to your testing requirements.



MODEL 3550 EXAMPLE

Visit our website at [www.epsilontech.com](http://www.epsilontech.com)



**Designed for simultaneously measuring axial and torsional deflections on specimens tested in axial/torsional machines. The 3550HT axial/torsional extensometers are available in versions rated to 1200 °C (2200 °F) or 1600 °C (2900 °F). These are externally supported and use a special bracket for load frame mounting.**



Model 3550HT extensometer with calibration stand

The high temperature 3550HT is for use in materials testing furnaces and with induction heating. The units are provided with high purity alumina rods (to 1200 °C) for specimen contact. Silicon carbide rods are used to 1600 °C.

This model extensometer is most often used on round specimens tested in bi-axial test machines capable of simultaneous axial and torsional loading. The extensometer is often customized for particular applications. All units are capable of bi-directional displacement, so they may be used for cyclic testing under fully reversed loading conditions.

All models are designed specifically to minimize crosstalk between axes and to provide high accuracy measurements. All feature the strong, dual flexure design common to other Epsilon extensometers.

Because these transducers are so often used for specialized tests, contact Epsilon with your specific test needs. We can then recommend the ideal configuration for your test requirements.

The Model 3550HT extensometers are strain gaged devices, making them compatible with any electronics designed for strain gaged transducers. Most often they are connected to a test machine controller. The signal conditioning electronics for the extensometer is typically included with the test machine controller or may often be added. In this case the extensometer is shipped with the proper connector and wiring to plug directly into the electronics. For systems lacking the required electronics, Epsilon can provide a variety of solutions, allowing the extensometer output to be connected to data acquisition boards, chart recorders or other equipment.

See the electronics section of this catalog for available signal conditioners and strain meters.

**Features**

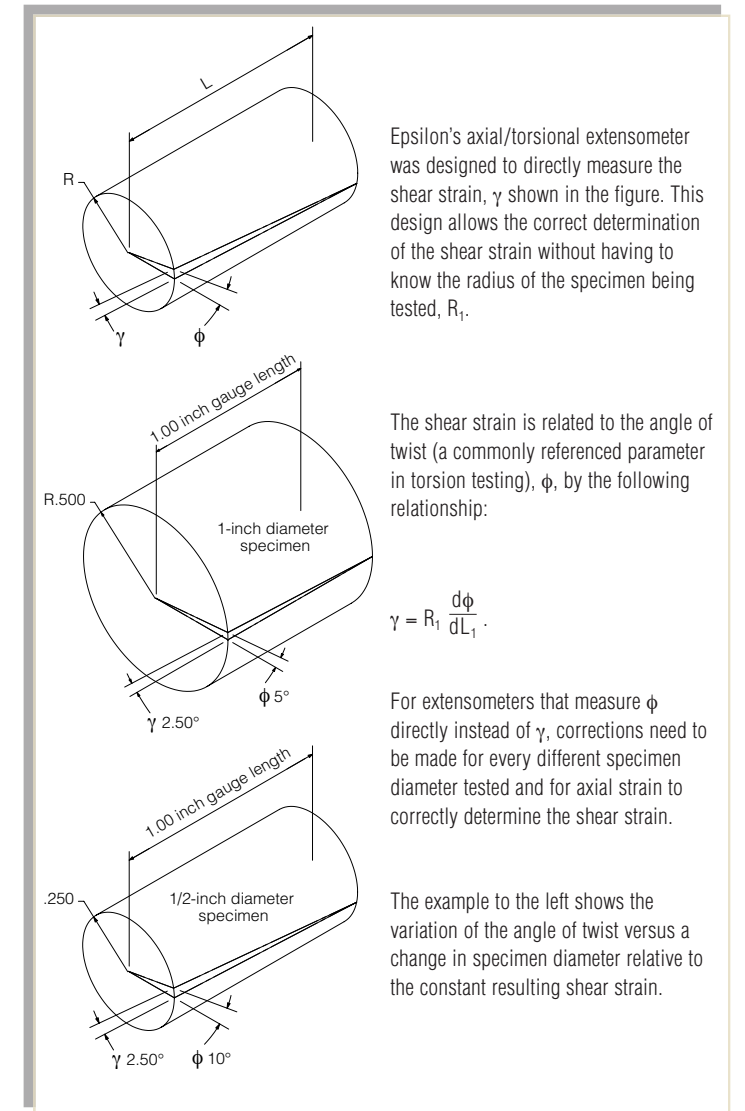
- Full bridge, 350 ohm strain gaged design for compatibility with nearly any test system.
- Standard units meet existing ASTM class B-1 requirements for accuracy in axial measuring range. A calibration certificate is included. ISO 9513 class 0,5 calibrations are available upon request. All standard units have linearity readings of 0.20% or better in torsion.
- All units come with either high purity alumina ceramic rods (1200 °C) or alpha grade silicon carbide rods (1600 °C).
- Rugged, dual flexure design for improved performance.
- Includes high quality foam lined case and a spare set of ceramic rods.

**SPECIFICATIONS**

- Excitation:** 5 to 10 VDC recommended, 12 VDC or VAC max.
- Output:** 2 to 4 mV/V, nominal, depending on model
- Linearity:** ≤0.15% of full scale measuring range, depending on model
- Temperature Range:** Standard (-ST) is to 1200 °C (2200 °F), optional (-HT) 1600 °C (2900 °F)
- Cable:** Integral, ultra-flexible cable, 8 ft. (2.5 m) standard
- Operating Force:** <30 g typical
- Crosstalk:** Less than 0.5%

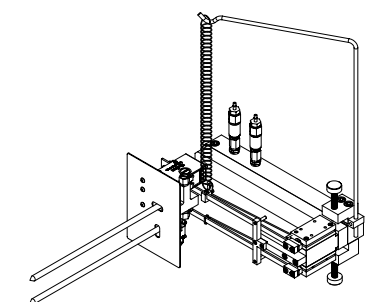
**OPTIONS**

- Model 2050 constant temperature water re-circulating bath
- High temperature option (-HT suffix) for use to 1600 °C
- Connectors to interface to nearly any brand test equipment
- Custom mounting bases are available to fit the customer's test frame
- Shunt calibration module (see page 104)



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**Model 2050 Constant Temperature Re-Circulation Bath**  
This bath provides the controlled temperature flow for water-cooled extensometers. Capable of cooling or heating the water, temperature is maintained within 0.1 °C. These units are ideal for obtaining the maximum stability of any water-cooled extensometer.



MODEL 3550HT EXAMPLE

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A single integral unit provides simultaneous lateral (transverse) strain and averaged axial strain measurement. The unit is also available as an averaged axial extensometer alone.



Model 3560 with 25 mm gauge length

This extensometer is ideally suited for testing anisotropic materials such as advanced composites as well as for general purpose tests like determining Poisson's ratio. The Model 3560BIA uses a design unique to Epsilon, where the knife edges remain parallel during the displacement. This approach greatly reduces crosstalk

between axes and allows use on round or flat specimens with equal ease. These extensometers are very easy to mount. Integral springs hold the unit on the test sample. The parallel multiple flexure design makes these units very durable.

The Model 3560AVG reads axial strain only, as a single averaged output. It may also be supplied with two independent outputs, one measurement from each side of the specimen. This set-up is most commonly required when an indication of specimen bending is desired. The second version, the Model 3560BIA, includes both the averaged axial strain and the transverse strain. Again, this may also be configured as dual independent axial readings, which results in a three channel extensometer.

The Model 3560 extensometers are strain gaged devices, making them compatible with any electronics designed for strain gaged transducers. Most often they are connected to a test machine controller. The signal conditioning electronics for the extensometer is typically included with the test machine controller or may often be added. In this case the extensometer is shipped with the proper connector and wiring to plug directly into the electronics. For systems lacking the required electronics, Epsilon can provide a variety of solutions, allowing the extensometer output to be connected to data acquisition boards, chart recorders or other equipment.

See the electronics section of this catalog for available signal conditioners and strain meters.

**Features**

- Multiple sets of dual flexures and mechanical stops allow testing through failure and provide a rugged unit.
- Full bridge, 350 ohm strain gaged design for compatibility with nearly any test system.
- Standard units meet existing ASTM class B-1 requirements for accuracy in tension. A calibration certificate is included. ISO 9513 class 0,5 calibrations are available upon request. All standard units have linearity readings of 0.15% or better in the transverse direction.
- Rugged, dual flexure design for improved performance.
- Includes high quality foam lined case and spare set of tool steel knife edges.
- Knife edge mounting and parallel displacement allows mounting on round or flat specimens. Much easier to mount than designs using conical points (especially on thin flat specimens and round ones).
- Self-supporting on the specimen.
- High accuracy and minimal crosstalk between channels.

