AMETEK®
TEST & CALIBRATION INSTRUMENTS

Part No. 01/3955
July 2014

LS Series
Contacting Extensometer

User Manual

LLOYD™
materials testing

WARRANTY

This instrument is warranted against defects in workmanship, material and design for one (1) year from date of delivery to the extent that AMETEK will, at its sole option, repair or replace the instrument or any part thereof which is defective, provided, however, that this warranty shall not apply to instruments subjected to tampering or, abuse, or exposed to highly corrosive conditions.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES WHETHER EXPRESS OR IMPLIED AND AMETEK HEREBY DISCLAIMS ALL OTHER WARRANTIES, INCLUDING, WITHOUT LIMITATION, ANY WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE OR MERCHANTABILITY. AMETEK SHALL NOT BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING, BUT NOT LIMITED TO, ANY ANTICIPATED OR LOST PROFITS.

This warranty is voidable if the purchaser fails to follow any and all instructions, warnings or cautions in the instrument's Instruction Manual.

If a manufacturing defect is found, AMETEK will replace or repair the instrument or replace any defective part thereof without charge; however, AMETEK's obligation hereunder does not include the cost of transportation, which must be borne by the customer. AMETEK assumes no responsibility for damage in transit, and any claims for such damage should be presented to the carrier by the purchaser.

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ICONS

WARNING
The raised hand icon warns of a situation or condition that may lead to personal injury or death. Do not proceed until the warning is read and thoroughly understood. Warning messages are shown in bold type.

DANGEROUS VOLTAGE
The lightning icon warns of the presence of an uninsulated dangerous voltage within the product enclosure that might be of sufficient magnitude to cause serious shocks or death. Never open the enclosures unless you are an authorized and qualified LLOYD INSTRUMENTS' service personnel. Never open any enclosure when power is connected to the system or its components.

CAUTION
The exclamation point icon indicates a situation or condition that may lead to equipment malfunction or damage. Do not proceed until the caution message is read and thoroughly understood. Caution messages are shown in bold type.

NOTE
The note icon indicates additional or supplementary information about the action, activity or concept. Notes are shown in bold type.

CAUTION

HIGH FORCES ARE OFTEN INVOLVED WITH THE MATERIAL TESTING PROCESSES.

THE ACCESSORY IS POWERED FROM A MATERIALS TESTING MACHINE

TO MAINTAIN ALL ASPECTS OF THE SPECIFICATION, ONLY LLOYD INSTRUMENTS APPROVED ACCESSORIES CONNECTIONS AND COMPONENTS SHOULD BE USED

STRICTLY ADHERE TO ALL SPECIFIED SAFETY PROCEDURES

READ THIS MANUAL AND THE MANUAL FOR THE SPECIFIC MATERIALS TESTING MACHINE BEFORE USING THIS ACCESSORY

THE EXPlus MUST ALWAYS BE FITTED CORRECTLY TO THE APPROPRIATE STAND.

General Safety

General safety precautions must be followed when using this LLOYD INSTRUMENTS product. Failure to observe precautions and warnings may result in damage to the equipment, or injury to personnel.

It is understood that safety rules within companies vary. If a conflict exists between the material contained in all LLOYD INSTRUMENTS' User's Guides and the rules of a company using a LLOYD INSTRUMENTS product, the more stringent rules should take precedence.

Safety Considerations

The EXPlus Series is completely enclosed and provides no potentially hazardous outputs. Safety considerations are related to the power connections and physical mountings.

Electronic and mechanical components housed within the EXPlus Series covers are to be serviced by authorized LLOYD INSTRUMENTS' representatives only.

