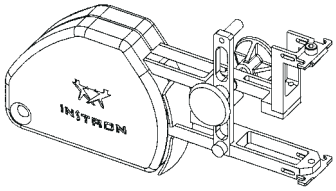
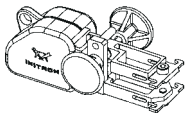
M20-52630-1
Issue C January 1997

Instron
2630-100 Series Clip-On Extensometers





Operator's Guide

INSTRON

Amendment Incorporation Record		
AMENDMENT NUMBER	BRIEF DESCRIPTION OF CONTENT	NAME OF PERSON INCORPORATING AMENDMENT
1	Additional information covering Phase 2 and Phase 3 extensometers	Siân Oakes
2	Wire clip information amended. Issue raised to C, ECR35152	Siân Oakes
3		
4		
5		
6		
7		
8		
9		
10		

Amendment Incorporation Record		
AMENDMENT NUMBER	BRIEF DESCRIPTION OF CONTENT	NAME OF PERSON INCORPORATING AMENDMENT
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		

GENERAL SAFETY PRECAUTIONS

Materials testing systems are potentially hazardous!

Materials testing involves inherent hazards from high forces, rapid motions and stored energy. You must be aware of all moving and operating components which are potentially hazardous, particularly the actuator in a servohydraulic testing system or the moving crosshead in an electromechanical testing system.

Always be aware of the possible hazards involved when operating and maintaining these systems. You must not operate any materials testing equipment unless you are thoroughly familiar with its functions and operation. Unfamiliarity with a materials testing system can lead to unexpected actuator or crosshead motion with the consequent risk of injury and damage.

Carefully read all relevant manuals and observe all WARNINGS and CAUTIONS. The term WARNING is used where a hazard may lead to injury or death. The term CAUTION is used where a hazard may lead to damage to equipment or to loss of data.

Ensure that the test set-up to be followed and the actual test to be performed on materials, assemblies or structures constitutes no hazard to operating personnel.

Make full use of all mechanical and electronic limits features. These are supplied for your

safety to enable you to prevent movement of the actuator piston / moving crosshead beyond the desired regions of operation.

The following pages detail various general warnings that you must heed at all times while using materials testing equipment. More specific warnings and cautions will be found in the text whenever your attention needs to be drawn to a potential hazard.

Your best safety precautions are to gain a thorough understanding of the equipment by reading your instruction manuals and to always use good judgement.

WARNING

DISCONNECT THE ELECTRICAL POWER SUPPLY BEFORE REMOVING THE COVERS OF ELECTRICAL EQUIPMENT

You must disconnect the equipment from the electrical power supply before removing any electrical safety covers or replacing fuses. Do not reconnect the main power source while the covers are removed unless you are specifically instructed to do so in the manual. Refit covers as soon as possible.

DISCONNECT POWER SUPPLIES BEFORE REMOVING THE COVERS OF ROTATING MACHINERY.

You must disconnect the equipment from all power supplies before removing any cover

which gives access to rotating machinery, e.g. belts, screws or shafts. Do not reconnect any power supply while the covers are removed unless you are specifically instructed to do so in the manual. If the equipment needs to be operated to perform maintenance tasks with the covers removed, ensure that all loose clothing, long hair, etc. is tied back. Refit covers as soon as possible.

WARNING

SHUT DOWN THE HYDRAULIC POWER SUPPLY AND DISCHARGE HYDRAULIC PRESSURE BEFORE DISCONNECTION OF ANY HYDRAULIC FLUID COUPLING.

Do not disconnect any hydraulic coupling without first shutting down the hydraulic power supply and discharging stored pressure to zero. Tie down or otherwise secure all pressurised hoses to prevent movement during system operation and to prevent the hose from whipping about in the event of a rupture.

SHUT OFF THE SUPPLY OF COMPRESSED GAS AND DISCHARGE RESIDUAL GAS PRESSURE BEFORE DISCONNECTION OF ANY COMPRESSED GAS COUPLING.

Do not release gas connections without first disconnecting the gas supply and discharging any residual pressure to zero.

WARNING

USE PROTECTIVE SHIELDS OR SCREENS IF ANY POSSIBILITY OF A HAZARD EXISTS FROM THE FAILURE OF A SPECIMEN, ASSEMBLY OR STRUCTURE UNDER TEST.

Protective shields should be used whenever a risk of injury to operators and observers exists from the failure of a test specimen, assembly or structure, particularly where explosive disintegration may occur. Due to the wide range of specimen materials, assemblies or structures that may be tested using materials testing equipment, any hazard resulting from the failure of a test specimen, assembly or structure is entirely the responsibility of the owner and user of the equipment.

PROTECT ELECTRICAL CABLES FROM DAMAGE AND INADVERTENT DISCONNECTION.

The sudden loss of controlling and feedback signals which can result from a disconnected or damaged cable causes an open loop condition which may drive the actuator of crosshead rapidly to its extremes of motion. All electrical cables, particularly transducer cables, must be

protected from damage. Never route cables across the floor without protection, nor suspend cables overhead under excessive strain. Use paddings to avoid chafing where cables are routed around corners or through wall openings.

WARNING

WEAR PROTECTIVE CLOTHING WHEN HANDLING EQUIPMENT AT EXTREMES OF TEMPERATURE.

Materials testing is often carried out at non-ambient temperatures using ovens, furnaces or cryogenic chambers. Extreme temperature means an operating temperature exceeding +60 °C (140 °F) or below 0 °C (32 °F). You must use protective clothing, such as gloves, when handling equipment at these temperatures. A warning notice concerning low or high temperature operation must be displayed whenever temperature control equipment is in use. You should note that the hazard from extreme temperature can extend beyond the immediate area of the test.

TAKE CARE WHEN INSTALLING OR REMOVING A SPECIMEN, ASSEMBLY OR STRUCTURE.

