AMETEK®
TEST & CALIBRATION INSTRUMENTS

Part No. 01/3461
May 2014

LR_Plus Series and EZ Series Universal Test Machine

User Manual

For Use with the following :
LR5KPLUS
LR10KPLUS
LR30KPLUS
LR50KPLUS
EZ20 & EZ50
LS100PLUS
LR100KPLUS
LR150K PLUS
including all
Extended Travel and Pogo Options

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.

TRADEMARKS

SUPPORT

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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 MACHINE IS POWERED BY MAINS SUPPLY VOLTAGE

CLASS 1 PRODUCT, MUST BE CONNECTED TO A MAINS SOCKET OUTLET WITH A PROTECTIVE EARTH CONNECTION

DO NOT POSITION THE EQUIPMENT SO THAT IT IS DIFFICULT TO OPERATE THE DISCONNECT DEVICE (MACHINE MAINS INLET SOCKET)

IF THE EQUIPMENT IS USED IN A MANOR NOT SPECIFIED BY THE MANUFACTURER, THE PROTECTION PROVIDED BY THE EQUIPMENT MAY BE IMPAIRED

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 BEFORE USING THE MATERIALS TESTING MACHINE.

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 machine 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 machine covers are to be serviced by authorized LLOYD INSTRUMENTS' representatives only.

Printed below is a copy of an AMETEK Lloyd Instruments declaration that the machine you have meets the requirements for CE marking. Actual copies of the certificate for your type of machine may be obtained from AMETEK, Inc. or from our websites.

AMETEK

MEASUREMENT & CALIBRATION TECHNOLOGIES DIVISION

DECLARATION OF CONFORMITY

We: Ametek, Inc.
of 8600 Somerset Drive
Largo, FL 33773,
USA,

In accordance with the following Directive(s):

2006/42/EC The Machinery Directive
2004/108/EC The Electromagnetic Compatibility Directive

Hereby declare that:

The following Lloyd Instruments LLOYD materials testing Dual Column Material Testing Machines (LLOYD is a brand name owned by Ametek, Inc)

Machine	Part No.
LR5kPlus	01/3051, Extended 01/3073, Pogo 01/3075
LR10kPlus	01/3052, Extended 01/3078, Pogo 01/3080
LR30kPlus	01/3160, Extended 01/3192, Pogo 01/3217
LR50kPlus	01/3219, Extended 01/3249, Pogo 01/3219
LR100kPlus	01/3302, Extended 01/3390
LR150kPlus	01/3334, Extended 01/3391
LS100-Plus	01/3174, Extended 01/3301, Pogo 01/3335
EZ20	01/2889, Extended 01/3375, Pogo 01/2949
EZ50	01/2830, Extended 01/3226, Pogo 01/3058

Serial Number: 100000 and up

Are in conformity with the applicable requirements of the following documents

Ref. No.	Title
EN 61010-1:2010	Safety Requirement for Electrical Equipment for measurement, control and laboratory use. General requirements
EN ISO 12100:2010	Safety of Machinery, General Principles for Design – Risk Assessment and Risk Reduction
EN 61326-1: 2006	Electrical equipment for measurement, control and laboratory use, EMC requirements. General requirements
BS EN 61326-2-3: 2006	Electrical equipment for measurement, control and laboratory use. EMC requirements. Particular requirements. Test configuration, operational conditions and performance criteria for transducers with integrated or remote signal conditioning

I hereby declare that the equipment named above has been designed to comply with the relevant sections of the above referenced specifications and is in accordance with the requirements of the Directive(s)

Signed by: .....

Name: Douglas Tilghman
Position: Division Vice President, Engineering
Done at 8600 Somerset Drive, Largo, Florida 33773, USA
On March 10, 2014 Document ref. No. ER-438

The technical documentation for the machinery is available from:

Name: Joel Frie
Position: Division Vice President & Business Unit Manager
Address: Ametek, Inc. Gydevang 32, 3450 Lillerod, Denmark

M4746 UL CERTIFIED ISO 9001

ACCREDITED Certificate Number: 1919.01

TABLE OF CONTENTS

1.0 INTRODUCTION

Welcome to your new Lloyd Instruments™ LR Plus, EZ or LS100 series (Lloyd Instruments machines) advanced, twin column, materials testing machine. This manual is to be used for the following Lloyd Instruments machines:

- LR5K Plus Series
- LR10K Plus Series
- LR30K Plus Series
- LR50K Plus Series
- LR100K Plus Series
- LR150K Plus Series

- EZ20 Series
- EZ50 Series

- LS100 Series

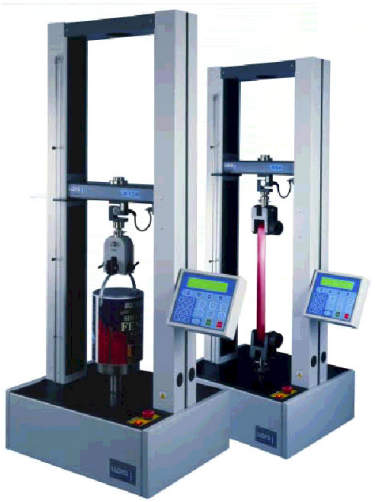
The Lloyd Instruments machines incorporate an extensive range of features making them ideal for performing complex testing applications. The machine is microprocessor controlled and uses world proven 32-bit technology for highly accurate load measurement and rapid data acquisition. The optional integral user interface consists of a side mounted control console with large, positive action membrane switches, allowing complex tests to be performed at the touch of a button.

A large, backlit Liquid Crystal Display shows the test and set-up information in multi-lingual, multi-unit format. The stand alone system is capable of storing up to 600 test results from a choice of 10 programmable test set-ups, or may be connected via its RS232 output to a personal computer running NEXYGEN™ or NEXYGEN PLUS™ software, providing almost unlimited testing capability and result manipulation facilities.

The high stiffness frame incorporates a crosshead guidance system to prevent side loading of the sample under test. The crosshead is driven by twin lead screws and a high precision servomotor and DC servo system to achieve a wide range of speeds throughout the full load range. The machine is capable of running full load at full speed. A range of highly accurate, interchange-able loadcells is available for tension, compression and cycling through zero force measurements. The system is ideal for use in production, quality control, educational and research environments.

All machines are designed to meet a broad range of applications. This is achieved mainly through the embedded control software and easily configurable data acquisition software, available as an optional extra. NEXYGEN or NEXYGEN PLUS software are fully Windows® compliant and compatible, they seamlessly integrate with contemporary Microsoft® Office® programs using OLE2® technology. The programs are easy to use, making use of drop down windows prompts, drag and drop, cut and paste routines. Data can easily be exported to programs such as Excel®, Access®, Outlook® and Powerpoint® for further manipulation, and enhanced presentation. NEXY-GEN™ and NEXYGEN PLUS software contain a library of pre-programmed test setups for conducting fully automated tests, in accordance with international standards.

For additional information about our NEXYGEN software products, please contact the nearest Lloyd Instruments Sales Office.



LRPlus Materials Testing Machines with optional grips and load cell

1.1 SAFETY

Depending on the industry, application, material (to be tested), location (of the use), etc. the final user must take the necessary steps to ensure the safety of the operator, other people, machine and properties by providing guards, shields, screen, adequate lighting and adequate ventilation etc. Furthermore, when the machine is installed, wired and ready for its intended use, the final user must conduct the final Risk Assessment on the machine, including all such safety measures (shield, guard, etc.), to satisfy the requirements of Machinery Directive and EHSR (Essential Health and Safety Requirements).

CAUTION: Materials testing machines are very safe to use providing the instructions presented in this manual are followed precisely. We would like draw your attention to both the Electrical Safety (Section 2.0) and Operational Precautions, (Section 8.0). Please refer to both sections for details on safe operation of this equipment before operating your materials testing machine.

Transparent splinter shields are available as an option to enclose the test sample if there is any danger of samples shattering as a result of the test. These shields have an electronic interlock such that the test cannot be started until the hinged shield is closed. While not mandatory for many applications and countries, AMETEK strongly recommend that users consider fitting this option.

2.0 ELECTRICAL SAFETY

1. The machines have been designed to meet the requirements of BS EN 61010:2001 Safety requirements for electrical equipment for measurement, control and laboratory use.

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

3. The machine has been designed for indoor use. It may occasionally be subjected to temperatures between +5ºC and -10ºC (41ºF and 14ºF) without degradation of its safety.

4. Before switching on the machine make sure that it is set to the voltage of the mains electricity supply.

5. The machines comply with electrical safety grade Class 1, which means that it is an “earthed apparatus” and requires the mains plug to contain a protective earth terminal. The mains plug must only be inserted in a socket outlet provided with a protective earth contact. The protective action must not be negated by the use of an extension cord without a protective conductor.

6. The machine must be disconnected from all voltage sources before it is opened for any adjustments, replacement, maintenance or repair.

7. Capacitors inside the machine may still be charged even if the machine has been disconnected from all voltage sources.

8. Any adjustment, maintenance or repair of the opened machine connect to the mains supply voltage should be avoided as far as possible but if inevitable, must only be carried out by a skilled person who is aware of the hazard involved.

9. Make sure that only fuses with the required rated current and of the specified type are used for replacement. The use of makeshift fuses and the short-circuiting of fuse holders is prohibited.

CAUTION: DOUBLE POLE, LIVE / NEUTRAL FUSING.

3.0 INSTALLATION

3.1 UNPACKING

All packing material should be carefully removed from the testing machine and a careful visual inspection should be made to ensure that there is no obvious transit damage.

The following standard items should be in this package:

- Material Testing Frame
- Console cable. (09/0710) (Not supplied with LR100K Plus or LR150K Plus frames)
- Power input cable
- RS232 cable (09/0639)
- Appropriate Grip/adaptor pins and Anchor pins
- 1 x “C” Spanner, 1 x 5mm Allen Key

Optional equipment, including any of the following, may also accompany your machine:

- Control Console
- NEXYGENPlus Software Package
- RS232 Printer Cable (p/n 09/0721)
- Load Cell
- Gripping Fixture

If there is any damage, or parts missing, please report this to your dealer or AMETEK without delay.

3.2 SETTING UP YOUR MACHINE

If the equipment is used in a manor not specified by the manufacturer, the protection provided by the equipment may be impaired.
The machine should be installed in an area where adequate ambient lighting is present in order to

NOTE: DO NOT to position the equipment so that it is difficult to operate the disconnect device. The mains supply machine socket should be easily accessible to disconnect the mains supply lead in case of emergency.

ensure safe use of equipment

The machines are heavy items and great care should be taken in choosing the location where they are to be installed. If it is to be bench mounted you must ensure the bench is capable of remaining firm and stable, withstanding the combined weight of the machine and any accessories supplied. Please see the Specification page at the end of this manual for the weight of the apparatus. The machine must be vertical, whether bench or floor mounted; otherwise the results may be affected, particularly for very low loads.
Please ensure utmost care is taken when lifting, as the machine is heavy. Lifting equipment should

CAUTION: It must be positioned such that the front of the machine can be easily accessed and that THE EMERGENCY STOP BUTTON IS NOT OBSTRUCTED IN ANY WAY.

be used as necessary.

3.3 LIFTING WITH A PALLET

NOTE: DO NOT use the console as a handle when lifting. The recommended methods are described below.

CAUTION: At no time should the machine be lifted by placing hands under the frame.

All the machines can have a pallet fitted under the machine so that it may be lifted to the desired position with a forklift or suitable lifting trolley.

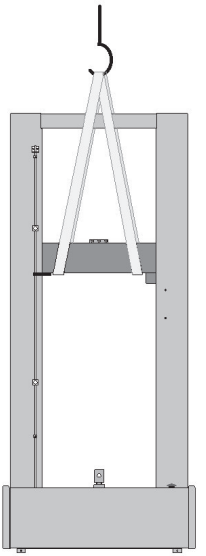
3.4 LIFTING WITH STRAPS

Lifting straps may be situated under the moving crosshead. Ensure the crosshead is padded to avoid damaging the machine. Care should be taken to ensure that the straps do not interfere with the load cell connection socket.

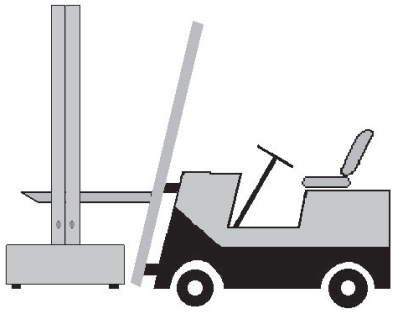
3.5 LIFTING WITH A FORKLIFT

An alternative method is the use of a forklift truck with the forks under the moving crosshead as shown below. Once again ensure the crosshead is well padded to avoid damage to the machine. Ensure the forks do not damage the load cell socket.