**SPECIFICATIONS**

- Excitation:** 5 to 10 VDC recommended, 12 VDC or VAC max.
- Output:** 2 to 4 mV/V, depending on model
- Linearity:** ≤0.15% of full scale measuring range, depending on model
- Temperature Range:** Standard (-ST) is -40 °C to +100 °C (-40 °F to 210 °F)
- Cable:** Integral, ultra-flexible cable, 8 ft (2.5 m) standard
- Specimen Size:** Works with samples 0.1 to 1 inch width or diameter (2.5 mm to 25 mm)
- Operating Force:** 30 to 50 g typical
- Crosstalk:** Less than 0.5%

**OPTIONS**

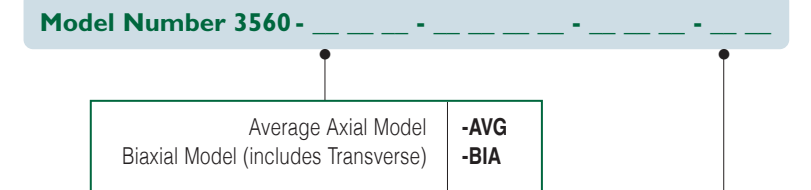
- Connectors to interface to nearly any brand test equipment
- Shunt calibration module (see page 104)
- Specialty knife edges (see page 105)



**ORDERING INFORMATION**

Model 3560 Available Versions: ANY combination of gauge length, measuring range and temperature range listed below is available.

Gauge Length		Measuring Range	
U.S.A.		% AXIAL STRAIN	TRANSVERSE MEASURING RANGE
-0050 <sup>1</sup>	0.500"	±5%	±0.025" (0.5 mm)
-0100	1.000"	±10%	±0.050" (1.0 mm)
-0200 <sup>2</sup>	2.000"		
METRIC			
-010M <sup>1</sup>	10.0 mm		
-025M	25.0 mm		
-050M <sup>2</sup>	50.0 mm		



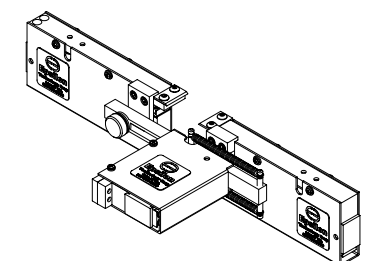
Temperature Range	
-LT	-265 °C to 100 °C (-450 °F to 210 °F)
-ST	-40 °C to 100 °C (-40 °F to 210 °F)
-HT1	-40 °C to 150 °C (-40 °F to 300 °F)
-HT2	-40 °C to 200 °C (-40 °F to 400 °F)
-LHT	-265 °C to 200 °C (-450 °F to 400 °F)

<sup>1</sup> 0.5 inch and 10 mm gauge lengths are only available in 10% axial measuring ranges.

<sup>2</sup> 2.0 inch and 50 mm gauge lengths are only available in 5% axial measuring ranges.

**Example:** 3560-BIA-010M-010-HT2: 10.0 mm gauge length, ±10% axial strain measuring range/±1.0 mm transverse measuring range, HT2 option (-40 °C to 200 °C)

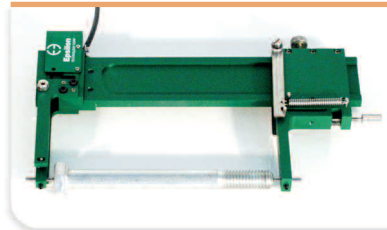
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MODEL 3560 EXAMPLE

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**Designed for measuring small measuring strain ranges as required for proof load testing of bolts and similar applications such as yield measurement.**



Model 3565 extensometer

The Model 3565 uses hard conical points to contact the bolt at the center of the head and at the bottom. It is fully adjustable for different length bolts ranging from 1 inch (25 mm) in length to 6 inches (150 mm) standard.

Extension beams are available for longer bolts. The standard maximum measuring range is 0.05 inches (1.25 mm). Generally, on longer bolts this extensometer will be self-supported without requiring any centering marks or punch marks on the bolt. For shorter bolts these marks may be required. If the conical pins are sharp, marks are often not needed even on the shortest bolts.

The extensometer has a zero adjustment screw to adjust the length between the contact pins. This is used to set the output voltage to zero, which corresponds to the correct starting position for the test. It also includes a breakaway lower arm. In the event a bolt should fail, the breakaway arm snaps free, helping to prevent damage to the extensometer. This is easily re-installed. In the event that bolt failures are likely during a test, it is recommended the user attach a cord around the upper part of the beam and tie the other end to the test frame to prevent the extensometer from falling. The conical point contacts included with the extensometer are made from tungsten carbide.

The Model 3565 extensometers are strain gaged devices, making them compatible with any electronics designed for strain gaged transducers. Most often they are connected to a test machine controller. The signal conditioning electronics for the extensometer is typically included with the test machine controller or may often be added. In this case the extensometer is shipped with the proper connector and wiring to plug directly into the electronics. For systems lacking the required electronics, Epsilon can provide a variety of solutions, allowing the extensometer output to be connected to data acquisition boards, chart recorders or other equipment.

See the electronics section of this catalog for available signal conditioners and strain meters.

**Features**

- Full bridge, 350 ohm strain gaged design for compatibility with nearly any test system.
- All standard units have linearity readings of 0.20% or better.
- Rugged, dual flexure design for improved performance.
- Includes high quality foam lined case.
- Breakaway arm to help prevent extensometer damage in the event of bolt failure.
- Self-supporting on the bolt specimen typically without the need for centering or punch marks.

**SPECIFICATIONS**

- Excitation:* 5 to 10 VDC recommended, 12 VDC or VAC max.
- Output:* 2 to 4 mV/V, nominal, depending on model
- Linearity:* ≤0.20% of full scale measuring range, depending on model
- Temperature Range:* Standard (-ST) is -40 °C to +100 °C (-40 °F to 210 °F)
- Cable:* Integral, ultra-flexible cable, 8 ft (2.5 m) standard

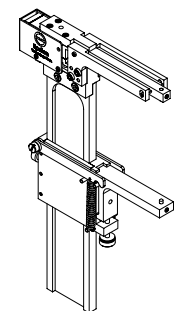
**OPTIONS**

- Connectors to interface to nearly any brand test equipment
- Gauge length adapters
- Shunt calibration module (see page 104)



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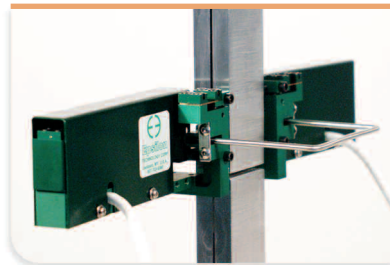
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MODEL 3565 EXAMPLE



Designed specifically for performing tests in accordance with ASTM D5656, Standard Test Method for Thick-Adherend Metal Lap-Shear Joints for Determination of the Stress-Strain Behavior of Adhesives in Shear by Tension Loading. The deformation is measured on opposite sides of the test specimen and the output is an average of the two readings.



Model 4013 extensometer

The Model 4013 extensometer meets or exceeds the requirements of ASTM D5656 for measuring the strain properties of an adhesive in shear. It uses different contact point spacing compared to the extensometer shown in D5656. This makes it much easier to mount and eliminates the slippage problems associated with the design shown in the ASTM standard. The Model 4013 is available with all of Epsilon's temperature configurations. It has 0.12 inches (3.0 mm) full scale measuring range. The conical point contacts included with the extensometer are made from tungsten carbide.

The Model 4013 extensometers are strain gaged devices, making them compatible with any electronics designed for strain gaged transducers. Most often they are connected to a test machine controller. The signal conditioning electronics for the extensometer is typically included with the test machine controller or may often be added. In this case the extensometer is shipped with the proper connector and wiring to plug directly into the electronics. For systems lacking the required electronics, Epsilon can provide a variety of solutions, allowing the extensometer output to be connected to data acquisition boards, chart recorders or other equipment.

See the electronics section of this catalog for available signal conditioners and strain meters.

**Features**

- Full bridge, 350 ohm strain gaged design for compatibility with nearly any test system.
- High accuracy, averaging output (optional dual independent outputs).
- All standard units have linearity readings of 0.20% or better.
- Rugged, dual flexure design for improved performance.
- Includes high quality foam lined case.
- Easy mounting, attaches with an integral spring.