Installation or removal of a specimen, assembly of structure involves working inside the hazard area between the grips or fixtures. Keep clear of the jaws of a grip or fixture at all times. Keep clear of the hazard area between the grips or fixtures during actuator or crosshead

movement. Ensure that all actuator or crosshead movements necessary for installation or removal are slow and, where possible, at a low force setting.

WARNING

BEFORE THE EXTENSOMETER IS USED IN STRAIN CONTROL, CHECK THE FOLLOWING:

1. Ensure that the extensometer is securely attached to the specimen.
2. Ensure that the extensometer is calibrated.
3. Set the Load, Position and Strain limits.
4. Ensure that the testing machine loop-shaping parameters are set correctly.

BEFORE REMOVING THE EXTENSOMETER FROM THE SPECIMEN AT ANY TIME, ENSURE THAT THE MACHINE IS NOT IN STRAIN CONTROL!

Table Of Contents

LIST OF ILLUSTRATIONS

List of Tables

INTRODUCTION

GENERAL

The 2630-100 series extensometers convert the mechanical displacement of a strained test specimen into an electrical signal. When used with the current range of Instron testing machines, each extensometer is automatically recognised, and is able to be calibrated at the touch of a button.

The displacement is transmitted by a light rigid frame to strain gauges bonded to a flexural element. The gauges are arranged in a fully active four-arm Wheatstone Bridge circuit.

The 2630-100 series of extensometers includes different gauge lengths/strain range options to suit a wide range of specimen characteristics.

Robust construction provides accuracy and reliability. As with all measuring instruments, rough handling, contamination with dirt and moisture effect calibration and shorten the life of the instrument.

The extensometer is supplied in a foam-lined presentation case, dimensions 350 mm (13.8 in.) long, 260 mm (10.2 in.) wide and 85 mm (3.3 in.) deep. The shipping weight is 0.9 kg (2 lbs).

When not in use, the extensometer should be stored in the presentation case.

BASIC FEATURES

- Ergonomic, lightweight, cross-braced design with overload protection.
- Easy attachment and release from the specimen facilitate single-handed operation.
- Simple, cone latch gauge-length setting method with automatic disengagement.
- Precise, fixed gauge-lengths with automatic recognition and calibration capability.
- Available in metric and U.S. Customary versions to meet ISO 9513 and ASTM E83 standards of accuracy.
- Low operating-force arms with single-bevel, interchangeable knife edges.
- Suitable for a wide range of specimen materials, geometry and size with a choice of attachment methods.
- Combined cable cleat and extensometer holder with provision for retaining cord attachment to the extensometer.
- High impact plastic storage case with a contour moulded insert, securely retains the extensometer

and accessory parts together with its Calibration Certificate and comprehensive operating manual.

EQUIPMENT SUPPLIED

Refer to Figure 1-1.

1 Extensometer
2 Cable cleat and extensometer holder
3 Allen key
4 11 pairs of wire clips
5 Specimen centering stops
6 Operator's guide
7 Calibration certificate
8 Foam lined presentation case

OPTIONAL ACCESSORIES & SPARES

1 Variable pressure specimen clamps: see page 3-5.

2 Replacement knife edges, one pair, straight profile. All purpose use on round and rectangular cross section specimens. Cat No. 2601-077.