AMETEK

MEASUREMENT & CALIBRATION TECHNOLOGIES DIVISION

EUROPEAN DECLARATION OF CONFORMITY

NAME, ADDRESS OF MANUFACTURER AND LOCATION OF TECHNICAL CONSTRUCTION FILE

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DESCRIPTION OF EQUIPMENT

Product: Ametek EX Plus Series Extensometer
Models: LLOYD: EX Plus 250 01/3269, EX Plus 800 01/3270, LS EX Plus 250 01/3946, LS EX Plus 800 01/3947

LLOYD materials testing

Effective Date: July 2014

HARMONIZED STANDARDS USED

A sample of this product has been assessed against the essential health and safety requirements of the Low Voltage and the EMC Directives listed below. Based on conformity with the listed directives, Ametek, Inc. declares the products mentioned above are in compliance with the following:

BS EN 61326-1: 2013	Electrical Equipment for Measurement, Control and Laboratory use: General Requirements
BS EN 55011:2009/A1:2010	Industrial, scientific and medical equipment. Radio-frequency disturbance characteristics. Limits and methods of measurement

This declaration of conformity is the result of testing and evaluation performed by Ametek, Inc. and Product Safety Engineering CE testing laboratory. LLOYD is a brand name owned by Ametek, Inc.

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A4716 UL CERTIFIED ISO 9001

ACCREDITED
Certificate Number: 1918.01

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1.0 INTRODUCTION

Welcome to your new EXPlus series extensometer. It is designed to measure extension mechanically by tracking the separation of two arms, which are clamped to the sample by spring pressure. The EXPlus is designed for use with the LS Series of Lloyd Instruments testing machines.

It is principally intended for rubbers, plastics, and other materials with high extension properties. Two lengths of travel are available, 250mm and 800mm.

1.2 SAFETY

Materials testing accessories are very safe to use providing the instructions presented in this manual are followed precisely. We would like to draw your attention to both the Electrical Safety and Precautions sections. Please refer to both sections for details on safe operation of this accessory before operating your materials testing equipment.

1.3 ELECTRICAL SAFETY

1. The EXPlus Extensometer has been designed to be electrically safe for laboratory use.

2. The User Manual contains information and warnings, which have to be followed by the user to ensure safe operation and to keep the accessory in safe condition.

3. The accessory has been designed for indoor use at temperatures between +5ºC and +35ºC (41ºF and 95ºF) without degradation of its safety.

4. Ensure the Material Testing Machine is switched off while connecting or disconnecting the EXPlus.

5. Any maintenance or repair of the accessory must only be carried out by a skilled person who is aware of the hazard involved.

2.0 INSTALLATION

2.1 INSPECTION

The EXPlus on its own, without the packing, weighs up to 15.5 kg (34 lbs). Therefore, safe lifting practices should be employed and lifting accessory used as necessary.

Carefully remove all packing materials.

Please make a careful visual inspection of all the parts supplied to ensure that there is no obvious transit damage.

Please check that you have received all the parts that were ordered.

- Extensometer column – 250mm or 800mm travel
- Two arm assemblies and 4 extra fixing screws
- Six disc, two convex and four parallel knife edges
- 25.0 mm and 50.0 mm gauge rods
- Machine to extensometer interface cables (2)
- Stand assembly – option chosen
- User Manual
- 1.5, 2.0, 2.5, 3.0, 4,0 and 5.0 metric hex keys

If there is any damage, or parts missing, please report them to your authorised LLOYD INSTRUMENTS representative.

