



DL Stage Series

High-Performance Delay Line Stages



 **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 instrument, transportation prepaid, to the indicated service facility. Repairs will be made and the instrument 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

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.**



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.

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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EC Declaration of Conformity

Delay Line Series Newport®

EU Declaration of Conformity

following Annex II-1A
of Directive 2006/42/EC on machinery

The manufacturer:

MICRO-CONTROLE Spectra-Physics,
9, rue du bois sauvage
F-91055 Evry FRANCE

Hereby declares that the machinery:

- Description: " DL "
- Function: High-Performance Delay Line Stages with Single-Axis Motion Controller/Driver.
- Models: DL125/225/325.

– the technical file of which was compiled by:

Mr Hervé LE COINTE, Directeur Qualité,
MICRO-CONTROLE Spectra-Physics, Zone Industrielle - B.P.29
F-45340 Beauce La Rolande France

- complies with all the relevant provisions of the Directive 2006/42/EC on machinery.
- complies with all the relevant provisions of the Directive 2014/30/EU relating to electromagnetic compatibility.
- complies with all the relevant provisions of the Directive 2011/65/EU relating to RoHS2.

– was designed and built in accordance with the following harmonised standards:

- NF EN 61326-1:2013 « Electrical equipment for measurement, control and laboratory use – EMC requirements – Part 1: General requirements »
- NF EN 55011:2010/A1:2011 Class A

– was designed and built in accordance with the following other standards:

- | | |
|-------------------|--------------------|
| • NF EN 61000-4-2 | • NF EN 61000-4-6 |
| • NF EN 61000-4-3 | • NF EN 61000-4-8 |
| • NF EN 61000-4-4 | • NF EN 61000-4-8 |
| • NF EN 61000-4-5 | • NF EN 61000-4-11 |

ORIGINAL DECLARATION

Done in Beauce La Rolande on 16 May 2017
Hervé LE COINTE
Quality Director



DC1-EN rev:A

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.

Warnings and Cautions



ATTENTION

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.

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

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, 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 a short-circuit.

WARNING

Do not exceed speed and load limitations as specified in this manual.

Caution

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. 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 +35 °C
 - Storage/Operating altitude: 1000 m
 - Storage/Operating humidity: 85%
 - Storage temperature: -10 to +40 °C (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 measurement every year.

High-Performance Delay Line Stages

DL Stage Series

1.0 Introduction

This manual provides operating instructions for the stage that you have purchased.



DL325 Stage.

RECOMMENDATION

We recommend you read the chapter “Connection to electronics” before using the DL stage.

1.1 Unpacking Instruction



NOTE

Please unscrew the two knobs before removing the stage from the plastic bag

2.0 Description

The DL linear stages Series is a high performance but very affordable, linear motor driven with an integrated motion controller. Optimized for small loads, repeatable positioning and fast traverse speeds, it's an ideal solution for spectroscopy applications ranging from pump-probe, interferometry, 2DIR, etc.

With travel ranges of 125 mm, 225 mm and 325 mm, this offering covers almost all possible delay needs from femtosecond to nanosecond delays.

The DL stage utilizes an FEM-optimized extruded aluminum body that is extremely stiff, while minimizing the bending effect caused by the different thermal expansion coefficients of the aluminum body and the steel rails. The rails' position relative to the profile's neutral fiber minimizes the effect due to bi-metal thermal expansion. The body's rigidity minimizes the deflection under load.

The stage has been designed to be mounted on standard breadboards (with a 0.2 mm flatness). This minimizes the effect of the table to pitch, yaw and roll performance of the stage.

Recirculating ball bearing slides provide excellent payload capabilities and long life. The movement is smooth with low noise.

Unlike screw driven stages, the DL employs a centered, high efficiency 3-phase, synchronous ironless, linear motor as the driving element. This drive system is absolutely non-contact, and has the advantage of higher speed, high acceleration and high system responsiveness without wear associated with motor brushes or drive screws. And because of the fully integrated linear motor, the DL is shorter than a comparable screw driven stage.

Precision position feedback is provided by a very repeatable linear scale mounted in the stage. The encoder signals are interpolated by the dedicated Newport motion controller with nanometer resolution for outstanding position sensitivity, repeatability, and stability. A home position is incorporated on the same scale, avoiding the use of additional electronics or mechanics for improved reliability and accuracy.