3 Replacement knife edges, one pair. Three point contact for flat specimens that are not truly flat. Cat No. 2601-078.

4 Replacement knife edges one pair. Radiused edge for flat specimens that are not truly flat. Cat No. 2601-079.

5 Digital Readout Extensometer Calibrator for manual span setting. Cat No. 2602-017.

7 Wire clips (see Appendix A).

8 O-Rings, internal diameter 11 mm unstretched. (Instron Part No. T1351-1034).

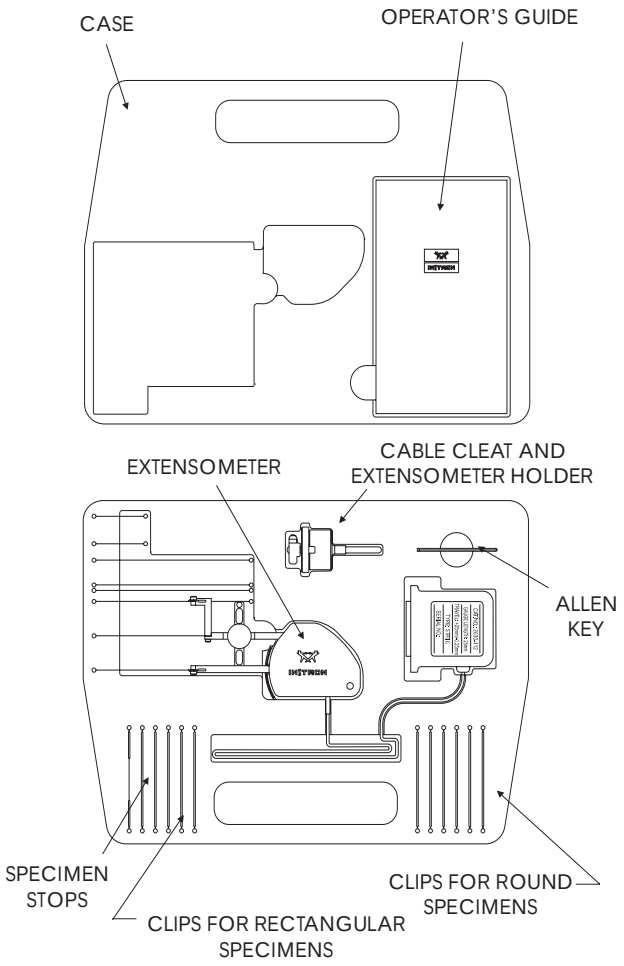


Figure 1-1. Case Layout

SPECIFICATION

Table 1. Extensometer Gauge Lengths and Travel

G.L mm (in.)	Strain %		Travel mm (in.)		Cat. No.	*Class ISO 9513 (ASTM E83) Strain %		Overall Dimensions mm (in.)			Operating Force g (lbs)	+Weight g (lbs)	Code Type
	+ve	-ve	+ve	-ve	2630-	Class 0.5 (B-2)	Class 1 (C)	Length	Width	Height			
8	50	50	4	4	120	0, +50	30, +50	67 (2.64)	39 (1.5)	25 (1)	20 (0.04)	27 (0.06)	Dual
(0.3)	50	50	(0.15)	(0.15)	121	0, +50	30, +50	67 (2.64)	39 (1.5)	25 (1)	20 (0.04)	27 (0.06)	Dual
10	10	10	1	1	101	-10, +10		67 (2.6)	39 (1.5)	25 (1)	160 (0.35)	27 (0.06)	Single
10	50	50	5	5	102	0, +50	30, +50	67 (2.64)	39 (1.5)	25 (1)	20 (0.04)	27 (0.06)	Single
(0.5)	10	10	(0.05)	(0.05)	103	-10, +10		67 (2.64)	39 (1.5)	25 (1)	170 (0.37)	27 (0.06)	Single
(0.5)	50	50	(0.25)	(0.25)	104	0, +50	30, +50	67 (2.64)	39 (1.5)	25 (1)	20 (0.4)	27 (0.06)	Single
25	10	10	2.5	2.5	105	-10, +10		100 (4)	39 (1.5)	52 (2)	55 (0.12)	56 (0.12)	Single
25	50	10	12.5	2.5	106	0, +50		115 (4.5)	39 (1.5)	58 (2.3)	75 (0.17)	58 (0.13)	Single
25	100	10	25	2.5	107	0, +70	0, +100	132 (5.2)	39 (1.5)	69 (2.7)	45 (0.1)	60 (0.13)	Single
(1)	10	10	(0.1)	(0.1)	108	-10, +10		100 (4)	39 (1.5)	52 (2)	56 (0.12)	56 (0.12)	Single

G.L mm (in.)	Strain %		Travel mm (in.)		Cat. No.	*Class ISO 9513 (ASTM E83) Strain %		Overall Dimensions mm (in.)			Operating Force g (lbs)	+Weight g (lbs)	Code Type
	+ve	-ve	+ve	-ve	2630-	Class 0.5 (B-2)	Class 1 (C)	Length	Width	Height			
(1)	50	10	(0.5)	(0.1)	109	0, +50		115 (4.5)	39 (1.5)	58 (2.3)	75 (0.17)	58 (0.13)	Single
(1)	100	10	(1)	(0.1)	110	0, +70	0, +100	132 (5.2)	39 (1.5)	69 (2.7)	45 (0.1)	60 (0.13)	Single
50	10	10	5	5	111	-10, +10		100 (4)	39 (1.5)	72 (2.8)	45 (0.1)	60 (0.13)	Single
50	50	5	25	2.5	112	0, +35	0, +50	132 (3.2)	39 (1.5)	72 (2.8)	45 (0.1)	60 (0.13)	Single
50	100	10	50	5	113	0, +70	0, +100	181 (7.1)	39 (1.5)	72 (2.8)	37 (0.08)	70 (0.15)	Dual
(2)	10	10	(0.2)	(0.2)	114	-10, +10		100 (4)	39 (1.5)	72 (2.8)	45 (0.1)	60 (0.13)	Single
(2)	50	5	(1)	(0.1)	115	0, +35	0, +50	132 (5.2)	39 (1.5)	72 (2.8)	45 (0.1)	60 (0.13)	Single
(2)	100	10	(2)	(0.2)	116	0, +70	0, +100	181 (7.1)	39 (1.5)	72 (2.8)	37 (0.08)	70 (0.15)	Dual
80	10	1	8	0.8	117	0, +10		116 (4.6)	39 (1.5)	101 (4)	60 (0.13)	60 (0.13)	Dual
80	50	5	40	4	118	0, +35	0, +50	181 (7.1)	39 (1.5)	101 (4)	45 (0.1)	70 (0.15)	Dual
100	50	5	50	5	119	0, +35	0, +50	181 (7.1)	39 (1.5)	121 (4.8)	37 (0.08)	70 (0.15)	Dual

*: *When calibrated using appropriate calibration apparatus these extensometers are guaranteed to meet the stated classification. Outside these stated ranges the extensometers in compressive mode generally perform to ISO 1.0 or ASTM C classification.*

+: *Weight excludes cable and connector.*

Table 2. General Specification

Creep (3 mins - 5 secs)	<± 0.15	% of FS
Repeatability	<0.1	% of FS
Hysteresis	<0.3	% of FS
Balance	<± 2.5	% of FS
Excitation	1 to 5 Vrms, d.c. to 5 kHz	
Sensitivity (full scale)	2.5 +1 % -3 %	mV/V
Overtravel limit	Mechanical stops	
Electrical calibration accuracy	± 0.06	% of FS
Bridge resistance (nominal)	350	Ω
Gauge length accuracy	± 0.5	% of GL
Temperature range	-100 to +200	°C
Temperature effect on zero	± 0.01	% /°C

Effect of Temperature on sensitivity	-0.006, 20 to 100 °C (typical) -0.008, 100 to 150 °C (typical) -0.01, 150 to 200 °C (typical)	% /°C
Method of attachment to Specimen	11 types of wire clips. Elastic bands (not supplied). Optional specimen clamps (refer to page 3-5).	
Immersibility	Non-conductive / non-corrosive fluids, i.e. acetone, mineral and silicone oils, alcohol, etc.	
Gauge length setting	Cone latch with automatic release	
Round specimen sizes	<15, (0.6 in.) and 20 (0.8 in.)	mm
Rectangular specimen sizes	Width <40 (1.6 in.) Thickness <15, (0.6 in.)	mm
Knife edge gripping force	300 to 600 (0.66 to 1.32 lbs), subject to the correct selection of clips	grams
Maximum width of specimen with specimen stops fitted	18 mm (0.71 in.)	