2.2 SETTING UP YOUR ACCESSORY

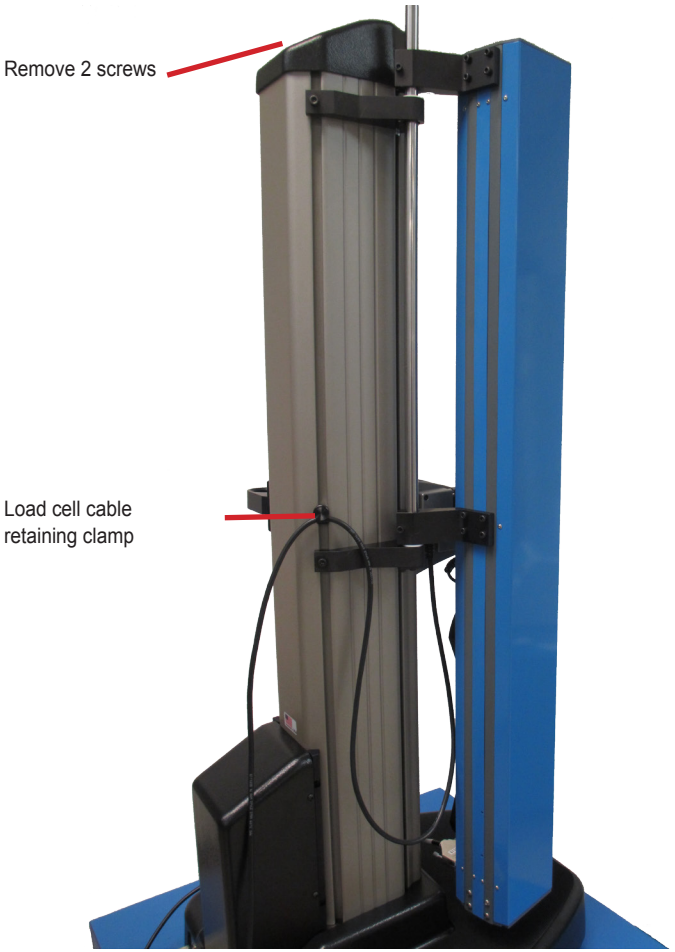
The EXPlus Extensometer is a heavy item and care should be taken in choosing the location where it is to be installed. Ensure the bench is capable of remaining firm and stable, withstanding the combined weight of the machine, extensometer, and any accessories supplied. Please see the Specification page for the weight of the accessory. The EXPlus must be vertical, (parallel to the common axis of the anchor pin and the loadcell eye end), otherwise the results may be affected.

Tools required:

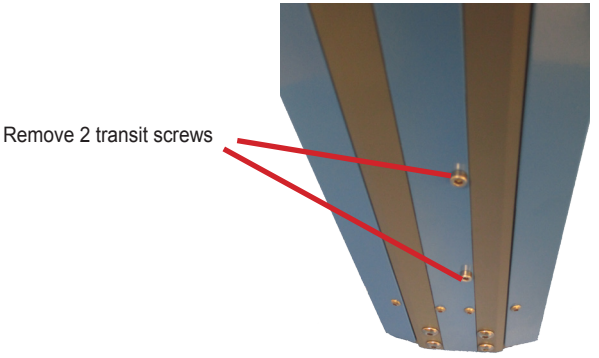
- Pozi-drive screwdriver
- Hex key set (metric), (6 sizes supplied)

2.3 ATTACHING TO THE MATERIALS TESTING MACHINE

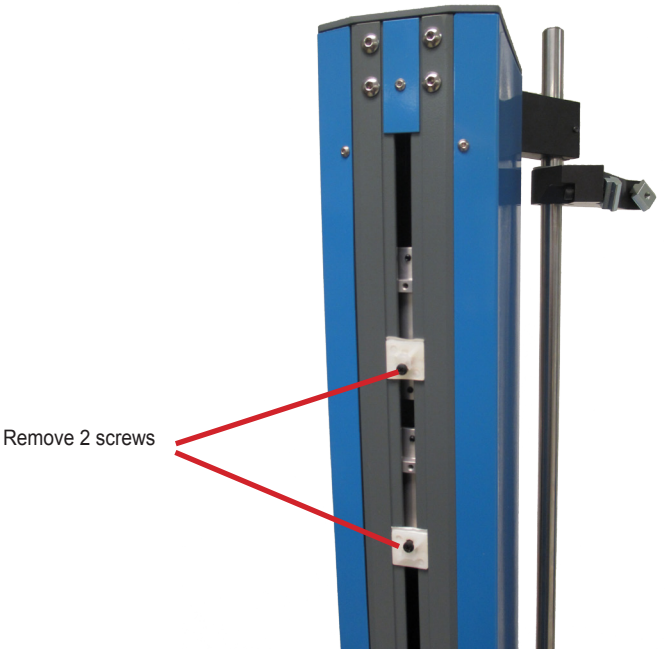
- Remove the top plastic cap by removing 2 screws of the LS series test machine using a hex key provided.
- Loosen and remove the load cell loom retaining clamp.
- Slide the extensometer mount onto the LS column extrusion using the T-Nuts provided with the assembly. Tighten down the T-Nut bolts once the extensometer is in the correct position. Ensure the top extensometer support is below the plastic cap position.
- Reassemble the load cell loom retaining clamp in its previous position.
- Reassemble the top plastic cap of the LS series test machine using a hex key provided.