Thus, the DL is the optimum solution for space constrained applications that require high-throughput, high reliability, and ultra-quiet operation.

To facilitate setups, beam kits consisting of retroreflectors, mirrors, mounts and other optomechanical parts, are available to suit various wavelengths and delay line configurations.

2.1 Design Details

Base Material	Extruded Aluminum
Bearings	Recirculating bearings
Drive System	3-phase synchronous ironless linear motor (without Hall effect sensors)
Motor Initialization	Has to be done by the controller
Motor Commutation	Done by the controller on encoder feedback
Feedback	Linear glass scale, 80 μm signal period, 1 V_{pp}
Limit	Optical
Home Switch	Optical, on encoder's fiducial track, located at the minus end of travel
Controller Compatibility	DL Controller
Cable	3 m long pigtail cables included
MTBF	20,000 hours

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:

Absolute Accuracy

Difference between ideal position and real position.

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 Value (Hysteresis)

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

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 achievable, whereas MIM, is the real output of a motion system.

Yaw, Pitch

Rotation of carriage around the Z axis (Yaw) or Y axis (Pitch), when it moves.

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

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

Guaranteed 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



	DL125	DL225	DL325
Travel Range (mm)	125	225	325
Minimum Incremental Motion (nm)	75	75	75
Bi-directional Repeatability, Guaranteed ⁽¹⁾ (μm)	±0.15	±0.15	±0.15
Accuracy, Guaranteed ⁽¹⁾⁽²⁾ (μm)	±1.5	±2	±2.5
Encoder Resolution (nm)	50	50	50
Origin Repeatability (μm)	0.4	0.4	0.4
Maximum Speed ⁽³⁾ (mm/s) [See chapters 3.3 to 3.6]	500	500	500
Maximum Acceleration, No Load (mm/s ²) [See chapters 3.3 to 3.6]	7500	7500	7500
Pitch, Typical (Guaranteed) ⁽¹⁾⁽²⁾⁽⁴⁾ (μrad)	±60 (±100)	±60 (±100)	±90 (±150)
Yaw, Typical (Guaranteed) ⁽¹⁾⁽²⁾⁽⁴⁾ (μrad)	±30 (±60)	±40 (±90)	±50 (±120)
Load Capacity (N)	See chapter 3.4.3		

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

²⁾ For a travel of 325 mm.

³⁾ With DL controller.

⁴⁾ To obtain arcsec units, divide μrad value by 4.8.



CAUTION

To reach the specifications stated, stages must be fixed on a plane surface with a flatness of 5 μm with washer under each fixing screw head (max. tightening torque for mounting screws: 3 Nm).

3.3 Stage Initialization



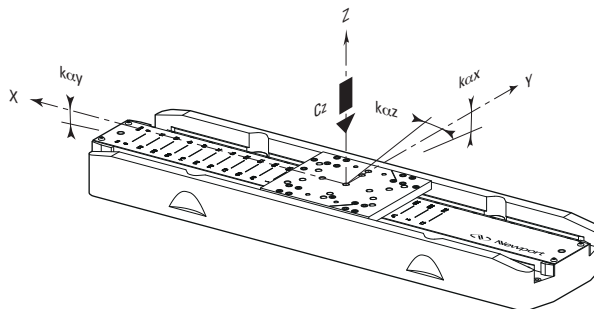
CAUTION

Before initializing the stage, be sure that the carriage is not positioned close to the end of run.

3.4 Static Load Characteristics and Stiffness

Normal Load Capacity (Cz)

Maximum load a stage can move while maintaining specifications.



Cz, Normal centered load capacity	20 N
Kαx, Compliance in roll	15 μrad/Nm
Kαy, Compliance in pitch	10 μrad/Nm
Kαz, Compliance in yaw	10 μrad/Nm

NOTE

It is recommended to keep the load centered on the carriage.

3.5 Dynamic Characteristics

Dynamic response of the stage depends on two parameters:

- The force delivered by the motor
- The total moving mass including carriage mass and payload

Newport's DL Controller includes four parameters allowing dynamic control optimization of the stage:

- Scaling Force
- Force Limit
- Carriage Mass
- Payload Mass

Although the three parameters are set in the factory perstage, the fourth (Payload Mass) must be adjusted by the user. Refer to the "FM" command of the Newport DL Controller user's manual.