3.6 LIFTING WITH EYE BOLTS



Lifting with Straps



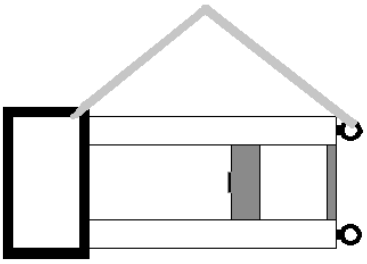
Lifting with Forklift Truck

Eyebolts are supplied with the LR100K Plus and the LR150K Plus. Appropriate rope/lifting straps should be used to lift the machine. Ensure that the rope/lifting straps and the lifting equipment are capable of taking the full weight of the machine.

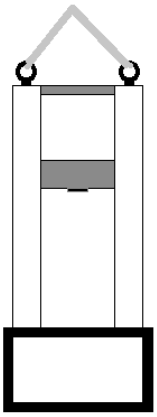
The LR100K Plus and LR150K Plus may be lifted vertically or horizontally (before the base unit covers are fitted) with straps fitted as shown in the sketches below.

In the horizontal lifting mode one of the lifting straps/ropes should be securely attached to the base unit main chassis frame and the other to the appropriate eyebolt.

In the vertical lifting mode the lifting straps/ropes should be firmly attached to both of the eye bolts.



Lifting horizontally with Eye Bolts



Lifting Vertically with Eye Bolts

3.7 SECURING THE MACHINE TO THE BENCH

If you have an LR5K, LR10K, LR30K Plus or EZ materials testing machines, which is to be mounted on a surface lower than 0.9m (3 ft) from the ground, the machine must be secured to the mounting surface.

Method for securing the machine to a supporting surface.

Two holes are provided through the base of the chassis, as indicated in sketch below and 2 M8 bolts, washers, and nuts should be used to secure the machine through these holes to the supporting surface.
To fasten the machine down, remove the two base covers to reveal the holes, which are labelled – 'Hole for securing the machine to a supporting surface'. The pitch of these holes is shown in the sketch below.

Drill the supporting surface to suit M8 clearance. Position the machine over and align the holes. Insert the M8 bolts through the chassis and the supporting surface and fasten with the washers and nuts.

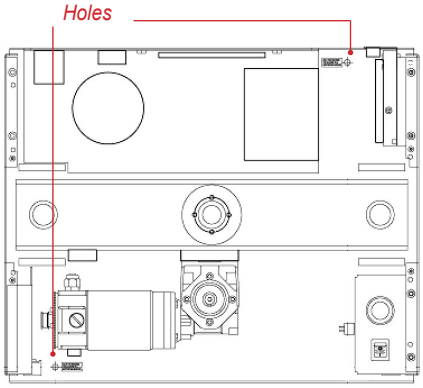
Replace the base covers.

WARNING: If your machine is an LR5K, LR10K, LR30K Plus, or EZ machine it must be secured to a rigid and stable supporting surface, as described in the following instruction. To ignore this requirement disregards the safety standard established for this machine.

3.8 SETTING UP POGO LR PLUS OR EZ

AMETEK produces a range of Lloyd Instruments machines that can be mounted on specially designed frames that can be used for testing a wide range of bulky items such as cardboard cartons, crates and furniture.

These “Pogo” machines have a linear bearing fitted in the fixed lower crosshead through which a rod runs, connecting the load cell and the compression platens mounted below the machine within the frame.



No specific information about setting up a LR Plus Pogo or EZ can be issued with the machine on it’s own because the size and specification of the mounting frame are decided by the customers specific needs.

The mounting frame should be positioned first and the instructions for set-up and wiring supplied with the mounting frame followed closely.

The LR Plus or EZ Pogo will have been supplied to you without the frame mounting plates fitted. The fitting of these plates needs to be carried out prior to the machine being lifted onto the Crusher Frame.

AMETEK recommend that the fitting of these mounting plates is carried out by a Lloyd Instruments appointed commissioning engineer to suit the requirements and needs of the customer.

Full fitting and wiring instructions are supplied with the Crusher Frame. Fitting and wiring of the Emergency Stop Buttons and Console are designed to meet each customer’s specific needs. The positioning of controls is the responsibility of the final user who should ensure, as part of the Risk Assessment, that sufficient stop buttons are provided.

Because the mounting plates protrude from the bottom of the LR Plus and EZ machines, no attempt should be made to stand the machine on its own. It will only be stable when it is fitted and secured to the mounting frame.

Suitable lifting equipment should be employed.

Example Installation of LR Plus Pogo mounted on a Carton Crusher Frame.

The Pogo Rod should be fitted last, once the LR Plus or EZ machine is secured to the top of the frame. Insert the rod through the bearing on the lower (fixed) crosshead of the LR Plus or EZ machine and connect to the Bottom Platen. Connect to the loadcell last.

Ones the machine is installed, wired and ready for its intended use, the final user must conduct the final Risk Assessment on the machine, including all such safety measures (shield, guard etc.), to satisfy the requirements of the Machinery Directive and EHSR (Essential Health and Safety Requirements).

3.9 FITTING AND MOVING THE CONSOLE (OPTIONAL)

The console is fitted to the right side of the machine. The height and the angle of the console may be set to give the best position for viewing and operation.

The height of the console is adjustable over a range of approximately 240mm on a standard machine when using the external connection cable supplied with the machine. If it is required to position the console nearer to the top of the machine or on the side of a compression cage, a longer cable may be obtained from AMETEK.
To connect the console to the machine:

1. Remove the outer two cap head screws from the adjustable backing plate located near the bottom of the right hand column, using the 5mm Allen Key supplied

2. Adjust the backing plate to the required height by loosening the centre cap head screw. Tighten the screw when the backing plate is in the desired position

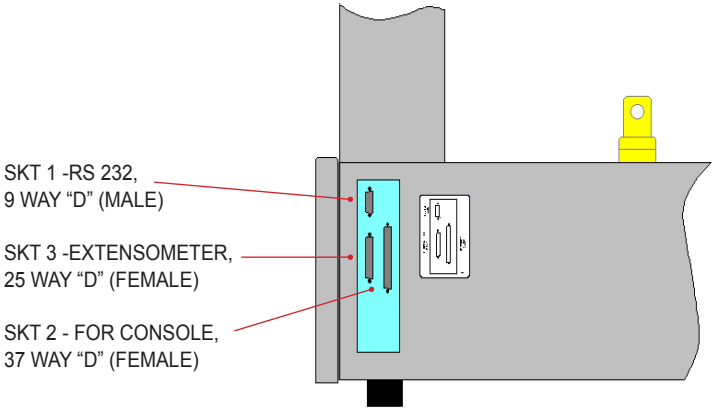
3. Fit the console assembly to the backing plate with the two cap head screws removed earlier. The angle of the console may be set prior to tightening the screws.

4. Plug the 37 way cable into the 37 way socket on the rear of the console and the other end into the socket marked SKT 2 CONSOLE on the back of the machine. Tighten the locking screws to retain both ends of the cable.

NOTE: To maintain EMC compatibility only leads supplied by Lloyd Instruments should be used.

The height of the console cannot be adjusted on these machines and the wiring to the console is housed within the right hand column of the machine.

NOTE: On the LR100K Plus and LR150K Plus the console is factory fitted on the front face of the right hand column, the angle can be set for the best viewing position. The height of the console cannot be adjusted on these machines and the wiring to the console is housed within the right hand column of the machine.



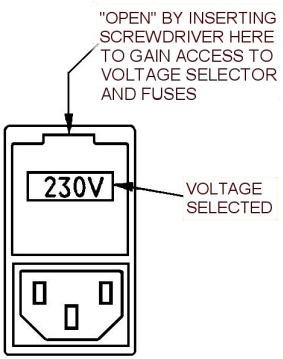
Section of Rear View LR5K, LR10K, LR30K, LR50K Plus EZ and LS100 Plus Machine

3.10 VOLTAGE SELECTION

The Lloyd Instruments machines can be used with electricity supplies of either 230Vac ±10% or 115Vac ±10%. The power input cable should be inserted at the rear of the machine. Before switching on the machine you MUST check the correct voltage has been selected on the mains input connector. Ensure that the selection is correct for the voltage range of your power supply. To change the voltage rating, use a screwdriver to open the voltage selector. The screwdriver should then be used to move the selector from the 115V position to the 230V position as appropriate. You MUST also check that the fuse rating is suitable for the supply voltage that you are using. The fuses (live and neutral) are located inside the power input connector. The fuse ratings for 230V and 115V are given in Section 10: Technical Specifications.

3.11 ON-OFF SWITCH

The power on switch is located on the machine base at the front right of the main base unit. The switch is a rocker type with positions O and I. By selecting I power will be supplied to the machine.



Voltage Selection

3.12 FITTING THE LOAD CELL

Before the machine is powered up, or any test set-ups are entered, the Load Cell should be fitted.

On the LR100K Plus and LR150K Plus the main loadcell is factory fitted.

Carefully unpack the Load Cell(s) supplied with your machine. Please make all operators aware that they are precision load measuring devices and should be treated with great care. Please read SECTION 4.0 LOAD CELLS before proceeding further.

3.13 FITTING LOAD CELLS TO LR100K PLUS AND LR150 K PLUS MACHINES

If a smaller loadcell is required on the LR100K Plus or LR150K Plus, they must be fitted onto the factory fitted loadcell.

To fit a smaller loadcell remove the upper anchor pin and two locking nuts.

WARNING: DO NOT LOOSEN ANY OTHER PART ON THE FACTORY FITTED LOAD CELL.

Fit one of the locking rings onto the smaller loadcell to be fitted. Fit the smaller loadcell as shown in the next picture. Turn the smaller loadcell to the orientation required and lock the locking nut to the factory fitted loadcell.

Remove the locking nuts and anchor pin only

Factory-fitted LR100K Load Cell

Unplug the factory fitted loadcell “D” plug and plug in the smaller loadcell.

3.14 ADDITIONAL LOAD CELLS

The following standard Load Cells are available for your LR Plus, EZ and LS100 Plus.

Model Number	Accuracy	Capacity	Part Number
XLC-0005-A1	0.5% accuracy	5N	01/2946
XLC-0010-A1	0.5% accuracy	10N	01/2360
XLC-0020-A1	0.5% accuracy	20N	01/2950
XLC-0050-A1	0.5% accuracy	50N	01/2361
XLC-0100-A1	0.5% accuracy	100N	01/2480
XLC-0250-A1	0.5% accuracy	250N	01/3048
XLC-0500-A1	0.5% accuracy	500N	01/2362
XLC-1000-A1	0.5% accuracy	1000N	01/2419
XLC-2500-A1	0.5% accuracy	2500N	01/2363
XLC-5000-A1	0.5% accuracy	1000N	01/2364
XLC-10K-A1	0.5% accuracy	10kN	01/2365
XLC-20K-A1	0.5% accuracy	20kN	01/2417
XLC-30K-A1	0.5% accuracy	30kN	01/2366
XLC-50K-A1	0.5% accuracy	50kN	01/2367
XLC-100K-A1	0.5% accuracy	100kN	01/2896

3.15 ADDITIONAL LOAD CELLS FOR LR100K PLUS AND LR150K PLUS

The following load cells are available for the LR100K Plus and LR150K Plus machines. they are supplied with an adapter for fitting the load cell onto the factory fitted loadcell, which is permanently fitted to the machines.

Model Number	Accuracy	Capacity	Part Number
HLC-0050-A1	0.5% accuracy	50N	01/2936
HLC-0100-A1	0.5% accuracy	100N	01/2413
HLC-1000-A1	0.5% accuracy	1000N	01/2412
HLC-5000-A1	0.5% accuracy	5000N	01/2944
HLC-10K-A1	0.5% accuracy	10kN	01/2411
HLC-30K-A1	0.5% accuracy	30kN	01/2978
HLC-100K-A1	0.5% accuracy	100kN	01/2457
HLC-150K-A1	0.5% accuracy	150kN	01/2458

4.0 LOADCELLS

4.1 CARE OF LOAD CELLS

ALL machine operators should be aware that Lloyd Instruments load cells are precision force measuring instruments, which should be treated with the utmost care to avoid accidental damage. Low force cells are easily damaged if abused or used without sufficient care:

1. Do not submit load cells to physical shock of any kind. DO NOT DROP!

2. When a load cell is removed from a machine immediately put it in a safe and dry place.

3. To install a load cell on all machines up to and including the LS100 Plus: Select the correct size load cell adaptor. Place the adaptor through the hole in the moving crosshead with the thread down. Carefully offer up the load cell and screw the load cell adaptor into the load cell, taking care to ensure that the locating dowel on the load cell sits in one of the holes on the under side of the moving crosshead and the connecting cable is on the same side as the connecting socket. Tighten the load cell adaptor in the load cell thread with the C spanner provided. Insert the load cell plug in the socket on the under side of the moving crosshead and finger tighten the two retaining screws. Fit the eye end to the load cell and tighten with the C spanner supplied.

