

MLT Series

Low Profile Cross Roller Bearing Linear Stage



 **Newport®**

USER'S MANUAL

Warranty

Newport Corporation warrants this product to be free from defects in material and workmanship for a period of 1 year from the date of shipment. If found to be defective during the warranty period, the product will either be repaired or replaced at Newport's discretion.

To exercise this warranty, write or call your local Newport representative, or contact Newport headquarters in Irvine, California. You will be given prompt assistance and return instructions. Send the product, transportation prepaid, to the indicated service facility. Repairs will be made and the product returned, transportation prepaid. Repaired products are warranted for the balance of the original warranty period, or at least 90 days.

Limitation of Warranty

This warranty does not apply to defects resulting from modification or misuse of any product or part.



CAUTION

Please return equipment in the original (or equivalent) packing.

You will be responsible for damage incurred from inadequate packaging if the original packaging is not used.

CAUTION

Warranty does not apply to damages resulting from:

- **Incorrect usage:**
 - **Load on the stage greater than maximum specified load.**
 - **Carriage speed higher than specified speed.**
 - **Improper grounding:**
 - **Connectors must be properly secured.**
 - **When the load on the stage represents an electrical risk, it must be connected to ground.**
 - **Excessive or improper cantilever loads.**
- **Modification of the stage or any part thereof.**

This warranty is in lieu of all other warranties, expressed or implied, including any implied warranty of merchantability or fitness for a particular use. Newport Corporation shall not be liable for any indirect, special, or consequential damages.

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Original instructions.

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EU Declaration of Conformity



2 Tech Drive
Andover, MA 01810
www.mksinst.com

EU27 Declaration of Conformity

Application of Council Directive(s):

- Electromagnetic Compatibility Directive (EMCD) – 2014/30/EU
- Machinery Directive – 2006/42/EC
- Restriction of Hazardous Substances Directive (RoHS2) – 2011/65/EU ⁽⁷⁾
- Restriction of Hazardous Substances Directive (RoHS3) – (EU) 2015/863 ⁽⁷⁾
- Waste Electrical and Electronic Equipment – Directive 2012/19/EU



Standard(s) to which conformity is declared:

- EN 61326-1:2013 – (EMC)
- EN ISO 12100:2010 Safety of Machinery – General Principles of Design – Risk Assessment and Risk Reduction

Emissions:

- IEC 61000-3-2:2018 EMC/Limits for Harmonic Current Emission ⁽¹⁾
- IEC 61000-3-3:2013 + AMD1:2017 EMC/Limitations of Voltage Fluctuations and Flicker in Low-Voltage Supply Systems ⁽²⁾
- EN 55011: 2016 +A1:2017 ⁽⁴⁾ Industrial, scientific and medical equipment - Radio-frequency disturbance characteristics - Limits and methods of measurement

Immunity:

- EN 61000-4-2:2009 EMC/Electrostatic Discharge Immunity Test
- EN 61000-4-3:2006+A2:2010 EMC/Radiated Radio Frequency Electromagnetic Field Immunity Test
- EN 61000-4-4:2012 EMC/Electrical Fast Transient/Burst Immunity Test
- EN 61000-4-5:2014+A1:2017 EMC/Surge Immunity Test
- IEC 61000-4-6:2013 EMC/Conducted Disturbances induced by Radio Frequency Fields Immunity Test
- IEC 61000-4-11:2004 + AMD 1:2017 EMC/Voltage Dips, Short Interruptions and Variations Immunity Test ⁽⁵⁾

Manufacturers Name: MKS Instruments, Inc., 2 Tech Drive, Andover, MA 01810 USA

Authorized Representatives Name & Location: _____ / _____

Equipment Type/Description: **Low Profile LM Cross Roller Bearings.**

Model Number(s) ⁽⁶⁾: **MLT25; MLT50; MLT100; MLT200; MLT250; MLT25-Z; MLT50-Z; MLT25-XYZR; MLT25-XYZL; MLT50-XYZL.**

The object of the declaration described above is in conformity with the relevant Community harmonization legislation. MKS product conforms to the above Directive(s) and Standard(s) only when installed in accordance with manufacturer's specifications. This declaration has been issued under the sole responsibility of the manufacturer.

Date: 9/20/2021

Le Cointe Hervé – Quality Director

1) Applicable to AC powered product only. Class B

3) Applicable to AC powered product; DC powered connections and may connect to a D.C. distribution network.

5) Applicable to AC powered product only.

6) Compliance of the above model numbers requires the use of a braided shielded cable properly terminated at both ends – if so noted in the MKS Instruction Manual.

7) RoHS Directive has to be checked for in scope products; cannot CE mark without compliance to RoHS. RoHS Directive can be unchecked only for systems which MKS sells which qualify for "Large Scale Industrial Tool" exclusion.

UK Declaration of Conformity



2 Tech Drive
Andover, MA 01810
www.mksinst.com

UK Declaration of Conformity

Application of Council Directive(s):

- Electromagnetic Compatibility Directive (EMCD) – 2014/30/EU
- Machinery Directive – 2006/42/EC
- Restriction of Hazardous Substances Directive (RoHS2) – 2011/65/EU ⁽⁷⁾
- Restriction of Hazardous Substances Directive (RoHS3) – (EU) 2015/863⁽⁷⁾
- Waste Electrical and Electronic Equipment – Directive 2012/19/EU



Standard(s) to which conformity is declared:

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Definitions and Symbols

The following terms and symbols are used in this documentation and also appear on the product where safety-related issues occur.

General Warning or Caution



The exclamation symbol may appear in warning and caution tables in this document. This symbol designates an area where personal injury or damage to the equipment is possible.

The following are definitions of the Warnings, Cautions and Notes that may be used in this manual to call attention to important information regarding personal safety, safety and preservation of the equipment, or important tips.



WARNING

Warning indicates a potentially dangerous situation which can result in bodily harm or death.



CAUTION

Caution indicates a potentially hazardous situation which can result in damage to product or equipment.

NOTE

Note indicates additional information that must be considered by the user or operator.

European Union CE Mark



The presence of the CE Mark on Newport Corporation equipment means that it has been designed, tested and certified as complying with all applicable European Union (CE) regulations and recommendations.

United Kingdom Conformity Assessed Mark



The presence of the UKCA Mark on Newport Corporation equipment means that it has been designed, tested and certified as complying with all applicable United Kingdom's regulations and recommendations.

Warnings



WARNING

The motion of objects of all types carries potential risks for operators. Ensure the protection of operators by prohibiting access to the dangerous area and by informing the personnel of the potential risks involved.



WARNING

The magnetic channel included in this device has the potential to disrupt pacemakers. Consequently, it is recommended that individuals maintain a distance of 1 meter or more from the stage as a precautionary measure.



WARNING

Take care when the stage is laying on a magnetic support (like a steel shelf), with its carriage close to end-of-run position. If tilted, the magnetic track could stick brutally on it and pinch your fingers.

WARNING

Do not use this stage when its motor is emitting smoke or is unusually hot to the touch or is emitting any unusual odor or noise or is in any other abnormal state.

Stop using the stage immediately, switch off the motor power and then disconnect the electronics power supply.

After checking that smoke is no longer being emitted contact your Newport service facility and request repairs. Never attempt to repair the stage yourself as this can be dangerous.

WARNING

Make sure that this stage is not exposed to moisture and that liquid does not get into the stage.

Nevertheless, if any liquid has entered the stage, switch off the motor power and then disconnect the electronics from power supply.

Contact your Newport service facility and request repairs.



WARNING

Do not insert or drop objects into this stage or have some caught by the magnetic track, this may cause an electric shock, or lock the drive.

Do not use this stage if any foreign objects have entered the stage. Switch off the motor power and then disconnect the electronics power supply.

Contact your Newport service facility for repairs.



WARNING

Do not place this stage in unstable locations such as on a wobbly table or sloping surface, where it may fall or tip over and cause injury.

If this stage has been dropped or the case has been damaged, switch off the motor power and then disconnect the electronics power supply.

Contact your Newport service facility and request repairs.

WARNING

Do not attempt to modify this stage; this may cause an electric shock or downgrade its performance.

WARNING

Do not exceed the usable depth indicated on the mounting holes (see section "Dimensions"). Longer screws can damage the mechanics or cause an electrical issue.

WARNING

Do not exceed the specified speed and load limitations.

Cautions

CAUTION

This stage is a Class A device. In a residential environment, this device can cause electromagnetic interference. In this case, suitable measures must be taken by the user.



CAUTION

Do not place this stage in a hostile environment such as X-Rays, hard UV, or in any vacuum environment.

CAUTION

Do not place this stage in a location affected by dust, oil fumes, steam or high humidity or acidity. This may cause an electric shock.

CAUTION

Do not leave this stage in places subject to extremely high temperatures or low temperatures. This may cause an electric shock.

- Operating temperature: +10 to +40 °C, 50% RH max. (non-condensing)
- Storage temperature: -10 to +40 °C, 50% RH max. (non-condensing, in its original packaging)

CAUTION

Do not move this stage if its motor power is on.

Make sure that the cable to the electronics is disconnected before moving the stage. Failure to do so may damage the cable and cause an electrical shock.

CAUTION

Be careful that the stage is not bumped when it is being carried. This may cause it to malfunction.

CAUTION

When handling this stage, always unplug the equipment from the power source for safety.

CAUTION

When the carriage is in its end-of-run position, it is strongly recommended not to go beyond this point as this may damage the stage mechanism.

CAUTION

Contact your Newport service facility to request cleaning and specification testing every year.

CAUTION

You may have unfortunately put your fingers on the optical scale. This can cause failures while the stage is operating. In order to obtain an optimal operation, we advise to clean this optical scale with isopropyl alcohol.