3.5.1 Description of Parameters

The DL Controller/driver "ScalingForce" parameter is used by the controller to scale the output current. It indicates the theoretical maximum force (friction not taken in account) of the DL carriage with the controller full scale current (See Controller Manual).

The DL Controller/driver "ForceLimit" parameter indicates the maximum force of the DL stage carriage limited by current saturation to avoid stage damage.

Then, stage carriage acceleration can be calculated using the following formula:

$$\text{MaxAcceleration} = \frac{\text{ForceLimit} - \text{Friction Constant}}{\text{Carriage Mass} + \text{Payload mass}}$$

See chapter 3.4.3 acceleration/Load graph.

- Due to its linear motor and rails, DL stage Friction Constant is only 4 N.
- **Carriage Mass is 0.85 kg.**

3.5.2 Stages Adjustment Proposal in Function of the Load

In order to improve and have better driving performances, it is advisable to change the control parameters according to the load. All the stages are delivered with a crossover frequency of 70 Hz. You can change the parameters KP, KI, KD, FD, FL and FMP in the controller terminal. Please see the following table:

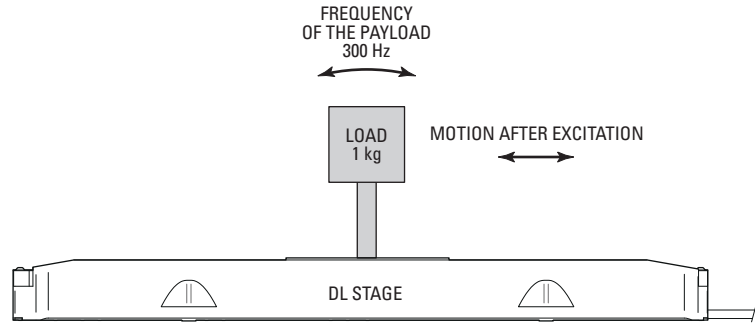
Customer payload from High (2 kg) to low (0 kg) FMP command	High	Medium	Low
Response Time	Slow	Medium	Fast
Crossover Frequency (Hz)	55	70	80
KP	19,000	31,000	48,000
KI	2,000,000	3,500,000	5,000,000
KD	350	420	500
Derivative cut off frequency (FD)	100	140	150
PID 2nd Order low pass filter (FI)	4,000	4,000	4,000

3.5.3 Payload Adjustment Influence on Displacement

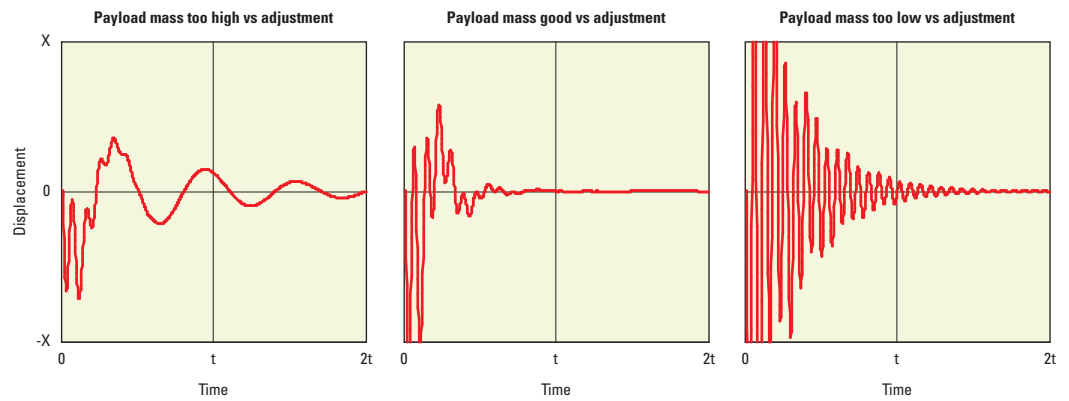


CAUTION

DL linear motor stages are sensitive to load variations and system stiffness. The charts below show the behavior of the displacement an underestimated/overestimated moving mass.