**SPECIFICATIONS**

Excitation: 5 to 10 VDC recommended, 12 VDC or VAC max.

Output: 2 to 4 mV/V nominal, depending on model

Linearity: ≤0.20% of full scale measuring range, depending on model

Temperature Range: Standard (-ST) is -40 °C to +100 °C (-40 °F to 210 °F)

Cable: Integral, ultra-flexible cable, 8 ft (2.5 m) standard

**OPTIONS**

Connectors to interface to nearly any brand test equipment  
Shunt calibration module (see page 104)



**ORDERING INFORMATION**

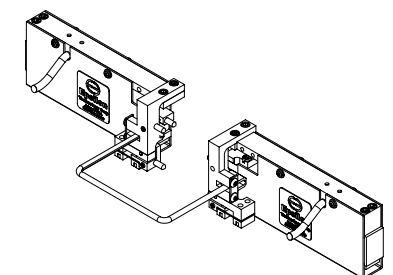
Model 4013 Available Versions: ANY combination of measuring range and temperature range listed below is available, except as noted.

Measuring Range	
U.S.A.	
-025T	0.025"
-050T	0.050"
-125T	0.125"
METRIC	
-005M	0.5 mm
-010M	1.0 mm
-030M	3.0 mm

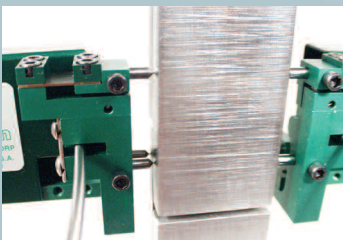
Model Number 4013- \_\_\_\_\_ - \_\_\_\_\_

Temperature Range	
-LT	-265 °C to 100 °C (-450 °F to 210 °F)
-ST	-40 °C to 100 °C (-40 °F to 210 °F)
-HT1	-40 °C to 150 °C (-40 °F to 300 °F)
-HT2	-40 °C to 200 °C (-40 °F to 400 °F)
-LHT	-265 °C to 200 °C (-450 °F to 400 °F)

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MODEL 4013 EXAMPLE



Close-up of the 3-point contacts used by Model 4013 extensometer

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**Submersible extensometer designed for performing tests in water, saline solutions, and other liquids compatible with the materials of construction.**



Model 4030 with 0.5 inch gauge length

The Model 4030 extensometer uses a special LVDT-like sensor to measure strains on samples submersed in water or other compatible liquids. The unit is provided with the signal conditioning electronics. The extensometer is a semi-custom design, which is available in smaller measuring ranges up to 5 mm (0.2 inches). Clip-on (COD) style designs are also available.

These are made entirely of stainless steel with Teflon cables. They can also be supplied with ceramic knife edges and heat shrink tubing over the quick attach kit wires, to eliminate any galvanic corrosion issues with test samples.

Contact Epsilon or email [sales@epsilontech.com](mailto:sales@epsilontech.com) for help with configuring a system to meet your test needs.

**Features**

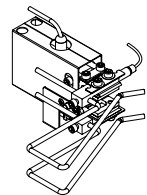
- Signal conditioner and power supply included. Easily interfaced to test controllers, data acquisition boards, and chart recorders.
- Shipped fully calibrated with electronics (traceable to NIST) with user specified voltage output.
- Includes high quality foam lined case.

**SPECIFICATIONS**

- Input:* Includes power supply for your country (specify)
- Output:* User specified, +/-5 VDC or +/-10 VDC typical
- Linearity:* :≤1.0% of full scale measuring range, depending on model
- Temperature Range:* Standard (-ST) is -40 °C to +100 °C (-40 °F to 210 °F)
- Cable:* 1.5 ft (45 cm), multistranded, shielded, SS reinforced, Teflon® insulated
- Standard Quick Attach Kit:* Fits round samples up to 0.5 inch diameter (12 mm) and flats to 0.5 inch thick by 0.5 inch wide (12 mm by 12 mm)
- Environment:* Submersible in water and other liquids compatible with materials of construction

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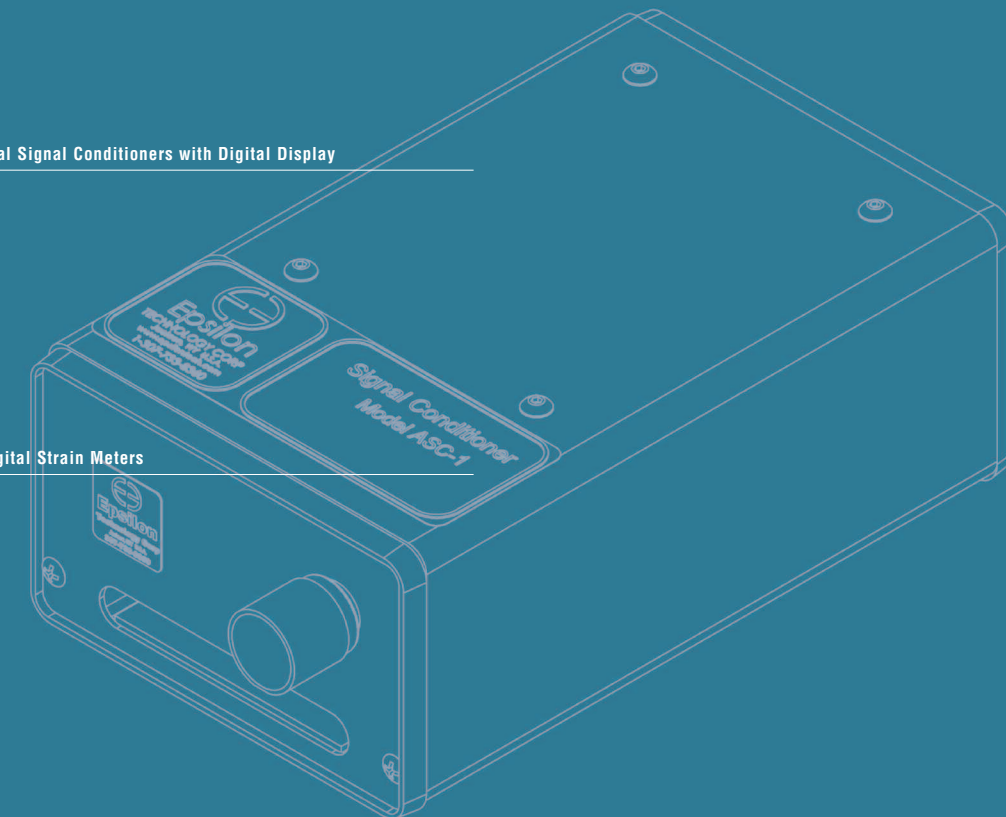
MODEL 4030 EXAMPLE

SGA Analog Signal Conditioners

DSC Digital Signal Conditioners

DSC-DD Digital Signal Conditioners with Digital Display

DSM-Plus Digital Strain Meters



**Electronics**

The SGA series signal conditioners are ideal for cyclic and high speed testing where no display is needed. Available in single and dual channel versions, they provide the signal conditioning electronics needed for a strain gage based extensometer.



Model SGA channel signal conditioner

The SGA has adjustable excitation voltage and a high accuracy amplifier to provide a high level DC voltage output. An offset adjustment potentiometer is easily accessible on the front panel.

The output is ideal for direct connection to data acquisition boards or test controllers which require high level voltage or current inputs.

All models are supplied with a universal power supply and adapters for your country: specify regional adapters when ordering. A 2.5 mm (8 ft) output cable is included to connect to external systems. Calibration with an extensometer (for each channel) is included.

**SPECIFICATIONS**

- Zero Adjustment Knob(s): On front panel. Fine ( $\pm 5\%$  FS) and coarse. ( $\pm 80\%$  FS) adjustment ranges
- Selectable Output Ranges:  $\pm 5V$ ,  $\pm 10V^*$ , 0-10V, 0-20 mA, etc.
- Bridge Excitation: 5V or  $10V^*$  DC
- Bridge Sensitivity Range: 0.06 to 30.0 mV/V
- Linearity: 0.03% FS typical
- Filtering: 8 settings, 1-5000 Hz, plus secondary 800 Hz filter. 1 kHz\* default
- Operating Temperature Range: -10 to +50 °C
- Zero Temperature Coefficient: 0.009%/C (90 ppm/°C)
- 90 Day Output Stability: ~330 ppm
- Output Noise: 10-100  $\mu V$  (1-100 ppm), depending on filter, DAQ, and gain. 50  $\mu V$  typ.
- Input Power: 100-240 VAC, 50-60Hz. Specify regional power plug type required. Includes: power supply, connection for extensometer(s), output cable(s) and calibration with extensometer

\* Default settings

**Model SGA Available Versions:**

- Model SGA-1 Single channel signal conditioner
- Model SGA-2 Dual channel signal conditioner



Designed as an inexpensive solution for static mechanical testing where no digital display is required.