NOTE FS — Full Scale. All values relate to a temperature of 22 °C unless otherwise stated.

Table 3. Machine Compatibility

The extensometer connector plugs contain codes which are used by the testing machine to define gauge length, travel and calibration points. The extensometers are fitted with either a single code or dual codes, as shown in Table 1.

Machine Series	Automatic Electrical Calibration	Manual Electrical Calibration	Manual Mechanical Calibration	Comments
8000	All	Not available	All	Via user-defined transducer setup using first code only.
8500 prior to V21	Single code only	Single code only	Single code only	Versions may be identified via the front panel or MDC board label.
8500 V21	All except 2630-119, 120, 121	All except 2630-119, 120, 121	All except 2630-119, 120, 121	
8500 Plus	All	All	All	

Machine Series	Automatic Electrical Calibration	Manual Electrical Calibration	Manual Mechanical Calibration	Comments
6000	All	Not available	All	Via user-defined transducer setup using first code only.
4500 prior to V2.25MS04	Single code only	All	All	Version may be identified via the Master board label.
4500 post V2.25MS04	All except 2630-120, 121	All	All	
4500 Post V2.25MS05 or later	All	All	All	
4200/4300 CPU card with PROMs prior to A474-717, 718, 719, 720	Single code only	All	All	Check CPU card.
4200/4300 CPU card with PROMs A474-717, 718, 719, 720	All except 2630-120, 121	All	All	

Machine Series	Automatic Electrical Calibration	Manual Electrical Calibration	Manual Mechanical Calibration	Comments
4200/4300 CPU card with PROMS A474-736, 737, 738, 739 or later	All	All	All	Check CPU card.
2180/2160	Not available	All	All	
1100	No	All	All	
4400	All except 2630-120,121	All	All	
4400 PROM A474-740 or later	All	All	All	
5500 Pre-Dec 93	All except 2630-120, 121	All	All	
5500 Post-Dec 93	All	All	All	

ENVIRONMENTAL

The extensometer's simple and easy attachment method make it ideal for use in a temperature chamber.

The extensometer's temperature capability is stated in Table 2.

High relative humidity may alter calibration and it is advisable to confirm the calibration using a suitable calibration fixture at the test condition.

CAUTION:

Contamination by condensation, electrically conducting fluids, dirt or corrosive substances may damage the extensometer.

Table 4.
Extensometer Physical Compatibility with 3119 Series Temperature Chambers

Chamber Cat. No.	Suitable Extensometers
3119-005	All except 2630-113, 116, 118 and 119
3119-006	All except 2630-113, 116, 118 and 119
3119-007	All
3119-008	All
3119-009	All except 2630-113, 116, 118 and 119

OPERATION

GAUGE LENGTH SETTING

Before strain can be accurately measured the extensometer arms must be spaced to set the knife edges at gauge length. The extensometer features an integral cone latch arm locating system.

To set gauge length press the two round buttons with index finger and thumb of either left or right hand. Ensure the cone locates in the cone-seat. The extensometer knife edges are now held at the correct gauge length. The extensometer is ready for attaching to a test specimen (refer to Figures 3-1 and 3-2).

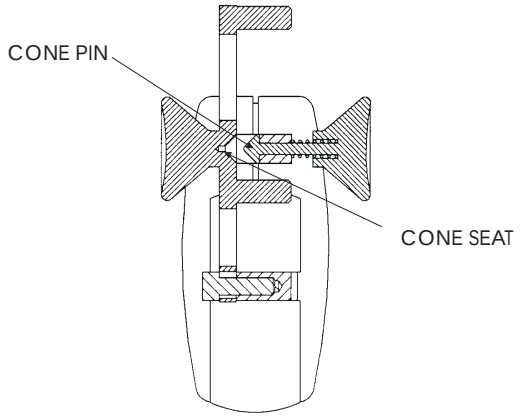


Figure 3-1. Gauge Length Setting with the cone-latch released

Verification of gauge length may be confirmed by engaging the gauge length cone latch and checking the distance between the knife edges using either callipers or a slip gauge.

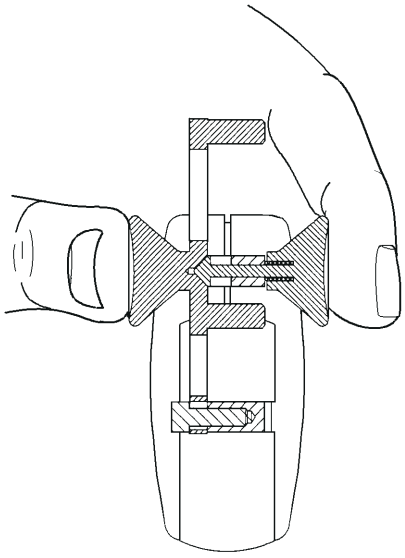


Figure 3-2. Gauge Length Setting with the cone-latch engaged (gauge length set)

SPECIMEN ATTACHMENT

For accurate results, effective attachment of the extensometer to the specimen is essential. Test results may be altered if the knife edges press too firmly into the specimen. A sign of excessive knife edge pressure is breaking of the specimen at the knife edge point of contact. At the other extreme, with low knife edge pressure, slippage may occur. This can be identified from a stress v strain graph by a rapid change in strain for a small change in stress. If a test is to involve strains greater than 10%, a higher clamping force may be required.

A number of different attachment methods are available offering the flexibility to suit a wide range of testing conditions. Care during attachment should avoid any difficulties and permit the optimum knife edge pressure to be achieved.

Knife edges should be replaced if blunt, as described on page 3-12.

Wire Clip

Clips are available in two profiles to accommodate round and rectangular specimens. It is important for good results to select the clip that best suits the specimen. Appendix A gives full size scale diagrams of the available clips with information on the optimum working range for each clip. The clips mount into the extensometer arms from either side,

using the technique shown in Figure 3-3. Figure 3-4 shows the wire clip in operation holding the extensometer to a typical specimen.