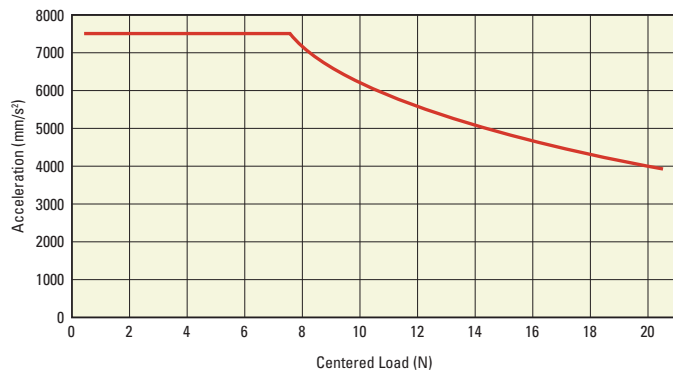
The driving force requires a good adjustment of the “Forces and Masses” (FM) and the payload (FMP) parameters. Refer to the “FM” and “FMP” commands in the DL Controller manual.



3.5.4 DL Stage Acceleration

Below is a chart illustrating the allowable operating area of the stage based on the load.

Total load = Pay Load + Carriage Mass (0.85 kg)



3.6 Stage Weights

The stage weight below does not include the cable.

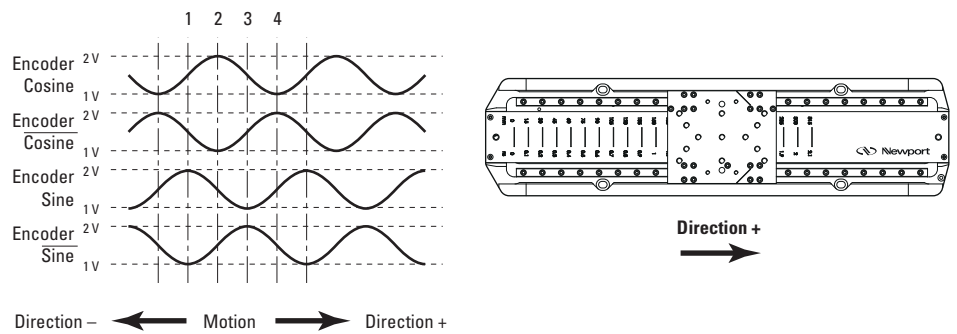
	Weight [lb (kg)]
DL125	7.1 (3.2)
DL225	8.8 (4.0)
DL325	10.4 (4.7)

4.0 Motor & Feedback

4.1 Brushless Motor Characteristics

	Motor Constant (N ² /W)	Magnet Pitch (mm)	Nominal Voltage (V)	Max. RMS Current (A)	Max. Peak Current (A)	Resistance per Phase (Ω)	Inductance per Phase (mH)
DL Stage	4.2	30	42	1.3	4.2	4	0.72

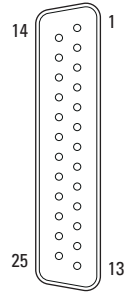
4.2 Feedback Signal Position



4.3 Pinouts

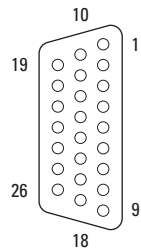
The pinout diagrams for DL stage connectors are shown below.

Motor Connector (SUB-D25M)



1	U Motor	14	Ground
2	U Motor	15	N.C.
3	N.C.	16	Ground
4	N.C.	17	Reserved (SMDAT)
5	V Motor	18	Reserved (SMCLK)
6	V Motor	19	N.C.
7	W Motor	20	N.C.
8	W Motor	21	+5 V
9	Reserved (Thermistor)	22	Ground
10	N.C.	23	N.C.
11	N.C.	24	N.C.
12	N.C.	25	N.C.
13	N.C.		

Encoder Connector (HD26M)



1	+5 V	14	+ End-of-Run
2	N.C.	15	/Sine
3	N.C.	16	N.C.
4	Cosine	17	Index Pulse /I
5	- End-of-Run	18	N.C.
6	Sine	19	+ 5 V
7	Ground	20	N.C.
8	Index Pulse I	21	N.C.
9	N.C.	22	N.C.
10	N.C.	23	N.C.
11	N.C.	24	N.C.
12	N.C.	25	Ground
13	/Cosine	26	Ground

5.0 Connection to Newport Controllers

5.1 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 is equipped with a 3-wire grounding type plug.

Any interruption of the grounding connection can create an electric shock hazard.

If you are unable to insert the plug into your wall plug receptacle, contact your electrician to perform the necessary alterations to ensure that the green (green-yellow) wire is attached to earth ground.

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.