4. When installing the upper grip (particularly heavy ones) on the load cell eye end, avoid bumping the eye end. If the grip is a close fit, DO NOT FORCE IT, establish the reason and rectify. Immediately set, or re-set, the bottom limit stop so the grips will not meet when the crosshead is lowered. See section 8.5 LIMIT STOPS.

5. In both tension and compression tests, centre the specimen in line with the axis of the load cell and the bottom fixed anchor pin to avoid side thrust.

6. In compression tests, care must be taken to avoid bringing the platens together or against solid specimens at high speed. Cells thus damaged cannot be repaired. Ensure that the lower crosshead limit is set correctly. See section 8.5 LIMIT STOPS.

7. In compression tests, if special lower fixtures are used, ensure that they are fixed in position so they cannot be accidentally moved to block the normal downward movement of the upper fixture, e.g. where a tongue on the upper fixture must fit into a slot in the lower fixture. See section 8.4 LOWER ANCHOR PIN ADJUSTMENT.

8. Avoid overloading beyond the cell's rated capacity. Prior to testing ensure, if possible, that the maximum force anticipated will not exceed the capacity of the cell installed. If maximum capacity is approached during a test, run the machine at slow speed in local mode, and reverse the crosshead if capacity is exceeded.

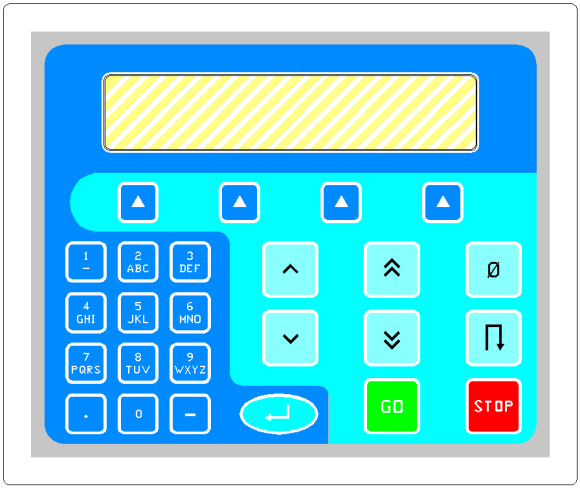
9. Lloyd Instruments load cells are built to exceed the standards as set out by ASTM, BS, DIN etc. All cells on the LR5K, 10K, 30K, 50K Plus, EZ20, EZ50 and LS100 Plus machines are user-changeable. Various capacities are available from 5N up to the capacity of the frame. While cells may be used below 10% of capacity it is recommended that, when such lower forces are anticipated, a lower force cell be installed such that the test force will fall in the upper 90% of its range. This will give the best signal to noise performance of the load measuring system.

NOTE: All LLOYD INSTRUMENTS machines incorporate overload protection, which will stop the machine if capacity is exceeded in either tension or compression. However, at higher speeds, momentum may carry the crosshead far enough after shut-off to damage the cell. In low force cells this distance is very short. Cells thus damaged cannot be repaired.

5.0 CONTROL PANEL

5.1 CONTROL PANEL DESCRIPTION

The unit has a Liquid Crystal Display (LCD) to show set-up information, load and extension values etc. and a key pad to input information for operating the machine when under control of the console. The machine is set up by answering simple questions and entering information when requested. The operating status of the machine is shown and described on the display.

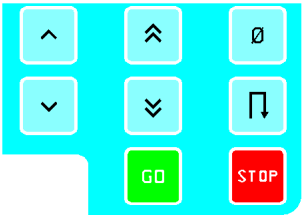


Control Console

5.2 KEYPAD OPERATION AND DESCRIPTION

The keypad has 25 keys arranged into 4 groups.

The first group contains 8 keys in the bottom right hand corner of the keypad



First Group of Keys

The First Group of Keys

GO
The GO button is used to start a test from the machine console and is operable from the “Pre-Test” display.

STOP
The STOP key is used to stop a test that is being performed from the machine console,e.g., if the machine does not stop automatically or the user requires to abort the test. The STOP key is not operable when the machine is performing a test under the control of an external computer. This is not an Emergency Stop Button. The Emergency Stop Button (Mushroom) is located on the left of machine base and can be used to stop the machine in an emergency situation.

CAUTION: The Stop key is not to be used as the Emergency Stop.

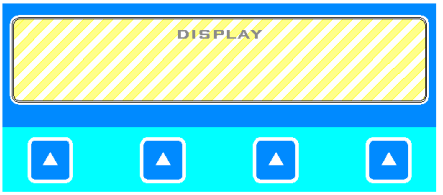
JOG UP and DOWN
These two keys allow the crosshead to be moved slowly into position when loading and removing samples. They are available when a test is not being performed and only operate whilst pressed. The crosshead will run at a user pre-set jog speed (a set-up option).

FAST JOG UP and DOWN
These two keys allow the crosshead to be moved at maximum speed and therefore it is essential to ensure there are no obstructions. These keys should only be used for moving large distances and not for final adjustment when the grips are close together. They are available when a test is not being performed and only operate whilst pressed.

ZERO
Pressing this key sets the load and extension values to zero. This is normally carried out at the start of a test but can be used at any time when not performing a test. If Auto Zero was selected in the set-up routine the system will automatically zero when GO is pressed.

RETURN
Pressing this key returns the crosshead to the position where the zero button was last pressed. The crosshead will move at maximum speed. The return button is available when a test is not being performed.

The second group contains 4 keys directly below the display. These “Soft Keys” are used to select various options that are identified by the text displayed on the lower lines of the display as described later.



Second Group of Keys

ALPHA-NUMERIC KEYS
contains 12 keys on the left hand side of the keypad. These keys are used to enter text or numbers and are labelled 1 to 9, 0, decimal point and negative sign. Most keys also double up as alphabetical entry keys similar to the style used on mobile phones.

Third Group of Keys

ENTER KEY
This key is the ENTER key which is used to accept any entered text, value or unit. It is also used to accept the entries on a completed display and to show the PREVIOUS display. The ENTER key is not available when a test is being performed or when input from another key is required.

ENTER Key

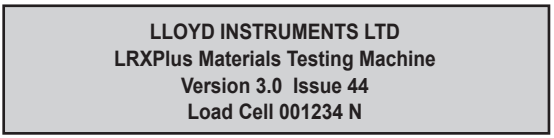
5.3 THE DISPLAY

The display, which has 4 lines of 40 characters, is used to show or request information. The information displayed depends upon the status of the machine but generally, the top line displays a title or help information for each display. The lower lines are split into 4 blocks, one block above each Soft Key, to indicate the function of that key.

5.4 "SWITCH-ON" DISPLAY

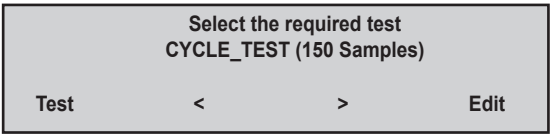
When first switched on the display will be blank while the system performs some routine checks.

After a few seconds the display will show information about the machine and the version of the embedded software installed. Similar to the one shown below.

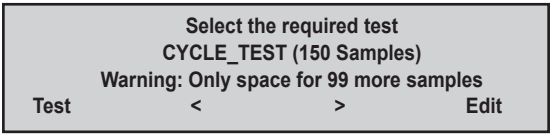


This information is displayed for three seconds after which the test selection screen is displayed.

The next display shows that a test called CYCLE_TEST has been defined. The number in brackets shows the number of sample results currently stored with this test.

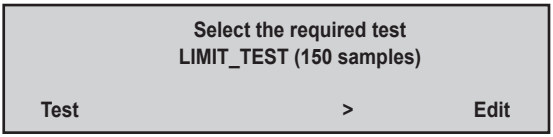


A total of 600 sample results can be stored across all test set-ups. If the total number of samples currently stored with all the test set-ups exceeds 500 then the third line will display a warning message.

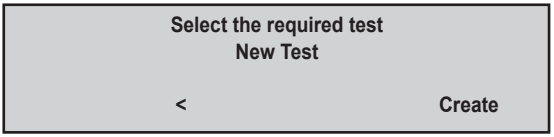


As the left and right arrow (< >) Soft Keys are pressed, the names of the previously defined tests will be shown.

When the first test is displayed, the left arrow will be hidden as shown below.



When the last test is displayed, and less than 10 set-ups have been defined the display below will be shown.



To define a test, refer to Section 7.0 SETTING UP A NEW TEST, noting that the supervisor may add a password to prevent the operator from entering the EDIT or CREATE modes.

6.0 PERFORMING A TEST

6.1 TEST MODES

The Lloyd Instruments machines can be used to perform tests in 2 modes. Firstly as a "stand alone" machine or under the control of a computer running NEXYGENPlus™ or NEXYGEN™ software.

If the machine is to be used with a computer and NEXYGENPlus™ or NEXYGEN™ software, then the NEXYGENPlus™ or NEXYGEN™ Software User Manual should be read in conjunction with this manual. The machine should be connected to the computer with the RS232 lead supplied. When the machine is on and ready, the computer connected with the lead supplied and NEXYGENPlus™ or NEXYGEN™ running, connection between the machine and computer is automatic.

If the Lloyd Instruments machine is being used in "stand alone" mode, proceed as follows. The following information will also be needed for "setting up" the machine with grips, samples etc.

6.2 TEST PARAMETERS

SAMPLE PREPARATION

The Jog Keys are used to prepare for a test. The accessories being used will be dependent on the type of test being conducted.

LOAD CELLS

The correct load cell should be fitted in the machine for the application being undertaken. Great care should be taken with these as they are precision measurement devices and can be damaged if used incorrectly. Please read Section 8.0 carefully before proceeding further.

GRIPS/ADAPTORS

It is important that grips are fitted along the central straining axis of the machine and that no side loads are applied to the load cells as this will affect the accuracy of the load readings. The grips should be connected to the load cell and the bottom anchor pin using only the pins provided. Care should be taken not to exceed the load rating of the grips. It is important to ensure that the grips used are suitable for the material under test. Any slippage of the material in the grips will affect both load and extension readings.

EXTENSOMETERS

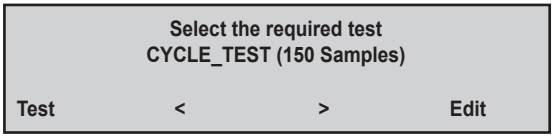
It is important to understand that the extension that the crosshead moves does not give a true reading of the strain in the samples. If we consider a dumbbell sample for instance, the strain will be different at different positions along the sample and no account is being taken of the take up of slack or bedding in of the grips. For accurate strain readings we would strongly recommend the use of a Lloyd Instruments extensometer which is suited for the material under test.

ENVIRONMENTALCHAMBERS If an environmental chamber is used with your materials testing machine there should be sufficient room behind the machine to slide the oven back away from the working area. It is important to ensure that the cut-off valve for the liquid coolant should be in an accessible place. Grips and other accessories are fitted to the machine with the environmental chamber in its fully forward position. The access holes at the top and bottom of the chamber should be positioned as centrally as possible along the straining axis of the machine.

CAUTION: Extreme care should be taken when dismantling grips or extracting samples after a test in the Environmental Chamber. This should be done only with suitable protective clothing, i.e. gloves, to prevent risk of burns.

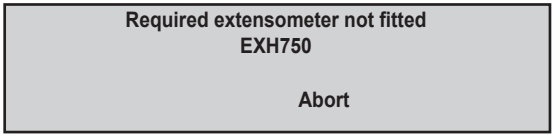
6.3 SELECTING A TEST

The user selects the required existing pre-programmed test by pressing the left and right arrow Soft Keys until the required test is shown on the display, then pressing the Test Soft Key.

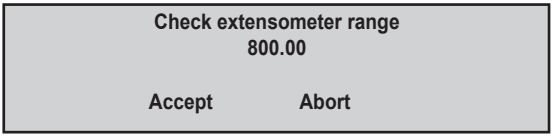


Depending on how the test has been set up one or more of the following screens will be displayed. Refer to Section 7.0 SETTING UP A NEW TEST for details on setting these options.