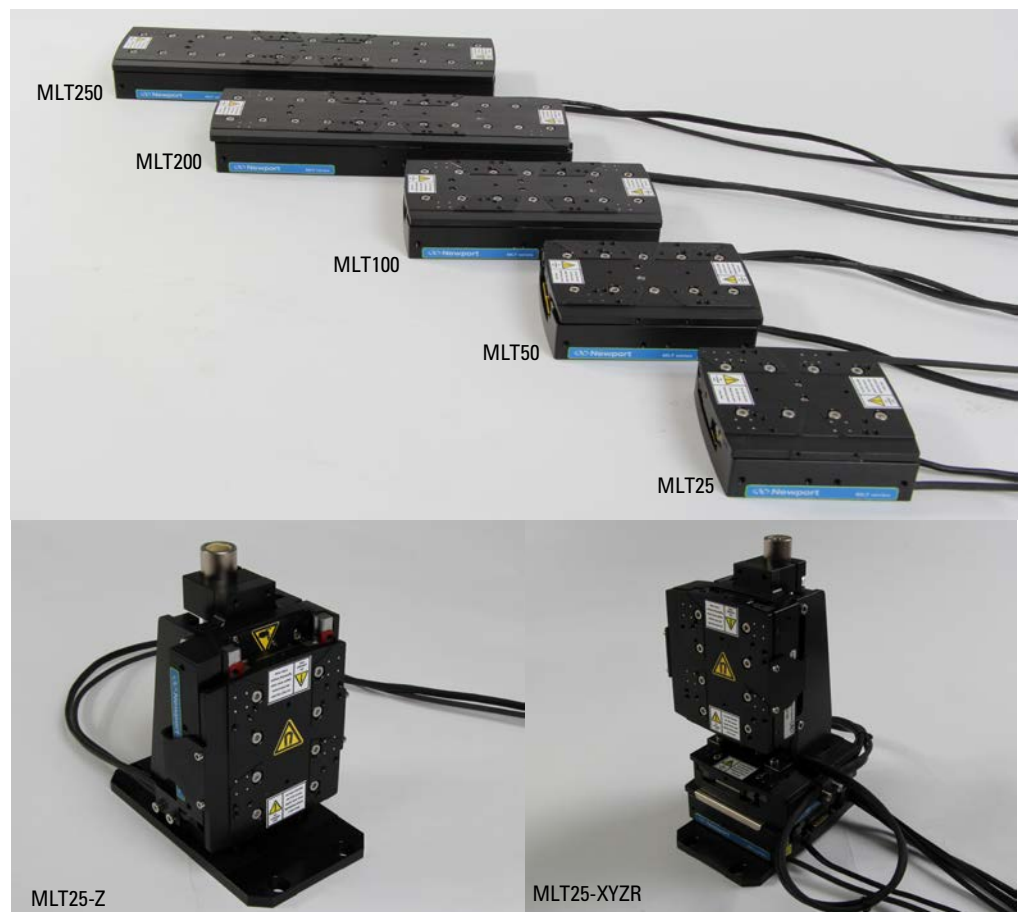


Low Profile Cross Roller Bearing Linear Stage

1.0 Introduction

This manual provides operating instructions for the translation stage that you have purchased in the MLT Series:

- MLT25
- MLT50
- MLT25-Z
- MLT25-XYZR
- MLT100
- MLT200
- MLT50-Z
- MLT25-XYZL
- MLT250
- MLT50-XYZL



MLT Series translation stages.

RECOMMENDATION

We recommend you carefully read the chapter “Connection to electronics” before using the MLT Series translation stage.

2.0 Description

The MLT stage family is a compact, low profile, high precision linear stage series. It bridges the ultra-precision performance of the XM family and the field-proven, compact VP family of linear stages. The MLT showcases the latest innovations and expertise of MKS in precision stage design for various industrial applications, while keeping the short setups expected of motion products when used with MKS motion controllers.

The MLT is designed for typical scanning or point to point applications that are implemented in industrial, semiconductor or research markets for metrology, sensor test and calibration, alignment and pick and place assembly.

The MLT will utilize less space, operate with higher accelerations and speeds thereby reducing operating costs, require low initial investment and need less maintenance due to its high reliability design. The overall benefit of the MLT stage is its low cost of ownership.

Each MLT stage is designed with an FEA-optimized base for the highest rigidity and thermal performance, using a high strength and stable aluminum alloy. Select components, like long life and high load recirculating ball bearings, high force linear motors and high precision linear encoders, are added with not only performance, but also reliability in mind. Significant tests were conducted to ensure the high reliability performance of the MLT. Built in limit switches prevent over travel and collision. ESP technology, MKS' well-established plug and play feature, is also included to facilitate effortless and quick setups.

Even for its size, the MLT's rigid structure enables excellent pitch and yaw characteristics. This reduces system-level errors in multi-axis configurations, thereby increasing the confidence in the production process, while reducing process times.

The MLT can be built into XY and XYZ stacks, utilizing the available mounting holes. A magnetic shield is required between the X and Y stages. Pre-assembled XYZ stacks are available in the short travel ranges. Cable chains can also be supplied as needed. The Z-stage features a magnetic counterweight to accommodate a range of vertical loads, while maintaining excellent positioning performance.

Other linear and rotation stages can also be directly mounted on the MLT stages. Also, using the MLT base plate, MLT stages can be mounted on vibration tables.

The MLT is compatible with standard MKS motion controllers from the XPS-D family, that support plug and play ESP technology, making startup really easy without the need for complex driver configuration. An added convenience is that the necessary cables are included with each MLT stage.

Understanding that certain customers prefer to use their own motion controller, the MLT is also compatible with 3rd party controllers/drivers. Motor specifications, limit switch protocols and pin assignments are available in this manual.

2.1 Design Details

Base Material	High-strength 7075 Aluminum
Bearings	Anti-creep crossed roller bearings
Drive Mechanism	3-phase synchronous ironless linear motor with Hall effect sensors and thermistor
Motor initialization	Utilizes XPS controller patented feature that avoids large motions during initialization, without using Hall effect sensors
Motor commutation	Done by the XPS controller using encoder signals
Feedback	Direct reading optical encoder on the translation plate, 20 μ m signal period
Limit Switches	Magnets along encoder scale
Origin	Reference mark on encoder scale
Cables	XPS compatible connectorized cables

3.0 Characteristics

3.1 Definitions

Specifications of our products are established in reference to ISO 230 standard part II “Determination of accuracy and repeatability of positioning numerically controlled axes”.

This standard gives the definition of position uncertainty which depends on the 3 following parameters:

Accuracy

- **Absolute Accuracy**

Difference between ideal position and real position.

- **On-axis accuracy**

Difference between ideal position and real position after the compensation of linear errors.

Linear errors include: cosine errors, inaccuracy of screw or linear scale pitch, angular deviation at the measuring point (Abbe error) and thermal expansion effects. All Newport motion electronics can compensate for linear errors.

The relation between absolute accuracy and on-axis accuracy is as follows:

$$\text{Absolute Accuracy} = \text{Accuracy} + \text{Correction Factor} \times \text{Travel}$$

Repeatability

Ability of a system to achieve a commanded position over many attempts.

Reversal Error (Hysteresis)

Difference between actual position values obtained for a given target position when approached from opposite directions.

The testing of accuracy, repeatability, and reversal error are made systematically with test equipment in controlled environment (20 \pm 1 $^{\circ}$ C).

A linear cycle with 21 data points on the travel and 4 cycles in each direction gives a total of 168 points.

The other following parameters are also evaluated:

Minimum Incremental Motion (MIM or Sensitivity)

The smallest increment of motion a device is capable of delivering consistently and reliably.

Resolution

The smallest increment that a motion device can theoretically move and/or detect. Resolution is not realistically achievable, whereas MIM is the real output of a motion system.

Yaw, Pitch

Rotation around the Z axis (Yaw) or Y axis (Pitch), as the carriage moves.

Straightness, flatness

Deviation from a straight line in horizontal direction (straightness) or vertical direction (flatness), as the carriage moves.

Guaranteed and Typical Specifications

Guaranteed maximum performance values are verified per Newport's A167 metrology test procedure. For more information, please consult the metrology tutorial section in the Newport catalog or at www.newport.com

3.2 Mechanical specifications

	MLT 25	MLT 50	MLT 100	MLT 200	MLT 250
Travel range (mm)	25	50	100	200	250
Minimum Incremental Motion, linear ⁽⁴⁾⁽⁵⁾ (μm)	0.005				
Bi-directional repeatability, guaranteed ⁽¹⁾⁽⁴⁾ (±μm)	0.15				
Accuracy, guaranteed ⁽¹⁾⁽⁴⁾ (±μm)	0.5	0.7	1.25	2.5	3
Maximum speed ⁽⁵⁾ (no load) (m/s)	0.5				
Maximum acceleration ⁽⁵⁾ (no load) (G)	0.75	0.75	0.75	0.5	0.5
Max. force (cont.) ⁽⁵⁾ (N)	3				
Drag force (N)	0.5				
Load capacity, stage horizontal (N)	50	70	70	70	70
Straightness, guaranteed ⁽¹⁾⁽²⁾ (±μm)	1	2	3	5	5
Flatness, guaranteed ⁽¹⁾⁽²⁾ (±μm)	1	2	3	5	10
Yaw, guaranteed ⁽¹⁾⁽²⁾⁽⁴⁾ (±μrad) ⁽³⁾	50	75	75	125	150
Pitch, guaranteed ⁽¹⁾⁽²⁾⁽⁴⁾ (±μrad) ⁽³⁾	50	75	75	150	200
MTBF (h) 100% load, 60% duty cycle	20,000				



¹⁾ For the definition of Typical and Guaranteed specifications see "Motion Basics Terminology & Standards" Tutorial at www.newport.com

²⁾ Middle 80% of travel.

³⁾ To obtain arcsec units, divide μrad value by 4.8.

⁴⁾ Requires operation in a controlled environment to achieve specification.

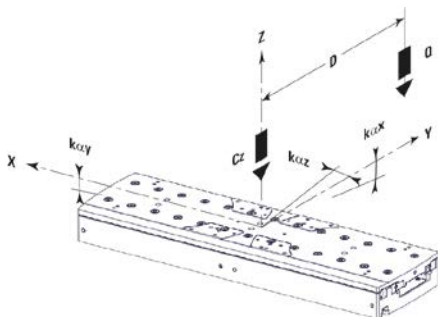
⁵⁾ With XPS-DRV11, maximum value is driver dependent. Contact Newport for additional information.