Remove the transit screws from the column. Two (2) screws are found at the back 95mm and 160mm up from the base holding the counter weights.

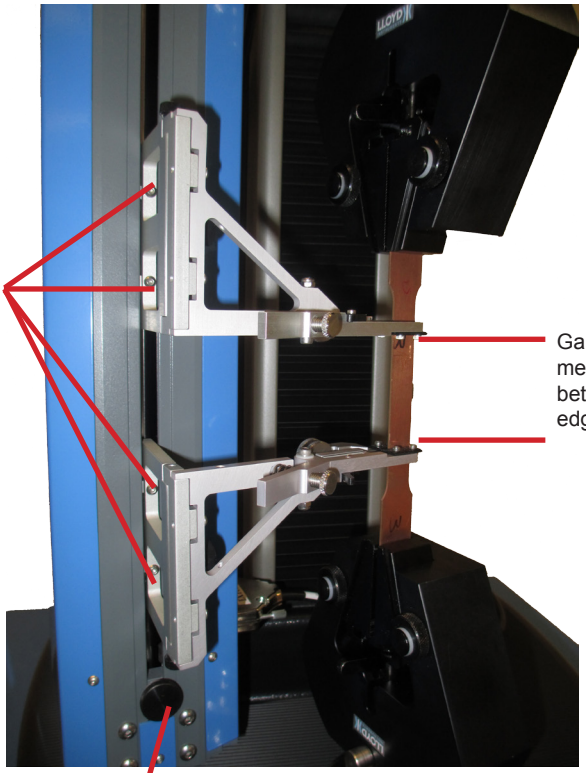


Remove two (2) screws shown below that are at the front holding the arm hubs. Release and lower the adjustable stop.



The two (2) arm assemblies can now be fitted with the screws provided (as shown below). Ensure the arm assemblies are properly located and secured.

The gauge rod fits onto the lower arm. The choice and position of the knife edges is optional as required.



2.4 CONNECTIONS

Use lead part number 09/0917 with EX250Plus or 09/0918 with EX800Plus, supplied in the accessory kit with the EXPlus along with loom assembly 09/1047, to connect the accessory to a machine.

It is important that these ‘smart’ leads are kept with the accessory that they are programmed for and not mixed up with any others.