If an external extensometer has been selected for use then the following screen will be displaying if the required extensometer is not fitted.

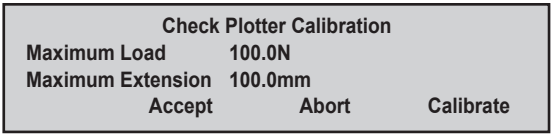


If the external extensometer is fitted but has a selectable range the following screen will be displayed.

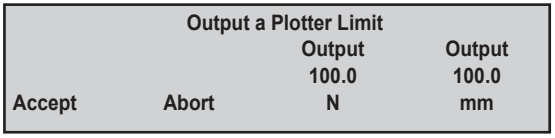


The external extensometer range must be set to the range displayed on this screen for the measurement of extension to be correct.

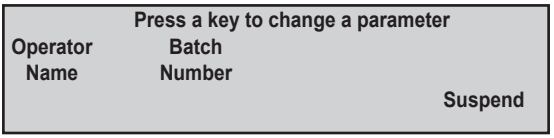
If a plotter output has been selected, then the following screen will be displayed.



Pressing the Calibrate Soft Key allows the user to the following screen



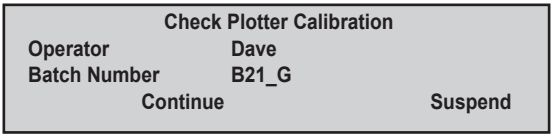
If the batch questions option is turned on, then the following screen will be displayed.



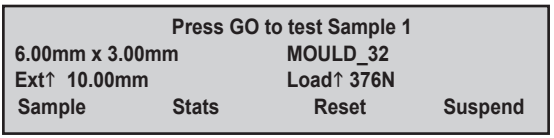
The information can only be entered when a new batch is started, i.e. when sample number 1 is to be tested. The operator can answer the questions by pressing the Soft Key below each question.

Pressing the Enter key will confirm all the answers to the batch questions and show the pre-test display.

If the operator is continuing with a previously suspended batch, then the batch questions, and their answers, will be displayed in a "view only" mode.



Here the operator will be given the option to Continue with the previously suspended batch or to Suspend the batch again by pressing the appropriate Soft Keys.



On the top line of the Pre-test display help information is shown. On the second line, the right hand side shows the test setup name.

On the third line, Extension and Load are displayed. Extension ↑ or ↓ indicates the direction of the extension from the "soft zero" position. "Soft zero" being the position at which the ZERO key was last pressed.

Load ↑ or ↓ indicates a Tensile Force or Compressive Force, respectively.

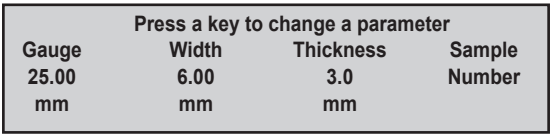
If the sample questions option is turned on, then next to the test name the sample width and thickness, diameter or area information will be shown. The SAMPLE Soft Key will also be displayed.
Refer to Section 7.0 SETTING UP A NEW TEST for details on setting these options.

Pressing the SUSPEND Soft Key returns to the test selection display but saves the statistics and last sample number ready to continue the batch later.

Pressing the RESET Soft Key resets the all the batch results, sets sample number to 1 and shows the display that would be selected when first selecting the test, i.e. batch or pre-test. This is only done after conformation by the operator.

Pressing the STATS Soft Key will show the statistics for the samples tested so far and allow them to be printed.

Pressing the SAMPLE Soft Key will display the sample question screen shown below.

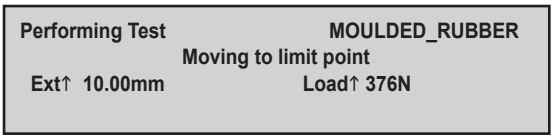


This display allows the operator to enter the sample dimensions and a single description. The text for the 3 sample fields depends upon the test mode and sample type. The first field will say GAUGE for Tension or HEIGHT for Compression. The second field will say WIDTH for Rectangular, DIAMETER for Circular or AREA for Area. The third field will only be displayed for Rectangular samples and will say THICKNESS. The fourth field will display the sample question define in the test setup. The Soft Keys allow the sample dimensions to be altered and the sample question to be answered.

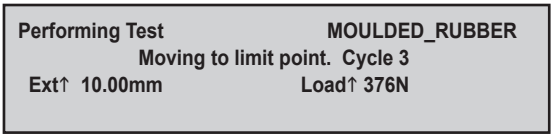
6.4 STARTING A TEST

When all the test parameters have been set as per 5.3 SELECTING A TEST above, press GO to start the test and display one of the screens below.

For a Limit Test:

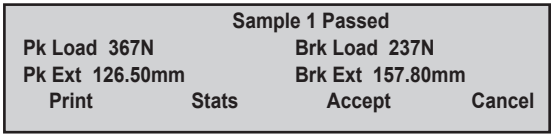


or for a Cycling Test



6.5 STOPPING A TEST

When the test ends, either automatically or if the user presses the STOP key, the post test screen will be displayed.



This screen will display different amounts of information depending on how the test has been set up. Refer to Section 6.0 SETTING UP A NEW TEST for details on setting these options.

6.6 PRINTING TEST RESULTS

Pressing the Print Soft Key will either print just the single result or, if All was selected for the Sample Printout option in the test setup, together with the machine setup details, i.e. test speed etc.

6.7 CANCELLING OR ACCEPTING THE RESULTS

Pressing the Cancel Soft Key will cancel the result (abort) and remove the result from the batch.

Pressing the Accept Soft Key or the ENTER key will accept the results and add them to the batch.

6.8 VIEWING THE STATISTICS

Pressing the Stats Soft Key will accept the result and show the statistics screen as below:

	Pk Load	Pk Ext	
Mean	367N	126.57mm	
Dev'n	5N	24.12mm	
Print			>

Pressing > Soft Key will show the second statistics screen:

	Brk Load	Brk Ext	
Mean	137N	155.03mm	
Dev'n	12N	54.13mm	
Print			<

Pressing the PRINT Soft Key from the statistics screen will show the 'print options' screen shown below:

Print Options for Cycle Test		
Stats Only	Brief Report	Full Report

Pressing the STATS ONLY Soft Key will give a table of statistics only, without the test value.

Pressing the BRIEF REPORT Soft Key will give a table of test values and statistics.

Pressing the FULL REPORT Soft Key will give a table of test values, statistics and test setup information.

6.9 ERROR CONDITIONS

If an error condition exists the cause of the error will be shown on the display. This error must be cleared before you can proceed with the test. See Section 8.7 for details of error messages.

7.0 SETTING UP A NEW TEST

7.1 PRE-DEFINED TEST SETUPS

The LRX Plus is supplied with three pre-defined test setups and one for new test setups, these are:

LIMIT_TEST	A test which is carried out to a limit. The limits are defined in mm or inches, % elongation (after setting gauge length), Newtons, Kg force, lbs force, Mega Pascal's Mpa (have entered the sample dimensions), Kg force per mm² and lb force per inch².
CYCLE_TEST	A cycle is from home to a limit (as set out above) and back to home. If when the test starts the crosshead is not at the home position, it will move to the home position first before going to the limit position. The machine can be set to perform up to 10000 cycles per test. If necessary this 10000 limit can be raised by your agent or dealer.
BREAK_TEST	A Break Test will either, stop at a limit as described above or when a break is detected. There are 2 types of break detector. A % break detector which detects when the load has dropped to 50% of the maximum peak load detected and sharp break detector. The sharp break detector operates when there has been a sharp change in load or direction between one load reading and the next.
NEW_TEST	Is a user defined test rather than one of the default settings which are detailed on the next page.

These Default test setups are as follows:

Test name >	LIMIT_TEST	CYCLE_TEST	BREAK_TEST	NEW_TEST
Test Type		Settings		
Test mode	Tension	Tension	Tension	Tension
Test type	Limit	Cycling	Limit	Limit
Limit position	10.0mm	10.0mm	5kN	10.0mm
Home position		0.0mm		
No. of cycles		10		
Preload	0.0N	0.0N	0.0N	0.0N
Speed	250mm/min	250mm/min	25mm/min	250mm/min
Hold 0 seconds			0 seconds	
Test Options				
Sharp Break detector	off	off	on	off
% Break Detector	off	off	off	off
Return to zero	manual	Manual	manual	manual
Zero readings	manual	Manual	manual	manual
Sample printout	All	All	All	All
Extensometer Used	Internal	Internal	Internal	Internal
Test Results				
Peak Load	N	N	N	N
Extens'n at peak load	mm	mm	mm	mm
Break load	N	N	N	N
Extension at Br'k load	mm	mm	mm	mm
Pass/fail Checks	off	off	off	off
Define Sample				
Sample type	Rectangular	Rectangular	Rectangular	Rectangular
Gauge	25.00mm	25.00mm	25.00mm	25.00mm
Width 6.00mm	6.00mm	6.00mm	6.00mm	
Thickness	3.00mm	3.00mm	3.00mm	3.00mm
1st Batch ? line 1	OPERATOR	OPERATOR	OPERATOR	OPERATOR
1st Batch ? line 2	NAME	NAME	NAME	NAME
2nd Batch ? line 1	BATCH	BATCH	BATCH	BATCH
2nd Batch ? line 2	NUMBER	NUMBER	NUMBER	NUMBER
3rd Batch ? line 1				
3rd Batch ? line 2				
Sample ? line 1	SAMPLE	SAMPLE	SAMPLE	SAMPLE
Sample ? line 2	ID	ID	ID	ID
Batch questions	off	off	off	off
Sample questions	off	off	off	off

7.2 DEFAULT GLOBAL SETTINGS

The Default Global Settings are:

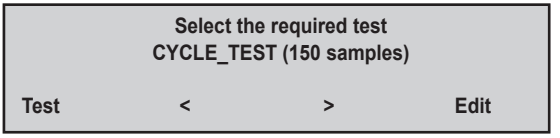
Field	Setting
Password	<None>
Safety load	50N
Slow jog speed	10mm/min
Data format	Printer
Grip protection Tension	110% of frame rating
Grip protection Compression	110% of frame rating
Language	English

To enter a New Test Setup or Edit a pre-defined setup, proceed as follows.

7.3 EDITING A PRE-DEFINED TEST SETUP

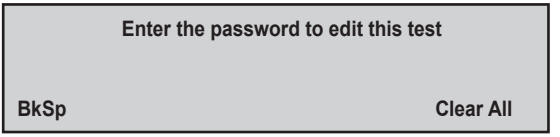
To edit a previously defined test setup, select the required test, using the left and right arrow keys, until the required test is displayed then press the Edit Soft Key.

This is the Select/Edit Display.



7.4 PASSWORD ACCESS

If the machine has been given a password, the password entry display will be shown.

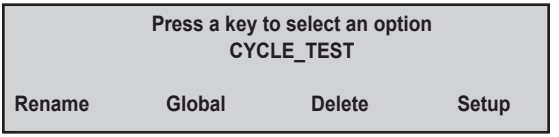


Type the password then press the ENTER key .

If the password is not correct, the test Select/Edit Display will be redisplayed.

If the password is correct, the main setup display is shown.

This is the Main Setup Display.



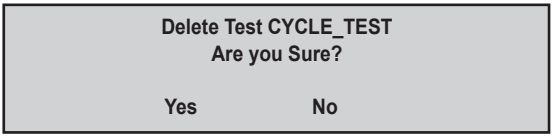
Pressing the ENTER key will return to the Select/Edit display.

7.5 RENAMING A TEST

Pressing the **Rename** Soft Key will allow the setup name to be changed. If a new test is created, the name will be automatically set to new_test.

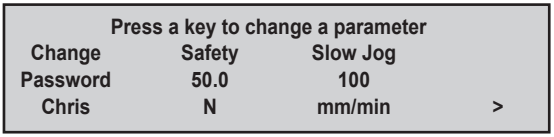
7.6 DELETING A TEST

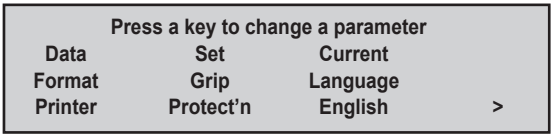
Pressing the **Delete** Soft Key will allow the selected test setup and all associated sample results to be deleted. The following screen will appear.

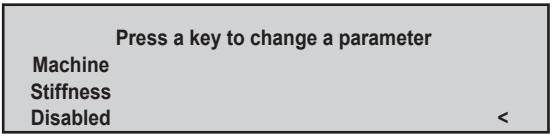


7.7 GLOBAL SETTINGS

Pressing the **Global** Soft key will allow the Password and Jog speed etc. to be changed. (see Main Setup Display).