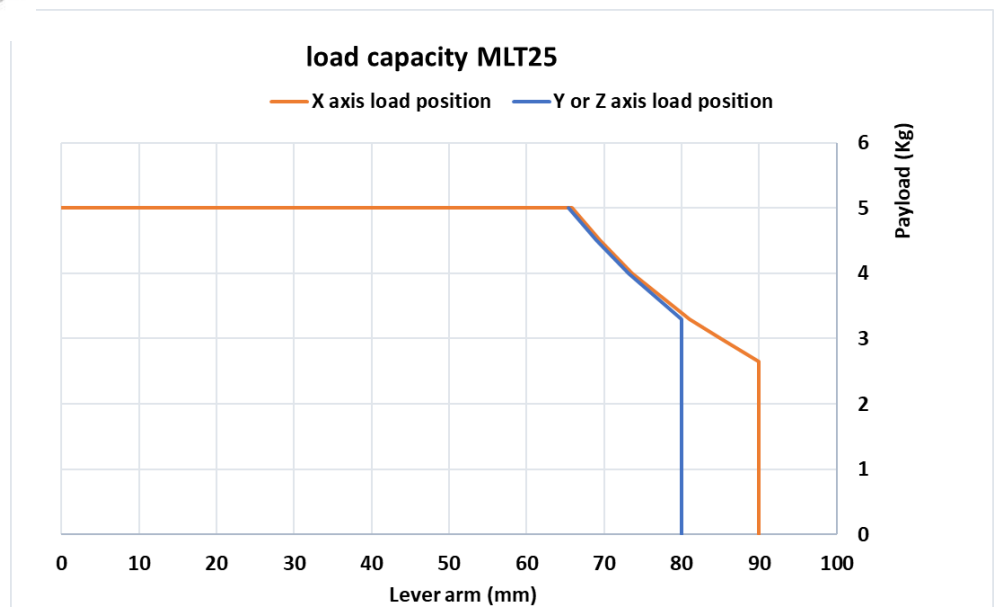
CAUTION

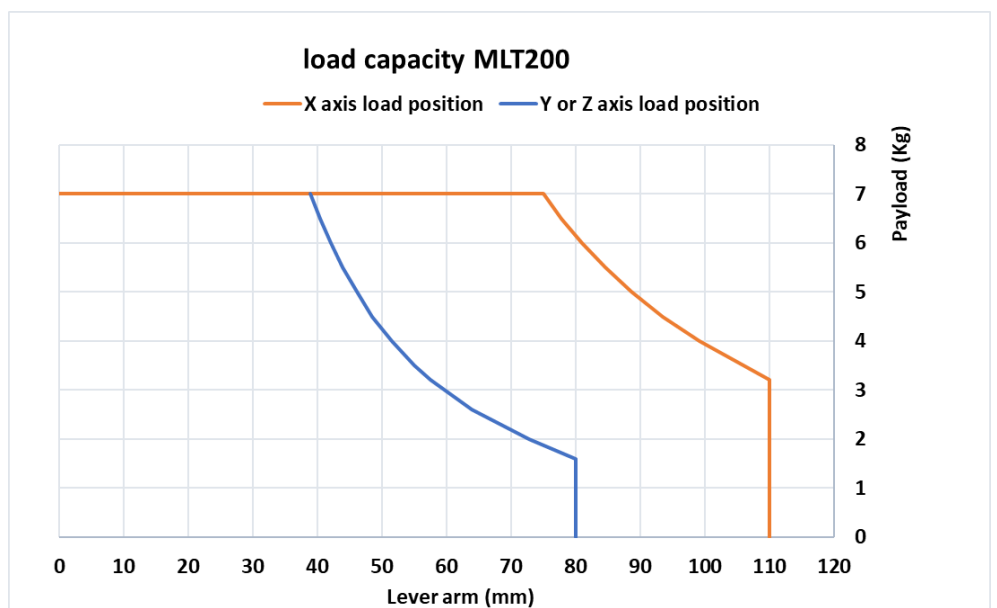
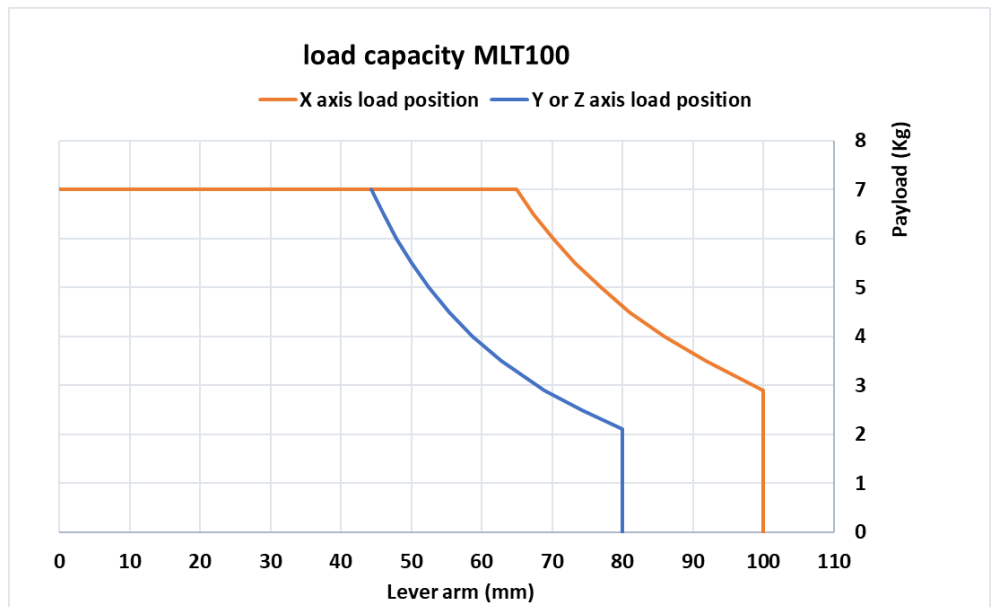
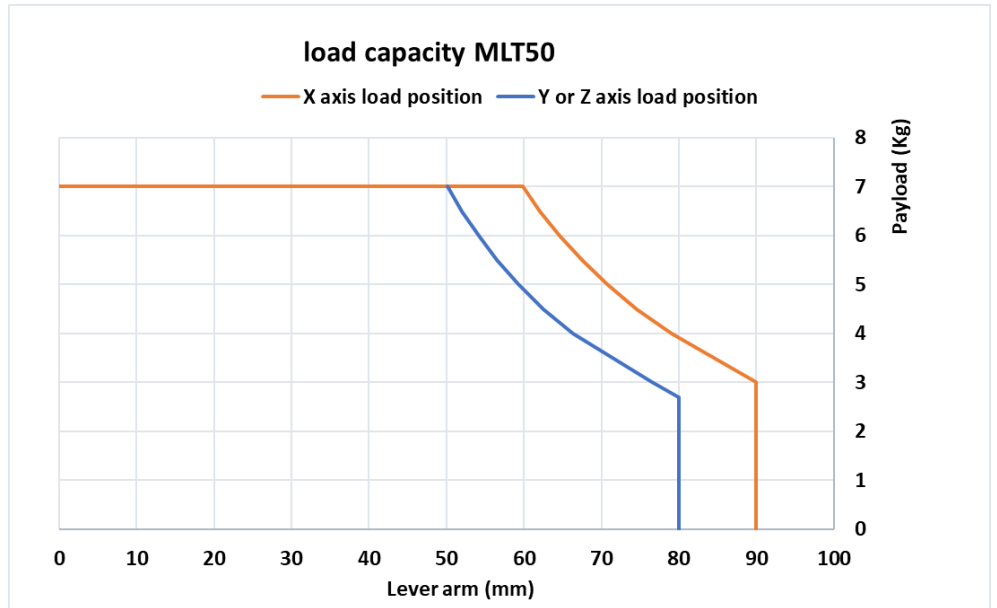
To reach specifications stated, stages must be used alone (not stacked) and fixed on a surface compliant with section 5.3 "Mounting condition".

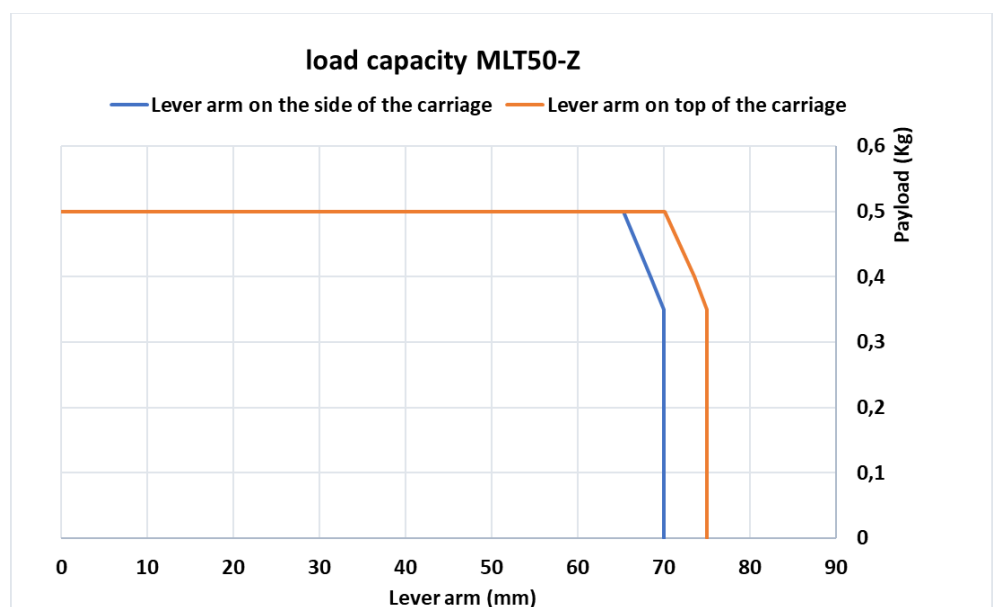
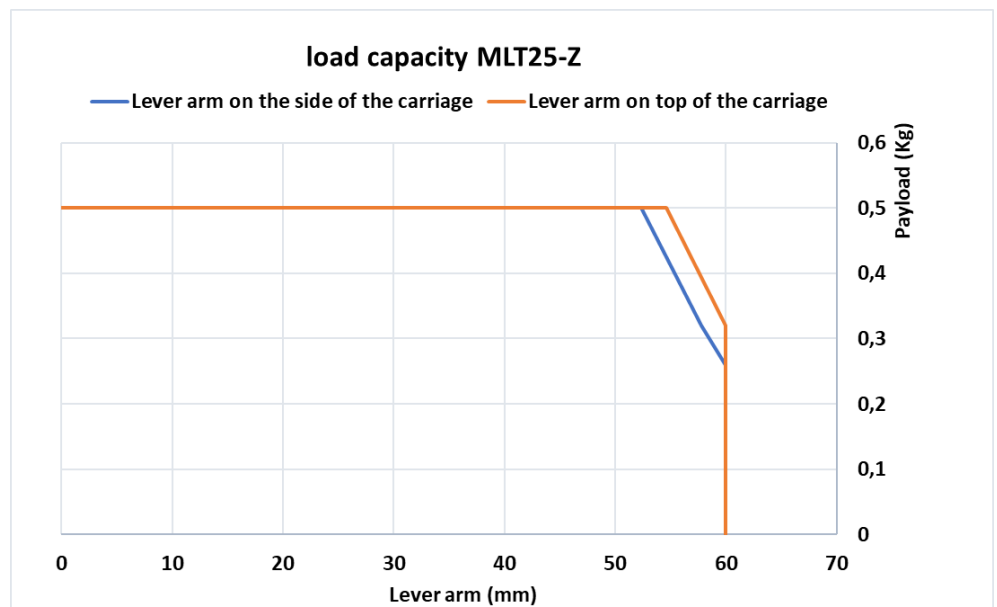
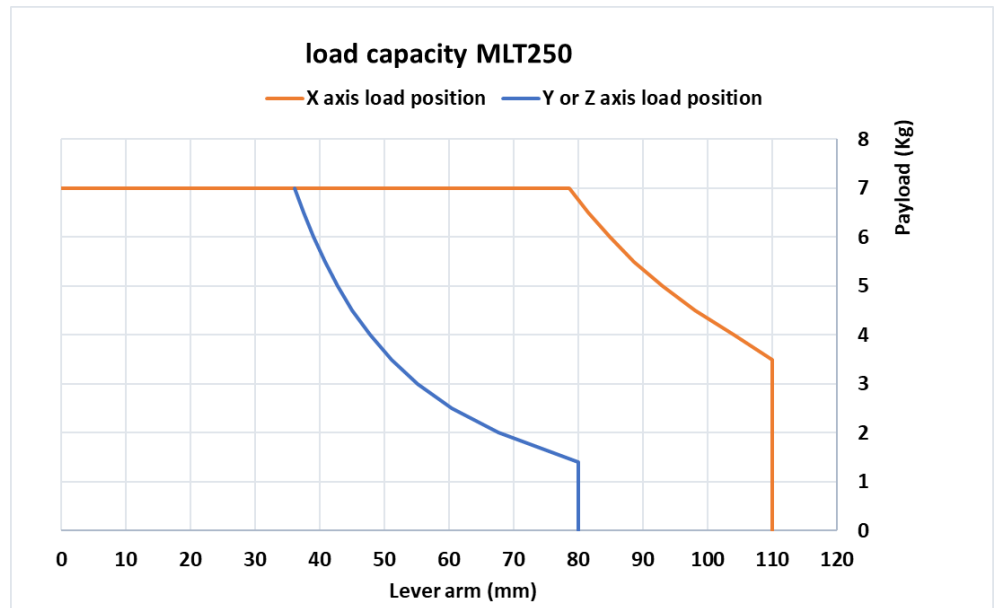
3.3 Load Characteristics and Stiffness