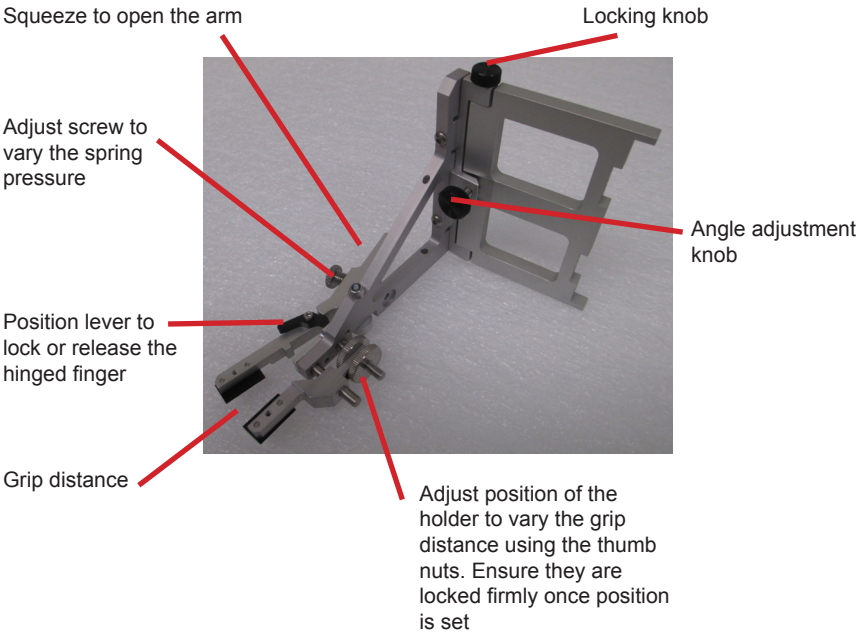
3.0 USING THE EXTENSOMETER

The extensometer can be used on a wide variety of rubbers and plastics in round and flat forms. It can be used where accurate extension of the material under test is required. This is normally the case when using the extension reading to calculate other material properties such as strain, yield point or modulus. Using the machine's internal extension would include errors such as grip slippage, non-linearity of the sample and small movements in the load train.

Swing the extensometer away from the sample (arms away from the sample). Ensure the extensometer is electrically connected to the LS test machine using the two cables provided. Plug in the 37 way cable into the labeled extensometer port on the LS test machine.

Choose a gauge length block and assemble to one of the arms, securing with the nut supplied.

Gauge length blocks available are 10, 25, 50, 80 and 100 mm. The gauge length can be checked by measuring between the knife edges. The arms can be squeezed and locked open with the plastic latches.



The sample can be loaded on the LS test machine between the appropriate grips as shown below. Once the sample is in the desired position and the arms aligned horizontally with the sample rotate the extensometer towards the sample until the knife edges are aligned vertically with the sample and the arms aligned to each other by the gauge length block being firmly sandwiched between the arms.

Carefully close the arms to grip the sample and adjust the width or pressure of the grip to suit. The test can now begin

3.1 PRECAUTIONS

To maximise the useful life of the knives, do not allow them to snap together quickly.

Damage to the extensometer, and particularly the arms, can be avoided by sliding it away from the normal working area of the machine while sample grips are being removed or fitted.

If for any reason the machine needs to be stopped without delay, an emergency stop mushroom switch is provided. Pressing this switch stops the testing machine immediately.

4.0 SAFETY

LLOYD INSTRUMENTS testing equipment is inherently safe if used properly. Operators must be made aware of the following:

1. Samples under test may shatter or fly out.

2. Hands, fingers and other parts of the body must at all times, be kept well away from the moving parts.

3. NEVER drive the equipment when anyone else is working on the equipment.

4. All operators must receive adequate training before being allowed to use the equipment. Additional copies of this manual are available from LLOYD INSTRUMENTS.

5. Operators must ensure that the Emergency Stop Button is never obstructed.

6. Operators must ensure that other personnel working near the area are made aware that testing is taking place and that they should not approach the machine while it is in use.

7. Ensure that the equipment is regularly serviced and calibrated by LLOYD INSTRUMENTS, or one of their accredited service dealers.

8. To maintain EMC compatibility, the accessory should only be used as prescribed in this manual. Connecting cables, plugs and sockets should be inspected regularly. Cables damaged or worn in any way should not be used. Accessory connecting leads, if suspect, should be replaced only with a LLOYD INSTRUMENTS approved replacement. Failure to observe this may cause your accessory to infringe the EMC legal requirements.

9. Never attempt any form of accessory maintenance without disconnecting the mains electrical supply.

5.0 CLEANING AND MAINTENANCE

5.1 CLEANING EXTERNAL FINISH AND TRIM

The finish and appearance of your accessory can be maintained by regular cleaning with a damp cloth containing a small amount of mild detergent. The equipment should be turned OFF and disconnected from the mains supply whilst cleaning is taking place. Strong proprietary cleaners and petroleum based or other solvents should not be used.