Model DSC signal conditioner

The DSC is a digital signal conditioner with analog output. All calibration is handled by software via an RS232 connection. The sampling rate is well suited for typical tensile tests. They provide all the signal conditioning electronics needed for a strain gage based

extensometer. The DSC has an excitation voltage of 5 VDC and a high accuracy amplifier to provide high level DC voltage output. The unit includes a tare button to zero output at the start of every test and a shunt button for periodic verification of the output.

The output is well suited for direct connection to data acquisition boards which require a high level DC input voltage. It will also connect directly to chart recorders or test controllers. For computer based controls, it allows the extensometer data to be acquired by the data acquisition software.

All models include a power cord for your country. An 8 ft (2.5m) output cable is included to connect to external systems. Calibration with an extensometer is included in the pricing.

**SPECIFICATIONS**

- Automatic recognition of up to 3 extensometers after initial set-up
- Multiple extensometers may be calibrated with one DSC
- Accuracy: 0.01% of full scale  $\pm 1$  digital count
- Analog output with capability of 0 to  $\pm 10$  VDC output
- Operating temperature range: 0 to 50 °C
- Front panel tare button to zero output at the start of every test
- 60 readings per second update rate
- Includes power cord, connector for extensometer(s), output cable and calibration with extensometer
- Input power: 110 VAC, 60 Hz, Optional 240 VAC, 50 Hz



Model DSC signal conditioner

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Visit our website at [www.epsilontech.com](http://www.epsilontech.com)  
Contact us for your special testing requirements.

Designed as an inexpensive solution for static mechanical testing

where a digital display is required.



Model DSC-DD signal conditioner

The DSC-DD is a digital signal conditioner with analog output. All calibration is handled by software via an RS232 connection. The sampling rate is well suited for typical tensile and compression tests. They provide all the signal conditioning electronics needed for a strain gage based extensometer. The DSC-DD has an excitation

voltage of 5 VDC and a high accuracy amplifier to provide high level DC voltage output. The unit includes a tare button to zero output at the start of every test and a shunt button for periodic verification of the output.

The output is well suited for direct connection to data acquisition boards which require a high level DC input voltage. It will also connect directly to chart recorders or test controllers. For computer based controls, it allows the extensometer data to be acquired by the data acquisition software.

All models include a power cord for your country. An 8 ft (2.5m) output cable is included to connect to external systems. Calibration with an extensometer is included in the pricing.

**SPECIFICATIONS**

- Automatic recognition of up to 3 extensometers after initial set-up
- Multiple extensometers may be calibrated with one DSC
- 6 digit display in engineering units such as percent strain or displacement
- Accuracy: 0.01% of full scale  $\pm 1$  digital count
- Analog output with capability of 0 to  $\pm 10$  VDC output
- Operating temperature range: 0 to 50°C
- Front panel tare button to zero output at the start of every test
- 60 readings per second update rate
- Includes power cord, connector for extensometer(s), output cable and calibration with extensometer
- Input power: 110 VAC, 60 Hz, Optional 240 VAC, 50 Hz



Model DSC-DD rear panel



Model DSC-DD signal conditioner

Designed for general purpose testing, these conditioners are

available with one or two channels, and can be used as full system

replacements for older test systems. This provides a low cost way to

obtain the data for stress-strain plots. The automatic recognition

feature allows multiple extensometers to be calibrated individually

on one meter.



Model DSM-Plus high accuracy digital strain meter

The DSM-Plus is ideal for customers who own several extensometers. When a configured extensometer is plugged in, the meter automatically recognizes it. It is also possible to calibrate the same extensometer in multiple ranges. For example, it is frequently convenient to calibrate an extensometer to a range of 10% of the full

scale measuring range to allow greater sensitivity for tests at small strains.

The dual channel version is very useful for tests which require two strain readings, such as measurement of Poisson's ratio or r-value tests on sheet metal samples. It also is a low cost solution to upgrading older test systems. One channel is used for strain and the other for the force reading from a load cell. The RS232 digital output or the analog outputs make computerized data acquisition simple.

**SPECIFICATIONS**

- Automatic recognition of up to 20 extensometers after initial set-up
- Accuracy: 0.01% of full scale  $\pm 1$  digital count
- 6 digit display in engineering units such as percent strain or displacement
- Analog output with capability of 0 to  $\pm 10$  VDC output
- Common mode rejection: 115dB
- Operating temperature range: 0 to 50 °C
- Front panel tare button to zero output at the start of every test
- 60 readings per second update rate
- Includes power cord, connector for extensometer(s), output cable and calibration with extensometer
- Input power: 110 VAC, 60 Hz, Optional 220 VAC, 50 Hz
- Optional second channel allows for second extensometer to be used simultaneously or load and strain to be measured simultaneously for a low cost solution to obtaining stress-strain plots for older machines

Model DSM-Plus Available Options:  
Second channel for strain or load cell



Model DSM-Plus two channel high accuracy strain meter with Model 3542

Visit our website at [www.epsilontech.com](http://www.epsilontech.com)



The **DSCUSB** provides **USB plug-and-play capability to any strain gauged extensometer. They are useful when you wish to acquire data directly to your computer without the need for a controller.**



Model DSCUSB Digital Extensometer Interface

Provides an inexpensive solution for digitally recording extensometer output.

The DSCUSB is a signal conditioner that provides a digital interface to a computer via USB. This allows direct data capture without the need for additional acquisition electronics or an input channel on your

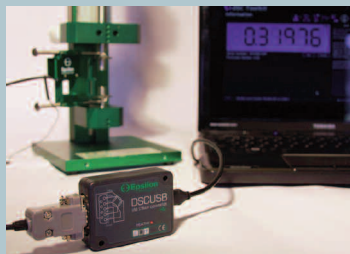
controller. Calibration of an extensometer is handled within the DSCUSB with up to 7 linearization points and output readings in the desired units (mV/V, mm, inches, strain). The simple software interface displays the current value as well as providing a trend chart and data logging capabilities.

If you wish to interface the DSCUSB with your existing software solution, the DSCUSB can be controlled using a set of ASCII commands through its virtual COM port.

A USB cable is included with the DSCUSB.

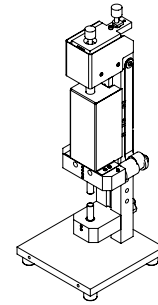
**SPECIFICATIONS**

- Power supply: USB powered (5V)
- Excitation voltage: 5V
- Temperature stability: <5ppm/°C
- A/D resolution: 16 Million counts (24 bits)
- Effective resolution: 120,000 counts @ 10Hz; 50,000 counts @ 50Hz
- Data rate: 1-200 samples/second, 9 settings
- Selectable low pass filter
- Capture software included
- ASCII command set available for custom software development
- Multiple DSCUSBs may be used simultaneously for multiple channel measurements

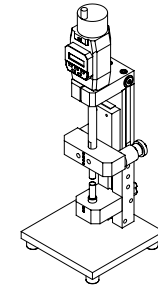


Model DSCUSB with monitor

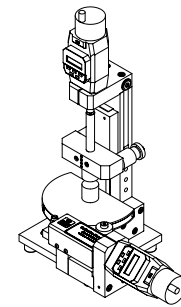
Visit our website at [www.epsilontech.com](http://www.epsilontech.com)