Once the wire clip is selected and a test specimen is correctly installed in the testing machine grips the extensometer can be attached.

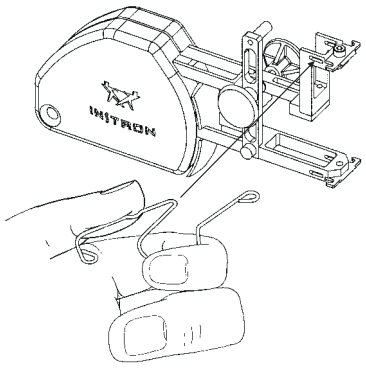


Figure 3-3. Insertion of Clips

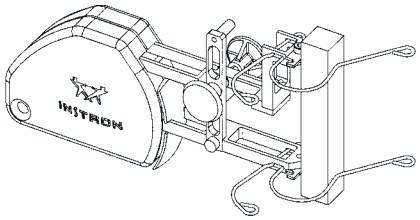


Figure 3-4. Wire clips in use

Variable Pressure Specimen Clamp

If preferred, the instrument may be changed to use variable pressure specimen clamps as supplied on earlier 2630 series instruments. This requires optional notch pivot knife edges to permit the use of specimen clamps.

Specimen clamps are an optional extra and can be ordered from Instron using the following Catalogue Numbers:
Cat No. 2601-081, specimen clamp and knife edges — Small, minimum gauge length 10 mm. Accommodates round specimens 1 to 9 mm in diameter or flat specimens to 9 mm wide and 1 to 10 mm thick.
Cat No. 2601-082, specimen clamp and knife edges — Medium, minimum gauge length 25 mm. Accommodates round specimens 1 to 15 mm in diameter in diameter or flat specimens to 14 mm wide and 1 to 18 mm thick.
Cat No. 2601-083, specimen clamp and knife edges — Large, minimum gauge length 25 mm. Accommodates round specimens 1 to 10 mm in diameter or flat specimens to 25 mm wide and 1 to 10 mm thick.

To fit the Extensometer to the Specimen

Hold the extensometer with the Gauge Length cone-latch engaged and position the knife edges against the test specimen. Holding a specimen clamp, straddle the

specimen above the knife edges of the extensometer. Press the clamp against the specimen to compress the spring loaded plunger and hook the specimen clamp on the knife edges. Ensure that the knife edge seats properly in the specimen clamp notch pivot. Repeat the same operation on the lower specimen clamp.
When testing round specimens, align the "V" groove of the spring-loaded plunger before straddling the specimen.

Note that the notch pivot slots in the specimen clamp should always point away from the gauge length, as shown below.

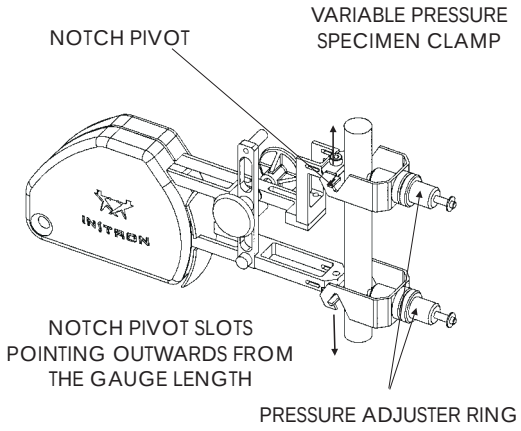


Figure 3-5. Specimen attachment using the optional Specimen Clamps and Pivot Knife Edges

Elastic Bands or O-Rings

Hooks for elastic bands or O-rings are an integral part of the knife edges, although elastic bands and O-rings are not supplied with the extensometer. Refer to page 1-4 for O-ring details.

Hold the extensometer with the gauge length cone latch engaged and position the knife edges on the test specimen.

Stretch good quality elastic bands or O-rings around the specimen and loop the ends over the two knife edge hooks, as shown in Figure 3-6.

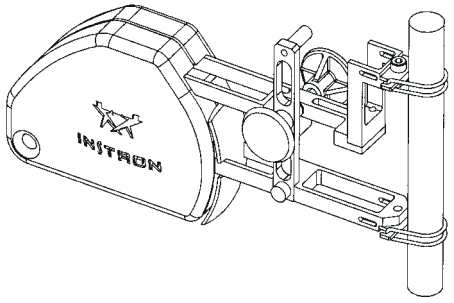


Figure 3-6. Specimen attachment using elastic bands

Fitting to the Specimen using Both Hands

When testing soft or delicate materials, two-handed installation reduces the possibility of marking the specimen.

Hold the extensometer with either hand and engage the gauge length cone-latch. Using the other hand open the wire clips to clear the specimen, as shown in Figure 3-7. Position the extensometer in line with the specimen and gradually release the clips. Once the extensometer is attached to the specimen the gauge length cone-latch can be released. If the extensometer is not held firmly onto the specimen select a smaller clip.

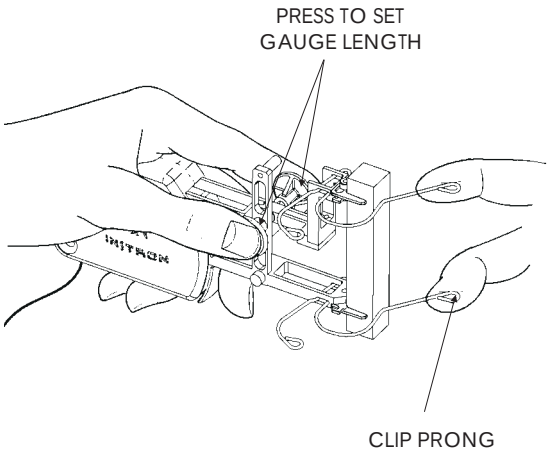


Figure 3-7. Two-handed Installation

Fitting to the Specimen using One Hand

Single handed installation is useful for working in temperature cabinets where access is limited.