5.2 Connection

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



WARNING

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

NOTE

These stages are equipped with a chipset memorizing parameters. Newport's exclusive technology enables Newport DL Controllers to recognize the connected Newport stage. This ensures that the user can operate the motion system quickly and safely.

5.2.1 Newport cables

DL stages are delivered with two 3-meter pigtailed cables that can be directly connected to Newport Controllers.

WARNING

DL Series stages can only operate with cable lengths of 3 m max.



WARNING

These cables are shielded. For correct operation, make sure to lock connectors (ground continuity provided by cables).

WARNING

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

6.0 Connection to Non-Newport Electronics

6.1 Connections

WARNING

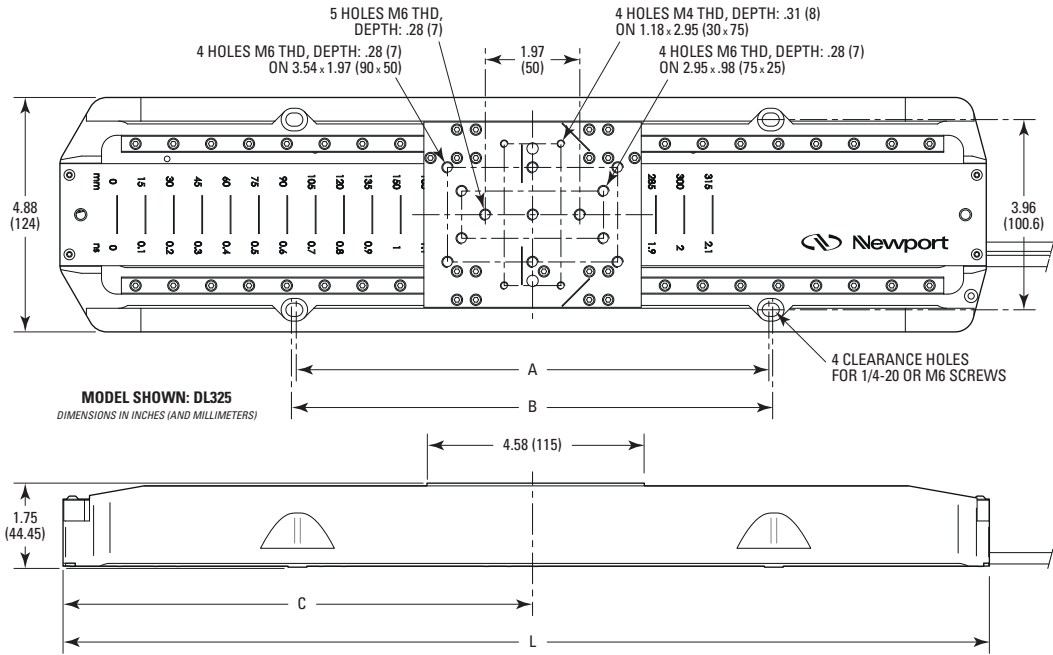
Newport is not responsible for malfunction or damage of DL stages when used with non-Newport controllers.

**WARNING**

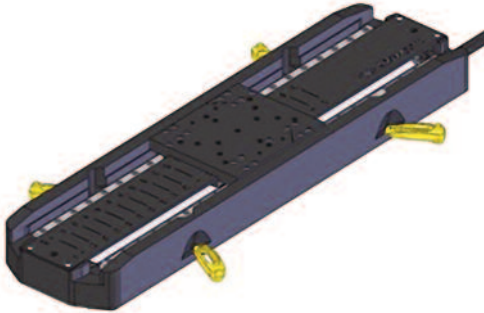
Newport guarantees “CE” compliance of DL stages only if used with Newport cables and controllers.

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

7.0 Dimensions

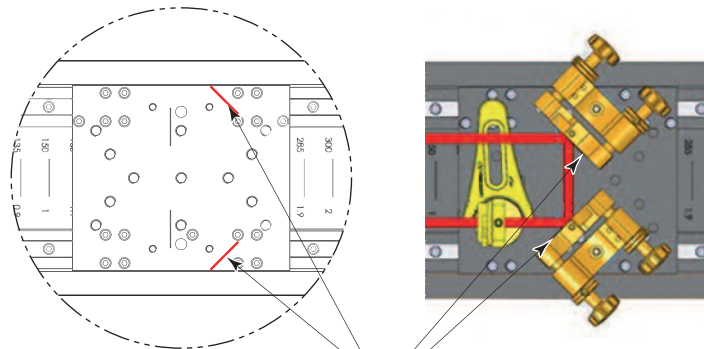


MODEL	TRAVEL	L	A	B	C
DL125	4.92 (125)	11.42 (290)	5.91 (150)	6.0 (152.4)	5.91 (150)
DL225	8.86 (225)	15.35 (390)	7.87 (200)	8.0 (203.2)	7.87 (200)
DL325	12.80 (325)	19.29 (490)	9.84 (250)	10.0 (254)	9.84 (250)



NOTE

The DL Stage can be clamped with Newport BC-5 or BC-6.