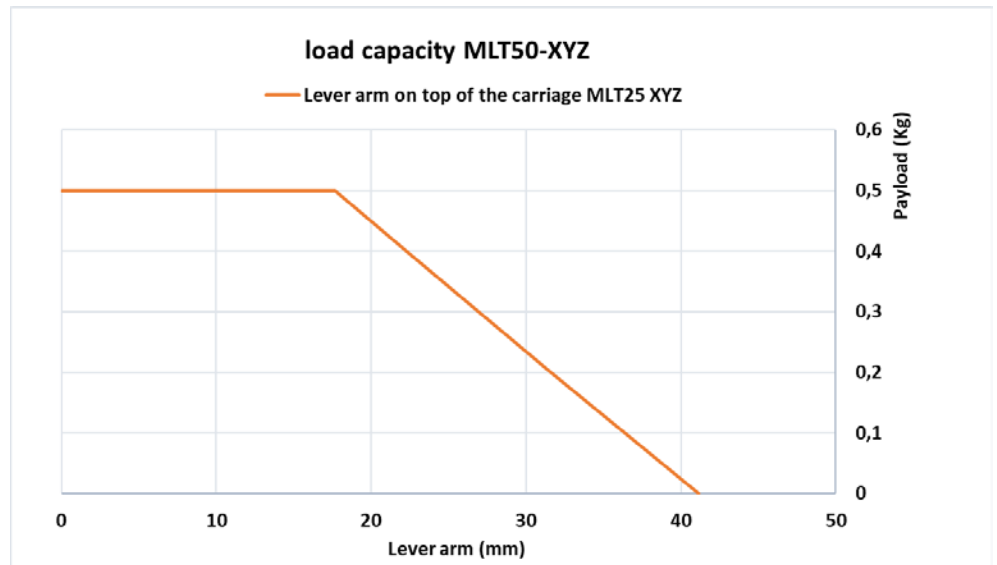
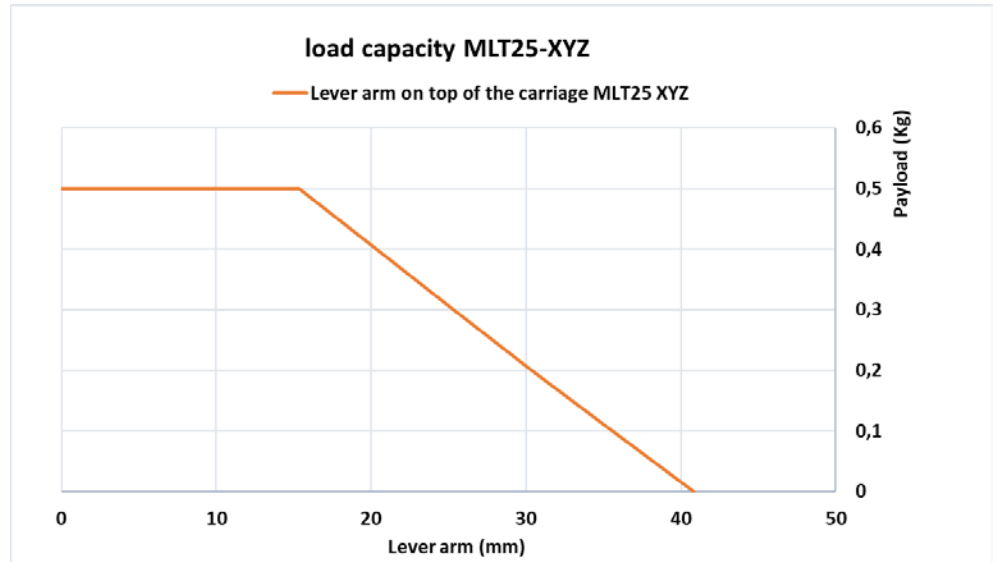


	MLT25	MLT50	MLT100	MLT200	MLT250
Cz, Normal centered load capacity (N)	50	70	70	70	70
k _{αx} , Compliance in roll (μrad/Nm)	11	12	21	24.6	30
k _{αy} , Compliance in pitch (μrad/Nm)	13	8.4	6.9	13.8	13.2
k _{αz} , Compliance in yaw (μrad/Nm)	12.3	5.8	3.9	3.3	2.3
Q, Off-center load	See load capacity graphs below (D = lever arm)				









When X, Y or Z axis distance load combined, please use the formula:

$$\sqrt{\text{dist } X^2 + \text{dist } Y^2 + \text{dist } Z^2} \leq Y \text{ or } Z \text{ axis load position}$$

3.4 Weights

The stage weights indicated below include the cables. Cable weight is 1.1lb (0.5kg) per stage and 3.3lb (1.5kg) per XYZ stage.

MCar is the weight of the moving carriage used for acceleration calculation.

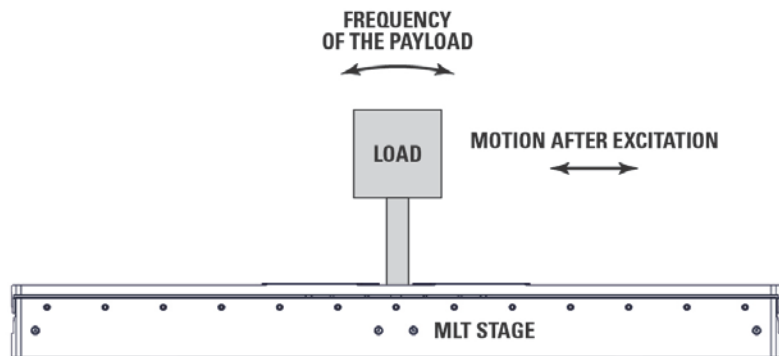
	Mass [lb (kg)]	
	Stage	Carriage MCar
MLT25	3.3 (1.5)	1.1 (0.5)
MLT50	3.7 (1.7)	1.3 (0.6)
MLT100	4.6 (2.1)	1.8 (0.8)
MLT200	6.8 (3.1)	2.9 (1.3)
MLT250	7.9 (3.6)	3.5 (1.6)
MLT25-Z	6.6 (3.0)	2.2 (1.0)
MLT50-Z	7.1 (3.2)	2.4 (1.1)
MLT25-XYZ	13.4 (6.1)	2.2 (1.0)
MLT50-XYZ	14.3 (6.5)	2.4 (1.1)