Hold the extensometer with either hand and engage the gauge length cone-latch. Hook the wire clip prongs behind the specimen as shown in Figure 3-8. Pull the extensometer to open the wire clips to clear the specimen. Slide the clip against the specimen bringing the extensometer in line with the specimen and gradually release the clips so the knife edges gently touch the specimen. Do not slide the knife edge against the specimen as the specimen may be marked or the knife edge blunted. Once the extensometer is attached to the specimen, release the gauge length cone-latch. If the extensometer is not held firmly onto the specimen select a smaller clip.

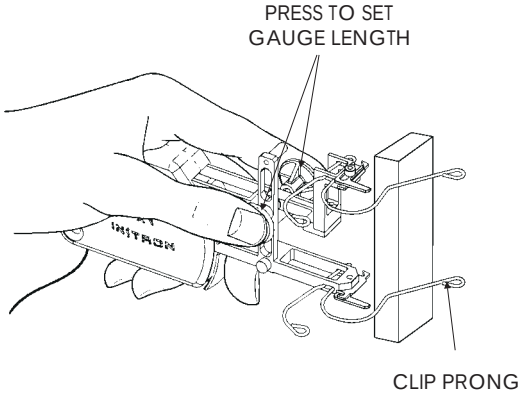


Figure 3-8. Single-handed Installation

CABLE CLEAT AND EXTENSOMETER HOLDER

A combined cable cleat and extensometer holder is provided, and is shown in Figures 3-9 and 3-10.

The magnetic base of the cleat can be attached to steel parts of the testing machine e.g. the column covers. For “T” slot machines with aluminium column covers the special keeper assembly will slide into the “T” slot and then the cleat will attach to the keeper.

The slot in the base of the cleat is used to support the extensometer cable. The cleat should be positioned to reduce the effects of cable tension on the extensometer.

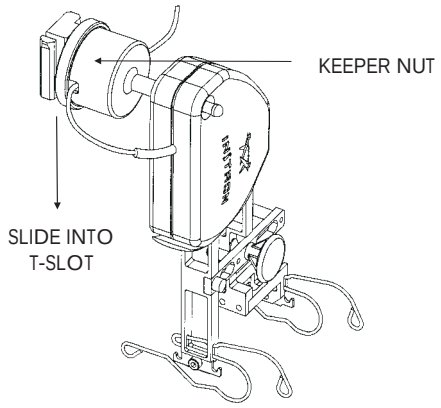


Figure 3-9. Extensometer suspended from cleat post — T-slot machines

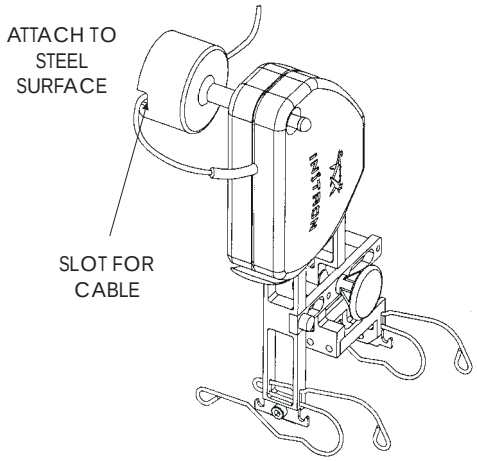


Figure 3-10. Extensometer suspended from cleat post — steel covered machines

When the extensometer is not in use but is still required to be connected to the testing machine, it may be secured to a cleat post using the hole provided in the extensometer cover.

Ensure the cleat is returned to the presentation case, with the magnet attached to the keeper plate when not in use.

KNIFE EDGE CHANGING

Refer to Figure 3-11 below. Loosen the socket head cap screw using the supplied allen key.

Position replacement knife edge with the bevel side of the knife edge furthest from the cut-out in the extensometer arms. Secure with socket head cap screw ensuring alignment faces of the knife edge and extensometer touch.

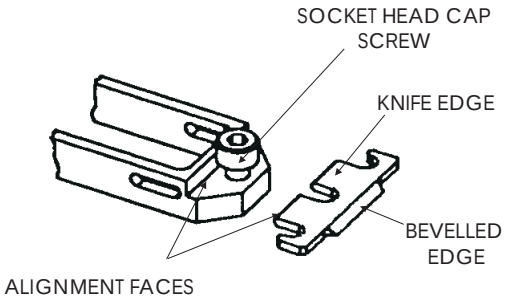


Figure 3-11. Knife Edge Replacement

SPECIMEN CENTERING STOPS

Precise alignment of the extensometer is necessary to ensure the correct measurement of strain in a specimen and to enable rapid, precise attachment to the specimen. To achieve this a pair of optional stops are supplied to assist with aligning the extensometer relative to the specimen. Graduations are marked on the surface of the stops to allow equal setting.

The installation of a specimen stop is shown below in Figure 3-12.

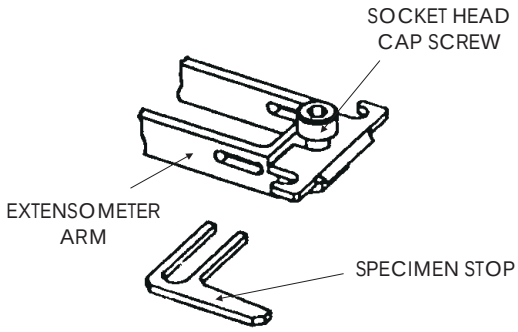


Figure 3-12. Specimen Stops

IMPORTANT SAFETY NOTE

WARNING

BEFORE THE EXTENSOMETER IS USED IN STRAIN CONTROL, CHECK THE FOLLOWING:

1. Ensure that the extensometer is securely attached to the specimen.
2. Ensure that the extensometer is calibrated.
3. Set the Load, Position and Strain limits.
4. Ensure that the testing machine loop-shaping parameters are set correctly.