8.0 Optical Kits

Four optical assemblies have been specially designed to be mounted on DL Stages to facilitate setting up a delay line.

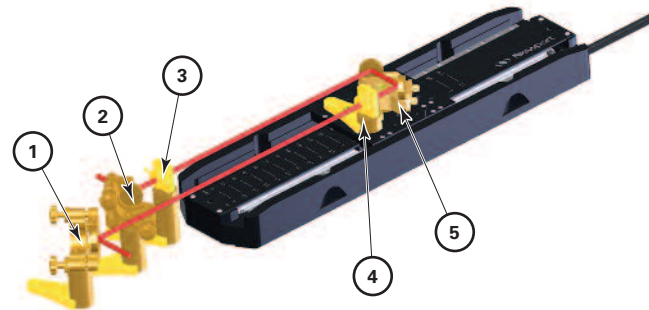
	Stage	Single Pass	Dual pass	Quad Pass
Delay (ns)	DL125	0.8	1.7	3.3
	DL125	1.5	3	6
	DL325	2.2	4.3	8.7
MIM (fs)		0.5	1	2

8.1 DL-BKIT19 Kit

One-pass, beam height of 3 inches.

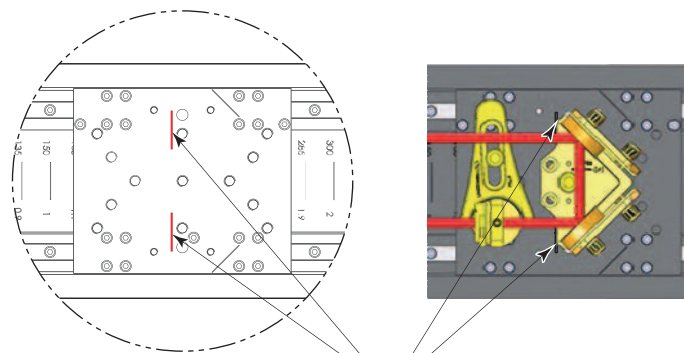
DL-BKIT19 for InfraRed, Visible light and Ultraviolet.

Total mass on carriage (Payload): 0.4 kg.



The DL-BKIT19 kit includes the following components:

- To be mounted on the breadboard:
 - 1 & 2:** 2 sets of: U100 + M-PS-2 + M-PS-F
 - 3:** ID-0.5 + MH-2P + M-PS-2 + M-PS-0.125 + PS 0.25 + PS-F
- To be mounted on the carriage:
 - 4:** 9848 + M-SS-1-B
 - 5:** ID-0.5 + MH-2P + M-PS-2 + M-PS-0.5 + M-PS-0.125 + PS-F



USE THESE 2 LINES TO PLACE
THE 9848 MIRROR MOUNT

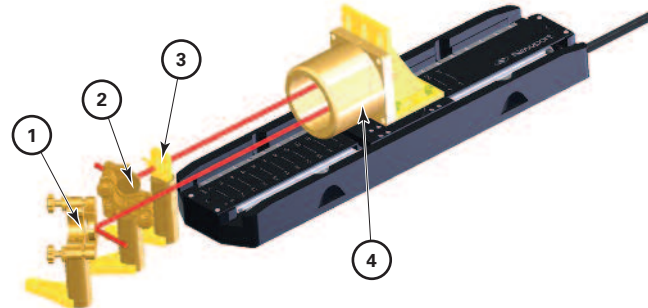
8.2 DL-BKIT1U Kits

One-pass, beam height of 3.5 inches.

DL-BKIT1U-S for InfraRed and Visible light.

DL-BKIT1U-UV for Ultraviolet.

Total mass on carriage (Payload): 0.85 kg.