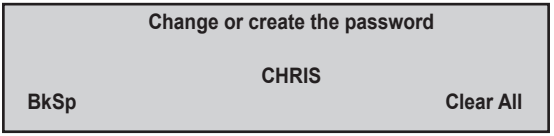






7.8 SETTING A PASSWORD

Pressing the Change Password Soft Key brings up the following display:



Pressing **BkSp** Soft Key deletes one character at a time starting from the right hand end of the password.

Pressing the **Clear All** Soft Key deletes all the characters.

The Alphanumeric keys add new characters to the password the **ENTER** key accepts the password as displayed.

If the password displayed is blank then there will be no password protection.

The password limits access to the edit test setup menus. If a password has been set this password will be required before any parameter of any test setup can be edited. The selection and running of previously defined test setups is not affected.

7.9 SAFETY LOAD LIMIT

The **Safety** limit is intended as an extra protection against accidental injury. It applies when the **JOG** keys are pressed or during return when the crosshead is moving down. Entering a high value for this option will reduce the level of safety provided and should only be done to over come nuisance errors caused by high friction in some accessories.

7.10 SLOW JOG SPEED

The **Slow Jog** setting allows the user to specify the speed that the crosshead will move when the slow **JOG** keys are pressed.

7.11 SETTING FOR PRINTER

The **Data Format** Soft Key toggles between **Printer** and **ASCII** (ASCII for when a DATALOGGER is to be used).

7.12 GRIP PROTECTION SETTINGS

The **Grip Protection** setting is an additional load limit, which can be used to protect grips or accessories that are being used. The test will be stopped if the value of load exceeds the **Grip Protection** setting during a test.

CAUTION: Grip protection settings, when configured by the user, protects the gripping fixture and/or load cell when properly specified, ***and when the system is being operated without software***.

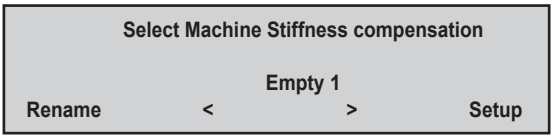
If they system is operated using Nexygen Plus or Nexygen MT software, the software console controls the machine. The user must use the software's Tension Limit and Compression Limit facilities to protect the fixture and/or load cell.

7.13 CURRENT LANGUAGE

Pressing the **Current Language** soft key allows the user to select the language to be used from the list of languages supported by the machine. The chosen language will be used for all information presented to the user, including information output to a printer.

7.14 MACHINE STIFFNESS COMPENSATION

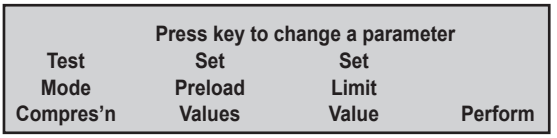
Pressing the **SET MACHINE STIFFNESS** soft key allows the user to perform a machine stiffness compensation.



Use the < or > soft keys to select the machine stiffness compensation slot to use for the compensation. There are 10 machine stiffness compensation slots.

Use the **Rename** soft key to change the name of the current machine stiffness slot.

Use the **Setup** soft key to setup the machine stiffness compensation range and perform a machine stiffness compensation.



Use the **Test Mode** soft key to select Tension or Compression Machine Stiffness compensation.

Use the **Set Preload Value** soft key to set the start value for the machine stiffness compensation.

NOTE: It is recommended that the minimum value for the machine stiffness compensation start value (Preload) is 1% of load cell value.

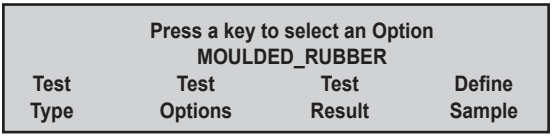
Use the **Set Limit Value** soft key to set the machine stiffness compensation end value.

Use the **Perform** soft key to perform a machine stiffness compensation.

7.15 TEST SETUP DISPLAY

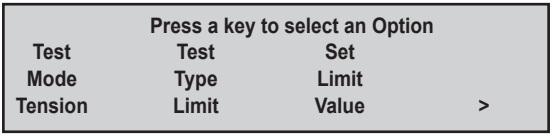
Pressing the Setup Soft Key from the Main Setup Display will show the test setup display.

This is the Test Setup Display

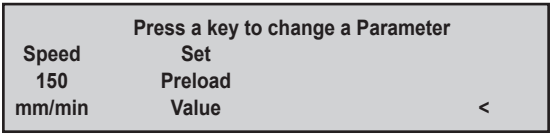


7.16 TEST TYPE

Pressing the **Test Type** Soft Key will allow the test type to be defined.



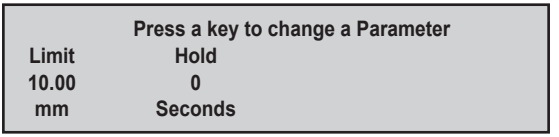
Pressing the > Soft Key will toggle between the display above and the next display.



The **test mode** Soft Key toggles between **Tension** and **Compression**.

The **Test Type** Soft Key toggles between **Limit** and **Cycling**. In cycling mode the **Set Limit Values** Soft Key changes to Set Cycling values.

Pressing the **Set Limit Values** Soft Key will allow the values to be set.



The limit type, value and unit may be set or changed by pressing the **Limit** Soft Key. The required parameters may then be entered.

If either a Hold value is set or if the units of Speed are in load rate units sample stiffness information will be displayed.

Press a key to change a Parameter			
Limit	**Hold**	**Sample**	**Initial**
10.00	**30**	**Stiffness**	**10000.0**
mm	**Seconds**	**Auto**	**N**

Sample Stiffness can be set to Auto (see above) or Manual (see screen below). Sample stiffness is used when a test is being carried out under load rate control, i.e. when driving at a rate of Newtons per minute or lbs per inch. The machine speed will have to vary depending on the stiffness of the sample.

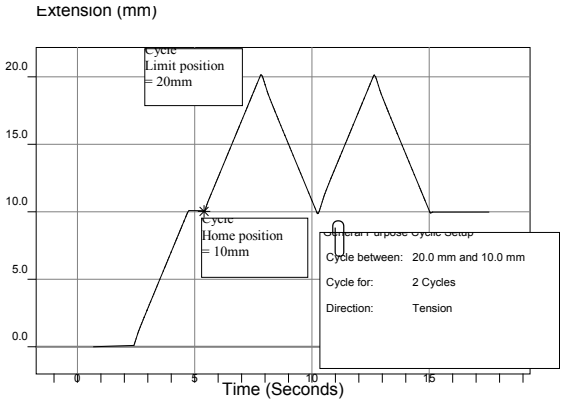
Manual Sample stiffness uses the value entered throughout the test. Auto sample stiffness starts from an Initial value and throughout the test re-calculates this value.

Press a key to change a Parameter			
Limit	**Hold**	**Sample**	**Initial**
10.00	**30**	**Stiffness**	**10000.0**
mm	**Seconds**	**Auto**	**N**

Pressing the **Set Cycling Values** Soft Key will allow the values to be set.

Press a key to change a Parameter			
Limit	**Hold**	**Sample**	**Initial**
10.00	**30**	**Stiffness**	**10000.0**
mm	**Seconds**	**Auto**	**N**

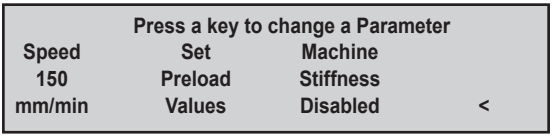
The **Home** position is the start of the Cycle Test position and wherever the machine is resting after loading it will drive first to the **Home** position. After reaching the home position it will drive to the Limit position and back to the **Home** position to complete the first cycle. The machine's response to inputs as shown above is illustrated in the NEXYGENPlus™ graph shown below.



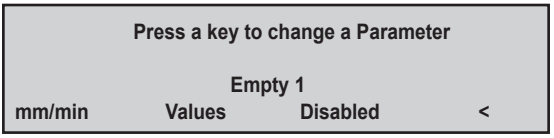
Pressing the Set Preload Soft Key will allow the values to be set. It is recommended that the minimum value entered is no less than 1% of the Loadcell value fitted.

Press a key to change a Parameter	
Speed	**Limit**
10.00	**0**
mm/min	**N**

7.17 SELECTING MACHINE STIFFNESS COMPENSATION

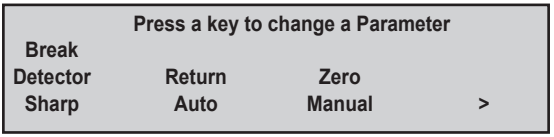


Pressing the **Machine Stiffness** soft key enables the user to select the machine stiffness compensation to use in the current selected test setup.

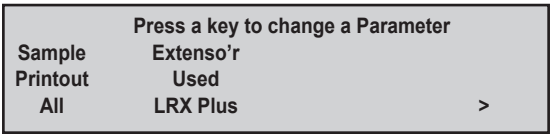


7.18 TEST OPTIONS

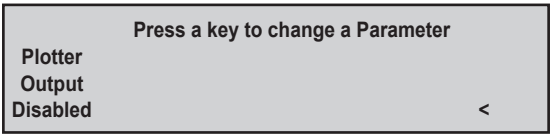
Pressing the Test Options Soft Key from the test setup display will allow the test options to be set.



Pressing the **>** key will toggle between the above display and the next display.



If the **>** key is pressed the following screen will appear.



By pressing the **Break Detector** Soft Key the following display is shown

Sharp Break Detector

Press a key to change a Parameter			
Sharp	Percent	Start	
Break	Break	50	
On	Off	N	

There are two break detectors, a sharp break detector and a percentage of peak load break detector. The sharp break detector operates when there has been a sharp change in load or direction between one load reading and the next. Either break detector is turned On or Off by pressing the appropriate Soft Key. Only one break detector can be turned On at a time. When a break detector is turned On, other options are displayed. Both break detectors have a **Start** option and the **Percentage** break detector also has a Percentage Break option.

Percentage of Peak Load Break Detector

Press a key to change a Parameter			
Sharp	Percent	Start	Break
Break	Break	50	Point
Off	On	N	50%

The **Start** option sets the threshold above which the peak load must rise before the break detector will start operation. The **Percent Break** option sets the percentage of peak load below which the measured load must fall to constitute a break.

The **Return** and **Zero** options toggle between **Manual** and **Auto**.

Pressing the **Extenso'r Used** Soft Key will allow the selection of any extensometer currently fitted from the following screen.

Select an extensometer	
LRX Plus Materials Testing Machine	
<	>

The left and right arrow (< >) Soft Keys will scroll through the list of currently connected extensometers, (theoretically a maximum of 4 with the internal crosshead position always being listed as one of these). The internal crosshead position extensometer is displayed as the LRXPlus materials testing machine, i.e., LRXPlus Press the **ENTER** key to select the displayed extensometer.

If the selected extensometer has a selectable range, then an additional option will be displayed in the Test Options screen.

Press a key to change a Parameter			
Sample	Extenso'r	Range	
Printout	Used	300.00	
All	EXH 750	mm	<

The extensometer range will default to the maximum range of the extensometer but can be changed by pressing the **Range** Soft Key.

Pressing the Sample Printout Soft Key, toggles between “Result” and “All”. “Result” will print the 4 results and “All” will print the 4 results and the machine parameters.

Pressing the Plotter Output Soft Key, toggles between “Disabled” and “Enabled”. In the “Enabled” position, the following screen will be displayed where the plotting parameters can be set.

Press a key to change a Parameter			
Plotter	Load	Ext	
Output	100.0	100	
Enabled	N	mm	<

7.19 TEST RESULTS

Pressing the Test Results Soft Key from the Test Setup Display will allow the test results units and pass/fail limits to be set.

Press a key to change a Parameter	
Test	Pass/Fail
Result	Checks
Units	Off

Pressing the **Tests Result Units** Soft Key allows the units to be set.

Press a key to change a Parameter			
Peak	Peak	Break	Break
Load	Ext	Load	Ext
N	mm	N	mm

7.20 PASS/FAIL VALUES

If Pass/Fail is set to On, another two options are available.

Press a key to change a Parameter			
Test	Pass/Fail	Break	Peak
Result	Checks	Pass/Fail	Pass/Fail
Units	Off	Values	Values

Pressing either the **Break Pass/Fail limits** or **Peak Pass/Fail** Soft Keys will allow the values to be set.