3590VHR Very High Resolution Digital Electronic Calibrators

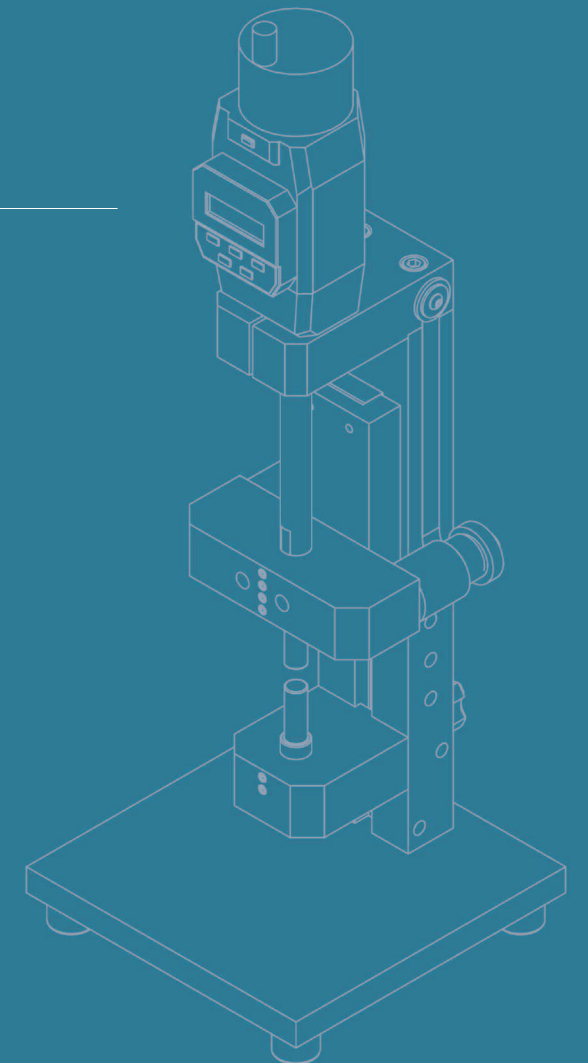


3590 Digital Electronic Calibrators



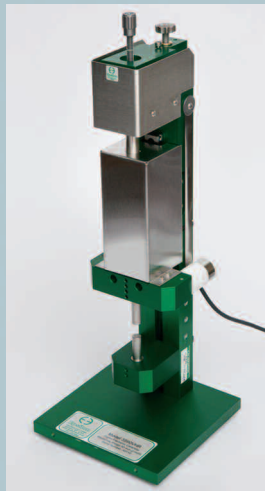
3590AT Axial/Torsional Digital Electronic Calibrators

## Calibrators



Epsilon's very high resolution calibrator features 0.8 microinches (20 nanometers) resolution and has 2 inches (50 mm) of measuring range.

The 3590VHR is provided with software to display the calibrator readings and optional netbook PC or digital display. The 3590VHR calibrator meets the accuracy and resolution requirements for ASTM E83 Class B-1 for a 6 mm gauge length and greater extensometers and ISO 9513 Class 0,5 over the full measuring range of the calibrator.



Model 3590VHR calibrator



Close-up of Model 3590VHR calibrator

The 3590VHR uses a coarse adjustment screw for large displacements, coupled with a fine adjustment screw that allows fine adjustment to within approximately 0.025 microns (about 1 micro inch). When it comes time to calibrate your extensometers, these calibrators are easier to use and faster than any others on the market. They have

enough measuring range to calibrate nearly all extensometers, and enough resolution to calibrate units with low measuring ranges.

The software provided reads in both inches and millimeters. The autozero function is a great help in calibrating. Just activate it to start readings from zero. The digital display reduces operator error.

A wide range of adapters are available. The calibrator comes with smooth round adapters, of 0.375 inches diameter (9.52 mm). For special adapters, contact Epsilon. For very long gauge length extensometers, an optional extension post is available. The calibrator is provided with a calibration traceable to NPL (UK standards organization).

**Model 3590 Adapters**  
For all 3590 models.



Supplied with ISO 17025 accredited calibration

**Features**

- Scale calibration traceable to NIST.
- System fully calibrated traceable to NPL (UK standards organization).
- Software for Windows based PC provided, a PC with a USB port is required.
- Optional Netbook PC or stand alone display available.
- Readings taken on the PC with included software may be save to a data file.
- Uses the same adapters as the model 3590 and 3590HR calibrators.
- Provided with a foam lined case for storage.



**SPECIFICATIONS**

- Measuring Range:** 2 in (50 mm) Maximum displacement
  - Maximum Range:** 0-5 in (125 mm) (Maximum gauge length + displacement)\*
  - Accuracy:** ±7.5µin (±0.19 µm) over any 0.00475 inch(0.12 mm) range  
Meets ASTM E83 Class B-1 for a 6 mm gauge length and greater extensometers and ISO 9513 Class 0,5 over the full measuring range of the calibrator
  - Resolution:** 0.8 µin (20 nm)
  - Temperature Range:** 18°C to 28°C (64°F to 82°F) operation\*\*, -10°C to 60°C storage (14°F to 140°F)
  - Relative Humidity:** < 90% (Non-condensing)
  - Connectivity:** USB 1.1 & 2.0 interface, self-powered
  - Weight:** 8 lbs (standard configuration)\*
  - Adapters:** Ø0.375" (9.52mm) posts included\*
  - EMC Compliance:** BS EN 61326-1: 2006
  - Environmental:** EU Directive 2011/65/EU (RoHS)
- \* Other options available upon request  
\*\*Recommended range

**Options for available adapter sets**

- 3590-01 Smooth round posts, 0.25 inches diameter (6.35 mm)
- 3590-02 Adapters for flat specimens
- 3590-03 Adapters for clip-on fracture mechanics gages
- 3590-04 Transverse extensometer adapter (Model 3560)
- 3590-11 Transverse extensometer adapters (Models 3575AVG, 3575, 3475, 3580, 3565, 3911 and 3975)
- 3590-05 Circumferential extensometer adapters (Model 3544)
- 3590-06 Adapters for large averaging extensometers (Models 3442RA and 3542RA)
- 3590-07 4 inch (100 mm) extension post for long gauge length extensometers
- 3590-55-10 10 inch (250 mm) extension post for long gauge length extensometers
- 3590-55-24 24 inch (600 mm) extension post for long gauge length extensometers

WITH EPSILON'S IN-HOUSE LASER INTERFEROMETER SYSTEM, THE FULL CALIBRATOR SYSTEM CAN BE CALIBRATED TRACEABLE TO NPL. NO LONGER DO CUSTOMERS HAVE TO RELY ON MICROMETER HEAD ONLY OR POTENTIALLY ERROR-PRONE GAUGE BLOCK CALIBRATIONS FOR FULL SYSTEM CALIBRATIONS.

Epsilon is one of the only companies in the world with the capability to perform full system calibrations on high resolution extensometer calibrators.

With Epsilon high resolution systems, you are assured compliance. When looking for a calibrator to meet ASTM and ISO specifications, the accuracy of the device is key for compliance, which is why full system calibration is essential to meet ISO 9513 and ASTM E83 requirements.

Standards Labs in most countries have signed a Mutual Recognition Arrangement CIPM MRA. This includes the NPL in the UK, NIST in the USA and many others. This makes them effectively traceable to each other. Services of the NPL are equivalent to those offered by NIST and are recognized by NIST through this agreement of reciprocity.  
[www.bipm.org/en/cipm-mra/](http://www.bipm.org/en/cipm-mra/)

Visit our website at [www.epsilontech.com](http://www.epsilontech.com)  
Contact us for your special testing requirements.

Visit our website at [www.epsilontech.com](http://www.epsilontech.com)

Epsilon's standard calibrator features 50 micrometers (0.001 mm) resolution and has 2 inches (50 mm) of measuring range. The autozero button and digital display greatly simplify calibration of extensometers. The 3590 calibrator is useful for extensometer calibration and verification with test systems.



Model 3590 with Model 3542 axial extensometer



Model 3590 in case



Model 3590 calibrator

When it comes time to calibrate your extensometers, these calibrators are easier to use and faster than any others on the market. They have enough measuring range to calibrate nearly all extensometers.

The digital display reads inches and changes to mm at the touch of a button. The autozero button is a great help in calibrating. Just press the button to start readings from zero. The digital display reduces operator error.

A wide range of adapters are available. The calibrator comes with smooth round adapters, of .375 inches diameter (9.52 mm). For special adapters, contact Epsilon. For very long gauge length extensometers, an optional extension post is available. An option is available for digital SPC output for interfacing with PCs. The calibrator is provided with a calibration traceable to NPL (UK standards organization).