BEFORE REMOVING THE EXTENSOMETER FROM THE SPECIMEN AT ANY TIME, ENSURE THAT THE MACHINE IS NOT IN STRAIN CONTROL.

CALIBRATION

The extensometer and machine conditioning electronics must be calibrated before use. Three parameters must be defined: full scale, calibration point and gauge length.

Three methods of calibration are possible:

Automatic Electrical Calibration

This is the normal method of calibration for current Instron testing machines. The extensometer is self-identifying via its code resistors. These are interrogated by the testing machine which has the calibration parameters stored within its memory. If the extensometer is to be used on an older Instron machine check compatibility with automatic calibration, refer to page 2-5.

To operate the automatic electrical calibration, refer to the operating instructions or user's guide supplied with the testing machine.

Note: Ensure that the extensometer is set at gauge length, and is correctly attached to the test specimen. Refer to pages 3-1 to 3-8.

Manual Electrical Calibration

This method can be used if your testing machine is unable to use the self-identifying feature or if you wish to modify the calibration parameters.

To operate manual electrical calibration refer to the operating instructions or user's guide supplied with the testing machine.

Note: Ensure that the extensometer is set at gauge length, and is correctly attached to the test specimen. Refer to pages 3-1 to 3-8.

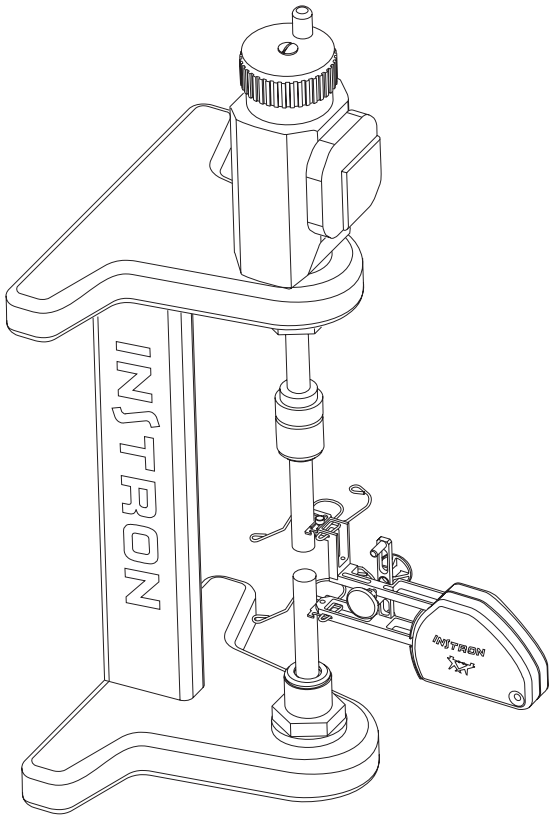


Figure 3-13. Extensometer mounted on an optional calibration fixture (Cat. No. 2602-017)

Manual Mechanical Calibration

This method must be used on older testing machines that are unable to perform any other type of calibration. It is also a way of confirming the electrical calibration.

A calibration fixture is required for manual mechanical calibration (refer to page 1-4 — Optional Accessories and Spares). The fixture consists of a digital micrometer head, mounted on a stand frame, with two knurled collets for holding various calibrator spindles corresponding to types and sizes of specimens to be tested. It enables the extensometer to be exercised over its mechanical displacement range and the span to be checked or set.

Note: Ensure that the extensometer is set at gauge length, and is correctly attached to the Calibrator. Refer to pages 3-1 to 3-8.

VERIFICATION

The achievable ISO or ASTM classification is given in Table 1 on pages 2-1 and 2-2. Certification of the strain measurement system which includes the extensometer, conditioning electronics and readout to the international standards should be arranged through accredited calibration services. Your local Instron area office will be able to arrange verification.

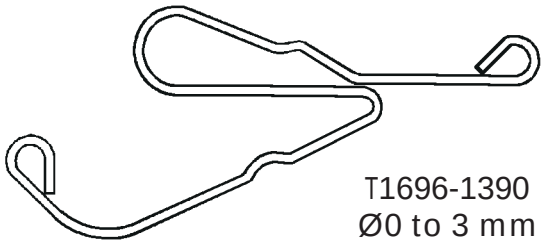
NOTE *It is advisable to check the accuracy of the automatic/manual electrical calibration at least once per year.*

APPENDIX A
CLIP SIZES

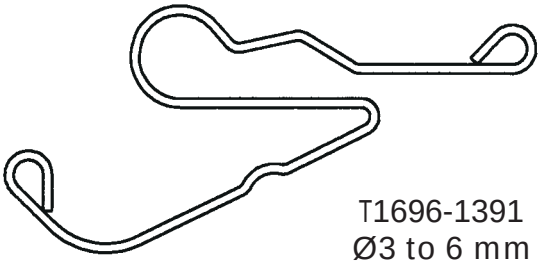
Use the full-scale diagrams on the following pages to identify the various clips supplied with the extensometer.

CLIPS FOR ROUND SPECIMENS

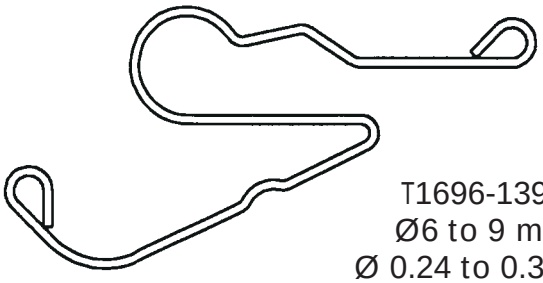
(Supplied in pairs)



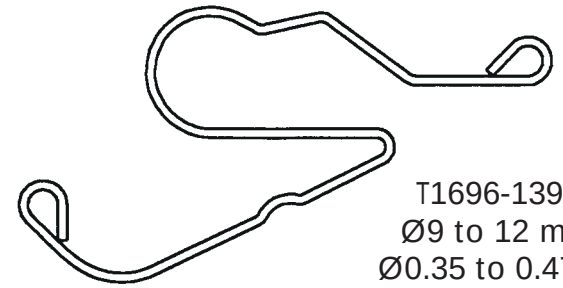
T1696-1390
Ø0 to 3 mm
Ø 0 to 0.12 in.