3.5 Estimated Moving Mass for MLT Stages

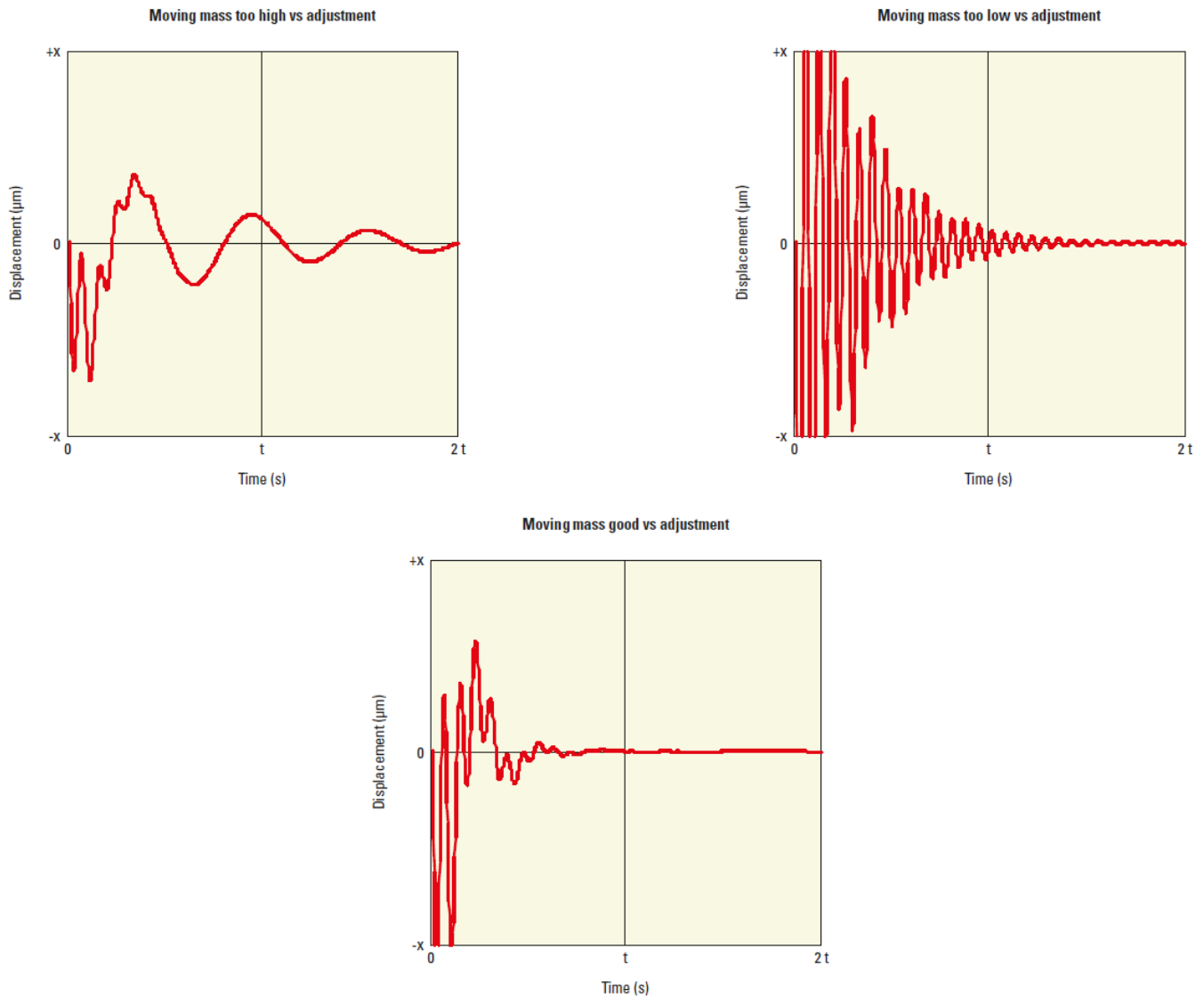


CAUTION

Stages with linear motor such as those of the MLT Series, are sensitive to the load variation and its stiffness. The typical example below shows the behavior of the displacement in accordance with the underestimated/overestimated moving mass.



Driving in force requires a good adjustment of the controller/driver theoretical acceleration parameter (ScalingAcceleration) which depends on the moving mass.



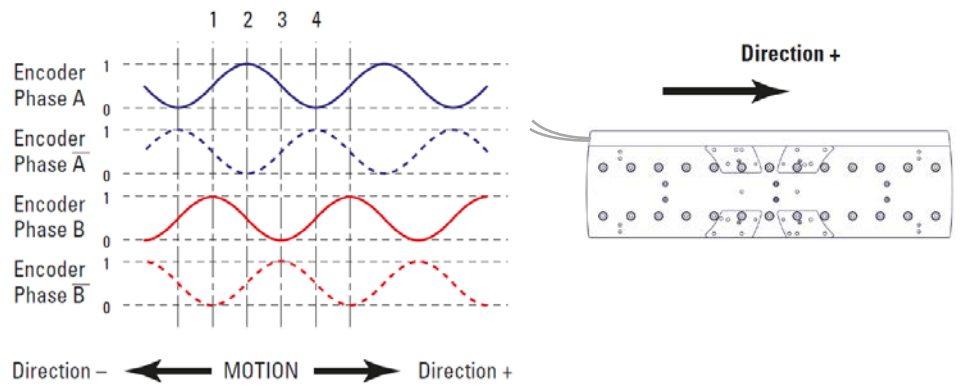
4.0 Motor and Encoder

4.1 Motor Characteristics

MLT stages are equipped with a brushless DC-motor (3-phase synchronous ironless linear motor) and a Renishaw encoder.

Motor Constant (N ² /W)	Motor force Constant (N/A)	Thermal Resistance ($^{\circ}\text{C}/\text{W}$)	Magnet Pitch (mm)	Nominal Voltage (V)	Max. RMS Current (A)	Max. Peak Current (A)	Resistance per Phase (Ω)	Inductance per Phase (mH)
6.1	5.35	1.43	24	48	2.9	6.4	3.3	0.78

4.2 Position Feedback Signals



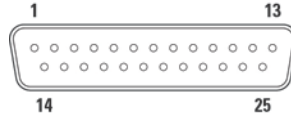
4.3 Pinouts

The MLT stage motor and encoder connectors are located at the end of the two cables.



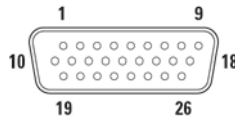
The pinout diagrams for MLT stage connectors are shown below.

4.3.1 Motor Connector



SUB-D25M	
1	Phase L Motor
2	Phase L Motor
3	N.C.
4	N.C.
5	Phase M Motor
6	Phase M Motor
7	Phase N Motor
8	Phase N Motor
9	Thermistor
10	Hall L
11	Hall M
12	Hall N
13	Do not connect
14	GND
15	N.C.
16	GND
17	Do not connect
18	Do not connect
19	N.C.
20	N.C.
21	+5V
22	GND
23	N.C.
24	N.C.
25	N.C.

4.3.2 Encoder Connector



SUB-D26HDM	
1	+5V
2	N.C.
3	N.C.
4	Encoder Phase A
5	- End-of-Run
6	Encoder Phase B
7	GND
8	Index Pulse I
9	N.C.
10	N.C.
11	N.C.
12	N.C.
13	Encoder Phase /A
14	+ End-of-Run
15	Encoder Phase /B
16	N.C.
17	Index Pulse /I
18	N.C.
19	N.C.
20	N.C.
21	N.C.
22	N.C.
23	N.C.
24	N.C.
25	N.C.
26	N.C.

5.0 Installation

5.1 Unpacking



WARNING

Do not unpack this stage if you are wearing a pacemaker.

The MLT stages are delivered in packaging designed for safe transport. Carefully lift and remove the stage from the packaging.

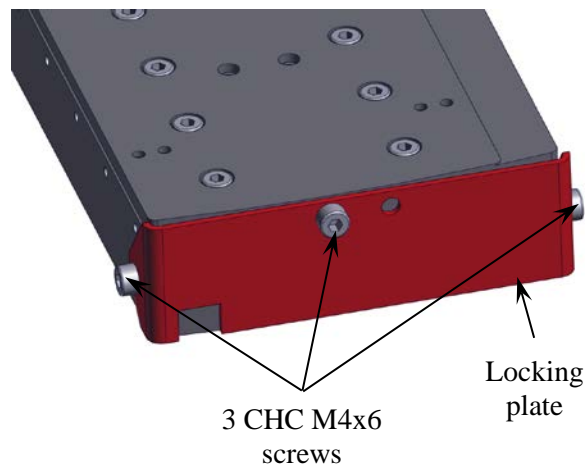
NOTE

An Allen key is supplied for CHC M4 screws.

The stage comes with a test report that indicates that the performance of the stage is within the guaranteed specifications. These measurements were taken in a controlled environment under flat mounting conditions.

5.2 Setting up

The MLT stages are equipped with a plate locking the carriage during transportation. Once the product is in place, remove the locking plate (3 CHC M4x6) and store for future handling.



CAUTION

Remove the locking plate with the supplied Allen key before using an MLT stage.

5.3 Mounting conditions

MLT stages feature a special 4-point bottom interface to minimize deformation. The top carriage interface also includes 4 contact areas with the threaded holes to secure the load or another stage.

It is recommended that the mounting conditions below be followed for best performance.

Installation considerations

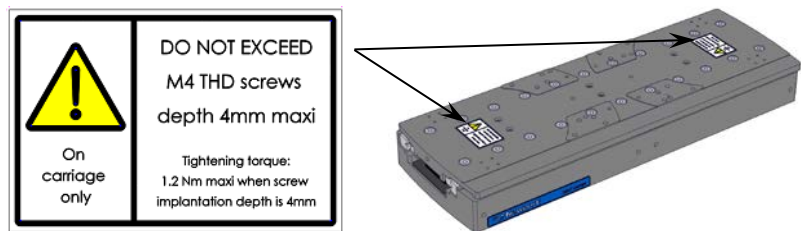
Mounting surface flatness	5 μm
Stainless steel M4 screw max. mounting torque (apply same torque on all screws)	2 N.m
Payload surface flatness	5 μm
Payload M4 screw mounting torque (4mm screwed depth on carriage)	1.2 N.m

NOTE

To ensure performances, make sure to have top and bottom interface flatness of 5 μm maximum.

WARNING

Do not exceed the usable depth indicated on the mounting holes (see section "Dimensions"). Longer screws can damage the mechanics or cause an electrical issue.



Dedicated accessories are available to easily interface with breadboards. Refer to section **6.3 Breadboard interface accessories**.

5.4 Grounding

It is recommended to connect MLT stages to earth to reduce electromagnetic interferences. They are equipped with a connection point (CHC M5x10 screw) for this purpose.



CAUTION

Make sure the screw head does not protrude above its mounting recess otherwise it may damage the scale.

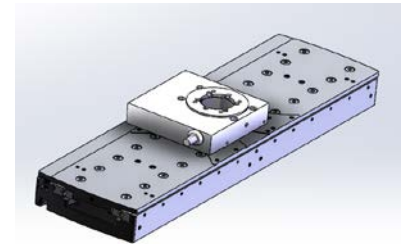


6.0 Assemblies

6.1 XY configuration or interfacing with other stages

MLT Series stages can be stacked directly together or with some other Newport stages as described in the table below.

Upper Lower	URS50	SR50	PR50	VP5ZA	MLT25	MLT50	MLT100	MLT200	MLT250
MLT25	Yes	Yes	No	No	Yes	No	No	No	No
MLT50	Yes	Yes	No	No	Yes	Yes	No	No	No
MLT100	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No
MLT200	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No
MLT250	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No



MLT assembly examples

When stacking 2 MLT stages, a special magnetic field barrier plate (ref. MLT-XYPLATE) must be inserted in between to prevent upper to lower stage disturbance.

RECOMMENDATION

When stacking MLT stages, please contact the local Newport support or application engineer for optimized driving parameters depending on your application.