Break pass/fail values

Press a key to change a Parameter			
Max Load	Min Load	Max Ext	Min Ext
5000	100	250.00	100.00
N	N	mm	mm

7.21 DEFINING SAMPLE

Pressing the **Define Sample** Soft Key from the **Test Setup Display** will allow the sample/batch details to be set.

Press a key to change a Parameter			
Sample Info	Pre-Test Questions	Batch Questions Off	Sample Question Off

The **Batch Questions** and **Sample Question** Soft Keys toggle between **On** and **Off** to specify which pre-test question displays will be shown.

Pressing the **Sample Info** Soft Key will allow the sample details to be defined.

Press a key to change a Parameter			
Sample	Gauge	Width	Thickness
Type	25.00	6.00	3.00
Rect'r	mm	mm	mm

Pressing the **Sample Type** Soft Key toggles between **Rect'r / Circular / Area**. The titles **Gauge, Width** and **Thickness** depend upon the test mode and the sample type. The title **Gauge** becomes **Height** for Compression. The title **Width** becomes **Diameter** for Circular or **Area** for Area. The title Thickness is only displayed for **Rect'r**.

7.22 PRE-TEST QUESTIONS

Pressing the **Pre-test Questions** Soft Key allows the pre-test questions to be defined. The Batch questions come at the beginning of the batch and help define the batch. The SAMPLE question comes up before each sample in a batch and helps identify each sample.

Press a key to change a Parameter			
Batch 1	Batch 2	Batch 3	Sample
Type	25.00	6.00	3.00
Rect'r	mm	mm	mm

Up to 3 batch questions and 1 sample question may be defined.

8.0 OPERATIONAL PRECAUTIONS

8.1 SAFETY

Lloyd Instruments materials testing machines are inherently safe if used properly. Operators must be made aware that:

1. High physical forces are involved.

2. Samples under test may shatter.

3. Electrical power supplies are involved.

4. The following must ALWAYS be brought to the attention of any operator before they are allowed to use the machine. Hands, fingers and other parts of the body must at all times be kept well away from the moving crosshead. Operators should be particularly careful when moving the crosshead to insert test samples, to ensure that no part of the hand could be accidentally compressed as the crosshead and grips are jogged into position.

5. NEVER drive the machine from a computer when anyone else is working on or near the straining frame.

6. If there is any danger that liquids may be spilt during tests, operators must use a drip tray (which is available from AMETEK) to guard against the possibility of any spillage entering the machine and giving rise to electrical or other hazards.

7. Take extra care when operating in compression mode where specimens may burst, shatter or fly out from between the platens. Operators should STAND CLEAR during testing. Splinter shields are available.

8. All operators must receive adequate training in basic operation before being allowed to use the machine. Additional copies of this manual are available from AMETEK.

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

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

11. Operators must ensure that the machine is regularly serviced and calibrated by Lloyd Instruments or one of their accredited service dealers.

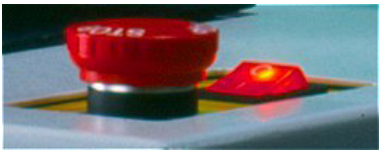
12. To maintain EMC compatibility, the machine should only be used as prescribed in this manual. Connecting cables, plugs and sockets should be inspected regularly. Cables damaged or worn in any way should not be used. Accessories and accessory connecting leads, if suspect, should be replaced only with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

13. Never attempt any form of machine maintenance without disconnecting the mains electrical supply.

14. Never attempt to test any samples with a type of grip or other accessory which is not designed for that particular test, or to use grips or the machine for tests in excess of the stated load limits. A comprehensive range of alternative grips, together with an applications advisory service, is available from AMETEK and its Lloyd Instruments accredited dealers.

8.2 EMERGENCY STOP

If for any reason the machine needs to be stopped without delay, an emergency stop mushroom is provided. Pressing this switch stops the LRX Plus immediately. It can be released by turning a quarter of a turn clockwise. The machine will then restart if the ON/OFF switch is already ON.



8.3 SPLINTER SHIELDS

Transparent splinter shields are available as an option to enclose the test sample if there is any danger of samples shattering as a result of the test. These shields can be fitted with an electronic interlock so that the test cannot be started until the hinged shield is closed. While not mandatory for many applications and countries, Lloyd Instruments strongly recommend that users consider fitting this optional item.

If a shield fitted with electronic interlock is used, the following screen will appear if the door is opened during a test.

Error Condition
Splinter Shield Open

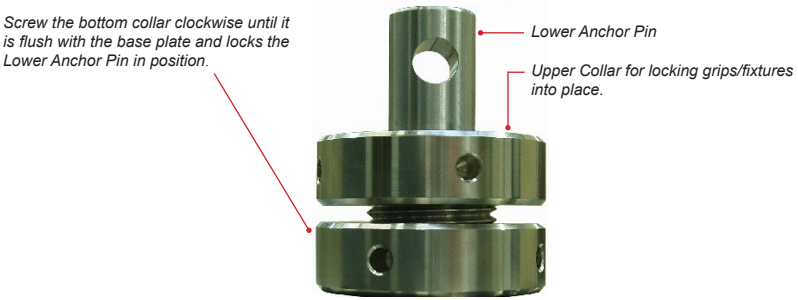
Press Enter to Cancel

The test in progress will be aborted and the next test or a new test will have to be started.

8.4 LOWER ANCHOR PIN ADJUSTMENT

The Lower Anchor Pin has two locking collars, one to lock it in position in the lower (fixed) crosshead and the other to screw upwards to lock the bottom grip / fixture firmly in position.
When the grips or test fixtures have been fitted to the loadcell and bottom anchor pin, carefully align the top and bottom grips or test fixtures. Turn the bottom collar clockwise until it is locked against the lower crosshead in the position required.

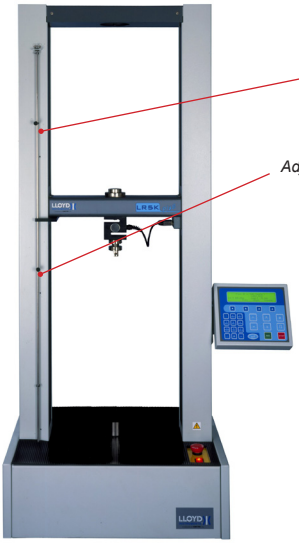
Extreme care must be taken when manoeuvring the crosshead, particularly when low force load cells are being used as they can easily be damaged even at moderate speeds. As an additional precaution during compression testing the lower hardware limit stop should be set so that the compression plates cannot come together either during or after a test.

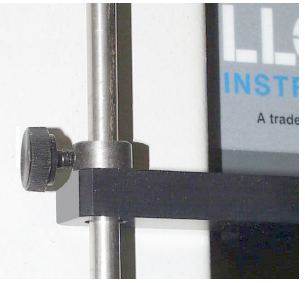


Lower Anchor Pint Locking Collars

8.5 LIMIT STOPS

The Lloyd Instruments machines are fitted with two magnetically activating limit stops. These can be used as extra protection to stop load cells, grips or fixtures coming into contact. The upper one can be used to back up the software limit. Reaching magnetically activated limit stop will result in the machine stopping.





Adjustable Top Limit Stop

To adjust the bottom limit stop, drive the moving crosshead to the lowest position that it is ever going to get to safely without damaging any fitted grips or fixtures. When this position has been reached drive the crosshead up by 3mm. Move the lower adjustable limit stop up to the crosshead actuator.

To adjust the top limit stop, drive the moving crosshead to the highest position that it is ever going to get to safely without damaging any fitted grips or fixtures. When this position has been reached drive the crosshead down by 3mm. Move the upper adjustable limit stop down to the cross head actuator.

If during a test or when manoeuvring the crosshead, a limit stop switch is activated, a display as shown below or similar will be seen.

Error Condition
Lower limit switch

Press Enter to Cancel

When ENTER has been pressed and this display has been cleared the machine will only allow the operator to drive the crosshead away from the limit stop.

9.0 ERROR CONDITIONS

9.1 ERROR CONDITIONS

On the Lloyd Instruments machines, if an error occurs, a message will be displayed on the console describing the error. This message must be cleared by pressing the ENTER key before proceeding. Some errors are displayed when the machine is first powered on and indicate faults that were detected during the power up sequence.

If the Lloyd Instruments machine is being used with a computer and NEXYGENPlus™ or NEXYGEN™ software, similar messages will be displayed on the computer by NEXYGENPlus™ or NEXYGEN™.

The ERROR messages are as follows:

Data Packet Error
This error indicates that an invalid data packet has been received across the RS232 interface. All data transferred via RS232 is checked for errors and resent if any error occurs, so this message should never be displayed. If it is seen it is indicative of other problems occurring either within the machine or at the PC.

Motor Drive Fault
This indicates that the motor drive system has reported an error condition.

Upper limit switch
The adjustable upper limit switch has been hit. This can be cleared by adjusting the upper limit or driving off it using the jog down keys.

Lower limit switch
The adjustable lower limit switch has been hit. This can be cleared by adjusting the lower limit, or driving off it using the jog up keys.

No Loadcell Available
An attempt has been made to drive the machine without a load cell connected. Ensure the load cell is properly connected and try again.

Splinter Shield Open
The splinter shield fitted to the machine is open. A test cannot be started until the splinter shield is closed.

Cell Overload
The load applied to the system is in excess of 110% of the load cell rating. Use the jog keys to remove the load.

Safety Overload
The load applied to the load cell is in excess of the safety load limit in the global settings. This limit only applies when the crosshead is moving downwards during return or under control of the jog keys.

Frame Overload
The load applied to the system is in excess of 105% of the frame rating. Use the jog keys to remove the load.

Grip Overload
The load applied to the system is in excess of the grip protection limit in the global settings. This limit only applies during a test.

Print unavailable. Power down and retry
An attempt has been made to print when the RS232 port is in use with a PC running NEXYGEN-Plus™ or NEXYGEN™. After using the machine with NEXYGENPlus™ or NEXYGEN™, it is necessary to power down before it is possible to print.

Unexpected reset code XX
Unexpected software reset code XXX
Software reset code 106 (XXXXXX)
These messages indicate that an internal error has caused the system to reset unexpectedly. Please make a note of the readings and contact LLOYD INSTRUMENTS Technical Support for help:

For LLOYD INSTRUMENTS:
Telephone: + 44 (0) 1243 833 370
Email: techsupport@ametek.co.uk

System Hardware Error
An error has occurred in the internal electronics of the system.

Drive System Error
The motor control system has not been able to maintain adequate control of the motor and has shut down as a safety precaution. This will usually indicate a fault within the motor drive or extension measurement system.

Accessory Connected/Disconnected
An accessory has been connected or removed while the crosshead is being driven.

Load / Speed / Rating Exceeded
The machine has moved outside the load and speed rating of the machine. Ensure the test being performed is within the machine's load and speed rating

Extensometer Range Exceeded
The machine has moved outside the range of the extensometer. Ensure the test being performed is within the range of the extensometer.

10.0 CLEANING AND MAINTENANCE

10.1 CLEANING EXTERNAL FINISH AND TRIM
The finish and appearance of your machine can be maintained by regular cleaning with a damp cloth containing a small amount of mild detergent. The machine 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.

10.2 MAINTENANCE
In normal use and conditions, your machine should be serviced and calibrated annually by AMETEK or one of their appointed Lloyd Instruments agents. There are no user serviceable or adjustable parts within the machine, therefore service and calibration should only ever be undertaken by engineers trained for the task.

If the machine is being used in a particularly arduous way or under extreme conditions, your appointed service agent may recommend more frequent calibration/service.