The DL-BKIT1U kits include the following components:

- To be mounted on the breadboard:
 - 1 & 2:** 2 sets of: U100 + M-PS-2 + M-PS-0.5E + PS-F
 - 3:** ID-0.5 + MH-2P + M-PS-2 + M-PS-0.5E + PS 0.125 + PS-0.25+ PS-F
- To be mounted on the carriage:
 - 4:** M-360-90 + UBBR2.5

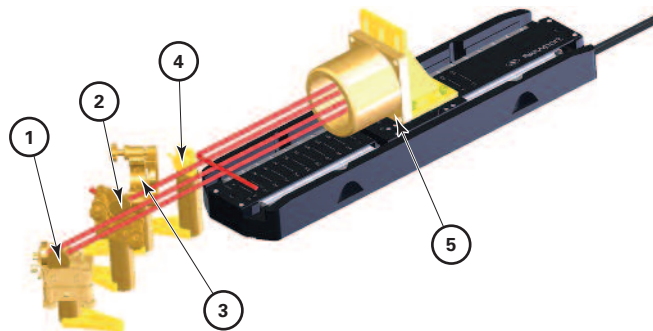
8.3 DL-BKIT2U Kits

Two-pass, beam height of 3.5 inches.

DL-BKIT2U-S for InfraRed and Visible light.

DL-BKIT2U-UV for Ultraviolet.

Total mass on carriage (Payload): 0.85 kg.



The DL-BKIT2U kits include the following components:

- To be mounted on the breadboard:
 - 1:** 9848KT + M-PS-1E + M-PS-0.5 + PS-F
 - 2 & 3:** 2 sets of: U100 + M-PS-0.5E + M-PS-2E+ PS-F
 - 4:** ID-0.5 + MH-2P + M-PS-0.5 + M-PS-2E + PS 0.125 + PS-0.25+ PS-F
- To be mounted on the carriage:
 - 5:** M-360-90 + UBBR2.5

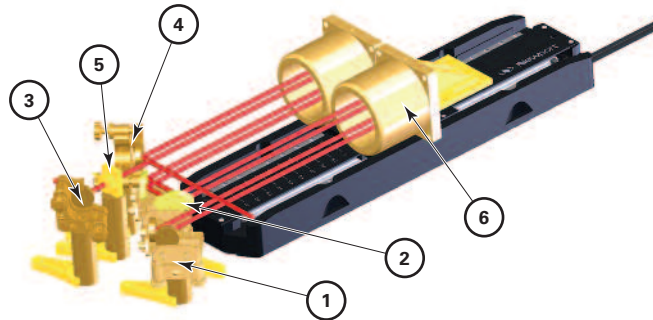
8.4 DL-BKIT4U Kits

Four-pass, beam height of 3.5 inches.

DL-BKIT4U-S for InfraRed and Visible light.

DL-BKIT4U-UV for Ultraviolet.

Total mass on carriage (Payload): 1.4 kg.



The DL-BKIT4U kits include the following components:

- To be mounted on the breadboard:
 - 1 & 2:** 2 sets of: 9848KT + M-PS-0.5 + M-PS-1E + PS-F
(1 set with elliptical mirrors)
 - 3 & 4:** 2 sets of: U100 + M-PS-0.5 + M-PS-2E + PS-F
 - 5:** ID-0.5 + MH-2P + M-PS-0.5 + M-PS-2E + M-PS-0.125 + M-PS-0.25 + PS-F
- To be mounted on the carriage:
 - 6:** M-360-90 + 2 pieces of UBBR2.5

9.0 Maintenance

RECOMMENDATION

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

9.1 Maintenance

The DL stage requires no particular maintenance. Nevertheless, this is a precision mechanical device that must be kept and operated in good condition.

PRECAUTIONS

The DL 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 DL stage is mounted on a workstation and cannot be easily removed, please contact Newport's Service for further instructions.

9.2 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 your warranty.

9.3 Calibration



CAUTION

It is recommended to return your DL stage to Newport once a year for recalibration to its original specifications.

Service Form

Your Local Representative

Tel.: _____
 Fax: _____

Name: _____
 Company: _____
 Address: _____
 Country: _____
 P.O. Number: _____

Return authorization #: _____
 (Please obtain prior to return of item)
 Date: _____
 Phone Number: _____
 Fax Number: _____

Item(s) Being Returned:

Model #: _____ Serial #: _____

Description: _____

Reasons of return of goods (please list any specific problems): _____



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