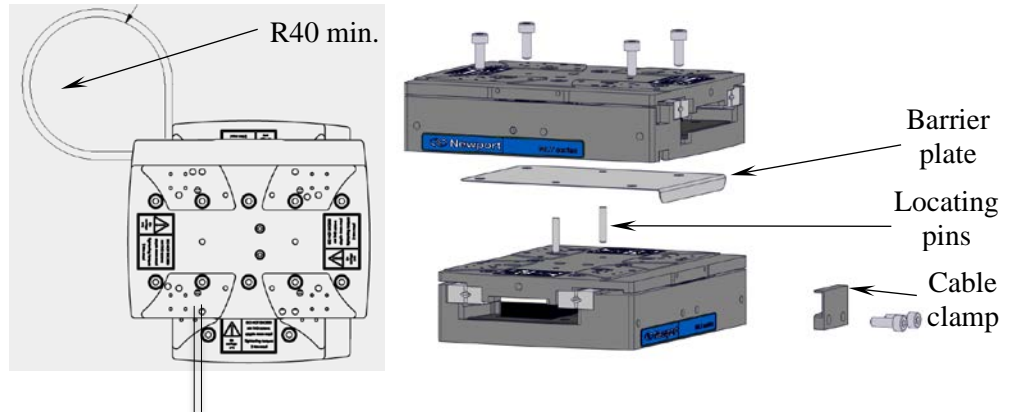
6.2 Cable management

A cable chain kit can be provided separately for XY stack cable management.

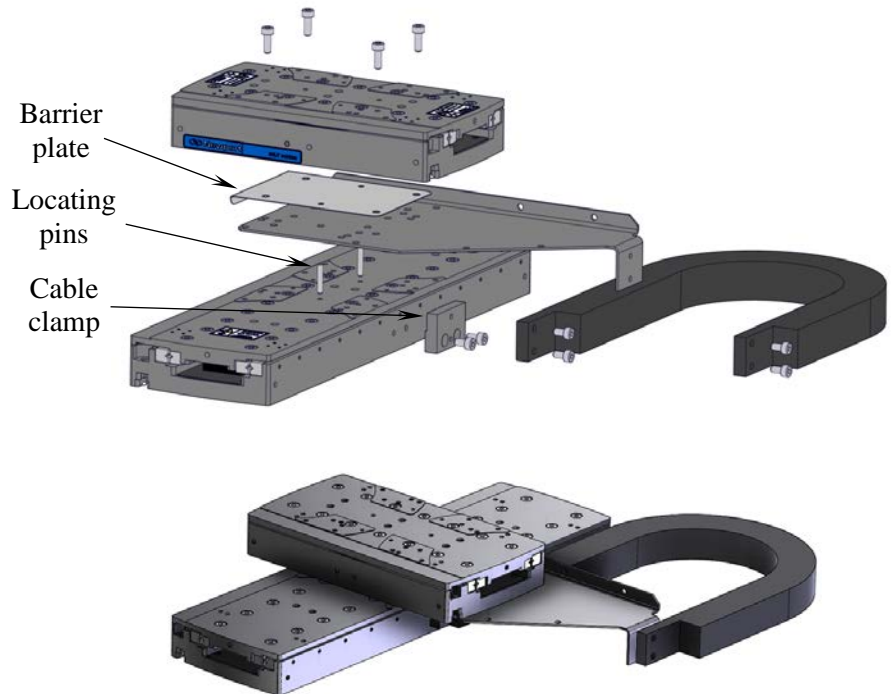
- MLT-CMS (from MLT25 to MLT100)
- MLT-CML (from MLT200)

These kits also include the magnetic barrier and 2 locating pins allowing 2 mrad max. perpendicularity between both axes.

Although these kits are available, it is recommended that Newport provides this stacking service to include tuning based on the application.



MLT-CMS cable management



MLT-CML cable management

6.3 Breadboard interface accessories

Depending on the models, base plates or M4-M6 inserts allow easy installation of your MLT stages on standard breadboards with 50 mm pitch M6 threaded holes. They can be ordered separately and the parts numbers are listed below.

	MLT25	MLT50	MLT100	MLT200	MLT250
Interface accessories	Base plate MLT-BP	Base plate MLT-BP	Base plate MLT-BP	4 Inserts TR-M4M6	4 Inserts TR-M4M6



MLT-BP base plate

6.4 Z versions

MLT25 and MLT50 stages are available in vertical configuration (MLT25-Z and MLT50-Z). These vertical translation stages feature a magnetic spring balancing system sized to compensate up to 0.5kg load on the stage. Depending on customer payload, it is recommended to adjust the number of countermass at the rear of the stage following table below.

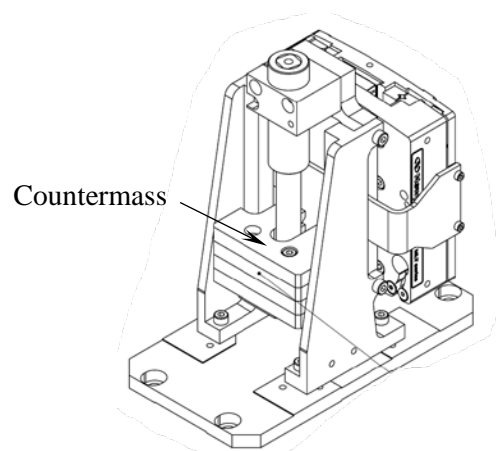
The stage is delivered with 4 countermass of 0.1kg each. This configuration is appropriate for 0 to 0.1kg payload. Decrease countermass for higher payloads accordingly.

The 2 CHC M4x35 mounting screws can be used to secure 3 or 4 countermass. 2 CHC M4x20 screws are also provided to secure 1 or 2 countermass.

CAUTION

**Using longer screws than specified may reduce the stroke.
Counter mass must be installed with counterbores on the top.**

Customer payload (kg)	Number of counter mass
0.0 – 0.1	4
0.1 – 0.2	3
0.2 – 0.3	2
0.3 – 0.4	1
0.4 – 0.5	0



MLT Z stage balancing

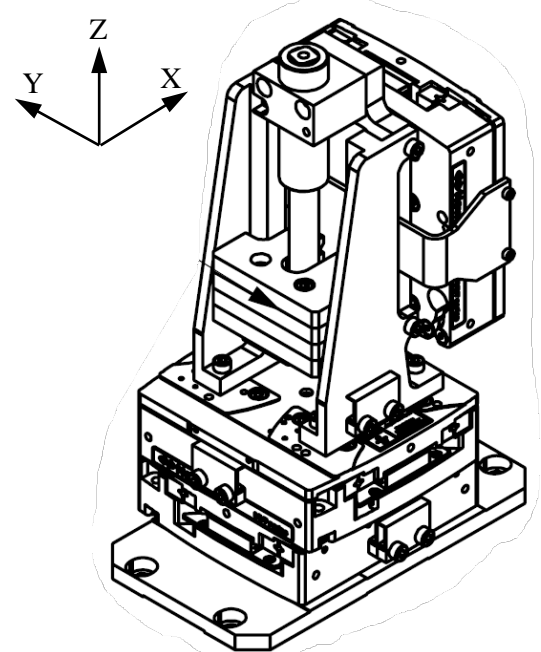
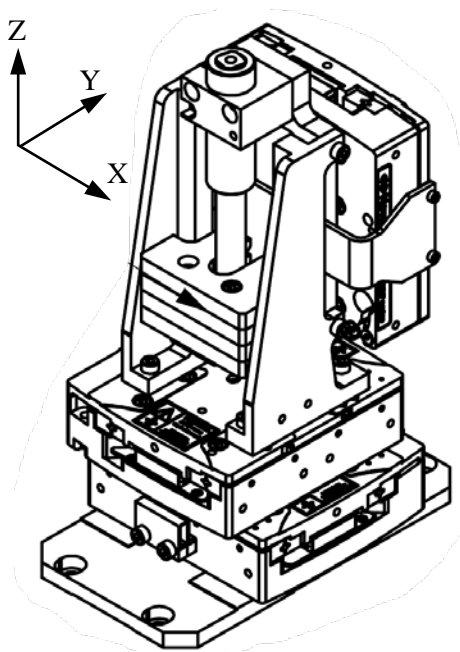
6.5 XYZ versions

MLT25 and MLT50 are available as assembled XYZ stacks.

MLT25-XYZ stacks are available in left-hand and right-hand orientations.

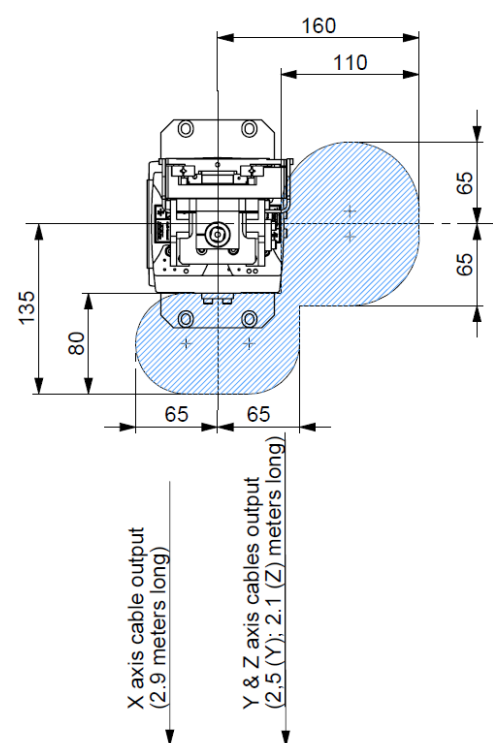
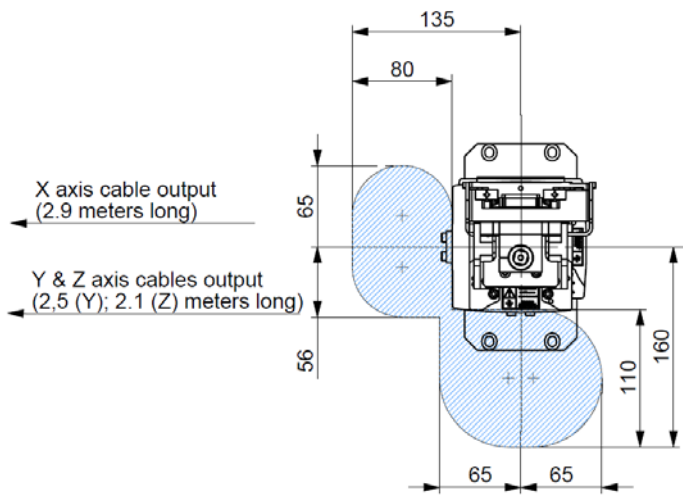
MLT50-XYZ stack is only available in left-hand orientation.

Stage stacking, and areas dedicated to cable management are shown below.



MLT25-XYZR
(Right-hand)

MLT25-XYZL
(Left-hand)



7.0 Connection to Newport Controllers

NOTE

MLT Series stages are intended to be used with Newport XPS-D or XPS-RLD controller and the XPS-DRV11 driver card.

7.1 Warnings on Controllers

Controllers are intended for use by qualified personnel who recognize shock hazards and are familiar with safety precautions required to avoid possible injury. Read the controller user's manual carefully before operating the instrument and pay attention to all written warnings and cautions.