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

11.0 SPECIFICATIONS

11.1 TECHNICAL SPECIFICATION LR5KPLUS

Maximum Force (tension and compression)	5kN (1124lbf)
Overall Force Range Using Interchangeable Load Cells	0.1N –5kN (0.02 –1124lbf)
Force Measuring System	Exceeds the requirements of BS EN ISO 7500 – 1: 1999 Class 0.5 ASTM E4, DIN 1221
Force Measuring Accuracy	Better than 0.5%
Crosshead Speed Range	0.01- 1016mm/min (0.0004 - 40in/min)
Crosshead Speed Accuracy	± 0.2% @ steady state
Maximum Working Width Between Columns	404mm (16in)
Vertical Travel	
Standard Travel	975mm (38.39in)
Extended Travel	1460mm (57.48in)
Internal Extension Resolution	< 0.1 microns
External Extensometer Connection. (Using Lloyd Instruments interface plug)	Analogue (±10V) or strain gauge. Digital encoders (Single or dual differential)
Frame Stiffness without Load Cell	Greater than 25kN/mm (142,750lbf/in)
Data Output For Computer / serial printer	RS 232
Supply Voltage	230V a.c. ±10% 50-60Hz (Fuse T5AH250V) 115V a.c. ±10% 50-60Hz (Fuse T10AH250V)
Power Consumption	500 VA maximum.
Main Frame Dimensions - Standard Travel	
Height	1565mm (61.61in)
Depth	482mm (19in)
Width (without console)	638mm (25in)
Width (with console)	797mm (31.4in)
Main Frame Dimensions - Extended Travel	
Height	2065mm (81.3in)
Depth	482mm (19in)
Width (without console)	638mm (25in)
Width (with console)	797mm (31.4in
Mass (without Grips or Load Cell fitted)	
Standard Travel	99kg (219lb)
Extended Travel	126kg (280lb)
Temperature	
Operating	5 to 35ºC (40ºF to 95ºF)
Storage	-20 to 55ºC (-4ºF to 130ºF)
Ventilation Requirements	Un-restricted air flow to side ventilation holes
Humidity	5 to 85% RH (Non- condensing)

11.2 TECHNICAL SPECIFICATION LR10KPLUS

Maximum Force (tension and compression)	10kN (2248lbf)
Overall Force Range Using	
Interchangeable Load Cells	0.1N - 10kN (0.02 - 2248lbf)
Force Measuring System	Exceeds the requirements of BS EN ISO 7500 – 1: 1999 Class 0.5 ASTM E4, DIN 1221
Force Measuring Accuracy	Better than 0.5%
Crosshead Speed Range @ Full Load	0.01 - 510mm/min (0.0004 - 20in/ min)
Crosshead Speed Accuracy	± 0.2% @ steady state
Maximum Working Width Between Columns	404mm (16in)
Vertical Travel	
Standard Travel	975mm (38.39in)
Extended Travel	1460mm (57.48in)
Internal Extension Resolution	< 0.1 microns
External Extensometer Connection.	
(Using Lloyd Instruments interface plug)	Analogue (±10V) or strain gauge. Digital encoders (Single or dual differential)
Frame Stiffness without Load Cell	Greater than 25kN/mm (142,750lbf/in)
Data Output For Computer / serial printer	RS 232
Supply Voltage	230V a.c. ±10% 50-60Hz (Fuse T5AH250V) 115V a.c. ±10% 50-60Hz (Fuse T10AH250V)
Power Consumption	500 VA maximum.
Main Frame Dimensions - Standard Travel	
Height	1565mm (61.61in)
Depth	482mm (19in)
Width (without console)	638mm (25in)
Width (with console)	797mm (31.4in)
Main Frame Dimensions - Extended Travel	
Height	2065mm (81.3in)
Depth	482mm (19in)
Width (without console)	638mm (25in)
Width (with console)	797mm (31.4in
Mass (without Grips or Load Cell fitted)	
Standard Travel	99kg (219lb)
Extended Travel	126kg (280lb)
Temperature	
Operating	5 to 35ºC (40ºF to 95ºF)
Storage	-20 to 55ºC (-4ºF to 130ºF)
Ventilation Requirements	Un-restricted air flow to side ventilation holes
Humidity	5 to 85% RH (Non- condensing)

11.3 TECHNICAL SPECIFICATION EZ20

Maximum Force (tension and compression)	20kN (5500lbf)
Overall Force Range Using	
Interchangeable Load Cells	0.1N - 20kN (0.02 - 4400lbf)
Force Measuring System	Exceeds the requirements of BS EN ISO 7500 – 1: 1999 Class 0.5 ASTM E4, DIN 1221
Force Measuring Accuracy	Better than 0.5%
Crosshead Speed Range @ Full Load	0.01 - 510mm/min (0.0004 - 20in/ min)
Crosshead Speed Range @ 10kN	0.01 - 1016mm/min (0.0004 - 40in/ min)
Crosshead Speed Accuracy	± 0.2% @ steady state
Maximum Working Width Between Columns	404mm (16in)
Maximum Crosshead Displacement	
Excluding Grips	1055mm (43in)
Vertical Travel	
Standard Travel	975mm (38.39in)
Extended Travel	1460mm (57.48in)
Internal Extension Resolution	< 5 microns
External Extensometer Connection.	
(Using Lloyd Instruments interface plug)	Analogue (0-1V), (0-10V) or strain gauge. Digital encoders (Single or dual differential)
Frame Stiffness without Load Cell	Greater than 80kN/mm (400,000lbf/in)
Maximum Test Duration	15 minutes @ Full Load
Duty Cycle	5:1
Data Output For Computer / serial printer	RS 232
Supply Voltage	230V a.c. ±10% 50-60Hz (Fuse T5AH250V) 115V a.c. ±10% 50-60Hz (Fuse T10AH250V)
Power Consumption	<1000W maximum.
Main Frame Dimensions - Standard Travel	
Height	1574mm (62in)
Depth	596mm (23.5in)
Width (without console)	690mm (27.2in)
Width (with console)	893mm (34in)
Mass (without Grips or Load Cell fitted)	148kg (326lb)
Temperature	
Operating	5 to 35ºC (40ºF to 95ºF)
Storage	-20 to 55ºC (-4ºF to 130ºF)
Ventilation Requirements	Un-restricted air flow to side ventilation holes
Humidity	5 to 85% RH (Non- condensing)

11.4 TECHNICAL SPECIFICATION LR30KPLUS

Maximum Force (tension and compression)	30kN (6744lbf)
Overall Force Range Using	
Interchangeable Load Cells	0.1N - 30kN (0.02 - 6744lbf)
Force Measuring System	Exceeds the requirements of BS EN ISO 7500 – 1: 1999 Class 0.5 ASTM E4, DIN 1221
Force Measuring Accuracy	Better than 0.5%
Crosshead Speed Range @ Full Load	0.01 - 510mm/min (0.0004 - 20in/ min)
Crosshead Speed Accuracy	± 0.2% @ steady state
Maximum Working Width Between Columns	404mm (16in)
Vertical Travel	
Standard Travel	870mm (34.25in)
Extended Travel	1370mm (53.2in)
Internal Extension Resolution	< 0.05 microns
External Extensometer Connection.	
(Using Lloyd Instruments interface plug)	Analogue (±10V) or strain gauge. Digital encoders (Single or dual differential)
Frame Stiffness without Load Cell	Greater than 80kN/mm (400,000lbf/in)
Data Output For Computer / serial printer	RS 232
Supply Voltage	230V a.c. ±10% 50-60Hz (Fuse T5AH250V) 115V a.c. ±10% 50-60Hz (Fuse T10AH250V)
Power Consumption	<1000 VA
Main Frame Dimensions - Standard Travel	
Height	1565mm (61.61in)
Depth	596mm (23.5in)
Width (without console)	686mm (27in)
Width (with console)	845mm (33.3in)
Main Frame Dimensions - Extended Travel	
Height	2065mm (81.3in)
Depth	596mm (23.5in)
Width (without console)	686mm (27in)
Width (with console)	845mm (33.3in)
Mass (without Grips or Load Cell fitted)	
Standard Travel	150kg (330lb)
Extended Travel	177kg (390lb)
Temperature	
Operating	5 to 35ºC (40ºF to 95ºF)
Storage	-20 to 55ºC (-4ºF to 130ºF)
Ventilation Requirements	Un-restricted air flow to side ventilation holes
Humidity	5 to 85% RH (Non- condensing)

11.5 TECHNICAL SPECIFICATION EZ50

Maximum Force (tension and compression)	50kN (11000lbf)
Overall Force Range Using	
Interchangeable Load Cells	0.1N - 50kN (0.02 -11000lbf)
Force Measuring System	Exceeds the requirements of BS EN ISO 7500 – 1: 1999 Class 0.5 ASTM E4, DIN 1221
Force Measuring Accuracy	Better than 0.5%
Crosshead Speed Range @ Full Load	0.01- 254mm/min (0.0004 - 10in/ min)
Crosshead Speed Accuracy	± 0.2% @ steady state
Maximum Working Width Between Columns	404mm (16in)
Maximum Crosshead Displacement	
Excluding Grips	1055mm (43in)
Vertical Travel	855mm (33.7in)
Internal Extension Resolution	< 5 microns
External Extensometer Connection.	
(Using Lloyd Instruments interface plug)	Analogue (0-1V), (0-10V) or strain gauge. Digital encoders (Single or dual differential)
Frame Stiffness without Load Cell	Greater than 80kN/mm (400,000lbf/in)
Maximum Test Duration	15 minutes @ Full Load
Duty Cycle	5:1
Data Output For Computer / serial printer	RS 232
Supply Voltage	230V a.c. ±10% 50-60Hz (Fuse T5AH250V) 115V a.c. ±10% 50-60Hz (Fuse T10AH250V)
Power Consumption	<1000W maximum.
Main Frame Dimensions	
Height	1574mm (62in)
Depth	596mm (23.5in)
Width (without console)	690mm (27.2in)
Width (with console)	893mm (34in)
Mass (without Grips or Load Cell fitted)	148kg (326lb)
Temperature	
Operating	5 to 35ºC (40ºF to 95ºF)
Storage	-20 to 55ºC (-4ºF to 130ºF)
Ventilation Requirements	Un-restricted air flow to side ventilation holes
Humidity	5 to 85% RH (Non- condensing)

11.6 TECHNICAL SPECIFICATION LR50KPLUS

Maximum Force (tension and compression)	50kN (11,241lbf)
Overall Force Range Using Interchangeable Load Cells	0.1N - 50kN (0.02 - 11,241lbf)
Force Measuring System	Exceeds the requirements of BS EN ISO 7500 – 1: 1999 Class 0.5 ASTM E4, DIN 1221
Force Measuring Accuracy	Better than 0.5%
Crosshead Speed Range @ Full Load	0.01 - 510mm/min (0.0004 - 20in/ min)
Crosshead Speed Accuracy	± 0.2% @ steady state
Maximum Working Width Between Columns	404mm (16in)
Vertical Travel	
Standard Travel	855mm (33.7in)
Extended Travel	1524mm (60in)
Internal Extension Resolution	< 0.05 microns
External Extensometer Connection. (Using Lloyd Instruments interface plug)	Analogue (±10V) or strain gauge. Digital encoders (Single or dual differential)
Frame Stiffness without Load Cell	Greater than 80kN/mm (400,000lbf/in)
Data Output For Computer / serial printer	RS 232
Supply Voltage	230V a.c. ±10% 50-60Hz (Fuse T5AH250V) 115V a.c. ±10% 50-60Hz (Fuse T10AH250V)
Power Consumption	<1000 VA
Main Frame Dimensions - Standard Travel	
Height	1567mm (61.7in)
Depth	496mm (13.5in)
Width (without console)	686mm (27in)
Width (with console)	845mm (33.3in)
Main Frame Dimensions - Extended Travel	
Height	2067mm (81.7in)
Depth	596mm (23.5in)
Width (without console)	686mm (27in)
Width (with console)	845mm (33.3in)
Mass (without Grips or Load Cell fitted)	
Standard Travel	155kg (342lb)
Extended Travel	182kg (402lb)
Temperature	
Operating	5 to 35ºC (40ºF to 95ºF)
Storage	-20 to 55ºC (-4ºF to 130ºF)
Ventilation Requirements	Un-restricted air flow to side ventilation holes
Humidity	5 to 85% RH (Non- condensing)

11.7 TECHNICAL SPECIFICATION LS100 PLUS

Maximum Force (tension and compression)	100kN (22,481lbf)
Overall Force Range Using	
Interchangeable Load Cells	0.1N - 100kN (0.02 - 22,481lbf)
Force Measuring System	Exceeds the requirements of BS EN ISO 7500 – 1: 1999 Class 0.5 ASTM E4, DIN 1221
Force Measuring Accuracy	Better than 0.5%
Crosshead Speed Range	
to 50kN	0.001 - 254mm/min (0.0004 - 10in/ min)
to 100kN	0.001 - 101.6mm/in (0.0004 - 4in/min)
Crosshead Speed Accuracy	± 0.2% @ steady state
Maximum Working Width Between Columns	404mm (16in)
Crosshead Vertical Travel	840mm (33in)
Internal Extension Resolution	< 0.03 microns
External Extensometer Connection.	
(Using Lloyd Instruments interface plug)	Analogue (±10V) or strain gauge. Digital encoders (Single or dual differential)
Data Output For Computer / serial printer	RS 232
Supply Voltage	230V a.c. ±10% 50-60Hz (Fuse T5AH250V) 115V a.c. ±10% 50-60Hz (Fuse T10AH250V)
Power Consumption	<1000 VA
Main Frame Dimensions	
Height	1567mm (61.7in)
Depth	496mm (13.5in)
Width with Console	845mm (33in)
Width without Console	686mm (27in)
Mass (without Grips or Load Cell fitted)	200kg (440lb)
Temperature	
Operating	5 to 35ºC (40ºF to 95ºF)
Storage	-20 to 55ºC (-4ºF to 130ºF)
Humidity	5 to 85% RH (Non- condensing)