CAUTION: Take care to use only a damp cloth. NO moisture must ever be allowed to get into the accessory. Wipe the accessory dry before connecting to the mains supply.

5.2 MAINTENANCE

In normal use and conditions your equipment should be serviced and calibrated annually by LLOYD INSTRUMENTS or one of their appointed agents.

There are no user serviceable or adjustable parts within the accessory, therefore service and calibration should only ever be undertaken by engineers trained for the task.

If the equipment is being used in a particularly arduous way or under extreme conditions, your LLOYD INSTRUMENTS representative may recommend more frequent calibration/service.

5.3 REFITTING OF TRANSIT SCREWS

If the extensometer is to be transported for any reason, to another location, the weights and arms will need to be secured.

To refit the transit screws to the weights, through the rear (refer to page 9), remove the side cover (opposite the connector) to assist location of the holes in the weights.

6.0 ORDERING INFORMATION

01/3946, LS SERIES EX250 PLUS EXTENSOMETER WITH SWING MOUNT
01/3947, LS SERIES EX800 PLUS EXTENSOMETER WITH SWING MOUNT

01/3906, COLUMN SWING MOUNT FOR LS SERIES EX250 PLUS EXTENSOMETER
01/3943, COLUMN SWING MOUNT FOR LS SERIES EX800 PLUS EXTENSOMETER