**Model 3590 Adapters**  
For all 3590 models.



**Features**

- Digital display
- Autozero button simplifies readings
- Adapters and extension posts available for nearly any extensometer
- Foam lined case for storage included
- System fully calibrated traceable to NPL (UK standards organization)



**SPECIFICATIONS**

- Measuring Range:* 2 in (50 mm) Maximum displacement
- Maximum Range:* 0-5 in (125 mm) (Maximum gauge length + displacement)\*
- Accuracy:* ±0.00015 in/in (±0.004 mm/25 mm)
- Resolution:* 50 µin (0.001 mm)
- Temperature Range:* 18°C to 28°C (64°F to 82°F) operation\*\*, -10°C to 60°C storage (40-100°F, 14-140°F)
- Relative Humidity:* <90% (Non-condensing)
- Power Supply:* 2x SR44 Batteries (included), ~2 year life
- Weight:* 6 lbs (standard configuration)\*
- Adapters:* Ø0.375" (9.52mm) posts included\*
- Environmental:* EU Directive 2011/65/EU (RoHS)

\* Other options available upon request

\*\*Recommended range

**Options for available adapter sets**

- 3590-01 Smooth round posts, 0.25 inches diameter (6.35 mm)
- 3590-02 Adapters for flat specimens
- 3590-03 Adapters for clip-on fracture mechanics gages
- 3590-04 Transverse extensometer adapter (Model 3560)
- 3590-11 Transverse extensometer adapters (Models 3575AVG, 3575, 3475, 3580, 3565, 3911 and 3975)
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Standards Labs in most countries have signed a Mutual Recognition Arrangement CIPM MRA. This includes the NPL in the UK, NIST in the USA and many others. This makes them effectively traceable to each other. Services of the NPL are equivalent to those offered by NIST and are recognized by NIST through this agreement of reciprocity.

[www.bipm.org/en/cipm-mra/](http://www.bipm.org/en/cipm-mra/)

Visit our website at [www.epsilontech.com](http://www.epsilontech.com)  
Contact us for your special testing requirements.

Visit our website at [www.epsilontech.com](http://www.epsilontech.com)



Epsilon's axial/torsional calibrator features 50 microinches (0.001 mm) resolution and has 2 inches (50 mm) of measuring range axial and torsional rotation where 0.050 inch (1.27 mm) of linear motion equates to 1° angle of twist. The autozero button and digital display greatly simplify calibration of extensometers. The 3590AT calibrator is designed to be used with the Model 3550 and 3550HT axial/torsional extensometers.



Model 3590AT calibrator



Model 3590AT calibrator

The digital display reads inches and changes to mm at the touch of a button. The autozero button is a great help in calibrating. Just press the button to start readings from zero. The digital display reduces operator error.

**Features**

- 50 microinches (0.001 mm) resolution
- ±0.00015 in/in (±0.004 mm/25 mm) accuracy
- Full 2 inches (50 mm) measuring range
- Digital display
- Autozero button simplifies readings
- Foam lined case for storage included
- System fully calibrated traceable to NPL (UK standards organization)

The 3590AT can be converted into a standard Model 3590 calibrator with the optional 3590AT-3590 adapter.

**Options for available adapter sets**

The 3590AT can be converted into a standard Model 3590 calibrator with the optional 3590AT-3590 adapter.

Standards Labs in most countries have signed a Mutual Recognition Arrangement CIPM MRA. This includes the NPL in the UK, NIST in the USA and many others. This makes them effectively traceable to each other. Services of the NPL are equivalent to those offered by NIST and are recognized by NIST through this agreement of reciprocity. [www.bipm.org/en/cipm-mra/](http://www.bipm.org/en/cipm-mra/)

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SCM Shunt Calibration Modules

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VREF Modules

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**Calibration References**

Designed to allow Epsilon's extensometer calibration to be easily transferred to a customer's electronics. These are available for any strain gaged extensometer listed in this catalog.

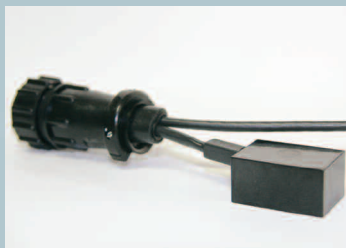
**What are they?**

Shunt calibration modules are a means of transferring Epsilon's transducer calibration to a customer's electronics, so the output reads correctly.

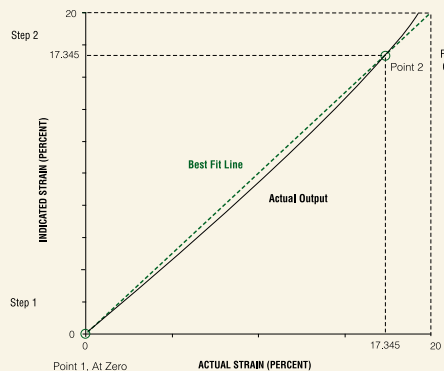
A very common method of calibrating electronics for use with strain gaged transducers is through a process known as shunt calibration. A resistor connected across one arm of the sensor bridge causes the output to shift. When properly chosen, this resistor will simulate an output whose value may be precisely measured and reported.

In order to set the electronics properly, it must read zero when the extensometer is at zero. It also must have the proper amplification (or output slope) so that non-zero readings are correct. Two points are required to accomplish this.

The shunt calibration module works for any of Epsilon's strain gaged extensometers and with nearly any electronics. As shown in the photo to the left, the module is a simple plug-in device containing the shunt resistor. It plugs into a miniature connector extending out the back of the extensometer connector. When plugged-in, it shunts across one arm of the sensor and shifts the output to a precise value recorded on the extensometer's test certificate.



**Shunt Calibration Module**



**Calibration requires only these two simple steps:**

1. Mount the extensometer on a sample. Adjust the output to read zero. This sets point 1 in the example graph to the left. This is the zero offset or tare.
2. Plug-in the shunt module. Adjust the output readings to precisely the value provided. This sets point 2 in the example. This amounts to adjusting the gain or amplification.

**That's all it takes.**

This process works for almost every situation. Further information is provided with every module. This works even if the test controls have internal shunt calibration capability. It is useful for digital systems which read in strain directly, as well as older system which read in volts. It may be used for data acquisition systems and stand alone signal conditioning electronics. For controls that only allow for one extensometer, it's a quick way to switch over to a second.

For systems with multiple calibration ranges, as common in materials testing, multiple shunt modules may be ordered, each set for the range specified.

With Epsilon's shunt calibration module, periodic re-calibration of the extensometer may be accomplished by sending the extensometer and module to Epsilon for re-calibration. They also provide a quick means to check that your electronics are properly setup and have not shifted.

10V calibration reference for high level devices.



VREF module

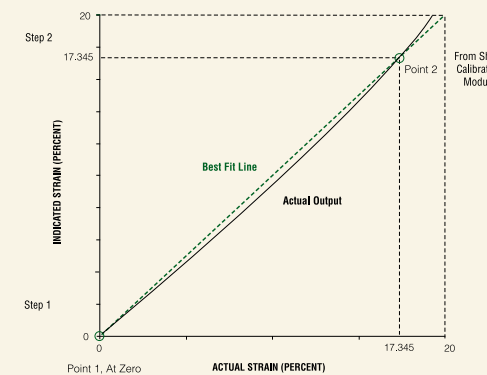
Like the shunt calibration module for strain gaged extensometers, the VREF module is used to transfer Epsilon's calibration to a customer's electronics.

VREF works with all of Epsilon's high temperature capacitive extensometers, and is compatible with both the 3603 and 3604 signal conditioners. The high precision 10V reference used in the VREF module ensures calibrations are spot on every time. One VREF module may be used to calibrate several high level output extensometers by using the

10V extension value for each extensometer.



**VREF Module**

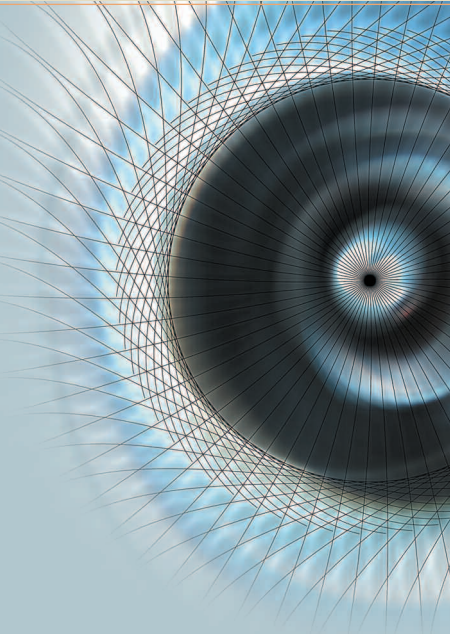


**That's all it takes.**

**Calibration requires only these two simple steps:**

1. Mount the extensometer on a sample. Adjust the output to read zero. This sets point 1 in the example graph to the left. This is the zero offset or tare.
2. Plug-in the shunt module. Adjust the output readings to precisely the value provided. This sets point 2 in the example. This amounts to adjusting the gain or amplification.