WARNING

Disconnect the power plug under the following circumstances:

- If the power cord or any attached cables are frayed or damaged in any way.
 - If the power plug is damaged in any way.
 - If the unit is exposed to rain, excessive moisture, or liquids are spilled on the unit.
 - If the unit has been dropped or the case is damaged.
 - If you suspect service or repair is required.
 - Whenever you clean the electronics unit.
-

CAUTION



To protect the unit from damage, be sure to:

- Keep all air vents free of dirt and dust.
 - Keep all liquids away from the unit.
 - Do not expose the unit to excessive moisture (85% humidity).
 - Read this manual before using the unit for the first time.
-

WARNING

All attachment plug receptacles in the vicinity of this unit are to be of the grounding type and properly polarized.

Contact your electrician to check your receptacles.

WARNING

This product operates with voltages that can be lethal.

Pushing objects of any kind into cabinet slots or holes, or spilling any liquid on the product, may touch hazardous voltage points or short out parts.

7.2 Cables

The MLT stages are supplied with 2 cables terminated with connectors for direct connection to XPS-D controller and XPS-DRV11 driver card. Their length is 2.9m for MLT25 to MLT100 and 2.8m for MLT200 and MLT250.



WARNING

To use the MLT Series stages with longer cables, please contact Newport.

7.3 Connection

There is a label on every stage indicating its part and serial number.



WARNING

Always turn the controller's power OFF before connecting to a stage.

Plug motor connector to the driver card, and encoder connector to the corresponding controller encoder socket.

WARNING

Cables are shielded correctly. For proper operation, make sure to lock connectors (ground continuity provided by the cable).



WARNING

Keep these cables at a safe distance from other electrical cables in your environment to avoid potential cross talk.

NOTE



These stages are ESP compatible. Enhanced System Performance is Newport's exclusive technology that enables Newport ESP motion controllers to recognize the connected Newport ESP stage and upload the stage parameters. This ensures that the user can operate the motion system quickly and safely.

7.4 Configuration

Default parameters provided in the stage database are at no/low payload. For optimal stage performance it is required to calculate *ScalingAcceleration* and *AccelerationLimit* parameters based on actual payload as follows and set them in *stages.ini* file.

$$ScalingAcceleration \left(\frac{mm}{s^2} \right) = \frac{25000}{(M_{Car} + L)}$$

$$AccelerationLimit \left(\frac{mm}{s^2} \right) = 0.98 \cdot ScalingAcceleration$$

With: L = Mass of the payload (kg)

M_{Car} : see §3.4

More details on these parameters can be found in XPS-D Configuration manual.

See also "Methods for determining an optimized scaling acceleration value"

Technical Application Note posted on the MLT product page at

www.newport.com.

IMPORTANT

For optimum performance, it is important to configure the XPS controller with the weight on the MLT stage.

8.0 Connection to Non-Newport Electronics

When operating with non-Newport controllers, it is recommended to adhere to the wiring pinouts presented previously and to use cabling with similar characteristics.

WARNING

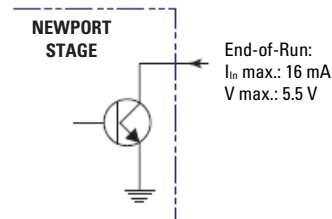
Newport is not responsible for malfunction or damage to MLT stages when used with non-Newport controllers.

WARNING

Newport guarantees “CE” compliance of MLT stages only if used with the appropriate Newport XPS-D family controller.

It is the customer's responsibility to modify the cables and take care of sensor signal connections, when using the stage with non-Newport controllers.

- The End-of-Run signal is open collector type. It supports up to 5.5 V and 16 mA.