01/3944, LS SERIES EX250 PLUS EXTENSOMETER - 90°
01/3945, LS SERIES EX800 PLUS EXTENSOMETER - 90°

7.0 SPECIFICATION

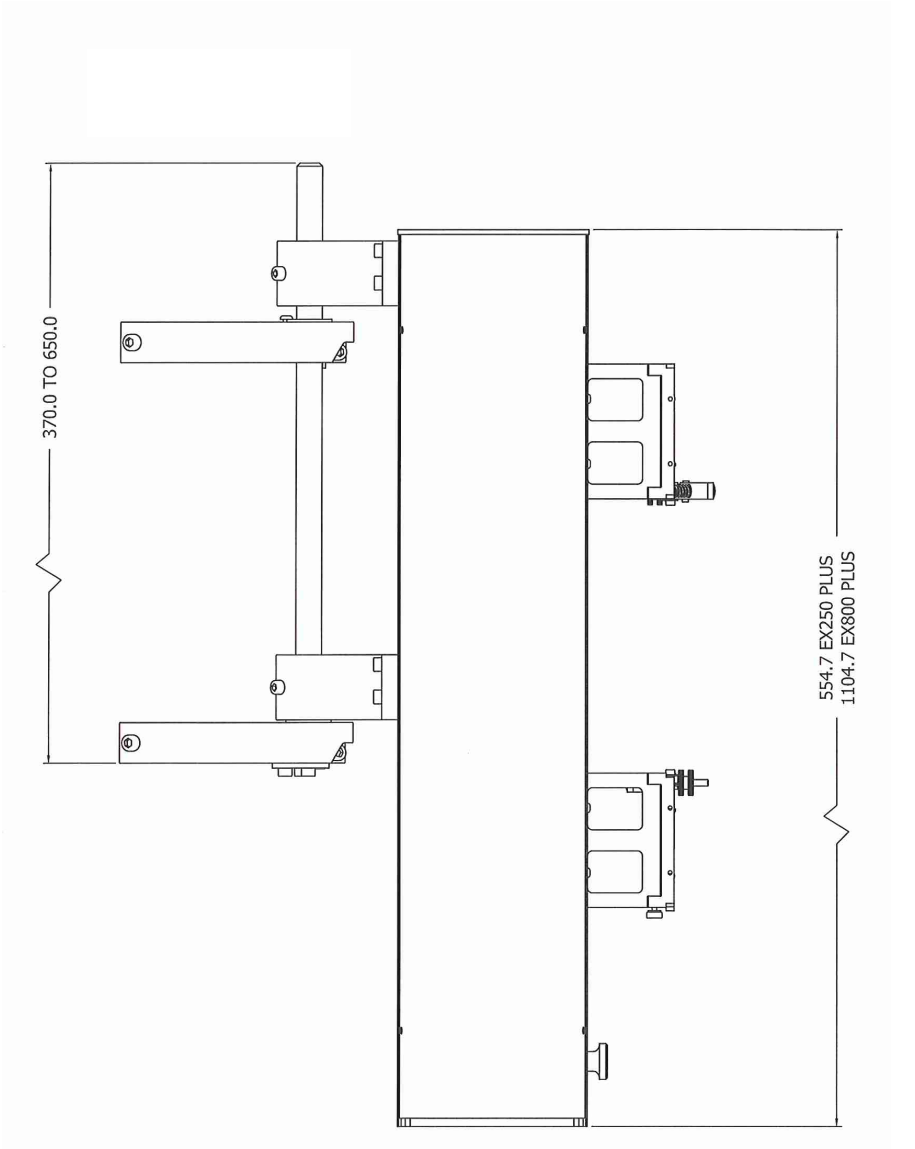
7.1 EX250 Plus

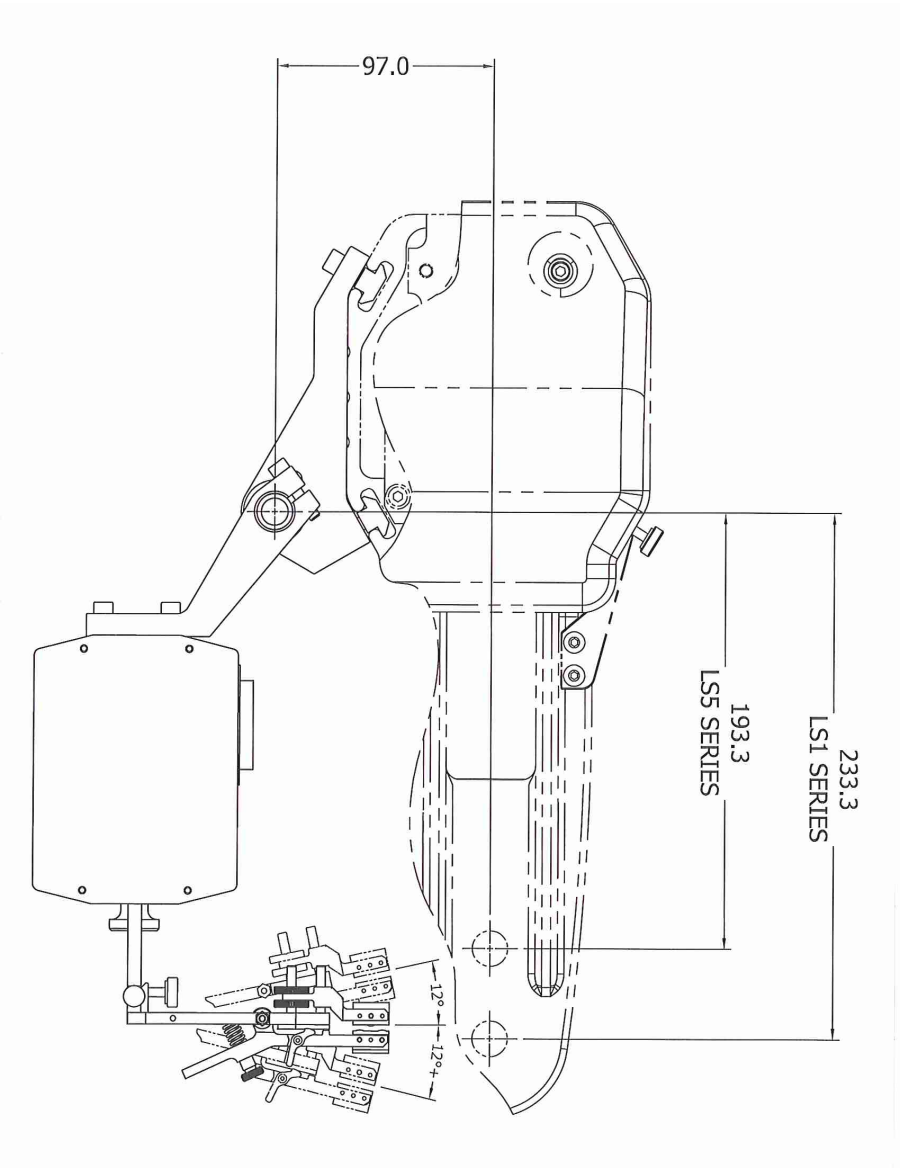
Maximum Travel of Arms	250mm (10 in)
Minimum Gauge Length	10mm (0.4 in)
User Range	1.25 to 250.00mm (0.05 – 10 in)
Maximum Activation Force (Tension)	0.2N (0.045lbf)
Extension Resolution	5 microns (0.0002 in)
Accuracy / Repeatability	1% of reading over the user range
Sample Capacity	25mm x 25mm (1.0 x 1.0 in)
Power Consumption	+5 VDC, 100mA
	+15 VDC, 50mA
	-15 VDC, 50mA
Main Dimensions	
Height (max)	783mm (30.9 in)
Depth	380mm (15.0 in)
Width	200mm (7.9 in)
Mass	6.5kg (14.5 lbs)
	11.5kg (25.5 lbs) with stand
Temperature	
(operating)	5 to 35ºC (40ºF to 95ºF)
(storage)	-20 to 75ºC (4ºF to 130ºF)
Atmospheric	20 to 80% RH (Non- condensing)