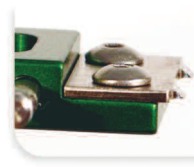
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All of the following knife edges will fit all models of Epsilon extensometers that use knife edges. The exceptions are high temperature units that use ceramic rods, specialty extensometers that require conical point contacts, asphalt extensometers, clip-on gages, and deflectometers.



**Standard Knife Edges**  
PART NO. 350210-01  
Produced from hardened tool steel, these knife edges are used for a wide range of applications, and can be used on both round and rectangular shaped specimens. These are the standard knife edges supplied with most Epsilon extensometers.



**Three-Point Contact Knife Edges**  
PART NO. 354299  
These knife edges were designed for use on flat specimens. They ensure stable contact on flat test samples due to 3-point contact.



**Dual Bevel Knife Edges**  
PART NO. 350210V2-01  
Produced from high toughness tool steel. These knife edges are used in applications where the standard knife edges may experience excessive chipping, such as on very hard metals. They are also ideal for high modulus composites. The dual bevel design and tougher material of construction provides a greater resistance to damage during testing. These knife edges are also recommended for biomedical testing (especially bone) where stability of the contact point can be compromised due to the softness of the test specimen. The dual bevel edge prevents slight output shifts on the sample that can result from the standard knife edges biting into the sample.



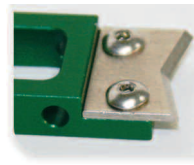
**Extended Knife Edges**  
PART NO. 350210EXT-01  
Knife edges for applications where the additional length is required, such as where the grips are very close together. Longer lengths are available on special order.



**Rounded Knife Edges**  
PART NO. 350210-BLUNT  
Knife edges designed for use on transverse extensometers and applications where blunt edges are required. These are primarily used on transverse or diametral extensometers, such as the 3575, 3575AVG and 3675.



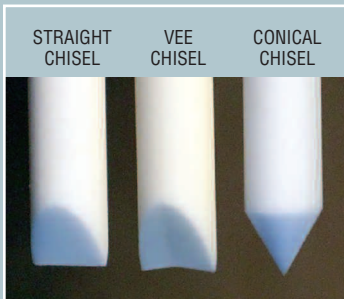
**Ceramic Knife Edges**  
PART NO. 350210C2-01  
These knife edges are typically used in low cycle fatigue applications on hard metals where metallic knife edges would likely experience undue wear. They are also used on the submersible Model 4030 extensometer to prevent galvanic corrosion between the extensometer and the test specimen.



**Vee Knife Edges**  
PART NO. 9903-01-01  
Designed for use on round specimens. Due to the contact point variation that can occur between specimens of different diameters, units with these knife edges must be calibrated with posts of equal diameter. On extensometers with longer arms, errors created by this variation are not so pronounced, but on units with shorter arms lengths, this must be taken into consideration. The primary advantage is self-centering on the test sample.



**Hardened Stainless Steel**  
PART NO. 350210-02  
These knife edges are designed to be used in environments where additional strength and corrosion resistance is required. Primary applications are in biomedical testing where the knife edges may be exposed to saline solutions.



**Available Rod Tip Styles**

Specify rod tip style desired.

Straight chisel tips are the most versatile, since they can be used with round or flat specimens.

Visit our website at [www.epsilontech.com](http://www.epsilontech.com)



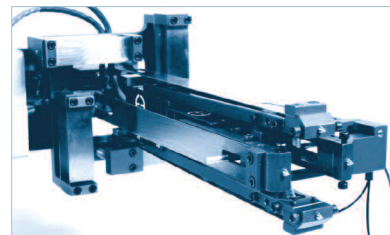
**Custom Extensometers**

# A small sampling of custom and modified extensometers manufactured and built at Epsilon.

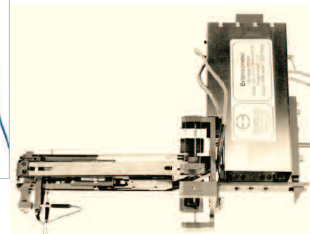
Sometimes the test requires a completely custom design. Often, though, special test needs can be accommodated by modifications to existing standard models. If you have special requirements and do not see it in our catalog, please contact us to discuss your application.

### 3561 Biaxial

Custom biaxial extensometer for plane strain measurement in sheet metal testing. This unique design contacts the test sample from one side only, as needed for a very wide sample. Used for formability testing.



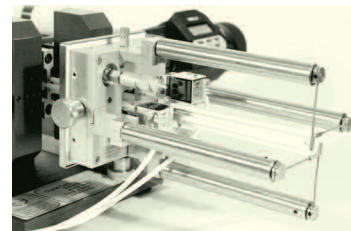
View of 4 conical points



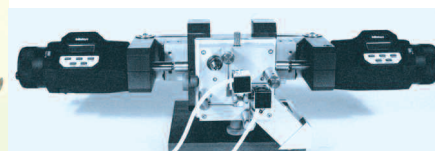
3561 biaxial plane strain

### 3561 High Temperature Biaxial

Special high temperature biaxial extensometer for cruciform test samples at 1200 °C (induction heated). This extensometer uses ceramic rods and is capable of measuring very small strains.



3561 biaxial for 1200 °C



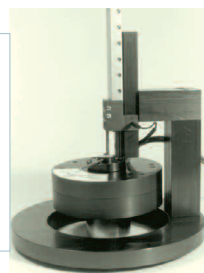
3561 on biaxial calibrator

### Bulge Test

Special biaxial extensometer for limiting dome height bulge tester for sheet metal formability testing. Simultaneous X and Y strain measurements are taken.



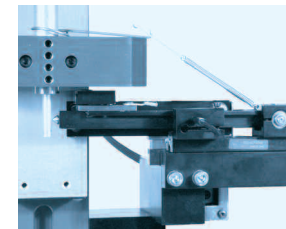
Close-up showing conical points



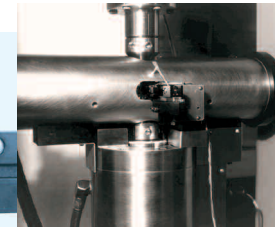
Biaxial sheet metal extensometer

### Fretting Fatigue Slip Sensor

Custom sensor for fretting fatigue test system. Measures very small fret slip amplitudes at frequencies up to 60 Hz. Capacitive sensor with full scale displacement of 100 microns.



Fretting fatigue slip amplitude sensor

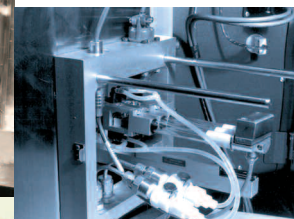


Fretting fatigue test system

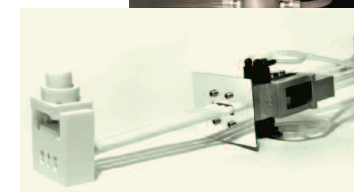
### High Temperature Bend Extensometer

High temperature bend fixture and 3 point bend deflection sensor for bend tests up to 1000 °C. Capacitive sensor allows very small full scale measurement of 100 microns. Includes radiant furnace, fixtures and controlled atmosphere chamber.

Bend test fixture inside radiant furnace



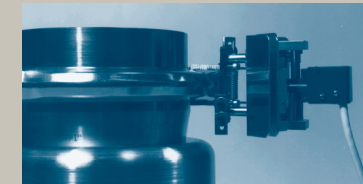
Exterior view of system showing bend sensor



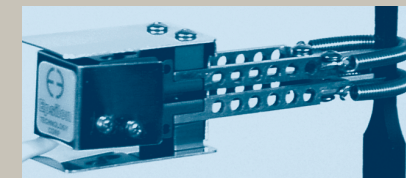
Ceramic bend fixture with deflection sensor



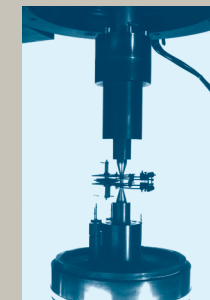
**3640**  
High temperature 540 °C (1000 °F) capacitive based deflectometer. The model shown has 1 inch of measuring range.



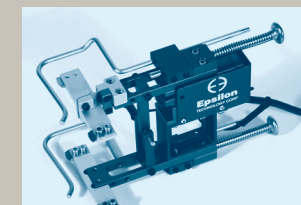
**Clamp Test Unit**  
High temperature 540 °C (1000 °F) clamp expansion test extensometer



**Special 3442, Heated Grips**  
Miniature Model 3442 extensometer modified for use with heated grips, to 300 °C (570 °F).