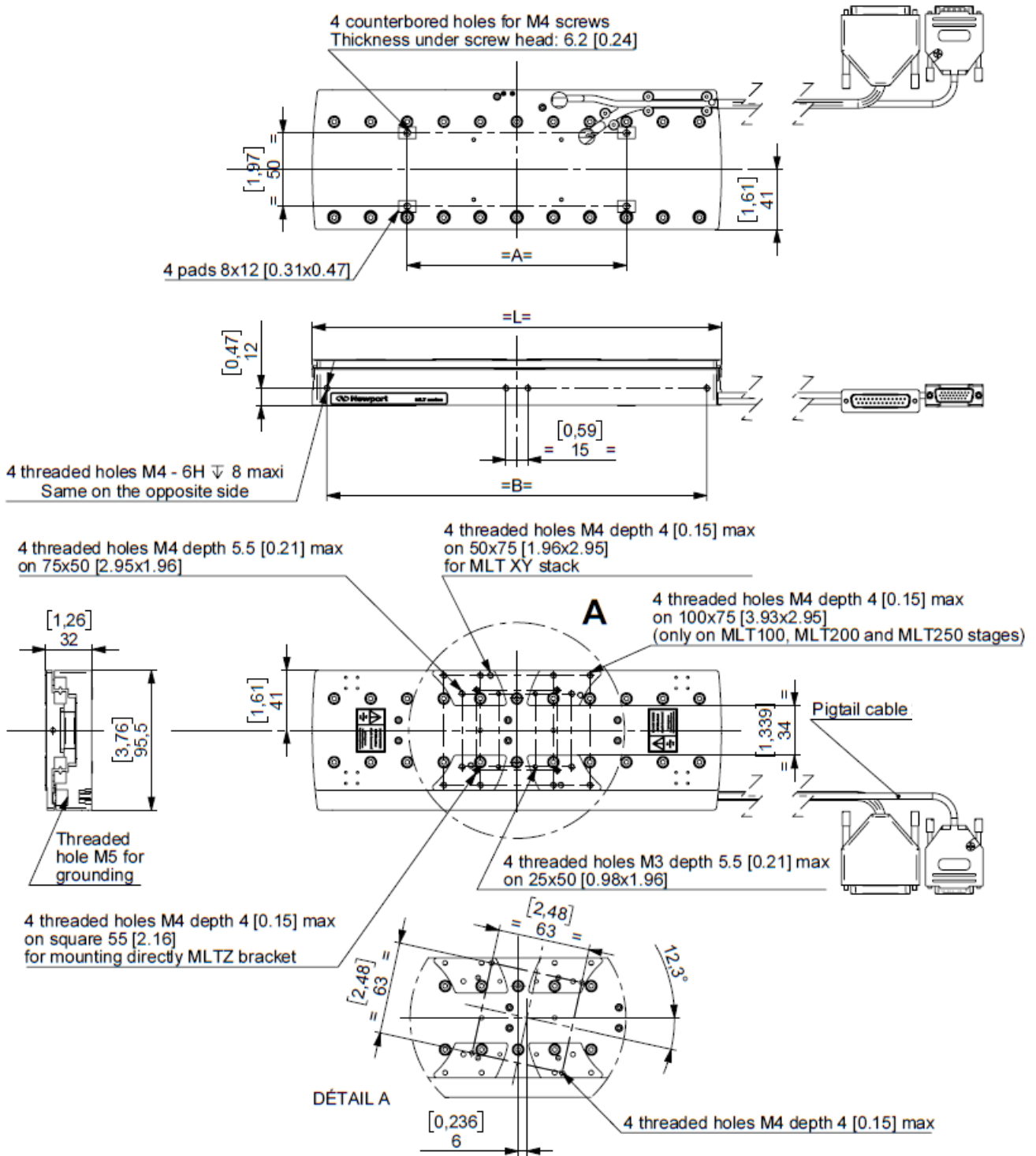
**WARNING**

Maximum motor peak voltage per phase: 48V

Maximum motor rms current per phase: 2.9A

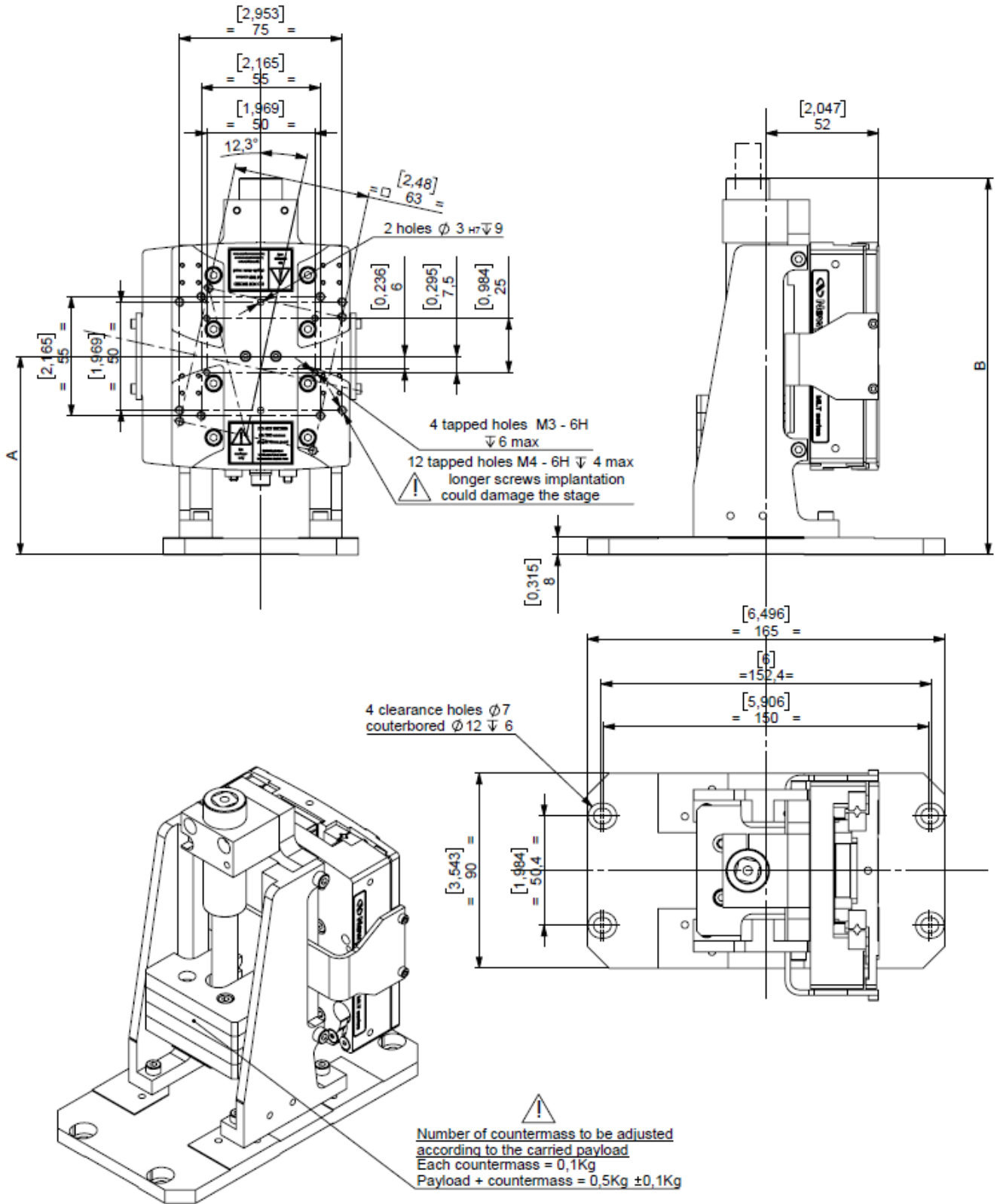
9.0 Dimensions

9.1 MLT25 to MLT250



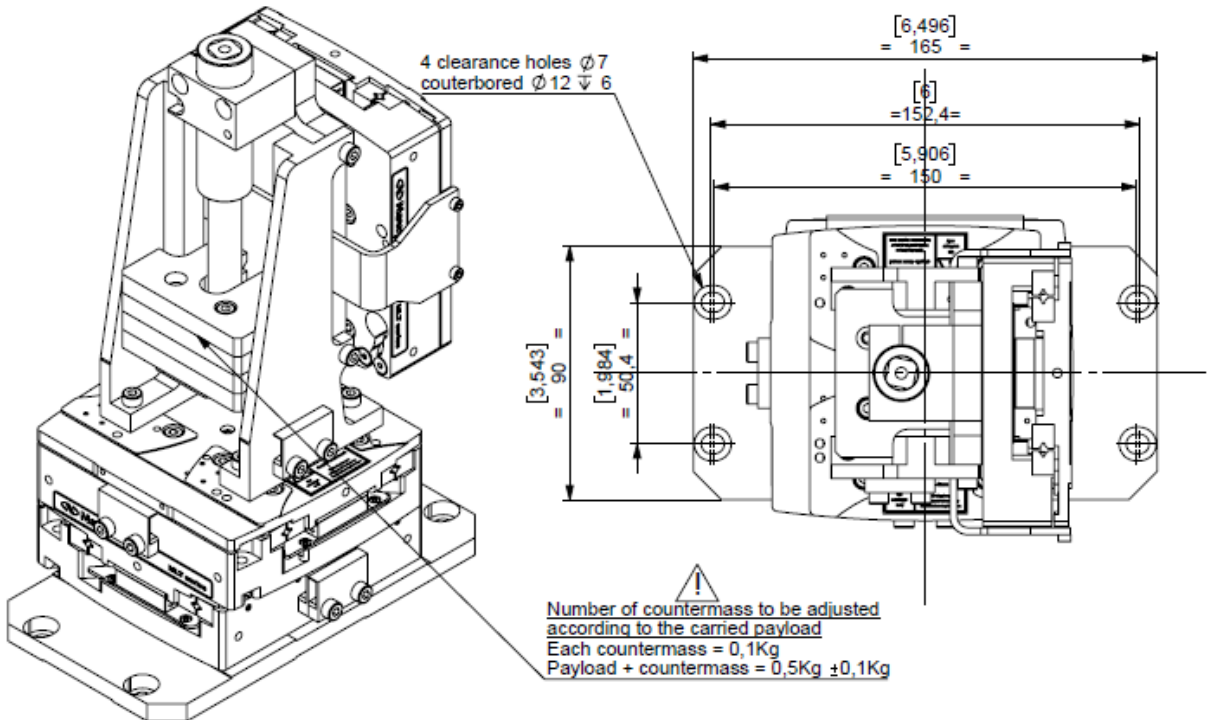
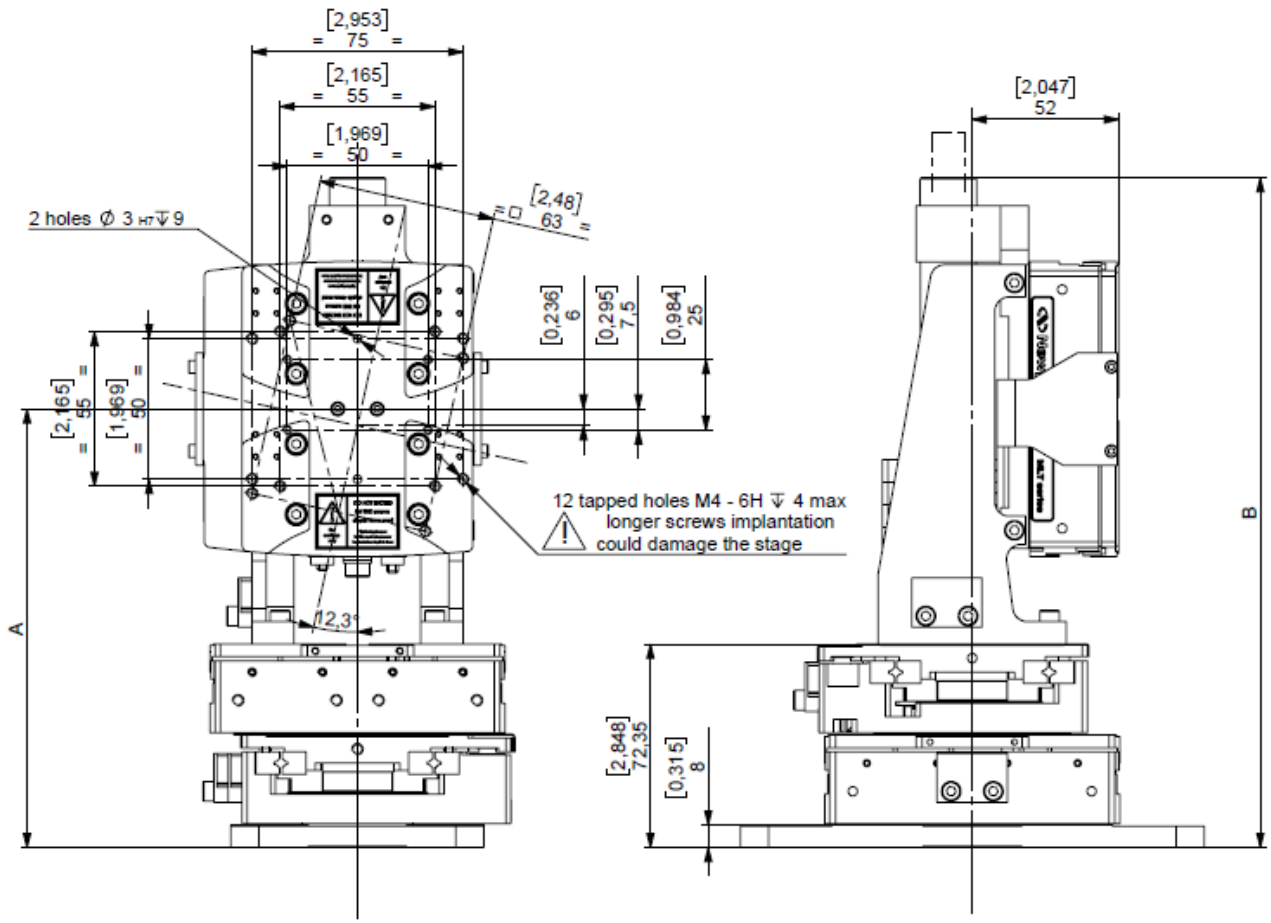
Model	A	B	L
	Bottom mounting pads	Side tapped holes	Stage length
MLT25	75[2.95]	85[3.35]	105[4.13]
MLT50	75[2.95]	110[4.33]	130[5.12]
MLT100	75[2.95]	160[6.29]	180[7.08]
MLT200	150[5.9]	260[10.2]	280[11]
MLT250	200[7.87]	310[12.2]	330[12.99]

9.2 MLT25-Z & MLT50-Z



Model	A Stage interface from bottom	B Stage total height
MLT25-Z	91.5 ± 12.5 [3.6 ± 0.49]	174.5 $\pm 15/0$ [6.87 $\pm 0.6/0$]
MLT50-Z	106 ± 25 [4.17 ± 0.98]	201 $\pm 18/0$ [7.91 $\pm 0.71/0$]

9.3 MLT25-XYZ & MLT50-XYZ



Model	A Stage interface from bottom	B Stage total height
MLT25-XYZR/L	156 $\pm 12,5$ [6.14 ± 0.49]	239 $\pm 15/0$ [9.41 $\pm 0.6/0$]
MLT50-XYZL	170 ± 25 [6.69 ± 0.98]	265 $\pm 18/0$ [10.43 $\pm 0.71/0$]

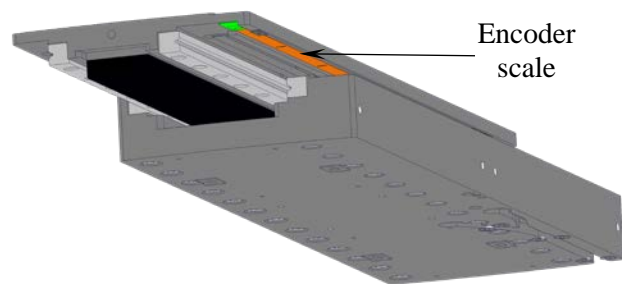
10.0 Maintenance

RECOMMENDATION

Please contact the Technical Sales Support team for recommendations on application specific maintenance.

10.1 Encoder scale cleaning

Encoder scale cleanliness is important for the proper operation of MLT stage. In case it would be soiled (for instance by putting fingers on it), move the stage to each end-of-run position and clean the accessible part of the scale with a wipe (optical or cleanroom) that is slightly moistened with Isopropyl alcohol.



10.2 Maintenance

The MLT stage requires no particular maintenance. Nevertheless, this is a precision mechanical device that must be kept and operated with caution.

PRECAUTIONS

The MLT stage must be used or stocked in a clean environment, without dust, humidity, solvents or other substances.

RECOMMENDATION

It is recommended to return the stage to Newport for re-lubrication after 2000 hours of use.

If the MLT stage is mounted on a workstation and cannot be easily removed, please contact Newport's After Sales Service for further instructions.

10.3 Repair



CAUTION

Never attempt to disassemble a component of the stage that has not been covered in this manual.

To disassemble a non-specified component can cause a malfunction of the stage.

If you observe a malfunction in your stage, please contact us immediately to arrange for a repair.



CAUTION

Any attempt to disassemble or repair a stage without prior authorization will void the product warranty.

10.4 Performance verification



CAUTION

It is recommended to return your MLT stage to Newport once a year to check compliance with its original specifications.



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