11.8 TECHNICAL SPECIFICATION LR100KPLUS

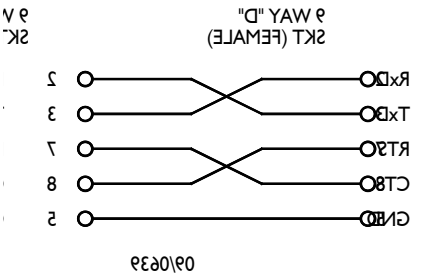
Maximum Force (tension and compression)	100kN (22,481lbf)
Overall Force Range Using Interchangeable Load Cells	0.1N - 100kN (0.02 - 22,481lbf)
Force Measuring System	Exceeds the requirements of BS EN ISO 7500 – 1: 1999 Class 0.5 ASTM E4, DIN 1221
Force Measuring Accuracy	Better than 0.5%
Crosshead Speed Range @ Full Load	0.001 - 510mm/min (0.0004 - 20in/ min)
Crosshead Speed Accuracy	± 0.2% @ steady state at 100mm/min and above. Reduced at lower speed, but better than 1% at 0.5mm/min.
Maximum Working Width Between Columns	620mm (24.4in)
Crosshead Vertical Travel	1050mm (41.34in)
Crosshead Position Accuracy	< 0.1mm
Internal Extension Resolution	< 0.5 microns
External Extensometer Connection. (Using Lloyd Instruments interface plug)	Analogue (±10V) or strain gauge. Digital encoders (Single or dual differential)
Data Output For Computer / serial printer	RS 232
Supply Voltage	230V a.c. ±10% 50-60Hz (Fuse T5AH250V) 115V a.c. ±10% 50-60Hz (Fuse T10AH250V)
Power Consumption	<1000 VA
Main Frame Dimensions	
Height	2508mm (98.74in)
Depth	733mm (28.86in)
Width	1204mm (47.4in)
Mass (without Grips or Load Cell fitted)	150kg (330lb)
Temperature	
Operating	5 to 35ºC (40ºF to 95ºF)
Storage	-20 to 55ºC (-4ºF to 130ºF)
Ventilation Requirements	Un-restricted air flow to side ventilation holes
Humidity	5 to 85% RH (Non- condensing)

11.9 TECHNICAL SPECIFICATION LR150KPLUS

Maximum Force (tension and compression)	150kN (33,721lbf)
Overall Force Range Using Interchangeable Load Cells	0.1N - 150kN (0.02 - 33,721lbf)
Force Measuring System	Exceeds the requirements of BS EN ISO 7500 – 1: 1999 Class 0.5 ASTM E4, DIN 1221
Force Measuring Accuracy	Better than 0.5%
Crosshead Speed Range @ Full Load	0.001 - 254mm/min (0.0004 - 10in/ min)
Crosshead Speed Accuracy	± 0.2% @ steady state at 100mm/min and above. Reduced at lower speed, but better than 1% at 0.5mm/min.
Maximum Working Width Between Columns	620mm (24.4in)
Crosshead Vertical Travel	1050mm (41.34in)
Crosshead Position Accuracy	< 0.1mm
Internal Extension Resolution	< 0.5 microns
External Extensometer Connection. (Using Lloyd Instruments interface plug)	Analogue (±10V) or strain gauge. Digital encoders (Single or dual differential)
Data Output For Computer / serial printer	RS 232
Supply Voltage	230V a.c. ±10% 50-60Hz (Fuse T5AH250V) 115V a.c. ±10% 50-60Hz (Fuse T10AH250V)
Power Consumption	<1000 VA
Main Frame Dimensions	
Height	2508mm (98.74in)
Depth	733mm (28.86in)
Width	1204mm (47.4in)
Mass (without Grips or Load Cell fitted)	150kg (330lb)
Temperature	
Operating	5 to 35ºC (40ºF to 95ºF)
Storage	-20 to 55ºC (-4ºF to 130ºF)
Ventilation Requirements	Un-restricted air flow to side ventilation holes
Humidity	5 to 85% RH (Non- condensing)

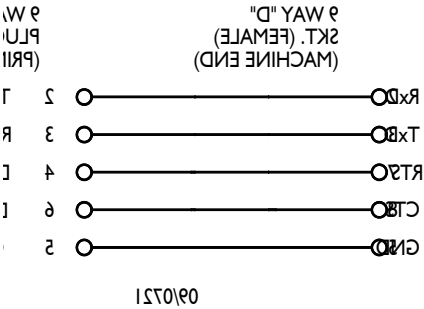
11.10 RS232 LEADS

MACHINE to PC Part No. 09/0639 (supplied).



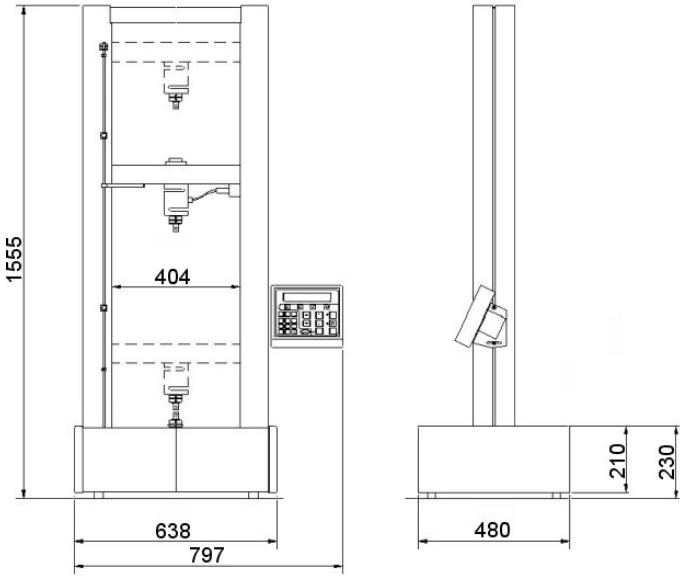
Data rate is 57600 BAUD, 8 Bit, no parity, 1 stop Bit

MACHINE TO PRINTER Part No. 09/0721 (optional)



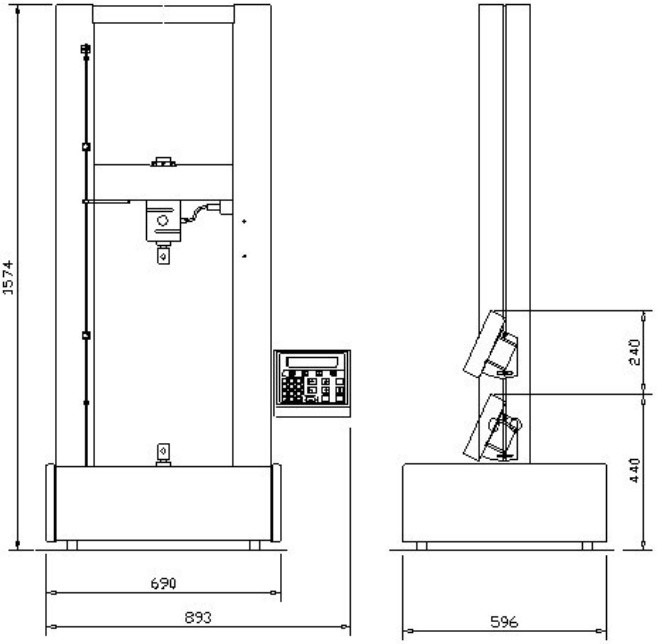
NOTE: To maintain EMC compliance ONLY LLOYD INSTRUMENTS leads supplied by AMETEK should be used. Check leads for signs of damage regularly. Replace leads that are damaged in any way.

Dimensions



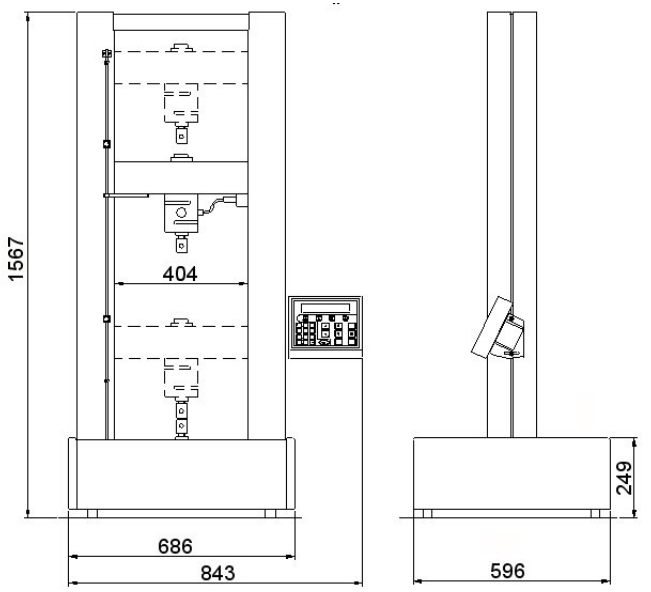
LR5K Plus and LR10K Plus Machines
(mm)

Dimensions



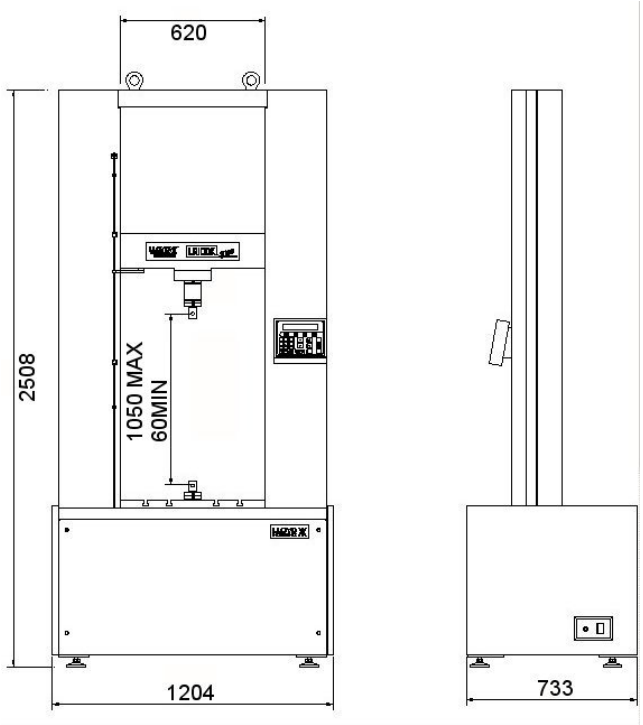
EZ20 and EZ50 Machines
(mm)

Dimensions



LR30K Plus, LR50K Plus and LS100 Plus Machines (mm)

Dimensions



LR100K Plus and LR150K Plus Machines
(mm)

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
下支架	O	O	O	O	O	O
保护外套	O	O	O	O	O	O
PCB - 处理器	X	O	O	O	O	O
PCB - 马达控制	X	O	O	O	O	O
PCB - 控制台	X	O	O	O	O	O
通讯线	O	O	O	O	O	O
变压器	O	O	O	O	O	O
马达	O	O	O	O	O	O
变速箱	O	O	O	O	O	O
丝杆	X	O	O	O	O	O
开关组件	X	O	O	O	O	O
载荷传感器	O	O	O	O	O	O
垫子	O	O	O	O	O	O
防护帘	O	O	O	O	O	O
控制台	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 MT	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
Lower bracket	O	O	O	O	O	O
Casings	O	O	O	O	O	O
PCB - Processor	X	O	O	O	O	O
PCB - Motor control	X	O	O	O	O	O
PCB - Console	X	O	O	O	O	O
Looms	O	O	O	O	O	O
Transformer	O	O	O	O	O	O
Motor	O	O	O	O	O	O
Gearbox	O	O	O	O	O	O
Leadscrew	X	O	O	O	O	O
Switch assembly	X	O	O	O	O	O
Load cell	O	O	O	O	O	O
Matting	O	O	O	O	O	O
Blinds	O	O	O	O	O	O
Console	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.

RoHS

This product is RoHS and China RoHS compliant. This symbol indicates the equipment contains some restricted hazardous substances above the recommended level, and may offer potential harm to the environment after 15 years from date of manufacture.

AMETEK®

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