**Capacitive in Hydrogen**  
Capacitive extensometer for use in hydrogen gas at 1800 °F and 5000 psi (1000 °C and 34 MPa).



**3542 Special 1.5 Wide**  
Modified Model 3542 extensometer for 4 point contact on test sample 1.5 inch (37.5 mm) wide.



**3542 on Very Large Sample**  
Modification to Model 3542 extensometer for mounting on large diameter test samples.



**3542 on 250 mm Wide**  
Special mounting for Model 3542 extensometer on 250 mm wide test samples.

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## Accreditation

# EPSILON is accredited by A2LA to the ISO/IEC 17025 international standard and certified by DNV to the ISO 9001 international quality management system standard.

The proven compliance with these standards demonstrates the accuracy and consistency of our measurements and calibrations and represents our commitment to quality.

To receive accreditation to ISO/IEC 17025 international standard, our laboratory has conducted comprehensive testing and documentation of all of our processes and ensured that the uncertainty in our measurements is both documented and reduced to the lowest amount possible. During the accreditation process, the robustness of our quality system is evaluated as well as our laboratory's technical proficiency to make measurements to our stated degree of accuracy.



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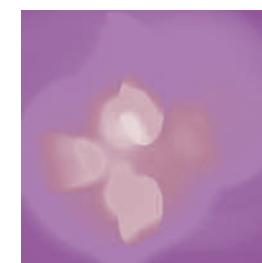
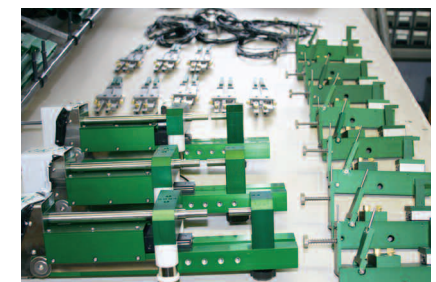
Epsilon Technology's A2LA accreditation scope covers all measurements made during calibration. This means that all calibration stands and extensometers sold with electronics come with a fully accredited calibration that you can rely upon to be accurate and traceable. If you are buying an extensometer to use with existing electronics you are still receiving an accredited calibration, however, you will need to calibrate your system as a whole. If you have any questions about this, please do not hesitate to contact us.

To become certified to ISO 9001, we further documented our processes starting in the design and development phase and following the product through manufacturing, calibration and shipment with a strong focus on quality throughout. These improvements to our quality management system allow us to better track ways to improve our products and services and continue to provide our customers with products to fulfill their materials testing needs.

Our certificates and scope of accreditation can be viewed on our website at: [www.epsilontech.com/quality.htm](http://www.epsilontech.com/quality.htm).



accreditation  
quality  
accuracy



## Epsilon Tech: Our Warranty

### 1. Limited Warranty

Epsilon warrants all products of our manufacture ("Products") to be free of defects in materials or workmanship for a period of one year from date of shipment. This warranty covers both parts and labor. Epsilon reserves the right to determine if defects are covered by warranty. This warranty does not cover items subject to wear. Specifically, this does not cover knife edges or ceramic rods. Upon return of item (shipping prepaid) for repair, Epsilon will determine whether the item is covered by warranty, and repair or replace it at our option.

The warranty period for any product is not extended from its original date by virtue of having been repaired or replaced under the original warranty.

### 2. Other Limits

THE FOREGOING IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Epsilon does not warrant against damages or defects arising out of improper or abnormal use or handling of the Products; against defects or damages arising from improper installation (where installation is by persons other than Epsilon), against defects in products or components not manufactured by Epsilon, or against damages resulting from such non-Epsilon made products or components. Epsilon passes on to Buyer the warranty it received (if any) from the maker thereof of such non-Epsilon made products or components. This warranty also does not apply to products upon which repairs have been effected or attempted by persons other than pursuant to written authorization by Epsilon.

### 3. Exclusive Obligation

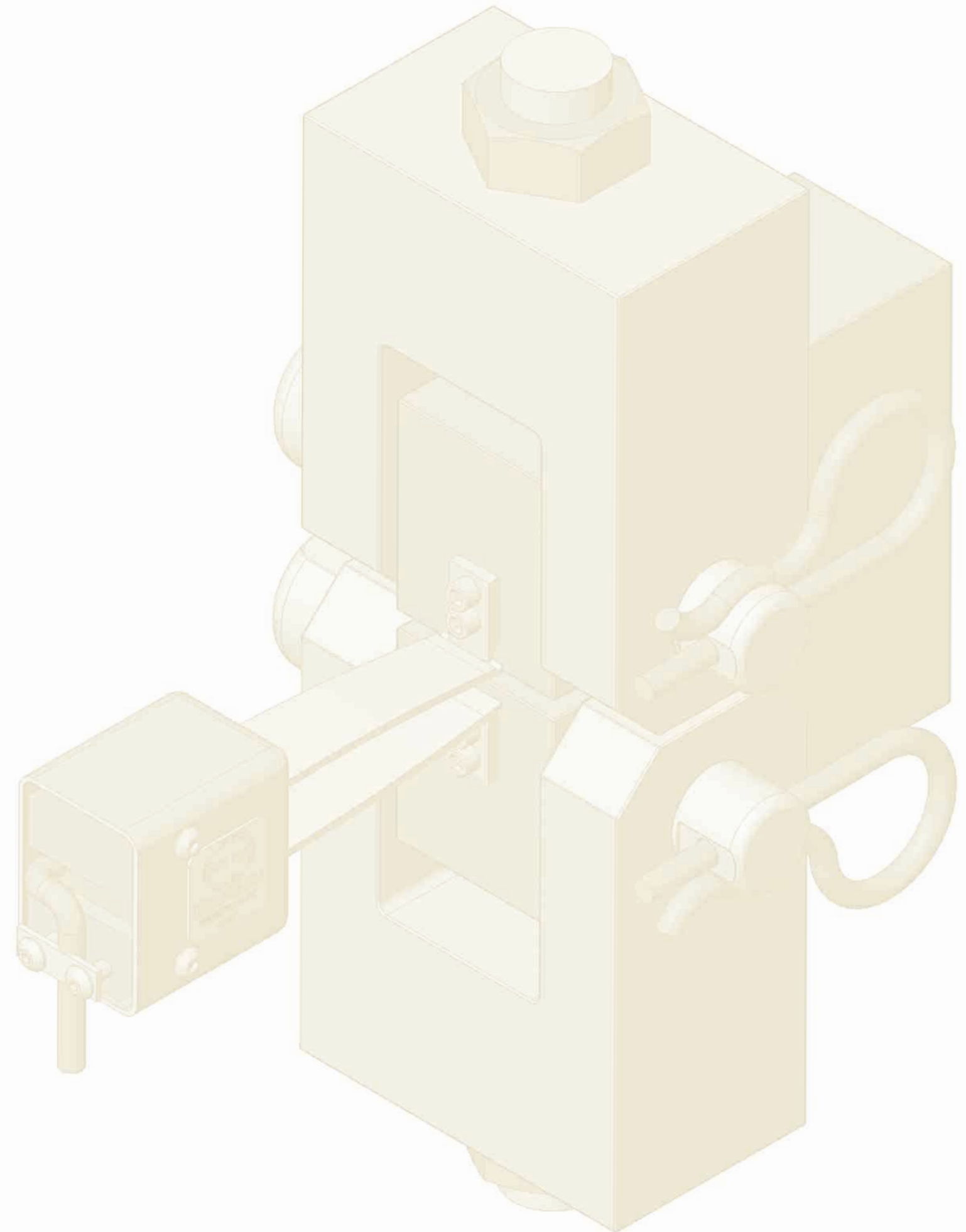
THIS WARRANTY IS EXCLUSIVE. The sole and exclusive obligation of Epsilon shall be to repair or replace the defective products in the manner and for the period provided above. Epsilon shall not have any other obligation with respect to the products or any part thereof, whether based on contract, tort, strict liability or otherwise. Under no circumstances, whether based on this Limited Warranty or otherwise, shall Epsilon be liable for incidental, special, or consequential damages.

### 4. Other Statements

Epsilon's employees or representatives' ORAL OR OTHER WRITTEN STATEMENTS DO NOT CONSTITUTE WARRANTIES, shall not be relied upon by Buyer, and are not a part of the contract for sale or this limited warranty, unless agreed to in writing by a corporate officer of Epsilon.

### 5. Entire Obligation

This Limited Warranty states the entire obligation of Epsilon with respect to the Products. If any part of this Limited Warranty is determined to be void or illegal, the remainder shall remain in full force and effect.



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