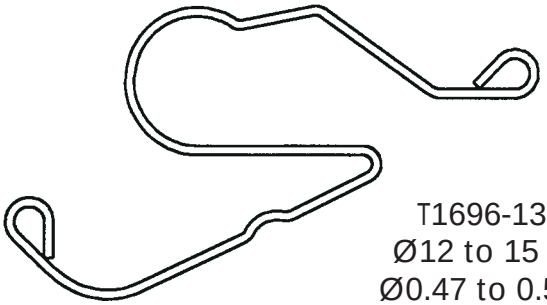
T1696-1391
Ø3 to 6 mm
Ø 0.12 to 0.24 in.



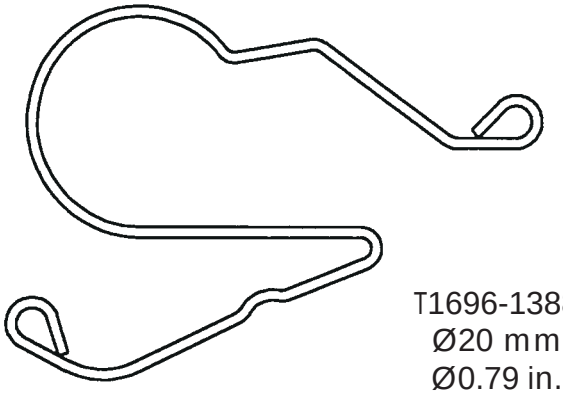
T1696-1392
Ø6 to 9 mm
Ø 0.24 to 0.35 in.



T1696-1393
Ø9 to 12 mm
Ø0.35 to 0.47 in.



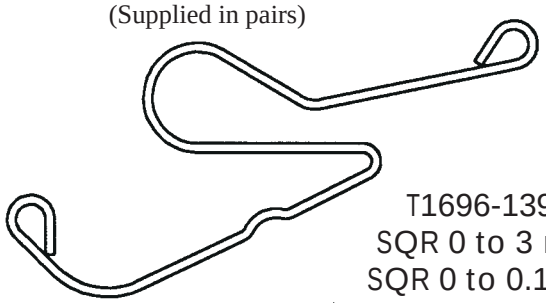
T1696-1394
Ø12 to 15 mm
Ø0.47 to 0.59 in.



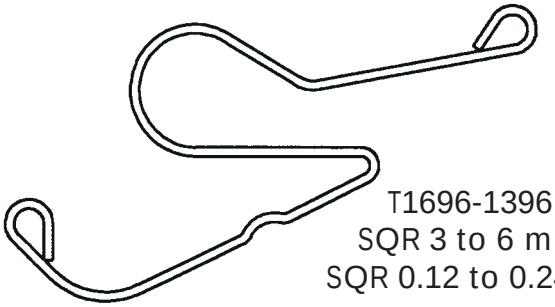
T1696-1388
Ø20 mm
Ø0.79 in.

CLIPS FOR RECTANGULAR SPECIMENS

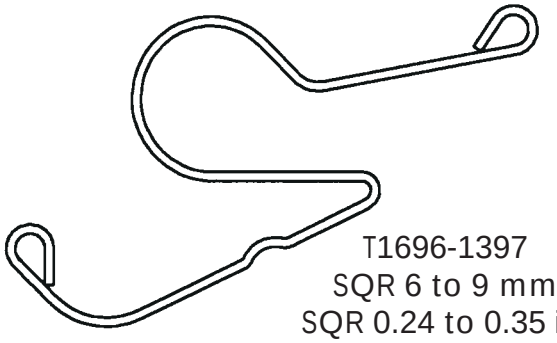
(Supplied in pairs)



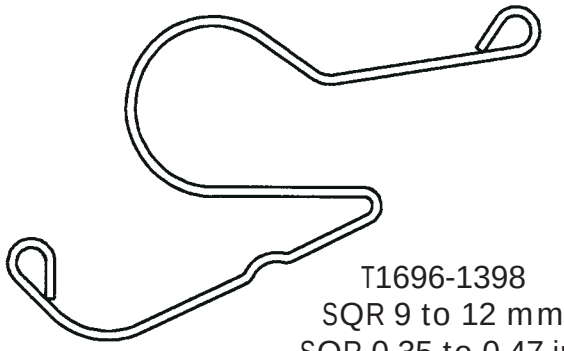
T1696-1395
SQR 0 to 3 mm
SQR 0 to 0.12 in.



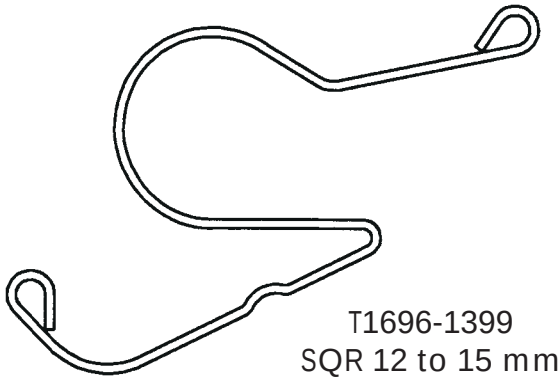
T1696-1396
SQR 3 to 6 mm
SQR 0.12 to 0.24 in.



T1696-1397
SQR 6 to 9 mm
SQR 0.24 to 0.35 in.



T1696-1398
SQR 9 to 12 mm
SQR 0.35 to 0.47 in.



T1696-1399
SQR 12 to 15 mm
SQR 0.47 to 0.59 in.

NOTES