7.2 EX800 Plus

Maximum Travel of Arms	800mm (31.5 in)
Minimum Gauge Length	10mm (0.4 in)
User Range	4.0 to 800.0mm (0.16 to 31.5 in)
Maximum Activation Force (Tension)	0.2N (0.045lbf)
Extension Resolution	5 microns (0.0002 in)
Accuracy / Repeatability	1% of reading over the user range
Sample Capacity	25mm x 25mm (1.0 x 1.0 in)
Power Consumption	+5 VDC, 100mA
	+15 VDC, 50mA
	-15 VDC, 50mA
Main Dimensions	
Height (max)	1258mm (49.6 in)
Depth	380mm (15.0 in)
Width	200mm (7.9 in)
Mass	10.0kg (22 lbs)
	15.5kg (34 lbs) with stand
Temperature	
(operating)	5 to 35ºC (40ºF to 95ºF)
(storage)	-20 to 75ºC (4ºF to 130ºF)
Atmospheric	20 to 80% RH (Non- condensing)

7.3 DIMENSIONS




97.0
233.3
LS1 SERIES
193.3
LS5 SERIES
12°
12°

零件或组件名称	有毒的、危险的物质和元素					
	铅(Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr6+)	聚溴化联苯 (PBB)	聚溴化苯基醚 (PBDE)
底盘	O	O	O	O	O	O
柱	O	O	O	O	O	O
移动臂	O	O	O	O	O	O
通讯线	X	O	O	O	O	O
O - 表示危险物含量低于要求限制。 X - 表示危险物含量高于要求限制。						

Part or Assembly Names EXPlus	Toxic and Hazardous Substances and Elements					
	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent Chromium (Cr6+)	Polybrominated biphenyls (PBB)	Polybrominated diphenyl ethers (PBDE)
Chassis	O	O	O	O	O	O
Column	O	O	O	O	O	O
Moving arm	O	O	O	O	O	O
Loom	X	O	O	O	O	O
O - indicates hazardous substance level contained is below the required limit. X - indicates hazardous substance level contained is above the required limit.						

International Symbols

WEEE Directive

This equipment contains electrical and electronic circuits and should not be directly disposed of in a landfill site.

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